Geophysical Research Abstracts
Vol. 18, EGU2016-11577, 2016
EGU General Assembly 2016

The Seasonal Hydrological Loading Impacts on Post-Earth Measurements for the 2015 Nepal Earthquake

Rong Zou (1,2), Qi Wang (1), Jeffrey T Freymueller (3), and Markku Poutanen (2)

(1) Hubei Subsurface Multi-Scale Imaging Key Laboratory, Institute of Geophysics & Geomatics, China University of Geosciences (Wuhan), Wuhan 430074, China;(zourong@cug.edu.cn), (2) Finnish Geospatial Research Institute FGI, Geodeetinrinne 2, Masala 02430, Finland;(markku.poutanen@nls.fi), (3) Geophysical Institute, University of Alaska Fairbanks, Fairbanks, AK 99775, USA(jeff.freymueller@gi.alaska.edu)

In southern Tibet and Himalaya, ongoing vertical and horizontal motions due to the collision between India and Eurasia are monitored by large numbers of global positioning system (GPS) continuous and campaign sites installed in the past decade. Displacements measured by GPS usually include tectonic deformation as well as non-tectonic, time-dependent signals. To estimate the regional long-term tectonic deformation using GPS more precisely, seasonal elastic deformation signals associated with surface loading must be removed from the observations. Seasonal oscillations in GPS site time series also can bias estimates of postseismic deformation, especially in the critical first months after an earthquake. We investigate tectonic and hydrologic deformation at GPS sites in southern Tibet and Himalaya, focusing on removing seasonal signals in GPS time series for a robust determination of tectonic deformation. The 2015 Mw 7.8 Gorkha earthquake occurred in late April. In the first half –year since this thrusting earthquake, postseimic displacements for sites in southern Tibet and Himalaya have mainly to the south, in the same direction as the coseismic displacement. Because this is in the same direction as the largest horizontal seasonal oscillation, and because the impact of an annual period oscillation on the estimated rate is greatest when the data span is half a cycle, the seasonal displacements can have a significant impact on the early postseismic displacements. This study represents a considerable complement to the previous works that were based exclusively on analyzing the Nepal continuous GPS network because new sites in southern Tibet, China are considered, and numerous time series of campaign sites are analyzed. In particular, we analyze how removing seasonal hydrologic signals from GPS site time series impacts estimates of the postseismic transient following the 2015 Mw 7.8 Gorkha earthquake.