

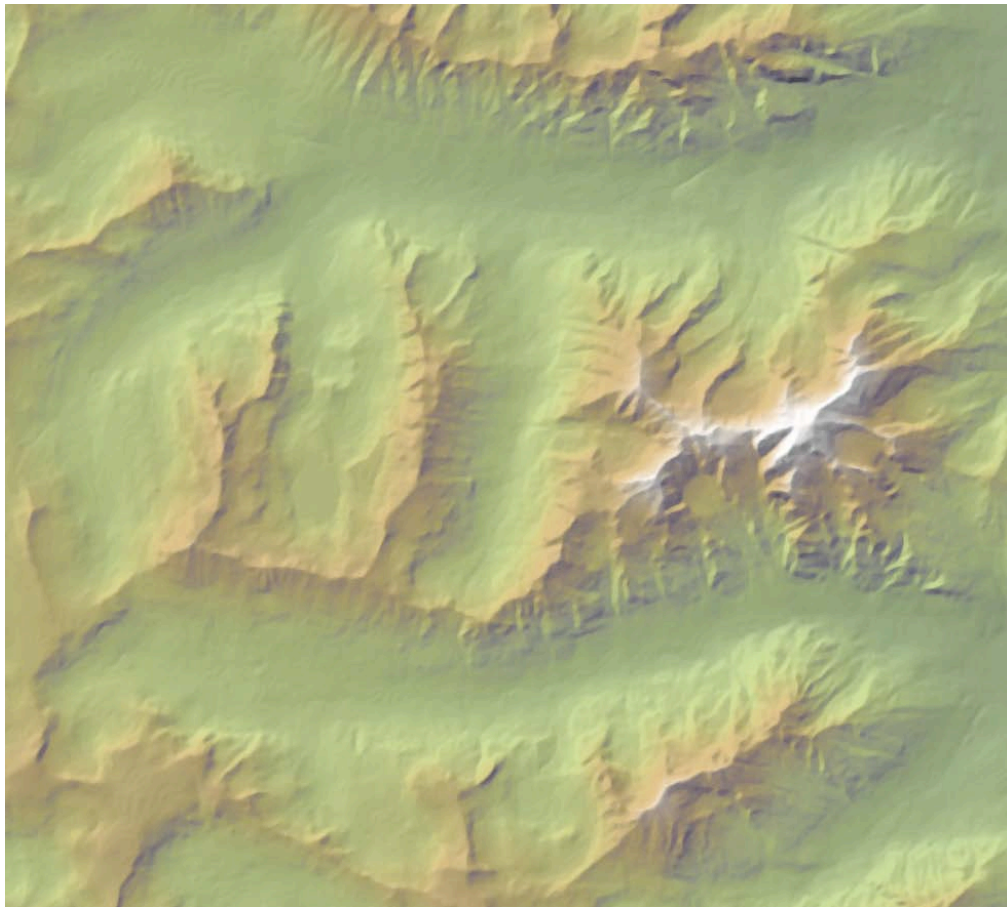
Photoshop 6 tutorial: How to Create Basic Colored Shaded Relief

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INTRODUCTION

Adobe Photoshop is the graphic arts industry standard software for raster image manipulation. Cartographers can also use Photoshop to create effective colored shaded relief for maps.



Terrain image of
Mount Moran Quadrangle, Wyoming

One important advantage in using Photoshop to create shaded relief is that of familiarity. Most cartographers and graphic artists have Photoshop on their desktop and are skilled in using it for working with images. It is an extremely powerful image-editing tool and a skilled cartographer can make many enhancements to a shaded relief map image once it is rendered.

What you will need

- Adobe Photoshop 6 or 7 running in MacOS or Windows
- Digital elevation file converted to a “grayscale to height image” (for the sample image used in this tutorial, go to http://www.equatorgraphics.com/nacis/mt_moran_g2h.tif)

Grayscale to Height preparation (optional)

To create relief in Photoshop you need first to get a grayscale to height image into the program. I will not go into details for this tutorial, I will simply use a grayscale image created using MacDEM, a remarkably powerful yet simple application that is a vital part of many a cartographer’s toolbox (available at <http://www.treeswallow.com/macdem/>).

