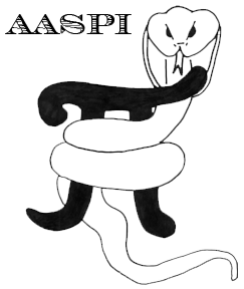


CONVERTING POSTSTACK DATA FROM AASPI TO SEGY FORMATS – The AASPI to SEGY conversion tabs

Contents

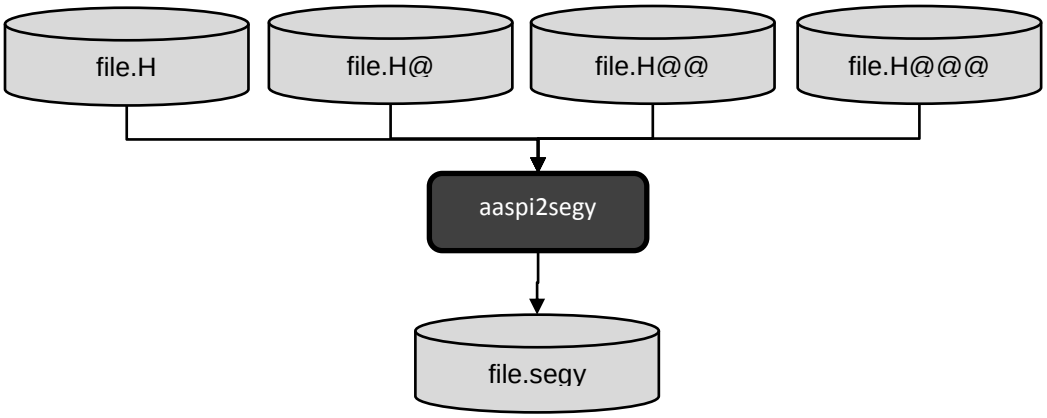
Poststack Data Conversion from AASPI to SEGY format

In 2015 we have 24 sponsors using at least eight different 3D seismic interpretation packages. For this reason, we convert our AASPI-format output to SEGY format. We are happy to work with any sponsors to define a more useful format, such as the *.zgy format used by Petrel, but this would require access to software specific developer toolkits.

The AASPI to SEGY conversion tabs allow the user to define specific header byte locations for inline, crossline, CDP x, and CDP y values, as well as an option to retain or reject the padded (dead) traces used to make a hypercube.

Conversion Flow Chart

The SEGY standard should be considered to be a convenient way to transfer seismic data from one application to another. The structure of the data is minimal, simply consisting of a line header and a suite of seismic traces, each of which has a seismic trace header and a seismic data component. In the AASPI format, (equivalent to the Stanford Exploration Project (SEP) format) project processing and volume description is stored in the ASCII-format “header” *.H file. This file points to two other files, the *.H@ file containing the binary-format data sample values, and an ASCII-format header format file (hff) *.H@@ describing the location and format of the headers stored in binary format in the *.H@@@ header value file. While this sounds quite complicated, separating header values from data values results in significant efficiency when sorting seismic data. Simply stated, one first sorts the headers, and then retrieves the appropriate seismic traces. The **aaspi2segy** conversion simply puts these four files back together again (losing the hypercube structure along the way):

