

Master

PREPARE TERRAIN

Required software:

- [Global Mapper](#)

Digital Elevation Model (DEM)

Selecting a DEM location:

1. Go to the [Global Data Explorer](#)
2. Log in (register, if you are not registered).
3. Click the *Help* button on the top toolbar, and follow instructions.
4. Download an archive.
5. Log out

Loading a DEM location:

1. Run the *Global Mapper*.
2. In the *Global Mapper* window, click on the *Open Your Own Data Files* button.
3. In Open dialog box browse to, select and open all *.tif files suffixed with **_dem** (if several tiles are).
NOTE: The program will automatically merge them.

Configuring the *Global Mapper*:

1. In the *Global Mapper* window, select *Tools > Configure*
2. In the *Configuration* dialog box, click LMB on the *Projection* tab
3. In the *Projection* drop-down list select *UTM* or *Mercator*
4. Click on the *OK* button to close the *Configuration* dialog box

The **frame shape file** is a polygon with four vertices, which outlines the terrain area, using UTM projection and WGS84 datum, and is stored as an ESRI shape file. This is required by the export process.

Creating an area feature (a frame shape file):

1. In the *Global Mapper* window Select *Tools > Digitizer*, or click LMB on the *Digitizer Tool* button on the toolbar.
2. Click RMB on the DEM image
3. In the context menu, select *Create Area/Polygon Features > Create Rectangular/Square Area (Specify Coordinates)*.
4. In the *Select Bounds of Feature* dialog box, switch to the *Corner w/ Size - Global Projection (UTM - meters)* option, and enter the values in the *Width* and *Height* field.

The optimal sizes of a terrain (meters) using the DEM from the *Global Data Explorer*

Grid Cell	Terrain Grid								
	16	32	64	128	256	512	1024	2048	4096
8*						4096	8192	16384	
4						2048	4096	8192	16384

* The values of a grid cell for DEM data from the *Global Data Explorer* are:

X-axis = 23.5539150311 m (~24); Y-axis = 30.8414811204 m (~32)

Thus, greatest common divisor of X and Y value is the value of 8.

The alternative sizes of a terrain (meters)

Grid Cell	Terrain Grid								
	16	32	64	128	256	512	1024	2048	4096
10*					2560	5120	10240	20480	
5**						2560	5120	10240	20480

* The values of a grid cell for a height map created by you

** The values of a grid cell for the DEM data from the *Global Data Explorer*

5. Click LMB on the *OK* button to close the *Select Bounds of Feature* dialog box
6. In the *Modify Feature Info* dialog box, in the *Name* field, name the area
7. Click LMB on the *OK* button to close the *Modify Feature Info* dialog box
8. Click RMB on the DEM image.
9. In the context menu, select *Options > Show Area and Line Vertices*.
10. Find the area of interest for your terrain
11. Click LMB on the named area to select it.
12. Click RMB on the named area.
13. In the context menu select the *Move Area Feature* item.

NOTE: To get a better idea where your selection is located in real world:

- Click on *Download Online Data* button on the toolbar.
- In the *Select online Data Source to Download* dialog box, in the *WORLDWIDE DATA* topic, select *OpenStreetMap.org Global Street Maps* item.

Elevation Grid

You may use a frame of an real-world elevation grid as a height map for your terrain. The frame has to match the size of your terrain, the global coordinates of an area feature (a frame shape file).

Exporting the frame of an elevation grid:

1. In the *Global Mapper* window, select the *Digitizer Tool*.
2. Click LMB on your area frame.
3. Select *File > Export > Export Elevation Grid Format*
4. In the *Select Export Format* dialog box, select the *XYZ Grid* item from the drop-down list.
5. Click on the *OK* button to close the *Select Export Format* dialog box.
6. In the *XYZ Grid Export Options* dialog box:
 - In the *Options* tab:
 - in the *Coordinate Separator* section, switch to the *Space* option
 - In the *Resolution* section, set both the X-axis and Y-axis to value of your grid cell.
 - In the *Export Bounds* tab, switch to the *Crop to Selected Area Features* option.
7. Click *OK* button to close the *XYZ Grid Export Options* dialog box
8. In the *Save As* dialog box, name and save ***.xyz** file

Satellite Map

You may use a frame of a satellite map as a map texture and/or a background image for your terrain. The frame has to match the size of your terrain, the global coordinates of an area feature (a frame shape file).

