



Improvements of the volcanic plume removal (VPR) approach for the real-time ash and SO₂ satellite retrievals

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The Volcanic Plume Removal (VPR) procedure (Pugnaghi et al., 2013; Guerrieri et al., 2014) estimates the plume transmittances at three Thermal Infrared bands: 8.7, 11 and 12 micron assuming a simplified atmospheric model which neglects the atmosphere above the plume. From the three transmittances, the ash optical depth, the effective radius and the SO₂ abundance are computed. An improved version of the VPR that takes into account both the part of atmosphere above the plume and the thermal radiance scattered in the line of sight of the sensor will be presented. These contributions increase significantly when the plume is highly scattering and the layer of atmosphere above the plume is quite thick. Their cumulative effect is obtained by means of two linear relationships depending on a unique variable: the Planck emission at the mean plume temperature. First a modified plume emission which accounts for the considered effects is computed, and then the transmittances are obtained by the ratio: (measured radiance minus modified plume emission) divided by (plume removed radiance minus modified plume emission).