Modeling of the time series of the postseismic deformation in Yamagata, Japan, after the 2011 Tohoku earthquake.

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Using daily coordinate time series provided by GSI (F3 solutions), we estimate the effects of the postseismic deformation in Yamagata, Japan after the 2011 Tohoku earthquake (M9.0). We assumed that the most of postseismic signals are caused by afterslip and viscoelastic relaxation. These postseismic deformations are often modeled by logarithmic and exponential (or power-low) temporal change, respectively. We approximated observed daily postseismic deformation by these theoretical models. As a result, the logarithmic theoretical time series, which assumes afterslip, is fitted the observations well between just after the earthquake and ˜100 days after the event, and exponential theoretical, which assumes viscoelastic relaxation with Maxwell body, time series explain data after ˜100 days after the earthquake. Estimated time constants are ˜8 days (afterslip) and ˜1000 days (viscoelastic relaxation), respectively. This result is consistent with other previous studies at the eastern pacific coast in Tohoku region. Combined model consists of summation of logarithmic and exponential signals also explain the time series. Distribution of the amplitude of the viscoelastic relaxation might be reflecting heterogeneous viscoelastic structure beneath the study area.

Keywords: postseismic deformation, tohoku earthquake