1996 to 2015

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In this study we have made a statistical investigation on the kinematic classification of coronal mass ejections (CMEs) using about 4,000 SOHO/LASCO CMEs from 1996 to 2015. For this we use their SOHO/LASCO C3 data and exclude all poor events. Using the constant acceleration model, we classify these CMEs into three groups: Acceleration group, Constant Velocity group, and Deceleration group. For classification we adopt four different methods: Acceleration method, Velocity Variation method, Height Contribution method, and Visual Inspection method. Our major results are as follows. First, the fractions of three groups depend on the method used. Second, the results of the Height Contribution method are most consistent with those of the Visual Inspection method, which is thought to be most promising. Third, the fractions of different kinematic groups for the Height contribution method are: Acceleration (35%), Constant speed (47%), and Deceleration (18%). Fourth, the fraction strongly depend on CME speed; the fraction of Acceleration decreases from 0.6 to 0.05 with CME speed; the fraction of Constant increases from 0.3 to 0.7; the fraction of Deceleration increases from 0.1 to 0.3. Finally we present dozens of CMEs with non-constant accelerations. It is found that about 40 % of these CMEs show quasi-periodic oscillations.

[구 SS-09] Estimation of CME 3-D parameters using a full ice-cream cone model

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In space weather forecast, it is important to determine three-dimensional properties of CMEs. Using 29 limb CMEs, we examine which cone type is close to a CME three-dimensional structure. We find that most CMEs have near full ice-cream cone structure which is a symmetrical circular cone combined with a hemisphere. We develop a full ice-cream cone model based on a new methodology that the full ice-cream cone consists of many flat cones with different heights and angular widths. By applying this model to 12 SOHO/LASCO halo CMEs, we find that 3D parameters from our method are similar to those from other stereoscopic methods (i.e., a triangulation method and a Graduated Cylindrical Shell model). In addition, we derive CME mean density $(\bar{\rho}_{CME} = \frac{M_{total}}{V_{cone}})$ based on the full ice-cream cone structure. For several limb events, we determine CME mass by applying the Solarsoft procedure (e.g., cme_mass.pro) to SOHO/LASCO C3 images. CME volumes are estimated from the full ice-cream cone structure. For the first time, we derive average CME densities as a function of CME height for several CMEs, which are well fitted to power-law functions. We will compare densities (front and average) of geoeffective CMEs and their corresponding ICME ones.

[구 SS-10] Radial and azimuthal oscillations of 24 Halo Coronal Mass Ejections using multi spacecraft

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We have made an investigation on the radial and azimuthal wave modes of full halo coronal mass ejections (HCMEs). For this, we consider 24 HCMEs which are simultaneously observed by SOHO and STEREO A & B from August 2010 to August 2012 when they were roughly in quadrature. Using the SOHO/LASCO C3 and STEREO COR2 A & B running difference images, we estimate the instantaneous apparent speeds of the HCMEs at 24 different position angles. Major results from this study are as follows. First, there are quasi-periodic variations of the instantaneous radial velocity with the periods ranging from 24 to 48 mins. Second, the amplitudes of instant speed variations are about a third of the projected speeds. Third, the amplitudes are found to have a weak anti-correlation with period. Our preliminary identification from SOHO observations shows that there are several distinct radial and azimuthal wave modes: m=0 (radial) for five events, m=1 for eleven events, m=2 for three events, and unclear for the other events. In addition, we are making a statistical investigation on the oscillation of 733 CMEs to understand their physical origins.

[구 SS-11] Competition between ICME and crustal magnetic field on the loss of Mars

atmosphere

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The Mars Atmosphere and Volatile (MAVEN) mission has been providing valuable information on the atmospheric loss of Mars since its launch in November 2013. The Neutral Gass and Ion Mass Spectrometer (NGIMS) onboard MAVEN, was developed to analyze the composition of the Martian upper atmospheric neutrals and ions depending on various space weather conditions. We investigate a variation of upper atmospheric ion densities depending on the interplanetary coronal mass ejections (ICMEs). It is known that the Mars has a very weak global magnetic field, so upper atmosphere of Mars has been strongly affected by the solar activities. Meanwhile, a strong crustal magnetic field exists on local surfaces, so they also have a compensating effect on the upper atmospheric loss outside the Mars. The weak crustal field has an influence up to 200km altitude, but on a strong field region, especially east longitude of 180° and latitude of -50°, they have an influence over 1,400km altitude. In this paper, we investigated which is more dominant between the crustal field effect and the ICME effect to the atmospheric loss. At 400km altitude, the ion density over the strong crustal field region did not show a significant variation despite of ICME event. However, over the other areas, the variation associated with ICME event is far more overwhelming.

항성/항성계

[초 SA-01] Variable stars in Galactic open clusters of the outermost VVV disk tiles

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We present the preliminary results obtained from the search of variable stars in the fields of open clusters located in the direction of the Galactic disk. The current study is based on J, H and Ks photometric data obtained in the near-infrared (NIR) VVV Survey. A first classification of the newly found variable stars is performed based on their light curves, periods and amplitudes. We also show the (Ks, J-Ks) color-magnitud decontaminated diagrams of the selected open clusters and examine the location of the variable stars in these diagrams. Available proper motion data are also used to analyze the possible membership of the discovered variable stars to the corresponding clusters, as well as to redetermine with more accuracy the parameters of the poorly studied clusters.

[구 SA-02] A new catalogue of galactic eccentric eclipsing binary stars

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우리 은하에 있는 618개 이심궤도 식쌍성의 카타로그를 제작하였다. 그 이심 식쌍성들은 우리의 극심시각 database에 수록된, 또는 여러 전천 탐사 자료에서 수집된 측광 자료로부터 새롭게 결정된, 또는 우리가 직접 관측하여 얻은 약 13만개의 극심시각 자료의 식시각도 분석을 통하여 편집된 것이다. 618개의 이심 식쌍성 중에서 근성점 운동을 보이는 시스템은 모두 170개이며, 이중에서 30개의 쌍성이 근성점 운동과 광시간 효과가 동시에 일어난다. 근성점 운동을 보이는 별들의 근성점 운동 변수들을 일관된 방식으로 산출하여 카타로그에 수록하였다. 우리가 작성한 최신의 카타로그는 기존 카타로그에 비해 양과 내용에 있어 가장 방대하다. 우리 은하 근성점 운동 쌍성들과 소마젤란 성운과 대마젤란 성운에서 발견된 근성점 운동 쌍성들을 모아 근성점 운동 변수들의 통계적 분포를 살펴 보았고, 그 결과들을 논의한다.

[구 SA-03] A Photometric Investigation of KIC6118779 with Phase Smearing Effect

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KIC6118779 is an over-contact binary system having a short orbital period of about 0.36 days. The photometric data for this system are acquired