

Thick skin tectonic study of the Hazara-Kashmir Syntaxis based on gravity data

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Gravity and geological study in the Hazara and its adjoining areas of northern Pakistan has been incorporated into interpretation of the gross crustal structure of the Hazara-Kashmir Syntaxis (HKS). In this area, continued northward migration of the Indian plate has been overridden by slices of its own northern margin, resulting in slight thickening of the crust. Two types of deformation have been observed, one is in the crystalline crust and the other in both the sedimentary wedge and crystalline crust. The crystalline crust is faulted into blocks by the Hazara Lower Seismic Zone (HLSZ), Bagh Basement Fault (BBF) and Indus Kohistan Seismic Zone (IKSZ). These faults are trending in the NW-SE direction. In the core of HKS the BBF is exposed on the surface in Shahidgala east of Rawalakot, Namanpura near Bagh and in Chatter Muzaffarabad areas. In the northwestern part between Chatter and Mansehra areas under the western limb of the HKS, this fault exists in the crystalline basement and not exposed on surface. In the south of Mansehra along the Abbottabad road, deformation in the sedimentary-metasedimentary wedge is an indication of BBF on surface. The study also suggests that the HLSZ is a blind basement fault trending in the NW-SE direction and extending up to Moho depth between Taxila and Kalar Syedian areas. In the northern part of the study area, the IKSZ was a blind basement fault before 2005 Kashmir earthquake. Due to compressional stresses, the rupture developed in 15–20 km thick sedimentary and meta-sedimentary wedge and the 8th October, 2005 earthquake occurred in the Kashmir and Balakot areas. The study also suggests that IKSZ or Kawai fault is a thick skin fault which penetrates both the sedimentary and metasedimentary wedge and is demarcated from Kawai to Davelian and Chinari areas.