

Minutes of the 36th SOHO SWT Meeting

Goddard Space Flight Center, Greenbelt, Maryland

22 November 2004

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0 Agree Agenda and Actions Revision

B. Fleck welcomed the attendees (see Annex 1) to the meeting which was held as a teleconference between GSFC and other sites. There were no changes to the agenda (see Annex 2). Actions Revision was not performed during the meeting – action items open/opened at the previous SWT meeting are included below for reference only.

0.1 Action Items

Action 36-1:

On BF/JG: Provide template for incremental reporting of instrument status (quarterly) and ground system (yearly) – NASA Senior Review inputs from teams to be taken as starting point.

0.2 Actions Revision

Action 35-1: Open

On PIs: Write an informal plan to address hardware problems in the future.

Action 34-1: Closed(except CELIAS)

On PIs: Input for contingency turn-on scripts to be given to SOCs, with time estimates, including need for NRT.

Action 34-2: Closed(except CELIAS part)

On SOCs: Make a master turn-on plan based on contingency turn-on scripts and time estimates.

Action 33-4: Closed (SH,EIT,CELIAS,UVCS,GOLF)/Open (all other)

On S. Haugan/Pis: A template web page with links to instrument/data file information to be constructed, and filled out by instruments.

Action 32-4: Closed (LS)/Open (European archives)

On L. Sanchez/European archive administrators: Provide monthly usage statistics for archive sites.

1 The future of SOHO

J. Gurman referred to the prepared statement circulated with the agenda:

NASA Senior Review of operating "Sun-Earth Connections" (name is changing) missions scheduled for 2006 Spring.

Current situation at NASA Headquarters is, in Dick Fisher's words, one of "noise and uncertainty;" entirely unclear where the Exploration orientation of the agency is taking science funding. Current assumption is that after the Mission Operations and Data

Analysis (MO&DA) cuts of the last year (to take affect no sooner than FY06, beginning 2005 October 1), MO&DA may be spared future cuts --- but we don't really know. Information flow downward within HQ has ceased.

Based on no new information, we still have to expect a funding profile that looks (in arbitrary units) something like:

<i>FY05 (current)</i>	<i>FY06</i>	<i>FY07</i>	<i>FY08</i>	<i>FY09</i>
<i>---</i>	<i>---</i>	<i>---</i>	<i>---</i>	<i>---</i>
<i>1.0</i>	<i>0.90</i>	<i>0.77</i>	<i>0.60</i>	<i>0.40</i>

The assumption is that with the launch of SDO in late FY08, we will continue operations similar to current ops, but only fund those instruments with analogs on board SDO (currently MDI - HMI, EIT - AIA), for one year of intercalibration. Obviously we want to keep as many of the European instruments going as possible, but there will have to be reduced ECS (SOC) support and possibly reduced FOT support during that time as well.

As of a year ago, when attempts to get a coronagraph back onboard SDO failed, the then SEC management and I had a discussion about continuing the operation of the spacecraft to return LASCO C2 and C3 data only, for the duration of the SDO mission if possible. If we adopt a model of operating the instrument as a NASA asset (i.e., no PI team except for troubleshooting problems, because no science is being done) and an extremely pared-down operation (no EOF, minimal, 5 x 8 FOT), we could do the job for ~ \$1M per year. I believe that is at no more than the thinking stage, and with the change of management and organization at NASA Headquarters, I have no insight into whether that is still an option.

Since LASCO is not telemetry bandwidth limited in synoptic operations, in such a scenario, we could certainly continue to record and distribute data on an as-received basis, with no value added services (e.g. level-zero data) and no facilities for PI team instrument commanding or intervention (really, no EOF). This is all just imagination at this point, however.

Discussion:

If one instrument stops working, will funding be affected? Yes, depending on the instrument. MDI and LASCO are critical for long term operations. If MDI fails, we will lose money and will have to scale down operations. Without other coronagraphs in space, we may keep LASCO running, probably others “for free” as well (e.g. GOLF, VIRGO).

The Senior Review proposal will need to be done in about a year.

