Neotectonic studies and structural modeling of a part of the Nanga Parbat syntaxis using seismological, geological and remote sensing data

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This work comprises of neo-tectonic studies and structural modeling of a part of the Nanga Parbat Syntaxis (NPS) using remote sensing, geological and seismological data. Geological analyses include detailed literature review of active faults bounding the NPS and their kinematic history while seismological interpretation includes the detailed analysis of earthquake data including source and Fault Plane Solution (FPS) or Focal Mechanism Studies (FMS). The seismological data obtained from local and international observatories e.g. United States Geological Survey (USGS) and International Seismological Center (ISC), UK. In addition, the freely available satellite images on websites e.g. the Glovis imagery web data source have been used for the fault identification. Landsat satellite images with spatial resolution of upto [60m] were used. The seismological, structural/geological and remote sensing data interpretation for the study area (an area between 74^{o}-75.5^{o} N longitude to 34.5^{o}-36^{o} E latitude), confirms the presence of several neotectonic features. Amongst of these the Raikot fault is proved to be the most active feature and is responsible for majority of the seismic activity at the western margin of the syntaxis especially. A careful study of most reliable duration of seismological data i.e. 2004-2010 shows that most of the earthquakes are occurring at the depth of 10-60 km with relatively low- to moderate- size (3.0-6.0 M_b) earthquakes. This proves our hypothesis that seismicity pattern of low- to moderate- magnitude earthquakes are occurring over a longer period of time and can produce greater deformation. It also shows that although the syntaxis is tectonically very active due to the presence of several neotectonic features, but release of strain energy is currently of low level, which might be indicative of any major earthquake event in the near future by the sudden burst of accumulated strain energy along the active Raikot-Sassi fault zone in particular. FMS for seven earthquakes in the area have shown that the western and eastern margins of NPS are surrounded by strike-slip faults and coincide with our geological interpretation. Small component of normal faulting in all these FMS is also evident, which might be indicative of localized strain adjustments along the active faults. Geologically, these faults were initiated as thrust faults along the Main Mantle Thrust (MMT), however, due to rapid Neogene uplift of the basement rocks, the MMT has been reactivated as dip- and strike-slip faults accommodating domal uplift of the syntaxis.