Japan Geoscience Union Meeting 2014
(28 April - 02 May 2014 at Pacifico YOKOHAMA, Kanagawa, Japan)

SSS33-03 Room:315 Time:April 30 09:30-09:45

Postseismic gravity changes after the 2011 Tohoku earthquake recorded by superconducting gravimeters

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Continuous gravity monitoring by means of superconducting gravimeters is revealing significant effects of the 2011 Tohoku Earthquake on surface gravity in Japan. Two stations of superconducting gravimeters, Matsushiro and Kamioka, both in the main island of Japan (Honshu), are indicating gravity decreases at similar rates of approximately 10 microgal per year after the 2011 event, and this trend is still going on. Since Matsushiro and Kamioka are relatively far from the earthquake source region (epicentral distances being 420 km and 490 km, respectively), the postseismic crustal uplifts of the stations recorded by GPS are too small to account for the observed gravity decreases. Therefore, the observed gravity changes are likely to reflect ongoing changes in the density of the earth material, maybe associated with a viscoelastic flow of the asthenosphere. Data from Mizusawa, another SG station in Honshu, will also be presented in the paper.

Keywords: superconducting gravimeter, 2011 Tohoku earthquake, postseismic gravity changes, viscoelasticity