Geophysical Research Abstracts
Vol. 14, EGU2012-12831-1, 2012
EGU General Assembly 2012

Planetary Seismometers for the Moon, Mars and Asteroids

D. Mimoun (1), Ph Lognonné (2), S. Deraucourt (2), M. Urvoy (1), R. Zweifel (3), P. Mance (3), T. Garcia (4), O. Robert (2), T. Gabsi (2), S. Tillier (2), M. Wieczorek (2), T. Nébut (2), B. Lecomte (2), O. Pot (2), M. Bierwirth (5), and R. Roll (5)

(1) ISAE, Université de Toulouse , France (mimoun@isae.fr), (2) IPGP, Paris, France, (3) ETHZ, Zürich, Zwitzerland, (4) IRAP, Université de Toulouse , France, (5) MPS, Katlenburg-Lindau, Germany

In comparison to our knowledge of the interior of the Earth, and to the extensive data set acquired on the planets of our solar system, very little is known about the interior of telluric planets (except from what we know of the interior of the Moon since the Apollo missions). For example, in spite of the various missions to Mars, all we know about the interior (and therefore the history) of Mars has been deduced by indirect means: gravity field measurements, mean density computations and the absence of a magnetic field at planetary scale.

Planetary seismometers technology has been under development at IPGP since the late 1980s, in long-standing collaboration with ETHZ and then MPS. The first development (OPTIMISM) was done for the Mars'96 mission (launched). The current generation of planetary very broadband seismometers, which is proposed for Moon missions (JAXA's SELENE-2) but also for the current round of NASA Discovery Proposal (InSight mission) has design heritage from NetLander and ExoMars phase B, from which it incorporates component-level design and electronics. The instrument has successfully passed the ExoMars PDR, with an ESA evaluation at TRL >5. On the long term, our group focuses on future Lunar Network missions (such as Lunette, or Farside Explorer concepts) but also on future Mars Network missions. In addition, sounding the interior of asteroids would also provide unique and critical information about the early stages of terrestrial planet formation. Therefore we proposed for the BaSiX Discovery proposal a concept of short period deployable seismometer.

Flying a planetary seismometer would fill a longstanding gap in the scientific exploration of the solar system and would provide unique and critical information about the fundamental processes of terrestrial planets, as well as deep insights on their formation and evolution.