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Evaluating the Geological Structure of Landslides through Hydrogeological Modeling of Subsurface Sections, Using an Integrated Geophysical Approach

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Abstract

The combination of different geophysical techniques is necessary for the learning of different seismic hazard complications, like subsurface cavities, sinkholes, internal erosion and even seismotectonic zoning. A multidisciplinary approach based on the integration of satellite, GIS techniques, applied geophysical techniques and hydrogeological evaluation can be used to investigate such problems for the large area. Similarly, commonly used qualitative geotechnical logging methods, including TCR, SCR, RQD, limited GSI and RMR techniques can be used to identify unseen potential hazards or quantify significant changes in rock mass quality, such the minimal effort can identify significant weak zones. In this research, geophysical 3D-ERT will be performed to measure the hydrogeology by electrical resistivity along different profile across the area and calculating the parameters for most important factors that affect the resistivity of different geological material like porosity, moisture content, dissolved electrolytes, temperature and conductivity of minerals. MASW testing can be performed, which consists of collecting surface-wave data in the field, generating the dispersion curve, and then using iterative modeling to back-calculate the corresponding Vs profile in order to identify the possible hazard zones and can model the structural geology of the study area. Results from the performed geophysical and geotechnical techniques will be used to develop a computational model for different types of weak zones based on geology and structure of landslide. At the end, we will present an efficient approach which will be based upon multi-scale analysis and characterization of slope by incorporating 3D simulation of wave propagation and amplification in order to check the seismic responses of structures using MATLAB Programming.

Author Keywords

ERT, Geophysics, Geotechnical Engineering, Hydrogeology, MASW, MATLAB, Structural Geology, Slope Stability

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