

MODIS Team Meeting Minutes

Minutes of the MODIS Team Meeting held on Tuesday November 8, 1994.

Action Items:

94. Provide a detailed (high fidelity) analysis of scatter in the scan cavity. The results would determine the need for PF near field scatter measurements vs scan angle. Assigned to Guenther 8/23/94 Preliminary results due 10/15/94. Final due 2/28/95.
95. SBRC & GSFC to team to investigate possible corrections for the spurious response effects in the filters. Assigned to Waluschka 8/23/94. Due 10/25/94 CLOSED 11/ 8/94
97. Review the SBRC IR&D report on the Indium Bump process and provide comments on acceptability. Assigned to Roberto, Martineau, and Ellis 9/30/94. Due 10/ 4/94
98. Review August schedules and provide a summary of subsystem schedule status. Assigned to Davis, Ferragut, Waluschka, Martineau, Safren and Daelemans 8/30/94. Due 9/20/94. Waluschka, Martineau, and Safren have complied. CLOSED 11/ 8/94
100. Devise an electronic distribution and communication system to use when GSFCMAIL shuts down. Assigned to Bauernschub 10/25/94. Due 11/29/94.
101. Provide an assessment of the SBRC test plan to measure radiometric accuracy as a function of scan angle position (sections 11.6.3 and 11.7 of the Performance Verification Plan). Assigned to Guenther 10/25/94. Due 11/29/94
102. Review and report on the assigned SBRC test specifications and procedures. Assigned to Waluschka 10/31/94. Due 11/22/94
103. Review and report on the assigned SBRC test specifications and procedures. Assigned to Martineau 10/31/94. Due 11/22/94
104. Review and report on the assigned SBRC test specifications and procedures. Assigned to Ferragut 10/31/94. Due 11/22/94
105. Review and report on the assigned SBRC test specifications and procedures. Assigned to Daelemans 10/31/94. Due 11/22/94
106. Review and report on the assigned SBRC test specifications and procedures. Assigned to Florez 10/31/94. Due 11/22/94
107. Review and report on the assigned SBRC test specifications and procedures. Assigned to Davis 10/31/94. Due 11/22/94

The following items were distributed:

- 1) Weekly Status Report #163
- 2) SBRC Memos submission from week #155
- 3) Minutes of the previous team meeting

Attendees:

✓ Richard Weber	Bruce Guenther	✓ Larissa Graziani
✓ John Bauernschub	✓ George Daelemans	✓ Bob Martineau
Rosemary Vail	Patricia Weir	Bob Silva
Lisa Shears	Mitch Davis	Robert Kiwak
✓ Mike Roberto	✓ Ken Anderson	✓ Harvey Safren
✓ Nelson Ferragut	Rick Sabatino	✓ Ed Knight
✓ Gene Waluschka	✓ Cherie Congedo	✓ Harry Montgomery
✓ Bill Barnes	✓ Jose Florez	Marvin Maxwell
Les Thompson	✓ Gerry Godden	Bill Mocarisky
	✓ Sal Cicchelli	Helen Phillips

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Dick Weber -

Ed Schultz has returned from a trip to Plessey in Great Britain. He did a microscopic inspection of 100 chips (about 2 hours per chip). He rejected about 20% of the chips. The rest were excellent, based on this visual inspection. SBRC should have the 80 candidates in December. (Electrical performance of the chips is yet to be measured. In particular, the chip speed has been a concern. A processor speed of about 13 MHz is needed. To date, very few of these processors have been able to perform at that speed).

Cherie Congedo-

The GSE holding/turnover fixture weighs 3000 pounds. This is the fixture that lifts and rotates MODIS. This fixture will be tested using an approximately 50 gallon drum of water to simulate the MODIS mass plus some margin.

Nelson Ferragut-

El Segundo does not have Pro E.

Jose Florez-

The MEM was baked out on the weekend. The hardware timing problem was related to the test setup and not to the MEM.

The final functional test of the SAM prior to integration and test in the Engineering Model was performed. The backplane was a little bowed and some cards connections became loose.

Harry Montgomery -

One thing to check for when inspecting the facilities at El Segundo is whether it would be possible to perform a solar test from inside one of the buildings using a Heliostat. This test is of particular interest because of science team concern about the stability of the photodiodes for the SRCA.

David Jones -

David is interested in determining the effects of changes in the PAR on performance verification of MODIS at the component and system level in terms of qualification and acceptance level sine sweep testing. (GSFC is in the process of reviewing comments from the review on the Performance Verification Plan/Spec. This document will include a verification matrix which will reference each requirement of each applicable GSFC document to a paragraph in the PVP/PVS. Any questions about sine level sweeps, etc. will be resolved once the PVP/PVS has been updated and approved).

