Geophysical Research Abstracts
Vol. 17, EGU2015-9584, 2015
EGU General Assembly 2015

Space-based thermal monitoring of the 2014 Holuhraun eruption (Bárðarbunga, Iceland) using MIROVA

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MIROVA (Middle InfraRed Observation of Volcanic Activity) is new volcanic hot-spot detection system, based on the analysis of IR data acquired by the MODIS sensor (Moderate Resolution Imaging Spectroradiometer). Since August 2014 MIROVA is operative over Icelandic volcanoes allowing to detect, locate and measure the heat radiated by the Holuhraun eruption and related lava field. Thermal maps and Volcanic Radiative Power (VRP) estimates are provided within 1-4 hours from each satellite overpass thus enabling to track the ongoing effusive eruption on a daily basis. Due to the elevated geographical latitude of Iceland, the image acquisition of the system has a quite high frequency (6 to 10 images per day), making MIROVA a real monitoring tool that has been enthusiastically embraced by the Icelandic Meteorological Office within its daily monitoring activity.
Here we present the first results of this thermal monitoring that allowed us to (i) track the initial advance of the lava flow; (ii) identify a decreasing trend of thermal output during the first 4 months of the eruption, (iii) recognise active areas within the growing and cooling lava field and (iv) identify a potential correlation between the active degassing lava field and the SO_2 ground concentration.
The above aspects are presented and discussed with special emphasis to the implications for lava discharge rates estimation as well as to the identification of the lava field as the major source of SO_2 measured at ground level all over the country. This last assumption is supported by sensitivity studies performed with the CALPUFF dispersal code indicating that only SO_2 emitted at low levels (below $\sim$500 m above ground level) has the potential to significantly impact air quality.