



## **SECCHI Status**

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**STEREO SWG – Trinity College, Dublin**

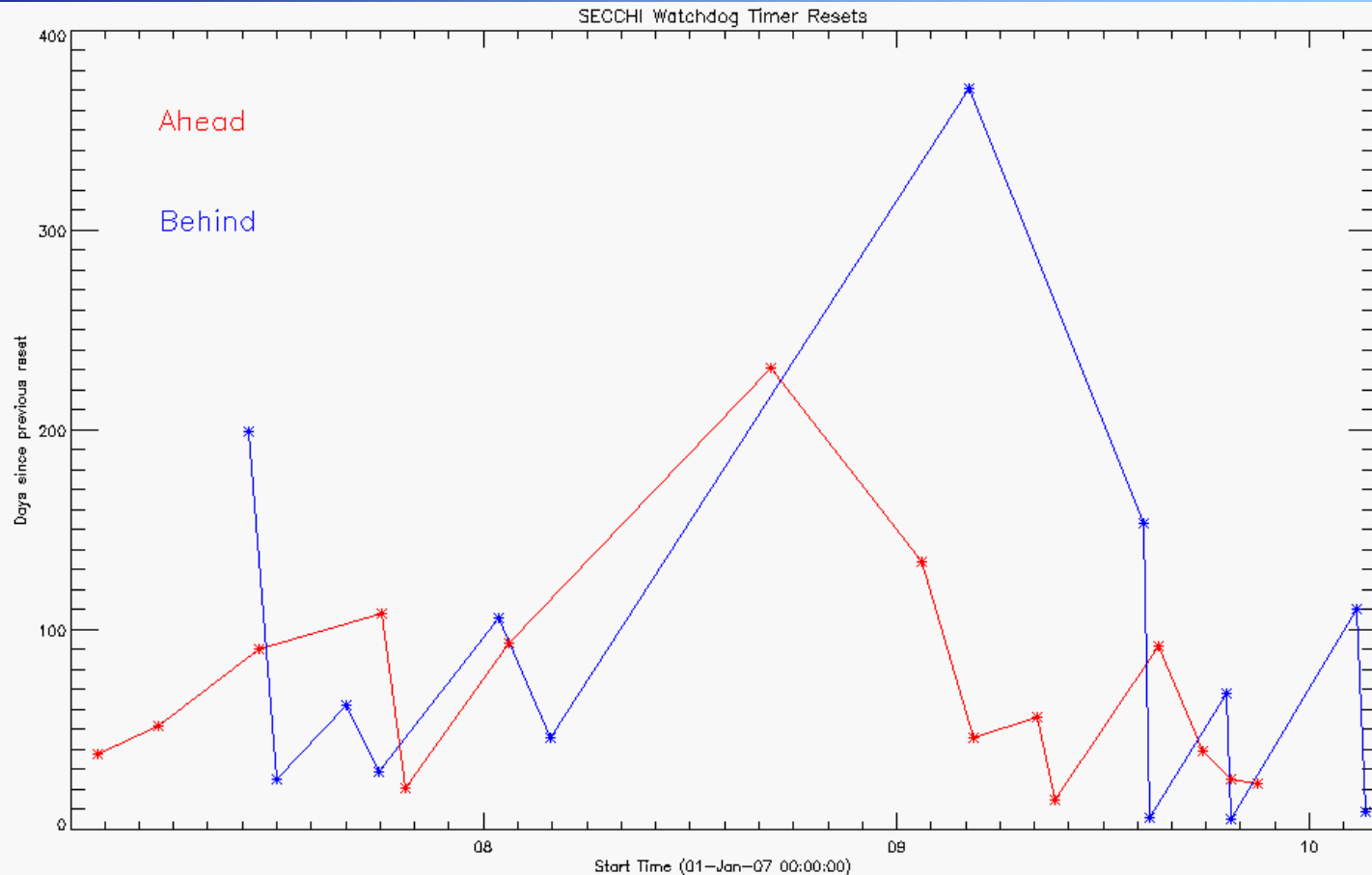
# Instrument Status

- **Mechanisms**
  - A mechanism calibration is done every few months to check timing in performing standard operations.
  - All mechanisms are nominal.
- **CCDs**
  - Calibrations are done periodically (every few months).
  - No deviations from nominal performance
- **SECCHI Electronics Box**
  - Watchdog Resets: “Random” resets of the 750 CPU of unknown origin.
  - To date we have had 15 on A and 13 on B.
- **Flight SW**
  - Current revision is 5.15.00 on both A and B, loaded 2010-02-03/4.
  - We continue to adjust the threshold tables for the on-board CME event detect to avoid false alarms. The very deep minimum had not only few CMEs, but also fainter than normal CMEs.
  - Started using “Active Sun” exposure tables

# Instrument Status

- **EUVI Filters**
  - The number of small pinholes in the front filters continue to increase, but the effect is minimized by secondary filter
- **COR-1A Anomaly**
  - There was an increase in the COR-1A stray light in the southeast, that disappears in pB. The cause is unknown, but is probably a dust particle on the objective lens
- **Summary:**
  - All 10 telescopes continue to work extremely well.

# Watchdog Resets



- A total of 15 resets on SECCHI-A (most recent on November 15, 2009), and 13 resets on SECCHI-B (most recent on February 20, 2010).
