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Estimation of the viscoelastic relaxation following the 2011 off the Pacific coast of Tohoku earthquake

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We are developing a 3-D viscoelastic model using the Finite Element Method to describe the postseismic deformation following the 2011 Tohoku-oki earthquake. The purpose of this presentation is how much viscoelastic relaxation contributes to the observed postseismic deformation. The viscoelastic relaxation strongly depends on the value of the mantle viscosity. The previous studies reported that a range of mantle viscosity under the Tohoku district is estimated to be 10^{18} to 10^{19} Pas. I computed the viscoelastic relaxation using a range of mantle viscosities 10^{17} to 10^{20} Pas.

Our model suggests that viscoelastic relaxation contributes to the observed 21 months postseismic horizontal displacement significantly in the Tohoku area when the viscosity is less than 10^{18} Pas. In this case, however, viscoelastic relaxation exceeds the observed displacement at the Japan Sea side.

In the case of the viscosity of 10^{19} Pas, our viscoelastic model predicts eastward velocity of 5 cm/yr in the Tohoku district for the first a few years. This eastward velocity lasts at least more than 30 years.

Keywords: Tohoku-Oki Earthquake, postseismic deformation, viscoelastic relaxation