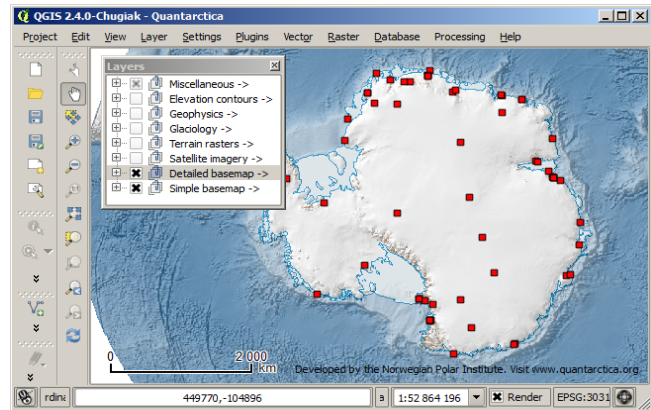




Get started with Quantarctica 2

Norwegian Polar Institute, July 2014
Project website: www.quantarctica.org

Quantarctica is the result of an initiative by the Norwegian Polar Institute (NPI) to develop and host a collection of geographical data sets and software freely available for non-commercial use, with offline capabilities to explore the Antarctic region, aimed at research, education and operational use. The current version is the second release of the package, with data collected from data centres around the world. ***This is a tool for and by the user community. Data sharing is encouraged!***



In the practical sense, Quantarctica (*Quantum GIS* [Since 2.0 just QGIS] + *Antarctica* = "*Quantarctica*") is a QGIS project presenting a *basemap* of the world south of 50 degrees latitude, on top of which the end users can work with preloaded *scientific data* sets or load their own; to create, visualize, analyze and present Antarctic geographical data.

The Quantarctica Package

QGIS. This is the software part of Quantarctica. QGIS is a powerful, user friendly and open source geographic information system (GIS) that runs on Windows, Linux, Mac OSX, Unix and Android. It was first released in 2002, and is licensed under the GNU General Public License. It supports a range of vector, raster and database data formats, and connects to a several types of online map services. The core functionality can be extended with plugins and scripting.

The basemap data. Quantarctica comes with basemap data for Antarctica and the Southern Ocean, featuring coastlines, ice edges, elevation contours, facility locations, place names etc., provided as vector data in the ESRI Shapefile format. Also included are e.g. elevation models and satellite imagery, provided as raster data in GeoTIFF and JPEG formats.

The scientific data. The package includes scientific data, mainly glaciology themes in this release, but also geophysical data.

The Quantarctica package comes in three separate components; the main project component and two high-resolution imagery data components, all downloadable from the Quantarctica website.

The main project component (~8GB), folder structure:

Quantarctica

- Basemap – Imagery, Miscellaneous, Terrain, Vector. The imagery folder contains continent-wide 100–300 m resolution mosaics, as well as full coverage of LIMA_CIRREF imagery (tiled Landsat imagery, 15 m resolution, false-color, pan-sharpened, derived from bands 4, 3, 2, photo date 1999–2002).
- MyDataFolder (Empty. User's personal data folder).
- Scientific (Geophysics, Glaciology).
- Software (QGIS installer for Windows, plugins and QGIS user guide).

Cont.->

The high-resolution imagery data component, part I: LIMA_MOS (~13GB), folder structure:

LIMA_MOS (tiled Landsat imagery, 15 m resolution, derived from bands 4, 3, 2, 1, photo date 1999–2002).

The high-resolution imagery data component, part II: RADARSAT (~15GB), folder structure:

RADARSAT (tiled RADARSAT imagery, 25 m resolution).

When downloading the imagery, it should be put in the corresponding Basemap/Imagery/Tiles/ folders already present in the main project component, and which already holds the ancillary files for each image.

Quantarctica Setup

Download Quantarctica. The package components mentioned above, can be downloaded from the project website. Downloading the main project component would probably be enough to start with. You can read more about accessing large imagery data in the section *Explore Quantarctica Part II*.

The rest of this guide is based on QGIS 2.2 for Windows.

Install QGIS. Launch the QGIS standalone installer included in the main project component (*QGIS-OSGeo4W-2.2.0-1-Setup-x86.exe*), and follow the instructions. (No demo datasets are necessary to use Quantarctica.) When completed, restart the computer and double-click the QGIS project file *Quantarctica.qgs* in the Quantarctica folder to launch the project for the first time.