There are numerous other ways to bring in digital elevation data including opening some data files directly into Photoshop in RAW format. See Tom Patterson’s excellent tutorials on working with GTOPO 30 data for an example: <http://www.nacis.org/cp/cp28/gtopo.html>.

ELEVATION-COLORED SHADED RELIEF

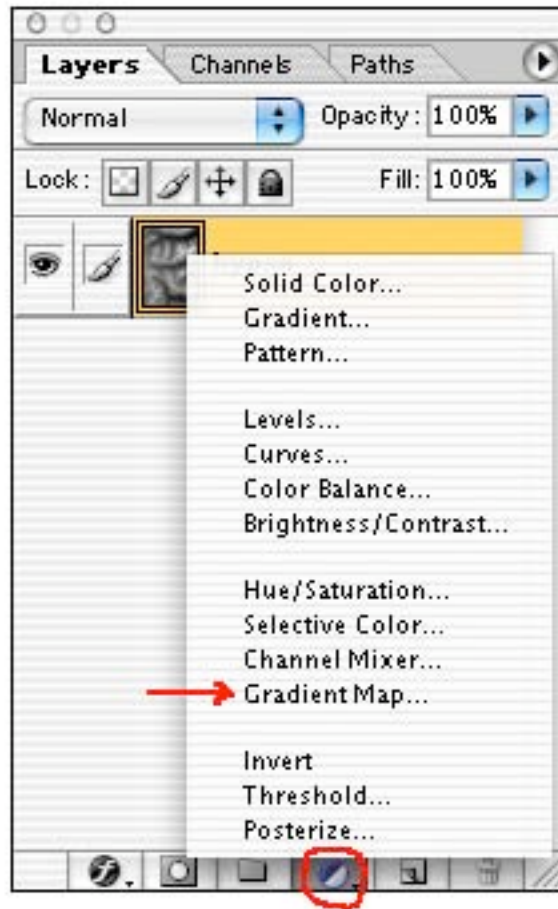
Coloring physical terrain by elevation is known as hypsometric tinting. This is an effective way to portray terrain when combined with shaded relief. The primary part of this tutorial is a guide to combining these two techniques in Photoshop to render a dramatic mountain image.

Create hypsometric tinting

To begin your session,

1. Open the sample grayscale to height image in Adobe Photoshop
2. Name your base layer “hypso” by double clicking in the layers palette on the one layer you currently have and then typing in the name

