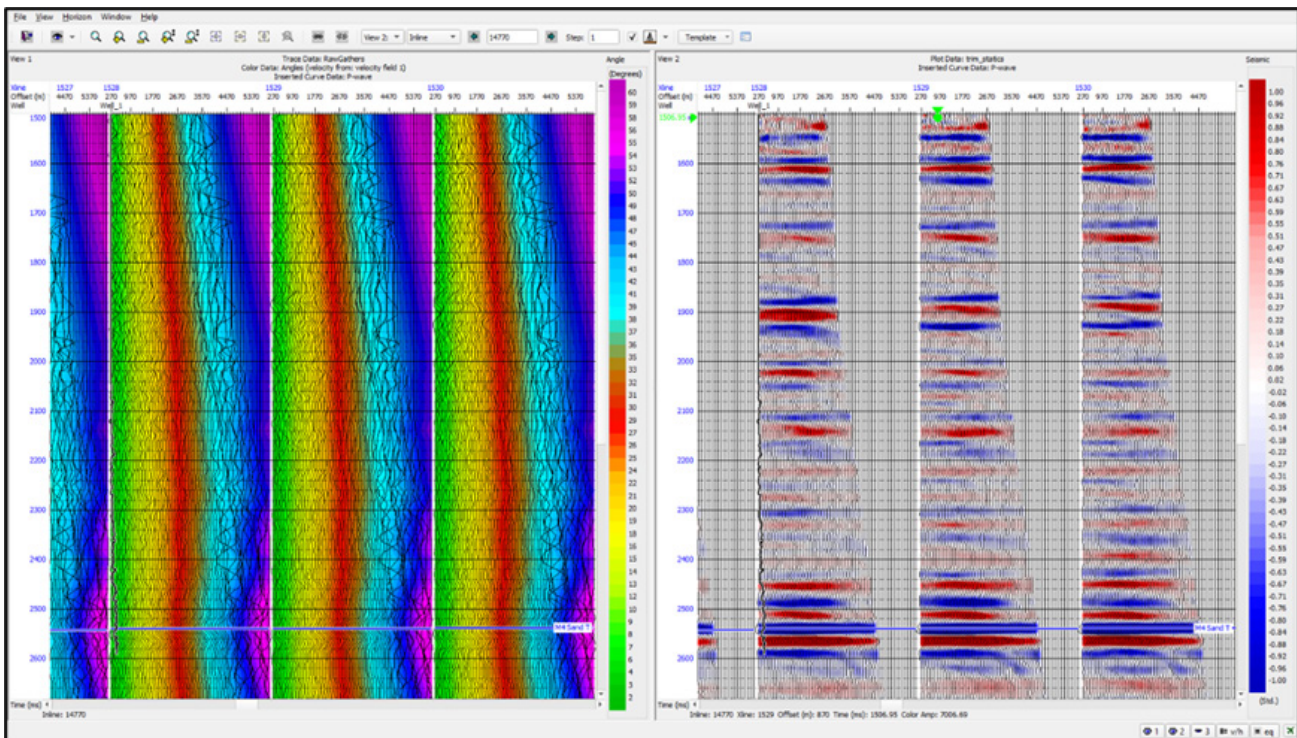


AVO

AVO offers comprehensive prestack seismic analysis and reservoir reconnaissance. As an industry-standard and a well-established product, **AVO** sets the benchmark for excellence in exploration and production environments.

This module contains tools designed for conditioning prestack seismic data, generating AVO attribute volumes, and preparing data for inversion workflows. Gain insight into AVO anomalies through crossplotting and AVO modeling analysis tools. Streamline your analysis with adaptable and user-friendly workflows, simplifying complex AVO analysis.



Raw gathers with colored incident angle range overlays (left). Conditioned pre-stack gathers in AVO (right).

