

# *Geogiga Seismic Pro 9.0*

## *Release Notes*



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## Introduction

This documentation introduces the release of *Geogiga Seismic Pro 9.0*.

*Geogiga Seismic Pro* is a complete seismic data processing and interpretation software package adapted to near-surface geophysics. It contains 18 standalone applications handling the full range of seismic survey methods from Reflection, Refraction, and Surface Wave to Borehole Seismic. There are also Utilities for wavefield modeling, velocity model plotting, and much more.

In this release, two new modules have been added:

- *Modeling 2D* – Full wavefield modeling software for complex velocity structures.
- *Surface RT* – Real-time monitoring software for passive surface wave data.

There are also new features, minor updates, and bug fixes for existing modules.

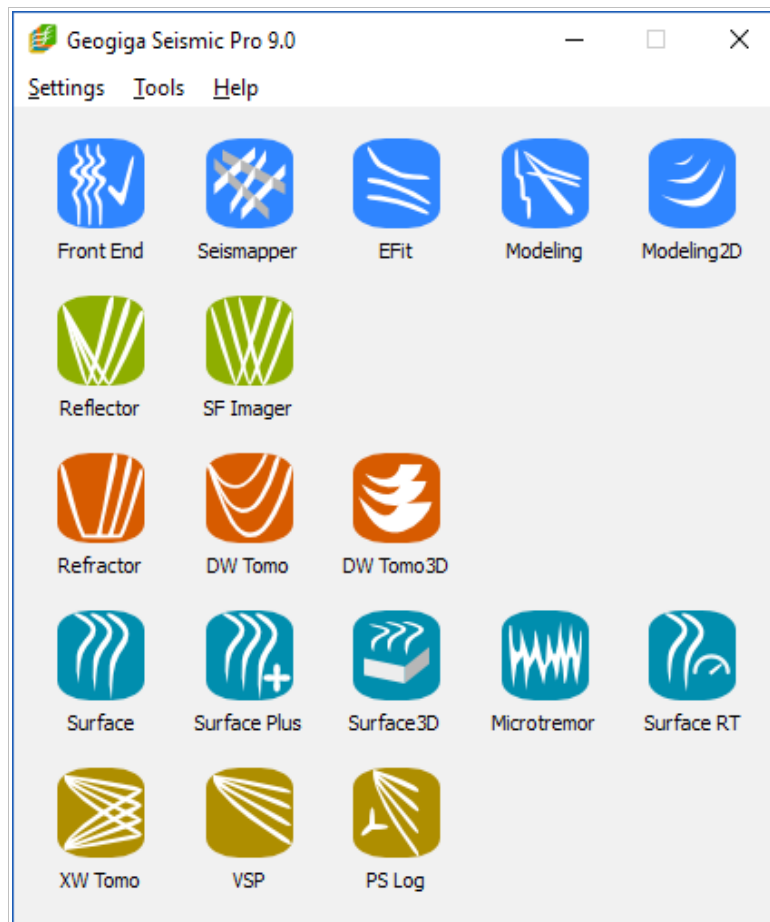


Figure 0-1: *Geogiga Seismic Pro 9.0* Launchpad

The release notes of *Seismic Pro* 9.0 are provided in the following order:

- Part 1 – New modules including *Modeling 2D* and *Surface RT*.
- Part 2 – General enhancements.
- Part 3 – Utility modules including *Front End*, *Seismapper*, *EFit*, and *Modeling*.
- Part 4 – Reflection modules including *Reflector* and *SF Imager*.
- Part 5 – Refraction modules including *Refractor*, *DW Tomo*, and *DW Tomo3D*.
- Part 6 – Surface Wave modules including *Surface*, *Surface Plus*, *Surface3D*, and *Microtremor*.
- Part 7 – Borehole Seismic modules including *XW Tomo*, *VSP*, and *PS Log*.

## Part 1 – New Modules

There are two new modules in *Seismic Pro 9.0*:

- *Modeling2D*
- *Surface RT*

### ***Modeling2D***

*Modeling2D* is the 2-D seismic wavefield modeling software based on the elastic wave equation. It uses the finite-difference method to simulate the full wavefield of elastic waves in complex velocity structures. During modeling, wavefields and seismograms are built, displayed and can be saved in files.

The following are the main features in *Modeling2D*:

- Build velocity model
- Set up geometry and data acquisition parameters
- Simulate full wavefield of elastic waves
- Display wavefields and seismograms
- Save snapshots in files

