0.30±0.03 in IC 1613 and 0.14±0.01 in NGC 205. From analyses of the correlations of the spatial distribution of the C/M ratios with the HI properties and dynamical structures of the target galaxies, we discuss environmental effects of the star formation in the galaxies. We also discuss the epochs of the AGB star formation in the galaxies by comparing theoretical isochrones with the color distributions and luminosity functions of the AGB stars.

[Ⅶ-1-6] CO and HI Properties of the Virgo Cluster Spiral Galaxies

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We investigate the molecular and atomic gas properties of 20 Virgo cluster spiral galaxies by comparing with optical properties to assess the effect of the Virgo environment on the interstellar media of the Virgo disks. CO maps from FCRAO On-The-Fly (OTF) mapping survey and HI maps from VIVA (VLA Imaging of Virgo spirals in Atomic gas) are shown, and radial properties of molecular and atomic gas are compared. H2 deficiency along with HI is investigated, and gas evolution history of the Virgo cluster spirals is also examined.

[Ⅶ-1-7] The first UV fundamental plane and evidence of star formation in early-type galaxies

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We present GALEX (Galaxy Evolution Explorer) far (FUV) and near (NUV) ultraviolet imaging of 34 nearby early-type galaxies from the SAURON representative sample of 48 E/S0 galaxies, all of which have ground-based optical imaging from the MDM Observatory. The surface brightness profiles of nine galaxies (~26 per cent) show regions with blue UV-optical colours suggesting recent star formation. Five of these (~15 per cent) show blue integrated UV-optical colours that set them aside in the NUV integrated colour-magnitude relation. These are objects with either exceptionally intense and localised NUV fluxes or blue UV-optical colours throughout. They also have other properties confirming they have had recent star formation, in particular Hbeta absorption higher than expected for a quiescent population and a higher CO detection rate. This suggests that residual star formation is more common in early-type galaxies than we are used to believe. NUV-blue galaxies are generally drawn from the lower stellar velocity dispersion (sigma_e <200 km/s) and thus lower dynamical mass part of the sample. We have also constructed the first UV Fundamental Planes and show that NUV blue galaxies bias the slopes and increase the scatters. If they are eliminated the fits get closer to expectations from the virial theorem. Although our analysis is based on a limited sample, it seems that a dominant fraction of the tilt and scatter of the UV Fundamental Planes is due to the presence of young stars in preferentially low-mass early-type galaxies.

■ Session : 태양 · 태양풍
10월 30일(금) 09:00 – 10:15 제2발표장

[(초)III-2-1] A Formula for Calculating Dst Injection Rate from Solar Wind Parameters

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This is an attempt to improve a formula to predict variations of geomagnetic storm indices (Dst) from solar wind parameters. A formula which is most widely accepted was given by Burton et al. (1975) over 30 years ago. Their formula is: $dDst^*/dt = Q(t) - Dst^*(t)/\tau$, where Q(t) is the Dst injection rate given by the convolution of dawn-to-dusk electric field generated by southward solar wind magnetic field and some response function. However, they did not clearly specify the response function. As a result, misunderstanding seems to be prevailing that the injection rate is proportional to the dawn-to-dusk electric field. In this study we tried to determine the response function by examining 12 intense geomagnetic storms with minimum Dst < -200 nT for which solar wind data are available. The method is as follows. First we assume the form of response function that is specified by several time constants, so that we can calculate the injection rate Q1(t) from the solar wind data. On the other hand, Burton et al. expression provide the observed injection rate $Q2(t) = dDst^*/dt + Dst^*(t)/\tau$. Thus, it is possible to determine the time constants of response function by a least-squares method to minimize

the difference between Q1(t) and Q2(t). We have found this simple method successful enough to reproduce the observed Dst variations from the corresponding solar wind data. The present result provides a scheme to predict the development of Dst 30 minutes to 1 hour in advance by using the real time solar wind data from the ACE spacecraft.

