



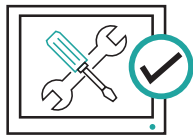
Accounting for lateral and temporal amplitude and frequency variations in LFC-based inversion

Independent Oil & Gas Operator, Malaysia



Challenge

Sharp Reflections was tasked by an operator to undertake reservoir-focused gather conditioning on an 850 sq km 3D survey in the Malay Basin, prior to litho-facies class (LFC) inversion. The specific challenge was to account for significant spatial and temporal variations in prestack data bandwidth and frequency related to the presence of gas charged sediments in the overburden.



Solution

Employing the Sharp Reflections toolkit, the first step was to use full-volume and well-tie QCs to identify artefacts in the data and design a gather conditioning workflow to address observed shortcomings in AVA compliance.

The issues of spatial and temporal variations in amplitude and frequency were solved through the application of a full-volume AVA preserving amplitude scalar, after the application of prestack spectral balancing. This facilitated the use of a single set of prestack wavelets for the final LFC-based PCube+ inversion.

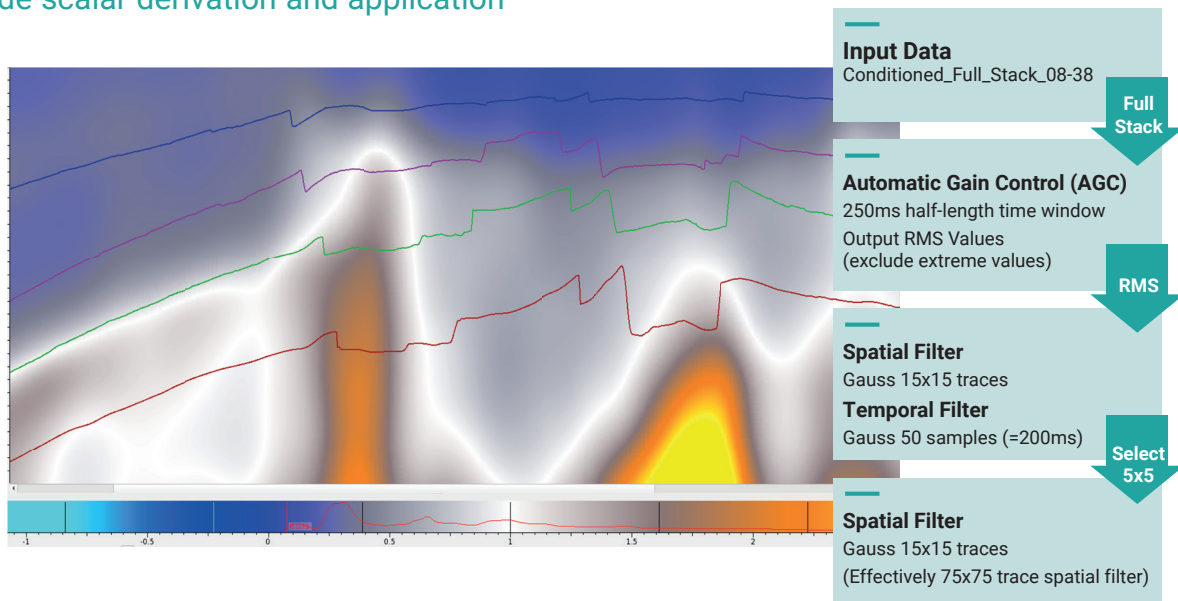


Impact

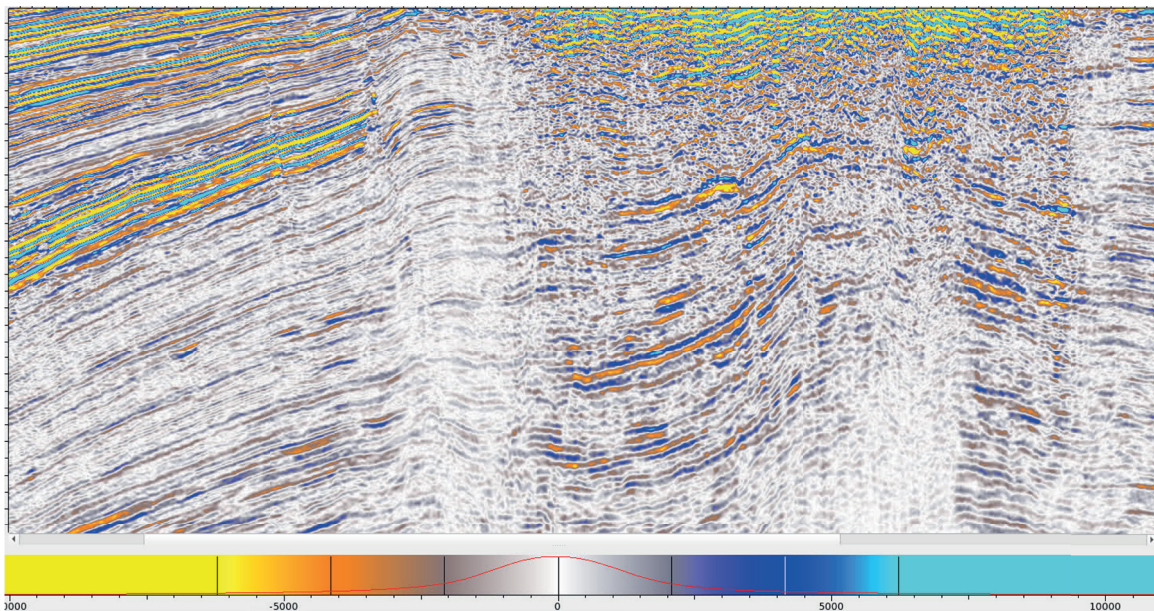
The resulting PCube+ inversion volumes significantly enhanced the lateral continuity of reservoir bodies in comparison to earlier Extended Elastic Impedance (EEI) studies. The resolution of thin reservoir bodies was also enhanced by the workflow, even beneath the shallow gas affected areas. The final results provided the operator with a dataset for planning new development and infill wells with greater confidence.