Gather Conditioning

In AVO studies, a fundamental assumption is the optimal processing of seismic gathers, with the goal to achieve a noise-free dataset with preserved amplitudes and accurate time positioning across the studied angle range. AVO Gather Conditioning provides a series of tools to accomplish this goal including:

Noise Attenuation:

- Trace mute
- Parabolic Radon Analysis
- Radon noise attenuation
- Radon multiple attenuation
- Super Gather/Angle Gather
- FXY Predictive Filter
- Footprint removal

Residual Moveout:

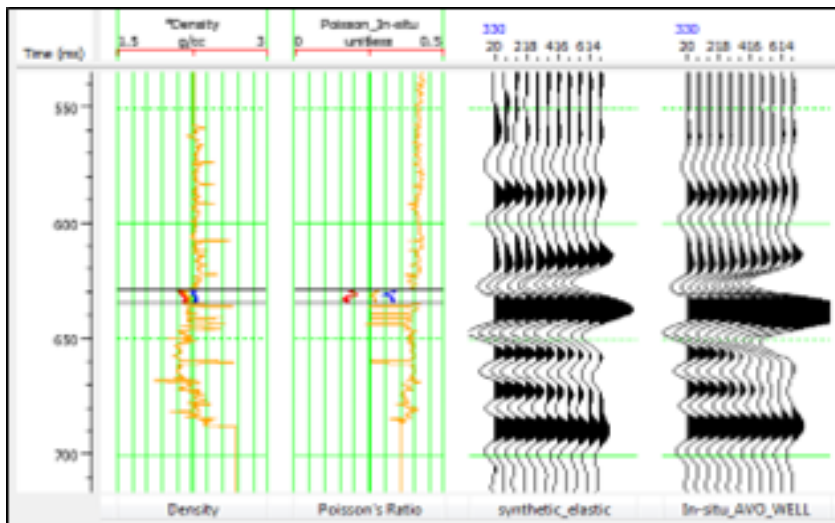
- Time variant trim statics
- Time shifts analysis
- NMO and RNMO
- Long Offset NMO
- Amplitude Correction:**
- AVO Offset Scaling
- Amplitude Analysis

Frequency and Bandwidth:

- Statistical Deconvolution
- Wavelet Deconvolution
- Wavelet Convolution
- Bandpass Filter
- Spectral balancing/blueing
- Phase Distortion:**
- Q compensation/Inverse Q

AVO Modeling

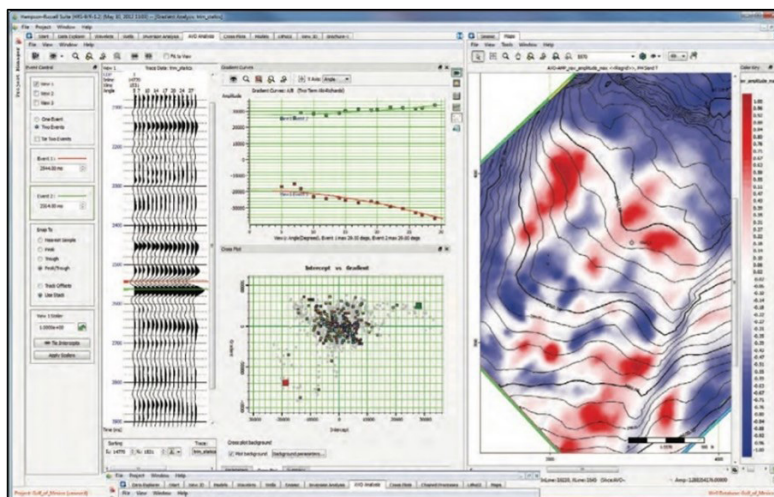
AVO synthetic modelling tools allow understanding the synthetic seismic response for various lithologies, often performed in conjunction with Fluid Replacement and 'What Ifs' scenario modelling. Synthetic calculations using Zoeppritz, Aki-Richards and Elastic modelling are supported.



Elastic wave and In-situ synthetic modelling of various scenarios.

AVO Gradient Analysis

Examine the change in seismic amplitudes with respect to offsets and angle of incidence. This analysis is fundamental to determining the class of AVO anomalies, comparing the response on seismic versus synthetic gathers, as well as parameterizing for the AVO attribute calculation.



