SeisImager/SW-2D

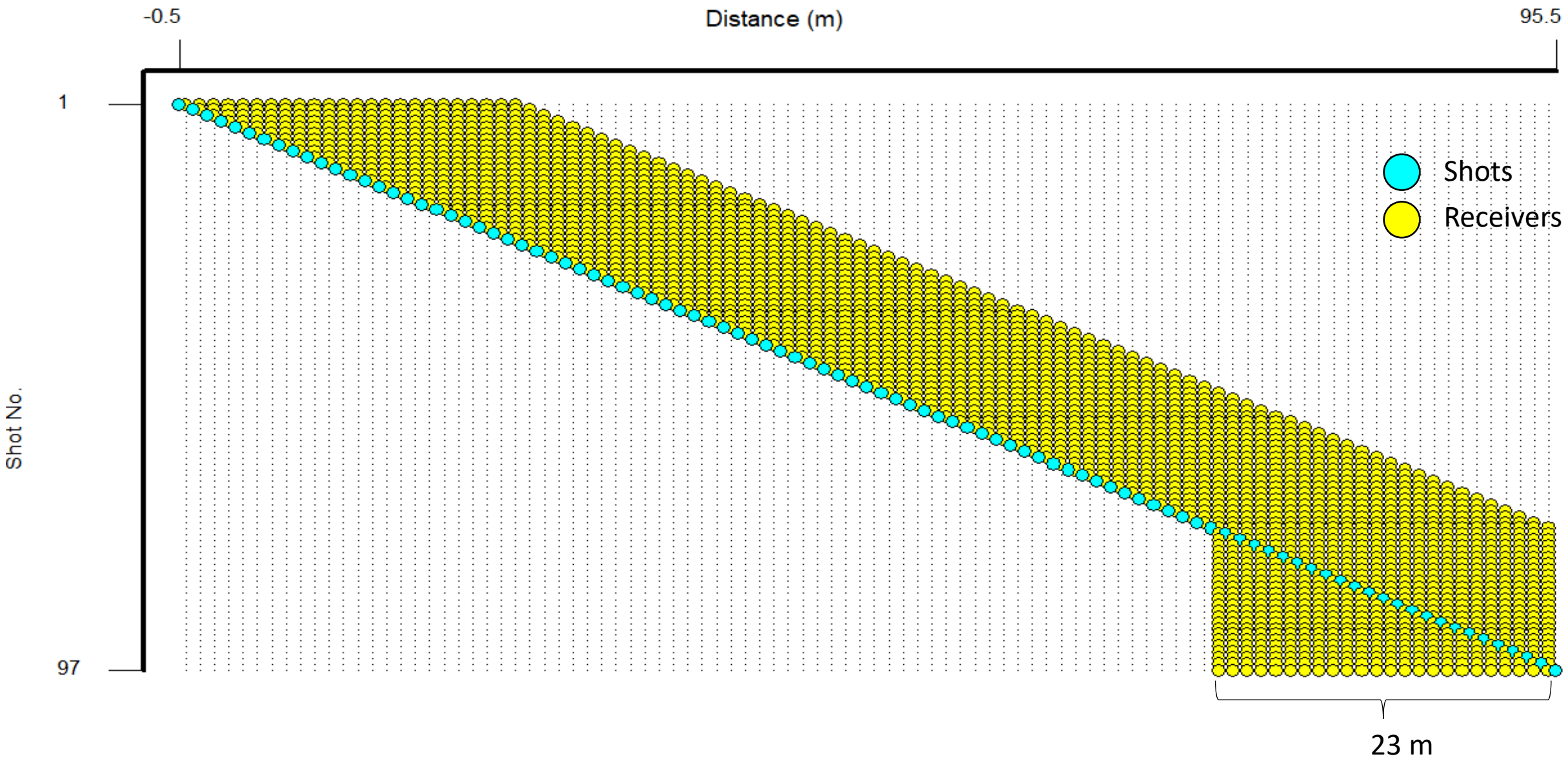
Tutorial for 2D MASW processing using SeisImager/SW-2D

- Processing 2D MASW data obtained by Geode.
- SeisImager/SW-2D license is required.
- Download the latest installer from : *https://seisimager.com/download/SeisImager.zip*
- Download the example data from : *https://seisimager.com/download/MASW(2D).zip*
- Can be processed either using wizard or manually
- The tutorial summarize manual processing
- See *"SeisImager/SW™ Manual"*, *"SeisImager/SW-Pro™ Manual"* and *"GeoPlot™ Manual"* for more details

Acquisition geometry

- Source interval : 1 m
- 1st source position : -0.5 m
- Receiver interval : 1 m
- 1st receiver position : 0 m
- Survey line length : 95 m (0~95 m)

Acquisition geometry

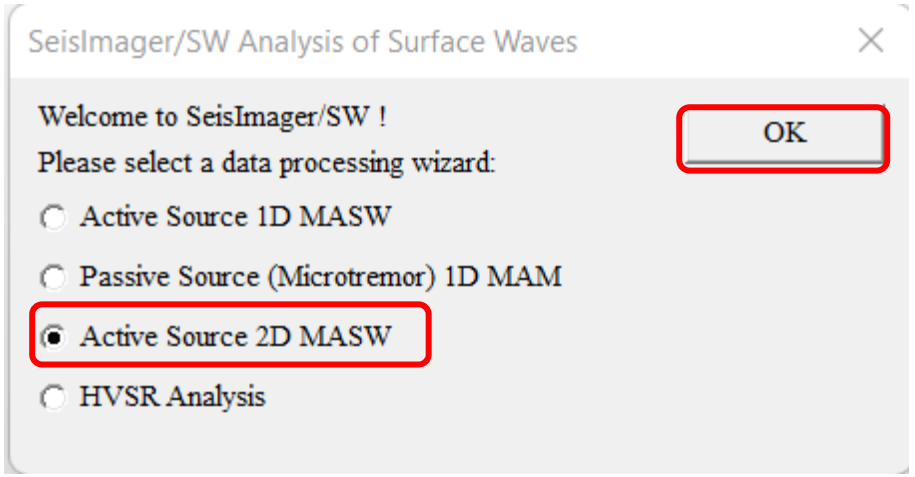


Processing with surface wave analysis wizard

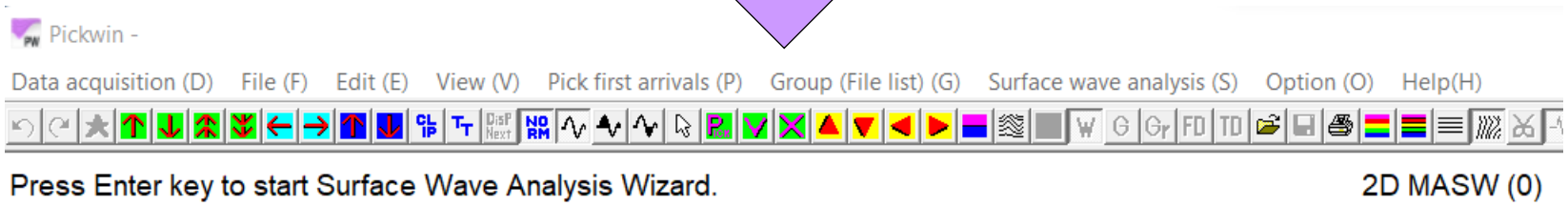
Data can be processed almost automatically using the “Surface Wave Analysis Wizard”

Click “Surface Wave Analysis Wizard” icon

Choose “Active Source 2D MASW” and click “OK”



Press “Enter” key to start processing



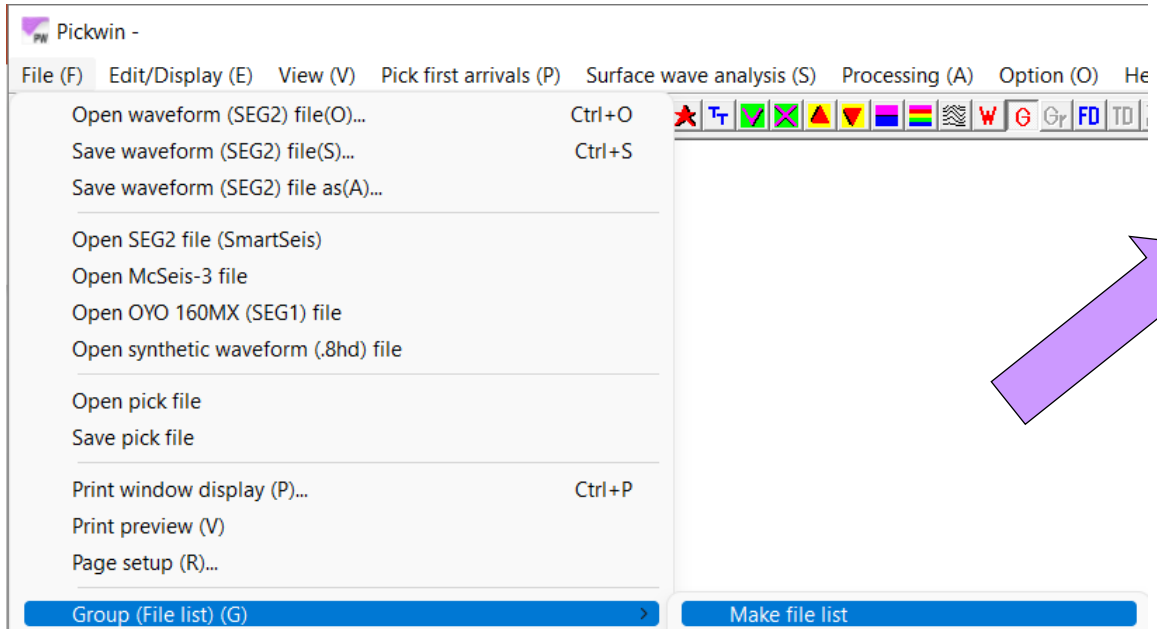
Wizard automatically selects processing menu describes below by pressing “Enter” key

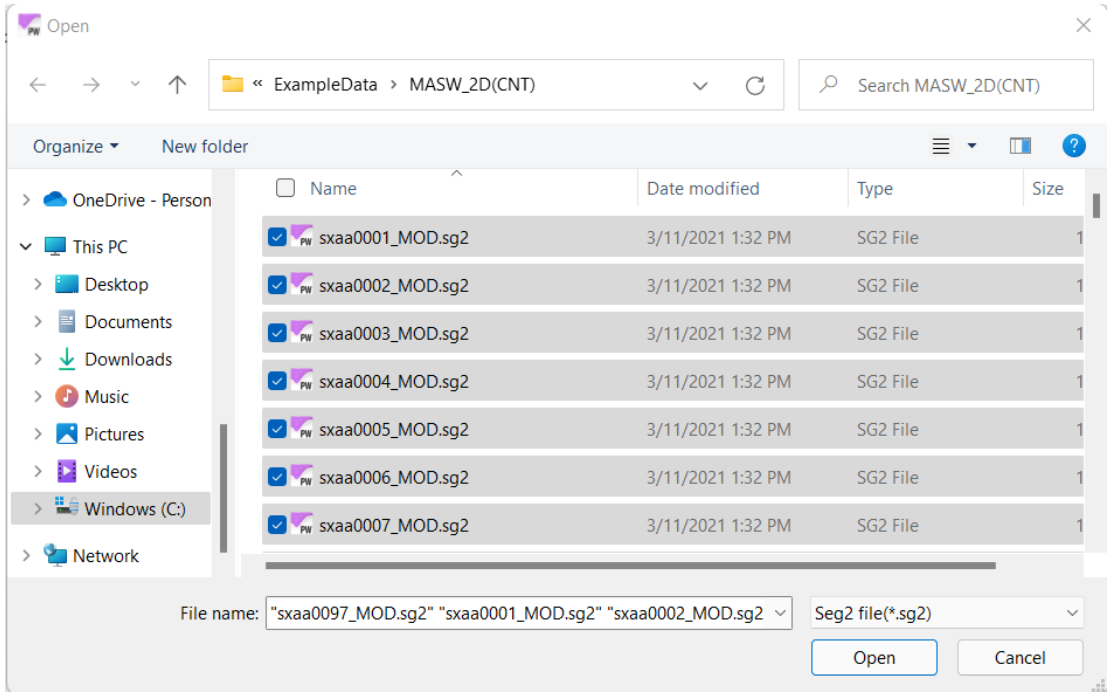
Import Geode data files (SEG2 files : .dat or .sg2)

Hereafter, the tutorial describes manual processing without the wizard.
The wizard basically follow almost the same procedure by pressing “Enter” key.

Double click icon to launch Pickwin

Select “File”, “Group (file list)”, “Make file list”.





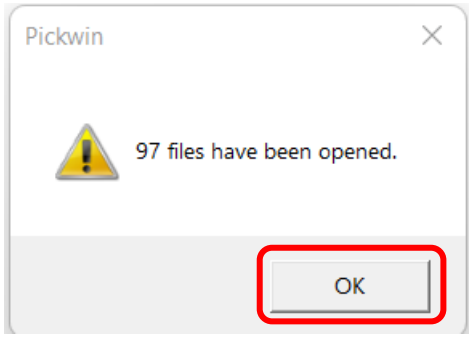
Select all SEG2 files.

Use “File”, “Group (file list)”, “Make file list (select a folder)” if the number of files is more than 100.

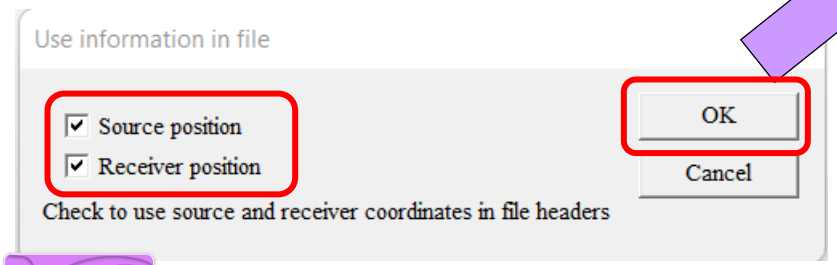
Import Geode data files (SEG2 files : .dat or .sg2)

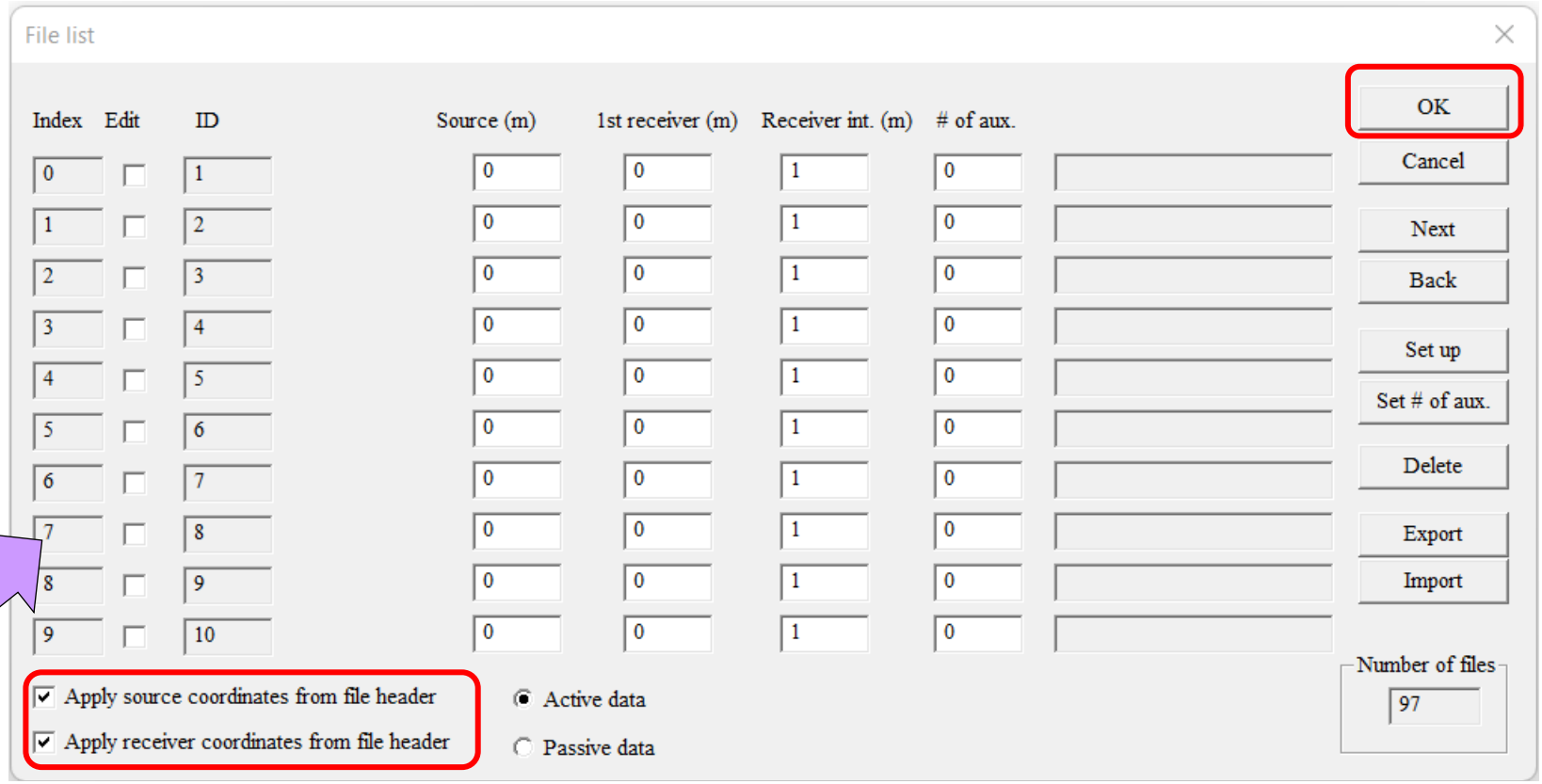
If waveform data files contain correct source-receiver geometry.

