

## 'Thermal analysis of fractures at Cerberus, Mars : detection of air convection in the porous debris aprons

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We report enigmatic temperatures inside Cerberus Fossae. Indeed, the fractures are up to 40 K warmer than the surrounding plains during the night. Several temperature profiles exhibit a minimum occurring in the central part of the fractures. We investigate the potential causes of these temperature patterns from topographic (MOLA), visible (HiRise, MOC, HRSC, THEMIS-VIS) and thermal data (THEMIS-IR). We show that these enigmatic temperatures can not be explained neither by radiative phenomena associated to topography, nor by thermal effects linked to lithology variations inside the fracture. As passive models do not satisfactorily explain the temperature field, the consequences of air convection within the porous debris are explored using numerical simulations. We obtain an excellent agreement between the calculated and observed temperatures, considering high Darcy velocities, a condition which requires high permeabilities of the medium. This assumption is plausible, given the presence of boulders and coarse material documented by HiRise images.

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