



The following was presented at DMT'11
(May 22-25, 2011).

The contents are provisional and will be
superseded by a paper in the
DMT'11 Proceedings.

See also earlier Proceedings (1997-2010)
<http://ngmdb.usgs.gov/info/dmt/>

Creating Slope-Enhanced Shaded Relief Using Global Mapper

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Slope-Enhanced Shaded Relief

What's wrong with a hillshade?

My point is to demonstrate that slope-enhanced shaded relief is superior to typical standard “hillshades”, and that they are very easy to create with Global Mapper.



Slope-Enhanced Shaded Relief

What You Need

- Global Mapper (under \$300)
- Appropriate elevation data for your project
- A polygon boundary of your map area



Slope-Enhanced Shaded Relief



Slope-Enhanced Shaded Relief

Global Mapper v12.02 (b041511) - REGISTERED

File Edit View Tools Search GPS Help

Slope Shader

Configuration

General | Vector Display | Area Styles | Line Styles
Point Styles | Vertical Options | Shader Options | Projection

Daylight Shader
Color Ramp Shader
Daylight Shader
Global Shader
Gradient Shader
HSV Shader
Slope Direction Shader
Slope Shader

Enable Hill Shading

Metric Statute (ft)

Azimuth 340

Ambient Lighting (0.00)
Dim ————— Bright

Vertical Exaggeration (0.8)
Flat ————— High

Hill Shading Shadow Darkness (36)
Dark ————— Light

Hill Shading Highlight from Direct Light (0)
None ————— White

Water Display
 Show Water on Elevation Data Water Color...

Water Level: 0 Feet

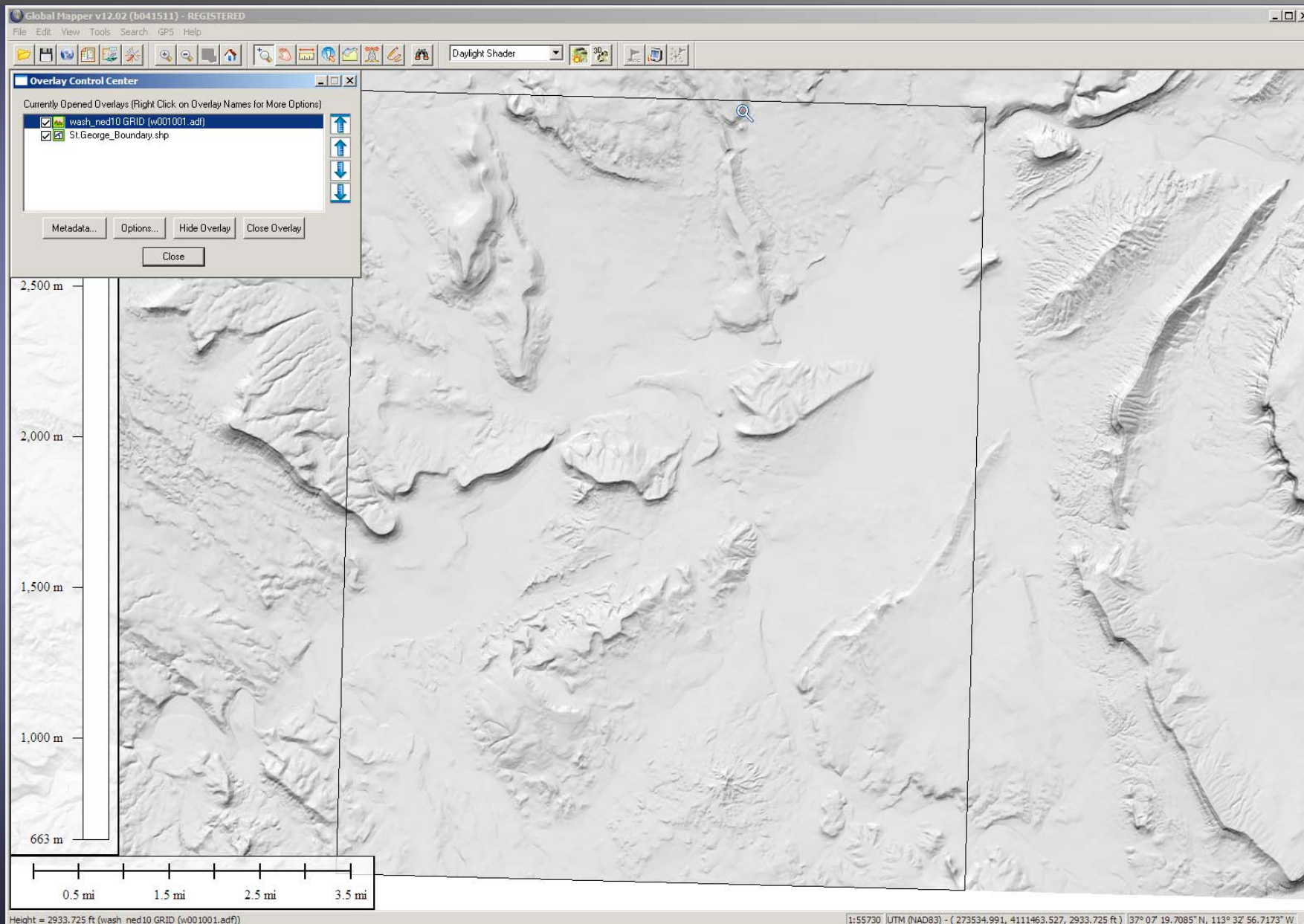
Water Transparency (213)
Clear ————— Opaque

