MLS-Related Scientific Publication

Scientific Theme: Atmospheric Chemistry

Variability of ozone loss during Arctic winter (1991-2000) estimated from UARS Microwave Limb Sounder measurements, G. L. Manney, L. Froidevaux, M. L. Santee, N. J. Livesey, J. L. Sabutis, and J. W. Waters, *J. Geophys. Res.*, **108**, 10.1029/2002JD002634, February 2003.

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Summary

Ozone observations from the Upper Atmosphere Research Satellite (UARS) Microwave Limb Sounder (MLS) are available during seven Arctic winters (1991/1992-1997/1998) and portions of the 1999/2000 winter. These observations have been reanalyzed, using the definitive data version and a "Lagrangian transport" model, to estimate the amount of chemical ozone loss that took place during each winter. MLS data, because of near-daily hemispheric coverage, are unique in their ability to show the three-dimensional time evolution of ozone during the 1990s. The results show substantial interannual variability in both the magnitude and spatial patterns of Arctic ozone loss. Most ozone loss was observed by MLS in 1995/1996 and 1992/1993. MLS observations indicate significant ozone loss during January in most years, confirming previous suggestions of mid-winter ozone loss.

This work benefits society by improving our understanding of and ability to quantify Arctic ozone loss. Because conditions in the Arctic are often near the threshold for substantial ozone loss, and because there is large interannual variability, improving our ability to quantify Arctic ozone loss from observations is crucial to understanding current and predicting future behavior.

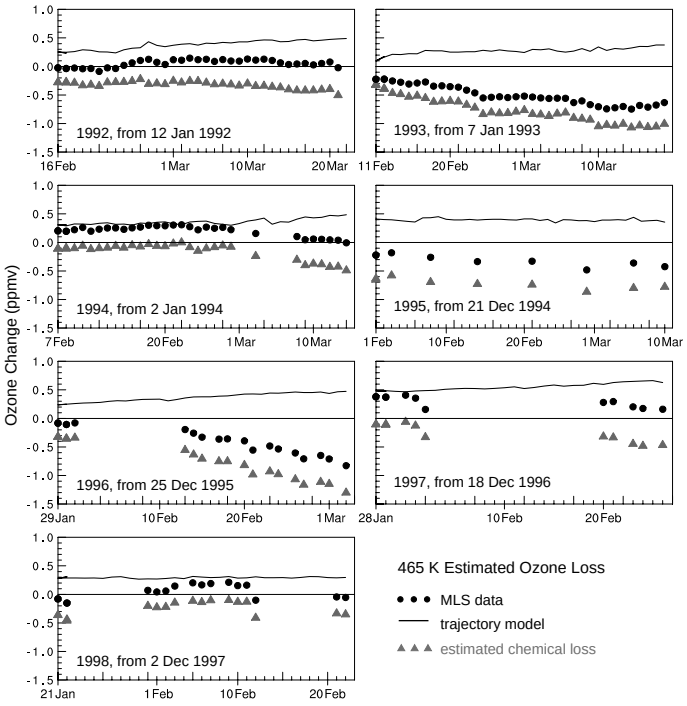

Figure 11. Time-series of MLS ozone in the Arctic vortex (solid circles) and the chemical ozone loss (grey triangles) estimated from MLS data and a Lagrangian transport model. Right side of plots provide an estimate of cumulative loss over the period of MLS observations in each winter. The difference from zero at the left of plots indicates the ozone loss that occurred in mid-winter.