



New observations of Phobos, Deimos, and their shadows with the HRSC/SRC on Mars Express

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In the past year, new observations of Phobos and Deimos have been carried out by the HRSC (High Resolution Stereo Camera) and the SRC (Super Resolution Channel) on the Mars Express spacecraft. Good image data are now available from a total of 25 Phobos close (< 4800 km) flybys. Three flyby maneuvers were executed within one November week (2005) alone. In addition, the Phobos shadow on the surface of Mars was captured on four different occasions. Contrary to Phobos, Deimos has been directly observed only from large distance ($> 10,000$ km). Previous image analyses focused on the shape modeling of Phobos, as well as on astrometric measurements of the Phobos and Deimos positions. Using the observations by the framing camera SRC, the positions of the two satellites could be determined with accuracies of 0.5 - 5.0 km (Phobos) and 1.0 km (Deimos). These data differed substantially from the various available predictions, a fact which motivated the beginning of renewed Phobos and Deimos orbit modeling efforts (Lainey et al., EOS Trans. AGU, G51A-0802, 2005). The new data are now being used to confirm and further improve the accuracy of the satellite orbit models, which bear important implications on tidal dissipation and internal structure of Mars, possibly even higher-order terms of the Phobos gravity field. Efforts are being made to refine the astrometric measurements. In particular, the planning software was upgraded recently to warrant that background stars are available in the SRC images for camera pointing control. Also, schemes are being developed to make use of the Phobos shadow to constraint its celestial position. This will add observational coverage along the Phobos orbit. The new data by HRSC and SRC may also be used to further refine the shape models of Phobos.