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Challenges of Marine Seismic Project in Block 15, Sudan Red Sea

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SUMMARY

During 2007 marine seismic survey, RSPOC s contracted 2D seismic vessel equipped with 6-km length streamer cable faced several technical and operational challenges. It is quite a challenging task to process Pre-Stack Time Migration (PSTM) seismic data due to complicated seismic wave ray paths and velocity trends from two different exploration objectives. Additionally, seismic interpretation using 2D seismic dataset requires exceptional interpretation skill with sound-geological model to ensure the result represent an acceptable geological model of Red Sea rift tectonics.

The latest Pre-Stack Depth Migration (PSDM) processing sequence has provided better definition of complicated Pre-Miocene Salt Formation fault pattern. With better PSDM seismic velocity dataset, bore hole formation pore pressure trend at the proposed prospect drilling locations could be estimated and predicted in effort to assist the planning of offshore high-pressure and high-temperature (HPHT) wildcat drilling campaign.

Marine seismic projects at Sudan Red Sea concession Blocks revive after 15-year hiatus period when in Q1 2007 RSPOC (Red Sea Petroleum Operating Company), acquired a new 3,500 line-km of 2D marine seismic data. RSPOC is an operator of Block 15 on behalf of consortium of five oil companies namely PETRONAS, CNPC, Sudapet, Express Petroleum and Hi-Tech.

During 2007 marine seismic survey, RSPOC's contracted 2D seismic vessel equipped with 6-km length streamer cable faced several technical and operational challenges due to numerous uncharted coral islands exist within survey area and also sudden change in water depth along the vessel traverse. It quite a challenging task to properly process the acquire 2D marine data through Pre-Stack Time Migration (PSTM) method due to complicated seismic wave ray paths and velocity trends from two different exploration objectives, i.e. Post-Salt and Pre-Salt Formations. In general, 2007 seismic vintage has shown improvements when compare to older vintages. However, seismic interpretation using 2D seismic dataset requires exceptional interpretation skill with sound-geological model to ensure the result represent an acceptable geological model of Red Sea rift tectonics.

The latest Pre-Stack Depth Migration (PSDM) processing sequence with optimum selected parameters applied has provided better definition of complicated Pre-Miocene Salt Formation fault pattern. With better PSDM seismic velocity dataset, bore hole formation pore pressure trend at the proposed prospect drilling locations could be estimated and predicted in effort to assist the planning of offshore high-pressure and high-temperature (HPHT) wildcat drilling campaign.

Despite all above challenges, Sudan Red Sea Block 15 still has high potential for hydrocarbon discoveries due to gas/condensate discoveries in Suakin-1 and Bashayer-1A wells and Block 15 thick sedimentary formations as indicated by interpretation of recent marine gravity data. Exploration well drilling campaign is currently in the final planning stage to drill down to Belayim Formation to test hydrocarbon in new existing play type Pre-Miocene Salt Formation which proven oil bearing in similar formation of Egyptian Red Sea.