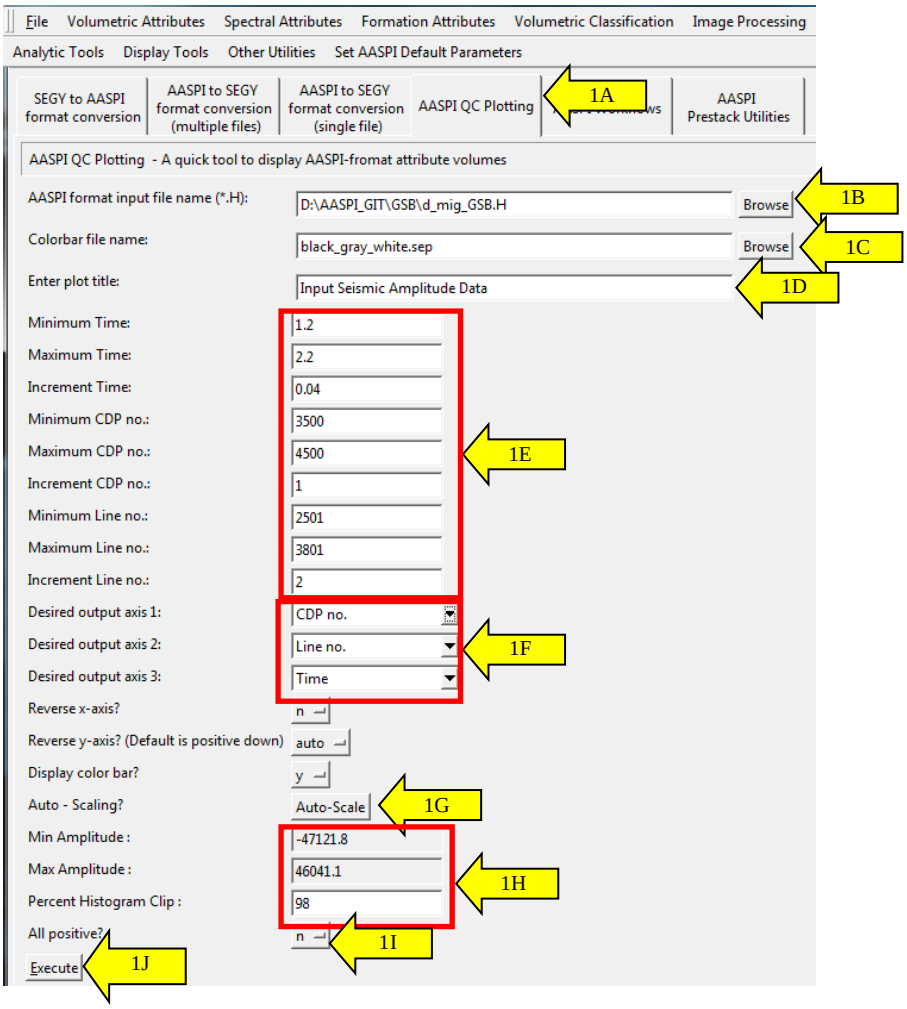
QC PLOTTING OF AASPI-FORMAT DATA AND ATTRIBUTES – Program aaspi_plot

The AASPI QC Plotting tab

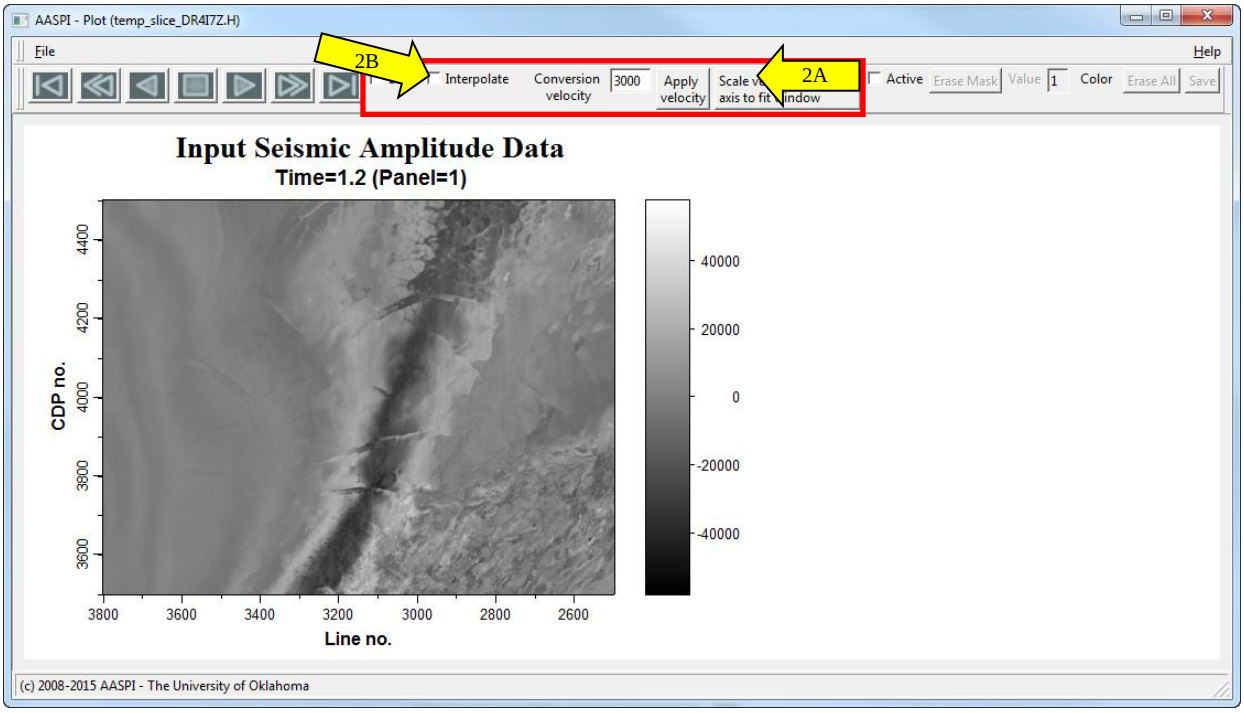
To further quality control the conversion process, you will wish to plot your data before computing seismic attributes. You will also wish to plot your attributes before converting them to SEGY format prior to importation into your interpretation workstation software. In the aaspi_util GUI (1A) Click the tab labeled 'AASPI QC Plotting'. The panel below appears.



