Modeling deformation velocity in Himalayan urban centers from plate motion and elastic strain accumulation

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The instantaneous tectonic motions across the Himalayan region have been measured by the GPS. We processed GPS observation for the permanent stations established by GBPIHED Since GBPK-Almora (1997), GBNL-Nainital (2005) and GBSK-Sikkim (2003) using GAMIT/GLOBK. All these Himalayan urban centers, that are from the focus of our study, presents at least 2.5 years of data, the minimum time span for a reliable determination of the deformation velocity .

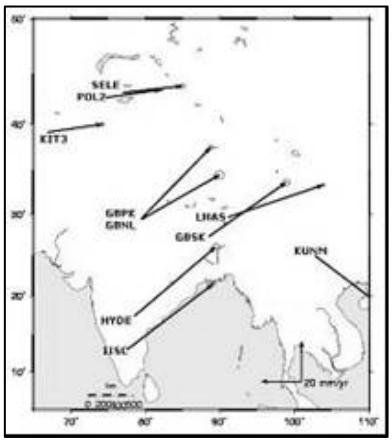

Figure 1: Velocities of GPS stations.

Results clearly shows the tectonic collision of Indian subcontinent towards Eurasia. Obtained distribution of sites velocities suggests the Indian plate which includes IGS sites IISC (53.12±0.57mm/yr) HYDE (52.68±0.91 mm/yr) [1] and our sites Almora (48.33±0.58 mm/yr), Nainital (45.09±1.16 mm/yr) are moving mostly as rigid.

Furthermore, baseline changes between the sites of study area indicates that Lahasa (southern Tibet) site is consistent with the east-west extension of Tibetan plateau with a extension of 18 mm/year relative to Indian plate. The baseline changes between GBPK-GBSK is 23 mm, as GBSK is moving towards east in comparison to GBPK.

[1] http://itrf.ensg.ign.fr

Tectonoic implications of dense GPS velocity fields at kumoun Himalayas

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A dense and wide semi-permanent GPS network has been studied in Gori-vally, Indian Central Himalaya by GBPIHED for 4 years since 2002 to 2007. Field campaigns for the GPS geodetic data are made every year for this network and is designed both for crystal deformation monitoring and to serve a highly précised GPS network in the Study area. Average distance between dense parts is about 10 to 20 km.

Velocity and precise position for the sites determined using GAMIT/GLOBK software.

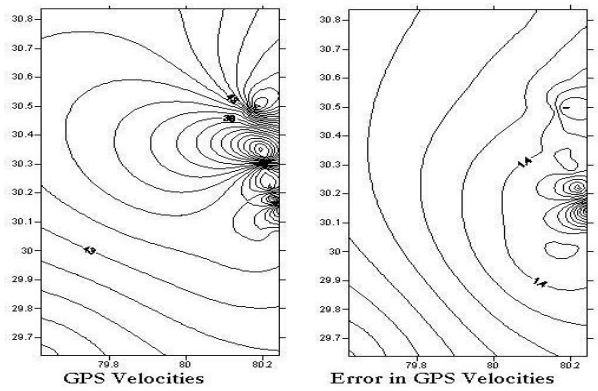

Figure 1: Contour map of GPS velocities and error.

The magnitude and direction of velocity vectors varies from south to north and from one thrust zone to other. The velocity has been found maximum in Dung (50.76±1.72 mm/yr), which falls in Tethys Himalaya zone. However the minimum velocity was estimated for martoli (28.85±1.34 mm/yr) in the fault zone of THF. The velocities indicate the tectonic movements are of similar magnitude and direction. Change in direction in Trans-Himalaya is observed towards east in case of Dung. The velocity of foot wall of MCT is also in the similar range (Munsiari 40.96±1.47 mm/yr) as compares to that of the velocity of hanging wall of MCT (Khalia = 42.73±1.34mm/yr).