

INVESTIGATION OF STRONGLY PERTURBED HELIOSPHERIC PARAMETERS IN THE PAST BASED ON GEOMAGNETIC DATA

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The Bz component of the interplanetary magnetic field is the main heliospheric parameter responsible for geomagnetic storms. We perform a statistical analysis of the peak values of the IMF Bz component with different combinations of plasma parameters and the hourly Dst and Dcx geomagnetic indices for all identified perturbations in 1963-2008. Empirical formulas are derived which relate peak values of geomagnetic indices and heliospheric parameters. These formulas are useful to estimate and reconstruct heliospheric conditions with the accuracy of the order of ten percent. We find the delay time between peak value of heliospheric and geomagnetic parameters between 3 and 6 hours. Multiple magnetic storm onsets initiated by solar and interplanetary magnetic perturbations are non-linearly coupled. We use the derived formulas to study heliospheric conditions in the early part of the previous century and discuss the predictability of IMF Bz and geomagnetic perturbations.

Geomagnetic storms, solar wind, heliosphere

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