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Magnetospheric effects in cosmic rays during the unique magnetic storm in November 2003

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Cosmic ray variations of magnetospheric origin during severe magnetic storm on 20 November 2003 are selected from the neutron monitor data by means of the global survey method. Planetary distribution of the cut off rigidity variations during this disturbed period was obtained on this basis. A correlation between Dst index and cut off rigidity variation was defined for each cosmic ray station. The most essential shift in cutoff rigidities occurred while Dst index was around -465 nT. Geomagnetic effect in cosmic ray intensity at some stations reached 6-8%. Cutoff rigidity variations were also calculated using the last model of Tsyganenko for a disturbed magnetosphere (T01S). This magnetospheric effect seems to be the greatest one over the history of neutron monitor observations. Maximum changes of geomagnetic cutoff rigidities were recorded this time at unusual low latitudes corresponded to about 7-8 GV cutoff rigidity. A comparison of the experimental and modeling results reveal a big discrepancy within the cut off rigidities less than 6 GV. The results on the geomagnetic effect in cosmic rays can be considered for the more accurate modeling of the magnetospheric current system during strong geomagnetic storms.