



Ozone Radiative Effects on the Quasi-Biennial Oscillation in the Equatorial Stratosphere

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Radiative feedback effect of ozone on the quasi-biennial oscillation (QBO) is investigated with a chemistry-climate model of Meteorological Research Institute, MJ98-CCM. The dynamical module (MJ98) is a spectral global model of T42 truncation with 68 layers extending from the surface to 0.01 hPa (about 80 km), wherein the vertical spacing is 500m in the stratosphere. To reproduce QBO in zonal wind, Hines gravity wave (GW) drag is incorporated with enhanced GW source in the tropics. Further, the horizontal diffusion is weakened to 180 hrs at the maximum wavenumber of 42 in the middle atmosphere, while a conventional value of 18 hrs is used in the troposphere not to change the model climate. Two control CCMs of interactive and non-interactive ozone are so prepared with different configurations for horizontal diffusion profiles that the two CCMs successfully reproduce zonal wind QBOs with realistic periods of 31 and 27 months in the equatorial stratosphere without trend, though the amplitudes are somewhat smaller than observations. By switching the ozone feedback off or on for the interactive or non-interactive run, the radiative effect of the zone QBO on the dynamical QBO is explored. It is found that the switching-off experiment shortens the QBO period from 31 to 20 months and that the switching-on experiment elongates the period from 27 to 48 months.