MODIS DATA SYSTEM STUDY

TEAM PRESENTATION

March 3, 1989

AGENDA

1. Specific Scenario Illustrating Routine Interactions
2. Specific Scenario Illustrating Targets of Opportunity
3. New Issues Regarding MIDACS Structure and Names

3.1 Specific Scenario Illustrating Routine Interactions

The following scenario presents the routine interactions of the Team Member and Team Leader with other segments of the MIDACS. This scenario for the routine production of land, ocean, and atmosphere data is presented here as an example of a general type of planning and coordination, and data processing and storage. Three areas of scientific specialty are combined into the routine interactions of the MIDACS. Although they are shown separately to clarify the interactions within the MIDACS, processing of each is considered to take place concurrently.

3.1.1 Routine Planning and Coordination

The planning and coordination of three scientific areas of specialty is discussed below and, as shown in Figures 6, 7, and 8, is performed within the box marked MODIS science team on each figure. It is assumed that the instrument models used by the ICC have already been tested and approved by the Team Members and are in-place at the ICC. It is anticipated that once the routine operations are implemented, the planning and coordination activities of the Team Members will be minimal if performed at all.

3.1.1.1 Routine Team Member Participation

The Team Members have previously decided on a routine observation plan to pursue. In this routine scenario, each Team Member from the land, ocean, and atmosphere scientific areas of interest propose the use of the MODIS instruments to collect data for their research. Since this is a routine scenario, the planning and coordination activities have been completed following the procedures discussed in section 2 and the Team Member is not required to submit another plan unless he wishes to update or change the routine instrument operations.

3.1.1.2 Routine MIDACS Participation

Using the IST, the Team Leader will have previously submitted an observation request to the instrument operations team (IOT) located at the ICC for weekly conflict resolution and command load generation. The MIDACS wi6l use the routine observation plan, the supplied instrument models, and EosDIS resource envelops to ensure allocated resources are not exceeded. If a conflict exist which prohibits the use of the MODIS, such as a tilt command for a portion of the requested observation time, a notification of the conflict and related information is then sent back to the Team Leader via the IST. The Team Leader resolves the conflict with the respective Team Member. This is shown in the figures by the data flow marked conflict resolution. Upon approval of the schedule by the EMOC, the IOT generates the command loads for this request and they are implemented at the appropriate time.

The routine planning and coordination of the MODIS is simplified by the nature of the instrument and the number and type of

