

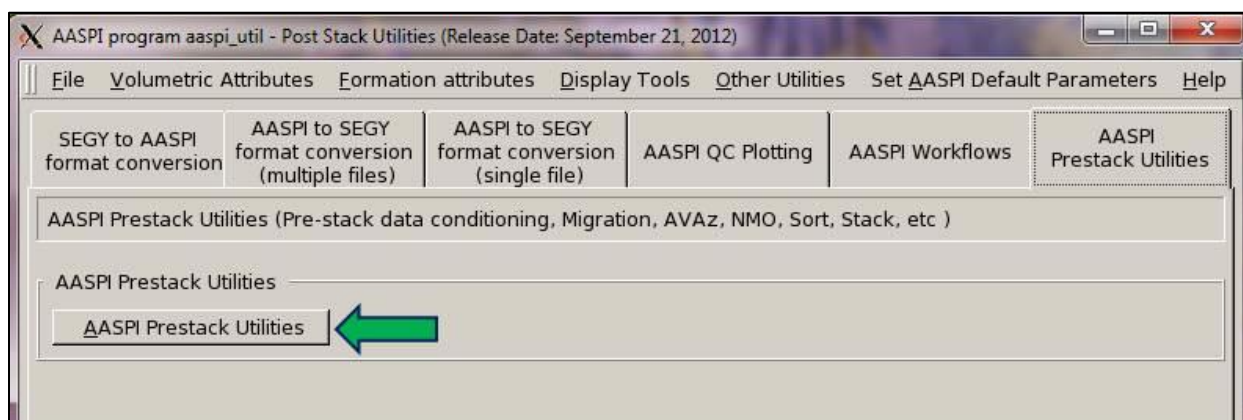


Converting Pre-stack Gathers Between SEGY and AASPI Formats, Pre-stack viewer Stacking Utility and Compute Fold

Converting from SEGY format to AASPI format

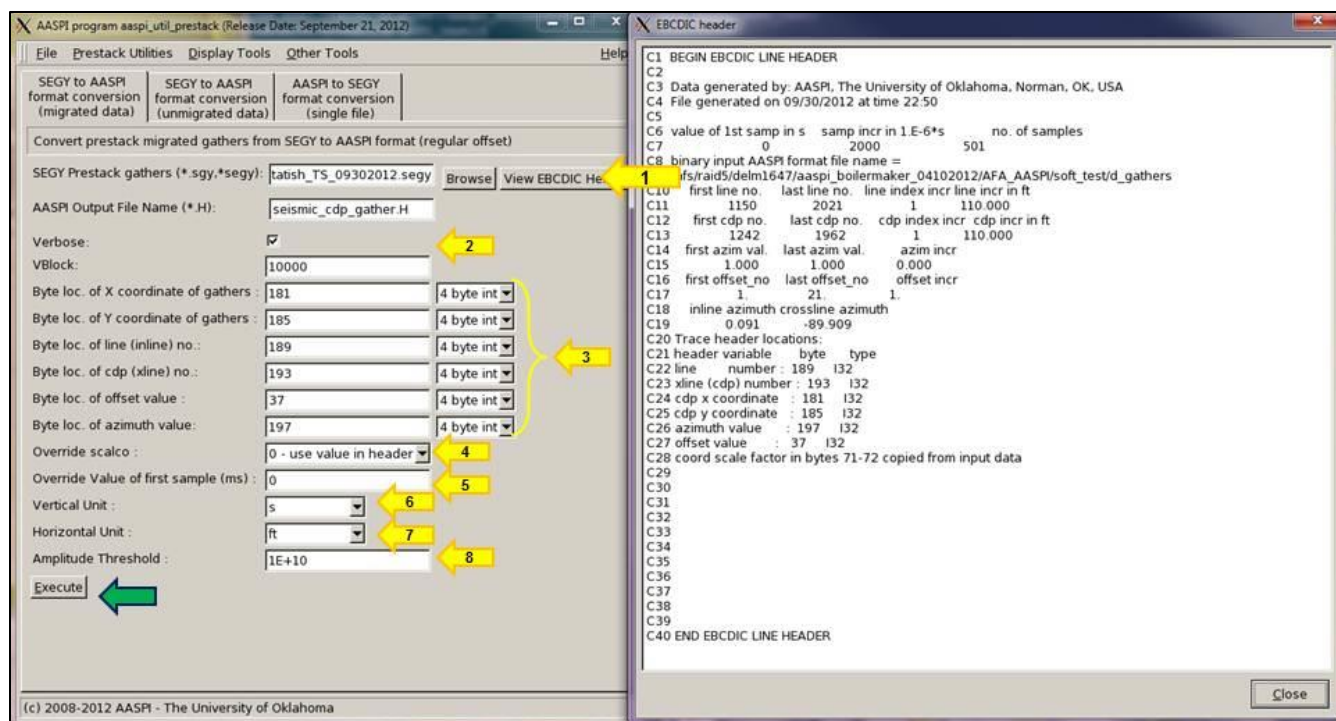
Launching the Graphical User Interface (GUI) - **aaspi_util_prestack**

There are two ways to invoke **the aaspi_util_prestack** GUI: either by typing it in on the command line, or by choosing it on the upper right hand corner of the (poststack analysis) **aaspi_util** GUI. In either manner, the following GUI appears and we can choose to compute the fold in the Prestack Utilities.



