

Coseismic Gravity Changes Associated with the 2004 Sumatra-Andaman Earthquake reviewed by GRACE level-2 data

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We try to recover the coseismic gravity change associated with the 2004 Sumatra-Andaman earthquake using GRACE level-2 data (the monthly gravity field estimates in form of spherical harmonic coefficients).

Gravity changes caused by the 2004 Sumatra-Andaman earthquake were reported by Han et al., (2006) that 30 microGal peak-to-peak coseismic gravity change can be recovered from GRACE level-1B (range rate) data.

Though GRACE level-1B data is useful to detect small scale gravity changes because it remains short wavelength information, we need complicate processing and technical knowledge to convert range-rate data to gravity changes. On the other hand, level-2 data is easy to handle because it is released as monthly gravity field estimates, although most of short wavelength information is lost by processing. In deed, Han et al., (2006) can not isolate positive gravity changes in ocean area and negative changes in land area using GRACE level-2 data.

In this study, we try to pick up coseismic gravity changes associated with 2004 Sumatra-Andaman earthquake by accumulating about 20 months GRACE level-2 data, while Han et al., (2006) use about 5 months data. The results are almost comparable to level-1B's output and show the enough resolution to separate positive gravity changes in ocean area and negative change in land area. Many GRACE measurements error such as striping and nonseismic signals are suppressed by data accumulation and resolution is improved about 350km. Furthermore we attempt to eliminate major nonseismic gravity signals using ocean and land water storage models.

We also design optimally designed regional filter to estimate the amplitude of the abrupt gravity changes induced by main shock. In addition, we make an attempt to pick out the precise gravity change induced by main shock and possible postseismic gravity change by omitting major nonseismic signals with ocean and ground water storage models.