Geophysical Research Abstracts, Vol. 7, 02560, 2005
SRef-ID: 1607-7962/gra/EGU05-A-02560

Analysis of solar variability influence on electric and climatic characteristics of high latitude troposphere

G.A. Zherebtsov, V.A. Kovalenko and S.I. Molodykh
Institute of Solar-Terrestrial Physics SB RAS, Russia (sim@iszf.irk.ru)

Complex analysis of the heliophysical disturbance influence on electric and climatic characteristics of troposphere is presented in this study.

The role of atmosphere electric field in solar-climate relations is considered and there is shown the solar activity influence on atmosphere electricity parameters, which can significantly impact the atmosphere radiation balance trough the influence on the height distribution of cloud condensation nuclei in atmosphere, on the phase state of the water in atmosphere, and on the cloudiness.

Here are analyzed the basic factors, which result in the significant changes of electric field in the Earth's atmosphere at polar latitudes during the heliophysical disturbances: solar cosmic rays; protons and electrons, precipitated from the magnetosphere during the geomagnetic disturbances; intensifications (disturbances) of magnetospheric convection during the geomagnetic storms.

The researches results of influence of the solar flares and of the interplanetary magnetic field structures on thermobaric characteristics of the troposphere are systematized and summarized within the framework of the mechanism of solar-terrestrial relations developed by authors.

It is shown that the greatest and unequivocal influence of solar activity on the climatic system state takes place during the periods when there is absent the coming radiation energy flux (high- latitude regions during the winter period), as in this case any cloudiness results in the decrease of energy losses by the climatic system.

On the basis of the mechanism proposed earlier there are explained the results of the great number of studies, in which the correlations are found between different characteristics of solar and geomagnetic activity and troposphere parameters:

a) Manifestation of solar flares in thermobaric field characteristics.

b) Change of the surface pressure field structure after geomagnetic storms.

c) The influence of the Earth's crossing of the interplanetary magnetic field sector boundary on atmosphere electricity characteristics, vorticity atmosphere index (VAI) and others.

The quantitative estimation is made of the possible contribution of solar activity (in the framework of proposed mechanism) to the radiation balance change for the periods of quiet and disturbed heliogeophysical conditions.