

Solar Mass Ejection Imager (SMEI) Mission: Final Report

**Janet C. Johnston
Paul E. Holladay
Thomas A. Kuchar**

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**AIR FORCE RESEARCH LABORATORY
Space Vehicles Directorate
29 Randolph Rd
AIR FORCE MATERIEL COMMAND
Hanscom AFB, MA 01731-3010**

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This technical report has been reviewed and is approved for publication.

/signed/
Robert A Morris, Chief
Battlespace Environment Division

/signed/
Janet C. Johnston
Research Physicist

/signed/
Joel B. Mozer, Chief
Space Weather Center of Excellence

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14. ABSTRACT The Solar Mass Ejection Imager experiment, launched 6 January 2003 on Coriolis, continues to detect and track Coronal Mass Ejections (CMEs). SMEI has outlived its planned 2-3 year lifetime and amassed a database of full-sky images with a 102-minute cadence recorded for almost five years. The Navy presently operates the spacecraft, provides SMEI data to AFRL, and plans to operate Coriolis for as long as its experiment, Windsat, is functional. An irrecoverable failure on its A-side electronics (March 2006) forced us to switch SMEI to B-side, which is operating nominally. Camera 3 (closest to the Sun) continually degrades with accumulated radiation dose and has run above predicted/planned-for temperatures. Periodic anneals have helped to alleviate this problem, and a severe on-board masking of hot pixels in Camera 3 was instituted in 2006. Despite these problems, SMEI has amassed a wealth of detailed images of coronal mass ejections, high altitude auroras, variable stars, zodiacal dust, and comet tail interactions with the heliosphere. SMEI has demonstrated that such an instrument can improve space weather forecasts by 30%.					
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1. EXECUTIVE SUMMARY

The Solar Mass Ejection Imager experiment, launched 6 January 2003 on Coriolis, continues to detect and track Coronal Mass Ejections (CMEs). A proof-of-concept experiment, SMEI has outlived its planned 2-3 year lifetime and amassed a database of full-sky images with a 102 minute cadence recorded for almost five years.

After its first year of operation, control of Coriolis was transferred from the Air Force Space Test Program to the Navy, who operates the spacecraft today and provides SMEI data to AFRL, as well as executing routine operations, such as calibrations, mask uploads, resets, etc. at no charge to the Air Force Research Laboratory. The Navy plans to operate Coriolis for as long as its experiment, Windsat, is functional.

Because of an irrecoverable failure on its A-side redundant electronics (March 2006), SMEI has been switched to B-side, which is operating nominally. Camera 3 (closest to the Sun) has run above predicted/planned for temperatures and performance continually degrades with accumulated radiation dose. In addition to periodic anneals to help alleviate this problem, we have instituted a severe on-board masking of hot pixels in Camera 3 since 2006.

Despite these problems, SMEI has amassed a wealth of detailed images of coronal mass ejections (CMEs), as well as other phenomena, such as high altitudes auroras, variable stars, zodiacal dust, Gegenschein, and comet tail interactions with the heliosphere. SMEI has demonstrated that such an instrument can accomplish a 30% and greater improvement in space weather forecasts.

At the time of this report, the SMEI team is working with the Air Force Space Weather Agency to incorporate SMEI data into their operational forecasts. A workshop on future heliospheric imaging missions to meet DoD needs was held in April 2007 at the Air Force facilities at the National Solar Observatory at Sunspot, NM, at which the Air Force and Navy agreed to work together to field the next heliospheric imager.

2. PERFORMANCE

2.1 Hardware

A complete description of the SMEI hardware can be found in [Eyles et al. 2003]. The Coriolis satellite is in a dawn-dusk, Sun-synchronous, circular polar orbit at an altitude of 840 km. The inclination of the orbit is 98° relative to the equatorial plane. The sensor suite consists of three carefully baffled CCD cameras, each covering a narrow 3° × 60° strip of the sky. The cameras are mounted on the satellite with their fields of view aligned end-to-end and slightly overlapping, so that the field of view swath is a 3° wide strip extending 160°, an approximate great circle with the ends near the orbit axis. Since the satellite is zenith-nadir pointing, during each complete orbit the cameras' fields of view sweep out nearly 90% of the entire sky. Gaps include a zone of exclusion of 20° radius in the direction of the Sun, a smaller circle in the anti-solar direction, and shuttered areas due to sunlight in the sunward camera. The instrument operates continuously, so the data set comprises a sequence of orbit images, 14 per day. It has maintained about an 85% duty cycle interrupted only for periodic calibration and diagnostic purposes, and occasionally for software anomalies and telemetry problems. The unfiltered CCDs have a red-biased spectral response from ~ 500 to 1100 nm peaking at 700 nm.

2.1.1. SMEI DESIGN PHILOSOPHY

SMEI was conceived and developed as a relatively low cost, 'proof-of-concept' instrument with a 2-year design lifetime (original requirement) and the aim of continuation through a third year. It has completed almost five years of operation. SMEI designers baselined use of hi-rel mil-spec parts rather than full space-quality, that is, integrated circuits to MIL-STD-883 Level B; MIL-38535 where possible, and used discrete semiconductors to JANTX; JANTXV where possible. The design used parts of known radiation tolerance rather than rad-hard to meet a 10 krad total dose spec at the component level. Parts with known radiation tolerance were used where possible, with total dose testing performed on parts of unknown radiation tolerance using a Co60 source.

Local shielding for parts of low radiation tolerance, *e.g.* the DHU Processor was used, along with parts of good "single-event" tolerance (SEU and SEL) where known.

There was no formal SEU/SEL tolerance requirement or testing.

Examples of measures taken to enhance and ensure reliability given 'compromises' on parts quality, etc. included:

- Two fully-redundant Data Handling Units (DHUs) - 'B' system in cold-redundancy.
- Redundant spacecraft interfaces: DHU-A power from spacecraft PDU-A; DHU-B from PDU-B, and each DHU has interfaces to spacecraft MIL-STD-1553B Bus A and Bus B. Also, a provision of an internally-generated 1Hz sync pulse if the spacecraft 1Hz is lost.
- Careful design for protection against latch-ups (SELs) - Current limiting at component, group of components or PCB level, by active current trips and/or limiting resistors as appropriate.

- Each Camera is 'single string', but careful attention paid to fault-tolerance of interfaces with DHUs. There is an independent power converter system in each camera and propagation of failures between cameras is not allowed.
- Eight redundant copies of on-board software in write-protected E2PROM selected in a robust manner by re-asserting 'DHU On' relay command.
- Capability of patching on-board software using write-enabled E2PROM as a provision for recovery from a 'bad' uplinked patch.

2.1.2 OVERALL PERFORMANCE FIRST THREE YEARS

There were no hardware failures until 31 March 2006. Until then, the DHU B had never been switched on. There is no evidence of bit-errors in copies of on-board software in E2PROM, SEL events in DHU, and no significant changes in voltage and current Analog Monitors (table below).

Table 1. DHU Voltage and Current, 2003 and 2006

	Feb 2003	Feb 2006
Processor PCB 5V	4.94 ± 0.05 V	4.94 ± 0.05 V
Processor PCB Current	Quiescent 0.32 ± 0.05 A Peaks to 0.9 A	Quiescent 0.32 ± 0.05 A Peaks to 0.9 A
Instrument Current (excluding De-Icer Heaters)	0.72 ± 0.05 A	0.72 ± 0.05 A

DHU temperatures have increased (table below). Camera 1 and 2 CCD temperatures are within optimal operating range; Camera 3 is running hot.

Table 2. Electronics Temperatures, 2003 and 2006

	Feb 2003	Feb 2006
Processor PCB Temperature	21.5 ± 1.0 C	25.2 ± 0.8 C
DHU Power Supply Temperature	18.6 ± 1.0 C	21.0 ± 0.6 C

2.1.2.1 DHU Processor Performance

- Data throughput from cameras required a fast processor ($11.71 \mu\text{s}$ per pixel for each of 3 cameras).
- Selected processor was Texas Instruments SMJ320C50 DSP
 - 20 MIPS performance (with 20Mhz clock – actually de-rated to 19Mhz)
 - Available to MIL-STD-883 Level B, but not rad-hard
 - Limited total dose data, no SEU/SEL data
 - Total dose tested in-house, 4 – 5 krad tolerance

- Local shielding to improve TID tolerance, current limiter for SEL protection
- Attempted to provide protection against crashes using watch-dog timer
- DHU upsets and anomalies have occurred fairly frequently
 - Usually require DHU reset, only occasionally fixed by going back to Configuration Mode
 - Have never required powering off DHU, so no SEL events in DHU
 - Cannot exclude possibility of some SEL events in cameras since cameras are power-cycled on DHU reset, but unlikely
 - The CODE_VER telemetry parameter increments on DHU reset, provides count of resets.

The average rate of resets is ~ 1 per 2 weeks, with no evidence of a significant increase in rate after the first 6 months.

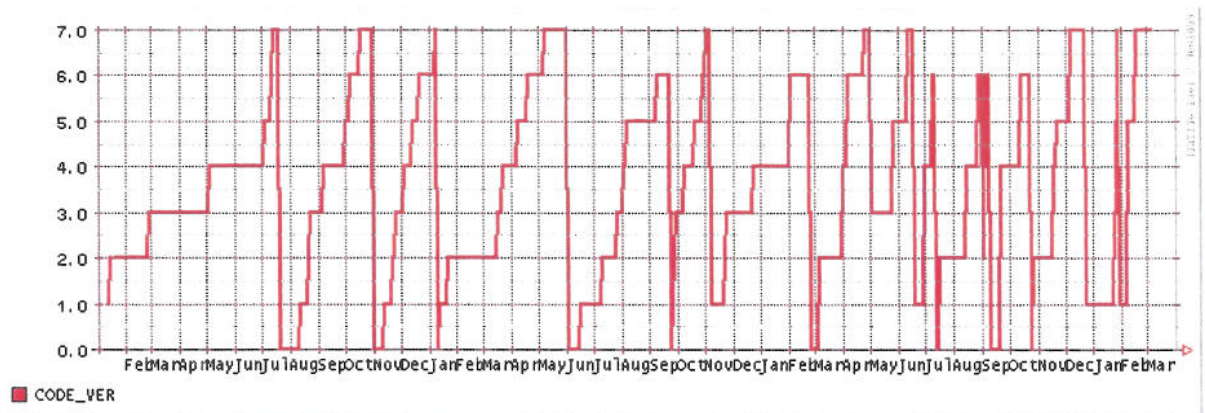


Figure 1. Data Handling Unit Resets Required during First Three Years

Table 3. DHU Re-Boots Required, by Quarter, 2003 to 2006

	Number of Re-Boots		Number of Re-Boots
1-Feb-03 to 30-Apr-03	2	1-Aug-04 to 31-Oct-04	11
1-May-03 to 31-July-03	3	1-Nov-04 to 31-Jan-05	4
1-Aug-03 to 31-Oct-03	5	1-Feb-05 to 30-Apr-05	4
1-Nov-03 to 31-Jan-04	7	1-May-05 to 31-July-05	8
1-Feb-04 to 30-Apr-04	9	1-Aug-05 to 31-Oct-05	9
1-May-04 to 31-July-04	4	1-Nov-05 to 31-Jan-06	5

2.1.2.2 Thermal Hardware

Over the course of the first three years, DHU temperatures have increased by $\sim 2 - 3^{\circ}\text{C}$. The best indicator of the overall camera temperature is the mirror temperature. There has been no evidence of a significant upward trend in Camera 1 or 2. Camera 3 temperatures have increased by $\sim 3^{\circ}\text{C}$.

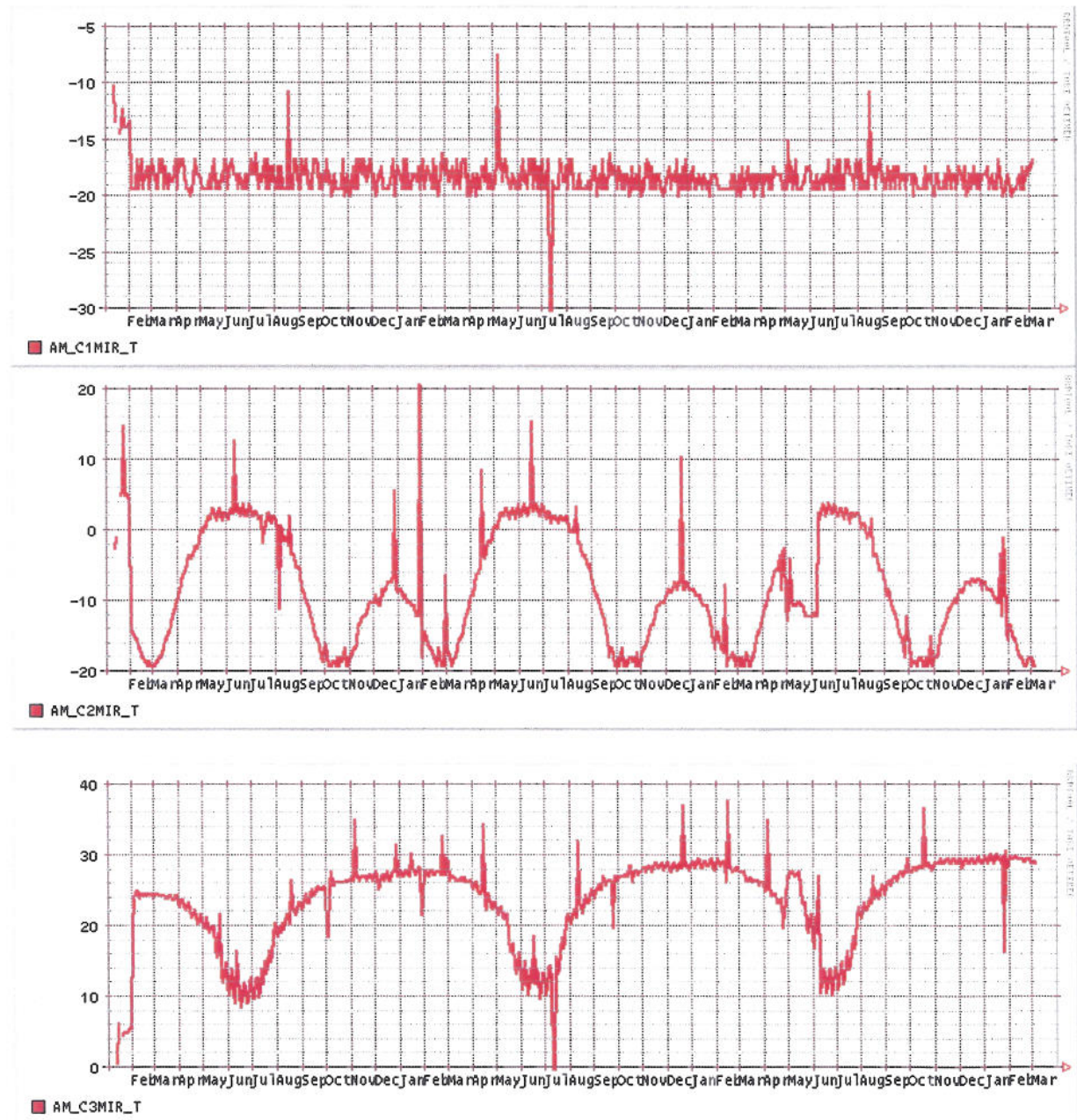


Figure 2. Temperatures of the Camera Mirrors, for (top to bottom) Cameras 1, 2, and 3.

CCD Temperatures experienced $\sim 1 - 2^{\circ}\text{C}$ increase over 3 years in Camera 3; less in Cameras 1 and 2.

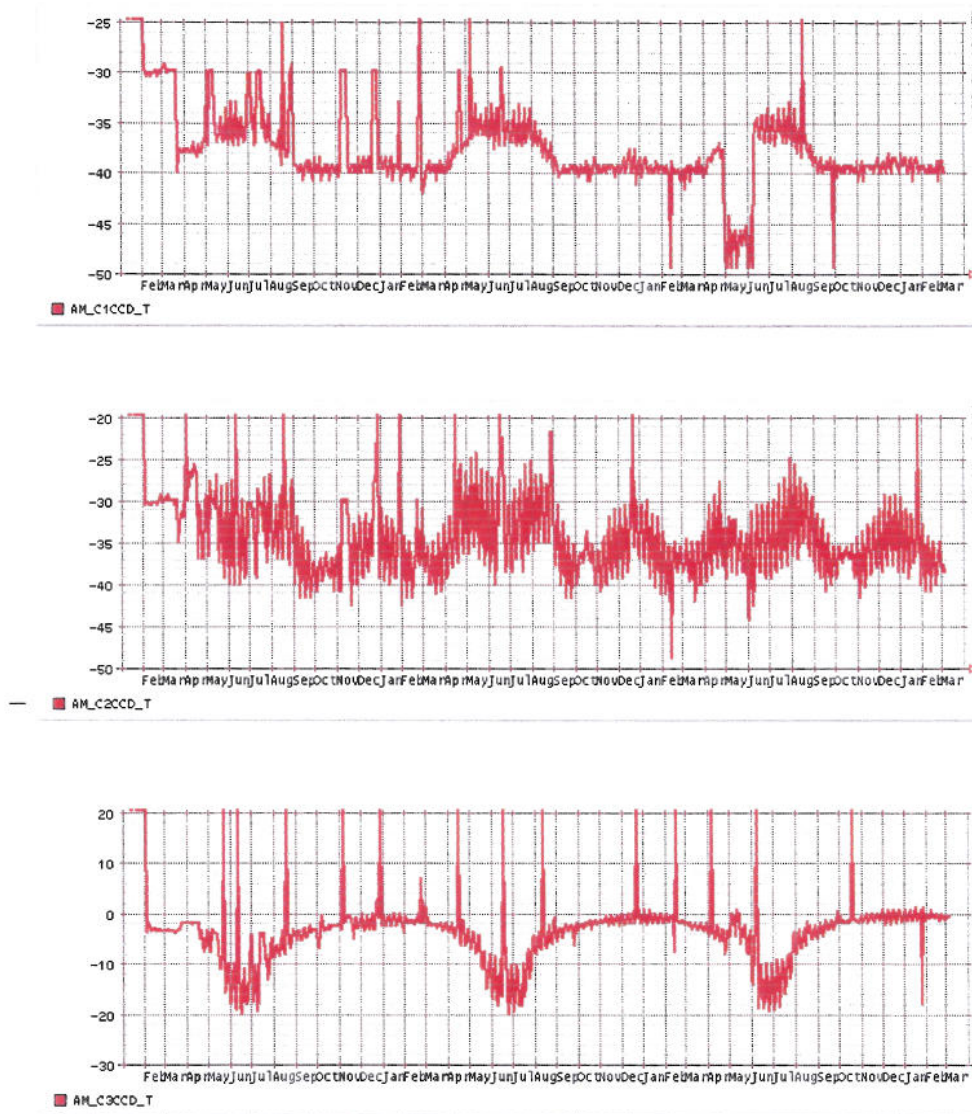


Figure 3. CCD Temperatures for (top to bottom) Cameras 1, 2, and 3.

CCD dark charge is measured in closed shutter calibrations, using the mode of pixel readout value (rather than the mean) to avoid biasing by hot pixels.

Camera 1 shows progressive increase due to radiation damage from ~ 1 ADU to ~ 6 ADU, reduced by periodic annealing at $\sim 45 - 50^{\circ}\text{C}$.

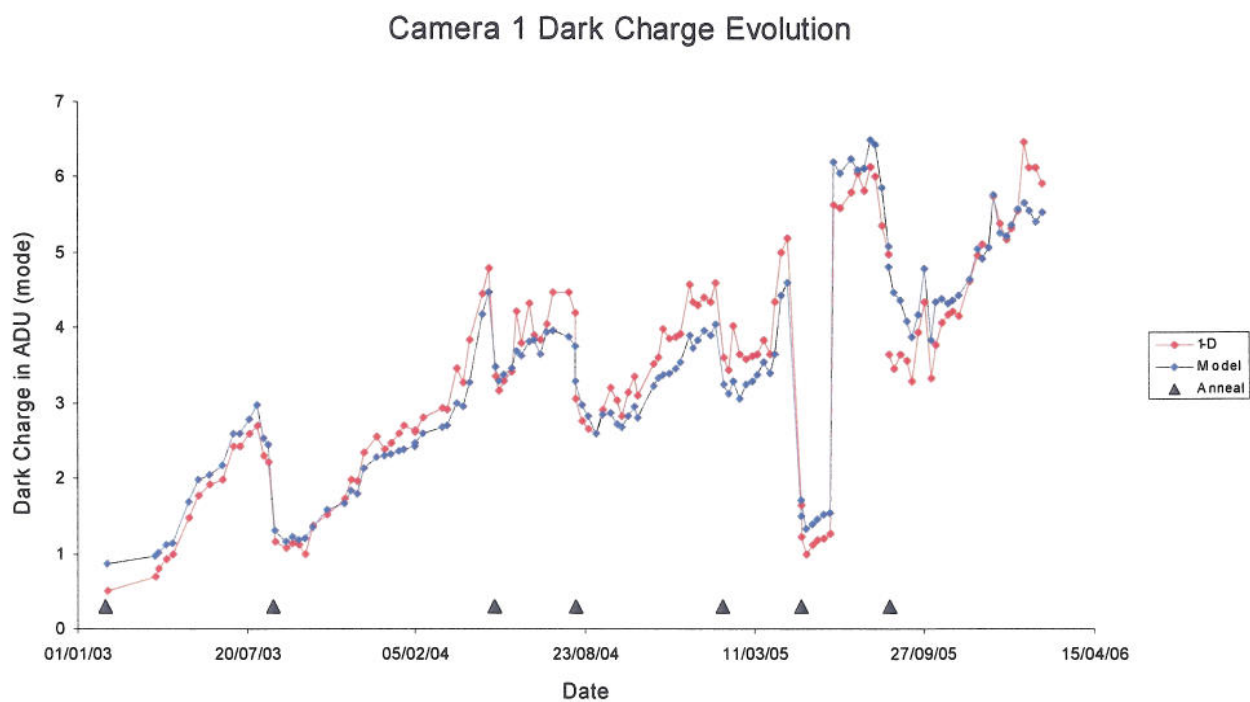


Figure 4. Camera 1 Dark Charge Evolution

The model is fit to $I_{\text{dark}} = (a_0 + a_1t + a_2\delta t) \exp(-a_3T)$, where t is time since launch, δt is time since last anneal and T is temperature (K).

Camera 2 shows progressive increase from ~ 2 ADU to ~ 8 ADU, reduced by periodic annealing at $\sim 50^\circ\text{C}$.

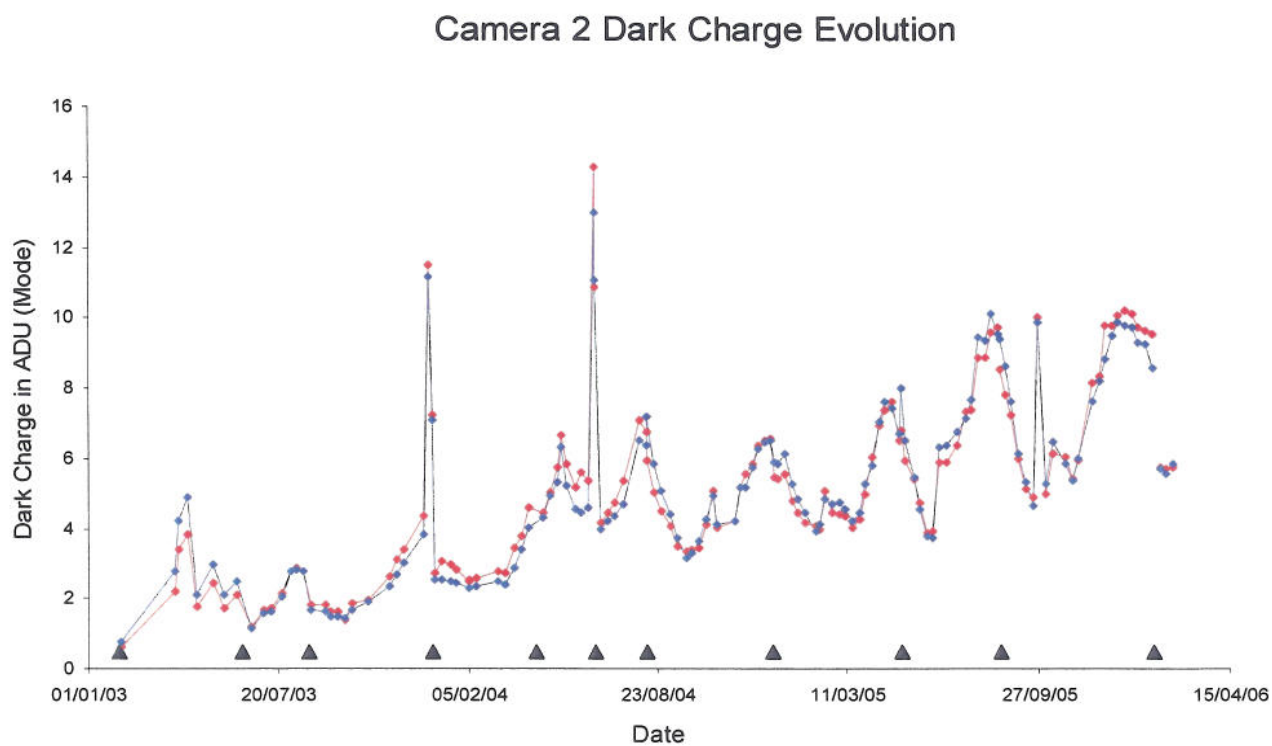


Figure 5. Camera 2 Dark Charge Evolution

Frequent annealing at $\sim 80^{\circ}\text{C}$ is not very effective.

Camera 3 Dark Charge Evolution

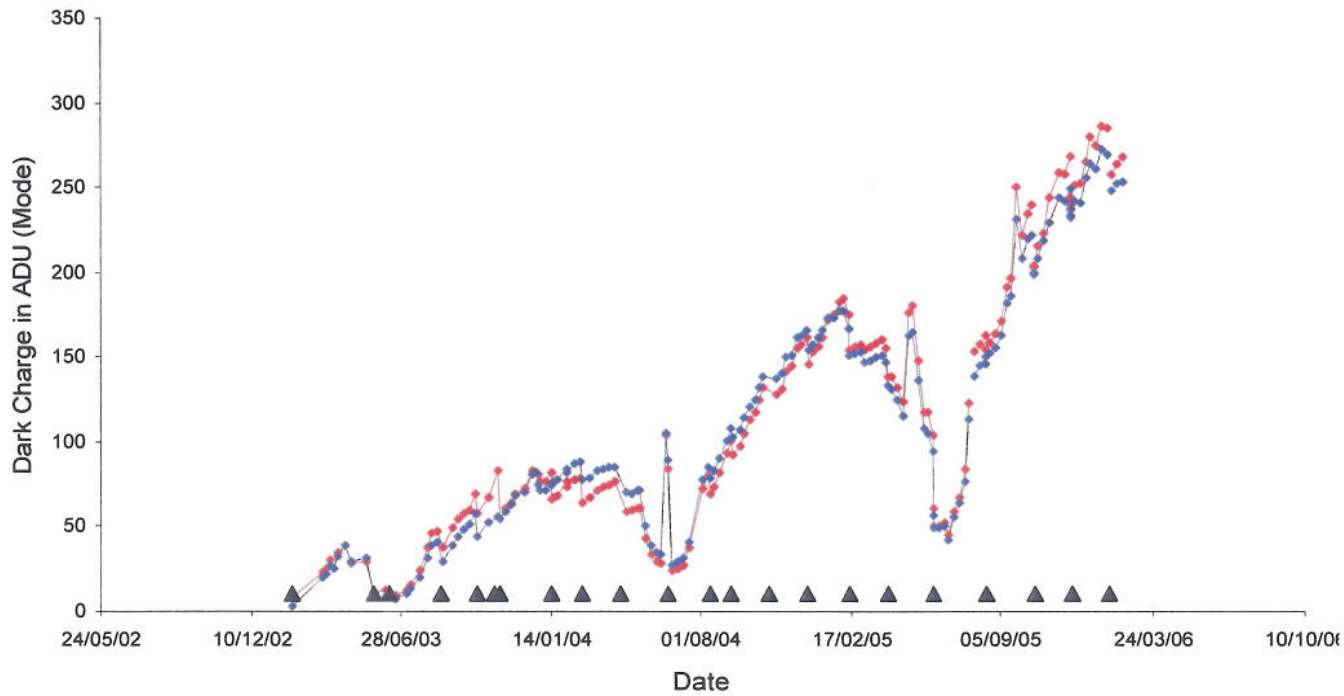


Figure 6. Camera 3 Dark Charge Evolution

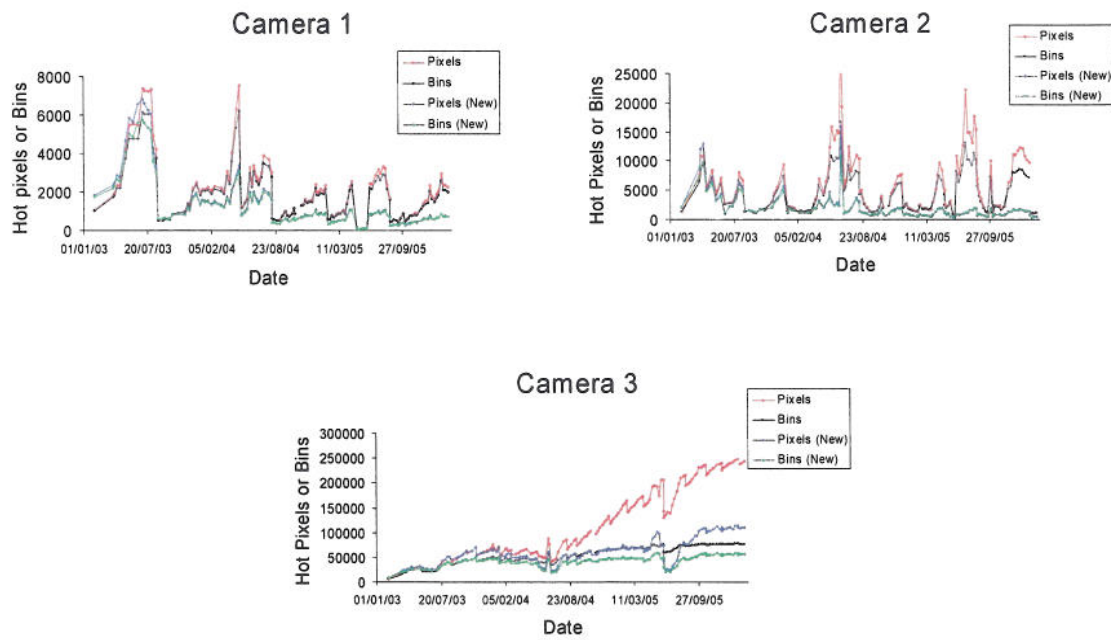


Figure 7. Evolution of the Number of Hot Pixels for Each Camera

Although Camera 1 and 2 CCD temperatures are quite acceptable, -40 to -50°C would be better. The SMEI thermal model incorrectly predicted temperatures which led the team to mask off portions of the radiators on Cameras 1 and 2 so that epoxies would not become brittle. It was also considered for Camera 3's radiator, which if implemented, would have been disastrous on the Camera 3 performance. Masking Camera 1 and 2 radiators was unnecessary. Camera 3 CCD temperature is a continuing and worsening problem. It has been mitigated by periodic annealing and hot pixel masking, but the camera will continue to degenerate from radiation damage. Cameras 1 and 2 experience the same radiation dose as Camera 3 but they are operating within an optimal temperature range.

