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ON INTERANNUAL FLUCTUATION OF THE AMOUNT OF OZONE IN THE NORTHERN HEMISPHERE (INTRODUCTION)(ABSTRACT)

Hiromichi MORI

Japan Meteorological Agency, 3–4, Otemachi 1-chome, Chiyoda-ku, Tokyo 100

Papers about ozone layer variability and related topics published in the U.S.S.R. from 1989 to 1991, are introduced.

(1) Long-term variations and trends in total ozone over the Northern Hemisphere

From ground-based network data the mean zonal variations in total ozone of 1974–1986 are estimated using approximation by spherical functions. Low total ozone values of 1983 and 1985 result in negative linear trends in total ozone over the Northern Hemisphere being equal to −1.4% over 10 years with standard deviation of 0.9%. Their amplitudes rise to 15–20 D.U. in January in the near polar areas but decrease to several D.U. in other seasons.

(2) On interannual ozone layer variability in the Northern Hemisphere wintertime

Data of land-based American and European stations in winter of 1966–1987 are analyzed and point to the presence of correlations between the total ozone and 10–12 years atmospheric cycle in the western phase of a quasi-biennial cycle. These correlations are similar to those between the 11 years solar cycle and the temperature in the North Pole lower troposphere. But for the eastern part of a quasi-biennial cycle no distinct correlations between the total ozone and 10–12 years cycle were found.

(3) Investigation of total ozone content and polar stratospheric clouds during winter-spring 1989 over the Arctic

At Heise Islands of the Arctic, the total ozone content and stratospheric clouds were observed during winter–spring 1989. Distinct decrease of the total ozone content was not found. Advection of ozone from low latitude to the Arctic causes when the polar vortex collapses. Polar stratospheric clouds are observed when the lower stratospheric temperature is below −80°C alone Heise Islands.

(4) Height trend of the center of the winter stratospheric vortex

Correlations between the height of the center of the stratospheric vortex (10 hPa) and the total ozone content are analyzed from December to February of 1960–1990. In general the height of the center of the stratosphere in each month (so-called winter stratospheric temperature) tends to fall, and the correlation coefficient between the total ozone content at 53–64°N and the height of the center of the stratosphere is 0.7.

(5) Monsoon circulations and atmospheric ozone

The effect of the Indonesian-Australian winter monsoon, directed from the Asian continent to the south, on atmospheric ozone is considered. Within this air flow the typical tropical ozone layer is formed. Its concentration maximum rises from 22 to 26.5 km, and the total ozone content, being below 240 D.U. under the monsoon, sometimes is reduced to 197 D.U., resulting in a deep tropical ozone anomaly.

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