we find a simple two sheet field-aligned current configuration. In the 21-24 MLT region a more complex current configuration is seen. In this local time region an overlap of the eastward and westward auroral electrojets are found consistent with the more complex field-aligned current pattern. Height integrated Pedersen and Hall conductivities are typically in the 5-20 mho range indicating an increase from quiet time.

SM71A-0586 0830h POSTER

The Observation and Simulation of Substorm Related Chorus Events

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Substorm-Related chorus events (SCE), VLF emissions with upper and lower cutoff frequencies increasing over time scales 10 min, have been identified in data from the SANAE base in Antarctica. These emissions, occurring predominantly in the midnight-dawn local time sector, have been shown to be a signature of the magnetospheric substorm expansion phase[1], and are thought to arise from cyclotron resonance between whistler mode waves and energetic particles injected around midnight.

The guiding-center motion of the injected particles is influenced by energy-dependent azimuthal drift (due to the gradient and curvature in B) and energy-independent radial ExB drift. The results of simulations indicate that the relative importance of these two drifts in determining the temporal evolution of the SCE is local time dependent. These simulations also suggest that the model used to describe the pre-dawn SCE might be applicable to another class of VLF events observed mainly in the dawn-noon sector.

References [1] A. J. Smith, M. P. Freeman, and G. D. Reeves. Postmidnight VLF chorus events, a substorm signature observed at the ground near L = 4. Journal of Geophysical Research, lOI(All):24641-24653, November 1996.

SM71A-0587 0830h POSTER

The temporal evolution of Whistler-mode waves; the relationship between space based observations, ground based observations and energetic electrons.

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One of the defining characteristics of substorm onset is the injection of energetic electrons. The observed evolution of the energy spectra of these injected electrons has been well documented and is understood in terms of energy dispersed gradient-curvature drifts. A less defining, but often observed, characteristic is the enhancement of equatorial whistler mode wave amplitudes. Whilst studies have categorised the occurrence of these waves in terms of location and geomagnetic activity levels, to our knowledge no attempt has been made to document and explain the evolution of the whistler frequency spectrum as has been done with injected electrons. In this paper we address this problem by examining 22 case studies of CRRES observations of substorm enhanced whistler mode waves. These observations were made close to the geomagnetic equator and between 02:00 and 06:00 MLT. The frequency of the enhanced whistler waves is seen to vary strongly with magnetic field strength and for this reason we re-plot the data in terms of the equivalent parallel resonant energy of an electron in first-order cyclotron resonance with a wave of a given frequency. We can interpret our findings in terms of the injected electron population and resonant ellipses in velocity space. Furthermore, we relate the findings of our study to observations of ducted waves seen on the ground as Substorm Chorus Events (SCEs) and conclude that the frequency dispersion seen in SCEs is dominated by electric field effects.

SM71A-0588 0830h POSTER

Energetic Ion Entry into the Magnetosphere During Storm Intervals

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During magnetic storms the magnetosphere is subjected not only to strong interactions with the solar wind and the interplanetary magnetic field (IMF) but can also be bombarded by energetic particles (SEP) of solar and interplanetary origin. For this study, storm time intervals with high SEP fluxes will be studied by using magnetohydrodynamic (MHD) simulations and particle tracing calculations. We have found that SEP entry in a slowly varying magnetosphere is determined by the magnetospheric configuration, which is controlled in turn by the IMF. The questions we will address in this study are how and where energetic (100 keV 50 MeV) protons enter the highly stressed storm time magnetosphere, and if rapid time variations in the solar wind and the IMF augment the entry of the particles. We have performed MHD simulations of storm intervals by using solar wind and IMF time series measured by upstream spacecraft. The upstream boundary conditions for the MHD simulations are based on these time series. A large number of test ions are launched in the time-dependent electric and magnetic fields from the MHD simulation. The accessibility of magnetospheric regions to these ions as well as precipitation and trapping in the model is then evaluated.

SM71A-0589 0830h POSTER

Storm Dependence of Occurrence Probability and Spatial Distribution of Upstream Events: Its Implication for Their Origin

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Increases of high energy (> 50 keV) particle flux, called upstream events, have been reported but their origin is yet to be identified. We examined how upstream events depend on geomagnetic storms, by using ion flux data acquired by the ICS sensor of the EPIC instrument on board the Geotail spacecraft.

