An Integrated Approach Using Advanced Seismic Processing Workflows Implications for the Fracture Characterization within the Complexly Deformed Kohat Foreland Fold and Thrust Belt Pakistan

Khokhar Mahmoood[1], Mohammad Khan[2], Rai Inam[3]
[1]MOL Pakistan Oil & Gas Co BV; [2]MOL Pakistan Oil & Gas Co. B.V; [3]MOL Pakistan

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Abstract

This study describes the real case history regarding the effectiveness of advanced seismic processing (ASP) workflows to identify the reservoir fracture system within the (X) D&PL located in the complexly deformed Kohat foreland fold and thrust belt, Pakistan. Generally highly deformed compressional regimes are characterized by poor seismic imaging at crestal parts due to low signal to noise ratio, complex over thrust deformation styles, overprinted by transpressional episodes, thick succession of Molasses, Eocene evaporites and shales that produce disharmony between surface and subsurface structures. Therefore, identifying the fracture zones within the reservoirs has been a key challenge in the developing hydrocarbon plays thus advanced seismic processing (ASP) workflows have been used to detect the dense fracture networks in the carbonates and clastic reservoirs for identifying the remaining upside HC potential with in the (X) D&PL. The (ASP) workflow mainly separated in-situ diffraction energy fields from 3D seismic data which play vital role in the identification of the zones of higher fracture distribution and intensity. On seismic volumes, separation of the scattered diffraction energy fields from the reflection data has been carried out and thereafter the resulting diffraction volumes are utilized while integrating the azimuthal anisotropy volumes and

geometrical seismic attributes (dip, curvature or coherency) highlighting areas with higher fracture swarms density and networks. The results of the workflow in the form of new dense fracture network reveals strong correlation and harmony with the borehole information while after integration with the dynamic data offers future potential hydrocarbon sweet spots in the (X) D&PL and adjoining structural high zones as well as will contribute for further optimization of the hydrocarbon exploration and exploitation in the region.