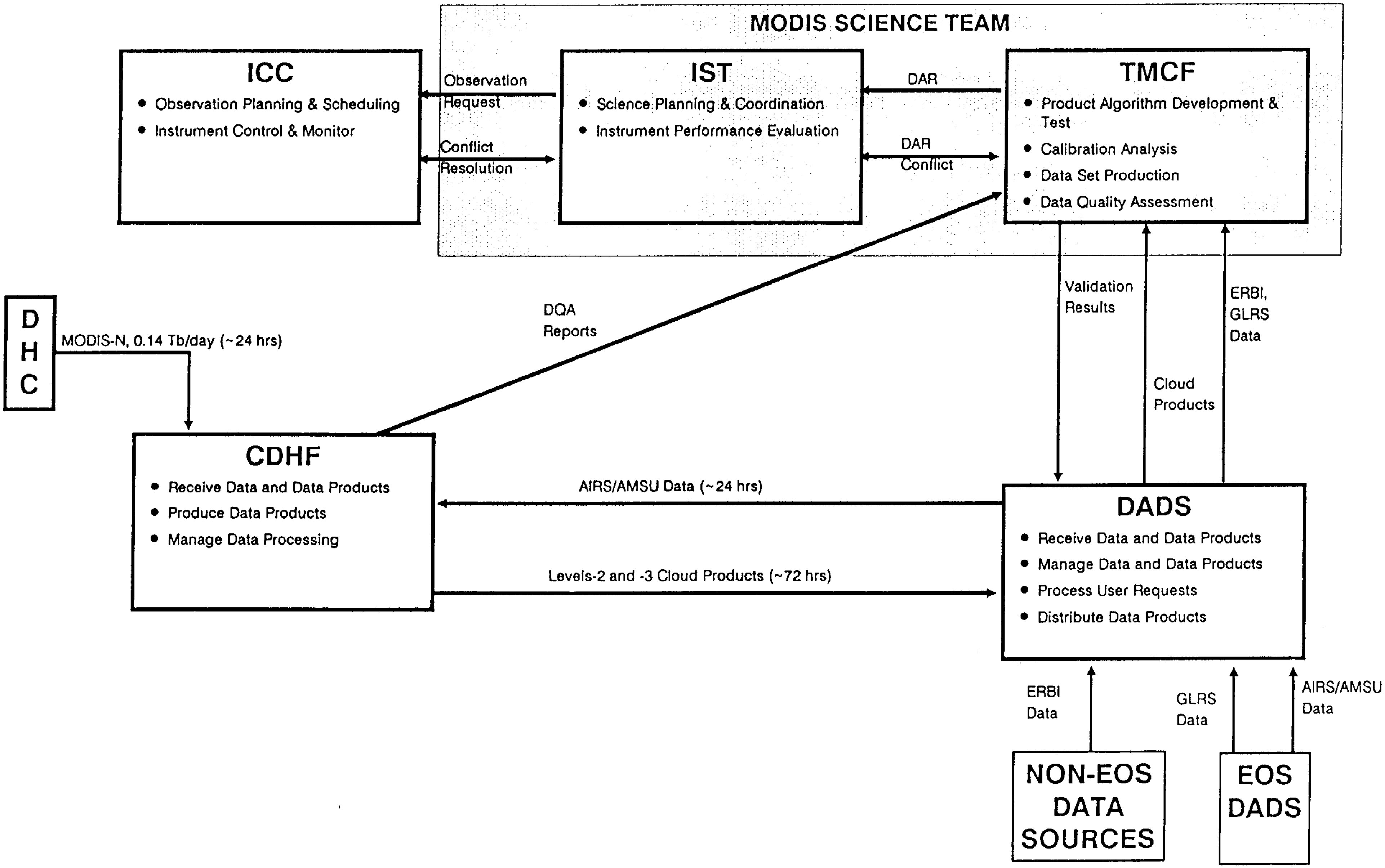

Figure 6. Routine Interaction Scenario for Atmosphere

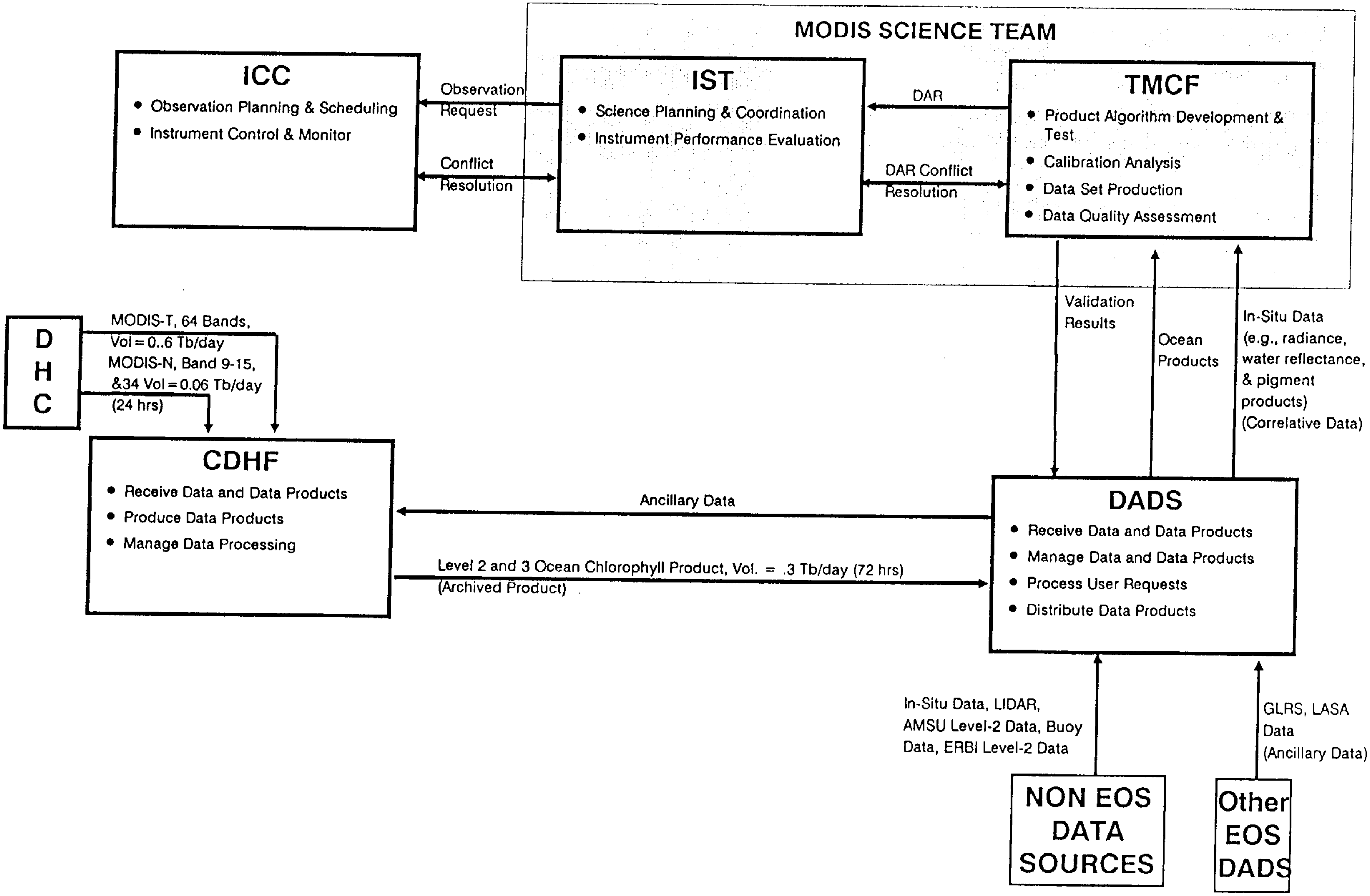

Figure 7. Routine Interaction Scenario for Ocean

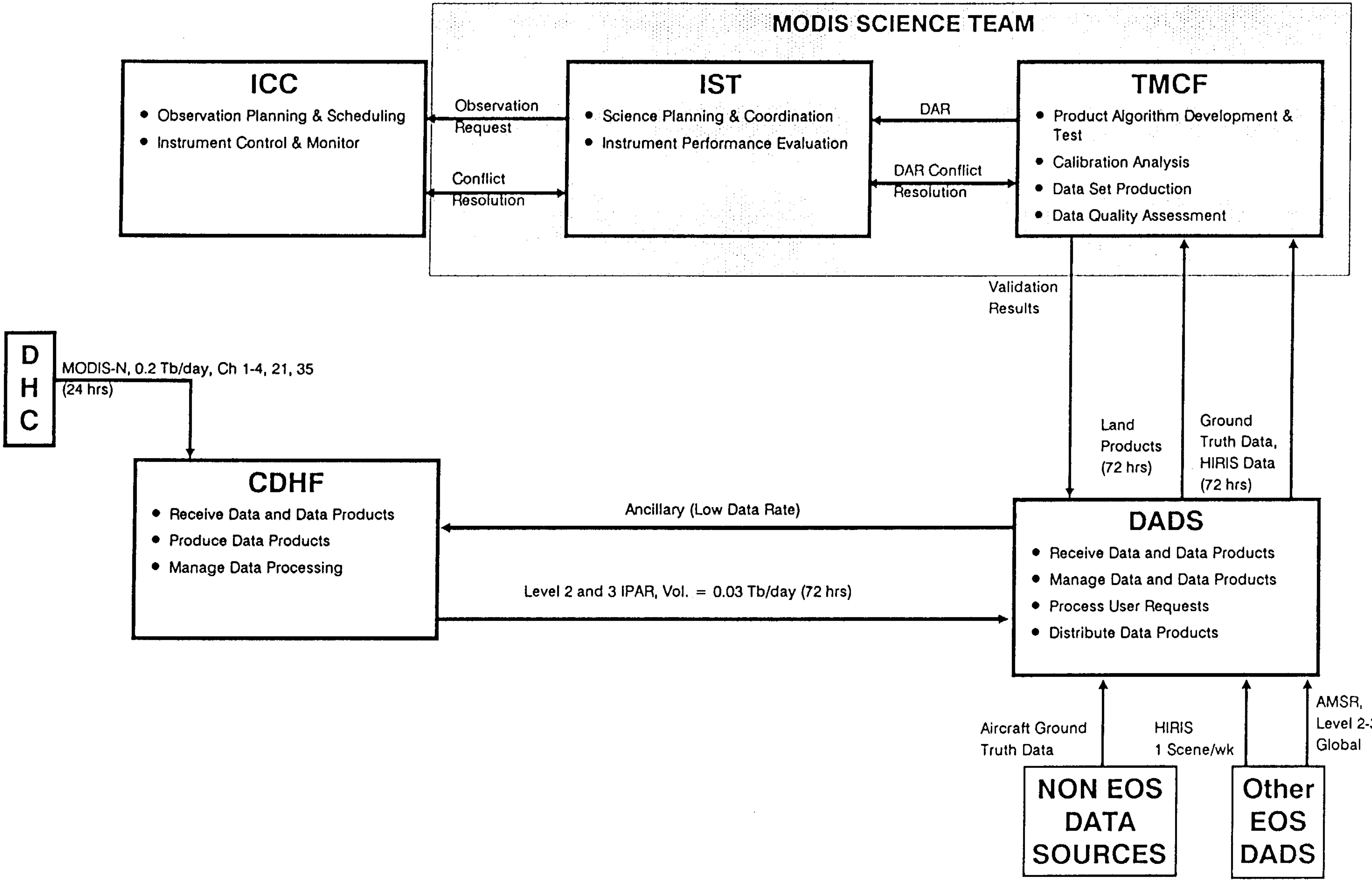

Figure 8. Routine Interaction Scenario for Land

commandable instructions. Since the duty cycle of MODIS -N and -T are 100% (50% for the reflected energy channels) and 50%, respectively, a set of commands such as those for pointing (tilt), gain, and day/night mode switching can be routinely uploaded. For the routine observations using MODIS-N, there are no special observation sequences needed for this scenario other than the duty cycle and on/off modes of operation based upon the IWG plan and guidelines. For the Ocean observation using the MODIS-T instrument, as presented below, a request for a tilt or stare mode of operation of MODIS-T was included in the observation request sent to the ICC.

3.1.2 Routine Data Acquisition

It is assumed in these scenarios that the Team Member has developed and tested the processing algorithms on the TMCF resources which are again tested in final form on the CDHF prior to implementation in routine processing. It is also assumed that the observation request has been honored and that MODIS data is available to the CDHF from the DHC for processing.

