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APPLICATION OF SPACEBORNE DIFFERENTIAL INTERFEROMETRIC RADAR TO LANDSLIDE
MONITORING IN RAS AL KHAIMAH, UNITED ARAB EMIRATES

Abstract

Landslides occur due to human activities, geological instability, steep topography, and other natural phenomenon like heavy rainfall. The scale of human and economic losses resulting from landslides justifies the importance of monitoring them in an attempt to predict their occurrence and to take them into account in any risk management plan. In United Arab Emirates, numerous landslides occurred in Ras Al Khaimah after heavy rains in December 2017 and December 2019. The use of advanced radar remote sensing techniques such as Interferometric Synthetic Aperture Radar (InSAR) makes it possible to measure small ground deformations, which generally precedes a landslide event, with centimetric accuracy. The aim of this study is to measure the surface displacement at Ras Al Khaimah using the InSAR technique and to relate it to different factors such as geology, topography, man-made structures and precipitation in order to locate vulnerable areas and to better understand the surface dynamics. Both the data and the processing software used in the study are available free of charge on the internet, which guarantees a completely free production chain: the SAR data is provided by the Sentinel-1 satellite and the SNAP software is provided by the European Space Agency (ESA). This technique can be further used to regularly monitor the ground movement, which can greatly help predict landslides before they occur and prevent their negative impacts in the future. The results obtained will be communicated to decision-makers to help find effective solutions in infrastructure management.