Larissa Graziani-

Details of the MODIS environmental requirements during prelaunch operations are included in a memo from Ron Peterson to Tom Pagano dated October 26. A few conclusions from this memo:

- 1) It is recommended that a door or cover be provided over the SDSM aperture to prevent particles from entering the optical cavity. Short of this, either an instrument bag or a nitrogen purge is recommended. Access to the instrument through the payload fairing before launch had not been planned. The possibility of access is being pursued.
- 2) It is recommended that an instrument GN2 purge be continued at the launch pad. If this is not possible, an alternative to the instrument purge would be to pressurize/purge the payload fairing with GN2 whenever possible. This purge is not possible when personnel are working around the spacecraft when the access doors are open. At these times, the air temperature and humidity requirements need to be tightened to prevent the possibility of reaching the dew point.

Eugene Waluschka -

- 1) Eugene has the blue prints for the SRCA. He will get together with Cherie Congedo to establish grid points where displacements and rotations are needed for the optical model.
- 2) Eugene is working with Ken Brown and Shi-yue Qiu on optical degradation (ghosting and scatter) and restoration. Gene has provided Qiu with his stand alone ray trace code (see description below). It has been used to show there is no ghosting in the VIS and NIR. It will be used to evaluate ghosting in the presence of the focal plane filters and intermediate focal plane fixes for the LWIR and S/MWIR (dichroics on the LWIR fold mirror, and S/MWIR intermediate focal plane transmissive filters). This work will be followed by an analysis of scatter.
- 3) El Segundo has one user/one copy of Code V optical program. The mainstay for this facility is an in house program call Hexagon.
- 4) The stand alone ray trace code developed by Eugene is described in an email message dated October 31. This code will be used in the scatter analysis and in some ghosting analysis. The code was developed because existing codes were awkward to use and could not perform some of the required calculations. The code is a set of subroutines, each of which performs a simple function. The input, once the optical geometry is specified is just the starting point of the ray and its direction. The output can be the points of intersection, the direction of the ray after the surface and the surface normals.

The email message describes the subroutines. Examples of some of the subroutines include use a modified Code V input to set up the geometry of the optical system, transform the ray to the surface's local coordinate frame, calculate the intersection of the ray with a plane, set up a rotation matrix, refract, reflect, calculate intersection of ray with an aspheric surface and the normal at that point

A sample output using Eugene's "Raytrace" program was provided and the same ray was traced using Code V. There was good agreement between the two codes.

Bill Mocarsky-

The following is from an email message to Bill Mocarsky dated 1 November from Vern Alferd concerning the status of the MODIS fixtures:

- (1) MODIS System Fixture:
 - a) Receive Remaining Material - Complete!
 - b) Drill & Pin Isolation pads, etc. - Complete

- c) Clean and prep to move into Cleanroom - 4 hours
- d) Mount to leveling Adapter Plate - 2 hours (2) Leveling/Adapter Plate:
 - a) Receive remaining material - Complete!
 - b) Locate and bond slip material - Complete!
- c) Cleaning and prep - 4 hours
- d) Assemble Leveling/Adapter Plate - 2 hours
- e) Mount to Tilt Table - 2 hours. (3) Tilt table
 - a) Burn-in tilt table motor - 12 hours (complete tomorrow)
 - b) Clean and prep for clean room - 8 hours
- c) Move into clean room - 2 hours. (4) Rotary table
 - a) Hone out rotary table center hole - 2 hours (tomorrow)
 - b) Clean and bag rotary table - 2 hours
- c) Mount Rotary Table to riser plate - 2 hours (5) 0.75" Riser Plate
 - a) Complete Riser Plate Assembly - 11/4/94
 - b) Mount Riser Plate to optical table - 2 hours.

There are two test scenarios.

- (a) For initial assembly the MODIS Mainframe is mounted to the MODIS System Fixture, which is mounted to the Leveling/Adapter Plate, which is mounted to the Tilt Table.
- (b) For subsequent operations the MODIS Mainframe is mounted to the MODIS System Fixture, which is mounted to the Leveling/Adapter Plate, which is mounted to the Rotary table, which is mounted to the 0.75" Riser Plate, which is mounted to the optical table.

The following is from an email message from Bill on November 14:

A brief update concerning GSE Status:

1. Fixtures:

The Modis system fixture is complete, has been load tested and has been mated to the rotary table. This allows the OBA to MF integration to occur this week.

2. DMCF - The dedicated Modis Calibration facility (tv chamber) is in and has been installed. They are running pumpdown checks now.

3. Polarization Source Assembly - should be in 21 NOV. It will need to be calibrated. It is expected to be ready for use 1st week of Dec.

