

MLS-Related Scientific Publication

Scientific Themes: Atmospheric Dynamics.

The two-day wave in EOS MLS temperature and wind measurements during 2004-2005 winter

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Summary

Two-day wave observations during January-March 2005 are reported using the recently launched Microwave Limb Sounder (MLS) aboard NASA's Earth Observing System Aura mission. Wave-induced disturbances in temperature, water vapor, carbon monoxide, and MLS line-of-sight wind appear in early January, peak near the end of January, and persist until late February. Temperature and wind amplitudes as large as 9 K and 50 m/s are observed near 90 km. The wave disturbance is initially confined in the mid to low summer latitudes where the climatological summer easterly jet exhibits strong shear. The wave then develops features akin to the third Rossby-gravity global normal mode, with a weak temperature disturbance in the winter hemisphere (anti-symmetric about the equator) and wind disturbance over the equator. Strong wind perturbation peak around 17-23 January 2005 in the mid-latitude southern hemisphere coincides with a particularly intense solar proton event.

The study is conducted to understand upper-atmospheric variability and possible impacts of solar proton events on atmospheric dynamics.

Figure 1. The 2005 latitude-time evolution of the two-day wave amplitude in temperature (every 2 K) and line-of-sight (LOS) wind (every 5 m/s). The LOS wind is computed from profiles along the ascending tracks (see Section 2). (Bottom) Concurrent values of NOAA GOES daily proton fluence (in Protons/cm²-day-sr).

