2005 Joint CEDAR-GEM Workshop
Eldorado Hotel and La Fonda Hotel
Santa Fe, New Mexico, USA
June 26 - July 1, 2005

Thursday GEM Poster Session Booklet
June 30

Contents

1 Global Geospace Circulation Model

1.1 GGCM.01: Modeling Services at the Community Coordinated Modeling Center – by Chulaki, Anna

Status of First Author: Nonstudent

Authors: Anna Chulaki, Michael Hesse, Maria Kuznetsova, Marlo Maddox, Peter MacNeice, Lutz Rastaetter **Abstract**: The Community Coordinated Modeling Center has as one of its functions the provision of research community with access to modern space science models. For this purpose, CCMC hosts a set of state-of-the-art space weather models ranging from the Solar atmosphere to Earth's upper atmosphere. The majority of models residing at the CCMC are comprehensive computationally intensive physics-based models. CCMC provides a web-based Runs-on-Request system by which the interested scientist can readily request simulations of science problems. To allow the models to be driven by data relevant to particular events, the CCMC developed an online data file generation tool that automatically downloads data from data providers and transforms them to required format. CCMC also provides a tailored web-based visualization interface for the model output, as well as the capability to download to the user simulation output directly. CCMC is working on addition options of model results representation tailored for easy comparison with observation data. Community feedback is invited for our ongoing efforts to further improve services.

1.2 GGCM.02: Modeling Alfven Continuum: comparison with data – by Kabin, K.

Status of First Author: Nonstudent

Authors: K. Kabin, R. Rankin, I. R. Mann, R. Marchand, A. J. Ridley, R. C. Clauer, and T. I. Gombosi

Abstract: The frequency of standing shear Alfven waves (Alfven continuum) in Earth's magnetosphere is primarily determined by two factors: the magnetic intensity and density distributions along the geomagnetic field line. These frequencies can often be estimated from ground-based magnetometer data, thus providing an experimental estimation of the magnetospheric plasma density. We use two different models of the Earth magnetic field (empirical Tsyganenko model and global circulation SWMF) to fit the observations for several specific events. We find that most of the considered events can be well described using magnetospheric plasma densities consistent with in situ satellite measurements. We also find that the L-shell dependence of the observed frequencies is well approximated in our models. For some unusual events, however. such as the day solar wind disappeared (May 12, 1999), the densities required to explain the observations by using the Tsyganenko model are unrealistically high. Using SWMF magnetic field topology improves the situation, however we note that there are numerous difficulties in modeling such extreme magnetospheric conditions.

1.3 GGCM.03: Source-Surface Approach to Modeling an Arbitrarily Shaped Magnetopause – by Ontiveros, P

Status of First Author: Student NOT in the poster competition PhD

Authors: Ontiveros, P A paulonti@rice.edu Rice University Dept. of Physics and Astronomy
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Hill, T W hill@rice.edu Rice University Dept. of Physics and Astronomy

Abstract: The source surface method is used to compute the Chapman-Ferraro currents for an arbitrarily shaped magnetopause confining a number of large-scale current systems. The model caclulates the magnetic field within the specified boundary from a scalar potential expanded in a set of general basis functions. The normal component of the total magnetic field due to all current systems within the source surface is minimized by the least squares method. This method proves to be a flexible approach to handle irregular magnetopause shapes, such as those that may be produced under extreme solar wind driving conditions.

1.4 GGCM.04: DMSP Auroral Boundaries During the Sun-Earth Connection Events – by Sotirelis, Thomas presented by Sotirelis, Thomas

Status of First Author: Nonstudent

Authors: Sotirelis, T, P T Newell, C-I Meng and F Rich **Abstract**:

1.5 GGCM.05: A Simulation of November 20, 2003 Super-storm: The First 12 Hours – by Zhang, Jichun

Status of First Author: Student NOT in the poster competition PhD

Authors: Jichun Zhang (jichunz@umich.edu; Center for Space Environment Modeling, University of Michigan, Ann Arbor, Michigan, USA), Michael W. Liemohn (liemohn@umich.edu; Center for Space Environment Modeling, University of Michigan, Ann Arbor, Michigan, USA), Darren L. De Zeeuw (darrens@umich.edu; Center for Space Environment Modeling, University of Michigan, Ann Arbor, Michigan, USA), Gabor Toth (gtoth@umich.edu; Center for Space Environment Modeling, University of Michigan, Ann Arbor, Michigan, USA), Aaron J. Ridley (ridley@umich.edu; Center for Space Environment Modeling, University of Michigan, Ann Arbor, Michigan, USA), Stanislav Sazykin (sazykin@rice.edu; Department of Physics and Astronomy, Rice University, Houston, Texas, USA), Janet U. Kozyra (jukozyra@umich.edu; Center for Space Environment Modeling, University of Michigan, Ann Arbor, Michigan, USA), Tamas I. Gombosi (tamas@umich.edu; Center for Space Environment Modeling, University of Michigan, Ann Arbor, Michigan, USA), Richard A. Wolf (rawolf@rice.edu; Department of Physics and Astronomy, Rice University, Houston, Texas, USA)