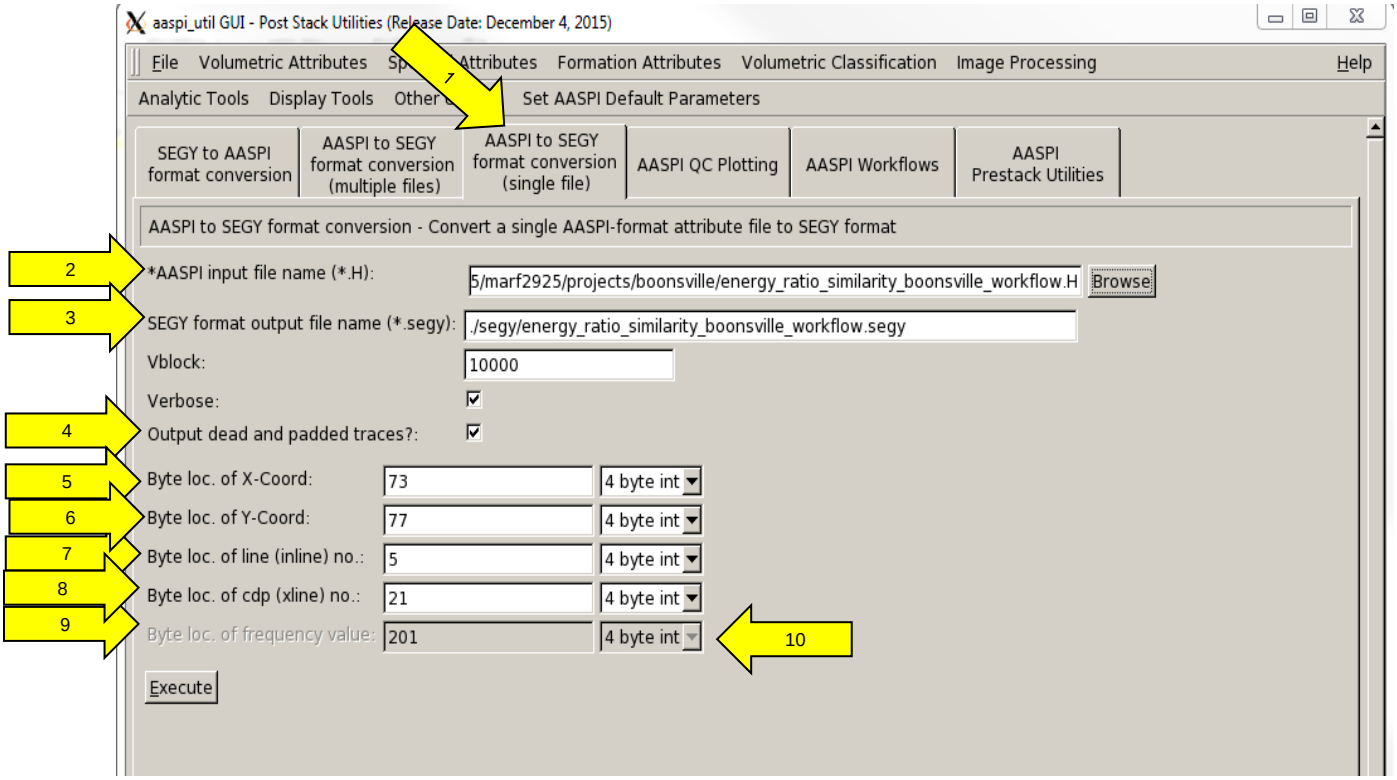


Poststack Data Conversion from AASPI to SEGY format (single file)

To convert an AASPI-formatted data into SEGY, go to *AASPI to SEGY format conversion (single file)* tab (1) on the **aaspi_util** GUI. Simply browse (2) and select an AASPI formatted file to be converted (in this case, "**energy_ratio_similarity_boonsville_workflow.H**"). The output file name (3) is automatically set to have the same name with the input file but with extension ".segy" instead of ".H". You can change the name if you wish. The file name also indicates that the output would be located in the "segy" directory within the current working directory. You may choose to output or not output (4) dead and padded traces. Almost all commercial software packages have no difficulty reading in such irregular data; however, search research codes may expect a padded hypercube of data.

Next specify header byte locations (5)-(8) of the desired CDP x, CDP y, inline, and crossline values. In this case, I am not using the SEGY standard values of 181, 185, 189, and 193, but rather those used by Petrel of 73, 77, 5, and 21. The (9) frequency header value is used when generating a 4D spectral decomposition hypercube. The SEGY standard is to (10) store headers as 4-byte integers. We can allow 2-byte integers. Let us know if for some reason you may need to store floating point trace header values. You can set defaults by invoking the (11) **Set AASPI Default Parameters** tab. Once the desired parameters are selected, click Execute.

