

PLASMA INTERACTION EFFECTS. J. G. Luhmann Space Sciences Laboratory, University of California, Berkeley, 7 Gauss Way, Berkeley, CA 94720, jgluhman@ssl.berkeley.edu.

Overview: The effects of an external, magnetized, flowing plasma on a planetary atmosphere is quite distinct for bodies with and without magnetospheres. Other reviews in this conference focus on the outer planet magnetospheres' effects on their massive atmospheres, and Mercury, the Moon, most planetary satellites, and minor bodies have likely been covered in the previous talk on escape from solid surface bodies. Thus the present overview focuses on our neighboring planets Venus and Mars, with some terrestrial magnetosphere processes mentioned to provide contrast. These major inner solar system bodies both possess significant CO₂ atmospheres that are exposed to the solar wind in an intimate way reminiscent of comets.

Much work has been done toward understanding the solar wind interaction with Venus, inspired by observations from the Venera, Pioneer Venus Orbiter, and now Venus Express missions. Mars has enjoyed less scrutiny, in part because of the loss of a mission (Nozomi) destined to make comprehensive measurements in this area of investigation. However, the combination of the Phobos mission, Mars Global Surveyor, and now Mars Express has made significant progress toward a similarly comprehensive picture.

In hindsight, it was important to have concentrated on Venus first because it has the same fundamental characteristics as the Mars solar wind interaction, but in a simpler setting. Mars is a particularly challenging case because the obstacle to the solar wind includes remanent crustal magnetic fields as well as the atmosphere. While these do not negate the many Venus analogies that can be drawn, they add some terrestrial magnetosphere-like aspects to the problem. Distance from the Sun, planet size, and atmosphere thickness also differentiate these plasma interactions. In addition, the scenarios for both are affected by solar influences on both sunspot cycle and active event time-scales. We are just beginning to analyze some of these potentially evolution-impacting effects.

A brief summary of some key observations and processes, and their consequences are given, together with lessons learned from a number of successful available modeling results. Outstanding questions for future measurements, analyses and models are offered.