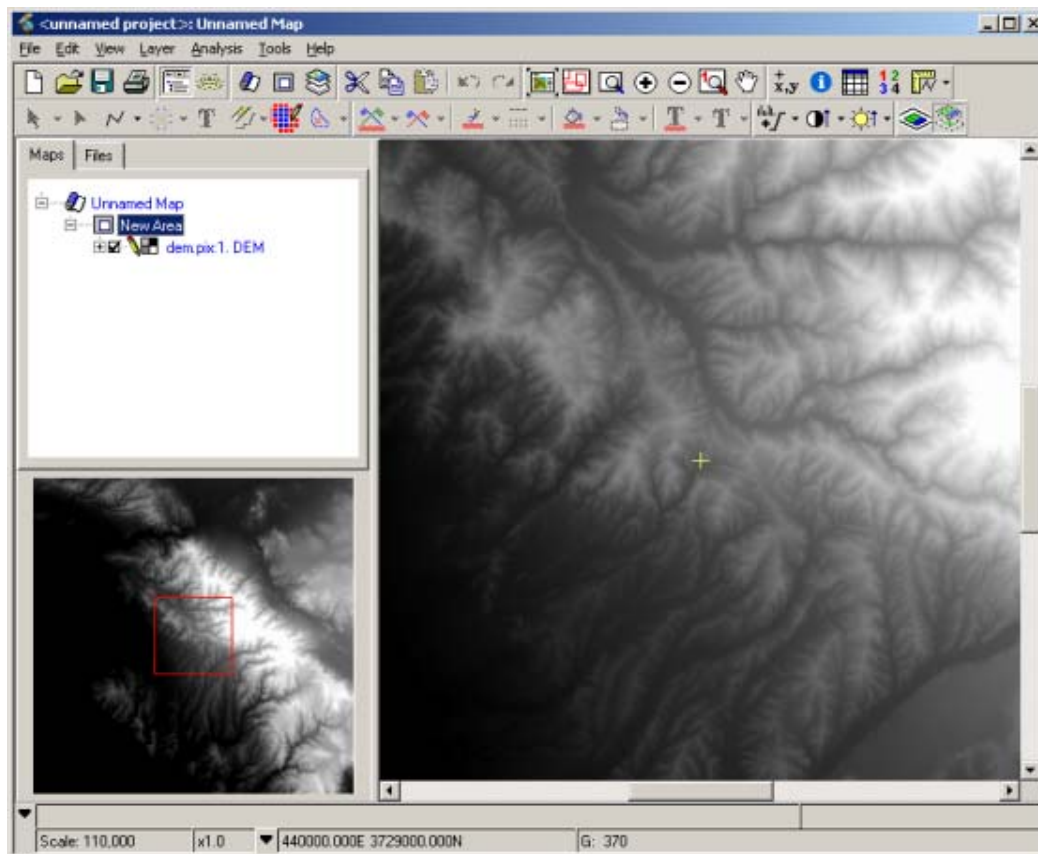


TUTORIAL

Shaded relief models indicate terrain displacements using a shadow effect from evaluating the aspect and slope relative to the sun's azimuth angle and altitude achieved with varying grey scale tones resulting in the darkening of one side of terrain features, such as hills and ridges (the darker the shading, the steeper the slope). The shadow direction is affected by the sun's azimuth setting and shadow length is affected by the altitude component. The models provide subtle shadings which we naturally perceive as depth, helping to make the image look three dimensional. A drawback with this type of model is that depending on the placement of the illumination source, the eye and brain often see different things. Adding color to the shaded relief images helps to portray elevation using both a color ramp and the shading effect. Color shaded relief models are usually graded from cooler (darker) colors representing lower elevations to warmer (brighter) colors depicting greater elevations.

You will notice when loading shaded relief models with a pseudo color table (PCT) that it will be given a general default color ramp that most often does not represent your DEM very well (especially along coastal areas). To obtain best results it is recommended that you manually edit your PCT.



