

Imaging and Prospecting in Subsalt Regimes

A Paradigm Geoscience Data Service

Seismic data is the geoscientist's primary deep water asset for locating slope sands, ranking prospects, and avoiding risks associated with drilling in the presence of shallow geohazards, overpressure and salt structures. A new generation of seismic acquisitions has enhanced our confidence when imaging the deep water subsurface, especially in areas where complex salt structures obscure our ability to interpret subsalt reflectors. While we have come a long way towards improving the seismic method for subsalt plays, the challenges and risks associated with subsalt interpretation remain high.

Salt structures take numerous forms and are responsible for generating complex wave phenomena which must be corrected before attempting an interpretation. Many iterations of velocity model building and imaging are often required before arriving at a defensible interpretation.

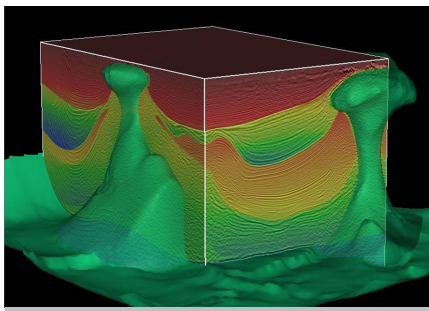
The Paradigm subsalt imaging workflow incorporates true 3D structural and stratigraphic velocity modeling technologies to ensure both the accurate modeling of salt structures and the rapid local updating of these structures to compress modeling-imaging iteration times. Additionally, the technology ensures a sealed salt-sediment interface at virtually no cost, and facilitates the use of geostatistics to distribute well-based velocities that honor the stratigraphy. Anisotropic velocities are rigorously determined using full-azimuth image gather creation and conveniently updated with full-azimuth tomography, reducing the non-uniqueness of the model. Both full-azimuth imaging in the local angle domain and Reverse Time Migration methods are available to image in the presence of complex wave phenomena (e.g. multi-arrivals, caustics, triplications). The Paradigm Geoscience Data Services team can also help oil company geoscientists evaluate interpretations using full-azimuth illumination.

Paradigm Subsalt Processing Solutions

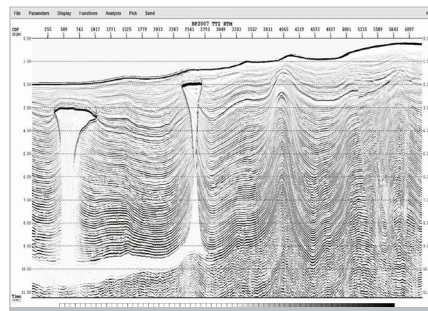
- Complex salt modeling with sealed salt-sediment interfaces, proper fault handling, and rapid updates
- Salt flooding/displacement velocity modeling workflows
- Full-azimuth anisotropic velocity determination and updating to minimize velocity uncertainty
- Full-azimuth imaging in the local angle domain with specular weighting to improve subsalt image quality
- Anisotropic (VTI, TTI) Reverse Time Migration for handling complex wave phenomena
- Full-azimuth illumination analysis for understanding the influence of the seismic acquisition on the seismic image
- Prestack with Poststack seismic data QC

Paradigm Subsalt Processing Advantages

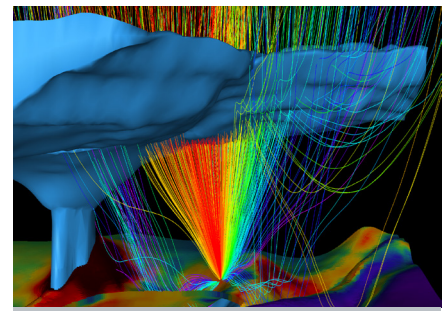
The Paradigm Geoscience Data Services team takes on the most difficult subsalt imaging challenges to reduce operator risk and allow oil company geoscientists to prospect with more confidence. Collaborative interpretation, modeling and analysis tools ensure that the velocity model is geologically-constrained, sealed and populated with accurate seismic and well velocities. Two complementary imaging applications (full-azimuth local angle domain and Reverse Time Migration) are available to handle complex wave phenomena and to validate outcomes with image comparisons.



▲ Complex multi-z salt modeling



▲ Reverse Time Migration (TTI velocity model courtesy of BP)



▲ Full azimuth illumination analysis enhances interpretation value