

# IMPACT Status and Data Updates

SWG Pasadena, February 3-5, 2008  
Janet Luhmann and  
Peter Schroeder for the IMPACT team

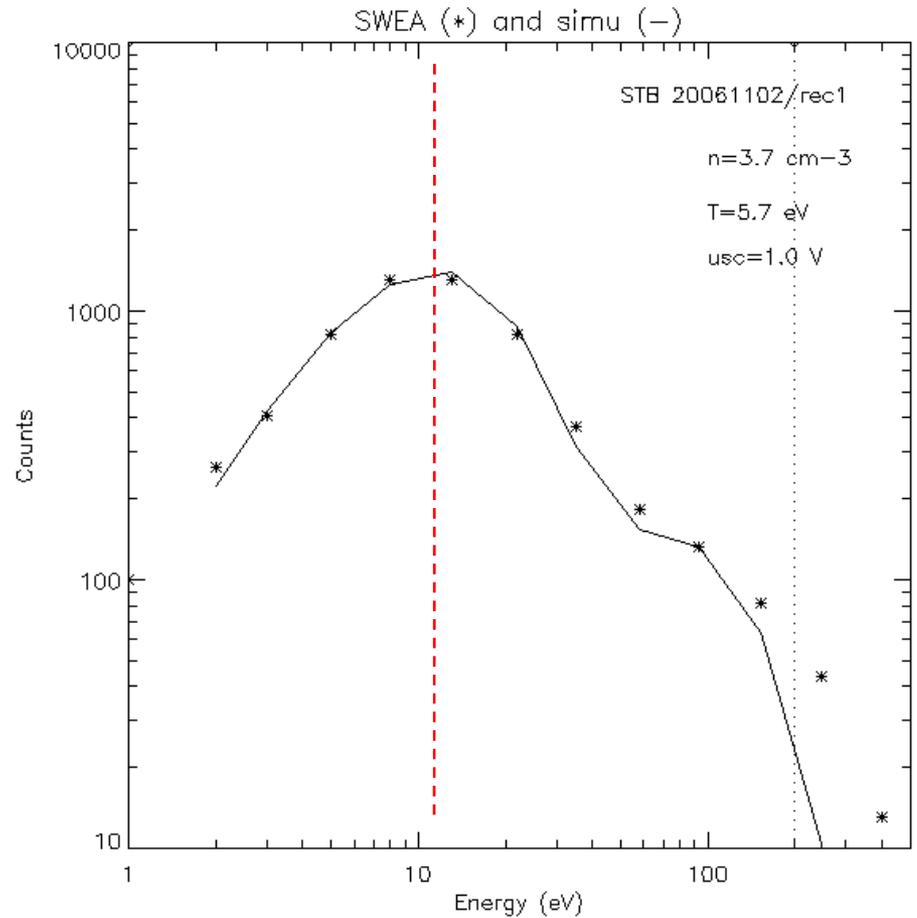
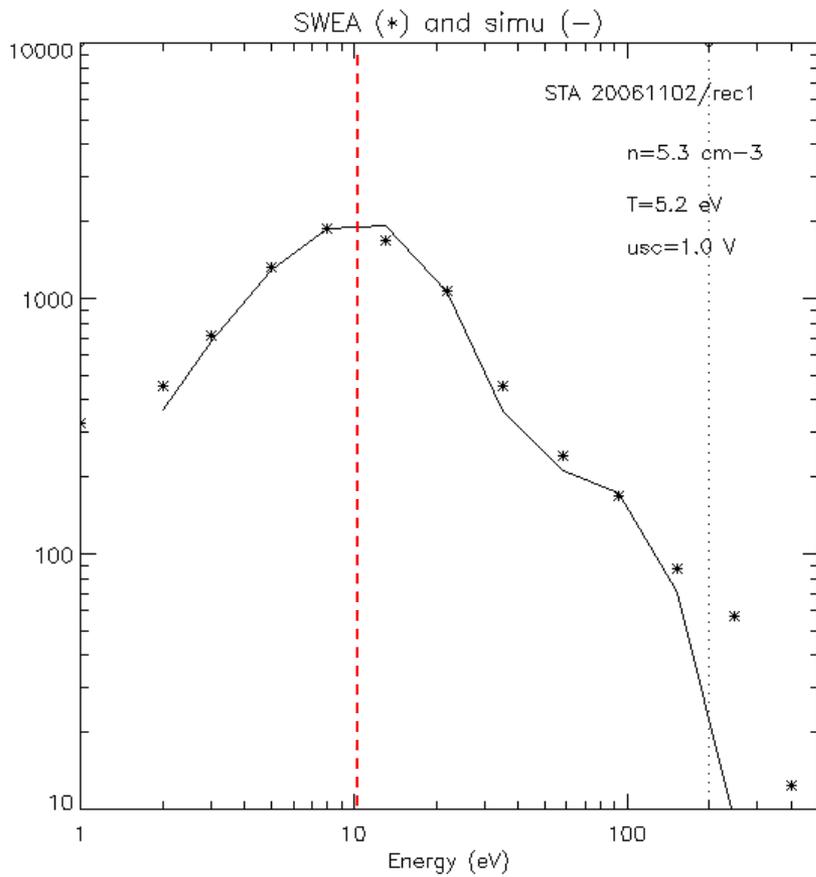
# IMPACT Instrument Status

- SWEA has some issues with spacecraft or instrument charging (possible cause). Bias voltage and temperature testing have been done to determine effect on the core solar wind electron spectrum (which shows degradation that appeared during commissioning phase ~11/03/06)
- STE has been found to detect the x-ray source SCOX-1, in look directions near the heliopause nose. STE ENA observations in that direction must be corrected for this previously unappreciated dominant contribution.
- Boom suite burst mode criteria are undergoing some experimental changes, e.g. longer duration bursts, in a campaign for B. Lauvraud et al. (CESR)
- MAG offsets slowly drifting but manageable
- SEP instruments (SEPT, LET, SIT, HET) all operating nominally but LET anisotropy data interpretation require more information about instrument orientation/mounting

## STEREO-SWEA ISSUES: TIMELINE

- > At the beginning of the STEREO mission (launch on 25th October 2006) the SWEA instruments (first light on 29th October 2006) were operating correctly.
- > After the deployment of the boom on 1st November 2006 (STA 16:30 and STB 19:45) both performed good solar wind electron measurements.
- > The energy spectra can be fitted with the anticipated instrument response and the secondary rate is very low as shown in the Figure 1. The fit assumes that both the solar wind electron core and halo populations arriving at the instrument have Maxwellian distribution.
- > Comparing the measured counts and the density results a nominal sensitivity difference of  $\sim 1.5$  between A and B.
- Core and secondary electron spectrum start looking compromised on both spacecraft on November 3 and continue to have shape alterations that cannot be readily understood or corrected (report available).

