Comparisons of Characteristics of Magnetic Clouds and Cloud-Like Structures during 1995-2012

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Using eighteen years (1995 - 2012) of solar wind plasma and magnetic field data (observed by the *Wind* spacecraft), solar activity (*e.g.* sunspot number: SSN), and the geomagnetic activity index (*Dst*), we have identified 168 magnetic clouds (MCs) and 197 magnetic cloud - like structures (MCLs), and we have made relevant comparisons. The following features are found during seven different periods (TP: Total period during 1995 - 2012, P1 and P2: first and second half period during 1995 - 2003 and 2004 - 2012, Q1 and Q2: quiet periods during 1995 - 1997 and 2007 - 2009, A1 and A2: active periods during 1998 - 2006 and 2010 - 2012). (1) During the total period the yearly occurrence frequency is 9.3 for MCs and 10.9 for MCLs. (2) In the quiet periods $<N_{MCs}>_{Q1} > <N_{MCLs}>_{Q1}$ and $<N_{MCs}>_{Q2} > <N_{MCLs}>_{Q2}$, but in the active periods $<N_{MCs}>_{A1} < <N_{MCLs}>_{A1}$ and $<N_{MCs}>_{A2} < <N_{MCLs}>_{A2}$. (3) The minimum Bz (Bz_{min}) inside of a MC is well correlated with the intensity of geomagnetic activity, Dstmin (minimum Dst found within a storm event) for MCs (with a Pearson correlation coefficient, c.c. = 0.75, and the fitting function is $Dst_{min} = 0.90+7.78Bz$min), but Bz_{min} for MCLs is not well correlated with the Dst index (c.c. = 0.56, and the fitting function is $Dst_{min} = -9.40+ 4.58 Bz_{min}$). (4) MCs play a major role in producing geomagnetic storms: the absolute value of the average Dst_{min} ($<Dst_{min}>_{MC}$ = -70 nT) for MCs associated geomagnetic storms is two times stronger than that for MCLs ($<Dst_{min}>_{MCL}$ = -35 nT), due to the difference in the IMF (interplanetary magnetic field) strength. (5) The SSN is not correlated with MCs ($<N_{MCs}>_{TP}$, c.c. = 0.27), but is well associated with MCLs ($<N_{MCLs}>_{TP}$, c.c. = 0.85). Note that the c.c. for SSN *vs.* $<N_{MCs}>_{P2}$ is higher than that for SSN *vs.* $<N_{MCLs}>_{P2}$. (6) Averages of IMF, solar wind speed, and density inside of the MCs are higher than those inside of the MCLs. (7) The average of MC duration (≈18.82 hours) is ≈20 % longer than the average of MCL duration (≈15.69 hours). (8) There are more MCs than MCLs in the quiet solar period, and more MCLs than MCs in the active solar period, probably due to the interaction between a MC and another significant interplanetary disturbance (including another MC) which could obviously change the character of a MC, but we speculate that some MCLs are no doubt due to other factors such as complex birth conditions at the Sun.