The **aaspi_util_prestack** GUI is shown below.

Seismic Imaging - Converting Prestack Migrated Gather SEG-Y- and AASPI-Format Volumes – the `aaspi_util_prestack` GUI



This tab is to convert the pre-stack migrated gathers to .H aaspi (SEP) format. Browse the *.seg-y file and view the EBCDIC headers as shown (Arrow 1). Click on the verbose if required (Arrow 2). Enter the proper byte locations according to the EBCDIC headers (Arrow 3). Note the two new byte locations one for the offset value another for the azimuth value.

After we convert to .H format in a later step and inspect the inline and crossline spacings (reasonable numbers might be 110 ft, 30 m, and so forth) we may find values that are orders of magnitude too low or too high (e.g. 1100 ft or 3 m). Such errors imply that the SEG-Y standard “scale coordinate” value (Arrow 4) is inconsistent with the x and y values stored in the data. Such errors can arise when exporting data in and out of some processing and interpretation packages. Override this value if necessary. The time of the first sample can also be corrupted in data export and transfer. Type in the correct first sample time/depth (Arrow 5) if it is wrong.

We will always wish to define our vertical and horizontal measurement units. In (Arrow 6) use the pull-down arrow to select the vertical units. The default for SEG-Y time data will be “s” (for seconds), with a 2 ms sample increment stored as 2000 μ s (microseconds). Depth data are more challenging. If the physical sample increment is 5 m (or 15 ft), and if we store them as 5000 mm, (or 15000 mft) then you should enter the unit “km”

(or “kft”) as the vertical unit. You would type “m” (or “ft”) only if the physical 5 m (or 15 ft) sample increment is stored as 5000000 μm (15000000 μs ft).

In the United States, almost all surveys define horizontal distances in ft. In almost every other place in the world, we will use m. However, be forewarned that you may obtain trade data from a European operator working the Gulf of Mexico with survey coordinates converted to m. There is a SEG-Y flag for this (1 for m, 2 for ft) but it is often set to 0 during processing and import/export from various packages. For this reason, the AASPI software asks you to (*Arrow 7*) explicitly choose the “Horizontal units’ using the drop down arrow selector.

Finally, from time to time you may obtain a data set with “glitches” in it. Ideally, such numbers are flagged somewhere along the way as “NaN”s, which stands for “Not a Number”, but it can be a cold, cruel world out there. Tape transcription, faulty disk drive controllers, or errors in seismic processing with insufficient internal error checking can introduce bad numbers. If you have NaNs, you will need to clip your data by (*Arrow 8*) typing in an appropriate number (say 10 standard deviations away from 0.0 for data that have had the outliers removed). The AASPI software will detect the outliers and attempt to interpolate their values from adjacent time or depth samples.

After entering all the values properly, execute the program (*Green Arrow*).

