

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

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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.

	🗙 aaspi_util GUI - Post Stack Utilities (Release Date: December 4, 2015)					
	Eile Volumetric Attributes Source Formation Attributes Volumetric Classification Image Processing					
	Analytic Tools Display Tools Other Set AASPI Default Parameters					
	SEGY to AASPI format conversion AASPI t format conversion (multip	to SEGY AASPI to SE onversion format conve ole files) (single fi	EGY ersion AASPI QC Plotting le)	AASPI Workflows	AASPI Prestack Utilities	^
	AASPI to SEGY format conver	rsion - Convert a single A	ASPI-format attribute file t	o SEGY format		
2	*AASPI input file name (*.H):	5/marf2925/p	projects/boonsville/energy_	ratio_similarity_boons	sville_workflow.H Browse	
3	SEGY format output file name	e (*.segy): ./segy/energy	/_ratio_similarity_boonsville	_workflow.segy		
	Vblock:	10000				
	Verbose:					
4	Output dead and padded traces?:					
5	Byte loc. of X-Coord:	73	4 byte int 💌			
6	Byte loc. of Y-Coord:	77	4 byte int 💌			
7	Byte loc. of line (inline) no.:	5	4 byte int 💌			
8	Byte loc. of cdp (xline) no.:	21	4 byte int 💌			
9	Byte loc. of frequency value:	201	4 byte int 🚽	10		
	Execute		<u> </u>			

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

BEGIN EBCDIC LINE HEADER 101 202 3C3 Data generated by: AASPI, The University of Oklahoma, Norman, OK, USA 4C4 File generated on 12/10/2015 at time 12:34 505 6C6 value of 1st samp in s samp incr in 1.E-6*s no. of samples 707 0,000 2000 800 8C8 binary input AASPI format file name = 9C9 /ouhomes5/marf2925/projects/boonsville/energy_ratio_similarity_boonsville 10010 first line no. last line no. line index incr line incr in ft 201 1 109,998 last cdp no, cdp index incr cdp incr in ft 11C11 109,998 105 12012 first cdp no. 13013 74 110,015 206 1 14C14 15015 inline azimuth crossline azimuth 16016 90.718 0.718 17017 18C18 Trace header locations: 19C19 header variable byte type 20C20 cdp x coordinate 73 132 77 21C21 cdp y coordinate : I32 5 132 22C22 inline number 23C23 xline (cdp) number : 21 132 24C24 25025 26026 27C27 coord scale factor in bytes 71-72 copied from input data 28028 29029 30030 31031 32032 33033 34C34 35035 36036 37037 38038 39039 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:



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 0th 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 userdefined 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:

	<u>File</u> Volumetric Attributes	Spectral Attributes Formation Attributes Volumetric Classification Image Processi	ng
Γ	Analytic Tools Display Tools	Other Utilities Set AASPI Default Parameters	s
	SEGY to AASPI format conversion (multiple f	EGY AASPI to SEGY format conversion (single file) AASPI QC Plotting AASPI Workflows Prestack Utilitie	is .
	AASPI to SEGY format conversion	- Convert multiple AASPI-format attribute files to SEGY format	
	AASPI input file directory/folder:		
	SEGY Output directory/folder:	.\segy	
	*Unique Project Name:		
	Input AASPI File Suffix:	0	
	Output SEGY File Suffix (Optional):		
	Output Prefix (Optional):		
	Set Output Attribute File Names:	Set Output File Names	
	VBlock:	10000	
	Verbose:		
	Output dead and padded traces?:		

🗙 AASPI - Set the output SEGY file names (Release Date:	December 4, 2015)	process and						- O X
]] <u>F</u> ile								<u>H</u> elp
Set the output SEGY file names according to the	Original Project Setup (Default Name F	ormat = \${Desired Name	e}_\${Output Suffix})					-
Output Suffix :boonsville_workflow	_							
Output Prefix (Optional) :	_							
dip3d filter_dip_components	similarity3d sof3d	Structural(k) curvature3d	Amplitude(e) curvature3d	glcm3d	spec_cmp	apparent component	euler curvature	
AASPI Dip3d Attribute Files Desired Attri	ibute Name							
Inline Dip Component: inline_dip								
Crossline Dip Component: crossline_c	dip							
Dip Azimuth Component: dip_azimut	h							
Dip Magnitude Component: dip_magnit	ude							
Save dip3d File Names								

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:

[®] Γι ο τοι τ 1 «1+	
∭[kmarfurt@tripolite ~]⊅ ca	at 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
8 [l C+Q+]:+- ~]# 📕	

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:

lls -ltr segy	
total 3294144	
-rw-rr 1 marf2925 faculty 44383040 Dec 10 13:	49 inline dip boonsville workflow.seou
-rw-rr 1 marf2925 faculty 44383040 Dec 10 13*	49 crossline din boonsville workflow seou
	49 inline die lum filt beensuille verkflev eesu
1 mart2325 Faculty 44363040 Dec 10 13;	43 InTINE_UIP_TUM_TITC_DOONSVIITE_WORKTOW.segg
	49 crossline_aip_lum_filt_boonsville_workflow.segy
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-rw-rr 1 marf2925 faculty 44383040 Dec 10 13:	49 dip_azimuth_lum_filt_boonsville_workflow.segy
-rw-rr 1 marf2925 faculty 44383040 Dec 10 13:	:49 energy_ratio_similarity_boonsville_workflow.segy
-rw-rr 1 marf2925 faculty 44383040 Dec 10 13:	49 outer product similarity boonsville workflow.segu
-rw-rr 1 marf2925 faculty 44383040 Dec 10 13:	49 sobel filter similarity boonsville workflow seev
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	40 infine_chergg_gradient_booksviile_workflow.segg
	45 CrossIne_energy_gradienc_boonsville_workflow.segg -
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-rw-rr 1 marf2925 faculty 44383040 Dec 10 14:	01 d recon cwt boonsville workflow.segy
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-rw-rr 1 marf2925 faculty 44383040 Dec 10 14:	01 spec map 3d cwt boonsville workflow 10.00 seou
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-rw-rr 1 marf2925 faculty 44383040 Dec 10 14:	01 spec_mag_3d_cwt_boonsville_workflow_40.00.sequ
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-rw-rr 1 marf2925 faculty 44383040 Dec 10 14:	01 spec_mag_3d_cwt_boonsville_workflow80.00.segy
-rw-rr 1 marf2925 faculty 44383040 Dec 10 14:	01 spec mag 3d cwt boonsville workflow 85.00.segu
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	01 spec_wag_3d_cwt_boonsville_workflow_100_00 seeg
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-rw-rr 1 marf2925 faculty 44383040 Dec 10 14:	V1 spec_phase_3d_cwt_boonsville_workflow5.VV.segy
-rw-rr 1 marf2925 faculty 44383040 Dec 10 14:	01 spec_phase_3d_cwt_boonsville_workflow10.00.segy
-rw-rr 1 marf2925 faculty 44383040 Dec 10 14:	:01 spec_phase_3d_cwt_boonsville_workflow15.00.segy
	:01 spec_phase_3d_cwt_boonsville_workflow20.00.segy -
-rw-rr 1 marf2925 faculty 44383040 Dec 10 14:	01 spec_phase_3d_cwt_boonsville_workflow25.00.segy
-rw-rr 1 marf2925 faculty 44383040 Dec 10 14:	01 spec phase 3d cwt boonsville workflow 30.00.segu
-rw-rr 1 marf2925 faculty 44383040 Dec 10 14:	01 spec phase 3d cwt boonsville workflow 35.00 seeu
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