OK Cancel Apply Help

0.5 mi 1.5 mi 2.5 mi 3.5 mi

<ST GEORGE> Unknown Area Type 1:55730 UTM (NAD83) - (274817.920, 4101893.173) | 37° 02' 10.5547" N, 113° 31' 54.4480" W

Slope-Enhanced Shaded Relief



Slope-Enhanced Shaded Relief

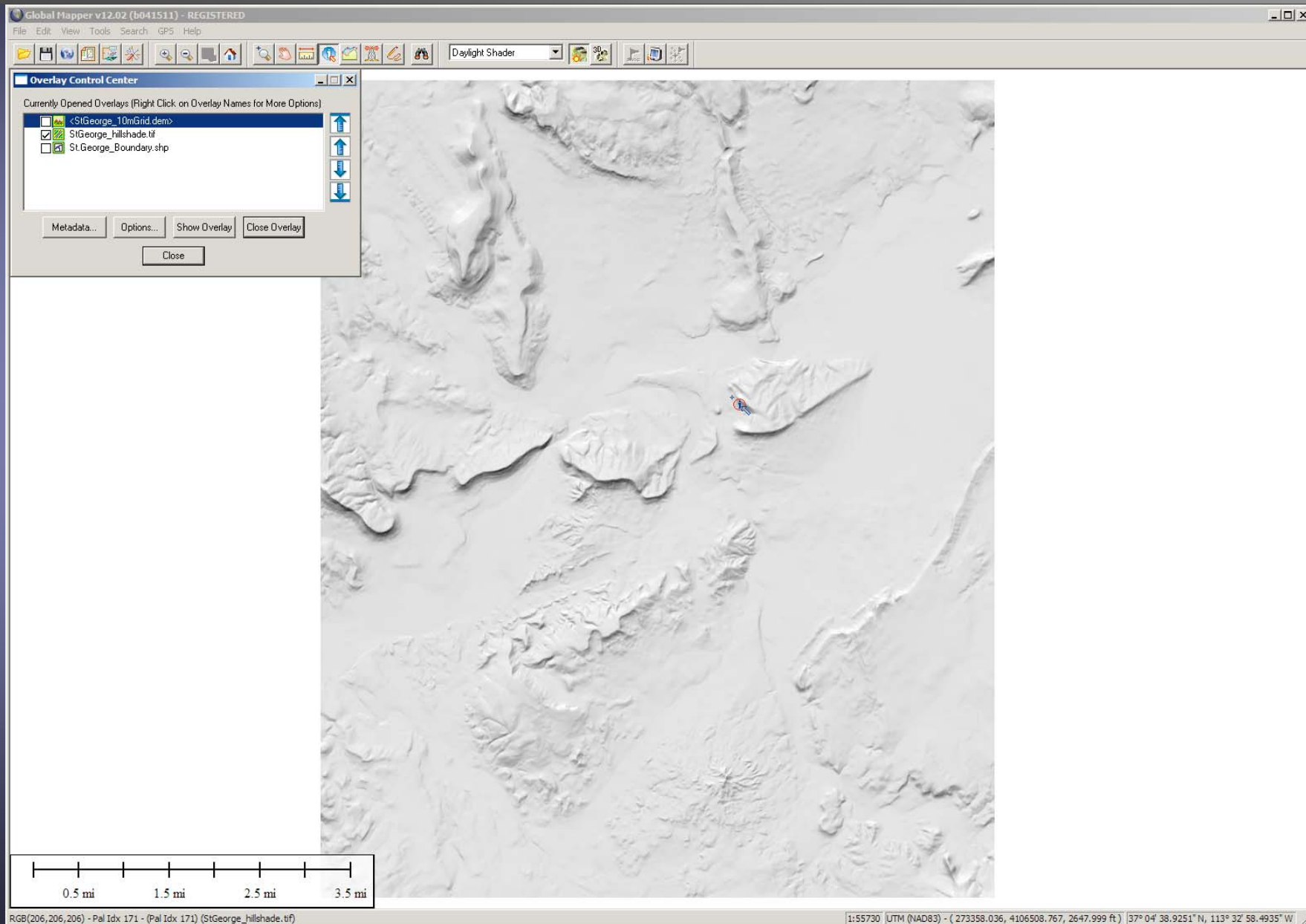
The screenshot displays the Global Mapper v12.02 interface. The main window shows a shaded relief map of a terrain. The 'File' menu is open, and 'Export Raster/Image Format...' is selected. The 'GeoTIFF Export Options' dialog box is open, showing the following settings:

