



Effects of volcanic eruptions on the quasi-biennial oscillation

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The quasi-biennial oscillation (QBO) in the zonal wind is the most prominent feature of interannual variability of the tropical stratospheric circulation. The period of this oscillation is about 24-30 months and zonally symmetric easterlies and westerlies alternate quasi regularly. These different phases have different consequences on the stratospheric tropical and extratropical circulation. Mt. Pinatubo volcano erupted on June 15, 1991 during the easterly QBO phase at 30 hPa and the phase change took place in August 1992. Observations show that the downward propagation of the easterly phase of the zonal wind has been slower after the eruption. The QBO cycles are unique in nature and hence, similar delays have been seen in the observed QBO data record. Therefore, it is not possible to affirm that this delay is due to this particular volcanic eruption or whether it is independent of the volcanic aerosol forcing on the QBO. However, it is possible to analyze this using a numerical model that includes an internally generated QBO. Here, we try to investigate whether there is a possible influence of volcanic aerosols on the QBO, for example, the variation in period of the QBO and amplitude. For this, the middle atmosphere version of the general circulation model that includes an internally generated QBO, MAECHAM5, in T42L90 resolution is employed to carry out ensemble simulations for two years (June 1991 - May 1993) following the eruption. The simulations are carried out with climatological SST as boundary conditions to isolate the feedbacks from the ocean. The model is forced by

zonally averaged values of aerosol extinction, single scattering albedo and asymmetry parameter and volcanically induced ozone anomalies. The tropical and extratropical responses to the different QBO phases are also discussed.