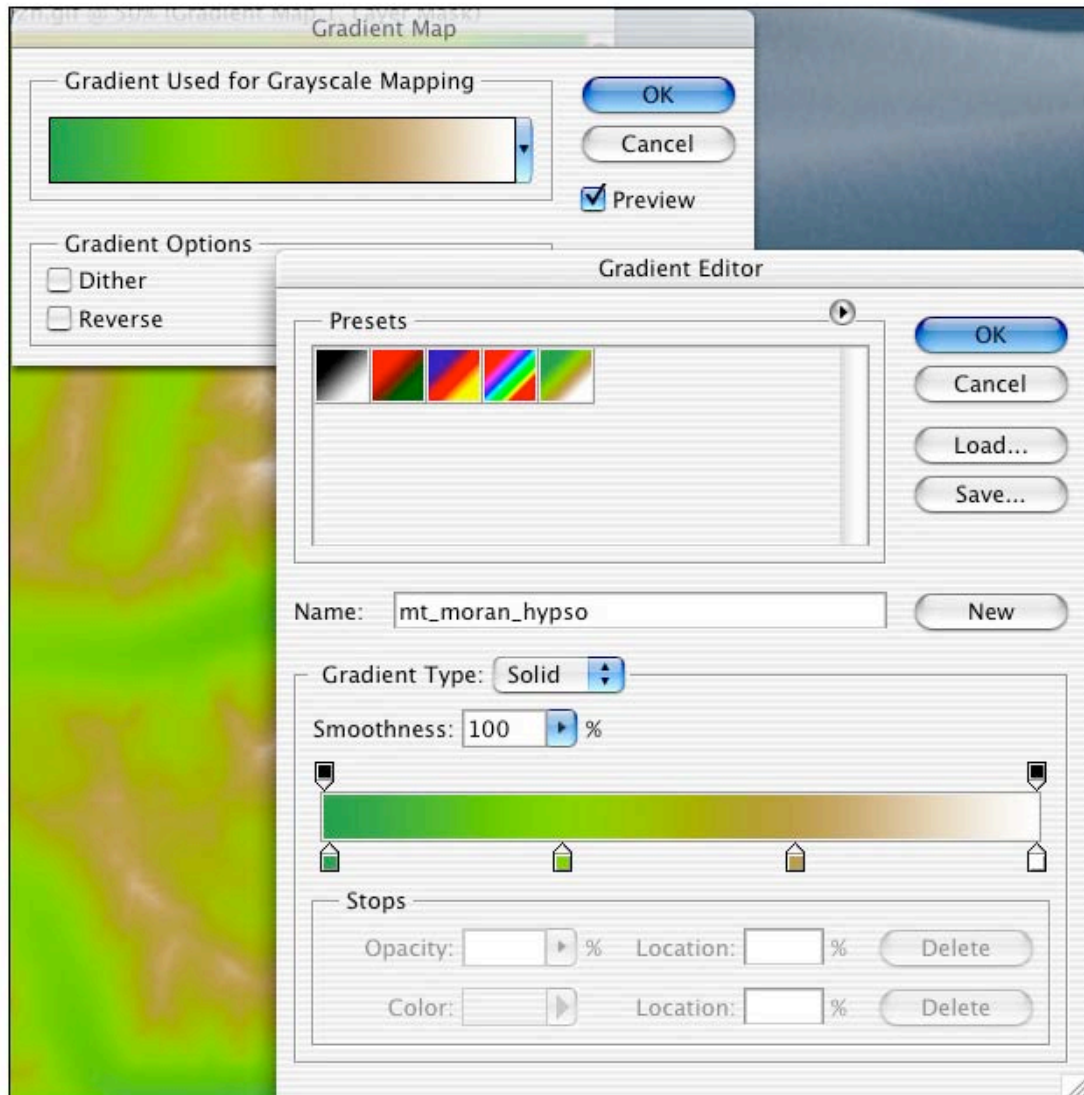
3. Add a “gradient map” adjustment layer to this layer by clicking on the icon in the layers palette for adding such a layer



4. Click once in the colored area of the gradient map to open the gradient editor and start playing with the colors in the gradient. You can click on the presets to start with and then click on any of the color “stops” along the gradient to change color. You can slide the stops and the center point between stops to adjust many aspects of the gradient map. As you work you can watch your grayscale image change as Photoshop maps the different color schemes to it (be sure “preview” is checked).

To use the presets pictured below you can load the “mt_moran.grd” settings here. (The file containing the settings is at: http://www.equatorgraphics.com/nacis/mt_moran.grd).

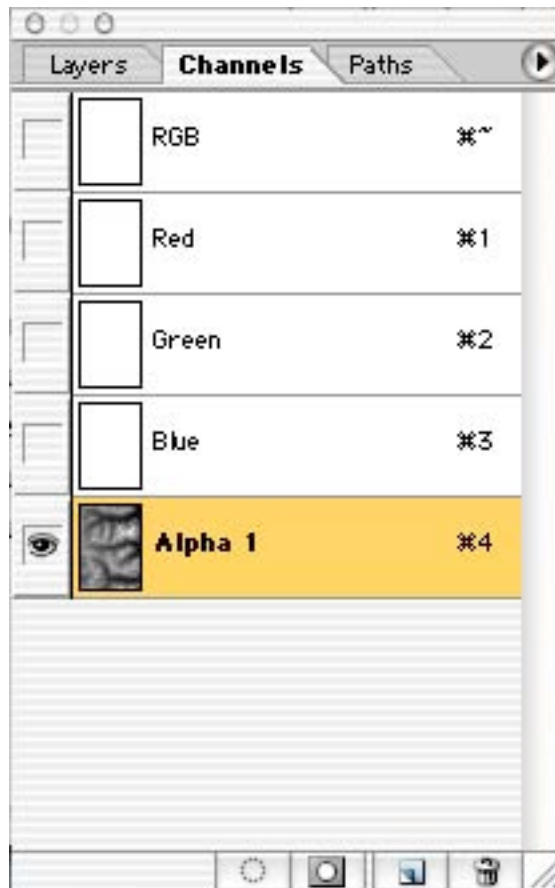
Once you have chosen a color gradient you like click OK for the dialog boxes.



