Geophysical Research Abstracts, Vol. 7, 10337, 2005
SRef-ID: 1607-7962/gra/EGU05-A-10337

GPS measurements in SE Asia: Sundaland motion and deformation before and after the December 26, 2004, Magnitude 9.0 earthquake

B. Ambrosius (1), W. Simons (1), C. Vigny (2), A. Socquet (1), S. Abu (3), Chalermchon Satirapod (4), M. Hashizume (5), C. Subarya (6)

(1) Department of Earth Observation and Space Systems; TU-Delft (b.a.c.ambrosius@lr.tudelft.nl), (2) Ecole Normale Superieure, Laboratoire de Geologie (vigny@mailhost.geologie.ens.fr), (3) Department of Survey and Mapping Malaysia (samadabu@jupem.gov.my), (4) Chulalongkorn University, Dept. of Survey Engineering (chalermchon.s@chula.ac.th), (5) Chulalongkorn University, Dept. of Geology (hashmich@geo.sc.chula.ac.th), (6) National Coordination Agency for Surveys and Mapping; Indonesia (csubarya@bakosurtanal.go.id)

A decade of GPS measurements in SE Asia has resulted in a high-quality and high-density geodetic solution of the crustal motions in this region. The existing GEODYSSEA network has been re-measured, and campaign and/or permanent data from many new GPS points in Indonesia, Malaysia, Myanmar and Thailand were added. The latest data was obtained in the framework of the EC-ASEAN "SE Asia: Mastering Environmental Research using GEodetic Space Techniques (SEAMERGES)" project. The extended GPS database in SE Asia now comprises more than 100 velocity estimates with horizontal accuracies of 0.5-2.5 mm/yr. The velocity field was computed in the ITRF-2000 reference frame by including 30 stations of the IGS network and uniformly (re-)processing all data using the JPL GIPSY software package.

The small residual velocities of a subset of 28 points clearly demonstrate the existence and outline of a rigid Sundaland block. On the basis of these observations an improved solution of the rotation pole for Sundaland in ITRF-2000 has been computed. It is located at 48.9 degrees S and 85.8 degrees E and with a clockwise rotation rate of 0.341 deg/Myr. The Sundaland block is composed of a rigid core, characterized by very slow strain rates and residual velocities < 3 mm/yr, which covers Indochina, the

Malaysian peninsula, the Sunda shelf and the major part of Borneo, and extends to the western part of Java. Outwards from the Sundaland core, strain rate increases, with significant cyclic, earthquake-related deformation occurring close to its boundaries.

The December 26, 2004, Magnitude 9 earthquake on the Sundaland and Indian plate boundary, west of the coast of Sumatra, has caused significant co- and post-seismic displacements, extending up to 1000 km into Sundaland. They are clearly visibile at more than 30 (mostly permanent) GPS stations of the SEAMERGES partners in Malaysia, Thailand and Indonesia. These observations and the pre- seismic motion of the Sampali station in Sumatra, providing evidence of strain build-up, will be used to refine the model of the earthquake that caused the huge tsunami, which caused so much devastation in the region.