Chromosphere and the Transition Region above Plage Regions

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We investigate velocity oscillations in the active region plage by using the high-spatial, high-spectral and high-temporal resolution spectral data acquired by the Interface Region Imaging Spectrograph (IRIS). From the Mn I 2801.907 Å (lower chromosphere), C II (lower transition region) and Si IV (middle transition region) lines, we measure the line of sight Doppler velocity at different atmospheric layers, and present results of wavelet analysis of the plage region with a range of periods from 2 to 8 minutes. In addition, we present correlations of the oscillations from the lower chromosphere to the middle transition region. Finally, we will discuss the regional dependence of the oscillation properties on physical properties such as temperature and magnetic field inclination.

[포 SS-03] Connection of Blobs along Post-CME Ray and EUV Flares

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After a coronal mass ejection occur, plasma blobs are often observed along the post-CME ray. Searching for features related to the plasma blobs would be important in understanding their origin. We investigated the morphology of solar flares at EUV wavelengths, around the estimated times when blobs were formed. We focused on three events - 2013 September 21 and 22, 2015 March 7 and 8, and 2017 July 13 and 14 - observed by Atmospheric Imaging Assembly (AIA) aboard Solar Dynamic Observatory (SDO). Around the blob ejection times on 2013 September 21 and 22 and 2017 July 13 and14, we found regions with recurrent events of pronounced flux increase in EUV images. Around those of 2015 March 7 and 8, however, we could not observe such recurrent flux increase. This illustrates that even though blob ejections along different post-CME rays look similar in the high corona, the assocated features in the low corona may differ. We conclude that magnetic morphology and CME triggering process should be carefully examined in order to classify plasma blobs by their nature.

[포 SS-04] Current Status of KMTNet/DEEP-South Collaboration Research for Comets and Asteroids Research between SNU and KASI

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Korea Microlensing Telescope Network (KMTNet) is one of powerful tools for investigating primordial objects in the inner solar system in that it covers a large area of the sky (2 × 2 degree2) with a high observational cadence. The Deep Ecliptic Patrol of the Southern sky (DEEP-South) survey has been scanning the southern sky using KMTNet for non-bulge time (45 full nights per year) [1] since 2015 for examining color, albedo, rotation, and shape of the solar system bodies. Since 2017 January, we have launched a new collaborative group between Korea Astronomy and Space Science Institute (KASI) and Seoul National University (SNU) with support from KASI to reinforce mutual collaboration among these institutes and further to enhance human resources development by utilizing the KMTNet/DEEP-South data. In particular, we focus on the detection of comets and asteroids spontaneously scanned in the DEEP-South for (1) investigating the secular changes in comet's activities and (2) analyzing precovery and recovery images of objects in the NASA's NEOWISE survey region. In this presentation, we will describe our scientific objectives and current status on using KMTNet data, which includes updating the accuracy of the world coordinate system (WCS) information, finding algorithm of solar system bodies in the image, and doing non-sidereal photometry.

[포 SS-05] Dependence of the peak fluxes of solar energetic particles on CME parameters and magnetic connectivity

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We investigate the relationships between the peak fluxes of 18 solar energetic particle (SEP) events and associated coronal mass ejection (CME) 3D parameters (speed, angular width, and separation angle) obtained from SOHO, STEREO-A and/or B for the period from 2010 August to 2013 June. We apply the STEREO CME Analysis Tool (StereoCAT) to the SEP-associated CMEs to obtain 3D speeds and 3D angular widths. The separation angles are determined as the longitudinal angle between flaring regions and magnetic footpoints of the spacecraft, which are calculated by the assumption of Parker spiral field. The main results are as follows. 1) We find that the dependence of the SEP peak fluxes on CME 3D speed from multi-spacecraft is similar to that on 2D CME speed. 2) There is a positive correlation between SEP peak flux and 3D angular width from multi-spacecraft, which is much more evident than the relationship between SEP peak flux and 2D angular width. 3) There is a noticeable anti-correlation (r=-0.62) between SEP peak flux and separation angle. 4) The multiple regression method between SEP peak fluxes and CME parameters shows that the longitudinal separation angle is the most important parameter, and the CME 3D speed is secondary on SEP peak flux.

[포 SS-06] Development of Solar Activity Monitoring Map and Its Application to the Space Weather Forecasting System

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SDO/AIA와 STEREO/EUVI 두 태양 관측 위성의 193 파장에서의 실시간 영상 이미지를 이용하여 Stonyhurst Heliographic Map을 작성하고 각각의 위성 데이터 분석으로부터 얻어진 결과들을 종합적으로 재구성하여 태양 전면 및 후면의 활동 영역들을 동시에 표출하는 태양 활동성 지도 (Solar Activity Monitoring Map)를 작성하는 프로그램을 제작하였다. 태양 활동성 지도를 이용하여 태양 후면에서의 극자외선 밝기 분포를 경도에 따라 등간격으로 나눈 후 각 지역에서 얻은 극자외선량을 실시간으로 갱신하며 그래프를 작성하는 프로그램도 함께 제작하고 그로부터 태양 후면 영역의 활동성이 향후 지구에 어떠한 방식으로 영향을 미칠 것인지 사전에 예측 가능하도록 하였다.

또한 태양 후면에서 발생하는 활동 영역 (Active Region) 및 코로나홀들을 자동적으로 탐지한 후 실시간으로 변화 정도를 추적 및 기록하는 프로그램도 제작하였다. 태양 활동성 지도는 193 파장에서 뿐만 아니라 두 위성이 공유하는 세 개의 동일 혹은 유사한 파장대 (171,211,304)에서 얻어진 데이터들도 함께 이용하여 각 파장대에서 독립적으로 작성하였는데 이로 인해 각각의 에너지 영역의 특성에 해당하는 태양 활동성을 동시에 표출하는 것이 가능하게 되었다. 이러한 프로그램을 이용하여 태양 후면에서의 활동 영역의 발생 및 변화를 사전에 인식하고 그들이 태양 전면으로 나타나기 전에 대비할 수 있는 예보 장치가 마련되었다.

본 연구들과 더불어 극자외선 영역에서의 태양 활동성 조사로부터 플레어의 발생을 예측할 수 있을 것인지의 가능성 여부를 타진하기 위해 과거 극자외선 관측에서 얻어진 활동 영역들의 데이터와 연 X-선 관측으로부터 기록된 플레어 발생 여부의 상관관계를 조사하는 연구가 현재 진행 중이다. 이러한 연구로부터 긍정적인 결과가 도출되는 경우 극자외선 영역에서의 관측 데이터를 이용하여 플레어 발생 가능성을 예측하는 새로운 방법을 제시하는 것이 가능해질 것이다.

[포 SS-07] Observations of Light bridge jets using the New Solar Telescope

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We report observations of light bridge (LB) jets taken with the New Solar Telescope. Jets as dark, fine threads occurred lined along both edges of a LB of a sunspot, which is a bright and elongated structure that divides a sunspot's umbra into two or more parts. This LB jets are observed for about three hours with Hα filtergraph at ±0.4Å, ±0.8Å from the line center, TiO filtergraph, and near infra-red imaging spectropolarimeter (NIRIS). High resolution Hα data revealed that subsequent ejection of LB jets were associated with subsequent brightening along the edge of the LB. Also, this subsequent brightening was spatially correlated with both photospheric flow and magnetic field change detected from the TiO and NIRIS data, respectively. Preliminary results of LB jet observation and discussions on its formation mechanism will be presented.

[포 SS-08] Observation of a 2016 Ganymede stellar occultation event with the SOAO 0.6m telescope

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