



Lateral variability in southeast Asia: combining gravity and GPS time series after the 2004 Sumatra megathrust event

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Postseismic deformation and gravity changes after megathrust earthquakes are key to the study of rheological properties of the mantle around subduction zones as well as the identification of the mechanisms of stress relaxation after earthquakes.

In previous work (Broerse et al., 2015) we showed a broad postseismic gravity increase over the rupture area of the 2004 Sumatra-Andaman earthquake. We also showed that the postseismic surface displacements displayed a different time behavior in the far field of the overriding plate. Specifically, the surface displacements showed much stronger initial relaxation rates than the gravity changes. Furthermore, the gravity field changes were smaller than predicted by radially stratified models that provide a good fit to the far field surface displacements.

In our current work, we study whether the differences in time behavior can be explained by large-scale lateral variations. Using finite element models we investigate the role of a the regional (elastic) slab, and of differences in the sub-slab and wedge. Furthermore, we use the time variable gravity field to constrain the amount of afterslip after the 2004 rupture. Especially in oceanic areas where geodetic displacement observations are scarce or absent, satellite gravity observations add independent information about relaxation processes for magnitude 9 earthquakes.