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The effects of IMF sector boundary crossings on the induced magnetosphere of Venus

D. Vech (1,2), G. Stenberg (2) , H. Nilsson (2), N. J. T. Edberg (3), A. Opitz (4), K. Szegő (4), T. L. Zhang (5), Y. Futaana (2)
(1) Luleå University of Technology, Kiruna, Sweden (2) Swedish Institute of Space Physics, Kiruna, Sweden, (3) Swedish Institute of Space Physics, Uppsala, Sweden, (4) Wigner Research Centre for Physics, Budapest, Hungary, (5) Space Research Institute, Austrian Academy of Sciences, Graz, Austria (vech.daniel@wigner.mta.hu)

Abstract

The induced planetary magnetosphere is the result of the interaction between the streaming solar wind plasma and an unmagnetized planetary body with an ionosphere acting as an obstacle. The structure of the induced magnetosphere highly depends on the upstream solar wind parameters including the direction and magnitude of the Interplanetary Magnetic Field (IMF). (e.g. *Zhang et al.*, 2009; *Masunaga et al.*, 2011).

Not only the upstream conditions but also temporal variations of the upstream conditions are expected to cause changes in the structure of induced magnetospheres. For example, *Niedner and Brandt* [1978] reported that the cometary ion tail was lost due to reconnection after an IMF sector boundary crossing. *Edberg et al.* [2011] studied the effects of Interplanetary Coronal Mass Ejections (ICME) and Co-rotating Interaction Regions (CIR) at Venus. They suggested that the change in the magnetic field polarity during IMF sector boundary crossings contribute to an increased ion outflow. In addition, they speculated that this might be due to dayside magnetic reconnection.

In this study we aim to understand the effects of the varying upstream conditions on the Venusian induced magnetosphere. Using the entire Venus Express/ASPERA-4 and MAG datasets, we first produce the spatial distribution of ions in the plasma environment of Venus during ICME and CIR passages together with that during the average condition. In addition to ICME/CIR passages, we focus on the Heliospheric Current Sheet (HCS) crossings, which can also change the polarity of the induced magnetosphere. By comparing HCS events and ICME/CIR events, we may be able to distinguish the contribution of IMF polarity change on the Venusian induced magnetosphere, because the solar wind is less disturbed during HCS events.

We will compare the signatures associated with the sector boundary crossings found at the magnetotail of Venus with that is previously reported from comet studies.

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