2 Information flow

B. Fleck referred to the prepared statement circulated with the agenda:

a) In the past we had regular SWT meetings where the PIs presented the status of their instrument. The gaps between SWT meetings have become very long now. We therefore suggest that the PIs provide a brief status update of their instrument each quarter (in writing). Further, if there are problems/changes with an instrument, please let Joe and me know immediately.

b) In the past couple of months several interesting results were published that would have been suitable for a press release. If you have results that appear to be interesting to a wider audience (e.g. papers that appear in Nature of Science), please let us know. If you give us even just a few days' warning of the date when the Nature or Science embargo is lifted, we can generally get NASA and ESA press releases issued. They tend to increase the visibility of the work, and the resulting press coverage helps everyone's funding.

Discussion:

a) Joe/Bernhard will ask for quarterly reports from the teams. Claush Fröhlich suggested a template be made for the reports and then sent out when reports are wanted.

b) It is important for the Senior Review that the Project Scientists be informed in advance about papers that are suitable for a press release.

3 Ground system equipment status

J. Gurman referred to the prepared statement circulated with the agenda.

*Could the PI's please update their ground system equipment aging status by January 31?
See Action 35-1 in the minutes of the last meeting:
<http://sohowww.nascom.nasa.gov/operations/SWT/swt35.pdf>*

We appear to be seeing some issues arise out of lack of resources (especially knowledgeable people) already.

Discussion:

Joe/Bernhard want instrument ground system status reports once a year. It was suggested that the ground system status gets put into the quarterly status reports once a year.

GOLF is having ground system difficulties but they are being worked around.

4 SOC report

The new SOC, Gini Heilman, was introduced. Emily Zamkoff will be working part-time next year after her baby is born.

As you know, the Fine Sun Pointing Attitude Anomaly Detector (FSPAAD) is now constantly showing an anomaly is detected – it appears most likely that it is obstructed by

some debris – and it has therefore been disabled to prevent spurious ESRs. The constant anomaly detection introduces a new risk to each instrument that is normally safed during ESRs, because a so-called chilly startup of the spacecraft will first turn all instruments OFF at the LCL level, then the FSPAAD goes back to the default state of being enabled, which will cause an ESR. Two different mitigation strategies are being explored: Creating quick turn-on/safe/turn-off scripts for each instrument subject to the new risk, and changing the Fine Pointing Sun Sensor (FPSS) offsets to clear the obstruction (there is reason to believe the FSPAAD is blocked only inside a pointing region very close to the nominal FPSS offset). If an FPSS offset clearing the blocked FSPAAD can be found, the FSPAAD will remain disabled during nominal operations, but the certainty of an ESR after a chilly startup has been eliminated. An offpointing test could be performed after all instruments provide input on the tolerable magnitude of any permanent change in nominal pointing.

5 Intermittent recording patch

B. Fleck referred to the prepared statement circulated with the agenda:

The COBS patch for intermittent recording is working very well and we expect to get continuous coverage for GOLF, VIRGO, and MDI during the upcoming winter keyhole. DSN coverage for subsequent keyholes is even better, and with the ability to select individual packets for recording, different subsets are possible. For the March 2005 keyhole, for instance, we can even give EIT/LASCO and CELIAS continuous data, provided that all passes work as advertised (EIT/LASCO only in submode 5, though). To simplify planning and execution of future keyholes, we should restrict ourselves to pre-defined subsets. First priority will be given to the helioseismology measurements, second priority to space weather measurements (EIT/LASCO in submode 5/6, and CELIAS). For very special events, it is always possible to use other subsets, with sufficient prior notice.

Discussion:

With CELIAS and EIT/LASCO, we are down to a stretch factor of 2 in terms of recording capacity – adding even more instruments means not much difference from normal recording. When we go to Submode 5 in keyholes, SUMER will have telemetry during passes and may use that for engineering.

6 Major Flare Watch (MFW) campaigns

B. Fleck referred to the prepared statement circulated with the agenda:

At SOHO SWT-33 (23-24 April 2001), the SWT agreed to

1) support Major Flare Watches three times before a revision of SOHO's response,

2) *"Telemetry submode changes (5 to 6, enabling full-resolution EIT 195 Å CME Watch) during SUMER operations periods will be performed on a best effort basis during workweek if no suitable HESSI target is reachable by SUMER."*

In my SWT e-mail from 6 September 2002 (#684) I proposed to continue with the present setup, based on the good track record of earlier Major Flare Watch alerts.

In the last 2 1/2 years, three out of 5 MEDOC campaigns have been touched by MFWs. Each time it was a hassle, because people had other plans.

