Working with Elevation Data in QGIS

By Kristen Jordan-Koenig, GIS Specialist, Kansas Data Access and Support Center, kristen@kgs.ku.edu

QGIS provides users with an open source platform for various types of spatial and raster analysis. One particularly useful set of tools focuses on working with elevation rasters.

DASC has a large collection of imagery available for download to use as practice data:
www.kansasgis.org

The following tutorials address these concepts:

- Mosaicking Multiple Raster Layers
- Converting Metric Raster Data to Feet
- Generating a Hillshade
- Creating Contour Lines

To get started, if you don't already have QGIS, download the latest version here:
https://www.qgis.org/en/site/forusers/download.html

The following tutorial was completed in QGIS 2.4.0, so images and menu options might be slightly different for subsequent versions of the software. For questions, please email Kristen.

Mosaicking Multiple Raster Layers

Raster data is pieced up at DASC for easier downloading. However, for analysis (particularly contours), it's better to work with a single raster. Here's how to merge/mosaic multiple raster layers into one layer.

1. If you want to, load the raster layers you want to mosaic into the map using the "Add Raster" tool. This step is not necessary to merge rasters.
2. On the top dropdown menu, select Raster > Miscellaneous > Merge.
3. If all the rasters you want are inside one folder, check the box to "Choose input directory instead of files."
4. If you want to use specific files, select the files you want to merge.
5. Specify an output file including a file type. If you don't know what file type to pick, use the same file extension as the data you're working with.
6. The other options available are better-suited for rasters that don't depict elevation.
7. Run the tool by clicking "OK". QGIS will process and then show you several boxes to click through to get back to the map interface.
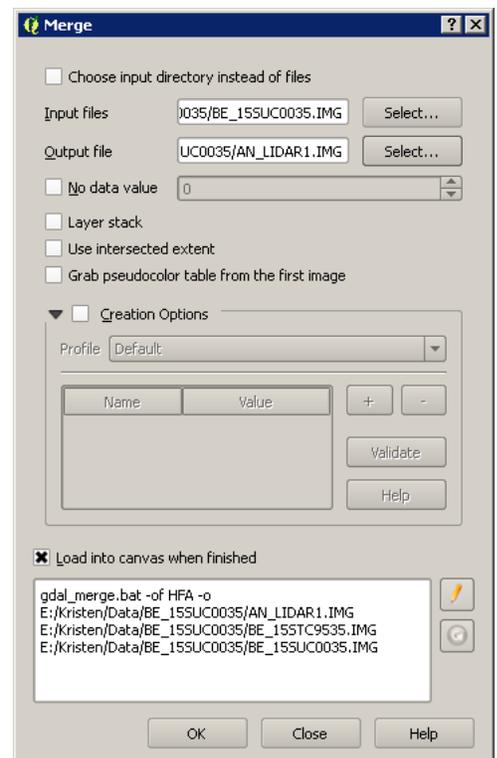
Converting Metric Raster Data to Feet

All the elevation data at DASC is in meters. Most people want contours in feet. Here's how to convert raster data to feet.