2.1.2.3 On-Board Masking

To quantify the improvements of onboard masking of Camera 3, noise estimates were made using orbit-differenced images, i.e. an image where the previous orbit was subtracted. Since this image product is primarily used for tracking CMEs, this approach will give an estimate of the faintest CME detectable by SMEI. A section of a Camera 3 imaged area was used for this analysis which was relatively devoid of large stellar residuals from the subtraction process as well as any noticeable transients. These types of residuals can be large and produce "outliers" in the noise distribution which, in turn, affect the statistical measurements. Several patches were taken both before and after the mask was applied. The differenced pixels were plotted in a histogram and then fit with a Gaussian. The standard deviation of the Gaussian distribution gives a direct measurement of noise and the likely detection limit of a CME. The results show a reduction in the noise by nearly a factor of two, after the mask was applied. The values of the standard deviations, pre- and post- mask application, were 1.01 and 0.55 ADU. Thus the detection threshold (3σ) for onboard masking of camera 3 is approximately 1.7 ADU. We continue to use on-board masking despite its consequences for some of the collateral observations, such as stellar photometry. The improvement to Camera 3 observations could be seen in a recording of the 6 December 2006 limb event, the first CME seen in the Camera 3 FoV since implementation of the mask.

2.1.3 DHU-A FAILURE AND CURRENT STATUS

SMEI telemetry was lost a few hours after onset of an anomaly coincident with passage through the South Atlantic Anomaly (SAA) on 31 March 2006. Attempts to recover DHU-A, including: power cycling of DHU-A, exercising all eight copies of the boot-up software, attempting 'blind' commanding to switch on the de-icer heaters, using the spacecraft PDU-B to issue a relay command to switch on DHU-A, and using the spacecraft MIL-STD-1553B bus B rather than bus A were unsuccessful. The failure was likely because of accumulated radiation damage, probably to the DSP processor itself.



Figure 8. Recording of the 6 Dec 2006 CME Event by Camera 3, after Implementation of the Hot Pixel Masking. The CME is the white arc at the bottom left.

Current Status: SMEI remained in a switched off mode (except for brief periods for recovery attempts) for nearly a month (commencing 31 March 2006). There was some risk to the optics in the cameras if sunlight penetrated to the surfaces because of an accident at the integrating facility during testing. Unfiltered compressed air was pumped into the experiment that could have laid down a hydrocarbon coating all the surfaces. When sunlight, mostly UV, hits such a material the coating can become opaque. With camera shutters almost certainly open, and further diagnostic tests exhausted, DHU redundant side B was powered up. As of this report date, SMEI, operating on the B-side is working nominally.

2.2 Data Processing

The real time data processing for SMEI was handled in-house at AFRL. A detailed description follows in section 2.2.1. The University of California – San Diego team spent considerable time working individual images for the best background subtraction possible. Their technique is described in Section 2.2.2.

2.2.1 AFRL PIPELINE PROCESSING TECHNIQUE

The AFRL pipeline (composite image) processing consists of a series of procedures that ingests the telemetry data, performs quality checks on the data, corrects the data for various instrumental and external effects, and creates several all-sky images for each orbit. The end product is a set of five Hammer–Aitoff images created for each orbit: an image derived from weighted input values, a FITS plane of the weights, an image of the observed sky using all the data, the same image using only “good” data, and a fifth image from which the stellar and zodiacal contents have been subtracted. The pipeline is able to process a day’s worth of data in less than a day. AFRL provided the basic real time processing of the images, including “quick-look” images for forecasting purposes. This work was performed by Boston College contractors, Drs T. Kuchar and D. Mizuno.

2.2.1.1 SMEI Image Products

The end products of the SMEI processing pipeline are single orbit images in several sky useful projections. Each sky projection was chose to fulfill a specific mission requirement. The three standard projections are:

1. High resolution (0.2 degree/pixel) all-sky cubic projection in celestial (equatorial) coordinates.
2. Low resolution (0.5 degree/pixel) all-sky Hammer-Aitoff in (observer) ecliptic coordinates
3. Low resolution (0.5 degree/pixel) hemispherical “fisheye” projection in (observer) ecliptic coordinates

Each image conforms to the FITS astronomical standard (*Calabretta and Greisen, 2000*). All the images contain at least two data planes. The first of these consists of (Image data) × (statistical weights) and the second contains the statistical weights. This format was chosen to provide a quality estimate of each pixel. The statistical weights are the weighted sum of the number of CCD pixels at that sky location. The final image can be obtained by dividing the first plane by the second. Some of the sky projections contain additional image planes (described below) to aid image analysis. The image file names indicate the projection type, the observation date and orbit duration:

PPP_YYYY_ddd_h1m1s1_h2m2s2.FIT, where PPP is the projection, YYYY is the year, ddd is the consecutive day of the year (DOY), h1m1s1 is the UT start time of the orbit and h2m2s2 is the elapsed time.

2.2.1.2 Cubic Projection

This image projection is the SMEI archival product. Its pixel size is equivalent to that of the CCD data binned in science mode. Thus it contains sufficient resolution to produce any (lower resolution) sky projection that is not readily available. The cubic sky projection chosen for the archive is the “spherical cube” developed for the Cosmic Background Explorer (COBE, see *Calabretta and Greisen, 2000*, for a mathematical description of this projection). This projection attempts to minimize the edge distortion

that is prevalent in all spherical cube type projections. Image file names of this type are denoted by CSC (COBE spherical cube).

2.2.1.3 Hammer-Aitoff Projection

The equal area Hammer-Aitoff projection is used for displaying an all-sky image in which the brightness of a unit area is preserved regardless of the pixel distortion. Image file names of this type are denoted by S. These images are cast in ecliptic coordinates centered on the sun (the longitude coordinate of the image center is rounded to an integral value of the solar ecliptic longitude). This is the natural coordinate system for detecting and tracking heliospheric transients that originate on the Sun. Each image file contains 6 image planes to meet this end:

1. (Image data) $\times$ (statistical weights)
2. Statistical Weights
3. Orbit recast in previous day's astrometry (*i.e.* centered on [current solar longitude - 1°])
4. Current orbit Image (*i.e.*, plane 1/plane 2)
5. Image with absolute star map and zodiacal model subtracted
6. Image with a mean orbit map subtracted

Image planes 1 through 4 are provided for consecutive orbit differencing to remove the celestial backgrounds. This is an efficient way to detect fast moving transients. To facilitate this type of image differencing, the ecliptic longitude of the image center is set to an integral value for the current day. To avoid an astrometry shift from comparing orbits that may overlap a two-day period, the Aitoff files contain the current day's data projected in the previous day's ecliptic longitude (image plane 3). The value of the current day's longitude is contained in the FITS header parameter CTYPE1. The flux of a transient may not be preserved using consecutive orbits, if the transient does not move sufficiently from orbit to orbit. **

Plane 5 contains an image with a standard stellar background and zodiacal emission already removed. This is useful for slower moving transients that may not move sufficiently to be detected with the above image differencing method. The flux of the transient is preserved in this method, however, camera and other systematic artifacts remain in this image. Future improvements in processing will account for these effects, allowing their removal.

Plane 6 contains an image where a mean background was determined from 5 previous orbits. This method was devised to reduce the effect of single-orbit transitory effects (e.g. aurora glow and particle contamination from the auroral zones and the South Atlantic Anomaly) that can be worsened in consecutive orbit subtraction. It can also aid in the detection of slower moving transients as well as preserving their flux.

2.2.1.4 Fisheye Projections

To reduce projection distortions at the ecliptic poles the SMEI data are also imaged as “fisheye” projections (i.e. zenithal equidistant, mathematically described in Calabretta and Greisen, 2000) which maintains a constant angular scale along the radius of the image. These images are also Sun-centered ecliptic coordinates with a radius of 135° about the Sun. Each image file contains four image planes, similar to those in the Aitoff images for consecutive orbit subtraction. Image file names of this type are denoted by F.

A second version of the above fisheye images is produced to help aid in “real-time” space weather forecasting. These “quick” images only contain data from cameras 2 and 3 and do not incorporate enhancements found in the Aitoff or the other fisheye images. They also contain only two image planes (i.e. the first two planes found in the Aitoff and ** fisheye images) cast in the current day’s ecliptic longitude. Thus these images require significantly less pipeline processing time. These image file names are denoted by ARC.

2.2.2 UCSD PROCESSING

Detailed image processing using both pre- and post-data to remove background was accomplished by UCSD contractors. A description of their techniques follows in Sections 2.2.2 to 2.2.5. Further details can be found in Jackson et al 2004.

2.2.2.1 Data Frame Conditioning

The basic corrections to the data in the pipeline processing are as follows:

1. *Rice-corrupted pixels*: Up to four of the final pixels in the data stream for a frame may be corrupted by the Rice compression. These pixels are removed from consideration..
2. *Bad pixel mask*: A bad pixel mask is determined from weekly on-orbit calibrations. Approximately one third of the pixels in camera 3 are identified as “hot” or “flipper” pixels due to the elevated focal plane temperatures. These pixels are omitted from further processing.
3. *Moon and planet detection*: Entire frames contaminated by the Moon and Venus are flagged as bad so that they can be discarded.
4. *Saturation detection*: Regions of excessive pixel saturations and anomalously elevated levels are checked and affected frames are flagged as bad so that they can be discarded.
5. *Position tagging*: The pixels are assigned right ascension and declination coordinates.
6. *Dark offset removal*: The bias and dark charge are computed from the appropriate columns and removed from the data.
7. *Spike detection and removal*: Pixels with locally anomalously high values are detected and flagged in a bad pixel mask applied to each frame.
8. *Large scale flatfields*: UCSD flatfields are applied.
9. *On-board flat-field equalization*: Frames that have not been flat-fielded onboard the spacecraft are multiplied by 0.75 to make them consistent with data frame levels where on board flat fields have been applied.
10. *Geometric corrections*: Focal plane projection effects as described by UCSD are applied.

11. *Excessive median-gradient detection*: Normally the median of the response distribution does not increase by more than about 1ADU from frame to frame for a given camera. Frames whose median increases by more than 10 ADU from the previous frame are flagged as bad so that they can be discarded.

12. *Sub-sampling the focal plane*: Only half (2.5°) of the data from the 5° -wide in-scan field of regard of the CCD that is transmitted from the focal plane is used in the imaging. The accepted data were identified by the UCSD flat field corrections.

2.2.2.2 Image Construction

A relatively high-resolution all-sky map image is constructed from the position tagged data, for each orbit, in a fixed projection that (ideally) would have no preferred direction. This image is then re-sampled onto the (lower resolution) Sun centered Hammer–Aitoff projection. An advantage to this approach is that we can easily re-project the higher resolution image created from given orbit into different representations since the re-sampling is a faster operation than the basic image construction. This is useful, for example, in using difference images between successive orbits to identify transient phenomena such as CMEs, as we can always make two orbits in the same sidereal projection, which is necessary to remove stars in the difference image.

The COBE Quadrilateralized Spherical Cube (CSC) (Calabretta and Greisen, 2002 defined the CSC FITS standard) is used for the high-resolution fixed projection images. This is a projection in which the sky is divided into six flat square faces. The projection for each face is designed such that the distortion and deviations from the pixel equal-area condition are minimized. The 12 arc min (0.2°) pixel size of the SMEI science data is adopted for the pixel size in these high-resolution images.

The point response function is quite asymmetric especially in the in-scan direction. Since the 1° program requirement for resolution allows data smoothing, one can use the transpose of the point response function to smooth the data while projecting it onto the COBE cube. Such smoothing of the data produces an ovoid shape for the point response function with axes of about $1^\circ \times 0.5^\circ$ in the in-scan and cross-scan directions, respectively. The transpose response function is smoothed with a 0.9° box averaging in the cross-scan direction such that the point response function is circularly symmetric after the filter function is applied to the data. The filter function is centered on each of the COBE cube pixels and the observations immediately around that point are averaged with weights defined by the filter function. Thus, the transpose plus cross-scan averaged filter function not only smooths the data but projects it on the proper grid. A Hammer–Aitoff image is created for each orbit with the Sun at the center of the image. A 0.5° pixel for the Hammer–Aitoff images is selected, as this is the Nyquist sampling interval for 1° resolution specified by the program. The ecliptic coordinates of the Sun are rounded to the nearest integer and the data is projected onto the Hammer–Aitoff image with 0.5° pixel spacing using a smoothing filter. The final Hammer–Aitoff files contain 5 image planes: the “weighted data” and “weights” planes for the “good data” only (these planes are the actual products of the image construction process), the “good data” and “all data”

images in true sky values (dividing the weighted-data plane by the weights plane), and the background subtracted image.

2.2.2.3 Galactic Background Subtraction

Camera 1 and 2 measurements were obtained from orbits sampled approximately every 10 days over a 108-day period. The observations were filtered with the modified transpose of the point response function and imaged onto a COBE-cube. The major planets have also been removed by excising a small box around them. After removal of the zodiacal light model, the processed images are averaged together. The result is a COBE-cube representation of the sidereal sky. This image is subtracted from each COBE image for a single orbit and the result is re-gridded to the Sun-centered Hammer–Aitoff projection.

2.2.2.4 Zodiacal Background

The zodiacal module of the Celestial Background Scene Descriptor (CBZODY 6 – Noah and Noah, 2001) is used to compute the zodiacal background. The module includes a modified form of the Reach, Franz, and Weiland (1997) dust bands component, which was found to predict too much infrared flux at smaller elongations (Price *et al.*, 2003) and in the SMEI observations. Thus, only the cloud component is used. The zodiacal model is computed at the pixel centers of the Sun centered Hammer–Aitoff projection for a given orbit, rather than the COBE cube, as the scale lengths for this phenomenon are large and this significantly improves the speed of calculation. Since the predicted zodiacal image is computed in units of MJy sr⁻¹, the best fit scaling between the model and observations provides an initial calibration, 1 MJy sr⁻¹ = 1250 analog to digital unit (ADU).

3. OPERATIONS

The SMEI experiment was launched from Vandenberg AFB on the last Titan II rocket to be sent into space. It shares the Coriolis spacecraft with the primary experiment, WindSat, operated by the Navy. Spectrum Astro, Inc. was the spacecraft vendor. ??? Integration and testing were accomplished first at the [SAI] facility in Gilbert, AZ, then ? moved to the Naval Research Laboratory facility in Washington DC. The first year of the Coriolis mission was operated by the Air Force Space Test Program (STP), and then operations transferred to the Navy IPO control. The Navy continues to provide SMEI data to the AFRL Space Vehicles Directorate at no cost to AFRL.

In 1999 AFRL management of SMEI passed from Dr. S. Keil to Dr R. Radick and Ms. J. Johnston. Mr. P. Holladay is the current Systems Engineer and Chief of Operations, replacing Mr. P. Anderson (Boston University) in 2003. Lt S. Figueroa assisted with integration, testing and early operations. Lt J. Hewitt served as Chief of Operations from 2005 to 2007. Drs T. Kuchar and D. Mizuno (both of Boston College) wrote the SMEI real time processing software to generate the all-sky maps. Ms Johnston currently serves as the Program Manager and Principal Investigator. SMEI data is currently archived at

the AFRL Sunspot, NM facility and current and archived sky maps and movies appear on a website.

Since the launch of Coriolis, SMEI operations have been performed by STP's RTD&E Support Complex (RSC) at Kirtland AFB, NM, in coordination with AFRL. The first month of operations included extensive real-time commanding to initialize the instrument components, open the Camera Doors, perform thorough checkout procedures and calibrate the instrument. Since that first month, nominal commanding has been accomplished using stored commands in text files (called tasking files) transferred [to the *from the*] RSC [from *to*] SMEI via ftp. The commands in these files execute *** weekly calibration, periodic special observations, and Camera CCD anneals as needed. As noted in Section 2.1.2.1 (DHU Processor Performance), SMEI experiences anomalies, on average, every 1 – 2 weeks, often traced to Coriolis transits of the South Atlantic Anomaly (SAA). The typical response to these anomalies is to request that the RSC to perform a reset of the SMEI DHU by executing a real-time command procedure; these requests are recorded in documents called memograms. In addition to causing anomalies, the SAA also corrupts the images of all three cameras. Hence, special observations, such as weekly calibrations, are planned for orbits that don't traverse the SAA.

Each SMEI Camera may collect images in any of a number of modes, depending on the purpose of the observation. The historical record of what specific mode each of the cameras was in at a given time since launch is a spreadsheet called the Configuration Log (config log.xls, see Appendix C). The log lists date and time, mode number, mode parameters, observation duration, and any associated comments for each observation. A brief description of each column of the spreadsheet is provided below.

- Rev # or UTC(hex): lists either the orbit number (since launch) or the time (in seconds since epoch, hexadecimal) of the start of the observation.
- Date
- Julian Day
- Time (Zulu)
- Camera parameters
 - Mode: Pre-defined mode number (0 through 15) or Dynamic Configuration mode number (DYNxxx). Mode 0 corresponds to the cameras being powered off; Mode 1 corresponds to the camera in Standby Mode. Specifics of each mode are listed in the subsequent parameters.
 - CCD Bin'g: The cameras may operate at three distinct resolutions, defined by how the CCD pixels are binned in producing the image. Normal binning mode takes a 4×4 bin of pixels and combines their response into one value. High-Resolution binning mode combines a 2×2 bin into one value. Engineering binning mode includes every pixel in the image (1×1 , or no binning).
 - ROI: Region Of Interest. An image may consist of all the pixels on the CCD, or a subset of those pixels forming a region of interest. The region of interest is typically slightly larger than the image that the aperture casts on the CCD via the camera optics.

- FF Correction: Flat Field Correction. A gain value can be applied to each pixel to account for variations in response to a flat input. These gain values are stored in a table; applying this table of gain values is a function that can be turned ON or OFF according to this parameter. For Camera 3, this functionality has been utilized to mask (i.e., setting gain to zero) hot pixels.
- Shutter position. There is a motor-controlled shutter over each camera's aperture that automatically closes to protect the optics when a bright object is detected by that camera's Bright Object Sensor. The shutter is also intentionally set to one of its closed positions in certain operational modes to collect images that are used to determine the Flat Field Correction gain values. This latter function is what is tracked in the Configuration Log. This parameter can be set to OPEN (where the shutter only closes when triggered by the BOS), or to one of the closed positions (CLOSED or FF). In the CLOSED position, the CCD sees a dark shutter, providing a dark (or Low) flat field. In the FF (Flat Field) position, the CCD sees a white shutter, which, when illuminated by the Flat Field LED (inside the camera box), provides a bright (or High) flat field.
- FF LED: Flat Field LED (Light Emitting Diode). Set to be ON or OFF. Used in conjunction with the FF shutter position to provide a High flat field. Note that a Medium Flat Field can also be configured by having the CCD image an illuminated dark shutter.
- De-Icer set point: Each camera's CCD has a heater (called a DeIcer Heater) and a thermistor that can be used to maintain the CCD at a certain temperature. These were set high (+30°C) soon after launch to protect the camera optics from contamination during orbit raising. For normal observations, the set point is kept low enough so that the heaters don't turn on (-50°C). As camera performance has degraded with time (especially in the case of Camera 3), the DeIcer heaters have been used to anneal the CCDs, which reduces the number of hot pixels, thus improving cameras performance. To anneal, the DeIcer heater is set to be continually on (100% duty cycle) for a period of time (nominally 12 hours).
- Observation Duration (in units DD:HH:MM)
- Comments

Note that the Configuration Log has also been used to document SMEI anomalies, Spacecraft anomalies, and significant WindSat events and anomalies, each described by a color-coded entry in the Comments section.

Another aspect of operations is the science data downlink via X-band and the delivery of that data to AFRL via CoDDS (the Coriolis Data Delivery System). Coriolis science data is downlinked using two ground stations--one in Fairbanks, Alaska, and the other in Svalbard, Norway. Early in the mission, it was decided that all SMEI data should be automatically redumped once, due to frequent issues with the X-band downlink. Utilizing this scheme, data gaps are infrequent. The SMEI data latency spec of six hours is nominally met by CoDDS, but the occasional excessive latency can be attributed to one

of a few effects. First, occasionally Coriolis gets bumped from its scheduled X-band contacts, deferring to higher priority programs; because our SMEI's redump strategy--the resulting long interval between dumps produces large data files that clog the CoDDS data pipe. Then there are also data delays due to CoDDS hardware issues (faulty components). The net result of this is a data downlink and delivery system that is adequate for a proof-of-concept type program; were an operational equivalent to SMEI to be pursued, a more reliable system should be pursued.

4. SCIENTIFIC RESULTS

SMEI's mission is to demonstrate that CMEs can be tracked across the inner heliosphere and lead to improvements in space weather forecasting (Jackson et al. 2004).

Appendix A is a list of scientific papers and articles on SMEI and SMEI scientific results published to date. Besides mission applications, SMEI's unique dataset has provided insight into CME morphology and driving forces, interactions between comet tails and the heliosphere, zodiacal light, stellar variability and high altitude auroral phenomena. SMEI also observes asteroids and orbital debris and has demonstrated a capability to observe resident space objects (RSOs) such as other satellites.

4.1 Coronal Mass Ejections (CMEs)

CMEs are huge blobs of plasma, sporadically ejected from the Sun in all directions. Their frequency varies from high in solar max to low during min. Their speeds vary from one to three days to travel over 1 A.U. distance. They are significant triggers of potentially hazardous geomagnetic storms. Such storms can damage spacecraft, disrupt communication/navigation, overload power grids and expose astronauts to harmful radiation. Detection and tracking of CMEs en route to Earth is critical for accurate space weather forecasting.

However, CMEs are extremely dim and observing them at any distance from the Sun is very difficult. SMEI was carefully designed with baffles to reject stray light in order to see CMEs (extended sources) to 10th magnitude. (It sees point sources to roughly 8th magnitude). Appendix B is a list of CMEs compiled to date by the SMEI team.

4.1.1 STATISTICS

At the four-year mark, SMEI has observed over 300 CMEs, ~30 of which have been geoeffective (caused geomagnetic storms at Earth). Webb et al (2006) compiled a list of CMEs and their characteristics for the first year and a half of the SMEI mission. They found:

Categories by Fractions of CMEs Observed by SMEI

A) Limb CMEs	50%?
B) Erupting prominences with CMEs	>4% (>6)
C) Multiple CMEs	25%

- | | |
|----------------------------------|--------|
| D) Distant wide arcs | ~30% |
| E) Concave-outward V-shaped CMEs | 3% (4) |
| F) Earthward (“halo”) CMEs | ~30% |

and

- SMEI observed 139 CMEs in 1.5 years and 204 CMEs in 2.5 yr
Estimated observation rate = 0.3 CMEs/day
- Brightness: Mean = 1.7 S10 units (range = 0.4 - 10 S10)
- Spans: Mean $> 40^\circ$; Range = $3^\circ - 113^\circ$
- Durations: Mean 16.3 hr; Range = 3.5 – 70 hr
- Speeds: Angular Mean = $1.1^\circ/\text{hr}$ P-approx. mean = 473 km/sec, range 51-1611 km/sec

4.1.2 MORPHOLOGY

Most of the SMEI events are likely to be associated with solar coronal mass ejections (CME), which are routinely monitored by SOHO/LASCO. In the period February 2003-September 2005 SMEI observed 171 events at times when there was good LASCO coverage. However only 120 of these events could be reasonably associated with a LASCO CME (Simnett and Howard, 2006). A further 24 occurred in association with a very weak feature seen in LASCO, which would not have been expected to propagate to the location observed by SMEI without very significant acceleration and mass concentration. The remaining 27 events were not associated with any detectable feature in LASCO. Approximately 70% of the positive associations had LASCO (projected) CME speeds between 200 and 600 km/s, while only 19% were associated with LASCO CMEs above 1000 km/s.

Howard et al (2006) tracked two events through LASCO within $30 R_{\text{Sun}}$ and then later as Interplanetary CMEs (ICMEs) through SMEI from $80\text{--}150 R_{\text{Sun}}$. Both events were also associated with erupting filaments, followed by post-eruptive arcades that were observed by EIT, providing information on the three-dimensional (3D) direction of propagation. Assuming radial propagation, this allowed 3D reconstructions of the CME/ICME geometry, along with corrected (not sky plane projected) measurements of the distance-time (d-t) plots for each event out to ~ 0.5 AU. Comparing CME/ICME images in LASCO and SMEI showed that the curvature becomes more sharply concave outward (i.e. the curvature is away from the Sun), suggesting that the ICME footprints remain fixed to the Sun even at 0.5 AU. They also considered two models describing the evolution of the CME/ICMEs at large distances from the Sun: Aerodynamic Drag and Snow Plow models. There was little difference between these, and their d-t profiles matched well with the SMEI data for the first event. The second event showed a net acceleration between the LASCO and SMEI fields of view. The data can be matched for this event well by introducing a driving Lorentz Force to the drag models. ICME mass almost doubled as a result of swept up solar wind material from the Snow Plow model.

4.1.3 SPACE WEATHER APPLICATIONS

Most relevant to SMEI's original space weather forecasting mission:

- Addition of SMEI data into forecast models as a "mid-course correction" improves forecasts by greater than 30%
- SMEI observes a CME in advance of 85% of all moderate to intense geomagnetic storms
- In the first 1 ½ years, SMEI detected ~20 halo CMEs at ~1/3 of Sun to Earth distance and can detect CMEs 10 hours to 1+ days before Earth arrival
- CMEs can travel with constant speed, be decelerated, or may actually accelerate from the Sun to the Earth, making continuous observation of them critical
- Multiple CMEs ejected at the Sun may morph into a single wave front arc at distance

4.2 High Altitude Aurora

When SMEI transmitted its first images of Earthbound CMEs the SMEI team was surprised by the auroras, and in fact did not recognize them as such because the viewing geometry of SMEI was not expected to suffer from auroral obscuration of its FoV of the inner heliosphere. Mizuno et al (2005) studied this phenomenon with SMEI data; their characteristics are summarized below:

- Mainly seen during passages through polar cap regions
- Aurora observed at 840 km altitude and some examples suggest columnar material extending to 2000 km or higher
- ~1000 examples observed in first year of operation
- Commonly observed at Kp > 2, ubiquitous at Kp > 6
- Surface brightnesses a few tens of Rayleighs to several kR
- Some (24%) observed in the absence of CMEs

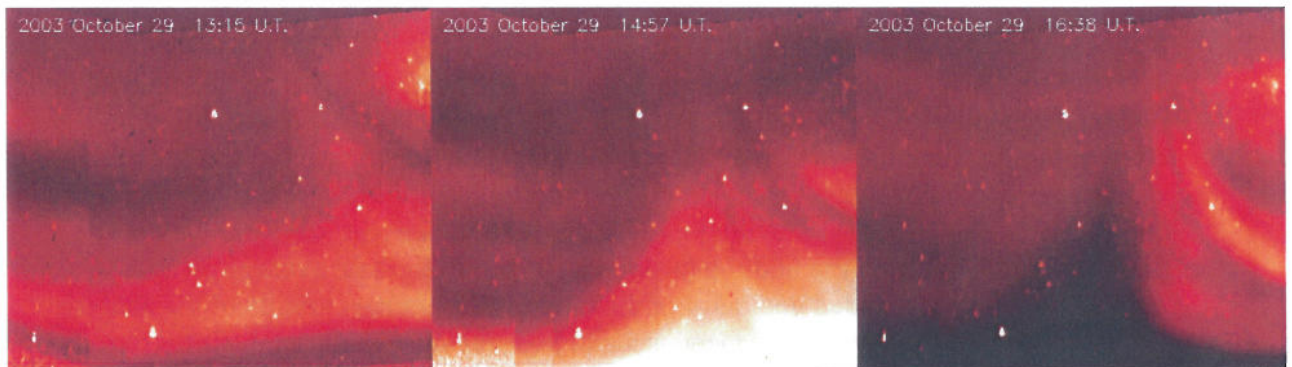


Figure 9. SMEI Observations of High Altitude Auroras, 29 Oct 2003

Any future CME tracker in Earth orbit would have to be designed to mitigate effects from auroras.

4.3 Comet Tail Disconnections

The Solar Mass Ejection Imager (SMEI) observed three bright comets during April-May 2004: Bradfield (C/2004 F4), LINEAR (C/2002 T7), and NEAT (C/2001 Q4). Investigation period reveals that two of the comets showed continual changes in their *** plasma tails. These changes are characterized by a “smokestack-like” billowing effect punctuated by the disconnections. Bradfield however was remarkably quiescent during this entire period. Also observed were spectacular tail disconnections. These observations, including the first of a CME interaction with a comet tail leading to a disruption of that tail are described in Kuchar et al. (2007, submitted). SMEI’s data base is unique for large scale (some 30-40 degrees elongation) comet observations.

