



Venus Plasma Boundaries and Ionospheric Plasma Escape

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Results from the ASPERA 4 plasma and energetic neutral atom instrument on Venus Express shows some new interesting aspects of the solar wind interaction with Venus and the corresponding escape of planetary ions. As expected, the outflowing ions have a composition consistent with a source region located in the topside ionosphere of Venus. The outflow consists of primarily atomic species such as O⁺, H⁺, and He⁺. The molecular ion outflow is low, much lower than on Mars. Of particular interest is also the flow properties and ion composition at the contact boundaries between the solar wind and the induced magnetosphere of Venus. Outer boundaries such as the Bow shock and the induced magnetosphere boundary (IMB), display plasma properties similar to those found from the Pioneer Venus Orbiter, PVO, but also to some extent similar to those found near Mars by Mars Global Surveyor and Mars Express. A major difference between Mars and Venus is the central tail, possibly related with the lack of magnetized regions on Venus.

Preliminary analysis lends support for a substantial low-energy mass escape on Venus. The escape flow, dominated by O⁺, appears more like a tapered low-energy ionospheric plasma extension into the tail, resembling extensions from the cometlike features reported by Brace et al., (1987). The average velocity of the flow at a downtail distance of ≈ 2 Venus radii is a few tens of km/s. The outflow rate based on 20 consecutive tail traversals correspond to 2.1 kg/s, with a standard deviation of 1.3 kg/s.