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SEISMIC IS AMAZING



AVO Compliant Processing

global expertise and personalized service

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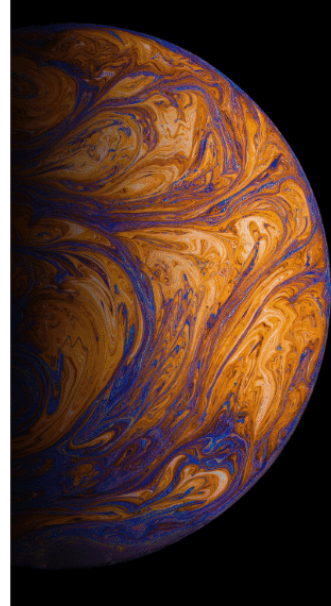
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Absolute Imaging provides a meticulous and rigorous AVO Complaint flow. To be fully AVO Compliant, a processing flow must preserve the true relative amplitude of the seismic signal which is representative of the geology and not the noise. Since AVO Compliant gathers are often input to Reservoir Characterization routines for detailed offset or azimuthal analysis, it is imperative that the amplitude relationships are correctly maintained and the seismic data is noise free.

In a fully AVO Compliant flow, it is necessary to do a substantial amount of testing - especially of the noise attenuation processes. Surface Consistent Scaling routines are run before and after all Noise Suppression and Deconvolution routines. Great care has to be taken to ensure that the noise is being removed and that the proper amplitude of the signal is being preserved.

Absolute Imaging's AVO Complaint flow includes an iterative approach to removing noise. We carefully analyze all noise suppression techniques to ensure minimal data leakage. We utilize an interactive tool, **Seismic Compare**, that allows the user to quantify the effectiveness of our noise suppression techniques. We also run a number of QC products to ensure our AVO compliance.



A series of techniques (pre- and post-stack) are available to remove noise bursts and spikes, linear noise (including guided waves) and random noise. Some of these are listed below.

- Polarization Ground Roll Filter
- Eigen Image Ground Roll Filter
- Surface Wave Noise Attenuation (SWNA)
- Coherent Noise Attenuation (CNA)
- Greedy Radon
- FX/FXY Prediction & Projection Filters
- Cadzow Filter including an Automatic Rank Determination option
- FX Median Filter (Frequency-space domain noise burst removal)
- TFD (Time Frequency Domain)

Absolute Imaging has developed a **Signal-Preserving Noise Suppression Workflow** specialized for use in our AVO complaint processing workflow.

- Specialized workflow to suppress noise and better preserve amplitude integrity of primary reflections.
- An improvement from traditional amplitude preserving processing schemes, this workflow provides an authentic amplitude-honoring way to suppress noise.
- The basic strategy is to capture either the signal or noise patterns within recorded seismic data volumes. This can be done using both standard processing techniques and more advanced modeling approaches. Once the patterns are derived, systematic pattern rejection or enhancement can be applied to suppress noise from the original data in an adaptive nonlinear fashion.
- The separation of signal and noise is done first. Then denoising would be done on the noise. The data of weak effective signal that is from the noise data could be blended with the original effective signal to reconstruct the denoising data, so the result which has high signal-to-noise ratio and preserved amplitude is acquired.

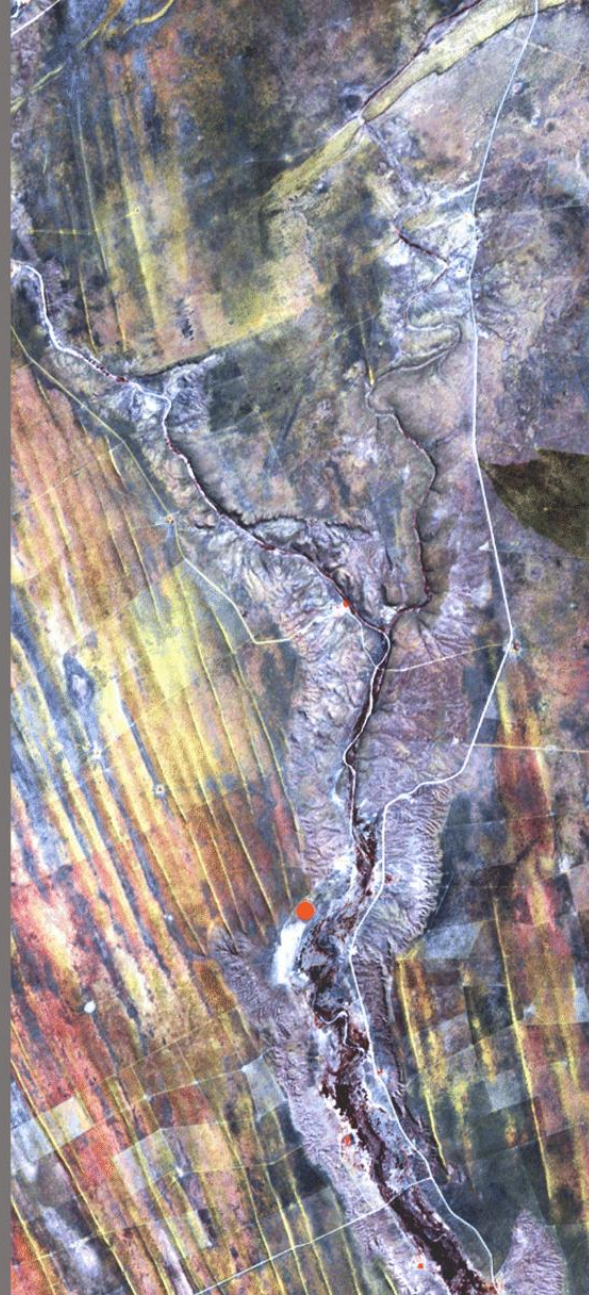


Since removal of noise and all testing can be tedious, sometimes a non-AVO Compliant flow is used in parallel to the AVO Compliant flow. This non-AVO flow, which can be taken to a post stack time or pre-stack time migration, allows for the calculation of Surface Consistent Statics and NMO Velocities while the noise suppression testing is done. The three benefits of this approach are:

- A migrated image of the dataset is produced so that the interpreter can receive an interpretable image quickly.
- This flow provides QC displays for Absolute to constantly check the quality and effectiveness of our AVO Compliant Noise Attenuation processes against a standard (non-AVO) processing sequence.
- Sufficient time to properly analyze the data in the AVO-Compliant flow is provided.

In addition to noise suppression testing and removal we understand the value of enhancing temporal resolution. Our robust Surface Consistent Deconvolution routine helps to broaden the spectrum and ensure phase stability across the data. Since trace-by trace whitening processes are not permitted in a fully AVO Compliant flow, Absolute's Ensemble-Based Spectral Whitening has been developed to further broaden the frequency spectrum in an AVO Compliant manner.





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