G473 Environmental Geology
Lab Exercise: Introduction to Surfer and Digital Mapping

This lab introduces standard digital mapping techniques using the software program Surfer 7.0. Log-on to your favorite network computer and enjoy the ride!

Task 1. - USGS Digital Elevation Models

The USGS has 7.5' topographic quadrangles available for free download on their web site. The DEM's are grid data with elevations of the land surface for quadrangles across the United States. These files are in the USGS STDS grid file format, surfer has the ability to import them.

A. Visit the USGS DEM file download site at: www.wou.taylor
-follow the links to Environmental Geology - Lab Data - Surfer Tutorial Exercise
-select the monmouth quadrangle
- click on "monmouth.zip" file and save the file to your "H:\" drive, and place it in a folder called "monmouth" (you will have to create this using windows explorer)
- this is a compressed, "zipped" file, you can uncompress by using "winzip" software on the start-programs menu, winzip will uncompress the file into a *.dem format
-using my computer, click on the monmouth.zip and winzip should automatically extract the original file to a folder of your choosing.

If you can't find winzip, then skip to part B.

- start surfer, from the "map" menu, choose shaded relief, and select the monmouth.dem file, surfer will import the DEM and display it as a shaded relief map.

Use the text icon / tool and put your name and map title on the map
Print the map and include in your lab packet.

- now try choosing "contour map" from the map menu, and make a contour map of the monmouth quad.

Use the text icon / tool and put your name and map title on the map
Print the map and include in your lab packet.

- experiment with the other map types, and try adjusting the parameters of each... see what happens when you change the options of the map.

Task 2 - Contouring Raw Precipitation Data for Oregon

On the class website-Lab Data - Surfer Tutorial, download the following files:

orprecip.xls	excel file with precipitation data for oregon
orcount.zip	zipped ArcView GIS files with an outline of OR counties, surfer can

Download both files, save the files to your h:\ drive, unzip the orcount.zip file (will decompress into orcount.shp files, which can be imported into Surfer)

all precipitatation data positions are recorded in longitude (x direction) and latitude (y direction)... in decimal degrees.

A. Copy and Save all of the above files to your I:\ drive so that you can work with them.

B. Use Excel to open the *.xls files from above, and see what the data looks like.

C. Steps to creating contour maps in Surfer:

Step 1: collect raw X, Y, Z data and save in an Excel file... I've already done this for you, here.

Step 2: Grid the Raw Data (you must convert the data into a continuous grid network, so that surfer can map them), in surfer, do the following:

- Grid-Data - choose the orprecip.xls file

under the data tab, make sure that the x value in long, the y = lat, and the z =rainfall_in
under the general tab, make sure the "kriging" method is chosen, just use the default settings under the general tab, note that the "grid" file will have a "*.grd" extension
check out the other tabs, but leave all settings as default
click OK and save the grid file to your H:\ drive

- now do the same grid process for the orstaelev.xls file, save the grid file to you I:\drive

Step 3: Make a contour map from the *.grd file for the orprecip.grd file (the precip. data)

choose Map-Contour Map-select the grid file, set the contour interval to "10 inches" and see what happens

In the same plot window, choose Map - Base Map, and import the orcount.shp file (this should overlay the counties on the rainfall contour map. **If both maps do not exactly line up, try Edit-select all-Map-overlay maps.**

Try double clicking on any part of the map, add text and lines to make it look good, print it out.

Save your work as a *.srf project file to your H:\drive (this will save everything you've imported and drawn)

Print all maps, and put your name on them for inclusion in the lab packet.