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Features of Forbush decreases obtained by satellite and ground-born detectors

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The Forbush decreases (FDs) are known as sharp drops in cosmic ray intensity, registered by different scientific equipment on Earth and interplanetary space. These events correlate with solar activity, mainly with coronal mass ejections (CMEs). CMEs spreads into interplanetary space and swap out the cosmic ray particles from the modulation region. The main features of FDs are the intensity drop amplitude and the recovery time to its undisturbed level. These parameters are characterized by a large variability of the measured values. The reasons for this variability are connected to the scale of the CMEs and with the structure and velocity of ejected solar mass in place of measurement. Also, they depend on the detector type used for observing FDs. The satellite detectors register primary cosmic rays in a wide energy range and effectuate the direct measurements of the phenomenon, whereas ground-based detectors measure the secondary cosmic rays born in the Earth's atmosphere. Ground-based detectors have larger statistics with respect to satellite experimentation but are less sensitive to different variations of cosmic rays intensity as well as FDs. To study FDs properties we use the primary flux data of CR cosmic ray particles recorded by the PAMELA and AMS-2 spectrometers for the time period from 2006 to 2019 in the rigidity range from 0.8 to 50 GV. The amplitudes and recovery time behaviors during FD phenomena were the subject of our study. The data from SOHO coronagraphs were taken for searching the CMEs responsible for the observed FDs. The amplitude values of FDs and the behavior of their recovery times were followed with respect to some parameters of solar activity and interplanetary space. The obtained results of the satellite instruments were compared with data from several neutron monitors.

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