ELS-XV-2015 Abstracts
ELS-XV-2015-76
Electromagnetic & Light Scattering XV 2015, Leipzig

Phase dependence of polarization of Saturnian moons in the phase angle range from 0.7° to 0.01°.

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The study of origin and evolution of small bodies of the solar system is an important part of solar system exploration. A major tool for these studies is imaging of atmosphereless small bodies in the solar light scattered by their surfaces. Recently, the Saturnian satellites have received much attention, as their surfaces have been imaged by cameras on board of the CASSINI mission. The wide angle camera of the CASSINI camera system ISS has a polarizing filter, but no polarization maps resolving the surfaces of the Saturnian satellites have been published.

Ground-based disk-integrated phase curves of polarization have been obtained in three observational campaigns in Jan. 2005, Nov./Dec. 2005 and Feb. 2007 at the Bulgarian National Observatory Rojen with the Two-channel Focal Reducer attached to the 2m-telescope. Polarization phase curves of the satellites Tethys, Dione and Rhea derived from these observations have been presented by Kulyk (PSS 73, 407-424, 2012). Like the observations of the Galilean icy satellites Europa and Ganymede (see e.g. Kiselev et al, JQSRT 110, 1713-1718, 2009, and references therein), the observations of Tethys, Dione and Rhea show a steep decrease of the degree of polarization in the range of phase angle α from 0° - 1°, which in part is even steeper than in case of the Galilean satellites. There is, however, no secondary maximum separating an opposition "dip", possibly caused by coherent backscatter, from a shallower, more extended negative polarization branch. This may be caused by lack of data for larger phase angles.

Kulyk (2012) discovered a dependence of the instrumental polarization on telescope position and modeled this by a linear dependence of the instrument polarization on telescope altitude. In the meantime this phenomenon has been recognized as caused by bending of the instrument and has been modeled in more detail. In the conference we will present a re-analysis of the data in the phase angle range $0° < \alpha < 0.7°$. If possible, we will also add data from other satellites, obtained in the same campaign. The results will be discussed in view of the knowledge gained by the CASSINI mission.