DInSAR and topographic techniques applied to study the Tazones Lighthouse landslide (N Spain)

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Ground displacements associated to landslides can be analysed by means of geological, geotechnical, topographic and remote sensing techniques. In this work different classical topographic techniques are combined with a satellite based remote sensing technique: Differential SAR Interferometry (DInSAR). The topographic techniques provide precise measurements on a set of points strategically located for each landslide. The DInSAR technique provides a more opportunistic set of points, usually denser than topographic techniques, providing key information on the area of influence of the movement and its potential impact on the surroundings. The combination of both approaches provides a complementary set of measurements useful to properly understand the landslide mechanics. The area of study is Tazones Lighthouse sector (43° 32' 54''N, 5° 23' 57''W), located on a coastal cliff in north Asturias (N Spain), where there is an important active mass movement.

The used procedure consisted in the following steps: a) Processing of Envisat ASAR satellite data from 2002 to 2012 to obtain the deformation velocity map of the zone of interest thorough the ESA G-POD service (European Space Agency Grid Processing On Demand); b) Processing of the period 2014-2019 with Sentinel-1 data to obtain the Deformation time series and the deformation velocity map with the PSIG software (developed by the Geomatics Division of the CTTC); c) Integration, combination and comparison by a Geographical Information System (GIS) of the satellite results with topographic data obtained from 2018 to 2019 by means of standard techniques (theodolite, feno survey markers and control points); d) Analysis and interpretation of the results taken into account geological-geomorphological data available.

The results of this study show different velocity ratios in the Area of Interest (AoI), from mm/year to m/year, which are consistent with the ground measurements. Therefore, the work
demonstrated the potentials of combining different geodetic techniques to infer information about landslides processes and the usefulness of the DInSAR for the control of the mass movement, whose fast evolution makes it difficult the topographic work due to the changes in the relief and the loss of several feno survey markers.