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

Il-Hyun Cho[1], Young-Sil Kwak[1], Khan-Hyuk Kim[1], Kyung-Suk Cho[1], Ho-Sung Choi[1], and Heon-Young Chang[2]

[1]*Korea Astronomy and Space Science Institute*
[2]*Department of Astronomy and Atmospheric Sciences, Kyungpook National University*

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

K. Marubashi and Kyung-Suk Cho

Korea Astronomy and Space Science Institute

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

Gwangson Choe[1,2], Geunseok Park[2], Hongdal Jun[2], Hyunnam Kim[2], and Kap-Sung Kim[1,2]

[1]*School of Space Research, Kyung Hee University*
[2]*Department of Astronomy and Space Science, Kyung Hee University*

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