Click “OK” to continue.



Check “Source position” and “Receiver position” if waveform data files contain correct source-receiver geometry.

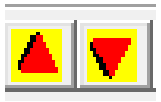


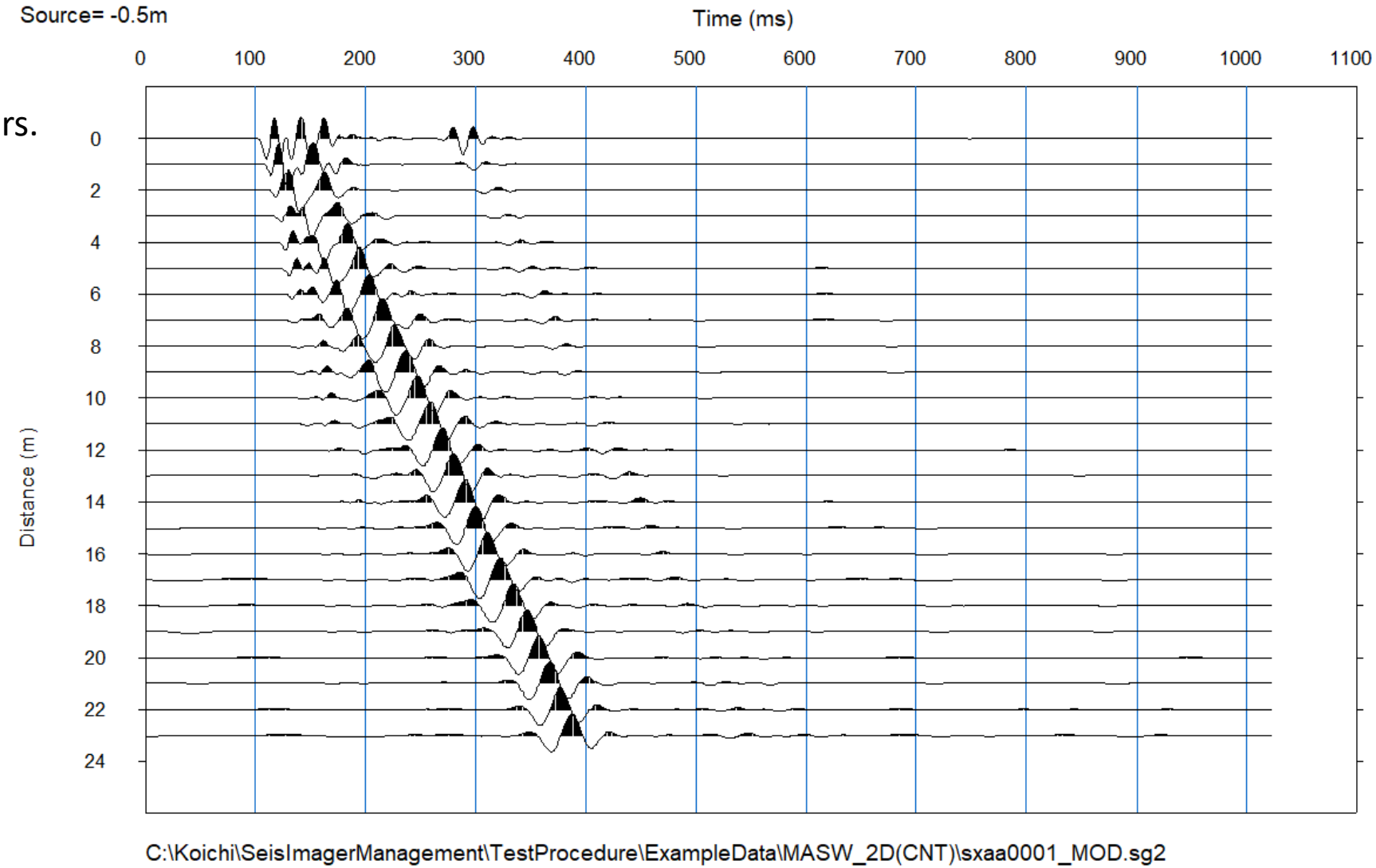


Check “Apply source coordinate from file header” and “Apply receiver coordinate from file header” if waveform data files contain correct source-receiver geometry.

Import Geode data files (SEG2 files : .dat or .sg2)

The 1st shot gather appears.

Use  to scroll shot gathers.



Manually set up acquisition geometry (optional)

If waveform data files do not contain correct source-receiver geometry, the acquisition geometry can be set up manually.

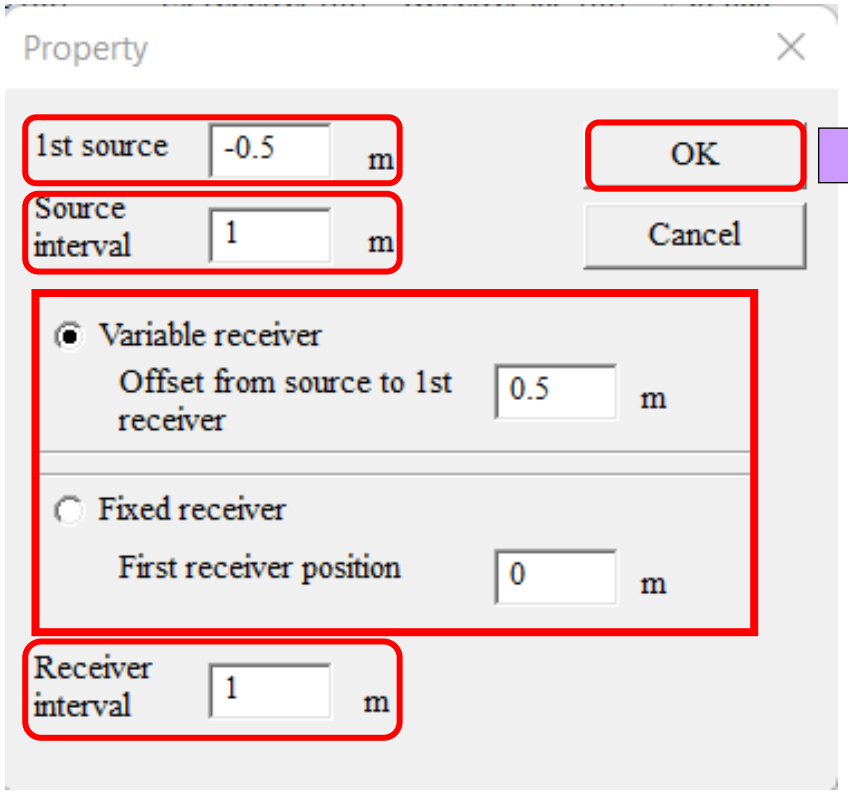
Click “Set up” to set up geometry.

Uncheck “Apply source coordinate from file header” and “Apply receiver coordinate from file header” if waveform data files do not contain correct source-receiver geometry.

Manually set up acquisition geometry

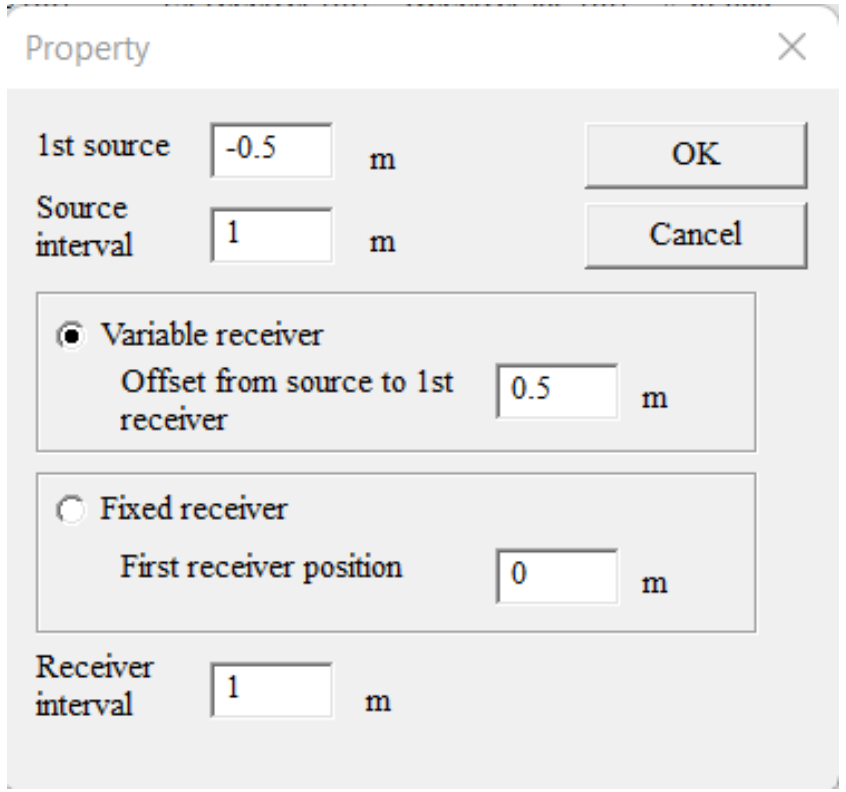
If waveform data files do not contain correct source-receiver geometry, the acquisition geometry can be set up manually.

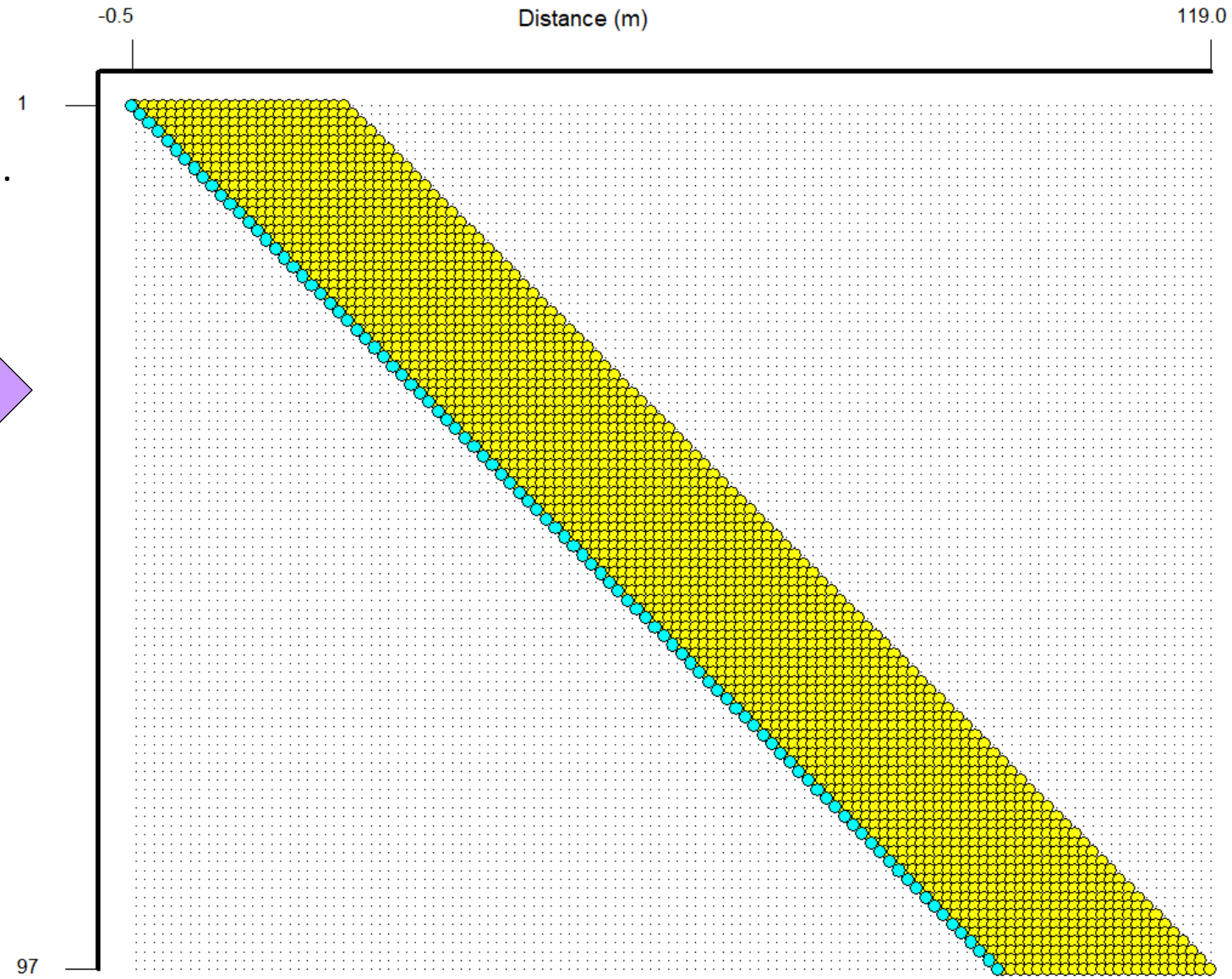
Enter the 1st source position, source interval, and receiver interval.
Choose “Variable receiver” or “Fixed receiver” and enter offset from source to 1st receiver or first receiver position respectively.



Manually set up acquisition geometry

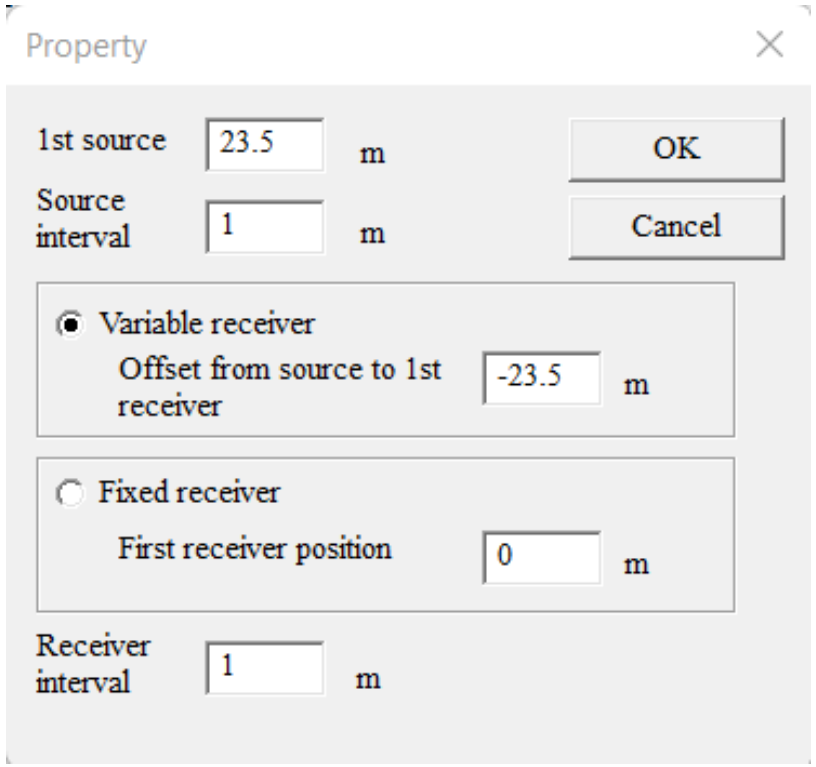
Geometry example 1 :
Variable receiver with sources behind receiver spread.

