



Contribution of the 2004 Sumatra-Andaman earthquake to sea-level change

J. Van Hove, B. Vermeersen, W. Simons

DEOS, Delft University of Technology, The Netherlands

GPS-observations have demonstrated that the 2004 Sumatra-Andaman earthquake resulted in very large horizontal co-seismic displacements, still up to 27 cm at a distance of 400 km from the epicenter [1]. An event with such a magnitude is expected to have a significant effect on the co-seismic vertical and gravitational displacement fields as well. Therefore, the earthquake will change both the relative sea level (RSL), defined as the radial distance between the sea-floor and the geoid level, and the absolute sea-level, which is assumed to be consistent with the change in the geoid level.

Both the co-seismic deformations and resulting RSL changes have been simulated by means of a spherical, self-gravitating, radially stratified Earth model with linear viscoelastic rheology. The sea-level equation has been implemented to ensure water mass conservation.

The results show that the RSL change has a maximum value of 3.5 meters over the fault plane, decreasing fast with the distance. At the coast of Sumatra values of several decimeters are found and even at the coast of Thailand a rise of approximately 20 mm is predicted. The absolute sea-level changes are maximally 15 mm close to the epicenter. In the far-field the influence of the earthquake on the sea-level does not exceed +/-0.5 mm.

[1] Vigny, C. et al, Insight into the 2004 Sumatra-Andaman earthquake from GPS measurements in southeast Asia, *Nature* 436, 201-206 (2005)