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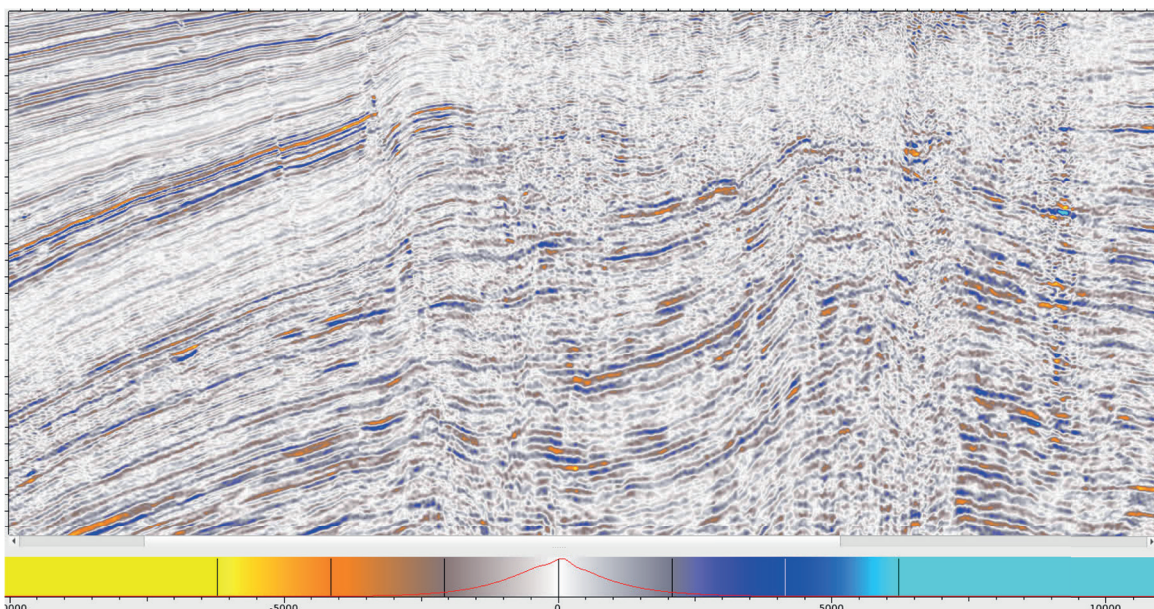
Amplitude scalar derivation and application



