

Calibration procedures and measurement tests of a multiparametric apparatus for real-time observations of aerosol optical and microphysical properties at ETNA (Italy)

The VULCAMED project, developed under the National Operational Programme “Research and Competitiveness” 2007–2013, aimed to increase the observative capability of strategic relevance research infrastructures in the volcanological research domain. In the frame of the VULCAMED project an innovative lidar system was developed. The lidar was firstly designed to make elastic measurements in the UV (355nm) and IR (1064/1530nm) spectral regions. Successively it has been upgraded adding the elastic channels in the visible (532nm), the N₂ Raman channels at 386 nm and 607 nm and the H₂O Raman channel at 407nm, with the aim to make it at the state of the art. Moreover, parallel and perpendicularly polarized components (P and S) of the elastic signals at 355 nm and 532 nm have been selected in order to retrieve information about the aerosol shape and distinguish water vapor from volcanic ash in the plumes emitted during volcanic activity. The calibration methods and results of VULCAMED have been presented, including Rayleigh fit, depolarization calibration, overlap correction, multi-wavelength channel calibration, water vapor mixing ratio test and particle size distribution. In order to verify the accuracy of the measured parameters the comparison with radiosonde and sun-photometer has been done. The results show that VULCAMED has the ability to measure real-time optical and microphysical properties of volcanic aerosol.

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