Seismic Imaging - Converting Prestack Migrated Gather SEGY- and AASPI-Format Volumes – the `aaspi_util_prestack` GUI

```

noffset,offset,offset_cnt(joffset)      16      8825      580939
noffset,offset,offset_cnt(joffset)      17      9200      580939
noffset,offset,offset_cnt(joffset)      18      9600      580939
noffset,offset,offset_cnt(joffset)      19     10000      580939
noffset,offset,offset_cnt(joffset)      20     10425      580939
noffset,offset,offset_cnt(joffset)      21     10900      580939
      offset index      offset value      offset increment
      1
      2          2900      1450,000
      3          3975      825,000
      4          4550      512,500
      5          5000      425,000
      6          5400      400,000
      7          5800      387,500
      8          6175      362,500
      9          6525      350,000
     10          6875      350,000
     11          7225      337,500
     12          7550      312,500
     13          7850      300,000
     14          8150      312,500
     15          8475      337,500
     16          8825      362,500
     17          9200      387,500
     18          9600      400,000
     19         10000      412,500
     20         10425      450,000
     21         10900
first_line =      1150 last_line =      2021 ← 1
first_cdp =      1242 last_cdp =      1962
first_offset_index      1
last_offset_index      21
offset_inc      1
noffset      21
finished assignment
form the matrix. best_offset, offset(best_offset) =      10900      1075
after generation of S matrix
nline,Nn =      549816      549816,000000000
Transformation matrix:
-109.999846099300      0.174322701167009      2097300.73863158
0.174310171651939      109.999866654837      37434.5319370694
dline= 110.0000 dcdp= 110.0000 ← 2
inline_azimuth= 9.0799630E-02 crossline_azimuth= -89.90921
clockwise = F
cdp inc=      1
line inc=      1
Survey grid defined
Scanning amplitudes and padding ...
n1 =      501 esize =      4
trace_block size in bytes =      2004
first_line,current_line,last_line      1150      1150      2021
first_line,current_line,last_line      1150      1160      2021
first_line,current_line,last_line      1150      1170      2021
first_line,current_line,last_line      1150      1180      2021
first_line,current_line,last_line      1150      1190      2021
first_line,current_line,last_line      1150      1200      2021

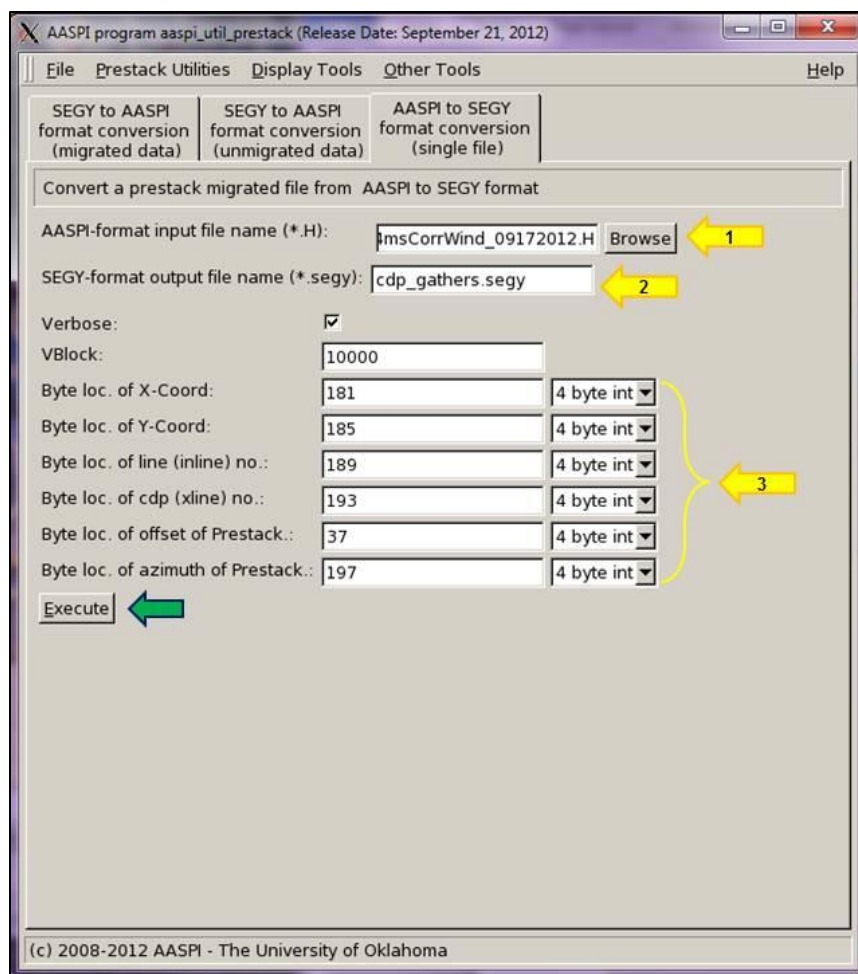
```

The output job will be displayed in the terminal window or will be written out in a text file `seggy2aaspi_prestack.out`. If the data is read in properly then note the correct and reasonable values for start and end CDPs and inlines (*Green Arrow 1*). Also note the proper inline and crossline separation (*Green Arrow 2*). If this separation is improper (too high or too low) then we need to put a finite scaling factor (Scalco) in the input.

Converting from AASPI format to SEGY format

Converting from AASPI format to SEGY is similar to the flow in the poststack `aaspi` utility. Select the file for converting into SEGY output (*Arrow 1*). Enter the `*seggy` output file name (*Arrow 2*). Mention the proper output byte locations (*Arrow 3*) and execute the program.

Seismic Imaging - Converting Prestack Migrated Gather SEGY- and AASPI-Format Volumes – the **aaspi_util_prestack** GUI