Step1 (Scale DEM):

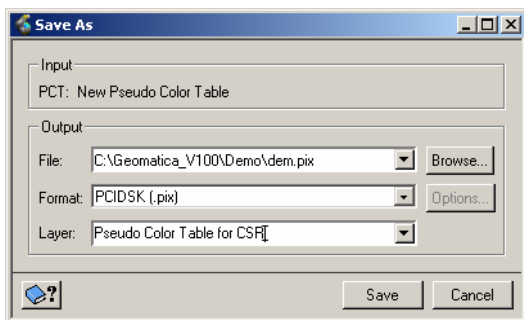
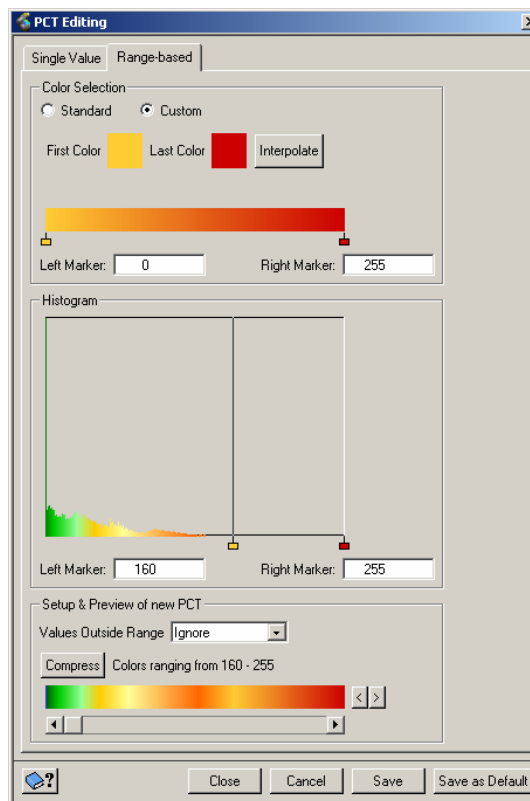
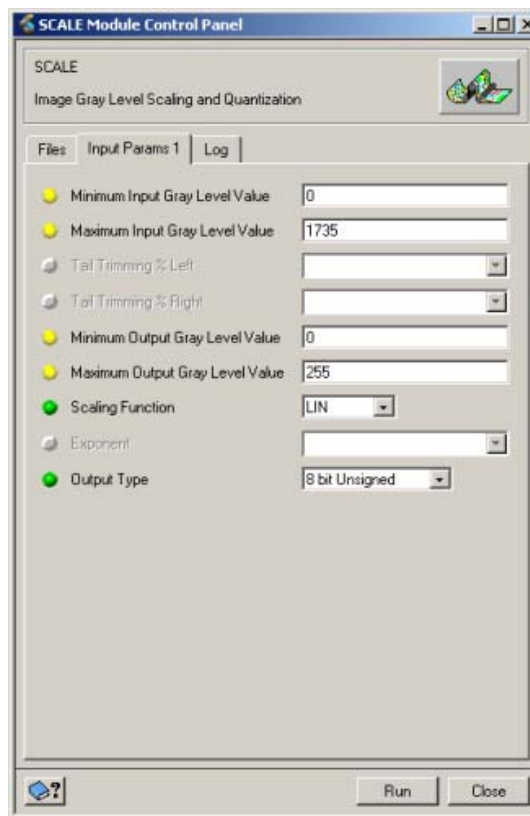
- Load DEM into Focus
- Determine the minimum and maximum DN value using a histogram and raster statistics
- Open the Scale command from the Algorithm librarian
- Scale the DEM down to an 8 bit output DEM to edit your PCT layer with

Step2 (Load DEM):

- Load the scaled DEM as a pseudo colored layer into the Focus viewer with the Add Layer Wizard in Focus
- Right click on your scaled DEM file name in the Maps tree, and select **Edit PCT** to open the PCT editing window.

