MODIS DATA SYSTEM STUDY

TEAM PRESENTATION

December 23, 1988

AGENDA

1. Present Status of the Phase-B MODIS Data System Study

2. Future Plans for the Phase-B MODIS Data System Study

   -- Study Drivers
   -- Outstanding Issues
   -- Milestone Charts

PRESENT STATUS OF THE MODIS DATA SYSTEM PHASE-B STUDY

The MODIS Data System Phase-B study team delivered the MODIS-HIRIS Ground Data Systems Commonality Report, the MIDACS Level II Functional Requirements document, the MIDACS Operations Concepts document, and the MIDACS System Specifications and Conceptual Design document.

The delivery was accomplished on schedule on December 21, 1988.

Accompanying these four documents was the Ground Data System Level I Requirements (produced jointly with JPL) and JPL's HIRIS Level II Functional Requirements, System Specifications and Operations Concept.

The milestone charts are attached.

MODIS DATA SYSTEM PHASE-B STUDY DRIVERS

1. MODIS Science Team Meeting During the Week of March 6

Provide a briefing on the data system, at its present state of development, to the science team members:

- The Level-I functional requirements.
- The known set of Level-II functional and performance requirements.
- The operations concept with scenarios.
- The preliminary specifications for the MIDACS, and the ICC, IST, CDHF, TMCF, and DADS.
- The conceptual design for the MIDACS, and the ICC, IST, CDHF, TMCF, and DADS.

Distribute a questionnaire to the science team members for completion; to be returned during the EosDIS meetings (the week of March 20).

2. The June 1989 Non-Advocacy Review

Provide the scheduled deliverables to the ATR, and through him the EOS Project, EosDIS, and the two Phase-B contractors.

Provide additional briefing materials and support as requested.

3. A Second MODIS Science Team Meeting in the June Timeframe

Brief the science team on the Data Processing Plan, including the Calibration Plan.

Provide a briefing on the data system, updating the science team members' understanding regarding new developments.

Acquire additional information from the science team members regarding data system requirements, issues, and uncertainties.

4. The Study Plan

Implement the updated study plan.

Update and resolve the list of outstanding issues and uncertainties (18 at present).

OUTSTANDING ISSUES AND UNCERTAINTIES

1. Monitoring of MODIS Data

Engineering and science data taken by the MODIS instruments, as well as selected platform ancillary data, must be monitored in the ICC. Ideally, all data of possible utility would be available in real time with a 100% duty cycle. However, the primary downlink will be through the TDRSS, and it is anticipated that the platform will have access to the TDRSS for only portions of each orbit. Each TDRSS access will be scheduled well in advance of the actual contact. While there will be an alternate, multiple-access low-rate data path for the transmission and verification of emergency commands, the TDRSS link will be the sole path for downlinked data destined for the monitoring function within the ICC. Engineering and science data will be stored on board the platform for playback and downlink at the time of the next TDRSS contact.

There is a requirement that science team or IOT members located in the ICC monitor four channels each of MODIS-N and MODIS-T data in real time, and that the choice of the channels being monitored be selectable in real time.

DISPOSITION: To be addressed.

2. Implementation of Algorithms for Standard Product Processing

The implementation of algorithms for standard product processing is to be specified in the future.

3. Capabilities of the On-Board Processor

The capabilities of the on-board processor within the context of an interface to the ground data system must be identified.

DISPOSITION: To be addressed.

4. Non-MODIS Instrument Data Availability

Non-MODIS instrument data availability from other EOS and non-EOS sources will be specified in the future.

5. Near-Real-Time Data Communication

Communication of near-real-time data from the CDHF/DADS to field experiments will be specified in the future.

DISPOSITION: To be addressed.

6. Data Processing Operations Concept

The level of meaningful detail in the processing operations concept is limited by our knowledge of the processing algorithms. Details of the processing scenarios and concepts such as the logical data record, Earth location, and calibration accuracy will evolve with our understanding of processing algorithms and end-user requirements.

DISPOSITION: To be addressed.

7. Capabilities and Interfaces of the MIDACS with the DHC

The current capabilities of the DHC are to support the real-time, near-real-time, and routine science data processing timelines that are required by the MIDACS. The DHC will process some data for real-time delivery to the MIDACS (ICC or CDHF) for instrument monitoring. The DHC will also pass the priority playback data to the MIDACS, but it is still uncertain how this will be accomplished. This DHC/MIDACS interface has not been fully clarified.

