Characterization of Mount Etna volcanic superficial materials based on their spectral properties

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Field spectra analyses of volcanic materials are presented and discussed. Data were acquired during a spectroradiometric field survey on Mt. Etna. Young fall-out deposits and the older lava flows have been spectrally sampled and correlated to grain size in the case of tephra flow. A number of sites in Mount Etna area characterised by different surface materials, were selected. Fall-out deposits produced by 2002-03 explosive activity, at different distance from the new vents were sampled and spectrally characterized. The spectral analysis shows that tephra flows are characterized by very low reflectance values; they are spectrally constant everywhere, besides grain size and composition, and they are identifiable from other surface materials. Lava fields of a'ā and minor pāhoehoe units have higher reflectance values, even though the spectral characterisation of the older lava flows must take into account weathering products and vegetation coverage. Also at the observation scale of the Lidar (footprint ∼1 m), the tephra are characterised by very low values of backscattered signal (Lidar intensity).

Resampling of collected spectra to the available satellite remote sensing instruments spectral resolution shows the possibility to differentiate the surface cover from satellite perspective using the reflectance properties of the volcanic materials.

Preliminary maps of ash and tephra fall-out using satellite hyperspectral sensor and airborne Lidar are presented.