(1B) Click Browse and select the AASPI-format file (*.H) that you want to display. After you browse the file, the Colorbar file name (1C), plot title

(1D), and all axes parameters (1E) are automatically loaded. You can change all those fields to your need.
By default, desired axes 1, 2, 3 are time, cdp, and line, respectively (1F). This default selection correspond to inline display type, where each panel is an inline view, with cdp as the horizontal axis and time as the vertical axis. To change the display type to cross-line view, make sure the desired axis 3 is “CDP no”. Similarly, to change the display type to time-slice view, make sure the desired axis 3 is “Time”.
Note that each time you change the display type, the increment value for the 3rd axis would be set to be 10x the original increment. For example, if you select time as the 3rd axis, and your sample interval is 0.004s, then the time increment is automatically set at 0.04s. This is recommended because it would help increase the display loading speed by cropping the data to the new increment of the 3rd axis and generate a smaller volume to be displayed.
By default, auto-scaling is active (1G). This means the program will use statistical percentage clip to scale the data to appropriate color level. The default percentage histogram clip is 98 (1H), meaning only values between 1% and 99% of the data statistical distribution will be taken into the scaling process. Data falls below 1% or above 99% of the distribution would be clipped. Anything in between 1% and 99% distribution will be scaled in between. This is useful when you are comparing seismic amplitude data with different processing flows or different surveys that have different range of values.
Click on (1G) would switch between auto-scaling and fixed-scaling modes. In fixed-scale mode, you need to define a minimum and maximum values (1H). These values are automatically loaded when you browse the input file and you can always change them to your need. Data falls below the minimum or above the maximum would be clipped. The display color would be scaled linearly from minimum value to maximum value.
If the browsed data have both positive and negative values (e.g. seismic amplitude, curvatures…), specify All-positive to “n” (1I). Otherwise (e.g. coherence, dip magnitude…) select “y”.

After all the parameters are set, click *Execute* (1J).
The following figure generated by the program **aaspi_plot** appears:


AASPI - Plot (temp_slice_DR4I7Z.H)
File
Help
2B
Interpolate
Conversion velocity
3000
Apply velocity
2A
Active
Erase Mask
Value
1
Color
Erase All
Save
Input Seismic Amplitude Data
Time=1.2 (Panel=1)
CDP no.
4400
4200
4000
3800
3600
Line no.
3800
3600
3400
3200
3000
2800
2600
40000
20000
0
-20000
-40000
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Basic interaction with aaspi_plot GUI

By default, the display panel will scale the vertical axis using a 3000ft/s conversion velocity (for inline and cross-line display type) or using the correct 1 inline : 1 cross-line (for time-slice display type). Click on 2A to switch to the window-size fitting mode. Click again to switch back to scaling using velocity conversion mode. You can change the replacement velocity and hit Apply to rescale the plot to your need.

