

Heterogeneous surface deformation of the Kanto plain after the 2011 Tohoku earthquake

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Surface deformation of Japan island after the 2011 Tohoku earthquake has been modeled by visco-elastic relaxation and after slip. On the other hand, there were local post-seismic deformation at the Kanto plain that cannot be explained by the common model. In this study, we investigated surface deformation of the Kanto plain from March 2011 to December 2013 using GEONET data and PS-InSAR analysis of TerraSAR-X data. It has been reported that the Kanto region has uplifted after the 2011 earthquake, and the uplift velocity has been faster along with the distance from the epicenter. In addition to the global uplift pattern, we found the uplift velocity was locally faster about several mm/year around the north of Kanagawa Prefecture and the west of Tokyo. The local uplift occurred soon after the earthquake and decayed over about two years. As far as we know, sudden artificial changes such as groundwater usage were not reported in the period, accordingly this local uplift has likely occurred spontaneously. Moreover, our PS-InSAR analysis estimated the uplift occurred with the spatial dimension of about 10-20 km². This study of local post-seismic deformation may reveal local stress perturbation and a post-seismic deformation mechanism that has not been previously concerned.

Keywords: The 2011 Tohoku earthquake, The Kanto plain, Crustal deformation, GEONET, PS-InSAR analysis