



PLASTIC

PLAsma And Supra-Thermal
Ion Composition investigation



“STEREO PLASTIC STATUS REPORT”

A.B. Galvin

Lorna Ellis (Data)

Mark Popecki (Operations)

Team (Science)

STEREO SWG
Meredith NH
October 27, 2009

For those with their laptops

- <http://www.winnipesaukee.com/weircam/>

The screenshot shows a web browser window displaying the WeirsCAM website. The browser's address bar shows the URL <http://www.winnipesaukee.com/index.php?pageid=weircam>. The website header includes the "Winnepesaukee NEW HAMPSHIRE" logo and a navigation menu with links to "WeirsCAM", "Home", "Forums", "Photo Gallery", "Lake Links", "Classifieds", "Local Weather", "Blogs", "Quiz", and "Water Temperatures".

The main content area features a "WeirsCAM.com" logo and the text "Live images from Lake Winnepesaukee, New Hampshire". Below this is a live video feed titled "Live view of Lake Winnepesaukee from Weirs Beach, New Hampshire". The video shows a wide view of the lake under a cloudy sky, with a wooden deck and railing in the foreground. A temperature display in the top left of the video frame shows "40 F".

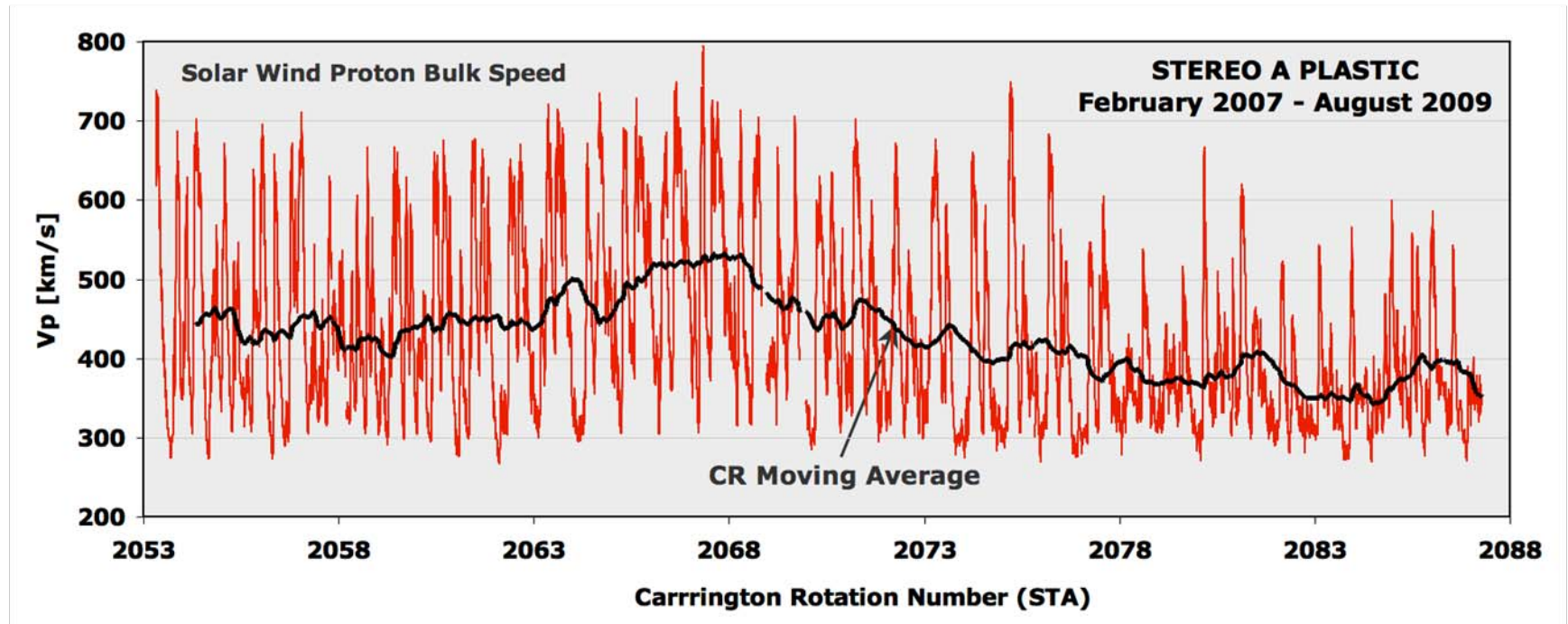
Below the video feed, there is a weather widget for "Laconia, NH - 7:55 AM" showing a temperature of "37°" and "Mostly Cloudy" conditions. Other widgets include "Anchor Marine CAM" and "Snake Eyes".

At the bottom of the video frame, a timestamp reads "Lake Winnepesaukee WeirsCAM - 10/27/09 08:20:26 AM" and a note states "The WeirsCAM is active from sunrise to sunset daily. The image is updated every 10 minutes".