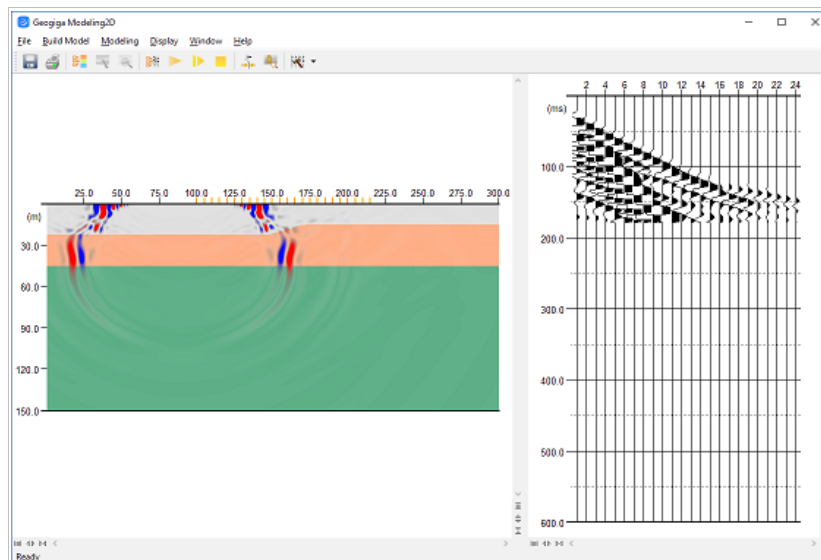


Figure 1-1: Velocity model building

## Surface RT

*Surface RT* is the real-time monitoring software for passive surface wave data. It generates dispersion images in real time during field data acquisition. When the dispersion images become stable, the data acquisition can be stopped. *Surface RT* improves the efficiency of field surveying while ensuring high data quality.

The following are the main features in *Surface RT*:

- Input geometry
- Set up data communication
- Generate and display dispersion images in real time
- Estimate the maximum depth of investigation

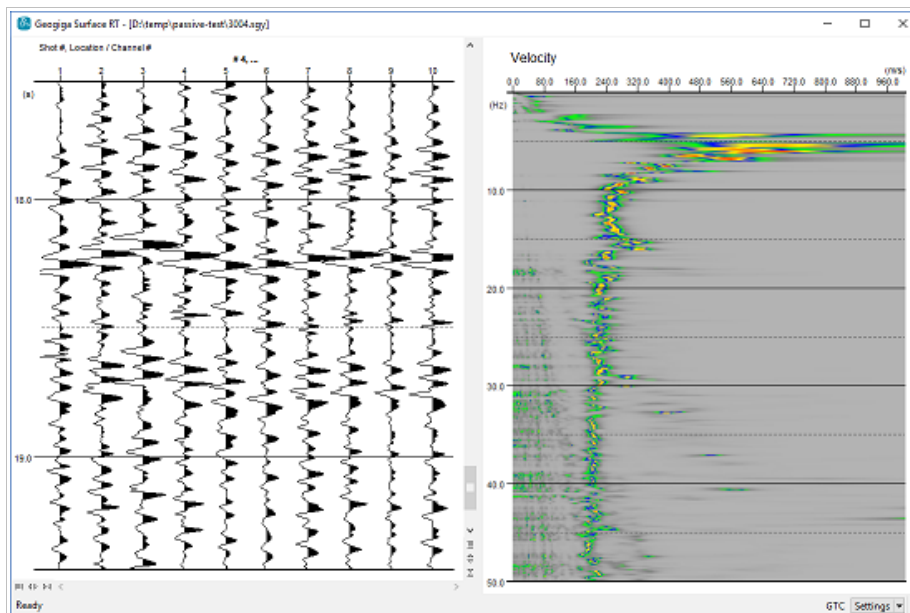


Figure 1-2: Real-time monitoring of passive surface wave data

## Part 2 – General Enhancements

The following enhancements apply to most of the modules in *Seismic Pro 9.0*:

- When individual seismic data files are imported, the files can be sorted by filename or shot point number, and the shot point locations can be exported in order to convert 2D coordinates to 1D, according to distances.

