Geophysical Research Abstracts
Vol. 19, EGU2017-18580, 2017
EGU General Assembly 2017

Light scattering by planetary-regolith analog samples: computational results

Timo Väisänen (1), Johannes Markkanen (1), Edith Hadamcik (2), Anny-Chantal Levasseur-Regourd (2), Jeremie Lasue (3), Jürgen Blum (4), Antti Penttilä (1), Karri Muinonen (1,5)

(1) Department of Physics, Univ. of Helsinki, Finland, (timo.h.vaisanen@helsinki.fi), (2) UPMC (Univ. Pierre et Marie Curie), LATMOS/CNRS, France, (3) IRAP-CNRS, Univ. Toulouse, France, (4) Univ. of Braunschweig, Institute for Geophysics and Extraterrestrial Physics, Germany, (5) Finnish Geospatial Research Institute, National Land Survey of Finland

We compute light scattering by a planetary-regolith analog surface. The corresponding experimental work is from Hadamcik et al. [1] with the PROGRA2-surf [2] device measuring the polarization of dust particles. The analog samples are low density (volume fraction 0.15 ± 0.03) agglomerates produced by random ballistic deposition of almost equisized silica spheres (refractive index n=1.5 and diameter 1.45 ± 0.06 μm). Computations are carried out with the recently developed codes entitled Radiative Transfer with Reciprocal Transactions (R2T2) and Radiative Transfer Coherent Backscattering with incoherent interactions (RT-CB-ic). Both codes incorporate the so-called incoherent treatment which enhances the applicability of the radiative transfer as shown by Muinonen et al. [3]. As a preliminary result, we have computed scattering from a large spherical medium with the RT-CB-ic using equal-sized particles with diameters of 1.45 microns.

The preliminary results have shown that the qualitative characteristics are similar for the computed and measured intensity and polarization curves but that there are still deviations between the characteristics. We plan to remove the deviations by incorporating a size distribution of particles (1.45 ± 0.02 microns) and detailed information about the volume density profile within the analog surface.

Acknowledgments: We acknowledge the ERC Advanced Grant no. 320773 entitled Scattering and Absorption of Electromagnetic Waves in Particulate Media (SAEMPL). Computational resources were provided by CSC – IT Centre for Science Ltd, Finland.

References: [1] Hadamcik E. et al. (2007), JQSRT, 106, 74–89 [2] Levasseur-Regourd A.C. et al. (2015), Polarimetry of stars and planetary systems, CUP, 61-80 [3] Muinonen K. et al. (2016), extended abstract for EMTS.