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**TITLE:** Lateral variations in subduction zone rheology from combined GRACE and GPS observations

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**ABSTRACT BODY:** More than 7 years of observations of post-seismic relaxation after the 2004 Sumatra-Andaman earthquake provide an improving view at the mechanisms that deform the wide vicinity of the 2004 rupture. We use both GRACE gravity field data and GPS backarc observations and interpret post-seismic changes as dominantly coming from mantle creep. With increasing time GPS and GRACE appear to show contrasts in relaxation styles that were not easily discernable using shorter time series. We link these contrasts in relaxation to lateral changes in the properties of the asthenosphere below the subduction zone. Furthermore, based on vertical GPS deformation and horizontal displacements at very far-field sites we find the depth extend of the currently ongoing mantle creep. Finally, we argue that viscoelastic relaxation models using radial viscosity profiles cannot reproduce relaxation observations from GPS and GRACE simultaneously.

**KEYWORDS:** 1242 GEODESY AND GRAVITY Seismic cycle related deformations, 1236 GEODESY AND GRAVITY Rheology of the lithosphere and mantle, 1217 GEODESY AND GRAVITY Time variable gravity, 8159 TECTONOPHYSICS Rheology: crust and lithosphere.

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### **Additional Details**

**Previously Presented Material:** 0%

Not published yet nor presented. We plan to submit the material well before the Fall Meeting.

### **Contact Details**

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