Geophysical Research Abstracts
Vol. 17, EGU2015-7627, 2015
EGU General Assembly 2015

investigating with the CONSERT bistatic radar a potential permittivity gradient at the Philae Landing site on 67P/Churyumov-Gerasimenko

Valerie Ciarletti (1), Anny-Chantal Levassur-Regourd (1), Jeremie Lasue (2), Christoph Statz (3), Dirk Plettemeier (3), Wlodek Kofman (4), and Alain Herique ()

(1) LATMOS/IPSL;UVSQ;UMPC, Guyancourt, France (valerie.ciarletti@latmos.ipsl.fr), (2) IRPA, Toulouse, France, (3) technische Universität Dresden, Dresden, Germany, (4) IPAG, Grenoble, France

There has been, prior to the ESA Rosetta rendez-vous, no direct evidence about the structure of cometary nuclei. Approaching their internal structure is of major importance to better understand their accretion in the early solar system and their subsequent evolution processes. The successful Rosetta mission with the recent descent and landing of Philae on the nucleus of 67P/Churyumov-Gerasimenko on the 12th of November 2014 has provided for the first time in-situ data of the upper most importance to this matter.
With receivers and transmitters onboard both Rosetta and Philae, the CONSERT (Comet Nucleus Sounding Experiment by Radiowave Transmission) bistatic radar uses radiowaves at 90 MHz that have the ability to propagate through the nucleus between the main spacecraft and the lander. CONSERT preliminary data analysis should allow us to retrieve the permittivity and, if any, to point out changes in local properties of the nucleus.
In this paper, we specifically investigate the possible existence and impact of a local subsurface permittivity gradient over depths ranging from tens to hundreds of meters. Even if CONSERT's primary goal is to perform the tomography of the whole nucleus, the grazing angles configurations (where Rosetta is just below Philae's horizon and where the propagation mainely takes place in the near surface zone) provide the best configurations to study the effect of a potential near surface permittivity gradient beneath the lander.
Results of propagation simulations for graz-ing angles configurations showing the effect of such a gradient as well as preliminary comparison with experimental data collected in the same Rosetta/Philae configuration will be presented.

Acknowledgements: The research on the CONSERT experiment is supported by funding from the Centre National d'Etudes Spatiales (CNES) and the Deutsches Zentrum für Luft- und Raumfahrt (DLR). CONSERT was designed and built by a consortium led by IPAG UJF/CNRS (France), in collaboration with LATMOS (France) and MPS Gottingen (Germany).