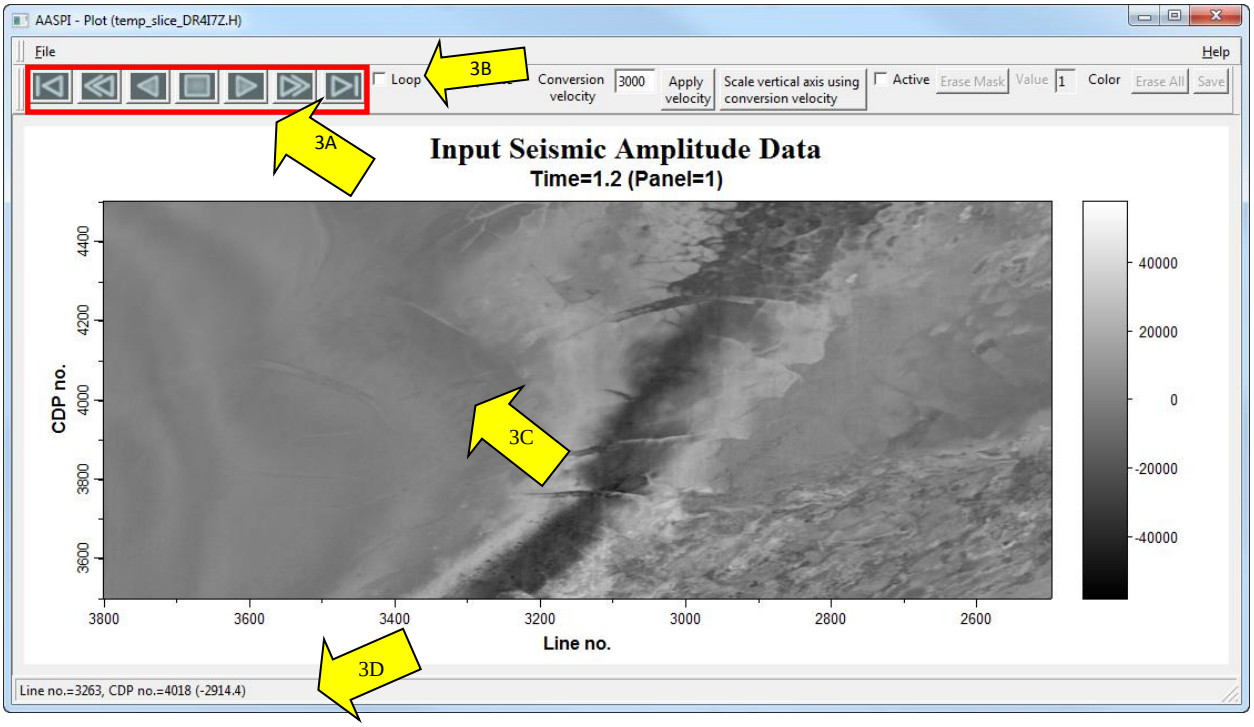
Click on 2B to turn on/off bilinear interpolation of the image. Interpolation makes the image look smoother. However, in some cases, it should be turned off to prevent interpolation artifacts, such as azimuthal wrap-around.

Click on the double right arrow button (3A) to move to next panel (e.g. move to the next inline in inline display type). Similarly, click on the double left arrow button to move to the previous panel.

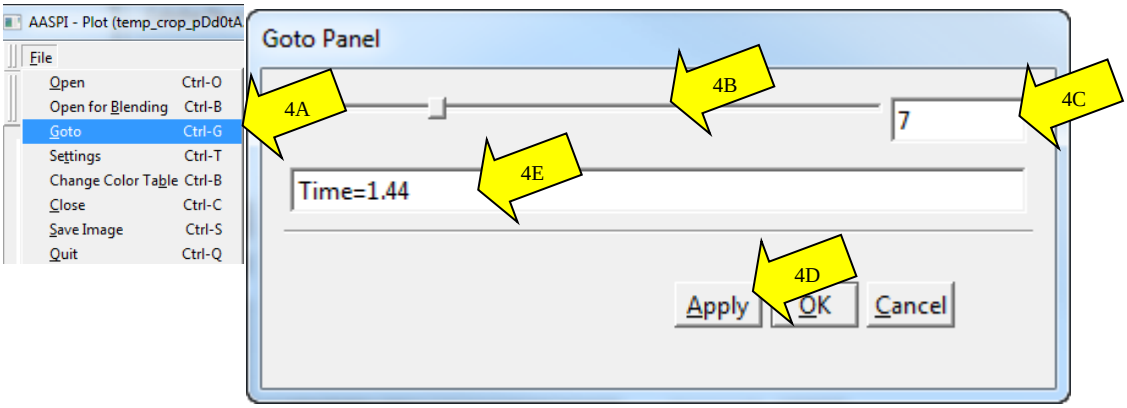
The single right arrow is used to “play forward” the panel as a movie. To play the movie in a loop, check-mark the loop option (3B). Left arrow button is for playing backward. Square button is to stop the movie. This is useful to animate through different panels in order to see the change of a geologic feature (such as a fault or a bedding surface).

The right most and left most button is used to quickly switch to the last or the first panel view.

To view the coordinate and value of a data point, left click on the data point of interest (3C). The coordinate and value of the data point is displayed in the bottom status bar (3D). Note that the value are the number inside the parentheses.

