

MARS IONOSPHERE STUDIES USING THE MGS RADIO SCIENCE EXPERIMENT

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Prior to the arrival of the Mars Global Surveyor (MGS) satellite, ionospheric science at Mars depended upon a total of 433 published electron density profiles obtained over a period of about one solar cycle (1965-1976). With its Radio Science (RS) experiment active at Mars since 1997, the MGS ionospheric database now includes approximately 2000 additional Ne(h) profiles. We have used these datasets to study ionospheric variability patterns at Mars. We have examined the values of electron density at its two peaks (layers we term M1 and M2), their respective altitudes, layer thicknesses and plasma scale heights. In addition, we have examined overall total electron content (TEC) and equivalent slab thickness to investigate the possibility of determining atmospheric neutral temperatures from the ionospheric profiles. Variability patterns depending on longitude, local time and solar irradiance have been found. A 1-dimensional ionospheric model that includes photochemistry and plasma diffusion is used to explore the causes of the variabilities observed.