

## 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 preliminary 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 'Open project', navigate to your directory 'Lab11', and open project 'fs2014'.
  - a) Open the seismic data display. Select a window covering one shot and about 200 ms of time. Make sure the display is in shot-gather order.
2. Select a convenient display mode and scaling, so that you clearly see the first arrivals. For this, in the window 'Seismic Plot Parameters' (popped up by a button in the upper-left corner):
  - a) Under tab 'Process', select Apply AGC scaling and timewindow100s (this is the automatic gain control).
  - b) Under tab 'Scale', select Scale Type = Individual Trace Scaling; for Scale Amplitude Settings, select User Defined Scaler 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* (*P*). You can also increase and decrease the trace amplitude gain by pressing 'S' followed by '+' or '-' on the numerical keypad.
3. On the "MAIN SEISMIC TOOLBAR", locate and click the "First Break Picking" button.
  - a) Press button 'O' (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) 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!
  - c) Use *Ctrl-N* and *Ctrl-P* to move to the next/previous records. Use 'S'

followed by '+' or '-' on the numerical keypad to adjust the amplitudes of wiggles on the display. Use amplitudes small enough so that the wiggles do not overlap and large enough for confident picks.

- d) 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 for manual pick". The picks will become unassisted.
  - e) Do not pick bad traces or where you are unsure. Delete bad picks by using Shift-Left Click.
  - 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.
4. Use File->Save Project to save your work.

## Part 2. Compute static corrections

This is similar to what you did in Lab 3 except that all calculations and plotting is 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/Refraction Statics. This will bring a list of (a single) available dataset up. Click on the dataset name ('lab#11). Click OK; this will bring a "Elevation/Refraction Statics" window up.
3. (20%) In the panel on the right, you will see a display of your picked first-arrival times. Examine this display for any inconsistencies and wild picks. Return to picking above and redo some of the picks, if necessary. Print the final travel times out.
4. (10%) Click the "2D Refraction Statics Parameters" button, click on "Statics" in the popup, and write down the values of Weathering velocity, Replacement velocity, and Datum that were preset for this dataset. Explain the meaning of these parameters in your lab report.
5. Click on the rightmost button ("Calc. Statics") in the toolbar. The calculations must be completed by now!
6. (30%) Click on the "Plot" button in the toolbar (the one without balloon help!) and try other plots. Print them out. Explain the results. Explain how the obtained static corrections would be used in further processing of the data.

**Hand in:**

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