QGIS User Guide

リリース *2.8*

QGIS Project

2016 年 07 月 30 日

Contents

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Chapter 1

はじめに

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This document has been typeset with reStructuredText. It is available as reST source code via github and online as HTML and PDF via http://www.qgis.org/en/docs/. Translated versions of this document can be downloaded in several formats via the documentation area of the QGIS project as well. For more information about contributing to this document and about translating it, please visit http://www.qgis.org/wiki/.

このドキュメントにおけるリンク

このドキュメントには内部リンクと外部リンクがあります. 外部リンクをクリックするとインターネットのアドレスを開きますが, 内部リンクをクリックするとこのドキュメント内を移動します. PDF フォームでは, 内部リンクは青色で表示され, 外部リンクは赤色で表示され、いずれもシステムブラウザにより処理されます.HTML フォームでは, 内部, 外部リンク双方ともブラウザは同様の表示と処理を行います.

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インターネット: http://www.qgis.org

このドキュメントのライセンス

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Chapter 2

記述ルール

このセクションではこのマニュアル全般にわたる統一した記述ルールについて列挙します.

2.1 GUI 記述ルール

GUI の記述スタイルは GUI の外観をまねるように意図されています. 一般的に これの目的は non-hover の外観を利用することです, ですからユーザーは GUI の外観を見てマニュアルの操作手引きと同じようなものを見出せます.

- メニューオプション: **レイヤ** → **ラスタレイヤの追加** または **設定** → **ツールバー** → **デジタイジング**
- Tool: Add a Raster Layer
- ボタン : **[デフォルトとして保存]**
- ダイアログボックスタイトル: **レイヤプロパティ**
- タブ: **一般情報**
- チェックボックス: **描画**
- Radio Button: *Postgis SRID* *EPSG ID*
- Select a number:
- Select a string:
- Browse for a file:
- Select a color:
- スライダ:
- Input Text:

影はクリック可能な GUI コンポーネントを表します.

2.2 テキストやキーボードの記述ルール

This manual also includes styles related to text, keyboard commands and coding to indicate different entities, such as classes or methods. These styles do not correspond to the actual appearance of any text or coding within QGIS.

- ハイパーリンク: http://qgis.org

- キーボード押下の組み合わせ: press `Ctrl+B`, Ctrl キー押下とホールドと B キーを同時に押すことを意味します.
- ファイル名: `lakes.shp`
- クラス名: **NewLayer**
- メソッド: *classFactory*
- サーバ: *myhost.de*
- ユーザ入力テキスト: `qgis --help`

プログラムコードの行は固定幅フォントで表示されます

```
PROJCS["NAD_1927_Albers",
  GEOGCS["GCS_North_American_1927",
```

2.3 プラットフォーム特有の操作方法

GUI sequences and small amounts of text may be formatted inline: Click *File* *QGIS → Quit to close QGIS*. This indicates that on Linux, Unix and Windows platforms, you should click the File menu first, then Quit, while on Macintosh OS X platforms, you should click the QGIS menu first, then Quit.

大量のテキストをリストとしてフォーマットされていてもいいです:

- これを実行します;
- あれを実行します
- 何か他のものを実行します

またはパラグラフとして:

Linux、Unix、Macintosh OSX プラットフォーム向けの解説です. 文章中の解説手順に基づいて作業してください.

Windows プラットフォーム向けの解説です. 文章中の解説手順に基づいて作業してください.

ユーザーガイド中のスクリーンショットはいろいろなプラットフォームで作成されています. その時のプラットフォームはプラットフォームの種別を示すアイコンが図のキャプションの最後に表示されます.

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Chapter 3

序文

地理情報システム (GIS) のすばらしい世界へようこそ!

QGIS is an Open Source Geographic Information System. The project was born in May of 2002 and was established as a project on SourceForge in June of the same year. We've worked hard to make GIS software (which is traditionally expensive proprietary software) a viable prospect for anyone with basic access to a personal computer. QGIS currently runs on most Unix platforms, Windows, and OS X. QGIS is developed using the Qt toolkit (http://qt.digia.com) and C++. This means that QGIS feels snappy and has a pleasing, easy-to-use graphical user interface (GUI).

QGIS aims to be a user-friendly GIS, providing common functions and features. The initial goal of the project was to provide a GIS data viewer. QGIS has reached the point in its evolution where it is being used by many for their daily GIS data-viewing needs. QGIS supports a number of raster and vector data formats, with new format support easily added using the plugin architecture.

QGIS is released under the GNU General Public License (GPL). Developing QGIS under this license means that you can inspect and modify the source code, and guarantees that you, our happy user, will always have access to a GIS program that is free of cost and can be freely modified. You should have received a full copy of the license with your copy of QGIS, and you also can find it in Appendix *GNU General Public License*.

ちなみに: 最新版ドキュメンテーション

The latest version of this document can always be found in the documentation area of the QGIS website at http://www.qgis.org/en/docs/.

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Chapter 4

特徴

QGIS offers many common GIS functionalities provided by core features and plugins. A short summary of six general categories of features and plugins is presented below, followed by first insights into the integrated Python console.

4.1 データを見る

異なる形式, 投影法のベクタ, ラスタデータを内部形式に変換することなくそのまま 閲覧したりオーバーレイ表示することができます. 利用できるデータ形式は以下の通りです:

- PostGIS や SpatiaLite、MSSQL Spatial、Oracle Spatial などを使用して空間情報が利用可能になっているテーブルやビューを利用できます. ベクタフォーマットはインストールされた OGR ライブラリによってサポートされ,ESRI shape ファイル,MapInfo,SDTS,GML, その他多くのものが利用できます **ベクタデータの操作** のセクションを参照してください.
- GeoTiff, Erdas Img., ArcInfo Ascii Grid, JPEG, PNG のようなラスタとイメージ形式はインストールされている GDAL(Geospatial Data Abstraction Library) ライブラリにサポートされています, 詳しくは **ラスタデータの操作** セクションを参照して下さい.
- GRASS データベース (location/mapset) の GRASS ラスタとベクタ. *GRASS GIS* **の統合** 参照.
- オンライン空間データは WMS, WMTS, WCS, WFS, WFS-T のような OGC Web サービスとして提供されます, *OGC* **データの操作** を参照して下さい.

4.2 データの検索と表示地図の構成

フレンドリーな GUI によって地図の作成が出来, インタラクティブな空間データを検索することができます.GUI に含まれている数多くの便利なツールが利用可能です. 例えば:

- QGIS browser
- オンザフライ再プロジェクション
- DB マネージャ
- マップコンポーザ
- 全体図パネル
- 空間ブックマーク
- 注記ツール
- 地物情報表示/地物選択
- 属性の編集/表示/検索

- Data-defined feature labeling
- データ定義のベクタとラスタシンボロジツール
- グリッドレイヤを使った地図帳の構成
- 地図のための北向き矢印 スケールバーと著作権ラベル
- プロジェクトの保存と読み込みのサポート

4.3 データの作成、編集、管理と出力

You can create, edit, manage and export vector and raster layers in several formats. QGIS offers the following:

- OGR でサポートされる形式とグラスベクタレイヤ用のデジタイジングツール
- Shapefile と GRASS ベクタレイヤの作成と編集機能
- イメージをジオコードするジオレファレンサプラグイン
- GPX 形式に入出力したり、GPX を他の GPX フォーマットに変換したり、あるいは GPS ユニット (Linux 上で、usb: has been addedto list of GPS devices) に直接ダウンロード/アップロードするための GPS ツール
- OpenStreetMap データの可視化と編集のサポート
- DB マネージャプラグインを使った shapefile から空間データベースを作る機能
- 空間データベーステーブルの扱い改善
- ベクタ属性テーブルを管理するツール
- スクリーンショットをジオリファレンスされたイメージとして保存するオプション
- DXF-Export tool with enhanced capabilities to export styles and plugins to perform CAD-like functions

4.4 Analyse data

You can perform spatial data analysis on spatial databases and other OGR- supported formats. QGIS currently offers vector analysis, sampling, geoprocessing, geometry and database management tools. You can also use the integrated GRASS tools, which include the complete GRASS functionality of more than 400 modules. (See section *GRASS GIS* **の統合**.) Or, you can work with the Processing Plugin, which provides a powerful geospatial analysis framework to call native and third-party algorithms from QGIS, such as GDAL, SAGA, GRASS, fTools and more. (See section **はじめに**.)

4.5 インターネットへの地図公開

QGIS can be used as a WMS, WMTS, WMS-C or WFS and WFS-T client, and as a WMS, WCS or WFS server. (See section *OGC* **データの操作**.) Additionally, you can publish your data on the Internet using a webserver with UMN MapServer or GeoServer installed.

4.6 Extend QGIS functionality through plugins

QGIS can be adapted to your special needs with the extensible plugin architecture and libraries that can be used to create plugins. You can even create new applications with C++ or Python!

4.6.1 コアプラグイン

コアプラグインに含まれるもの:

1. 座標取得 (マウスで指示した位置の座標を異なる CRS で返します)
2. DB Manager (Exchange, edit and view layers and tables; execute SQL queries)
3. Dxf2Shp コンバータ (DXF ファイルを shapefile に変換します)
4. eVIS (イベントを可視化します)
5. fTools (ベクタデータの解析と管理を行います)
6. GDALTools (Integrate GDAL Tools into QGIS)
7. ジオリファレンサー GDAL (GDAL を利用してラスタにプロジェクション情報を付加します)
8. GPS ツール (GPS データのロードとインポート)
9. GRASS (統合された GRASS GIS)
10. ヒートマップ (ポイントデータからラスタヒートマップをつくる機能)
11. 補間プラグイン (ベクタレイヤの頂点を利用して補間を行う)
12. Metasearch Catalogue Client
13. オフライン編集 (データベースのオフライン編集と同期を行います)
14. Oracle Spatial Georaster
15. プロセッシング（元 SEXTANTE）
16. ラスタ地形解析 (ラスタベース地形解析)
17. ロードグラフプラグイン (最短経路ネットワーク解析)
18. 空間検索プラグイン
19. SPIT (Import shapefiles to PostgreSQL/PostGIS)
20. トポロジチェッカー (ベクタレイヤ内のトポロジーエラーを検出する)
21. 地域統計プラグイン (ベクタレイヤの各ポリゴンでラスタのカウント, 合計, 平均を算出します)

4.6.2 外部 Python プラグイン

QGIS offers a growing number of external Python plugins that are provided by the community. These plugins reside in the official Plugins Repository and can be easily installed using the Python Plugin Installer. See Section **プラグインダイアログ**.

4.7 Python コンソール

For scripting, it is possible to take advantage of an integrated Python console, which can be opened from menu: *Plugins* → *Python Console*. The console opens as a non-modal utility window. For interaction with the QGIS environment, there is the `qgis.utils.iface` variable, which is an instance of `QgsInterface`. This interface allows access to the map canvas, menus, toolbars and other parts of the QGIS application. You can create a script, then drag and drop it into the QGIS window and it will be executed automatically.

For further information about working with the Python console and programming QGIS plugins and applications, please refer to *PyQGIS-Developer-Cookbook*.

4.8 既知の問題

4.8.1 ファイル数の制限

もしあなたが大きな QGIS プロジェクトを開いていて多くののレイヤが正常だけどいくつかのレイヤがおかしい場合たぶんこの問題に遭遇します. Linux (そして他の OS でも同じように) ではあるプロセスが開けるファイルの数の制限があります. プロセスごとのリソースの制限は継承されます. シェルに組み込まれている `ulimit` コマンドを使うと, 現在のシェルプロセスについてその制限を変更することができます; あたらしい制限はすべての子プロセスに継承されます.

現状の ulimit を次のようにタイプすると見ることができます

```
user@host:~$ ulimit -aS
```

You can see the current allowed number of opened files per proccess with the following command on a console

```
user@host:~$ ulimit -Sn
```

To change the limits for an **existing session**, you may be able to use something like

```
user@host:~$ ulimit -Sn #number_of_allowed_open_files
user@host:~$ ulimit -Sn
user@host:~$ qgis
```

問題をずっと解決するためには

ほとんどの Linux システムではログイン時のリソースの制限は `pam_limits` モジュールで行われその設定は `/etc/security/limits.conf` か `/etc/security/limits.d/*.conf` の記述にしたがっています. もしあなたがルート権限を持っているなら (または sudo を使って) それらのファイルを編集するべきです, しかし再度ログインするまで変更は有効になりません.

更なる情報:

http://www.cyberciti.biz/faq/linux-increase-the-maximum-number-of-open-files/ http://linuxaria.com/article/open-files-in-linux?lang=en

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Chapter 5

What's new in QGIS 2.8

This release contains new features and extends the programmatic interface over previous versions. We recommend that you use this version over previous releases.

This release includes hundreds of bug fixes and many new features and enhancements that will be described in this manual. You may also review the visual changelog at http://qgis.org/en/site/forusers/visualchangelog28/index.html.

5.1 Application

- **Map rotation**: A map rotation can be set in degrees from the status bar
- **Bookmarks**: You can share and transfer your bookmarks
- **Expressions**:
  - when editing attributes in the attribute table or forms, you can now enter expressions directly into spin boxes
  - the expression widget is extended to include a function editor where you are able to create your own Python custom functions in a comfortable way
  - in any spinbox of the style menu you can enter expressions and evaluate them immediately
  - a get and transform geometry function was added for using expressions
  - a comment functionality was inserted if for example you want to work with data defined labeling
- **Joins**: You can specify a custom prefix for joins
- **Layer Legend**: Show rule-based renderer's legend as a tree
- **DB Manager**: Run only the selected part of a SQL query
- **Attribute Table**: support for calculations on selected rows through a 'Update Selected' button
- **Measure Tools**: change measurement units possible

5.2 Data Providers

- **DXF Export tool improvements**: Improved marker symbol export
- **WMS Layers**: Support for contextual WMS legend graphics
- **Temporary Scratch Layers**: It is possible to create empty editable memory layers

5.3 Digitizing

- **Advanced Digitizing**:
  - digitise lines exactly parallel or at right angles, lock lines to specific angles and so on with the advanced digitizing panel (CAD-like features)
  - simplify tool: specify with exact tolerance, simplify multiple features at once ...
- **Snapping Options**: new snapping mode 'Snap to all layers'

5.4 Map Composer

- **Composer GUI improvements**: hide bounding boxes, full screen mode for composer toggle display of panels
- **Grid improvements**: You now have finer control of frame and annotation display
- **Label item margins**: You can now control both horizontal and vertical margins for label items. You can now specify negative margins for label items.
- optionally store layer styles
- **Attribute Table Item**: options 'Current atlas feature' and 'Relation children' in Main properties

5.5 Plugins

- **Python Console**: You can now drag and drop python scripts into the QGIS window

5.6 QGIS Server

- Python plugin support

5.7 Symbology

- live heatmap renderer creates dynamic heatmaps from point layers
- raster image symbol fill type
- more data-defined symbology settings: the data-defined option was moved next to each data definable property
- support for multiple styles per map layer, optionally store layer styles

5.8 User Interface

- **Projection**: Improved/consistent projection selection. All dialogs now use a consistent projection selection widget, which allows for quickly selecting from recently used and standard project/QGIS projections

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Chapter 6

はじめましょう

This chapter gives a quick overview of installing QGIS, some sample data from the QGIS web page, and running a first and simple session visualizing raster and vector layers.

6.1 インストール

Installation of QGIS is very simple. Standard installer packages are available for MS Windows and Mac OS X. For many flavors of GNU/Linux, binary packages (rpm and deb) or software repositories are provided to add to your installation manager. Get the latest information on binary packages at the QGIS website at http://download.qgis.org.

6.1.1 ソースからのインストール

If you need to build QGIS from source, please refer to the installation instructions. They are distributed with the QGIS source code in a file called `INSTALL`. You can also find them online at http://htmlpreview.github.io/?https://raw.github.com/qgis/QGIS/master/doc/INSTALL.html

6.1.2 外部メディアへのインストール

QGIS allows you to define a `--configpath` option that overrides the default path for user configuration (e.g., `~/.qgis2` under Linux) and forces **QSettings** to use this directory, too. This allows you to, for instance, carry a QGIS installation on a flash drive together with all plugins and settings. See section **システムメニュー** for additional information.

6.2 サンプルデータ

The user guide contains examples based on the QGIS sample dataset.

The Windows installer has an option to download the QGIS sample dataset. If checked, the data will be downloaded to your `My Documents` folder and placed in a folder called `GIS Database`. You may use Windows Explorer to move this folder to any convenient location. If you did not select the checkbox to install the sample dataset during the initial QGIS installation, you may do one of the following:

- あなたがお持ちの GIS データを利用する場合;
- Download sample data from http://qgis.org/downloads/data/qgis_sample_data.zip
- Uninstall QGIS and reinstall with the data download option checked (only recommended if the above solutions are unsuccessful)

For GNU/Linux and Mac OS X, there are not yet dataset installation packages available as rpm, deb or dmg. To use the sample dataset, download the file `qgis_sample_data` as a ZIP archive from http://qgis.org/downloads/data and unzip the archive on your system.

The Alaska dataset includes all GIS data that are used for examples and screenshots in the user guide; it also includes a small GRASS database. The projection for the QGIS sample dataset is Alaska Albers Equal Area with units feet. The EPSG code is 2964.

```
PROJCS["Albers Equal Area",
GEOGCS["NAD27",
DATUM["North_American_Datum_1927",
SPHEROID["Clarke 1866",6378206.4,294.978698213898,
AUTHORITY["EPSG","7008"]],
TOWGS84[-3,142,183,0,0,0,0],
AUTHORITY["EPSG","6267"]],
PRIMEM["Greenwich",0,
AUTHORITY["EPSG","8901"]],
UNIT["degree",0.0174532925199433,
AUTHORITY["EPSG","9108"]],
AUTHORITY["EPSG","4267"]],
PROJECTION["Albers_Conic_Equal_Area"],
PARAMETER["standard_parallel_1",55],
PARAMETER["standard_parallel_2",65],
PARAMETER["latitude_of_center",50],
PARAMETER["longitude_of_center",-154],
PARAMETER["false_easting",0],
PARAMETER["false_northing",0],
UNIT["us_survey_feet",0.3048006096012192]]
```

If you intend to use QGIS as a graphical front end for GRASS, you can find a selection of sample locations (e.g., Spearfish or South Dakota) at the official GRASS GIS website, http://grass.osgeo.org/download/sample-data/.

6.3 Sample Session

Now that you have QGIS installed and a sample dataset available, we would like to demonstrate a short and simple QGIS sample session. We will visualize a raster and a vector layer. We will use the `landcover` raster layer, `qgis_sample_data/raster/landcover.img`, and the `lakes` vector layer, `qgis_sample_data/gml/lakes.gml`.

6.3.1 Start QGIS

- Start QGIS by typing "QGIS" at a command prompt, or if using a precompiled binary, by using the Applications menu.
- Start QGIS using the Start menu or desktop shortcut, or double click on a QGIS project file.
- Double click the icon in your Applications folder.

6.3.2 Load raster and vector layers from the sample dataset

1. Click on the Add Raster Layer icon.
2. フォルダ `qgis_sample_data/raster/`, を開いて ERDAS Img file `landcover.img` を選択した後 **[Open]** をクリックして下さい.
3. If the file is not listed, check if the *Files of type* combo box at the bottom of the dialog is set on the right type, in this case "Erdas Imagine Images (*.img, *.IMG)".

4. Now click on the Add Vector Layer icon.
5. *File* should be selected as *Source Type* in the new *Add vector layer* dialog. Now click **[Browse]** to select the vector layer.
6. Browse to the folder `qgis_sample_data/gml/`, select 'Geography Markup Language [GML] [OGR] (.gml,.GML)' from the *Filter* combo box, then select the GML file `lakes.gml` and click **[Open]**. In the *Add vector layer* dialog, click **[OK]**. The *Coordinate Reference System Selector* dialog opens with *NAD27 / Alaska Alberts* selected, click **[OK]**.
7. Zoom in a bit to your favorite area with some lakes.
8. 地図凡例にある `lakes` layer をダブルクリックして *Properties* ダイアログを開いて下さい.
9. *Style* タブをクリックして塗りつぶし色として青を選択して下さい.
10. Click on the *Labels* tab and check the *Label this layer with* checkbox to enable labeling. Choose the "NAMES" field as the field containing labels.
11. To improve readability of labels, you can add a white buffer around them by clicking "Buffer" in the list on the left, checking *Draw text buffer* and choosing 3 as buffer size.
12. Click **[Apply]**. Check if the result looks good, and finally click **[OK]**.

You can see how easy it is to visualize raster and vector layers in QGIS. Let's move on to the sections that follow to learn more about the available functionality, features and settings, and how to use them.

6.4 Starting and Stopping QGIS

In section *Sample Session* you already learned how to start QGIS. We will repeat this here, and you will see that QGIS also provides further command line options.

- Assuming that QGIS is installed in the PATH, you can start QGIS by typing `qgis` at a command prompt or by double clicking on the QGIS application link (or shortcut) on the desktop or in the Applications menu.
- Start QGIS using the Start menu or desktop shortcut, or double click on a QGIS project file.
- Double click the icon in your Applications folder. If you need to start QGIS in a shell, run `/path-to-installation-executable/Contents/MacOS/Qgis`.

To stop QGIS, click the menu option *File* *QGIS* → *Quit*, or use the shortcut `Ctrl+Q`.

6.5 コマンドラインオプション

QGIS supports a number of options when started from the command line. To get a list of the options, enter `qgis --help` on the command line. The usage statement for QGIS is:

```
qgis --help
QGIS - 2.6.0-Brighton 'Brighton' (exported)
QGIS is a user friendly Open Source Geographic Information System.
Usage: /usr/bin/qgis.bin [OPTION] [FILE]
OPTION:
      [--snapshot filename]   emit snapshot of loaded datasets to given file
      [--width width] width of snapshot to emit
      [--height height]       height of snapshot to emit
      [--lang language]       use language for interface text
      [--project projectfile] load the given QGIS project
      [--extent xmin,ymin,xmax,ymax]  set initial map extent
      [--nologo]      hide splash screen
      [--noplugins]   don't restore plugins on startup
```

```
    [--nocustomization]     don't apply GUI customization
    [--customizationfile]   use the given ini file as GUI customization
    [--optionspath path]    use the given QSettings path
    [--configpath path]     use the given path for all user configuration
    [--code path]   run the given python file on load
    [--defaultui]   start by resetting user ui settings to default
    [--help]                this text

FILE:
  Files specified on the command line can include rasters,
  vectors, and QGIS project files (.qgs):
   1. Rasters - supported formats include GeoTiff, DEM
      and others supported by GDAL
   2. Vectors - supported formats include ESRI Shapefiles
      and others supported by OGR and PostgreSQL layers using
      the PostGIS extension
```

ちなみに: コマンドライン引数利用例

You can start QGIS by specifying one or more data files on the command line. For example, assuming you are in the `qgis_sample_data` directory, you could start QGIS with a vector layer and a raster file set to load on startup using the following command: `qgis ./raster/landcover.img ./gml/lakes.gml`

コマンドラインオプション `--snapshot`

このオプションを使うと PNG 形式でカレントビューのスナップショットを作れますこの機能によってたくさんのプロジェクトをもっている場合でも簡単にスナップショットを作ることができます

このオプションを使うと 800x600 ピクセルの PNG ファイルが作成されます. `--width` と ''–height'' をコマンドライン引数に加えることでサイズの調整ができます. `--snapshot` の後にファイル名を指定できます.

コマンドラインオプション `--lang`

Based on your locale, QGIS selects the correct localization. If you would like to change your language, you can specify a language code. For example, `--lang=it` starts QGIS in italian localization.

コマンドラインオプション `--project`

Starting QGIS with an existing project file is also possible. Just add the command line option `--project` followed by your project name and QGIS will open with all layers in the given file loaded.

コマンドラインオプション `--extent`

ある地図の領域を指定して QGIS を起動する場合はこのオプションを使います. この場合 下記のようにカンマで区切られた書式の領域指定で領域を包含する長方形を指定する 必要があります:

```
--extent xmin,ymin,xmax,ymax
```

コマンドラインオプション `--nologo`

This command line argument hides the splash screen when you start QGIS.

コマンドラインオプション `--noplugins`

起動時にプラグインのトラブルがある場合スタートアップ時にプラグインのロードを無効にすることができます. それらのプラグインは後にプラグインマネージャで有効にすることができます.

コマンドラインオプション `--customizationfile`

このコマンドライン引数を使うとファイルに定義した GUI カスタマイゼーションが起動時に利用されます.

** コマンドラインオプション ** `--nocustomization`

このコマンドライン引数を使うと設定してある GUI カスタマイゼーションが適用されないで起動されます.

コマンドラインオプション `--optionspath`

You can have multiple configurations and decide which one to use when starting QGIS with this option. See **オプション** to confirm where the operating system saves the settings files. Presently, there is no way to specify a file to write settings to; therefore, you can create a copy of the original settings file and rename it. The option specifies path to directory with settings. For example, to use /path/to/config/QGIS/QGIS2.ini settings file, use option:

```
--optionspath /path/to/config/
```

コマンドラインオプション `--configpath`

This option is similar to the one above, but furthermore overrides the default path for user configuration (`~/.qgis2`) and forces **QSettings** to use this directory, too. This allows users to, for instance, carry a QGIS installation on a flash drive together with all plugins and settings.

コマンドラインオプション `--code`

This option can be used to run a given python file directly after QGIS has started.

例えば、以下の内容の `load_alaska.py` という名の python ファイルをもつ場合:

```
from qgis.utils import iface
raster_file = "/home/gisadmin/Documents/qgis_sample_data/raster/landcover.img"
layer_name = "Alaska"
iface.addRasterLayer(raster_file, layer_name)
```

Assuming you are in the directory where the file `load_alaska.py` is located, you can start QGIS, load the raster file `landcover.img` and give the layer the name 'Alaska' using the following command: `qgis --code load_alaska.py`

6.6 プロジェクト

The state of your QGIS session is considered a project. QGIS works on one project at a time. Settings are considered as being either per-project or as a default for new projects (see section **オプション**). QGIS can save the state of your workspace into a project file using the menu options *Project* → *Save* or *Project* → *Save As...*.

Load saved projects into a QGIS session using *Project* → *Open...*, *Project* → *New from template* or *Project* → *Open Recent* →.

If you wish to clear your session and start fresh, choose *Project* → *New*. Either of these menu options will prompt you to save the existing project if changes have been made since it was opened or last saved.

以下の情報はプロジェクトファイルに保存されます:

- 追加されたレイヤ群
- Which layers can be queried
- Layer properties, including symbolization and styles
- マップビューの投影法
- 最後に表示された領域座標
- Print Composers
- Print Composer elements with settings
- Print Composer atlas settings
- Digitizing settings
- Table Relations
- Project Macros
- Project default styles

- Plugins settings
- QGIS Server settings from the OWS settings tab in the Project properties
- Queries stored in the DB Manager

The project file is saved in XML format, so it is possible to edit the file outside QGIS if you know what you are doing. The file format has been updated several times compared with earlier QGIS versions. Project files from older QGIS versions may not work properly anymore. To be made aware of this, in the *General* tab under *Settings* → *Options* you can select:

- *Prompt to save project and data source changes when required*
- *Warn when opening a project file saved with an older version of QGIS*

Whenever you save a project in QGIS a backup of the project file is made with the extension ~.

6.7 出力

There are several ways to generate output from your QGIS session. We have discussed one already in section プロジェクト, saving as a project file. Here is a sampling of other ways to produce output files:

- Menu option *Project* → Save as Image opens a file dialog where you select the name, path and type of image (PNG,JPG and many other formats). A world file with extension PNGW or JPGW saved in the same folder georeferences the image.
- Menu option *Project* → *DXF Export ...* opens a dialog where you can define the 'Symbology mode', the 'Symbology scale' and vector layers you want to export to DXF. Through the 'Symbology mode' symbols from the original QGIS Symbology can be exported with high fidelity.
- Menu option *Project* → *New Print Composer* opens a dialog where you can layout and print the current map canvas (see section プリントコンポーザ).

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Chapter 7

QGIS GUI

When QGIS starts, you are presented with the GUI as shown in the figure (the numbers 1 through 5 in yellow circles are discussed below).

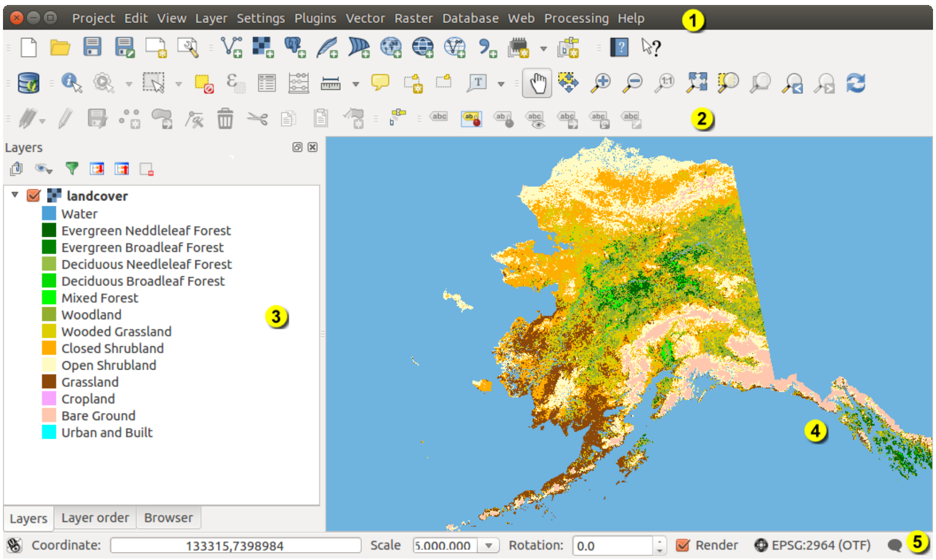

Figure 7.1: QGIS GUI with Alaska sample data

ノート: ウィンドウの装飾（タイトルバーとか）は利用している オペレーティングシステムやウィンドウマネージャによって見かけが異なります.

The QGIS GUI is divided into five areas:

1. メニューバー
2. Tool Bar
3. Map Legend
4. 地図ビュー
5. ステータスバー

These five components of the QGIS interface are described in more detail in the following sections. Two more sections present keyboard shortcuts and context help.

7.1 メニューバー

The menu bar provides access to various QGIS features using a standard hierarchical menu. The top-level menus and a summary of some of the menu options are listed below, together with the associated icons as they appear on the toolbar, and keyboard shortcuts. The shortcuts presented in this section are the defaults; however, keyboard shortcuts can also be configured manually using the *Configure shortcuts* dialog, opened from *Settings* → *Configure Shortcuts...*.

ほとんどのメニューオプションはツールに対応しているけど, 逆に対応していないこともあります, メニューはツールバーのようには構成されていません. ツールバーはそれぞれのチェックボックスエントリとしてあらわされているメニューオプションのリストツールを含んでいます. いくつかのメニューオプションは対応するプラグインがロードされている時のみ表示されます. ツールとツールバーについてのさらに詳しい情報は **ツールバー** 節を参照して下さい.

7.1.1 プロジェクト

メニューオプション	ショートカット	リファレンス	ツールバー
New	`Ctrl+N`	see **プロジェクト**	**プロジェクト**
Open	`Ctrl+O`	see **プロジェクト**	**プロジェクト**
テンプレートを基に新規作成 →		see **プロジェクト**	**プロジェクト**
Open Recent →		see **プロジェクト**	
Save	`Ctrl+S`	see **プロジェクト**	**プロジェクト**
Save As...	`Ctrl+Shift+S`	see **プロジェクト**	**プロジェクト**
Save as Image...		see **出力**	
DXF Export ...		see **出力**	
New Print Composer	`Ctrl+P`	see **プリントコンポーザ**	**プロジェクト**
Composer manager ...		see **プリントコンポーザ**	**プロジェクト**
プリントコンポーザ →		see **プリントコンポーザ**	
Exit QGIS	`Ctrl+Q`		

7.1.2 編集

メニューオプション	ショートカット	リファレンス	ツールバー
Undo	`Ctrl+Z`	see **高度なデジタイジング**	**先進的なデジタイズ**
Redo	`Ctrl+Shift+Z`	see **高度なデジタイジング**	**先進的なデジタイズ**
Cut Features	`Ctrl+X`	see **既存レイヤのデジタイズ**	**デジタジング**
Copy Features	`Ctrl+C`	see **既存レイヤのデジタイズ**	**デジタジング**
Paste Features	`Ctrl+V`	see **既存レイヤのデジタイズ**	**デジタジング**
新規レイヤへの地物貼り付け →		*Working with the Attribute Table* 参照	
Add Feature	`Ctrl+.`	see **既存レイヤのデジタイズ**	**デジタジング**
Move Feature(s)		see **既存レイヤのデジタイズ**	**デジタジング**
Delete Selected		see **既存レイヤのデジタイズ**	**デジタジング**
Rotate Feature(s)		see **高度なデジタイジング**	**先進的なデジタイズ**
Simplify Feature		see **高度なデジタイジング**	**先進的なデジタイズ**
Add Ring		see **高度なデジタイジング**	**先進的なデジタイズ**
Add Part		see **高度なデジタイジング**	**先進的なデジタイズ**
Fill Ring		see **高度なデジタイジング**	**先進的なデジタイズ**
Delete Ring		see **高度なデジタイジング**	**先進的なデジタイズ**
Delete Part		see **高度なデジタイジング**	**先進的なデジタイズ**
Reshape Features		see **高度なデジタイジング**	**先進的なデジタイズ**
Offset Curve		see **高度なデジタイジング**	**先進的なデジタイズ**
Split Features		see **高度なデジタイジング**	**先進的なデジタイズ**
Split Parts		see **高度なデジタイジング**	**先進的なデジタイズ**
Merge Selected Features		see **高度なデジタイジング**	**先進的なデジタイズ**
Merge Attr. of Selected Features		see **高度なデジタイジング**	**先進的なデジタイズ**
Node Tool		see **既存レイヤのデジタイズ**	**デジタジング**
Rotate Point Symbols		see **高度なデジタイジング**	**先進的なデジタイズ**

After activating Toggle editing mode for a layer, you will find the `Add Feature` icon in the *Edit* menu depending on the layer type (point, line or polygon).

7.1.3 編集（おまけ）

メニューオプション	ショートカット	リファレンス	ツールバー
Add Feature		see **既存レイヤのデジタイズ**	**デジタジング**
Add Feature		see **既存レイヤのデジタイズ**	**デジタジング**
Add Feature		see **既存レイヤのデジタイズ**	**デジタジング**

7.1.4 ビュー

メニューオプション	ショートカット	リファレンス	ツールバー
Pan Map			**地図ナビゲーション**
Pan Map to Selection			**地図ナビゲーション**
Zoom In	`Ctrl++`		**地図ナビゲーション**
Zoom Out	`Ctrl+-`		**地図ナビゲーション**
選択 →		see **地物の選択と選択解除**	**属性**
Identify Features	`Ctrl+Shift+I`		**属性**
計測 →		see **計測**	**属性**
Zoom Full	`Ctrl+Shift+F`		**地図ナビゲーション**
Zoom To Layer			**地図ナビゲーション**
Zoom To Selection	`Ctrl+J`		**地図ナビゲーション**
Zoom Last			**地図ナビゲーション**
Zoom Next			**地図ナビゲーション**
Zoom Actual Size			**地図ナビゲーション**
地図整飾 →		**整飾** 参照	
Preview mode →			
Map Tips			**属性**
New Bookmark	`Ctrl+B`	see **空間ブックマーク**	**属性**
Show Bookmarks	`Ctrl+Shift+B`	see **空間ブックマーク**	**属性**
Refresh	`F5`		**地図ナビゲーション**

7.1.5 レイヤ

メニューオプション	ショートカット	リファレンス	ツールバー
Create Layer →		**新しいベクタレイヤの作成** を参照	**レイヤの管理**
Add Layer →			**レイヤの管理**
Embed Layers and Groups ...		see **プロジェクトの入れ子**	
Add from Layer Definition File ...			
Copy style		see **スタイルメニュー**	
Paste style		see **スタイルメニュー**	
Open Attribute Table		*Working with the Attribute Table* 参照	**属性**
Toggle Editing		see **既存レイヤのデジタイズ**	**デジタジング**
Save Layer Edits		see **既存レイヤのデジタイズ**	**デジタジング**
Current Edits →		see **既存レイヤのデジタイズ**	**デジタジング**
Save as...			
Save as layer definition file...			
Remove Layer/Group	`Ctrl+D`		
Duplicate Layers (s)			
Set Scale Visibility of Layers			
Set CRS of Layer(s)	`Ctrl+Shift+C`		
Set project CRS from Layer Properties ...			
Query...			
Labeling			
Add to Overview	`Ctrl+Shift+O`		**レイヤの管理**
Add All To Overview			
Remove All From Overview			
Show All Layers	`Ctrl+Shift+U`		**レイヤの管理**
Hide All Layers	`Ctrl+Shift+H`		**レイヤの管理**
Show selected Layers			
Hide selected Layers			

7.1.6 設定

メニューオプション	ショートカット	リファレンス	ツールバー
パネル →		see *Panels and Toolbars*	
ツールバー →		see *Panels and Toolbars*	
Toggle Full Screen Mode	`F 11`		
Project Properties ...	`Ctrl+Shift+P`	see **プロジェクト**	
Custom CRS ...		see **カスタム空間参照システム**	
スタイルマネージャ...		see *Presentation*	
Configure shortcuts ...			
Customization ...		see **カスタマイゼーション**	
Options ...		**オプション** 参照	
Snapping Options ...			

7.1.7 プラグイン

メニューオプション	ショートカット	リファレンス	ツールバー
Manage and Install Plugins ...		see **プラグインダイアログ**	
Python Console	Ctrl+Alt+P		

When starting QGIS for the first time not all core plugins are loaded.

7.1.8 ベクタ

メニューオプション	ショートカット	リファレンス	ツールバー
オープンストリートマップ →		see *OpenStreetMap* **ベクタの読み込み**	
解析ツール →		see *fTools* **プラグイン**	
調査ツール →		see *fTools* **プラグイン**	
ジオプロセッシングツール →		see *fTools* **プラグイン**	
ジオメトリツール →		see *fTools* **プラグイン**	
データマネジメントツール →		see *fTools* **プラグイン**	

When starting QGIS for the first time not all core plugins are loaded.

7.1.9 ラスタ

メニューオプション	ショートカット	リファレンス	ツールバー
Raster calculator ...		see **ラスタ計算機**	

When starting QGIS for the first time not all core plugins are loaded.

7.1.10 Database

メニューオプション	ショートカット	リファレンス	ツールバー
Database →		see *DB* **マネージャプラグイン**	*Database*

When starting QGIS for the first time not all core plugins are loaded.

7.1.11 Web

メニューオプション	ショートカット	リファレンス	ツールバー
Metasearch		see *MetaSearch Catalogue Client*	*Web*

When starting QGIS for the first time not all core plugins are loaded.

7.1.12 プロセシング

メニューオプション	ショートカット	リファレンス	ツールバー
Toolbox		see **ツールボックス**	
Graphical Modeler ...		**グラフィカルモデラー** 参照	
History and log ...		see **履歴マネージャ**	
Options ...		**プロセッシングフレームワークを構成する** 参照	
Results viewer ...		see **外部アプリケーションの設定**	
Commander	`Ctrl+Alt+M`	*QGIS* **コマンダー** 参照	

When starting QGIS for the first time not all core plugins are loaded.

7.1.13 ヘルプ

メニューオプション	ショートカット	リファレンス	ツールバー
Help Contents	`F1`		**ヘルプ**
What's This?	`Shift+F1`		**ヘルプ**
API Documentation			
Need commercial support?			
QGIS Home Page	`Ctrl+H`		
Check QGIS Version			
About			
QGIS Sponsors			

Please note that for Linux, the menu bar items listed above are the default ones in the KDE window manager. In GNOME, the *Settings* menu has different content and its items have to be found here:

Custom CRS	*Edit*
Style Manager	*Edit*
Configure Shortcuts	*Edit*
Customization	*Edit*
Options	*Edit*
Snapping Options ...	*Edit*

7.2 ツールバー

ツールバーではメニューのほとんどと同じ機能を提供している上に対話的に地図を操作する機能を提供しています. ツールバーのそれぞれのアイテムではポップアップヘルプが提供されています. マウスでアイテムの上を動かすとツールの簡単な説明が表示されます.

Every menu bar can be moved around according to your needs. Additionally, every menu bar can be switched off using your right mouse button context menu, holding the mouse over the toolbars (read also *Panels and Toolbars*).

ちなみに: ツールバーの復元

If you have accidentally hidden all your toolbars, you can get them back by choosing menu option *Settings* → *Toolbars* →. If a toolbar disappears under Windows, which seems to be a problem in QGIS from time to time, you have to remove key `\HKEY_CURRENT_USER\Software\QGIS\qgis\UI\state` in the registry. When you restart QGIS, the key is written again with the default state, and all toolbars are visible again.

7.3 Map Legend

The map legend area lists all the layers in the project. The checkbox in each legend entry can be used to show or hide the layer. The Legend toolbar in the map legend are list allow you to **Add group**, **Manage Layer Visibility** of all layers or manage preset layers combination, **Filter Legend by Map Content**, **Expand All** or **Collapse All** and **Remove Layer or Group**. The button allows you to add **Presets** views in the legend. It means that you can choose to display some layer with specific categorization and add this view to the **Presets** list. To add a preset view just click on , choose *Add Preset...* from the drop down menu and give a name to the preset. After that you will see a list with all the presets that you can recall pressing on the button.

All the added presets are also present in the map composer in order to allow you to create a map layout based on your specific views (see **メインプロパティ**).

レイヤは選択してドラッグで上下に移動することによって Z オーダリングを変えることができます.Z オーダリングとは, 凡例のリストでの表示順が地図表示のレイヤ表示順になることです.

ノート: This behaviour can be overridden by the 'Layer order' panel.

Layers in the legend window can be organised into groups. There are two ways to do this:

1. Press the icon to add a new group. Type in a name for the group and press `Enter`. Now click on an existing layer and drag it onto the group.
2. 凡例ウィンドウでいくつかのレイヤを選択してマウス右ボタンをクリックして *Group Selected* を選択して下さい. 選択されたレイヤで自動的に新しいグループが作られます.

あるレイヤをグループからはずしたい場合はレイヤ名をドラッグしてグループ外に持っていくかマウス右ボタンクリックして *Make to toplevel item* を選択して下さい. グループは他のグループからネストすることができます.

グループ用チェックボックスを使うとグループ内全レイヤの表示, 非表示を 1 回のクリックで行えます.

The content of the right mouse button context menu depends on whether the selected legend item is a raster or a vector layer. For GRASS vector layers, Toggle editing is not available. See section ***GRASS* ベクタレイヤのデジタイジングと編集** for information on editing GRASS vector layers.

Right mouse button menu for raster layers

- *Zoom to Layer*
- *Show in overview*
- *Zoom to Best Scale (100%)*
- *Remove*
- *Duplicate*
- *Set Layer Scale Visibility*
- *Set Layer CRS*
- **レイヤの *CRS* をプロジェクトに設定する**
- *Styles* →
- *Save as ...*
- *Save As Layer Definition File ...*
- **プロパティ**
- **改名**

Additionally, according to layer position and selection

- *Move to Top-level*
- **選択されたレイヤをグループにする**

Right mouse button menu for vector layers

- *Zoom to Layer*
- *Show in overview*
- *Remove*
- *Duplicate*
- *Set Layer Scale Visibility*
- *Set Layer CRS*
- **レイヤの *CRS* をプロジェクトに設定する**
- *Styles →*
- *Open Attribute Table*
- *Toggle Editing* (not available for GRASS layers)
- *Save As ...*
- *Save As Layer Definition Style*
- **フィルター**
- *Show Feature Count*
- **プロパティ**
- **改名**

Additionally, according to layer position and selection

- *Move to Top-level*
- **選択されたレイヤをグループにする**

Right mouse button menu for layer groups

- *Zoom to Group*
- *Remove*
- *Set Group CRS*
- **改名**
- *Add Group*

It is possible to select more than one layer or group at the same time by holding down the `Ctrl` key while selecting the layers with the left mouse button. You can then move all selected layers to a new group at the same time.

You may also delete more than one layer or group at once by selecting several layers with the `Ctrl` key and pressing `Ctrl+D` afterwards. This way, all selected layers or groups will be removed from the layers list.

7.3.1 レイヤの標示順序から独立した凡例の操作

There is a panel that allows you to define an independent drawing order for the map legend. You can activate it in the menu *Settings* → *Panels* → *Layer order*. This feature allows you to, for instance, order your layers in order of importance, but still display them in the correct order (see figure_layer_order). Checking the *Control rendering order* box underneath the list of layers will cause a revert to default behavior.

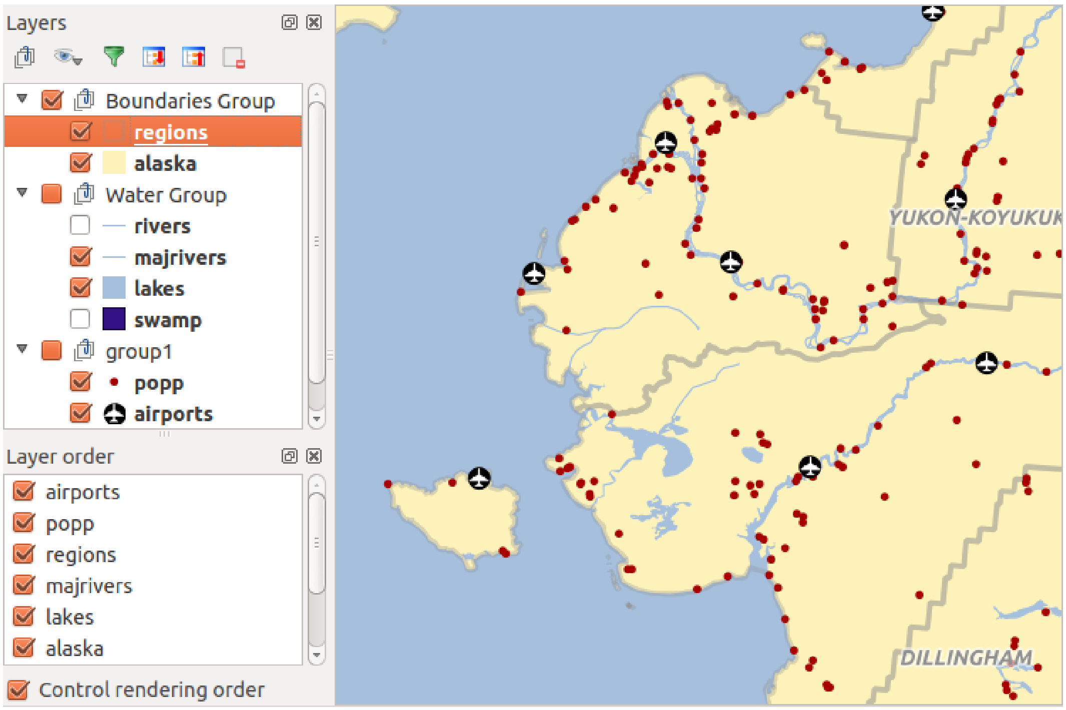

Figure 7.2: Define a legend independent layer order

7.4 地図ビュー

This is the "business end" of QGIS — maps are displayed in this area! The map displayed in this window will depend on the vector and raster layers you have chosen to load (see sections that follow for more information on how to load layers). The map view can be panned, shifting the focus of the map display to another region, and it can be zoomed in and out. Various other operations can be performed on the map as described in the toolbar description above. The map view and the legend are tightly bound to each other — the maps in view reflect changes you make in the legend area.

ちなみに: マウスホィールを使って地図をズームします

マウスホィールを使って地図のズームインとズームアウトを行うことができます. マウスカーソルを地図エリアの中に置きホィールを前方 (あなたの側から) ロールするとズームインを行えます, そして手前に (あなたの側に) ロールするとズームアウトします. マウスカーソルの位置がズームの中心になります. マウスホィールのズーム動作については *Settings* → *Options* メニューの *Map tools* タブでカスタマイズができます.

ちなみに: 矢印キーとスペースバーを使った地図パンニング

矢印キーを使ってパンを行うことができます. マウスカーソルを地図エリアにおきクリックした後右矢印キーを押すと東にパンします, 左矢印キーを押すと西にパンします, 上矢印キーを押すと北にパンします. 下矢印キーを押すと南にパンします. またスペースバーかマウスホィールを使ってパンを行うことができます. この場合スペースバーを押しながらマウスを動かすかマウスホィールをクリックして下さい.

7.5 ステータスバー

The status bar shows you your current position in map coordinates (e.g., meters or decimal degrees) as the mouse pointer is moved across the map view. To the left of the coordinate display in the status bar is a small button that will toggle between showing coordinate position or the view extents of the map view as you pan and zoom in and out.

Next to the coordinate display you will find the scale display. It shows the scale of the map view. If you zoom in or out, QGIS shows you the current scale. There is a scale selector, which allows you to choose between predefined scales from 1:500 to 1:1000000.

To the right of the scale display you can define a current clockwise rotation for your map view in degrees.

A progress bar in the status bar shows the progress of rendering as each layer is drawn to the map view. In some cases, such as the gathering of statistics in raster layers, the progress bar will be used to show the status of lengthy operations.

If a new plugin or a plugin update is available, you will see a message at the far left of the status bar. On the right side of the status bar, there is a small checkbox which can be used to temporarily prevent layers being rendered to the map view (see section レンダリング below). The icon immediately stops the current map rendering process.

To the right of the render functions, you find the EPSG code of the current project CRS and a projector icon. Clicking on this opens the projection properties for the current project.

ちなみに: マップキャンバスにおける正しい縮尺を計算する

When you start QGIS, the default units are degrees, and this means that QGIS will interpret any coordinate in your layer as specified in degrees. To get correct scale values, you can either change this setting to meters manually in the *General* tab under *Settings* → *Project Properties*, or you can select a project CRS clicking on the Current CRS: icon in the lower right-hand corner of the status bar. In the last case, the units are set to what the project projection specifies (e.g., '+units=m').

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Chapter 8

一般ツール

8.1 キーボードショートカット

QGIS provides default keyboard shortcuts for many features. You can find them in section **メニューバー**. Additionally, the menu option *Settings* → *Configure Shortcuts..* allows you to change the default keyboard shortcuts and to add new keyboard shortcuts to QGIS features.

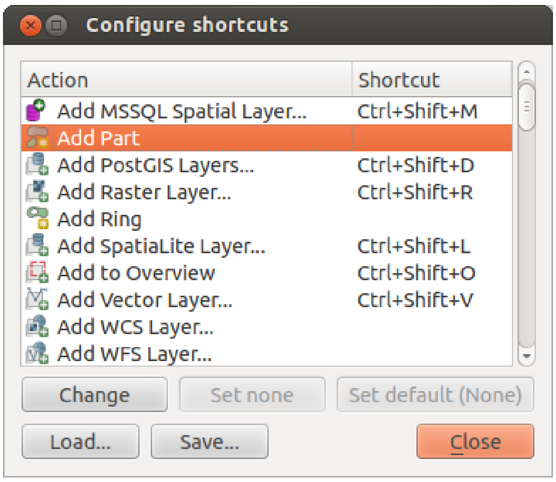

Figure 8.1: Define shortcut options (Gnome)

Configuration is very simple. Just select a feature from the list and click on **[Change]**, **[Set none]** or **[Set default]**. Once you have finished your configuration, you can save it as an XML file and load it to another QGIS installation.

8.2 コンテキストヘルプ

特定のトピックでヘルプが必要な場合多くのダイアログに実装されている **[Help]** ボタンでコンテキストヘルプを利用することができます- サードパーティプラグインでは専用のウェッブページを指し示すことを注意して下さい.

8.3 レンダリング

By default, QGIS renders all visible layers whenever the map canvas is refreshed. The events that trigger a refresh of the map canvas include:

- レイヤの追加
- パンまたはズーム
- Resizing the QGIS window
- レイヤまたはレイヤ群の表示、非表示を変更します

QGIS allows you to control the rendering process in a number of ways.

8.3.1 スケール依存レンダリング

スケール依存レンダリングを利用するとあるレイヤが表示される最小と最大のスケールを指定することができます. スケール依存レンダリングを設定する場合レイヤを凡例でダブルクリックして **プロパティ** ダイアログを開いて下さい. **一般情報** タブで, ☑ **縮尺に応じた表示設定** チェックボックスをアクティブにして最小と最大の縮尺値を設定して下さい.

You can determine the scale values by first zooming to the level you want to use and noting the scale value in the QGIS status bar.

8.3.2 地図レンダリングの制御

Map rendering can be controlled in the various ways, as described below.

描画の中断

To suspend rendering, click the ☑ *Render* checkbox in the lower right corner of the status bar. When the ☑ *Render* checkbox is not checked, QGIS does not redraw the canvas in response to any of the events described in section **レンダリング**. Examples of when you might want to suspend rendering include:

- 沢山のレイヤを追加して描画する前に描画方法を編集したい場合
- データ量が多いレイヤを追加して描画する前に縮尺依存描画条件を指定したい場合
- データ量が多いレイヤを追加して描画する前に特定の位置にズームしておきたい場合
- 上記の場合のいくつかの組み合わせ

Checking the ☑ *Render* checkbox enables rendering and causes an immediate refresh of the map canvas.

レイヤ追加オプションの設定

新しくレイヤを追加した時に, すぐに描画しないオプションを設定できます. これはレイヤが地図に追加された時に, 地図凡例の可視属性チェックボックスがデフォルトでチェックされないことを意味します. このオプションを指定するためには **設定** → **オプション** → を選択して **レンダリング** タブをクリックしてください. ☑ *By default new layers added to the map should be displayed* のチェックを解除してください. すると, 地図に追加されたレイヤの表示属性は不可視の状態がデフォルトになります.

描画の中断

地図描画を中断したい場合は `ESC` キーを押して下さい. これにより地図キャンパスの更新が中断され地図の一部が描画された状態になります. `ESC` キーを押してから地図描画が中断されるまで少し時間がかかります.

ノート: 現在描画中断機能は利用できません - これは Qt4 のポートに依存しています, なぜならばユーザーインターフェース (UI) に問題が発生してクラッシュするからです.

Updating the Map Display During Rendering

You can set an option to update the map display as features are drawn. By default, QGIS does not display any features for a layer until the entire layer has been rendered. To update the display as features are read from the datastore, choose menu option *Settings* → *Options* and click on the *Rendering* tab. Set the feature count to an appropriate value to update the display during rendering. Setting a value of 0 disables update during drawing (this is the default). Setting a value too low will result in poor performance, as the map canvas is continually updated during the reading of the features. A suggested value to start with is 500.

描画品質への影響

To influence the rendering quality of the map, you have two options. Choose menu option *Settings* → *Options*, click on the *Rendering* tab and select or deselect following checkboxes:

- ☑ *Make lines appear less jagged at the expense of some drawing performance*
- ☑ *Fix problems with incorrectly filled polygons*

スピードアップレンダリング

There are two settings that allow you to improve rendering speed. Open the QGIS options dialog using *Settings* → *Options*, go to the *Rendering* tab and select or deselect the following checkboxes:

- ☑ *Enable back buffer*. This provides better graphics performance at the cost of losing the possibility to cancel rendering and incrementally draw features. If it is unchecked, you can set the *Number of features to draw before updating the display*, otherwise this option is inactive.
- ☑ **再描画の速度を上げられる場合にレンダのキャッシュを利用します**

8.4 計測

Measuring works within projected coordinate systems (e.g., UTM) and unprojected data. If the loaded map is defined with a geographic coordinate system (latitude/longitude), the results from line or area measurements will be incorrect. To fix this, you need to set an appropriate map coordinate system (see section **投影法の利用方法**). All measuring modules also use the snapping settings from the digitizing module. This is useful, if you want to measure along lines or areas in vector layers.

To select a measuring tool, click on and select the tool you want to use.

8.4.1 Measure length, areas and angles

Measure Line: QGIS is able to measure real distances between given points according to a defined ellipsoid. To configure this, choose menu option *Settings* → *Options*, click on the *Map tools* tab and select the appropriate ellipsoid. There, you can also define a rubberband color and your preferred measurement units (meters or feet) and angle units (degrees, radians and gon). The tool then allows you to click points on the map. Each segment length, as well as the total, shows up in the measure window. To stop measuring, click your right mouse button. Note that you can interactively change the measurement units in the measurement dialog. It overrides the *Preferred measurement units* in the options. There is an info section in the dialog that shows which CRS settings are being used during measurement calculations.

Measure Area: Areas can also be measured. In the measure window, the accumulated area size appears. In addition, the measuring tool will snap to the currently selected layer, provided that layer has its snapping tolerance set (see section **スナップ許容量と検索半径の設定**). So, if you want to measure exactly along a line feature, or

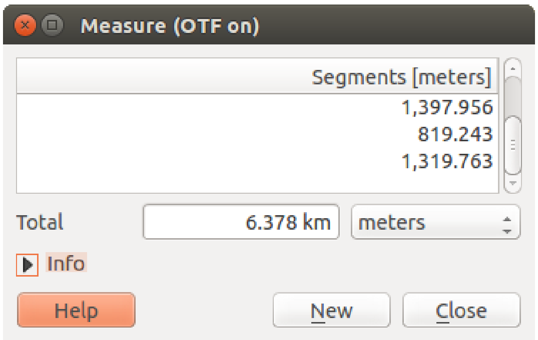

Figure 8.2: Measure Distance (Gnome)

around a polygon feature, first set its snapping tolerance, then select the layer. Now, when using the measuring tools, each mouse click (within the tolerance setting) will snap to that layer.

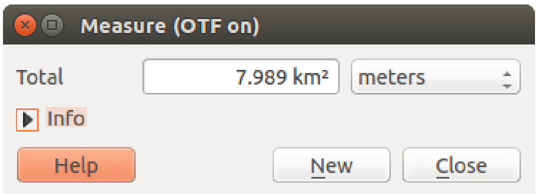

Figure 8.3: Measure Area (Gnome)

Measure Angle: You can also measure angles. The cursor becomes cross-shaped. Click to draw the first segment of the angle you wish to measure, then move the cursor to draw the desired angle. The measure is displayed in a pop-up dialog.

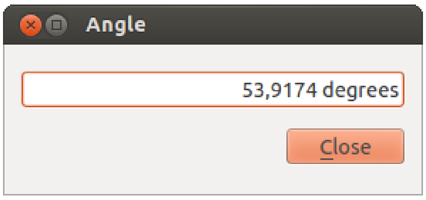

Figure 8.4: Measure Angle (Gnome)

8.4.2 地物の選択と選択解除

The QGIS toolbar provides several tools to select features in the map canvas. To select one or several features, just click on and select your tool:

- Select Single Feature
- Select Features by Rectangle
- Select Features by Polygon
- Select Features by Freehand
- Select Features by Radius

To deselect all selected features click on Deselect features from all layers.

Select feature using an expression allow user to select feature using expression dialog. See *Expressions* chapter for some example.

Users can save features selection into a **New Memory Vector Layer** or a **New Vector Layer** using *Edit* → *Paste Feature as ...* and choose the mode you want.

8.5 地物情報表示

The Identify tool allows you to interact with the map canvas and get information on features in a pop-up window. To identify features, use *View* → *Identify features* or press `Ctrl + Shift + I`, or click on the Identify features icon in the toolbar.

If you click on several features, the *Identify results* dialog will list information about all the selected features. The first item is the number of the layer in the list of results, followed by the layer name. Then, its first child will be the name of a field with its value. The first field is the one selected in *Properties* → *Display*. Finally, all information about the feature is displayed.

このウィンドウはカスタムフィールドを表示するためにカスタマイズできますがデフォルトで 3 種類の情報を表示します:

- Actions: Actions can be added to the identify feature windows. When clicking on the action label, action will be run. By default, only one action is added, to view feature form for editing.
- Derived: This information is calculated or derived from other information. You can find clicked coordinate, X and Y coordinates, area in map units and perimeter in map units for polygons, length in map units for lines and feature ids.
- Data attributes: This is the list of attribute fields from the data.

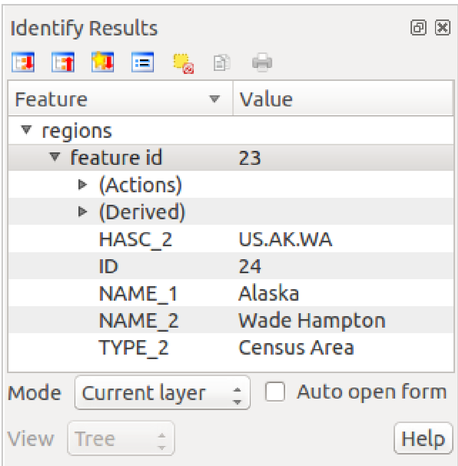

Figure 8.5: Identify feaures dialog (Gnome)

At the top of the window, you have five icons:

- Expand tree
- Collapse tree
- Default behaviour
- Copy attributes
- Print selected HTML response

At the bottom of the window, you have the *Mode* and *View* comboboxes. With the *Mode* combobox you can define the identify mode: 'Current layer', 'Top down, stop at first', 'Top down' and 'Layer selection'. The *View* can be set as 'Tree', 'Table' and 'Graph'.

The identify tool allows you to auto open a form. In this mode you can change the feautures attributes.

その他の機能は、識別されたアイテムのコンテキストメニューにあります。たとえば、コンテキストメニューから次のことができます：

- 地物フォームの表示
- 地物のズーム
- 地物のコピー: すべての地物, のジオメトリと属性をコピーします;
- Toggle feature selection: adds identified feature to selection
- 属性値のコピー: あなたがクリックした属性値のみをコピーします。
- Copy feature attributes: Copy only attributes
- 結果のクリア:ウィンドウ内の結果が削除されます
- ハイライトのクリア:地図上でハイライトしている地物が除去されます
- すべてをハイライトする
- レイヤをハイライトする
- レイヤのアクティベート: アクティベートするレイヤの選択
- レイヤプロパティ: レイヤプロパティウィンドウを表示する
- すべてを展開する
- すべてを折りたたむ

8.6 整飾

The Decorations of QGIS include the Grid, the Copyright Label, the North Arrow and the Scale Bar. They are used to 'decorate' the map by adding cartographic elements.

8.6.1 グリッド

グリッド では座標のグリッドと座標注記をマップキャンバスに追加します。

1. Select from menu *View* → *Decorations* → *Grid*. The dialog starts (see figure_decorations_1).
2. マップキャンバスにロードされているレイヤにしたがって *Enable grid* チェックボックスを有効にしてグリッドの設定を行って下さい.
3. マップキャンバスにロードされているレイヤにしたがって *Draw annotations* チェックボックスを有効にしてアノテーションの定義を行ってください.
4. Click **[Apply]** to verify that it looks as expected.
5. Click **[OK]** to close the dialog.

8.6.2 著作権ラベル

Copyright label adds a copyright label using the text you prefer to the map.

1. メニューの **ビュー** → **地図整飾** → **著作権ラベル** を選択します。ダイアログが表示されます (figure_decorations_2 を参照すること)。

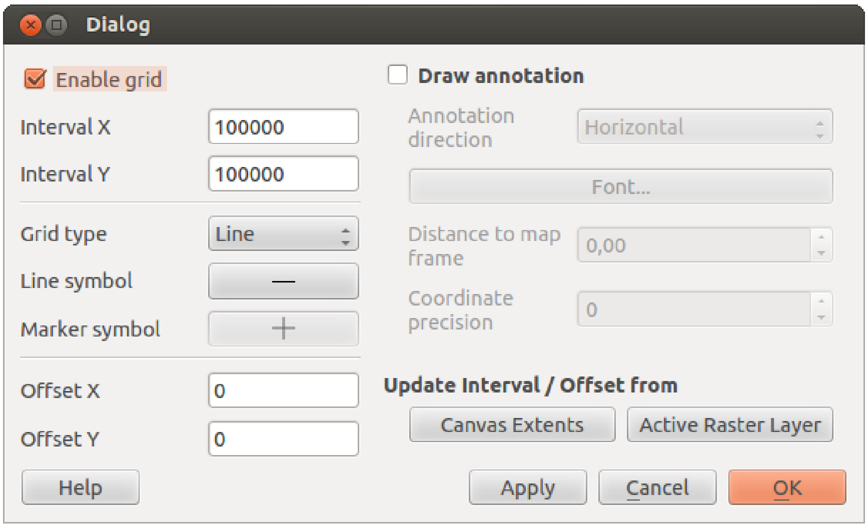

Figure 8.6: The Grid Dialog

Figure 8.7: The Copyright Dialog

2. マップ上に配置したいテキストを入力してください. 例に示す通り HTML を使用することができます.
3. Choose the placement of the label from the *Placement* combo box.
4. Make sure the *Enable Copyright Label* checkbox is checked.
5. Click **[OK]**.

In the example above, which is the default, QGIS places a copyright symbol followed by the date in the lower right-hand corner of the map canvas.

8.6.3 北向き矢印

North Arrow places a simple north arrow on the map canvas. At present, there is only one style available. You can adjust the angle of the arrow or let QGIS set the direction automatically. If you choose to let QGIS determine the direction, it makes its best guess as to how the arrow should be oriented. For placement of the arrow, you have four options, corresponding to the four corners of the map canvas.

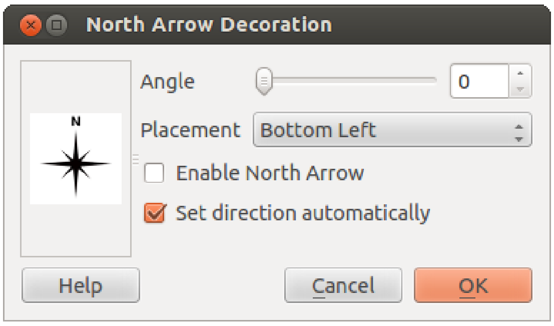

Figure 8.8: The North Arrow Dialog

8.6.4 スケールバー

Scale Bar adds a simple scale bar to the map canvas. You can control the style and placement, as well as the labeling of the bar.

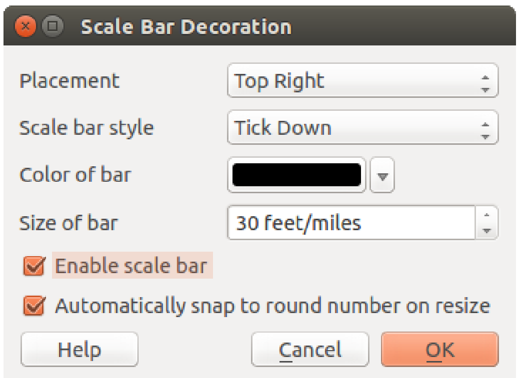

Figure 8.9: The Scale Bar Dialog

QGIS only supports displaying the scale in the same units as your map frame. So if the units of your layers are in meters, you can't create a scale bar in feet. Likewise, if you are using decimal degrees, you can't create a scale bar to display distance in meters.

スケールバーを追加するために：

1. メニューの **ビュー** → **地図整飾** → **著作権ラベル** を選択して下さい. ダイアログが表示されます (figure_decorations_4 を参照して下さい).
2. Choose the placement from the *Placement* combo box.
3. Choose the style from the *Scale bar style* combo box.
4. Select the color for the bar *Color of bar* or use the default black color.
5. Set the size of the bar and its label *Size of bar* .
6. Make sure the *Enable scale bar* checkbox is checked.
7. Optionally, check *Automatically snap to round number on resize*.
8. Click **[OK]**.

ちなみに: 整飾の設定

`.qgs` プロジェクトを保存する際, グリッド, 方位記号, スケールバーと著作権ラベルに加えた変更はそのプロジェクトに保存され, 次回プロジェクトをロードした際に復元されます.

8.7 アノテーションツール

The Text Annotation tool in the attribute toolbar provides the possibility to place formatted text in a balloon on the QGIS map canvas. Use the *Text Annotation* tool and click into the map canvas.

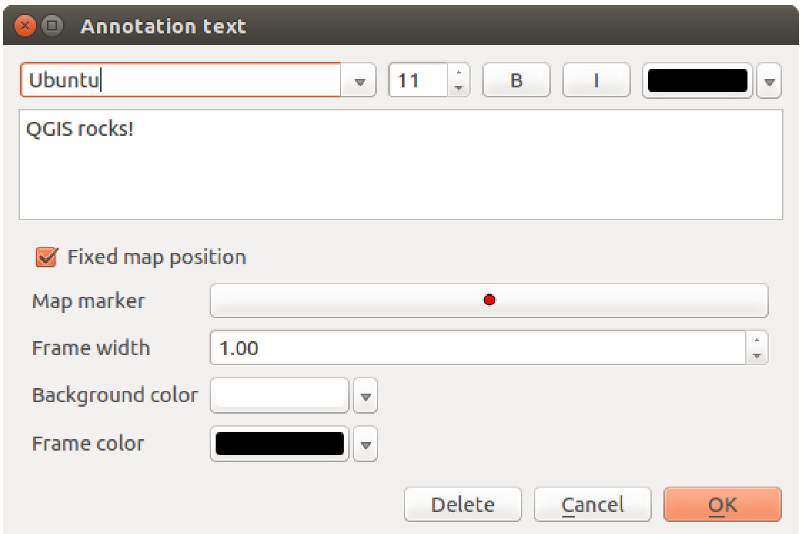

Figure 8.10: Annotation text dialog

項目をダブルクリックすると、さまざまなオプションを含むダイアログが開きます。フォーマットされたテキストやその他の項目の設定値を入力するテキストエディタがあります。例えば、マップの位置（マーカーシンボルが表示された）に関する項目またはスクリーンの位置（マップに関連していない）における選択肢を持ちます。この項目はマップの位置（マップマーカーをドラッグすることにより）が移動し、またはバルーンのみが移動します。アイコンは、GIS の主題図の一部であり、それらも、他の主題図においてデフォルトとして用いられます。

The Move Annotation tool allows you to move the annotation on the map canvas.

8.7.1 HTML 注記

The Html Annotation tools in the attribute toolbar provides the possibility to place the content of an html file in a balloon on the QGIS map canvas. Using the *Html Annotation* tool, click into the map canvas and add the path to the html file into the dialog.

8.7.2 SVG 注記

The SVG Annotation tool in the attribute toolbar provides the possibility to place an SVG symbol in a balloon on the QGIS map canvas. Using the *SVG Annotation* tool, click into the map canvas and add the path to the SVG file into the dialog.

8.7.3 注記の書式設定

Additionally, you can also create your own annotation forms. The Form Annotation tool is useful to display attributes of a vector layer in a customized Qt Designer form (see figure_custom_annotation). This is similar to the designer forms for the *Identify features* tool, but displayed in an annotation item. Also see this video https://www.youtube.com/watch?v=0pDBuSbQ02o from Tim Sutton for more information.

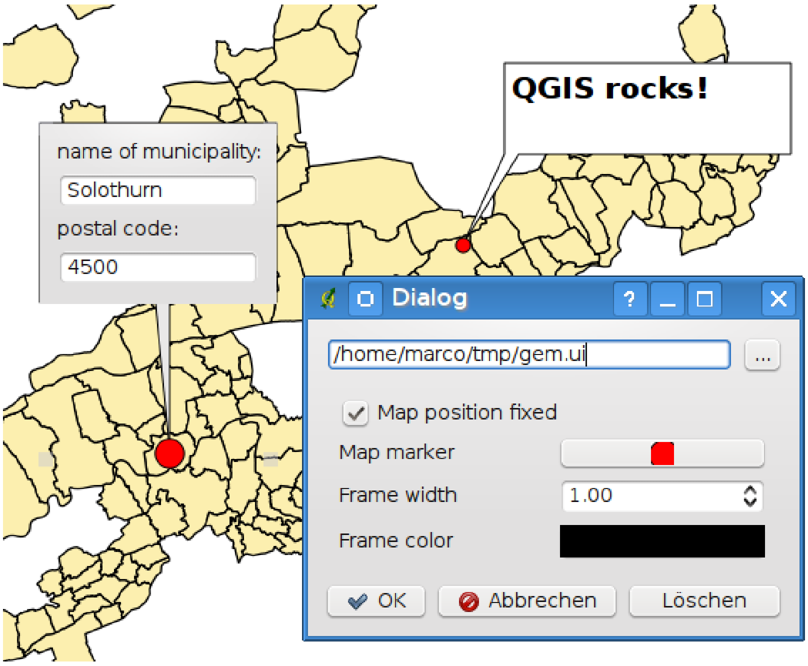

Figure 8.11: Customized qt designer annotation form

ノート: If you press `Ctrl+T` while an *Annotation* tool is active (move annotation, text annotation, form annotation), the visibility states of the items are inverted.

8.8 空間ブックマーク

Spatial Bookmarks allow you to “bookmark” a geographic location and return to it later.

8.8.1 ブックマークの作成

ブックマークを作るには：

1. 関心のある領域にズームまたはパンします。
2. Select the menu option *View* → *New Bookmark* or press `Ctrl-B`.
3. ブックマークを説明する名称（255 文字まで）を入力します。
4. Press `Enter` to add the bookmark or **[Delete]** to remove the bookmark.

同じ名称で複数のブックマークを所有できることにご注意ください。

8.8.2 ブックマークの操作

To use or manage bookmarks, select the menu option *View* → *Show Bookmarks*. The *Geospatial Bookmarks* dialog allows you to zoom to or delete a bookmark. You cannot edit the bookmark name or coordinates.

8.8.3 Zooming to a Bookmark

From the *Geospatial Bookmarks* dialog, select the desired bookmark by clicking on it, then click **[Zoom To]**. You can also zoom to a bookmark by double-clicking on it.

8.8.4 Deleting a Bookmark

To delete a bookmark from the *Geospatial Bookmarks* dialog, click on it, then click **[Delete]**. Confirm your choice by clicking **[Yes]**, or cancel the delete by clicking **[No]**.

8.8.5 Import or export a bookmark

To share or transfer your bookmarks between computers you can use the *Share* pull down menu in the *Geospatial Bookmarks* dialog.

8.9 プロジェクトの入れ子

あなたのプロジェクトに他のプロジェクトファイルからコンテンツを埋め込む場合 *Layer* → **埋め込みレイヤとグループ** を選択して下さい.

8.9.1 埋め込みレイヤ

次のダイアログで, 他のプロジェクトのレイヤを埋め込むことができます.

1. Press  to look for another project from the Alaska dataset.
2. Select the project file `grassland`. You can see the content of the project (see figure_embed_dialog).
3. Press `Ctrl` and click on the layers `grassland` and `regions`. Press **[OK]**. The selected layers are embedded in the map legend and the map view now.

埋め込まれているレイヤが編集可能になっている間, スタイルやラベリングのようなプロパティは変更することができません.

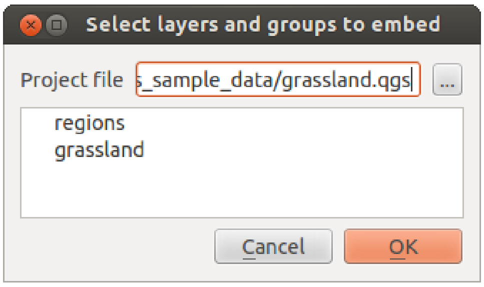

Figure 8.12: Select layers and groups to embed

8.9.2 埋め込みレイヤの除去

Right-click on the embedded layer and choose Remove.

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Chapter 9

QGIS Configuration

QGIS is highly configurable through the *Settings* menu. Choose between Panels, Toolbars, Project Properties, Options and Customization.

ノート: QGIS follows desktop guidelines for the location of options and project properties item. Consequently related to the OS you are using, location of some of items described above could be located in the *View* menu (Panels and Toolbars) or in *Project* for Options.

9.1 Panels and Toolbars

In the *Panels*→ menu, you can switch on and off QGIS widgets. The *Toolbars*→ menu provides the possibility to switch on and off icon groups in the QGIS toolbar (see figure_panels_toolbars).

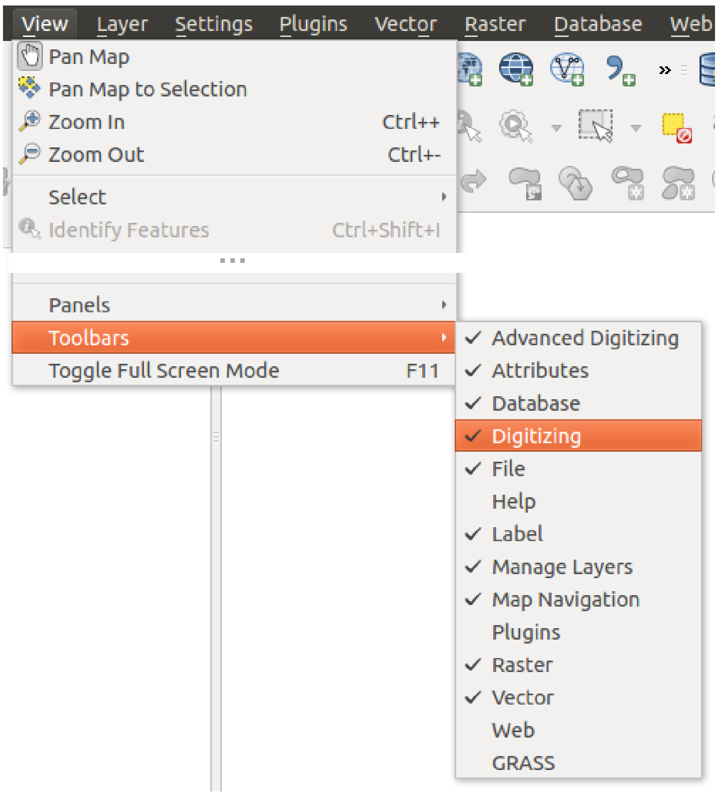

Figure 9.1: The Panels and Toolbars menu

ちなみに: Activating the QGIS Overview

In QGIS, you can use an overview panel that provides a full extent view of layers added to it. It can be selected under the menu *Settings* → *Panels* or *View* → *Panels*. Within the view is a rectangle showing the current map extent. This allows you to quickly determine which area of the map you are currently viewing. Note that labels are not rendered to the map overview even if the layers in the map overview have been set up for labeling. If you click and drag the red rectangle in the overview that shows your current extent, the main map view will update accordingly.

ちなみに: Show Log Messages

It's possible to track the QGIS messages. You can activate *Log Messages* in the menu *Settings* → *Panels* or *View* → *Panels* and follow the messages that appear in the different tabs during loading and operation.

9.2 プロジェクトのプロパティ

In the properties window for the project under *Settings* → *Project Properties* (kde) or *Project* → *Project Properties* (Gnome), you can set project-specific options. These include:

- In the *General* menu, the project title, selection and background color, layer units, precision, and the option to save relative paths to layers can be defined. If the CRS transformation is on, you can choose an ellipsoid for distance calculations. You can define the canvas units (only used when CRS transformation is disabled) and the precision of decimal places to use. You can also define a project scale list, which overrides the global predefined scales.
- The *CRS* menu enables you to choose the Coordinate Reference System for this project, and to enable on-the-fly re-projection of raster and vector layers when displaying layers from a different CRS.
- With the third *Identify layers* menu, you set (or disable) which layers will respond to the identify tool (see the "Map tools" paragraph from the **オプション** section to enable identifying of multiple layers).
- The *Default Styles* menu lets you control how new layers will be drawn when they do not have an existing `.qml` style defined. You can also set the default transparency level for new layers and whether symbols should have random colours assigned to them. There is also an additional section where you can define specific colors for the running project. You can find the added colors in the drop down menu of the color dialog window present in each renderer.
- The tab *OWS Server* allows you to define information about the QGIS Server WMS and WFS capabilities, extent and CRS restrictions.
- **マクロ** メニューは Python マクロの編集のために使います. 現時点では: `openProject()`, `saveProject()` そして `closeProject()` の 3 つのマクロのみ使用可能です.
- The *Relations* menu is used to define 1:n relations. The relations are defined in the project properties dialog. Once relations exist for a layer, a new user interface element in the form view (e.g. when identifying a feature and opening its form) will list the related entities. This provides a powerful way to express e.g. the inspection history on a length of pipeline or road segment. You can find out more about 1:n relations support in Section *Creating one to many relations*.

9.3 オプション

Some basic options for QGIS can be selected using the *Options* dialog. Select the menu option *Settings* → *Options*. The tabs where you can customize your options are described below.

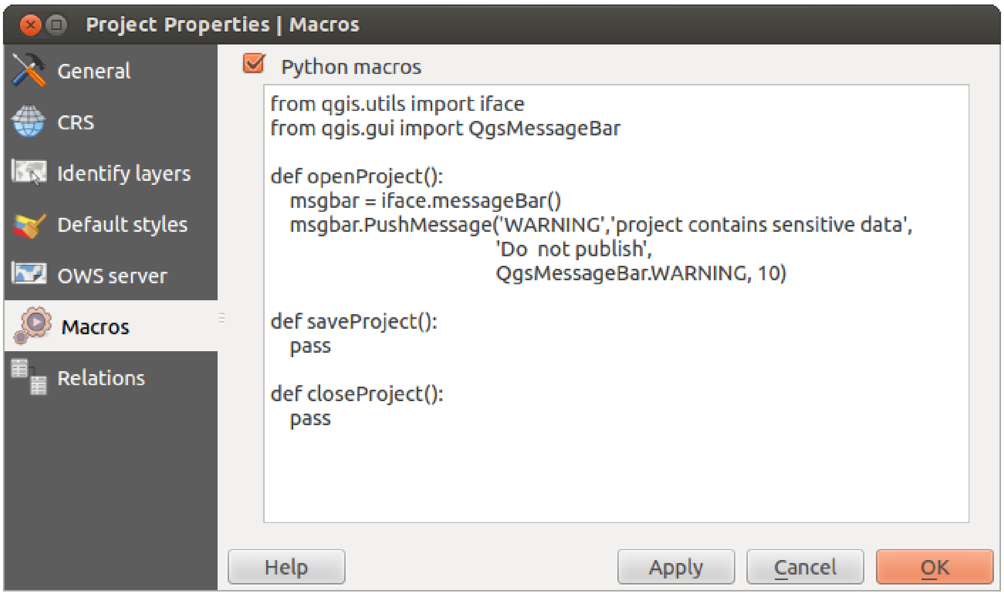

Figure 9.2: Macro settings in QGIS

9.3.1 一般情報メニュー

アプリケーション

- Select the *Style (QGIS restart required)* and choose between 'Oxygen','Windows','Motif','CDE', 'Plastique' and 'Cleanlooks' ( ).
- Define the *Icon theme* . Currently only 'default' is possible.
- Define the *Icon size* .
- Define the *Font*. Choose between *Qt default* and a user-defined font.
- Change the *Timeout for timed messages or dialogs* .
- **起動時のスプラッシュスクリーンを隠す**
- **起動時にチップスを表示する**
- **グループボックスのタイトルを太字にする**
- ***QGIS* スタイルのグループボックス**
- *Use native color chooser dialogs*
- *Use live-updating color chooser dialogs*
- *Custom side bar style*
- *Experimental canvas rotation support (restart required)*

プロジェクトファイル

- *Open project on launch* (choose between 'New', 'Most recent' and 'Specific'). When choosing 'Specific' use the to define a project.
- **既定のプロジェクトから新プロジェクトを作成する**. **現在のプロジェクトを既定プロジェクトとして指定する** または **既定を解除** ボタンをクリックすることができます. またユーザが作成したプロジェクトテンプレートをファイルやディレクトリを指定するとブラウズすることができます. **プロジェク**

ト → テンプレートをもとに新規作成 というエントリでそれができます. プロジェクトテンプレートを保存したい場合は最初に **既定のプロジェクトから新プロジェクトを作成する** をアクティブにしてプロジェクトテンプレートフォルダーにプロジェクトを保存してください.

- **必要に応じプロジェクトとデータソースの変更の保存を促す**
- *Prompt for confirmation when a layer is to be removed*
- *QGIS* **の旧バージョンで保存したプロジェクトファイルを開く際に警告する**
- *Enable macros* . This option was created to handle macros that are written to perform an action on project events. You can choose between 'Never', 'Ask', 'For this session only' and 'Always (not recommended)'.

9.3.2 システムメニュー

環境

System environment variables can now be viewed, and many configured, in the **Environment** group (see figure_environment_variables). This is useful for platforms, such as Mac, where a GUI application does not necessarily inherit the user's shell environment. It's also useful for setting and viewing environment variables for the external tool sets controlled by the Processing toolbox (e.g., SAGA, GRASS), and for turning on debugging output for specific sections of the source code.

- *Use custom variables (restart required - include separators)*. You can **[Add]** and **[Remove]** variables. Already-defined environment variables are displayed in *Current environment variables*, and it's possible to filter them by activating *Show only QGIS-specific variables*.

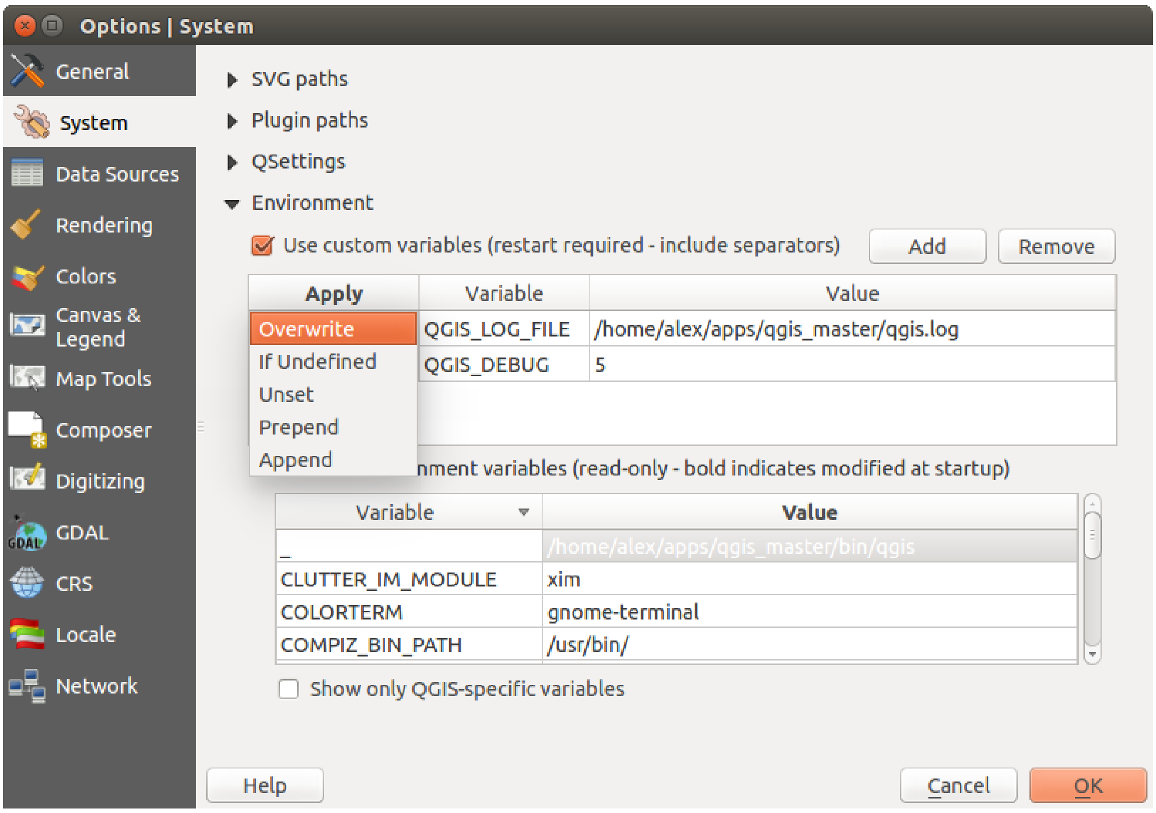

Figure 9.3: System environment variables in QGIS

プラグインパス

[Add] or **[Remove]** *Path(s) to search for additional C++ plugin libraries*

9.3.3 データソースメニュー

地物属性とテーブル

- **ドックウィンドウで属性テーブルを開く（***QGIS* **の再起動が必要）**‘
- *Copy geometry in WKT representation from attribute table*. When using Copy selected rows to clipboard from the *Attribute table* dialog, this has the result that the coordinates of points or vertices are also copied to the clipboard.
- *Attribute table behaviour* . There are three possibilities: ‘Show all features’, ‘Show selected features’ and ‘Show features visible on map’.
- *Attribute table row cache* 1,00. This row cache makes it possible to save the last loaded N attribute rows so that working with the attribute table will be quicker. The cache will be deleted when closing the attribute table.
- *Representation for NULL values*. Here, you can define a value for data fields containing a NULL value.

データソースの操作

- *Scan for valid items in the browser dock* . You can choose between ‘Check extension’ and ‘Check file contents’.
- *Scan for contents of compressed files (.zip) in browser dock* . ‘No’, ‘Basic scan’ and ‘Full scan’ are possible.
- *Prompt for raster sublayers when opening*. Some rasters support sublayers — they are called subdatasets in GDAL. An example is netCDF files — if there are many netCDF variables, GDAL sees every variable as a subdataset. The option allows you to control how to deal with sublayers when a file with sublayers is opened. You have the following choices:
  - ‘ 常に ’:毎回確認 (サブレイヤが存在する場合)
  - ‘ 必要な場合 ’:バンドがなくサブレイヤをもつかを尋ねます
  - ‘ 利用しない ’:確認せず何もロードしません
  - ‘‘ すべてをロード’:確認せず, すべてのサブレイヤをロードします
- *Ignore shapefile encoding declaration*. If a shapefile has encoding information, this will be ignored by QGIS.
- *Add PostGIS layers with double click and select in extended mode*
- **ダブルクリックで** *Oracle* **レイヤを追加する. 拡張選択モードを利用する**

9.3.4 レンダリングメニュー

Rendering behaviour

- **地図に新しくレイヤを追加した際にそのレイヤが表示されることをデフォルトにする**
- **再描画の速度を上げられる場合にレンダのキャッシュを利用します**
- *Render layers in parallel using many CPU cores*
- *Max cores to use*
- *Map update interval (default to 250 ms)*
- *Enable feature simplication by default for newly added layers*
- *Simplification threshold*

- **可能であればプロバイダ側で簡素化**
- *Maximum scale at which the layer should be simplified*

描画品質

- **線のジャギーを目立たなくします (描画パフォーマンスが低下します)**

ラスタ

- With *RGB band selection*, you can define the number for the Red, Green and Blue band.

Contrast enhancement

- *Single band gray* . A single band gray can have 'No stretch', 'Stretch to MinMax', 'Stretch and Clip to MinMax' and also 'Clip to MinMax'.
- *Multi band color (byte/band)* . Options are 'No stretch', 'Stretch to MinMax', 'Stretch and Clip to MinMax' and 'Clip to MinMax'.
- *Multi band color (>byte/band)* . Options are 'No stretch', 'Stretch to MinMax', 'Stretch and Clip to MinMax' and 'Clip to MinMax'.
- *Limits (minimum/maximum)* . Options are 'Cumulative pixel count cut', 'Minimum/Maximum', 'Mean +/- standard deviation'.
- **累積ピクセル数のカット制限**
- **標準偏差の乗数**

デバッグ

- **マップキャンバスリフレッシュ**

9.3.5 Colors Menu

This menu allows you to add some custom color that you can find in each color dialog window of the renderers. You will see a set of predefined colors in the tab: you can delete or edit all of them. Moreover you can add the color you want and perform some copy and paste operations. Finally you can export the color set as a `gpl` file or import them.

9.3.6 キャンバスと凡例のメニュー

デフォルトのマップ外観（プロジェクトプロパティを上書きします）

- Define a *Selection color* and a *Background color*.

レイヤの凡例

- *Double click action in legend* . You can either 'Open layer properties' or 'Open attribute table' with the double click.
- 以下の **凡例アイテムスタイル** は利用可能です
  - **レイヤ名の最初を大文字にする**
  - **レイヤ名を太字にする**
  - **グループ名を太字にする**
  - **分類の属性名称を表示する**
  - **ラスタアイコンの作成 (多分遅い)**

9.3.7 マップツールズメニュー

This menu offers some options regarding the behaviour of the *Identify tool*.

- *Search radius for identifying and displaying map tips* is a tolerance factor expressed as a percentage of the map width. This means the identify tool will depict results as long as you click within this tolerance.
- *Highlight color* allows you to choose with which color should features being identified are to be highlighted.
- *Buffer* expressed as a percentage of the map width, determines a buffer distance to be rendered from the outline of the identify highlight.
- *Minimum width* expressed as a percentage of the map width, determines how thick should the outline of a highlighted object be.

計測ツール

- 計測ツールの **ラバーバンド色** を定義します。
- Define **小数位**
- *Keep base unit*
- *Preferred measurements units* ('Meters', 'Feet', 'Nautical Miles' or 'Degrees')'
- *Preferred angle units* ('Degrees', 'Radians' or 'Gon')

パンとズーム

- Define *Mouse wheel action* ('Zoom', 'Zoom and recenter', 'Zoom to mouse cursor', 'Nothing')
- ホイールマウスの **ズーム倍率** の定義

定義済み縮尺

Here, you find a list of predefined scales. With the **[+]** and **[-]** buttons you can add or remove your individual scales.

9.3.8 コンポーザメニュー

コンポジションデフォルト

You can define the *Default font* here.

グリッドの外観

- Define the *Grid style* ('Solid', 'Dots', 'Crosses')
- Define the *Grid color*

Grid and guide defaults

- Define the *Grid spacing* 1,00
- Define the *Grid offset* 1,00 for x and y
- Define the *Snap tolerance* 1,00

9.3.9 デジタイズメニュー

地物の作成

- **地物作成後のポップアップ属性入力を行わない**
- **最後に入力した値を再利用する**

- *Validate geometries*. Editing complex lines and polygons with many nodes can result in very slow rendering. This is because the default validation procedures in QGIS can take a lot of time. To speed up rendering, it is possible to select GEOS geometry validation (starting from GEOS 3.3) or to switch it off. GEOS geometry validation is much faster, but the disadvantage is that only the first geometry problem will be reported.

ラバーバンド

- ラバーバンドの **線幅** と **線色** を指定して下さい

スナップ

- **ドックウィンドウ内でスナップオプションを開く** *(QGIS* **の再起動が必要***)*
- Define *Default snap mode* (‘To vertex’, ‘To segment’, ‘To vertex and segment’, ‘Off’)
- Define *Default snapping tolerance* in map units or pixels
- Define the *Search radius for vertex edits* in map units or pixels

頂点マーカー

- **選択された地物のみマーカーを表示する**
- Define vertex *Marker style* (‘Cross’ (default), ‘Semi transparent circle’ or ‘None’)
- 頂点の **マーカーの大きさ** を指定して下さい

カーブオフセットツール

The next 3 options refer to the Offset Curve tool in **高度なデジタイジング**. Through the various settings, it is possible to influence the shape of the line offset. These options are possible starting from GEOS 3.3.

- **結合スタイル**
- *Quadrant segments*
- **継ぎ目制限**

9.3.10 GDAL メニュー

GDAL is a data exchange library for raster files. In this tab, you can *Edit create options* and *Edit Pyramids Options* of the raster formats. Define which GDAL driver is to be used for a raster format, as in some cases more than one GDAL driver is available.

9.3.11 CRS メニュー

新プロジェクトの既定の投影座標系

- *Don’t enable ‘on the fly’ reprojection*
- *Automatically enable ‘on the fly’ reprojection if layers have different CRS*
- *Enable ‘on the fly’ reprojection by default*
- CRS の選択と **新しいプロジェクトは常にこの** *CRS* **で開始する**

新しいレイヤの投影座標系

このエリアでは新しいレイヤが作成された場合、または CRS のないレイヤが読み込まれた場合に、実行するアクションを定義することができます。

- *Prompt for CRS*
- *Use project CRS*
- *Use default CRS*

デフォルト datum 変換

- **デフォルトが定義されていないときにデータム変換をするかどうか問いかける**
- If you have worked with the 'on-the-fly' CRS transformation you can see the result of the transformation in the window below. You can find information about 'Source CRS' and 'Destination CRS' as well as 'Source datum transform' and 'Destination datum transform'.

9.3.12 ロケールメニュー

- **システムロケールを上書きする** と **代わりに利用するロケール**
- 有効なシステムロケールについての情報

9.3.13 ネットワークメニュー

一般情報

- Define *WMS search address*, default is `http://geopole.org/wms/search?search=\%1\&type=rss`
- Define *Timeout for network requests (ms)* - default is 60000
- *Default expiration period for WMSC/WMTS tiles (hours)* を定義して下さい- デフォルトは 24 です
- Define *Max retry in case of tile request errors*
- Define *User-Agent*

キャッシュ設定

キャッシュのための **ディレクトリ** と **サイズ** の指定.

- *Web* **接続にプロキシを使用する** と 'ホスト', 'ポート', 'ユーザ', と 'パスワード' の指定.
- Set the *Proxy type* according to your needs.
  - *Default Proxy*: プロキシはアプリケーションのプロキシ設定によって決まります
  - *Socks5Proxy*: あらゆる種類の接続に対応した一般的なプロキシ. TCP, UDP, ポートへのバインディング (入力コネクション) と認証をサポートします.
  - *HttpProxy*: "CONNECT" コマンドを実装しています, 外向きの TCP コネクションのみサポートしています; 認証をサポートしています.
  - *HttpCachingProxy*: Implemented using normal HTTP commands, it is useful only in the context of HTTP requests.
  - *FtpCachingProxy*: Implemented using an FTP proxy, it is useful only in the context of FTP requests.

プロキシ設定の下のテキストボックスに除外するいくつかの URL を追加できます (Figure_Network_Tab 参照).

If you need more detailed information about the different proxy settings, please refer to the manual of the underlying QT library documentation at http://doc.trolltech.com/4.5/qnetworkproxy.html#ProxyType-enum.

ちなみに: プロキシの利用

Using proxies can sometimes be tricky. It is useful to proceed by 'trial and error' with the above proxy types, to check to see if they succeed in your case.

You can modify the options according to your needs. Some of the changes may require a restart of QGIS before they will be effective.

- Settings are saved in a text file: `$HOME/.config/QGIS/QGIS2.conf`

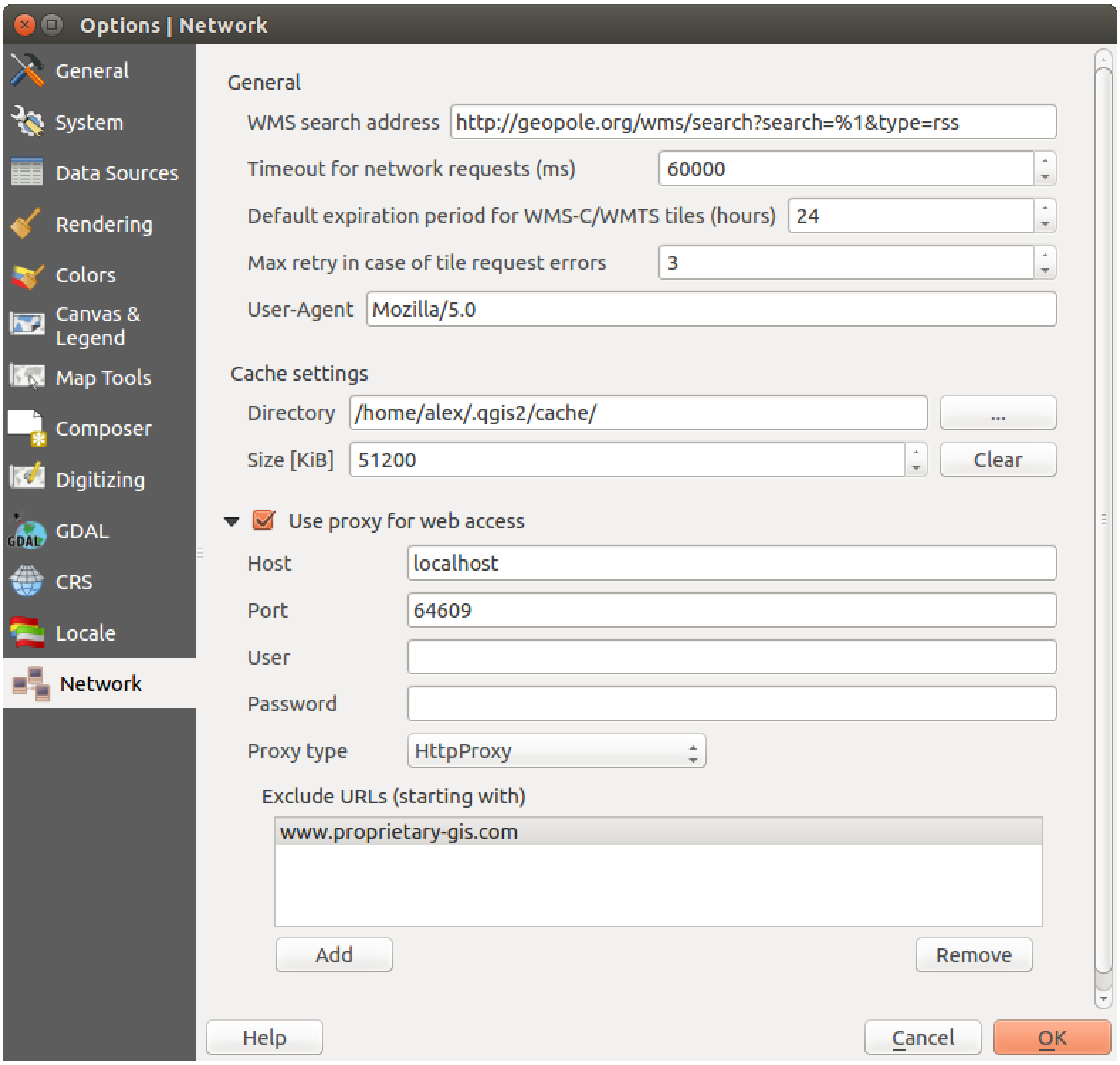

Figure 9.4: Proxy-settings in QGIS

- $HOME/Library/Preferences/org.qgis.qgis.plist で設定を見つけることができます。
- 設定は以下のレジストリに保存されます: HKEY\CURRENT_USER\Software\QGIS\qgis

9.4 カスタマイゼーション

The customization tool lets you (de)activate almost every element in the QGIS user interface. This can be very useful if you have a lot of plugins installed that you never use and that are filling your screen.

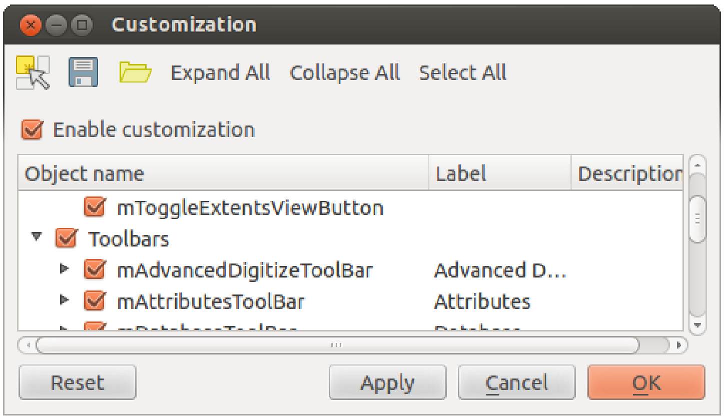

Figure 9.5: The Customization dialog

QGIS Customization is divided into five groups. In *Menus*, you can hide entries in the Menu bar. In *Panels*, you find the panel windows. Panel windows are applications that can be started and used as a floating, top-level window or embedded to the QGIS main window as a docked widget (see also *Panels and Toolbars*). In the *Status Bar*, features like the coordinate information can be deactivated. In *Toolbars*, you can (de)activate the toolbar icons of QGIS, and in *Widgets*, you can (de)activate dialogs as well as their buttons.

With Switch to catching widgets in main application, you can click on elements in QGIS that you want to be hidden and find the corresponding entry in Customization (see figure_customization). You can also save your various setups for different use cases as well. Before your changes are applied, you need to restart QGIS.

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Chapter 10

投影法の利用方法

QGIS allows users to define a global and project-wide CRS (coordinate reference system) for layers without a pre-defined CRS. It also allows the user to define custom coordinate reference systems and supports on-the-fly (OTF) projection of vector and raster layers. All of these features allow the user to display layers with different CRSs and have them overlay properly.

10.1 投影法サポート概要

QGIS has support for approximately 2,700 known CRSs. Definitions for each CRS are stored in a SQLite database that is installed with QGIS. Normally, you do not need to manipulate the database directly. In fact, doing so may cause projection support to fail. Custom CRSs are stored in a user database. See section **カスタム空間参照システム** for information on managing your custom coordinate reference systems.

The CRSs available in QGIS are based on those defined by the European Petroleum Search Group (EPSG) and the Institut Geographique National de France (IGNF) and are largely abstracted from the spatial reference tables used in GDAL. EPSG identifiers are present in the database and can be used to specify a CRS in QGIS.

In order to use OTF projection, either your data must contain information about its coordinate reference system or you will need to define a global, layer or project-wide CRS. For PostGIS layers, QGIS uses the spatial reference identifier that was specified when the layer was created. For data supported by OGR, QGIS relies on the presence of a recognized means of specifying the CRS. In the case of shapefiles, this means a file containing the well-known text (WKT) specification of the CRS. This projection file has the same base name as the shapefile and a `.prj` extension. For example, a shapefile named `alaska.shp` would have a corresponding projection file named `alaska.prj`.

Whenever you select a new CRS, the layer units will automatically be changed in the *General* tab of the *Project Properties* dialog under the *Project* (Gnome, OS X) or *Settings* (KDE, Windows) menu.

10.2 グローバル投影法指定

QGIS starts each new project using the global default projection. The global default CRS is EPSG:4326 - WGS 84 (`proj=longlat +ellps=WGS84 +datum=WGS84 +no_defs`), and it comes predefined in QGIS. This default can be changed via the **[Select...]** button in the first section, which is used to define the default coordinate reference system for new projects, as shown in figure_projection_1. This choice will be saved for use in subsequent QGIS sessions.

When you use layers that do not have a CRS, you need to define how QGIS responds to these layers. This can be done globally or project-wide in the *CRS* tab under *Settings* → *Options*.

オプションは figure_projection_1 にしめされています:

- *Prompt for CRS*

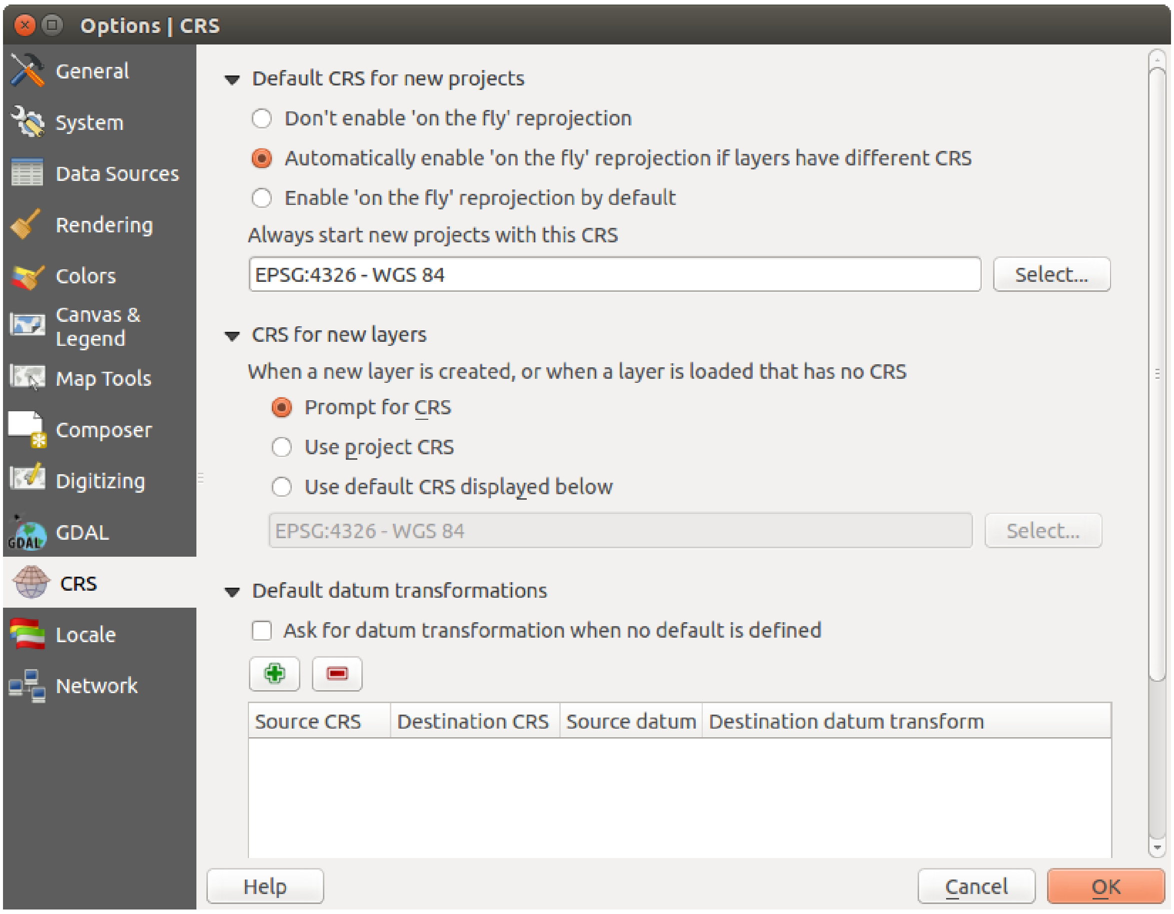

Figure 10.1: CRS tab in the QGIS Options Dialog

- *Use project CRS*
- *Use default CRS displayed below*

If you want to define the coordinate reference system for a certain layer without CRS information, you can also do that in the *General* tab of the raster and vector properties dialog (see **一般情報メニュー** for rasters and **一般メニュー** for vectors). If your layer already has a CRS defined, it will be displayed as shown in *Vector Layer Properties Dialog* .