4. Spectral Measurement Assembly/ and Scatter Measurement Assembly look like they will be available mid Dec instead of 1st of DEC.

5. It looks like Hughes is planning to build a clean room for Modis at El Segundo. - Estimated completion date is July 95(?).

6. Vern may be losing Tom Moreno (?) an OASIS guy. He will know by the end of the week. This is his last OASIS guy.

7. System's Engineering is asking Vern to automate some of his stimuli that he had not planned to automate. This is new work. He will be figuring out impact and make internal recommendations first. The work will require new OASIS software. That could be a problem.

I&T Status:

Talked with Duane Bates. He says he wants to maintain a schedule showing going into the TV chamber in February (as before). He thinks he can make up the time by going 2 shifts.

Immediate schedule:

End of this week - OBA to MF complete.

Early next week - Alignment checks

Later next week - MEM integration start (I heard that the MEM was delayed)

2nd Week DEC - Blackbody I&T.

Currently about 1 month out of bed with schedule presented at Sept Quarterly.

Solar Diffuser Screen Meeting On November 8, there was a meeting to discuss the design of the solar diffuser screen. Attendees included Dick Weber, Bill Barnes, Eugene Waluschka, and Mike Roberto. Eugene recommended a hexagon pattern. The hole size might be about 1 mm in diameter. The hole would be tapered if needed.

The idea is to have the holes uniformly spaced and to have a sufficient number of holes so that there is a relatively uniform transition as the sun moves off from or onto holes in the screen.

Systems and Calibration Telecon

The telecon was held on Monday, November 7. The following are Tom Pagano's notes from the telecon:

GSFC: Gerry Godden, Harry Montgomery, Ed Night, Bill Barnes

SBRC: Neil Therrien, Dzung Phan, Jim Young, Tom Pagano

Barnes

p. 128 PVS. Why are we integrating over 2km to 21 km.

T. P. By integrating from 2km to 21km it is like having a 19km cloud.

Knight

Deviation request on filters. Ed's numbers and mine don't quite match up. Will call us. SNR on band 13 was down did we run this. TP. We still have about 40% margin.

Systems Action items list. Complete MODIS simulator, assigned to NASA. Who at NASA?

TP. John Barker. He's doing a simulator, and we'd support that effort.

Jim was to develop system timeline?

JY. It is not yet available. We could interlace tests, but there is a concern whether we can run multiple calibration sequence files simultaneously. This is TBD at this point. We don't have the time in PF T/V at each plateau so we will need to perform tests concurrently.

In the encoder pulse mail, SBRC indicated a change in the number of downloaded pulses from 32 to 100. Gives 2 samples per frame. This will give information on the 45 Hz error from ASTER. TP. No, all vibrations in common reference frame. Will not allow measurement of the jitter.

Harry. Working on ATBD. Didymium to do spectral calibration.

JY. There is a method of least squares fit to doing monochromator calibration that seems simpler than what would be done on the SRCA. Harry. Would like to see document so they can try it.

Godden. Has minutes from BRO meeting. Waiting for action items comments from

T. Kampe. Action items are light. Kampe and Ferguson felt the effort is being performed properly, thoroughly and accurately. BRDF data that Jim used was pessimistic. JY. Instrumental profile already removed. Godden. Spiak and Breault don't believe the data was representative of the mirror. So T. Kampe providing raw data on disk.

Godden. Memo completed on solar diffuser stray light analysis summarized by Sullivan. Point out paths that ought to be looked at that should be investigated. JY. Already been pointed out, and Mike is extending the analysis. There were no scattering paths which address the path between the solar port and the solar diffuser.

Knight. Paths that miss the solar diffuser at an oblique angle. Copy of memo to Weber to be sent ASAP. JY. We are concerned about sunlight striking the SRCA and the opposite side of the cavity.

TP. Algorithm document nearing completion. Expect delivery at end of week.

Software. Systems has the TAC software responsibility. Plan to provide adequate documentation, but may not meet the full extent of the requirements or coding conventions. We want to make use of existing code wherever possible. This is due to the need to meet the Engineering Model schedule.

Knight. Concerned over documentation at the user interface.

TP. Will have at least as good documentation as for MSAP.

Harry. Karen said they would combine the TAC and the ARC for someone at SBRC to use. Recently R. Sabatino said this wouldn't be happening. Is concerned that NASA will not have ability to run TAC software at GSFC.

NT. Our plan is to provide TAC software. Confusion may be due to who's doing the work. ARC has jukebox; hardware differences than what NASA has.

Harry. We'd put the data on the 5Mbyte disks, and feed the data into their TAC.

