Comparisons of Co-Seismic Gravity Changes between GRACE Observations and the Predictions from the Finite-Fault Models for the 2012 Mw = 8.6 Indian Ocean Earthquake Off-Sumatra

Authors : Armin Rahimi

Abstract : The Gravity Recovery and Climate Experiment (GRACE) has been a very successful project in determining math redistribution within the Earth system. Large deformations caused by earthquakes are in the high frequency band. Unfortunately, GRACE is only capable to provide reliable estimate at the low-to-medium frequency band for the gravitational changes. In this study, we computed the gravity changes after the 2012 Mw8.6 Indian Ocean earthquake off-Sumatra using the GRACE Level-2 monthly spherical harmonic (SH) solutions released by the University of Texas Center for Space Research (UTCSR). Moreover, we calculated gravity changes using different fault models derived from teleseismic data. The model predictions showed non-negligible discrepancies in gravity changes. However, after removing high-frequency signals, using Gaussian filtering 350 km commensurable GRACE spatial resolution, the discrepancies vanished, and the spatial patterns of total gravity changes predicted from all slip models became similar at the spatial resolution attainable by GRACE observations, and predicted-gravity changes were consistent with the GRACE-detected gravity changes. Nevertheless, the fault models, in which give different slip amplitudes, proportionally lead to different amplitude in the predicted gravity changes.

Keywords : undersea earthquake, GRACE observation, gravity change, dislocation model, slip distribution

Conference Title : ICSGRS 2017 : International Conference on Satellite Geodesy and Remote Sensing

Conference Location : London, United Kingdom

Conference Dates : May 25-26, 2017