Geophysical Research Abstracts
Vol. 21, EGU2019-10895, 2019
EGU General Assembly 2019

Observations of the Dayside Martian Ionopause by the Mars Express Radar Sounder

Feng Chu, Zachary Girazian, Donald Gurnett, David Morgan, Jasper Halekas, and Andrew Kopf
University of Iowa, Department of Physics and Astronomy, Iowa City, United States (feng-chu@uiowa.edu)

The Mars Advanced Radar for Subsurface and Ionosphere Sounding (MARSIS) on board the Mars Express spacecraft is a radar sounder used to probe the topside Martian ionosphere. MARSIS measures the electron density through both remote radar sounding and excitation of local plasma oscillations, providing a unique way to study the steep density gradient existing on the top of the dayside ionosphere, called the ionopause. Our ultimate goal is to address the conditions under which the Martian ionopause forms. This study, based on over ten thousand orbits from 2005 to 2017, shows that the ionopause occurs at altitudes between 250 km and 600 km, with a sharp cut-off altitude at 250 km for solar zenith angle (SZA) smaller than 70 degrees. Unlike the ionopause of Venus, which seems to appear almost all the time, the Martian ionopause is only observed in about 10% of all the orbits used in the study. In addition, the study shows that the ionopause mainly appears over weak crustal fields with a cut-off magnitude of $\sim$10 nT. The dependence of the ionopause altitude on solar zenith angle, solar wind dynamic pressure, and solar EUV irradiance will also be discussed.