Multi-temporal analysis of radiance acquired by ASTER and Landsat 8 on Mt. Etna volcano

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Temperature estimations of active lava flows are crucial to characterize volcanic eruptions and better understand their dynamic and evolution. EO data acquired by satellites, in the SWIR-TIR spectral range, allows to retrieve active lava flows temperature applying specific algorithms (e.g. TES). In particular, radiances emitted by the High Temperature targets, acquired by multispectral space sensors, represent the input parameter for temperature estimation methods; their incertitude influences the accuracy of the temperature retrieval. In the present work, a multi-temporal analysis of radiances acquired from different spaceborne imaging sensors, at several wavelengths in the SWIR-TIR spectral range, has been carried out in order to perform a cross-comparison of data and to estimate the error associated with the radiance of high temperature targets. We considered and analysed radiance data recorded by the Advanced Spaceborne Thermal Emission and Reflectance radiometer (ASTER) and the Landsat 8 Thermal InfraRed Sensor (TIRS) on Mt. Etna volcano in the last twenty years. ASTER, launched on December 1999, is mainly used to study surface temperature and emissivity with a relatively high spatial resolution; ASTER measures radiance in the Visible and Near-InfraRed (0.52-0.86 μm) and Thermal InfraRed ranges (8.12 to 11.65 μm) with a pixel size of 15 m and 90 m, respectively, and a revisit time of 16 days. Landsat 8 is the most recent satellite of NASA Landsat program launched on February 2013. Its payload consists of two sensors: the OLI (Operational Land Imager) and the TIRS with two thermal bands. Specifically, daytime acquisitions over Mt. Etna volcano by ASTER from 2011 up to now and by Landsat 8 from 2013 up to now, are considered in the present study; the channels at 10.6 μm of both instruments are mainly investigated. The goal of the study is to analyse the migration of the thermal activity on Mt. Etna summit area.