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Two-Day Wave Observations of UARS-MLS Mesospheric Water Vapor and Temperature

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Summary

The two-day wave disturbance is observed in the mesospheric temperature and water vapor based on a new version of data from the *Upper Atmosphere Research Satellite Microwave Limb Sounder*. Using two data segments during the Austral summers (January-February of 1992 and 1993) and the asynoptic mapping method, a strong wave signal is identified as zonal wavenumber 3 with a westward period of about 2.1 days. The wave amplitudes are located near the core of the summer easterly jet with strongest wave amplitudes (as large as 11 Kelvins and 0.35 part per million by volume) near the mesopause. The temperature and water vapor wave strengths are highly correlated in time but their peaks are almost out-of-phase in longitude. Poleward heat flux associated with upward wave energy propagation in the southern hemisphere points to baroclinic instability as the cause for the wave appearance. Wave signature in water vapor is observed in regions of strong meridional gradient of water vapor. Moist polar air is displaced into the much drier subtropics, suggesting wave breaking near the mesopause.

This research is conducted to help better understanding of dynamic variability in the upper atmosphere.

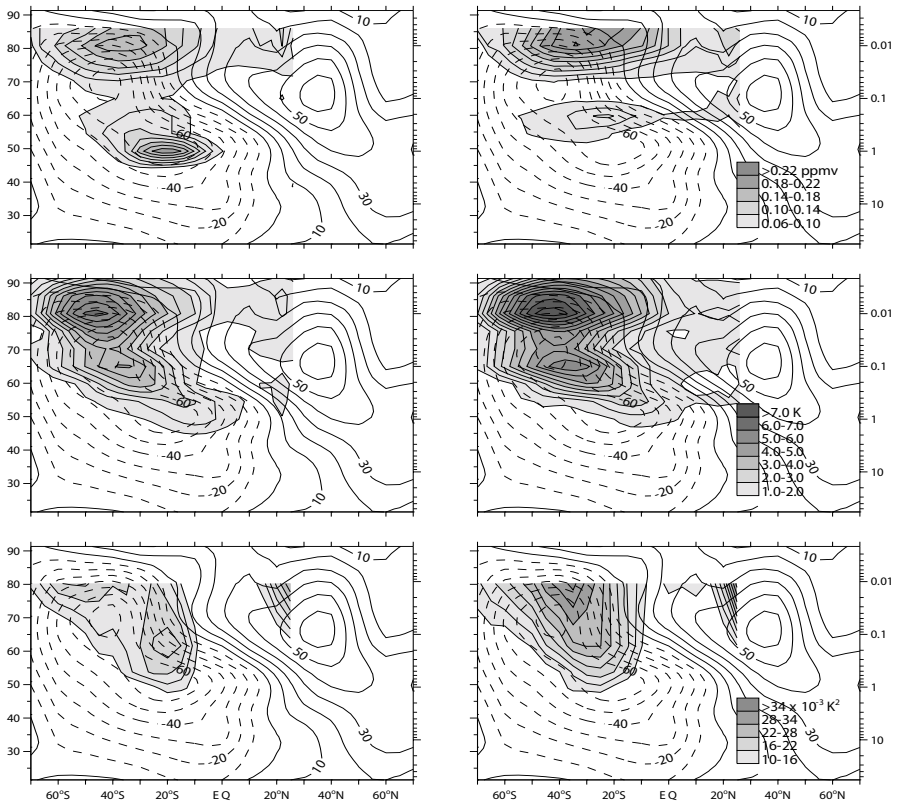

Fig. 2. *Meridional cross-section of the two-day wave amplitudes. The wave amplitudes are given as filled contours whereas CIRA mean zonal wind is overplotted as unfilled contours. The top (middle, bottom) row is for water vapor (temperature, gravity wave variance). The left (right) column is for analyzed period during 1992 (1993).*