Enhanced AASPI Algorithms: October 2021			
Application Name	**Application Description**	**Location**	**Software Documentation**
instantaneous_attributes	Broke out routines agc and avt into separate programs because most users will not think of them as being "instantaneous"	under aaspi_util > Single trace attributes	http://mcee.ou.edu/aaspi/documentation/Single_Trace_Calculations-instantaneous_attributes.pdf
spec_cmp, spec_cwt	Improved dip correction computation. Also allow optional output of dip correction volume for QC.	under aaspi_util > Spectra attributes	http://mcee.ou.edu/aaspi/documentation/Spectral_Attributes-spec_cmp.pdf
corender	Reworked defaults for HSL and RGB images. Added an explicit CMY blending option. By default, the coherence family of attributes will have their axes flipped (low values plotted against either RGB or CMY)	under aaspi_util > Display tools	http://mcee.ou.edu/aaspi/documentation/Display_Tools-aaspi_corender.pdf
rgb_cmy_plot	Modified orientation of colors to be consistent with RGB and CMY displays in commercial software and in program corender	under aaspi_util > Display tools	http://mcee.ou.edu/aaspi/documentation/Display_Tools-rgb_cmy_plot.pdf
sof3d	Set frequency filter defaults to be 0 to Nyquist to avoid filtering signal for depth-migrated data that might be particularly broad band	under aaspi_util > Geometric attributes	http://mcee.ou.edu/aaspi/documentation/Geometric_Attributes-sof3d.pdf
fault_enhancement	Fixed a memory leak! If fault probability falls below a user-defined threshold, the fault dip azimuth and fault dip magnitude are set to have znull values	under aaspi_util > Image processing	http://mcee.ou.edu/aaspi/documentation/Image_Processing-fault_enhancement.pdf

skeletonize3d	Now output skeletonized fault dip azimuth and fault dip magnitude corresponding to non-zero values of fault probability and set to have znull values elsewhere. Addressed the correlation and machine learning challenges associated with dip azimuth and dip magnitude measures, where the dip azimuth jumps 360° at ±180° and for slight changes of vertical faults of ±1° to either side by 180°. The algorithm now optionally outputs four additional volumes: the north and east components of fault strike and the horizontal and vertical components of fault dip.	under aaspi_util > Image processing	http://mcee.ou.edu/aaspi/documentation/Image_Processing-skeletonize3d.pdf
aaspi_plot	Reworked display options and defaults to be consistent with program corender and with the interactive parameters on the image after display	under aaspi_util > QC Plotting	http://mcee.ou.edu/aaspi/documentation/Display_Tools-aaspi_plot.pdf
CNN_fault_prediction	Reduced core memory requirements to be two overlapping rows of 128×128×128 blocks or *nt* ×128×256 voxels where *nt* is the number of time or depth samples. Previous version required entire amplitude and label data volumes to remain in memory.	under aaspi_util > Machine learning toolbox > CNN Fault	http://mcee.ou.edu/aaspi/documentation/Machine_Learning_Toolbox-cnn_fault.pdf
filter_single_attribute	Provided the option to *subtract* the filtered version from the original data. In this manner, we can apply a median filter along structure, enhance stratigraphic anomalies parallel to structure (e.g. condensed sections or just low amplitude shale-on-shale reflections), and subtract them from the original coherence volume, leaving steeply dipping fault anomalies.	under aaspi_util > Image Processing	http://mcee.ou.edu/aaspi/documentation/Image_Processing-filter_single_attribute.pdf
iterative_fault_enhancement	Modified the workflow to apply filter_single_attribute to reduce anomalies subparallel to structure prior to iterative fault enhancement	under aaspi_util > AASPI Workflows	http://mcee.ou.edu/aaspi/documentation/Workflows-iterative_fault_enhancement_workflow.pdf

display_headers	Reworked to allow user to output slices through the chosen header values that can be plotted for effective quality control	under aaspi_util > Other utilities	http://mcee.ou.edu/aaspi/documentation/Other_Utilities-display_aaspi_headers.pdf
similarity3d	Added an optional Laplacian of the input seismic amplitude volume, including multispectral computation. Although amplitude curvature provides more robust, long wavelength results, this short wavelength multispectral capability is considerably faster	under aaspi_util > Geometric attributes	http://mcee.ou.edu/aaspi/documentation/Geometric_Attributes-similarity3d.pdf
kmeans3d	Previous algorithm normalized attributes used the Mahalanobis distance. Using the machine learning toolkit, the new algorithm normalizes in two steps: first by allowing z-score or logarithmic scaling, then second by computing the first several (orthogonal) principal components and clustering in that domain. Finally, the clusters are plotted against a 2D color bar defined by the first two eigenvectors. This algorithm provides more stable results when using large numbers of correlated attributes.	under aaspi_util > Machine learning toolbox	http://mcee.ou.edu/aaspi/documentation/Volumetric_Classification-kmeans3d.pdf
machine learning toolbox	Reorganization of the GUI with algorithms now being broken into shallow learning and deep learning categories, with the shallow learning further subdivided into supervised and unsupervised subcategories	under aaspi_util > Machine learning toolbox	
machine learning toolbox	Now provide a way to eliminate spikes in the histogram prior to normalization, training, and classification. Although some spikes occur next to mute zones and dead traces, most occur when the data are somehow clipped, such as forcing the porosity from 3rd party software to range between 0 and 100%.	under aaspi_util > Machine learning toolbox	
glcm3d	Now allow window-based computation to reduce computation effort. Horizon limited computations will come later	under aaspi_util > Geometric attributes	http://mcee.ou.edu/aaspi/documentation/Geometric_Attributes-glcm3d.pdf

som3d	Now output an additional file showing the probability that each voxel belongs to a given class	under aaspi_util > Volumetric classification	http://mcee.ou.edu/aaspi/documentation/Volumetric_Classification-som3d.pdf