EGU22-9194
https://doi.org/10.5194/egusphere-egu22-9194
EGU General Assembly 2022

The importance of InSAR data post-processing for the interpretation of geomorphological processes

Marta Zocchi[1], Benedetta Antonielli[1], Roberta Marini[1], Claudia Masciulli[1], Gianmarco Pantozzi[2], Francesco Troiani[1], Paolo Mazzanti[1,2], and Gabriele Scarascia Mugnozza[1]
[1]Sapienza University of Rome, Department of Earth Sciences, Piazzale Aldo Moro, 5, 00185 Rome, Italy (marta.zocchi@uniroma1.it)
[2]NHAZCA S.r.l., Via Vittorio Bachelet, 12, 00185 Rome, Italy

A-DInSAR (Advanced Differential Synthetic Aperture Radar Interferometry) is widely acknowledged as one of the most powerful remote sensing tools for measuring Earth's surface displacements over large areas, and in particular landslides. The Persistent Scatterer Interferometry (PS-InSAR or PSI) is a common A-DInSAR multitemporal technique, which allows retrieving displacement measurements with sub-centimetric precision. Characterization and interpretation of landslides can greatly benefit from the application of A-DInSAR post-processing tools, especially when extremely slow-moving phenomena are not detectable by classical geomorphological investigations, or when complex displacement patterns need to be highlighted. Detailed representations of the spatial and temporal evolution of the processes provide useful constraints during the planning stages of reconstructions and for land use purposes.
The present study is part of a broader national project, focused on updating and monitoring landslide-prone slopes interacting with urban centres in the Central Apennines (Italy), by using both geomorphological and A-DInSAR analysis. Therefore, although field surveys permitted the systematic updating of the available landslide inventories, in most cases, clear indications of displacement were outlined only by the SAR interferometry results. In this regard, the preliminary results of the ongoing research focus on specific post-processing analyses of interferometric data performed in the study area.
A specific PS-toolbox software, developed by NHAZCA S.r.l. as a set of post-processing plugins for the open-source software QGIS, was specifically designed to enhance spatial and temporal deformation trends of the PSI results, as well as for visualizing the differences between multi-satellite datasets. Moreover, the PS-toolbox allowed depicting subtle surface patterns within the landslide area, shedding light on kinematics and style of activity of slope instabilities.
In complex morphological conditions, as the Apennines mountainous regions, the geometric distortions and the site coverage percentage can lead to a lack of information. Therefore, we compared the coverage of PSs and the accuracy of the surface velocity maps produced using different InSAR tool packages on both Sentinel-1 and COSMO-SkyMed scenes. Thus, the comparison of the resulting datasets allowed their validation in terms of measured displacements and reliability for further processing.