Bottom Line: We may remain restricted to SWEA data above a few hundred eV (e.g. super-halo and heat flux electron science). Further tests and analyses ongoing.

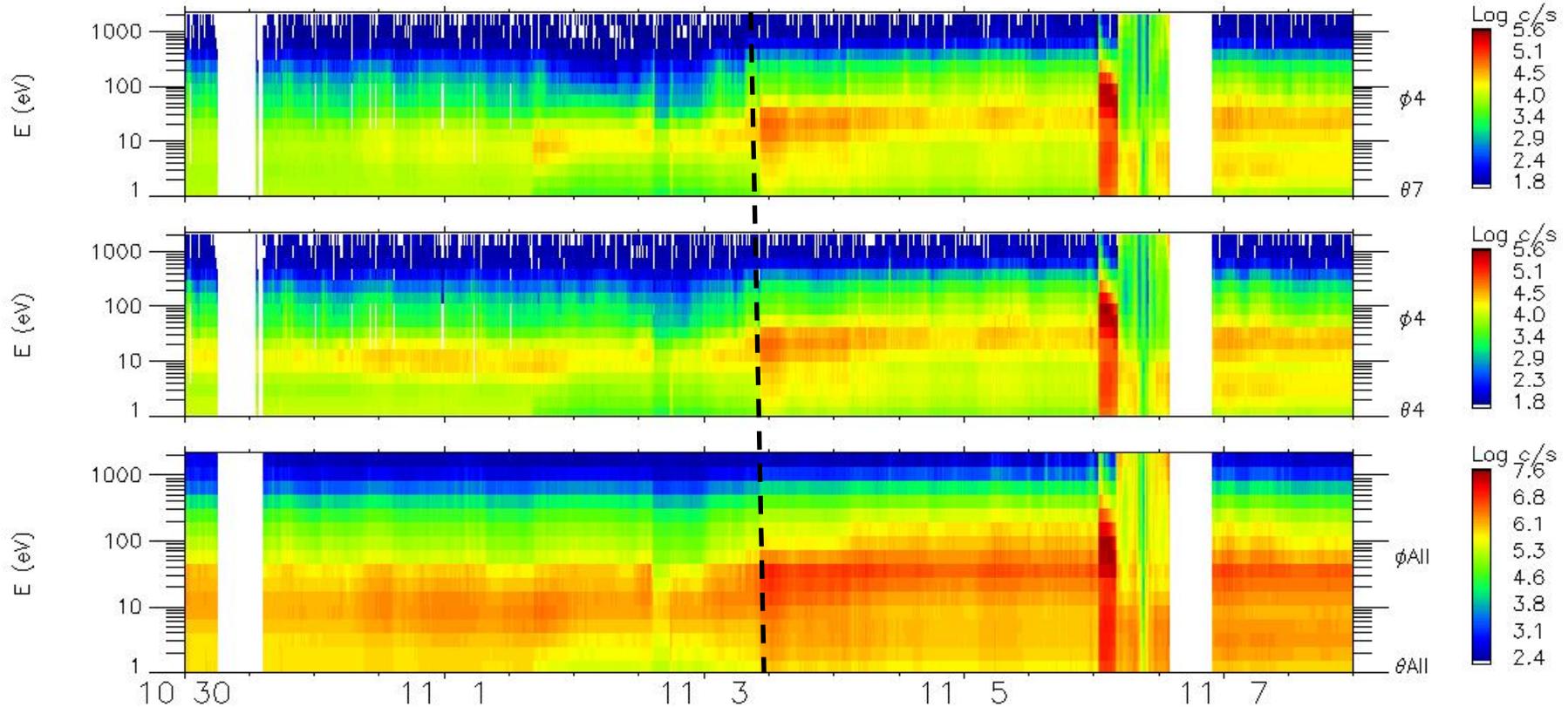


SWEA measurements showing sample early 'normal' core and halo electron spectra obtained on 11/02/06.

