OpenStreetMap Garmin Maps Generator

User's guide

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Chapter 1. Getting started

1.1. Introduction

Osm2garmin combines OpenStreetMap (OSM) geographic data with contours from NASA's SRTM data and generates maps for Garmin GPS receivers.

It is a total solution, downloading the required data, processing the data through 3 external tools (Mkgmap, Splitter and Osmosis - included in the distribution) and creating map files that can be used by Garmin GPSs or loaded into MapSource/BaseCamp/QLandkarte.

The program is a Netbeans Rich Client application running within Sun Java virtual machine.

Map creation sequence:

• OSM Planet and required SRTM data are downloaded.

• Contours are generated from SRTM data.

• OSM data are converted to Garmin format.

• gmapsupp.img and supporting files are created.

For subsequent updates of processed regions only OSM Planet updates are downloaded and these are joined to existing contour data to generate updated map files.

1.2. Quick start

Follow these instructions to create maps of one or more predefined regions:

•
  Click or select Tools-Options to adjust program settings. Click appropriate tab for desired settings group.

  Default settings will produce a set of Garmin maps covering the whole globe. You can adjust all settings according to your needs.

  For first time use, set directory locations in the "Processing Parameters" tab and select regions to process.

• Click "Start" to begin data download and map generation.

  Program status is displayed in the Output window.

• Wait until maps download and creation process is finished. It can take long time (12+ hours), especially on the first run.

• Copy maps to the GARMIN folder of the memory card of your Garmin instrument and/or install maps into MapSource/BaseCamp/QLandkarte.

• Repeat on a regular basis to add OSM updates to your maps.

Chapter 2. Reference

This section explains the program's controls/settings, providing User control. It is organized by program windows/tabs.

2.1. Main window controls
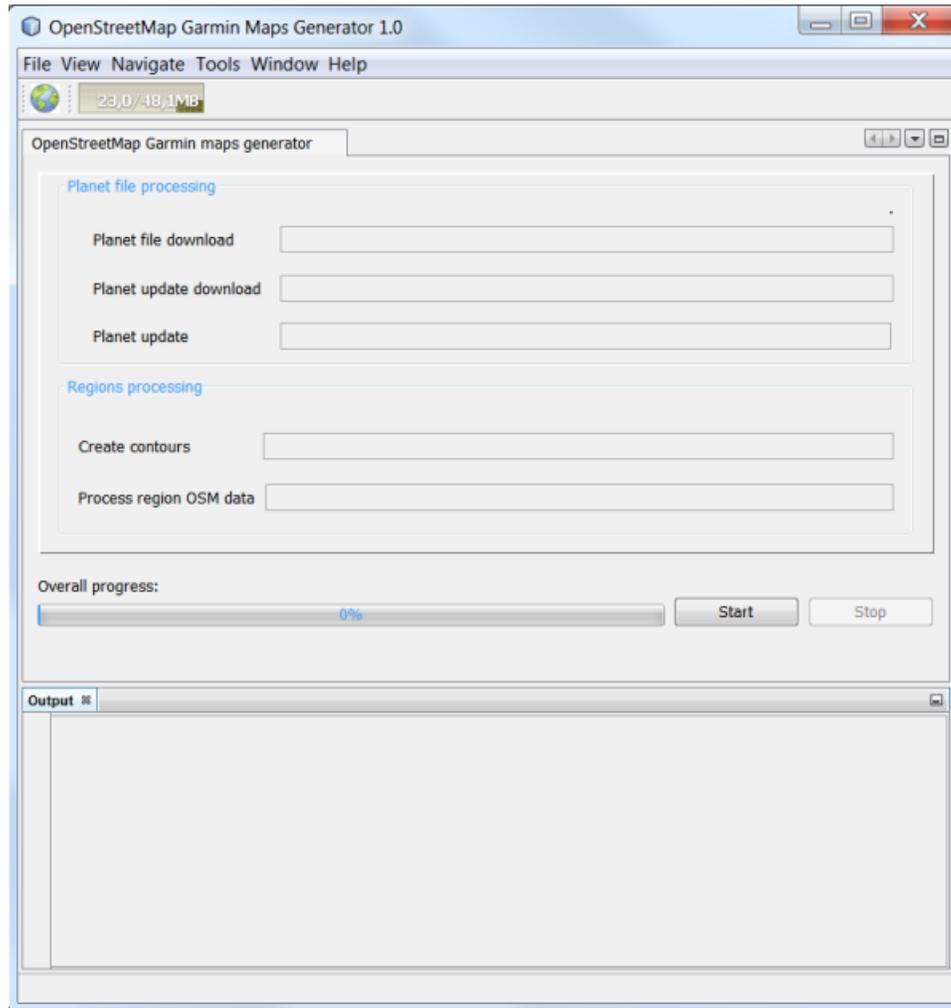
The main window is where you start/stop/exit the program, view map generation progress and access settings. We will briefly review the controls found here - note that hovering the mouse over an item provides a brief description.

