

## About representative pattern of observations of ozone holes in the polar cap during proton events

V.I.Demin ( *Polar Geophysical Institute, Fersman str.14, 184209, Apatity, Russia, [Demin@pgi.kolasc.net.ru](mailto:Demin@pgi.kolasc.net.ru)* )

There are large-scale (thousands of kms) troposphere-stratosphere masses of air inside which the ozone values (TOC) varies insignificantly (no more than by 6%) (1,2). Borders of those air masses are formed by jet streams in the upper troposphere, with their activity spreading from 2 to 25 kms altitude. Variations of the TOC during the transition from cyclonic to anticyclonic part of jet streams are of a sharp nature and they make up to 5 - 30% (3).

One of the planetary high-altitude frontal zones, a jet stream being an inherent part of which, is continuously present at auroral latitudes. Its shifting is capable of producing sharp variations of TOC at some stations. In case if this shift coincides in time with proton events it is easy to interpret this simple temporal coincidence as real physical process. Hence, there are imposed high requirements to synoptic homogeneity when considering specific events. The dependence between solar activity induced events and the TOC should only be sought outside jet stream zones or in summer period, when the difference in ozone contents in the arctic air mass and the temperate one is the least and the effect of their interchange is minimal.

Unfortunately, in papers (4,5) those conditions were not taken into consideration, as a result the described cases of TOC increase (+10%) during the Forbush decrease in February 1978 (4) and the decrease (-20%) during solar proton events in May 1990 (5) can also be given a purely dynamical interpretation, connected with the shift of jet streams' axes, which is clearly seen in synoptical maps for corresponding periods.

On the other hand, the negative result, obtained when considering the variations of the general contents of ozone during proton events in paper (6) may be explained by the fact, that dynamical mechanisms of the variation of total contents of ozone prevailed over the proton ones. In these conditions a simple averaging without aerosynoptical analysis becomes unacceptable.

This study was supported by RFFR grants №№ 02-05-64114, 02-05-79148 and INTAS № 01-0016.

### References:

1. A.M.Shalamyanski, K.I.Romashkina, «Distribution and splitting of the general ozone contents in various air masses», *Izv. AN SSSR, FAO*, V.16, 1980, N.12.
2. A.Kh.Khrguian, G.I.Kuznetsov, «The challenge of studying the atmosphere ozone», MSU, 1981.
3. G.P.Guschin, «Distribution of ozone and atmosphere dynamics in the zone of a jet stream», *Izv.AN SSSR, FAO*, V.16, 1980, N.3.
4. O.I.Shumilov, E.A.Kassatkina, «Influence of cosmic rays on the ozone layer», «Geomagnetism and aeronomy» 1997, N.1.
5. O.I.Shumilov, E.A.Kassatkina, O.M.Raspopov, K. Henriksen, «High latitude ozone «miniholes» and solar protons» «Geomagnetism and aeronomy», 1996, N. 6.
6. V.K.Roldugin, «Constancy of the general ozone contents at the intrusion of relativistic protons», *Meteorology and Hydrology*, 2000, N. 3.