Global Mapper and Basic Visualization of GEON LiDAR Workflow Products

Christopher J. Crosby

School of Earth and Space Exploration Arizona State University

24 October 2007

http://lidar.asu.edu

Table of Contents

Introduction	2
Importing GLW DEMs into Global Mapper	3
Raster Image Overlay on LiDAR DEM.	12
3D Visualization	15
Exporting LiDAR DEMs to Google Earth Files (KML/KMZ)	17

INTRODUCTION:

Global Mapper (http://www.globalmapper.com/)is presented here as a low cost alternative to ArcGIS for users who do not have access to ESRI products. Global Mapper supports many common raster, elevation and vector GIS datasets - including those produced by the GEON LiDAR Workflow (GLW). The software offers easy import and export of LiDAR DEMs as well as 3D visualization and raster imagery overlays.

This tutorial will provide an overview on importing GLW DEMs into Global Mapper as well as some of the basic analysis and visualization capabilities of the software.

More information on Global Mapper, trial software and information on purchasing the software is available at: http://www.globalmapper.com/

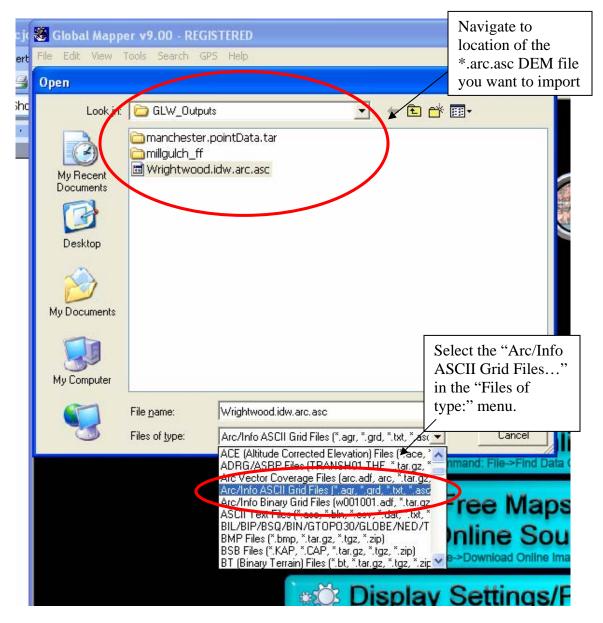
IMPORTING GLW DEMs INTO GLOBAL MAPPER

Launch Global Mapper: Start>All Programs>Global Mapper> Global Mapper 9

Once open, select "Open Your Own Data Files"



Navigate to the location of the *.arc.asc grid file you wish to import and select the "**Arc/Info ASCII Grid Files**..." option from the "Files of type:" option.



You will receive a message telling you that "ARC ASCII GRID files do not contain projection information" – select "OK" and you will define the projection in the next step.

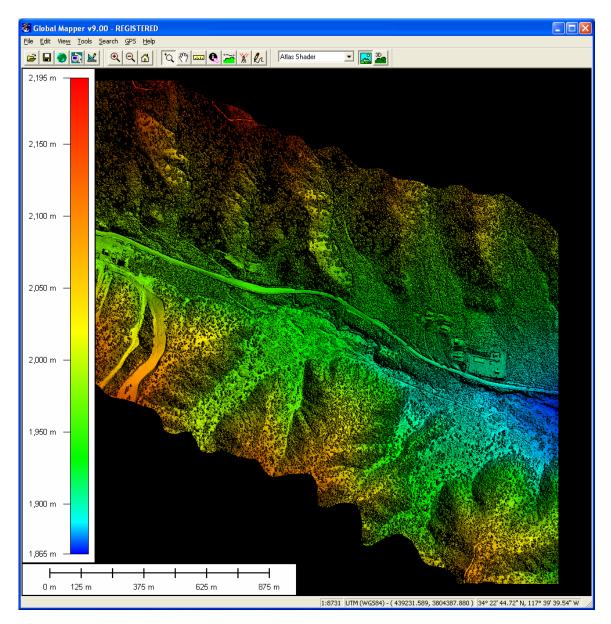
Global Mapper will next present you with the menu shown below to define the projection of the dataset. The B4 dataset sample we will be using for this exercise has the following projection definition:

Grid Coordinate System Name: Universal Transverse Mercator UTM Zone Number: 11 N Transverse Mercator Projection Scale Factor at Central Meridian: 0.999600 Longitude of Central Meridian: -117.000000 Latitude of Projection Origin: 0.000000 False Easting: 500000.000000 False Northing: 0.000000 Planar Coordinate Information: Planar Distance Units: meters Geodetic Model Horizontal Datum Name: D_WGS_1984 Ellipsoid Name: WGS_1984

Set:

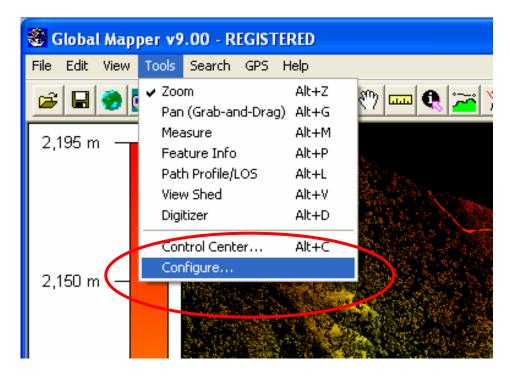
"Projection" to "UTM" "Zone" to "11" "Datum" to "WGS84"

Select Projection for Wrightwood.if Projection = "U	TM"
Projection	
Projection: Load From File	
UTM Save T Zone =	··11"
Init From	11
11 (120"W · 114"W · Northern Hemisphere)	
Datum:	WGS84"
Planar Units: Elevation Units:	
METERS METERS	
Parameters:	
Attribute Value	
CENTRAL MERIDIAN SCALE FACT 0.999600000 CENTRAL MERIDIAN -117.00000000	
ORIGIN LATITUDE 0.00000000	
FALSE EASTING (m) 500000	
FALSE NORTHING (m) 0	
Use Selected Projection for All Selected Files	
OK Cancel Help	



Once you have defined the dataset projection and selected "OK", Global Mapper will then load the DEM. Once loaded, you will see something that looks like this:

To configure the appearance of the DEM you have just loaded choose "Tools>Configure..."



Configuration menu:

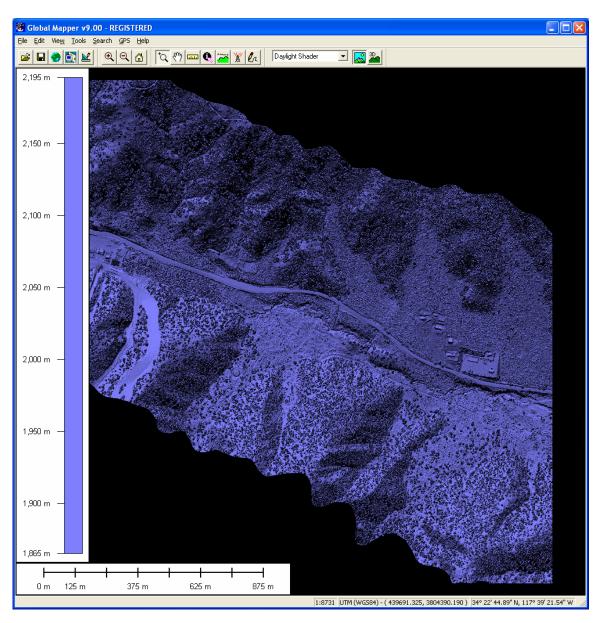
Configuration
Point Styles Vertical Options Shader Options Projection General Vector Display Area Styles Line Styles
Grid Display (Shift+G) Contract Contract Contract Contract Projection Grid Grid Spacing Contract Contract Co
 Show All Grid Lines Regardless of Zoom Scale Extend Grid Lines Beyond Loaded Data Bounds
Distance Scale Display Units (Shift+S) No Scale Metric (m/km) Statute (ft/mi)
Elevation Legend Display Units (Shift+L) No Legend Metric (meters) Statute (feet)
Position Display Format Lat/Lon dd° mm' ss.ss'' h
Area Measure Units Square Miles
Distance Measure Units Statute (ft/miles)
Miscellaneous Advanced Options Prefer World File (TFW) Coordinates for GeoTIFF Files Export Old Format PRJ Files
Restore Default Settings
OK Cancel Apply Help

The configuration menu has many features which we will not deal with in this tutorial. For out purposes, we will only deal with the "**Vertical Options**" and "**Shader Options**" tabs to customize the appearance of the DEM.