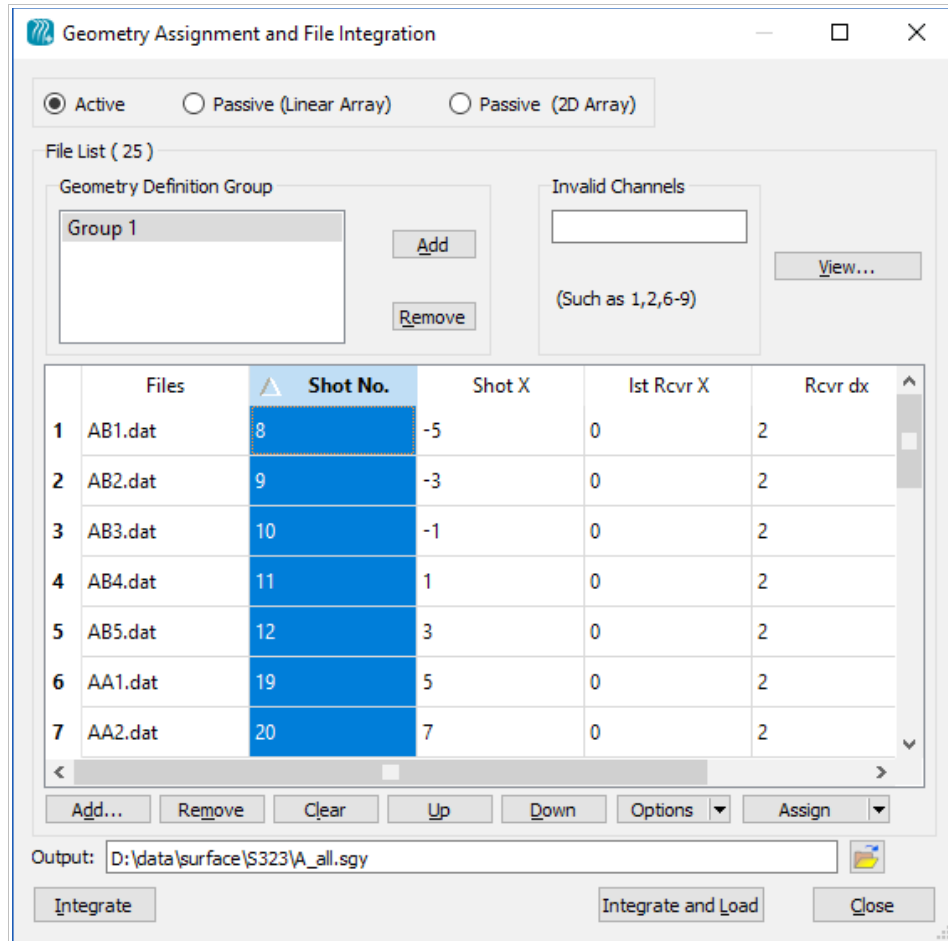


Figure 2-1: Sorting files by shot point numbers

- The geometry can also be plotted as the stacking chart, and more options are added for the geometry plot.
- The distance between any two points can be interactively measured on a 2D geometry plot.

- When a first arrival or dispersion curve file and seismic data file are loaded together, the filename extension of the selected seismic data will be saved, so there is no need to change the extension every time.
- Multiple elevation data files can be inputted at a time, and the elevation data will be automatically sorted and merged according to the X coordinates.
- The elevation profile can be printed or saved as an image.
- The right Y-axis and bottom X-axis can be annotated on a velocity section.
- The size of an image can be adjusted to fit the paper size for printing.
- The issue where some contour lines may break is fixed.

## Part 3 – Utility Modules

There are five Utility modules in *Seismic Pro* 9.0:

- *Front End*
- *Seismapper*
- *EFit*
- *Modeling*
- *Modeling2D*

The updates in *Front End* 9.0 include:

- The free version of *Front End* is renamed *Front End Express*, and the Express edition offers more features than any previous free versions.
- The directory and data type of recent files are saved so that the data files can be quickly located next time when *Front End* is started.
- 3D coordinates of receivers and shot points can be viewed or assigned.
- The SAC format is supported and single station seismic traces can be assembled to form a record, especially for passive surface wave data processing.

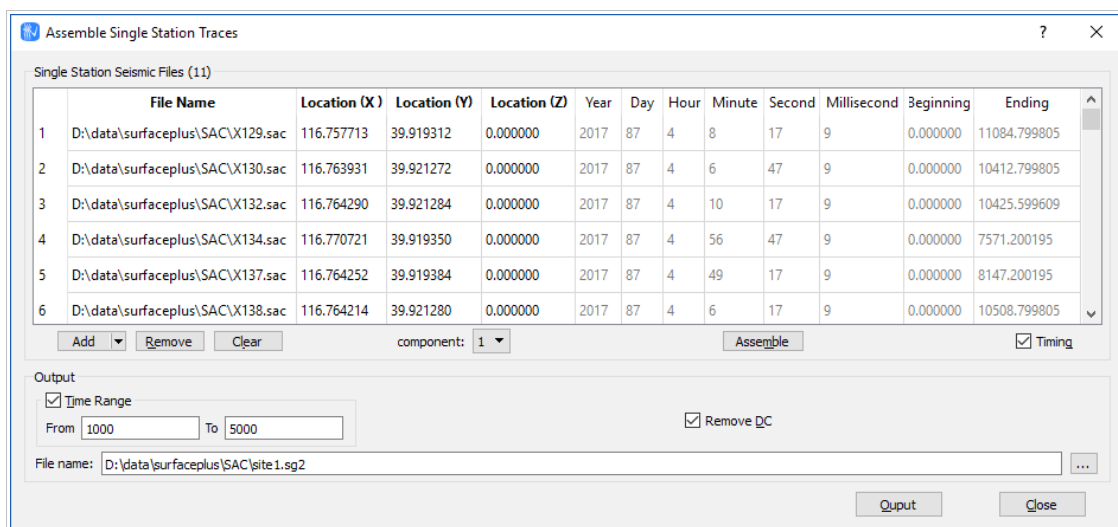


Figure 3-1: Assembling single station SAC files

- The trace increment and filename suffix options are added in order to efficiently extract traces from 3-component data.
- The frequency spectrum of seismic data within a selected region can be plotted, and the selected data can be filtered with redo and undo supported.