Install Plugins. Beyond the core functionality, numerous plugins are available to extend it. Currently, nearly 300 plugins are available. Plugins can be easily installed to QGIS through the core embedded Plugin installer, and run from the *Plugins* toolbar and menu (some install to other menus). As part of the installation of QGIS, some plugins might be assumed handy for everyone to install. For convenience, these are already downloaded and available in the Plugin folder of the main project component. There are two ways to install them. (a) Copy the subfolders from the Quantarctica Plugin folder, and paste them into the user specific folder of your system, e.g. in *C:\Users\JohnDoe\.qgis\python\plugins*. (For multiuser computers, you probably need to create the *python* and *plugins* folder too.) Then, in QGIS, click the *Plugins* menu and select *Manage and Install Plugins* and check the plugin checkboxes in the *Installed* tab to enable them. (b) Click the *Plugins* menu in QGIS, and select *Manage and Install Plugins*, search for and install these plugins:

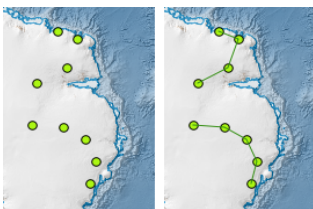
- *Points2One*
- *Profile Tool*
- *Table Manager*
- *Value Tool*

Convert a series of points into tracks

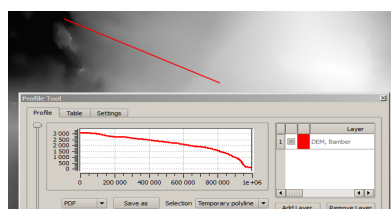
See the cell values along a profile of a raster layer, e.g. elevation

Edit the attribute table structure, e.g. rename or rearrange fields

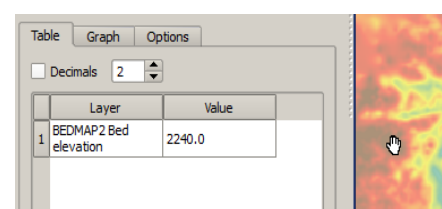
See the value of the raster cell below the mouse cursor



Points2One



Profile Tool



Value Tool

Other plugins to consider (not bundled in Quantarctica):

- Dockable MirrorMap Duplicate the map canvas, and view different layers in each.
- GarminCustomMap* Export map to KMZ (for Google Earth or custom Garmin GPS map).
- Numerical Vertex Edit Set the precise location of any point or line vertex when editing data.
- Point Sampling Tool Transfer multiple raster values to point dataset at point position.
- Quick Finder Search attributes, like place names, more efficiently.

Cont.->

- Statist Calculate and view different statistics for a vector layer field.
 - TimeManager Animate temporal vector dataset, like animal movements.
- * Visit Garmin website to see which handheld GPS units support custom KMZ maps.

First Time Launch: QGIS Tuning

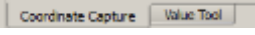
The next step is some optional and one-time QGIS tuning and customizations. From the *Plugins* menu, click *Manage and Install Plugins*. In the *Settings* tab in the appearing box, enable QGIS to *Check for updates on startup*, and select it to do so e.g. *once a day*. Additionally, check the *Show also experimental plugins* checkbox.

From *Settings/Options* menu, consider the following adjustments:

In the *General* tab, change *Icon size* to *16* pixels. In the *Data sources* tab, uncheck *Ignore shapefile encoding declaration*. ***- In the *Rendering* tab: Check *Use render caching ...* / Increase *Map update interval* to e.g. *10000* / Uncheck *Make lines appear less jagged ...* / Set *No Stretch* in *Contrast enhancement* dropdowns *** In the *Canvas & Legend* tab, check *Create raster icons* *** In the *Locale* tab, consider to *Override system locale*, and set to *en_US* *** Click *OK* to finish.

Consider hiding rarely used toolbars from the interface. Right-click e.g. to the right of the *Help* menu, and uncheck the following toolbars in the appearing context menu: *Browser*, *GRASS*, *Label*, *Shortest path*, *Vector* and *Web*. Similarly, you might want to set *Coordinate Capture* (Read a map point's coordinates in e.g. decimal degrees.) to visible by checking it in the list.