1. On the top dropdown menu, select Raster > Raster Calculator…
2. You will be completing a raster expression to convert the raster. You are basically setting up the equation m * 3.28 where m is the elevation value in meters for a particular cell.
3. Select a location for the "Output layer".
4. The current extent and output format should already be filled in for you. You may edit these if you need to.
5. Double click on the "Raster bands" entry that corresponds to the data you want to convert. You'll see that entry populate in the "Raster calculator expression."
6. Type in or select the asterisk button to add it to the expression and then type in 3.28 (or 3.28084 for increased precision). The resulting window should look similar to the example below.
7. Click OK. The resulting raster will automatically be added to the display.
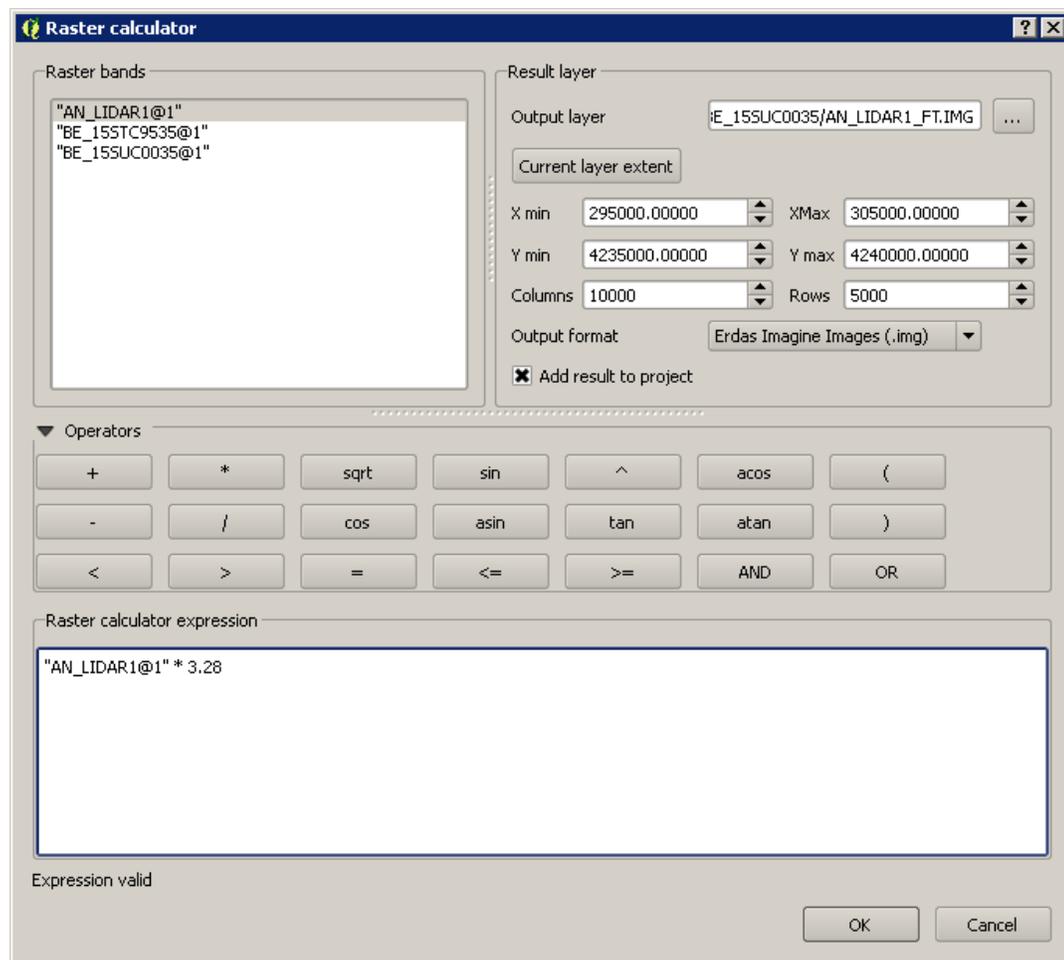
Generating a Hillshade

The hillshade result will be similar whether the elevation raster is in meters or feet, but for best results the elevation units should be the same as the projection units.

1. On the top dropdown menu, select Raster > Terrain analysis > Hillshade.
2. Select the elevation layer you want to convert.
3. Choose an output layer.
4. If the output format is not already filled in, I'd recommend sticking with whatever format your original raster data is in.
5. Leave the Z factor a 1.0, the azimuth at 300.00, and the vertical angle at 40.00. It can be amusing to experiment with these numbers and see the results in the hillshade.
6. Click OK and wait for the hillshade to process. The result will be automatically added to your map display.
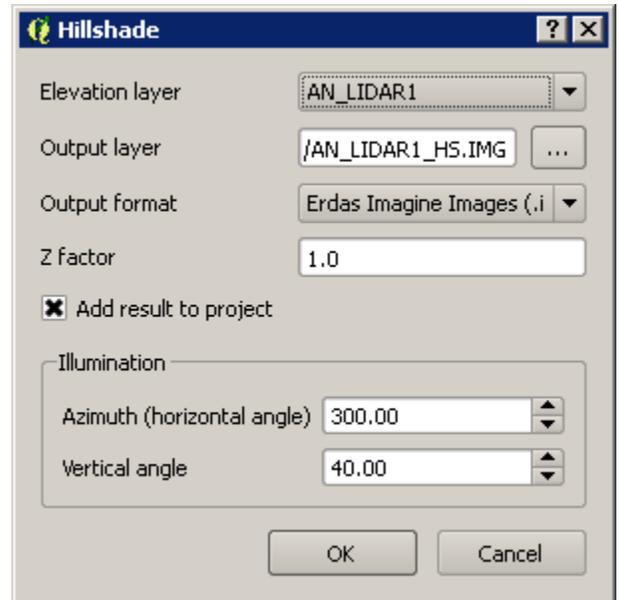
Creating Contour Lines

For contour data, make sure you know if you're working with your data in feet or meters.

1. On the top dropdown menu, select Raster > Extraction > Contour.
2. Select which file you'd like to convert to contours.
3. Select the output file for your contour lines. It's best to add ".shp" as the file extension. I personally add an indication of the given contour level inside the output file name.
4. Specify the interval you want between your contour lines. If your data is in meters, the unit is meters. If your data is in feet, the unit is feet.
5. If you want to label your contours in the future, check the box for "Attribute name". If this box is not checked, only the visual contours will be created without an indication of what elevation level it is.
6. Click OK and wait for the contours to process. If you selected a large area and/or a small contour interval like a number less than 5, this could take a while.