

Loading 'Shuttle Radar Topography Mission' maps in L3DT

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This tutorial explains how to import real-world terrain into L3DT, using radar-generated height data produced by the NASA 'Shuttle Radar Topography Mission' ([SRTM](#)). In this case, we will be using the 90 metre resolution SRTM data that is provided free of charge by [CGIAR](#), which covers the majority of the Earth's surface. Higher-resolution SRTM or LIDAR data is available elsewhere, but this is outside the scope of this tutorial.

Required L3DT version

Before we proceed further, I should mention that to follow this tutorial you will need L3DT Professional version 2.7 build 6 or later. If you do not have this version, or a later version thereof, please update your copy of L3DT Professional.

Note: L3DT Professional is required because each SRTM v4.1 file is 6001×6001 pixels in size, which is too large to load in L3DT Standard edition.

Some acronyms explained

This tutorial uses several acronyms, the meanings of which are listed below:

CGIAR Consultative Group on International Agricultural Research.

CIAT International Centre for Tropical Agriculture.

CSI Consortium for Spatial Information.

SRTM Shuttle Radar Topography Mission.

GeoTIFF Georeferenced tagged image file format.

Accessing SRTM data

Thanks to the wonderful people at CIAT-CSI ^[1], you may download SRTM data for the Earth's surface in a handy GeoTIFF format from the [CGIAR-CSI SRTM download page](#), as shown below.

The screenshot shows the 'SRTM Data Selection Options' web interface. At the top, there is a header for 'The CGIAR Consortium for Spatial Information (CGIAR-CSI)' with a logo and the tagline 'Applying GeoSpatial Science for a Sustainable Future...'. Below the header, there are navigation links: 'CSI HOME', 'SRTM MAIN', and 'HELP'. The main content area is titled 'SRTM Data Selection Options' and contains several sections:

- 1. Select Server:** Radio buttons for 'CGIAR-CSI (USA)', 'TelaScience (USA)', 'HarvestChoice (USA)', 'JRC (IT)', and 'King's College (UK)'. 'King's College (UK)' is selected.
- 2. Data selection method:** Radio buttons for 'Multiple Selection', 'Enable Mouse Drag', and 'Input Coordinates'. 'Multiple Selection' is selected.
- Coordinate Selection:** A note states 'Many tiles can be selected at random locations. These selected tiles are listed in the results page for download.' Below this are two options: 'Decimal Degrees (ie 34.5, -100.5)' and 'Degrees: Minutes: Seconds (ie 34 30 00 N, 100 30 00 W)'. The 'Degrees: Minutes: Seconds' option is selected. There are input fields for Longitude - min, Longitude - max, Latitude - min, and Latitude - max, each with a 'max:' label and a 'min:' label. There are also dropdown menus for 'East' and 'North' directions.
- 3. Select File Format:** Radio buttons for 'GeoTiff' and 'ArcInfo ASCII'. 'GeoTiff' is selected.
- Search Results:** A yellow button labeled 'Click here to Begin Search >>'.

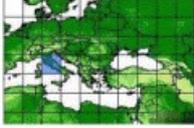
Below the form is a world map showing a grid of SRTM tiles. The map is color-coded by elevation, with green representing lower elevations and brown representing higher elevations. The map is overlaid with a grid of latitude and longitude lines. The x-axis (Longitude) ranges from 1 to 72, and the y-axis (Latitude) ranges from 1 to 24. A small red box highlights a specific area on the map.

At the bottom of the page, there is a footer with the following text: 'CGIAR-CSI Home | SRTM 90m Database | SRTM Data Processing Methodology | SRTM Data Search | Disclaimer | Contact Us' and '© 2004 CGIAR - Consortium for Spatial Information (CGIAR-CSI)'.

To select the area you wish to download, you may either left-click on the tiles in the map, or else manually input the latitude/longitude extents for your desired area. Once you have selected your area, press the bright yellow 'Click here to begin search' button to proceed to the results page.

