

## Sometimes You Need to Turn the World Upside-Down

As a frequent user of lidar- and IfSAR-derived digital elevation models (DEMs), on multiple GIS software platforms, I have come to standardize the “look and feel” of the rendering of these datasets on each platform. Because I am usually looking at DEMs to help me understand terrain characteristics and where to find water, I typically make lower elevations blue and higher elevations browns and/or reds. While each GIS platform offers several pre-designed color ramps, often none are quite to my liking. So, here are a few tips and tricks that I use to “standardize” between platforms.

My workflow includes, using the DEM to make a hillshaded-surface, usually with a 5X exaggeration, then making the DEM transparent, usually between 35 – 45 %, and finally choosing a color ramp and invert it to make the blue colors represent the lower elevations. Here’s how:

### IN QGIS DESKTOP

After you load a DEM into the Layers, in the Processing Toolbox open the “Raster terrain analysis” tools and double-click on “Hillshade” to open the dialog as below. You can customize the Azimuth and Vertical angle, but I use the defaults here, and only modify the Z factor (set it to 5) to produce a 5X vertical exaggeration.

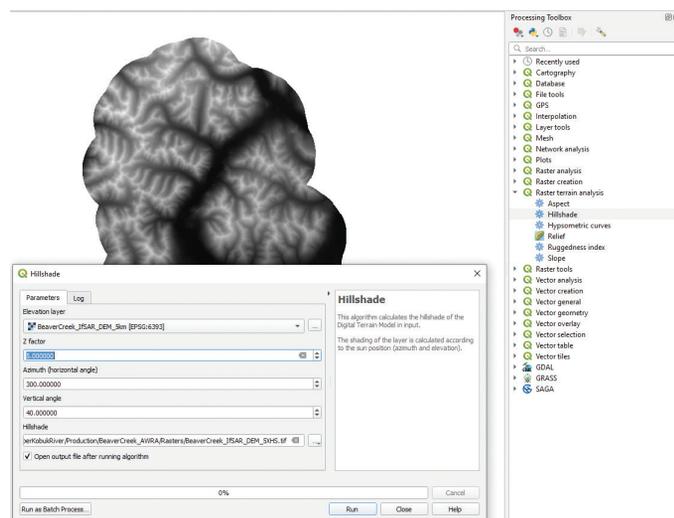


Figure 1. QGIS dialog for constructing a Hillshaded Surface raster.

When complete, move the hillshaded-surface below the DEM in the Layers.

Next, double-click on the DEM in the Layers window to start the Layer Properties dialog box and use the Transparency tab to set the “Global Opacity” to 35%. You can do this by either moving the slider, clicking the up/down arrows, or typing 35 into the window.

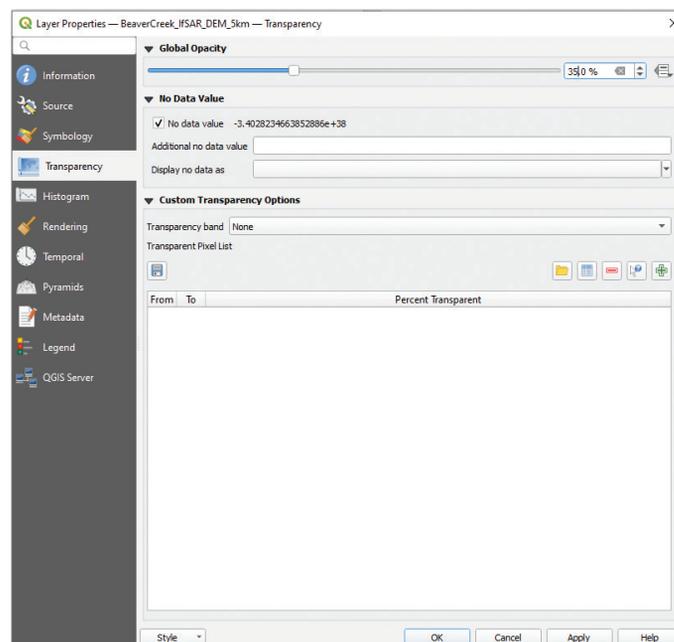


Figure 2. Use the Transparency Tab on the Layer Properties to set the Global Opacity.