DISPOSITION: To be addressed.

8. Storage of the MODIS Science, Engineering, and Ancillary Data

The MODIS science, engineering, and ancillary data will be stored at the MIDACS DADS.

DISPOSITION: To be resolved.

9. Implementation of DARS for Real-Time Field Experiments or Instrument Calibration

The number of requests is unknown at this time. Any request for real-time support would effect the TDRSS scheduling, and therefore need to be coordinated with the appropriate facility to satisfy the request.

DISPOSITION: Ignore.

10. Hierarchy of Requests

The hierarchy of priorities for the request for the support of field experiments or real-time monitoring and the availability of workstations at the ICC to provide support is to be defined.

DISPOSITION: Ignore.

11. Command Tracking of TOOs and Real-Time Requests

The ICC must verify the command load for all commands uplinked to the MODIS before they are transmitted to the EMOC. The procedure and timeline for doing this must be defined.

DISPOSITION: Ignore.

12. MODIS/HIRIS and Joint Scheduling with Other Instruments

The MODIS and HIRIS will have some degree of interaction, not only for the planning and scheduling phase, but also for the impacts of requests for data in the real-time and near-real-time for the support of field experiments for MODIS and coincident observations for HIRIS. A prioritized scheduling process must be developed.

DISPOSITION: To be addressed.

13. MIDACS Support Personnel

The role of the product support analysts and the system operators with respect to the production of standard data products must be defined.

DISPOSITION: Ignore.

14. Error Correction/Grade of Service

The level of MODIS data encoding for error correction is TBD. At a bit error rate of 10^{-12}, on average only one bad MODIS bit will be encountered every day. However, at a bit error rate of only 10^{-8}, 10,000 bad bits will be encountered daily. The packets with uncorrectable errors should be flagged as such by the DHC. The MODIS science team may require a bit error rate of no worse than 10^{-8} or Grade II service in data communication, which is lower.

DISPOSITION: To be addressed.

15. Data Coverage

Because MODIS data will be used to produce products with global coverage, missing packets will degrade the quality of the final product. Completeness to only the 99% level would result in a loss of 15 minutes of coverage; at 6.5 km per second, this is a 51° or 5600 km swath along the orbit. The MODIS science team may require coverage to no less than 99.9%. Systematic coverage loss may be subject to different requirements than random coverage loss, perhaps by a factor of ten.

DISPOSITION: To be addressed.

16. CDHF Element Specification

Data processing estimates are highly dependent upon horizontal resolution and coverage assumed for the products. If spatial resolution for a product was relaxed from $(1\ km)^2$ to $(5\ km)^2$, the processing load would change by a factor approaching 25. More data processing scenarios are needed. In fact, as the science team progresses with its plans for MODIS, there will eventually be a data processing scenario for every product.

DISPOSITION: To be addressed.

17. TMCF Specification

Clarify the specification for the TLCF, the three major TMCF's for atmospheric, oceanographic, and terrestrial science, and the facilities for the 15 domestic and five foreign investigators.

DISPOSITION: To be addressed.

18. DADS Responsibilities for Interdisciplinary Investigators

The DADS responsibilities for interdisciplinary investigators must be fully defined; also, HIRIS and MODIS science teams may require 100% of the other instrument's data for each HIRIS acquisition.

DISPOSITION: To be addressed.

