Geophysical Research Abstracts,
Vol. 10, EGU2008-A-04539, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-04539
EGU General Assembly 2008

Dependence of intensity and duration of magnetic storms on a trajectory of magnetic cloud passage through terrestrial magnetosphere

N. Barkhatov (1,2), E. Kalinina (2) and A. Levitin (3)

(1) Research Radiophysical Institutes (NIRFI), Nizhniy Novgorod, Russia, (2) Nizhniy Novgorod State Pedagogical University, Nizhniy Novgorod, Russia, (3) Pushkov Institute of Terrestrial Magnetism, Ionosphere and Radio Wave Propagation of RAS (IZMIRAN), Troitsk, Russia (n@barkh.sci-nnov.ru / Fax: +7 831-4331017)

The strongest geomagnetic storms usually connect to occurrence near to the Earth plasma eject such as a magnetic cloud. Work is devoted to studying of magnetic storm origin of various intensity and duration depending on a trajectory of passage of such cloud through Earth's magnetosphere. Research was carried out on magnetic cloud model as force-free flow rope.

It is known, that geomagnetic storms are characterized by a Dst-index dynamics, which is supervised by behavior components of interplanetary magnetic field (IMF) Bz$<$0. To proceed from statistic magnetic storms, dependence of their intensity class on presence in IMF within three hours in succession concrete amplitudes IMF Bz$<$0 is revealed. Connection law of storms classes and Bz is established: a weak storm – Dst =-30 – -50 nTl, Bz =-5 nTl; medium – Dst =-50 – -100 nTl, Bz =-10 nTl; strong – Dst =-100 – -200 nTl, Bz =-15 nTl; extreme storm – Dst =-200 – -300 nTl, Bz =-30 nTl. On the basis of such representations, on a line of a cloud through Earth's magnetosphere passage conditions of modeling magnetic field existence which necessary for generation of a geomagnetic storm are analyzed. For this purpose variants of magnetic cloud of various orientations on various distance passage from the Earth have been considered. It is marked, that vertical a component of vector IMF in the same cloud on a trajectory of its movement concerning the Earth can accept negative values

depending on its orientation.

Presence in a cloud of a negative component IMF and passage of the Earth through this part is the main condition for occurrence of a magnetic storm. Then becomes clear, that duration of magnetic storm phases and their peak characteristics depend on a trajectory of magnetic cloud passage through the Earth. Thus, it is possible, that one and too plasma eject can cause magnetic storms of different duration and intensity or to not generate storm at interaction with magnetosphere.

The work was executed under the financial support of the RFBR (grants 06-05-64482, 05-05-65196).