Geol 335.3

LAB 10: Seismic processing: Data Sort Orders and Displays

This lab introduces you to the different views of seismic reflection data using ProMAX.

1. Start ProMAX as in Lab 9. Select project 'Geol 483/335' and subproject 'Geol335 lab 10/11', and copy of it into your lab area. This subproject contains the seismic line acquired by the students in one of our field schools (maybe this is why the data are not perfect, as you will see).

2. In your copy of 'Geol335 lab 10', create a new processing flow; call it "Data Sort Orders". Make this flow of: Disk Input, Bandpass Filter, and Trace Display. These tools can be found in the library on the right of the screen. They can also be easily obtained by typing the names of the tools in the upper part of the flow window.

   In 'Filter', set the bandpass parameters of 6-12-60-90, or try if can find better parameters.

   In Trace Display, find and enable the option for plotting the values of trace offset headers. Also, with this small dataset, you can try displaying multiple (2-3) ensembles (shot or CMP gathers) in one screen (this is also an option of Trace Display).

3. In Disk Data Input, select "Sort" (instead of the default "Get All") mode, and select the "External Source Number" as the primary sort key and "Channel" as the secondary. Note that the "primary key" is the trace header defining grouping the traces into ensembles, whereas the "secondary keys" specify how the traces are sorted within the ensembles. With the choice above, therefore, we request the data to be output by Disk Data Input in common-shot gathers.

4. Execute the flow. The Trace Display tool will pop up a screen showing the data. The traces are now displayed by "shot gathers", and spaced according to the trace sequential numbers within the gathers. Note that a graph of source-receiver offsets is plotted along above the section. Make a hard copy of the plot. Exit the flow by using File->Exit (Stop Flow).

5. (20% if got this far) In the parameters of Trace Display, enable offset plotting (by selecting Use Variable Trace Spacing). This will make trace coordinates on the screen proportional to their source-receiver distances. Execute the flow. The traces are now displayed at a horizontal scale proportional to their source-receiver offsets. Make a hard copy of the new plot.

6. (5%) Explain why the offset sections have some gaps whereas the original sections did not have them.

7. Zoom in on the reflection near 800 ms. You can zoom by using the zoom selector on the left of the Trace Display window.

(5%) Select a zoom showing the curvature of the reflection best and make a hardcopy.

8. Exit the flow. In the Disk Input Tool, select "Receiver" as the primary sort key and "External Source number" as the secondary. With this choice, we request the data to be provided in Common Receiver Gathers. Note that the number of items separated by ':' in the selection pattern should match the number of selected sort keys. With two keys, the simplest pattern (using all traces) looks like this: ' * : * / '

9. Scroll to the middle of the line where good reflections are present near 800 and 1200 ms.

10. (20%) Make a hard copy. Describe what you see. What is the difference from the shot gather view? Why are there fewer traces and broader gaps in each of the receiver gathers? Are the slopes of refractions and curvatures of reflections different from what they are in shot gathers? You may want to zoom in, make another hard copy, or draw additional lines on the plot.

11. Similarly to the above, make the Disk Data Input retrieve the data in Common Midpoint Gathers (use the CDP and the primary and Signed Offset as the secondary sort keys). Again, by double-clicking on the tab below the plot, select a CMP near the middle of the line where the 800- and 1200-ms reflections are best, and chose a suitable zoom.

12. (30%) Make a hard copy in OFFSET scaling and describe the plot. What is the difference from the shot and receiver gather views? Compare the numbers of traces in the gathers. Why do the CMP gathers contain about ½ of the traces compared to the receiver gathers? Are the slopes of refractions and curvatures of reflections different from what they are in the other gathers?

13. (20%) Return to the Shot Order in Disk Data Input. Execute the flow. In the resulting display, go to "Trace Display", where you will find several typical types of seismic displays. Try all of them.

   Make paper copies of the "*Wiggle trace*", "*Variable-area*", and "*Variable intensity*" displays and try to explain their ideas. Note that these three basic modes can be combined in the displays.

Hand in:

Answers to the questions and plots in a binder.