Create Shaded relief

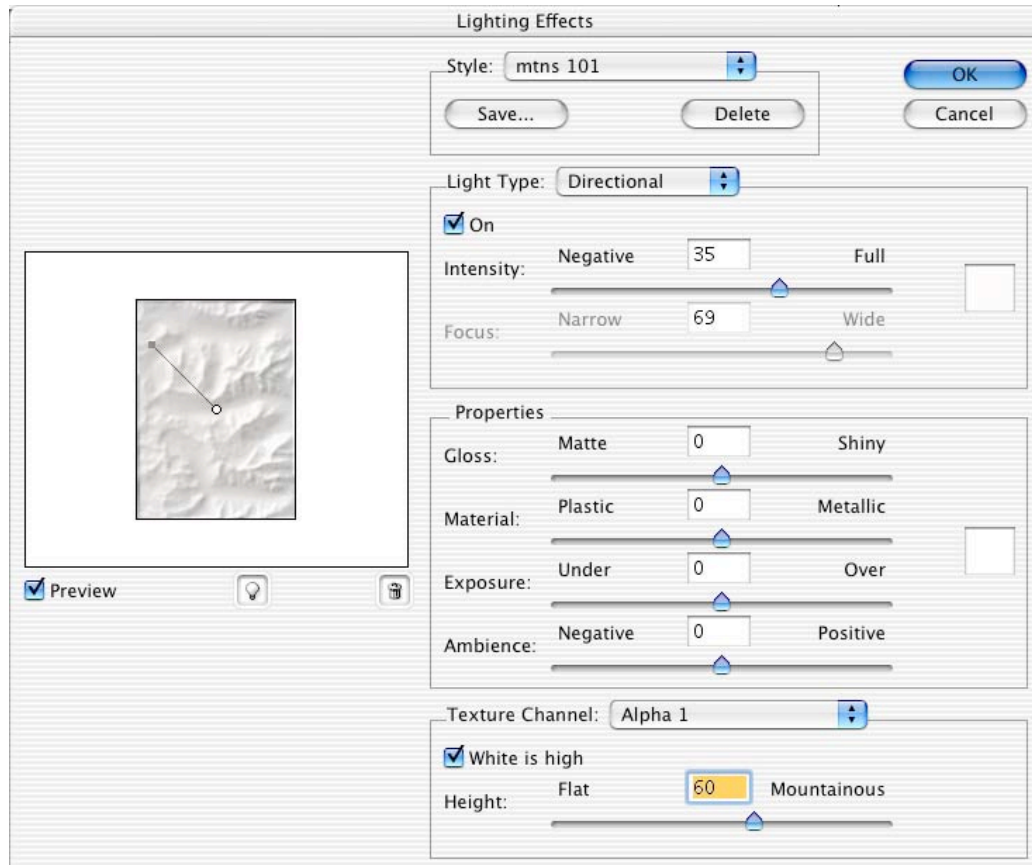
Now your file should have a layer for the grayscale to height image and an adjustment layer adding a color gradient. The next step is to create shaded relief from the grayscale to height image and blend it into the colored elevation.