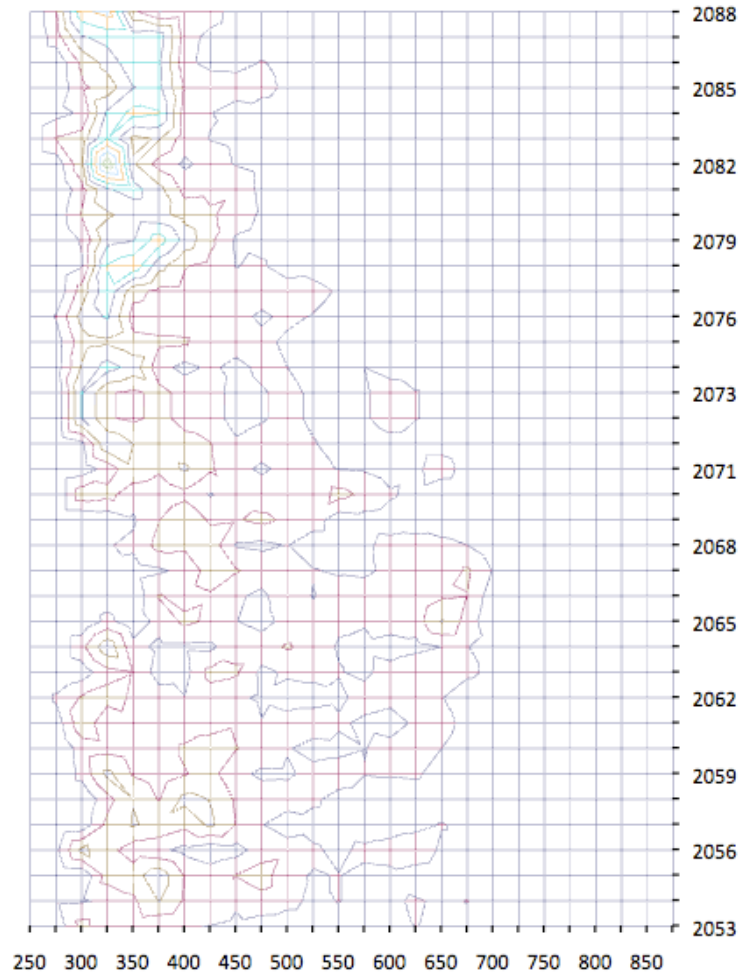
The browser's status bar at the bottom indicates "Loading 'http://www.winnipesaukee.com/index.php?pageid=weircam', completed 21 of 22 items".

