

Spectral analysis of planetary-scale disturbances in the Mars atmosphere using MGS/TES data

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Atmospheric wavenumber spectra of planetary scale disturbances in the Mars atmosphere have been obtained as a function of latitude and season from MGS/TES atmospheric temperature data. Wavenumber spectra reflect the excitation processes of atmospheric disturbances and the energy cascade in turbulent motions. For example, in the Earth's atmospheric wavenumber spectrum, there is a peak at the zonal wavenumber of 5-6 due to the forcing

by baroclinic instability at this scale, and the spectral slope at smaller scales is near -3 probably due to the two-dimensional turbulent nature of the atmosphere.

We analyzed the temperature disturbances in the longitudinal direction to obtain power spectra covering zonal wavenumbers 1-6, and these spectra were averaged in each 60 days period and in the latitude bands of 30 degrees width centered at 60S, 30S, equator, 30N and 60N. The results show that the winter hemisphere has the highest power and a peak occurs at the wavenumber of 1. In other seasons or latitudes peaks sometimes tend to occur at the wavenumber of 2. Interannual variability was found to be large. We will further investigate the energy distribution of the Mars atmospheric disturbances at different altitudes and in other years, and compare it with the Earth's one.