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Hazard Mapping of Structurally Controlled Landslides in Leyte, Philippines Using High Resolution Digital Elevation Model

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Structurally controlled landslides are one of the most destructive natural hazards that have occurred in the Philippines. The 2006 Guinsaugon Landslide, which was produced by the displacement of the Philippine fault, is a classic example of such hazard that took more than 1,000 lives and displaced more than 19,000 residents in the municipality of St. Bernard, Southern Leyte. Frequent monitoring and assessment should be done across the Philippine archipelago. The purpose of this study is to locate structurally controlled landslide prone areas with the aid of Coltop3D, Matterocking and Conefall using a high resolution digital elevation model (5 m resolution Interferometric Synthetic Aperture Radar images). The study area is set in the municipality of Ormoc, Leyte where the Philippine fault also cuts through and trending northwest. Discontinuity sets were identified using Coltop3D software that simulates a 3D model of the digital elevation model showing the dip and dip direction of different discontinuities. Lineation analysis and rose diagrams were made to verify the discontinuity sets in the area. Matterocking computes and estimates the locations where rock instabilities can occur according to the identified discontinuity sets that may allow sliding. Conefall was then used to compute and estimate the potential rockslide extent. Results show that the area has zones of potential rockslides with generated simulation of rockslide propagation extent. There is a high probability of landslides in Ormoc area where continuous monitoring of such danger zones should be done.

Keywords: structurally controlled landslides, geohazard, philippine fault, discontinuities, landslide mapping, structures