

PITCH-ANGLE FEATURES IN COSMIC RAYS IN ADVANCE OF SEVERE MAGNETIC STORMS: NEUTRON MONITOR OBSERVATIONS

A. V. Belov¹, J. W. Bieber², **E. A. Eroshenko**¹, P. Evenson², R. Pyle², and V. G. Yanke¹

(1) Institute of Terrestrial Magnetism, Ionosphere and Radio Wave Propagation Russian Academy of Sciences (IZMIRAN), 142190 Troitsk, Moscow region, Russia.

(2) Bartol Research Institute University of Delaware, Newark, DE 19716, U.S.A.
erosh@izmiran.troitsk.ru

The behavior of the cosmic rays in advance of the severe geomagnetic storms in 1978-1982 (from the Gosling list of “major” storms) was analyzed on the basis of the cosmic ray anisotropy and pitch angle distribution derived from neutron monitor observations. This analysis was aimed at revealing the predictive effects (“loss” cone and pre-increase) before arrival of the shock and solar wind disturbed region. Essentially in all cases the changes in cosmic rays, in particular their anisotropy, start well before the beginning of major magnetic storms, which do not always coincide with the time of shock arrival; the severe magnetic storm may start later (up to 20 hours after), depending on the structure, orientation and magnetic topology of solar ejecta. We show examples for which the characteristic changes in CR anisotropy and pitch angle distribution (as a narrow decrease oriented along the magnetic force line) are revealed. These “loss” cone effects can be considered as predictors of the strong geomagnetic disturbance.