ちなみに: マップ凡例の CRS

地図凡例 (Section *Map Legend*) でレイヤ名を右ボタンでクリックすると 2 個の CRS ショートカットが表示されます *Set layer CRS* を選択すると空間参照システム選択ダイアログ (figure_projection_2 参照) が表示されます. *Set project CRS from Layer* を選択するとレイヤの CRS を使ってプロジェクトの CRS を再定義します

10.3 オンザフライ再投影 (OTF) を定義する

QGIS supports OTF reprojection for both raster and vector data. However, OTF is not activated by default. To use OTF projection, you must activate the *Enable on the fly CRS transformation* checkbox in the *CRS* tab of the *Project Properties* dialog.

これを実行する方法は３つあります:

1. Select *Project Properties* from the *Project* (Gnome, OSX) or *Settings* (KDE, Windows) menu.
2. ステータスバーの右下角にある CRS ステータス アイコンをクリックして下さい.
3. *Options* ダイアログの *CRS* タブにて OTF をデフォルトに変更するには、 **デフォルトで' オンザフライ' 再投影を可能にする** または **もしレイヤが異なる** *CRS* **をもつ場合、自動で' オンザフライ' 投影変換を有効にする** を選択します。

もしレイヤをすでにロードしていて OTF プロジェクションを有効にしたい場合, 最良の方法は *Project Properties* メニューの *Coordinate Reference System* ダイアログを開いて, CRS を選択して, *Enable on the fly CRS transformation* チェックボックスをアクティブにすることです. そうすると CRS status アイコンはグレイアウトしていなくて すべてのレイヤがアイコンの隣にある CRS に OTF 投影されます.

The *CRS* tab of the *Project Properties* dialog contains five important components, as shown in Figure_projection_2 and described below:

1. **オンザフライ CRS 変換を有効にする** — このチェックボックスは OTF プロジェクションの有効, 無効を設定できます. オフの場合それぞれのレイヤはデータソースから読み込まれた座標で描画され以下のコンポーネントは無効になります. オンの場合それぞれのレイヤの座標はマップキャンバス用に定義された空間参照システムに投影されます.
2. **フィルター** — もしあなたが 利用したい空間参照システムの EPSG コードの識別子または名前を知っている場合, 検索機能を使ってそれを見つけることができます EPSG コードの識別子, または名前を入力して下さい.
3. **最近利用した座標参照系** — 日常の GIS での作業でよく使う CRS があるなら, このリストに表示されます. これらのひとつをクリックすると,CRS を選択できます。
4. **Coordinate reference systems of the world** — This is a list of all CRSs supported by QGIS, including Geographic, Projected and Custom coordinate reference systems. To define a CRS, select it from the list by expanding the appropriate node and selecting the CRS. The active CRS is preselected.
5. **PROJ.4 text** — 投影変換エンジンである PROJ.4 で使われる CRS 文字列です. この文字列は読み取り専用で, 情報提供のために提供されます.

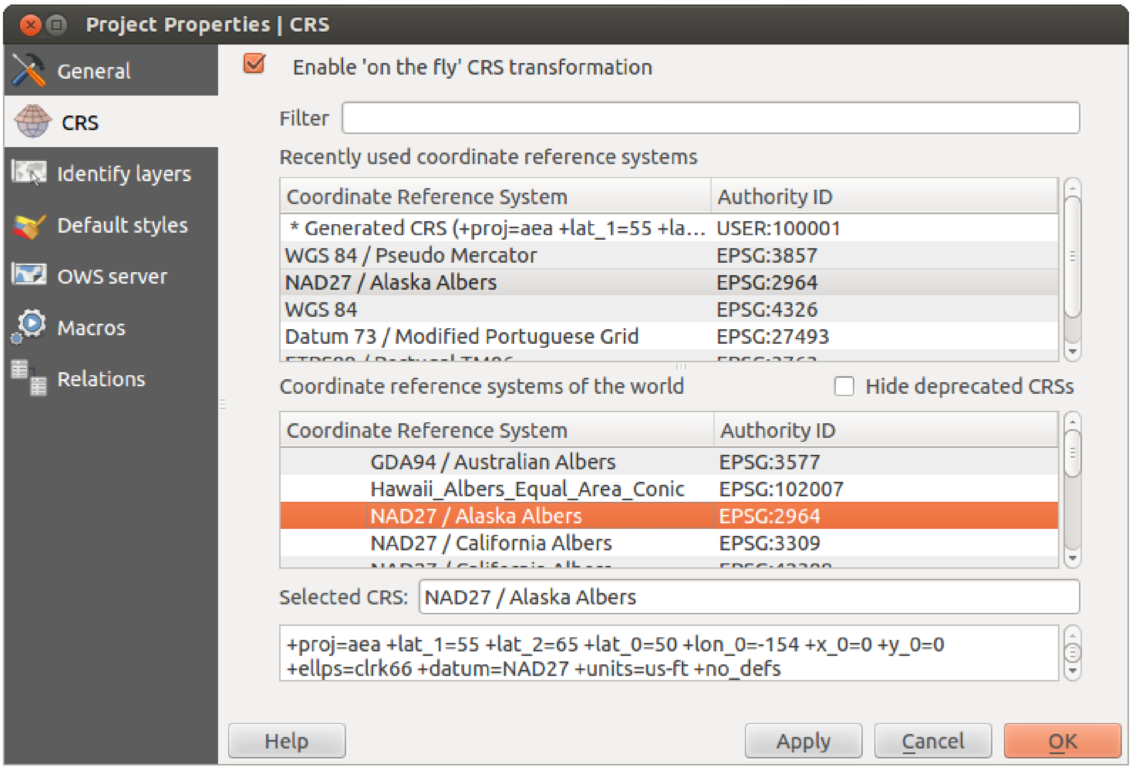

Figure 10.2: Project Properties Dialog

ちなみに: プロジェクトプロパティダイアログ

Project メニューの *Project Properties* ダイアログを開いて *CRS* タブをクリックすると CRS の設定を見ることができます.

CRS ステータス アイコンからダイアログを開くと自動的に **座標参照系** タブが前面に表示されます。

10.4 カスタム空間参照システム

If QGIS does not provide the coordinate reference system you need, you can define a custom CRS. To define a CRS, select *Custom CRS...* from the *Settings* menu. Custom CRSs are stored in your QGIS user database. In addition to your custom CRSs, this database also contains your spatial bookmarks and other custom data.

Defining a custom CRS in QGIS requires a good understanding of the PROJ.4 projection library. To begin, refer to "Cartographic Projection Procedures for the UNIX Environment - A User's Manual" by Gerald I. Evenden, U.S. Geological Survey Open-File Report 90-284, 1990 (available at ftp://ftp.remotesensing.org/proj/OF90-284.pdf).

This manual describes the use of the `proj.4` and related command line utilities. The cartographic parameters used with `proj.4` are described in the user manual and are the same as those used by QGIS.

The *Custom Coordinate Reference System Definition* dialog requires only two parameters to define a user CRS:

1. 記述可能な名称
2. PROJ.4 書式による地図作成パラメータ.

To create a new CRS, click the Add new CRS button and enter a descriptive name and the CRS parameters.

注 新しい CRS を表現するには、 パラメータは `+proj=` -ブロックで開始されていなければいけません。

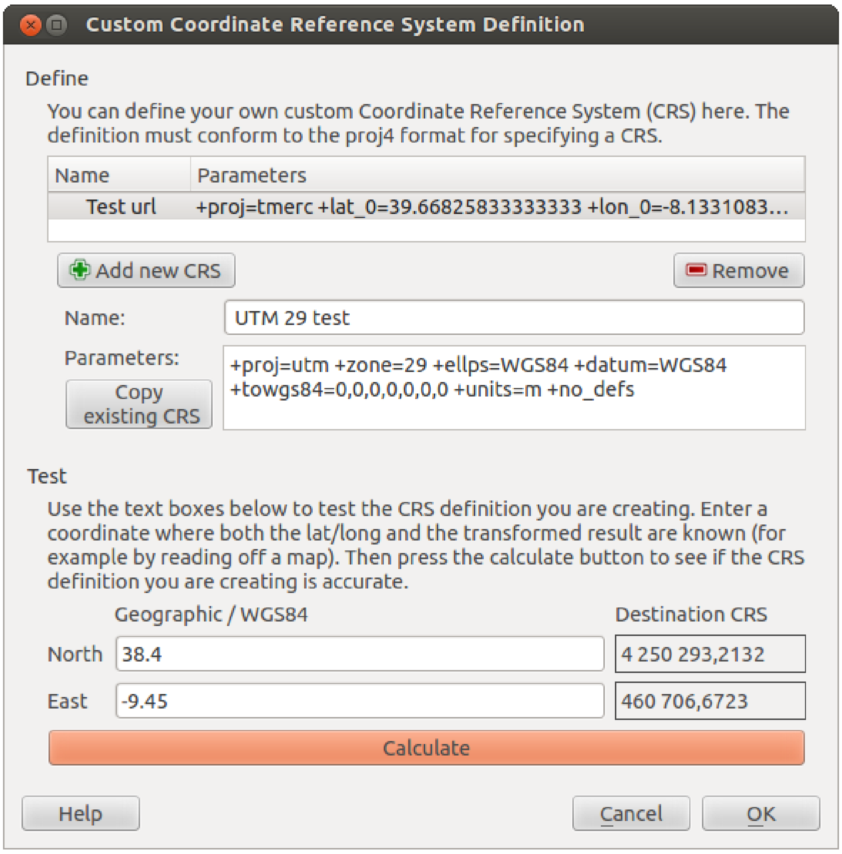

Figure 10.3: Custom CRS Dialog

まともな結果が得られるかを見ることで、CRS パラメータをテストできます。これを行うには、知っている WGS84 緯度経度の値を *North* 、 *East* フィールドにそれぞれ入力します。 **[計算]** をクリックして、出てきた結果と、定義した CRS での知っている値とを比較します。

10.5 デフォルト datum 変換

OTF depends on being able to transform data into a 'default CRS', and QGIS uses WGS84. For some CRS there are a number of transforms available. QGIS allows you to define the transformation used otherwise QGIS uses a default transformation.

In the *CRS* tab under *Settings* → *Options* you can:

- set QGIS to ask you when it needs define a transformation using *Ask for datum transformation when no default is defined*
- 変換のユーザーデフォルトリストの編集.

QGIS asks which transformation to use by opening a dialogue box displaying PROJ.4 text describing the source and destination transforms. Further information may be found by hovering over a transform. User defaults can be saved by selecting *Remember selection*.

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Chapter 11

QGIS Browser

The QGIS Browser is a panel in QGIS that lets you easily navigate in your filesystem and manage geodata. You can have access to common vector files (e.g., ESRI shapefiles or MapInfo files), databases (e.g., PostGIS, Oracle, SpatiaLite or MS SQL Spatial) and WMS/WFS connections. You can also view your GRASS data (to get the data into QGIS, see *GRASS GIS* **の統合**).

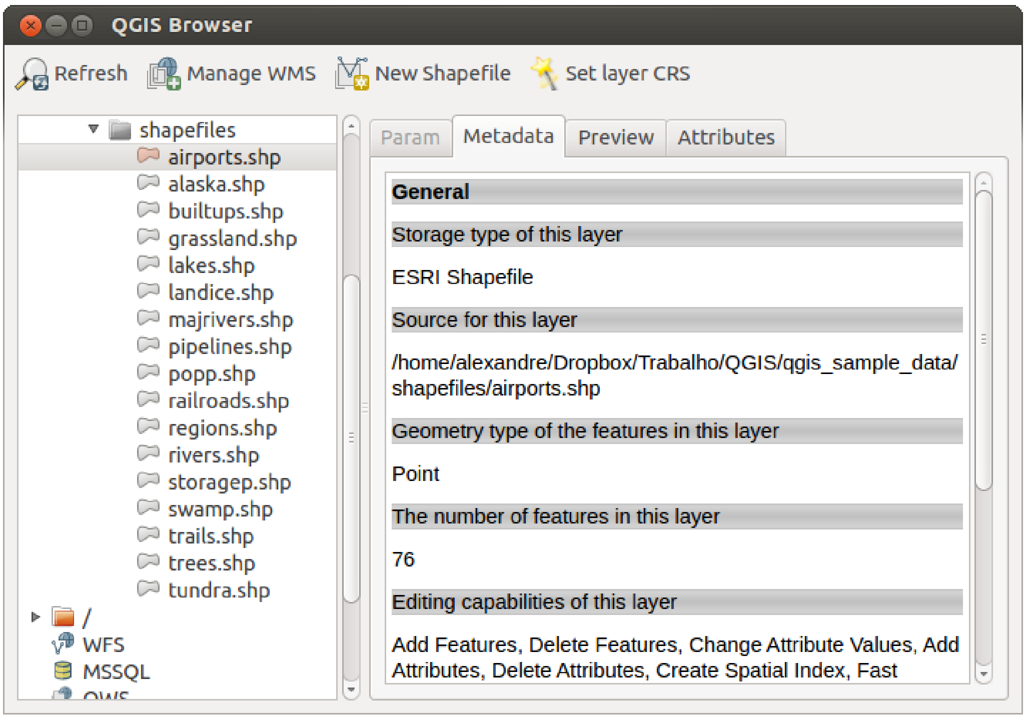

Figure 11.1: QGIS browser as a stand alone application

Use the QGIS Browser to preview your data. The drag-and-drop function makes it easy to get your data into the map view and the map legend.

1. Activate the QGIS Browser: Right-click on the toolbar and check *Browser* or select it from *Settings* → *Panels*.
2. Drag the panel into the legend window and release it.
3. Click on the *Browser* tab.
4. Browse in your filesystem and choose the `shapefile` folder from `qgis_sample_data` directory.
5. Press the `Shift` key and select the `airports.shp` and `alaska.shp` files.

6. Press the left mouse button, then drag and drop the files into the map canvas.
7. Right-click on a layer and choose *Set project CRS from layer*. For more information see **投影法の利用方法**.
8. Click on Zoom Full to make the layers visible.

There is a second browser available under *Settings* → *Panels*. This is handy when you need to move files or layers between locations.

1. Activate a second QGIS Browser: Right-click on the toolbar and check *Browser (2)*, or select it from *Settings* → *Panels*.
2. Drag the panel into the legend window.
3. Navigate to the *Browser (2)* tab and browse for a shapefile in your file system.
4. Select a file with the left mouse button. Now you can use the Add Selected Layers icon to add it into the current project.

QGIS automatically looks for the coordinate reference system (CRS) and zooms to the layer extent if you work in a blank QGIS project. If there are already files in your project, the file will just be added, and in the case that it has the same extent and CRS, it will be visualized. If the file has another CRS and layer extent, you must first right-click on the layer and choose *Set Project CRS from Layer*. Then choose *Zoom to Layer Extent*.

The Filter files function works on a directory level. Browse to the folder where you want to filter files and enter a search word or wildcard. The Browser will show only matching filenames – other data won't be displayed.

It's also possible to run the QGIS Browser as a stand-alone application.

QGIS ブラウザの起動

- コマンドプロンプトで "qbrowser" と入力します。
- Start the QGIS Browser using the Start menu or desktop shortcut.
- The QGIS Browser is available from your Applications folder.

In figure_browser_standalone_metadata, you can see the enhanced functionality of the stand-alone QGIS Browser. The *Param* tab provides the details of your connection-based datasets, like PostGIS or MSSQL Spatial. The *Metadata* tab contains general information about the file (see **メタデータメニュー**). With the *Preview* tab, you can have a look at your files without importing them into your QGIS project. It's also possible to preview the attributes of your files in the *Attributes* tab.

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Chapter 12

ベクタデータの操作

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12.1 サポートされるデータ形式

QGIS uses the OGR library to read and write vector data formats, including ESRI shapefiles, MapInfo and MicroStation file formats, AutoCAD DXF, PostGIS, SpatiaLite, Oracle Spatial and MSSQL Spatial databases, and many more. GRASS vector and PostgreSQL support is supplied by native QGIS data provider plugins. Vector data can also be loaded in read mode from zip and gzip archives into QGIS. As of the date of this document, 69 vector formats are supported by the OGR library (see OGR-SOFTWARE-SUITE in **文献と** *Web* **参照**). The complete list is available at http://www.gdal.org/ogr/ogr_formats.html.

ノート: Not all of the listed formats may work in QGIS for various reasons. For example, some require external commercial libraries, or the GDAL/OGR installation of your OS may not have been built to support the format you want to use. Only those formats that have been well tested will appear in the list of file types when loading a vector into QGIS. Other untested formats can be loaded by selecting `*.*`.

GRASS ベクタデータの利用方法はセクション *GRASS GIS* **の統合** に記述されています.

This section describes how to work with several common formats: ESRI shapefiles, PostGIS layers, SpatiaLite layers, OpenStreetMap vectors, and Comma Separated data (CSV). Many of the features available in QGIS work the same, regardless of the vector data source. This is by design, and it includes the identify, select, labeling and attributes functions.

12.1.1 ESRI Shapefiles

The standard vector file format used in QGIS is the ESRI shapefile. Support is provided by the OGR Simple Feature Library (http://www.gdal.org/ogr/).

ひとつの shapefile は実際多くのファイルで構成されています. 以下の 3 個が必須のものです:

1. `.shp` ファイルは地物のジオメトリを持ちます.
2. `.dbf` ファイルは dBase 形式で属性を保持します.
3. `.shx` はインデックスファイルです.

Shapefiles ではさらに `.prj` という拡張子のファイルが含まれることがあります, このファイルには投影法の情報が保持されています. プロジェクションファイルがあると便利ですが, このファイルは必須のファイルではありません. shapefile データセットは追加のファイルを持つことができます. さらに詳細な情報は ESRI technical specification at: http://www.esri.com/library/whitepapers/pdfs/shapefile.pdf を参照して下さい.

Loading a Shapefile

To load a shapefile, start QGIS and click on the Add Vector Layer toolbar button, or simply press `Ctrl+Shift+V`. This will bring up a new window (see figure_vector_1).

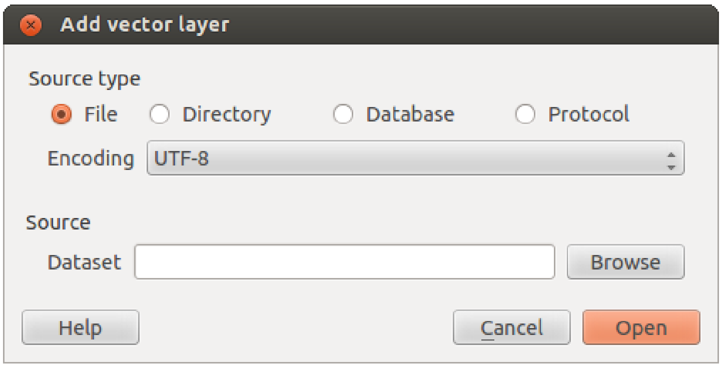

Figure 12.1: Add Vector Layer Dialog

From the available options check *File*. Click on **[Browse]**. That will bring up a standard open file dialog (see figure_vector_2), which allows you to navigate the file system and load a shapefile or other supported data source. The selection box *Filter* allows you to preselect some OGR-supported file formats.

You can also select the encoding for the shapefile if desired.

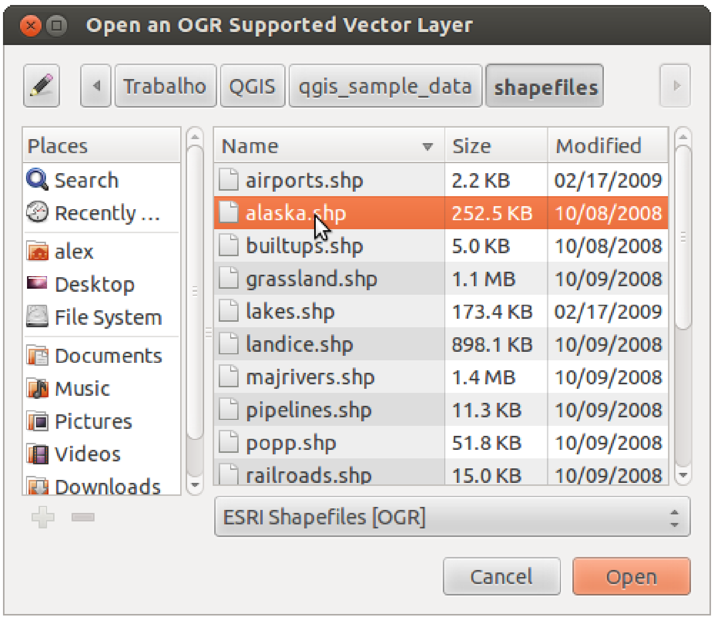

Figure 12.2: Open an OGR Supported Vector Layer Dialog

Selecting a shapefile from the list and clicking **[Open]** loads it into QGIS. Figure_vector_3 shows QGIS after loading the `alaska.shp` file.

ちなみに: レイヤ色

地図にレイヤを追加するとランダムな色が割り当てられます. 複数のレイヤを一度に追加することができますが, その場合それぞれのレイヤには異なる色が割り当てられます.

Once a shapefile is loaded, you can zoom around it using the map navigation tools. To change the style of a layer, open the *Layer Properties* dialog by double clicking on the layer name or by right-clicking on the name in the

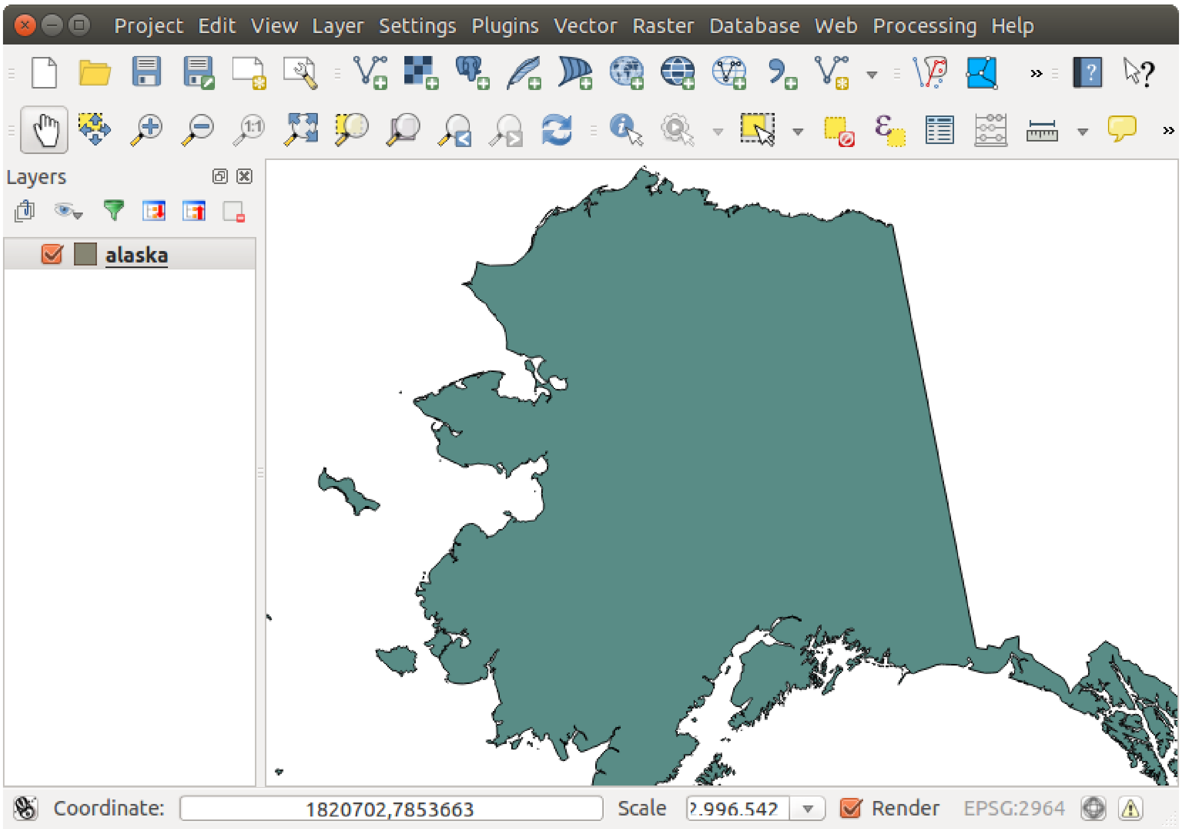

Figure 12.3: QGIS with Shapefile of Alaska loaded

legend and choosing *Properties* from the context menu. See section **スタイルメニュー** for more information on setting symbology of vector layers.

ちなみに: OS X で外部ドライブからレイヤとプロジェクトをロードする

OS X でプライマリハードドライブ以外にマウントされるポータブルドライブは *File* → *Open Project* に期待されているように表示されません. 私たちは OS X-ネイティブ open/save ダイアログを作ることでこの問題を解決しました. ファイル名ボックスで作業するときに '/Volumes' と打ち込んでから `return` を押してください. そうすると外部ドライブやネットワークマウントの中を見ることができます.

Improving Performance for Shapefiles

To improve the performance of drawing a shapefile, you can create a spatial index. A spatial index will improve the speed of both zooming and panning. Spatial indexes used by QGIS have a `.qix` extension.

これらの手順でインデックスを作成できます:

- Load a shapefile by clicking on the Add Vector Layer toolbar button or pressing `Ctrl+Shift+V`.
- Open the *Layer Properties* dialog by double-clicking on the shapefile name in the legend or by right-clicking and choosing *Properties* from the context menu.
- In the *General* tab, click the **[Create Spatial Index]** button.

Problem loading a shape .prj file

If you load a shapefile with a `.prj` file and QGIS is not able to read the coordinate reference system from that file, you will need to define the proper projection manually within the *General* tab of the *Layer Properties* dialog of the layer by clicking the **[Specify...]** button. This is due to the fact that `.prj` files often do not provide the complete projection parameters as used in QGIS and listed in the *CRS* dialog.

For the same reason, if you create a new shapefile with QGIS, two different projection files are created: a `.prj` file with limited projection parameters, compatible with ESRI software, and a `.qpj` file, providing the complete parameters of the used CRS. Whenever QGIS finds a `.qpj` file, it will be used instead of the `.prj`.

12.1.2 Loading a MapInfo Layer

To load a MapInfo layer, click on the Add Vector Layer toolbar button; or type `Ctrl+Shift+V`, change the file type filter *Files of type* : to 'Mapinfo File [OGR] (*.mif *.tab *.MIF *.TAB)' and select the MapInfo layer you want to load.

12.1.3 Loading an ArcInfo Binary Coverage

To load an ArcInfo Binary Coverage, click on the Add Vector Layer toolbar button or press `Ctrl+Shift+V` to open the *Add Vector Layer* dialog. Select *Directory* as *Source type*. Change the file type filter *Files of type* to 'Arc/Info Binary Coverage'. Navigate to the directory that contains the coverage file, and select it.

Similarly, you can load directory-based vector files in the UK National Transfer Format, as well as the raw TIGER Format of the US Census Bureau.

12.1.4 デリミテッドテキストファイル

表形式のデータは読みやすくシンプルなので広く共通に利用される形式です – データはプレインテキストエディタで閲覧や編集もできます. デリミテッドテキストファイルはそれぞれのカラムが指定された文字で区切られ各行がラインブレークで構成されている属性テーブルです. 通常最初の行にはカラム名が格納されます. 一般的なデリミテッドテキストファイルはそれぞれのカラムがコンマで区切られた CSV です (Comma Separated Values).

そのようなデータファイルは位置情報を 2 種類の形式で持つことができます:

- 点の座標を区切られたカラムとして持ちます
- ウェルノウンテキスト (WKT) としてジオメトリをあらわします

QGIS allows you to load a delimited text file as a layer or ordinal table. But first check that the file meets the following requirements:

1. ファイルは区切り文字で区切られたフィールド名が記述されたヘッダ行が必要です. これはテキストファイルの先頭の行になければいけません.
2. ヘッダ行はジオメトリが定義されたカラムを持たなければいけません. これらのフィールドは任意の名前をつけられます.
3. x 座標と y 座標は (ジオメトリが座標で定義されている場合) 数値である必要があります. 座標系は重要ではありません.

As an example of a valid text file, we import the elevation point data file `elevp.csv` that comes with the QGIS sample dataset (see section **サンプルデータ**):

```
X;Y;ELEV
-300120;7689960;13
-654360;7562040;52
1640;7512840;3
[...]
```

このサンプルテキストファイルについての解説:

1. 例のテキストファイルでは ; (セミコロン) を区切り文字として使っています. どんな文字でもフィールドの区切り文字として使うことができます.
2. 最初の行はヘッダーです. それには X, Y および "ELEV"のフィールドが含まれています.
3. 引用符 (") はテキストフィールドを区切るのに使われません
4. X 座標は "X" フィールドに含まれています.
5. y 座標は "Y"フィールドに含まれています.

デリミテッドテキストファイルをロードしています

Click the toolbar icon Add Delimited Text Layer in the *Manage layers* toolbar to open the *Create a Layer from a Delimited Text File* dialog, as shown in figure_delimited_text_1.

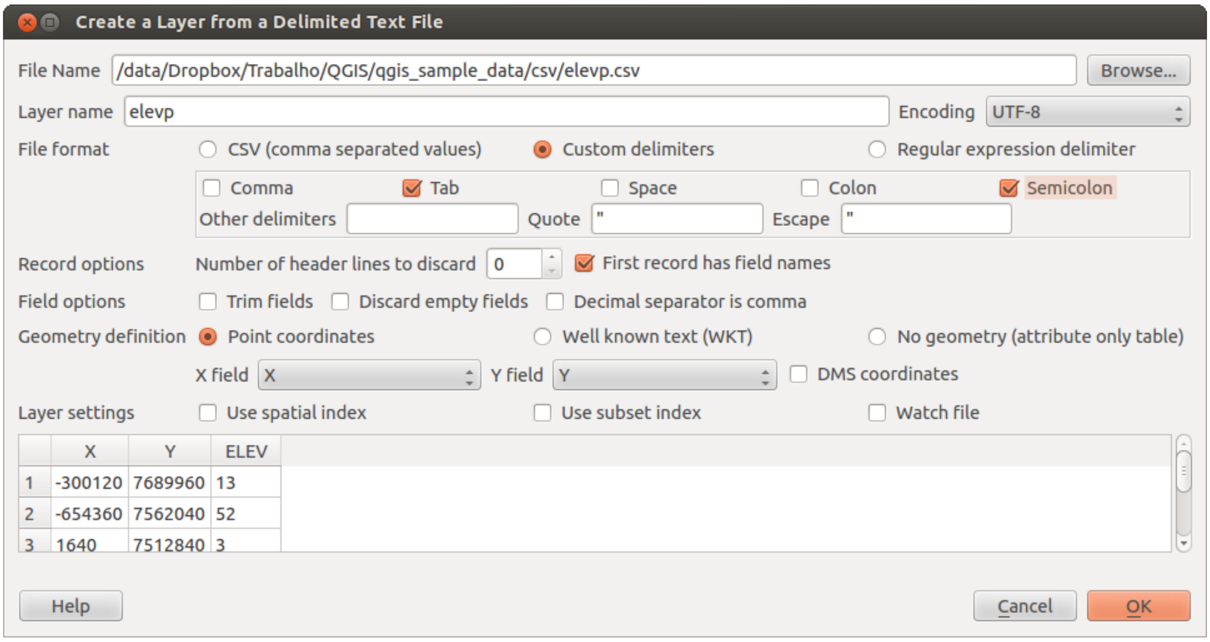

Figure 12.4: Delimited Text Dialog

First, select the file to import (e.g., `qgis_sample_data/csv/elevp.csv`) by clicking on the **[Browse]** button. Once the file is selected, QGIS attempts to parse the file with the most recently used delimiter. To enable QGIS to properly parse the file, it is important to select the correct delimiter. You can specify a delimiter by activating *Custom delimiters*, or by activating *Regular expression delimiter* and entering text into the *Expression* field. For example, to change the delimiter to tab, use `\t` (this is a regular expression for the tab character).

Once the file is parsed, set *Geometry definition* to *Point coordinates* and choose the `X` and `Y` fields from the dropdown lists. If the coordinates are defined as degrees/minutes/seconds, activate the *DMS coordinates* checkbox.

Finally, enter a layer name (e.g., `elevp`), as shown in figure_delimited_text_1. To add the layer to the map, click **[OK]**. The delimited text file now behaves as any other map layer in QGIS.

フィールドの前と後の空白を除去するヘルパーオプションがあります — **前後の空白削除**. またこのオプションも使えます Also **空フィールドを削除**. 必要ならばコンマを数字の桁区切り文字にすることができます **コンマを小数点区切りに利用**.

If spatial information is represented by WKT, activate the *Well Known Text* option and select the field with the WKT definition for point, line or polygon objects. If the file contains non-spatial data, activate *No geometry (attribute only table)* and it will be loaded as an ordinal table.

Additionaly, you can enable:

- **空間インデックスの利用** をチェックすると表示のパフォーマンスや空間条件での地物選択パフォーマンスを向上させます.
- **サブセットインデックスの利用**.
- *Watch file* to watch for changes to the file by other applications while QGIS is running.

12.1.5 OpenStreetMap データ

In recent years, the OpenStreetMap project has gained popularity because in many countries no free geodata such as digital road maps are available. The objective of the OSM project is to create a free editable map of the world from GPS data, aerial photography or local knowledge. To support this objective, QGIS provides suppport for OSM data.

OpenStreetMap ベクタの読み込み

QGIS integrates OpenStreetMap import as a core functionality.

- OSM サーバに接続してデータをダウンロードするためにはメニューの **ベクタ** → *Openstreetmap* → *Load data* を選択して下さい. もし JOSM や Overpass API や他のソースを使って `.osm` XML ファイルをすでに取得している場合はこのステップをスキップできます.
- メニュー **ベクタ** → *Openstreetmap* → *XML* **からトポロジーインポート** を使うと `.osm` ファイルを spatialite データベースに変換して db 接続を作成します.
- The menu *Vector* → *Openstreetmap* → *Export topology to SpatiaLite* then allows you to open the database connection, select the type of data you want (points, lines, or polygons) and choose tags to import. This creates a SpatiaLite geometry layer that you can add to your project by clicking on the Add SpatiaLite Layer toolbar button or by selecting the *Add SpatiaLite Layer...* option from the *Layer* menu (see section *SpatiaLite* **レイヤ**).

12.1.6 PostGIS レイヤ

PostGIS layers are stored in a PostgreSQL database. The advantages of PostGIS are the spatial indexing, filtering and query capabilities it provides. Using PostGIS, vector functions such as select and identify work more accurately than they do with OGR layers in QGIS.

ストアドコネクションの作成

The first time you use a PostGIS data source, you must create a connection to the PostgreSQL database that contains the data. Begin by clicking on the Add PostGIS Layer toolbar button, selecting the *Add PostGIS Layer...* option from the *Layer* menu, or typing `Ctrl+Shift+D`. You can also open the *Add Vector Layer* dialog and select *Database*. The *Add PostGIS Table(s)* dialog will be displayed. To access the connection manager, click on the **[New]** button to display the *Create a New PostGIS Connection* dialog. The parameters required for a connection are:

- **Name**: このコネクションの名前. *Database* と同じにすることも可能.
- **Service**: hostname/port (それと利用可能データベース) の代わりに利用するサービスパラメータ. これはファイル `pg_service.conf` にも定義できます

- **Host**: Name of the database host. This must be a resolvable host name such as would be used to open a telnet connection or ping the host. If the database is on the same computer as QGIS, simply enter *'localhost'* here.
- **Port**: PostgreSQL データベースサーバが接続待ちをしているポート番号. デフォルトポートは 5432 です.
- **データベース**: データベースの名称
- **SSL mode**: How the SSL connection will be negotiated with the server. Note that massive speedups in PostGIS layer rendering can be achieved by disabling SSL in the connection editor. The following options are available:
  - Disable: 暗号化されていない SSL 接続の場合のみ試みる
  - allow: SSL コネクションの試行に失敗した場合非 SSL コネクションの試行をする.
  - prefer (デフォルトです): SSL コネクションを試行します. もし失敗したら非 SSL コネクションを試行します.
  - require: SSL コネクションのみを試行します.
- **Username**: データベースにログインするユーザー名.
- **Password**: データベースに接続するために *Username* と一緒に利用するパスワード.

オプションで以下のチェックボックスをアクティブにできます:

- **ユーザ名の保存**
- **パスワードの保存**
- :guilabel: *geometry_columns* **テーブルの中のみを参照する**
- **制限されていないカラム** *(GEOMETRY)* **の型解決を行わない**
- :guilabel:' 'public' スキーマのみを参照する '
- **ジオメトリを持たないテーブルもリストする**
- **推定されるテーブルメタデータを利用する**

すべてのパラメータとオプションを設定した後で **[接続テスト]** ボタンをクリックして接続テストを行うことができます.

PostGIS レイヤの読み込み

Once you have one or more connections defined, you can load layers from the PostgreSQL database. Of course, this requires having data in PostgreSQL. See section *PostgreSQL* **へのデータインポート** for a discussion on importing data into the database.

PostGIS からレイヤをロードするには、以下のステップを実行します：

- If the *Add PostGIS layers* dialog is not already open, selecting the *Add PostGIS Layer...* option from the *Layer* menu or typing `Ctrl+Shift+D` opens the dialog.
- ドロップダウンリストから接続を選択して **[Connect]** をクリックして下さい.
- **ジオメトリを持たないテーブルもリストする** を選択または非選択にできます
- オプションで *Search Options* 使うとレイヤからどの地物をロードするか定義できます, また **[Build query]** ボタンを使うと *Query builder* ダイアログを開始できます.
- 有効なレイヤリストからあなたが利用したいレイヤを探してください.

- クリックすると選択できます. `Shift` キーを押しながらクリックすると複数のレイヤを選択することができます. PostgreSQL クエリビルダを使ってレイヤを高度に利用する方法についてはセクション **クエリビルダー** を参照して下さい.
- **[追加]** ボタンをクリックし、マップにレイヤを追加します。

ちなみに: PostGIS レイヤ

Normally, a PostGIS layer is defined by an entry in the geometry_columns table. From version 0.9.0 on, QGIS can load layers that do not have an entry in the geometry_columns table. This includes both tables and views. Defining a spatial view provides a powerful means to visualize your data. Refer to your PostgreSQL manual for information on creating views.

PostgreSQL レイヤに関する詳細情報

This section contains some details on how QGIS accesses PostgreSQL layers. Most of the time, QGIS should simply provide you with a list of database tables that can be loaded, and it will load them on request. However, if you have trouble loading a PostgreSQL table into QGIS, the information below may help you understand any QGIS messages and give you direction on changing the PostgreSQL table or view definition to allow QGIS to load it.

QGIS requires that PostgreSQL layers contain a column that can be used as a unique key for the layer. For tables, this usually means that the table needs a primary key, or a column with a unique constraint on it. In QGIS, this column needs to be of type int4 (an integer of size 4 bytes). Alternatively, the ctid column can be used as primary key. If a table lacks these items, the oid column will be used instead. Performance will be improved if the column is indexed (note that primary keys are automatically indexed in PostgreSQL).

If the PostgreSQL layer is a view, the same requirement exists, but views do not have primary keys or columns with unique constraints on them. You have to define a primary key field (has to be integer) in the QGIS dialog before you can load the view. If a suitable column does not exist in the view, QGIS will not load the layer. If this occurs, the solution is to alter the view so that it does include a suitable column (a type of integer and either a primary key or with a unique constraint, preferably indexed).

QGIS offers a checkbox **Select at id** that is activated by default. This option gets the ids without the attributes which is faster in most cases. It can make sense to disable this option when you use expensive views.

ちなみに: Backup of PostGIS database with layers saved by QGIS

If you want to make a backup of your PostGIS database using the `pg_dump` and `pg_restore` commands the default layer styles as saved by QGIS are failing to restore afterwards. You need to set the XML option to `DOCUMENT` and the restore will work.

12.1.7 PostgreSQL へのデータインポート

Data can be imported into PostgreSQL/PostGIS using several tools, including the SPIT plugin and the command line tools shp2pgsql and ogr2ogr.

DB マネージャ

QGIS comes with a core plugin named DB Manager. It can be used to load shapefiles and other data formats, and it includes support for schemas. See section *DB* **マネージャプラグイン** for more information.

shp2pgsql

PostGIS は shapefile を PostGIS にインポートする **shp2pgsql** というユーティリティを持っています. 例えば `lakes.shp` という shapefile を `gis_data` という PostgreSQL データベースにインポートする場合以下の

コマンドを使って下さい:

```
shp2pgsql -s 2964 lakes.shp lakes_new | psql gis_data
```

ここで `gis_data` データベースに `lakes_new` という名前の新しいレイヤが作成されます. 新しいレイヤは 2964 という空間参照識別子 (SRID) を持ちます. 空間参照システムと投影についてはセクション **投影法の利用方法** を参照して下さい.

ちなみに: PostGIS からデータセットをエキスポートする

インポートツール **shp2pgsql** と同じように PostGIS-データセットを shapefile としてエキスポートするツールがあります: **pgsql2shp**. これはあなたの PostGIS ディストリビューションと一緒に出荷されています.

ogr2ogr

Besides **shp2pgsql** and **DB Manager**, there is another tool for feeding geodata in PostGIS: **ogr2ogr**. This is part of your GDAL installation.

shapefile を PostGIS にインポートする手順は以下のとおりです:

```
ogr2ogr -f "PostgreSQL" PG:"dbname=postgis host=myhost.de user=postgres
password=topsecret" alaska.shp
```

これによって shapefile `alaska.shp` を サーバ *myhost.de*. の PostGIS データベース *postgis* にユーザ *postgres* パスワード *topsecret* でインポートします.

注 PostGIS をサポートする場合は OGR が PostgreSQL を組み込んでビルドされていなければなりません. 次のようにタイプすると確認できます (の場合)

```
ogrinfo --formats | grep -i post
```

もしデフォルトの **INSERT INTO** メソッドの代わりに PostgreSQL の **COPY** -command を使いたい場合は以下の環境変数をエキスポートすることができます (少なくても と の場合は可能です):

```
export PG_USE_COPY=YES
```

ogr2ogr は **shp2pgsl** のように空間インデックスを作成しません. 空間インデックスを作るためには特別ステップとして手動で通常の SQL コマンド **CREATE INDEX** を発行する必要があります (次のセクション **パフォーマンスの改善** で説明しています).

パフォーマンスの改善

Retrieving features from a PostgreSQL database can be time-consuming, especially over a network. You can improve the drawing performance of PostgreSQL layers by ensuring that a PostGIS spatial index exists on each layer in the database. PostGIS supports creation of a GiST (Generalized Search Tree) index to speed up spatial searches of the data (GiST index information is taken from the PostGIS documentation available at http://postgis.refractions.net).

GIST インデックス作成シンタックスは次のとおりです

```
CREATE INDEX [indexname] ON [tablename]
  USING GIST ( [geometryfield] GIST_GEOMETRY_OPS );
```

注　巨大テーブルでインデックスを作ると長い時間がかかります. 一度インデックスを作成したら `VACUUM ANALYZE` を実行する必要があります. 詳しくは PostGIS ドキュメンテーション (POSTGIS-PROJECT **文献と *Web* 参照**) を見て下さい.

以下はＧＩＳＴインデックス作成の例です

```
gsherman@madison:~/current$ psql gis_data
Welcome to psql 8.3.0, the PostgreSQL interactive terminal.

Type:  \copyright for distribution terms
       \h for help with SQL commands
       \? for help with psql commands
       \g or terminate with semicolon to execute query
       \q to quit

gis_data=# CREATE INDEX sidx_alaska_lakes ON alaska_lakes
gis_data-# USING GIST (the_geom GIST_GEOMETRY_OPS);
CREATE INDEX
gis_data=# VACUUM ANALYZE alaska_lakes;
VACUUM
gis_data=# \q
gsherman@madison:~/current$
```

12.1.8 経度 180 °をまたぐベクタレイヤ

Many GIS packages don't wrap vector maps with a geographic reference system (lat/lon) crossing the 180 degrees longitude line (http://postgis.refractions.net/documentation/manual-2.0/ST_Shift_Longitude.html). As result, if we open such a map in QGIS, we will see two far, distinct locations, that should appear near each other. In Figure_vector_4, the tiny point on the far left of the map canvas (Chatham Islands) should be within the grid, to the right of the New Zealand main islands.

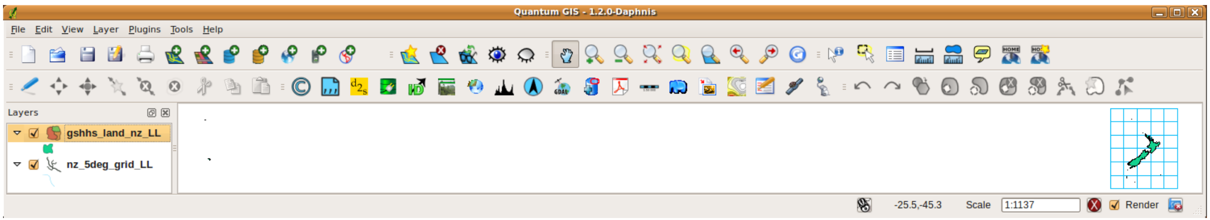

Figure 12.5: Map in lat/lon crossing the 180 ° longitude line

この問題の回避方法は経度の値を PostGIS の **ST_Shift_Longitude** 関数を使って変換することです この関数はジオメトリのそれぞれの地物のコンポーネント中の点/頂点を読んで, それの経度が < 0 °の場合 360 °を加算します. その結果は 0 ° - 360 °の間になり 180 °が中心の地図にプロットできます.

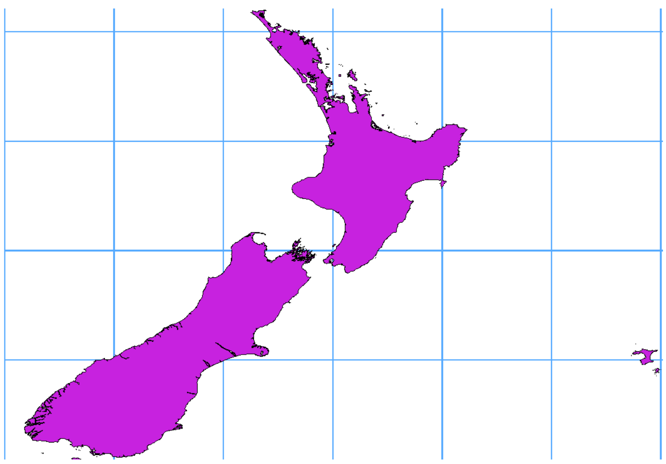

Figure 12.6: 経度 180 °をまたぐため **ST_Shift_Longitude** 関数の適用した結果

利用方法

- DB マネージャプラグインを利用した PostGIS (*PostgreSQL* **へのデータインポート**) へのデータインポート例.
- PostGIS コマンドラインインターフェースを利用して以下のコマンドを発行して下さい (これは例で "TABLE" のところはあなたの PostGIS テーブルの実際の名前にして下さい): `gis_data=# update TABLE set the_geom=ST_Shift_Longitude(the_geom);`
- すべてがうまくいけば更新された地物の数についての確認を求められます, それから地図をロードして違いを見ることができるでしょう (Figure_vector_5).

12.1.9 SpatiaLite レイヤ

The first time you load data from a SpatiaLite database, begin by clicking on the Add SpatiaLite Layer toolbar button, or by selecting the *Add SpatiaLite Layer...* option from the *Layer* menu, or by typing `Ctrl+Shift+L`. This will bring up a window that will allow you either to connect to a SpatiaLite database already known to QGIS, which you can choose from the drop-down menu, or to define a new connection to a new database. To define a new connection, click on **[New]** and use the file browser to point to your SpatiaLite database, which is a file with a `.sqlite` extension.

ベクタレイヤを SpatiaLite 形式で保存したい場合凡例でそのレイヤを右クリックして下さい. それから **名前をつけて保存**.., を選択して出力ファイル名を指定して下さい, 'SpatiaLite' を形式として選択して CRS を指定して下さい. 'SQLite' を形式として選択することもできます, その場合 `SPATIALITE=YES` を OGR データソース作成オプションフィールドに指定して下さい. この指定で OGR に SpatiaLite データベースを作成することを伝えます. http://www.gdal.org/ogr/drv_sqlite.html も参照して下さい.

QGIS also supports editable views in SpatiaLite.

新規 SpatiaLite レイヤの作成

新しい Spatia Ｌｉｔｅレイヤを作成したい場合は **新規** *Spatialite* **レイヤの作成**. を参照して下さい.

ちなみに: SpatiaLite データ管理プラグイン

For SpatiaLite data management, you can also use several Python plugins: QSpatiaLite, SpatiaLite Manager or DB Manager (core plugin, recommended). If necessary, they can be downloaded and installed with the Plugin Installer.

12.1.10 MSSQL Spatial レイヤ

QGIS also provides native MS SQL 2008 support. The first time you load MSSQL Spatial data, begin by clicking on the Add MSSQL Spatial Layer toolbar button or by selecting the *Add MSSQL Spatial Layer...* option from the *Layer* menu, or by typing `Ctrl+Shift+M`.

12.1.11 Oracle Spatial レイヤ

The spatial features in Oracle Spatial aid users in managing geographic and location data in a native type within an Oracle database. QGIS now has support for such layers.

ストアドコネクションの作成

The first time you use an Oracle Spatial data source, you must create a connection to the database that contains the data. Begin by clicking on the Add Orcale Spatial Layer toolbar button, selecting the *Add Orcale Spatial Layer...* option from the *Layer* menu, or typing `Ctrl+Shift+O`. To access the connection manager, click on the **[New]** button to display the *Create a New Oracle Spatial Connection* dialog. The parameters required for a connection are:

- **Name**: このコネクションの名前. *Database* と同じにすることも可能.
- **Database** Oracle インスタンスの SID または SERVICE_NAME.
- **Host**: Name of the database host. This must be a resolvable host name such as would be used to open a telnet connection or ping the host. If the database is on the same computer as QGIS, simply enter *'localhost'* here.
- **Port**: Oracle データベースサーバが接続待ちをしているポート番号. デフォルトポートは 1521 です.
- **Username**: データベースにログインするユーザー名.
- **Password**: データベースに接続するために *Username* と一緒に利用するパスワード.

オプションで以下のチェックボックスをアクティブにできます:

- *Save Username* は接続構成にデータベースユーザ名を保存するかどうかを示しています.
- *Save Password* は接続構成にデータベースパスワードを保存するかどうかを示しています.
- *Only look in meta data table* は all_sdo_geom_metadata ビューに存在するテーブルのみ表示するように制限を行います. これをチェックすると空間情報テーブルの初期表示を高速化します.
- *Only look for user's tables* 空間テーブルを検索する場合に指定ユーザが所有するテーブルのみを検索する制約.
- *Also list tables with no geometry* デフォルトでジオメトリを持たないテーブルもリストすることを示します.
- *Use estimated table statistics for the layer metadata* Oracle テーブルのレイヤ設定するときに様々なメタデータが必要です. ここにはテーブルの行数, ジオメトリタイプ, 空間の領域等のデータが含まれます . テーブルの行数がとても多い場合このメタデータ作成に時間がかかります. このオプションを有効にすると以下の高速メタデータ操作が実行されます: 行数は all_tables.num_rows から取得されます. テーブルの領域はフィルターが適用されていても常に SDO_TUNE.EXTENTS_OF 関数で取得されます. テーブルのジオメトリは先頭の NULL でない 100 行のデータで判定されます.
- *Only existing geometry types* 存在しているジオメトリタイプのみリストを行い他の型の追加は行いません.

すべてのパラメータとオプションを設定した後で **[接続テスト]** ボタンをクリックして接続テストを行うことができます.

ちなみに: QGIS ユーザ設定とセキュリティ

Depending on your computing environment, storing passwords in your QGIS settings may be a security risk. Passwords are saved in clear text in the system configuration and in the project files! Your customized settings for QGIS are stored based on the operating system:

- 設定 はあなたのホームディレクトリの `.qgis2/` に格納されます.
- 設定はレジストリに格納されます.

ORACLE Spatial レイヤの読み込み

Once you have one or more connections defined, you can load layers from the Oracle database. Of course, this requires having data in Oracle.

ORACLE Spatial からレイヤをロードするには、以下のステップを実行してください：

- If the *Add Oracle Spatial layers* dialog is not already open, click on the Add Oracle Spatial Layer toolbar button.
- ドロップダウンリストから接続を選択して **[Connect]** をクリックして下さい.
- **ジオメトリを持たないテーブルもリストする** を選択または非選択にできます
- オプションで *Search Options* 使うとレイヤからどの地物をロードするか定義できます, また **[Build query]** ボタンを使うと *Query builder* ダイアログを開始できます.
- 有効なレイヤリストからあなたが利用したいレイヤを探してください.
- クリックするとそれを選択できます. `Shift` キーを押しながらクリックすると複数のレイヤを選択することができます. PostgreSQL クエリビルダを使ってレイヤを高度に利用する方法についてはセクション **クエリビルダー** を参照して下さい.
- **[追加]** ボタンをクリックし、マップにレイヤを追加します。

ちなみに: Oracle Spatial レイヤ

通常 ORACLE Spatial レイヤは **USER_SDO_METADATA** テーブルのエントリで定義されています.

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12.2 The Symbol Library

12.2.1 Presentation

The Symbol Library is the place where users can create generic symbols to be used in several QGIS projects. It allows users to export and import symbols, groups symbols and add, edit and remove symbols. You can open it with the *Settings* → *Style Library* or from the **Style** tab in the vector layer's *Properties*.

Share and import symbols

Users can export and import symbols in two main formats: qml (QGIS format) and SLD (OGC standard). Note that SLD format is not fully supported by QGIS.

share item displays a drop down list to let the user import or export symbols.

Groups and smart groups

Groups are categories of Symbols and smart groups are dynamic groups.

To create a group, right-click on an existing group or on the main **Groups** directory in the left of the library. You can also select a group and click on the add item button.

To add a symbol into a group, you can either right click on a symbol then choose *Apply group* and then the group name added before. There is a second way to add several symbols into group: just select a group and click and choose **Group Symbols**. All symbols display a checkbox that allow you to add the symbol into the selected groups. When finished, you can click on the same button, and choose **Finish Grouping**.

Create **Smart Symbols** is similar to creating group, but instead select **Smart Groups**. The dialog box allow user to choose the expression to select symbols in order to appear in the smart group (contains some tags, member of a group, have a string in its name, etc.)

Add, edit, remove symbol

With the *Style manager* from the **[Symbol]** menu you can manage your symbols. You can add item, edit item, remove item and share item. 'Marker' symbols, 'Line' symbols, 'Fill' patterns and 'colour ramps' can be used to create the symbols. The symbols are then assigned to 'All Symbols', 'Groups' or 'Smart groups'.

For each kind of symbols, you will find always the same dialog structure:

- at the top left side a symbol representation
- under the symbol representation the symbol tree show the symbol layers
- at the right you can setup some parameter (unit,transparency, color, size and rotation)
- under these parameters you find some symbol from the symbols library

The symbol tree allow adding, removing or protect new simple symbol. You can move up or down the symbol layer.

More detailed settings can be made when clicking on the second level in the *Symbol layers* dialog. You can define *Symbol layers* that are combined afterwards. A symbol can consist of several *Symbol layers*. Settings will be shown later in this chapter.

ちなみに: Note that once you have set the size in the lower levels of the *Symbol layers* dialog, the size of the whole symbol can be changed with the *Size* menu in the first level again. The size of the lower levels changes accordingly, while the size ratio is maintained.

12.2.2 Marker Symbols

Marker symbols have several symbol layer types:

- Ellipse marker
- Font marker
- Simple marker (default)
- SVG marker
- Vector Field marker

The following settings are possible:

- *Symbol layer type*: You have the option to use Ellipse markers, Font markers, Simple markers, SVG markers and Vector Field markers.
- *colors*
- *Size*
- *Outline style*
- *Outline width*
- *Angle*
- *Offset X,Y*: You can shift the symbol in the x- or y-direction.
- *Anchor point*
- *Data defined properties ...*

12.2.3 Line Symbols

Line marker symbols have only two symbol layer types:

- Marker line
- Simple line (default)

The default symbol layer type draws a simple line whereas the other display a marker point regularly on the line. You can choose different location vertex, interval or central point. Marker line can have offset along the line or offset line. Finally, *rotation* allows you to change the orientation of the symbol.

The following settings are possible:

- *colour*
- *Pen width*
- *Offset*
- *Pen style*
- *Join style*
- *Cap style*
- *Use custom dash pattern*
- *Dash pattern unit*
- *Data defined properties ...*

12.2.4 Polygon Symbols

Polygon marker symbols have also several symbol layer types:

- Centroid fill
- Gradient fill
- Line pattern fill
- Point pattern fill
- Raster image fill
- SVG fill
- Shapeburst fill
- Simple fill (default)
- Outline: Marker line (same as line marker)
- Outline: simple line (same as line marker)

The following settings are possible:

- *Colors* for the border and the fill.
- *Fill style*
- *Border style*
- *Border width*
- *Offset X,Y*
- *Data defined properties ...*

Using the color combo box, you can drag and drop color for one color button to another button, copy-paste color, pick color from somewhere, choose a color from the palette or from recent or standard color. The combo box allow you to fill in the feature with transparency. You can also just click on the button to open the palettte dialog. Note that you can import color from some external software like GIMP.

With the 'Raster image fill' you can fill polygons with a tiled raster image. Options include (data defined) file name, opacity, image size (in pixels, mm or map units), coordinate mode (feature or view) and rotation.

'Gradient Fill' *Symbol layer type* allows you to select between a *Two color* and *Color ramp* setting. You can use the *Feature centroid* as *Referencepoint*. All fills 'Gradient Fill' *Symbol layer type* is also available through the *Symbol* menu of the Categorized and Graduated Renderer and through the *Rule properties* menu of the Rule-based renderer. Other possibility is to choose a 'shapeburst fill' which is a buffered gradient fill, where a gradient is drawn from the boundary of a polygon towards the polygon's centre. Configurable parameters include distance from the boundary to shade, use of color ramps or simple two color gradients, optional blurring of the fill and offsets.

It is possible to only draw polygon borders inside the polygon. Using 'Outline: Simple line' select *Draw line only inside polygon*.

12.2.5 Color ramp

You can create a custom color ramp choosing *New color ramp...* from the *color ramp* drop-down menu. A dialog will prompt for the ramp type: Gradient, Random, colorBrewer, or cpt-city. The first three have options for number of steps and/or multiple stops in the color ramp. You can use the *Invert* option while classifying the data with a color ramp. See figure_symbology_3 for an example of custom color ramp and figure_symbology_3a for the cpt-city dialog.

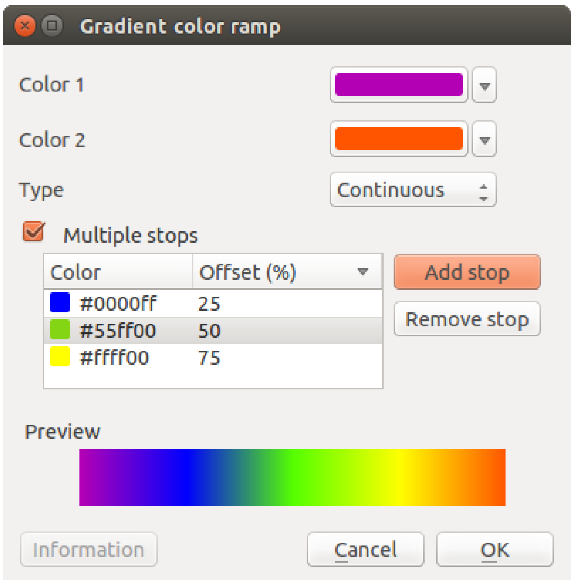

Figure 12.7: Example of custom gradient color ramp with multiple stops

The cpt-city option opens a new dialog with hundreds of themes included 'out of the box'.

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12.3 ベクタプロパティダイアログ

The *Layer Properties* dialog for a vector layer provides information about the layer, symbology settings and labeling options. If your vector layer has been loaded from a PostgreSQL/PostGIS datastore, you can also alter

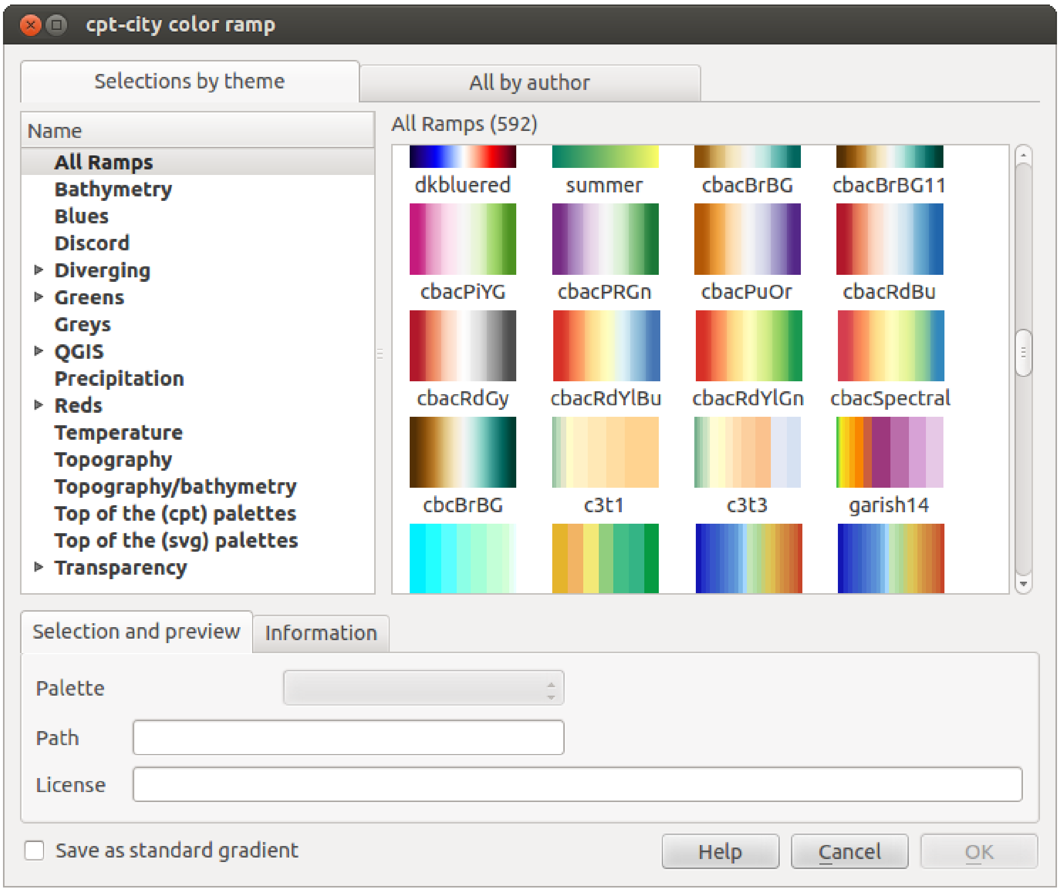

Figure 12.8: cpt-city dialog with hundreds of color ramps

the underlying SQL for the layer by invoking the *Query Builder* dialog on the *General* tab. To access the *Layer Properties* dialog, double-click on a layer in the legend or right-click on the layer and select *Properties* from the pop-up menu.

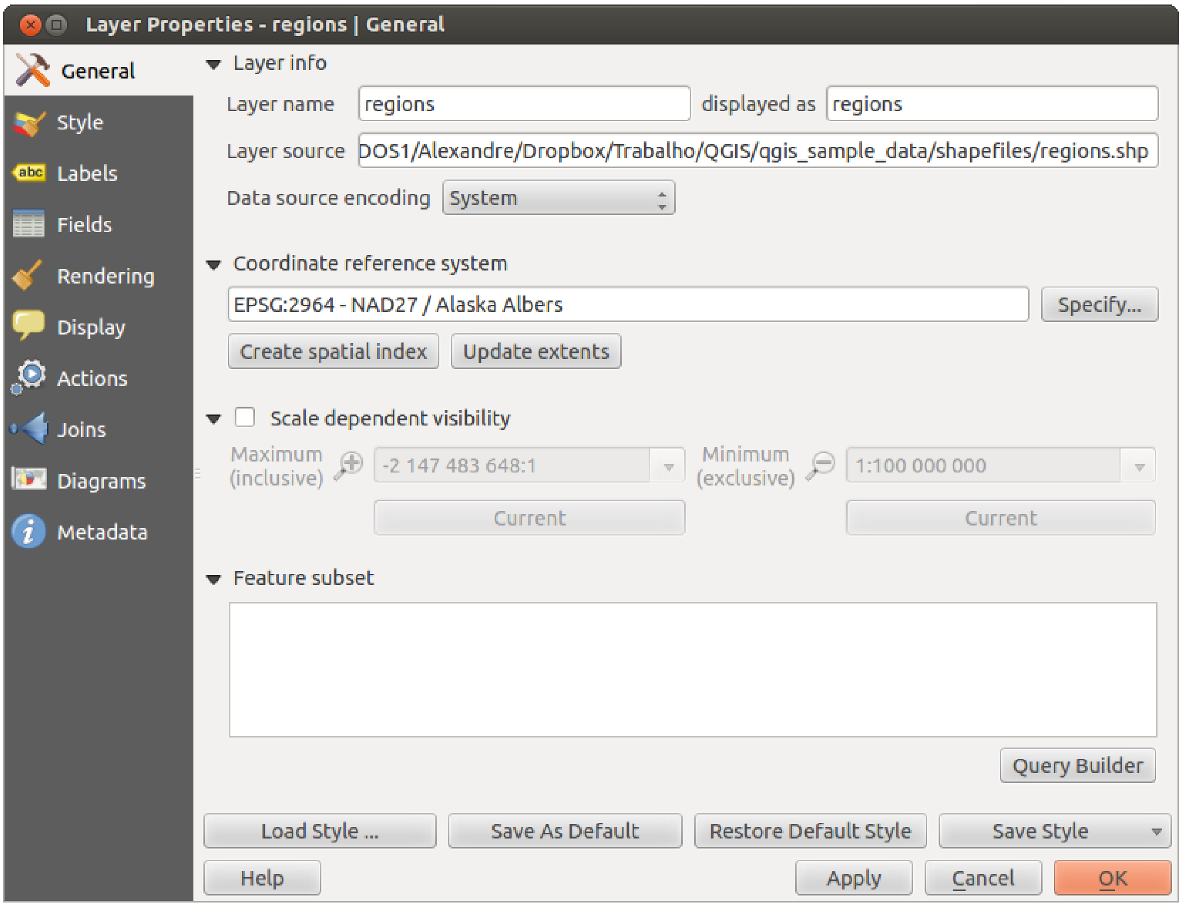

Figure 12.9: Vector Layer Properties Dialog

12.3.1 スタイルメニュー

The Style menu provides you with a comprehensive tool for rendering and symbolizing your vector data. You can use *Layer rendering* → tools that are common to all vector data, as well as special symbolizing tools that were designed for the different kinds of vector data.

Renderers

The renderer is responsible for drawing a feature together with the correct symbol. There are four types of renderers: single symbol, categorized, graduated and rule-based. There is no continuous color renderer, because it is in fact only a special case of the graduated renderer. The categorized and graduated renderers can be created by specifying a symbol and a color ramp - they will set the colors for symbols appropriately. For point layers, there is a point displacement renderer available. For each data type (points, lines and polygons), vector symbol layer types are available. Depending on the chosen renderer, the *Style* menu provides different additional sections. On the bottom right of the symbology dialog, there is a **[Symbol]** button, which gives access to the Style Manager (see *Presentation*). The Style Manager allows you to edit and remove existing symbols and add new ones.

After having made any needed changes, the symbol can be added to the list of current style symbols (using **[Symbol]** *Save in symbol library*), and then it can easily be used in the future. Furthermore, you can use the **[Save Style]** button to save the symbol as a QGIS layer style file (.qml) or SLD file (.sld). SLDs can be exported from any type of renderer – single symbol, categorized, graduated or rule-based – but when importing an SLD, either a single symbol or rule-based renderer is created. That means that categorized or graduated styles are converted to rule-based. If you want to preserve those renderers, you have to stick to the QML format. On the other hand, it can be very handy sometimes to have this easy way of converting styles to rule-based.

If you change the renderer type when setting the style of a vector layer the settings you made for the symbol will be maintained. Be aware that this procedure only works for one change. If you repeat changing the renderer type the settings for the symbol will get lost.

If the datasource of the layer is a database (PostGIS or Spatialite for example), you can save your layer style inside a table of the database. Just click on *Save Style* comboxbox and choose **Save in database** item then fill in the dialog to define a style name, add a description, an ui file and if the style is a default style. When loading a layer from the database, if a style already exists for this layer, QGIS will load the layer and its style. You can add several style in the database. Only one will be the default style anyway.

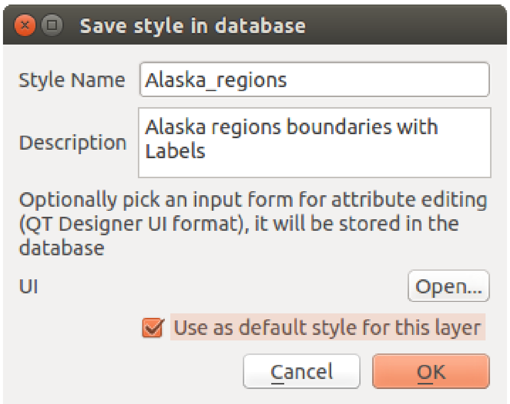

Figure 12.10: Save Style in database Dialog

ちなみに: 複数シンボルを選択して変更する

シンボロジでは複数のシンボルを選択して右クリックでそれらの色, 透過度, サイズや太さを変更できます.

Single Symbol Renderer

The Single Symbol Renderer is used to render all features of the layer using a single user-defined symbol. The properties, which can be adjusted in the *Style* menu, depend partially on the type of layer, but all types share the following dialog structure. In the top-left part of the menu, there is a preview of the current symbol to be rendered. On the right part of the menu, there is a list of symbols already defined for the current style, prepared to be used by selecting them from the list. The current symbol can be modified using the menu on the right side. If you click on the first level in the *Symbol layers* dialog on the left side, it's possible to define basic parameters like *Size*, *Transparency*, *color* and *Rotation*. Here, the layers are joined together.

In any spinbox in this dialog you can enter expressions. E.g. you can calculate simple math like multiplying the existing size of a point by 3 without resorting to a calculator.

If you click on the second level in the *Symbol layers* dialog a 'Data-defined override' for nearly all settings is possible. When using a data-defined color one may want to link the color to a field 'budged'. Here a comment functionality is inserted.

```
/* This expression will return a color code depending on the field value.
 * Negative value: red
 * 0 value: yellow
 * Positive value: green
 */
CASE
  WHEN value < 0 THEN '#DC143C' -- Negative value: red
  WHEN value = 0 THEN '#CCCC00' -- Value 0: yellow
  ELSE '#228B22'                -- Positive value: green
END
```

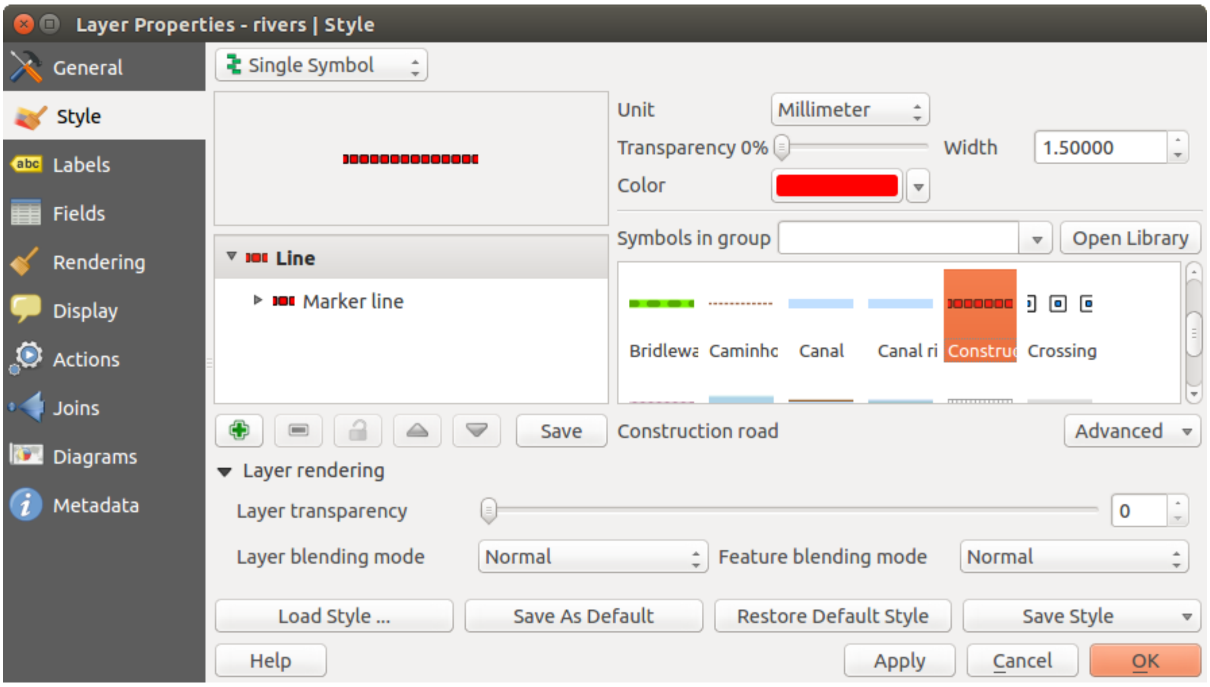

Figure 12.11: Single symbol line properties

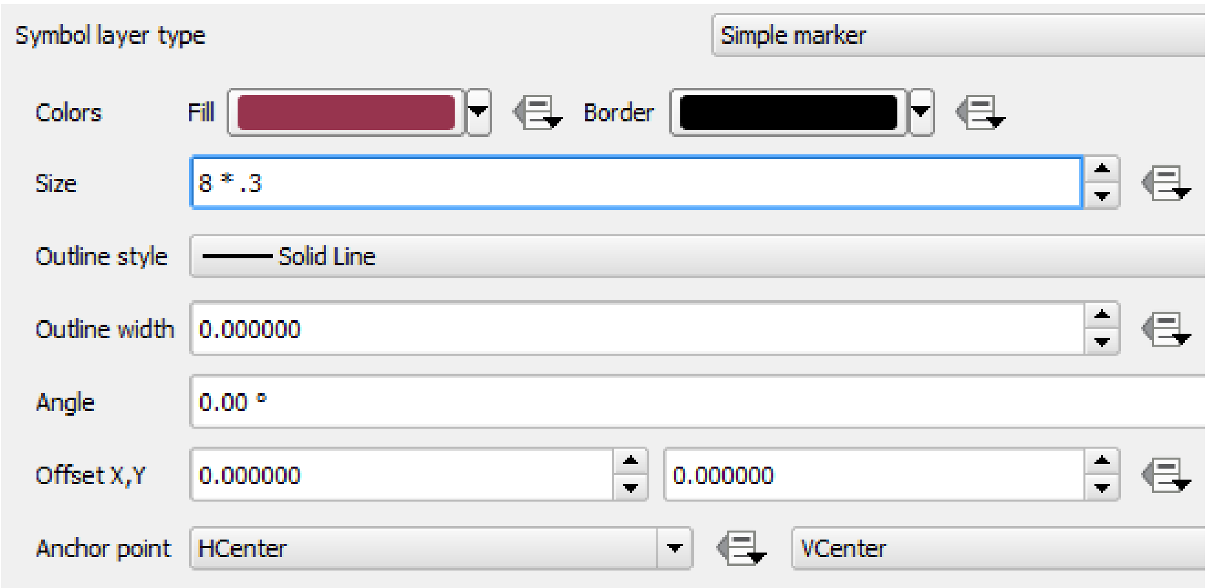

Figure 12.12: Expression in Size spinbox

Figure 12.13: Data-defined symbol with Edit... menu

Categorized Renderer

The Categorized Renderer is used to render all features from a layer, using a single user-defined symbol whose color reflects the value of a selected feature's attribute. The *Style* menu allows you to select:

- The attribute (using the Column listbox or the *Set column expression* function, see *Expressions*)
- The symbol (using the Symbol dialog)
- The colors (using the color Ramp listbox)

Then click on **Classify** button to create classes from the distinct value of the attribute column. Each classes can be disabled unchecking the checkbox at the left of the class name.

You can change symbol, value and/or label of the class, just double click on the item you want to change.

Right-click shows a contextual menu to **Copy/Paste**, **Change color**, **Change transparency**, **Change output unit**, **Change symbol width**.

The **[Advanced]** button in the lower-right corner of the dialog allows you to set the fields containing rotation and size scale information. For convenience, the center of the menu lists the values of all currently selected attributes together, including the symbols that will be rendered.

The example in figure_symbology_6 shows the category rendering dialog used for the rivers layer of the QGIS sample dataset.

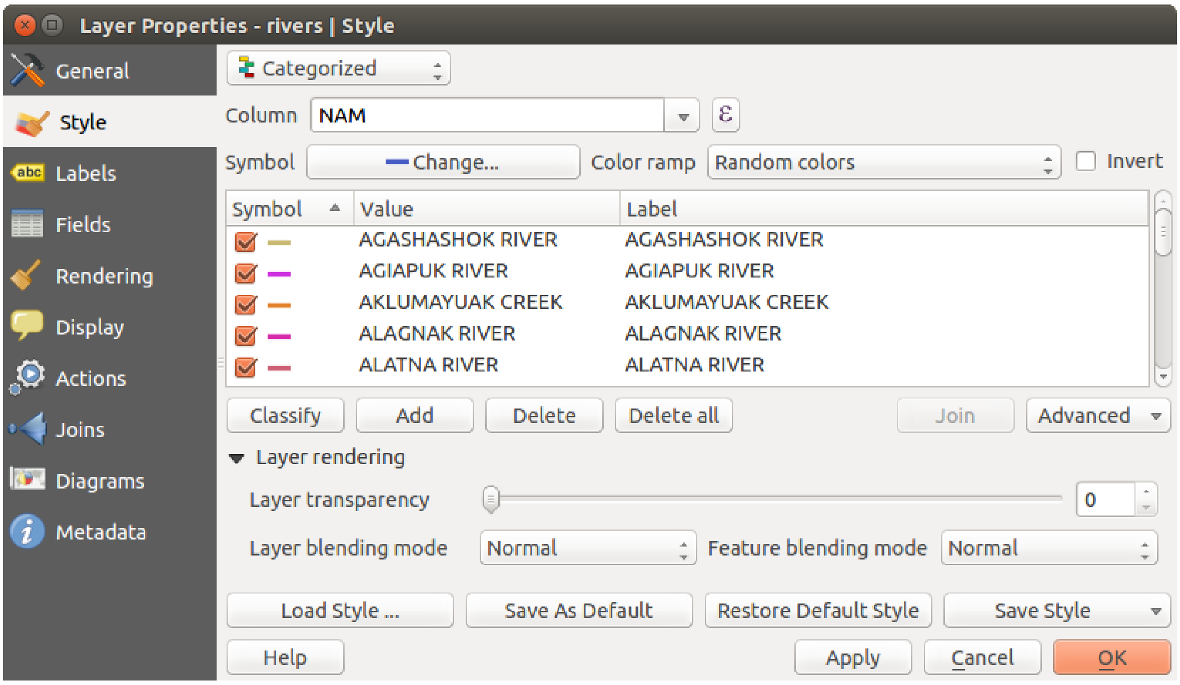

Figure 12.14: Categorized Symbolizing options

Graduated Renderer

The Graduated Renderer is used to render all the features from a layer, using a single user-defined symbol whose color reflects the assignment of a selected feature's attribute to a class.

Like the Categorized Renderer, the Graduated Renderer allows you to define rotation and size scale from specified columns.

Also, analogous to the Categorized Renderer, the *Style* tab allows you to select:

- The attribute (using the Column listbox or the *Set column expression* function, see *Expressions* chapter)
- The symbol (using the Symbol Properties button)
- The colors (using the color Ramp list)

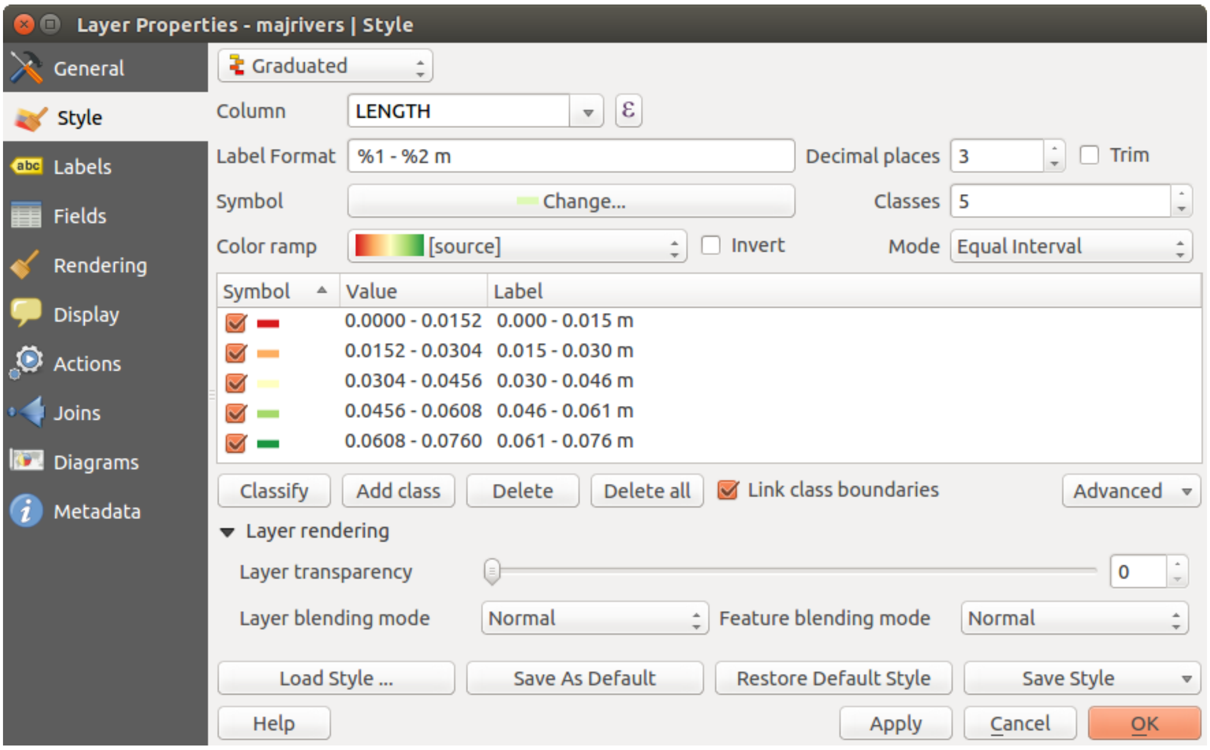

Figure 12.15: Graduated Symbolizing options

Additionally, you can specify the number of classes and also the mode for classifying features within the classes (using the Mode list). The available modes are:

- Equal Interval: each class has the same size (e.g. values from 0 to 16 and 4 classes, each class has a size of 4);
- Quantile: each class will have the same number of element inside (the idea of a boxplot);
- Natural Breaks (Jenks): the variance within each class is minimal while the variance between classes is maximal;
- Standard Deviation: classes are built depending on the standard deviation of the values;
- Pretty Breaks: the same of natural breaks but the extremes number of each class are integers.

The listbox in the center part of the *Style* menu lists the classes together with their ranges, labels and symbols that will be rendered.

Click on **Classify** button to create classes using the choosen mode. Each classes can be disabled unchecking the checkbox at the left of the class name.

You can change symbol, value and/or label of the clic, just double clicking on the item you want to change.

Right-click shows a contextual menu to **Copy/Paste**, **Change color**, **Change transparency**, **Change output unit**, **Change symbol width**.

The example in figure_symbology_7 shows the graduated rendering dialog for the rivers layer of the QGIS sample dataset.

ちなみに: 式を利用した主題図

Categorized and graduated thematic maps can now be created using the result of an expression. In the properties dialog for vector layers, the attribute chooser has been augmented with a *Set column expression* function. So now you no longer need to write the classification attribute to a new column in your attribute table if you want the classification attribute to be a composite of multiple fields, or a formula of some sort.

Rule-based rendering

The Rule-based Renderer is used to render all the features from a layer, using rule based symbols whose color reflects the assignment of a selected feature's attribute to a class. The rules are based on SQL statements. The dialog allows rule grouping by filter or scale, and you can decide if you want to enable symbol levels or use only the first-matched rule.

The example in figure_symbology_8 shows the rule-based rendering dialog for the rivers layer of the QGIS sample dataset.

To create a rule, activate an existing row by double-clicking on it, or click on '+' and click on the new rule. In the *Rule properties* dialog, you can define a label for the rule. Press the ... button to open the expression string builder. In the **Function List**, click on *Fields and Values* to view all attributes of the attribute table to be searched. To add an attribute to the field calculator **Expression** field, double click its name in the *Fields and Values* list. Generally, you can use the various fields, values and functions to construct the calculation expression, or you can just type it into the box (see *Expressions*). You can create a new rule by copying and pasting an existing rule with the right mouse button. You can also use the 'ELSE' rule that will be run if none of the other rules on that level match. Since QGIS 2.8 the rules appear in a tree hierarchy in the map legend. Just double-klick the rules in the map legend and the Style menu of the layer properties appears showing the rule that is the background for the symbol in the tree.

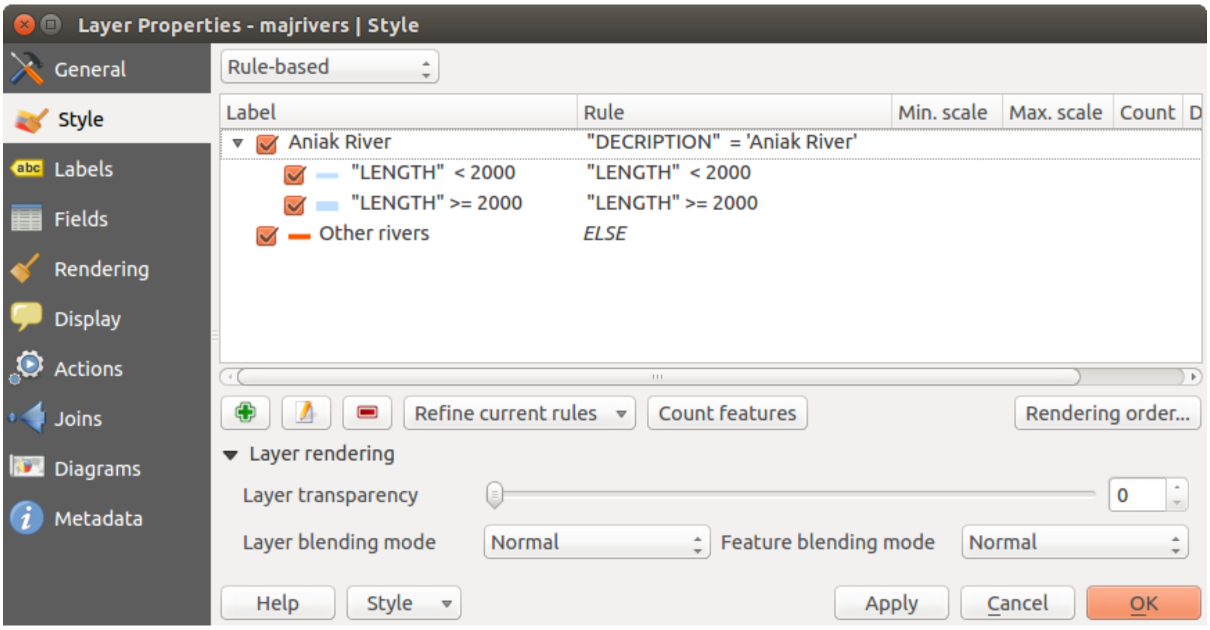

Figure 12.16: Rule-based Symbolizing options

Point displacement

The Point Displacement Renderer works to visualize all features of a point layer, even if they have the same location. To do this, the symbols of the points are placed on a displacement circle around a center symbol.

ちなみに: ベクタシンボロジーのエキスポート

You have the option to export vector symbology from QGIS into Google *.kml, *.dxf and MapInfo *.tab files. Just open the right mouse menu of the layer and click on *Save selection as* → to specify the name of the output file and its format. In the dialog, use the *Symbology export* menu to save the symbology either as *Feature symbology* → or as *Symbol layer symbology* →. If you have used symbol layers, it is recommended to use the second setting.

Inverted Polygon

Inverted polygon renderer allows user to define a symbol to fill in outside of the layer's polygons. As before you can select subrenderers. These subrenderers are the same as for the main renderers.

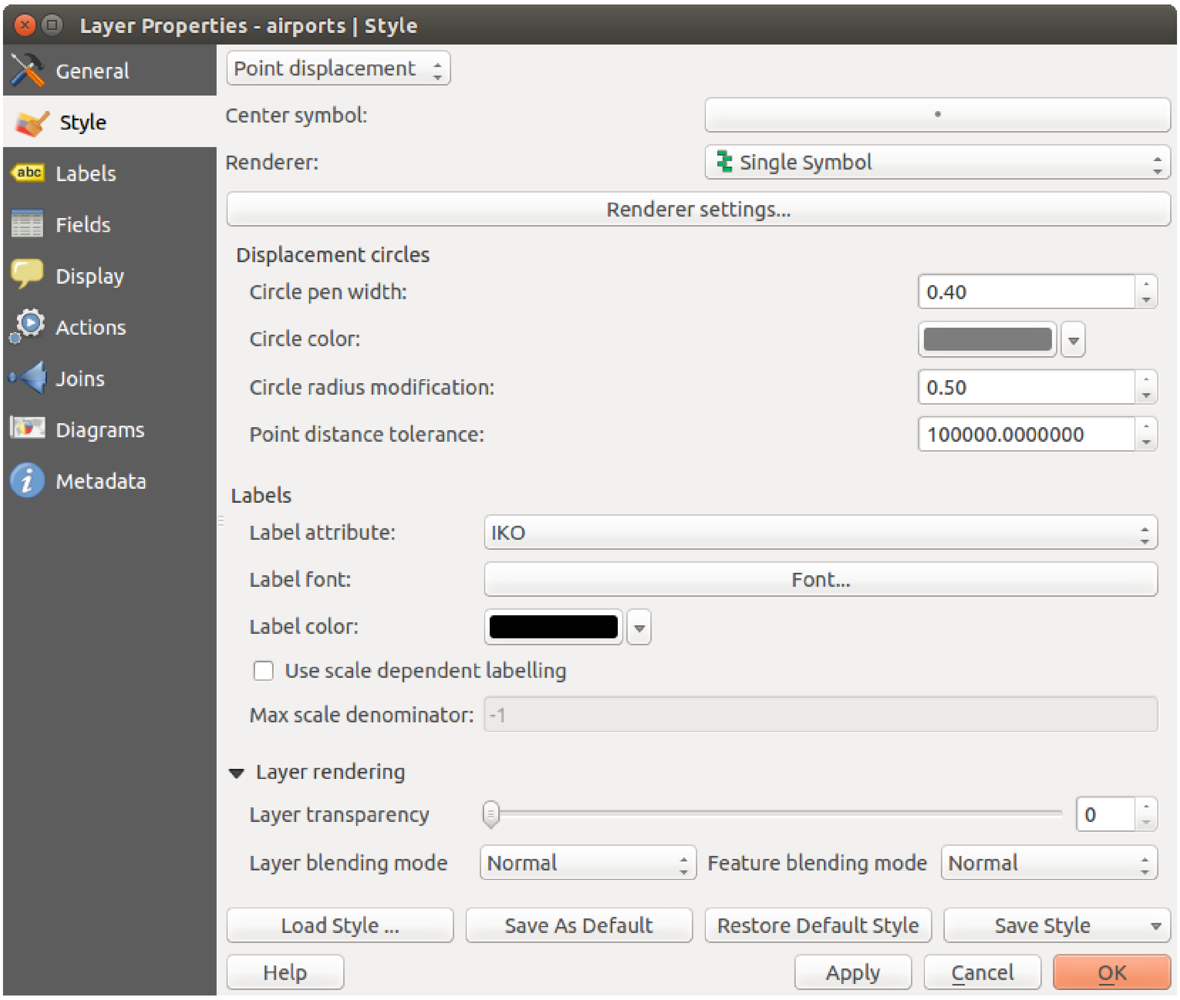

Figure 12.17: Point displacement dialog

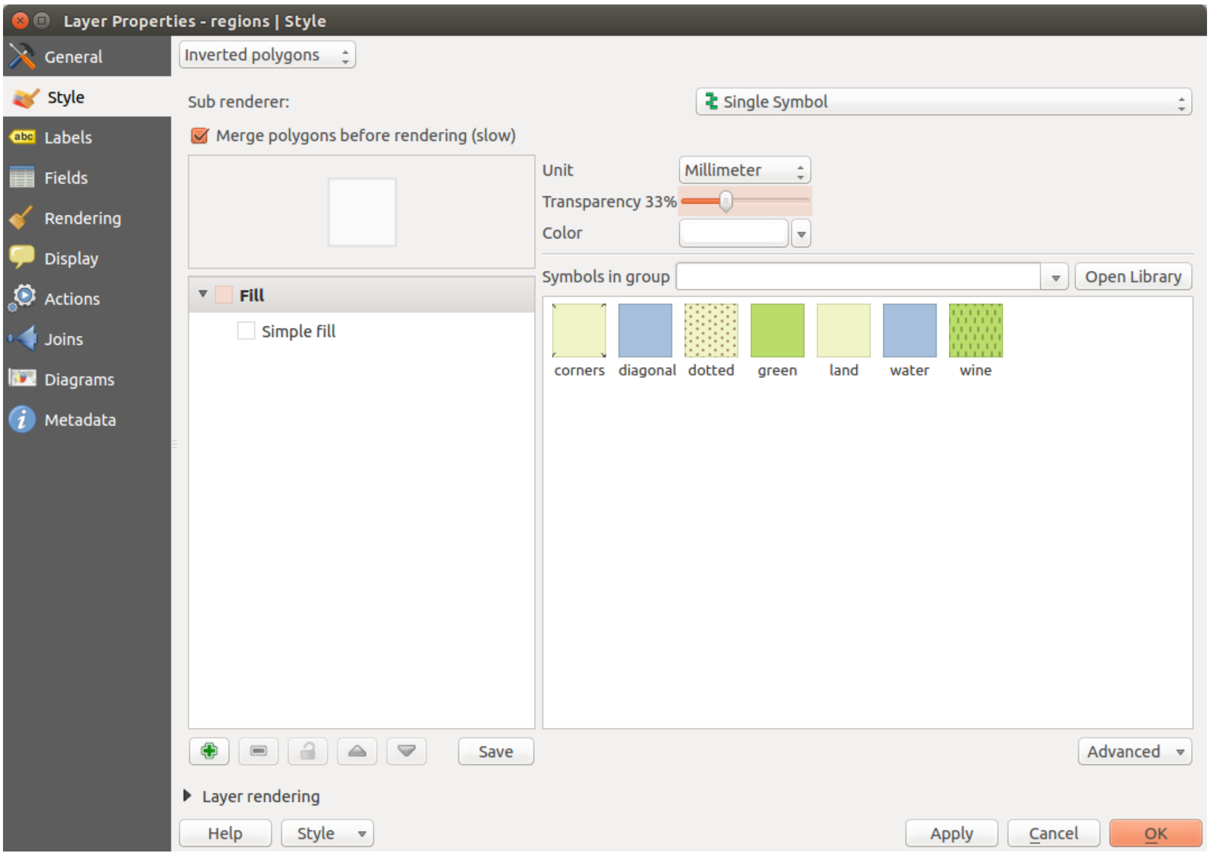

Figure 12.18: Inverted Polygon dialog

ちなみに: Switch quickly between styles

Once you created one of the above mentioned styles you can right-klick on the layer and choose *Styles* → *Add* to save your style. Now you can easily switch between styles you created using the *Styles* → menu again.

Heatmap

With the Heatmap renderer you can create live dynamic heatmaps for (multi)point layers. You can specify the heatmap radius in pixels, mm or map units, choose a color ramp for the heatmap style and use a slider for selecting a tradeoff between render speed and quality. When adding or removing a feature the heatmap renderer updates the heatmap style automatically.

Color Picker

Regardless the type of style to be used, the *select color* dialog will show when you click to choose a color - either border or fill color. This dialog has four different tabs which allow you to select colors by color ramp, color wheel, color swatches or color picker.

Whatever method you use, the selected color is always described through color sliders for HSV (Hue, Saturation, Value) and RGB (Red, Green, Blue) values. There is also an *opacity* slider to set transparency level. On the lower left part of the dialog you can see a comparison between the *current* and the *new* color you are presently selecting and on the lower right part you have the option to add the color you just tweaked into a color slot button.

With color ramp or with color wheel, you can browse to all possible color combinations. There are other possibilities though. By using *color swatches* you can choose from a preselected list. This selected list is populated with one of three methods: *Recent colors*, *Standard colors* or *Project colors*

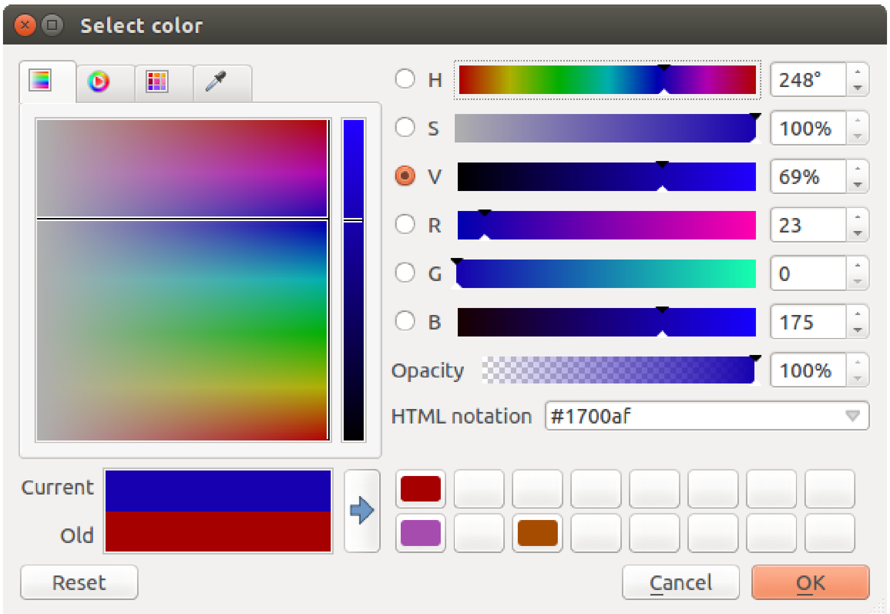

Figure 12.19: Color picker ramp tab

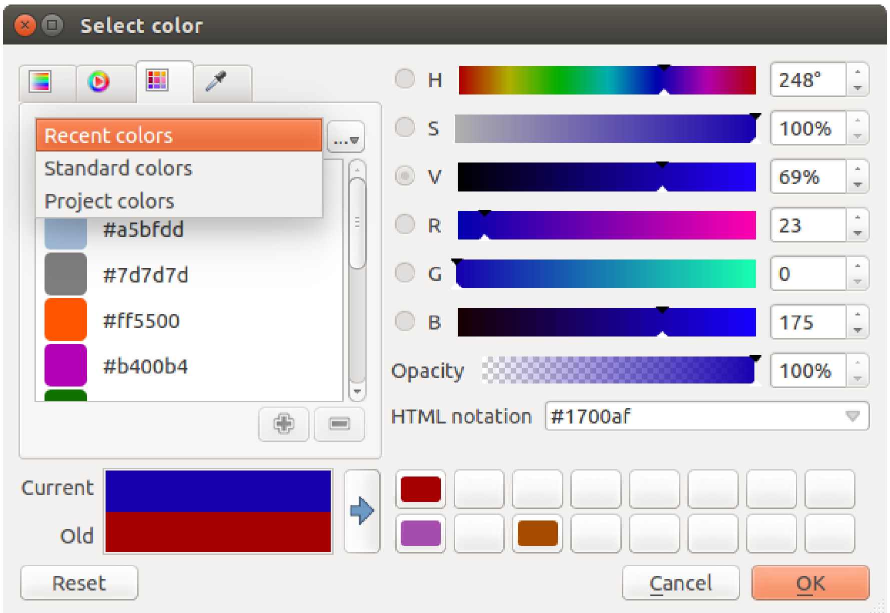

Figure 12.20: Color picker swatcher tab

Another option is to use the color picker which allows you to sample a color from under your mouse pointer at any part of QGIS or even from another application by pressing the space bar. Please note that the color picker is OS dependent and is currently not supported by OSX.

ちなみに: quick color picker + copy/paste colors

You can quickly choose from *Recent colors*, from *Standard colors* or simply *copy* or *paste* a color by clicking the drop-down arrow that follows a current color box.

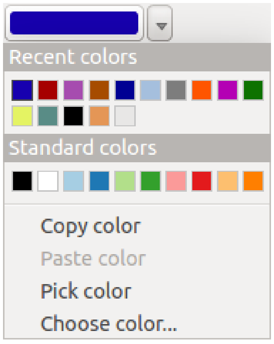

Figure 12.21: Quick color picker menu

レイヤレンダリング

- **レイヤ透過性** : このツールによって地図キャンパスにおけるレイヤの可視性を設定できます. このスライダでベクタレイヤの可視性を調整できます. メニューの横にあるスライダを使ってレイヤの表示比率を定義することができます.
- *Layer blending mode* and *Feature blending mode*: You can achieve special rendering effects with these tools that you may previously only know from graphics programs. The pixels of your overlaying and underlaying layers are mixed through the settings described below.
  - Normal: This is the standard blend mode, which uses the alpha channel of the top pixel to blend with the pixel beneath it. The colors aren't mixed.
  - Lighten: This selects the maximum of each component from the foreground and background pixels. Be aware that the results tend to be jagged and harsh.
  - Screen: Light pixels from the source are painted over the destination, while dark pixels are not. This mode is most useful for mixing the texture of one layer with another layer (e.g., you can use a hillshade to texture another layer).
  - Dodge: Dodge will brighten and saturate underlying pixels based on the lightness of the top pixel. So, brighter top pixels cause the saturation and brightness of the underlying pixels to increase. This works best if the top pixels aren't too bright; otherwise the effect is too extreme.
  - Addition: This blend mode simply adds pixel values of one layer with the other. In case of values above one (in the case of RGB), white is displayed. This mode is suitable for highlighting features.
  - Darken: This creates a resultant pixel that retains the smallest components of the foreground and background pixels. Like lighten, the results tend to be jagged and harsh.
  - Multiply: Here, the numbers for each pixel of the top layer are multiplied with the corresponding pixels for the bottom layer. The results are darker pictures.
  - Burn: Darker colors in the top layer cause the underlying layers to darken. Burn can be used to tweak and colorise underlying layers.
  - Overlay: This mode combines the multiply and screen blending modes. In the resulting picture, light parts become lighter and dark parts become darker.

- Soft light: This is very similar to overlay, but instead of using multiply/screen it uses color burn/dodge. This is supposed to emulate shining a soft light onto an image.
- Hard light: Hard light is also very similar to the overlay mode. It's supposed to emulate projecting a very intense light onto an image.
- Difference: Difference subtracts the top pixel from the bottom pixel, or the other way around, to always get a positive value. Blending with black produces no change, as the difference with all colors is zero.
- Subtract: This blend mode simply subtracts pixel values of one layer from the other. In case of negative values, black is displayed.

12.3.2 ラベルメニュー

The Labels core application provides smart labeling for vector point, line and polygon layers, and it only requires a few parameters. This new application also supports on-the-fly transformed layers. The core functions of the application have been redesigned. In QGIS, there are a number of other features that improve the labeling. The following menus have been created for labeling the vector layers:

- テキスト
- 整形
- バッファ
- 背景
- 影
- 配置
- 描画

Let us see how the new menus can be used for various vector layers. **Labeling point layers**

Start QGIS and load a vector point layer. Activate the layer in the legend and click on the Layer Labeling Options icon in the QGIS toolbar menu.

The first step is to activate the *Label this layer with* checkbox and select an attribute column to use for labeling. Click if you want to define labels based on expressions - See labeling_with_expressions.

The following steps describe a simple labeling without using the *Data defined override* functions, which are situated next to the drop-down menus.

You can define the text style in the *Text* menu (see Figure_labels_1). Use the *Type case* option to influence the text rendering. You have the possibility to render the text 'All uppercase', 'All lowercase' or 'Capitalize first letter'. Use the blend modes to create effects known from graphics programs (see blend_modes).

In the *Formatting* menu, you can define a character for a line break in the labels with the 'Wrap on character' function. Use the *Formatted numbers* option to format the numbers in an attribute table. Here, decimal places may be inserted. If you enable this option, three decimal places are initially set by default.

To create a buffer, just activate the *Draw text buffer* checkbox in the *Buffer* menu. The buffer color is variable. Here, you can also use blend modes (see blend_modes).

If the *color buffer's fill* checkbox is activated, it will interact with partially transparent text and give mixed color transparency results. Turning off the buffer fill fixes that issue (except where the interior aspect of the buffer's stroke intersects with the text's fill) and also allows you to make outlined text.

In the *Background* menu, you can define with *Size X* and *Size Y* the shape of your background. Use *Size type* to insert an additional 'Buffer' into your background. The buffer size is set by default here. The background then consists of the buffer plus the background in *Size X* and *Size Y*. You can set a *Rotation* where you can choose between 'Sync with label', 'Offset of label' and 'Fixed'. Using 'Offset of label' and 'Fixed', you can rotate the background. Define an *Offset X,Y* with X and Y values, and the background will be shifted. When applying *Radius X,Y*, the background gets rounded corners. Again, it is possible to mix the background with the underlying layers in the map canvas using the *Blend mode* (see blend_modes).

Use the *Shadow* menu for a user-defined *Drop shadow*. The drawing of the background is very variable. Choose between 'Lowest label component', 'Text', 'Buffer' and 'Background'. The *Offset* angle depends on the orientation of the label. If you choose the *Use global shadow* checkbox, then the zero point of the angle is always oriented to the north and doesn't depend on the orientation of the label. You can influence the appearance of the shadow with the *Blur radius*. The higher the number, the softer the shadows. The appearance of the drop shadow can also be altered by choosing a blend mode (see blend_modes).

Choose the *Placement* menu for the label placement and the labeling priority. Using the *Offset from point* setting, you now have the option to use *Quadrants* to place your label. Additionally, you can alter the angle of the label placement with the *Rotation* setting. Thus, a placement in a certain quadrant with a certain rotation is possible. In the *priority* section you can define with which priority the labels are rendered. It interacts with labels of the other vector layers in the map canvas. If there are labels from different layers in the same location then the label with the higher priority will be displayed and the other will be left out.

In the *Rendering* menu, you can define label and feature options. Under *Label options*, you find the scale-based visibility setting now. You can prevent QGIS from rendering only selected labels with the *Show all labels for this layer (including colliding labels)* checkbox. Under *Feature options*, you can define whether every part of a multipart feature is to be labeled. It's possible to define whether the number of features to be labeled is limited and to *Discourage labels from covering features*.

