

IMPACT SWG Status Report – March 28, 2007



IMPACT Instrument Status

(updates since December SWG)

* Boom Suite

- MAG Operating OK but running cold and offsets larger than expected (~30 nT)
- SWEA Operating OK, although spacecraft charging effects larger than expected
- STE Suspected light contamination issue has rendered STE-U 'blind'. Additional light leak affects STE-U on B. STE-D works fine on both spacecraft (now that the Earth is no longer in FOV). Closeout FRB for STE-U occurred on March 6.

• SEP Suite

- SEPT Operating OK
- SIT Operating OK
- LET Operating OK but has experienced reboots
- HET Operating OK

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SEP Suite

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Recent team meeting's focus

Magnetometer Status

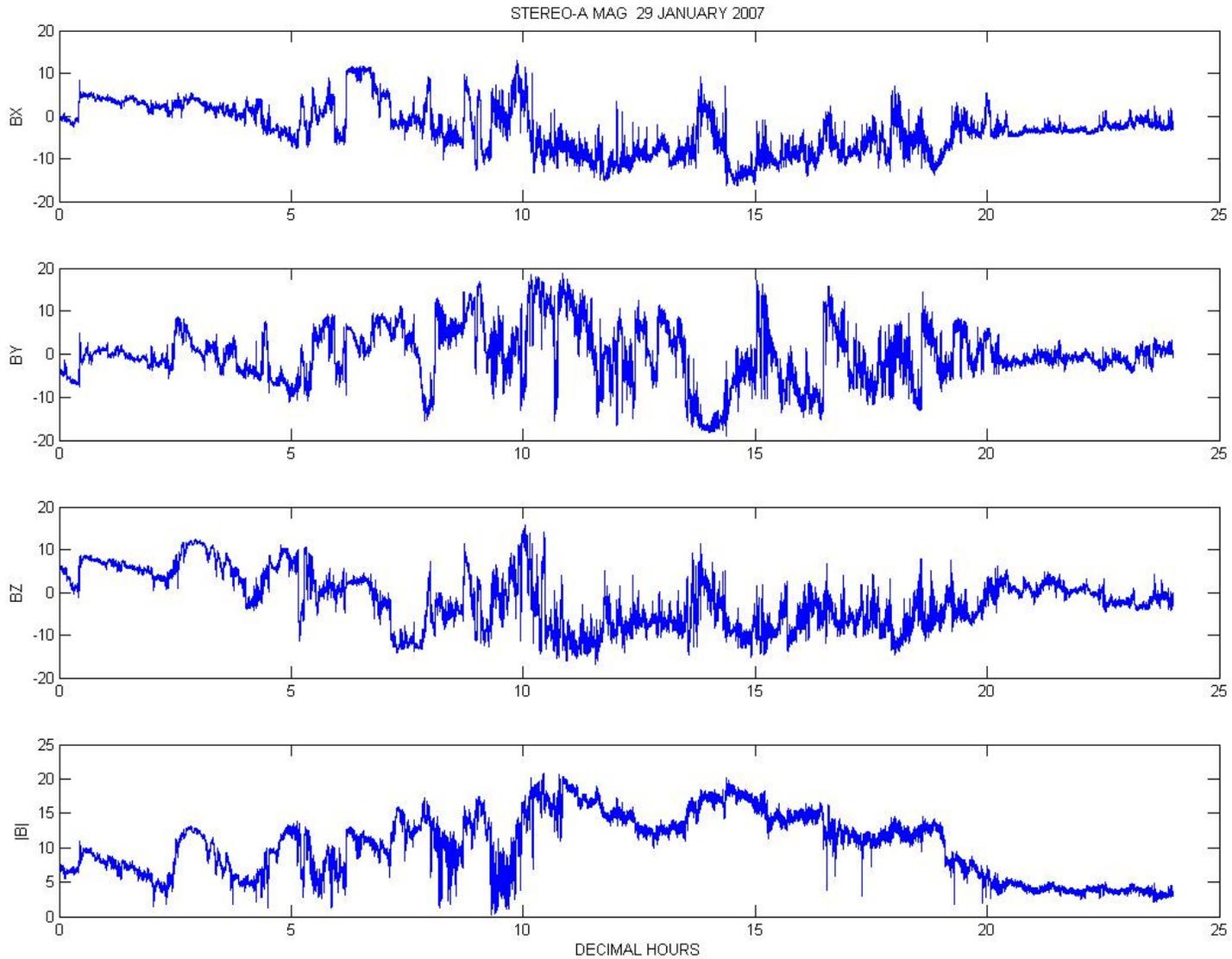
Current issue: Interference seen in Magnetometer measurements

Magnetometer operations have been generally stable since turn-on and the corrections for the larger-than-expected offsets are being reliably made. Their magnitude has been independently verified by GSFC and UCLA. However:

- STEREO B: after launch SECCHI decontamination heater was seen in magnetometer output-but now heater is off
- More recently on STEREO A we noticed spiky noise with an amplitude of about 0.5 nT peak to peak in spacecraft X sensor only

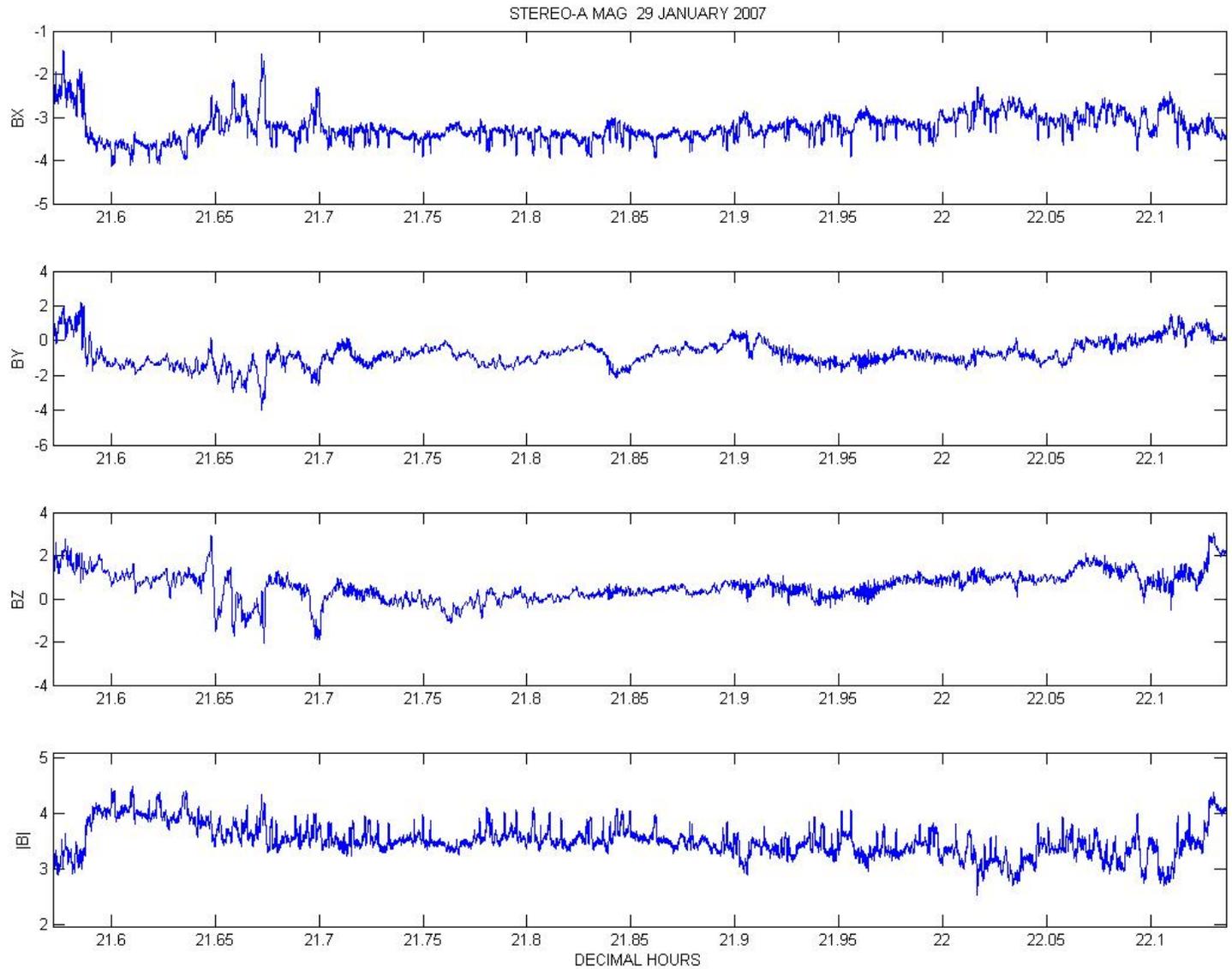
DATA EXAMPLE (8 SAMPLES/SEC)

01/29/07



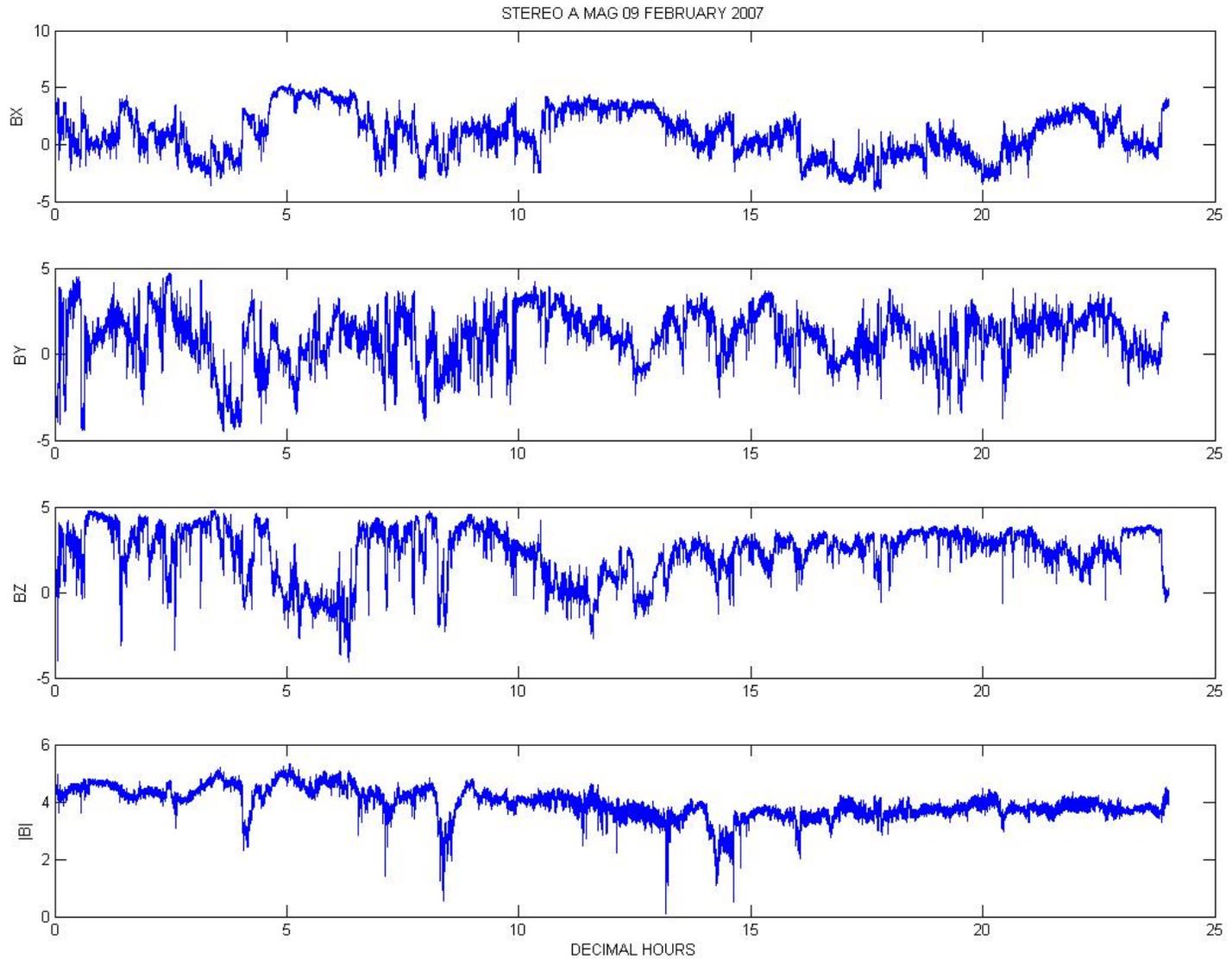
01/29/07

DETAIL SHOWING "SPIKES" PRIMARILY ALONG THE X-AXIS (BOOM AXIS)



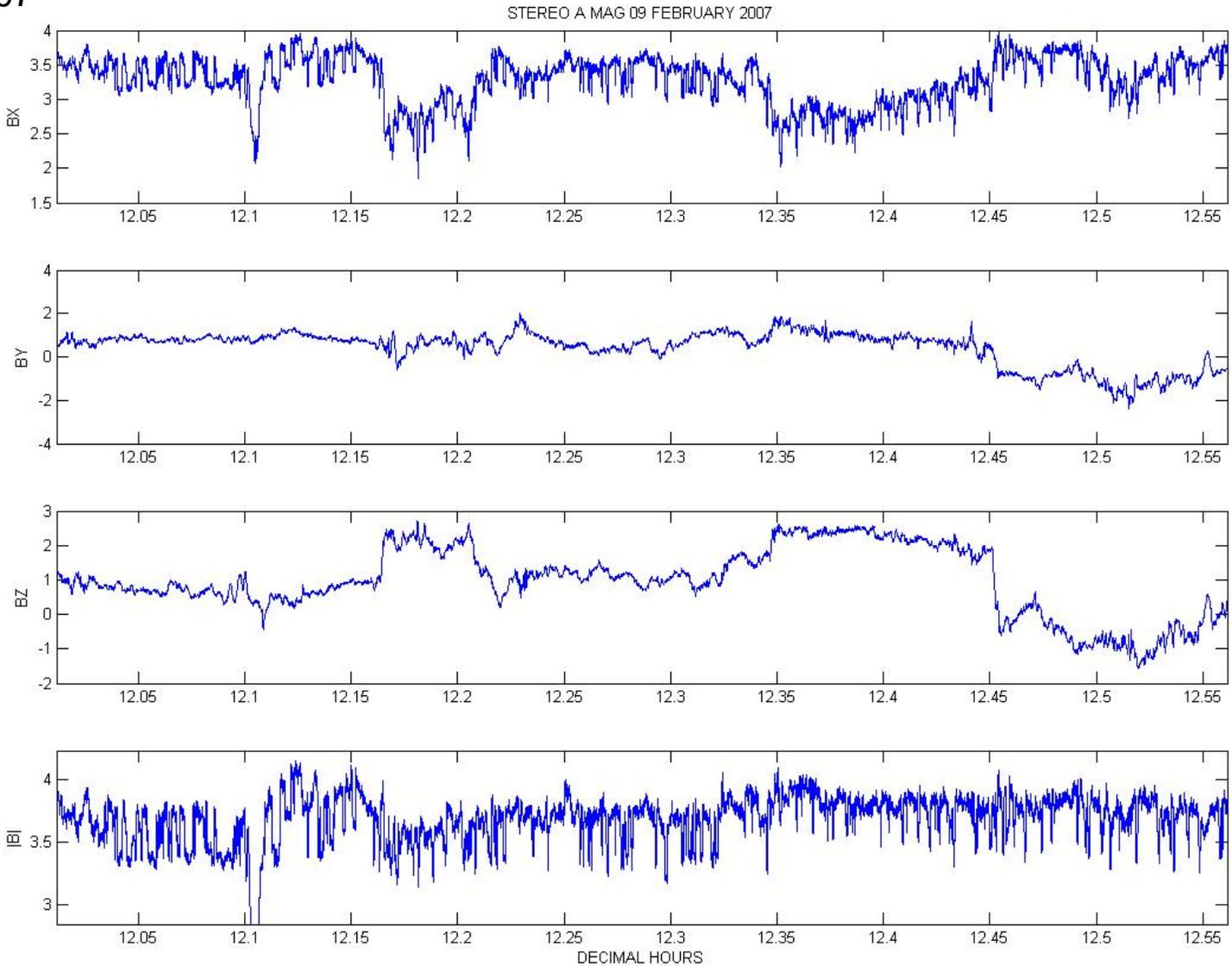
DATA EXAMPLE (8 SAMPLES/SEC)

02/09/07



DETAIL SHOWING SPIKES

02/09/07

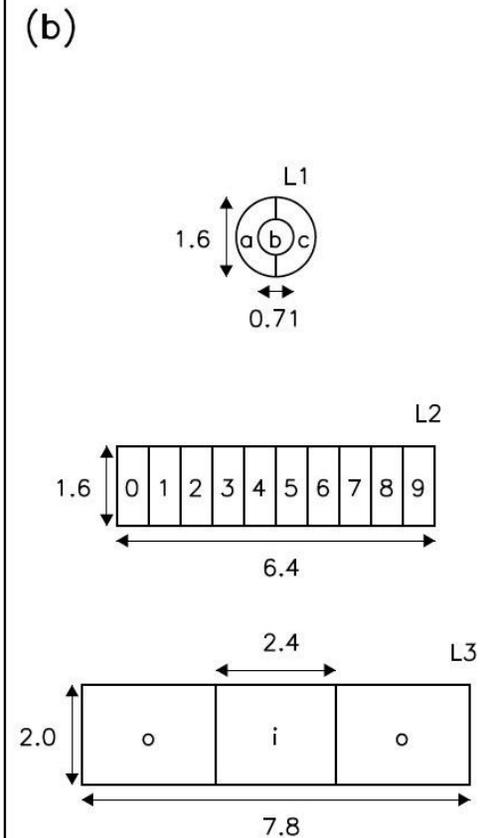
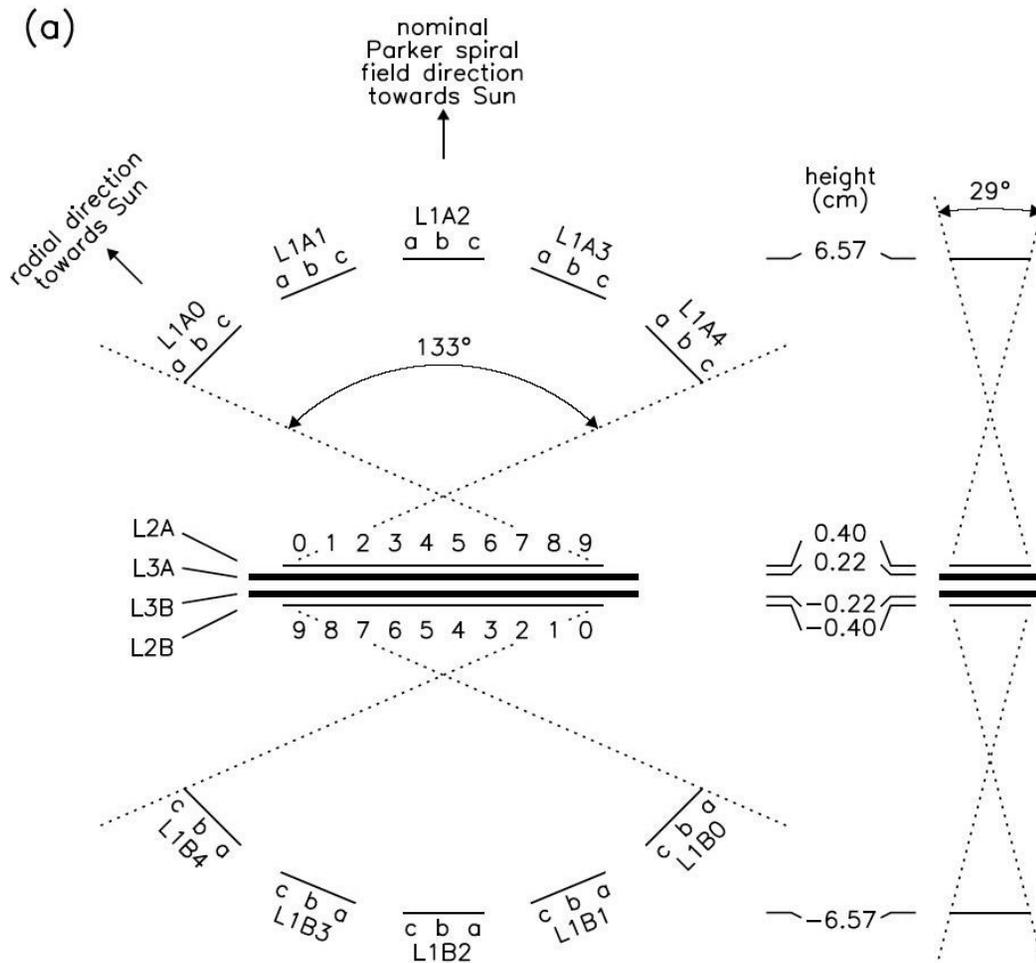


LET Status

The LET and HET Sensors mounted on SEP Central



Schematic of the LET Telescope

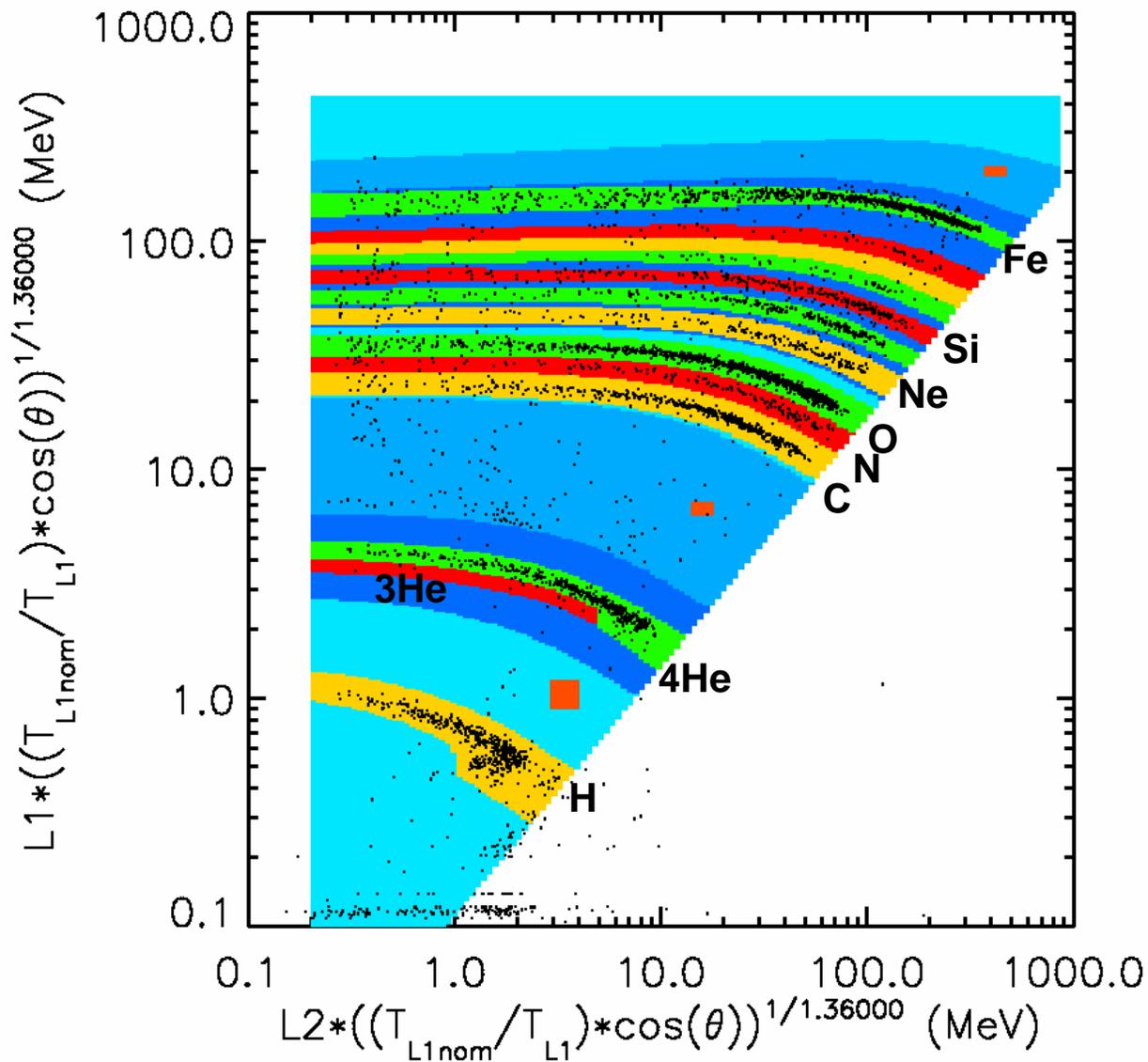


LET Issues

- Processor in both LETs crashed while in inner radiation belt
 - LET on Behind recovered on auto-reboot
 - LET on Ahead rebooted by command to enable memory dump
 - Problem is not understood - probably related to high count rates
 - No problems in large SEP events of December 2006 or in other radiation belt passes

LET software updates and bugs to be addressed in an upcoming EEPROM upload

- **All updates and bug-fixes currently uploaded as RAM patches**
- **New detector response matrices, based on analysis of December SEP events**
- **New L2 detector thickness tables**
- **New detector offsets and gains**
- **Update to the table that defines which sector each L1L2 detector combination belongs to**
- **Fix a software bug that assigns events with small signals to the wrong telemetry buffer**
- **Minor change to ^3He energy range in Beacon Data**



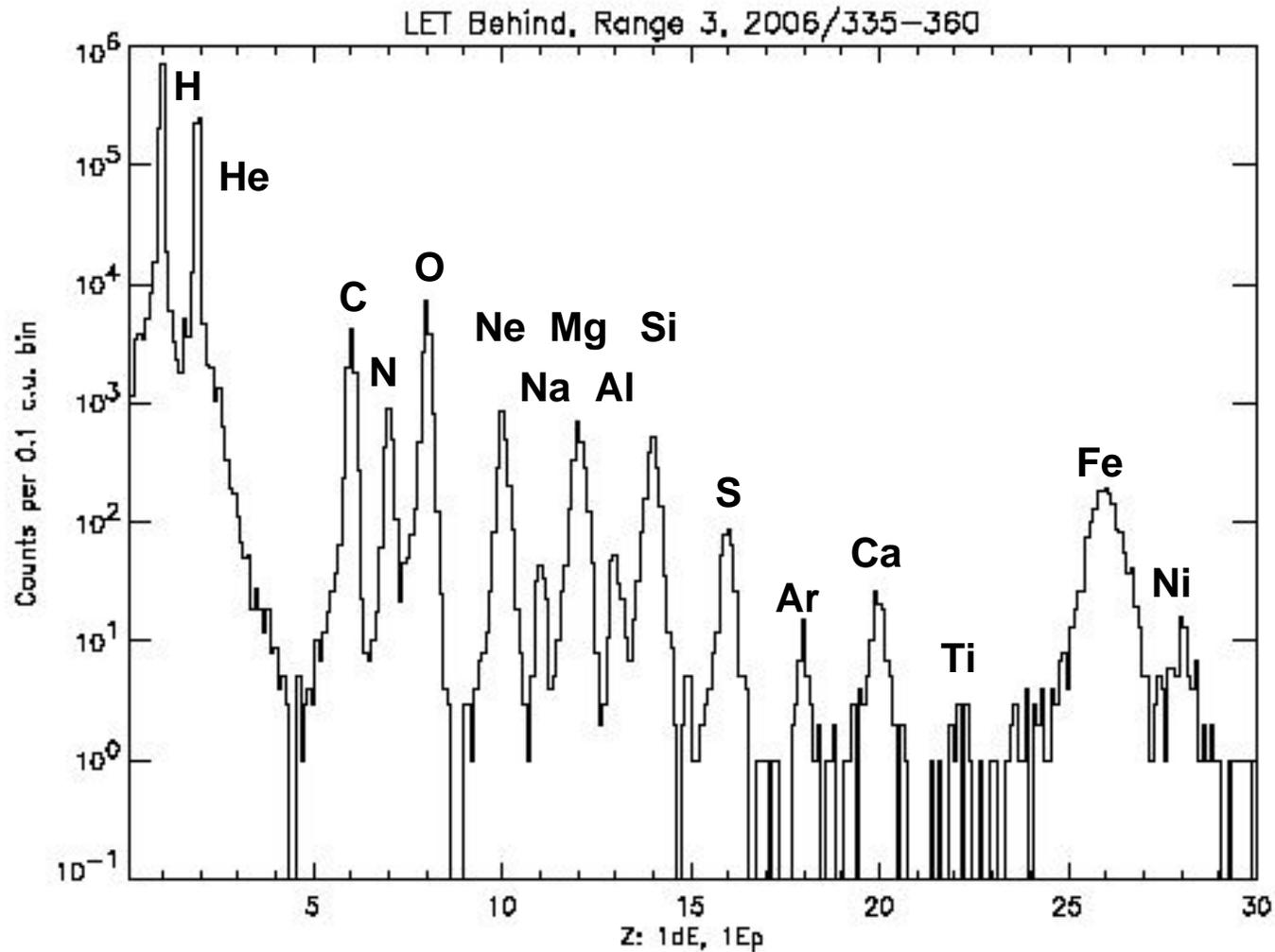
Example of LET L1 vs L2 Response Matrix

Colored bands show regions used for on-board particle identification

Individual events are corrected for L1 detector thickness and angle-of-incidence before plotting.

