



P.O. Box 3524, La Romaine, Trinidad and Tobago, W.I. or UTT Building, Esperanza Road, Brechin Castle, Couva, Trinidad W.I. Website: [www.the.gstt.org](http://www.the.gstt.org) Email: [thegstt@gmail.com](mailto:thegstt@gmail.com)

## Qualitative and Quantitative Geophysical Data Integration for Better-Informed Decisions

**Author: 1Matthew Miller and Surender Manral**

<sup>1</sup>mmiller9@slb.com - presenter, Schlumberger Trinidad and Tobago

Theme: FG: Geophysical techniques

Key Words: geophysical integration, reverse time migration, VIP gathers, inversion, colored stack

Integration of geophysical data throughout the entire lifecycle of an asset is a key enabler for commercial success. The integration of data throughout the project also allows experts from multiple domains to make both quantitative and qualitative decisions based on a multitude of data sources from various stages in an assets lifecycle. Both quantitative and qualitative integration of geophysical data on a shared earth platform is critical in planning wells and field development.

We integrated quantitative and qualitative geophysical data to get a better understanding of a subsalt target for comprehensive and accurate reservoir delineation. Vector image partitions (5D prestack gathers) produced from reverse time migration (RTM) allowed for improved interpretability of the reservoir by offering precise control of azimuthal and offset distribution for stacking. The 5D prestack gathers were used for qualitative visual inspection through interactive stacking followed by multi-attribute generation and analysis. Multi-attribute analysis (MAA) enabled working on several attributes simultaneously, thereby facilitating the integration of varied but vital information in an intuitive fashion.

The prestack workflows and detailed MAA produced the optimal image of the subsalt target reservoir and have significantly improved the illumination of the salt structure. Quantitative multidisciplinary data integration was accomplished through inversion followed by a Bayesian prediction workflow; this process was used to integrate well logs, seismic inversion, geological modeling, and interpretation. It provided an estimate of the most probable lithology/fluid and the uncertainty associated with the prediction.

The quantitative approach provided detailed insight into rock types, reservoir extents, and volumetrics and produced additional geophysical datasets that could be input to improve interpretation, generate pore pressure volumes, and help develop drilling scenarios. The



# THE GEOLOGICAL SOCIETY OF TRINIDAD & TOBAGO

P.O. Box 3524, La Romaine, Trinidad and Tobago, W.I. or UTT Building, Esperanza Road, Brechin Castle, Couva, Trinidad W.I. Website: [www.thegstt.org](http://www.thegstt.org) Email: [thegstt@gmail.com](mailto:thegstt@gmail.com)

integration of qualitative and quantitative data enables accurate reservoir delineation and reduces uncertainties, thereby supporting confident decisions.