SeismiGraphix Guide

Updated for version 1.4.0

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http://seismigraphix.com

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Introduction

SeismiGraphix is a freely distributed software that can be used for seismic data viewing and data conversion that is compatible with the most commonly used formats in today's seismic exploration industry like Segy, Segd , Seismic Unix and Javaseis . This application was developed 100% in Java which makes it cross platform and enables it to run under Windows , OS X ,and Linux

The idea the developer had when programming SeismiGraphix was to create a user friendly application capable of handling the different formats and its variations in one application that can be used from the field data to the final stacked processed data. SeismiGraphix is intended for Geophysicist, Geologist, students and pretty much everybody who needs to view raw pre-stacked or stacked Geophysical data.

Features

- Data Import. Segy (IBM-32, IEEE), Segd (8015, 8036, 8038, 8058), Seismic Unix, and Javaseis (Seispace Promax Datasets).
- File format automatic validation will detect if the file matches the format your trying to view.
- Stacked and non-stacked data view, Individual shot viewing and trace count limit.
- Display capture and movie like player will help when comparing files.
- Density display and Wiggle display, different color and color map adjustments
- AGC with adjustable window and Normalization on/off option;
- Spectral analysis based on selected area.
- Includes a Bandpass filter and Butterworth filter
- Generate synthetic sine wave data.
- Import image files and has the option to export images as a segy file.
- Trace length control to increase or reduce trace length.
- Flip data left to right or right to left.
- Interactive plot with direction and azimuth auto calculation. A red pointer moves on the graph as you hover the mouse over the displayed data,
- Multi file viewing. Navigation tree to the left
- Header remapping and Viewing for Segy files, Header viewing for Segd files.
- Easy Zoom in/out using mouse drag to zoom in the area you want to see and double click to zoom out.
- Scroll through individual shots for non-stacked data.
- Segd format code auto-detect. Powerful algorithms will scan through your data no matter what encapsulation was used then it will read it and display it.
- Open multiple shot Segd files will display individual shots on the fly, you can also see the available Segd headers.

Installation

Prior to installing SeismiGraphix, make sure you have the java runtime environment installed in your system JRE 1.7 or higher, this can be downloaded for free from the Oracle website.

To run your SeismiGraphix installation open a terminal in Linux and in Windows open the command prompt, then go to the folder where you have your downloaded file and type this command :

java -jar "seismigraphix_setup.jar"

For Windows you can also just simply double click on the "seismigraphix_setup.jar" file, and the installation wizard should start.

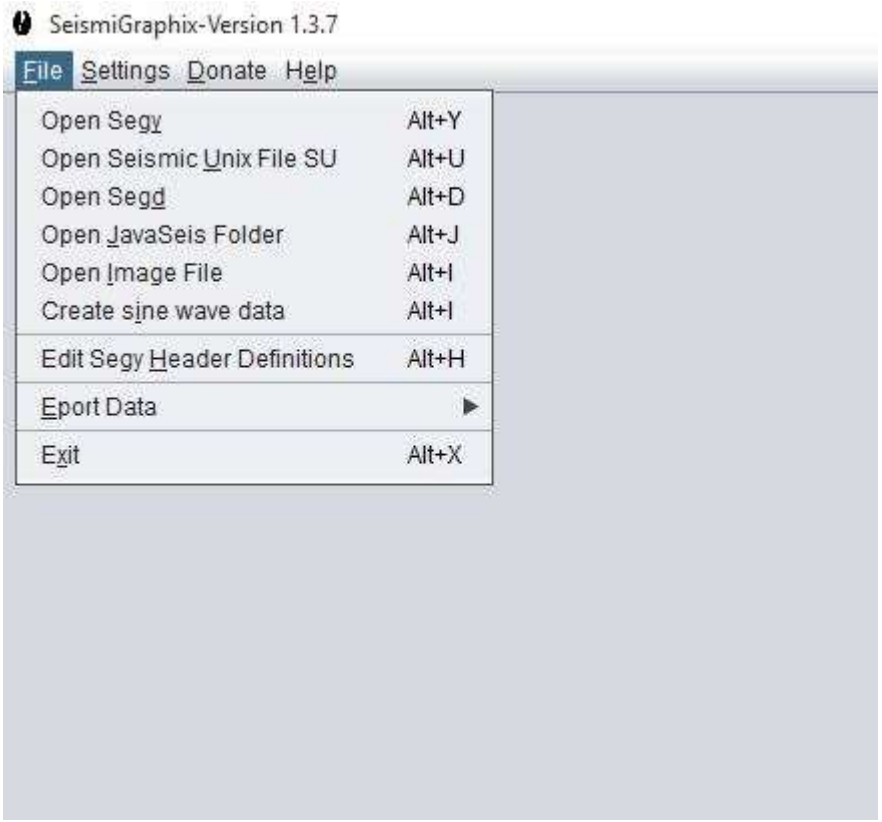
For Mac Os X the zip file containing the app file can be downloaded; after unzipping the file you can move the app package to your applications folder, you will need writing permissions to the Applications folder and you might also need to change some security settings to allow running this application as is not yet certified by apple but you should not have any problems as this application is absolutely safe . Once the app package is in the applications folder you will see the coffee bean icon in the launcher.

This is the 1.2.0 release of SeismiGraphix, new features and developments will become available in the future. Please come regularly to this site to check for new improvements or register to receive a newsletter as changes are available, also SeismiGraphix will check for updates on every start and notify you as they become available. Again thank you for support, for downloading SeismiGraphix and welcome to the SeismiGraphix users group. If you have any comments or suggestions please send us an email to abel@seismigraphix.com.

Opening Files

In the file menu you should be able to select from the different supported formats the one you want to view. SeismiGraphix allows you to select multiple files to view, you need to add them to the list of files and then select open.

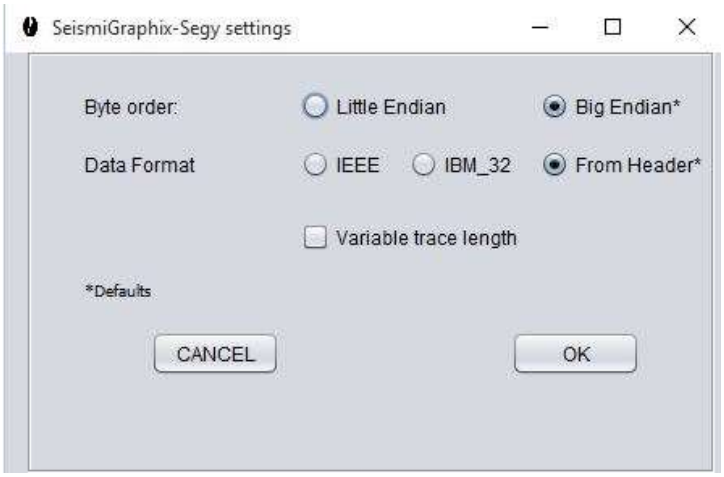
The selected files are validated to match the format you want to view. If a file is shown as invalid it will be automatically removed from the list when you select open and only valid files will be displayed in the file list.

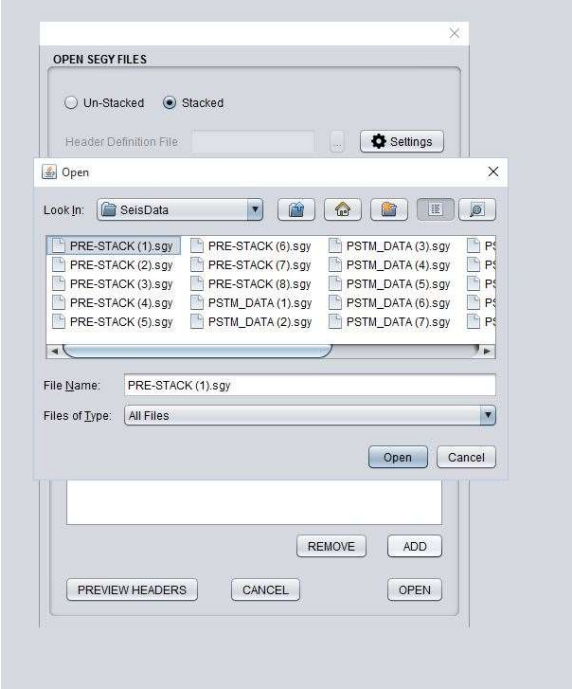


Select the file format you wish to open

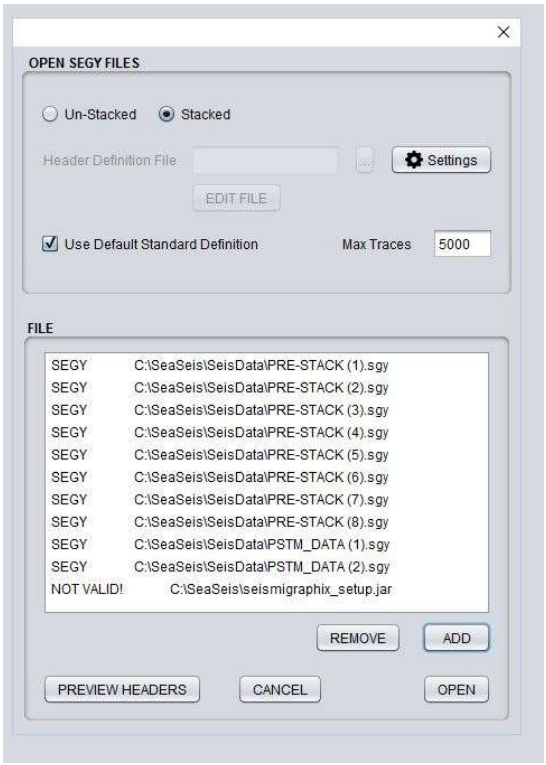
When adding files to the list, make sure to select Un-stacked or Stacked accordingly to the type of file your trying to open. The Un-Stacked option will ignore the maximum number of traces selected but instead will show one ensemble at a time. Ensembles are group based on file record number. The forward and back buttons will be active for Un-sacked data and stacked data if more than the maximum traces are detected.

