Seismic Imaging & Interpretation Enhancement Using 3D OBN Data - Cheleken Asset Turkmenistan

Author block: M. Khdaouria, Dragon Oil PLC.

Abstract

Objectives/Scope: The study area is located in the North-eastern part of the South Caspian Basin and characterised by a highly complex faulted structure of a flower shaped with heterogeneous fluvial deltaic deposits composed of channel sand, point bar, distributary channel and flood plain casing lateral and vertical variation. The objective is to overcome the above challenges by acquiring, processing and interpreting a high resolution 3D OBN seismic data.

Methods, Procedures, Process: Acquiring High-resolution 3D OBN seismic data in Cheleken asset (Caspian Sea), using the latest seismic imaging technologies lead to characterize the structure and stratigraphic complexity and to a better subsurface interpretation, and mapping of this complex structural setting by taking advantage of the following parameters of the OBN: • High fold • Full azimuth • Dense shot geometries • High signal to noise ratio • Multicomponent receivers and long offset information. The recent 3D OBN survey area was approximately 820 km2, with a water depth varying from 5m at eastern side to 40m to the western survey area. We were able to shoot up to 9m water depth and deploy node up to 6.5m water depth. Z100 marine 4C nodes with life-cycle battery of 30 days were used. A sparser geometry was used for receivers (200 × 400 m) with dense carpet shooting geometry for shots (25 × 50 m) respectively. This acquisition geometry allowed a maximum offset of 20 km in the inline direction and 5km in the crossline direction. The existing of Mud volcano and gas chimney zone within the surveyed area beside the very complex subsurface structure made the data processing very challenging.

Results, Observations, Conclusions: Knowing the main challenges in the area and applying and adequate seismic processing workflow to the recent OBN survey, we were able to end up with a better seismic image quality compared to the low quality of the legacy seismic data. The new seismic allow a better mapping and evaluation of the different reservoir targets by a good identification of the faults pattern, both manually and using machine learning, as well as a better reservoir delineation and shale barriers and baffle via application and combination of several seismic attributes.

Novel/Additive Information: This paper will show the high seismic data quality achieved by the new 3D OBN compared to the legacy OBC seismic data. Such enhancement in data quality lead to better structural and stratigraphic interpretation.
over the whole surveyed area and will have a big impact in the future operation and minimize the drilling risk by optimizing well trajectory and avoiding possible stuck in a very complex and faulted area.