On the results page, shown below, you may select the type of download using either HTTP (see 'Data download (HTTP)' link) or FTP (see 'Data download (FTP)' link). If you don't know what FTP is, use the HTTP option.

1 Items have been Found.

Description	Location	Image
<p>Product : SRTM 90m DEM version 4</p> <p>Data File Name : srtm_38_04.zip</p> <p>Mask File Name: srtm_rk_38_04.zip</p> <p>Latitude min: 40 N max: 45 N</p> <p>Longitude min: 10 E max: 15 E</p> <p>Center point: Latitude 42.50 N Longitude 12.50 E</p>		

Kings College(UK) Server :  Data Download (FTP)  Data Download (HTTP)  Data Mask Download (FTP)  Data Mask Download (HTTP)

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Once you have selected your download type, the download should commence. The data is packed into a ZIP archive, with a size of about 20MB per tile.

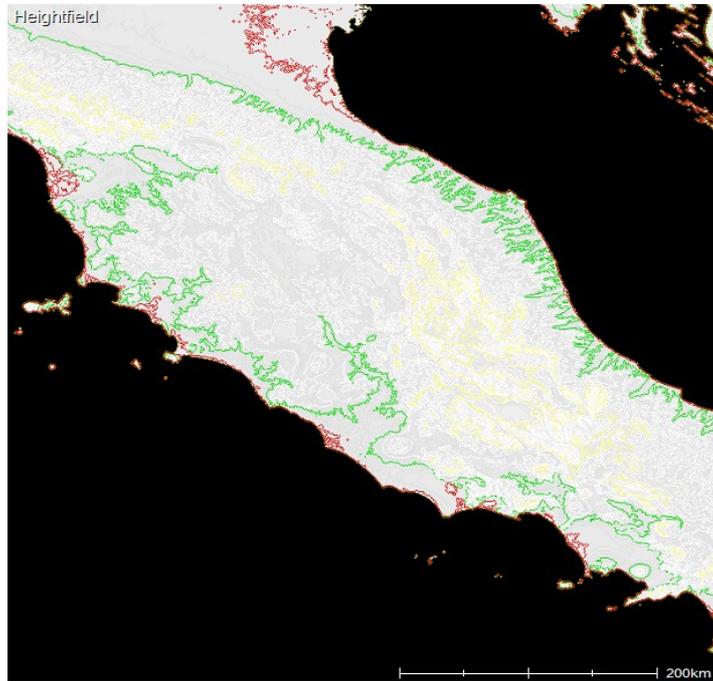
What is in the download archive?

The download archive includes four files:

- A TIF file, in GeoTIFF format, which contains the actual height data. Please see the next section for how to load this file in L3DT.
- A Readme.txt file, which you should read at least once ([see example](#)).
- A HDR file, which is a text file that describes the GeoTIFF projection, datum, extents, etc. ([see example](#)). This file is not used by L3DT, as it reads this data directly from the TIF file.
- A TFW file, which is a text file that lists the tiepoints in the map. This file is not used by L3DT, as it reads this data directly from the TIF file.

