

N92-14535 J

A. Title of Research Task

Stratospheric Dynamics and Transport Studies

B. Investigators and Institutions

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C. Abstract of Research Objectives

A 3-D GCM/transport model will be used to simulate stratospheric circulation and constituent distributions. Model simulations will be analyzed to interpret radiative, chemical, and dynamical processes and their mutual interactions. Concurrent complementary studies will be conducted using both global satellite data and other appropriate data. Comparisons of model simulations and data analysis studies will be used to aid in understanding stratospheric dynamics and transport processes and to assess the validity of current theory and models.

D. Summary of Progress

(1) Revised chemistry formulation implemented in transport model to incorporate explicit transport of O_x , NO_y , Cl_x , HNO_3 , H_2O_6 , and H_2O_2 . Conducted 2-year simulation and analysis of seasonal evolution of odd nitrogen and total ozone column and begun comparison with available data. (2) Conducted 2-year simulation of N_2O distribution and begun comparison with SAMS data. Preparing to incorporate explicit transport of N_2O with other families and species in transport model. (3) Conducted multi-year simulation to study dilution effect after formation of Antarctic ozone hole and subsequent breakup of the vortex. (4) Analyzed annual cycle from model simulation to elucidate large-scale transport of ozone between troposphere and stratosphere. (5) Analyzed polar jet instability in Southern Hemisphere using LIMS and SSU data. (6) Performed comparative analysis of stratospheric warmings from multi-year SSU data set.

E. Publications

Grose, W. L., R. S. Eckman, R. E. Turner, and W. T. Blackshear: Global Modeling of Ozone and Trace Gases, in Atmos. Ozone and Its Policy Implications, T. Schneider (Ed.), Elsevier Publ., Amsterdam, 1989.

Miles, T. and W. L. Grose: Upper Stratosphere Polar Jet Instability in the Southern Hemisphere, Geophys. Res. Lett., 16, 1989.

Grose, W. L., T. Miles, K. Labitzke, and E. Pantzke: Comparison of LIMS Temperatures and Geostrophic Winds with Berlin Radiosonde Temperature and Wind Measurements, J. Geophys. Res., 93, 1988.

Miles, T. and W. L. Grose: Comparison of Geostrophic and Nonlinear Balanced Winds from LIMS Data and Implications for Derived Dynamical Quantities, PAGEOPH, 129, 1989.

Grose, W. L. and A. O'Neill: Comparison of Data and Derived Quantities for the Middle Atmosphere of the Southern Hemisphere, PAGEOPH, 129, 1989.