- An unrelated 'warm reset' (ops mode to ops mode) occurred on SECCHI-B on January 5, 2010. Occurred during ICER compression of a COR1 image, but cause is unknown.

# Operations

- **Observations are going very smoothly. We are scheduling about 7500 images/day. Images are generally on the web site within 3 days.**
- **The redistribution of telemetry to the HI-2 beacon images have made them much more useful**
- **The CME detection algorithm continues to be tweaked to eliminate false detections. The latest threshold tables will be uploaded this week. The purpose of the on-board algorithm is to inhibit any further writes to the recirculating SSR2 memory on a detection.**
- **Calibration refinements on all telescopes continue.**
- **The distribution of telemetry between the SECCHI telescopes will carry us through the next year.**

# Current SSR1 Synoptic Program ('30-hour' blocks)

Telescope	# Images and Size (pixels)	Exposure (seconds)	Cadence (minutes)	Total Images/Day	Compression Scheme	Total MB/Day
EUVI	1 2k x 2k (171)	16	120	12	ICER4	
	1 2k x 2k (195)	16	5	275	ICER5	
	1 2k x 2k (195)	16	120	12	ICER4	
	1 2k x 2k (284)	32	120	12	ICER6	
	1 2k x 2k (304)	4	10	132	ICER5	
	1 2k x 2k (304)	4	120	12	ICER4	
COR1	3 512 x 512 (pB)	1.7	5	858	ICER7	
COR2	3 2k x 2k (pB)	6	60	72	ICER3	
	1 2k x 2k (B)	6	15	72	ICER3	
HI1	1 1k x 1k	1200	40	36	Rice	
HI2	1 1k x 1k	4950	120	12	Rice	
Total				1505		448.9

- EUVI SSR2 observations are interleaved with SSR1 observations to increase the image cadence in all wavelengths by at least a factor of 2 from that obtained with SSR1 alone.