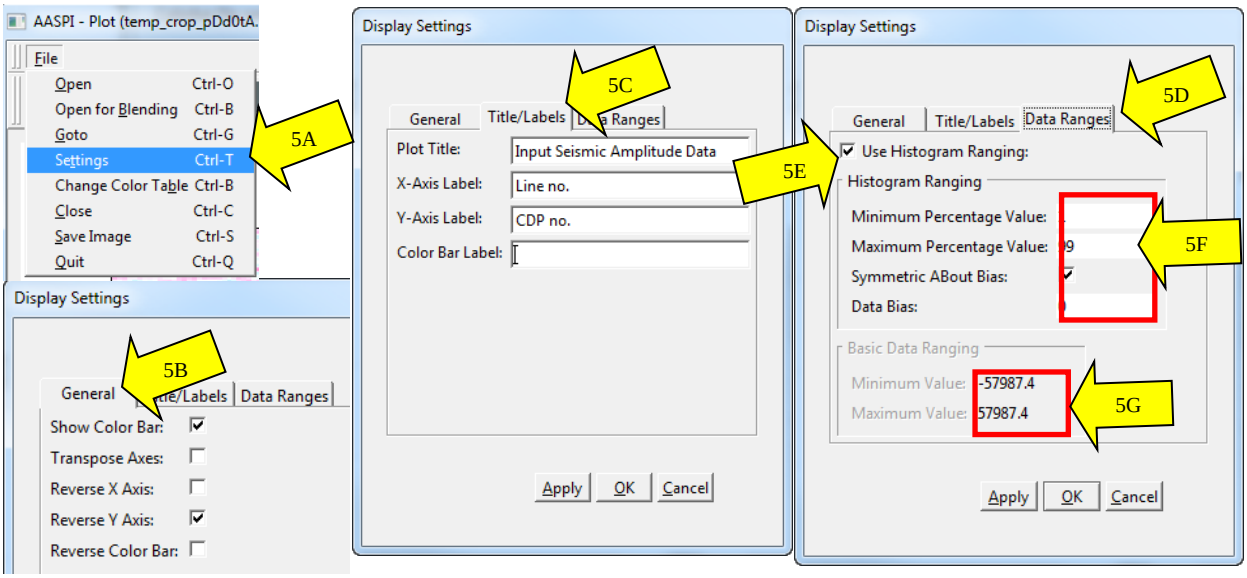


To go to a specific panel of interest, click (4A) *File*, *Goto* to open the *Goto panel*. In this panel, you can either (4B) move the slider, or alternatively, type in the panel number on the right (4C) and click (4D) *Apply*. The label of the panel will change accordingly (4E).



Settings

AASPI Plot GUI allows you to manually change plotting parameters after a data is displayed. Click on (5A) File → Settings to open the settings dialog.

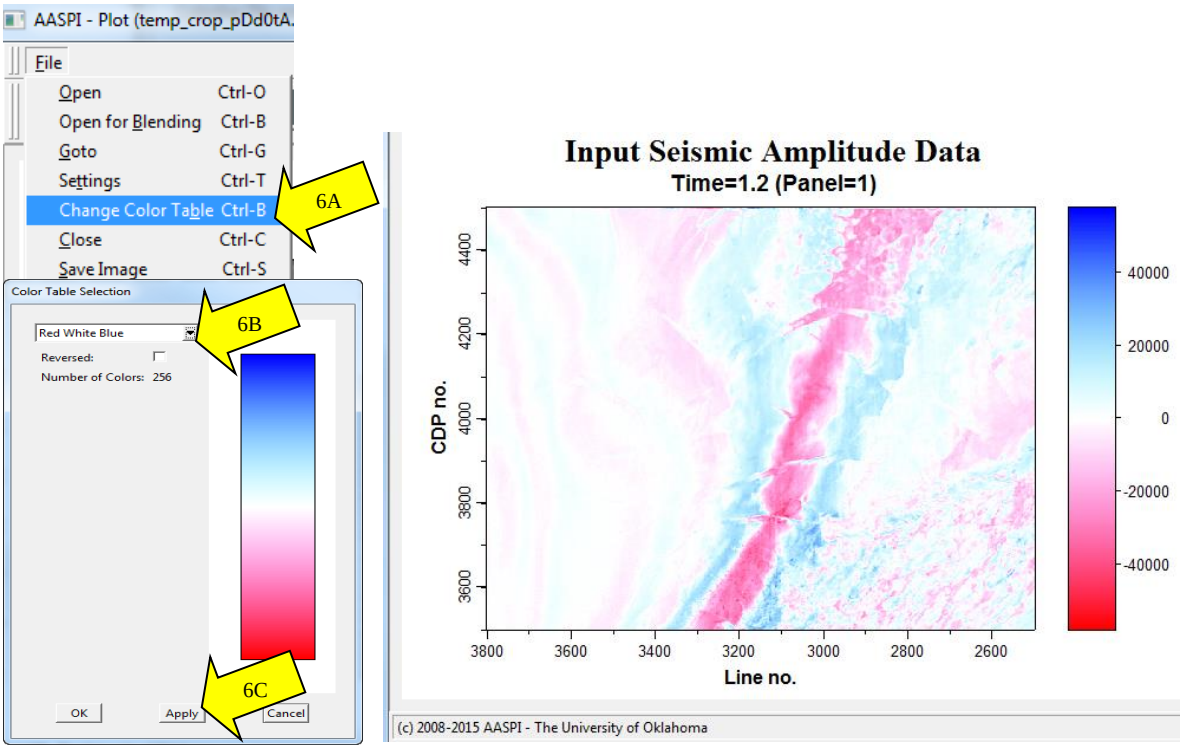


In the general tab (5B), you can specify whether to show color bar, transpose image, reverse axes, and reverse color bar. If you are comparing two data of the same type but with different ranges of values (for example, seismic amplitude reprocessed in different workflow), it is better to turn off the color bar to maintain the exact size of the main plot area.
In the Title/Labels tab (5C), you can change the title of the plot, as well as the axes labels and color bar label.
The data ranges tab (5D) is probably the most important one that you will regularly use. This tab allow you to change from statistical scaling mode using histogram percentage distribution to fixed scale mode using minimum and maximum values(5E). These modes are mutually exclusive, so you can only use one of them at a time. Statistical scaling parameters are in box (5F), while fixed scaling parameters are in box (5G). Note that if "Symmetric about bias" is activated and Data bias is 0, then it would correspond to "All-positive" set to "n" in the QC plotting tab of aaspi_util, meaning your data has both positive and negative values (e.g. amplitude, curvatures…) and you want to set zero value as the middle color of the color bar. If your data values are all positive, uncheck "Symmetric about bias".