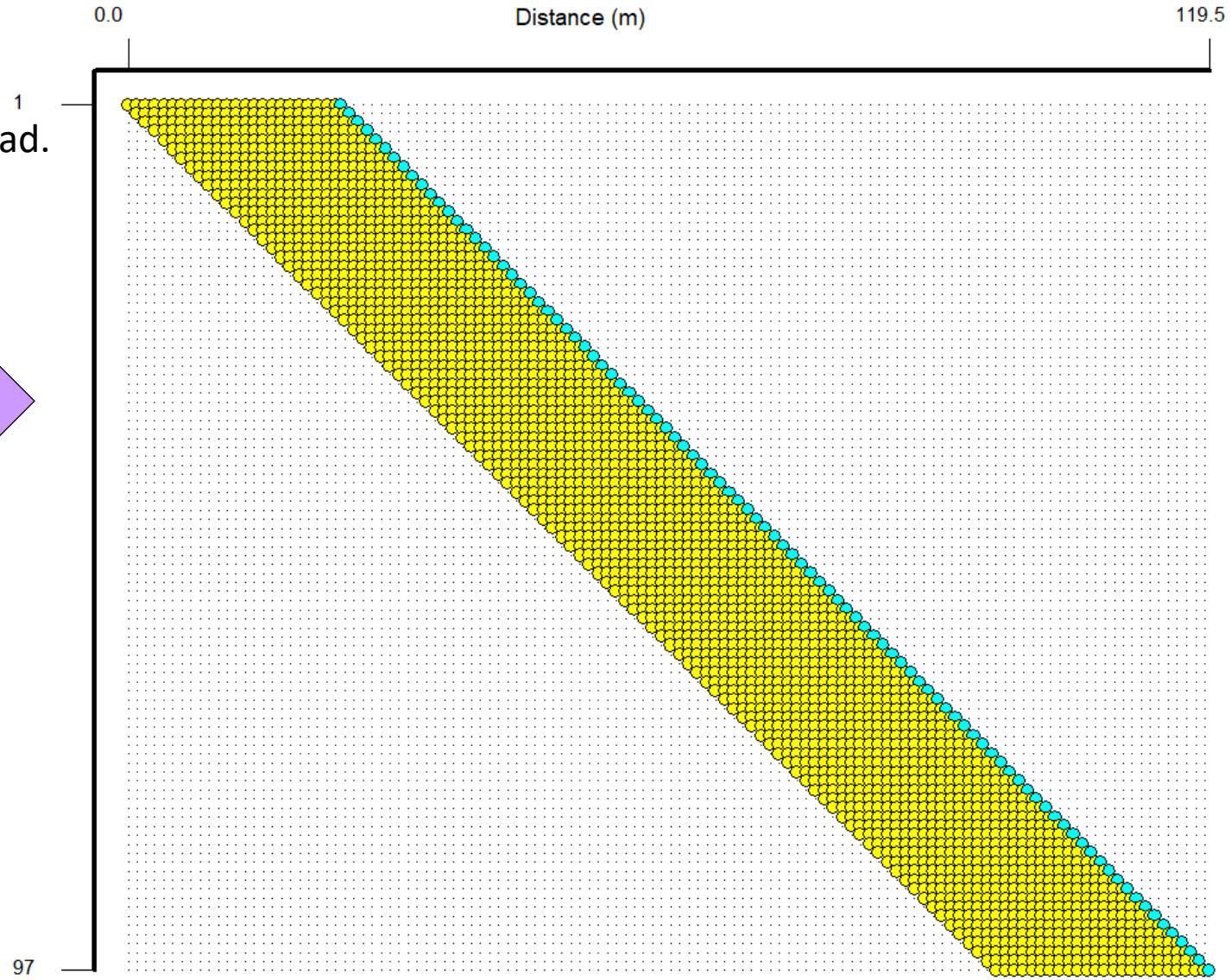




Manually set up acquisition geometry

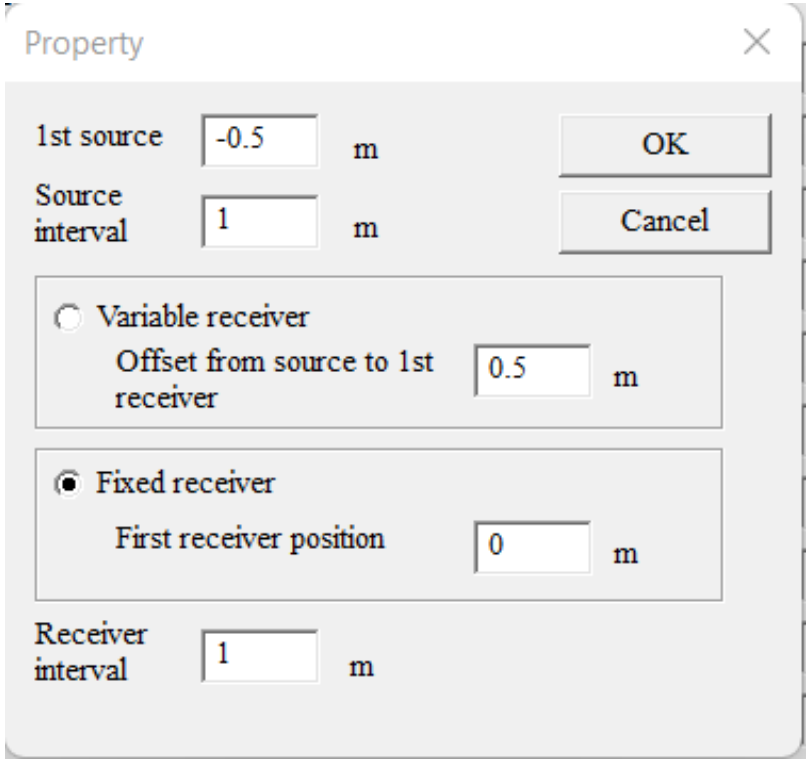
Geometry example 2 :
Variable receiver with sources ahead of receiver spread.

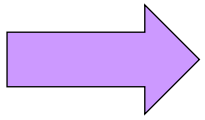


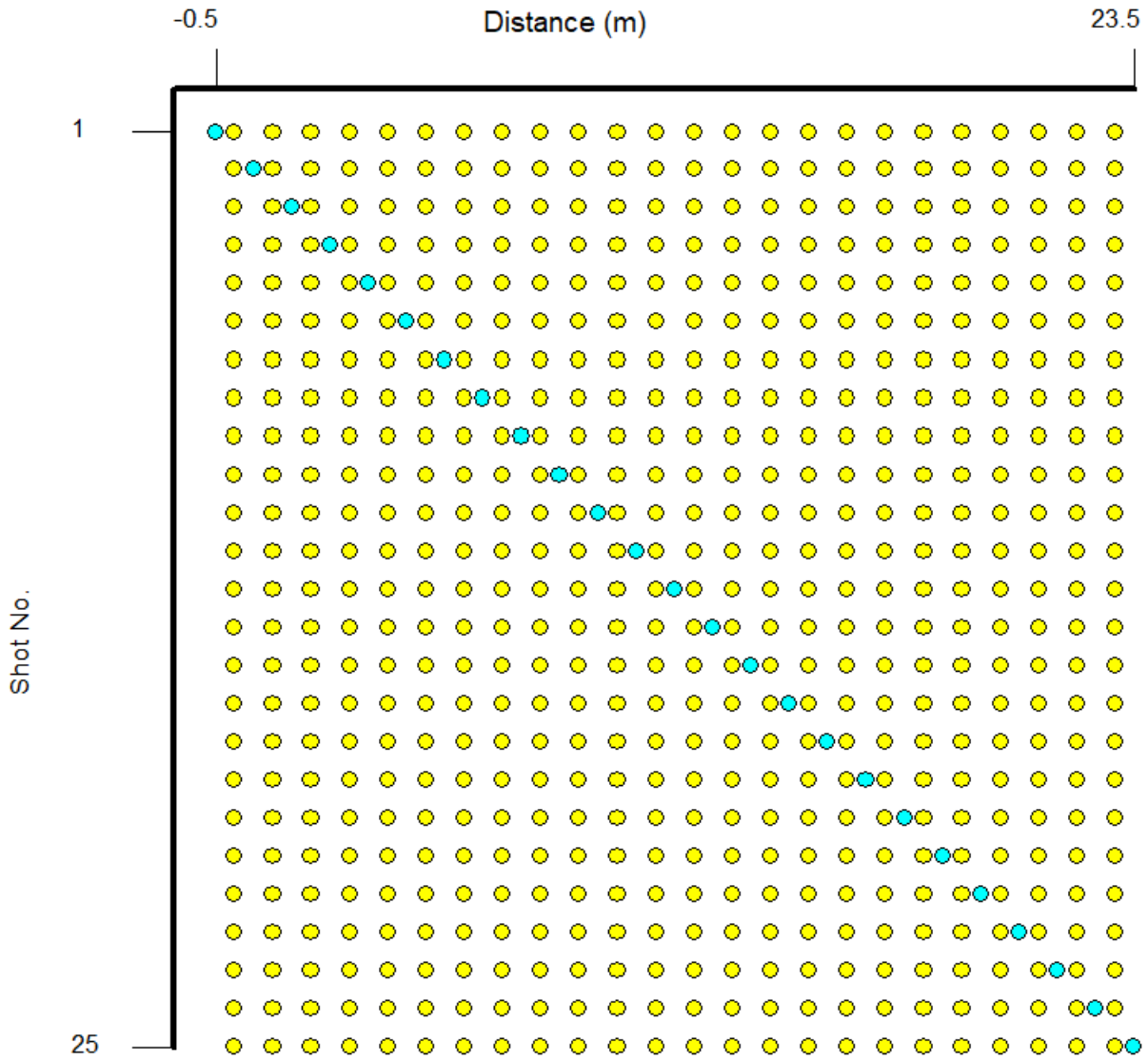


Manually set up acquisition geometry

Geometry example 3 :
Fixed receiver spread.

