

Static strain and stress changes in eastern Japan due to the 2011 Tohoku earthquake, Japan, as derived from GPS data

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The 2011 M 9.0 Tohoku-oki earthquake induced regional crustal deformation not only on the Japanese Islands but also northeastern Asia. Strain release due to mainshock faulting should cause strain redistribution in overriding plates. The dense GPS network in Japan enables us to calculate coseismic strain and stress changes from observed data. Strain is a more objective indicator than displacement because no reference frame is required. The coseismic strain field clearly indicates island-scale strain redistribution. Huge extensional strain changes were concentrated in southern Iwate and northern Miyagi regions with maximum value 45×10^{-6} , which might correspond with approximately 250-500 years of strain accumulation. This implies relatively large strain accumulation and releasing off these regions. Small strain decay in northernmost Niigata-Kobe tectonic zone and anomalous coulomb failure stress change in Mt. Fuji region were observed. Triggered earthquakes occurring above regions might be associated with these anomalies, and/or these non-uniform crustal deformations may reflect crustal heterogeneity.