STEREO-SWEA

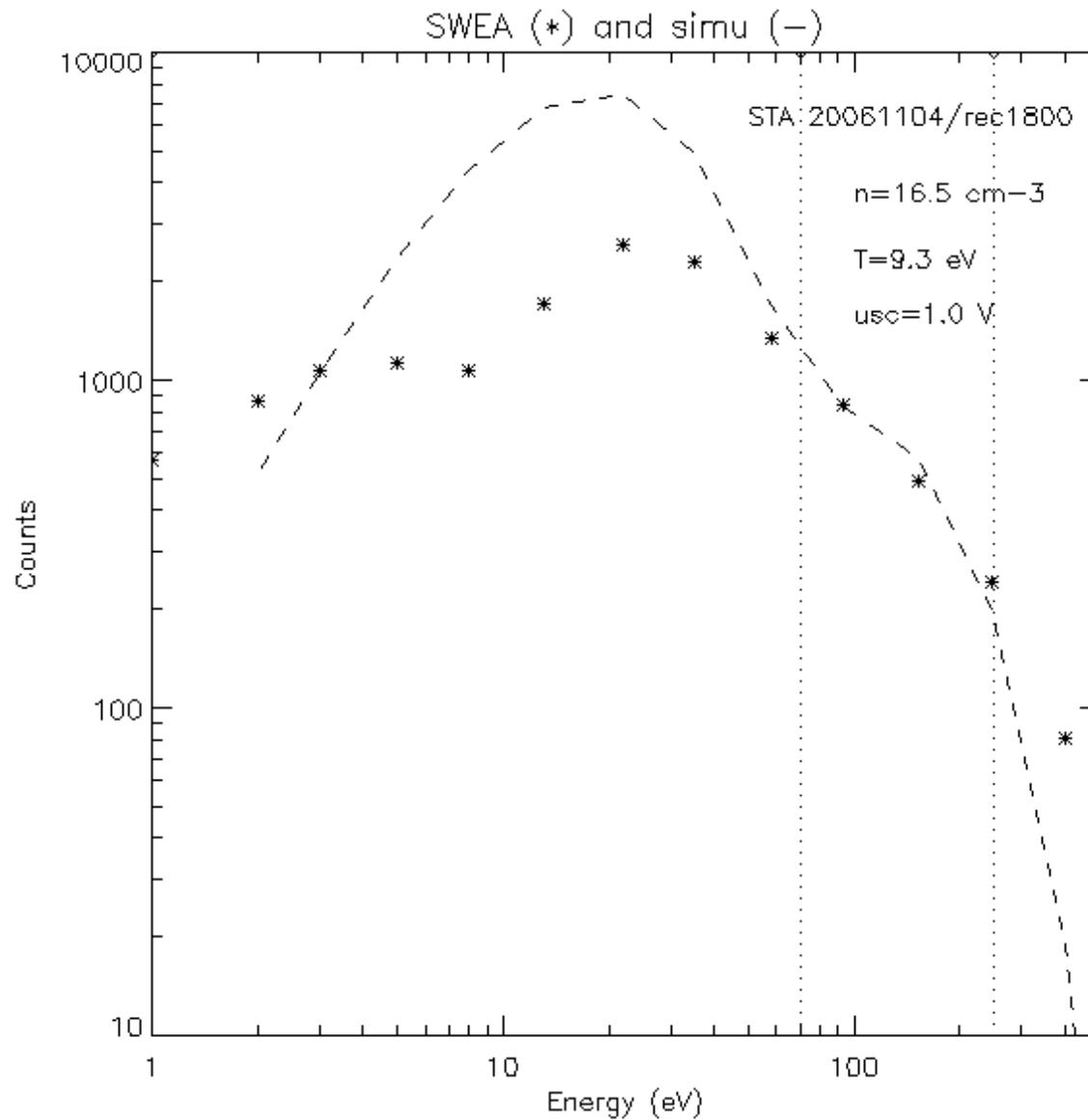
AHEAD (SC 1)

30/Oct/2006



XGSE_RT	61.28	64.71	54.48	23.00	38.67
YGSE_RT	-7.72	-6.97	-4.52	0.88	-14.71
ZGSE_RT	-1.36	2.66	6.15	6.68	-4.66

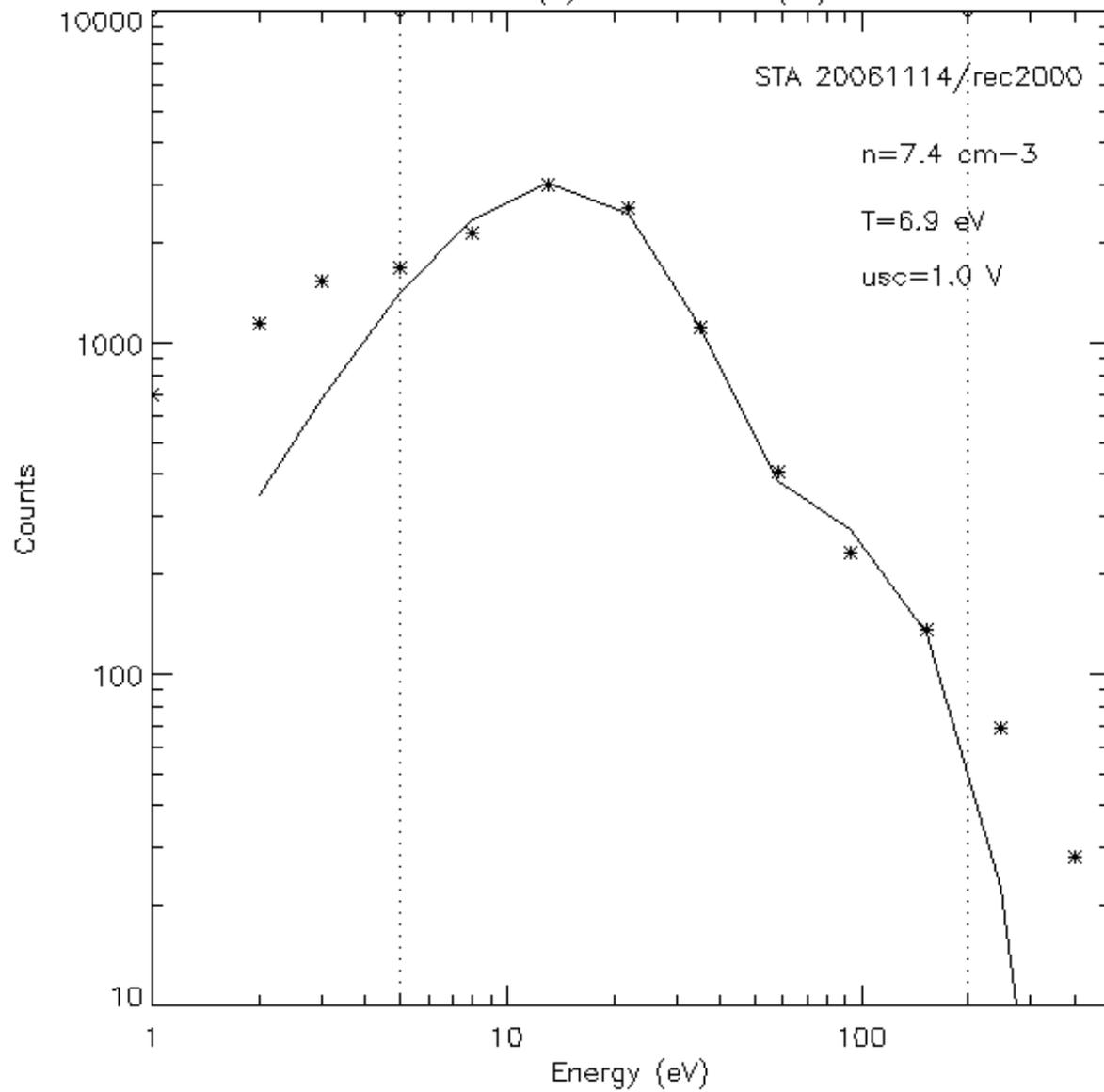
Something changes on Nov. 3, 2006 on STA (also STB) in all look directions



