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INTERANNUAL VARIATION OF THE STRATOSPHERIC CIRCULATION IN THE SOUTHERN HEMISPHERE DURING WINTER TO SPRING —OBSERVATION AND SIMULATION—(ABSTRACT)

Koji YAMAZAKI, Masaru CHIBA and Kunihiko KODERA

Meteorological Research Institute, 1–1, Nagamine, Tsukuba 305

To obtain dominant interannual variation patterns of the stratospheric circulation, an EOF (Empirical Orthogonal Function) analysis is performed using variance matrixes of the monthly and zonally mean zonal wind in the southern hemisphere both for observed and simulated data. The observed data are based on US NMC analysis covering 1000–0.4 hPa for 12 years 1979–1990. The simulated data are based on a 10-year simulation by the R24L23 version of the MRI global spectral model with climatological sea surface temperature. In the observation, the 1st eigen modes explain more than 38 % of the total variance during June to November. The 1st mode in July is a meridional dipole pattern in the stratosphere. Inspecting daily variations, this mode expresses the timing of the poleward and downward shift of the polar night jet. In the succeeding months, the pattern of the 1st mode shifts poleward and downward; and in October and November, the pattern expresses the variation in strength of the polar night jet. Correlation coefficients between the score of the 1st mode in one month and that in the next month are over 0.7 from July to October. That means that the circulation in July almost determines the following seasonal change until November. More precisely, in the year when the midwinter shift of the polar night jet occurs early, the final breakdown of the polar vortex in spring occurs early. In the simulation without any interannual change of boundary and external forcings, very similar 1st modes are obtained with much higher contribution rates. Therefore, the observed dominant interannual variation is not considered to be a response of variant boundary forcings.

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