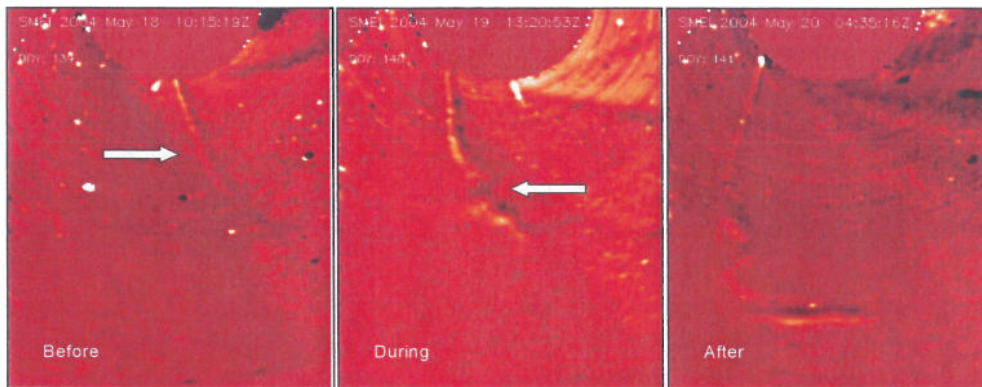


Figure 10. SMEI Observations of a Comet Tail Disconnection Event, 18 May 2004

4.4 Zodiacal Light

The SMEI visible-light cameras provide a photometric sky map for each 102-minute orbit with the objective to observe transient Coronal Mass Ejections (CMEs). Zodiacal light is a significant contributor to these maps and must be removed in the data analysis in order to detect and characterize the much fainter CMEs. Over three years of the SMEI calibration data that were taken at the highest spatial resolution were analyzed to derive the yearly averaged global distribution of zodiacal light between solar elongations of 20° and 180°. Residuals on the individual sky maps from this global average provide information on the detailed geometry of the clouds. Preliminary results of the analysis include a characterization of the Gegenschein, possible dust bands, and annual variations (Buffington, et al. 2005).

4.5 Stellar Photometry – Variable Stars

The unique SMEI dataset of continuous monitoring of the entire sky has been used to study variations in the brightnesses of stars. A new reduction and analysis method has

been used to study the Cepheid star Polaris, to take part in the discovery and study of the eclipsing binary (Penny, 2006).

4.6 Open Questions

At the time of this report, the SMEI scientific team was investigating these questions:

- What happens in the gap region between coronagraph observations and SMEI?
- What causes the chevron-shaped features? (Kahler and Webb, 2007)
- Why are some CMEs viewed by SMEI but absent in LASCO?
- Why does SMEI detect fewer CMEs than LASCO?
- What causes high altitude auroras when no CME is present in SMEI?
- What causes the 15% of geomagnetic storms for which SMEI does not observe a CME?
- What causes some CMEs to just “appear” in SMEI, camera 2?
- Which dominates CME brightness: expansion of the plasma, proximity to Sun or to the Earth, Thomson scattering sphere?
- What is the driving force behind CMEs that do not decelerate and may even accelerate through the inner heliosphere?

5. LESSONS LEARNED

5.1 Thermal

The thermal issue with Camera 3 has plagued SMEI through its mission life. Post-launch reviews of the problem by the designers and STP consultants never revealed the flaw in thermal design, however, two major factors contributed, in the author’s opinion. One, despite our best efforts at requesting ITAR permission to pass information about the spacecraft interface to the British designers/builders, this critical information was delayed and initial thermal testing proceeded without it. Secondly, because of cost limitations, the payloads were never tested with a simulated sun source. Further, the thermal design was late and could not be properly reviewed by the panel of experts at the SMEI Critical Design Review (CDR). Thermal design should have been reviewed at a supplementary CDR at a later date.

Specific suggestions to correct the design include:

- Reduce thermal conductivity along baffle stack and between baffles and camera strongbox.
- Pay more attention to parasitic thermal loads between CCD and surroundings.
- Use thermo-electric cooler (2-stage Peltier) for CCD. (Peltier coolers were included in the original SMEI design but were later eliminated based on predicted cool temperatures.

The SMEI uses the instrument’s heaters to anneal the cameras to alleviate some of the thermal effects, especially to Camera 3. Also, an on-board mask is applied to Camera 3 pixels before binning and transmission to Earth. While the masking makes CMEs easier

to detect and track, masking will have undesired consequences for other SMEI studies, such as CME intensity or stellar variability.

5.2 Electromagnetic Emission

SMEI failed to meet the required E&M emission specification. There was concern that SMEI would interfere with Windsat operations. With the help of Aerospace consultants to the Space Test Program (STP) emissions were reduced, not to spec, but to a level that did not interfere with the primary payload.

5.3 Aurora

The high altitude auroras observed by SMEI (sec 3.2) were completely unexpected and although a scientific discovery, render parts of SMEI sky maps useless for CME observation. If the auroras have a predominant colour, it might possible to design a filter to reduce their camouflaging effect on the sky. Their appearance does aid assessment of geoeffectivity of incoming CMEs, however.

5.4. Radiation/Particles

A major problem with the SMEI design/orbit combination is the impact of particles when crossing the South Atlantic Anomaly (SAA) and the auroral bands. This obscures large portions on the sky maps on several passes per day. A transparent window over the optics would likely diminish this to acceptable levels. A future imager based on the SMEI design might use an additional camera or employ a mechanism to change the viewing angle to capture what was missed while the imager was in the high particle zones.

5.5 Point Response Function (PRF)

SMEI mission requirements dictated a fast optical system that could image large areas of the sky with a differential photometric accuracy of 0.1%. This was accomplished by using a folded optical path that could image a large field of view on SMEI's large CCD array. Since the resolution requirement was about 1° , the optics were de-focused to produce stellar images (point sources) to that size. However, the folded light path produced a point response function (PRF) that was highly structured, approximately triangular in shape, and varied in size over the CCD array.

Unfortunately an asymmetric and variable PRF compromised the star subtraction process needed to detect CMEs. Various methods, including a symmetrization process and long baseline background images, were used to compensate for this, but bright stars (brighter than 6th magnitude) continued to pose problems as they typically left 20% residuals after star subtraction regardless of the processing method. Future designs that require low star subtraction residuals over long baseline periods need to employ a PRF that is symmetric and regular over the CCD array.

6. IMPLICATIONS FOR FUTURE (OPERATIONAL) DESIGNS

White-light heliospheric observations from the Solar Mass Ejection Imager (SMEI) experiment have shown that the structure and propagation of coronal mass ejections (CMEs) in the heliosphere are more complex than previously assumed. SMEI has operated routinely since January 2003 and is still the only instrument recording CMEs with nearly all-sky coverage.

Because all space weather is initiated by the Sun, it is critical for the Air Force to understand processes at work and their effects from the Sun. Basically, it is a study of the *forward* problem, any improvement in which will lead to multiplicative improvements downstream in actual Air Force applications, such as prediction/forecasting of occurrence, type, intensity, and duration of effects.

SMEI, despite limitations on data latency, particle hits, auroral interference, Camera 3 thermal issues, and DHU anomalies demonstrated a 30% improvement in arrival time forecasting. New designs and mission concepts should be able to raise this to 50%. The Space Environmental Effects Monitoring System, proposed for the FY10 POM cycle, includes heliospheric imagers (HIs) as part of its Spiral Three step.

It is possible to design an HI that will work in several different orbits. LEO will have to overcome the radiation environment through the SAA and auroral bands. Protective windows, an extra camera or a tilting mechanism would be needed if a SMEI-like design were employed (such a design we have named "SMEI-OV"). Use of numerous, light-weight, partial field of view instruments, employed in different orbits (COVI – Compact, Orbit-Versatile Imager) is at the other end of the spectrum. With greater resources, imagers placed at L1, or L4 and L5 (for off-center viewing) might be employed as well as the "solar diamond" orbit that places four satellites in solar orbit but encircling the Earth at 0.1 AU. to keep one between the Earth and the Sun at any given time.

7. CONCLUDING REMARKS AND RECOMMENDATIONS

Although CMEs are a major solar and heliospheric phenomenon, their structure and propagation through the heliosphere remain poorly understood. Until recently, modeling was the main method available to try to physically approximate the evolution of a CME into the interplanetary medium. Such models use input parameters obtained at the Sun by coronagraphs and X-ray, EUV, H-alpha and radio data to predict the arrival of the CME at 1 AU. Such models are often utilized by the space physics community for space weather forecasting. Complexities in the interaction of the IP medium and the ICME are generally ignored due to the lack of data on the propagation of the ICME between the Sun and Earth. Until recently, with the exception of studies using Helios photometer and interplanetary scintillation (IPS) data, observations of ICMEs between 30Rs and one AU have not been available. The Solar Mass Ejection Imager (SMEI – Eyles et al., 2003, Jackson et al., 2004) now provides us with measurements of ICMEs in this region, and has observed over 300 transients since routine observations became available in February, 2003.

The Solar Mass Ejection Imager attained remarkable success on a relatively small budget (~\$10M for the instrument). It brought the first detailed heliospheric images of CMEs to the scientific community. Its unprecedented database of a full-sky image every 102 minutes for five years has utility for a wide range of research areas.

SMEI demonstrated the practicality in white light heliospheric imaging, detection and tracking of CMEs for space weather forecasting and basic research in CME phenomenology. SMEI was and is a pathfinder for future DoD operational capability.

REFERENCES

- Buffington, A., B V Jackson, P Hick, S D Price, (2006) An Empirical Description of Zodiacal Light as Measured by SMEI, SH32A-06, abstract, Fall *AGU Meeting*, Dec. 11-15, 2006, San Francisco, CA
- Calabretta, M. and Greisen, E. W.: (2002), Representation of Celestial Coordinates in FITS, *Astron. Astrophys.* **395**, 1077
- Eyles, C.J., G.M. Simnett, M.P. Cooke, B.V. Jackson, A. Buffington, P.P. Hick, N.R. Waltham, J.M. King, P.A. Anderson, and P.E. Holladay, (2003) The Solar Mass Ejection Imager (SMEI) [instrument paper], *Solar Phys.*, **217**, p. 319-347
- Howard, T.A., D.F. Webb, S.J. Tappin, D.R. Mizuno and J.C. Johnston, (2006) Tracking Halo Coronal Mass Ejections from 0 – 1 AU and Space Weather Forecasting Using the Solar Mass Ejection Imager (SMEI), *J. Geophys. Res.*, **111**, A04105, doi:10.1029/2005JA011349
- Howard, T.A., C.D. Fry, J.C. Johnston and D.F. Webb, (2007) On the evolution of coronal mass ejections in the interplanetary medium, *Astrophys. J.*, **667**, 610-626,
- Jackson, B.V., A. Buffington, P.P. Hick, R.C. Altrock, S. Figueroa, P.E. Holladay, J.C. Johnston, S.W. Kahler, J.B. Mozer, S. Price, R.R. Radick, R. Sagalyn, D. Sinclair, G.M. Simnett, C.J. Eyles, M.P. Cooke, S.J. Tappin, T. Kuchar, D. Mizuno, D.F. Webb, P.A. Anderson, S.L. Keil, R.E. Gold, and N.R. Waltham, (2004) The Solar Mass Ejection Imager (SMEI); The Mission, *Solar Phys.*, **225**, 177-207
- Kahler, S. W., and D. F. Webb (2007) V arc interplanetary coronal mass ejections observed with the Solar Mass Ejection Imager, *J. Geophys. Res.*, **112**, A09103, doi:10.1029/2007JA012358
- Kuchar, T.A., A. Buffington, C.N. Arge, P.P. Hick, T.A. Howard, B.V. Jackson, J.C. Johnston, D.R. Mizuno, S.J. Tappin, and D.F. Webb, (2007) Observations of a Comet Tail Disconnection Induced by CME Passage, *J. Geophys. Res.*, submitted ****???
- Mizuno, D., A. Buffington, M.P. Cooke, C.J. Eyles, P.P. Hick, P.E. Holladay, B.V. Jackson, J.C. Johnston, T. Kuchar, J.B. Mozer, S. Price, R.R. Radick, G.M. Simnett, D. Sinclair, J. Tappin, and D.F. Webb, (2005) Very High-Altitude Aurora Observations With the Solar Mass Ejection Imager, *J. Geophys. Res.*, **110**, A7, A07230, doi:10.1029/2004JA010689
- Noah, P.V. and Noah, M. A.: (2001), in *Validation Report for the Celestial Background Scene Descriptor (CBSD) Zodiacal Emission (CBZODY6) Model*, AFRL-TR-2001-1578 ADA 418442

Penny, A. J., Variable stars with the SMEI instrument, (2006) SH32A-07, abstract, Fall AGU Meeting, Dec. 11-15, 2006, San Francisco, CA

Price, S. D., Noah, P. V., Mizuno, D., Walker, R. G., and Jayaraman, S.: (2003) Midcourse Space Experiment Mid-Infrared Measurements of the Thermal Emission from the Zodiacal Dust Cloud, *Astron. J.* **125**, 962

Reach, W. T., Franz, B. A., and Weiland, J. L.: (1997), The Three-Dimensional Structure of the Zodiacal Dust Bands, *Icarus* **127**, 461.

Simnett, G. M., T A Howard, (2006) Interplanetary Transient Events Seen by SMEI That Are Not Observed by LASCO: Analysis and Interpretation, INVITED SH32A-05, abstract, Fall AGU Meeting, Dec. 11-15, 2006, San Francisco, CA

St. Cyr, O.C., M. A. Mesarch, H. M. Maldonado, D. C. Folta, A. D. Harper, J. M. Davila, R. R. Fisher, (2000) Space Weather Diamond: a four spacecraft monitoring system, *J. Atmos. & Solar-Terr. Phys.*, **62**, p. 1251-1255.

Webb, D.F., D. R. Mizuno, A. Buffington, M.P. Cooke, C.J. Eyles, C.D. Fry, L.C. Gentile, P.P. Hick, P.E. Holladay, T.A. Howard, J.G. Hewitt, B.V. Jackson, J. C. Johnston, T. A. Kuchar, J. B. Mozer, S. Price, R. R. Radick, G. M. Simnett, and S. J. Tappin, (2006) Solar Mass Ejection Imager (SMEI) Observations of CMEs in the Heliosphere, *J. Geophys. Res.*, **111**, A12101, doi:10.1029/2006JA011655

APPENDIX A

Publications

LIST OF PUBLICATIONS, PRESENTATIONS AND PRESS COVERAGE ON THE SOLAR MASS EJECTION IMAGER (SMEI) – AFTER 2000

PUBLICATIONS:

PRE-LAUNCH

Radick, R. R., (2001) UV/EUV and Visible Space Instrumentation for Astronomy and Solar Physics, Proceedings of SPIE, O. Siegmund, S. Fineschi, and M. Gummin, eds., v. 4498, pp. 84-90, "The Solar Mass Ejection Imager (SMEI) Space Experiment"

Webb, D.F., J.C. Johnston, R.R. Radick, and the SMEI Team, (2002) The Solar Mass Ejection Imager (SMEI): A new tool for space weather, *EOS, Trans. AGU*, **83**, pp. 33, 38-39

Jackson, B.V., P.P. Hick, and A. Buffington, (2003) Time-dependent tomography of heliospheric features using the three-dimensional reconstruction techniques developed for the Solar Mass Ejection Imager (SMEI), in *Innovative Telescopes and Instrumentation for Solar Astrophysics*, eds., S. Keil and S. Avakyan, *SPIE Proc.* 4853, p. 23-30

Buffington, A., Jackson, B.V., and P.P. Hick, (2003) Calculations for, and laboratory measurements of a multistage labyrinthine baffle for SMEI, in *Innovative Telescopes and Instrumentation for Solar Astrophysics*, eds., S. Keil and S. Avakyan, *SPIE Proc.* 4853, p. 490-503

POST-LAUNCH

Eyles, C.J., G.M. Simnett, M.P. Cooke, B.V. Jackson, A. Buffington, P.P. Hick, N.R. Waltham, J.M. King, P.A. Anderson, and P.E. Holladay, "The Solar Mass Ejection Imager (SMEI)" [instrument paper], *Solar Phys.*, **217**, p. 319-347 (2003)

Jackson, B.V., P.P. Hick and A. Buffington, "The Solar Mass Ejection Imager (SMEI) as an Imaging Photometer for Tomography", *Royal Astron. Soc. Newsletter*, in press (2003)

Jackson, B.V., P.P. Hick and A. Buffington, "Time-Dependent Tomography of Heliospheric Structures using IPS and Thomson Scattering Observations", in *Solar Variability as an Input to the Earth's Environment*, ed., A. Wilson, ESA SP-535, ESTEC, Noordwijk, The Netherlands, p. 823 (2003)

Tappin, S.J., A. Buffington, M.P. Cooke, C.J. Eyles, P.P. Hick, P.E. Holladay, B.V. Jackson, J.C. Johnston, T. Kuchar, D. Mizuno, J.B. Mozer, S. Price, R.R. Radick, G.M. Simnett, D. Sinclair, N.R. Waltham, and D.F. Webb, (2004) Tracking a Major Interplanetary Disturbance with SMEI, *Geophys. Res. Lett.*, **31**, L02802, doi:10.1029/2003GL018766

Jackson, B.V., A. Buffington, P.P. Hick, R.C. Altrock, S. Figueroa, P.E. Holladay, J.C. Johnston, S.W. Kahler, J.B. Mozer, S. Price, R.R. Radick, R. Sagalyn, D. Sinclair, G.M. Simnett, C.J. Eyles, M.P. Cooke, S.J. Tappin, T. Kuchar, D. Mizuno, D.F. Webb, P.A. Anderson, S.L. Keil, R.E. Gold, and N.R. Waltham, (2004) The Solar Mass Ejection Imager (SMEI); The Mission, *Solar Phys.*, 225, 177-207

Showstack, R., (6 January 2004) Instrument Demonstrates Ability to Closely Track Coronal Mass Ejections, *EOS, Trans. AGU*, 85, p. 2,

Webb, D. and J. Allen, (2004) Spacecraft and Ground Anomalies Related to the October-November 2003 Solar Activity, *Space Weather*, 2, S03008, doi:10.1029/2004SW000075

Jackson, B.V., Hick, P.P., Buffington, A., Gold, R., Simnett, G.M., Eyles, C.J. and Cooke, M.P., (2004) SMEI: Design and Development of an Earth-Orbiting All-Sky Coronagraph", *Proc. SPIE* 5171, 1-5

Jackson, B.V. and P.P. Hick, (2004) Three-dimensional tomography of interplanetary disturbances", in: *Solar and Space Weather Radiophysics Current Status and Future Developments*, D.G. Gary and C.U. Keller (eds.), *ASSL 314*, Kluwer, The Netherlands, 355

Webb, D.F., (2004) Coronal Mass Ejections and Space Weather, *Multi-Wavelength Investigations of Solar Activity*, A. Stepanov et al. (eds.), p. 499-508, IAU, Cambridge Univ. Press, Cambridge, UK

Mizuno, D., A. Buffington, M.P. Cooke, C.J. Eyles, P.P. Hick, P.E. Holladay, B.V. Jackson, J.C. Johnston, T. Kuchar, J.B. Mozer, S. Price, R.R. Radick, G.M. Simnett, D. Sinclair, J. Tappin, and D.F. Webb, (2005) Very High-Altitude Aurora Observations With the Solar Mass Ejection Imager", *J. Geophys. Res.*, 110, A7, A07230, doi:10.1029/2004JA010689

Reiner, M.J., B.V. Jackson, D.F. Webb, D.R. Mizuno, M.L. Kaiser, and J.-L. Bougeret, (2005) CME Kinematics Deduced from White-Light (SMEI) and Radio (Wind/WAVES) Observations, *J. Geophys. Res.*, 110, A9, A09S14, doi:10.1029/2004JA010943

Buffington, A., Jackson, B.V., and P.P. Hick, (2005) Space performance of the multistage labyrinthine SMEI baffle", in *Solar Physics and Space Weather Instrumentation, Proc. of SPIE*, Vol. 5901, 590118, doi: 10.1117/12615526

Jackson, B.V., A. Buffington, P.P. Hick, and Y. Yu, (2005) Low-resolution three-dimensional reconstruction of CMEs using solar mass ejection imager (SMEI) data (*Invited Paper*), in *Solar Physics and Space Weather Instrumentation, Proc. of SPIE*, Vol. 5901, 590101, doi: 10.1117/12.616329

- Yu, Y., P.P. Hick, and B.V. Jackson, (2005) "Interactive visualization of solar mass ejection imager (SMEI) volumetric data, in *Solar Physics and Space Weather Instrumentation, Proc. of SPIE* Vol. 5901, 5901A, - 0277-786X/05/15, doi: 10.1117/12.616358
- Hick, P.P., A. Buffington, and B. V. Jackson, (2005) The SMEI real-time data pipeline: From raw CCD frames to photometrically accurate full-sky maps, in *Solar Physics and Space Weather Instrumentation, Proc. of SPIE*, 59011B, doi: 10.1117/12.617996
- Simnett, G.M., (2005) CMEs Observed by SMEI Which are not Seen by LASCO", in *Proc. of the Conference Solar Wind 11 - SOHO 16, Connecting Sun and Heliosphere*, B. Fleck and T.H. Zurbuchen (eds.), ESA SP-592, p. 767, ESTEC, Noordwijk, The Netherlands
- Simnett, G.M. and S.W. Kahler, (2005) Interplanetary CMEs Without Observed Coronagraph CMEs, in *Proc. of the 29th Intl. Cosmic Ray Conference*, Pune, India, 1, 165-168
- Kahler, S.W. and G.M. Simnett, (2005) Imaging Interplanetary Disturbances Causing Forbush Decreases, in *Proc. of the 29th Intl. Cosmic Ray Conference*, Pune, India, 2, 267-270
- Jackson, B.V, A. Buffington, P.P. Hick, X. Wang, and D. Webb, (2006) Preliminary 3D Analysis of the Heliospheric Response to the 28 October 2003 CME Using SMEI White-Light Observations, *J. Geophys. Res.*, **111**, A04S91, doi:10.1029/2004JA010942
- Howard, T.A., D.F. Webb, S.J. Tappin, D.R. Mizuno and J.C. Johnston, (2006) Tracking Halo Coronal Mass Ejections from 0 – 1 AU and Space Weather Forecasting Using the Solar Mass Ejection Imager (SMEI), *J. Geophys. Res.*, **111**, A04105, doi:10.1029/2005JA011349
- Tappin, S.J., (2006) The Deceleration of an Interplanetary Transient from the Sun to 5 AU, *Solar Phys.*, **233**, 233 doi:10.1007/s11207-006-2065-2
- Buffington, A., D.L. Band, B.V. Jackson, P.P. Hick, and A.C. Smith, (2006) A Search for Early Optical Emission at Gamma-Ray Burst Locations by the Solar Mass Ejection Imager (SMEI), *Astrophys. J.*, **637**, 880
- Webb, D.F., D. R. Mizuno, A. Buffington, M.P. Cooke, C.J. Eyles, C.D. Fry, L.C. Gentile, P.P. Hick, P.E. Holladay, T.A. Howard, J.G. Hewitt, B.V. Jackson, J. C. Johnston, T. A. Kuchar, J. B. Mozer, S. Price, R. R. Radick, G. M. Simnett, and S. J. Tappin, (2006) Solar Mass Ejection Imager (SMEI) Observations of CMEs in the Heliosphere, *J. Geophys. Res.*, **111**, A12101, doi:10.1029/2006JA011655

- Bruntt, H., J. Southworth, G. Torres, A. Penny, J.V. Clausen, and D.L. Buzasi, (2006) Eclipsing binaries with the WIRE satellite; I. Discovery of eclipses in the bright AOIV star ψ Centauri, *Astron. Astrophys.*, **456**, 651-658
- Johnston, Janet C., David F. Webb, Ghee Fry, Joel B. Mozer, Thomas A. Kuchar, Donald R. Mizuno, and Timothy A. Howard, (2006) Observations of Coronal Mass Ejections from the Solar Mass Ejection Imager and Space Weather Implications, in *Solar Activity and its Magnetic Origin*, proc. of IAU Symposium 233, Cairo, Egypt, eds., V. Bothmer, A.A. Hady & M.A.M. Shaltout, pp. 347-350, Cambridge University Press,
- Webb, D. F. and N. Gopalswamy, (2006) Coronal Mass Ejections and Space Weather, in *Solar Influence on the Heliosphere and Earth's Environment: Recent Progress and Prospects*, Proceedings of the ILWS Workshop, Goa, India: February 19-24, 2006, Ed., N. Gopalswamy and A. Bhattacharyya, p. 71-80
- Fry, C. D., T. R. Detman, M. Dryer, Z. Smith, W. Sun, C. S. Deehr, S.- I. Akasofu, C.-C. Wu and S. McKenna-Lawlor, (2007) Real-time solar wind forecasting: Capabilities and challenges, *J. Atmos. Solar Terr. Phys.*, **69**, 109-115
- Howard, T. A., C. D. Fry, J. C., Johnston and D. F. Webb, (2007) On the Evolution of Coronal Mass Ejections in the Interplanetary Medium, *Astrophys. J.*, **667**, 610
- Jackson, B.V., J. A. Boyer, P. P. Hick, A. Buffington, M. M. Bisi, and D. H. Crider, (2007) Analysis of Solar Wind Events Using Interplanetary Scintillation (IPS) Remote Sensing 3D Reconstructions And Their Comparison at Mars, *Solar Phys.*, **241**, 385
- Tokumaru, Munetoshi, Masayoshi Kojima, Ken'ichi Fujiki, Masahiro Yamashita, and Bernard V. Jackson, (2007) The source and propagation of the interplanetary disturbance associated with the full-halo coronal mass ejection on 2003 October 28, *J. Geophys. Res.*, **112**, A05106, doi:10.1029/2006JA012043
- Jackson, B.V., P. P. Hick, A. Buffington, M. M. Bisi, M. Kojima and M. Tokumaru, (2007) Comparison of the extent and mass of CME events in the interplanetary medium using IPS and SMEI Thomson scattering observations, Proceedings of the International Colloquium "Scattering and Scintillation in Radio Astronomy" in *Astronomical and Astrophysical Transactions*, I. Chesei and V. Shishov, eds., in press
- Zhang, I. G. Richardson, D. F. Webb, N. Gopalswamy, E. Huttunen, J. Kasper, N. Nitta, W. Poomvises, B. J. Thompson, C.-C. Wu, S. Yashiro, and A. Zhukov, (2007) Solar and Interplanetary Sources of Major Geomagnetic Storms ($Dst < -100$ nT) in 1996 – 2004, *J. Geophys. Res.*, **112**, A10102, doi:10.1029/2007JA012321
- Kahler, S. W., and D. F. Webb (2007) V arc interplanetary coronal mass ejections observed with the Solar Mass Ejection Imager, *J. Geophys. Res.*, **112**, A09103, doi:10.1029/2007JA012358

Harrison, Richard A., Chris J. Davis, Chris J. Eyles, Danielle Bewsher, Steve Crothers, Jackie A. Davies, Russell A. Howard, Daniel J. Moses, Dennis G. Socker, Jean-Philippe Halain, Jean-Marc Defise, Emmanuel Mazy, Pierre Rochus, David F. Webb, and George M. Simnett, (2007) First Imaging of Coronal Mass Ejections in the Heliosphere Viewed from Outside the Sun-Earth Line, *Solar Phys.*, **247**: 171-193, doi:10.1007/11207-007-9083-6 (2008)

Kuchar, T.A., A. Buffington, C.N. Arge, P.P. Hick, T.A. Howard, B.V. Jackson, J.C. Johnston, D.R. Mizuno, S.J. Tappin, and D.F. Webb, Observations of a Comet Tail Disconnection Induced by CME Passage, *J. Geophys. Res.*, A04101, doi:10.1029/2007AJ012603 (2008)

Bisi, M.M., Jackson, B.V., Hick, P.P., Buffington, A. and Clover, J.M., 3D Reconstruction of the Early-November 2004 CDAW Geomagnetic Storms: Preliminary Analysis of STELab IPS Speed and SMEI Density, *J. Geophys. Res.*, submitted to Geostorm SS (2008)

Hick, P.P., Buffington, A. and Jackson, B.V., A Procedure for Fitting Point Sources in SMEI White-Light Full-Sky Maps, *Proc. SPIE 6689*, 66890C, p. 1-8, doi:10.1117/12.734808 (2007)

Buffington, A., Morrill, J.S., Hick, P.P., Howard, R.A., Jackson, B.V. and Webb, D.F., Analysis of the Comparative Responses of SMEI and LASCO, *Proc. SPIE 6689*, 66890B, p.1-6, doi:10.1117/12.734658 (2007)

Jackson, B.V., Hick, P.P., Buffington, A., Bisi, M.M. and Jensen, E.A., SMEI Observations in the STEREO Era, *Proc. SPIE 6689*, 66890G, p. 1-14, 2007, doi:10.1117/12.734870 (2007)

Bisi, M.M., Jackson, B.V., Fallows, R.A., Breen, A.R., Hick, P.P., Wannberg, G., Thomasson, P., Jordan, C. and Dorrian, G.D., "Combined STELab, EISCAT, ESR, and MERLIN IPS Observations of the Solar Wind", *Proc. SPIE 6689*,

Jackson, B.V., M.M. Bisi, P.P. Hick, A. Buffington, J.M. Clover, and W. Sun, Solar Mass Ejection Imager (SMEI) 3D Reconstruction of the 27-28 May 2003 CME Sequence, *J. Geophys. Res.*, submitted to Geostorm SS (2008)

Webb, D.F., T.A. Howard, C.D. Fry, T.A. Kuchar, D.R. Mizuno, J.C. Johnston and B.V. Jackson, Studying Geoeffective ICMEs between the sun and the Earth: Space Weather Implications of SMEI Observations, *Space Weather*, submitted (2008)

Bisi, M.M., B.V. Jackson, R.A. Fallows, A.R. Breen, P. Hick, G. Wannberg, P. Thomasson, C.A. Jordan and G.D. Dorrian, Combined STELab, EISCAT, ESR and MERLIN IPS observations of the solar wind, submitted to Proc SPIE Optical Engineering + Applications 2007 meeting, 2007

PRESENTATIONS/ABSTRACTS:

Mozer, Joel B., (2003) Incorporating User Value in Space Weather Forecast Skill, *Military Operations Research Society*, June 11-13, 2003, Marine Corps Base, Quantico, VA.

Jackson, B., Hick, P.P., and Buffington, A., (2003) Remote Sensing of Heliospheric Structures Using IPS and Thomson Scattering Observations, ISCS Symposium 2003: *Solar Variability as an Input to the Earth's Environment*, June 23-28, 2003, Tatranska Lomnica, Slovakia.

Jackson, B.V., A. Buffington, P. P. Hick, J. Mozer, and the SMEI Team, (2003) UCSD Plans and Intent for the Analysis of SMEI Photometric Data, *SHINE 2003 Workshop*, July 7-11, 2003, Maui, Hawaii.

D.F. Webb and the SMEI Team, (2003) Early Operations and Results from the Solar Mass Ejection Imager, *SHINE 2003 Workshop*, July 7-11, 2003, Maui, Hawaii.

D.F. Webb and the SMEI Team, (2003) SMEI: Early Operation of an Earth-Orbiting All-Sky Imager, *IAU Symp. 219: Stars as Suns: Activity, Evolution and Planets*, July 21-25, 2003, Sydney, Australia.

