Landslide susceptibility in the Sierra Nevada National Park (SE Spain) using a multivariate statistics method.

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In this work we have evaluated the landslide susceptibility of the Sierra Nevada National Park area. In order to assess the landslide susceptibility, as well as the traditional factors extracted from the Digital Elevation Model and the lithology, we analyzed many important variables that had not been taken into account in previous studies such as; normalized vegetation index (NDVI), distance to active tectonic structures (folds and faults), snow melting cycles, snow duration, and runoff coefficient (P0). We have differentiated three types of slope instabilities; rotational landslides, fluxes, and rocks failures. For each landslide type we carried out a field inventory using aerial photographs and field work. We used a multivariate statistic approach to obtain those factors that better explain the variance of the landslide distribution through a Principal Component Analysis (PCA). In order to produce the different susceptibility maps for each landslide type, we performed a discrimination analysis to weigh the different factors. The three resulting susceptibility maps have been combined to obtain a general susceptibility map for slope movements in the Sierra Nevada National Park area. This study indicates that some of the new analyzed factors as NVDI index, tectonic activity, and runoff coefficient have a strong influence in the landslide susceptibility in the Sierra Nevada National Park.