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Mars in the Solar Wind

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The physics of the interaction of unmagnetized planets with the Solar wind has been investigated since the first Mariner spacecraft did reach Mars and Venus more than 50 years ago. Magneto hydro-dynamic models were able to predict the formation and location of the bowshock in front of these planets. More sophisticated models of the interaction with the magnetized solar wind later could demonstrate the global static picture of the plasma environment of Mars and Venus. But earlier models were rarely able to model dynamic effects and the timing of physical process in this interaction. We use the PLUTO code (http://plutocode.ph.unito.it/, Mignone et al, AphJ. Suppl.,198,3 (2012)) to investigate the evolution of the bow shock and the interaction of the solar wind with the ionosphere of Mars in 2D and 3D hydrodynamic and magneto-hydrodynamic models to separate different physical effects. We compare these simulations to recent observations by the MAVEN spacecraft.