Step3 (Edit the PCT):

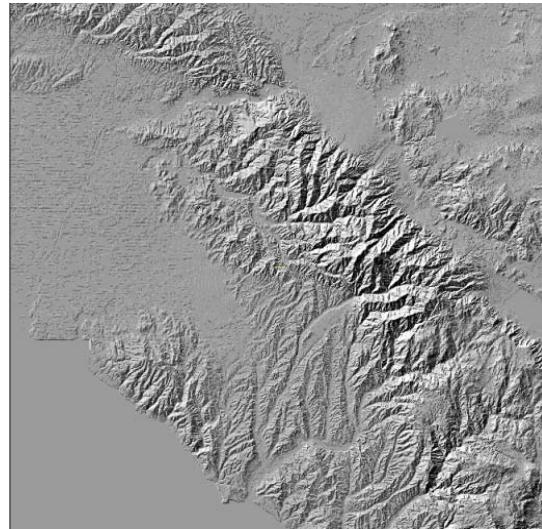
- Select the **Gray Ramp** button to change the colors back to a gray scale range between 0 and 255, switch to the **Range Based** tab and then click the **Custom** radio button.
- Set the first color (e.g. black) and the last color (e.g. blue), then press **Interpolate**.
- In the **Histogram** window set the values for the left and right markers that you want to map this color range to and press the **Map** button (the first time you do this, you will want to have the **Values Outside Range** set to black, but every other time you repeat this, you will want this option set to ignore).
- Repeat the above steps until all values in your image from 0 to 255 have been mapped using colors blues, greens, yellows, oranges and then reds (with blue and green representing low elevations and orange and reds representing high elevations)
- When you are finished **Save the PCT** as a segment of your DEM file.



Step4 (Shaded Relief):

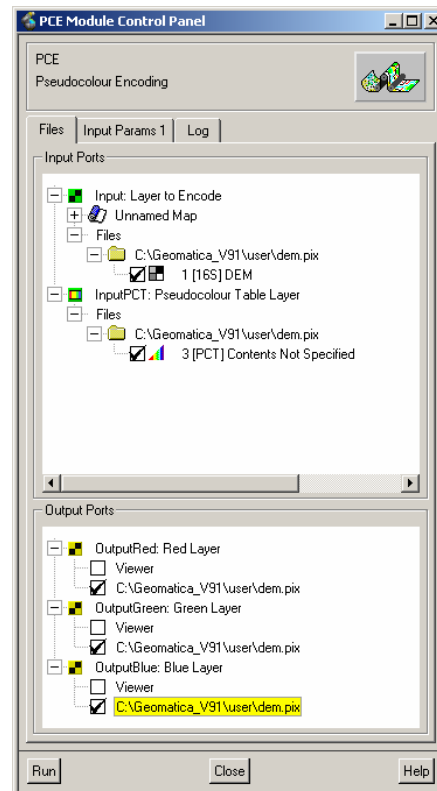
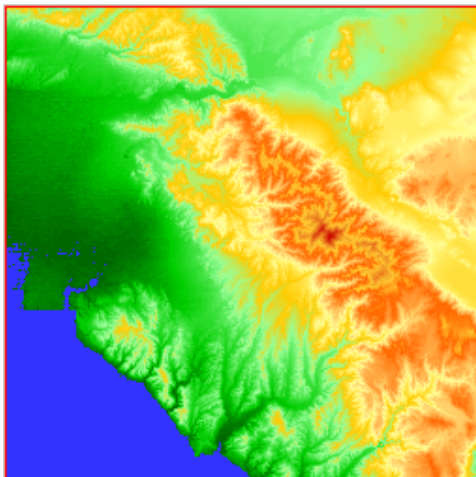
When you generate the shaded relief be sure to use the original DEM data and not the scaled DEM (Optional, If your area has relative low relief you may want to exaggerate the relief, to emphasis topographic features in your DEM)

- Open **REL** from the Algorithm Librarian
- Right click on the **Output File**, select **Browse** and then select your input DEM file as the output file source (this will add the result of the REL module as a new channel of your existing pix file)
- Switch over to the Input Params 1 tab and specify the light source (Azimuth and elevation angles), and an elevation step size factor if you wish to exaggerate the relief
- Run the **REL** module