We have talked to Brian Dennis (RHESSI Project Scientist). He made it clear they consider the full resolution EIT data, at least, to be of enormous importance in sorting out context. And more evidence for the importance of SOHO data is expected to come out of the RHESSI/SOHO/TRACE meeting that will take place early December in Sonoma.

The question now is: Do we want to go ahead with our commitment to Major Flare Watches, and if so, are we in the future prepared to do what the SWT agreed to do?

Discussion:

There was much discussion, in particular regarding MEDOC campaigns and SUMER operations versus submode changes related to MFWs.

In the end, there seemed to be general agreement to accept a proposal by J. Kohl that the MEDOC campaigns by default should be extended from 2 to 3 weeks, providing some buffer for interruptions due to MFWs. If a Major Flare Watch occurs during a MEDOC campaign, the standard response applies: If SUMER observes the target, we stay in submode 5, if SUMER cannot observe the target, we change to submode 6.

Exceptions to the submode change rules based on engineering/staffing constraints for SUMER are TBD. .

7 10th anniversary activities

B. Fleck referred to the prepared statement circulated with the agenda:

a) Anniversary meeting: We have an offer from the Catania group (Daniele Spadaro et al.) to host a Symposium celebrating the 10th anniversary of the beginning of the scientific in-orbit operational phase of SOHO in Sicily, Italy in the spring of 2006.

b) Any other ideas for special activities?

- I've been in contact with Ken Lang, who approached the editors of Scientific American to enquire about the possibility of a ten-year overview of SOHO's accomplishments.

- I've contacted ESA Science Communication Service for support for a DVD. Unfortunately, they are going through a very difficult time right now (> 70% of their budget cut). I'm afraid we can't expect much from them in the future.

Any ideas/suggestions?

Discussion:

It will be nice to have a general meeting instead of a specific science meeting. Avoid other meetings around the same time. All approved and agreed.

Send out something to the IAU? Probably not, though individual papers are okay.

We should do whatever we can to publicize the anniversary. Ideas: Maybe do a session at the meeting of other missions to come? Maybe do a Best of SOHO Movies? There won't be much ESA support for public outreach due to funding problems. Maybe contact National Geographic or Discovery Channel - but do it soon. Maybe do stardate program? Maybe do the European equivalent of NPR Science Friday? Maybe EADS can put a Congratulations to SOHO in the European papers? Solar minimum and ion-cyclotron resonance in solar minimum are important and we can use this for some PR as well.

Keep thinking and give Joe/Bernhard more ideas.

8 Future SOHO Workshops

B. Fleck referred to the prepared statement circulated with the agenda:

8-11	Dec	2004	RHESSI/SOHO/TRACE in Sonoma, CA
12-17	Jun	2005	Solar Wind 11 / SOHO 16, in Whistler, Canada
?	May	2006	SOHO 17 (10 year anniversary mtg - SOHO wide science)
	Aug/Sep	2006	GONG2006/SOHO-18

any other volunteers? suggestions?

Discussion:

Put SOHO 17 meeting after EGS meeting in April. HMI may have tests in May.

John Kohl suggested to get theorists back and interested again in ion-cyclotron resonance for solar minimum, perhaps do another SOHO meeting on that topic. John may plan it with Alan Gabriel for 2007 - it will be SOHO 19.

9 Polar coronal hole campaign

B. Fleck referred to the prepared statement circulated with the agenda:

See Alan's SWT message # 986 (Annex 3) from 12 July 2004, which I'll forward once more in separate mail.

With the HGA stuck, we can't do rolls anymore on the HGA. However, if we can get a 70m station and allow an extra switch to the LGA and back, we could do this, even with MDI high rate. We could (if necessary) also stay in MR with just a 34m if MDI observations are not needed, and bridge any gaps with intermittent recording mode if needed.

Discussion:

Do we know of any ground based eclipse observations? This needs to be looked into. If we want a 70m station for an extended period of time we need to request it soon. All agreed. Do we need to put the spacecraft into record at 90 degrees during keyhole rolls to obtain more data on that? The answer is no. We need a 34m station to go to the LGA.

10 Future meetings

We will have another telecon after the SUMER team has a meeting, some time after Christmas. We should try to meet yearly. Next year we should meet at GSFC. Bernhard wants quarterly telecons. 10:30am local time is good timing and Joe/Bernhard will send out the template for instrument reports before the meeting.

