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TITLE OF RESEARCH TASK: IN SITU OZONE MEASUREMENTS FOR THE AIRBORNE ARCTIC STRATOSPHERIC EXPERIMENT

INVESTIGATOR: Dr. Gerald L. Gregory
NASA Langley Research Center
Hampton, VA 23665-5225

ABSTRACT OF RESEARCH OBJECTIVES:

The research provided in situ ozone measurements onboard the NASA Ames DC-8 research aircraft during the January/February 1989 Airborne Arctic Stratospheric Experiment. The Ames DC-8 and ER-2 aircraft performed extensive sampling of the Arctic stratosphere and troposphere in a program designed to investigate those factors important in ozone depletion in the Arctic during times when the polar vortex and meteorology are conducive to the formation of polar stratospheric clouds and/or an Arctic ozone hole. The DC-8 ozone instrument complement included in situ measurements for H_2O, NO, NO_2, NO_y (gas), NO_y (particulate), as well as remote sensors for measuring the vertical distribution and column density of ozone above the aircraft altitude. The in situ data (ozone, water vapor, and nitrogen species) at the aircraft altitude provide a definition of tropospheric conditions in the vicinity of the polar vortex and polar stratospheric clouds. Defining tropospheric conditions will assist in the understanding of the chemistry of both the stratosphere and troposphere and the extent to which polar stratospheric clouds affect the chemistry of transported air. Currently, little data are available on the chemical composition (stratosphere and troposphere) of air masses which have had encounters with polar stratospheric clouds.

SUMMARY OF PROGRESS AND RESULTS:

The in situ ozone package was successfully flown on all 19 of the AASE missions. Data have been archived and made available to the various investigators. Results show a good correlation of the ozone data among the various instrument platforms (ER-2, DC-8, sonde lanches). Comparison of the ozone and nitrogen data suggest that ozone/nitrogen oxide ratios are similar to those observed in the stratosphere. Data also suggest that the high gas phase NO_y mixing ratios can be explained by the precipitation and evaporation of particulate phase NO_y from the higher altitudes. Analyses of these data are continuing.

JOURNAL PUBLICATIONS:

Gregory, G. L., W. D. Hypes, L. S. Warren, A. D. Tuck, K. K. Kelly, and A. J. Krueger, Tropospheric ozone in the vicinity of the ozone hole: 1987 Antarctic Ozone Experiment, accepted J. Geophys. Res., 1989.