There are three main window sections; menus/toolbars, processing/progress and output.

2.1.1. Toolbar

Options
: Allows changing of program settings – Downloads, Processing Parameters and Regions.

    This is the most frequently used window.

Open/Close Argument file editors
: Opens tabs in the "Progress Area" to edit arguments passed to the program and external tools.

For advanced users only.

Save all, Undo, Redo
Controls text editing of the argument files.

Memory
Displays the current/committed Java heap memory usage. Clicking will force a Java garbage collection action.

Icons can be placed/removed from the toolbar by selecting View - Toolbar and clicking on the item.

Toolbar actions can be also accessed via main menu.

2.1.2. Progress bars

Report progress of the various steps to generate maps. Reports "Completed" as each step successfully finishes.

The "start" and "stop" buttons begin and stop map generation. These buttons switch to "exit" and "restart" upon program completion. See the Error Messages section for additional information.

2.1.3. Output window

Displays internal program activity messages and is helpful for tracking errors. Output is copied to the report.log file in the working directory. Log file is cleaned upon program restart.

2.2. Program settings

Click or select Tools-Options to open Program Settings dialog.

Changes are saved by selecting the "OK" button (lower right corner). They are retained and used for subsequent map generation session(s) and are not region specific

Export and Import buttons are not used by Osm2garmin, they provide internal Netbeans functionality and can be safely ignored by most users.

2.2.1. Download sources
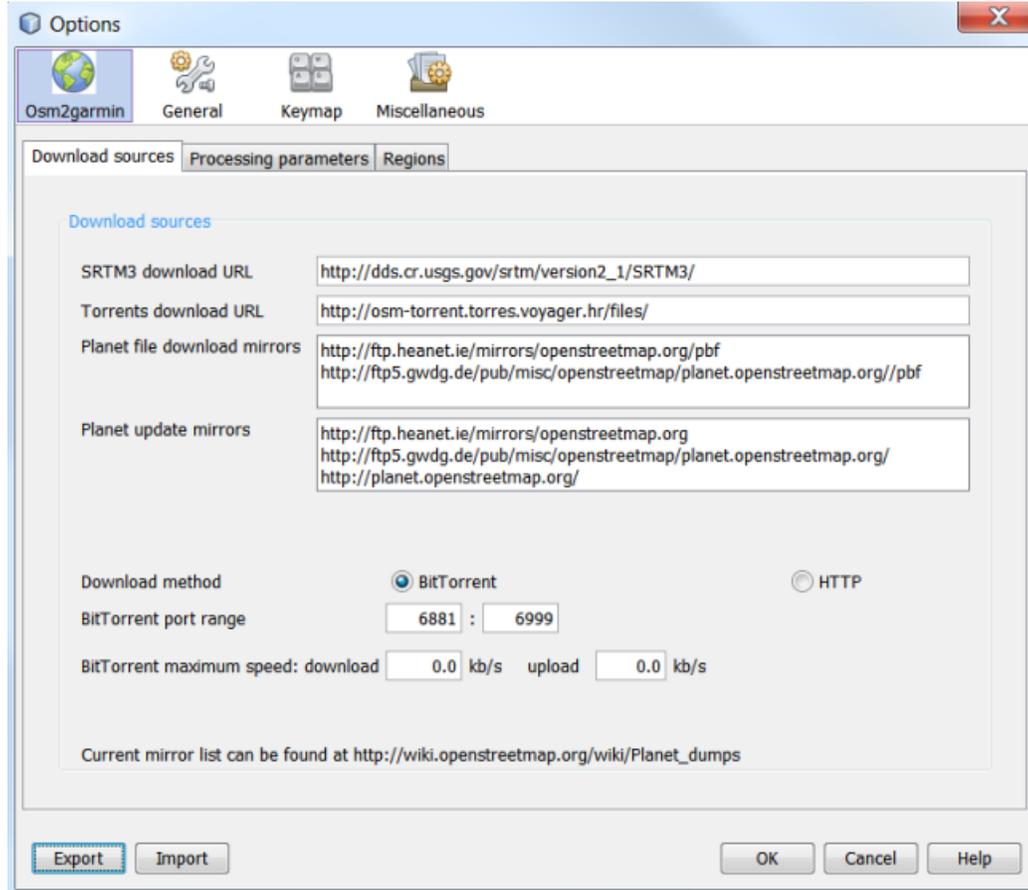
SRTM3 download URL
URL for downloading SRTM data. If local/company mirror of SRTM3 data is available, this location can be changed. Please note that HTTP protocol only is supported.

