

MODIS TECHNICAL TEAM MEETING

February 29, 1996

The MODIS Technical Team Meeting was chaired by Vince Salomonson. Present were Ed Masuoka, Al Fleig, Dorothy Hall, Paul Chan, David Herring, Eric Vermote, Bill Barnes, Dick Weber, Bruce Guenther, Barbara Conboy, Yoram Kaufman, Wayne Esaias, Bob Murphy, Ray Taylor, and Barbara Putney.

1.0 SCHEDULE OF EVENTS

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| March 18 - 19 | EOS Test Site Meeting |
| March 20 | MODIS Science Software Review at Valley Forge |
| March 21 - 22 | SWAMP at Valley Forge |
| March 26 - 27 | MODIS Quarterly Review at SBRS |
| April 15 | Quarterly Reports due to Barbara Conboy |
| April 30 | MCST-Science Team Precursor Meeting at GSFC |
| May 1 - 2 | MODIS Software Acceptance Review (tentative dates) |
| May 1 - 3 | MODIS Science Team Meeting at GSFC |
| May 16 - 17 | SWAMP Land Discipline Review |

2.0 MINUTES OF THE MEETING

Salomonson reiterated his statement from the previous Technical Team Meeting that he wants the MODIS Team to participate, in a more aggressive posture, in planning for an advanced MODIS to fly in the new millennium. He thanked Ray Taylor for attending the meeting.

2.1 MODIS Project Reports

Weber reported that the MODIS Protoflight Model (PFM) optics problems are beginning to move behind us now. SBRS has remounted all lenses on the PFM, and has thermally tested and vibrated them to ensure that they are now stable. The infrared and visible band optics have been reassembled onto the aft optics assembly. Vibration testing of the aft optics platform will be held in about two weeks. The power supply testing is complete and it is being shipped to SBRS.

Weber announced that all PFM focal plane assemblies have been delivered to SBRS; Flight Model 1 focal planes are now completed. The Flight Model 2 focal planes will be completed by mid-March.

Weber announced that there will be a MODIS Quarterly Management Review at SBRS on March 26 - 27. Weber pointed out that there is a need to reduce the test schedule for MODIS by two months. Due to the schedule slips caused by the

recent PFM hardware problems, SBRS must now prioritize the tests and perform only the essential ones in order to deliver in time.

2.1.1 Spacecraft Maneuvers

Salomonson noted that EOS Project finds it difficult to fund the computer coding this year for the proposed spacecraft maneuvers. The Project is worried that there are thermal considerations, and related mechanical possibilities, wherein the radiative cooler or other components may not return to their original state after a maneuver to look at deep space or the moon. Salomonson observed that there are some who feel that because the EOS AM-1 spacecraft wasn't designed to do maneuvers it would be too risky to attempt them. It is then argued that maneuvers should not be done with AM-1, and that we should plan to do maneuvers for EOS AM-2 and subsequent platforms.

A spirited discussion ensued. Guenther stated that waiting until AM-2 to do maneuvers is too late. He expects that there will be calibration problems in the EOS AM-1 data set that he cannot solve without spacecraft maneuvers.

Barnes added that all along the CERES Team has said that they need maneuvers in order to look over the horizon. He stated that that is all MODIS needs to view deep space. Barnes is convinced that the MODIS infrared channels will fall out of calibration in no more than 6 months after launch if AM-1 can't do a roll maneuver for calibration. He authored a recent white paper in which he stated that MODIS cannot meet its calibration specifications without the maneuver (see Attachment 1).

2.2 Advances in Planning for MODIS-light

Taylor stated that he sees two options for EOS AM-2: 1) include LATI, the advanced Landsat sensor, a copy of CERES, an advanced MISR, an EOSP, and some form of MODIS, or 2) the same instruments, but separated onto three different spacecraft. In the second option, LATI would probably fly alone, MODIS and CERES would fly together on another spacecraft, and MISR and EOSP would occupy the third. All three platforms could launch so that they fly in formation.

Taylor stated that a key question now is what form MODIS will take for EOS AM-2. Barnes and Weber are putting together a list of options. Taylor said the MODIS question is key because MODIS drives the design for AM-2. If MODIS can somehow be made smaller, that would have a big impact on the launch vehicle required and the size of the platform. MODIS is the largest instrument planned for AM-2.

Murphy pointed out that MODIS and MISR have a registration problem that cannot be solved if they fly on separate spacecraft. Taylor responded that two possibilities are either docking spacecraft or flying them in close proximity. He acknowledged, however, that formation flying requires additional fuel. Also,

attitude and position knowledge must be good enough to allow geolocation of pixels.

Taylor said that nothing has been decided yet; the EOS AM-2 payload issues are still being worked. He solicited inputs from the MODIS Team on the subject. Barnes responded that Taylor needs to let the Team know what the major design drivers—such as weight, power, volume, and cost—are for the follow-on MODIS.