Solar Wind Speed Profile

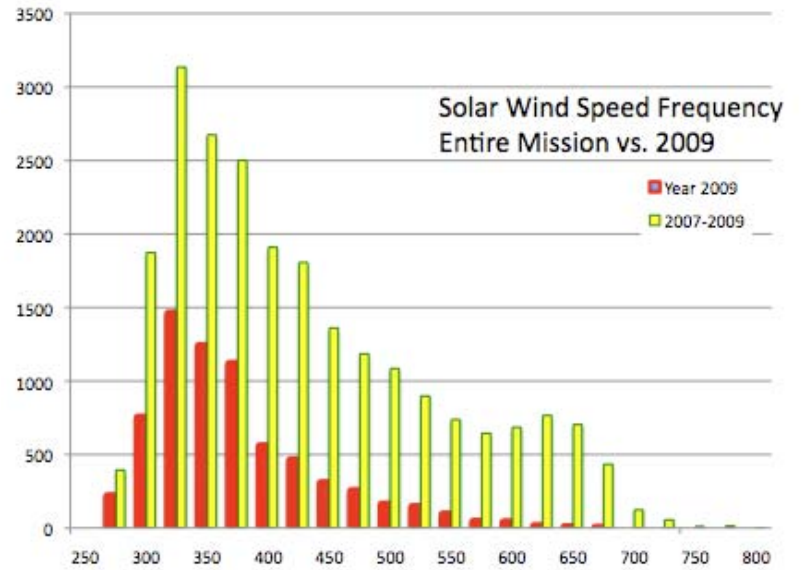
Mission Overview



From Galvin et al. 2009

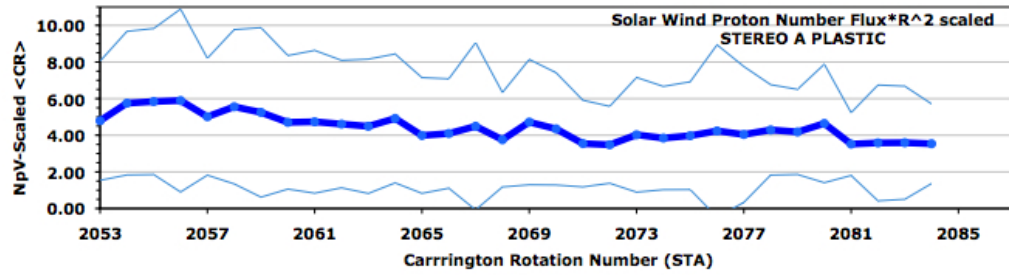
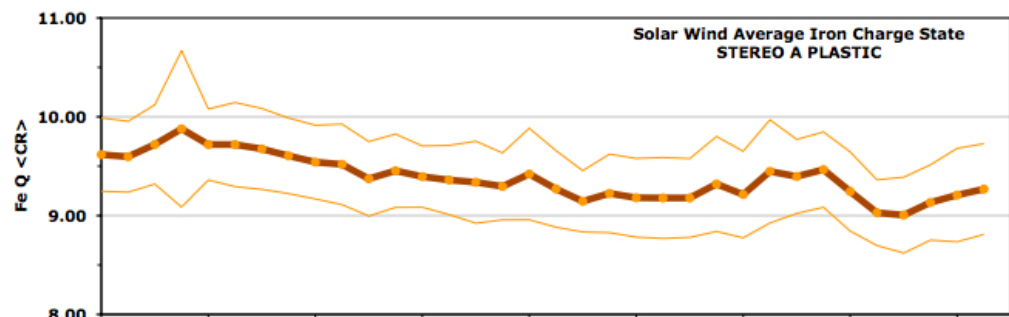
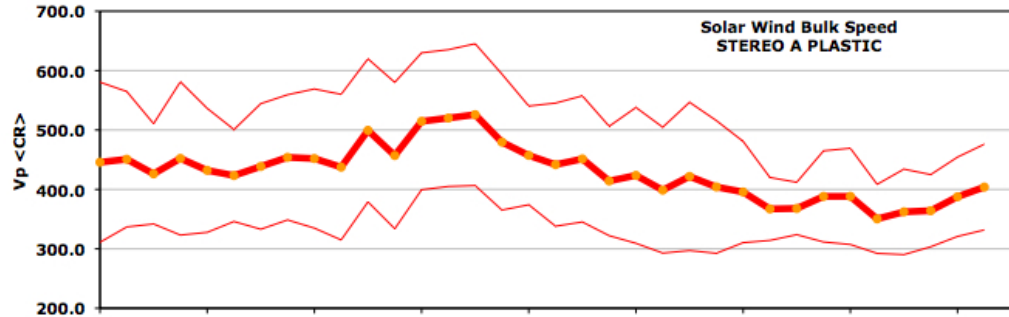
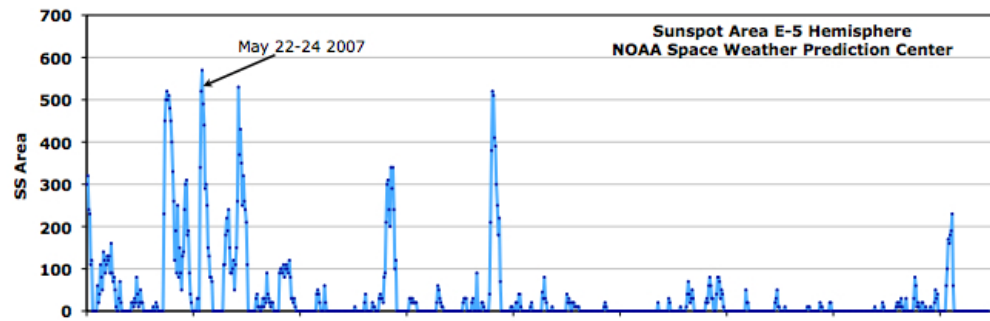


Solar Wind Speed



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Solar Wind Profile in 2009 is different than in the previous years (2007-2008)

