ESCI7205 hw5

This is going to be a big exercise that we will work on in several installments, so it will be broken down into little parts, the first of which will be due Tue., Oct. 13, 2009.

Part A:

1) Review the notes on SAC and AWK.

2) Copy the seismic data from /gaia/home/rsmalley/ESCI7205/seisdata to a directory in your account.

3) Each of these files is one day long. Read the Z component into SAC and answer the following questions.

- When was this data collected (general start and end times)?
- Where are the stations? (follow the notes to make a sac macro that will list the stations and their locations.)
- Describe what you see in the files. (Is there an earthquake? Is there more than 1 earthquake? Is the data from the station good?)

4) If there was an earthquake, where was it – can you find the answer on the internet?

5) Make a map showing the earthquake, the stations, and plot the great circle paths between the earthquake and the stations. (You have already plotted map backgrounds using pscoast, points using psxy, and "lines" using psxy [when you plotted the plate boundaries on the last homework]. Modify the shell script from the last homework to make the new map [This way you don't have to retype all the definitions at the beginning, etc.]. Be careful not to erase last week's homework. You may have to read the man pages for psxy a bit.)

6) Synch and cut the seismograms so you have about 10,000 seconds of data that includes the earthquake. (You can throw out the bad stations.). Write a SAC macro to put the earthquake location in the sac headers of ALL the files. Write a SAC macro to rotate the seismograms to the great circle azimuth (see notes). Save them without clobbering the NS and EW components (see notes, you will now have 5 files per station). Plot the vertical components in a record section (this is a SAC command).

7) Use SAC to read the P wave arrival times. Give the polarity and "quality" (0=best quality, 4=worst – don't use). Save in a hypo file.

8) Plot the particle motion of the P-wave and the Rayleigh waves using the rotated seismograms for one station. These two waves show up on the vertical and radial (the seismogram rotated to the great circle azimuth).

9) Add the focal mechanism of the earthquake to the map. Google on "Harvard cmt" or "global cmt" to find the web site that provides the focal mechanism data.