

High-energy magnetospheric electron flux enhancements and the parameters of interplanetary and near-Earth medium

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Based on the data of 35-year (1987-2021) measurements of magnetospheric electron fluxes with energy >2 MeV in geostationary orbits, solar wind speed and geomagnetic activity, a catalog of electron flux enhancements was compiled in which the electron fluence exceeds $10^8 \text{ cm}^{-2} \text{ sr}^{-1} \text{ day}^{-1}$. The epoch superposition method performed using the GOES-13 spacecraft data shows that large electron flux enhancements are preceded by a significant increase in the solar wind velocity and the Ap index of geomagnetic activity, and immediately before the increase the relativistic electron flux decreases. Based on the calculated mean values of the electron fluences, solar wind velocity, and Ap-index of geomagnetic activity on the day of electron enhancement and on previous days, a typical behavior of these parameters during and before an electron flux enhancement was obtained. The average characteristics of electron flux enhancements and the parameters of interplanetary and near-Earth medium are calculated before large electron flux enhancements. It is shown that the greater the increase in solar wind velocity and geomagnetic activity the larger the subsequent electron flux enhancement. The density and vector anisotropy of galactic cosmic rays for 453 events of high-energy magnetospheric electron flux enhancements over the period 1996-2020 were calculated by the Global Survey Method (GSM). Some examples of these events, which are characteristic of different classes of solar sources, are considered.

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