



## **HRSC/SRC imaging results from the Phobos flybys**

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From May through December 2004, Mars Express had nine encounters with Phobos. The small captured asteroid (radii: 13x11x9 km) was observed at ranges from 1900 km to as close as 150 km at solar phase angles between 23° and 84°. Almost all of the flybys occurred at similar positions of Phobos during its orbit about Mars. During these flybys, the High-Resolution Stereo Camera (HRSC) on board obtained scanner-images in 5-fold stereo and color. Additional framing images were obtained by the HRSC's Super Resolution Channel (SRC). The high intrinsic geometrical precision of the imaging experiment permitted us to carry out astrometric modelling of the orbit of Phobos. Fortunately, observations of known stars together with the Phobos limb allowed us to separate camera pointing errors from Phobos positional offsets. Analysis of data from all flybys show consistently that the satellite has advanced by ~6 sec. (corresponding to 12 km along the orbit) beyond what is predicted by its ephemeris from the Viking era. There is no appreciable offset of the predicted Phobos' orbit parameters in the radial (towards Mars) or out-of-orbit-plane direction. More Martian satellite flybys (including flybys at Deimos) and HRSC observations are expected through 2005.