5. Make a new layer (under the Layer menu) above the hypso and gradient map adjustment layers, name it "relief" and fill with white
6. Copy entire grayscale to height image into the clipboard by clicking on the "hypso" layer, selecting all, and copying
7. Move to the "channels" palette and create a new alpha channel and paste the grayscale to height info into the channel



8. Return to viewing your image (click on the RGB layer in the channels palette), click on the "relief" layer in the layers palette and go to Filters/Render/Lighting Effects... menu item

9. In the dialog box make the following settings. Experiment to find better setting if you'd like, these work for me (you must have the Alpha 1 channel as your texture channel). The trickiest setting is the tether line in the preview image, it must be pulled about 2/3 to 3/4 of the way to the northwest of the image to get a traditional looking shaded relief.

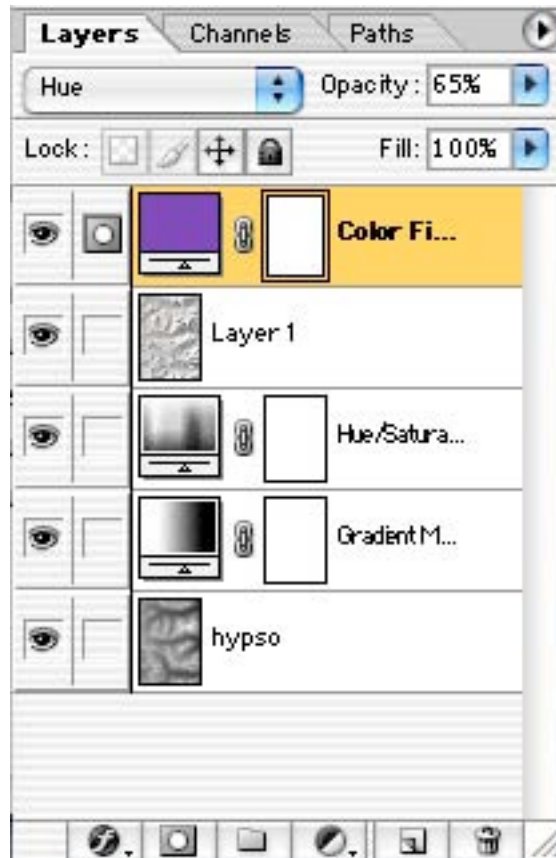


10. Use Photoshop filters to enhance relief because it will look a bit stair-stepped and rough when you first render it. Try these filters:
- Blur/Guassian filter, set to 1.0
 - Noise/Median Blur filter (the magic relief generalizer), set to 2
 - Sharpen/Unsharp Mask filter, set to 75%, 1.0, 0
11. Combine relief with hypsometric tinting and tweak
- Multiply relief layer at 50–70% opacity
 - Adjust colors in gradient if necessary
 - Add Hue/Saturation... adjustment layer to boost saturation and make other colors tweaks, the adjustment layer is great because it can be undone and modified easily

