



Nano- and microsize particles and Schumann resonances

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The influence of dust (nano- and microsize particles) in Earth's atmosphere on properties of the global electromagnetic Schumann resonator is studied. Two channels of this influence are shown to exist. Firstly, the presence of charged nano- and microsize particles in the lower ionosphere modifies its dispersion properties that, in turn, can result in variations of the resonant frequencies and the quality of the resonator, both the frequencies and the quality decreasing with the increase in size and density of dust grains. Such an influence of charged dust on the Schumann resonator may be of major importance from the biological point of view. Secondly, the Schumann resonance is driven by worldwide lightning activity, which is sensitive to the presence of nano- and microsize particles in the atmosphere. The presence of the dust particles in the Earth-ionosphere cavity may lead to strengthening of the lightning activity. There is a direct relation between the intensity of the lightning activity and the amplitude of electromagnetic oscillations in the Schumann resonator. Thus the growth of the density of the nano- and microsize particles in the atmosphere can lead to the increase in the energy density in the resonator. Furthermore, the presence of the dust particles in the atmosphere influences the average annual surface temperature. For example, in the case of the strong volcano eruption remarkable decrease in the average annual temperature may be observed. Since correlation between the amplitude of the electromagnetic oscillations in the Schumann resonator and monthly mean temperature is observed, a decrease in the temperature can result in a decrease in the energy density in the resonant cavity. This work was carried out within the Program of Fundamental Investigations of the Division of Earth Sciences of the Russian Academy of Sciences "Nanoparticles in Nature: Conditions of Existence and Technological and Ecological Consequences." J.N.B. is grateful to the "Dynasty" Foundation for financial support.