Geophysical Research Abstracts
Vol. 18, EGU2016-7054-1, 2016
EGU General Assembly 2016

Contribution of Geodetic Datum in GNSS Networks to Monitored Displacements

Alpay Ozdemir, Ugur Dogan, and Cuneyt Aydin
Yildiz Technical University, Department of Geomatic Engineering, Istanbul, Turkey

The aim of this study is to investigate the effects of datum definition on the monitored displacements of GNSS networks. The datum definition is a significant problem in terms of reliable deformation analysis and interpretation on determining the deformation in GNSS networks. The observations have been analyzed to show the reliability analysis of a group of station in the network and the influence of datum definition on the deformations of GNSS monitoring networks.

For this purpose, we studied GPS observations in the CORS-TR network collected on a set of 13 station to detect co-seismic deformation of the 23 October 2011 (Mw=7.2) Van earthquake in the eastern of Turkey. The GPS observations were processed in the ITRF 2008 reference frame using the Bernese 5.2 GNSS software. Seven datum configuration modes which depend on the number of datum stations, which are selected from 9 IGS stations, were defined to determine co-seismic deformation of the Van earthquake and the deformations of GPS stations were computed for every datum definition.

Our results indicate that each station showed different temporal behavior and significant relative motions with respect to datum definition. On the other hand, the distribution of the datum stations around the monitored region seems to be very important factor for determining the displacements. To show the effect of datum station distribution, we compare the displacements obtained from two different datum configuration modes (mode 1: 4 datum station “BUCU, GRAZ, MATE, SOFI” located at Eurasian plate, which are far away from the region, and mode 2: 9 datum station “BUCU, GRAZ, MATE, SOFI, TUBI, CRAO, ZECK, NICO, DRAG” located around the region). For instance, co-seismic displacements for station MURA, which is the closest station to the earthquake epicenter ($\sim$43 km), amounted to -82.24 $\pm$ 0.60 mm for the north component, 12.01 $\pm$ 0.76 mm for the east component and -25.19 $\pm$ 2.49 mm for the up component with respect to mode 1, -89.34 $\pm$ 0.59 mm for the north component, 8.63 $\pm$ 0.55 mm for the east component and -9.23 $\pm$ 2.39 mm for the up component with respect to mode 2.

Keywords: Displacement, Datum Effect, GNSS