

First estimations of Gravity Wave Potential Energy in the Martian thermosphere: An analysis using MAVEN NGIMS data

G. Manju¹ and N Mridula²,

SPL, VSSC, Trivandrum, India. Pin:695022

Introduction: RGravity Wave Potential Energy (GWPE) for the Martian thermosphere is estimated for the first time using the MAVEN NGIMS instrument based height profiles of CO₂ density and corresponding temperature fluctuations for different Martian seasons during the 33rd Martian year. Explicit diurnal evolution of GWPE (for 52° to 73° latitude bin) with a post sunset maximum is delineated for summer. The higher values of GWPE are observed during morning, compared to post mid-night (35° to 55° latitude bin) for summer. As the latitude increases from 16° to 45°, GWPE (1-4 LT bin) is found to be nearly doubled for summer. Further, GWPE estimates in autumn are 6 times higher during night compared to day (-45° to -72° latitude bin) and daytime (-53° to -72° latitude bin) GWPE is much lower in autumn compared to spring for all longitudes. Overall, from the available data autumn (with respect to northern hemisphere) daytime periods appear to be better suited for aerobraking operations of Martian landing missions.

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