

MODIS TECHNICAL TEAM MEETING

May 23, 1996

The MODIS Technical Team Meeting was chaired by Vince Salomonson. Present were Bill Barnes, Ed Masuoka, Eugene Waluschka, Dick Weber, Harry Montgomery, David Herring, Steve Ungar, Chris Justice, Al Fleig, Paul Chan, Yoram Kaufman, Michael King, Wayne Esaias, and Locke Stuart.

1.0 SCHEDULE OF EVENTS

June 11 - 13	Primary Productivity Workshop at GSFC
July 17 - 18	Atmosphere Discipline Group Meeting in Chincoteague, VA
Oct. 2 - 4	MODIS Science Team Meeting (tentative)
Aug. 16	Revised ATBDs due to the EOS Project Science Office

2.0 MINUTES OF THE MEETING

2.1 MODIS Pointing Accuracy

There was some discussion via e-mail among team members prior to this meeting regarding the importance of knowing MODIS pointing accuracy before launch. Whereas SBRS had been planning to perform a pointing knowledge test, the AM Project is now considering canceling that test in order to save time and money. According to the specification, SBRS is tasked with knowing MODIS pointing accuracy before delivery. Weber is proposing that NASA loosen the requirement in the specification of knowledge of pointing accuracy from 90 to 1,000 arc seconds, and reduce SBRS testing.

Weber added that no matter how well SBRS could test the pointing accuracy of MODIS on the ground, the actual bias and random error in pointing accuracy will not be known until data are taken when it is on orbit. Given time and budgetary constraints, Weber feels that SDST should wait and determine pointing accuracy after launch. Overall, spacecraft and MODIS dynamic error is projected to be 105 to 165 meters (3-sigma). Weber also pointed out that the only issue at hand is the time to refine, via the 250-m bands, the on-orbit bias error from 3 or 4 km (as proposed) to the 0.5 km currently specified with full ground testing. Time necessary for the further refinement to tens of meters is not at issue.

Fleig expressed substantial concern. He concurred that SDST can, given time remove any fixed bias. However, after consultation with Fred Patt and Robert Wolfe, Fleig estimated that changing the initial knowledge of instrument pointing error from 90 arc seconds to 1000 arc seconds would probably force a change in the approach used to remove this bias and could extend the time

required to get most of the bias out by 3 to 6 months (i.e., change from the present estimate of 6 months to 9 - 12 months). He said there might be incremental improvements in the accuracy of pointing knowledge during this time. Fleig believed that all Science Team members could do some useful work in checking code flow during this time, but that some products such as Land Cover Change and BRDF could not be produced accurately until improved pointing knowledge was available. Thus, this should be evaluated as a trade off between cost and timely delivery of promised at-launch science rather than as a free (no impact) cost reduction. Therefore, the Science Team should be involved in the decision. Fleig felt very strongly that even if it proved necessary to delete this test because of time and money pressures, the deletion should not be done by changing the Specification. The Project might choose to waive the test but should not change the Specification. To do otherwise would lead to future instrument designers claiming that the MODIS Specification was 1000 arc seconds and so they only needed to do better than that. In fact, this is only under consideration because MODIS was built to a 90 arc second specification and even that will not meet science requirements if the error is not mostly bias.

All Science Team members present agreed with Fleig. Justice asked why the AM Project would even consider changing the Specification. He proffered that deleting a test is different from changing the Specification, as the latter could have negative implications for testing and design of follow-on MODIS sensors. Moreover, changing the Specification could also result in an impact to the science; such as a less robust cloud mask and a diminished capability for change detection.

Weber estimated that by canceling the pointing accuracy tests, NASA saves about \$500K and about 1 week of critical path (instrument delivery) time. He also pointed out that if it conducted its pointing accuracy test, SBRS would only be able to provide pointing accuracy for a single set of conditions that MODIS may encounter in orbit; but certainly the test wouldn't characterize the pointing accuracy for all on-orbit conditions. He feels that testing in orbit is more valid.

Fleig disagreed, stating that pre-launch knowledge of pointing accuracy would reduce the time after launch before the data were accurately located. Justice requested clarification from Weber as to the specifics of the pointing accuracy test that SBRS would conduct. He emphasized that MODLAND wants SBRS to conduct their test as originally planned.