Add Colored Highlights and Shadows

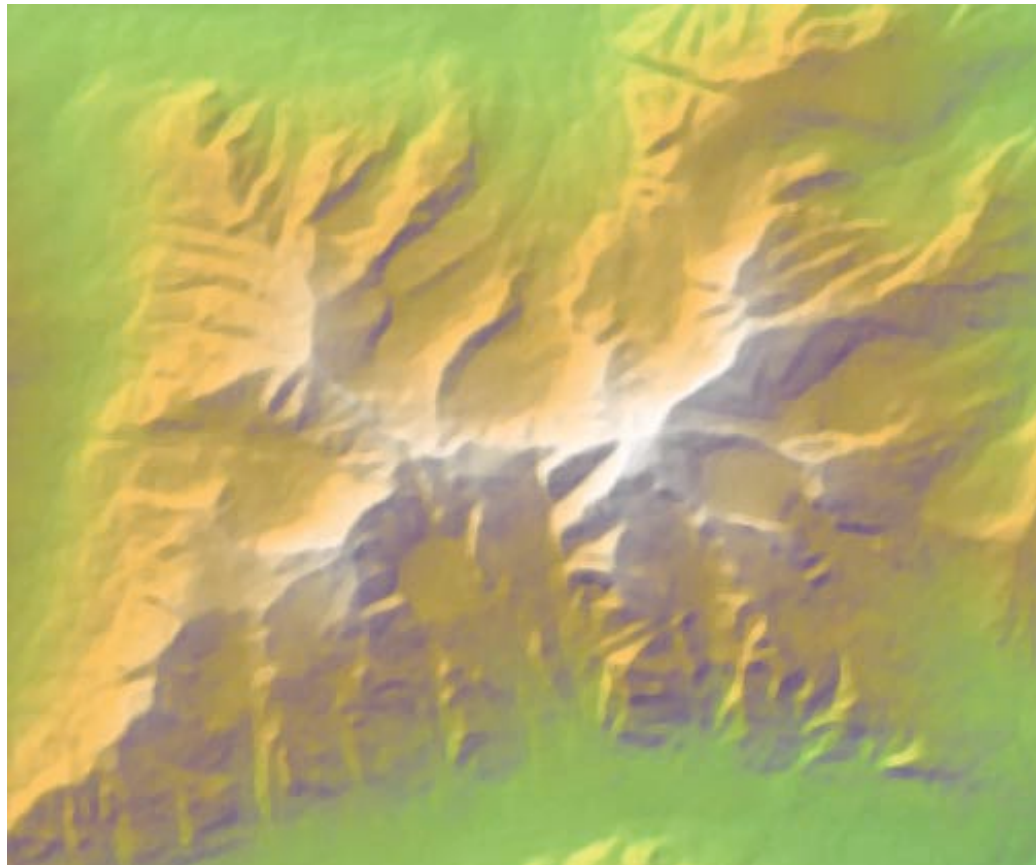
To further enhance your mountain relief image you can add color tinting only to the shadows (e.g. purple) and other color tinting only to the highlights (e.g. red alpenglow).

12. Add Colored shadows
 - a. Add Solid Color... (called Color Fill after created) adjustment layer above other layers
 - b. Choose color RGB = 110/92/175, click okay
 - c. Set layer blending to hue, set layer opacity to 65%



- d. The Color Fill adjustment layer has a mask area built in, you will want to fill this with the inverse of the relief so that the purple will only color the dark areas of the relief
 - i. Click on relief layer, select all copy
 - ii. Option (or Alt) click on the mask for the Color Fill adjustment layer (this selects that mask)
 - iii. Paste
 - iv. Invert
- e. Adjust levels for the mask to further emphasize the purples in the shadows, input levels to 100/1.00/190

13. Add colored highlights
 - a. Add another Solid Color... adjustment layer
 - b. Choose color RGB = 201/69/23
 - c. Set layer blending to screen, set layer opacity to 75%
 - d. Copy relief into mask for the red Color Fill adjustment layer (as above) but do not invert
 - e. Adjust levels for the mask to input levels at 135/0.50/240
14. As you are working, be sure that you know which layer and mask are active when tweaking adjustment layers, colors, etc. Photoshop is a mighty engine if you know how to control it. Turn layers on and off to check your results and keep tweaking. You can download my complete Photoshop file at http://www.equatorgraphics.com/nacis/moran_psd.zip (warning, this is a 8mb file). Here's a piece of my image:



CONCLUSION

This is only a basic starter course in using Adobe Photoshop for creating and especially enhancing shaded relief. To be truthful, I don't usually render the lighting of the shaded relief in Photoshop, I use MacDEM or Bryce or Natural Scene Designer which all can use the full 16bit grayscale information and can open DEM formats more easily than Photoshop.

Additional tricks to play with are adjusting relief and coloring to elevations (use masks based on the grayscale to height image) and combination masks using both elevation and relief (slope aspect). Yet another tactic is to play with adjusting relief and coloring by the steepness of the slope. See new article at NACIS Shaded Relief Home Page (<http://www.nacis.org/cp/cp28/resources.html>) by Tom Patterson and Mike Hermann for more on using slope.

Without breaking out of flatland, all these techniques for using hue, saturation, and value can create a terrain image based in the hard data of the DEM but evincing the beauty of the mountain world.