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The periodic comet 17P/Holmes underwent an astonishing outburst on October 24, 2007; its apparent total brightness increased from V~17 to V~2.5 magnitude in just two days. After the outburst, 17P/Holmes may have lost some mass in the nucleus, and changed its rotation period and the color. We made time series observations for 17P/Holmes using the 1.8m telescope with 2K CCD at Bohyunsan Observatory, on the nights of 2009 January 19-22. Our observation reveals that 17P/Holmes is still active even at the heliocentric distance of about 4.22 AU. The coma and the dust tail could be obviously seen from a 300s exposed image. We will present the surface brightness profile of the coma from our co-added image, comparing with a stellar PSF, and will estimate the dust production rate calculated from the $Af\rho$ value. Also, the rotation of the nucleus derived from the brightness variation will be discussed.

■ Session : 태양 및 우주환경 I
4월 29일(수) 11:00 - 12:45 제2발표장

[초SE-01] The 27-Day Modulation of the Low Latitude Ionosphere during a Solar Maximum

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The 27-day solar modulation of the low latitude ionosphere is investigated for the solar maximum period using in situ satellite measurement data as well as the total electron contents (TEC) estimated from the satellite signals of the Global Positioning System (GPS). While the density and temperature of the topside ionosphere observed at an altitude of 685 km manifest delayed responses to the 27-day variations in the daily F10.7 values, similar to those previously reported for an altitude of 840 km, the nighttime scale height, obtained by comparing the densities observed at altitudes of 685 km and 840 km at similar local times, was shown to vary in accordance with the changes in F10.7 with the same time delay. The oxygen ion fraction measured at an altitude of 840 km shows a similar response regardless of the local time. Moreover, the GPS TEC values, most of which come from the F peak region, also exhibit similar delayed modulations in accordance with the solar rotation. The TEC value correlates well with the thermospheric neutral density, and both are observed to be modulated with the solar rotation with time delay, especially when a long term variation is filtered out. The present result confirms that the whole thermospheric and ionospheric system is modulated with the solar rotation.

[SE-02] FUV spectral analysis of the relativistic electron aurora (REA)

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The auroral emissions are usually occurred by impacts of several keV precipitating electron to the ionospheric elements. While these several keV electrons effects on aurora phenomenon is well-known in the auroral science, the precipitating "hard" electron roles have been scarcely examined because of insufficient particle data. SPP aboard STSAT-1 had observed both low energy (100eV~20keV, ESA) and high energy (170 ~ 360keV, SST) electron with FUV (far ultraviolet) spectrograph which is known as FIMS. We checked the FUV auroral emissions shows good correlation with incident electron energy flux. We also examined that the line spectral variation depends on the peak energy of precipitating electron with STSAT-1 one year data from Nov. 2003 to Oct. 2004. Among these one year data, we found the coincident events between the ESA and SST data which have relativistic electron phenomenon. We show these events and compare the line ratios of 1340~1715Å which contain OI1356, NI1493 and LBH band. And we examine the FUV line-ratio verification to indicate the relativistic electron precipitating at the auroral region.

[SE-03] Thermospheric Density Variations Caused by IMF Sector Polarity Changes

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Thermospheric density is important not only for predicting the atmospheric drag in the context of the satellite ephemeris prediction, but also in understanding the thermosphere-ionosphere coupling process as well. Thermospheric density variations are controlled by various sources such as Joule/particle heating, Lorentz force,

thermal expansion, upwelling and horizontal wind circulation. These sources are directly or indirectly associated with the direction and/or strength of the interplanetary magnetic field (IMF). That is, there is an intimate relationship between IMF variation and thermospheric density variation. In 2003 and 2007 during the declining phase solar cycle 23, the IMF exhibited a well-defined sector polarity change; directed toward the Sun (i.e., +Bx and By) and away the Sun (-Bx and +By). It has been known that the IMF By in GSE coordinates makes a positive or negative IMF Bz offset in GSM coordinate. We discuss whether the thermospheric total mass density changes with the IMF sector polarity. For this study, we use total mass density around 400 km, derived from the high-accuracy accelerometer on board the CHAllenging Minisatellite Payload (CHAMP) spacecraft.

[SE-04] Statistical Analysis for Climatic Elements with the Solar North-South Asymmetry

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We show that the solar north-south asymmetry, the normalized difference between the northern and southern hemispheric sunspot area, could be a source of different statistical distributions of terrestrial climatic elements. For this purpose, we compare sliding correlation coefficients between sunspot numbers and earth's annual mean temperature anomalies with the solar north-south asymmetry, which is having larger values than zero from 1907 to 1985 and lower values than zero for the period before 1907 and after 1985. We also compare probability distributions of Northern Atlantic Oscillation (NAO) index in two different periods abovementioned. Temperature anomalies are shown to be negatively correlated with sunspot numbers when the southern solar hemisphere is more active, and vice versa. Probability distributions in two periods are different from each other.

[SE-05] Magnetic Clouds and Pseudo-Magnetic Clouds

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The interplanetary magnetic clouds have a structure of nested helical magnetic fields which can be well described by a magnetic flux rope. Observationally, they are characterized by smooth rotations of magnetic field vectors in the plane perpendicular to the Sun-Earth line. We tried to select as many events as possible which exhibit such characteristic rotations by surveying the solar wind data obtained by ACE for one year of 1999, and identified more than 80 cases with durations ranging from 1 to 10 hours (typically 2-3 hours). Then, we investigated characteristic solar wind structures of those selected events. It has been revealed, as a result, that there are two distinct kinds of structures. One is described by a magnetic flux rope structure, and the other is a bunch of magnetic flux tubes along which torsional Alfvén waves are propagating. We call this latter structure a pseudo-magnetic cloud, noting that they can be easily but incorrectly taken as a magnetic cloud. The distinction of the two is clearly seen by investigating the solar wind velocity vectors. Typically, in the Alfvén wave cases, the wave components of the velocity show clear planar rotations similar (or in opposite directions) to the rotations of magnetic field vectors as expected from MHD theory. In the magnetic flux rope cases, on the other hand, no strong correlations are seen between magnetic fields and velocity fields, with clear planar rotations being seen only in the magnetic fields.

[SE-06] Emergence of a Diamagnetic Flux Rope in the Solar Corona and Its Significance in Coronal Mass Ejections

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The evolution of a coronal magnetic field system in response to emergence of a diamagnetic flux rope is investigated by numerical magnetohydrodynamic (MHD) simulations in relation to escape of a CME structure from the sun. The toroidal magnetic field of the emerging flux rope is set to be either parallel (case 1) or antiparallel (case 2) to the toroidal field of the overlying arcade. In case 1, magnetic reconnection between the emerging field and the overlying arcade field creates a new paramagnetic flux rope. Although the presence of this paramagnetic flux rope slows down reconnection between the overlying field and the emerging field in the early stage, the flux rope gathers more and more flux, expands, and rises with time. In case 2, magnetic reconnection efficiently progresses from the beginning between the emerging diamagnetic flux rope and the overlying arcade field. This reconnection process removes not only the closed field barrier surrounding the diamagnetic flux rope, but also the poloidal flux in this flux rope. Thus, the flux rope can eventually become free to go