the settings button can be used to change Segy data options

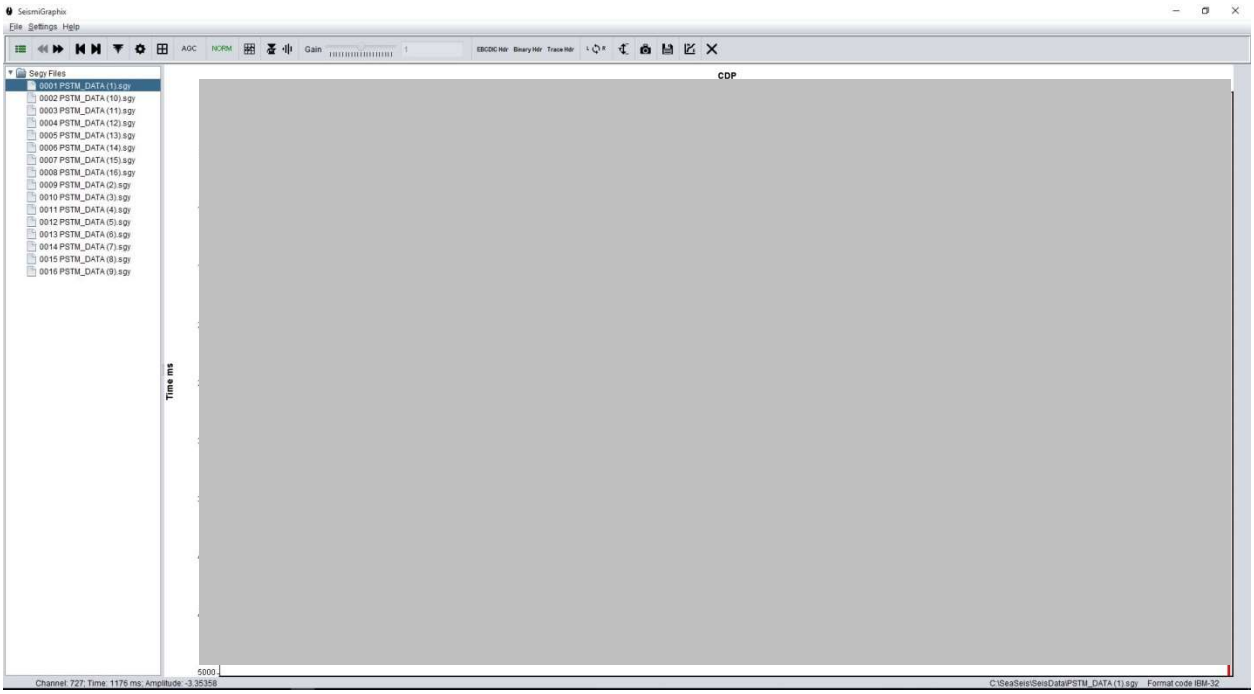




Add the files to the list



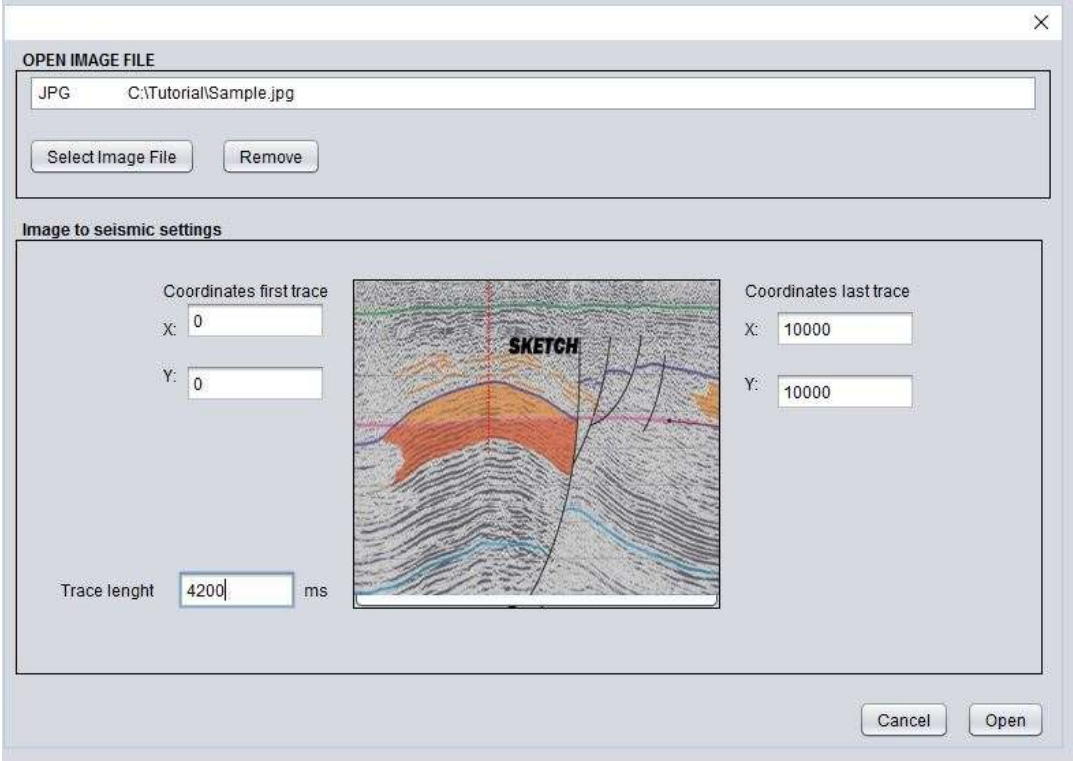
Files selected to be opened. Notice the jar file is shown as ‘not valid’ as this file is not recognized as a Segy file.



After selecting the files and opening them the first file on the list will be displayed, the fist button to the left is the list button which will toggle the list on and off.

Open Image Files:

Image files can be opened to visualize them in SeismiGraphix and later converted to Segy format. Such images can be scanned seismic sections or plots but if you wish to experiment yo can open any kind of image an later on convert it to Segy. Formats supported are PNG, GIG, JPG, JPEG and TIFF



When opening image files you will have the option to have the image georeferenced to a set of coordinates for both sides of the image and to set a time length in ms for the vertical dimension.