# SECCHI Publications

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- **2009**
  - **31 Journal Papers**
  - **30 Talks**

# ON-GOING SCIENCE TOPICS

- **Modeling and stereographic interpretation of CMEs and other structures**
- **Imaging and Interpretation of CIRs**
- **Outflows**
- **Comet observations and analyses**
- **Initiation of CMEs**
- **F-corona**
- **Binary Star Photometry**
- **Relation to Other Observations (in-situ, Radio, SMEI, etc)**
- **Calibrations**
- **Automatic determination and characterization of CMEs**
- **More ??**



# SECCHI Image Statistics

- Status as of February 28, 2010

	Cor1A	Cor1B	Cor2A	Cor2B	EuviA	EuviB	Hi1A	Hi1B	Hi2A	Hi2B
N Images (not incl. SPWX)	751242	792425	202952	204441	1192747	1241375	40261	39661	15008	14508
Size (Raw GB)	170	174	116	114	300	305	69	65	35	30
Size (FITS GB)	1088	1162	1628	1647	9451	9846	169	166	69	66

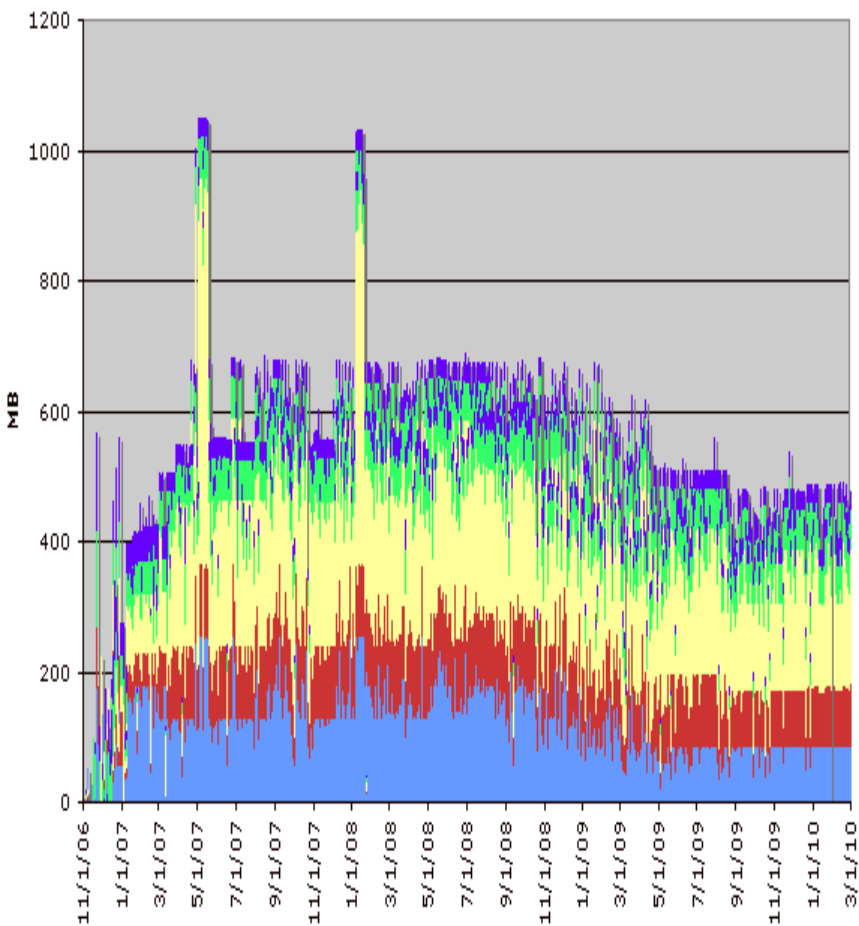
**Total Images:** 4,494,620  
**FITS volume:** 25.2 TB  
**Telemetry volume:** 1381 GB

- For specific information about SECCHI telemetry statistics, use  
IDL> sccgetinfo in SolarSoft

