



Post-seismic displacement around the Kanto plain, Japan after the 2011 Tohoku earthquake: implications for the subsurface structure

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We investigated three-year post-seismic displacement of the 2011 Tohoku earthquake around the Kanto plain using persistent scatterer interferometry and global positioning network. Several ground subsidence areas possibly due to groundwater extraction were observed before the earthquake. On the other hand, post-seismic displacements show overall ground uplift with both uniform and local scale. The global uplift areas were about the northeast of Japan island scale, whereas the local uplift areas were about $30 \times 50 \text{ km}^2$, and showed complex spatial distribution with irregular shape. Since the groundwater level has increased, we interpreted that the local ground uplift was associated with permeability enhancement and pore pressure increase of the aquifer system, which were induced by the mainshock vibration. The areas of local uplift are characterized by deeper sediment layer than in other areas, and the velocity response spectrum shows that the earthquake caused seismic shear waves of long period ($\sim 1\text{--}30 \text{ sec}$), attributable to the thick sedimentary basin beneath the Kanto Plain. Based on the fact that low-frequency seismic wave especially increase permeability, the local structure beneath the Kanto plain would alter permeability of the aquifer structure and induce pore fluid migration.