

Study the effects of magnetic clouds of geomagnetic field variation during 2006 – 2012.

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ABSTRACT

The event magnetic cloud in interplanetary medium was first introduced and interpreted by Burlaga et al 1981. Magnetic cloud is a particular type of ejecta with the following properties: (i) the magnetic field direction rotates smoothly through a large angles during an interval of order of one day, (ii) the magnetic field strength is higher than average; and the temperature is lower than average. On average cloud are 0.25 AU in diameter at IAU & they are typically 27 hours in direction & often have the field structure of magnetic flux rope. The magnetic cloud maintained its characteristics magnetic structure during its outward propagation up to least 2 AU. A cloud is usually expanding a sit moves outward from the sun, as seen at 1 AU in its speed profile i.e. high to low speed (Lapping, et. al. 2001).

Keyword: - Interplanetary magnetic filed IMF (B), Plasma Temperature (T), Plasma Density (D), Geomagnetic Disturbance Strom Time (Dst), Solar wind Velocity, Vsw (km/sec).

INTRODUCTION

As we know that the magnetic cloud event is a large scale interplanetary structure produced due to transient ejections in the ambient solar wind. Several researchers investigate time to derive effects of magnetic clouds on geomagnetic field as well as on cosmic ray modulation (Kaushik & Shirivastava 2000; Mishra et. al 2005). Studied the effects of magnetic clouds event on geomagnetic filed & cosmic ray intensity various for the three different conditions. They have concluded that magnetic cloud associated with truant shock produce large cosmic ray decrease & geomagnetic field variations. Several studies indicate a correlation between geomagnetic activity & southward component of interplanetary magnetic filed (Baker, et al. 1984).

In this study we have taken the 5 & 3 event of magnetic clouds for the year of 2006 & 2007. A chree analysis of super epoch method has been adapted to the effect of magnetic cloud event on geomagnetic activity on short-term basis, shows the result of chree analysis for taking the daily value of geomagnetic Dst-index for -5 to +10 days. This analysis has been done for both the year of 2006 & 2007. Zero days are taken on the arrival time of magnetic cloud events. Large decreases in Dst value for both the year are seen. It indicates a significant enhancement in geomagnetic field of earth due to influence of magnetic clouds. For the further analysis, we have taken some magnetic cloud events to observe their association with interplanetary & geomagnetic indices. In this event wise analysis we have chosen the event of magnetic cloud on 21 may 2007 & magnetic cloud event of 19 Nov 2007. Association of plasma speed, IMF By, Bz, Plasma temp, Density & Sat index are plotted in figure 1

& 2 for the both events. Daily values of these indices are plotted five days prior & post ten days from the magnetic cloud event.

Daily value of plasma speed, B_y , B_z , proton temperature, Density & Dst are plotted in different panel of figure 1 & 2. Daily value of Dst has been taken as a measure of the level of geomagnetic disturbances. As expected proton density is significantly low during the period of high plasma speed & high plasma temperature. IMF B_z turns to southward after the zero days. Plasma speed remains high 4-5 days after the onset of magnetic cloud event. Decreases in Dst values, reflects, the large geomagnetic activity in association of magnetic cloud events.

DATA ANALYSIS

In our work we used hourly data of solar wind plasma vulk speed V (Km/sec), interplanetary magnetic field (IMF vector B nT) and magnitude of IMF vector (B nT) from NSSDC OMNI web (<http://nsdc.gsfc.nasa.gov/omniweb/>). And the data of coronal mass ejection have been taken from the website (http://lepmi.gsfc.nasa.gov/cme_publ.html).

