



Automated Landslide Dating Using Multisensor Satellite Data on Google Earth Engine

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Landslides are complex phenomena influenced by natural and anthropogenic factors. In recent years, the need to better understand their dynamics has driven the development of methodologies aimed at improving risk monitoring and mitigation. In this context, accurately dating landslide occurrence is essential to correctly identify triggering causes and define critical thresholds. This study presents a fully automated and objective methodology, implemented on the Google Earth Engine platform, which enables access to and processing of large volumes of satellite data directly online, thereby accelerating analyses and facilitating method sharing. The procedure exploits the complementarity between changes in vegetation cover detected through vegetation indices and variations in radar backscattering, intending to narrow down the time window in which the landslide occurred. In 45 out of 46 cases analyzed, a time interval of landslide occurrence could be correctly identified, with an average temporal window of approximately 8 days, confirming the robustness of the approach across different geomorphological settings and landslide types. The complete automation of the workflow represents one of the most innovative aspects of the methodology, as it allows the script to be directly and consistently applied to a wide range of recent and vegetated landslides larger than about 10 Sentinel-2 pixels without requiring additional manual and subjective procedures.