２．ISEE International Joint Research Program 目次詳細

（所属・職名は平成29年3月現在）
(Affiliation and Department are correct as of March 2017)

The role of day-to-day plasma movement in triggering and modifying ionospheric irregularities

Bolaji, O.S. (Department of Physics, University of Lagos, Nigeria)

Purpose

A significant factor, which ionospheric irregularity is known for is its peculiarity to equatorial and low latitude (ELL). The equatorial latitude is well-known region characterized by equatorial ionization anomaly (EIA) due to vertical drift of plasma (Vz) that produced daily EIA troughs and crests (Hanson and Moffet, 1966) modulated by meridional wind. Apart from gravitational Rayleigh-Taylor (R-T) instability, a well-known process that explains ionospheric irregularity, efforts of Risbeth (1971), Raghavarao et al. (1988), Sridharan et al. (1994), Fejer et al. (1999), de Paula et al. (2015) have shown that electron density gradient, eastward electric field, Vz, eastward winds in the presence of the westward gradient, vertical winds and meridional winds play key role in the day-to-day variability of ionospheric irregularity. For example, Raghavarao et al. (1988), Alex et al (1989), Jayachandra et al. (1997), Rama Rao et al. (1997) used few ionosondes to investigate the role of evening EIA on ionospheric irregularities. These limited ionosondes were unable to clearly depict the EIA troughs and crests because the number of stations used are inadequate. Stations around 20^0 dip of the equator classified as the crests by Raghavarao et al. (1988), Alex et al (1989), Jayachandra et al. (1997), Rama Rao et al. (1997) are questionable, as they may not, since the EIA feature varies from one day to another. This question is partly answered in the works of de Paula et al. (2015) as their attention is more focused on the weakening of Vz and equatorward thermospheric meridional wind at Sao Jose (17.3^0S dip latitude) during sudden stratospheric warming (SSW) event of 2012/2013. Also, different threshold values of Vz have been suggested for the occurrence of ionospheric irregularity (Basu et al., 1996; Fejer et al., 1999; Whalen, 2003; Anderson et al., 2004; Huang et al., 2010). Apart from the shortcoming that their investigations were made at a fixed location (the EIA trough, along the crest and crest could not be identified), it is clearer that the discrepancies in the Vz threshold values is due to differences in the plasma magnitudes at different locations at sunset that was not given attention to. A critical issue here, which has not been addressed is whether the plasma density around the ELL and its movement from one location to another must reach some threshold value or not for the generation/modulation of ionospheric irregularity. This crucial issue arises from the fact that the weakened Vz at Sao Jose reduced scintillations activity during SSW (Fig 1a). de Paula et al. (2015) attributed this to equatorward thermospheric wind that transported the plasma away from Sao Jose (Fig 1b). This signifies that the plasma will accumulate somewhere else (new location) and the condition of ionospheric irregularity at the new location with respected to the former depleted location remains unresolved. This indicates that apart from the periods of SSW, there is difference in the location of EIA crests and troughs on day-to-day basis over the ELL that as well produced difference in the magnitudes of plasma around 1800-2000 LT. Hence, the role played by plasma and its transportation along the EIA crest having different magnitudes at different locations on daily basis around 1800-2200 LT (evening-night period) as regard ionospheric irregularity remains opened for thorough investigations.

To address these shortcomings, I will like to answer the following questions during my stay at ISEE:

1. Where is EIA trough, along the crest and crest and their extent of locations on daily basis?
2. What is the threshold TEC and Vz values at identified EIA trough, along the crest and the crest that could generate/modulate ionospheric irregularity?
3. Since meridional wind moves plasma accumulation from one location to another on daily basis, what is their threshold values for equatorward and poleward direction?
4. What are the physical mechanisms responsible for the above questions?

