PROBABILITY DISTRIBUTION FUNCTIONS FOR THE GEOFFECTIVENESS OF SOLAR WIND INTERPLANETARY MAGNETIC STRUCTURES

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Abstract

The knowledge of probability distribution functions for the geoeffectiveness of interplanetary (IP) magnetic structures is relevant to schemes for forecasting space weather. It allows estimate the chance of a given geomagnetic activity been reached after the detection of an interplanetary structure approaching Earth. Among these structures, we have particular interest on magnetic clouds (MCs), IP shocks and corotating interaction regions (CIRs). These structures drive magnetic storms with different characteristics, as recent results show. In this paper we asses the geoeffectiveness of a large number of events: 170 MCs, 840 shocks and 727 CIRs. The geoefectiveness is evaluated with the geomagnetic indices Kp, AE and Dst peak values within 2 days after the interplanetary structure has passed near Earth orbit. The number of events followed by each level of geomagnetic activity shows that MCs are more geoeffective than shocks or CIRs. However, CIRs are more geoeffective then other structures if we use the magnetic index AE. Shocks driven by MCs are the most geoeffective structures independently of the used magnetic index. We fit the histograms representing the percentage of events against intervals of magnetic index to obtain the theoretical (continuous) probability distribution functions for the three magnetic indices.