

Evaluating landslide susceptible zones in Taiwan using satellite image time series

*Mohammad Adil Aman*¹, Hone-Jay Chu¹, Khushbakht Rehman¹*

¹ *Department of Geomatics, NCKU*

A landslide is a natural catastrophic event resulting in mass movements of rocks, debris, or earth down the slope. Tectonic, climatic, or human activities, and seldom a combination of those are the common triggering factors for the occurrence of landslides, consequently leading to the loss of human life and property, flora, and fauna. Landslides result in abrupt changes in the landscape and thus can be effectively detected using the vegetation index time series derived from satellite data. The proposed study monitored the Landslide vulnerability zones in the mountainous region of Taiwan using the Digital Elevation Model (DEM) and Landsat multispectral data. The Normalized Difference Vegetation Index (NDVI) time series data derived from Landsat 5 & Landsat 8 missions is used in the study. Since subtropical regions don't experience sharp changes in the NDVI due to the seasonal leaf-off effect, therefore these significant changes in the NDVI time series are indicative of the Landslide event. The aim is to determine and map the landslide frequency, through the variations in the NDVI long-term time series values for each pixel. Moreover, we also propose a simple but robust approach to predict the landslide susceptible zones by computing the vegetation occurrence frequency using the NDVI time series data. However, to rule out the uncertainty of misclassification due to the change in land cover type i.e. from vegetation to any other class, only those pixels which remain vegetated during the whole time series are used for the analysis. The study also further evaluates the correlation of the Landslide susceptible zones with the slope derived from the high spatial resolution (5 m) DEM. The preliminary results indicate the homogeneous spatial distribution as well as high frequency of landslides in central Taiwan. Steep slopes in high altitudes are most susceptible to landslides, with some areas showing minimal vegetation frequency due to experiencing landslides multiple times in a year.

Keywords: Landslides, NDVI time series, vegetation occurrence frequency, Digital Elevation Model (DEM)