



MARSIS Observation of Mars Ionosphere using Surface Radar Echoes

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MARSIS radar echoes from the surface of Mars contain valuable information about the ionosphere of Mars as well as the surface and subsurface. The ionosphere of Mars distorts the radar signal as it propagates to the surface and back through the ionosphere. The ionospheric distortion is removed on the ground to allow further interpretation of the subsurface echoes. The process of ionospheric correction yields information about the total electron content (TEC) and ionosphere height scale, H. The TEC and H values are estimated for each MARSIS frame which is localized to a 10-km footprint providing a detailed view of the ionospheric structure as a function of sun illumination angle and ionosphere's interaction with the Mars magnetic anomalies. MARSIS collect subsurface data at altitudes lower than 900 km and traverses a range of solar zenith angles and as a result provides a global view of the ionosphere of Mars. We will present an image which shows the intricate interaction between the ionosphere and the magnetic anomaly revealing a global view of a systematic non-uniform electron distribution in Mars ionosphere. We will also present our estimate of the Mars ionosphere peak plasma frequency and height scale based on the analysis of MARSIS data. This data is complementary to the active ionospheric mode of MARSIS which collects data in the topside sounder mode. *This work was carried out in part at the Jet Propulsion Laboratory, California Institute of Technology, under a contract with NASA and in part at Laboratoire de Planetologie de Grenoble CNRS/UJF France. Authors would also like to acknowledge helpful private discussions with the MARSIS ionospheric science team lead by Dr. D. Gurnett.*