Abstract: With the Space Weather Modeling Framework (SWMF), the super-storm on Nov 20, 2003 is simulated for the first 12 hours of the day. In comparison with observations from Wind, Geotail, Polar, Goes10, Goes12, and measured Sym-H, simulation results are validated. It is found that plasma temperature and entropy are asymmetric on the nightside with a peak at 4:00 - 5:00 AM local time. After the solar wind shock hits the magnetosphere, closer to dawn and dusk, nightside plasma becomes denser.

1.6 GGCM.06: The Equatorward Boundary of Auroral (Precipitation) Particles Modulated by the CIR/CME - NOAA/POES Observations – by Xie, Lun

Status of First Author: Nonstudent

Authors: L. Xie(1,2) Q.G. Zong(2) T.A. Fritz(2) X.Z. Zhou(1) Z.Y.Pu(1)
(1)Department of Geophysics, Peking University, Beijing, P.R. China (2)Center for Space Physics, Boston University, Boston, USA

Abstract: The distributions of energetic electrons and protons (50eV-20keV) with L-value have been investigated by using the TED and MEPED onboard NOAA/POES – low-altitude polar orbit satellite. The time period of interest is from Sep. 1 2003 to Dec. 31 2003 when the Earths magnetosphere experienced with a series of 4 recurrent CIRs and two transient coronal mass ejection (CME) events. The precipitation particle observations indicated that the movement of the equatorward boundary of auroral particles and the auroral intensity are strongly related to the geomagnetic Kp index and are modulated by the CIR. An remarkable coincidence between the auroral equatorward boundary with the position of plasmapause is seen. Very intense period of geomagnetic activity (such as the intense storm driven by the large CME) can lead to the auroral oval moved to the more lower magnetic latitude, as low as 450.

1.7 GGCM.07: Towards embedding a Hall MHD plasma sheet simulation within the Lyon-Fedder-Mobarry global MHD code – by Guild, Timothy

Status of First Author: Student NOT in the poster competition PhD

Authors: Timothy Guild (Boston University, tguild@bu.edu); Harlan Spence (Boston University, spence@bu.edu); Viacheslav Merkin (Boston University, vgm@bu.edu); Chuck Goodrich (Boston University, ccg@bu.edu); John Lyon (Dartmouth College, lyon@tinman.dartmouth.edu) **Abstract**:

2 Other Contributed Posters (CISM=Center for Integrated Space Weather Modelling, MICG=MI Coupling Global Studies

2.1 CISM.01: Plasma Sheet Climatology: Geotail data and LFM MHD Model Comparisons – by Guild, Timothy

Status of First Author: Student NOT in the poster competition PhD

Authors: Timothy Guild, Boston University **Abstract**:

2.2 CISM.02: Implementation of ionospheric outflow in the LFM Global MHD Magnetosphere simulation – by Gagne, John presented by ?, ?

Status of First Author: Nonstudent

Authors: John Gagne et al. **Abstract**:

2.3 CISM.03: Overview of CISM Code Coupling – by Goodrich, Charles

Status of First Author: Nonstudent

Authors: Charles Goodrich, Boston University **Abstract**:

2.4 CISM.04: Storm-time configuration of the inner magnetosphere – by Huang, Chia-Lin

Status of First Author: Student NOT in the poster competition PhD

Authors: Chia-Lin Huang, Boston University **Abstract**:

2.5 CISM.05: Overview of CISM Magnetospheric Modeling – by Hudson, Mary

Status of First Author: Nonstudent

Authors: Mary Hudson, Dartmouth College **Abstract**:

2.6 CISM.06: The CISM Graduate Space Weather Summer School – by Hughes, Jeffrey

Status of First Author: Nonstudent

Authors: Jeffrey Hughes, Boston University **Abstract**:

2.7 CISM.07: Overview of CISM Solar/Heliospheric Modeling – by Luhmann, Janet presented by ?, ?

Status of First Author: Nonstudent

Authors: Janet Luhmann, University of California at Berkeley **Abstract**:

2.8 CISM.08: Future Directions for CISM Code Coupling and Framework Effort – by Lyon, John presented by ?, ?

Status of First Author: Nonstudent

Authors: John Lyon, Dartmouth College **Abstract**:

2.9 CISM.09: CISM grades 6-14 professional developmentusing space weather monitors – by Scherrer, Deborah presented by ?, ?

