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Thermography of volcanic areas on Piton de la Fournaise, Reunion Island : mapping surface properties and possible detection of convective air flow within volcanic debris

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We report on the detection of air convection in a couple of quasi circular cavities forming the 300 years old volcanically inactive cone of Formica Leo (Piton de la Fournaise, Reunion Island) [1]. Infrared thermal images of the cone have been acquired in 2006 from a hand held camera at regular time interval during a complete diurnal cycle. During night and dawn, the data display hot rims and cold centers. Both the conductivity contrasts of the highly porous soils filling the cavities and their 30˚ slopes are unable to explain the systematic rim to center temperature drop. Accordingly, this signal could be attributed to an air convection dipping inside the highly porous material at the center of each cavity, then flowing upslope along the base of the soil layer, before exiting it along the rims. Anemometrical and electrical data acquired in 2007 allow for the first time the direct detection of this air flow on the field: dipping gas velocities are measured at the center of the cone and self-potentials anomalies [2] generated by the humid air flow in the porous medium are detected. To quantify this process, we present 2D/3D numerical models of air convection in a sloped volcanic soil and a surface temperature evolving between day and night and taking into account elec-

trical phenomena created by the air flow. At this present stage, this work constitutes a first step to investigate the deep structure of the active caldera of Bory-Dolomieu. The detection of the air flow at the surface could be of paramount importance for the understanding of volcanic hazards of the Reunion volcano.

[1] Antoine et. al, submitted to G-Cubed

[2] Darnet, PhD (2003), Université Louis Pasteur