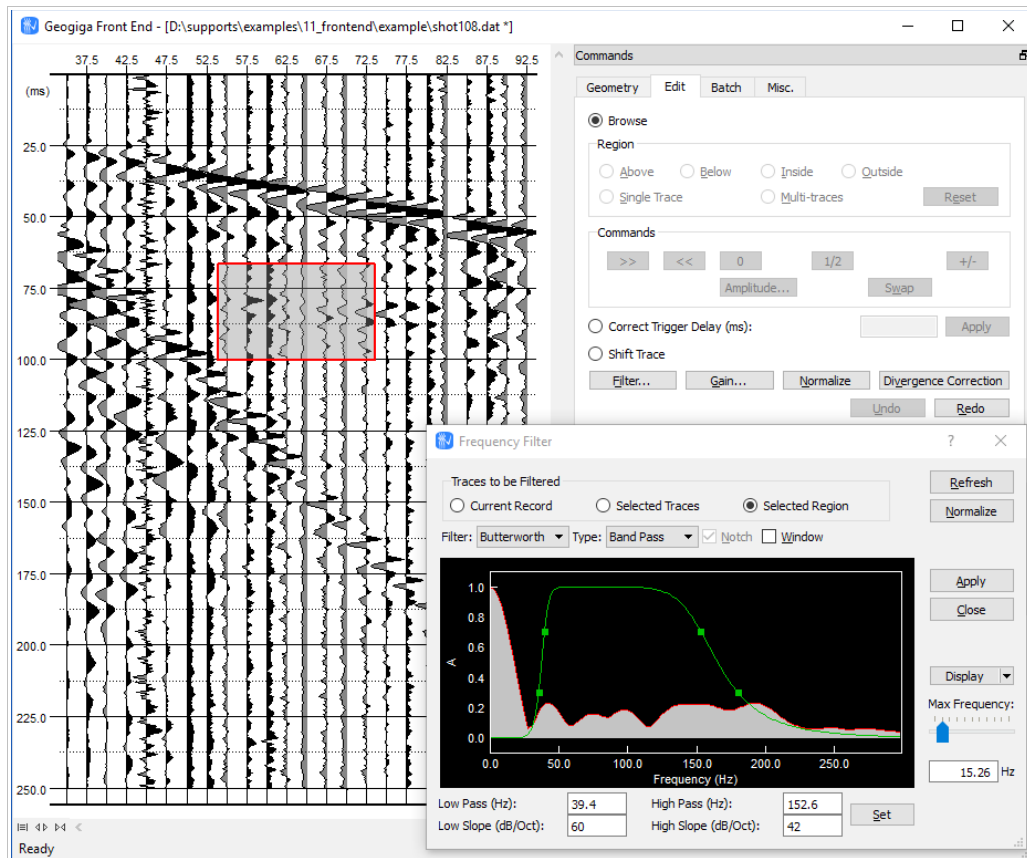


Figure 3-2: Filtering data within a selected region

The updates in *Modeling 9.0* include:

- A layer can be easily inserted or deleted when a velocity model is defined.
- The dispersion curve generated in the simulation of surface waves can be outputted in a text file.

## Part 4 – Reflection Modules

There are two modules for seismic reflection in *Seismic Pro*:

- *SF Imager*
- *Reflector*

The updates in *SF Imager* 9.0 include:

- For the first arrival based static correction, first arrivals can be quickly picked by moving the mouse along waveforms while holding down the **Ctrl** key.
- The frequency spectrum of seismic data within a selected region can be plotted, and the selected data can be filtered with redo and undo supported.
- When a horizon file is loaded, the **Horizon List** in the **Horizon Picking** dialog box is updated accordingly.

The updates in *Reflector* 9.0 include:

- The geometry is plotted as the stacking chart by default.
- Horizon picking is supported. A horizon can be quickly picked by moving the mouse along waveforms while holding down the **Ctrl** key. The picks are automatically snapped to the peak, trough, or zero-cross of the waveform and can be saved in the CSV format for easy importing into Microsoft Excel.

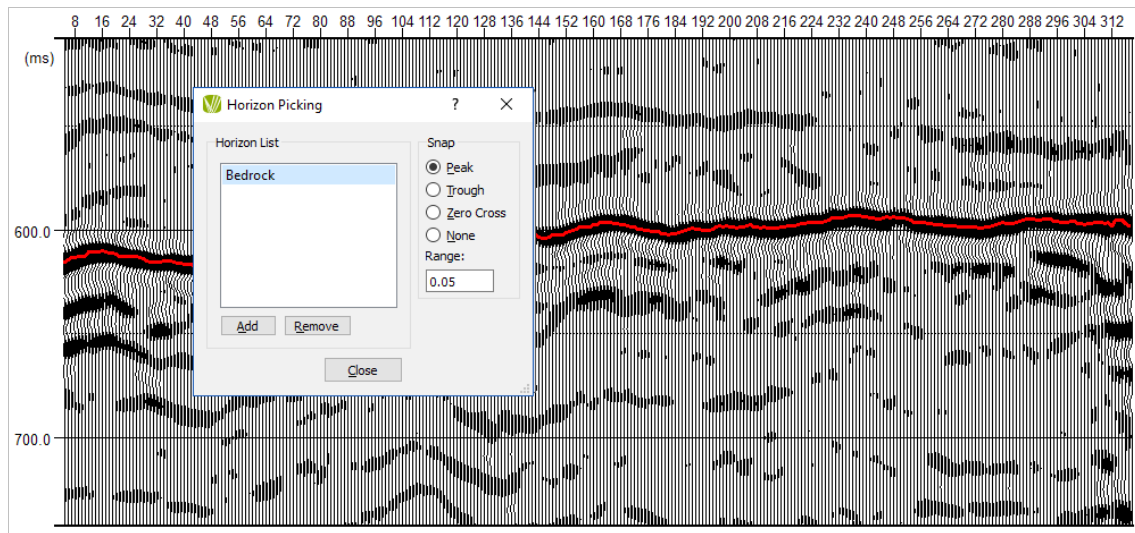


Figure 4-1: Horizon Picking

- The frequency spectrum of seismic data within a selected region can be plotted, and the selected data can be filtered with redo and undo supported.

