

**JPL (MLS Team) Scientific Publication**  
Scientific Theme: Atmospheric Chemistry

**Lower stratospheric temperature differences between meteorological analyses in two cold Arctic winters and their impact on polar processing studies**, G. L. Manney, J. L. Sabutis, S. Pawson, M. L. Santee, B. Naujokat, R. Swinbank, M. E. Gelman, and W. Ebisuzaki, *J. Geophys. Res.*, **108**, 10.1029/2001JD000482, January 2003.

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**Summary**

Six analyzed global gridded meteorological datasets that are commonly used in polar processing studies are compared. Diagnostics such as temperature histories and the potential for polar stratospheric cloud (PSC) formation and longevity show that using different analyses can strongly influence the results of studies aimed at modeling and understanding polar processes, such as denitrification and dehydration, that profoundly influence chemical ozone loss. Although they were comparably cold, the 1995-1996 and 1999-2000 Arctic winters otherwise had very different meteorological conditions - in 1999-2000, the polar vortex and cold regions were usually concentric, while in 1995-1996 the cold region was often near the vortex edge. These different conditions affected not only the potential PSC lifetimes (much longer in 1999-2000), but also the discrepancies between different meteorological analyses (larger discrepancies in 1995-1996).

Understanding the sensitivity to the meteorological dataset used is critical to assessing the robustness of polar processing studies, and these studies are the primary tool in furthering our understanding of polar ozone loss. This research thus benefits society by improving our ability to carry out detailed data analysis and modeling studies of polar chemistry and ozone loss.

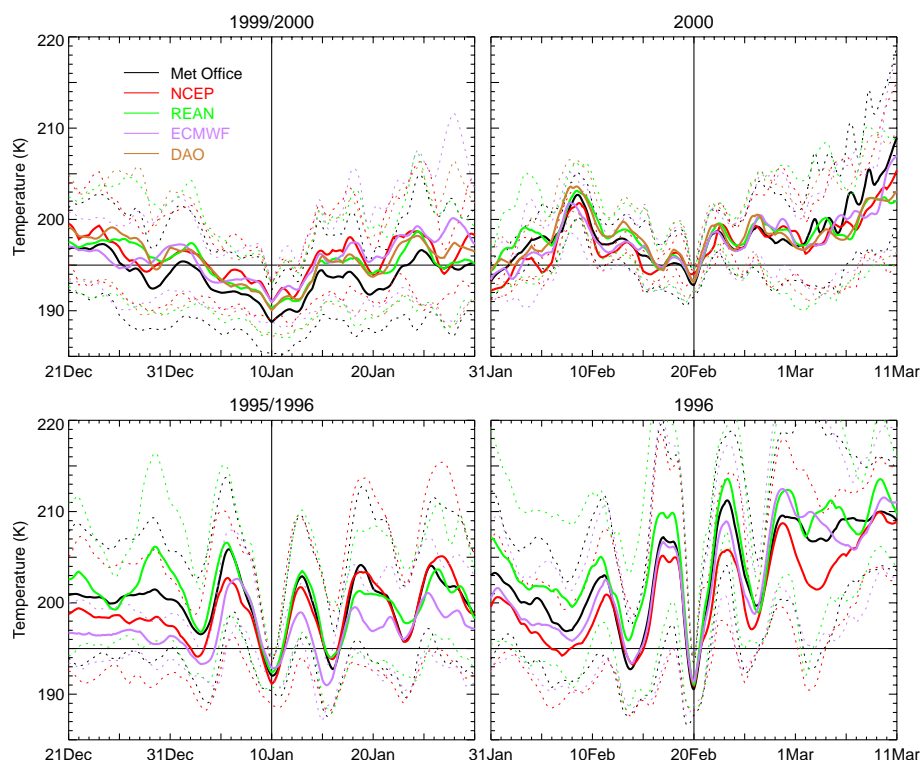


Figure 7. Average (solid lines; dashed lines show one standard deviation range) temperature history of air parcels that filled the cold region ( $T \leq 195$  K, thin horizontal line, where PSCs may form) on the central date shown, for two periods in the 1999-2000 and 1995-1996 winters, from five meteorological analyses. The amount of time spent below the PSC formation threshold varies significantly between analyses and between years.