

Possibility of a northern analog of the spring Antarctic ozone hole

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Monitoring of total ozone over Antarctica during the development of the spring ozone anomaly ("ozone hole") in this region is of importance due to possibilities of most reliable observation of the manifestations of the ozone layer evolution. In particular, such investigations are necessary for future prediction of such phenomena in the Arctic. Peculiarities of the ozone hole development in Antarctica have been considered and the most important features characterizing this phenomenon revealed: 1) the occurrence of total ozone minimum during the period when its maximum is expected to occur, 2) the presence of a noticeable (by more than 10%) total ozone dip in polar latitudes compared with the mean values, and 3) a dip in the vertical distribution of the ozone mixing ratio in the height range (15-20 km) where maximum partial ozone pressure must be expected. The most important ozone hole characteristics are its area, thickness, and integral ozone deficit during the anomaly existence. In general, the largest ozone hole was observed in 1998. Certain signs of the ozone hole have already been detected during early total ozone observations at all the observation points in Antarctica since the 1950s (G.M.B. Dobson). The anomaly was also detected in the first total ozone satellite-borne observations in the early 1970s (Nimbus-4/BUV). It was only once that total ozone near the north pole in spring was observed to be considerably less than in the middle latitudes of the Northern Hemisphere: in March 1997, the mean zonal total ozone value near the north pole was approximately 1.25 times less than that observed in the middle latitudes. In other years, the state of total ozone in the Arctic can hardly be considered as abnormal: the mean zonal total ozone value in the high latitudes decreased relative to the mid-latitude maximum by not more than 10 %. Therefore, the term "Arctic ozone hole" can only be justified as applied to the ozone layer state in the spring of 1997. No other such phenomena have been observed so far.