Long journey, tectonic and geodynamics of Indo-Pak plate: evidences from Pakistan

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The geodynamics and tectonic study of Indo-Pak is significant due to its present regional contact with Asia but past contact with Gondwana. The ironstone and ferruginous brown strata of Jurassic-Cretaceous boundary provide a clue of separation from Madagascar and start of northward long journey at about 135 Ma. The marine strata was dominant in the Lower Cretcaeous while coastal sandstone were dominat in the Upper Cretaceous. The eastern part of upper Indus basin show a wide range of erosion where the Precambrian Salt Range Formation in Eastern Salt Range and Cambrian dolomite in Tatta Pani, Kotli are capped by Infra Tertiary boundary Indus Formation (bauxite/laterite). This erosion show a long journey of more than 5000 km in a period of 68 Million years (135 Ma–67 Ma) with average speed of 10cm/year. When Indo-Pak plate came close to Asian plate, the stress created subduction of Tethys plate (at the line of Karakoram Suture) under Hindukush-Karakoram resulted in the form of Karakoram magmatic arc. Further stress at later created subduction of Tethys sea plate (at the line of Northern Indus Suture) under Kohistan-Ladakh belt resulted in the form of Kohistan-Ladakh magmatic arc. The Indo-Pak collided first time with Afghan block at Latest Cretaceous about 67 Ma. The Indo-Pak plate docked with Kohistan-Ladakh Tethyan belt. Due to first collision, uplift took place resulted in the birth of Paleo Indus river systems and end of Paleo Vitakri river systems. During Eocene the Paleo Indus river systems deposited the Shagala Group in Balochistan basin, Chamalang (Ghazij) in middle Indus and western part of upper Indus, and Kuldana groups in uppermost and middle and eastern part of upper Indus basins. At Latest Eocene (40–35 Ma) the northern part of Indo-Pakistan collided hard which resulted in the uplift, folding and faulting (mainly south verging thrusts) in the northwestern Foreland and deposition of terrestrial Potwar/Vihowa (Siwalik) Group in the Hinterland. The last major geoevent at Pliocene-Pleistocene boubdary created further uplift, folding and faulting and the deposition of Pleistocene-Holocene Sakhi Sarwar Group (Dada conglomerate and Sakhi Sarwar snad and clays). This orogeny is responsible for creating highest peaks and present morphology.