Data Conversion: The **AASPI_util** AASPI to SEGY format conversion tabs



The output for this job includes the EBCDIC format SEGY line header which looks like the following image:

```
1C1  BEGIN EBCDIC LINE HEADER
2C2
3C3  Data generated by: AASPI, The University of Oklahoma, Norman, OK, USA
4C4  File generated on 12/10/2015 at time 12:34
5C5
6C6  value of 1st samp in s    samp incr in 1.E-6*s           no. of samples
7C7                    0.000                  2000                      800
8C8  binary input AASPI format file name =
9C9  /ouhomes5/marf2925/projects/boonsville/energy_ratio_similarity_boonsville_
10C10     first line no.     last line no.   line index incr  line incr in ft
11C11                105               201                 1          109.998
12C12      first cdp no.      last cdp no.    cdp index incr   cdp incr in ft
13C13                 74               206                 1          110.015
14C14
15C15     inline azimuth crossline azimuth
16C16             90.718             0.718
17C17
18C18 Trace header locations:
19C19 header variable       byte      type
20C20 cdp x coordinate   :   73     I32
21C21 cdp y coordinate   :   77     I32
22C22 inline number      :    5     I32
23C23 xline (cdp) number :   21     I32
24C24
25C25
26C26
27C27 coord scale factor in bytes 71-72 copied from input data
28C28
29C29
30C30
31C31
32C32
33C33
34C34
35C35
36C36
37C37
38C38
39C39
40C40 END EBCDIC LINE HEADER
```

This header contains the minimum information needed to load the data volume into an interpretation workstation. The “Data generated by” line can be easily modified to represent your company if you are a service provider. I use the Linux command “ls” to see if my file is there in the */segy directory:

```
marf2925@tripolite:~/projects/boonsville$ ls -ltr segy/*simi*
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 12:34 segy/energy_ratio_similarity_boonsville_workflow.segy
marf2925@tripolite:~/projects/boonsville$
```

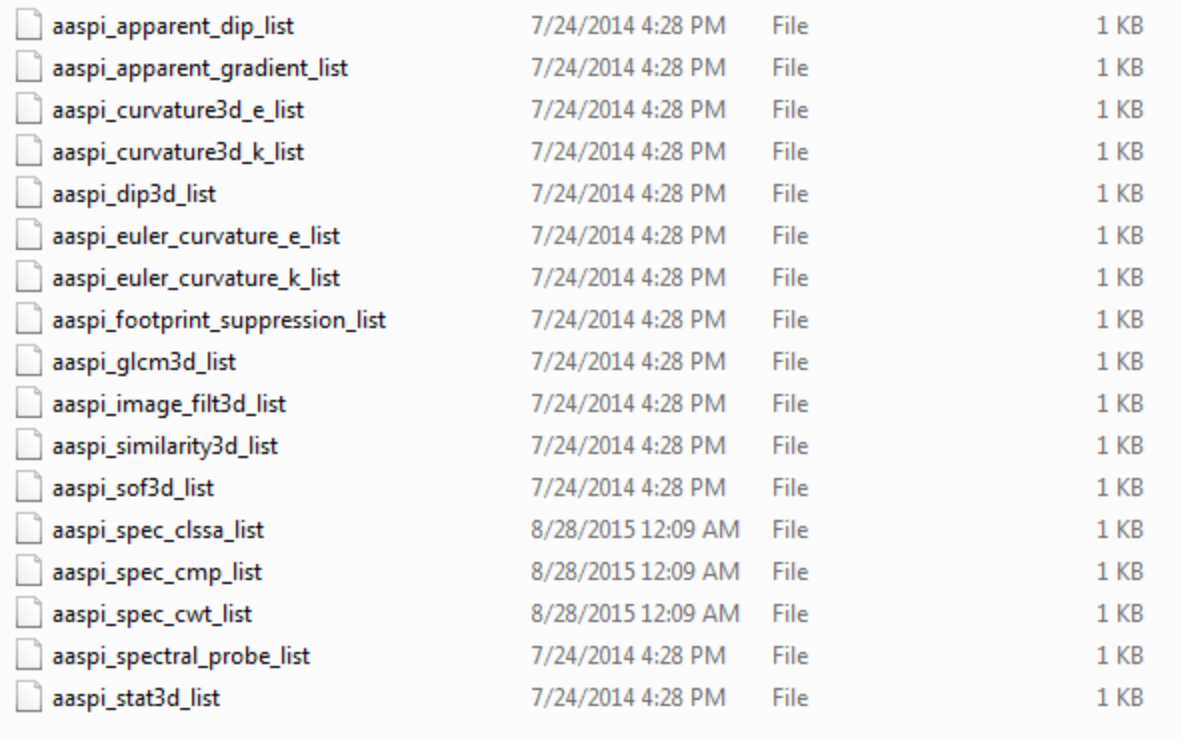
I observe that it contains 44Mbytes.

