



Accessing the Martian subsurface - Science return from the Heat Flow and Physical Properties Package (HP³)

M. Grott (1), L. Richter (2), T. Spohn (1) and M. A. Wieczorek (3)

(1) Deutsches Zentrum für Luft- und Raumfahrt, Institute of Planetary Research, Berlin, Germany, (2) Deutsches Zentrum für Luft- und Raumfahrt, Institute of Aerospace Systems, Bremen, Germany, (3) Institut de Physique du Globe de Paris, Saint Maur, France

The Heat flow and Physical Properties Package (HP³) is part of the Humboldt payload for ESA's upcoming ExoMars mission and consists of an instrumented mole system, a self-penetrating probe designed to penetrate up to 5 m into the martian regolith. This experiment will for the first time access the martian subsurface and allow for a depth resolved measurement of the physical, thermal, and electrical soil properties. From these measurements, the regolith thermal structure, density, stratigraphy and volatile content will be determined. Furthermore, the combination of these measurements will allow for a determination of the planetary heat flow, a key quantity quantifying the thermal state of the planet. We will show how the science output of the experiment would benefit from multiple realizations of the measurements at different landing sites and that the experiment should therefore also be considered as part of upcoming geophysical network missions. We will address the instrument measurement requirements and give an overview of how the proposed measurements will improve our knowledge of the martian thermal evolution, the characterization of the near surface layers and interior-surface interactions.