Jackson, Bernard V., P. Paul Hick and A. Buffington, R. Gold, G. Simnett, C. Eyles, N. Waltham, R. Radick J. Mozer, S. Kahler, D. Webb, S. Keil, and J. Johnston, (2003) SMEI: Design and Development of an Earth-Orbiting All-Sky Coronagraph, *SPIE*, August 3-8, 2003, San Diego, CA.

Abstracts (SMEI-specific) for the *Fall AGU Meeting*, Dec. 8-12, 2003, San Francisco, CA.:

Oral Sessions:

Radick, R.R., J. Johnston, J. Mozer and the SMEI Team, The Solar Mass Ejection Imager (SMEI) and Related Remote-Sensing Heliospheric Observations, *EOS, Trans. AGU*, **84**, F1224.

Simnett, G.M., Eyles, C.J., M.P. Cooke, N.R. Waltham, J.M. King, B.V. Jackson, A. Buffington, P.P. Hick, P.E. Holladay, and P.A. Anderson, The Solar Mass Ejection Imager (SMEI), *EOS, Trans. AGU*, **84**, F1224.

Webb, D.F., J. Mozer, R. Radick, J. Johnston, S. Price, T. Kuchar, D.R. Mizuno, B.V. Jackson, A. Buffington, and G. Simnett, SMEI: First Results and Future Capabilities, *EOS, Trans. AGU*, **84**, F1224.

Howard, R.A., LASCO/SMEI Potential Joint Observations, *EOS, Trans. AGU*, **84**, F1224.

Tokumaru, T., M. Kojima, K. Fujiki, B.V. Jackson, and P. Hick, IPS/SMEI potential joint observations, *EOS, Trans. AGU*, **84**, F1225.

Bougeret, J.-L., Solar Mass Ejection Imager (SMEI) - Hectometric/Kilometric Wave Comparisons, *EOS, Trans. AGU*, **84**, F1225.

Mozer, J.B., R.R. Radick, J.C. Johnston, and D.F. Webb, W. Sun, C.S. Deehr, C.D. Fry, M. Dryer, Z. Smith, and S.I. Akusofu, The Solar Mass Ejection Imager: Early Results and Prospects for Space Weather Forecasts, *EOS, Trans. AGU*, **84**, F1225.

Penny, A.J., B.V. Jackson, A.J. Buffington, P.P. Hick, S. Kahler, S. Price, J.C. Johnston, P. Anderson, P.E. Holladay, D. Sinclair, T. Kuchar, D. Mizuno, R.R. Radick, J.B. Mozer, R., G.M. Simnett, C.J. Eyles, M.P. Cooke, N.R. Waltham, and D.F. Webb, Stellar Variability Studies with SMEI, *EOS, Trans. AGU*, **84**, F1225.

Webb, D.F., the SMEI Team, and Ginet, G.P., K.P. Ray, D. Brautigam, B. Dichter, J.M. Albert, D. Madden, and A. Ling, Observations of the Oct.-Nov. 2003 Geoeffective CMEs & Resultant Radiation Belt Restructuring, in SM51F late-breaking session.

Poster session:

Jackson, B.V. et al., The Solar Mass Ejection Imager (SMEI) Mission, *EOS, Trans. AGU*, **84**, F1222.

Wang, C.X., P.P. Hick, and B.V. Jackson, Interactive Visualization of Transient Solar Wind Phenomena for Space Weather Applications, *EOS, Trans. AGU*, **84**, F1222.

Buffington, A., B.V. Jackson, and P.P. Hick, Space Performance of the Multistage Labyrinthine SMEI Baffle, *EOS, Trans. AGU*, **84**, F1222.

Thernisien, A.F. et al., LASCO C2 and C3 Level-1 Images: Calibration and Pipeline Processing, *EOS, Trans. AGU*, **84**, F1222.

St. Cyr, O.C. et al., Can SOHO SWAN Detect CMEs?, *EOS, Trans. AGU*, **84**, F1222.

Oberoi, D. et al., (2003) IPS From LOFAR: A Complement to Thomson Scattering Studies, *EOS, Trans. AGU*, **84**, F1222.

Miyasaka, H. et al., Remote Sensing of CMEs with Cosmic Rays, *EOS, Trans. AGU*, **84**, F1222.

Sun, W. et al., Comparison between All-Sky Images Observed by Satellite SMEI and Simulations by using the HAF Solar Wind Model, *EOS, Trans. AGU*, **84**, F1222.

Wu, C., R.P. Lepping, and D.B. Berdichevsky, Near Real Time Predictions of Magnetic

- Storm Intensity and Timing from Measurements of North-to-South Interplanetary Magnetic Clouds", *EOS, Trans. AGU*, **84**, F1222.
- Jensen, E.A., C.T. Russell, and T. Mulligan, A Simple Method for Determining the Time of Closest Approach to the Center of a Magnetic Fluxrope, *EOS, Trans. AGU*, **84**, F1222.
- Wimmer-Schweingruber, R.F., P. Bochsler, P. Wurz, G. Gloeckler, J. Geiss, R. Kallenbach, and T.H. Zurbuchen, Variability of N/O in the Solar Wind, *EOS, Trans. AGU*, **84**, F1222.
- Smith, E.J., R.G. Marsden, S.T. Suess, and R.J. MacDowall, Second Encounter of Ulysses with Jupiter, *EOS, Trans. AGU*, **84**, F1222.
- Woo, R., S.R. Habbal, and U. Feldman, What do Measurements of Abundance Variations Tell Us About the Origins and Evolution of the Solar Wind?, *EOS, Trans. AGU*, **84**, F1222.
- Shevchenko, V.I., V.L. Galinsky, R.Z. Sagdeev, and D. Winske, Macroscopic Instability of the Ion Shell Distribution Function in the Divergent Solar Wind, *EOS, Trans. AGU*, **84**, F1222.
- Webb, D.F., D.R. Mizuno, J. B. Mozer, R.R. Radick, J.C. Johnston, B.V. Jackson, S. J. Tappin, and G.M. Simnett, CMEs Observed in the Heliosphere by the Solar Mass Ejection Image, *LWS Science Workshop Abstract book*, Paper 6.05, March 23-26, 2004, Boulder, CO.
- Webb, David and the SMEI Team, Remote Sensing Observations of the late October 2003 Geoeffective Halo CMEs, *EOS. Trans. AGU*, **85**, JA383.
- Jackson, B.V., P.Paul Hick, A Buffington, D. Webb, D. Mizuno, and T. Kuchar, The Solar Mass Ejection Imager Mission, *AAS/SPD Meeting*, May 31-June 3, 2004, Denver, CO.
- Webb, D.F., Coronal Mass Ejections and Space Weather, *IAU Symposium 223 on Multi-Wavelength Investigations of Solar Activity*, June 14-19, 2004, St. Petersburg, Russia; Book of Abstracts, p. 229.
- B.V. Jackson, A. Buffington, P.P. Hick, M. Kojima, and M. Tokumaru, Heliospheric Photometric Images and 3D Reconstruction from the Solar Mass Ejection Imager (SMEI) Data Analyses, *Conference on Sun-Earth Connection Physics: The GeoImpact of CMEs, CIRs and Ordinary Solar Wind*, held in Merida, Mexico, November 8-12, 2004, p. 17.
- B.V. Jackson, A. Buffington and P.P. Hick, A Heliospheric Imager for the 3D Reconstruction of Space Plasma Density, *Community Workshop for the Sun-Solar Connections Roadmap*, College Park, Maryland, Nov. 16-17, 2004.

Abstracts (SMEI-specific) for the *Fall AGU Meeting*, Dec. 13-17, 2004, San Francisco, CA.:

Oral session:

*M Tokumaru, M Kojima, K Fujiki, M Yamashita, B V Jackson, P Hick, "Three-dimensional structure of compound interplanetary transients associated with 27-28 May 2003 coronal mass ejections"

*B V Jackson, A Buffington, P P Hick, and the SMEI Team, "Heliospheric Photometric Images and 3D Reconstruction from the Solar Mass Ejection Imager (SMEI) Data"

*D F Webb, "CMEs Observed in the Heliosphere by the Solar Mass Ejection Imager (SMEI)"

*T A Howard, G M Simnett, I M Robinson, J Tappin, "Earthbound and Geoeffective CMEs Observed by the Solar Mass Ejection Imager (SMEI)"

*M J Reiner, B V Jackson, D F Webb, M L Kaiser, E W Cliver, J L Bougeret, "Wind/WAVES and SMEI Observations of ICMEs"

*D R Mizuno, "Observations of High Altitude Aurora With the Solar Mass Ejection Imager"

*A Buffington, B V Jackson, P Hick, "Systematic Error Reduction and Photometric Calibration for the Solar Mass Ejection Imager (SMEI)"

*J C Johnston, J B Mozer, R R Radick, P E Holladay, T A Kuchar, D R Mizuno, D F Webb, "Heliospheric Imagers for Tracking Coronal Mass Ejections: Lessons Learned from the Solar Mass Ejection Imager"

Poster Session:

*I M Robinson, G M Simnett, J Tappin, "Using SMEI Observations to Constrain Levels of Interplanetary Scattering for Energetic Protons"

*G Simnett, S Kahler, "Imaging of Interplanetary Disturbances Causing Forbush Decreases"

*B V Jackson, A Buffington, P P Hick, M Kojima, M Tokumaru, "Comparison of Solar Mass Ejection Imager (SMEI) White Light Observations with IPS Velocity"

*J Tappin, G M Simnett, B V Jackson, "The Deceleration of Interplanetary Transients Between the Sun and 5 AU"

*R A Jones, A R Breen, R Fallows, M Bisi, G Lawrence, "Interplanetary Propagation Of Coronal Mass Ejections: Results From Interplanetary Scintillation Observations Using EISCAT"

*T A Kuchar, D Mizuno, C N Arge, D F Webb, S W Kahler, J C Johnston, "Comet Tail Disconnections Observed by SMEI"

*C J Eyles, J Tappin, A Buffington, "Compensating for the Effects of hot Pixels in the Sunward Camera of SMEI"

*S Simon, B V Jackson, A Buffington, P P Hick, A Smith, "Zodiacal Light Analysis and Removal From the Solar Mass Ejection Imager (SMEI) Data"

*R M Skoug, J T Gosling, J T Steinberg, D J McComas, "Characterization of 90 degree depletions in solar wind suprathermal electrons as a function of radial distance and latitude using Ulysses/SWOOPS observations"

Abstracts (SMEI-specific) for the AAS Meeting, Jan. 9-13, 2005, San Diego, CA.:

B. V. Jackson, A. Buffington, P. P. Hick, X. Wang, "Preliminary Three Dimensional Reconstruction of CMEs Using Solar Mass Ejection Imager (SMEI) Data"

P. P. Hick, A. Buffington, and B. V. Jackson, "Near Real-Time Photometric Data Processing for the Solar Mass Ejection Imager (SMEI)"

Buffington, A. Smith, B. V. Jackson, and P. P. Hick, "Photometric Calibration for the Solar Mass Ejection Imager (SMEI)"

C.X. Wang, P.P. Hick, B.V. Jackson (UCSD/CASS), "Interactive Visualization of Solar Mass Ejection Imager (SMEI) Volumetric Data"

SMEI Abstracts for the Spring AGU Meeting, May 23-27, 2005, New Orleans, LA:

B.V. Jackson, A. Buffington, P.P. Hick, Y. Yu, D. Webb, D. Mizuno, and T. Kuchar, "Preliminary Three dimensional CME Mass and Energy Using Solar Mass Ejection Imager (SMEI) Data"

Johnston, J.C., D.R. Mizuno, D.F. Webb, T.A. Kuchar, and T.A. Howard, "Tracking Coronal Mass Ejections with a Heliospheric Imager: Case Studies from the Solar Mass Ejection Imager"

SMEI Abstracts for the *Solar Wind11/SOHO-16* Meeting, June 12-17, 2005, Whistler, BC, Canada:

Webb, D., D. Mizuno, G. Simnett, T. Howard, B. Jackson, J. Johnston and J. Tappin, "CMEs Observed in the Heliosphere by SMEI"

Jackson, B.V., A. Buffington, P.P. Hick, Y. Yu, D.F. Webb, "The Pertinence of Three Dimensional Solar Mass Ejection Imager (SMEI) Solar Wind Analysis to Ulysses Observations"

Simnett, G., "CMEs Observed By SMEI Which Are Not Seen By LASCO"

Webb, D.F., B.V. Jackson and P.P. Hick, "Use of Coriolis SMEI Imaging Observations to Provide All-sky Context Observations for the STEREO Mission", STEREO/Solar-B Workshop, Turtle Bay, Oahu, HI, 15-18 November 2005.

SMEI Abstracts for the *Fall AGU Meeting*, Dec. 5-9, 2005, San Francisco, CA.:

Jackson, B.V., A. Buffington, P.P. Hick, Y. Yu, D.F. Webb, "Solar Mass Ejection Imager (SMEI) Solar Wind 3-D Analysis of the January 20, 2005 CME"

Hick, P.P., Jackson, B.V., A. Buffington, and Y. Yu, "SMEI: A Spaceborne Observatory for Heliospheric Remote Sensing".

Jackson, B.V., A. Buffington, P.P. Hick, Y. Yu, D.F. Webb, "Solar Mass Ejection Imager (SMEI) Solar Wind 3-D Analysis of the January 20, 2005 CME".

Johnston, J.C., D.F. Webb, G. Fry, J.B. Mozer, T.A. Kuchar, and D.R. Mizuno, "Observations of coronal mass ejections from the Solar Mass Ejection Imager and space weather implications", IAI S233 Solar Activity and its Magnetic Origin, Cairo, Egypt, Mar 31-April 4, 2006, Abstract book, p. 148.

SMEI Abstracts for Space Weather Week, April 25-28, 2006, Boulder, CO:

Hick, P., A. Buffington, and B.V. Jackson, "SMEI Data Processing from Raw CCD Frames to Photometrically Accurate Full-Sky Maps", S-19.

Jackson, B.V., P. Hick, A. Buffington, and D. Odstrcil, "Interactive Visualization of Volumetric Data from the Solar Mass Ejection Imager (SMEI)", S-18.

Webb, D.F., T.A. Howard, J.C. Johnston, C.D. Fry and D.R. Mizuno, "SMEI Observations of Earthward-Directed CMEs and Space Weather", S-20.

SMEI Abstracts for Solar Physics Div. meeting, June 26-30, 2006, UNH, Durham, NH:

Morrill, J.S., R. Howard, and D. Webb, "Impacts of Viewing Geometry on CME Observations in the Heliosphere", Poster 8.07, *Bull. American Astron. Soc.*, **38**, p.231, 2006.

Howard, T.A. and J.C. Johnston, "A Study of the Evolution of Coronal Mass Ejections Into Interplanetary Space Using SOHO and SMEI", Poster 11.01, *Bull. American Astron. Soc.*, **38**, p. 238, 2006.

SMEI Abstracts for the *Fall AGU Meeting*, Dec. 11-15, 2006, San Francisco, CA.:

J C Johnston, R R Radick, "Results from the AFRL Solar Mass Ejection Imager Mission - Four Years of Operation", INVITED SH32A-01

M Tokumaru, M Yamashita, M Kojima, K Fujiki, "Propagation of coronal mass ejections in the interplanetary medium", INVITED SH32A-02

A Vourlidas, D F Webb, J S Morrill, B V Jackson, "CME Brightness at Large Elongations: Application to LASCO and SMEI Observations", INVITED SH32A-03

T A Howard, J C Johnston, D F Webb, "Coronal Mass Ejection Evolution in the Inner Heliosphere – Geometry and Speed", SH32A-04

G M Simnett, T A Howard, "Interplanetary Transient Events Seen by SMEI Which are not Observed by LASCO: Analysis and Interpretation", INVITED SH32A-05

A Buffington, B V Jackson, P Hick, S D Price, "An Empirical Description of Zodiacal Light as Measured by SMEI", SH32A-06

A J Penny, "Variable stars with the SMEI instrument", SH32A-07

T Kuchar, A Buffington, T Howard, C N Arge, D Webb, B V Jackson, P P Hick, "The Evolution of Comets in the Heliosphere as Observed by SMEI", SH32A-08

D Webb, T Howard, J Johnston, C Fry, "SMEI Observations and Space Weather Forecasting",

POSTER SH33A-0394

S E Fry, C D Fry, T A Howard, "Combining HAFv2 Model Simulations With SMEI Images to Improve ICME forecasts and Interpretations of Observations", POSTER SH33A-0395

B V Jackson, P P Hick, A Buffington, "The 20 January 2005 CME Solar Mass Ejection Imager (SMEI) Analyses", POSTER SH33A-0396

E A Jensen, T Mulligan, B V Jackson, M Tokumaru, "3-D Magnetic Field Geometry of the October 28, 2003 ICME: Comparison with SMEI White-Light Observations", POSTER SH33A-0397

A Gonzalez-Esparza, E Andrade, A Carrillo, S Kurtz, S Jeyakumar, R Perez-Enriquez, P Sierra, S Vazquez, P Manoharan, "MEXART. Interplanetary Scintillation Array in Mexico in the IHY2007", POSTER SH33A-0398

M M Bisi, A R Breen, R A Fallows, G D Dorrian, R A Jones, G Wannberg, P Thomasson, C Jordan, "Off-radial flow of the solar wind from EISCAT and MERLIN IPS observations", POSTER SH33A-0399

G M Simnett, T A Howard, "The Evolution of a Small, Faint Coronal Mass Ejection Into an Interplanetary Transient", SH33A-0400

D. F. Webb, T. A. Howard, B. V. Jackson and J. C. Johnston, "SMEI Observations of ICMEs Driving CDAW Storms", presented at the at the Living With a Star Geostorm CDAW and Conference, Florida Inst. of Technology, Melbourne, FL, March 8, 2007

BV Jackson, MM Bisi, PP Hick and A. Buffington, "CME 3D Reconstructions Using Solar Mass Ejection Imager and Interplanetary Scintillation Data," presented at 210th AAS/SPD meeting, Honolulu, 28-31 May 2007. BAAS, 39,#1, p. 244, 2007.

D. F. Webb, T. A. Howard, T. A. Kuchar, J. S. Morrill, R. A. Harrison, C. J. Eyles, R. A. Howard & J. C. Johnston, "First Combined CME Observations: LASCO, SMEI & Stereo SECCHI HIs," presented at 210th AAS/SPD meeting, Honolulu, 28-31 May 2007. BAAS, 39,#1, p. 244, 2007

J.C. Johnston, "Results from the AFRL Solar Mass Ejection Imager Mission: 4 1/2 Years of Operation", presented at AOGS 2007 Meeting, Bangkok, Thailand, 30 July – 4 Aug. 2007

D. F. Webb, T. A. Howard, T. A. Kuchar, J. S. Morrill, R. A. Harrison, C. J. Eyles, R. A. Howard, B.V. Jackson and J. C. Johnston, "CME Propagation in the Inner Heliosphere Using SMEI and STEREO SECCHI HI Data", presented at SHINE 2007 Workshop, 30 July – 3 Aug. 2007, Whistler, Canada

B.V. Jackson, P.P. Hick, A. Buffington, M.M. Bisi and E.A. Jensen, "Solar Mass Ejection Imager (SMEI) Analysis of the 20 January 2005 CME", presented at SHINE 2007 Workshop, 30 July – 3 Aug. 2007, Whistler, Canada

Buffington, A., "SMEI – Its Heritage, and What We've Learned from the SMEI Mission", SWFL seminar presented at AFRL, Hanscom, MA, 23 Aug 2007.

David Webb, T. A. Howard, T. A. Kuchar, J. S. Morrill, R. A. Harrison, C. J. Eyles, R. A. Howard, B.V. Jackson, and J.C. Johnston, "Study of CME Propagation in the Inner

Heliosphere”, contributed talk presented at Living With a Star science meeting, 10-13 Sept. 2007, Boulder, CO. Abstract booklet, p. 23.

Bernard Jackson, Andrew Buffington, P. Paul Hick, Mario M. Bisi, and Elizabeth A. Jensen, “STEREO-Era Solar Mass Ejection Imager (SMEI) Observations”, poster 4.11 presented at Living With a Star science meeting, 10-13 Sept. 2007, Boulder, CO. Abstract booklet, p. 41.

Murray Dryer, Wei Sun, Charles Deehr, C.D.(Ghee) Fry, Zdenka Smith, and Syun-Ichi Akasofu, “Simulation of the SMEI and ”STEREO-like” views of the Solar Wind following the Solar Flares on 27, 28, and 29 May 2003”, poster 4.7 presented at Living With a Star science meeting, 10-13 Sept. 2007, Boulder, CO. Abstract booklet, p. 34.

PRESS RELEASES/ARTICLES

Iannotta, B., “Experimental Coriolis satellite operating well in orbit”, *Space News*, **14**, 12, March 31, 2003.

“Birmingham Astrophysicists Complete Mission for US Military”, BUZZ (The Univ. of Birmingham Newsletter), p. 1-2, Is. 26(2), May 2003.

Brownlee, J. (POC), “Air Force Studies Sun’s Effect on Spacecraft”, USAF, Space Vehicles Directorate OPA, VS Release No. 03-21, 24 June 2003. URL:

“New Space Experiment Images Solar Mass Ejections Out to Earth’s Orbit”, p. 7, The Magellanic Times (Newspaper of the IAU General Assembly, Sydney, Aust.), 23 July 2003.

Brownlee, J. (POC), “Air Force Keeps a Wary Eye on Ferocious Space Storms”, USAF, Space Vehicles Directorate OPA, VS Release No. 03-28, November 3, 2003. URL:

Messier, J. and J. Brownlee, “Sun Scientists Surveying Solar Storms”, *Hansconian*, p. 6, November 21, 2003.

Bridges, A., “High-Altitude Auroras Stump Scientists”, AP wires September 11, 2003. Appeared in at least WashingtonPost.com, CTV News, ABCNews.com, LATimes.com.

McDonald, K., “UCSD Physicists See Solar Electrons, Auroras Associated with Recent Geomagnetic Storms”, UCSD Press Release, December 10, 2003. URL:

Britt, R.R., “Strange Lights Imaged, Astronauts not Crazy”, Space.com, December 10, 2003.

Becker, M., “Kamera sieht irdischen Schutzschild glühen”, *Der Spiegel*, December 11, 2003.

Sullivan, M., "Boston College Scientists Help Turn a New Lens on the Heavens", Boston College Chronicle, 22 January 2003. URL: Bond, Peter, "The Sun's Influence – and Beyond", Astronomy & Geophysics, Royal Astron., Soc., p. 32, vol. 45, February 2004.

West, Krista, "Storm Spotting", Scientific American, p. 26, vol. 290, March 2004. URL (partial): Suplee, C., "A Stormy Star", National Geographic, p. 2 (SMEI pic p. 14-15), 206, July 2004. URL (partial):

McDowell, J., "Mission Update: Coriolis", Sky and Telescope, p. 4, Sept. 2004.

Webb, D.F. and Johnston, J.C., "Solar Storm Stories: New Satellite Observes Intense Solar Storms", AFRL Technology Horizons, p. 8-9, vol. 5, no. 6, December 2004.

Kleiman, Michael P., "Trio of cameras enhance forecasting of sun-generated storms", Air Force Research Laboratory Space Vehicles Directorate Public Affairs, Hansconian, p. 5, 14 July 2006.

Kleiman, Michael P., "Space Weather Forecasting Keeps Warfighter Talking", Air Force Research Laboratory Space Vehicles Directorate Public Affairs, Nucleus, p. 6, 21 July 2006.

Appendix B

SMEI CME Summary List

Version 10 (May 2006)

Notes:

1. Confidence in CME ID or Quality of event: E(xcellent), V(ery Good), G(ood), P(oor), ?(? Event).
- 2: SMEI orbital time as estimated at the azimuth location of the event.
- 3: Azimuth is angle in deg. measured CCW from ecliptic north through east.
4. Morphological type. V-arcs & CO are concave-outward structures. Halo is implied only.
5. Angular distance from Sun; first observed to last observed.
6. The associations are incomplete; systematic surveys are pending.
7. JT: Tappin id.; Earthward: likely an Earth-directed CME

Year/ DOY	Date	Conf ¹	First Obs. Time [UT] ²	Dura- tion [hrs.]	Azimuth Location [deg/dir] ³	Angu- lar Span [deg.]	Peak Bright- ness [adu]	Type ⁴	Angular Speed [deg/hr]	Point P Speed [km/sec]	Elonga- tion Range [deg.] ⁵	Elong- vs Time?/ Movie?	LASCO Assoc? ⁶	Surface Activity? ⁶	IP Shock/ Storm Assoc? ⁶	Comments ⁷
2003																
41	Feb. 10	P	12:32	10	44.3/NE	23.4	1.0	2 arcs	0.38	232	30.2- 33.9	Y/Y				Prob. 1 CME; brief.
42	Feb. 11		21:10		./SE			arcs				N/N				JT. Wide arcs, maybe also to N. Subtle
43	Feb. 12	P	16:15	12	231/SW	20.3	0.5	arc	0.52	339	23.0- 28.9	Y/Y				
44	Feb. 13	P	8:24	8.50	30/NNE	16.3	2.0	blob			38.6- 36.0	Y/Y				Sm. bright blob; particles
45	Feb. 14	P	2:41	14	105/ESE	23.3	1.0	arc	0.77	494	22.6- 32.3	Y/Y				Fast arc, fades
47	Feb. 16	G	10:36	13.5	96/E	75.1	0.5	loop(s)	0.44	283	23.4- 29.7	Y/Y				Slow, maybe 2 events
48	Feb. 17	P	12:54	8	280/WNW	23.3	0.5	arc	0.46	288	28.7- 32.6	Y/Y	Y - TH		Sh-TH	Other diffuse mat ? Particles.
50	Feb. 19	V	5:12	12	330/NW	44.4	1.0	loop/arc	1.00	602	27.8- 39.8	Y/Y	2/18,0242	EP		Loop then arc; EP assoc. JT - same feature??

Year/ DOY	Date	Conf ¹	First Obs. Time [UT] ²	Dura- tion [hrs.]	Azimuth Location [deg/dir] ³	Angu- lar Span [deg.]	Peak Bright- ness [adu]	Type ⁴	Angular Speed [deg/hr]	Point P Speed [km/sec]	Elonga- tion Range [deg.] ⁵	Elong. vs Time? Movie?	LASCO Assoc? ⁶	Surface Activity? ⁶	IP Shock/ Storm Assoc? ⁶	Comments ⁷
52	21 Feb.	V	2:00	44	358; 19	16; 29	1.0; 1.0	sev arcs	0.72; 0.76	394; 414	27.0-49.7	2Y/Y	2/18, 0642	Back?		Nice, wide arcs; >70 deg. JT??
54	23 Feb.	P	6:38	8.5	157/SSE	50.0	0.5	loop	0.59	379	25.0-30.1	Y/Y				Faint
55	24 Feb.	G	4:42	35	145; 143	18; 25	2.0; 2.0	2 arcs	0.49; 0.56	314; 348	20.5-33.7	2Y/Y				Very narrow; 1 or 2 CMEs?
55	24 Feb.	?	12:48									N/Y				Not a CME? Moon glare?
58	27 Feb.	P	17:11 (JT)		SSE			arcs				N/Y				Faint arcs in Cam2. JT??
60	1 Mar.	G	19:12	13	329/NW	10.3	2.0	blob	0.40	254	26.2-31.3	Y/Y	2/27, 2108	EP?		Sm. bright blob
60	1 Mar.	E	21:53	25	130/SE	62.6	1.0	loops	0.76	450	24.7-45.0	Y/Y	2/28, 1830	EPL-1800		Large loop complex; SE EPL
62	3 Mar.	G	6:04	7	125/SE	62.6	1.0	arc	0.56	354	26.1-29.7	Y/Y	?	?		Faint arc ff. above
63	4 Mar.	P	2:08	17.5	112/ESE	13.5	0.5	arc	0.34	200	31.8-37.9	Y/Y				Maybe continuation of above
63	4 Mar.	G	16:10	29	85/E	97.0	0.5-1.0	loop	0.77; 1.05	462; 682	21.8-44.2	Y/Y				Nice wide loop; moon interferes
66	7 Mar.	P	14:06	10	335/NW	5.4	0.5	blob	0.47	300	26.2-31.0	Y/Y				Sm. and faint blob; real?
71	12 Mar.	P	8:54	7	44/NE	4.9	0.5	blob	0.55	374	19.2-22.8	Y/Y				Same but brighter
72	13 Mar.	P	0:27		NNE			arcs				N/Y				E-W motion; noisy; Cam2
72	13 Mar.	V	10:24	21	20/NNE	20.1	1.5	V arc	0.60	397	16.7-28.7	Y/Y	3/12, 0154	Back?		Concave-out structure
72	13 Mar.	P	20:29	7	53/ENE	31.3	0.5	arcs	1.32	855	21.2-30.2	Y/Y				2nd event? Overlaps with above
77	18 Mar.	?	2:18	12	8/NNE	11.2	0.5	?	0.73	444	28.4-37.2	Y/Y				Faint, dubious CME
78	19 Mar.	G	19:01	20	336/NW	54.4	0.5	arc-loop	0.67	425	21.8-34.1	Y/Y			Sh-TH	Rising material
81	22 Mar.	P	23:16	24	350/N	44.6	0.5		0.65; 0.86	430; 526	21.6-42.3	2Y/Y				Faint arc develops to loop
	24 Mar.										42.3-44.2					

