

Calculation of the postseismic deformation following the 2003 Tokachi-oki Earthquake with the crustal heterogeneity

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Surface coseismic and postseismic deformation have been recorded for the 2003 Tokachi-oki earthquake by a dense GNSS measurement array, GEONET. We calculate postseismic deformation following the 2003 Tokachi-oki earthquake. It is known that the crustal heterogeneity and rheology in lower crust and mantle are critical to reproduce the observed surface displacements. We calculate the viscoelastic relaxation based on the equivalent body-force method (Barbot et al., 2017). This method allows us to introduce the crustal heterogeneity and various viscoelastic rheology such as linear Maxwell, Burgers body or nonlinear viscoelastic rheology. We calculate contribution of viscoelastic flow by the mantle wedge and the oceanic mantle. Spatial patterns of flows in the mantle wedge and the oceanic mantle are different; the former and the latter produce south-eastward and westward surface postseismic displacements, respectively. Calculated postseismic deformation are compared with 7 years of data after the 2003 Tokachi-oki earthquake. We conducted preliminary calculations with the linear Maxwell rheology. The result suggests that it is substantial to introduce the mantle wedge with lower viscosity and/or thinner lithosphere over the mantle wedge than those of the oceanic mantle, in order to reproduce the south-eastward postseismic displacements near the epicenter. In the presentation we show the postseismic displacements calculated with non-linear viscoelastic rheology and suggest the best-fitting crustal structure.

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