

MLS-Related Scientific Publication

Scientific Themes: Atmospheric Dynamics, Earth Climate and Weather

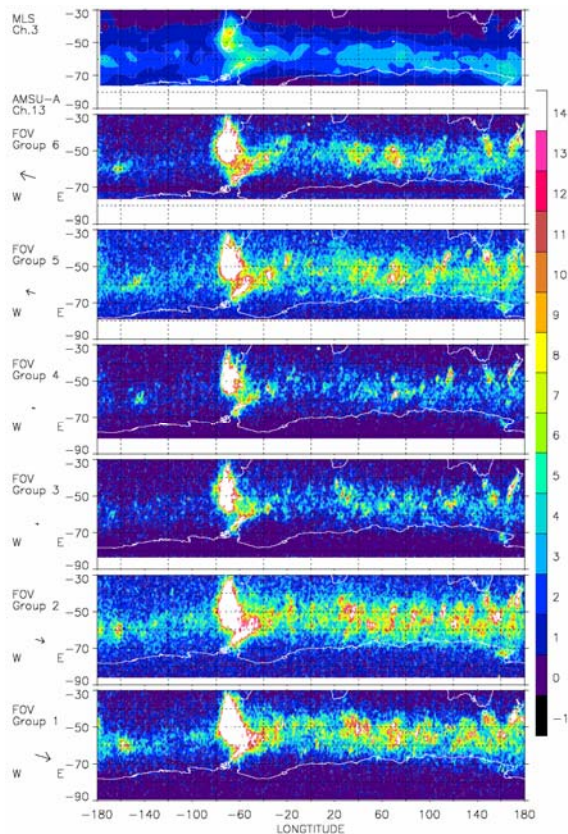
Mesoscale gravity wave variances from AMSU-A radiances. D. L. Wu, *Geophys. Res. Lett.*, L12114, doi:10.1029/2004GL019562, 2004.

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Summary

A variance analysis technique is developed here to extract gravity wave (GW) induced temperature fluctuations from NOAA AMSU-A (Advanced Microwave Sounding Unit-A) radiance measurements. By carefully removing the instrument/measurement noise, the algorithm can produce reliable GW variances with the minimum detectable value as small as 0.1 K^2 . Preliminary analyses with AMSU-A data show GW variance maps in the stratosphere have very similar distributions to those found with the UARS MLS (Upper Atmosphere Research Satellite Microwave Limb Sounder). However, the AMSU-A offers better horizontal and temporal resolution for observing regional GW variability, such as activity over sub-Antarctic islands.

Small-scale disturbances at high latitudes play an important role in Earth dynamical system. This study develops a novel method to extract small-scale waves from the operational data. The new information obtained with such analysis can help improve climate and weather forecasting skills.



This figure shows GW variance maps, in $(-180^\circ, 180^\circ)$ longitude and $(30^\circ\text{S}, 90^\circ\text{S})$ latitude region, for MLS channel 3 ($\sim 38 \text{ km}$) and AMSU-A channel 13 ($\sim 37 \text{ km}$) radiances in the June-August season. The MLS map is produced on a $5^\circ \times 10^\circ$ latitude-longitude grid and averaged for both ascending and descending data during 1991-1994. The MLS color scales have a unit of 0.004 K^2 . The AMSU-A maps are produced on $0.5^\circ \times 0.5^\circ$ grid boxes for 6 FOV groups, separated for ascending/descending conditions. This example shows the descending maps, and the pointing projected on the horizontal plane for each FOV group is indicated by the arrow on the right of each panel. The pointing differences among the FOV groups account for most of the variance amplitude differences seen in the maps. FOV group 1 (group 6) in these maps primarily points to the east (west) at low latitudes. The color scales for AMSU-A variances have a unit 0.04 K^2 .