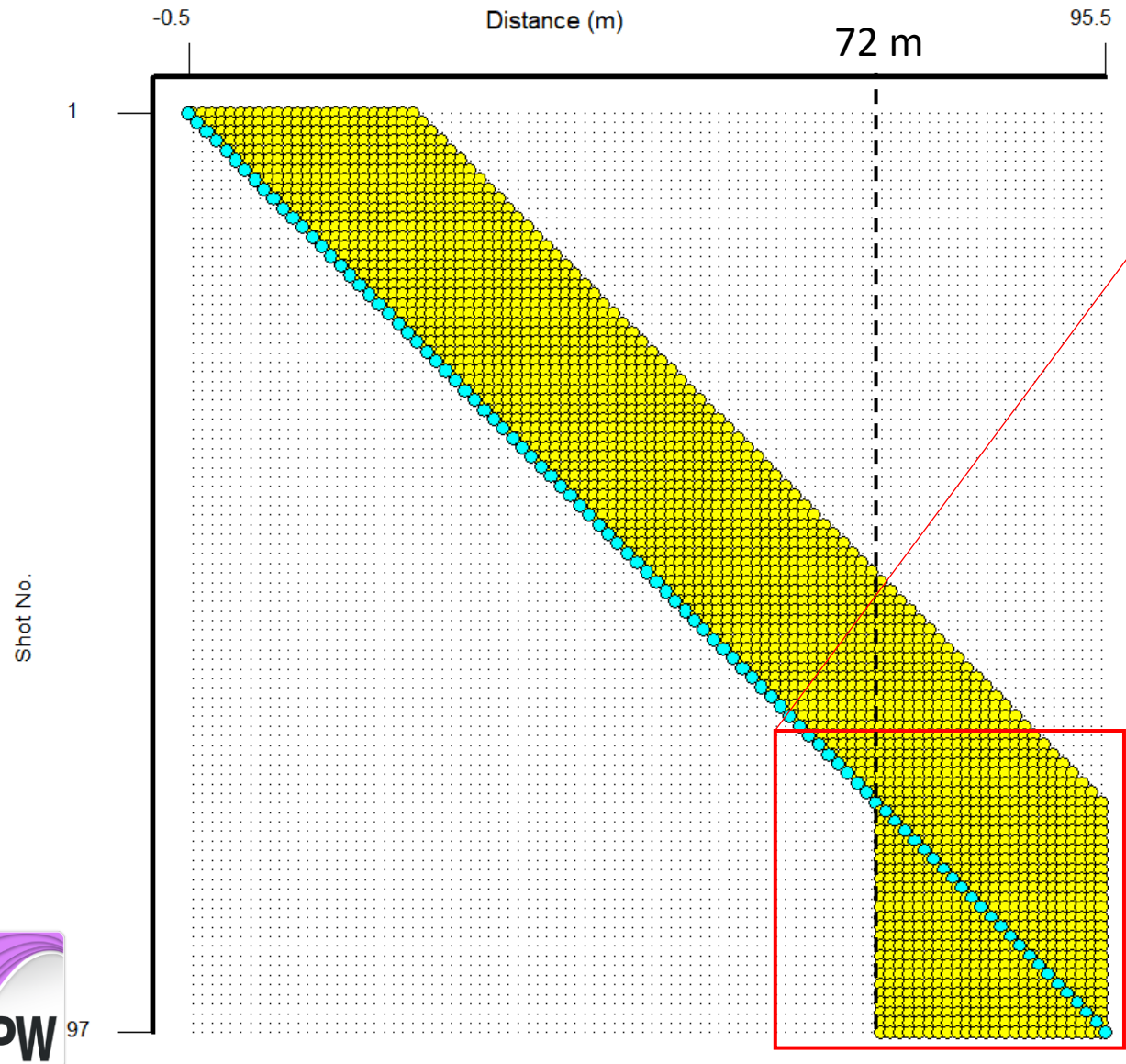




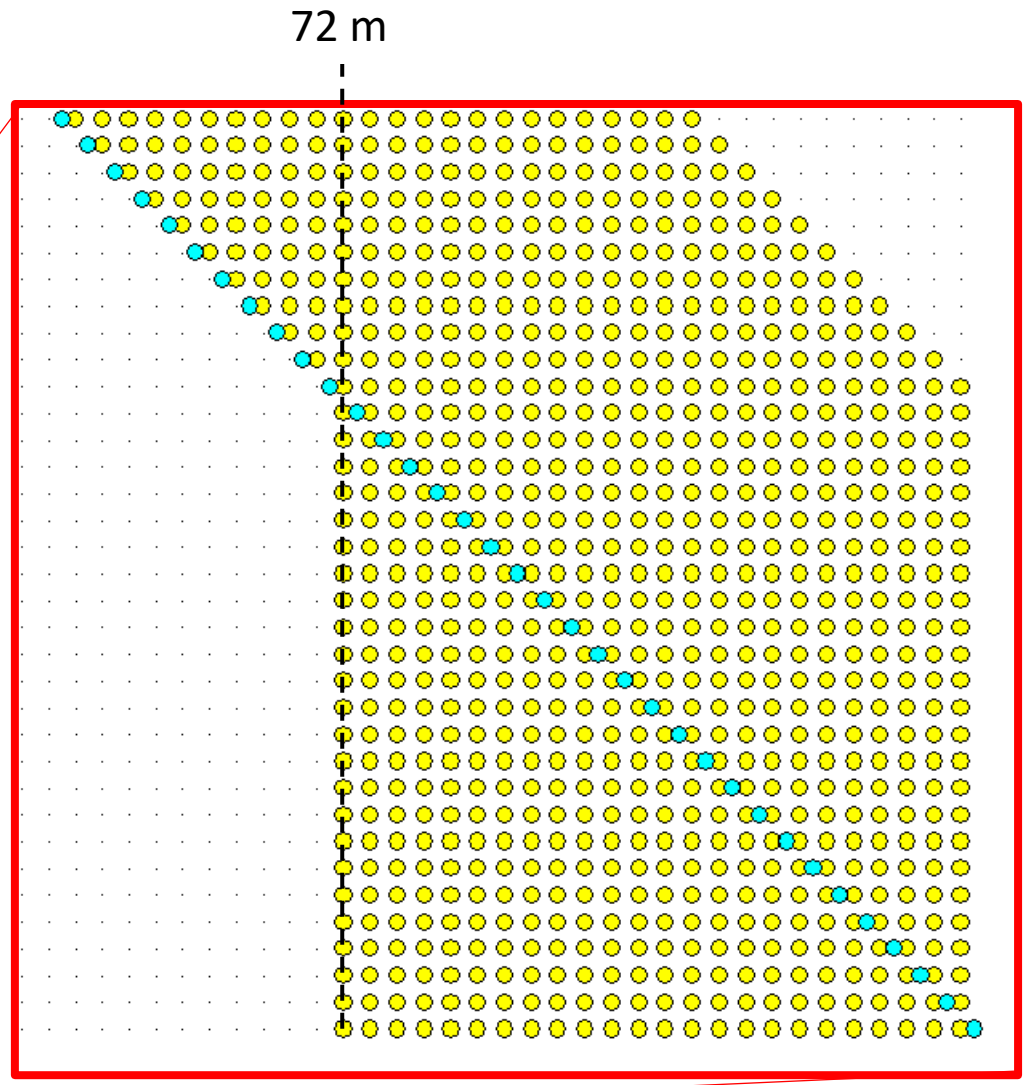


Manually set up acquisition geometry

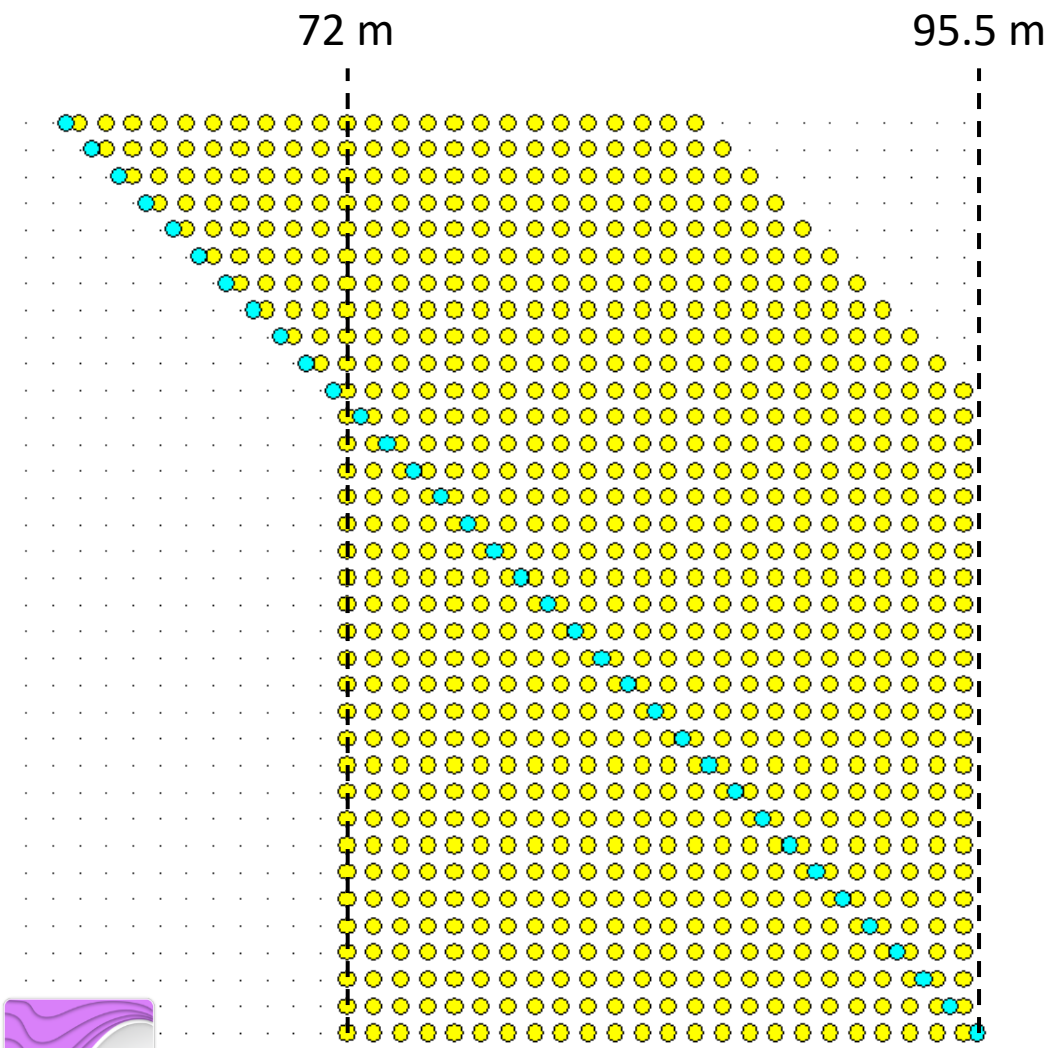
Source and/or receiver location can be edited manually.

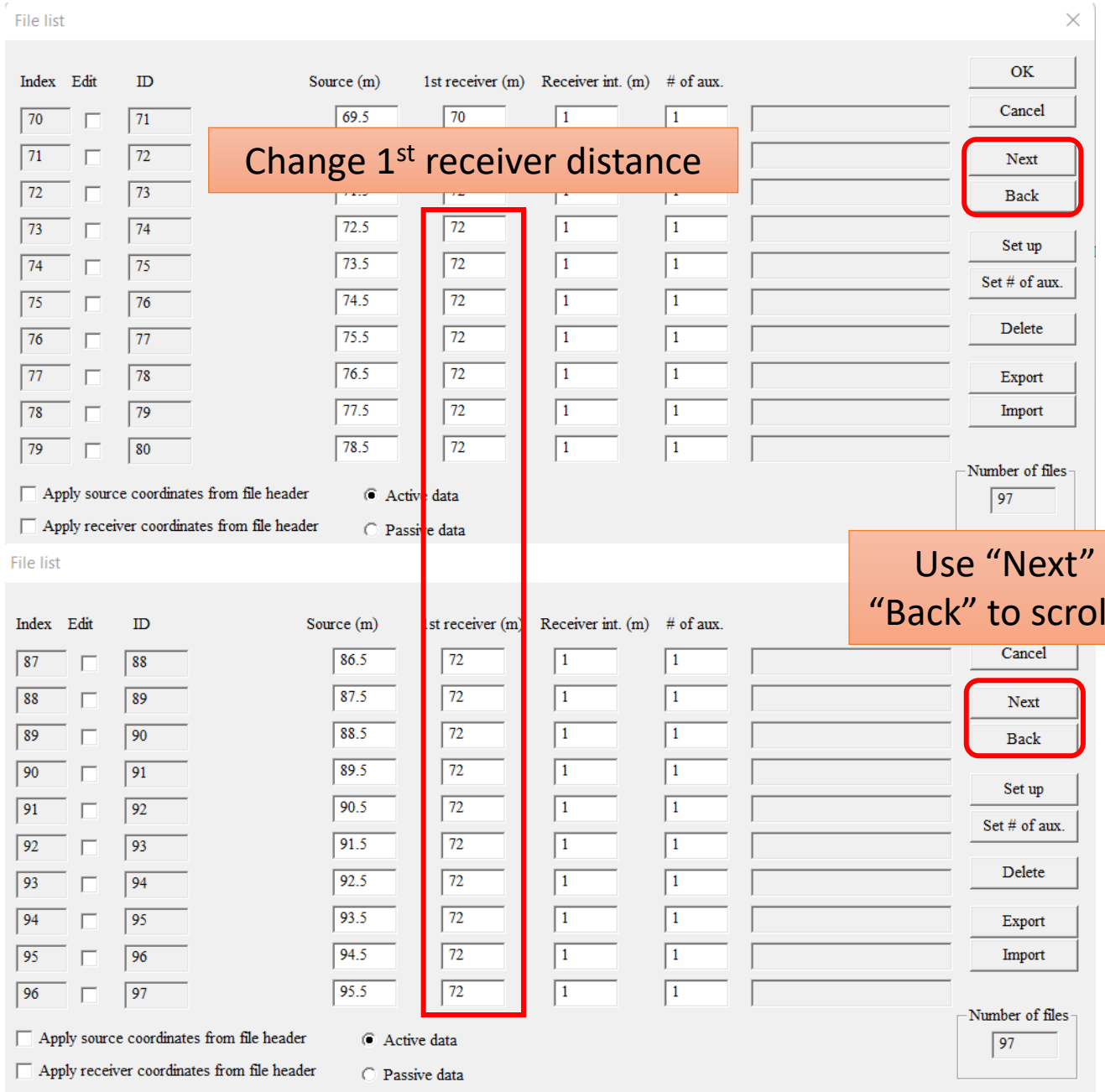


Receiver spreads were fixed after the shot of 71.5 m.



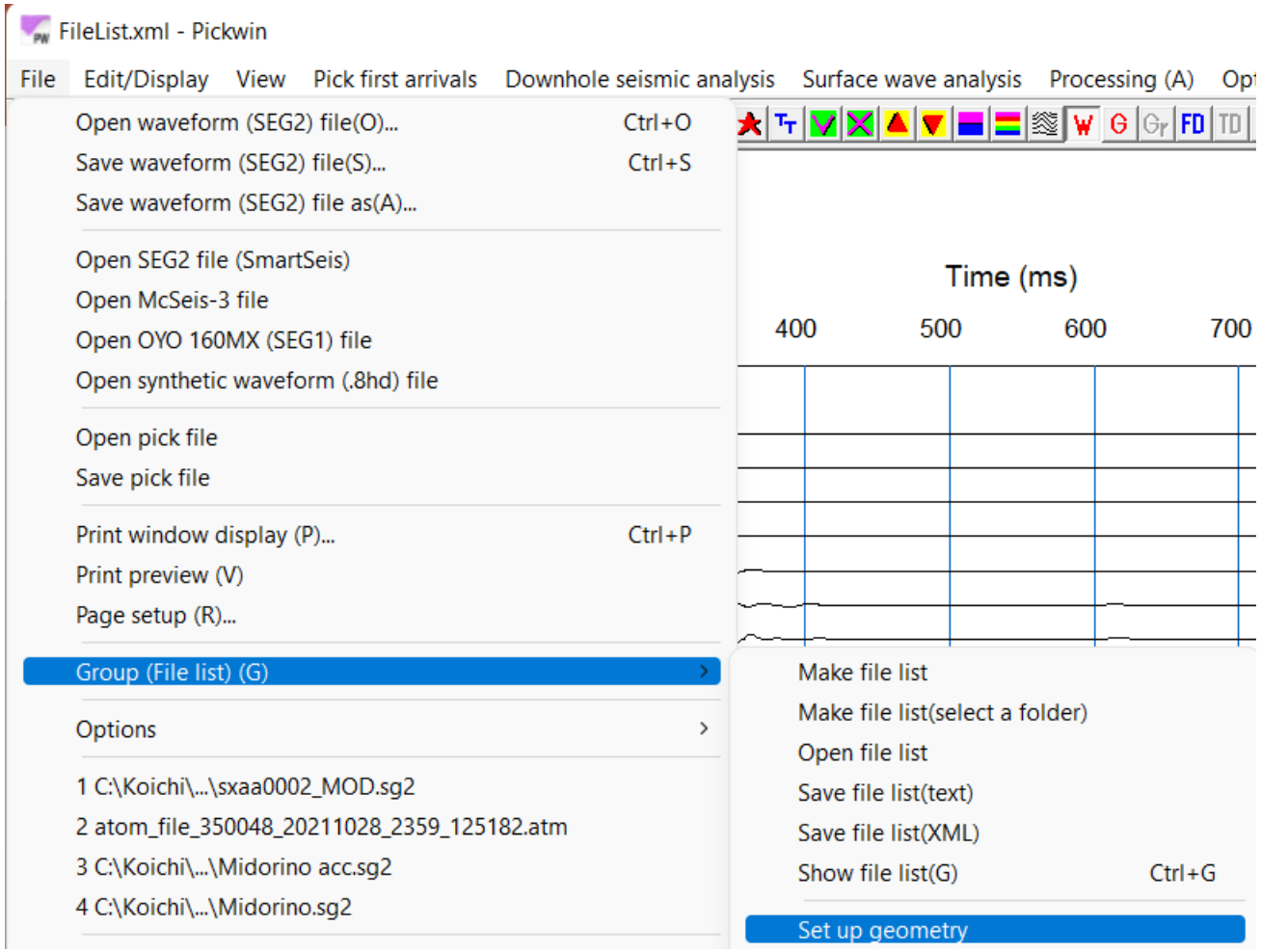
Manually set up acquisition geometry

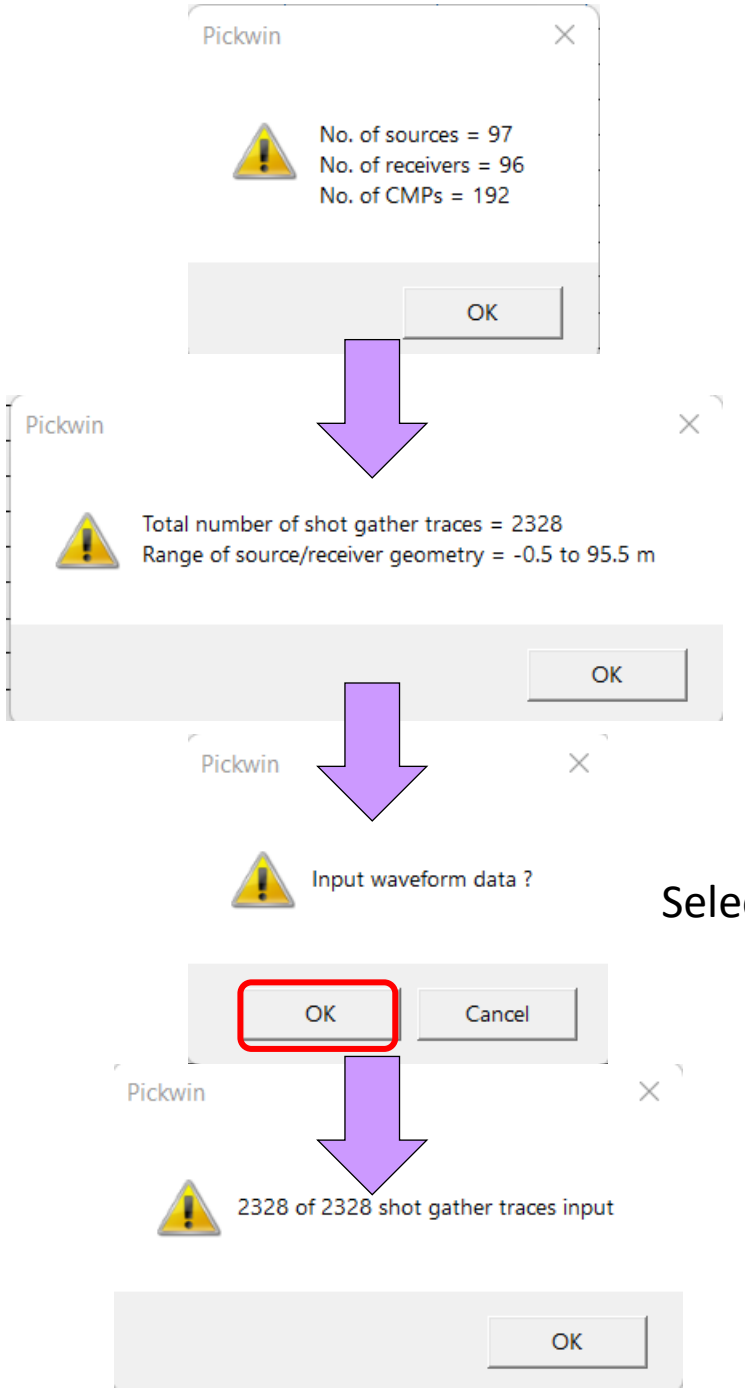




Set up Geometry

Select “File”, “Group (File list)”, “Set up geometry”

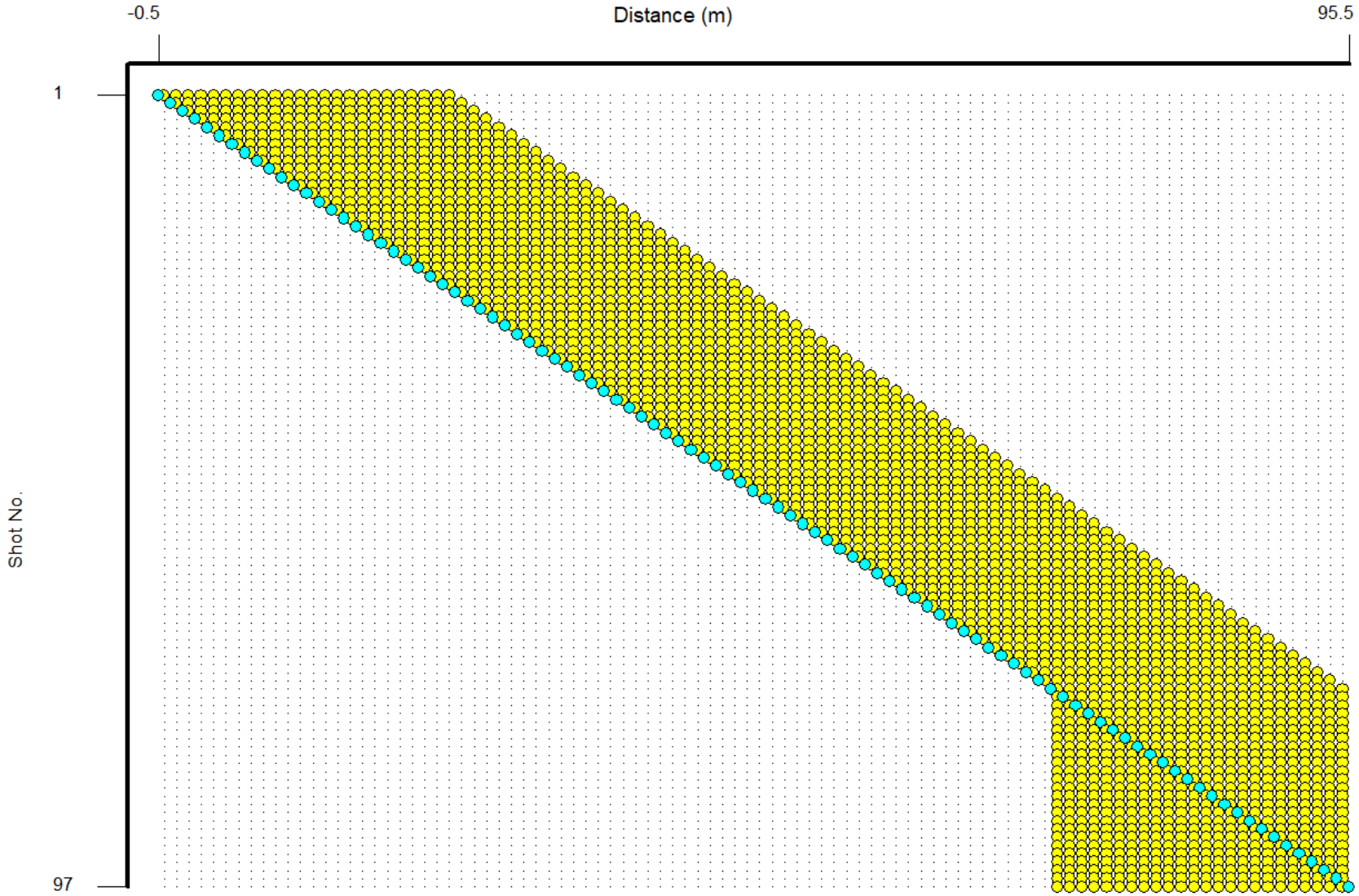




Select “OK”

