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Strain inhomogeneity of the crust induced by the great earthquake east off NE Japan

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We evaluated inhomogeneity of crustal strain in NE Japan associated with a step-wise stress change induced by the great earthquake of M9.0 east off NE Japan. The earthquake ruptured the plate interface of as long as about 500km, from off Iwate to off Ibaraki. The observed eastward coseismic displacements of GPS stations were relatively uniform in the central NE Japan. This suggests that the induced stress change in this area should be uniform. The inhomogeneity of crustal strain, therefore, should reflect inhomogeneity of rheological characteristic of the crust.

The observed deformation was dominated by E-W extension. Crustal deformation predicted from a source model consisting of two rectangle faults was subtracted from the observed crustal deformation to depict deformation anomaly. It was found that the E-W extension in the Ou-backbone range was smaller than the predicted extension. This evidence strongly supports a hypothesis that viscosity of the lower crust beneath the Ou-backbone range is low.

Keywords: strain concentration zone, structural inhomogeneity