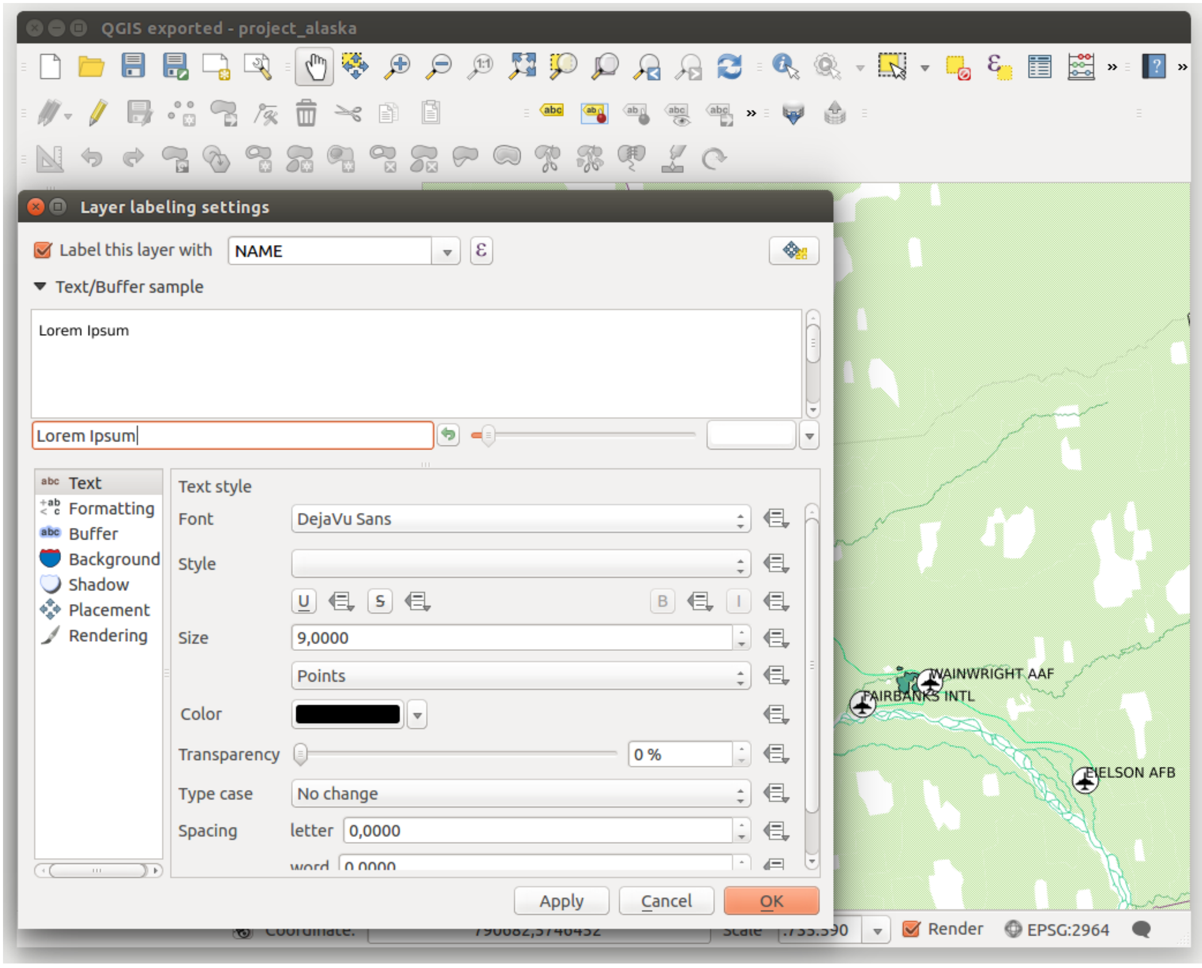

Figure 12.22: Smart labeling of vector point layers

Labeling line layers

The first step is to activate the *Label this layer* checkbox in the *Label settings* tab and select an attribute column to use for labeling. Click if you want to define labels based on expressions - See labeling_with_expressions.

After that, you can define the text style in the *Text* menu. Here, you can use the same settings as for point layers.

Also, in the *Formatting* menu, the same settings as for point layers are possible.

The *Buffer* menu has the same functions as described in section labeling_point_layers.

The *Background* menu has the same entries as described in section labeling_point_layers.

Also, the *Shadow* menu has the same entries as described in section labeling_point_layers.

In the *Placement* menu, you find special settings for line layers. The label can be placed *Parallel*, *Curved* or *Horizontal*. With the *Parallel* and *Curved* option, you can define the position *Above line*, *On line* and *Below line*. It's possible to select several options at once. In that case, QGIS will look for the optimal position of the label. Remember that here you can also use the line orientation for the position of the label. Additionally, you can define a *Maximum angle between curved characters* when selecting the *Curved* option (see Figure_labels_2).

You can set up a minimum distance for repeating labels. Distance can be in mm or in map units.

Some Placement setup will display more options, for example, *Curved* and *Parallel* Placements will allow the user to set up the position of the label (above, below or on the line), *distance* from the line and for *Curved*, the user can also setup inside/outside max angle between curved label. As for point vector layers you have the possibility to define a *Priority* for the labels.

The *Rendering* menu has nearly the same entries as for point layers. In the *Feature options*, you can now *Suppress labeling of features smaller than*.

Labeling polygon layers

The first step is to activate the *Label this layer* checkbox and select an attribute column to use for labeling. Click if you want to define labels based on expressions - See labeling_with_expressions.

In the *Text* menu, define the text style. The entries are the same as for point and line layers.

The *Formatting* menu allows you to format multiple lines, also similar to the cases of point and line layers.

As with point and line layers, you can create a text buffer in the *Buffer* menu.

Use the *Background* menu to create a complex user-defined background for the polygon layer. You can use the menu also as with the point and line layers.

The entries in the *Shadow* menu are the same as for point and line layers.

In the *Placement* menu, you find special settings for polygon layers (see Figure_labels_3). *Offset from centroid*, *Horizontal (slow)*, *Around centroid*, *Free* and *Using perimeter* are possible.

In the *Offset from centroid* settings, you can specify if the centroid is of the *visible polygon* or *whole polygon*. That means that either the centroid is used for the polygon you can see on the map or the centroid is determined for the whole polygon, no matter if you can see the whole feature on the map. You can place your label with the quadrants here, and define offset and rotation. The *Around centroid* setting makes it possible to place the label around the centroid with a certain distance. Again, you can define *visible polygon* or *whole polygon* for the centroid. With the *Using perimeter* settings, you can define a position and a distance for the label. For the position, *Above line*, *On line*, *Below line* and *Line orientation dependent position* are possible.

Related to the choice of Label Placement, several options will appear. As for Point Placement you can choose the distance for the polygon outline, repeat the label around the polygon perimeter.

As for point and line vector layers you have the possibility to define a *Priority* for the polygon vector layer.

The entries in the *Rendering* menu are the same as for line layers. You can also use *Suppress labeling of features smaller than* in the *Feature options*. **Define labels based on expressions**

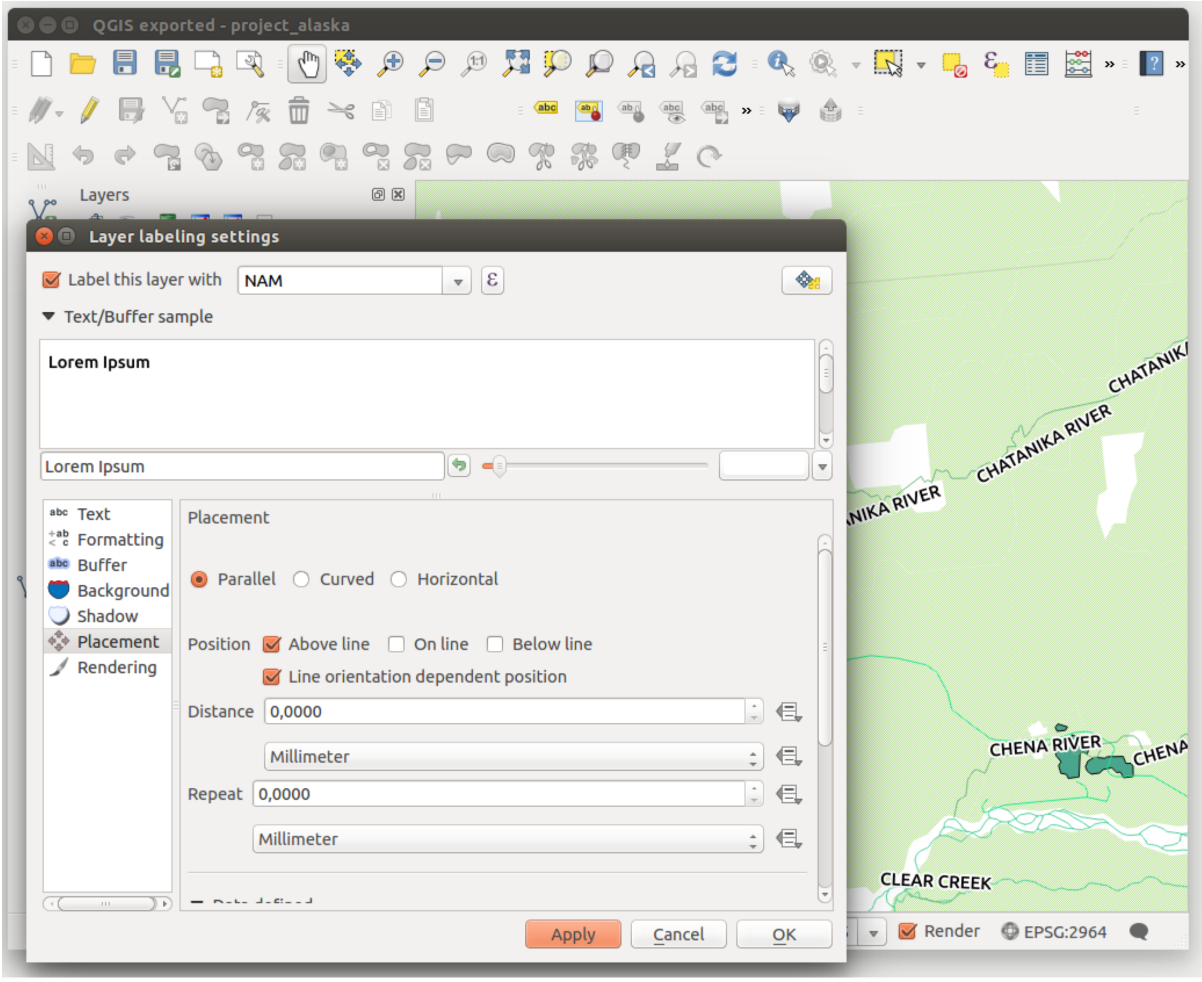

Figure 12.23: Smart labeling of vector line layers

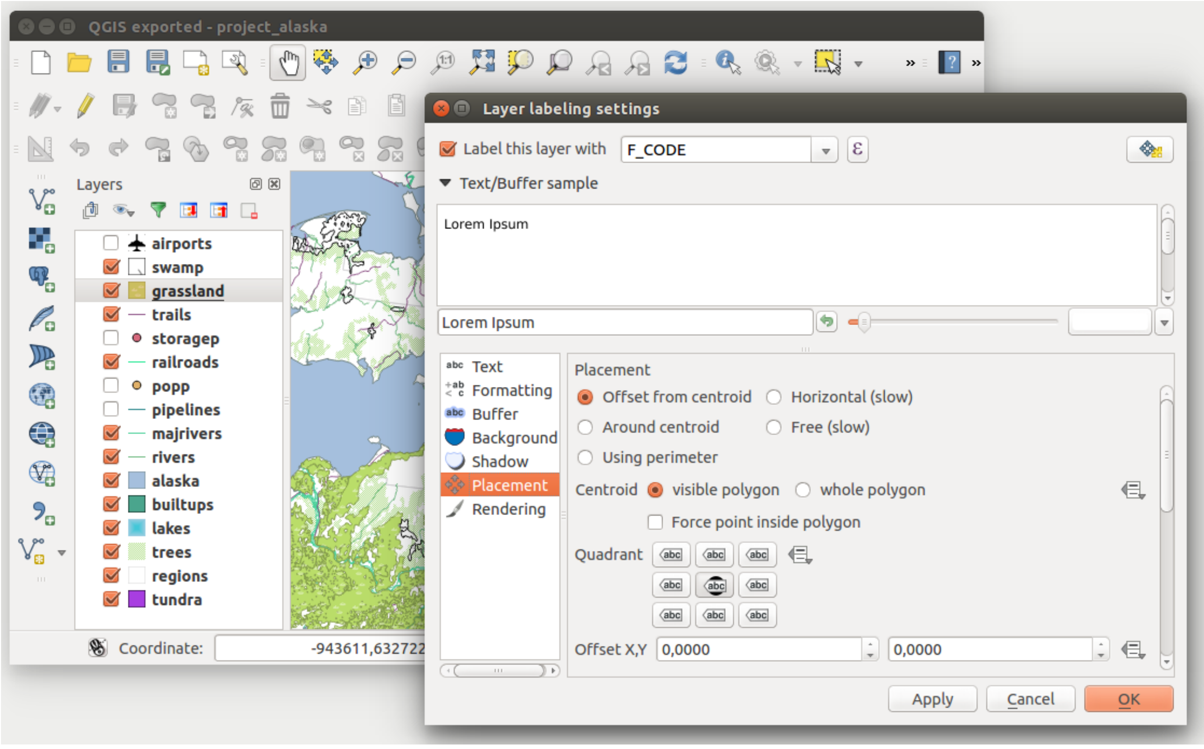

Figure 12.24: Smart labeling of vector polygon layers

QGIS allows to use expressions to label features. Just click the icon in the Labels menu of the properties dialog. In figure_labels_4 you see a sample expression to label the alaska regions with name and area size, based on the field 'NAME_2', some descriptive text and the function '$area()' in combination with 'format_number()' to make it look nicer.

Expression based labeling is easy to work with. All you have to take care of is, that you need to combine all elements (strings, fields and functions) with a string concatenation sign '||' and that fields a written in "double quotes" and strings in 'single quotes'. Let's have a look at some examples:

```
# label based on two fields 'name' and 'place' with a comma as separater
"name" || ', ' || "place"

-> John Smith, Paris

# label based on two fields 'name' and 'place' separated by comma
'My name is ' || "name" || 'and I live in ' || "place"

-> My name is John Smith and I live in Paris

# label based on two fields 'name' and 'place' with a descriptive text
# and a line break (\n)
'My name is ' || "name" || '\nI live in ' || "place"

-> My name is John Smith
   I live in Paris

# create a multi-line label based on a field and the $area function
# to show the place name and its area size based on unit meter.
'The area of ' || "place" || 'has a size of ' || $area || 'm'

-> The area of Paris has a size of 105000000 m

# create a CASE ELSE condition. If the population value in field
```

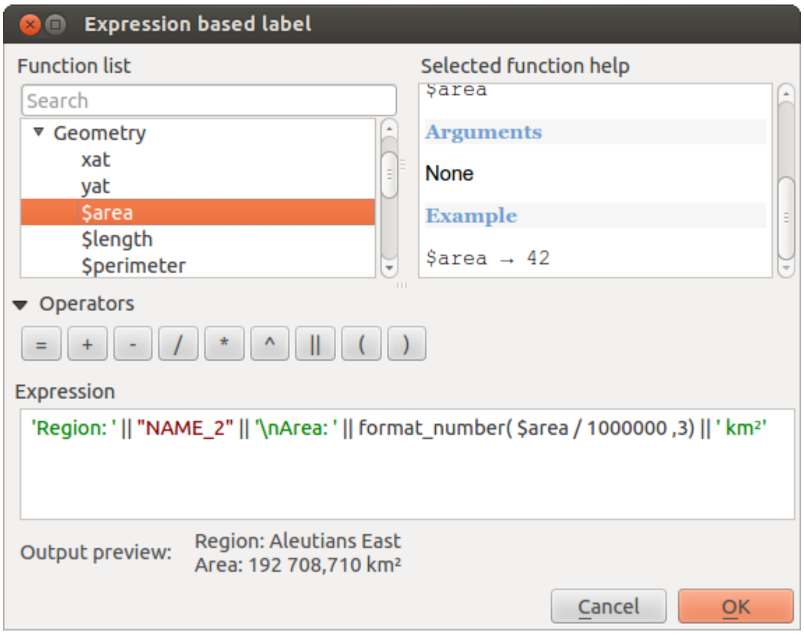

Figure 12.25: Using expressions for labeling

```
# population is <= 50000 it is a town, otherwise a city.
'This place is a ' || CASE WHEN "population <= 50000" THEN 'town' ELSE 'city' END

-> This place is a town
```

As you can see in the expression builder, you have hundreds of functions available to create simple and very complex expressions to label your data in QGIS. See *Expressions* chapter for more information and examples on expressions.

Using data-defined override for labeling

With the data-defined override functions, the settings for the labeling are overridden by entries in the attribute table. You can activate and deactivate the function with the right-mouse button. Hover over the symbol and you see the information about the data-defined override, including the current definition field. We now describe an example using the data-defined override function for the Move label function (see figure_labels_5).

1. Import `lakes.shp` from the QGIS sample dataset.
2. Double-click the layer to open the Layer Properties. Click on *Labels* and *Placement*. Select *Offset from centroid*.
3. Look for the *Data defined* entries. Click the icon to define the field type for the *Coordinate*. Choose 'xlabel' for X and 'ylabel' for Y. The icons are now highlighted in yellow.
4. 湖へズーム
5. Go to the Label toolbar and click the icon. Now you can shift the label manually to another position (see figure_labels_6). The new position of the label is saved in the 'xlabel' and 'ylabel' columns of the attribute table.

12.3.3 フィールドメニュー

Within the *Fields* menu, the field attributes of the selected dataset can be manipulated. The buttons New Column and Delete Column can be used when the dataset is in Editing mode.

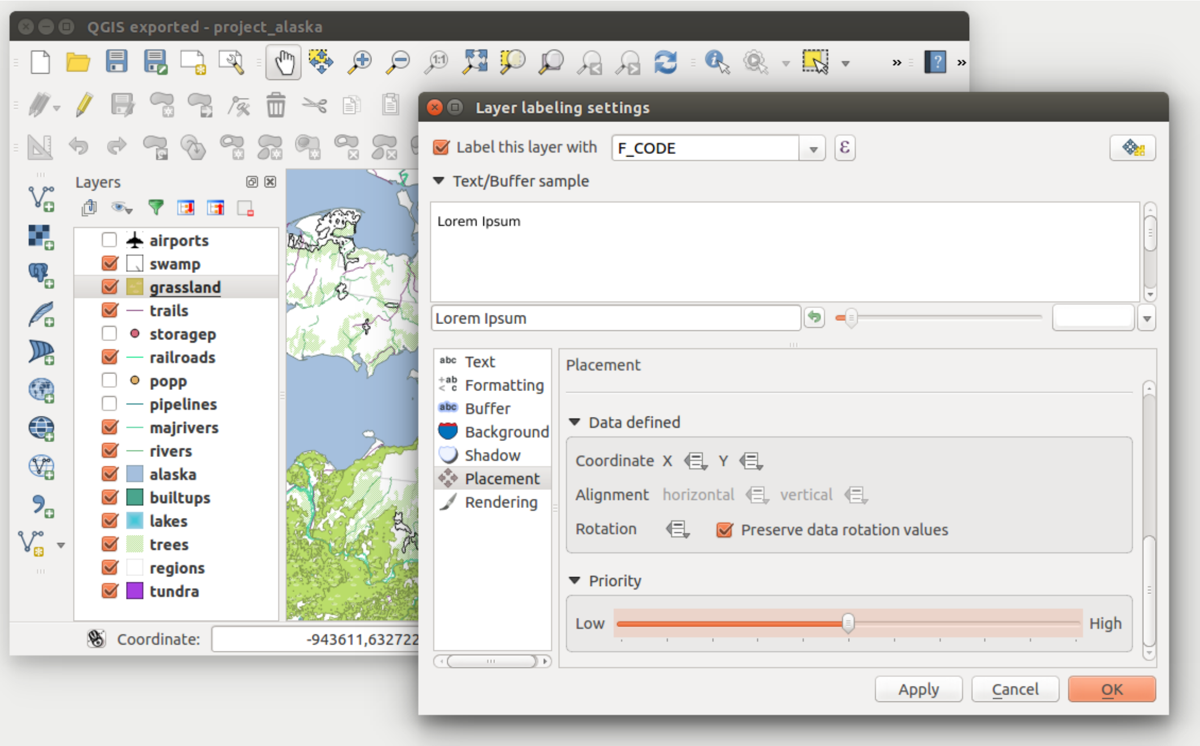

Figure 12.26: Labeling of vector polygon layers with data-defined override

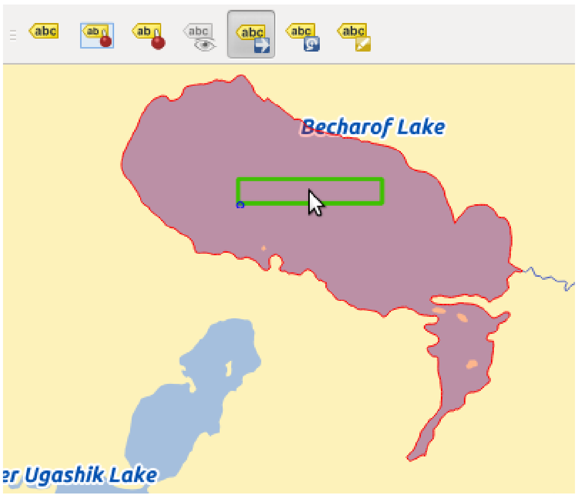

Figure 12.27: Move labels

編集ウィジェット

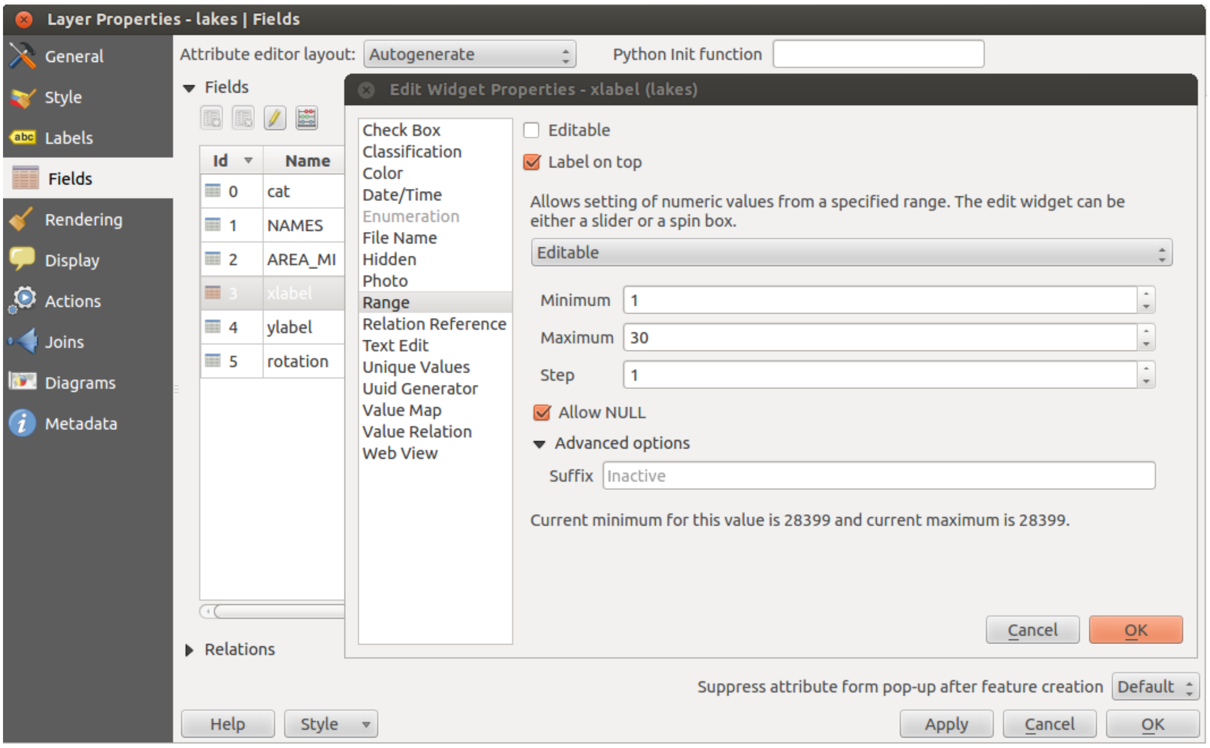

Figure 12.28: Dialog to select an edit widget for an attribute column

Within the *Fields* menu, you also find an **edit widget** column. This column can be used to define values or a range of values that are allowed to be added to the specific attribute table column. If you click on the **[edit widget]** button, a dialog opens, where you can define different widgets. These widgets are:

- **Checkbox**: Displays a checkbox, and you can define what attribute is added to the column when the checkbox is activated or not.
- **分類**: , プロパティの **スタイル** メニューで '固有値' を凡例タイプとして選択している場合コンボボックスで分類を行う値を選択してください.
- **Color**: Displays a color button allowing user to choose a color from the color dialog window.
- **Date/Time**: Displays a line field which can open a calendar widget to enter a date, a time or both. Column type must be text. You can select a custom format, pop-up a calendar, etc.
- **Enumeration**: Opens a combo box with values that can be used within the columns type. This is currently only supported by the PostgreSQL provider.
- **ファイル名**: ダイアログにファイル選択を追加した簡素なファイル選択.
- **Hidden**: 隠れた属性カラムは見ることができません. ユーザーはそのコンテンツをみることができません.
- **写真**: ピクチャのファイル名を含むフィールドです。フィールドの幅と高さが定義されます。
- **Range**: Allows you to set numeric values from a specific range. The edit widget can be either a slider or a spin box.
- **Relation Reference**: This widged lets you embed the feature form of the referenced layer on the feature form of the actual layer. See *Creating one to many relations*.
- **Text edit** (default): This opens a text edit field that allows simple text or multiple lines to be used. If you choose multiple lines you can also choose html content.
- **Unique values**: You can select one of the values already used in the attribute table. If 'Editable' is activated, a line edit is shown with autocompletion support, otherwise a combo box is used.

- **UUID ジェネレータ**:空の場合、読み取り専用の UUID (Universally Unique Identifiers) フィールドを生成します。
- **Value map**: A combo box with predefined items. The value is stored in the attribute, the description is shown in the combo box. You can define values manually or load them from a layer or a CSV file.
- **Value Relation**: Offers values from a related table in a combobox. You can select layer, key column and value column.
- **Webview**: Field contains a URL. The width and height of the field is variable.

ノート: QGIS has an advanced 'hidden' option to define your own field widget using python and add it to this impressive list of widgets. It is tricky but it is very well explained in following excellent blog that explains how to create a real time validation widget that can be used like described widgets. See http://blog.vitu.ch/10142013-1847/write-your-own-qgis-form-elements

---

With the **Attribute editor layout**, you can now define built-in forms (see figure_fields_2). This is usefull for data entry jobs or to identify objects using the option auto open form when you have objects with many attributes. You can create an editor with several tabs and named groups to present the attribute fields.

Choose 'Drag and drop designer' and an attribute column. Use the icon to create a category to insert a tab or a named group (see figure_fields_3). When creating a new category, QGIS will insert a new tab or named group for the category in the built-in form. The next step will be to assign the relevant fields to a selected category with the icon. You can create more categories and use the same fields again.

Other options in the dialog are 'Autogenerate' and 'Provide ui-file'.

- 'Autogenerate' just creates editors for all fields and tabulates them.
- The 'Provide ui-file' option allows you to use complex dialogs made with the Qt-Designer. Using a UI-file allows a great deal of freedom in creating a dialog. For detailed information, see http://nathanw.net/2011/09/05/qgis-tips-custom-feature-forms-with-python-logic/.

QGIS dialogs can have a Python function that is called when the dialog is opened. Use this function to add extra logic to your dialogs. An example is (in module MyForms.py):

```
def open(dialog,layer,feature):
geom = feature.geometry()
control = dialog.findChild(QWidged,"My line edit")
```

Reference in Python Init Function like so: MyForms.open

MyForms.py must live on PYTHONPATH, in .qgis2/python, or inside the project folder.

12.3.4 一般メニュー

このメニューはベクタレイヤの一般的な設定で利用します. ここには多くのオプションが利用できます:

レイヤ情報

- *displayed as* を使うとレイヤの表示名称を変更できます
- ベクタレイヤの *Layer source* を指定します
- Define the *Data source encoding* to define provider-specific options and to be able to read the file

空間参照システム

- *Specify* the coordinate reference system. Here, you can view or change the projection of the specific vector layer.
- Create a *Spatial Index* (only for OGR-supported formats)
- **領域の更新** レイヤの情報

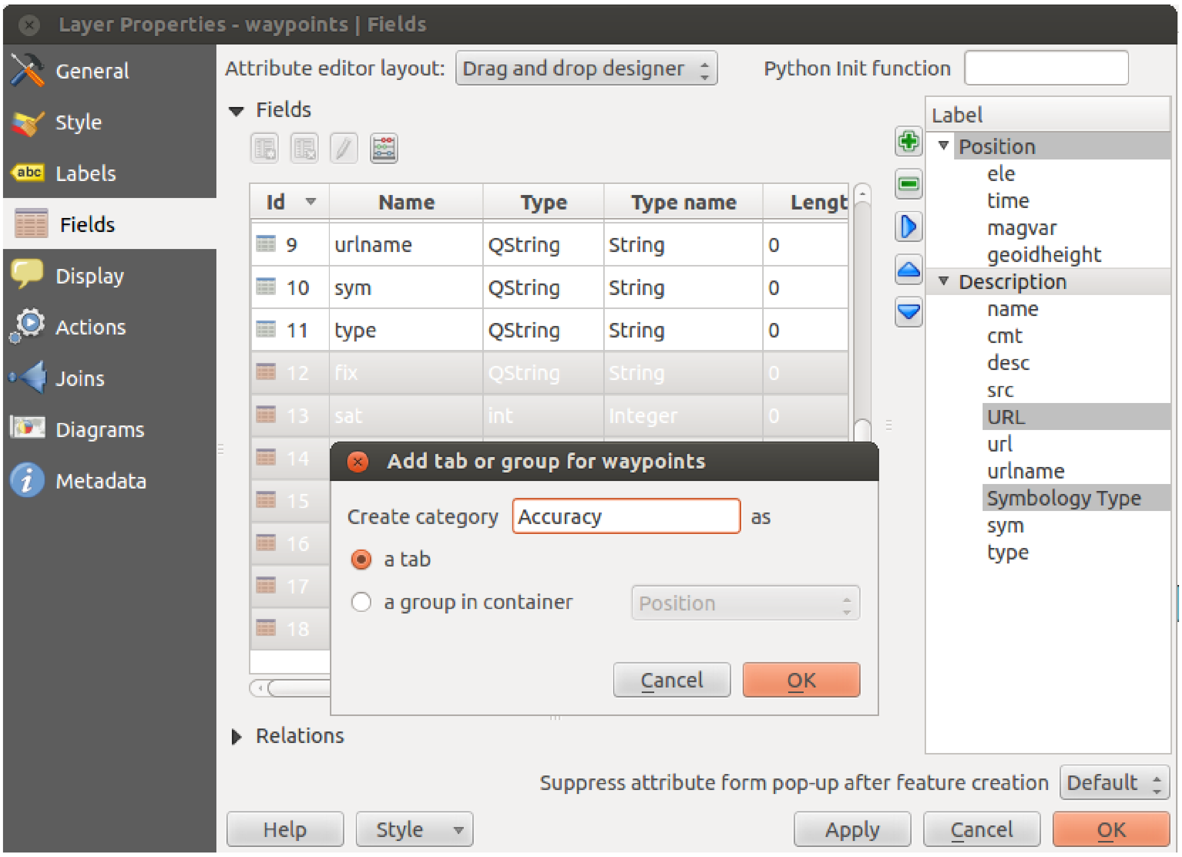

Figure 12.29: **属性編集レイアウト**でカテゴリを生成するダイアログ

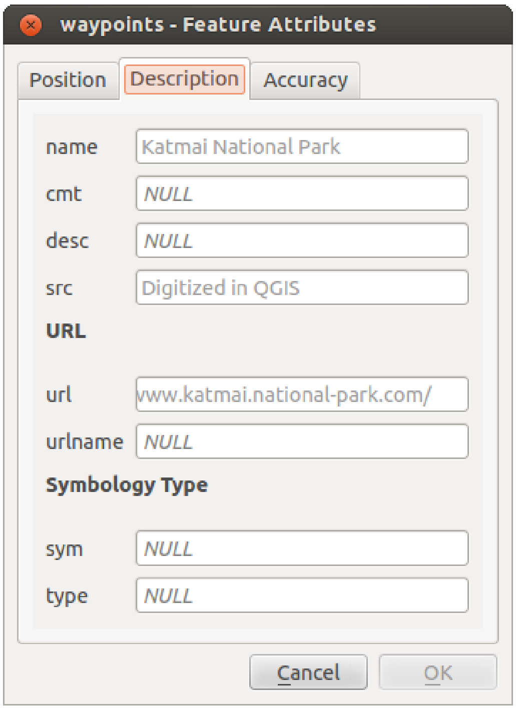

Figure 12.30: Resulting built-in form with tabs and named groups

- ベクタレイヤに指定されている投影方法を閲覧や変更したい場合は **指定** ... をクリックして下さい

Scale dependent visibility

- You can set the *Maximum (inclusive)* and *Minimum (exclusive)* scale. The scale can also be set by the **[Current]** buttons.

Feature subset

- With the **[Query Builder]** button, you can create a subset of the features in the layer that will be visualized (also refer to section **クエリビルダー**).

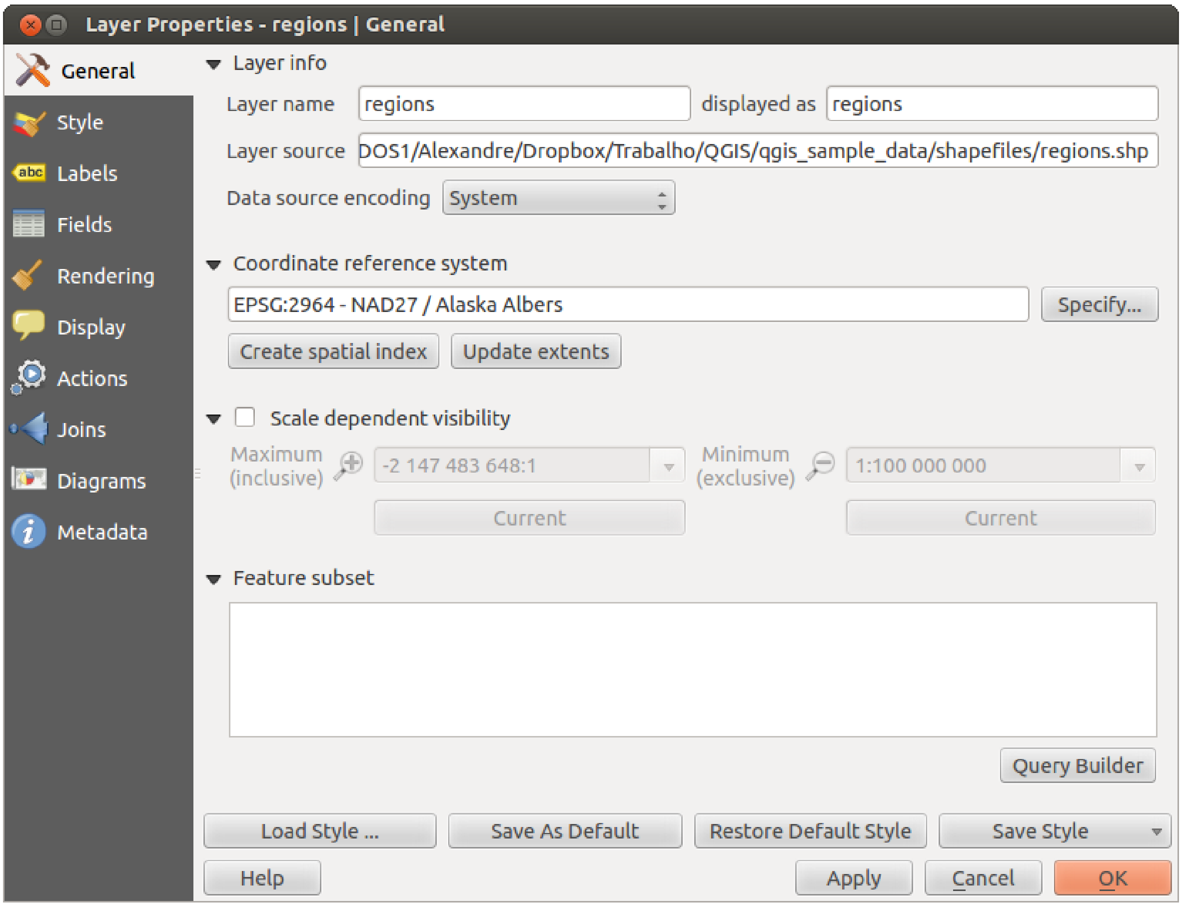

Figure 12.31: General menu in vector layers properties dialog

12.3.5 レンダリングメニュー

QGIS 2.2 introduces support for on-the-fly feature generalisation. This can improve rendering times when drawing many complex features at small scales. This feature can be enabled or disabled in the layer settings using the *Simplify geometry* option. There is also a new global setting that enables generalisation by default for newly added layers (see section **オプション**). **Note**: Feature generalisation may introduce artefacts into your rendered output in some cases. These may include slivers between polygons and inaccurate rendering when using offset-based symbol layers.

12.3.6 メニュー表示

This menu is specifically created for Map Tips. It includes a new feature: Map Tip display text in HTML. While you can still choose a *Field* to be displayed when hovering over a feature on the map, it is now possible to insert HTML code that creates a complex display when hovering over a feature. To activate Map Tips, select the menu option *View* → *MapTips*. Figure Display 1 shows an example of HTML code.

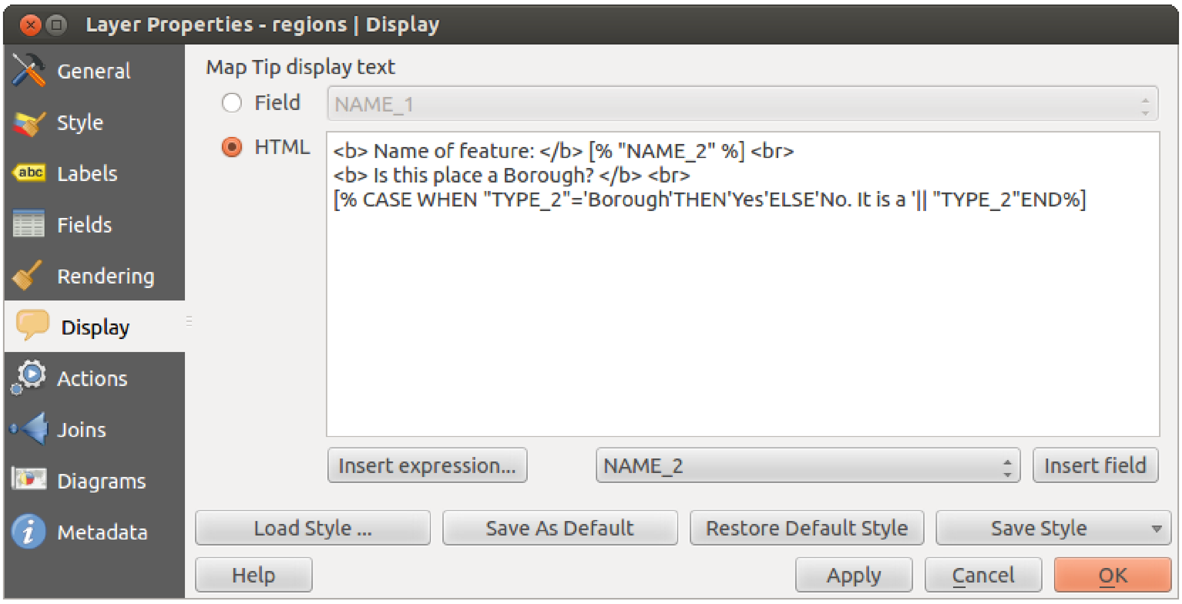

Figure 12.32: HTML code for map tip

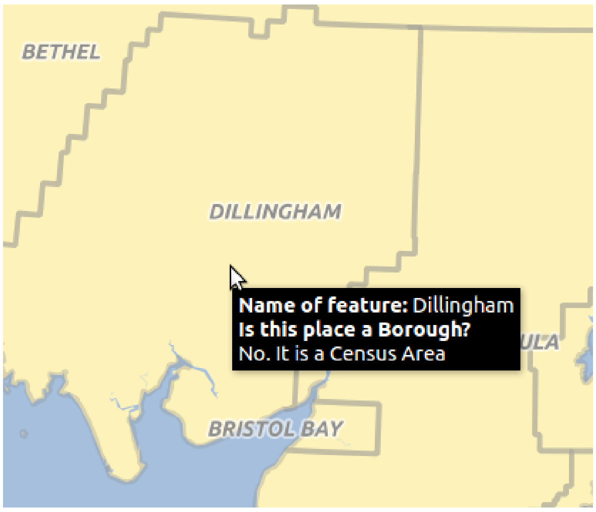

Figure 12.33: Map tip made with HTML code

12.3.7 アクションメニュー

QGIS provides the ability to perform an action based on the attributes of a feature. This can be used to perform any number of actions, for example, running a program with arguments built from the attributes of a feature or passing parameters to a web reporting tool.

Actions are useful when you frequently want to run an external application or view a web page based on one or more values in your vector layer. They are divided into six types and can be used like this:

- Generic、Mac、Windows と Unix のアクションが外部プロセスを開始します。
- Python アクションは Python 構文を実行します.

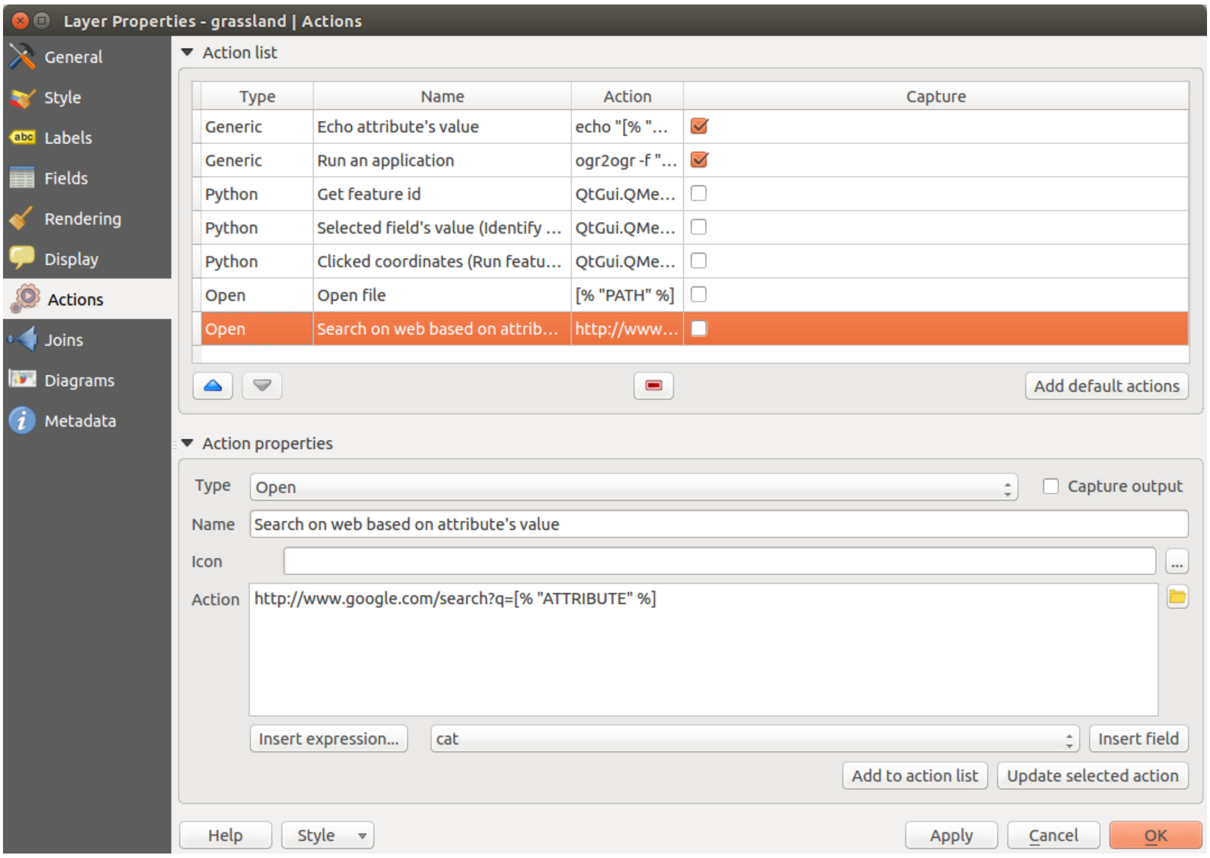

Figure 12.34: Overview action dialog with some sample actions

- Generic と Python のアクションはどこでも見ることができます。
- Mac, Windows and Unix actions are visible only on the respective platform (i.e., you can define three 'Edit' actions to open an editor and the users can only see and execute the one 'Edit' action for their platform to run the editor).

There are several examples included in the dialog. You can load them by clicking on **[Add default actions]**. One example is performing a search based on an attribute value. This concept is used in the following discussion.

Defining Actions

Attribute actions are defined from the vector *Layer Properties* dialog. To define an action, open the vector *Layer Properties* dialog and click on the *Actions* menu. Go to the *Action properties*. Select 'Generic' as type and provide a descriptive name for the action. The action itself must contain the name of the application that will be executed when the action is invoked. You can add one or more attribute field values as arguments to the application. When the action is invoked, any set of characters that start with a `%` followed by the name of a field will be replaced by the value of that field. The special characters %% will be replaced by the value of the field that was selected from the identify results or attribute table (see using_actions below). Double quote marks can be used to group text into a single argument to the program, script or command. Double quotes will be ignored if preceded by a backslash.

If you have field names that are substrings of other field names (e.g., `col1` and `col10`), you should indicate that by surrounding the field name (and the % character) with square brackets (e.g., `[%col10]`). This will prevent the `%col10` field name from being mistaken for the `%col1` field name with a `0` on the end. The brackets will be removed by QGIS when it substitutes in the value of the field. If you want the substituted field to be surrounded by square brackets, use a second set like this: `[[%col10]]`.

Using the *Identify Features* tool, you can open the *Identify Results* dialog. It includes a *(Derived)* item that contains information relevant to the layer type. The values in this item can be accessed in a similar way to the other fields by preceeding the derived field name with `(Derived).`. For example, a point layer has an `X` and `Y` field, and the values of these fields can be used in the action with `%(Derived).X` and `%(Derived).Y`. The derived attributes are only available from the *Identify Results* dialog box, not the *Attribute Table* dialog box.

2 つの アクション例 が以下にあります:

- `konqueror http://www.google.com/search?q=%nam`
- `konqueror http://www.google.com/search?q=%%`

In the first example, the web browser konqueror is invoked and passed a URL to open. The URL performs a Google search on the value of the `nam` field from our vector layer. Note that the application or script called by the action must be in the path, or you must provide the full path. To be certain, we could rewrite the first example as: `/opt/kde3/bin/konqueror http://www.google.com/search?q=%nam`. This will ensure that the konqueror application will be executed when the action is invoked.

The second example uses the %% notation, which does not rely on a particular field for its value. When the action is invoked, the %% will be replaced by the value of the selected field in the identify results or attribute table.

Using Actions

Actions can be invoked from either the *Identify Results* dialog, an *Attribute Table* dialog or from *Run Feature Action* (recall that these dialogs can be opened by clicking Identify Features or Open Attribute Table or Run Feature Action). To invoke an action, right click on the record and choose the action from the pop-up menu. Actions are listed in the popup menu by the name you assigned when defining the action. Click on the action you wish to invoke.

もしあなたが `%%` 表記を使ってアクションを呼び出した場合, アプリケーションかスクリプトに渡したいフィールドを *Identify Results* ダイアログか *Attribute Table* ダイアログで右クリックして下さい.

Here is another example that pulls data out of a vector layer and inserts it into a file using bash and the `echo` command (so it will only work on or perhaps). The layer in question has fields for a species name `taxon_name`, latitude `lat` and longitude `long`. We would like to be able to make a spatial selection of localities and export these field values to a text file for the selected record (shown in yellow in the QGIS map area). Here is the action to achieve this:

```
bash -c "echo \"%taxon_name %lat %long\" >> /tmp/species_localities.txt"
```

いくつかの地域を選択して、それぞれのアクションを実行し、出力ファイルを開いた後、このようなものが表示されます。

```
Acacia mearnsii -34.0800000000 150.0800000000
Acacia mearnsii -34.9000000000 150.1200000000
Acacia mearnsii -35.2200000000 149.9300000000
Acacia mearnsii -32.2700000000 150.4100000000
```

As an exercise, we can create an action that does a Google search on the `lakes` layer. First, we need to determine the URL required to perform a search on a keyword. This is easily done by just going to Google and doing a simple search, then grabbing the URL from the address bar in your browser. From this little effort, we see that the format is http://google.com/search?q=qgis, where `QGIS` is the search term. Armed with this information, we can proceed:

1. 必ず ‘‘lakes‘‘レイヤをロードしましょう。
2. Open the *Layer Properties* dialog by double-clicking on the layer in the legend, or right-click and choose *Properties* from the pop-up menu.
3. Click on the *Actions* menu.
4. アクションの名前を入力して下さい. たとえば `Google Search`.
5. アクションを定義するために実行する外部プログラムの名前を提供しなければいけません. この場合私達は Firefox を使います. もしプログラムがあなたのシステムのパス内に存在しない場合はフルパスを指定する必要があります.
6. 以下の外部アプリケーション名に Google search を行うための URL `http://google.com/search?q=` を加えます. しかし検索文字は含まれていません
7. The text in the *Action* field should now look like this: `firefox http://google.com/search?q=`

8. lakes レイヤのフィールド名が含まれているドロップダウンボックスをクリックして下さい. それは **[Insert Field]** ボタンの左側にあります.
9. ドロップダウンボックスで 'NAMES' を選択した後に **[Insert Field]** をクリックして下さい.
10. あなたのアクションテキストは現在このようになっています:

    ```
    firefox http://google.com/search?q=%NAMES
    ```

11. 最後に **[Add to action list]** ボタンをクリックして下さい.

アクションは完成して利用可能になりました. 最終的なテキストはこのようになっています:

```
firefox http://google.com/search?q=%NAMES
```

これでアクションの利用が可能です. *Layer Properties* ダイアログを閉じて地図を見たい領域にズームして下さい. lakes レイヤがアクティブであることに注意して地物情報表示ツールで湖をクリックして下さい. 結果表示ボックスの中にアクションが表示されているはずです:

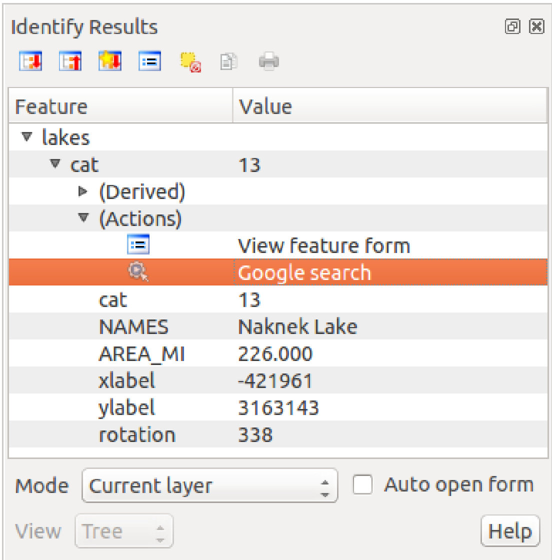

Figure 12.35: Select feature and choose action

When we click on the action, it brings up Firefox and navigates to the URL http://www.google.com/search?q=Tustumena. It is also possible to add further attribute fields to the action. Therefore, you can add a + to the end of the action text, select another field and click on **[Insert Field]**. In this example, there is just no other field available that would make sense to search for.

You can define multiple actions for a layer, and each will show up in the *Identify Results* dialog.

There are all kinds of uses for actions. For example, if you have a point layer containing locations of images or photos along with a file name, you could create an action to launch a viewer to display the image. You could also use actions to launch web-based reports for an attribute field or combination of fields, specifying them in the same way we did in our Google search example.

また、より複雑な例を作成できます。例えば、**Python** アクションを使用できます。

Usually, when we create an action to open a file with an external application, we can use absolute paths, or eventually relative paths. In the second case, the path is relative to the location of the external program executable file. But what about if we need to use relative paths, relative to the selected layer (a file-based one, like a shapefile or SpatiaLite)? The following code will do the trick:

```
command = "firefox";
imagerelpath = "images_test/test_image.jpg";
layer = qgis.utils.iface.activeLayer();
import os.path;
layerpath = layer.source() if layer.providerType() == 'ogr'
```

```
  else (qgis.core.QgsDataSourceURI(layer.source()).database()
  if layer.providerType() == 'spatialite' else None);
path = os.path.dirname(str(layerpath));
image = os.path.join(path,imagerelpath);
import subprocess;
subprocess.Popen( [command, image ] );
```

We just have to remember that the action is one of type *Python* and the *command* and *imagerelpath* variables must be changed to fit our needs.

But what about if the relative path needs to be relative to the (saved) project file? The code of the Python action would be:

```
command="firefox";
imagerelpath="images/test_image.jpg";
projectpath=qgis.core.QgsProject.instance().fileName();
import os.path; path=os.path.dirname(str(projectpath)) if projectpath != '' else None;
image=os.path.join(path, imagerelpath);
import subprocess;
subprocess.Popen( [command, image ] );
```

Another Python action example is the one that allows us to add new layers to the project. For instance, the following examples will add to the project respectively a vector and a raster. The names of the files to be added to the project and the names to be given to the layers are data driven (*filename* and *layername* are column names of the table of attributes of the vector where the action was created):

```
qgis.utils.iface.addVectorLayer('/yourpath/[% "filename" %].shp','[% "layername" %]',
  'ogr')
```

ラスタ (この例では TIF イメージ) を追加するには、次のようになります:

```
qgis.utils.iface.addRasterLayer('/yourpath/[% "filename" %].tif','[% "layername" %]
')
```

12.3.8 結合メニュー

The *Joins* menu allows you to join a loaded attribute table to a loaded vector layer. After clicking , the *Add vector join* dialog appears. As key columns, you have to define a join layer you want to connect with the target vector layer. Then, you have to specify the join field that is common to both the join layer and the target layer. Now you can also specify a subset of fields from the joined layer based on the checkbox *Choose which fields are joined*. As a result of the join, all information from the join layer and the target layer are displayed in the attribute table of the target layer as joined information. If you specified a subset of fields only these fields are displayed in the attribute table of the target layer.

QGIS currently has support for joining non-spatial table formats supported by OGR (e.g., CSV, DBF and Excel), delimited text and the PostgreSQL provider (see figure_joins_1).

さらにベクタ結合ダイアログでは次のことができます:

- **結合レイヤをヴァーチャルメモリにキャッシュする**
- **結合フィールドに属性インデックスを作成する**
- *Choose which fields are joined*
- Create a *Custom field name prefix*

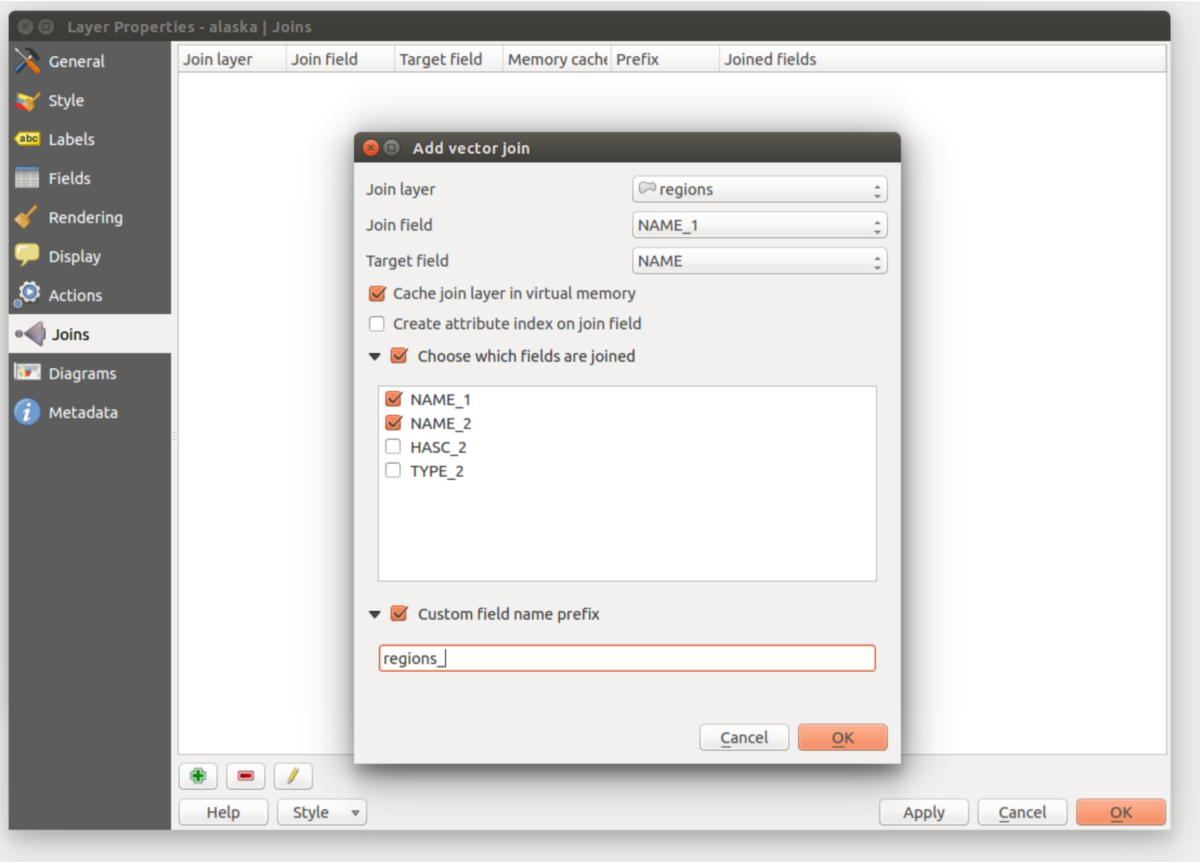

Figure 12.36: Join an attribute table to an existing vector layer

12.3.9 ダイアグラムメニュー

ダイアグラム メニューではベクタレイヤにグラフィックオーバーレイを行うことができます (figure_diagrams_1 参照).

The current core implementation of diagrams provides support for pie charts, text diagrams and histograms.

The menu is divided into four tabs: *Appearance*, *Size*, *Postion* and *Options*.

In the cases of the text diagram and pie chart, text values of different data columns are displayed one below the other with a circle or a box and dividers. In the *Size* tab, diagram size is based on a fixed size or on linear scaling according to a classification attribute. The placement of the diagrams, which is done in the *Position* tab, interacts with the new labeling, so position conflicts between diagrams and labels are detected and solved. In addition, chart positions can be fixed manually.

We will demonstrate an example and overlay on the Alaska boundary layer a text diagram showing temperature data from a climate vector layer. Both vector layers are part of the QGIS sample dataset (see section **サンプルデータ**).

1. First, click on the Load Vector icon, browse to the QGIS sample dataset folder, and load the two vector shape layers `alaska.shp` and `climate.shp`.
2. 地図凡例にある `climate` layer をダブルクリックして **レイヤプロパティ** ダイアログを開いて下さい.
3. Click on the *Diagrams* menu, activate *Display diagrams*, and from the *Diagram type* combo box, select 'Text diagram'.
4. In the *Appearance* tab, we choose a light blue as background color, and in the *Size* tab, we set a fixed size to 18 mm.

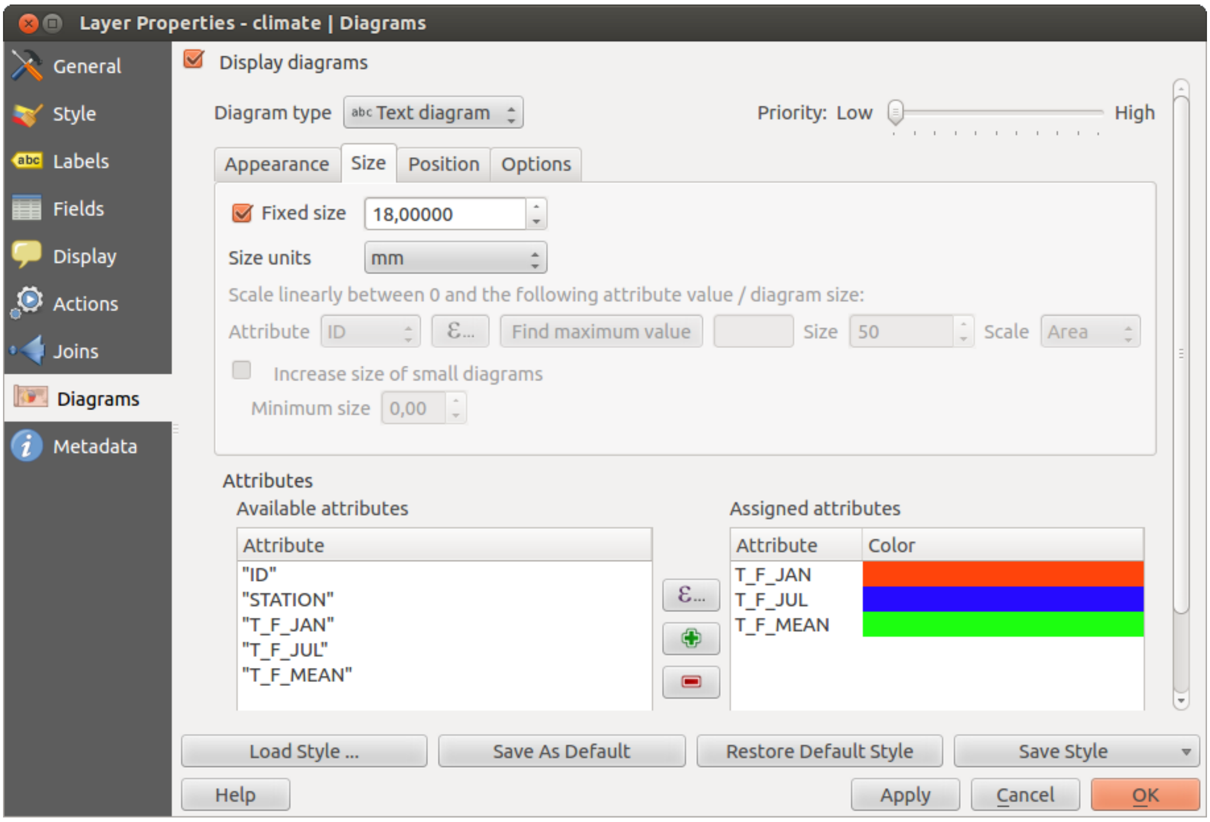

Figure 12.37: Vector properties dialog with diagram menu

5. In the *Position* tab, placement could be set to 'Around Point'.
6. In the diagram, we want to display the values of the three columns `T_F_JAN`, `T_F_JUL` and `T_F_MEAN`. First select `T_F_JAN` as *Attributes* and click the button, then `T_F_JUL`, and finally `T_F_MEAN`.
7. Now click **[Apply]** to display the diagram in the QGIS main window.
8. You can adapt the chart size in the *Size* tab. Deactivate the *Fixed size* and set the size of the diagrams on the basis of an attribute with the **[Find maximum value]** button and the *Size* menu. If the diagrams appear too small on the screen, you can activate the *Increase size of small diagrams* checkbox and define the minimum size of the diagrams.
9. Change the attribute colors by double clicking on the color values in the *Assigned attributes* field. Figure_diagrams_2 gives an idea of the result.
10. 最後に**[OK]**をクリックします。

Remember that in the *Position* tab, a *Data defined position* of the diagrams is possible. Here, you can use attributes to define the position of the diagram. You can also set a scale-dependent visibility in the *Appearance* tab.

The size and the attributes can also be an expression. Use the ε... button to add an expression. See *Expressions* chapter for more information and example.

12.3.10 メタデータメニュー

The *Metadata* menu consists of *Description*, *Attribution*, *MetadataURL* and *Properties* sections.

In the *Properties* section, you get general information about the layer, including specifics about the type and

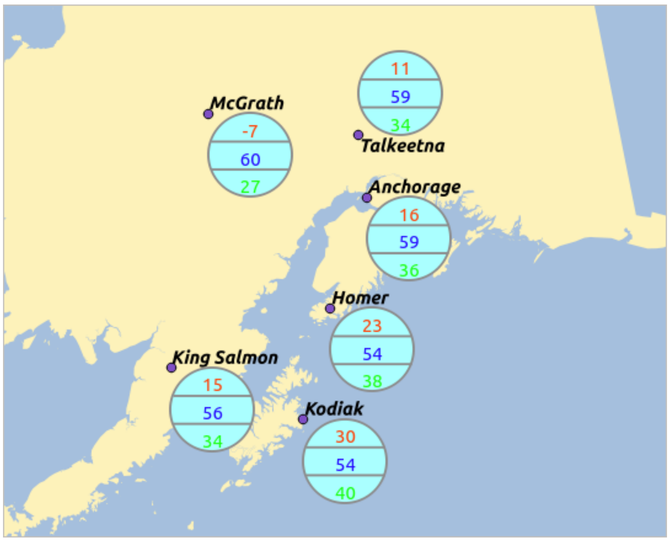

Figure 12.38: Diagram from temperature data overlayed on a map

location, number of features, feature type, and editing capabilities. The *Extents* table provides you with layer extent information and the *Layer Spatial Reference System*, which is information about the CRS of the layer. This is a quick way to get information about the layer.

Additionally, you can add or edit a title and abstract for the layer in the *Description* section. It's also possible to define a *Keyword list* here. These keyword lists can be used in a metadata catalogue. If you want to use a title from an XML metadata file, you have to fill in a link in the *DataUrl* field. Use *Attribution* to get attribute data from an XML metadata catalogue. In *MetadataUrl*, you can define the general path to the XML metadata catalogue. This information will be saved in the QGIS project file for subsequent sessions and will be used for QGIS server.

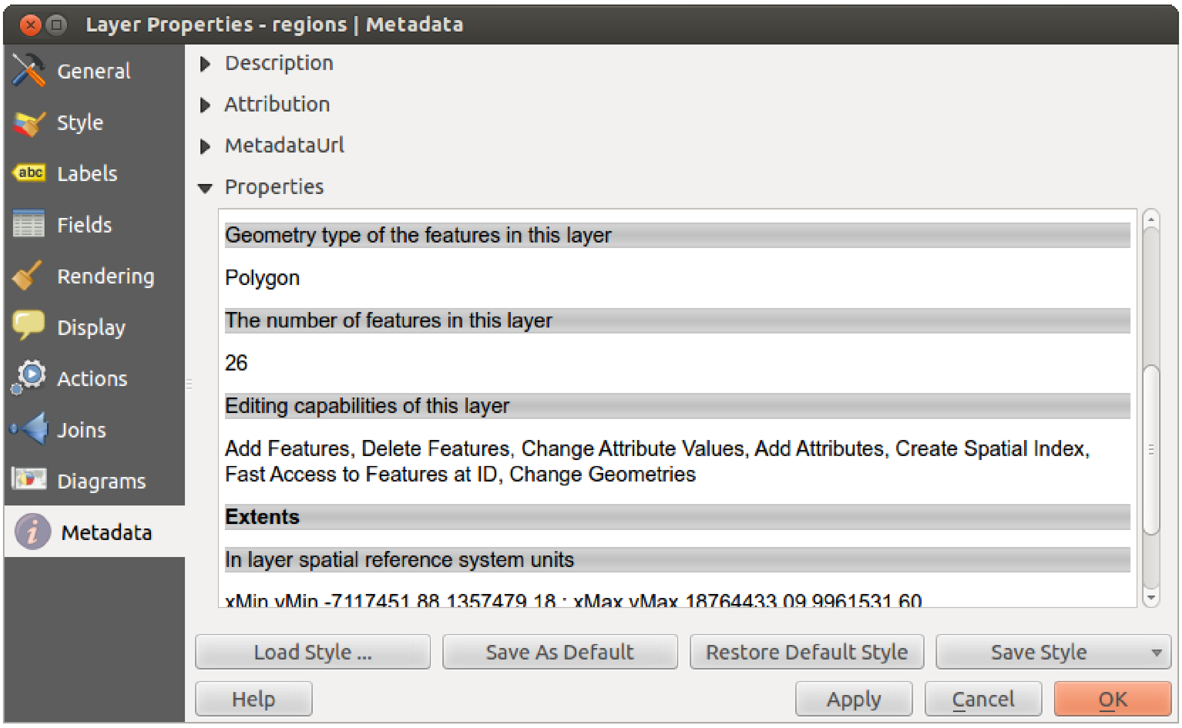

Figure 12.39: Metadata menu in vector layers properties dialog

.

12.4 Expressions

The **Expressions** feature are available through the field calculator or the add a new column button in the attribut table or the Field tab in the Layer properties ; through the graduaded, categorized and rule-based rendering in the Style tab of the Layer properties ; through the expression-based labeling in the Labeling core application ; through the feature selection and through the diagram tab of the Layer properties as well as the *Main properties* of the label item and the *Atlas generation* tab in the Print Composer.

They are a powerful way to manipulate attribute value in order to dynamically change the final value in order to change the geometry style, the content of the label, the value for diagram, select some feature or create virtual column.

12.4.1 Functions List

The **Function List** contains functions as well as fields and values. View the help function in the **Selected Function Help**. In **Expression** you see the calculation expressions you create with the **Function List**. For the most commonly used operators, see **Operators**.

In the **Function List**, click on *Fields and Values* to view all attributes of the attribute table to be searched. To add an attribute to the Field calculator **Expression** field, double click its name in the *Fields and Values* list. Generally, you can use the various fields, values and functions to construct the calculation expression, or you can just type it into the box. To display the values of a field, you just right click on the appropriate field. You can choose between *Load top 10 unique values* and *Load all unique values*. On the right side, the **Field Values** list opens with the unique values. To add a value to the Field calculator **Expression** box, double click its name in the **Field Values** list.

The *Operators*, *Math*, *Conversions*, *String*, *Geometry* and *Record* groups provide several functions. In *Operators*, you find mathematical operators. Look in *Math* for mathematical functions. The *Conversions* group contains functions that convert one data type to another. The *String* group provides functions for data strings. In the *Geometry* group, you find functions for geometry objects. With *Record* group functions, you can add a numeration to your data set. To add a function to the Field calculator **Expression** box, click on the > and then double click the function.

Operators

This group contains operators (e.g., +, -, *).

```
a + b      a plus b
a - b      a minus b
a * b      a multiplied by b
a / b      a divided by b
a % b      a modulo b (for example, 7 % 2 = 1, or 2 fits into 7 three
           times with remainder 1)
a ^ b      a power b (for example, 2^2=4 or 2^3=8)
a = b      a and b are equal
a > b      a is larger than b
a < b      a is smaller than b
a <> b     a and b are not equal
a != b     a and b are not equal
a <= b     a is less than or equal to b
a >= b     a is larger than or equal to b
a ~ b      a matches the regular expression b
+ a        positive sign
- a        negative value of a
||         joins two values together into a string 'Hello' || ' world'
LIKE       returns 1 if the string matches the supplied pattern
ILIKE      returns 1 if the string matches case-insensitive the supplied
           pattern (ILIKE can be used instead of LIKE to make the match
           case-insensitive)
```

```
IS          returns 1 if a is the same as b
OR          returns 1 when condition a or b is true
AND         returns 1 when condition a and b are true
NOT         returns 1 if a is not the same as b
column name "column name"     value of the field column name, take
                              care to not be confused with simple
                              quote, see below
'string'                      a string value, take care to not be
                              confused with double quote, see above
NULL                          null value
a IS NULL                     a has no value
a IS NOT NULL                 a has a value
a IN (value[,value])          a is below the values listed
a NOT IN (value[,value])      a is not below the values listed
```

Some examples:

- Joins a string and a value from a column name:

  ```
  'My feature's id is: ' || "gid"
  ```

- Test if the "description" attribute field starts with the 'Hello' string in the value (note the position of the % character):

  ```
  "description" LIKE 'Hello%'
  ```

条件

このグループには式の中で条件を扱う関数を含まれます.

```
CASE                          evaluates multiple expressions and returns a
                              result
CASE ELSE                     evaluates multiple expressions and returns a
                              result
coalesce                      returns the first non-NULL value from the
                              expression list
regexp_match                  returns true if any part of a string matches
                              the supplied regular expression
```

Some example:

- Send back a value if the first condition is true, else another value:

  ```
  CASE WHEN "software" LIKE '%QGIS%' THEN 'QGIS' ELSE 'Other'
  ```

Mathematical Functions

This group contains math functions (e.g., square root, sin and cos).

```
sqrt(a)                       square root of a
abs                           returns the absolute value of a number
sin(a)                        sine of a
cos(a)                        cosine of a
tan(a)                        tangent of a
asin(a)                       arcsin of a
acos(a)                       arccos of a
atan(a)                       arctan of a
atan2(y,x)                    arctan of y/x using the signs of the two
                              arguments to determine the quadrant of the
                              result
exp                           exponential of a value
ln                            value of the natural logarithm of the passed
```

```
                              expression
log10                         value of the base 10 logarithm of the passed
                              expression
log                           value of the logarithm of the passed value
                              and base
round                         round to number of decimal places
rand                          random integer within the range specified by
                              the minimum
                              and maximum argument (inclusive)
randf                         random float within the range specified by
                              the minimum
                              and maximum argument (inclusive)
max                           largest value in a set of values
min                           smallest value in a set of values
clamp                         restricts an input value to a specified
                              range
scale_linear                  transforms a given value from an input
                              domain to an output
                              range using linear interpolation
scale_exp                     transforms a given value from an input
                              domain to an output
                              range using an exponential curve
floor                         rounds a number downwards
ceil                          rounds a number upwards
$pi                           pi as value for calculations
```

Conversions

This group contains functions to convert one data type to another (e.g., string to integer, integer to string).

```
toint                        converts a string to integer number
toreal                       converts a string to real number
tostring                     converts number to string
todatetime                   converts a string into Qt data time type
todate                       converts a string into Qt data type
totime                       converts a string into Qt time type
tointerval                   converts a string to an interval type (can be
                             used to take days, hours, months, etc. off a
                             date)
```

Date and Time Functions

このグループには日付や時刻データを扱う関数が含まれます.

```
$now       current date and time
age        difference between two dates
year       extract the year part from a date, or the number of years from
           an interval
month      extract the month part from a date, or the number of months
           from an interval
week       extract the week number from a date, or the number of weeks
           from an interval
day        extract the day from a date, or the number of days from an
           interval
hour       extract the hour from a datetime or time, or the number
           of hours from an interval
minute     extract the minute from a datetime or time, or the number
           of minutes from an interval
second     extract the second from a datetime or time, or the number
           of minutes from an interval
```

Some example:

- Get the month and the year of today in the format "10/2014"

```
month($now) || '/' || year($now)
```

String Functions

This group contains functions that operate on strings (e.g., that replace, convert to upper case).

```
lower                         convert string a to lower case
upper                         convert string a to upper case
title                         converts all words of a string to title
                              case (all words lower case with leading
                              capital letter)
trim                          removes all leading and trailing white
                              space (spaces, tabs, etc.) from a string
wordwrap                      returns a string wrapped to a maximum/
                              minimum number of characters
length                        length of string a
replace                       returns a string with the supplied string
                              replaced
regexp_replace(a,this,that)   returns a string with the supplied regular
                              expression replaced
regexp_substr                 returns the portion of a string which matches
                              a supplied regular expression
substr(*a*,from,len)          returns a part of a string
concat                        concatenates several strings to one
strpos                        returns the index of a regular expression
                              in a string
left                          returns a substring that contains the n
                              leftmost characters of the string
right                         returns a substring that contains the n
                              rightmost characters of the string
rpad                          returns a string with supplied width padded
                              using the fill character
lpad                          returns a string with supplied width padded
                              using the fill character
format                        formats a string using supplied arguments
format_number                 returns a number formatted with the locale
                              separator for thousands (also truncates the
                              number to the number of supplied places)
format_date                   formats a date type or string into a custom
                              string format
```

Color Functions

This group contains functions for manipulating colors.

```
color_rgb       returns a string representation of a color based on its
                red, green, and blue components
color_rgba      returns a string representation of a color based on its
                red, green, blue, and alpha (transparency) components
ramp_color      returns a string representing a color from a color ramp
color_hsl       returns a string representation of a color based on its
                hue, saturation, and lightness attributes
color_hsla      returns a string representation of a color based on its
                hue, saturation, lightness and alpha (transparency)
                attributes
color_hsv       returns a string representation of a color based on its
                hue, saturation, and value attributes
```

```
color_hsva      returns a string representation of a color based on its
                hue, saturation, value and alpha (transparency) attributes
color_cmyk      returns a string representation of a color based on its
                cyan, magenta, yellow and black components
color_cmyka     returns a string representation of a color based on its
                cyan, magenta, yellow, black and alpha (transparency)
                components
```

Geometry Functions

This group contains functions that operate on geometry objects (e.g., length, area).

```
$geometry        returns the geometry of the current feature (can be used
                 for processing with other functions)
$area            returns the area size of the current feature
$length          returns the length size of the current feature
$perimeter       returns the perimeter length of the current feature
$x               returns the x coordinate of the current feature
$y               returns the y coordinate of the current feature
xat              retrieves the nth x coordinate of the current feature.
                 n given as a parameter of the function
yat              retrieves the nth y coordinate of the current feature.
                 n given as a parameter of the function
xmin             returns the minimum x coordinate of a geometry.
                 Calculations are in the Spatial Reference System of this
                 Geometry
xmax             returns the maximum x coordinate of a geometry.
                 Calculations are in the Spatial Reference System of this
                 Geometry
ymin             returns the minimum y coordinate of a geometry.
                 Calculations are in the Spatial Reference System of this
                 Geometry
ymax             returns the maximum y coordinate of a geometry.
                 Calculations are in the Spatial Reference System of this
                 Geometry
geomFromWKT      returns a geometry created from a well-known text (WKT)
                 representation
geomFromGML      returns a geometry from a GML representation of geometry
bbox
disjoint         returns 1 if the geometries do not share any space
                 together
intersects       returns 1 if the geometries spatially intersect
                 (share any portion of space) and 0 if they don't
touches          returns 1 if the geometries have at least one point in
                 common, but their interiors do not intersect
crosses          returns 1 if the supplied geometries have some, but not
                 all, interior points in common
contains         returns true if and only if no points of b lie in the
                 exterior of a, and at least one point of the interior
                 of b lies in the interior of a
overlaps         returns 1 if the geometries share space, are of the
                 same dimension, but are not completely contained by
                 each other
within           returns 1 if geometry a is completely inside geometry b
buffer           returns a geometry that represents all points whose
                 distance from this geometry is less than or equal to
                 distance
centroid         returns the geometric center of a geometry
bounds           returns a geometry which represents the bounding box of
                 an input geometry. Calculations are in the Spatial
                 Reference System of this Geometry.
bounds_width     returns the width of the bounding box of a geometry.
```

```
                 Calculations are in the Spatial Reference System of
                 this Geometry.
bounds_height    returns the height of the bounding box of a geometry.
                 Calculations are in the Spatial Reference System of
                 this Geometry.
convexHull       returns the convex hull of a geometry (this represents
                 the minimum convex geometry that encloses all geometries
                 within the set)
difference       returns a geometry that represents that part of geometry
                 a that does not intersect with geometry b
distance         returns the minimum distance (based on spatial ref)
                 between two geometries in projected units
intersection     returns a geometry that represents the shared portion
                 of geometry a and geometry b
symDifference    returns a geometry that represents the portions of a and
                 b that do not intersect
combine          returns the combination of geometry a and geometry b
union            returns a geometry that represents the point set union of
                 the geometries
geomToWKT        returns the well-known text (WKT) representation of the
                 geometry without SRID metadata
geometry         returns the feature's geometry
transform        returns the geometry transformed from the source CRS to
                 the dest CRS
```

Record Functions

このグループにはレコードを特定するような関数が含まれます.

```
$rownum                 returns the number of the current row
$id                     returns the feature id of the current row
$currentfeature         returns the current feature being evaluated.
                        This can be used with the 'attribute' function
                        to evaluate attribute values from the current
                        feature.
$scale                  returns the current scale of the map canvas
$uuid                   generates a Universally Unique Identifier (UUID)
                        for each row. Each UUID is 38 characters long.
getFeature              returns the first feature of a layer matching a
                        given attribute value.
attribute               returns the value of a specified attribute from
                        a feature.
$map                    returns the id of the current map item if the map
                        is being drawn in a composition, or "canvas" if
                        the map is being drawn within the main QGIS
                        window.
```

Fields and Values

Contains a list of fields from the layer. Sample values can also be accessed via right-click.

Select the field name from the list, then right-click to access a context menu with options to load sample values from the selected field.

Fields name should be double-quoted. Values or string should be simple-quoted.

.

12.5 編集

QGIS supports various capabilities for editing OGR, SpatiaLite, PostGIS, MSSQL Spatial and Oracle Spatial vector layers and tables.

ノート: GRASS レイヤを編集する手順は異なります- 詳細は *GRASS* **ベクタレイヤのデジタイジングと編集** のセクションを参照ください。

ちなみに: 同時編集

This version of QGIS does not track if somebody else is editing a feature at the same time as you are. The last person to save their edits wins.

12.5.1 スナップ許容量と検索半径の設定

Before we can edit vertices, we must set the snapping tolerance and search radius to a value that allows us an optimal editing of the vector layer geometries.

スナッピング許容値

Snapping tolerance is the distance QGIS uses to `search` for the closest vertex and/or segment you are trying to connect to when you set a new vertex or move an existing vertex. If you aren't within the snapping tolerance, QGIS will leave the vertex where you release the mouse button, instead of snapping it to an existing vertex and/or segment. The snapping tolerance setting affects all tools that work with tolerance.

1. A general, project-wide snapping tolerance can be defined by choosing *Settings* → *Options*. On Mac, go to *QGIS* → *Preferences...*. On Linux: *Edit* → *Options*. In the *Digitizing* tab, you can select between 'to vertex', 'to segment' or 'to vertex and segment' as default snap mode. You can also define a default snapping tolerance and a search radius for vertex edits. The tolerance can be set either in map units or in pixels. The advantage of choosing pixels is that the snapping tolerance doesn't have to be changed after zoom operations. In our small digitizing project (working with the Alaska dataset), we define the snapping units in feet. Your results may vary, but something on the order of 300 ft at a scale of 1:10000 should be a reasonable setting.
2. A layer-based snapping tolerance can be defined by choosing *Settings* → (or *File* →) *Snapping options...* to enable and adjust snapping mode and tolerance on a layer basis (see figure_edit_1).

Note that this layer-based snapping overrides the global snapping option set in the Digitizing tab. So, if you need to edit one layer and snap its vertices to another layer, then enable snapping only on the `snap to` layer, then decrease the global snapping tolerance to a smaller value. Furthermore, snapping will never occur to a layer that is not checked in the snapping options dialog, regardless of the global snapping tolerance. So be sure to mark the checkbox for those layers that you need to snap to.

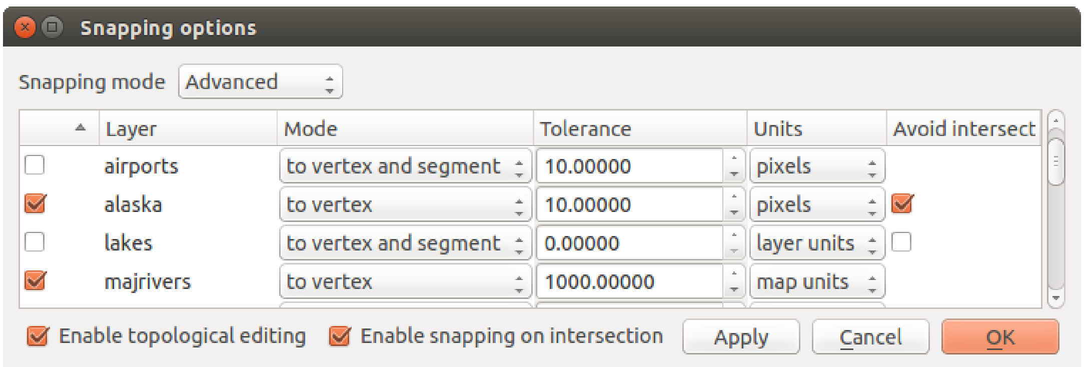

Figure 12.40: Edit snapping options on a layer basis (Advanced mode)

The *Snapping options* enables you to make a quick and simple general setting for all layers in the project so that the pointer snaps to all existing vertices and/or segments when using the 'All layers' snapping mode. In most cases it is sufficient to use this snapping mode.

It is important to consider that the per-layer tolerance in 'map units' was actually in layer units. So if working with a layer in WGS84 reprojected to UTM, setting tolerance to 1 map unit (i.e. 1 meter) wouldn't work correctly because the units would be actually degrees. So now the 'map units' has been relabeled to 'layer units' and the new entry 'map units' operates with units of the map view. While working with 'on-the-fly' CRS transformation it is now possible to use a snapping tolerance that refers to either the units of the reprojected layer (setting 'layer units') or the units of the map view (setting 'map units').

検索半径

Search radius is the distance QGIS uses to `search` for the closest vertex you are trying to move when you click on the map. If you aren't within the search radius, QGIS won't find and select any vertex for editing, and it will pop up an annoying warning to that effect. Snap tolerance and search radius are set in map units or pixels, so you may find you need to experiment to get them set right. If you specify too big of a tolerance, QGIS may snap to the wrong vertex, especially if you are dealing with a large number of vertices in close proximity. Set search radius too small, and it won't find anything to move.

The search radius for vertex edits in layer units can be defined in the *Digitizing* tab under *Settings* → *Options*. This is the same place where you define the general, project- wide snapping tolerance.

12.5.2 Zooming and Panning

Before editing a layer, you should zoom in to your area of interest. This avoids waiting while all the vertex markers are rendered across the entire layer.

Apart from using the pan and zoom-in / zoom-out icons on the toolbar with the mouse, navigating can also be done with the mouse wheel, spacebar and the arrow keys.

Zooming and panning with the mouse wheel

While digitizing, you can press the mouse wheel to pan inside of the main window, and you can roll the mouse wheel to zoom in and out on the map. For zooming, place the mouse cursor inside the map area and roll it forward (away from you) to zoom in and backwards (towards you) to zoom out. The mouse cursor position will be the center of the zoomed area of interest. You can customize the behavior of the mouse wheel zoom using the *Map tools* tab under the *Settings* → *Options* menu.

Panning with the arrow keys

Panning the map during digitizing is possible with the arrow keys. Place the mouse cursor inside the map area, and click on the right arrow key to pan east, left arrow key to pan west, up arrow key to pan north, and down arrow key to pan south.

You can also use the space bar to temporarily cause mouse movements to pan the map. The `PgUp` and `PgDown` keys on your keyboard will cause the map display to zoom in or out without interrupting your digitizing session.

12.5.3 トポロジ編集

Besides layer-based snapping options, you can also define topological functionalities in the *Snapping options...* dialog in the *Settings* (or *File*) menu. Here, you can define *Enable topological editing*, and/or for polygon layers, you can activate the column *Avoid Int.*, which avoids intersection of new polygons.

トポロジ編集を有効にする

The option *Enable topological editing* is for editing and maintaining common boundaries in polygon mosaics. QGIS 'detects' a shared boundary in a polygon mosaic, so you only have to move the vertex once, and QGIS will take care of updating the other boundary.

新規ポリゴンの重なりの禁止

The second topological option in the *Avoid Int.* column, called *Avoid intersections of new polygons*, avoids overlaps in polygon mosaics. It is for quicker digitizing of adjacent polygons. If you already have one polygon, it is possible with this option to digitize the second one such that both intersect, and QGIS then cuts the second polygon to the common boundary. The advantage is that you don't have to digitize all vertices of the common boundary.

交差に対するスナッピングを有効にする

Another option is to use *Enable snapping on intersection*. It allows you to snap on an intersection of background layers, even if there's no vertex on the intersection.

12.5.4 既存レイヤのデジタイズ

By default, QGIS loads layers read-only. This is a safeguard to avoid accidentally editing a layer if there is a slip of the mouse. However, you can choose to edit any layer as long as the data provider supports it, and the underlying data source is writable (i.e., its files are not read-only).

In general, tools for editing vector layers are divided into a digitizing and an advanced digitizing toolbar, described in section **高度なデジタイジング**. You can select and unselect both under *View* → *Toolbars* →. Using the basic digitizing tools, you can perform the following functions:

アイコン	目的	アイコン	目的
	現在の編集		編集切り替え
	Adding Features: Capture Point		Adding Features: Capture Line
	Adding Features: Capture Polygon		フィーチャの移動
	ノードツール		選択したものの削除
	フィーチャの切り取り		フィーチャのコピー
	フィーチャの貼り付け		レイヤ編集の保存

テーブル編集　ベクタレイヤ基本編集ツールバー

All editing sessions start by choosing the Toggle editing option. This can be found in the context menu after right clicking on the legend entry for a given layer.

Alternatively, you can use the Toggle Editing Toggle editing button from the digitizing toolbar to start or stop the editing mode. Once the layer is in edit mode, markers will appear at the vertices, and additional tool buttons on the editing toolbar will become available.

ちなみに: 定期的に保存する

Remember to Save Layer Edits regularly. This will also check that your data source can accept all the changes.

フィーチャの追加

You can use the Add Feature, Add Feature or Add Feature icons on the toolbar to put the QGIS cursor into digitizing mode.

For each feature, you first digitize the geometry, then enter its attributes. To digitize the geometry, left-click on the map area to create the first point of your new feature.

For lines and polygons, keep on left-clicking for each additional point you wish to capture. When you have finished adding points, right-click anywhere on the map area to confirm you have finished entering the geometry of that feature.

The attribute window will appear, allowing you to enter the information for the new feature. Figure_edit_2 shows setting attributes for a fictitious new river in Alaska. In the *Digitizing* menu under the *Settings* → *Options* menu, you can also activate *Suppress attributes pop-up windows after each created feature* and *Reuse last entered attribute values*.

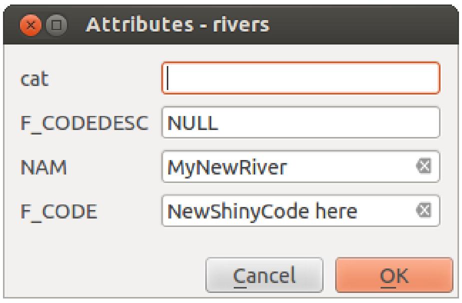

Figure 12.41: Enter Attribute Values Dialog after digitizing a new vector feature

With the Move Feature(s) icon on the toolbar, you can move existing features.

ちなみに: Attribute Value Types

For editing, the attribute types are validated during entry. Because of this, it is not possible to enter a number into a text column in the dialog *Enter Attribute Values* or vice versa. If you need to do so, you should edit the attributes in a second step within the *Attribute table* dialog.

Current Edits

This feature allows the digitization of multiple layers. Choose *Save for Selected Layers* to save all changes you made in multiple layers. You also have the opportunity to *Rollback for Selected Layers*, so that the digitization may be withdrawn for all selected layers. If you want to stop editing the selected layers, *Cancel for Selected Layer(s)* is an easy way.

同じ機能がプロジェクトの全レイヤの編集で可能です.

ノードツール

For shapefile-based layers as well as SpatialLite, PostgreSQL/PostGIS, MSSQL Spatial, and Oracle Spatial tables, the Node Tool provides manipulation capabilities of feature vertices similar to CAD programs. It is possible to simply select multiple vertices at once and to move, add or delete them altogether. The node tool also works with 'on the fly' projection turned on, and it supports the topological editing feature. This tool is, unlike other tools in QGIS, persistent, so when some operation is done, selection stays active for this feature and tool. If the node tool is unable to find any features, a warning will be displayed.

It is important to set the property *Settings* → Options → *Digitizing* → *Search Radius:* 1,00 to a number greater than zero (i.e., 10). Otherwise, QGIS will not be able to tell which vertex is being edited.

ちなみに: 頂点マーカー

The current version of QGIS supports three kinds of vertex markers: 'Semi-transparent circle', 'Cross' and 'None'. To change the marker style, choose *Options* from the *Settings* menu, click on the *Digitizing* tab and select the appropriate entry.

基本操作

Start by activating the Node Tool and selecting a feature by clicking on it. Red boxes will appear at each vertex of this feature.

- **Selecting vertices**: You can select vertices by clicking on them one at a time, by clicking on an edge to select the vertices at both ends, or by clicking and dragging a rectangle around some vertices. When a vertex is selected, its color changes to blue. To add more vertices to the current selection, hold down the `Ctrl` key while clicking. Hold down `Ctrl` or `Shift` when clicking to toggle the selection state of vertices (vertices that are currently unselected will be selected as usual, but also vertices that are already selected will become unselected).
- **Adding vertices**: To add a vertex, simply double click near an edge and a new vertex will appear on the edge near to the cursor. Note that the vertex will appear on the edge, not at the cursor position; therefore, it should be moved if necessary.
- **Deleting vertices**: After selecting vertices for deletion, click the `Delete` key. Note that you cannot use the Node Tool to delete a complete feature; QGIS will ensure it retains the minimum number of vertices for the feature type you are working on. To delete a complete feature use the Delete Selected tool.
- **Moving vertices**: Select all the vertices you want to move. Click on a selected vertex or edge and drag in the direction you wish to move. All the selected vertices will move together. If snapping is enabled, the whole selection can jump to the nearest vertex or line.

Each change made with the node tool is stored as a separate entry in the Undo dialog. Remember that all operations support topological editing when this is turned on. On-the-fly projection is also supported, and the node tool provides tooltips to identify a vertex by hovering the pointer over it.

地物の切り取り、コピーと貼り付け

Selected features can be cut, copied and pasted between layers in the same QGIS project, as long as destination layers are set to Toggle editing beforehand.

Features can also be pasted to external applications as text. That is, the features are represented in CSV format, with the geometry data appearing in the OGC Well-Known Text (WKT) format.

However, in this version of QGIS, text features from outside QGIS cannot be pasted to a layer within QGIS. When would the copy and paste function come in handy? Well, it turns out that you can edit more than one layer at a time and copy/paste features between layers. Why would we want to do this? Say we need to do some work on a new layer but only need one or two lakes, not the 5,000 on our `big_lakes` layer. We can create a new layer and use copy/paste to plop the needed lakes into it.

例として新しいレイヤにいくつかの湖沼をコピーします:

1. コピーしたいレイヤをロードします (ソースレイヤ)
2. コピー先にしたいレイヤをロードまたは作成します (ターゲットレイヤ)
3. ターゲットレイヤの編集を開始します
4. 凡例をクリックしてソースレイヤをアクティブにします

5. Use the Select Single Feature tool to select the feature(s) on the source layer
6. Click on the Copy Features tool
7. 判例をクリックしてコピー先レイヤをアクティブにして下さい
8. Click on the Paste Features tool
9. 編集モードを終了して変更内容を保存して下さい

What happens if the source and target layers have different schemas (field names and types are not the same)? QGIS populates what matches and ignores the rest. If you don't care about the attributes being copied to the target layer, it doesn't matter how you design the fields and data types. If you want to make sure everything - the feature and its attributes - gets copied, make sure the schemas match.

ちなみに: 貼り付け地物の一致

If your source and destination layers use the same projection, then the pasted features will have geometry identical to the source layer. However, if the destination layer is a different projection, then QGIS cannot guarantee the geometry is identical. This is simply because there are small rounding-off errors involved when converting between projections.

ちなみに: Copy string attribute into another

If you have created a new column in your attribute table with type 'string' and want to paste values from another attribute column that has a greater length the length of the column size will be extended to the same amount. This is because the GDAL Shapefile driver starting with GDAL/OGR 1.10 knows to auto-extend string and integer fields to dynamically accomodate for the length of the data to be inserted.

選択地物の削除

If we want to delete an entire polygon, we can do that by first selecting the polygon using the regular Select Single Feature tool. You can select multiple features for deletion. Once you have the selection set, use the Delete Selected tool to delete the features.

The Cut Features tool on the digitizing toolbar can also be used to delete features. This effectively deletes the feature but also places it on a "spatial clipboard". So, we cut the feature to delete. We could then use the Paste Features tool to put it back, giving us a one-level undo capability. Cut, copy, and paste work on the currently selected features, meaning we can operate on more than one at a time.

編集レイヤの保存

When a layer is in editing mode, any changes remain in the memory of QGIS. Therefore, they are not committed/saved immediately to the data source or disk. If you want to save edits to the current layer but want to continue editing without leaving the editing mode, you can click the Save Layer Edits button. When you turn editing mode off with Toggle editing (or quit QGIS for that matter), you are also asked if you want to save your changes or discard them.

If the changes cannot be saved (e.g., disk full, or the attributes have values that are out of range), the QGIS in-memory state is preserved. This allows you to adjust your edits and try again.

ちなみに: データの整合性

It is always a good idea to back up your data source before you start editing. While the authors of QGIS have made every effort to preserve the integrity of your data, we offer no warranty in this regard.

12.5.5 高度なデジタイジング

アイコン	目的	アイコン	目的
	アンドゥ		リドゥ
	フィーチャ（群）の回転		地物の簡素化
	リングの追加		パートの追加
	リングの塗りつぶし		リングの削除
	パートの削除		地物の変形
	オフセットカーブ		地物の分割
	部分の分割		選択地物の結合
	選択地物の属性の結合		ポイントシンボルの回転

高度なテーブル編集: ベクタレイヤの高度な編集ツールバー

アンドゥとリドゥ

The Undo and Redo tools allows you to undo or redo vector editing operations. There is also a dockable widget, which shows all operations in the undo/redo history (see Figure_edit_3). This widget is not displayed by default; it can be displayed by right clicking on the toolbar and activating the Undo/Redo checkbox. Undo/Redo is however active, even if the widget is not displayed.

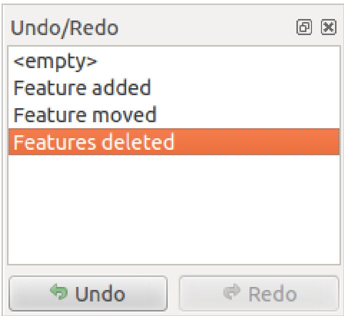

Figure 12.42: Redo and Undo digitizing steps

When Undo is hit, the state of all features and attributes are reverted to the state before the reverted operation happened. Changes other than normal vector editing operations (for example, changes done by a plugin), may or may not be reverted, depending on how the changes were performed.

undo/redo ヒストリウィジェットを利用する場合単純に操作のヒストリリストをクリックして下さい. すべての操作は選択操作のあとであった状態に戻されます.

フィーチャ（群）の回転

Use Rotate Feature(s) to rotate one or multiple features in the map canvas. Press the Rotate Feature(s) icon and then click on the feature to rotate. Either click on the map to place the rotated feature or enter an angle in the user input widget. If you want to rotate several features, they shall be selected first.

If you enable the map tool with feature(s) selected, its (their) centroid appears and will be the rotation anchor point. If you want to move the anchor point, hold the `Ctrl` button and click on the map to place it.

If you hold Shift before clicking on the map, the rotation will be done in 45 degree steps, which can be modified afterwards in the user input widget.

地物の簡素化

The Simplify Feature tool allows you to reduce the number of vertices of a feature, as long as the geometry doesn't change. With the tool you can also simplify multi-part features. First, drag a rectangle over the feature. The vertices will be highlighted in red while the color of the feature will change and a dialog where you can define a tolerance in map units or pixels will appear. QGIS calculates the amount of vertices that can be deleted while maintaining the geometry using the given tolerance. The higher the tolerance is the more vertices can be deleted. After gaining the statistics about the simplification just klick the *OK* button. The tolerance you used will be saved when leaving a project or when leaving an edit session. So you can go back to the same tolerance the next time when simplifying a feature.

リングの追加

You can create ring polygons using the Add Ring icon in the toolbar. This means that inside an existing area, it is possible to digitize further polygons that will occur as a 'hole', so only the area between the boundaries of the outer and inner polygons remains as a ring polygon.

パートの追加

You can add part polygons to a selected multipolygon. The new part polygon must be digitized outside the selected multi-polygon.

リングの塗りつぶし

You can use the Fill Ring function to add a ring to a polygon and add a new feature to the layer at the same time. Thus you need not first use the Add Ring icon and then the Add feature function anymore.

リングの削除

The Delete Ring tool allows you to delete ring polygons inside an existing area. This tool only works with polygon layers. It doesn't change anything when it is used on the outer ring of the polygon. This tool can be used on polygon and multi-polygon features. Before you select the vertices of a ring, adjust the vertex edit tolerance.

パートの削除

The Delete Part tool allows you to delete parts from multifeatures (e.g., to delete polygons from a multi-polygon feature). It won't delete the last part of the feature; this last part will stay untouched. This tool works with all multi-part geometries: point, line and polygon. Before you select the vertices of a part, adjust the vertex edit tolerance.

地物の変形

You can reshape line and polygon features using the Reshape Features icon on the toolbar. It replaces the line or polygon part from the first to the last intersection with the original line. With polygons, this can sometimes lead to unintended results. It is mainly useful to replace smaller parts of a polygon, not for major overhauls, and the reshape line is not allowed to cross several polygon rings, as this would generate an invalid polygon.

たとえばポリゴンの境界線をこのツールで編集できます. 最初にポリゴンの内側をクリックした後に新しく頂点を追加したい位置に点を入力してください. それから境界線をまたいでポリゴンの外側に頂点を追加してください. このツールは境界線と新しい線の交点に自動的にノードを追加します. これはポリゴンの一部を削除する場合にも利用できます, ポリゴンの外側から新しいラインを開始して内側に新しい頂点を追加します, そしてポリゴンの外側に最終点を右ボタンクリックで作成してください.

ノート: The reshape tool may alter the starting position of a polygon ring or a closed line. So, the point that is represented 'twice' will not be the same any more. This may not be a problem for most applications, but it is something to consider.

オフセットカーブ

The Offset Curve tool creates parallel shifts of line layers. The tool can be applied to the edited layer (the geometries are modified) or also to background layers (in which case it creates copies of the lines / rings and adds them to the the edited layer). It is thus ideally suited for the creation of distance line layers. The displacement is shown at the bottom left of the taskbar.

To create a shift of a line layer, you must first go into editing mode and activate the Offset Curve tool. Then click on a feature to shift it. Move the mouse and click where wanted or enter the desired distance in the user input widget. Your changes may then be saved with the|mActionSaveEdits|:sup:*Save Layer Edits* tool.

QGIS options dialog (Digitizing tab then **Curve offset tools** section) allows you to configure some parameters like **Join style**, **Quadrant segments**, **Miter limit**.

地物の分割

You can split features using the Split Features icon on the toolbar. Just draw a line across the feature you want to split.

部分の分割

In QGIS 2.0 it is now possible to split the parts of a multi part feature so that the number of parts is increased. Just draw a line across the part you want to split using the Split Parts icon.

選択フィーチャのマージ

The Merge Selected Features tool allows you to merge features. A new dialog will allow you to choose which value to choose between each selected features or select a function (Minimum, Maximum, Median, Sum, Skip Attribute) to use for each column. If features don't have a common boundaries, a multipolygon will be created.

選択地物の属性マージ

The Merge Attributes of Selected Features tool allows you to merge attributes of features with common boundaries and attributes without merging their boundaries. First, select several features at once. Then press the

Merge Attributes of Selected Features button. Now QGIS asks you which attributes are to be applied to all selected objects. As a result, all selected objects have the same attribute entries.

ポイントシンボルの回転

Rotate Point Symbols allows you to change the rotation of point symbols in the map canvas. You must first define a rotation column from the attribute table of the point layer in the *Advanced* menu of the *Style* menu of the *Layer Properties*. Also, you will need to go into the 'SVG marker' and choose *Data defined properties ....* Activate *Angle* and choose 'rotation' as field. Without these settings, the tool is inactive.

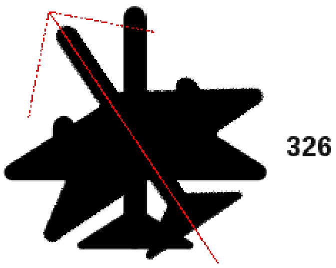

Figure 12.43: Rotate Point Symbols

To change the rotation, select a point feature in the map canvas and rotate it, holding the left mouse button pressed. A red arrow with the rotation value will be visualized (see Figure_edit_4). When you release the left mouse button again, the value will be updated in the attribute table.

ノート: If you hold the `Ctrl` key pressed, the rotation will be done in 15 degree steps.

12.5.6 The Advanced Digitizing panel

When capturing new geometries or geometry parts you also have the possibility to use the Advanced Digitizing panel. You can digitize lines exactly parallel or at a specific angle or lock lines to specific angles. Furthermore you can enter coordinates directly so that you can make a precise definition for your new geomtry.

_figure_advanced_edit 1:

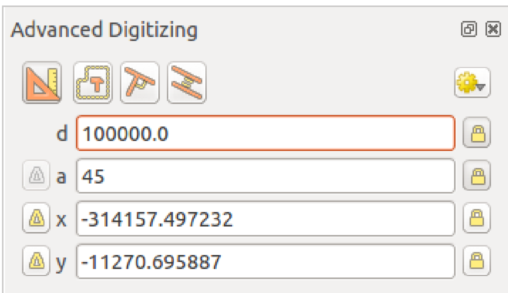

Figure 12.44: The Advanced Digitizing panel

The tools are not enabled if the map view is in geographic coordinates.

12.5.7 新しいベクタレイヤの作成

QGIS allows you to create new shapefile layers, new SpatiaLite layers, new GPX layers and New Temporary Scratch Layers. Creation of a new GRASS layer is supported within the GRASS plugin. Please refer to section **新しい** *GRASS* **ベクターレイヤーの作成** for more information on creating GRASS vector layers.

新規 Shapefile レイヤの作成

To create a new shape layer for editing, choose *New* → *New Shapefile Layer...* from the *Layer* menu. The *New Vector Layer* dialog will be displayed as shown in Figure_edit_5. Choose the type of layer (point, line or polygon) and the CRS (coordinate reference system).

Note that QGIS does not yet support creation of 2.5D features (i.e., features with X,Y,Z coordinates).

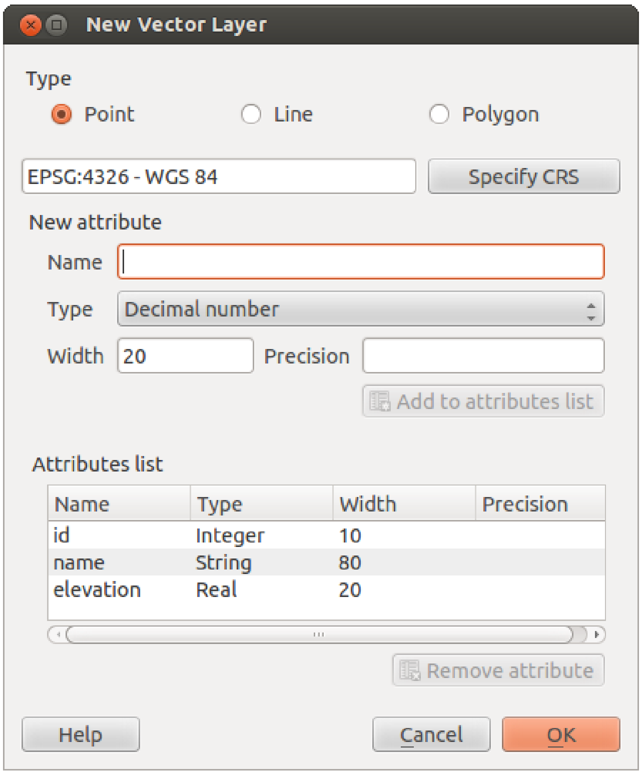

Figure 12.45: Creating a new Shapefile layer Dialog

To complete the creation of the new shapefile layer, add the desired attributes by clicking on the **[Add to attributes list]** button and specifying a name and type for the attribute. A first 'id' column is added as default but can be removed, if not wanted. Only *Type: real* , *Type: integer* , *Type: string* and *Type:date* attributes are supported. Additionally and according to the attribute type, you can also define the width and precision of the new attribute column. Once you are happy with the attributes, click **[OK]** and provide a name for the shapefile. QGIS will automatically add a `.shp` extension to the name you specify. Once the layer has been created, it will be added to the map, and you can edit it in the same way as described in section **既存レイヤのデジタイズ** above.

新規 Spatialite レイヤの作成

To create a new SpatiaLite layer for editing, choose *New* → *New SpatiaLite Layer...* from the *Layer* menu. The *New SpatiaLite Layer* dialog will be displayed as shown in Figure_edit_6.

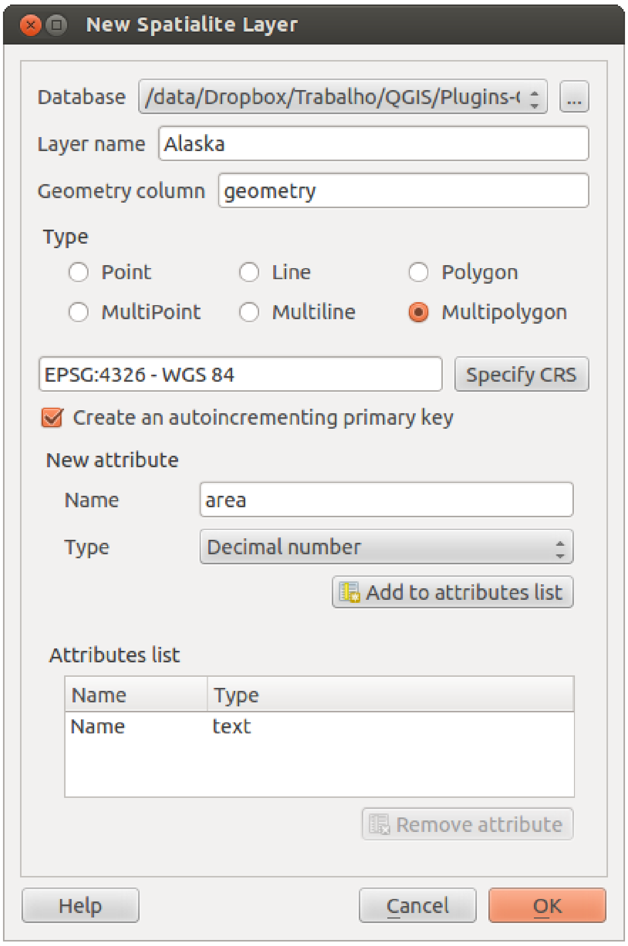

Figure 12.46: Creating a New SpatiaLite layer Dialog

The first step is to select an existing SpatiaLite database or to create a new SpatiaLite database. This can be done with the browse button ... to the right of the database field. Then, add a name for the new layer, define the layer type, and specify the coordinate reference system with **[Specify CRS]**. If desired, you can select *Create an autoincrementing primary key*.