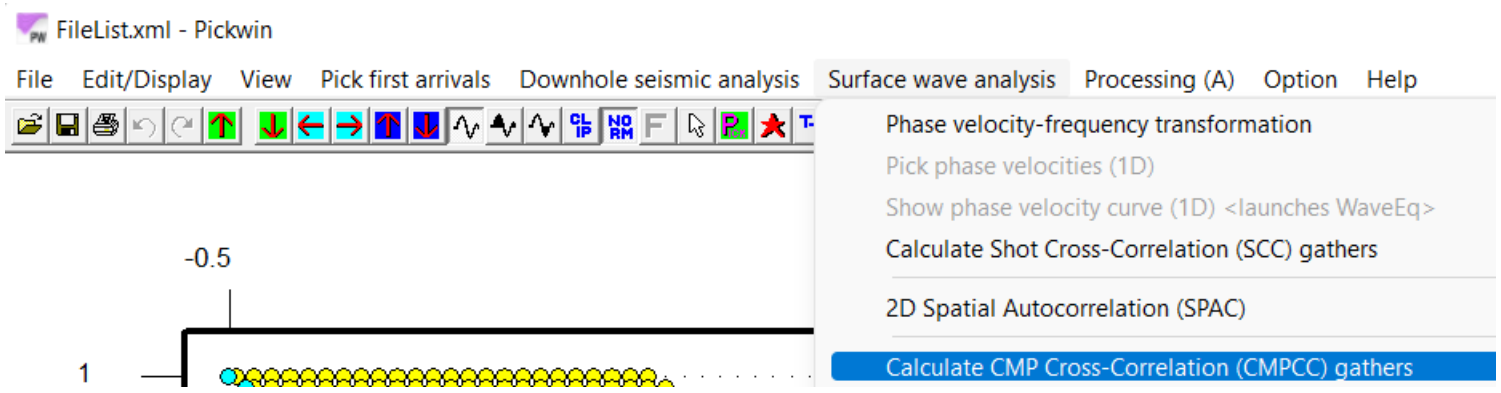
Set up Geometry

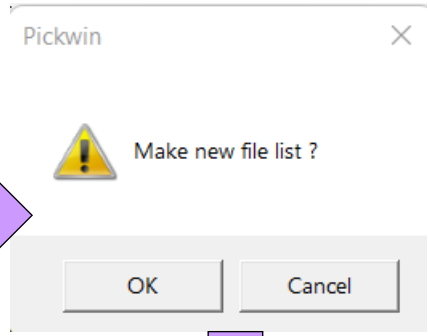
Confirm acquisition geometry



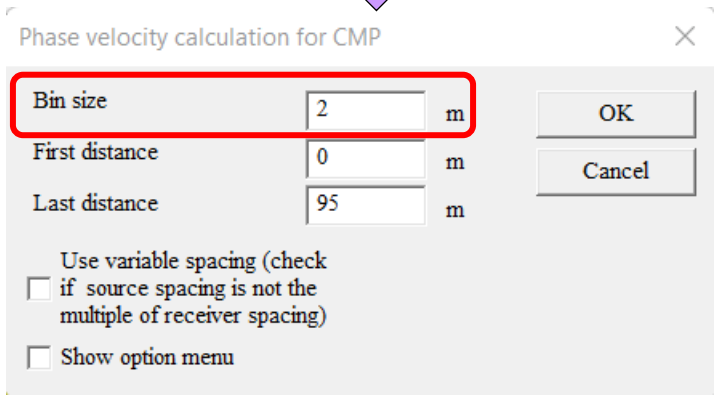
Calculate CMP Cross-Correlation (CMPCC) gathers

Select “Surface wave analysis”, “Calculate CMP Cross-Correlation (CMPCC) gathers”





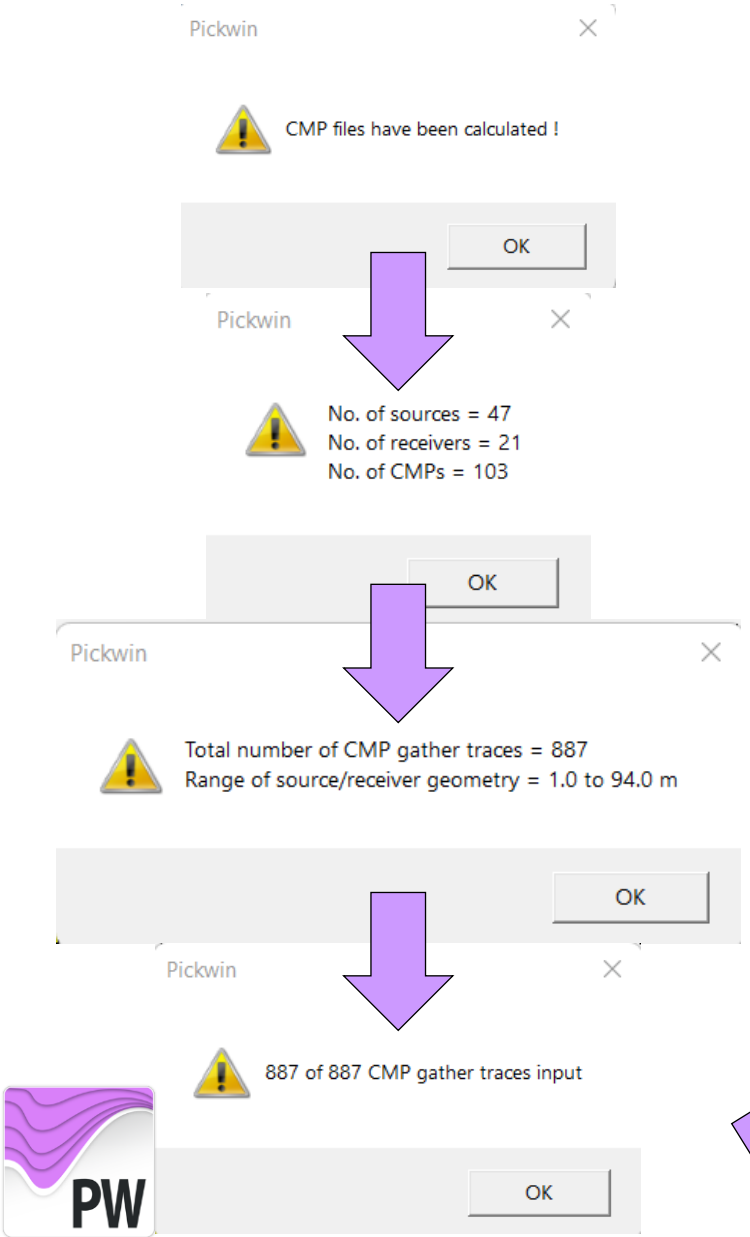
Click “OK”

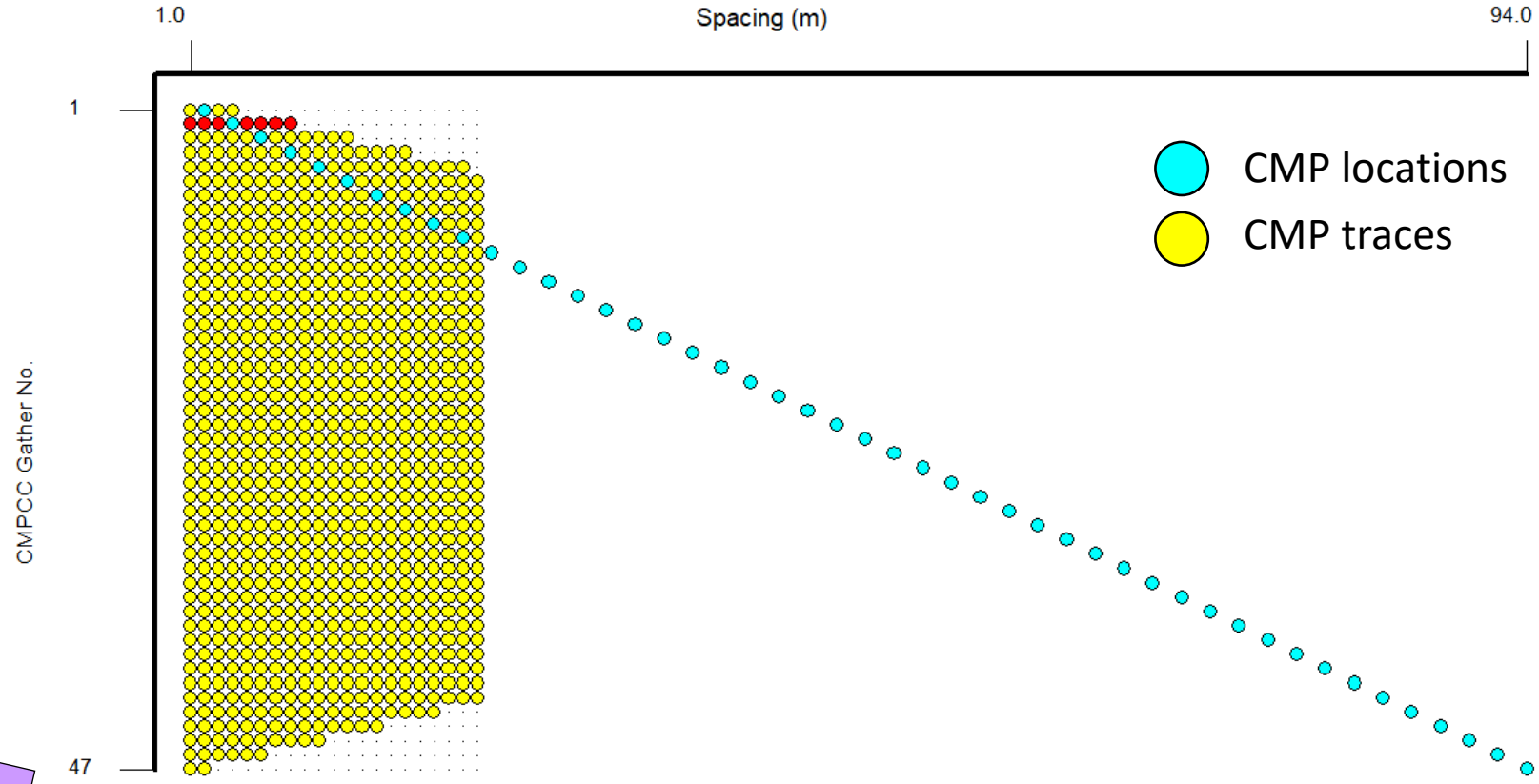


Click “OK”

The bin size is interval of CMPCC gathers.
Default value is set to the double of receiver spacing.

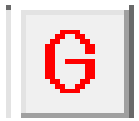
Calculate CMP Cross-Correlation (CMPCC) gathers

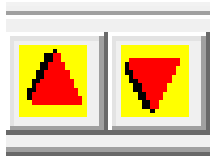


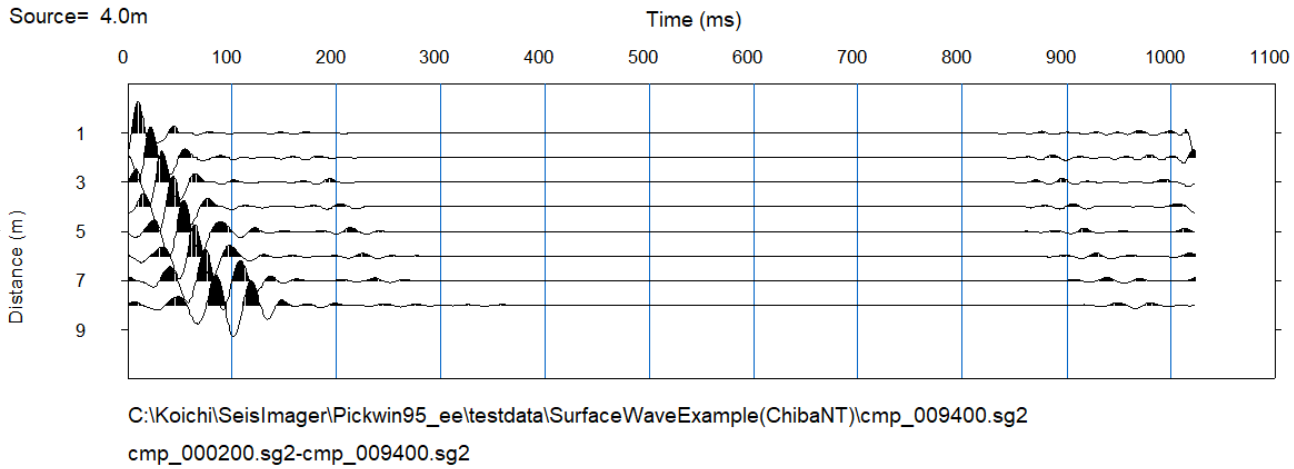


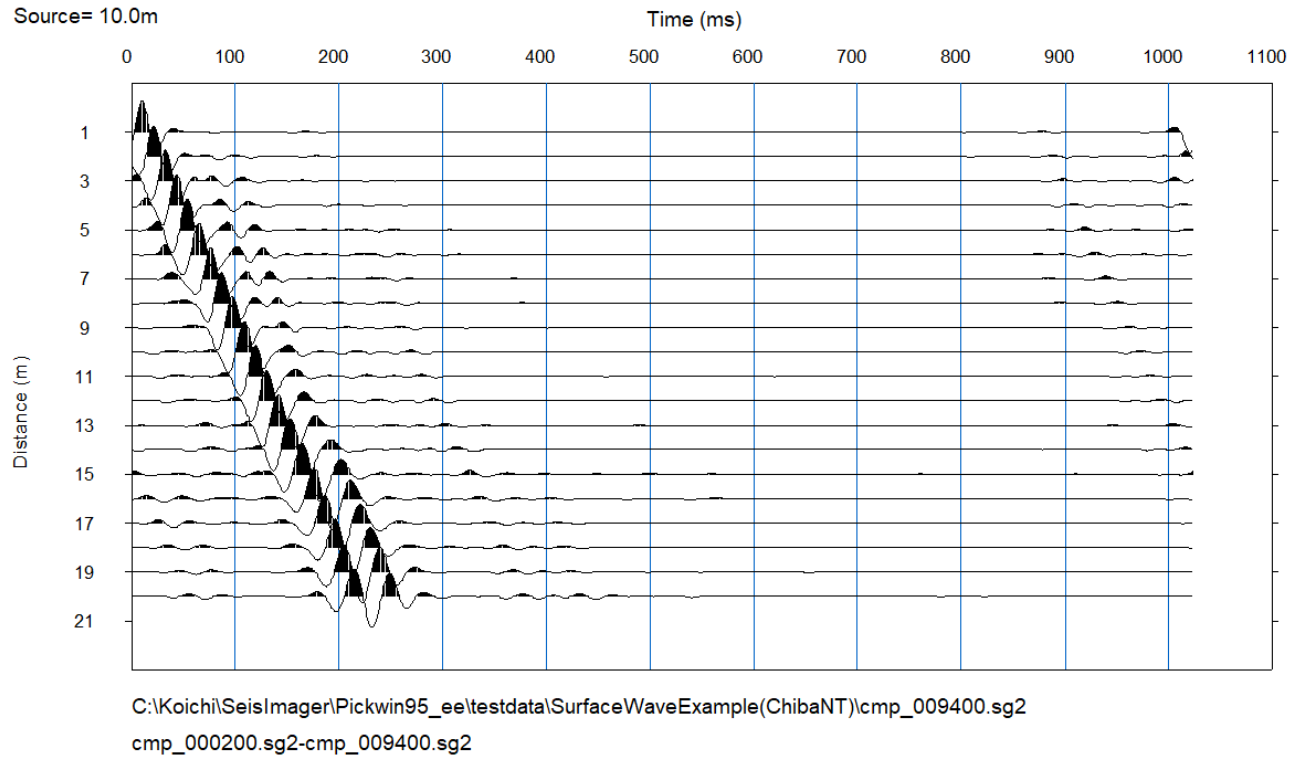
Examine CMP Cross-Correlation (CMPCC) gathers (not required)