Year/ DOY	Date	Conf ¹	First Obs. Time [UT] ²	Dura- tion [hrs.]	Azimuth Location [deg/dir] ³	Angu- lar Span [deg.]	Peak Bright- ness [adu]	Type ⁴	Angular Speed [deg/hr]	Point P Speed [km/sec]	Elonga- tion Range [deg.] ⁵	Elong. vs Time? Movie?	LASCO Assoc? ⁶	Surface Activity? ⁶	IP Shock/ Storm Assoc? ⁶	Comments ⁷
85	26 Mar.	G	13:33	13.5	341/NNW	44.7	1.0	2 arcs	0.65	428	19.9- 28.7	Y/Y	3/25,1354	EP? 1512	Sh, St- TH	Shuttering interferences
86	27 Mar.	P	18:20	6.5	342/NNW	9.6	1.0	arc	0.66	432	22.8- 27.5	Y/Y				Small, only 4 diffs
96	6 Apr.	G	17:20	8+	293/NNW	21.3	0.5		0.55- 0.58	362-374	25.0- 29.9	Y/Y	4/4,17-26	Back?	Sh-TH	Faint outflow
97	7 Apr.	V	16:40	12	71/ENE	53.2	1.0	arc	0.93	100	75.5- 86.8	Y/Y	same?			Wide arc thru Cam2; Ulysses evt
108	18 Apr.	G	0:05	25	15/NNE	27.8	0.6	arc	0.61	197	55.1- 70.7	Y/Y				Slow arc
110	20 Apr.	V	11:21	30.5	13/NNE	35.4	0.3	2 arcs	0.76,1.37	128;299	51.1- 91.9	2Y/Y	4/18,1526			Trailing arc catches leading
115	25 Apr.	V	5:02	20	330/NW	49.8	1.0	V arc	1.06	621	25.7- 47.1	Y/Y	4/23,0127	EP 0125	Sh-TH	Concave-out; EP assoc.
116	26 Apr.	P	13:07	15.5	311/NW	10.4	0.3	blob	0.54	337	26.5- 34.7	Y/Y				Small blob, fades
118	28 Apr.	P	9:08	8.5	290/WWNW	37.9	1.0	arc	0.73	481	21.3- 28.0	Y/Y				Short arc, fades; moon interferences
119	29 Apr.	G	6:59	3.5	38/NE	21.8	0.3	2 loops	0.89	391	50.8- 53.8	Y/Y				Faint + brighter arc; Cam2
123	3 May.	V	2:33	36	358/N	23.4	0.2	arcs	0.60	194	53.2- 72.5	Y/Y				Sev. arcs; Cam2
125	5 May.	V	8:39	24	25;26;342 NE-NW	30; 20; 30.0	1.0	arcs	0.65;0.79 1.05	291;334 434	43.9- 64.6	3Y/Y				Sev. bright arcs; Cam3 Eng.
133	13 May.	V	4:36	48	17/NNE	48.0	1.0	arcs	0.64	301	37.8- 60.2	Y/Y	5/11,2058	Back?		1 bright arc; Cam2
140	20 May.	G	19:32	15	4/N	17.1	1.0	2 arcs	1.03	504	39.2- 55.0	Y/Y				2 short arcs, one brighter
148	28 May.	E	16:53	24	284/WWNW	89.1	0.5	halo	1.76	758	32.4- 74.8	2Y/Y	5/28,0028	X1:X3 fla.	Sh, St, 8+	halo, mostly N, 3 parts; Earthward
150	30 May.	G	18:18	27	355/N	25.0	0.3	arc	0.69	324	39.0- 60.2	Y/Y	5/29,0127	X1;halo		Slow arc
151	31 May.	E	16:31	8.5	248/WSW	61.9	1.0	loop	1.99	1164	27.5- 43.9	Y/Y	5/31,<0354	M9 0223		Bright, fast, limb loop
153	2 Jun.	G	15:56	11	240/SW	47.1	1.0	loop	1.32	778	28.3- 41.8	Y/Y	6/2,0040			Another bright, fast limb loop
154	3 Jun.	G	20:31	24;22	13; 350	54.2	0.5	loop	0.85;0.45	432;216	35.4- 54.6	2Y/Y				Faint, slow loop. 2 parts
159	8 Jun.	P	22:26	11.5	9/N	22.3	0.5	arc	0.70	324	46.3- 54.5	Y/Y				Short, faint arc, Cam2

Year/ DOY	Date	Conf ¹	First Obs. Time [UT] ²	Dura- tion [hrs.]	Azimuth Location [deg/dir] ³	Angu- lar Span [deg.]	Peak Bright- ness [adu]	Type ⁴	Angular Speed [deg/hr]	Point P Speed [km/sec]	Elonga- tion Range [deg.] ⁵	Elong. vs Time?/ Movie?	LASCO Assoc? ⁶	Surface Activity? ⁶	IP Shock/ Storm Assoc? ⁶	Comments ⁷
164	13 Jun.	E	0:45	3.5	305/NW	39.9	5.0	loop	1.12	715	26.1- 29.9	Y/Y			Sh; St- TH	Very bright, short loop Sev. arcs in Cam3 + 2
165	14 Jun.	V	10:36	39	325;319	36.6	0.5	arcs	0.94;1.16	489;562	26.2- 72.9	2Y/Y				
175	24 Jun.	G	11:10	10	260/WSW	73.4	1.0	loop	1.30	804	24.5- 38.0	Y/Y				Broad limb event.
175	24 Jun.	P	22:43	7	31/NNE	15.6	1.5	arc	0.53	306	34.4- 37.8	Y/Y				Bright, but brief, particles
177	26 Jun.	E	12:04	32	354/N	24.0	0.5	arcs	1.23	456	38.3- 77.5	Y/Y				~3 long arcs; prob. 1 event
186	5 Jul.	G	6:05	27	345/NNW	23.3	0.2	arc	0.53	182	54.5- 68.8	Y/Y				Faint, slow arc; poor data
191	10 Jul.	E	6:16	25.5	357/N	30.2	0.5	arc	0.94	411	40.7- 64.1	2Y/Y				Nice, mult. events, maybe 3
		E	4:43	27	310/NNW	48.1	0.7	arc	0.65	372	28.7- 47.0					Wide (80deg!), bright arc
193	12 Jul.	G	14:15	8.5	332/242	25;15	0.5	arc	0.91;0.59	518;378	24.9- 42.0	2Y/Y				Same arcs(?) in Cam2+3
200	19 Jul.	P	20:35	12	351/N	19.2	0.5	arc	1.14	520	44.3- 57.7	Y/Y				Faint, short arc in Cam2
204	23 Jul.	G	2:32	5	323/NNW	54.0	0.5	arc	1.43	792	36.2- 43.5	Y/Y				Wide arc in Cam2; cal mode
205	24 Jul.	V	20:44	12	00/N	19.1	0.5	arc	1.08	336	58.2- 70.6	Y/Y				Wide arc in Cam3+2; cal
205	24 Jul.	P	20:57	10	298/NNW	37.9	1.0	arc	0.80	505	25.4- 33.5	Y/Y				Slow, faint arc
206	25 Jul.	E	17:14	2+d.	305/NNW	47.40	1.0	V arc	0.91- 1.02	437-336	25.5- 71.9	2Y/Y				Slow, bent arc thru Cam3+2
206	25 Jul.	E	23:53	10	6.5/N	73.8		arc	3.38	1222	42.0- 78.1	2Y/Y				Fast, wide arc, Cam2
207	26 Jul.	E	6:37	10	88/E	73.8		arc	1.80	xxx	110-129					Wide arc to 135 deg.
207	26 Jul.	E	17:01	22.5	290;231	85;33	0.4	arc	4.89;3.42	123;xxx	61.8- 121	2Y/Y				Faint, wide, fast arc thru Cam2
210	29 Jul.	V	5:48	15	350/NNW	32.5	0.5	2 arcs	1.23	567	40.7- 59.8	Y/Y				2 slow, wide arcs in Cam2
214	2 Aug.	P	10:17	24	330/NNW	19.0	0.3	arc	0.56	237	47.4- 60.9	Y/Y				faint, short arc, Cam2
217	5 Aug.	P	7:13	13.5	324/NNW	23.8	0.3	arc	0.59	256	48.8- 57.5	Y/Y				Short arc fades in Cam2
218	6 Aug.	V	18:45	8.5	330/NNW	36.6	0.4	arc	1.02	452	47.9- 56.5	Y/Y				Wide arc ff. arc at edge Cam3
219	7 Aug.	?	2:02		NW			loops				N/N				Faint sm. Loops; missing orbits

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229	Aug. 17	P	5:04	5	52/NE	18.1	0.3	arc	0.82	331	54.0- 58.2	Y/Y			Sh; St- TH	Short arc; particles
232	Aug. 20	P	19:54	8.5	268/W	72.8(?)	0.3	loop	1.08	632	31.4- 40.5	Y/Y				Faint loop off limb
233	Aug. 21	P	11:03	9.5	294/NW	23.6	1.0	arc	0.67	433	23.5- 29.2	Y/Y				Short arc
240	Aug. 28	G	20:44	24	340/NNW	37.0	0.5	arc	0.71	271	48.6- 65.7	Y/Y				Slow, wide arc in Cam2
245	2 Sep.	P	5:53	10	269/W	58.1	0.5	2 loops	0.73	465	23.8- 31.3	Y/Y				2 faint loops in Cam3
251	8 Sep.	G	10:51	7	252/SW	43.7	0.5	loops	1.00	655	21.9- 28.8	Y/Y				Mult. loop struc. Loop in Cam3, fades
260	Sep. 17	G	9:59	13.5	268/W	67.2	0.5	loop	0.48	313	20.8- 28.3	Y/Y				
264	Sep. 21	P	0:41	5	276/W	55.8	0.0?	loop	0.77	518	18.9- 22.9	Y/Y				Loop in Cam3, fades fast
293	Oct. 20	P	4:30	10	108/ESE	10.5		arc	0.71	430	29.1- 36.4	Y/Y	10/18,2230			Faint arc bet. particles. Real?
296	Oct. 23	G	11:37	7	328/190	28.31	1.0,2.0	2 arcs	1.15,1.14	668,704	27.4- 40.4	2Y/Y	10/22,08;10	M4,M2	Sh; St 7	2 arcs, fade; halo? 2 assoc EPs
297	Oct. 24	V	4:33	13.5	326/332	22.3	1.0	2 arcs	0.95,0.88	537,483	32.0- 45.0	2Y/Y				2 NW arcs in Cam3
297	Oct. 24	V	6:52	10	101/ESE	107.3	0.5	arc	3.37	51	70.8- 106	Y/Y	10/23,0854	X5.4		Wide arc in Cam2; see next
297	Oct. 24	V	16:08	7	294/NW	78.9	0.5	arc	4.22	xxx	82.4- 112	Y/Y				Wide arc in Cam2 to 135deg.
300	Oct. 27	V	6:49	15.5	275/W	95.4	6.0	loops	1.13	703	22.4- 37.8	Y/Y	10/26,1754	X1		Large loop cmpl; fades fast
301	Oct. 28	V	13:03	7, 6	297,115	37.1	1.0	2 arcs	2.57,1.86	1611,1054	21.0- 44.7	2Y/Y	10/28,1054	X17,EP	Sh; 29, 9	2 arcs of halo, Cam3
304	Oct. 31	P	5:27	3+	324/NW	28.5	1.0	arc	1.71	856	43.3- 49.1	Y/Y	10/29,2054	X10,2049	Sh; 30, 9	Bowed arc after anomaly; halo?
306	2 Nov.	V	21:54	8.5	267/W	50.9	2.0	loop	2.04	1322	19.3- 32.8	2Y/Y	Y?		Sh; St- TH	Bright, fast loop ff. by next
307	3 Nov.	V	8:04	13.5	300/NW	50.9	2.0	loop	0.88	540	25.1- 37.7	N/Y	Y?			Faint, slower loop Loop to S, w/NW loop?; halo?
307	3 Nov.	G	<13:09	3+	S			loop					Y?			
311	7 Nov.	G	4:17	21	142/89	43.28	0.5	2 arcs	3.31,1.27	279,172	68.8- 91.5	2Y/Y				1 or 2 broad arcs, Cam2
318	Nov. 14	G	5:11	7	129/SE	23.0	1.0	arc	1.31	836	22.9- 31.9	Y/Y			Sh; St- TH	Bright arc, extends to ENE
323	Nov. 19	E	5:48	10	150/SSE	33.5	0.5	arcs	2.34	775	50.0- 73.5	Y/Y	11/18,0950		211/20, 9	Wide arc(s) parts; not halo?

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325	21 Nov.	V	0:17	5+	111/SE	61.9	1.0	arc?	14.8?	xxx	65.5- 142	Y/Y			?same?	Broad arc sweeps thru Cam2,1 Likely Earthward
325	21 Nov.	G	4:19	7	324/NW	26.3	1.0	arc	1.01	615	29.1- 35.9	Y/Y	11/19,0950			Short, bright arc; particles
334	30 Nov.	V	2:36	12	135/SE	54.7	5.0	arc	0.68	433	23.2- 31.3	Y/Y	11/28,??	11/28,12:50		Bright arc thru Cam3. Nice.
2004																
No events in December																
1	1 Jan.	P	6:40	29	141/SE	20.0	0.5	arc	0.71	324	39.2- 60.3	Y/Y				Faint arc in Cam3+2
3	3 Jan.	V	6:04	17	92/ESE	70.5	1.0	loop	1.19	714	23.4- 43.0	Y/Y				Bright, wide loop; parts., Venus
6	6 Jan.	V	0:23	7	117/ESE	34.8	1.0	loop	1.92	1094	31.1- 44.3	Y/Y			Sh; St- TH	Bright, fast loop w/blob
11	11 Jan.	P	9:06	8.5	122/SE	35.8	0.5	arc	2.50	188	73.3- 94.4	Y/Y				Faint, broad arc in Cam2
14	14 Jan.	G	8:11	8.5	115/ESE	30.0	0.5	blob	0.77	508	21.0- 27.6	Y/Y				2 sm. arc/blobs in Cam3
21	21 Jan.	V	3:48	9	133/SE	60.0	0.5	arcs	0.71	400	35.0- 42.7	Y/Y			Sh; St- TH	Sev. bowed arcs ff. by aur.
22	22 Jan.		04:14	13.5	119/ESE	24.6	0.5	arc	0.98	180	67.8- 81.4	Y/Y			Sh; St- TH	h.t. above CME in Cam2?
23	23 Jan.	G	3:31	12	115/ESE	60.0	1.0	loop	1.26	793	21.7- 36.7	Y/Y				Loop ff. by 2nd?
25	25 Jan.	P	3:11	5.5	133/SE	7.5	1.0	blob	0.81	509	27.2- 31.7	Y/Y				Bad data- ~5 orbits
38	7 Feb.	P	20:10	10	58/NE	10.3	0.5	arc	0.72	459	24.6- 33.0	Y/Y				Small arc, fades
40	9 Feb.	G	20:54	~36	21-32	40:51	0.5	arc	0.77	379	43.3- 50.9	Y/Y				Faint, slow arc; real? Good h,t
47	16 Feb.	E	7:01	17	114/ESE	81.5	2.0	loops	1.25	xxx	42.1- 102	Y/Y				1 slow, wide arc? Cam3 to 2
									0.63	401	21.9- 33.0	Y/Y	2/15,0400	EPL,0:		Front+struc. loops; EIT EPL

First year totals: 105 = 13E, 25V, 30G, 34P, 3?, 1 None. So, 68 = E, V or G.

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52	21 Feb.	G	8:32	7	197/SSW	38.4	1.0	loop	1.10	717	21.7- 29.3	Y/Y				Short loop, fades; Cam3 eng. JT- weak, Cam2 eng.
53	22 Feb.	P	23:38		./SE											
68	8 Mar.	E	16:42	3 d	NNW/ESE	65;25	1; 2	arcs	0.98	377	19.8- 93.3	Y/Y				Series of arcs; 2 parts of halo? JT- Cam3, messy, real?
70	10 Mar.	G	19:32	10	340/NW	35.3	1.0	arc	0.70	457	22.0- 29.0	Y/Y				Nice arc; brief. parts., mode chg. JT- Cam3, messy, data gap
78	18 Mar.	P	9:32		./NW											
86	26 Mar.	?	18:06	14	4/NNE	44.0	0.5	loop	0.61	370	28.6- 37.0	Y/Y				Very slow loop; nonradial, real?
89	29 Mar.	P	10:41	12	326/NW	10.7	1.0	blob	0.68	427	25.5- 34.1	Y/Y				Sm. fast, compact blob
91	31 Mar.	G	10:00	12.5	3/NNW	49.0	1.0	loop	0.71	447	25.0- 33.8	Y/Y			Sh; St- TH	Nice loop, but fades & shutter
92	1 Apr.	G	9:42	?	N-NW	85;38	1; 0.5	loop			23.4- 81.1	N/Y				Wide loop
94	3 Apr.	G	22:36	10	20/NE	54.8	0.5	arc	2.56	391	64.5- 91.3	Y/Y				Ft., wide arc in Cam2, aurora at start; JT- Cam 2; auroral?
95	4 Apr.	G	7:08	20	357/NNW	60.0	1.0	arc	0.76	443	28.3- 43.8	Y/Y				Arc in Cam3, same as 18:56?
95	4 Apr.	G	18:56	12	44/NE	49.8	0.5	arc	1.19	142	73.4- 87.8	Y/Y				Slow, wide arc, Cam2;ff. d094 arc JT- very faint.
101	10 Apr.	P	19:43		./NE											
105	14 Apr.	P	0:45	10	25/NNE	33.5	0.5	arc	1.06	355	57.0- 67.5	Y/Y				Ft. wide arc in Cam2; particles
106	26 Apr.	?	14:31	10	275/W	3.3	1.0	blob	0.47	234	43.8- 48.3	Y/Y				Faint, glare, real?
117	27 Apr.	?	21:30		./NE											JT- stray light?
122	1 May.	P	5:43	18	15/NNE	30.1	1.0	arc	0.89	343	48.8- 66.5	Y/Y				Ft. wide arc in Cam2, bet. parts. JT- wide arc hits CometNeat; Tail dis-
125	4 May.	G	21:08	2.5d	./SE			arc				Y/N	?			con.; likely near Earth .
131	10 May.	P	2:26	~27	23/NE	46.2	0.5	loops	0.66	241	50.4- 69.6	Y/Y			Sh-TH	Ft. wide loop; JT- faint, complex
143	22 May.	G	13:22	24	356/N	86.5	0.5	loop	0.92	425	44.5- 55.5	Y/Y				Ft. wide, peaked loop; Cam3 to 2 JT- sm., faint. same as next?
144	23 May.		10:28		./NNW											

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145	24 May.	P	0:55	12	354/N	~60		arc	0.93	380	49.0- 61.5	Y/Y				Ft., wide arc- Cam2 JT- blob or arc; same as next?
148	27 May.		19:27		JNNE			blob								
149	28 May.	V	6:29	27	13/NNE	47.6	1.0	V arc	0.82	295	46.5- 72.1	Y/Y	5/24, 2/126	arcade, EP?		Brg, wide arc to Cam2 edge; be- comes concave-out; weird h,t
150	28 May.	G	4:30	24	6-10/N	34.8	1.0	arc	0.98	431	40.7- 65.3	Y/Y				Follows prior evt. but less defined.
175	23 Jun.	G	9:08	10	306/WNW	51.3	2.0	loop	0.99	625	23.3- 33.7	Y/Y				Brg loop Cam3, fades
181	29 Jun.	P	5:40	~12	290/NW 292-	19.3	1.0	loop	0.76	488	24.3- 30.0	Y/Y				Ft. loop bet. part. bands
192	10 Jul.	V	7:34	35	306/NW	48;35	1; 1	loop	1.18	576	25.6- 68.8	2Y/2Y				Loops Cam3 to 2; moon, parts.
197	15 Jul.	V	19:28	1.5d	330-341/	30;11.5	0.3,0.5	loops	0.77	350	35.7- 60.4	2Y/2Y			Sh-TH Sh; St- TH	Series of loops; Cam2
202	20 Jul.	G	21:28	5	278/WNW	25.1	1.0	arc	0.70	464	20.9- 24.5	Y/Y				Brief in Cam3; Parts., shutter.
203	21 Jul.	E	16:02	20	348;302	113;110	0.5; 1	loop	1.57;1.24	728;715	29.7- 62.0	2Y/Y	7/20, 1330 Part. Halo	M9, 1230	same?	Wide loop to edge, Cam2; maybe mat. to SE Cam3. Earthward ; storm; aurora at end
211	29 Jul.	G	3:38	17	245/SW	39.9	1.0	loop	0.77	483	22.2- 35.8	Y/Y			Sh-TH	Nice but brief due to particles
1.5 Year totals: 107 + 32 = 139. 15E, 28V, 43G, 43P, 67, 4 None. So 86 = E, V or G.																
228	15 Aug.	P	8:46	10	266/W	55.1	0.5	loop	0.89	571	22.4- 30.9	Y/Y				Faint loop
230	17 Aug.	P	23:24	19	313/NW	26.5	0.5	arc	0.68	299	48.6- 56.8	Y/Y				Ft, slow arc in Cam2.
246	2 Sep.	P	8:34	12	266/W	34.2	2.0	loop	0.57	380	19.9- 26.9	Y/A				Brg. loop in Cam3; shutter early (new meas.))
[	13 Sep.	V	12:39	7	267/W	41.4	0.5		0.68	443	22.8- 27.3	Y/F				Wide, fast arc, fades; SE to NE (new meas.))
257	[		13:11	8.5	89/E	80.1	0.5	arc	3.33	xxx	77.7- 106	Y/A				
[	16 Sep.		11:26	8.5	92/E	84.2	0.5		3.59	xxx	76.8- 107	Y/F				
260	[	P	5:15	8.5	123/SE	19.3	0.5	arc	1.25	663	37.1- 47.7	Y/A				Ft, short arc; fades, noisy

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[	20		5:19	7	120/SE	25.5	0.5		0.94	518	37.1- 43.6	Y/F				(new meas.)]
264	Sep.	P	8:24	~20	270/W	61.4	0.5	loop	1.17	744	20.8- 34.4	Y/A				Faint loop, Cam3
			15:09	12	270/W	71.5	0.5		0.79	505	22.8- 32.3	Y/F				(new meas.)]
287	13 Oct.	G	18:31	15.5	333/NW	39.9	0.3	arc	0.74	188	63.6- 74.9	Y/F				Broad, faint, subtle arc
306	1 Nov.	P	14:38	7	293/WNW	34.7	0.5	arc	0.57	316	37.7- 41.4	Y/F				Faint, short arc in Cam3
309	4 Nov.	?	16:33	20.5	56/ENE	19.1	0.2	loop	0.54	288	36.6- 47.5	Y/F				Noisy, real? Part of next halo?
310	5 Nov.	E	11:08	25.5	93/E	94.1	0.3	halo?	1.09	xxx	73.9- 101	Y/F				Wide loop to 270d!
311	6 Nov.	E	2:17	10+	122/SE	107.8	1.0	halo?	2.61 1.68;	xxx	101 78.2-	Y/F				Earthward , Cam2-1
313	8 Nov.	G	19:22	7	313; 327	27.7	0.5	arcs	1.79 1.33;	252; 861	86.0 37.4-	2Y/F				2nd brighter, wide loop. Earthward
339	4 Dec.	E	6:02	29	348/NNW	80.4	1.0	arc	1.83	577; xxx	99.8 70.4-	2Y/F				Arcs Cam3-2 3 related events? Bright arc in Cam3-2
339	4 Dec.	E	6:02	17	122/SE	135.0	0.5	loop	2.31	xxx	112	Y/F				Wide loop sweeps SE- Earthward . Cam2; dimming behind loop!
339	4 Dec.	P	6:02	10	62/NE	25.5	0.5	loop	1.30	130	75.3- 88.5	Y/F				Faint, slow loop in Cam2
354	19 Dec.	G	21:49	24	119/SE	39.2	0.3	loop	0.95	xxx	77.4- 100	Y/F				Faint, fairly wide loop in Cam2
361	26 Dec.	V	7:53	32	115/SE	34.3	1.0	loop	1.42	580	32.2- 80.4	Y/F				Loop Cam 3 - 2 then fades
365	30 Dec.	G	10:03	12	103/ESE	27.8	1.0	arc	0.99 0.99;	636	20.9- 32.9	Y/F				Bright, fast arc fades in Cam3
366	31 Dec.	G	6:23	6.5	98; 110	51.0	1.0	2 arcs	1.15	618; 701	23.4- 36.2	2Y/F				2 seq. bright arcs fade quickly
2005																
2	2 Jan.	V	2:22	32	116/ESE	66.5	2.0	arc	1.46	694	24.5- 71.4	Y/F				Brig. struct. In Cam3, faint in Cam2
4	4 Jan.	P	10:14	10	120/SE	40.6	1.0	arc	0.80 1.00;	517	22.1- 30.4	Y/F				Fades fast; cutoff to W by shutter
6	6 Jan.	V	14:44	~39	123; 140	70.0	2.0	arcs	2.02	600; 566	23.7- 77.6	3Y/F				Prob. same evt., Cam3-2; PAs differ
10	10 Jan.	G	3:24	10	97/ESE	44.1	1.0	loop	0.96	580	28.0- 38.0	Y/F				Fades in Cam3; maybe next in Cam2

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12	12 Jan.	?	18:14	14	112/SE	8.1	0.3	blob	0.82	249	59.6- 70.3	Y/F				Real? Cam2; Moon in Cam3
16	16 Jan.	E	13:44	~37	79; 118	68.4	2.0	arc(CO)	1.39; 1.8	776; ~500	29.6- 81.5	3Y/F				2?Arcs in E&SE, Cam3; then into C First is C.O.; Earthward -aurora on 17th
17	17 Jan.	G	22:37	7	319/NW	40.1	1.0	blob	2.81 2.05;	1342	39.2- 57.7	Y/F				Fast arc to NW, Cam3
19	19 Jan.	P	23:36	25	318; 331	45.6	0.5	blob	2.52	1137; 1280	34.5- 53.4	2Y/F				Blob fades fast; h,t's differ 2nd event is famous SEP
21	21 Jan.	G	12:52	10	323/NW	36.6	1.0	arc	1.88	954	35.2- 54.4	Y/F				Arc in Cam3; aurora late on 21st
24	24 Jan.	P	9:35	20.5	129/SE	30.5	0.3	arc	0.76	224	58.6- 73.5	Y/F				Slow arc in Cam2; subtle
27	27 Jan.	?	6:48	/S				arc				N/N				Slow arc in Cam2; (no h,t; movie)
28	28 Jan.	P	4:50	5	187/S	24.4	0.3	arc	2.59	xxx	77.4- 90.5	Y/Y				Faint arc to S Cam2; poss. part ES
28	28 Jan.	E	18:32	15	150/SE	75.5	0.3	loop	2.52	xxx	77.4- 116	Y/Y				Wide, fast loop appears at 80E in Cam2-1; asymmetric; Earthward?
30	30 Jan.	P	5:03	25.5	3.5/N	67.4	0.3	loop	0.71	xxx	87.0- 108	Y/Y				Wide asy. loop; particles; 2 h,t's?
31	31 Jan.	P	10:30	8.5	68/NE	14.4	0.5	arc	0.82	439	38.5- 45.4	Y/Y				Short arc in Cam3; parts. obscure
32	1 Feb.	G	0:42	7	130/SE	27.1	1.0	loop	1.12	689	27.8- 35.4	Y/Y				Bent arc in Cam3; subtle; comet ta
35	4 Feb.	V	2:59	15	125/SE	21.4	0.5	arc	1.58	232	66.4- 89.6	Y/Y				Narrow, thin arc in Cam2
47	16 Feb.	G	8:32	12	353/N	40.0	0.5	V arc	1.54	xxx	73.7- 91.8	Y/Y				Wide, slightly C.O. arc in Cam2
48	17 Feb.	P	13:32	7	313/NW	8.2	0.5	blob	3.47	xxx	71.8- 95.1	Y/Y				Faint, fast blob in Cam2
54	23 Feb.	?	10:46	>3 d?	E			arc				N/N				Faint, wide arc Cam3-2; (no H,t; movie)
62	3 Mar.	G	4:08	22	332/NW	38.7	0.5	loop	0.69	398	29.4- 44.8	Y/Y				Clear loop in Cam3; ends in parts.
62	3 Mar.	P	20:51	8.5	13/NNE	18.2	0.5	arc	1.01	636	24.9- 33.1	Y/Y				Short, faint arc in Cam3; subtle
63	4 Mar.	V	22:19	25	33/NNE	46.1	0.5	arc	1.02	xxx	78.6- 105	Y/Y				Wide, asy. arc, Cam2; parts., need C1
111	21 Apr.	P	20:03	27	26; 21	31.9	0.3	arc	0.85	192; 276	60.6- 78.5	2Y/Y				Faint, slow arc in Cam2; C3 shuttered
162	11 Jun.	P	4:13	7	100/E	37.5	0.5	arc	1.79	153	77.0- 89.2	Y/Y				Faint, wide, asy arc in Cam2; also in N

Year/ DOY	Date	First Obs. Time [UT] ²	Dura- tion [hrs.]	Azimuth Location [deg/dir] ³	Angu- lar Span [deg.]	Peak Bright- ness [adu]	Type ⁴	Angular Speed [deg/hr]	Point P Speed [km/sec]	Elonga- tion Range [deg.] ⁵	Elong. vs Time? Movie?	LASCO Assoc? ⁶	Surface Activity? ⁶	IP Shock/ Storm Assoc? ⁶	Comments ⁷
166	15 Jun.	14:54	4	320/NW	22.8	0.5	arc	1.57	724	46.3- 54.4	Y/Y				Short arc to NW Cam2; ahead of ne
166	15 Jun.	18:41	23	282; 342	81.9	0.5; 1.0	loop	1.79; 1.57	153; 724	22.8- 54.0	2/Y/Y				Brq, wide loop, Cam3-2
171	20 Jun.	15:07	20	51/NE	26.6	0.5	arc	0.96	184	64.2- 84.6	Y/Y				Faint arc in Cam2; glare interferes Clear asy. loop to edge Cam2.
173	22 Jun.	17:55	15	110/E	53.3	0.5	loop	1.89	xxx	94.3- 124	Y/2/Y				aurora on 23rd; faint N part? Earthward?
180	29 Jun.	17:33	13.5	17/NNE	xxx	xxx	arcs	0.99	438	44.9- 58.8	Y/Y				Sev. faint arcs; parts. Interfere
181	30 Jun.	20:38	12	355/N	xxx	xxx	arcs	1.06	596	32.8- 45.6	Y/Y				Sev. brq. arcs; poss. aurora late Jul
188	7 Jul.	23:40	8.5	128/SE	33.1	0.5	arc	1.80	xxx	87.3- 103	Y/Y				Wide arc to SE; only a few orbits
190	9 Jul.	21:23	8.5	338/NNW	xxx	xxx	diffuse	1.87	730	49.1- 64.9	Y/Y				Faint; aurora early 10th; Earthward?
191	10 Jul.	12:37	19	305/NW	57.6	0.5	arc	2.30 1.14;	1099	27.6- 70.8	Y/Y				Wide arc in Cam2; above aur. at star
194	13 Jul.	21:54	24	287; 281	xxx	xxx	2loops	1.46 2.61;	742; 900	19.1- 36.0	2/Y/Y				2 brq. loops to edge Cam3; shutter E
197	16 Jul.	12:33	15	266; 0.0	74.5	0.5	2 arcs	2.26	xxx; 806	50.8- 94.0	2/Y/Y				Wide loop NW thru Cam2; 2nd N arc trails; aurora mid-17th; Earthward? Curved loop in Cam2; before next evt.
212	31 Jul.	12:08	7	38/NNE	28.3	0.3	loop	1.48	489	57.3- 68.2	Y/Y				Nice loop but fades in Cam2
212	31 Jul.	16:56	13.5	100/E	31.5	0.5	loop	1.58	xxx	74.5- 95.9	Y/Y				Faint NW arc in Cam2
217	5 Aug. 13	2:27	22	325/NW	60.0	0.3	arc	1.57	562	42.6- 77.9	Y/Y				Faint, ~C.O. 'arc' in Cam2
225	Aug. 19	15:28	12	297/NW	43.1	0.5	arc(CO)	1.03	328	57.6- 69.9	Y/Y				Very faint arc(s) E & NE
231	Aug. 21	9:31	15	105/E	15.9	0.3	2 arcs	0.86	xxx	77.9- 91.7	Y/Y				Wide, subtle, fades (4 frames); Cam2
233	Aug. 22	7:00	~8.5	155/SSE	40.9	0.3	arc	1.05	xxx	104-113	Y/Y				Very faint arc; real?; glare interferes
234	Aug. 24	10:25	7.5	82/ENE	21.7	0.2	arc	0.94	141	73.8- 81.6	Y/Y				Broad, fast loop E Cam2; earlier fast arc to NW? Aurora; Earthward?
236	Aug.	18:16	5	96/E	66.5	0.5	loop	5.63	xxx	81.8- 111	Y/Y				

Year/ DOY	Date	Conf ¹	First Obs. Time [UT] ²	Dura- tion [hrs.]	Azimuth Location [deg/dir] ³	Angu- lar Span [deg.]	Peak Bright- ness [adu]	Type ⁴	Angular Speed [deg/hr]	Point P Speed [km/sec]	Elonga- tion Range [deg.] ⁵	Elong. vs Time?/ Movie?	LASCO Assoc? ⁶	Surface Activity? ⁶	IP Shock/ Storm Assoc? ⁶	Comments ⁷
241	29 Aug.	P	4:40	7	77/ENE	14.7	0.2	arc	1.22	156	75.4- 83.9	Y/Y				Very faint, short arc in Cam2
251	8 Sep.	G	22:21	7	84/ENE	45.1	0.5	loop	2.26	xxx	79.6- 94.9	Y/Y				Wide, fast loop in Cam2; aur. streamer & shock 9th; Earthward? AR808
253	10 Sep.	P	13:06	7.5	119/SE	26.1	1.0	arc	1.49	777	37.0- 49.5	Y/Y				SE arc in Cam3; maybe in Cam2; X fl., brg aur & shock 11th; Earthward

SMEI Camera Configuration Log: 2003

Notes:
Times are for beginning of pass in which event occurred, exact time of execution may be up to 15 mins later.

