

Air-cooled volcanoes ? Exploration and modeling at Piton de la Fournaise volcano, La Reunion Island

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At Piton de La Fournaise volcano (La Reunion Island, Indian Ocean), there is no obvious surface manifestations of the hydrothermal system between eruptions. This phenomenon has been explained by the cooling of the volcano, induced by the important rain infiltrations within the structure. In this study, we propose that this highly permeable volcano is cooled by an intense air convection. To support this hypothesis, we study the air flow within a 50 m-large quiescent scoria cone located on the volcano from infrared, subsurface temperature, SP, anemometric, gravimetric, ground penetrating radar and ERT data. In particular, we determine the relationships between the thermal field and the electric field induced by the air flow within the cone, and we realize a 2-3D modeling of the convection in the porous medium. Finally, these relationships are used to propose that the entire volcano is cooled by air convection.

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