

Characteristics of magnetic clouds/magnetic-cloud-like structures during the years 1995-2003

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Using nine years of solar wind plasma and magnetic field data, we investigated the characteristics of both magnetic clouds (MCs) and magnetic cloud like structures (MCLs) during 1995-2003. A MCL structure is an event which was identified by an automatic scheme [Lepping et al., 2005] with the same criteria as for a MC but is not identifiable as a flux rope by using the MC [Burlaga, 1981] fitting model developed by Lepping et al. [1990]. The average occurrence rate is ~ 9.5 for MCs and ~ 13.6 for MCLs per year for the overall period of interest; and there were 82 MCs and 122 MCLs identified during this period. The characteristics of MCs and MCL structures are as follows: (1) The averaged duration, Dt of MCs is 21.1 hour which is 40% longer than MCLs ($Dt = 15$ hrs); (2) The averaged $B_{z_{min}}$ (minimum B_z found in MC/MCL) is -10.2 nT for MCs and -6 nT for MCLs; (3) The averaged Dst_{min} (minimum Dst caused by MC/MCL) is -82 nT for MCs and -37 nT for MCLs; (4) The average of the solar wind velocity is 453 km/s for MCs and 413 km/s for MCLs; (5) The average of the thermal speed is 24.6 km/s for MCs and 27.7 km/s for MCLs; (6) The average of the magnetic field intensity is 12.7 nT for MCs and 9.8 nT for MCLs; and (7) The average of the solar wind density is 9.4 cm^{-3} for MCs and 6.3 cm^{-3} for MCLs. The longer duration, more intense magnetic field and higher solar wind speed and density of MCs, compared to those of the MCLs, might be the major reason for generally causing geomagnetic storms with higher geomagnetic activity.

References: (1) Burlaga, L. F., F. Mariani, and R. Schwenn, *J. Geophys. Res.*, 86, 6673, 1981. (2) Lepping, R. P., C. C. Wu, and D. B. Berdichevsky, *Annales Geophysicae*, 23, 2687-2704, 2005. (3) Lepping, R. P., J. A. Jones, and L. F. Burlaga, *Geophys. Res. Lett.*, 95, 11957, 1990.