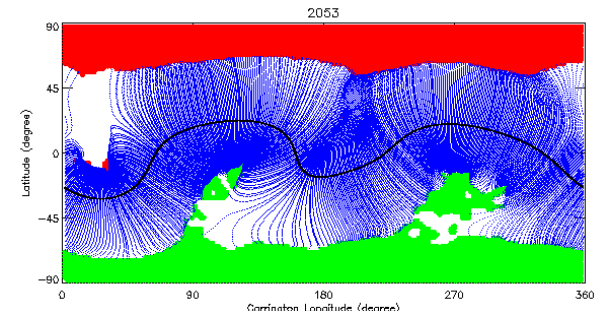


G1

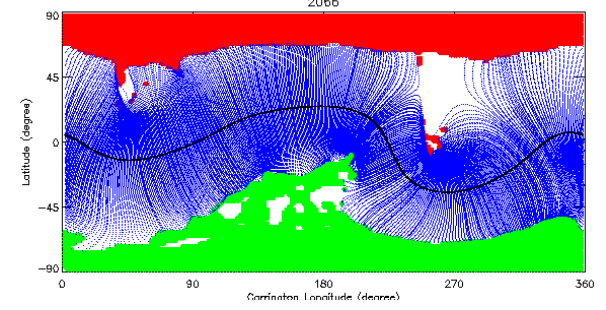
G2

G3

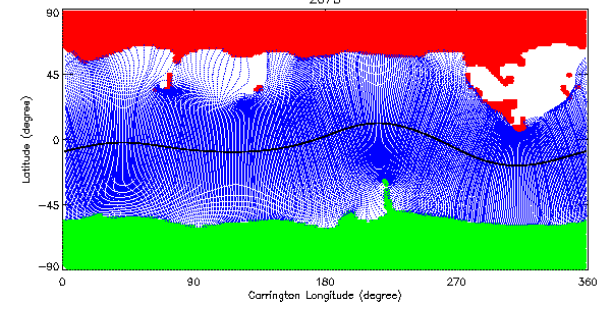
G4



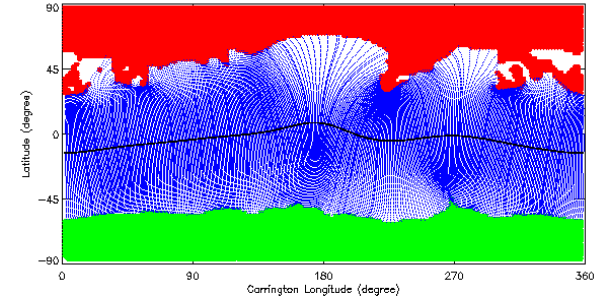
G1



G2



G3



G4

Conference Participation Since Last Report

SOHO CELIAS/STEREO PLASTIC Team Meeting
SOHO-22 STEREO-3 Workshop: Three Eyes on the Sun
EGU
Solar Wind 12
SHINE
AGU (Spring)
IAGA
Shock Waves in Space and Astrophysical Environments
(8th Annual International Astrophysics Conference)
SOHO-23 Understanding a Peculiar Solar Minimum
Also: IAU, SPD

Upcoming: WHI2 workshop

STEREO Papers in 2009

(PLASTIC Authorship, Co-authorship, or Participation)

Articles in Refereed Journals, Published or In-Press (2009, only):

- Bisi et al., *Low Resolution STEReLAb IPS 3D Reconstructions of the Whole Heliosphere Interval and Comparison with in-Ecliptic Solar Wind Measurements from STEREO and Wind Instrumentation*, Solar Physics, 256, 210-217, [online](#), 2009.
 - Daoudi et al., *The STEREO / PLASTIC Response to Solar Wind Ions (Flight Measurements and Models)*, Astrophysics and Space Sciences Transactions, 5, 1-13, [online](#), 2009.
 - Dresing et al., *Multi-spacecraft observations of CIR-associated ion increases during the Ulysses 2007 ecliptic crossing*, Solar Physics 256, 409-425, doi 10.1007/s11207-009-9356-3, [online](#), 2009.
 - Eriksson et al., *Asymmetric shear-flow effects on magnetic field configuration within oppositely directed solar wind reconnection exhausts*, J. Geophys. Res., 114, A07103, doi:10.1029/2008JA013990, 2009.
 - Foullon et al., *The Apparent Layered Structure of the Heliospheric Current Sheet: Multi-Spacecraft Observations*, Solar Physics, DOI 10.1007/s11207-009-9452-4, [online](#), 2009.
 - Galvin et al., *Solar Wind Trends and Signatures: STEREO PLASTIC Observations Approaching Solar Minimum*, Ann. Geophys., 27, 3909-3922, [online](#), 2009.
 - Gomez-Herrero et al., *Recurrent CIR-accelerated ions observed by STEREO SEPT*, J. Geophys. Res., 114, A05101, doi:10.1029/2008JA013755, 2009.
 - Jian et al., *Multi-spacecraft observations: Stream interactions and associated structures*, Solar Physics, doi:10.1007/s11207-009-9445-3, [online](#), 2009.
 - Jian et al., *Ion Cyclotron Waves in the Solar Wind Observed by STEREO near 1 AU*, ApJ, 701, L105-L109, doi: 10.1088/0004-637X/701/2/L105, 2009
 - Kilpua et al., *Small solar wind transients and their connection to the large-scale coronal structure*, Solar Physics, 256, 327-344, doi: 10.1007/s11207-009-9366-1, [online](#), 2009.
 - Kilpua et al., *Multispacecraft observations of magnetic clouds and their solar origins between 19 and 23 May 2007*, Solar Physics, 254, 325-344, doi 10.1007/s11207-008-9300-y, 248, No. 2, 325-344, [online](#), 2009.
 - Leitner et al., *The solar wind Quasi-Invariant observed by STEREO A and B at solar minimum 2007, and comparison with two other minima*, Solar Physics, 259, 381, doi: 10.1007/s11207-009-9412-z, [online](#), 2009.
 - Louarn et al., *On the Temporal Variability of the "Strahl" and Its Relationship with Solar Wind Characteristics: STEREO SWEA Observations*, Solar Physics, doi: 10.1007/s11207-009-9402-1, 2009.
 - Luhmann et al., *Solar wind sources in the late declining phase of cycle 23: Effects of the weak solar polar filed on high speed streams*, Solar Physics, 256, 285-305, doi 10.1007/s11207-009-9354-5, [online](#), 2009.
 - Mason et al., *In-situ observations of CIRs on STEREO, Wind, and ACE during 2007-2008*, Solar Physics, 256, 393-408, doi 10.1007/s11207-009-9367-0, [online](#), 2009.
 - Moestl et al., *Multi-spacecraft recovery of a magnetic cloud and its origin from magnetic reconnection on the Sun*, J. Geophys. Res., 114, A04102, doi:10.1029/2008JA013657, 2009.
 - Moestl et al., *Optimized Grad-Shafranov reconstruction of a small magnetic cloud using STEREO-WIND observations*, Solar Physics, 256, 427-441, doi 10.1007/s11207-009-9360-7, [online](#), 2009.
 - Moestl et al., *Linking remote imagery of a coronal mass ejection to its in situ signatures at 1 AU*, Astrophysical Journal Letters, 705, L180-L185, [online](#), 2009.
 - Opitz et al., *Temporal evolution of the solar wind bulk velocity at solar minimum by cross-correlating the STEREO A and B measurements*, Solar Physics, 256, 365-377, doi 10.1007/s11207-008-9304-7, [online](#), 2009.
 - Rouillard et al., *A multispacecraft analysis of small-scale transient entrained by solar wind streams*, Solar Physics, 256, No. 1-2, 307-326, DOI 10.1007/s11207-009-9329-6, [online](#), 2009.
 - Simunac et al., *In situ observations of solar wind stream interface evolution*, Solar Physics, 10.1007/s11207-009-9393-y, [online](#), 2009.
 - Simunac et al., *In situ observations from STEREO/PLASTIC: a test for L5 space weather monitors*, Ann. Geophys., 27, 3805-3809, 2009.
- ### Conference Proceedings, Published (2009, only):
- Bochsler, Peter, *Composition of matter in the heliosphere*, Proceedings of the International Astronomical Union, 4, Symposium S257, 17-28, doi 10.1017/S1743921309029044, 2009.
 - Dresing et al., *Multi-point observations or CIR-associated energetic ions during Ulysses' ecliptic crossing in 2007*, Proceedings of the 31st ICRC 2009, Lodz, Poland, 2009.
 - Liu et al., *The thermalization of oxygen ions and protons at shocks associated with CIRs*, Shock Waves in Space and Astrophysical Environments, 8th Annual International Astrophysics Conference, Kona Hawaii, 1-7 May 2009, AIP Conference Proceedings, Vol. 1183, Editors Xianzhi Ao, Ross Burrows and Gary P. Zank, in press, 2009.
- ### Papers Submitted and Under Review (2009, only):
- Bochsler et al., *Kinetic temperatures of iron ions in the solar wind observed with STEREO/PLASTIC*, submitted to AIP Proceedings, 2009.
 - Gomez-Herrero et al., *Multi-point observations of CIR-associated energetic particles during 2008 solar minimum*, Solar Wind 12 Proceedings, submitted 2009.
 - Kilpua et al., *STEREO observations of interplanetary coronal mass ejections and prominence deflection during solar minimum period*, submitted to ANGeo, 2009.
 - Liu et al., *Proton Enhancement and Decreased O6+/H at the Heliospheric Current Sheet: Implication for the Origin of Slow Solar Wind*, submitted to AIP Proceedings, 2009.
 - Simunac, K.D.C. et al., *Identifying the ends of high-speed streams near 1 AU with in situ data from STEREO/PLASTIC*, submitted to AIP Proceedings, 2009.

