

## STUDY OF THE PHYSICAL PROPERTIES OF METEORITES USING MOBILE LABORATORY FACILITY.

T. Kohout<sup>1,2,3</sup>, T. Elbra<sup>1</sup>, L. J. Pesonen<sup>1</sup>, P. Schnabl<sup>2,3</sup>, S. Slechta<sup>2,3</sup>, <sup>1</sup>Division of Geophysics, Faculty of Science, University of Helsinki, Finland, e-mail: tomas.kohout@helsinki.fi, <sup>2</sup>Department of Applied Geophysics, Faculty of Science, Charles University in Prague, Prague, Czech Republic, <sup>3</sup>Institute of Geology, Academy of Sciences of the Czech Republic, Prague, Czech Republic.

**Introduction:** Physical properties of meteorites provide valuable information about the meteorite history and the meteorite parent bodies - asteroids. However, the meteorites represent valuable rare material and it is difficult to bring meteorites directly to the laboratory for scientific studies. Thus the **mobile laboratory facility** was prepared at Division of Geophysics, University of Helsinki in order to perform the research tour over the museums and collections in Europe and to measure the physical properties of meteorites in the presence of the curator using **harmless, non-destructive methods**.

**Instruments and methods:** During the meteorite research tour the measurement of bulk physical parameters (magnetic susceptibility, bulk and grain density, porosity and magnetic remanence) of meteorites was performed. According to the rare nature of meteorites only harmless, non-destructive methods were applied. The necessary instrumentation and methodology was prepared and tested in laboratory facilities at Division of Geophysics during the year 2004 and first half of year 2005.

The Hämäläinen TH-1 portable susceptibility meter with large (12 cm) coil was used for susceptibility measurements of bulk samples.

In order to determine the meteorite bulk and grain density as well as porosity the bulk and grain volume and mass must be measured. For bulk volume measurements the chemically inert tiny glass beads (20 – 50 µm) were used to replace liquids used in traditional Archimedean method. The mass was determined using digital balance.

The balance was always calibrated prior the measurements.

The grain volume was measured by Notari portable air pycnometer working at low pressures.

The magnetic remanence was measured using portable Schoenstedt PSM-1 remanence meter.

**The 2005 European meteorite research tour:** The first meteorite research tour was conducted in October 2005 using the mobile laboratory facility. During the tour the 6 member team visited 13 institutions in 8 countries across Europe and measured around 200 individual meteorite samples (fig. 1).

**Data application:** The results of the project are used to enhance existing database of physical properties of meteorites. The petrophysical parameters obtained on meteorites can be applied in rapid and harmless classification of meteorites [1], early Solar System history studies, data interpretation of planetary and asteroid space missions, in future sample return research and in asteroid mitigation efforts.

**References:** [1] Terho M. et al. 1993. *Studia Geophysica et Geodaetica*, 37, 65-82.



Figure 1: The team is performing meteorite measurements at Vilnius University, Lithuania.