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Adaptive InSAR combined with surveying techniques for an improved characterisation of active landslides (El Portalet)

Javier Duro (1), David Albiol (1), Francisco Sánchez (1), Gerardo Herrera (2), Juan Carlos García Davalillo (2), Jose Antonio Fernandez Merodo (2), Paolo Allasia (3), Piernicola Lollino (3), and Andrea Manconi (3)

(1) ALTAMIRA INFORMATION, Barcelona, Spain (javier.duro@altamira-information.com), (2) Geohazards InSAR laboratory and Modeling group, Departamento de Investigación y Prospectiva Geocientífica. Instituto Geológico y Minero de España, Madrid, Spain, (3) Consiglio Nazionale delle Ricerche, Istituto di Ricerca per la Protezione Idrogeologica, Torino/Bari, Italy

InSAR and the Persistent Scatterer Interferometry (PSI) are well established techniques for monitoring urban and rural areas. Besides the large number of available SAR data in the past, the current and forthcoming space-borne SAR sensors offer the possibility of selecting the optimal acquisition configuration (wavelength, resolution, incidence angle, etc.) for each application. However, optimal data takes are not always possible and/or the processing area is difficult to analyse under an InSAR point of view. In such situations, additional and adaptive InSAR developments combined with other surveying techniques provide consistent solutions that meet the requirements of different application cases

This work presents an advanced InSAR processing adapted for an active slow deformation landslide in a mountainous area. The presentation will show the benefits of applying advanced and adaptive filtering strategies for improving the InSAR quality in highly decorrelated environments. The availability of Artificial Corner Reflectors over the area of interest enables to tune the filtering procedure and thus maximize the detection and exploitation of natural targets (bare soil, roads, rocks) as measurement points while preserving the phase characteristics over individual and punctual targets (building corners, poles). The new results will be evaluated in terms of final density and quality of measurement points that can be retrieved. The results will show that a very high density of measurements improves the detection of the deformation gradients and its perimeters resulting in a more accurate characterization of the landslide area.

The area of study is El Portalet, an active slow deformation landslide area in Central Spanish Pyrenees. During many years the slope of interest has been monitored with several surveying techniques like DGPS, extensometers, inclinometers, GB-SAR and InSAR jointly with an extensive geological interpretation.

Currently, in the frame of the FP7 Project LAMPRE, these surveying techniques have been complemented with 3D modelling, Artificial Corner Reflectors and a real-time automatic inclinometer. The technical developments of the project show the potential of combining remote and in-situ measurements with advanced geomechanical models to better characterise and understand landslide behaviour. Some preliminary results of this combination of different technologies will be shown in the last part of our presentation.