*Get started with*
Quantarctica 3

Norwegian Polar Institute, February 2018
Project website: quantarctica.npolar.no

Quantarctica is the result of an initiative by the Norwegian Polar Institute (NPI) to develop and host a collection of freely available geographical datasets and software, with offline capabilities to explore the Antarctic region, aimed at research, education, management and operational use. The current version is the third release of the package, with data gathered from data centres around the world, based on recommendations by an international editorial board for the various diciplines. ***This is a tool <u>for</u> and <u>by</u> the user community. Data sharing is encouraged!***
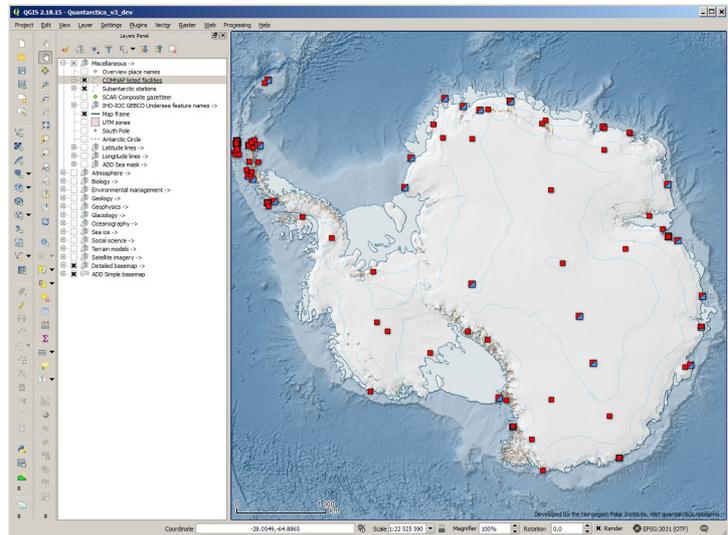
In the practical sense, Quantarctica (*Quantum GIS* [Since 2.0 just QGIS] + *Antarctica* = "*Quantarctica*") is a *QGIS* project presenting a *basemap* of the world south of 40 degrees latitude, on top of which the end users can work with preloaded *scientific dataset*s or load their own; to create, visualise, analyse and present Antarctic geographical data.

In published works produced using Quantarctica, you are required to cite each dataset that was used in the work. Quantarctica provides all dataset citation information in each layer's Metadata tab in QGIS, in a text file in the data folder, and in the online Quantarctica Data Catalog. You are also required to acknowledge or cite Quantarctica and the Norwegian Polar Institute in your work.

The Quantarctica package

QGIS. This is the software part of Quantarctica. QGIS (qgis.org) is a powerful, user friendly and open source geographic information system (GIS) that runs on Windows, Mac, Linux and BSD. 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 and 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, JPEG and JPEG2000 formats.

The scientific data. The package includes scientific data, with the following main themes: atmosphere, biology, environmental management, geology, geophysics, glaciology, oceanography, sea ice, and social science.

The Quantarctica package or individual datasets are available for download at the project website in three different structures:

- The whole package as a single zip file (5 GB)
- The whole package devided into smaller zip files:
    - Basemap and scienctific data (1.3 GB)
    - Satellite imagery (1.6 GB)
    - Terrain models (1.6 GB)
    - Software (QGIS installers, user guides) (0.3-0.4 GB)
- The whole Quantarctica project on FTP structure where any file or folder can be downloaded individually.

The project website also includes a gallery where the various themes and datasets can be browsed.

Quantarctica setup

Download Quantarctica. The package components mentioned above, can be downloaded from the project website.

The rest of this guide is based on QGIS 2.18.16 for Windows.

Install QGIS. Launch the QGIS standalone installer (.exe file) included in the Software package, and follow the instructions. When completed, 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. 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 to install. While online, click the *Plugins* menu in QGIS, and select *Manage and Install Plugins*, search for and install plugins, such as:

- *Points2One*	Convert a series of points into tracks (installs to *Vector* menu)
- *Profile Tool*	See the cell values along a profile of a raster layer, e.g. elevation
- *Value Tool*	See the value of the raster cell below the mouse cursor
- *Copy layers and groups to clipboard*	Copy Layer Panel content to another QGIS project

Other plugins to consider:
- autoSaver*	Auto save current project at specified intervals
- 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).
- Point Sampling Tool	Transfer multiple raster values to point dataset at point position.
- Qgis2threejs	View your dynamically in 3D in the web browser.
- Search Layers	Enhanced textual searching on all QGIS layers and fields.
- Spreadsheet Layers	Load layers from spreadsheet files (ods, xls, xlsx)
- Statist	Calculate and view different statistics for a vector layer field.
- TimeManager	Animate temporal vector dataset, like animal movements.

* Optionally also autosave layers in edit mode. Be careful, enabling this will save edits without user confirmation.
** 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 customisations.
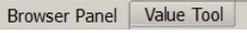
From the *Plugins* menu, click *Manage and Install Plugins*. In the *Settings* tab in the appearing box, enable QGIS to *Check for updates on startup*, and select it to do so e.g. *once a day*.

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: Set *No Stretch* in *Rasters / Contrast enhancement* dropdowns.
- In the *Locale* tab, check *Override system locale*, and set to *U.S. English*
Click *OK* to finish.

Consider hiding rarely used toolbars from the interface. Right-click e.g. to the right of the *Help* menu, and have uncheck all but these: *Layers Panel*, *Attributes Toolbar*, *Digitizing Toolbar*, *Manage Layers Toolbar*, *Map Navigation Toolbar*, and *Project Toolbar*.