Poststack Data Conversion from AASPI to SEGY format (multiple files)

While the previously described single file conversion can be done for any file, you will see as you read the through the documentation that there are a great many attributes. Converting files one at a time might be tedious, but may introduce mixing files from different suites of parameters. For this reason, we provide a multiple file conversion utility. Within the AASPI software, the output file names are not arbitrary, but rather controlled by a combination of GUIs and shell scripts. Typical attribute files will have the format of "attribute name" followed by an underscore, followed by "unique project name" followed by another hyphen, followed by a "suffix" followed by ".H". Thus, my inline reflector dip attribute for the Boonsville data volume will be named (in dip3d documentation) **inline_dip_boonsville_0.H** where 'boonsville' is my unique project name and the "0" indicates that I considered this to be my 0^{th} or baseline computation. Previous releases of AASPI would simply convert this file to SEGY with the name ***inline_dip_boonsville_0.segy***. Such long file names have caused data base headaches with some of our sponsor installations.

AASPI provides the ability to rename the attribute files in a manner more consistent with your environment. Many of our sponsors use oracle and other data bases with a predefined naming convention. Some of the older interpretation software (such as Geoframe) may be relatively limited in the number of characters a file name can have. To address these issues, we have constructed a GUI that facilitates this naming strategy.

As with the default parameters defined above, and indeed with the interface between the GUIs and the python scripts, everything is controlled by intermediate files. The use of files (rather than command line arguments) facilitates moving our software across the Linux/Windows OS. In this case, the files actually reside in the ${AASPIHOME}/lists directory and have the form *.list



aaspi_apparent_dip_list	7/24/2014 4:28 PM	File	1 KB
aaspi_apparent_gradient_list	7/24/2014 4:28 PM	File	1 KB
aaspi_curvature3d_e_list	7/24/2014 4:28 PM	File	1 KB
aaspi_curvature3d_k_list	7/24/2014 4:28 PM	File	1 KB
aaspi_dip3d_list	7/24/2014 4:28 PM	File	1 KB
aaspi_euler_curvature_e_list	7/24/2014 4:28 PM	File	1 KB
aaspi_euler_curvature_k_list	7/24/2014 4:28 PM	File	1 KB
aaspi_footprint_suppression_list	7/24/2014 4:28 PM	File	1 KB
aaspi_glcm3d_list	7/24/2014 4:28 PM	File	1 KB
aaspi_image_filt3d_list	7/24/2014 4:28 PM	File	1 KB
aaspi_similarity3d_list	7/24/2014 4:28 PM	File	1 KB
aaspi_sof3d_list	7/24/2014 4:28 PM	File	1 KB
aaspi_spec_clssa_list	8/28/2015 12:09 AM	File	1 KB
aaspi_spec_cmp_list	8/28/2015 12:09 AM	File	1 KB
aaspi_spec_cwt_list	8/28/2015 12:09 AM	File	1 KB
aaspi_spectral_probe_list	7/24/2014 4:28 PM	File	1 KB
aaspi_stat3d_list	7/24/2014 4:28 PM	File	1 KB

If I *edit* one of *the aaspi_dip3d_list* I note that it consists of two identical columns:

```
inline_dip          inline_dip
crossline_dip           crossline_dip
dip_magnitude           dip_magnitude
dip_azimuth         dip_azimuth
```