- File Type: 24-bit RGB (Full Color, May Create Large Files)
- Black and White (1 bit per pixel)
- Multi-Band (8 bits per Band) 1 Bands
- Elevation (16 bit integer samples)
- Elevation (32 bit floating point samples)
- Palette: Image Optimized Palette
- Sample Spacing/Scale: X-axis: 0.686706429399818 meters, Y-axis: 0.704529814405126 meters
- Always Generate Square Pixels
- TIFF Format Options: DPI Value To Save in Image (0 for None): 0, Compression: Default (LZW Compression)
- Make Background (Void) Pixels Transparent
- ADVANCED: Use Tile Rather than Strip Orientation
- ADVANCED: JPEG-in-TIFF Quality: 90
- Save Map Layout (Scale/Margins/Grid/Legend/etc.)
- Save Vector Data if Displayed
- Interpolate to Fill Small Gaps in Data
- Generate TFW (World) File
- Generate PRJ File

The 'Select Export Format' dialog box is also visible, showing 'GeoTIFF' selected in the dropdown menu. The 'File' menu list includes: Open Data File(s)..., Open Generic ASCII Text File(s)..., Open All Files in a Directory Tree..., Open ECW File from the Web..., Open Data File at Fixed Screen Location..., Unload All..., Create New Map Catalog..., Find Data Online..., Download Online Imagery/Topo/Terrain Maps..., Load Workspace..., Save Workspace..., Save Workspace As..., Run Script..., Capture Screen Contents to Image..., Export Global Mapper Package File..., Export PDF File..., Export Elevation Grid Format..., Export Raster/Image Format..., Export Vector Format..., Export Web Format..., Batch Convert/Reproject..., Create S-63 User Permit File..., Combine Terrain Layers..., Generate Contours..., Generate Watershed..., Rectify (Georeference) Imagery..., Print..., Print Preview..., Print Setup..., 1 K:\DEM\...w001001.adf, 2 StGeorge_10mGrid.dem, 3 StGeorge_10mGrid.asc, 4 StGeorge_hillshade.tif, 5 St.George_Boundary.shp, 6 GlobalMapper_Mashups test_20110303.gmw, 7 Hurricane_US Topo.tif, 8 StGeorgeForkent400.tif, 9 StGeorge_GeologicUnits-Base_mashup_24bit.tif, Exit.

