Tectonic Geomorphometry from Space: A Case Study in Kundasang, Sabah, Seismically Active Zone in Malaysia

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**ABSTRACT**

The distribution and frequency of seismotectonic activities are increasing in Malaysia. Given the complexity of climatic, topographic and anthropogenic issues in the tropics, the understanding of seismotectonic processes at regional or local scales remains elusive. Conventional mapping techniques (e.g. field mapping and aerial-photo interpretation) have been widely used but shown some limitations in rugged and vegetated sloping terrain. In this research, we utilize both DTM-derived from active airborne sensor ifSAR and very high-resolution optical imagery; WorldView-2, to map and characterize fault-lines (Mensaban and Lobou-lobou) in Kundasang-Ranau, Sabah, Malaysia. An expert knowledge is an added informative value to the aforementioned methodology. GIS-based terrain morphometry and land surface analysis in dealing with tectonic processes has been investigated. Tectonic geomorphometric is a novelty ingredient introduced and evaluated in this study to quantify the seismic activity accurately over a large area within a short observation time. As a result, the integrated geospatial approach allows an accurate representation of terrain and surface structures and revealed a number of previously unknown fault scarps including other hidden geomorphic features. The result leads to a better understanding of characterization of seismotectonic activities. Remarkably, this is a first attempt to investigate the suitability of active- and passive remotely sensed images for mapping and characterizing the geo-indicators or causal of geodynamic activity in the most seismically active region. We also highlight the extraction of the elements at risk as a result of geomorphic processes. Interestingly, we discuss spatiotemporal of the primary (earthquake) and secondary (landslides) hazards. The mapping challenges in the anthropogenic tropical environment, both expert image interpretation and object-based image analysis for extracting seismically active faults related to seismotectonic features are critically discussed. This study illustrates the suitability of modern remote sensing images coupling with expert driven data for a better understanding of hazardous geomorphic problems in changing environment.

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