

The dynamical influences of the equatorial QBO on the winter stratospheric circulation in the Northern Hemisphere

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The effects of the equatorial quasi-biennial oscillation (QBO) on the extratropical stratosphere are investigated with statistical methods, focused on winter months in the Northern Hemisphere, based on both 44 years of the ERA-40 reanalysis dataset (1958-2001) and 125 years of the simulation data set (5members times recent past 25 years from 1980 to 2004) according to REF1 common scenario. The QBO can be simulated employing the Hines non-orographic gravity wave drag scheme using the Meteorological Research institute (MRI) GCM, which includes full stratospheric chemistry. The model can more or less realistically reproduce the observed QBO and/or QBO signals. The power spectrum analysis of the equatorial zonal-mean zonal winds showed that the simulated QBO has a period of 27 months; this is very similar to the observed period of 28 months. However, the simulated QBO power is reduced by about 80 % of the observed one. The simulated QBO signals of the zonal wind and temperature are well reproduced with regard to extratropical influences, which are characterized by the colder and stronger polar vortex during the westerly QBO phase.