The column on the left will not be changed by the GUI and will form the root word if the AASPI format files, which typically have the form

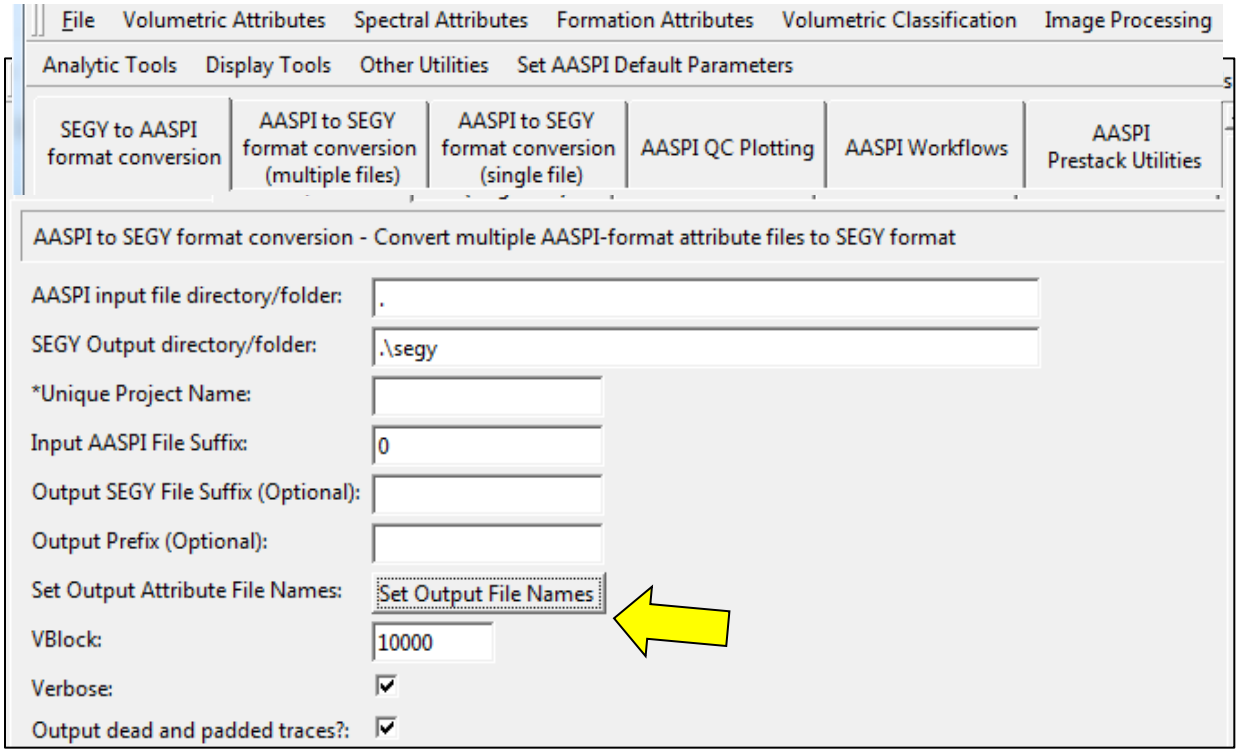
${root_left}_${unique_project_name}_${suffix}.H .

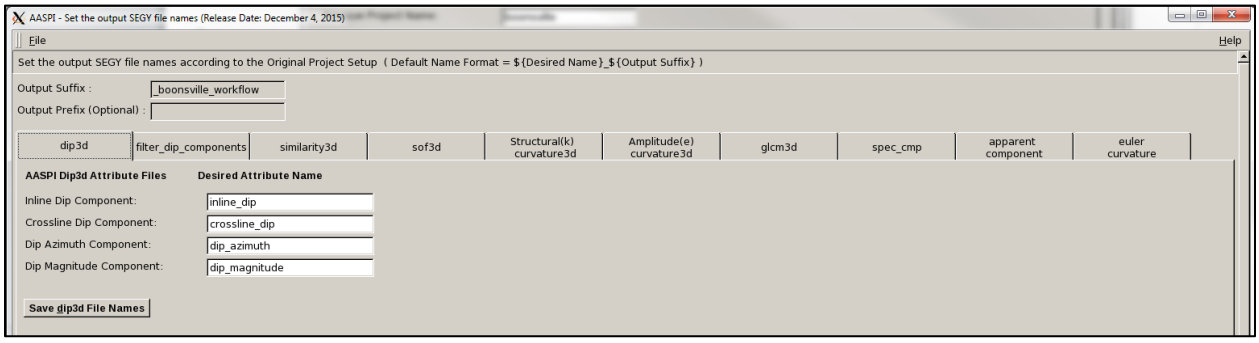
The column on the right *can* be changed. By default, the corresponding output file will have the form of previous AASPI releases:

${root_right}_${unique_project_name}_${suffix}.segy .

However, in the GUI, one can not only modify the right hand column, but also add a user-defined output prefix and output suffix (either of which may be blank). For instance, several Geoframe users require the jobname to be the leading characters in the file name. If there is a 16-character name limit, then the AASPI name needs to be shortened.

To set this up with GUI, choose the **AASPI to SEGY Conversion (Multiple Files)** *tab*, and the click **Set Output File Names** as shown below:





Proceed to click each of the programs for which you wish to change the names. Ideally, you will only want to do this once and the person doing it will place it in the ${AASPIHOME}/lists directory so that everyone uses the same convention. For this exercise, I did it in my home directory and generated the new **aaspi_dip3d_list** file:

```
[kmarfurt@tripolite ~]$ cat aaspi_dip3d_list
inline_dip=IL
crossline_dip                   XL
dip_magnitude                   DM
dip_azimuth                     DA
inline_dip_median_filt          IL_MED
crossline_dip_median_filt       XL_MED
dip_magnitude_median_filt       DM_MED
dip_azimuth_median_filt         DA_MED
inline_dip_lum_filt             IL_LUM
crossline_dip_lum_filt          XL_LUM
dip_magnitude_lum_filt          DM_LUM
dip_azimuth_lum_filt            DA_LUM
```

Most of our sponsors have more flexible interpretation workstation naming conventions, so I will just show the simplest conversion. Previously, I had used the AASPI Workflows tab and run the **geometric_attribute** workflow. First (1) click the **AASPI to SEGY format conversion (multiple files)** tab. I had previously invoked **aaspi_util** from the boonsville project directory, so the (2) **AASPI input file directory/folder** is simply "." . The (3) **SEGY output directory/folder** will fall under this directory and be called "./segy". Previously, I had chosen the (4) **unique project** *name* to be "boonsville" and the (5) *suffix* to be "workflow". The (6) output SEGY file suffix will be "**boonsville_workflow**" , which will be tacked onto all output files. You are free to call this descriptor use any combination of characters that can be used to describe a file name (i.e. do NOT use characters such as "=" or "+" in your names). The (7) byte descriptors are identical to those described above in the single file conversion.

Next, (8) place a checkmark next to programs from which you wish to convert the output. Note, that I did not check the curvature attributes, since the **geometric_attribute** workflow will give it suffices of "**long_wavelength**" and "**short_wavelength**". Converting these files require entering these suffices into (5).

I had run program **spec_cwt** and output a suite of 3D magnitude and phase volumes, between 5 and 100 Hz at 5 Hz intervals. I therefore (9) define these parameters as well. Make sure to make these values EXACTLY THE SAME as you ran previously or the python script will not find the files. Click **Execute**. The conversion completes and in my case obtains the following files in my segy subdirectory:

Data Conversion: The **AASPI_util** AASPI to SEGY format conversion tabs

```
ls -ltr segy
total 3294144
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 13:49 inline_dip_boonsville_workflow.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 13:49 crossline_dip_boonsville_workflow.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 13:49 inline_dip_lum_filt_boonsville_workflow.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 13:49 crossline_dip_lum_filt_boonsville_workflow.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 13:49 dip_magnitude_lum_filt_boonsville_workflow.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 13:49 dip_azimuth_lum_filt_boonsville_workflow.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 13:49 energy_ratio_similarity_boonsville_workflow.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 13:49 outer_product_similarity_boonsville_workflow.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 13:49 sobel_filter_similarity_boonsville_workflow.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 13:49 inline_energy_gradient_boonsville_workflow.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 13:49 crossline_energy_gradient_boonsville_workflow.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 peak_freq_cwt_boonsville_workflow.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 peak_phase_cwt_boonsville_workflow.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 peak_mag_cwt_boonsville_workflow.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 peak_mag_above_avg_cwt_boonsville_workflow.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 d_recon_cwt_boonsville_workflow.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_mag_3d_cwt_boonsville_workflow___5.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_mag_3d_cwt_boonsville_workflow__10.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_mag_3d_cwt_boonsville_workflow__15.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_mag_3d_cwt_boonsville_workflow__20.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_mag_3d_cwt_boonsville_workflow__25.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_mag_3d_cwt_boonsville_workflow__30.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_mag_3d_cwt_boonsville_workflow__35.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_mag_3d_cwt_boonsville_workflow__40.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_mag_3d_cwt_boonsville_workflow__45.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_mag_3d_cwt_boonsville_workflow__50.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_mag_3d_cwt_boonsville_workflow__55.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_mag_3d_cwt_boonsville_workflow__60.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_mag_3d_cwt_boonsville_workflow__65.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_mag_3d_cwt_boonsville_workflow__70.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_mag_3d_cwt_boonsville_workflow__75.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_mag_3d_cwt_boonsville_workflow__80.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_mag_3d_cwt_boonsville_workflow__85.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_mag_3d_cwt_boonsville_workflow__90.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_mag_3d_cwt_boonsville_workflow__95.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_mag_3d_cwt_boonsville_workflow_100.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_phase_3d_cwt_boonsville_workflow___5.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_phase_3d_cwt_boonsville_workflow__10.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_phase_3d_cwt_boonsville_workflow__15.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_phase_3d_cwt_boonsville_workflow__20.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_phase_3d_cwt_boonsville_workflow__25.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_phase_3d_cwt_boonsville_workflow__30.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_phase_3d_cwt_boonsville_workflow__35.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_phase_3d_cwt_boonsville_workflow__40.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_phase_3d_cwt_boonsville_workflow__45.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_phase_3d_cwt_boonsville_workflow__50.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_phase_3d_cwt_boonsville_workflow__55.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_phase_3d_cwt_boonsville_workflow__60.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_phase_3d_cwt_boonsville_workflow__65.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_phase_3d_cwt_boonsville_workflow__70.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_phase_3d_cwt_boonsville_workflow__75.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_phase_3d_cwt_boonsville_workflow__80.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_phase_3d_cwt_boonsville_workflow__85.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_phase_3d_cwt_boonsville_workflow__90.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_phase_3d_cwt_boonsville_workflow__95.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_phase_3d_cwt_boonsville_workflow_100.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_voice_3d_cwt_boonsville_workflow___5.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_voice_3d_cwt_boonsville_workflow__10.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_voice_3d_cwt_boonsville_workflow__15.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_voice_3d_cwt_boonsville_workflow__20.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_voice_3d_cwt_boonsville_workflow__25.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_voice_3d_cwt_boonsville_workflow__30.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_voice_3d_cwt_boonsville_workflow__35.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:01 spec_voice_3d_cwt_boonsville_workflow__40.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:02 spec_voice_3d_cwt_boonsville_workflow__45.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:02 spec_voice_3d_cwt_boonsville_workflow__50.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:02 spec_voice_3d_cwt_boonsville_workflow__55.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:02 spec_voice_3d_cwt_boonsville_workflow__60.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:02 spec_voice_3d_cwt_boonsville_workflow__65.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:02 spec_voice_3d_cwt_boonsville_workflow__70.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:02 spec_voice_3d_cwt_boonsville_workflow__75.00.segy
-rw-r--r-- 1 marf2925 faculty 44383040 Dec 10 14:02 spec_voice_3d_cwt_boonsville_workflow__80.00.segy
```