Salomonson requested that Weber prepare a presentation for the next Technical Team Meeting in which he discusses the specific details of SBRS's pointing accuracy test, and lists the reasons why he feels that NASA should allow SBRS to cancel it. Additionally, he requested Fleig to prepare a presentation in which he explains why he estimates that this would take more than a few days after launch to resolve, as well as explaining how SDST will determine pointing accuracy on orbit. Salomonson asked Barnes to bring the complete, prioritized

list of tests that SBRS is currently planning to conduct prior to delivery. Barnes replied that prioritizing all of the tests is a futile exercise. For example, which is more important, calibration testing or electronics testing. Both are mission critical. Salomonson agreed.

2.1.1 Project Software Review

Weber reported that the AM Project held a software review at SBRS that went very well. The review included software for the Test and Analysis Computer (TAC) and ground support equipment (GSE). He feels that there now is no need for a delta review.

2.1.2 Stray Light Tests

Barnes presented SBRS's current plans for MODIS stray light tests (see Attachment 1). Currently, SBRS plans to test near field response, point spread function, far field response, and Earthshine reflected off of the Spectroradiometric Calibration Assembly (SRCA). Additionally, SBRS will add a heater to the Nadir Aperture Door (NAD).

Weber stated that the AM Project has not agreed to some of the tests on the list Barnes showed.

Justice asked when will SBRS's test data on MODIS be available to the Science Team. Salomonson responded that it will be available before the next MODIS Science Team Meeting (which is tentatively scheduled for Oct. 2 - 4, 1996).

Justice proffered that he would like to have a plan for the scheduled delivery of test data from MCST so that Science Team members may process the information and respond in a methodical manner.

2.2 MCST Reports

Montgomery announced that Bruce Guenther is at SBRS attending the software review.

Montgomery stated that during the Science Team Meeting, MCST received good input from Otis Brown, Paul Menzel, and Peter Minnett, and that these members of the Science Team seemed to be pleased with the progress on the thermal band calibration algorithms. The responsivity of the MODIS infrared detectors is a strong function of the focal plane temperature and it is uncertain at this time over what time scales the temperature may be considered as constant. Adaptive software will be developed to accommodate the hardware by allowing interpolation and averaging over variable time scales. The uncertainties in the responsivity of the MODIS detectors won't be known until they are tested in the protoflight model (PFM).

Montgomery reported that MCST is preparing a Quality Assurance (QA) plan for its algorithms. The QA Plan specifies procedures used to verify that the

instrument has operated in the expected manner, that the calibration algorithms are appropriate for the instrument and the data they process, and that the input data have the characteristics expected by the algorithms.

2.3 Advanced MODIS

Barnes told the Team that Weber would like for the Science Discipline Group Leaders to review the MODIS Specification and feedback to Barnes their comments on an Advanced MODIS. Barnes distributed copies of the original MODIS Specification showing where changes have been made.

2.4 The Increasing Cost of AVIRIS

King noted that several EOS principal investigators are planning to use AVIRIS in their field campaigns this year. He stated that Bob Harriss, Director of the Science Division, NASA Headquarters, has identified the cost of AVIRIS as \$52,000 per flight. King said that, at that cost, he is prepared to cancel all flights that require AVIRIS (including TARFOX, BOREAS, and Phil Slater's Railroad Playa Vicarious Calibration Experiment).

2.5 SWAMP-MODLAND Review/Workshop

Justice reported on the SWAMP Land Review/Workshop, held May 16 - 17 at GSFC. The review was productive and enabled several of the MISR/MODIS/ASTER product-interface issues to be worked. The reviewers' report back from the first day was generic, focusing largely on SWAMP management issues. Apparent duplication in the area of land cover was identified by Marvin Bauer. The fact that the ATBDs have not been updated recently meant that there were discrepancies between the ATBD and the summary presentations which caused some confusion. However, this shows that the algorithms are evolving through the pre-launch research and development. All recognized Michael King's desire for the teams to update their ATBDs by August 1996.

