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AN INVESTIGATION OF TRANSIENT PLASMA EVENTS AND ASSOCIATED GEOEFFECTIVNESS

Abstract

The solar Cycle 23 has shown some peculiar features, i.e. slow and prolonged decline phase. It is when combined with the ascending phase of Cycle 24, it provides us a long phase during which the overall magnetic activity was very low. During this interval the average sunspot number appeared on the solar disk were very low and signifies the weak polar magnetic fields, and solar wind streams mainly originating from coronal holes. The study investigate the relationship between magnetic structure of coronal holes and/or coronal mass ejection (CME) source region and their influence on Earth's geomagnetic field, i.e. storms and sub storms. Mainly considering very intense geomagnetic storms that occurred during Solar Cycle 23. The disturbance storm time index Dst is taken as an indicator of geomagnetic activity by setting a value of Dstmin 200 nT as threshold. By examining halo CMEs that erupted between 2000 to 2008. We selected 07 events associated with M-class and X-class solar flares. Furthermore, as the geomagnetic field (BGeomag) puts a lower cutoff rigidity (Rc) to the entry of cosmic particles in to the earth, depending upon the geomagnetic activity. Sometimes when this entry of charged particles exhibits very sudden sharp and short lived increases in cosmic ray intensities, registered by neutron monitor, it is termed as Ground-level enhancement (GLEs). These enhancements are known to take place during the result of powerful solar eruption. In this present investigation we also studied GLE events associated with solar flare and coronal mass ejection (CMEs). The spacecraft data acquired by various spacecraft mission and those provided by Omni web and geomagnetic stations like WDC-Kyoto are utilized in the study. We observed that IMF B is highly geo-effective during the main phase of magnetic storms, while it more significant at the time of storm peak, which is further contributed by southward component of IMF Bz, substantiating earlier findings. The correlation between Dst and wind velocity is higher, as compared with IMF Bz and ion density. It has been verified that geomagnetic storm intensity is correlated well with the total magnetic field strength of IMF better than with its southward component.