[구SE-23] Comparison of 3-D structures of Halo CMEs using cone models

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Halo coronal mass ejections (HCMEs) are major cause of geomagnetic storms and their three dimensional structures are important for space weather. In this study, we compare three cone models: an elliptical cone model, an ice-cream cone model, and an asymmetric cone model. These models allow us to determine the three dimensional parameters of HCMEs such as radial speed, angular width, and the angle (γ) between sky plane and cone axis. We compare these parameters obtained from three models using 62 well-observed HCMEs from 2001 to 2002. Then we obtain the root mean square error (RMS error) between maximum measured projection speeds and their calculated projection speeds from the cone models. As a result, we find that the radial speeds obtained from the models are well correlated with one another ($R > 0.84$). The correlation coefficients between angular widths are less than 0.53 and those between γ values are less than 0.47, which are much smaller than expected. The reason may be due to different assumptions and methods. The RMS errors of the elliptical cone model, the ice-cream cone model, and the asymmetric cone model are 213 km/s, 254 km/s, and 267 km/s, respectively. Finally, we discuss their strengths and weaknesses in terms of space weather application.

[구SE-24] Dependence of Geomagnetic Storms on Their Assocatied Halo CME Parameters

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We have compared the geoeffective parameters of halo coronal mass ejections (CMEs) to predict geomagnetic storms. For this we consider 50 front-side full halo CMEs whose asymmetric cone model parameters and earthward direction parameter were available. For each CME we use its projected velocity (Vp), radial velocity (Vr), angle between cone axis and sky plane (γ) from the cone model, earthward direction parameter (D), source longitude (L), and magnetic field orientation (M) of the CME source region. We make a simple and multiple linear regression analysis to find out the relationship between CME parameters and Dst index. Major results are as follows. (1) Vr x γ has a higher correlation coefficient (cc = 0.70) with the Dst index than the others. When we make a multiple regression of Dst and two parameters (Vr x γ, D), the correlation coefficient increases from 0.70 to 0.77. (2) Correlation coefficients between Dst index and Vr x γ have different values depending on M and L. (3) Super geomagnetic storms (Dst ≤ -200 nT) only appear in the western and southward events. Our results demonstrate that not only the cone model parameters together with the earthward direction parameter improve the relationship between CME parameters and Dst index but also the source longitude and its magnetic field orientation play a significant role in predicting geomagnetic storms.