Global Mapper uses a variety of different shader options to change the appearance of the elevation file (DEM) that has been loaded. The "Atlas Shader" is the default option and it provides a color ramp behind a hillshade effect to render the DEM. We will not explore all of the various shader options, but you are encouraged to explore the options to achieve your desired effect. If you are interested, the Global Mapper online help has excellent documentation on each shader as well as other options available via the "Configuration" menu: http://www.globalmapper.com/helpv9/Help_Config.html

To achieve the standard grey scale hillshade effect commonly used to visualize LiDAR DEMs set the "Vetical Options" menu like this (feel free to experiment to see what effect the various parameters have):

	Use the day shader Shader Options	Projecti	> on	
Elevation Display Units Native Overlay Units Me Light Direction Altitude 45 🕂 Azir	nuth 345 🗧		azim illun	ltitude and uth for the nination ntation
Ambient Lighting (0.00) Dim Vertical Exaggeration (1.0) Flat	Brig			
Hill Shading Shadow Darkness (0)	Lig			on is set
Water Level: Water Level: Water Transparency (128)	Meters			
Clear	Opa	ique Help		

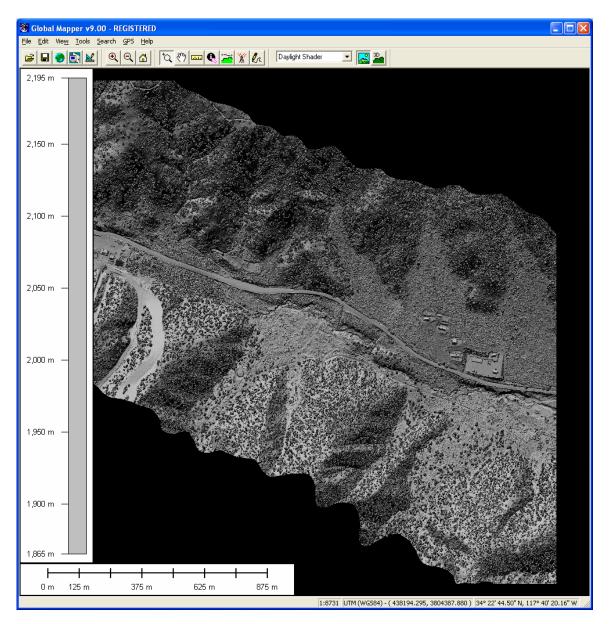


Once you click "OK" you should see an image that looks something like this:

It looks ok but why is it purple (or whatever your default color is)? This is because we need to modify the "Shader Options" to set the background color to grey. Go back to the "Tools>Configuration" menu and choose the "Shader Options" tab:

Under "**Daylight Shader**", chose the "**Surface Color...**" option then pick a light grey color from the palate :

Color 🛛 💽 🔀
<u>B</u> asic colors:
<u>C</u> ustom colors:
Define Custom Colors >>
OK Cancel



And voila – a nice grey scale hillshade of the LiDAR DEM:

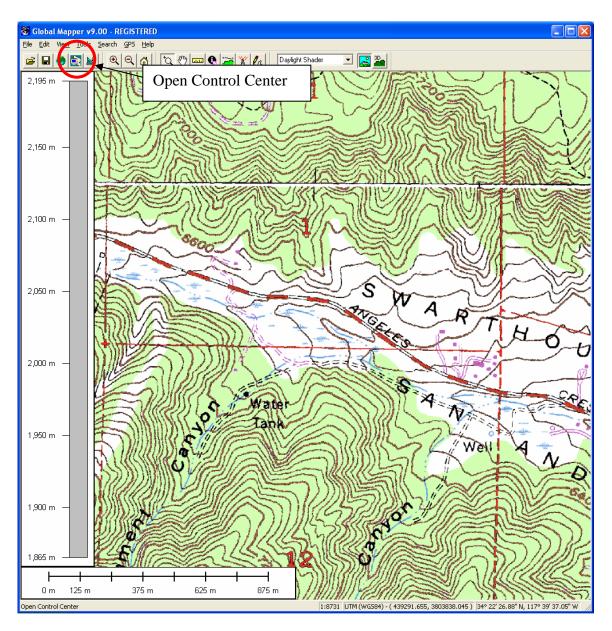
RASTER IMAGE OVERLAY ON LIDAR DEM:

One of the cool features of Global Mapper is that it provides simple access to online USGS Digital Ortho Photos Quadrangles (aka DOQs) and Digital Raster Graphics (DRGs) so that you can quickly overlay topomaps and airphotos on your DEM.

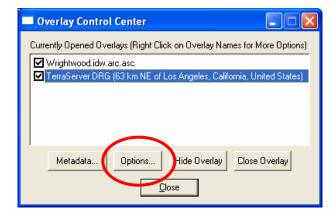
Select: "**File>Download Online Imagery/Topo/Terrain Maps...**" which will bring up a new menu. Choose the "DRG – USGS Digital..." option – Global Mapper will now go out on the internet, find the appropriate topomap and load it:

	Select Online Data Source to Download
	Select Data Source OK Image with from Digital State /
4	DOG - USGS Digital Ortho-Quadrangle (Grayscale aerial imagery) (TERRASERVER-USA.COM) DRG - USGS Digital Raster Graphics (Topographic Maps) (TERRASERVER-USA.COM) UrbanArea - High resolution Color Imagery for Select Urban Areas in the US (TERRASERVER-USA.COM)
	Landsat7 Global Imagery Mosaic (Color, Pan-Sharpened) United States Elevation Data (NED) (30m Resolution) SRTM Worldwide Elevation Data (3-arc-second Resolution) NEXRAD Radar Base Composite (US)
	Add WMS Data Source Remove Source
	Select Area to Download
	Current Screen Bounds Within Imiles of address O Within Imiles of address O O Within I Imiles of address Innoitude -117.667882991459
	Within 1 miles reliable 34.3656238509271 longitude -117.667882991459 Specify Latitude/Longitude Bounds of Area (NOTE: Longitude values in the
	West 117.68028158950 North 34.379159747801 East 117.65548439340 Draw Box Western Hemisphere and latitude values in the Southern hemisphere must be negative.)
	C Entire Data Source Bounds
	IMPORTANT NOTE: These data sources are on external servers that Global Mapper has no control over. The data may draw/export very slowly or become unavailable at any time. We have no control over this.

It'll take minute or so to load and then you should see the topomap map. The problem is that you can't see the DEM any more. So, choose the "Open Control Center" button:



Highlight the "TerraServer DRG" layer and select "Options..."



Raster Options 🛛 🔀	
Cropping Feathering Projection Display Color/Contrast Adjustment	
Color Intensity (0) Lighter Darker Darker	
Translucency (Can You See Through It?) (35.0%) Transparent Opaque	
Blend Mode No Blend	
Transparent Set Transparent Cr Anti-Alias Pixels (Interpolate) Set "Translucency to about 35%	y"
Texture Map	
OK Cancel Apply Help	

Under the "**Display**" tab, adjust the "**Translucency**" option to be about 35%

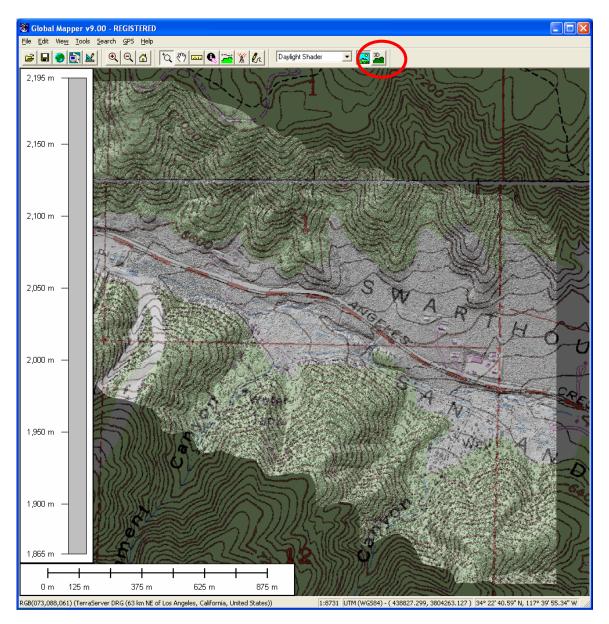
You should now be able to see through the DRG to the underlying hillshaded LiDAR DEM:



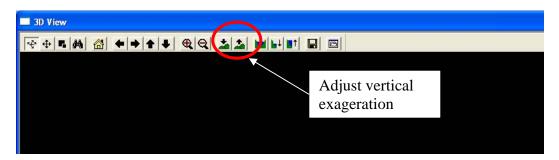
3D VISUALIZATION:

In addition to map view visualization of the LiDAR DEMs, Global Mapper also offers nice 3D visualization.

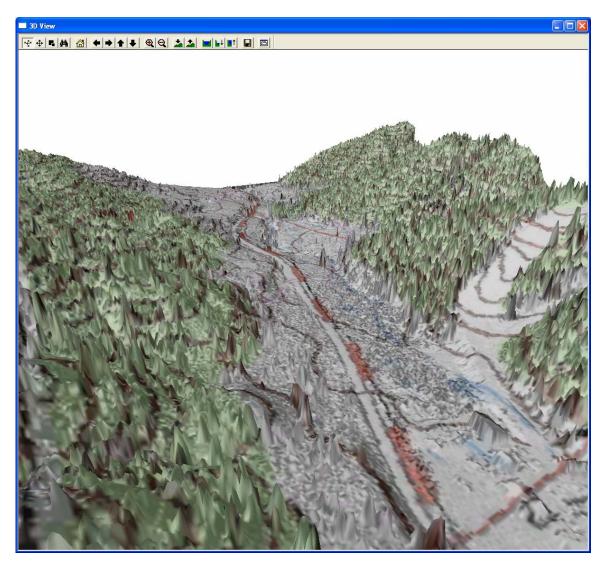
With data loaded in Global Mapper, choose the "Show 3D View" button:



Launching the 3D view will bring up a new widow which shows the same data in an interactive 3D perspective. You can spin, drag and zoom the view to change the perspective. Buttons across the top of the view allow you to modify the vertical exaggeration quickly.

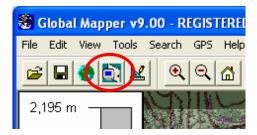


A quick 3D view for example:



EXPORT LIDAR DEMs TO GOOGLE EARTH KML FILE:

Close your 3D view if still open. Next, select the "**Open Contol Center**" button again:



Turn off (uncheck) the DRG layer:

Overlay Control Center
Currently Opened Overlays (Right Click on Overlay Names for More Options)
TerraServer DRG (63 km NE of Los Angeles, California, United States)
Metadata Options Show Overlay Close Overlay

Close the menu

Select: "File>Export Raster and Elevation Data>Export KML/KMZ"

In the "KML/KMZ Export Options there are many options that are fully explained of you choose the "Help" option. For our purposes we will just accept the default options:

KML/KMZ Export Options	×
KML/KMZ Dptions Gridding Export Bounds Export Image Format UPG PNG TIFF (Palette) TIFF (24-bit RGB Color) Sample Spacing X-axis: 5.47339264925739e-006 arc degrees X-axis: 5.47339264925739e-006 arc degrees Y-axis: 4.53855301060635e-006 arc degrees Click Here to Calculate Spacing in Other Units Image: Create Compressed KMZ File (Recommended) Save Scale/Elevation Legend/Grid if Displayed Save Vector Data if Displayed Automatically Grid Export of Large Data Sets so that Google Earth Can Handle Them Better	×
OK Cancel Apply Help	1

Click "OK" and name and save the kml file.

Once Global Mapper has finished exporting the LiDAR DEM to KML you can navigate to whereever you saved it and open it with Google Earth. Note that you can adjust the transparency of the LiDAR overlay using the slider on the left hand menu so that you can effectively "merge the LiDAR topography with the high-resolution aerial photography in Google Earth.