Now, this is much about personal preference, but some might think the width of the map canvas is too large compared to the height. You can expand the height at expense of the width by docking the different top toolbars on the left side of the QGIS application interface. You might want to keep the most frequently used toolbars closes to the map canvas for convenience. Suggestion: Click and hold the left "rubber-band" edge of the *File* toolbar , and drag and drop it to the same height and on the left side of the *Layers* panel. Beneath, place the *Digitizing* toolbar , and then the *Advanced* editing toolbar . To the immediate right of the *File* toolbar, drop the *Manage Layers* toolbar , and beneath, the *Plugins* toolbar . To the right of the *Manage Layers* toolbar, drop the *Map Navigation* toolbar , and beneath this, the *Attributes* toolbar .

You might want to have neither the *Value Tool* nor the *Coordinate Capture* panels visible by default. Simply click the close button  in the top right corner of the panels. However, if you want to keep them, you can group them to take less space (creates tabs) , by taking hold of the rubber band right of the *Coordinate Capture* label, and drag and drop it on top of the *Value Tool* panel, and then minimize both in vertical extent by dragging the rubber band below the *Layers* panel downwards.

Close and restart the QGIS to save and apply these changes.

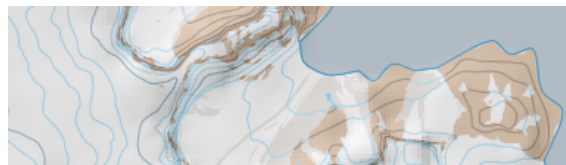
Some general Quantarctica recommendations

- Rename the MyDataFolder folder in Quantarctica, to your user name.
- Save your own data in your personal folder.
- Save the default Quantarctica project as a new and personal project file in the same folder where the default Quantarctica project is situated (if you are dependent on the Add full resolution image from local disk functionality described below).
- Add your own data in your personal project file.
- Save regularly when editing data, and do data backups.

Explore Quantarctica. Part I – Basic Operation

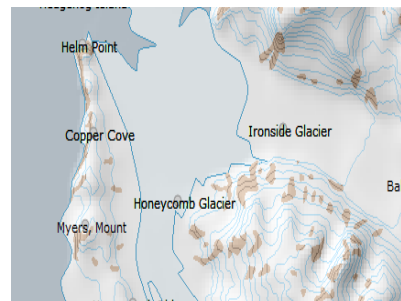
When opening the Quantarctica QGIS project, a basic map of Antarctica is the only visible data in the map canvas. However, a range of preloaded datasets are available for display in the tree structure in the *Layers* panel. Let's go through some basic operation of Quantarctica.

Activate detailed basemap. To turn on a more detailed basemap, check the box to the left of the *Detailed basemap* item in the *Layers* panel. A map with topographical themes and bathymetry will appear.

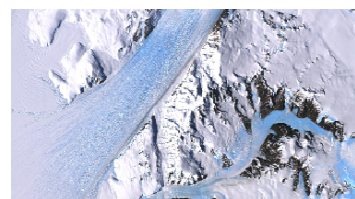


Navigate in the map. Click the *Zoom In* button  in the navigation toolbar, and draw a rectangle around e.g. the Antarctic Peninsula, and repeat to zoom closer in to a specific area. As you will see, the level of detail increases as you zoom in. Click the *Pan Map* button  in the navigation toolbar to pan around in the map. Try using the mouse wheel, and see how zooming is very convenient that way too.

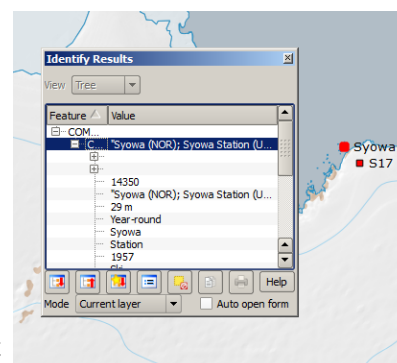
Toggle place names. The main project component includes two place names datasets. One for overview purposes, and one with the complete list of place names in Antarctica. Now, zoom out to see the whole of the continent, do this by clicking the *Zoom Full* button . Then, expand the *Miscellaneous* folder by clicking the tree node  to the left of it, and check the *GeneralNames* layer (don't click the *Miscellaneous* folder checkbox, it will toggle all layers in the group, not just the place names). Zoom in a step to see more clearly the selected Antarctic overview names. Turn off the place names again, and now check the *SCAR Place names* layer. A lot of points populate the map canvas. To see the actual place name labels, zoom further in. (This kind of scale dependent rendering is used for many layers to keep large-area views simple and small-area views information rich.) Collapse the *Miscellaneous* folder, or scroll in the layers list to locate the *Detailed basemap* entry. Toggle it to get a feeling with which landscape features the names represent.



