
3D Pre-Stack Depth Migration of a Land Survey with Considerable Multiple Interference - A Case History

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Saudi Aramco has started the application of 3D pre-stack depth migration to improve seismic imaging of deep targets. Historically, processing which included dip move out and post-stack depth migration effectively imaged most of the shallow exploration and development targets. Recently, some of the deeper, faulted targets required the use of 3D pre-stack depth migration (Pre-SDM). Applying 3D Pre-SDM on high fold seismic surveys, reaching up to 960 fold, presents a unique challenge. Such large data sets have tested the limits of software and computer resources.

Much effort was focused on the initial velocity model development. Several models were created using check shots, sonic logs, pre-stack time migration root mean square velocities and pseudo apparent interval velocities. Velocity model updating was also challenging due to multiple energy contamination. An innovative approach was internally developed to attenuate multiples on high fold common mid-point gathers. The application of this method on common image gathers proved to be effective in improving the velocity model updating procedure.

The pre-stack depth migrated results show better imaging of the primary reflections leading to better fault definition and positioning. These imaging improvements have allowed more effective placement of exploration, delineation and development wells.