Energy/nuc is found by summing the L1 and L2 energies and dividing by the mass

Example of a Charge Histogram

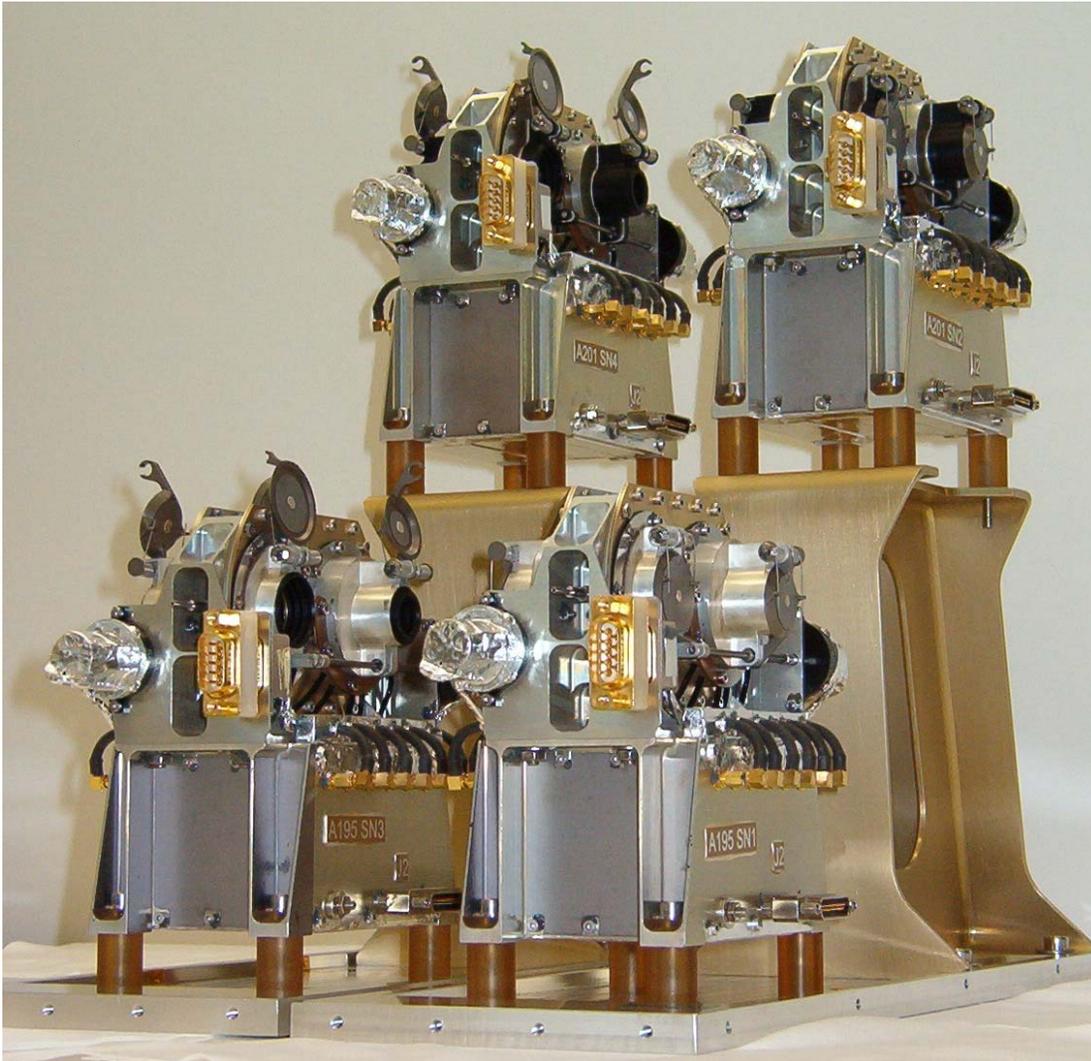


Summary

- On-board particle identification working as designed - minor adjustments to boxes have been made
- Charge resolution exceeds all goals - 17 species identified
- Noise levels improved over pre-launch - allows protons to be measured to higher energy (~12 MeV).
- ^3He resolution not yet optimized - should work to a few % $^3\text{He}/^4\text{He}$ levels
- High-rate performance - works as designed; dynamic thresholds reduce singles rates - crashes not yet understood
- Data products: Heavy ion data available from launch; first few months of on-board H and He data to be reprocessed to take into account lower thresholds and offsets

SEPT Status

SEPT telescopes



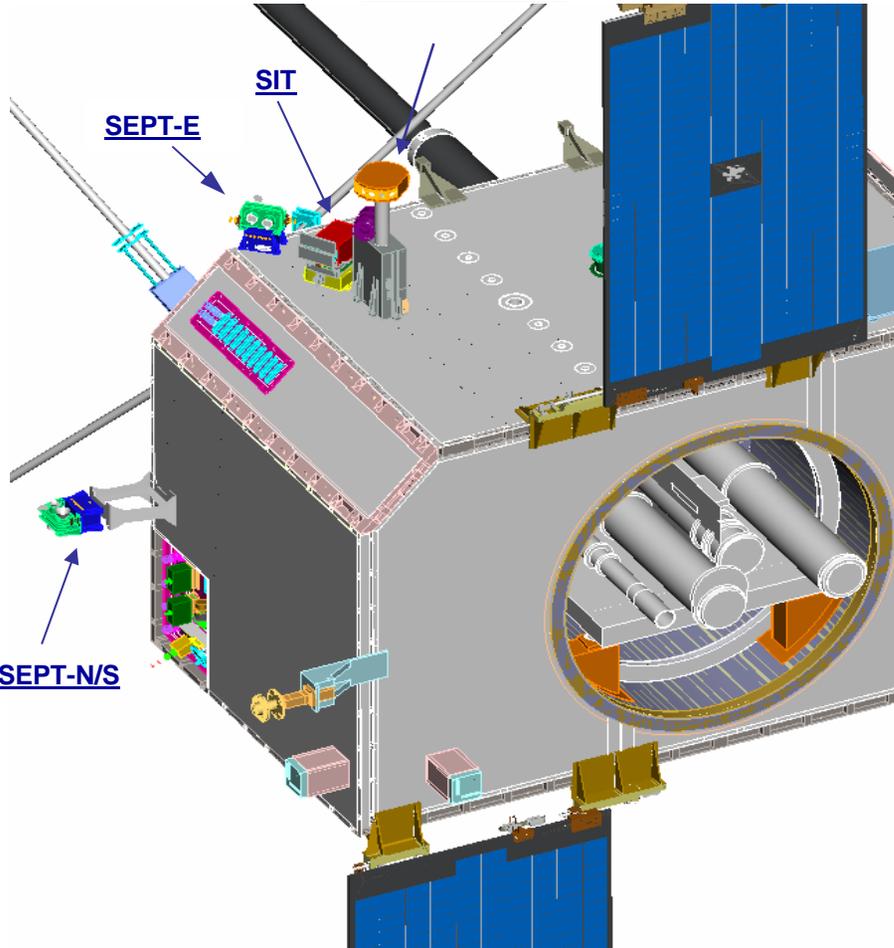
(North, South, Sun, Anti-Sun)
x (Electrons, Protons)
x (Stereo A, B)
= 16 telescopes

SEP sensor location

SEP/ HET & LET

SIT

SEPT-E



**AHEAD
SPACECRAFT**

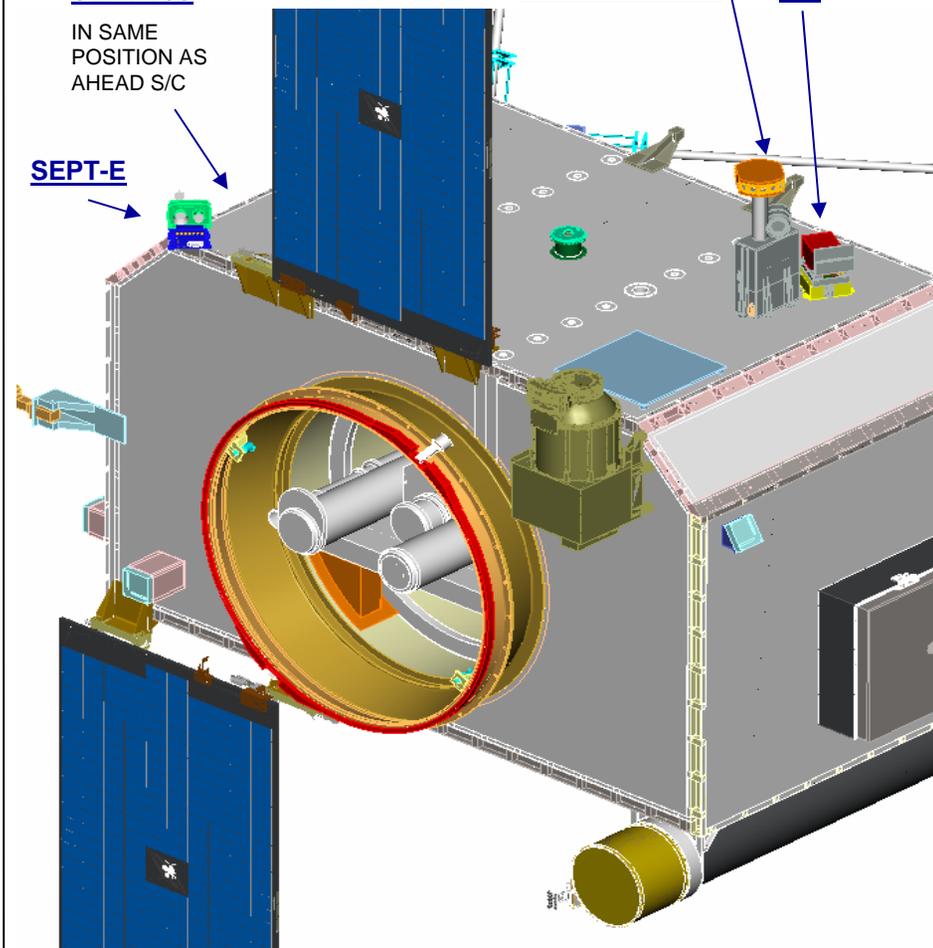
SEPT-N/S

IN SAME
POSITION AS
AHEAD S/C

SEP/ HET & LET

SIT

SEPT-E



**BEHIND
SPACECRAFT**

IMPACT SEPT Cover Release (following turn-ons in mid-November)

- SEPT aboard STEREO-A
 - Cover release: 14-DEC-2006 17:32 – 18:10 UT
 - All 8 covers **fully** open, verified by jump in single detector counting rates and science channels to comparable levels in all 8 detectors, courtesy of cooperative Sun
 - Temperature increase for SEPT-E by ~ 6 °C OK (doors are in sun light), no temperature change for SEPT-NS (doors are in shadow)
 - Leakage current increase of sun-viewing proton detector by ~ 10 nA, OK
- SEPT aboard STEREO-B
 - Cover release: 16-JAN-2007 20:32 – 21:06 UT
 - All 8 covers open, verified by jump in single detector counting rates and science channels, no solar particles around, but at least protons from the bow-shock (upstream events). Waiting for a solar event to verify **full** opening.
 - Temperature and leakage current behaviour OK, similar to STEREO-A

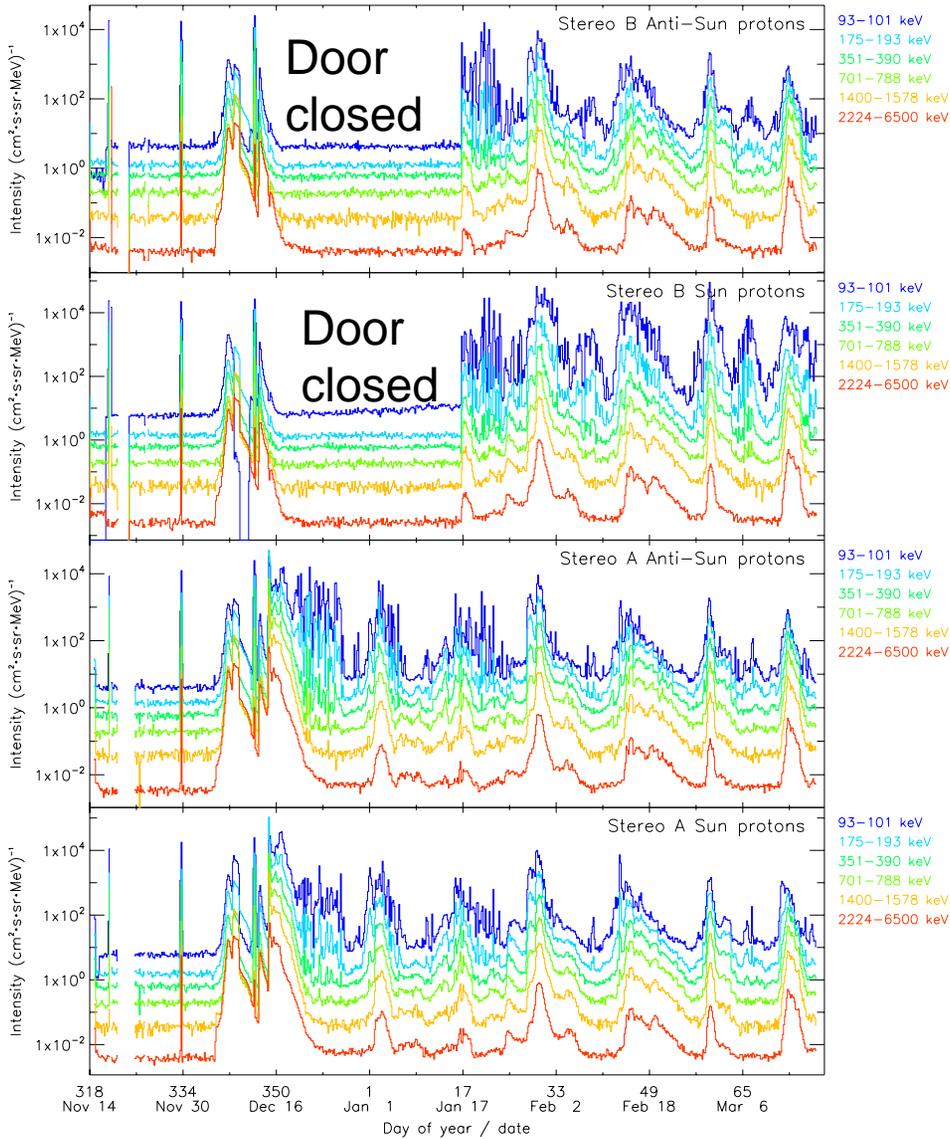
IMPACT SEPT Problems / Failures

- A **minor bug** in the onboard software (for compression of counting rates and packaging of telemetry packets) was detected during a radiation belt pass. The bug affected only certain counting values, which were not reached during ground level tests, but showed up in the high intensity environment.
- There was a **simple fix** by changing three bit masks. The patch was tested on the SEPT and SEP-Central Engineering models, and uploaded to the flight models on 8-JAN-2007 (STEREO-A) and 9-JAN-2007 (STEREO-B).
- Patch was **successful**. Needs to be uploaded each time when SEP-Central software is rebooted, unless new SEP-Central software is uploaded.
- **Conclusion:**

SEPT-E and SEPT-NS on both S/C are ready for nominal mission operations

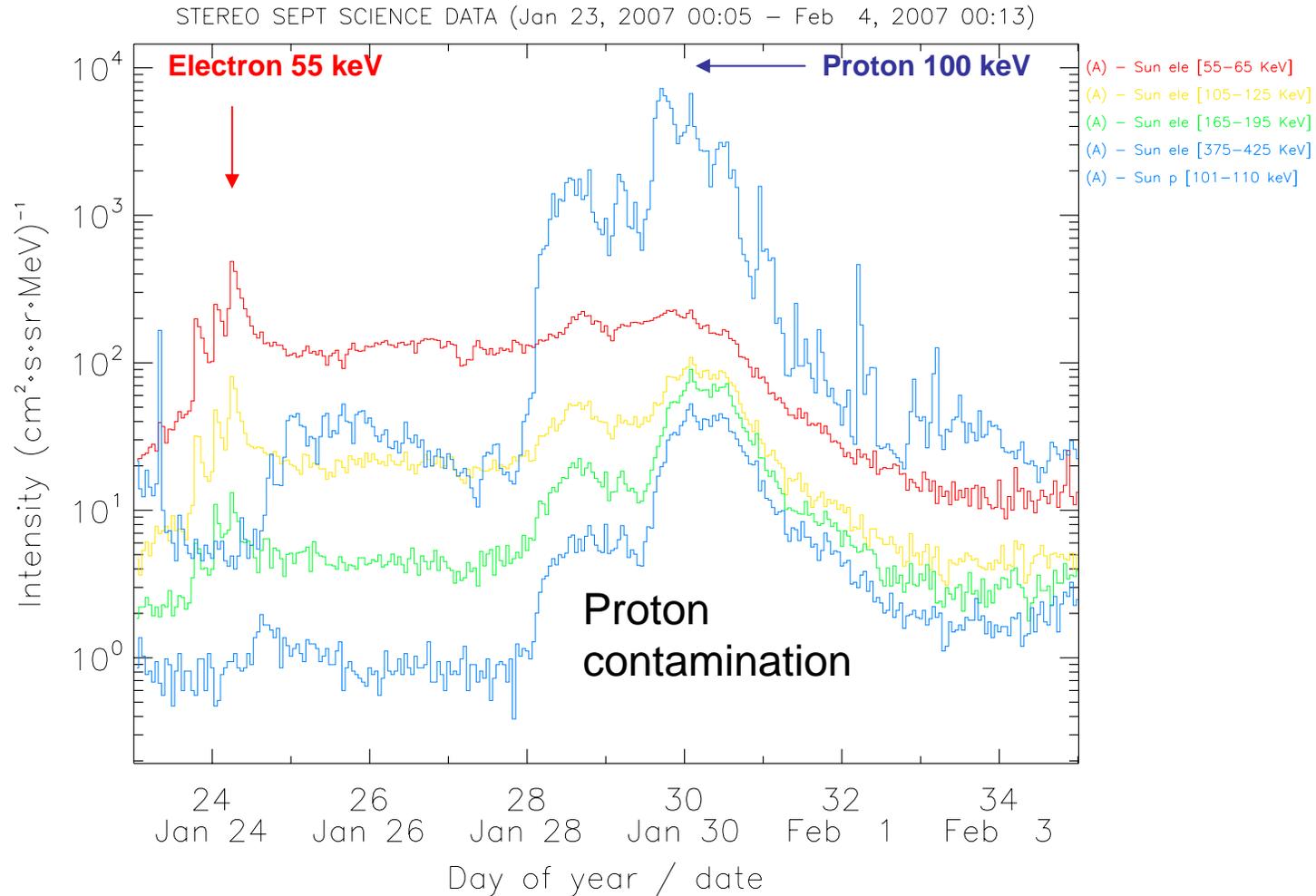
STEREO SEPT SCIENCE DATA (Nov 14, 2006 00:00 – Mar 20, 2007 00:00)

Initial SEPT Observations Overview



Proton channels

Comparison of electron and proton channels



Some electron data need to be corrected for proton contamination before use

SIT Status

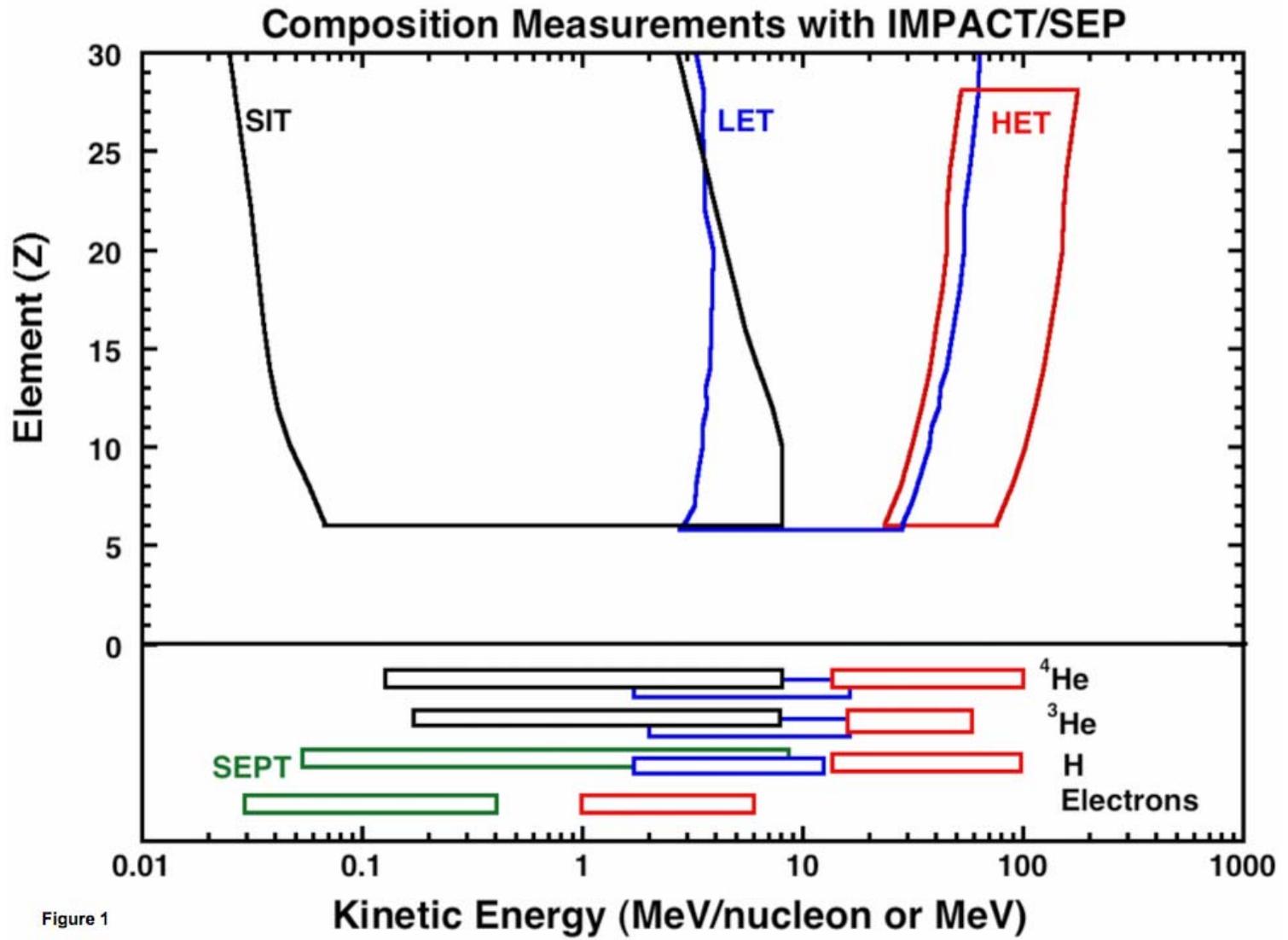
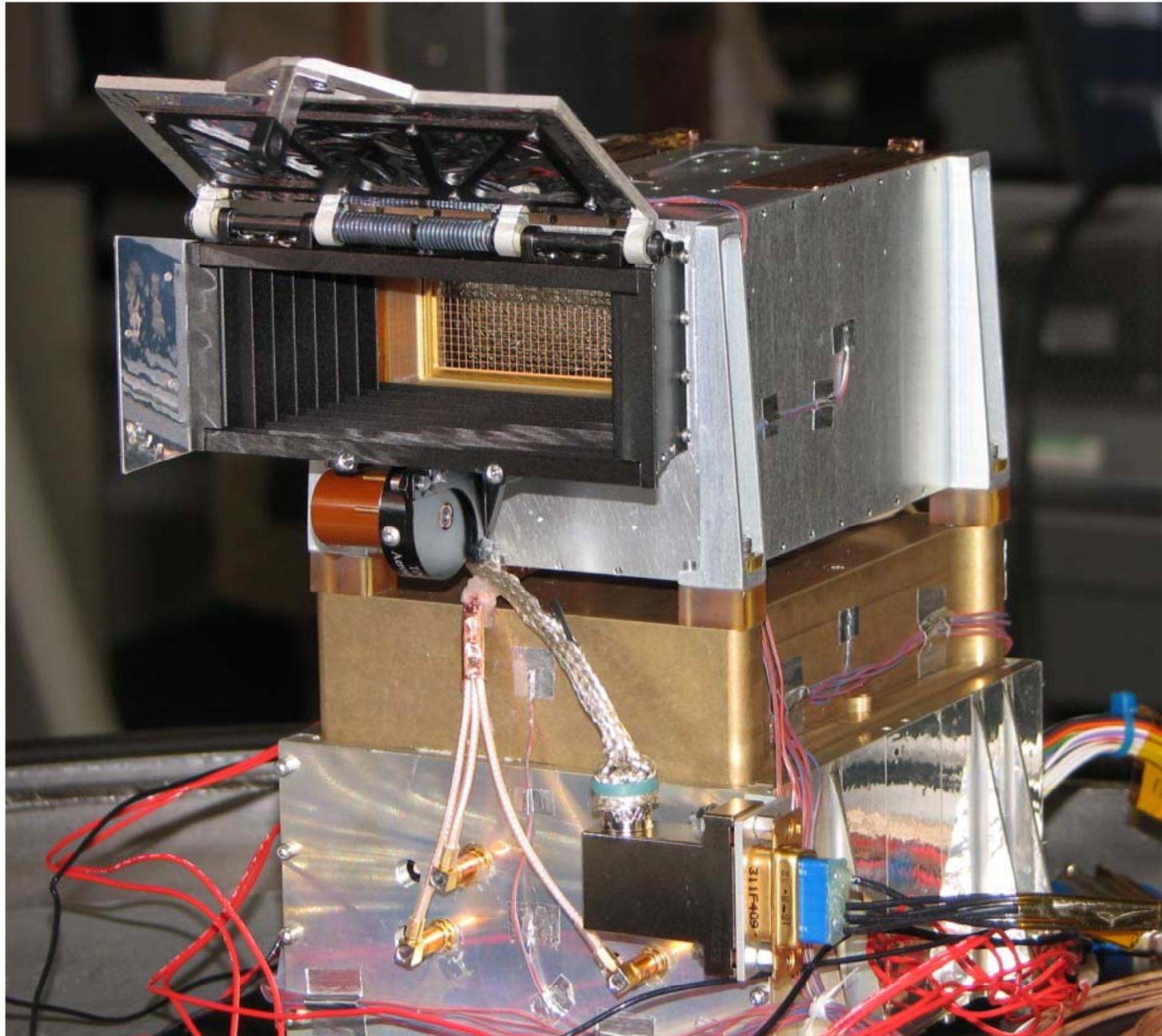
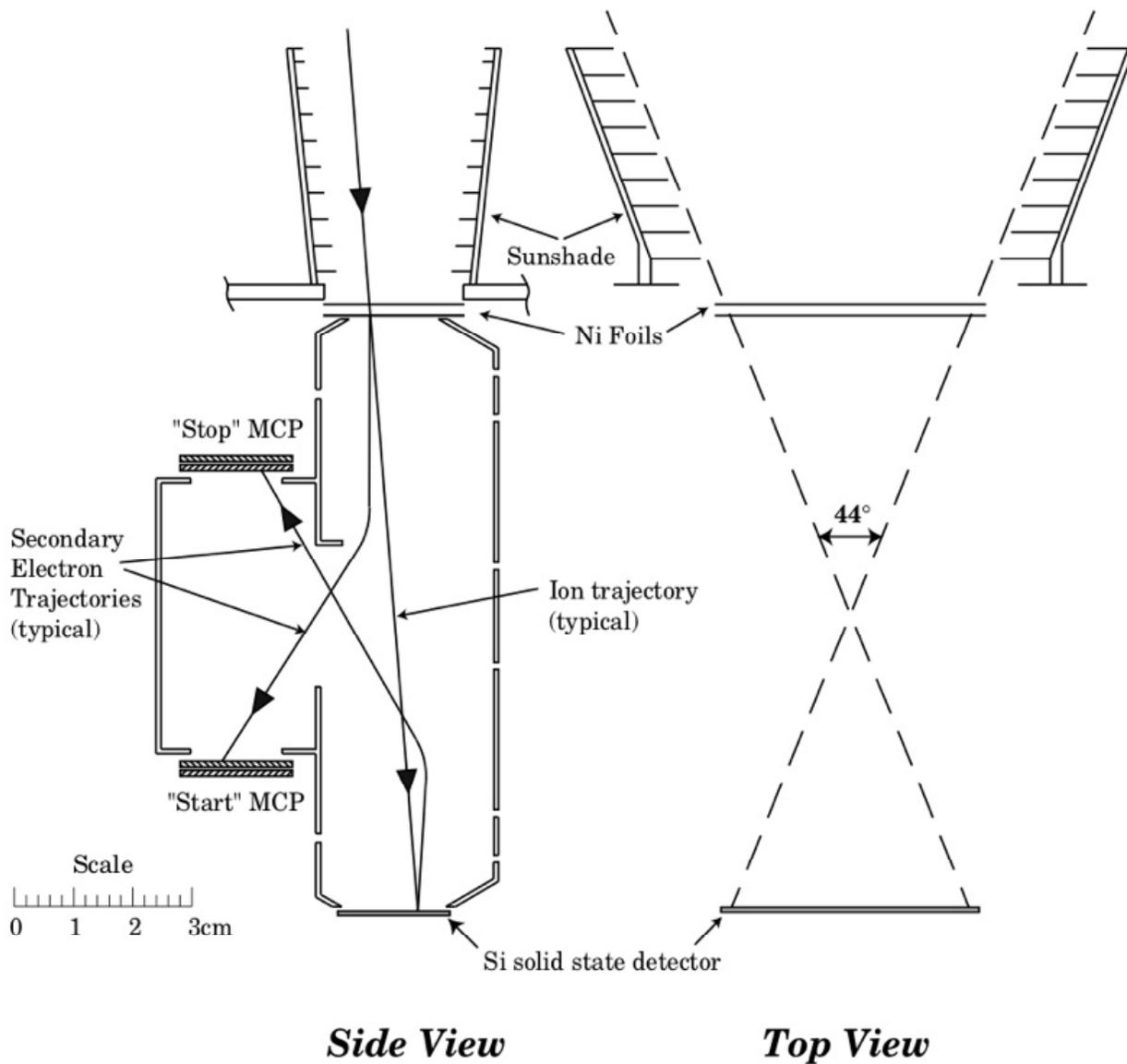
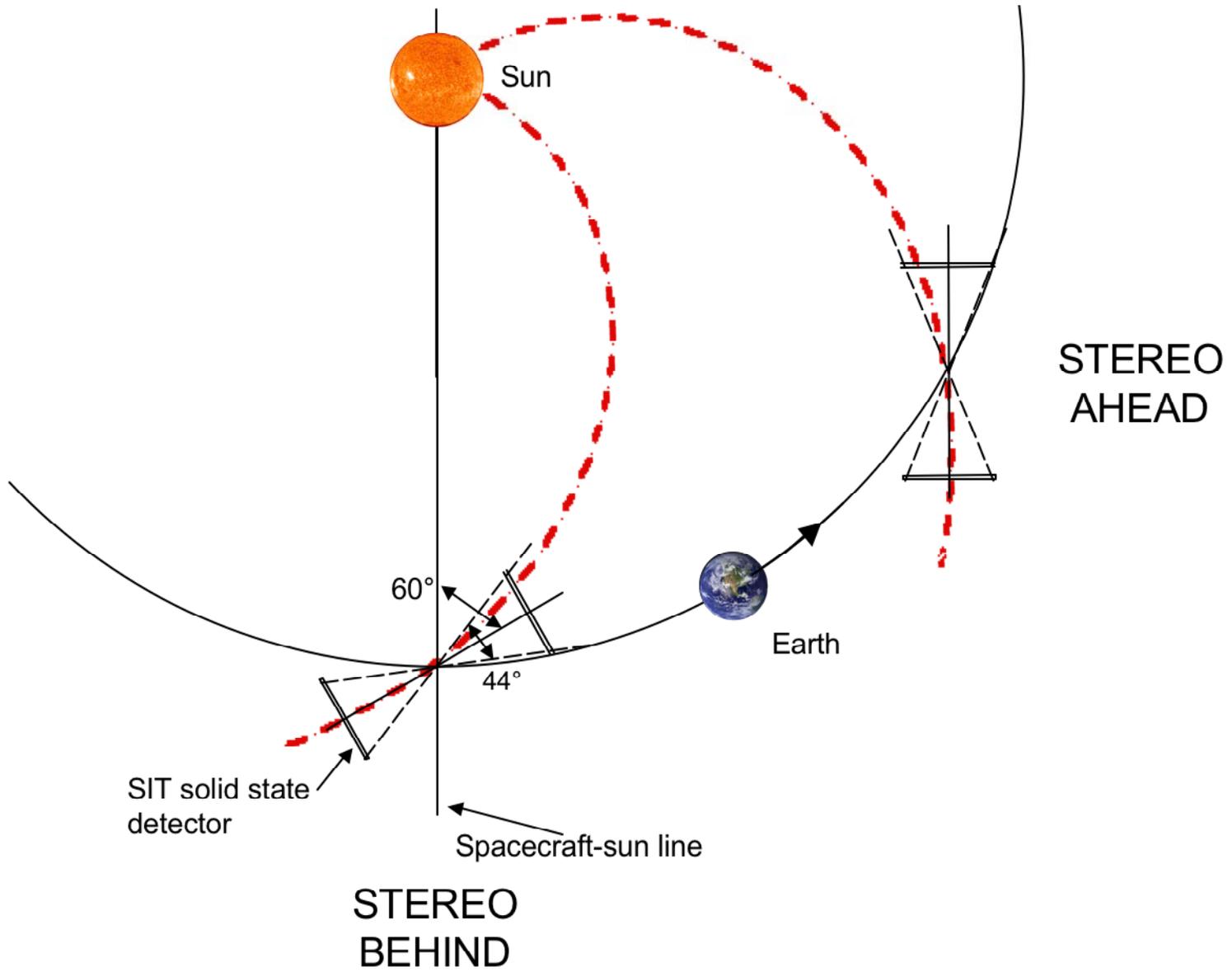


