Geodisaster and lithostratigraphy of doubly plunging thrusted Muzafarabad anticline, Muzaffarabad District, Sub Himalayas, Azad Kashmir, Pakistan

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Abstract

The Muzafarabad anticline is located on the northwestern, northern and southeastern vicinity of Muzaffarabad city. Geological and tectonic setting shows its location in the Uppermost (Khyber-Hazara-Kashmir) Indus basin. This anticline trending northwest to southeast is doubly plunging. It is thrusted anticline and also its thrusting is active. The northeastern limb of thrusted Abbottabad anticline is relatively normal and less faulted while the southwestern limb is overturned and shows active thrust line. The maximum throw (vertically displaced more than one kilometer) of this anticline is observed in the southwestern limb of Balakot-Muzaffarabad area. Further this thrust started from Balakot to Muzaffarabad to Chikar to Bagh to Rawlakot to Tatta Pani to onward west of Nikial and then extends into India. From Balakot to Muzafarabad to Chikar to Bagh to Rawalakot the relatively maximum shake were reported by local inhabitants on this active trust line than vicinity areas. In Tatta Pani-Nikial sections geothermal hot springs are observed on this major fault line. Further the southwestern limb of the Muzaffarabad anticline physically shows fresh fault breccia, mylonite and gouge line and their downward flow revealing the recent active nature of this thrusted anticline. This active and fresh mylonite, fault breccia and gouge can be easily recognised by an overview at high site in front of thrust line. This thrust line generally trending from Muzaffarabad to Balakot, indicating this as an active thrust. This is the reason for more geohazards in this area in 2005 earthquake. Further the most active nature of this thrust alerts for natural disaster advances. In the thrusted Muzaffarabad anticline the oldest formation exposed is the Cambrian Abbottabad Formation (mainly Dolomite and dolomitic limestone with minor shale; 600m), which is caped by the glauconitic-chamositic-pyritic-hematitic and partly lateritic Hazira Formation (5m). Then the Triassic Kingriali Dolomite (50m; greyish white, massive to thick bedded) and Jurassic Samanasuk Limestone/dolomitic limestone (50m; ferruginous with yellow brown iron weathering separates it from the older Kingriali dolomite) and some negligible Cretaceous Kawagarh (limestone and shale) is observed. Further some negligible lateritic and pisolitic bauxite of Indus Formation of Latest Cretaceous to Cretaceous-Tertiary boundary found just below the Early Paleocene Hangu Formation (2-5m; coal, quartzose sandstone, shale; synonym Patala) which is followed by Late Paleocene to Early Eocene Sakesar Limestone (115m; synonym Margala Hill and Lokhart Limestones: rubbly nodular/conglomeratic type just like the Dungan Limestone of Sulaiman and Kirthar basins). Then Early Eocene Chorgali Formation (50-60m; mainly marine green shale with alternation of medium to thick beds of limestones) and Early-Early Middle Eocene Kuldana (200m; continental and marine; red to maroon and green shale and sandstone, alternated grey limestone beds) are also observed. It is necessary to mention that this Kuldana Formation is well correlated with Early Eocene Kingri Formation of Chamalang (Ghazij) Group of Sulaiman (middle Indus) Basin. After a long disconformity (from Middle Eocene to Early Miocene) the Miocene-Pliocene Murree Formation (3000m) was deposited under fluvial conditions.