

# Ionospheric Variability at Mars

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## Abstract

We have used the approximately 1.4 million values of the total electron content (TEC) of the Martian ionosphere obtained by the MARSIS instrument on Mars Express to study ionospheric variability over spatial scales ranging from global to regional. To quantify variability, we use the standard deviation of the mean value of a sample of TEC ordered by such parameters as local time, latitude, season or crustal magnetic field strength (B). For example, daytime variability averaged over all seasons is typically 10-15% in regions of minimal crustal-B, rising to 15-25% in the 0-30 S latitude band where crustal-B values are greater than 50 nT. Under nighttime conditions, global TEC variability is 50-60%, increasing to over twice those values in the region of strong crustal-B in the latitude range 30-90 S at longitudes 150-210 E. For this high-B sector, the TEC variability versus latitude correlates with the pattern of variability in the magnetic field inclination angle.