Changing Color Bar

The color bar can be browsed in the QC Plotting tab. However, if you want to change the color bar after the data is displayed, go to (6A) File → Change Color Table. The color bar dialog will pop up, allow you to change

the color bar to your need (6B) and to reverse it if needed. Then click (6C) Apply (or OK) to see the change.



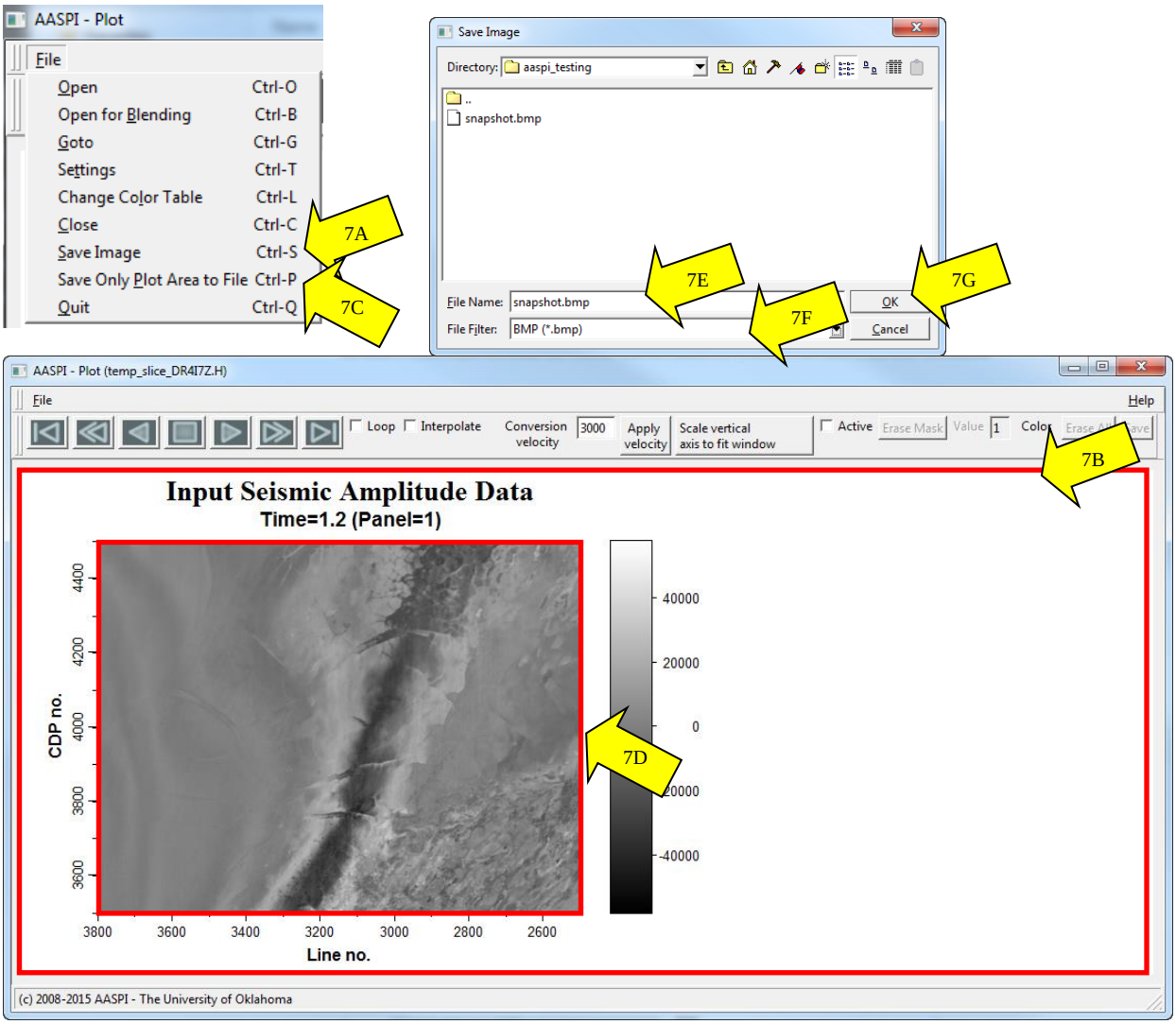
Exporting Graphics Files

Program **aaspi_plot** allows you to export PNG (Linux only), JPEG (Linux only), GIF, and BMP format graphics files for use in reports and publications. This may be particularly useful in exporting images that appear better when using 24-bit color tables.

There are two options to export the image.

1. Save the entire image: click (7A) File → Save Image. This will save the entire image, including color bar, titles, and axes labels to an image file (7B).
2. Save only the plotting area: click (7C) File → Save. This will only save the plotting area to an image file (7D).

Give the file a name (7E), choose export format (7F), and click OK (7G).