Figure 1



Suprathermal Ion Telescope (SIT)





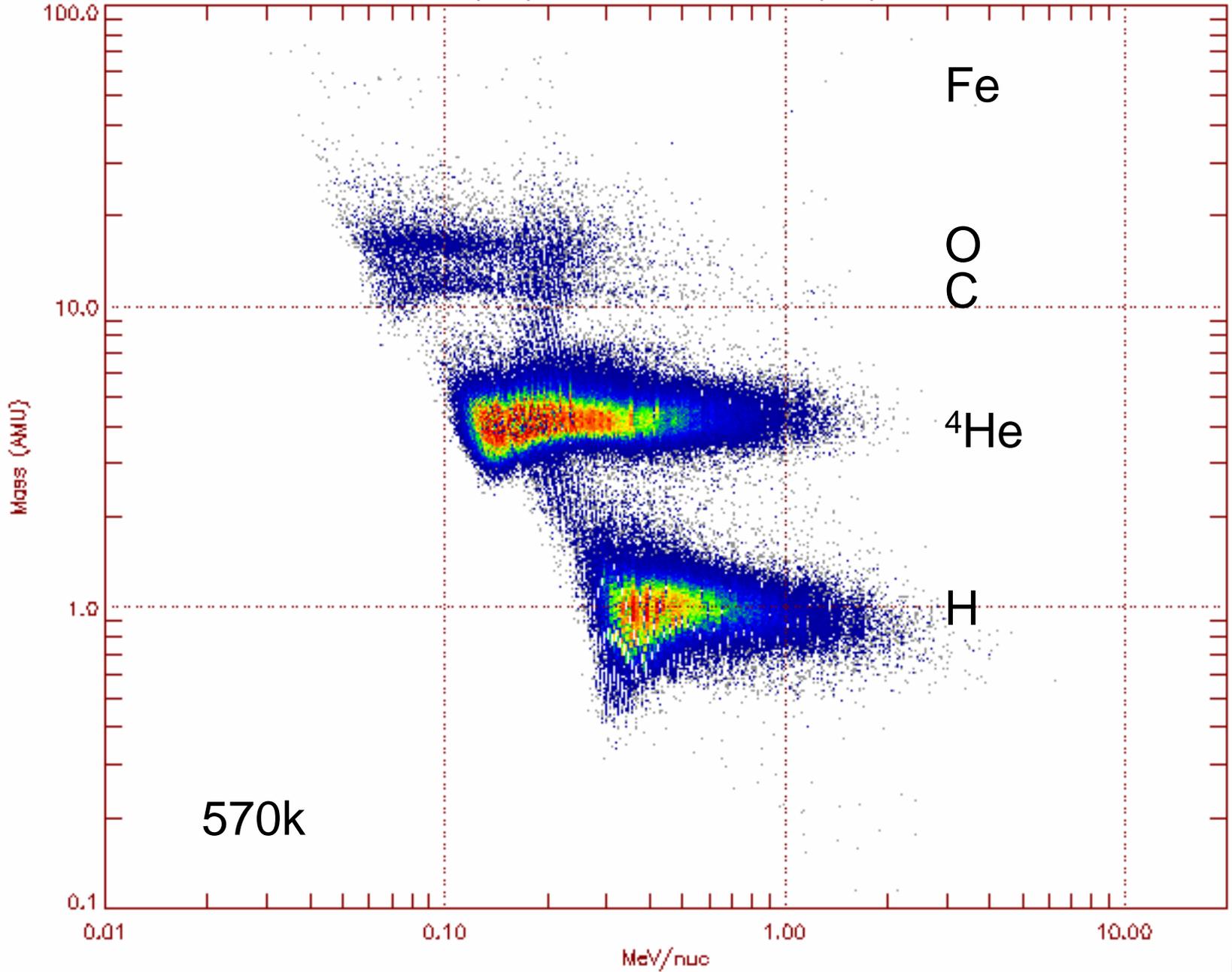
SIT Status

	Ahead	Behind
LV on	Nov. 14, 2006	Nov. 13, 2006
Door opened	Dec. 14, 2006	Jan. 16, 2007
HV ramp-up complete	Dec. 22, 2006	Jan 26, 2007
Probable SEU in lookup table	--	Feb. 8, 2007
Tables reloaded to fix SEU		Feb. 20, 2007
Improved rate box tables loaded	Mar. 14, 2007	Mar. 14, 2007

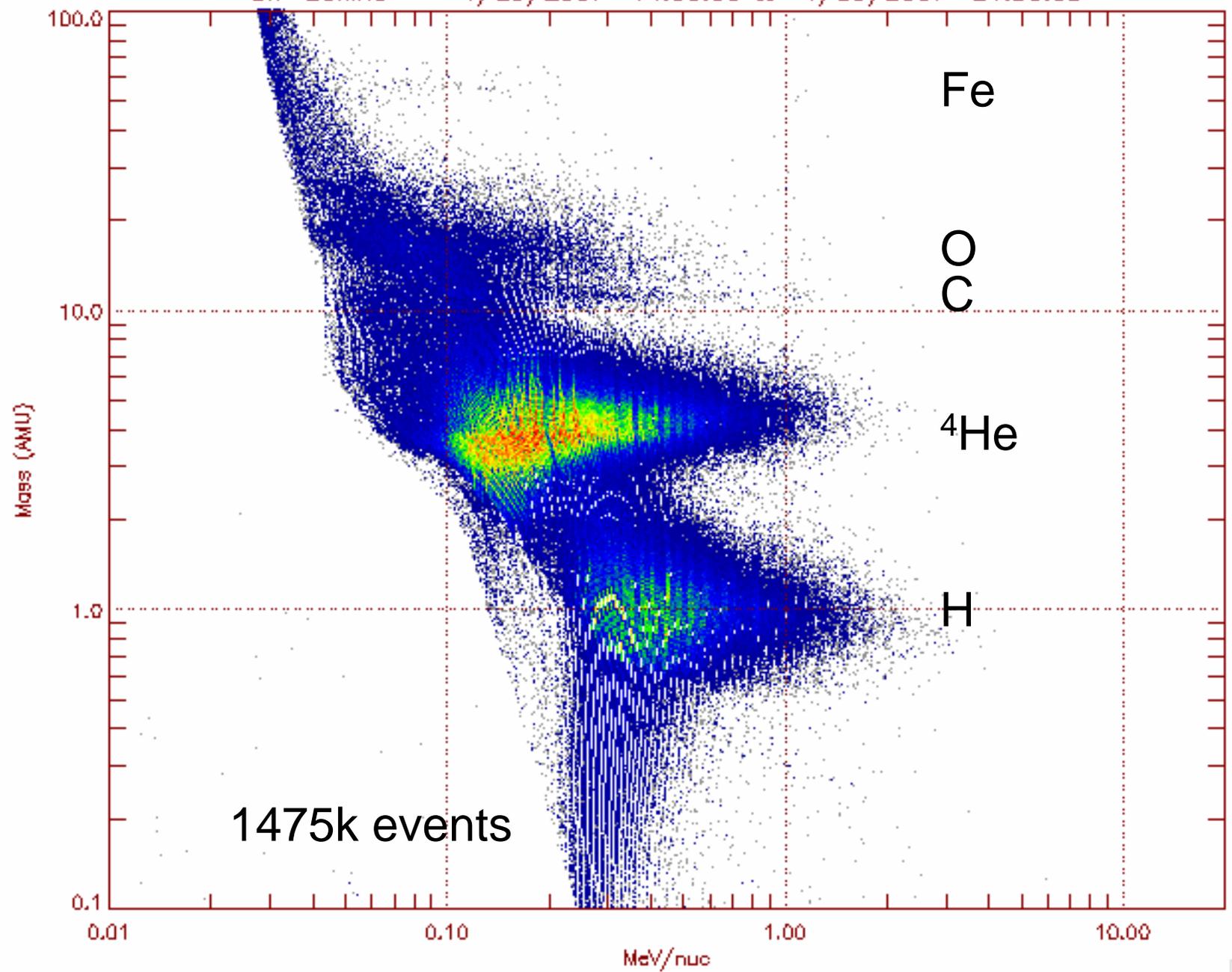
- SIT L1 boxes are in calibration starting March 15, 2007
- for earlier times, SIT L1 fluxes should be considered qualitative only

SIT Performance

- SIT-A: nominal; mass resolution and energy response as expected
- SIT-B: nominal *except* for Energy Signal performance:
 - consistent with noise pickup of a few 10s of keV equivalent
 - source unknown but pre-launch data consistent with problem being present prior to launch
 - some effect on ^3He mass resolution at low energies
 - resolution of other species (e.g., C vs O) is not affected much since SSD energy deposits are larger
 - results in a lower threshold than expected, especially for H, and He



SIT-Behind 1/29/2007 14:30:00 to 1/30/2007 21:30:00



1475k events

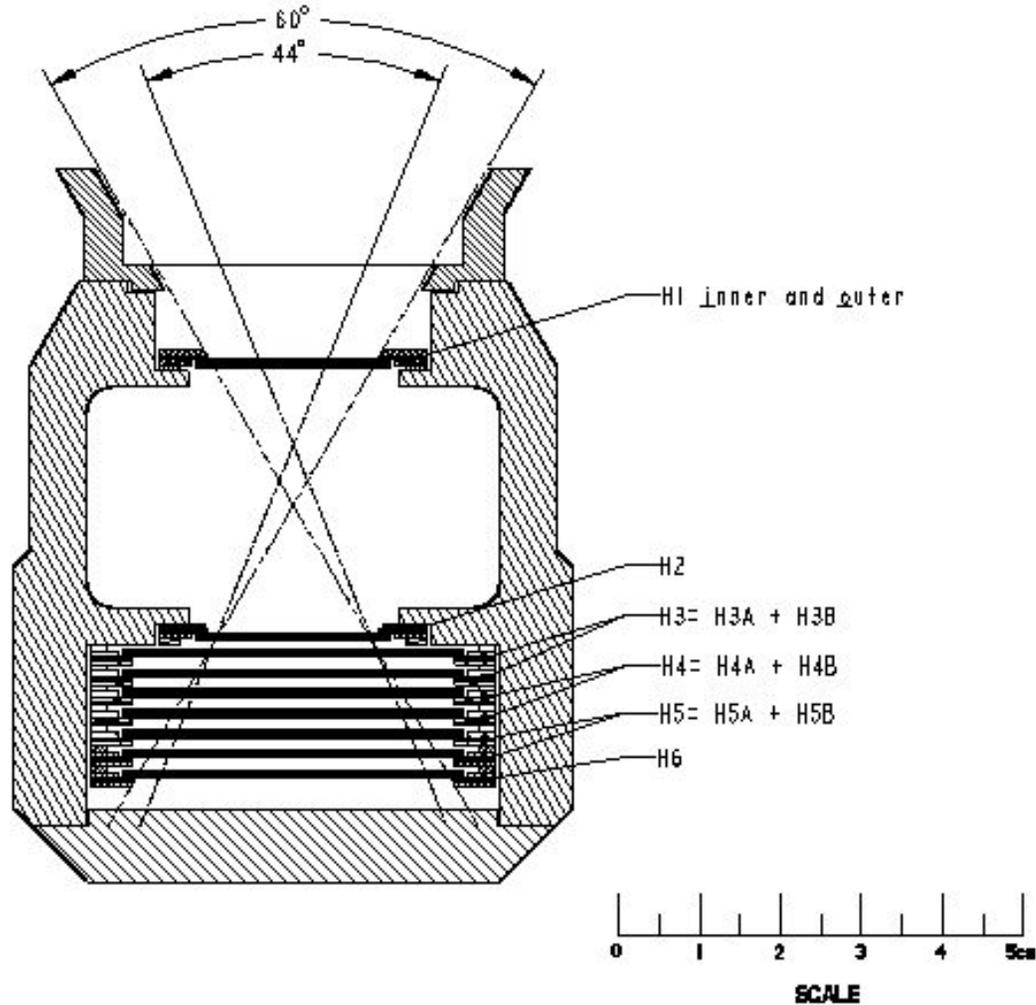


SIT postlaunch performance summary-

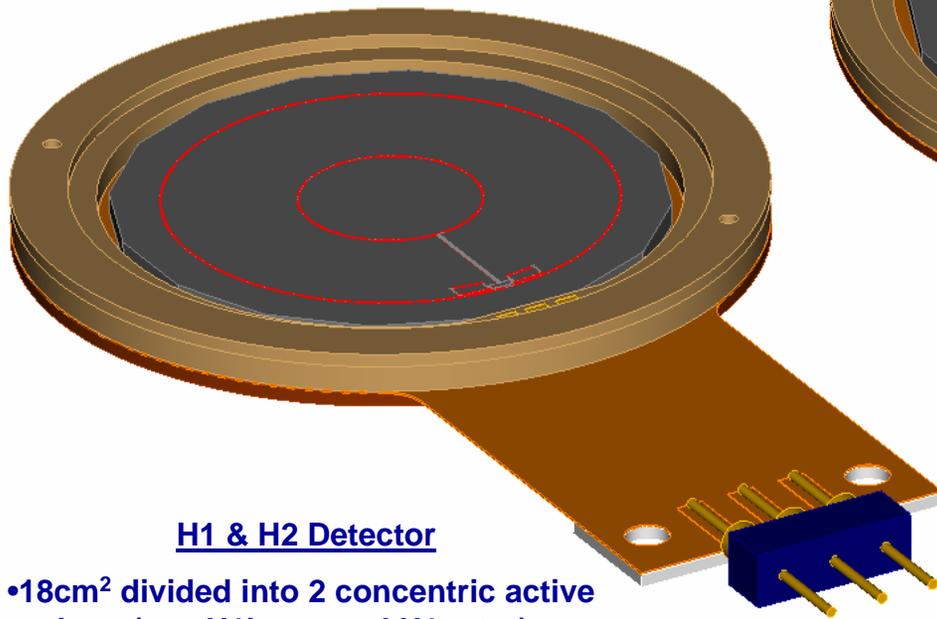
- *mass, energy resolution close to nominal except for some degradation on SIT-B for low energy ^3He*
- *SIT will clearly distinguish compositional signatures of different particle populations, e.g.,*
 - *^3He -rich and Fe-rich material*
 - *CIRs*
 - *CME-associated SEP events and ESP events*

HET Status

HET Telescope Schematic

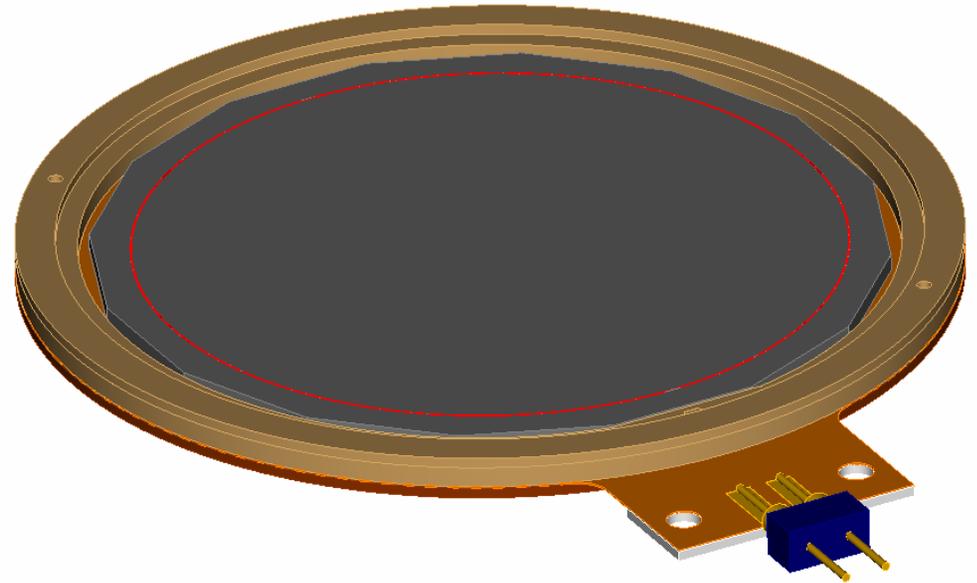


HET Silicon Wafer Detectors



H1 & H2 Detector

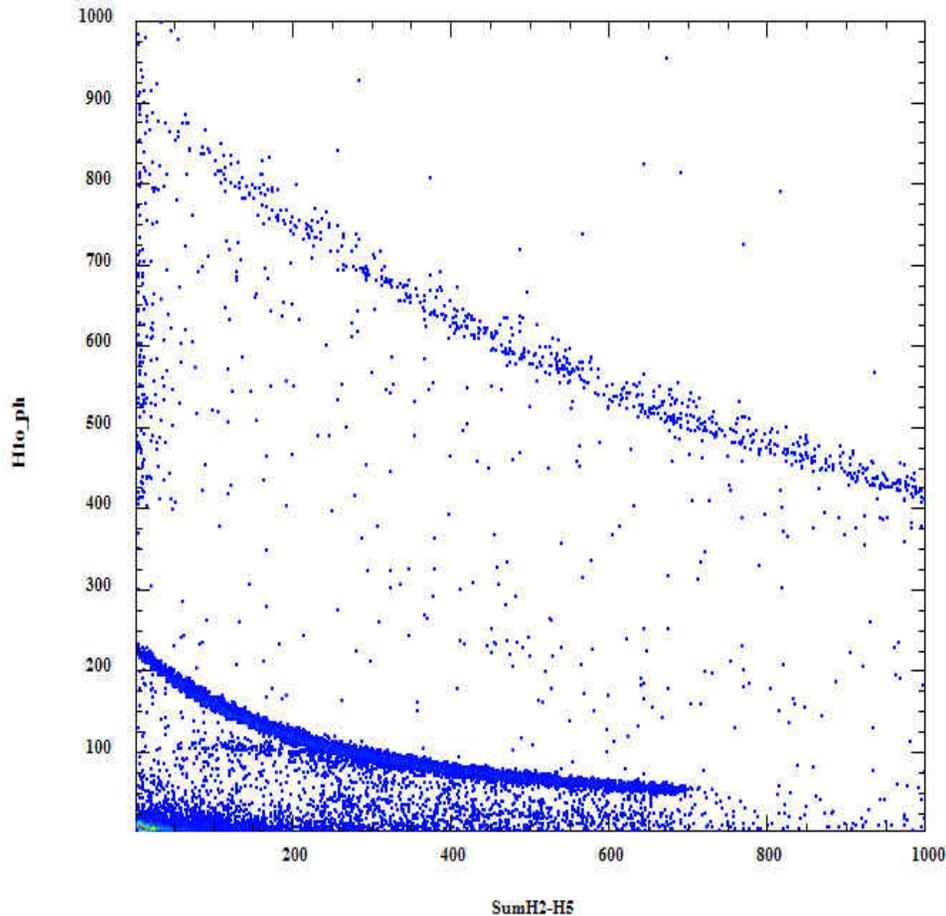
- 18cm² divided into 2 concentric active regions (e.g. H1inner and H1outer)
- 1.0mm thick
- Mounted in Flex-Rigid mount
- 2 detectors per telescope



H3 – H6 Detectors

- 65 cm² single active region
- 1.0mm thick
- Mounted in Flex-Rigid mount
- 7 detectors per telescope

Stereo Ahead Spacecraft



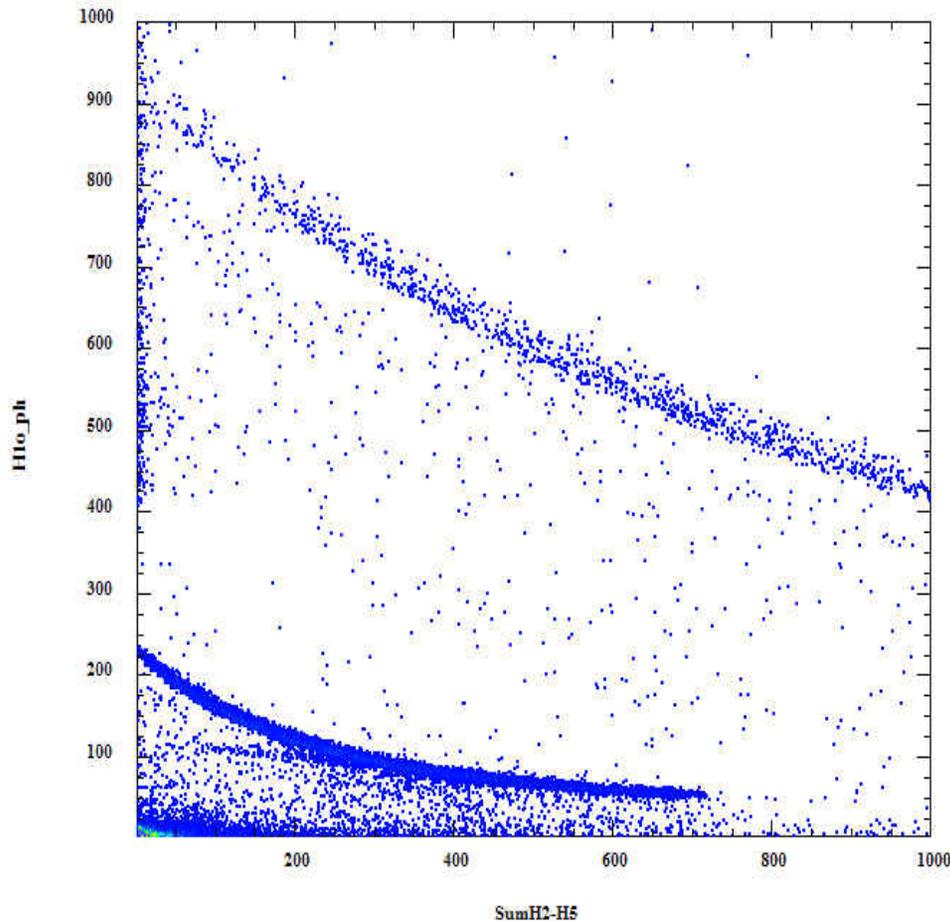
2006 DOY 339 + 340

delta E pulse height
(H1outer) on y-axis versus
residual E pulse height on
x-axis (H2+H3+H4+H5)

upper track is He4, lower
track is protons

electrons are in lower left
of plot

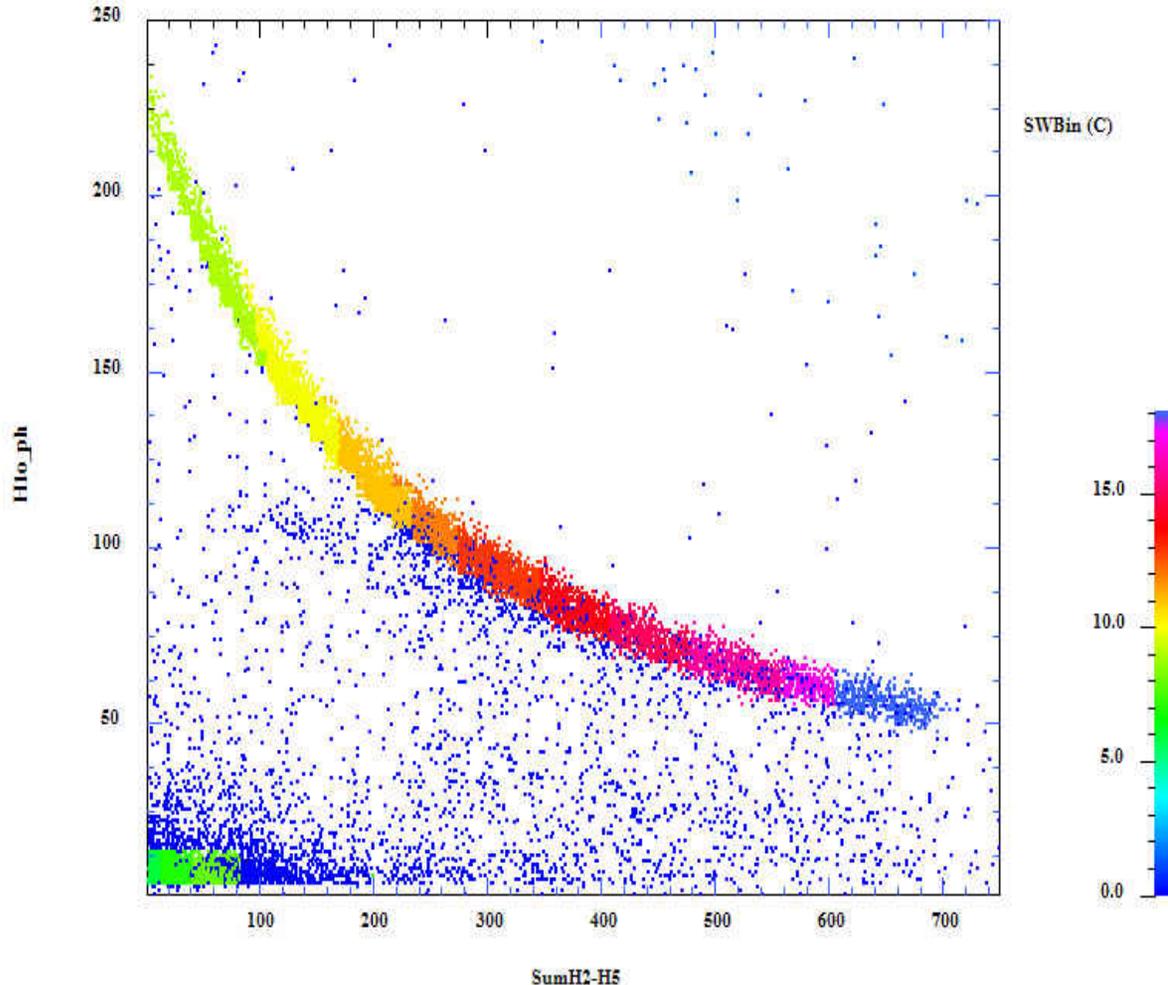
Stereo Behind Spacecraft



2006 DOY 339+340+341
delta E pulse height
(H1outer) on y-axis versus
residual E pulse height on
x-axis (H2+H3+H4+H5)

upper track is He4, lower
track is protons
electrons are in lower left
of plot

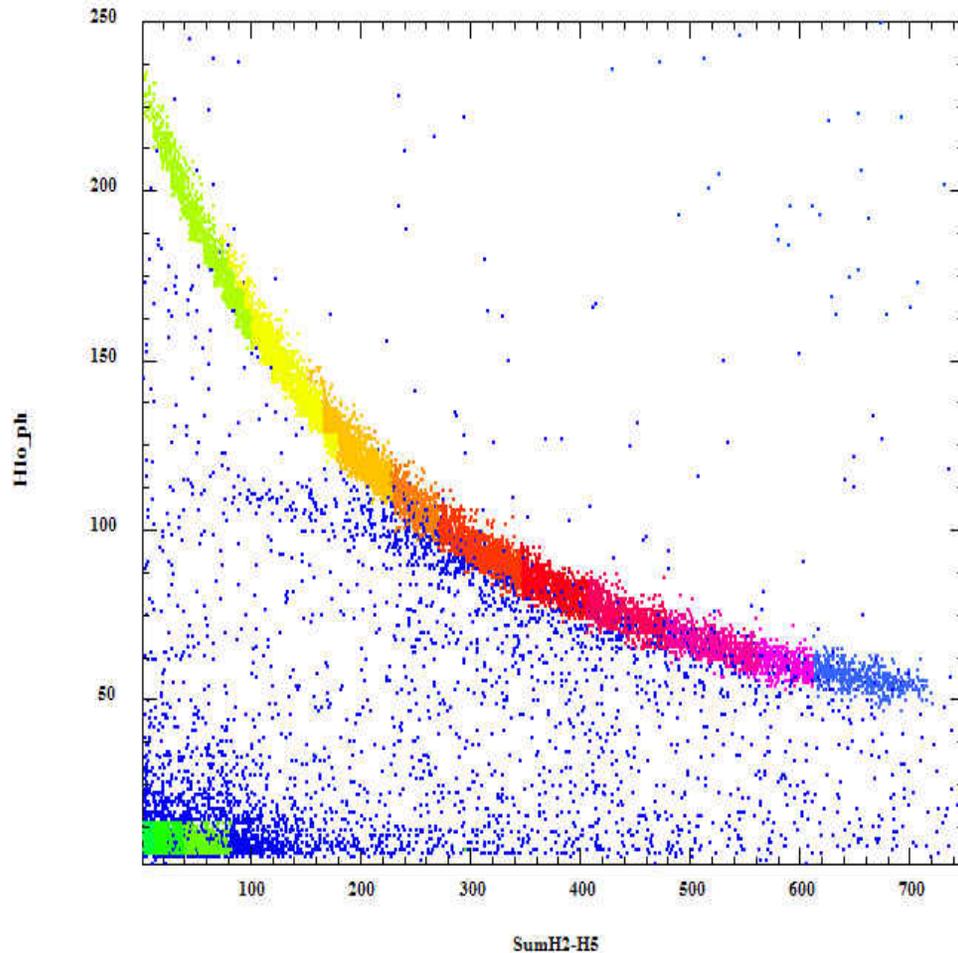
Stereo Ahead Spacecraft



The on-board software counts each particle in a software counter which corresponds to the particle type (e.g. electron, proton, He3, He4) and particle kinetic energy interval.

