

MIS036-P20

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Post-seismic displacement during 30 days just after 2011 Off Tohoku Earthquake observed by GEONET and IGS networks

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30-days post-seismic displacement just after the occurrence of the 2011 Off Tohoku Earthquake (M9.0) observed by GEONET and IGS GPS networks is obtained applying GAMIT/GLOBK program 10.4 (Herring et al., 2011). For the fiducial sites, we adopt 15 IGS network sites in eastern Asia, Pacific, and North America, whose ITRF2005 coordinates (Altamimi et al., 2007) are tightly constrained. For the analysis of the GPS data of the pre-seismic period we adopt IGS final orbit as precise ephemeris, and for the analysis of data of the 30days after the main shock we adopt IGS rapid orbit as precise ephemeris.

We divide nationwide GEONET sites and domestic IGS sites (TSKB and USUD) into regional 39 groups, obtain one-day GAMIT solutions of each group with IGS fiducial sites using RINEX data, and combine all the regional GAMIT solutions to one nationwide GEONET and IGS site coordinates solutions applying GLOBK program (Ito et al., 2009).

For the period before the earthquake, for four-day period during March 7 and 10UT, 2011, we combine every daily (24-hourly) solutions into one GEONET and IGS site coordinates solution applying GLOBK program. For the period just after main shock, we analyze the RINEX data for the periods during 05:50 and 23:59UT on March 11 and 24 hour on March 12 (UT), 2011, applying GAMIT program and obtain daily GAMIT solution, then we combine two daily solutions into one GEONET and IGS site coordinates solution applying GLOBK program (Shimada and Herring, 2011). For 30-days after the main shock, we analyze the 24-hourly RINEX data for April 9 and 10 (UT), 2011, applying GAMIT program and obtain daily GAMIT solutions, then we combine two daily solutions into one GEONET and IGS site coordinates solution applying GLOBK program. Finally we correct co-seismic displacements from the site coordinates solution of the 30-days after the main shock, and compare with the site coordinates solution of the pre-seismic period and obtain the 30-days post-seismic displacement just after the main shock. Thus the displacements may include the co-seismic displacements caused by the aftershocks occurred during the day after the main shock and 30 days after the main shock.

In the resultant post-seismic displacement, for the horizontal movements, coastal area from Iwate to Ibaraki near the main shock generating fault, displacements directed eastward to eastern southeastward are significant. Especially comparing with the co-seismic displacement distribution, the region from Ibaraki and the northern part of the Boso Peninsula eastern southeastward movement is relatively significant. In the western Japan, eastward to eastern northeastward displacement is seen to the sites in Kyushu Island as well as the co-seismic motion. In Hokkaido, the east part moves northwestward, anti-clockwise rotating to the southward displacements in the western part are observed. For the vertical movements, in the coastal area in Iwate near the main shock generating fault, significant subsidence is observed, however in the coastal area from Miyagi to Ibaraki the uplift area widely seen, possibly indicating the co-seismic motions of the aftershocks. Around the uplift area, in the marginal area of the subsidence area in the co-seismic motion, subsidence is widely seen, except the area from Niigata to Nagano where uplift is seen. In the far west of the epicentral area, the uplifting and subsidence sites are contaminating in the Izu Peninsula and the coastal area of central Shizuoka, and also the same for the western Japan area.

Keywords: 2011 Off Tohoku Earthquake, 30-days post-seismic displacement, Global Positioning System, GEONET, IGS