HXR emission, and (4) there are two groups of CME height at the onset time of SPE; one is the height below 5 Rs (low corona) and the other is above 5Rs (high corona). In this talk, we will present the onset time comparison and discuss about the origin of the SPE onset.

[Ⅲ-3-3] Relationships between solar/interplanetary (IP) parameters and Dst index, according to IP sources

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We have investigated interplanetary (IP) structures of 82 intense geomagnetic storms (Dst ≤ -100 nT) that occurred from 1998 to 2006. According to their interplanetary origins, we classified them as four groups: 20 sMC events (IP shock and MC), 19 SH events (sheath field), 12 SH+MC events (Sheath field and MC), and 8 nonMC events (non-MC type ICME). For each group, we examined the relationships between Dst index and solar/IP parameters, namely, direction parameter (DP), CME speed (V_{CME}), solar wind speed (V_{SW}), minimum of IMF B_z component(Bz_{min}), and maximum of E_y component (Ey_{max}).We found that the relationships strongly depend on their IP source. Our main results can be summarized as follows: 1) The correlation between Dst and DP is the best for the SH+MC events (r = -0.61). 2) The relationship between Dst and V_{CME} gives the best correlation for the sMC events (r = -0.56). 3) There is the best correlation between Dst and V_{SW} for the sMC events (r = -0.61), while there is a very weak correlation (r= -0.17) for the SH events. 4) The relationship between Dst and Bz_{min} gives the best correlation (r = -0.87) for the SH+MC events. 5) The correlation between Dst and Ey_{max} is the best for the SH+MC events (r = -0.87). Summing up, the sMC and SH+MC events give us good correlations, but the SH events, weak correlations. From this study, we suggest that this tendency should be caused by the characteristics of IMF southward components, e.g., smooth field rotations for the MC events and highly IMF fluctuations for the SH events.

[Ⅲ-3-4] Three-Dimensional Magnetohydrodynamic Simulations of Nonlinear Field Line Resonances

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Field line resonances (FLRs) observed in the magnetosphere often have the amplitude of a few nT, which indicates that dB/B roughly satisfies ~0.01. It is well known that the FLRs are excited by compressional waves via mode conversion, but there has been no apparent criterion on the maximum amplitude in the regime of linear approximations. Such limited range of amplitude should be understood by including nonlinear saturation of FLRs, which has not been examined until now. In this study, using a three-dimensional magnetohydrodynamic (MHD) simulation code, we examine the evolution of nonlinear field line resonances (FLRs) in the cold plasmas. The MHD code used in this study allows a full nonlinear description and enables us to study the maximum amplitude of FLRs. When the disturbance is sufficiently small, it is shown that linear properties of MHD wave coupling are well reproduced. In order to examine a nonlinear excitation of FLRs, it is shown how these FLRs become saturated as the initial magnitude of disturbances is assumed to increase. Our results suggest that the maximum amplitude of FLRs become saturated at the level of the same order of dB/B as in observations. In addition, we discuss the role of both linear terms and nonlinear terms in the MHD wave equations.

[Ⅲ-3-5] Sea-Level Pressure Response to the Fast Solar Wind Stream

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Solar-terrestrial links in short-time scales(daily ~monthly) are extensively explored in recent years: such as a response of low cloud amounts to the Forbush decrease, a response of Northern Atlantic oscillation index to sudden increase in electric field intensity of solar wind and so on (e.g., Svensmark et al., 2009; Boberg & Lundstedt, 2002). In this study, we perform the superposed epoch analysis to see any possible response of the sea-level pressure over Korean peninsula to the fast solar wind stream. Data sets are daily values, and zero days are determined to be days when the solar wind velocity exceeds 800km/s. Average profile of superposed sea-level pressure shows a gradual increase during the first 2 days and a decrease afterward below the normal level with a low pressure condition maintained for a few days. This result indicates that the sea-level pressure may respond to the fast solar wind stream. In other words, the average profile of sea-level pressure mimics the average velocity profiles. The correlation coefficient between two average profiles is 0.80, with 2 day lag.