

Variability of Atmospheric Circulation and Geomagnetic Field in the Northern Hemisphere

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Abstract

To understand the causes of climate change, it is necessary to consider the relationship between the various physical fields of our planet. The relationship between variations in atmospheric circulation and the magnetic field has received little attention. We studied changes of atmospheric circulation in the lower troposphere and geomagnetic field in the Northern Hemisphere during the 20th and beginning of the 21st centuries to determine spatial-temporal relations between variations of these fields. Integral characteristics of atmospheric circulation and geomagnetic field have been investigated in the latitudinal band 40-70° N, applying the same approach. In the indicated latitudinal range, the main centers of action of the atmosphere in the Northern Hemisphere are located (Canadian and Siberian anticyclones, North Atlantic ridge, and Icelandic and Aleutian depressions and European trough), as well as global geomagnetic anomalies (Canadian and Siberian). For the analyzed time period there is the most complete set of observational data, which ensures high reliability of the results obtained. The time diagrams were plotted for atmospheric circulation and magnetic field by their integral characteristics. Their comparison showed that the minima and maxima of the pressure field and the full vector of the geomagnetic field coincide quite well. This allows to assume that trends in changes in the geomagnetic field and atmospheric circulation, which were outlined at the beginning of this millennium, will continue in the coming decades. For prediction of global changes of the air pressure and geomagnetic fields in the future it is possible using the same methodology.