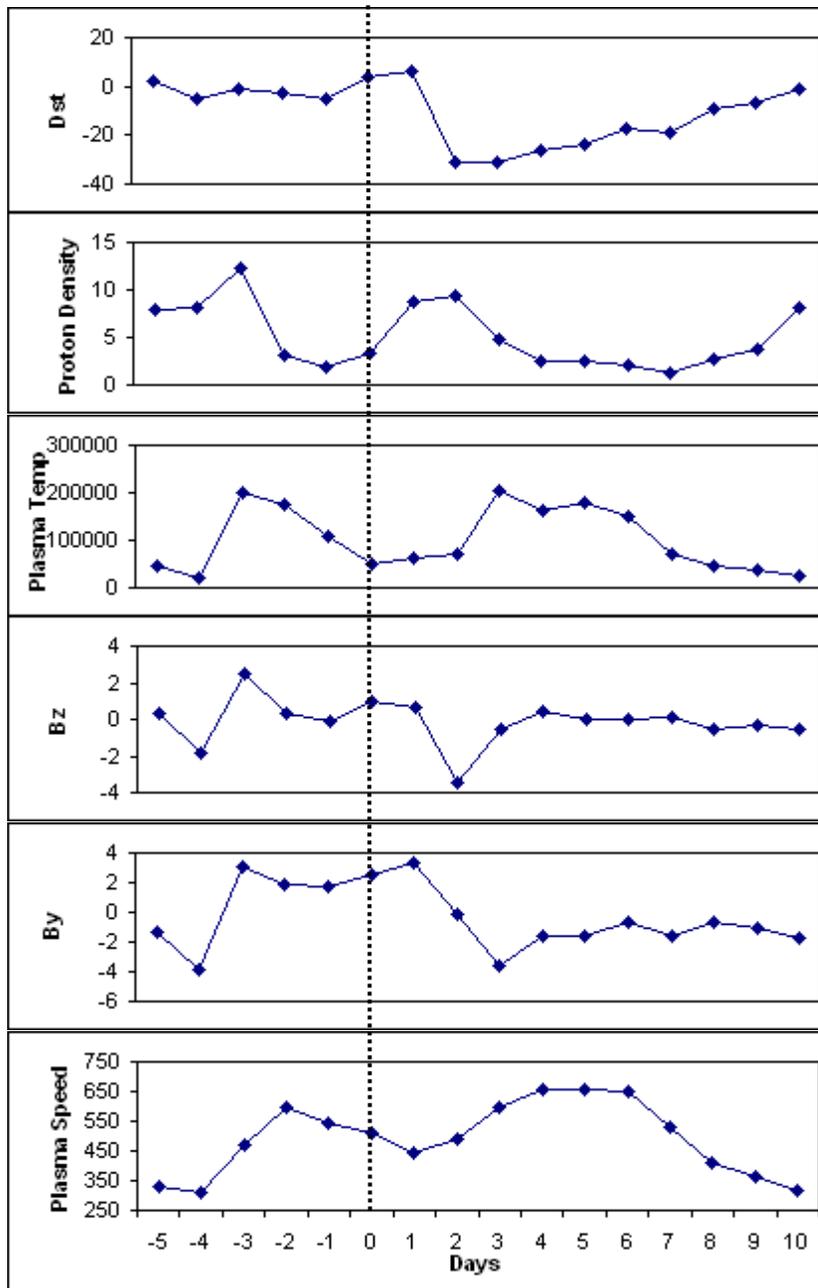


Fig 1: - Magnetic cloud event for plasma speed, B_y , B_z , plasma temperature, proton density & Dst for date 21-05-2007.

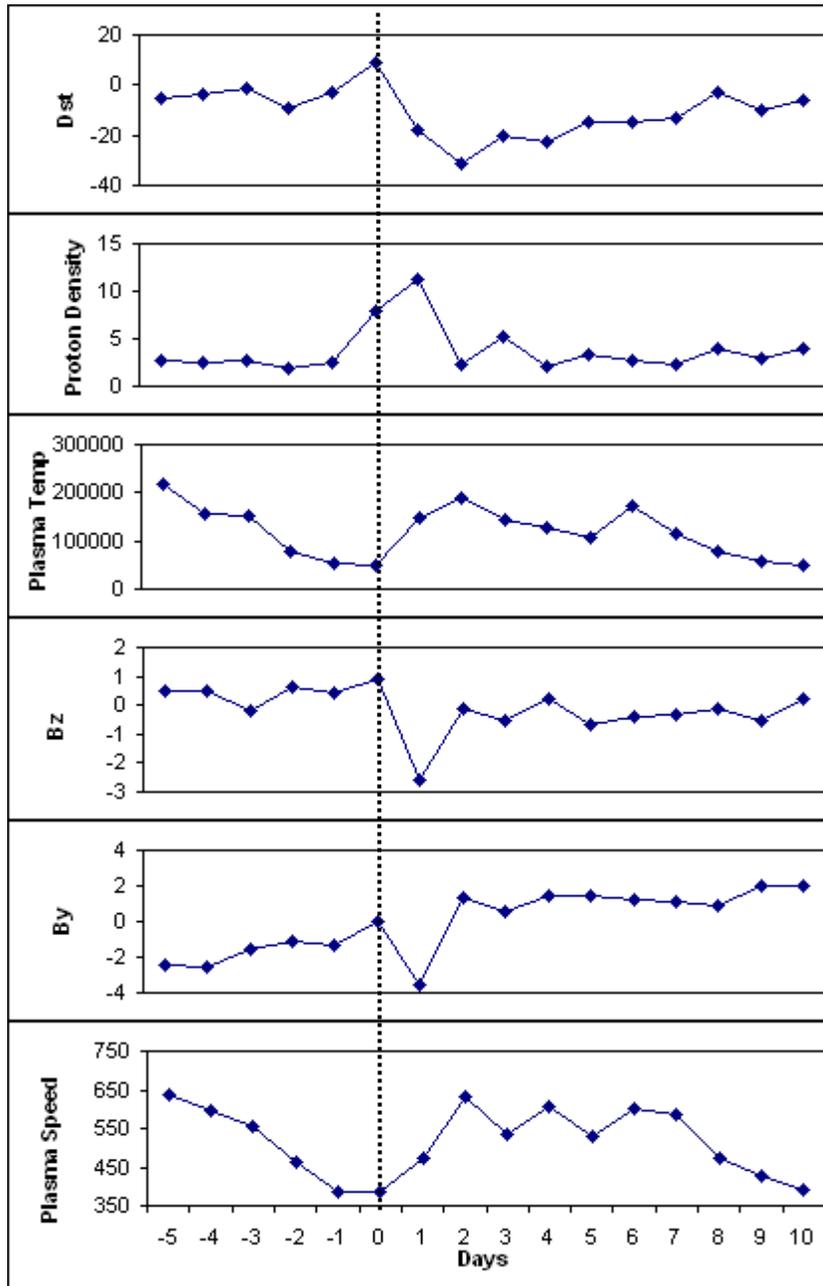


Fig 2: - Magnetic cloud event for plasma speed, B_y , B_z , plasma temperature, proton density & Dst for date 19-11-2007.

RESULT & CONCLUSION

Magnetic cloud events produce increases in IMF (B, nT), Solar wind velocity V_{sw} (km/sec) & geomagnetic activity. It is concluded from the analysis that magnetic cloud events produce change in interplanetary features & also produce enhancement in geomagnetic field of earth. It is concluded from the analysis that magnetic cloud event produce change in interplanetary features & also produce enhancement in geomagnetic field of earth.

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