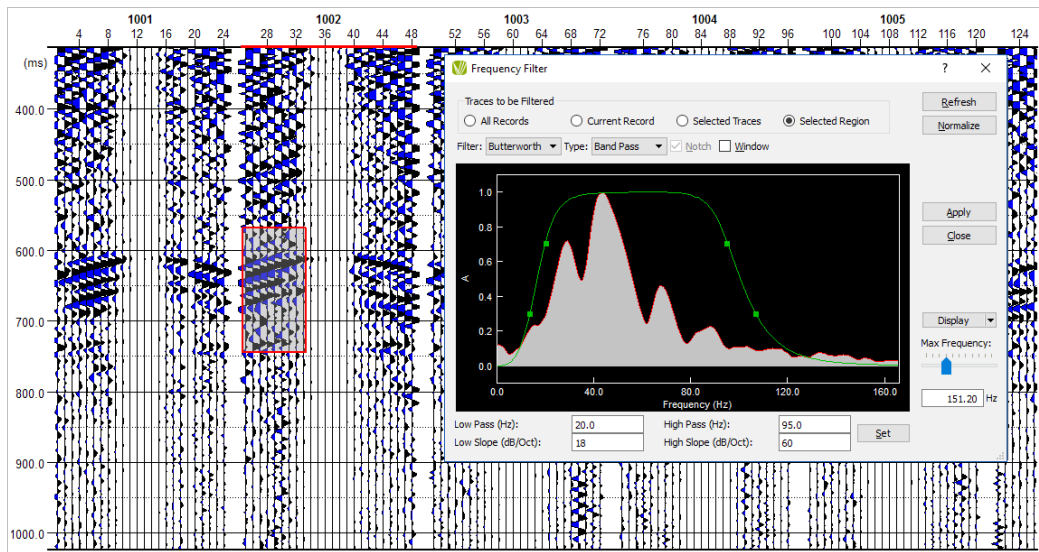


Figure 4-2: Filtering data within a selected region

- The frequency spectrum of each trace can be calculated and displayed.

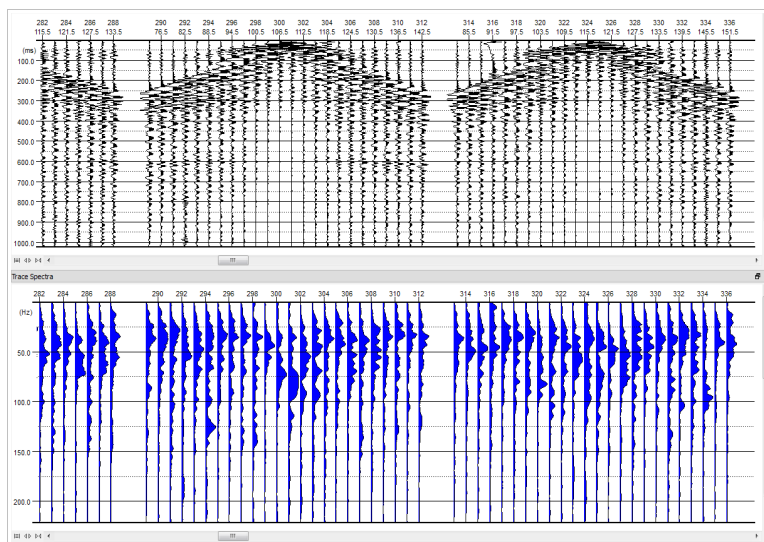


Figure 4-3: Displaying frequency spectrum of each trace

- The parameters of tomostatic correction are simplified and a velocity model with elevation data is supported.
- The velocity field can be exported to a SEG-Y velocity file.

## Part 5 – Refraction Modules

There are three modules for seismic refraction in *Seismic Pro*:

- *Refractor*
- *DW Tomo*
- *DW Tomo3D*

The enhancements common to all three modules include:

- If the number of picks does not match the number of traces when a third-party picks file is opened, the first arrivals will be correctly loaded according to the receiver and shot point coordinates obtained from the seismic trace header.
- More third-party picks formats are supported.

*Refractor* 9.0 includes more new features:

- The color of TX curves and depth curves can be changed for each layer.

