MLS-Related Scientific Publication

Scientific Theme: Atmospheric Transport and Chemistry

EOS Microwave Limb Sounder Observations of the Antarctic Polar Vortex Breakup in 2004, G. L. Manney, M. L. Santee, N. J. Livesey, L. Froidevaux, W. G. Read, H. C. Pumphrey, J. W. Waters, and S. Pawson, *Geophys. Res. Lett.*, **32**, L12811, doi:10.1029/2005GL022823, 23 June 2005.

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Summary

Measurements from the Microwave Limb Sounder (MLS) on NASA's new Aura satellite were used along with meteorological analyses to study the breakup of the Antarctic polar vortex in 2004; a companion paper [*Santee, et al.*, GRL, June 2005] describes polar processing in the vortex before its breakup. Measurements of nitrous oxide (N_2O), water vapor (H_2O), hydrogen chloride (HCl) and ozone (O_3) throughout the stratosphere illustrate the top down breakup of the 2004 Antarctic vortex, showing poleward transport at progressively lower levels, with increasing filamentation and mixing. MLS on Aura provides the first global daily maps of HCl, and these provide an unprecedentedly clear view of the vortex breakup in the lower stratosphere in December 2004, and the dispersal of vortex air after the breakup. The results from MLS extend previous observational transport studies and show consistency with meteorological analyses and previous modeling studies.

This work benefits society by improving our understanding of the transport of chemically processed air from the Antarctic "ozone hole" when the vortex breaks up in spring. Monitoring and understanding this behavior is critical to assessing the impact of the ozone hole on hemispheric and global ozone amounts and to detecting possible trends in vortex behavior and ozone loss; these issues are critical to the health of our atmosphere.

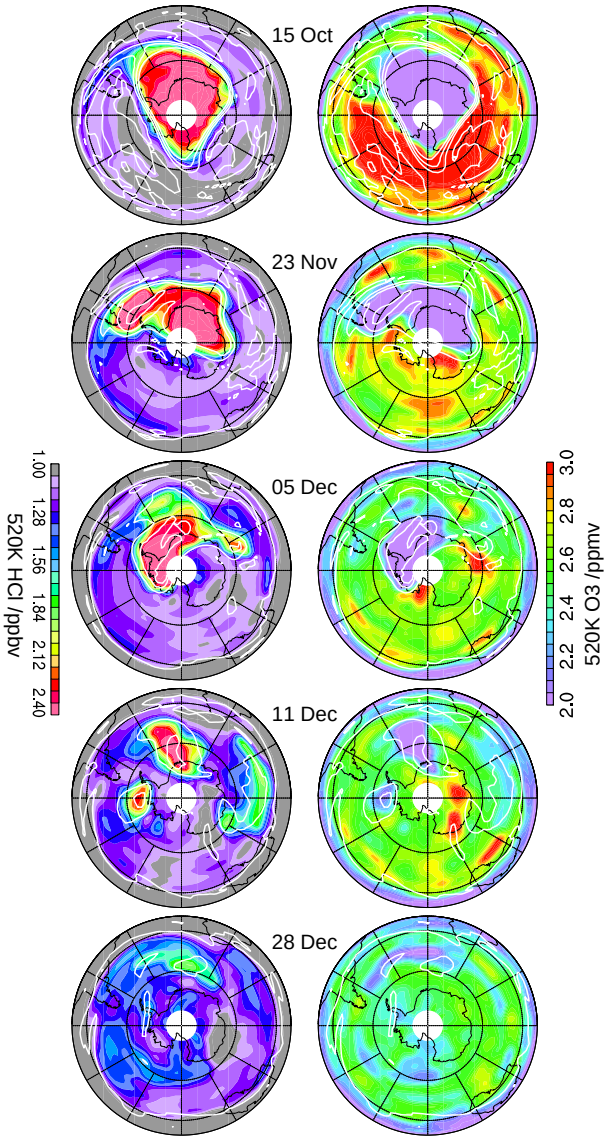

Figure 5. Maps of HCl and O_3 in the lower stratosphere (520 K is near 20 km) showing the breakup of the lower stratospheric vortex and dispersal of chemically processed air. After recovery of chlorine to reservoir forms, HCl provides an excellent tracer of vortex morphology and air motions, showing clearly the fragmentation of the vortex and dispersal of vortex remnants