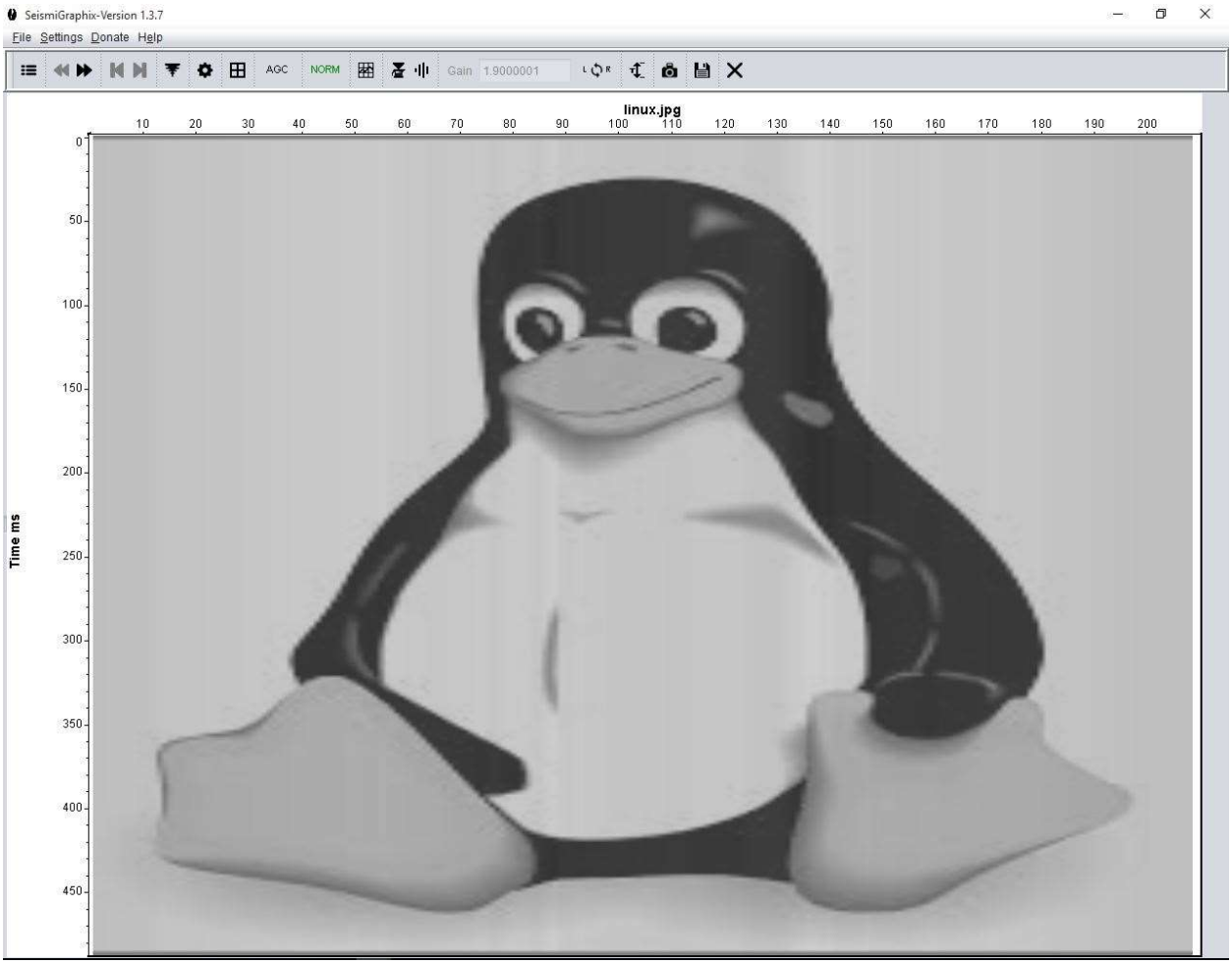


Image loaded from a PNG file display in gray scale

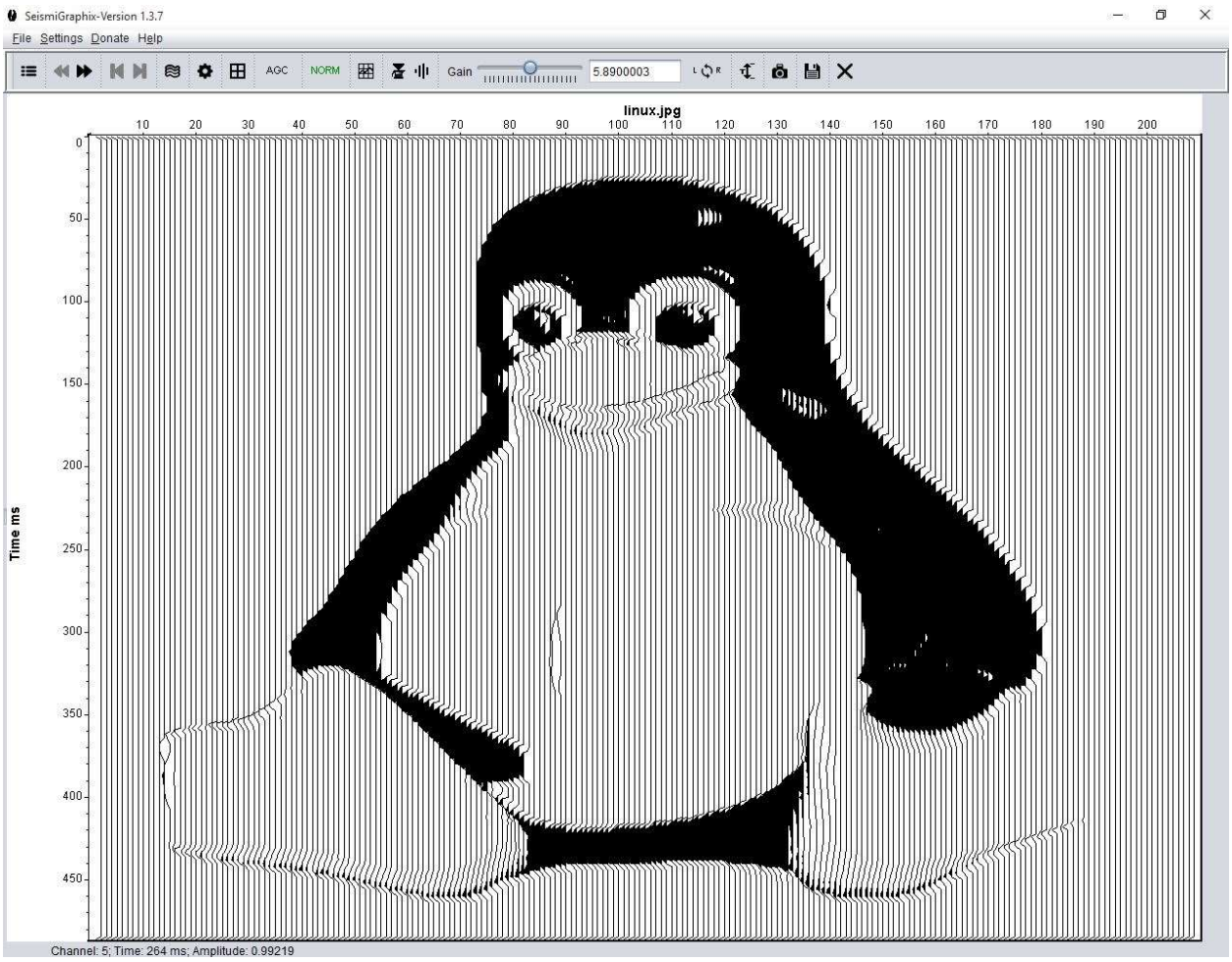
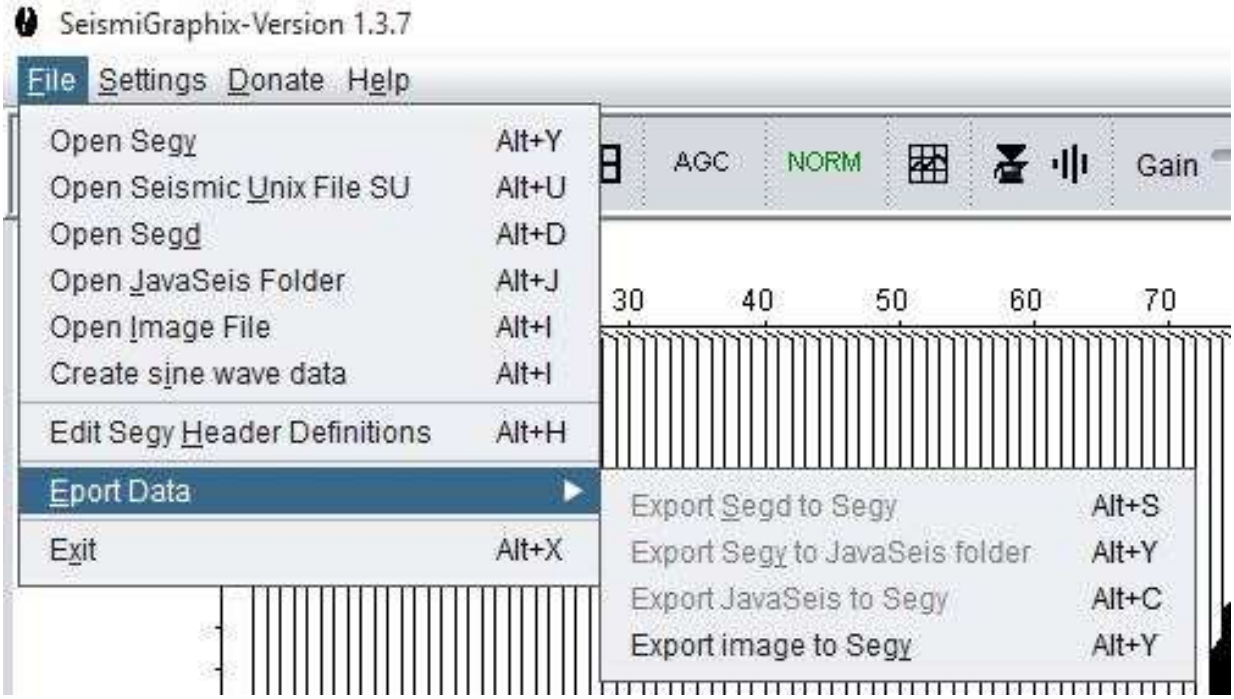


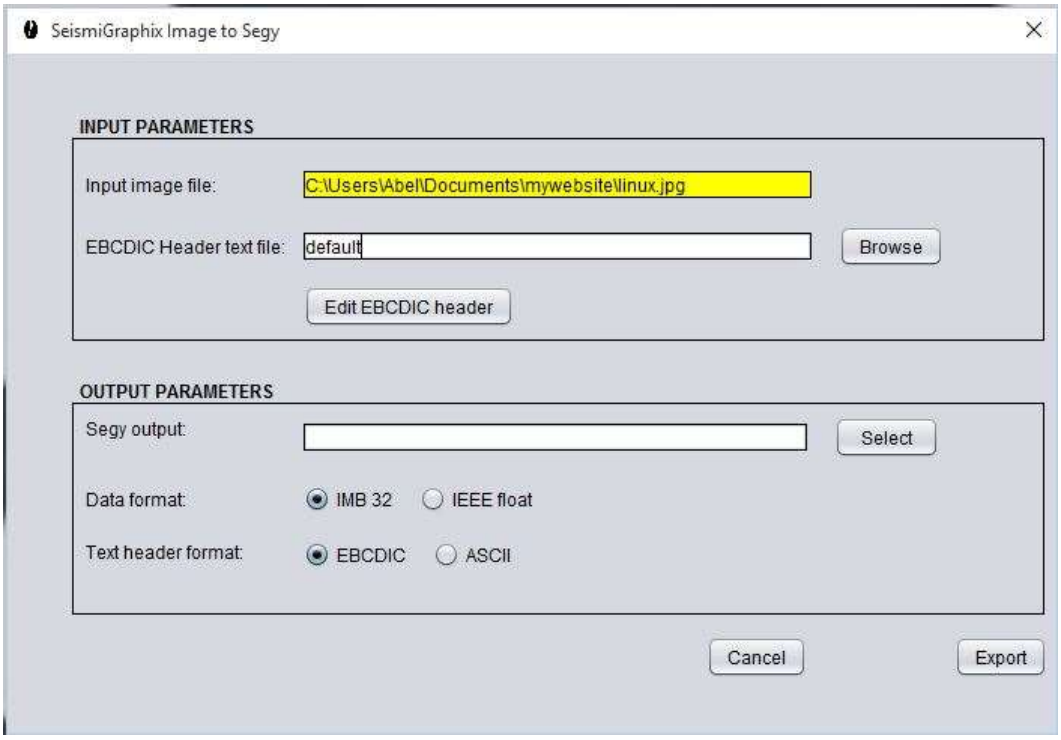
Image loaded from a PNG file display in wiggle mode.

Export Data

Currently only image files can be exported to Segy format. In the next planed release of SeismiGraphix conversion from Segd to Segy and modified Segy export will be available. At this moment this functions are being improved and tested for accuracy.



