SM43C-06 1330h POSTER

Trapped, Streaming and Counter-Streaming Energetic Electrons in the Geomagnetic Tail: Cluster/RAPID

Patrick W. Daly[1] (49-5556-979-279; daly@linmpi.mpg.de); Joseph F. Fennell[2]; J. Bern Blake[2]; James Roeder[2]; Reiner Friedel[3]; Geoffry D. Reeves[3]; Christopher H. Perry[4]; Jackie Davies[4]; Malcolm W. Dunlop[4]; Manuel Grande[4]

[1]Max-Planck-Institute für Aeronomie, Max-Planck-Str. 2, Katlenburg-Lindau 37191, Germany

[2]The Aerospace Corporation, 2350 E. El Segundo Blvd., El Segundo, CA 90245-4691, United States

[3]Los Alamos National Lab, Bikini Atoll Rd., Los Alamos, NM 87545, United States

[4]Rutherford Appleton Laboratory, Chilton, Didcot OX11 0QX, United Kingdom

During the Cluster orbit 474 on July 26-28, 2003, with apogee in the geomagnetic tail and slightly towards the dawnside, the RAPID energetic particle spectrometer was in its high resolution mode for the entire 58 hours, permitting detailed 3-D electron distributions over an unprecedented length of time. On July 27, from ca. UT 0830 to 2300, very enhanced electron fluxes were observed, exhibiting a wide variety of distributions: trapped, counter-streaming, and field line streaming. The largest fluxes are seen in conjunction with the current sheet crossing, with trapped and counter-streaming distributions observed within very short time intervals. These results are interpreted in terms of the geometry and dynamics of the central plasma sheet.

SM43C-07 1330h POSTER

Energetic Electron Distributions at the Dusk and Dawn Magnetotail Flanks: Cluster Rapid Observations

J. F. Fennell[1] (+1 310 336 7075; joseph.fennell@aero.org); J. L. Roeder[1] (+1 310 336 7081; james.l.roeder@aero.org); R. Friedel[2] (+1 505-665-1936; rfriedel@lanl.gov); M. Grande[3] (+44 1235 446501; m.grande@rl.ac.uk); P. W. Daly[4] (+49 5556 979 297; daly@linmpi.mpg.de); T. A. Fritz[5] (+1 617 353 7446; fritz@bu.edu)

[1]Aerospace Corp., MS:M2-259 POBox 92957, Los Angeles, CA 90009-2957, United States

[2]Los Alamos National Laboratory, MS: D-436, Los Alamos, NM 87545, United States

[3]Rutherford Appleton, Laboratory, Chilton, didcot, OX OX11,OQX, United Kingdom

[4]Max-Planck-Institut fuer Aeronomie, Max-Planck-Str. 2, Katlenburg-Lindau D-37191, Germany

[5]Boston University, Dept. of Astronomy 725 Commonwealth Ave, Boston, MA 02215, United States

We use the Cluster Rapid/IES data to characterize the energetic electron fluxes and angular distributions at the dawn and dusk nightside plasmasheet-magnetopause boundary in the magnetotail. During the mid to late June and December 2003 the Cluster satellites were crossing the equatorial plane near the nightside magnetopause at dawn and dusk respectively. We focus on burst mode data, which provides detailed energy and angular distributions for the four spacecraft, during 16 and 24 June 2003. During December, we focus on the new Rapid NM3 data that provides burst-mode-like IES data on C2 only. We examine the electron distributions in light of their possible sources and spatial characteristics.

SM43D CC: 518 C Thursday 1330h

The Magnetospheric Interaction With the Jovian Satellites: Theory and Observation I *(joint with P)*

Presiding: **C P Paranicas,** Applied Physics Laboratory, Johns Hopkins University**; C Higgins,** Middle Tennessee State University

SM43D-01 1330h INVITED

Energetic Particle Interactions in the Vicinity of Io

Richard M Thorne (310 8255974; rmt@atmos.ucla.edu)

UCLA, Department of Atmospheric Sciences, 7127 MS, Box 951565, Los Angeles, CA 90095, United States

Changes in the distribution of energetic particles measured by the Galileo Energetic Particle Detector in the vicinity of Io can be used to model the global distribution of magnetic and electric fields in the vicinity of the moon. Some changes are simply caused by an adiabatic response of the particles as they are carried past Io by the co-rotational flow. There is also evidence for non-adiabatic scattering processes, which allow entry of particles to regions inaccessible by direct flow. The presence of narrow field-aligned electron beams in the wake region behind Io and also across the polar caps of the moon requires a strong acceleration source close to the footpoint of the magnetic flux tube in the Jovian upper atmosphere. We suggest that this is a result of current flow between Io and the atmosphere, as a consequence of the differential rotation rates.

SM43D-02 1350h INVITED

Thermal Plasmas Near Jupiter's Galilean Moons

Louis A Frank[1] (319-335-1695; louis-frank@uiowa.edu)

William R Paterson[1] (319–335-1864; william-paterson@uiowa.edu)

[1]The University of Iowa, Department of Physics and Astronomy, 413 Van Allen Hall, Iowa City, IA 52242, United States

Although the Galileo spacecraft was destroyed during its plunge into Jupiter in September of 2003, scientific efforts related to the Galileo mission are not ended. Among the many gems left to our scientific community as a legacy are the measurements acquired during numerous near encounters with Jupiter's 4 large moons. High-resolution measurements from the plasma instrumentation (PLS) recorded during many of these encounters yield unprecedented evidence of complex phenomena associated with the motions of the moons through the Jovian magnetosphere. The plasma environment of each moon exhibits unique characteristics. Many exciting findings have been reported, but it is unlikely that the full scientific gain from the mission has been realized yet. Additional significant insights can be achieved through theory and modeling efforts guided by these remarkable observations, and through continued analysis of the measurements. With that in mind, we provide an overview of findings based on plasma observations near the moons, and we discuss these findings in the context of other past and recent work directed toward understanding the environments of the moons and their interactions with Jupiter and with Jupiter's magnetosphere.

