Laboratory to Practice Techniques Using Surfer – Due October 17, 2012, 5 PM

At the website www.geo.utep.edu/pub/doser/surfer-lab you will find the following files you will need to make maps in Surfer for this assignment:

Gravity data: GRV_ALL_092611-v2.xls
Magnetic data: mag-dataset-cmf1.txt
Earthquake data: catalog01-11.xls
Anticlines/folds (base map): pha2.bna
Faults (base map): phf2.bna
Shoreline (base map): akshore.bna

All maps to hand in for this assignment should cover the region between 61 and 62° N and -152 and -148°W, have scales in kilometers, and labeled axes. Legends and/or color scale bars should also be used and maps should have titles. Remember 0.224825 degrees latitude = 25 km.

1) Make two maps of the region that show the coastline, mapped faults and folds, and earthquakes. For the first map use different colors to show depths of earthquakes in 10 km intervals (0-10 km, 10-20 km, 20-30 km and 30-40 km). For the second map use the same color for all the earthquakes but use different symbol sizes to show earthquake magnitude (0-2, 2-4, 4-6). Comment on what you see in the different maps.

2) Make two color maps of magnetic data with the coastline. To do this you must import the magnetic data into a spreadsheet and then grid the data using surfer. For your first map grid the magnetic data at a grid interval of 0.04 degrees for x and y. Then use the grid to make a contour map with range of -400 to +1200 nT (nanoTeslas) with a 200 nT contour interval. Label the -200, 0, +200 and +400 nT contours. For your second map grid the magnetic data at a grid interval of 0.4 degrees for x and y. Make a similar contour map (same range of values, colors and contour intervals), but use the smoothing option to
apply a high amount of smoothing to the map. Compare the two maps and comment on them.

3) Make a surface map of the magnetic data using the first grid you created. Indicate which direction is north and east on this map. Use smooth lighting with light position angles of -120 horizontal and 50 vertical. Adjust the specular light to be 10% black, the ambient to be 90% black and the diffuse to be white. Tilt the image to 20 degrees with a rotation of 45 degrees and a field of view of 50 degrees.

4) Grid the free air anomaly (FA_new) gravity data (data are in milliGalileos (mGal)) using a 0.01 degree grid size in x and a 0.005 degree size in y. Then using the grid make a shaded relief map of the gravity. Position the light for the map at a horizontal angle of 140 and vertical angle of 45. How does this map compare with one created using light position angles of -140 horizontal and 45 vertical?

5) Overlay the fault and fold base maps on Google Earth image of the area. Do you observe any relation of the folds and faults to surface features?