This plot shows the H10 delta E pulse height versus the residual energy as before but with Z-axis showing the software bin number. This shows that stopping protons are being correctly identified as protons and in proper kinetic energy bins.

Stereo Behind Spacecraft



The on-board software counts each particle in a software counter which corresponds to the particle type (e.g. electron, proton, He3, He4) and particle kinetic energy interval.

This plot shows the H1o delta E pulse height versus the residual energy as before but with Z-axis showing the software bin number. This shows that stopping protons are being correctly identified as protons and in proper kinetic energy bins.

HET Summary: Ahead and Behind Spacecraft (page 1)

- The HET telescopes and their electronics are working well
- The on-board particle identification algorithm for transmitted particle events matches the results of C code on the ground
- The on-board software is working well (a new version was uploaded to each spacecraft very soon after turn-on)
- Averaged intensities versus time plots are available
- Can plot kinetic energy spectra averaged over time intervals from 1-minute to 1-day for both HET and LET

HET Summary: Ahead and Behind Spacecraft (page 2)

- High-rate performance during perigee passes through the Van Allen belts and during the recent solar particle events is being evaluated
- HET has not experienced any software crashes since launch
- The stopping particle response tables are reasonably well defined
- The penetrating response tracks need to be revised (i.e. protons and 4He above 40 MeV/n)
- HET SSR Paper is nearing completion

IMPACT Data Status

Status of IMPACT Data Products

- Beacon
 - Produced at SSC (GSFC)
 - Uses NOAA antenna partners for 24/7 space weather monitoring
(IMPLEMENTED AT HELIOCENTRIC...MAG data now available at SSC, SEP data available but not yet routinely displayed)
- L1
 - Produced at UCB after validation by instrument teams
 - Highest time resolution data in physical units of all measured quantities
 - Available in variety of formats (CDF, ASCII, FITS, ...)
 - Reside natively in ISTP-compliant CDF's
(Data Files on-line for MAG thru 2/28. Will be available shortly for SWEA, STE, LET, SEPT. HET and SIT)
- L2
 - Produced at UCLA
 - Key parameter (1-minute cadence) data in physical units
 - Includes PLASTIC and SWAVES
 - Available in ASCII
(NOT YET AVAILABLE)
- L3
 - Produced at UCLA
 - Higher level products such as event lists
 - ASCII
(NOT YET AVAILABLE)

Current Level 1 Data Holdings

Instrument	1 st Date (A)	1 st Date (B)	Last Date
MAG	Nov 2	Nov 2	Feb 28
SWEA	Oct 28	Oct 28	Present
STE	Oct 28	Oct 28	Present
LET	Nov 14	Nov 13	Present
SEPT	Dec 12	Dec 12	Present
SIT	Data available within next week		
HET	Data available within two weeks		

Overall Data Portal Info

- Access through:
<http://stereo.ssl.berkeley.edu/l1invalid>
- Data Validation Tool, Level 0, validated Level 1 data, and TPLOT (SPLAT parent) data analysis tool (IDL) available at:
<http://stereo.ssl.berkeley.edu>
- Preliminary Summary plots (1 day, 10 day, Carrington Rotation) available at:
<http://stereo.ssl.berkeley.edu/sumplots>

Outstanding Level 1 Data Issues

- MAG V02 files – corrected for offsets
- SWEA Distribution V02 files – need to be converted from counts to flux, compute 3D moments from these files
- STE Spectra V01 files – counts to flux

More Level 1 Data Issues

- LET V02 files – software in very good shape, look for V02 files next week
- SEPT V02 files – software in good shape as well, V02 files will appear next week
- HET, SIT – have processing software, will be producing “V01” files in the next 1 to 2 weeks
- Ascii translations are now available (look in “ahead_ascii” and “behind_ascii” dirs)

First IMPACT Level 1 data set to
go public:

Magnetometer

(accessible as ascii data at three time
resolutions at UCLA* or as cdf files at UCB)

**spacecraft coords+geocentric coords for phasing orbit,
RTN coords for heliocentric orbit*

- visitor
- missions
- research
- library
- personnel
- education
- resources
- news
- help

DATA



- ground-station
- imp8
- isee 1,2
- isee3
- polar mfe
- polar orbit
- solar wind
- stereo
- offline data
- data links

► Data ▼ STEREO

STEREO Magnetometer Interactive Data Server Heliocentric Phase

Plot

The magnetic field plots can be drawn in RTN and Spacecraft (S/C) coordinates at low (1 min) resolution, 1s resolution and 125ms resolution. Both 1m and 1s data are created with overlapped averages of high resolution data.

- PLOT:**
 - [Low \(1 minute\)](#)
 - [Med \(1s\)](#)
 - [Full \(8 s/s\)](#)
- ASCII:**
 - [Low \(1 minute\)](#)
 - [Med. Res \(1s\)](#)
 - [Full \(8 s/s\)](#)
- CORRELATIVE:**
 - [Wind](#)
 - [ACE](#)

ASCII Listing

The magnetic field data can be listed in RTN and S/C coordinates at all resolutions.
[Under construction]

Time Format

All data are displayed in UTC.

Data Availability

January 1, 2007 to January 31, 2007

- visitor
- missions
- research
- library
- personnel
- education
- resources
- news
- help



- ground-station
- imp8
- isee 1,2
- isee3
- polar mfe
- polar orbit
- solar wind
- offline data
- data links

STEREO Magnetometer Data Heliocentric Phase

► Data ▼ STEREO

You may plot or retrieve ASCII data from either STEREO/A or STEREO/B.

Data is available for the following intervals:
STEREO/A: 2007, January 1 - 2007, January 30.
STEREO/B: 2007, January 1 - 2007, January 30.

- PLOT:**
- [Low \(1 minute\)](#)
 - [Med. Res \(1s\)](#)
 - [Full \(8 s/s\)](#)
- ASCII:**
- [Low \(1 minute\)](#)
 - [Med. Res \(1s\)](#)
 - [Full \(8 s/s\)](#)

Please select plot or ASCII data.

- Plot ASCII

Please select Auto Scale Fixed scale nT/tick

Please select coordinate system for vector quantities.

- RTN Spacecraft

Please select coordinate system for vector quantities.

- RTN
- Spacecraft

Please select spacecraft to be examined.

- STEREO A**
- STEREO B**
- Both

Please select parameters to be examined.

- Time, Bx, By, Bz, |B|
- Time, RBx, RBy, RBz, |B|, Cone Angle, Clock Angle

Please enter delta t for superposition in minutes. STEREO A plot remains fixed. STEREO B plot moves to later times by amount specified.

Please enter time in the fields below.

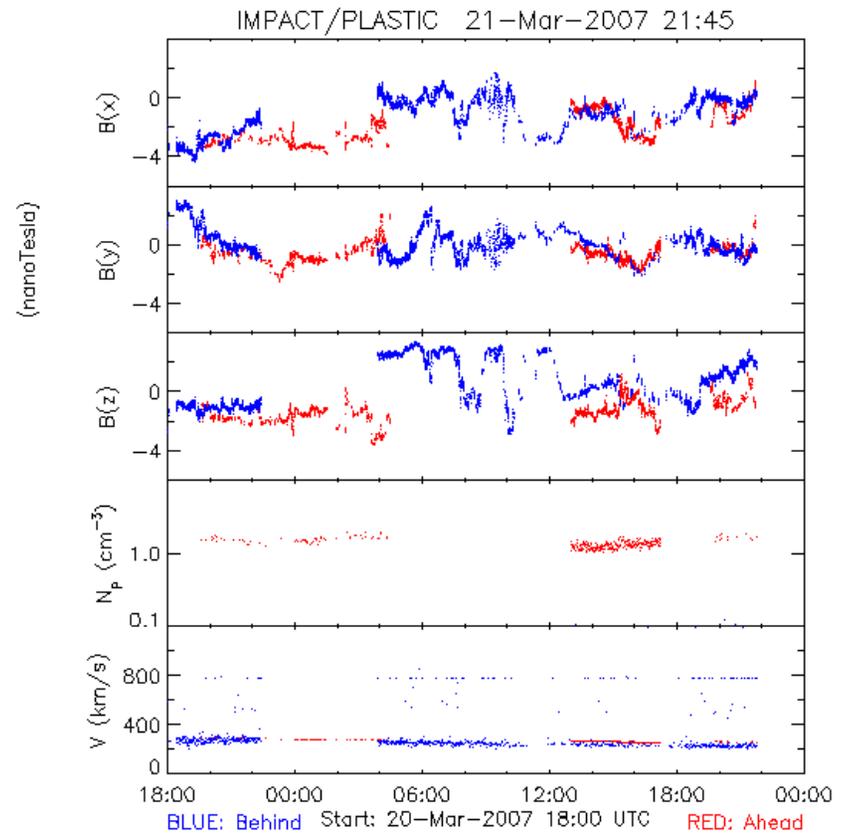
Start time:						Stop time:					
Year	Mon	Day	Hr	Min	Sec	Year	Mon	Day	Hr	Min	Sec
2006	jan	1	0	0	0	2006	jan	1	0	0	0
2007	feb	2	1	1	1	2007	feb	2	1	1	1
2008	mar	3	2	2	2	2008	mar	3	2	2	2
2009	apr	4	3	3	3	2009	apr	4	3	3	3
2010	may	5	4	4	4	2010	may	5	4	4	4

Level 2 Data Serving@UCLA

- Plan to install data servers for all IMPACT level 2 data
- Have SEP test files from Caltech and will start on these soon but magnetometer Level 1 data processing has been given priority
- Encourage other groups to send us test files now (ctrussel@igpp.ucla.edu)

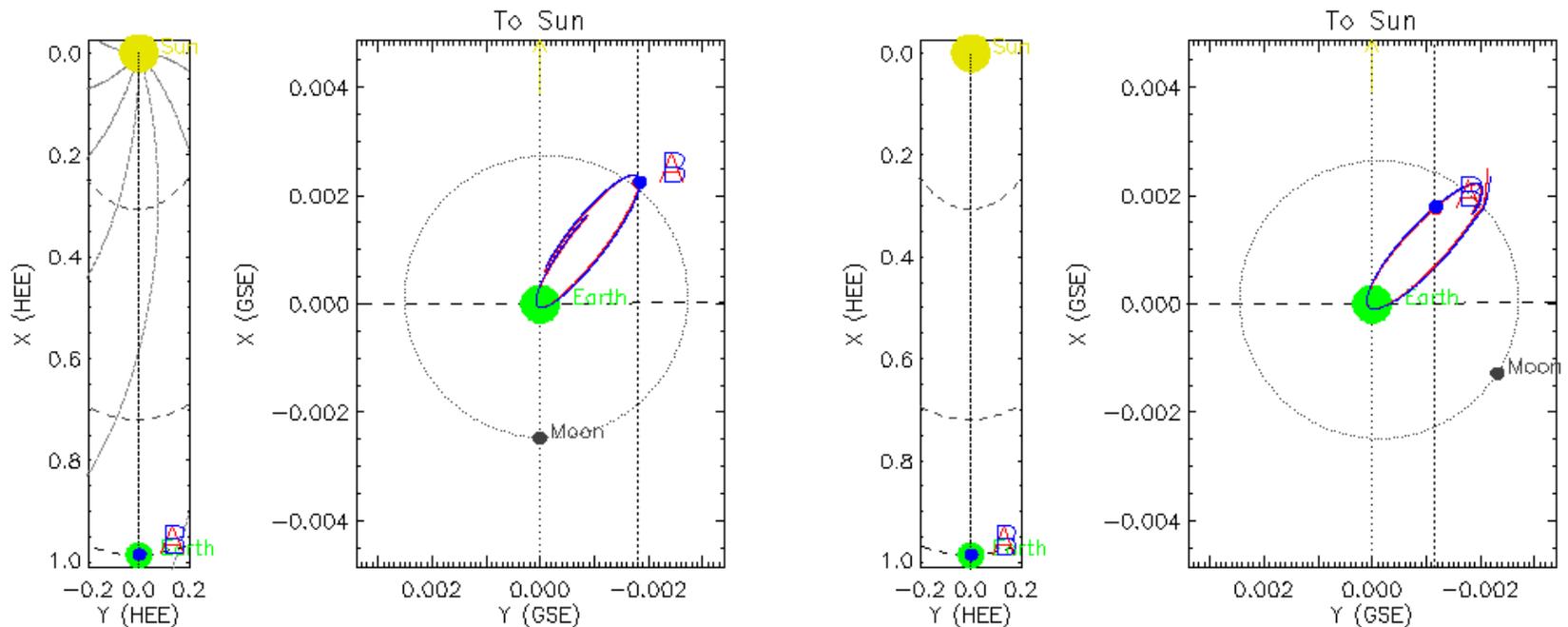
MAG Beacon data now at SSC

- B field data needs to be transformed to RTN coordinates (SSC?)
- Corrected for offsets
- One minute cadence
- Need to provide ascii format beacon data files in addition to the current cdf files (IMPACT+SSC)
- Need to add selected SEP beacon data plots (SSC+IMPACT)



Early Science Samples:
the December 5-15 solar and
interplanetary events observed
with IMPACT

STEREO's "only" in-situ CME-related events thus far occurred early-mid December 2006, while the spacecraft were still in a late phasing orbit near apogee

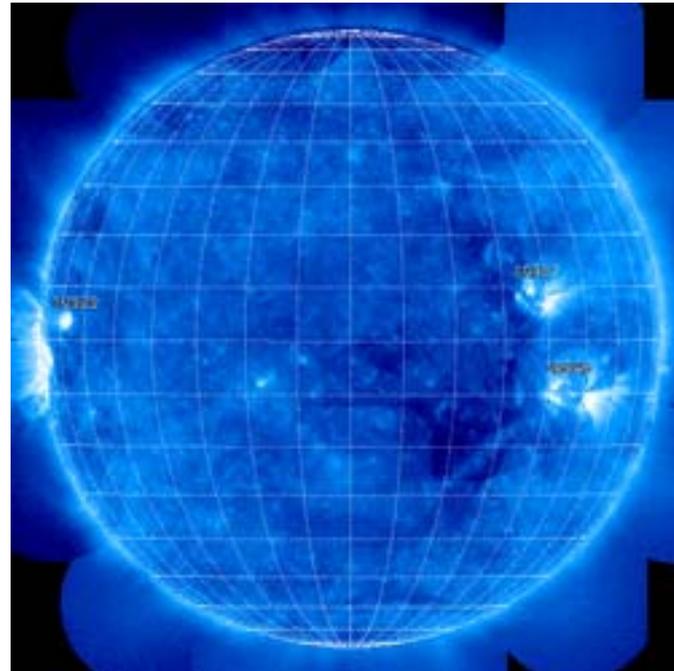
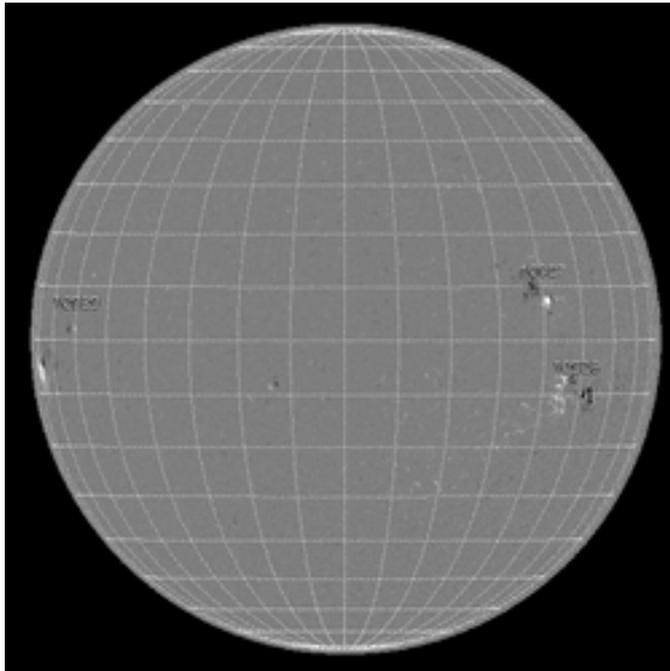


December 5, 2006

December 15, 2006

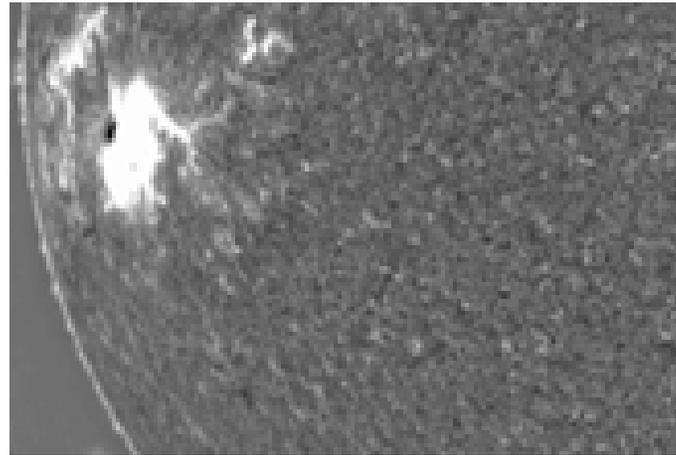
Plots from SSC website 'where is stereo' tool

The larger of two CMEs involving the same active region occurred December 5 when it was on the eastern limb. Unfortunately no LASCO or EIT images were obtained and SECCHI was not yet commissioned



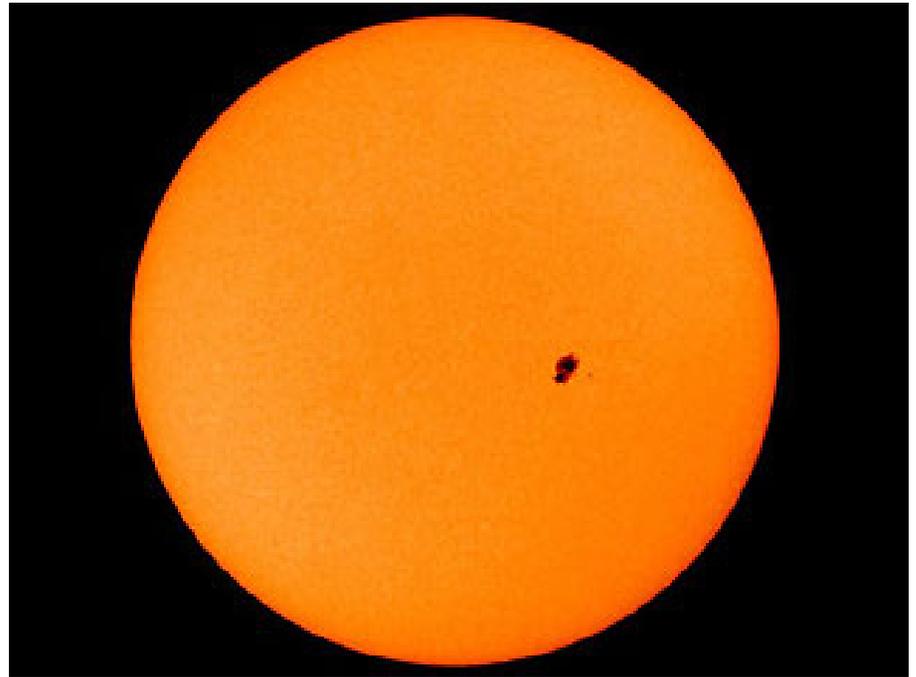
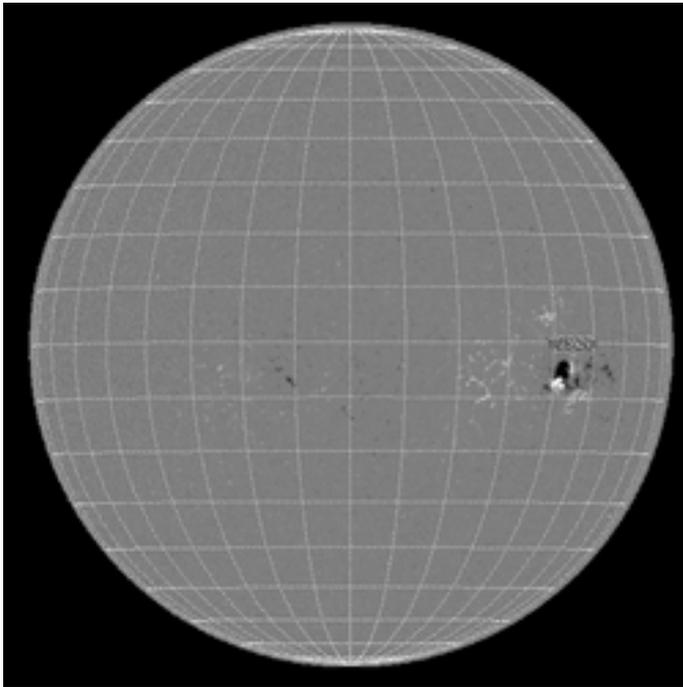
MDI magnetogram (left) and TRACE 171 Angstrom image (right)

The December 5 event included an X9 flare and a sunquake observable from the ground



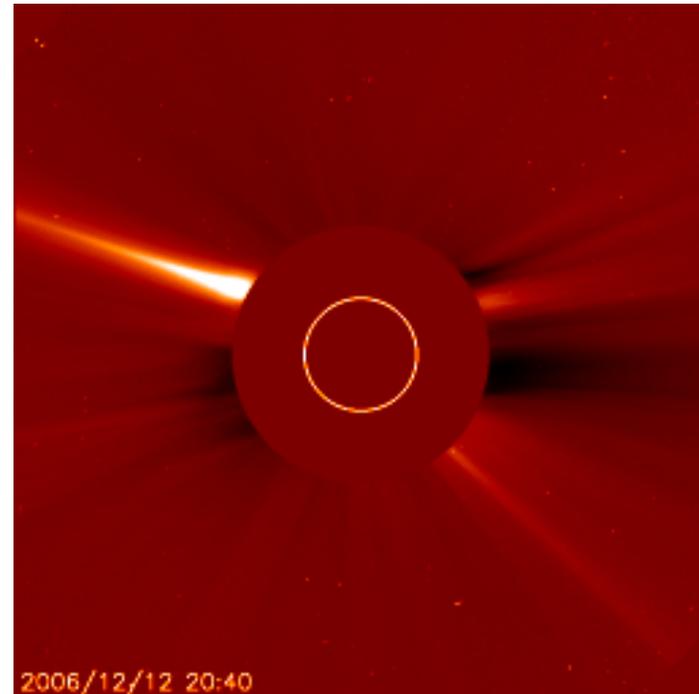
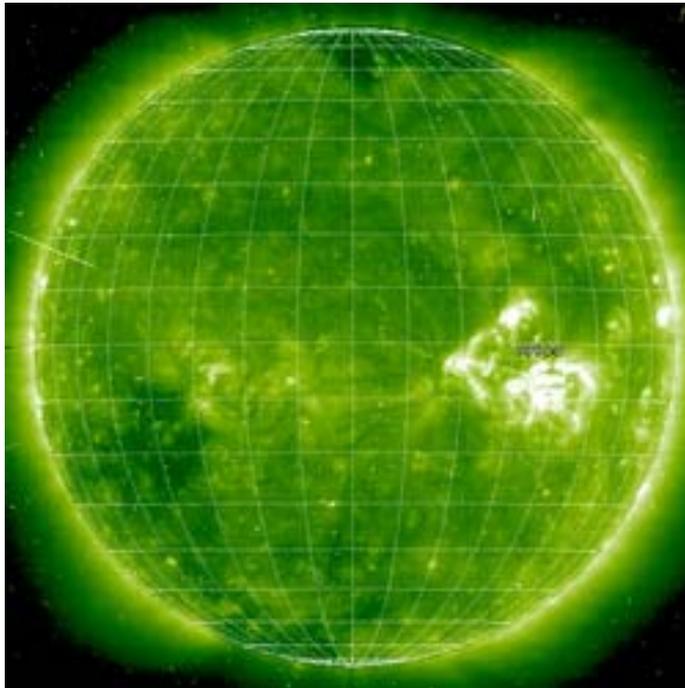
Flare image from ?, H-alpha sunquake movie from NSO.

The active region evolved as it rotated to a mid-western longitude on the disk, flaring several times along the way



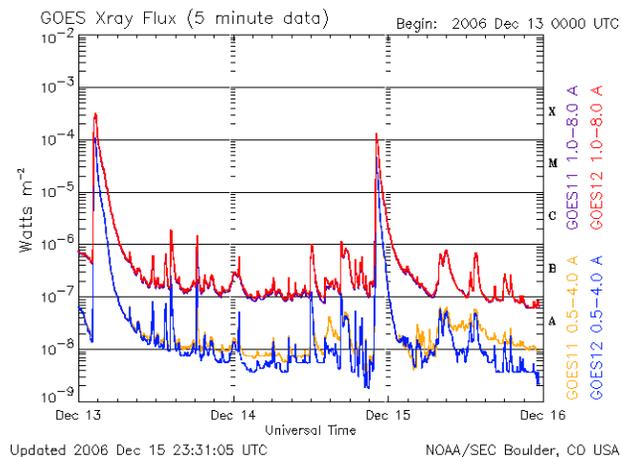
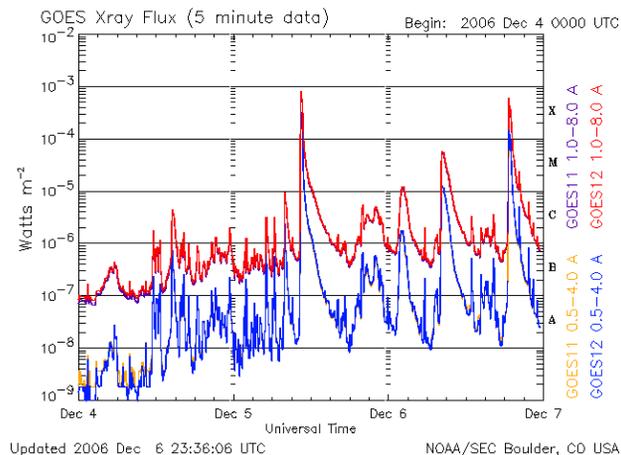
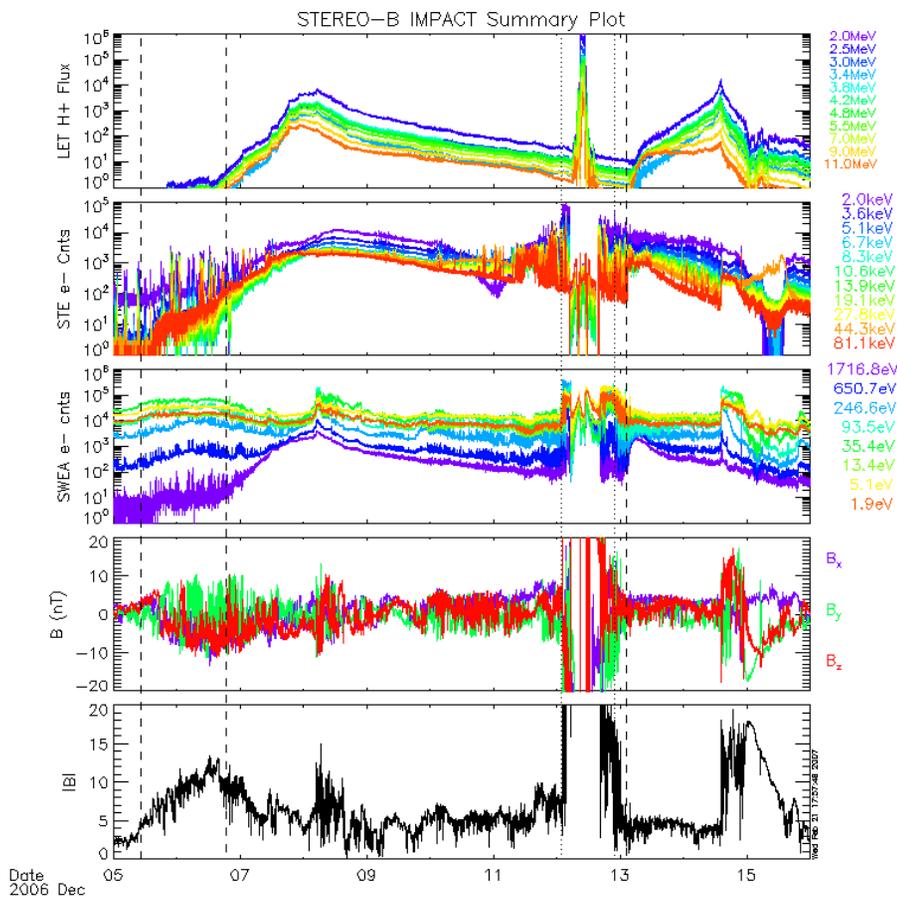
SOHO MDI images

Another strong event occurred December 7, but the one associated with a smaller flare on December 13 was positioned for good magnetic connection to Earth. This time the SOHO imagers caught the action including a halo CME.



