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A microwave monitoring service for the study of the Stromboli volcano deformation

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In this paper, we present the activities relevant to the microwave monitoring of the Stromboli volcano ground deformation, performed by IREA-CNR (Institute for the Electromagnetic Sensing of the Environment) and UNIFI (University of Florence) as Centres of Competence for the Italian Civil Protection Department.

The availability of Synthetic Aperture Radar (SAR) system provides, among several techniques, accurate information on the volcano morphology and deformation, thus allowing us to understand the on-going volcanic changes. In this work, we present the results of a back-analysis (from 2015) of the volcano behaviour in terms of ground deformation and an insight on the volcano crisis occurred from July 3 2019, by using Differential Interferometry SAR (DInSAR) measurements.

The generated DInSAR results are both satellite and ground based. In particular, we show the displacement time series obtained with Sentinel-1 data acquired from March 2015 to October 2019 over the whole island and from ascending and descending orbits, and the displacement estimated with a Ground-Based SAR placed for the Sciara del Fuoco and summit craters sensing.

Moreover, the combination of the deformation measurements retrieved with both monitoring systems, which are characterized by independent acquisition geometries, allowed us to partially reconstruct a 3D deformation field of Sciara del Fuoco area.

Finally, we show the preliminary result of a test about an operational monitoring service based on new methodologies for the processing of airborne SAR data, aimed at evaluating its relevance for Civil Protection purposes in volcanic risk context.

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