CONTRADICTIONS IN THE THEORY OF OZONE HOLE FORMATION

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In this paper I would like to attract attention to contradictions in the modern theories of ozone hole formation that unilaterally consider only the anthropogenic factor connected with the industrial emission of freones into the atmosphere. Temporal behavior of the total ozone content in 1978–1985 and 1985–1993 periods is shown to be of opposite signs. The positive trend in the second period can in no way be connected with the anthropogenic impact on the ozonosphere being a consequence of natural processes.

Recently, the theory of ozone holes has become widely spread, which, being discussed in mass media and officially supported by international organizations, created hysteria about this poorly studied problem. The theories of ozone holes are contradictory and give no reasonable solution to this problem.

Let me now describe briefly the history of this problem. The Earth's atmosphere and ozone in it, protecting against UV radiation, appeared seven hundred million years ago, allowed the life to make a step from the ocean to land. The ozone content in the atmosphere has long been studied. Early in this century the presence of ozone, as well as radon in the ambient atmosphere often served for advertising different places of resort. Now such facts are usually passed over in silence.

There was British scientist, G. Dobson, who discovered the dynamics of ozone content variation in the atmosphere during the observation for International geophysical year (IGY) (1957–1959) at the Holly-Bay station (Great Britain). Using the device he constructed, he conducted the measurements of ozone content in the atmosphere and noticed a decrease in the ozone content during the Antarctic spring (September, October) which then grew to its initial value by November. Dobson correctly associated[1] this phenomenon with the atmospheric dynamic processes running in winter above the Antarctic. Then similar phenomena were observed at other stations, as well as in the northern hemisphere. Just these observations gave rise to speculations about the presence of dangerous "holesB in the ozone layer and about their connection with the atmospheric pollution with freons (although in IGY production of freons were negligibly low). Freons are used in refrigerator industry and as a filler of sprays, and the blame for ozone holes occurrence and, consequently, for the global danger due to penetration of the UV radiation were put on them without any doubts.

Certainly, such chemical compounds as freons as well as a lot of other fluorine and chlorine oxides, reacting with ozone, destroy the ozone layer. But how great is the contribution of this destruction into the process of ozone holes formation?

Extensive observations of the global distribution of ozone are now being conducted, including those using the TOMS (Total Ozone Mapping Spectrometers) systems on Nimbus-7 and Meteor-3 satellites.

Let us consider some data obtained during 15-year observations using the TOMS system.[2] Figure 1 shows the behavior of total ozone content in the atmosphere from 1978 till 1993. One can see from the figure that if until 1985 the total ozone content in the atmosphere decreased, then during succeeding eight years it increased. (These data correspond to the latitude belt from 69°N to 69°S.) The decrease in the ozone content by 1985 is 3% per decade, and even if it can be accounted for by the anthropogenic impact on the atmosphere, then its following rise can be explained by only natural reasons that, as will be shown below, can initiate oscillations in both directions.

Figure 2 shows the 3-D plot of seasonal oscillations in the earth's ozonosphere for the same period (1978–1993). Here some regularities attract our attention: seasonal oscillations in the ozone content are clearly seen, and the higher is the latitude, the higher is the amplitude. The absolute value of the ozone content at the equator is far lower than that in high latitudes in the presence of ozone holes, but this fact for some reasons worries nobody. Seasonal peaks differ from each other, that can be a result of external effects, such as El-Ninio phenomenon, occurring with the interval of two to three years, or volcanic eruptions (El Chichon, 1982, Mt. Pinatubo, 1991), as well as 11-year periods in the solar activity. This is clearly seen in Fig. 3, where the correlation between the number of sun spots and the global ozone content[3] can readily be followed. The dashed line in Fig. 3 is for the trend for the last 17 years, to which all the supporters of ozone disaster refer. It is clear that five years apart this trend will change its sign.

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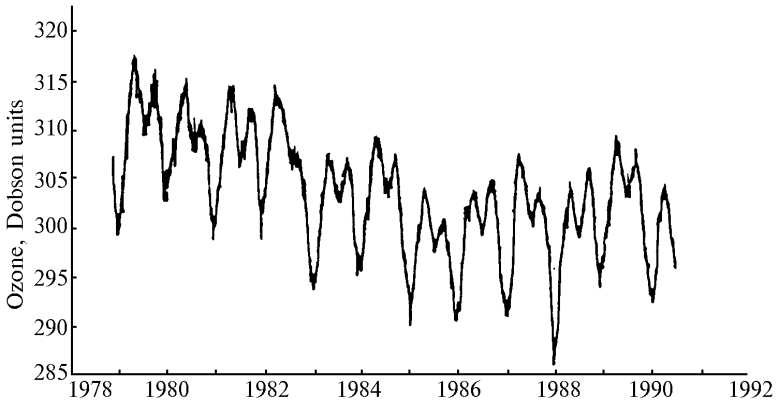

