Geol 335.3

Lab #11 Seismology: Picking first arrivals for weathering correction

The purpose of this lab is to provide you with practical understanding of the first steps of seismic data processing and reflection data interpretation. The first significant part of seismic data analysis is commonly the "static correction". Statics are localized time shifts caused by variations of shallow velocities and topography. If not carefully corrected for, these shifts cause degradation of reflection images.

Here, you will use ProMAX to pick the first-arrival travel times. These first-arriving waves are the direct waves from the source and refractions through the uppermost velocity layers. First-arrival (i.e., refraction) travel times are used to invert for the uppermost velocity structures (commonly having the strongest heterogeneity) and to derive "refraction statics," which is one of the best possible statics solutions. We will *not* perform such inversions in this lab but only output the travel times (for example, for their further analysis in Matlab).

1. Start ProMAX and open your copy of the Line 'Geol335 lab 10' as in Lab 10. Create a new flow, name it something like "Pick First Arrivals". Add Disk Input and Trace display into the empty flow. The Trace Display tool in ProMAX also serves for picking first arrivals, horizons, and various time gates. Using the middle mouse button, open its parameter window. Make sure the horizontal axis is scaled by the source-receiver offset. This should allow you to directly compare the (apparent) velocities.
2. Execute the job, and a display of seismic traces will appear. This is the interactive component of the Trace Display tool. Zoom in the time and offset axis so that you can see the first-arrival phases clearly. If you like, you could also achieve a similar zoom permanently, by setting the corresponding time range and number of traces per screen in Trace Display parameters.
3. Pick some (about 20) of the shots. Use *the* arrows in the upper-left corner to move to the next/previous records. **Important: Make sure you pick the same phase for all the shots!**
4. Make a couple of hardcopy plots to illustrate your picking.
5. To exit the picker, use the leftmost button in the main menu. Use File->Save Project to save your work.
6. To ensure good quality of your picks, it is useful to switch to different sort orders as you did it in Lab 10. To do this, you need to close the display (always use "Exit -> Continue flow'!), then change the sort order to CDP, and run the flow again. If the picks are done inconsistently for different shots, they will appear jumping up and down within CDP gathers, and will need to be repicked.

Hand in:

Answers to the questions and plots in a binder.