In an analysis using ion data from the EPIC P3 channel (77.3 keV − 107.4 keV), we identified upstream events to be flux enhancements by a factor of greater than 100 occurring in less than 10 minutes in the upstream region defined by $X_{GSE} > 0$ and $15 < \sqrt{X^2_{GSE} + Y^2_{GSE}} < 35$ Re. Observations are sorted into four radial distance bins and eight local time bins, resulting in each mesh has a radial size of 5 Re and a local time of 1.5 hours. We calculated the occurrence probability, which is the total duration of events divided by traveling time of the satellite, in each mesh. We also analyzed its dependence on the SYM-H index, which is thought to indicate a geomagnetic storm activity. The probability was about 0.05 regardless of satellite location when the SYM-H was larger than zero (no storm). By contrast, the probability reached 0.2 to 0.3 in the dawnside and about 0.1 in the duskside when the SYM-H was below −30 nT (storm time). This dawn-dusk asymmetry was stronger than that derived from all events.

We have also examined carbon-nitrogen-oxygen (CNO) ions detected by M3 channel (221.4 keV − 275.2 keV) during the upstream events. Plots of M3 channel data show that background flux of CNO ions was less than one count in the upstream region. We consider ion counts more than three as a flux enhancement of CNO ions, because the lower limit of the uncertainty for three counts (2.42) is larger than the upper limit of the uncertainty for one count (2.00). The enhancement was observed in almost all the upstream events. The rate of detecting the enhancement reached more than 80 %.

These statistical results indicate that particles of magnetospheric origin are observed more frequently in the upstream region when a storm occurs in particular. We conclude that energetic particles can leak out of the magnetosphere and travel toward the dawnside of the upstream region when a storm occurs. We propose that this leakage process is a possible decay mechanism of the storm-time ring current.

URL: http://www-step.kugi.kyoto-u.ac.jp/˜keika/

SM71A-0590 0830h POSTER

Low Frequency Weak Signals Detected in Storm Sudden Commencements: Is There a Correlation With the Solar Magnetic Cycle?

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A series of storm sudden commencements (SSCs) is analyzed during the period from 11 to 22 solar cycles using a Dynamical Spectrum technique combined with the Maximum Entropy Method. Our main interest is to study the low frequencies range. Several periodicities were identified at 22y, 18.6y and 30y approximately. Not all the signals are present in the whole period. We believe that they could be associated to the magnetic solar and Gleissberg cycles and possibly with another intermittent solar phenomena. Additionally and comparing with sunspot numbers a sunspot series for the same period has been analyzed with the same methods. Results between SSCs and sunspot numbers show similarities as expected as well as some marked differences also. They will be discussed in the context of their possible origins.

SM71B MCC: 105 Sunday 0830h

Magnetosphere-Ionosphere Coupling I

(joint with SA)

Presiding: **P Song,** University of Massachusetts Lowell**; T I Pulkkinen,** Finnish Meteorological Institute

SM71B-01 0830h INVITED

The Unreasonable Success of Magnetosphere-Ionosphere Coupling Theory

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The description of plasma dynamics on the basis of self-consistent coupling between magnetosphere and ionosphere, as first systematized in the early 1970's, is arguably one of the most successful theories in magnetospheric physics. It accounts for the pattern of magnetospheric convection at auroral and low latitudes, the distribution of Birkeland currents, and the dependence on changing orientation of the interplanetary magnetic field. It can incorporate assumed effects, e.g. of particle sources or conductance variations, to almost any degree of complexity at moderate cost in additional computing effort (compare the levels of physics included in advanced versions of the Rice Convection Model and of global MHD simulations, respectively). Such success combined with relative simplicity, however, is possible only because the theory has limited itself in significant ways. It treats the system in effect as doubly two-dimensional: height-integrated ionosphere plus field-line-integrated magnetosphere, with the background magnetic field structure treated as known or derived from some empirical model. It assumes that the system is always in slowly evolving quasi-equilibrium and deals only with time scales long compared to wave propagation times. Hence the theory is not easily applied where genuine 3D aspects (e.g. height and field-line dependence), poorly known or variable magnetic fields (e.g. open field lines), or transient responses e.g. to rapid solar-wind changes are important, and it is intrinsically incapable of describing explosive non-equilibrium developments such as substorm onset. Possible extensions

of the theory, comparison with numerical-simulation approaches, and implications for general space plasma physics (E-J vs. B-V) will be discussed.

