

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

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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. The ASI-SRV is devoted to the development of an integrated system based on EO data to respond to specific needs of the Italian Civil Protection Department (DPC) and improve the monitoring of Italian active volcanoes. The ASI-SRV provides support to the different volcanic activity phases risk management and its results are addressed by 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 products which will be functional to the phases described above.

The processing modules for EO Optical sensors data, are based on procedures mainly developed by INGV, University of Modena. This procedures allow to estimate a number of parameters which include: surface thermal properties, 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 presents 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 through 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.

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.