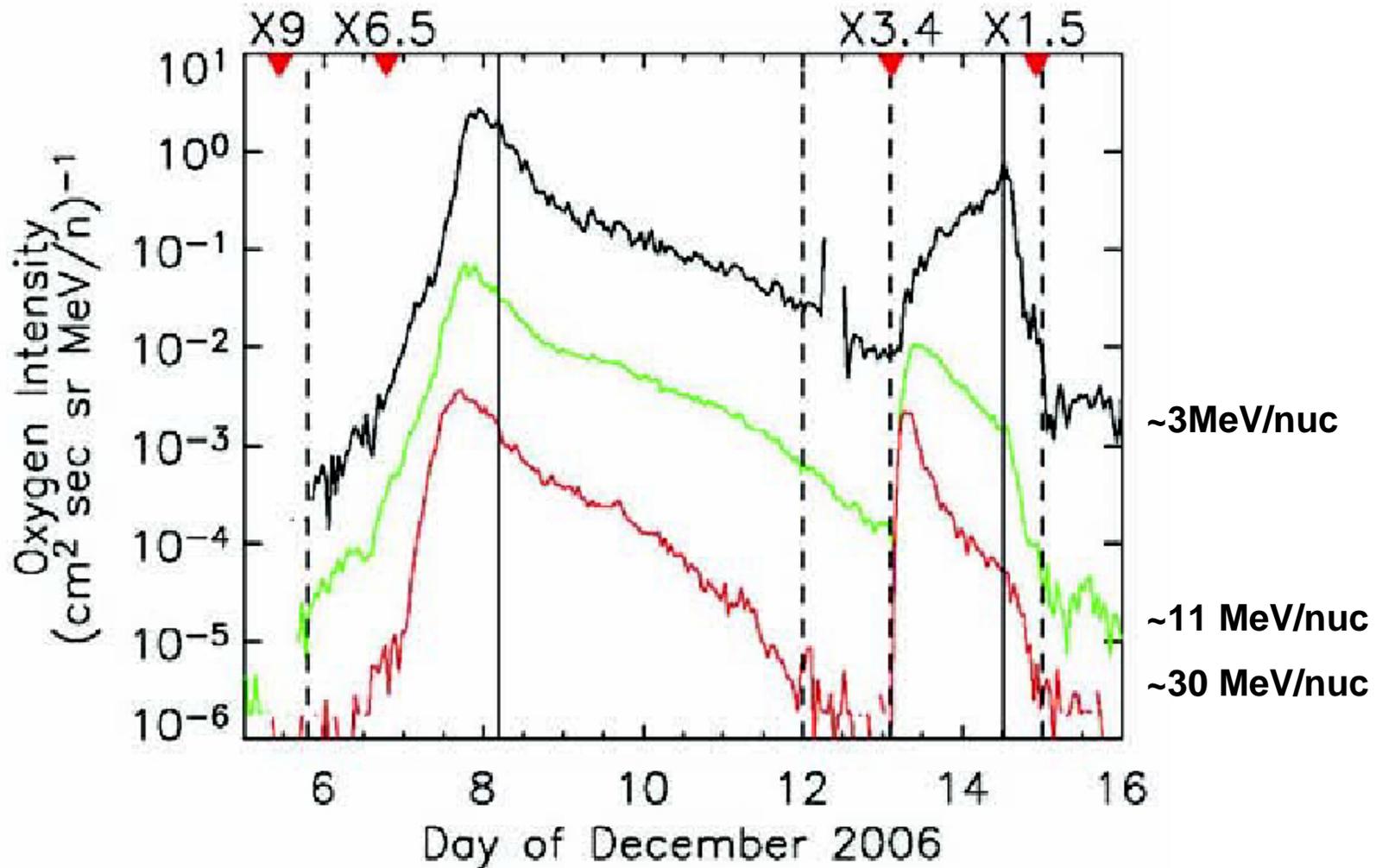
SOHO EIT (left) and LASCO (right) images

IMPACT MAG, STE, SWEA, LET and HET detected results of the early-mid December solar events, and in the case of the December 13 halo CME observed both the SEPs and the ICME.

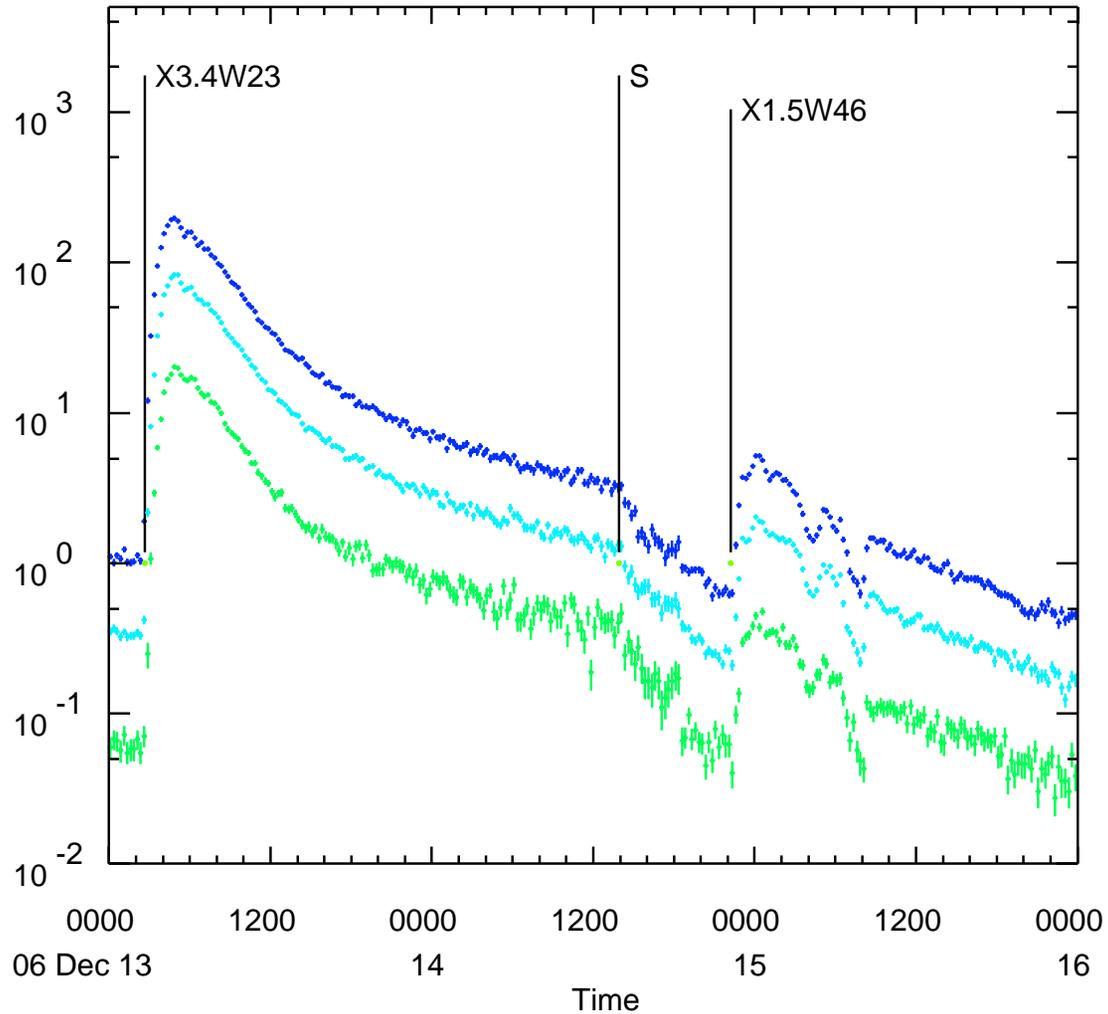


IMPACT data from LET, STE-U, SWEA and MAG on Behind. GOES x-rays.

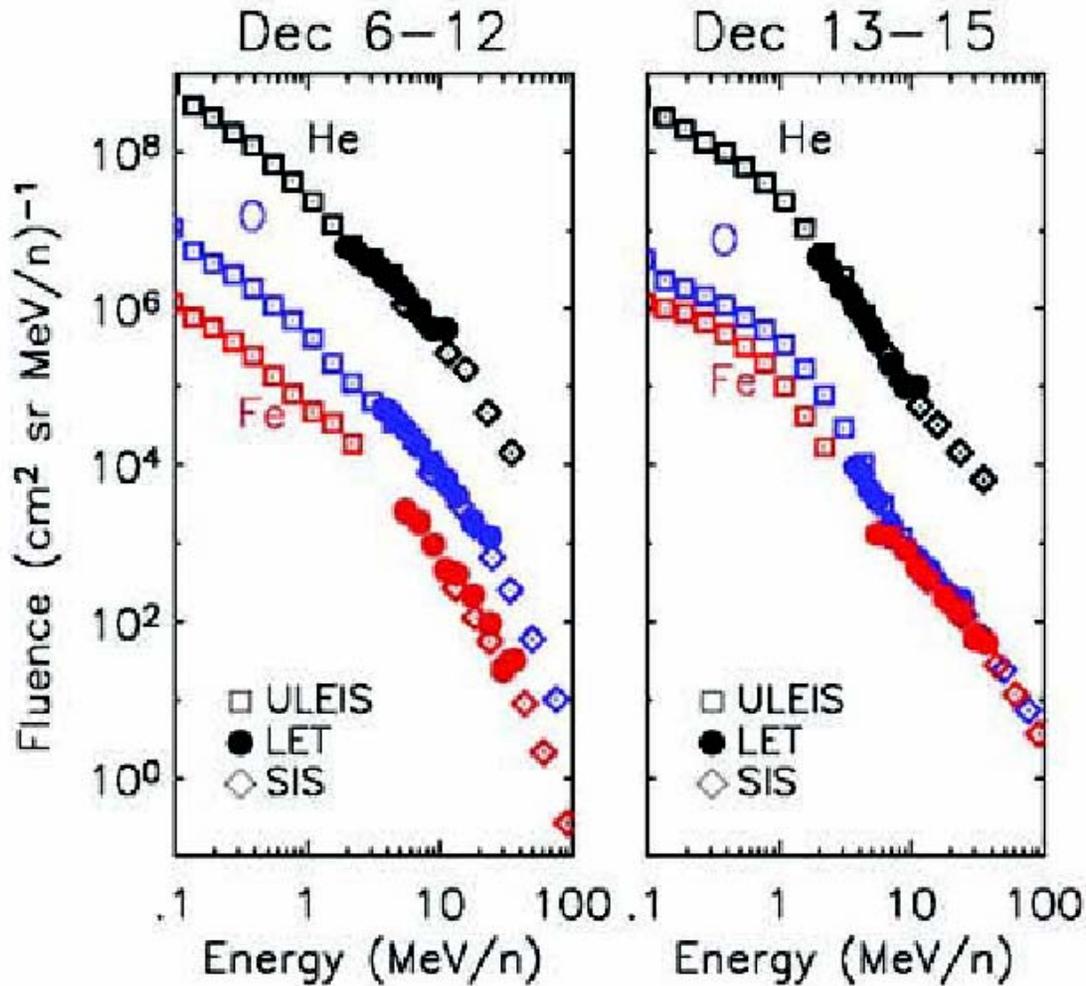
The December, 2006 Events seen by LET



HET Electrons During the Event on 06 Dec 13

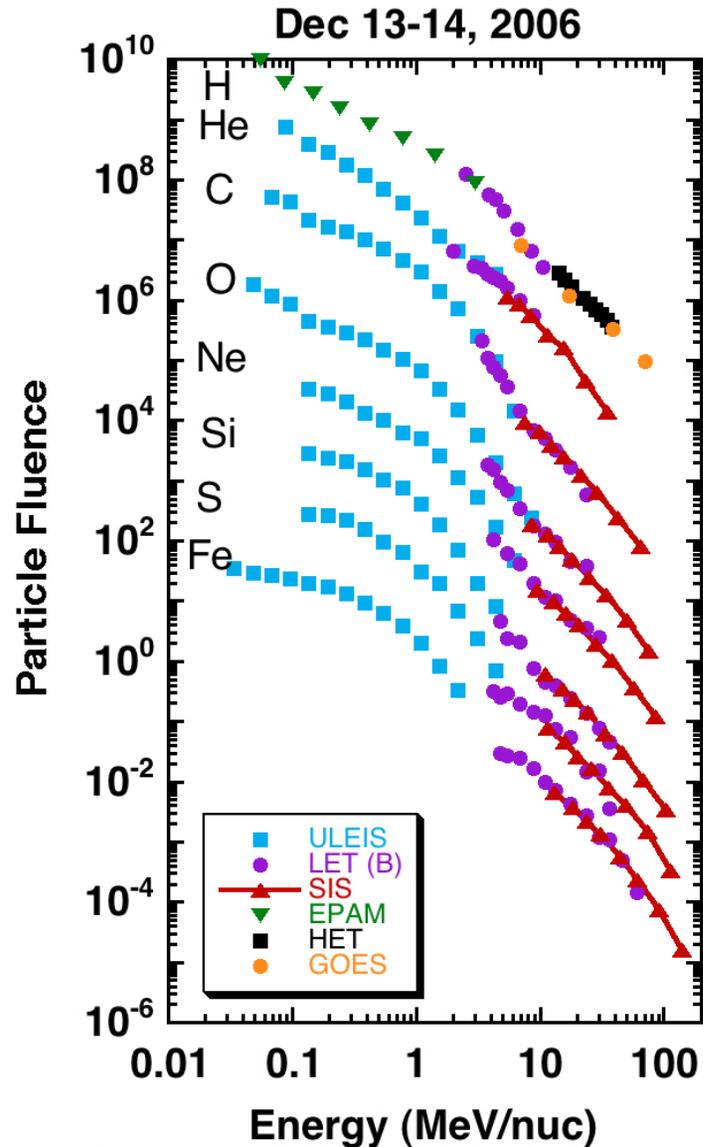
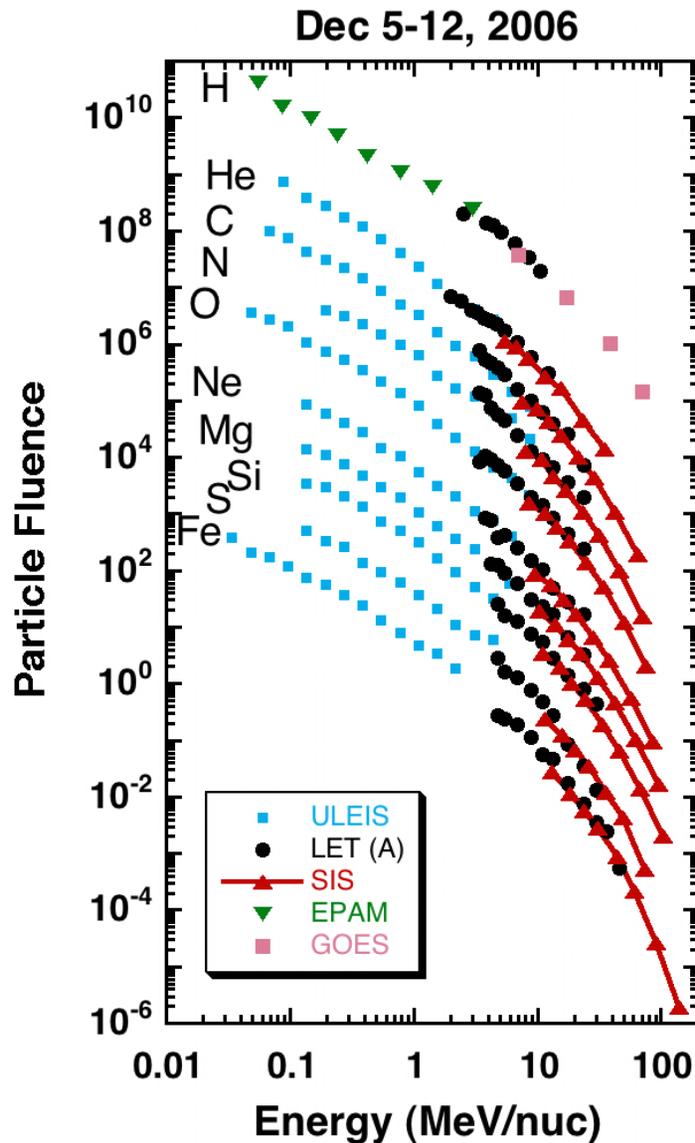


Event Spectra from LET and ACE compared

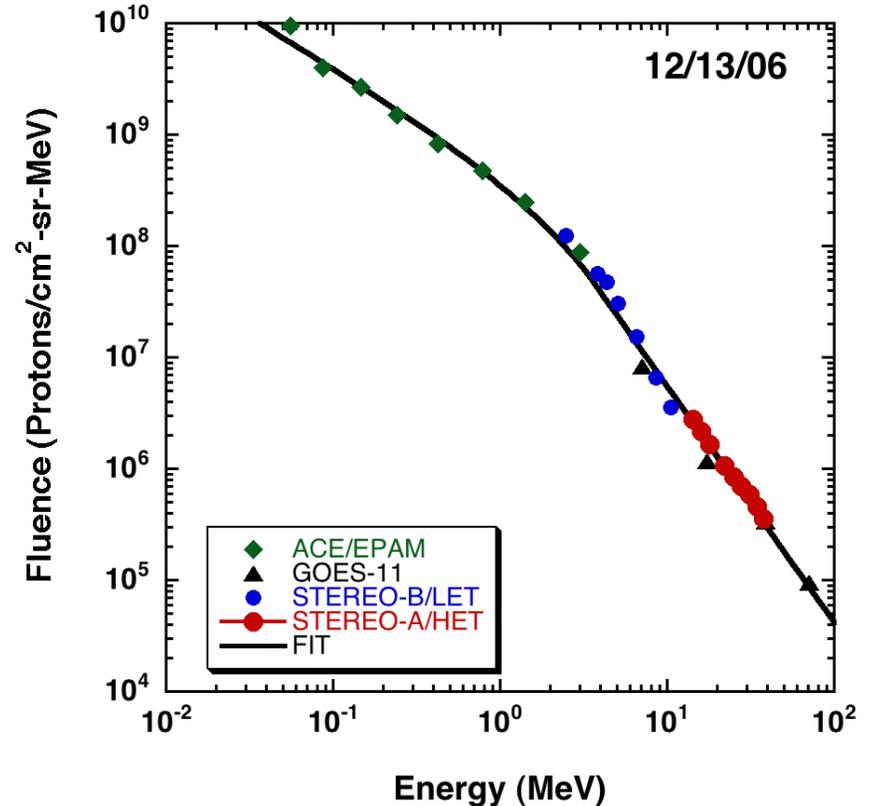
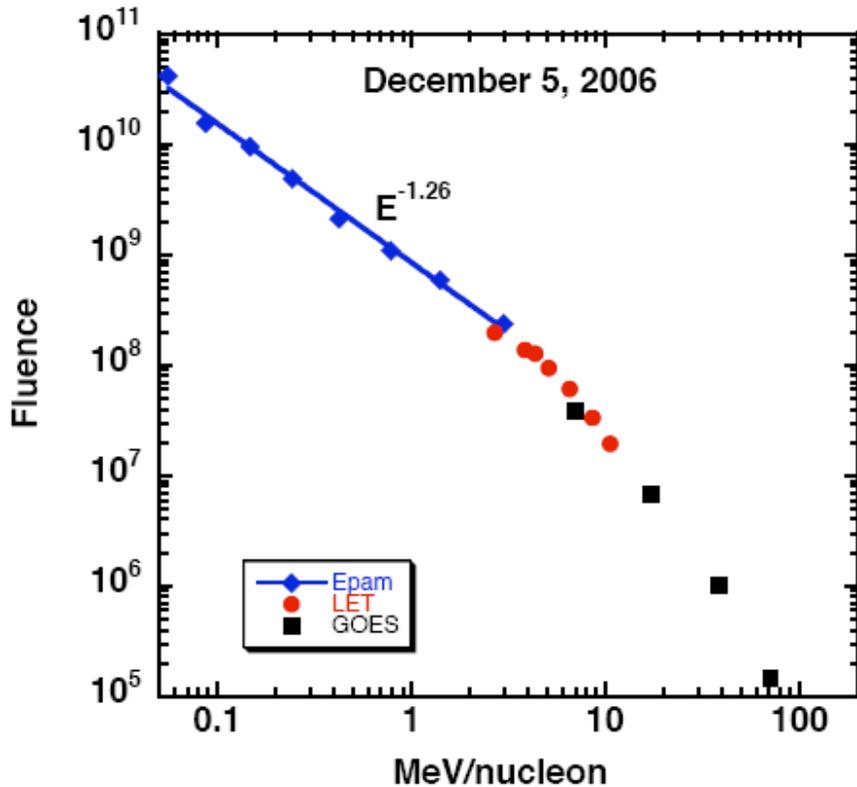


The December 13 event was Fe-rich

Details of the ion composition from LET and ACE

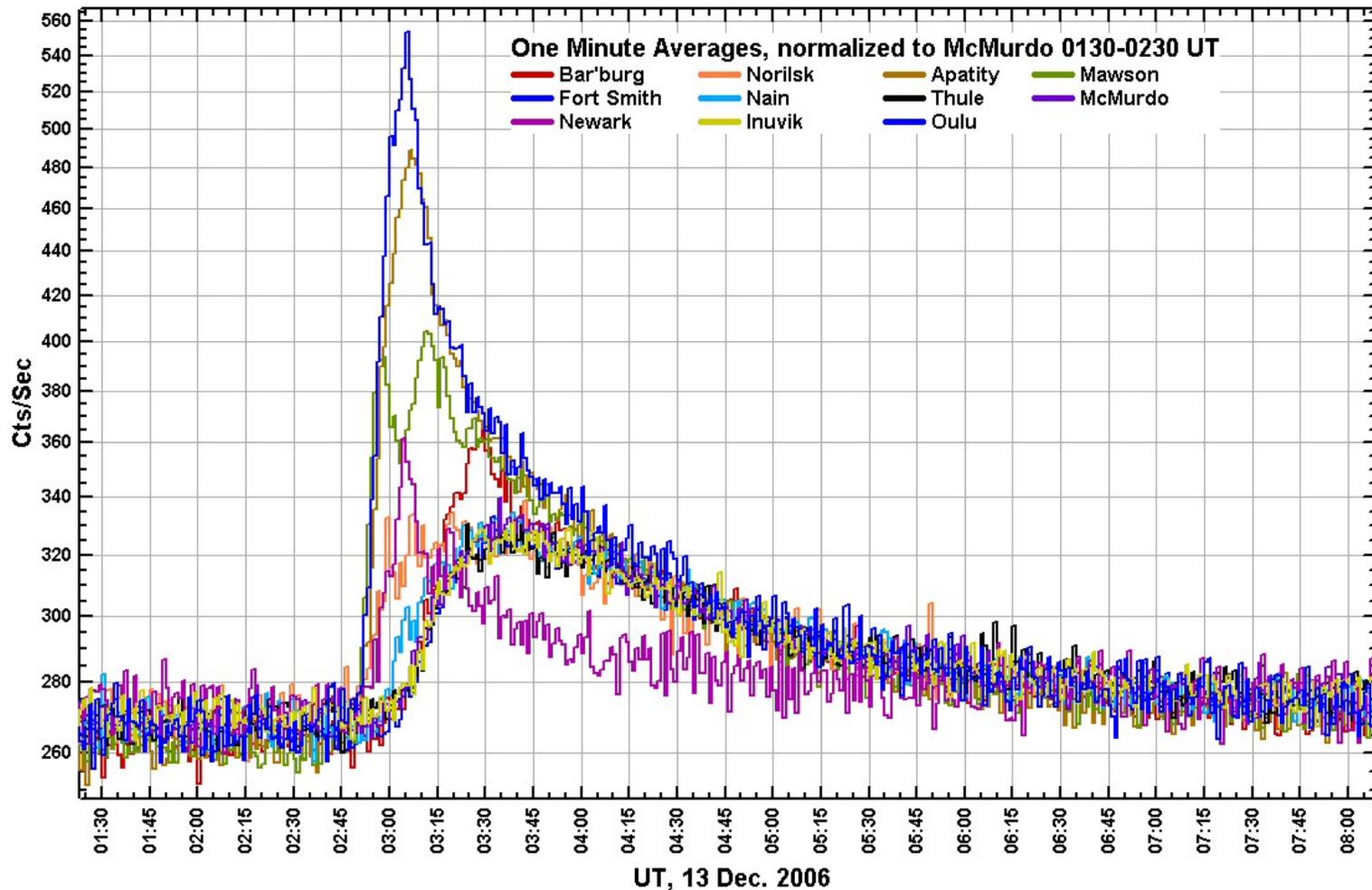


Proton Spectra from the December 2006 Events

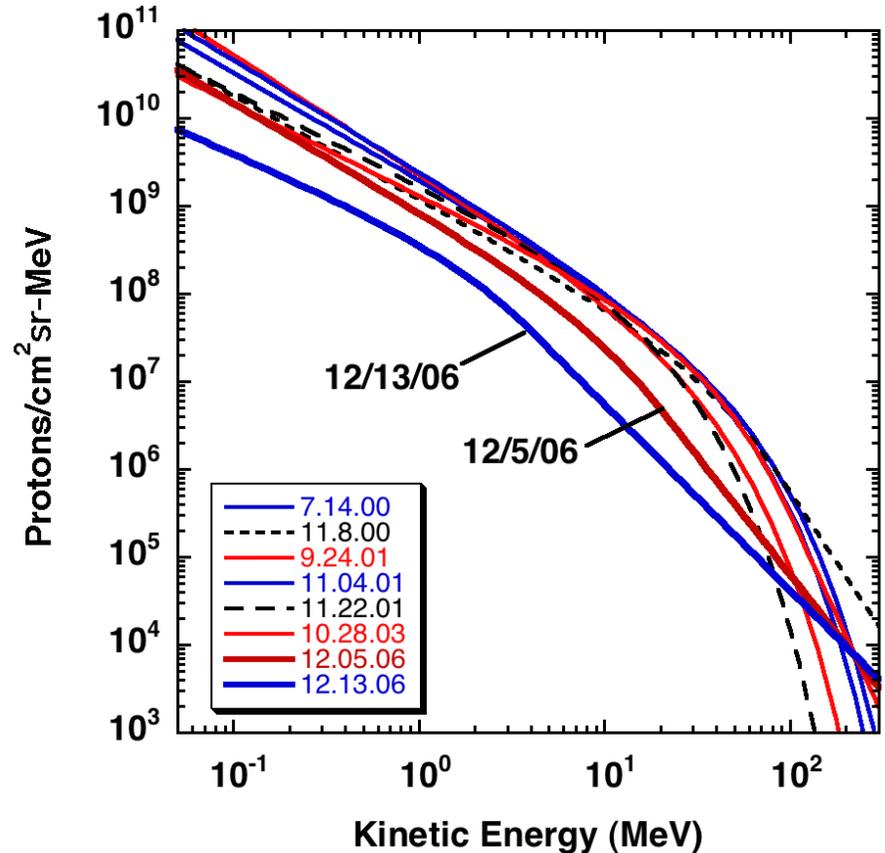
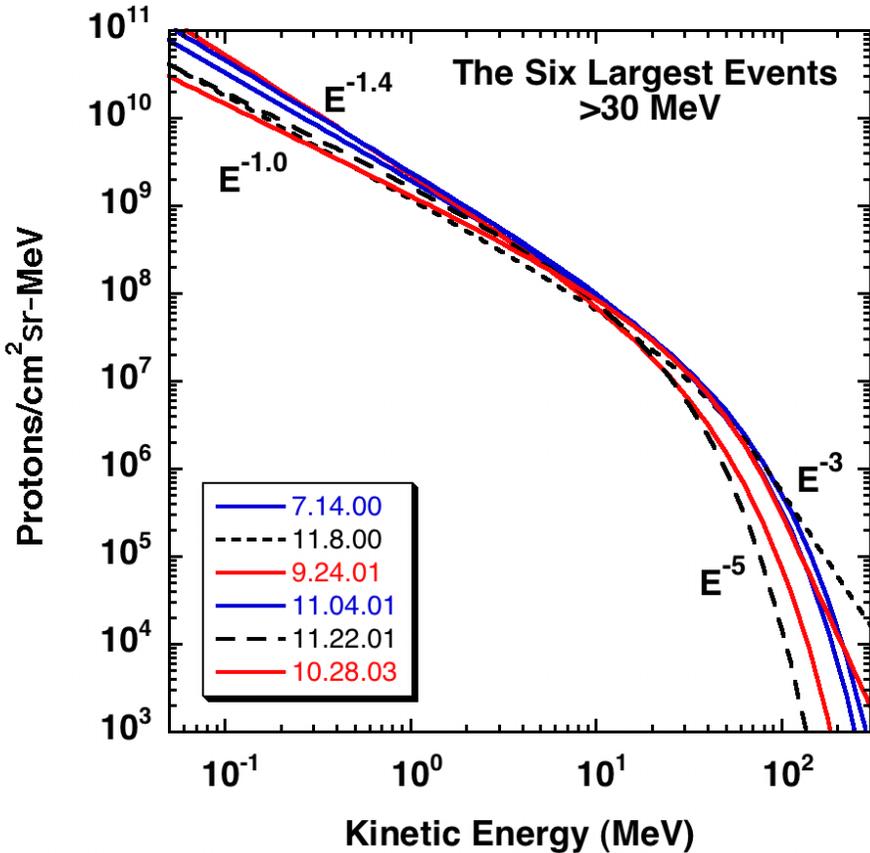


The December 13 2006 GLE (ground level event) was seen in ground Neutron Monitors

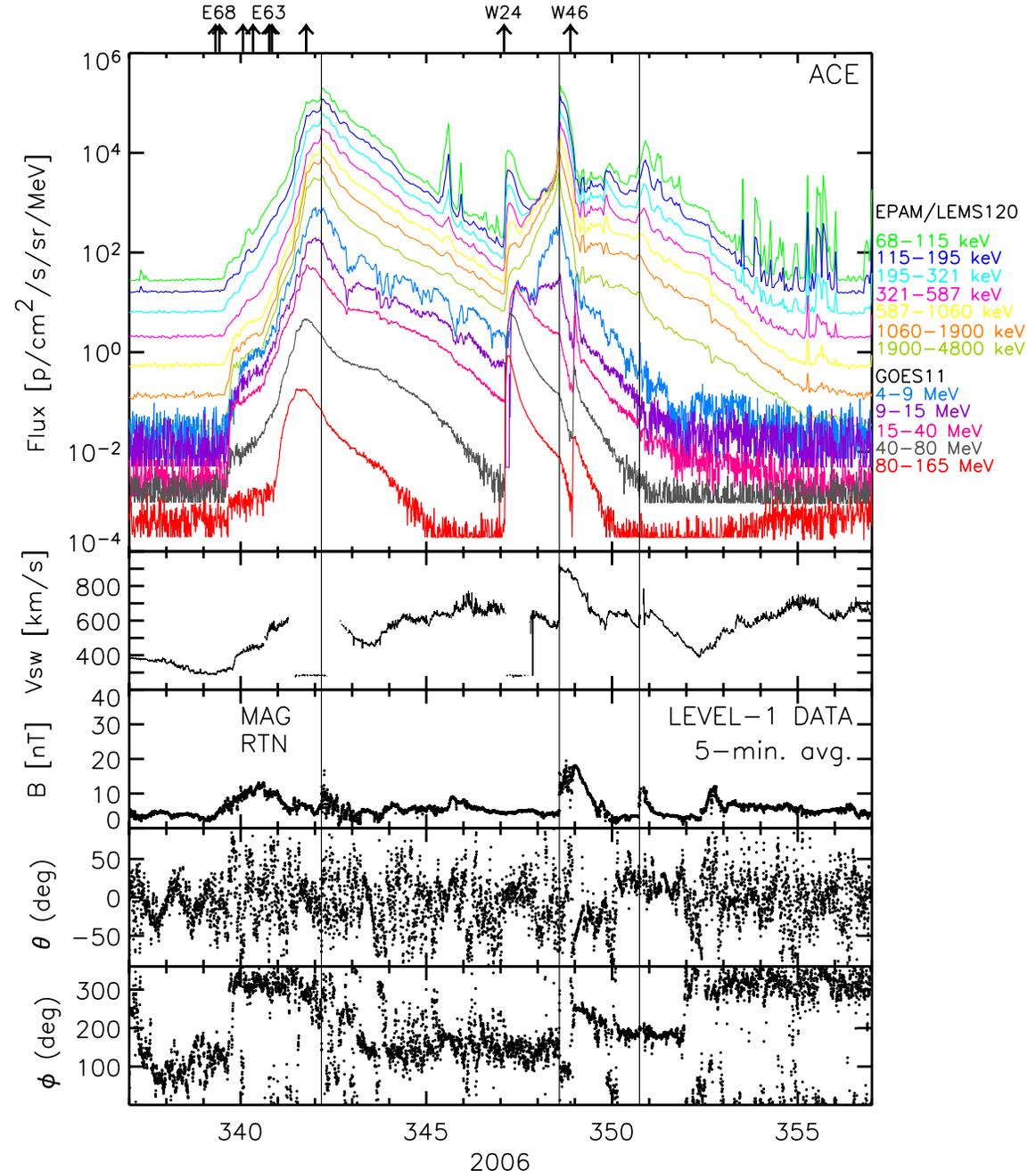
*Spaceship Earth Observations of the Solar Minimum GLE
Recorded December 13, 2006 by Neutron Monitors*



