

Positions and Shapes of Martian Plasma Boundaries from Phobos 2 and Mars Global Surveyor Observations

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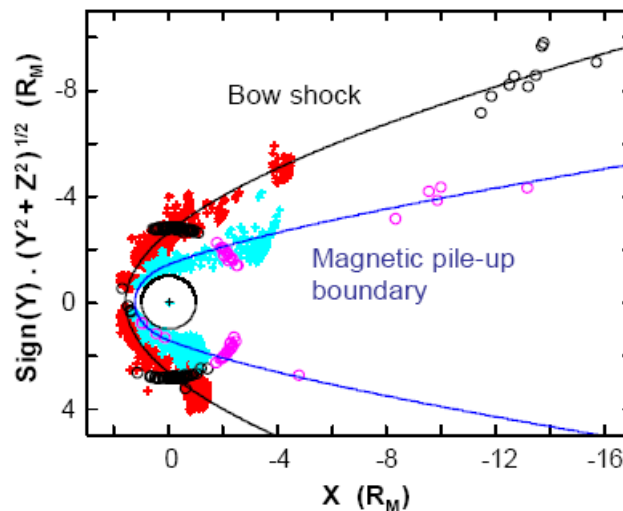
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A great many Martian bow shock and magnetic pile-up boundary crossings have been identified in the Phobos 2 and Mars Global Surveyor, MGS, data. From these observations the positions and shapes of the bow shock and magnetic pile-up boundary, MPB, have been derived and modelled, using curve-fitting techniques. The models thus derived separately from the Phobos-2 and MGS data sets do not differ drastically, despite the different time and space data coverages. The purpose of the paper is therefore to show the results obtained from the mixing of the Phobos-2 and MGS data bases and to compare the derived bow shock and MPB models with the ones obtained previously. The underlying objective was to see whether it was possible to determine improved bow shock and MPB models or not. The answer is definitely yes, and particularly for the MPB, thanks to the complementary nature of the observations. The boundaries crossed close to the subsolar direction or mostly far downstream by Phobos 2 indeed allow a better coverage of the Martian space environment to be considered. Nevertheless, in order to reduce the domination of the overabundant MGS data set and/or the crossings that are close to Mars ($x > -4 R_M$, i.e. $x > -13\,562$ km) weighting factors have been introduced.



Martian bow shock (black line) and Magnetic Pile-up Boundary (blue line) models that best fit the observations made by both the plasma wave system of the Phobos 2 mission (black rings for the shock and purple rings for the MPB) and the MAG/ER experiment aboard the MGS spacecraft (red crosses for the shock and blue crosses for the MPB). Negative and positive ordinate values correspond with crossings in respectively the dawn and dusk hemispheres.