Methods

This work will be carried out within the ELL over the Asian sector during months of high (equinoctial months; March and September) and low (June and December) occurrence of ionospheric irregularities around 1800-2200 LT. The densely populated GPS receivers over Asia will be mapped from the Asian hemispheric geomagnetic equators to closer to the middle latitudes. These will reveal the daily plasma density distribution with respect to plasma transportation from one location to another. Of course, not all these locations along the Asian crest with potential of becoming the EIA crest will have scintillation monitors, but some of them will have OMTI or VHF radar that could complement it to observe and measure ionospheric irregularity. For example, along the Asian crest is the ISEE three closely spaced GPS receivers that measure ionospheric scintillation and determined the ionospheric plasma drift. This is co-located with the Equatorial Atmosphere Radar (EAR) at Kototabang (0.20^0S, 100.32^0E, geomagnetic latitude 10.6^0S) that could observe coherent echoes due to field aligned irregularities and as well produced the vertical drift is a host to varieties of atmospheric instrumentations including Magnetometer (210 MM) and All-sky imager. The FPI and VHF radar will as well reveal the role played by meridional wind along the Asian crests on daily basis.

Results

In-Progress.

Periods of stay in ISEE

November 19th to December 18th, 2017.

List of publications in maximum two pages

No publication yet. Results in-progress.

Joint investigation of solar activities by MUSER and NoRH

Jing Huang[1], Baolin Tan, Chengming Tan, and Xiao He[2]
(1. National Astronomical Observatories, Chinese Academy of Sciences
2. Peking University, School of Physics)

MUSER recorded the radio emission from the Sun at 0.4-15 GHz and NoRH recorded the radio emission from the Sun at 17 and 34 GHz. The joint analysis of MUSER and NoRH data could help us to understand the radio emission from chromosphere, corona and even in the bottom of interplanetary space. We could study both quiet sun and solar bursts based on the observational features deduced from NoRH and MUSER data.

From April 2016 to now, we have studied several solar flare events with NoRH and MUSER data and also investigated quiet sun comparing with model results. Jing Huang and Xiao He have analyzed an eruptive flux rope at the solar limb. They found that bright point with small size in the flux rope appeared when the flux rope grew up. The bright point distributed in the whole flux rope before it ejection and the intensity of individual bright point become weak when the flux rope grew up into lager size. After the flux rope ejection, the bright point became weaker and disappeared. This bright point could be emitted by thermal plasma inside the flux rope with higher temperature than the local plasma. This may indicate that reconnection with small size occurred inside the flux rope, which thermalize the local plasma. The main flare took place after the ejection of flux rope and nonthermal emission of electrons emitted from the underlying flaring loops. This work firstly found the small size of reconnection inside the eruptive flux rope.

Based on the support of ISEE international joint research program, the team members have visited Nagoya University for twice:

09-11/09/2016, Yihua Yan, Baolin Tan, Chengming Tan and Jing Huang attended the meeting ‘Solar Physics with Radio Observations’ held in Nagoya Universityand presented talks. The titles of their reports are listed as following:

Yihua Yan: Recent Progress of MUSER

Baolin Tan: Solar microwave Zebra pattern burst and its source region

Chengming Tan: Radio Emission Diagnosis of Solar Atmospheric Model

Jing Huang: Quasi-periodic acceleration of electrons in solar flares

16-24/01/2017, Baolin Tan and Chengming Tan visited ISEE for nine days. Baolin Tan presented a talk on "solar microwave type III bursts and the diagnostics of flaring source regions" in an informal meeting on solar radio physics in Nagoya University on January 20, discussed the observations of solar radio zebra pattern obtained by a Japanese radio spectrometer AMATERAS. In most time of the visit, Baolin Tan discussed the pre-flare VLPs with Japanese collaborators and analyzed the NORH and NORP observations to find out the evidence of preflare VLP. Chengming Tan presented a report on "Study of the radio quiet Sun" in the seminar on solar radio physics. During the visit, he learned how to use the NoRH/NoRH data, and compare the observation of the radio quiet Sun with the theoretical results.

22-31/01/2017, Jing Huang visited Nagoya University and studied a flare event on July 23, 2016, which occurred at solar limb with two successive filament eruption. From NoRH observations, two sources could be found in the flaring region, which are related to two individual loop structures. The filaments were originated from the same region, which is located between these radio sources. We have analyzed the spectral evolution of the radio emission and found that the spectral index become hard when the filament move faster. The movement of filament would affect the acceleration process of electron.