STEREO PLASTIC STUDENT STUDIES

Theses and Dissertations (2001-2009)

F. Allegrini, *The PLASTIC sensor on STEREO: Design of the entrance system/energy analyzer and numerical simulations of solar wind measurements*, Ph.D. thesis, University of Bern, Switzerland, 2002.

S. A. H. Daoudi, *First STEREO/PLASTIC measurements of Fe charge states in the solar wind, presentation of a new method for flight data analyses*, Ph.D. thesis, University of Bern, Switzerland, 2008.

R. Karrer, *Ion optical calibration of the PLASTIC sensor on STEREO*, Ph.D. thesis, University of Bern, Switzerland, 2007.

B. King, *Anode electronics development realized in very large scale integration design*, Master thesis, University of New Hampshire, NH, 2004.

M. Koeten, *Detection Efficiencies for STEREO/PLASTIC and ACE/SWICS*, Diplomarbeit, University of Kiel, Germany, 2005.

A. Opitz, *STEREO PLASTIC calibration, simulation and data analysis*, Ph.D. thesis, University of Bern, Switzerland, 2007.

K.D.C. Simunac, *Solar wind stream interfaces: the importance of time, longitude, and latitude separation between points of observation*, Ph.D. dissertation, University of New Hampshire, May 2009.

M. Stalder, *Aufloesungsvermoegen bei der Energiemessung mit Si-Detektoren fuer Sonnenwindionen, und Berechnungen zur Mefisto Ionenquelle*, Diploarbeit, University of Bern, Switzerland, 2001.

