Observation of coseismic gravity changes caused by Kuril Islands Earthquakes with superconducting gravimeters in central Japan

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Earthquake faulting gives rise to changes in Earth's mass distribution and therefore in the terrestrial gravity field. This effect was detected in terms of small changes in gravity acceleration recorded by superconducting gravimeters (Imanishi et al., 2004) on the Tokachi-oki event of September 25, 2003 (Mw 8.3), pointing to possible applications of precise gravity observations to studies of earthquake sources.

The two events which occurred near the Kuril Islands on November 15, 2006 (Mw 8.3) and January 13, 2007 (Mw 8.1) are similar in magnitude and locations but different in their mechanisms (reverse-faulting and normal-faulting, respectively). It is of great interest to see how superconducting gravimeters recorded gravity changes associated with these events.

Here we investigate coseismic gravity changes caused by the two Kuril Islands Earthquakes using records from three superconducting gravimeters (Matsushiro, Kamioka and Inuyama) located in the central area of Japan. From preliminary analysis of the November 15 event, we are obtaining promising results in favor of detection of finite gravity changes at every station. We will make detailed analysis for both events incorporating corrections for the effects of atmospheric pressure and underground water, and discuss observed gravity changes in comparison with theoretical predictions.