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SAR4Volcanoes: an international ASI funded research project on volcano deformation through new generation SAR sensors

E. Sansosti (1), S. Pepe (1), G. Solaro (1), F. Casu (1), P. Tizzani (1), V. Acocella (2), J. Ruch (2), A. Nobile (2), G. Puglisi (3), F. Guglielmino (3), and S. Zoffoli (4)

(1) IREA, National Research Council, Italy (sansosti.e@irea.cnr.it), (2) University of Roma Tre, Roma, Italy (acocella@uniroma3.it), (3) Osservatorio Etneo - INGV, Catania, Italy (giuseppe.puglisi@ct.ingv.it), (4) Italian Space Agency (ASI), Roma, Italy (simona.zoffoli@asi.it)

Volcano deformation monitoring is crucial to understand how magma emplaces, propagates and erupts. Therefore, volcano deformation research projects are particularly important opportunities to improve our understanding of volcano dynamics.

SAR4Volcanoes is a 2-year research project funded by the Italian Space Agency (ASI) within the framework of a cooperation agreement with the Japan Aerospace Exploration Agency (JAXA). It focuses on volcano deformation analysis through Differential SAR Interferometry (DInSAR) techniques by means of COSMO-SkyMed and ALOS data, through the joint use of L-band and X-band SAR data. It also aims to the identification of methods and techniques to support decision making in emergency cases.

Main target volcanoes in the projects are Etna, Vesuvio, Campi Flegrei and Stromboli (Italy) and Sakura-jima and Kirishima (Japan). Secondary target volcanoes include recently or currently erupting volcanoes, as El Hierro (Spain), Nabro (Ethiopia) and Galapagos volcanoes (Ecuador).

Since the project kickoff (July 2011) a large number of COSMO-SkyMed data has been acquired at these volcanoes; in some cases, the acquisitions are available almost at every satellite orbit, with an average interval down to 4 days.

On these premises, the project represents an important opportunity to: (1) collect a significant amount of X-band data on active and erupting volcanoes and (2) study surface deformation to understand magma dynamics in different volcanic settings.

We will present preliminary results on the ground deformation analysis of the main and secondary target volcanoes. In particular, target volcanoes without a pre-project archive are analyzed using single deformation maps, while those with archives are analysed through a time series approach, based on the SBAS technique.