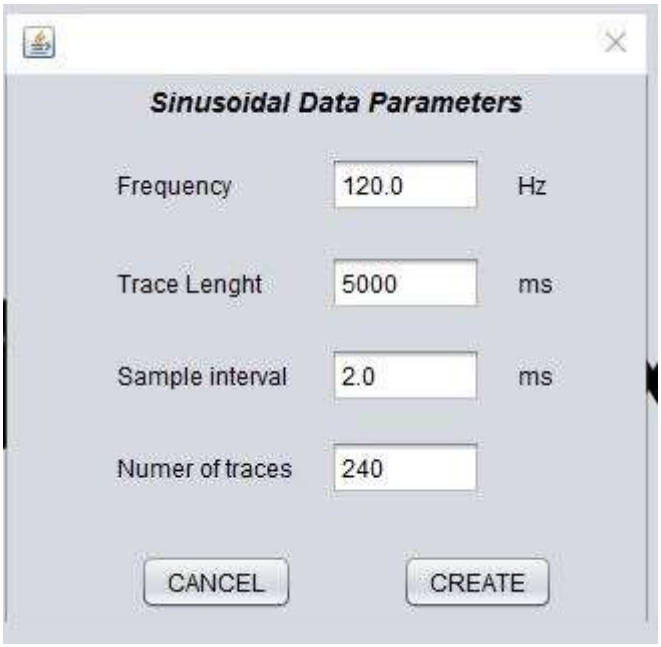
Export Data menu



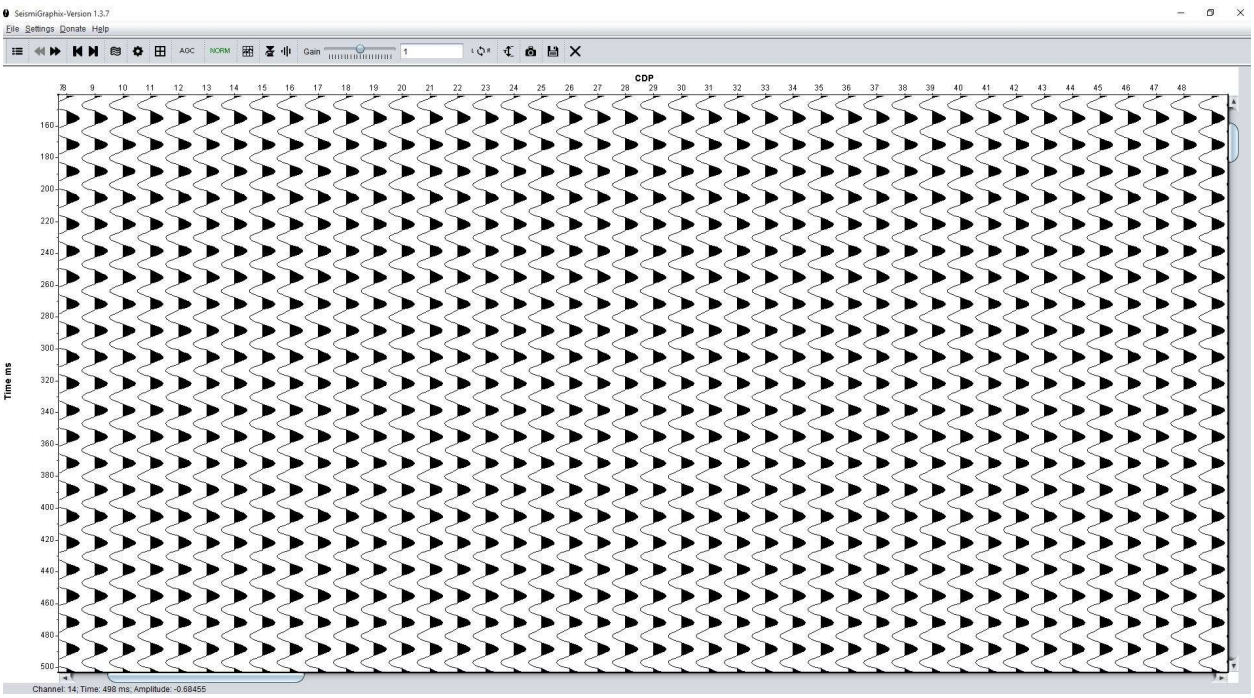
Export image to Segy parameter window

Sine Wave generation

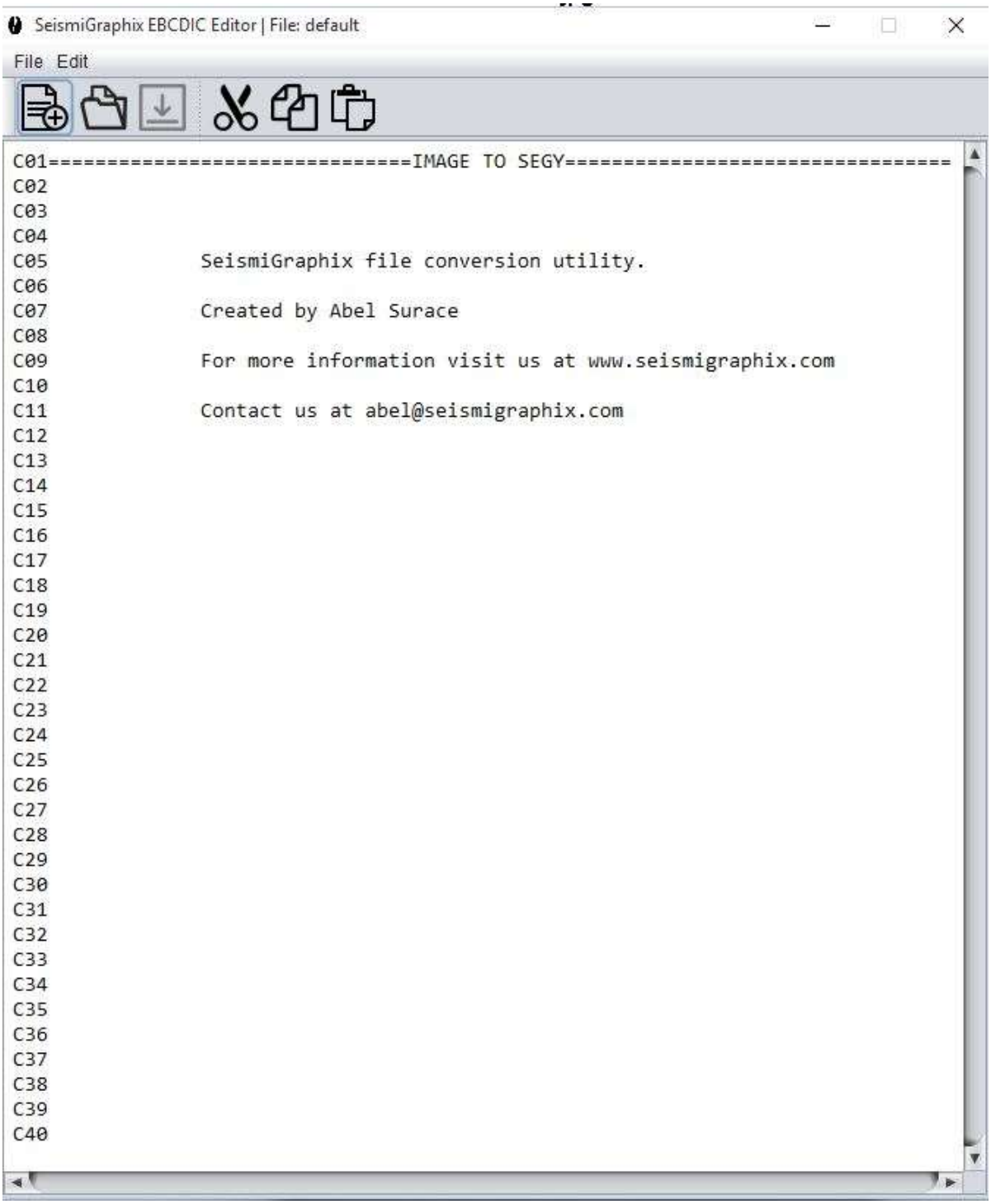
You can generate any frequency sine wave of any duration and number of traces. This can be useful to test filters and to understand how they work.



Sine wave generation parameters



Sine wave data

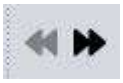


Contextual “EBCDIC” header editor for the image export utility.

Viewer Options

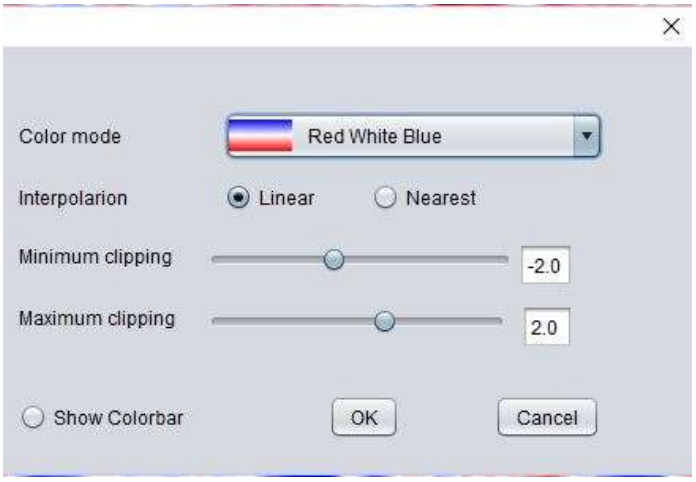
After opening a valid file on the top of the viewer you should see a toolbar like this:

 List: Displays or hides the list of files that can be viewed.

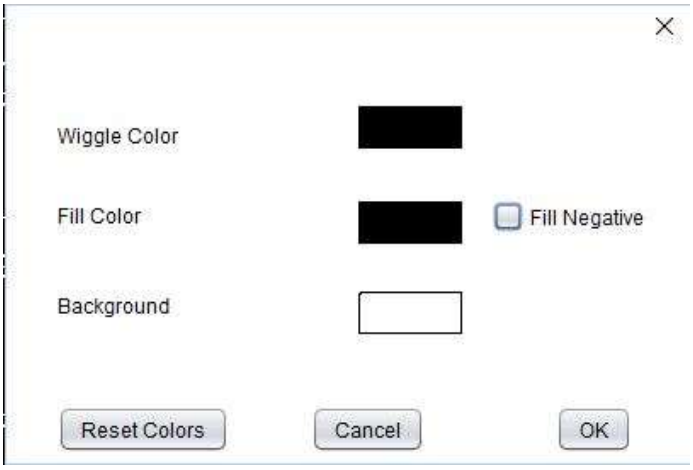
 These buttons move to the next or previous record, this option is used to scroll through the different ensembles. Each ensemble is a group of traces that belong to the same Field file record and are displayed in the trace sequence order. For unstacked data it will move to the rest of the traces not displayed if the staked data has more traces than the maximum number of traces selected.

 These buttons move through the files in the list. When the last file is reached it goes back to the first file.

 Switch to density display from wiggle display, next is the settings button to change the options for density display.



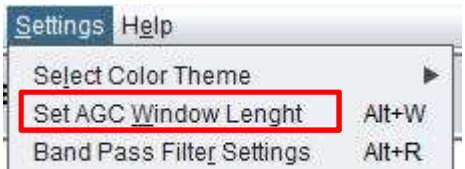
 Switch to wiggle display from density display, next is the settings button to change the display options for wiggle display.

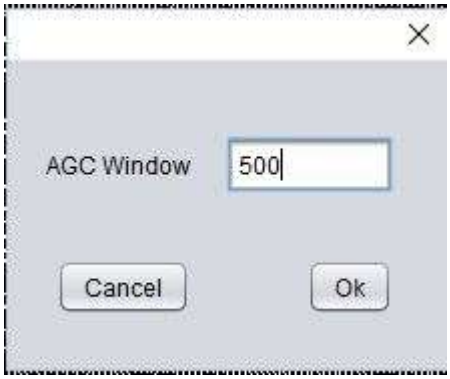


 This turns the grid on and off.

This button turns AGC on and off

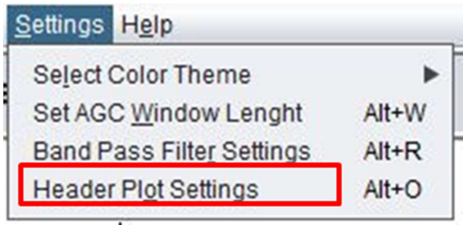
To change AGC window length go to settings menu an select set AGC Window length or use Alt+W..

