

Forbush decreases and terminator's effects in Kamchatka's atmospheric electricity and atmospheric electric field model

V. Kuznetsov, N. Cherneva.

Institute of Space Physical Research and Radio Wave Propagation (IKIR), Kamchatka, Russia
vvk@ikir.kamchatka.ru

It is reported about the atmospheric electrical field (AEF) investigations, which were carried out at Paratunka geophysical observatory of IKIR FEB RAS. Only “fair-weather” days were analyzed. As the result of the performed work terminator's effects were discovered: the AEF increases regularly at dawn and less frequently at sunset. The quantity of the effect doesn't exceed 20-30% of the average field value. At night time and in winter the AEF strength is higher than at daytime and in summer. The effects of field value decrease were observed on “fair-weather” days at the moments of geomagnetic disturbance passing simultaneously with Forbush decreases. The degree of the field decrease correlates with the degree of neutron intensity decrease on supermonitors. Some cases of simultaneous recording of terminator's effects during Forbush decreases were registered. These are the effects of the same order in the electrical field variations.

A new model of AEF based on the idea of AEF generation due to electric charges separation in “fair weather” atmosphere is proposed. In the absence of thunderstorms the electric charges in the atmosphere are induced by its ionization by galactic cosmic rays (GCR). Light positively charged ions are carried away to the upper layers by upward air flows and heavy negatively charged aerosols fall to the Earth. The model provides the explanation of atmospheric electric field unitary variation, and of some other features of atmospheric electricity; in particular, of AEF behavior during geomagnetic disturbances and Forbush decreases of GCR.