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The utilization of Malaysian Active GPS System data for geodynamic applications: a case study in East and West Malaysia

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Geodynamic studies of Malaysia have been ventured upon in the South-East Asia region since the first GeodySEA project in 1996. Both East and West Malaysia lies on the Eurasian Plate, and assumed to have no linear distortion between any two joined points relative to one another. However, Malaysia lies at the southern tip of the plate encroached by two frequently ruptured boundaries, the Indian-Australian plate and the Philippines plate, and it is also within the buffer of the Ring of fire. Hence, this paper is essential to determine the relative movement of Malaysia, and with the possibilities to identify the presences of slip-fault formation which might be of threat to the stable platform that we have taken for granted.

Availability of uninterrupted GPS observations over the Malaysian Active GPS System known as MASS stations situated across the country established by the Department of Survey and Mapping (DSMM) evidently help provides the data for this study. There are currently eighteen MASS stations mounted with Trimble 4000 dual frequency antenna and data recorded at fine second interval made accessible in hourly files. Satellite data collected continuously over a long period of time are processed by Bernese GPS processing software. Fifteen International GNSS Service (IGS) stations were selected within similar period of observations were gathered, processed, later act as tie points to the MASS stations. Apparently with this Malaysia will form a network to the globe.

In this research the author will output the relative MASS stations coordinates and velocity estimates in International terrestrial reference frame (ITRF) 2000 since GPS data used are before the derivation of ITRF2005. At present the measures of quality for GPS derived coordinates given by commercial software packages tend to be unrealistic because unmodelled errors remain unaccounted for. The commercial software packages are either over-optimistic or conversely, therefore, have low fidelity. Thus, Bernese GPS processing software was used here due to its capability to provide high precision result for long baselines observables and able to parameterize the atmosphere, earth rotation, earth and ocean tide from the terrestrial observations.

The output of this study showed that the velocity of the relative movement of Malaysia have a magnitude of 3cm per year for the year 2000 till 2002 and towards the South-Eastern direction. For future research, data should be processed with the latest version of Bernese GPS processing software 5.0 which allows for a fully combined processing of data from both GPS and GLONASS receivers with standard ambiguity resolution strategies taking reference to ITRF2005.