SM71B-02 0850h INVITED

The Role of Middle Altitude Processes in Magnetosphere-Ionosphere Coupling: Lessons from FAST

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As a first approximation the ionosphere can be thought of as a passive load for the magnetosphere, where currents and electric fields are imposed on the ionosphere by the magnetosphere. In this simple picture the ionosphere acts a both a mechanical and electromagnetic load. The reality is of course much more complex. The ionosphere is not a uniformly conducting medium, especially in the nightside, and the currents and electric fields imposed by the magnetosphere do not simply map to the ionosphere. Moreover, because of non-uniformities within the ionosphere, there will be feedback between the ionosphere and magnetosphere. Lastly, processes occurring on flux tubes at intermediate altitudes will also act to distort the mapping between the magnetosphere and ionosphere. The Fast Auroral Snapshot Small Explorer (FAST), with its high-resolution instrumentation, has explored these intermediate altitudes. FAST has demonstrated the presence of large-scale parallel potential drops, which correspond to a decoupling between magnetosphere and ionosphere in terms of electric field mapping. Moreover, FAST has shown the validity of the "Knight relation" in the upward current region. As a consequence the electric field pattern will be further distorted by the resultant conductivity gradients associated with the enhanced electron precipitation. These effects can be large locally, but the consequences of such non-ideal mapping on the more global aspects of magnetosphere-ionosphere coupling have yet to be assessed. FAST has also demonstrated the importance of parallel electric fields in the return current region, and again some degree of decoupling is expected. In the return current region waves are expected to play a more important role, and the relationship between downward current and parallel potentials is likely to be depend on a scaling law that incorporates wave effects. Last, FAST observations have demonstrated the importance of Alfvén waves for acccelerating electrons and heating outflowing ions, especially at the poleward edge of the auroral oval. Alfvén waves are the means by which changes in the magnetospheric drivers are transmitted to the ionosphere, but this evidence of wave-induced particle acceleration, and the possibility of ionospheric conductivity enhancements, again emphasizes the complexity of what at first glance appears to be a relatively simple interaction.

SM71B-03 0910h

Influence of Ionospheric Conductances on Magnetosphere Structure and Dynamics

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Varying ionospheric conductances are known to draw different currents from the inner magnetosphere and can lead to vastly different electric potential patterns. Different ionospheric potentials, on the other hand, generate differences in magnetospheric convection. Thus, magnetospheric structure and dynamics can, in principle, be impacted or modified by the values of the ionospheric conductances. In order to study the dependence of the large-scale dynamics on ionospheric conductivities, we employ the two global MHD resident at the Community Coordinated Modeling Center (CCMC). The BATSRUS (U. Michigan) and the UCLA-GGCM models are run with the same real event and/or simulated conditions and varying levels of ionospheric conductances. As part of a validation of the magnetospheric models we compare the effect that different conductances have on the magnetosphere of for each of the models and compare runs with the same ionospheric parameters performed with the two models. Specifically, we will focus on magnetospheric convection and magnetic field topology.

SM71B-04 0925h

Closure of Ion-Pressure-Driven Magnetospheric Electric Currents Through the Ionosphere: Implications for Global Electric Fields

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Energetic neutral atom (ENA) images of H+ and O+ ions 10-60 keV/nuc from the HENA camera on the IMAGE spacecraft reveal that the storm-time ring current is often asymmetric. This implies an azimuthal gradient in the ion pressure that will drive field-aligned currents into and out of the ionosphere. Kinetic modeling of the ring current indicates that the closure of this partial ring current through the ionosphere will in turn produce electric fields in the magnetosphere. Such electric fields are strong and are distorted from the classical picture of just a solar wind plus corotational electric field. This in turn implies that the transport of ring current ions may be dominated by localized regions of fast ExB drifts, as is required to explain the temporal and spatial dependence of the asymmetry observed in the HENA images. We are now able to calculate the global electric currents throughout the magnetosphere that are driven by the ion pressure gradients. Where those currents enter the ionosphere, we can calculate the intensity of the Region 2 field-aligned current (FAC) system. The ion pressure (P) is deduced from the H+ and O+ ion intensities extracted by inversion of the HENA images (assuming pitch-angle isotropy). Then the electric current intensity (J) may be calculated from the force-balance relation JxB=∇P using the Euler potential representation of J introduced by *Roelof [Adv. Space Res.*, 9(12), 195, 1989]. For storm main phases (e.g., 4 October 2000), the computed FAC into the ionosphere has been compared with the FAC measured directly by magnetometers on the Iridium low-altitude satellites. We have also analyzed periods during which the partial ring current builds up, and we find a consistent increase in the FAC pattern. We expect that further aspects of this kind of magnetosphere-ionosphere coupling may be revealed by comparison with EUV images from the IMAGE spacecraft of plasmasphere erosion in response to the electric fields that are generated by this process.