Study on dynamics of galactic cosmic rays in the heliosphere

Sunil.K. Gupta (TIFR)

There is an active ongoing participation of several Japanese scientists in the GRAPES-3 experiment located in Ooty, India which contains world's largest (560 sq.m) muon telescope that detects GeV muon. The contribution of Japanese collaborators has been critical in its success. The GRAPES-3 provides an uninterrupted 17-year data base of muon intensity with highest sensitivity covering cycles 23 and 24. With the help of this data base, manifestation of space weather events triggered by CMEs, flares, coronal holes etc. leading to Forbush decreases, and various solar and sidereal anisotropies can be probed with unprecedented sensitivities (Nonaka 2006, Subramanian 2009, Arunbabu 2013 2015, Kojima 2016a 2016b).

In Nonaka (2006), we showed that the time structure of Forbush decrease of 29 October 2003 could be studied in great detail as well as its rigidity spectrum could be measured with fairly high accuracy. In subsequent, analysis of data it was shown that a combination of multi-rigidity GRAPES-3 data could be used to measure the turbulence in the IMF in magnetic clouds propagating in interplanetary space (Subramanian 2009). This work was followed by further studies that showed that CME sheath region was mainly responsible for generation of Forbush decrease in GRAPES-3 data with shock region playing a minor role. This study depended on the use of GRAPES-3 multi-rigidity data. Subsequent analysis showed that the Forbush decreases typically lag behind the IMF by several hours, and lag corresponds to time taken by high-energy protons to diffuse into the IMF via cross-field diffusion. Thus, high rigidity events associated with CMEs are caused primarily by the cumulative diffusion of protons across the IMF in the turbulent sheath region between the shock and the CME (Arunbabu 2015).

The sensitivity of GRAPES-3 data can be gauged from the fact that even a small change in atmospheric pressure cause significant change in the detected muon rate (P.K. Mohanty 2016), and similarly data are very sensitive to changes in atmospheric temperature (K.P. Arunbabu 2017). One could measure tiny amplitude of Swinson flow followed by accurate measurement of radial density gradient at high rigidity of 77 GV (H. Kojima 2016a). This was followed by the measurement of dependence of galactic cosmic ray intensity variation on the changes in solar wind velocity (Kojima 2016b). The recent work done during the last visit of Indian physicist to Nagoya led to the measurement of radial diffusion coefficient of galactic cosmic rays as well as the mean free path for parallel diffusion by two independent methods (Kojima 2017 to be submitted). In future, it is proposed to take this work forward by exploring several of these lines of research through visits of Indian scientists to Nagoya and those of Japanese scientists to India.

Study of Ground Based Cosmic Ray Observations

Jozsef Kota (The University of Arizona, Tucson Arizona, USA)

I was fortunate to visit ISEE at the Nagoya University and I am most grateful for the opportunity to work together with Japanese scientists in the period of September 15 to October 14, 2016. A significant part of my time was spent at the Shinshu University, Matsumoto, working with Co-Investigator Professor Kazuoki Munakata, with whom we have a long relation of joint research. The joint work during my visit focused on understanding and modeling the ground based galactic cosmic ray (GCR) measurements, which has been a primary subject of common interest. I have been working for several years with Professor K. Munakata, who is one of the best experts in the field. Below, I briefly describe our joint work which was carried out during my visit, and which has been continuing since last fall.

The energy spectrum of galactic cosmic rays (GCRs) ranges from MeV to 10^20 eV. The heliospheric magnetic field (HMF) carried by the expanding solar wind constitutes a barrier that reduces the flux of GCRs in the inner heliosphere. This solar modulation effect is efficient below a few GV, and gradually decreases toward higher energies. Some of these heliospheric effects are still present at hundreds of GeV. The transition region where solar modulation ceases is arguably the most advantageous regime to study the large-scale magnetic structure of our heliosphere. In this region solar effects appear in the directional anisotropies of GCRs, which can be observed as solar diurnal variations and/or North-South asymmetries in GCR count rates on the rotating Earth.

Modeling the transport of GCRs above ~20GeV is a challenging task. The standard diffusive transport equation (known as Parker-equation) is robust and works well at low energies, but becomes inaccurate and ultimately breaks down at high particle energies where the gyro-radius of GCRs become large. We have been working to fill this gap in our understanding by comparing Neutron Monitor and Muon Detector data spanning over for 11-year solar cycles. This is a natural continuation of an earlier work led by Professor Munakata, and published in The Astrophysical Journal (**791**:22, 2014) and The Earth, Planets and Space (**66**, 151, 2014).

