Modeling of Low Latitude Ionosphere of Mars using MGS/ACC Data

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In this paper, we use the measurements of mass density of 112 orbits (#P0790-P0910) from December 1-22, 1998, between latitude range (0-25°N) under spring equinox and medium solar activity conditions during phase 2 of the aerobraking in the thermosphere of Mars. These measurements of mass density are obtained from the Accelerometer Experiment onboard Mars Global Surveyor. From these mass densities, the neutral densities of different gases are derived from their mixing ratios. Using these neutral densities, the longitudinal distribution of various peak ionization rates, peak electron densities and their corresponding peak altitudes are obtained due to incident radiation of wavelength range 1-102.57 nm at solar zenith angle 78° in the dayside atmosphere of Mars using analytical yield spectrum model. Thus by averaging the longitudinal variation of the peak ionization rates, the mean primary and secondary peak electron densities in the upper ionosphere of mars using measured mass densities at LST 14.86 - 15.27 hours are estimated to be \sim 7.96 x 10⁴ cm⁻³ and 1.60 x 10⁴ cm⁻³. These estimated mean primary and secondary peak electron densities are then compared with calculated mean primary and secondary peak electron densities in the upper ionosphere of Mars, which are found to be in good agreement.