TO: Distribution February 14, 1990

FROM: Daesoo Han

SUBJECT: MODIS Data Study Team Minutes for February 9, 1990

ATTENDEES:			
	Mike Andrews	GSC	953-2700
	Phil Ardanuy	RDC	982-3714
	P.K. Bhartia	TRW	794-9016
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	Jack Schols	GSC	953-2700
	Tom Wolford	GSC	953-2700

NEXT MEETING: The next meeting of the MODIS Data Study Team will be held at 9:30 AM, Friday, February 16, in Building 28, Room W125.

TOPICS:

1. A status report for the MODIS data effort was presented. The contractor deliverable for January consisted of a presentation to the MODIS Science Team. The deliverable for February is a "MODIS Science Data Support Team/Instrument Characterization Team (SDST/ICT) Requirements Document" and for March the deliverable is the "MODIS Processing, Storage, and Communications Requirements Document". All efforts are proceeding on schedule.

2. Several data team members who attended the ocean science group meeting at the MODIS Science Team meeting reported on activities within that group. The group agreed that the MODIS-T Dual Mode is required to meet SNR requirements for ocean observation in the near infrared. The group also stressed the need for dedicated facilities (ships, buoys, drifters, and aircraft) to support ocean product validation. Data system issues touched on by the group include a request for better definition of the EosDIS role during the prelaunch period, a request that the MODIS utility algorithms include support for earth location [earth location was already planned as a utility activity], a field experiment support timeliness requirement of 3 hours from observation to receipt of Level-0 data, granularity definitions for ocean products (Local: 1 km, daily; Regional: 4 km, weekly; and Global: 20 km, monthly), and a MODIS data packetization recommendation. Band interleaved data from the instruments is preferred since algorithms require multiple spectral bands for processing, and if some packets are lost during transmission, data

utility is maximized if all data required to process a given set of pixels is included in a single packet. New ocean data products and team member responsibilities were defined.

3. A report for the MODIS land science group was also presented. Discussion in the land working group sessions focused on identifying at-launch and post-launch data products, which scientists would be responsible for them, utility/support algorithms needed, ancillary data sets needed, and simulated data needed for algorithm development. The emphasis common to the sessions was the integration of proposals in matters pertaining to the allocation of research resources, prioritization of research, and interdependence of data products and algorithms.

Discussions indicate that land team members will be expecting the CDHF to routinely supply calibrated at-satellite radiances, with a suite of utility/support algorithms available to assist in producing data products. It is also expected that MODIS imagery will be earth located and that a Digital Terrain Model (DTM) will be available by launch time for the topographical correction of data. Team members are also expecting EosDIS to have a Geographic Information System (GIS) component containing geophysical information such as soil types, biophysical data, and surface meteorlogical data at regional and global scales. Discussions did not resolve data product prioritization and integration issues, nor was the source of required input data defined. These tasks apparently fall to the team leader.

The MODIS Data Team weekly "handout" report for February 9th contains additional specific information pertaining to each of the land products.

4. The atmospheric group discussed the nature of the atmospheric products to be produced, who would produce them, and the support (including ancillary data) needed to produce them. The atmospheric products to be produced include Level-2 and -3 cloud products, Level-3 aerosol products (large-scale averaging will be applied to aerosol products, so that a Level-2 intermediate product is not required), and Level-2 and -3 clear-sky products. Ancillary data needed may be taken from operational NMC forecasts and AMSU results. The Data Team "handout" contains a table listing atmospheric products, the planned spatial and temporal resolution of each product, and responsible investigators. The "handout" also contains a chart showing the general structure of atmospheric processing and a text description itemizing specifics for each of the atmospheric products.

