Exercise 5: Downloading, processing, and exploring GeoEarthScope data from OpenTopography

This exercise will show off some of the OpenTopography site's functionality as you download, process, and explore GeoEarthScope data. You will reconnoiter a study area of your choice in Google Earth and progressively focus on it, first by analyzing the Standard DEMs, and then by computing custom DEMs in OpenTopography.

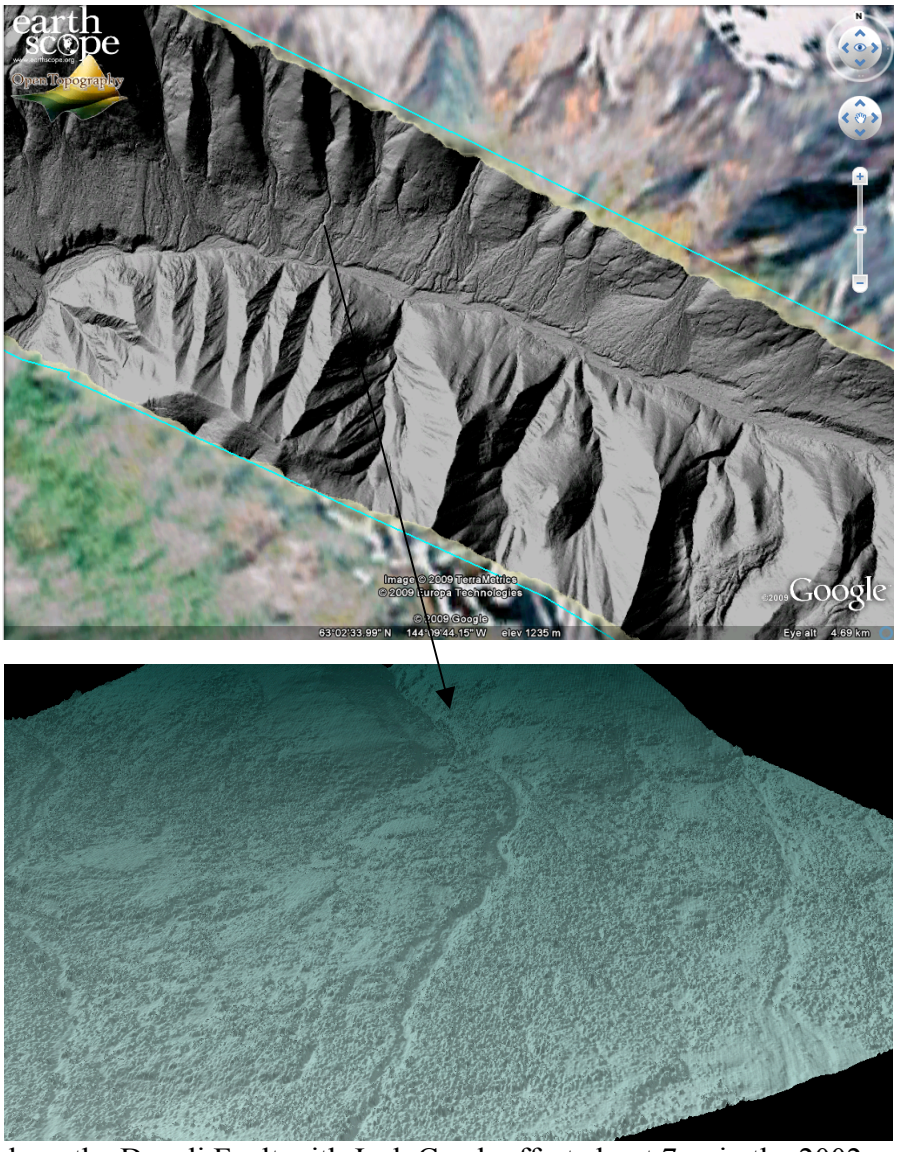
1) **Use precomputed hillshade KMZ to locate an interesting area**.
   From the home page at the www.opentopography.org site, navigate to Google Earth Files, and download the EarthScope data KMZ for the dataset of interest. Load the KMZ into Google Earth and explore the fault zones which have been imaged. Look at both full feature and bare earth hillshades. Be sure to experiment with which hillshade illumination angle shows which features. If a slopeshade is available, compare its demonstration of the landforms with the hillshades. Identify zones along the faults with simple and complex structure and describe the interaction between the surface processes and repeated faulting to develop the landscape. Choose an area with fine tectonic landforms including good offsets for more detailed study.

2) **Download standard DEMs of the detailed study area**
   From the home page at the www.opentopography.org site, navigate to the EarthScope Standard DEMs corresponding to the data set you studied with the KMZ in step 1. Zoom in on the Standard DEMs map to the detailed study area (compare the GoogleEarth view and the Google Maps view inside OpenTopography). As you zoom in, you will see download buttons for the 1 square kilometer standard DEMs. Download 2-4 DEMs covering the detailed study area. Mosaic, visualize, and analyze them as demonstrated in Exercises 2 and 4. What are the ways that you used ArcMap tools to interact with the data to get a better sense of the tectonic geomorphology of your study area? Select a potential field study site that is less than 1 km on a side.

3) **Compute custom 0.25 m resolution DEMs of potential field study site**
   For this step in particular, you should login to myOpenTopo (upper right of the home page). If you don't have an account, it is easy to set one up.
   - After logging in, navigate to the EarthScope Point Cloud Data corresponding to the data sets you studied with the KMZ and standard DEMs in steps 1 and 2.
   - Zoom to the potential field study site you developed in step 2 by comparing with Google Earth and ArcMap maps.
   - Select the region of interest (should be less than 1 km on a side).
   - Scroll down the page and choose all of the DEM Generation via Local Binning Algorithms and keep the default Arc Grid Product download format.
   - Set the Grid resolution to 0.25 and the search radius to 0.8 (those are in units of meters).
   - You can watch the job run if you continue on to myLidar Jobs Archive.
   - Go back to your job in myLiDAR Jobs Archive and rerun it. Compute an IDW DEM, but change the search radius to 3 m.
   - When the jobs finish, you will receive an email.

- Load the files into ArcMap (note that you will need to convert the Arc Ascii Grids into Arc Binary Grids: In ArcMap->ArcToolbox->Conversion Tools->To Raster->Ascii to Raster; make sure to change the Output Data Type to Float).

4) **Compare the data products and their depiction of the tectonic landforms**
Once your custom DEMs are loaded, compare them with the Standard DEMs. What is the effect of increasing the resolution? How do the different computation algorithms vary in their result (min, mean, max, IDW)? How many points are in each of your search radii (0.8m)? How many shots per square meter is that? What is the pattern of point count? What is the difference between the IDWs computed with different search radii? Ready to go in the field?



0.25 m DEM along the Denali Fault with Jack Creek offset about 7 m in the 2002 earthquake in the middle of the view.