

# Space Weather Beacon

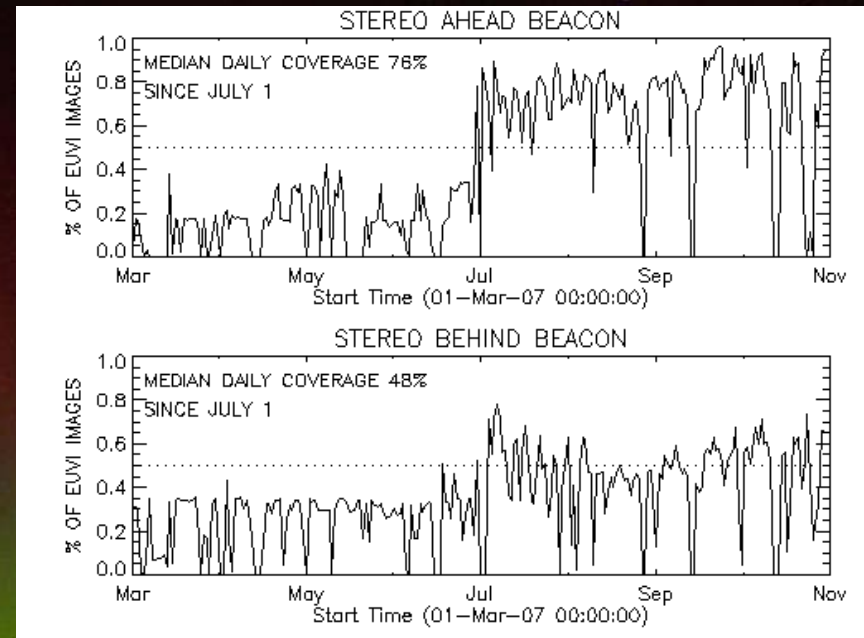
Curt de Koning for  
Douglas Biesecker  
NOAA/SWPC

# Outline

- Status of tracking coverage
- Status of tools and products
  - For external users
- SWPC concerns and issues

# Current Beacon Tracking

- DSN, NICT (Japan), and RAL (UK)
- STEREO-A has seen significantly better coverage
  - Due to DSN tracking STEREO-A from Goldstone and STEREO-B from Madrid,
  - Plots show number of EUVI images received / 144.
    - Doesn't include 'bad' images
  - 76% coverage A
  - 48% coverage B
  - Increase in July due to improvements at NICT



# Additional tracking in work

- CNES (FRANCE)
  - Provide redundancy. Expect to test this month.
- NOAA (Wallops)
  - Currently hung up on paperwork. Could be running by end of year.
- NOAA (Fairbanks)
  - Could be running before end of year.
  - First attempts failed – still investigating
- NOAA (Boulder)
  - Currently working on hardware upgrades. Spring, 08 most likely.
- Have exchanged information with INPE (Brazil)
  - Still uncertain as to ability to provide any coverage

Doug Biesecker apologizes profusely for not having a more complete tracking network in place, more than 1 full year after launch. Any data gaps in beacon coverage rest squarely on his

# SWPC Derived Products

- <http://www.spaceweather.gov/stereo>
  - Plots of PLASTIC and IMPACT data
  - Patterned after ACE RTSW
    - Governs which parameters are included
    - Designed specifically for forecasters
    - Co-rotating structure lead/lag time

# NOAA / Space Weather Prediction Center



## STEREO

## Real-Time Beacon



FAQ

Real-time plots

ASCII lists of real-time data

### Introduction

- [Beacon Data Notes](#)

### Real Time Data

- [Dynamic Plots](#)
- 1&5 min Lists<sup>#</sup>
- Hourly Lists<sup>#</sup>
- Ground-station Tracking<sup>#</sup>
- [Where is STEREO\\*](#)

<sup>#</sup> Under construction

### More STEREO Links

- [STEREO Website \(GSFC\)\\*](#)
- [STEREO Science](#)

## STEREO Beacon News and Announcements

Sep 12, 2007: The NASA STEREO Beacons are transmitting real-time STEREO data continuously. Only the DSN, RAL (UK), and NICT (Japan) are currently receiving real-time data, so there can still be significant data gaps.

### Introduction

The NOAA Space Weather Prediction Center now provides near-real-time data from the NASA STEREO mission. The STEREO mission consists of two spacecraft that are in heliocentric orbits leading and lagging the Earth. Each spacecraft provides a unique observing vantage point, and taken together, they enable a stereoscopic view of the Sun, solar activity, and the solar environment between the Sun and Earth. The STEREO mission studies the Sun and heliosphere with 4 suites of instruments. This website brings you data from two of the instruments, the PLASMA and SupraThermal Ion Composition (PLASTIC) Instrument and the In-situ Measurements of Particles and CME Transients (IMPACT) Instrument. These two instruments provide measurements of the solar wind plasma, particles, magnetic field, and solar energetic protons, all quantities that are of significant use in forecasting space weather.