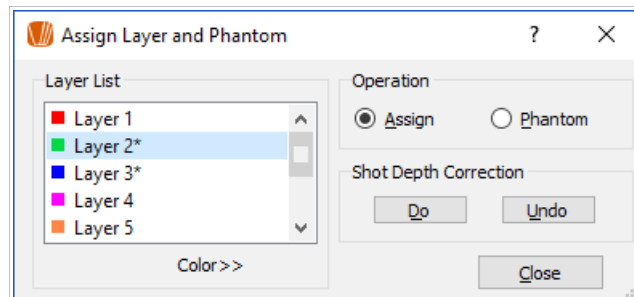


Figure 5-1: Changing the color of curves for each layer

- When a layer is assigned on a TX curve, the layer velocity will be calculated and shown on the **Status Bar**.
- An option to show or hide the mark of the current TX curve is added for printing.

- The velocity analysis feature in GRM is enhanced. A segment can be excluded in calculating the regression line of a velocity analysis function, and the regression line can be shown or hidden.

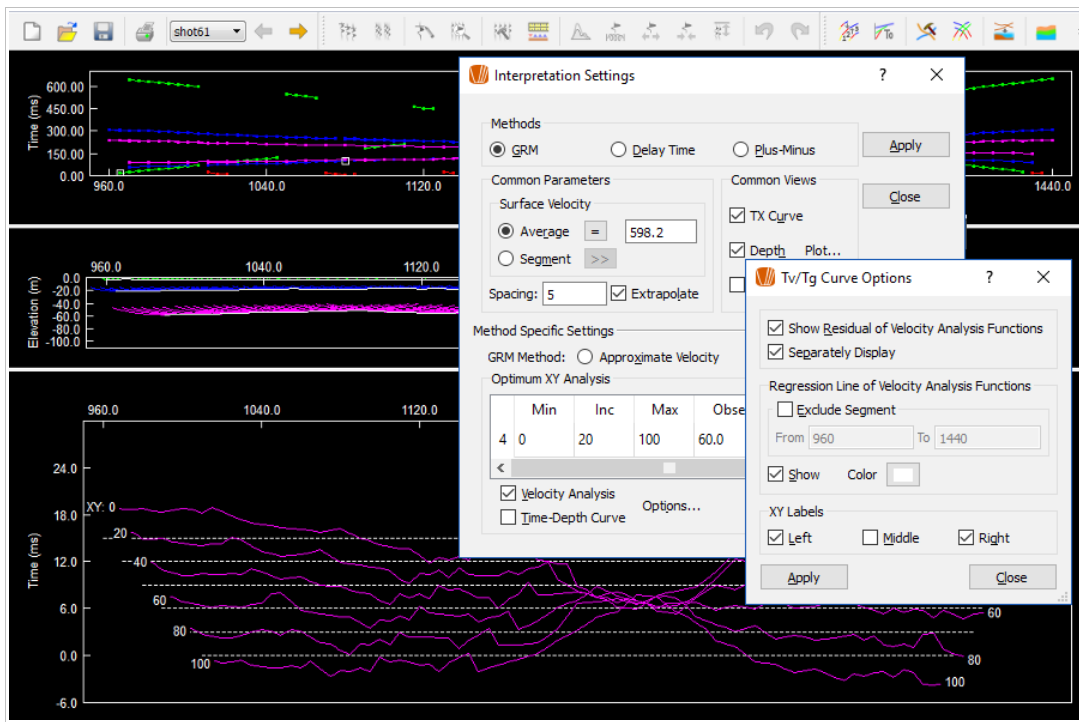


Figure 5-2: Enhanced velocity analysis functions

There is also a bug fix in *Refractor* 9.0: The program crashed when a layer with only one pick was accidentally inserted into an existing layer on a TX curve .

The following new features are available in *DW Tomo* 9.0:

- The overlay plot is supported for two shear wave records shot from opposite directions.