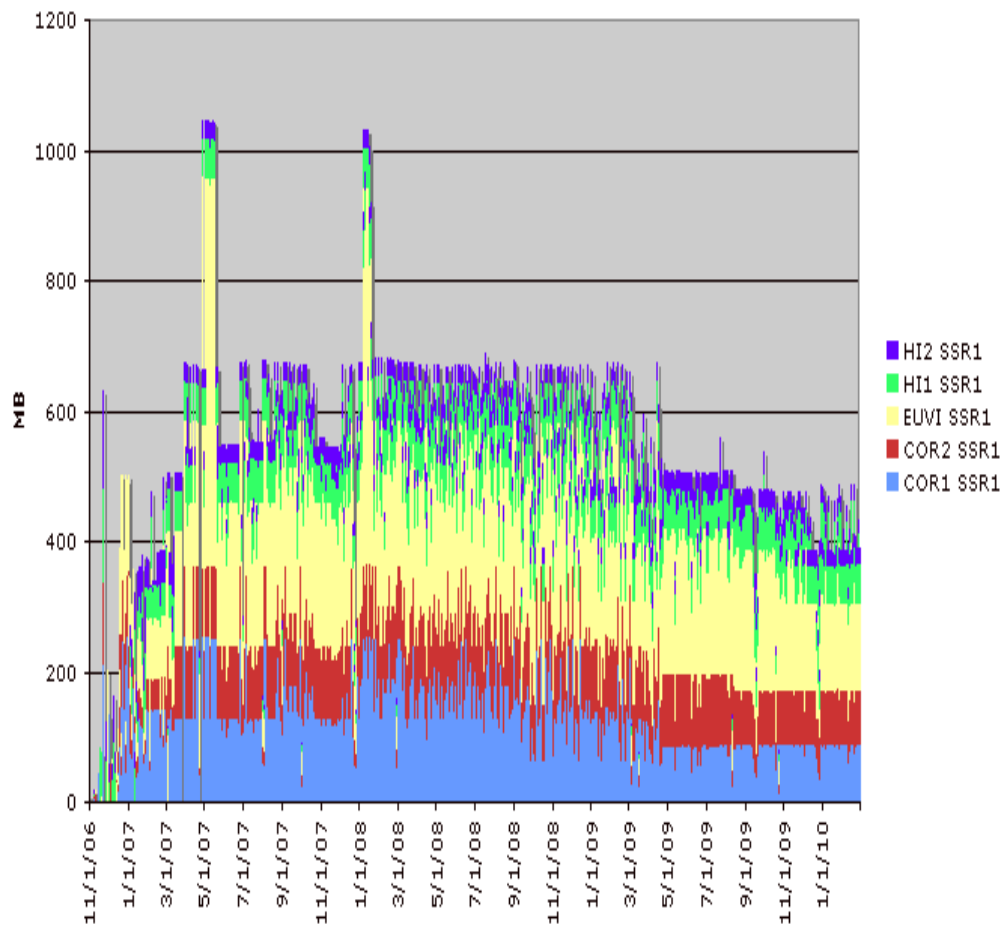


# SECCHI SSR1 Telemetry Volume

SECCHI-A Daily Image Telemetry Volume from SSR1