Putting the December 2006 Events in Context (They are #11 and #15 for >30 MeV Fluences in Cycle 23)



Observations at 1 AU

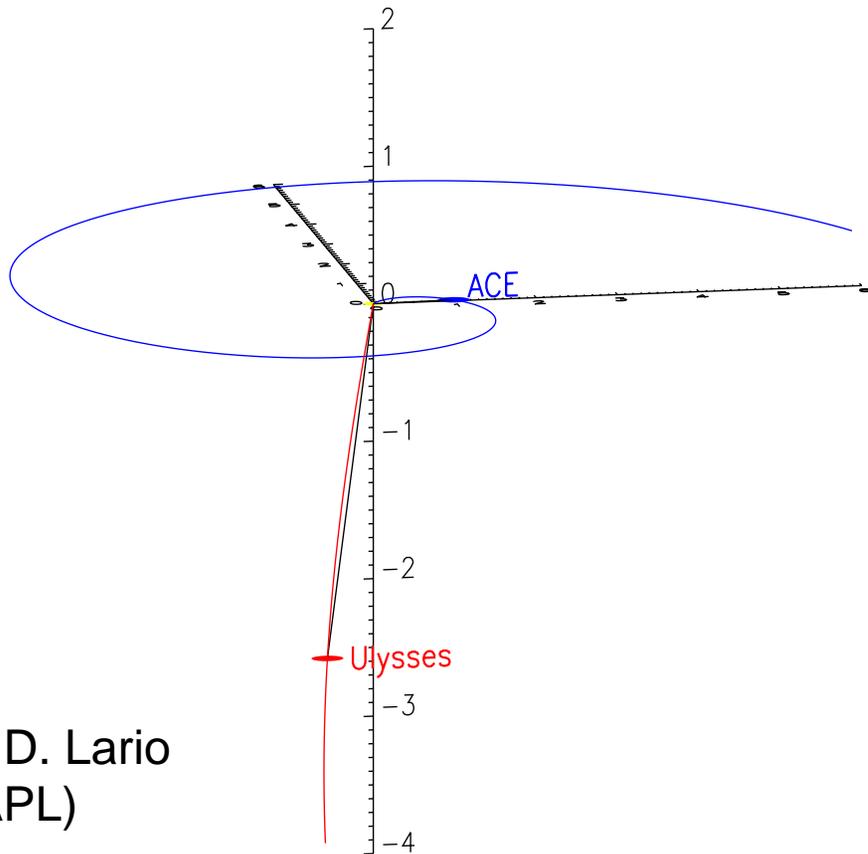


(From D. Lario
JHUAPL)

On day 339

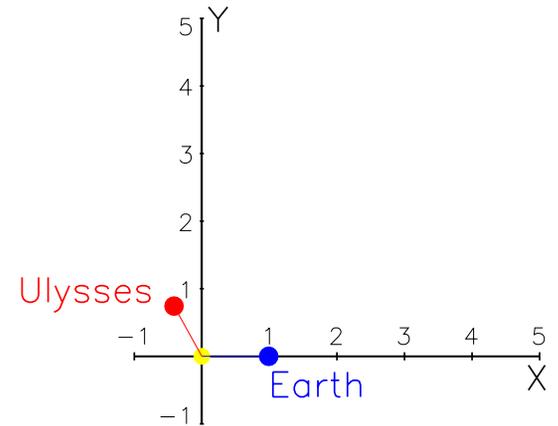
Earth was at $R=0.99$, $\Phi=356^\circ$, $\Lambda=-0.4^\circ$

Ulysses was at $R=2.81$, $\Phi=115^\circ$, $\Lambda=-72.4^\circ$

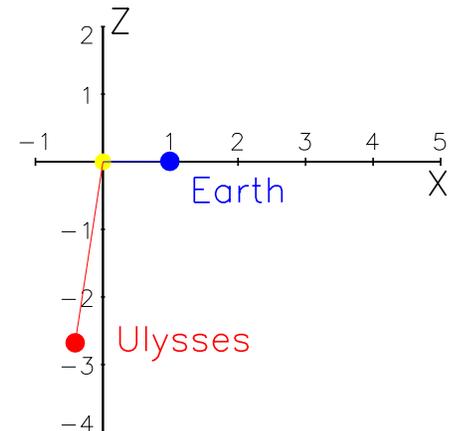


(from D. Lario
JHUAPL)

Projection to the plane XY



Projection to the plane XZ

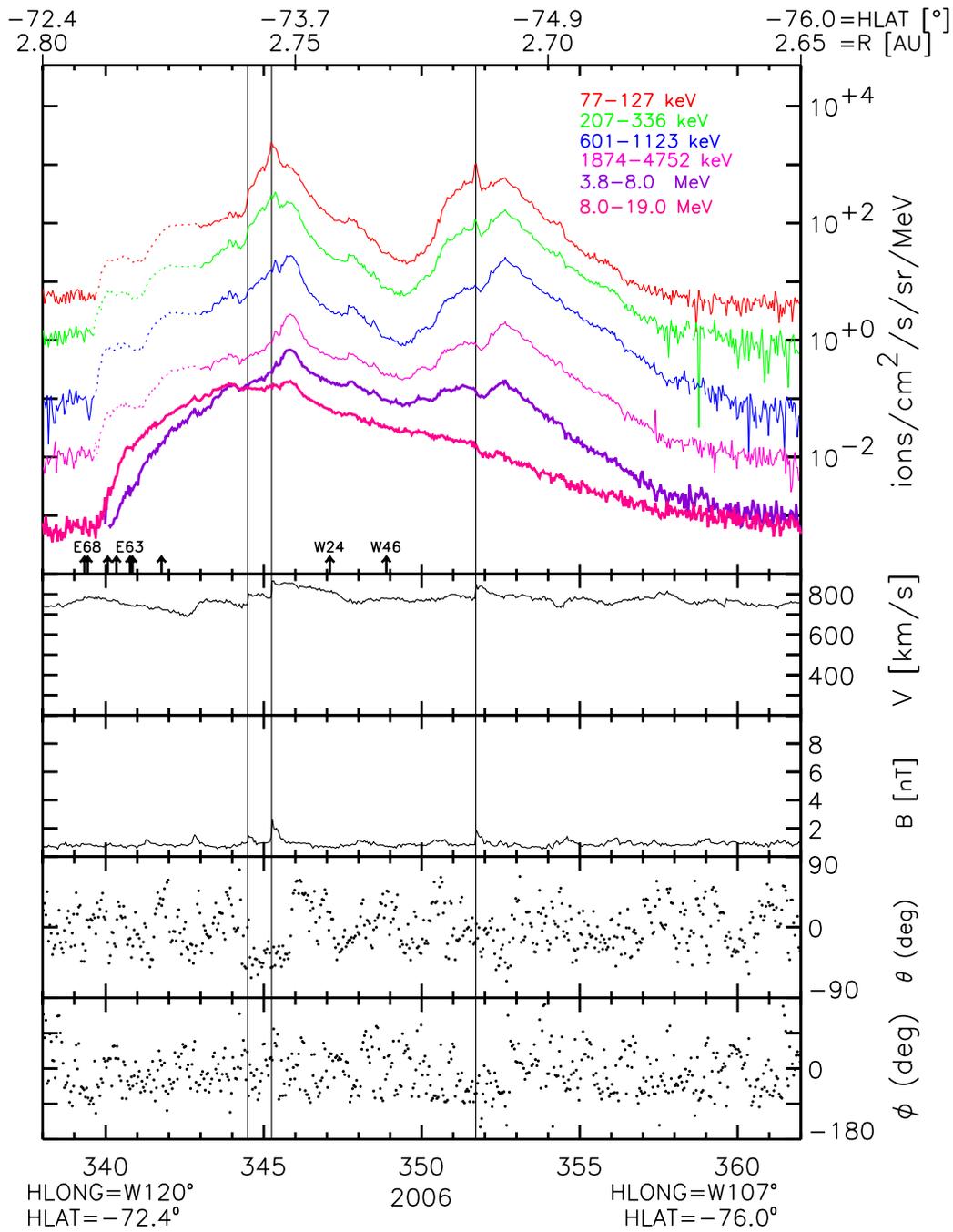


Observations at Ulysses

Dec'06

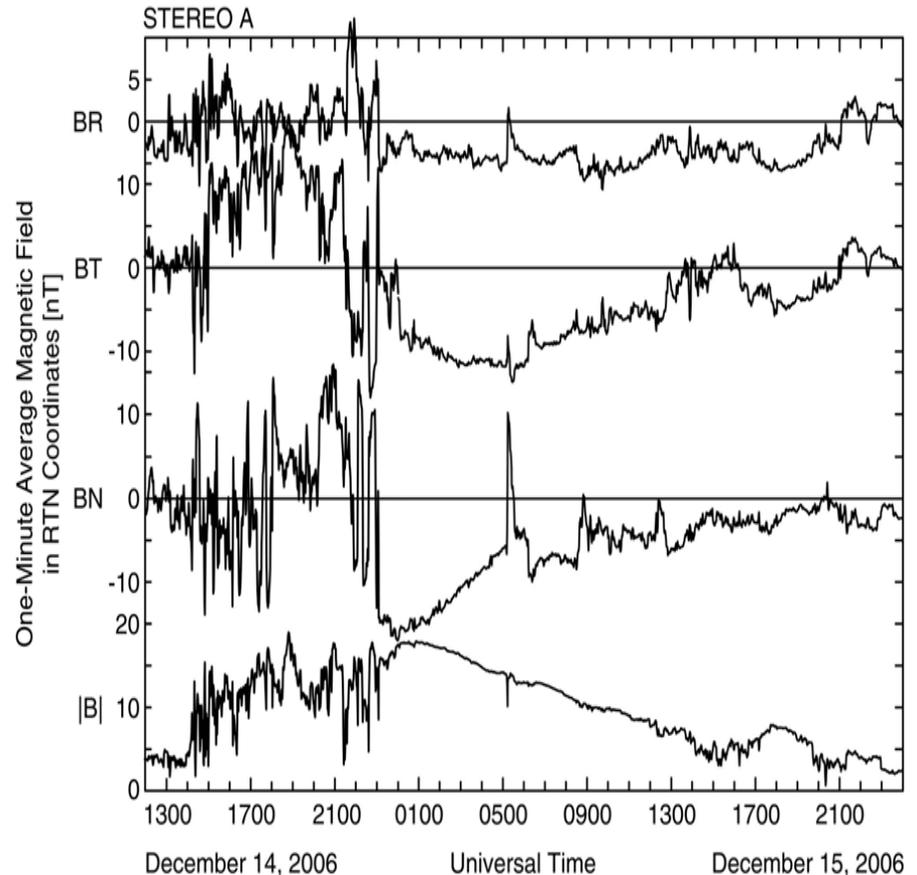
(From D. Lario
JHUAPL)

- 1st shock $\langle v \rangle = 944$ km/s
- 2nd shock $\langle v \rangle = 1066$ km/s
- 3rd shock $\langle v \rangle = 1020$ km/s



An intriguing feature of the ICME of December 14-15, 2006

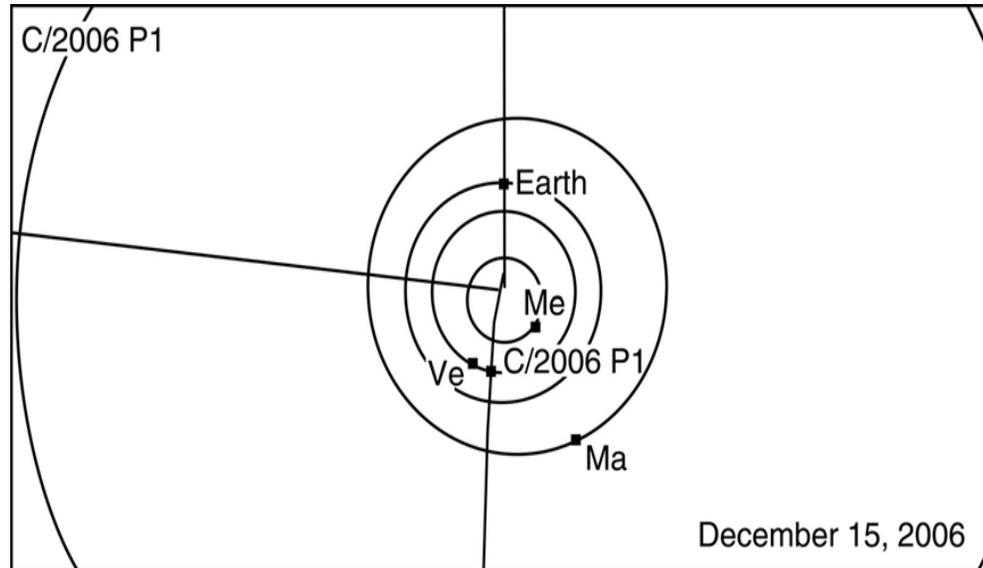
- The strong ICME reached STEREO A and B almost simultaneously on December 14, 2006
- The strong shock arrived at 1400 UT followed by a noisy (high beta) magnetosheath
- The magnetic flux rope arrived at 2300 UT at which time the magnetic field became quiet and began to rotate
- At 0513 UT on December 15, an unusual current sheet was crossed



Is it related to Comet McNaught?

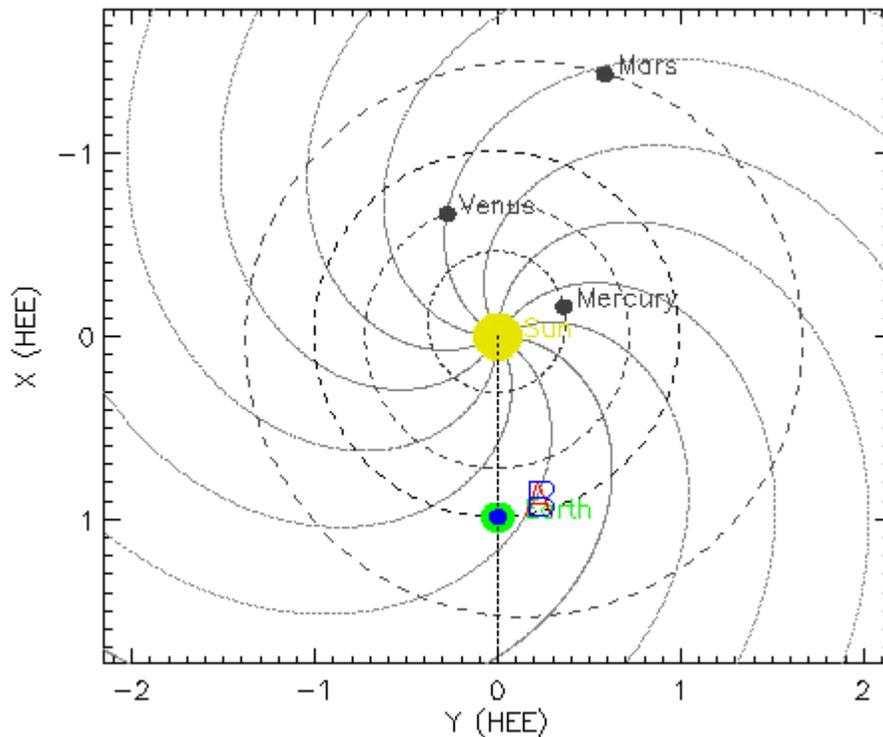


Comet Mc Naught



- By December 15 Comet Mc Naught had entered the inner solar system and was heading down toward the ecliptic plane
- On December 15, Earth was directly upstream from the point in the ecliptic plane where comet Mc Naught was going to cross
- It is possible that the current sheet seen by STEREO is caused by the interaction of the solar wind with material in comet Mc Naught's orbit but ahead of Mc Naught. Such behavior has been detected in the solar wind on Pioneer Venus

The December 6 event on the east limb for which IMPACT saw a gradual onset SEP event apparently had great effects at Mars and Venus- as seen on VEX and MEX



Venus and Mars were apparently Well-connected to the CME that Must have accompanied the X-9 Flare on December 5. VEX and MEX Are Not instrumented for energetic Particle detection, but have a Plasma analyzer for electron and Ion detection and in the case of VEX, a magnetometer.

Bottom line:

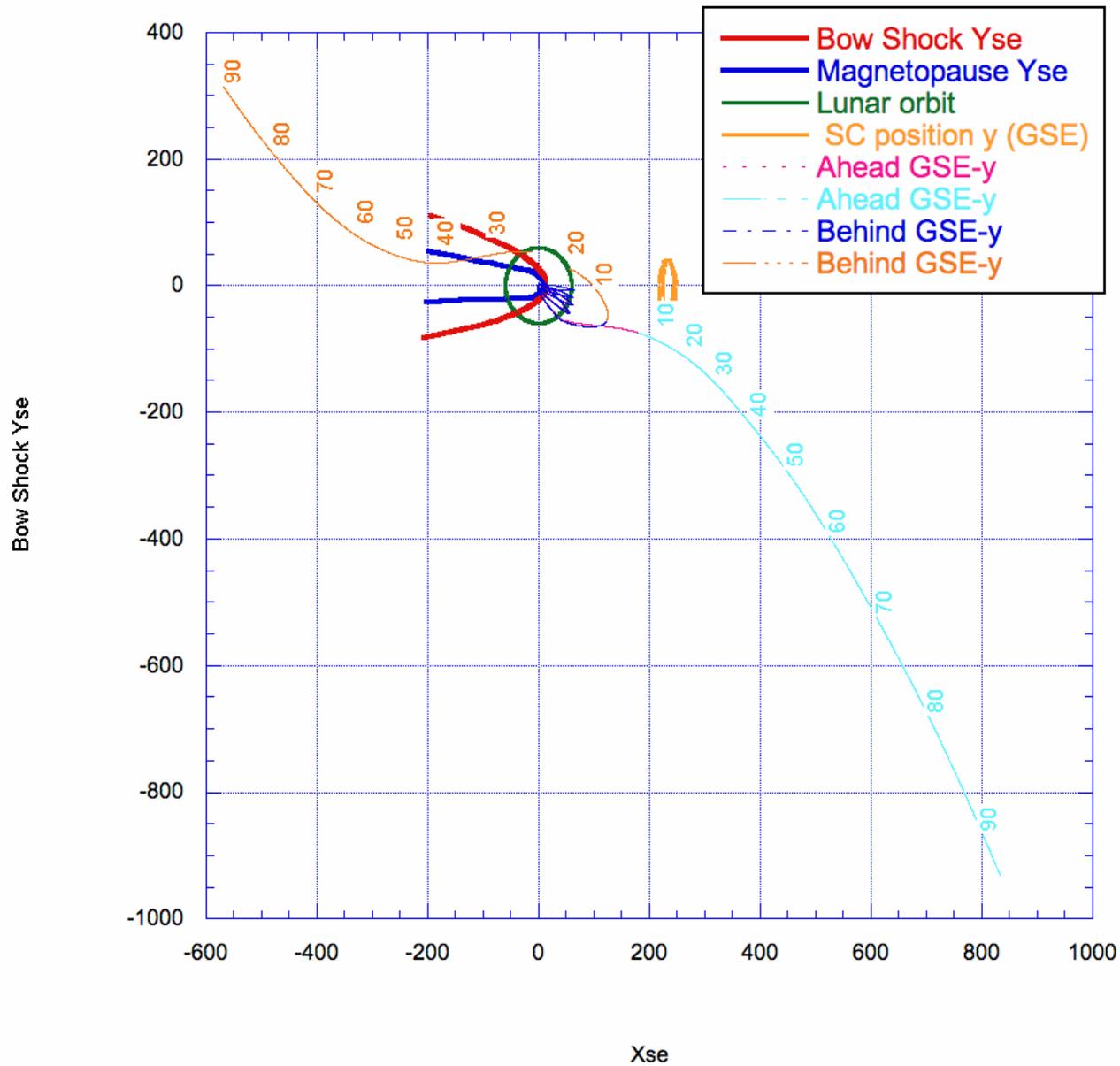
- The early December '06 events have several aspects worth analyzing in detail even though STEREO images are not available. December 13 event was a classic in terms of 1 AU SEP event and ICME signatures, and was seen in multipoint measurements. The December 5 event seems to have had major effects at Venus and Mars.
- Possibility is to coordinate publications with ACE, Ulysses, VEX and MEX on in-situ results- and SOHO and TRACE on solar source

Early Science Samples:
Quiet Sun period (January-March
'07) energetic particle events and
their associated corotating solar
wind stream interaction regions

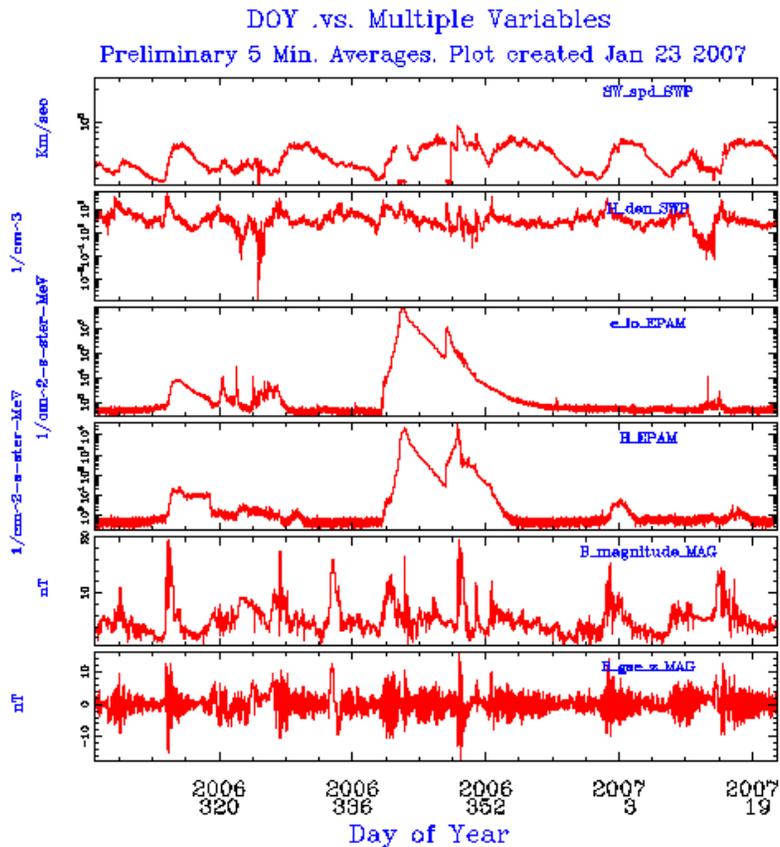
Bottom Line

- Since January 1 the quiet coronal and solar wind structure has provided an excellent example of a quasi-steady inner heliosphere
- SECCHI as well as SOHO images of the solar wind sources are available
- An excellent case for validating and learning from solar wind models

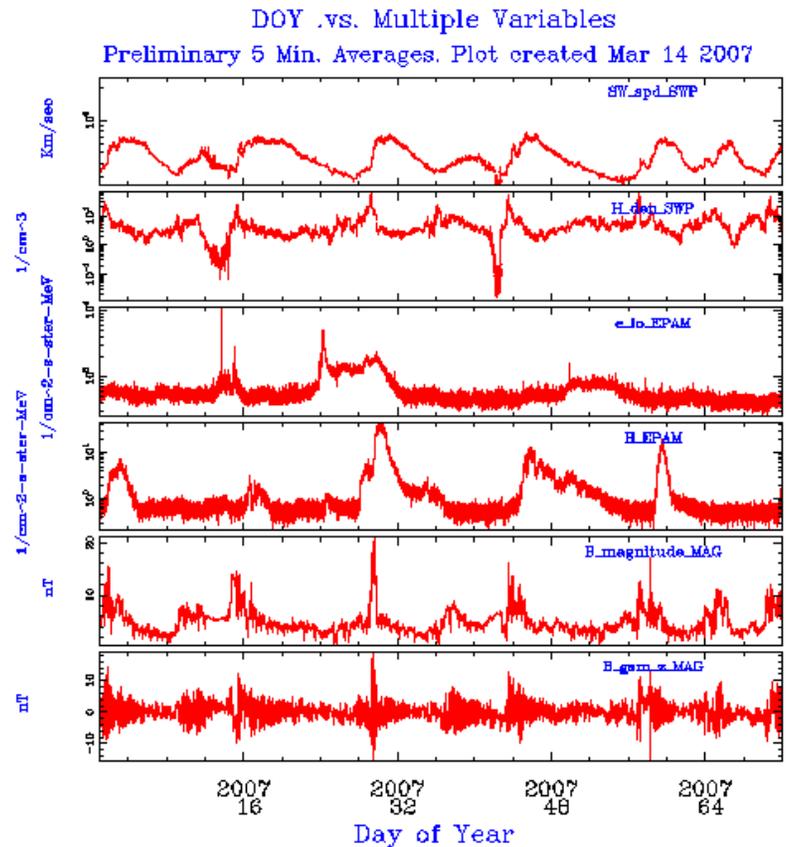
STEREO-Ahead/Behind + ACE positions



ACE browse plots-overview of conditions since STEREO launch

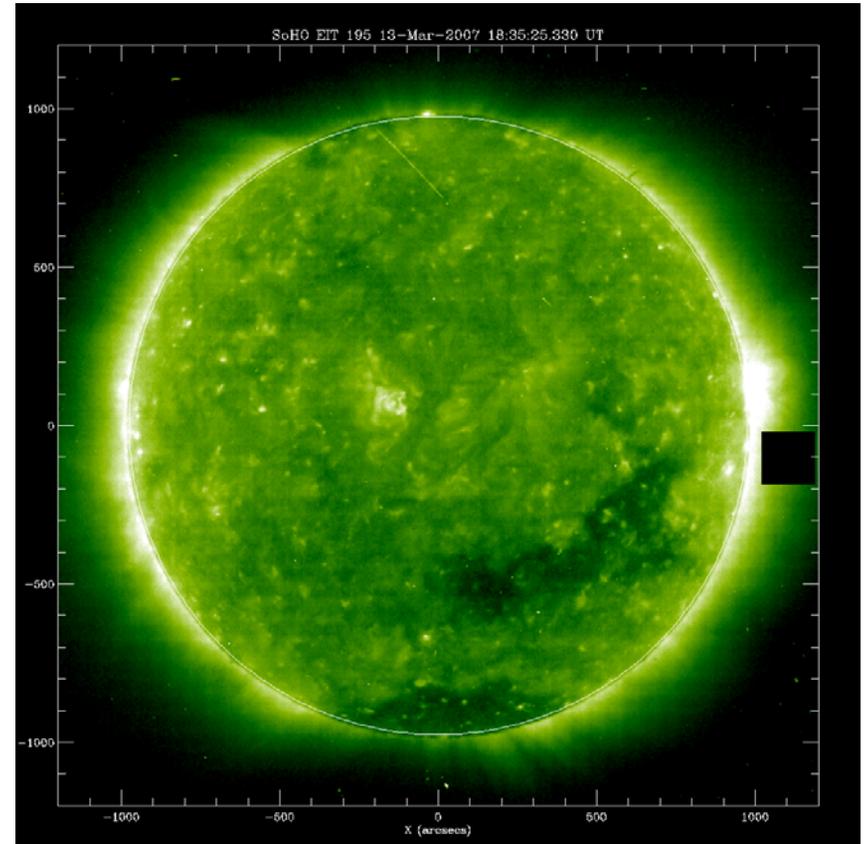
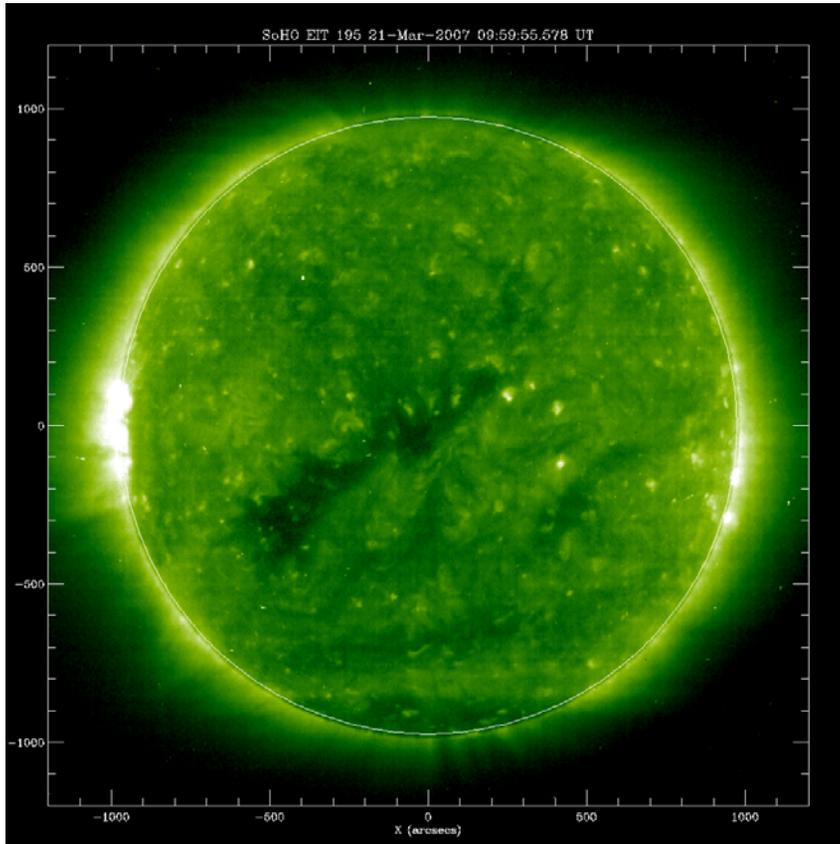