Status of First Author: Nonstudent

Authors: Deborah Scherrer **Abstract**:

2.10 CISM.10: Overview of CISM Data Assimilation – by Solomon, Stan

Status of First Author: Nonstudent

Authors: Stan Solomon, HAO/NCAR **Abstract**:

2.11 CISM.11: Overview of CISM Ionosphere-Thermosphere Modeling – by Solomon, Stan

Status of First Author: Nonstudent

Authors: Stan Solomon, HAO/NCAR **Abstract**:

2.12 CISM.12: Overview of CISM Validation and Metrics – by Spence, Harlan presented by ?, ?

Status of First Author: Nonstudent

Authors: Harlan Spence, Boston University **Abstract**:

2.13 CISM.13: Coupling the LFM and the RCM – by Toffoletto, Frank

Status of First Author: Nonstudent

Authors: Frank Toffoletto, Stanislav Sazykin, John Lyon, Paolo Ricci **Abstract**:

2.14 MICG.09: Polar cap size and shape - magnetospheric and ionospheric modeling studies at CCMC – by Rastaetter, Lutz presented by Rastaetter, Lutz

Status of First Author: Nonstudent

Authors: Lutz Rastaetter, IACS, Catholic, Univ., Lutz_Rastaetter@gsfc.nasa.gov Masha Kuznetsova, NASA Goddard, Maria.M.Kuznetsova@nasa.gov Michael Hesse, NASA Godard, Michael.Hesse@.nasa.gov John Sigwarth, NASA GSFC, John.B.Sigwarth@nasa.gov

Abstract:

3 Global Interactions Reconnection Dynamics, Cusp and LLBL

3.1 GIR.01: Plasma Dynamics in the Vicinity of a Cusp-like Configuration – by Adamson, E

Status of First Author: Student NOT in the poster competition PhD

Authors: Eric Adamson University of Alaska Fairbanks eric_adamson@hotmail.com
Antonius Otto University of Alaska Fairbanks ao@why.gi.alaska.edu
Katariina Nykyri Imperial College k.nykyri@imperial.ac.uk

Abstract:

3.2 GIR.02: Solar wind interaction with Earth's magnetosphere: waves in the foreshock and magnetosheath. – by Blanco-Cano, X. presented by Blanco-Cano, X.

Status of First Author: Nonstudent

Authors: X. Blanco-Cano, N. Omidi and C. T. Russell

Abstract: We perform global hybrid (kinetic ions, fluid electrons) simulations of the solar wind interaction with magnetic dipoles of different strength and study foreshock morphology and its influence on the bow shock and magnetosheath. The advantage of the hybrid code over fluid codes is that it treats ion-scale microphysics in the context of the global interaction. We study the ultra low frequency (ULF) waves generated by kinetic instabilities and find two types of waves, (1) noncompressive parallel propagating waves and (2) compressive obliquely propagating fluctuations. Our results show that, for low dipole magnetization, noncompressive waves dominate the foreshock, while compressive waves grow just in a very small region and do not have time to evolve, so no quasi-parallel shock is formed. In contrast, when the system scale size is much larger than an ion inertial length, compressive waves convect into the quasi-parallel region, evolving into large steepened structures that eventually form the shock transition. These waves play an active role in the dissipation processes that heat the solar wind and eventually form part of the wave spectra in the magnetosheath. Comparison of our results with observations shows that the characteristics of noncompressive waves in our simulations match the properties of 30-second sinusoidal waves in the earths foreshock, while compressive waves have similar properties to the observed right-handed compressive fluctuations. Downstream from the shock, the magnetosheath is permeated by a variety of waves that result from the convection of upstream waves and also from local generation. The wave characteristics are different in the quasi-parallel and quasi-perpendicular parts of the magnetosheath.

3.3 GIR.03: Magnetospheric reconnection enhancements after a sharp increase in solar wind dynamic pressure – by Boudouridis, Athanasios

Status of First Author: Nonstudent

Authors: A. Boudouridis (1), L. R. Lyons (1), E. Zesta (1), J. M. Ruohoniemi (2), P. C. Anderson (3)
(1) Department of Atmospheric and Oceanic Sciences, UCLA, California, USA (thanasis@atmos.ucla.edu)
(2) Johns Hopkins University/Applied Physics Lab, Maryland, USA (3) University of Texas at Dallas, Richardson, Texas, USA

