

Construct a 3D geological model of the Dalun Mountain, Taiwan

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Abstract

The slope at Huaafan University is recorded as a dip slope that has been proposed to be possibly unstable in the Dalun Mountain of Western Foothills in northern Taiwan. The lithology is mainly composed of intercalation of sandstone and shale, and the thickness of the sandstone varies from thin to massive interbedded with shale of the Miocene age. By interpolating the thickness of colluvium as the cover material derived from the borehole data and analyzing the contouring of the interpolation result in the surfer software, it is revealed that debris accumulates at the slope foot toward the southwest in the direction of movement. Because of the influences of tectonic activities, especially, according to previous investigations, two local faults that pass through the study area play an important role in changing the strata's orientation. For a detailed analysis of the subsurface geological structure of this slope, this study focuses on the development of a 3D geological model by using a polynomial surface fitting which is aimed to compute the regressive orientation of the bedding plane derived from the borehole data. Based on calculating the regression plane passing through the elevations of the geologic interface (key bed). The results show that the regression plane's direction is consistent with the measurement of outcrops. Moreover, several cross-sectional profiles are made to visualize and clarify the 3D geological model. Finally, surface and subsurface monitoring data are compared to refine the 3D geological model. The geological model will contribute significantly to the phenomenon of slope failure and can be guidelines to minimize disasters.

Keywords: dip slope, 3D geological model, surface fitting, interpolating.