Geol 335.3

Lab #11 Seismic processing: Weathering Correction

The purpose of this lab is to provide the students with an understanding of the first steps of seismic data processing and reflection data interpretation. Here, you will use Vista to pick first breaks and to invert them for refraction statics.

Before starting, download the dataset (zipped folder lab11.zip) linked from the lab index page and unpack it in your directory.

Part 1. Pick first arrivals using Vista

1. Start Vista, go to file < 'Open Project', navigate to your directory 'Lab11', and open project 'fs2014'.
   a) Open the seismic data display  , go to select a window covering one shot and about 200 ms of time. In order to make that: select Seismic Data Plot Parameters  on the right tool bar, go to views < number of views (select # 1), vertical, apply, and ok. To select 200 ms of time, go to Seismic Data Plot Parameters  , and go to display >Force Time window, Min. Time: 0 ms, and Max. Time: 200 ms > apply and ok.

2. Select a convenient display mode and scaling, so those clearly see the first arrivals. For this, 'Seismic Plot Parameters' (popped up by a button in the upper-left corner):
   a) Under tab 'Process', select Apply AGC scaling and time window 100 s (AGC is the Automatic Gain Control).
   b) Under tab 'scale', select Scale Type = Individual Trace Scaling; for Scale Amplitude Setting, select User Define Scalar and set values Min Amp=-20 and Max Amp = 20. Press "apply to test the settings and OK to continue.
   c) You should now see the first arrivals reasonably clearly. Note that you can scroll to the next and previous shot records by pressing Ctrl-N (or simply N) and Ctrl-P (or P). You can also increase and decrease the trace amplitude gain by pressing '+' or '-'on the numerical keypad.

3. On the "MAIN SEISMIC TOOLBAR", locate and click the "First Break Picking" button  .
   a) Press button  (Options) to set picking options. Under 'Search mode', select 'Up to zero'. This will cause the program to precisely position your picks at the nearest negative-to-positive zero crossings of seismic records.

b) Near crossover points, the 'Up to zero' time snapping mode may be ineffective. Right-click to go to FB picking options, and uncheck the "Use search mode on manual pick". The picks will become unassisted.
c) On the "FIRST-BREAK PICK TOOLBAR" that is currently active, click "Manual FBreak Pick". **Caution:** Do not attempt the "Auto-pick" options; they can destroy your previous work!
d) Use Crtl-N and Ctrl-P to move to the next/previous records. Use '+' or '-'on the numerical keypad to adjust the amplitudes of the wiggles on the display. Use amplitudes small enough to that the wiggles do not overlap and large enough for confident picks.
e) Do not pick bad traces or where you are unsure. Delete bad picks by using Shift-Left Click, or you can kill the traces by using the Pick Data Trace Kills  on the main bar and Press on the Pick Data Trace Kills  , you will see yellow status bar > click left on the bad traces . Once you have done killing traces, click on mines sign on the left side of the yellow status bar  , you can go back for Picking FB.
f) (40%) Pick all (about 25) of the shots. **Important: Make sure you pick the same phase for all the shots!**
g) Make a couple of hardcopy plots to illustrate your picking.
h) To exit the picker, use the leftmost button in the yellow status bar.

Part 2. Compute static corrections:

This is similar to what you did in Lab #2 except that all calculations and plotting are done by the computer with a much larger dataset.

1. Start Vista; go to the same fs2014 dataset. Display the data as in Part 1 with first break picks.
2. On the main program menu bar, select > Statics > Elev/Reflection Statics. This will bring a list of (a single) available dataset up. Click on the dataset name ('lab#11). Click OK; this will bring an "Elevation/Refraction Statics" window up.
3. In the panel on the left, you will see 4 control points: if you make double click on each one, you will see a display of your picked first-arrival times on the right panel.
4. On the panel on the right, you can determine your velocity to the direct wave, head wave, and refracted wave. In order to make that, go to the left tool bar on the left panel and choose Pick Layer Velocities  . Once you choose that button, you can pick the group velocities by clicking left click with making a linear line among the points in order to get the velocity to all the events that are showing on the left panel. **Make sure that you did for whole seismic line by using the all control points.**

5. You have now performed the static corrections. Explain the results and explain how the obtained static corrections would be used in the further processing of the data.

Hand in:

Answers to the questions and hand the plots stapled or in a binder.