Exporting the frame of a satellite map:

1. In the *Global Mapper* window, click LMB on the *Download Online Data* button on the top toolbar.
2. In the *Select Online Data Source to Download* dialog box, select a satellite map, for example:
 - Landsat7 Global Imagery Mosaic (Natural Color, Pan-Sharpended)
 - Landsat7 Global Imagery Mosaic (Pseudo-Color, Pan-Sharpended)
3. Select *Tools > Control Center*.
4. In the *Overlay Control Center* window, ensure all the layers are unchecked, except the *User Created Features* (the frame shape file) and your satellite map source.
5. Select the *Digitizer Tool*.
6. Click LMB on your area frame.
7. Select *File > Export > Export Raster/Image Format*
8. In the *Select Export Format* dialog box, select the *PNG* format from the drop-down list.
9. Click on the *OK* button to close the *Select Export Format* dialog box.
10. In the *PNG Export Options* dialog box, on the *PNG Export Options* tab, you may want to switch to the *24-bit RGB (Larger Size, Full Color)* option.

11. In the *Sample Spacing* section, set both the X-axis and Y-axis to value of your grid cell.
12. Ensure that *Generate World File* and *Generate Projection (PRJ) File* are selected. These files will be created with PGW and PRJ extensions, and should remain with your *.png file.
13. In the *Export Bounds* tab, switch to the *Crop to Selected Area Features* option.
14. Click *OK* button to close the *PNG Export Options* dialog box.
15. In the *Save As* dialog box, name and save *.png file

NOTE: Alternative software <http://www.allmapsoft.com/umd/index.html>

Universal Maps Downloader is a tool that downloads tile images from *Google Maps, Yahoo maps, Bing maps, OpenStreet Maps, Yandex Maps*.

Features:

- Downloaded tile images are saved on your hard disk
- You can view downloaded tile images with *Maps Viewer*
- You can combine tile images into a BMP file with *Maps Combiner*

Sample levels of zoom for the *Maps*

Web Source	Zoom Level	Image Resolution	Resize to
Google	15	2560x2560	-
	16	4864x4864	4096 or 5120
	17	9472x9216	8192 or 10240
	18	18432x17920	16384 or 20480

Street Map

You may use a frame of a street map as stuff for a layer mask. The frame has to match the size of your terrain, the global coordinates of an area feature (a frame shape file).

Exporting the frame of a street map:

1. In the *Global Mapper* window, click LMB on the *Download Online Data* button on the top toolbar.
2. In the *Select Online Data Source to Download* dialog box, select a street map:
 - The *OpenStreetMap.org Global Street Maps* option
3. With your data loaded, select *Tools > Control Center*.
4. In the *Overlay Control Center* window, ensure all the layers are unchecked, except the *User Created Features* (the frame shape file) and your street map source.
5. Select the *Digitizer Tool*.
6. Select your area frame.
7. Select *File > Export > Export Raster/Image Format*
8. In the *Select Export Format* dialog box, select the *PNG* format from the drop-down list.
9. Click on the *OK* button to close the *Select Export Format* dialog box.
10. In the *PNG Export Options* dialog box, on the *PNG Export Options* tab, you may want to switch to the *24-bit RGB (Larger Size, Full Color)* option
11. In the *Sample Spacing* section, set both the X-axis and Y-axis to value of your grid cell.
12. Ensure that *Generate World File* and *Generate Projection (PRJ) File* are selected. These files will be created with PGW and PRJ extensions, and should remain with your *.png file.
13. In the *Export Bounds* tab, switch to the *Crop to Selected Area Features* option.

NOTE: You can choose *Reset to Last Exported Bounds*, or enter the UTM boundary values manually.