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Summary of Deliverables

ORIG. APPVL. 06/24/88
LAST CHANGE 12/21/88
STATUS AS OF 12/21/88

	MILESTONES
01	WBS Study Plans
02	Prelim User Data Prod Req'ts
03	Preliminary Operations Concept
04	Functional Requirements Doc
05	Prelim Data Processing Plan
06	Prelim System Specification
07	Operations Concept
08	Prelim Data Requirements Doc
09	Conceptual Design Doc
10	Draft Calibration Plan
11	Draft Data Processing Plan
12	Draft Instrument Oper'ns Plan
13	Data Requirements Doc
14	Database Specification
15	System Specification
16	Program Specification
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19	
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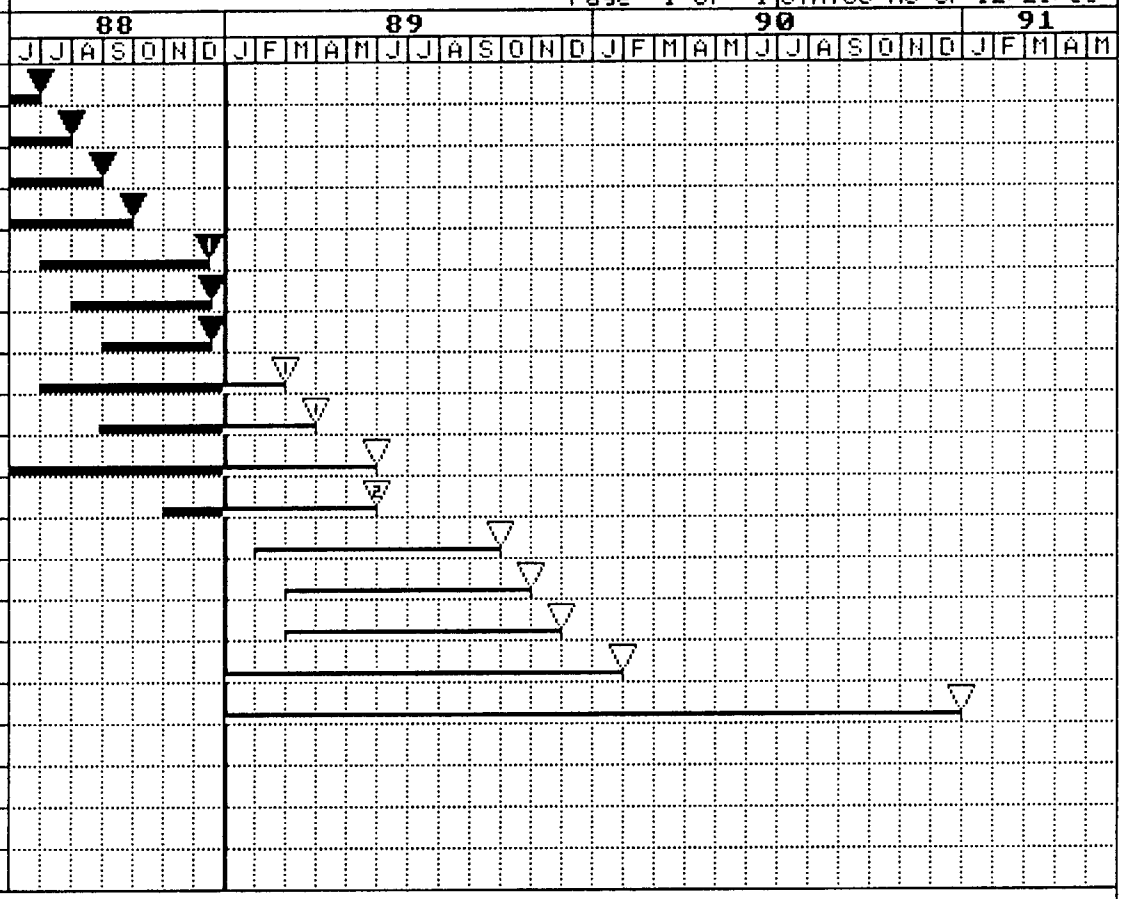

Note:
1 - Deliverable delayed due to HIRIS/MODIS commonality study
2 - Deliverable moved earlier to accommodate science team meeting

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WBS - 2000

ORIG. APPVL. 07/01/88
LAST CHANGE 12/21/88
STATUS AS OF 12/21/88

	MILESTONES	88 J	88 J	88 A	88 S	88 O	88 N	88 D	89 J	89 F	89 M	89 A	89 M
01	2000 Req'ts Anlysis Study Plan												
02	2100 User Data Product Req'ts												
03	2200 MIDACS Operations Concept												
04	2300 MIDACS Operations Req'ts												
05	2400 System Performance Req'ts												
06	2500 MIDACS Functional Req'ts												
07	2640 Prelim L4 Requirements												
08	2650 Prelim Data Requirements												
09													
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Note:
1 - Required Deliverable
2 - deliverable delayed due to HIRIS/MODIS commonality study

