

## **VENUS/MARS PICKUP IONS AND IONOSHEATH WAVE STRUCTURES**

J.M. Grebowsky (1), D. H. Crider (2), D. S. Intriligator (3), R. E. Hartle (1), M. H. Acuña (1)

(1) Goddard Space Flight Center, Greenbelt, MD 20771, (2) Catholic University, Washington, DC 20064, (3) Carmel Research Center, Santa Monica, CA 90406

An analysis of the waves associated with pickup ions was undertaken for Venus, and analogously for Mars. The Pioneer Venus Orbital Plasma Analyzer (OPA) measurements of energy/charge spectra provided pick-up ion characteristics for comparison to the power spectra and propagation characteristics of structures in the local magnetic field, measured by the Pioneer Venus Orbiter Magnetometer. Magnetic field analysis of Mars-Global-Surveyor's magnetometer data provided a comparative look at the effects of pick-up ions at Mars. Both linear and circular polarization waves are found in the vicinity of pickup regions on both planets, but they have characteristics of solar wind effects previously identified in the ionosheath of Venus, analogous to wave activity in the Earth's magnetosheath. Ion pickup driven waves at Venus are suppressed in part, because it requires several gyrations of the ions to generate waves (which takes place over a distance greater than the characteristic ionosheath thickness). Sometimes the pickup ion distributions observed by OPA do not have the classical upper cutoff speed of 2 times the shocked solar wind speed. This is because the atmospheric scale height in the source region of the pickup ions on Venus is smaller than the pick-up ion gyroradii. The data on Mars provide a comparative reference. An analysis of the free energy available in the gyrating Venus/Mars pickup  $O^+$  and  $H^+$  ions is undertaken to determine the magnitude of the wave energy that could be produced for both planets.