1. Click *OK* button to close the *PNG Export Options* dialog box.
2. In the *Save As* dialog box, name and save *.png file

Vector Data

The real-world vector data for vegetation, buildings, roads, and other features may be used for a map texture, also using a satellite image, and a layer mask.

Downloading the vector data:

1. Go to the <http://download.geofabrik.de/>
2. Click LMB on the sub-region name to see the overview page for that, or select one of the file extension links for quick access.
3. Click on the region name to see the overview page for that, or select one of the file extension links (if any) for quick access. In this case, [.shp.zip]. The <region name> -latest.shp.zip, yields the ESRI-compatible shape files.
4. Download, and Unpack the *.zip file into separate folder.

Loading the vector data:

1. In *Global Mapper* window, open your *.gmw project: *File > Open*.
2. Select *File > Open Data Files*
3. In the *Open* dialog box, browse and open all the *.shp files.
NOTE: The shape files cover the whole region, not your frame area.
4. Select *Tools > Configure*
5. In the *Configuration* dialog box, click on the *Vector Display* tab.
6. On the *Vector Display* tab, uncheck the *Draw Feature Labels* option (if it is checked).
7. Select *Tools > Digitizer*, or click LMB on the *Digitizer Tool* button on the toolbar.
8. Click RMB on the workspace screen.
9. In the context menu, select *Options > Hide Area and Line Vertices* (if it is showed).

Exporting a frame of the vector data:

1. In the *Global Mapper* window, select *Tools > Control Center*.
2. In the *Overlay Control Center* window, ensure all the layers are unchecked, except the *User Created Features* (the frame shape file) and your *.shp file.
3. Select the *Digitizer Tool*.
4. Select your area frame.
5. Select *File > Export > Export Raster/Image Format*
6. In the *Select Export Format* dialog box, select the *PNG* format from the drop-down list.
7. Click on the *OK* button to close the *Select Export Format* dialog box.
8. In the *Sample Spacing* section, set both the X-axis and Y-axis to value of your grid cell.
9. Ensure that *Generate World File* and *Generate Projection (PRJ) File* are selected. These files will be created with PGW and PRJ extensions, and should remain with your *.png file.
10. In the *Export Bounds* tab, switch to the *Crop to Selected Area Features* option.
NOTE: You can choose *Reset to Last Exported Bounds*, or enter the UTM boundary values manually.
11. Click *OK* button to close the *PNG Export Options* dialog box.
12. In the *Save As* dialog box, name and save *.png file

Normal Map

Normal mapping is the technique to replace the existing normals on a 3D model. Normal maps are used together with the layer textures.

Required tools:

- [Kegetys' ArmA Tools \(PAAPlug\)](#)
- *Adobe Photoshop*
NOTE: You need to have *Adobe Photoshop CS6* since the current version of NVIDIA Texture Tools for Adobe Photoshop is compatible with this, not *Adobe Photoshop CC*.
- [NVIDIA Texture Tools for Adobe Photoshop](#) (for users with a NVIDIA GPU)
NOTE: [ATI's Normal Mapper](#) (for users with an ATI GPU)

Creating a normal map:

1. Install **PAAplug.8bi** (from Kegetys' ArmA Tools) into directory:
C:\Program Files\Adobe\Adobe Photoshop CS6\Plug-ins\File Formats
2. Open *Adobe Photoshop*
3. Create a layer texture
4. Save it as *.tga file with 32 bit color.
5. Open *TexView 2* (from BI Tools)
6. Save the file as *_co.paa
NOTE: The suffix **_co** means **color** (a diffuse map).
7. Exit the *TexView 2*.
8. In the *Adobe Photoshop* window, open the *_co.paa (using *PAAplug*).
9. When you are asked, click "Yes" button.
10. In the *Adobe Photoshop* window, select *Filter > NVIDIA Tools > NormalMapFilter*
11. In the *NVIDIA Normal Map Filter* dialog box, set up the settings, see:
All Programs > NVIDIA Corporation > NVIDIA Photoshop Plug-ins > Normal Map Plug-in User Guide
12. Click OK button.
13. Save file as *_nopx.paa
14. Close *Adobe Photoshop*.

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