AOGS 2005

GPS measured Inter-seismic strain and Co-seismic far-field displacements caused by the 26th December, 2004 Great Sumatra Earthquake

PARAMESH BANERJEE
parameshb@wihg.res.in
Wadia Institute of Himalayan Geology, Dehradun, INDIA

The 26th December, 2004 (Mw=9.0) Great Sumatra Earthquake occurred as at the interface of subducting India-Australia plate-pair and the overriding Andaman microplate. The Andaman micropate formed as forearc sliver block between the India plate and Sunda-South China (SSC) block. The SSC block is decoupled from the Eurasian plate and moves southwards relative to the India plate. Data from GPS stations established within India, and surrounding regions in South-East Asia were processed to study the interseismic strain distribution in the region and far-field coseismic displacements caused by the Sumatra event. An Indian GPS reference frame was defined and GPS velocities were computed in a consistent ITRF2000 frame and also relative to the India and Eurasian plates.

The main Sumatra event caused east-ward static displacements of the order of 10-15 mm at CGPS sites at Bangalore (IISC) and Hyderabad (HYDE) in India, west-ward displacement at Singapore (NTUS), and Southward displacement at Kunming (KUNM) in South China. The range of coseismic offsets appears to have extended upto at least 3000 km from the earthquake source zone. The GPS derived plate convergence rates in India-Andaman-Sunda block reveals along-the-arc variation of the convergence mechanism which changes from thrust coupling in the Sunda arc to gradually more predominant strike- slip component in the Andaman arc. The near-to tal seismic loading in the southern section led to two great earthquakes (1933 and 1961) which ruptured nearly 600 and 300km length. The 2004 Sumatra earthquake probably ruptured more than 1000km length which progressed from the source zone towards north, where seismic coupling is weaker because of predominant arc-parallel component of the India plate motion.

Keywords: Sumatra earthquake, GPS, interseismic strain, far field deformation, Andaman arc.