3.1.2.1 Routine Data Processing

Routine processing of the MODIS data takes place at the CDHF. This processing requires three basic interactions to be performed; ingest of MODIS science data and MODIS ancillary data from the DHC, ingest of additional ancillary data from other data sources such as other EOS DADS, and the processing of this data to provide the Team Member with his product. This scenario assumes that the Level 1-3 processing is done in sequence.

The routine scenario for atmosphere, Figure 6 incorporates the routine processes for the generation of cloud parameters, requiring the coprocessing of data from two different types of instruments: the AIRS and the AMSU which provide specific observations at a coarser resolution. The Team Member then generates and sends a request for these data to be sent to the CDHF from storage on a routine basis. The request is made either by direct communication with the DADS or through the IMC. These data will have already been processed to derive atmospheric temperature and water vapor profiles and surface temperatures and were stored in the respective DADS. Level 1-3 data sets are routinely produced by the CDHF using the MODIS-N earth located and radiometrically calibrated data and ancillary data. As part of the routine processing, cloud products are sent to the DADS after generation at the CDHF. The Team Member request that this data be sent to him along with other selected data. Again, this may be a standing request and will be filled by the DADS, possibly in a automatic operation mode, at a requested time interval.

The routine scenario for Ocean, Figure 7, shows the routine processing for the generation of ocean chlorophyll. Both MODIS-N and -T data are required for this product. This scenario requires the use of other instrument data to generate the product required by the Team Member. After the ocean product has been generated, it is sent to the DADS for dissemination to the Team Member at his request as stated above.

Figure 8 presents the routine scenario for the generation of biomass/IPAR. MODIS-N data is required along with ancillary data. The Team Member has also previously requested that related products be sent to him for future validation of the processed data.

