

A GEOMAGNETIC STORM DECREASES COHERENCE OF OSCILLATIONS OF ELECTRIC POTENTIALS OF A HUMAN BRAIN

OLEG NOVIK

RU-142190 IZMIRAN, Troitsk, Russia

Plenty of technological processes are known to be damaged by magnetic storms. But technology is controlled by men and their functional systems may be damaged as well. We are going to consider the electro-neurophysiological aspect of the general problem formulated and investigated at first by В.И. Вернадский and А.Л. Чижевский: men surrounded by geophysical fields including ones of cosmic origination.

The effect formulated in the title was observed for a group of 13 students (practically healthy girls and boys from 18 to 23 years old). To control the main functional systems of the men under investigation, their electroencephalograms (EEG) were being registered along with electrocardiograms, respiratory rhythms, arterial blood pressure and other characteristics during a year. According to the EEG investigations during implementation of the proof-reading test in absence of magnetic storms, the values of the coherence function of time series of the theta-rhythm oscillations ($f = 4 - 7.9$ Hz, $A = 20$ μ V) of electric potentials of the frontal and occipital parts of the head belong to the interval $[0.3, 0.6]$ for nearly all of the students under investigation. (As the proof-reading test, it was necessary to choose given symbols from a random sequence of ones demonstrated at a monitor and to enter the number of the symbols discovered in a computer. Everyone was known that the time for determination of symbols is unlimited. On the other hand, nobody was known that the EEG and other registrations mentioned are connected with geophysical events).

Let us formulate the *main result*: by implementation of the same test during a magnetic storm, $5 \leq K \leq 6$, or no later then 24 hours after its beginning (different types of moderate magnetic storms occurred, the data of the IZMIRAN were used), the values of the theta-rhythm coherence function of all of the students of the group under consideration occurred to be decreased up to 0.1 or less including 0. The similar result was obtained for another basic low-frequency electro-neurophysiological rhythm delta ($f = 0.5 - 3.9$ Hz, $A = 20$ μ V). The usual coherence function values from the interval $[0.3, 0.6]$ were being registered, typically, about 48 hours after the magnetic storm end

The result about decreasing of the coherence of the brain low frequency bioelectric oscillations under a magnetic storm influence was obtained by two methods: 1) comparison of the time series of bioelectric oscillations of a given person without a magnetic storm and under its influence; 2) comparison of two sets of time series of oscillations: a) the set A of time series measured without a magnetic storm and b) the set B of time series measured under its influence, regardless to an individual. Surely, the total number of the EEGs available for the investigation by the set's approach (i.e. without personification) is more then the number of the EEGs available by the individual approach because there were ones investigated without a magnetic storm only as well as ones investigated under its influence only. By the EEG measurements with closed or open eyes, but without a functional load on the brain in the form of the proof-reading test, a distinctive decrease of the coherence function was not observed during a magnetic storm as well as for pairs of points from other parts of the head (see above) or other rhythms.