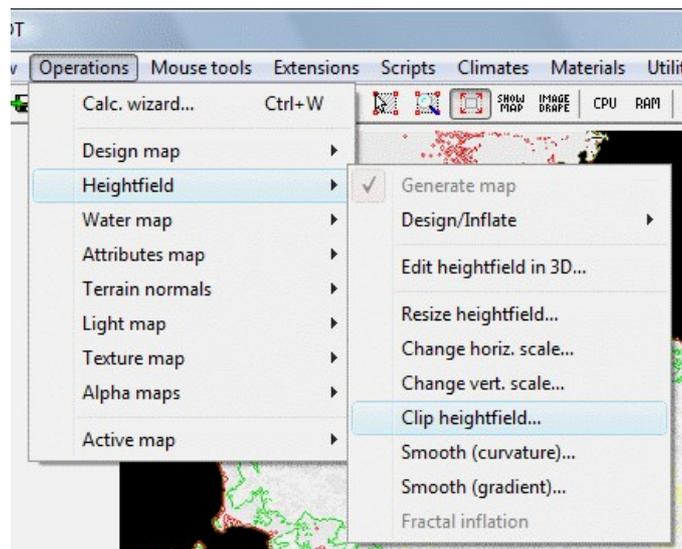
Importing the GeoTIFF

To load the TIF file in L3DT, select the *'File→Import→Heightfield'* menu option, and select the TIF file you want to load. After you click OK, L3DT will import the heightmap and show it in the main window display, like so:

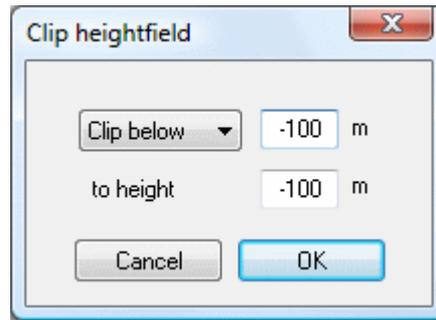


Handling no-data values

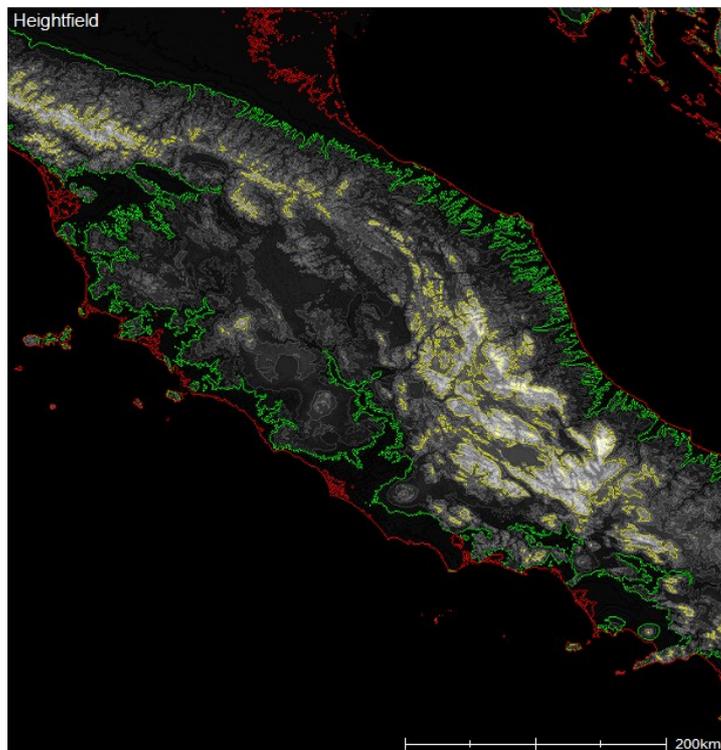
Since this data was mapped by radar from orbit, it does not include the land height below water. Thus, the sea-floor is represented in the GeoTIFF using a [GDAL](#) 'no data' value of -32768 metres. In L3DT, this will produce an enormous vertical cliff edge at the sea shore about 33km (20mi) high, which may be undesirable. To set an artificial sea floor at a more reasonable depth, select the *'Operations→Heightfield→Clip heightfield'* menu option, shown below.



In the 'Clip heightfield' window, set the controls to clip all terrain below -100m to a value of -100 (as shown below). This ensures that the no data regions (i.e. sea floor) are set to a reasonable number.