Abstract: It is well known that the Interplanetary Magnetic Field (IMF) is the major contributor to geomagnetic activity on Earth. Recent studies, however, have shown that solar wind dynamic pressure variations cause global effects when they encounter the terrestrial magnetosphere. In particular, it has been shown that solar wind dynamic pressure enhancements significantly increase particle precipitation and cause global intensification of the aurora. A global-scale closing of field lines, and resulting large reduction in polar-cap area has also been observed, implying that solar wind dynamic pressure enhancements greatly affect large-scale magnetospheric reconnection. Studies using Defense Meteorological Satellite Program (DMSP) measurements have demonstrated that solar wind pressure increases also significantly increase the cross-polar-cap potential drop. This implies that the dynamic pressure has an important effect on the coupling efficiency between the solar wind and the Earth's magnetosphere, which is in addition to that due to the IMF. It was previously suggested, based on the DMSP data, that solar wind dynamic pressure enhancements induce enhanced magnetotail reconnection as well as magnetospheric convection. We now present Super Dual Auroral Radar Network (SuperDARN) observations that demonstrate significantly enhanced ionospheric convection in the dayside ionosphere associated with the impact of solar wind pressure fronts. The enhanced convection extends to the vicinity of the expected location of the dayside separatrix, suggesting that solar wind dynamic pressure fronts significantly increase dayside reconnection as well as polar-cap convection. We give a qualitative assessment of the relative contribution to magnetospheric convection of the enhanced dayside and magnetotail reconnection after a sharp increase in solar wind dynamic pressure.

3.4 GIR.04: Magnetopause Crossings in the Lyon-Fedder-Mobarry MHD model and Satellite Data – by Garcia, Katherine

Status of First Author: Student NOT in the poster competition PhD

Authors: Katherine S. Garcia, Boston University, ksgarcia@bu.edu W. Jeffrey Hughes, Boston University, hughes@bu.edu

Abstract: Prediciton of magnetopause crossings plays a crucial role in spacecraft operations, especially during times of extreme space weather. Analysis of magnetopause crossing accuracy serves to determine the usefulness in using a given model for such predictions, as well as to provide a useful way of determining the overall performance of a magnetospheric model. Here we utilize a magnetopause crossing of the Cluster spacecraft on 31 March 2001 in comparison with the Lyon-Fedder-Mobarry (LFM) MHD model. We examine the structure of the magnetopause in the LFM model as compared with Cluster observations and investigate means of determining the magnetopause position in the model and data.

3.5 GIR.05: The high-latitude boundary layer as a driver of magnetosphere-ionosphere coupling – by Lund, Eric

Status of First Author: Nonstudent

Authors: E. J. Lund (University of New Hampshire; Eric.Lund@unh.edu), P. E. Sandholt (University of Oslo; p.e.sandholt@fys.uio.no), C. J. Farrugia (University of New Hampshire; charlie.farrugia@unh.edu)
Abstract: Previous studies of reconnection-driven ionospheric convection have focused on the effect of the Lorentz force acting on newly opened field lines. We show that this description ignores two significant aspects of solar wind-magnetosphere-ionosphere coupling: (a) a flow channel coupled by field-aligned currents to the high-latitude boundary layer downstream of the cusp, where vigorous momentum transfer occurs on old open field lines; and (b) the high-latitude ground-level magnetic variations, traditionally used to determine the local IMF sector (Svalgaard-Mansurov effect), which result from the Hall current associated with this flow channel.

3.6 GIR.06: Structure of Cusp Diamagnetic Cavities – by Niehof, Jonathan

Status of First Author: Student NOT in the poster competition PhD

Authors: J.T. Niehof, Boston University, jniehof@bu.edu T.A. Fritz, Boston University, fritz@bu.edu R.H.W. Friedel, Los Alamos National Laboratory, rfriedel@lanl.gov J. Chen, jschen@bu.edu

Abstract: POLAR observations indicate the existence of large (up to 6 RE) cavities in the cusp region, characterized by an increased plasma density and reduced magnetic field. These have been dubbed cusp diamagnetic cavities as the plasma opposes the geomagnetic field. Their apparent stability suggests the

diminished pressure of the field is balanced by the increase in plasma, and total pressure remains constant across a cavity. Previous work, using MFE and HYDRA, revealed a discrepancy, with high-beta regions at approximately half the pressure of low-beta regions. To resolve this difference, we look to the composition of the plasma via the CAMMICE MICS instrument. High charge state ions are undercounted in energy by HYDRA and incorporating this energy by a few tens of percent. As a final check of the relation between the plasma and field, we investigate their correlation, including on very small scales, and find it consistent with pressure balance, suggesting some still-unmeasured contribution from the plasma.

3.7 GIR.07: Turbulence in high-altitude cusp: Cluster FGM and STAFF observations – by Nykyri, Katariina

Status of First Author: Nonstudent

Authors: K. Nykyri(1)(k.nykyri@ic.ac.uk), B. Grison (2), P. J. Cargill (1), B. Lavraud (3), I. Dandouras (4), E. Lucek (1), A. Balogh (1), N. Cornilleau-Wehrlin (2), H. Reme (4)
(1)The Blackett Laboratory, Imperial College, London, UK, (2)CETP/CNRS-UVSQ, 10/12 Avenue de l Europe, 78140, Velizy, France, (3)Los Alamos National Lab, Los Alamos, NM, USA, (4)Centre d'Atude Spatiale des Rayonnements, Toulouse, France