To define an attribute table for the new SpatiaLite layer, add the names of the attribute columns you want to create with the corresponding column type, and click on the **[Add to attribute list]** button. Once you are happy with the attributes, click **[OK]**. QGIS will automatically add the new layer to the legend, and you can edit it in the same way as described in section **既存レイヤのデジタイズ** above.

SpatiaLite レイヤ の高度な管理は DB マネージャを使うと実行できます *DB* **マネージャプラグイン** 参照.

新しい GPX レイヤの作成

To create a new GPX file, you need to load the GPS plugin first. *Plugins* → *Plugin Manager...* opens the Plugin Manager Dialog. Activate the *GPS Tools* checkbox.

When this plugin is loaded, choose *New* → *Create new GPX Layer...* from the *Layer* menu. In the *Save new GPX file as* dialog, you can choose where to save the new GPX layer.

Creating a new Temporary Scratch Layer

Empty, editable memory layers can be defined using *Layer* → *Create Layer* → *New Temporary Scratch Layer*. Here you can even create *Multipoint*, *Multiline* and *Multipolygon* Layers beneath *Point*, *Line* and *Polygon* Layers. Temporary Scratch Layers are not saved and will be discarded when QGIS is closed. See also paste_into_layer .

12.5.8 Working with the Attribute Table

The attribute table displays features of a selected layer. Each row in the table represents one map feature, and each column contains a particular piece of information about the feature. Features in the table can be searched, selected, moved or even edited.

To open the attribute table for a vector layer, make the layer active by clicking on it in the map legend area. Then, from the main *Layer* menu, choose *Open Attribute Table*. It is also possible to right click on the layer and choose *Open Attribute Table* from the drop-down menu, and to click on the *Open Attribute Table* button in the Attributes toolbar.

This will open a new window that displays the feature attributes for the layer (figure_attributes_1). The number of features and the number of selected features are shown in the attribute table title.

Selecting features in an attribute table

Each selected row in the attribute table displays the attributes of a selected feature in the layer. If the set of features selected in the main window is changed, the selection is also updated in the attribute table. Likewise, if the set of rows selected in the attribute table is changed, the set of features selected in the main window will be updated.

Rows can be selected by clicking on the row number on the left side of the row. **Multiple rows** can be marked by holding the `Ctrl` key. A **continuous selection** can be made by holding the `Shift` key and clicking on several row headers on the left side of the rows. All rows between the current cursor position and the clicked row are selected. Moving the cursor position in the attribute table, by clicking a cell in the table, does not change the row selection. Changing the selection in the main canvas does not move the cursor position in the attribute table.

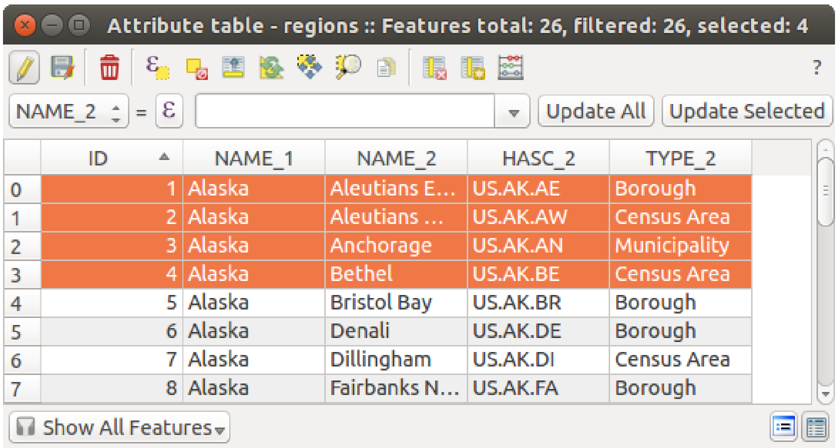

Figure 12.47: Attribute Table for regions layer

The table can be sorted by any column, by clicking on the column header. A small arrow indicates the sort order (downward pointing means descending values from the top row down, upward pointing means ascending values from the top row down).

For a **simple search by attributes** on only one column, choose the *Column filter* → from the menu in the bottom left corner. Select the field (column) on which the search should be performed from the drop-down menu, and hit the **[Apply]** button. Then, only the matching features are shown in the attribute table.

To make a selection, you have to use the Select features using an Expression icon on top of the attribute table. Select features using an Expression allows you to define a subset of a table using a *Function List* like in the Field Calculator (see **フィールド計算機**). The query result can then be saved as a new vector layer. For example, if you want to find regions that are boroughs from `regions.shp` of the QGIS sample data, you have to open the *Fields and Values* menu and choose the field that you want to query. Double-click the field 'TYPE_2' and also **[Load all unique values]** . From the list, choose and double-click 'Borough'. In the *Expression* field, the following query appears:

```
"TYPE_2"  =  'Borough'
```

Here you can also use the *Function list* → *Recent (Selection)* to make a selection that you used before. The expression builder remembers the last 20 used expressions.

The matching rows will be selected, and the total number of matching rows will appear in the title bar of the attribute table, as well as in the status bar of the main window. For searches that display only selected features on the map, use the Query Builder described in section **クエリビルダー**.

To show selected records only, use *Show Selected Features* from the menu at the bottom left.

The field calculator bar allows you to make calculations on the selected rows only. For example, you can alter the number of the ID field of the file:*regions.shp* with the expression

```
ID+5
```

as shown in figure_attributes_1 .

The other buttons at the top of the attribute table window provide the following functionality:

- Toggle editing mode to edit single values and to enable functionalities described below (also with `Ctrl+E`)
- Save Edits (also with `Ctrl+S`)
- Unselect all (also with `Ctrl+U`)
- Move selected to top (also with `Ctrl+T`)

- Invert selection (also with `Ctrl+R`)
- Copy selected rows to clipboard (also with `Ctrl+C`)
- Zoom map to the selected rows (also with `Ctrl+J`)
- Pan map to the selected rows (also with `Ctrl+P`)
- Delete selected features (also with `Ctrl+D`)
- New Column for PostGIS layers and for OGR layers with GDAL version >= 1.6 (also with `Ctrl+W`)
- Delete Column for PostGIS layers and for OGR layers with GDAL version >= 1.9 (also with `Ctrl+L`)
- Open field calculator (also with `Ctrl+I`)

Below these buttons is the Field Calculator bar, which allows calculations to be quickly applied attributes visible in the table. This bar uses the same expressions as the Field Calculator (see **フィールド計算機**).

ちなみに: Skip WKT geometry

If you want to use attribute data in external programs (such as Excel), use the Copy selected rows to clipboard button. You can copy the information without vector geometries if you deactivate *Settings* → *Options* → Data sources menu *Copy geometry in WKT representation from attribute table*.

Save selected features as new layer

The selected features can be saved as any OGR-supported vector format and also transformed into another coordinate reference system (CRS). Just open the right mouse menu of the layer and click on *Save as* to define the name of the output file, its format and CRS (see section *Map Legend*). To save the selection ensure that the *Save only selected features* is selected. It is also possible to specify OGR creation options within the dialog.

Paste into new layer

Features that are on the clipboard may be pasted into a new layer. To do this, first make a layer editable. Select some features, copy them to the clipboard, and then paste them into a new layer using *Edit* → *Paste Features as* and choosing *New vector layer* or *New memory layer*.

This applies to features selected and copied within QGIS and also to features from another source defined using well-known text (WKT).

Working with non spatial attribute tables

QGIS allows you also to load non-spatial tables. This currently includes tables supported by OGR and delimited text, as well as the PostgreSQL, MSSQL and Oracle provider. The tables can be used for field lookups or just generally browsed and edited using the table view. When you load the table, you will see it in the legend field. It can be opened with the Open Attribute Table tool and is then editable like any other layer attribute table.

As an example, you can use columns of the non-spatial table to define attribute values, or a range of values that are allowed, to be added to a specific vector layer during digitizing. Have a closer look at the edit widget in section **フィールドメニュー** to find out more.

12.5.9 Creating one to many relations

Relations are a technique often used in databases. The concept is, that features (rows) of different layers (tables) can belong to each other.

As an example you have a layer with all regions of alaska (polygon) which provides some attributes about its name and region type and a unique id (which acts as primary key).

Foreign keys

Then you get another point layer or table with information about airports that are located in the regions and you also want to keep track of these. If you want to add them to the region layer, you need to create a one to many relation using foreign keys, because there are several airports in most regions.

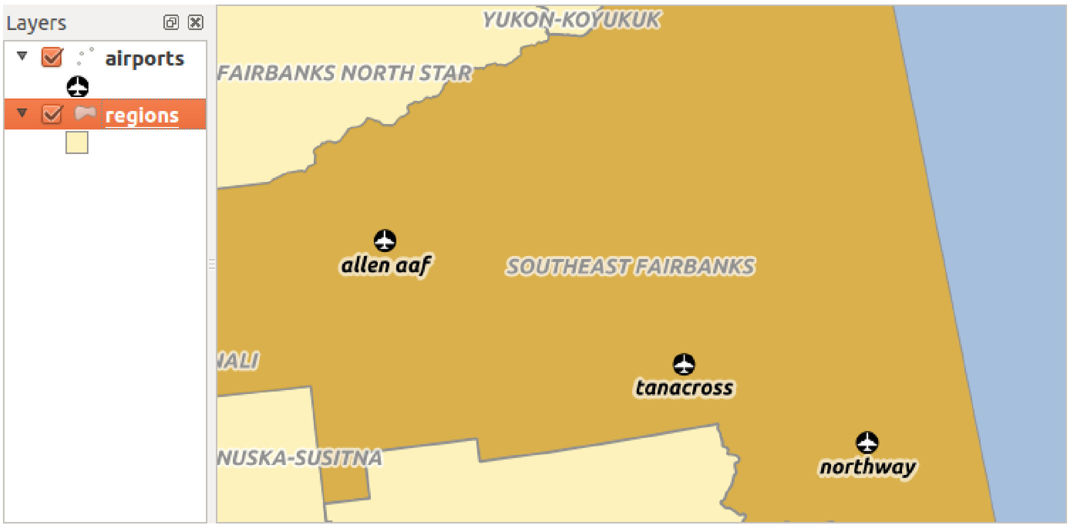

Figure 12.48: Alaska region with airports

In addition to the already existing attributes in the airports attribute table another field fk_region which acts as a foreign key (if you have a database, you will probably want to define a constraint on it).

This field fk_region will always contain an id of a region. It can be seen like a pointer to the region it belongs to. And you can design a custom edit form for the editing and QGIS takes care about the setup. It works with different providers (so you can also use it with shape and csv files) and all you have to do is to tell QGIS the relations between your tables.

Layers

QGIS makes no difference between a table and a vector layer. Basically, a vector layer is a table with a geometry. So can add your table as a vector layer. To demostrate you can load the 'region' shapefile (with geometries) and the 'airport' csv table (without geometries) and a foreign key (fk_region) to the layer region. This means, that each airport belongs to exactly one region while each region can have any number of airports (a typical one to many relation).

Definition (Relation Manager)

The first thing we are going to do is to let QGIS know about the relations between the layer. This is done in *Settings* → *Project Properties*. Open the *Relations* menu and click on *Add*.

- **name** is going to be used as a title. It should be a human readable string, describing, what the relation is used for. We will just call say "Airports" in this case.

- **referencing layer** is the one with the foreign key field on it. In our case this is the airports layer
- **referencing field** will say, which field points to the other layer so this is fk_region in this case
- **referenced layer** is the one with the primary key, pointed to, so here it is the regions layer
- **referenced field** is the primary key of the referenced layer so it is ID
- **id** will be used for internal purposes and has to be unique. You may need it to build custom forms once this is supported. If you leave it empty, one will be generated for you but you can assign one yourself to get one that is easier to handle.

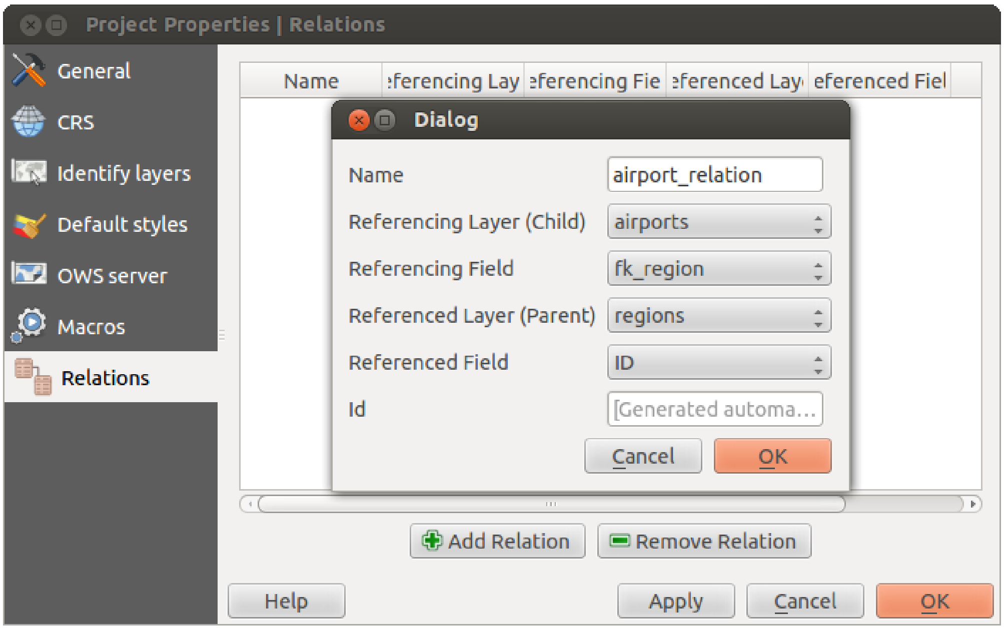

Figure 12.49: Relation Manager

Forms

Now that QGIS knows about the relation, it will be used to improve the forms it generates. As we did not change the default form method (autogenerated) it will just add a new widget in our form. So let's select the layer region in the legend and use the identify tool. Depending on your settings, the form might open directly or you will have to choose to open it in the identification dialog under actions.

As you can see, the airports assigned to this particular region are all shown in a table. And there are also some buttons available. Let's review them shortly

- The button is for toggling the edit mode. Be aware that it toggles the edit mode of the airport layer, although we are in the feature form of a feature from the region layer. But the table is representing features of the airport layer.
- The button will add a new feature to the airport layer. And it will assign the new airport to the current region by default.
- The button will delete the selected airport permanently.
- The symbol will open a new dialog where you can select any existing airport which will then be assigned to the current region. This may be handy if you created the airport on the wrong region by accident.
- The symbol will unlink the selected airport from the current region, leaving them unassigned (the foreign key is set to NULL) effectively.

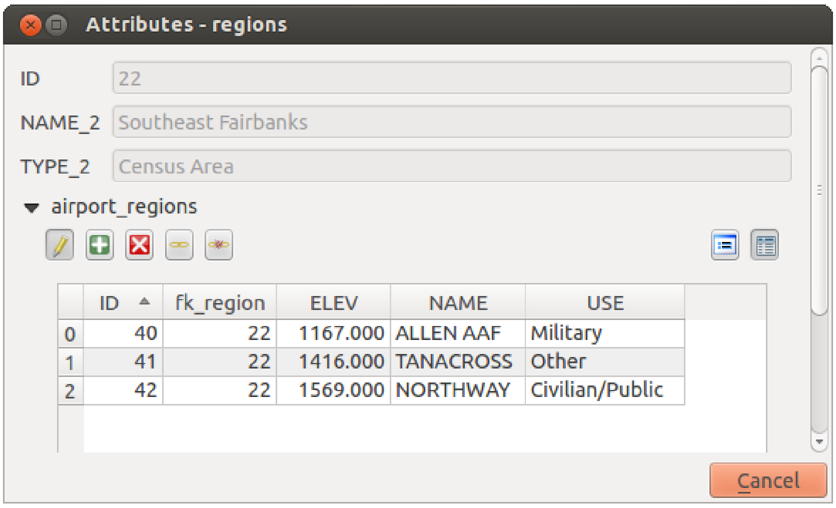

Figure 12.50: Identification dialog regions with relation to airports

- The two buttons to the right switch between table view and form view where the later let's you view all the airports in their respective form.

If you work on the airport table, a new widget type is available which lets you embed the feature form of the referenced region on the feature form of the airports. It can be used when you open the layer properties of the airports table, switch to the *Fields* menu and change the widget type of the foreign key field 'fk_region' to Relation Reference.

If you look at the feature dialog now, you will see, that the form of the region is embedded inside the airports form and will even have a combobox, which allows you to assign the current airport to another region.

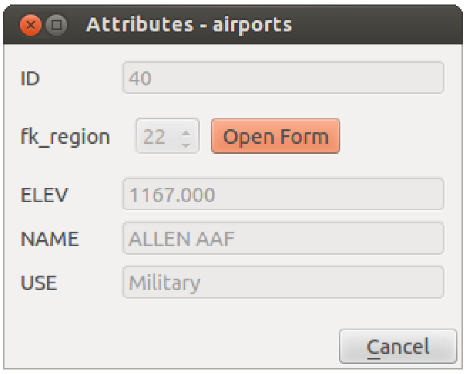

Figure 12.51: Identification dialog airport with relation to regions

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12.6 クエリビルダー

The Query Builder allows you to define a subset of a table using a SQL-like WHERE clause and to display the result in the main window. The query result can then be saved as a new vector layer.

12.6.1 クエリ

Open the **Query Builder** by opening the Layer Properties and going to the *General* menu. Under *Feature subset*, click on the **[Query Builder]** button to open the *Query builder*. For example, if you have a `regions` layer with a

TYPE_2 field, you could select only regions that are borough in the *Provider specific filter expression* box of the Query Builder. Figure_attributes_2 shows an example of the Query Builder populated with the regions.shp layer from the QGIS sample data. The Fields, Values and Operators sections help you to construct the SQL-like query.

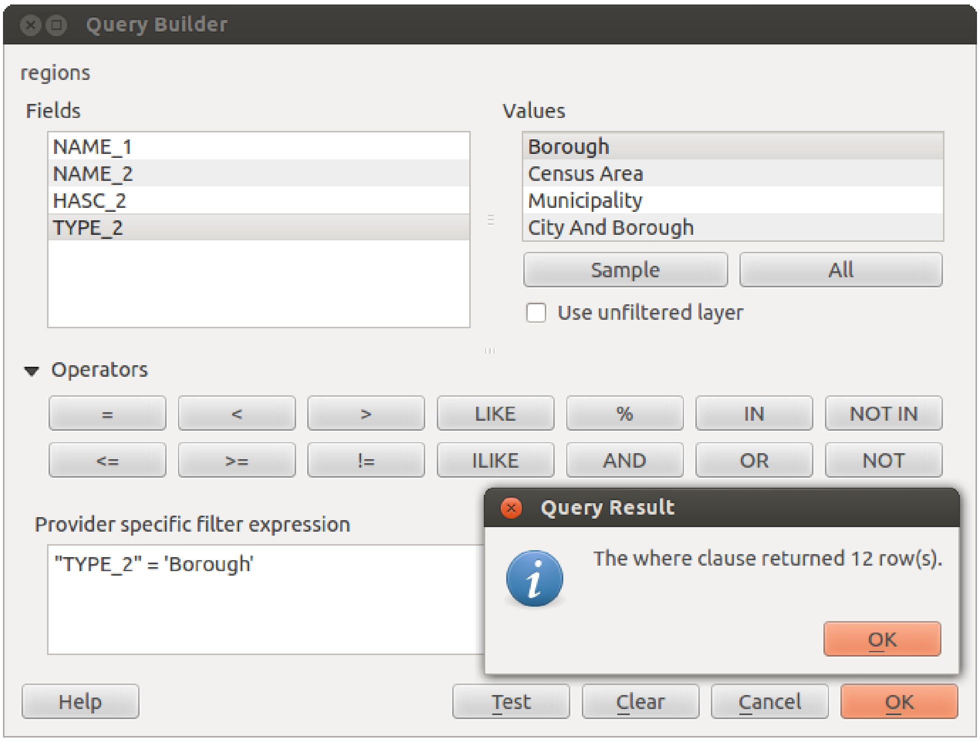

Figure 12.52: クエリビルダー

The **Fields list** contains all attribute columns of the attribute table to be searched. To add an attribute column to the SQL WHERE clause field, double click its name in the Fields list. Generally, you can use the various fields, values and operators to construct the query, or you can just type it into the SQL box.

The **Values list** lists the values of an attribute table. To list all possible values of an attribute, select the attribute in the Fields list and click the **[all]** button. To list the first 25 unique values of an attribute column, select the attribute column in the Fields list and click the **[Sample]** button. To add a value to the SQL WHERE clause field, double click its name in the Values list.

The **Operators section** contains all usable operators. To add an operator to the SQL WHERE clause field, click the appropriate button. Relational operators (= , > , ...), string comparison operator (LIKE), and logical operators (AND, OR, ...) are available.

The **[Test]** button shows a message box with the number of features satisfying the current query, which is useful in the process of query construction. The **[Clear]** button clears the text in the SQL WHERE clause text field. The **[OK]** button closes the window and selects the features satisfying the query. The **[Cancel]** button closes the window without changing the current selection.

QGIS treats the resulting subset acts as if it where the entire layer. For example if you applied the filter above for 'Borough', you can not display, query, save or edit Anchorage, because that is a 'Municipality' and therefore not part of the subset.

The only exception is that unless your layer is part of a database, using a subset will prevent you from editing the layer.

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12.7 フィールド計算機

The Field Calculator button in the attribute table allows you to perform calculations on the basis of existing attribute values or defined functions, for instance, to calculate length or area of geometry features. The results can be written to a new attribute field, a virtual field, or they can be used to update values in an existing field.

ちなみに: Virtual Fields

- Virtual fields are not permanent and are not saved.
- To make a field virtual it must be done when the field is made.

The field calculator is now available on any layer that supports edit. When you click on the field calculator icon the dialog opens (see figure_attributes_3). If the layer is not in edit mode, a warning is displayed and using the field calculator will cause the layer to be put in edit mode before the calculation is made.

The quick field calculation bar on top of the attribute table is only visible if the layer is editable.

In quick field calculation bar, you first select the existing field name then open the expression dialog to create your expression or write it directly in the field then click on **Update All** button.

12.7.1 Expression tab

In the field calculator dialog, you first must select whether you want to only update selected features, create a new attribute field where the results of the calculation will be added or update an existing field.

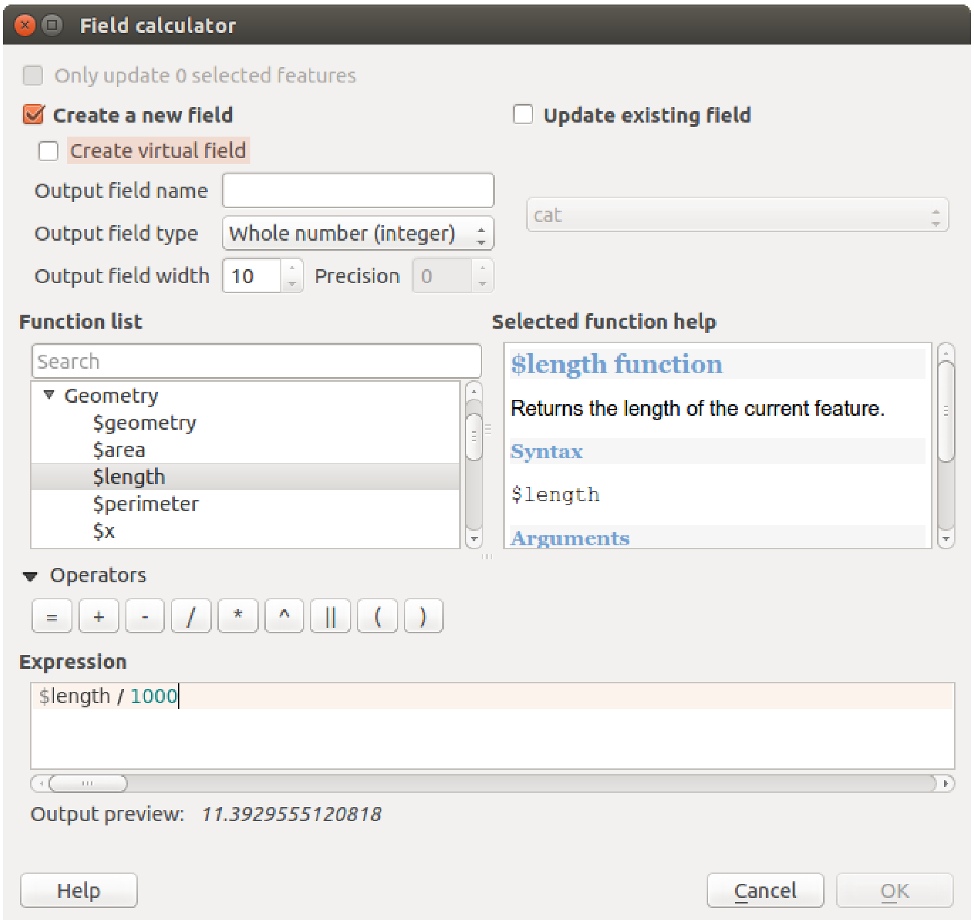

Figure 12.53: フィールド計算機

If you choose to add a new field, you need to enter a field name, a field type (integer, real or string), the total field width, and the field precision (see figure_attributes_3). For example, if you choose a field width of 10 and a field precision of 3, it means you have 6 digits before the dot, then the dot and another 3 digits for the precision.

A short example illustrates how field calculator works when using the *Expression* tab. We want to calculate the length in km of the `railroads` layer from the QGIS sample dataset:

1. Load the shapefile `railroads.shp` in QGIS and press Open Attribute Table.
2. Click on Toggle editing mode and open the Field Calculator dialog.
3. Select the *Create a new field* checkbox to save the calculations into a new field.
4. Add `length` as Output field name and `real` as Output field type, and define Output field width to be 10 and Precision, 3.
5. Now double click on function `$length` in the *Geometry* group to add it into the Field calculator expression box.
6. フィールド計算機の式ボックスに "/ 1000" と打ち込むと式の完成です. それから **[Ok]** をクリックして下さい.
7. You can now find a new field `length` in the attribute table.

The available functions are listed in *Expressions* chapter.

12.7.2 Function Editor tab

With the Function Editor you are able to define your own Python custom functions in a comfortable way. The function editor will create new Python files in `qgis2pythonexpressions` and will auto load all functions defined when starting QGIS. Be aware that new functions are only saved in the `expressions` folder and not in the project file. If you have a project that uses one of your custom functions you will need to also share the .py file in the expressions folder.

Here's a short example on how to create your own functions:

```
@qgsfunction(args="auto", group='Custom')
def myfunc(value1, value2 feature, parent):
    pass
```

The short example creates a function 'myfunc' that will give you a function with two values. When using the args='auto' function argument the number of function arguments required will be calculated by the number of arguments the function has been defined with in Python (minus 2 - feature, and parent).

This function then can be used with the following expression:

```
myfunc('test1', 'test2')
```

Your function will be implemented in the 'Custom' *Functions* of the *Expression* tab after using the *Run Script* button.

Further information about creating Python code can be found on http://www.qgis.org/html/en/docs/pyqgis_developer_cookbook/inde

The function editor is not only limited to working with the field calculator, it can be found whenever you work with expressions. See also *Expressions*.

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Chapter 13

ラスタデータの操作

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13.1 ラスターデータの操作

This section describes how to visualize and set raster layer properties. QGIS uses the GDAL library to read and write raster data formats, including ArcInfo Binary Grid, ArcInfo ASCII Grid, GeoTIFF, ERDAS IMAGINE, and many more. GRASS raster support is supplied by a native QGIS data provider plugin. The raster data can also be loaded in read mode from zip and gzip archives into QGIS.

この文書の日付において、GDAL ライブラリでは 100 以上のラスターフォーマットがサポートされています(**文献と** *Web* **参照** の GDAL-SOFTWARE-SUITE を参照)。完全なリストは http://www.gdal.org/formats_list.html で参照可能です。

ノート: Not all of the listed formats may work in QGIS for various reasons. For example, some require external commercial libraries, or the GDAL installation of your OS may not have been built to support the format you want to use. Only those formats that have been well tested will appear in the list of file types when loading a raster into QGIS. Other untested formats can be loaded by selecting the `[GDAL] All files (*)` filter.

GRASS ラスターデータの操作については *GRASS GIS* **の統合** のセクションで説明されています。

13.1.1 ラスターデータとは？

Raster data in GIS are matrices of discrete cells that represent features on, above or below the earth's surface. Each cell in the raster grid is the same size, and cells are usually rectangular (in QGIS they will always be rectangular). Typical raster datasets include remote sensing data, such as aerial photography, or satellite imagery and modelled data, such as an elevation matrix.

Unlike vector data, raster data typically do not have an associated database record for each cell. They are geocoded by pixel resolution and the x/y coordinate of a corner pixel of the raster layer. This allows QGIS to position the data correctly in the map canvas.

QGIS makes use of georeference information inside the raster layer (e.g., GeoTiff) or in an appropriate world file to properly display the data.

13.1.2 Loading raster data in QGIS

Raster layers are loaded either by clicking on the Add Raster Layer icon or by selecting the *Layer* → *Add Raster Layer* menu option. More than one layer can be loaded at the same time by holding down the `Ctrl` or `Shift` key and clicking on multiple items in the *Open a GDAL Supported Raster Data Source* dialog.

ラスタレイヤをマップの凡例にロードしたらマウスの右ボタンでレイヤ名上をクリックし, アクティブレイヤの特定の地物を選択したり, レイヤのラスタプロパティを設定するためのダイアログを開くことができます.

ラスタレイヤの右マウスボタンメニュー

- **レイヤの領域にズーム**
- **最適スケール にズームする** *(100%)*
- **現在の領域を使って引き伸ばす**
- **全体図に表示**
- **削除**
- **複製**
- **レイヤの** *CRS* **を設定する**
- **レイヤの** *CRS* **をプロジェクトに設定する**
- **名前をつけて保存** *...*
- **プロパティ**
- **改名**
- **スタイルのコピー**
- **新規グループ追加**
- **すべてを展開する**
- **すべてを折りたたむ**
- **描画順序の更新**

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13.2 ラスタのプロパティダイアログ

ラスタレイヤのプロパティを表示および設定するには、マップの凡例でレイヤ名をダブルクリックするか、レイヤ名をクリックし、コンテキストメニューから **プロパティ** を選択してください. これによって *Raster Layer Properties* ダイアログが開きます (figure_raster_1 参照).

このダイアログには多くのメニューがあります:

- **一般情報**
- **スタイル**
- **透過性**
- **ピラミッド**
- **ヒストグラム**
- **メタデータ**

13.2.1 一般情報メニュー

レイヤ情報

The *General* menu displays basic information about the selected raster, including the layer source path, the display name in the legend (which can be modified), and the number of columns, rows and no-data values of the raster.

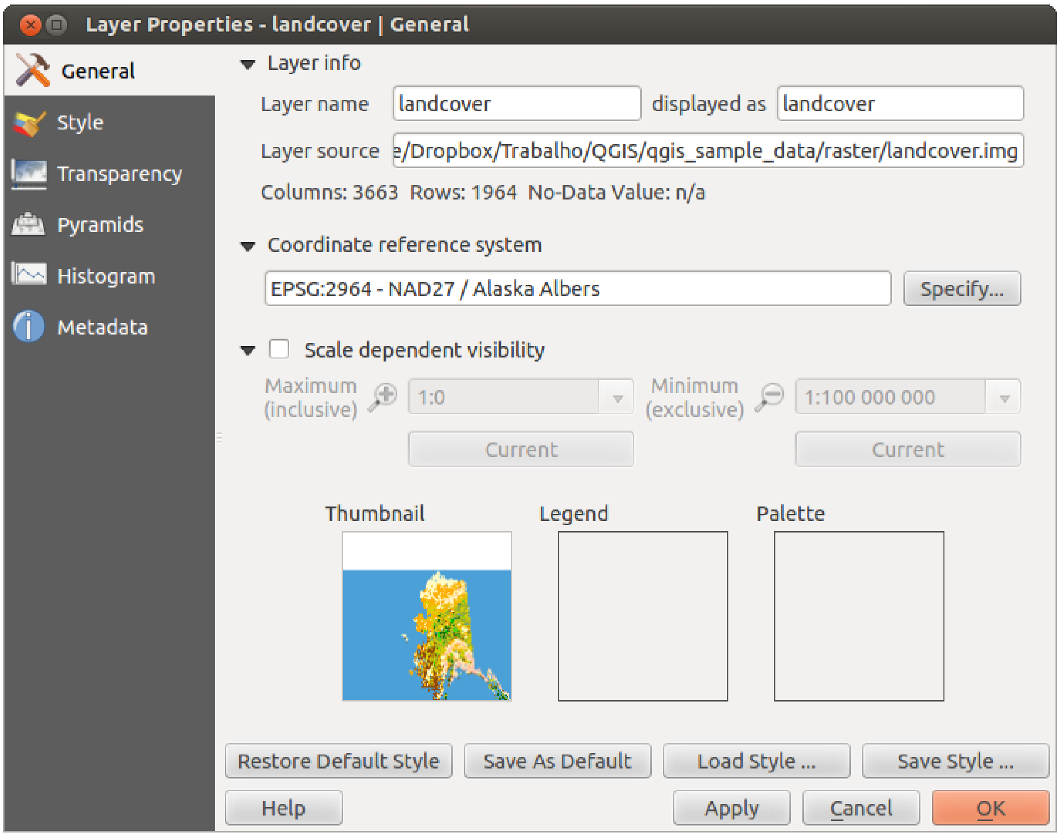

Figure 13.1: Raster Layers Properties Dialog

座標参照システム

ここでは座標参照システム (CRS) の情報を PROJ.4 文字列として見ることができます. もしこの設定が正しくない場合は **[Specify]** ボタンをクリックすると変更することができます.

縮尺に応じた表示設定

さらに、縮尺に応じた表示設定を行うことができます。 チェックボックスにチェックを入れ、データがマップキャンバスに表示される適当な縮尺を入力します。

一番下にはレイヤのサムネイルが表示されます, それは凡例のシンボルに利用されます. またパレットが表示されます

13.2.2 スタイルメニュー

バンドレンダリング

QGIS offers four different *Render types*. The renderer chosen is dependent on the data type.

1. マルチバンドカラー - ファイルが多くのバンドを持つとマルチバンドになります (例., 多くのバンドを持つ衛星イメージ)
2. パレットを使った- シングルバンドファイルがインデックスされたパレットを使う場合 (例., デジタルトポグラフィックマップで利用する場合)
3. Singleband gray - (one band of) the image will be rendered as gray; QGIS will choose this renderer if the file has neither multibands nor an indexed palette nor a continous palette (e.g., used with a shaded relief map)

4. シングルバンド擬似カラー - このレンダーは連続色パレットかカラーマップで利用できます (例., 標高マップでの利用)

マルチバンドカラー

マルチバンドカラーレンダラーではイメージから赤、緑、青をあらわす 3 つのバンドが選択され描画されます. **コントラスト拡張** で methods: 'No enhancement', 'Stretch to MinMax', 'Stretch and clip to MinMax' と 'Clip to min max' などのメソッドを選択できます.

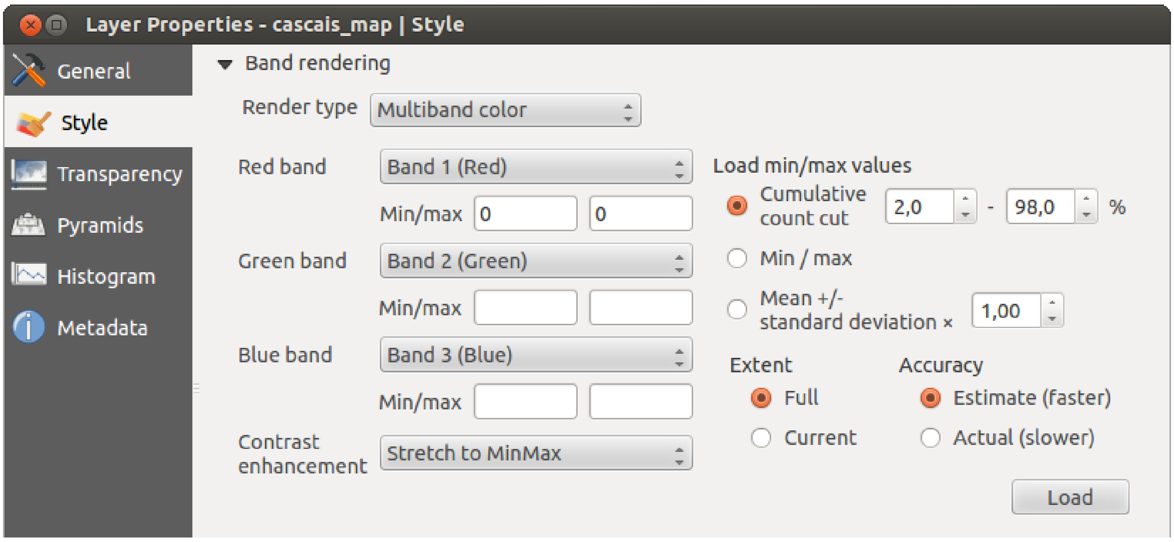

Figure 13.2: Raster Renderer - Multiband color

This selection offers you a wide range of options to modify the appearance of your raster layer. First of all, you have to get the data range from your image. This can be done by choosing the *Extent* and pressing **[Load]**. QGIS can *Estimate (faster)* the *Min* and *Max* values of the bands or use the *Actual (slower) Accuracy*.

Now you can scale the colors with the help of the *Load min/max values* section. A lot of images have a few very low and high data. These outliers can be eliminated using the *Cumulative count cut* setting. The standard data range is set from 2% to 98% of the data values and can be adapted manually. With this setting, the gray character of the image can disappear. With the scaling option *Min/max*, QGIS creates a color table with all of the data included in the original image (e.g., QGIS creates a color table with 256 values, given the fact that you have 8 bit bands). You can also calculate your color table using the *Mean +/- standard deviation x* 1,00. Then, only the values within the standard deviation or within multiple standard deviations are considered for the color table. This is useful when you have one or two cells with abnormally high values in a raster grid that are having a negative impact on the rendering of the raster.

All calculations can also be made for the *Current* extent.

ちなみに: マルチバンドラスタの単バンドを表示する

If you want to view a single band of a multiband image (for example, Red), you might think you would set the Green and Blue bands to "Not Set". But this is not the correct way. To display the Red band, set the image type to 'Singleband gray', then select Red as the band to use for Gray.

パレット

This is the standard render option for singleband files that already include a color table, where each pixel value is assigned to a certain color. In that case, the palette is rendered automatically. If you want to change colors assigned to certain values, just double-click on the color and the *Select color* dialog appears. Also, in QGIS 2.2. it's now possible to assign a label to the color values. The label appears in the legend of the raster layer then.

コントラスト強調

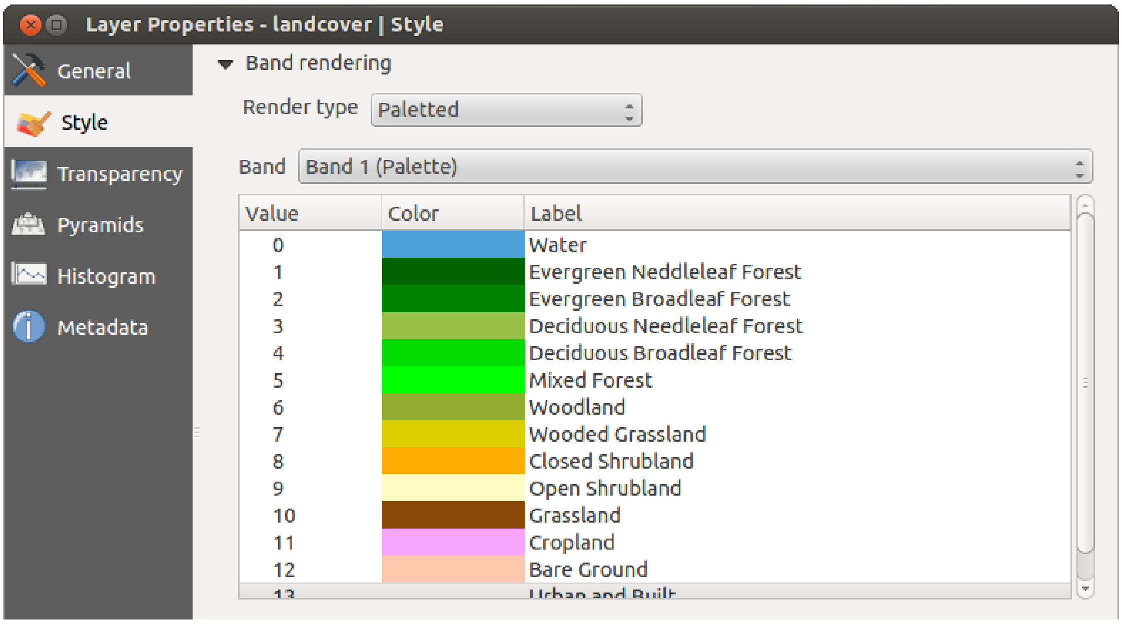

Figure 13.3: Raster Renderer - Paletted

ノート: When adding GRASS rasters, the option *Contrast enhancement* will always be set automatically to *stretch to min max*, regardless of if this is set to another value in the QGIS general options.

シングルバンドグレイ

This renderer allows you to render a single band layer with a *Color gradient*: 'Black to white' or 'White to black'. You can define a *Min* and a *Max* value by choosing the *Extent* first and then pressing **[Load]**. QGIS can *Estimate (faster)* the *Min* and *Max* values of the bands or use the *Actual (slower) Accuracy*.

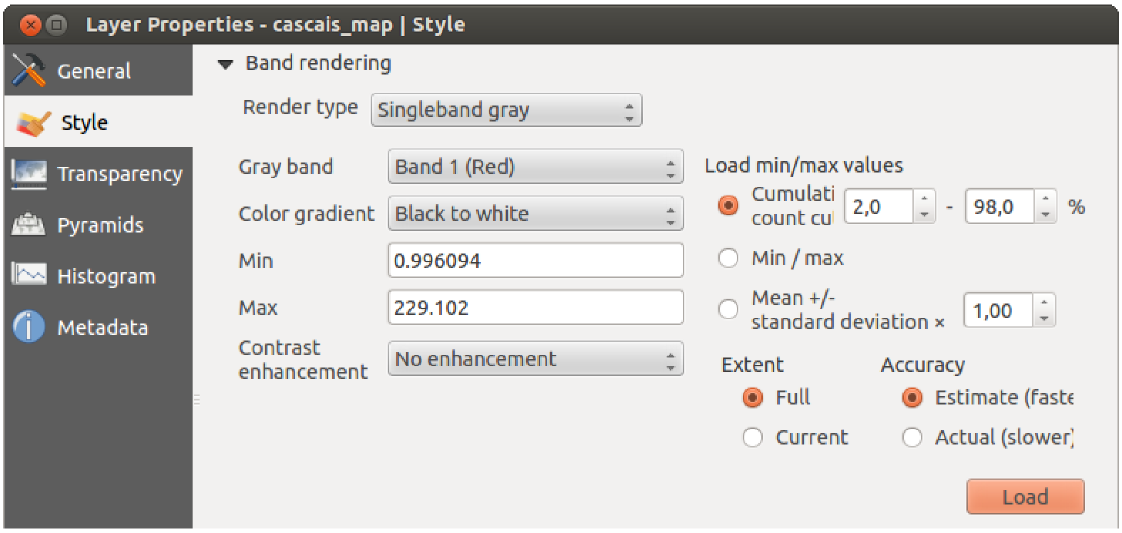

Figure 13.4: Raster Renderer - Singleband gray

With the *Load min/max values* section, scaling of the color table is possible. Outliers can be eliminated using the *Cumulative count cut* setting. The standard data range is set from 2% to 98% of the data values and can be adapted manually. With this setting, the gray character of the image can disappear. Further settings can be made with *Min/max* and *Mean +/- standard deviation x* 1,00. While the first one creates a color table with all of the data included in the original image, the second creates a color table that only considers values within the standard deviation or within multiple standard deviations. This is useful when you have one or two cells with abnormally high values in a raster grid that are having a negative impact on the rendering of the raster.

シングルバンド疑似カラー

This is a render option for single-band files, including a continous palette. You can also create individual color maps for the single bands here. 3 種類の色補間方法が利用できます:

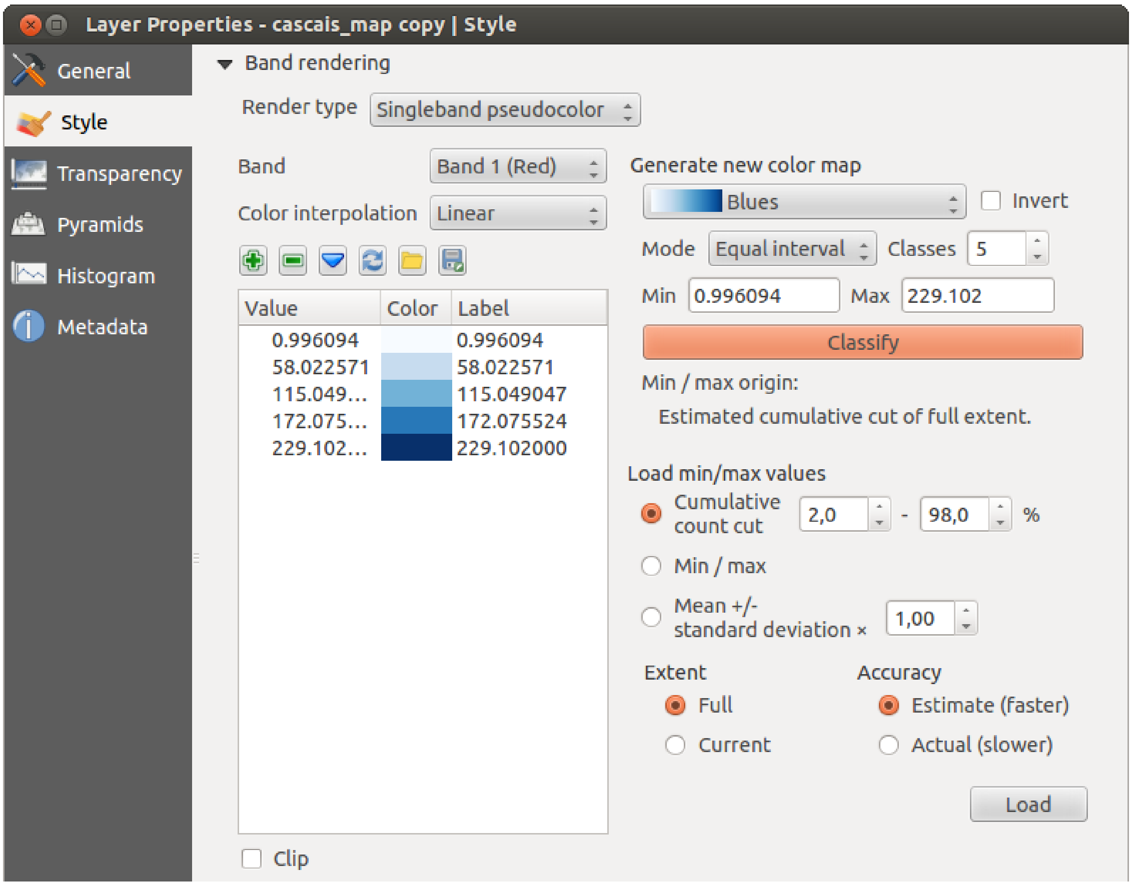

Figure 13.5: Raster Renderer - Singleband pseudocolor

1. 個別の
2. 線形
3. 正確な

In the left block, the button Add values manually adds a value to the individual color table. The button Remove selected row deletes a value from the individual color table, and the Sort colormap items button sorts the color table according to the pixel values in the value column. Double clicking on the value column lets you insert a specific value. Double clicking on the color column opens the dialog *Change color*, where you can select a color to apply on that value. Further, you can also add labels for each color, but this value won't be displayed when you use the identify feature tool. You can also click on the button Load color map from band, which tries to load the table from the band (if it has any). And you can use the buttons Load color map from file or Export color map to file to load an existing color table or to save the defined color table for other sessions.

In the right block, *Generate new color map* allows you to create newly categorized color maps. For the *Classification mode* 'Equal interval', you only need to select the *number of classes* 1,00 and press the button *Classify*. You can invert the colors of the color map by clicking the *Invert* checkbox. In the case of the *Mode* 'Continous', QGIS creates classes automatically depending on the *Min* and *Max*. Defining *Min/Max* values can be done with the help of the *Load min/max values* section. A lot of images have a few very low and high data.

These outliers can be eliminated using the *Cumulative count cut* setting. The standard data range is set from 2% to 98% of the data values and can be adapted manually. With this setting, the gray character of the image can disappear. With the scaling option *Min/max*, QGIS creates a color table with all of the data included in the original image (e.g., QGIS creates a color table with 256 values, given the fact that you have 8 bit bands). You can also calculate your color table using the *Mean +/- standard deviation x* 1,00. Then, only the values within the standard deviation or within multiple standard deviations are considered for the color table.

カラーレンダリング

それぞれについて *Band rendering*, *Color rendering* が利用可能です.

You can also achieve special rendering effects for your raster file(s) using one of the blending modes (see **ベクタプロパティダイアログ**).

Further settings can be made in modifying the *Brightness*, the *Saturation* and the *Contrast*. You can also use a *Grayscale* option, where you can choose between 'By lightness', 'By luminosity' and 'By average'. For one hue in the color table, you can modify the 'Strength'.

リサンプリング

The *Resampling* option makes its appearance when you zoom in and out of an image. Resampling modes can optimize the appearance of the map. They calculate a new gray value matrix through a geometric transformation.

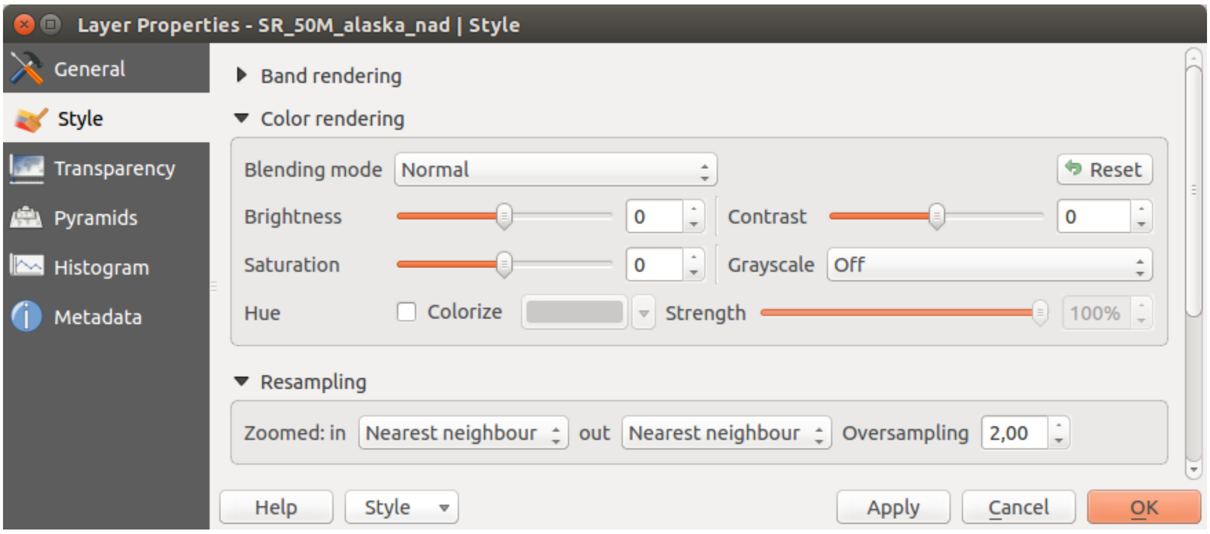

Figure 13.6: Raster Rendering - Resampling

When applying the 'Nearest neighbour' method, the map can have a pixelated structure when zooming in. This appearance can be improved by using the 'Bilinear' or 'Cubic' method, which cause sharp features to be blurred. The effect is a smoother image. This method can be applied, for instance, to digital topographic raster maps.

13.2.3 透過性メニュー

QGIS has the ability to display each raster layer at a different transparency level. Use the transparency slider to indicate to what extent the underlying layers (if any) should be visible though the current raster layer. This is very useful if you like to overlay more than one raster layer (e.g., a shaded relief map overlayed by a classified raster map). This will make the look of the map more three dimensional.

Additionally, you can enter a raster value that should be treated as *NODATA* in the *Additional no data value* menu.

An even more flexible way to customize the transparency can be done in the *Custom transparency options* section. The transparency of every pixel can be set here.

As an example, we want to set the water of our example raster file `landcover.tif` to a transparency of 20%. The following steps are neccessary:

1. ラスタファイルのロード `landcover.tif`.
2. 凡例のラスタ名称をダブルクリックするか右ボタンクリックでポップアップメニューから *Properties* を選択して *Properties* ダイアログを開いて下さい.
3. **透過性** メニューを選択して下さい.
4. **透過設定するバンド** メニューから 'なし' を選んでください.
5. Click the Add values manually button. A new row will appear in the pixel list.
6. Enter the raster value in the 'From' and 'To' column (we use 0 here), and adjust the transparency to 20%.
7. **[Apply]** ボタンを押し, マップを見ます。

You can repeat steps 5 and 6 to adjust more values with custom transparency.

As you can see, it is quite easy to set custom transparency, but it can be quite a lot of work. Therefore, you can use the button Export to file to save your transparency list to a file. The button Import from file loads your transparency settings and applies them to the current raster layer.

13.2.4 ピラミッドメニュー

Large resolution raster layers can slow navigation in QGIS. By creating lower resolution copies of the data (pyramids), performance can be considerably improved, as QGIS selects the most suitable resolution to use depending on the level of zoom.

ピラミッドを作成するには、オリジナル画像があるディレクトリへの書き込み権限を持っている必要があります。

ピラミッドの計算には多くのリサンプリングメソッドを利用できます:

- 最近傍
- 平均
- ガウス
- キュービック
- モード
- なし

If you choose 'Internal (if possible)' from the *Overview format* menu, QGIS tries to build pyramids internally. You can also choose 'External' and 'External (Erdas Imagine)'.

Please note that building pyramids may alter the original data file, and once created they cannot be removed. If you wish to preserve a 'non-pyramided' version of your raster, make a backup copy prior to building pyramids.

13.2.5 ヒストグラムメニュー

The *Histogram* menu allows you to view the distribution of the bands or colors in your raster. The histogram is generated automatically when you open the *Histogram* menu. All existing bands will be displayed together. You can save the histogram as an image with the button. With the *Visibility* option in the *Prefs/Actions* menu, you can display histograms of the individual bands. You will need to select the option *Show selected band*. The *Min/max options* allow you to 'Always show min/max markers', to 'Zoom to min/max' and to 'Update style to min/max'. With the *Actions* option, you can 'Reset' and 'Recompute histogram' after you have chosen the *Min/max options*.

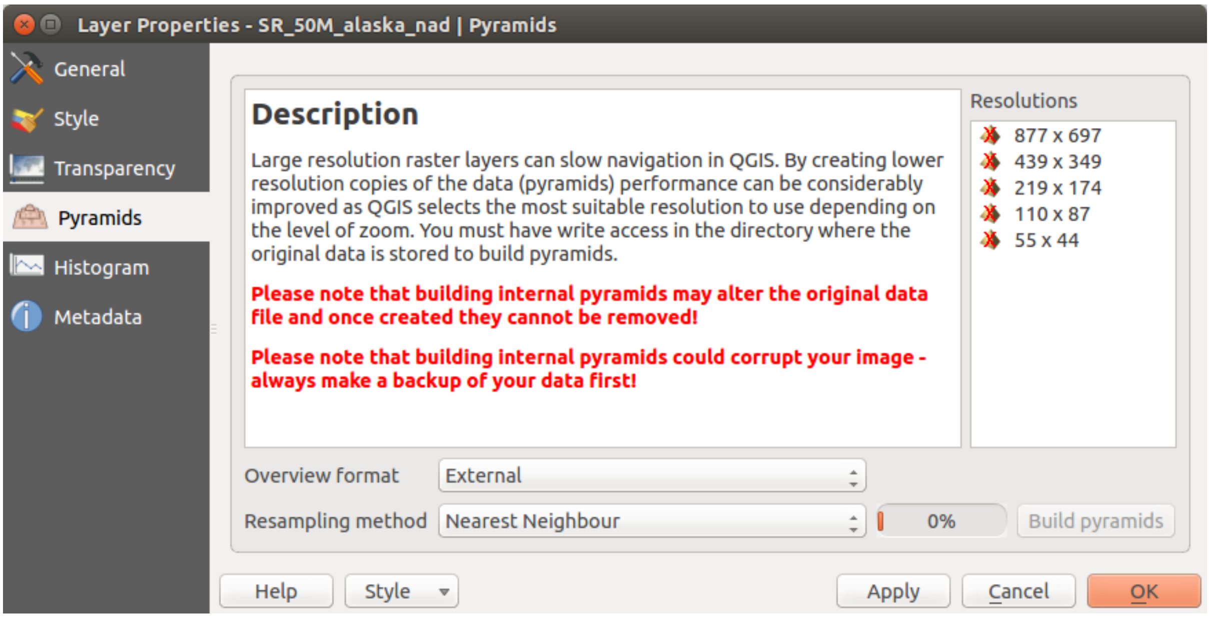

Figure 13.7: The Pyramids Menu

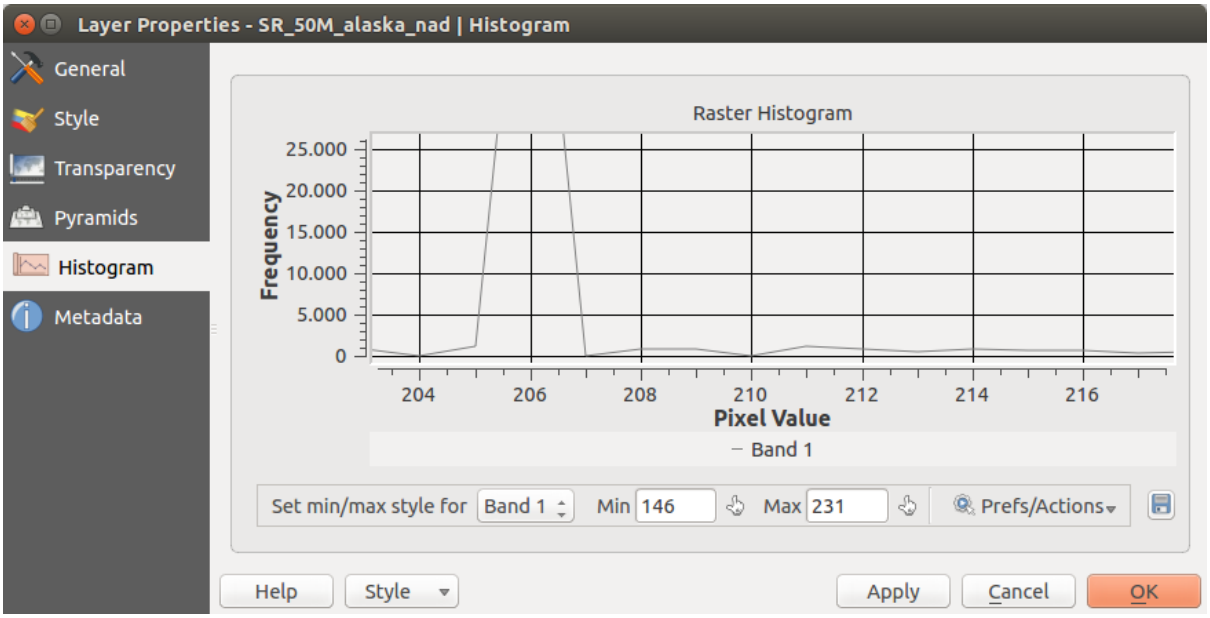

Figure 13.8: Raster Histogram

13.2.6 メタデータメニュー

The *Metadata* menu displays a wealth of information about the raster layer, including statistics about each band in the current raster layer. From this menu, entries may be made for the *Description*, *Attribution*, *MetadataUrl* and *Properties*. In *Properties*, statistics are gathered on a 'need to know' basis, so it may well be that a given layer's statistics have not yet been collected.

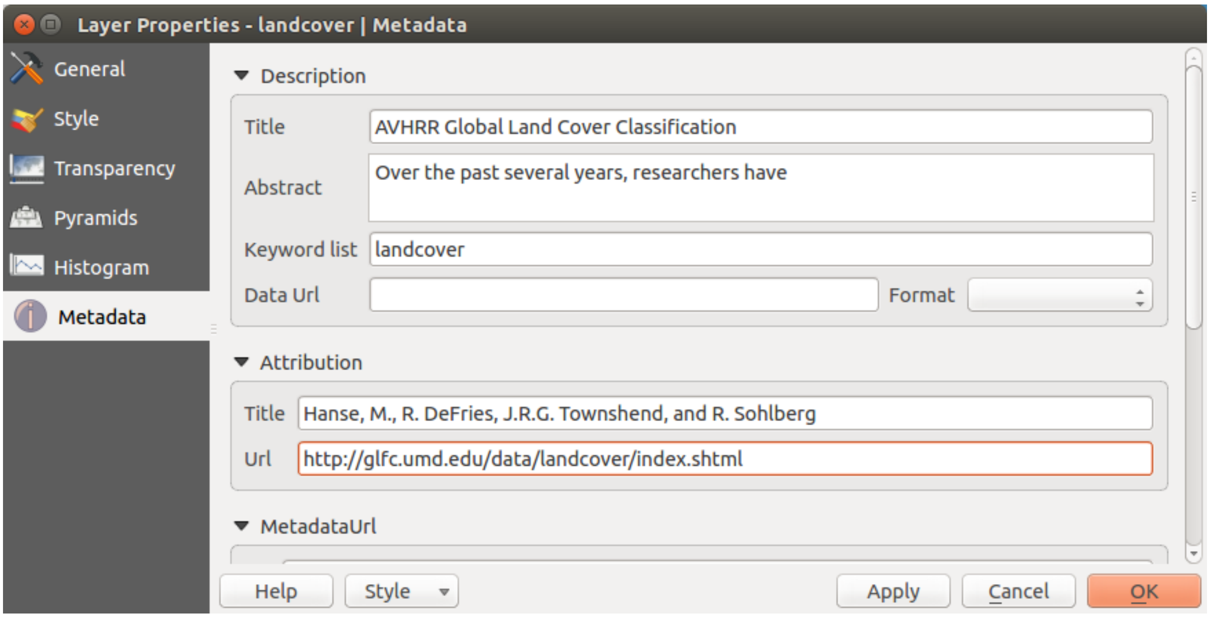

Figure 13.9: Raster Metadata

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13.3 ラスタ計算機

The *Raster Calculator* in the *Raster* menu allows you to perform calculations on the basis of existing raster pixel values (see figure_raster_10). The results are written to a new raster layer with a GDAL-supported format.

The **Raster bands** list contains all loaded raster layers that can be used. To add a raster to the raster calculator expression field, double click its name in the Fields list. You can then use the operators to construct calculation expressions, or you can just type them into the box.

In the **Result layer** section, you will need to define an output layer. You can then define the extent of the calculation area based on an input raster layer, or based on X,Y coordinates and on columns and rows, to set the resolution of the output layer. If the input layer has a different resolution, the values will be resampled with the nearest neighbor algorithm.

The **Operators** section contains all available operators. To add an operator to the raster calculator expression box, click the appropriate button. Mathematical calculations (`+`, `-`, `*`, ...) and trigonometric functions (`sin`, `cos`, `tan`, ...) are available. Stay tuned for more operators to come!

With the *Add result to project* checkbox, the result layer will automatically be added to the legend area and can be visualized.

13.3.1 例

Convert elevation values from meters to feet

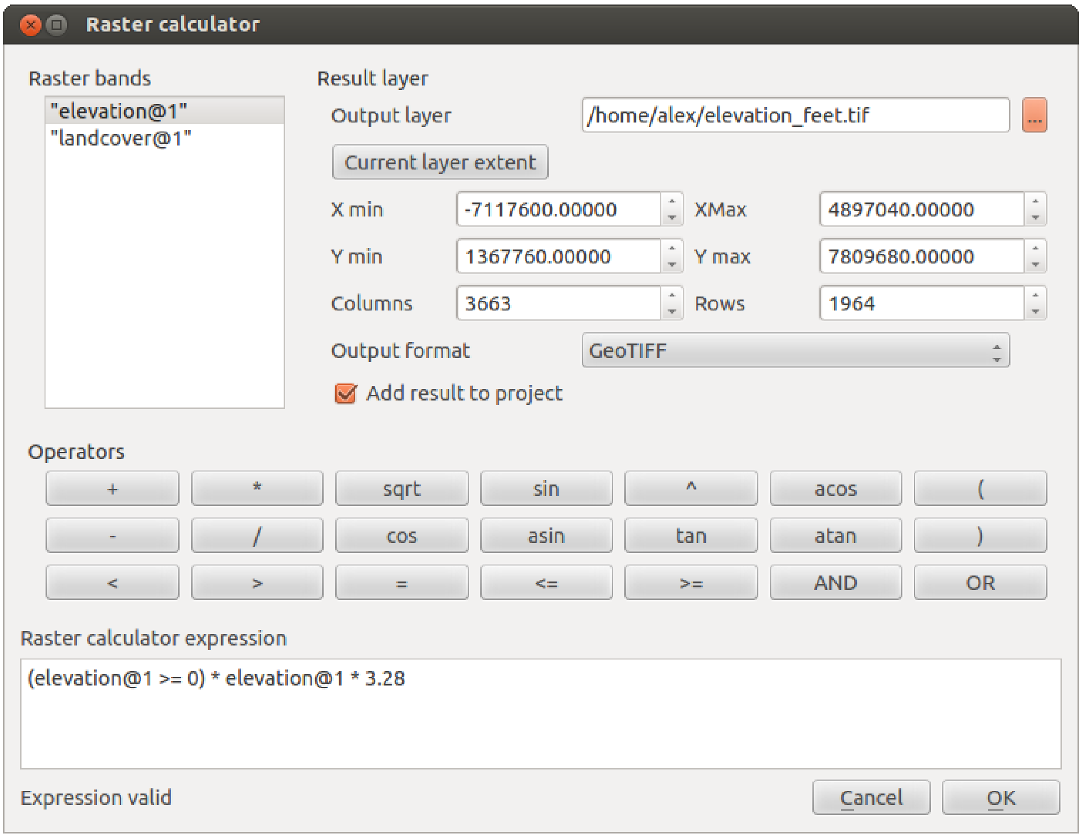

Figure 13.10: ラスタ計算機

Creating an elevation raster in feet from a raster in meters, you need to use the conversion factor for meters to feet: 3.28. The expression is:

```
"elevation@1" * 3.28
```

マスクの利用

If you want to mask out parts of a raster – say, for instance, because you are only interested in elevations above 0 meters – you can use the following expression to create a mask and apply the result to a raster in one step.

```
("elevation@1" >= 0) * "elevation@1"
```

In other words, for every cell greater than or equal to 0, set its value to 1. Otherwise set it to 0. This creates the mask on the fly.

If you want to classify a raster – say, for instance into two elevation classes, you can use the following expression to create a raster with two values 1 and 2 in one step.

```
("elevation@1" < 50) * 1 + ("elevation@1" >= 50) * 2
```

In other words, for every cell less than 50 set its value to 1. For every cell greater than or equal 50 set its value to 2.

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Chapter 14

OGCデータの操作

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14.1 QGIS as OGC Data Client

The Open Geospatial Consortium (OGC) is an international organization with membership of more than 300 commercial, governmental, nonprofit and research organizations worldwide. Its members develop and implement standards for geospatial content and services, GIS data processing and exchange.

地理的な地物の基礎モデルの記述や多くの標準が OGC により開発され GIS を含む位置と地理情報テクノロジーの相互運用性ニーズの増大に対応しています. 詳しい情報は http://www.opengeospatial.org/ で参照できます.

Important OGC specifications supported by QGIS are:

- **WMS** — Web Map Service (*WMS/WMTS* **クライアント**)
- **WMTS** — Web Map Tile Service (*WMS/WMTS* **クライアント**)
- **WFS** — Web Feature Service (*WFS* **および** *WFS-T* **クライアント**)
- **WFS-T** — Web Feature Service - Transactional (*WFS* **および** *WFS-T* **クライアント**)
- **WCS** — Web Coverage Service (*WCS* **クライアント**)
- **SFS** — Simple Features for SQL (*PostGIS* **レイヤ**)
- **GML** — ジオグラフィーマークアップランゲージ

OGC services are increasingly being used to exchange geospatial data between different GIS implementations and data stores. QGIS can deal with the above specifications as a client, being **SFS** (through support of the PostgreSQL / PostGIS data provider, see section *PostGIS* **レイヤ**).

14.1.1 WMS/WMTS クライアント

WMS サポート概要

QGIS currently can act as a WMS client that understands WMS 1.1, 1.1.1 and 1.3 servers. In particular, it has been tested against publicly accessible servers such as DEMIS.

A WMS server acts upon requests by the client (e.g., QGIS) for a raster map with a given extent, set of layers, symbolization style, and transparency. The WMS server then consults its local data sources, rasterizes the map, and sends it back to the client in a raster format. For QGIS, this format would typically be JPEG or PNG.

WMS is generically a REST (Representational State Transfer) service rather than a full-blown Web service. As such, you can actually take the URLs generated by QGIS and use them in a web browser to retrieve the same images that QGIS uses internally. This can be useful for troubleshooting, as there are several brands of WMS server on the market and they all have their own interpretation of the WMS standard.

WMS レイヤは簡単に追加できます. あなたが WMS サーバにアクセスする URL を知っていれば追加できます. サーバに対してあなたがアクセスできる接続ができてサーバがデータ転送方式として HTTP を理解できれば大丈夫です.

WMTS サポートの概要

QGIS can also act as a WMTS client. WMTS is an OGC standard for distributing tile sets of geospatial data. This is a faster and more efficient way of distributing data than WMS because with WMTS, the tile sets are pre-generated, and the client only requests the transmission of the tiles, not their production. A WMS request typically involves both the generation and transmission of the data. A well-known example of a non-OGC standard for viewing tiled geospatial data is Google Maps.

In order to display the data at a variety of scales close to what the user might want, the WMTS tile sets are produced at several different scale levels and are made available for the GIS client to request them.

この図はタイルセットの概念を示しています:

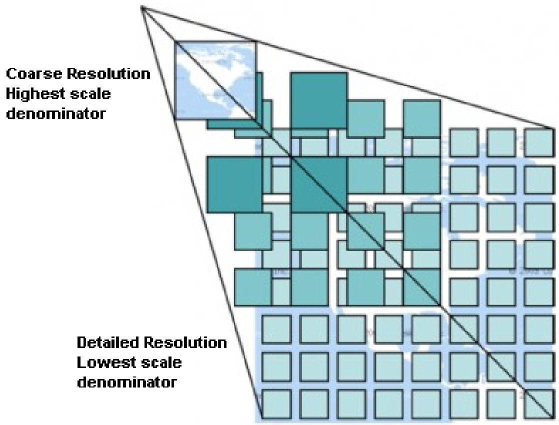

Figure 14.1: WMTS タイルセットコンセプト

The two types of WMTS interfaces that QGIS supports are via Key-Value-Pairs (KVP) and RESTful. These two interfaces are different, and you need to specify them to QGIS differently.

1) In order to access a **WMTS KVP** service, a QGIS user must open the WMS/WMTS interface and add the following string to the URL of the WMTS tile service:

```
"?SERVICE=WMTS&REQUEST=GetCapabilities"
```

このタイプのアドレスの例は次のとおりです

```
http://opencache.statkart.no/gatekeeper/gk/gk.open_wmts?\
  service=WMTS&request=GetCapabilities
```

For testing the topo2 layer in this WMTS works nicely. Adding this string indicates that a WMTS web service is to be used instead of a WMS service.

2. The **RESTful WMTS** service takes a different form, a straightforward URL. The format recommended by the OGC is:

```
{WMTSBaseURL}/1.0.0/WMTSCapabilities.xml
```

This format helps you to recognize that it is a RESTful address. A RESTful WMTS is accessed in QGIS by simply adding its address in the WMS setup in the URL field of the form. An example of this type of address for the case of an Austrian basemap is http://maps.wien.gv.at/basemap/1.0.0/WMTSCapabilities.xml.

ノート: You can still find some old services called WMS-C. These services are quite similar to WMTS (i.e., same purpose but working a little bit differently). You can manage them the same as you do WMTS services. Just add ?tiled=true at the end of the url. See http://wiki.osgeo.org/wiki/Tile_Map_Service_Specification for more information about this specification.

WMTS を読んだときに, WMS-C についても考えるでしょう.

Selecting WMS/WMTS Servers

The first time you use the WMS feature in QGIS, there are no servers defined.

Begin by clicking the Add WMS layer button on the toolbar, or selecting *Layer → Add WMS Layer...*.

The dialog *Add Layer(s) from a Server* for adding layers from the WMS server appears. You can add some servers to play with by clicking the **[Add default servers]** button. This will add two WMS demo servers for you to use: the WMS servers of the DM Solutions Group and Lizardtech. To define a new WMS server in the *Layers* tab, select the **[New]** button. Then enter the parameters to connect to your desired WMS server, as listed in table_OGC_1:

名前	接続の名前. この名前はサーバーコネクションドロップダウンボックスで使われます, ですから他の WMS サービスと区別できる名前にして下さい.
URL	URL of the server providing the data. This must be a resolvable host name – the same format as you would use to open a telnet connection or ping a host.
ユーザ名	Username to access a secured WMS server. This parameter is optional.
パスワード	Password for a basic authenticated WMS server. This parameter is optional.
GetMap URI の無視	*Ignore GetMap URI reported in capabilities*. Use given URI from URL field above.
GetFeatureInfo URI の無視	*Ignore GetFeatureInfo URI reported in capabilities*. Use given URI from URL field above.

表 OGC 1: WMS 接続パラメータ

If you need to set up a proxy server to be able to receive WMS services from the internet, you can add your proxy server in the options. Choose *Settings → Options* and click on the *Network & Proxy* tab. There, you can add your proxy settings and enable them by setting *Use proxy for web access*. Make sure that you select the correct proxy type from the *Proxy type* drop-down menu.

Once the new WMS server connection has been created, it will be preserved for future QGIS sessions.

ちなみに: WMS サーバー URL

Be sure, when entering the WMS server URL, that you have the base URL only. For example, you shouldn't have fragments such as `request=GetCapabilities` or `version=1.0.0` in your URL.

WMS/WMTS レイヤの読み込み

Once you have successfully filled in your parameters, you can use the **[Connect]** button to retrieve the capabilities of the selected server. This includes the image encoding, layers, layer styles and projections. Since this is a network operation, the speed of the response depends on the quality of your network connection to the WMS server. While downloading data from the WMS server, the download progress is visualized in the lower left of the WMS dialog.

Your screen should now look a bit like figure_OGR_1, which shows the response provided by the European Soil Portal WMS server.

画像エンコーディング

The *Image encoding* section lists the formats that are supported by both the client and server. Choose one depending on your image accuracy requirements.

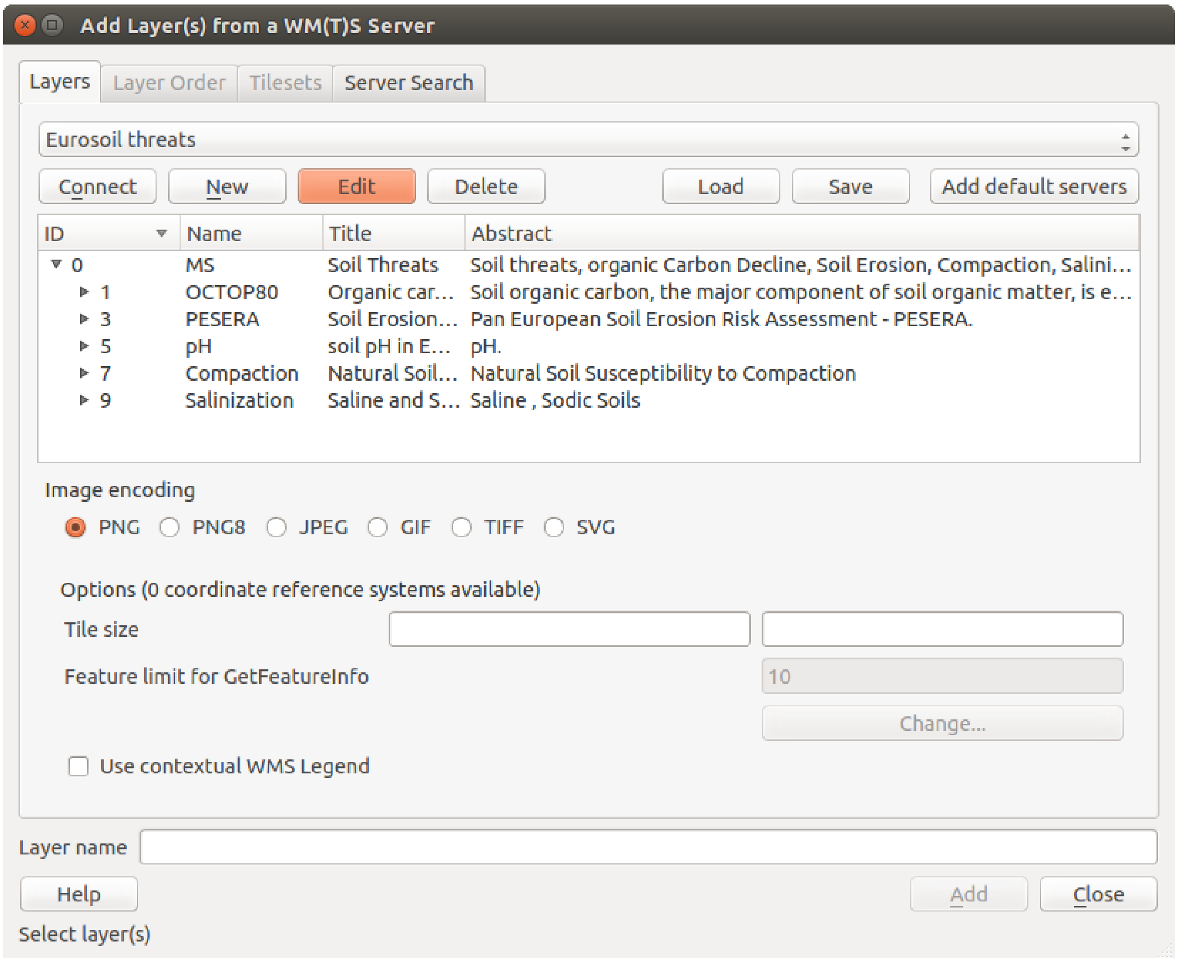

Figure 14.2: Dialog for adding a WMS server, showing its available layers

ちなみに: 画像エンコーディング

典型的な WMS サーバーはイメージのエンコーディングに JPEG か PNG を提案してくるでしょう. JPEG は損失のある圧縮形式です is a lossy compression format, 一方 PNG は生のラスタデータを忠実に再現します.

Use JPEG if you expect the WMS data to be photographic in nature and/or you don't mind some loss in picture quality. This trade-off typically reduces by five times the data transfer requirement compared with PNG.

Use PNG if you want precise representations of the original data and you don't mind the increased data transfer requirements.

オプション

The Options area of the dialog provides a text field where you can add a *Layer name* for the WMS layer. This name will appear in the legend after loading the layer.

Below the layer name, you can define *Tile size* if you want to set tile sizes (e.g., 256x256) to split up the WMS request into multiple requests.

The *Feature limit for GetFeatureInfo* defines what features from the server to query.

If you select a WMS from the list, a field with the default projection provided by the mapserver appears. If the **[Change...]** button is active, you can click on it and change the default projection of the WMS to another CRS provided by the WMS server.

Finally you can activate *Use contextual WMS-Legend* if the WMS Server supports this feature. Then only the relevant legend for your current map view extent will be shown and thus will not include legend items for things you can't see in the current map.

** レイヤ順序**

The *Layer Order* tab lists the selected layers available from the current connected WMS server. You may notice that some layers are expandable; this means that the layer can be displayed in a choice of image styles.

You can select several layers at once, but only one image style per layer. When several layers are selected, they will be combined at the WMS server and transmitted to QGIS in one go.

ちなみに: WMS Layer の順序

WMS layers rendered by a server are overlaid in the order listed in the Layers section, from top to bottom of the list. If you want to change the overlay order, you can use the *Layer Order* tab.

透過性

In this version of QGIS, the *Global transparency* setting from the *Layer Properties* is hard coded to be always on, where available.

ちなみに: WMS Layer の透過度

The availability of WMS image transparency depends on the image encoding used: PNG and GIF support transparency, whilst JPEG leaves it unsupported.

空間参照系

A coordinate reference system (CRS) is the OGC terminology for a QGIS projection.

Each WMS layer can be presented in multiple CRSs, depending on the capability of the WMS server.

To choose a CRS, select **[Change...]** and a dialog similar to Figure Projection 3 in **投影法の利用方法** will appear. The main difference with the WMS version of the dialog is that only those CRSs supported by the WMS server will be shown.

サーバ検索

Within QGIS, you can search for WMS servers. Figure_OGC_2 shows the *Server Search* tab with the *Add Layer(s) from a Server* dialog.

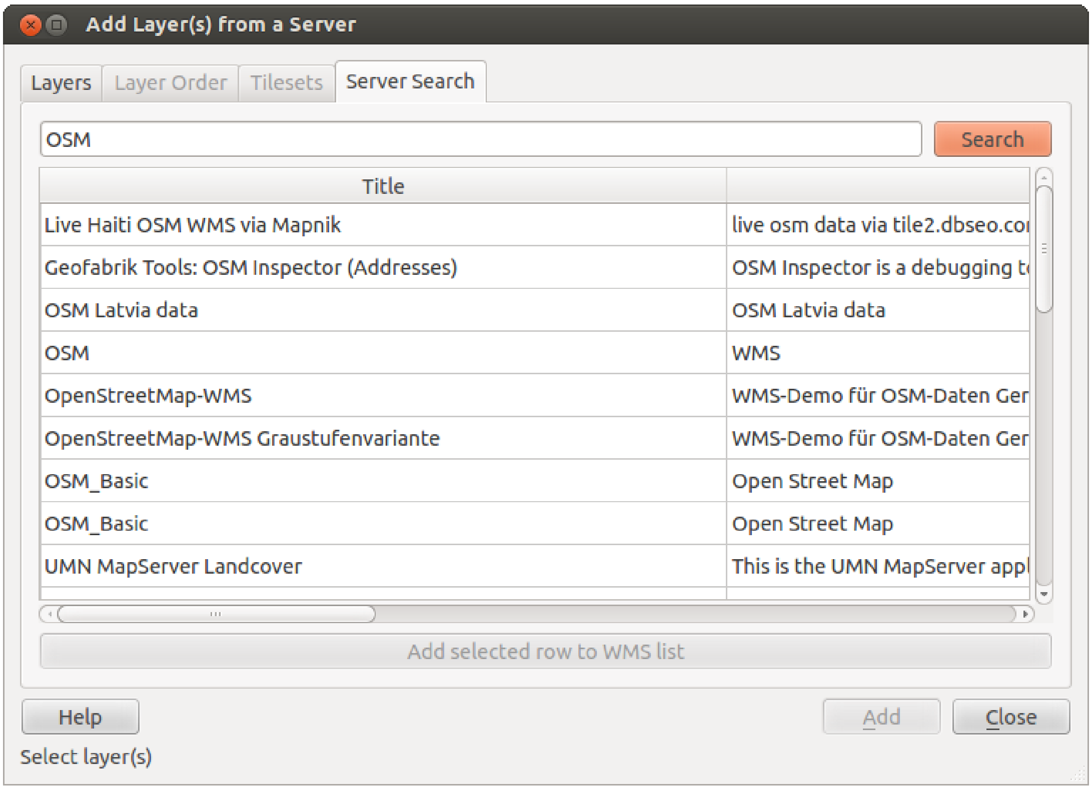

Figure 14.3: Dialog for searching WMS servers after some keywords

As you can see, it is possible to enter a search string in the text field and hit the **[Search]** button. After a short while, the search result will be populated into the list below the text field. Browse the result list and inspect your search results within the table. To visualize the results, select a table entry, press the **[Add selected row to WMS list]** button and change back to the *Layers* tab. QGIS has automatically updated your server list, and the selected search result is already enabled in the list of saved WMS servers in the *Layers* tab. You only need to request the list of layers by clicking the **[Connect]** button. This option is quite handy when you want to search maps by specific keywords.

Basically, this option is a front end to the API of http://geopole.org.

タイルセット

When using WMTS (Cached WMS) services like

```
http://opencache.statkart.no/gatekeeper/gk/gk.open_wmts?\
  service=WMTS&request=GetCapabilities
```

you are able to browse through the *Tilesets* tab given by the server. Additional information like tile size, formats and supported CRS are listed in this table. In combination with this feature, you can use the tile scale slider by selecting *Settings* → *Panels* (KDE and Windows) or *View* → *Panels* (Gnome and MacOSX), then choosing *Tile scale*. This gives you the available scales from the tile server with a nice slider docked in.

地物特定ツールの利用

Once you have added a WMS server, and if any layer from a WMS server is queryable, you can then use the Identify tool to select a pixel on the map canvas. A query is made to the WMS server for each selection made. The results of the query are returned in plain text. The formatting of this text is dependent on the particular WMS server used. **フォーマット選択**

If multiple output formats are supported by the server, a combo box with supported formats is automatically added to the identify results dialog and the selected format may be stored in the project for the layer. **GML フォーマットサポート**

The Identify tool supports WMS server response (GetFeatureInfo) in GML format (it is called Feature in the QGIS GUI in this context). If "Feature" format is supported by the server and selected, results of the Identify tool are vector features, as from a regular vector layer. When a single feature is selected in the tree, it is highlighted in the map and it can be copied to the clipboard and pasted to another vector layer. See the example setup of the UMN Mapserver below to support GetFeatureInfo in GML format.

```
# in layer METADATA add which fields should be included and define geometry (example):

"gml_include_items"   "all"
"ows_geometries"      "mygeom"
"ows_mygeom_type"     "polygon"

# Then there are two possibilities/formats available, see a) and b):

# a) basic (output is generated by Mapserver and does not contain XSD)
# in WEB METADATA define formats (example):
"wms_getfeatureinfo_formatlist" "application/vnd.ogc.gml,text/html"

# b) using OGR (output is generated by OGR, it is send as multipart and contains XSD)
# in MAP define OUTPUTFORMAT (example):
OUTPUTFORMAT
    NAME "OGRGML"
    MIMETYPE "ogr/gml"
    DRIVER "OGR/GML"
    FORMATOPTION "FORM=multipart"
END

# in WEB METADATA define formats (example):
"wms_getfeatureinfo_formatlist" "OGRGML,text/html"
```

表示プロパティ

Once you have added a WMS server, you can view its properties by right-clicking on it in the legend and selecting *Properties*. **メタデータタブ**

The tab *Metadata* displays a wealth of information about the WMS server, generally collected from the capabilities statement returned from that server. Many definitions can be gleaned by reading the WMS standards (see OPEN-GEOSPATIAL-CONSORTIUM in **文献と** *Web* **参照**), but here are a few handy definitions:

- **サーバプロパティ**
  - **WMS バージョン** — サーバによってサポートされた WMS のバージョン.
  - **Image Formats** — The list of MIME-types the server can respond with when drawing the map. QGIS supports whatever formats the underlying Qt libraries were built with, which is typically at least `image/png` and `image/jpeg`.
  - **Identity Formats** — The list of MIME-types the server can respond with when you use the Identify tool. Currently, QGIS supports the `text-plain` type.
- ** レイヤプロパティ **
  - **Selected** — Whether or not this layer was selected when its server was added to this project.

- **Visible** — Whether or not this layer is selected as visible in the legend (not yet used in this version of QGIS).
- **Can Identify** — Whether or not this layer will return any results when the Identify tool is used on it.
- **Can be Transparent** — Whether or not this layer can be rendered with transparency. This version of QGIS will always use transparency if this is `Yes` and the image encoding supports transparency.
- **Can Zoom In** — Whether or not this layer can be zoomed in by the server. This version of QGIS assumes all WMS layers have this set to `Yes`. Deficient layers may be rendered strangely.
- **Cascade Count** — WMS servers can act as a proxy to other WMS servers to get the raster data for a layer. This entry shows how many times the request for this layer is forwarded to peer WMS servers for a result.
- **Fixed Width, Fixed Height** — Whether or not this layer has fixed source pixel dimensions. This version of QGIS assumes all WMS layers have this set to nothing. Deficient layers may be rendered strangely.
- **WGS 84 Bounding Box** — The bounding box of the layer, in WGS 84 coordinates. Some WMS servers do not set this correctly (e.g., UTM coordinates are used instead). If this is the case, then the initial view of this layer may be rendered with a very 'zoomed-out' appearance by QGIS. The WMS webmaster should be informed of this error, which they may know as the WMS XML elements `LatLonBoundingBox`, `EX_GeographicBoundingBox` or the CRS:84 `BoundingBox`.
- **Available in CRS** — The projections that this layer can be rendered in by the WMS server. These are listed in the WMS-native format.
- **Available in style** — The image styles that this layer can be rendered in by the WMS server.

Show WMS legend graphic in table of contents and composer

The QGIS WMS data provider is able to display a legend graphic in the table of contents' layer list and in the map composer. The WMS legend will be shown only if the WMS server has GetLegendGraphic capability and the layer has getCapability url specified, so you additionally have to select a styling for the layer.

If a legendGraphic is available, it is shown below the layer. It is little and you have to click on it to open it in real dimension (due to QgsLegendInterface architectural limitation). Clicking on the layer's legend will open a frame with the legend at full resolution.

In the print composer, the legend will be integrated at it's original (dowloaded) dimension. Resolution of the legend graphic can be set in the item properties under Legend -> WMS LegendGraphic to match your printing requirements

The legend will display contextual information based on your current scale. The WMS legend will be shown only if the WMS server has GetLegendGraphic capability and the layer has getCapability url specified, so you have to select a styling.

WMS クライアントの制限

Not all possible WMS client functionality had been included in this version of QGIS. Some of the more noteworthy exceptions follow.

WMS レイヤ設定の編集

Once you've completed the Add WMS layer procedure, there is no way to change the settings. A work-around is to delete the layer completely and start again.

認証が必要な WMS サーバ

Currently, publicly accessible and secured WMS services are supported. The secured WMS servers can be accessed by public authentication. You can add the (optional) credentials when you add a WMS server. See section *Selecting WMS/WMTS Servers* for details.

ちなみに: セキュアな OGC-レイヤへのアクセス

If you need to access secured layers with secured methods other than basic authentication, you can use InteProxy as a transparent proxy, which does support several authentication methods. More information can be found in the InteProxy manual at http://inteproxy.wald.intevation.org.

ちなみに: QGIS WMS Mapserver

Since Version 1.7.0, QGIS has its own implementation of a WMS 1.3.0 Mapserver. Read more about this in chapter *QGIS as OGC Data Server*.

14.1.2 WCS クライアント

A Web Coverage Service (WCS) provides access to raster data in forms that are useful for client-side rendering, as input into scientific models, and for other clients. The WCS may be compared to the WFS and the WMS. As WMS and WFS service instances, a WCS allows clients to choose portions of a server's information holdings based on spatial constraints and other query criteria.

QGIS has a native WCS provider and supports both version 1.0 and 1.1 (which are significantly different), but currently it prefers 1.0, because 1.1 has many issues (i.e., each server implements it in a different way with various particularities).

The native WCS provider handles all network requests and uses all standard QGIS network settings (especially proxy). It is also possible to select cache mode ('always cache', 'prefer cache', 'prefer network', 'always network'), and the provider also supports selection of time position, if temporal domain is offered by the server.

14.1.3 WFS および WFS-T クライアント

In QGIS, a WFS layer behaves pretty much like any other vector layer. You can identify and select features, and view the attribute table. Since QGIS 1.6, editing WFS-T is also supported.

In general, adding a WFS layer is very similar to the procedure used with WMS. The difference is that there are no default servers defined, so we have to add our own.

WFS レイヤのロード

As an example, we use the DM Solutions WFS server and display a layer. The URL is: http://www2.dmsolutions.ca/cgi-bin/mswfs_gmap

1. Click on the Add WFS Layer tool on the Layers toolbar. The *Add WFS Layer from a Server* dialog appears.
2. Click on **[New]**.
3. 名前として 'DM Solutions' と入力して下さい.
4. Enter the URL (see above).
5. Click **[OK]**.
6. Choose 'DM Solutions' from the *Server Connections* drop-down list.
7. **[Connect]** をクリックして下さい.
8. Wait for the list of layers to be populated.
9. Select the *Parks* layer in the list.
10. レイヤを地図に加えるために **[Apply]** をクリックして下さい.

Note that any proxy settings you may have set in your preferences are also recognized.

You'll notice the download progress is visualized in the lower left of the QGIS main window. Once the layer is loaded, you can identify and select a province or two and view the attribute table.

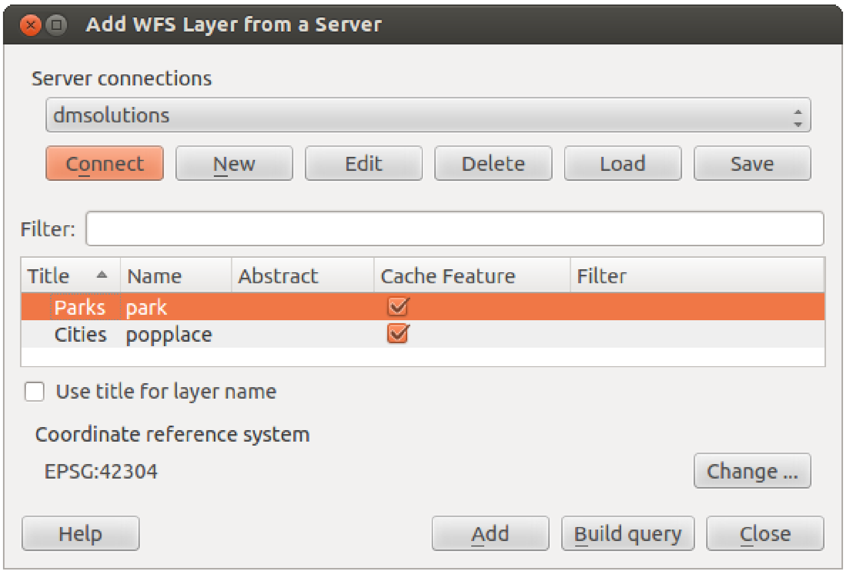

Figure 14.4: Adding a WFS layer

Only WFS 1.0.0 is supported. At this time, there have not been many tests against WFS versions implemented in other WFS servers. If you encounter problems with any other WFS server, please do not hesitate to contact the development team. Please refer to section **ヘルプとサポート** for further information about the mailing lists.

ちなみに: WFS サービスの検索

You can find additional WFS servers by using Google or your favorite search engine. There are a number of lists with public URLs, some of them maintained and some not.

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14.2 QGIS as OGC Data Server

QGIS Server is an open source WMS 1.3, WFS 1.0.0 and WCS 1 1.1.1 implementation that, in addition, implements advanced cartographic features for thematic mapping. The QGIS Server is a FastCGI/CGI (Common Gateway Interface) application written in C++ that works together with a web server (e.g., Apache, Lighttpd). It has Python plugin support allowing for fast and efficient development and deployment of new features. It is funded by the EU projects Orchestra, Sany and the city of Uster in Switzerland.

QGIS Server uses QGIS as back end for the GIS logic and for map rendering. Furthermore, the Qt library is used for graphics and for platform-independent C++ programming. In contrast to other WMS software, the QGIS Server uses cartographic rules as a configuration language, both for the server configuration and for the user-defined cartographic rules.

As QGIS desktop and QGIS Server use the same visualization libraries, the maps that are published on the web look the same as in desktop GIS.

In one of the following manuals, we will provide a sample configuration to set up a QGIS Server. For now, we recommend to read one of the following URLs to get more information:

- http://karlinapp.ethz.ch/qgis_wms/
- http://hub.qgis.org/projects/quantum-gis/wiki/QGIS_Server_Tutorial
- http://linfiniti.com/2010/08/qgis-mapserver-a-wms-server-for-the-masses/

14.2.1 Sample installation on Debian Squeeze

At this point, we will give a short and simple sample installation how-to for a minimal working configuration using Apache2 on Debian Squeeze. Many other OSs provide packages for QGIS Server, too. If you have to build it all from source, please refer to the URLs above.

Firstly, add the following debian GIS repository by adding the following repository:

```
$ cat /etc/apt/sources.list.d/debian-gis.list
deb http://qgis.org/debian trusty main
deb-src http://qgis.org/debian trusty main

$ # Add keys
$ sudo gpg --recv-key DD45F6C3
$ sudo gpg --export --armor DD45F6C3 | sudo apt-key add -

$ # Update package list
$ sudo apt-get update && sudo apt-get upgrade
```

Now, install QGIS-Server:

```
$ sudo apt-get install qgis-server python-qgis
```

Installation of a HelloWorld example plugin for testing the servers. You create a directory to hold server plugins. This will be specified in the virtual host configuration and passed on to the server through an environment variable:

```
$ sudo mkdir -p /opt/qgis-server/plugins
$ cd /opt/qgis-server/plugins
$ sudo wget https://github.com/elpaso/qgis-helloserver/archive/master.zip
$ # In case unzip was not installed before:
$ sudo apt-get install unzip
$ sudo unzip master.zip
$ sudo mv qgis-helloserver-master HelloServer
```

Install the Apache server in a separate virtual host listening on port 80. Enable the rewrite module to pass HTTP BASIC auth headers:

```
$ sudo a2enmod rewrite
$ cat /etc/apache2/conf-available/qgis-server-port.conf
Listen 80
$ sudo a2enconf qgis-server-port
```

This is the virtual host configuration, stored in `/etc/apache2/sites-available/001-qgis-server.conf` :

```
<VirtualHost *:80>
  ServerAdmin webmaster@localhost
  DocumentRoot /var/www/html

  ErrorLog ${APACHE_LOG_DIR}/qgis-server-error.log
  CustomLog ${APACHE_LOG_DIR}/qgis-server-access.log combined

  # Longer timeout for WPS... default = 40
  FcgidIOTimeout 120
  FcgidInitialEnv LC_ALL "en_US.UTF-8"
  FcgidInitialEnv PYTHONIOENCODING UTF-8
  FcgidInitialEnv LANG "en_US.UTF-8"
  FcgidInitialEnv QGIS_DEBUG 1
  FcgidInitialEnv QGIS_SERVER_LOG_FILE /tmp/qgis-000.log
  FcgidInitialEnv QGIS_SERVER_LOG_LEVEL 0
  FcgidInitialEnv QGIS_PLUGINPATH "/opt/qgis-server/plugins"

  # ABP: needed for QGIS HelloServer plugin HTTP BASIC auth
  <IfModule mod_fcgid.c>
```

```
        RewriteEngine on
        RewriteCond %{HTTP:Authorization} .
        RewriteRule .* - [E=HTTP_AUTHORIZATION:%{HTTP:Authorization}]
    </IfModule>

    ScriptAlias /cgi-bin/ /usr/lib/cgi-bin/
    <Directory "/usr/lib/cgi-bin">
        AllowOverride All
        Options +ExecCGI -MultiViews +FollowSymLinks
        # for apache2 > 2.4
        Require all granted
        #Allow from all
    </Directory>
  </VirtualHost>
```

Now enable the virtual host and restart Apache:

```
$ sudo a2ensite 001-qgis-server
$ sudo service apache2 restart
```

Test the server with the HelloWorld plugin:

```
$ wget -q -O - "http://localhost/cgi-bin/qgis_mapserv.fcgi?SERVICE=HELLO"
HelloServer!
```

You can have a look at the default GetCpabilities of the QGIS server at: `http://localhost/cgi-bin/qgis_mapserv.fcgi?SERVICE=WMS&VERSION=1.3.0&REQUEST=GetCapabili`

ちなみに: If you work with a feature that has many nodes then modyfying and adding a new feature will fail. In this case it is possible to insert the following code into the `001-qgis-server.conf` file:

```
<IfModule mod_fcgid.c>
FcgidMaxRequestLen 26214400
FcgidConnectTimeout 60
</IfModule>
```

14.2.2 Creating a WMS/WFS/WCS from a QGIS project

To provide a new QGIS Server WMS, WFS or WCS, we have to create a QGIS project file with some data. Here, we use the 'Alaska' shapefile from the QGIS sample dataset. Define the colors and styles of the layers in QGIS and the project CRS, if not already defined.

Then, go to the *OWS Server* menu of the *Project* → *Project Properties* dialog and provide some information about the OWS in the fields under *Service Capabilities*. This will appear in the GetCapabilities response of the WMS, WFS or WCS. If you don't check *Service capabilities*, QGIS Server will use the information given in the `wms_metadata.xml` file located in the `cgi-bin` folder.

WMS capabilities

In the *WMS capabilities* section, you can define the extent advertised in the WMS GetCapabilities response by entering the minimum and maximum X and Y values in the fields under *Advertised extent*. Clicking *Use Current Canvas Extent* sets these values to the extent currently displayed in the QGIS map canvas. By checking *CRS restrictions*, you can restrict in which coordinate reference systems (CRS) QGIS Server will offer to render maps. Use the button below to select those CRS from the Coordinate Reference System Selector, or click *Used* to add the CRS used in the QGIS project to the list.

If you have print composers defined in your project, they will be listed in the GetCapabilities response, and they can be used by the GetPrint request to create prints, using one of the print composer layouts as a template. This is a QGIS-specific extension to the WMS 1.3.0 specification. If you want to exclude any print composer from

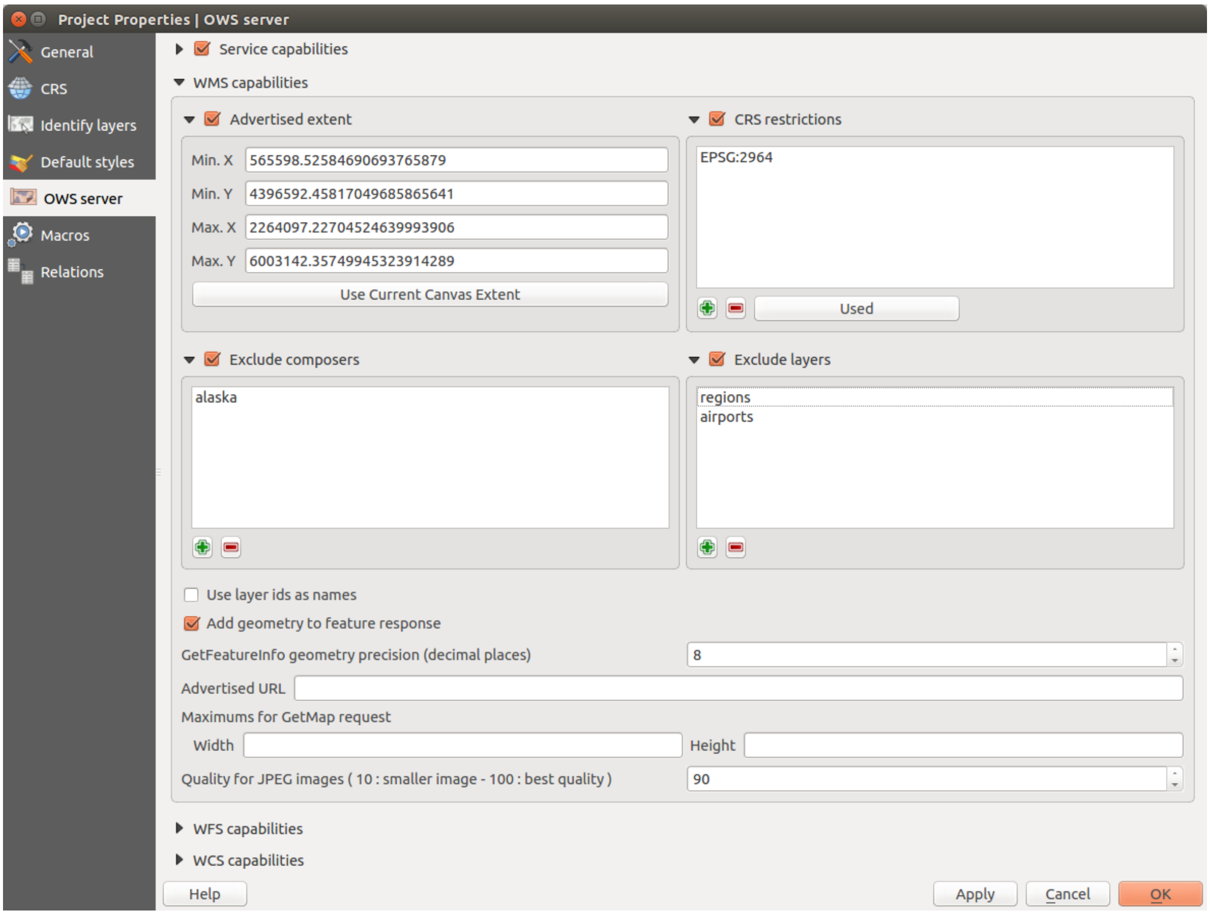

Figure 14.5: Definitions for a QGIS Server WMS/WFS/WCS project (KDE)

being published by the WMS, check ☑ *Exclude composers* and click the ➕ button below. Then, select a print composer from the *Select print composer* dialog in order to add it to the excluded composers list.

If you want to exclude any layer or layer group from being published by the WMS, check ☑ *Exclude Layers* and click the ➕ button below. This opens the *Select restricted layers and groups* dialog, which allows you to choose the layers and groups that you don't want to be published. Use the `Shift` or `Ctrl` key if you want to select multiple entries at once.

You can receive requested GetFeatureInfo as plain text, XML and GML. Default is XML, text or GML format depends the output format choosen for the GetFeatureInfo request.

If you wish, you can check ☑ *Add geometry to feature response*. This will include in the GetFeatureInfo response the geometries of the features in a text format. If you want QGIS Server to advertise specific request URLs in the WMS GetCapabilities response, enter the corresponding URL in the *Advertised URL* field. Furthermore, you can restrict the maximum size of the maps returned by the GetMap request by entering the maximum width and height into the respective fields under *Maximums for GetMap request*.

If one of your layers uses the Map Tip display (i.e. to show text using expressions) this will be listed inside the GetFeatureInfo output. If the layer uses a Value Map for one of his attributes, also this information will be shown in the GetFeatureInfo output.

QGIS support the following request for WMS service:

- GetCapabilities
- GetMap
- GetFeatureInfo
- GetLegendGraphic (SLD profile)
- DescribeLayer (SLD profile)
- GetStyles (custom QGIS profile)

WFS capabilities

In the *WFS capabilities* area, you can select the layers that you want to publish as WFS, and specify if they will allow the update, insert and delete operations. If you enter a URL in the *Advertised URL* field of the *WFS capabilities* section, QGIS Server will advertise this specific URL in the WFS GetCapabilities response.

QGIS support the following request for WFS service:

- GetCapabilities
- DescribeFeatureType
- GetFeature
- Transaction

WCS capabilities

In the *WCS capabilities* area, you can select the layers that you want to publish as WCS. If you enter a URL in the *Advertised URL* field of the *WCS capabilities* section, QGIS Server will advertise this specific URL in the WCS GetCapabilities response.

Now, save the session in a project file `alaska.qgs`. To provide the project as a WMS/WFS, we create a new folder `/usr/lib/cgi-bin/project` with admin privileges and add the project file `alaska.qgs` and a copy of the `qgis_mapserv.fcgi` file - that's all.

Now we test our project WMS, WFS and WCS. Add the WMS, WFS and WCS as described in *WMS/WMTS* **レイヤの読み込み**, *WFS* **および** *WFS-T* **クライアント** and *WCS* **クライアント** to QGIS and load the data. The URL is:

```
http://localhost/cgi-bin/project/qgis_mapserv.fcgi
```

QGIS support the following request for WCS service:

- GetCapabilities
- DescribeCoverage
- GetCoverage

あなたの OWS 用ファイル調整

For vector layers, the *Fields* menu of the *Layer* → *Properties* dialog allows you to define for each attribute if it will be published or not. By default, all the attributes are published by your WMS and WFS. If you want a specific attribute not to be published, uncheck the corresponding checkbox in the *WMS* or *WFS* column.

You can overlay watermarks over the maps produced by your WMS by adding text annotations or SVG annotations to the project file. See section Annotation Tools in **一般ツール** for instructions on creating annotations. For annotations to be displayed as watermarks on the WMS output, the *Fixed map position* check box in the *Annotation text* dialog must be unchecked. This can be accessed by double clicking the annotation while one of the annotation tools is active. For SVG annotations, you will need either to set the project to save absolute paths (in the *General* menu of the *Project* → *Project Properties* dialog) or to manually modify the path to the SVG image in a way that it represents a valid relative path.

WMS GetMap リクエストでサポートされているエキストラパラメータ

In the WMS GetMap request, QGIS Server accepts a couple of extra parameters in addition to the standard parameters according to the OCG WMS 1.3.0 specification:

- **MAP** parameter: Similar to MapServer, the `MAP` parameter can be used to specify the path to the QGIS project file. You can specify an absolute path or a path relative to the location of the server executable (`qgis_mapserv.fcgi`). If not specified, QGIS Server searches for .qgs files in the directory where the server executable is located.