Click  to show CMPCC traces

Click  to show CMPCC geometry

Use  to scroll CMPCC gathers

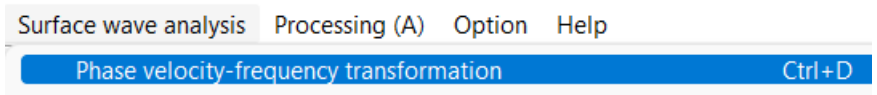


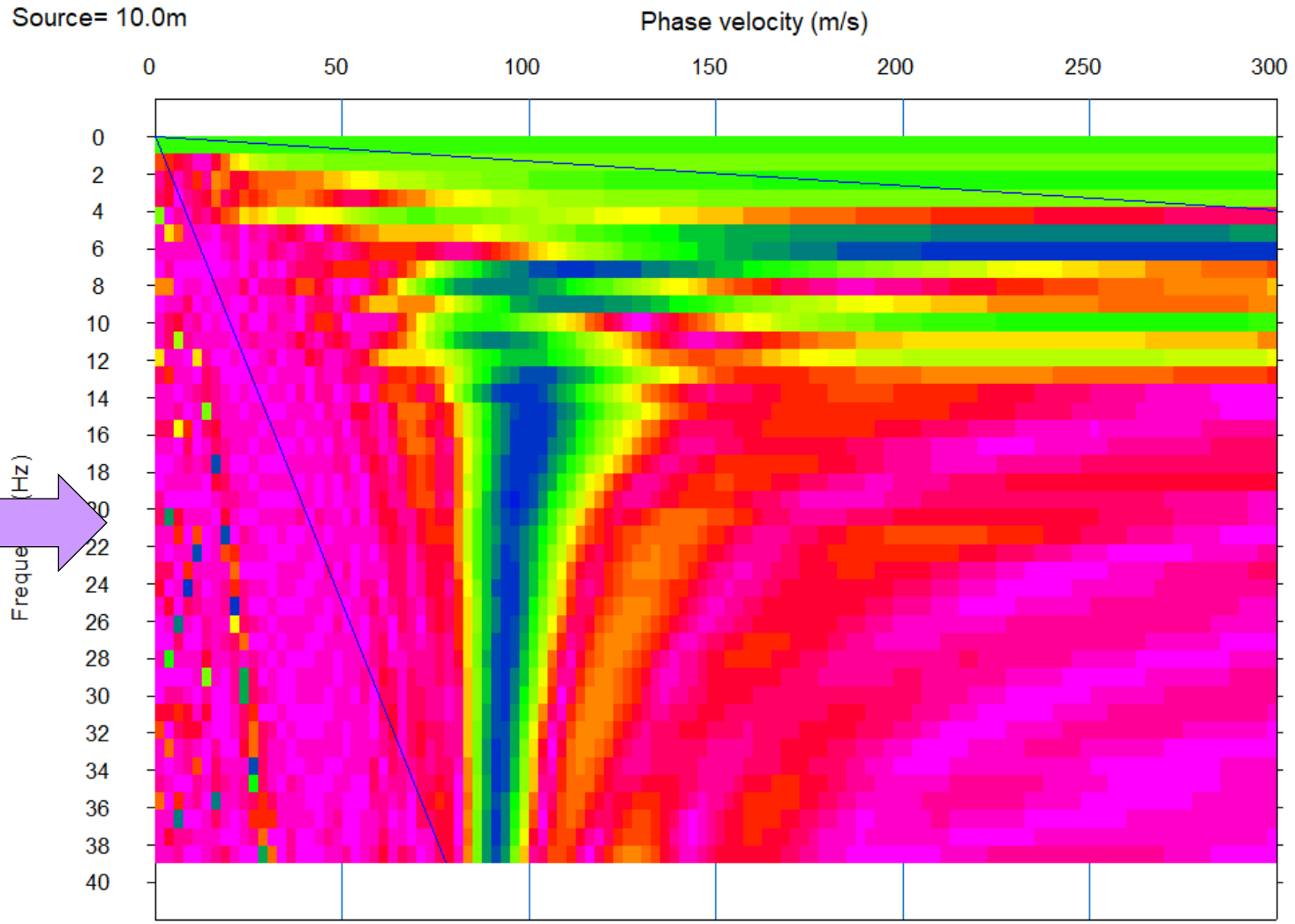


Examine CMP Cross-Correlation (CMPCC) gathers

It is strongly recommended to take a look several phase velocity images to decide phase velocity and frequency ranges, and minimum frequency to pick phase velocity before picking dispersion curves

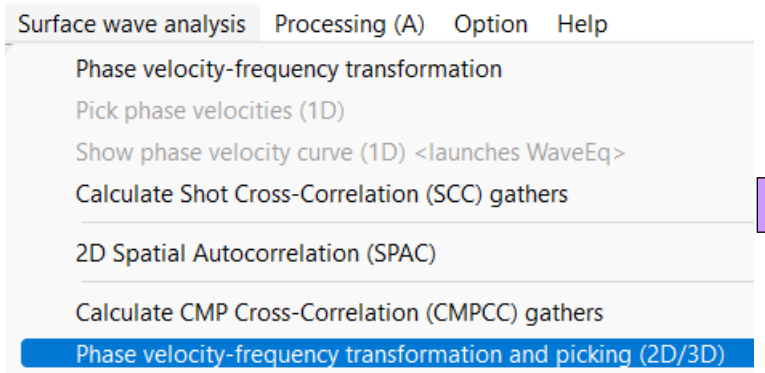
Select “Surface wave analysis”, “Phase velocity-frequency transformation” or press “Ctrl+D” to show a phase velocity image for each CMPCC gather.



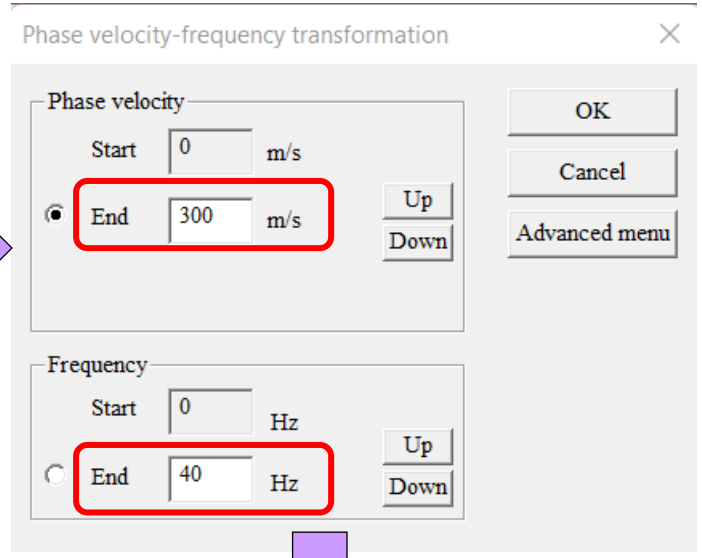


Calculate phase velocity images and pick dispersion curves for all CMPCC gathers

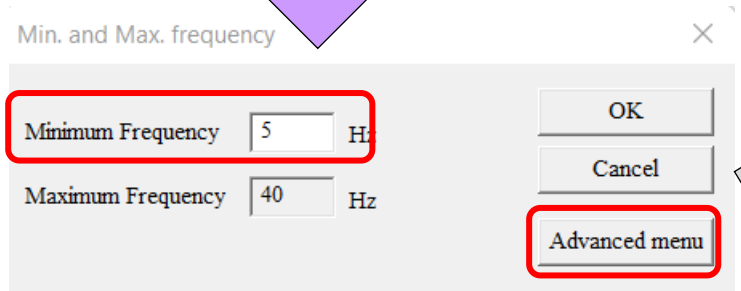
Select “Surface wave analysis”, “Phase velocity-frequency transformation and picking (2D/3D)”



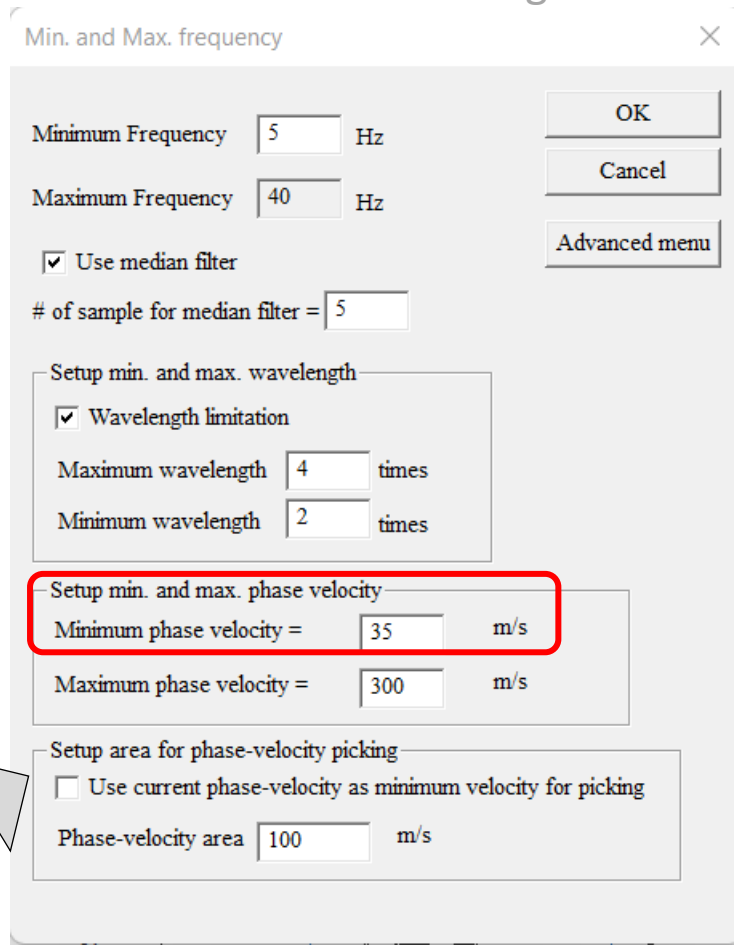
Set up phase velocity and frequency range based on phase velocity image shown in previous page.



Change minimum frequency to pick dispersion curves based on the phase velocity image.

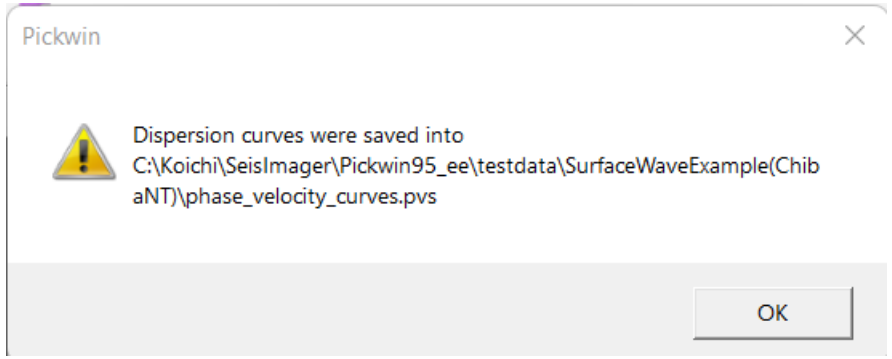


It is sometimes better to change “Minimum phase velocity”. Click “Advanced menu” to change it.

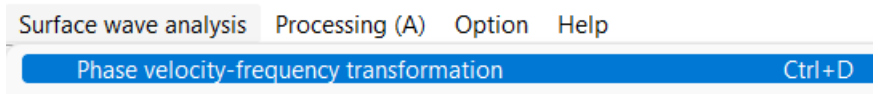


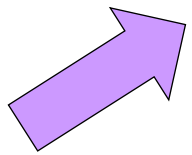
Calculate phase velocity images and pick dispersion curves for all CMPCC gathers

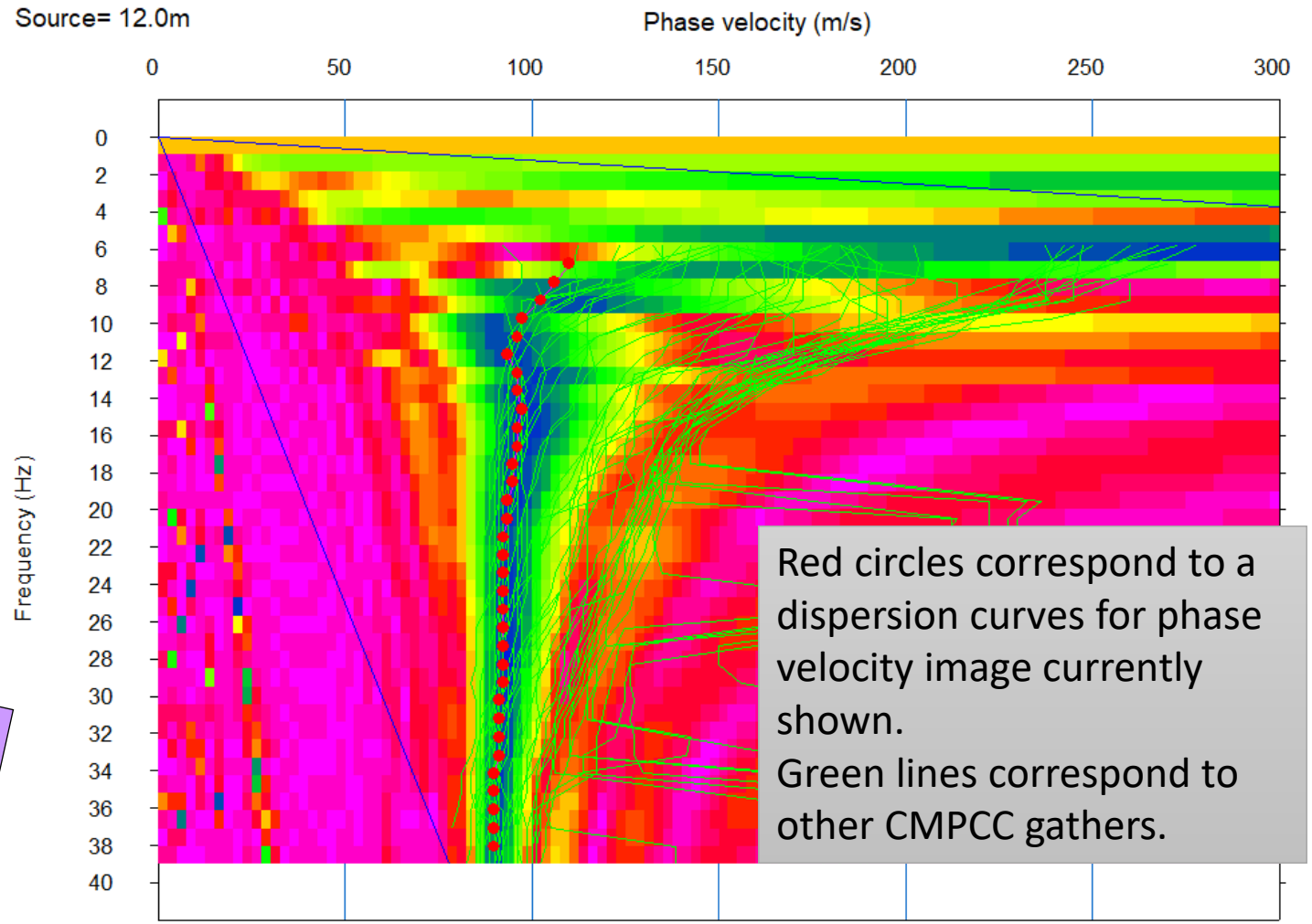
Picked dispersion curves were automatically saved in a .pvs file.



It is strongly recommended to take a look several phase velocity images.
Select “Surface wave analysis”, “Phase velocity-frequency transformation” or press “Ctrl+D” to show picked dispersion curves on a phase velocity image for each CMPCC gather.