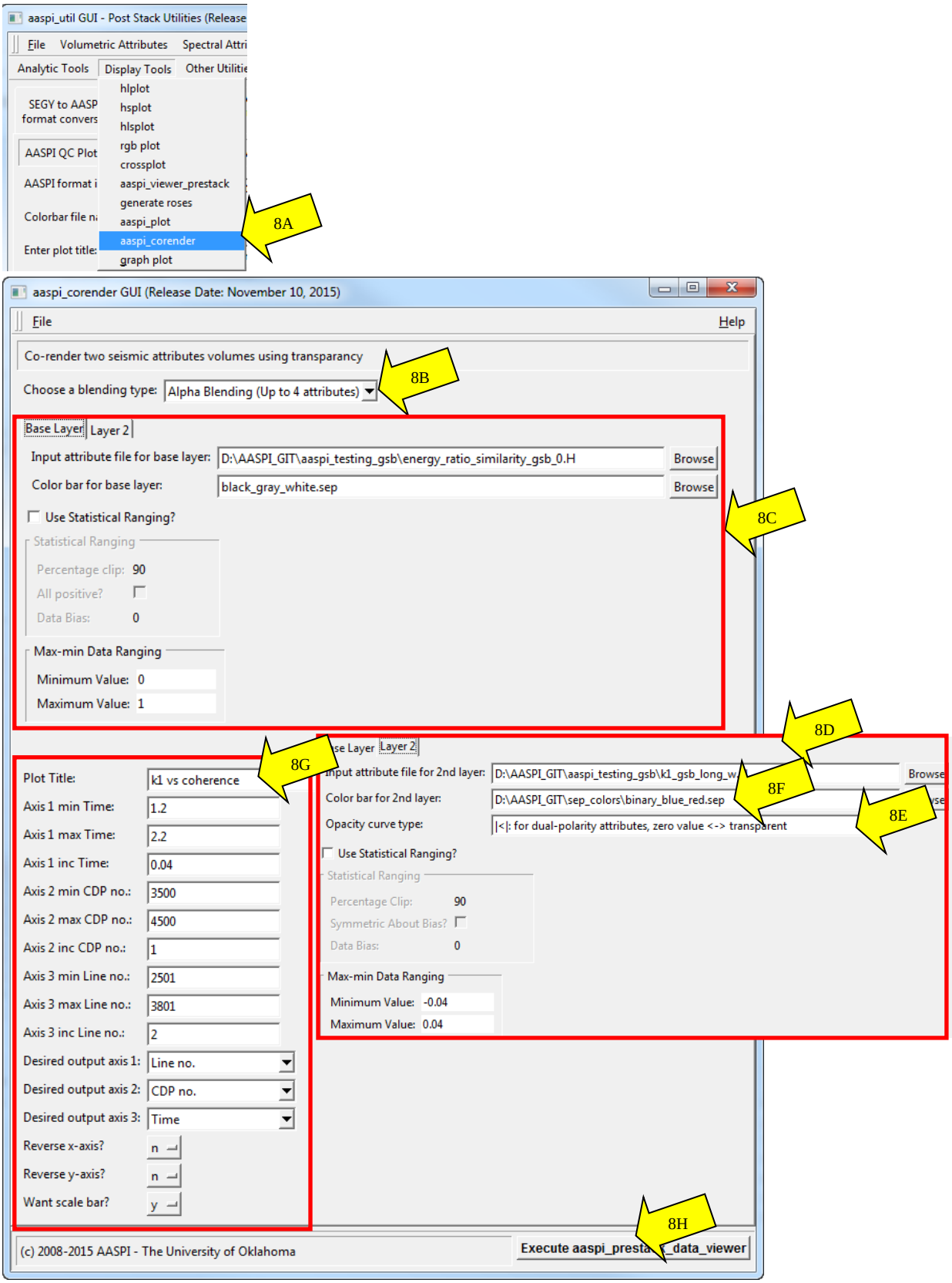
Co-rendering two attributes

To co-render two attributes, go to Display Tools → aaspi_corender (8A). Currently we support single display (no blending) and alpha blending with two layers (8B). We planned to implement RGB and HLS blending methods soon.

In the tab book, specify input file, input color bar, as well as statistical or normal max-min ranging parameters for the base layer (8C) as well as the second layer (8D). In layer 2 tab, choose appropriate opacity curve for blending (8E). There are 5 choices of opacity curves:

- Positive linear: low values are transparent, while high values are opaque

- Negative linear: low values are opaqe, while high values are transparent
- |>|: near-zero values are opaque, while positive and negative values are transparent
- |<|: near-zero values are transparent, while positive and negative values are opaque
- Custom: use the embedded alpha channel in the color bar file (usually Petrel "*.alut" file). If an ".alut" file is selected for the color bar, this choice is automatically selected.


