

Non-local variations of the Earth's magnetic field during falling meteorites

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Using geomagnetic records at the mid-latitude observatories of the INTERMAGNET network and at Mikhnevo Geophysical Observatory of IDG RAS, we analyzed the geomagnetic effect when meteorites fall into the Earth's atmosphere. We considered the following examples: Vitim (2002.09.24), Chelyabinsk (2013.02.15), Romanian (2015.01.07), Buryatia (2016.10.25), Khakassia (2016.12.06), St. Petersburg (2017.09.11) and Lipetsk (2018.06.21) events. It has been established that the fall of cosmic bodies is accompanied by pronounced variations of the geomagnetic field, and the effect is non-local and is observed at distances up to 7,000 km from the place of the fall of the cosmic body. There is a weak dependence of the amplitude of the induced geomagnetic variations on the distance to the event place. The results indicate that the character of the effect under consideration may differ for different events: there are changes in the geomagnetic field in both a positive and negative direction. In some cases, the alternating character of variations is recorded. It is shown that the passage and explosion of a meteorite have a greater influence on the horizontal component of the magnetic field. Significant differences in the amplitudes of the researched effect for different events require further, more detailed study of the phenomenon under consideration with the involvement of additional information. The obtained data complement the available experimental information, expand modern ideas about the mechanisms of geophysical processes accompanying the fall of cosmic bodies to Earth and create a basis for verifying theoretical and numerical models developed to describe the response of geospheres to strong local perturbations.