

Detection of landslides and vegetation recovery from multitemporal UAV and satellite images

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Heavy rainfall and earthquakes are major triggers of landslides. Recently, unmanned aerial vehicles (UAVs) have attracted great interest for use in the creation of high-resolution images for geoscientific studies. This study used this technique to examine the topographic characteristics of coseismic- and rainfall-induced landslides at the Aso volcano in Japan. The study area has frequently experienced coseismic- and rainfall-induced landslide events, such as those in 1990, 2001, 2012, and 2016. The study area is characterized by the typical grassy vegetation landscape of the region. Vegetation recovery at the landslide sites was also monitored using multitemporal UAV and satellite images. We obtained orthorectified images and digital surface models with a spatial resolution of 0.06 m based on UAV surveys conducted between 2014 and 2020. These high-spatial-resolution images show that the coseismic landslides, many of which were initiated near topographic ridges, were typically located on the upside hillslopes of the previous rainfall-induced landslide scars. The UAV and satellite images revealed strong vegetation recovery at both the rainfall-induced and the coseismic landslide sites. However, site-specific vegetation recovery was determined primarily by topographic parameters, such as slope angle and direction at the local scale.

Keywords: Landslides, UAV, Aso volcano