During and after the data processing, the Team Member receives data quality assessment reports (DQRs) from the CDHF on the processing of the requested data. The DQR contain statistical and quality assessment of the data and processing system.

3.1.2.2 Routine Data Storage

All products generated by the CDHF are sent to the DADS for storage. The Team Member accesses his data by requesting it either directly or through the IMC using a TBD (menu driven) system. The data is sent routinely to the Team Member either electronically or via mail on a physical medium. The Team Member can request data from other studies through the IMC or DADS which enable him to validate and verify his results. This may be a routine operation that is performed at the Team Member's discretion. These results are then sent to the DADS for subsequent release to the public.

3.1.3 Summaries

The following table presents some basic Team Member activities. Some of these activities may only occur as an exception once the observations and processing become routine. The Team Member may chose to receive his data either electronically or on a physical medium.

3.1.3.1 Activities

Team Member Action	Reason/link
Submit DAR	Propose observation plan, (also conflict resolution) implemented for coordination Electronic link from TMCF to Team Leader
Submit Observation Request	Generation of commands and EOS resource conflict resolution Electronic Link from IST to ICC
Submit Data Processing Request	Select and prioritize data essing Electronic link from TMCF or IST to CDHF

Submit Data Request	To Receive MODIS and other archived data
Electronic link to DADS or IMC	Receive data electronically or on physical medium

3.1.3.2 Timeline

The following table presents a routine timeline of activities.

Activities	Timeline	FROM/TO
1. Plan/Coordinate	Weeks-Months before routine operations	
Observation		TMCF/ICC
Synergism		TMCF/ICC
Other Data		TMCF/CDHF-DADS
2. Receive MODIS data	Within 24 hours from the DHC	DHC/CDHF
Receive ancillary data	At time interval specified by Team Member	Data Sources/ DADS DADS/CDHF
3. Process Data Level-2 & Up	Within 8 hours after receiving data	CDHF/CDHF
	Within 72-96 hours after receiving data	
4. Receive MODIS data	After processing of data, 72-96 hours or at Team Members discretion	CDHF-DADS/TMCF

3.2 Specific Scenario Illustrating Targets of Opportunity

Dynamic phenomena, such as explosive volcanic eruptions (EVE), insect infestations, and human produced or related events, will be detected by MODIS. These events represent targets of opportunity for scientists and require a quick response both by the scientist and MIDACS to study these phenomena. The scientist, presented in this scenario as a science team member, will notify the science team leader of an ongoing event. Specific information necessary to operate the MODIS instruments to study this event will result in the generation of command or observation request by the science team leader which is sent to the ICC via the Instrument Support Terminal within the TLCF. These requests will impact the current schedule at that time.

Planning

Since the majority of EVE events are not predictable, the following scenario discusses MIDACS operations for an unpredicted event. The request does not follow the current instrument schedule. The science team member delivers a request to the science team leader at the TMCF, the Instrument Support Terminal within the TLCF or the IMC for intensive observation of the explosive volcanic eruption. Since the MODIS science team leader is responsible for science planning and the overall stewardship of the experiment and since the team member request has a significant impact upon the present plan and instrument schedule, the team member must present his case for alterations of the plan to the team leader. Since an EVE is of wide scientific interest, the team member's request is expected to be approved. Because of the wide scientific interest of the EVE, the team leader will probably be presented with multiple requests for MODIS operations. The time pressures for immediate data acquisition may place the team leader in a position where he will be unable to consult all team members before arriving at a decision as to which mode of operation MODIS should be placed in. In this case, the team leader will decide which course of action to take. The Science Management Plan may provide a pre-determined and agreed upon plan of action for EVE's and other contingencies. Whatever the course of action, an approved observation request is then transmitted via the Instrument Support Terminal within the TLCF to the ICC. As an example, this observation request may contain the following information.

