

Evidence of the influence of waves in the upper atmosphere of Mars: A new Perspective

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Here, using the measurements of mass densities for 57 orbits (P0588-P0648) and 115 orbits (P0670-P0789) for northern high latitude (50-70° N) and northern mid latitude (17-42° N) respectively in the dayside atmosphere from accelerometer experiment (ACC) onboard Mars Global Surveyor (MGS), the neutral densities of different gases are derived for both latitude ranges which are further used in obtaining the longitudinal distribution of various peak ionization rates for solar zenith angle 78° at wavelength range 10-1025.7 nm due to solar EUV radiation A using Analytical Yield Spectrum approach (AYS). Recently, we suggested that there are two dominant regions of wave generation in the spectra of peak ionization rates at high latitude (50-70° N) in the upper atmosphere of Mars. These two regions of dominant waves we interpreted are due to the presence of stationary waves and baroclinically unstable waves. In the analysis of mid latitude (17-42° N) range, we find that the dominance of lower wave number due to topography continues to be either equal to its high latitudinal values or at least comparable. However, the amplitude of higher wave number is substantially reduced. A similar behavior is expected in the baroclinic waves because of the increase of β parameter. Thus, our results strongly support the interpretation we gave earlier that the dominance of higher wave number band is due to baroclinic instability.

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