December activity



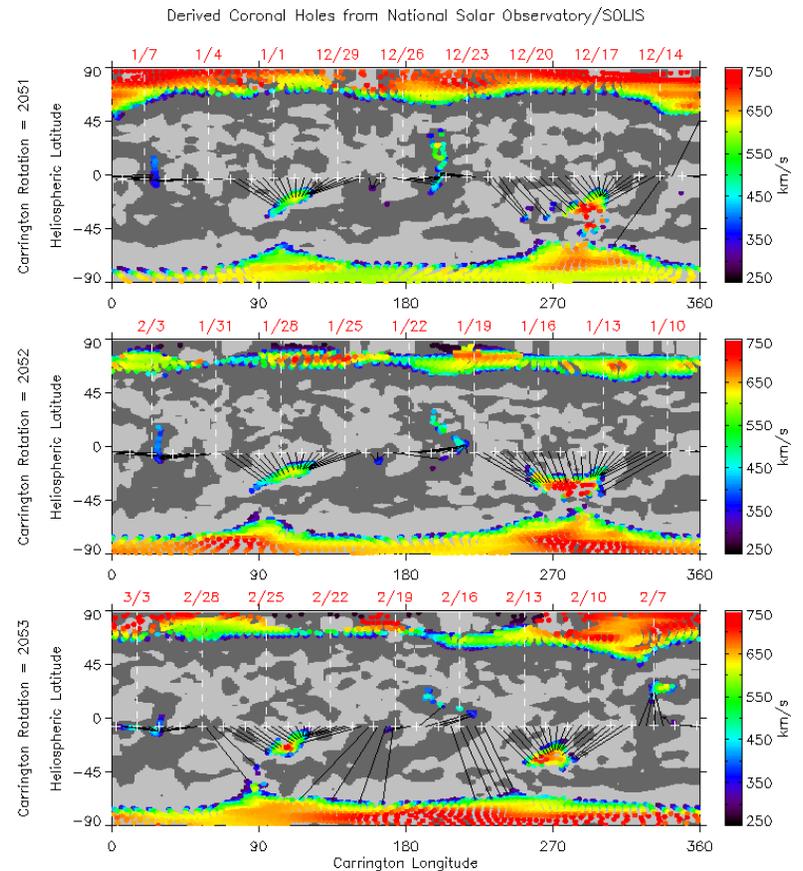
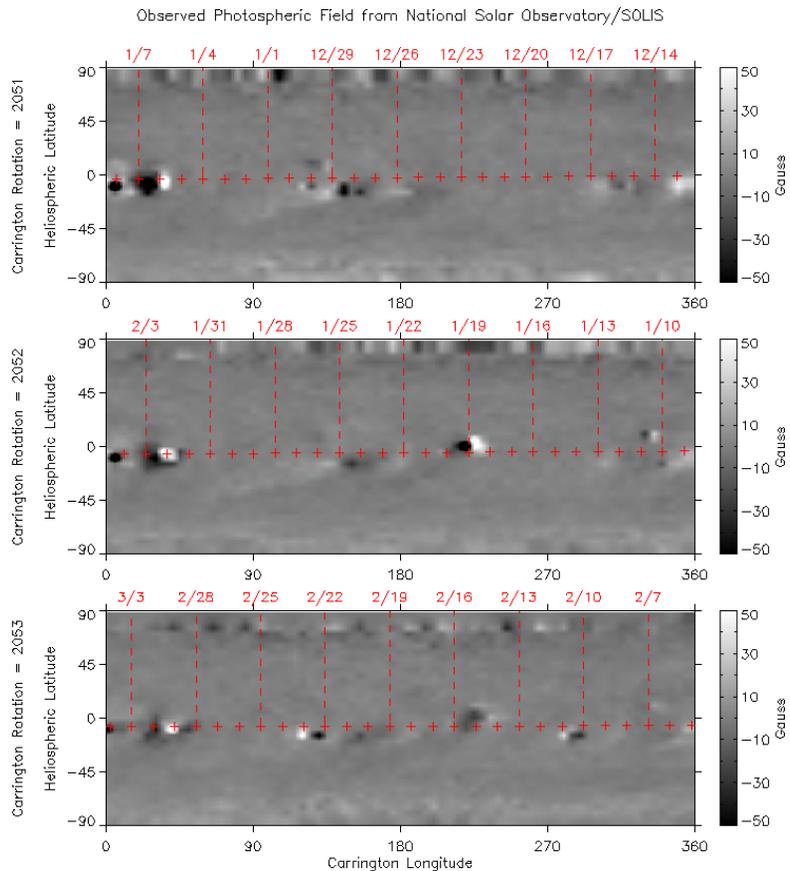
Conditions since January 1

Dominant Solar features of early 2007: Two S. Hemisphere coronal holes



SOHO EIT images

These coronal holes are present in the now routine solar wind models (e.g. at SEC and CCMC)



WSA model synoptic map boundary conditions and resulting coronal hole maps

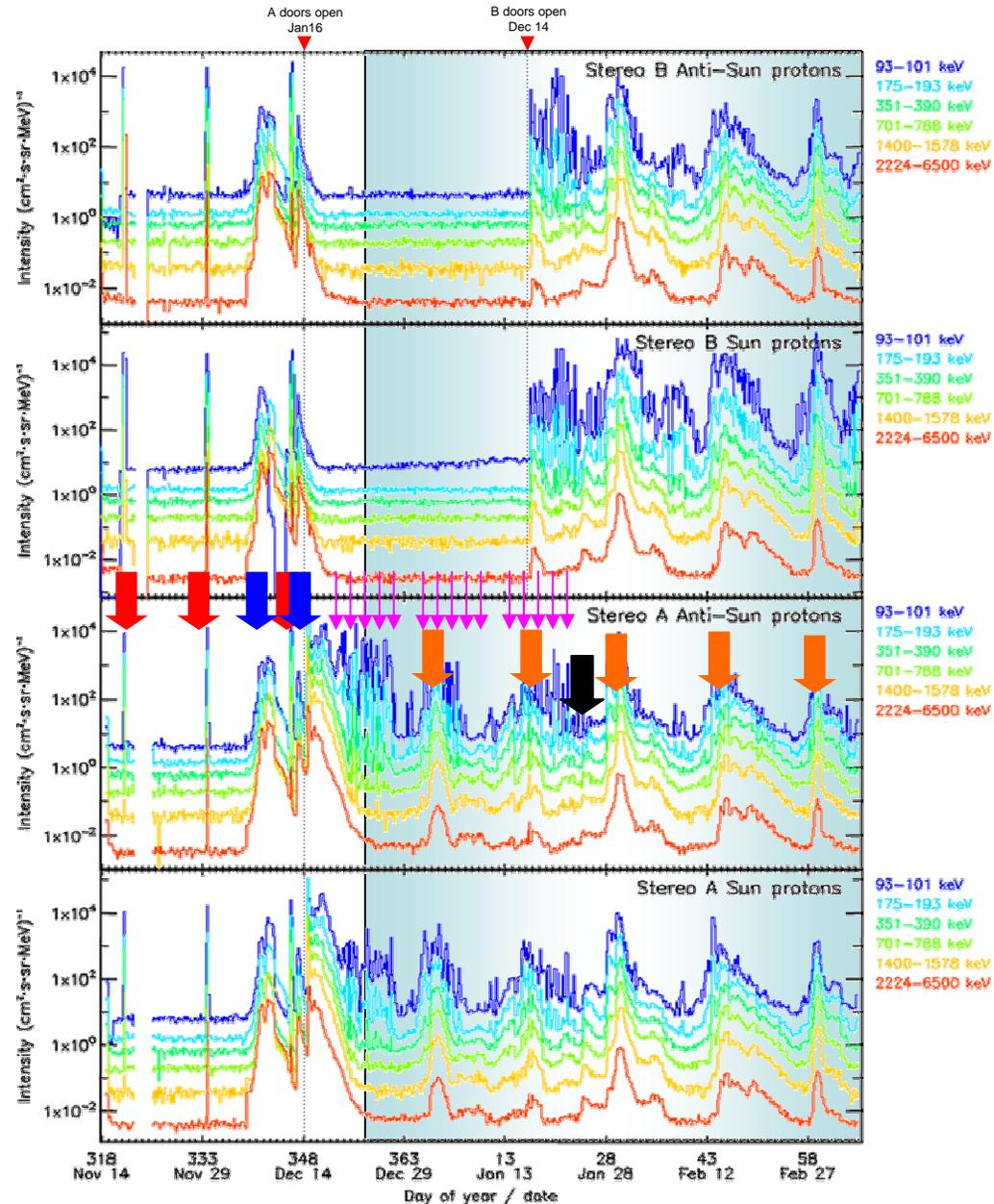
SEPT proton intensities November 2006 - March 2007

Intensity increases observed by SEPT:

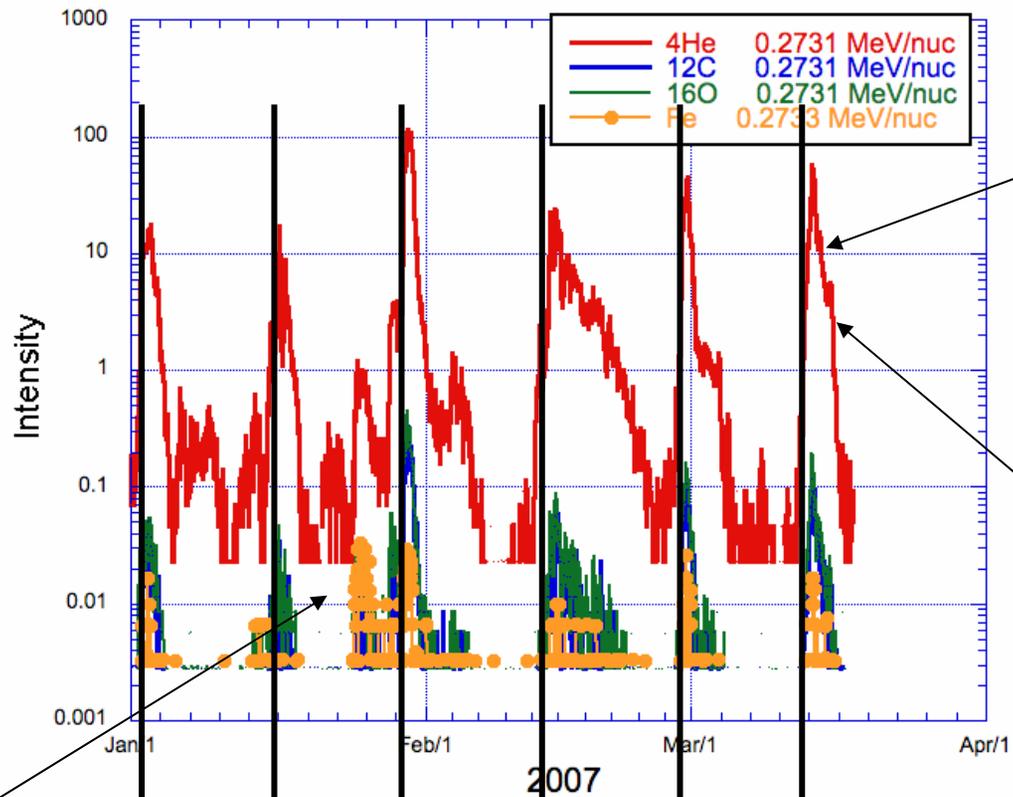
- Radiation belts
- Dec 2006 large SEP events
- Upstream events
- CIR associated events
- Jan 23,24 small SEP events (mainly electrons)

Jan 1-March 6 2007 period:

- Extended solar quiet time period (118 B-class, 15 C-class, no M, X-class flares)
- Non-QT Proton fluxes dominated by upstream events and CIR-associated events



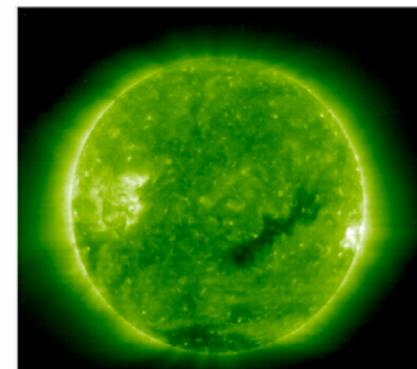
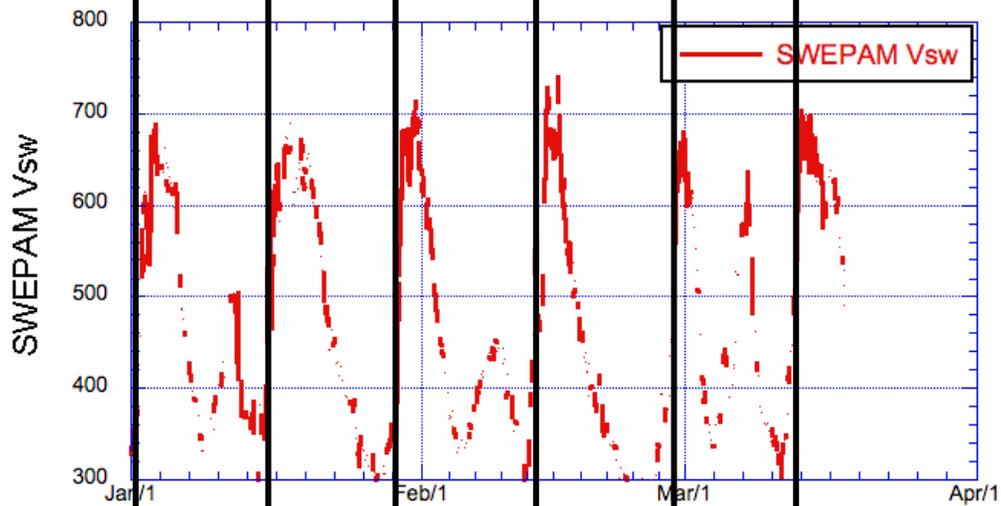
ACE / ULEIS 1-hr fluxes - 273 keV/nucleon



New SIT tables uploaded

24 hr period compared with SEPT, SIT

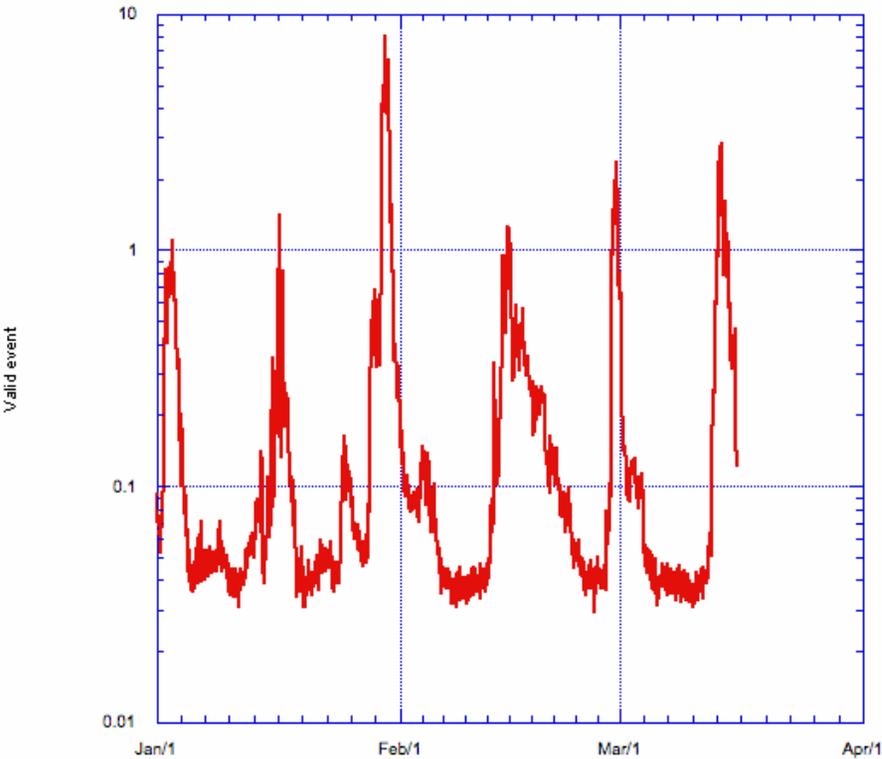
3He-rich period



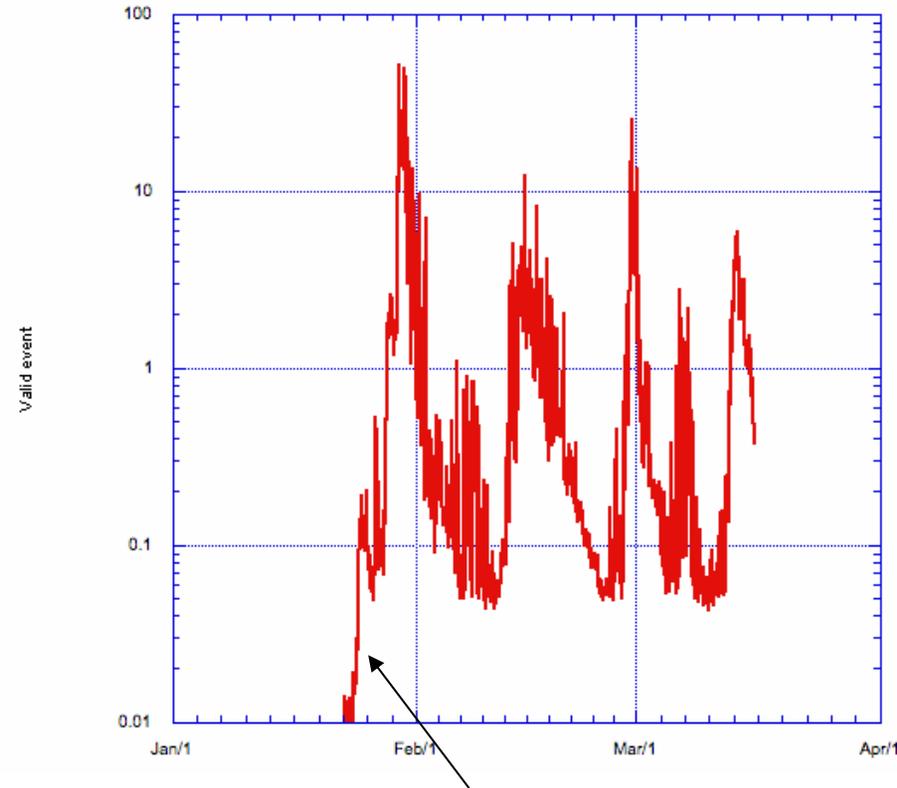
2007/03/24 14:00

SIT 1=hr average count rates: SIT-B sees magnetospheric events superposed on interplanetary events