You might want to have neither the *Value Tool* nor the *Browser* panels visible by default. Simply click the close button ⬚Value Tool ⬚⬚ 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) ⬚Browser Panel Value Tool , by taking hold of the rubber band right of the *Browser Panel* label, and drag and drop it on top of the *Value Tool* panel, and then minimise both in vertical extent by dragging the rubber band below the *Layers* panel downwards.

An overview map is essential to many, and QGIS has the capabilities for it. In the *View* menu, expand the *Panels* sub-menu, and click *Overview Panel*. The panel should appear in the interface, but it contains no map. For this, right-click the *ADD Simple basemap* layer, and from the appearing context menu, click *Show in Overview.*

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 ⬚⬚⬚⬚ .
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 ⬚⬚⬚⬚ .

Close and restart QGIS to save and apply any of these changes requiring restart to take effect.

Some general Quantarctica recommendations
- Rename the MyDataFolder folder in Quantarctica, to your own user name.
- Save the default Quantarctica project as a new and personal project file in this folder.
- Save your own data in this folder too.
- Add your own data in your personal project file.
- Save regularly when editing data, and do data backups.

Explore Quantarctica – 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.

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 project includes three place names datasets. One for overview purposes, one with all place names in Antarctica (as reported to SCAR), and one with undersea feature names. 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 *Overview place names* 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 or two to see more clearly the selected Antarctic overview names. Turn off the place names again, and now check the *SCAR Composite gazetteer* 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 *LIMA Landsat low-resolution mosaic (240m)* checkbox, and the image appears on top of the simple basemap. To view the image in its native resolution, make sure that the 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 facilities* layer. Zoom to the full extent of the dataset by clicking the *Zoom to Layer* button 🔍. 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 Elevation model, surface (500m)* dataset, place your mouse over the layer name in the Layer Panel for a second, and a metadata box will pop up. You can also access it by double-clicking the layer in the layers list. A *Layer Properties* box appears. At the left of this, several tabs are shown. Click the *Metadata* tab. Finally, the metadata accompanies any single dataset in the file folders as a .TXT file.

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.

Export map. Besides regular printscreens, 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 customisations, the *Print Composer* in *Project* menu is more versatile and can produce both vector and raster exports for your papers.

Explore Quantarctica – More useful essentials

View country specific place names. To just view e.g. the names approved by New Zealand, right-click the *SCAR Composite gazetteer* layer, and from the appearing context menu, click *Filter...* In the appearing *Query Builder*, double-click *country_na* 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 Composite gazetteer*, and selecting *Open Attribute Table*. The box that appears, resembles 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.

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*.

Layer styling and styling panel. Layers in Quantarctica come with preset styling in QGIS project file, including labeling, transparency and scale-dependent rendering settings. If this doesn't suit your needs for any particular dataset, you can change the styling manually in the layer's properties, under the *Style* and *Label* tabs. Then saving the project means that the style is also saved, so if you at any point want to go back to the previous default styling, remove the layer from the *Layers Panel*, open a second instance of QGIS with the default Quantarctica project, locate the layer there and activate it (highlights), click the copy button visible in the *Copy layers and groups to clipboard* plugin toolbar (see page 2 about plugins) 🗐 🗒 , go to your own project file and, similarly, click the Paste button to insert the layers in the *Layer Panel*.

For easier access to the layer styling properties, you can enable the *Layer Styling* panel and dock it in the QGIS interface: Right-click on any toolbar and activate the panel in the appearing context menu.

If you have a personal layer like a GeoTIFF raster and you would like to add and apply the regular Quantarctica colours to it, the package includes the file *Quantarctica_ColourRamp.xml* in the root folder. This file must be loaded into QGIS a single time: Click *Settings* menu, and then *Style*

Manager (here you can also create your own colour ramps), then the blue link button in the lower right corner of the appearing box, click *Import* and browse for the XML style file to import it. The colour ramp will then stay available in the *Style* tab's *Color* (raster) or *Colar ramp* (vector) dropdown menu thereafter.

Terrain models: Customise terrain model hillshades and contour line intervals. The *Terrain models* layer group contains certain layers with suffixes "*virtual hillshade*" and "*customizable interval*". The former are terrain models rendered as hillshades, where you can set the hillshade effect to the amount of vertical exaggeration you prefer (open layer *Style* tab and enter value in *Z factor* box). The latter are contour lines with preset drawing rules where only the lines of preferred height interval are shown, but where the actual dataset contains all heights. If you prefer e.g. 1000 m intervals, you can set this by opening the layer properties *General* tab, press the lower right *Query Builder* button, and enter *"nnn"%1000=0*, where *nnn* is the attribute name holding the height values. The interval value must be present in the dataset itself for this filter to be valid.

Increase readability. If symbols and labels appear to small on your computer, you can either change the symbol size and labels manually in the layer properties, or apply a magnification factor on the map canvas itself. This is done by entering the desired magnify percentage in the *Magnify* box located in the QGIS status bar in the lower right corner.

Rotate map canvas. If your geographical area of interest is far away from the Greenwich Meridian, you can rotate the map to how you are used to view the continent with the *Rotation* option in the status bar. Note that hillshades in the Detailed basemap layer group will appear different, but that virtual hillshades in the Terrain models layer group can be manually adjusted through the *Azimuth* box to make light source appear from top right corner of the map canvas, which produces the hillshade effect most are used to.

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, or USB on some tablets, and have live tracking in the map as you go. (Toggle *GPS Information Panel* through the *View/Panels/GPS Information Panel* menu entry.)

Some more Quantarctica recommendations
- If the project launches very slowly or if you use Quantarctica on a not too powerful computer, you can 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. This shortens rendering time and software stability.

Further reading
- Included in the Software folder in the Quantarctica main project component, there is the official QGIS User Guide. Also, online resources exists on the QGIS website at https://qgis.org.

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