



A compact thermal probe for applications in geosciences

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Based on the MUPUS thermal probe (part of the ESA Rosetta-Mission) we are developing a new complete system for near-surface thermal measurements under the name EXTASE (**EX**perimental **T**hermal probe for **A**pplications in **S**now research and **E**arth sciences) at the Institut für Planetologie.

The system consists of thermal probe(s), electronics and user software for applications in several disciplines of geosciences (e.g. soil science, snow research...). The thermal probes deploy an improved type of temperature sensor as well as an enhanced method for determining the thermal conductivity of a material. Another improvement is the design of the thermal probes where 16 sensors are placed in one probe, which diminishes the amount of work required significantly. Some of the planned or already realized applications are:

- Observation of temperature and thermal conductivity profiles in different materials (soil, snow,...) in the lab as well as under in-situ conditions in the field
- Snow and ice science (temperature and thermal conductivity profiles, avalanche research, heat flux...)
- Soil science (temperature and thermal conductivity profiles, heat flux, thermal conductivity as a measure for soil humidity, observation of the intrusion of the daily heat wave into the underground)
- Freezing and thawing behaviour of lakes (in the lab and natural environment)

- Observation of the solid state greenhouse effect in the lab (planetary science)
- Control of the heat flux during decomposition of waste deposits
- and many more

Since the completion of the hardware, several tests in different materials and environments have been made. Some exemplary results of these measurements are shown to illustrate possible applications of this new instrument for thermal measurements.