MODIS DATA STUDY

TEAM PRESENTATION

November 2, 1990

AGENDA

1. Action Items
2. MODIS Level-1 Processing System Functional Requirements
3. MODIS Level-1 Processing System Data Dictionary
4. Conceptual MODIS Level-1 Processing Context Diagram

ACTION ITEMS:

10/5/90-2 [Doug Hoyt]: Examine MCST documentation and identify missing or additional information items that the MODIS Data Study Team will need to complete the specification of MODIS processing. STATUS: Presentation given at 10/19/90 meeting. Doug Hoyt to revise list of questions. Open.

10/12/90-2 [Watson Gregg]: Prepare a report on MODIS anchor point requirements. Analyze the utility of alternative parameters to describe MODIS observation and solar geometry. STATUS: Open.

10/19/90-1 [John Blaisdell]: Expand introductory material in Earth Model write-up to include broad discussion of MODIS geolocation and need for Earth model. Coordinate with Al Fleig to distribute report. STATUS: Met with Al Fleig. Open.

10/26/90-1 [John Blaisdell]: Scope a brief error analysis and impact study on the merits of a geoid model as opposed to an ellipsoid. STATUS: Open.

MODIS LEVEL-1 PROCESSING SYSTEM FUNCTIONAL REQUIREMENTS

Many of the functional requirements listed below are inherited from a higher level. They are included here because we focus on Level-1 data processing.

A. INPUT

THE MODIS LEVEL-1 PROCESSING SYSTEM SHALL RECEIVE:

1. Level-0 Data

   (Page 7-23, 3PGS-00440: The PGS shall accept from the DADS L0-L4 Data Sets.)

2. Ancillary Data

   (Page 7-23, 3PGS-00450: The PGS shall accept from the DADS Ancillary Data Sets.) Received information shall contain at a minimum: (a) Instrument Status Information and (b) Spacecraft Ancillary Data.)

3. Quick-Look Data

   (Page 7-24, 3PGS-00530: The PGS shall generate quick-look products in support of field experiments, event monitoring, and instrument monitoring using algorithms and calibration coefficients provided by the scientists.)

4. Locally Maintained Data Bases

   (Page 7-23, 3PGS-00490: The PGS shall have the capability to access and use for the generation of standard data products information stored in locally maintained data bases. Examples of such databases are: (a) Digital Terrain Map Database, (b) Land/Sea Database, and (c) Digital Political Map Database.)

B. CONTROL

THE MODIS LEVEL-1 PROCESSING SYSTEM SHALL RESPOND TO CONTROL:

(Page 7-21, 3PGS-00270: The PGS shall provide a scheduler with the capacity to perform the following functions, at a minimum: (a) Add tasks to the job queue, (b) Allocate tasks among processors, (c) initiate execution of tasks in the job queue, (d) Suspend execution of tasks, (e) Resume execution of a suspended task, (f) Cancel execution of tasks, and (g) Request and verify the staging and/or destaging of data stored in the DADS.)

C. FAULTS

THE MODIS LEVEL-1 PROCESSING SYSTEM SHALL GENERATE FAULT INDICATIONS:

(Page 7-22, 3PGS-00320: The PGS shall display detected faults to the system operators.)

D. STATUS

THE MODIS LEVEL-1 PROCESSING SYSTEM SHALL PROVIDE STATUS INFORMATION

(Page 7-22, 3PGS-00380: The PGS shall monitor its internal operations and generate a status report periodically.)

E. OUTPUT

THE MODIS LEVEL-1 PROCESSING SYSTEM SHALL PRODUCE:

1. Level-1 Data Products

(Page 7-13, 3DAAC00070: The DAAC shall generate Levels 1, 2, 3, and 4 data products, archive, manage, quality check and account for archived data products.)

2. Processing Log

(Page 7-22, 3PGS-00360: The PGS shall generate a PGS Processing Log periodically that accounts for all data processing activities.)

3. Metadata

(Page 7-24, 3PGS00510: The PGS shall have the capability to generate metadata according to the algorithms provided by the scientists and associate this metadata with each standard data product generated.)

(Page 7-14, 3DAAC00220: The DAAC shall generate browse data and metadata for routing to the requested users, through the coordination of IMS.)

4. Browse Data

(Page 7-24, 3DAAC00220: The DAAC shall generate browse data and metadata for routing to the requested users, through the coordination of IMS.)

5. Quick-Look Product

(Page 7-24, 3PGS-00530: The PGS shall generate quick-look products in support of field experiments, event monitoring, and instrument monitoring using algorithms and calibration coefficients provided by the scientists.)

F. OTHER

MODIS LEVEL-1 PROCESSING SHALL BE ACCOMPLISHED USING TWO DISTINCT SETS OF STAND-ALONE SOFTWARE: ONE SET TO SUPPORT MODIS-N PROCESSING AND ONE SET TO SUPPORT MODIS-T PROCESSING.

(Unreferenced)

THE MODIS LEVEL-1 PROCESSING SYSTEM SHALL BE CAPABLE OF REPROCESSING

(Page 7-24, 3PGS-00540: The PGS shall reprocess specified science data using new and/or updated algorithms provided by the scientists.)