Abstract: High-resolution (22 vector/s) magnetic field data from Cluster FGM instrument and the Spatio-Temporal Analysis of Field Fluctuations (STAFF) experiment is used to study the turbulence of the magnetic field fluctuations in the high-altitude cusp crossing on 17th of March 2001. Despite of the quiet solar wind conditions, the cusp was filled with magnetic field turbulence that correlates with sheared field-aligned plasma flux. We have evaluated slopes of the magnetic field wave power spectra throughout this cusp crossing and found examples of magnetic field wave spectra with inertial range and dissipation range. The break between the slopes usually occurred at the vicinity of the local ion cyclotron frequency but we also found intervals where break was observed at the lower frequencies. Sometimes we found strong peaks close to local ion cyclotron frequency with a second peak at first harmonic indicative of resonant processes between protons and the waves. We will discuss physical mechanisms generating the observed spectral breakpoint frequency and formation of the spectral peaks in the high-altitude cusp.

3.8 GIR.08: Observation of cusp footprints from Vize island, Russia – by Valladares, Cesar

Status of First Author: Nonstudent

Authors: C. E. Valladares, and R. E. Sheehan Institute for Scientific Research, Boston College, Massachusetts USA valladar@bc.edu / phone:781-863-5928 H. C. Carlson AFOSR, 801 N. Randolph street, Arlington VA 22203 herb.carlson@afosr.af.mil Todd Pedersen Space Vehicle directorate, Air Force Research Laboratory, Hanscom AFB, MA 01731 todd.pedersen@hanscom.af.mil

Abstract: An all-sky imager has operated at Vize Island (79.5 N, 77 E) during the winter of 2003-2004. The high geographic latitude, and the 75 magnetic latitude of this site permit us to observe the cusp-related aurora in the middle of the winter solstice for about 40 days. The imager field of view (FOV) overlaps with the FOV of another imager located at Ny Alesund (78 N, 58 E), providing an extended and complete view of the cusp for a few hours. The Vize Island imager observed the cusp aurora during 20 days. This poster presents preliminary results of images collected at Vize, Ny Alesund and Qaanaaq; the latter site is located at the center of the polar cap. We have used values of the IMF, measured by the ACE satellite, to organize the different types of aurora following the characterization presented by Sandholt and co-workers. Information on particles and electric fields from the orbiting DMSP satellites, and convection patterns from the SuperDARN radars are also presented in some of the case events. On 7 days, we observed a peculiar pattern of auroras aligned in the north-south direction and connected in their poleward end to the cusp aurora. We discuss the implications of these observations in the frame of the current theories of the cusp spatial/temporal variability.

3.9 GIR.09: The scaling of Forced Collisionless Reconnection – by Sullivan, Brian

Status of First Author: Student NOT in the poster competition PhD

Authors: Brian P. Sullivan, Dartmouth Colelge, Brian.P.Sullivan@Dartmouth.edu, Barrett N. Rogers, Dartmouth College, Barrett.N.Rogers@Dartmouth.edu, Michael A. Shay, University of Maryland, shay@glue.umd.edu **Abstract**: We present two-fluid simulations of forced magnetic reconnection in a collisionless two-dimensional slab geometry. In the absence of forcing, our system has $\Delta' \leq 0$ and as expected exhibits no reconnection. The most common method of driving reconnection in such stable systems is to add a finite amplitude perturbation to the boundaries of the simulation. In contrast, reconnection in our study is driven by a spatially localized forcing function, which is added to the ion momentum equation in the interior of the simulation domain. This function represents a generic external forcing agent that drives plasma and magnetic field toward the reconnection region at a controllable rate. We investigate the behavior of the resulting reconnection as a function of various free parameters in the system, including the temporal and spatial structure of the forcing function, the plasma beta, and the presence of an out-of-plane guide magnetic field component. Consistent with previous scaling studies done on systems with relatively large Delta' we find that for sufficiently strong forcing the reconnection process becomes Alfvenic, i.e., the inflow velocity scales roughly like some small fraction of the Alfven speed based on the reconnecting component of the magnetic field just upstream of the dissipation region. The magnitude of this field and thus the rate of reconnection is ultimately controlled by the behavior of the forcing function.