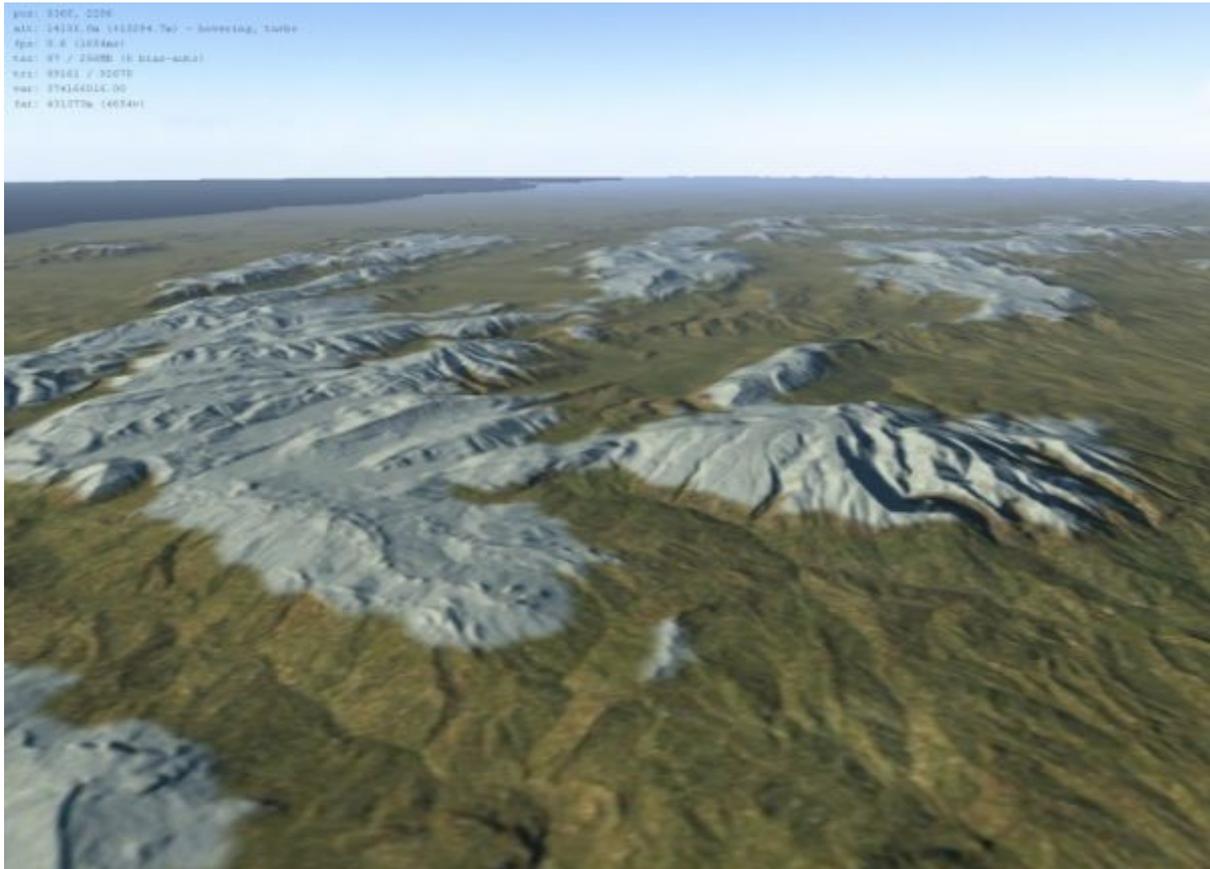


After you click OK, L3DT will clip the no data regions to the set altitude, and refresh the heightfield display accordingly.



You may now proceed to flood the water map, generate the attributes map, texture map, etc. These operations are explained in the [L3DT userguide](#), and so won't be repeated here.

When done, the map may look like this:



I hope this has helped.

Cheerio,

Aaron.

Footnotes

- [1] Jarvis A., H.I. Reuter, A. Nelson, E. Guevara, 2008, Hole-filled seamless SRTM data V4, International Centre for Tropical Agriculture (CIAT), available from <http://srtm.csi.cgiar.org>.