SH41A-19 0830h POSTER

Interpretation of Recent Data from the Voyager 1 Plasma Instrument

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Voyager 1 (V1) was launched in September 1978 and the onboard M.I.T. Plasma (PLS) instrument returned a wealth of information, most notably for the plasma environments around Jupiter and Saturn. Shortly after the Saturn encounter in 1980 the V1 PLS instrument failed. Despite this failure the instrument was still able to make limited "DC" measurements of integral current and DC data was collected from 1981 to 1985. Until recently, the V1 PLS instrument was turned off for power sharing reasons. Given the controversial evidence that V1 crossed the termination shock around August 2002, the V1 PLS instrument was reactivated in May of 2003. A second similar event/crossing began at V1 in mid 2003 and recent data from the V1 Cosmic Ray Subsystem (CRS) instrument show fluxes as high as those observed for the 2002 event. In this paper we attempt to calculate likely electron/ion fluxes seen by the V1 PLS instrument during the most recent 2003 event. We also present estimates of the present capabilities of the V1 PLS instrument. These calculations and estimates are compared alongside recent data taken from the V1 instrument. We also present recent V2 observations and discuss their implications for plasma conditions at V1 during the recent energetic particle events.

SH41B CC: 518 A Thursday 0830h

Violent Sun-Earth Connection Events of October-November 2003: Geospace Impact I *(joint with SA, SM)*

Presiding: **B Giles,** NASA Headquarters**; R Skoug,** Los Alamos National Laboratory

SH41B-01 0830h

The Solar Storms of October/November 2003: Operations Lessons Learned

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The Sun-Earth space weather related to sunspots 484,486, and 488 affected a number of NASA spacecraft and instruments between mid-October and early November 2003. Information available from Earth and Space Science Missions indicate about 59% of the spacecraft and about 18% of the instrument groups experienced some effect from the solar activity. This paper summarizes the impacts on spacecraft, instruments and science data. The types of environmental effects observed on spacecraft were electronic upsets, housekeeping and science noise, proton degradation to solar arrays, upper atmosphere induced changes to orbit dynamics, high levels of accumulated radiation and proton heating. The paper concludes with the development of best practices that foster continuing and expanding feedback on the environment in all space mission phases, designing to the mission's observing mode so that planning is appropriate to mission science goals, distributing operational experience and lessons learned widely among both developing and operating missions and uniformly applying the developed knowledge base.

URL: http://ssmo_home.hst.nasa.gov/

SH41B-02 0845h INVITED

Russian cooperative investigation of solar, heliospheric and magnetospheric processes during October-November 2003

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The review of the Joint Russian Cooperation of Solar Extreme Events of October-November, 2003(JRC - SEE) efforts will be presented in the multidisciplinary analysis of the data obtained on ground based geophysical and astronomical observatories as well as spacecrafts.Strong solar, heliospheric and magnetic storms are well documented and placed in the context of current studies and retrospective knowledge. Data from CORONAS-F satellite substantially contribute to the better understanding of the solar flare and coronal mass ejection dynamics in the EUV, X-ray, gamma-ray and neutron emissions. In situ measurements of charged energetic particles characteristics in broad spectral ranges are performed onboard CORONAS-F, METEOR, ISS, and several geo-stationary satellites in the near the Earth space. This allows to make important conclusions about the radiation conditions, acceleration and propagation processes of energetic ions and electrons. ODYSSEY/HEND instrument on the orbit around the Mars also brings the valuable information from the different vantage point during this period of time. Observed electromagnetic emissions in the broad range from radio to gamma rays, plasma waves and motions, energetic particle and cosmic ray characteristics, neutrons give some clues to the physics of the solar and heliospheric releases as well as solar-terrestrial relations during this highly perturbed period of time. New features in this respect will be presented and discussed.

SH41B-03 0905h INVITED

Structure of the Magnetospheric Boundary Layers during the Extreme Compression Events of October-November 2003

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How the solar wind mass, momentum and energy are transported across the magnetopause boundary remains a fundamental problem in Sun-Earth connection. A way to study this problem is to investigate the magnetopause boundary. This talk will present multi-spacecraft observations of the magnetospheric boundary layers by the Cluster experiments during the violent Sun-Earth connection events of October-November 2003. In particular we will focus on comparing boundary structures during two CME induced magnetospheric compressions, the first on 24 Oct 2003 and the second on 29 Nov 2003. In both events, magnetopause was compressed to inside of geosynchronous orbit (6.6 R_E). While the second event period developed into a magnetic superstorm (Dst < -300 nT), the first event period did not apparently related to an extended period of strongly northward IMF (B_z > 20 nT) following the initial CME impact. Preliminary observations indicate the first magnetopause crossing showed a thin or no boundary layer while the second period showed a very thick boundary layer. O+ was observed on both boundary crossings. By contrasting these two extreme space weather events, we hope to gain insight into the processes involved in solar wind-magnetosphere coupling.

SH41B-04 0925h INVITED

Impact of the October-November 2003 Super Storms on the Distant Geomagnetic Tail: Wind Observations

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Between October 22 and November 4, 2003 the Wind spacecraft repeatedly encountered the distant geomagnetic tail from X_{GSE} = -120 R_E to X_{GSE} = -180 R_E. During the major solar storms on October 28 - November 1, 2003 Wind observed an unusually hot plasma sheet with the electron temperature often reaching 1 keV. High energy solar particles were present both outside and inside the magnetosphere. The magnetic cloud event with strongly northward interplanetary magnetic field on October 23, 2003 produced unusual low frequency fluctuations in the distant magnetotail, lasting more than 17 hours. The periodic fluctuations indicate that the entire magnetotail was flapping with a period of ∼10 min.

SH41B-05 0945h

Gyrophase-Bunched Energetic He+ and O+ Accelerated to Several Hundered keV (by Cusp Reconnection?) in the October 31 Superstorm

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During the recovery phase of the super storm of October 31, 2003, the Earth was hit by a pressure pulse in the solar wind flow, accompanied by strong northward Bz. The IMAGE spacecraft was just south of the equator near apogee when the pressure pulse apparently pushed the magnetopause earthward of IMAGE around 0500UT. At 0530 UT, energetic O+ and He+ (with sufficient E/q to enter the High Energy Neutral Atom imager (HENA) above the cut-off E/q of HENA's ion rejection system) appeared, but only at very specific angles. Although there is no magnetometer on IMAGE, the field apparently remained very steady over the next 1.5 hours, and the ions were continuously present, always with a very beam-like angular distribution. The appearance of these high energy singly ionized ions coincides with the onset of intense Doppler shifted Lyman-alpha emission in the polar cap, as seen by the SI12 imager of the IMAGE FUV instrument. This indicates intense precipitation of energetic protons in association with the solar wind event, although there is no evidence for very energetic protons (above the 160 keV rejection cut-off) in the HENA data. We will investigate the possibility that the ions seen by HENA are extracted from the polar ionosphere, and accelerated to very high energies as they encounter a reconnection region in the high latitude cusp/lobe region. Other data sets may be brought in to investigate this unusual acceleration event.

URL: http://sd-www.jhuapl.edu/IMAGE/