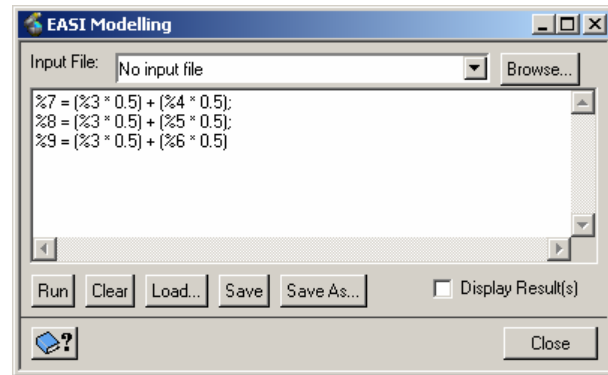
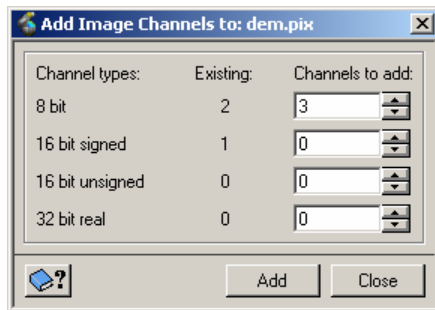
Step5 (Generate RGB image):

- Open **PCE** from the Algorithm Librarian
- Select the **PCT** segment that you edited and your scaled **DEM** to encode a RGB colored file
- Right click on the **Output File**, select **Browse** and then select your input DEM file as the output file source (this will add the result of the REL module as a new channel of your pix file)
- Run the **PCE** module



Step6 (Model the layers):

- Add three 8 bit channels to your file



- Open the **EASI Modeling** Modeler window
- Add the following EASI code

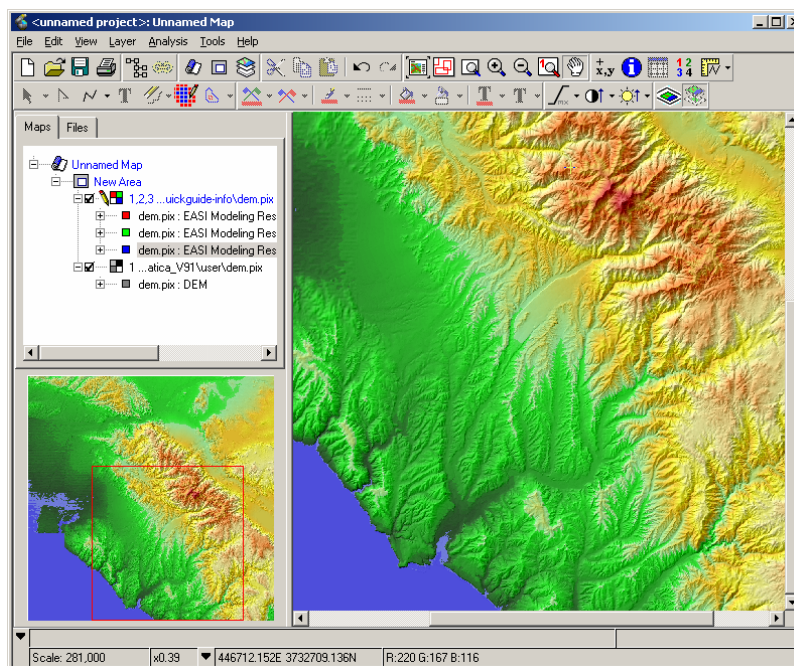
```
%7 = (%3 * 0.5) + (%4 * 0.5);
%8 = (%3 * 0.5) + (%5 * 0.5);
%9 = (%3 * 0.5) + (%6 * 0.5)
```

- Run the Modeling Script

Note: These channel numbers may not correspond with yours. To find out which channel numbers you should use, switch over to the files tab as each channel and segment number will be displayed along with the layer in the file tree. In this example %3 is the REL result, %4, %5, and %6 are the PCE result.

Results

Load your new CSR image into Focus to examine your results (Optional, you may want to export the resultant CSR channels from your working DEM pix file into a separate image when you are finished).



Modeler alternative method

You can also achieve the above task using Geomatica Modeler by using the model displayed below (downloadable on our script exchange page). In the model the ARI & ARICONST modules replace the EASI modeling step and the model will not edit the PCT layer for you; it is assuming that you have already done that step or that a PCT already exists. An advantage of using this method is that Modeler will allow you to batch process multiple Color Shaded Relief models if you have several that need to be generated and it should save time if you have everything set up properly.