Blue font denotes planned activities.
Red font denotes problems & anomalies.
Green font denotes WindSat activity.
Magenta font denotes a Spacecraft anomaly.
Orange font denotes CCD annealing.

Rev # or UTC (hex)	Date	Camera 1					Camera 2					Camera 3					Obs Duration (DD-HH-MM-M)	Comments
		Mode	CCD Bin/g	ROI	FF Cor-rec- tion	Shutter Position	FF LED	De-locr set pt.	Mode	CCD Bin/g	ROI	FF Cor-rec- tion	Shutter Position	FF LED	De-locr set pt.	Obs		
11.0	6-Jan-03	6	7:17															DHU pwr'd ON
12.0	6-Jan-03	6	8:51															Deicers set to +30 / +30 / +30
42.0	9-Jan-03	9	8:49															SMEI to SAFE due to ACS anomaly
43.2	9-Jan-03	9	10:52															DHU pwr'd ON, Deicers to +30 / +30 / +30
80.1	11-Jan-03	11	22:36	2	1X1 ON	OFF	OFF	ON	0									Cam 1 anomaly, put SMEI into CONFIG mode
81.0	12-Jan-03	12	0:04	13	1X1 ON	OFF	FF	ON	0									Turned Cam 1 OFF, stopped recording
81.5	12-Jan-03	12	0:45	0					0									Cam 1 anomaly, put SMEI into CONFIG mode
85.3	12-Jan-03	12	7:04	2	1X1 ON	OFF	OPEN	OFF	0									Turned Cam 1 OFF, stopped recording
86.2	12-Jan-03	12	8:37	0					0									DHU reset fixed anomaly
96.5	13-Jan-03	13	1:30	2	1X1 ON	OFF	OPEN	OFF	0									
98.0	13-Jan-03	13	4:03	13	1X1 ON	OFF	FF	ON	0									
99.3	13-Jan-03	13	6:13	0					2	1X1 ON	OFF	OFF	FF	ON				
100.3	13-Jan-03	13	7:52	0					13	1X1 ON	OFF	FF	ON					
101.2	13-Jan-03	13	9:26	0					0									Turned Cam 2 OFF, stopped recording
105.1	13-Jan-03	13	15:53	0					2	1X1 ON	OFF	FF	ON					
106.2	13-Jan-03	13	17:40	0					13	1X1 ON	OFF	FF	ON					
107.4	13-Jan-03	13	19:43	0					0									
234.2	22-Jan-03	22	17:57	4	4X4 ON	ON	OFF	OFF	0									
235.4	22-Jan-03	22	20:02	3	2X2 ON	ON	OFF	OFF	0									
236.1	22-Jan-03	22	21:18	2	1X1 ON	OFF	OPEN	OFF	0									
237.1	22-Jan-03	22	22:52	0					0									
247.4	23-Jan-03	23	16:19	0					4	4X4 ON	ON	ON	OPEN	OFF	OFF			
248.2	23-Jan-03	23	17:39	0					3	2X2 ON	ON	ON	OPEN	OFF	OFF			
249.1	23-Jan-03	23	19:20	0					2	1X1 ON	ON	OFF	OPEN	OFF	OFF			
250.4	23-Jan-03	23	21:26	0					0									
263.2	24-Jan-03	24	19:02	0					0									
264.1	24-Jan-03	24	20:36	0					0									
265.1	24-Jan-03	24	22:24	0					0									
266.0	24-Jan-03	24	23:56	0					0									
375.1	1-Feb-03	32	16:35	0					0									Opened Cam 1 Door
376.2	1-Feb-03	32	18:25	0					0									Opened Cam 2 Door
377.1	1-Feb-03	32	20:05	0					0									Opened Cam 3 Door
392.1	2-Feb-03	33	21:28	4	4X4 ON	ON	OFF	OFF	4	4X4 ON	ON	ON	OPEN	OFF	OFF			
394.0	3-Feb-03	34	0:41	3	2X2 ON	ON	OPEN	OFF	1									
395.0	3-Feb-03	34	2:21	1					3	2X2 ON	ON	ON	OPEN	OFF	OFF			
396.0	3-Feb-03	34	4:00	1					1									
397.3	3-Feb-03	34	6:11	2	1X1 ON	OFF	OPEN	OFF	1									99% of complete orbit
398.2	3-Feb-03	34	7:46	1					2	1X1 ON	ON	OFF	OPEN	OFF	OFF			
399.3	3-Feb-03	34	9:39	1					1									
400.3	3-Feb-03	34	11:18	10	1X1 OFF	OFF	FF	ON	1									
401.3	3-Feb-03	34	13:04	14	1X1 OFF	OFF	OPEN	OFF	1									
402.3	3-Feb-03	34	14:42	13	1X1 ON	OFF	FF	ON	1									<1 orbit-ok, shtr closed
403.2	3-Feb-03	34	16:10	15	1X1 ON	ON	FF	ON	1									

[illegible]

06C5CB3C	8-Aug-03	220	14.45	1						-50	1									-50	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	00:01:45		
06C5E30A	8-Aug-03	220	16.30	1	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	OFF	CLOSED	OFF	-3	00:01:45						-50	00:01:45		Delivers to -50 / 50 / -3
06C9F04A	8-Aug-03	220	18.15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	OFF	CLOSED	OFF	-50	06:04:15						-50	00:01:45		Delivers to -50 / 50 / -50
06C9F7B8	14-Aug-03	226	22.30	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	1									-50	00:01:45						-50	00:01:45		
06C9B36A	15-Aug-03	227	2.05	1						-50	DYN000	1X1	OFF	OFF	CLOSED	OFF	OFF			-50	00:01:45						-50	00:01:45		
06C5E900	15-Aug-03	227	0.10	1	20T	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	OFF	CLOSED	OFF	-50	00:01:45						-50	00:01:45		
06C6B4FC	15-Aug-03	227	3.45	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	OFF	CLOSED	OFF	-50	02:19:45						-50	00:01:45		
06C22386	17-Aug-03	229	23.30	DYN000	1X1	OFF	OFF	CLOSED	OFF	-27	1									-3	00:01:45						-3	00:01:45		Delivers to -27 / 27 / -3
06C2035A	18-Aug-03	230	1.15	1						-27	DYN000	1X1	OFF	OFF	CLOSED	OFF	OFF	CLOSED	OFF	-3	00:01:45						-3	00:01:45		
06C204D0	18-Aug-03	230	3.00	DYN000	1X1	ON	ON	OPEN	OFF	-27										-3	00:01:45						-3	00:01:45		
06C20B9C	18-Aug-03	230	4.45	4	4X4	ON	ON	CLOSED	OFF	45	4	4X4	ON	ON	OPEN	OFF	OFF	CLOSED	OFF	45	01:00:00						45	01:00:00		C1 C3 ANNEAL, normal trim off set
06C9B70C	19-Aug-03	231	4.45	4	4X4	ON	ON	OPEN	OFF	-27	DYN000	4X4	ON	ON	CLOSED	OFF	OFF	CLOSED	OFF	45	01:00:00						45	01:00:00		C2 C3 ANNEAL
06D510BC	20-Aug-03	232	4.45	DYN000	1X1	OFF	OFF	CLOSED	OFF	-27	1									-3	00:07:00						-3	00:07:00		Delivers to -27 / 27 / -3, fast trim crit.
06D577FC	20-Aug-03	232	11.45	1						-27	DYN000	1X1	OFF	OFF	CLOSED	OFF	OFF	CLOSED	OFF	-3	00:01:45						-3	00:01:45		
06D569B8	20-Aug-03	232	13.30	1						-27	DYN000	1X1	OFF	OFF	CLOSED	OFF	OFF	CLOSED	OFF	-3	00:01:45						-3	00:01:45		
06D4A4A4	20-Aug-03	232	15.15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	OFF	CLOSED	OFF	-50	00:02:25						-50	00:02:25		
06D5C930	20-Aug-03	232	17.40	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	OFF	CLOSED	OFF	-50	01:04:50						-50	01:04:50		DHU Reset, Post-Anneal (preemptive)
06D779AA	21-Aug-03	233	22.30	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	1									-50	00:01:45						-50	00:01:45		
06D77444	22-Aug-03	234	0.15	1						-50	DYN000	1X1	OFF	OFF	CLOSED	OFF	OFF			-50	00:01:45						-50	00:01:45		
06D782E0	22-Aug-03	234	2.00							-50	1									-50	00:01:45						-50	00:01:45		
06D7A67C	22-Aug-03	234	3.45	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	OFF	CLOSED	OFF	-50	04:13:15						-50	04:13:15		
06D8A5D0	26-Aug-03	236	17.00	1						-30	1									-4	02:00:00						-4	02:00:00		Delivers to -30 / 30 / 4
06D8A8D0	28-Aug-03	240	17.00	1						-30	DYN001	1X1	ON	OFF	OPEN	OFF	OFF			-4	02:00:00						-4	02:00:00		
06E2EBD0	30-Aug-03	242	17.00	DYN001	1X1	ON	OFF	OPEN	OFF	-30	1									-4	02:00:00						-4	02:00:00		
06E																														
06E96D00	1-Sep-03	244	17.00	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	OFF	CLOSED	OFF	-50	00:05:30						-50	00:05:30		Delivers to -50 / 50 / 50
06E5D023	1-Sep-03	244	22.30	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	1									-50	00:01:45						-50	00:01:45		
06E4F4C4	2-Sep-03	245	0.15	1						-50	DYN000	1X1	OFF	OFF	CLOSED	OFF	OFF			-50	00:01:45						-50	00:01:45		
06E60790	2-Sep-03	245	2.00	1						-50	1									-50	00:01:45						-50	00:01:45		
06E6297C	2-Sep-03	245	3.45	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	OFF	CLOSED	OFF	-50	03:11:00						-50	03:11:00		
06EAB3C0	5-Sep-03	246	14.45	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	OFF	CLOSED	OFF	-50	00:08:15						-50	00:08:15		DHU Reset, Rice Compression anomaly (2nd)
06E1B230	6-Sep-03	248	23.00	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	1									-50	00:01:45						-50	00:01:45		
06E1B41C	6-Sep-03	249	0.45	1						-50	DYN000	1X1	OFF	OFF	CLOSED	OFF	OFF			-50	00:01:45						-50	00:01:45		
06E1B468	6-Sep-03	249	2.30	1						-50	1									-50	00:01:45						-50	00:01:45		
06E1B704	6-Sep-03	249	4.15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	OFF	CLOSED	OFF	-50	06:18:30						-50	06:18:30		
06E465C0	12-Sep-03	255	22.45	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	1									-50	00:01:45						-50	00:01:45		
06E478C3	13-Sep-03	256	0.30	1						-50	DYN000	1X1	OFF	OFF	CLOSED	OFF	OFF			-50	00:01:45						-50	00:01:45		
06E481E4	13-Sep-03	256	2.15	1						-50	1									-50	00:01:45						-50	00:01:45		
06E4A000	13-Sep-03	256	4.00	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	OFF	CLOSED	OFF	-50	06:20:00						-50	06:20:00		
06E1A0C0	20-Sep-03	263	0.00	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	1									-50	00:01:45						-50	00:01:45		
06E1A0C0	20-Sep-03	263	1.45	1						-50	DYN000	1X1	OFF	OFF	CLOSED	OFF	OFF			-50	00:01:45						-50	00:01:45		
06E1A0C0	20-Sep-03	263	3.30	1						-50	1									-50	00:01:45						-50	00:01:45		
06E1A0C0	20-Sep-03	263	5.15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	OFF	CLOSED	OFF	-50	06:18:45						-50	06:18:45		
06E1A0C0	27-Sep-03	270	0.00	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	1									-50	00:01:45						-50	00:01:45		
06E1A0C0	27-Sep-03	270	1.45	1						-50	DYN000	1X1	OFF	OFF	CLOSED	OFF	OFF			-50	00:01:45						-50	00:01:45		
06E1A0C0	27-Sep-03	270	3.30	1						-50	1									-50	00:01:45						-50	00:01:45		
06E1A0C0	27-Sep-03	270	5.15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	OFF	CLOSED	OFF	-50	05:05:45						-50	05:05:45		
06E1A0C0	30-Sep-03	273	17.22	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	OFF	CLOSED	OFF	-50	05:19:23						-50	05:19:23		
06E1A0C0																														
06E1A0C0																														
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[illegible]

Orange font denotes CCD annealing.

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[illegible]

SMEI Camera Configuration Log: 2005

Notes:
Times are for beginning of pass in which event occurred; exact time of execution may be up to 15 mins later.

Blue font denotes planned activities.
Red font denotes problems & anomalies.
Green font denotes WindSat activity.
Magenta font denotes a spacecraft anomaly.
Orange font denotes CCD annealing.

Rev # or UTC (hex)	Date	JD	Time (Zulu)	Camera 1										Camera 2										Camera 3										Comments
				Mode	CCD Bin/g	ROI	Corr e- ctn	Shutter Position	FF LED	De-Icer set pt.	Mode	CCD Bin/g	ROI	Corr e- ctn	Shutter Position	FF LED	De-Icer set pt.	Mode	CCD Bin/g	ROI	Corr e- ctn	Shutter Position	FF LED	De-Icer set pt.	Obs Duration (DD:HH:MM)									
00001C0	5-Jan-05	5	0:00	DYN0000	1X1	OFF	OFF	CLOSED	OFF	-50	1	1X1	OFF	OFF	CLOSED	OFF	-50	1	1X1	OFF	OFF	CLOSED	OFF	-50	00:01:45									
5-Jan-05	5-Jan-05	5	1:45	1	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	00:01:45									
00007F9	5-Jan-05	5	3:30	1	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	00:01:45									
00028B84	5-Jan-05	5	5:15	4	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	00:01:45									
12-Jan-05	12-Jan-05	12	0:00	DYN0000	1X1	OFF	OFF	CLOSED	OFF	-50	1	1X1	OFF	OFF	CLOSED	OFF	-50	1	1X1	OFF	OFF	CLOSED	OFF	-50	00:01:45									
00029C40	12-Jan-05	12	1:45	1	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	00:01:45									
00029C40	12-Jan-05	12	3:30	1	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	00:01:45									
00029C40	12-Jan-05	12	5:15	4	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	00:01:45									
00029C40	19-Jan-05	19	0:00	DYN0000	1X1	OFF	OFF	CLOSED	OFF	-50	1	1X1	OFF	OFF	CLOSED	OFF	-50	1	1X1	OFF	OFF	CLOSED	OFF	-50	00:01:45									
00029C40	19-Jan-05	19	1:45	1	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	00:01:45									
00029C40	19-Jan-05	19	3:30	1	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	00:01:45									
00029C40	19-Jan-05	19	5:15	4	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	00:01:45									
00029C40	26-Jan-05	26	0:00	DYN0000	1X1	OFF	OFF	CLOSED	OFF	-50	1	1X1	OFF	OFF	CLOSED	OFF	-50	1	1X1	OFF	OFF	CLOSED	OFF	-50	00:01:45									
00029C40	26-Jan-05	26	1:45	1	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	00:01:45									
00029C40	26-Jan-05	26	3:30	1	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	00:01:45									
00029C40	26-Jan-05	26	5:15	4	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	00:01:45									
00029C40	27-Jan-05	27	9:48	4	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	00:01:45									
00029C40	28-Jan-05	28	0:51	4	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	00:01:45									
00029C40	1-Feb-05	32	11:00	4	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	00:01:45									
00029C40	1-Feb-05	32	17:22	4	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	00:01:45									
00029C40	2-Feb-05	33	0:00	1	1X1	OFF	OFF	CLOSED	OFF	-50	1	1X1	OFF	OFF	CLOSED	OFF	-50	1	1X1	OFF	OFF	CLOSED	OFF	-50	00:01:45									
00029C40	2-Feb-05	33	3:30	1	1X1	OFF	OFF	CLOSED	OFF	-50	1	1X1	OFF	OFF	CLOSED	OFF	-50	1	1X1	OFF	OFF	CLOSED	OFF	-50	00:01:45									
00029C40	2-Feb-05	33	5:15	1	1X1	OFF	OFF	CLOSED	OFF	-50	1	1X1	OFF	OFF	CLOSED	OFF	-50	1	1X1	OFF	OFF	CLOSED	OFF	-50	00:01:45									
00029C40	2-Feb-05	33	12:15	0	4X4	ON	ON	ON	OFF	-50	0	4X4	ON	ON	ON	OFF	-50	0	4X4	ON	ON	ON	OFF	-50	00:01:45									
00029C40	2-Feb-05	33	21:00	4	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	00:01:45									
00029C40	3-Feb-05	34	0:00	14	1X1	OFF	OFF	CLOSED	OFF	-50	14	1X1	OFF	OFF	CLOSED	OFF	-50	14	1X1	OFF	OFF	CLOSED	OFF	-50	00:01:45									
00029C40	3-Feb-05	34	3:30	10	1X1	OFF	FF	FF	FF	-50	10	1X1	OFF	FF	FF	FF	-50	10	1X1	OFF	FF	FF	FF	-50	00:01:45									
00029C40	3-Feb-05	34	5:15	DYN0000	1X1	ON	ON	ON	OFF	-50	1	1X1	ON	ON	ON	OFF	-50	1	1X1	ON	ON	ON	OFF	-50	00:01:45									
00029C40	3-Feb-05	34	12:15	13	1X1	ON	ON	FF	FF	-50	1	1X1	ON	ON	FF	FF	-50	1	1X1	ON	ON	FF	FF	-50	00:01:45									
00029C40	3-Feb-05	34	14:00	15	1X1	ON	ON	FF	FF	-50	1	1X1	ON	ON	FF	FF	-50	1	1X1	ON	ON	FF	FF	-50	00:01:45									
00029C40	3-Feb-05	34	15:45	4	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	00:01:45									
00029C40	5-Feb-05	36	12:15	1	1X1	OFF	FF	FF	FF	-50	1	1X1	OFF	FF	FF	FF	-50	1	1X1	OFF	FF	FF	FF	-50	00:01:45									
00029C40	5-Feb-05	36	14:00	1	1X1	OFF	FF	FF	FF	-50	1	1X1	OFF	FF	FF	FF	-50	1	1X1	OFF	FF	FF	FF	-50	00:01:45									
00029C40	5-Feb-05	36	15:45	4	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	00:01:45									
00029C40	6-Feb-05	37	0:00	1	1X1	OFF	FF	FF	FF	-50	1	1X1	OFF	FF	FF	FF	-50	1	1X1	OFF	FF	FF	FF	-50	00:01:45									
00029C40	6-Feb-05	37	3:30	1	1X1	OFF	FF	FF	FF	-50	1	1X1	OFF	FF	FF	FF	-50	1	1X1	OFF	FF	FF	FF	-50	00:01:45									
00029C40	6-Feb-05	37	5:15	1	1X1	ON	ON	ON	OFF	-50	1	1X1	ON	ON	ON	OFF	-50	1	1X1	ON	ON	ON	OFF	-50	00:01:45									
00029C40	6-Feb-05	37	12:15	1	1X1	ON	ON	ON	OFF	-50	1	1X1	ON	ON	ON	OFF	-50	1	1X1	ON	ON	ON	OFF	-50	00:01:45									
00029C40	6-Feb-05	37	14:00	1	1X1	ON	ON	ON	OFF	-50	1	1X1	ON	ON	ON	OFF	-50	1	1X1	ON	ON	ON	OFF	-50	00:01:45									
00029C40	6-Feb-05	37	15:45	4	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	00:01:45									
00029C40	7-Feb-05	38	0:00	1	1X1	OFF	FF	FF	FF	-50	1	1X1	OFF	FF	FF	FF	-50	1	1X1	OFF	FF	FF	FF	-50	00:01:45									
00029C40	7-Feb-05	38	0:00	1	1X1	OFF	FF	FF	FF	-50	1	1X1	OFF	FF	FF	FF	-50	1	1X1	OFF	FF	FF	FF	-50	00:01:45									
00029C40	8-Feb-05	39	0:00	1	1X1	OFF	FF	FF	FF	-50	1	1X1	OFF	FF	FF	FF	-50	1	1X1	OFF	FF	FF	FF	-50	00:01:45									
00029C40	9-Feb-05	40	0:00	DYN0000	1X1	OFF	FF	FF	FF	-50	1	1X1	OFF	FF	FF	FF	-50	1	1X1	OFF	FF	FF	FF	-50	00:01:45									
00029C40	9-Feb-05	40	1:45	1	1X1	ON	ON	ON	OFF	-50	1	1X1	ON	ON	ON	OFF	-50	1	1X1	ON	ON	ON	OFF	-50	00:01:45									
00029C40	9-Feb-05	40	3:30	1	1X1	ON	ON	ON	OFF	-50	1	1X1	ON	ON	ON	OFF	-50	1	1X1	ON	ON	ON	OFF	-50	00:01:45									
00029C40	9-Feb-05	40	5:15	4	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	00:01:45									

Notes:
Times are for beginning of pass in which event occurred: exact time of execution may be up to 15 mins later.

Blue font denotes planned activities.

Green font denotes WindSat activity.

Orange font denotes CCD annealing.

Orange 101k denotes DVD downloading.

Camera 1										Camera 2										Camera 3									
Rev # or UTC (hex)	Date	Time (Zulu)	Mode	CCD Bin/g	FF Corre ction	Shutter Position	FF LED	De-Icer set pt.	Obs Duration (DD-HH-MM)	Comments	Mode	CCD Bin/g	ROI	Corre ction	Shutter Position	FF LED	De-Icer set pt.	Obs Duration (DD-HH-MM)	Comments	Mode	CCD Bin/g	ROI	Corre ction	Shutter Position	FF LED	De-Icer set pt.	Obs Duration (DD-HH-MM)	Comments	
08492740	2-Jan-06	1 0:00	1	4	4X4	ON	ON	OFF	-50	DYN0001	1X1	ON	OFF	OPEN	OFF	-50	DYN010	2x2	ON	OFF	OPEN	OFF	-50	01:00:00	C2 one-day engineering				
0849A000	2-Jan-06	2 0:00	4	4X4	ON	ON	OFF	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	DYN010	2x2	ON	OFF	OPEN	OFF	-50	02:00:00	resume normal mode obs				
08492730	4-Jan-06	4 0:00	DYN0000	1x1	OFF	CLOSED	OFF	-50	1	DYN0000	1X1	OFF	OFF	CLOSED	OFF	-50	DYN010	2x2	ON	OFF	OPEN	OFF	-50	00:01:45	weekly cal				
0849D058	4-Jan-06	4 1:45	1					-50	1	DYN0000	1X1	OFF	OFF	CLOSED	OFF	-50	DYN010	2x2	ON	OFF	OPEN	OFF	-50	00:01:45	weekly cal				
0849C4F8	4-Jan-06	4 3:30	1	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	DYN010	2x2	ON	OFF	OPEN	OFF	-50	07:00:00	resume normal mode obs				
0849D004	4-Jan-06	4 5:15	4	4X4	ON	ON	OFF	OFF	-50	1	DYN0000	1X1	OFF	OFF	CLOSED	OFF	-50	DYN010	2x2	ON	OFF	OPEN	OFF	-50	00:01:45	weekly cal			
08495540	11-Jan-06	11 0:00	DYN0000	1x1	OFF	CLOSED	OFF	-50	1	DYN0000	1X1	OFF	OFF	CLOSED	OFF	-50	DYN010	2x2	ON	OFF	OPEN	OFF	-50	00:01:45	weekly cal				
08497608	11-Jan-06	11 1:45	1					-50	1	DYN0000	1X1	OFF	OFF	CLOSED	OFF	-50	DYN010	2x2	ON	OFF	OPEN	OFF	-50	00:01:45	weekly cal				
084968F8	11-Jan-06	11 3:30	1	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	DYN010	2x2	ON	OFF	OPEN	OFF	-50	00:01:45	resume normal mode obs				
0850A314	11-Jan-06	11 5:15	4	4X4	ON	ON	OFF	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	DYN010	2x2	ON	OFF	OPEN	OFF	-50	06:18:45	resume normal mode obs				
084976C0	12-Jan-06	12 14:05				CLOSED		-50					CLOSED		-50					CLOSED		-50	00:00:16	PatchUpload (Config&PatchModes patches 1-8)					
084979AC	12-Jan-06	12 14:21				CLOSED		-50					CLOSED		-50					CLOSED		-50	00:00:01						
084976C0	12-Jan-06	12 14:22				CLOSED		-50					CLOSED		-50					CLOSED		-50	00:00:12	Patch Upload (patches 9-17)					
08497C97	12-Jan-06	12 14:34				CLOSED		-50					CLOSED		-50					CLOSED		-50	00:01:11						
08495920	12-Jan-06	12 15:36				CLOSED		-50					CLOSED		-50					CLOSED		-50	00:00:25	Patch Upload (patches 18-26)					
084958E8	12-Jan-06	12 15:50				CLOSED		-50					CLOSED		-50					CLOSED		-50	05:08:10						
084958D0	12-Jan-06	12 15:45				CLOSED		-50					CLOSED		-50					CLOSED		-50	00:00:16	Patch Upload (ConfigMode, patches 27-32)					
084958D0	12-Jan-06	12 16:01	4	4X4	ON	ON	OFF	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	DYN010	2x2	ON	OFF	OPEN	OFF	-50	05:07:59	resume normal mode obs				
084959F8	18-Jan-06	18 0:00	DYN0000	1x1	OFF	CLOSED	OFF	-50	1	DYN0000	1X1	OFF	OFF	CLOSED	OFF	-50	DYN010	2x2	ON	OFF	OPEN	OFF	-50	00:01:45	weekly cal				
0849F158	18-Jan-06	18 1:45	1					-50	1	DYN0000	1X1	OFF	OFF	CLOSED	OFF	-50	DYN010	2x2	ON	OFF	OPEN	OFF	-50	00:01:45	weekly cal				
0849F2F8	18-Jan-06	18 3:30	1	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	DYN010	2x2	ON	OFF	OPEN	OFF	-50	03:09:45	resume normal mode obs				
0849F234	18-Jan-06	18 5:15	4	4X4	ON	ON	OFF	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	DYN010	2x2	ON	OFF	OPEN	OFF	-50	00:09:00	WindSat B-Box Mode, Memogram 385				
0849A000	21-Jan-06	21 15:00	4	4X4	ON	ON	OFF	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	DYN010	2x2	ON	OFF	OPEN	OFF	-50	01:19:13	WindSat 24hr Mask Test				
0849C0C0	22-Jan-06	22 0:00	1					-50	1	DYN013	1X1	ON	ON	OPEN	OFF	-50	DYN010	2x2	ON	OFF	OPEN	OFF	-50	01:04:47	DHU Reset				
0849727C	23-Jan-06	23 19:13	4	4X4	ON	ON	OFF	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	DYN010	2x2	ON	OFF	OPEN	OFF	-50	00:01:45	weekly cal				
0849C0A0	25-Jan-06	25 0:00	DYN0000	1x1	OFF	CLOSED	OFF	-50	1	DYN0000	1X1	OFF	OFF	CLOSED	OFF	-50	DYN010	2x2	ON	OFF	OPEN	OFF	-50	00:01:45	weekly cal				
0849E0B8	25-Jan-06	25 1:45	1					-50	1	DYN0000	1X1	OFF	OFF	CLOSED	OFF	-50	DYN010	2x2	ON	OFF	OPEN	OFF	-50	00:01:45	weekly cal				
0849C078	25-Jan-06	25 3:30	1	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	DYN010	2x2	ON	OFF	OPEN	OFF	-50	00:01:45	weekly cal				
0849D014	25-Jan-06	25 5:15	4	4X4	ON	ON	OFF	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	DYN010	2x2	ON	OFF	OPEN	OFF	-50	00:12:00	C2 & C3 HOT ANNEAL - 100%, 12hrs				
0849A000	25-Jan-06	25 17:15	4	4X4	ON	ON	OFF	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	DYN010	2x2	ON	OFF	OPEN	OFF	-50	00:13:23	Anomaly, Memogram 392				
0849A000	26-Jan-06	26 6:38	4	4X4	ON	ON	OFF	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	DYN010	2x2	ON	OFF	OPEN	OFF	-50	00:02:22	DHU Reset				
0849A000	26-Jan-06	26 9:00	1					-50	1	DYN013	1X1	ON	ON	OPEN	OFF	-50	DYN010	2x2	ON	OFF	OPEN	OFF	-50	00:08:47	Anomaly, Memogram 397				
0849A000	26-Jan-06	26 17:47	4	4X4	ON	ON	OFF	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	DYN010	2x2	ON	OFF	OPEN	OFF	-50	00:02:14	Anomaly, Memogram 397				
0849B3C0	26-Jan-06	26 20:01	4	4X4	ON	ON	OFF	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	DYN010	2x2	ON	OFF	OPEN	OFF	-50	00:03:58	DHU Reset				
0849B0A4	26-Jan-06	26 23:59	4	4X4	ON	ON	OFF	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	DYN010	2x2	ON	OFF	OPEN	OFF	-50	00:00:01	Anomaly, Memogram 398				
0849B0A0	27-Jan-06	27 0:00	4	4X4	ON	ON	OFF	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	DYN010	2x2	ON	OFF	OPEN	OFF	-50	00:08:00	DYN012 24hr Mask Test-interrupted, bad ROI				
0849B0C0	27-Jan-06	27 8:00	4	4X4	ON	ON	OFF	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	DYN012	2x2	ON	OFF	OPEN	OFF	-50	00:13:24	Coriolis IMU Anomaly				
0849B0C0	27-Jan-06	27 12:24	4	4X4	ON	ON	OFF	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	DYN010	2x2	ON	OFF	OPEN	OFF	-50	00:02:36	DHU Reset				
0849C7C0	28-Jan-06	28 0:00	14	1X1	OFF	OFF	OFF	-50	1	DYN0000	1X1	OFF	OFF	CLOSED	OFF	-50	DYN010	2x2	ON	OFF	OPEN	OFF	-50	00:03:30	C1 anniversary obs				
0849C7C0	28-Jan-06	28 3:30	10	1X1	OFF	OFF	FF	-50	1	DYN0000	1X1	OFF	OFF	CLOSED	OFF	-50	DYN010	2x2	ON	OFF	OPEN	OFF	-50	00:01:45	C1 anniversary obs				
0849C7C0	28-Jan-06	28 5:15	DYN0000	1X1	ON	OFF	CLOSED	OFF	-50	1	DYN0000	1X1	ON	OFF	CLOSED	OFF	-50	DYN010	2x2	ON	OFF	OPEN	OFF	-50	00:07:00				
0849D144	28-Jan-06	28 12:15	13	1X1	ON	OFF	FF	-50	1	DYN0000	1X1	ON	OFF	CLOSED	OFF	-50	DYN010	2x2	ON	OFF	OPEN	OFF	-50	00:01:45					
0849D740	28-Jan-06	28 14:00	15	1X1	ON	FF	ON	-50	1	DYN0000	1X1	ON	FF	ON	FF	-50	DYN010	2x2	ON	OFF	OPEN	OFF	-50	00:01:45					
0849D0C0	28-Jan-06	28 14:00	13	1X1	ON	ON	FF	-50	1	DYN0000	1X1	ON	ON	FF	ON	-50	DYN010	2x2	ON	OFF	OPEN	OFF	-50	00:01:45					
0849D0C0	28-Jan-06	28 15:45	4	4X4	ON	ON	OFF	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	DYN010	2x2	ON	OFF	OPEN	OFF	-50	00:03:30	C3 anniversary obs				
0849E140	29-Jan-06	29 0:00	1					-50	1	DYN0000	1X1	OFF	OFF	CLOSED	OFF	-50	DYN010	2x2	ON	OFF	OPEN	OFF	-50	00:01:45					
0849E140	29-Jan-06	29 3:30	1					-50	1	DYN0000	1X1	OFF	OFF	CLOSED	OFF	-50	DYN010	2x2	ON	OFF	OPEN	OFF	-50	00:01:45					

SIMEI Camera Configuration Log: 2007

Notes:
Times are for beginning of pass in which event occurred, exact time of execution may be up to 15 mins later.
Blue font denotes planned activities.
Red font denotes problems & anomalies.
Green font denotes WindSat activity.
Magenta font denotes a Spacetrack anomaly.
Orange font denotes CCD annealing.