From the point of view of minimum cost and simplicity in planning, the current MODIS would be the fastest and cheapest option for AM-2. However, Taylor is concerned that using the same MODIS would not be acceptable in terms of the push to inject the latest/best technology and make MODIS as small and light as possible. Therefore, it is important that GSFC take a serious look at other, more up-to-date options for MODIS.

Barnes countered that there are currently no funds available to begin a follow-on MODIS Phase A study. The possibility for any advanced version of MODIS must be presented to the Science Team, which in turn requires completion of a detailed study.

It was generally agreed that this subject must be revisited as an ongoing discussion. Salomonson said that, in his opinion, the Team must be very much involved in any considerations regarding options for the follow-on MODIS sensor.

2.3 MCST Reports

Guenther reminded the Team that at the Feb. 15 Technical Team Meeting a question was raised on implications for accuracy in the MODIS infrared bands. Guenther stated that G. Daelemans is briefing MCST on the problem and its implications. An answer hasn't yet been reached, however, progress is being made on the problem.

Guenther reported that MCST is releasing its Level 1B file format today. However, he asked for relief on the Level 1B Code until March 11.

MCST is still on track to meet its revised software delivery deadline this spring, but Guenther would like to slip the delivery date until after the May 1996 Science Team Meeting.

Guenther announced that two MCST personnel are traveling to the University of Wisconsin-Madison on March 14 - 15 to review further their approach for their infrared calibration algorithm. The primary motivation for a revised software delivery is to adjust to any Version 1 changes made to the Level 1A geolocation file format.

2.4 SDST Reports

Masuoka announced that the issue of 50-50 day/night mode, versus 60-40, has been settled—MODIS will use a 50-50 day/night mode. The asynchronous transfer mode (ATM) network connection between NASA GSFC and EDC is now in place. EDC reported that the interface is impressive and is glad that real clients are moving real data across the network. Masuoka said there are still some minor problems to be solved regarding the GSFC ATM firewall.

2.5 Terminology Issue: Radiance versus Reflectance

Regarding the MODIS Level 1B data format, Vermote requests a change in terminology from reflectance to normalized radiance. He feels that using the term reflectance to refer to the Level 1B calibration data could be confusing, as it is not really reflectance data, and that term has a different, literal definition.

Guenther responded that the Ocean and Atmosphere Groups feel that reflectance is a good way to describe the data. The Land Group uses reflectance to describe a surface property.

Guenther stated that the 1B data is not radiance data, it is reflectance. Following a lengthy discussion, it was generally agreed to discuss the subject further off-line and recommend the appropriate terminology to be used at a future Technical Team Meeting.

2.5.1 Uncertainty Data

Vermote questioned whether uncertainty data should be included at Level 1B in Version 1 if no one plans to use it at Version 1. He questioned whether the Team could save processing and storage space if we simply eliminated the uncertainty data at Version 1.

Guenther pointed out that if the MODIS PFM has scattering features, then it will not be possible to produce uncertainties on a band-by-band basis, but will need to be produced on a pixel-by-pixel basis. In any case, uncertainty is required for the Level 1B product and should be left in for the Version 1 delivery.

Fleig observed that there are two questions inherent in this discussion: 1) Is there ever a justification for having measurements and uncertainty fields present? He feels that that question is better answered after more calibration tests have been run on the PFM instrument. 2) If you don't know now what the uncertainty is, should you include it in your Version 1 software? Fleig feels that principal investigators can name it, but not bother filling in the data yet. This approach will not cost more to do, so Fleig would rather leave uncertainty data in for now and find out later that they are not needed, rather than taking a beating later for discovering that they are needed and not available.

Guenther added that he doesn't know yet that he can calibrate the MODIS instrument properly if he doesn't have reflectance data. He stated that if he gets

the test data that he needs, his primary product will be reflectance. However, he said, unless we know MCST can do all scene-dependent corrections with the reflectance product, then it may be necessary to carry both reflectance, radiance, and their error fields as Level 1B output products.

Vermote asked rhetorically, "If we start an uncertainty game, why not have uncertainty for each product and double the size of the MODIS processing requirement?"

2.6 MODIS Products

Salomonson reported that Piers Sellers, EOS AM Project Scientist, is asking for input from the MODIS Science Team on which MODIS products should be placed "up for bid" for processing within the new DAAC federation. Vigorous discussion ensued on which products should be placed on the table for bidding.

It was agreed to continue this discussion off-line. Murphy will collect inputs from team members and will prepare a statement for the team leader's signature on which products will be up for bid.

2.7 Ocean Group Report

Esaias announced that there will be an Ocean Group meeting in Miami on April 2 - 3. He would like to meet with personnel from Headquarters, Salomonson, and Murphy to discuss the group's plans and progress made.

3.0 ACTION ITEMS

1. *Murphy*: collect inputs from MODIS Science Team members and prepare a statement for the team leader's signature on which data products should be up for bid under the new DAAC Federation.