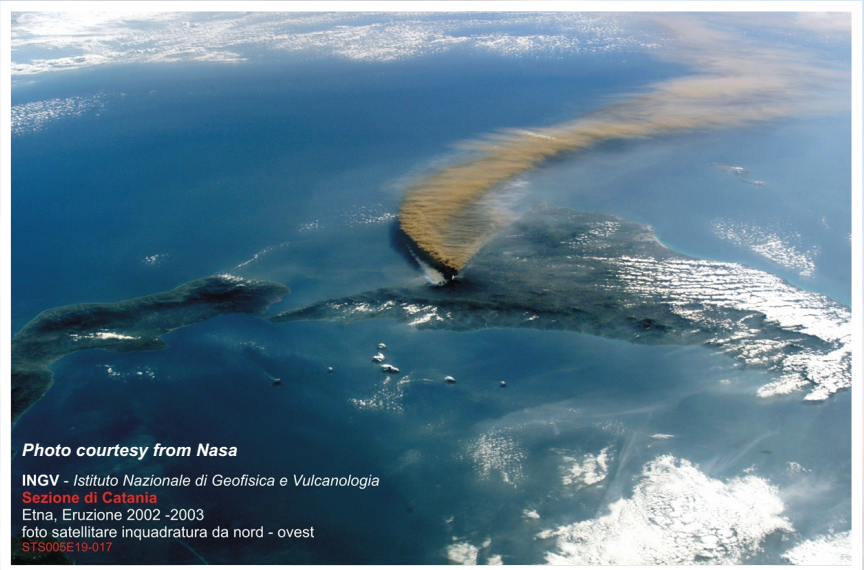


Volcanic Ash Monitoring and fOrecaSting between Sicily and Malta arEa and sharinG of the resUlts foR aviatiOn safety

During explosive activity, volcanoes release a large amount of silicate particles and gases that are mainly made up of water vapor, carbon and sulphur dioxides. This emission represents the most important natural source of pollutants in the atmosphere, affects terrestrial ecosystems and human health and influences the climate. The accidental encounter between volcanic ash and airplanes causes damage to control surfaces, windshields and landing lights, loss of visibility and failure of critical navigational and operation instrumentations and in the worst scenario, the failure of the engine. Moreover, volcanic ash deposited on the ground cause respiratory problems, eye injuries and skin irritations, damage to crops, roads and infrastructures.



One of the most active volcanoes in the world is Mt. Etna, in Italy. Explosive activity occurs from the central craters and from fractures opened up along the volcano flanks. In the last two decades the number of explosive events has increased, making Etna an extraordinary natural laboratory for testing new instruments and validating volcanic ash dispersal models. During its frequent explosive episodes, volcanic plumes have risen up to several kilometers above the summit craters and volcanic ash plumes have also reached the Maltese islands, 100 km south of Sicily.

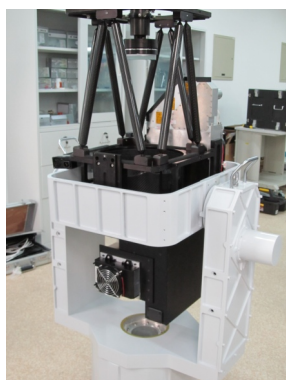
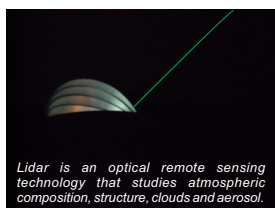
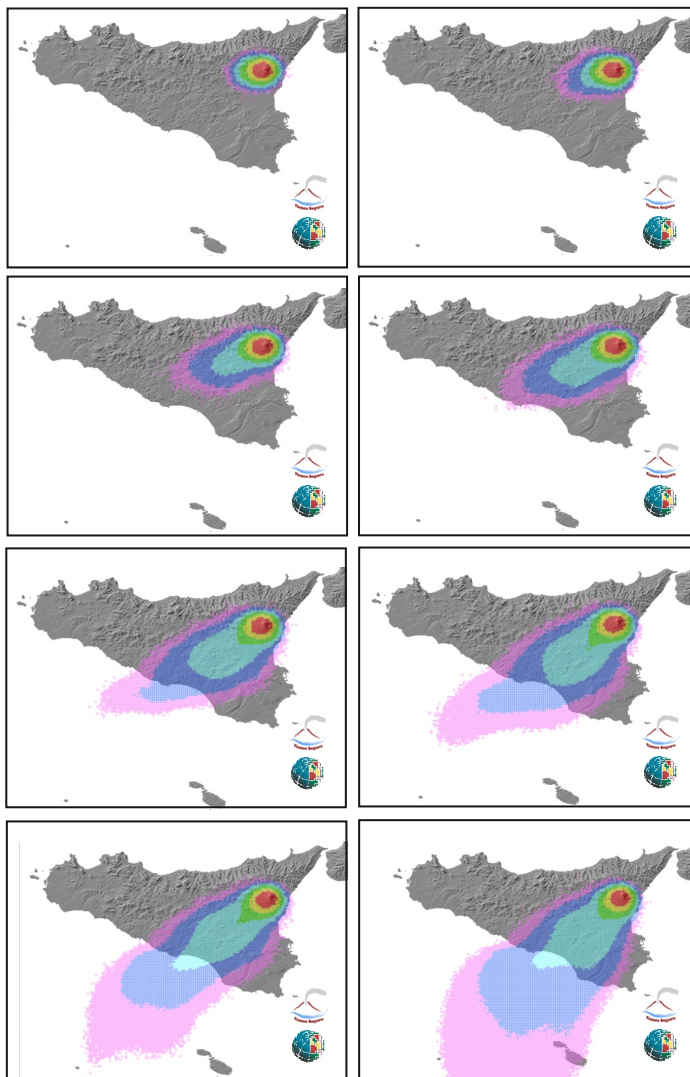


