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INVITED PAPERS

**CRUSTAL DEFORMATION MONITORING IN INDONESIA: CURRENT STATUS
AND FUTURE PLAN**

Submitted by National Coordinating Agency for Surveys and Mapping of Indonesia
(BAKOSURTANAL) **

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Crustal Deformation Monitoring in Indonesia ; Current Status and Future Plan

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Abstract

Lessons learned from 26.12.2004 megathrust devastating Aceh-Andaman earthquake that was generated tsunami and 28.03.2005 Nias earthquake, it shows that the complex and dynamical tectonics in the Asia-Australia region, notably the circum-Indian Ocean (Australia plate) boundaries and the India-Eurasia collision zone, gives rise to some of the world's most active crustal deformations. It is important to monitor and understand these deformations, as accompanying them are natural hazards of earthquakes, tsunami, and volcanoes. The realization of short-term earthquake and tsunami prediction is highly required for the people who live in the active seismic and/or volcanic zones and Asian and Indian Ocean regions.

In order to understand current deformation in Indonesia archipelago region, Global Positioning System (GPS) measurements were initiated in 1989. A current velocity field and kinematics model for the South and Southeast Asia is available from the analysis of the available GPS data until recently. This current velocity field available in the region is a direct outgrowth of the study of plate convergence at the subduction zone and given the level of uncertainty that accompanies any estimate of earthquake recurrence times, it would be reasonable to begin planning an observation program now.

The establishment of a permanent geodetic GPS array in the outer arc, forearc, backarc of the subduction zone and at near/or on Tide Gauge station and coastal region, continuous measurements would ensure dense temporal sampling of pre-, co- and post-seismic displacements. In establishment of a continuous GPS array across the Indonesian archipelago would greatly increase our chances of observing aseismic events or creep episodes in the near future.

We propose to collect continuous GPS data along active seismic belt in Indonesia region, in order to obtain precise crustal deformation measurements of high temporal resolution. The locations of our proposed GPS stations have been carefully chosen to provide supplemental data which is crucial to distinguishing between different dislocation models which fit the current data (GPS and tidal) equally well. The high precision afforded by continuous GPS, in addition to supplying precise horizontal deformation, will also provide vertical displacement data to supplement the information gleaned from the tidal records. Furthermore, the continuous nature of the proposed GPS measurements should enable us to resolve any time-dependent variations in strain accumulation such as fault creep and aseismic events. Current estimates of earthquake recurrence intervals for Sumatra and the long Java subduction zone, adjacent to heavily populated Java Island, suggest that there is a significant chance of another large earthquake occurring at the subduction zone within the next few decades.