

this variation occurred are almost the same as those of the Arctic response. The differences of the date and tendency between the Arctic and Antarctic responses cause no problem, because the same disturbance can cause the opposite direction of the heat flux, if the basic state is different. This variation in Antarctica must have the same origin as the Arctic response.

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UPPER STRATOSPHERIC CIRCULATIONS: A COMPARISON BETWEEN THE NORTHERN AND SOUTHERN HEMISPHERES (Abstract)

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By the use of observations from Nimbus-5 and TIROS-N/NOAA satellites the upper stratospheric circulations are investigated, especially by paying attention to the differences between the Northern Hemisphere (N.H.) and the Southern Hemisphere (S.H.).

One of the most notable features of the thermal structure in the upper stratosphere is the reversal of north-south gradient of the zonal temperature observed in higher latitudes of the S.H. in late winter. This pattern regularly appears every year in the S.H., while it is highly variable in the N.H. because of the occurrence of sudden warmings.

From the statistical analysis, it is found that variability of the zonal mean temperature is much different between the two hemispheres: The increase of the S.H. temperature is highly oscillatory throughout the period from winter to summer, whereas the temperature in the N.H. increases abruptly in midwinter and rather gradually from spring to summer. In association with the temperature variation, the transient planetary waves of wavenumber 2 are predominant in the S.H., in contrast to the dominant steady waves in the N.H.

It is also found that these characteristics of thermal field and wave activity are closely connected with the seasonal variation of zonal mean wind in the stratosphere.

For details, the reader may refer to the full paper of this work (HIROTA *et al.*: Q. J. R. Meteorol. Soc., **109**, 443, 1983).

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SEASONAL VARIATION OF THE VERTICAL GRADIENT OF GLOBAL MEAN TEMPERATURE IN THE UPPER STRATOSPHERE (Abstract)

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Seasonal variation of the vertical gradient of global mean temperature in the upper stratosphere is investigated with the use of the data from the top channels of Nimbus 5 Selective Chopper Radiometer (SCR) for two years from 1973 to 1974 on daily basis. As the index of the temperature gradient is introduced the

difference of globally averaged radiances between one channel and another. It is found that the index of the temperature gradient in the upper stratosphere assumed quasi-semiannual oscillation, though the oscillation was modified for the year 1974: the amplitude of the oscillation for the difference of radiances between channels B23 and B34 (whose weighting functions peak around 38 km and 33 km respectively) was about 25% of the time mean value, peaking around day 90 (1973), day 270 (1973), day 60 (1974), day 200 (1974) and day 330 (1974). The date of the peaks in 1973 almost coincided with the westerly phase of the well-known semiannual oscillation of mean zonal wind in the equatorial upper stratosphere.

The factors which determine the global mean temperature gradient are considered to be the vertical distribution of radiative heating (associated with the ozone distribution) and that of the vertical heat transport by atmospheric motion. The effect of planetary waves among the factors is investigated. As the index of the vertical heat transport by planetary waves is adopted the globally averaged standard deviation of radiances around the zonal mean. It seems that the planetary wave activity could not produce the semiannual oscillation of the temperature gradient, whereas it was related to the modification of the oscillation for the year 1974.

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