At the bottom of the map, there is a scale bar showing 0.5 mi, 1.5 mi, 2.5 mi, and 3.5 mi. A vertical scale bar on the left shows 1,000 m and 663 m. The status bar at the bottom right displays: 1:55730 UTM (NAD83) - (261929.647, 4108632.235, 3084.352 ft) 37° 05' 37.5629" N, 113° 40' 43.2919" W.

Slope-Enhanced Shaded Relief



Slope-Enhanced Shaded Relief

The screenshot displays the Global Mapper v12.02 interface. The main window shows a shaded relief map of a terrain. Overlaid on the map are three data layers: a grid, a hillshade, and a boundary. The Configuration dialog box is open, showing the 'Slope Shader' settings. The 'Enable Hill Shading' checkbox is checked. The 'Elevation Display/Export Units' are set to 'Statute (ft)'. The 'Light Direction' is set to an altitude of 60 and an azimuth of 340. The 'Ambient Lighting' is set to 0.00, 'Vertical Exaggeration' is 0.8, and 'Hill Shading Shadow Darkness' is 36. The 'Hill Shading Highlight from Direct Light' is set to 'None'. The 'Water Display' section is currently disabled. A scale bar at the bottom left indicates distances up to 3.5 miles. The status bar at the bottom right shows the current map coordinates: 11:55730 UTM (NAD83) - (273358.036, 4106508.767, 2647.999 ft) 37° 04' 38.9251" N, 113° 32' 58.4935" W.

Global Mapper v12.02 (b041511) - REGISTERED

File Edit View Tools Search GPS Help

Daylight Shader

Overlay Control Center

Currently Opened Overlays (Right Click on Overlay Names for More Options)

- <StGeorge_10mGrid.dem>
- StGeorge_hillshade.tif
- St_George_Boundary.shp

Metadata... Options... Show Overlay Close Overlay

Close

Configuration

General Vector Display Area Styles Line Styles

Point Styles Vertical Options Shader Options Projection

Slope Shader Enable Hill Shading

Elevation Display/Export Units

Native Overlay Units Metric Statute (ft)

Light Direction

Altitude 60 Azimuth 340

Ambient Lighting (0.00)

Dim Bright

Vertical Exaggeration (0.8)

Flat High

Hill Shading Shadow Darkness (36)

Dark Light

Hill Shading Highlight from Direct Light (0)

None White

Water Display

Show Water on Elevation Data Water Color...

Water Level: 0 Feet

Water Transparency (213)

Clear Opaque

OK Cancel Apply Help

0.5 mi 1.5 mi 2.5 mi 3.5 mi

11:55730 UTM (NAD83) - (273358.036, 4106508.767, 2647.999 ft) 37° 04' 38.9251" N, 113° 32' 58.4935" W

Slope-Enhanced Shaded Relief

Global Mapper v12.02 (b041511) - REGISTERED

File Edit View Tools Search GPS Help

Daylight Shader

Overlay Control Center

Currently Opened Overlays (Right Click on Overlay Names for More Options)

- <STGeorge_10mGrid.dem>
- STGeorge_hillshade.tif
- St.George_Boundary.shp

Metadata... Options... Show Overlay Close Overlay

Close

Configuration

General Vector Display Area Styles Line Styles

Point Styles Vertical Options Shader Options Projection

Daylight Shader Gradient Shader

Surface Color... Low Color... High Color...

Slope Shader

Minimum Slope Slope Value... Color...