Finally, before your hit <Apply> and <OK> of the bottom of the Layer Properties, use the Symbology tab to set the Render type to “Singleband pseudocolor”, select the color ramp, “Spectral” from the dropdown choices, (and here comes the trick)... right-click on the Color rap and choose “Invert Color Ramp”. At this point, you can change the Mode to “Equal Interval” and specify 10 (or some number of) Classes (I generally choose 10 Classes):

Photogrammetric Engineering & Remote Sensing  
Vol. 88, No. 2, February 2022, pp. 83-85.  
0099-1112/22/83-85

© 2022 American Society for Photogrammetry  
and Remote Sensing  
doi: 10.14358/PERS.88.2.83

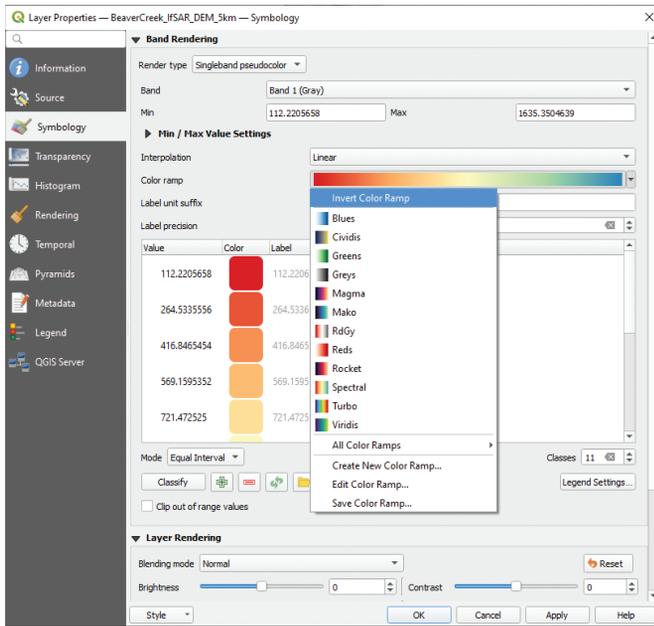


Figure 3. Band Rendering settings on the Layer Properties dialog box.

Finish by pressing <Apply> and <OK> to get the final Band Rendering.

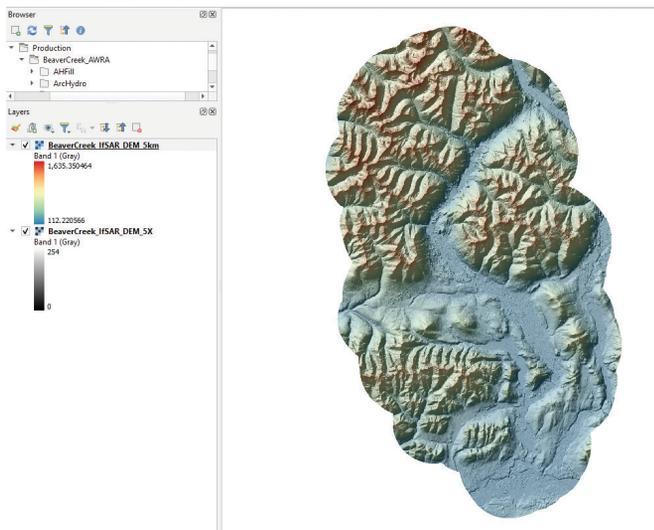


Figure 4. DEM with hillshaded-rendering in QGIS.

## FOR ARCGIS DESKTOP

After you load the DEM into the Table of Contents, open ArcToolbox and use the Spatial Analyst Tools | Surface | Hillshade tool to construct the Hillshaded surface. In this dialog, use the Z factor (optional) parameter to specify the 5X exaggeration as seen in Figure 5.