Core distribution and secondary contribution at <100 eV are affected



SWEA (\*) and simu (-)



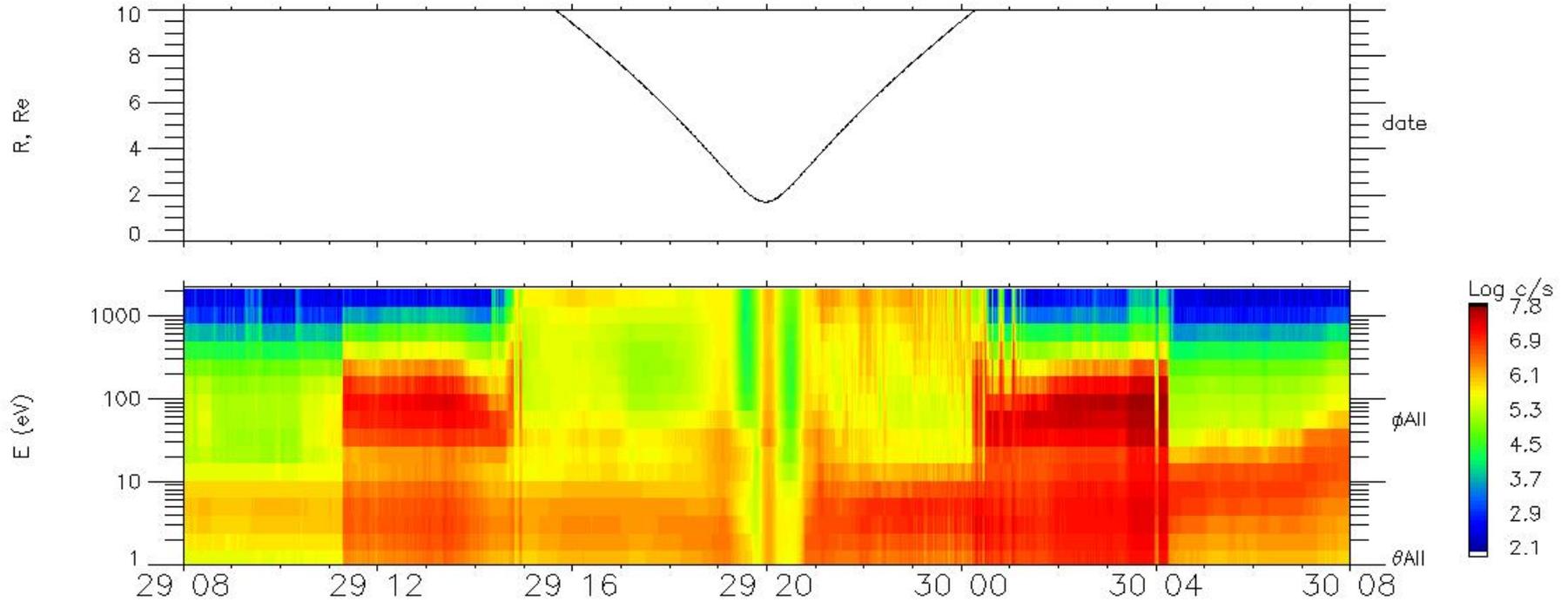
# RECOVERY 2

## Magnetospheric pass 'recovery'

STEREO-SWEA

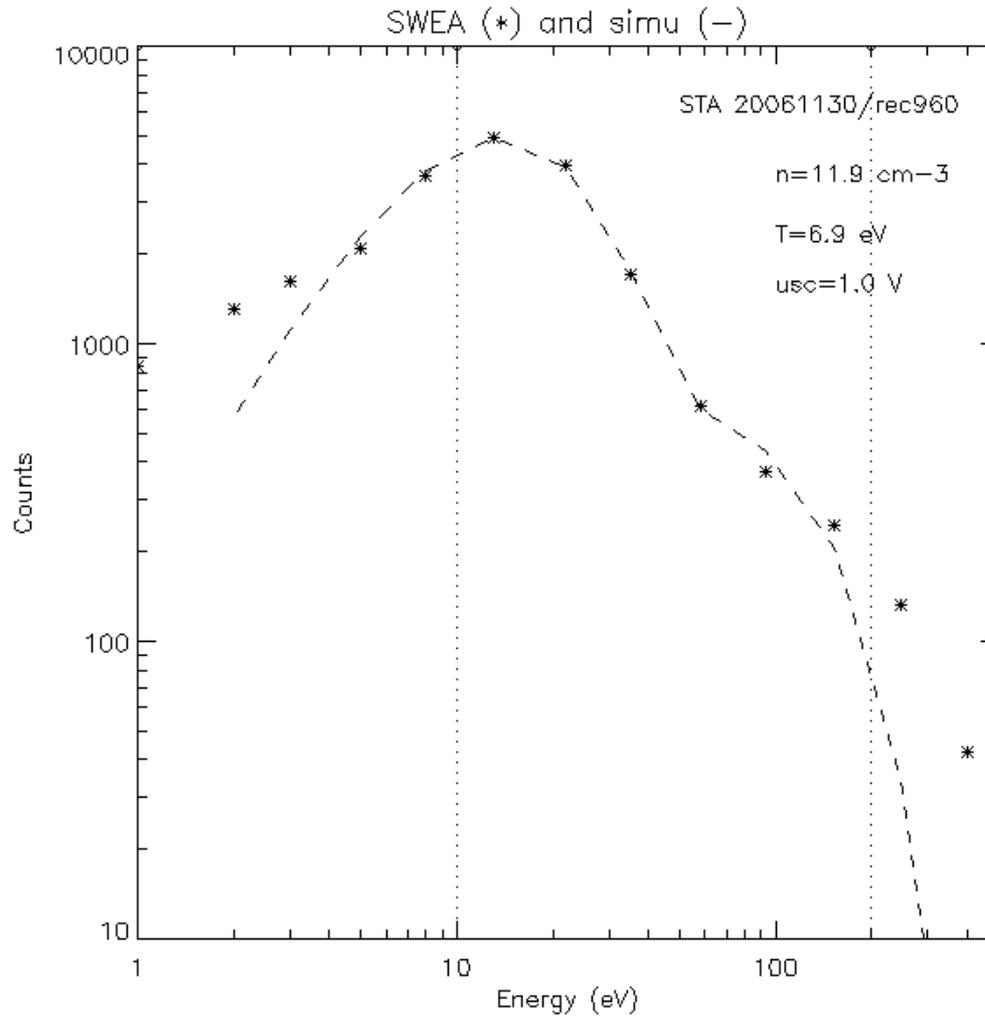
AHEAD (SC 1)