3.10 GIR.10: Current Structure and Motion of a Northward IMF X-Line – by Wendel, Deirdre

Status of First Author: Student NOT in the poster competition

Authors: Deirdre Wendel, Rice University, dwendel3@cs.com
Patricia Reiff, Rice University
Tianheng Han, Hong Kong University of Science and Technology
Andrew Fazakerley, Mullard Space Science Laboratory
Steven Schwartz, Imperial College London
Stephen Mende, Berkeley Space Sciences Laboratory
J. D. Winningham, Southwest Research Institute
Mel Goldstein, Goddard Space Science Laboratory

Abstract: Abstract: On March 18, 2002, between 14:50 and 15:03 UT, Cluster passed from the tail lobe northward and sunward into the magnetosheath. The IMAGE FUV instrument observed a proton emission, northward of the auroral zone, that endured for a period of over 9 hours, including the time of Clusters magnetopause crossing. Some researchers mapped the location of cluster during its magnetopause crossing to the location of the ionospheric footprint observed by IMAGE. We argue from Cluster PEACE electron and magnetic field data that the Cluster spacecraft pass to within at least 5 km of an active x-line, the spacecraft actually entering the Hall zone where ions demagnetize. We map the position of the x-line at the points of closest approach to each spacecraft through inversion of a low-order expansion for the magnetic field near the x-line, allowing us to infer the current structure, velocity, orientation, and size of the x-line. The functional fit to the data also gives an estimate of the thickness of the current sheet. The x-line earth and IMF fields form a large angle from the GSE x-direction and while undergoing enhancement in the GSE y-direction, consistent with anti-parallel reconnection, but with a twist in the x-y plane. We propose that the x-line, though it does waver across the spacecraft several times, is largely stable during Cluster's observations.

3.11 GIR.11: Dayside Boundary Layer under Extreme Solar Wind Conditions: A Cluster Perspective – by Zhang, Hui

Status of First Author: Student NOT in the poster competition PhD

Authors: H. Zhang1(zhang@bu.edu), T.A. Fritz1(fritz@bu.edu), Q.-G. Zong1(zong@bu.edu), P. W. Daly2(daly@linmpi.mpg.de) 1Boston University, CSP 2Max-Planck-Institut f Sonnersystem, D-37191, Katlenburg-Lindau, Germany

Abstract: The high latitude boundaries properties are quite different under different solar wind conditions. During northward interplanetary magnetic field (IMF), the interface between the magnetosheath and magnetosphere is clear. We present statistical results based on 2 years of data obtained by Cluster when these spacecraft were in the vicinity of the dayside magnetopause during northward IMF. The changes of the plasma density, temperature, velocity, energetic particle flux and magnetic field geometry across the magnetopause under northward IMF were analyzed by a superposed epoch analysis. The normal direction was calculated using a Minimum Variance Analysis method for each clear boundary. The particle spectra are characterized by a power law and the power law index is found to be closely related to solar wind velocity. The spectra seem to be harder for higher solar wind velocity. We also found that the higher the solar wind velocity, the higher the ion flux in the Stagnant Exterior Cusp (SEC) region. The magnetic shear angle is the difference between local B vector and IMF clock angle projected on the plane perpendicular to the shock normal. The larger the magnetic shear angle, the more turbulent the magnetic field in the SEC. Further, the properties of the high latitude boundary layer during storm time have been studied in detail.

3.12 GIR.12: 3-D hybrid simulation of plasma crossing a magnetopause-like flow shear boundary – by Wang, Chih-Ping

Status of First Author: Nonstudent

Authors: Chih-Ping Wang, UCLA, cat@atmos.ucla.edu Larry R. Lyons, UCLA, larry@atmos.ucla.edu

Abstract:

4 Global Interactions Plasma Acceleration and Transport

4.1 GIP.01: The 2-D equatorial distributions of the nightside plasma sheet during different IMF Bz conditions – by Wang, Chih-Ping

Status of First Author: Nonstudent

Authors: Chih-Ping Wang, UCLA, cat@atmos.ucla.edu Larry R. Lyons, UCLA, larry@atmos.ucla.edu James Weygand, UCLA, jweygand@igpp.ucla.edu

Abstract:

4.2 GIP.02: Identifying and Characterizing Magnetic Structures in the Solar Wind and Their Origin – by Cartwright, Megan

Status of First Author: Student NOT in the poster competition PhD

Authors: Mark Moldwin UCLA mmoldwin@igpp.ucla.edu

Abstract:

4.3 GIP.03: Observations of multiple X-line structure in the Earth's magnetotail current sheet: A Cluster case study – by Eastwood, Jonathan

Status of First Author: Nonstudent

Authors: J. P. Eastwood (NASA GSFC/ NRC RRA) jonathan.p.eastwood.1@gsfc.nasa.gov D. G. Sibeck (NASA GSFC) david.g.sibeck@nasa.gov J. A. Slavin james.a.slavin@gsfc.nasa.gov

Abstract: Observations of the Earth's magnetotail made by the four Cluster spacecraft on October 2 2003 are presented. Multi-spacecraft analysis is used to show that the variations in field and flow are consistent with a series of two active reconnection sites bounding an Earthward moving flux rope. It is shown that a single spacecraft analysis leads to an different interpretation of the data.