Enter a slope value

Degrees (Enter slope in degrees from horizontal)

0 degrees

OK

Cancel

Slope Value (Enter slope as rise / run)

0

Fractional

1 in 0

Color

Basic colors:

Red	Yellow	Green	Cyan	Blue	Pink	Purple
Orange	Light Green	Light Blue	Light Purple	Light Cyan	Light Pink	Light Purple
Dark Red	Dark Orange	Dark Green	Dark Blue	Dark Cyan	Dark Pink	Dark Purple
Black	Dark Olive	Dark Teal	Dark Blue-Gray	Dark Gray	Dark Purple	Dark Purple

Custom colors:

White	White	White	White	White	White	White
White	White	White	White	White	White	White

Define Custom Colors >>

OK Cancel

0.5 mi 1.5 mi 2.5 mi 3.5 mi

RGB(206,206,206) - Pal Idx 171 - (Pal Idx 171) (STGeorge_hillshade.tif)

1:55730 UTM (NAD83) - (273358.036, 4106508.767, 2647.999 Ft) 37° 04' 38.9251" N, 113° 32' 58.4935" W

Slope-Enhanced Shaded Relief

Global Mapper v12.02 (b041511) - REGISTERED

File Edit View Tools Search GPS Help

Daylight Shader

Overlay Control Center

Currently Opened Overlays (Right Click on Overlay Names for More Options)

- <StGeorge_10mGrid.dem>
- StGeorge_hillshade.tif
- St George_Boundary.shp

Metadata... Options... Show Overlay Close Overlay

Close

Configuration

General Vector Display Area Styles Line Styles

Point Styles Vertical Options Shader Options Projection

Daylight Shader Gradient Shader

Surface Color... Low Color... High Color...

Slope Shader

Minimum Slope Slope Value... Color...

Maximum Slope Slope Value... Color...

Enter a slope value

Degrees (Enter slope in degrees from horizontal)

5 degrees

OK

Cancel

Slope Value (Enter slope as rise / run)

0.0874887

Fractional

1 in 11.4301

Saturation: Range:

Custom Shaders

Reverse Colors of Selected Sh

OK Cancel

Color

Basic colors:

Custom colors:

