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Applying of high-technology algorithms for high-quality seismic and velocity products: Nile Delta, offshore Egypt

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ABSTRACT

The West Nile Delta (including Raven concession) seismic strategy is to minimize risk and optimize recovery by planning and delivering development wells on fit-for-purpose seismic data. When reviewing the quality of the seismic data for Raven shortcomings in imaging were observed, which due to technology improvements in the processing domain including Full-wave inversion (FWI) and anisotropic processing and advanced depth-migration algorithms (e.g. reverse time migration RTM.) can now be addressed.

The Raven field multi-azimuth (MAZ) dataset used for this project is a streamer dataset 640 km2 in size. This dataset consisted of three evenly distributed suites of azimuths acquired at 0, 60 and 120 degrees, which go through a detailed processing sequence including seismic preconditioning, Full Wave Inversion followed by reflection tomography to update the velocity model then depth migration using both Kirchhoff pre stack depth migration (KPSDM) and Reverse Time Migration (RTM) algorithms.

We have demonstrated a successful approach for building a high- resolution earth model using an acoustic 3D FWI workflow together with reflection tomography, which assists with the convenient processing workflow to produce the following results:
· Building a high-resolution velocity that successfully captured the shallow- velocity details and provided a better understanding of the overburden hazards along with better input to pore pressure prediction.

· Obtain a more geological plausible image for the deep section compared with the legacy PSDM stack.
· Improve the tie between the final stack and the well data, which definitely will help to reduce the drilling risks and uncertainty compared with the Legacy stack.
· Prove the success of our FWI technology in the Middle East market (Elbadry et al.2015), which demonstrates our leading technology in this market.

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