Knight. ARC software to recover data from jukebox is complete

TP. We will be designing the software to be compatible with NASA use.

Harry. When can we get the software?

TP. After engineering model tests are complete. It will need to be debugged extensively with the EM data set.

Knight. Unacceptable. Their schedule requires an earlier need date, before EM completion.

All. We need to work this issue off line.

Barnes. CDRLS. Meeting next Thursday when Bruce comes back. Will be reviewed at that time.

Barnes. Solar Diffuser Screen is being done by Waluschka. Call him for schedule.

NT. Supporting algorithm development and SIT team test procedures.

Dzung. A lot of progress on the TAC software. Regular meetings 3 times per week.

End of Tom's Report

Fairing Environment

The following is an email message from Tom Pagano on November 4: Colleagues,

I talked with M. Sedlazeck regarding the spacecraft environment while in the Fairing at the Launch Vehicle.

Martin Sedlazeck, (301) 286-7051, Interface Manager on the EOS AM Project, works for R. Taylor

Environment:

o HEPA filtered to nominal class 100, guaranteed 5000 per FED std 209B. o There shall never be a condition where condensation will occur in the ferring. o Launch Vehicle Interface Document, being converted to ICD with Martin Denver (Atlas IIAS),

All this is from the specification:

ICD 103 EOS AM Spacecraft to Launch Vehicle Interface Requirements Document Revision A, Dated 20 September 1994. Generated by MM Astro Space (See C. Wilda)

They have back-up systems in case of power failures.

T. Pagano

Rick Sabatino-

The following is excerpted from an email message from Rick to Ken Anderson on November 7:

The Flt and GSE folks are recommending the following dates for S/W TRR and S/W AR. In addition, I have just been informed of a second GSE software resignation, and it is not good. Steve (Mr. OASIS) Walters is leaving as of 11/18. I will let you know more as soon as I do.

- 1) SWTRR - at "Start PFM Electronics integration" - October 1995
- 2) SWAR - at "Start PFM Ambient Baseline Testing" - January 1996

The following resignations have happened in the GSE software team:

- 1) Brian Adler - last day 11/11/94
- 2) Stephen Walters - last day 11/18/94

Gerry Godden-BRO Trip

In a memo dated November 2, Gerry has summarized the MODIS stray light analysis meeting held at BRO in Tucson, AZ on October 31. Attendees included Gerry; R. Breault and D Milsom from BRO; T. Ferguson; T. Kampe; and P. Spyak from University of Arizona.

Bob Breault and Paul Spyak will independently review the TMA original TMA scan mirror BRDF data and recommend an analytic fit. Jim Young's analysis may have been too pessimistic regarding small angle scatter. Bob Breault also strongly suggested someone look at the scan mirror with a long focal length 20x - 30x microscope. Also scatter measurements at large angles of incidence would be helpful to interpret how to apply the measuring apparatus signature profile.

Other topics included how to specify scatter performance of optical elements for future purchases, the possibility of inverting the S/MWIR intermediate filter to reduce the possibility of substrate optical crosstalk, the possibility of getting "grating like" peaks in the BRDF/BTDF data. Several action items were assigned.

Tom Kampe-BRO Trip

Tom reviewed Gerry's minutes of the meeting in a memo dated November 5. As far as Tom can see, Jim Young's logic with regards to scan mirror BRDF stands. SBRC will conduct additional measurements of a scan mirror sample to determine if they can see the roll-off of the BRDF at small angles. Tom will also talk to TMA about their confidence about the accuracy of the small angle measurements.

SBRC was to send a computer disk to BRO on November 7 containing scatter data for all 5 sample points and the instrument profile. Tom was collecting design details of the S/MWIR IFP mask and the LWIR dichroic reflector to be shipped to BRO and Gerry. Visual inspection on a routine basis (semi-weekly) using a long focal length 20X-30X microscope will be incorporated in the handling/maintenance procedure for the scan and afocal telescope mirrors. SBRC is continuing with aft optics BTDF measurements. Tom provided a list of the materials SBRC plans to measure..

Gerry Godden and Ed Knight - Notes Regarding SBRC's Stray Light Analysis of the MODIS Solar Diffuser

These notes referenced an internal memo from Mike Sullivan (Q04366,10/12/94). There are some questions regarding assumptions and additional paths that may be significant for calibration purposes are identified. Stray light effects on the BB and SRCA are considerations for calibration accuracy and near-real-time cross calibrations. A couple of items identified as requiring attention are:

- 1) stray light paths entering through the solar diffuser port that have not yet been addressed.
- 2) solar diffuser port stray light effects on the BB or SRCA if the solar diffuser door was to fail open.

Mike Roberto

November 14, 1994