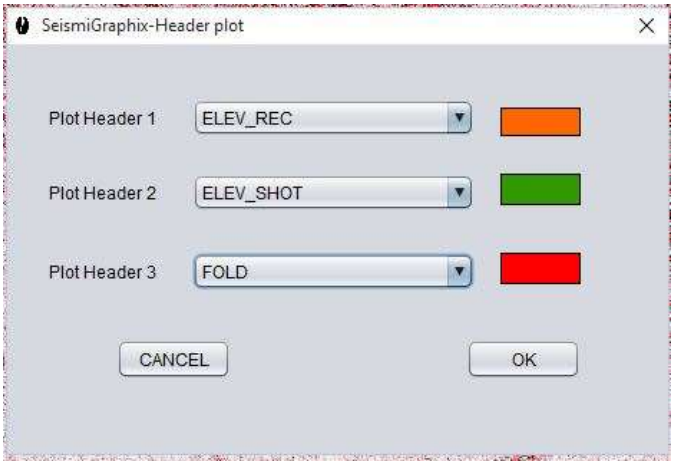


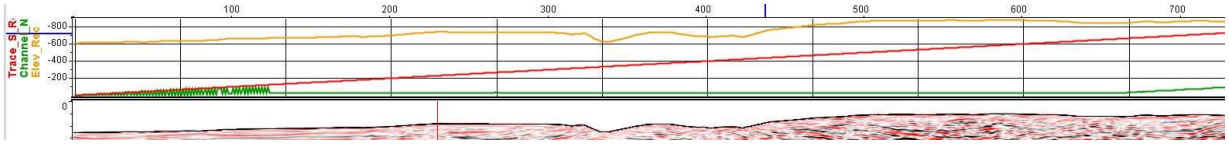


Normalization is on by default whenever you start SeismiGraphix to help display data with very low amplitude values however it can be turned off if needed. Normalization is a trace based and not ensemble based normalization and uses the RMS method.

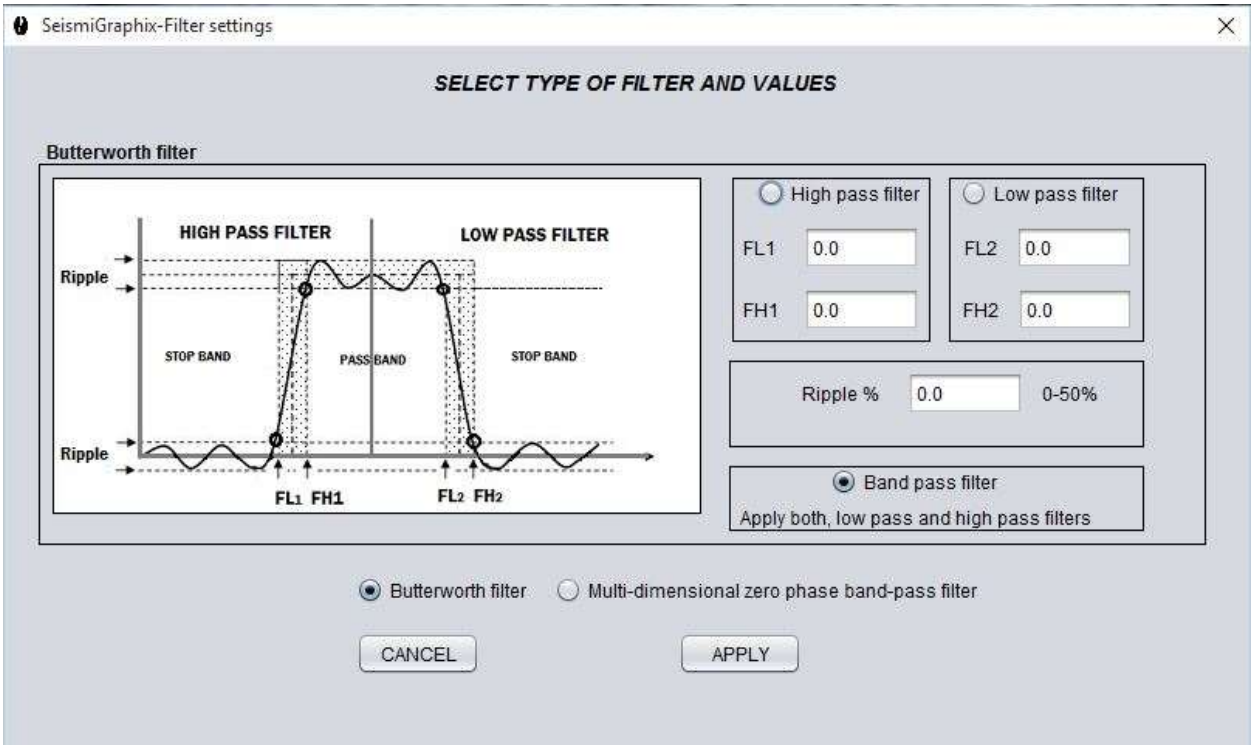

Starting in Version 1.2 SeismiGraphix allows displaying a header plot on the top part of the data display, up to 3 header words can be plot simultaneously selecting different colors to differentiate them. The first time the button is pressed it will allow to setup the display after that subsequent press will only turn it on and off. To change the plot settings they can be accessed from the settings top menu (Alt+O).



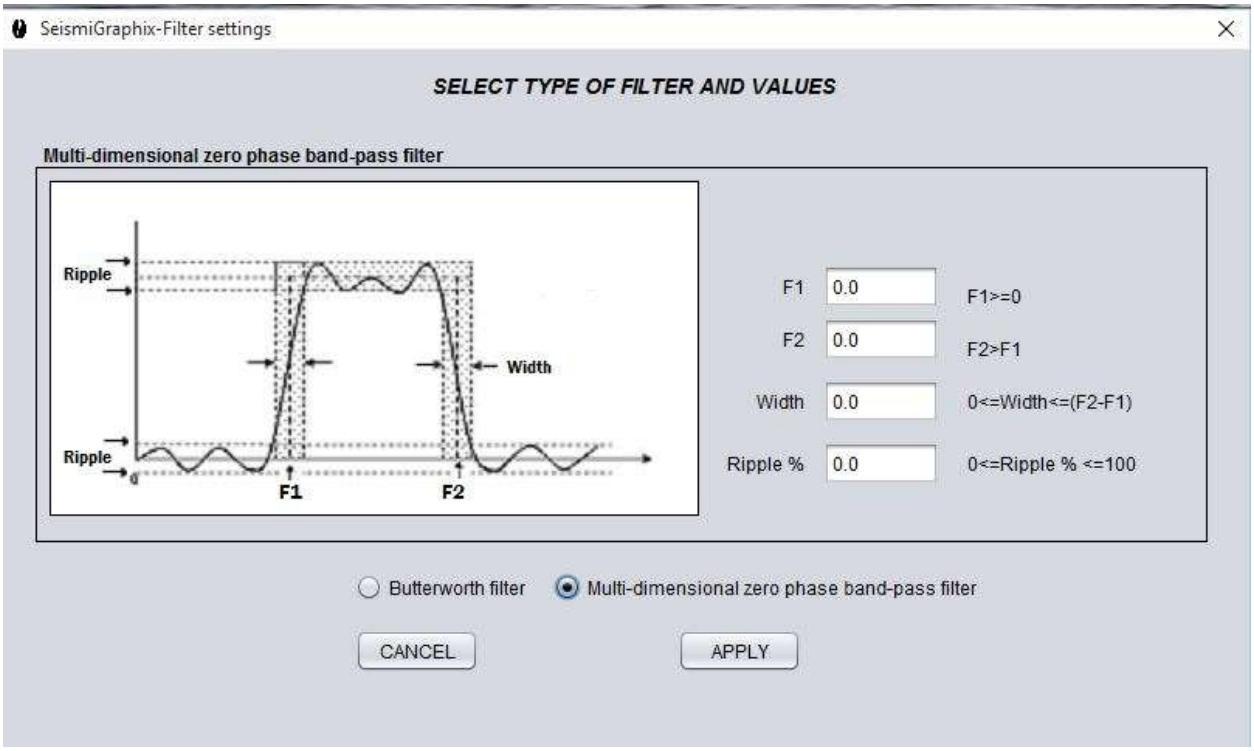




Filter button, will apply or remove a **Butter worth** or a **Multidimensional zero phase band pass filte**r, the first time you press this button or if all values are zero the filter settings window will show up.

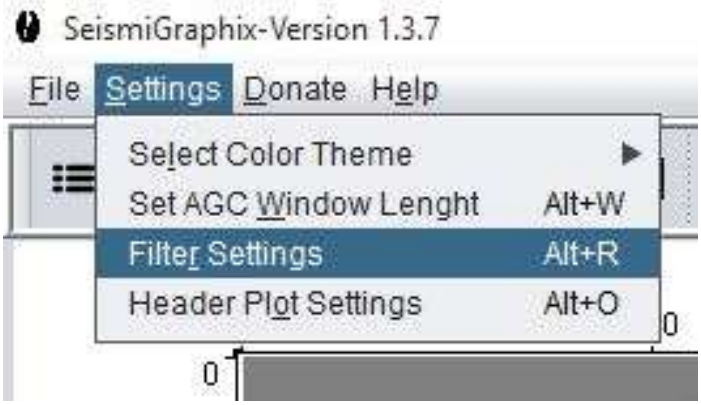


For the Butterworth filter you have the option to apply a high pass filter “low cut” or a low pas filter “high cut” or both which will form a band pass filter. The ramp up is form between FL and FH.

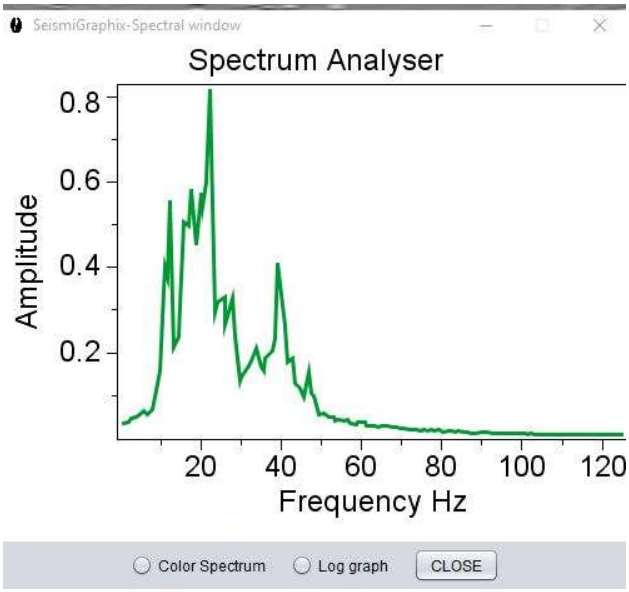


For the multidimensional zero phase band pass filter, frequencies between F1 and F2 will pass the filter the other frequencies will be attenuated or removed based on the data characteristics. The width is the ramp up or ramp down filter application, in this filter the width is symmetrical on both sides of the pass band therefore only one value is required. The width cannot be higher than the band width or F2-F1. The ripple is a percentage value higher than 0 and lower than 100%. Usually 10% is a good starting value. Play using different values to achieve the best results and to get a feeling how each value affects the filter behavior.

