• News?
• Close approach (April 09) plans
• March 17, 2015 storm:
  MagEIS, REPT, RBSPICE, MMS, AMPERE
• Poster session/data workshop at GEM (June 14-19, Snowmass, CO)
• Publication update
• Walk on
SWG telecon (Van Allen Probes)  
Host: Aleksandr Ukhorskiy

When it's time, start your meeting from here:  
https://apl-webex.jhuapl.edu/orion/joinmeeting.do?ED=wwyDMAXdRv6n9JtpmDZNkQ==&PW=BgAAAGgwVMPV8EYx2MZgLVcYZ9nQz1U9N43KeW9A1q7HrapKADBHCrTfN4X92Mr2NJJP3iQOPBxntuXIz5jaByKw1

When: Friday, April 3, 2015, 3:00 pm (2 hrs), Eastern Daylight Time (New York, GMT-04:00).

Access Information

Meeting Number:  
994 273 842

Password:  
RBSP

Host Key:  
632563 (Use this key during the meeting if you ever need to reclaim the host role.)

Audio Connection

8-1000 (Internal)  
(240)228-1000 (Washington, DC)  
(443)778-1000 (Baltimore, MD)  
(844)275-9323 (Toll Free)

Access Code:  
994 273 842

The apl-webex.jhuapl.edu team

Need help?
Close Approach April 09

Orbit adjustment requires ~40 g of fuel. The burn is scheduled for April 03.
These are mapped magnetic equatorial planes. dY and dX are SC separations in that plane.
Planned Activities

ECT
REPT and MagEIS means normal mode; HOPE in burst “electron-only” mode

EFW
?

EMFISIS
A single long 5 min burst for the very closest approach (April 05 15:04:26). For other close approach orbits - several 1 min bursts every 5 min on either side of the closest approach.

RBSPICE and RPS
Normal modes

Unique Science Opportunities
Cross-calibration
Small-structure of injections
Field-align structure particle distributions and wave-particle interaction
March 17, 2015 Storm
MagEIS (Seth Claudepierre)

30 keV injections down into inner zone

242 keV slot filling

743 keV slot filling

Energy dependent delay in MeV acceleration
Orbits at time of shock impact (~0445 UTC)

Shock at 210 MAG chain (~0445 UTC)

210 MM Magnetic Field Data, 1-min Averages
Mar 17 2015 Day 76
100nT/div(KTN,TKI,CHD,KOT,ZYK,MCQ) 200nT/div(Other)

Shock at SOHO (~0411 UTC)
Primary thing is that the satellites were probably close to the plasmasheet boundary layer part of the time, giving rise to electron dropouts at high energies but not completely at the 10's-100 keV. The first chart in the gives an overview and shows the succession of injections that occurred in the first few days. The following 2 charts show just 17 and 18 March separately. The last charts give a close up view of the dropouts on 17 March. We know the field was stretched because our pitch angle coverage was constrained to near 90 deg (not shown) and there are examples of non-gyrotropy at times (also not shown). I have not had time to put together a good view of the pitchangle distributions or our High Rate data. We were in HR mode most of the 17th on SC-A. Just starting to look into that.
Shri Kanekal, Dan Baker, Allison Jaynes, Vaughn Hoxie
March 18

e: 2.5 - 3.2 MeV

e: 3.2 - 4.0 MeV
REPT ultra-relativistic electron pitch angle spectrograms 2.1 MeV Mar 17

L'  03:00 06:00 09:00 12:00 15:00 18:00 21:00 00:00
0.0  5.144 5.396 5.194 1.239 5.542 5.210 5.210 5.210
0.5  5.482 4.658 2.370 6.004 4.979 2.327 2.327 2.327
1.0  2.349 4.658 2.370 6.004 4.979 2.327 2.327 2.327
1.5  3.492 4.658 2.370 6.004 4.979 2.327 2.327 2.327
2.0  4.658 2.370 6.004 4.979 2.327 2.327 2.327 2.327
2.5  5.814 2.370 6.004 4.979 2.327 2.327 2.327 2.327
3.0  6.970 2.370 6.004 4.979 2.327 2.327 2.327 2.327
3.5  8.126 2.370 6.004 4.979 2.327 2.327 2.327 2.327
4.0  9.282 2.370 6.004 4.979 2.327 2.327 2.327 2.327

Alpha (degrees)
REPT 2.1 MeV electron PAD spectrograms
Mar 17 02:00 to 07:00 UTC
REPT ultra-relativistic electron pitch angle spectrograms

rbpa/ect-rept-sci-L3  FEDU_Unbinned_0to180 - Unidirectional Differential Electron Flux (raw sector data).
FEDU_Energy=2.6 MeV

rbpb/ect-rept-sci-L3  FEDU_Unbinned_0to180 - Unidirectional Differential Electron Flux (raw sector data).
FEDU_Energy=2.6 MeV
REPT ultra-relativistic electron pitch angle distributions L=4.0

Energy (MeV) 4.0-5.0

normalized flux

pitch angle (deg)

e\(^{-}\): 4.0-5.0 MeV
REPT ultra-relativistic electrons: 7.7=9.7 MeV
REPT ultra-relativistic electron pitch angle distributions L=4.0

Energy (MeV): 3.2-4.0

Normalized flux vs. pitch angle (deg) for different days:
- Mar 16/2015
- Mar 17/2015
- Mar 18/2015
- Mar 19/2015
- Mar 20/2015
- Mar 21/2015
- Mar 22/2015
- Mar 23/2015