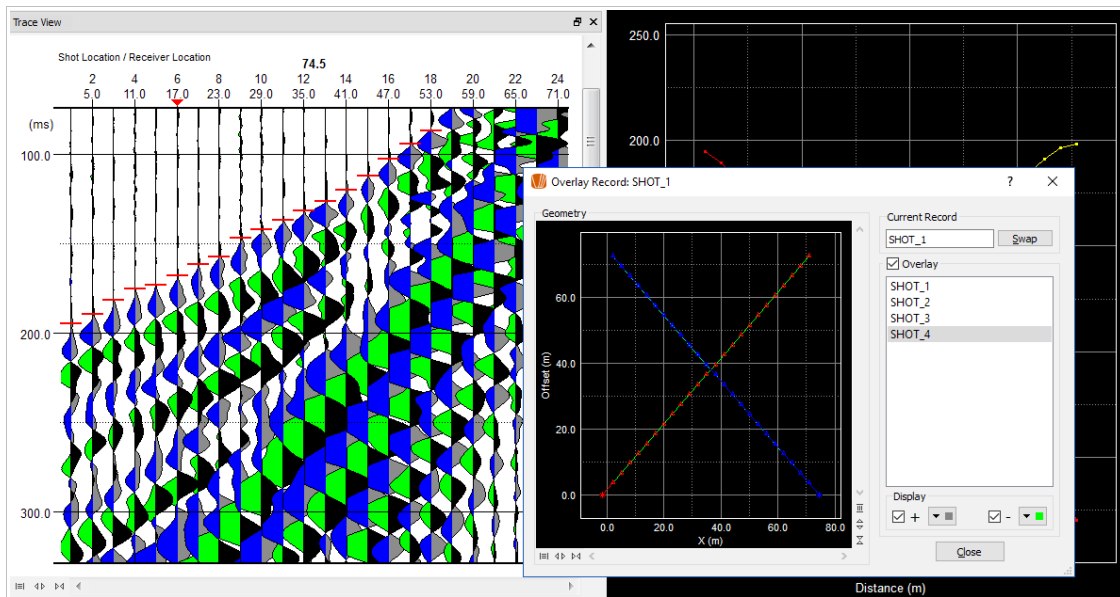


Figure 5-3: Overlay plot of two shear wave records

- Options are added to plot the elevation line and mark receiver or shot point locations on a velocity section.

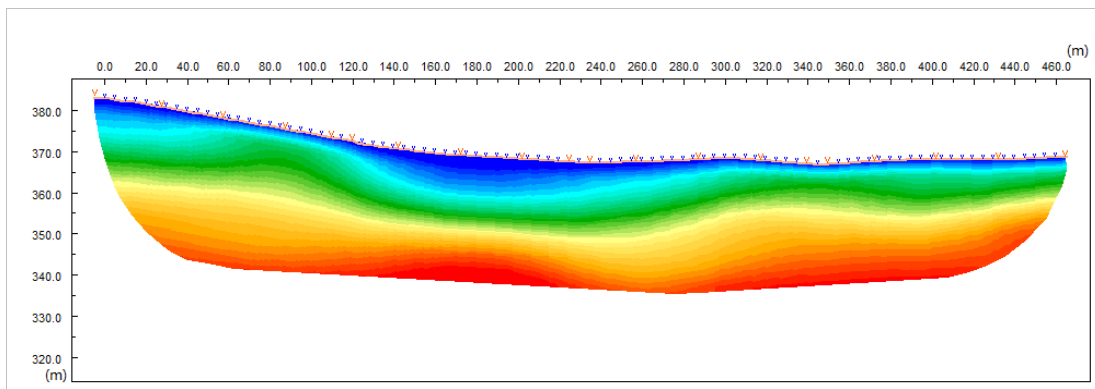


Figure 5-4: Plotting elevation line, receiver, and shot point locations

- When an initial velocity model is interactively defined, the velocity and depth of layers are shown in tooltip.
- A velocity section can be trimmed by the coverage of rays or receiver locations.

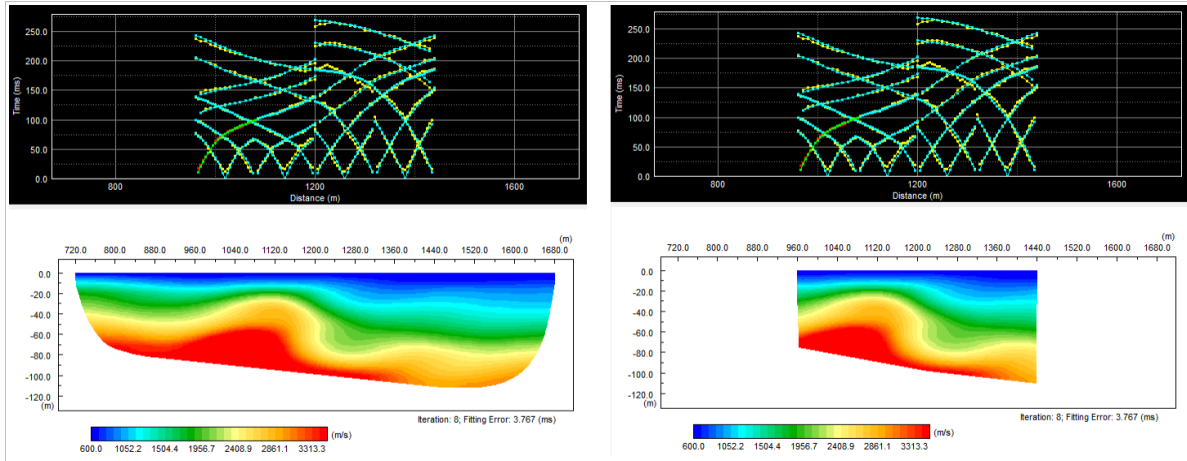


Figure 5-5: Trimming a velocity section based on rays or receiver locations

There is also a bug fix in *DW Tomo 9.0*: The BLN file exported to Surfer was incorrect when the ground surface was not flat.

## Part 6 – Surface Wave Modules

There are five modules for surface wave methods in *Seismic Pro* 9.0:

- *Surface*
- *Surface Plus*
- *Surface3D*
- *Microtremor*
- *Surface RT*

The enhancements common to both *Surface* and *Surface Plus* include:

- Improvement of the dispersion curve picking feature.

The dispersion curve of the previous or next record close to the current record is plotted as a reference for picking and can be copied to the current record.

The semiautomatic or manual picking mode can be quickly switched by pressing the shortcut key **Ctrl + A**, and the search range can be adjusted by pressing the **Spacebar** or **Ctrl + Spacebar**.

