Geophysical Research Abstracts, Vol. 8, 09258, 2006
SRef-ID: 1607-7962/gra/EGU06-A-09258

Implications of Mercury's surface composition on 3-D exosphere modelling

H. Lammer (1), H.I.M. Lichtenegger (1), C. Kolb (1), P. Dobnikar (2), V. Mangano (3), A. Mura (3), P. Wurz (4), A. Milillo (3), S. Orsini (3), K. Torkar (2)

(1) Space Research Institute, Austrian Academy of Sciences, Graz, Austria (helmut.lammer@oeaw.ac.at, herbert.lichtenegger@oeaw.ac.at, christoph.kolb@oeaw.ac.at), (2) Institute for Physics, University of Graz, Austria, (3) Istituto di Fisica dello Spazio Interplanetario, Consiglio Nazionale delle Ricerche, Roma, Italy, (4) (3) Physics Institute, University of Bern, Sidlerstr. 5, CH-3012 Bern, Switzerland

A better understanding of particle release processes from Mercury's surface is needed for planned exospheric and remote surface geochemical studies by the Neutral Particle Analyzer Ion Spectrometer sensors ELENA, STROFIO, MIPA and PICAM of the SERENA instrument on board of ESA's BepiColombo planetary orbiter MPO. We present a survey of potential surface analogues, which are based on laboratory studied Lunar surface regolith and hypothetical analogue materials as derived form experimental studies for Mercury's surface. The formation of the exosphere depend on various parameters, such as regolith porosity, binding energies and elemental fractionation of the surface minerals. We use the derived geochemical surface composition as an input for a 3-D exospheric model for studying whether the measurements of exospheric particles by the particle detectors is feasible along the MPO spacecraft orbit. We model energy and ejection angle distributions of the particles at the surface, with the emission process determining the actual distribution functions. Our model follows the trajectory of each particle by numerical integration until the particle hits Mercury's surface again or escapes from the calculation domain. Using a large set of these trajectories, bulk parameters of the exospheric gas are derived, e.g., particle densities for various atomic and molecular species. We present our first results of the 3-D simulations and discuss them in the frame of the mission objectives.