MODIS Team Meeting Minutes

Minutes of the MODIS Team Meeting held on Tuesday January 17, 1995.

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.

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. Revised due date 1/17/95

108. Prepare a report addressing the status of the MODIS Reliability Program. Reliability elements will include: FMEA, Worst Case, CIL, Reliability Assessment and Parts Device Stress Analysis and Trend Analysis. Assigned to Silva 1/ 3/94. Due 1/17/95

109. Determine if there are any technical problems associated with the different instrument orientations with respect to gravity when testing MODIS at SBRC versus testing MODIS at the spacecraft integrator. Assigned to Roberto 1/10/95. Due 2/13/95

110. Write up the disposition of the reduced -5°C torque margin on the scan mirror, given increasing torque requirement of test bearings. If the decision is to accept as is, document the rationale. Assigned to Roberto 1/17/95. Due 1/31/95

Attendees:

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

The following items were distributed:

1) Weekly Status Report #172
2) SBRC Memos submission from week #164
3) Minutes of the previous team meeting

Eugene Waluschka
Email report Friday, January 20 1995:
So far here are my observations regarding MODIS polarization and near field response testing. So far everything is progressing well. Preliminary polarization tests were performed and some initial scatter data was also acquired (yesterday) using the ScMA.

Background

The MODIS instrument is of course in the clean room high bay area. The spin axis of the scan mirror is vertical and the angular velocity
vector points up (right hand rule). During the busy times there are two clusters of people. One group working on the electronics and the other performing various tests which are controlled by PC's (?). Everybody is of course in clean room attire.

Before getting to my main topic a few related observations.

Contamination

The scan and fold mirrors were visibly dusty and today (Thursday) they were clean using the carbon dioxide jet. The cleaning removed most of the specks visible by naked eye. During the inspection of the cleaning process (using flash lights and getting up close to the mirrors) some smudges, along the edges, were visible on the scan mirror. These will require cleaning with solvents as the carbon dioxide spray will not remove them. The smudges appear to be a result of handling.

Yesterday, with the Polarization Source Assembly (PSA) sending a nice bright beam into MODIS one could easily see the primary with a smudge on it as well. This smudge is not small. My guess is that it is about 20% or the total area of the primary. Cleaning it will probably require solvents.

Electronics

There are still problems which seem to be related to the manner in which the instrument is started. Some sequence of power ups creates a "mis-registration" problem. They think they know why and how to avoid the difficulty but I am not altogether sure. The only reason that I mention it is that is does effect the polarization measurements primarily by delay them. As the week has progress so has there ability to avoid the problem, if not cure it.

Software

Tom Pagano is feverishly writing portions of the TAC software. I think Dzeng Pham's absence is felt. A replacement for Dzeng is Joe Baurer from the mechanical engineering branch.

Discussions with some of the programmers while in the high bay (watch) area (while standing around observing the measurement process) indicate that the Santa Barbara area has a acute shortage of programmers. But this is not surprising news.

A related observation. They are "lean" on their computing capabilities. The Mac's are OK for small data sets, however the polarization data is measured in megabytes. The SUN is OK but not the Mac's. Also they have a one user FORTRAN license on the SUN. That means only one person can compile at a time!

Now for the main topics.

MODIS polarization testing

The polarization measurements are measurements are made with the PSA. The PSA sends out a, approximately 8.5 inch beam of linearly polarized light at a given orientation, say t1 degrees. The divergence of the beam is about 1 degree. On the VIS focal plane this beam is imaged as a circular spot. The measurements are performed with the scan mirror rotating. This means that the circular spot moves across the focal planes, just as a projected slit from the ScMA would.
In one rotation of the scan mirror the spot would scan each focal plane twice.
The diameter of the PSA spot on the focal plane is about equal to a band length. So that, if the spot center moves along the "middle" of the focal plane, then detectors which lie in the middle of a band will be in illuminated for a longer time than detectors at the "top" or "bottom" of a band. The inclination at SBRC at present is to use the data from these central pixels for the determination of polarization as this data is regarded as more reliable. It should be noted that as the spot moves across the focal plane some vignetting of the pupil does occur at either end of the focal plane. So that for full coverage of the focal plane the PSA must be moved slightly with respect to the instrument.

The intensity and polarization of the beam of light from the PSA has been measured. The results are out as a memo (number ?). The results, in brief, are that if we stay away from the edges of the beam them the intensity is constant to within a few percent (I don't remember the actual values, but it acceptable). The beam is linearly polarized and also uniform to with a few tenths of a percent. So that the PSA is not a big contributor to the measurement error.