Default value: http://dds.cr.usgs.gov/srtm/version2_1/SRTM3/

Torrents download URL
URL for downloading OSM planet file torrents. There is no need to change the default value under normal circumstances. This option affects BitTorrent download only.

Default value: http://osm-torrent.torres.voyager.hr/files/

Planet download mirrors
List of mirrors for HTTP downloads of the planet.pbf file one per line. Download mirror is randomly selected upon program startup. This option affects HTTP download only.

Default value:

http://ftp.heanet.ie/mirrors/openstreetmap.org/pbf
http://ftp5.gwdg.de/pub/misc/openstreetmap/planet.openstreetmap.org//pbf

Planet update mirrors
List of mirrors for downloading OSM updates one item per line. Update mirror is randomly selected each run.

Default value:

http://ftp.heanet.ie/mirrors/openstreetmap.org
http://ftp5.gwdg.de/pub/misc/openstreetmap/planet.openstreetmap.org

http://planet.openstreetmap.org

Download method

Method for initial planet file download. Default method is BitTorrent.

Warning

HTTP download method is deprecated and will be removed in future releases.

BitTorrent port range

Lists the range of ports for BitTorrent downloads. The first available port is used.

For best download performance, ports open to the Internet should be listed.

BitTorrent maximum speed

Speed limit for BitTorrent download/upload in kb/s. Value of 0 (zero) sets unlimited speed (default).

Program restart is required for changes to take effect.