29/Nov/2006



XGSE_RT	18.34	10.97	-1.47	5.53	11.62
YGSE_RT	-3.72	-0.53	0.82	-9.93	-15.26
ZGSE_RT	7.62	6.15	-0.15	-5.59	-6.58

After the third Earth flyby (29/30th November 2006), the SWEA twins got cured (Figure 3) for a short while.

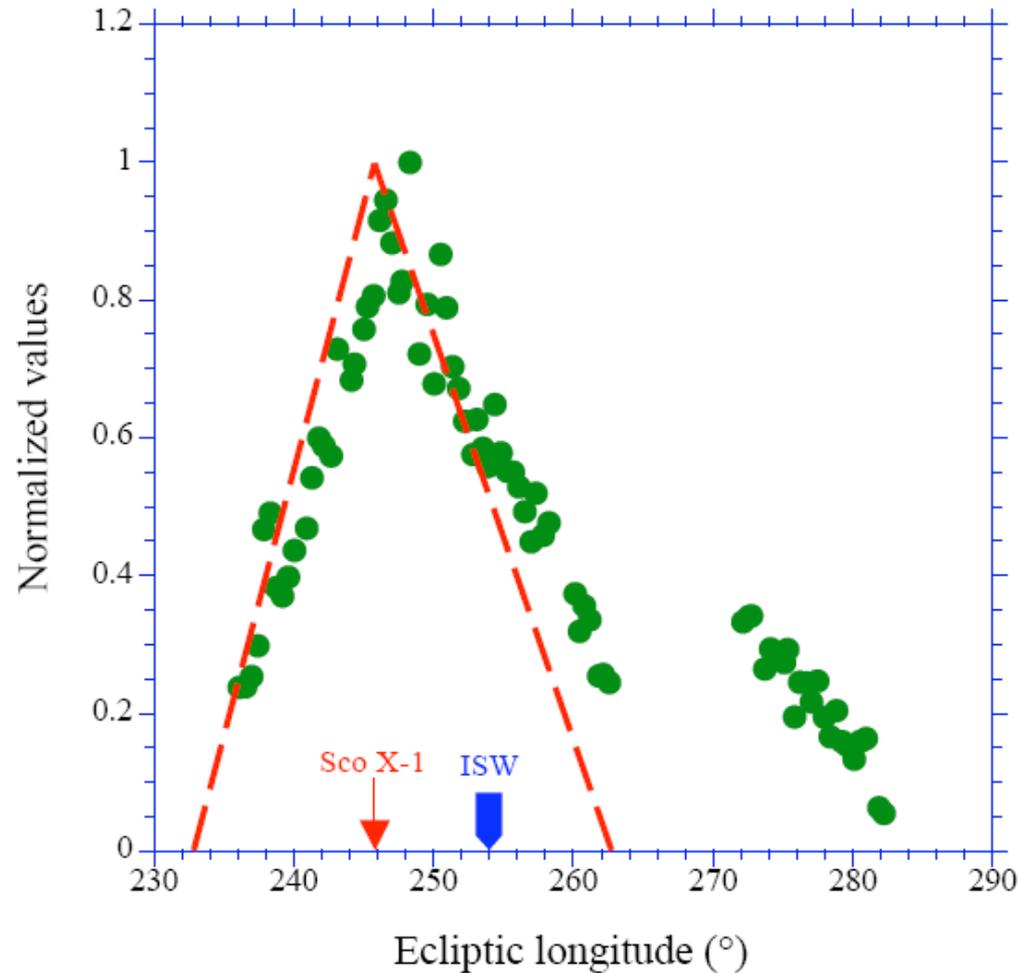


# CHARGING EFFECT??

The effect of the charging, if that is the cause, would have had to rather abruptly begin on 11/03/06 on both spacecraft (boom deployed 11/01/06)

The charging must have been reduced by ionization of the gas expelled by the thrusters and by the hot magnetospheric plasma.

