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Deep Seated Gravitational Slope Deformation And Normal Faulting Observed in the Central Range of Taiwan

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Deep seated gravitational slope deformation(DSGSD) is a phenomenon that causes rock mass deformation under long-term gravity in the large-scale slope area. In the Central Range of Taiwan where mainly slate and schist distributed, it is more susceptible to developing deep seated gravitational slope deformation. In recent decades, normal faulting has been identified to play an important role in mountain building processes affecting rock denudation and surface erosion. Along two major highways across the Central Range of Taiwan, Crespi et al. (1996) first showed the evidence of normal faulting from fault slickenside data. Due to limited accuracy and resolution of terrain data, topographic evidence for normal faulting was not clearly identified or found in the past. With the progress of surveying technology, meter-scaled geomorphic features can be displayed and analytically studied using high-resolution DEMs. In this study, field investigation and geomorphic analysis were carried out using LiDAR-derived DEMs to explore the features of normal faulting or gravitational slope deformation around Mt. Hehuan in central Taiwan. Our preliminary results both from the field investigation and topographic analysis show that the phenomena of gravitational slope deformation were common in the slate area of the Central Range. Three lineament sets with clear subsidence regions along the broad ridge-top areas of the Central Range can be identified from north to south of the Central Range. In comparison, the measured lineament directions were similar to those from the field observations of brittle normal faults reported by Crespi et al. (1996). Comparing the terrain features formed by normal faulting and the DSGSD, we have observed the difference based on their distribution. The terrain features of the normal faulting were directional and distributed across several slopes units. In contrast, the terrain features formed with the DSGSD is distributed within one single slope unit. Many alpine lakes found in the Central Range may be interpreted to have formed by the normal faulting and the DSGSD mechanisms.