Session:	**[B2B-1] S1 : Solar System and Sun-Earth Interactions**
Date:	August 19, 2014 (Tuesday)
Time:	14:00~15:30
Room:	Room A (Room 101~102)
Chair:	Jingxiu Wang (National Astronomical Observatories)

[B2B-1-1] **14:00~14:15**

Digitized Archive of Kodaikanal Ca-K Spectroheliograms and Solar Activity Cycle

V. Muthu Priyal (Indian Institute of Astrophysics, India), Jagdev Singh, D. Banerjee, and B. Ravindra

The spectroheliograms in Ca-II K line obtained at Kodaikanal since 1907 have been digitized using 4k x 4k CCD camera. After CCD and intensity calibration we identified different chromospheric features. Using different thresholds of the intensity contrast and size criterion different features are classified as the plage (> 1.35 and area > 1-arc-min2) , enhanced-network (>1.35, area < 1-arcmin2) , active-network (1.25 -1.35), and quiet-Sun (1.15-1.25). For 100 years Ca-K spectroheliograms (1907 – 2007), the variation of Plage index, enhanced-work, active-network and quiet network index are studied with the solar cycle phase. The centroid of each individual plages corresponding to different latitudes are also identified using auto detection methods as developed using IDL, and the chromospheric differential rotation rates are calculated. Furthermore, we study the variation of the contribution of CaII K plage flux to the total solar irradiance. In this presentation we will present the Kodaikanal data archive and some important and interesting result obtained from our KKL Ca-K Spectroheliograms as outlined above.

[B2B-1-2] **14:15~14:30**

Spectral Inversion of the Hα line for a Plasma Feature in the Chromosphere of the Quiet Sun

Jongchul Chae (Seoul National University, Korea)

We propose a generalization of Becker's cloud model (BCM): an embedded cloud model (ECM)—for the inversion of the core of the Hα line spectrum of a plasma feature either lying high above the forest of chromospheric features or partly embedded in the outermost part of this forest. The fundamental assumption of the ECM is that the background light incident on the bottom of the feature from below is equal to the ensemble-average light at the same height. This light is related to the observed ensemble-average light via the radiative transfer that is described by the four parameters newly introduced in addition to the original four parameters of the BCM. Three of these new parameters are independently determined from the observed rms contrast profile of the ensemble. We use the constrained $\chi 2$ fitting technique to determine the five free parameters. We find that the ECM leads to the fairly good fitting of the observed line profiles and the reasonable inference of physical parameters in quiet regions where the BCM cannot. Our first application of this model to a quiet region of the Sun indicates that the model can produce the complete velocity map and Doppler width map of the region.

[B2B-1-3] **14:30~14:45**

Loss of Relativistic Electrons at Geosynchronous Orbit During Quiet Geomagnetic Intervals: the Role of EMIC Waves

K. Hyun (Kyung Hee University, Korea), K.-H Kim, E. Lee, and D.-H. Lee

The dynamics of relativistic electrons (REE) in Earth's radiation belt is of much current interest in space weather because many spacecraft failures and anomalies have been attributed to REE. The flux of REE in Earth's radiation belt is highly dynamic. Typically, dramatic changes of flux occur during a geomagnetic storm period. At that time, loss and enhancement of flux occur sequentially. It was known that the loss process is dominant in a main phase of storm and various mechanisms associated with the loss of REE can occur.

Those are magnetopause shadowing effect, magnetic moment scattering and wave-particle interaction considering a permanent loss. However, it is difficult to identify what is the dominant loss process during the interval. In this study, we have examined REE losses at geosynchronous orbit during quiet geomagnetic intervals in 2008. During the intervals, rapid or sudden decrease of REE flux was observed by GEO satellites (GOES 10, 11 and 12) and well defined electromagnetic ion cyclotron (EMIC) waves were detected. It was known that the rapid loss of REE are closely associated with the EMIC-REE interaction. We have identified that the rapid losses of REE were caused by EMIC-REE interaction. To do that, we have checked the conditions for EMIC-REE interaction and loss time scales based on quasi-linear theory. We have used the cold plasma density from THEMIS satellites and magnetic field data from GOES satellites. Additionally, we have identified that other loss processes were not dominant or less effective compared with the energetic proton flux. We have found out that the most of rapid losses of REE during quiet geomagnetic intervals occurred when the plasmapause expanded beyond the geosynchronous altitude (6.6 Re) and cold plasma density was high enough to cause the EMIC-REE interaction.

[B2B-1-4] **14:45~15:00**

Research of Radiation Belt Models in KASI

Jaejin Lee (Korea Astronomy and Space Science Institute, Korea), Kyung-Chan Kim, and Jong-Gil Lee

In Korea, the role of GEO satellites has been increased significantly in the area of communication, military, meteorology and monitoring of marine environment. In order to protect these national space assets from severe space environment, understanding magnetospheric phenomena and predicting space weather condition have been demanded continuously. In response to these requests, Korea astronomy and Space science Institute(KASI) constructed an antenna system receiving space weather data from a NASA mission, Van Allen Probes in 2012. The real time measurements of plasmas and fields provide useful information for predicting space storms that could potentially affect GEO satellite operation. In addition, for predicting space environment on the geosynchronous orbit, practical space weather model should be developed. KASI develop assimilation code based on the real time observational data to predict variation of energetic particles on the GEO orbit.

[B2B-1-5] **15:00~15:15**

The Signatures of Worldwide Solar Quiet of the Horizontal Field Intensity on Annual Time Scale

Owolabi T. P. (Obafemi Awolowo University, Nigeria), Rabiu A. B., Bolaji O. S., and Olayanju G. M.

The morphologies of solar quiet field of the horizontal magnetic field intensity $S_q(H)$ across the globe were investigated with Sixty-four (64) geomagnetic stations at different latitudinal and longitudinal sectors on an annual time scale. This investigation on 64 observatories was made possible with data from January to December, 1996 a year of low solar activity. Geomagnetic stations around the north and south of the high latitudes were observed to have highest magnitudes of $S_q(H)$ in the range of 130-260 nT compared to the ranges at the middle (78-100 nT) and low (78-140 nT) latitude. Interestingly, the highest magnitude of about 260 nT was observed at the south of high latitude (HL) and the minimum value of 130 nT was observed at the north of the HL. Our results further showed that these highest magnitudes of $S_q(H)$ at HL were more pronounced at the eastern axes compared to western axes of the longitude. At the low latitude, highest magnitude of $S_q(H)$ with no shift was observed at 0^0N/S across the longitude, with a slight shift to around 8^0N at 18.75^0E and with a greater shift to around 15^0N at 141.28^0E. This continuous shift of abnormal increment in the magnitude of $S_q(H)$ at the low latitude shows that the jet focus as well continuously changes its position to the north of higher latitude as one moves towards the eastern axis of the longitude. Physical mechanisms responsible for these phenomena were investigated.

[B2B-1-6] **15:15~15:30**

Deep Solar Minimum During SC-23, SC-24 and its Energetic Storms

Ahmed A. Hady (Cairo University, Egypt)

The paper examines the deep minimum of solar cycle 23, and solar cycle 24. Potential impact of energetic storms on geomagnetic field and space weather were studied. In addition, a source region of the solar winds at solar activity minimum, especially in the solar cycle 23. Solar activities have had notable effect on space weather changes. There is a close association between solar proton events and solar radio bursts occurring at several frequencies, 1-2 days before. The 245 MHz radio bursts associated with proton events have

intense peak fluxes (up to 650000 sfu). The resulting correlations may be used for providing short-term prediction of solar proton events.