Recent PhD dissertations which include post-launch data analysis

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- F. Allegrini, [*The PLASTIC sensor on STEREO: Design of the entrance system/energy analyzer and numerical simulations of solar wind measurements*](#), Ph.D. thesis, University of Bern, Switzerland, 2002.
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- B. King, Anode electronics development realized in very large scale integration design, Master thesis, University of New Hampshire, NH, 2004.
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- A. Opitz, [*STEREO PLASTIC calibration, simulation and data analysis*](#), Ph.D. thesis, University of Bern, Switzerland, 2007.
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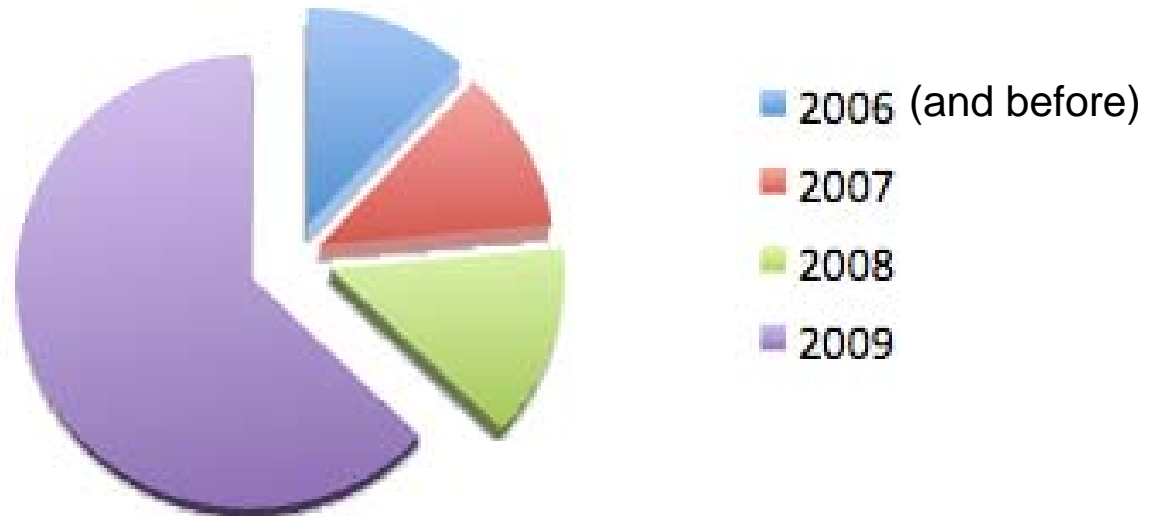
Two UNH Undergraduate Internships (Summer 2009):

- He⁺ pickup ion fluxes
- Solar wind alpha abundances

Current Graduate Students:

- Christian Drews (CAU, Kiel) – Inner Source Pickup Ions Observed by PLASTIC
- Joshua Barry (UNH) – PLASTIC Suprathermal Observations: Upstream Events, Compression Regions
- Shuoyang Wang (UNH) – Solar Wind In-situ and Solar Source Regions

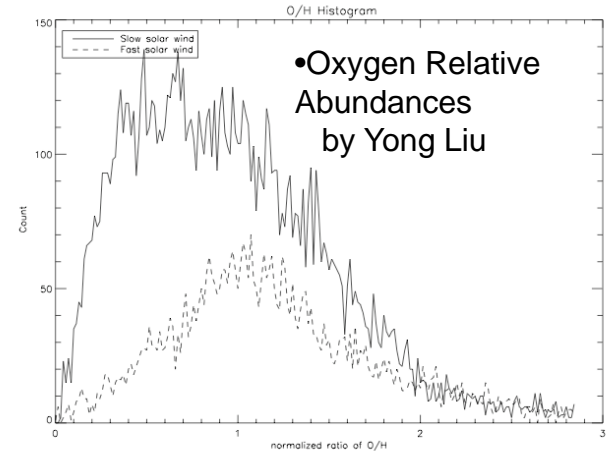
Publication Summary



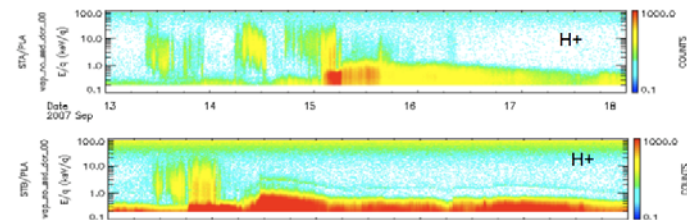
Total Publications = 51
(includes dissertations, theses, and under review)

Science Updates This SWG:

- Several update and status talks will be given at this SWG:
 - EPO Efforts: Jeanne Gerulskis
 - Solar Wind O: Yong Liu
 - Stream Interfaces: Kristin Simunac
 - Long Term Trends in Solar Wind Fe: Mark Popecki
 - Suprathermal Events: Josh Barry
 - SEPs – Berndt Klecker
 - Farrugia



Multi-spacecraft Observations of Accelerated Ions: Compression Regions



- Compression Regions and/or CIR shocks are of interest because they accelerate ions.

Spectra by Josh Barry

PLASTIC Operations

One Instrument Reset,
Otherwise Nominal

Recent 2009 PLASTIC A Activity

- Feb 13 Raised S-Ch Switch on the DPU side to 260 counts on rate 19
- Feb 17 Raised MCP voltage by 1 step (20V) from C0C6 to C0C7.
- Apr 1 Increased MCP voltage by one step from 2963V (C0C7) to 2985 V (C0C8)
- Jul 29 Changed trigger mode to 23h, allowing multiple positions on the non-SSD side.
- Jul 31 Increased TAC0 threshold to 50d (32h).
Decreased the SSD threshold to 6.
Return SSD threshold to 7.
- Aug 4 Shut down HVs in preparation for S/C A reboot with new G&C software.
- Restarted PLASTIC after power-cycling during reboot.
- Aug 5 Continued to restart PLASTIC after power-cycling during reboot.
- Aug 21 Reduced the TAC2 threshold to 35d channels for 3 days - 234 17:25:00.
- Aug 25 Raised TAC2 threshold to 70d (46h) again: 237 08:45:00.