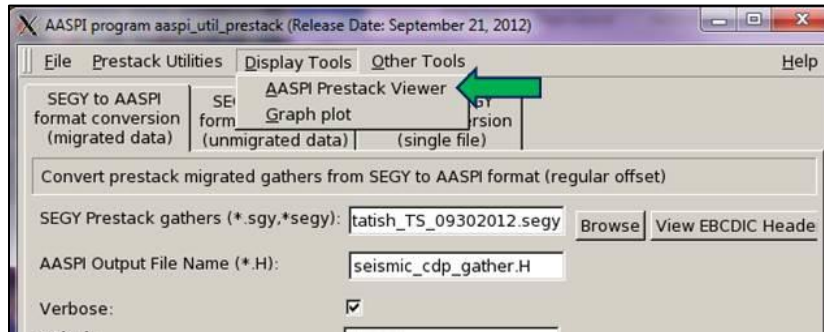


The AASPI pre-stack viewer

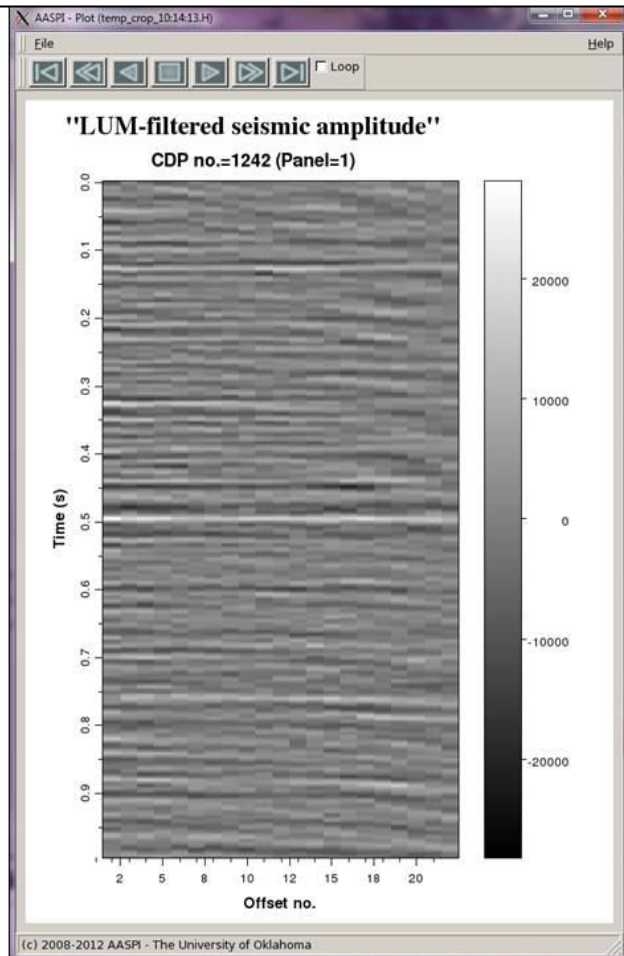
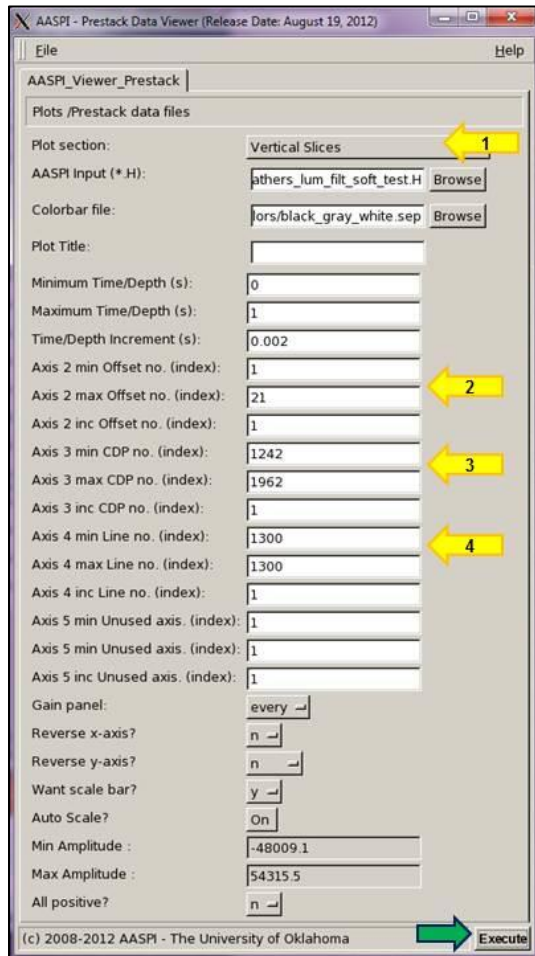
The `aaspi_prestack_viewer` can both view four-dimensional (e.g. *time,offset,cdp_no,line_no*) and five-dimensional data (e.g. *time,azimuth,offset,cdp_no,line_no*). Moreover, you can choose any

Seismic Imaging - Converting Prestack Migrated Gather SEGY- and AASPI-Format Volumes – the **aaspi_util_prestack** GUI

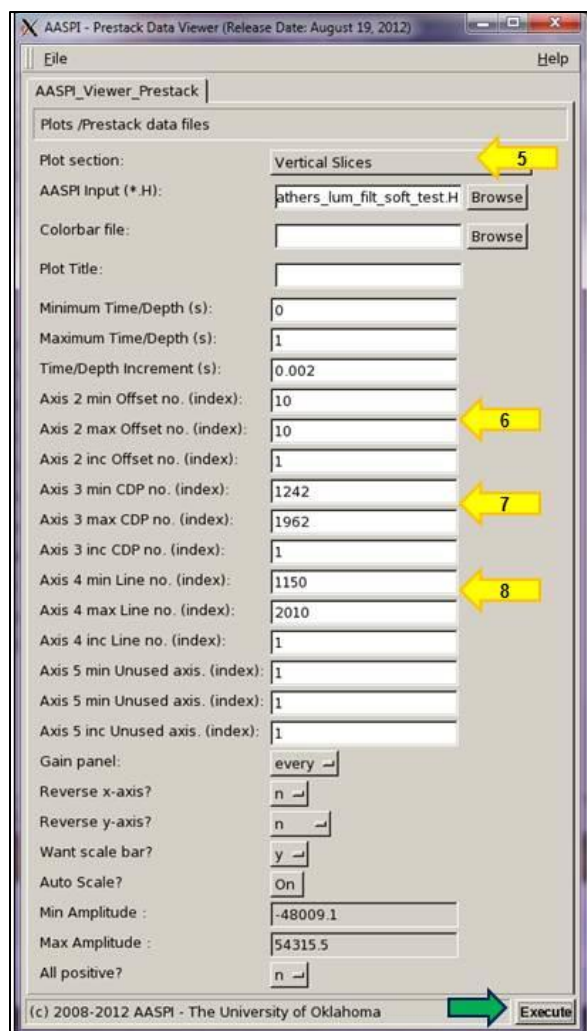
dimension you want to display, as the following examples show). It may not be sophisticated multi-dimensional GPU-based visualization capabilities of some of the commercial vendors; it gets the job done for quality control. Here an example is shown with a four-dimensional data volume. The viewer GUI can be opened from the **aaspi_util_prestack** from the display tools as shown.