SM71B-05 0940h

Quasi-Static Alfvén Dynamics and Scale-Dependent Energy Deposition in Magnetosphere-Ionosphere Coupling

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Alfvén wave dynamics become quasi-static in the ionosphere and low-altitude magnetosphere in the ULF regime below 10 mHz and at altitudes less than a few R_E when the following two conditions are met: $\omega L R_E << v_A(\ell)$ and $\omega\ell << 1/\mu_0\Sigma_P$. L is the dipole shell parameter, ω is the wave frequency in radians, ℓ represents field-aligned distance above the ionosphere, $v_A(\ell)$ is the local Alfvén speed, and Σ_P is the ionospheric Pedersen conductance. In this limit, reactive power stored in Alfvénic fluctuations at high altitude flows quasi-statically into ionospheric Joule heating and low-altitude collisionless dissipation. The combined dissipative effects are described by the electrostatic model of *Chiu-Cornwall-Lyons* [1980] which captures the transverse wavelength dependence of low-altitude Alfvénic energy deposition. The analysis and results described here 1) correspond to the low-altitude, low-frequency limit of theories for the interaction of an Alfvén wave with the ionosphere [*Knudsen et al.*, 1992], including effects of a low-altitude collisionless dissipation layer [*Vogt and Haerendel*, 1998], and field line eigenmodes with allowance for finite ionospheric conductivity and realistic parallel inhomogeneity [*Allan and Knox*, 1979]; 2) reconcile the interpretation of inverted-V precipitation regions as electrostatic potential structures with electromagnetic energy deposition via Alfvén waves at frequencies below 10 mHz; 3) provide criteria for the validity of the Knight current-voltage relation in the ULF regime and its use in global MHD simulations; 4) relate low-altitude satellite measurements of both "static" and ULF electric and magnetic fields directly to the ionospheric Pedersen conductivity; and 5) offer a resolution to debates about high-altitude closure of auroral potential structures as O-, U-, or S-potential forms.

SM71B-06 0955h

The Breakdown of MHD in the Auroral Region and the Generation of Parallel Electric Fields

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MHD does not allow parallel electric fields. However, electric fields parallel to the magnetic field have been experimentally well-established in the auroral region. What features of the auroral region cause MHD to be inapplicable ? It is argued that the answer lies in the superposition of two magnetic structures, one consisting of the rotating magnetic dipole, and the other consisting of the external magnetic field which is fixed in the inertial frame. The conductivity condition requires that the net force on a charged particle is zero, which means that either the condition E + VxB =0 (Case I) is satisfied or E and V are individually zero (Case II) in a given frame of reference. For example, for plasma co-rotating with the magnetic dipole, Case I is satisfied in the inertial frame while Case II is satisfied in the rotating frame by the appropriate transformation. On the other hand, if Case I is imposed in the rotating frame and Case II in the inertial frame there is no co-rotation. How does nature decide between these two possibilities? Laboratory experiments that were performed in the early 1900's show that a magnet rotating about its axis of symmetry produces a detectable motional electric field only in the rotating frame. In other words, the rotating dipole creates an electrostatic motional electric field in the rotating frame which is canceled by a polarization of the conducting plasma, consistent with Case II (Etot'=0). The effect of the resulting polarization electric field is seen in the inertial frame as EpxBd plasma drift, co-rotating with the dipole. In short, the rotating dipole naturally entrains an initially stationary plasma and causes it to rotate . On the other hand, the stationary external magnetic field does not contribute to the rotation of the plasma and must satisfy Case I in the rotating frame and Case II in the inertial frame, which is opposite to that for the rotating dipole. Since it is impossible for the combined magnetic field to simultaneously satisfy the conductivity condition for both rotating and stationary magnetic structures, MHD does not apply here. In fact, one can easily show by incorporating both magnetic fields in an MHD treatment that inconsistencies become clear in the limit as one of the magnetic fields is set to zero. Note that the magnetic force from the stationary magnetic field is partially perceived as an equivalent electric force in the rotating frame which is perpendicular to the stationary magnetic field, but not that of the rotating dipole. The polarization electric field from the rotating dipole exists in the inertial frame and is perpendicular to the dipole magnetic field, but not that of the stationary magnetic field. Therefore, in the auroral region where both magnetic field structures are significant, there is the same finite E-parallel in both reference frames. This E-parallel is sustained by the Earth's rotation and provides a continuous energy source for the aurora.

