Geophysical Research Abstracts, Vol. 7, 08322, 2005
SRef-ID: 1607-7962/gra/EGU05-A-08322

Interannual variations of stratospheric ozone and temperature in long-term observations and chemistry-climate model simulations

B. Hassler (1), W. Steinbrecht (1), H. Claude (1), P. Winkler (1), M. Dameris (2), V. Grewe (2), B. Steil (3), C. Bruehl (3)

(1) Met. Obs. Hohenpeissenberg, German Weather Service, Germany, (2) DLR Oberpfaffenhofen, Wessling, Germany, (3) MPI for Chemistry, Mainz, Germany

We report on the comparison of total ozone and temperature long-term observations (TOMS/SBUV, NCEP-reanalyses, sondes and lidars) with simulations from state of the art chemistry-climate models (ECHAM4.L39(DLR)/CHEM or MAECHAM/CHEM). The focus is on the comparison of observed and modelled interannual variations, due to trends, QBO, 11-year solar cycle, strength of the polar vortices, tropospheric meteorological parameters and other factors. The model runs are transient experiments where observed sea surface temperatures, increasing source gases (CO_2, CFCs, CH_4, N_2O...), solar cycle, volcanic aerosols and the QBO are accounted for. Total ozone and lower stratospheric temperature show very similar variation patterns. Both models reproduce this similarity. They also reproduce the global patterns of the various modes of variability surprisingly well. Main contributors to the interannual variations in observations as well as in model results are a trend (up to -30 DU or - 1.5 K/decade), the QBO (up to 25 DU or 2.5 K peak to peak), the strength of the polar vortices (up to 50 DU or 5 K peak to peak) and tropospheric meteorology (up to 30 DU or 3 K peak to peak). The models tend to have polar vortices that are too strong and last too long. This well known ”cold-bias”, results in more chemical ozone loss and a stronger temperature decrease in polar regions, in the simulations. Also, wave number 1 tends to be less pronounced in the model runs: Zonally non-symmetric, strong signals from QBO and solar cycle are found close to the Aleutian Islands in the observations. Similar features appear in the model runs, but at different longitudes.