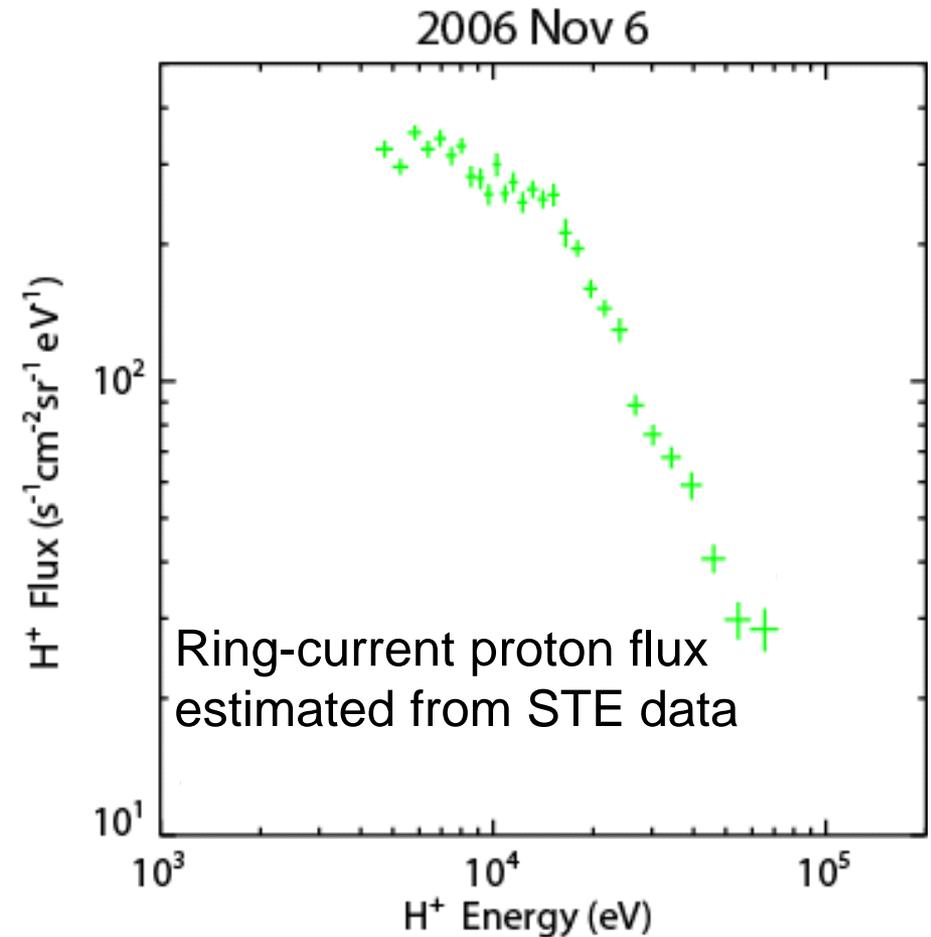
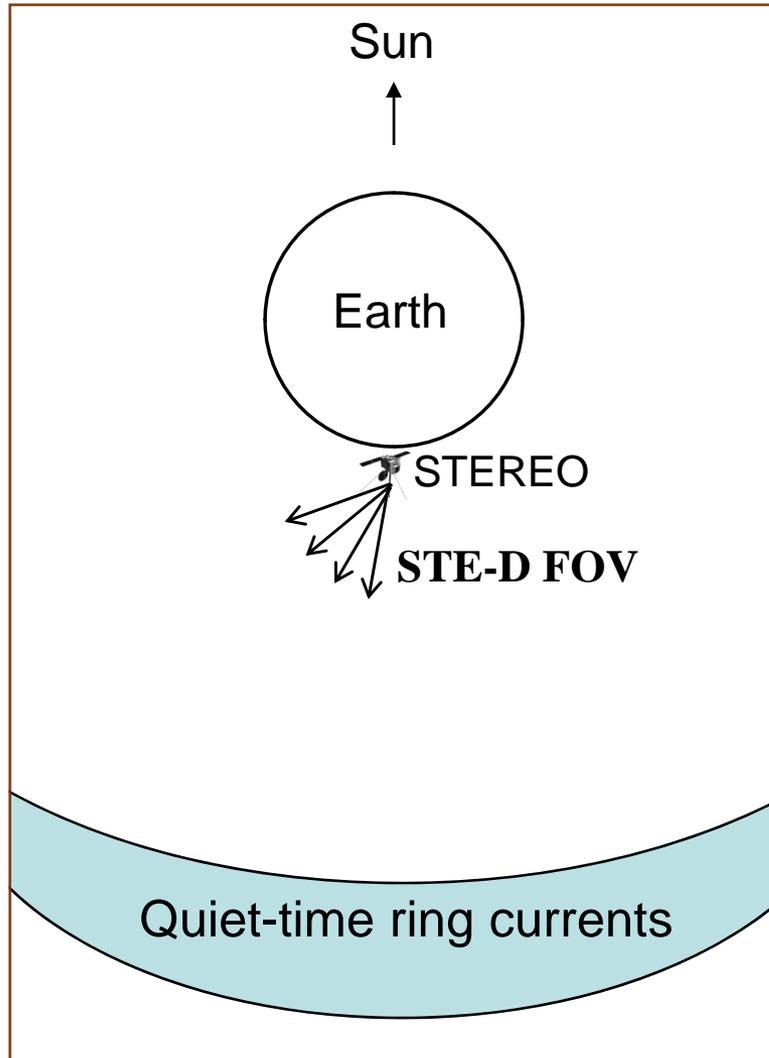
# STE heliospheric ENA reinterpretation: SCO X-1 effect



From Hseih et al. (ApJL, 2009) showing STE counts versus expected response to a point source located at SCOX-1 location. STE ENA observations must all be corrected for this and other extra-heliospheric x-ray sources.

# New: STE detections of terrestrial ENAs when close to Earth

## Quiet-time ring current ENAs from low Earth orbit:

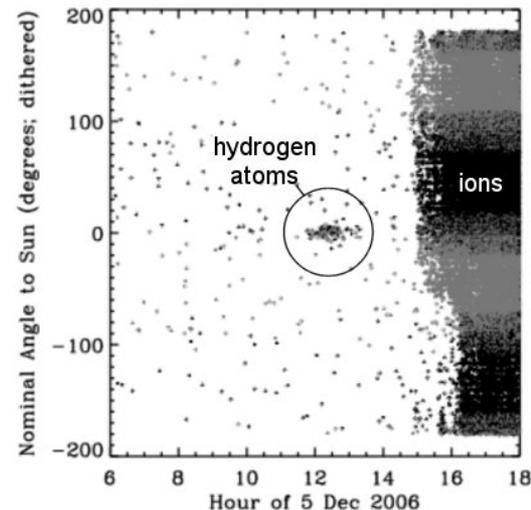


## LET Science Highlight:

Observations with the LET-A and LET-B sensors discovered a burst of neutral H atoms that was emitted from the Sun in coincidence with the X9 SEP event of December 5, 2006. The burst arrived at the Earth ~2.5 hours before the onset of accelerated ions from this event. To our knowledge this is the first reported measurement of energetic neutral atoms (ENAs) from a solar flare/CME event. This result was featured in a NASA Science News release on December 15, 2008 (see [http://science.nasa.gov/headlines/y2008/15dec\\_solarflaresurprise.htm?list214121](http://science.nasa.gov/headlines/y2008/15dec_solarflaresurprise.htm?list214121)) and it has been accepted for publication in Ap. J. Letters in early 2009.



