

MLS-Related Scientific Publication

Scientific Themes: Atmospheric Dynamics and Climatology.

Interannual and Seasonal Variations of Diurnal Tide, Gravity Wave, Ozone, and Water Vapor as Observed by MLS during 1991-1994. Dong L. Wu and Jonathan H. Jiang, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, California, USA. *Adv. Space Res.*, 35(11), 1999-2004, 2005.

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Summary

The diurnal tide in the mesosphere and lower thermosphere (MLT) has large seasonal and interannual variations. Despite recent modeling investigations, the underlying physical mechanisms for causing these variations remain unclear. This paper provides further observational constraints to tide-sensitive variables (H_2O , O_3 , and gravity wave variances) used by the models, which can be obtained simultaneously by UARS MLS (Upper Atmosphere Research Satellite Microwave Limb Sounder) at altitudes below the MLT region. The strong QBO (quasi biannual oscillation) and SAO (semiannual oscillation) variations in these measurements reveal good correlations between the diurnal tide with other tide-sensitive variables, which should be taken into account in future modeling studies.

This study highlights aspects of middle-atmosphere climatologies that relatively uncertain.

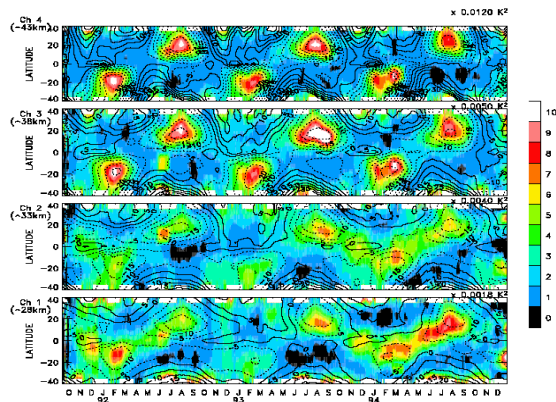


Figure 4. Time-latitude plot of MLS GW variances at 28-43 km (with the multiplier for each panel) overlaid by UKMO zonal winds (in m/s) at 10 km below.

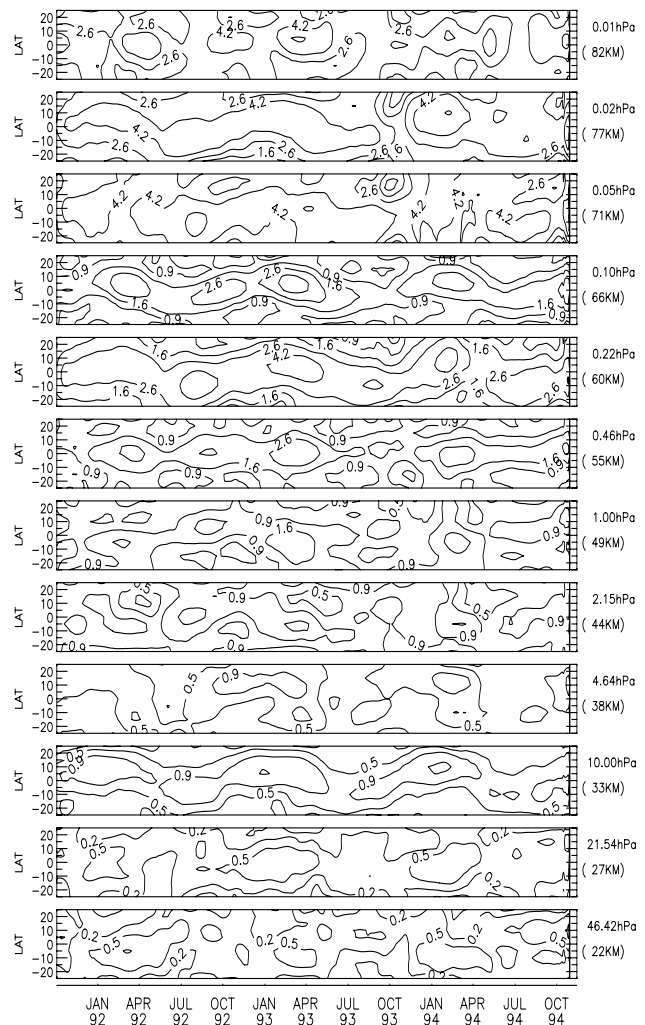


Figure 1. Diurnal amplitude of MLS temperature from the lower stratosphere to the mesosphere during 1991-1994 when MLS sampling was quite uniform. The contour levels are increased exponentially as $0.2 \cdot 1.5^n$ K ($n=1, 2, \dots, 10$) to cover the large range of the tidal variability.