[III-2-2] Origin of the Multiple Type II Solar Radio Bursts Observed on December 31 2007

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Solar type II radio burst is regarded as a signature of coronal shock. However its association with coronal mass ejections (CMEs)-driven shock and/or flare blast waves remains controversial. On December 31 2007, SOHO/LASCO and STEREO/COR observed a CME that occurred on the east limb of the Sun. Meanwhile, two type II bursts were observed sequently by KASI/E-Callisto and the Culgoora radio observatory during the CME apparence time. In this study, we estimate kinematics of the two coronal shocks from dynamic spectrum of the multiple type II bursts and compare with the kinematics of the CME derived from the space observations. An origin of the multiple type II bursts is inspected and discussed briefly.

[III-2-3] Dependence of solar proton events on X-ray flare peak flux, longitude, and impulsive time

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In this study, we present a new empirical forecasting method of solar proton events based on flare parameters. For this we used NOAA solar energetic particle (SEP) events from 1976 to 2006 and their associated X-ray flare data. As a result, we found that about only 3.5% (1.9% for M-class and 21.3% for X-class) of the flares are associated with the proton events. It is also found that this fraction strongly depends on longitude; for example, the fraction for 30W° < L < 90W° is about three times larger than that for 30°E < L < 90°E. The occurrence probability of solar proton events for flares with long duration (> 0.3 hours) is about 2 (X-class flare) to 7 (M-class flare) times larger than that for flares with short duration (< 0.3 hours). The relationship between X-ray flare peak flux and proton peak flux as well as its correlation coefficient are strongly dependent on longitude. Using these results for prediction of proton flux, we divided the data into 6 subgroups depending on two parameters: (1) 3 longitude ranges (east, center, and west) and (2) flare impulsive times (long and short). For each subgroup, we make a linear regression between the X-ray flare peak flux and the corresponding proton peak flux. The result shows that the proton flux in the eastern region is much better correlated with the X-ray flux than that in the western region.

[III-2-4] 태양간섭현상 예측을 위한 프로그램 개발

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태양물리연구실에서는 춘·추분기를 전후한 일정 기간 사이에 수 분 정도 발생하는 태양간섭 현상을 예측하기 위하여 프로그램을 개발하였다. TU 미디어에서 제공해준 3개의 통신위성 PAS-8, TELSTAR-10, MEASAT-1에 대한 2006, 2007년도 춘·추분기의 통신장애 자료와 계산한 자료를 비교 분석하였고, 이를 이용하여 2009년도 추분기의 태양간섭 현상 시간을 예측하였다. 태양위치 변화 계산은 NASA/JPL에서 발행하는 DE406 역서 자료를 이용하여 정밀도를 높였으며, 지구 타원체 모델을 통해 기지국에서의 정확한 태양 및 위성의 고도, 방위각을 구하였다. 또한 기지국 안테나 이득률을 계산하여 기지국 안테나에서 예상 되는 태양 간섭 시간을 얻어 냈다. 기지국 안테나의 빔 패턴은 안테나의 중심 부근에서 가장 강하게 나타나며, 중심에서 멀어질수록 특수한 감쇄 형태를 보인다. 이러한 빔 패턴은 안테나의 이득률과 관련이 있으며, 빔 패턴의 적분을 통해 얻어진 이득률과 태양 디스크가 얼마나 안테나의 범위에 들어오는가에 따라 안테나에 수신되는 전파의 강도가 달라진다. 이러한 강도 변화량을 계산함으로써 태양 간섭 시간을 계산할 수 있다. 본래 안테나 빔 패턴은 개개의 안테나에 따라 다르며 직접 측정하여 얻을 수 있다. 사용한 빔 패턴 모델은 ITU에서 채택된 WARC-79 모델을 이용하였고 모든 위성 기지국 안테나의 빔 패턴은 이 모델에서 벗어나지 않는다. 이 연구에서는 빔 패턴 모델을 적용하여 기존의 TU미디어 성수기지국에서의 태양간섭 시간을 다시 계산하였다. 또한 새롭게 KT 용인 위성 관제센터의 자료를 추가하여 태양 간섭시간을 계산하고 예측하였다. 위성데이터는 기존의 PAS-8, TELSTAR-10, MEASAT-1 통신위성과 KT에서 운용하고 있는 무궁화 3호와 무궁화 5호 통신위성 자료를 사용하였다. 이러한 계산 방법은 전국 임의의 지역에서 춘·추분기에 발생할 수 있는 태양간섭 시간을 예측하고 적용할 수 있다.

[III-2-5] Testing Capability of CME Eccentricity Parameter

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