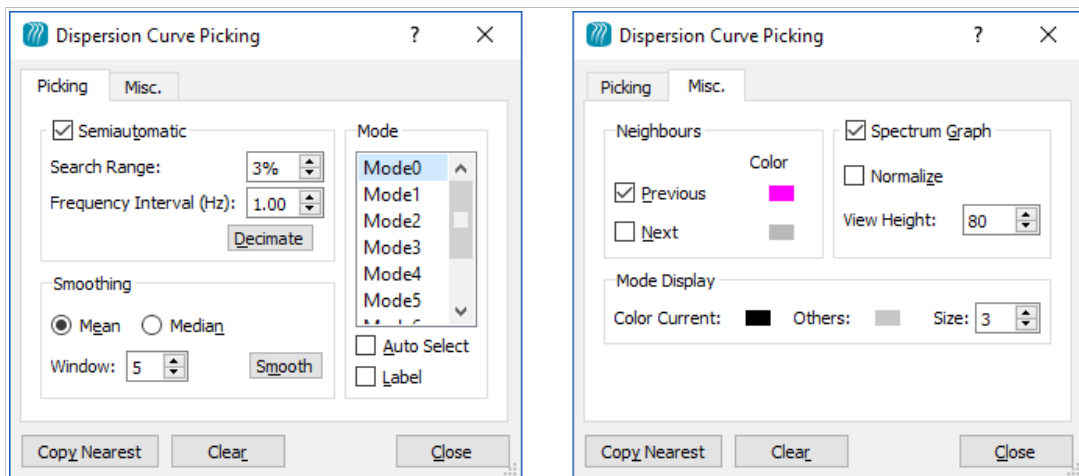


Figure 6-1: Enhanced dispersion curve picking feature

- The parameters of wavenumber K and slowness P in the **Dispersion Analysis** dialog box are simplified to avoid inappropriate settings.
- The inversion of the dispersion curve can be constrained by the trend of the initial velocity model.
- When multiple dispersion curves are merged, the center locations of all curves can be loaded from a text file.
- The bottom layer (half-space) of inverted velocity models can be excluded from the plotting of a velocity section.

There are also a few bug fixes in both *Surface* and *Surface Plus* 9.0:

- Occasionally, picks on a dispersion image were inaccurately displayed.
- After the geometry was changed, the apparent velocity tested by dragging the mouse in the seismic display window was not updated correctly.
- If the sample rate of active records greatly differed from that of passive records, the dispersion image calculated from active records was incorrect when active and passive surface wave records were combined.

*Surface Plus* 9.0 includes more new features:

- When active surface wave data is collected, the shot points can be positioned offset from the survey line.
- The resolution of the dispersion image is enhanced for long (e.g.3 hours) passive surface wave records.

## Part 7 – Borehole Seismic Modules

There are three modules for borehole seismic in *Seismic Pro*:

- *XW Tomo*
- *VSP*
- *PS Log*

In *XW Tomo* 9.0, the overlay plot is supported for two shear wave records shot from opposite directions.

The updates in *VSP* 9.0 include:

- Offset VSP in a deviated well is supported.
- A bug in the VSP-CDP transformation is fixed.

In *PS Log* 9.0, the polarization, which rotates two horizontal components of shear waves to the direction of particle motion, can be applied to make first arrivals on shear waves more clearly identifiable.

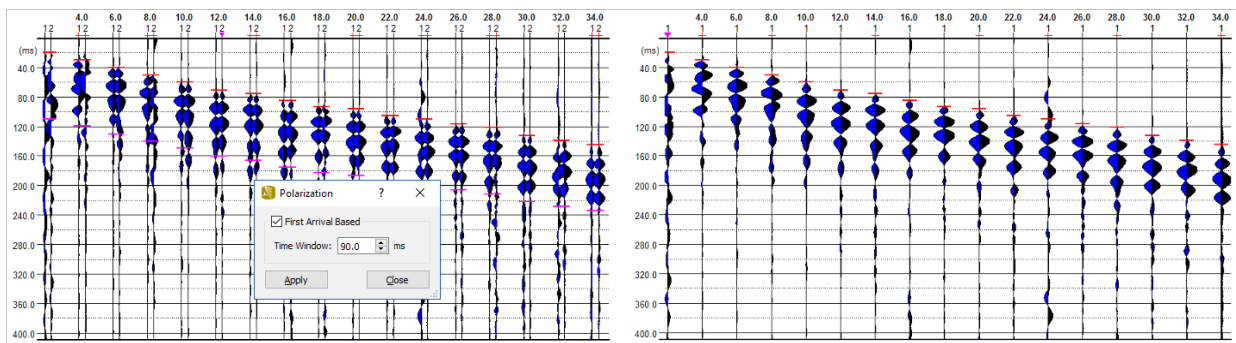


Figure 7-1: Shear wave data before (left) and after (right) polarization

## Technical Support

If you have questions or need technical assistance, please contact us using the information below:

- Telephone: 1-403-4514886
- Email: [support@geogiga.com](mailto:support@geogiga.com)
- Web: [www.geogiga.com](http://www.geogiga.com)