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WBS 3000

ORIG. APPVL. 07/01/88
LAST CHANGE 12/21/88
STATUS AS OF 12/21/88

	MILESTONES	88 J	88 J	88 A	88 S	88 O	88 N	88 D	89 J	89 F	89 M	89 A	89 M
01	3000 Architecture Study Plan												
02	3100 EosDIS Architecture Rev												
03	3200 MIDACS External I/F Rep't												
04	3300 MIDACS Data Flow Report												
05	3500 Prelim Sys Specification												
06	3420 Configur'n Cost Analysis												
07	3450 Arch Trade Study Report												
08													
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Note:
1 - Required Deliverable
2 - Deliverable delayed due to HIRIS/MODIS commonality study

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WBS 4000

ORIG. APPVL. 07/01/88
LAST CHANGE 12/21/88
STATUS AS OF 12/21/88

	MILESTONES
01	4000 Operations Study Plan
02	4120 L1 Data Proc Ops Concept
03	4120 L2/3 Data Proc Ops Conc
04	4300 Prelim Instr Cal'n Plan
05	4400 Prelim Data Proc Plan
06	4100 MIDACS Ops Concept
07	4500 Prelim Instr Ops Plan
08	4120 L4 Data Proc Ops Concept
09	4250 Data Proc Ops Scenario
10	4200 MIDACS Ops Scenarios
11	4340 Continuing Instr Cal Plan
12	4300 Instrument Cal'n Plan
13	4430 Input Data Attributes
14	4400 Data Processing Plan
15	4530 Operations Procedures
16	4500 Instrument Operation Plan
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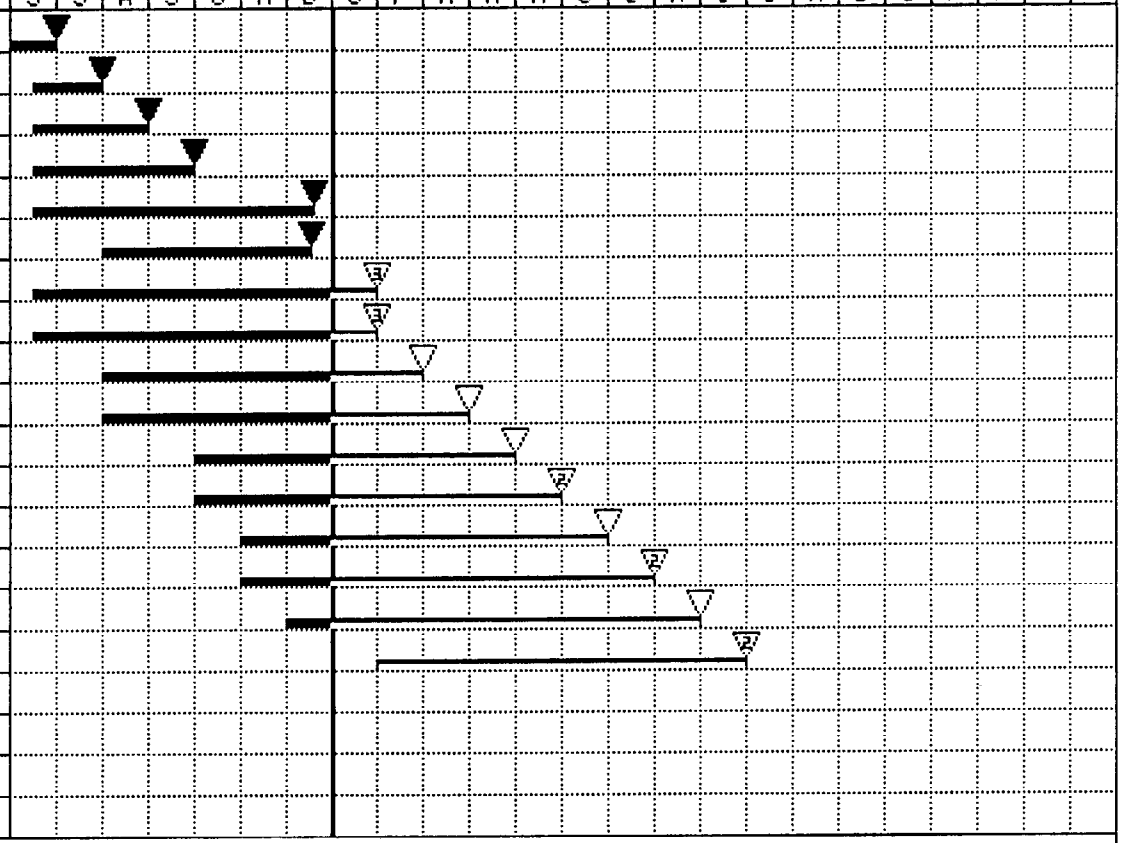