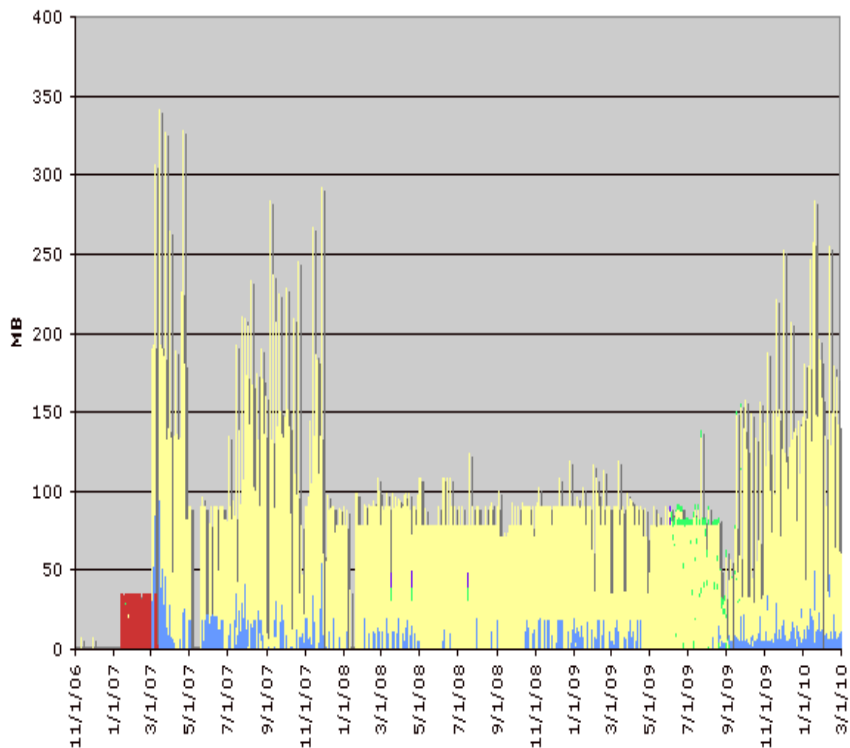


SECCHI-B Daily Image Telemetry Volume from SSR1

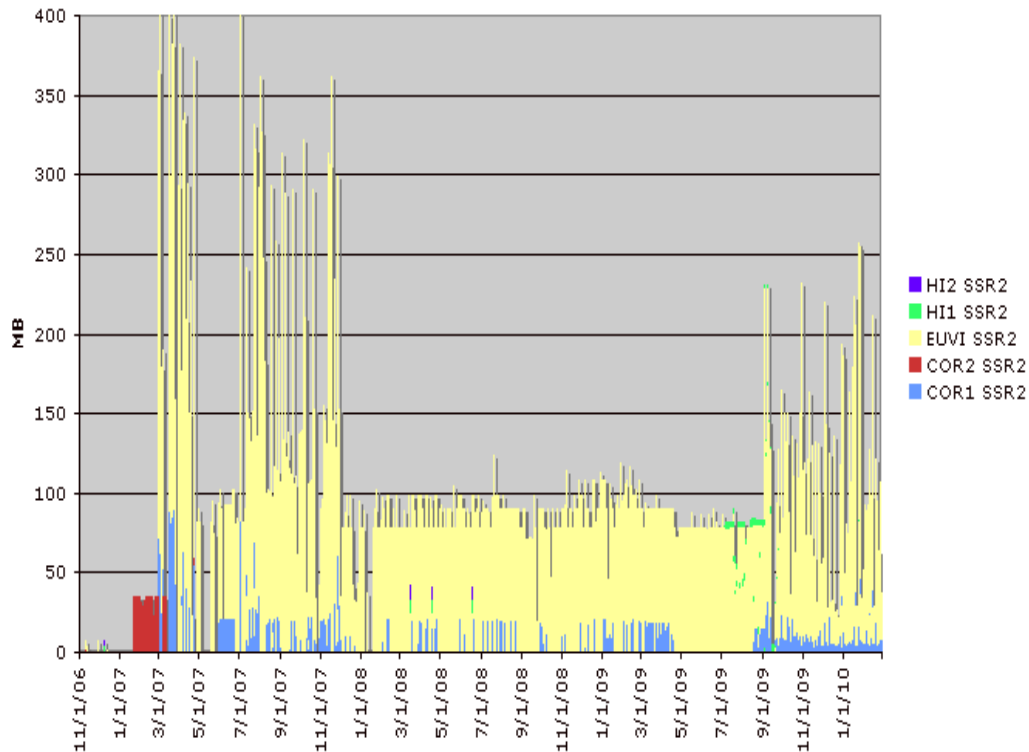


# SECCHI SSR2 Telemetry Volume