SM71B-07 1035h INVITED

The Role of Thermospheric Winds in Magnetosphere-Ionosphere Coupling

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Thermospheric winds are forced primarily by non-uniform solar heating, by atmospheric tides and other waves coming from below, and by ion drag and Joule heating associated with high-latitude convection. The high-latitude ion drag above 120 km altitude tends to drive winds in the direction of the ionospheric convection, although inertia of the air and other forces

prevent a tight coupling of the ion and neutral motions. The tendency for high-latitude winds to move in the direction of ion motion tends to reduce the effective conductance of the ionosphere as felt by the magnetosphere, with consequences for magnetosphere-ionosphere coupling. The inertia of the air can cause delayed "flywheel" effects, which can potentially help maintain magnetospheric convection after a sudden reduction in the strength of solar-wind/magnetosphere coupling. At low latitudes, the ionospheric electric fields associated with magnetospheric disturbances can have complex temporal behavior. The electric field that penetrates to the equator directly from the polar cap tends to enhance the regular quiet-day equatorial east-west electric field. In contrast, the equatorial east-west electric field produced by the "shielding" region-2 currents tends to act oppositely to the directly penetrating field, but with a time delay of tens of minutes. Disturbance thermospheric winds have an ionospheric dynamo effect that also tends to act oppositely to the directly penetrating field, but with a time delay of a few hours. The combined effects can lead to electric-field disturbances of either sign, including long-lasting "overshielding" disturbances that can reduce or even reverse the normal quiet-day equatorial east-west electric field.

SM71B-08 1055h INVITED

Cluster / Ground-Based Correlative Observations in the Polar Cusp and the Nightside Magnetotail-Auroral Regions

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ESA's multisatellite mission Cluster is now in its second operational year and has visited some of the key regions of the magnetosphere with different inter-spacecraft separations. This mission concept allowed detailed studies of different scale sizes in the micro-physical plasma-processes which occur at the various boundaries in space (both on the day side magnetopause and Cusp, and in the nightside tail).

Most of the effective plasma processes in these magnetospheric regions have consequences for the magnetospheric and ionospheric plasma populations, convection flows and three-dimensional current systems on meso- and global scales, which cannot directly be monitored by the Cluster multi-spacecraft mission. In order to understand the causal relationships between microphysical processes and the meso-scale and global planetary reactions, combined observations from spacecraft and distributed ground-based networks are absolutely essential.

We will present the recent progress which has been made using such combined observation techniques. We intend to concentrate on a few key regions where such coordinated observations are most effective. These are the dayside interior and exterior Cusp, the nightside tail from the Cluster location at 19 Re and inwards, and the interior auroral field lines on the dawn, dusk and nightside portion of the auroral oval.

SM71B-09 1115h

Ion outflow in a dynamic coordinate frame.

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The ionosphere contributes a significant and variable flux of ions to the magnetosphere, primarily of low energy ions. The transport and energization of these ions play a important and poorly understood role in dynamic processes such as substorms. Progress in understanding the role of ionospheric ions requires incorporating realistic models of ion outflow into global magnetospheric models. Prior reports of ion outflow have used the static geomagnetic coordinate system. In this presentation the ion outflow observed during 1997 (solar minimum) from the FAST satellite is analyzed with the respect to the auroral oval, removing the effects of auroral motion in response to geomagnetic activity. The location of auroral oval is identified from both electron and ion measurements. Within the auroral oval, the ion outflow is then statistical analyzed with respect to the ion characteristics (i.e. beams and conics) and global parameters such as altitude and magnetic activity. In the dynamic boundary oriented coordinate system, we find that ion beams near midnight are found uniformly distributed across the auroral oval. Ion conics at midnight, however, are observed primarily near the poleward boundary of the auroral oval. We will report on these and other features observed in our initial assessment of this new and unique data set.