Recent 2009 PLASTIC B Activity

- Feb 12 Raised S-Ch Switch on the DPU side to 180 on RA_trig
- Apr 1 Increased MCP voltage by one step from 3226V (COD5) to 3245 V (COD6)
- May 8 Instrument Reset, PLASTIC stopped communicating with the DPU.
- May 10 Restarted PLASTIC B
- May 11 Completed restart; set Actel side S-ch switch to 500 cts on RA_trig
- May 12 Shut down HVs to prepare for Spacecraft reset for software load
- May 13 Turned 28v back on for PLASTIC B
- May 14 Restarted PLASTIC B;
Set Actel side S-channel switch to 800 cts on RA_trig
Raised S-Ch Switch on the DPU side to 300 counts on RA_trig
- Jun 9 Increased DPU side S-channel switch from 300 to 500 cts on RA_trig, 2345 UT.
- Jun 19 Increased DPU side S-channel switch from 500 to 700 cts on RA_trig, 0345 UT.
Increased Actel side S-channel switch from 800 cts to 1500 cts on RA_trig, 0221 UT
- Jul 25 Increased DPU side S-channel switch threshold from 700 cts to 900 cts on RA_trig,
Reduced SSD threshold from to 6 for three days, pixels 0-15, 0320 UT
- Jul 28 Increased SSD threshold from 6 to 7, 2325 UT
- Aug 3 Decreased SSD threshold from 7 to 5 on pixels 1-15
- Aug 7 Set SSD threshold back to 7 for pixels 0-15, 0100 UT
Sent SSD offsets for PHA processing, 0110 UT
Increased SSD side TOF threshold to 50d, 0120 UT

Reduced Telemetry Modes

- Three basic options:
 - Decrease time resolution of certain rates (requires s/w update to IDPU and costs money)
 - Delete certain rates (suprathermals, some matrix rates)
 - Combination of two

STEREO PLASTIC Data

STEREO/PLASTIC Data

http://fiji.sr.unh.edu/

Syfy Solitai... Game Center SAO/NASA A...Home Page Visual Sear...earchme.com

STEREO/PLASTIC Data

PLASTIC
Plasma And Supra-Thermal Ion Composition Investigation

Index	Proton Parameters	Proton Velocity Components	Proton Condegrams
On-Board Moments	Solar Wind Stack Plots	He+ Plots	Fe Charge States
Housekeeping	Spacecraft Monitory		

PLASTIC Data Plots

Plots

- [Proton Parameters](#): Bulk Velocity, Density, and Temperature derived from a 1D Maxwellian fit of PLASTIC data.
- [Proton Velocity Components](#): Preliminary components derived from a 1D Maxwellian fit of PLASTIC data.
- [Proton Condegrams](#): Bulk Velocity, Density, and Temperature derived from a 1D Maxwellian fit of PLASTIC data. Condegram Plots.
- [On-Board Proton Moments](#): Bulk Velocity, Density, and Temperature derived from on-board (IDPU) moment calculations. These data are updated on a daily basis, but are not fully validated.
- [Solar Wind Stack Plots](#): Time series of the solar wind full resolution rate.
- [He+ Plots: Explanation](#).
- [Fe Charge States](#): Preliminary, browse-quality plots of Fe charge states.
- [Housekeeping](#)
- [Spacecraft Location](#)
- [Merged PLASTIC/MAG](#)
- [NOAA/Space Weather Prediction Center](#): STEREO PLASTIC Real Time Data/Plots.
- [NASA STEREO Science Center](#): Real Time PLASTIC Beacon Plots.
- [CCMC STEREO Heliospheric Model Support](#)

Movie Gallery

- [Solar Wind Fe Charge States at a CIR, 5 minute resolution \(contributed by P. Boehsler and H. Daoudi\)](#).

Data Files

- [Level 1 CDFs](#): SSC Mirror of all Level 1 CDFs.
- [Level 2 CDFs](#): SSC Mirror of Level 2 CDFs (solar wind proton data).
- [Level 2 Ascii files](#): Solar Wind Proton Data.
- [NASA STEREO Science Center](#): Real Time PLASTIC Beacon Data.
- [IMPACT Housekeeping Data for Spacecraft A](#): In CDF format.
- [IMPACT Housekeeping Data for Spacecraft B](#): In CDF format.

Data Descriptions

- [PLASTIC Instrument Resources Page](#)

Internal Site
[Lorna Ellis](#)
Last modified: Thu Aug 6 14:12:15 EDT 2009

Beacon processing algorithm has been improved and now used in SSC.

PLASTIC Level 0, 1, and 2 data sets and user software available at the SSC website.