The near-real-time data, known as the Space Weather Beacon, from STEREO is a compressed, binned, subset of the full science data. The beacon data are broadcast continuously, and if no ground

# Real-Time Beacon



## Dynamic STEREO Beacon Plots

### Introduction

- [Beacon Data Notes](#)

### Real Time Data

- [Dynamic Plots](#)
- 1&5 min Lists\*
- Hourly Lists\*
- Ground-station Tracking\*
- [Where is STEREO\\*](#)

# Under con

### More ST

- [STEREO](#) (GSFC)
- [STEREO](#) Center

\* Leaving S

Plot types mirror ACE and RTSW

Individual plots for each s/c. Choice of plot background.

6 hr, 24 hr, 3 day, and 7 day plots

	SOLAR WIND: Mag field & Plasma	Magnetic Field	Plasma	Low Energy Electrons & Protons	Low Energy Electrons	Low Energy Protons	High Energy Protons
6 hrs	A (w)	A (w)	A (w)	A (w)	A (w)	A (w)	A (w)
	B (w)	B (w)	B (w)	B (w)	B (w)	B (w)	B (w)
24 hrs	A (w)	A (w)	A (w)	A (w)	A (w)	A (w)	A (w)
	B (w)	B (w)	B (w)	B (w)	B (w)	B (w)	B (w)
3 days	A (w)	A (w)	A (w)	A (w)	A (w)	A (w)	A (w)
	B (w)	B (w)	B (w)	B (w)	B (w)	B (w)	B (w)
7 days	A (w)	A (w)	A (w)	A (w)	A (w)	A (w)	A (w)
	B (w)	B (w)	B (w)	B (w)	B (w)	B (w)	B (w)

A and B refer to the STEREO Ahead and Behind spacecraft, respectively. The backgrounds are black. For a version of each plot with a white background, click on the corresponding spacecraft identifier.

All data are real-time "ESTIMATED" data processed for operational use. Do not

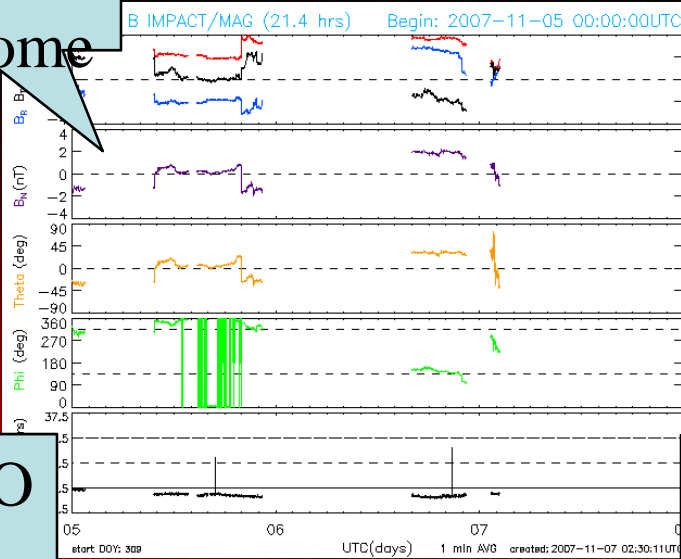
- The plots update as follows: 6-hr and 24-hr web pages refresh every 60 seconds. Fresh plots (e.g. 30 files) are created every 2 minutes. The data used to generate the plots is updated every 2 minutes, so the fastest real refresh is greater than 2 minutes. As each of the steps is independent, it is possible the data latency will around 4 minutes in addition to any processing time at the STEREO Science Center.
- 3-day and 7-day web pages are refreshed every 5 minutes. The plots are created once each hour with data that has been updated at 2 minute cadence. The latency of these plots can be