Rev # or UTC (hex)	Date	JD	Time (Zulu)	Camera 1										Camera 2										Camera 3										Comments
				Mode	CCD Bin/g	FF Corr e- cion	Shutter Position	FF LED	De-icer set pt.	Mode	CCD Bin/g	FF Corr e- cion	Shutter Position	FF LED	De-icer set pt.	Mode	CCD Bin/g	FF Corr e- cion	Shutter Position	FF LED	De-icer set pt.	Obs Duration (DD:HH:MM M)												
00000003	3-Jan-07	3	1:45	DYN000	1x1	OFF	OFF	CLOSED	OFF	-50	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	DYN011	1X1	ON	OFF	CLOSED	OFF	-50	00:01:45	weekly cal								
00000003	3-Jan-07	3	3:15	1	1					-50	DYN000	1	1			-50	DYN011	1X1	ON	OFF	CLOSED	OFF	-50	00:01:45	resume normal mode obs									
00000003	3-Jan-07	3	5:30	1	4X4	ON	ON	OFF	OFF	-50	4	4X4	ON	ON	OFF	OFF	-50	DYN014	2X2	ON	ON	OFF	OFF	-50	06:18:45	resume normal mode obs								
00000003	10-Jan-07	10	0:00	DYN000	1x1	OFF	OFF	CLOSED	OFF	-50	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	1					-50	00:01:45	weekly cal									
00000003	10-Jan-07	10	1:45	1	1					-50	DYN000	1	1			-50	DYN011	1X1	ON	OFF	CLOSED	OFF	-50	00:01:45	resume normal mode obs									
00000003	10-Jan-07	10	3:30	1	4X4	ON	ON	OFF	OFF	-50	4	4X4	ON	ON	OFF	OFF	-50	DYN014	2X2	ON	ON	OFF	OFF	-50	02:03:45	resume normal mode obs								
00000003	12-Jan-07	12	9:00	4	4X4	ON	ON	OFF	OFF	-50	4	4X4	ON	ON	OFF	OFF	-50	DYN014	2X2	ON	ON	OFF	OFF	-50	00:08:46	Anomaly Frame Incrementing Errors								
00000003	12-Jan-07	12	17:46	4	4X4	ON	ON	OFF	OFF	-50	4	4X4	ON	ON	OFF	OFF	-50	DYN014	2x2	ON	ON	OFF	OFF	-50	04:06:14	DHU reset via SIMEI-07B Memo 494								
00000003	17-Jan-07	17	0:00	DYN000	1x1	OFF	OFF	CLOSED	OFF	-50	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	1					-50	00:01:45	weekly cal									
00000003	17-Jan-07	17	1:45	1	1					-50	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	1					-50	00:01:45	resume normal mode obs									
00000003	17-Jan-07	17	3:30	1	4X4	ON	ON	OFF	OFF	-50	4	4X4	ON	ON	OFF	OFF	-50	DYN014	2X2	ON	ON	OFF	OFF	-50	00:01:45	resume normal mode obs								
00000003	17-Jan-07	17	5:15	14	1X1	OFF	OFF	FF	FF	-50	1					-50	1					-50	00:03:30	C1 anniversary obs										
00000003	18-Jan-07	18	0:00	10	1X1	OFF	FF	FF	FF	-50	1					-50	1					-50	00:01:45	resume normal mode obs										
00000003	18-Jan-07	18	3:30	10	1X1	OFF	FF	FF	FF	-50	1					-50	1					-50	00:07:00	resume normal mode obs										
00000003	18-Jan-07	18	5:15	DYN000	1X1	ON	OFF	CLOSED	OFF	-50	DYN000	1X1	ON	OFF	CLOSED	OFF	-50	1					-50	00:01:45	resume normal mode obs									
00000003	18-Jan-07	18	12:15	13	1X1	ON	OFF	FF	FF	-50	1					-50	1					-50	00:01:45	resume normal mode obs										
00000003	18-Jan-07	18	14:00	15	1X1	ON	ON	FF	FF	-50	1					-50	1					-50	00:01:45	resume normal mode obs										
00000003	18-Jan-07	18	15:45	4	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	DYN014	2x2	ON	ON	OFF	OFF	-50	00:03:30	C3 anniversary obs								
00000003	19-Jan-07	19	0:00	1	1					-50	DYN011	1X1	ON	OFF	FF	FF	-50	1					-50	00:01:45	resume normal mode obs									
00000003	19-Jan-07	19	3:30	1	1					-50	1					-50	10	1X1	OFF	FF	FF	FF	FF	-50	00:01:45	resume normal mode obs								
00000003	19-Jan-07	19	5:15	1	1					-50	1					-50	10	1X1	OFF	FF	FF	FF	FF	-50	00:07:00	resume normal mode obs								
00000003	19-Jan-07	19	12:15	1	1					-50	1					-50	13	1X1	ON	OFF	FF	FF	FF	-50	00:01:45	resume normal mode obs								
00000003	19-Jan-07	19	14:00	1	4X4	ON	ON	ON	OFF	-50	1					-50	15	1X1	ON	ON	FF	FF	FF	-50	00:01:45	resume normal mode obs								
00000003	19-Jan-07	19	15:45	4	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	DYN014	2x2	ON	ON	OFF	OFF	-50	00:03:30	C2 anniversary obs								
00000003	20-Jan-07	20	0:00	1	1					-50	14	1X1	OFF	FF	FF	FF	FF	1					-50	00:01:45	resume normal mode obs									
00000003	20-Jan-07	20	3:30	1	1					-50	10	1X1	OFF	FF	FF	FF	FF	1					-50	00:01:45	resume normal mode obs									
00000003	20-Jan-07	20	5:15	1	1					-50	DYN000	1X1	ON	OFF	CLOSED	OFF	-50	1					-50	00:07:00	resume normal mode obs									
00000003	20-Jan-07	20	12:15	1	1					-50	13	1X1	ON	OFF	FF	FF	FF	1					-50	00:01:45	resume normal mode obs									
00000003	20-Jan-07	20	14:00	1	4X4	ON	ON	ON	FF	-50	15	1X1	ON	ON	FF	FF	FF	1					-50	00:01:45	resume normal mode obs									
00000003	20-Jan-07	20	15:45	4	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	DYN014	2x2	ON	ON	OFF	OFF	-50	00:01:45	resume normal mode obs								
00000003	24-Jan-07	24	0:00	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	1					-50	1					-50	00:01:45	weekly + pre-anneal calls										
00000003	24-Jan-07	24	1:45	1	1					-50	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	1					-50	00:01:45	resume normal mode obs									
00000003	24-Jan-07	24	3:30	1	4X4	ON	ON	ON	OFF	100%	4	4X4	ON	ON	ON	OFF	100%	DYN014	2X2	ON	ON	OFF	OFF	-50	00:00:15	C1 & C3 HOT ANNEAL - 100% 12hrs								
00000003	24-Jan-07	24	5:15	4	4X4	ON	ON	ON	OFF	100%	4	4X4	ON	ON	ON	OFF	100%	DYN014	2X2	ON	ON	OFF	OFF	-50	00:14:20	Anomaly Frame Errors, anneal continued								
00000003	24-Jan-07	24	5:30	4	4X4	ON	ON	ON	OFF	100%	4	4X4	ON	ON	ON	OFF	100%	DYN014	2X2	ON	ON	OFF	OFF	-50	00:04:10	DHU reset via SIMEI-07B Memo 496								
00000003	24-Jan-07	24	19:50	4	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	DYN014	2x2	ON	ON	OFF	OFF	-50	00:07:00	C3 post-anneal cal								
00000003	25-Jan-07	25	0:00	1	1					-50	1					-50	DYN011	1X1	ON	OFF	CLOSED	OFF	-50	00:01:45	C1 post-anneal cal									
00000003	25-Jan-07	25	7:00	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	1					-50	1					-50	00:01:45	resume normal mode obs										
00000003	25-Jan-07	25	8:45	4	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	DYN014	2X2	ON	ON	OFF	OFF	-50	00:01:45	resume normal mode obs								
00000003	31-Jan-07	31	0:00	DYN000	1x1	OFF	OFF	CLOSED	OFF	-50	1					-50	1					-50	00:01:45	weekly cal										
00000003	31-Jan-07	31	1:45	1	1					-50	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	1					-50	00:01:45	resume normal mode obs									
00000003	31-Jan-07	31	3:30	1	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	DYN011	1X1	ON	OFF	CLOSED	OFF	-50	00:01:45	resume normal mode obs								
00000003	31-Jan-07	31	5:15	4	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	DYN014	2X2	ON	ON	OFF	OFF	-50	06:18:45	resume normal mode obs								
00000003	7-Feb-07	38	0:00	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	1					-50	1					-50	00:01:45	weekly cal										
00000003	7-Feb-07	38	1:45	1	1					-50	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	DYN011	1X1	ON	OFF	CLOSED	OFF	-50	00:01:45	resume normal mode obs								
00000003	7-Feb-07	38	3:30	1	1					-50	1					-50	DYN011	1X1	ON	OFF	CLOSED	OFF	-50	00:01:45	resume normal mode obs									
00000003	7-Feb-07	38	5:15	4	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	DYN014	2X2	ON	ON	OFF	OFF	-50	06:18:45	resume normal mode obs								
00000003	14-Feb-07	45	0:00	DYN000	1x1	OFF	OFF	CLOSED	OFF	-50	1					-50	1					-50	00:01:45	weekly cal										
00000003	14-Feb-07	45	1:45	1	1					-50	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	DYN011	1X1	ON	OFF	CLOSED	OFF	-50	00:01:45	resume normal mode obs								
00000003	14-Feb-07	45	3:30	1	1					-50	1					-50	DYN011	1X1	ON	OFF	CLOSED	OFF	-50	00:01:45	resume normal mode obs									
00000003	14-Feb-07	45	5:15	4	4X4	ON	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OFF	-50	DYN014	2x2	ON	ON	OFF	OFF	-50	06:18:45	resume normal mode obs								
00000003	21-Feb-07	52	0:00	DYN000	1x1	OFF	OFF	CLOSED	OFF	-50	1					-50	1					-50	00:01:45	weekly cal										

Camera 1										Camera 2										Camera 3									
Rev # or UTC (hex)	Date	Time (Zulu)	Mode	Bin/g	FF Corr e-ction	Shutter Position	FF LED	De-Icer set pt.	Mode	Bin/g	CCD	ROI	FF Corr e-ction	Shutter Position	FF LED	De-Icer set pt.	Mode	Bin/g	CCD	ROI	FF Corr e-ction	Shutter Position	FF LED	De-Icer set pt.	Obs Duration (DD-HH-MM-M)	Comments			
006B7D0C	21-Feb-07	1:45	1					-50	DYN000	1X1	OFF	OFF		CLOSED	OFF	-50	DYN011	1X1	ON	OFF	CLOSED	OFF	-50	00:01:45					
006C0078	21-Feb-07	3:30	1					-50	1							-50	DYN014	2X2	ON	ON	OPEN	OFF	-50	00:01:45					
006B0B14	21-Feb-07	5:15	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OPEN	OFF	-50	DYN014	2X2	ON	ON	OPEN	OFF	-50	04:03:12	resume normal mode obs				
00736C14	26-Feb-07	8:27	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OPEN	OFF	-50	DYN014	2X2	ON	ON	OPEN	OFF	-50	01:11:46	Anomaly: Dropped Frames				
0079530C	26-Feb-07	20:13	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OPEN	OFF	-50	DYN014	2X2	ON	ON	OPEN	OFF	-50	01:03:47	DHU read via SMEI-07/B Memo 497				
007B020D	28-Feb-07	0:00	DYN000	1X1	OFF	CLOSED	OFF	-50	1							-50	1						-50	00:01:45	weekly cal				
007BF29C	28-Feb-07	1:45	1					-50	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	1							-50	00:01:45					
00770A78	28-Feb-07	5:30	1					-50	1							-50	DYN011	1X1	ON	OFF	CLOSED	OFF	-50	00:01:45	resume normal mode obs				
00772384	28-Feb-07	5:15	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OPEN	OFF	-50	DYN014	2X2	ON	ON	OPEN	OFF	-50	06:18:45	resume normal mode obs				
0060C02C	7-Mar-07	6:00	DYN000	1X1	OFF	CLOSED	OFF	-50	1							-50	1						-50	00:01:45	weekly cal				
0060C02C	7-Mar-07	1:45	1					-50	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	1							-50	00:01:45					
0060C02C	7-Mar-07	6:30	1					-50	1							-50	DYN011	1X1	ON	OFF	CLOSED	OFF	-50	00:01:45					
00605E14	7-Mar-07	66	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OPEN	OFF	-50	DYN014	2X2	ON	ON	OPEN	OFF	-50	#REF!	resume normal mode obs				
00605E14	7-Mar-07	66	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OPEN	OFF	-50	DYN014	2X2	ON	ON	OPEN	OFF	-50	00:04:27	Anomaly: Command Rejected				
00605B78	13-Mar-07	72	11:00	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OPEN	OFF	-50	DYN014	2X2	ON	ON	OPEN	OFF	-50	00:08:33	DHU read via SMEI-07/B Memo 498			
00605B84	13-Mar-07	15:27	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OPEN	OFF	-50	DYN014	2X2	ON	ON	OPEN	OFF	-50	00:01:45	weekly cal				
006B4E0C	14-Mar-07	73	0:00	DYN000	1X1	OFF	CLOSED	OFF	-50	1						-50	1						-50	00:01:45					
006B4E0C	14-Mar-07	1:45	1					-50	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	1							-50	00:01:45					
006B4E0C	14-Mar-07	3:30	1					-50	1							-50	DYN011	1X1	ON	OFF	CLOSED	OFF	-50	00:01:45	resume normal mode obs				
006B4E0C	14-Mar-07	73	5:15	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OPEN	OFF	-50	DYN014	2X2	ON	ON	OPEN	OFF	-50	03:18:45	resume normal mode obs			
00625B24	18-Mar-07	77	0:00	DYN001	1X1	OFF	OFF	OFF	-50	1						-50	1						-50	01:00:00	C1 one-day engineering (23 minute data gap)				
00625B24	18-Mar-07	78	0:00	1				-50	1							-50	DYN001	1X1	ON	OFF	OPEN	OFF	-50	01:00:00	C2 one-day engineering				
00625B24	18-Mar-07	79	0:00	1				-50	DYN001	1X1	ON	OFF	OPEN	OFF	-50	1							-50	00:01:45	pre-annual cal				
00625B24	21-Mar-07	80	0:00	DYN000	1X1	OFF	OFF	OFF	-50	1						-50	1						-50	00:01:45					
00625B24	21-Mar-07	80	1:45	1				-50	1							-50	DYN011	1X1	ON	OFF	CLOSED	OFF	-50	00:01:45					
006B4E0C	21-Mar-07	80	3:30	1				-50	1							-50	DYN014	2X2	ON	ON	OPEN	OFF	-50	00:18:38	C3 HOT ANNEAL - 100%, 12hrs				
006B4E0C	21-Mar-07	80	5:15	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OPEN	OFF	-50	DYN014	2X2	ON	ON	OPEN	OFF	-50	00:17:47	Anomaly: Dropped Frames			
00605B78	21-Mar-07	80	23:53	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OPEN	OFF	-50	DYN014	2X2	ON	ON	OPEN	OFF	-50	01:06:20	DHU read via SMEI-07/B Memo 499			
00605B78	21-Mar-07	81	17:40	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OPEN	OFF	-50	DYN014	2X2	ON	ON	OPEN	OFF	-50	00:07:00	C3 post-annual cal			
00625B24	22-Mar-07	83	0:00	1				-50	1							-50	DYN011	1X1	ON	OFF	CLOSED	OFF	-50	03:17:00	resume normal mode obs				
006B7D0C	24-Mar-07	83	7:00	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OPEN	OFF	-50	DYN014	2X2	ON	ON	OPEN	OFF	-50	00:01:45	weekly cal			
006B7D0C	24-Mar-07	87	0:00	DYN000	1X1	OFF	OFF	OFF	-50	1						-50	1						-50	00:01:45					
006B7D0C	28-Mar-07	87	1:45	1				-50	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	1							-50	00:01:45					
006B7D0C	28-Mar-07	87	3:30	1				-50	1							-50	DYN011	1X1	ON	OFF	CLOSED	OFF	-50	00:01:45					
006B7D0C	28-Mar-07	87	5:15	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OPEN	OFF	-50	DYN014	2X2	ON	ON	OPEN	OFF	-50	03:08:05	resume normal mode obs			
00605B78	31-Mar-07	90	13:20	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OPEN	OFF	-50	DYN014	2X2	ON	ON	OPEN	OFF	-50	00:02:06	Anomaly: SMEI Systems Off			
00605B78	31-Mar-07	90	15:26	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OPEN	OFF	-50	DYN014	2X2	ON	ON	OPEN	OFF	-50	02:00:16	DHU read via SMEI-07/B Memo 502			
00605B78	2-Apr-07	92	15:42	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OPEN	OFF	-50	DYN014	2X2	ON	ON	OPEN	OFF	-50	00:23:27	Corolla Anomaly: IMU Upset			
00605B78	3-Apr-07	93	15:09	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OPEN	OFF	-50	DYN014	2X2	ON	ON	OPEN	OFF	-50	00:08:51	Corolla Ref Point			
00605B78	4-Apr-07	94	0:00	DYN000	1X1	OFF	OFF	OFF	-50	1						-50	1						-50	00:01:45	weekly cal				
00605B78	4-Apr-07	94	1:45	1				-50	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	1							-50	00:01:45					
00605B78	4-Apr-07	94	3:30	1				-50	1							-50	DYN011	1X1	ON	OFF	CLOSED	OFF	-50	00:01:45	resume normal mode obs				
00605B78	4-Apr-07	94	5:15	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OPEN	OFF	-50	DYN014	2X2	ON	ON	OPEN	OFF	-50	05:07:29	Patch Upload (Config&PatchModes: patches 1-7) *Left in Patch Mode			
00605B78	9-Apr-07	99	12:44					-50								-50							-50	00:01:01	Patch Upload (Patch Mode: patches 8-20) *Left in Patch Mode				
00605B78	9-Apr-07	99	13:45					-50								-50							-50	00:02:10	Mode				
00605B78	9-Apr-07	99	15:55					-50								-50							-50	00:00:06	Patch Upload (PatchMode: patches 21-32)				
00605B78	9-Apr-07	99	16:01	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OPEN	OFF	-50	DYN014	2X2	ON	ON	OPEN	OFF	-50	00:00:00	resume normal mode obs			
00605B78	9-Apr-07	99	16:01	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OPEN	OFF	-50	DYN014	2X2	ON	ON	OPEN	OFF	-50	00:05:20	[False] Anomaly: Small Files			
00605B78	9-Apr-07	99	21:21	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OPEN	OFF	-50	DYN014	2X2	ON	ON	OPEN	OFF	-50	01:02:39	DHU read via SMEI-07/B Memo 510			
00605B78	11-Apr-07	101	0:00	DYN000	1X1	OFF	OFF	OFF	-50	1						-50	1						-50	00:01:45	weekly cal				
00605B78	11-Apr-07	101	1:45	1				-50	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	1							-50	00:01:45					
00605B78	11-Apr-07	101	3:30	1				-50	1							-50	DYN011	1X1	ON	OFF	CLOSED	OFF	-50	00:01:45					
00605B78	11-Apr-07	101	5:15	1				-50	1							-50	DYN013	1X1	ON	ON	OPEN	OFF	-50	00:00:10	DYN013 10 Minute Mask Test				
00605B78	11-Apr-07	101	5:25	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OPEN	OFF	-50	DYN014	2X2	ON	ON	OPEN	OFF	-50	04:19:49	resume normal mode obs			
00605B78	16-Apr-07	106	1:14	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OPEN	OFF	-50	DYN014	2X2	ON	ON	OPEN	OFF	-50	01:12:34	Anomaly: SMEI Systems Off			
00605B78	17-Apr-07	107	13:48	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OPEN	OFF	-50	DYN014	2X2	ON	ON	OPEN	OFF	-50	00:10:12	DHU read via SMEI-07/B Memo 511			
00605B78	18-Apr-07	108	0:00	DYN000	1X1	OFF	OFF	OFF	-50	1						-50	1						-50	00:01:45	weekly cal				
00605B78	18-Apr-07	108	1:45	1				-50	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	1							-50	00:01:45					
00605B78	18-Apr-07	108	3:30	1				-50	1							-50	DYN011	1X1	ON	OFF	CLOSED	OFF	-50	00:01:45					
00605B78	18-Apr-07	108	5:15	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OPEN	OFF	-50	DYN014	2X2	ON	ON	OPEN	OFF	-50	00:18:45	resume normal mode obs			
00605B78	19-Apr-07	109	0:00	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OPEN	OFF	-50	DYN014	2X2	ON	ON	OPEN	OFF	-50	02:00:05	Anomaly: Data Loss			
00605B78	19-Apr-07	109	20:05	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	ON	OPEN	OFF	-50	DYN014	2X2	ON	ON	OPEN	OFF	-50	05:03:55	DHU read via SMEI-07/B Memo 512			
00605B78	25-Apr-07	115	0:00	DYN000	1X1	OFF	OFF	OFF	-50	1						-50	1						-50	00:01:45	weekly cal				

