Geophysical Research Abstracts,
Vol. 11, EGU2009-9193, 2009
EGU General Assembly 2009

ASI-Volcanic Risk System (SRV): a pilot project to develop EO data processing modules and products for volcanic activity monitoring, first results.

M. Silvestri (1), M. Musacchio (1), M.F. Buongiorno (1), L. Dini (2), and the ASI-SRV Team
(1) INGV, CNT, rome, Italy (malvina@ingv.it), (2) ASI Centro di Geodesia, Matera, Italy

The Project called Sistema Rischio Vulcanico (SRV) is funded by the Italian Space Agency (ASI) in the frame of the National Space Plan 2003-2005 under the Earth Observations section for natural risks management. The SRV Project is coordinated by the Istituto Nazionale di Geofisica e Vulcanologia (INGV) which is responsible at national level for the volcanic monitoring. The project philosophy is to implement, by incremental versions, specific modules which allow to process, store and visualize through Web GIS tools geophysical parameters suitable for volcanic risk management. The ASI-SRV is devoted to the development of an integrated system based on Earth Observation (EO) data to respond to specific needs of the Italian Civil Protection Department (DPC) and improve the monitoring of Italian active volcanoes during all the risk phases (Pre Crisis, Crisis and Post Crisis). The ASI-SRV system provides support to risk managers during the different volcanic activity phases and its results are addressed to the Italian Civil Protection Department (DPC). SRV provides the capability to manage the import many different EO data into the system, it maintains a repository where the acquired data have to be stored and generates selected volcanic products. The processing modules for EO Optical sensors data are based on procedures jointly developed by INGV and University of Modena. This procedures allow to estimate a number of parameters such as: surface thermal proprieties, gas, aerosol and ash emissions and to characterize the volcanic products in terms of composition and geometry. For the analysis of the surface thermal characteristics, the available algorithms allow to extract information during the prevention phase and during the Warning and Crisis phase. In the prevention phase the thermal analysis is directed to the identification of temperature variation on volcanic structure which may indicate a change in the volcanic activity state. At the moment the only sensor that shows good technical characteristics for the prevention phase is the ASTER sensor (90 m pixel) on NASA satellite TERRA. The product regarding the Crisis phase is mainly finalized to the estimation of the effusion rate for active lava flows, the algorithms for this product are well consolidated and could be applied to the low spatial resolution space sensors (eg. AVHRR, MODIS) and to high spatial resolution space sensors (eg. Hyperion, ASTER). A further class of products regards the analysis of degassing plumes and eruptive clouds. The analysis of the emitted gas species from degassing plume is usually performed trough ground networks of instruments based on the spectral behaviour of the gas species, although many volcanoes in the world do not have such permanent networks. The SRV system will produce information on the concentration and flux of sulphur dioxide (SO2) water vapour and volcanic aerosol optical thickness by means of ASTER, MODIS and HYPERION data on Etna test site. The analysis of ash clouds will be made by means of already consolidated procedures which uses low spatial resolution sensors with an high revisit time (eg. AVHRR, MSG, MODIS). For the Post Crisis phase the required products will be obtained through classification algorithms and spectral analysis operated by the scientific personnel of INGV and introduced in the system repository after the use of modules. The processing modules for EO RADAR sensors data for ground deformation measurement via Differential Interferometric SAR (DInSAR) techniques is performed by IREA-CNR. The selected test sites are Etna, Vesuvius and Campi Flegrei caldera. In particular, ground deformation time series will be generated by using ERS and ENVISAT SAR data and via the application of the Small BAeline Subset (SBAS) technique. This algorithm has the advantage of being both simple and very effective; moreover, it allows an easy combination of multiplatform data, provided that the acquisition geometries of both platform are compatible.
In this paper the first results obtained by means of modules developed within the ASI-SRV project and dedicated to the processing of EO historical series are presented.