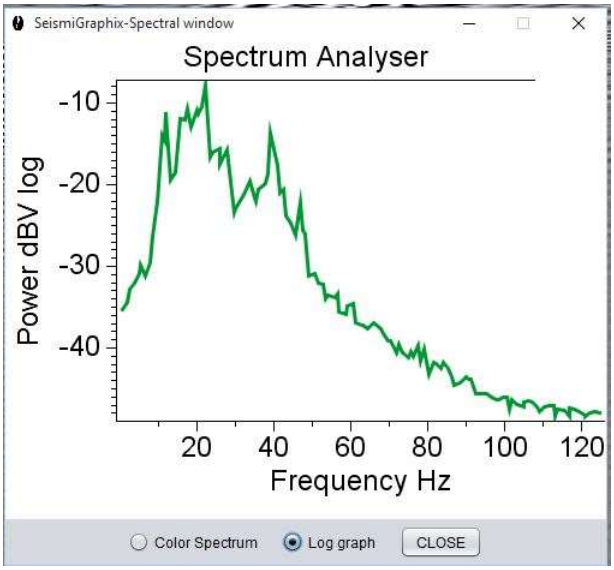
After filter is applied if you wish to change values again you will need to go to settings>>filter settings as shown below:



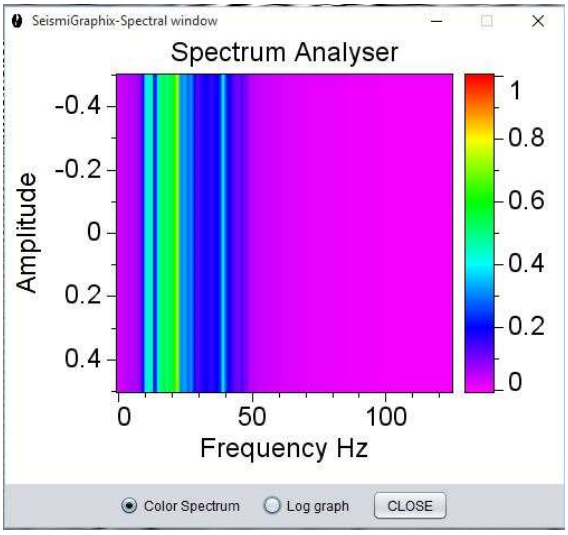
 Spectrum analyzer button. This button will activate the spectrum analyzer mode. By clicking and dragging an area of your data, you can plot the spectrum to find out which frequencies are more dominant in that region of your data. The selected area can be of any size including the whole data, off course the bigger the rea selected and based on the amount of traces and samples the spectrum might take longer to plot.



Spectrum analyzer



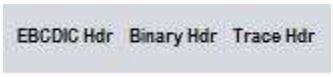
Spectrum analyzer logarithmic scale



Spectrum analyzer color scale

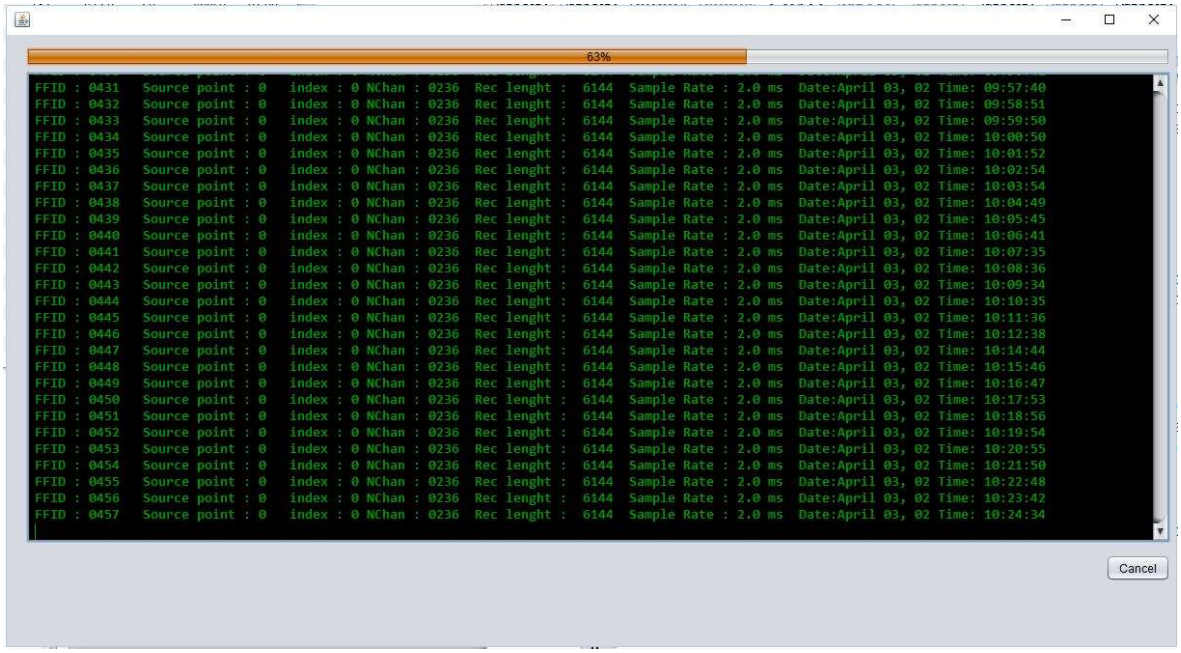
When the spectrum analyzer button is active, the mouse icon will change to this  and zoom will be disabled. After clicking again in spectrum button and this is disabled the zooming capability will come back. To differentiate between a zoom window and a spectrum selection area, the spectrum area when selected is of a greenish color.

The trace gain can be augmented or diminished by sliding the bar right or left; this gain is only available when wiggle display is selected as this has no effect on the density display.

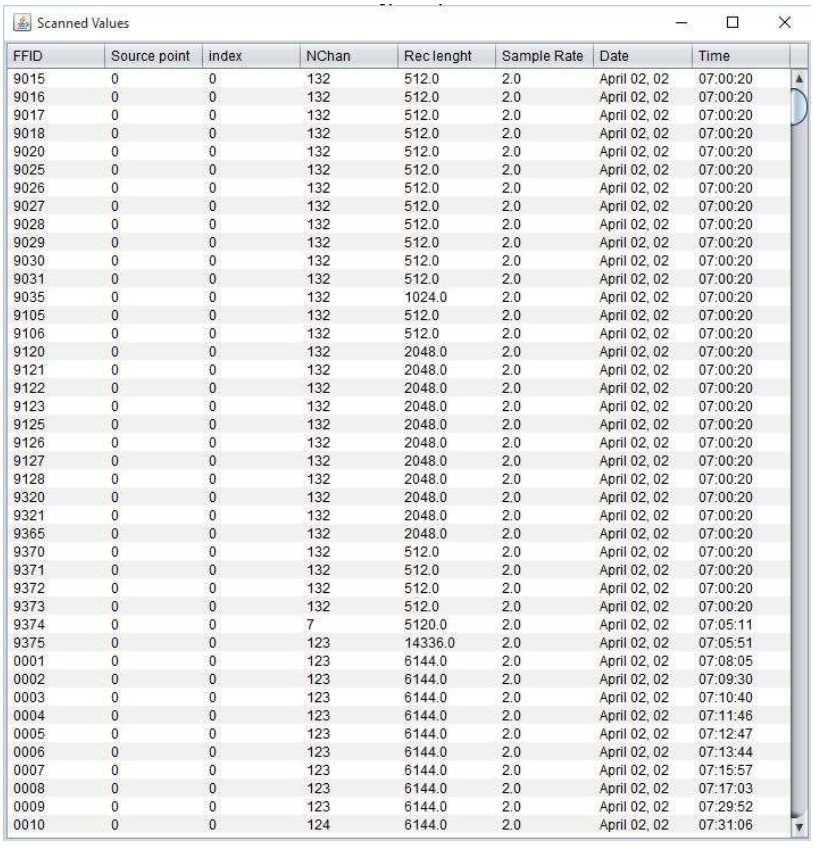


These three buttons show EBCDIC, binary and trace header respectively, they only show when Segy are selected. If Segd or Seismic Unix files are selected only trace header button will be show. For javaseis files header view is not yet available for this version of SeismiGraphix.

When a segd file is open this button will be available to allow scanning segd headers, this is especially usefull when dealing with multiple record segd files. For the next release Seismigraphix will incluide segy file header scanning too.



Multiple record Segd file scan.