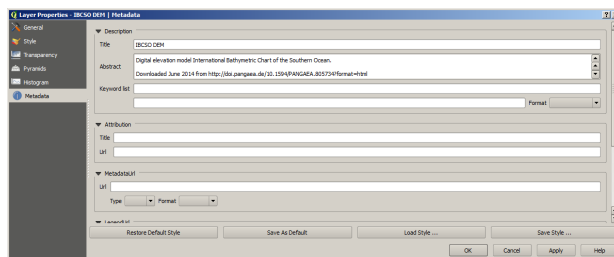
Switch to satellite view. Uncheck *Detailed basemap* (for performance reasons), and expand the *Satellite imagery* folder. From the expanded list, click the *Landsat RGB Antarctica mosaic* checkbox, and the image appears on top of the simple basemap. To view the image in its native resolution, make sure that the Landsat layer is marked in grey or blue in the layers list (meaning, it has the focus), and click the concurrently enabled *Zoom to Native Pixel Resolution* button .



Get map feature info. Turn off all layers except the *Simple basemap*, expand the *Miscellaneous* folder, and check the *COMNAP-listed [main] facilities* layer. Zoom to the extent of the dataset by clicking the *Zoom to Layer* button . Now you see the facilities. To read the specific info on any particular facility in the map, zoom in on one of the facilities, make sure that the COMNAP layer is selected (shown in gray or blue) in the layers list, click the *Identify Feature* button  in the toolbar and then on a facility point in the map. A box titled *Identity Results* appears, and here are all the data about this specific facility for you to study. Close and click e.g. on the *Pan Map* button to leave identify mode.



View dataset metadata. To read the general info about a dataset, e.g. the IBCSO DEM dataset, check it to be visible, and double-click the layer in the layers list. A *Layer Properties* box appears. At the left of this, several tabs are shown. Click the *Metadata* tab, and here you will see what this specific dataset is about.



Stop waiting for QGIS to draw the map. You can temporarily disable rendering while you turn on and off a series of layers you would like to see together, and then enable the rendering when you're ready. This might give a smoother QGIS experience when working with heavy datasets. The rendering option ☒ **Render** is located in the lower right corner of QGIS. Try turning this off, check a few layers, and then switch rendering on again to render the toggled layers.

See layer legend. You can see any layer's legend (symbols and explanations) by expanding the tree node  to the left of the layer name.

Explore Quantarctica. Part II – More Essentials

View country specific place names. To just view e.g. the names approved by New Zealand, right-click the *SCAR Place names* layer, and from the appearing context menu, click *Filter...* In the appearing *Query Builder*, double-click *Country* in the *Fields* list, then the equals sign in the Operators box, and then click the *All* button in the *Values* box. From the appearing list, double-click *New Zealand*. As you can see in the box *Provider specific filter expression*, you now select to show only the place names where "*Country*" = '*New Zealand*'. Press *OK*, and you'll see only the names approved by New Zealand.

View attribute table. A vector dataset has an associated data table that hosts all the non-geometric information on the features, like the information you've seen with the *Identify Feature* tool in the *Basic Operation* tutorial.

To view more than one feature's associated data at a time, you can open the attribute table by right-clicking the layer, e.g. the *SCAR place names*, and selecting *Open Attribute Table*. The box that appears, resembles

Attribute table - SCAR Place names :: Features total: 36820, filtered: 3682...

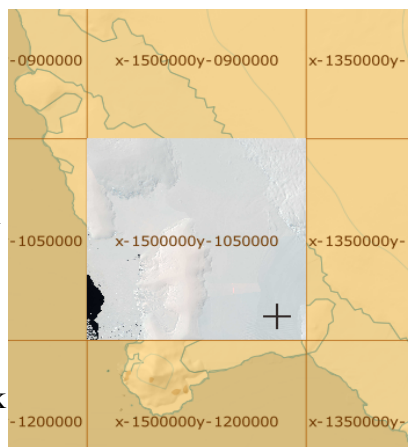
	Place_Name	Country	SCAR_Featu	Narrative
1	Aagaard, glacier	Argentina	NULL	Al este de la pení...
7	Aaron Glacier	United States of ...	Glacier	Glacier 4 mi long, ...
8	Aaron, Mount	United States of ...	Mountain	Mountain in the ...
9	Aaron, Mount	United Kingdom	Mountain	rising to c. 1500...
10	Abbey Nunatak	United States of ...	Nunatak	A nunatak 2 mi S...
11	Abbot Ice Shelf	Russia	Ice shelf	NULL
12	Abbot Ice Shelf	United States of ...	Ice shelf	An ice shelf 250 ...
13	Abbott Island	United Kingdom	Island	near head of Bou...

