

Instrument capabilities of the HP³ Permittivity Probe

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ABSTRACT

In this work the capabilities of a bore-hole type permittivity sensor, originally developed for the ExoMars/Humboldt Station are presented. Electrical properties measurement techniques provide a vast amount of information about the local soil parameters, which are not restricted to electrical properties alone. One could also derive texture parameters like e.g. stratification or even density estimations.

As part of the HP³ (**H**eat-flow and **P**hysical **P**roperties **P**ackage) sensor suite the HP³-Permittivity Probe (PP) was initially intended to be on board the ExoMars Humboldt surface station. After the cancellation of the original ExoMars mission it was decided to continue with the development until a sufficient instrument maturity was achieved. In this perspective a huge number of laboratory measurements, testing the ability of the PP-instrument were performed. An extract of those measurements will be presented in this work.

In general PP is able to detect the electrical properties (i.e. electrical permittivity and conductivity) of its local environment in the frequency range of 4 to 20000 Hz during and after a penetration into the ground. The main focus in the laboratory work was given to the instruments capability to detect layered structures and local inhomogenities.

Therefore a set of meanwhile collected data of ground penetrations are presented. Additionally the instruments high sensitivity to the water content in a test material will be demonstrated.