  例:

  ```
  http://localhost/cgi-bin/qgis_mapserv.fcgi?\
    REQUEST=GetMap&MAP=/home/qgis/mymap.qgs&...
  ```

- **DPI** パラメータ: `DPI` パラメータでは要求される出力解像度の指定に使われます.

  例:

  ```
  http://localhost/cgi-bin/qgis_mapserv.fcgi?REQUEST=GetMap&DPI=300&...
  ```

- **OPACITIES** パラメータ: 透明度はレイヤかグループ単位に指定できます. 指定できる値の範囲は 0 (完全に透明) から 255 (完全に不透明) です.

  例:

  ```
  http://localhost/cgi-bin/qgis_mapserv.fcgi?\
    REQUEST=GetMap&LAYERS=mylayer1,mylayer2&OPACITIES=125,200&...
  ```

QGIS Server logging

To log requests send to server, set the following environment variables:

- **QGIS_SERVER_LOG_FILE**: Specify path and filename. Make sure that server has proper permissions for writing to file. File should be created automatically, just send some requests to server. If it's not there, check permissions.
- **QGIS_SERVER_LOG_LEVEL**: Specify desired log level. Available values are:
  - 0 INFO (log all requests),
  - 1 WARNING,

  - 2 CRITICAL (log just critical errors, suitable for production purposes).

例:

```
SetEnv QGIS_SERVER_LOG_FILE /var/tmp/qgislog.txt
SetEnv QGIS_SERVER_LOG_LEVEL 0
```

Note

- When using Fcgid module use FcgidInitialEnv instead of SetEnv!
- Server logging is enabled also if executable is compiled in release mode.

Environment variables

- **QGIS_OPTIONS_PATH**: The variable specifies path to directory with settings. It works the same ways as QGIS application –optionspath option. It is looking for settings file in <QGIS_OPTIONS_PATH>/QGIS/QGIS2.ini. For exaple, to set QGIS server on Apache to use /path/to/config/QGIS/QGIS2.ini settings file, add to Apache config:

```
SetEnv QGIS_OPTIONS_PATH "/path/to/config/"
```

.

Chapter 15

GPSデータの操作

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15.1 GPSプラグイン

15.1.1 GPSとは？

GPS, the Global Positioning System, is a satellite-based system that allows anyone with a GPS receiver to find their exact position anywhere in the world. GPS is used as an aid in navigation, for example in airplanes, in boats and by hikers. The GPS receiver uses the signals from the satellites to calculate its latitude, longitude and (sometimes) elevation. Most receivers also have the capability to store locations (known as **waypoints**), sequences of locations that make up a planned **route** and a tracklog or **track** of the receiver's movement over time. Waypoints, routes and tracks are the three basic feature types in GPS data. QGIS displays waypoints in point layers, while routes and tracks are displayed in linestring layers.

15.1.2 ファイルからGPSデータを読み込み

There are dozens of different file formats for storing GPS data. The format that QGIS uses is called GPX (GPS eXchange format), which is a standard interchange format that can contain any number of waypoints, routes and tracks in the same file.

To load a GPX file, you first need to load the plugin. *Plugins* → *Plugin Manager...* opens the Plugin Manager Dialog. Activate the *GPS Tools* checkbox. When this plugin is loaded, a button with a small handheld GPS device will show up in the toolbar and in *Layer* → *Create Layer* → :

- GPS Tools
- *Create new GPX Layer*

For working with GPS data, we provide an example GPX file available in the QGIS sample dataset: `qgis_sample_data/gps/national_monuments.gpx`. See section **サンプルデータ** for more information about the sample data.

1. Select *Vector* → *GPS* → *GPS Tools* or click the GPS Tools icon in the toolbar and open the *Load GPX file* tab (see figure_GPS_1).
2. フォルダ `qgis_sample_data/gps/` を開いてください, GPX ファイル `national_monuments.gpx` を選択して **[開く]** をクリックして下さい.

Use the **[Browse...]** button to select the GPX file, then use the checkboxes to select the feature types you want to load from that GPX file. Each feature type will be loaded in a separate layer when you click **[OK]**. The file `national_monuments.gpx` only includes waypoints.

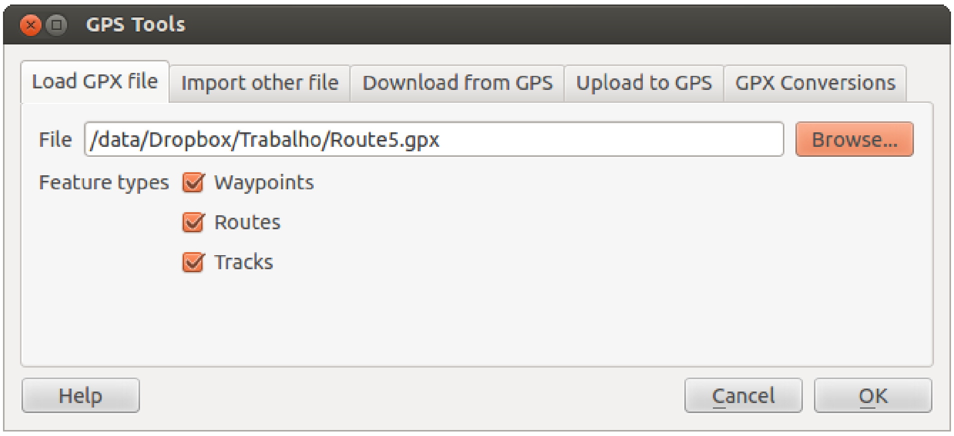

Figure 15.1: The *GPS Tools* dialog window

ノート: GPS units allow you to store data in different coordinate systems. When downloading a GPX file (from your GPS unit or a web site) and then loading it in QGIS, be sure that the data stored in the GPX file uses WGS 84 (latitude/longitude). QGIS expects this, and it is the official GPX specification. See http://www.topografix.com/GPX/1/1/.

15.1.3 GPSBabel

Since QGIS uses GPX files, you need a way to convert other GPS file formats to GPX. This can be done for many formats using the free program GPSBabel, which is available at http://www.gpsbabel.org. This program can also transfer GPS data between your computer and a GPS device. QGIS uses GPSBabel to do these things, so it is recommended that you install it. However, if you just want to load GPS data from GPX files you will not need it. Version 1.2.3 of GPSBabel is known to work with QGIS, but you should be able to use later versions without any problems.

15.1.4 GPS データのインポート

GPX ファイルではないファイルから GPS データをインポートする場合 GPS ツールダイアログの *Import other file* ツールを使ってください. ここでインポートしたいファイル (とファイルタイプ) を選択できます. ここではインポートしたい地物タイプと変換して格納する GPX ファイルと新しいレイヤの名前を指定できます. すべての GPS データ形式が 3 種類すべての型をサポートしているわけではありません, 多くの場合 1 種類か二種類の形式を選択することになるでしょう.

15.1.5 GPS 装置から GPS データのダウンロード

QGIS can use GPSBabel to download data from a GPS device directly as new vector layers. For this we use the *Download from GPS* tab of the GPS Tools dialog (see Figure_GPS_2). Here, we select the type of GPS device, the port that it is connected to (or USB if your GPS supports this), the feature type that you want to download, the GPX file where the data should be stored, and the name of the new layer.

GPS デバイスメニューで選択したデバイスタイプは,GPSBabel が GPS デバイスとどのように接続するかを決定します.GPS デバイスで動作する利用可能なタイプがない場合、新しいタイプを作成することができます（**新しいデバイスタイプの定義** のセクションを参照すること）.

ポートはファイル名, もしくはオペレーティングシステムが GPS デバイスと接続するコンピュータの物理ポートへの参照として使用する他の名前かもしれません. また, USB 対応 GPS ユニットでは, 単に「USB」となる場合もあります.

- Linux では `/dev/ttyS0` または ‘‘/dev/ttyS1‘‘ のようなものになります

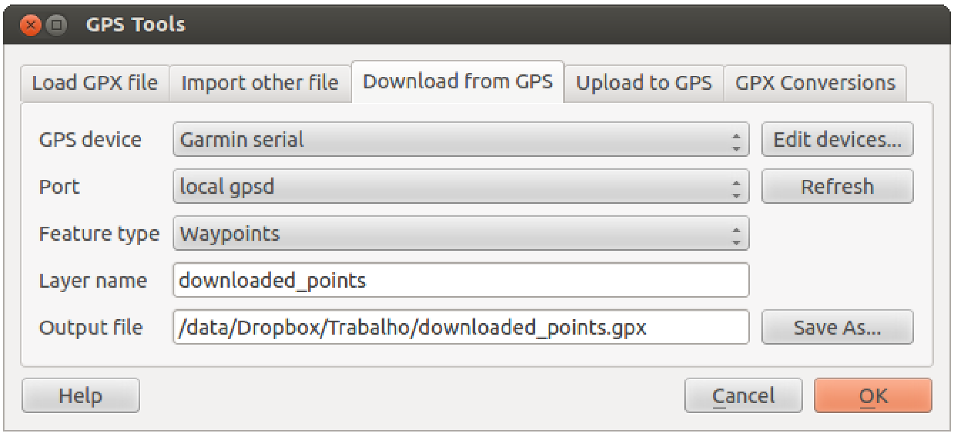

Figure 15.2: ダウンロードツール

- Windows では `COM1` または "COM2" となります

When you click **[OK]**, the data will be downloaded from the device and appear as a layer in QGIS.

15.1.6 GPS データのデバイスへのアップロード

You can also upload data directly from a vector layer in QGIS to a GPS device using the *Upload to GPS* tab of the GPS Tools dialog. To do this, you simply select the layer that you want to upload (which must be a GPX layer), your GPS device type, and the port (or USB) that it is connected to. Just as with the download tool, you can specify new device types if your device isn't in the list.

This tool is very useful in combination with the vector-editing capabilities of QGIS. It allows you to load a map, create waypoints and routes, and then upload them and use them on your GPS device.

15.1.7 新しいデバイスタイプの定義

There are lots of different types of GPS devices. The QGIS developers can't test all of them, so if you have one that does not work with any of the device types listed in the *Download from GPS* and *Upload to GPS* tools, you can define your own device type for it. You do this by using the GPS device editor, which you start by clicking the **[Edit devices]** button in the download or the upload tab.

To define a new device, you simply click the **[New device]** button, enter a name, enter download and upload commands for your device, and click the **[Update device]** button. The name will be listed in the device menus in the upload and download windows – it can be any string. The download command is the command that is used to download data from the device to a GPX file. This will probably be a GPSBabel command, but you can use any other command line program that can create a GPX file. QGIS will replace the keywords `%type`, `%in`, and `%out` when it runs the command.

% `type` は、ウェイポイントをダウンロードする場合-w''で、トラックをダウンロードする場合 ''-r''で、トラックをダウンロードする場合 ''-t''に置き換わります。これらはどの地物タイプをダウンロードするかを GPSBabel に伝えるためのコマンドラインオプションです。

`%in` will be replaced by the port name that you choose in the download window and `%out` will be replaced by the name you choose for the GPX file that the downloaded data should be stored in. So, if you create a device type with the download command `gpsbabel %type -i garmin -o gpx %in %out` (this is actually the download command for the predefined device type 'Garmin serial') and then use it to download waypoints from port `/dev/ttyS0` to the file `output.gpx`, QGIS will replace the keywords and run the command `gpsbabel -w -i garmin -o gpx /dev/ttyS0 output.gpx`.

アップロードコマンドはデバイスにデータをアップロードするために使用されます。同様のキーワードが使われますが、''%in''はアップロードされるレイヤに対する GPX ファイルの名称に置き換えられ、''%out''はポート名称に置き換えられます。

GPSBabel と利用可能なコマンドラインオプションについては http://www.gpsbabel.org で学習できます.

いったん新しいデバイスタイプを作成すると, ダウンロードおよびアップロードツールのデバイスリストに表示されます.

15.1.8 GPS ユニットから ポイント/トラックのダウンロード

前のセクションに記述されているように As described in previous sections QGIS はポイント/トラックをプロジェクトに直接ダウンロードする場合 GPSBabel を使います. QGIS はガーミンデバイスから事前定義されたプロファイルをダウンロードできるようになりました. 不運なことに他のプロファイルを作れないという バグ が存在します, ですから GPS ツールを使った QGIS への直接ダウンロードは現状ではガーミンユニットでのみ利用できます.

Garmin GPSMAP 60cs

MS Windows

Install the Garmin USB drivers from http://www8.garmin.com/support/download_details.jsp?id=591

Connect the unit. Open GPS Tools and use `type=garmin serial` and `port=usb`: Fill the fields *Layer name* and *Output file*. Sometimes it seems to have problems saving in a certain folder, using something like `c:\temp` usually works.

Ubuntu/Mint GNU/Linux

It is first needed an issue about the permissions of the device, as described at https://wiki.openstreetmap.org/wiki/USB_Garmin_on_GNU/Linux. You can try to create a file `/etc/udev/rules.d/51-garmin.rules` containing this rule

```
ATTRS{idVendor}=="091e", ATTRS{idProduct}=="0003", MODE="666"
```

その後 ‘‘garmin_gps‘‘カーネルがロードされていないことを確認することが大事です。

```
rmmod garmin_gps
```

and then you can use the GPS Tools. Unfortunately there seems to be a bug #7182 and usually QGIS freezes several times before the operation work fine.

BTGP-38KM データロガー (Bluetooth のみ)

MS Windows

The already referred bug does not allow to download the data from within QGIS, so it is needed to use GPSBabel from the command line or using its interface. The working command is

```
gpsbabel -t -i skytraq,baud=9600,initbaud=9600 -f COM9 -o gpx -F C:/GPX/aaa.gpx
```

Ubuntu/Mint GNU/Linux

Windows のように同様のコマンド (または GPSBabel GUI を使っているなら設定する) を使います。Linux では、それは多分何とか共通のようなメッセージを取得します。

```
skytraq: Too many read errors on serial port
```

datalogger をオン／オフして、再び試すことは、問題なだけです。

BlueMax GPS-4044 データロガー (BT と USB 両方)

MS Windows

ノート: これは、Windows7 においてそれを使用する前にドライバをインストールする必要があります。適

切なダウンロードのためにメーカーサイトを参照してください。

GPSBabel でダウンロードして、USB と BT の両者とも、常にエラーその他を返します。

```
gpsbabel -t -i mtk -f COM12 -o gpx -F C:/temp/test.gpx
mtk_logger: Can't create temporary file data.bin
Error running gpsbabel: Process exited unsucessfully with code 1
```

Ubuntu/Mint GNU/Linux

USB の利用

After having connected the cable use the `dmesg` command to understand what port is being used, for example `/dev/ttyACM3`. Then as usual use GPSBabel from the CLI or GUI

```
gpsbabel -t -i mtk -f /dev/ttyACM3 -o gpx -F /home/user/bluemax.gpx
```

Bluetooth の利用

Use Blueman Device Manager to pair the device and make it available through a system port, then run GPSBabel

```
gpsbabel -t -i mtk -f /dev/rfcomm0 -o gpx -F /home/user/bluemax_bt.gpx
```

.

15.2 Live GPS トラッキング

To activate live GPS tracking in QGIS, you need to select *Settings* → *Panels* *GPS information*. You will get a new docked window on the left side of the canvas.

GPS トラッキングウィンドウでは４つの表示可能なスクリーンがあります：

- GPS position coordinates and an interface for manually entering vertices and features
- GPS signal strength of satellite connections
- GPS polar screen showing number and polar position of satellites
- GPS options screen (see figure_gps_options)

With a plugged-in GPS receiver (has to be supported by your operating system), a simple click on **[Connect]** connects the GPS to QGIS. A second click (now on **[Disconnect]**) disconnects the GPS receiver from your computer. For GNU/Linux, gpsd support is integrated to support connection to most GPS receivers. Therefore, you first have to configure gpsd properly to connect QGIS to it.

> **警告:** あなたがキャンバスに自分の位置を記録したい場合は, 最初に新しいベクタレイヤを作成し, あなたのトラックを記録することができるようにステータスを編集可能に切り替えなければいけません.

15.2.1 位置と追加属性

If the GPS is receiving signals from satellites, you will see your position in latitude, longitude and altitude together with additional attributes.

15.2.2 GPS シグナル強度

Here, you can see the signal strength of the satellites you are receiving signals from.

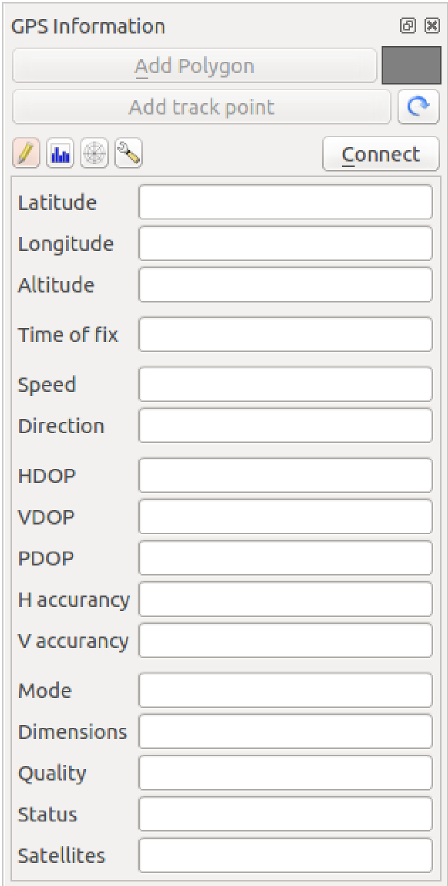

Figure 15.3: GPS tracking position and additional attributes

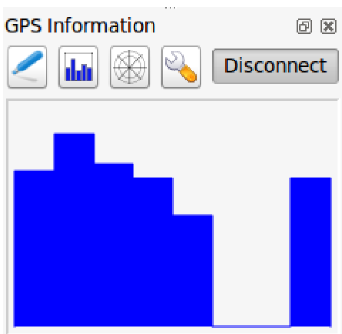

Figure 15.4: GPS tracking signal strength

15.2.3 GPS 極座標 ウィンドウ

If you want to know where in the sky all the connected satellites are, you have to switch to the polar screen. You can also see the ID numbers of the satellites you are receiving signals from.

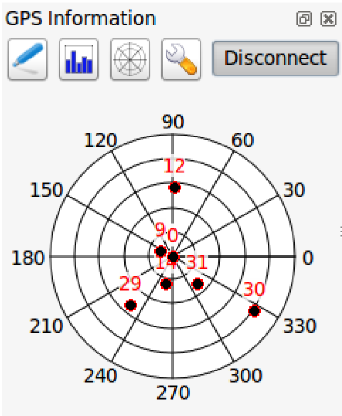

Figure 15.5: GPS tracking polar window

15.2.4 GPS オプション

In case of connection problems, you can switch between:

- *Autodetect*
- *Internal*
- *Serial device*
- *gpsd* (selecting the Host, Port and Device your GPS is connected to)

[接続] を再度クリックすると GPS レシーバとの接続を初期化します.

編集モードになっている場合 **追加された地物を自動的に保存する** オプションを有効にすることができます. また **自動的に点を追加する** オプションを有効にして地図キャンパスに指定した幅と色で点を追加できます.

Activating *Cursor*, you can use a slider to shrink and grow the position cursor on the canvas.

Activating *Map centering* allows you to decide in which way the canvas will be updated. This includes 'always', 'when leaving', if your recorded coordinates start to move out of the canvas, or 'never', to keep map extent.

最後に **ログファイル** を有効にして GPS トラッキングで記録されたログメッセージを書き込むファイルのパスを指定することができます.

If you want to set a feature manually, you have to go back to Position and click on **[Add Point]** or **[Add track point]**.

15.2.5 ライブトラッキングの Bluetooth GPS への接続

QGIS を使用すると、フィールドデータ収集用の Bluetooth GPS を接続することができます。このタスクを実行するには、GPS、Bluetooth デバイスとコンピュータの Bluetooth レシーバーが必要です。

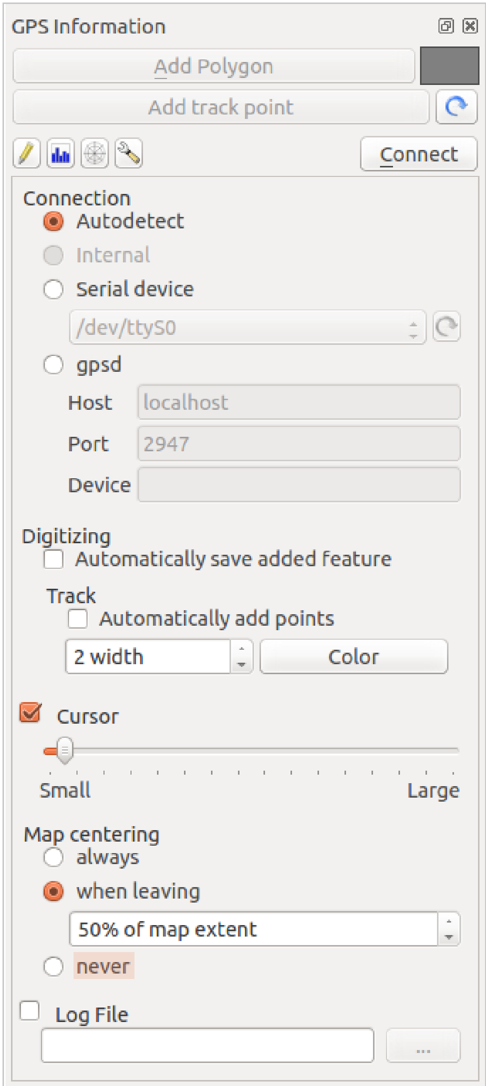

Figure 15.6: GPS tracking options window

最初にあなたの GPS デバイスが認識され、コンピュータにペアリングさせる必要があります。 GPS をオンにし、あなたの通知領域に Bluetooth アイコンに移動し、新しいデバイスを検索します。

デバイスの選択マスクの右側にあなたの GPS ユニットは、おそらく利用可能なものの中に表示されますので、すべてのデバイスが選択されていることを確認します。シリアル接続サービスが利用可能であるべき次のステップでは、それを選択し、** [構成]**ボタンをクリックします。

Bluetooth の特性によって生じた、GPS 接続に割り当てられた COM ポートの番号を覚えておいてください。

After the GPS has been recognized, make the pairing for the connection. Usually the autorization code is `0000`.

Now open *GPS information* panel and switch to GPS options screen. Select the COM port assigned to the GPS connection and click the **[Connect]**. After a while a cursor indicating your position should appear.

QGIS が GPS データを受信できない場合は、GPS デバイスを再起動して 5〜10 秒ほど待ってから、再度接続を試みてください。通常、このソリューションで対応できます。再び接続エラーを受信した場合、同じ GPS ユニットと対になった別の Bluetooth レシーバーが近くにないことを確認してください。

15.2.6 GPSMAP 60cs の利用

MS Windows

機能させるためのもっとも簡単な方法は、GPSGate と呼ばれるミドルウェア（フリーウェア、オープンではない）を使うことです。

Launch the program, make it scan for GPS devices (works for both USB and BT ones) and then in QGIS just click **[Connect]** in the Live tracking panel using the *Autodetect* mode.

Ubuntu/Mint GNU/Linux

Windows にとって簡単な手段は中間にサーバを使うことであり、この場合 GPSD を使います。このため、

```
sudo apt-get install gpsd
```

‘‘garmin_gps‘‘カーネルモジュールを読み込みます

```
sudo modprobe garmin_gps
```

そして、GPS ユニットを接続します。接続したら、`dmesg` を使って、GPS ユニットが実際に使っているデバイス (たとえば `/dev/ttyUSB0`) を確認します。これで gpsd を起動することができるようになりました。

```
gpsd /dev/ttyUSB0
```

最終的に QGIS ライブトラッキングツールで接続します。

15.2.7 BTGP-38KM datalogger (Bluetooth のみ) の利用

GPSD (Linux) または GPSGate (Windows) を使うと手間が省略できます。

15.2.8 BlueMax GPS-4044 データロガー (BT と USB 両方) の利用

MS Windows

The live tracking works for both USB and BT modes, by using GPSGate or even without it, just use the *Autodetect* mode, or point the tool the right port.

Ubuntu/Mint GNU/Linux

USB

The live tracking works both with GPSD

```
gpsd /dev/ttyACM3
```

or without it, by connecting the QGIS live tracking tool directly to the device (for example `/dev/ttyACM3`).

Bluetooth

The live tracking works both with GPSD

```
gpsd /dev/rfcomm0
```

or without it, by connecting the QGIS live tracking tool directly to the device (for example `/dev/rfcomm0`).

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Chapter 16

GRASS GIS の統合

The GRASS plugin provides access to GRASS GIS databases and functionalities (see GRASS-PROJECT in **文献と** *Web* **参照**). This includes visualizing GRASS raster and vector layers, digitizing vector layers, editing vector attributes, creating new vector layers and analysing GRASS 2-D and 3-D data with more than 400 GRASS modules.

In this section, we'll introduce the plugin functionalities and give some examples of managing and working with GRASS data. The following main features are provided with the toolbar menu when you start the GRASS plugin, as described in section sec_starting_grass:

- Open mapset
- New mapset
- Close mapset
- Add GRASS vector layer
- Add GRASS raster layer
- Create new GRASS vector
- Edit GRASS vector layer
- Open GRASS tools
- Display current GRASS region
- Edit current GRASS region

16.1 GRASS プラグインの起動

To use GRASS functionalities and/or visualize GRASS vector and raster layers in QGIS, you must select and load the GRASS plugin with the Plugin Manager. Therefore, go to the menu *Plugins* → *Manage Plugins*, select *GRASS* and click **[OK]**.

You can now start loading raster and vector layers from an existing GRASS `LOCATION` (see section sec_load_grassdata). Or, you can create a new GRASS `LOCATION` with QGIS (see section **新しい** *GRASS LOCATION* **の作成**) and import some raster and vector data (see section *GRASS LOCATION* **へデータをインポート**) for further analysis with the GRASS Toolbox (see section *GRASS* **ツールボックス**).

16.2 GRASS ラスタとベクタレイヤのロード

With the GRASS plugin, you can load vector or raster layers using the appropriate button on the toolbar menu. As an example, we will use the QGIS Alaska dataset (see section **サンプルデータ**). It includes a small sample GRASS `LOCATION` with three vector layers and one raster elevation map.

1. Create a new folder called `grassdata`, download the QGIS 'Alaska' dataset `qgis_sample_data.zip` from http://download.osgeo.org/qgis/data/ and unzip the file into `grassdata`.
2. Start QGIS.
3. If not already done in a previous QGIS session, load the GRASS plugin clicking on *Plugins* → *Manage Plugins* and activate *GRASS*. The GRASS toolbar appears in the QGIS main window.
4. In the GRASS toolbar, click the Open mapset icon to bring up the *MAPSET* wizard.
5. For `Gisdbase`, browse and select or enter the path to the newly created folder `grassdata`.
6. You should now be able to select the *LOCATION* `alaska` and the *MAPSET* `demo`.
7. Click **[OK]**. Notice that some previously disabled tools in the GRASS toolbar are now enabled.
8. Click on Add GRASS raster layer, choose the map name `gtopo30` and click **[OK]**. The elevation layer will be visualized.
9. Click on Add GRASS vector layer, choose the map name `alaska` and click **[OK]**. The Alaska boundary vector layer will be overlayed on top of the `gtopo30` map. You can now adapt the layer properties as described in chapter **ベクタプロパティダイアログ** (e.g., change opacity, fill and outline color).
10. Also load the other two vector layers, `rivers` and `airports`, and adapt their properties.

As you see, it is very simple to load GRASS raster and vector layers in QGIS. See the following sections for editing GRASS data and creating a new `LOCATION`. More sample GRASS `LOCATION`s are available at the GRASS website at http://grass.osgeo.org/download/sample-data/.

ちなみに: GRASS データの読み込み

If you have problems loading data or QGIS terminates abnormally, check to make sure you have loaded the GRASS plugin properly as described in section *GRASS* **プラグインの起動**.

16.3 GRASS LOCATION と MAPSET

GRASS data are stored in a directory referred to as GISDBASE. This directory, often called `grassdata`, must be created before you start working with the GRASS plugin in QGIS. Within this directory, the GRASS GIS data are organized by projects stored in subdirectories called `LOCATION`s. Each `LOCATION` is defined by its coordinate system, map projection and geographical boundaries. Each `LOCATION` can have several `MAPSET`s (subdirectories of the `LOCATION`) that are used to subdivide the project into different topics or subregions, or as workspaces for individual team members (see Neteler & Mitasova 2008 in **文献と** *Web* **参照**). In order to analyze vector and raster layers with GRASS modules, you must import them into a GRASS `LOCATION`. (This is not strictly true – with the GRASS modules `r.external` and `v.external` you can create read-only links to external GDAL/OGR-supported datasets without importing them. But because this is not the usual way for beginners to work with GRASS, this functionality will not be described here.)

16.3.1 新しい GRASS LOCATION の作成

As an example, here is how the sample GRASS `LOCATION alaska`, which is projected in Albers Equal Area projection with unit feet was created for the QGIS sample dataset. This sample GRASS `LOCATION alaska`

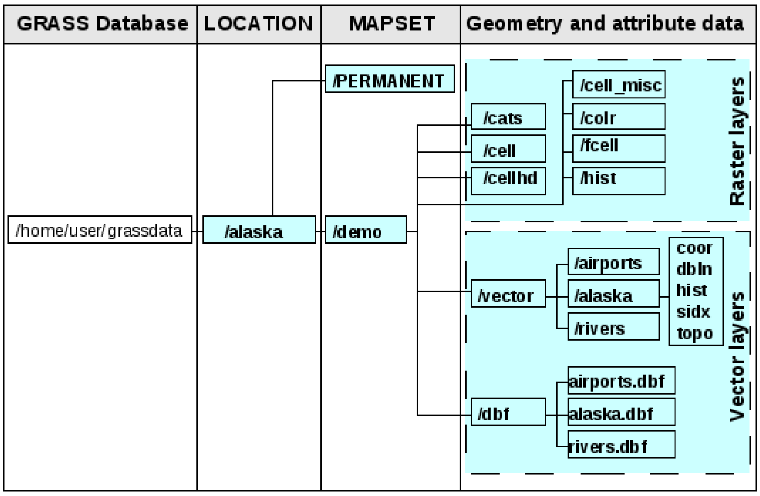


Figure 16.1: alaska LOCATION の GRASS データ

will be used for all examples and exercises in the following GRASS-related sections. It is useful to download and install the dataset on your computer (see **サンプルデータ**).

1. Start QGIS and make sure the GRASS plugin is loaded.
2. Visualize the `alaska.shp` shapefile (see section *Loading a Shapefile*) from the QGIS Alaska dataset (see **サンプルデータ**).
3. In the GRASS toolbar, click on the New mapset icon to bring up the *MAPSET* wizard.
4. 既存の GRASS データベース (GISDBASE) フォルダ `grassdata` を選択するかあなたのコンピュータのファイルマネージャを使って新しい `LOCATION` を作成して下さい. それから **[Next]** をクリックして下さい.
5. We can use this wizard to create a new `MAPSET` within an existing `LOCATION` (see section **新しい** *MAPSET* **の追加**) or to create a new `LOCATION` altogether. Select *Create new location* (see figure_grass_location_2).
6. Enter a name for the `LOCATION` – we used 'alaska' – and click **[Next]**.
7. Define the projection by clicking on the radio button *Projection* to enable the projection list.
8. We are using Albers Equal Area Alaska (feet) projection. Since we happen to know that it is represented by the EPSG ID 2964, we enter it in the search box. (Note: If you want to repeat this process for another `LOCATION` and projection and haven't memorized the EPSG ID, click on the CRS Status icon in the lower right-hand corner of the status bar (see section **投影法の利用方法**)).
9. In *Filter*, insert 2964 to select the projection.
10. **[次へ]** をクリックして下さい.
11. To define the default region, we have to enter the `LOCATION` bounds in the north, south, east, and west directions. Here, we simply click on the button **[Set current |qg| extent]**, to apply the extent of the loaded layer `alaska.shp` as the GRASS default region extent.
12. **[次へ]** をクリックして下さい.
13. We also need to define a `MAPSET` within our new `LOCATION` (this is necessary when creating a new `LOCATION`). You can name it whatever you like - we used 'demo'. GRASS automatically creates a special `MAPSET` called `PERMANENT`, designed to store the core data for the project, its default spatial extent and coordinate system definitions (see Neteler & Mitasova 2008 in **文献と** *Web* **参照**).
14. Check out the summary to make sure it's correct and click **[Finish]**.

15. 新しい LOCATION 'alaska' と 2 つの MAPSETs 'demo' と 'PERMANENT' が作られました. 現在オープンされているワーキングセットはあなたが定義した 'demo' です.
16. GRASS ツールバーのそれまでは利用できなかったいくつかのツールが利用可能になっています.

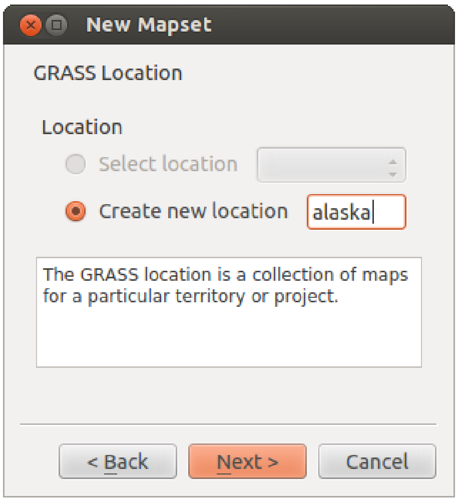


Figure 16.2: Creating a new GRASS LOCATION or a new MAPSET in QGIS

If that seemed like a lot of steps, it's really not all that bad and a very quick way to create a LOCATION. The LOCATION 'alaska' is now ready for data import (see section *GRASS LOCATION* **へデータをインポート**). You can also use the already-existing vector and raster data in the sample GRASS LOCATION 'alaska', included in the QGIS 'Alaska' dataset **サンプルデータ**, and move on to section *GRASS* **ベクターデータモデル**.

16.3.2 新しい MAPSET の追加

A user has write access only to a GRASS MAPSET he or she created. This means that besides access to your own MAPSET, you can read maps in other users' MAPSETs (and they can read yours), but you can modify or remove only the maps in your own MAPSET.

すべての MAPSETs には WIND ファイルが含まれ, そこには現在の領域の座標値と選択されているラスタの解像度が格納されています (Neteler & Mitasova 2008 **文献と** *Web* **参照**, セクション *GRASS* **領域ツール** 参照).

1. Start QGIS and make sure the GRASS plugin is loaded.
2. In the GRASS toolbar, click on the New mapset icon to bring up the *MAPSET* wizard.
3. さらに MAPSET の 'test' をするため LOCATION 'alaska' の GRASS データベース (GISDBASE) フォルダ grassdata を選択して下さい.
4. **[次へ]** をクリックして下さい.
5. We can use this wizard to create a new MAPSET within an existing LOCATION or to create a new LOCATION altogether. Click on the radio button *Select location* (see figure_grass_location_2) and click **[Next]**.
6. Enter the name text for the new MAPSET. Below in the wizard, you see a list of existing MAPSETs and corresponding owners.
7. Click **[Next]**, check out the summary to make sure it's all correct and click **[Finish]**.

16.4 GRASS LOCATION へデータをインポート

This section gives an example of how to import raster and vector data into the 'alaska' GRASS LOCATION provided by the QGIS 'Alaska' dataset. Therefore, we use the landcover raster map landcover.img and the vector GML file lakes.gml from the QGIS 'Alaska' dataset (see サンプルデータ).

1. Start QGIS and make sure the GRASS plugin is loaded.
2. In the GRASS toolbar, click the Open MAPSET icon to bring up the *MAPSET* wizard.
3. Select as GRASS database the folder grassdata in the QGIS Alaska dataset, as LOCATION 'alaska', as MAPSET 'demo' and click **[OK]**.
4. Now click the Open GRASS tools icon. The GRASS Toolbox (see section *GRASS* ツールボックス) dialog appears.
5. ラスタマップ landcover.img をインポートする場合 *Modules Tree* タブの r.in.gdal モジュールをクリックして下さい. この GRASS モジュールは GDAL がサポートしているファイルを GRASS LOCATION にインポートします. r.in.gdal モジュールダイアログが表示されます.
6. Browse to the folder raster in the QGIS 'Alaska' dataset and select the file landcover.img.
7. ラスタの出力名称として landcover_grass を指定して **[Run]** をクリックして下さい. *Output* タブには実行している GRASS コマンド r.in.gdal -o input=/path/to/landcover.img output=landcover_grass が表示されます.
8. When it says **Succesfully finished**, click **[View output]**. The landcover_grass raster layer is now imported into GRASS and will be visualized in the QGIS canvas.
9. To import the vector GML file lakes.gml, click the module v.in.ogr in the *Modules Tree* tab. This GRASS module allows you to import OGR-supported vector files into a GRASS LOCATION. The module dialog for v.in.ogr appears.
10. Browse to the folder gml in the QGIS 'Alaska' dataset and select the file lakes.gml as OGR file.
11. As vector output name, define lakes_grass and click **[Run]**. You don't have to care about the other options in this example. In the *Output* tab you see the currently running GRASS command v.in.ogr -o dsn=/path/to/lakes.gml output=lakes_grass.
12. When it says **Succesfully finished**, click **[View output]**. The lakes_grass vector layer is now imported into GRASS and will be visualized in the QGIS canvas.

16.5 GRASS ベクターデータモデル

It is important to understand the GRASS vector data model prior to digitizing.

In general, GRASS uses a topological vector model.

This means that areas are not represented as closed polygons, but by one or more boundaries. A boundary between two adjacent areas is digitized only once, and it is shared by both areas. Boundaries must be connected and closed without gaps. An area is identified (and labeled) by the **centroid** of the area.

Besides boundaries and centroids, a vector map can also contain points and lines. All these geometry elements can be mixed in one vector and will be represented in different so-called 'layers' inside one GRASS vector map. So in GRASS, a layer is not a vector or raster map but a level inside a vector layer. This is important to distinguish carefully. (Although it is possible to mix geometry elements, it is unusual and, even in GRASS, only used in special cases such as vector network analysis. Normally, you should prefer to store different geometry elements in different layers.)

It is possible to store several 'layers' in one vector dataset. For example, fields, forests and lakes can be stored in one vector. An adjacent forest and lake can share the same boundary, but they have separate attribute tables. It is also possible to attach attributes to boundaries. An example might be the case where the boundary between a lake and a forest is a road, so it can have a different attribute table.

The 'layer' of the feature is defined by the 'layer' inside GRASS. 'Layer' is the number which defines if there is more than one layer inside the dataset (e.g., if the geometry is forest or lake). For now, it can be only a number. In the future, GRASS will also support names as fields in the user interface.

Attributes can be stored inside the GRASS LOCATION as dBase or SQLite3 or in external database tables, for example, PostgreSQL, MySQL, Oracle, etc.

データベーステーブルの属性とリンクされたジオメトリエレメントを ‘カテゴリ’ 値として使ってます.

‘Category’ (key, ID) is an integer attached to geometry primitives, and it is used as the link to one key column in the database table.

ちなみに: GRASS ベクターモデルについて調べる

GRASS ベクタモデルとその機能について学習する最良の方法はベクタモデルについてさらに深く記述されている GRASS チュートリアルをダウンロードすることです. http://grass.osgeo.org/documentation/manuals/ に様々な言語での本やチュートリアルが記述されています.

16.6 新しい GRASS ベクターレイヤーの作成

To create a new GRASS vector layer with the GRASS plugin, click the Create new GRASS vector toolbar icon. Enter a name in the text box, and you can start digitizing point, line or polygon geometries following the procedure described in section *GRASS* **ベクタレイヤのデジタイジングと編集**.

In GRASS, it is possible to organize all sorts of geometry types (point, line and area) in one layer, because GRASS uses a topological vector model, so you don’t need to select the geometry type when creating a new GRASS vector. This is different from shapefile creation with QGIS, because shapefiles use the Simple Feature vector model (see section **新しいベクタレイヤの作成**).

ちなみに: Creating an attribute table for a new GRASS vector layer

If you want to assign attributes to your digitized geometry features, make sure to create an attribute table with columns before you start digitizing (see figure_grass_digitizing_5).

16.7 GRASS ベクタレイヤのデジタイジングと編集

The digitizing tools for GRASS vector layers are accessed using the Edit GRASS vector layer icon on the toolbar. Make sure you have loaded a GRASS vector and it is the selected layer in the legend before clicking on the edit tool. Figure figure_grass_digitizing_2 shows the GRASS edit dialog that is displayed when you click on the edit tool. The tools and settings are discussed in the following sections.

ちなみに: GRASS ポリゴンをデジタイズ

If you want to create a polygon in GRASS, you first digitize the boundary of the polygon, setting the mode to ‘No category’. Then you add a centroid (label point) into the closed boundary, setting the mode to ‘Next not used’. The reason for this is that a topological vector model links the attribute information of a polygon always to the centroid and not to the boundary.

ツールバー

In figure_grass_digitizing_1, you see the GRASS digitizing toolbar icons provided by the GRASS plugin. Table table_grass_digitizing_1 explains the available functionalities.

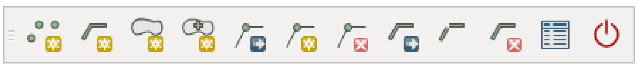


Figure 16.3: GRASS Digitizing Toolbar

アイコン	ツール	目的
	新しい点	新しい点をデジタイズ
	新しいライン	新しいラインをデジタイズ
	新しい境界	Digitize new boundary (finish by selecting new tool)
	セントロイドの新規作成	新しいセントロイドをデジタイズ (ラベルのあるエリア)
	Move vertex	Move one vertex of existing line or boundary and identify new position
	Add vertex	Add a new vertex to existing line
	Delete vertex	Delete vertex from existing line (confirm selected vertex by another click)
	Move element	Move selected boundary, line, point or centroid and click on new position
	Split line	Split an existing line into two parts
	Delete element	Delete existing boundary, line, point or centroid (confirm selected element by another click)
	Edit attributes	Edit attributes of selected element (note that one element can represent more features, see above)
	Close	Close session and save current status (rebuilds topology afterwards)

表 GRASS デジタイジング 1: GRASS デジタイジングツール

Category Tab

The *Category* tab allows you to define the way in which the category values will be assigned to a new geometry element.

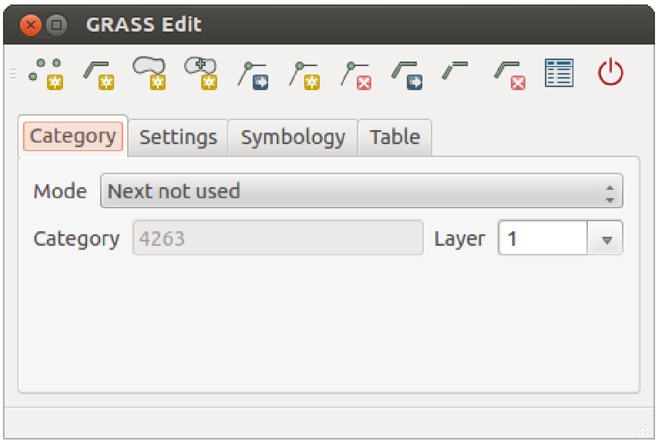


Figure 16.4: GRASS Digitizing Category Tab

- **Mode**: The category value that will be applied to new geometry elements.
  - Next not used - Apply next not yet used category value to geometry element.
  - Manual entry - Manually define the category value for the geometry element in the 'Category' entry field.
  - No category - Do not apply a category value to the geometry element. This is used, for instance, for area boundaries, because the category values are connected via the centroid.
- **Category** - The number (ID) that is attached to each digitized geometry element. It is used to connect each geometry element with its attributes.

- **Field (layer)** - Each geometry element can be connected with several attribute tables using different GRASS geometry layers. The default layer number is 1.

ちなみに: Creating an additional GRASS 'layer' with |qg|

If you would like to add more layers to your dataset, just add a new number in the 'Field (layer)' entry box and press return. In the Table tab, you can create your new table connected to your new layer.

Settings Tab

The *Settings* tab allows you to set the snapping in screen pixels. The threshold defines at what distance new points or line ends are snapped to existing nodes. This helps to prevent gaps or dangles between boundaries. The default is set to 10 pixels.

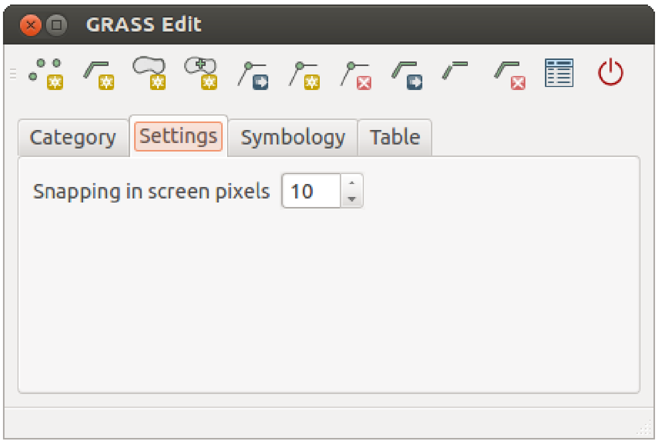


Figure 16.5: GRASS Digitizing Settings Tab

Symbology Tab

The *Symbology* tab allows you to view and set symbology and color settings for various geometry types and their topological status (e.g., closed / opened boundary).

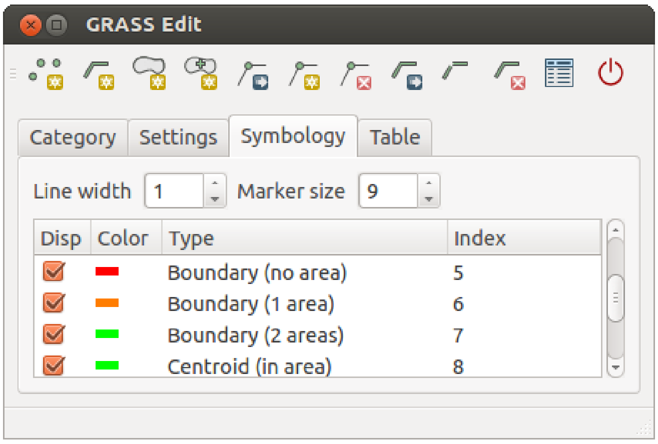


Figure 16.6: GRASS Digitizing Symbology Tab

Table Tab

The *Table* tab provides information about the database table for a given 'layer'. Here, you can add new columns to an existing attribute table, or create a new database table for a new GRASS vector layer (see section **新しい *GRASS* ベクターレイヤーの作成**).

ちなみに: GRASS 編集権限

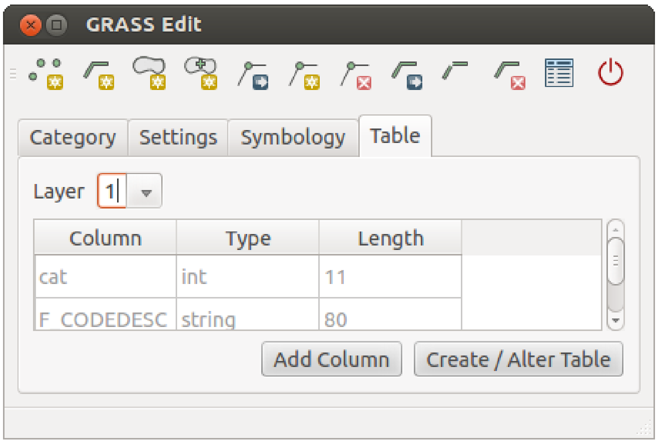


Figure 16.7: GRASS Digitizing Table Tab

編集を行いたい場合あなたは GRASS MAPSET のオーナーにならなければいけません. あなたが所有する以外の MAPSET に属するレイヤはファイルに書き込み権限を持っていても編集できません.

16.8 GRASS 領域ツール

The region definition (setting a spatial working window) in GRASS is important for working with raster layers. Vector analysis is by default not limited to any defined region definitions. But all newly created rasters will have the spatial extension and resolution of the currently defined GRASS region, regardless of their original extension and resolution. The current GRASS region is stored in the `$LOCATION/$MAPSET/WIND` file, and it defines north, south, east and west bounds, number of columns and rows, horizontal and vertical spatial resolution.

It is possible to switch on and off the visualization of the GRASS region in the QGIS canvas using the Display current GRASS region button.

With the Edit current GRASS region icon, you can open a dialog to change the current region and the symbology of the GRASS region rectangle in the QGIS canvas. Type in the new region bounds and resolution, and click **[OK]**. The dialog also allows you to select a new region interactively with your mouse on the QGIS canvas. Therefore, click with the left mouse button in the QGIS canvas, open a rectangle, close it using the left mouse button again and click **[OK]**.

The GRASS module `g.region` provides a lot more parameters to define an appropriate region extent and resolution for your raster analysis. You can use these parameters with the GRASS Toolbox, described in section *GRASS ツールボックス*.

16.9 GRASS ツールボックス

The Open GRASS Tools box provides GRASS module functionalities to work with data inside a selected GRASS `LOCATION` and `MAPSET`. To use the GRASS Toolbox you need to open a `LOCATION` and `MAPSET` that you have write permission for (usually granted, if you created the `MAPSET`). This is necessary, because new raster or vector layers created during analysis need to be written to the currently selected `LOCATION` and `MAPSET`.

16.9.1 GRASS モジュールを使用します

The GRASS shell inside the GRASS Toolbox provides access to almost all (more than 300) GRASS modules in a command line interface. To offer a more user-friendly working environment, about 200 of the available GRASS modules and functionalities are also provided by graphical dialogs within the GRASS plugin Toolbox.

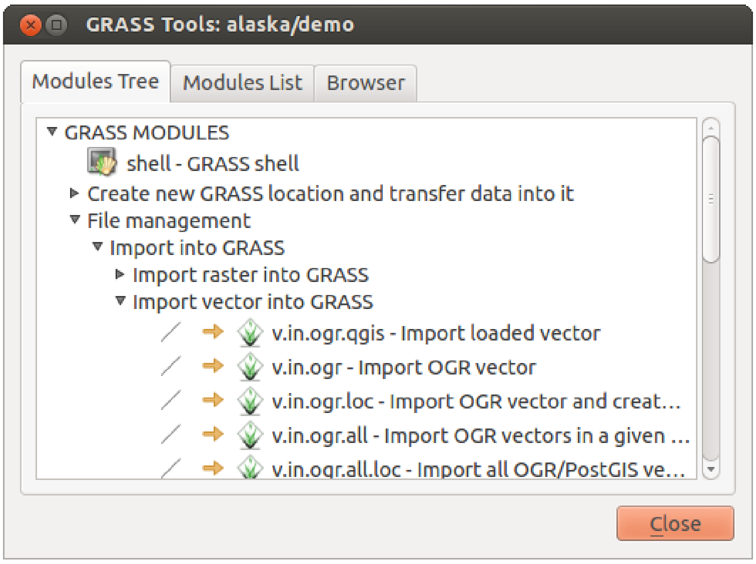


Figure 16.8: GRASS ツールボックスとモジュールツリー

A complete list of GRASS modules available in the graphical Toolbox in QGIS version 2.8 is available in the GRASS wiki at http://grass.osgeo.org/wiki/GRASS-QGIS_relevant_module_list.

GRASS ツールボックスの内容をカスタマイズできます. この機能は セクション *GRASS* **ツールボックスのカスタマイズ** に記述されています.

As shown in figure_grass_toolbox_1, you can look for the appropriate GRASS module using the thematically grouped *Modules Tree* or the searchable *Modules List* tab.

By clicking on a graphical module icon, a new tab will be added to the Toolbox dialog, providing three new sub-tabs: *Options*, *Output* and *Manual*.

オプション

The *Options* tab provides a simplified module dialog where you can usually select a raster or vector layer visualized in the QGIS canvas and enter further module-specific parameters to run the module.

The provided module parameters are often not complete to keep the dialog clear. If you want to use further module parameters and flags, you need to start the GRASS shell and run the module in the command line.

A new feature since QGIS 1.8 is the support for a *Show Advanced Options* button below the simplified module dialog in the *Options* tab. At the moment, it is only added to the module `v.in.ascii` as an example of use, but it will probably be part of more or all modules in the GRASS Toolbox in future versions of QGIS. This allows you to use the complete GRASS module options without the need to switch to the GRASS shell.

出力

The *Output* tab provides information about the output status of the module. When you click the **[Run]** button, the module switches to the *Output* tab and you see information about the analysis process. If all works well, you will finally see a `Successfully finished` message.

マニュアル

The *Manual* tab shows the HTML help page of the GRASS module. You can use it to check further module parameters and flags or to get a deeper knowledge about the purpose of the module. At the end of each module manual page, you see further links to the `Main Help index`, the `Thematic index` and the `Full index`. These links provide the same information as the module `g.manual`.

ちなみに: 結果をすぐ表示

もし計算結果をすぐにマップキャンバスに表示したい場合モジュールタブの一番下にある 'View Output' ボタンを利用できます.

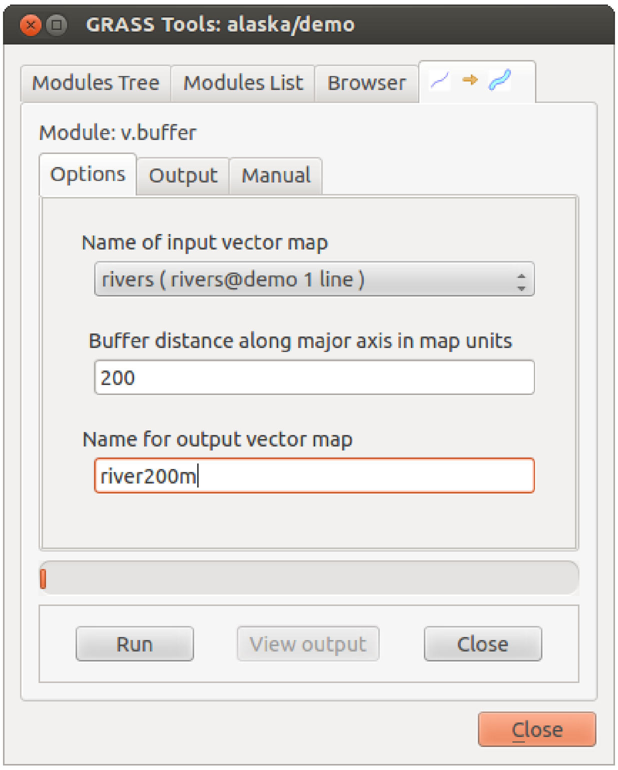


Figure 16.9: GRASS ツールボックスモジュールオプション

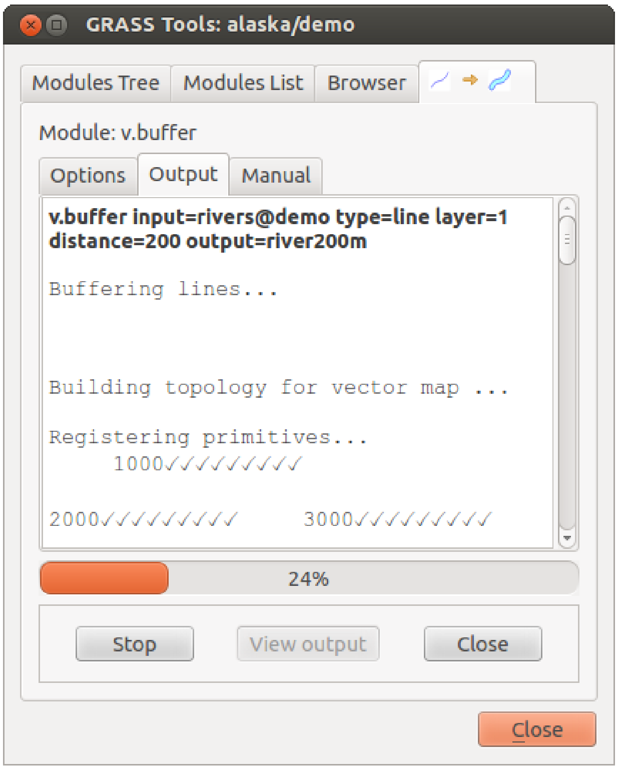


Figure 16.10: GRASS ツールボックス出力

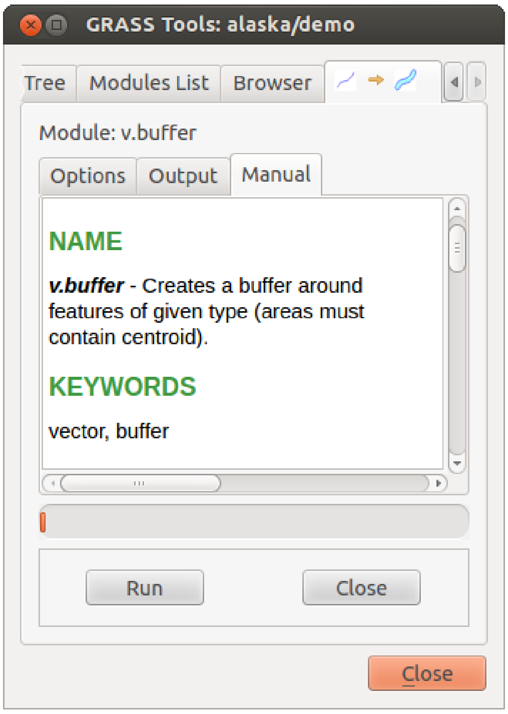


Figure 16.11: GRASS ツールボックスモジュールマニュアル

16.9.2 GRASS モジュールの例

以下の例はいくつかの GRASS モジュールの力をデモンストレートします．

等高線の作成

The first example creates a vector contour map from an elevation raster (DEM). Here, it is assumed that you have the Alaska `LOCATION` set up as explained in section *GRASS LOCATION* **へデータをインポート**.

- First, open the location by clicking the Open mapset button and choosing the Alaska location.
- Now load the `gtopo30` elevation raster by clicking Add GRASS raster layer and selecting the `gtopo30` raster from the demo location.
- Now open the Toolbox with the Open GRASS tools button.
- In the list of tool categories, double-click *Raster* → *Surface Management* → *Generate vector contour lines*.
- Now a single click on the tool **r.contour** will open the tool dialog as explained above (see *GRASS* **モジュールを使用します**). The `gtopo30` raster should appear as the *Name of input raster*.
- Type into the *Increment between Contour levels* 1,00 the value 100. (This will create contour lines at intervals of 100 meters.)
- Type into the *Name for output vector map* the name `ctour_100`.
- Click **[Run]** to start the process. Wait for several moments until the message `Successfully finished` appears in the output window. Then click **[View Output]** and **[Close]**.

Since this is a large region, it will take a while to display. After it finishes rendering, you can open the layer properties window to change the line color so that the contours appear clearly over the elevation raster, as in **ベクタプロパティダイアログ**.

Next, zoom in to a small, mountainous area in the center of Alaska. Zooming in close, you will notice that the contours have sharp corners. GRASS offers the **v.generalize** tool to slightly alter vector maps while keeping their overall shape. The tool uses several different algorithms with different purposes. Some of the algorithms (i.e., Douglas Peuker and Vertex Reduction) simplify the line by removing some of the vertices. The resulting vector will load faster. This process is useful when you have a highly detailed vector, but you are creating a very small-scale map, so the detail is unnecessary.

ちなみに: シンプル化ツール

Note that the QGIS fTools plugin has a *Simplify geometries* → tool that works just like the GRASS **v.generalize** Douglas-Peuker algorithm.

However, the purpose of this example is different. The contour lines created by `r.contour` have sharp angles that should be smoothed. Among the **v.generalize** algorithms, there is Chaiken's, which does just that (also Hermite splines). Be aware that these algorithms can **add** additional vertices to the vector, causing it to load even more slowly.

- Open the GRASS Toolbox and double-click the categories *Vector* → *Develop map* → *Generalization*, then click on the **v.generalize** module to open its options window.
- Check that the 'ctour_100' vector appears as the *Name of input vector*.
- From the list of algorithms, choose Chaiken's. Leave all other options at their default, and scroll down to the last row to enter in the field *Name for output vector map* 'ctour_100_smooth', and click **[Run]**.
- The process takes several moments. Once `Successfully finished` appears in the output windows, click **[View output]** and then **[Close]**.
- You may change the color of the vector to display it clearly on the raster background and to contrast with the original contour lines. You will notice that the new contour lines have smoother corners than the original while staying faithful to the original overall shape.

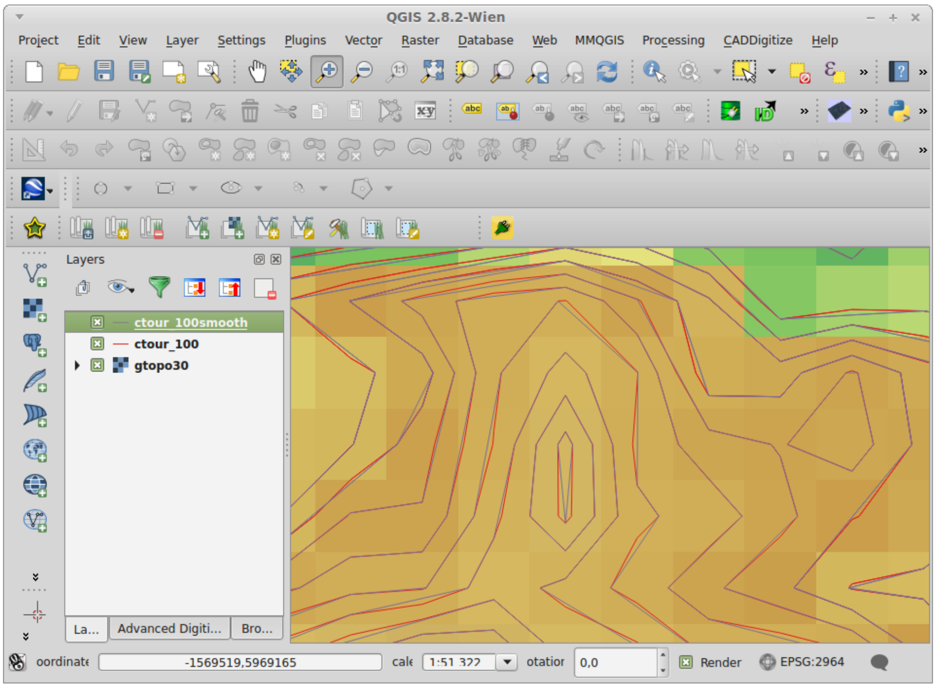


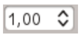
Figure 16.12: GRASS module v.generalize to smooth a vector map

ちなみに: その他に r.contour も使えます

The procedure described above can be used in other equivalent situations. If you have a raster map of precipitation data, for example, then the same method will be used to create a vector map of isohyetal (constant rainfall) lines.

陰影 3D 効果の作成

Several methods are used to display elevation layers and give a 3-D effect to maps. The use of contour lines, as shown above, is one popular method often chosen to produce topographic maps. Another way to display a 3-D effect is by hillshading. The hillshade effect is created from a DEM (elevation) raster by first calculating the slope and aspect of each cell, then simulating the sun's position in the sky and giving a reflectance value to each cell. Thus, you get sun-facing slopes lighted; the slopes facing away from the sun (in shadow) are darkened.

- Begin this example by loading the `gtopo30` elevation raster. Start the GRASS Toolbox, and under the Raster category, double-click to open *Spatial analysis* → *Terrain analysis*.
- それからモジュールをオープンするために **r.shaded.relief** をクリックして下さい.
- Change the *azimuth angle* 

 270 to 315.
- 新しいヒルシェードラスタとして `gtopo30_shade` と入力して **[Run]** をクリックして下さい.
- プロセスが完了するとヒルシェードラスタが地図に追加されます. これはグレイスケールで表示されます.
- To view both the hillshading and the colors of the `gtopo30` together, move the hillshade map below the `gtopo30` map in the table of contents, then open the *Properties* window of `gtopo30`, switch to the *Transparency* tab and set its transparency level to about 25%.

You should now have the `gtopo30` elevation with its colormap and transparency setting displayed **above** the grayscale hillshade map. In order to see the visual effects of the hillshading, turn off the `gtopo30_shade` map, then turn it back on.

GRASS shell の使用

The GRASS plugin in QGIS is designed for users who are new to GRASS and not familiar with all the modules and options. As such, some modules in the Toolbox do not show all the options available, and some modules do not appear at all. The GRASS shell (or console) gives the user access to those additional GRASS modules that do not appear in the Toolbox tree, and also to some additional options to the modules that are in the Toolbox with the simplest default parameters. This example demonstrates the use of an additional option in the **r.shaded.relief** module that was shown above.

The module **r.shaded.relief** can take a parameter `zmult`, which multiplies the elevation values relative to the X-Y coordinate units so that the hillshade effect is even more pronounced.

- Load the `gtopo30` elevation raster as above, then start the GRASS Toolbox and click on the GRASS shell. In the shell window, type the command `r.shaded.relief map=gtopo30 shade=gtopo30_shade2 azimuth=315 zmult=3` and press **[Enter]**.
- After the process finishes, shift to the *Browse* tab and double-click on the new `gtopo30_shade2` raster to display it in QGIS.
- As explained above, move the shaded relief raster below the `gtopo30` raster in the table of contents, then check the transparency of the colored `gtopo30` layer. You should see that the 3-D effect stands out more strongly compared with the first shaded relief map.

ベクターマップによるラスター統計

次の例は GRASS モジュールがラスタデータを集計してベクタマップのそれぞれのポリゴンのカラムに統計値を追加するものです.

- 再び Alaska データを使います, *GRASS LOCATION* **へデータをインポート** を参照して `shapefiles` ディレクトリから shapefile trees を GRASS にインポートして下さい.
- Now an intermediate step is required: centroids must be added to the imported trees map to make it a complete GRASS area vector (including both boundaries and centroids).
- ツールボックスで *Vector* → *Manage features*, を選択して **v.centroids** モジュールを開いて下さい.
- Enter as the *output vector map* 'forest_areas' and run the module.

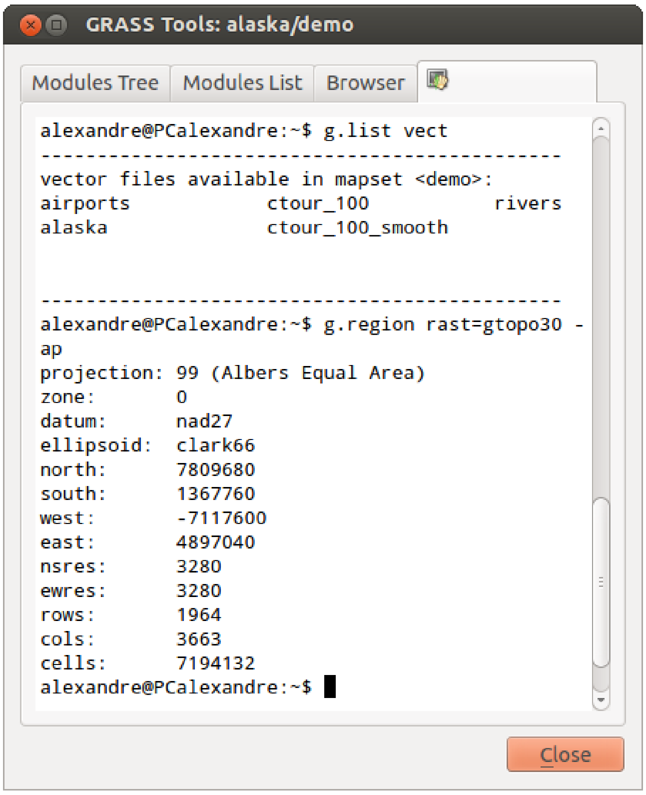


Figure 16.13: GRASS シェル, r.shaded.relief モジュール

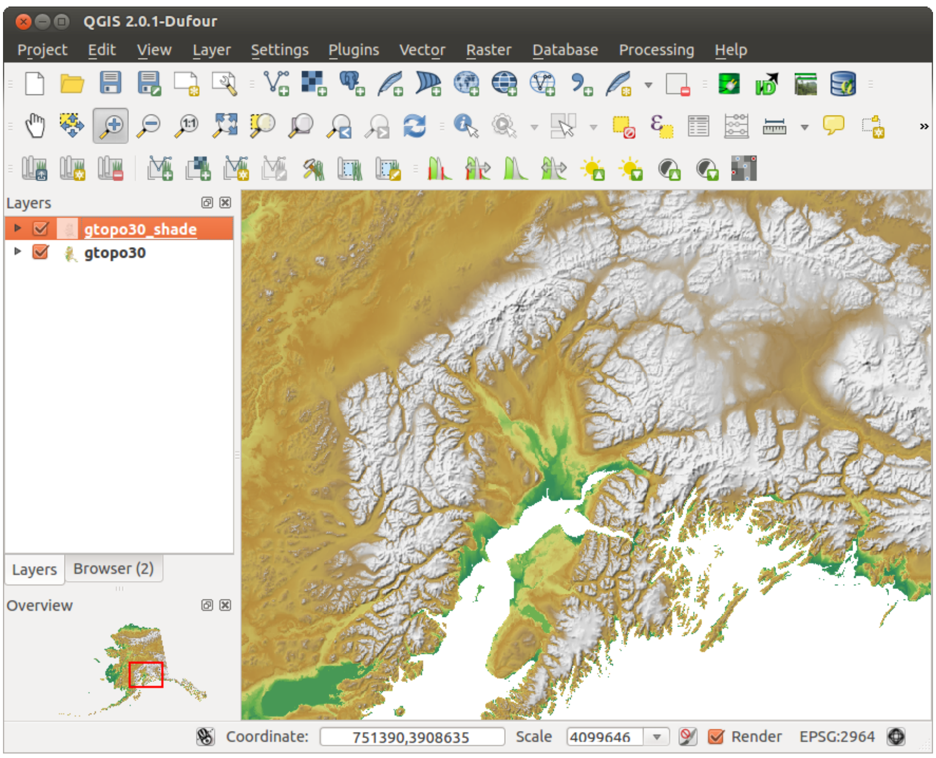


Figure 16.14: GRASS モジュール r.shaded.relief で作成した陰影図の表示

- Now load the `forest_areas` vector and display the types of forests - deciduous, evergreen, mixed - in different colors: In the layer *Properties* window, *Symbology* tab, choose from *Legend type* ‘Unique value’ and set the *Classification field* to ‘VEGDESC’. (Refer to the explanation of the symbology tab in **スタイルメニュー** of the vector section.)
- 次に GRASS ツールボックスを再オープンして *Vector* → *Vector update* を他の地図で開いて下さい.
- **v.rast.stats** モジュールをクリックして. `gtopo30`, と `forest_areas` と入力して下さい.
- Only one additional parameter is needed: Enter *column prefix* `elev`, and click **[Run]**. This is a computationally heavy operation, which will run for a long time (probably up to two hours).
- Finally, open the `forest_areas` attribute table, and verify that several new columns have been added, including `elev_min`, `elev_max`, `elev_mean`, etc., for each forest polygon.

16.9.3 Working with the GRASS LOCATION browser

Another useful feature inside the GRASS Toolbox is the GRASS `LOCATION` browser. In figure_grass_module_7, you can see the current working `LOCATION` with its `MAPSETs`.

In the left browser windows, you can browse through all `MAPSETs` inside the current `LOCATION`. The right browser window shows some meta-information for selected raster or vector layers (e.g., resolution, bounding box, data source, connected attribute table for vector data, and a command history).

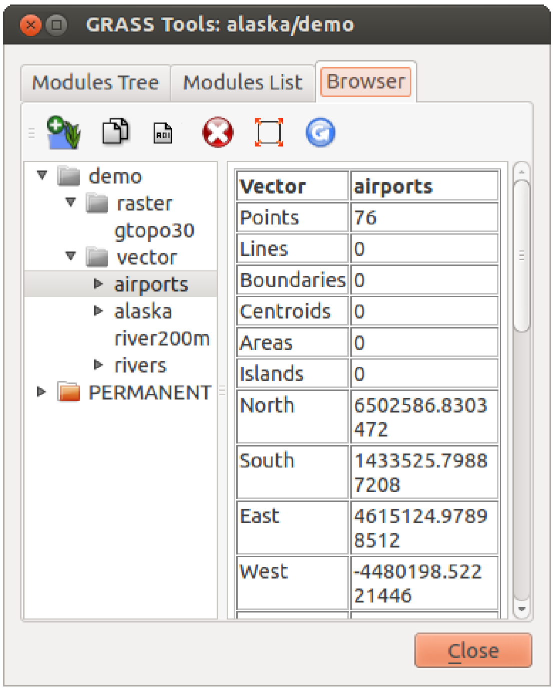


Figure 16.15: GRASS LOCATION browser

The toolbar inside the *Browser* tab offers the following tools to manage the selected `LOCATION`:

- *Add selected map to canvas*
- *Copy selected map*
- *Rename selected map*
- *Delete selected map*
- *Set current region to selected map*

- *Refresh browser window*

The *Rename selected map* and *Delete selected map* only work with maps inside your currently selected MAPSET. All other tools also work with raster and vector layers in another MAPSET.

16.9.4 GRASS ツールボックスのカスタマイズ

Nearly all GRASS modules can be added to the GRASS Toolbox. An XML interface is provided to parse the pretty simple XML files that configure the modules' appearance and parameters inside the Toolbox.

A sample XML file for generating the module `v.buffer` (v.buffer.qgm) looks like this:

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE qgisgrassmodule SYSTEM "http://mrcc.com/qgisgrassmodule.dtd">

<qgisgrassmodule label="Vector buffer" module="v.buffer">
        <option key="input" typeoption="type" layeroption="layer" />
        <option key="buffer"/>
        <option key="output" />
</qgisgrassmodule>
```

The parser reads this definition and creates a new tab inside the Toolbox when you select the module. A more detailed description for adding new modules, changing a module's group, etc., can be found on the QGIS wiki at http://hub.qgis.org/projects/quantum-gis/wiki/Adding_New_Tools_to_the_GRASS_Toolbox.

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Chapter 17

QGIS processing framework

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17.1 はじめに

This chapter introduces the QGIS processing framework, a geoprocessing environment that can be used to call native and third-party algorithms from QGIS, making your spatial analysis tasks more productive and easy to accomplish.

以降のセクションではフレームワークのグラフィカルな機能をどのように使うのかをそれぞれ見ていきます.

There are four basic elements in the framework GUI, which are used to run algorithms for different purposes. Choosing one tool or another will depend on the kind of analysis that is to be performed and the particular characteristics of each user and project. All of them (except for the batch processing interface, which is called from the toolbox, as we will see) can be accessed from the *Processing* menu item. (You will see more than four entries. The remaining ones are not used to execute algorithms and will be explained later in this chapter.)

- ツールボックス.GUI の主な要素は, 単一のアルゴリズムを実行するか, そのアルゴリズムに基づいてバッチプロセスを実行するために使用されます.

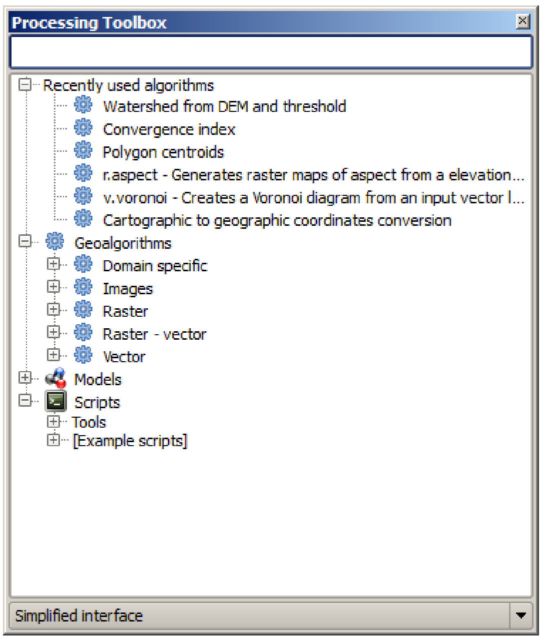

Figure 17.1: Processing Toolbox

- グラフィカルモデラー. いくつかのアルゴリズムをグラフィカルサブプロセスのいくつかを伴う単一のプロセスを作成し, ワークフローを定義するために, モデラーを使用して組み合わせることができます.

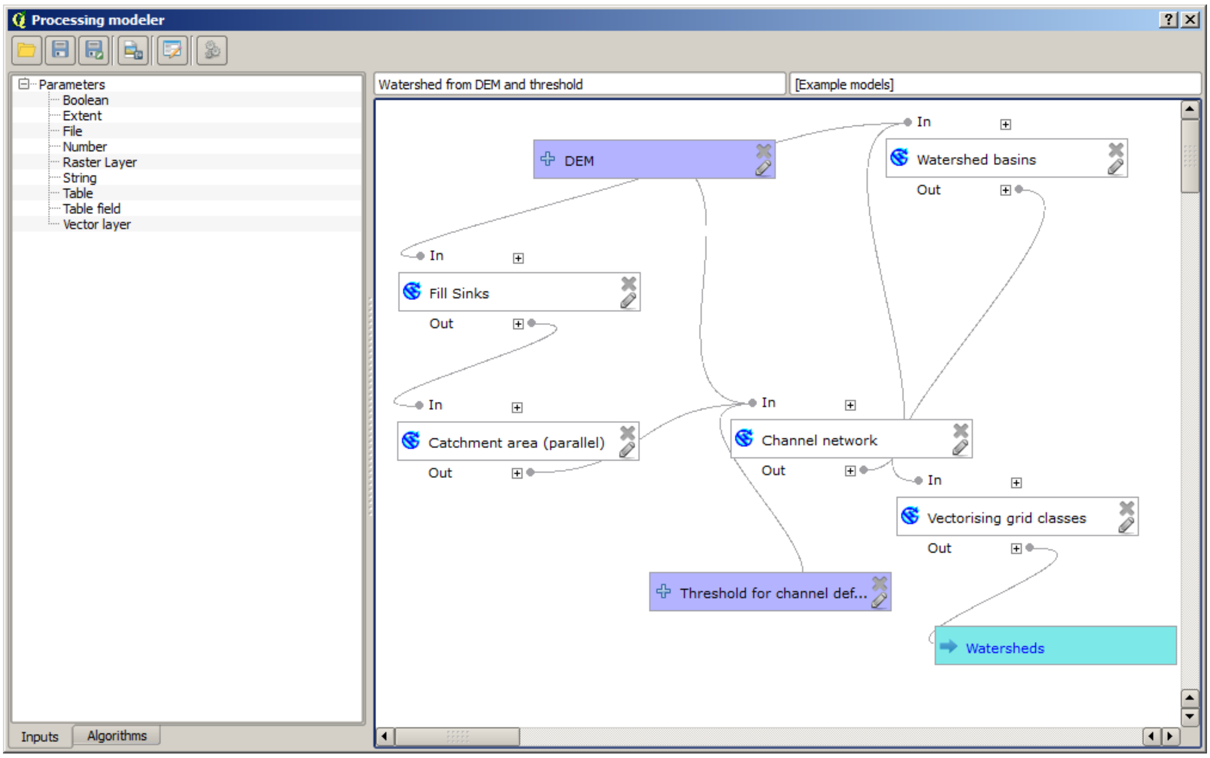

Figure 17.2: Processing Modeler

- 履歴マネージャ. 前述の要素のいずれかを用いて実行されたすべてのアクションが履歴ファイルに保存され, 後で簡単に履歴マネージャを使用して再生することができます.
- バッチプロセシングインタフェース. このインタフェースを使用すると, バッチ処理を実行し, 複数のデータセットに対し単一のアルゴリズムの実行を自動化することができます.

以下のセクションではそれぞれのエレメントの詳細を紹介します.

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17.2 ツールボックス

The *Toolbox* is the main element of the processing GUI, and the one that you are more likely to use in your daily work. It shows the list of all available algorithms grouped in different blocks, and it is the access point to run them, whether as a single process or as a batch process involving several executions of the same algorithm on different sets of inputs.

The toolbox contains all the available algorithms, divided into predefined groups. All these groups are found under a single tree entry named *Geoalgorithms*.

Additionally, two more entries are found, namely *Models* and *Scripts*. These include user-created algorithms, and they allow you to define your own workflows and processing tasks. We will devote a full section to them a bit later.

In the upper part of the toolbox, you will find a text box. To reduce the number of algorithms shown in the toolbox and make it easier to find the one you need, you can enter any word or phrase on the text box. Notice that, as you type, the number of algorithms in the toolbox is reduced to just those that contain the text you have entered in their names.

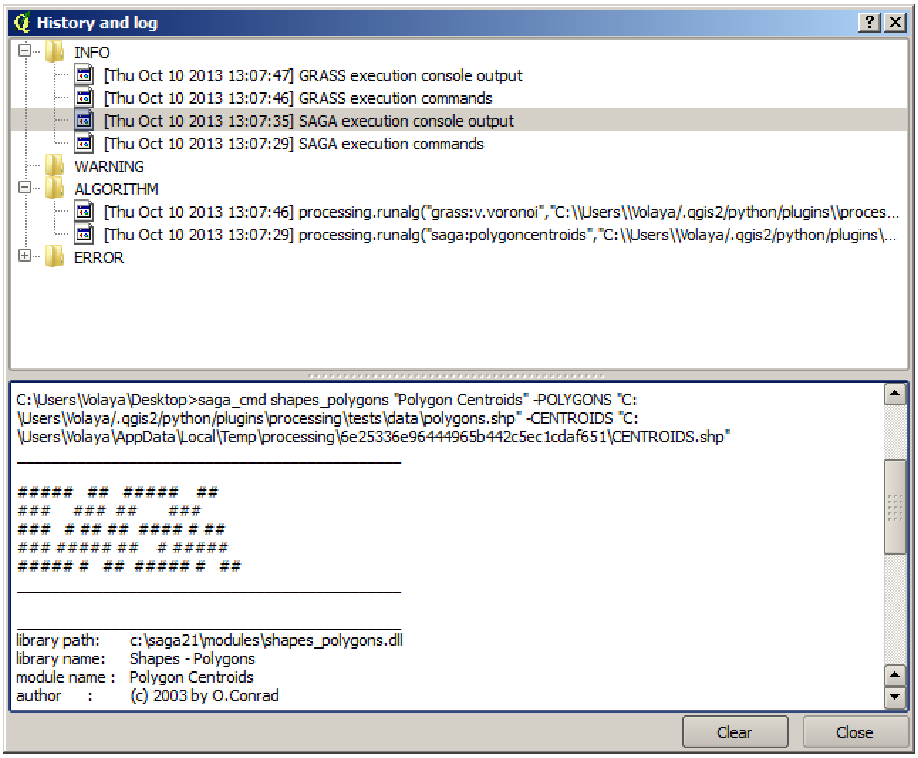

Figure 17.3: Processing History

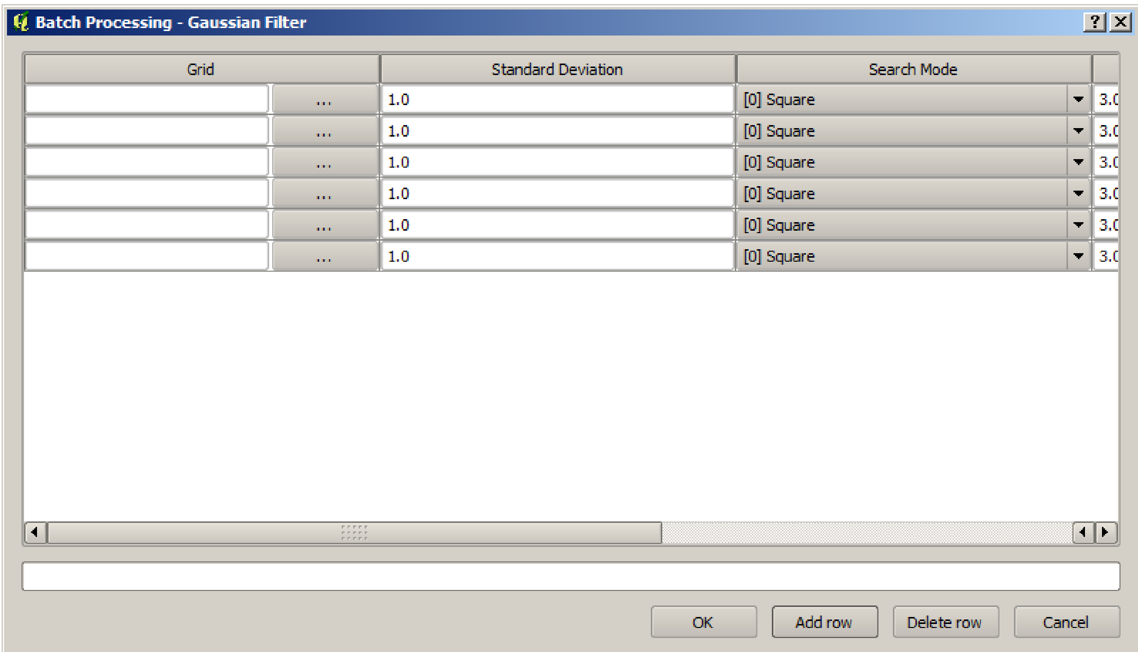

Figure 17.4: Batch Processing interface

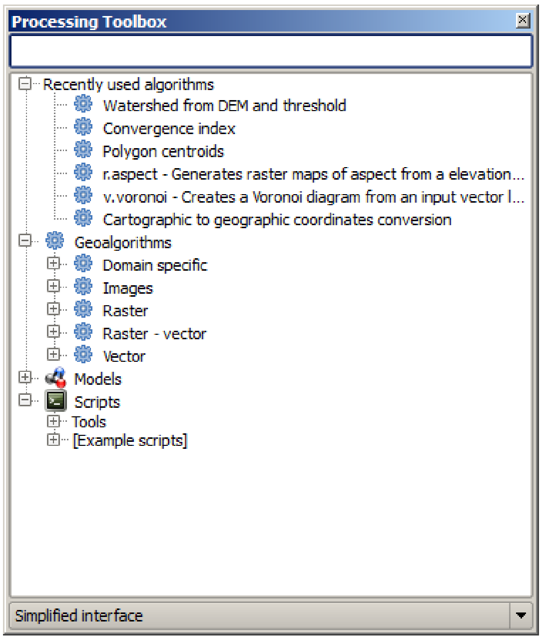

Figure 17.5: Processing Toolbox

In the lower part, you will find a box that allows you to switch between the simplified algorithm list (the one explained above) and the advanced list. If you change to the advanced mode, the toolbox will look like this:

In the advanced view, each group represents a so-called 'algorithm provider', which is a set of algorithms coming from the same source, for instance, from a third-party application with geoprocessing capabilities. Some of these groups represent algorithms from third-party applications like SAGA, GRASS or R, while others contain algorithms directly coded as part of the processing plugin, not relying on any additional software.

This view is recommended to those users who have a certain knowledge of the applications that are backing the algorithms, since they will be shown with their original names and groups.

Also, some additional algorithms are available only in the advanced view, such as LiDAR tools and scripts based on the R statistical computing software, among others. Independent QGIS plugins that add new algorithms to the toolbox will only be shown in the advanced view.

In particular, the simplified view contains algorithms from the following providers:

- GRASS
- SAGA
- OTB
- Native QGIS algorithms

In the case of running QGIS under Windows, these algorithms are fully-functional in a fresh installation of QGIS, and they can be run without requiring any additional installation. Also, running them requires no prior knowledge of the external applications they use, making them more accesible for first-time users.

If you want to use an algorithm not provided by any of the above providers, switch to the advanced mode by selecting the corresponding option at the bottom of the toolbox.

アルゴリズムを実行したい場合ツールボックスの名前をダブルクリックすればいいです.

17.2.1 アルゴリズムダイアログ

Once you double-click on the name of the algorithm that you want to execute, a dialog similar to that in the figure below is shown (in this case, the dialog corresponds to the SAGA 'Convergence index' algorithm).

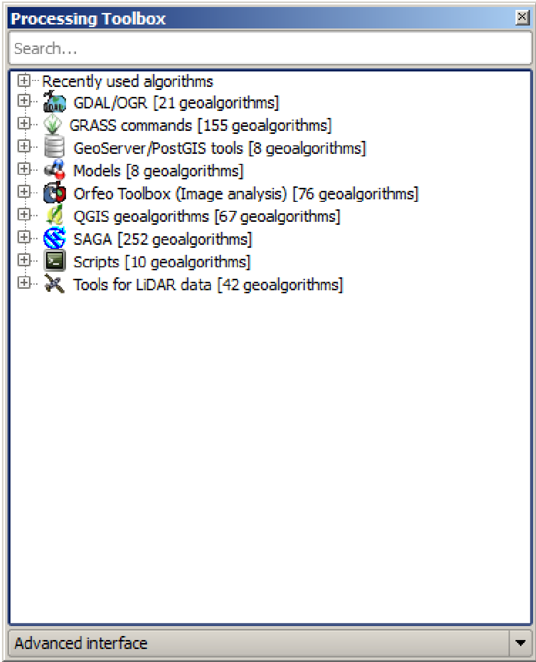

Figure 17.6: Processing Toolbox (advanced mode)

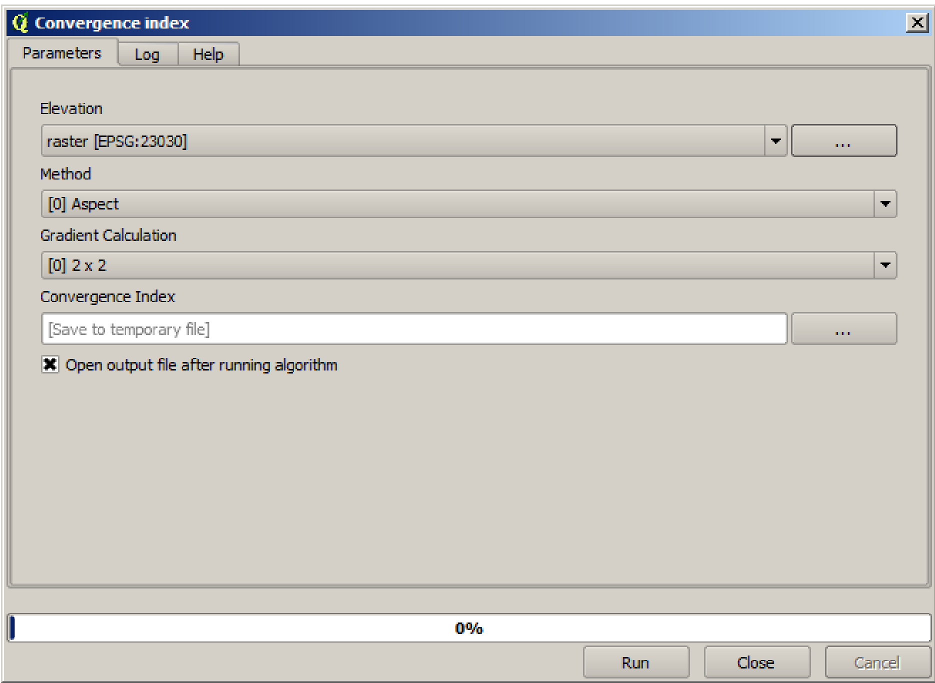

Figure 17.7: Parameters Dialog

This dialog is used to set the input values that the algorithm needs to be executed. It shows a table where input values and configuration parameters are to be set. It of course has a different content, depending on the requirements of the algorithm to be executed, and is created automatically based on those requirements. On the left side, the name of the parameter is shown. On the right side, the value of the parameter can be set.

パラメータの数とタイプは、アルゴリズムの特性に依存しますが、構造は、それらのすべてについても同様です。テーブルで検出されたパラメータは、次のいずれかのタイプのものとすることができます。

- A raster layer, to select from a list of all such layers available (currently opened) in QGIS. The selector contains as well a button on its right-hand side, to let you select filenames that represent layers currently not loaded in QGIS.
- A vector layer, to select from a list of all vector layers available in QGIS. Layers not loaded in QGIS can be selected as well, as in the case of raster layers, but only if the algorithm does not require a table field selected from the attributes table of the layer. In that case, only opened layers can be selected, since they need to be open so as to retrieve the list of field names available.

  以下の図のように各ベクタレイヤにボタンが表示されるでしょう.

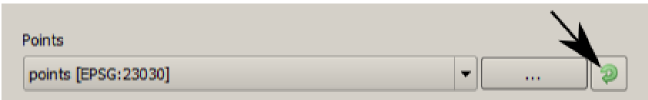

Figure 17.8: Vector iterator button

If the algorithm contains several of them, you will be able to toggle just one of them. If the button corresponding to a vector input is toggled, the algorithm will be executed iteratively on each one of its features, instead of just once for the whole layer, producing as many outputs as times the algorithm is executed. This allows for automating the process when all features in a layer have to be processed separately.

- A table, to select from a list of all available in QGIS. Non-spatial tables are loaded into QGIS like vector layers, and in fact they are treated as such by the program. Currently, the list of available tables that you will see when executing an algorithm that needs one of them is restricted to tables coming from files in dBase (`.dbf`) or Comma-Separated Values (`.csv`) formats.
- 利用可能なオプションのリストから選択するオプション.
- A numerical value, to be introduced in a text box. You will find a button by its side. Clicking on it, you will see a dialog that allows you to enter a mathematical expression, so you can use it as a handy calculator. Some useful variables related to data loaded into QGIS can be added to your expression, so you can select a value derived from any of these variables, such as the cell size of a layer or the northernmost coordinate of another one.

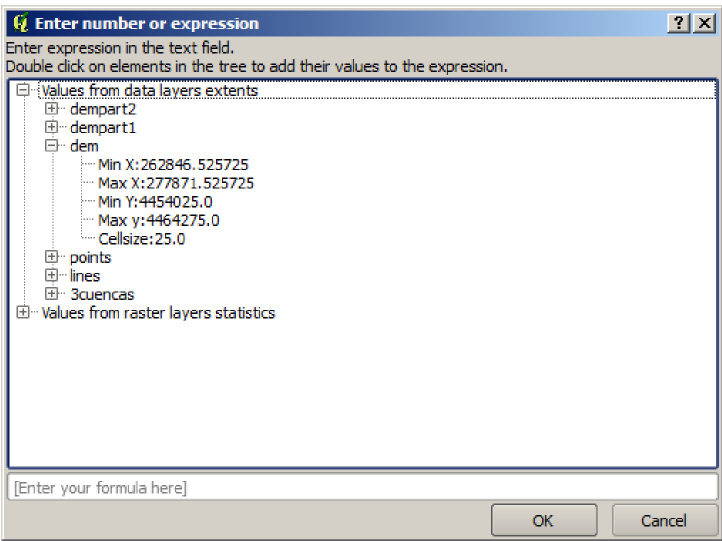

Figure 17.9: Number Selector

- レンジ, 2 個のテキストボックスで最小値と最大値で指定されます.
- テキストストリング, 1 個のテキストボックスで指定されます.
- フィールドは、ベクタレイヤまたは別のパラメータで選択された単一のテーブルの属性テーブルから選択します。
- A coordinate reference system. You can type the EPSG code directly in the text box, or select it from the CRS selection dialog that appears when you click on the button on the right-hand side.
- An extent, to be entered by four numbers representing its `xmin`, `xmax`, `ymin`, `ymax` limits. Clicking on the button on the right-hand side of the value selector, a pop-up menu will appear, giving you two options: to select the value from a layer or the current canvas extent, or to define it by dragging directly onto the map canvas.

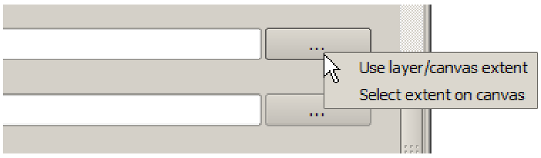

Figure 17.10: Extent selector

最初のオプションを選択すると次のようなウィンドウが表示されます.

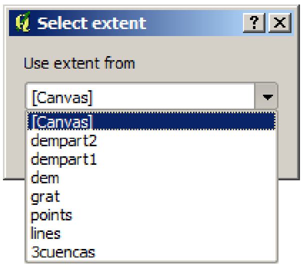

Figure 17.11: Extent List

2 番目の 1 つを選択した場合は、パラメータウィンドウはそれ自身を非表示にしますので、キャンバスにクリックしてドラッグすることができます。選択した矩形を定義すると、ダイアログが再表示され、エクステントのテキストボックス内の値を格納します。

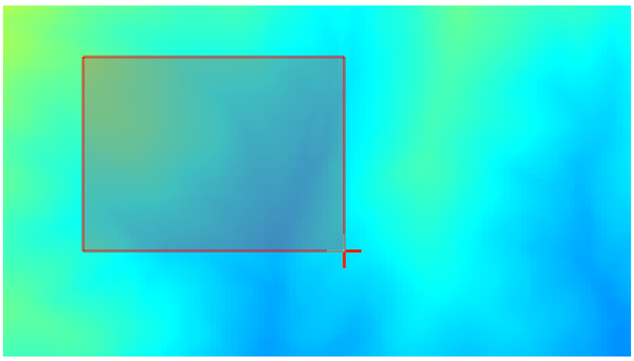

Figure 17.12: Extent Drag

- A list of elements (whether raster layers, vector layers or tables), to select from the list of such layers available in QGIS. To make the selection, click on the small button on the left side of the corresponding row to see a dialog like the following one.

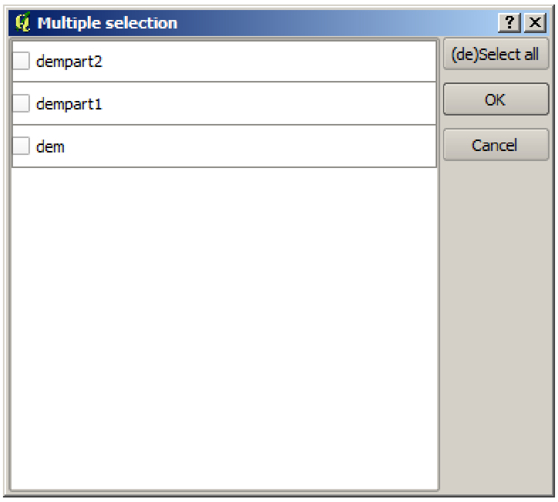

Figure 17.13: Multiple Selection

- 小さなテーブルは、ユーザによって編集されます。これらは、とりわけ、ルックアップテーブルまたはコンボリューションカーネルのようなパラメータを定義するために使用されます。

  右側にあるボタンをクリックするとテーブルを表示してその値を編集できます.

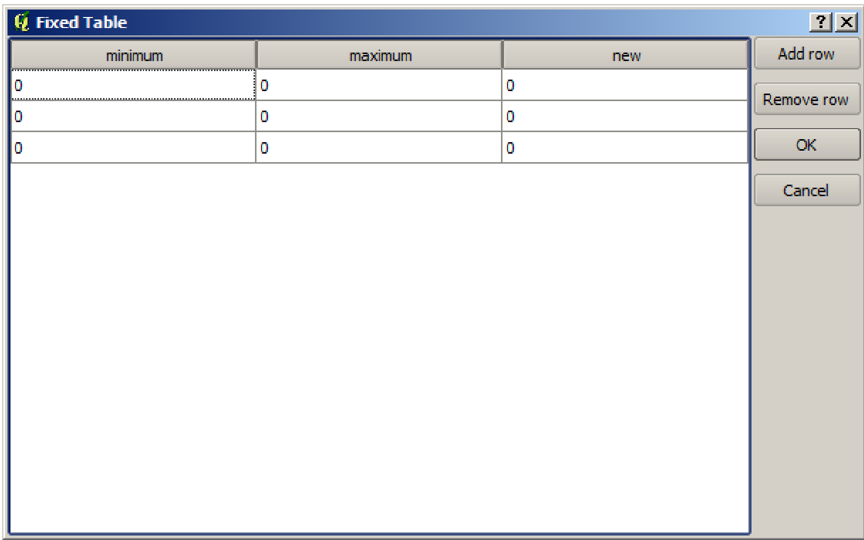

Figure 17.14: Fixed Table

アルゴリズムによっては、行数は、ウィンドウの右側にあるボタンを使用せずに変更できます。

You will find a **[Help]** tab in the the parameters dialog. If a help file is available, it will be shown, giving you more information about the algorithm and detailed descriptions of what each parameter does. Unfortunately, most algorithms lack good documentation, but if you feel like contributing to the project, this would be a good place to start.

投影法についての記述

Algorithms run from the processing framework — this is also true of most of the external applications whose algorithms are exposed through it. Do not perform any reprojection on input layers and assume that all of them are already in a common coordinate system and ready to be analized. Whenever you use more than one layer as input to an algorithm, whether vector or raster, it is up to you to make sure that they are all in the same coordinate system.

Note that, due to QGIS's on-the-fly reprojecting capabilities, although two layers might seem to overlap and match, that might not be true if their original coordinates are used without reprojecting them onto a common coordinate system. That reprojection should be done manually, and then the resulting files should be used as input to the algorithm. Also, note that the reprojection process can be performed with the algorithms that are available in the processing framework itself.

By default, the parameters dialog will show a description of the CRS of each layer along with its name, making it easy to select layers that share the same CRS to be used as input layers. If you do not want to see this additional information, you can disable this functionality in the processing configuration dialog, unchecking the *Show CRS* option.

CRS が異なる 2 つ以上の入力レイヤを使ってアルゴリズムの実行を試みる場合、警告ダイアログが表示されます。

まだアルゴリズムを実行するほとんどの場合、入力レイヤと重複しないため空のレイヤがせいされるような間違った結果を生成し、そのことに気づくことができます。

17.2.2 アルゴリズムによって生成されたデータオブジェクト

アルゴリズムによって生成されるデータオブジェクトは以下のタイプが利用できます:

- ラスタレイヤ
- ベクタレイヤ
- テーブル
- HTML ファイル (テキストとグラフィック出力の場合利用できます)

These are all saved to disk, and the parameters table will contain a text box corresponding to each one of these outputs, where you can type the output channel to use for saving it. An output channel contains the information needed to save the resulting object somewhere. In the most usual case, you will save it to a file, but the architecture allows for any other way of storing it. For instance, a vector layer can be stored in a database or even uploaded to a remote server using a WFS-T service. Although solutions like these are not yet implemented, the processing framework is prepared to handle them, and we expect to add new kinds of output channels in a near feature.

To select an output channel, just click on the button on the right side of the text box. That will open a save file dialog, where you can select the desired file path. Supported file extensions are shown in the file format selector of the dialog, depending on the kind of output and the algorithm.

The format of the output is defined by the filename extension. The supported formats depend on what is supported by the algorithm itself. To select a format, just select the corresponding file extension (or add it, if you are directly typing the file path instead). If the extension of the file path you entered does not match any of the supported formats, a default extension (usually `.dbf`' for tables, `.tif` for raster layers and `.shp` for vector layers) will be appended to the file path, and the file format corresponding to that extension will be used to save the layer or table.

If you do not enter any filename, the result will be saved as a temporary file in the corresponding default file format, and it will be deleted once you exit QGIS (take care with that, in case you save your project and it contains temporary layers).

You can set a default folder for output data objects. Go to the configuration dialog (you can open it from the *Processing* menu), and in the *General* group, you will find a parameter named *Output folder*. This output folder is used as the default path in case you type just a filename with no path (i.e., `myfile.shp`) when executing an algorithm.

When running an algorithm that uses a vector layer in iterative mode, the entered file path is used as the base path for all generated files, which are named using the base name and appending a number representing the index of the iteration. The file extension (and format) is used for all such generated files.

Apart from raster layers and tables, algorithms also generate graphics and text as HTML files. These results are shown at the end of the algorithm execution in a new dialog. This dialog will keep the results produced by any algorithm during the current session, and can be shown at any time by selecting *Processing* → *Results viewer* from the QGIS main menu.

Some external applications might have files (with no particular extension restrictions) as output, but they do not belong to any of the categories above. Those output files will not be processed by QGIS (opened or included into the current QGIS project), since most of the time they correspond to file formats or elements not supported by QGIS. This is, for instance, the case with LAS files used for LiDAR data. The files get created, but you won't see anything new in your QGIS working session.

他の出力タイプのすべてに対し、アルゴリズムによってか生成されると、ファイルをロードするかどうかをアルゴリズムに指示するために使用できるチェックボックスがあります。デフォルトでは、すべてのファイルが開かれます。

Optional outputs are not supported. That is, all outputs are created. However, you can uncheck the corresponding checkbox if you are not interested in a given output, which essentially makes it behave like an optional output (in other words, the layer is created anyway, but if you leave the text box empty, it will be saved to a temporary file and deleted once you exit QGIS).

17.2.3 プロセッシングフレームワークを構成する

As has been mentioned, the configuration menu gives access to a new dialog where you can configure how algorithms work. Configuration parameters are structured in separate blocks that you can select on the left-hand side of the dialog.

Along with the aforementioned *Output folder* entry, the *General* block contains parameters for setting the default rendering style for output layers (that is, layers generated by using algorithms from any of the framework GUI components). Just create the style you want using QGIS, save it to a file, and then enter the path to that file in the settings so the algorithms can use it. Whenever a layer is loaded by SEXTANTE and added to the QGIS canvas, it will be rendered with that style.

Rendering styles can be configured individually for each algorithm and each one of its outputs. Just right-click on the name of the algorithm in the toolbox and select *Edit rendering styles*. You will see a dialog like the one shown next.

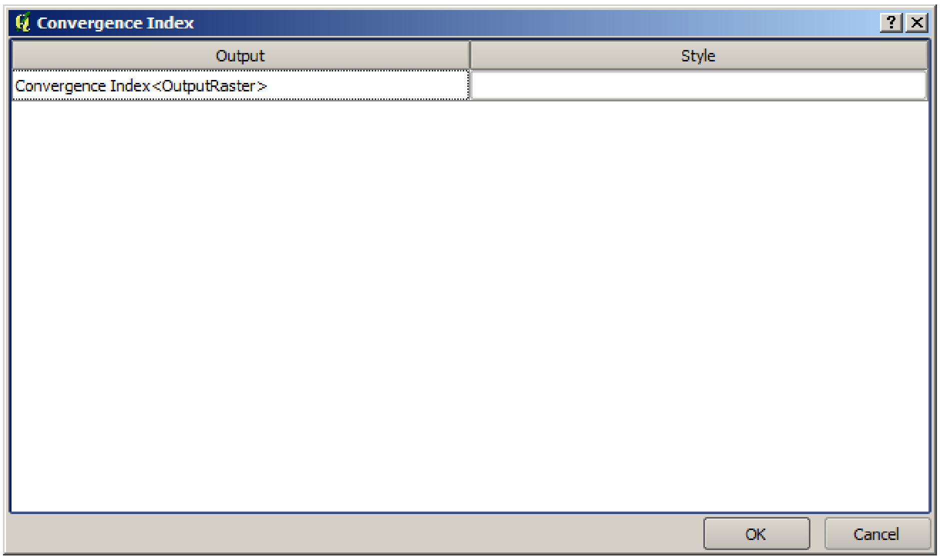

Figure 17.15: Rendering Styles

それぞれの出力に設定したいスタイルファイル (`.qml`) を選択して **[OK]** を押して下さい.

Other configuration parameters in the *General* group are listed below:

- *Use filename as layer name*. The name of each resulting layer created by an algorithm is defined by the algorithm itself. In some cases, a fixed name might be used, meaning that the same output name will be used, no matter which input layer is used. In other cases, the name might depend on the name of the input layer or some of the parameters used to run the algorithm. If this checkbox is checked, the name will be taken from the output filename instead. Notice that, if the output is saved to a temporary file, the filename of this temporary file is usually a long and meaningless one intended to avoid collision with other already existing filenames.

- *Use only selected features*. If this option is selected, whenever a vector layer is used as input for an algorithm, only its selected features will be used. If the layer has no selected features, all features will be used.
- *Pre-execution script file* and *Post-execution script file*. These parameters refer to scripts written using the processing scripting functionality, and are explained in the section covering scripting and the console.

Apart from the *General* block in the settings dialog, you will also find a block for algorithm providers. Each entry in this block contains an *Activate* item that you can use to make algorithms appear or not in the toolbox. Also, some algorithm providers have their own configuration items, which we will explain later when covering particular algorithm providers.

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17.3 グラフィカルモデラー

The *graphical modeler* allows you to create complex models using a simple and easy-to-use interface. When working with a GIS, most analysis operations are not isolated, but rather part of a chain of operations instead. Using the graphical modeler, that chain of processes can be wrapped into a single process, so it is as easy and convenient to execute as a single process later on a different set of inputs. No matter how many steps and different algorithms it involves, a model is executed as a single algorithm, thus saving time and effort, especially for larger models.

プロセッシングメニューからモデラーは開けます.

モデラーにはモデルの構造とワークフローを表現するワーキングキャンバスがあります. ウィンドウの左のパートには２つのタブを持つパネルがありモデルに新しいエレメントを加えるために使われます.

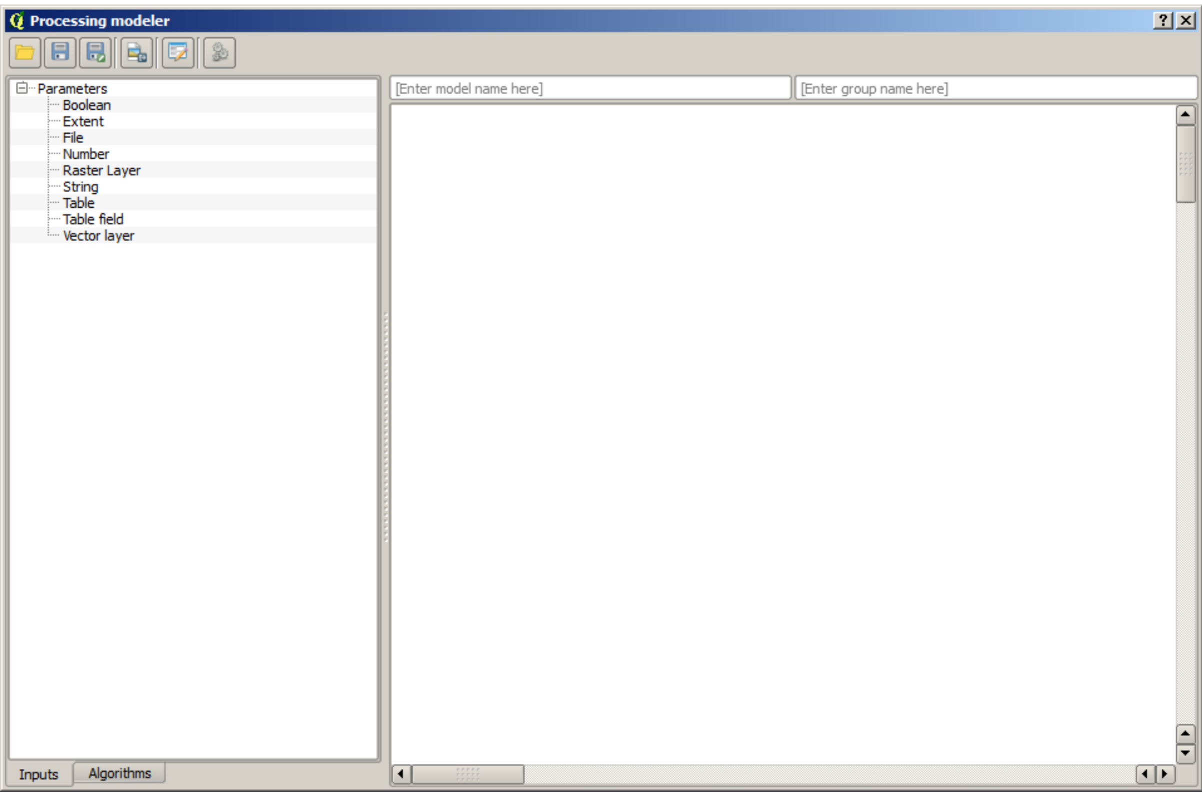

Figure 17.16: Modeler

モデルの作成には２つのステップが含まれます:

1. **必須入力項目の定義**. これらの入力はパラメータウィンドウに追加されます, ですからユーザはモデルの実行時にそれらの値を入力できます. モデル自身はアルゴリズムですからパラメータウィンドウはプロセッシングフレームワークの全てのアルゴリズムで入力が必要になった時に自動的に生成されます.
2. **ワークフローの定義**. モデルの入力データを使ってアルゴリズムの追加と入力をどう使いすでにモデルにあるアルゴリズムを使って出力をどう作るかを指定したりすることでワークフロウを定義します

17.3.1 入力の定義

モデル作成の最初の一歩は必要な入力を定義することです. モデラーウィンドウの左にある *Inputs* タブには以下のエレメントがあります:

- ラスタレイヤ
- ベクタレイヤ
- 文字列
- テーブルフィールド
- テーブル
- 領域
- 数値
- 真偽値
- ファイル

Double-clicking on any of these elements, a dialog is shown to define its characteristics. Depending on the parameter itself, the dialog may contain just one basic element (the description, which is what the user will see when executing the model) or more of them. For instance, when adding a numerical value, as can be seen in the next figure, apart from the description of the parameter, you have to set a default value and a range of valid values.

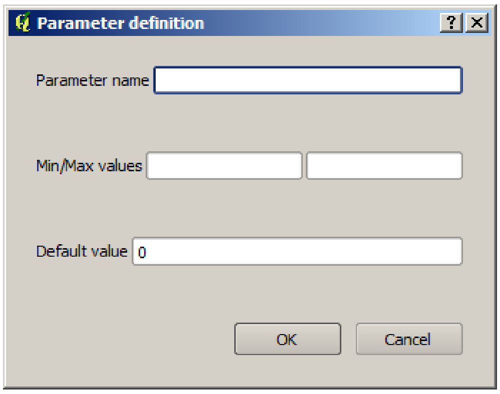

Figure 17.17: Model Parameters

それぞれの入力が追加されるとモデラーキャンバスに新しいエレメントが追加されます.

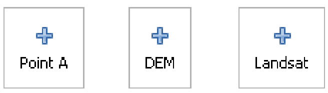

Figure 17.18: Model Parameters

You can also add inputs by dragging the input type from the list and dropping it in the modeler canvas, in the position where you want to place it.

17.3.2 ワークフロウの定義

入力の定義が行われた後にそれらに適用するアルゴリズムの定義を行います．アルゴリズムは *Algorithms* タブで見つけることができツールボックスと同じようにグループ分けされています．

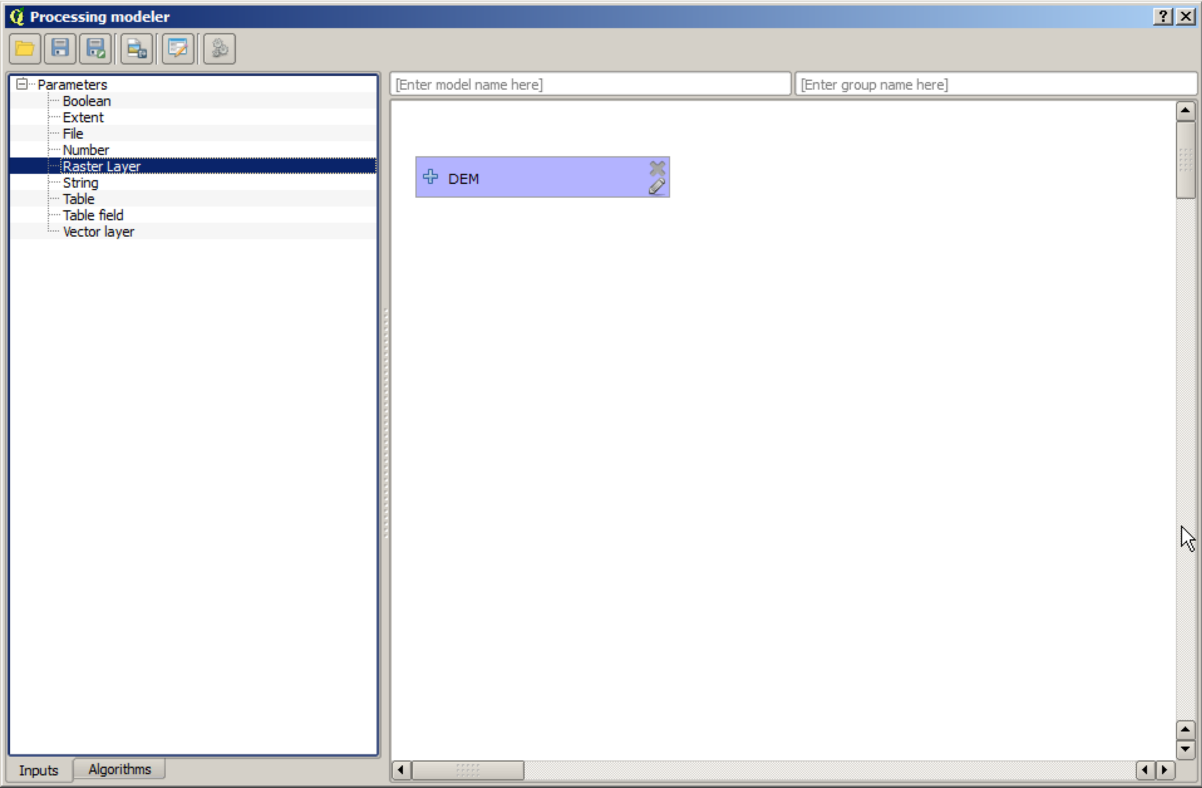

Figure 17.19: Model Parameters

The appearance of the toolbox has two modes here as well: simplified and advanced. However, there is no element to switch between views in the modeler, so you have to do it in the toolbox. The mode that is selected in the toolbox is the one that will be used for the list of algorithms in the modeler.

To add an algorithm to a model, double-click on its name or drag and drop it, just like it was done when adding inputs. An execution dialog will appear, with a content similar to the one found in the execution panel that is shown when executing the algorithm from the toolbox. The one shown next corresponds to the SAGA 'Convergence index' algorithm, the same example we saw in the section dedicated to the toolbox.

As you can see, some differences exist. Instead of the file output box that was used to set the file path for output layers and tables, a simple text box is used here. If the layer generated by the algorithm is just a temporary result that will be used as the input of another algorithm and should not be kept as a final result, just do not edit that text box. Typing anything in it means that the result is final and the text that you supply will be the description for the output, which will be the output the user will see when executing the model.

Selecting the value of each parameter is also a bit different, since there are important differences between the context of the modeler and that of the toolbox. Let's see how to introduce the values for each type of parameter.

- Layers (raster and vector) and tables. These are selected from a list, but in this case, the possible values are not the layers or tables currently loaded in QGIS, but the list of model inputs of the corresponding type, or other layers or tables generated by algorithms already added to the model.
- Numerical values. Literal values can be introduced directly in the text box. But this text box is also a list that can be used to select any of the numerical value inputs of the model. In this case, the parameter will take the value introduced by the user when executing the model.
- String. As in the case of numerical values, literal strings can be typed, or an input string can be selected.

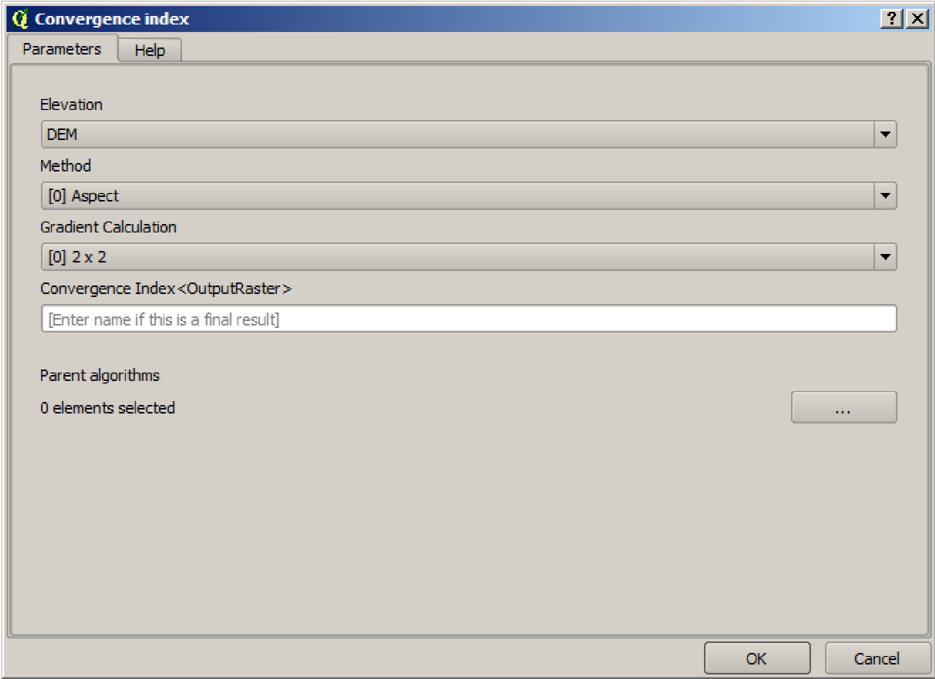

Figure 17.20: Model Parameters

- Table field. The fields of the parent table or layer cannot be known at design time, since they depend on the selection of the user each time the model is executed. To set the value for this parameter, type the name of a field directly in the text box, or use the list to select a table field input already added to the model. The validity of the selected field will be checked at run time.

In all cases, you will find an additional parameter named *Parent algorithms* that is not available when calling the algorithm from the toolbox. This parameter allows you to define the order in which algorithms are executed by explicitly defining one algorithm as a parent of the current one, which will force the parent algorithm to be executed before the current one.

When you use the output of a previous algorithm as the input of your algorithm, that implicitly sets the previous algorithm as parent of the current one (and places the corresponding arrow in the modeler canvas). However, in some cases an algorithm might depend on another one even if it does not use any output object from it (for instance, an algorithm that executes an SQL sentence on a PostGIS database and another one that imports a layer into that same database). In that case, just select the previous algorithm in the *Parent algorithms* parameter and the two steps will be executed in the correct order.

Once all the parameters have been assigned valid values, click on **[OK]** and the algorithm will be added to the canvas. It will be linked to all the other elements in the canvas, whether algorithms or inputs, that provide objects that are used as inputs for that algorithm.

Elements can be dragged to a different position within the canvas, to change the way the module structure is displayed and make it more clear and intuitive. Links between elements are updated automatically. You can zoom in and out by using the mouse wheel.

You can run your algorithm anytime by clicking on the **[Run]** button. However, in order to use the algorithm from the toolbox, it has to be saved and the modeler dialog closed, to allow the toolbox to refresh its contents.

17.3.3 モデルの保存とロード

Use the **[Save]** button to save the current model and the **[Open]** button to open any model previously saved. Models are saved with the `.model` extension. If the model has been previously saved from the modeler window, you will not be prompted for a filename. Since there is already a file associated with that model, the same file will be used for any subsequent saves.

モデルの保存を行う前にウィンドウの上部にあるテキストボックスを使って名前とグループを入力しなければいけません.

Models saved on the `models` folder (the default folder when you are prompted for a filename to save the model) will appear in the toolbox in the corresponding branch. When the toolbox is invoked, it searches the `models` folder for files with the `.model` extension and loads the models they contain. Since a model is itself an algorithm, it can be added to the toolbox just like any other algorithm.

The models folder can be set from the processing configuration dialog, under the *Modeler* group.

モデルは `models` フォルダーからロードされツールボックスだけではなく モデラーウィンドウの *Algorithms* タブのアルゴリズムツリーにも表示されます. これは他の任意のモデルを追加するのと同じようにモデルを大きなモデルの一部として取り込むことが可能であることを意味します.

In some cases, a model might not be loaded because not all the algorithms included in its workflow are available. If you have used a given algorithm as part of your model, it should be available (that is, it should appear in the toolbox) in order to load that model. Deactivating an algorithm provider in the processing configuration window renders all the algorithms in that provider unusable by the modeler, which might cause problems when loading models. Keep that in mind when you have trouble loading or executing models.

17.3.4 モデルの編集

作成中のモデルは編集できます, ワークフローやアルゴリズム間のリレーションシップの再定義がや入力の再定義をモデル内で行えます.

キャンバスに表示しているモデルのアルゴリズムをマウス右ボタンでクリックすると次のようなコンテキストメニューが表示されます:

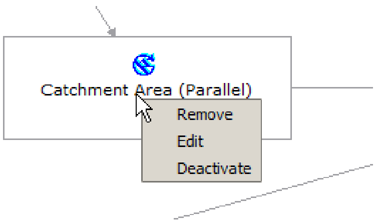

Figure 17.21: Modeler Right Click

Selecting the *Remove* option will cause the selected algorithm to be removed. An algorithm can be removed only if there are no other algorithms depending on it. That is, if no output from the algorithm is used in a different one as input. If you try to remove an algorithm that has others depending on it, a warning message like the one you can see below will be shown:

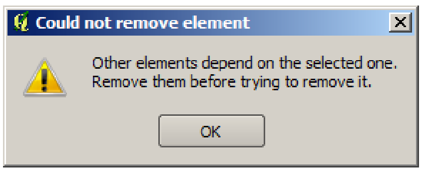

Figure 17.22: Cannot Delete Algorithm

Selecting the *Edit* option or simply double-clicking on the algorithm icon will show the parameters dialog of the algorithm, so you can change the inputs and parameter values. Not all input elements available in the model will appear in this case as available inputs. Layers or values generated at a more advanced step in the workflow defined by the model will not be available if they cause circular dependencies.

Select the new values and then click on the **[OK]** button as usual. The connections between the model elements will change accordingly in the modeler canvas.

17.3.5 モデルヘルプファイルとメタ情報の編集

あなたは、モデラー自体から、あなたのモデルを文書化することができます。** ［Edit model help］**ボタンをクリックするだけで、そして、次に示すようなダイアログが表示されます。

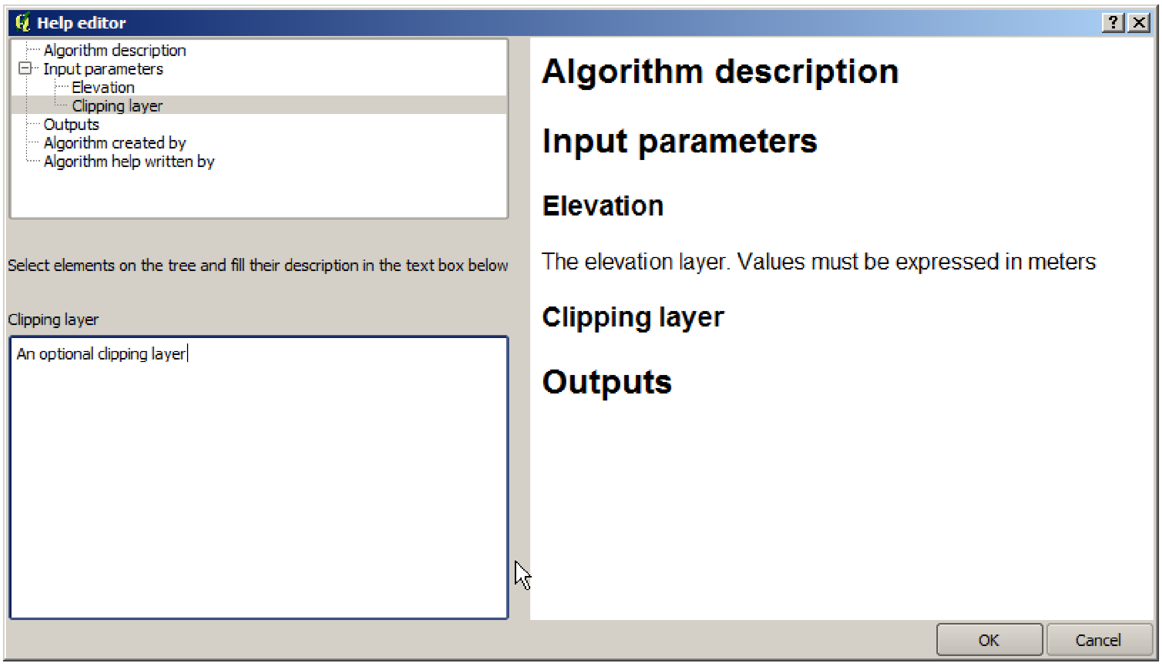

Figure 17.23: Help Edition

On the right-hand side, you will see a simple HTML page, created using the description of the input parameters and outputs of the algorithm, along with some additional items like a general description of the model or its author. The first time you open the help editor, all these descriptions are empty, but you can edit them using the elements on the left-hand side of the dialog. Select an element on the upper part and then write its description in the text box below.

Model help is saved in a file in the same folder as the model itself. You do not have to worry about saving it, since it is done automatically.

17.3.6 利用可能なアルゴリズムについて

You might notice that some algorithms that can be be executed from the toolbox do not appear in the list of available algorithms when you are designing a model. To be included in a model, an algorithm must have a correct semantic, so as to be properly linked to others in the workflow. If an algorithm does not have such a well-defined semantic (for instance, if the number of output layers cannot be known in advance), then it is not possible to use it within a model, and thus, it does not appear in the list of algorithms that you can find in the modeler dialog.

Additionally, you will see some algorithms in the modeler that are not found in the toolbox. These algorithms are meant to be used exclusively as part of a model, and they are of no interest in a different context. The 'Calculator' algorithm is an example of that. It is just a simple arithmetic calculator that you can use to modify numerical values (entered by the user or generated by some other algorithm). This tool is really useful within a model, but outside of that context, it doesn't make too much sense.

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17.4 バッチプロセシングインタフェース

17.4.1 はじめに

すべてのアルゴリズム (モデルを含む) はバッチプロセスとして実行することができます. すなわち, それらは単一の入力のセットではなく, それらのいくつかを使用して実行でき, 必要に応じて何度でもアルゴリズムを実行できます. 大量のデータを処理する際には, ツールボックスからアルゴリズムを何回も起動する必要がないので, これは有用です.

アルゴリズムをバッチプロセスとして実行する場合ツールボックスの名前を右ボタンクリックして表示されるポップアップメニューで *Execute as batch process* を選択して下さい

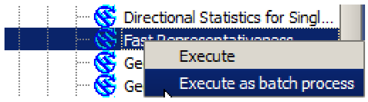

Figure 17.24: Batch Processing Right Click

17.4.2 パラメータテーブル

バッチプロセスの実行は、アルゴリズムの単純な実行と類似しています。パラメータ値を定義しなければばならないが、この場合は、各パラメータに単一の値を設定する必要はありません。値は次に示すようなテーブルを使って紹介しています。

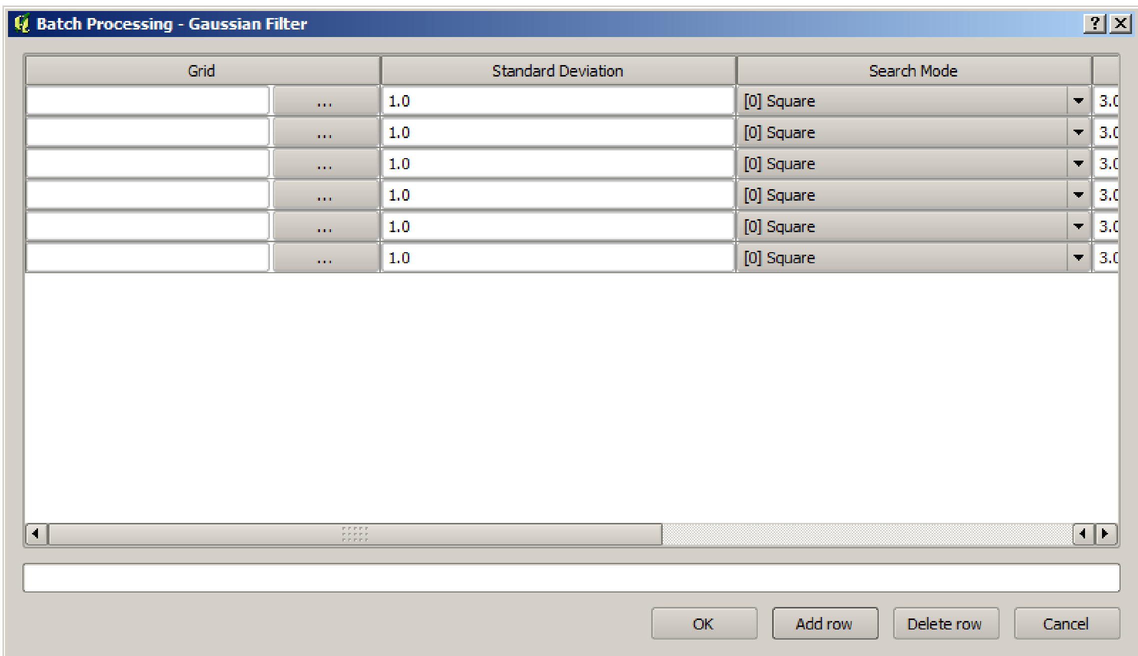

Figure 17.25: Batch Processing

このテーブルの各行はアルゴリズム単一の実行を表し、各セルはパラメータの１つを含みます。これはツールボックスからアルゴリズムを実行する際に表示されるパラメータダイアログと類似しており、配列が異なっています。

デフォルトではテーブルｈは２行のみ含んでいます。ウィンドウの下部にあるボタンを使って、行の追加や削除ができます。

テーブルのサイズが設定されると適切な値で埋められます.

17.4.3 パラメータテーブルの入力

たいていのパラメータで, その値を設定するのは些細なことです. 値を直接入力するか, パラメータタイプに応じて, 利用可能なオプションのリストから選択するだけです.

The main differences are found for parameters representing layers or tables, and for output file paths. Regarding input layers and tables, when an algorithm is executed as part of a batch process, those input data objects are taken directly from files, and not from the set of them already opened in QGIS. For this reason, any algorithm can be executed as a batch process, even if no data objects at all are opened and the algorithm cannot be run from the toolbox.

Filenames for input data objects are introduced directly typing or, more conveniently, clicking on the ... button on the right hand of the cell, which shows a typical file chooser dialog. Multiple files can be selected at once. If the input parameter represents a single data object and several files are selected, each one of them will be put in a separate row, adding new ones if needed. If the parameter represents a multiple input, all the selected files will be added to a single cell, separated by semicolons (`;`).

Output data objects are always saved to a file and, unlike when executing an algorithm from the toolbox, saving to a temporary file is not permitted. You can type the name directly or use the file chooser dialog that appears when clicking on the accompanying button.

いったんファイルを選択すると、新しいダイアログが同じ列 (同じパラメータ) 内の他のセルの自動補完を行うために表示されます。

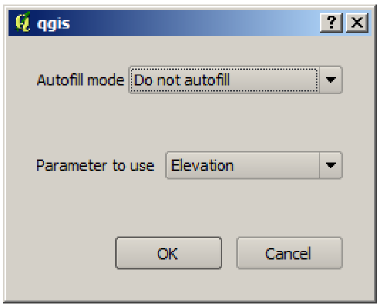

Figure 17.26: バッチプロセッシング保存

もしデフォルトの値 (‘自動補完しない’) が選ばれた場合は、パラメータテーブルから選択されたセルの中の選択されたファイル名が選ばれます。もし、その他のオプションが選ばれた場合は、以下の選択された全てのセルは定義された条件に基づいて自動的に入力されます。この方法は、テーブルを埋めるよりはるかに簡単で、バッチプロセスは最小の労力によって定義することが出来ます。

自動入力は、単に選択したファイルパスに相関的な番号を追加するか、同じ行で別のフィールドの値を追加して行うことができます。これは、入力されたものに応じて出力データオブジェクトを命名するのに特に役立ちます。

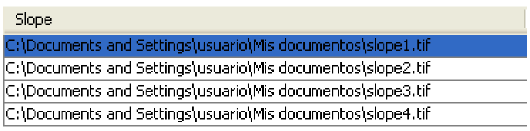

Figure 17.27: Batch Processing File Path

17.4.4 バッチプロセスの実行

いったん必要な値を導入しバッチプロセスを実行するためには **[OK]**をクリックするだけです。バッチタスク全体の進捗はダイアログの下部にあるプログレスバーで表示されます。

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17.5 処理アルゴリズムをコンソールから使う

処理フレームワークの他の GUI エレメントを使用しては実現できない上級ユーザ向けの生産性向上を可能にします。複数のアルゴリズムを含むモデルは、コマンドラインインタフェースを使って定義できます。また、ループや条件分岐のような付加的な演算子を追加して、より柔軟でパワフルなワークフローを作成することができます。

There is not a proccesing console in QGIS, but all processing commands are available instead from the QGIS built-in Python console. That means that you can incorporate those commands into your console work and connect processing algorithms to all the other features (including methods from the QGIS API) available from there.

Python コンソールから実行できるコードは、たとえいかなる処理メソッドを使っていない場合でも、ちょうど他のアルゴリズムでそうするように、ツールボックス、グラフィカルなモデラー、あるいはいかなる他のコンポーネントからでも呼び出すことができます。実際、ツールボックス内で見られるアルゴリズムの中にはシンプルなスクリプトもあります。

In this section, we will see how to use processing algorithms from the QGIS Python console, and also how to write algorithms using Python.

17.5.1 Python コンソールからの呼び出しアルゴリズム

最初にやるべきことは、次行で処理ファンクションをインポートすることです:

```
>>> import processing
```

今や、コンソールからこれを使ってできるのは基本的にひとつの (興味深い) ことだけ: つまりアルゴリズムの実行です。`runalg()` メソッドを使いますが、これはその第一パラメータとしてアルゴリズムの名前を使って、次にアルゴリズムの要件に応じた付加的なパラメータの可変な数値、を使って実行されます。このため、最初に知っておくべきことは、実行するアルゴリズムの名前です。ツールボックスで見える名前ではなく、むしろユニークなコマンドラインの名前です。自分のアルゴリズム用に正しい名前を探す場合は、`algslist()` メソッドを使うことができます。コンソールで次の行をタイプしてください:

```
>>> processing.alglist()
```

このようなものを目にするでしょう。

```
Accumulated Cost (Anisotropic)---------------->saga:accumulatedcost(anisotropic)
Accumulated Cost (Isotropic)------------------>saga:accumulatedcost(isotropic)
Add Coordinates to points--------------------->saga:addcoordinatestopoints
Add Grid Values to Points--------------------->saga:addgridvaluestopoints
Add Grid Values to Shapes--------------------->saga:addgridvaluestoshapes
Add Polygon Attributes to Points-------------->saga:addpolygonattributestopoints
Aggregate------------------------------------->saga:aggregate
Aggregate Point Observations------------------>saga:aggregatepointobservations
Aggregation Index----------------------------->saga:aggregationindex
Analytical Hierarchy Process------------------>saga:analyticalhierarchyprocess
Analytical Hillshading------------------------>saga:analyticalhillshading
Average With Mask 1--------------------------->saga:averagewithmask1
Average With Mask 2--------------------------->saga:averagewithmask2
Average With Thereshold 1--------------------->saga:averagewiththereshold1
Average With Thereshold 2--------------------->saga:averagewiththereshold2
Average With Thereshold 3--------------------->saga:averagewiththereshold3
B-Spline Approximation------------------------>saga:b-splineapproximation
...
```

これが、アルファベット順の、対応するコマンドライン名に沿った、利用可能な全アルゴリズムの一覧です。

このメソッドでは、パラメータとして文字列を使えます。アルゴリズムの全文を返却する代わりに、その文字列を含むものだけを表示します。もし、例えば、DEM からスロープを計算するアルゴリズムを探している場合、`alglist("slope")` とタイプすると次のような結果が得られます:

```
DTM Filter (slope-based)----------------------->saga:dtmfilter(slope-based)
Downslope Distance Gradient------------------->saga:downslopedistancegradient
Relative Heights and Slope Positions---------->saga:relativeheightsandslopepositions
Slope Length---------------------------------->saga:slopelength
Slope, Aspect, Curvature---------------------->saga:slopeaspectcurvature
Upslope Area---------------------------------->saga:upslopearea
Vegetation Index[slope based]----------------->saga:vegetationindex[slopebased]
```

この結果は、あなたが利用可能なアルゴリズムによって変わります。

これであなたが探しているアルゴリズムは探しやすくなったはずです。コマンドライン名はこの場合 ‘‘saga:slopeaspectcurvature‘‘です。

いったんアルゴリズムのコマンドライン名が分かれば、次にやるのはそれを実行する構文を知ることです。それはすなわち、必要なパラメータと `runalg()` メソッドを呼び出す際に引き渡す順序を知ることです。アルゴリズムを詳細に説明するメソッドがあり、アルゴリズムが必要とするパラメータと、生成されるアウトプットの一覧を取得することができます。その目的のために、`alghelp(name_of_the_algorithm)` メソッドを使うことができます。説明用の長い名前ではなく、コマンドライン名を使用してください。

`saga:slopeaspectcurvature` をパラメータとしてこのメソッドを呼び出すと, 次の説明が得られるでしょう.

```
>>> processing.alghelp("saga:slopeaspectcurvature")
ALGORITHM: Slope, Aspect, Curvature
   ELEVATION <ParameterRaster>
   METHOD <ParameterSelection>
   SLOPE <OutputRaster>
   ASPECT <OutputRaster>
   CURV <OutputRaster>
   HCURV <OutputRaster>
   VCURV <OutputRaster>
```

これであらゆるアルゴリズムを実行する準備ができました。すでに述べたとおり、アルゴリズムを実行するのは単一のコマンド: ‘‘runalg()‘‘だけです。その構文は以下の通りです:

```
>>> processing.runalg(name_of_the_algorithm, param1, param2, ..., paramN,
         Output1, Output2, ..., OutputN)
```

追加すべきパラメータとアウトプットの一覧は実行したいアルゴリズムによって異なり、まさに ‘‘alghelp()‘‘メソッドから受け取った通りで、順番も表示された通りです。

パラメータの種別により, 値は様々に説明されます. 次は各種別の入力パラメータ値の説明方法についてのクイックレビューです:

- Raster Layer, Vector Layer or Table. Simply use a string with the name that identifies the data object to use (the name it has in the QGIS Table of Contents) or a filename (if the corresponding layer is not opened, it will be opened but not added to the map canvas). If you have an instance of a QGIS object representing the layer, you can also pass it as parameter. If the input is optional and you do not want to use any data object, use `None`.
- 選択。アルゴリズムに選択パラメータがある場合、そのパラメータの値は整数値で入力すべきです。利用可能なオプションを調べるには、 `algoptions()` コマンドを使って、次の例のように表示させることができます:

  ```
  >>> processing.algoptions("saga:slopeaspectcurvature")
  METHOD(Method)
      0 - [0] Maximum Slope (Travis et al. 1975)
      1 - [1] Maximum Triangle Slope (Tarboton 1997)
      2 - [2] Least Squares Fitted Plane (Horn 1981, Costa-Cabral & Burgess 1996)
      3 - [3] Fit 2.Degree Polynom (Bauer, Rohdenburg, Bork 1985)
      4 - [4] Fit 2.Degree Polynom (Heerdegen & Beran 1982)
      5 - [5] Fit 2.Degree Polynom (Zevenbergen & Thorne 1987)
      6 - [6] Fit 3.Degree Polynom (Haralick 1983)
  ```

この場合, アルゴリズムには、そのようなパラメータのひとつが,7 つのオプション付きであります. 順序はゼロから始まることに注意してください.

- 複数のインプット. 値はセミコロン (`;`) で区切られたインプット記述子付きの文字列です. 単一のレイヤやテーブルの場合と同様, 各インプット記述子にはデータオブジェクト名やファイルパスが使えます.
- XXX のテーブル項目名。項目名の文字列を利用して使ってください。このパラメータは大文字小文字を区別します。
- 固定テーブル. カンマ (`,`) で区切られ, 引用符 (`"`) で閉じられた全てのテーブル値の一覧をタイプします. 値は上部の列から始まり, 左から右に進みます. テーブルを表す 2 次元の配列も使えます.
- CRS. 必要な CRS の EPSG コード番号を入力。
- 拡張。カンマ (`,`) 区切りの `xmin`, `xmax`, `ymin` および ‘‘ymax‘‘ 付きの文字列を使わなければなりません。

ブーリアン、ファイル、文字列および数値のパラメータには、追加説明は不要です。

文字列, ブーリアン, 数値といった入力パラメータにはデフォルト値があります. それを使う場合は, 対応するパラメータエントリーに ‘‘None‘‘ を使ってください.

アウトプットデータオブジェクト用には, ツールボックスでそうするように, 保存時は使用するファイルパスをタイプしてください. 結果を一時ファイルに保存したい場合は,‘‘None‘‘を使用してください. ファイルの拡張子でファイル形式が決まります. アルゴリズムがサポートしていない拡張子を入力した場合は, その出力種別用のデフォルトのファイル形式が使用され, 与えられたファイルパスに対応する拡張子が追加されます.

Unlike when an algorithm is executed from the toolbox, outputs are not added to the map canvas if you execute that same algorithm from the Python console. If you want to add an output to the map canvas, you have to do it yourself after running the algorithm. To do so, you can use QGIS API commands, or, even easier, use one of the handy methods provided for such tasks.

`runalg` メソッドは出力名 (アルゴリズムの説明に書かれているもの) 付きの辞書をキーとして、出力のファイルパスを値として返します。そのファイルパスを ‘‘load()‘‘ メソッドに渡すことでこれらのレイヤをロードすることができます.

17.5.2 データ操作用の付加的なファンクション

Apart from the functions used to call algorithms, importing the `processing` package will also import some additional functions that make it easier to work with data, particularly vector data. They are just convenience functions that wrap some functionality from the QGIS API, usually with a less complex syntax. These functions should be used when developing new algorithms, as they make it easier to operate with input data.

Below is a list of some of these commands. More information can be found in the classes under the `processing/tools` package, and also in the example scripts provided with QGIS.

- `getObject(obj)`: Returns a QGIS object (a layer or table) from the passed object, which can be a filename or the name of the object in the QGIS Table of Contents.
- `values(layer, fields)`: 渡された項目に, ベクターレイヤの属性テーブル内の値を返します. 項目は項目名またはゼロから始まる項目インデックスで渡すことができます. 渡された項目の識別子をキーとして, 一覧の辞書を返します。既存の選択を考慮します.
- `features(layer)`: ベクターレイヤにかかる反復子を既存の選択を考慮して返します。
- `uniqueValues(layer, field)`: 保有している属性のユニークな値の一覧を返却します。属性は項目名またはゼロから始まる項目のインデックスとして渡すことができます. 既存の選択を考慮します.

17.5.3 スクリプトの作成とツールボックスからの実行

対応する Python のコードを書いたり, アルゴリズムのセマンティクスを定義するのに必要な付加情報をいくつか追加することで, 自分自身のアルゴリズムを作成することができます. ツールボックスの *Script* アル

ゴリズムブロック内の *Tools* グループの下にある *Create new script* メニューが見つかると思います. それをダブルクリックしてスクリプト編集ダイアログを開いて下さい. これがコードを打ち込む場所です. ここで入力したスクリプトを `scripts` フォルダ (ファイル保存ダイアログを開くときのデフォルトのひとつ) に `.py` という拡張子で保存すると, それに対応するアルゴリズムが自動的に作られます.

アルゴリズムの名前 (ツールボックスで見えるもの) はファイル名から、拡張子を除き、アンダースコアを空白に置き換えて作成されます。

次のコードを取り上げましょう。これは地表流水指標 (TWI) を DEM から直接計算します

```
##dem=raster
##twi=output
ret_slope = processing.runalg("saga:slopeaspectcurvature", dem, 0, None,
                None, None, None, None)
ret_area = processing.runalg("saga:catchmentarea(mass-fluxmethod)", dem,
                0, False, False, False, False, None, None, None, None, None)
processing.runalg("saga:topographicwetnessindex(twi), ret_slope['SLOPE'],
                ret_area['AREA'], None, 1, 0, twi)
```

見て頂いたとおり, これは 3 つのアルゴリズムを含んでおり, それらは全て SAGA から来ています. 最後のものは TWI を計算しますが, 斜面のレイヤと流量蓄積のレイヤが必要です. これらのものはありませんが,DEM があるので, 対応する SAGA アルゴリズムを呼び出して計算することができるのです.

この処理が行われるコードの部分は本章の前節を読んでいれば理解は難しくありません。しかしながら、最初の行にはもう少し説明が必要です。ツールボックスやグラフィカルモデラーのように、あらゆる GUI コンポーネントから実行できるようなアルゴリズムへとあなたのコードを変えるのに必要な情報が提供されています。

これらの行はダブル Python コメントシンボル (`##`) で始まり、次のような構造を持っています

```
[parameter_name]=[parameter_type] [optional_values]
```

これは, 処理スクリプト中でサポートされる全パラメータ種別の一覧, 文法, そしていくつかの例です.

- `raster`. A ラスターレイヤ
- `vector`. A ベクターレイヤ
- `table`. A テーブル
- `number`.A 数値.A デフォルト値が必要です. たとえば、`depth=number 2.4`
- `string`。テキスト文字列。数値と同様、デフォルト値が必須です。例、 `name=string Victor`
- `boolean`。ブーリアン値。その後に ``True`` または `False` を追加してデフォルト値をセットします。例えば、 `verbose=boolean True`
- `multiple raster`。入力ラスターレイヤのセット。
- `multiple vector`。入力ベクターレイヤのセット。
- `field`。ベクターレイヤの属性テーブル内の項目。レイヤ名を ``field`` タグの後に追加しなければなりません。例えば、ベクター入力を ``mylayer=vector``で宣言した場合、`myfield=field mylayer` を使ってパラメータとしてそのレイヤから項目を追加することができます。
- `folder`. あるフォルダ.
- `file`. あるファイル名.

パラメータ名はアルゴリズム実行時にユーザに表示される名前であり、同時にスクリプトコード内で使う変数名でもあります。このパラメータに対してユーザが入力した値は、この名前の変数に割り当てられます。

ユーザにパラメータ名を表示する場合、名前は見栄えを改善するために、アンダースコアを空白に置き換えて、編集されます。このため、例えば、ユーザに ``A numerical value``という名前のパラメータを見せたければ、``A_numerical_value``という変数名を使うことができます。

Layers and table values are strings containing the file path of the corresponding object. To turn them into a QGIS object, you can use the `processing.getObjectFromUri()` function. Multiple inputs also have a string value, which contains the file paths to all selected object, separated by semicolons (`;`).

出力は同様のやり方で定義されます。次のタグを使います:

- `output raster`
- `output vector`
- `output table`
- `output html`
- `output file`
- `output number`
- `output string`

出力変数に割り当てられた値は常にファイルパス付きの文字列です。ユーザが出力ファイル名を入力していない場合の一時ファイルパスに対応します。

When you declare an output, the algorithm will try to add it to QGIS once it is finished. That is why, although the `runalg()` method does not load the layers it produces, the final TWI layer will be loaded (using the case of our previous example), since it is saved to the file entered by the user, which is the value of the corresponding output.

`load()` メソッドは自分のアルゴリズム内ではなく、コンソール行での作業中に使ってください。レイヤがアルゴリズムの出力として作成されている場合は、そのように宣言すべきです。さもないと、モデラー内のアルゴリズムを正しく使えないことになります。なぜならその文法 (上述のタグで定義されているとおり) はアルゴリズムが実際に作成するものと一致しないからです。

非表示の出力 (数値及び文字列) は値を持ちません。代わりに、それらに値を割り当てるのはあなたです。そうするためには、その出力の定義で使用した名前付きの変数の値をセットします。例えば、この宣言を使っている場合、

```
##average=output number
```

次の行は出力の値を 5 にセットします:

```
average = 5
```

パラメータと出力向けのタグに加えて、‘‘group‘‘タグを使えばその下にアルゴリズムが表示されるグループを定義することができます。

あなたのアルゴリズムが、処理に時間が掛かる場合、ユーザに知らせるのは良いアイデアです。`progress`‘‘という名前の `global` を使って 2 つのメソッド: ‘‘`setText(text)` および `setPercentage(percent)` で進捗テキストと進捗バーを変更することができます。

いくつかの例が提供されています。処理フレームワーククラスを使っているアルゴリズムの作成方法を実際の例でチェックしてみてください。任意のスクリプトアルゴリズム上で右クリックして *Edit script* を選んでコードを編集したり、単に閲覧したりすることができます。

17.5.4 自分のスクリプトのドキュメント化

モデルの場合と同様、自分のスクリプト用に付加的な文書を作成して、その内容や使い方を説明することができます。スクリプト編集ダイアログに、**[Edit script help]** ボタンがあります。それをクリックすると、ヘルプ編集ダイアログに移動します。グラフィカルモデラーについての章をチェックして、このダイアログについての詳細やその使い方を知ることができます。

ヘルプファイルはスクリプトと同じフォルダに保存されており、:file:‘.help‘拡張子がファイル名に追加されています。自分のスクリプトのヘルプは、最初に保存する前に編集できますので注意してください。後で、スクリプトを保存せずにスクリプト編集ダイアログを閉じた場合 (例えば無視して)、自分で書いたヘルプの内容は失われます。自分のスクリプトが既に保存され、ファイル名に関連付けられていれば、保存は自動的に行われます。

17.5.5 実行前後のスクリプトのフック

アルゴリズムを動かす前後に走らせる実行前および実行後フックをセットするのにもスクリプトは利用可能です。これは、アルゴリズムが実行される都度実行すべきタスクを自動化するのに使うことができます。

文法は上述のものと同様ですが、付加的に ''alg'' という名前のグローバル変数を使うことができ、これはたった今 (あるいはまさにこれから) 実行されたアルゴリズムを表します。

処理構成ダイアログの *General* グループ内に、 **実行前スクリプトファイル** 及び :guilabel:'実行後スクリプトファイル名 'という 2 つのエントリ名があり、ここでそれぞれの場合に実行するスクリプトのファイル名を入力することができます。

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17.6 履歴マネージャ

17.6.1 プロセッシングの履歴

いつでも履歴マネージャに格納されているプロセスの情報、アルゴリズムを実行できます. ここでは利用されたパラメータや実行された日時も保存されます.

This way, it is easy to track and control all the work that has been developed using the processing framework, and easily reproduce it.

履歴マネージャは実行日時にしたがってグルーピングされたレジストリエントリのセットであり、任意の特定の時点で実行されるアルゴリズムの情報を見つけることを容易にします。

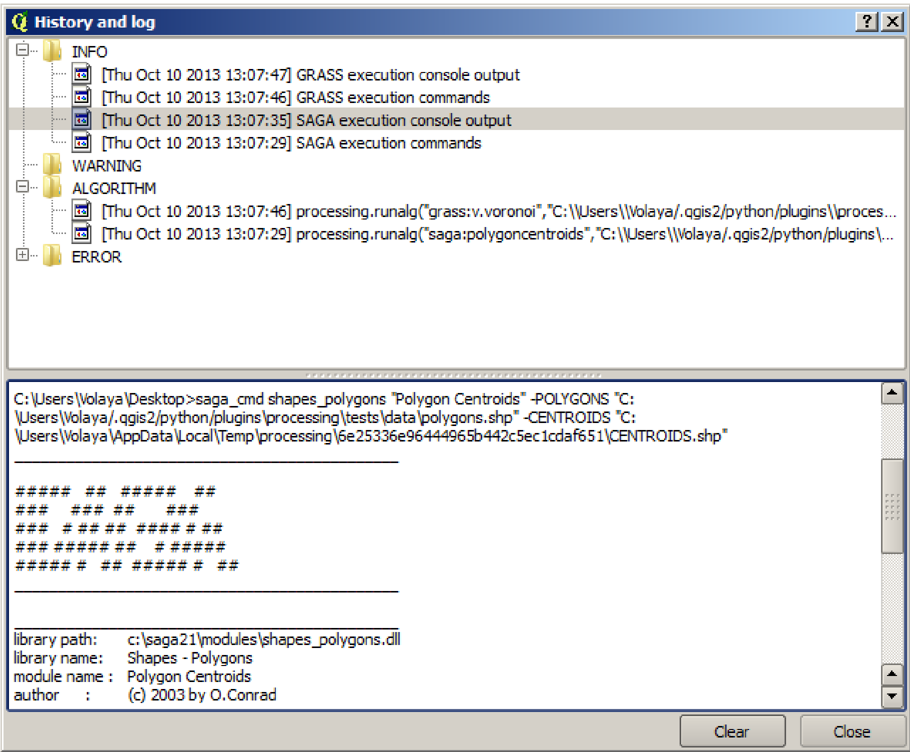


Figure 17.28: 履歴

プロセス情報は、アルゴリズムをツールボックスから起動された場合でも、コマンドライン式として保持されます。ツールボックスを使用してアルゴリズムを呼び出し、それからヒストリーマネージャでコマンドラインから呼び出したアルゴリズムを確認するため、それはコマンドラインインタフェースを使い方を学習するのにも役立ちます。

レジストリ内のエントリは別として、対応するエントリを単にダブルクリックすることで、プロセスを再実行することができます。

Along with recording algorithm executions, the processing framework communicates with the user by means of the other groups of the registry, namely *Errors*, *Warnings* and *Information*. In case something is not working properly, having a look at the *Errors* might help you to see what is happening. If you get in contact with a developer to report a bug or error, the information in that group will be very useful for her or him to find out what is going wrong.

Third-party algorithms are usually executed by calling their command-line interfaces, which communicate with the user via the console. Although that console is not shown, a full dump of it is stored in the *Information* group each time you run one of those algorithms. If, for instance, you are having problems executing a SAGA algorithm, look for an entry named 'SAGA execution console output' to check all the messages generated by SAGA and try to find out where the problem is.

Some algorithms, even if they can produce a result with the given input data, might add comments or additional information to the *Warning* block if they detect potential problems with the data, in order to warn you. Make sure you check those messages if you are having unexpected results.

17.7 Writing new Processing algorithms as python scripts

You can create your own algorithms by writing the corresponding Python code and adding a few extra lines to supply additional information needed to define the semantics of the algorithm. You can find a *Create new script* menu under the *Tools* group in the *Script* algorithms block of the toolbox. Double-click on it to open the script edition dialog. That's where you should type your code. Saving the script from there in the `scripts` folder (the default one when you open the save file dialog), with `.py` extension, will automatically create the corresponding algorithm.

The name of the algorithm (the one you will see in the toolbox) is created from the filename, removing its extension and replacing low hyphens with blank spaces.

Let's have the following code, which calculates the Topographic Wetness Index (TWI) directly from a DEM

```
##dem=raster
##twi=output raster
ret_slope = processing.runalg("saga:slopeaspectcurvature", dem, 0, None,
                None, None, None, None)
ret_area = processing.runalg("saga:catchmentarea", dem,
                0, False, False, False, False, None, None, None, None, None)
processing.runalg("saga:topographicwetnessindextwi, ret_slope['SLOPE'],
                ret_area['AREA'], None, 1, 0, twi)
```

As you can see, it involves 3 algorithms, all of them coming from SAGA. The last one of them calculates the TWI, but it needs a slope layer and a flow accumulation layer. We do not have these ones, but since we have the DEM, we can calculate them calling the corresponding SAGA algorithms.

The part of the code where this processing takes place is not difficult to understand if you have read the previous chapter. The first lines, however, need some additional explanation. They provide the information that is needed to turn your code into an algorithm that can be run from any of the GUI components, like the toolbox or the graphical modeler.

These lines start with a double Python comment symbol (`##`) and have the following structure

```
[parameter_name]=[parameter_type] [optional_values]
```

Here is a list of all the parameter types that are supported in processign scripts, their syntax and some examples.

- `raster`. A raster layer
- `vector`. A vector layer
- `table`. A table
- `number`. A numerical value. A default value must be provided. For instance, `depth=number 2.4`

- `string`. A text string. As in the case of numerical values, a default value must be added. For instance, `name=string Victor`
- `longstring`. Same as string, but a larger text box will be shown, so it is better suited for long strings, such as for a script expecting a small code snippet.
- `boolean`. A boolean value. Add `True` or `False` after it to set the default value. For example, `verbose=boolean True`.
- `multiple raster`. A set of input raster layers.
- `multiple vector`. A set of input vector layers.
- `field`. A field in the attributes table of a vector layer. The name of the layer has to be added after the `field` tag. For instance, if you have declared a vector input with `mylayer=vector`, you could use `myfield=field mylayer` to add a field from that layer as parameter.
- `folder`. A folder
- `file`. A filename
- `crs`. A Coordinate Reference System

The parameter name is the name that will be shown to the user when executing the algorithm, and also the variable name to use in the script code. The value entered by the user for that parameter will be assigned to a variable with that name.

When showing the name of the parameter to the user, the name will be edited it to improve its appearance, replacing low hyphens with spaces. So, for instance, if you want the user to see a parameter named `A numerical value`, you can use the variable name `A_numerical_value`.

Layers and tables values are strings containing the filepath of the corresponding object. To turn them into a QGIS object, you can use the `processing.getObjectFromUri()` function. Multiple inputs also have a string value, which contains the filepaths to all selected objects, separated by semicolons (`;`).

Outputs are defined in a similar manner, using the following tags:

- `output raster`
- `output vector`
- `output table`
- `output html`
- `output file`
- `output number`
- `output string`
- `output extent`

The value assigned to the output variables is always a string with a filepath. It will correspond to a temporary filepath in case the user has not entered any output filename.

In addition to the tags for parameters and outputs, you can also define the group under which the algorithm will be shown, using the `group` tag.

The last tag that you can use in your script header is `##nomodeler`. Use that when you do not want your algorithm to be shown in the modeler window. This should be used for algorithms that do not have a clear syntax (for instance, if the number of layers to be created is not known in advance, at design time), which make them unsuitable for the graphical modeler

17.8 Handing data produced by the algorithm

When you declare an output representing a layer (raster, vector or table), the algorithm will try to add it to QGIS once it is finished. That is the reason why, although the `runalg()` method does not load the layers it produces, the final *TWI* layer will be loaded, since it is saved to the file entered by the user, which is the value of the corresponding output.

Do not use the `load()` method in your script algorithms, but just when working with the console line. If a layer is created as output of an algorithm, it should be declared as such. Otherwise, you will not be able to properly use the algorithm in the modeler, since its syntax (as defined by the tags explained above) will not match what the algorithm really creates.

Hidden outputs (numbers and strings) do not have a value. Instead, it is you who has to assign a value to them. To do so, just set the value of a variable with the name you used to declare that output. For instance, if you have used this declaration,

```
##average=output number
```

the following line will set the value of the output to 5:

```
average = 5
```

17.9 Communicating with the user

If your algorithm takes a long time to process, it is a good idea to inform the user. You have a global named `progress` available, with two available methods: `setText(text)` and `setPercentage(percent)` to modify the progress text and the progress bar.

If you have to provide some information to the user, not related to the progress of the algorithm, you can use the `setInfo(text)` method, also from the `progress` object.

If your script has some problem, the correct way of propagating it is to raise an exception of type `GeoAlgorithmExecutionException()`. You can pass a message as argument to the constructor of the exception. Processing will take care of handling it and communicating with the user, depending on where the algorithm is being executed from (toolbox, modeler, Python console...)

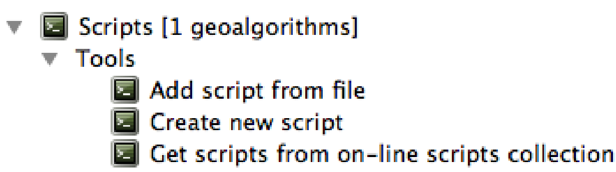
17.10 Documenting your scripts

As in the case of models, you can create additional documentation for your script, to explain what they do and how to use them. In the script editing dialog you will find a **[Edit script help]** button. Click on it and it will take you to the help editing dialog. Check the chapter about the graphical modeler to know more about this dialog and how to use it.

Help files are saved in the same folder as the script itself, adding the `.help` extension to the filename. Notice that you can edit your script's help before saving it for the first time. If you later close the script editing dialog without saving the script (i.e. you discard it), the help content you wrote will be lost. If your script was already saved and is associated to a filename, saving is done automatically.

17.11 Example scripts

Several examples are available in the on-line collection of scripts, which you can access by selecting the *Get script from on-line script collection* tool under the *Scripts/tools* entry in the toolbox.



Please, check them to see real examples of how to create algorithms using the processing framework classes. You can right-click on any script algorithm and select *Edit script* to edit its code or just to see it.

17.12 Best practices for writing script algorithms

Here's a quick summary of ideas to consider when creating your script algorithms and, especially, if you want to share with other QGIS users. Following these simple rules will ensure consistency across the different Processing elements such as the toolbox, the modeler or the batch processing interface.

- Do not load resulting layers. Let Processing handle your results and load your layers if needed.
- Always declare the outputs your algorithm creates. Avoid things such as declaring one output and then using the destination filename set for that output to create a collection of them. That will break the correct semantics of the algorithm and make it impossible to use it safely in the modeler. If you have to write an algorithm like that, make sure you add the `##nomodeler` tag.
- Do not show message boxes or use any GUI element from the script. If you want to communicate with the user, use the `setInfo()` method or throw an `GeoAlgorithmExecutionException`
- As a rule of thumb, do not forget that your algorithm might be executed in a context other than the Processing toolbox.

17.13 Pre- and post-execution script hooks

Scripts can also be used to set pre- and post-execution hooks that are run before and after an algorithm is run. This can be used to automate tasks that should be performed whenever an algorithm is executed.

The syntax is identical to the syntax explained above, but an additional global variable named `alg` is available, representing the algorithm that has just been (or is about to be) executed.

In the *General* group of the processing config dialog you will find two entries named *Pre-execution script file* and *Post-execution script file* where the filename of the scripts to be run in each case can be entered.

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17.14 外部アプリケーションの設定

The processing framework can be extended using additional applications. Currently, SAGA, GRASS, OTB (Orfeo Toolbox) and R are supported, along with some other command-line applications that provide spatial data analysis functionalities. Algorithms relying on an external application are managed by their own algorithm provider.

This section will show you how to configure the processing framework to include these additional applications, and it will explain some particular features of the algorithms based on them. Once you have correctly configured the system, you will be able to execute external algorithms from any component like the toolbox or the graphical modeler, just like you do with any other geoalgorithm.

By default, all algorithms that rely on an external appplication not shipped with QGIS are not enabled. You can enable them in the configuration dialog. Make sure that the corresponding application is already installed in your system. Enabling an algorithm provider without installing the application it needs will cause the algorithms to appear in the toolbox, but an error will be thrown when you try to execute them.

This is because the algorithm descriptions (needed to create the parameters dialog and provide the information needed about the algorithm) are not included with each application, but with QGIS instead. That is, they are part of QGIS, so you have them in your installation even if you have not installed any other software. Running the algorithm, however, needs the application binaries to be installed in your system.

17.14.1 Windows ユーザへの注意点

If you are not an advanced user and you are running QGIS on Windows, you might not be interested in reading the rest of this chapter. Make sure you install QGIS in your system using the standalone installer. That will automatically install SAGA, GRASS and OTB in your system and configure them so they can be run from QGIS. All the algorithms in the simplified view of the toolbox will be ready to be run without needing any further configuration. If installing through OSGeo4W application, make sure you select for insttallation SAGA and OTB as well.

If you want to know more about how these providers work, or if you want to use some algorithms not included in the simplified toolbox (such as R scripts), keep on reading.

17.14.2 ファイルフォーマットに関する注意点

When using an external software, opening a file in QGIS does not mean that it can be opened and processed as well in that other software. In most cases, other software can read what you have opened in QGIS, but in some cases, that might not be true. When using databases or uncommon file formats, whether for raster or vector layers, problems might arise. If that happens, try to use well-known file formats that you are sure are understood by both programs, and check the console output (in the history and log dialog) to know more about what is going wrong.

もし、あなたがレイヤを入力するのに使用する外部アルゴリズムを呼び出したときに、この処理でトラブルが起こったり処理が終了しなかった場合は、GRASS ラスタレイヤを使用してください。このため、これらのレイヤは利用可能なアルゴリズムとして表示されません。

You should, however, find no problems at all with vector layers, since QGIS automatically converts from the original file format to one accepted by the external application before passing the layer to it. This adds extra processing time, which might be significant if the layer has a large size, so do not be surprised if it takes more time to process a layer from a DB connection than it does to process one of a similar size stored in a shapefile.

Providers not using external applications can process any layer that you can open in QGIS, since they open it for analysis through QGIS.

Regarding output formats, all formats supported by QGIS as output can be used, both for raster and vector layers. Some providers do not support certain formats, but all can export to common raster layer formats that can later be transformed by QGIS automatically. As in the case of input layers, if this conversion is needed, that might increase the processing time.

If the extension of the filename specified when calling an algorithm does not match the extension of any of the formats supported by QGIS, then a suffix will be added to set a default format. In the case of raster layers, the `.tif` extension is used, while `.shp` is used for vector layers.

17.14.3 ベクトル・レイヤ選択に関する注意点

External applications may also be made aware of the selections that exist in vector layers within QGIS. However, that requires rewriting all input vector layers, just as if they were originally in a format not supported by the external application. Only when no selection exists, or the *Use only selected features* option is not enabled in the processing general configuration, can a layer be directly passed to an external application.

ほかの場合では、選択したフィーチャのみをエクスポートするには長い実行時間を必要とします。

SAGA: System for Automated Geoscientific Analyses、自動化地球科学的分析システム

SAGA algorithms can be run from QGIS if you have SAGA installed in your system and you configure the processing framework properly so it can find SAGA executables. In particular, the SAGA command-line executable is needed to run SAGA algorithms.

If you are running Windows, both the stand-alone installer and the OSGeo4W installer include SAGA along with QGIS, and the path is automatically configured, so there is no need to do anything else.

If you have installed SAGA yourself (remember, you need version 2.1), the path to the SAGA executable must be configured. To do this, open the configuration dialog. In the *SAGA* block, you will find a setting named *SAGA Folder*. Enter the path to the folder where SAGA is installed. Close the configuration dialog, and now you are ready to run SAGA algorithms from QGIS.

If you are running Linux, SAGA binaries are not included with SEXTANTE, so you have to download and install the software yourself. Please check the SAGA website for more information. SAGA 2.1 is needed.

In this case, there is no need to configure the path to the SAGA executable, and you will not see those folders. Instead, you must make sure that SAGA is properly installed and its folder is added to the PATH environment variable. Just open a console and type `saga_cmd` to check that the system can find where the SAGA binaries are located.

17.14.4 SAGA グリッドシステムの制限について

Most SAGA algorithms that require several input raster layers require them to have the same grid system. That is, they must cover the same geographic area and have the same cell size, so their corresponding grids match. When calling SAGA algorithms from QGIS, you can use any layer, regardless of its cell size and extent. When multiple raster layers are used as input for a SAGA algorithm, QGIS resamples them to a common grid system and then passes them to SAGA (unless the SAGA algorithm can operate with layers from different grid systems).

The definition of that common grid system is controlled by the user, and you will find several parameters in the SAGA group of the settings window to do so. There are two ways of setting the target grid system:

- Setting it manually. You define the extent by setting the values of the following parameters:
  - *Resampling min X*
  - *Resampling max X*
  - *Resampling min Y*
  - *Resampling max Y*
  - *Resampling cellsize*

  Notice that QGIS will resample input layers to that extent, even if they do not overlap with it.
- Setting it automatically from input layers. To select this option, just check the *Use min covering grid system for resampling* option. All the other settings will be ignored and the minimum extent that covers all the input layers will be used. The cell size of the target layer is the maximum of all cell sizes of the input layers.

多重ラスタレイヤを使用しないあるいは固有の入力グリッドシステムを必要としないアルゴリズムでは、SAGA を呼び出す前にリサンプリングは実行されませんし、これらのパラメータは使用されません。

17.14.5 マルチバンドレイヤに関する制限

Unlike QGIS, SAGA has no support for multi-band layers. If you want to use a multiband layer (such as an RGB or multispectral image), you first have to split it into single-banded images. To do so, you can use the 'SAGA/Grid - Tools/Split RGB image' algorithm (which creates three images from an RGB image) or the 'SAGA/Grid - Tools/Extract band' algorithm (to extract a single band).

17.14.6 セルサイズの制限

SAGA はラスタレイヤが x 軸と y 軸において同じセルサイズであることを仮定しています。もし、あなたが水平方向と垂直方向でセルサイズが異なる値のレイヤで作業するならば、あなたは予想できない結果を得ることになるでしょう。この場合、入力レイヤが SAGA によって適切に処理されないであろうという警告がプロセスログに加えられることになります。

17.14.7 Logging

When QGIS calls SAGA, it does so using its command-line interface, thus passing a set of commands to perform all the required operations. SAGA shows its progress by writing information to the console, which includes the percentage of processing already done, along with additional content. This output is filtered and used to update the progress bar while the algorithm is running.

Both the commands sent by QGIS and the additional information printed by SAGA can be logged along with other processing log messages, and you might find them useful to track in detail what is going on when QGIS runs a SAGA algorithm. You will find two settings, namely *Log console output* and *Log execution commands*, to activate that logging mechanism.

コマンドラインから外部アプリケーションを使ったり呼び込んだりするようなほとんどのほかのプロバイダは同様なオプションを持っているので、あなたは処理セッティングリストのほかの場所で同様にそれらを見つけるでしょう。

R スクリプトで作成された R.。

R integration in QGIS is different from that of SAGA in that there is not a predefined set of algorithms you can run (except for a few examples). Instead, you should write your scripts and call R commands, much like you would do from R, and in a very similar manner to what we saw in the section dedicated to processing scripts. This section shows you the syntax to use to call those R commands from QGIS and how to use QGIS objects (layers, tables) in them.

The first thing you have to do, as we saw in the case of SAGA, is to tell QGIS where your R binaries are located. You can do this using the *R folder* entry in the processing configuration dialog. Once you have set that parameter, you can start creating and executing your own R scripts.

今一度、これが Linux では異なるので、あなたは R フォルダが PATH 環境変数に含まれているかをちゃんと確認しなければなりません。もし、お使いの環境のコンソールで' 'R' 'とだけタイプして R を実行できるなら、実行する用意はできています。

To add a new algorithm that calls an R function (or a more complex R script that you have developed and you would like to have available from QGIS), you have to create a script file that tells the processing framework how to perform that operation and the corresponding R commands to do so.

R script files have the extension `.rsx`, and creating them is pretty easy if you just have a basic knowledge of R syntax and R scripting. They should be stored in the R scripts folder. You can set this folder in the *R* settings group (available from the processing settings dialog), just like you do with the folder for regular processing scripts.

Let 's have a look at a very simple script file, which calls the R method `spsample` to create a random grid within the boundary of the polygons in a given polygon layer. This method belongs to the `maptools` package. Since almost all the algorithms that you might like to incorporate into QGIS will use or generate spatial data, knowledge of spatial packages like `maptools` and, especially, `sp`, is mandatory.

```
##polyg=vector
##numpoints=number 10
##output=output vector
##sp=group
pts=spsample(polyg,numpoints,type="random")
output=SpatialPointsDataFrame(pts, as.data.frame(pts))
```

The first lines, which start with a double Python comment sign (`##`), tell QGIS the inputs of the algorithm described in the file and the outputs that it will generate. They work with exactly the same syntax as the SEXTANTE scripts that we have already seen, so they will not be described here again.

When you declare an input parameter, QGIS uses that information for two things: creating the user interface to ask the user for the value of that parameter and creating a corresponding R variable that can later be used as input for R commands.

In the above example, we are declaring an input of type `vector` named `polyg`. When executing the algorithm, QGIS will open in R the layer selected by the user and store it in a variable also named `polyg`. So, the name of a parameter is also the name of the variable that we can use in R for accesing the value of that parameter (thus, you should avoid using reserved R words as parameter names).

Spatial elements such as vector and raster layers are read using the `readOGR()` and `brick()` commands (you do not have to worry about adding those commands to your description file – QGIS will do it), and they are stored as `Spatial*DataFrame` objects. Table fields are stored as strings containing the name of the selected field.

テーブルは ``read.csv()``コマンドを使って開かれます。もし、ユーザによって入力されたテーブルが CSV 形式でないならば、それは R によってそれがインポートされる前に変換されます。

加えて、ラスタファイルは ``##usereadgdal``を使うことによる ``brick()``に代わって ``readGDAL()``コマンドを使って読み込むことができます。

If you are an advanced user and do not want QGIS to create the object representing the layer, you can use the `##passfilename` tag to indicate that you prefer a string with the filename instead. In this case, it is up to you to open the file before performing any operation on the data it contains.

上記の情報により、現在私たちは最初のサンプルスクリプトの一行目 (行頭が Python コメントになっていない最初の行) を理解することができます。

```
pts=spsample(polyg,numpoints,type="random")
```

変数 ``polygon``はすでに ``SpatialPolygonsDataFrame``オブジェクトを含んでいるので、ちょうど ``numpoints`` メソッドのように、作成されたサンプルグリッドを加えたポイントの数を示す、``spsample``メソッドを呼び込むことができます。

私たちは ``out``と名付けたタイプベクトルの出力を宣言してから、そこに (この場合は ``SpatialPointsDataFrame``に)``out``と名付けた変数と ``Spatial*DataFrame``オブジェクトを作成しなければならない。あなたの最終結果を保存する変数があなたが宣言して適切な値を含んでいる同じ名前を持つことを確認するように、あなたはあるらゆる名前をあなたの媒介変数として使うことができます。

In this case, the result obtained from the `spsample` method has to be converted explicitly into a `SpatialPointsDataFrame` object, since it is itself an object of class `ppp`, which is not a suitable class to be returned to QGIS.

もし、あなたのアルゴリズムがラスタレイヤを作成するなら、それらを保存する方法はあなたが ``#dontuserasterpackage``オプションを使用するかどうかによります。もし、あなたがそれを使用するならば、レイヤは ``writeGDAL()``メソッドを使って保存されます。そうでないならば、`raster` パッケージから ``writeRaster()``メソッドが使われます。

もし、あなたが ``#passfilename``オプションを使ったならば、たとえ ``raster`` パッケージ (``writeRaster()``を伴った) が入力に使われないとしても、出力はそれを使って作成されます。

もし、あなたのアルゴリズムがなんのレイヤも作成しないで、代わりにコンソールにテキストで結果を作成するのならば、あなたは実行が終了したことを示すようにコンソールに指示をしなければなりません。このために、あなたは ``>`` ('greater') サインを伴った印刷を欲する結果を作成するだけのコマンドラインを開始します。すべてのほかの行の出力は表示されません。たとえば、ここにあるのはベクトルレイヤの属性として与えられたフィールド (列) の正常性テストを実行するアルゴリズムの説明ファイルです:

```
##layer=vector
##field=field layer
##nortest=group
library(nortest)
>lillie.test(layer[[field]])
```

The output of the last line is printed, but the output of the first is not (and neither are the outputs from other command lines added automatically by QGIS).

もし、あなたのアルゴリズムがあるグラフィックスの種類 (``plot()``メソッドを使って) を作成するならば、次の行を加えます:

```
##showplots
```

This will cause QGIS to redirect all R graphical outputs to a temporary file, which will be opened once R execution has finished.

グラフィックスとコンソール結果はどちらも処理結果マネジャで見えるようになります。

For more information, please check the script files provided with SEXTANTE. Most of them are rather simple and will greatly help you understand how to create your own scripts.

ノート： `rgdal` and `maptools` libraries are loaded by default, so you do not have to add the corresponding `library()` commands (you just have to make sure that those two packages are installed in your R distribution). However, other additional libraries that you might need have to be explicitly loaded. Just add the necessary commands at the beginning of your script. You also have to make sure that the corresponding packages are installed in the R distribution used by QGIS. The processing framework will not take care of any package installation. If you run a script that requires a package that is not installed, the execution will fail, and Processing will try to detect which packages are missing. You must install those missing libraries manually before you can run the algorithm.

GRASS: Geographic Resources Analysis Support System、地理的資源分析支援システム

Configuring GRASS is not much different from configuring SAGA. First, the path to the GRASS folder has to be defined, but only if you are running Windows. Additionaly, a shell interpreter (usually `msys.exe`, which can be found in most GRASS for Windows distributions) has to be defined and its path set up as well.

By default, the processing framework tries to configure its GRASS connector to use the GRASS distribution that ships along with QGIS. This should work without problems in most systems, but if you experience problems, you might have to configure the GRASS connector manually. Also, if you want to use a different GRASS installation, you can change that setting and point to the folder where the other version is installed. GRASS 6.4 is needed for algorithms to work correctly.

もし、あなたが Linux を利用している場合は、GRASS が適切にインストールされているかと、それがコンソールから問題なく起動するかを確認するだけです。

GRASS algorithms use a region for calculations. This region can be defined manually using values similar to the ones found in the SAGA configuration, or automatically, taking the minimum extent that covers all the input layers used to execute the algorithm each time. If the latter approach is the behaviour you prefer, just check the *Use min covering region* option in the GRASS configuration parameters.

The last parameter that has to be configured is related to the mapset. A mapset is needed to run GRASS, and the processing framework creates a temporary one for each execution. You have to specify if the data you are working with uses geographical (lat/lon) coordinates or projected ones.

GDAL: Geospatial Data Abstraction Library、地理空間データ抽象化ライブラリ

No additional configuration is needed to run GDAL algorithms. Since they are already incorporated into QGIS, the algorithms can infer their configuration from it.

Orfeo ToolBox

Orfeo Toolbox (OTB) algorithms can be run from QGIS if you have OTB installed in your system and you have configured QGIS properly, so it can find all necessary files (command-line tools and libraries).

As in the case of SAGA, OTB binaries are included in the stand-alone installer for Windows, but they are not included if you are runing Linux, so you have to download and install the software yourself. Please check the OTB website for more information.

Once OTB is installed, start QGIS, open the processing configuration dialog and configure the OTB algorithm provider. In the *Orfeo Toolbox (image analysis)* block, you will find all settings related to OTB. First, ensure that algorithms are enabled.

Then, configure the path to the folder where OTB command-line tools and libraries are installed:

- Usually *OTB applications folder* points to `/usr/lib/otb/applications` and *OTB command line tools folder* is `/usr/bin`.

- If you use the OSGeo4W installer, then install `otb-bin` package and enter `C:\OSGeo4W\apps\orfeotoolbox\applications` as *OTB applications folder* and `C:\OSGeo4W\bin` as *OTB command line tools folder*. These values should be configured by default, but if you have a different OTB installation, configure them to the corresponding values in your system.

TauDEM: Terrain Analysis Using Digital Elevation Models、DEM を使用した地形分析

To use this provider, you need to install TauDEM command line tools.

17.14.8 Windows

Please visit the TauDEM homepage for installation instructions and precompiled binaries for 32-bit and 64-bit systems. **IMPORTANT**: You need TauDEM 5.0.6 executables. Version 5.2 is currently not supported.

17.14.9 Linux

There are no packages for most Linux distributions, so you should compile TauDEM by yourself. As TauDEM uses MPICH2, first install it using your favorite package manager. Alternatively, TauDEM works fine with Open MPI, so you can use it instead of MPICH2.

Download TauDEM 5.0.6 source code and extract the files in some folder.

Open the `linearpart.h` file, and after line

```
#include "mpi.h"
```

新しい行を加える

```
#include <stdint.h>
```

だから取得できるでしょう

```
#include "mpi.h"
#include <stdint.h>
```

Save the changes and close the file. Now open `tiffIO.h`, find line `#include "stdint.h"` and replace quotes (`""`) with <>, so you'll get

```
#include <stdint.h>
```

Save the changes and close the file. Create a build directory and cd into it

```
mkdir build
cd build
```

Configure your build with the command

```
CXX=mpicxx cmake -DCMAKE_INSTALL_PREFIX=/usr/local ..
```

and then compile

```
make
```

Finally, to install TauDEM into `/usr/local/bin`, run

```
sudo make install
```

.

17.15 QGIS コマンダー

プロセシング にはツールボックスを使わないでアルゴリズムを実行する実用的なツールが含まれています, ここでは実行したいアルゴリズムの名前をタイプすれば実行できます.

このツールは *QGIS commander* という名前で自動補完機能つきのシンプルなテキストボックスで提供されています. このツールで実行したいコマンドをタイプできます.

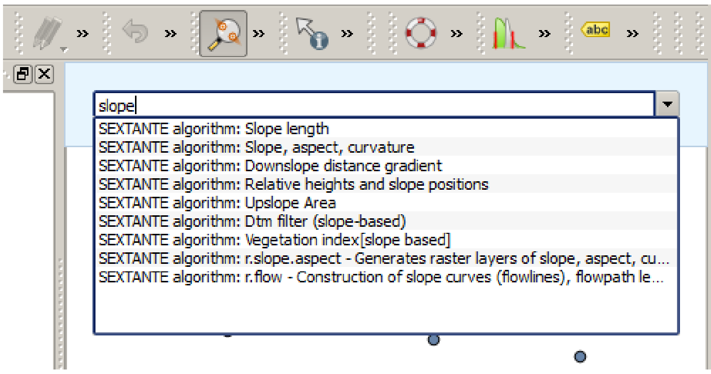

Figure 17.29: The QGIS Commander

The Commander is started from the *Analysis* menu or, more practically, by pressing `Shift + Ctrl + M` (you can change that default keyboard shortcut in the QGIS configuration if you prefer a different one). Apart from executing Processing algorithms, the Commander gives you access to most of the functionality in QGIS, which means that it gives you a practical and efficient way of running QGIS tasks and allows you to control QGIS with reduced usage of buttons and menus.

Moreover, the Commander is configurable, so you can add your custom commands and have them just a few keystrokes away, making it a powerful tool to help you become more productive in your daily work with QGIS.

17.15.1 利用可能コマンド

コマンドは以下のカテゴリのコマンダーフォールで利用できます:

- プロセシングアルゴリズム. これらは プロセシングアルゴリズム: `<name of the algorithm>` として表示されます.
- Menu items. These are shown as `Menu item: <menu entry text>`. All menus items available from the QGIS interface are available, even if they are included in a submenu.
- Python 関数. 利用可能コマンドリストに含めることができる短い Python 関数を作成することができます. それらは `Function: <function name>` として表示されます

上記のものを実行するためにはタイプを開始して入力したテキストを補完して表示されるコマンドリストから必要なエレメントを選択すればよいです.

In the case of calling a Python function, you can select the entry in the list, which is prefixed by `Function:` (for instance, `Function: removeall), or just directly type the function name (``removeall` in the previous example). There is no need to add brackets after the function name.

17.15.2 カスタム機能の作成

Custom functions are added by entering the corresponding Python code in the `commands.py` file that is found in the `.qgis/sextante/commander directory` in your user folder. It is just a simple Python file where you can add the functions that you need.

The file is created with a few example functions the first time you open the Commander. If you haven't launched the Commander yet, you can create the file yourself. To edit the commands file, use your favorite text editor. You can also use a built-in editor by calling the `edit` command from the Commander. It will open the editor with the commands file, and you can edit it directly and then save your changes.

例えば、すべてのレイヤを削除する次の関数を追加できます:

```
from qgis.gui import *

def removeall():
    mapreg = QgsMapLayerRegistry.instance()
    mapreg.removeAllMapLayers()
```

Once you have added the function, it will be available in the Commander, and you can invoke it by typing `removeall`. There is no need to do anything apart from writing the function itself.

Functions can receive parameters. Add `*args` to your function definition to receive arguments. When calling the function from the Commander, parameters have to be passed separated by spaces.

ここでレイヤーをロードし、ロードするためのレイヤのファイル名でパラメータを取る関数の例を次に示します。

