

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

indefinitely away, but with only a small flux in it. These two types of flux rope ejections may account for the different types of CMEs.

■ Session : 고층대기

4월 29일(수) 14:40 - 15:55 제2발표장

[ATM-01] Diurnal Variations of Sporadic Meteor Flux Observed by SKYiMet Meteor Radar

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Meteors are the important source of metallic atoms in the ionosphere. The sporadic meteors penetrating in 80–100 km altitudes provide a long term effect on the metallic ion layer formations. Earlier studies have shown that the sporadic meteor flux is not constant throughout the globe. However, recent studies showed that they are not random, but follow certain periodic diurnal and seasonal pattern. For a better understanding of meteor origin, it is important to know precisely the global annual, seasonal and diurnal variation of meteor flux. In the paper we study the diurnal variation of meter flux rate at different latitudes using observations from Thumba, India, Darwin, Buckland Park, Davis. We observed a secondary peak occurring at 0300 LT in addition to a morning peak occurring at 0600 LT at Thumba. At other latitudes only one peak occurring at 0600 LT is observed. Interestingly, this secondary peak has a clear seasonal variations. In summer (winter), the primary (secondary) peak is larger than the secondary (primary) peak. However, the primary and secondary peaks are comparable in equinoxes. Comparing with the observations from low to high latitudes, we conclude that the secondary peak is strongly limited in the region of the equator. We suggest that the secondary peak could be due to sporadic meteor sources located around apex, which may not be associated with Helion and Antihelion sources.

[ATM-02] On the Seasonal Variation of Meteor Decay Times Measured by a Meteor Radar at King Sejong Station(62°S, 58°W), Antarctica

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A meteor radar, installed at King Sejong Station (KSS), Antarctica in February 2007, has been detecting numerous meteors more than 18,000 per day. Meteors entering the earth's atmosphere reveal much information on the atmosphere through the process of interacting with the increasingly dense air molecules, especially the altitude region between 70km and 100km. Meteor decay times measured by a meteor radar have been used to infer the atmospheric temperature and pressure under the assumption that diffusion is the only process for decay of meteor echo signals. However, meteor decay times measured over KSS decrease with decreasing altitude below 80~85 km, clearly opposite behavior to the diffusion assumption for meteor decay. The monthly averaged height profiles of meteor decay times show a maximum at 80~85km, which appears at higher altitude during southern summer season than winter. This feature was previously attributed to additional removal of meteor trail electrons by icy dust particles in the cold mesosphere. Models of meteor decay time with dust particles (Havnes and Sigernes, 2005; Younger et al., 2008) predict shorter decay times for weak echoes than strong echoes, which was supported by some of previous observations (Ballinger et al., 2008; Singer et al., 2008). However, our measured meteor decay times are generally shorter for strong echoes than for weak echoes in the altitude region of about 70~90km. In addition, height profiles of meteor echo power and SNR (signal-to-noise ratio) show steep decreases below 80~85km, indicating fast extinguishing mechanism of meteor trails even in the beginning stage at the low altitudes. These characteristics found in our data may imply fast removal of plasma/electrons other than absorption by dust particles. We will discuss about other possible mechanisms related with D-region chemistry.

[ATM-03] Differences between the TOPEX/Jason and GPS TEC measurements

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The TEC data obtained from the TOPEX/Jason and GPS satellites have been extensively utilized for the various studies on the ionosphere due to their unprecedented temporal and spatial coverage. The TOPEX/Jason