

Seismic Subsalt Imaging in a Complex Salt Basin

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ABSTRACT

Seismic imaging below salt bodies is a renowned challenge with multiple approaches attempted in different salt basins to resolve sub-salt visualisation. These include seismic acquisition parameters and techniques through to innovative migration algorithms that have been tested with various degrees of success. The solution to the problem requires a PSDM approach, especially where the salt is mobile and the lateral velocity variation needs to be understood and properly modelled.

In the current 2D example, complex lateral velocity variations are a consequence of the presence of layered evaporites/sediments (fast and slow) and pure mobile halite (constant), which makes velocity estimation extremely difficult. State of the art tomographic solutions were employed for velocity modelling prior to processing the 2D data with three different PSDM algorithms, Kirchhoff, Beam and Reverse Time Migration (RTM), so that these different algorithm solutions could be compared and tested. In addition, to ensure an optimal processing result it is important to have a thorough understanding of the geology to constrain the velocity analysis during the data processing. Consequently, a multidisciplinary team was assembled, including geologists and salt tectonic experts, along with the processing and interpretation geophysicists.

Examples of interpretation and tomography analysis are shown to exhibit the methodology applied. In addition, we show some cases where the geological input has positively impacted the image solution.