Proton data has now been contributed to COHOWeb.gsfc.nasa.gov

In addition:

PLASTIC public web page – Validated Data Sets:

<http://fiji.sr.unh.edu>

Space Weather Product for Rocket Launches: Condegrams

PLASTIC Proton Condegrams

10/27/09 10:16 AM

PLASTIC
Proton And Solar Wind
Data Comparison Overview

- index
- Proton Parameters
- Proton Velocity Comparisons
- Proton Condegrams
- On-Board Monitors
- Solar Wind Black Flashes
- H+ Plots
- Fe Charge States
- Housekeeping
- Spacecraft Identity

PLASTIC Proton Condegrams

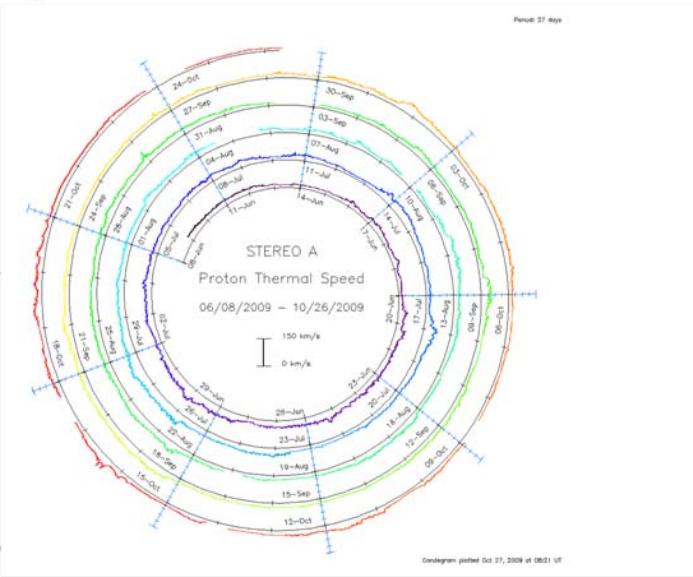
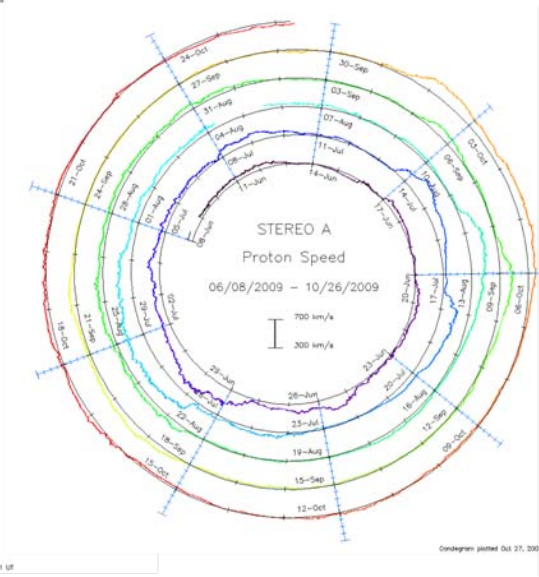
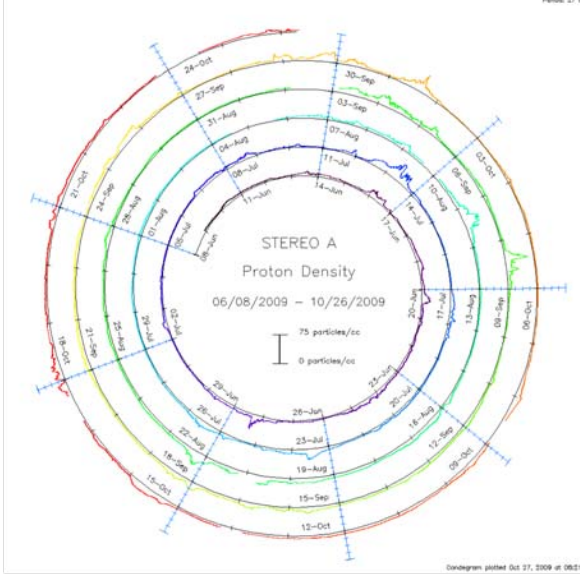
Bulk Velocity, Density, and Temperature derived from a 1D Maxwellian fit of 1-minute PLASTIC data. Many thanks to Mark Conde for creating the 'condegrams' concept and for providing us the plotting software.

Ahead 3 | All | Date | 3 | Same

PLASTIC Proton Condegrams

10/27/09 10:16 AM

10/27/09 10:16 AM



Public Domain Software

(and yes, these are what we use):

SPLAT (STEREO PLASTIC Analysis Tool)

- Runs in IDL
- Based on Berkeley's TPLOT
- Very flexible plotting tool
- Most plots on web page made from SPLAT
- "Cribs" allow you to create tplot variables which you can then plot as you like

PhaPlay (Pulse Height Analysis)

- Runs in IDL
- Creates plots and ascii files of pha data, including mass and m/q species binning (default), normalization
- Allows you to change species box definitions
- Allows you to change species algorithms
- Can create .tplot variables for use in SPLAT
- This is used, for example, to create the Fe Charge State plots

Data Production In Progress

Incorporating improved mass and m/q algorithms provided by CAU (Kiel) team members into PhaPlay species identification

Finalizing He abundances – for both solar wind and pickup ions

Revising verification methodology of proton analysis