AVO Gradient Analysis tool

Gradient Analysis features include:

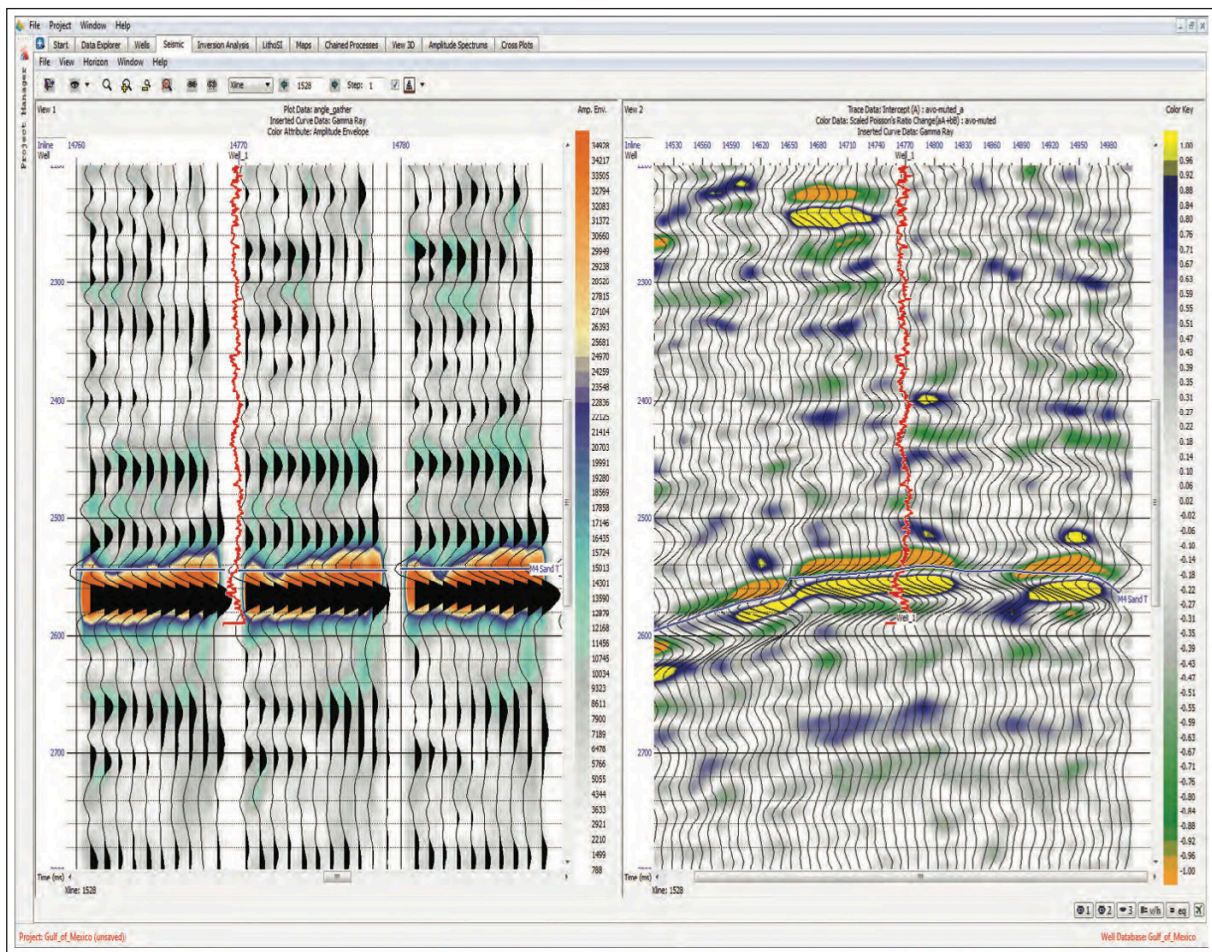
- Analysis of the gradient distribution against offset angle (θ), or $\sin^2 \theta$.
- Tracking of amplitudes by constant time, or horizons.
- Crossplotting of the overall data trend and the deviations from background.
- Simultaneous analysis of multiple locations
- Comparison of AVO responses on seismic and synthetic gathers.

