



## Investigation of Planetary Surfaces with Acoustic Sounding

**C. Krause** (1), K.J. Seidensticker (1), L. Richter (2)

(1) DLR Institute of Materials Physics in Space, Linder Höhe, D-51170 Cologne, Germany,  
(2) DLR Institute of Planetary Research, Rutherfordstraße 2, 12489 Berlin, Germany

The analysis of mechanical vibrations may provide a new means to study the structure and properties of the surface layer of terrestrial planets and minor bodies like comets. Seismic sounding proved quite effective not only on Earth but also on the Moon (Apollo missions). The Comet Acoustic Surface Sounding Experiment (CASSE) [1] on the Rosetta Lander Philae will try to determine elastic parameters and the structure of the surface layer of the target comet. The combination of ground penetrating instruments as sounders like PLUTO (PLANetary Underground TOol) [2], developed at the DLR for the Mars Express lander Beagle 2, or MUPUS [3], a heat probe instrument also on Philae, as strong acoustic sources with CASSE-like receivers offers large advantages in increased signal strength, variation of acoustic pathways and effective use of resources. This combination might easier overcome the attenuation problem in dry Regolith and allow a 3D-tomography of the surface layer.

A project has been started at the DLR - Deutsches Zentrum für Luft- und Raumfahrt - to test the applicability of planetary penetration instruments as acoustic sources for analysing simulated surface layers under various environmental conditions. We will report on the first results to determine mechanical properties and the structure of surface layers, e.g. dry, wet or icy layers. We will also show how the seismic sensors can be used to locate the penetrating sounders.

References: [1] Seidensticker, K. J., Möhlmann D., Apathy I., Schmidt W., Thiel K., Arnold W., Fischer H.-H., Kretschmer M., Madlener D., Péter A., Trautner R. and Schieke S., SESAME - An Experiment of the Rosetta Lander Philae: Objectives and General Design, *Space Sci. Rev.*, 2007, accepted. [2] Richter, L., Coste P., Gromov V. V., Kochan H., Nadalini R., Ng T.C., Pinna S., Richter H.-E. and Yung K. L., De-

velopment and testing of subsurface sampling devices for the Beagle 2 lander, Planet. Space Sci., 50, 903-913, 2002. [3] Spohn T., Seiferlin K., Hagermann A., Knollenberg J., Ball A. J., Banasziewicz M., Benkhoff J., Gedomski S., Grygorczuk J., Hlond M., et al., MUPUS - a Thermal and Mechanical Properties Probe for the Rosetta Lander PHILAE, Space Sci. Rev., 2007, accepted