The Nagoya multi-directional muon telescope is a most valuable instrument since it covers four 11-year solar cycles and, by the virtue of multi-directional observations, it gives an excellent possibility to separate different components of the anisotropy. We used Nagoya data together with a set of Neutron Monitor data to cover lower energies. We employed two theoretical modeling tools. We had an older 3-dimensional numerical code solving the diffusive Parker equation. In the past couple of years we have been developing a new simulation tool in another directions: concerning high GCR energies (above 50 GeV), where the diffusion model is inapplicable. During our work we obtained encouraging preliminary results and also encountered some difficulties which led us to incorporate major improvements in our 3-D code of diffusive transport.

Employing our numerical codes we investigated various solar effects such as the strength and polarity of the HMF, as well as the effects of the tilted heliospheric current sheet (HCS) dividing the two polarity hemispheres of the solar dipole. The tilt of the HCS is thought to be one of the important parameters of solar modulation. The simulation results successfully reproduced robust qualitative features such as the observed phase-shift of the solar diurnal variation between the consecutive 11-year solar cycles. This shows that particle drifts, which are sensitive to the polarity state of the Sun, are indeed important in the transport of GCRs through the heliosphere. We are still working on more quantitative results.

GCR anisotropies are as small as a fraction of a percent. We encountered difficulties in modeling the North-South (NS) anisotropy, which is a small and delicate effect. This difficulty was most likely connected with the boundary condition used near the Sun, and led us to revise our 3-D code and incorporate a new scheme to resolve this problem. The revised code led to a significant improvement, and now our newer simulation results reproduce the qualitative features of the measured NS anisotropy as well. We are working on a survey of parameter dependence and expect conclusive results by this summer. An abstract on our preliminary results has been submitted to the 35th International Cosmic Ray Conference, and hopefully we shall be able to present our finding at the Conference in Busan, Korea, in July, 2017.

We still foresee two publications in peer reviewed scientific journals. We must obtain sufficient material in the first half of 2017, and submit two articles for publication in the second half of 2017. During my stay in Japan two invited colloquia were given, one at ISEE Nagoya, the other one at Shinshu University, Matsumoto.

Invited Colloquia:

Kota, J.: Voyager-1 beyond the Heliopause: Lessons and Challenges, September 29, 2016, Shinshu University, Matsumoto, Japan

Kota, J.: Understanding Voyager Observations in the Interstellar Space, October 12, 2016, Nagoya University, Nagoya, Japan 12th ISEE/CICR Colloquium.

Three-dimensional tomograpic analysis using integrated global IPS data sets from MEXART and ISEE observations

Hsiu-Shan Yu (University of California, San Diego)

Purpose:

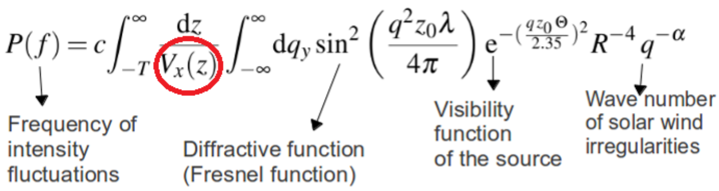
Remote-sensing interplanetary scintillation (IPS) data can provide information on heliospheric structures over an extended period of time during their outward propagation beyond the near-Sun regions. The University of California, San Diego (UCSD) time-dependent tomographic analyses, when employing IPS data, reconstruct three-dimensional (3D) volumetric velocities and densities of the solar wind. These include the solar wind background environment, transient features such as coronal mass ejection (CMEs), and more stable ones like stream/co-rotating interaction regions (SIRs/CIRs). The 3D reconstructions, with data from Institute for Space-Earth Environmental Research (ISEE, formerly STELab), Japan, have provided a real-time low resolution prediction of global solar features throughout the inner heliosphere having a time cadence of about one day. The spatial resolution are also limited by the IPS observational coverage and signal-to-noise of each radio source observed. An ISEE IPS time-dependent 3D reconstruction has a resolution of 20° × 20° in latitude and longitude, and 0.1 AU in radial distance.

