

The analysis of ozone variations and connections with local and global geocosmical agents and the functional state of human organisms by systems reconstruction technology

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The analysis of the connection of the Total Ozone Content (TOC) with local and global variations of meteorological and geocosmical agents and the indices of the state of human organisms is discussed. The study was carried out on the basis of the technology of system reconstruction (TSR). This technology is a new approach for the reconstruction analysis of open complex systems. It is intended for fundamental research, which are related with qualitative determination of possible states, conditions and variability of complex systems. Experimental data of the investigated objects or their appearances serve as a source of the information of the TSR analysis. The results of TSR application are verified by conceptual models of the mechanisms of multiple internal system interactions, which form the various types of the local and global system behavior. The TSR is an universal and an unique tool for system analysis. The St.-Petersburg local TOC data was supplemented by global geocosmical data, including the indices of Solar activity, proton fluxes, the parameters of the interplanetary media and the local meteorological agents as well as the indices related to human organisms estimated on the example of bronchial asthma (BA). It was shown by TSR that the TOC has negative signs of connections with local variations of humidity, water pressure, atmospheric pressure, atmospheric electric field gradients, but the positive signs of connections were found by cloud forming and neutron counts. The connection with global variations of geocosmical agents showed positive signs of connections with the B_x component of the interplanetary magnetic field (IMF), the electric field of solar wind, the variability of the solar wind, the hydrodynamic pressure of the solar wind, the solar wind velocity, with protons with energies more than 60 MeV, and AE-indices. Negative signs of connections with sunspots, the B_z component of the IMF, Pc1 variations and protons with energies with more than 10 MeV were found. The results of this study indicate that the geoeffective agents of the IMF can induce the same conditions, when the TOC in atmosphere increases. The estimation between connections of the TOC with indices of the human functional state show that the TOC has a negative connection with the total content of immune-globulin and corticosteroid hormones in peripheral blood, the reactions on the diverse allergens, which are involved in the decrease of allergen reactions of BA patients. At the same time the anxiety can increase with increasing TOC so that a portion of oxygen pressure in the blood and function of respiration increases and adispnea decrease. The reaction on the variability of TOC depends on the age, which has a positive connection with the TOC. Thus the role of solar proton flux variations to the TOC is more significant than one will find by an analysis of the simple time series of the similar parameters. The analysis of data obtained by TSR for more than 10 years permit to select some groups of parameters, which are concentrated near the TOC and solar proton fluxes and indicate the general effects induced by these agents. Thus, the TSR usage allows to study the connection between the TOC and solar proton fluxes with the state of the human organism and may be important for the prediction of the human health effects under environmental conditions, although the physical mechanism of this dependences is not yet fully understood, but there are some ideas which could be have a relation to the mechanisms of multiple interaction.