Features of the ocean-atmosphere exchange and its effect on terrestrial climate conditions

A. Kartushinsky (1, 2), L. Sashko (2)

(1) Institute of Biophysics (Russian Academy of Sciences, Siberian Branch), (2) Krasnoyarsk State Technical University, Krasnoyarsk, Russia (kartalvas@rambler.ru / Fax: +7 3912-433400 / Phone: +7 3912-494603)

The climatic changes on Earth are to a large extent influenced by the intensity of ocean-atmosphere-land interactions. Energy exchange in the atmosphere-ocean system depends on the transfer of warm and cold water masses by stream flows. Interaction of water masses leads to formation of frontal zones with high temperature gradients. Such zones are easily detected by temperature gradients which are calculated according to AVHRR MCSST satellite data for the 1982 – 1986 (average monthly) and 1990 – 2001 (average weekly) periods. The spatial extension and the size of the frontal zone formed by Gulf Stream in North Atlantic affects the evaporation mode. Such interaction with atmosphere leads to changes in the cyclonic and anticyclonic activity in the North Atlantic Oscillation (NAO) zone. In this work the seasonal North Atlantic Oscillations are compared with the temperature gradients in North Atlantic for the period of satellite measurements. Besides, the investigation is made of the connection between the changes of NAO and climatic parameters overland. We used the weather stations data concerning the average monthly air temperature and precipitation for the territory of Eurasia for the period of 1900-2004. This work analyses the features of ocean-atmosphere interaction and the effect of such interaction on the climatic conditions. We developed software for the analysis of climagrams in graphic form, in which the air temperature and amount of precipitation are averaged over the whole observation period, and also for separate periods. The average seasonal and annual climagrams of several parts of land in latitudinal direction are compared with the seasonal and annual indices of NAO. Besides, comparison is made between the variability amplitudes of precipitation and air temperature over a prolonged observation period. For separate land regions estimation was made of NDVI dynamics, climatic conditions variability and comparison was made between SST gradients and NAO index. Thus, in the long view, it is possible to work out new methods for investigation of interaction of the system ocean-atmosphere-land vegetation, based on satellite monitoring.