# Sample real-time plots

STEREO-B

3-day

magnetometer



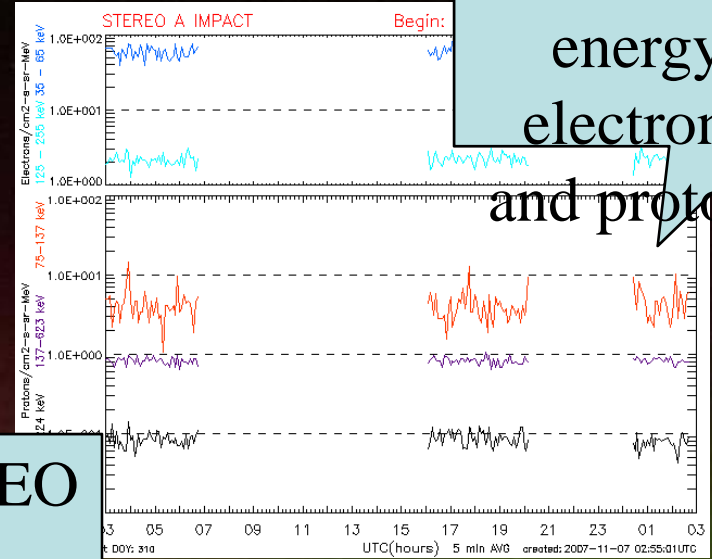
STEREO-A

24-hr low

energy

electrons

and protons



STEREO

-B

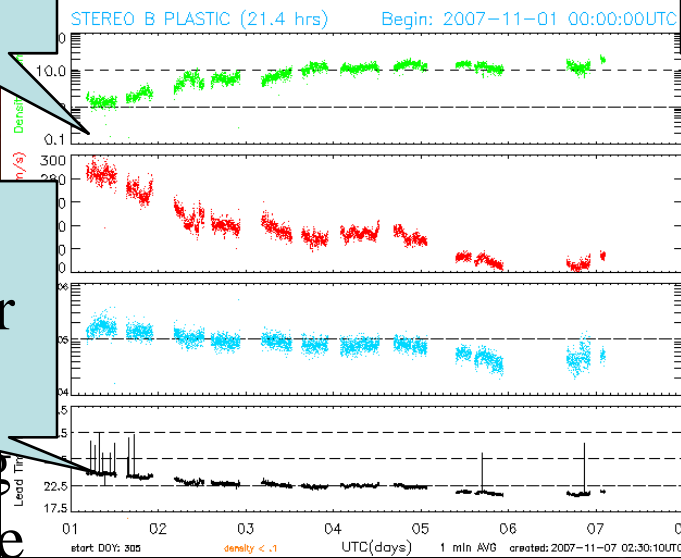
7-day

solar

Lead-

time for

co-



STEREO

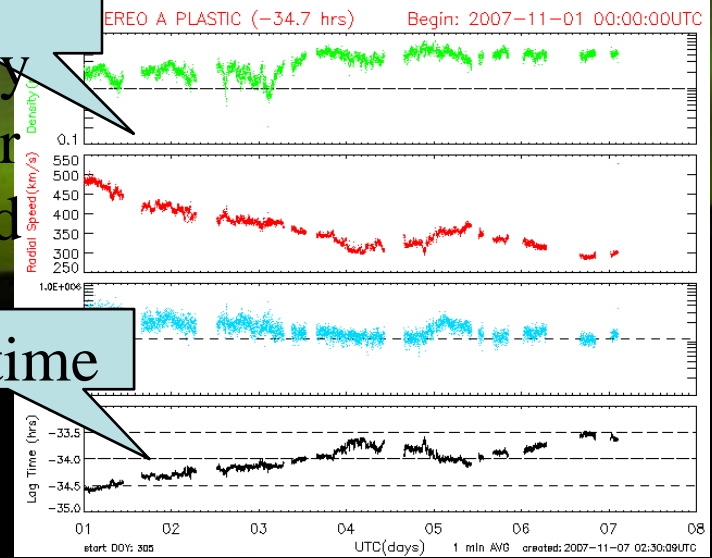
-A

7-day

solar

wind

Lag-time





# Still to come

- Ascii data lists of real-time data
  - Same format as ACE data lists
- Plots of STEREO and ACE data overlaid
  - By end of year
- Wang-Sheeley-Arge predictions at STEREO location
  - By end of year
- 27-day plots of STEREO data
- Geometric localization – see talk by de Koning

# Forecasters are using STEREO everyday

- Keeping close watch on coronal holes from STEREO-B
  - Have generated coronal hole product (UCOHO) using EUVI when other imagers not available
  - PLASTIC and IMPACT/MAG are crucial
- Getting used to HI-1 and HI-2
  - There just haven't been CME's of interest

# SWPC Issues and Concerns

- Tracking
  - DSN coverage of STEREO-B from Madrid ‘wastes’ excellent coverage from RAL and soon CNES
  - No major barriers to getting NOAA resources on-line. Just requires effort. Could have both Wallops and Fairbanks up and running in the very near future.

# SWPC Issues and Concerns

- PLASTIC

- STEREO-B data invalid quite often

- Abnormally low density values

- Rule – ignore data where  $n < 0.1/\text{cm}^3$

- STEREO-B velocities appear to always be low, as compared to ACE (~50 km/s)

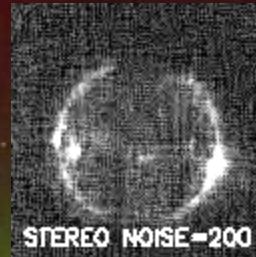
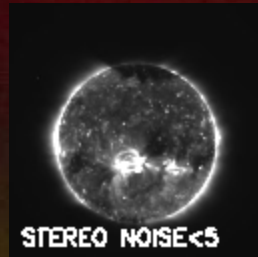
- IMPACT

- No known issues

# SWPC Issues and Concerns

- SECCHI

- Image data degrades significantly with dropped telemetry packets



- Still working with team to optimize EUVI, COR2, HI-1, and HI-2 compression and binning

# SWPC Thanks You

- NOAA/SWPC would like to thank the STEREO project, the STEREO instrument and spacecraft teams, and the STEREO Science Center for providing excellent support of the mission and of the beacon data.
  - Special thanks to Bill Thompson
- NOAA forecasters make use of STEREO beacon data every day to assist in putting together forecasts.