

SPACE PHYSICS SEMINAR

DEPARTMENT OF EARTH, PLANETARY, AND SPACE SCIENCES
DEPARTMENT OF ATMOSPHERIC AND OCEANIC SCIENCES
UNIVERSITY OF CALIFORNIA, LOS ANGELES
(AOS M275C, EPSS M288C)

The Induced Global Looping Magnetic Fields On Venus and Mars

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Abstract

Venus serves as the prototype of solar wind interaction with unmagnetized planetary bodies with atmospheres. It has no intrinsic dipole or crustal magnetic field; the only global magnetic field is believed to be formed by the draped interplanetary magnetic field (IMF). However, the large-scale magnetic fields observed by Venus Express over the northern polar region have a bias in the dawnward direction and seemingly unresponsive to the IMF's direction. Here we show that besides the draped field, there is a second type of induced global magnetic field at Venus and the dawnward field is only a part of it. This global field has a distribution in a cylindrical shell around the magnetotail and a counterclockwise direction looking from the planetary tail toward the Sun, which demonstrates that there are two currents flowing out of and into the planet along the inner and outer boundaries of the looping field, respectively. Considering the similarities in the interactions of Mars and Venus with the solar wind (Both have no global dipole field), we also investigated the looping field on Mars with MAVEN observations. It is found that the global looping magnetic field found on Venus also exists on Mars and therefore it is a common feature of unmagnetized planets with atmospheres. A possible formation mechanism has been suggested based on the observation of the azimuthal solar wind flows around the planet towards the $-E$ (conventional electrical field) direction.

**Friday, April 27, 2018
Room 6704 Geology**

3:30 - 5:00 PM

In-Charge: C. T. Russell