The IPS data from the ISEE arrays has been continuously available and reliable. The scintillation level (*g*-level, which serves as a proxy for solar wind bulk density) has been obtained year round since the end of 2010, and the three-site IPS velocity and *g*-level have been generally available in near-real-time from May through December [*Tokumaru et al.*, 2011, *Radio Science*, *46*, RS0F02; *Tokumaru*, 2013, *Proc. Japan Academy, Ser. B*, *89*, 67-79]. However, this system sometimes has breakdowns and data outages, and data are valid when radio sources are overhead (as at most radio IPS systems or stations). This permits only one observation from a given radio source in a single day, and thus means that the fastest CMEs evolving on short time scales and arriving at Earth in less than a day can be missed on any given day. The Worldwide IPS Stations (WIPSS) network gathers IPS groups around the world (ISEE, Japan; MEXART, Mexico; Ooty, India; Pushchino, Russia; LOFAR, Netherlands; and MWA, Australia) and the members have recently agreed to adopt a more uniform data analysis system. These groups collaborate internationally to study the solar wind features throughout the inner heliosphere and strive to improve the capability of space weather forecasting using IPS techniques. The Mexican Array Radio Telescope (MEXART) began full-time dedicated IPS operation in early 2013, and now obtains IPS data for use and comparison with that from ISEE, and other IPS systems. Combining IPS observations from different sites around the world could greatly reduce data outage due to poor longitudinal coverage of the individual radio sites and also improve the spatial and temporal resolution of the analysis.

Methods:

The MEXART radio array is dedicated to IPS observations and situated 8 hours in longitude east of ISEE, views radio sources prior to those at ISEE by this amount of time. Scintillation signals provide *g*-level measurements from MEXART in a way similar to those from ISEE. However, unlike at ISEE, where IPS velocity is determined by correlating the signals measured between multiple stations, MEXART fits observations of the scintillating spectral power from a single radio site to a theoretical solar wind model [*Manoharan*, 2010, *Solar Phys.*, *265*, 137-157; and references therein] that provides a measure of the solar wind speed, parameter circled in red).

$$P(f) = c\int_{-T}^{\infty} \frac{dz}{V_x(z)} \int_{-\infty}^{\infty} dq_y \sin^2\left(\frac{q^2 z_0 \lambda}{4\pi}\right) e^{-\left(\frac{q z_0 \Theta}{2.35}\right)^2} R^{-4} q^{-\alpha}$$



Mejia-Ambriz *et al.* [2015, *Solar Phys.*, *290*, 2539-2552], using preliminary measurements, show that *g*-levels and single-site speeds obtained from the lower-frequency 140 MHz MEXART array generally match those from ISEE 327 MHz. Thus we believe that the MEXART array can fill data gaps at times not covered by ISEE, and extends sky coverage to southerly locations poorly viewed by the more northerly ISEE arrays. However, in a recent test study of combining ISEE and MEXART data, we found that the MEXART *g*-level values has an IPS factor for excursions set to be 0.5 to fit in with the values from ISEE. In order to understand why this mismatch occurs and provide an integrated ISEE-MEXART data set for use by the UCSD tomographic technique, I have reanalyzed the observed time series of intensity fluctuations from two radio sources (3C273 and 3C298) and used Fast Fourier Transfer to obtain the power spectrum for solar wind model fitting.

Results:

Using combined worldwide IPS data sets requires agreed-upon criteria and in addition, a way to adjust each data set to fit to a standard when some of these criteria are not easily met, since no current IPS radio observatory is identical to another. The most easily-obtained quantity in IPS analyses is g-level from an individual radio source. However, (for instance) just how the time series is obtained over the interval necessary to provide a power spectrum, and how the noise level is subtracted from the spectrum are all unique to a given radio observatory. Additionally, determining the error and mean value of g-level has generally not been standardized.