4.4 GIP.04: Analysis of the substorm recovery phase using a multisatellite view and MHD simulation – by Farr, Nathan

Status of First Author: Student NOT in the poster competition PhD

Authors: N. L. Farr Nathan.Farr@colorado.edu D. N. Baker Daniel.Baker@lasp.colorado.edu R. S. Weigel Robert.Weigel@lasp.colorado.edu J. C. Green Janet.Green@lasp.colorado.edu University of Colorado, LASP M. J. Wiltberger wiltbemj@hao.ucar.edu NCAR/HAO T.A. Fritz Center for Space Physics, Boston Univ. J.M. Weygand IGPP, UCLA

Abstract: Substorms have been the subject of many studies; however, most of them deal primarily with the growth and expansion phases, while the recovery phase is usually just assumed to be a simple relaxation of the magnetosphere to a more normal configuration. This study looks at a substorm on August 11, 2002 using a constellation of satellites including Cluster, Polar, and various geosynchronous satellites. The event is also modeled using the Lyon-Federer-Mobarry MHD code. The simulation allows a much more global view of the magnetospheric dynamics than is available by the satellite data alone. We look at the onset of the recovery phase and comparisons between the MHD simulation and satellite data .

4.5 GIP.05: Polar MFE Investigation of Near-Tail Dynamics: Stretching and Collapse of the Nightside Magnetosphere at 9Re – by Ge, Yasong

Status of First Author: Student NOT in the poster competition PhD

Authors: Yasong Ge, IGPP UCLA, ysge@ucla.edu and C.T. Russell, IGPP UCLA,ctrussel@igpp.ucla.ed

Abstract: During the fall of 2001, 2002 and 2003, the apsides of Polar spacecraft precessed through the equatorial plane. The present study examines the plasma sheet at 9 Re near local midnight. Even through sometimes the magnetic field magnitude in this region was very low, below 5 nT, no reconnection was observed at this distance in our investigation. But when the field was so weak, we saw a variety of dynamic signatures associated with magnetic reconnection including stretching and collapse of magnetic field. In this study, we present several events during which the magnetic field at about 9 Re was strongly and rapidly stretched and then suddenly collapsed. During the collapse of magnetic field strength, there was an immediate dipolarization which suggests that the onset of magnetic reconnection occurred very near this region. One of events also shows multiple depolarizations associated with the collapse of the tail field. Interplanetary Magnetic Field (IMF) and solar wind conditions during these events have been investigated. High speed solar wind, approaching 800 km/s, is essential for strong stretching on tail field and IMF is southward at least a significant portion of time.

4.6 GIP.06: An Analysis of of Substorm Onset Triggering by Mutiple Satelltes – by Hsu, Tung-Shin presented by Hsu, Tung-Shin

Status of First Author: Nonstudent

Authors: Tung-Shin Hsu and R L McPherron Joseph E. Borovsky James M. Weygand

Abstract: Substorms are so complex that many issues related to them remain very controversial. Many models have been proposed to explain substorm activity. These models can be broadly classified into two categories depending on the cause of the expansion onset. The first invokes processes in the near-Earth region (abs(X) less than about 15 Re) such as current sheet disruption, instability triggered by reduction of interplanetary electric field, or some feed back instabilities near the ionosphere. The other invokes mid-tail magnetic reconnection beyond abs(X) greater than 15 Re as a source of plasma flowing earthward. Deceleration of this earthward flowing plasma and pileup of magnetic flux pileup close to the Earth is then the cause of near-Earth disturbances. A possible way to distinguish the cause of substorm expansion onset is to examine the relative timing of magnetotail disturbances. If the near-Earth region is the source region of substorm onset, a disturbance should be first observed in the near-Earth region and later in the midtail. Similarly, the opposite time delay should be observed if the mid-tail reconnection is the source of substorm expansion onset. In this study, we have identified several candidate events with chance conjuctions of GOES, GEOTAIL, POLAR, and Cluster. Data from auroral imagers, ground magnetometers, Pi 2 pulsation detectors, and synchronous particle detectors will be used to establish accurate onset times. IMF observations will be accurately time propagated by Weimer et al [2003] algorithm. The starting time of near and mid-tail disturbances from these multi-satellite observation will be compared with substorm onset time to establish a relative timing pattern during substorms.

4.7 GIP.07: Flux tube content and transport in the plasma sheet – by Kaufmann, Richard

Status of First Author: Nonstudent

Authors: Richard L. Kaufmann Univ. of NH dick.kaufmann@unh.edu

Abstract: A magnetic flux transport parameter was used to sort 8 years of Geotail measurements into 12 data sets. A separate 3-D long-term averaged model of particles and fields in the plasma sheet was generated from each of these 12 data sets. The models cover the [(-30 ¡ x ¡ -10), (—y— ¡ 15), (—z— ¡ 5)] Re region. This presentation shows results from a study that examined how the average unit flux tube plasma content, magnetic flux transport, and ion transport depend on flow conditions. The fastest 15

