JPL (MLS Team) Scientific Publication

Scientific Theme: Atmospheric Chemistry and Transport

ACE-FTS Measurements Across the Edge of the Winter 2004 Arctic Vortex, R. Nassar, P. F. Bernath, C. D. Boone, G. L. Manney, S. D. McLeod, C. P. Rinsland, R. Skelton, and K. A. Walker, *Geophys. Res. Lett.*, **32**, L15S05, doi:10.1029/2005GL022671, June 2005.

MLS contact: Gloria Manney, manney@mls.jpl.nasa.gov, 505-454-3364.

Summary

Measurements of long-lived trace gases from the first retrievals from the new Canadian Atmospheric Chemistry Experiment Fourier Transform Spectrometer (ACE-FTS) instrument are used to study transport in and around the polar vortex in the 2003-2004 Arctic winter. Potential Vorticity fields derived from meteorological analyses are used to classify vortex and extravortex profiles, with the classification confirmed by differences in trace gas values observed by ACE-FTS. The differences between vortex and extravortex profiles are use to estimate the amount of descent of air within the polar vortex. The polar vortex in the upper stratospher in late winter 2004 was unusually strong and long-lived, and estimates indicate strong descent at higher altitudes than previously observed.

This research benefits society by improving our understanding of transport processes in and around the Arctic stratospheric vortex. Detailed understanding of these processes in the highly variable Arctic is crucial to understanding Arctic ozone loss processes, and to detecting possible trends in temperature and ozone that may affect the health of our planet.

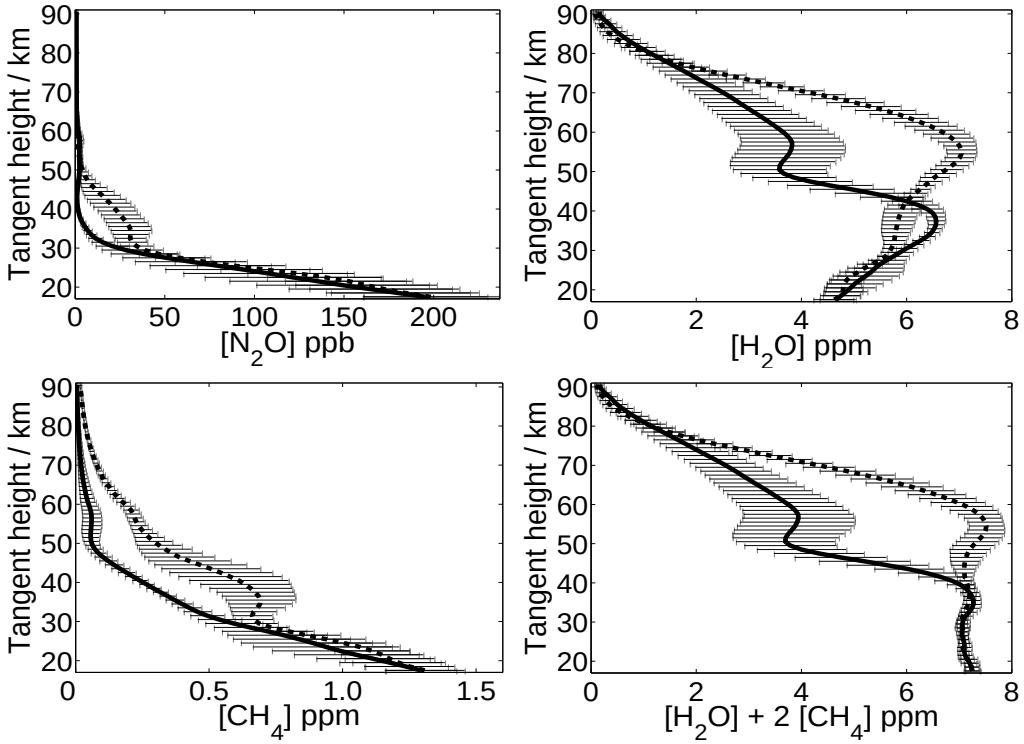

Figure 4. Plots of long-lived tracers nitrous oxide, water vapor, methane, and "potential water" calculated from water vapor and methane measured by the ACE-FTS instrument inside (solid lines) and outside (dashed lines) the stratospheric polar vortex in February to March 2004. Lower values of nitrous oxide and methane inside the polar vortex than outside above about 30 km indicate that the air within the vortex has descended from higher altitudes.