A tool for mapping the evolution of a lava field through the Etna video-surveillance camera network

Maria Marsella[1], Peppe J.V. D'Aranno[1], Roberto De Bonis[1], Carla Nardinocchi[1], Silvia Scifoni[1], Marianna Scutti[1], Alberico Sonnessa[1], Wissam Wahbeh[1], Emilio Biale[2], Mauro Coltelli[2], Emilio Pecora[2], Cristina Proietti[2]

[1]*SurveyLab S.r.l. Spin Off of Sapienza - Università di Roma, Roma, Italy*
[2]*Istituto Nazionale di Geofisica e Vulcanologia, Sezione di Catania - Osservatorio Etneo, Catania, Italy*

In active volcanic areas it is often difficult carry out direct surveys during an eruption, remote sensing techniques based on airborne/satellite platforms and ground-based sensors have remarkable monitoring potentialities in terms of safety and observation capability. In addition, the recent development of high resolution digital cameras, laser scanners and SAR instruments have improved the ability to obtain reliable measurements for modelling the evolution of effusive and explosive eruptions by following the rate of advancement of a lava flow or the dispersal of a volcanic plume. In order to collect data at an adequate level of accuracy and frequency it is not possible to exclusively rely on airborne or satellite methods and it is necessary to carry out measurements using also remote sensing instruments operating on the ground. Among the other techniques, the use of a simplified photogrammetric approach based a video-surveillance camera network represents a straightforward alternative for rapid mapping in active volcanic areas. Therefore a procedure for optimizing and extending the observational capability of the Etna NEtwork of Thermal and VIsible cameras (NETVIS) for systematically monitoring and quantifying surface sin-eruptive processes was implemented. The activity included also the extension of the permanent video-surveillance network by installing additional mobile stations. A dedicated tool for automatic processing of image datasets was developed and tested in both simulated and real scenarios to obtain a time series of digital orthophotos for tracking the evolution of a lava flow emplacement. The developed tool was tested by processing images acquired by the Etna_NETVIS sensors, in particular from Monte Cagliato thermal camera, during the 2011 paroxysmal episodes of the New South East Crater that poured lava flows in the Valle del Bove.

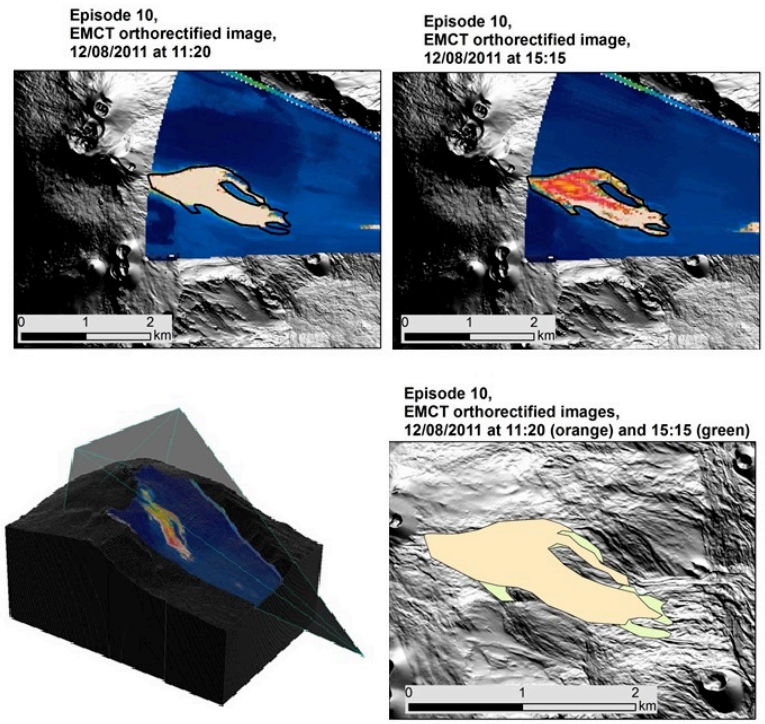

Figure 1. Digital orthophotos obtained using NETVIS tool. Thermal images acquired by the Etna_NETVIS sensor Monta Cagliato camera (episode 2011).