Flare on Dec 5, 2006



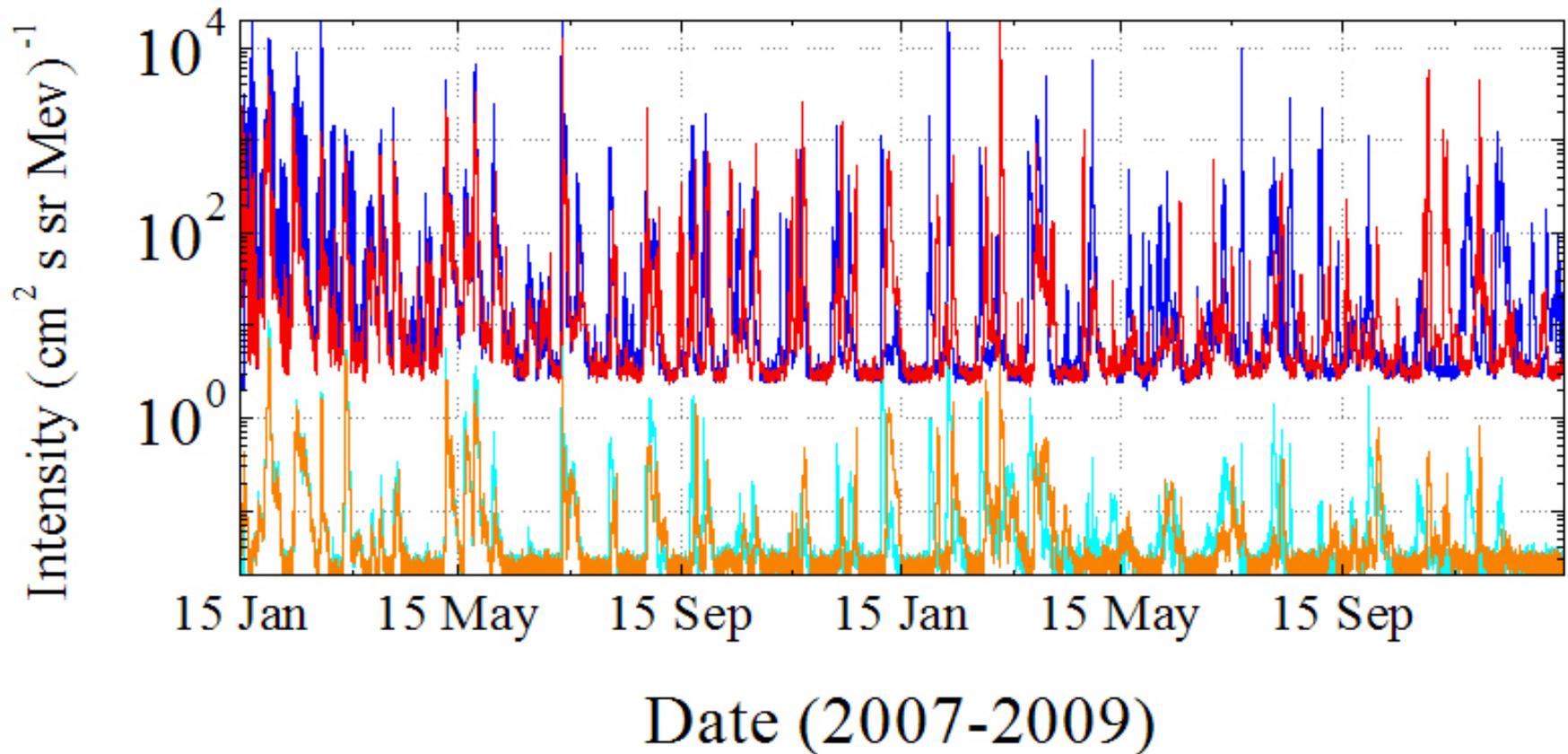
Energetic atom detection by LET

# IMPACT SEPT Collected Data Showing Record of CIRs to Date: These data sets offer exceptional CIR study opportunities.

## STEREO SEPT SCIENCE DATA

Ion intensities Jan 15, 2007 - Jan,15 2009 (1h-ave)

— Behind 101-137 keV      — Ahead 101-137 keV  
— Behind 1.6-2.2 MeV      — Ahead 1.6-2.2 MeV



# Current IMPACT Level 1 Data Holdings

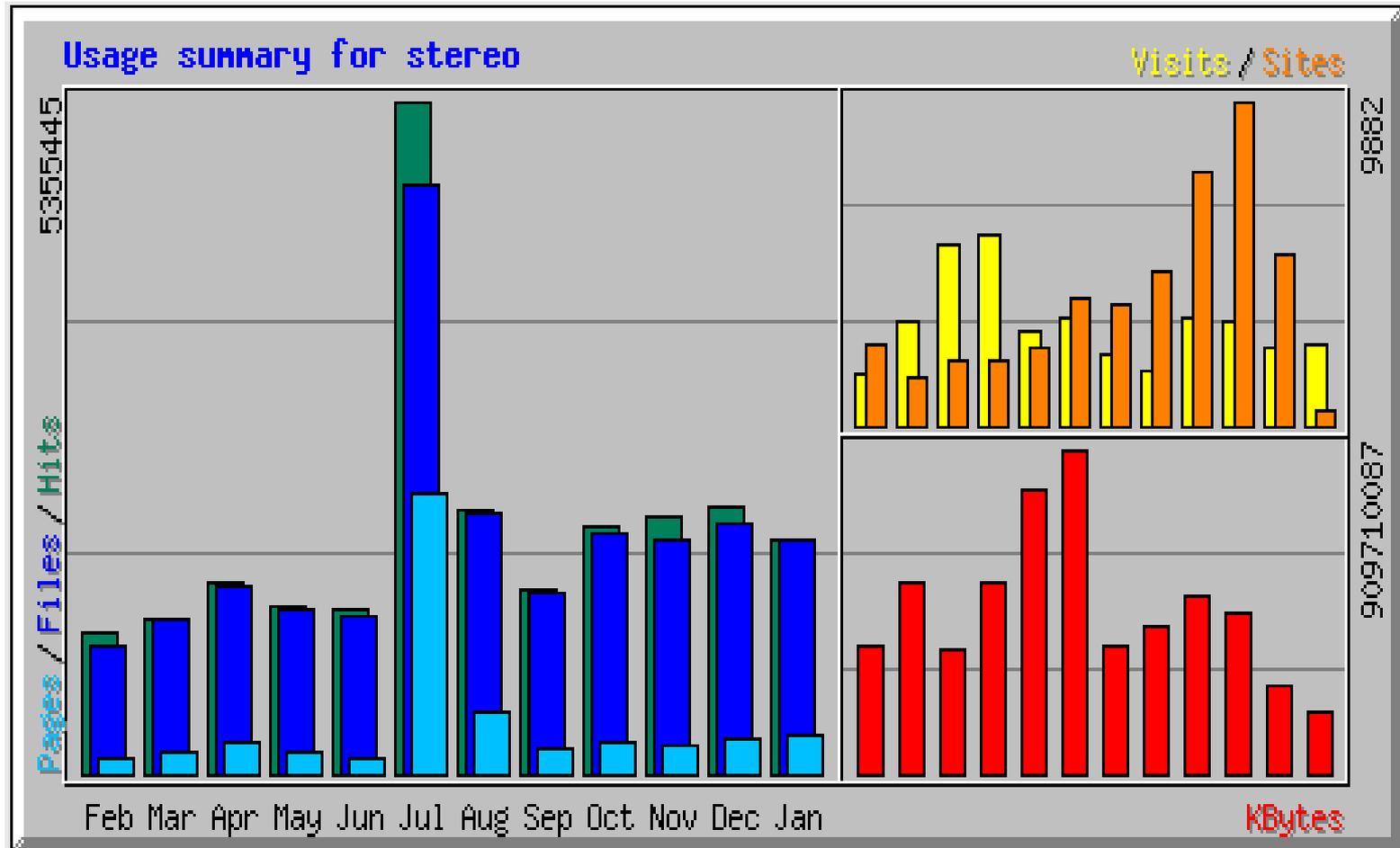
Instrument	1 <sup>st</sup> Date (A)	1 <sup>st</sup> Date (B)	Last Date
MAG	2006 Nov 2	2006 Nov 2	2008 Oct 31
SWEA	2006 Oct 28	2006 Oct 28	2009 Jan 15
STE	2006 Oct 28	2006 Oct 28	2008 Dec 31
LET	2006 Nov 14	2006 Nov 13	2008 Nov 30
SEPT	2006 Dec 12	2006 Dec 12	2008 Nov 30
SIT	2007 Mar 15	2007 Mar 15	2008 Nov 30
HET	15 minutes averages through 2008 Jan 31		