Again, move the hillshaded-surface below the DEM in the Table of Contents, and double-click on the DEM layer to open the Layer Properties dialog. On the Display Tab, enter 45 (%) for the Transparency and on the Symbology Tab, choose the Red to Blue color ramp (and here comes the trick again...), check the Invert Box as in Figure 6.

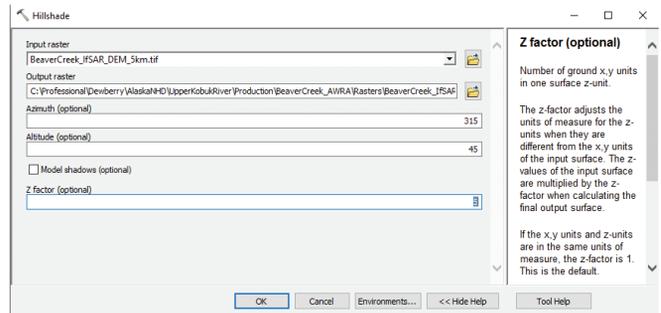


Figure 5. ArcGIS Desktop Spatial Analyst | Hillshade dialog box showing 5X vertical exaggeration.

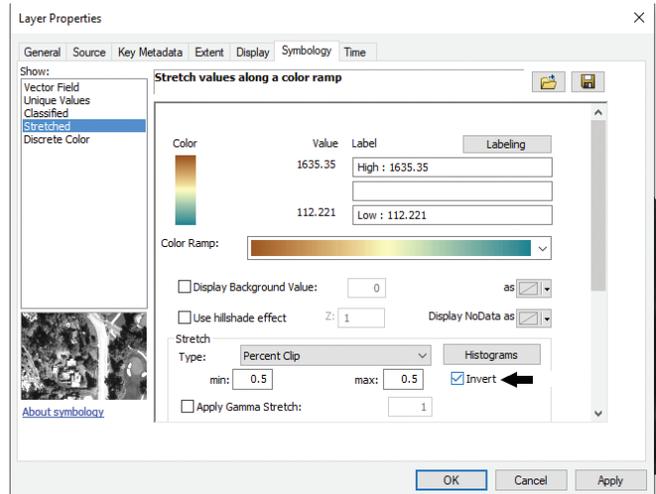


Figure 6. The Layer Properties | Symbology Tab showing the Invert (color ramp) check box.

Pressing <Apply> and <OK> produces the same visualization as in QGIS.

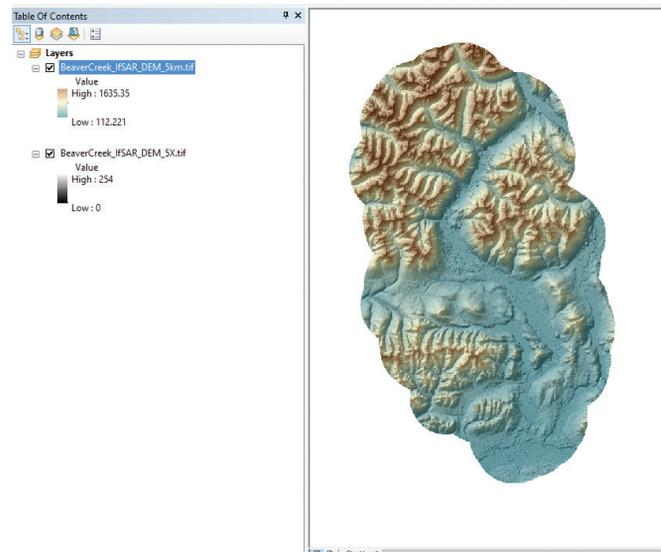


Figure 7. DEM with hillshaded-rendering in ArcGIS Desktop.

## FOR ARCGIS PRO

A nearly identical workflow can be used in ArcGIS Pro using the Spatial Analyst Toolbox to construct the 5X exaggerated hillshade-surface. As before, move the hillshaded-surface to under the DEM in the Contents. Click on the DEM surface and use the Raster Layer | Appearance and choose the “Symbology” tab to start the Symbology dialog. In the Symbology Dialog, select the Red to blue color scheme, and check the Invert box. This will result in the same hillshaded-rendering as in ArcGIS Desktop and QGIS.

