

# EXPLORING THE POTENTIAL OF HIGH-ACCURACY LANDSLIDE DETECTION AND MONITORING BASED ON NEW REMOTE SENSING DATA AND TECHNIQUES

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**Abstract:** Landslides are types of natural hazards and landsliding processes affect most countries in the world and represent a global problem. They continuous growth of the world population, with urbanization of areas susceptible to failure, combined with the increasing climate variability, imply greater vulnerability and risk. Remote sensing data and technology can be considered a powerful and well-established instrument for landslide detection and monitoring. The use of remote sensing for landslide detection and monitoring has diversified in recent years owing to an increase in data availability and technological advances in their interpretation. This paper explores the potential of high-accuracy landslide detection and monitoring based on new remote sensing data and techniques. The results illustrate that is not possible to recommend a single data type or processing solution that will work under all conditions. The SAR (Synthetic Aperture Radar) and InSAR (Interferometric Synthetic Aperture Radar) techniques are of considerable value for monitoring but optical data offers several advantages over SAR in detection. SAR imagery also would be most useful for multitemporal analysis with preferable and spectral enhancement is required as storm-induced landsliding. Furthermore, researches using MTI (multi-temporal interferometry) techniques based on the Sentinel-1 for landslide detection and monitoring have an excellent potential in comparing with the MTI based on ENVISAT data. By offering regular global-scale coverage, improved temporal resolution, the new radar satellite mission Sentinel-1 can now guarantee wider and more efficient application of MTI for this field. With number of radar satellites and improved data processing tools are strongly increasing, high-accuracy landslide detection and monitoring can now benefit from high quality information obtainable using MTI techniques and images acquired by SAR satellites to grow in the future.

**Keywords:** landslide; detection; monitoring; hazard; remote sensing.

## 1. Introduction

Landslides are types of natural hazards and recognized in many areas throughout the world. There are many definitions of a landslide but in commonly accepted international usage the term landslide refers to “the movement of a mass of rock, debris or earth down a slope (Cruden 1991, Cruden and Varnes 1996). These movements can be merely inconvenient but can from time to time become seriously damaging or even disastrous in their proportions and effects. In regional studies, landslide is commonly mapping to provide recognition of areas where landslides exist or may

occur via predicting models. However, all spatial landslide predictions need information about history of landslide in study area. Thus, landslide detection and monitoring are a principle and essential parts of landslide hazard analysis. The results of landslide detection and monitoring can provide historical information expressing the knowledge of the landslides in an area as locations and outlines of landslides as single or multiple events. Based on this, landslide models will analyse predict future patterns of instability directly from the past distribution of landslide deposits.

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