SM43D-03 1410h

Energetic Electron Beams in Ganymede's Magnetosphere

Donald J. Williams (1-240-228-5405; donald.williams@jhuapl.edu)

Johns Hopkins Applied Physics Laboratory, 11100 Johns Hopkins Road, Laurel, MD 20723-6099, United States

Data from a series of Galileo close encounters with the Jovian moon Ganymede have provided much information about its magnetic field, its magnetosphere, and its trapped particle populations. Data obtained from the Energetic Particles Detector (EPD) during the final Ganymede encounter on December 28, 2000 yield further insights into the dynamics of Ganymede's magnetosphere. The encounter occurred at mid-latitudes at the beginning of the moon's plasma wake. In the region where trapped-like electron and ion distributions were measured, field-aligned electron beams also were observed. These beams were observed on two of the three occasions when EPD was oriented such that it could sample any extant beams (pitch angles greater than 170 degrees). We will discuss possible sources for these beams and compare them with those measured at Io.

SM43D-04 1425h INVITED

Satellite-magnetosphere interactions at Jupiter as revealed with energetic charged particle measurements

Barry H. Mauk (240-228-6023; Barry.Mauk@jhuapl.edu)

The Johns Hopkins University Applied Physics Laboratory, 11100 Johns Hopkins Road, Laurel, MD 20723, United States

Aspects of the interactions between Jupiter's magnetosphere and the Galilean satellites are reviewed as revealed by measurements of energetic charged particles. Addressed specifically are: 1) Energetic charged particle diagnostics of the connection between the satellites and Jupiter; 2) Diagnostics on the topology, geometry, and evolution of the magnetosphere-satellite interactions; 3) Interactions between energetic particles and the satellite surfaces and atmospheres; and 4) the dispersal of satellite generated materials within Jupiter's space environment. Outstanding questions are highlighted as they may relate to such future missions as the Jupiter Icy Moon Orbiter (JIMO) and the Jupiter Polar Orbiter.

SM43D-05 1445h INVITED

Moon-Ionosphere Coupling

Margaret G. Kivelson (310-825-3435; mkivelson@igpp.ucla.edu)

UCLA/Institute of Geophysics and Planetary Physics, 6843 Slichter Hall, 405 Hilgard Ave., Los Angeles, CA 90095-1567, United States

Data acquired by Galileo in its glorious tour of the Jovian magnetosphere, supplemented by the auroral images acquired by the Hubble Space Telescope, provide the foundation for increasingly detailed and sophisticated descriptions of the perturbations of the magnetospheric plasma as a result of its interaction with a good-sized moon. Many aspects of the interaction had been anticipated before the close flybys occurred, but perhaps not all of the early work on the subject had been fully digested. We now know much more about the disturbances launched from the moon into the jovian ionosphere but we are still wringing our hands over the evidence that strong coupling to the ionosphere extends along the orbits of the moons far into the downstream region. The development of field-aligned electric fields coupling the moons to the planet has been upgraded from speculative to probable following multiple observations of narrowly beamed relativistic electrons on passes by Io. Questions remain as to how energy from equatorial regions reaches the auroral ionosphere of Jupiter despite the strong reflection of Alfvén waves from field-aligned density gradients. Although this matter is not fully understood, some interesting ideas have been proposed and will be discussed.

SM44A CC: 518 C Thursday 1530h

Comparative Magnetospheres I *(joint with P)*

Presiding: **K Kabin,** University of Alberta**; S Ledvina,** University of California, Berkeley

SM44A-01 1530h INVITED

Mars Global Surveyor Observations of High Altitude Ionospheric Clouds

Dana Hurley Crider[1] (336 449-7269; dcrider@lepvax.gsfc.nasa.gov)

Mario H Acuna[2] (mario.h.acuna@nasa.gov)

David L Mitchell[3] (mitchell@ssl.berkeley.edu)

[1]Catholic University of America, 106 Driftwood Dr, Gibsonville, NC 27249-3310, United States

[2]NASA Goddard Space Flight Center, Code 695, Greenbelt, MD 20771, United States

[3]Space Science Laboratory, University of California, Berkeley, CA 94720, United States

As Mars Global Surveyor orbits Mars, it crosses into different plasma regimes, as is evident by the electron spectra obtained by the Electron Reflectometer (ER). Below about 380 km, the electron spectra are dominated by locally produced photoelectrons indicating the solar wind electrons do not have access to that region. We investigate the appearance of this electron signature at altitudes above the observed photoelectron boundary height. These may be detached high altitude ionospheric clouds, analogous to those observed at Venus by the Pioneer Venus Orbiter. Like at Venus, we are unable to distinguish the morphology of the clouds with a single cut through at any given time. However, we analyze their occurrence rates as a function of position and upstream parameters to understand the conditions under which they occur.

S M