In order to reduce the impact that Etna explosive activity has in the area between Sicily and Malta, a new research project VAMOS SEGURO (Volcanic Ash Monitoring and ForecaSting between Sicilia and Malta arEa and sharinG of the resUlts foR aviatiOn safety) has been funded by Programma di Cooperazione Transfrontaliera Italia-Malta 2007-2013, A1.2.3-62, Obiettivo Specifico 2.3). The project is a cooperation among The Istituto Nazionale di Geofisica, Osservatorio Etneo, lead partner of the project, the Istituto Nazionale di Astrofisica, Comune di Montedoro and the Physics Department of the University of Malta. The goals of the project are the acquisition of new data retrieved by instruments that can detect in real time the presence of volcanic ash between Sicily and Malta in real time; the laboratory analysis of the collected data, a daily forecasting of the deposit and plume dispersal produced; model validation through comparisons with data retrieved by instruments.

The VAMOS SEGURO project provides an automatic system for monitoring and forecasting of volcanic ash dispersal between Sicily and Malta in the case of an Etna eruption. New instruments have been installed both in Sicily and at the University observatory facility at Giordan lighthouse and at Xewkija, Gozo. This station comprises monitors for Carbon Monoxide and Dioxide (CO and CO₂), Sulphur Dioxide (SO₂), Water Vapour (H₂O), volcanic ash and meteorological stations. Moreover, an innovative transportable scanning lidar system, designed and realized by CNISM (Consorzio Nazionale Interuniversitario per le Scienze Fisiche della Materia), will be operated mainly from two suitable sites, Montedoro (Caltanissetta) in the center of Sicily and at Serra La Nave, 7 km away far from the Etna summits. The lidar instrument is able to detect aerosol layers, estimate the column height and give a 3D vision of volcanic plumes if it has scanning capabilities. The polarization lidar technique is also particularly suited to distinguish volcanic ash from liquid components in volcanic plumes. At Etna, a scanning lidar system has already been tested to analyze volcanic plumes. Data analysis has allowed identifying of the volcanic plume region and to estimation of ash mass concentration, crucial information for preventing air traffic accidents. High resolution camera and binoculars also enable recording of the eruptive phenomena while laboratory instruments allow the analysis of volcanic ash particles collected on the ground during explosive events. The automatic forecasting system simulates the region affected by the volcanic ash plumes in case of an Etna eruption on a daily basis. Every day an automatic system downloads weather forecasts from meteorological mesoscale models, runs the PUFF-parallel model, plots hazard maps of volcanic ash dispersal and deposition for certain scenarios and publishes the results on the project's web-site www.ct.ingv.it/vamosseguro. Warning messages will be issued during the main eruptive events and with the support of the Malta International Airport Meteorological Office they will be transmitted to the competent Civil Authorities and Catania and Malta airports.

The VAMOS SEGURO's project part-financed by the European Union Regional Development Fund (ERDF) (Co-financing rate 85% EU Funds; 15% National Funds), will provide rapid responses during volcanic emergencies from Etna volcano and drastically reduce the risks from volcanic ash in the Mediterranean area.

Volcanic Ash forecasting between Malta and Sicily



A new prototype of LIDAR realized ad hoc for the VAMOS SEGURO project by CNISM in collaboration with the University of Naples.

Simona Scollo: project coordinator e-mail: simona.scollo@ct.ingv.it

Simona Scollo, Mauro Coltelli, Michele Prestifilippo, Gaetano Spata
Istituto Nazionale di Geofisica e Vulcanologia, Osservatorio Etno

Giuseppe Leto
Istituto Nazionale di Astrofisica, Catania

Federico Messana
Sindaco di Montedoro

Raymond Ellul, Francelle Azzopardi, Martin Saliba
Physics Department, University of Malta

Joseph Schiavone
Malta International Airport Meteorological Office, Malta

Antonella Boselli, Gianluca Pisani, Nicola Spinelli, Xuan Wang
CNISM, University of Naples, IMAA-CNR and SPIN-CNR



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