

Himalayan-Induced Deformational Events and Kinematics of the Arcuate Nature of Trans Indus Salt Ranges, Northwest Himalayas, Pakistan

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The topographic fabric of the north Pakistan includes a chain of arcuate orogenic belts known as arcs, oroclinal, syntaxis, and re-entrants. One of such belts is the Trans Indus Salt Ranges that preserve the imprints of Himalayan-induced deformation in the region and is a classical example of an arcuate orogenic belt associated with convergent plate tectonic habitat. The Himalaya-induced deformation that affected the Trans-Indus ranges is distinguished into three distinct episodes including a) pre-molasse, b) syn-molasse and c) post-molasse deformation. The pre-molasse episode of deformation in the region is correlative with the Oligocene unconformity during which the region was graded down to the level of Eocene in the eastern, up to Triassic in the central and Paleocene in the western Trans-Indus Salt Ranges. The syn-molasse deformational episode is well demonstrated by the gradual south-younging of molasse deposits involved in the structuration of the Kohat Basin in the north. The post-molasse deformational episode started in the region at the time when the regional basal detachment underneath the Kohat Basin ramped at the site of Trans Indus Salt Ranges producing the present day frontal ranges. Based on the early paleomagnetic studies conducted in the Surghar Range, it is believed that the arcuate nature of the Trans Indus ranges is in situ without any significant rotation. The arcuate geometry of the Trans-Indus ranges is partly controlled by pre-existing basement irregularities, most likely down to the north basement related normal faults and possible strain partitioning. The strain partitioning axis is oriented northwest, produced by synchronous multi-directional compression related to the oblique subduction of the Indian Plate in northwest Pakistan.