AVO Attribute Volume Calculation

Once AVO preserving gather conditioning has been performed, AVO attributes can be calculated as volumes and maps. Volumes can be cross-plotted to characterize the different AVO classes and proceed through modeling to lithology.

AVO Attribute options include:

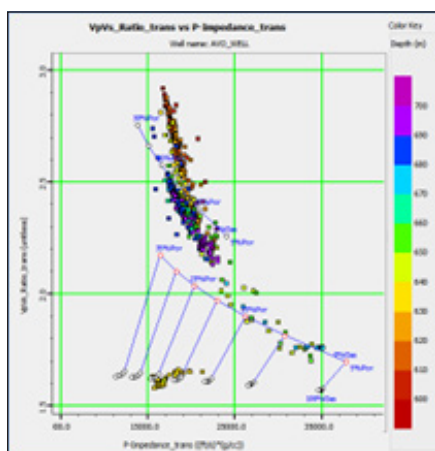
- Aki-Richards A/B and A/B/C
- Fatti Equation R_p/R_s and $R_p/R_s/R_d$
- Intercept * Gradient volume
- Scaled Poisson's Ratio Change $aA+bB$
- Fluid Factor Volume



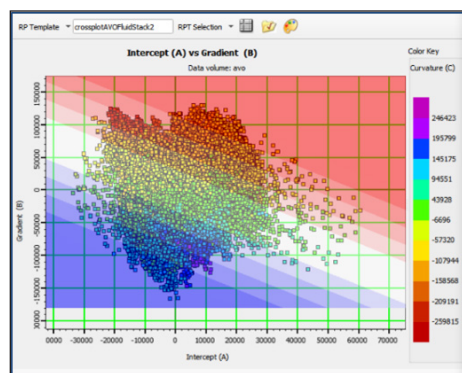
AVO anomaly highlighted on the Scaled Poisson's Ratio AVO attribute volume.

Crossplotting

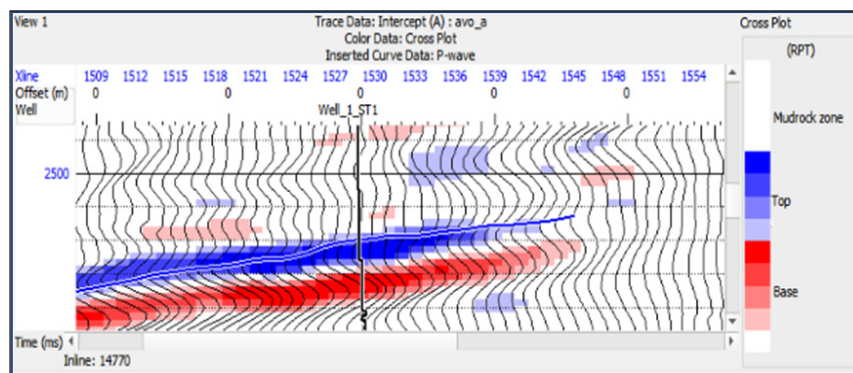
- Crossplot seismic and well data within the same tool
- Define zones using a variety of shapes and colors
- Tie zones to wells, volume cross sections and maps
- Process zones for geo-bodies
- AVO Fluid Factor cross plotting template
- Import of Rock Physics Models from RockSI



P-Impedance vs Vp/Vs crossplot with overlaid RPT



Fluid Factor template on Intercept vs Gradient attribute data and its projection on the seismic cross section.



Benefits of AVO Module:

- Provides a single comprehensive module for data conditioning, attribute calculation and for extensive AVO synthetic modelling analysis
- High-grades prestack seismic data for inversions
- Calibrates seismic data Enables simple navigation and comparison of multiple
- Seismic gathers

The **AVO** module within **HampsonRussell** equips you with essential AVO modelling and data conditioning tools, ensuring your dataset is finely tuned for comprehensive attribute analysis and subsequent reservoir studies. Prepare your data with confidence, ensuring reliability of seismic reservoir characterization.