2.2.2. Processing parameters
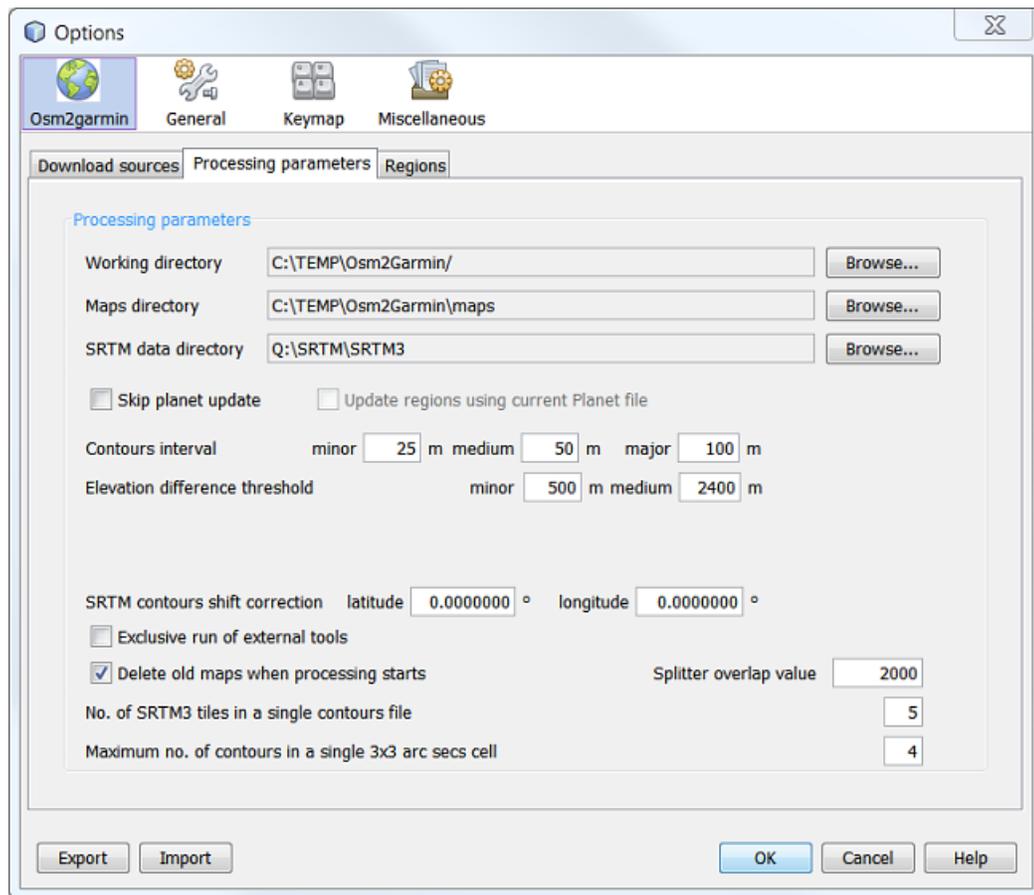
Working directory

Directory for saving all program, OSM planet and contoru data.

Note

The Osm2garmin program needs at least 150-200 Gbyte of free space to save map data for the whole Earth.

Maps directory

    Directory where final maps will be saved. Each region is in a separate subdirectory.

SRTM data directory

    Directory where downloaded SRTM3 data is saved. If you have a local SRTM mirror available, you can point to that directory. Data available in this directory will not be downloaded but missing (incomplete) data will be.

Skip planet updates

    Skip downloading planet file updates and updating. Regions directories are not cleared when this option is checked. Regions maps are not refreshed. If regions boundaries were changed since last update, processing results will be incorrect or processing of the affected regions will fail.

Elevation difference threshold

    Contours are processed in one of three groups. To create the groups, two "elevation difference thresholds" are set to establish "break points" between the groups.

    The minor group contains tiles where the elevation difference is less than the first threshold, the major group where the difference is greater than the second threshold and the intermediate group is between the two values.

    Default settings are 500 and 2400.

Contours interval

    Sets the elevation distance between contours that are calculated within each group.

    Default values are minor 25, intermediate 50 and major 100.

Maximum number of contours in a single 3x3 arc sec cell

    Determines the density of contours in a tile 3x3 arcSecs tile. If more contours appear in a single tile than this value, no contours are plotted inside the tile.

    Default setting is 4.

No. of SRTM3 tiles in a single contours file

    Degree of aggregation of SRTM tiles in each contour file. A higher number makes the contours processing faster but needs more memory and increases overlap at region boundaries.

    Default setting is 5, i.e. each single contours file aggregates 5 x 5 = 25 SRTM tiles.

SRTM contours shift correction

    In some areas, SRTM data have a systematic processing shift. This results in contours being shifted relative to OSM data. If your map has this problem, a correction can be introduced here.

    E.g. for some regions in Central Europe, value of 0.0004167 (= 1/2400) degree in both directions synchronizes SRTM and OSM data.

    Default setting is 0 in both directions.

Exclusive run of external tools

    When selected, no simultaneous run of more than one external tool (Osmosis, Mkgmap or Splitter) is allowed. Useful if you experience out-of-memory problems but extends processing time.

    See the Assign more memory to the program section for more info.

Skip planet update

    When selected, updates to the OSM Planet file are not downloaded and the Planet file is not updated. Recent additions to OSM (buildings, POI, roads) that were posted after your last update will not be added to your map.

    This option can save considerable processing time.

Update regions using current planet file

    When selected, the Planet file is updated using the update file that was previously downloaded. Only active when Skip planet update has been selected.

Delete old maps when processing starts

When selected, the files in the regions selected for processing are deleted upon program execution. Downloaded OSM data and previously computed contours are not deleted.

Splitter overlap value

Increase this value if you experience routing problems over tiles boundaries.

A value of 10,000 has been reported to correct routing problems.

Default setting is 2,000.

Note

Default contour settings were chosen to generate maps for the continental sized, predefined default regions and display them correctly on most common Garmin GPS's.

Settings are usually changed only when maps for user defined regions are created and more/less detail is required.

Caution should be exercised as changing settings can result in increased map size, required memory, processing time and/or degraded view-ability.

Caution

If any parameter affecting contours generation is changed, the contours directory in the working directory must be cleaned (emptied) to reprocess contour data.

Note

Contour generation is a complex process. Users should read the "Contour generating" explanation in the appendix for more information before changing default parameters.

