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Final Report

for

The Project Entitled

Prediction of Dynamical Impact of Changes in Stratospheric Ozone

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Under this grant one paper by Lou et al (1997) has appeared in J. Geophys. Res. and a second paper by Kindler et al is in press in the same journal. These papers both describe N_2O simulations using UKMO and Goddard assimilated wind fields and comparisons of the results against CLAES N_2O observations. The results of these studies indicate some of the difficulties of using the assimilated wind fields, and the vertical motions in particular, in simulating long term variations in trace gases in the stratosphere. On the other hand, qualitatively the results possess a number of features of the observations even on time scales longer than a month or two.

More recently we have started to examine results obtained using NCAR models developed by Dr. Tie, a 3D version of which also uses the UKMO assimilated wind fields. Calculations have already been made with their 2D model with emphasis on the seasonal cycle in ozone at high latitudes in the upper stratosphere. This study is directed at the reported interhemispheric asymmetry in stratospheric ozone losses since 1979. Simultaneously trends in stratospheric ozone have been studied in detail from SAGE and UARS observations. The trend results from a significant part of the SPARC ozone trends report and the trend asymmetry was addressed in a paper at the Fall AGU meeting last December. The preliminary results regarding the latter are that despite significant observed dynamical differences between the hemispheres, the modeled interhemispheric trend differences are small. Moreover, observations of the trends since 1984 do not show a significant interhemispheric asymmetry in upper stratospheric ozone. Therefore any asymmetry in the trends must have occurred prior to the mid-eighties and would most likely have been related to interhemispheric differences in upper stratospheric temperature trends.

Another activity has been to compile an ozone climatology from UARS and SAGE observations. This effort has been performed as part of a UARS team activity to assemble a climatology of all the UARS long-lived trace gases for 1992-1993. The results are being

presented in two ways: latitude-pressure level monthly-mean cross-sections and equivalent latitude-potential temperature surface monthly-mean cross-sections. For ozone, this has involved producing 5 years of potential vorticity versus equivalent latitude maps. The ozone climatology is currently being submitted to the UARS climatology team date archive and the results will be presented at the COSPAR meeting in Nagoya, Japan in July.

References

Lou, G.P., F.N. Alyea, D.M. Cunnold, and T.P. Kindler, N_2O transport in a 3D model driven by UKMO winds, J. Geophys. Res., 102, 16065-16087, 1997.

Kindler, T.P., D.M. Cunnold, F.N. Alyea, W.L. Chameides, G.P. Lou, and K. Schwan, An evaluation using ^{14}C and N_2O simulations of 3D transport driven by UKMO and GSFC assimilated winds, J. Geophys. Res., in press, 1998.