EVE: Eruption of Mt. St. Helens
EVE start time and duration: 1998, July plus six weeks
EVE location: State of Washington, USA
Timeliness requirement: Daily, each observation opportunity for the next 6 weeks
Near Real-time requirements: First day (day to day decisions thereafter)
Instrument Unique Operations: MODIS-T in stare mode in each pass over the site

All the team members as well as the requesting team member will be kept informed of the changes in the observation plans by the science team leader. From the point of view of the requesting team member, the MODIS science team leader is the point of contact for all follow-up information and for additional status requests. The science team leader may have a designated assistant to perform most of these mission related duties. The designated assistant might be viewed as an ombudsman for the team members where most routine inquiries can be directed. The ombudsman would allow the science team leader to focus his attention on the overall strategic science planning issues.

In addition to observation requests from MODIS, the team members may also wish to acquire data from other platform instruments for synergistic studies. If these Eos data products are routinely generated, he can contact the IMC to acquire the necessary data. For non-Eos data, the team member will need to acquire it on his own from other data centers.

Scheduling and Commanding

The IOT at the ICC will respond in an appropriate manner to the request. To minimize turnaround time, the ICC may use pregenerated commands developed for such an event or generate the commands from a simulation of the request. The latter may be a shortened process due to the nature of the request. The command load is then verified and sent to the EMOC for resource conflict review. The commands are then uploaded to the instrument according to standard procedures during the next available TDRSS contact. If the event is to be observed in near real-time, command loads will be generated to assure that the instrument properly tags the instrument packets for near-real-time processing. Once the EVE event is over or the duration time span of the observation request to monitor the EVE is exceeded, commands will be issued by the IOT to resume the current weekly schedule that was interrupted.

Monitoring

The ICC will notify the CDHF of the request in order for the CDHF to provide the appropriate processing functions and will notify the science team leader of the status of the request. The IOT will monitor the engineering and science data to ensure that the instrument is responding to the command load. If an anomaly is discovered in the operations, corrective action will be taken by the IOT upon approval by the science team leader.

Data Processing And Archiving

Processing of observation data for explosive volcanic eruptions will follow near real-time processing requirements closely. The CDHF will contain or be provided with an automation code to provide the near real-time processing for the event as requested. An EVE event with MODIS-T in a stare mode during a portion of many orbits may require special processing at the CDHF. Presumably an event of this nature will be planned for and algorithms will have already been developed to study the EVE. These algorithms will be submitted to the CDHF, probably by the SDPST, along with the raw EVE data. A special data product may result, such as the production of a film of the eruption plume using many flybys of the event. The DADS will be notified by the science team leader to anticipate the receipt of the EVE data as soon as it is processed. The DADS verifies, stores, and transmits the data to the originator of the request.