Rev # or UTC (hex)	Date	JD	Time (Zulu)	Camera 1					Camera 2					Camera 3					Comments							
				Mode	CCD Bin/g	FF Corr e- cation	Shutter Position	FF LED	De-Icer set pt.	Mode	CCD Bin/g	FF Corr e- cation	Shutter Position	FF LED	De-Icer set pt.	Mode	CCD Bin/g	FF Corr e- cation		Shutter Position	FF LED	De-Icer set pt.	Obs Duration (DD:HH:M M)			
00002562	25-Apr-07	115	1:45	1					-50	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	1	DYN011	1X1	ON	OFF	CLOSED	OFF	-50	00:01:45	
00002563	25-Apr-07	115	3:30	1					-50	1					-50	DYN014	2X2	ON	ON	OFF	OFF	-50	07:18:45	resume normal mode obs		
00002784	25-Apr-07	115	5:15	4	4X4	ON	ON	OFF	OFF	4	4X4	ON	ON	OFF	OFF	-50	1						-50	00:01:45	weekly cal	
00003003	3-May-07	123	0:00	DYN000	1x1	OFF	OFF	CLOSED	OFF	1	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	1						-50	00:01:45	
00003020	3-May-07	123	1:45	1					-50	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	1	DYN011	1X1	ON	OFF	CLOSED	OFF	-50	00:01:45	
00003049	3-May-07	123	3:30	1					-50	1					-50	DYN014	2X2	ON	ON	OFF	OFF	-50	00:01:45	resume normal mode obs		
00003054	3-May-07	123	5:15	4	4X4	ON	ON	OFF	OFF	4	4X4	ON	ON	OFF	OFF	-50	1	DYN014	2X2	ON	ON	OFF	OFF	-50	00:01:45	pre-anneal cal
00003200	9-May-07	129	0:00	DYN000	1X1	OFF	OFF	CLOSED	OFF	1	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	1						-50	00:01:45	
00003350	9-May-07	129	1:45	1					-50	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	1	DYN011	1X1	ON	OFF	CLOSED	OFF	-50	00:01:45	
00003361	9-May-07	129	3:30	1					-50	1					-50	DYN014	2X2	ON	ON	OFF	OFF	-50	00:01:45			
00003364	9-May-07	129	5:15	4	4X4	ON	ON	OFF	OFF	4	4X4	ON	ON	OFF	OFF	-50	1	DYN014	2X2	ON	ON	OFF	OFF	-50	00:01:45	C3 HOT ANNEAL - 100%, 12hrs
00047440	10-May-07	130	0:00	1					-50	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	1	DYN011	1X1	ON	OFF	CLOSED	OFF	-50	00:01:45	C3 post-anneal cal
00047460	10-May-07	130	7:00	4	4X4	ON	ON	OFF	OFF	4	4X4	ON	ON	OFF	OFF	-50	1	DYN014	2X2	ON	ON	OFF	OFF	-50	00:18:45	resume normal mode obs
00047980	11-May-07	131	23:00	0					-50	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	1	DYN011	1X1	ON	OFF	CLOSED	OFF	-50	05:17:00	resume normal mode obs
00047990	11-May-07	131	23:00	0					-50	0					-50	0							-50	04:02:45	Anomaly Boot mode	
00047996	12-May-07	132	9:40	4	4X4	ON	ON	OFF	OFF	4	4X4	ON	ON	OFF	OFF	-50	0	DYN014	2X2	ON	ON	OFF	OFF	-50	03:17:50	Reset via SMEI-07B, Memo 513
00047998	12-May-07	132	11:00	0					-50	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	0							-50	03:18:15	Anomaly Boot mode again
00047999	12-May-07	132	12:57	4	4X4	ON	ON	OFF	OFF	4	4X4	ON	ON	OFF	OFF	-50	1	DYN014	2X2	ON	ON	OFF	OFF	-50	04:16:18	Reset via SMEI-07B, Memo 514
00050040	16-May-07	136	0:00	DYN000	1X1	OFF	OFF	CLOSED	OFF	1	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	1						-50	00:01:45	weekly cal
00050042	16-May-07	136	1:45	1					-50	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	1	DYN011	1X1	ON	OFF	CLOSED	OFF	-50	00:01:45	
00050043	16-May-07	136	3:30	1					-50	1					-50	DYN011	1X1	ON	OFF	CLOSED	OFF	-50	00:01:45			
00050078	16-May-07	136	5:15	1					-50	1					-50	DYN007	1X1	ON	OFF	CLOSED	OFF	-50	00:01:45	C3 one-day engineering		
00050174	16-May-07	136	5:15	1					-50	DYN001	1X1	ON	OFF	CLOSED	OFF	-50	1							-50	01:00:00	C3 one-day engineering
00050184	17-May-07	137	5:15	1					-50	DYN001	1X1	OFF	OFF	CLOSED	OFF	-50	1							-50	05:00:00	C1 one-day engineering
00050194	18-May-07	138	5:15	DYN000	1X1	OFF	OFF	CLOSED	OFF	1	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	1	DYN010	2X2	ON	OFF	OFF	-50	03:18:45	resume normal mode obs (C3 in DYN010)
00050200	23-May-07	143	0:00	DYN000	1X1	OFF	OFF	CLOSED	OFF	1	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	1						-50	00:01:45	weekly cal
00050202	23-May-07	143	1:45	1					-50	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	1	DYN011	1X1	ON	OFF	CLOSED	OFF	-50	00:01:45	
00050205	23-May-07	143	3:30	1					-50	1					-50	DYN011	1X1	ON	OFF	CLOSED	OFF	-50	00:01:45	resume normal mode obs		
00050208	23-May-07	143	5:15	4	4X4	ON	ON	OFF	OFF	4	4X4	ON	ON	OFF	OFF	-50	1	DYN010	2X2	ON	OFF	OFF	OFF	-50	06:18:45	resume normal mode obs
00050214	30-May-07	150	0:00	DYN000	1X1	OFF	OFF	CLOSED	OFF	1	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	1						-50	00:01:45	weekly cal
00050240	30-May-07	150	1:45	1					-50	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	1	DYN011	1X1	ON	OFF	CLOSED	OFF	-50	00:01:45	
00050242	30-May-07	150	3:30	1					-50	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	1	DYN011	1X1	ON	OFF	CLOSED	OFF	-50	00:01:45	
00050248	30-May-07	150	5:15	4	4X4	ON	ON	OFF	OFF	4	4X4	ON	ON	OFF	OFF	-50	1	DYN010	2X2	ON	OFF	OFF	OFF	-50	01:10:15	resume normal mode obs
00050250	31-May-07	151	15:30	4	4X4	ON	ON	OFF	OFF	4	4X4	ON	ON	OFF	OFF	-50	1	DYN010	2X2	ON	OFF	OFF	OFF	-50	00:04:30	ACS anomaly, Corolla to SAFE mode SMEI still ON
00050252	31-May-07	151	20:00	4	4X4	ON	ON	OFF	OFF	4	4X4	ON	ON	OFF	OFF	-50	1	DYN010	2X2	ON	OFF	OFF	OFF	-50	05:04:00	Vehicle back to Reference Pt
00050255	6-Jun-07	157	0:00	DYN000	1X1	OFF	OFF	CLOSED	OFF	1	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	1						-50	00:01:45	weekly cal
00050257	6-Jun-07	157	1:45	1					-50	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	1							-50	00:01:45	
00050258	6-Jun-07	157	3:30	1					-50	1					-50	DYN011	1X1	ON	OFF	CLOSED	OFF	-50	00:01:45			
00050261	6-Jun-07	157	5:15	4	4X4	ON	ON	OFF	OFF	4	4X4	ON	ON	OFF	OFF	-50	1	DYN010	2X2	ON	OFF	OFF	OFF	-50	02:03:40	resume normal mode obs
00050262	8-Jun-07	159	8:55	4	4X4	ON	ON	OFF	OFF	4	4X4	ON	ON	OFF	OFF	-50	1	DYN010	2X2	ON	OFF	OFF	OFF	-50	00:00:33	Corolla 1553 anomaly--no telemetry from Star Trackers, WindSat, or SMEI
00050264	8-Jun-07	159	9:28	4	4X4	ON	ON	OFF	OFF	4	4X4	ON	ON	OFF	OFF	-50	1	DYN010	2X2	ON	OFF	OFF	OFF	-50	00:10:38	Vehicle to Sun Pt mode due to no data from Star Tracker
00050266	8-Jun-07	159	20:06	4	4X4	ON	ON	OFF	OFF	4	4X4	ON	ON	OFF	OFF	-50	1	DYN010	2X2	ON	OFF	OFF	OFF	-50	03:19:54	Cnd'd SMEI & WindSat to use 1553 Bus-B, no change
00050268	12-Jun-07	163	16:00	4	4X4	ON	ON	OFF	OFF	4	4X4	ON	ON	OFF	OFF	-50	1	DYN010	2X2	ON	OFF	OFF	OFF	-50	00:02:34	Auto-resets discontinued
00050269	12-Jun-07	163	18:34	0					-50	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	1							-50	01:20:47	SMEI anomaly, cameras pwr'd OFF (discernable in PLB, B, CUR)
00050270	12-Jun-07	163	18:34	0					-50	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	1							-50	01:20:47	partial DHU reboot via bleivel cmd, DHU returned to 'known state'
00050272	14-Jun-07	165	15:21	0					-50	0					-50	0								-50	05:03:26	1750 reset procedure, partial DHU reboot, enabled SMEI RT on the 1553 Bus A--SMEI telemetry! They got 1553 errors when they enabled the ST and WindSat, so they disabled them
00050284	19-Jun-07	170	18:47	0					-50	0					-50	0								-50	00:01:27	Switched to 1553 Bus B, SMEI worked, ST worked, no change
00050285	19-Jun-07	170	20:14	0					-50	0					-50	0								-50	00:00:11	SMEI returned to normal obs mode, veh still in Sun Pt. No sky maps due to lack of quaternion data
00050287	19-Jun-07	170	20:25	4	4X4	ON	ON	OFF	OFF	4	4X4	ON	ON	OFF	OFF	-50	1	DYN010	2X2	ON	OFF	OFF	OFF	-50	02:03:20	Auto-resets resumed
00050290	21-Jun-07	172	23:45	4	4X4	ON	ON	OFF	OFF	4	4X4	ON	ON	OFF	OFF	-50	1	DYN010	2X2	ON	OFF	OFF	OFF	-50	00:19:36	cmdd SAFEROLD to per-down WindSat, uncontrolled spin-down, Corolla to b-dot, WindSat pwr'd ON, telemetry restored! SMEI remained pwr'd ON thru this.
00050292	22-Jun-07	173	19:21	4	4X4	ON	ON	OFF	OFF	4	4X4	ON	ON	OFF	OFF	-50	1	DYN010	2X2	ON	OFF	OFF	OFF	-50	00:03:22	Vehicle to Sun Pt
00050294	22-Jun-07	173	22:43	4	4X4	ON	ON	OFF	OFF	4	4X4	ON	ON	OFF	OFF	-50	1	DYN010	2X2	ON	OFF	OFF	OFF	-50	03:10:02	ACS anomaly--IKU upset, WindSat pwr'd OFF
00050295	26-Jun-07	177	8:45	4	4X4	ON	ON	OFF	OFF	4	4X4	ON	ON	OFF	OFF	-50	1	DYN01								

Rev # or UTC (hex)	Date	JD	Time (Zulu)	Camera 1					Camera 2					Camera 3					Comments						
				Mode	CCD Bin/g	FF Corr e- Position	Shutter Position	FF LED set pt.	De-icer set pt.	Mode	CCD Bin/g	FF Corr e- Position	Shutter Position	FF LED set pt.	De-icer set pt.	Obs Duration (DD-HH-M M)									
0E100020	28-Jun-07	179	0:00	1					-50	1							DYN011	1X1	ON	OFF	CLOSED	OFF	-50	00:05:15	C3 post-annual cal
0E105744	28-Jun-07	179	5:15	1					-50	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	00:01:45	C2 post-annual cal						00:01:45	C2 post-annual cal
0E107030	28-Jun-07	179	7:00	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:06:46	resume normal mode obs						00:06:46	resume normal mode obs
0E107038	28-Jun-07	179	13:46	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:00:43	Vehicle back to Reference Pt						00:00:43	Vehicle back to Reference Pt
0E10706C	28-Jun-07	179	14:29	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:04:47	WindSat spin-up						00:04:47	WindSat spin-up
0E1070B0	28-Jun-07	179	19:16	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	01:04:44	SSR indices re-specified						01:04:44	SSR indices re-specified
0E1070C0	30-Jun-07	181	0:00	DYN000	1X1	OFF	OFF	CLOSED	OFF	1							00:01:45	weekly cal, repeat due to lost data						00:01:45	weekly cal, repeat due to lost data
0E1070C6	30-Jun-07	181	1:45	1					-50	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	00:01:45							00:01:45	
0E1070F8	30-Jun-07	181	3:30	1					-50	1							00:01:45							00:01:45	
0E1070FA	30-Jun-07	181	5:15	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:03:09	resume normal obs						00:03:09	resume normal obs
0E1070B0	30-Jun-07	181	8:24	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:03:09	Coronols SAFEHOLD: Star Tracker						00:03:09	Coronols SAFEHOLD: Star Tracker
0E10705C	30-Jun-07	181	11:33	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	02:09:55	Coronols SAFEHOLD: Star Tracker						02:09:55	Coronols SAFEHOLD: Star Tracker
0E1081A0	2-Jul-07	183	21:28	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	02:02:32	Coronols IMU anomaly, vehicle to B-dot, then Sun Pt, WindSat uncontrolled spin-down						02:02:32	Coronols IMU anomaly, vehicle to B-dot, then Sun Pt, WindSat uncontrolled spin-down
0E1070C0	5-Jul-07	186	0:00	DYN000	1X1	OFF	OFF	CLOSED	OFF	1							00:01:45	weekly cal						00:01:45	weekly cal
0E1070C6	5-Jul-07	186	1:45	1					-50	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	00:01:45							00:01:45	
0E107078	5-Jul-07	186	3:30	1					-50	1							00:01:45							00:01:45	
0E107074	5-Jul-07	186	5:15	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:11:59	resume normal obs						00:11:59	resume normal obs
0E1070A8	5-Jul-07	186	17:14	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	01:06:46	vehicle to Ref Pt						01:06:46	vehicle to Ref Pt
0E206E80	7-Jul-07	188	0:00	1					-50	1							00:01:45	C3 cal repeated						00:01:45	C3 cal repeated
0E2070C0	7-Jul-07	188	1:45	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:23:07	resume normal obs						00:23:07	resume normal obs
0E2070C6	8-Jul-07	189	0:52	0					-50	0							00:01:56	Anomaly: Boat mode						00:01:56	Anomaly: Boat mode
0E207078	8-Jul-07	189	2:48	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	01:02:25	Reset via SMEI-066: Memo 550						01:02:25	Reset via SMEI-066: Memo 550
0E20707C	9-Jul-07	190	5:13	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:00:04	Coronols SAFEHOLD: Star Tracker						00:00:04	Coronols SAFEHOLD: Star Tracker
0E20708C	9-Jul-07	190	5:17	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:09:20	Coronols B-dot Mode						00:09:20	Coronols B-dot Mode
0E2069C0	9-Jul-07	190	14:37	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:03:07	Coronols Sun Point Mode						00:03:07	Coronols Sun Point Mode
0E206970	9-Jul-07	190	17:44	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	01:06:16	WindSat spin-up						01:06:16	WindSat spin-up
0E207078	11-Jul-07	192	0:00	DYN000	1X1	OFF	OFF	CLOSED	OFF	1							00:01:45	weekly cal						00:01:45	weekly cal
0E20707C	11-Jul-07	192	1:45	1					-50	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	00:01:45							00:01:45	
0E206978	11-Jul-07	192	3:30	1					-50	1							00:01:45	C3 cal interrupted due to Coronols Star Tracker Anomaly						00:01:45	C3 cal interrupted due to Coronols Star Tracker Anomaly
0E206974	11-Jul-07	192	5:13	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	01:04:28	vehicle to Ref Pt						01:04:28	vehicle to Ref Pt
0E2069B4	12-Jul-07	193	20:11	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:03:49	Star Tracker soft reset						00:03:49	Star Tracker soft reset
0E207040	13-Jul-07	194	0:00	DYN000	1X1	OFF	OFF	CLOSED	OFF	1							01:00:00	C1 one-day engineering						01:00:00	C1 one-day engineering
0E207050	14-Jul-07	195	0:00	1					-50	1							01:00:00	C2 one-day engineering						01:00:00	C2 one-day engineering
0E207078	15-Jul-07	196	0:00	1					-50	DYN000	1X1	ON	OFF	OPEN	OFF	-50	01:20:18	resume normal obs						01:20:18	resume normal obs
0E20707C	16-Jul-07	197	0:00	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:03:42	Star Tracker threshold changed from 5.5 to 5.75, 3 Starhold						00:03:42	Star Tracker threshold changed from 5.5 to 5.75, 3 Starhold
0E207078	17-Jul-07	198	20:18	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:03:30	weekly cal						00:03:30	weekly cal
0E2070C0	18-Jul-07	199	0:00	DYN000	1X1	OFF	OFF	CLOSED	OFF	1							00:01:45	C2 cal skipped due to Safeshold						00:01:45	C2 cal skipped due to Safeshold
0E2070C6	18-Jul-07	199	3:30	1					-50	1							00:11:51	resume normal obs mode, but Coronols still in Sun Pt						00:11:51	resume normal obs mode, but Coronols still in Sun Pt
0E207078	18-Jul-07	199	5:15	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:11:51	Switch from -Roll Star Trk to -Roll Star Trk, threat for both set to 5.5, -Roll ST does not produce quaternions, so vehicle stays in Sun Pt.						00:11:51	Switch from -Roll Star Trk to -Roll Star Trk, threat for both set to 5.5, -Roll ST does not produce quaternions, so vehicle stays in Sun Pt.
0E2070C8	18-Jul-07	199	17:06	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	02:00:45	Return to -Roll ST, extend timeout to 9.5 hours, begin Ref Pt/Sun Pt "cycling"						02:00:45	Return to -Roll ST, extend timeout to 9.5 hours, begin Ref Pt/Sun Pt "cycling"
0E2070C4	20-Jul-07	201	17:51	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	03:08:36	Emergency mode, vehicle to B-dot due to eclipse, WindSat despin						03:08:36	Emergency mode, vehicle to B-dot due to eclipse, WindSat despin
0E207074	24-Jul-07	205	2:27	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:01:33	Vehicle returned to Sun Pt						00:01:33	Vehicle returned to Sun Pt
0E2070C0	24-Jul-07	205	4:00	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:20:00	Vehicle returned to Sun Pt						00:20:00	Vehicle returned to Sun Pt
0E2070C6	25-Jul-07	206	0:00	DYN000	1X1	OFF	OFF	CLOSED	OFF	1							00:01:45	weekly cal						00:01:45	weekly cal
0E207078	25-Jul-07	206	1:45	1					-50	DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	00:01:45							00:01:45	
0E20707C	25-Jul-07	206	3:30	1					-50	1							00:01:45							00:01:45	
0E207074	25-Jul-07	206	5:15	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:01:45	resume normal obs mode, but Coronols still in Sun Pt						00:01:45	resume normal obs mode, but Coronols still in Sun Pt
0E2070C8	27-Jul-07	208	17:30	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:12:15	Vehicle returned to Reference Pt, Star Tracker functioning after power cycle						00:12:15	Vehicle returned to Reference Pt, Star Tracker functioning after power cycle
0E2070C4	27-Jul-07	208	22:31	1					-50	1							00:01:39	Coronols -5 deg Roll offset						00:01:39	Coronols -5 deg Roll offset
0E207078	28-Jul-07	209	0:00	DYN000	1X1	OFF	OFF	CLOSED	OFF	1							00:01:29	Coronols return to nominal attitude						00:01:29	Coronols return to nominal attitude
0E2070C0	28-Jul-07	209	1:45	1					-50	1							00:01:45	repeat weekly cal						00:01:45	repeat weekly cal
0E2070C6	28-Jul-07	209	3:30	1					-50	1							00:01:45							00:01:45	
0E207078	28-Jul-07	209	5:15	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	02:09:41	resume normal obs mode						02:09:41	resume normal obs mode
0E2069B4	30-Jul-07	211	14:56	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:02:00	WindSat spin-up to 0.3 RPM to investigate WIS-induced glint in Star Tracker-None found.						00:02:00	WindSat spin-up to 0.3 RPM to investigate WIS-induced glint in Star Tracker-None found.
0E2070C8	30-Jul-07	211	16:56	4	4X4	ON	ON	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	04:11:04	WindSat spin-up to 3.1 RPM (nominal rate)						04:11:04	WindSat spin-up to 3.1 RPM (nominal rate)

Rev # or UTC (hex)	Date	Time (Zulu)	Camera 1										Camera 2										Camera 3										Comments
			Mode	CCD Bin/g	FF Corr e- cion	Shutter Position	FF LED	De-icer set pt.	Mode	CCD Bin/g	FF Corr e- cion	Shutter Position	FF LED	De-icer set pt.	Mode	CCD Bin/g	FF Corr e- cion	Shutter Position	FF LED	De-icer set pt.	Obs Duration (DD HH MM M)												
0E46C0A0	4-Aug-07	216	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	DYN010	2X2	ON	OFF	OPEN	OFF	-50	02:12:14	Anomalous SCH Ident: all 1,1's static, frame counters & images good								
0E46C0B8	6-Aug-07	218	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	DYN010	2X2	ON	OFF	OPEN	OFF	-50	01:07:46									
0E46C0C0	8-Aug-07	220	0	DYN000	1X1	OFF	CLOSED	OFF	-50	1													00:01:45	DHU reset via SMEI-06B, Memo 601									
0E46C0D0	8-Aug-07	220	1																				00:01:45										
0E46C0E0	8-Aug-07	220	3:30	1					-50	1													00:01:45	resume normal obs mode									
0E46C0F0	8-Aug-07	220	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	DYN010	2X2	ON	OFF	OPEN	OFF		00:01:45								
0E46C100	15-Aug-07	227	0:00	DYN000	1X1	OFF	CLOSED	OFF	-50	1													00:01:45	weekly cal									
0E46C110	15-Aug-07	227	1:45	1																			00:01:45										
0E46C120	15-Aug-07	227	3:30	1					-50	1													00:01:45	resume normal obs mode									
0E46C130	15-Aug-07	227	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	DYN010	2X2	ON	OFF	OPEN	OFF		00:01:45								
0E46C140	22-Aug-07	234	0:00	DYN000	1X1	OFF	CLOSED	OFF	-50	1													00:01:45	pre-anneal / weekly cal									
0E46C150	22-Aug-07	234	1:45	1																			00:01:45										
0E46C160	22-Aug-07	234	3:30	1					-50	1													00:01:45	C1 post-anneal cal									
0E46C170	22-Aug-07	234	5:15	4	4X4	ON	ON	OPEN	OFF	100%	4	4X4	ON	ON	OPEN	OFF	-50	DYN010	2X2	ON	OFF	OPEN	OFF		00:01:06								
0E46C180	22-Aug-07	234	7:00	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	DYN010	2X2	ON	OFF	OPEN	OFF	00:01:06	C3 post-anneal cal								
0E46C190	22-Aug-07	234	8:10	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	DYN010	2X2	ON	OFF	OPEN	OFF	00:01:45									
0E46C1A0	22-Aug-07	234	9:00	1					-50	1													00:01:45	C1 post-anneal cal									
0E46C1B0	22-Aug-07	234	10:40	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	DYN010	2X2	ON	OFF	OPEN	OFF		00:01:45								
0E46C1C0	22-Aug-07	239	10:35	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	DYN010	2X2	ON	OFF	OPEN	OFF	01:03:25	DHU reset via SMEI-06B, Memo 607								
0E46C1D0	22-Aug-07	241	0:00	DYN000	1X1	OFF	CLOSED	OFF	-50	1													00:01:45										
0E46C1E0	22-Aug-07	241	1:45	1					-50	1													00:01:45	resume normal obs mode									
0E46C1F0	22-Aug-07	241	3:30	1					-50	1													00:01:45										
0E46C200	22-Aug-07	241	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	DYN010	2X2	ON	OFF	OPEN	OFF	06:18:30									
0E46C210	4-Sep-07	247	23:45	0						0													00:00:15	Anomaly, BOOT mode									
0E46C220	4-Sep-07	248	0:00	DYN000	1X1	OFF	CLOSED	OFF	-50	1													00:01:45										
0E46C230	5-Sep-07	248	1:45	1					-50	1													00:01:45	no data									
0E46C240	5-Sep-07	248	3:30	1					-50	1													00:01:45										
0E46C250	5-Sep-07	248	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	DYN010	2X2	ON	OFF	OPEN	OFF	00:00:14	resume normal obs mode--no data								
0E46C260	5-Sep-07	248	5:29	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	DYN010	2X2	ON	OFF	OPEN	OFF	00:00:14									
0E46C270	7-Sep-07	250	0:00	DYN000	1X1	OFF	CLOSED	OFF	-50	1													00:01:45	weekly cal - repeat									
0E46C280	7-Sep-07	250	1:45	1					-50	1													00:01:45										
0E46C290	7-Sep-07	250	3:30	1					-50	1													00:01:45	resume normal obs mode									
0E46C2A0	7-Sep-07	250	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	DYN010	2X2	ON	OFF	OPEN	OFF		04:18:45								
0E46C2B0	12-Sep-07	255	0:00	DYN000	1X1	OFF	CLOSED	OFF	-50	1													00:01:45	weekly cal									
0E46C2C0	12-Sep-07	255	1:45	1					-50	1													00:01:45										
0E46C2D0	12-Sep-07	255	3:30	1					-50	1													00:01:45	DYN013 10-min Mask Test									
0E46C2E0	12-Sep-07	255	5:15	1					-50	1													00:00:10										
0E46C2F0	12-Sep-07	255	5:25	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	DYN013	1X1	ON	ON	OPEN	OFF	00:05:35	resume normal mode obs (C3 in DYN014)								
0E46C300	12-Sep-07	255	5:29	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	DYN014	2X2	ON	ON	OPEN	OFF	00:05:35									
0E46C310	12-Sep-07	255	11:00	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	DYN014	2X2	ON	ON	OPEN	OFF	00:12:45	old auto-read switched C3 back to DYN010								
0E46C320	12-Sep-07	255	23:45	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	DYN014	2X2	ON	ON	OPEN	OFF	05:09:24									
0E46C330	18-Sep-07	261	9:09	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	DYN014	2X2	ON	ON	OPEN	OFF	00:09:36	Corolla ACS anomaly, SV to B-dot, WindSat despin, IMU initiated during SAA transit								
0E46C340	18-Sep-07	261	18:45	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	DYN014	2X2	ON	ON	OPEN	OFF	00:05:15									
0E46C350	18-Sep-07	262	0:00	DYN000	1X1	OFF	CLOSED	OFF	-50	1													SV back to Ref Pt										
0E46C360	18-Sep-07	262	1:45	1					-50	1													00:01:45	weekly cal									
0E46C370	18-Sep-07	262	3:30	1					-50	1													00:01:45										
0E46C380	18-Sep-07	262	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	DYN000	1X1	OFF	CLOSED	OFF	-50	00:01:45	resume normal obs mode								
0E46C390	19-Sep-07	262	7:16	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	DYN011	1X1	ON	ON	OPEN	OFF	00:02:01									
0E46C3A0	19-Sep-07	262	20:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	DYN011	1X1	ON	ON	OPEN	OFF	00:12:59	Corolla ACS anomaly, SV to B-dot, IMU initiated during SAA transit								
0E46C3B0	19-Sep-07	268	6:00	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	DYN014	2X2	ON	ON	OPEN	OFF	05:09:45									
0E46C3C0	25-Sep-07	269	0:00	DYN000	1X1	OFF	CLOSED	OFF	-50	1													SV back to Ref Pt										
0E46C3D0	25-Sep-07	269	1:45	1					-50	1													00:18:00	Anomaly, skytrap station in C1, C2									
0E46C3E0	25-Sep-07	269	3:30	1					-50	1													00:01:45										
0E46C3F0	25-Sep-07	269	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	DYN011	1X1	ON	ON	OPEN	OFF	00:01:45	resume normal obs mode								
0E46C400	25-Sep-07	269	20:10	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	DYN014	2X2	ON	ON	OPEN	OFF	00:14:55									
0E46C410	3-Oct-07	276	0:00	DYN000	1X1	OFF	CLOSED	OFF	-50	1													06:03:50	DHU reset via SMEI-07B, Memo 629									
0E46C420	3-Oct-07	276	1:45	1					-50	1													00:01:45										
0E46C430	3-Oct-07	276	3:30	1					-50	1													00:01:45	weekly cal									
0E46C440	3-Oct-07	276	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	DYN011	1X1	ON	ON	OPEN	OFF		00:01:45								

Rev # or UTC (hex)	Date	JD	Time (Zulu)	Camera 1					Camera 2					Camera 3					Comments
				Mode	CCD Bin/g	ROI	FF Corr e- cation	Shutter Position	FF LED set pt.	De-icer set pt.	Mode	CCD Bin/g	ROI	FF Corr e- cation	Shutter Position	FF LED set pt.	De-icer set pt.	Obs Duration (DD:HH:MM M)	
08050114	3-Oct-07	276	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	04:05:09	resume normal obs mode
08060780	7-Oct-07	280	10:24	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:06:16	Anomaly: no valid images
08081740	7-Oct-07	280	16:40	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	02:07:20	DHU reset via SMEI-075, Memo 633
08082003	10-Oct-07	283	0:00	DYN000	1x1	OFF	OFF	CLOSED	OFF	-50	1						-50	00:01:45	pre-anneal / weekly cal
08082003	10-Oct-07	283	1:45	1							DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	00:01:45	
08082003	10-Oct-07	283	3:30	1							1						-50	00:01:45	
08082003	10-Oct-07	283	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:12:00	C3 HOT ANNEAL - 100%, 12hrs
08082003	10-Oct-07	283	17:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	100%	00:06:45	annual ends
08082003	11-Oct-07	284	0:00	1							DYN011	1X1	ON	OFF	CLOSED	OFF	-50	00:05:15	C3 post-anneal cal
08082003	11-Oct-07	284	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	01:05:45	resume normal obs mode
08082003	12-Oct-07	285	11:00	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:07:25	Anomaly: invalid telemetry
08082003	12-Oct-07	285	18:25	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	04:05:35	DHU reset via SMEI-075, Memo 636
08082003	17-Oct-07	290	0:00	DYN000	1x1	OFF	OFF	CLOSED	OFF	-50	1						-50	00:01:45	weekly cal
08082003	17-Oct-07	290	1:45	1							DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	00:01:45	
08082003	17-Oct-07	290	3:30	1							1						-50	00:01:45	
08082003	17-Oct-07	290	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	06:18:45	resume normal obs mode
08082003	24-Oct-07	297	0:00	DYN000	1x1	OFF	OFF	CLOSED	OFF	-50	1						-50	00:01:45	weekly cal
08082003	24-Oct-07	297	1:45	1							DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	00:01:45	
08082003	24-Oct-07	297	3:30	1	90	ON	ON	OPEN	OFF	-50	1						-50	00:01:45	
08082003	24-Oct-07	297	5:15	4	90	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	06:06:45	resume normal obs mode
08082003	30-Oct-07	303	12:00	0							0						-50	00:03:00	Anomaly: inadvertent reset, SMEI in BOOT
08082003	30-Oct-07	303	15:00	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:08:45	DHU reset, mistakenly by SMEI-086, C3 in DYN010
08082003	30-Oct-07	303	23:45	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:00:15	Auto-reset returns C3 to DYN014
08082003	31-Oct-07	304	0:00	DYN000	1x1	OFF	OFF	CLOSED	OFF	-50	1						-50	00:01:45	weekly cal
08082003	31-Oct-07	304	1:45	1							DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	00:01:45	
08082003	31-Oct-07	304	3:30	1							1						-50	00:01:45	
08082003	31-Oct-07	304	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:01:45	resume normal obs mode
08082003	4-Nov-07	308	21:20	0							0						-50	00:03:40	Anomaly: inadvertent reset, SMEI in BOOT
08082003	5-Nov-07	309	1:00	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	01:23:00	DHU reset via SMEI-075, Memo 636
08082003	7-Nov-07	311	0:00	DYN000	1x1	OFF	OFF	CLOSED	OFF	-50	1						-50	00:01:45	weekly cal
08082003	7-Nov-07	311	1:45	1							DYN000	1X1	OFF	OFF	CLOSED	OFF	-50	00:01:45	
08082003	7-Nov-07	311	3:30	1							1						-50	00:01:45	
08082003	7-Nov-07	311	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:01:45	resume normal obs mode
08082003	7-Nov-07	311	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:01:45	resume normal obs mode
08082003	7-Nov-07	311	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:01:45	resume normal obs mode
08082003	7-Nov-07	311	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:01:45	resume normal obs mode
08082003	7-Nov-07	311	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:01:45	resume normal obs mode
08082003	7-Nov-07	311	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:01:45	resume normal obs mode
08082003	7-Nov-07	311	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:01:45	resume normal obs mode
08082003	7-Nov-07	311	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:01:45	resume normal obs mode
08082003	7-Nov-07	311	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:01:45	resume normal obs mode
08082003	7-Nov-07	311	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:01:45	resume normal obs mode
08082003	7-Nov-07	311	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:01:45	resume normal obs mode
08082003	7-Nov-07	311	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:01:45	resume normal obs mode
08082003	7-Nov-07	311	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:01:45	resume normal obs mode
08082003	7-Nov-07	311	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:01:45	resume normal obs mode
08082003	7-Nov-07	311	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:01:45	resume normal obs mode
08082003	7-Nov-07	311	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:01:45	resume normal obs mode
08082003	7-Nov-07	311	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:01:45	resume normal obs mode
08082003	7-Nov-07	311	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:01:45	resume normal obs mode
08082003	7-Nov-07	311	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:01:45	resume normal obs mode
08082003	7-Nov-07	311	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:01:45	resume normal obs mode
08082003	7-Nov-07	311	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:01:45	resume normal obs mode
08082003	7-Nov-07	311	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:01:45	resume normal obs mode
08082003	7-Nov-07	311	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:01:45	resume normal obs mode
08082003	7-Nov-07	311	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:01:45	resume normal obs mode
08082003	7-Nov-07	311	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:01:45	resume normal obs mode
08082003	7-Nov-07	311	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:01:45	resume normal obs mode
08082003	7-Nov-07	311	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:01:45	resume normal obs mode
08082003	7-Nov-07	311	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:01:45	resume normal obs mode
08082003	7-Nov-07	311	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:01:45	resume normal obs mode
08082003	7-Nov-07	311	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:01:45	resume normal obs mode
08082003	7-Nov-07	311	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:01:45	resume normal obs mode
08082003	7-Nov-07	311	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:01:45	resume normal obs mode
08082003	7-Nov-07	311	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:01:45	resume normal obs mode
08082003	7-Nov-07	311	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:01:45	resume normal obs mode
08082003	7-Nov-07	311	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:01:45	resume normal obs mode
08082003	7-Nov-07	311	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:01:45	resume normal obs mode
08082003	7-Nov-07	311	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:01:45	resume normal obs mode
08082003	7-Nov-07	311	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:01:45	resume normal obs mode
08082003	7-Nov-07	311	5:15	4	4X4	ON	ON	OPEN	OFF	-50	4	4X4	ON	ON	OPEN	OFF	-50	00:01:45	resume normal obs mode
08082003	7-Nov-07	311	5:15	4															