20-26° angle stack section before scaling

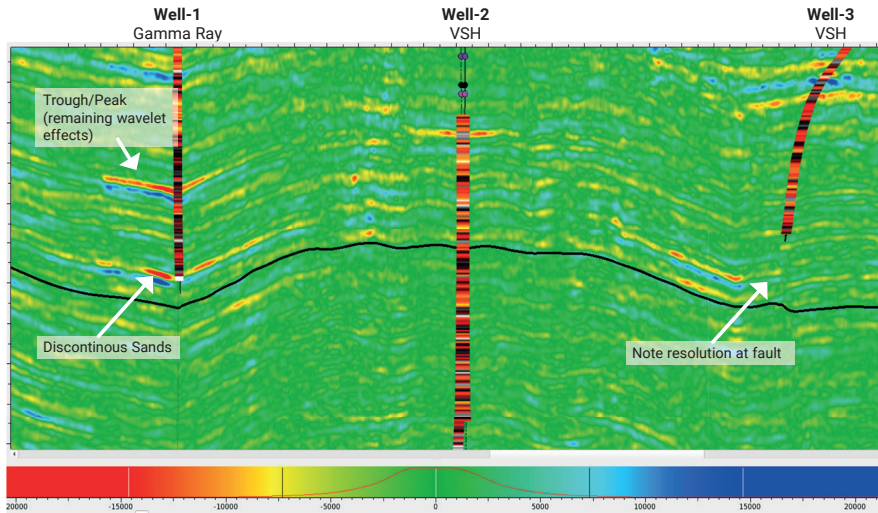


20-26° angle stack section after scaling

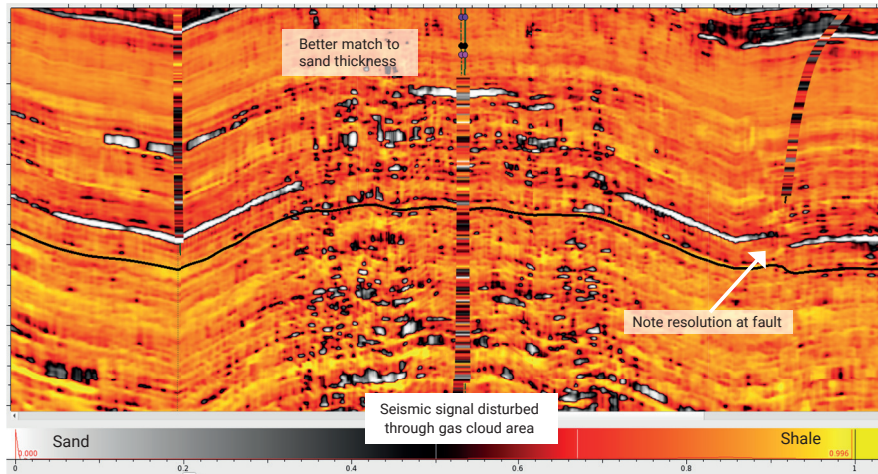


Comparison between legacy EEI results and scaled PCube+ inversion results

Lithology section from EEI (relative Vp/Vs ratio – legacy data)

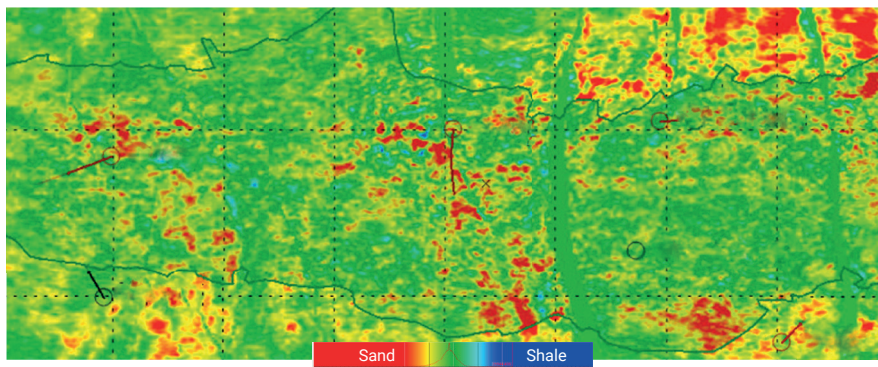


Lithology section (shale probability) from PCube+ inversion after conditioning and scaling

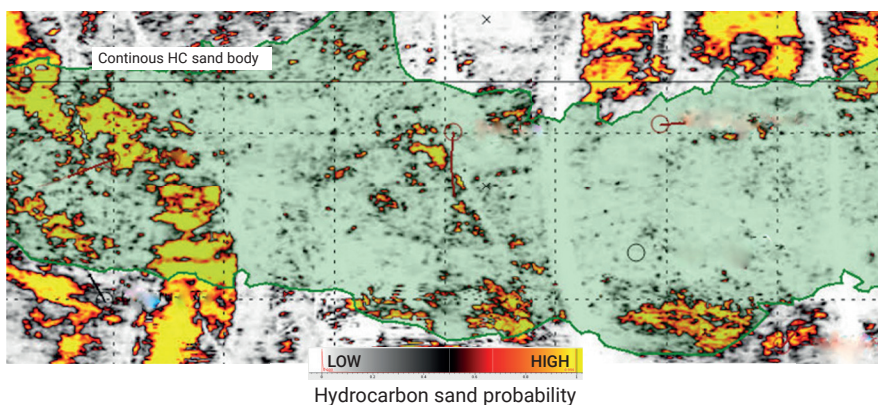


Inverted lithology volumes show improved continuity and more discrete definition of sand bodies than the legacy EEI volumes. Imaging effects of shallow overburden gas are still evident to some extent in inversion results, however additional sand bodies are identified in the target interval.

Mapped lithology response at target from EEI (relative Vp/Vs ratio – legacy data)



Mapped hydrocarbon sand probability at target from PCube+ inversion after conditioning and scaling



Sand body continuity is relatively poorly defined beneath the gas cloud (green polygon) in the legacy EEI data. After conditioning, scaling and inversion, a hydrocarbon bearing sand channel is now identified with high probability running beneath the gas cloud to the west of the structural closure.

SHARP REFLECTIONS

DISCOVER MORE

Discover more

Sharp Reflections was built on a bold idea—to reinvent seismic data processing and analysis. Sharp Reflections software, powered by high-performance computing, runs on a bespoke engine that allows users to explore enormous multidimensional volumes of raw processed data.

Users are empowered to extract detailed reservoir insight, make trustable drilling decisions and optimize production.



Fidelity

Vivid details, critical information, deep insight pulled straight from your source dataset.



Capacity

A powerful computing engine for managing enormous data volumes speedily, efficiently and painlessly.



Certainty

Tools for clarifying risk factors and reducing uncertainty, so you reach accurate, trustable decisions.

For more details on this case study, and to read how Sharp Reflections has helped other clients around the world, visit our website

sharprefections.com

