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Forecasting the weather
- ensemble techniques
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Sensitivity of stratospheric dynamics and chemistry to QBO nudging width in the chemistry-climate model WACCM

F. Hansen (1,2) and K. Matthes (1,2)

(1) Institut für Meteorologie, Freie Universität Berlin (FUB), Berlin, Germany, (2) Helmholtz Centre Potsdam, German Research Centre for Geosciences (GFZ), Potsdam, Germany

The Quasi-Biennial Oscillation (QBO) is the dominant mode of variability in the equatorial lower to upper stratosphere. Most recent general circulation models (GCMs) are still not able to generate an internal QBO, due to insufficient spatial resolution or missing small-scale processes like tropical convection. Nudging techniques are therefore used to relax the modeled zonal wind along the equator towards observations.
We investigate the response to the width of the QBO nudging in NCAR's Whole Atmosphere Community Climate Model (WACCM) version 3, a fully interactive chemistry-climate model extending from the Earth's surface through the thermosphere (about 140 km). Two SPARC-CCMVaL REFB1 simulations of the recent past (1960-2006) are compared. In the first simulation, the zonal mean zonal winds are relaxed towards observations within an equatorial band extending from 22°S-22°N. In the second experiment, the QBO nudging width is decreased to 8°S-8°N.
We focus on the question of how QBO nudging width influences the dynamics and chemistry of the atmosphere, with emphasis on the representation of the Holton-Tan mechanism in the polar stratosphere. The model results are validated with ECMWF extended reanalysis data.