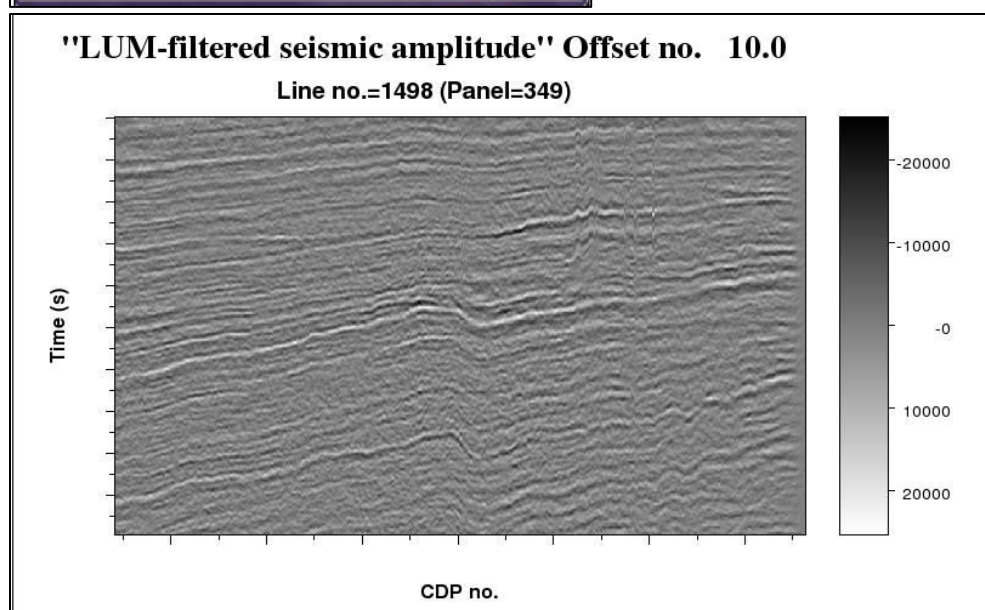
Visualizing a gather in the viewer utility; Note to change the toggle button to Vertical Slice (Arrow 1)



Seismic Imaging - Converting Prestack Migrated Gather SEGY- and AASPI-Format Volumes – the `aaspi_util_prestack` GUI



Visualization of an offset corresponding to one inline and all the CDPs. Toggle the Plot selection to Vertical slices (Arrow 5). Select the offset number to visualize (Arrow 6). Note that the values are the index for the offsets and does not represent the offset value in ft. or m. Also, note the titles for the plot are automatically taken from the title of the .H file. To give a different name the Plot title name can be mentioned in the GUI without any spaces between the words.



Seismic Imaging - Converting Prestack Migrated Gather SEGY- and AASPI-Format Volumes – the `aaspi_util_prestack` GUI

AASPI - Prestack Data Viewer (Release Date: August 19, 2012)

File Help

AASPI_Viewer_Prestack

Plots /Prestack data files

Plot section: Time Slices **9**

AASPI Input (*.H): aters_lum_filt_soft_test.H Browse

Colorbar file: Browse

Plot Title:

Minimum Time/Depth (s): 0.3

Maximum Time/Depth (s): 0.78

Time/Depth Increment (s): 0.02

Axis 2 min Offset no. (index): 1

Axis 2 max Offset no. (index): 21 **10**

Axis 2 inc Offset no. (index): 1

Axis 3 min CDP no. (index): 1242

Axis 3 max CDP no. (index): 1962 **11**

Axis 3 inc CDP no. (index): 1

Axis 4 min Line no. (index): 1150

Axis 4 max Line no. (index): 2021 **12**

Axis 4 inc Line no. (index): 1

Axis 5 min Unused axis. (index): 1

Axis 5 min Unused axis. (index): 1

Axis 5 inc Unused axis. (index): 1

Gain panel: every

Reverse x-axis? n

Reverse y-axis? y

Want scale bar? y

Auto Scale? On

Min Amplitude: -48009.1

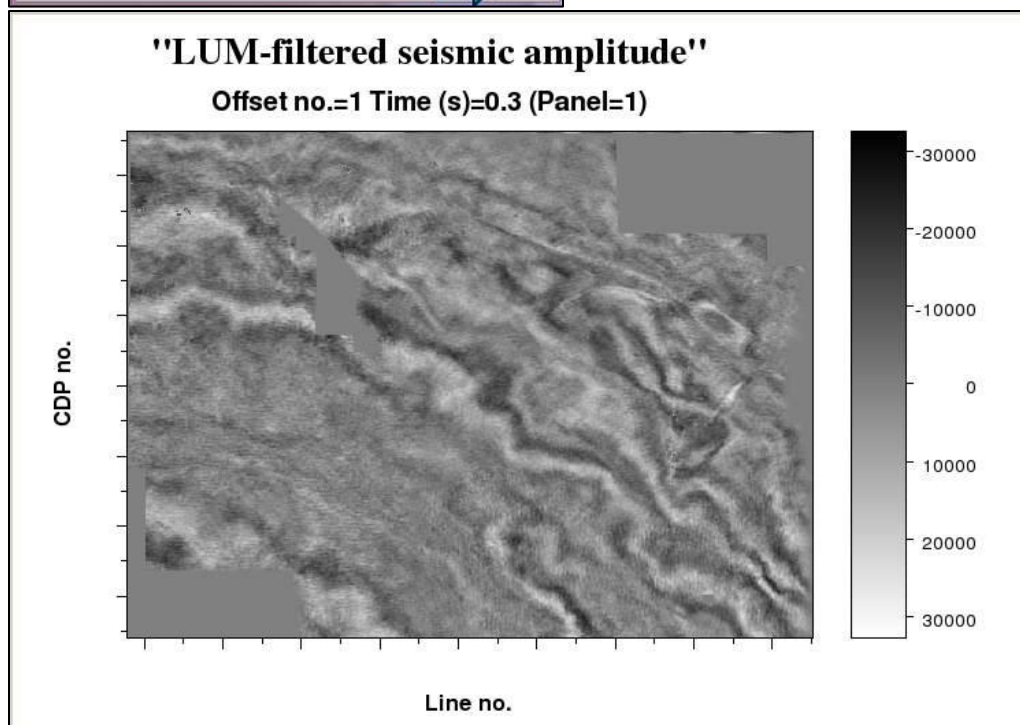
Max Amplitude: 54315.5

All positive? n

Minimum value of the 4nd axis (cdp)

Execute

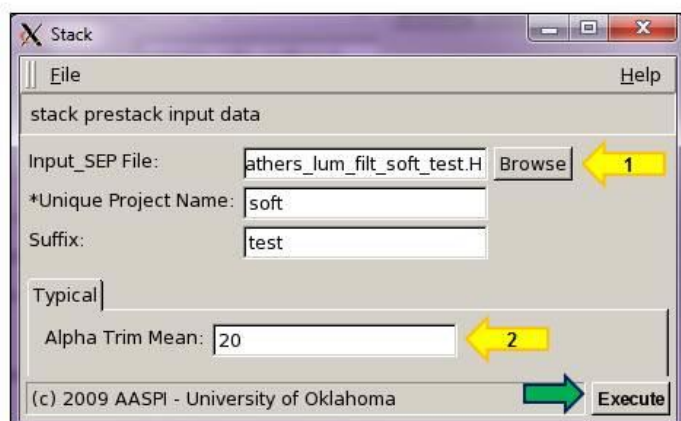
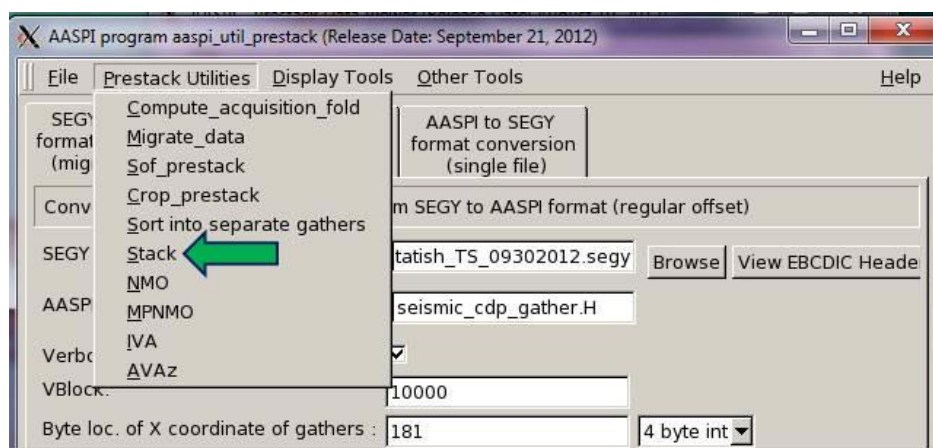
Visualization of a time-slice corresponding to one inline and all the CDPs. Toggle the Plot selection to Time slices (Arrow 9). Select the offset, CDP and the Inline index as required for the visualization.



AASPI Stack for the pre-stack migrated gathers

There is a simple utility to stack the pre-stack migrated gathers. Note that the gathers input to this program should be NMO corrected thus should be pre-stack migrated gathers.