aaspi_util GUI - Post Stack Utilities (Release
File
Volumetric Attributes
Spectral Attri
Analytic Tools
Display Tools
Other Utilitie
SEGY to AASP format convers
AASPI QC Plot
AASPI format i
Colorbar file n
Enter plot title:
hlplot
hsplot
hlsplot
rgb plot
crossplot
aaspi_viewer_prestack
generate roses
aaspi_plot
aaspi_corender
graph plot
8A
aaspi_corender GUI (Release Date: November 10, 2015)
File
Help
Co-render two seismic attributes volumes using transparency
Choose a blending type:
Alpha Blending (Up to 4 attributes)
8B
Base Layer
Layer 2
Input attribute file for base layer:
D:\AASPI_GIT\aaspi_testing_gsb\energy_ratio_similarity_gsb_0.H
Browse
Color bar for base layer:
black_gray_white.sep
Browse
Use Statistical Ranging?
Statistical Ranging
Percentage clip: 90
All positive?
Data Bias: 0
Max-min Data Ranging
Minimum Value: 0
Maximum Value: 1
8C
8D
8F
8E
8G
Plot Title:
k1 vs coherence
Axis 1 min Time:
1.2
Axis 1 max Time:
2.2
Axis 1 inc Time:
0.04
Axis 2 min CDP no.:
3500
Axis 2 max CDP no.:
4500
Axis 2 inc CDP no.:
1
Axis 3 min Line no.:
2501
Axis 3 max Line no.:
3801
Axis 3 inc Line no.:
2
Desired output axis 1:
Line no.
Desired output axis 2:
CDP no.
Desired output axis 3:
Time
Reverse x-axis?
n
Reverse y-axis?
n
Want scale bar?
y
Layer 2
Color bar for 2nd layer:
D:\AASPI_GIT\sep_colors\binary_blue_red.sep
Opacity curve type:
|<|: for dual-polarity attributes, zero value <-> transparent
Use Statistical Ranging?
Statistical Ranging
Percentage Clip: 90
Symmetric About Bias?
Data Bias: 0
Max-min Data Ranging
Minimum Value: -0.04
Maximum Value: 0.04
8H
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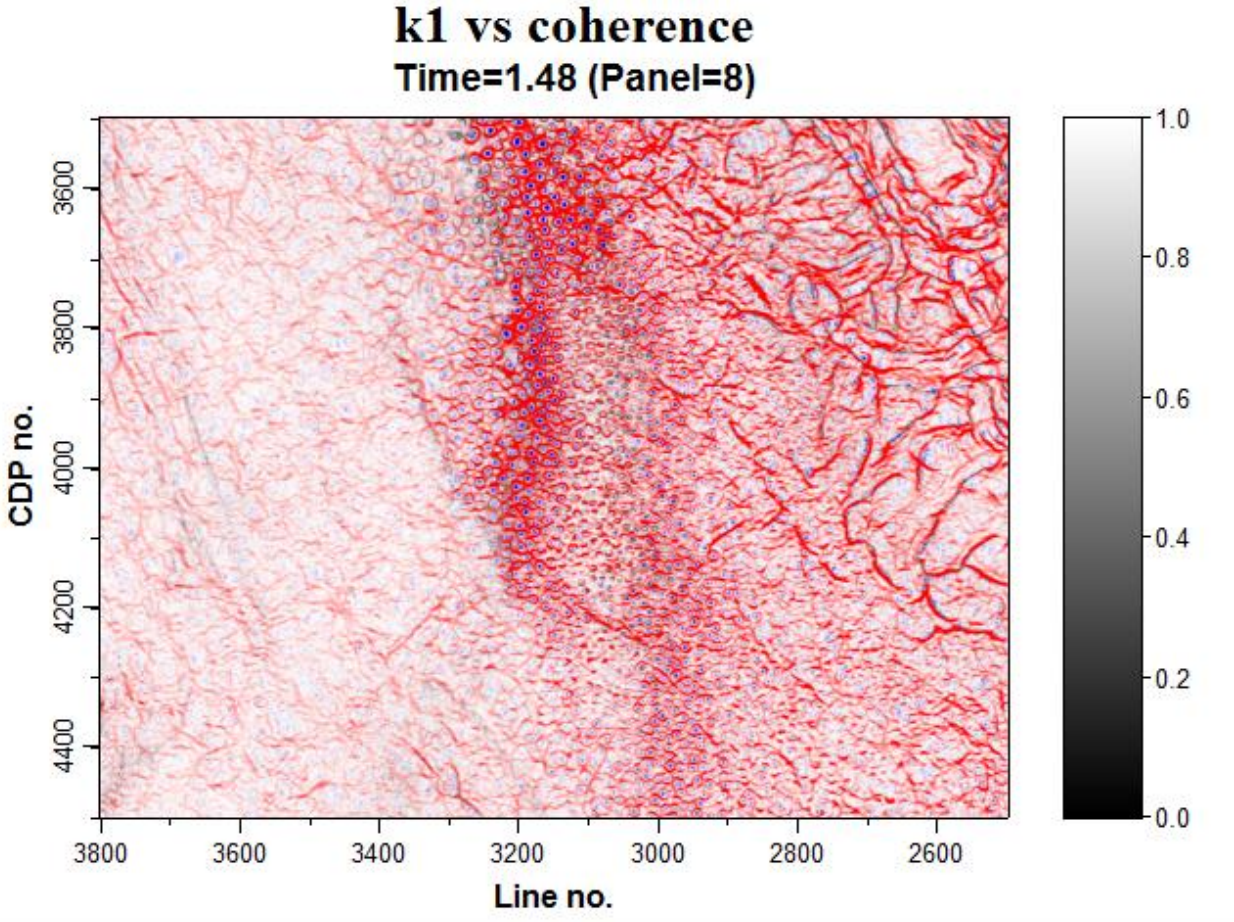
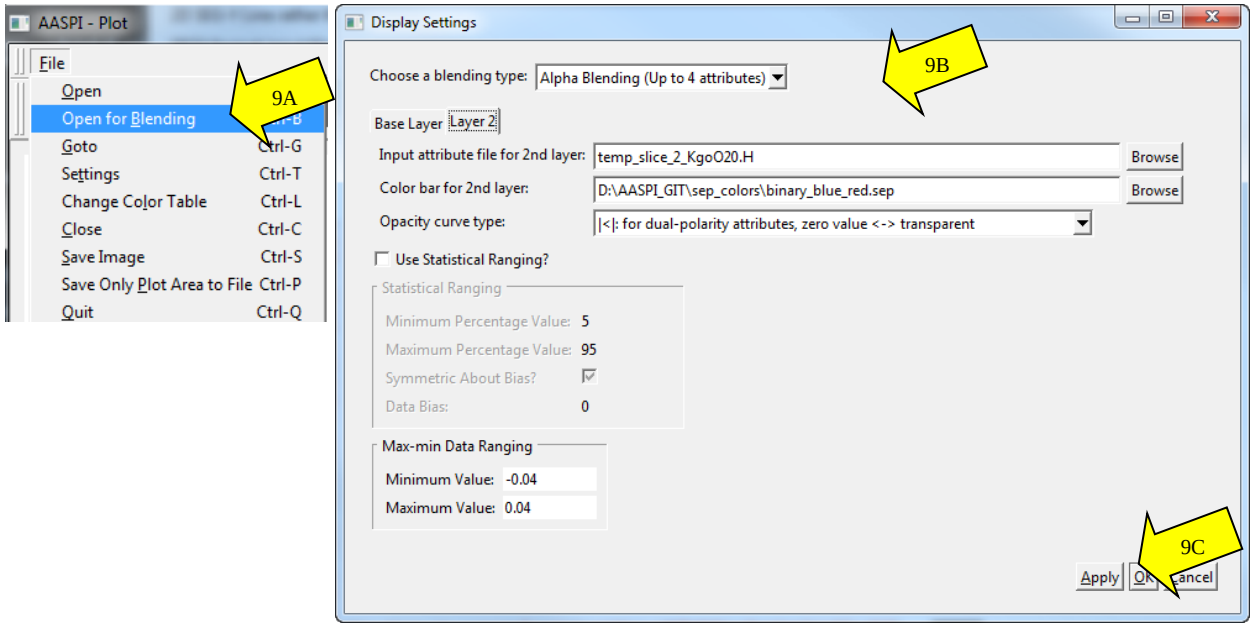
In this case, we are plotting curvature as the 2nd layer, we want to use |<| opacity curve type to enhance the high positive and low negative values of curvature. Notice that we also created a binary blue-red color bar, which has all red for positive values and all blue for negative value, for this blending purpose (8F).