SECCHI-A Daily Image Telemetry Volume from SSR2



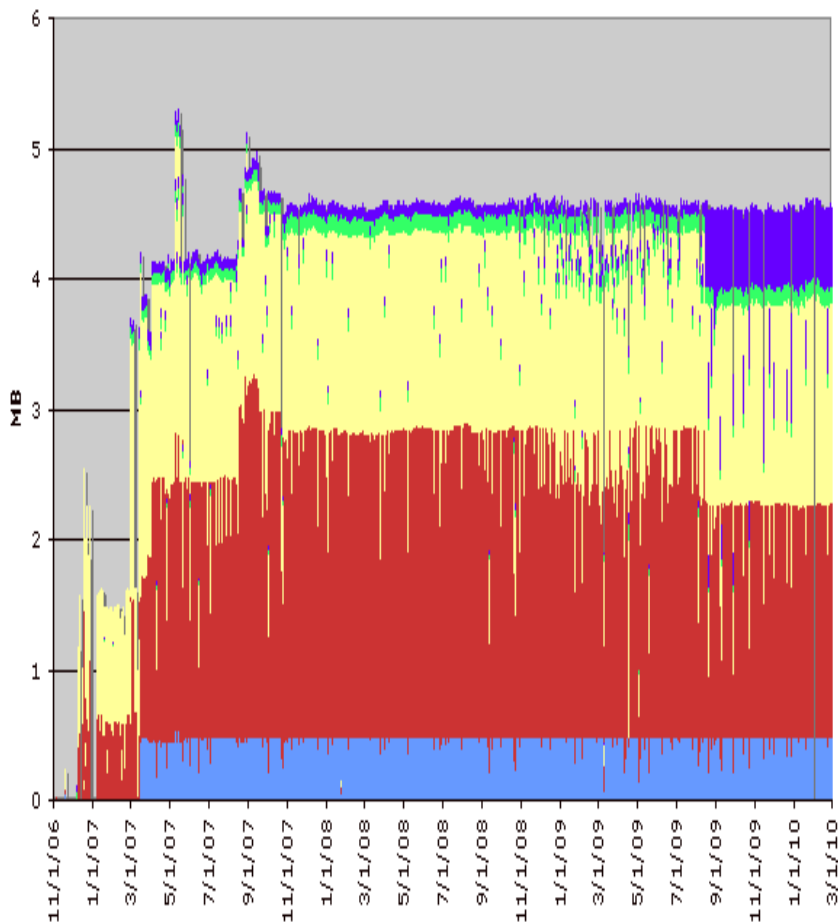
SECCHI-B Daily Image Telemetry Volume from SSR2