2.2.3. Regions
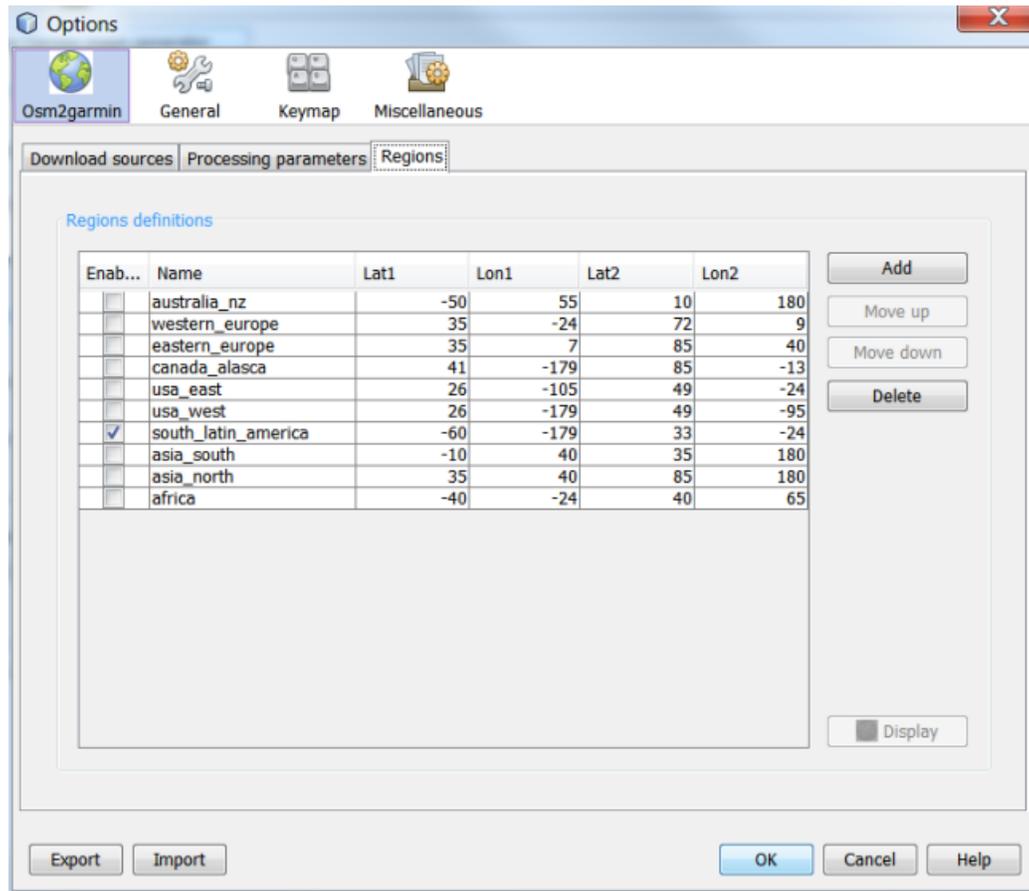
The Regions table defines individual regions for map generation.

Each rectangular region is defined by a name and bounding coordinates. The Display button opens a map of the region in a browser window and saves a HTML page in the working directory.

Selecting the "Enabled" box generates maps for the region. Regions are processed from top to bottom and the sequence is changed by highlighting a region and using the Move up and Move down buttons.

New regions are created by selecting the "Add" button. Values are entered/changed by double-clicking or using the F2 key for each cell of the table. To define region boundaries, visualize a box with North at the top. Lat1 is the bottom of the box, Lat2 the top, Long1 the left side and Long2 the right side. So Lat1<Lat2 and Long1<Long2. Both positive and negative values are used for Lat/Long.

Delete button deletes the highlighted region.

When a file named <region_name>.poly exists in the working directory, a region is defined by polygon coordinates from the .poly file. Coordinates in the Regions table represent the bounding box of the polygon and are not editable.

More information about polygon file formats, download sources and examples are at: http://wiki.openstreetmap.org/wiki/Osmosis/Polygon_Filter_File_Format

2.2.4. Other sections of the Options dialog

General
Web Browser and Proxy settings.

Keymap
> Defines program's keyboard shortcuts.

Miscellaneous
> Controls file settings and windows behaviors.

Chapter 3. Using your map files

When map generation finishes, the following files are created in each region's directory:

gmapsupp.img - Garmin GPS mapset file
> The compiled mapset for Garmin GPSs. Copy this file into the Garmin folder on the external memory card of the GPS. Most Garmin GPS's support only one mapset at a time.

