

Postseismic deformation from the Sumatra-Andaman earthquake detected by continuous GPS: effect of viscoelastic relaxation

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The great Sumatra-Andaman earthquake (M 9.1) of 26 December 2004 occurred west off the Sumatra Island (95.87deg.E, 3.3deg.N). We have analyzed the data of Global Positioning System (GPS) in and around Thailand across the Andaman Sea to study postseismic displacements following the earthquake. Coseismic displacements were detected even 3,000 km away from the epicenter (Vigny et al., 2005). We found as large postseismic displacements at Phuket (PHKT), Bangkok (BNKK) and so on, as the coseismic ones. Postseismic displacements are detected even at the sites in northeast Thailand.

Because of size of earthquake, upper mantle is expected to flow and its motion may affect postseismic displacement after the earthquake. Furthermore, the Andaman Sea, which is known as an active backarc basin, is spreading, and a low viscosity material under the sea is proposed by Ogawa and Heki, (2007) and Shapiro et al. (2007). For these reasons, this material may also affect postseismic displacement in Thailand across the sea.

In this study, I constructed a three dimensional finite element model (3D-FEM) to investigate the effect of viscoelastic relaxation following the earthquake and tried to evaluate it. Postseismic displacements just after the earthquake at PHKT and Chumpon (CPN) are hard to be explained only by viscoelastic relaxation. However, the trends of postseismic displacements after half a year are similar to those due to viscoelastic relaxation. At far sites, on the other hand, such as BNKK and Sri Samrong (SIS2), displacements are gradual decaying after the earthquake and they can be explained only by viscoelastic relaxation.