

COSMIC DUST AND THE GLOBAL ELECTRIC CIRCUIT OF THE EARTH

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One of the key issues in the formation of the Earth's global electric circuit (EGEC) is to determine the conditions for the formation of an electricity source that stably supports the potential difference between the ionosphere and the Earth. According to modern concepts, the main "heart" of the atmospheric electric machine is in a thundercloud. It is considered that electric charges in clouds are formed at collisions of the aerosols which are in different aggregate states and separation of charges occurs at the expense of convective streams of air. Thus there is a conversion of mechanical energy into electrical energy. The failure of such reasoning is obvious.

In this paper, we consider the model of EGEC, which is inextricably linked with the processes in the cosmic plasma, ionosphere and atmosphere of the Earth. The basic concept laid down in the model of the EGEC is a well-known process of charging various bodies (probe, dust) placed in the plasma, which is carried out by a more mobile component, and in space plasma, as a rule, these are electrons. Our planet Earth is surrounded by cosmic plasma, which consists of electrons, ions and negatively charged dust. Numerous studies have shown that the Earth is surrounded by a dense dust shell and on the surface of the Earth settles according to various data from 40 to 400 thousand tons of dust per day. The charged dust, unlike electrons and ions, penetrates freely through the magnetic field and atmosphere and charges the Earth's surface negatively. To compensate for the negative charge from the surrounding space plasma, positively charged ions are accelerated, which penetrate the atmosphere through the northern and southern latitudes to an altitude of about 100 km, where the frequency of collisions with neutrals is much higher than the ion cyclotron frequency. These ions can move along the earth's surface, carrying out additional ionization of the anomalous structure of the E-layer, and create a current of "clear" weather (about 1700 ampères), which evenly settles on the negatively charged surface of the Earth. The stationary electric state of the Earth is achieved when the current of positively charged ions and the current of negative dust are equal. Dust is transferred to the Ground in the form of rain, snow and lightning. Using the average dust flow to the Ground and the value of the current of "clear" weather, it is obtained that the bulk of the dust has an average radius of about $4 \cdot 10^{-7}$ m, a mass of 10^{-16} kg and a charge of 10^{-16} C.

The paper presents the formation, charging and discharging of clouds, as well as the impact of space dust on the earth's weather.