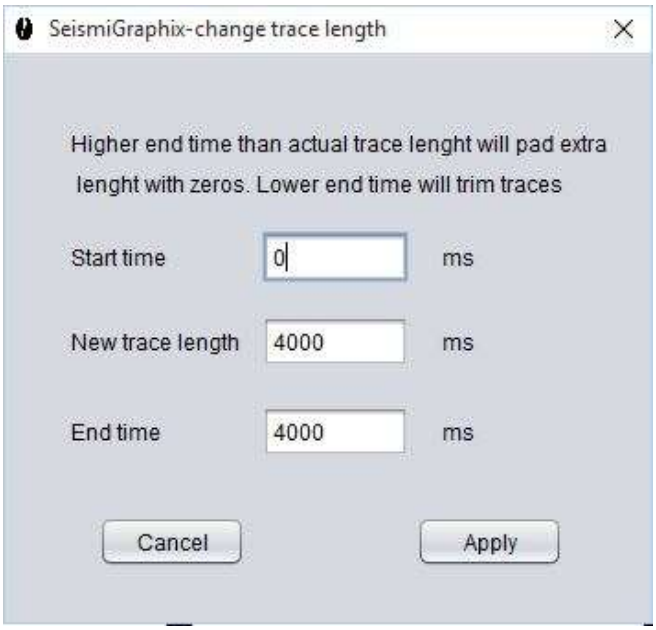


FFID	Source point	index	NChan	Rec lenght	Sample Rate	Date	Time
9015	0	0	132	512.0	2.0	April 02, 02	07:00:20
9016	0	0	132	512.0	2.0	April 02, 02	07:00:20
9017	0	0	132	512.0	2.0	April 02, 02	07:00:20
9018	0	0	132	512.0	2.0	April 02, 02	07:00:20
9020	0	0	132	512.0	2.0	April 02, 02	07:00:20
9025	0	0	132	512.0	2.0	April 02, 02	07:00:20
9026	0	0	132	512.0	2.0	April 02, 02	07:00:20
9027	0	0	132	512.0	2.0	April 02, 02	07:00:20
9028	0	0	132	512.0	2.0	April 02, 02	07:00:20
9029	0	0	132	512.0	2.0	April 02, 02	07:00:20
9030	0	0	132	512.0	2.0	April 02, 02	07:00:20
9031	0	0	132	512.0	2.0	April 02, 02	07:00:20
9035	0	0	132	1024.0	2.0	April 02, 02	07:00:20
9105	0	0	132	512.0	2.0	April 02, 02	07:00:20
9106	0	0	132	512.0	2.0	April 02, 02	07:00:20
9120	0	0	132	2048.0	2.0	April 02, 02	07:00:20
9121	0	0	132	2048.0	2.0	April 02, 02	07:00:20
9122	0	0	132	2048.0	2.0	April 02, 02	07:00:20
9123	0	0	132	2048.0	2.0	April 02, 02	07:00:20
9125	0	0	132	2048.0	2.0	April 02, 02	07:00:20
9126	0	0	132	2048.0	2.0	April 02, 02	07:00:20
9127	0	0	132	2048.0	2.0	April 02, 02	07:00:20
9128	0	0	132	2048.0	2.0	April 02, 02	07:00:20
9320	0	0	132	2048.0	2.0	April 02, 02	07:00:20
9321	0	0	132	2048.0	2.0	April 02, 02	07:00:20
9365	0	0	132	2048.0	2.0	April 02, 02	07:00:20
9370	0	0	132	512.0	2.0	April 02, 02	07:00:20
9371	0	0	132	512.0	2.0	April 02, 02	07:00:20
9372	0	0	132	512.0	2.0	April 02, 02	07:00:20
9373	0	0	132	512.0	2.0	April 02, 02	07:00:20
9374	0	0	7	5120.0	2.0	April 02, 02	07:05:11
9375	0	0	123	14336.0	2.0	April 02, 02	07:05:51
0001	0	0	123	6144.0	2.0	April 02, 02	07:08:05
0002	0	0	123	6144.0	2.0	April 02, 02	07:09:30
0003	0	0	123	6144.0	2.0	April 02, 02	07:10:40
0004	0	0	123	6144.0	2.0	April 02, 02	07:11:46
0005	0	0	123	6144.0	2.0	April 02, 02	07:12:47
0006	0	0	123	6144.0	2.0	April 02, 02	07:13:44
0007	0	0	123	6144.0	2.0	April 02, 02	07:15:57
0008	0	0	123	6144.0	2.0	April 02, 02	07:17:03
0009	0	0	123	6144.0	2.0	April 02, 02	07:29:52
0010	0	0	124	6144.0	2.0	April 02, 02	07:31:06

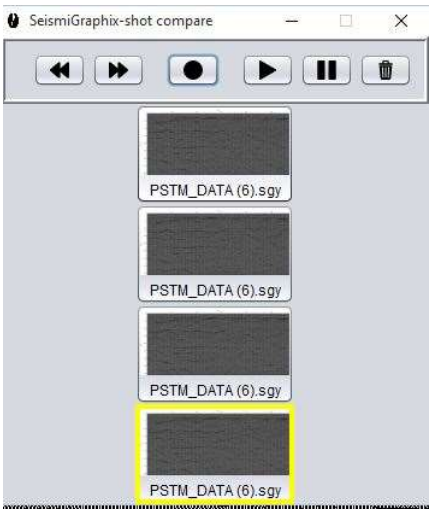
Table list showing results after scaning file.

This button will reverse the trace order moving the left to the right and viceversa.


this button can be used to change the trace start time and the trace lenght. The trace length will be added to the trace start time. ie: start time=200ms and new trace length=6000ms, then the display data will be from 200ms to 6200ms. If end time (start time+trace length) is higher than the actual trace length then the extra length will be paded with zeros.



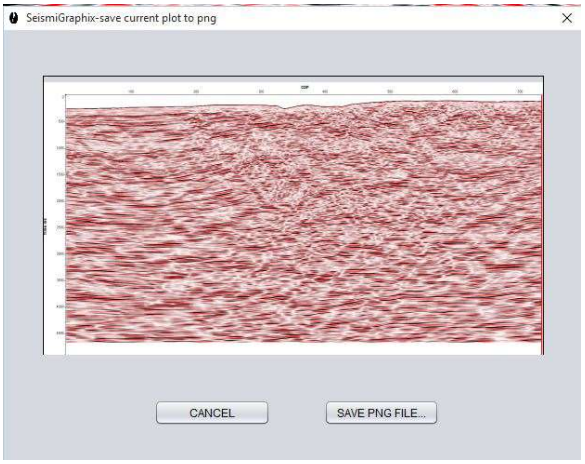

Capture slide: this button will display the capture slide and player tool.



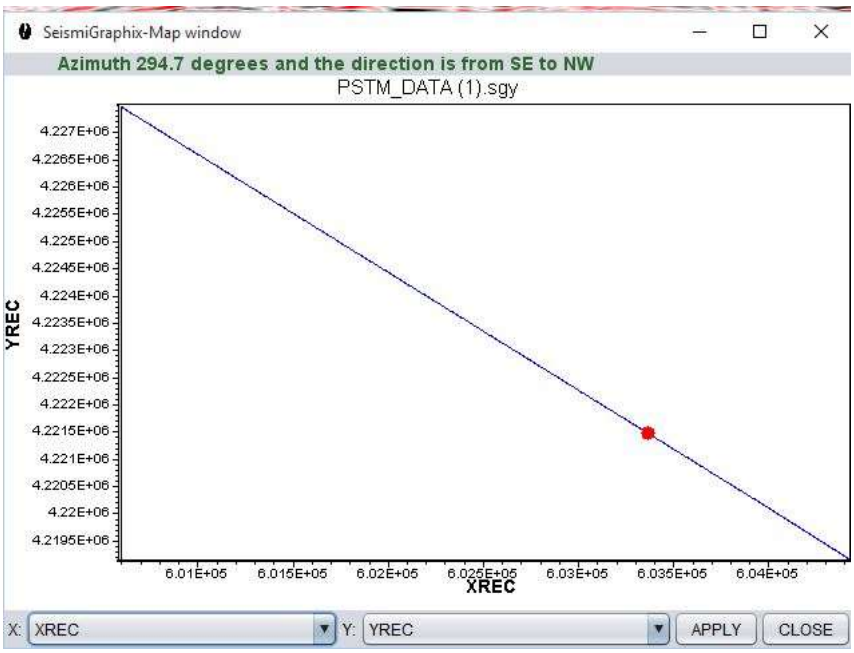
The frames will be displayed in the same window the data is normally displayed, the button with the circle is the record button used to capture the current frame, the other buttons are used to navigate and play or pause the slide show. The garbage can is used to remove frames from the list.

After closing the tool or clicking on the viewer you will return to the last viewed data set before the camera button was selected.

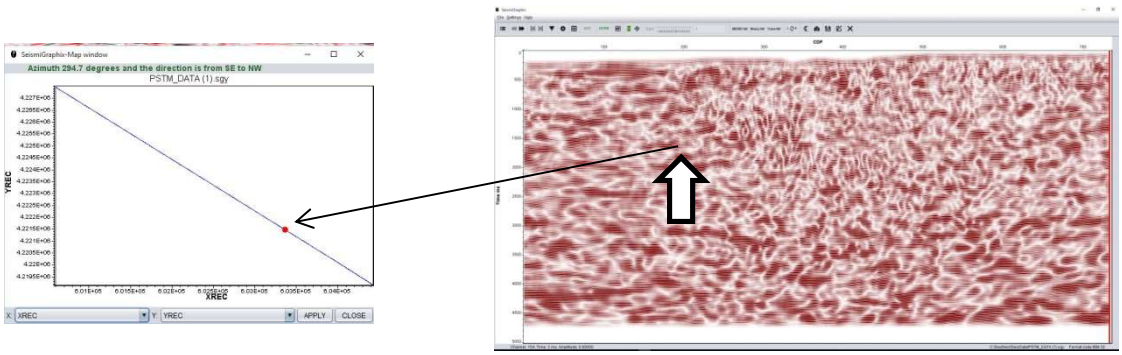
 This button saves the current plot to a PNG file in a selected location. A small preview will show up before saving.



 This button is used to plot the interactive graph for any of the header words vs any of the other header words contain in the trace headers. When XREC and YREC or XSHOT and YSHOT are used the azimuth and the line direction are calculated and displayed on the top of the graph



If you hover the mouse over the data display a red circle will move and reposition in the interactive display. The location of this red circle corresponds to the trace you are hovering over with the mouse in the data display, making the 2 plots interactive.. For example if you plot Fold vs CMP number, when hovering the mouse over a trace the red circle will relocate in the graph over the fold value plotted form that trace.

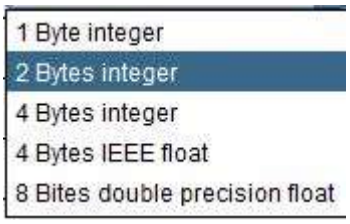


Red circle moves to the position related to the trace being hovered over in the data display

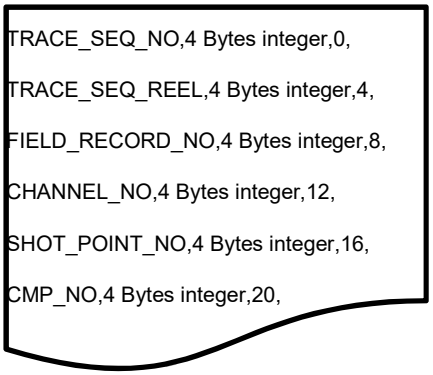
 This button closed the viewer panel but does not exit the application, you will be asked to confirm before closing.

You can edit the Segy trace header byte words type and location and save it in a file, this file is a simple coma separated values text file CSV. The file has this structure: HEADER_WORD,#Number of Bytes type, position,

The type or format can be selected from the drop down list in the editor:



The first six lines of a CSV header definition file are shown below.