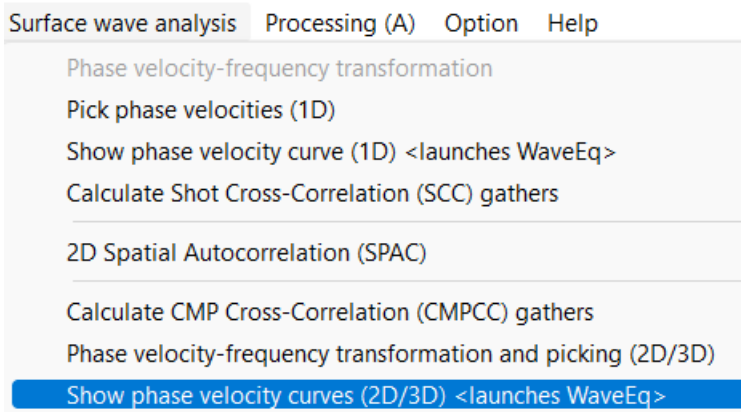




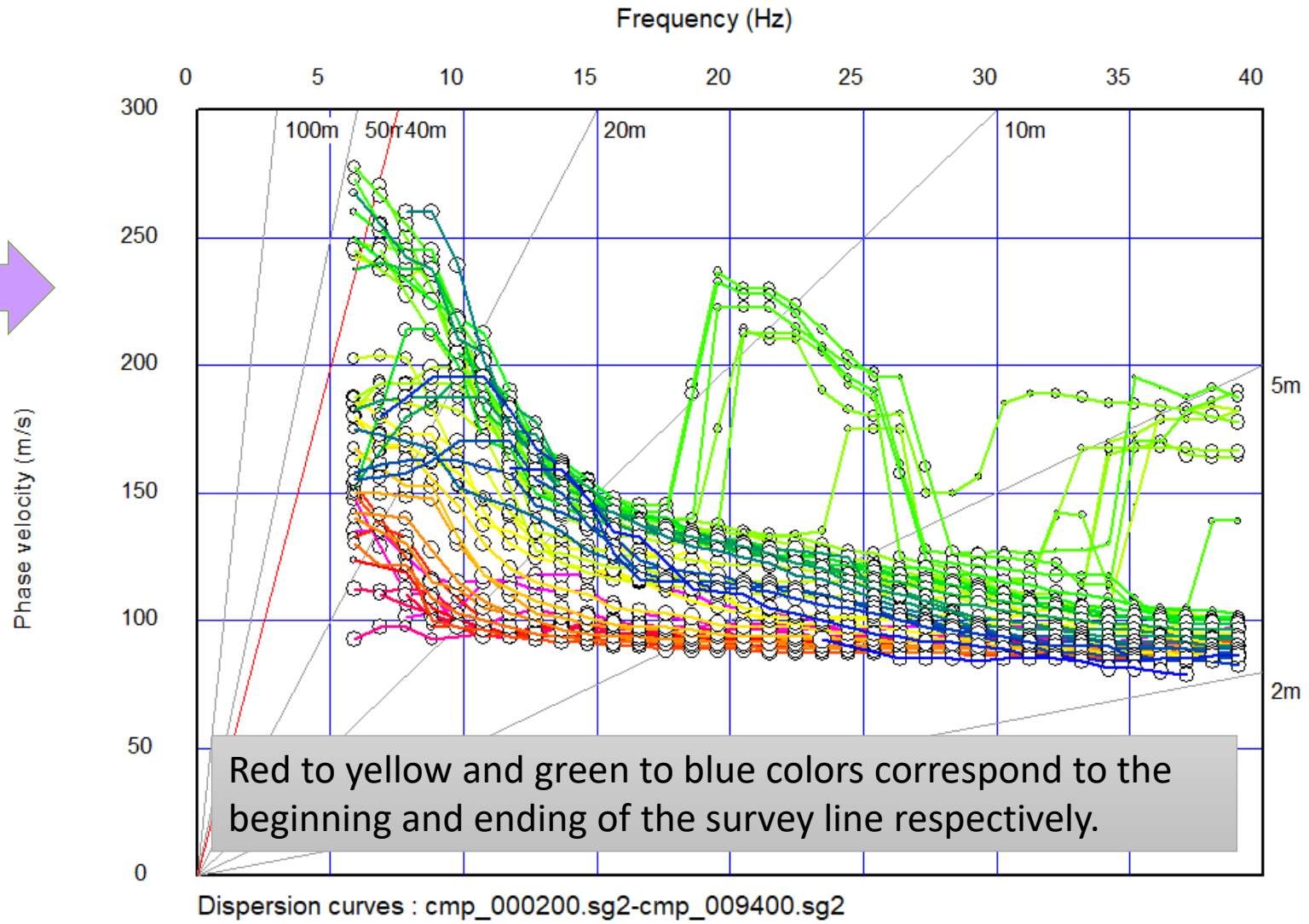


Show dispersion curves by WaveEq

Select “Surface wave analysis”, “Show Phase velocity curves (2D/3D)”.



WaveEq is automatically launched and phase velocity curves appears.



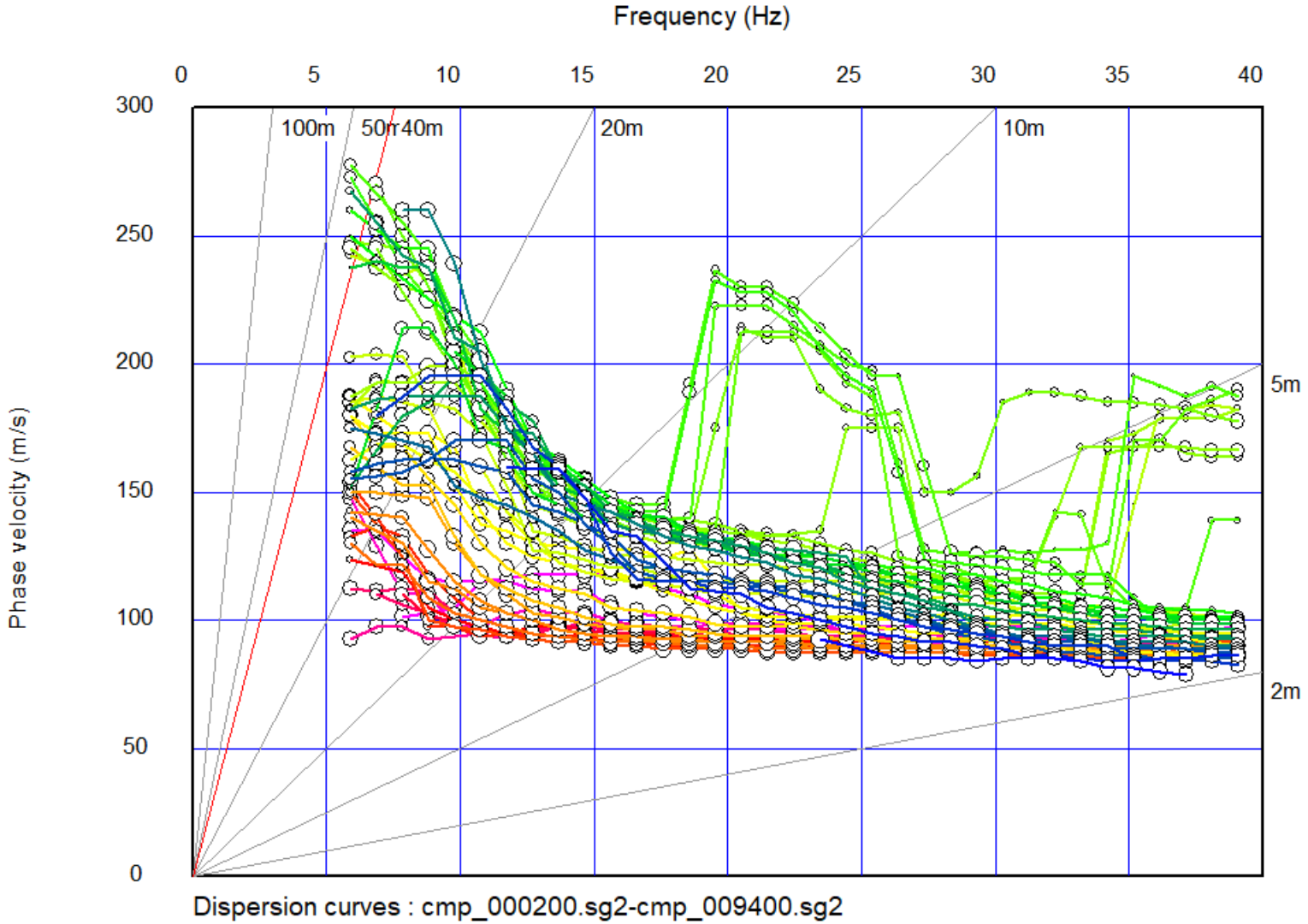
Show dispersion curves by WaveEq

Delete noises or unnecessary phase velocities like 1D processing.

Use  to scroll dispersion curves.

Use  to change how many dispersion curves are shown.

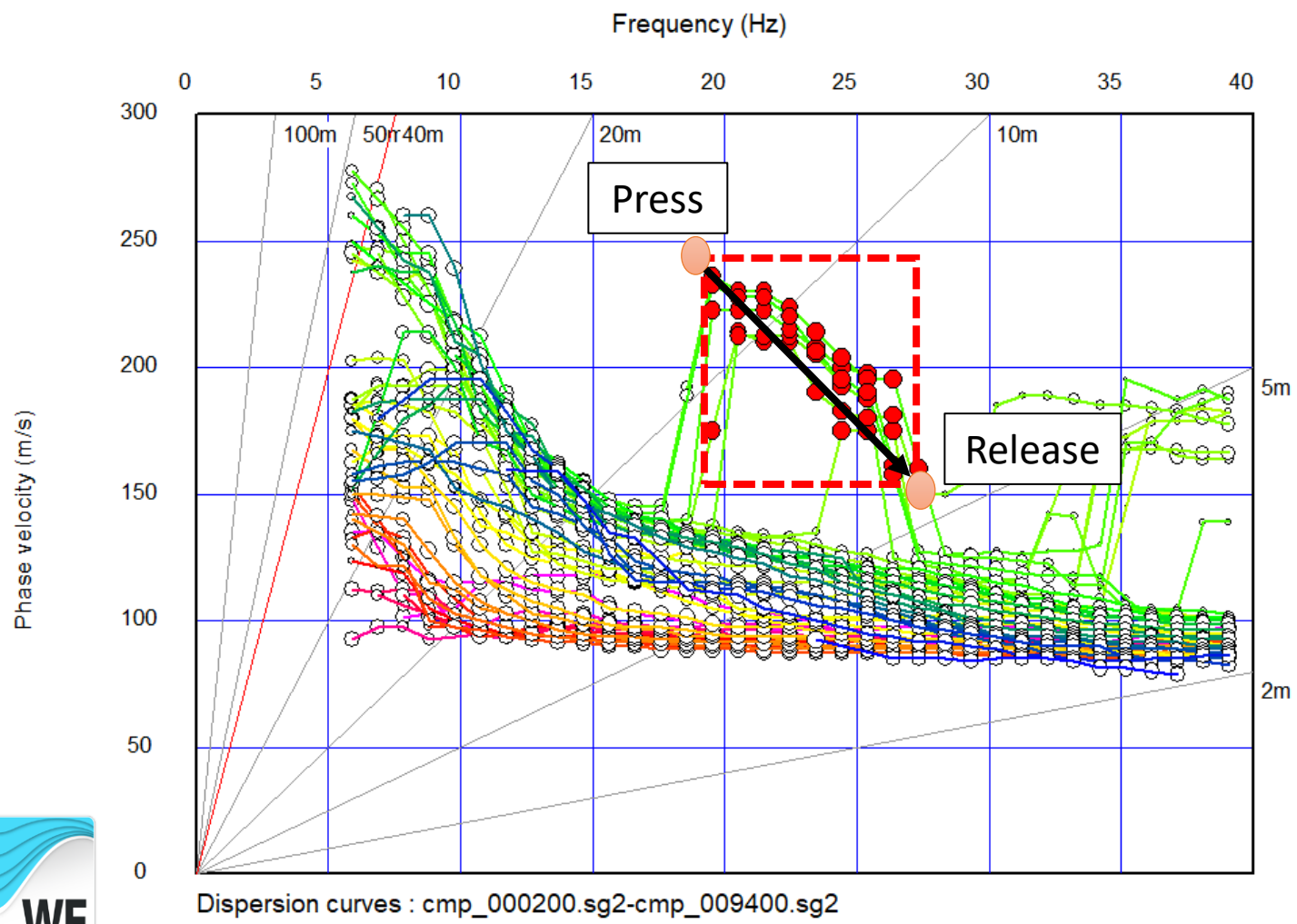
Use  to single and multi phase velocities.

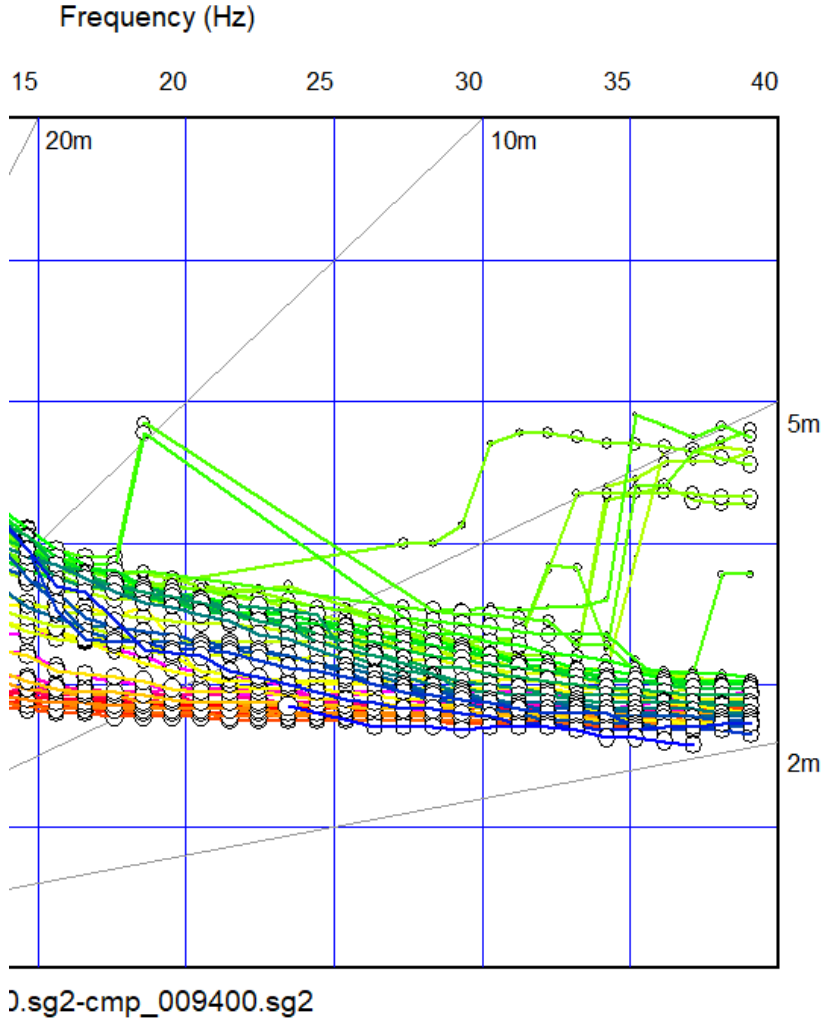


Edit dispersion curves

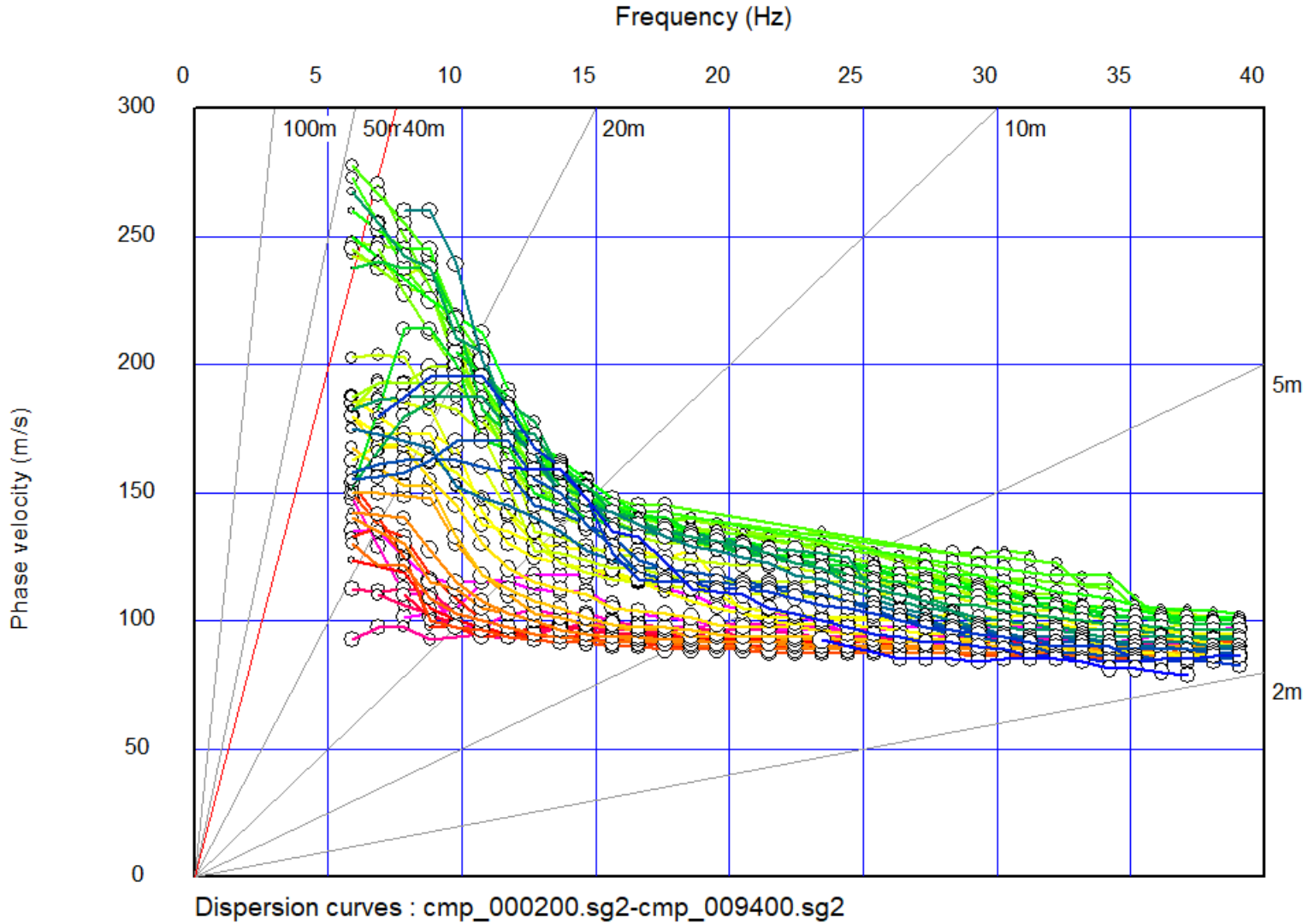
Click  to select multi-phase velocities.