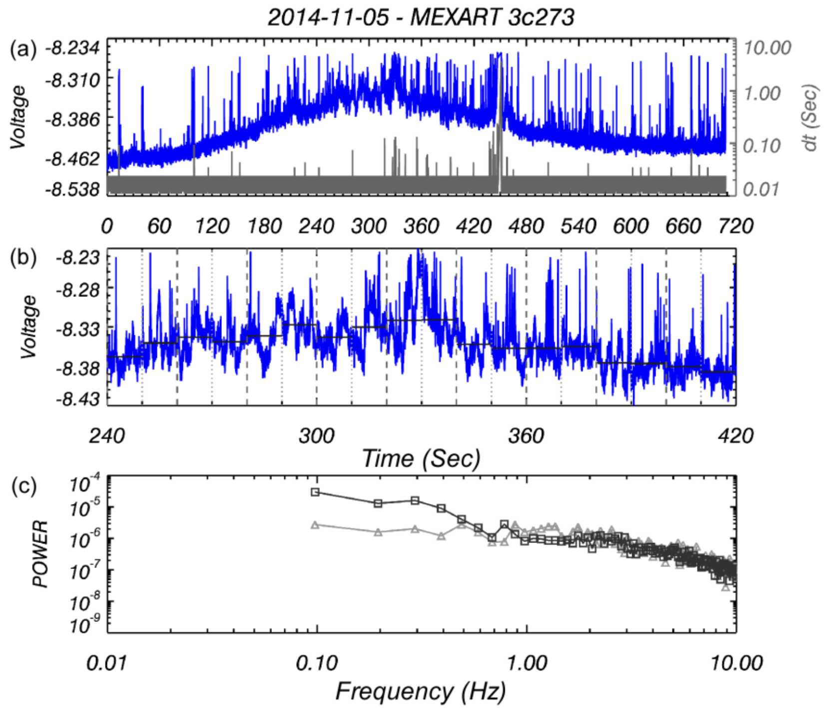


Figure (a) shows a sample the time series (blue curves) of the intensity fluctuations from radio sources 3C273. We can see that several glitches (specifically one at 330 s, and another at 440 s) appear in the time series. I also discovered an unaccounted-for time cadence (gray curves below the time series) irregularity in the time series, i.e., that there is a variation of the time between the recorded data time stamps by almost a factor of two which is unlike the ISEE data that has a constant time stamp variation. Figure (b) shows the time series around the central observation time. This three-minute data is divided into 18 segments and each black line denotes the average of 10-second data segment. Figure (c) shows the average power spectrum of 18 FFT of 10-second data segments (black curve and squares) and the off-source (gray curve and triangles). The power spectrum does not appear to be as smooth as the one provided by the MEXART group and it is unclear at this stage how the RC constant (that results in a fall-off in power to high frequencies) was removed. It is also unclear how the data was recorded and we suspect this might also be the cause of the factor of two difference in the *g*-level response we observe when the ISEE and MEXART data are combined in the tomography analysis. Furthermore, the power difference obtained from the radio source and the off-source is smaller than we expected and further confirmation about this from the MEXART group is needed. Clearly, only power lower than about 0.5 Hz can provide the scintillation level used to obtain g-level from our on and off source analyses for this sample radio source.

Periods of stay in ISEE:

With the travel fund from ISEE, I was able to travel from San Diego, U.S.A. to Nagoya, Japan and worked with Dr. Tokumaru and Dr. Fujiki during the following periods: (1) January 12th to 20th, 2017, (2) February 27th to March, 4th, 2017, and (3) March 20th to March 28th, 2017.

List of publications:

Yu, H.-S., Jackson, B.V., Buffington, A., Hick, P.P., Yang, Y.-H., Chang, O., Tokumaru, M., 2017, ‘IPS observed ICME events reconstructed by the UCSD time-dependent tomographgy’, submitted to Space Weather.

Jackson, B.V., Yu, H.-S., Hick, P.P., Buffington, A., Gonzalez-Esparza, A., Rodriguez, E., Mejia-Ambriz, J., De La Luz, V.H., Chang, O., Tokumaru, M., Kojima, M., Nishimura, N., Nozaki, N., Fujiki, K., Hayashi, K., Bisi, M.M., Odstrcil, D., Kim, J, and Yun, J., 2016, ‘Use of the UCSD IPS Tomography Program for Predicting Heliospheric Plasma Parameters from World Interplanetary Scintillation Stations (WIPSS)’, invited oral presentation at the Reunion Anual 2016 Union Geofisica, Puerto Vallarta, Mexicana, 30 October - 4 November.

