

## **Definition and archiving of ground-based observations in support of space missions**

A. Coustenis (1), M. Toplis (2), O. Grasset, C. Sotin (3), M. L. Khodachenko (4), K. Kossacki (5), J. Leliwa-Kopystynski (5), M. Küppers (6), M. Massironi (7), W. Schmidt (8), T. Siili (8,9)

(1) LESIA, Paris-Meudon Obs., 5, place Jules Janssen, 92195 Meudon Cedex, France, (2) CESR, Toulouse, (3) LPGN, Nantes, France, (4) IWF, Graz, Austria, (5) Univ. Warsaw, Poland, (6) MPG-MPS, Germany (7) CISAS, Padova, Italy (8) FMI, Finland, (9) NASA/GSFC, USA, ([Athena.coustenis@obspm.fr](mailto:Athena.coustenis@obspm.fr) / Fax: +33145077469 / Phone: +33145077720)

This science case was developed by the WG3&5 to induce and optimize the follow-up of space missions or to monitor a probe entry, in order to provide support in the case of failure, and help achieve science objectives. The space mission data need to be complemented by ground-based and space-borne observations that can help interpret the space mission return. Such coordinated observations were performed at the time of the Huygens descent in Titan's atmosphere and led to a JGR special issue publication (2006, in press). We should gather and archive all such observations to support space missions already existing or to come.

For this we would need to get the space mission data from Cassini-Huygens (both images and spectra), Venus Express, Mars Express and future missions (to Europa and Mercury for instance) and complete them with ground-based observations (spectra, images, radio data, radar,...) of Titan, Venus, Mars, Europa, Mercury with the HST, ISO, etc, as well as amateur observations, if possible, taken from 1990 on.

This applies to cometary, moon and planet surfaces/subsurfaces composition-structure. This would help among other with the target selections (comets, moons) and landing sites for SMART-1 (on the Moon).

There are specific needs for stereoscopic images of the Moon and other objects. Our study will assist in optimizing the Rosetta mission return. For Mercury we need to observe from the ground at the time of the Bepi-Colombo mission to cross-calibrate the mission data.

There are many examples of success from this additional input, as for instance with Cassini-Huygens (DWE- Channel C), Galileo, etc. For Titan there is a requirement for RADAR measurements of the whole surface during the extended Cassini mission. Also, assist with the interpretation of high-resolution DISR images in terms of surface activity and surface-atmosphere interactions

This involves in some cases techniques possible only from the Earth such as the VLBI

radio-tracking of a space mission with probe signal during entry or landing and a radar search for solid and liquid extents on moon surfaces.

We need to assure extended temporal monitoring to study diurnal or seasonal effects and complete planetary objects' lightcurves and derive insights on the evolution of their surface properties