Agrawal Ritesh, Singh S. K., Rajawat A. S. and Ajai, 2014, Estimation of regional mass anomalies from Gravity Recovery and Climate Experiment (GRACE) over Himalayan region, The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences, Volume XL-8, 2014 (ISPRS Technical Commission VIII Symposium, 09 – 12 December 2014, Hyderabad, India), doi:10.5194/isprsarchives-XL-8-329-2014, pp 329-332.

Abstract:

Time-variable gravity changes are caused by a combination of postglacial rebound, redistribution of water and snow/ice on land and as well as in the ocean. The Gravity Recovery and Climate Experiment (GRACE) satellite mission, launched in 2002, provides monthly average of the spherical harmonic co-efficient. These spherical harmonic co-efficient describe earth's gravity field with a resolution of few hundred kilometers. Time-variability of gravity field represents the change in mass over regional level with accuracies in cm in terms of Water Equivalent Height (WEH). The WEH reflects the changes in the integrated vertically store water including snow cover, surface water, ground water and soil moisture at regional scale. GRACE data are also sensitive towards interior strain variation, surface uplift and surface subsidence cover over a large area. GRACE data was extracted over the three major Indian River basins, Indus, Ganga and Brahmaputra, in the Himalayas which are perennial source of fresh water throughout the year in Northern Indian Plain. Time series analysis of the GRACE data was carried out from 2003-2012 over the study area. Trends and amplitudes of the regional mass anomalies in the region were estimated using level 3 GRACE data product with a spatial resolution at 10 by 10 grid provided by Center for Space Research (CSR), University of Texas at Austin. Indus basin has shown a subtle decreasing trend from 2003-2012 however it was observed to be statistically insignificant at 95% confidence level. Ganga and Brahmaputra basins have shown a clear decreasing trend in WEH which was also observed to be statistically significant. The trend analysis over Ganga and Brahamputra basins have shown an average annual change of -1.28 cm and -1.06 cm in terms of WEH whereas Indus basin has shown a slight annual change of -0.07 cm. This analysis will be helpful to understand the loss of mass in terms of WEH over Indian Himalayas and will be crucial for hydrological and climate applications at regional scale.