[S11-1] Geoeffective Physical Parameters of Fast Coronal Mass Ejections

문용재[1], 조경석[1], 김연한[1], 봉수찬[1], 채종철[2], 박영득[1]
[1]한국천문연구원, [2]서울대학교

We have examined the physical characteristics of very fast coronal mass ejections (CMEs) and their geoeffective parameters. For this we consider SOHO/LASCO CMEs whose speeds are larger than 1300 km/s. By examining their SOHO/EIT and SOHO/LASCO images, we selected 38 front-side very fast CMEs. For the examination of CME geoeffectiveness, we select 12 halo CMEs whose longitudes are less than 40 degrees, which are thought to be the most plausible candidates of geoeffective CMEs. Then we examine the relationship between their CME physical parameters (mass, column density, location of an associated flare, and direction) and the Dst index. Especially, we propose a new CME direction parameter which is defined as the maximum ratio of its shorter front from solar disk center and its longer one. Its major advantage is that it can be directly estimated from coronagraph observation. It is found that while the location of the associated flare has a poor relationship with the Dst index, the new direction parameter has a relatively good relationship. In addition, the column density of a CME also has a comparable good correlation with the Dst index. Noting that the CME column density is strongly affected by the direction of a CME, our results imply that the CME direction seems to be the most important parameter that controls the geoeffectiveness of very fast halo CMEs.

[S11-2] Study of Flare-Associated X-Ray Plasma Ejections: Morphological Classification and Kinematic Properties

김연한, 문용재, 조경석, 박영득
Korea Astronomy and Space Science Institute

X-ray plasma ejections (XPEs) often occurred around the impulsive phase of solar flares and have been well observed by the SXT aboard Yohkoh. Though the XPEs show various morphological shapes, there has been no attempt at classifying the morphological groups for a large sample of the XPEs. In this study, we have classified 137 XPEs according to their shape for the first time. As a result, we classified the flare-associated XPEs into five groups as follows: loop-type (60 events), spray-type (40 events), jet-type (11 events), confined ejection (18 events), and others (8 events). We present time sequence images of several typical events to discuss their morphological characteristics, speed, CME association, and magnetic field configuration. In addition, we investigate the kinematic properties of XPEs and compare them with those of CMEs. The main results are as follows. Firstly, XPE speed ranges from 30 km/s to 1300 km/s with the mean value of about 230 km/s. In the case of their associated CMEs, the CME speed ranges from 150 km/s to 2000 km/s with the mean value of about 530 km/s. Secondly, when we make height-time plots for several selected events, we fund that while the CME speeds have some correlations with soft X-ray flux, the XPE speeds are similar to the hard X-ray flux curve. Thirdly, we also found that there is little correlation between the X-ray plasma ejection speeds and the CME speeds. These facts imply that the kinematic evolutions of XPEs and CMEs are quite different.