Annex 1: List of Participants

Name	Institute/Experiment	Email address
Bocchialini, Karine	IAS/MEDOC	bocchialini@ias.fr
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Annex 2: Agenda

- 1) The Future of SOHO (JG)
- 2) Information flow (BF)
 - a) Instrument status updates
 - b) Results suitable for E/PO
- 3) Ground system equipment status (JG)
- 4) SOC report
- 5) Intermittent recording patch + keyhole operations (BF)
- 6) Major Flare Watch Campaigns (BF)
- 7) 10 year anniversary activities (BF)
 - a) Workshop/Symposium
 - b) special activities
- 8) Future SOHO Workshops (BF)
- 9) Polar coronal hole campaign (AG)
(cf. Alan's SWT message # 986 from 12 July 2004)

Annex 3: SUMER instrument status

SUMER status report by Werner Curdt (22 Nov 2004)

(1) SUMER operations in the past

During the last two years, SUMER was operated twice a year from MEDOC and on several occasions from the EOF with an accumulated switch-on time of 2-3 months per year. Most observations were done off-disk, but also limited disk observations were performed. A systematic checkout of the instrument was done in April/May this year. No new flaws were detected at that time.

(2) SUMER detectors

The limitations of the SUMER detectors to sufficiently increase the gain of the MCP photocathode had been a major concern in the past for both detectors. Recently, we have noticed a different problem with detector A. On 2 June 2004 we discovered spectra with no counts in rows 201 to 2006, but with enhanced count rates in row 2007. Since then, the problem has worsened and half of detector A is black, now. The problem is related to an electronic component in the post-anode digital electronic, which is gradually deteriorating – a problem with no hope of recovery. The erosion is going on continuously and is also in effect during non-op phases. The loss rate is unpredictable, currently it is 1-2 rows per week.

We have decided to continue SUMER observations and to allow high photon load programs on the disk, which had to be given up due to photocathode concerns in the past. Please contact me, if you want to participate in 'burning' the detector.

(3) Future Operations

We have proven that SUMER can still retrieve good data and make excellent science. However, SUMER operations in the future will be more complicated due to additional constraints. Only few individuals will be able to operate the instruments under these conditions. We will have problems to support SUMER operations of the kind we did in the past. We suggest therefore to concentrate our efforts on fewer, well-staffed and well-planned campaigns.

Specifically, we suggest to the SWT to define two default SUMER slots, inside which SUMER will operate their instrument either from MEDOC or the EOF and where SUMER will have guaranteed submode 5 telemetry:

Slot 1 from 1-May to 15 June

Slot 2 from 1 Nov to 15 Dec

Note, that the SOHO-Ulysses quadratures fall into these periods. Normally, SUMER will not make use of all of the 6 weeks. We these restrictions and measures we hope that we can make the planning easier and that we can keep the instrument alive until 2008.

(4) Funding

DLR funding for SUMER operations is available until mid 2007.

Annex 3: Polar coronal hole campaign (A. Gabriel)

JOP 2006. Polar Coronal Holes and the Fast Solar Wind onset region.

The object of this note is to seek SWT support for the planning of a special JOP on 26 March 2006. Clearly, any plans would be subject to the continued operation of SOHO and the required instruments at that time. The date of 2006 March 26 is that of a total solar eclipse, a crucial element for the science being studied.

Looking at polar coronal holes very close to the limb requires exceptional observing conditions, if one is to avoid including closed-field denser corona from lower latitudes within the line of sight. This situation can only be achieved close to the solar minimum when the polar holes are at their largest and symmetrically placed. Although the polar holes are beginning to grow today, they are still well removed from this required situation.

The famous JOP 2 programme, planned 2 years before the mission and carried out on 1996 March 21, was designed specifically to measure the electron temperature gradient in the corona, using principally CDS and SUMER data. The observation was successful and enabled the objective to be achieved (David et al 1998). The observations had a duration of 14 hours and used a spacecraft roll attitude of 90 degrees to the standard. The outstanding quality of the unique data recorded has enabled other interesting objectives to be explored, outside of the original JOP 2 aims. A more recent analysis of the SUMER observations of the oxygen VI multiplet in these data has enabled the outflow velocity in the solar wind to be measured over the height range 1.0 to 1.3 R_{\odot} (Gabriel et al 2003). Further analysis of this same data set, including the UVCS JOP 2 data, is continuing with the aim of resolving some outstanding scientific questions.

