

MLS Scientific Publication

Scientific Theme: Atmospheric Chemistry

Polar processing and development of the 2004 Antarctic ozone hole: First results from MLS on Aura, M.L. Santee, G.L. Manney, N.J. Livesey, L. Froidevaux, I. A. MacKenzie, H. C. Pumphrey, W.G. Read, M. J. Schwartz, J. W. Waters, and R. S. Harwood, *Geophys. Res. Lett.*, **32**, L12817, doi:10.1029/2005GL022582, 2005.

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Summary

The Microwave Limb Sounder (MLS) on NASA's new Aura satellite is providing a much more complete picture of stratospheric winter polar processing than was previously available from any single set of simultaneous measurements. Aura launched in time for MLS to observe most of the development of the 2004 Antarctic ozone hole. Here we present first results charting the evolution of many key polar processing quantities during late winter, including the first daily global observations of HCl, as well as ClO, HNO₃, H₂O, O₃, N₂O, and temperature (T). In particular, the horizontal, vertical, and temporal extent of active chlorine are shown to be consistent in the MLS ClO and HCl fields, and MLS observations of chlorine deactivation and ozone loss in late winter are shown to agree well with results from a chemical transport model. A companion paper [Manney *et al.*, GRL 32, 2005] uses Aura MLS data to study the breakup of the 2004 Antarctic polar vortex. This work benefits society by providing a comprehensive overview of polar processing leading to development of the Antarctic ozone hole and demonstrating the reliability of the new Aura MLS measurements, which will enable detailed studies to further elucidate these processes.

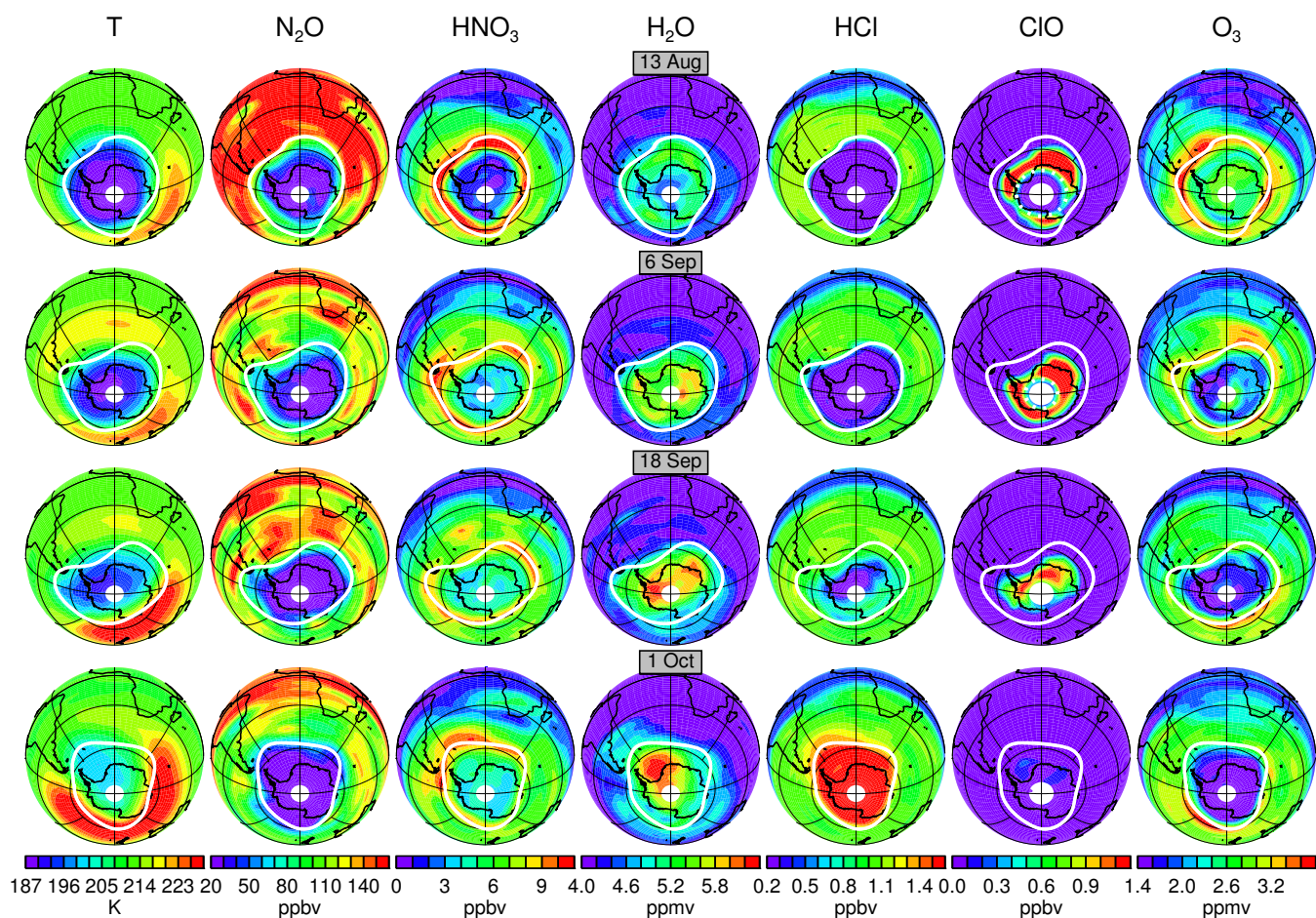


Figure 2. Maps of MLS data in the lower stratosphere (520 K, ~21 km) for selected days during the 2004 Antarctic late winter. Solid white contours outline the approximate polar vortex boundary. Only data from the “day” (ascending) side of the orbit are shown for ClO; the dashed white circle on ClO maps demarks the edge of daylight.