



## **Identification of the boundary between the ionosphere of Mars and the magnetosheath using MARSIS data**

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In addition to the remote sounding of the ionosphere, the Mars Advanced Radar for Subsurface and Ionospheric Sounding (MARSIS) instrument on the Mars Express spacecraft also excites local electron plasma oscillations. Plasma oscillations are not observed when the plasma flow velocity is higher than about 160 km/s, or/and the electron density is lower than  $10 \text{ cm}^{-3}$ . These conditions occur mainly in the solar wind and magnetosheath. As a consequence, in many passes, there is a sudden disappearance of the plasma oscillations as the spacecraft enters into the magnetosheath, which makes it possible to identify the dayside boundary between the ionosphere of Mars and the magnetosheath (i.e., the ionopause). This study summarizes the investigation of the boundary of the magnetosheath and the ionosphere of Mars. On the dayside, the boundary points found using MARSIS have been verified by measurements from the ASPERA ELS instrument on Mars Express. From the subsolar point to the terminator, the altitude of the boundary between the magnetosheath and the ionosphere increases from about 600 to 1200 km with increasing solar zenith angle (SZA) and is in relatively good agreement with the magnetic pileup boundary determined from the MARSIS electron echo technique. On the nightside the boundary altitude is almost constant and is mostly between 1000 and 1200 km.