

Computer Applications

Surfer Module

In this module you will become familiar with two aspects of surfer. The first is using a combination of post and base maps to build an image of seismicity of a region of Alaska. The second demonstrates how to grid data and create contour, wireframe, and other maps to display data in 2 or 3 dimensions. All the base maps, spreadsheets, etc. needed in this module may be found at the website: www.geo.utep.edu/pub/doser/computerapps Please post the results (outlined below) to your computer applications website no later than **Thursday, November 20!**

1) Seismicity of Southeastern Alaska

You will use a series of maps and spreadsheets to display earthquakes in a portion of southeastern Alaska. The area of map should extend from *57 to 60 N and 133 to 138 W*. At my website you will find the following files:

[akshore.bna](#) This is a surfer “bna” file that contains the latitudes and longitudes for a base map of the coast of Alaska.

[seakstations.xls](#) This is a spreadsheet that contains the latitudes and longitudes for seismograph stations in Alaska and Canada.

[seakseismicity.xls](#) This spreadsheet contains earthquakes that occurred between 1977 and 1988 within the region of interest

Start up the surfer program and generate a base map of the shoreline, make a post map of the seismograph stations (use a triangle symbol for stations and include labels for the stations), and a classed post map of the earthquakes (they should be classed based on depth, with depth ranges of 0-10 km, 10-20 km and 20-30 km). Use different colors or symbols for the depth ranges. Use the overlay maps command to get all 3 maps overlain together on the same plot. You will need to adjust the map limits to the limits requested above and may need to change the scale to get a readable map that fits on the page with reasonable proportions. *At a minimum* be sure to label the axes, include a distance scale and a key for the earthquake classes. To get a distance scale in km you should request a map scale with the following options: number of cycles = 2, cycle spacing = 0.498, label increment=50, scale tracks Y axis

2) Maps of geophysical conductivity data collected at Rattlesnake Springs, New Mexico

In 2006 and 2007 geophysicists (and their family members) collected conductivity data at Rattlesnake Springs, New Mexico. These springs serve as the fresh water source for Carlsbad Caverns National Park and the Park Service is supporting UTEP researchers to better characterize the watershed for the springs. Using the spreadsheet [vertqcombined.xls](#) you will examine several ways that the data can be plotted to make

a map. The data (Qv, column A) are conductivity values with units of mS/m. Each data point has a corresponding latitude and longitude. In all cases you will have to start your map by opening a gridded data file.

To create your gridded data file use the “minimum curvature” gridding option and a grid spacing of 0.0002 in the y direction and 0.0003 in the x direction (roughly a 10 m grid spacing). Once you have gridded your data use it to create the following maps:

a) Make a filled contour map. Try to make it with 3 colors that would be readable to someone with color blindness. The article ([colorscale.pdf](#)) found in my pub directory discusses various ways to make material readable to people with color blindness. About 8% of Caucasian men have some form of colorblindness so chances are you will likely make a presentation at meeting where some of your audience could be colorblind. Be sure to include a color scale.

b) Make a shaded relief map. Try the Lambertian reflection shading option for the map with light position angles of : horizontal=90 vertical=0; horizontal=0, vertical=90; and vertical=45, horizontal=45 Comment on the differences between maps.

c) Make a wireframe map. Experiment with changing the field of view of the map. Discuss what view angle you felt was the most useful in portraying the data.

d) Make a 3-D surface map. Experiment with the colors to enhance the high values. **(NOTE THIS PORTION OF THE ASSIGNMENT NEEDS TO BE DONE ON SURFER 8!)**

At a minimum your maps should have labeled axes, north arrow and scale. You can add your comments regarding your map directly below the map image.

If Surfer 7 or 8 “disappears” from computers in 409 before the assignment due date, please ask Carlos to re-install it.