

Analyzing Seismic Data

Pickwin

Open .dat files: File > Open SEG2 file

Use buttons across to adjust –

- Up and down arrows to increase/decrease amplitude
- Sideways arrows to increase/decrease length of x axis
- Up and down arrows to increase/decrease spacing on y axis
- Next three buttons to change shading of waveforms
- CLIP to clip waveforms above a set amplitude
- NORM to turn off normalization of waveforms (will set to same scale)
- F to undo filtering

Filtering –

- Ctrl H to lower low-cut frequency filter
- Ctrl L to lower high-cut frequency filter
- Also under Edit/Display > Filtering

Pick first breaks: Pick first arrivals > Pick first breaks

Adjust picks by clicking on waveform

Save: File > Save Pick file

Then open new file to repeat, but first delete all picks! Otherwise will save all picks made since opening the program. Go to Pick first arrivals > Delete all picks

Plotrefa

Open pickfiles

For 1st file: File > Open Plotrefa file (traveltime data and velocity model)

For all other files in the line: File > Append Plotrefa file (traveltime data only)

If you need to modify travel times, Traveltime curve > modify traveltimes (all shots) Can check reciprocal times and adjust, Traveltime curve > correct reciprocal time automatically

To do a Time-term inversion to get a starting model:

- Time-term inversion > assign layer (2,3) arrivals
- Then click where you see the slope change for every shot
- When you have layers assigned (2 or 3), do the inversion:
 - Time-term inversion > Do time-term inversion

To change view, View > Scale

To do tomographic inversion:

Tomography > generate initial model will give you a starting model based on the model you constructed above if the box is checked for 'use layered model as initial model' (See note below)

To generate a generic layered model (will provide better result) uncheck the 'use layered model as initial model' box. Have the model go deeper than the default values.

You can manually adjust the starting model:

Velocity model > Modify layer boundary (point by point) will allow you to change the boundaries under each shot location by clicking and dragging with mouse

Velocity model > modify velocities (by mouse) will allow you to specify a velocity and change each segment to that value by clicking on it

Tomography > inversion (set parameters manually) will run the inversion Make sure min and max velocity make sense (~0.2 to ~3 km/sec)

Adjust horizontal smoothing if needed

To view predicted travel times:

Raytracing > execute – this will show predicted and observed travel times, as well as give you average error

Click 'RP' button to see ray paths through your model

Note – if you use the model generated by time-term inversion as the starting model and it has a maximum velocity ~0.5 km/sec, the tomographic inversion will have a hard time increasing this velocity at depth. Using a generic layered model that goes from ~0.2-~3 km/sec seems to do better.