

Structural Style, Evolution and Hydrocarbon Prospects of the Bhattani Range, Northwest Himalayas, Pakistan

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The Bhattani Range (Trans-Indus Salt Ranges) of north Pakistan is located in the northwestern indenter of the Himalayan fold-thrust belt where east west structural trend switches to north south. Its main topographic expression is credited to the Bhattani Anticline divisible into a couple of near orthogonal segments oriented west-northwest and north-northeast. Both these segments are bounded by a frontal fault called as Pezu-Khirgi Fault that is in trend conformity with the arcuate nature of the Bhattani Anticline. The structural genesis of the Bhattani Range is mainly related to a transfer fault system located along the southwestern flank of the Bannu Basin located in the northeast. During the influence of the southwards movement of the thrust slab underneath the Bannu Basin the northwest oriented transfer fault system experienced dextral wrenching along with a secondary southwest directed contraction which started shaping of the Bhattani Range. Due to the continued movement along the transfer fault system and synchronous east west compression transmitted from the left lateral convergent Kurram Fault in the west, the Bhattani Range took its present day arcuate shape. The structural style and genesis of the Bhattani Range is well constrained by the available seismic data across the Bhattani Anticline. The proposed geo-seismic models depicts that the Khirgi-Pezu Fault is steeply northeast dipping, reverse fault in the west-northwest segment that switches to west dipping reverse fault in the north-northeastern segment of the Bhattani Anticline. Current investigations reveal that underneath the northwestern apex of the Bhattani Anticline a potential closure at the level of Cretaceous and Jurassic reservoirs is present which might be filled with hydrocarbons as live gas seeps are present all along the surface trace of Khirgi-Pezu Fault confirming the active petroleum system in the area.