Geophysical Research Abstracts, Vol. 9, 03076, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-03076

Venus' nightside low altitude Ionosphere – a new examination of Pioneer Venus Orbiter data

J. Grebowsky (1), W.R. Hoegy (2) and R. Hartle (1)

(1) Goddard Space Flight Center, Greenbelt, Maryland, USA, (2) Leelanau Research, Empire, Michigan, USA (joseph.m.grebowsky@nasa.gov)

Archived data from Pioneer Venus Orbiter (PVO) covering over a full solar cycle from before the peak of cycle 21 (December 1978) past the peak of cycle 22 (October 1992) are used to study the nightside ionosphere of Venus. The data sets include: OMAG (Fluxgate Magnetometer, OIMS(Ion Mass Spectrometer), ONMS (Neutral Mass Spectrometer), OETP (Electron Temperature Probe), and the NASA GSFC UADS (Unified Abstract Data Set). The latter contains 12-second averages of all the PVO data in a convenient ASCII format. After a brief review of the data sets and orbit parameters for the PVO mission, results are presented for the analysis of the nightside ionosphere. Venus' nightside ionosphere under solar maximum conditions is maintained by flow from the dayside. However, far into the night the ionosphere is not always characterized by smoothly varying densities from the ionopause to periapsis. Most orbits far into the night traverse abrupt, dynamically extreme perturbations: holes, abrupt density depressions having tailward magnetic field enhancements, and extremely disturbed ionospheres, where the ionospheric densities are severely depleted. This analysis is restricted to altitudes below $\sim$300 km where the plasma pressure usually dominates over the magnetic pressures. The magnetic field of the extreme ionosphere depletion regions becomes enhanced and ordered, whereas the field is weak and irregular in the full-up ionosphere regions above the low altitudes where ion-neutral collisions play a significant role. The transition between these states is demonstrated by correlating the plasma density with the magnetic field. The terminator ion composition also differs from dawn and dusk with the tendency of the holes to occur on the dawn side of midnight where the light ions are comparable to the oxygen ions.