(note: command log now online at [stereo.ssl.berkeley.edu](http://stereo.ssl.berkeley.edu))

# IMPACT website/data access@UCB

Summary by Month										
Month	Daily Avg				Monthly Totals					
	Hits	Files	Pages	Visits	Sites	KBytes	Visits	Pages	Files	Hits
<a href="#">Jan 2009</a>	66483	66233	11187	88	467	167141964	2483	313242	1854529	1861550
<a href="#">Dec 2008</a>	68333	64595	9288	77	5219	244492289	2416	287939	2002448	2118344
<a href="#">Nov 2008</a>	67785	61568	7539	104	9882	446948393	3140	226185	1847061	2033564
<a href="#">Oct 2008</a>	63079	61795	8061	104	7687	500405362	3232	249900	1915675	1955470
<a href="#">Sep 2008</a>	48466	47868	6456	55	4677	415823722	1671	193709	1436054	1454001
<a href="#">Aug 2008</a>	67578	66642	15395	68	3683	361381550	2126	477250	2065918	2094919
<a href="#">Jul 2008</a>	172756	150983	71866	106	3905	909710087	3305	2227856	4680496	5355445
<a href="#">Jun 2008</a>	43694	41849	4159	97	2417	789417189	2920	124795	1255485	1310827
<a href="#">May 2008</a>	42868	42493	5306	186	1992	533237318	5779	164498	1317286	1328917
<a href="#">Apr 2008</a>	50252	49899	8184	181	1923	345843454	5451	245525	1496997	1507581
<a href="#">Mar 2008</a>	39610	39328	5370	103	1424	533390319	3221	166496	1219169	1227931
<a href="#">Feb 2008</a>	38502	35240	3711	54	2437	357156724	1567	107625	1021972	1116581
<b>Totals</b>						<b>5604948371</b>	<b>37311</b>	<b>4785020</b>	<b>22113090</b>	<b>23365130</b>

# IMPACT website/data access@UCB



# Now Available

- HET 1 min Level 1 data in cdf
- “Level 2” merged Key Parameters (1 min) including MAG, PLASTIC Moments, SWEA and LET data in ascii
- “Level 3” Event lists (Shocks, SIRs, ICMEs...)
- Improved boom browse plots with added SWEA electron heat flux pitch angle spectrograms, plus SEP browse plots. Will soon add burst mode intervals to browse plots as well.
- New Burst mode triggers
- CDAW-served IMPACT MAG, SWEA and LET Level 1 files (Note we need to check content of CDAW server)

# Recent Progress

- **Processing**

We are keeping reasonably up-to-date on Level 1 data release except for HET, whose software is still being worked (Level 2 data is available in ascii and cdf, though).

Automation of many basic tasks including routine summary plot and data ingestion from UCLA and other sources has been completed.

We are working up a “quick start” guide for users of our data sets emphasizing the different interfaces and software options people have.

- **Website**

Improvements include access to magnetometer burst data and progress on integrating more data for the Level 2 ‘merged’ in situ data set.

# IMPACT Team Current Science Activities List (partial)

Yan Li, ICMEs and solar signatures

Emilia Kilpua- small transients, slow solar wind structure

Ying Liu- Sun-to-1AU event tracking and modeling

Linghua Wang and Bob Lin- heliospheric and magnetospheric ENAs, SEP e-

Lan Jian- Ion cyclotron waves

Chris Russell-Current sheets, dust effects

Benoit Luvraud-reconnection signatures

A. Opitz-solar wind stream structure

J-A. Sauvaud- magnetospheric observations

J. Gosling and S. Eriksson-reconnection signatures

R. Mewaldt-SEP events

R. Leske- CIRs and anisotropies

M. Weidenbeck-impulsive SEPs

T. von Rosenvinge- SEP events

R. Gomez, B. Heber, R. Mueller-Mellin-CIRs

D. Odstrcil-Sun to 1 AU simulations

J. Linker, Z. Mikic and Pete Riley-Sun to 1AU simulations

J. Luhmann ,C. Lee +coauthors-solar wind structure

P. Schroeder- STEREO in-situ data in VHO