GEOPHYS 624 Homework 2

Due: Thursday, Sep 25 (in class)

Computer usage: Note, you could do the following in the classroom 1-14, or you could use computers in room 3-24. Furthermore, you could try to login from your home computer (if it is a Linux machine, a mac or has cygwin or xwindows in your PC laptop) by

ssh Your_username@ugl-gw.phys.ualberta.ca

Problem 1. Complete the lab 2 (see course page for minor corrections labeled in red color).

Problem 2. This exercise gets you started with requesting data from the IRIS (Incorporated Research in Seismology), the largest data center in the world. You are asked to submit a map of the stations in the permanent seismic network with network code of US. Then you need to find an earthquake (with given information below) and generate a request file for data retrieval (the so called "BREQ_FAST" file.

(1) got to webpage http://www.iris.edu/SeismiQuery and click on "earthquakes". Choose "Seismic Query". You will be prompted two panels. Click on "stations" in the lower set of options. In the "view station inventories" page, enter "US" as network. Do "view result". Click "Make station map". Then "Make Map". You can see your station location, tell me where the station is located.

(2) Go back to the "Seismic Query" page. This time choose "events". Select IRIS Searcher Original button. You will be prompted for many options for an earthquake search under the page of "Query for Events". I like you to set "magnitude" to >= 7.8 and time between Apr 30, 2008 and Jun 1, 2008. Click on "view result". If you don't get an answer from a pop-up window for more than 5 minutes, you likely did something wrong (e.g., too many earthquakes in that window by accident). If things worked, you should have a small list of event(s). They are actually the same event, but reported by different agencies (NEIC, Global CMT, etc.), write down the earthquake time and location on a piece of paper.

(3) Go back to the "Seismic Query" page. This time I like you to click on "breq_fast". Enter network as US and station as BOZ. Then, based on your search result from part (2), enter the origin time of the earthquake under "data start time *" (in addition to YYYY, MM, DD, you have to change the value in HHMMSS block). And then enter in "data end time *" the same day, but exactly **1 hour** after your start time (meaning, you will be requesting 1 hour of continuous of data). Click "start query".

(4) View the BREQ_FAST File. Then send a copy to your own email address or simply cut-and-paste it into a new email.

(5) Request data from the IRIS data center by using the BREQ_FAST request email or the one you are constructing from part (4). The instructions can be found at http://www.iris.edu/manuals/breq_fast.htm

What you need to do: Check the page and check the given example on this page on how to modify the Breq_fast file. You must input your information, and make sure to choose **Electronic** as the primary **Media.** When you are done, send the request to breq_fast@iris.washington.edu (see help page). To send correctly, you email address cannot have this option of automatically adding information such as "Yu Jeffrey Gu, Dept. of Physics", etc. Check your webmail options. **There should be nothing else beside the request in this email.**

(6) After about 1-2 hours, you should get emails regarding the data for your request. Login to your geop624 account, make a new directory called homework2. Go to that directory (empty now) and do the following,
ftp ftp.iris.washington.edu
username: anonymous
password: Your_email_address

cd /pub/userdata
cd YOUR_NAME (check the last part of your email from IRIS)
bin (this set into binary ftp mode)
get DATA_FILE_NAME
quit

Problem 3. If you are successful with everything above, you should have a SEED seismic data file from IRIS.

(1) Use rdseed to open up the file they sent to you
(2) Find the source-station distance, report here the P phase predicted time P and PkiKP here.
(3) Use sac2000 to read in all 3 components of **Broadband** High-gain SAC files (ends with .SAC) and check if the timing of the P and PKiKP phases, report here. Where do differences between predictions and observations come from? What lesson do we learn here as far as requesting data to have *complete* data?
(4) For PKiKP phase, why is BHE smaller than the two components?
(5) What seismic phase do you think large wave amplitudes arriving at 1500-1600 sec is? Justify your answer from both travel times and amplitude characteristics of the three components.
(6) Plot the vertical component Broadband High-gain seismogram by first converting to a 2-column ASCII format using program "plotsac" (see programming help, 1st handout), then use "xmgrace" to view and print the seismogram.