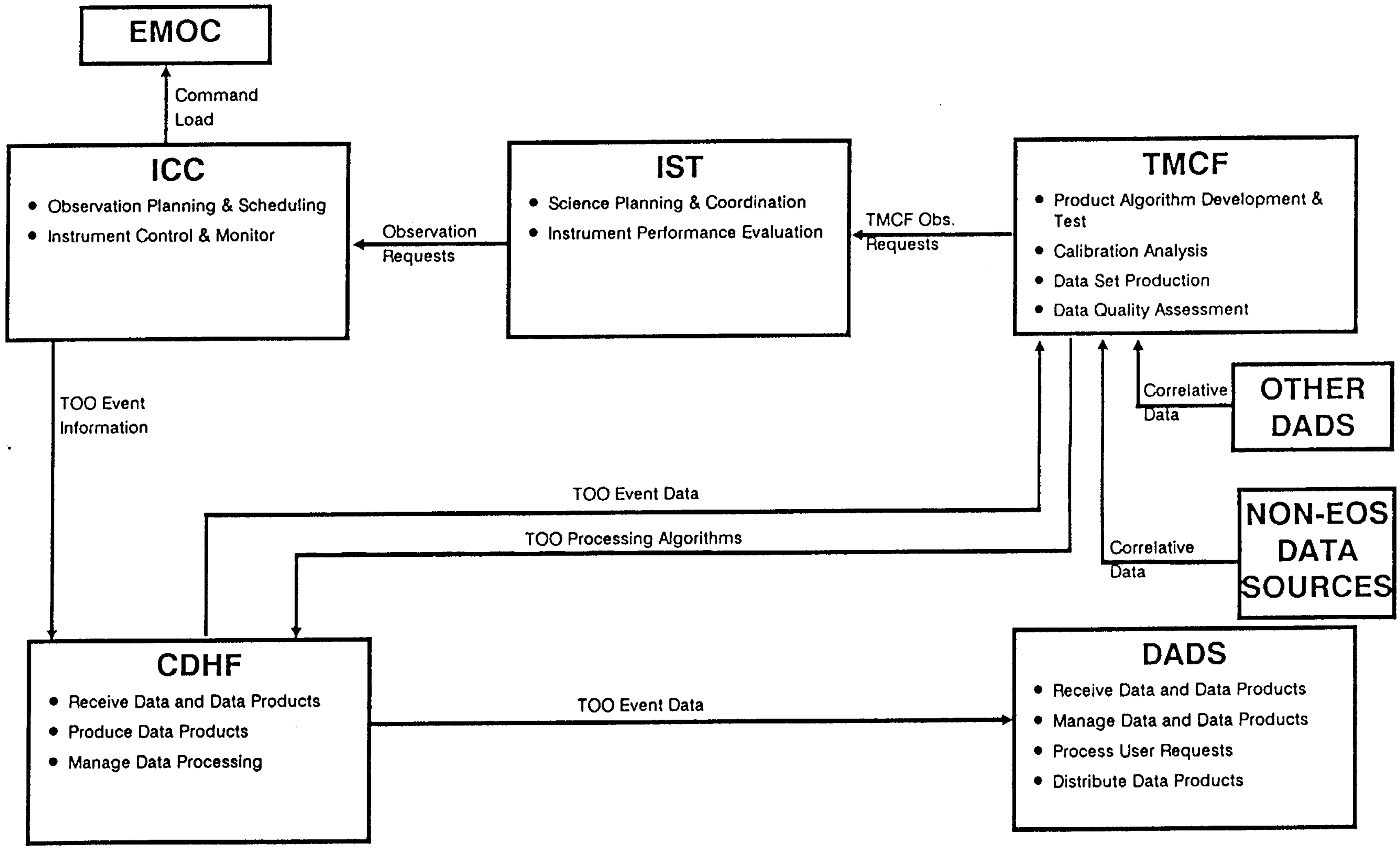

Figure 9. Target of Opportunity Scenario

NEW ISSUES REGARDING MIDACS STRUCTURE AND NAMES

1. IST's Status within MIDACS

MIDACS until now has five major organizational units: the ICC, IST, TMCF, CDHF, and DADS. The functional allocation diagram shows these units each with separately defined functions. The MODIS team leader is co-located at the Team Leader Computing Facility (TLCF) and at the IST. At the TLCF, his duties center around planning and coordinating the ground system aspects of MIDACS. At the IST, the team leader's duties center around planning and coordinating the spacecraft aspects of the MIDACS.

The planning and coordinating duties at the IST are subsidiary to the overall planning activities. It is confusing to have the activities of the team leader split up so as to appear to reside in two separate organizational units. Based upon these reasons and following a discussion between Vince Solomonson, John Barker, Douglas Hoyt, and Mike Andrews, it was suggested by Vince Solomonson that the IST be incorporated within the TLCF.

This suggested re-organization would have several effects: 1) The MIDACS Functional Allocation Diagram would need to re-drawn. 2) The TLCF Functional Allocation Diagram would need to be re-drawn. 3) The IST functions would remain mostly as is, but some changes in the data flow diagrams may result. 4) The near-real-time instrument monitoring terminals in the ICC suggested by John Barker would move over as part of the IST to the TLCF and probably be part of the CST.

Should this re-organization be done?

2. Renaming of the CST as the Instrument Characterization Team

The Calibration Support Team (CST) is proposed to be re-named the Instrument Characterization Team (ICT). All of its present functions would remain intact. In addition, the ICT would be responsible for monitoring the mechanical/thermal/electrical properties of the instrument as a necessary adjunct of its calibration duties - hence the name change. The ICT would have control and access to the instrument monitoring terminals proposed by John Barker and now residing within the ICC.

Should this name change be made?

3. Renaming the SST as the Science Data Processing Support Team

The Science Support Team (SST) is proposed to be renamed to the Science Data Processing Support Team (SDPST) since its functions concentrate on data processing support rather than science support.

Should this name change be made? Is there another SDPST (in EosDIS) for which this name change could lead to confusion?