

Global geomagnetic and auroral response to a sudden change of solar wind dynamic pressure at the onset of magnetic storm

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Research result concerning the influence of pressure sharp change in the solar wind upon the spatial-temporal distribution of geomagnetic disturbance and auroral luminosity intensity are given. The global network of ground geomagnetic observatories with a high temporal resolution and satellite observations of aurorae aboard the POLAR satellite has been used. It has been obtained that the geomagnetic disturbance caused by a sudden change of pressure extends beginning from the noon both westward and eastward with the velocity of the order of 10 km/s. Approximately with the same velocity and of the same direction there occurs the expansion of auroral luminosity region along the aurora oval at 70-75° latitudes from the dayside to the night one. It is supposed that a sudden compression of the solar wind leads to the enhancement of field-aligned currents of 0 (R0) and 1(R1) regions as it follows from the numerous model Rezhnev and Lyatsky [1987]. As the day magnetosphere is compressed the disturbance extends along the magnetopause from its fore-part to the tail with the velocity of ~300 km/s with the simultaneous precipitation into the ionosphere of particles trapped into the magnetosphere earlier. Variations of ionospheric conductivity in the presence of field-aligned currents lead to the reconstruction of ionospheric current systems responsible for geomagnetic disturbance. The work is supported by RFBR grant 03-05-39011-GFEN.