Note:
2 - Supporting Deliverable
3 - Deliverable delayed due to HIRIS/MODIS commonality study

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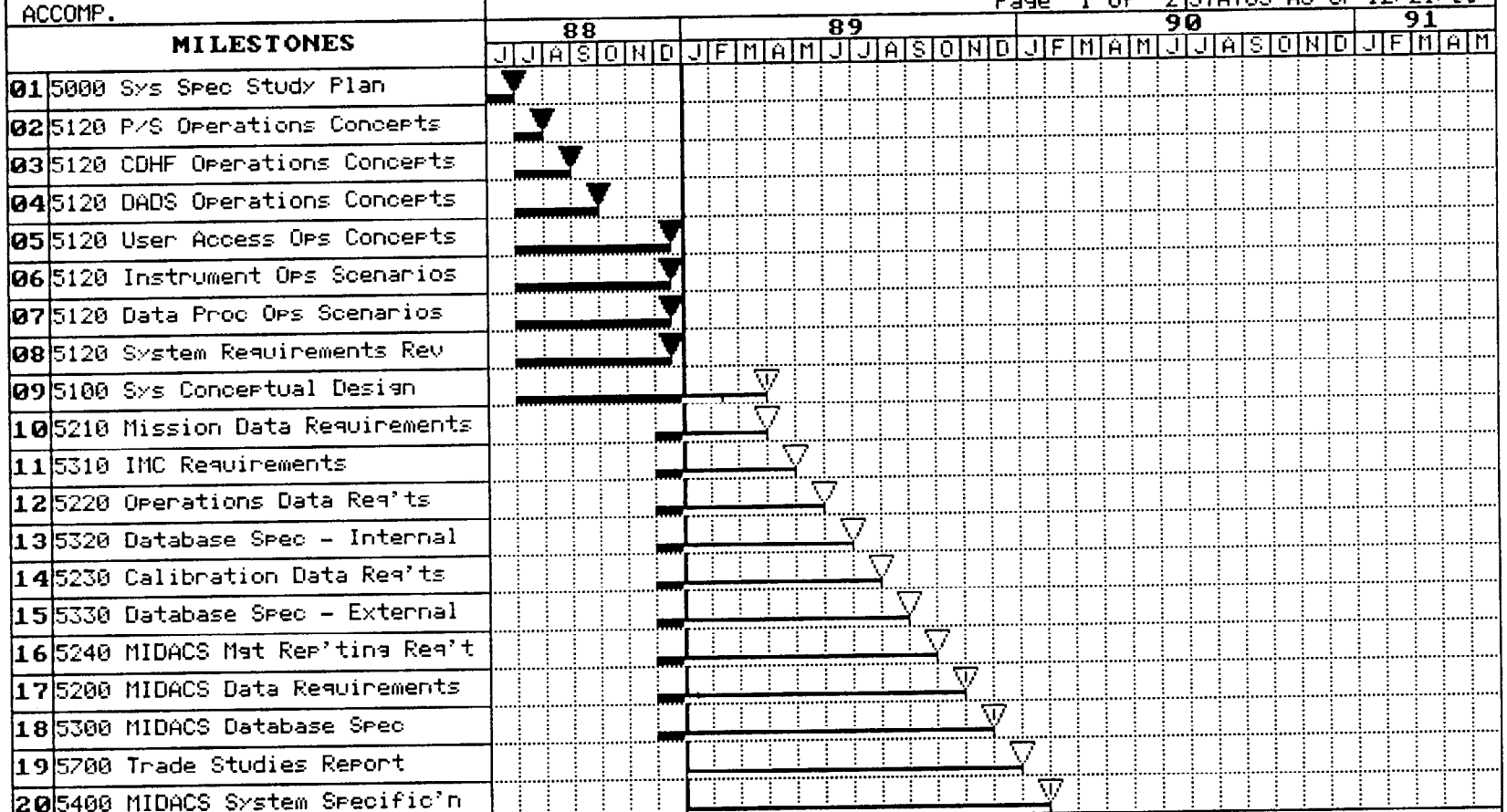
WBS 5000

ORIG. APPVL. 07/01/88
LAST CHANGE 12/21/88
STATUS AS OF 12/21/88



Note:
1 - Required Deliverable

P/S - Planning & Scheduling