CAN THE NORTHERN HEMISPHERE ANOMALIES BE IDENTIFIED WITH THE ANTARCTIC OZONE HOLE?

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Systematic studies of the Antarctic ozone hole evolution have only became possible from 1979, after the beginning of column ozone observations over vast territories using a satellite-borne TOMS instrument. The impossibility either to predict or even to explain the basic features of the hole's time series shows the lack of knowledge about its origin. Moreover, no commonly accepted approaches to identify ozone anomalies observed in the Northern Hemisphere with those in the Antarctic have been elaborated. Using TOMS column ozone measurements made since 1979, we have intercompared the ozone holes observed in different years with regard to their area, evolution kinetics, column ozone minimums, shape and center position, rotation rate, the extension of ozone anomalies over middle latitudes, etc. By the combination of its features, the 1998 ozone hole seems to be the most significant one. However, the 2000 ozone hole was also marked by several record characteristics - the area, the earliest ever onset, and the largest extension over a 50-55 (S latitudinal belt. The 2001 ozone hole was similar to that observed in 1998, but ca. 10 % less intensive. We believe that the basic features of the Antarctic ozone hole are: 1) regular occurrence in late winter and spring periods, 2) a local minimum in seasonal column ozone variability instead of a maximum to be expected by analogy with its seasonal variability both in middle latitudes and the high latitudes of the Northern Hemisphere, and 3) the presence at a 15-20-km level of a local minimum in the vertical ozone profile, plotted in terms of ozone mixing ratio, instead of a monotone increase to be expected. Based on TOMS instrument data, ozone anomalies over the Antarctic were clearly observed as early as the late 1970s. We believe that the development of the Antarctic ozone hole is to a much larger extent governed by the evolution of meteorological parameters in the upper atmosphere, than by the increase of clorofluorocarbons concentrations in it. In the Northern Hemisphere, the most considerable column ozone decreases occurred in the spring months of 1995, 1997 (both over Eastern Siberia) and 2000 (over Greenland and Canada). Although some of their characteristics were similar to those in the Antarctic ozone hole, others were not as compared with the Antarctic ozone anomalies even of 1950s. Column ozone anomalies in the Northern Hemisphere are largely related with the Arctic (or Northern Atlantic) Oscillation.