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## Global Ozone Signals Associated with Extreme NAM Events in the 1980-2004 Simulation of the MRI CCM

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Global ozone changes during the extreme northern annular mode (NAM) events are investigated in the simulation of a middle-atmosphere chemistry-climate model (CCM) of Meteorological Research Institute (MRI). The data is comprised of five-ensemble simulation of the past 25 years (from 1980 to 2004) under observed forcings. The MRI-CCM is a spectral global model of T42L6 8 with detailed ozone photochemistry in the stratosphere. In the simulation the distribution of the NAM values is so different from that of observations that stronger vortex events more frequently appear. Thereby, the criterion for positive NAMs (vortex intensification, VI) is set to +2.5 at 10 hPa and the one for negative NAMs (stratospheric sudden warming, SSW) is -3.0, in contrast with usually used criteria for observed data, +1.5 and -3.0. In total, 36 positive NAMs and 30 negative NAMs in 125-year data are analyzed. The composites of positive and negative NAMs possess similarly 40-50 days persistent period in the lower stratosphere and troposphere, being close to the observed NAMs. The high-latitude ozone changes for SSWs exhibit abrupt increase in the lower stratosphere from about one week earlier of onset and the increase persists for more than one month. On the other hand, the low-latitude ozone starts to decrease about one month earlier with a peak at the onset and the decrease persists for more than one month. Ozone signals for VIs show signs opposite to those for SSWs in the high- and low-latitudes. However, the pre-onset signals are more prominent for VIs than for SSWs.

Keywords: Chemistry-Climate Model, ozone, NAM, simulation