

Consequence of 2012 Mw 8.6 Northern Sumatra Earthquakes Towards Sundaland Plate

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Key words: Deformation measurement; GNSS/GPS; Positioning; Reference frames; Sundaland plate, velocity field, geodesy

SUMMARY

The impact of post-seismic decay has mostly been concerned at the edge of plate boundaries. But great earthquakes (larger than M8.0) can cause widespread post-seismic deformation decay instead of at the edge of plate boundaries only. The Mw8.6 and 8.2 northern Sumatra doublet earthquakes occurred on 11 April 2012, near the conjunction region of Indian, Australian and Sundaland plate, have caused an extensive coseismic offset and post-seismic decay over the region. In this study, the long GPS time-series (1999 – 2014) suggested that the post-seismic of 2012 doublet earthquakes have re-orientated the course of motion of western Sundaland plate, particularly in northern Peninsular Malaysia, from southeast to south-southeast direction. This re-orientation effect is presumed to be the elastic rebound of Peninsular Malaysia back to its original course of motion before the 2004 Mw 9.1 Aceh and 2005 Mw 8.6 Nias earthquakes, with slightly lower displacement magnitude. In this paper, the GPS network and availability of data is summarised. Next, the GPS processing strategies and deformation analysis used in this study are discussed. The paper then focuses on the impact of coseismic and post-seismic deformation of the 2012 Mw 8.6 and 8.2 northern Sumatra earthquakes towards Sundaland plate vectors. Lastly, a new rotation vector for Sundaland plate is defined in ITRF2008 by using 75 selected GPS sites that located in stable block. The coseismic and post-seismic deformation of great earthquakes (M8 or greater) between year 1999 – 2014 were modelled, in advance, before defining the rotation vectors of Sundaland plate.

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FIG Working Week 2016
Recovery from Disaster
Christchurch, New Zealand, May 2–6, 2016