



ID de Contribution: 31

Type: Oral presentation

Phobos photometric properties from Mars Express HRSC observations

vendredi 1 mars 2024 13:00 (15 minutes)

The Mars Express mission has been orbiting Mars since 2004, and it has acquired several observations of Phobos which were never published in the literature. We have analyzed resolved images of Phobos, available at the ESA Planetary Science archive, acquired between 2004 and 2022 by the High Resolution Stereo Camera (HRSC) on board the Mars Express spacecraft. We used both data acquired with the blue-green-red and IR filters of HRSC, which are absolutely calibrated in flux, and the panchromatic data of the Stereo Resolution Camera, which are relatively but not absolutely calibrated. The SRC data are quite unique because they cover small phase angles (0.2° - 10°) permitting to investigate Phobos opposition effect. Photometric analysis was performed both on disk-averaged photometry and, for the 4 absolute calibrated filters, on disk-resolved images. The opposition surge parameters were determined from Hapke (2012) model of the SRC data, after arbitrary normalization to match the radiance of the HRSC green filter data at 5° of phase angle. The results of the modeling show that the surface of Phobos is dark with an albedo of 6.85 % in the green filter, centered at 538 nm, and diffusing the light in the backward direction. We find that Phobos has a relatively strong opposition effect due to shadow-hiding, with amplitude and half-width of the opposition surge values of 2.28 and 0.057, respectively. These values are considerably lower compared to those determined by Simonelli et al. (1998), and similar to those found for comet 67P (Fornasier et al., 2015). We also found a surface porosity of 87% , indicating the presence of a thick dust mantle or of fractal aggregates on the top surface. We present in this work the results of the photometric modeling for the different HRSC filters, the single scattering albedo maps, and a comparison of Phobos photometric properties with those of other satellites and dark minor bodies. These results are of high interest in support of the JAXA Martian Moons Exploration mission (MMX). This mission has as main goals the return of Phobos samples, the detailed investigation of Mars satellites and to determine the origin of the martian moons.

Astrophysics Field

Planetology (including small bodies and exoplanets)

Day constraints

Only possible:

-28th in the morning

- 1st (morning+afternoon)

Auteur principal: WARGNIER, Antonin (LESIA - Observatoire de Paris)

Co-auteurs: FORNASIER, Sonia (LESIA - Observatoire de Paris); HASSELMANN, P. H. (INAF - Osservatorio di Roma); TIRSCH, Daniela (DLR); MATZ, K.-D. (DLR)

Orateur: WARGNIER, Antonin (LESIA - Observatoire de Paris)

