

Analysis of Positional Displacement in Bohol Island on Aftermath of the 2013 Central Visayas Earthquake from GNSS Surveys

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SUMMARY

A 7.2 magnitude earthquake struck Central Visayas, Philippines on 8:12 AM 15 October 2013, originating 12km deep from a previously unmapped reverse fault in Bohol Island. Ground shaking resulted in heavy casualties and damage to infrastructure estimated at US\$52.06 million in the predominantly-limestone island and still linger threatened by failure-prone hillslopes, debris-filled rivers and collapsing sinkholes. Quantifying the distribution of seismic-induced ground movement is important not only for assessing the damage caused by the earthquake but also for guiding local surveyors that they rely on a stable reference system for conduct of surveys in the area necessary for reconstruction and rehabilitation. A static GNSS survey was conducted from 10-13 November 2015 to quantify the displacements. GNSS receivers were occupied previously established High-Ordered (0, 1st and 2nd Order) reference points and fixing a relatively stable point. Subsequently, the GNSS data were analyzed to assess the movement of areas were conducted. The average horizontal displacement is about $0.5166\text{m} \pm 0.2682\text{m}$. Maximum displaced 1.169 m observed while minimum displacement is 0.063. Vertical displacement of $0.6072 \pm 0.8388\text{m}$ was also observed with maximum of 3.70m. The displacement headed towards southeast direction with greatest magnitudes computed at the northern and eastern portion of the Island. The results of the survey may provide key agencies further motivation to review the control points and conduct the necessary re-observation and re-adjustment.

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