

Application of Radar Interferometry for Measuring the Surface Deformation of Southern Kumaun, India

Wei-Ji, Wang^a, Chung-Pai Chang^{ab}, Wu-Lung Chang^a

a : Department of Earth Sciences, National Central University, Jhongli, Taiwan

b : Center for Space and Remote Sensing Research, National Central University, Jhongli, Taiwan

Abstract

The Kumaun area is a part of the Himalayan mountain belt that locates on the Uttarakhand state, northwest India. In this study we focus on the deformation of "Lesser Himalaya", "Siwalik" and Ganga Plain areas, from north to the south. Siwalik is the deformation front of the Himalayan orogene bounded by HFT (Himalayan Frontal Thrust) to the south and MBT (Main Boundary Thrust) to the north. Since there was no geodetic network in this area, our research group installed 12 campaign GPS stations and two continuous GPS stations in the area. We also used InSAR (Interferometry Synthetic Aperture Radar) technique to observe surface deformation of this area. We used ALOS image from 2007 to 2010 to carry out a series of analysis. Because our study area is in mountain area, we did the atmospheric correction individually in the step of data processing. As a result of lacking seismic data and others geodetic measurement in the region, our InSAR preliminary results are the first observations to reveal the different deformation patterns along some geological structures, and can be applied for further discussions. We also take our results compare with previous studies, which indicate that even though the Kumaun area is a seismic gap, some faults in this area are active and cause the surface deformation rate of about 20 mm/yr (LOS velocity). HFT and MBT are locked at shallow depths in our observation period and the results conform to the observation in the field survey.

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