

MODIS OCEAN MEETING

**June 8 -9, 1998,
Goddard Space Flight Center**

The MODIS Ocean (MOCEAN) Group meeting was chaired by Wayne Esaias. Present at the meeting were Bob Evans, Mark Abbott, Kendall Carder, Howard Gordon, Janet Campbell, Dennis Clark, Kevin Turpie, Bruce Guenther, Chuck McClain, Bob Murphy, Ed Masuoka and Al Fleig.

1.0 Introduction

Esaias reviewed the meeting agenda (Attachment 1). He noted that Murphy will be presenting material on MODIS follow-on activities, and that Guenther will be discussing proposed enhancements to the PFM instrument scheduled to fly aboard the AM-1 satellite. Esaias indicated that there is a need to increase the MOCEAN QA presence at GSFC, and when discussing this in the meeting he hopes to better-define the role of RSMAS in QA activities. Other items for discussion include MOCEAN's need to refresh validation plans (as much as possible, in light of the launch delay); AM-1 adaptive processing; and MODIS data analysis tools for use by the research community.

2.0 MODIS Follow-on Activities

Murphy reported that efforts are underway to determine the logical continuation of MODIS into the AM-2 and PM eras. Some MODIS Team members have been working with NPOESS to come up with a "reduced MODIS" sensor (the Advanced Global Imager [AGI]) for the AM-2 era. Murphy distributed a table showing the 20 bands that UGLI would incorporate (Attachment 2). Currently two contractors are scoping this instrument, which would be launched in 2004. Ultimately IPO will make the final choice as to which design to use, although MODIS will have input throughout the decision-making process. Murphy added that the Oceans community has been doing a good job of pushing contractors to include their requirements. He distributed a paper entitled "The NPOESS Preparatory Project (NPP): A Transitional Mission from EOS to NPOESS," (Attachment 3) which outlines in more detail plans for future sensors like the Advanced Global Imager (AGI), the Visible Infrared Imaging Radiometer Suite (VIIRS) and Clouds and Earth's Radiant Energy System-II (CERES-II).

3.0 AM-1 Launch Delay

Esaias asked Murphy to comment on the AM-1 launch delay. Murphy responded that ESDIS is now evaluating whether to fix the existing flight ops software, or replace it with commercial off-the-shelf (COTS) software that would have to be modified somewhat. This decision is expected to be made in July. Right now the earliest possible AM-1 launch date is December.

4.0 MODIS Data Processing

4.1 PM-1

Murphy indicated that the MODIS Science Team has been requested to provide a proposal for PI (or adaptive) processing in the PM era. Ground rules stipulate that archive and distribution must remain with the DAAC, and the Team must show that PI processing is no more expensive than ECS processing. A MODIS processing plan will be finalized sometime this summer.

4.2 AM-1

Murphy reported that the AM-1 Project has recently asked that MODIS submit a plan for adaptive processing of AM-1 data. SDST is in the process of costing such a plan now. Esaias noted that it will be difficult to discuss and scope the plan without a solid launch date. Murphy indicated that the MODIS Science Team may want to designate a Science Manager to oversee the various pieces of a MODIS adaptive processing system, and he asked that meeting participants recommend qualified candidates. He reported that he will be meeting with a representative from the US Navy to discuss providing MODIS data to the Navy in real time.

5.0 Instrument Status

5.1 Second Sample Problem

Guenther distributed copies of a presentation entitled "MCST Accomplishments at Third-year Anniversary" (Attachment 4). He reported that MCST and SBRS continue to work the second sample problem, which he anticipates will have less impact on the FM1 instrument than the PFM instrument; the problem is related to the spectral light leak in the SWIR bands, and this leak has largely been corrected on FM1. SBRS contends that the second sample problem is also present in the VIS/NIR bands, but it may not be easily detected. Initially it was thought that correcting the second sample problem would require a complete redesign of the focal plane, but now it looks as if it may be possible to make some corrections that would not require changing the focal plane (i.e., "off chip" fix). If the off-chip fix works for the FM1 instrument, MCST would like to pull the PFM instrument off of the AM-1 platform and make the fix to that instrument prior to launch. Esaias asked if this decision will be made prior to the next MODIS Science Team (MST) meeting (June 24 - 26), and Guenther replied that a decision is not likely until a week or so afterward. Esaias stressed that we should really push the Project to allow us to make the proposed fix to the PFM instrument, so as to profit from lessons learned through FM1 testing.

5.2 FM1 Testing

Guenther indicated that the FM1 instrument is scheduled to enter thermal vacuum testing near the end of July, but that might be delayed a month or two. The instrument will remain in the chamber for approximately 45 days, after which there will be 30 days of data analysis.