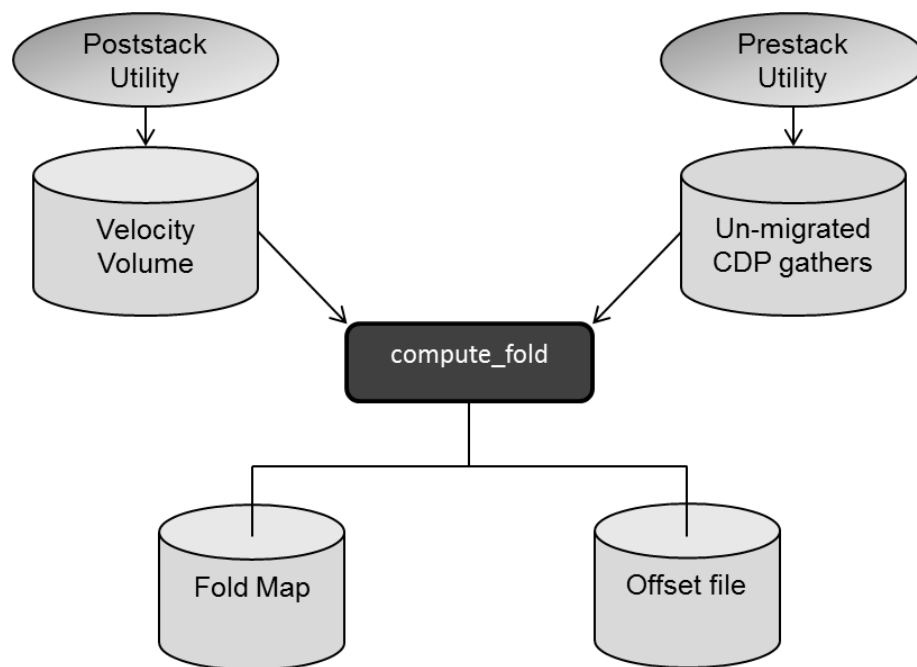
Input the pre-stack migrated gathers as input (*Arrow 1*). Currently the default is to run a 20% alpha-trim mean (*Arrow 2*) stack, which implies that the sample are first ordered across the gather, the lowest 20% values and highest 20% values are rejected, and the middle 60% values are averaged. Zero-valued samples are excluded from these statistics.



AASPI Fold Computation Utility

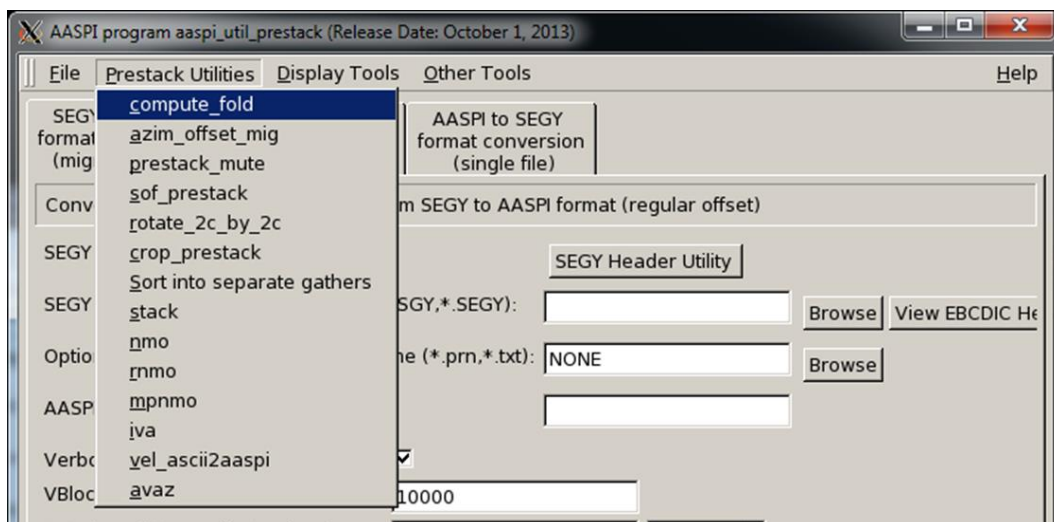
The fold map calculation is essential and first step for the subsequent aaspi pre-stack migration. The input parameters are the prestack un-migrated CDP gathered seismic data and the velocity cube. The outputs include the fold map, the offset information, and confidence.

The fold calculation will use the velocity cube coordinates as references and, based on the prestack unmigrated data, will calculate the number of events for a determined CDP or fold.

