

Characterizing hydrocarbon traps through surface geology and subsurface geophysics in the Talagang area, Potwar Plateau, north Pakistan

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Hydrocarbon traps in the Potwar Plateau are generally structurally controlled; however, local stratigraphic traps are also reported. The structural traps are the product of the Tertiary Himalayan orogeny. This firmly suggests that the structural traps in the Potwar should be analyzed under the framework of fold-and thrust-belt system. For the last about two decades, the Potwar Plateau received much attention in terms of petroleum exploration. In this regard, a number of petroleum national and multinational companies are seriously been involved to understand the structural complexities of the area. However, very limited data is published highlighting the trap configurations and their 2D and 3D geometries.

In this study, a key area known as Talagang, located in the centre of the Potwar Plateau, is selected to decipher the 2D structural geometries of the structural traps. For this purpose, surface geological maps and 2D (after permission from DGPC) subsurface geophysical seismic sections along and across the strike of the beds are integrated. The surface structural cross-section shows gentle-dipping pair of anticline (Jhatla) and syncline (Khichh) with open interlimb angle, therefore, the same, at least part of, is well manifested in the N-S trending seismic sections. However, the E-W trending strike-seismic section shows prominent anticlinal structure. The geometry of this fold is not picked in the N-S dip-seismic section, therefore, it can be inferred that this fold can best be viewed in the E-W strike section. From here, it is interpreted that the axis of this fold is *ca.* N-S, means that this fold is formed by E-W crustal subsurface shortening. Surface expression of E-W shortening is manifested in the form of many folded structures exposed in the eastern part of the Potwar and in the western Trans-Indus Ranges, where N-S trending Surghar-Shinghar Anticline and the Makarwal Anticline are excellent surface examples of N-S trending folds. Thus, it can be further interpreted that the N-S trending structures overprint over the E-W as shown here. This can also suggests the formation of domal (type-1 of Ramsay and Huber fold interference classification, 1987) structures, may be responsible for the trap of hydrocarbons.