Normalized flux for each day ranges from 0.0 to 1.2.
REPT ultra-relativistic electron pitch angle distributions L=4.0

e⁻: 5.0-6.2 MeV

Energy (MeV) 5.0-6.2
REPT ultra-relativistic electron pitch angle distributions L=4.0

- Energy (MeV): 6.2-8.1 MeV
- Normalized flux
- Pitch angle (deg)
- Day:
  - Mar/21/2015
  - Mar/22/2015
  - Mar/23/2015
  - Mar/24/2015
  - Mar/25/2015
  - Mar/26/2015
  - Mar/27/2015
  - Mar/28/2015

REPT A L:3.9-4.1

REPT B L:3.9-4.1
EFW E Field spectra

Efield PSD RB–A March 16–17 2015

Hz

hours from 2015–03–16/00:00:00

4/3/15
REPT MagEIS spectra 16-26 March 2015

RBSP–A REPT & MagEIS electron spectra: Mar 16–21, 2015: Inbound pass: Low MLAT

L=4.0
Recent RBSPICE Results: March 17, 2015 Storm
Recent RBSPICE Results: March 17, 2015 Storm

[Graph showing magnetic activity over time]
Recent RBSPICE Results: March 17, 2015 Storm

H+ 90° PA RBSPICEB
Recent RBSPICE Results: March 17, 2015 Storm

He+ and He++
90° PA
RBSPICEB

March 16

March 17
Recent RBSPICE Results:
March 17, 2015 Storm

O+
90° PA
RBSPICEB

March 16
March 17
MMS-EIS Observations After the March 17th Storm

Joseph Westlake
JHU/APL
Introduction

- MMS Launched March 12\textsuperscript{th}
- EIS (which is similar to RBSPICE) turned on (for MMS2 and MMS4) March 21\textsuperscript{st}. MMS3 followed on the 22\textsuperscript{nd} and MMS1 on the 26\textsuperscript{th}.
- The EIS instruments are currently operating with the 1 mm Al doors closed and the HV off, so only SSD data is coming down at low rates.
- Any particles that enter the instrument are likely electrons above 700 keV.
Orbits for March 22

Disclaimer: The orbit is probably correct for MMS, but that the location within the orbit could be significantly incorrect.
An Orbit in the Life of MMS
MMS2 Radiation Belt Encounter

Note that for the energies, add roughly 700 keV for the actual energy (doors closed)
700 keV+ e- Observed Near Apogee

MMS2

MMS4
RBSPICE Observations from the Same Time Period
MagEIS Saw Similar Features

These features show up in the lowest 2-3 channels of MagEIS, and the lowest two channels of EIS. Could they be penetrating electrons for both instruments?

Also note that A saw it before B and before MMS…
From my rough calculations these are
730 keV e- (red)
800 keV e- (blue)
930 keV e- (orange)
Possible Actual Spacecraft Locations During this Timeframe?

This MMS ephemeris is probably off by ~1-2 hours. I will update this as the ephemeris data improves.
e- Range in Aluminum

Therefore the observed electrons are 700 keV – 1 MeV
AMPERE (Haje Korth & Rob Barnes)
AMPERE Birkeland Current Analysis

- Vector magnetic perturbation data, \( \delta B \).
- Continuous \( \delta B \) map via spherical harmonic fit.
- Field-aligned current density, \( J_r \), from Ampere’s law applied to horizontal \( \delta B \).
- Time cadence: 9 min, set by inter-spacecraft separation.
- Latitude resolution: 1.15° for 19.44 s sampling, 0.13° for 2.16 s sampling.

\[
\delta B = \text{Spherical harmonic fit: } \quad J_r = \text{curl } \delta B
\]

04 August 2010 00:00:00 – 00:10:00 (north)

\( 1 \mu A/m^2 \)

Upward \( J_r \)

Downward \( J_r \)

500.0 nT

500.0 nT
Total Current: March 2015
Total Current: 17-18 March 2015
17 March 2015 04:24:00 – 04:34:00 (north)

Before storm onset.

storm onset; dayside current intensification.

17 March 2015 04:50:00 – 05:00:00 (north)
Main phase; nightside current onset.

Full R1/R2 current system forms.
IMF northward turning with $B_y < 0$.

IMF back southward.
Near Dst minimum (~-220 nT).

Into recovery phase; Dst ~-190 nT.
Recovery phase; Dst \(-150\) nT.

Recovery phase; Dst \(-130\) nT.
Recovery phase; Dst ~-130 nT; Bz>0.
• Special Van Allen Probes poster session/data workshop at GEM (June 14-19, Snowmass, CO)
• Call for instrument team representation
Authors: Miyoshi Y, Oyama S., Saito S., Kurita S., Fujiwara H., et al.
Title: Energetic electron precipitation associated with pulsating aurora: EISCAT and Van Allen Probe observations

Title: Global Storm-Time Depletion of the Outer Electron Belt

Title: Postmidnight depletion of the high-energy tail of the quiet plasmasphere

Authors: Min Kyungguk, Liu Kajum, Bonnell John W., Breneman Aaron W., Denton Richard E, et al.
Title: Study of EMIC wave excitation using direct ion measurements

If you do not see your favorite paper published in March 2015 on the Science Gateway publication list please email the reference to Giuseppe Romeo (Giuseppe.Romeo@jhuapl.edu)