3/4/5/6xxxxxxx.img - contours maps in Garmin format, 7xxxxxxx.img - OSM data converted to Garmin format
> The numbered individual map files (XXX tiles) which were compiled together to create the gmapsupp.img mapset file in the final processing step. These files can be registered to, and used in, MapSource/BaseCamp by using methods described later.

installer.bat
> This Windows script creates the necessary registry items for MapSource/BaseCamp to recognize your generated maps.

uninstaller.bat
> This Windows script uninstalls maps from MapSource/BaseCamp. You must uninstall and reinstall maps if you generate updated maps or change the number/order of regions in the Regions table.

osmmap*.*
> Files used by MapSource/BaseCamp.

osmmap.nsi
> Script for the Nullsoft Scriptable Install System (NSIS) which uses MakeNSIS or MakeNSISW to create a Windows installer and files for MapSource/BaseCamp used on a remote computer. At the destination computer when <region_name>.exe is run, maps are unpacked to c:\garmin\maps\<region_name>. Maps can be un-installed and deleted using standard "Windows" methods, e.g. "Add/remove programs" or "Programs and functions" control panel items.

> You can obtain NSIS from http://nsis.sourceforge.net.

Caution

Note that if map size exceeds 2Gb, installer creation can fail because of default /SOLID compressor parameter in osmmap.msi script. To avoid this problem, either remove "/SOLID" parameter from SetCompressor command in the script, or use /X"SetCompressor /FINAL LZMA" startup parameter for MakeNSIS.

Note

MakeNSIS command can be e.g.:

```
"C:\Program Files\NSIS\makensis.exe" /X"SetCompressor /FINAL lzma" osmmap.nsi
```

Even without "/SOLID" parameter, total size of resulting installer file cannot exceed 2 Gb, which corresponds to gmapsupp.img size approx. 3 Gb. This is an unbreakable limitation of current version of NSIS.

Maps installed via NSIS installer are not compatible with installer.bat / uninstaller.bat method. Uninstaller.bat will NOT uninstall maps installed via NSIS and vice-versa.

Warning

Do NOT delete/overwrite commercial maps on the GPS's internal memory or external card - use a new card instead. Maps generated by this software come with NO WARRANTY of any kind and you use them at your own risk.

Important

Depending on the model and firmware version of the Garmin GPS, the maximum size of the gmapsupp.img file is 4 or 2 Gb. If your file is larger than this, the map will not be displayed.

Note

To decrease the size of the generated mapset, the region's boundaries can be reduced or contour creation parameters adjusted.

If contour settings are changed, the contents of the contours directory in the working directory must be deleted.

Generation of new contours can take a long time.

Chapter 4. Startup options

The program launcher (osm2garmin for Linux or osm2garmin.exe for Windows) supports several startup options which control parameters of Java NetBeans. Startup options can be listed by passing -h or --help as a startup option, e.g.:

osm2garmin.exe --help

4.1. Assign more memory to the program

Java JRE works with a fixed-maximum-size heap memory space and will not use more memory than it is allocated at startup. Thus, during processing it will not use more memory, even if it is available on your system. Items influencing memory usage include running multiple external tools, contour settings and region size.

If running a 64bit system with 64bit JRE, the Java maximum memory size can be increased by:

1. Starting program with -J-Xmx<memsize>m option where memsize is memory size in Mbytes, e.g.

   osm2garmin.exe -J-Xmx2000m

2. Edit the configuration file osm2garmin.conf located at

   Windows   `<PROGRAM_FILES>/osm2garmin_<version>/etc/osm2garmin.conf`

   Linux   `/usr/local/osm2garmin_<version>/etc/osm2garmin.conf`

   In the file replace

   -J-Xmx1400m

   with higher value, e.g.

   -J-Xmx2000m

   In Windows Vista or 7 use a privileged editor by right-clicking Notepad, Start, menu shortcut and select "Run as administrator".

   ### Note

   32 bit Java VM on both 32 bit and 64 bit Windows OS can not allocate more heap memory than approx. 1400m.

The starting heap memory size can be changed at

-J-Xms=<memsize>m

Note that Xms <= Xmx.

On 64 bit Windows systems with 64 bit JVM, additional parameter

-J-XX:MaxPermSize=<memsize>m

is often needed to avoid PermGenSpace overflow errors.

To change the JRE to a different version, change the parameter

--jdkhome <path-to-jre>

This can be useful e.g. if both 32 bit and 64 bit JVM is installed on a single computer.

