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Development and testing of an automated High-resolution InSAR volcano-monitoring system in the MED-SUV project

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Volcanic unrest which produces a variety of geological and hydrological hazards is difficult to predict. Therefore it is important to monitor volcanoes continuously. The monitoring of active volcanoes requires the reliable measurement of surface deformation before, during and after volcanic activities. Besides the improvements of the understanding of geophysical processes underlying the volcanic systems of Vesuvius/ Campi Flegrei and Mt. Etna, one of the main goals of the MED-SUV (MEDiterranean SUpersite Volcanoes) project is to design a system for automatically monitoring ground deformations over active volcanoes. Space-borne synthetic aperture radar (SAR) interferometry (InSAR), persistent scatterer interferometry (PSI) and small baseline subset algorithm (SBAS) provide powerful tools for observing the surface changes with millimeter accuracy. All the mentioned techniques address the challenges by exploiting medium to large SAR image stacks. The generation of interferometric products constitutes a major effort in terms of processing and planning. It requires a high degree of automation, robustness and quality control of the overall process. As a consequence of these requirements and constrains, the Integrated Wide Area Processor (IWAP) developed at DLR is introduced in the framework of a remote sensing task of MED-SUV project. The IWAP has been conceived and designed to optimize the processing workflow in order to minimize the processing time. Moreover, a quality control concept has been developed and integrated in the workflow. The IWAP is structured into three parts: (i) firstly, preparation of an order file containing some configuration parameters and invokes the processor; (ii) secondly, upon request from the processor, the operator performs some manual interactions by means of visual interfaces; (iii) analysis of the final product supported by extensive product visualization. This visualization supports the interpretation of the results without the need of direct interaction with the data.