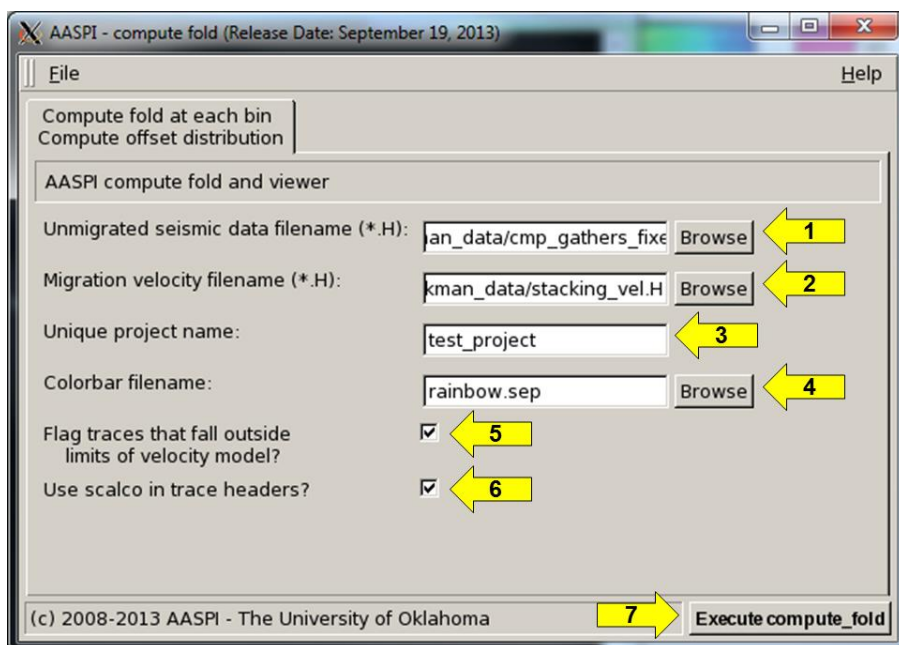


We select program **compute_fold** from the Prestack utility window

Seismic Imaging - Converting Prestack Migrated Gather SEGY- and AASPI-Format Volumes – the **aaspi_util_prestack** GUI



The following GUI appears:



We now choose the prestack un-migrated CDP gathers (1), the velocity volume (2), we choose a unique project name, and the default and most common color bar use for fold display: rainbow.sep.

AASPI software is able to verify if any trace from the CDP gathers volume that falls outside the coordinate limits taken from the velocity file (5). The comparison takes into account the coordinate scalar in the trace headers (6).

Finally, the fold is calculated by executing the `compute_fold` (7) and after a while, you will see the following message in the terminal and a new plot window will pop-up showing the fold map.

```
slice: percent read in = 75.9 percent written out = 0.0
slice: percent read in = 82.3 percent written out = 0.0
slice: percent read in = 88.6 percent written out = 0.0
slice: percent read in = 94.9 percent written out = 0.0
Copying trace headers
Closing file: fold_test_project.H
Closing file: temp_slice_18:03:56.H
normal completion of program slice
aaspi_plot d_fn=${temp_sliced_fn} yreverse=y \
    allpos=y wantscalebar=y color=${AASPIHOME}/sep_colors/${colorbar_fn} &
AASPI_PLOT_PID=$!
+ AASPI_PLOT_PID=23697
#
# remove temporary cropped files used in plot QC
#
wait ${AASPI_PLOT_PID}
+ wait 23697
+ aaspi_plot d_fn=temp_slice_18:03:56.H yreverse=y allpos=y wantscalebar=y color=/home/aaspi/devel/sep_colors/rainbow.sep
Using color table: /home/aaspi/devel/sep_colors/rainbow.sep
Min percent=0.5
Max percent=99.5
Using file: temp_slice_18:03:56.H
Naxes=2
Axis 1 n=158 o=1 d=1 Line No.
Axis 2 n=127 o=1 d=1 CDP No.
```

Using the rainbow color bar, areas with 0 fold or no CDPs will be black; whereas the zones with high fold or coverage will display magenta and red colors.

There is the possibility to re-plot the fold without calculating it again using the AASPI QC Plotting in the post-stack AASPI utility and choosing the file created with the prefix “`fold_`” (1) and the rainbow color bar (2).

Seismic Imaging - Converting Prestack Migrated Gather SEGY- and AASPI-Format Volumes – the **aaspi_util_prestack** GUI

AASPI program aaspi_util - Post Stack Utilities (Release Date: September 19, 2013)

File Volumetric Attributes Formation attributes Display Tools Other Utilities Set AASPI Default Parameters Help

SEGY to AASPI format conversion AASPI to SEGY format conversion (multiple files) AASPI to SEGY format conversion (single file) AASPI QC Plotting AASPI Workflows AASPI Prestack Utilities

AASPI QC Plotting - A quick tool to display AASPI-format attribute volumes

AASPI format input file name (*.H): pcum/dickman_data/fold_test_project.H Browse 1

Colorbar file name: rainbow.sep Browse 2

Enter plot title: fold

Plot section: Timeslice

Minimum Time/ Depth: 0

Maximum Time/ Depth: 0

Time/Depth Increment: 10

Minimum CDP: 1

Maximum CDP: 127

CDP Increment: 1

Minimum Inline: 1

Maximum Inline: 158

Inline Increment: 1

Gain panel: all

Reverse x-axis? n

Reverse y-axis? (Default is positive down) auto

Want scale bar? y

Auto - Scaling? Fixed-Scale

Min Amplitude : 0

Max Amplitude : 40

All positive? y

Execute

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Seismic Imaging - Converting Prestack Migrated Gather SEGY- and AASPI-Format Volumes – the `aaspi_util_prestack` GUI