Startup parameters can be added permanently to the program startup link, e.g. associated to the program desktop icon. In Windows, right-click the icon, select Properties and adjust the settings as needed

Your Windows customized command line can look like:

```
c:\program files\osm2garmin_>version<\bin\osm2garmin.exe" -J-Xmx2000m --jdkhome "c:/program files/
Java/jre6"
```

Chapter 5. Command-line processing

The Osm2garmin program offers a command-line, unattended mode where map generation is performed in a single step with no user intervention.

The command-line module is invoked from a single *jar* file available in the directory where the program is installed:

`osm2garmin/modules/org-mantlik-osm2garmin.jar`

Copy the file to your working directory and run the command

`java -Xmx<mamsize>m -jar org-mantlik-osm2garmin.jar`

On the first run, two files are created, *regions.txt* and *settings.properties*.

Edit both files to meet your needs and run the program again. The complete downloading and processing cycle occurs.

Repeating the unattended run will download OSM updates and create updated maps.

Chapter 6. Installation, Un-installation, Updating, Upgrading

6.1. System requirements

- Windows XP/Vista/7/8 or Linux 2.6+ or Max OSX 10

- Minimum 2 Gb of RAM and 200 Gb of free disk space

- Sun Java JRE 6 or newer 64 or 32 bit

  Java must be downloaded and installed separately from http://java.com/download.

  ### Note

  With 32 bit Java VM, some functions of the Osm2garmin software are not available.

  Osm2garmin is a processor intensive program and while it requires sufficient memory to generate maps, performance is increased with fast, 64 bit multi-core processors. At least 4Gb of ram, 500Gb of disc space and 64 bit multi-core processor(s) is a recommended configuration.

6.2. Installation

Download the installer (stable or unstable version) for your os from: http://code.google.com/p/osm2garmin/downloads

Check that Java JRE 6 or newer is installed.

Change to the directory where you downloaded the Osm2garmin installer and:

Windows and MacOSX   Double click on the installer file.

Linux   Allow executing file as program.

In a terminal window type:

```
sudo ./<program name>.sh <enter>
```

Complete installation using the provided Installer Wizard which installs Osm2garmin to a user determined folder.

6.3. Un-installation

Windows   Uninstall the program from Control Panels - Add and remove programs / Programs and functions.

Linux and MacOSX   Change to

/usr/local<program name>

In a terminal window type:

```
sudo ./uninstall.sh <enter>
```

Complete using the Uninstall Wizard.

6.4. Upgrading

The software regularly checks for new releases. When new version was published, update wizard is offered automatically.

If you want to check for new version manually, you can select Help - Check for updates.

Complete upgrade using the Upgrade Wizard. Osm2garmin must be restarted after upgrade is finished.

Note

It is not recommended to run Upgrade Wizard when maps generation is in progress.

6.5. Unstable (development) version

Unstable version of the software implements the newest features not yet included in the stable version.

More information concerning unstable version including detail instructions how to switch your installation of the Osm2garmin software into unstable version can be found here:

https://code.google.com/p/osm2garmin/wiki/UnstableVersionHowto   [http://code.google.com/p/osm2garmin/wiki/UnstableVersionHowto]

Appendix A. Frequently asked questions

Is the program still running?

Osm2garmin takes a long time to generate maps, particularly the first time it runs because many Gigabytes of Planet and SRTM data must be downloaded and processed.

In the main program window, check the processing boxes for status information and the "Output – Osm2garmin" window for activity messages. If the status is not changing for a long time (e.g. if "processing maps completed xx%" is not increasing) or there are no activity messages, then the program has probably stalled.

You can view the Resources tab of the System Monitor program of your system, your processor(s), disk(s) and/or network should be highly active.

If the programm has stalled, Select "Stop", "exit" then "ok". Run again and consider increasing Java maximum memory heap size and/or changing program parameters.

Updating is taking a long time.

Yes, it does. All 2 billion nodes and 200 million ways in the planet file must be checked and updated. Selecting the "Skip planet update" box prevents the downloading and updating of the planet file if you would like to process new/updated regions with existing OSM data.

Create Contours box reports "Null".

This indicates that that the contour creation process failed. Try re-running the program.

Out of memory?

The error message will depend on which situation caused the problem. Examine output window and log files.

More information: Assign more memory to the program

utput tab reports "Attention: Data being output lacks metadata. Please use omitmetadata=true"

This is a bug in the Osmosis external tool which falsely reports this error message, as Osm2garmin does not use OSM metadata. The message can be safely ignored.