5. A few MODIS Science Team Members met with the Calibration Group to consider instrument calibration activities. The first issue considered by the group relates to the definition of appropriate activities for the calibration group and the appropriate division of product validation activities among the members of the calibration group and the Science Team Members responsible for individual products. It was agreed that the primary focus of the

calibration group must be the basic Level-1 radiance product of the instrument. All activities relating to the spectral, radiometric, and geometric calibration of the instrument are included. The validation of derived geophysical parameters (Level-2 products and above) is primarily the responsibility of the Science Team Members implementing the corresponding products. Calibration activities can include the examination of selected Level-2 products for which the accuracy and reasonableness of the derived Level-2 product can confirm or deny the accuracy of calibration parameters used during Level-1 processing. Instrument calibration problems are sometimes first detected as anomalies or inconsistencies in derived geophysical products.

The instrument calibration activity consists of prelaunch characterization done in the laboratory before instrument launch and performance validation done once the instrument is in orbit. Prelaunch calibration support includes the provision of common instrument calibration standards for use with all Eos radiometric instruments and the provision of a single, transportable, high-accuracy reference standard to which all instrument calibration standards are compared to ensure absolute and relative accuracy among the instrument calibration standards themselves.

The basic procedures for MODIS-N calibration will be proposed and executed by the instrument contractor. To a large extent, procedures for MODIS-T can imitate the MODIS-N procedures. The MODIS Science Team Calibration Group will review and approve all procedures applied for instrument calibration.

The Calibration Group serves as the coordination point for Science Team Member input on instrument calibration and the group can also serve as a communications facilitator for matters related to calibration and product validation. Examples of this sort of activity might include the tabulation of (perhaps conflicting) desires of Team Members for adjustments in calibration parameters and perhaps the sponsorship of an early-results conference soon after instrument launch at which Team Members can compare notes on the apparent validity of their products and the initial radiometric calibration of the MODIS instrument.

The MODIS Science Team Calibration Group may also develop and distribute a set of common definitions and data system conventions relating to MODIS data quality. One objective of this effort is to develop suitable definitions of data quality categories that can be understood and applied by all members of the MODIS Science Team and the ultimate data product user. Another objective is to specify a common set of data formatting conventions that can be used to implement the quality definitions and designate MODIS data quality throughout the data system.

The Calibration Group may also coordinate an effort to relate specific MODIS calibration accuracy requirements to corresponding accuracy requirements for derived geophysical products. The intent of this effort is to justify specified instrument accuracy

requirements in terms of the underlying data product accuracy required for acceptable earth and environmental science. This justification will be developed primarily by the science team members developing the individual products, and in this effort, the Calibration Group will serve primarily as coordinator and advisor.

6. An updated analysis of wind speed accuracy requirements for MODIS processing over oceans was presented. The effects of errors in wind speed estimation were simulated using realistic MODIS orbits, radiative transfer theory and a surface roughness model as applied to ocean processing. The relationship between wind speed and sun glitter itself was obtained using an algorithm developed by Viollier, et al. Sun glint determination errors do not directly translate into corresponding errors in water-leaving radiance since the processing procedure used to determine aerosol radiance is sensitive to sun glint and some sun glint is included in aerosol radiance estimates obtained using conventional aerosol algorithms. Results of the analysis generally show an appreciable sun glint effect for many observation geometries, and the resulting recommendation is that wind speed should be obtained with all possible accuracy to support MODIS processing.

7. Results of a processor timing test were presented for the IBM 3081. The tests derived specific execution times for basic operations (addition, subtraction, multiplication, division) and for transcendental functions such as sine, cosine, etc. The basic result is that this IBM machine performs about 1.4 million operations per second (1.4 MFLOPS). This number is useful in assigning number-of-operations figures to algoriths run and timed on the IBM 3081.

8. Timing data for an algorithm to estimate cloud optical depth and effective particle radius was analyzed to determine processing requirements for this algorithm. Since the algorithm can be run in several modes, a mode requiring near-maximum processing was selected for study. Results show a required effective capacity of between 350 and 440 MFLOPS for this algorithm. Although these numbers are perhaps a maximum, timing tests indicate only a slight decrease in requirements for processing in actual run modes.

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