4.8 GIP.08: An Observational Study of the Plasma Sheet Specific Entropy – by Lemon, Colby

Status of First Author: Nonstudent

Authors: Colby Lemon, Aerospace Corp., colby@aero.org
Paul O'Brien, Aerospace Corp., paul.obrien@aero.org

Abstract:

4.9 GIP.09: Building a modular global MHD model: partitioning LFM code for easy coupling – by Merkin, Viacheslav

Status of First Author: Nonstudent

Authors: Charles Goodrich, Boston University, ccg@bu.edu John Lyon, Dartmouth College and Boston University, john.lyon@dartmouth.edu Tim Guild, Boston University, tguild@bu.edu

Abstract: We report on the progress in developing a general code coupling framework for the CISM project. This presentation concentrates on partitioning the LFM global MHD model into the separate MHD and ionospheric solvers and building interfaces between them suited for easy coupling and code substitution.

4.10 GIP.10: Solar Wind Ion entry into the magnetosphere during the September 24-25, 1998 Magnetic Storm – by Peroomian, Vahe

Status of First Author: Nonstudent

Authors: V. Peroomian, M. El-Alaoui, M. Ashour-Abdalla and L. M. Zelenyi **Abstract**:

4.11 GIP.11: Particle Acceleration and the Resulting Energetic Particles' influence on the Magnetic field during substorm – by Pin, Wu

Status of First Author: Student NOT in the poster competition PhD

Authors: Theodore Fritz, Boston University, fritz@bu.edu Patrick Daly, Max-Planck-Institute, daly@linmpi.mpg.de

Abstract:

4.12 GIP.12: Cold dense plasma entry into the magnetosphere under northward IMF condition – by Li, Wenhui

Status of First Author: Student NOT in the poster competition PhD

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Abstract: Cold dense plasma (¿1cc, 1kev) has been observed in the plasma sheet in the near tail and even as close as to the geosynchronous orbit when the IMF is northward for at least several hours. To study the formation and convection of the cold dense plasma in the magnetosphere, we use OpenGGCM to simulate several cold dense plasma events. One typical event with strong northward IMF for approximately 35 hours occured October 22/23, 2003. Our results for this event show in detail how the lobe reconnection causes IMF flux tubes in the magnetosheath to be captured into the magnetosphere to form cold dense plasma sheet, and subsequently convected into the tail. This presentation also show results of our study of several other events that will help us to understand in more detail the solar wind entry mechanism, and the convection of cold dense plasma within the magnetosphere.

4.13 GIP.13: Statistical and Superposed Epoch Study of Dipolarization Events Using Data from Wind Perigee Passes – by Sigsbee, Kristine

Status of First Author: Nonstudent

Authors: K. Sigsbee, Department of Physics and Astronomy, University of Iowa, Iowa City, Iowa, 52242 USA (kristine-sigsbee@uiowa.edu)
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M. Oieroset, Space Sciences Laboratory, University of California, Berkeley, California, USA
M. J. Reiner, The Catholic University of America, Washington, D.C., 20064, USA
H. J. Singer, NOAA Space Environment Center, Boulder, Colorado, 80305 USA

Abstract: We examined the properties of magnetic field dipolarizations using over 500 hours of data obtained by the Wind spacecraft in the magnetotail between 1995 to 2000. Most of the dipolarization events occurred in the pre-midnight region of the magnetotail and were accompanied by earthward flows with speeds greater than 100 km/s. The properties of the dipolarization events did not depend upon the Y GSM position. However, they did vary with the distance to the neutral sheet. Isolated dipolarization events, defined as occurring more than 20 minutes apart, were characterized by a decrease in BX GSM and BTOTAL and an increase in BZ GSM and the magnetic field inclination. Dipolarizations that occurred as part of a series of small dipolarizations spaced less than 20 minutes apart were characterized by a transient increase in BZ GSM and the magnetic field inclination, but no significant change in BX GSM and BTOTAL. The events consisting of a series of small dipolarizations occurred predominantly near midnight. We interpret these results in terms of two different modes of magnetotail convection: (1) a classical substorm pattern featuring storage of magnetic energy in the tail lobes which is explosively released at onset, and (2) a directly driven process.

4.14 GIP.14: Solar Wind Sources for Geosynchronous Particle Injections – by Vasic, Ljiljana

Status of First Author: Student NOT in the poster competition PhD

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Abstract:

4.15 GIP.15: Observational constraints for plasma sheet ion sources and transports during northward IMF – by Wing, Simon

Status of First Author: Nonstudent

Authors: J. R. Johnson P. T. Newell C.-I. Meng

Abstract:

4.16 GIP.16: Quasi-static Magnetospheric Structure: First Three-dimensional Results From a Coupled Model – by Zaharia, Sorin

Status of First Author: Nonstudent

Authors: Sorin Zaharia and J. Birn, Los Alamos National Laboratory; szaharia@lanl.gov **Abstract**:

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