

Landslide Movement Monitoring Using the Space-born Technique of SAR Interferometry and Global Positioning System

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ABSTRACT:

Landslide is one of the most destructive natural hazards which threatens human's life and influences the socioeconomic conditions of many countries. In this way, Landslide monitoring and mitigation of its consequence is very crucial. Also, proper determination of hazardous areas is too important to develop an early warning system.

Evaluation of surface displacement is the most common way to detect the landslide. So, effective parameters in geophysical modeling are obtained by investigating the land surface displacement. In this process, the most hazardous regions which have significant movements in displacement field are discovered and flagged by means of statistical analysis. Geomatics methods are so useful for determination of landslide displacement field with high accuracy. In this study, SAR Interferometry is applied to illustrate the past mechanism of the slope instability, also to measure the range of the occurred mass movement along sensor line-of-sight. The present mechanism of land movement is obtained by determining the precise horizontal movement at some specific sparse locations. Iran is so susceptible to suffer from this kind of geological disaster because of its specific geologic and continental condition. The mentioned method is applied to two creeping landslides in Iran. They are located in Sarcheshmeh village in northeast of Iran and near Gougerd village in northwest of Iran. To study the kinematics of these two creeping landslides, space-born techniques of Radar Interferometry and Global Positioning System are applied. First, to make a network of suitable Interferograms, Differential InSAR technique for a dataset of Envisat ASAR images in descending orbits is applied. Then, displacement time series are generated by the least square adjustment. On the other hand, repeated GPS measurements are analyzed to study the kinematics of these creeping landslides. These results prove the stability in Sarcheshmeh slope and demonstrate tangible movement in Gougerd landslide.