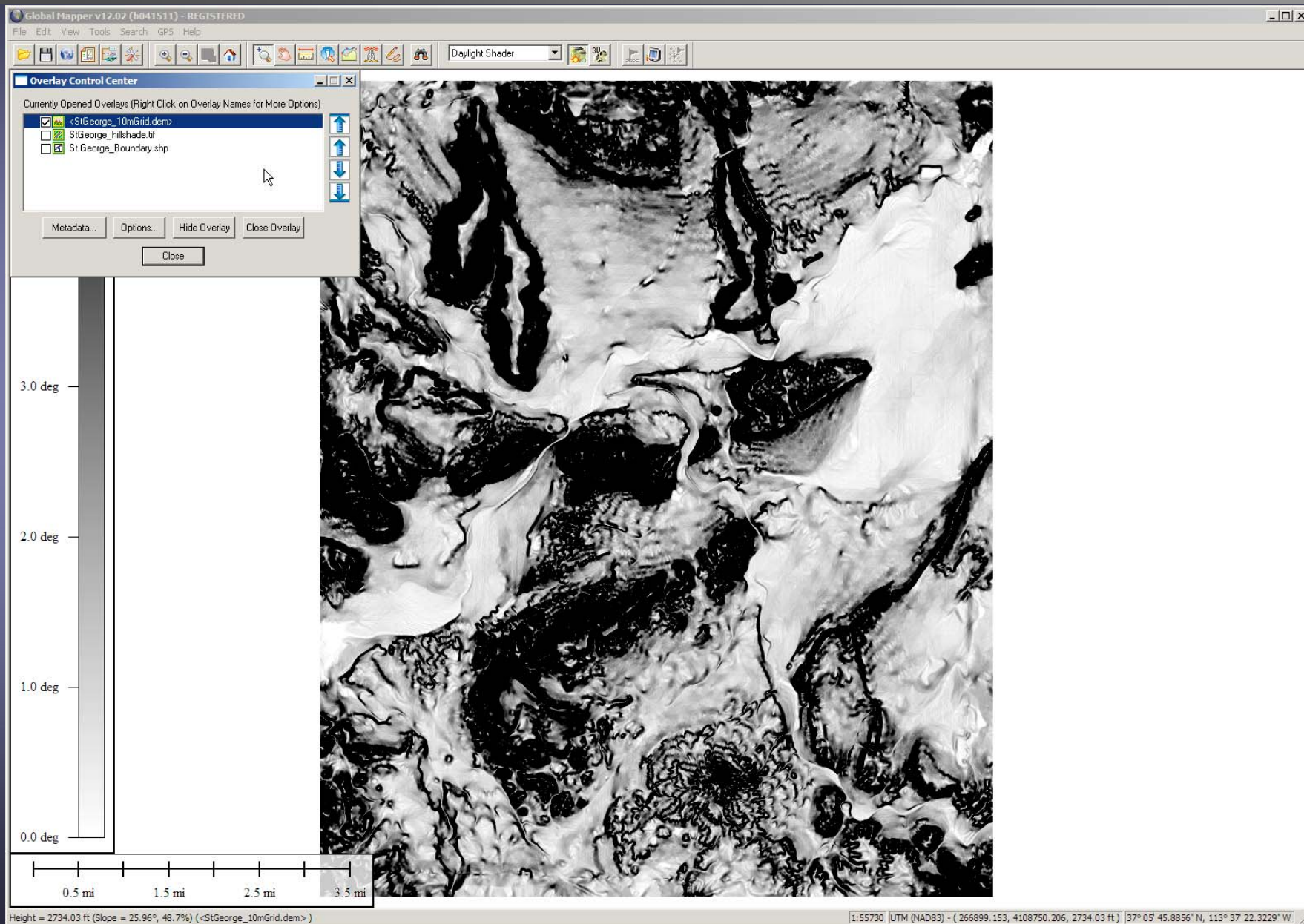
Define Custom Colors >>

OK Cancel

0.5 mi 1.5 mi 2.5 mi 3.5 mi

1:55730 UTM (NAD83) - (273358.036, 4106508.767, 2647.999 Ft) 37° 04' 38.9251\"