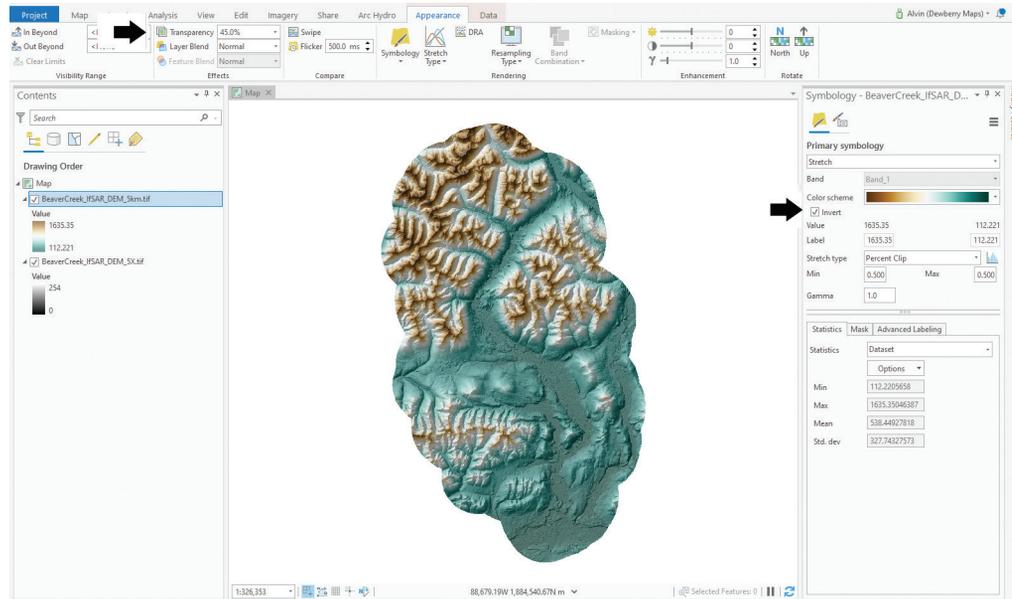


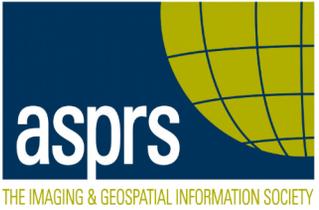
Figure 8. DEM with hillshaded-rendering in ArcGIS Pro.

And that’s all there is to inverting the color ramp in these GIS packages.

Send your questions, comments, and tips to [GISTT@ASPRS.org](mailto:GISTT@ASPRS.org).

*Al Karlin, Ph.D., CMS-L, GISP is with Dewberry’s Geospatial and Technology Services group in Tampa, FL. As a senior geospatial scientist, Al works with all aspects of Lidar, remote sensing, photogrammetry, and GIS-related projects.*

# HTTP://DPAC.ASPRS.ORG



**“The ASPRS Aerial Data Catalog is a tool allowing owners of aerial photography to list details and contact information about individual collections. By providing this free and open metadata catalog with no commercial interests, the Data Preservation and Archiving Committee (DPAC) aims to provide a definitive metadata resource for all users in the geospatial community to locate previously unknown imagery.”**

## ASPRS AERIAL DATA CATALOG

**“THE SOURCE FOR FINDING AERIAL COLLECTIONS”**

- 1 USE** Use the catalog to browse over 5,000 entries from all 50 states and many countries. Millions of frames from as early as 1924!
- 2 SUPPLY** Caretakers of collections with, or without metadata, should contact DPAC to add their datasets to the catalog for free!
- 3 TELL** Spread the word about the catalog! New users and data collections are key to making this a useful tool for the community!

**For More Details Contact:**

David Ruiz <a href="mailto:druiz@quantumspatial.com">druiz@quantumspatial.com</a> 510-834-2001	David Day <a href="mailto:dday@kasurveys.com">dday@kasurveys.com</a> 215-677-3119
--	---