```
import processing

def load(*args):
  processing.load(args[0])
```

If you want to load the layer in `/home/myuser/points.shp`, type `load /home/myuser/points.shp` in the Commander text box.

.

Chapter 18

プリントコンポーザ

With the Print Composer you can create nice maps and atlasses that can be printed or saved as PDF-file, an image or an SVG-file. This is a powerfull way to share geographical information produced with QGIS that can be included in reports or published.

The Print Composer provides growing layout and printing capabilities. It allows you to add elements such as the QGIS map canvas, text labels, images, legends, scale bars, basic shapes, arrows, attribute tables and HTML frames. You can size, group, align, position and rotate each element and adjust the properties to create your layout. The layout can be printed or exported to image formats, PostScript, PDF or to SVG (export to SVG is not working properly with some recent Qt4 versions; you should try and check individually on your system). You can save the layout as a template and load it again in another session. Finally, generating several maps based on a template can be done through the atlas generator. See a list of tools in table_composer_1:

アイコン	目的	アイコン	目的
	プロジェクトの保存		新コンポーザ
	コンポーザの複製		コンポーザマネージャ
	テンプレートからロードする		テンプレートとして保存する
	Print or export as PostScript		イメージ画像として出力する
	SVG として出力する		PDF 型式で出力する
	アンドゥ		最後の変更を元に戻す
	全域表示		Zoom to 100%
	拡大		縮小
	Refresh View		
	Pan		Zoom to specific region
	印刷構成でアイテムを選択/移動する		アイテム内のコンテンツを移動する
	QGIS マップキャンバスから新規地図を追加する		印刷構成にイメージ画像を追加
	印刷構成にラベルを追加		印刷構成に新規凡例を追加
	Add scale bar to print composition		印刷構成に基本図形を追加
	印刷構成に矢印を追加		印刷構成に属性テーブルを追加
	Add an HTML frame		
	印刷構成内のアイテムをグループ化する		印刷構成内のアイテムグループを解除する
	Lock Selected Items		Unlock All items
	アイテムを前面に移動		選択アイテムを背面に移動
	選択アイテムを最前面に移動		選択アイテムを最背面に移動
	選択アイテムを左側で整列		選択アイテムを右側で整列
	選択アイテムを中央合わせで整列		選択アイテムを水平方向の中央で整列
	選択アイテムを上側線で整列		選択アイテムを下側線で整列
	Preview Atlas		First Feature
	Previous Feature		Next Feature
	Last feature		Print Atlas
	Export Atlas as Image		Atlas Settings

Table Composer 1: プリントコンポーザツール

すべてのプリントコンポーザツールはメニューとツールバーアイコンから利用できます. ツールバーはマウスをツールバーの上に置いた状態で右ボタンで表示、非表示を切り替えることができます.

18.1 最初のステップ

18.1.1 新しいプリントコンポーザテンプレートを開く

Before you start to work with the Print Composer, you need to load some raster and vector layers in the QGIS map canvas and adapt their properties to suit your own convenience. After everything is rendered and symbolized to your liking, click the New Print Composer icon in the toolbar or choose *File* → *New Print Composer*. You will be prompted to choose a title for the new Composer.

18.1.2 Overview of the Print Composer

Opening the Print Composer provides you with a blank canvas that represents the paper surface when using the print option. Initially you find buttons on the left beside the canvas to add map composer items; the current QGIS map canvas, text labels, images, legends, scale bars, basic shapes, arrows, attribute tables and HTML frames. In this toolbar you also find toolbar buttons to navigate, zoom in on an area and pan the view on the composer and toolbar buttons to select a map composer item and to move the contents of the map item.

Figure_composer_overview shows the initial view of the Print Composer before any elements are added.

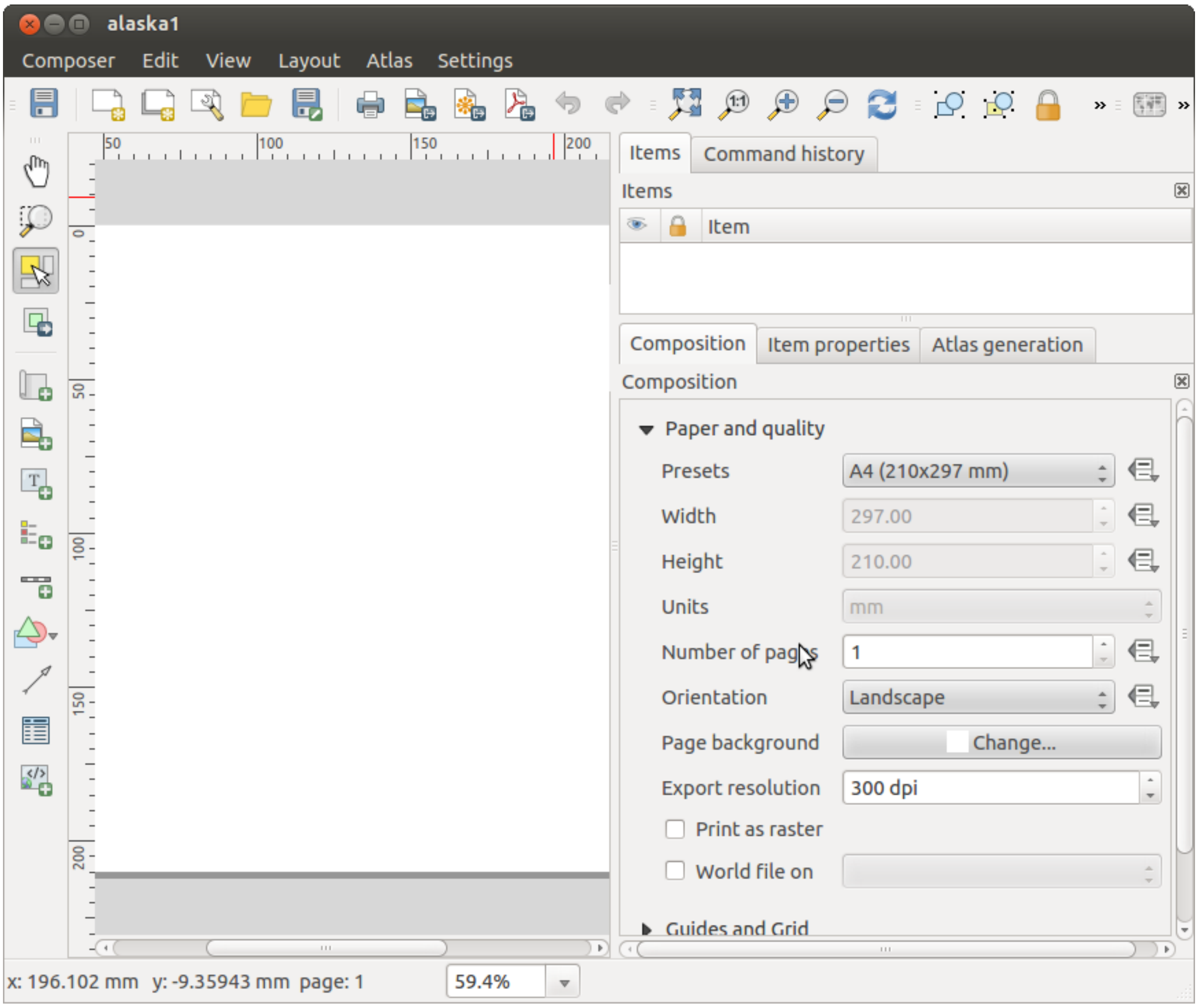

Figure 18.1: プリントコンポーザ

On the right beside the canvas you find two panels. The upper panel holds the tabs *Items* and *Command History* and the lower panel holds the tabs *Composition*, *Item properties* and *Atlas generation*.

- The *Items* tab provides a list of all map composer items added to the canvas.
- The *Command history* tab displays a history of all changes applied to the Print Composer layout. With a mouse click, it is possible to undo and redo layout steps back and forth to a certain status.
- The *Composition* tab allows you to set paper size, orientation, the page background, number of pages and print quality for the output file in dpi. Furthermore, you can also activate the *Print as raster* checkbox. This means all items will be converted to raster before printing or saving as PostScript or PDF. In this tab, you can also customize settings for grid and smart guides.
- The *Item Properties* tab displays the properties for the selected item. Click the Select/Move item icon to select an item (e.g., legend, scale bar or label) on the canvas. Then click the *Item Properties* tab and customize the settings for the selected item.
- The *Atlas generation* tab allows you to enable the generation of an atlas for the current Composer and gives access to its parameters.
- Finally, you can save your print composition with the Save Project button.

In the bottom part of the Print Composer window, you can find a status bar with mouse position, current page number and a combo box to set the zoom level.

You can add multiple elements to the Composer. It is also possible to have more than one map view or legend or scale bar in the Print Composer canvas, on one or several pages. Each element has its own properties and, in the case of the map, its own extent. If you want to remove any elements from the Composer canvas you can do that with the `Delete` or the `Backspace` key.

ナビゲーションツール

To navigate in the canvas layout, the Print Composer provides some general tools:

- ズームイン
- ズームアウト
- Zoom full
- Zoom to 100%
- Refresh view (if you find the view in an inconsistent state)
- Pan composer
- Zoom (zoom to a specific region of the Composer)

You can change the zoom level also using the mouse wheel or the combo box in the status bar. If you need to switch to pan mode while working in the Composer area, you can hold the `Spacebar` or the the mouse wheel. With `Ctrl+Spacebar`, you can temporarily switch to zoom mode, and with `Ctrl+Shift+Spacebar`, to zoom out mode.

18.1.3 Sample Session

To demonstrate how to create a map please follow the next instructions.

1. On the left site, select the Add new map toolbar button and draw a rectangle on the canvas holding down the left mouse button. Inside the drawn rectangle the QGIS map view to the canvas.
2. Select the Add new scalebar toolbar button and place the map item with the left mouse button on the Print Composer canvas. A scalebar will be added to the canvas.

3. Select the Add new legend toolbar button and draw a rectangle on the canvas holding down the left mouse button. Inside the drawn rectangle the legend will be drawn.
4. Select the Select/Move item icon to select the map on the canvas and move it a bit.
5. While the map item is still selected you can also change the size of the map item. Click while holding down the left mouse button, in a white little rectangle in one of the corners of the map item and drag it to a new location to change it's size.
6. Click the *Item Properties* tab on the left lower panel and find the setting for the orientation. Change the value of the setting *Map orientation* to '15.00 ° '. You should see the orientation of the map item change.
7. Finally, you can save your print composition with the Save Project button.

18.1.4 Print Composer Options

From *Settings* → *Composer Options* you can set some options that will be used as default during your work.

- *Compositions defaults* let you specify the default font to use.
- With *Grid appearance*, you can set the grid style and its color. There are three types of grid: **Dots**, **Solid** lines and **Crosses**.
- *Grid and guide defaults* defines spacing, offset and tolerance of the grid.

18.1.5 コンポジションタブ — 一般的なコンポジションのセットアップ

コンポジション タブで、コンポジションの全体的な設定を定義できます。

- You can choose one of the *Presets* for your paper sheet, or enter your custom *width* and *height*.
- Composition can now be divided into several pages. For instance, a first page can show a map canvas, and a second page can show the attribute table associated with a layer, while a third one shows an HTML frame linking to your organization website. Set the *Number of pages* to the desired value. You can choose the page *Orientation* and its *Exported resolution*. When checked, *print as raster* means all elements will be rasterized before printing or saving as PostScript or PDF.
- *Grid and guides* lets you customize grid settings like *spacings*, *offsets* and *tolerance* to your need. The tolerance is the maximum distance below which an item is snapped to smart guides.

Snap to grid and/or to smart guides can be enabled from the *View* menu. In this menu, you can also hide or show the grid and smart guides.

18.1.6 Composer items common options

Composer items have a set of common properties you will find on the bottom of the *Item Properties* tab: Position and size, Rotation, Frame, Background, Item ID and Rendering (See figure_composer_common_1).

- **位置とサイズ** ダイアログを使うとアイテムのフレームの大きさと位置を指定できます. **参照ポイント** を選択して事前に決まっている **X** と **Y** 座標を指定することもできます.
- The *Rotation* sets the rotation of the element (in degrees).
- The *Frame* shows or hides the frame around the label. Use the *Frame color* and *Thickness* menus to adjust those properties.
- Use the *Background color* menu for setting a background color. With the dialog you can pick a color (see *Color Picker*).

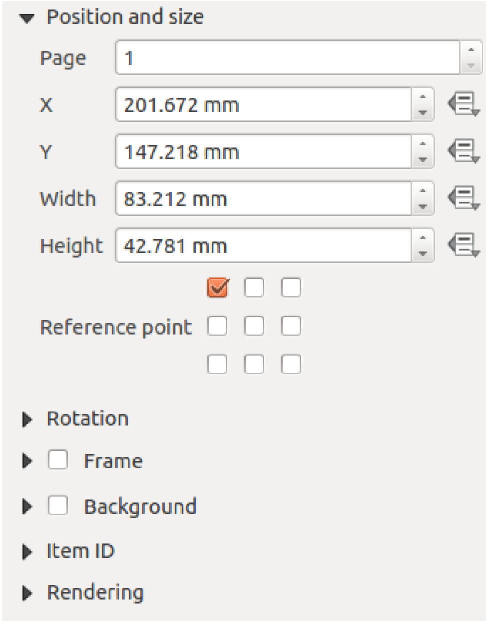

Figure 18.2: 共通アイテムプロパティダイアログ

- Use the *Item ID* to create a relationship to other Print Composer items. This is used with QGIS server and any potential web client. You can set an ID on an item (e.g., a map and a label), and then the web client can send data to set a property (e.g., label text) for that specific item. The GetProjectSettings command will list what items and which IDs are available in a layout.
- *Rendering* mode can be selected in the option field. See Rendering_Mode.

ノート:

- If you checked *Use live-updating color chooser dialogs* in the QGIS general options, the color button will update as soon as you choose a new color from **Color Dialog** windows. If not, you need to close the **Color Dialog**.
- The Data defined override icon next to a field means that you can associate the field with data in the map item or use expressions. These are particularly helpful with atlas generation (See atlas_data_defined_overrides).

18.2 レンダリングモード

QGIS now allows advanced rendering for Composer items just like vector and raster layers.

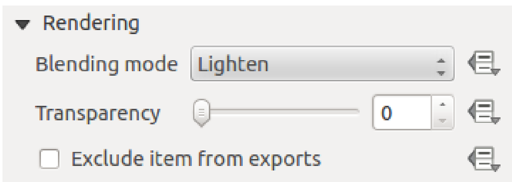

Figure 18.3: レンダリングモード

- *Transparency* : You can make the underlying item in the Composer visible with this tool. Use the slider to adapt the visibility of your item to your needs. You can also make a precise definition of the percentage of visibility in the menu beside the slider.

- ☑ *Exclude item from exports*: You can decide to make an item not visible in all exports. After activating this checkbox, the item will not be included in PDF's, prints etc..
- *Blending mode*: You can achieve special rendering effects with these tools that you previously only may know from graphics programs. The pixels of your overlaying and underlaying items are mixed through the settings described below.
  - Normal: This is the standard blend mode, which uses the alpha channel of the top pixel to blend with the pixel beneath it; the colors aren't mixed.
  - Lighten: This selects the maximum of each component from the foreground and background pixels. Be aware that the results tend to be jagged and harsh.
  - Screen: Light pixels from the source are painted over the destination, while dark pixels are not. This mode is most useful for mixing the texture of one layer with another layer (e.g., you can use a hillshade to texture another layer).
  - Dodge: Dodge will brighten and saturate underlying pixels based on the lightness of the top pixel. So, brighter top pixels cause the saturation and brightness of the underlying pixels to increase. This works best if the top pixels aren't too bright; otherwise the effect is too extreme.
  - Addition: This blend mode simply adds pixel values of one layer with pixel values of the other. In case of values above 1 (as in the case of RGB), white is displayed. This mode is suitable for highlighting features.
  - Darken: This creates a resultant pixel that retains the smallest components of the foreground and background pixels. Like lighten, the results tend to be jagged and harsh.
  - Multiply: Here, the numbers for each pixel of the top layer are multiplied with the numbers for the corresponding pixel of the bottom layer. The results are darker pictures.
  - Burn: Darker colors in the top layer cause the underlying layers to darken. Burn can be used to tweak and colorise underlying layers.
  - Overlay: This mode combines the multiply and screen blending modes. In the resulting picture, light parts become lighter and dark parts become darker.
  - Soft light: This is very similar to overlay, but instead of using multiply/screen it uses color burn/dodge. This mode is supposed to emulate shining a soft light onto an image.
  - ハードライト：ハードライトはオーバーレイモードと非常によく似ています。これは、画像に非常に強い光を投影しエミュレートすることになっています。
  - Difference: Difference subtracts the top pixel from the bottom pixel, or the other way around, to always get a positive value. Blending with black produces no change, as the difference with all colors is zero.
  - Subtract: This blend mode simply subtracts pixel values of one layer with pixel values of the other. In case of negative values, black is displayed.

18.3 コンポーザアイテム

18.3.1 The Map item

Click on the Add new map toolbar button in the Print Composer toolbar to add the QGIS map canvas. Now, drag a rectangle onto the Composer canvas with the left mouse button to add the map. To display the current map, you can choose between three different modes in the map *Item Properties* tab:

- **四角形** はデフォルトの設定です. これは 'Map will be printed here' のメッセージを表示した中身の無いボックスを表示します.
- **Cache** renders the map in the current screen resolution. If you zoom the Composer window in or out, the map is not rendered again but the image will be scaled.

- **Render** means that if you zoom the Composer window in or out, the map will be rendered again, but for space reasons, only up to a maximum resolution.

Cache is the default preview mode for newly added Print Composer maps.

You can resize the map element by clicking on the Select/Move item button, selecting the element, and dragging one of the blue handles in the corner of the map. With the map selected, you can now adapt more properties in the map *Item Properties* tab.

To move layers within the map element, select the map element, click the Move item content icon and move the layers within the map item frame with the left mouse button. After you have found the right place for an item, you can lock the item position within the Print Composer canvas. Select the map item and use the toolbar Lock Selected Items or the *Items* tab to Lock the item. A locked item can only be selected using the *Items* tab. Once selected you can use the *Items* tab to unlock individual items. The Unlock All Items icon will unlock all locked composer items.

メインプロパティ

The *Main properties* dialog of the map *Item Properties* tab provides the following functionalities (see figure_composer_map_1):

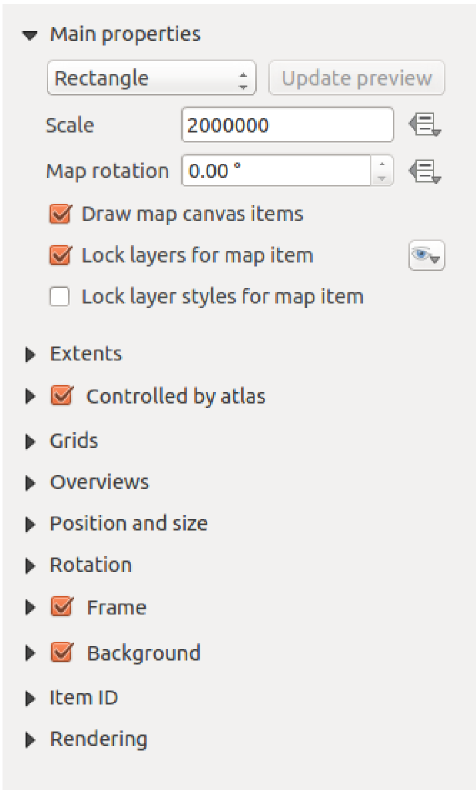

Figure 18.4: 地図アイテムプロパティタブ

- The **Preview** area allows you to define the preview modes 'Rectangle', 'Cache' and 'Render', as described above. If you change the view on the QGIS map canvas by changing vector or raster properties, you can update the Print Composer view by selecting the map element in the Print Composer and clicking the **[Update preview]** button.
- フィールド **スケール** 1,00 には手動でスケールを設定して下さい.
- The field *Map rotation* 1,00 allows you to rotate the map element content clockwise in degrees. The rotation of the map view can be imitated here. Note that a correct coordinate frame can only be added with

the default value 0 and that once you defined a *Map rotation* it currently cannot be changed.

- *Draw map canvas items* lets you show annotations that may be placed on the map canvas in the main QGIS window.
- You can choose to lock the layers shown on a map item. Check *Lock layers for map item*. After this is checked, any layer that would be displayed or hidden in the main QGIS window will not appear or be hidden in the map item of the Composer. But style and labels of a locked layer are still refreshed according to the main QGIS interface. You can prevent this by using *Lock layer styles for map item*.
- The button allows you to add quickly all the presets views you have prepared in QGIS. Clicking on the button you will see the list of all the preset views: just select the preset you want to display. The map canvas will automatically lock the preset layers by enabling the *Lock layers for map item*: if you want to unselect the preset, just uncheck the and press on the button. See *Map Legend* to find out how to create presets views.

領域

The *Extents* dialog of the map item tab provides the following functionalities (see figure_composer_map_2):

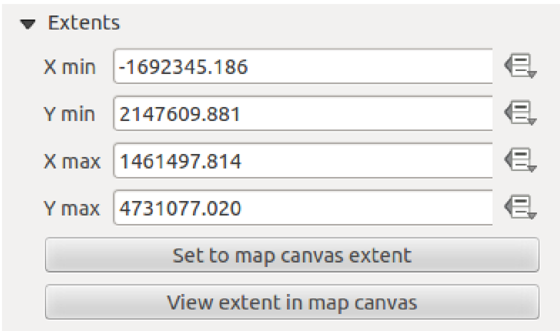

Figure 18.5: 地図領域ダイアログ

- The **Map extents** area allows you to specify the map extent using X and Y min/max values and by clicking the **[Set to map canvas extent]** button. This button sets the map extent of the composer map item to the extent of the current map view in the main QGIS application. The button **[View extent in map canvas]** does exactly the opposite, it updates the extent of the map view in the QGIS application to the extent of the composer map item.

If you change the view on the QGIS map canvas by changing vector or raster properties, you can update the Print Composer view by selecting the map element in the Print Composer and clicking the **[Update preview]** button in the map *Item Properties* tab (see figure_composer_map_1).

Grids

The *Grids* dialog of the map *Item Properties* tab provides the possibility to add several grids to a map item.

- With the plus and minus button you can add or remove a selected grid.
- With the up and down button you can move a grid in the list and set the drawing priority.

When you double click on the added grid you can give it another name.

After you have added a grid, you can activate the checkbox *Show grid* to overlay a grid onto the map element. Expand this option to provide a lot of configuration options, see Figure_composer_map_4.

As grid type, you can specify to use a 'Solid', 'Cross', 'Markers' or 'Frame and annotations only'. 'Frame and annotations only' is especially useful when working with rotated maps or reprojected grids. In the devisions

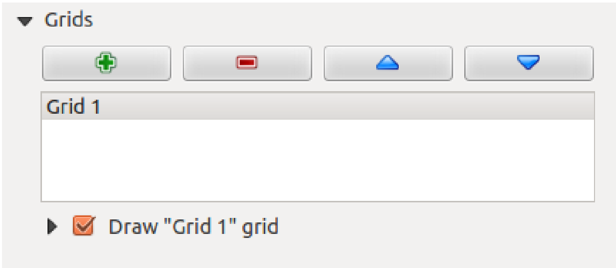

Figure 18.6: Map Grids Dialog

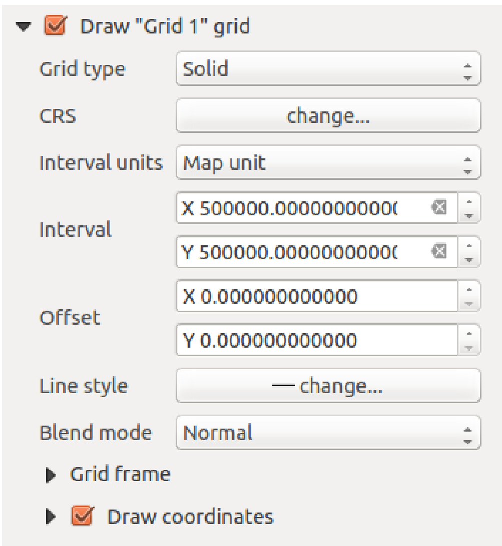

Figure 18.7: Draw Grid Dialog

section of the Grid Frame Dialog mentioned below you then have a corresponding setting. Symbology of the grid can be chosen. See section Rendering_Mode. Furthermore, you can define an interval in the X and Y directions, an X and Y offset, and the width used for the cross or line grid type.

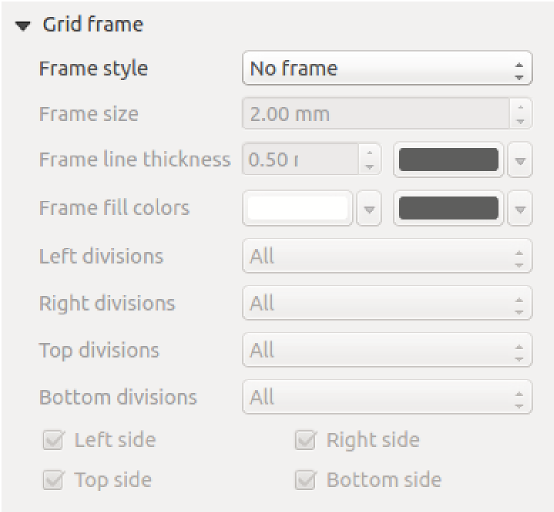

Figure 18.8: Grid Frame Dialog

- There are different options to style the frame that holds the map. Following options are available: No Frame, Zebra, Interior ticks, Exterior ticks, Interior and Exterior ticks and Lineborder.
- With 'LatitudeY/ only' and 'Longitude/X only' setting in the devisions section you have the possibility to prevent a mix of latitude/y and longitude/x coordinates showing on a side when working with rotated maps or reprojected grids.
- Advanced rendering mode is also available for grids (see section Rendering_mode).
- The *Draw coordinates* checkbox allows you to add coordinates to the map frame. You can choose the annotation numeric format, the options range from decimal to degrees, minute and seconds, with or without suffix, and aligned or not. You can choose which annotation to show. The options are: show all, latitude only, longitude only, or disable(none). This is useful when the map is rotated. The annotation can be drawn inside or outside the map frame. The annotation direction can be defined as horizontal, vertical ascending or vertical descending. In case of map rotation you can Finally, you can define the annotation font, the annotation font color, the annotation distance from the map frame and the precision of the drawn coordinates.

Overviews

The *Overviews* dialog of the map *Item Properties* tab provides the following functionalities:

You can choose to create an overview map, which shows the extents of the other map(s) that are available in the composer. First you need to create the map(s) you want to include in the overview map. Next you create the map you want to use as the overview map, just like a normal map.

- With the plus and minus button you can add or remove an overview.
- With the up and down button you can move an overview in the list and set the drawing priority.

Open *Overviews* and press the green plus icon-button to add an overview. Initially this overview is named 'Overview 1' (see Figure_composer_map_7). You can change the name when you double-click on the overview item in the list named 'Overview 1' and change it to another name.

When you select the overview item in the list you can customize it.

- The *Draw "<name_overview>" overview* needs to be activated to draw the extent of selected map frame.

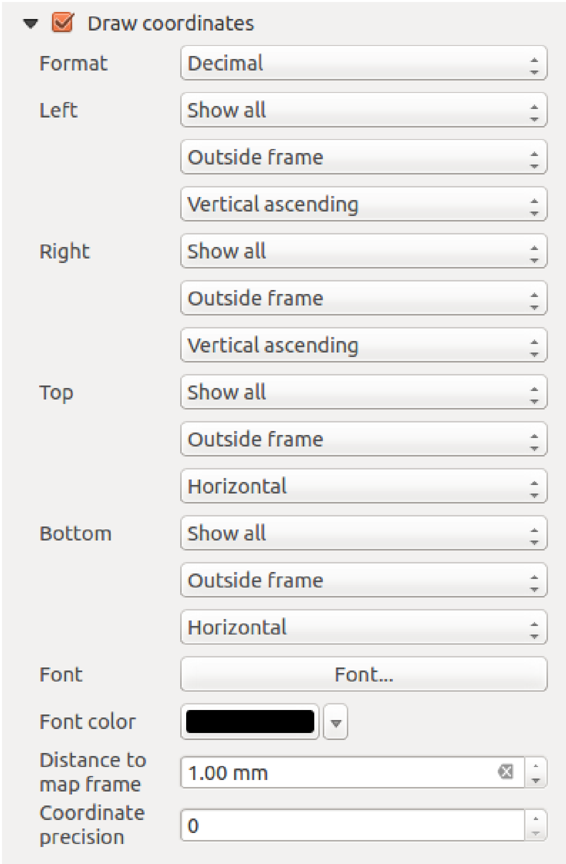

Figure 18.9: Grid Draw Coordinates dialog

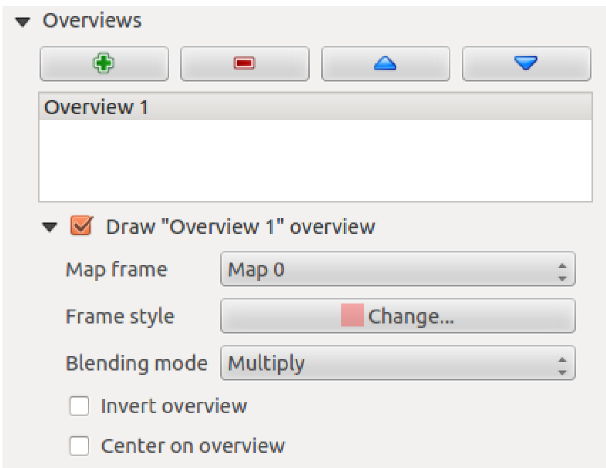

Figure 18.10: Map Overviews Dialog

- The *Map frame* combo list can be used to select the map item whose extents will be drawn on the present map item.
- The *Frame Style* allows you to change the style of the overview frame.
- The *Blending mode* allows you to set different transparency blend modes. See Rendering_Mode.
- The *Invert overview* creates a mask around the extents when activated: the referenced map extents are shown clearly, whereas everything else is blended with the frame color.
- The *Center on overview* puts the extent of the overview frame in the center of the overview map. You can only activate one overview item to center, when you have added several overviews.

18.3.2 The Label item

To add a label, click the Add label icon, place the element with the left mouse button on the Print Composer canvas and position and customize its appearance in the label *Item Properties* tab.

The *Item Properties* tab of a label item provides the following functionality for the label item (see Figure_composer_label):

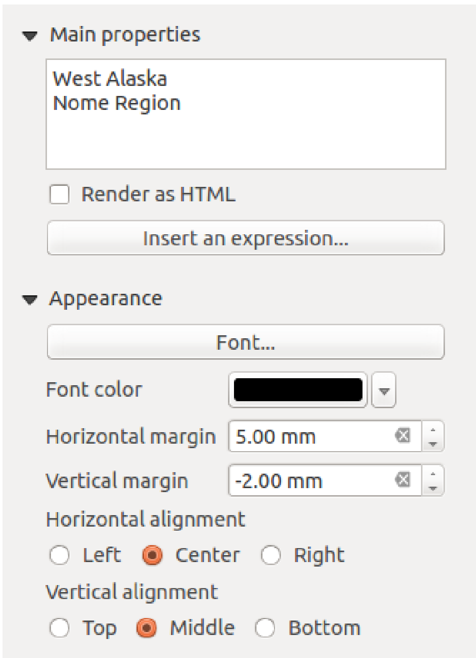

Figure 18.11: ラベルアイテムプロパティタブ

メインプロパティ

- The main properties dialog is where the text (HTML or not) or the expression needed to fill the label is added to the Composer canvas.
- Labels can be interpreted as HTML code: check *Render as HTML*. You can now insert a URL, a clickable image that links to a web page or something more complex.
- You can also insert an expression. Click on **[Insert an expression]** to open a new dialog. Build an expression by clicking the functions available in the left side of the panel. Two special categories can be useful, particularly associated with the atlas functionality: geometry functions and records functions. At the bottom, a preview of the expression is shown.

Appearance

- Define *Font* by clicking on the **[Font...]** button or a *Font color* selecting a color using the color selection tool.
- You can specify different horizontal and vertical margins in mm. This is the margin from the edge of the composer item. The label can be positioned outside the bounds of the label e.g. to align label items with other items. In this case you have to use negative values for the margin.
- Using the *Alignment* is another way to position your label. Note that when e.g. using the *Horizontal alignment* in *Center* Position the *Horizontal margin* feature is disabled.

18.3.3 The Image item

To add an image, click the Add image icon, place the element with the left mouse button on the Print Composer canvas and position and customize its appearance in the image *Item Properties* tab.

The picture *Item Properties* tab provides the following functionalities (see figure_composer_image_1):

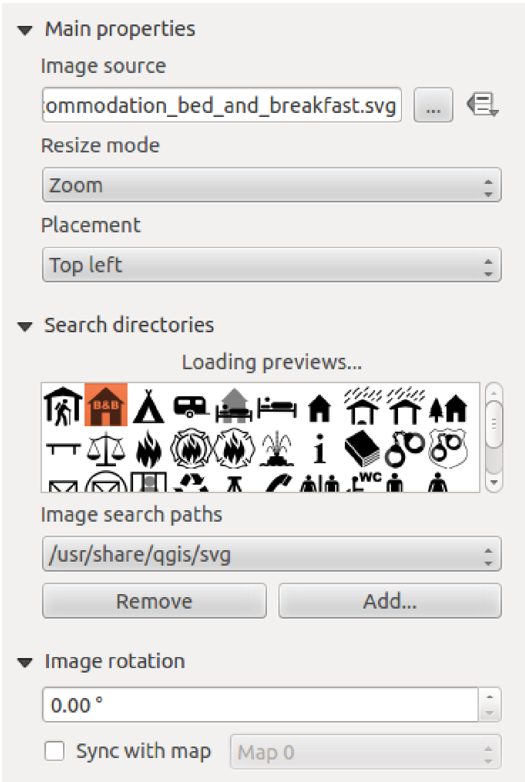

Figure 18.12: イメージアイテムプロパティタブ

You first have to select the image you want to display. There are several ways to set the *image source* in the **Main properties** area.

1. Use the browse button ... of *image source* to select a file on your computer using the browse dialog. The browser will start in the SVG-libraries provided with QGIS. Besides `SVG`, you can also select other image formats like `.png` or `.jpg`.
2. You can enter the source directly in the *image source* text field. You can even provide a remote URL-address to an image.
3. From the **Search directories** area you can also select an image from *loading previews ...* to set the image source.

4. Use the data defined button to set the image source from a record or using a regular expression.

With the *Resize mode* option, you can set how the image is displayed when the frame is changed, or choose to resize the frame of the image item so it matches the original size of the image.

You can select one of the following modes:

- Zoom: Enlarges the image to the frame while maintaining aspect ratio of picture.
- Stretch: Stretches image to fit inside the frame, ignores aspect ratio.
- Clip: Use this mode for raster images only, it sets the size of the image to original image size without scaling and the frame is used to clip the image, so only the part of the image inside the frame is visible.
- Zoom and resize frame: Enlarges image to fit frame, then resizes frame to fit resultant image.
- Resize frame to image size: Sets size of frame to match original size of image without scaling.

Selected resize mode can disable the item options 'Placement' and 'Image rotation'. The *Image rotation* is active for the resize mode 'Zoom' and 'Clip'.

With *Placement* you can select the position of the image inside it's frame. The **Search directories** area allows you to add and remove directories with images in SVG format to the picture database. A preview of the pictures found in the selected directories is shown in a pane and can be used to select and set the image source.

Images can be rotated with the *Image rotation* field. Activating the *Sync with map* checkbox synchronizes the rotation of a picture in the QGIS map canvas (i.e., a rotated north arrow) with the appropriate Print Composer image.

It is also possible to select a north arrow directly. If you first select a north arrow image from **Search directories** and then use the browse button ... of the field *Image source*, you can now select one of the north arrow from the list as displayed in figure_composer_image_2.

ノート: Many of the north arrows do not have an 'N' added in the north arrow, this is done on purpose for languages that do not use an 'N' for North, so they can use another letter.

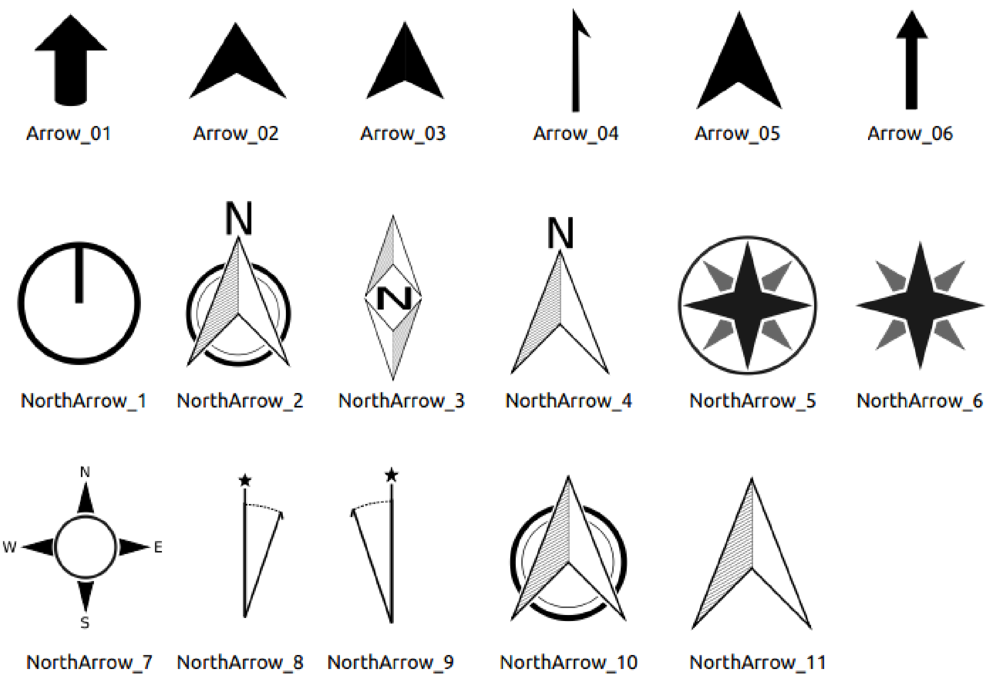

Figure 18.13: North arrows available for selection in provided SVG library

18.3.4 The Legend item

To add a map legend, click the Add new legend icon, place the element with the left mouse button on the Print Composer canvas and position and customize the appearance in the legend *Item Properties* tab.

The *Item properties* of a legend item tab provides the following functionalities (see figure_composer_legend_1):

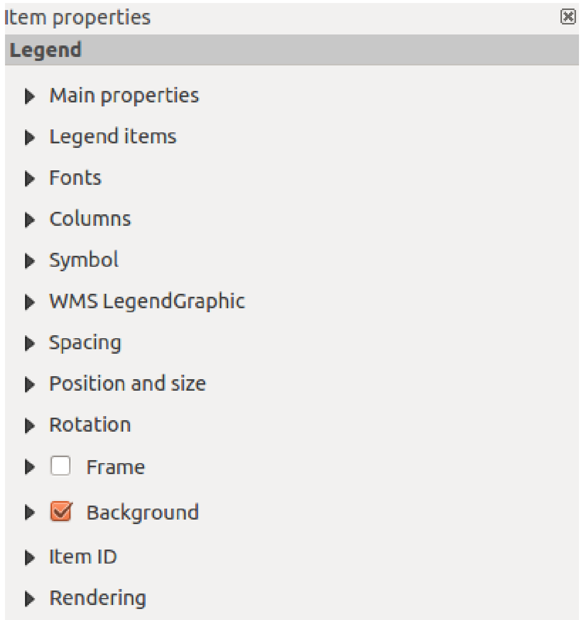

Figure 18.14: 凡例アイテムプロパティタブ

メインプロパティ

The *Main properties* dialog of the legend *Item Properties* tab provides the following functionalities (see figure_composer_legend_2):

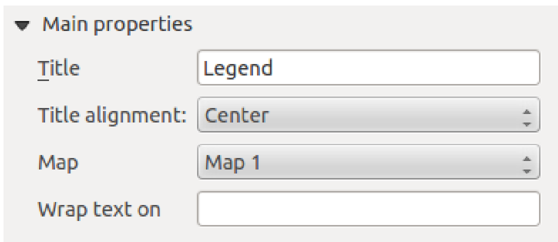

Figure 18.15: 凡例メインプロパティダイアログ

In Main properties you can:

- Change the title of the legend.
- Set the title alignment to Left, Center or Right.
- You can choose which *Map* item the current legend will refer to in the select list.
- You can wrap the text of the legend title on a given character.

凡例アイテム

The *Legend items* dialog of the legend *Item Properties* tab provides the following functionalities (see figure_composer_legend_3):

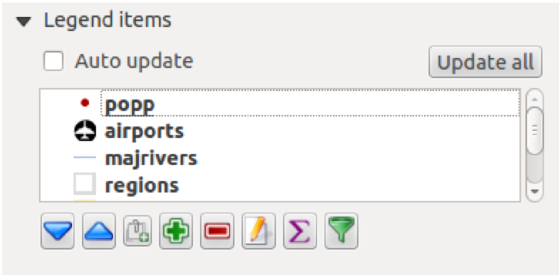

Figure 18.16: 凡例アイテムダイアログ

- The legend will be updated automatically if *Auto-update* is checked. When *Auto-update* is unchecked this will give you more control over the legend items. The icons below the legend items list will be activated.
- The legend items window lists all legend items and allows you to change item order, group layers, remove and restore items in the list, edit layer names and add a filter.
  - The item order can be changed using the **[Up]** and **[Down]** buttons or with 'drag-and-drop' functionality. The order can not be changed for WMS legend graphics.
  - Use the **[Add group]** button to add a legend group.
  - Use the **[plus]** and **[minus]** button to add or remove layers.
  - The **[Edit]** button is used to edit the layer-, groupname or title, first you need to select the legend item.
  - The **[Sigma]** button adds a feature count for each vector layer.
  - Use the **[filter]** button to filter the legend by map content, only the legend items visible in the map will be listed in the legend.

  After changing the symbology in the QGIS main window, you can click on **[Update All]** to adapt the changes in the legend element of the Print Composer.

Fonts, Columns, Symbol

The *Fonts*, *Columns* and *Symbol* dialogs of the legend *Item Properties* tab provide the following functionalities (see figure_composer_legend_4):

- You can change the font of the legend title, group, subgroup and item (layer) in the legend item. Click on a category button to open a **Select font** dialog.
- You provide the labels with a **Color** using the advanced color picker, however the selected color will be given to all font items in the legend..
- Legend items can be arranged over several columns. Set the number of columns in the *Count* 1,00 field.
  - *Equal column widths* sets how legend columns should be adjusted.
  - The *Split layers* option allows a categorized or a graduated layer legend to be divided between columns.
- You can change the width and height of the legend symbol in this dialog.

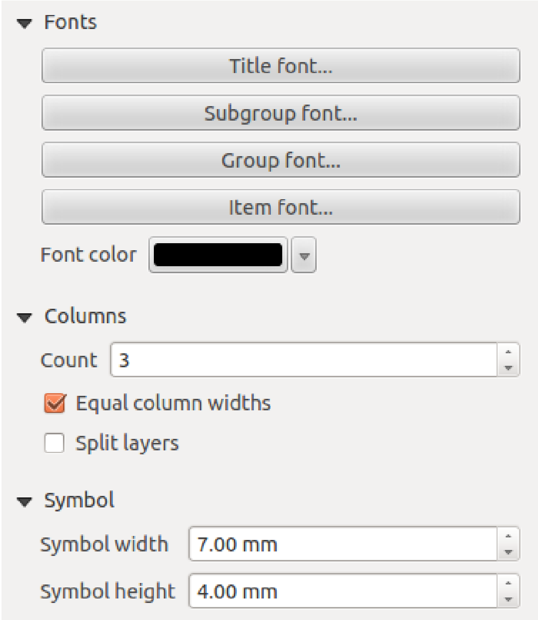

Figure 18.17: 凡例フォント, カラム, シンボルと間隔ダイアログ

WMS LegendGraphic and Spacing

The *WMS LegendGraphic* and *Spacing* dialogs of the legend *Item Properties* tab provide the following functionalities (see figure_composer_legend_5):

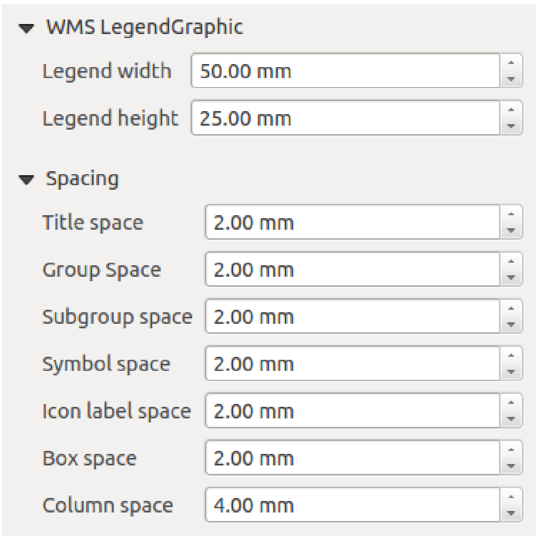

Figure 18.18: WMS LegendGraphic Dialogs

When you have added a WMS layer and you insert a legend composer item, a request will be send to the WMS server to provide a WMS legend. This Legend will only be shown if the WMS server provides the GetLegendGraphic capability. The WMS legend content will be provided as a raster image.

WMS LegendGraphic is used to be able to adjust the *Legend width* and the *Legend height* of the WMS legend raster image.

Spacing around title, group, subgroup, symbol, icon label, box space or column space can be customized through this dialog.

18.3.5 The Scale Bar item

To add a scale bar, click the Add new scalebar icon, place the element with the left mouse button on the Print Composer canvas and position and customize the appearance in the scale bar *Item Properties* tab.

The *Item properties* of a scale bar item tab provides the following functionalities (see figure_composer_scalebar_1):

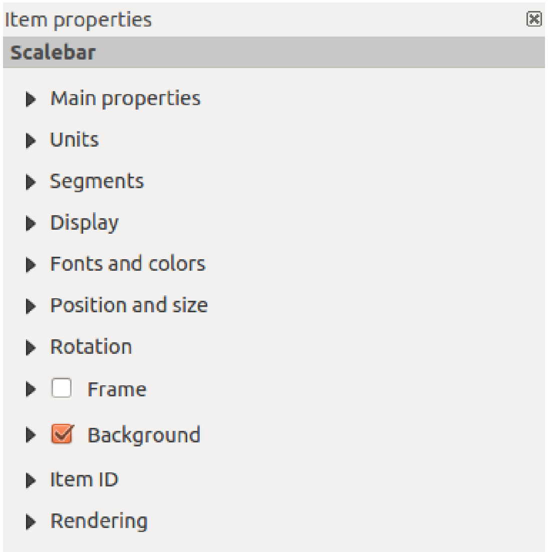

Figure 18.19: Scale Bar Item properties Tab

メインプロパティ

The *Main properties* dialog of the scale bar *Item Properties* tab provides the following functionalities (see figure_composer_scalebar_2):

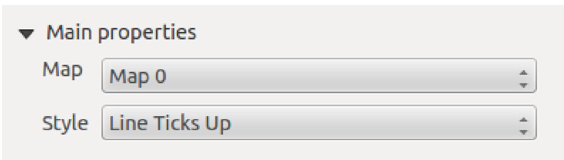

Figure 18.20: Scale Bar Main properties Dialog

- First, choose the map the scale bar will be attached to.
- Then, choose the style of the scale bar. Six styles are available:
  - **Single box** and **Double box** styles, which contain one or two lines of boxes alternating colors.
  - **Middle**, **Up** or **Down** line ticks.
  - **Numeric**, where the scale ratio is printed (i.e., 1:50000).

単位とセグメント

The *Units* and *Segments* dialogs of the scale bar *Item Properties* tab provide the following functionalities (see figure_composer_scalebar_3):

In these two dialogs, you can set how the scale bar will be represented.

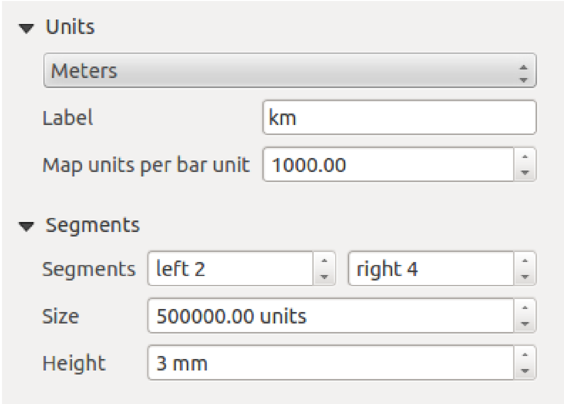

Figure 18.21: Scale Bar Units and Segments Dialogs

- Select the map units used. There are four possible choices: **Map Units** is the automated unit selection; **Meters**, **Feet** or **Nautical Miles** force unit conversions.
- The *Label* field defines the text used to describe the units of the scale bar.
- The *Map units per bar unit* allows you to fix the ratio between a map unit and its representation in the scale bar.
- You can define how many *Segments* will be drawn on the left and on the right side of the scale bar, and how long each segment will be (*Size* field). *Height* can also be defined.

Display

The *Display* dialog of the scale bar *Item Properties* tab provide the following functionalities (see figure_composer_scalebar_4):

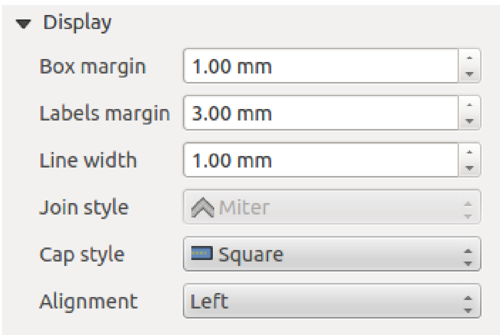

Figure 18.22: Scale Bar Display

You can define how the scale bar will be displayed in its frame.

- *Box margin* : space between text and frame borders
- *Labels margin* : space between text and scale bar drawing
- *Line width* : line widht of the scale bar drawing
- *Join style* : Corners at the end of scalebar in style Bevel, Rounded or Square (only available for Scale bar style Single Box & Double Box)
- *Cap style* : End of all lines in style Square, Round or Flat (only available for Scale bar style Line Ticks Up, Down and Middle)
- *Alignment* : Puts text on the left, middle or right side of the frame (works only for Scale bar style Numeric)

Fonts and colors

The *Fonts and colors* dialog of the scale bar *Item Properties* tab provide the following functionalities (see figure_composer_scalebar_5):

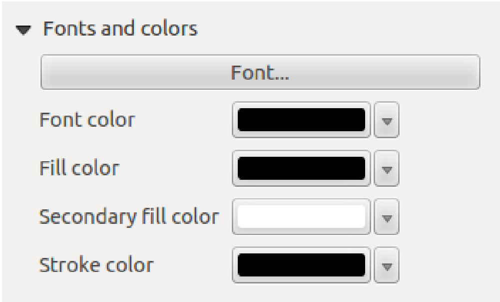

Figure 18.23: Scale Bar Fonts and colors Dialogs

You can define the fonts and colors used for the scale bar.

- Use the **[Font]** button to set the font
- *Font color*: set the font color
- *Fill color*: set the first fill color
- *Secondary fill color*: set the second fill color
- *Stroke color*: set the color of the lines of the Scale Bar

Fill colors are only used for scale box styles Single Box and Double Box. To select a color you can use the list option using the dropdown arrow to open a simple color selection option or the more advanced color selection option, that is started when you click in the colored box in the dialog.

18.3.6 The Basic Shape Items

To add a basic shape (ellipse, rectangle, triangle), click the Add basic shape icon or the Add Arrow icon, place the element holding down the left mouse. Customize the appearance in the *Item Properties* tab.

When you also hold down the `Shift` key while placing the basic shape you can create a perfect square, circle or triangle.

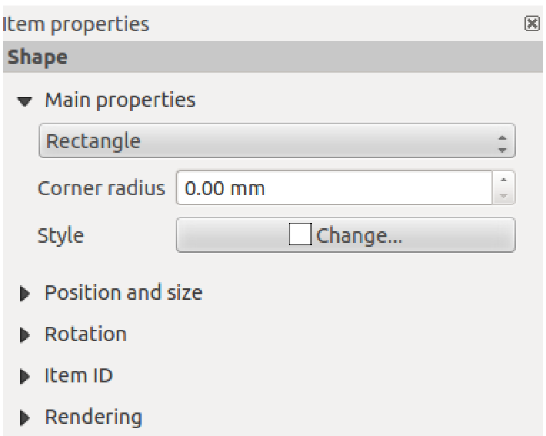

Figure 18.24: 図形アイテムプロパティタブ

The *Shape* item properties tab allows you to select if you want to draw an ellipse, rectangle or triangle inside the given frame.

You can set the style of the shape using the advanced symbol style dialog with which you can define its outline and fill color, fill pattern, use markers etcetera.

For the rectangle shape, you can set the value of the corner radius to round of the corners.

ノート: Unlike other items, you can not style the frame or the background color of the frame.

18.3.7 The Arrow item

To add an arrow, click the Add Arrow icon, place the element holding down the left mouse button and drag a line to draw the arrow on the Print Composer canvas and position and customize the appearance in the scale bar *Item Properties* tab.

When you also hold down the `Shift` key while placing the arrow, it is placed in an angle of exactly 45 ° .

The arrow item can be used to add a line or a simple arrow that can be used, for example, to show the relation between other print composer items. To create a north arrow, the image item should be considered first. QGIS has a set of North arrows in SVG format. Furthermore you can connect an image item with a map so it can rotate automatically with the map (see the_image_item).

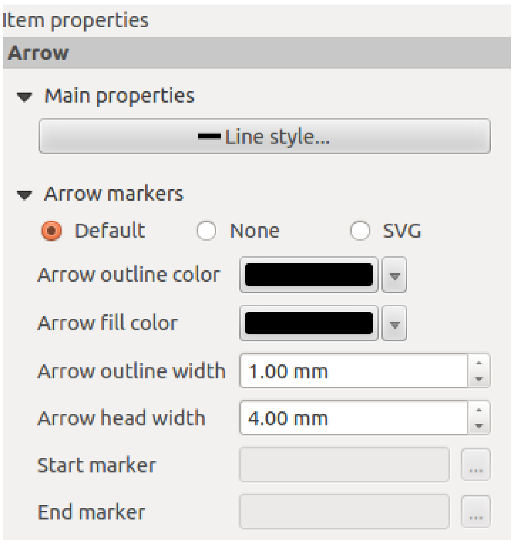

Figure 18.25: 矢印アイテムプロパティタブ

Item Properties

The *Arrow* item properties tab allows you to configure an arrow item.

The **[Line style ...]** button can be used to set the line style using the line style symbol editor.

In *Arrows markers* you can select one of three radio buttons.

- *Default* : To draw a regular arrow, gives you options to style the arrow head
- *None* : To draw a line without arrow head
- *SVG Marker* : To draw a line with an SVG *Start marker* and/or *End marker*

For *Default* Arrow marker you can use following options to style the arrow head.

- *Arrow outline color* : Set the outline color of the arrow head
- *Arrow fill color* : Set the fill color of the arrow head

- *Arrow outline width* : Set the outline width of the arrow head
- *Arrow head width*: Set the size of the arrow head

For *SVG Marker* you can use following options.

- *Start marker* : Choose an SVG image to draw at the beginning of the line
- *End marker* : Choose an SVG image to draw at the end of the line
- *Arrow head width*: Sets the size of Start and/or End marker

SVG images are automatically rotated with the line. The color of the SVG image can not be changed.

18.3.8 The Attribute Table item

It is possible to add parts of a vector attribute table to the Print Composer canvas: Click the Add attribute table icon, place the element with the left mouse button on the Print Composer canvas, and position and customize the appearance in the *Item Properties* tab.

The *Item properties* of an attribute table item tab provides the following functionalities (see figure_composer_table_1):

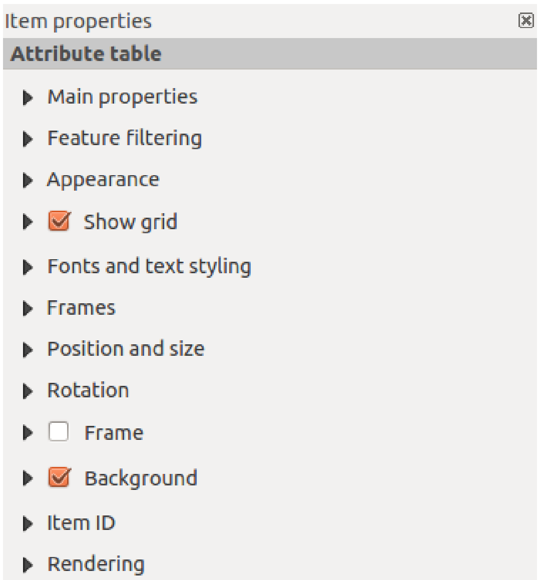

Figure 18.26: Attribute table Item properties Tab

メインプロパティ

The *Main properties* dialogs of the attribute table *Item Properties* tab provide the following functionalities (see figure_composer_table_2):

- For *Source* you can normally select only 'Layer features'.
- With *Layer* you can choose from the vector layers loaded in the project.
- The button **[Refresh table data]** can be used to refresh the table when the actual contents of the table has changed.
- In case you activated the *Generate an atlas* option in the *Atlas generation* tab, there are two additional *Source* possible: 'Current atlas feature' (see figure_composer_table_2b) and 'Relation children' (see figure_composer_table_2c). Choosing the 'Current atlas feature' you won't see any option to choose the layer, and the table item will only show a row with the attributes from the current feature of the atlas coverage

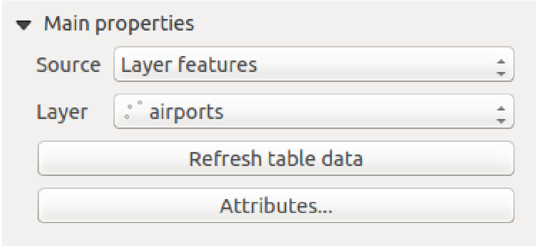

Figure 18.27: Attribute table Main properties Dialog

layer. Choosing 'Relation children', an option with the relation name will show up. The 'Relation children' option can only be used if you have defined a relation using your atlas coverage layer as parent, and it will show the children rows of the atlas coverage layer's current feature (for further information about the atlas generation see atlasgeneration).

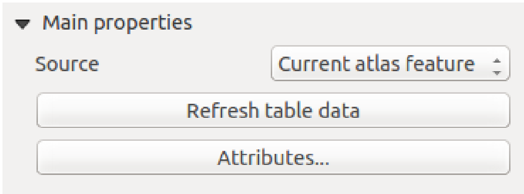

Figure 18.28: Attribute table Main properties for 'Current atlas feature'

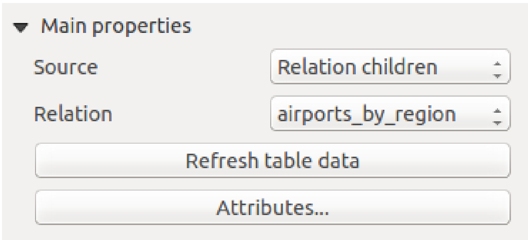

Figure 18.29: Attribute table Main properties for 'Relation children'

- The button **[Attributes...]** starts the *Select attributes* menu, see figure_composer_table_3, that can be used to change the visible contents of the table. After making changes use the **[OK]** button to apply changes to the table.

  In the *Columns* section you can:

  - Remove an attribute, just select an attribute row by clicking anywhere in a row and press the minus button to remove the selected attribute.
  - Add a new attribute use the plus button. At the end a new empty row appears and you can select empty cell of the column *Attribute*. You can select a field attribute from the list or you can select to build a new attribute using a regular expression (button). Of course you can modify every already existing attribute by means of a regular expression.
  - Use the up and down arrows to change the order of the attributes in the table.
  - Select a cel in the Headings column to change the Heading, just type in a new name.
  - Select a cel in the Alignment column and you can choose between Left, Center or Right alignment.
  - Select a cel in the Width column and you can change it from Automatic to a width in mm, just type a number. When you want to change it back to Automatic, use the cross.
  - The **[Reset]** button can always be used to restore it to the original attribute settings.

  In the *Sorting* section you can:

- Add an attribute to sort the table with. Select an attribute and set the sorting order to 'Ascending' or 'Descending' and press the plus button. A new line is added to the sort order list.
- select a row in the list and use the up and down button to change the sort priority on attribute level.
- use the minus button to remove an attribute from the sort order list.

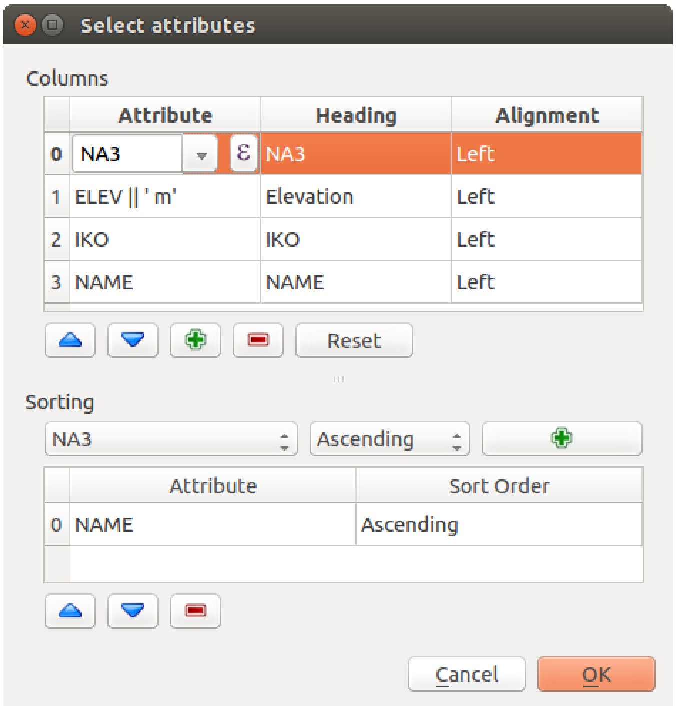

Figure 18.30: 属性テーブル 属性選択ダイアログ

Feature filtering

The *Feature filtering* dialogs of the attribute table *Item Properties* tab provide the following functionalities (see figure_composer_table_4):

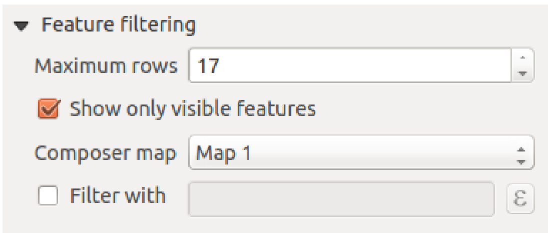

Figure 18.31: Attribute table Feature filtering Dialog

You can:

- Define the *Maximum rows* to be displayed.
- Activate *Remove duplicate rows from table* to show unique records only.
- Activate *Show only visible features within a map* and select the corresponding *Composer map* to display the attributes of features only visible on selected map.
- Activate *Show only features intersecting Atlas feature* is only available when *Generate an atlas* is activated. When activated it will show a table with only the features shown on the map of that particular page of the atlas.

- Activate *Filter with* and provide a filter by typing in the input line or insert a regular expression using the given expression button. A few examples of filtering statements you can use when you have loaded the airports layer from the Sample dataset:
  - `ELEV > 500`
  - `NAME = 'ANIAK'`
  - `NAME NOT LIKE 'AN%`
  - `regexp_match( attribute( $currentfeature, 'USE' ) , '[i]')`

  The last regular expression will include only the arpoirts that have a letter 'i' in the attribute field 'USE'.

Appearance

The *Appearance* dialogs of the attribute table *Item Properties* tab provide the following functionalities (see figure_composer_table_5):

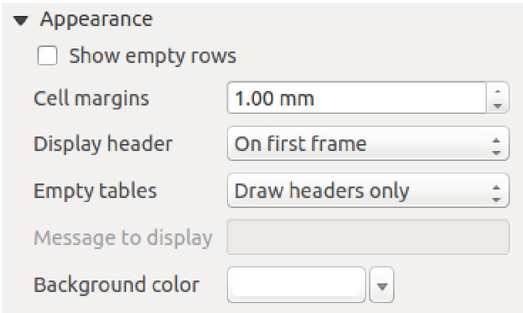

Figure 18.32: Attribute table appearance Dialog

- Click *Show empty rows* to make empty entries in the attribute table visible.
- With *Cell margins* you can define the margin around text in each cell of the table.
- With *Display header* you can select from a list one of 'On first frame', 'On all frames' default option, or 'No header'.
- The option *Empty table* controls what will be displayed when the result selection is empty.
  - **Draw headers only**, will only draw the header except if you have choosen 'No header' for *Display header*.
  - **Hide entire table**, will only draw the background of the table. You can activate *Don't draw background if frame is empty* in *Frames* to completely hide the table.
  - **Draw empty cells**, will fill the attribute table with empty cells, this option can also be used to provide additional empty cells when you have a result to show!
  - **Show set message**, will draw the header and adds a cell spanning all columns and display a message like 'No result' that can be provided in the option *Message to display*
- The option *Message to display* is only activated when you have selected **Show set message** for *Empty table*. The message provided will be shown in the table in the first row, when the result is an empty table.
- With *Background color* you can set the background color of the table.

Show grid

The *Show grid* dialog of the attribute table *Item Properties* tab provide the following functionalities (see figure_composer_table_6):

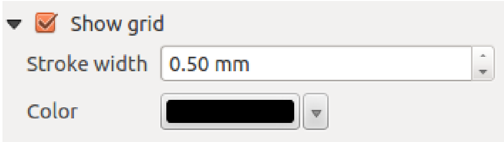

Figure 18.33: Attribute table Show grid Dialog

- Activate *Show grid* when you want to display the grid, the outlines of the table cells.
- With *Stroke width* you can set the thickness of the lines used in the grid.
- The *Color* of the grid can be set using the color selection dialog.

Fonts and text styling

The *Fonts and text styling* dialog of the attribute table *Item Properties* tab provide the following functionalities (see figure_composer_table_7):

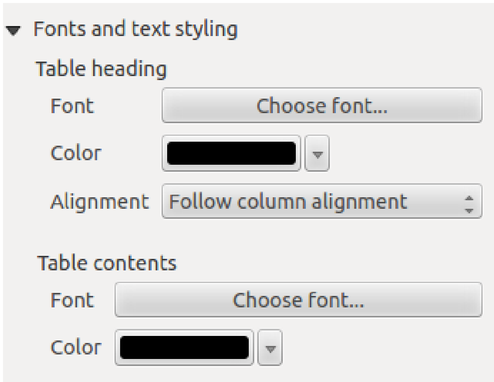

Figure 18.34: Attribute table Fonts and text styling Dialog

- You can define *Font* and *Color* for *Table heading* and *Table contents*.
- For *Table heading* you can additionally set the *Alignment* and choose from *Follow column alignment*, *Left*, *Center* or *Right*. The column alignment is set using the *Select Attributes* dialog (see Figure_composer_table_3).

Frames

The *Frames* dialog of the attribute table *Item Properties* tab provide the following functionalities (see figure_composer_table_8):

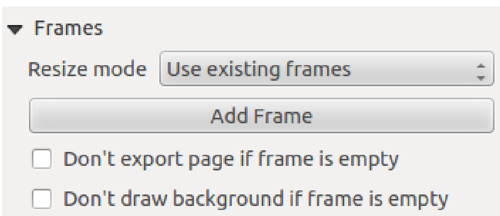

Figure 18.35: Attribute table Frames Dialog

- With *Resize mode* you can select how to render the attribute table contents:
  - *Use existing frames* displays the result in the first frame and added frames only.
  - *Extent to next page* will create as many frames (and corresponding pages) as necessary to display the full selection of attribute table. Each frame can be moved around on the layout. If you resize a frame, the resulting table will be divided up between the other frames. The last frame will be trimmed to fit the table.
  - *Repeat until finished* will also create as many frames as the *Extend to next page* option, except all frames will have the same size.
- Use the **[Add Frame]** button to add another frame with the same size as selected frame. The result of the table that will not fit in the first frame will continue in the next frame when you use the Resize mode *Use existing frames*.
- Activate *Don't export page if frame is empty* prevents the page to be exported when the table frame has no contents. This means all other composer items, maps, scalebars, legends etc. will not be visible in the result.
- Activate *Don't draw background if frame is empty* prevents the background to be drawn when the table frame has no contents.

18.3.9 The HTML frame item

It is possible to add a frame that displays the contents of a website or even create and style your own HTML page and display it!

Click the Add HTML frame icon, place the element by dragging a rectangle holding down the left mouse button on the Print Composer canvas and position and customize the appearance in the *Item Properties* tab (see figure_composer_html_1).

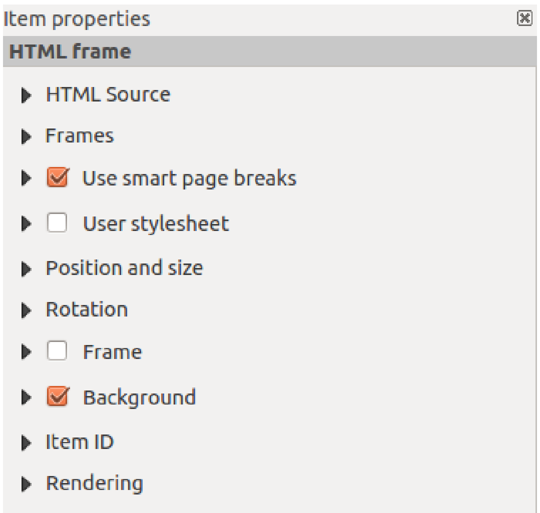

Figure 18.36: HTML frame, the item properties Tab

HTML Source

As an HTML source, you can either set a URL and activate the URL radiobutton or enter the HTML source directly in the textbox provided and activate the Source radiobutton.

The *HTML Source* dialog of the HTML frame *Item Properties* tab provides the following functionalities (see figure_composer_html_2):

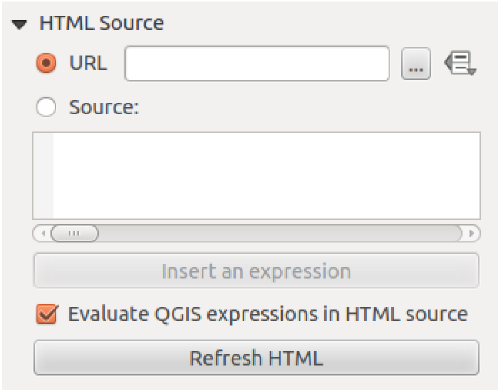

Figure 18.37: HTML frame, the HTML Source properties

- In *URL* you can enter the URL of a webpage you copied from your internet browser or select an HTML file using the browse button . There is also the option to use the Data defined override button, to provide an URL from the contents of an attribute field of a table or using a regular expression.
- In *Source* you can enter text in the textbox with some HTML tags or provide a full HTML page.
- The **[insert an expression]** button can be used to insert an expression like `[%Year($now)%]` in the Source textbox to display the current year. This button is only activated when radiobutton *Source* is selected. After inserting the expression click somewhere in the textbox before refreshing the HTML frame, otherwise you will lose the expression.
- Activate *Evaluate QGIS expressions in HTML code* to see the result of the expression you have included, otherwise you will see the expression instead.
- Use the **[Refresh HTML]** button to refresh the HTML frame(s) to see the result of changes.

Frames

The *Frames* dialog of the HTML frame *Item Properties* tab provides the following functionalities (see figure_composer_html_3):

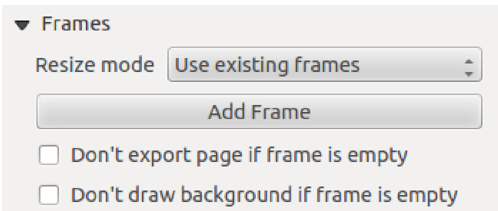

Figure 18.38: HTML frame, the Frames properties

- With *Resize mode* you can select how to render the HTML contents:
  - *Use existing frames* displays the result in the first frame and added frames only.
  - *Extent to next page* will create as many frames (and corresponding pages) as necessary to render the height of the web page. Each frame can be moved around on the layout. If you resize a frame, the webpage will be divided up between the other frames. The last frame will be trimmed to fit the web page.
  - *Repeat on every page* will repeat the upper left of the web page on every page in frames of the same size.
  - *Repeat until finished* will also create as many frames as the *Extend to next page* option, except all frames will have the same size.

- Use the **[Add Frame]** button to add another frame with the same size as selected frame. If the HTML page that will not fit in the first frame it will continue in the next frame when you use *Resize mode* or *Use existing frames*.
- Activate *Don't export page if frame is empty* prevents the map layout from being exported when the frame has no HTML contents. This means all other composer items, maps, scalebars, legends etc. will not be visible in the result.
- Activate *Don't draw background if frame is empty* prevents the HTML frame being drawn if the frame is empty.

Use smart page breaks and User style sheet

The *Use smart page breaks* dialog and *Use style sheet* dialog of the HTML frame *Item Properties* tab provides the following functionalities (see figure_composer_html_4):

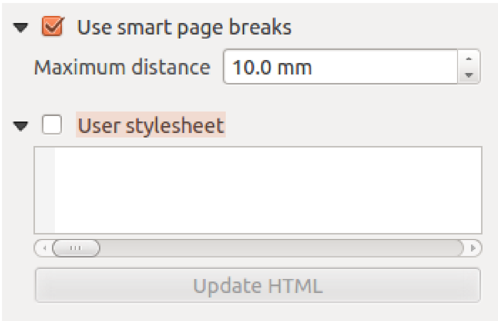

Figure 18.39: HTML frame, Use smart page breaks and User stylesheet properties

- Activate *Use smart page breaks* to prevent the html frame contents from breaking mid-way a line of text so it continues nice and smooth in the next frame.
- Set the *Maximum distance* allowed when calculating where to place page breaks in the html. This distance is the maximum amount of empty space allowed at the bottom of a frame after calculating the optimum break location. Setting a larger value will result in better choice of page break location, but more wasted space at the bottom of frames. This is only used when *Use smart page breaks* is activated.
- Activate *User stylesheet* to apply HTML styles that often is provided in cascading style sheets. An example of style code is provide below to set the color of `<h1>` header tag to green and set the font and fontsize of text included in paragraph tags `<p>`.

```
h1 {color: #00ff00;
}
p {font-family: "Times New Roman", Times, serif;
   font-size: 20px;
}
```

- Use the **[Update HTML]** button to see the result of the stylesheet settings.

18.4 Manage items

18.4.1 Size and position

Each item inside the Composer can be moved/resized to create a perfect layout. For both operations the first step is to activate the Select/Move item tool and to click on the item; you can then move it using the mouse while holding the left button. If you need to constrain the movements to the horizontal or the vertical axis, just hold the `Shift` while moving the mouse. If you need a better precision, you can move a selected item using the `Arrow keys` on the keyboard; if the movement is too slow, you can speed up it by holding `Shift`.

A selected item will show squares on its boundaries; moving one of them with the mouse, will resize the item in the corresponding direction. While resizing, holding `Shift` will maintain the aspect ratio. Holding `Alt` will resize from the item center.

The correct position for an item can be obtained using snapping to grid or smart guides. Guides are set by clicking and dragging in the rulers. Guides are moved by clicking in the ruler, level with the guide and dragging to a new place. To delete a guide move it off the canvas. If you need to disable the snap on the fly just hold `Ctrl` while moving the mouse.

You can choose multiple items with the Select/Move item button. Just hold the `Shift` button and click on all the items you need. You can then resize/move this group just like a single item.

Once you have found the correct position for an item, you can lock it by using the items on the toolbar or ticking the box next to the item in the *Items* tab. Locked items are **not** selectable on the canvas.

Locked items can be unlocked by selecting the item in the *Items* tab and unchecking the tickbox or you can use the icons on the toolbar.

To unselect an item, just click on it holding the `Shift` button.

Inside the *Edit* menu, you can find actions to select all the items, to clear all selections or to invert the current selection.

18.4.2 Alignment

Raising or lowering functionalities for elements are inside the Raise selected items pull-down menu. Choose an element on the Print Composer canvas and select the matching functionality to raise or lower the selected element compared to the other elements (see table_composer_1). This order is shown in the *Items* tab. You can also raise or lower objects in the *Items* tab by clicking and dragging an object's label in this list.

There are several alignment functionalities available within the Align selected items pull-down menu (see table_composer_1). To use an alignment functionality, you first select some elements and then click on the matching alignment icon. All selected elements will then be aligned within to their common bounding box. When moving items on the Composer canvas, alignment helper lines appear when borders, centers or corners are aligned.

18.4.3 Copy/Cut and Paste items

The print composer includes actions to use the common Copy/Cut/Paste functionality for the items in the layout. As usual first you need to select the items using one of the options seen above; at this point the actions can be found in the *Edit* menu. When using the Paste action, the elements will be pasted according to the current mouse position.

ノート: HTML items can not be copied in this way. As a workaround, use the **[Add Frame]** button in the *Item Properties* tab.

18.5 取り消しと再実行ツール

During the layout process, it is possible to revert and restore changes. This can be done with the revert and restore tools:

- Revert last change
- Restore last change

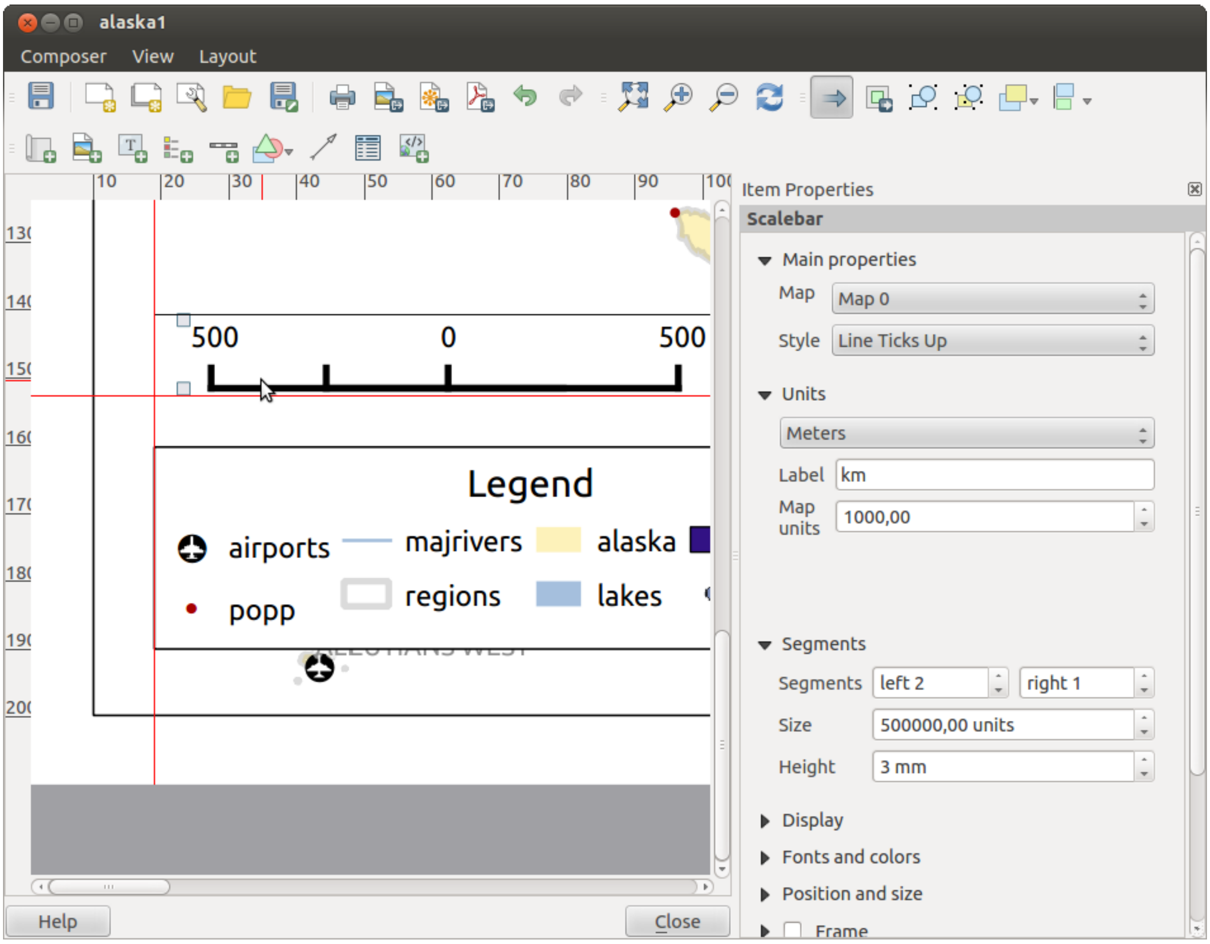

Figure 18.40: プリントコンポーザ内の配置ヘルパーライン

This can also be done by mouse click within the *Command history* tab (see figure_composer_29).

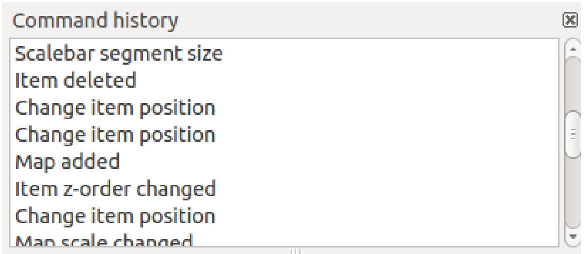

Figure 18.41: プリントコンポーザでのコマンドヒストリー|nix|

18.6 地図帳の生成

The Print Composer includes generation functions that allow you to create map books in an automated way. The concept is to use a coverage layer, which contains geometries and fields. For each geometry in the coverage layer, a new output will be generated where the content of some canvas maps will be moved to highlight the current geometry. Fields associated with this geometry can be used within text labels.

Every page will be generated with each feature. To enable the generation of an atlas and access generation parameters, refer to the *Atlas generation* tab. This tab contains the following widgets (see Figure_composer_atlas):

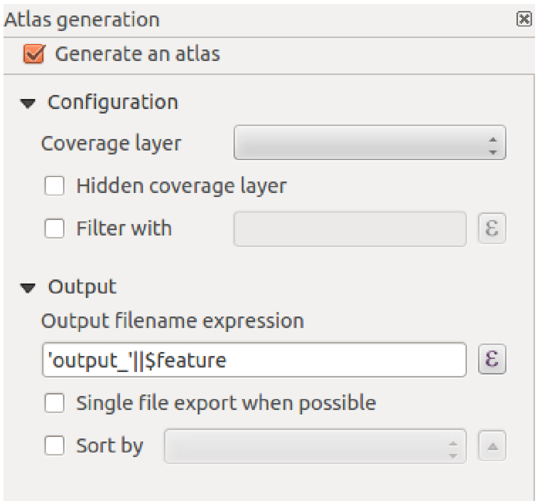

Figure 18.42: 地図帳作成タブ

- *Generate an atlas*, which enables or disables the atlas generation.
- A *Coverage layer* combo box that allows you to choose the (vector) layer containing the geometries on which to iterate over.
- An optional *Hidden coverage layer* that, if checked, will hide the coverage layer (but not the other ones) during the generation.
- An optional *Filter with* text area that allows you to specify an expression for filtering features from the coverage layer. If the expression is not empty, only features that evaluate to `True` will be selected. The button on the right allows you to display the expression builder.
- **出力ファイル名の式** 必要に応じて各ジオメトリからファイル名を生成するために使用される式を入力します。これは式に基づいています。このフィールドは複数のファイルにレンダリングするためのみ意味します。

- A Single file export when possible that allows you to force the generation of a single file if this is possible with the chosen output format (PDF, for instance). If this field is checked, the value of the *Output filename expression* field is meaningless.
- An optional *Sort by* that, if checked, allows you to sort features of the coverage layer. The associated combo box allows you to choose which column will be used as the sorting key. Sort order (either ascending or descending) is set by a two-state button that displays an up or a down arrow.

You can use multiple map items with the atlas generation; each map will be rendered according to the coverage features. To enable atlas generation for a specific map item, you need to check *Controlled by Atlas* under the item properties of the map item. Once checked, you can set:

- A radiobutton *Margin around feature* that allows you to select the amount of space added around each geometry within the allocated map. Its value is meaningful only when using the auto-scaling mode.
- A *Predefined scale* (best fit). It will use the best fitting option from the list of predefined scales in your project properties settings (see *Project –> Project Properties –> General –> Project Scales* to configure these predefined scales).
- A *Fixed scale* that allows you to toggle between auto-scale and fixed-scale mode. In fixed-scale mode, the map will only be translated for each geometry to be centered. In auto-scale mode, the map's extents are computed in such a way that each geometry will appear in its entirety.

18.6.1 Labels

In order to adapt labels to the feature the atlas plugin iterates over, you can include expressions. For example, for a city layer with fields CITY_NAME and ZIPCODE, you could insert this:

```
The area of [% upper(CITY_NAME) || ',' || ZIPCODE || ' is ' format_number($area/1000000,2) %] km2
```

The information *[% upper(CITY_NAME) || ',' || ZIPCODE || ' is ' format_number($area/1000000,2) %]* is an expression used inside the label. That would result in the generated atlas as:

The area of PARIS,75001 is 1.94 km2

18.6.2 Data Defined Override Buttons

There are several places where you can use a Data Defined Override button to override the selected setting. These options are particularly usefull with Atlas Generation.

For the following examples the *Regions* layer of the QGIS sample dataset is used and selected for Atlas Generation. We also assume the paper format *A4 (210X297)* is selected in the *Composition* tab for field *Presets*.

With a *Data Defined Override* button you can dynamically set the paper orientation. When the height (north-south) of the extents of a region is greater than it's width (east-west), you rather want to use *portrait* instead of *landscape* orientation to optimize the use of paper.

In the *Composition* you can set the field *Orientation* and select *Landscape* or *Portrait*. We want to set the orientation dynamically using an expression depending on the region geometry. press the button of field *Orientation*, select *Edit ...* so the *Expression string builder* dialog opens. Give following expression:

```
CASE WHEN bounds_width($atlasgeometry) > bounds_height($atlasgeometry) THEN 'Landscape' ELSE 'Por
```

Now the paper orients itself automatically for each Region you need to reposition the location of the composer item as well. For the map item you can use the button of field *Width* to set it dynamically using following expression:

```
(CASE WHEN bounds_width($atlasgeometry) > bounds_height($atlasgeometry) THEN 297 ELSE 210 END) - 
```

Use the button of field *Heigth* to provide following expression:

```
(CASE WHEN bounds_width($atlasgeometry) > bounds_height($atlasgeometry) THEN 210 ELSE 297 END) - 2
```

When you want to give a title above map in the center of the page, insert a label item above the map. First use the item properties of the label item to set the horizontal alignment to *Center*. Next activate from *Reference point* the upper middle checkbox. You can provide following expression for field *X* :

```
(CASE WHEN bounds_width($atlasgeometry) > bounds_height($atlasgeometry) THEN 297 ELSE 210 END) / 2
```

For all other composer items you can set the position in a similar way so they are correctly positioned when page is automatically rotated in portrait or landscape.

Information provided is derived from the excellent blog (in english and portugese) on the Data Defined Override options Multiple_format_map_series_using_QGIS_2.6 .

This is just one example of how you can use Data Defined Overrides.

18.6.3 Preview

Once the atlas settings have been configured and map items selected, you can create a preview of all the pages by clicking on *Atlas* → *Preview Atlas* and using the arrows, in the same menu, to navigate through all the features.

18.6.4 生成

The atlas generation can be done in different ways. For example, with *Atlas* → *Print Atlas*, you can directly print it. You can also create a PDF using *Atlas* → *Export Atlas as PDF*: The user will be asked for a directory for saving all the generated PDF files (except if the *Single file export when possible* has been selected). If you need to print just a page of the atlas, simply start the preview function, select the page you need and click on *Composer* → *Print* (or create a PDF).

18.7 Hide and show panels

To maximise the space available to interact with a composition you can use *View* –> *Hide panels* or press `F10`.

:: note:

```
It’s also possible to switch to a full screen mode to have more space to interact by pressing
:kbd:‘F11‘ or using :guilabel:‘View --> |checkbox| :guilabel:‘Toggle full screen‘.
```

18.8 出力の作成

Figure_composer_output shows the Print Composer with an example print layout, including each type of map item described in the sections above.

Before printing a layout you have the possibility to view your composition without bounding boxes. This can be enabled by deactivating *View* –> *Show bounding boxes* or pressing the shortcut `Ctrl+Shift+B`.

The Print Composer allows you to create several output formats, and it is possible to define the resolution (print quality) and paper size:

- The Print icon allows you to print the layout to a connected printer or a PostScript file, depending on installed printer drivers.

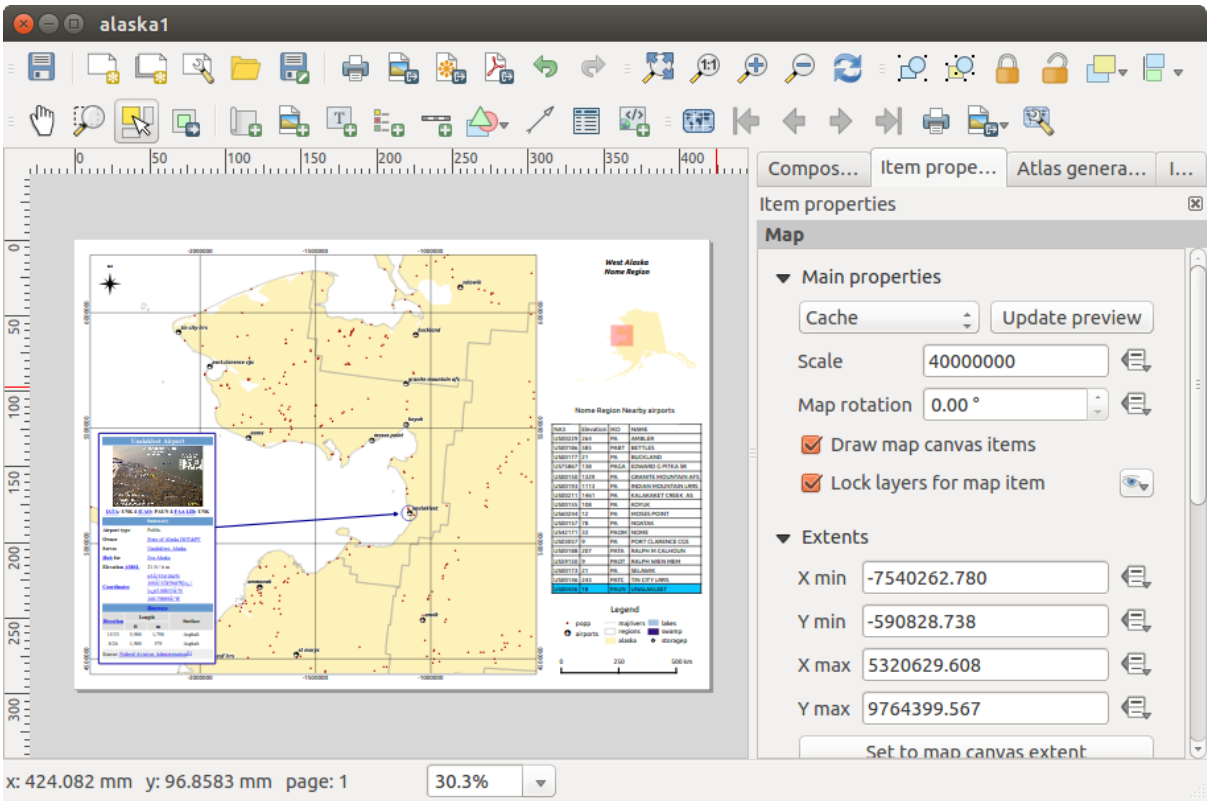

Figure 18.43: Print Composer with map view, legend, image, scale bar, coordinates, text and HTML frame added

- The Export as image icon exports the Composer canvas in several image formats, such as PNG, BPM, TIF, JPG,...
- Export as PDF saves the defined Print Composer canvas directly as a PDF.
- The Export as SVG icon saves the Print Composer canvas as an SVG (Scalable Vector Graphic).

If you need to export your layout as a **georeferenced image** (i.e., to load back inside QGIS), you need to enable this feature under the Composition tab. Check *World file on* and choose the map item to use. With this option, the 'Export as image' action will also create a world file.

ノート:

- Currently, the SVG output is very basic. This is not a QGIS problem, but a problem with the underlying Qt library. This will hopefully be sorted out in future versions.
- Exporting big rasters can sometimes fail, even if there seems to be enough memory. This is also a problem with the underlying Qt management of rasters.

18.9 コンポーザの管理

With the Save as template and Add items from template icons, you can save the current state of a Print Composer session as a `.qpt` template and load the template again in another session.

The Composer Manager button in the QGIS toolbar and in *Composer* → *Composer Manager* allows you to add a new Composer template, create a new composition based on a previously saved template or to manage already existing templates.

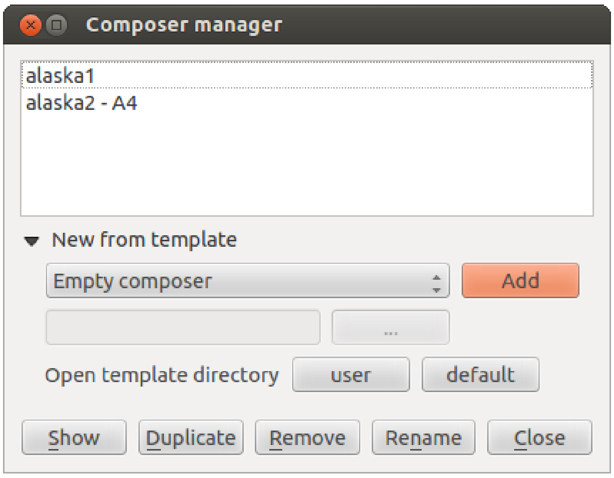

Figure 18.44: プリントコンポーザマネージャ

By default, the Composer manager searches for user templates in ~/.qgis2/composer_template.

The New Composer and Duplicate Composer buttons in the QGIS toolbar and in *Composer* → *New Composer* and *Composer* → *Duplicate Composer* allow you to open a new Composer dialog, or to duplicate an existing composition from a previously created one.

Finally, you can save your print composition with the Save Project button. This is the same feature as in the QGIS main window. All changes will be saved in a QGIS project file.

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Chapter 19

プラグイン

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19.1 QGIS Plugins

QGIS has been designed with a plugin architecture. This allows many new features and functions to be easily added to the application. Many of the features in QGIS are actually implemented as plugins.

You can manage your plugins in the plugin dialog which can be opened with *Plugins* > *Manage and install plugins* ....

When a plugin needs to be updated, and if plugins settings have been set up accordingly, QGIS main interface could display a blue link in the status bar to tell you that there are some updates for plugins waiting to be applied.

19.1.1 プラグインダイアログ

The menus in the Plugins dialog allow the user to install, uninstall and upgrade plugins in different ways. Each plugin have some metadatas displayed in the right panel:

- information if the plugin is experimental
- 説明
- rating vote(s) (you can vote for your prefered plugin!)
- タグ
- some useful links as the home page, tracker and code repository
- 作者
- 利用可能バージョン

特定のプラグインを見つけるためフィルタを使うことができます。

All

Here, all the available plugins are listed, including both core and external plugins. Use **[Upgrade all]** to look for new versions of the plugins. Furthermore, you can use **[Install plugin]**, if a plugin is listed but not installed, and **[Uninstall plugin]** as well as **[Reinstall plugin]**, if a plugin is installed. If a plugin is installed, it can be de/activated using the checkbox.

Installed

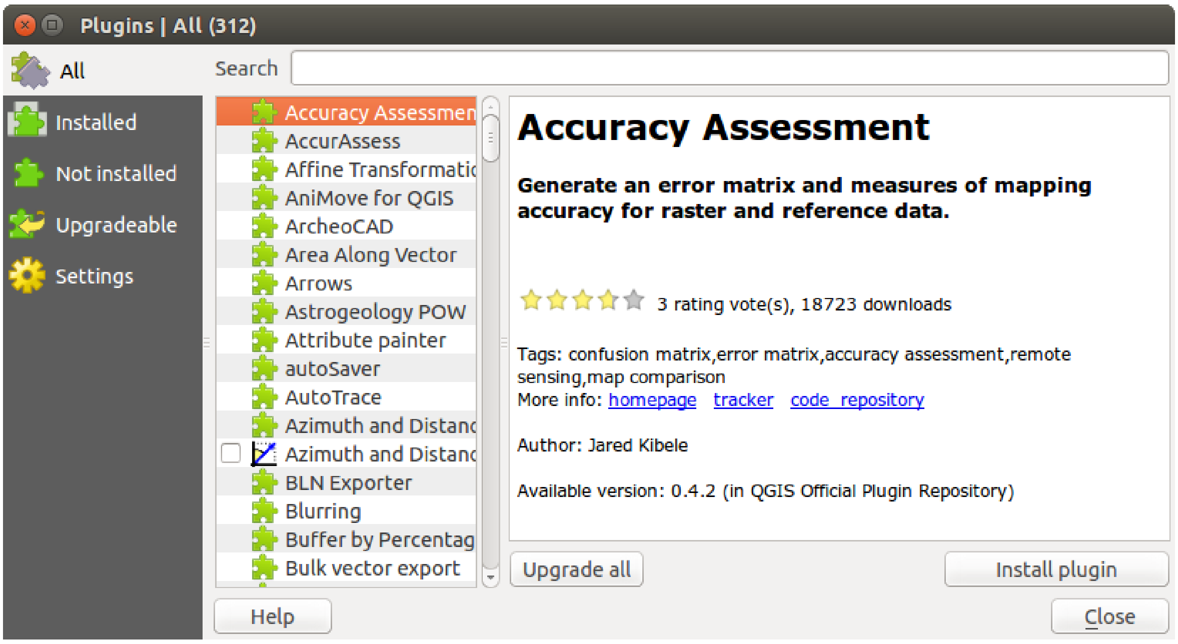

Figure 19.1: The *All* menu

このメニューではインストールされているプラグインのみがリストされます. 外部プラグインは **[Uninstall plugin]** と **[Reinstall plugin]** ボタンを使ってアンインストールと再インストールを行えます. **[Upgrade all]** もここで同じように使えます.

インストールされていない

This menu lists all plugins available that are not installed. You can use the **[Install plugin]** button to implement a plugin into QGIS.

Upgradeable

If you activated *Show also experimental plugins* in the *Settings* menu, you can use this menu to look for more recent plugin versions. This can be done with the **[Upgrade plugin]** or **[Upgrade all]** buttons.

Settings

このメニューであなたは以下のオプションを使えます:

- *Check for updates on startup*. Whenever a new plugin or a plugin update is available, QGIS will inform you 'every time QGIS starts', 'once a day', 'every 3 days', 'every week', 'every 2 weeks' or 'every month'.
- *Show also experimental plugins*. QGIS will show you plugins in early stages of development, which are generally unsuitable for production use.
- **非推奨プラグインも表示する**. これらのプラグインは、非推奨となり、本番環境での使用にとって、一般的には適していません。

外部リポジトリを追加するためには *Plugin repositories* セクションにある **[Add...]** をクリックして下さい. 追加したリポジトリを利用したくなくなった場合は **[Edit...]** ボタンで無効にできますし, **[Delete]** ボタンで完全に削除できます.

The *Search* function is available in nearly every menu (except *Settings*). Here, you can look for specific plugins.

ちなみに: Core and external plugins

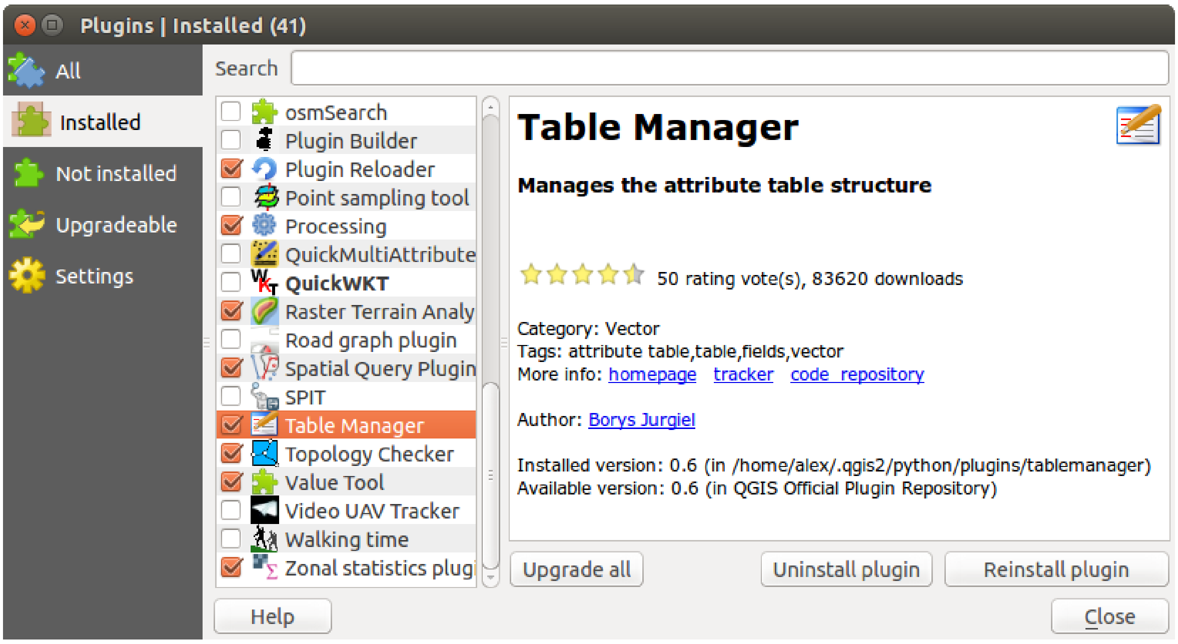

Figure 19.2: The *Installed* menu

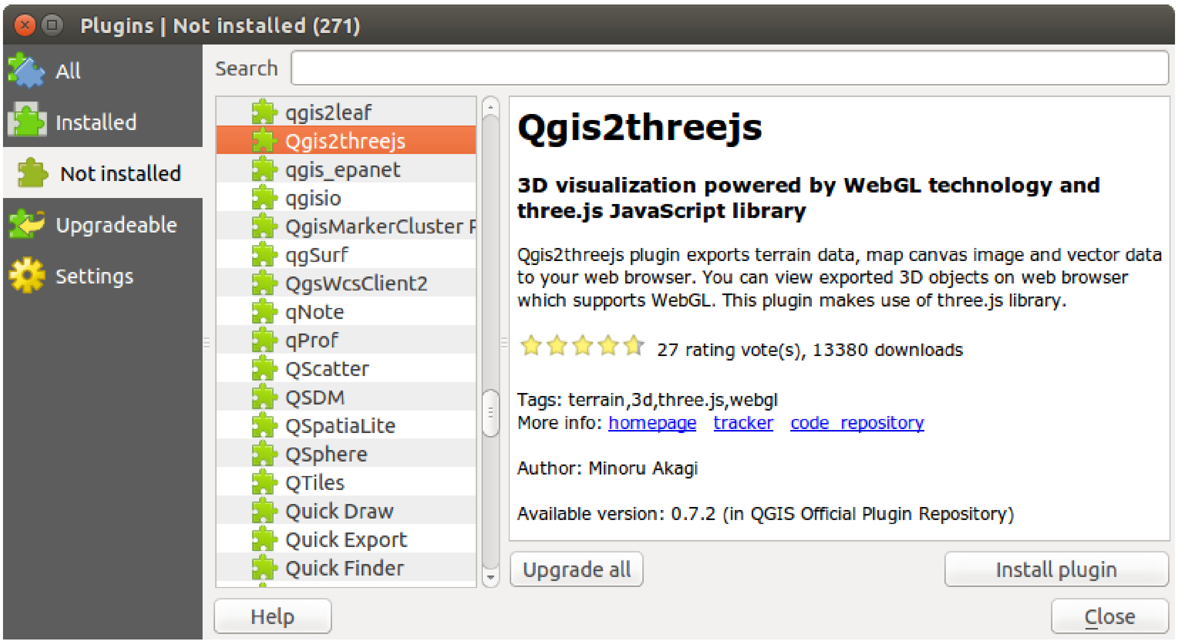

Figure 19.3: The *Not installed* menu

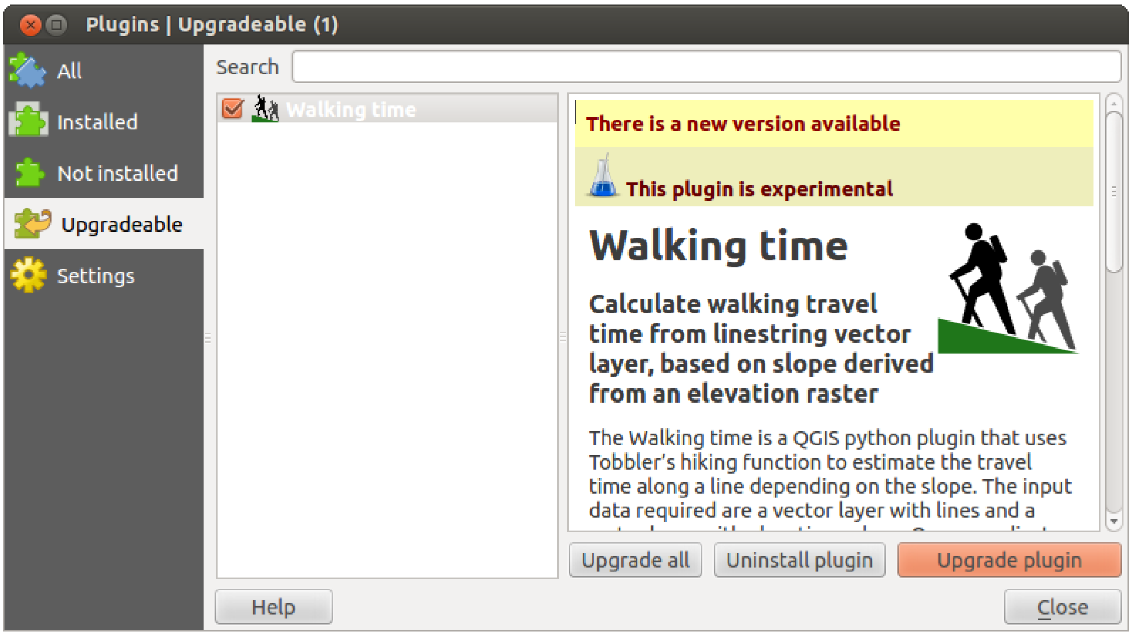

Figure 19.4: The *Upgradeable* menu

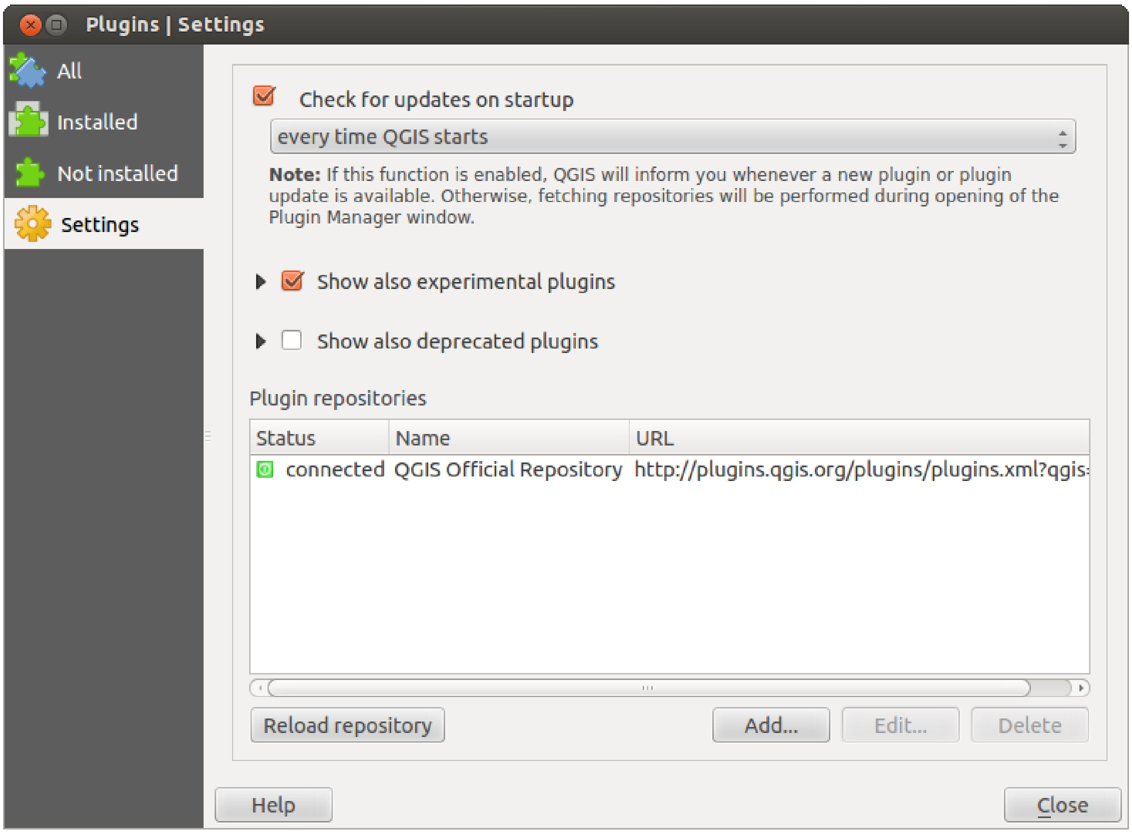

Figure 19.5: The *Settings* menu

QGIS plugins are implemented either as **Core Plugins** or **External Plugins**. **Core Plugins** are maintained by the QGIS Development Team and are automatically part of every QGIS distribution. They are written in one of two languages: C++ or Python. **External Plugins** are currently all written in Python. They are stored in external repositories and are maintained by the individual authors.

Detailed documentation about the usage, minimum QGIS version, home page, authors, and other important information are provided for the 'Official' QGIS Repository at http://plugins.qgis.org/plugins/. For other external repositories, documentation might be available with the external plugins themselves. In general, it is not included in this manual.

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19.2 Using QGIS Core Plugins

アイコン	プラグイン	説明	マニュアルの参照
	Accuracy Assessment	Generate an error matrix	*accuracy*
	CadTools	Perform CAD-like functions in QGIS	*cadtools*
	座標取得	マウスで指定した位置の座標を、異なる CRS で取得します	**座標取得プラグイン**
	DB マネージャ	Manage your databases within QGIS	*DB* **マネージャプラグイン**
	DXF2Shape コンバータ	DXF ファイルを Shapefile に変換します	*Dxf2Shp* **コンバータープラグイン**
	eVis	イベント可視化ツール	*eVis* **プラグイン**
	fTools プラグイン	ベクターツールのセット	*fTools* **プラグイン**
	GPS ツール	GPS データをロードやインポートするツール	*GPS* **プラグイン**
	GRASS	GRASS の機能	*GRASS GIS* **の統合**
	GDAL ツール	GDAL ラスタ機能	*GDAL* **ツールズプラグイン**
	ジオレファレンサ GDAL	GDAL を使ったラスタジオリファレンス	**ジオレファレンサプラグイン**
	ヒートマップ	ベクタポイントを入力としてヒートマップ作成	**ヒートマッププラグイン**
	補間プラグイン	ベクタレイヤの頂点を利用して補間を行います	**データ補間プラグイン**
	オフライン編集	オフラインでの編集とデータベースとの同期	**オフライン編集プラグイン**
	Oracle Spatial Georaster	Oracle Spatial GeoRaster へのアクセス	*Oracle Spatial GeoRaster* **プラグイン**
	プラグインマネージャ	コアと外部プラグインを管理します	**プラグインダイアログ**
	ラスタ地形解析	DEM の地形的特徴を計算する	**ラスター地形解析プラグイン**
	ロードグラフプラグイン	最短経路解析	**道路グラフプラグイン**
	SQL Anywhere plugin	Access SQL anywhere DB	*sqlanywhere*
	空間クエリ	ベクタへの空間クエリ	**空間検索プラグイン**
	SPIT	Shapefile to PostgreSQL/PostGIS Import Tool	*SPIT* **プラグイン**
	地域統計	ベクタポリゴン用のラスタ統計を計算します	**地域統計プラグイン**
	MetaSearch	メタデータカタログサービス (CSW) との相互作用	*MetaSearch Catalogue Client*

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19.3 座標取得プラグイン

座標入力プラグインは使いやすく、選択した 2 つの座標参照系 (CRS) について地図上のキャンバスに座標を表示する機能を提供します。

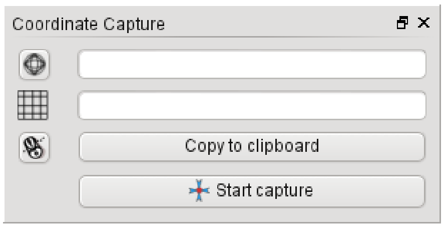

Figure 19.6: Coordinate Capture Plugin

1. Start QGIS, select *Project Properties* from the *Settings* (KDE, Windows) or *File* (Gnome, OSX) menu and click on the *Projection* tab. As an alternative, you can also click on the CRS status icon in the lower right-hand corner of the status bar.
2. **オンザフライ** *CRS* **変換を有効にする ‘チェックボックスをクリックし、プロジェクトの座標系を選択します** *(:ref:‘label_projections* も参照すること)。
3. プラグインマネージャで座標取得プラグインをロードします (*load_core_plugin* 参照) そして *View* → *Panels* でそのダイアログが表示されるように設定してください, さらに *Coordinate Capture* を有効にして下さい. 座標取得ダイアログは Figure figure_coordinate_capture_1 のように表示されます. *Vector* → *Coordinate Capture* を選択すると, そこで *Coordinate Capture* が有効になっています.
4. Click on the Click to the select the CRS to use for coordinate display icon and select a different CRS from the one you selected above.
5. 座標入力を開始するには**[入力開始]**をクリックします。それからマップキャンバス上の任意の場所をクリックすると、プラグインは、あなたの選択した CRS の両方の座標を表示します。
6. マウスの座標追跡を可能にするには、 マウストラッキング アイコンをクリックして下さい.
7. 選択した座標をクリップボードにコピーすることができます。

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19.4 DB マネージャプラグイン

The DB Manager Plugin is officially part of the QGIS core and is intended to replace the SPIT Plugin and, additionally, to integrate all other database formats supported by QGIS in one user interface. The DB Manager Plugin provides several features. You can drag layers from the QGIS Browser into the DB Manager, and it will import your layer into your spatial database. You can drag and drop tables between spatial databases and they will get imported. .. _figure_db_manager:

The *Database* menu allows you to connect to an existing database, to start the SQL window and to exit the DB Manager Plugin. Once you are connected to an existing database, the menus *Schema* and *Table* additionally appear.

The *Schema* menu includes tools to create and delete (empty) schemas and, if topology is available (e.g., PostGIS 2), to start a *TopoViewer*.

The *Table* menu allows you to create and edit tables and to delete tables and views. It is also possible to empty tables and to move tables from one schema to another. As further functionality, you can perform a VACUUM and then an ANALYZE for each selected table. Plain VACUUM simply reclaims space and makes it available

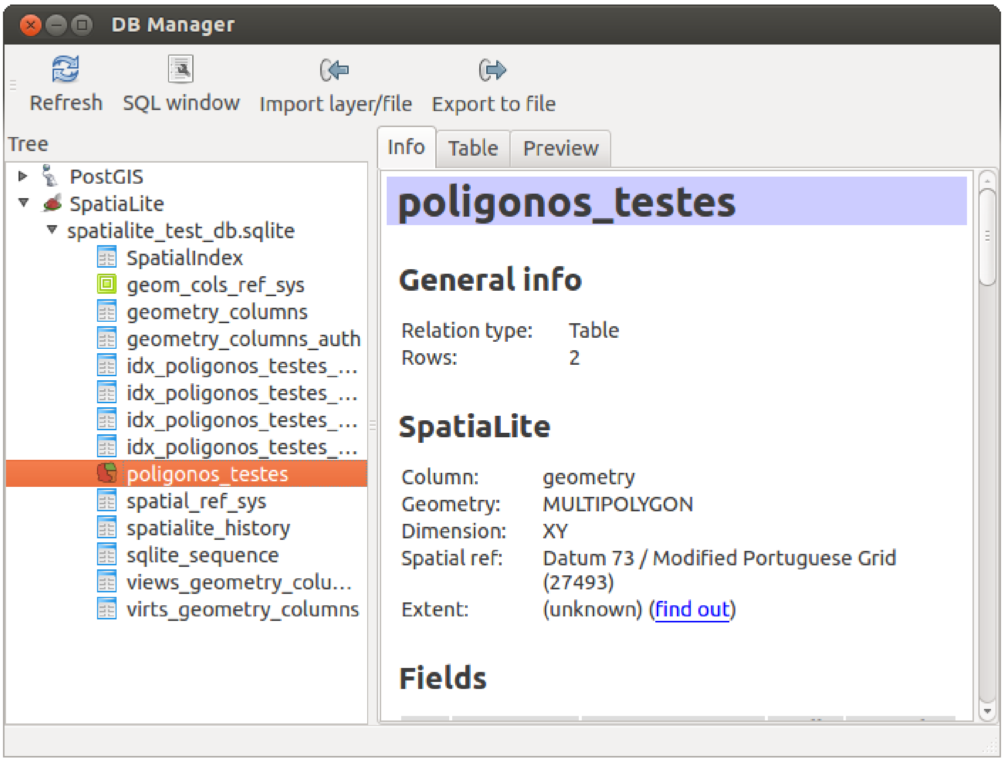

Figure 19.7: DB Manager dialog

for reuse. ANALYZE updates statistics to determine the most efficient way to execute a query. Finally, you can import layers/files, if they are loaded in QGIS or exist in the file system. And you can export database tables to shape with the Export File feature.

The *Tree* window lists all existing databases supported by QGIS. With a double-click, you can connect to the database. With the right mouse button, you can rename and delete existing schemas and tables. Tables can also be added to the QGIS canvas with the context menu.

データベースに接続されている場合 DB マネージャの **メイン** ウィンドウでは 3 個のタブが提供されます. *Info* タブではテーブルとそのジオメトリの情報が既存フィールドや制約やインデックス情報と同じように提供されます. また選択テーブルに対して作業が行われていない場合ヴァキューム解析や空間インデックスの作成を行うことができます. *Table* タブではすべての属性を表示し *Preview* タブではジオメトリのプレビューを描画します.

19.4.1 Working with the SQL Window

You can also use the DB Manager to execute SQL queries against your spatial database and then view the spatial output for queries by adding the results to QGIS as a query layer. It is possible to highlight a portion of the SQL and only that portion will be executed when you press `F5` or click the *Execute (F5)* button.

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19.5 Dxf2Shp コンバータープラグイン

コンバータープラグインはベクタデータを DXF から Shapefile 形式に変換します。変換を実行する際に以下のパラメータが要求されます:

- **入力 DXF ファイル**: 変換を行う DXF ファイルのパスを入力して下さい
- **出力 Shp file**: 作成される Shapefile の名前を入力して下さい

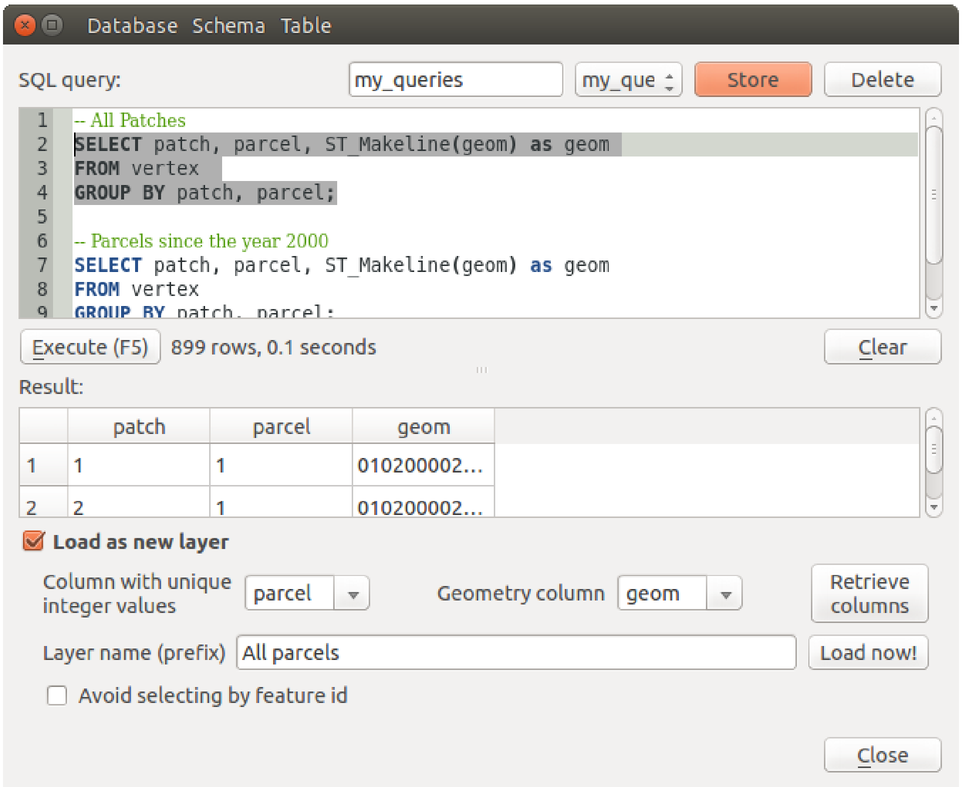

Figure 19.8: Executing SQL queries in the DB Manager SQL window

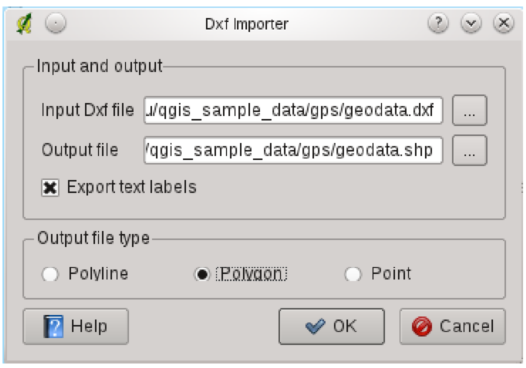

Figure 19.9: Dxf2Shp コンバータープラグイン

- **出力ファイルタイプ**: 出力 Shapefile のジオメトリタイプを指定して下さい。現在サポートされているタイプはポリライン、ポリゴンとポイントです。
- **テキストラベルをエクスポートする**: このチェックボックスが有効な場合、追加で Shapefile のポイントレイヤが作成されます。 そして関連の dbf テーブルには"TEXT" フィールドに関する情報が含まれ、テキスト文字列そのものもファイルの中にできます。

19.5.1 プラグインの利用

1. Start QGIS, load the Dxf2Shape plugin in the Plugin Manager (see **プラグインダイアログ**) and click on the Dxf2Shape Converter icon, which appears in the QGIS toolbar menu. The Dxf2Shape plugin dialog appears, as shown in Figure_dxf2shape_1.
2. DXF ファイル、出力ファイルの名前、Shapefile のタイプを入力して下さい。
3. レイヤのラベル表示のためのポイントレイヤを追加で作成する場合は、 **テキストラベルの出力** チェックボックスを有効にして下さい。
4. **[OK]**をクリックします。

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19.6 eVis プラグイン

(This section is derived from Horning, N., K. Koy, P. Ersts. 2009. eVis (v1.1.0) User's Guide. American Museum of Natural History, Center for Biodiversity and Conservation. Available from http://biodiversityinformatics.amnh.org/, and released under the GNU FDL.)

The Biodiversity Informatics Facility at the American Museum of Natural History's (AMNH) Center for Biodiversity and Conservation (CBC) has developed the Event Visualization Tool (eVis), another software tool to add to the suite of conservation monitoring and decision support tools for guiding protected area and landscape planning. This plugin enables users to easily link geocoded (i.e., referenced with latitude and longitude or X and Y coordinates) photographs, and other supporting documents, to vector data in QGIS.

eVis is now automatically installed and enabled in new versions of QGIS, and as with all plugins, it can be disabled and enabled using the Plugin Manager (see **プラグインダイアログ**).

The eVis plugin is made up of three modules: the 'Database Connection tool', 'Event ID tool', and the 'Event Browser'. These work together to allow viewing of geocoded photographs and other documents that are linked to features stored in vector files, databases, or spreadsheets.

19.6.1 イベントブラウザ

The Event Browser module provides the functionality to display geocoded photographs that are linked to vector features displayed in the QGIS map window. Point data, for example, can be from a vector file that can be input using QGIS or it can be from the result of a database query. The vector feature must have attribute information associated with it to describe the location and name of the file containing the photograph and, optionally, the compass direction the camera was pointed when the image was acquired. Your vector layer must be loaded into QGIS before running the Event Browser.

イベントブラウザモジュールを起動する

To launch the Event Browser module, click on *Database* → *eVis* → *eVis Event Browser*. This will open the *Generic Event Browser* window.

The *Event Browser* window has three tabs displayed at the top of the window. The *Display* tab is used to view the photograph and its associated attribute data. The *Options* tab provides a number of settings that can be adjusted to control the behavior of the eVis plugin. Lastly, the *Configure External Applications* tab is used to maintain a table of file extensions and their associated application to allow eVis to display documents other than images.

ディスプレイウィンドウを理解する

To see the *Display* window, click on the *Display* tab in the *Event Browser* window. The *Display* window is used to view geocoded photographs and their associated attribute data.

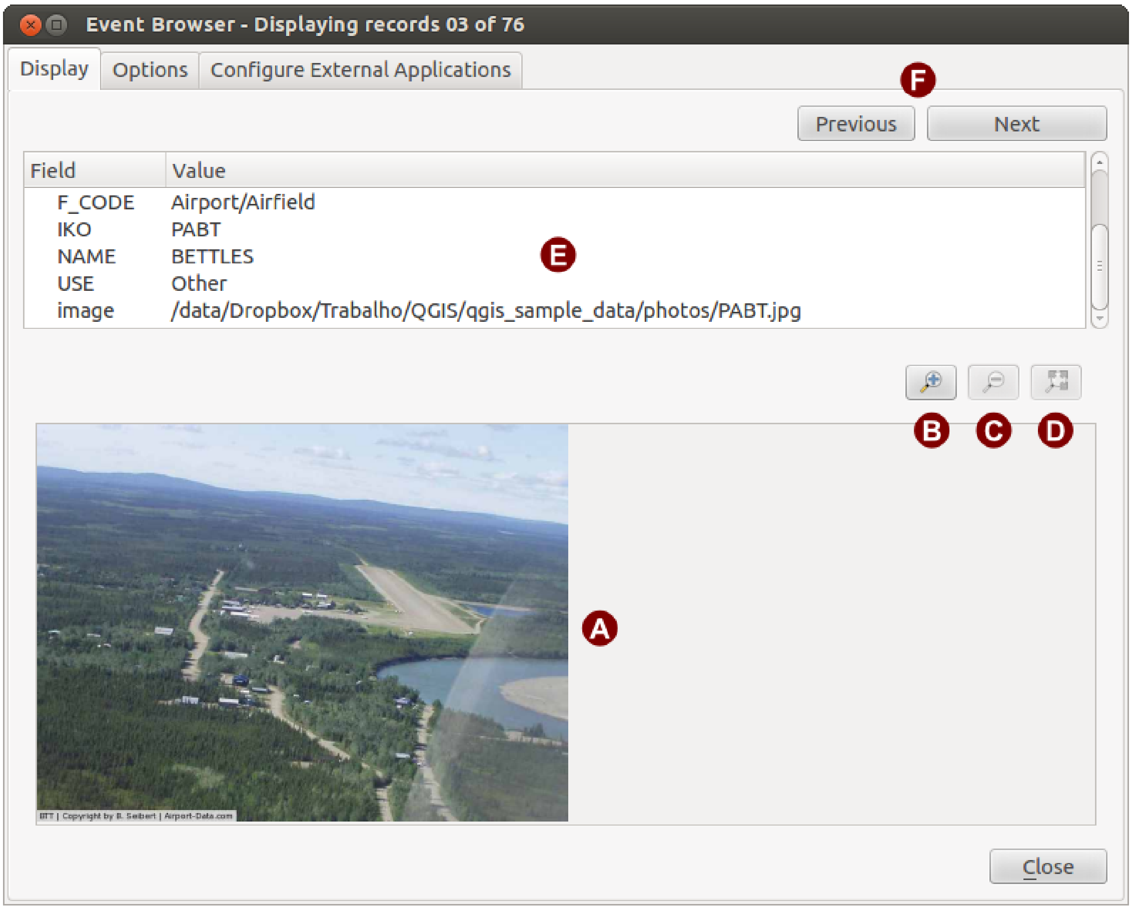

Figure 19.10: *eVis*表示ウィンドウ

1. **ディスプレイウィンドウ**:フォトを表示する場所のウィンドウ。
2. **ズームインボタン**: さらに詳細を見るためズームインを行います. ディスプレイウィンドウにイメージ全体を表示できない場合, 左と下部にスクロールバーが表示されイメージをパンすることができます.
3. **ズームアウトボタン**: もっと広い領域を見るためにズームアウトします.
4. **全領域にズーム** ボタン: 写真の全領域えお表示します.
5. **Attribute information window**: All of the attribute information for the point associated with the photograph being viewed is displayed here. If the file type being referenced in the displayed record is not an image but is of a file type defined in the *Configure External Applications* tab, then when you double-click on the value of the field containing the path to the file, the application to open the file will be launched to view or hear the contents of the file. If the file extension is recognized, the attribute data will be displayed in green.
6. **ナビゲーションボタン**: 前ボタンと次ボタンは 1 個以上の地物が選択されている場合前と後の地物をロードする場合に利用されます.

オプションウィンドウを理解する

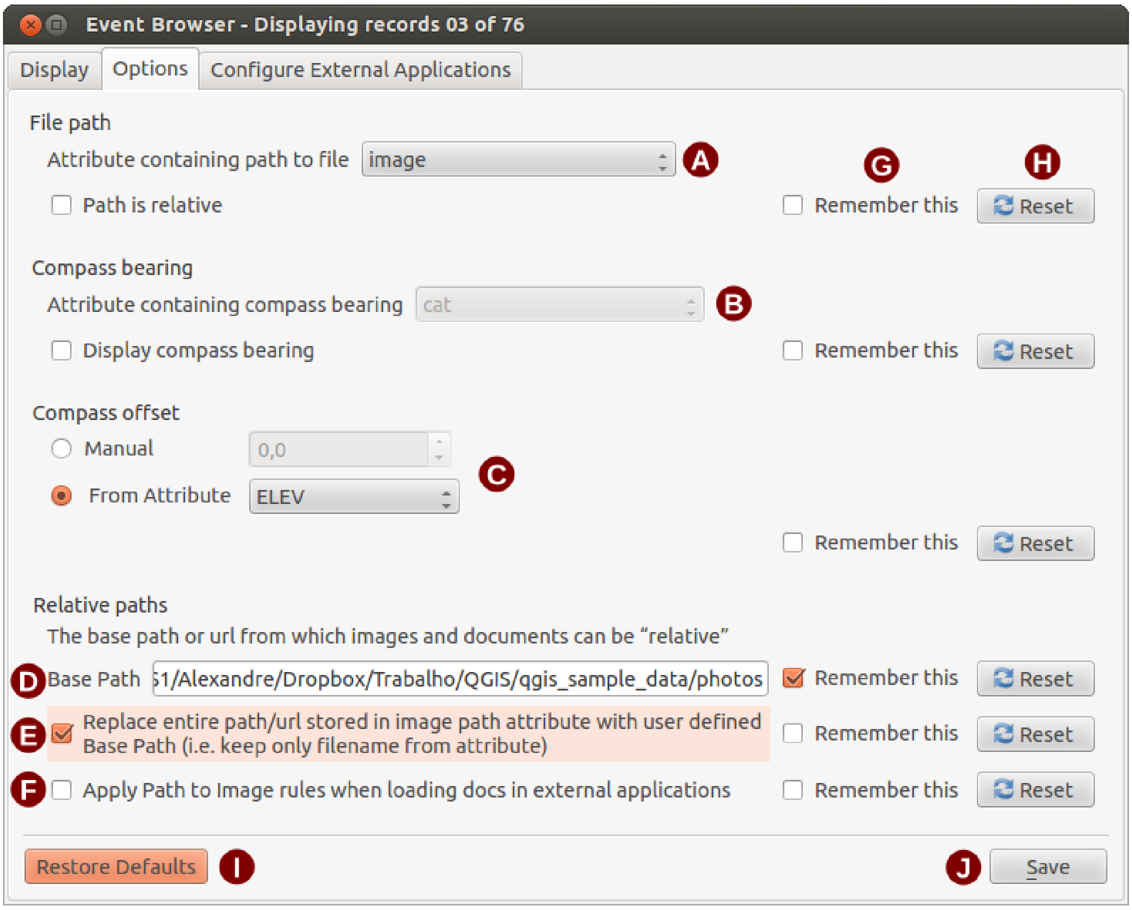

Figure 19.11: *eVis*オプションウィンドウ

1. **File path**: A drop-down list to specify the attribute field that contains the directory path or URL for the photographs or other documents being displayed. If the location is a relative path, then the checkbox must be clicked. The base path for a relative path can be entered in the *Base Path* text box below. Information about the different options for specifying the file location are noted in the section **写真の場所と名前を指定します** below.
2. **Compass bearing**: A drop-down list to specify the attribute field that contains the compass bearing associated with the photograph being displayed. If compass bearing information is available, it is necessary to click the checkbox below the drop-down menu title.
3. **Compass offset**: Compass offsets can be used to compensate for declination (to adjust bearings collected using magnetic bearings to true north bearings). Click the *Manual* radio button to enter the offset in the text box or click the *From Attribute* radio button to select the attribute field containing the offsets. For both of these options, east declinations should be entered using positive values, and west declinations should use negative values.
4. **Directory base path**: The base path onto which the relative path defined in Figure_eVis_2 (A) will be appended.
5. **Replace path**: If this checkbox is checked, only the file name from A will be appended to the base path.
6. **Apply rule to all documents**: If checked, the same path rules that are defined for photographs will be used for non-image documents such as movies, text documents, and sound files. If not checked, the path rules will only apply to photographs, and other documents will ignore the base path parameter.
7. **Remember settings**: If the checkbox is checked, the values for the associated parameters will be saved for the next session when the window is closed or when the **[Save]** button below is pressed.

8. **値のリセット**: この業の値をリセットし、デフォルト設定に戻します。
9. **Restore defaults**: This will reset all of the fields to their default settings. It has the same effect as clicking all of the **[Reset]** buttons.
10. **Save**: この機能を使うと設定を *Options* ペインを閉じないで保存します.

外部アプリケーションの設定を理解する

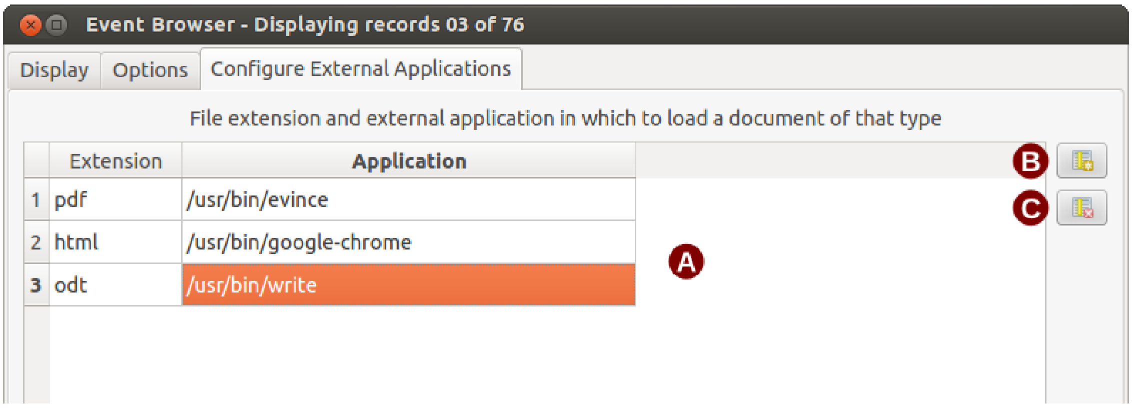

Figure 19.12: The *eVis* External Applications window

1. **File reference table**: A table containing file types that can be opened using eVis. Each file type needs a file extension and the path to an application that can open that type of file. This provides the capability of opening a broad range of files such as movies, sound recordings, and text documents instead of only images.
2. **新しいファイルタイプの追加***: 新しいファイルタイプをユニークなファイル拡張子と開くためのアプリケーションのパスと一緒に追加して下さい.
3. **Delete current row**: Delete the file type highlighted in the table and defined by a file extension and a path to an associated application.

19.6.2 写真の場所と名前を指定します

The location and name of the photograph can be stored using an absolute or relative path, or a URL if the photograph is available on a web server. Examples of the different approaches are listed in Table evis_examples.