Hit “Delete” key to delete selected phase velocities.

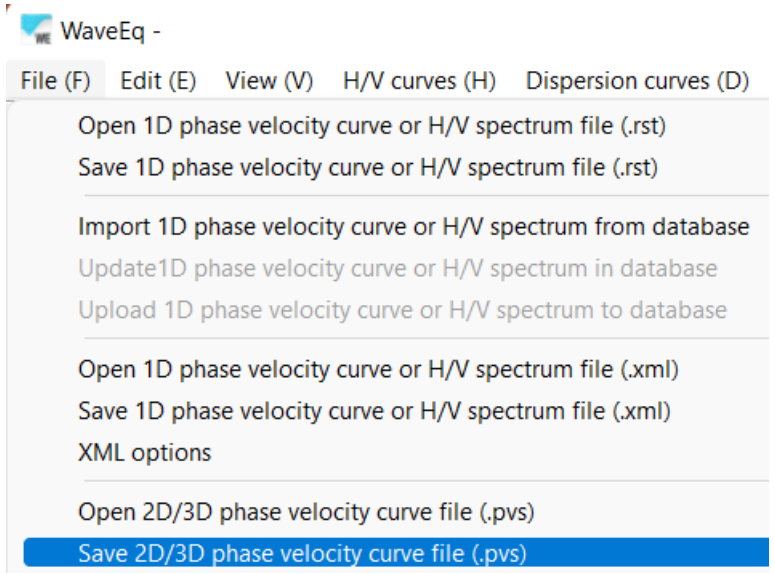




Edit dispersion curves

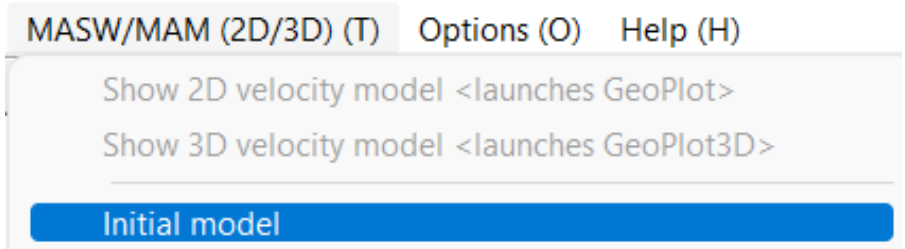


Select “File”, “Save 2D/3D phase velocity curve” to export all dispersion curves to an ASCII file (.pvs).

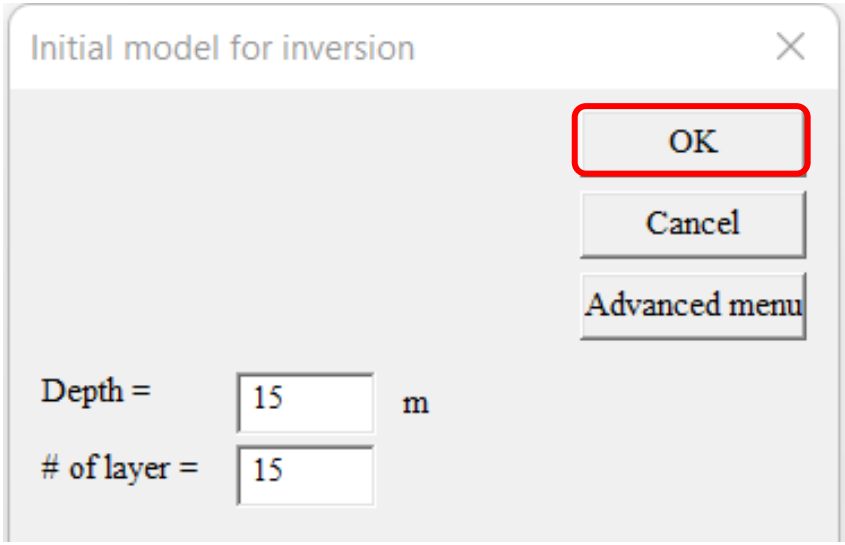


Create an initial velocity model

Select “MASW/MAM (2D/3D)”, “Initial model” to create an initial velocity model.



Set depth and the number of layers of model and click “OK”.

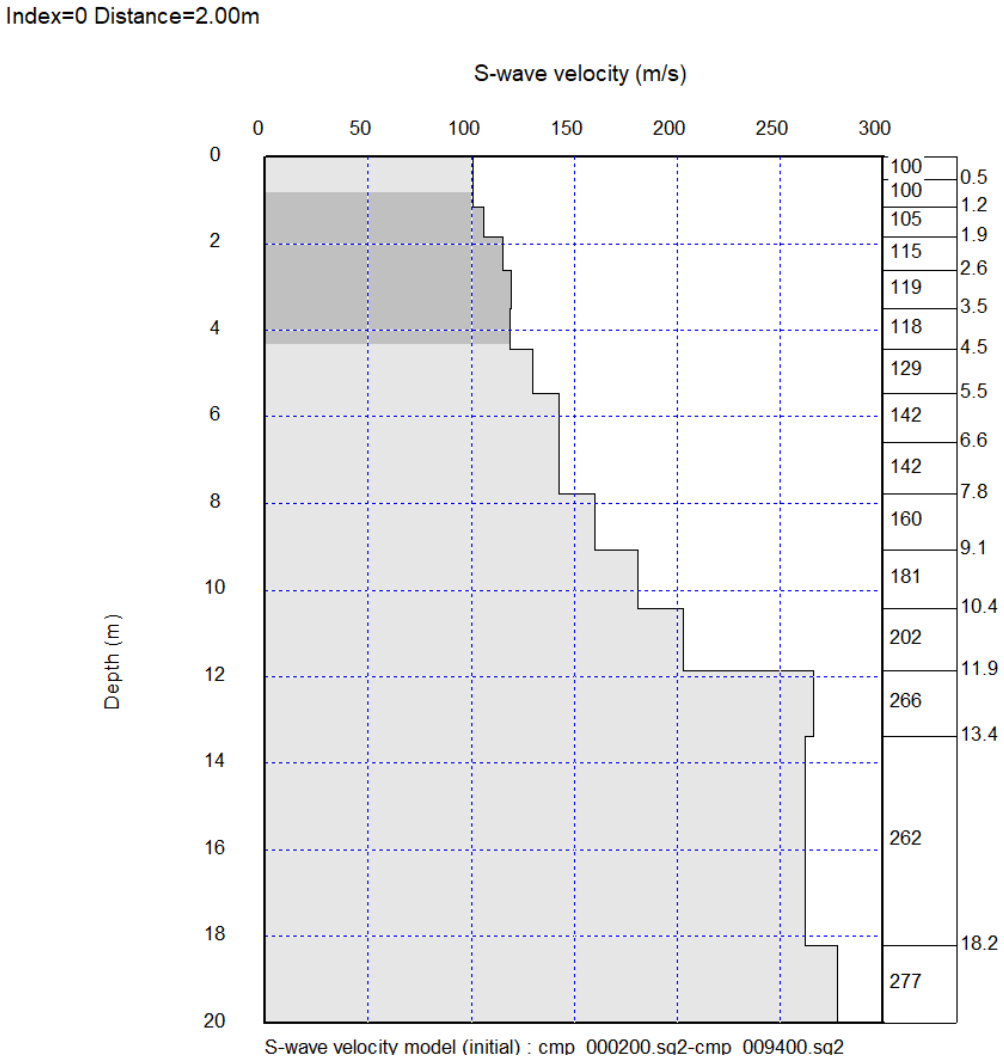


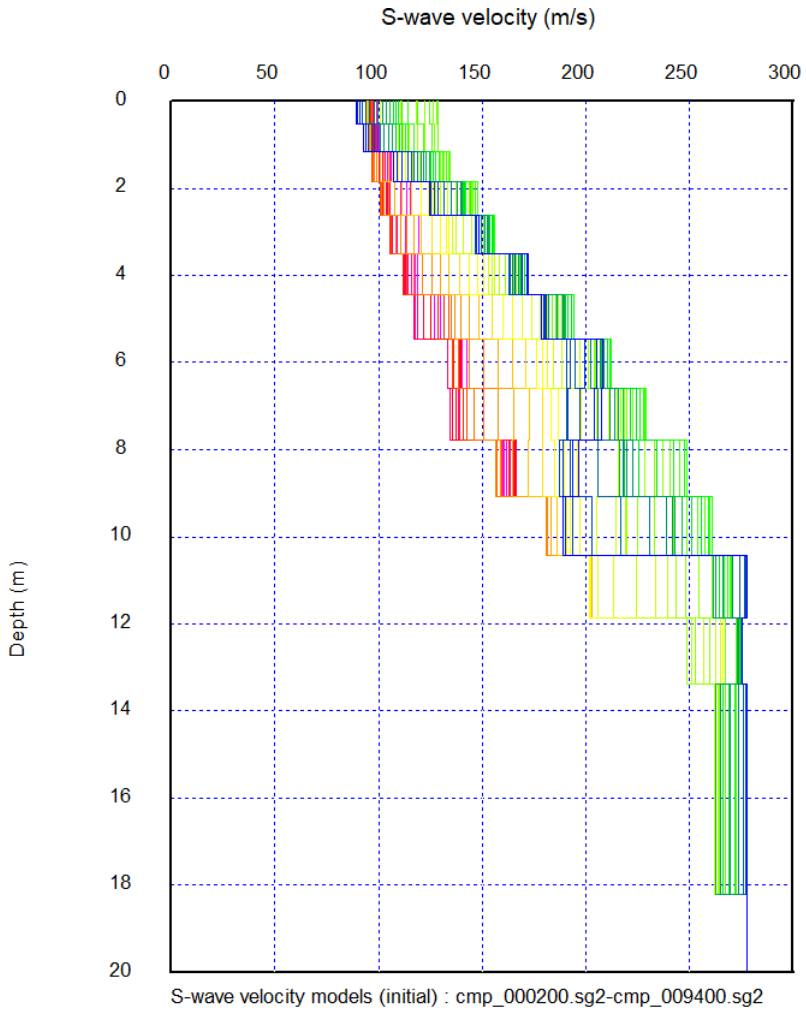
Create an initial velocity model

Initial velocity model appears.

Use 

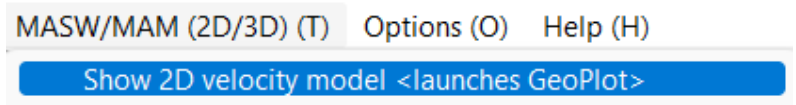
to change how many velocity profiles are shown like dispersion curves.



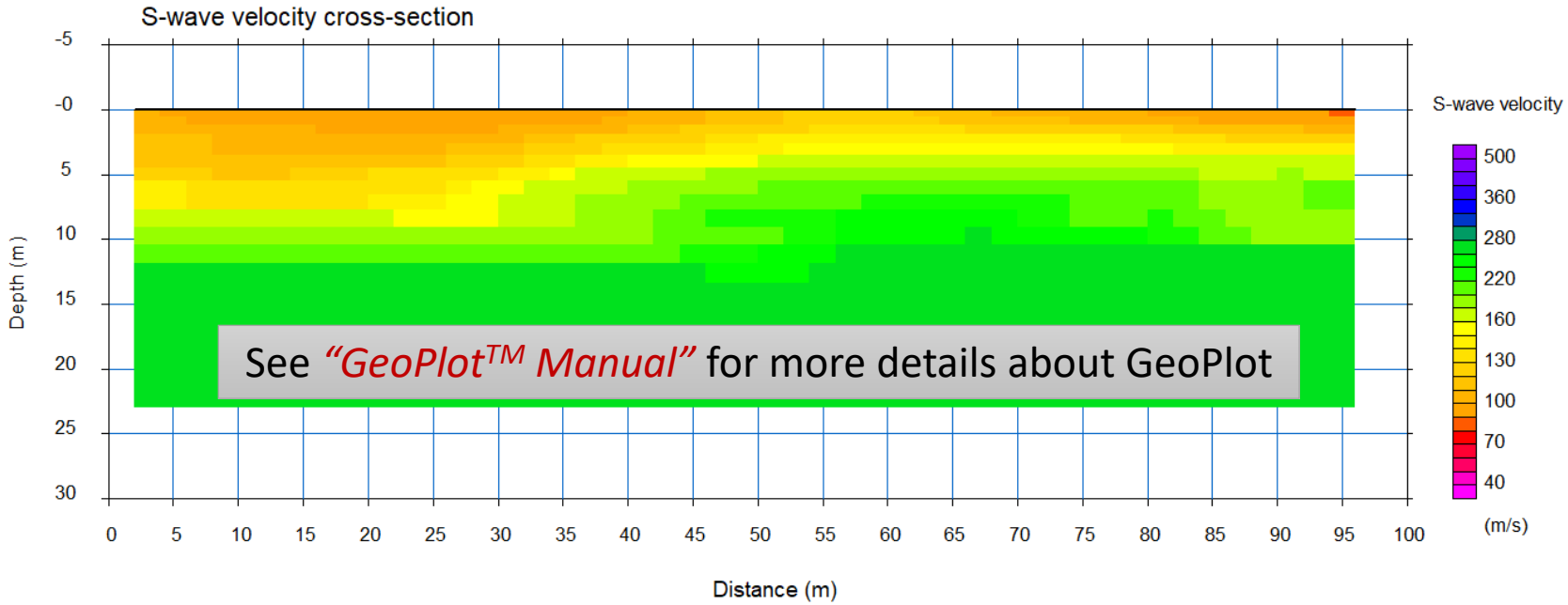


Show 2D velocity model by GeoPlot3D

Select “MASW (2D/3D)”, “Show 2D velocity model <launches GeoPlot>”. Note that you can apply inversion before showing 2D velocity model.

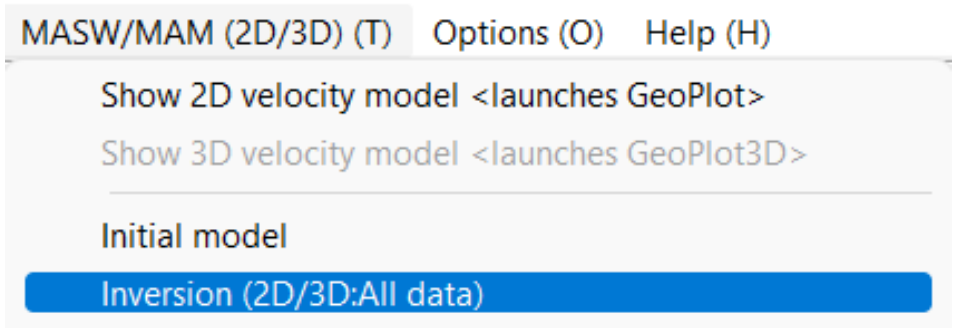


GeoPlot launches and velocity model appears.

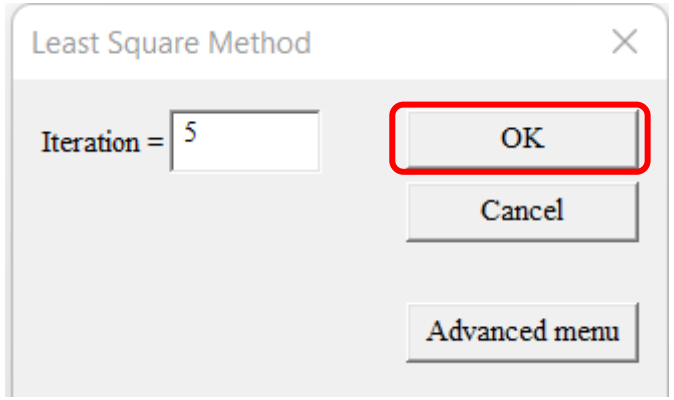


Apply inversion

Select “MASW (2D/3D)”, “Inversion (2D/3D:All data)” to apply inversion to all dispersion curves at once.



Set the number of iteration for inversion and click “OK” to start the inversion.



See *“SeisImager/SW-ProTM Manual”* for more details about various inversion.