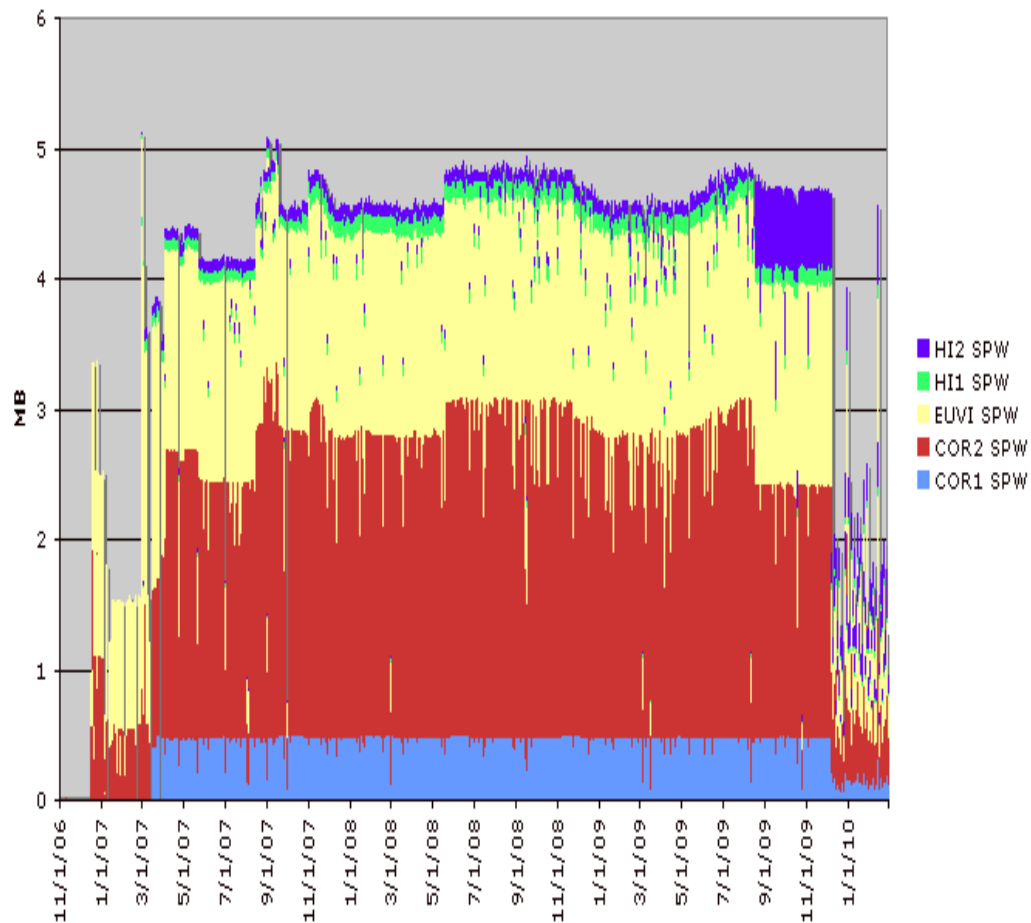
- HI2 SSR2
- HI1 SSR2
- EUVI SSR2
- COR2 SSR2
- COR1 SSR2

# SECCHI-A Beacon Telemetry Volume

SECCHI-A Daily Beacon Image Telemetry Volume from SSR



SECCHI-B Daily Beacon Image Volume from SSR



# Data Volume During Extended Mission

Date Ahead	Date Behind	Telemetry Rate (kbps)	Pass Duration (hours)	SECCHI Data Volume (MB/Day)*
Jan 2007	Jan 2007	720	4	584
Oct 2008	Sep 2008	480	5	539
Aug 2009	Sep 2009	360	6	490
Apr 2010	Dec 2009	240	7	461
Sep 2010	Sep 2010	160	8	345
Apr 2011	Nov 2010	120	8	246
Sep 2011	Sep 2011	96	8	195
Aug 2012	Aug 2012	30	10	21**

\* From STEREO Science Operations Plan (SOP), Version 2 (November 2009).

\*\* Estimate based on past experience.

# Future Science Objectives

- **Origin of SEPs**
- **CME initiation**
- **CME propagation**
- **Campaign observations**
  - **Opportunities for future SECCHI campaigns?**
- **Cross-calibration of CORs when spacecraft are separated by 180° (Super Bowl Sunday 2011)**
  - **Other unique calibration opportunities?**
- **SSR1 observations continue to provide the background synoptic program, with reduced image cadence and/or spatial resolution compared to nominal mission.**
- **Increased reliance on SSR2 (event buffer) observations to meet science objectives.**

# Options for Reduced Telemetry in Extended Mission (1 of 3)

- EUVI:
  - Increase compression for majority of images in highest-cadence wavelength;
  - Reduce image cadence to 10 minutes in highest-cadence wavelength;
  - Reduce image cadence to 2 hours in other wavelengths (×2.7 combined telemetry reduction).
- COR1:
  - Bin images to 512×512 pixels, and increase compression (×3 telemetry reduction);
  - Sum images onboard and send down a single 512×512 total B image, instead of three polarized images (×3 telemetry reduction);
  - Reduce image cadence.
- COR2:
  - Bin images to 1024×1024 pixels, and increase compression (×3 telemetry reduction);
  - Change all polarization sequences to total B images (currently interleave pB and B) (×2.25 telemetry reduction);
  - Reduce image cadence.
- HI:
  - Reduce cadence of high resolution calibration images from once per day to once per week;
  - Change HI-1 image cadence from 40 minutes to 60 minutes;
  - Use subfield masks to send down only a portion of each image;
  - Change HI-2 image cadence from 2 hours to 3 hours;
  - Bin images to 512×512 pixels (impact on star removal?).