```
X         Y         FILE                                              BEARING
780596    1784017   C:\Workshop\eVis_Data\groundphotos\DSC_0168.JPG   275
780596    1784017   /groundphotos/DSC_0169.JPG                        80
780819    1784015   http://biodiversityinformatics.amnh.org/\
                    evis_testdata/DSC_0170.JPG                        10
780596    1784017   pdf:http://www.testsite.com/attachments.php?\
                    attachment_id-12                                  76
```

19.6.3 Specifying the location and name of other supporting documents

Supporting documents such as text documents, videos, and sound clips can also be displayed or played by eVis. To do this, it is necessary to add an entry in the file reference table that can be accessed from the *Configure External Applications* window in the *Generic Event Browser* that matches the file extension to an application that can be used to open the file. It is also necessary to have the path or URL to the file in the attribute table for the vector layer. One additional rule that can be used for URLs that don't contain a file extension for the document you want to open is to specify the file extension before the URL. The format is — `file extension:URL`. The URL is preceded by the file extension and a colon; this is particularly useful for accessing documents from wikis and other web sites that use a database to manage the web pages (see Table evis_examples).

19.6.4 イベントブラウザの利用

When the *Event Browser* window opens, a photograph will appear in the display window if the document referenced in the vector file attribute table is an image and if the file location information in the *Options* window is properly set. If a photograph is expected and it does not appear, it will be necessary to adjust the parameters in the *Options* window.

If a supporting document (or an image that does not have a file extension recognized by eVis) is referenced in the attribute table, the field containing the file path will be highlighted in green in the attribute information window if that file extension is defined in the file reference table located in the *Configure External Applications* window. To open the document, double-click on the green-highlighted line in the attribute information window. If a supporting document is referenced in the attribute information window and the file path is not highlighted in green, then it will be necessary to add an entry for the file's filename extension in the *Configure External Applications* window. If the file path is highlighted in green but does not open when double-clicked, it will be necessary to adjust the parameters in the *Options* window so the file can be located by eVis.

If no compass bearing is provided in the *Options* window, a red asterisk will be displayed on top of the vector feature that is associated with the photograph being displayed. If a compass bearing is provided, then an arrow will appear pointing in the direction indicated by the value in the compass bearing display field in the *Event Browser* window. The arrow will be centered over the point that is associated with the photograph or other document.

To close the *Event Browser* window, click on the **[Close]** button from the *Display* window.

19.6.5 イベント ID ツール

The 'Event ID' module allows you to display a photograph by clicking on a feature displayed in the QGIS map window. The vector feature must have attribute information associated with it to describe the location and name of the file containing the photograph and, optionally, the compass direction the camera was pointed when the image was acquired. This layer must be loaded into QGIS before running the 'Event ID' tool.

イベント ID モジュールを実行する

To launch the 'Event ID' module, either click on the Event ID icon or click on *Database → eVis → Event ID Tool*. This will cause the cursor to change to an arrow with an 'i' on top of it signifying that the ID tool is active.

To view the photographs linked to vector features in the active vector layer displayed in the QGIS map window, move the Event ID cursor over the feature and then click the mouse. After clicking on the feature, the *Event Browser* window is opened and the photographs on or near the clicked locality are available for display in the browser. If more than one photograph is available, you can cycle through the different features using the **[Previous]** and **[Next]** buttons. The other controls are described in the ref:*evis_browser* section of this guide.

19.6.6 データベース接続

The 'Database Connection' module provides tools to connect to and query a database or other ODBC resource, such as a spreadsheet.

eVis can directly connect to the following types of databases: PostgreSQL, MySQL, and SQLite; it can also read from ODBC connections (e.g., MS Access). When reading from an ODBC database (such as an Excel spreadsheet), it is necessary to configure your ODBC driver for the operating system you are using.

データベース接続モジュールを実行する

To launch the 'Database Connection' module, either click on the appropriate icon eVis Database Connection or click on *Database → eVis → Database Connection*. This will launch the *Database Connection* window. The window has three tabs: *Predefined Queries*, *Database Connection*, and *SQL Query*. The *Output Console* window at the bottom of the window displays the status of actions initiated by the different sections of this module.

データベースとの接続

Click on the *Database Connection* tab to open the database connection interface. Next, use the *Database Type* combo box to select the type of database that you want to connect to. If a password or username is required, that information can be entered in the *Username* and *Password* textboxes.

Enter the database host in the *Database Host* textbox. This option is not available if you selected 'MS Access' as the database type. If the database resides on your desktop, you should enter "localhost".

Enter the name of the database in the *Database Name* textbox. If you selected 'ODBC' as the database type, you need to enter the data source name.

When all of the parameters are filled in, click on the **[Connect]** button. If the connection is successful, a message will be written in the *Output Console* window stating that the connection was established. If a connection was not established, you will need to check that the correct parameters were entered above.

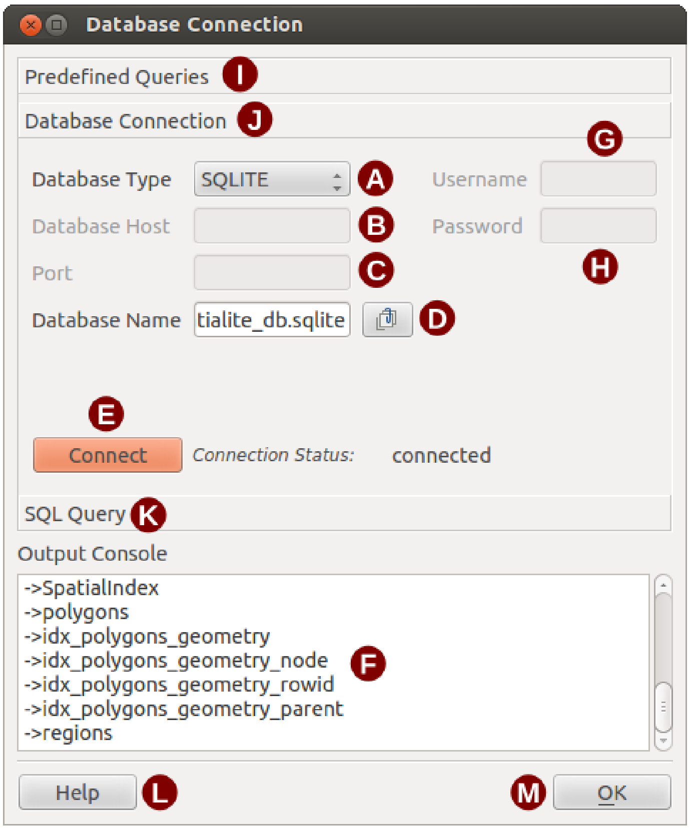

Figure 19.13: *eVis* データベースコネクションウィンドウ

1. **データベースタイプ**: 使用するデータベースの種類を特定するためのドロップダウンリスト
2. **データベースホスト**: データベースホストの名称
3. **ポート**: MySQL または PostgreSQL データベースのタイプを選択した場合のポート番号
4. **データベース名称**: データベースの名称
5. **接続**：上で定義したパラメータを使ってデータベースに接続するボタン
6. **出力コンソール**：処理に関連するメッセージが表示されたコンソールウィンドウ
7. **ユーザ名**:データベースがパスワードで保護されている場合使用するユーザ名
8. **パスワード**:データベースがパスワードで保護されている場合に使用するパスワード
9. **定義済クエリ**: "定義済クエリ" ウィンドウを表示するタブ
10. **データベース接続**: "データベース接続" ウィンドウを表示するタブ

11. **SQL クエリ**: “SQL クエリ” ウィンドウを表示するタブ
12. **ヘルプ**:オンラインヘルプを表示する
13. **OK**: メインの “データベース接続” ウィンドウを閉じる

SQL クエリの実行

SQL queries are used to extract information from a database or ODBC resource. In eVis, the output from these queries is a vector layer added to the QGIS map window. Click on the *SQL Query* tab to display the SQL query interface. SQL commands can be entered in this text window. A helpful tutorial on SQL commands is available at http://www.w3schools.com/sql. For example, to extract all of the data from a worksheet in an Excel file, `select * from [sheet1$]` where `sheet1` is the name of the worksheet.

Click on the **[Run Query]** button to execute the command. If the query is successful, a *Database File Selection* window will be displayed. If the query is not successful, an error message will appear in the *Output Console* window.

In the *Database File Selection* window, enter the name of the layer that will be created from the results of the query in the *Name of New Layer* textbox.

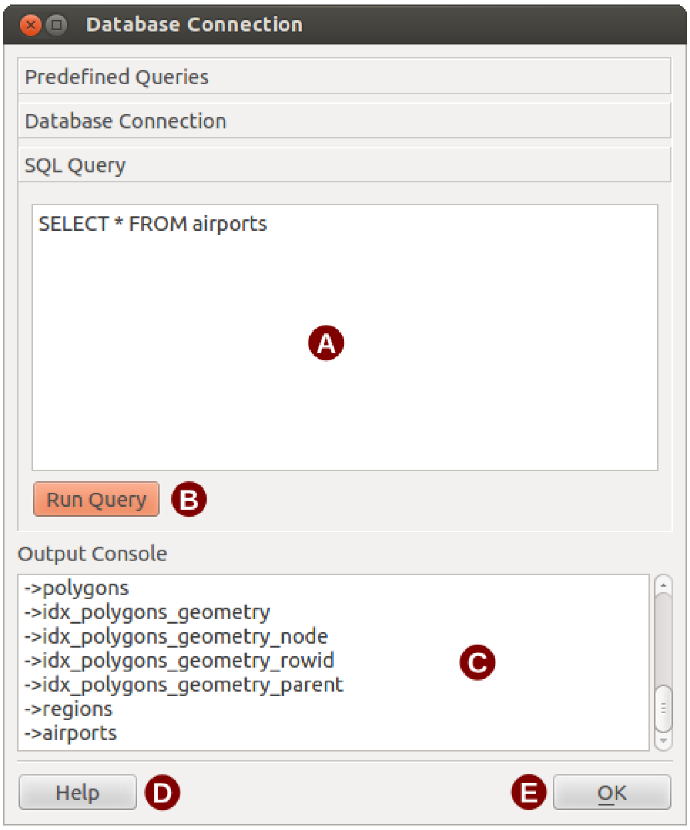

Figure 19.14: eVis SQL クエリタブ

1. **SQL クエリテキストウィンドウ**: SQL クエリをタイプするためのスクリーン
2. **クエリ実行**: *SQL* **クエリウィンドウ** で入力したクエリを実行するためのボタン
3. **コンソールウィンドウ**：処理に関連するメッセージが表示されたコンソールウィンドウ
4. **ヘルプ**:オンラインヘルプを表示する
5. **OK**: メインの :guilabel: “データベース接続” ウィンドウを閉じる

Use the *X Coordinate* and *Y Coordinate* combo boxes to select the fields from the database that stores the `X` (or longitude) and `Y` (or latitude) coordinates. Clicking on the **[OK]** button causes the vector layer created from the SQL query to be displayed in the QGIS map window.

To save this vector file for future use, you can use the QGIS 'Save as...' command that is accessed by right-clicking on the layer name in the QGIS map legend and then selecting 'Save as...'

ちなみに: Microsoft Excel ワークシートからベクタレイヤを作成

When creating a vector layer from a Microsoft Excel Worksheet, you might see that unwanted zeros ("0") have been inserted in the attribute table rows beneath valid data. This can be caused by deleting the values for these cells in Excel using the `Backspace` key. To correct this problem, you need to open the Excel file (you'll need to close QGIS if you are connected to the file, to allow you to edit the file) and then use *Edit → Delete* to remove the blank rows from the file. To avoid this problem, you can simply delete several rows in the Excel Worksheet using *Edit → Delete* before saving the file.

定義済クエリの実行

With predefined queries, you can select previously written queries stored in XML format in a file. This is particularly helpful if you are not familiar with SQL commands. Click on the *Predefined Queries* tab to display the predefined query interface.

To load a set of predefined queries, click on the Open File icon. This opens the *Open File* window, which is used to locate the file containing the SQL queries. When the queries are loaded, their titles as defined in the XML file will appear in the drop-down menu located just below the Open File icon. The full description of the query is displayed in the text window under the drop-down menu.

Select the query you want to run from the drop-down menu and then click on the *SQL Query* tab to see that the query has been loaded into the query window. If it is the first time you are running a predefined query or are switching databases, you need to be sure to connect to the database.

Click on the **[Run Query]** button in the *SQL Query* tab to execute the command. If the query is successful, a *Database File Selection* window will be displayed. If the query is not successful, an error message will appear in the *Output Console* window.

1. **Open File**: Launches the "Open File" file browser to search for the XML file holding the predefined queries.
2. **定義済クエリ**: 定義済クエリの XML ファイルによって定義されたクエリすべてのドロップダウンリスト
3. **クエリ説明**: クエリの短い説明文。この説明は定義済クエリの XML ファイルに由来します。
4. **コンソールウィンドウ**：処理に関連するメッセージが表示されたコンソールウィンドウ
5. **ヘルプ**:オンラインヘルプを表示する
6. **OK**: メインの "データベース接続" ウィンドウを閉じる

eVis 定義済クエリの XML フォーマット

eVis で読み込まれる XML タグ

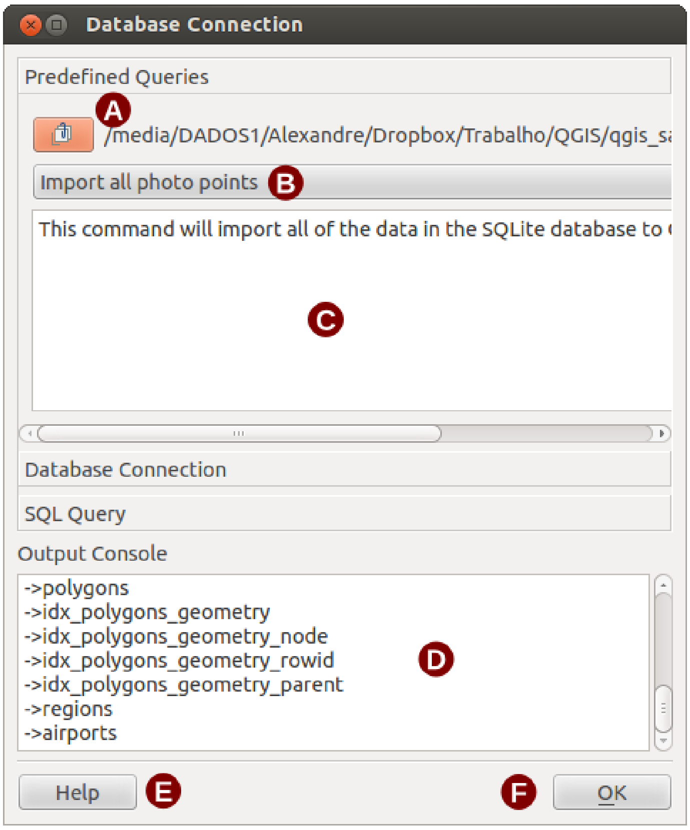

Figure 19.15: *eVis*定義済クエリタブ

タグ	説明
query	クエリ文の始まりと終わりを定義します。
shortdescription	A short description of the query that appears in the eVis drop-down menu.
description	定義済みクエリテキストウィンドウに表示されたクエリのより詳細な説明。
databasetype	データベース接続タブのデータベースタイプドロップダウンメニューで定義されたデータベースタイプ
databaseport	データベース接続タブのポートテキストボックスで定義されたポート
databasename	データベース接続タブのデータベース名テキストボックスに定義されたデータベース名
databaseusername	データベース接続タブのユーザ名テストボックスで定義されたデータベースのユーザ名
databasepassword	データベース接続タブのパスワードテキストボックスに定義されたデータベースパスワード
sqlstatement	SQL コマンド。
autoconnect	A flag (“true”” or “false”) to specify if the above tags should be used to automatically connect to the database without running the database connection routine in the Database Connection tab.

３つのクエリを含む XML ファイルの完全なサンプルは下に表示されています.

```
<?xml version="1.0"?>
<doc>
 <query>
   <shortdescription>Import all photograph points</shortdescription>
   <description>This command will import all of the data in the SQLite database to QGIS
      </description>
   <databasetype>SQLITE</databasetype>
```

```
   <databasehost />
   <databaseport />
   <databasename>C:\textbackslash Workshop/textbackslash
eVis\_Data\textbackslash PhotoPoints.db</databasename>
   <databaseusername />
   <databasepassword />
   <sqlstatement>SELECT Attributes.*, Points.x, Points.y FROM Attributes LEFT JOIN
      Points ON Points.rec_id=Attributes.point_ID</sqlstatement>
   <autoconnect>false</autoconnect>
 </query>
  <query>
   <shortdescription>Import photograph points "looking across Valley"</shortdescription>
   <description>This command will import only points that have photographs "looking across
      a valley" to QGIS</description>
   <databasetype>SQLITE</databasetype>
   <databasehost />
   <databaseport />
   <databasename>C:\Workshop\eVis_Data\PhotoPoints.db</databasename>
   <databaseusername />
   <databasepassword />
   <sqlstatement>SELECT Attributes.*, Points.x, Points.y FROM Attributes LEFT JOIN
      Points ON Points.rec_id=Attributes.point_ID where COMMENTS='Looking across
      valley'</sqlstatement>
   <autoconnect>false</autoconnect>
 </query>
 <query>
   <shortdescription>Import photograph points that mention "limestone"</shortdescription>
   <description>This command will import only points that have photographs that mention
      "limestone" to QGIS</description>
   <databasetype>SQLITE</databasetype>
   <databasehost />
   <databaseport />
   <databasename>C:\Workshop\eVis_Data\PhotoPoints.db</databasename>
   <databaseusername />
   <databasepassword />
   <sqlstatement>SELECT Attributes.*, Points.x, Points.y FROM Attributes LEFT JOIN
      Points ON Points.rec_id=Attributes.point_ID where COMMENTS like '%limestone%'
      </sqlstatement>
   <autoconnect>false</autoconnect>
 </query>
</doc>
```

.

19.7 fTools プラグイン

fTool プラグインの目的は, 追加のソフトウェアやライブラリ複雑な手順を必要とせず, ベクタデータに関する多くの解析や調査, 演算を処理することです. そのために必要な一連の地理空間データの解析や調査機能を提供しています.

fTools is now automatically installed and enabled in new versions of QGIS, and as with all plugins, it can be disabled and enabled using the Plugin Manager (see **プラグインダイアログ**). When enabled, the fTools plugin adds a *Vector* menu to QGIS, providing functions ranging from Analysis and Research Tools to Geometry and Geoprocessing Tools, as well as several useful Data Management Tools.

19.7.1 解析ツール

アイコン	ツール	目的
	距離マトリックス	2 つの点レイヤ間の距離を計測し、a) 距離行列、b) 線形距離行列、c) 距離統計行列といった出力が可能です。また、最近傍点（k）の点群のみに限定して計測することも可能です。
	線長の合計	ポリゴンベクタレイヤの各ラインについて、線長の合計値を計算することができます。
	ポリゴン内の点	ベクタレイヤに含まれる点の数をカウントすることができます。
	ユニーク値のリスト	ベクタレイヤフィールド中のユニーク値のリストを抽出することができます。
	基本統計	ベクタレイヤの基本的な統計値 (平均値, 標準偏差, 分散, 総数, 総計, 中央値等)
	最小近傍分析	ポイントベクタレイヤにおいて, 最小近傍分析を行います.
	平均座標 (群)	ベクタレイヤ全体またはユニーク ID をもつ複数の地物について、平均座標あるいは重み付き平均座標の計算を行います。
	ラインの交差	ラインとラインの交差を特定し, ポイントとして Shapefile 型式で出力します。道路や軌跡の交差の特定に利用できます. 線長が 0 のラインは無視されます.

Table Ftools 1: fTools 解析ツール

19.7.2 調査ツール

アイコン	ツール	目的
	ランダム選択	n 個の地物または n%の地物をランダムに選択します.
	ランダムセットのランダム選択	ユニークな ID を持つサブセットをランダムに選択します
	ランダム点群	選択レイヤの中からランダムな点群を発生させます
	規則的な点群	選択レイヤの中から, 設定した規則的な範囲で点群を発生させ, ポイントの Shapefile を出力します.
	ベクタグリッド	ユーザーが設定した領域内に, ポリゴンまたはラインのグリッドを発生させ,Shapefile として出力します
	場所による選択	地物を指定した場所に基づいて選択します. 指定した場所は, 他のレイヤで新しい選択を行うか, あるいは現在の選択に追加または削除が行えます
	レイヤ領域のポリゴン	指定したラスタまたはベクタレイヤの領域から, 新たなポリゴンを作成し,Shapefile で出力する

Table Ftools 2: fTools 調査ツール

19.7.3 ジオプロセッシングツール

アイコン	ツール	目的
	凸包	選択したレイヤまたは入力された ID フィールドに基づいた凸包を作成し,Shapefile として出力します
	バッファ	バッファ距離またはバッファ距離の入ったフィールドを指定し, 入力したベクタにバッファ(群) を発生させ,Shapefile で出力します
	交差	指定したベクタレイヤの交差しているポリゴン, ライン, ポイントを出力し,Shapefile で出力します
	統合	指定したベクタレイヤの交差しているポリゴン, ライン, ポイントを出力し,Shapefile で出力します
	対称差分	指定したベクタレイヤの交差していないポリゴン, ライン, ポイントを出力し、Shapefile で出力します
	クリップ	レイヤをオーバーレイし, クリップレイヤと重なる部分のみを Shapefile として出力します
	差分	レイヤをオーバーレイさせてクリップレイヤと重ならない部分のみを Shapefile として出力します
	融合	Merge features based on input field. All features with identical input values are combined to form one single feature.
	微小ポリゴンの除去	Merges selected features with the neighbouring polygon with the largest area or largest common boundary.

Table Ftools 3: fTools ジオミトリツール

19.7.4 ジオメトリツール

アイコン	ツール	目的
	ジオメトリの妥当性チェック	Check polygons for intersections, closed holes, and fix node ordering. You can choose the engine used by the in the options dialog, digitizing tab Change the Validate geometries value. There is two engines: QGIS and GEOS which have pretty different behaviour. Another tools exists which shows different result as well: Topology Checker plugin and 'must not have invalid geometries' rule.
	ジオミトリカラムの出力/追加	ベクタレイヤのジオメトリ情報に点 (X 座標、Y 座標)、線 (長さ) またはポリゴン (面積、周囲の長さ) を追加します
	ポリゴン重心	ポリゴンから重心を計算し出力します
	ドロネー三角形分割 ボロノイポリゴン	指定点ベクタレイヤでドロネー三角形分割を行い, 結果を (ポリゴンとして)Shapefile に出力します 点データからボロノイポリゴンを生成します
	ジオミトリを簡素化する ジオメトリの圧縮	Douglas-Peucker アルゴリズムでラインまたはポリゴンを間引いて簡素化します 頂点の追加によるラインまたはポリゴンの精密化
	マルチパートをシングルパートへ	マルチパート地物をシングルパート地物に変換します. シンプルポリゴン群とライン群を作成します
	シングルパートをマルチパートへ	複数の地物をユニーク ID フィールドで結合し, 単一のマルチパート地物に変換します
	ポリゴンをラインに	ポリゴンをラインに変換します. マルチパートポリゴンは複数のシングルパートラインに変換します
	ラインをポリゴンに	ラインをポリゴンに変換します. マルチパートラインは複数のシングルパートポリゴンに変換します
	ノードの展開	ラインまたはポリゴンレイヤからポイントとしてノードを出力します

Table Ftools 4: fTools ジオミトリツール

ノート: Simplify geometry ツールは、ラインやポリゴンの重複ノードを削除します. 単純化の許容値を 0 に設定するだけでその操作を行います.

19.7.5 データマネジメントツール

アイコン	ツール	目的
	カレント投影法の定義	CRS が定義されていない Shapefile の投影法を定義します
	属性の結合	属性をベクタに結合し, 追加します. ベクタレイヤの属性と他の属性テーブルを結合し,Shapefile として出力します
	ベクタレイヤの分割	ベクタレイヤを指定したフィールドに基づいて複数の Shapefile に分割します
	複数のシェープファイルを一つに結合する	指定フォルダ内にある複数のシェープファイルをレイヤタイプに基づいて（点、ライン、ポリゴン)、新しく結合したシェープファイルを作成します。
	空間インデックスを作成する	OGR がサポートするフォーマット用の空間インデックスを作成します。

Table Ftools 5: fTools データマネジメントツール

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19.8 GDAL ツールズプラグイン

19.8.1 GDAL ツールとは何?

The GDAL Tools plugin offers a GUI to the collection of tools in the Geospatial Data Abstraction Library, http://gdal.osgeo.org . These are raster management tools to query, re-project, warp and merge a wide variety of raster formats. Also included are tools to create a contour (vector) layer, or a shaded relief from a raster DEM, and to make a VRT (Virtual Raster Tile in XML format) from a collection of one or more raster files. These tools are available when the plugin is installed and activated.

GDAL ライブラリ

The GDAL library consists of a set of command line programs, each with a large list of options. Users comfortable with running commands from a terminal may prefer the command line, with access to the full set of options. The GDALTools plugin offers an easy interface to the tools, exposing only the most popular options.

19.8.2 GDAL ツールの一覧

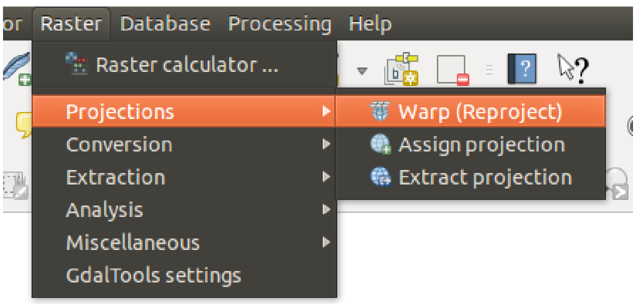

Figure 19.16: *GDALTools* メニューリスト

投影法

Warp (Reproject)	このユーティリティはイメージモザイキング, 再投影とラッピングを行います. このプログラムを利用するとサポートされている任意の方法で再投影を行うことができ, イメージが ”raw” でコントロール情報がある場合 GCP ポイントを格納することができます. さらに詳しい情報は GDAL ウェッブサイト http://www.gdal.org/gdalwarp.html を参照して下さい
Assign projection	このツールを使うとジオリファレンスされているけど投影法が無いラスタに投影法を割り当てることができます. またこれを使うと存在する投影法定義と異なる定義をすることもできます. 単一ファイルに対する作業とバッチモードの両方が可能です. さらに詳しい情報は GDAL サイト http://www.gdal.org/gdalwarp.html を参照して下さい
Extract projection	このユーティリティを使うと入力ファイルから投影法情報を抽出する手助けになります. もし全ディレクトリから投影情報を抽出したい場合はバッチモードを使えます. これにより `.prj` と `.wld` の両方のファイルが作られます.

変換

Rasterize	このプログラムはベクタジオメトリ (ポイント, ラインやポリゴン) をラスタイメージのラスタバンドに書き込みます. ベクタは OGR がサポートする形式から読み込まれます. 注意ベクタデータはラスタデータと同じ座標系でなければいけません; オンザフライ利プロジェクションは提供されていません. さらに詳しい情報は http://www.gdal.org/gdal_rasterize.html を参照して下さい
Polygonize	このユーティリティを使うとラスタで同じピクセル値の連続領域からベクタポリゴンを生成できます. それぞれのポリゴンはそのピクセル値を属性値として保持しています. 出力データソースが存在しない場合このユーティリティが作成します, デフォルトは ESRI shapefile 形式です. http://www.gdal.org/gdal_polygonize.html も参照して下さい
Translate	このユーティリティはラスタデータの異なる形式間での変換を行えます, またプロセス中でサブセッティング, リサンプリング, ピクセルのリコーリング等のいくつかの操作ができます. 詳しい情報は http://www.gdal.org/gdal_translate.html を参照して下さい.
RGB to PCT	このユーティリティは与えられた RGB イメージに最適な擬似カラーテーブルを作成します。そのときダウンサンプリングされた RGB ヒストグラムを使ってメディアンカットアルゴリズムが利用されます. それか作成されたカラーテーブルを使って擬似カラーイメージに変換を行います. この変換はフロイド-スタインバーグデザリング (誤差拡散) を使って出力イメージの質を最良化します. このユーティリティについては http://www.gdal.org/rgb2pct.html にも記述されています
PCT to RGB	このユーティリティは入力ファイルの擬似カラーバンドを指定形式の RGB 形式出力に変換します. 詳細情報は http://www.gdal.org/pct2rgb.html を参照して下さい

抽出

Contour	このプログラムはラスタ標高モデル (DEM) からベクタ等高線ファイルを作成します. 詳細情報は http://www.gdal.org/gdal_contour.html を参照して下さい.
Clipper	このユーティリティはラスターのクリップ (サブセットの抽出) を行えます, そのとき領域の指定かマスクレイヤの範囲で領域が指定されます. 詳しい情報は http://www.gdal.org/gdal_translate.html を参照して下さい.

解析

Sieve	このユーティリティは指定された閾値 (ピクセル) より小さいラスタポリゴンを除去して, それらを直近の最大のポリゴンの値で置き換えます. 結果は既存の背景ラスタバンドに書き込まれるか新しいファイルに書き込まれます. 詳細な情報は http://www.gdal.org/gdal_sieve.html を参照して下さい.
Near Black	このユーティリティはイメージをスキャンして正確な黒 (または白) の縁の周りのすべてのピクセルをほとんど黒 (またはほとんど白) にセットします. これはしばしば航空写真の圧縮による損失の" 修正 "に利用され, モザイク時にカラーピクセルが透過として扱われます. 詳細は http://www.gdal.org/nearblack.html を参照して下さい.
Fill nodata	このユーティリティは選択されたラスタの領域 (通常は nodata の領域) を領域の周りの有効なピクセルのから補間を行います. http://www.gdal.org/gdal_fillnodata.html に詳しい情報があります.
Proximity	このユーティリティはラスタ近接マップを作れます. それはそれぞれのピクセルの中心からターゲットとされるピクセルまでのもっとも近い距離を表します. ターゲットピクセルはソースラスタ中のターゲットピクセル値のセットの値を持つピクセルです. さらに詳しい情報は http://www.gdal.org/gdal_proximity.html を参照して下さい.
Grid (Interpolation)	このユーティリティは OGR データソースの散在するデータを読んで規則的なグリッド (ラスタ) を作成します. 入力データはグリッドノードに補間されます, この時様々な補間方法から方法を選択できます. このユーティリティについては GDAL ウェッブサイト http://www.gdal.org/gdal_grid.html に記述があります.
DEM (Terrain models)	DEM の解析や可視化を行うツールです. これを使うと陰影図や傾斜, アスペクト, カラーレリーフ,Terrain Ruggedness Index, Topographic Position Index と roughness map を GDAL がサポートする標高ラスタから作成します. さらに詳しい情報は http://www.gdal.org/gdaldem.html を参照して下さい

その他

Build Virtual Raster (Catalog)	このプログラムは VRT (バーチャルデータセット) を作ります. これは入力 GDAL データセットのモザイクです. http://www.gdal.org/gdalbuildvrt.html も参照して下さい .
Merge	このユーティリティを使うとイメージの自動モザイクを行うことができます. すべてのイメージは同じ座標系で同じバンド数でなければいけませんが, オーバーラップしていたり解像度が異なってもかまいません. オーバーラップしている領域は後のイメージがさきのイメージを上書きします. このユーティリティについては http://www.gdal.org/gdal_merge.html にも記述されています.
Information	このユーティリティを使うと GDAL がサポートするラスタデータセットの様々な情報をリストすることができます. http://www.gdal.org/gdalinfo.html に詳しい情報があります.
Build Overviews	gdaladdo ユーティリティは多彩なダウンサンプリングアルゴリズムのうち 1 つを利用して多くサポートされている形式で画像のオーバービューを再作成できます. 詳しい情報は http://www.gdal.org/gdaladdo.html を参照して下さい.
Tile Index	このユーティリティを使うと入力ラスタファイル用のレコードを持つ shapefile を作れます. その属性にはファイル名とラスタのアウトラインジオメトリが含まれます. http://www.gdal.org/gdaltindex.html も参照して下さい.

GDAL ツールズの設定

このダイアログをあなたの GDAL 変数に組み込めます

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19.9 ジオレファレンサプラグイン

ジオリファレンサプラグインはラスタ用ワールドファイルを作成するためのツールです. これを使うと新しい GeoTiff ファイルの作成またはワールドファイルを既存のイメージに追加することによってジオグラフィックまたは投影された座標システムをラスタが参照するようにすることができます. ラスタがジオリファレンスするための基本的な方法は座標を正確に特定できる点群をラスタ中に指定することです.

機能

アイコン	目的	アイコン	目的
	ラスタのオープン		ジオリファレンシングの開始
	GDAL スクリプトの生成		GCP ポイントのロード
	GCP ポイントを名前をつけて保存		変換の設定
	点の追加		点の削除
	GCP ポイントの移動		パン
	拡大		ズームアウト
	レイヤの領域にズーム		直前の領域にズーム
	次の領域にズーム		Link Georeferencer to QGIS
	Link QGIS to Georeferencer		全体的なヒストグラムストレッチ
	局所的なヒストグラムストレッチ		

ジオファレンサ表 1: ジオリファレンサツールズ

19.9.1 通常の手順

イメージ中の選択された点に依存する X と Y 座標 (DMS (dd mm ss.ss), DD (dd.dd) または投影された座標 (mmmm.mm) は 2 種類の異なる手法で指定することができます.

- 時々ラスタそのものがイメージ上に座標を" 書いて" 提供されることがあります. そのような場合座標を手作業で入力することができます.
- Using already georeferenced layers. This can be either vector or raster data that contain the same objects/features that you have on the image that you want to georeference and with the projection that you want for your image. In this case, you can enter the coordinates by clicking on the reference dataset loaded in the QGIS map canvas.

通常のイメージジオレファレンス手順ではラスタ上の複数の点の選択とそれらの座標指定が必要ですそして利用する変換タイプの選択が必要です. 入力パラメータとデータに従ってプラグインはワールドファイルパラメータを計算します. さらに多くの座標を指定すると結果はより良いものになるでしょう.

The first step is to start QGIS, load the Georeferencer Plugin (see **プラグインダイアログ**) and click on *Raster* → *Georeferencer* , which appears in the QGIS menu bar. The Georeferencer Plugin dialog appears as shown in figure_georeferencer_1.

例として SDGS にある South Dakota の位置シートを使います. これは後で GRASS の spearfish60 ロケーションで見ることができます. この位置シートは以下の場所からダウンロードできます: http://grass.osgeo.org/sampledata/spearfish_toposheet.tar.gz.

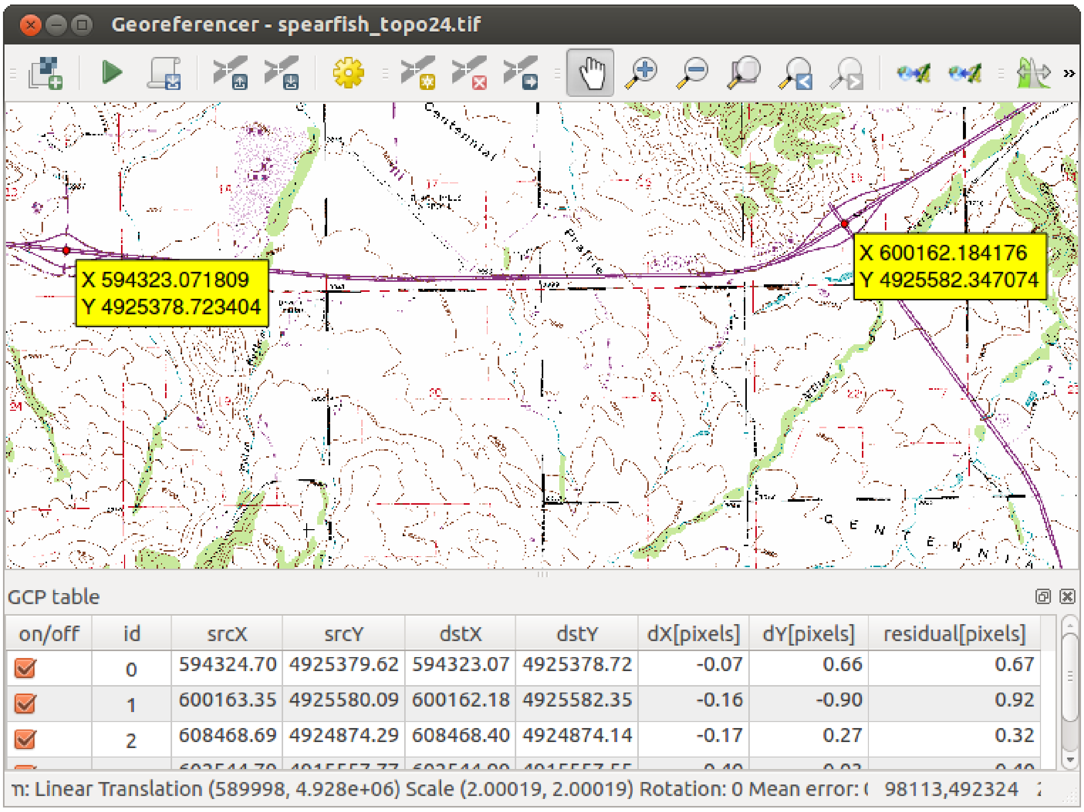

Figure 19.17: ジオリファレンサプラグインダイアログ

グラウンドコントロールポイント (GCPs) の入力

1. To start georeferencing an unreferenced raster, we must load it using the button. The raster will show up in the main working area of the dialog. Once the raster is loaded, we can start to enter reference points.
2. Using the Add Point button, add points to the main working area and enter their coordinates (see Figure figure_georeferencer_2). For this procedure you have three options:
   - ラスタイメージ内の点をクリックして X と Y 座標を手動で入力して下さい.
   - Click on a point in the raster image and choose the From map canvas button to add the X and Y coordinates with the help of a georeferenced map already loaded in the QGIS map canvas.
   - With the button, you can move the GCPs in both windows, if they are at the wrong place.
3. ポイント入力を続けられます. 最低 4 個のポイントの指定が必要です. さらに多くの座標を入力でき, そのほうがいい結果になるでしょう. プラグインダイアログには GCP ポイントを適切な場所に置くためのワーキングエリアのズームとパンのツールがあります.

The points that are added to the map will be stored in a separate text file (`[filename].points`) usually together with the raster image. This allows us to reopen the Georeferencer plugin at a later date and add new points or delete existing ones to optimize the result. The points file contains values of the form: `mapX, mapY, pixelX, pixelY`. You can use the Load GCP points and Save GCP points as buttons to manage the files.

変換設定の定義

GCP をラスタイメージに追加した後ジオレファレンス処理のための変換方法の設定をする必要があります.

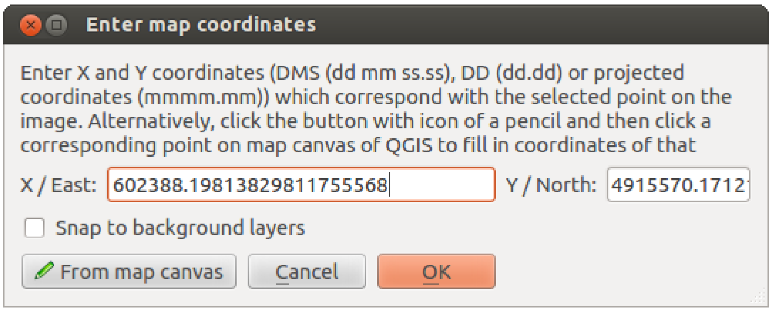

Figure 19.18: ラスタイメージへのポイントの追加

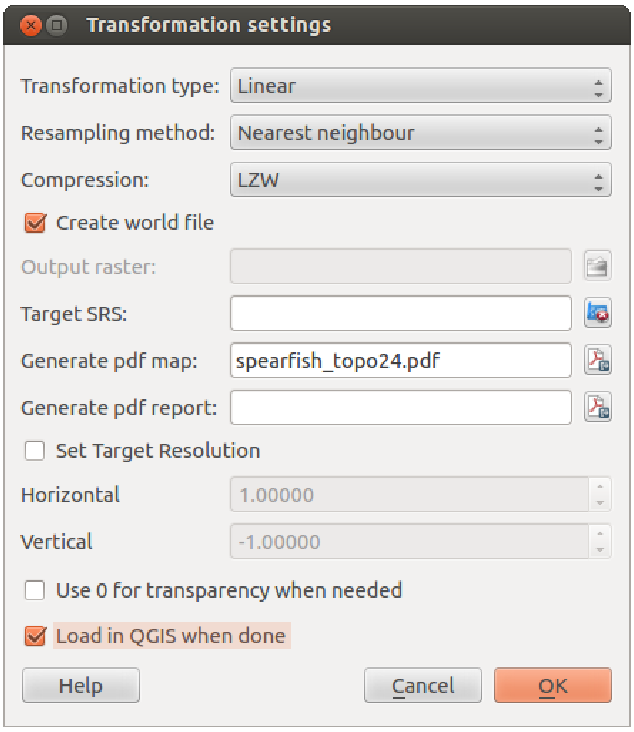

Figure 19.19: ジオリファレンサの変換設定定義中

利用可能な変換アルゴリズム

グランドコントロールポイントを何個設定したかによって異なる変換アルゴリズムを使ったほうがいいです. 入力データの型と品質, 変換結果に現れる地理的な歪みの量を勘案して変換アルゴリズムを選択して下さい.

現在以下の **変換タイプ** が利用できます:

- The **Linear** algorithm is used to create a world file and is different from the other algorithms, as it does not actually transform the raster. This algorithm likely won't be sufficient if you are dealing with scanned material.
- The **Helmert** transformation performs simple scaling and rotation transformations.
- The **Polynomial** algorithms 1-3 are among the most widely used algorithms introduced to match source and destination ground control points. The most widely used polynomial algorithm is the second-order polynomial transformation, which allows some curvature. First-order polynomial transformation (affine) preserves colliniarity and allows scaling, translation and rotation only.
- The **Thin Plate Spline** (TPS) algorithm is a more modern georeferencing method, which is able to introduce local deformations in the data. This algorithm is useful when very low quality originals are being georeferenced.
- The **Projective** transformation is a linear rotation and translation of coordinates.

リサンプリング方法の定義

リサンプリングの形式選択は入力データと最終実行結果の出来栄えによって選択して下さい. イメージの統計を変更したくない場合最近傍を選ぶといいと思います. それに対してキュービックリサンプルを選ぶとスムーズな結果が得られます.

5 種類の異なるリサンプリング方法から選択することが可能です.

1. 最近傍
2. 線形
3. キュービック
4. キュービックスプライン
5. ランチョシュ

変換方法の定義

ジオリファレンスされたラスタ出力を行うために指定する必要があるオプションがたくさんあります.

- The *Create world file* checkbox is only available if you decide to use the linear transformation type, because this means that the raster image actually won't be transformed. In this case, the *Output raster* field is not activated, because only a new world file will be created.
- 他の変換タイプでは **出力ラスタ** を指定しなければなりません. デフォルトで新しいファイルはオリジナルラスタファイルを同じフォルダに ([filename]_modified　という名前で) 作成されます.
- 次のステップとしてジオリファレンスされたラスタのための **ターゲット** *SRS* (Spatial Reference System) を指定しなければいけません (**投影法の利用方法** 参照).
- If you like, you can **generate a pdf map** and also **a pdf report**. The report includes information about the used transformation parameters, an image of the residuals and a list with all GCPs and their RMS errors.
- さらに **ターゲットの解像度を指定して下さい** チェックボックスをアクティブにして出力ラスタの解像度を指定することができます. デフォルトの水平と垂直解像度は 1 です,
- 0 の値のピクセルが透明に表示されるべきな場合 **必要に応じて透明に** *0* **を使用** をアクティブにできます. 例のトポシートの白いエリアは透明に表示されるべきです.

- Finally, Load in QGIS when done loads the output raster automatically into the QGIS map canvas when the transformation is done.

ラスタプロパティの表示と調整

Clicking on the *Raster properties* dialog in the *Settings* menu opens the raster properties of the layer that you want to georeference.

ジオリファレンサの構成

- You can define whether you want to show GCP coordiniates and/or IDs.
- ピクセルと地図の残差の単位は選択できます.
- For the PDF report, a left and right margin can be defined and you can also set the paper size for the PDF map.
- 最後に **ジオレファレンサウィンドウを結合して表示する** を有効化できます.

変換の実行

After all GCPs have been collected and all transformation settings are defined, just press the Start georeferencing button to create the new georeferenced raster.

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19.10 ヒートマッププラグイン

The *Heatmap* plugin uses Kernel Density Estimation to create a density (heatmap) raster of an input point vector layer. The density is calculated based on the number of points in a location, with larger numbers of clustered points resulting in larger values. Heatmaps allow easy identification of "hotspots" and clustering of points.

19.10.1 ヒートマッププラグインの有効化

このコアプラグインはプラグインマネージャ (*load_core_plugin* のセクションを参照) を使って有効にする必要があります。それからヒートマップアイコン|heatmap| が有効になったこと、:menuselection:'ラスタ –> ヒートマップ 'メニュー をラスタツールバーで確認できます。

ラスタツールバーが表示されない場合は **表示** → **ツールバー** → **ラスタ** を選択してツールバーを表示しましょう。

19.10.2 ヒートマッププラグインの利用

'ヒートマップ 'ツールボタンをクリックし、ヒートマッププラグインダイアログ (figure_heatmap_2 を参照) を開きます。

ダイアログには次のオプションがあります：

- **入力ポイントレイヤ**: カレントプロジェクト内の すべてのベクタポイントレイヤのリストであり、選択したレイヤが分析に使われます。
- **Output raster**: Allows you to use the ... button to select the folder and filename for the output raster the Heatmap plugin generates. A file extension is not required.

- **Output format**: Selects the output format. Although all formats supported by GDAL can be choosen, in most cases GeoTIFF is the best format to choose.
- **Radius**: Is used to specify the heatmap search radius (or kernel bandwidth) in meters or map units. The radius specifies the distance around a point at which the influence of the point will be felt. Larger values result in greater smoothing, but smaller values may show finer details and variation in point density.

When the *Advanced* checkbox is checked, additional options will be available:

- **Rows** and **Columns**: Used to change the dimensions of the output raster. These values are also linked to the **Cell size X** and **Cell size Y** values. Increasing the number of rows or columns will decrease the cell size and increase the file size of the output file. The values in Rows and Columns are also linked, so doubling the number of rows will automatically double the number of columns and the cell sizes will also be halved. The geographical area of the output raster will remain the same!
- **Cell size X** and **Cell size Y**: Control the geographic size of each pixel in the output raster. Changing these values will also change the number of Rows and Columns in the output raster.
- **Kernel shape**: The kernel shape controls the rate at which the influence of a point decreases as the distance from the point increases. Different kernels decay at different rates, so a triweight kernel gives features greater weight for distances closer to the point then the Epanechnikov kernel does. Consequently, triweight results in "sharper" hotspots, and Epanechnikov results in "smoother" hotspots. A number of standard kernel functions are available in QGIS, which are described and illustrated on Wikipedia.
- **Decay ratio**: Can be used with Triangular kernels to further control how heat from a feature decreases with distance from the feature.
  - A value of 0 (=minimum) indicates that the heat will be concentrated in the centre of the given radius and completely extinguished at the edge.
  - 0.5 の値は、半径の端のピクセルは、検索半径の中心にピクセルとして半分のヒートを与えられることを示しています。
  - 1 の値は、ヒートが探索半径の円全体上に均等に分散されていることを示します。（これは「画一的な」カーネルに相当します）
  - 1 より大きい値は、ヒートが中央部よりも検索範囲のエッジに対して高いことを示している。

入力ポイントトレイヤはヒートマップにどれくらい影響をおよぼすかの属性フィールドを持ちえます。

- **フィールドから半径を使用する**:入力レイヤの属性フィールドから、各フィーチャの検索半径を設定します。
- **Use weight from field**: Allows input features to be weighted by an attribute field. This can be used to increase the influence certain features have on the resultant heatmap.

出力ラスタファイル名を指定したら、**[OK]** ボタンが利用でき、ヒートマップを作成します。

19.10.3 チュートリアル：ヒートマップの作成

For the following example, we will use the `airports` vector point layer from the QGIS sample dataset (see **サンプルデータ**). Another exellent QGIS tutorial on making heatmaps can be found at http://qgis.spatialthoughts.com.

Figure_Heatmap_1 ではアラスカの空港が示されてます。

1. *Heatmap* ツールボタンを選択しヒートマップダイアログ (Figure_Heatmap_2 を参照) を開きます。
2. In the *Input point layer* field, select `airports` from the list of point layers loaded in the current project.
3. Specify an output filename by clicking the ... button next to the *Output raster* field. Enter the filename `heatmap_airports` (no file extension is necessary).
4. **出力フォーマット** はデフォルトのフォーマットである ‘‘GeoTIFF‘‘にしておきます。
5. **半径** は `1000000` メートルに変更します。

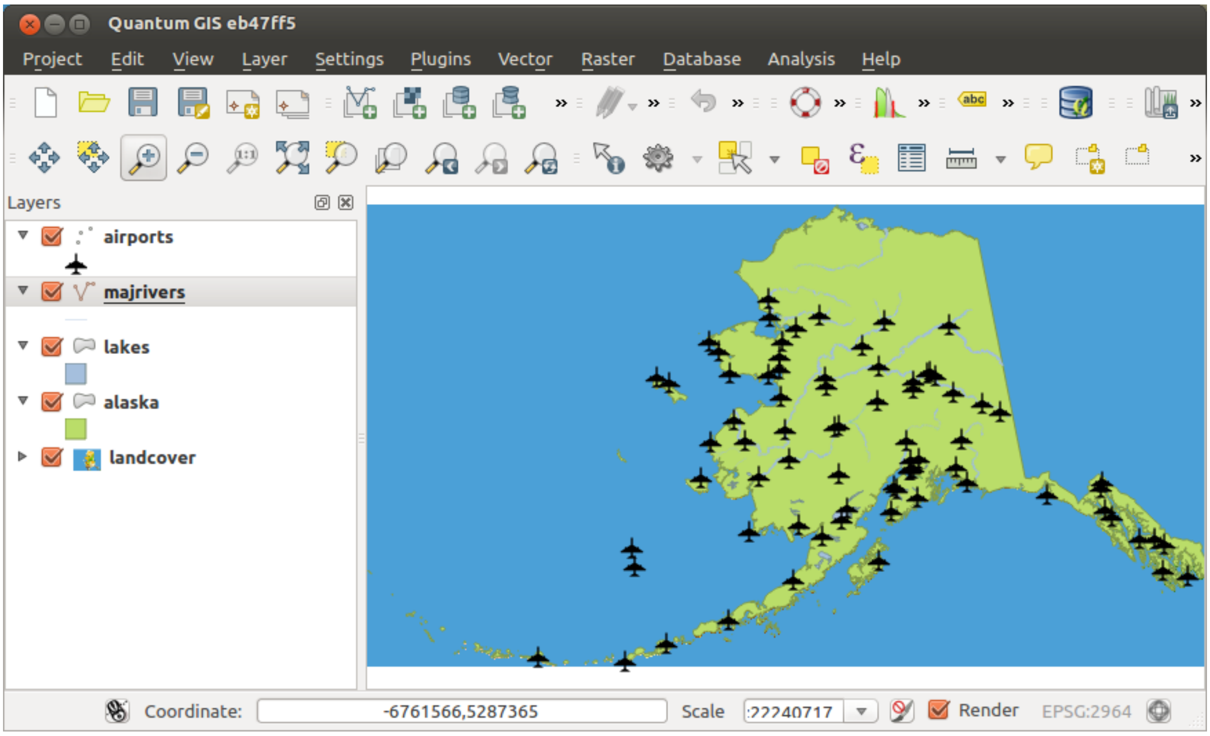

Figure 19.20: Airports of Alaska

6. **[OK]** をクリックし、空港のヒートマップを作成および読み込みます (Figure_Heatmap_3 を参照)

QGIS will generate the heatmap and add the results to your map window. By default, the heatmap is shaded in greyscale, with lighter areas showing higher concentrations of airports. The heatmap can now be styled in QGIS to improve its appearance.

1. ‘ *heatmap_airports*‘‘**レイヤのプロパティダイアログを開きます（**‘‘*heatmap_airports*‘‘**レイヤを選択し、右ボタンでクリックしてコンテキストメニューを開き** *:guilabel:*‘**プロパティ** を選択します）
2. Select the *Style* tab.
3. Change the *Render type* to ‘Singleband pseudocolor’.
4. Select a suitable *Color map* , for instance `YlOrRed`.
5. **[読み込み]** ボタンをクリックし、ラスタから最小および最大値を読み込み、**[分類]**ボタンをクリックします。
6. **[OK]**を押しレイヤを更新します。

最終的な結果は Figure_Heatmap_4 に示してあります。

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19.11 データ補間プラグイン

The Interplation plugin can be used to generate a TIN or IDW interpolation of a point vector layer. It is very simple to handle and provides an intuitive graphical user interface for creating interpolated raster layers (see Figure_interpolation_1). The plugin requires the following parameters to be specified before running:

- Input **Vector layers**: Specify the input point vector layer(s) from a list of loaded point layers. If several layers are specified, then data from all layers is used for interpolation. Note: It is possible to insert lines or polygons as constraints for the triangulation, by specifying either “points”, “structure lines” or “break lines” in the *Type* combo box.

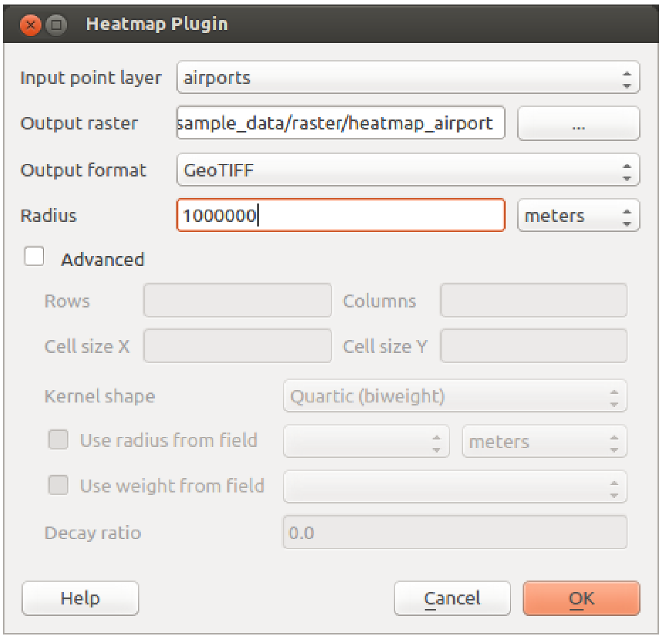

Figure 19.21: The Heatmap Dialog

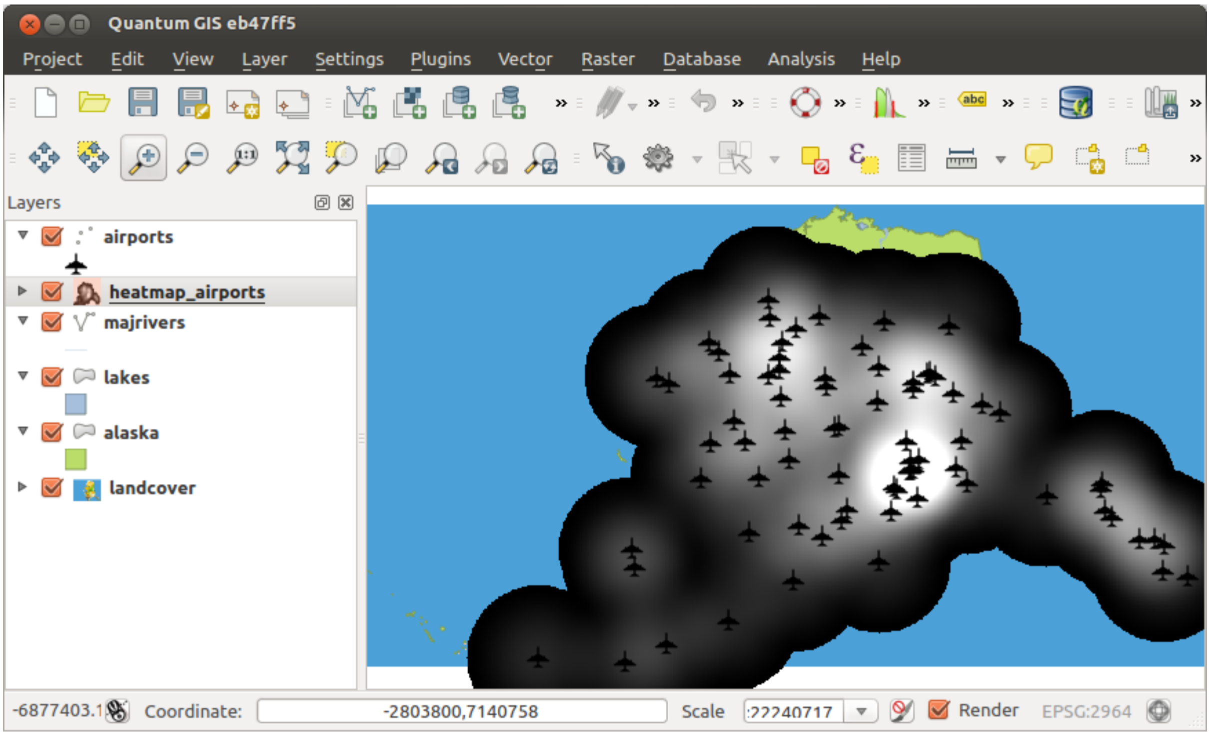

Figure 19.22: The heatmap after loading looks like a grey surface

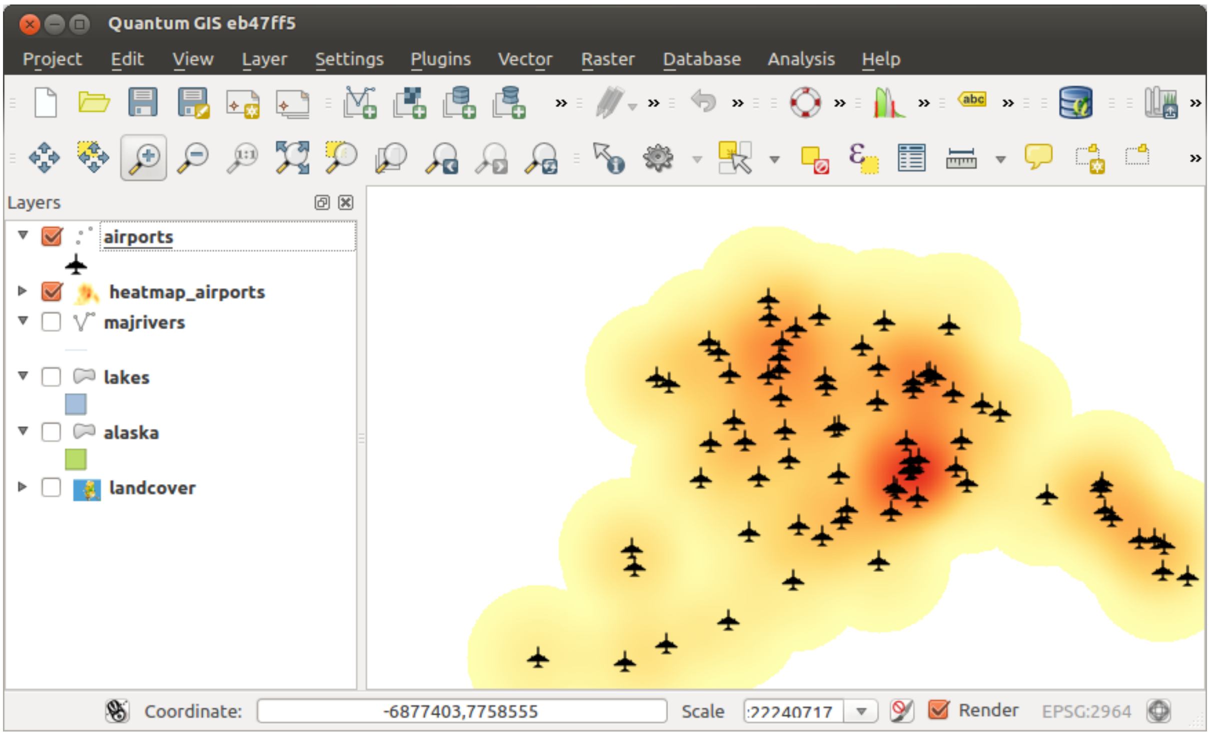

Figure 19.23: Styled heatmap of airports of Alaska

- **補間する属性**: 補間に使用する属性カラムを選択するか, 格納された Z 値を使用するには *Z* **座標を使用する** チェックを有効にします.
- **Interpolation Method**: Select the interpolation method. This can be either 'Triangulated Irregular Network (TIN)' or 'Inverse Distance Weighted (IDW)'. With the TIN method you can create a surface formed by triangles of nearest neighbour points. To do this, circumcircles around selected sample points are created and their intersections are connected to a network of non overlapping and as compact as possible triangles. The resulting surfaces are not smooth. When using the IDW method the sample points are weighted during interpolation such that the influence of one point relative to another declines with distance from the unknown point you want to create. The IDW interpolation method also has some disadvantages: the quality of the interpolation result can decrease, if the distribution of sample data points is uneven. Furthermore, maximum and minimum values in the interpolated surface can only occur at sample data points. This often results in small peaks and pits around the sample data points.
- **カラム/行の数**: 出力するラスタファイルの 行またはカラムの数を指定します。
- **出力ファイル**: 出力するラスタファイルの名称を指定します。
- **結果をプロジェクトに追加する** マップキャンバスに結果をロードします。

Note that using lines as constraints for the interpolation the triangulation (TIN method) you can either use 'structure lines' or 'break lines'. When using 'break lines' you produce sharp breaks in the surface while using 'structure lines' you produce continous breaks. The triangulation is modified by both methods such that no edge crosses a breakline or structure line.

19.11.1 プラグインの利用

1. Start QGIS and load a point vector layer (e.g., `elevp.csv`).
2. Load the Interpolation plugin in the Plugin Manager (see **プラグインダイアログ**) and click on the *Raster* → *Interpolation* → *Interpolation* , which appears in the QGIS menu bar. The Interpolation plugin dialog appears as shown in Figure_interpolation_1.

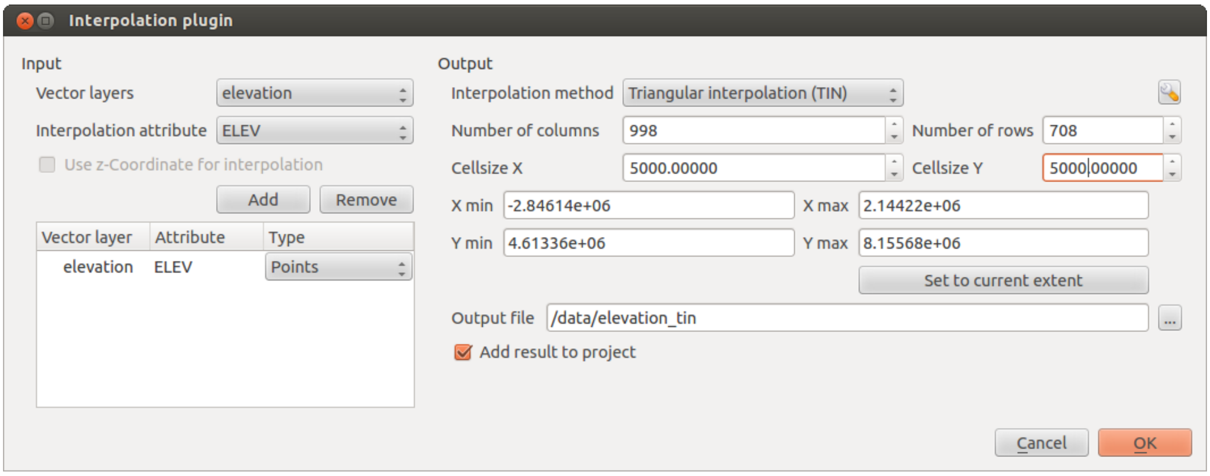

Figure 19.24: Interpolation Plugin

3. Select an input layer (e.g., *elevp*) and column (e.g., `ELEV`) for interpolation.
4. 補間法 (e.g. 三角形分割補間（TIN）) を選択し、出力ラスタのファイル名（e.g., `elevation_tin`）および 5000 のセルサイズを特定します。
5. **[OK]** をクリックします。

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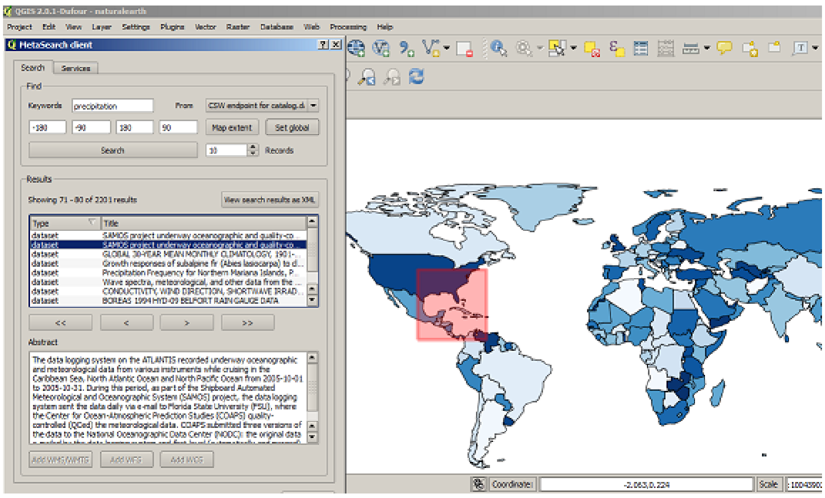
19.12 MetaSearch Catalogue Client



19.12.1 Introduction

MetaSearch is a QGIS plugin to interact with metadata catalogue services, supporting the OGC Catalogue Service for the Web (CSW) standard.

MetaSearch provides an easy and intuitive approach and user-friendly interface to searching metadata catalogues within QGIS.

19.12.2 Installation

MetaSearch is included by default with QGIS 2.0 and higher. All dependencies are included within MetaSearch.

Install MetaSearch from the QGIS plugin manager, or manually from http://plugins.qgis.org/plugins/MetaSearch.

19.12.3 Working with Metadata Catalogues in QGIS

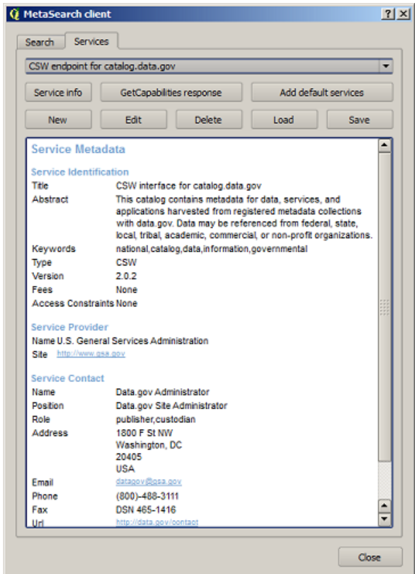
CSW (Catalogue Service for the Web)

CSW (Catalogue Service for the Web) is an OGC (Open Geospatial Consortium) specification, that defines common interfaces to discover, browse, and query metadata about data, services, and other potential resources.

Startup

To start MetaSearch, click the MetaSearch icon or select Web / MetaSearch / MetaSearch via the QGIS main menu. The MetaSearch dialog will appear. The main GUI consists of two tabs: ‘Services’ and ‘Search’.

Managing Catalogue Services



The ‘Services’ tab allows the user to manage all available catalogue services. MetaSearch provides a default list of Catalogue Services, which can be added by pressing ‘Add default services’ button.

To all listed Catalogue Service entries, click the dropdown select box.

To add a Catalogue Service entry, click the ‘New’ button, and enter a Name for the service, as well as the URL/endpoint. Note that only the base URL is required (not a full GetCapabilities URL). Clicking ok will add the service to the list of entries.

To edit an existing Catalogue Service entry, select the entry you would like to edit and click the ‘Edit’ button, and modify the Name or URL values, then click ok.

To delete a Catalogue Service entry, select the entry you would like to delete and click the ‘Delete’ button. You will be asked to confirm deleting the entry.

MetaSearch allows for loading and saving connections to an XML file. This is useful when you need to share settings between applications. Below is an example of the XML file format.

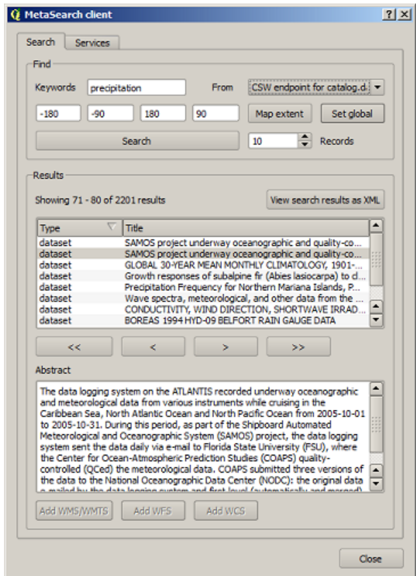
```xml
<?xml version="1.0" encoding="UTF-8"?>
<qgsCSWConnections version="1.0">
    <csw name="Data.gov CSW" url="http://catalog.data.gov/csw-all"/>
    <csw name="Geonorge - National CSW service for Norway" url="http://www.geonorge.no/geonetwork
    <csw name="Geoportale Nazionale - Servizio di ricerca Italiano" url="http://www.pcn.minambient
    <csw name="LINZ Data Service" url="http://data.linz.govt.nz/feeds/csw"/>
```

```
    <csw name="Nationaal Georegister (Nederland)" url="http://www.nationaalgeoregister.nl/geonetw
    <csw name="RNDT - Repertorio Nazionale dei Dati Territoriali - Servizio di ricerca" url="http
    <csw name="UK Location Catalogue Publishing Service" url="http://csw.data.gov.uk/geonetwork/s
    <csw name="UNEP/GRID-Geneva Metadata Catalog" url="http://metadata.grid.unep.ch:8080/geonetwo
</qgsCSWConnections>
```

To load a list of entries, click the ‘Load’ button. A new window will appear; click the ‘Browse’ button and navigate to the XML file of entries you wish to load and click ‘Open’. The list of entries will be displayed. Select the entries you wish to add from the list and click ‘Load’.

The ‘Service info’ button displays information about the selected Catalogue Service such as service identification, service provider and contact information. If you would like to view the raw XML response, click the ‘GetCapabilities response’ button. A separate window will open displaying Capabilities XML.

Searching Catalogue Services



The ‘Search’ tab allows the user to query Catalogue Services for data and services, set various search parameters and view results.

The following search parameters are available:

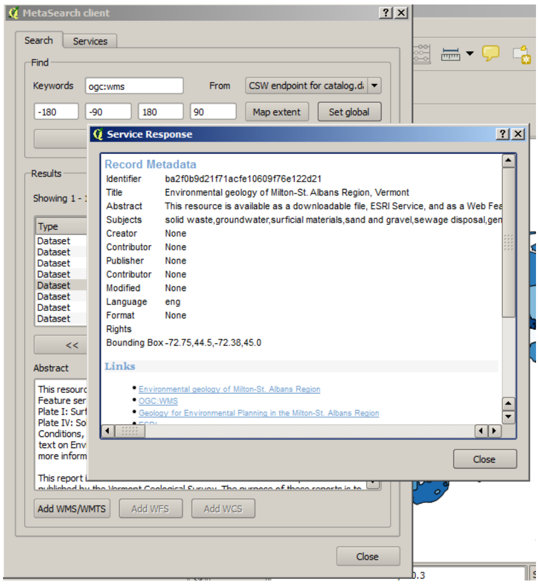
- **Keywords**: free text search keywords
- **From**: the Catalogue Service to perform the query against
- **Bounding box**: the spatial area of interest to filter on. The default bounding box is the map view / canvas. Click ‘Set global’ to do a global search, or enter custom values as desired
- **Records**: the number of records to return when searching. Default is 10 records

Clicking the ‘Search’ button will search the selected Metadata Catalogue. Search results are displayed in a list and are sortable by clicking on the column title. You can navigate through search results with the directional buttons below the search results. Clicking the ‘View search results as XML’ button opens a window with the service response in raw XML format.

Clicking a result will show the record’s abstract in the ‘Abstract’ window and provides the following options:

- if the metadata record has an associated bounding box, a footprint of the bounding box will be displayed on the map
- double-clicking the record displays the record metadata with any associated access links. Clicking the links opens the link in the user’s web browser

- if the record is an OGC web service (WMS/WMTS, WFS, WCS), the appropriate 'Add to WMS/WMTS|WFS|WCS' buttons will be enabled for the user to add to QGIS. When clicking this button, MetaSearch will verify if this is a valid OWS. The OWS will then be added to the appropriate QGIS connection list, and the appropriate WMS/WMTS|WFS|WCS connection dialogue will then appear



Settings

You can fine tune MetaSearch with the following settings:

- **Connection naming**: when adding an OWS connection (WMS/WMTS|WFS|WCS), the connection is stored with the various QGIS layer provider. Use this setting to set whether to use the name provided from MetaSearch, whether to overwrite or to use a temporary name
- **Results paging**: when searching metadata catalogues, the number of results to show per page
- **Timeout**: when searching metadata catalogues, the number of seconds for blocking connection attempt. Default value is 10

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19.13 オフライン編集プラグイン

データ収集のために、ノートパソコンやフィールドでオフラインの携帯電話で作業するのは一般的な状況です。ネットワークへの復帰後、変更内容はマスターデータソース（e.g. a PostGIS データベース）と同期する必要があります。複数の人が同じデータセットを同時に作業している場合、それは人々が同じ地物を変更していない場合でも、手作業で編集内容をマージするのは困難です。

The Offline Editing Plugin automates the synchronisation by copying the content of a datasource (usually PostGIS or WFS-T) to a SpatiaLite database and storing the offline edits to dedicated tables. After being connected to the network again, it is possible to apply the offline edits to the master dataset.

19.13.1 プラグインの利用

- ベクタレイヤ（e.g. PostGIS or WFS-T データソース 由来）を開きます。
- プロジェクトとして保存する.
- Go to *Database* → *Offline Editing* → *Convert to offline project* and select the layers to save. The content of the layers is saved to SpatiaLite tables.

- オフラインでレイヤを編集します。
- After being connected again, upload the changes using *Database* → *Offline Editing* → *Synchronize*.

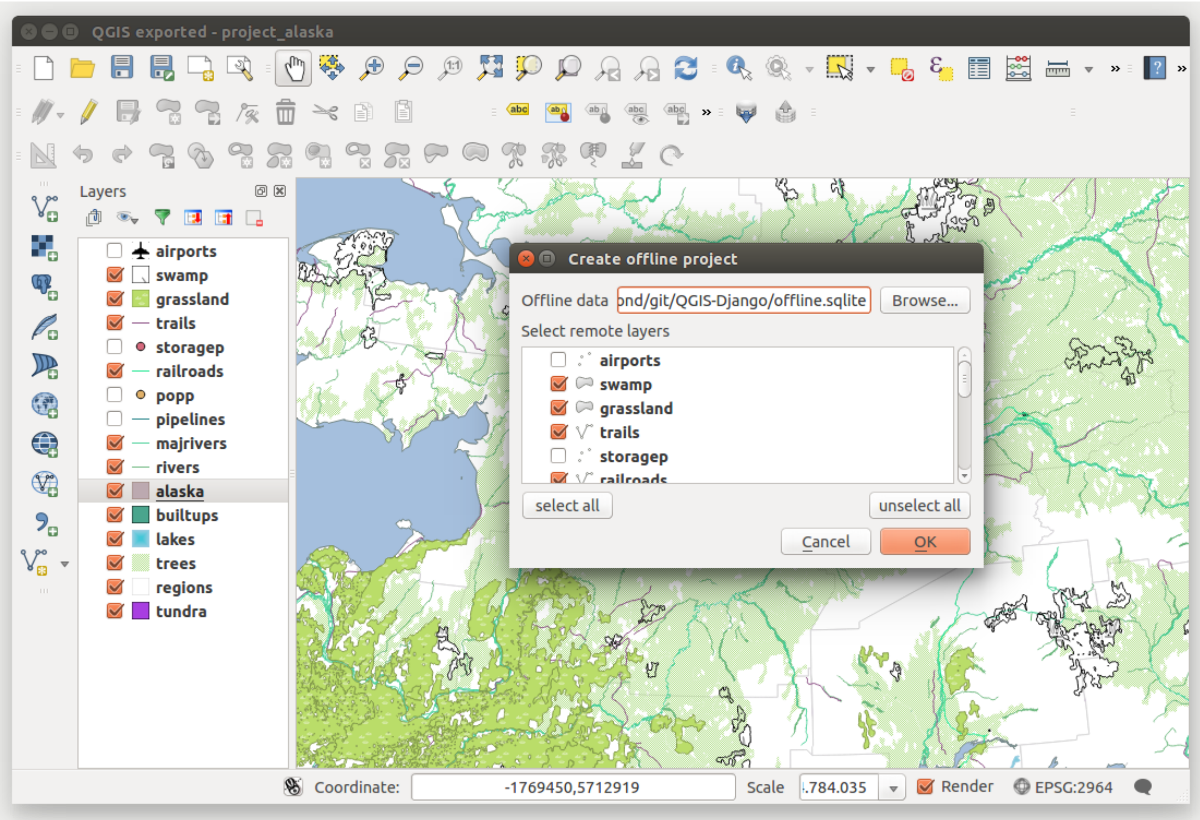

Figure 19.25: PostGIS または WFS レイヤからオフラインプロジェクトを作ります

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19.14 Oracle Spatial GeoRaster プラグイン

In Oracle databases, raster data can be stored in SDO_GEORASTER objects available with the Oracle Spatial extension. In QGIS, the Oracle Spatial GeoRaster plugin is supported by GDAL and depends on Oracle's database product being installed and working on your machine. While Oracle is proprietary software, they provide their software free for development and testing purposes. Here is one simple example of how to load raster images to GeoRaster:

```
$ gdal_translate -of georaster input_file.tif geor:scott/tiger@orcl
```

デフォルトの GDAL_IMPORT テーブルにラスタがロードされ、カラム名は "RASTER"になります。

19.14.1 接続の管理

Firstly, the Oracle GeoRaster Plugin must be enabled using the Plugin Manager (see **プラグインダイアログ**). The first time you load a GeoRaster in QGIS, you must create a connection to the Oracle database that contains the data. To do this, begin by clicking on the Add Oracle GeoRaster Layer toolbar button – this will open the *Select Oracle Spatial GeoRaster* dialog window. Click on **[New]** to open the dialog window, and specify the connection parameters (See Figure_oracle_raster_1):

- **名称**: データベース接続の名称を入力します

- **データベースインスタンス**:接続するデータベースの名称を入力します 。
- **ユーザ名**: データベースにアクセスするユーザ名を指定します。
- **パスワード**: データベースにアクセスするために必要なユーザ名に関連付けられているパスワードを入力します。

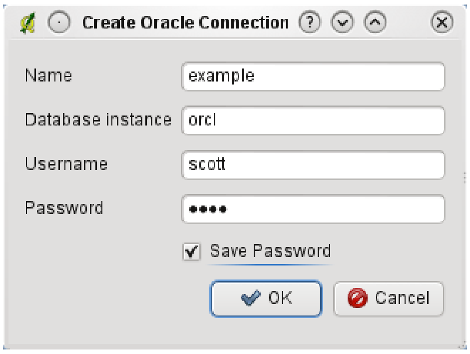

Figure 19.26: Oracle 接続ダイアログの作成

Now, back on the main *Oracle Spatial GeoRaster* dialog window (see Figure_oracle_raster_2), use the drop-down list to choose one connection, and use the **[Connect]** button to establish a connection. You may also **[Edit]** the connection by opening the previous dialog and making changes to the connection information, or use the **[Delete]** button to remove the connection from the drop-down list.

19.14.2 Selecting a GeoRaster

いったん接続が確立されると、サブデータセットウィンドウには GDAL サブデータセット名の形式でデータベースに GeoRaster カラムを含むすべてのテーブルの名称が表示されます。

リストアップされたサブデータセットのいずれかをクリックし、 **[選択]**をクリックしてテーブル名を選択します。 今サブデータセットの別のリストは、そのテーブルの GeoRaster 列の名称で表示されています。ほとんどのユーザは同じテーブルに１つまたは２つ以上の GeoRaster 列を持たないため、これはたいてい短いリストです。

Click on one of the listed subdatasets and then click on **[Select]** to choose one of the table/column combinations. The dialog will now show all the rows that contain GeoRaster objects. Note that the subdataset list will now show the Raster Data Table and Raster Id pairs.

いつでも選択エントリは既知の GeoRaster に直接移動するか、最初に戻って、別のテーブル名を選択するために編集することができます。

The selection data entry can also be used to enter a `WHERE` clause at the end of the identification string (e.g., `geor:scott/tiger@orcl,gdal_import,raster,geoid=`). See http://www.gdal.org/frmt_georaster.html for more information.

19.14.3 GeoRaster の表示

Finally, by selecting a GeoRaster from the list of Raster Data Tables and Raster Ids, the raster image will be loaded into QGIS.

The *Select Oracle Spatial GeoRaster* dialog can be closed now and the next time it opens, it will keep the same connection and will show the same previous list of subdatasets, making it very easy to open up another image from the same context.

ノート: GeoRasters that contain pyramids will display much faster, but the pyramids need to be generated outside of QGIS using Oracle PL/SQL or gdaladdo.

以下は ‘‘gdaladdo‘‘を使用した例です:

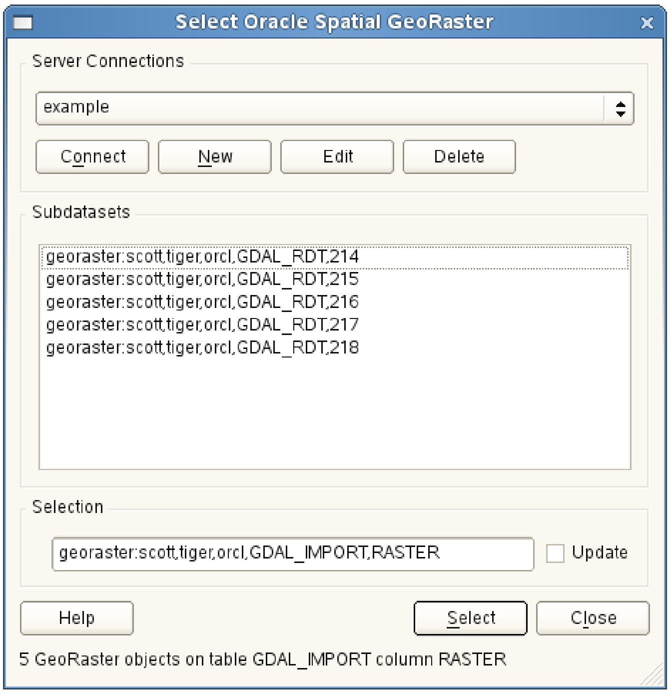

Figure 19.27: Oracle GeoRaster ダイアログの選択

```
gdaladdo georaster:scott/tiger@orcl,georaster\_table,georaster,georid=6 -r
nearest 2 4 6 8 16 32
```

これが PL/SQL の使用例です:

```
$ sqlplus scott/tiger
SQL> DECLARE
 gr sdo_georaster;
BEGIN
    SELECT image INTO gr FROM cities WHERE id = 1 FOR UPDATE;
    sdo_geor.generatePyramid(gr, 'rLevel=5, resampling=NN');
    UPDATE cities SET image = gr WHERE id = 1;
    COMMIT;
END;
```

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19.15 ラスター地形解析プラグイン

 The Raster Terrain Analysis Plugin can be used to calculate the slope, aspect, hillshade, ruggedness index and relief for digital elevation models (DEM). It is very simple to handle and provides an intuitive graphical user interface for creating new raster layers (see Figure_raster_terrain_1).

分析の説明：

- **傾斜**：各セルの傾斜角を度単位で計算する（一時導関数の推定に基づく)。
- **傾斜方位**： 説明 （反時計回りに、北方向は 0 から始まる） .
- **Hillshade**: Creates a shaded map using light and shadow to provide a more three-dimensional appearance for a shaded relief map. The output map is a Single band gray reflecting the gray value of the pixels.
- **起伏度指標**: Riley et al. (1999) により述べられている地形の不均一性を定量的に示す. 3x3 グリッドごとに全ての場所ごとに標高の変化を要約して計算します.

- **Relief**: Creates a shaded relief map from digital elevation data. Implemented is a method to choose the elevation colors by analysing the frequency distribution. The output map is a multiband color with three bands reflecting the RGB values of the shaded relief.

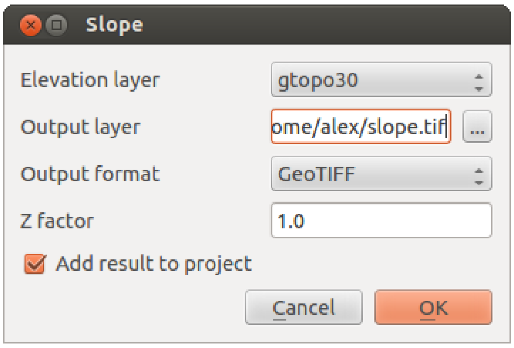

Figure 19.28: ラスター地形解析プラグイン (傾斜計算)

19.15.1 プラグインの利用

1. Start QGIS and load the `gtopo30` raster layer from the GRASS sample location.
2. ラスター地形解析プラグインをプラグインマネージャーで読み込む (**プラグインダイアログ** 参照)
3. メニューから解析手法を選択します (例. **ラスタ** → **地形解析** → **傾斜**). **傾斜** ダイアログが Figure_raster_terrain_1 のように表示されます.
4. 出力ファイルパスおよび出力ファイルタイプを指定します。
5. **[OK]**をクリックします。

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19.16 道路グラフプラグイン

The Road Graph Plugin is a C++ plugin for QGIS that calculates the shortest path between two points on any polyline layer and plots this path over the road network.

主な機能:

- 経路, 距離, 旅行時間を計算する
- 距離または旅行時間で最適化する
- 経路をベクタレイヤとして出力する
- 道路の方向にハイライトを入れる (動作が遅いため, 主にデバッグや設定確認目的に利用します)

As a roads layer, you can use any polyline vector layer in any QGIS-supported format. Two lines with a common point are considered connected. Please note, it is required to use layer CRS as project CRS while editing a roads layer. This is due to the fact that recalculation of the coordinates between different CRSs introduces some errors that can result in discontinuities, even when 'snapping' is used.

次に示すレイヤ属性テーブルのフィールドが利用可能です

- 道路区間の速度 (数値フィールド);
- 方向 (文字列にキャストできる任意の型). 一方通行の道路は前方向と逆方向があります, 両方の方向を持つ場合は両方向の道路を示します.

もしいくつかのフィールドが値を持っていないか存在しない場合, デフォルトの値が使われます. デフォルトの変更といくつかのプラグインの設定は設定ダイアログで可能です.

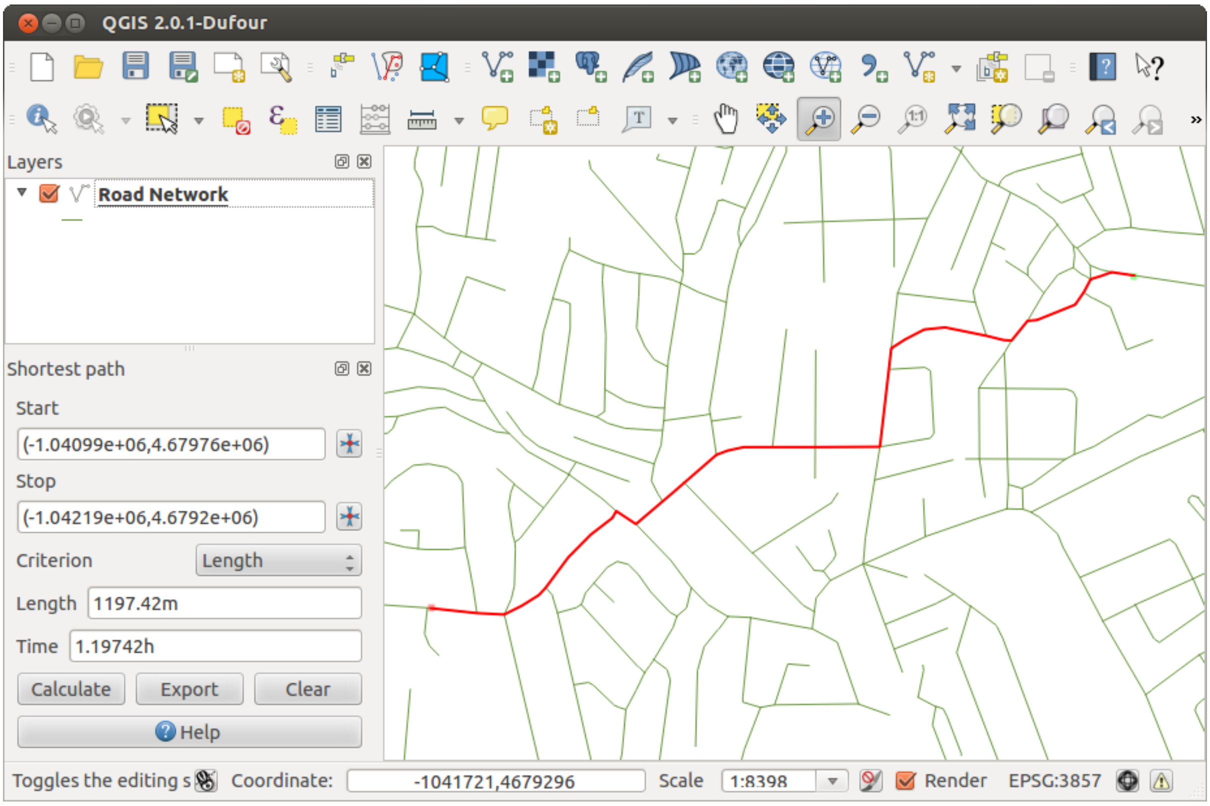

Figure 19.29: Road Graph Plugin

19.16.1 このプラグインの利用

After plugin activation, you will see an additional panel on the left side of the main QGIS window. Now, enter some parameters into the *Road graph plugin settings* dialog in the *Vector* → *Road Graph* menu (see figure_road_graph_2).

After setting the *Time unit*, *Distance unit* and *Topology tolerance*, you can choose the vector layer in the *Transportation layer* tab. Here you can also choose the *Direction field* and *Speed field*. In the *Default settings* tab, you can set the *Direction* for the calculation.

最後に *Shortest Path* パネルで 道路ネットワークレイヤ開始と終了ポイントを選択して下した後で **[Calculate]** をクリックして下さい.

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19.17 空間検索プラグイン

The Spatial Query Plugin allows you to make a spatial query (i.e., select features) in a target layer with reference to another layer. The functionality is based on the GEOS library and depends on the selected source feature layer.

利用可能な演算子：

- 含む
- 一致する
- 重複する
- 横切る
- 交差する

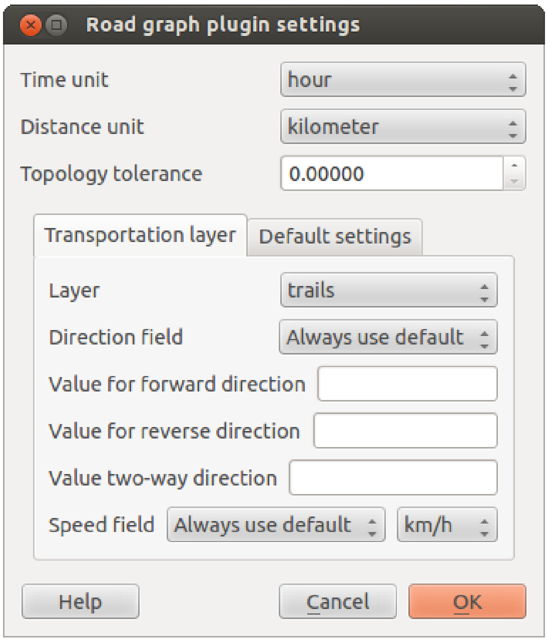

Figure 19.30: Road graph plugin settings

- 離れている
- 接する
- 範囲内

19.17.1 プラグインの利用

例として、我々は空港が含まれているアラスカのデータセット内の領域を見つけたい。次の手順が必要です：

1. Start QGIS and load the vector layers `regions.shp` and `airports.shp`.
2. Load the Spatial Query plugin in the Plugin Manager (see **プラグインダイアログ**) and click on the Spatial Query icon, which appears in the QGIS toolbar menu. The plugin dialog appears.
3. ソースのレイヤとして `regions`\`\`レイヤを選択し、参照する地物レイヤとして\`\``airports` を選択します。
4. 地物の場所で '範囲内' を選択し**[Apply]**をクリックします。

ここで検索結果の地物 ID のリストが得られます. そして figure_spatial_query_1 に表示されている様々なオプションが利用できます.

- Click on Create layer with list of items.
- Select an ID from the list and click on Create layer with selected.
- Select 'Remove from current selection' in the field *And use the result to* .
- You can *Zoom to item* or display *Log messages*.
- Additionally in *Result Feature ID's* with the options 'Invalid source' and 'Invalid reference' you can have a look at features with geometries errors. These features aren't used for the query.

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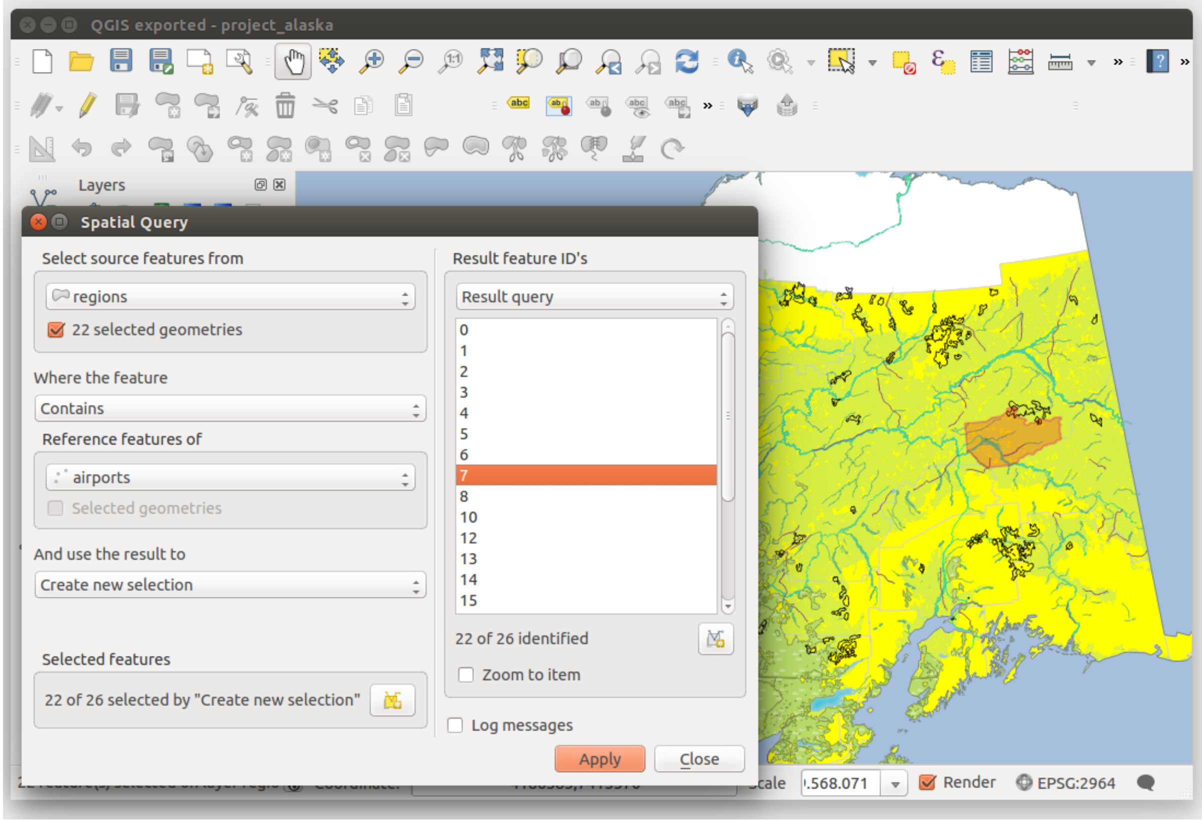

Figure 19.31: Spatial Query analysis - regions contain airports

19.18 SPIT プラグイン

QGIS comes with a plugin named SPIT (Shapefile to PostGIS Import Tool). SPIT can be used to load multiple shapefiles at one time and includes support for schemas. To use SPIT, open the Plugin Manager from the *Plugins* menu, in the *Installed* menu check the box next to the *SPIT* and click **[OK]**.

To import a shapefile, use *Database* → *Spit* → *Import Shapefiles to PostgreSQL* from the menu bar to open the *SPIT - Shapefile to PostGIS Import Tool* dialog. Select the PostGIS database you want to connect to and click on **[Connect]**. If you want, you can define or change some import options. Now you can add one or more files to the queue by clicking on the **[Add]** button. To process the files, click on the **[OK]** button. The progress of the import as well as any errors/warnings will be displayed as each shapefile is processed.　.

19.19 トポロジチェッカープラグイン

トポロジは、地理的領域のフィーチャを表すポイント、ラインおよびポリゴン間の関係を記述するものです。トポロジチェッカープラグインを使用すれば、ベクタファイルに目を通すことができ、いくつかのトポロジルールでトポロジを確認できます。これらのルールは、’Equal’, ‘Contain’, ‘Cover’, are ‘CoveredBy’, ‘Cross’ かどうか、’Disjoint’, ‘Intersect’, ‘Overlap’, ‘Touch’ かどうか、あるいは互いに’Within’ かの空間的関係でチェックします。それはベクタデータに適用されるトポロジルール個々の質問に依存します（例えば、通常は、配線レイヤでのオーバーシュートを受け入れませんが、それらがデッドエンドの通りを示している場合、ベクタレイヤからそれらを削除しません）。

QGIS has a built-in topological editing feature, which is great for creating new features without errors. But existing data errors and user-induced errors are hard to find. This plugin helps you find such errors through a list of rules.

トポロジチェッカ＾プラグインでトポロジルールを作成するのはとても簡単です。

On **point layers** the following rules are available:

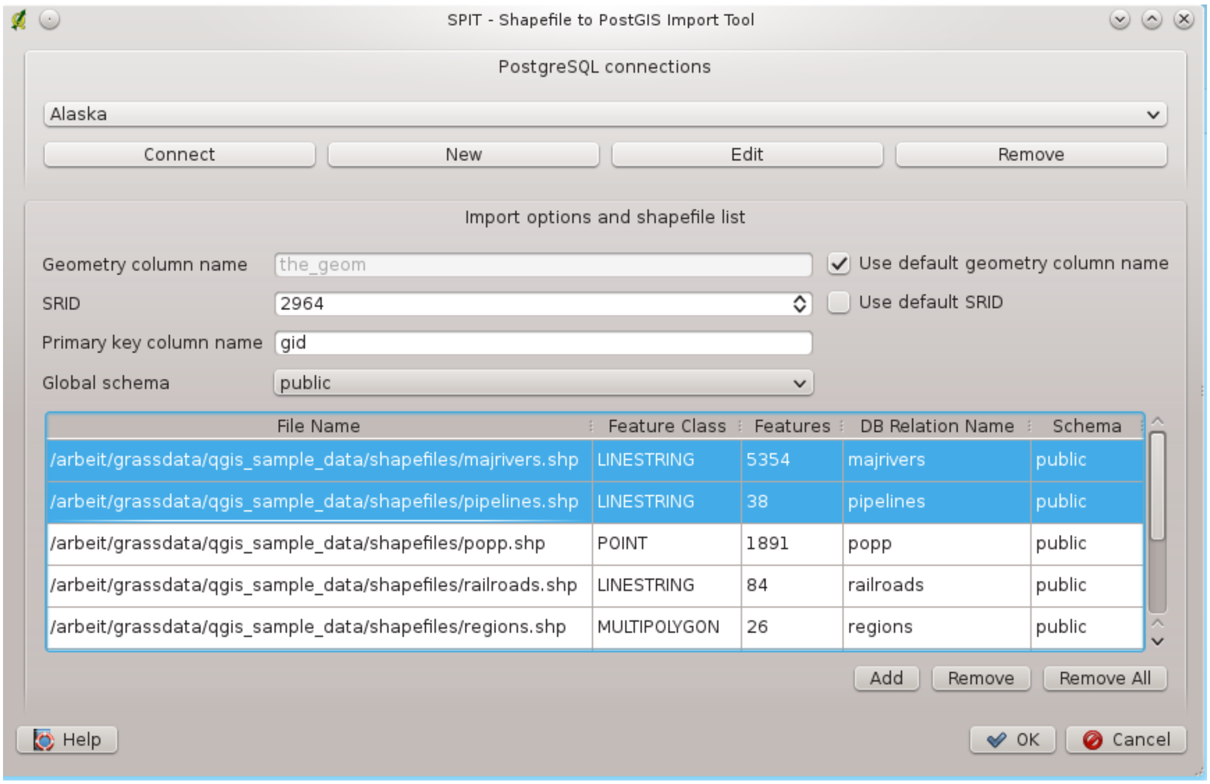

Figure 19.32: PostGIS に Shape ファイルをインポートするための SPIT プラグインの使い方

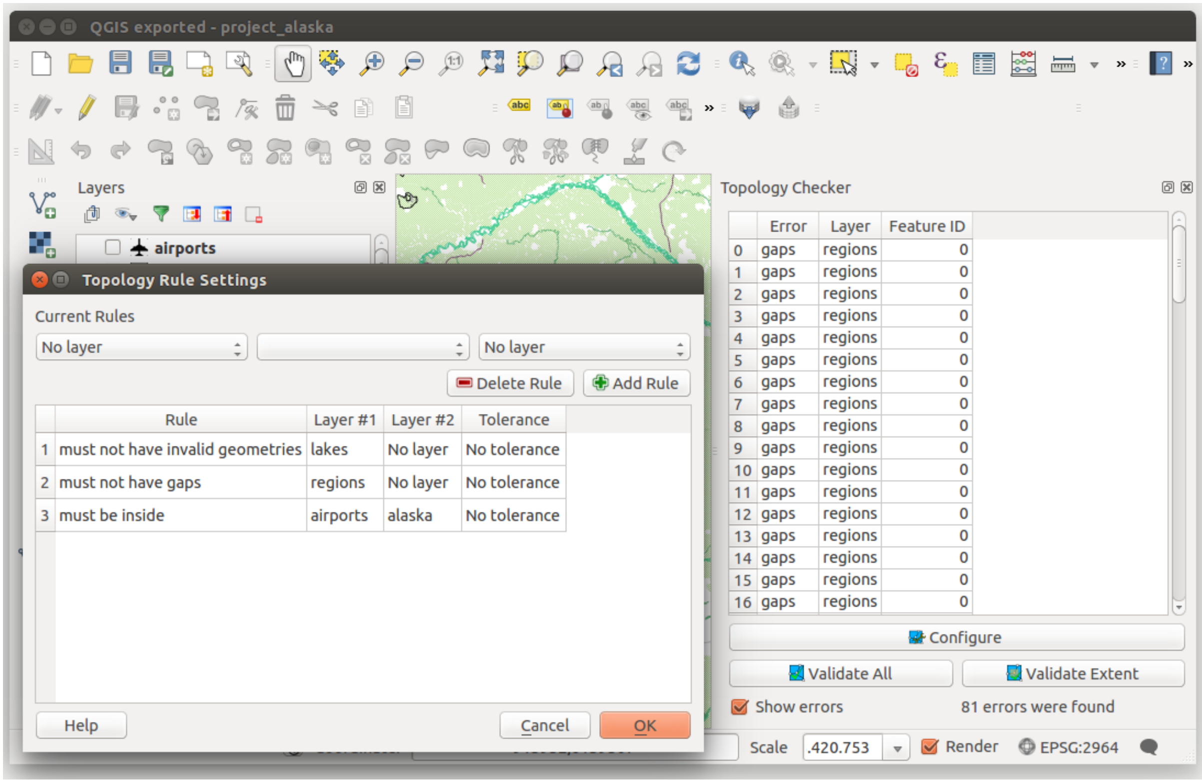

Figure 19.33: トポロジチェッカープラグイン

- **Must be covered by**: ここでは、プロジェクト内のベクタレイヤを選択することができます。与えられたベクタレイヤでカバーされていない点は' エラー' フィールドが発生します。
- **must be covered by endpoints of**: ここではあなたのプロジェクトのラインレイヤを選べます.
- **Must be inside**: Here you can choose a polygon layer from your project. The points must be inside a polygon. Otherwise, QGIS writes an 'Error' for the point.
- **Must not have duplicates**: ポイントは２点以上で表される必要があり、そうでなければ'Error' フィールドが発生します。
- **Must not have invalid geometries**: ジオメトリが有効化をチェックします。
- **Must not have multi-part-geometries**: マルチパートポイントは'Error' フィールドが追加されます。

On **line layers**, the following rules are available:

- **end points must be covered by**: ここではプロジェクトからポイントレイヤを選んで下さい.
- **must not have dangles**: ラインレイヤでのオーバーシュートを表示します.
- **Must not have duplicates**:ライン地物が２点以上で表されるたびに、'Error' フィールドが発生します。
- **Must not have invalid geometries**: ジオメトリが有効化をチェックします。
- **Must not have multi-part geometries**: 時には１つのジオメトリは実際に単純な（シングルパート）ジオメトリの集合です。このような幾何学的形状は、マルチパートジオメトリと呼ばれています。単純にジオメトリのちょうど１種類が含まれている場合は、マルチポイント、マルチラインまたはマルチポリゴンと呼んでいます。すべてのマルチパートのラインは'Error' フィールドが書き込まれます。
- **Must not have pseudos**: A line geometry's endpoint should be connected to the endpoints of two other geometries. If the endpoint is connected to only one other geometry's endpoint, the endpoint is called a psuedo node.

On **polygon layers**, the following rules are available:

- **Must contain**: ポリゴンレイヤは最低でもセカンドレイヤの１つのポイントジオメトリを含まないといけません。
- **Must not have duplicates**: 同じレイヤのポリゴンは、同一のジオメトリを持つことはできません。ポリゴンが２つまたはそれ以上表される場合、'Error' フィールドが発生します。
- **Must not have gaps**: 隣接ポリゴンはそれらの間にギャップを持ってはいけません。行政界は例（アメリカの境界はそれらの間にギャップをもたない）として言及されます。
- **Must not have invalid geometries**: ジオメトリが有効化を確認します。有効なジオメトリを定義するルールがあります:
  - ポリゴンリングは閉じていなければいけません.
  - 穴を定義しているリングは外側の境界線の内部になければいけません.
  - リングは自分で交差してはいけません (お互いに接触したり交差してはいけません)
  - リングは他のリングと点以外で接触してはいけません.
- **Must not have multi-part geometries**:時には１つのジオメトリは実際に単純な（シングルパート）ジオメトリの集合です。このような幾何学的形状は、マルチパートジオメトリと呼ばれています。単純にジオメトリのちょうど１種類が含まれている場合は、マルチポイント、マルチラインまたはマルチポリゴンと呼んでいます。例えば、複数の島からなる国は、マルチポリゴンのように表すことができます。
- **Must not overlap**: 隣接するポリゴンが共通領域を共有することはできません。
- **Must not overlap with**: １つのレイヤの隣接ポリゴンは、他のレイヤのポリゴンと共通領域を共有できません。

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19.20 地域統計プラグイン

With the *Zonal statistics* plugin, you can analyze the results of a thematic classification. It allows you to calculate several values of the pixels of a raster layer with the help of a polygonal vector layer (see figure_zonal_statistics). You can calculate the sum, the mean value and the total count of the pixels that are within a polygon. The plugin generates output columns in the vector layer with a user-defined prefix.

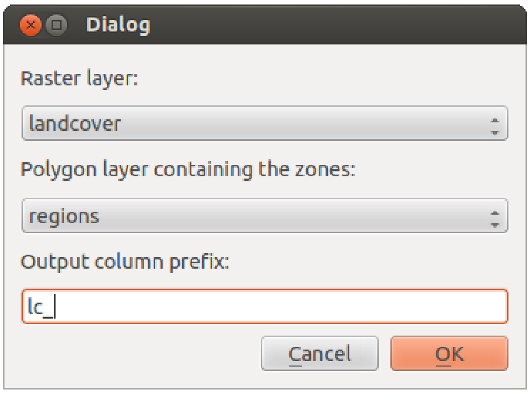

Figure 19.34: Zonal statistics dialog (KDE)

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Chapter 20

ヘルプとサポート

20.1 メーリングリスト

QGIS is under active development and as such it won't always work like you expect it to. The preferred way to get help is by joining the qgis-users mailing list. Your questions will reach a broader audience and answers will benefit others.

20.1.1 qgis-users

This mailing list is used for discussion of QGIS in general, as well as specific questions regarding its installation and use. You can subscribe to the qgis-users mailing list by visiting the following URL: http://lists.osgeo.org/mailman/listinfo/qgis-user

20.1.2 fossgis-talk-liste

For the German-speaking audience, the German FOSSGIS e.V. provides the fossgis-talk-liste mailing list. This mailing list is used for discussion of open-source GIS in general, including QGIS. You can subscribe to the fossgis-talk-liste mailing list by visiting the following URL: https://lists.fossgis.de/mailman/listinfo/fossgis-talk-liste

20.1.3 qgis-developer

もしあなたが開発者で技術的な問題に直面しているなら 、ここの qgis-developer メーリングリストに参加するといいでしょう :http://lists.osgeo.org/mailman/listinfo/qgis-developer

20.1.4 qgis-commit

Each time a commit is made to the QGIS code repository, an email is posted to this list. If you want to be up-to-date with every change to the current code base, you can subscribe to this list at: http://lists.osgeo.org/mailman/listinfo/qgis-commit

20.1.5 qgis-trac

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20.1.6 qgis-community-team

This list deals with topics like documentation, context help, user guide, web sites, blog, mailing lists, forums, and translation efforts. If you would like to work on the user guide as well, this list is a good starting point to ask your questions. You can subscribe to this list at: http://lists.osgeo.org/mailman/listinfo/qgis-community-team

20.1.7 qgis-release-team

This list deals with topics like the release process, packaging binaries for various OSs and announcing new releases to the world at large. You can subscribe to this list at: http://lists.osgeo.org/mailman/listinfo/qgis-release-team

20.1.8 qgis-tr

This list deals with the translation efforts. If you like to work on the translation of the manuals or the graphical user interface (GUI), this list is a good starting point to ask your questions. You can subscribe to this list at: http://lists.osgeo.org/mailman/listinfo/qgis-tr

20.1.9 qgis-edu

This list deals with QGIS education efforts. If you would like to work on QGIS education materials, this list is a good starting point to ask your questions. You can subscribe to this list at: http://lists.osgeo.org/mailman/listinfo/qgis-edu

20.1.10 qgis-psc

This list is used to discuss Steering Committee issues related to overall management and direction of QGIS. You can subscribe to this list at: http://lists.osgeo.org/mailman/listinfo/qgis-psc

You are welcome to subscribe to any of the lists. Please remember to contribute to the list by answering questions and sharing your experiences. Note that the qgis-commit and qgis-trac lists are designed for notification only and are not meant for user postings.

20.2 IRC

We also maintain a presence on IRC - visit us by joining the #qgis channel on irc.freenode.net. Please wait for a response to your question, as many folks on the channel are doing other things and it may take a while for them to notice your question. If you missed a discussion on IRC, not a problem! We log all discussion, so you can easily catch up. Just go to http://qgis.org/irclogs and read the IRC-logs.

Commercial support for QGIS is also available. Check the website http://qgis.org/en/commercial-support.html for more information.

20.3 BugTracker

While the qgis-users mailing list is useful for general 'How do I do XYZ in QGIS?'-type questions, you may wish to notify us about bugs in QGIS. You can submit bug reports using the QGIS bug tracker at http://hub.qgis.org/projects/quantum-gis/issues. When creating a new ticket for a bug, please provide an email address where we can contact you for additional information.

Please bear in mind that your bug may not always enjoy the priority you might hope for (depending on its severity). Some bugs may require significant developer effort to remedy, and the manpower is not always available for this.

将来実装してほしい要望についてもバグと同じようにチケットで登録できます。“Feature“というタイプのチケットを選択して下さい。

If you have found a bug and fixed it yourself, you can submit this patch also. Again, the lovely redmine ticketsystem at http://hub.qgis.org/wiki/quantum-gis/issues has this type as well. Check the `Patch supplied` checkbox and attach your patch before submitting your bug. One of the developers will review it and apply it to QGIS. Please don't be alarmed if your patch is not applied straight away – developers may be tied up with other commitments.

20.4 Blog

The QGIS community also runs a weblog at http://planet.qgis.org/planet/, which has some interesting articles for users and developers as well provided by other blogs in the community. You are invited to contribute your own QGIS blog!

20.5 プラグイン

The website http://plugins.qgis.org provides the official QGIS plugins web portal. Here, you find a list of all stable and experimental QGIS plugins available via the 'Official QGIS Plugin Repository'.

20.6 Wiki

Lastly, we maintain a WIKI web site at http://hub.qgis.org/projects/quantum-gis/wiki where you can find a variety of useful information relating to QGIS development, release plans, links to download sites, message-translation hints and more. Check it out, there are some goodies inside!

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Chapter 21

付録

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Version 2, June 1991

はじめに

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Chapter 22

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