Geophysical Research Abstracts
Vol. 18, EGU2016-16308, 2016
EGU General Assembly 2016

Effusion rates, volumes and emplacement style using MODIS MIR data: the 2014-15 Holuhraun eruption (Bárðarbunga, Iceland) tracked by MIROVA

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MIROVA (Middle InfraRed Observation of Volcanic Activity) is a new volcanic hot-spot detection system, based on the near-real time analysis of infrared data acquired by the MODIS sensor (Moderate Resolution Imaging Spectroradiometer). During the Holuhraun (Bárðarbunga) eruption, which lasted from the end of August 2014 to February 2015, MIROVA has been used to detect, locate and measure the heat radiated by the evolving lava field. After peaking during the first two week of activity, the eruption produced a slow but persistent decay of MIR-derived thermal flux, that was coupled with a gradual transition from channel- to tube-fed dominated emplacement style. This was coupled with a modification of the principal growing process of the flow field that shifted from lengthening to widening and finally to thickening.
Despite the evident evolution of the emplacement style our results suggest that the decreasing trend of the thermal flux was essentially controlled by the slow reduction of the effusion rates, rather than by the increasing insulation of the flow field. In fact, we provide evidence that the changing emplacement style, from channel- to tube-fed activity , did not affected (substantially) the area of radiating lava surface, but had simply a strong impact in transporting the lava farther from the vent. This suggests that during the Holuhraun eruption, as well as during many other effusive eruptions, the MIR-derived radiant flux essentially mimic the trend of lava discharge rates, with only a minor influences due to the emplacement style.