According to Justice, the reviewers did not raise any specific problems associated with the MODIS Land products, with the exception that John Price (reviewing the thermal products) stated he had problems with one surface temperature algorithm.

Justice said on the second day the workshop focused on atmospheric correction coordination between instruments, land cover, LAI/FPAR and surface temperature.

A coordination group was set up on atmospheric correction between instruments, to be chaired by Eric Vermote. Ranga Myneni was also asked to develop a small e-mail discussion group on LAI/FPAR (MODIS and MISR).

2.6 Ocean Primary Productivity Workshop

Esaias announced that the Ocean Primary Productivity Workshop will be held June 11 - 13, 1996, at GSFC in Building 26, Room 205.

2.7 SDST Reports

Masuoka reported that SDST is working on projecting the cost of archiving MODIS data products. Robert Wolfe has proposed a cheaper archive that he estimates will cost \$1.2 million to \$1.7 million, as opposed to the original \$7 million estimate proposed by HAIS. Masuoka said that SDST is also updating its list of processing and storage volume requirements for MODIS data products. SDST has also recently been conducting benchmark tests. Masuoka stated that it will be necessary to update the operating system on the Silicon Graphics Power Challenges in the TLCF to IRIX 6.2 in order to adequately benchmark input/output.

Masuoka has requested that Mary Armstrong, of HAIS, provide costing information for early activation of portions of the NSIDC DAAC as requested by NSIDC and the MODIS team.

2.8 EO-1's Potential Impacts on

Ungar discussed possible synergisms between EO-1 and MODIS. Although inherently closely linked to the Landsat-7 mission, it is also mutually beneficial to foster close coordination between EO-1 and MODIS by involvement of two of the new MODIS Science Team members—Bo-Cai Gao and Eric Vermote—on the EO-1 science advisory team. EO-1 and MODIS share many common science objectives, such as multiple calibration involving lunar looks, solar looks, onboard lamps, and views of the Earth. The EO-1 Science Office is proposing, in addition to formation flying with Landsat-7, also flying in formation with EOS AM-1, which would promote synergism between the two Projects in validating atmospheric corrections.

Stuart pointed out that EO-1 would have to be in the same orbit as EOS AM-1, or it would drift relative to EOS AM-1.

2.9 GSFC DAAC Update

Chan announced that the GSFC DAAC is working on ways to automate its system. The GSFC DAAC is gearing up to run tens of thousands of batch jobs on a regular basis, so it is important to automate those jobs. He stressed the importance of keeping the GSFC DAAC system reliable, maintainable, and evolvable. Chan pointed out that even if the system is 99 percent reliable, then the implication is that it would fail hundreds of times. Its reliability must approach 100 percent.

2.10 MAST Reports

Herring announced that Barbara Conboy, MAST Team Leader, is on maternity leave. He and Dave Toll will assume her responsibilities until she returns.

Herring reported that MAST is preparing the minutes from the May 1 - 3 Science Team Meeting. He expects to have the first draft completed and sent out for review by May 31. Herring reminded the team that the tentative dates for the next Science Team Meeting are Oct. 2 - 4, 1996. If any team member knows of any potential conflict with those dates, they should bring it to Herring's attention as soon as possible.

3.0 ACTION ITEMS

3.1 New Action Items

1. *D. Weber*: prepare a presentation for the next MODIS Technical Team Meeting on the specific details of SBRS's pointing accuracy test, and list the reasons why NASA should allow SBRS to cancel it.
2. *A. Fleig*: prepare a counterpoint for the next Technical Team Meeting explaining how SDST will determine pointing and why the change Weber requests will have a more than trivial impact in determining accuracy of MODIS on orbit.

3.2 Action Items Carried Forward

3. *R. Murphy*: Meet with Yoram Kaufman and Harry Montgomery to resolve the band 1 & 2 saturation issue and determine whether it impacts the atmospheric narrow band filter.

4.0 ATTACHMENTS

NOTE: All attachments referenced below are maintained in MODARCH and are available for distribution upon request. Please contact David Herring, MAST Technical Manager, at (301) 286-9515, Code 920, NASA/Goddard Space Flight Center, Greenbelt, MD 20771 if you desire copies of any attachments.

1. MODIS Stray Light Tests, by Bill Barnes