FIG. 1. The ozone concentration as follows from the TOMS system data[2] *for the* 69°N–69°S *latitudes belt.*

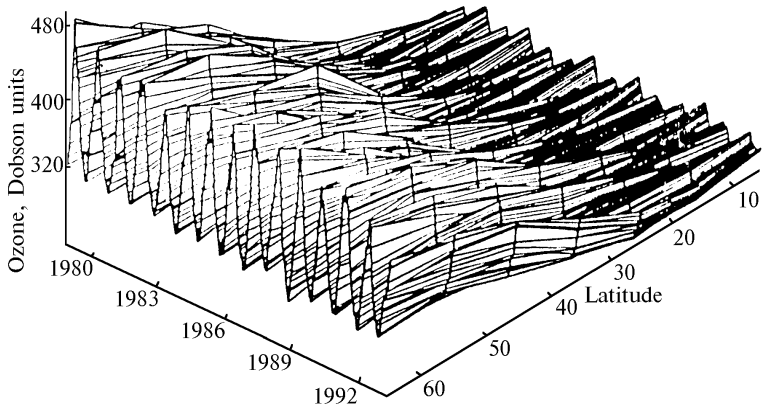

FIG. 2. The 3-D plot of ozone distribution in space and time from the TOMS system data.[2]

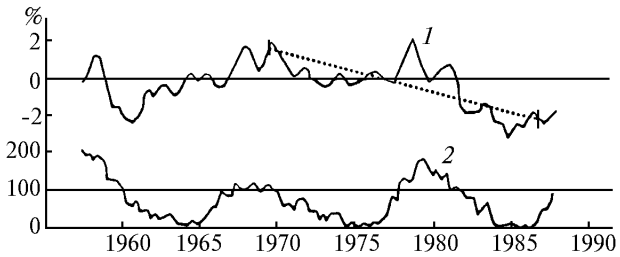

FIG. 3. The relation between the total ozone content (1) measured from the ground and the sunspot number (2) reflecting the cycles of solar activity.[3]

Many other natural reasons for oscillation of the ozone content in the atmosphere can be listed. In this context, it should be noted that the total ozone content varies within 2–3%. The point is that the occurrence of local and seasonal holes is often debated, in which the ozone content varies by several tens per cent. The most well-known is the Antarctic hole discovered by Dobson even before the problem of freon emissions into the atmosphere has arisen. Similar holes were then discovered in the northern hemisphere, but they were several times smaller than the Antarctic one and also had a temporary character.

Many authors note the connection of such holes with dynamic processes in the atmosphere, whose role is far greater than any chemical pollution of the atmosphere due to human activity.[4–6] Unfortunately, the mass media presents only one point of view, fully ignoring any doubts in the unambiguous character of the theory of chemical destruction of the ozone layer.

The intergovernmental agreements on prohibition of freon production concluded in Rio de Janeiro were based on the document prepared by the group of experts. This document in some mysterious way lost the part devoted to the influence of natural factors on the ozone layer variations. This part was prepared by supporters of the theory of natural reasons for ozone layer variation and accompanied the main report about the meeting of Interstate Group of Specialists on Climate Changes at the UN, which took place at the same time in Rio de Janeiro in 1992 (Ref. 4). This distorted document was then widely cited and republished in the mass media.

Working with the complex ecological problems, I would like to attract the attention of specialists to the point that unilateral consideration of influence of chemical agents on the dynamics of ozone layer is incorrect. Facts indicate that the natural reasons may be the main factor of ozone holes formation. Moreover, the danger of ozone holes to mankind is greatly overestimated, and the great expenses on the industry reconstruction, which will be put onto ordinary people,

are unjustified and might be used more efficiently to solve other ecological problems.

At the same time, any statement against "the official point of view" gives rise to a storm of criticism, refusals to publish, and baiting in the mass media. Many great scientists believe that the facts accumulated are insufficient to draw a conclusion on the true reason for the ozone hole problem. But if funds are lavishly given to supporters of the freon theory, there is no money for its opponents. At the same time, very important observations, for example, of the UV irradiation in some USA towns are stopped due to the lack of funds for the research that contradict the official point of view.[4]

The objective truth will no doubts be established and if it does not correspond to the theory of anthropogenic destruction of the ozone layer widely spread now, then the science will suffer a great damage, only comparable with the Lysenko phenomenon. The monopoly to truth in science has never been beneficial.

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