Show All Features

spreadsheet software, and you can expand columns, sort and select records similarly as in regular spreadsheets. In this particular place name table, you will see only the New Zealand approved place names, because of the data query above. Select a few of the records (click on the record number to the left, hold down the *Ctrl* key, and click some others). Now, minimize the table, and click the *Zoom to Selected* button . Deselect with the *Deselect Features from all layers* button .

Add high-resolution satellite imagery. Quantarctica comes with high-resolution Landsat (CIRREF and MOS) and Radarsat imagery of Antarctica. Rather than a single mosaic covering the whole continent, these images are tiled into 150x150 km squares. CIRREF imagery, which represents the most "natural looking" imagery of the three, is distributed as a part of the main project component. To load a specific CIRREF tile, first make the *Landsat CIRREF Tile index* layer under the *Satellite imagery* folder visible. Then zoom in on a specific area. While the layer is marked with grey or blue in the layers list, from the *Run Feature Action* dropdown menu

 , select *Add full resolution image from local disk*, and click the tile in the map you want to load. The tile should appear in the map and the layers list (it automatically loads the right tile from the local *Quantarctica Tiles* folder).



To load imagery not locally available, you need to download it from the Quantarctica website. You can download all in two *Landsat MOS* or *Radarsat* zip files, or tile by tile as you need them, within QGIS. To load a high-resolution RADARSAT imagery tile for a specific part of Antarctica, first toggle the *RADARSAT Tile index* layer. While the layer is marked with grey or blue in layers list, click the *Run Feature Action* button dropdown menu, and select *Get full resolution image from Quantarctica website*. Then click on the index tile that covers the spot you want the high-resolution imagery for. Your default web browser will open the download page for this specific image tile. Unzip the downloaded image into the corresponding folder in the Quantarctica main folder structure (*Basemap/Imagery/Tiles/RADARSAT*). At that point, you can either drag and drop the TIF file onto the map canvas, or use the *Add full resolution image from local disk* described above, and click the index tile again.

Adjust image contrast. If you zoom in on any specific part of a satellite image, you can stretch the contrast to see the details better, e.g. fine glacier structures in Radarsat imagery. A convenient way to do this is with a right-click on the image in the layers list, and then *Stretch using current extent*.

Export map. The most straight-forward way to take your current map view out of QGIS, is to export it into a graphical image file, like TIFF or JPEG. From the *File* menu, simply click the *Save as Image*. However, if you want more advanced exports with higher resolution and perhaps a scale bar, a north arrow, a legend and maybe some other customizations, the *Print Composer* in *File* menu is more versatile and can produce both vector and raster exports for your papers.

See layer without preset styling. Layers in Quantarctica comes with preset styling by default, including labeling, transparency and scale-dependent rendering settings. To view a dataset without the preset styling, either manually change it, or temporarily rename the dataset's QML file.

Working with GPS data. QGIS supports uploading and downloading of data to a range of handheld GPS units, directly and through GPX file import and export. (Functionality located in the *Vector/GPS* menu). Also, there are some capabilities to connect a GPS through a serial port on the computer, and have live tracking in the map as you go. (Toggle GPS panel through the *View/Panels/GPS Information* menu entry.)

Some more Quantarctica recommendations

- Consider removing layers loaded in the default project but irrelevant to you. This will make the project launch faster. Right-click the layer in the layer list and select *Remove*. (Removes from the project only, not from disk.)
- Generally, have only visible layers checked. A layer totally covering another layer (lies above it in the Layers panel, and without preset/custom transparency), makes the covered layer unnecessary to render, and decreases performance.
- Although QGIS can render and work with data of different projections at the same time, it is generally recommended that when creating data, it should be projected to the default projection.

Further reading

- Included in the *Software* folder in the Quantarctica main project component, there is the official Quantum GIS User Guide. Also, online resources exists on the Quantum GIS website at www.qgis.org.

Please read the Important Notice text file in the main Quantarctica folder for general terms and disclaimer.