5.3 Code Delivery

Guenther reported that Version 2.1 Level 1B code has been delivered, and this delivery contains the optical crosstalk correction. MCST is considering making an additional delivery before the AM-1 launch, in order to clean up some maintenance and code issues.

5.4 Deep Space Maneuver

Esaias asked Guenther to comment on the status of the deep space maneuver, in light of the flight ops software problems and the launch delay. Guenther replied that, in his opinion, the systems and software should be in place to perform the maneuver.

6.0 MOCEAN Code Status

Esaias asked MOCEAN members to consider, given the extra time due to the launch slip, the demands that should be placed on MOCEAN code to ensure that products are consistent. He asked Evans for an update on MOCEAN code delivery status. Evans replied that basically Level 2 code is now at the GDAAC, and Level 3 code is being integrated at SDST. The GDAAC asked RSMAS to rewrite some code to reflect new file names. Evans indicated that, based on extrapolations from SeaWiFS data, RSMAS should be able to ingest 200 gigabits of data per day.

7.0 SeaWiFS Initialization and Validation

Gordon presented a series of charts containing data obtained during the SeaWiFS initialization cruise. Overall there appears to be very good agreement between SeaWiFS data and MOBY data.

8.0 SIMBIOS Status and MODIS Interactions

McClain reported that he spent a great deal of time working with Brent Holben to modify the sun photometers so that they will stand up to Oceans work. McClain indicated that he is now looking at OCTS data. The Japanese sent 160 tapes of matchup data, and they have agreed to send some plots of the coastal United States. Interaction between the SIMBIOS and POLDER science teams is improving. Esaias indicated that if there is no MODIS launch until June 1999, then MOCEAN can make more concrete plans for validation with SIMBIOS.

9.0 MODIS Adaptive Processing for AM-1

9.1 Approach

Masuoka distributed copies of his presentation entitled "Adaptive Processing for EOS AM-1" (Attachment 5). He explained that the adaptive processing approach is PI-led, and entails producing MOCEAN products in the Team Leader-Science Computing Facility (TL-SCF). The GDAAC would then handle archive and distribution. The current plan calls for making 100% of MOCEAN products at launch using the improved science algorithms from RSMAS. Resources for reprocessing are as follows: 1x at Launch + 1 year; 2x at Launch + 2 years; and 4x at Launch +3 and +4 years. Additional personnel envisioned to implement the adaptive processing plan include an Ocean Production Lead, a QA Specialist, and a Software Developer/Miami Liaison. (At SDST, it will be necessary to add a Software Developer and an Integration and Test Specialist.) The Software Developer/Miami Liaison would be hired by MOCEAN, be responsible to Evans, and be supervised by Esaias. Esaias noted that it is necessary to bolster the MOCEAN presence at SDST if it is to be a production facility. He added that the production roles of RSMAS and SDST must be clearly defined, and that we must also give some thought as to who will assist entities outside of MODIS as they try to implement MODIS code.

9.2 Hardware

Masuoka reviewed the proposed hardware requirements, and noted that each discipline group will have a dedicated processing string. The at-launch system will be the SGI Origin 2000 from ECS. SDST plans to consult with Evans to determine the best hardware configuration for subsequent years. Currently SDST is considering the DEC "Wildfire" system, as well as clusters of DEC Alphas connected to an Origin 2000 server.

9.3 Proposal

Masuoka anticipates having the MODIS adaptive processing proposal ready for internal review in the next day or so, after which the proposal will be delivered to ESDIS.

9.4 Network Issues

Evans inquired about the GDAAC's network capacity to deliver data to the outside world. Masuoka replied that the GDAAC's connection out to the Very High Performance Backbone Network Service (VBNS) is an OC-3 connection (155 Mbps); this connection can probably be augmented if it is insufficient. He added that the National Science Foundation (NSF) has agreed that MODIS' proposed use of VBNS is acceptable, although there is no guaranteed bandwidth agreement. Masuoka has already asked Ramapriyan to come up with an acceptable set of alternatives to VBNS should available bandwidth become inadequate. Abbott stressed that we

must keep on top of network issues and configuration to be sure that the system is really integrated and able to meet the considerable demands that we will make of it.

10.0 MOCEAN Budget

MOCEAN members discussed budget issues.

(End of June 8 session.)