Yu, H.-S., Jackson, B.V., Buffington, A., Hick, P.P., Chang, O., Tokumaru, M., 2016, ‘The 2014 August 19 CME VarSITI ISEST Event Observed in ISEE IPS Observations with the UCSD Time-dependent Tomography’, poster and oral presentation, SHINE workshop, 11-15 July, Santa Fe, NM

Yu, H.-S., Jackson, B.V., Buffington, A., Hick, P.P., Tokumaru, M., Odstrcil, Kim, J., Yun, J., 2016, ‘The UCSD Time-dependent Tomography and IPS use for Exploring Space Weather Events, AGU Session SH22B-06 oral presentation, San Francisco, 12-16 December.

The study of the magnetospheric phenomena for the dipole tilt effect by using a Global MHD simulation

Kyung Sun Park (Chungbuk National University)

Research summary:

1. Introduction

The interaction of the solar wind with the Earth's magnetosphere produces various phenomena, such as substorms and aurora, in the polar region. The orientation of the IMF has significant effects on determining magnetospheric dynamics including substorm, storm, convection pattern and the FAC system. [Fairfied and Cahill, 1966; Reiff and Bursh, 1985: Cowley and Lockwood, 1992]. When the IMF turns southward, the energy of the solar wind is efficiently trapped by magnetic reconnection in the magnetosphere, and convection and currents within in the magnetosphere increase. Therefore, the magnetic reconnection is a key for understanding the dynamics of the Earth's magnetosphere. The effectiveness of the dynamics depends on the magnetic reconnection rate and location on the magnetopause.

2. Previous study

There have been many studies of dayside magnetopause reconnection by using global MHD simulation. Park et al. [2006, 2009] showed for the case of southward IMF with a positive dipole tilt (30 deg) that the dayside magnetic reconnection tends to occur efficiently at locations where the IMF encountered the weakest field along the geomagnetic field line, and the magnetosheath magnetic field line was antiparallel to the geomagnetic field. However, few attempts have been made to understand to the effect of the dipole tilt angle. The reconnection rate at the dayside magnetopause for dipole tilt angle has not been evaluated quantitatively by global simulation. Also, there is a need of further research as comparative investigation by observation.

3.Purpose of study

We need to understand how the dayside and tail reconnection works only due to the dipole tilt effect by using a global MHD simulation. What is the structure of the reconnection line during the dipole tilt angle. If possible we will compare the results of satellite observation data during the magnetopause crossing.

4. Simulation Result

A 3-dimensional global MHD simulation of interaction between the solar wind and the earth's magnetosphere has been carried out for the dipole tilt in order to study magnetospheric dynamic and polar phenomena. In this case, for the southward. In this case, for the southward interplanetary magnetic field (IMF) was imposed has two hours, we have studied what are happening the magnetosphere for the positive dipole tilt and where the dayside reconnection is occurring. Dayside reconnection occur about R = 10.5 ~ 11.4R_E near the magnetic equator and tail reconnection occur about X= 14 ~ 18R_E when the positive dipole tilt increase. Both the central plasma sheet and the magnetic neutral sheet are raise up in the midnight meridian. The hinging distance increase about ~14% during the increase dipole tilt angle.

Presentation list:

1. Kyung Sun Park, Dae-Young Lee, and Tatsuki Ogino, The Study of the Magnetospheric Phenomena for the Dipole Tilt by using a Global MHD Simulation, The Korean Space Science Society-2016 spring conference, Gangneung in Korea, 28-29/04/2016
2. Kyung Sun Park et al, Global MHD simulation study of the vortex at the magnetopause boundary for the southward IMF and steady solar wind conditions, JpGU-AGU join meeting 2016, Chiba in Japan, 22-26/05/2016
3. Kyung Sun Park, Hyomin Kim, Tatsuki Ogino, C. R. Clauer, J. M. Ruohoniemi, D.-Y. Lee, and D.-H. Lee, Global MHD simulation of magnetospheric and ionospheric response to a sudden increase solar wind dynamic pressure during northward IMF, AOGS 2016, Beijing in China, 31/7-5/8/2016

Schedule of the stay at ISEE

1. January 15-21, 2017
2. March 27-31, 2017