The set is almost unique. A further set of data in the same general form was recorded on 1996 June 3, for SUMER and UVCS. This does not compare in quality with the 1996 May 21 set, especially for the SUMER data, which had only a few hours of collection time. In November of 1996, SUMER decided to stop its rastering mode. Some months later, the ideal minimum configuration of the holes began to deteriorate.

There remain important scientific uncertainties regarding the wind onset in coronal holes. These concern the question: Is there a two-component plasma in the holes? This arises because of the presence of observed solar plumes and was the subject of working group sessions at the SOHO 8 Workshop in 1998. Many observers have suggested that the plumes are cooler denser material, which does not take part in the wind. This is a crucial question for which we must eventually obtain a clear answer from SOHO. With my collaborators, I recently published an analysis of the SUMER data from JOP 2 (Gabriel et al 2003), showing that, in the SUMER region, the plumes represent an outflow velocity in excess of the interplume velocities. At the same time, Teriaca et al (2003) published an analysis of the 1996 June 3 data set claiming that this was consistent with the inverse situation, with the wind coming mainly from the interplume regions. They used SUMER plus UVCS data, although, since the SUMER data was of poorer quality, their result

depends mostly on UVCS. We have continued to work on and try to resolve these difficulties. My group have been trying to combine the UVCS data from JOP 2 with the outstanding SUMER data at this time, in order to extend our interpretation to greater height.

At the recent AOGS meeting in Singapore, I presented a very recent advance in the interpretation. We have shown that, beyond a certain height around $1.4 R_{\odot}$, the basic Doppler dimming effect itself leads to an important drop in luminosity of the faster flowing wind component, when viewed in the oxygen VI radiation. This has important consequences, which could help to resolve the previously conflicting results. In effect, if the plumes are really faster, then they will become darker in the UVCS height region than the interplumes, leading to an error in identification of the two structures. We are pursuing this idea in our continuing analysis efforts.

A critical parameter in the modelling is the electron density, which affects both luminosity and Doppler dimming signals. We have already claimed (Gabriel et al 2003) that line ratio density and Thompson scattering density give different results below $1.5 R_{\odot}$, for legitimate reasons related to filling factor effects. We are currently using both densities appropriately in our analysis. Thompson scattering is not available from SOHO below $2.5 R_{\odot}$. This is one reason for interest in simultaneous eclipse data. The other reason concerns abundance anomalies. We are using oxygen line intensity variations to infer local density variations. If some of the structures do not have significant flow, then gravitational settling will deplete the oxygen and invalidate this assumption. We need to see the same plume structures in Thompson scattering.

We are continuing our analysis with the aim of resolving the outstanding questions. However some questions can be addressed with much less uncertainty if we can obtain an improved data set during the forthcoming solar minimum. We believe that, in spite of the known degradation of SOHO and its instruments, the requirements of such a programme can be fully met today. We need primary data from SUMER and UVCS. We use only linearity of response and do not need intensity calibration. We need supporting data from EIT, CDS and LASCO. SUMER needs to raster, but only once to the extent of some 20 or so steps in one direction, over a period of some 10 to 15 hours. We greatly prefer to carry out this sequence in a 90 degree rolled position of SOHO. We need polarised brightness eclipse measurements down to $1.1 R_{\odot}$ from one of the many observers who will be in action on 2006 March 26.

The science requires a total observation of some 15 hours, with synchronisation to the order of 0.5 day. This means that although we want to "coincide" with the eclipse, we could co-exist with other compatible measurements that aim to use the same eclipse.

If the SWT agrees this proposal in principle, I will undertake to coordinate the various observing sequences required in order to write a detailed JOP. In addition to the purely scientific interest, SWT members may feel that the designation of some specific priority observations in 2006 contributes to a needed morale boost for the SOHO programme as it approaches its final stages.

Note: I was able to discuss this idea with Klaus Wilhelm in Singapore last week. Independently of my suggestion, he was feeling that the outstanding success of JOP 2 would justify an effort to repeat it within the next year. One way to accommodate both ideas would be to approve a rehearsal of my proposal (without the eclipse), within say the next 6 to 9 months.

Alan Gabriel, in association with many other collaborators, including Ester Antonucci, Francoise Bely-Dubau, Lucia Abbo, Klaus Wilhelm, etc, etc.

11.7.04