After the two layers' parameters are set up, specify common parameters for plotting (8G). This is similar to the QC plot tab in aaspi_util. Finally, hit Execute (8H). The figure below shows the co-rendered result of coherence (specifically energy-ratio similarity) and most positive curvature (k_1) on a time-slice.



If somehow you want to change co-rendering parameters for the two attributes after they are plotted, in aaspi_plot, click File → Open for blending… (9A). This window show almost exactly the same settings you applied to the two layers in aaspi_corender, including blending type, input file, color bar, scaling parameters, and opacity curve type (9B). Note that the input files are not the actual attributes, but rather a cropped / sliced / transposed versions of them. This is a good practice for plotting since it allows us to view the data in time slice and X-line mode, as well as increasing the panel increment so we can go through the data quicker. Change the parameters to your need, and click Apply/OK (9C)



Looking under the hood: GUIs, parameter files, shell scripts, and application programs

A few users and the system administrators may wish to know how we have put this software together. The components were discussed in reviewing our migration plans to support Windows in Section 1. The AASPI software is driven by a collection of graphical user interfaces (GUIs) written in C++ and using the Fox toolkit. These GUI read default and user-supplied parameters to generate a parameter file, which for the QC plotting program here is called *aaspiviewer.parms*:

```
[kmarfurt@tripolite boonsville]$ cat aaspiviewer.parms
aaspi_fn=/nfs/raid1/home/kmarfurt/projects/boonsville/d_mig_boonsville.H
colorbar_fn=black_gray_white.sep
plot_title="Input Seismic Amplitude Data"
plotsection=0
gainpanel=every
wantscalebar=y
min1=0
max1=1.5
inc1=0.1
min2=74
max2=206
inc2=1
min3=105
max3=201
inc3=1
minval=-121406
maxval=149036
allpos=n
fixed_scale=0
xreverse=n
yreverse=auto
[kmarfurt@tripolite boonsville]$
```

The GUI invokes a python script *${AASPIHOME}/pyscripts/* a*aspi_aaspiviewer_poststack.py*. The python script reads the parameters from the **.parms* file, processes them, and then invokes application program **aaspi_plot** (written in C++ and also using the Fox toolkit). The bulk of our applications is written in Fortran95, run in parallel under MPI, and is not interactive. This four-layer software architecture provides an interactive user interface, computationally efficient application codes, glued together with python scripts that provide multiplatform capabilities on Linux and Windows.

If you were to inspect *${AASPIHOME}/pyscripts/* a*aspi_aaspiviewer_poststack.py* you would see that it reads the parameter values from the parameter file, such as those to determine whether we wish to plot time slices or vertical slices, a call to program **crop** that crops the data according to the input parameters, and program **slice** that generates time slices from the input cropped data sub-volume, prior to calling program **aaspi_plot** that actually plots the seismic data. Since we no longer will use pipes in order to move to Windows, we need to define temporary intermediate files. Unique *temp_sliced* and *temp_cropped* files are created by appending the time of execution to the file name. These temporary files are deleted when program **aaspi_plot** is closed. Occasionally, your system connection may be interrupted or a process may terminate abnormally. Nothing will be damaged if you remove any of the **.parms* or *temp** files in any of your directories.