

SURFER <-> USGS GRIDS, and Coordinate shifts

The goal is to download gravity or magnetic data in geographic coordinates and transform them to Cartesian coordinates for processing, filtering, and modeling with the USGS software.

You will need:

1. some gravity or magnetic data from the Gravity and Magnetic Data Repository:
<http://irpsrvgis00.utep.edu/repositorywebsite/Default.aspx>
download your data and grid them appropriately using Surfer
2. PFdriver, a utility program that transforms among data formats for Surfer and USGS grids, pos files, and binary xyz files:
http://www.umt.edu/geosciences/faculty/sheriff/Sheriff_Software_Files/Pfdriver08.exe
3. Various programs from the USGS Potential Field Software
(<http://pubs.usgs.gov/of/1997/ofr-97-0725/>)

The Steps (pay attention to your file names, they must be 8 characters or less for the USGS!)

1. Start with a Surfer grid, e.g. magnetics.grd
2. find the center of the grid in latitude and longitude, and write it down
Latitude = 44.7, Longitude = -112.6
3. Open your Surfer grid in Surfer's *Grid Node Editor* and save it as a "GS_binary" grid. PFdriver will crash if it is saved as a "Surfer 7" grid, Surfer's default.
4. Start PFdriver08.exe and transform the Surfer grid to a USGS grid.
5. Put USGS PRJGRD.EXE in the subdirectory you are working in, the one with your data files. Run it by keyboarding it at the Command Line in a CMD.EXE window from Window's *Start/Run*. If you don't run it from the command line, you will miss some information if it crashes. When running, PRJGRD asks for:
 - your projection number, enter 99 for a list of possibilities. For this exercise, you want #5, Albers equal area which is in kilometers – so enter 5 as the projection number
 - the input grid, here *GS_mag.grd* or whatever you saved the grid as earlier
 - input units (you should have decimal degrees)
 - projected output grid – the output grid name, like *GSmagALB.grd* (8 characters or less)
 - output dx, dy in km – this should be the same you gridded in, say 1, 1
 - central meridian – this is the Longitude value you wrote down in step 2 above
 - base latitude – the average latitude of your grid area
 - change area covered? Probably not
 - PRJGRD should run and produce your output grid.
6. Use PFdriver to transform the output grid back to Surfer format to make sure everything worked. That is, in Surfer, the new grid should contour just like the old grid, but with kilometers from your central point as the coordinate system rather than latitude and longitude. That, was the goal.

There might be some problems:

- You might see some white areas inside your map's borders. This is caused by some skew in the Albers transformation. You can get rid of it by:
 1. *Grid Node Editor*, open your Surfer grid file
 2. *Save File as type:* ASCII XYZ.dat
 3. *Open it in a Surfer worksheet*
 4. sort appropriately and get rid of the spurious "DVALS" = 1E38
 5. grid that data file with the rows and columns of choice
 6. contour the result.