The actual determination of the polarization measurements proceed in the following way. The orientation of the stepped through the angles 0, 30, 60, 90, ..., 360 degrees. At each step a average signal (based upon ten or more scans) is determined. The determination of the average is not altogether error free as it relies on signal slope determination to find the center of a particular signal plateau and not on using the same frame in subsequent scans (from a given scan mirror side). It is very similar to a scatter measurement but instead of a slit the above mentioned circle moves across the focal planes.
The change in the average should exhibit a cosine squared variation as a
function of the PSA orientation angle. Also because the PSA is rotated through a full 360 degrees the two end point intensity measurements should be the same (except for noise).

MODIS polarization results

I witnessed a polarization measurement in the high bay. The signal was the result of ten scans at each PSA orientation. The PSA was at 45 degrees relative to the scan mirror. Nadir was also taken, but I don't have those results. Only the data from the center pixels for bands 1, 2, 3, 4, 8, 13, 14, 17 was analyzed and discussed. More data is presumably available but was not processed or discussed, except in passing.

The results are that for bands 2 and 8 the data appears to be good. This is based upon the observed cosine squared variation and the end point intensities being about equal. The measured (predicted) polarization was 0.47% (0.6%)and 2.8% (2.8%), respectively.

The results for the other bands were small, but because there was no cosine squared variation, they were not reliable. It may very well be that we were just measuring noise.

Integration and Test Status Reports for 1/17/95

David Jones is now providing weekly status reports from SBRC integration and test personnel. Reports for January 17 and 18 included the following:

1) Status of the 22 EM TAC software routines as of 95/01/17 - Tom Pagano These include gain, offset, DC restore, charge subtraction, sensitivity and noise, calibration coefficients, response versus scan angle, near field
response radiometric error, relative radiometric accuracy, pattern noise, IFOV, near field response, field of view, spectral band registration, pointing knowledge, spectral coverage, polarization insensitivity, and DN simulator.
The walk-through was complete on 11 of the routines and unit tests were
complete on 8 routines.

Not applicable to the EM includes short/long term stability, bright /dark/warm target within field stray light, stray light rejection, and DN retrieval function.

2) Status of MODIS Test Procedures as of 95/01/17 - Duane Bates
This included the status of 29 test procedures including software verification, system performance tests, environmental tests, etc. The following were ready for GSFC review: measurement of polarization insensitivity, Rad-Cal of VIS, NIR, & SWIR spectral bands, and ..MWIR & LWIR spectral-bands responsivities.

3) Status of MODIS GSE (95/01/17) - Vernon Alferd
Most GSE is complete. The following is under development: STE2, BTC-2, and the Spectral Measurement Assembly (SpMA). The Scatter Measurement Assembly (ScMA) was due to be complete on 1/18.

4) GSE S/W Status as of 95/01/16 - Karen Olin
This includes status for software for the System Test Controller, Archiver, and the Payload Interface Controller. The Stimulus Controller is supported by OASIS.

5) Status of MODIS Drawings as of 95/01/17 - Steve Adams
There were 611 EM drawings released out of 641 total expected. There were 516 PFM drawings released out of a total expected of 1208. This also included information on numbers of specs released.

MODIS Engineering Model Systems Integration & Test Coordination Meeting - January 23, 1995

The presentation was made by TL Koch and faxed to GSFC by David Jones. This included mainframe integration and manufacturing support, electronics/STE integration, primary test activities progress for W/E 1/20/95, plans for W/E 1/27/95, looking ahead to next week, and EM test plan status.

Some key events which were completed or are scheduled include the following:

1) Acquired initial polarization data set using PSA on 1/16

2) Acquired initial scattering data set using ScMA on 1/19

3) CO2 cleaned EM MODIS scan mirror and fold mirror on 1/19

4) Established manual gain and offset control of individual SWIR bands 1/20

5) Established ability to upload gains and offsets to VIS and NIR FPAs 1/21

6) CO2 cleaned IAC mirrors on 1/21

7) Upload VIS gains and offsets - due 1/23

8) Need polarization with new VIS/NIR gains and offsets due 1/23

9) Complete blackbody electrical checkout - due 1/24

10) Need extensive scattering data set with optimal radiometry - due 1/25

11) Conduct consent to deconfigure - due 1/25

12) correct MWIR/LWIR charge subtraction circuitry - due 1/25

13) Move IAC to DMCF; setup and align - due 1/26 - 1/28

14) Electrically integrate FAM/CLAM with PC FPA - due 1/28

15) Integrate MEM with EM mainframe - due 1/28

16) Mount FAM and CLAM onto EM mainframe - due 1/28

17) Prepare for GSFC thermal blanket installation - due 1/30

18) Mount EM MF/MODIS System Fixture (MSF) Assy on Gurney - 2/2

19) Move MODIS to DMCF - due 2/2

20) Install and align EM MODIS in DMCF - 2/2 to 2/4

EOS AM Project Briefing to AM-1 CDR Systems Review Team

This briefing was held on January 18 at GSFC. Presentations were made by Project, instrument, and spacecraft personnel.

MR
1/23/95