Green: implemented

Orange: partially implemented



# Options for Reduced Telemetry in Extended Mission (2 of 3)

- Reduce real-time telemetry rate (used for housekeeping) to increase playback volume.
  - Real-time telemetry is also recorded on SSR, so it counts twice;
  - Average daily telemetry rate is reduced by ~17% of any reduction in real-time rate;
  - Reduce real-time rate from 3.6 kbps to 2.2 kbps with no impact on real-time data (additional 1.4 kbps is not used routinely);
  - Further reduction to 1.2 kbps could be achieved by reducing sampling rate of selected ApIDs;
  - Emergency mode with 16 kbps real time rate for anomaly resolution.
- Stop writing space weather data to SSR, and send only in real-time during contacts.
  - Pipeline processing of Level-0 telemetry means that these data are not available in time to be useful for forecasting;
  - Science data are available at the same time as space weather data from SSR;
  - Saves ~10% of daily telemetry @ 96 kbps rate.



# Options for Reduced Telemetry in Extended Mission (3 of 3)

- **Change sizes of SSR1 and SSR2 partitions to reduce emphasis on synoptic observations in favor of better coverage of selected events.**
- **Request that APL generate two new playback DFD tables: one to downlink only SSR1 and the other to emphasize downlink of SSR2 at the expense of SSR1.**
  - **SSR1-only would be the default DFD. SSR2 data would only be downlinked when a suitable event is detected, or during scheduled campaign periods.**
  - **When an event is detected and SSR2 is frozen, SWx images will be examined as soon as possible to determine if it is worthwhile to downlink SSR2 data.**
  - **If the answer to the above is yes, SECCHI POC will request MOC to change DFD to downlink SSR2 data at the next available opportunity. SECCHI POC will also upload schedules to manage decreased SSR1 data volume while SSR2 is downlinked.**
  - **If the answer to the above is no, SECCHI POC will send a command to re-enable writing to SSR2 at the next available opportunity (probably during the pass on the next day).**
  - **MOC will reset DFD to default SSR1-only when SSR2 has been completely emptied.**
  - **Other options (from 3/23/09 telecon with SSC and APL) are to use extra bits in the status message to trigger an autonomy rule to change DFD, or to switch DFD to play back SSR2 when SSR1 is empty.**

# Straw Man SSR1 Synoptic Program for Reduced Telemetry in Extended Mission

Telescope	# Images and Size (pixels)	Exposure (seconds)	Cadence (minutes)	Total Images/Day	Compression Scheme	Total MB/Day
EUVI	1 2k x 2k (171)	16	120	12	ICER5	
	1 2k x 2k (195)	16	5	276	ICER6	
	1 2k x 2k (195)	16	120	12	ICER5	
	1 2k x 2k (284)	32	120	12	ICER6	
	1 2k x 2k (304)	4	120	12	ICER5	
COR1	3 512 x 512 (pB)	1.7	10	432	ICER7	
	1 512 x 512 (B)	1.7	10	144	ICER7	
COR2	3 2k x 2k (pB)	6	360	12	ICER3	
	1 2k x 2k (B)	6	15	92	ICER3	
HI1	1 1k x 1k	1200	40	36	Rice	
HI2	1 1k x 1k	4950	120	12	Rice	
<b>Total</b>				<b>1052</b>		<b>310</b>

- Increased EUVI compression at most wavelengths, and reduced cadence of 304 images
- Interleaved COR1 pB and B images.
- Reduced COR2 pB image cadence to 6 hours.
- Meets SOP allocation at 240 kbps and 160 kbps, but does not meet allocation at 120 kbps