How can I view my maps?

In Windows, Maps created by Osm2garmin can be viewed in MapSource/Basemap by using the installer.bat in each region's subdirectory.

QlandkarteGT (Linux, Mac, Win) can also display Osm2garmin maps by selecting File, Load Map, the osmmap.tdb and then osmmap_mdr.img file for the region of interest. You may have to zoom in a number of times to see details of your map.

Contours but not OSM data is displayed.

If this is the first time you are processing a new region and the "Skip Planet Update" option is checked, then Osm2garmin did not create the 7xxxxxx.img OSM data files. Check the region's subdirectory to verify that these files were not created. Un-select the "Skip planet update" and re-run the program.

OSM data but no contours are displayed on the GPS

In version 1.1 of the software there is a bug that prevents contours from being displayed for regions with negative Lat/Long values under some circumstances. Please upgrade to newer version.

Why is OSM Planet downloading again?

If your planet file is older than 12 of September 2012, it was released under old CC-BY-SA License while newer versions are released under ODbL License. License terms do not allow update of CC-BY-SA licensed data with ODbL data. Osm2garmin software has to download latest available ODbL Planet file and use it for any further updates.

This is a one-time event only, it should never happen again. OpenStreetMap Foundation is sorry for inconvenience.

Where can I get more information on the external tools?

Mkgmap - http://www.mkgmap.org.uk/

Splitter - http://www.mkgmap.org.uk/doc/splitter.html

Osmosis - http://wiki.openstreetmap.org/wiki/Osmosis

Appendix B. Contours generation

Contour generation is a complex process and the following explanation provides a "high level" overview. Nevertheless it should provide the user with enough information to adjust contour settings.

We begin with a description of Osm2garmin's data structure, terminology and the steps to generate contours.

The data structure used for contour generation is based on:

SRTM raster cells (appx. 90x90 meters) which contain position and elevation data.
Cells are combined into 1x1 degree tiles (appx. 111x111 kilometers – see below), each tile contains approximately 1.5 million cells.
Tiles are combined into contour files.

Terminology:

Elevation difference	difference between the lowest and highest elevation points in a tile
Elevation difference threshold	the "break point" that determines which "group" a tile is assigned to
Contour interval	distance (elevation) between contours
Contour density	number of contours in a single tile
Tiles in a file	number of tiles combined into a contour file

The steps to generate contours begin with examining each tile, calculating the tile's elevation difference and assigning it to one of three processing groups (minor, intermediate or major). Contours are then generated for each file based on the contour interval value for the group. The contour density of each tile is checked and adjoining tiles are combined into files. These contour files are compressed for future use and converted into Garmin .img files.

Processing using external tools occurs at each step. Complicating this process is that users can adjust program settings at each stage of processing and the settings interact with each other, sometimes in unexpected ways.

Garmin GPS devices display two "types" of contours, regular and major (indicated by a thicker contour line) but these contours do not relate to the 3 groups discussed above. Rather, a contour is selected for each tile and a major is selected a group higher.

E.g. if for a particular tile, minor contour group will be created, each contour falling into intermediate group will be marked "major" for Garmin. Similarly, if intermediate contours will be created, each contour corresponding to major contour interval will be marked as "major" etc.

To generate contours for continental sized regions, with their varying elevation profiles and to keep map file size reasonable, Osm2garmin organizes tiles into three processing "groups" (minor, intermediate and major). Using 3 groups (each with an associated contour interval) allows contours to be displayed in flat, intermediate and mountainous regions in reasonable spacing. The alternative, a "one size fits all" contour processing, can result in widely spaced and/or highly bunched contours, making GPS viewing and navigation difficult.

Example:

The state of Colorado in the USA has a low, flat plain in the east, a high mountainous center and a mid level plateau in the west. Setting threshold values of 1500 minor and 5000 medium will generate minor contours for each 1x1 degree SRTM tile where elevation difference between the highest and the lowest point will be less than 1500 m, i.e. on the eastern plains where relief is low. In the rest of the area, intermediate contours will be created, because the elevation difference never exceeds 5000 m in a single SRTM tile.

The longitudinal width of SRTM tiles varies with latitude approximately as follows:

111 km at 0 degrees
96 km at 30 degrees
79 km at 45 degrees

56 km at 60 degrees

Appendix C. License

C.1. GNU General Public License

Version 2, June 1991

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