SM71B-10 1130h

Connections Between SEP Effects on the Atmosphere and Terrestrial Ion Outflows

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Significant increases of solar energetic particles (SEP) impinging on the Earths atmosphere produce enhanced HOx (H, OH, HO2) and NOx (N, NO, NO2) constituents in the middle atmosphere at polar latitudes of both hemispheres [c.f., Jackman et al., GRL, 2883, 2001]. In addition, energy is deposited into the neutral gas that may elevate temperatures. Either density increases or scale height increases will increase the supply of heavy neutral atoms at higher altitudes. Because charge exchange interactions within the ionosphere maintain the O+/H+ ratio in roughly the same proportions as the neutral O/H particle ratio, an increased scale height of light and heavy atmospheric neutrals should then influence the potential supply of light and heavy ions at the topside ionosphere. Lighter ions experience additional evaporative escape along open field lines so that scale height changes lead to changes in the outward flux preferentially for the heavier, more gravitationally bound species. These changes, which take place well in advance of interplanetary shock impacts on the magnetosphere and the dynamics associated with those interactions, offer the opportunity to investigate possible connections between short time scale solar influences on the atmosphere and the magnetosphere storm dynamics that follow on longer time scales. We examine12 SEP events known to induce enhanced atmospheric neutrals and map the temporal evolution of terrestrial ion outflow to the magnetosphere. Particle trajectory tracings show that changing ion outflow rates due to strong SEP are important contributors to plasma sheet and ring current populations during dynamic conditions.

SM71B-11 1145h

Neutral Effects on Magnetosphere-Ionosphere Coupling

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We take a three-fluid approach to describing the dynamic processes of magnetosphere-ionosphere-thermosphere coupling. The three species are electrons, ions, and neutrals. Electromagnetic interactions between the charged species and collisions among the three species are included to derive the three-fluid generalized Ohm's law, the plasma momentum equation, and the neutral momentum equation. The three-fluid generalized Ohm's law describes the time dependence of the current and electron motion, while the plasma (neutral) momentum equation describes the time dependence of the ion (neutral) motion. This formalism adds the neutral momentum equation to the conventional magnetosphere-ionosphere coupling. We derive the general dispersion relation for this three-fluid system and show that at frequencies much below the ion gyrofrequency the phase speed decreases continuously from the Alfven speed as collision frequencies increase at lower altitudes because of neutral-inertia loading . Heavy damping occurs for frequencies higher than 1 Hertz. The magnetosphere-ionosphere coupling is better described as a neutral drag process rather than as resistive Ohmic dissipation.

SM72A MCC: Hall D Sunday 1330h

Magnetotail, Plasma Sheet, and Boundary Layers I Posters

Presiding: **E Zesta,** University of California, Los Angeles**; M Fillingim,** University of California, Berkeley

SM72A-0591 1330h POSTER

Field-aligned currents in the outermost plasma sheet boundary layer with Geotail observation

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We have studied the outermost field-aligned currents (FACs) in the plasma sheet boundary layer (PSBL) with the Geotail observations.

The trajectory and plasma data of Geotail enable us to conduct a more comprehensive and systematic survey than former work based on the ISEE 1 and 2 data.

We identified the FACs with the variation of the dawn-dusk magnetic field component and calculated their intensities on the assumption of the sheet geometry.

A case study indicated that the FACs flow earthward on the earthward side of the reconnection site while the FACs are directed tailward on the tailward side.

This tendency was confirmed statistically for PSBL crossings by Geotail inside $X_{\mathrm{GSM}} = -40\,R_E$.

This FAC distribution can be reasonably interpreted in terms of the Hall current system generated by the magnetic reconnection process.

The statistical study also showed a dawn-dusk asymmetry of the polarity of the outermost FACs on the earthward side of the reconnection site.

That is, while the FACs flow mainly earthward, tailward-flowing FACs frequently appear in the dusk sector.

In the tailward side of the reconnection site, however, we did not find such a dawn-dusk dependence about the polarity of the outermost FACs.

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Comparison of Global MHD Simulations of the Lobe Magnetic Field with Spacecraft Data

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The magnetic field in the magnetotail simulated by the LFM global MHD code is compared with a long time series of lobe field data from observations by Geotail and Interball spacecraft. Earlier comparisons of code results with satellite data have been mainly case studies. The comparison of the data from the code with satellite data on large datasets are used to study in more detail the ability of the code to model magnetospheric dynamics. In a study using large database, several intervals of Bargatze et al [1985] data set were simulated using the global MHD code and the AL index computed from the simulation data compared with the actual data. However, ionospheric indices are not very well defined in the code and the magnetic field in the tail under different solar wind conditions is better suited for detailed study. An important issue is the question of how well the code reproduces the directly driven and and loading-unloading components. The