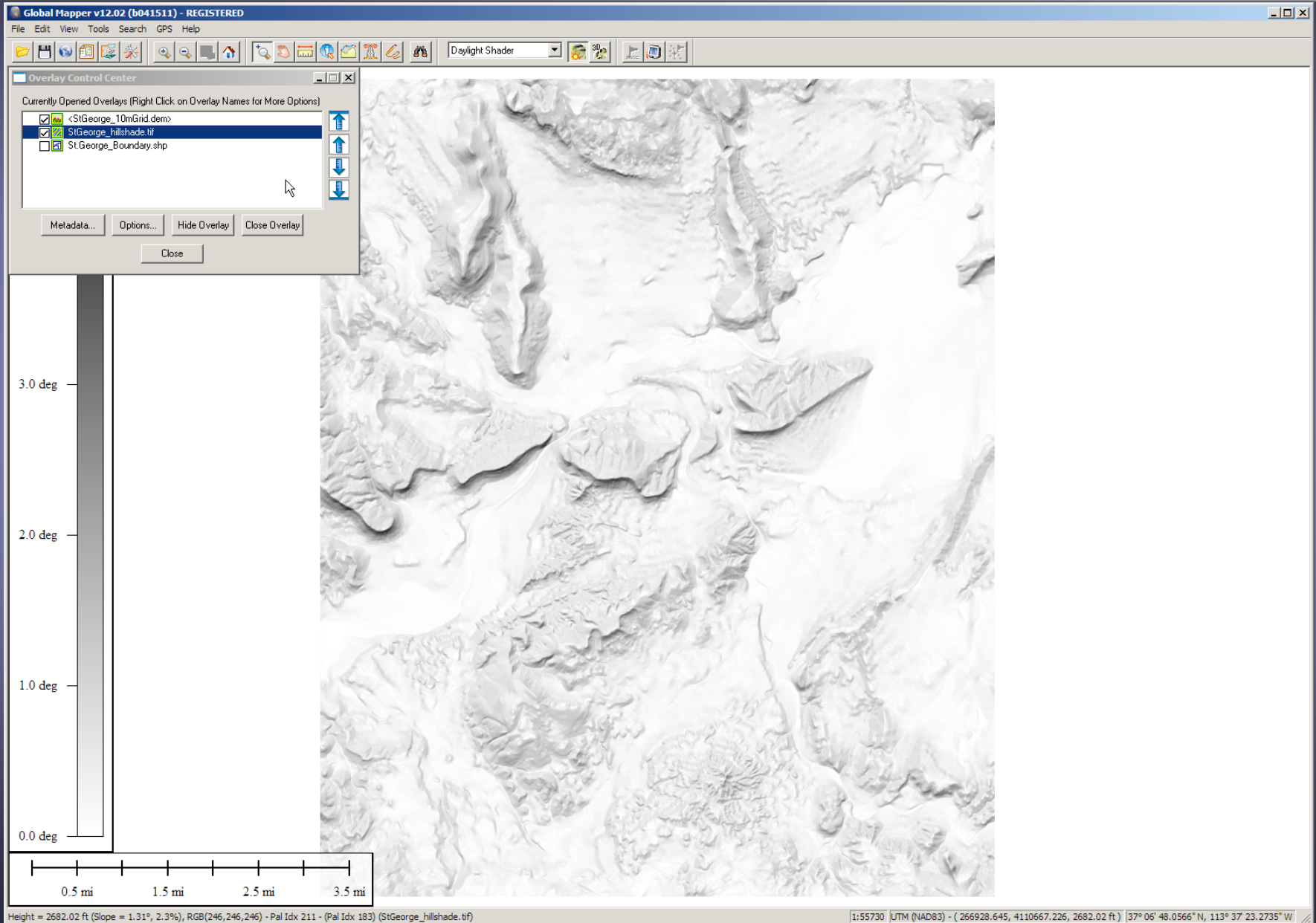
Slope-Enhanced Shaded Relief



Slope-Enhanced Shaded Relief

The screenshot displays the Global Mapper v12.02 interface. The main window shows a grayscale shaded relief map of a terrain. On the left, there is a vertical scale bar labeled from 0.0 deg to 3.0 deg. Below the scale bar is a horizontal scale bar labeled from 0.5 mi to 3.5 mi. The top menu bar includes File, Edit, View, Tools, Search, GPS, and Help. The toolbar contains various icons for map navigation and processing. The 'Daylight Shader' dropdown is visible in the toolbar. The 'Overlay Control Center' window is open, showing a list of currently opened overlays: <StGeorge_10mGrid dem>, StGeorge_hillshade.tif (selected), and St George_Boundary.shp. Below the list are buttons for Metadata..., Options..., Hide Overlay, Close Overlay, and a Close button. The 'Raster Options' dialog box is open, showing settings for Palette, Feathering, Color Grade, Projection, Display, Color/Contrast Adjustment, and Cropping. The 'Color Intensity (0)' slider is set to 'Default'. The 'Translucency (Can You See Through It?) (100.0%)' slider is set to 'Opaque'. The 'Blend Mode' dropdown is set to 'No Blend', and the 'Resampling' dropdown is set to 'Multiple'. The 'Texture Map' checkbox is unchecked. The 'OK', 'Cancel', 'Apply', and 'Help' buttons are at the bottom of the dialog. The status bar at the bottom shows the coordinates: 1:55730 UTM (NAD83) - (266029.120, 4108573.250) [37° 05' 39.3684" N, 113° 37' 57.3332" W].

