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Ozone hole indices and wave activity in the Southern Hemisphere

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Relationships between the ozone hole indices and atmospheric wave activity in the Southern Hemisphere are examined. The data used for the analysis are TOMS, JRA25, and the output from the CCSR/NIES CCM for the future projection of ozone (the REF2 experiment) defined by CCMVal, that from REFB2 for CCMVal2, and that from a REFB2 run using a new CCM that was constructed based on a GCM for IPCC-AR4 (MIROC 3.2). Analysis was made for the period 1990-2009, when the Antarctic ozone loss developed and nearly reached the maximum. The result shows a similar relationship between the observation and the CCM; a positive correlation with statistical significance between annual minimum total ozone and September wave amplitude, and a negative correlation between annual maximum ozone hole area and September wave amplitude, which are expected by the assumption that a large wave activity brings more ozone, more heat, and more NO_x from the mid-latitudes to the Antarctic region, thus reduces the ozone loss in the Antarctic in the year. However, a few exceptions were found. These exceptions are analyzed and discussed.

Keywords: ozone hole, wave activity, CCM, CCMVal, CCSR/NIES, future projection