11.0 Introduction, Day 2

Esaias stated that he would like to continue yesterday's discussion of the MODIS adaptive processing proposal. He indicated that in an adaptive processing scenario MOCEAN will have to clearly delineate the way data processing requirements are divided between SDST and RSMAS. Additionally, MOCEAN will have to look at the interaction between these two groups and the GDAAC. Esaias stated that he would like to discuss these issues today. The agenda also includes an item on analysis tools for use of MODIS data by the research community. Campbell indicated that Chris Brown at NOAA may be willing to put some money into analysis tools. Esaias stated that in the afternoon he would like to discuss RFI concepts and panel approaches.

12.0 MOCEAN Response to MODIS AM-1 Adaptive Processing Proposal

12.1 Issues to Consider

Esaias stated that MOCEAN needs to clarify what will happen at RSMAS, our SCFs and at GSFC in an adaptive processing environment. Furthermore, we need to think about some kind of institutionalized care of code (i.e., how is code updated?) Abbott cautioned about focusing on building "the solution." Looking at SeaWiFS, for instance, we see that constant reprocessing is done. It is somewhat naive to think that our SCFs will deliver code and it will immediately run. Abbott emphasized that the processing system must be resilient, in case SDST falls behind. The system should also support the evolution of code. Abbott proposed that perhaps SDST take the lead on routine production, but that RSMAS take the lead on algorithm development and the evolution of code.

12.2 Models

Esaias suggested that we need to break away from a centralized processing model but, so far, nobody has really come up with a satisfying structure to do that. Evans replied that MOCEAN should look at what has been done by SeaWiFS and AVHRR. These projects have track records for getting data out to the community. Abbott agreed, but added that he would like to see a dynamic, flexible backup system somewhere, perhaps logically at RSMAS. Evans noted that we need to maintain traceability of code and data sets--i.e., which versions mean what. Furthermore,

SDST would likely be required to maintain current documentation on calibration as well as code. Evans indicated that we need a publicly accessible library of where we are and where we have been, and that this is something the primary processing center must maintain. Presumably the GDAAC retains the archive and distribution functions, which is a personnel- and cost-intensive undertaking.

Evans stated that he would like to see somebody at GSFC assigned to track code problems. Code problems are often difficult to locate, but it helps if there are two groups (GSFC and RSMAS, in this case) working simultaneously and comparing results.

12.3 Possible Collaboration with SIMBIOS and SeaWiFS

The group discussed the advantages of having MOCEAN collaborate with SIMBIOS and SeaWiFS to effectively process ocean data. Chuck McClain joined the meeting to discuss the feasibility of this proposal. Abbott reiterated that MOCEAN would like to have more resiliency and ability to evolve code than the ECS processing system would allow. He asked McClain if there might be a division of responsibility according to what SIMBIOS, RSMAS and SDST do, and how can we organize those relationships so as to maximize synergy between the groups?

Esaias stated that the current SDST processing proposal breaks down roughly as follows: GDAAC produces Level 1B, Cloud Mask and Geolocation, while SDST produces Level 2 and 3 products. Evans indicated that the SeaWiFS group has developed lots of expertise in understanding the underlying physics of the algorithms and code, and we certainly do not want to lose that as SeaWiFS continues and funding declines. He stated further that as Gordon and others advance their algorithms, we must assure that these advancements are ported over into the processing system. It makes sense to take advantage of the cal/val frameworks for SIMBIOS and SeaWiFS if possible, rather than construct an independent parallel effort for MODIS. McClain agreed that on several fronts it seems logical to explore some sort of collaboration, so long as this collaboration is not detrimental to SeaWiFS. Currently SeaWiFS enjoys a large degree of autonomy, defines its own interfaces and tasking, and does not get tied up in requirements. McClain cited some possible complications, like staffing; it is difficult for him to find and keep knowledgeable people and, with a contract recompetition scheduled in the next year and a half, much of his time will be spent dealing with managerial and personnel issues. McClain emphasized that any discussion of collaboration between MODIS, SIMBIOS and SeaWiFS must include Gene Feldman.

[Note: Feldman was unable to join the MOCEAN meeting, but Evans did meet with him at lunch, and Feldman agreed to consider a collaborative effort between SIMBIOS, SeaWiFS and MODIS.]

13.0 RFIs

Campbell reported that Ghassem Asrar has stipulated that science questions should drive future Earth Science Enterprise (ESE) missions. Code YS at Headquarters has formulated some science questions and made them available on the Web, and asked the community to come back with mission concepts. The mission concepts should include not only science, but an overview of the required sensor, ground-based instruments, etc. Four panels will evaluate the mission concepts, with one panel devoted to Oceans and Ice. The panels will convene on June 23 and 24. The 300 submitted concepts will be pared to 100, and these 100 will then be reevaluated in August. Campbell made copies of certain RFIs available, including one from Abbott and one from Esaias and Chris Brown of NOAA.