

Forecast of geomagnetic storm with CME parameters

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For a purpose of space weather forecast, we searched for the criteria for selecting geoeffective CMEs ($Dst \leq -50nT$). Since the front side halo CMEs are generally considered as strong candidates for geomagnetic storms, we selected 293 events from 1997 to 2003. We then examined how their geoeffectiveness depends on their speed, V , Source region location, L , and the earthward direction parameter, D . The direction parameter is defined as the ratio of distance between the shorter CME front and the solar center to that of the longer CME front. We present the probability map of geoeffective CMEs depending on the speed and location. We show that this probability can be significantly improved by including the direction parameter. We present the contingency tables that are used to estimate various statistical parameters including the Probability Of Detection yes (PODy) and Critical Success Index (CSI). The criteria that we found in this study can lead to a more accurate forecast of geomagnetic storms with the information of CME characteristics only, which thus allows an earlier warning than other existing methods.