

Validity of space weather prediction to Venus and Mars

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Abstract

Both Venus and Mars have ionospheres, but no strong intrinsic magnetospheres, only Mars has some inhomogeneously distributed crustal field. The solar wind interaction with the ionosphere of these unmagnetized planets is highly important in defining the planets' plasma environment. The properties of their induced magnetospheres depend strongly on the solar input arriving at the planet. In order to study this interaction of the solar wind and the planetary plasma environment, ideally we would need measurements both in the solar wind and in this induced magnetosphere the same time. When there is only one spacecraft around the planet, it cannot perform such simultaneous observations, thus the prediction of solar wind properties and solar events to the different planetary objects becomes important. These predictions can be validated by in situ measurements onboard the planetary spacecraft such as Mars Express and Venus Express while these are located in the solar wind. The solar predictions are based on solar spacecraft observations such as SOHO, ACE, WIND, STEREO A and B, which are at different distances from the investigated planets. We show how the prediction accuracy depends on the spatial separation of the solar and the planetary spacecraft.