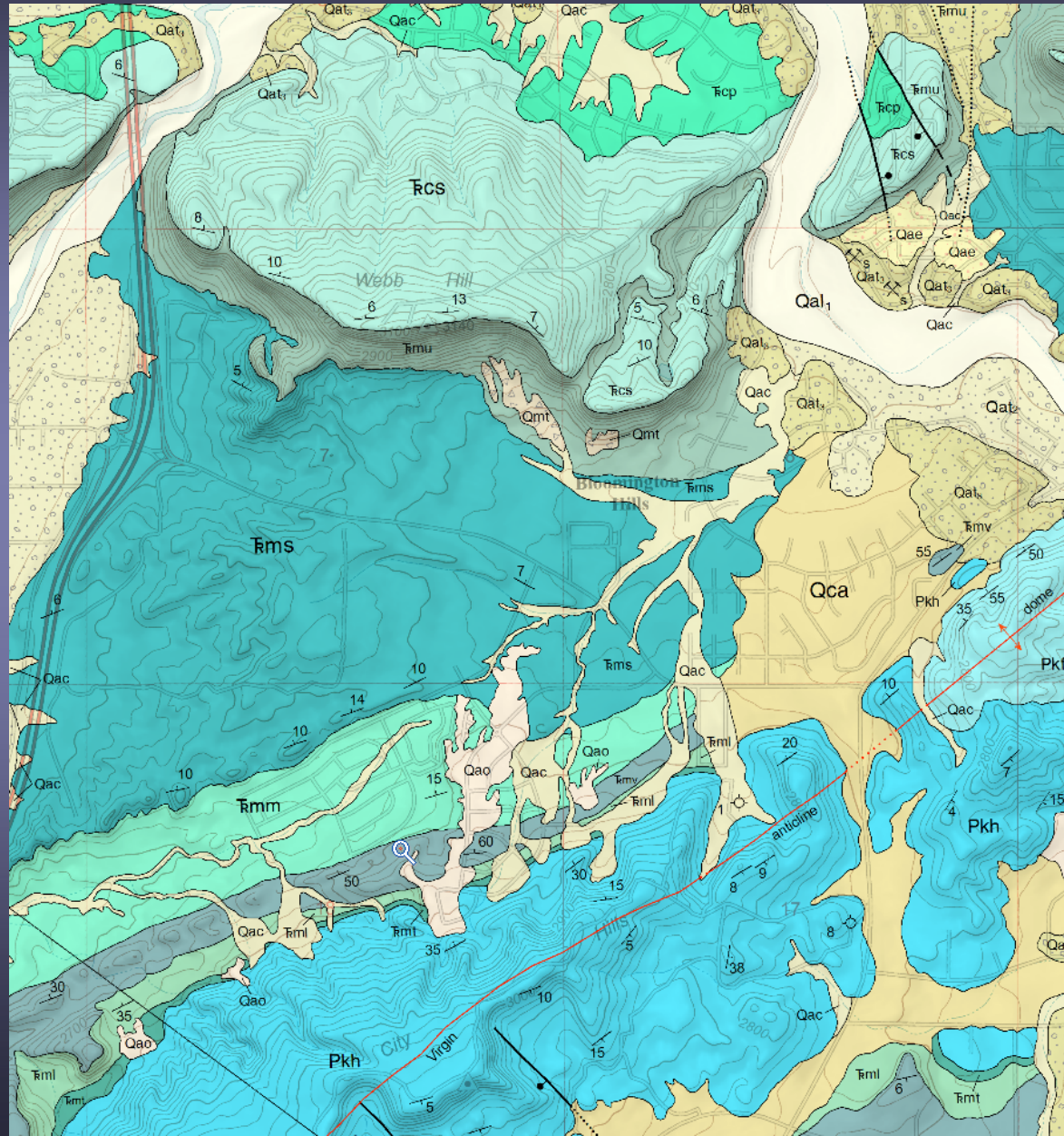
Slope-Enhanced Shaded Relief



Slope-Enhanced Shaded Relief



Slope-Enhanced Shaded Relief



Slope-Enhanced Shaded Relief

Benefits of Slope-Enhanced Shaded Relief

- Much better definition of “3-D” terrain



Slope-Enhanced Shaded Relief

Benefits of Slope-Enhanced Shaded Relief

- Much better definition of “3-D” terrain
- Clears out the gray from low-angle slopes so quaternary map unit colors are not “muddied” by shading



Digital Mapping Techniques '11



Association of
American State Geologists

United States
Geological Survey

Questions...comments?

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