Determination of Local Geoid Model Pre and Post-seismic Event as inferred from GPS/Leveling Data: Case Study of the 2013 Bohol Earthquake (M7.2)

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Key words: Deformation measurement; Education; Engineering survey; GNSS/GPS; Positioning

SUMMARY

Title: Determination of Local Geoid Model Pre and Post-seismic Event as inferred from GPS/Leveling Data: Case Study of the 2013 Bohol Earthquake (M7.2)

Philippines is a country that suffers from an inexhaustible number of deadly natural disasters, earthquakes among others. In the early morning hours of October 15, 2013 the island province of Bohol, located in Central Visayas in the Philippines, was disrupted by the deadliest earthquake in the Philippines in 23 years. The earthquake lasted 34 seconds and had a magnitude size of 7.2. It has been estimated that the energy the quake released was equivalent to 32 Hiroshima bombs.

PHIVOLCS reported that the North Bohol Fault (NBF), a thrust fault, generated the Mw 7.2 earthquake, and is a northeast-southwest trending reverse fault along the western sector of Bohol Island. According to experts, the fault may be as much as 100 kilometres long. It was also noted that Bohol gained around 500 meters more of shoreline due to the quake and shifted 55 centimetres west towards Cebu Island.

The paper focuses on the determination of the pre and post-seismic local Geoid Model associated with the said earthquake with the aid of GPS data using at least two (2) interpolation techniques (Kriging, Inverse Distance Weighting, etc.), a comparison of the pre and post-seismic events of mostly second order accuracy Ground Control Points (GCP's) and Benchmarks (BM's) scattered throughout Bohol Island.

The result is a local geoid model of Bohol pre and post-earthquake. The model will be evaluated using the Light Detection and Ranging (LiDAR)

data.

Keywords: GPS, Seismology, Earthquake, GCP and BM, LiDAR, Interpolation, Kriging, Inverse Distance Weighting, Local Geoid Model.