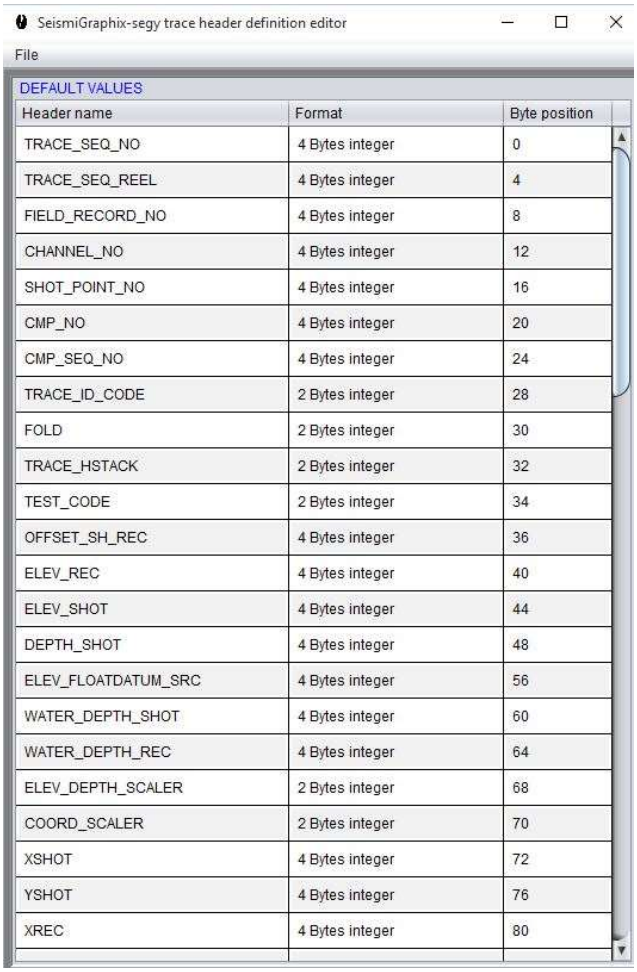


The first byte position in the trace header is 0, this is the convention used in SeismiGraphix. The next byte location available is the previous byte location plus the previous byte length, see table below for illustration.

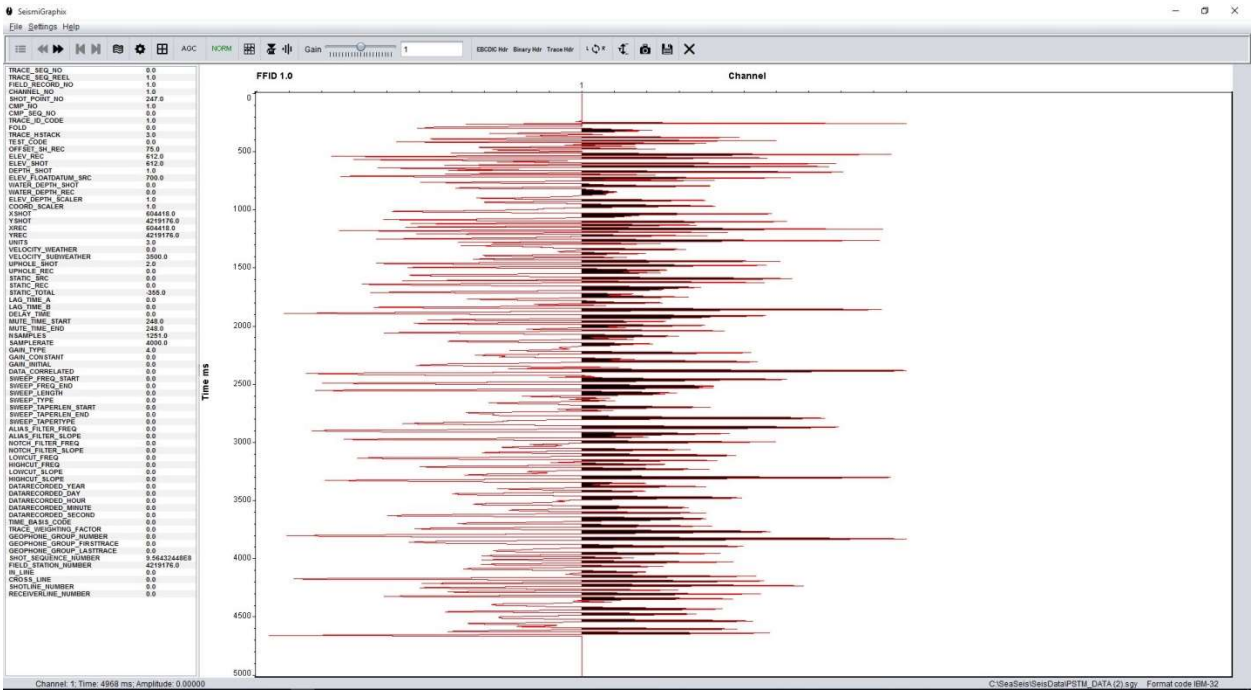
BYTE LOCATION	BYTE Length	Current byte location
0	4	
4	4	0 + 4
8	2	4 + 4
10	4	8 + 2

Header word renaming is not allowed in this version of SeismiGraphix.

NOTE: when opening un-stacked data the ensembles are grouped using the “FIELD_RECORD_NO” byte word, so be careful when editing this byte location, this can cause the program to behave different if remapped to a byte that has not common values within an ensemble. For example mapping trace sequence number to this word name will cause SeismiGraphix to show only one trace per ensemble.

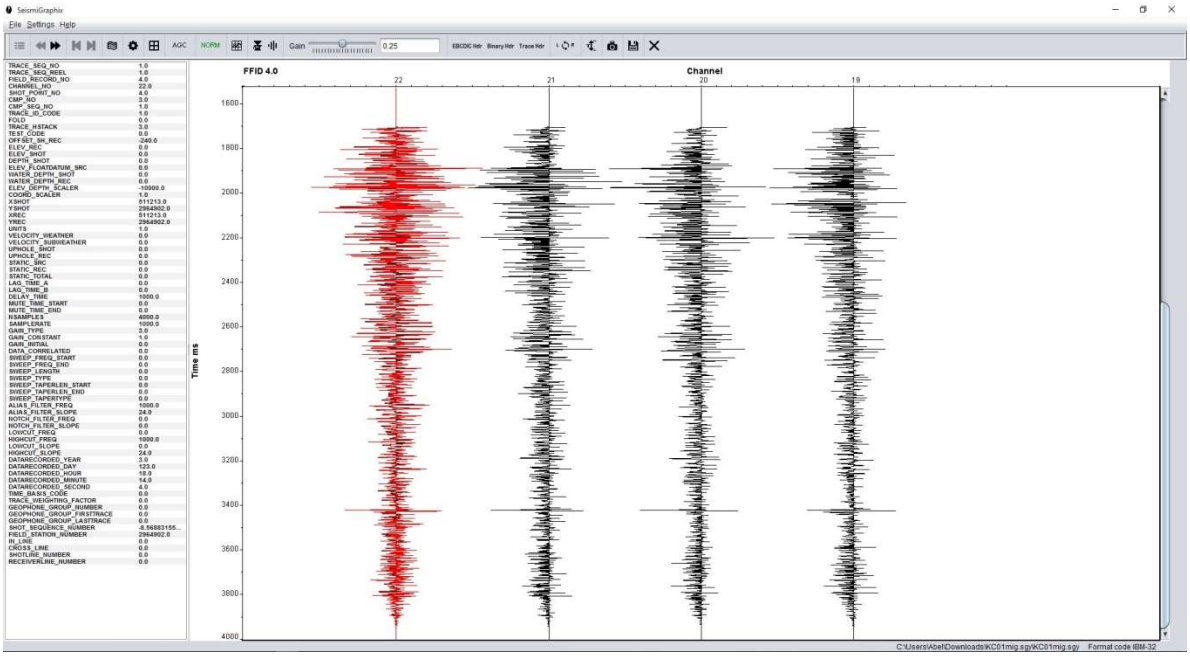


Header name	Format	Byte position
TRACE_SEQ_NO	4 Bytes integer	0
TRACE_SEQ_REEL	4 Bytes integer	4
FIELD_RECORD_NO	4 Bytes integer	8
CHANNEL_NO	4 Bytes integer	12
SHOT_POINT_NO	4 Bytes integer	16
CMP_NO	4 Bytes integer	20
CMP_SEQ_NO	4 Bytes integer	24
TRACE_ID_CODE	2 Bytes integer	28
FOLD	2 Bytes integer	30
TRACE_HSTACK	2 Bytes integer	32
TEST_CODE	2 Bytes integer	34
OFFSET_SH_REC	4 Bytes integer	36
ELEV_REC	4 Bytes integer	40
ELEV_SHOT	4 Bytes integer	44
DEPTH_SHOT	4 Bytes integer	48
ELEV_FLOATDATUM_SRC	4 Bytes integer	56
WATER_DEPTH_SHOT	4 Bytes integer	60
WATER_DEPTH_REC	4 Bytes integer	64
ELEV_DEPTH_SCALER	2 Bytes integer	68
COORD_SCALER	2 Bytes integer	70
XSHOT	4 Bytes integer	72
YSHOT	4 Bytes integer	76
XREC	4 Bytes integer	80



Only one trace is shown per ensemble when “FIELD_RECORD_NO” gets its value from trace sequence number.

REMEMBER! Loading stacked data using the Un-Stacked option instead of the stacked option will cause similar effect as before. SeismiGraphix will group each ensemble based on whatever value is stored in the “FIELD_RECORD_NO” byte word. See below:



APENDIX A:

How to solve out of memory issues in JAVA VIRTUAL MACHINE "JVM"

When loading large amounts of data, depending on your system configuration, the java virtual machine created to run SeismiGraphix might run out of memory, causing the application to freeze, become unstable or simply some options will stop working.

To confirm when the JVM is running out of memory, check the output in the terminal from where SeismiGraphix was launched, you might see something like this:

One of the error lines will read:

To solve this, you have to increase the heap space when running SeismiGraphix.

Loading SeismiGraphix, using the following command:

java –jar –Xmx1g SeismiGraphix.jar

-Xmx1g: this switch tells the JVM to use 1 Gigabyte of heap memory.

Change this value based on your system properties, as a rule of thumb this value should not be higher than 50% of your total available memory. In most cases one Gigabyte is enough to solve memory issues within SeismiGraphix.

If you want to permanently set the value used when launching SeismiGraphix edit the shortcut settings by adding

-Xmx1g option: in windows your shortcut properties might look like this