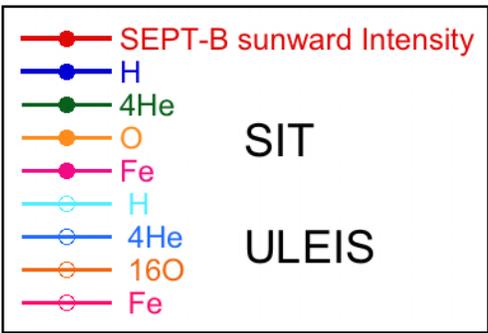
SIT_A_2007_001_rates



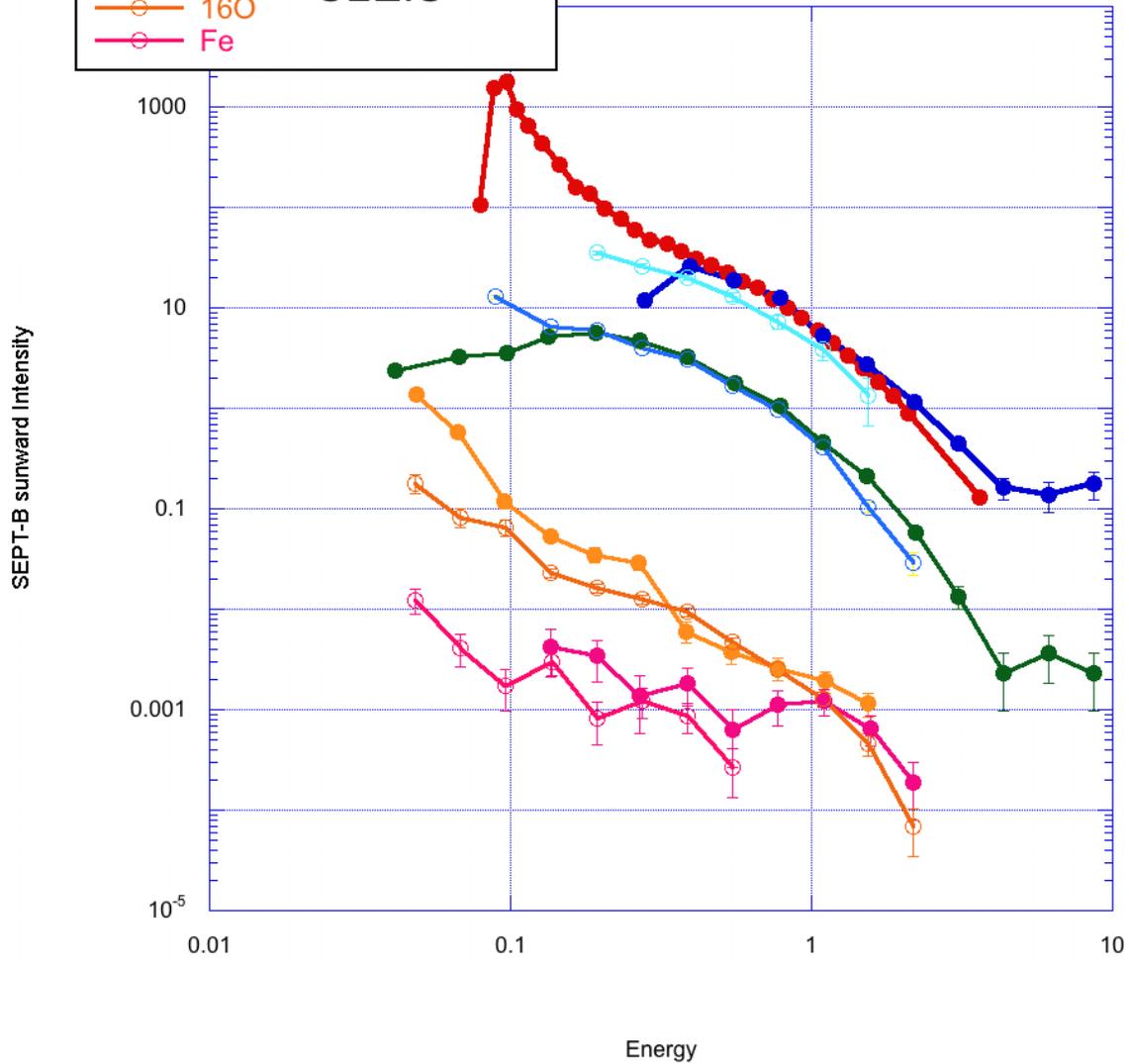
SIT_B_2007_001_rates



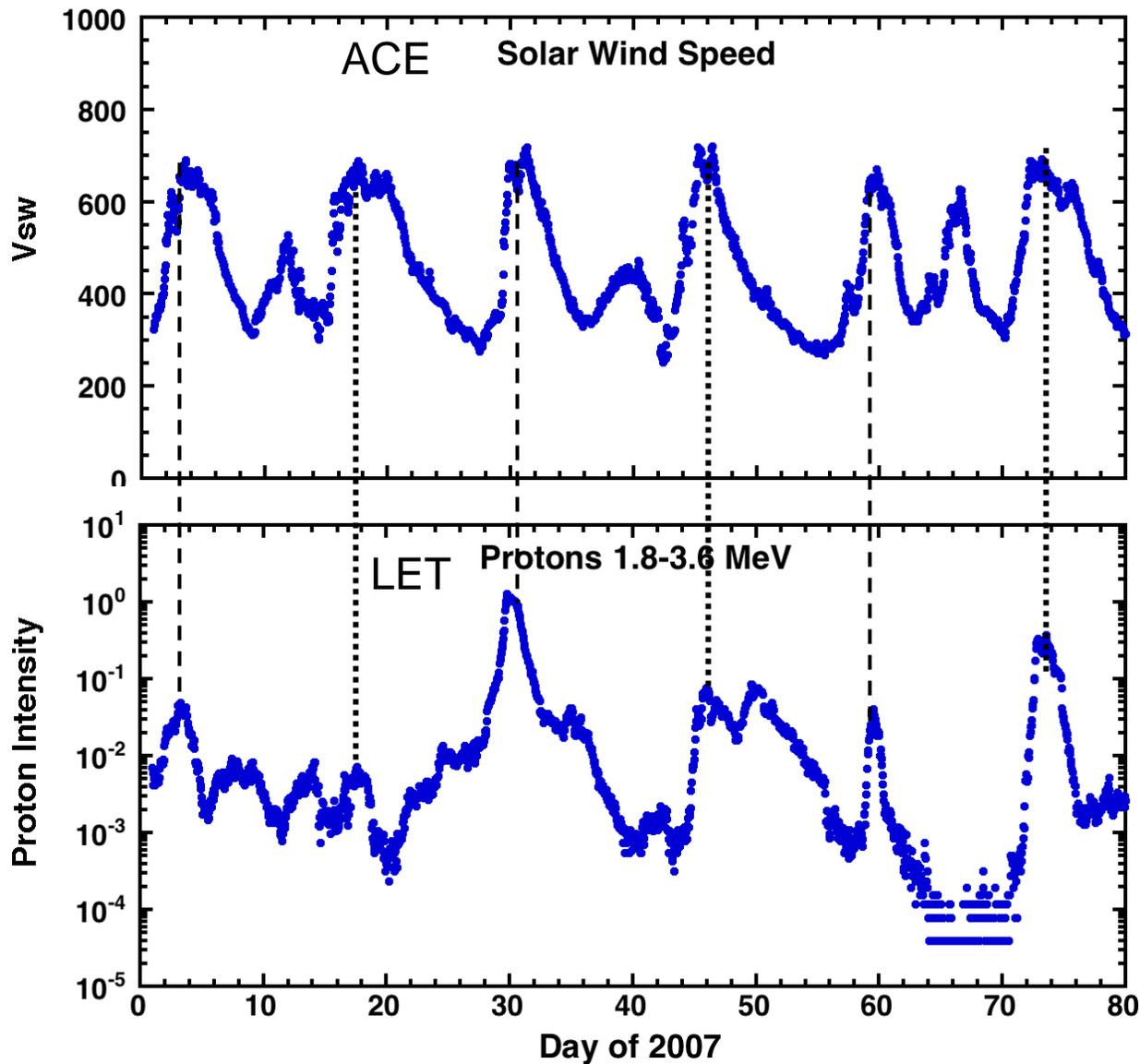
SIT-B HV ramp-up



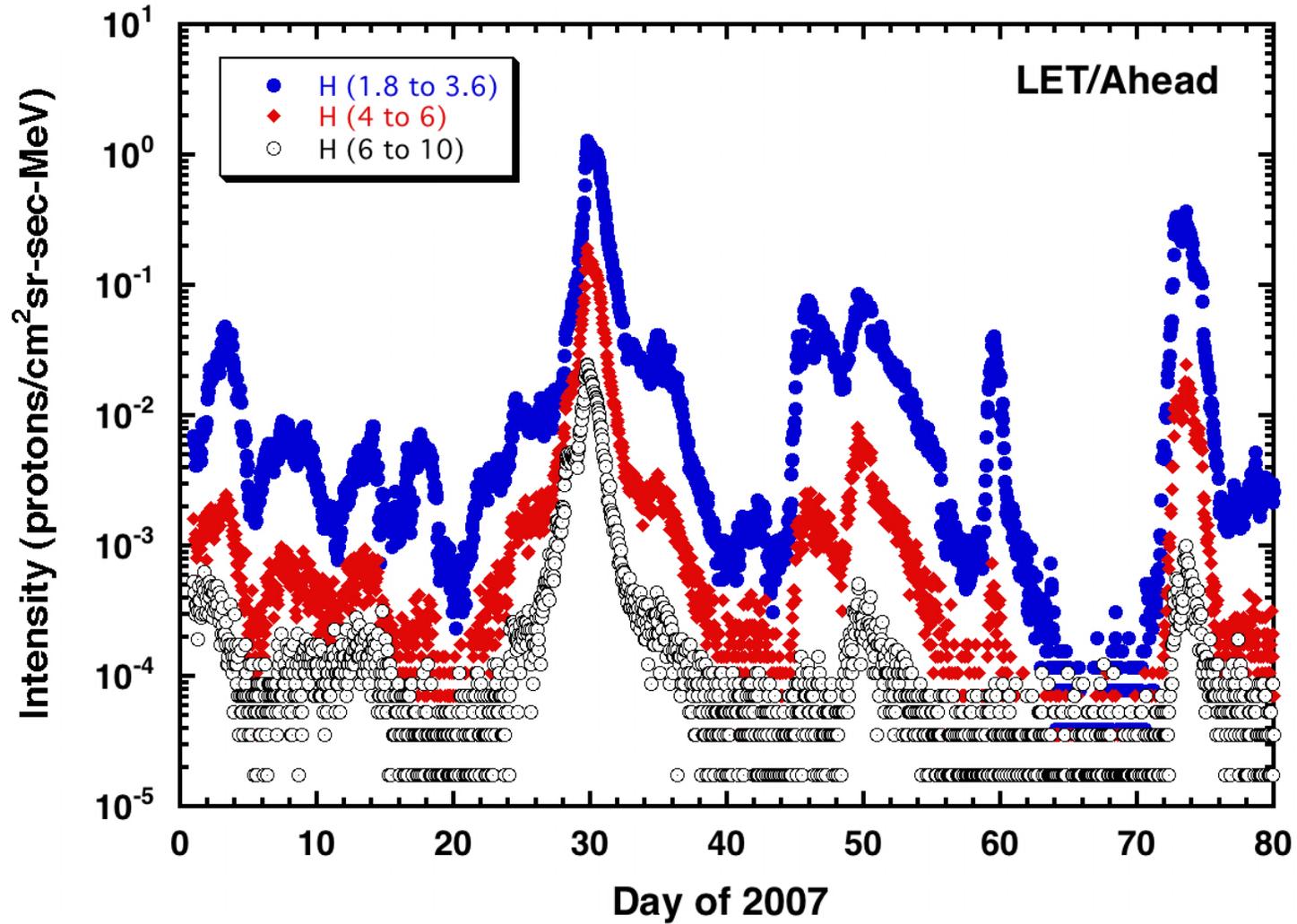
March 15, 2007



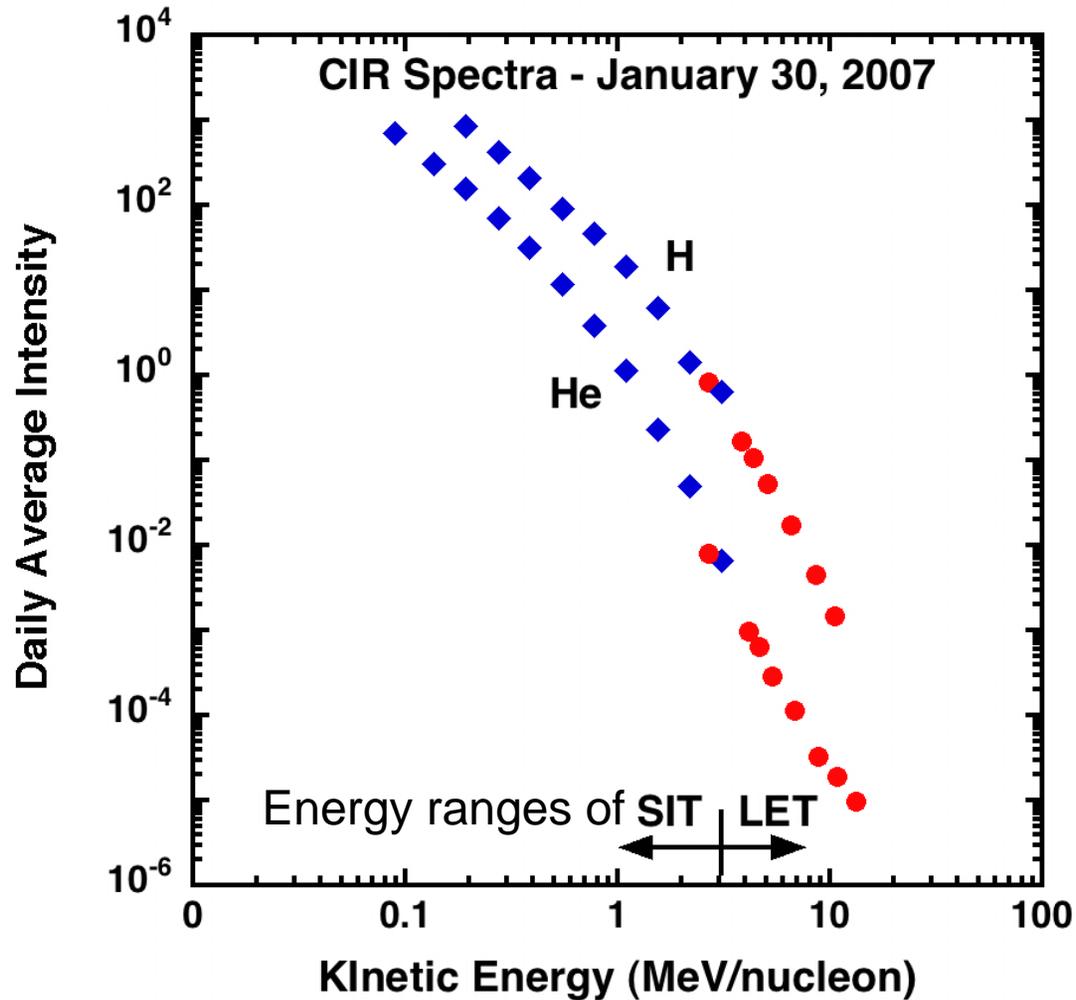
Particle Acceleration in CIRS



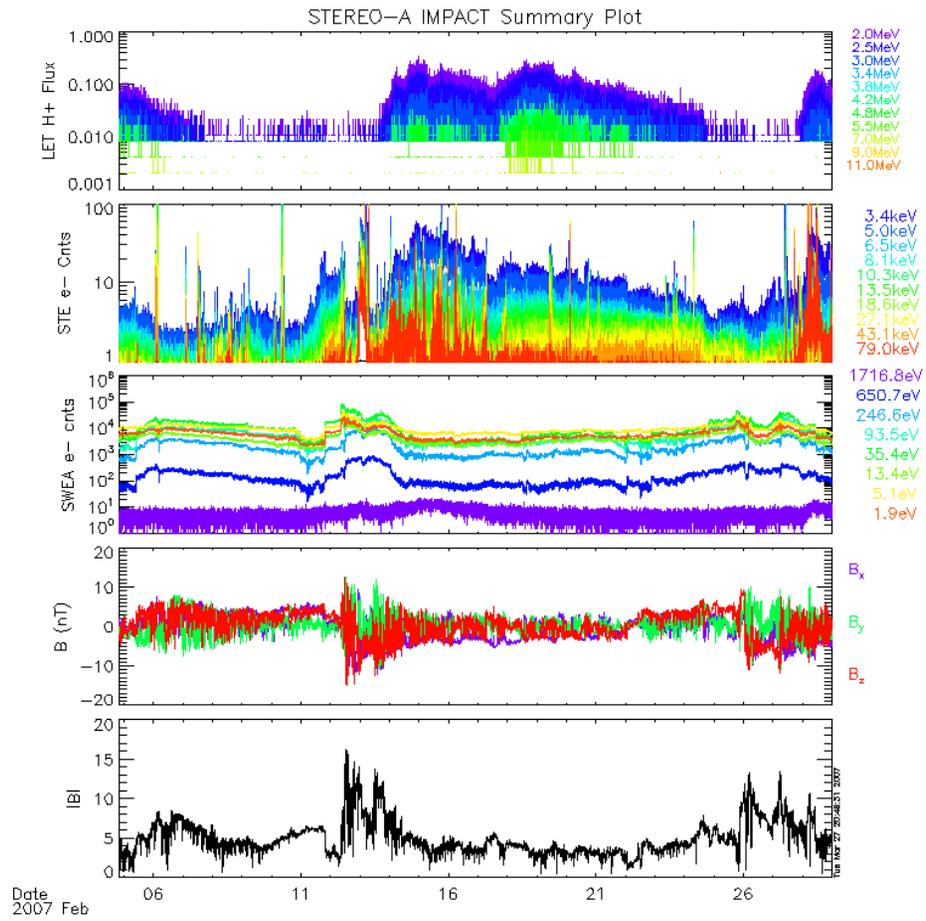
Particle Acceleration in CIRS



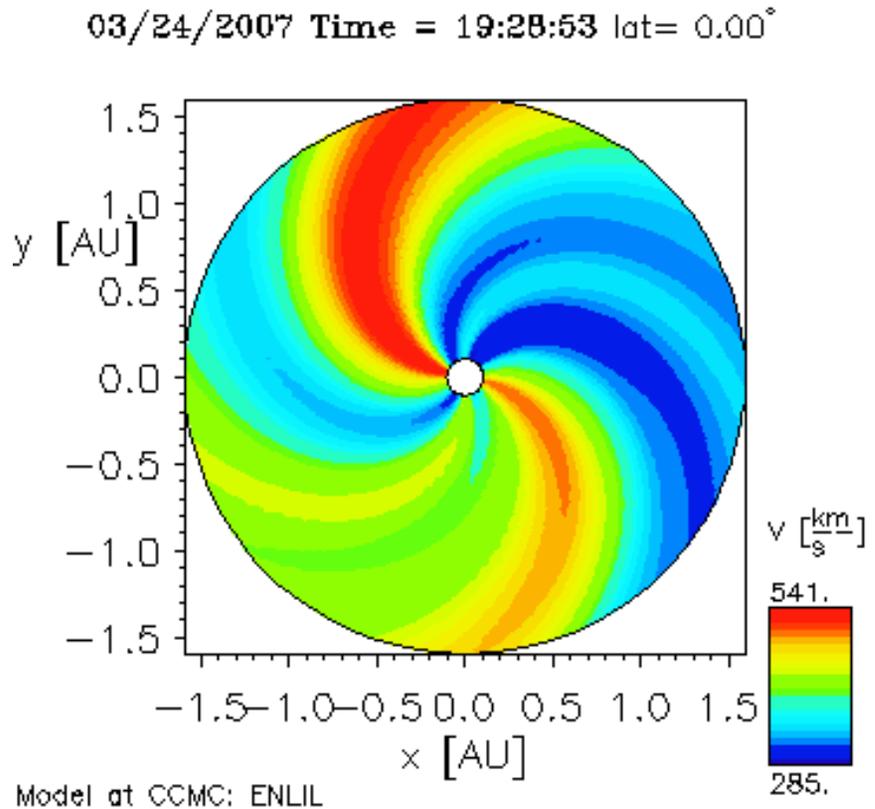
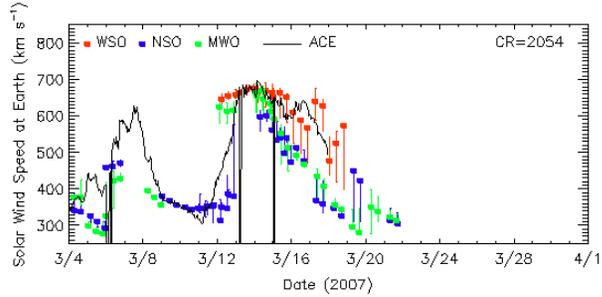
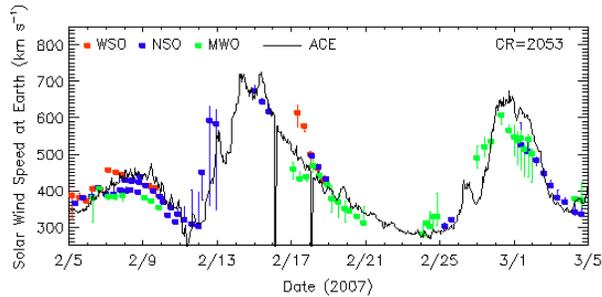
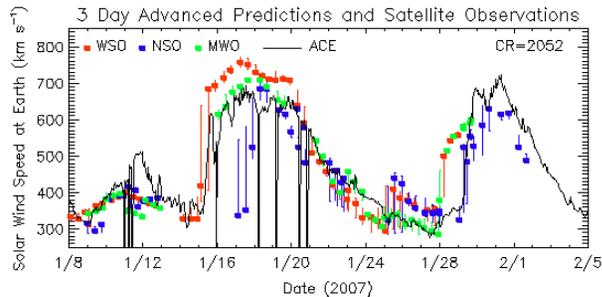
CIR Energy Spectra from ACE/ULEIS and LET



Preliminary browse plot sample for CR 2053 showing LET, STE, SWEA and MAG

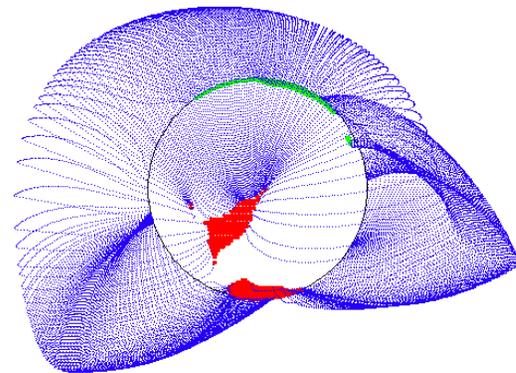
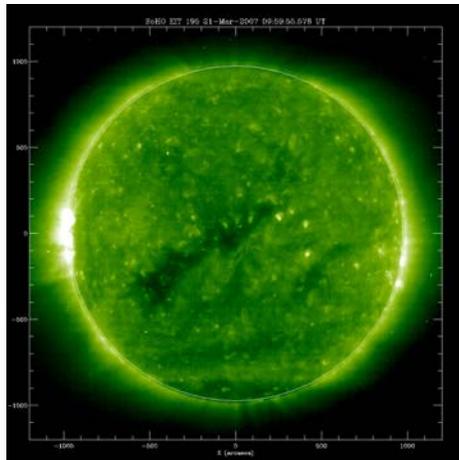
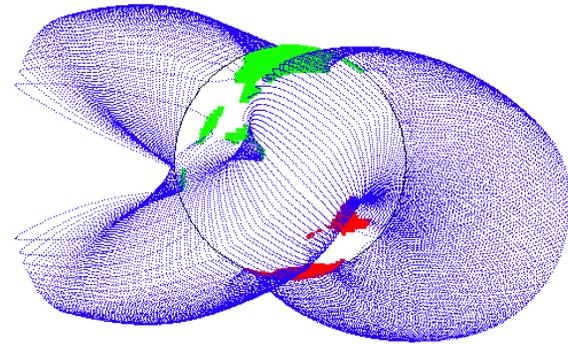
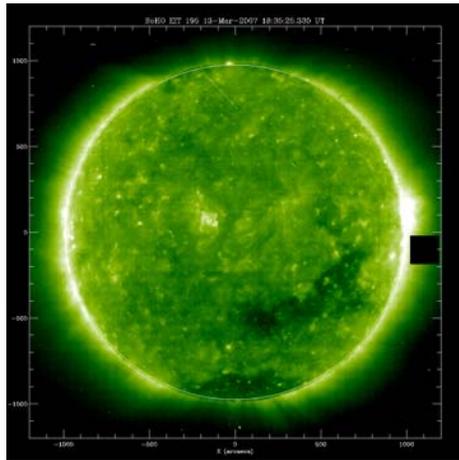


-Solar wind models can be used to analyze what controls the properties of these quiet time events



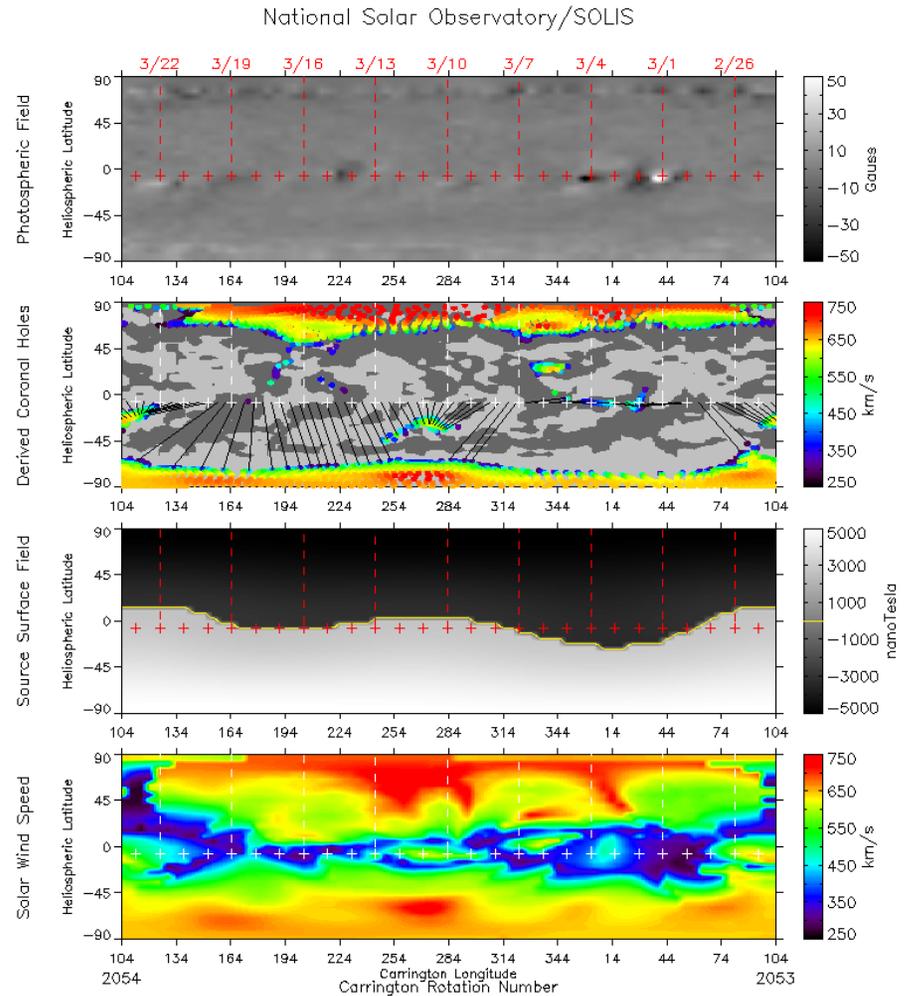
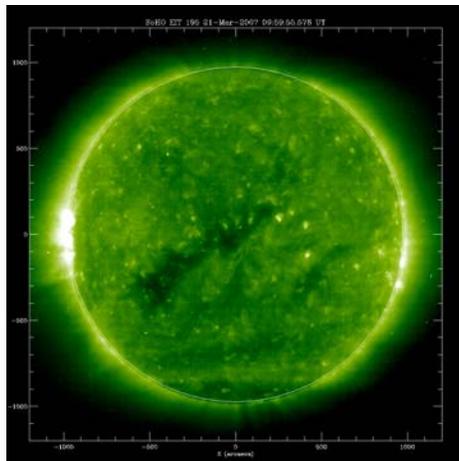
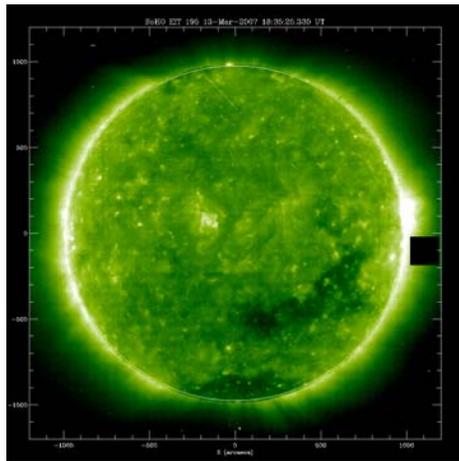
ACE comparisons from SEC website, color plot from CCMC website

Also their ties to coronal structure



SOHO EIT images and PFSS models from GONG website

-a recent source mapping from SEC website

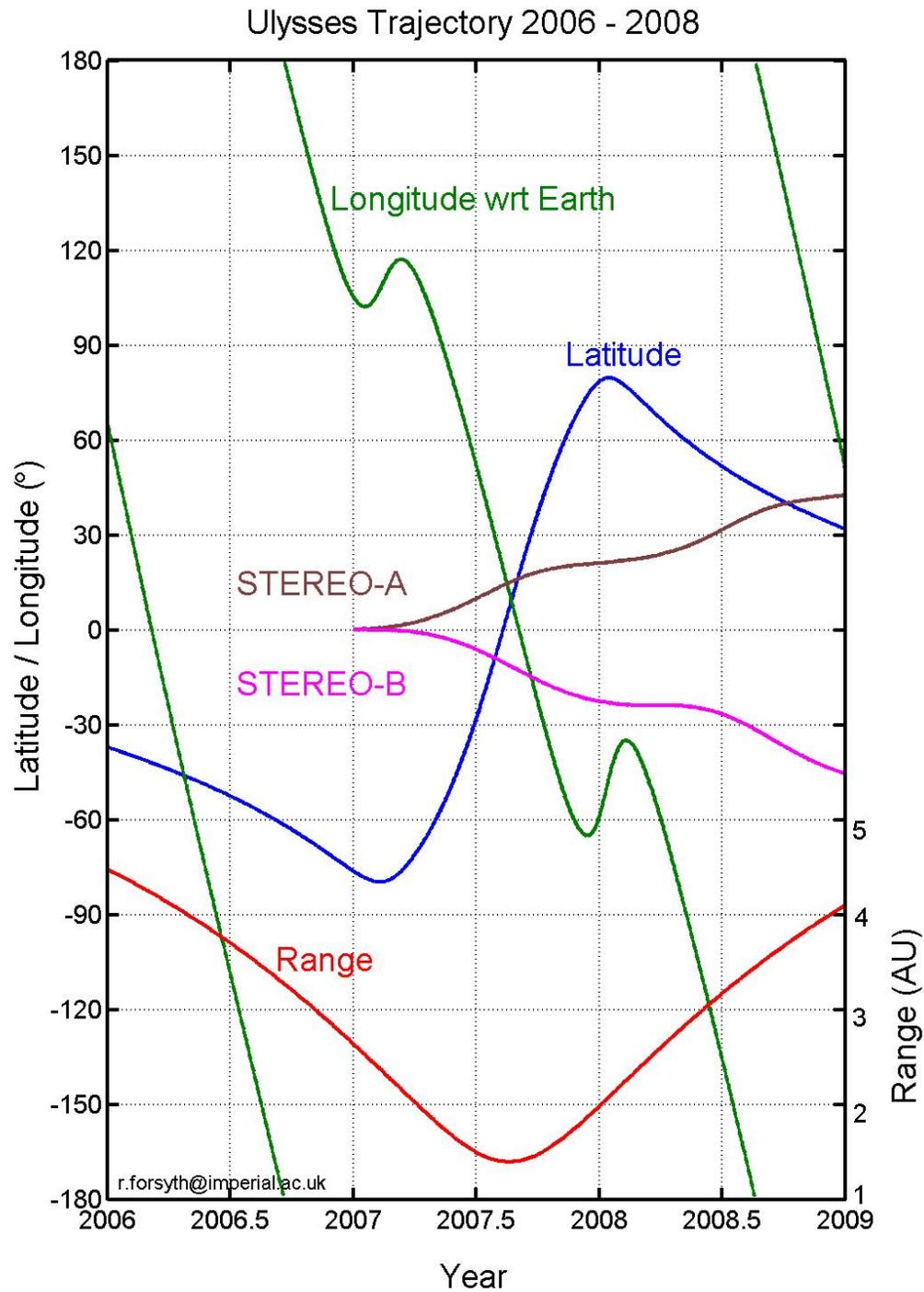


Created 2007 Mar 21 1425 UTC

NOAA/SEC, BOULDER, CO, USA

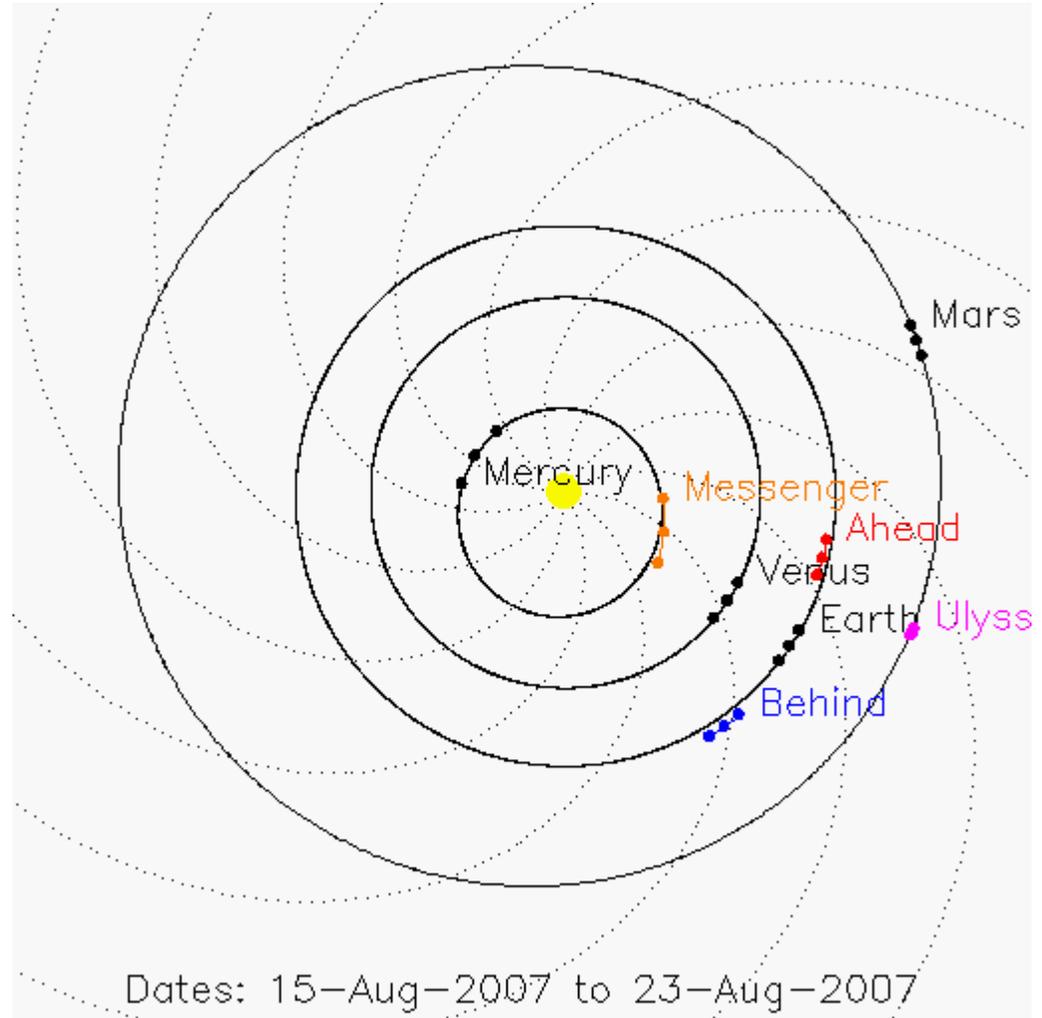
Near Future:

ULYSSES
Ecliptic plane
Passage will
provide added
In-situ science
opportunities
(figure from
R. Forsyth)



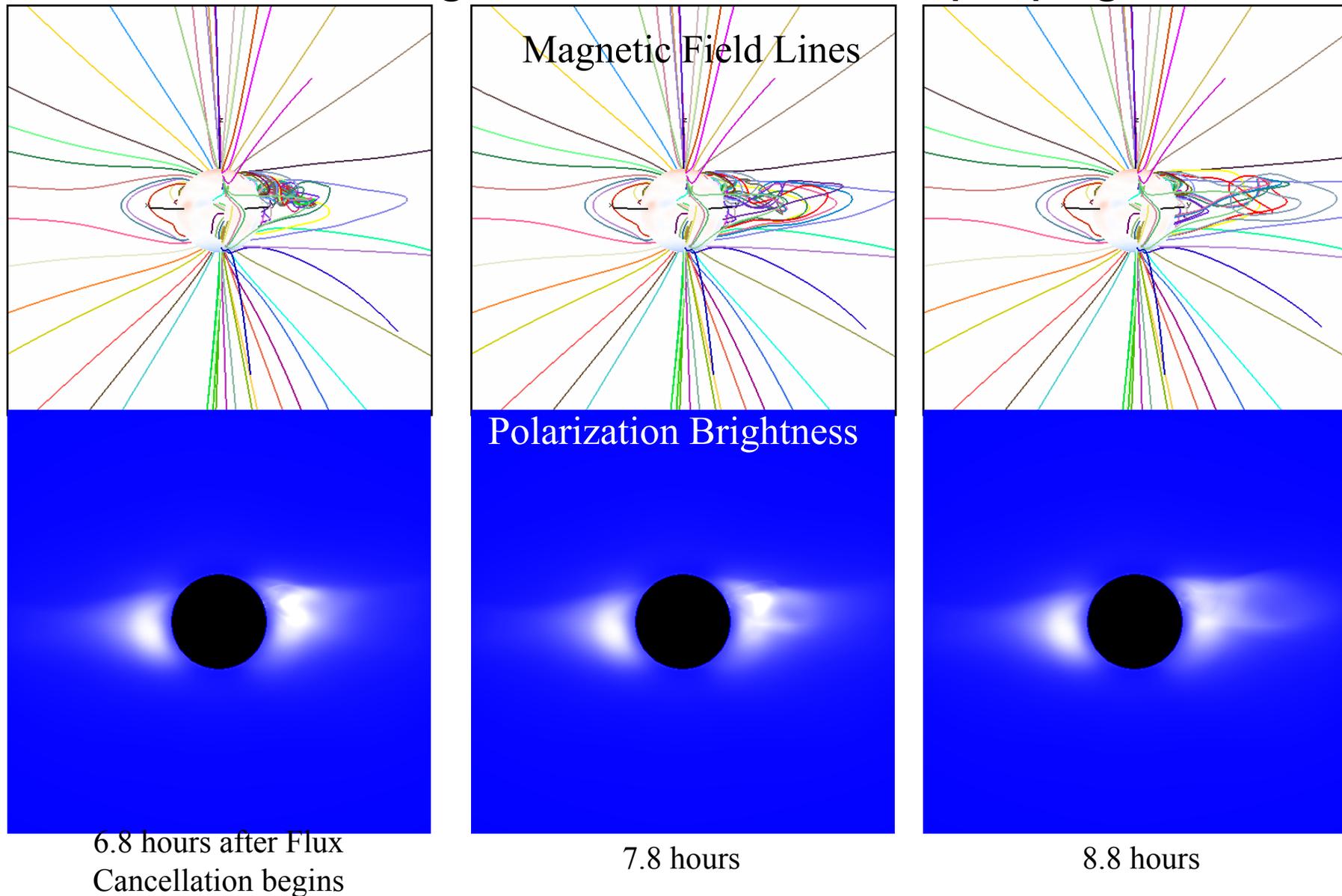
Ulysses ecliptic plane passage

- Here is shown the orbital configuration during the Ulysses ecliptic plane passage on 19-Aug-2007.
- Just before plane passage, **STEREO-Ahead** is close to radial alignment with **Ulysses**.
- **Messenger** is close to alignment with **Ulysses** during plane passage.
- Just after plane passage, **STEREO-Ahead** is close to magnetic connection with **Ulysses**.
- **STEREO-Behind**, Venus, and **Messenger** magnetically connected during same period.



(from Bill Thompson)

New models from SAIC and other team members are addressing CME initiation and propagation



IMPACT E/PO

Current Activities

- Sonification project
 - Put IMPACT/SWAVES sonifications on E/PO website
- Teacher Professional Development Workshops
 - National and California Science Teacher conferences
 - SSL @ UC Berkeley workshops
- Dissemination of teacher guides/resources

Future Additional Activities

- Integrating Solar Spanish resources into program
 - AGU presentation on 'Outreach in US highlighting STEREO EPO program'
 - AGU Family Science Night Presentation in Mexico
 - Self guided hands-on Magnetism activities- translated to Spanish
- Sonification podcasts from IMPACT E/PO site
- Sonification with STEREO images of the week
- Many other important work with sonification possible, but there are not enough funds (update software, web interface, museum exhibit possibilities...etc)

Recent IMPACT Sonification

- LET at high base frequency (440 Hz) in left speaker
- SWEA at lower base frequency (220 Hz) in right speaker
- Pitch changes with color of spectrogram