(Page 7-24, 3PGS-00550: The PGS shall reprocess science data using the original or updated (provided by the scientists) calibration coefficients.)

THE MODIS LEVEL-1 PROCESSING SYSTEM SHALL PRODUCE AND APPEND A HEADER TO THE DATA GRANULE

(Page 7-29, 3PGS-01240: The PGS shall send the DADS Produced L1-L4 Data Sets. L1-L4 data sets shall contain the following information at a minimum: (a) Product identification, (b) L1-L4 data set, (c) Product processing priority, and (d) Current date and time.)

THE MODIS LEVEL-1 PROCESSING SYSTEM SHALL PERFORM DATA QUALITY ASSESSMENT

(Page 7-13, 3DAAC00090: The DAAC shall provide the PIs and the other science users with all the information associated with data quality.)

THE MODIS LEVEL-1 PROCESSING SYSTEM SHALL BE CAPABLE OF PRODUCING LEVEL-0 DATA FROM LEVEL-1A DATA

(Requirement inferred from definition of Level-1A data)

DATA DICTIONARY

Ancillary Data: Data other than instrument data required to perform an instrument's data processing. They include orbit data, attitude data, time information, spacecraft or platform housekeeping data (e.g., pointing information, optics temperature, structure temperature, instrument mounting alignment), calibration data, data quality information, and data from other instruments (e.g., cloud information derived from a second instrument, status of items in a second instrument which could create interference with the instrument data being processed, map data, atmosphere temperature grids). (Page A-2)

Audit Trail: A record that describes the processing history of data and its identification. Contained within the metadata. (Unreferenced)

Browse Data: Data produced primarily to provide other investigators with an understanding of the type and quality of data available. Typically, browse data sets are limited in size or resolution. The specific form of browse data depends on the type of instrument or discipline with which the browse data are related. Browse data are sometimes considered to be a sample of available data. (Page A-3)

Control: The PGS shall provide a scheduler with the capacity to perform the following functions, at a minimum: (a) Add tasks to the job queue, (b) Allocate tasks among processors, (c) Initiate execution of tasks in the job queue, (d) Suspend execution of tasks, (e) Resume execution of a suspended task, (f) Cancel execution of tasks, and (g) Request and verify the staging and/or destaging of data stored in the DADS.) (Page 7-21)

In addition to the above is the ability to perform different processing modes:

> Standard Product Processing: The PGS shall have the capability to produce each standard product as specified in that product's Standard Product Specification. (Page 7-23, 3PGS-00470)
>
> Reprocessing: The PGS shall reprocess specified science data using new and/or updated algorithms provided by the scientists. (Page 7-24, 3PGS-00540)
>
> Quick-Look Data Processing: The PGS shall send the DADS quick-look data for routing to the appropriate destination (e.g., ICC, SCF). Quick-look data shall contain the following information at a minimum: (a) Product identication, (b) quick-look data, (c) associated metadata, (d) process facility identification, and (e) current date and time. (Page 7-30, 3PGS-01260)

Data Quality Assessment: TBD; awaiting requirement statement.

Fault Indication: An unsolicited flag denoting that a hardware or software error has occurred (e.g., a disk drive failed during data transfer or data header identifiers are not correct). (Unreferenced)

Header: Descriptive data appended to the data granule; shall include at the minimum: (a) Product identification, (b) L1-L4 data set, (c) product processing priority, and (d) current date and time.

Instrument Status Information: High level information about the status of an instrument stored in a designated DADS. These are redundant backup copies only. Primary backup copies are maintained at the ICC. (Page 7-34)

Level-0 Data: Raw instrument data at original resolution, time ordered, with duplicities [sic] removed. (Page A-4)

Level-1 Data Product: A data set composed of Level-1A and -1B data product.

Level-1A Data: Level-0 data, which may have been reformatted or transformed reversibly, located to a coordinate system, and packaged with needed ancillary, engineering, and auxiliary data. (Page A-4)

Level-1B Data: Irreversibly transformed values of the instrument measurements (e.g., radiances, marine conductivity). For in-situ observations, the Level-1B product is also the geophysical parameter of interest (e.g., particle flux, ambient magnetic field vector, radiosonde-generated atmospheric temperatures). (Page A-4)

Locally Maintained Data Bases: Examples of locally maintained data bases are: (a) Digital terrain map, (b) Land/sea, (c) Climatology, and (d) Digital political map. (Page 7-23)

Metadata: Information which is obtained from data sets, and which provides an understanding of the content or utility of the data set. Metadata may be used to select data for a particular scientific investigation. (Page A-11) Metadata will include an audit trail. (Page 7-18)

Processing Log: Periodically accounts for all data processing activities. (Page 7-22, 3PGS-00360).

Processing Performance: A statement of the amount of data processed; will include a record during processing (dynamic status) and a post-event record (static status).

Real-time or priority playback data which receive minimal processing and are forwarded to the user for his review/use. The user may provide additional processing to suit his requirements. (Page A-14)

Quick-Look Data: Real-time or priority playback data which receive minimal processing and are forwarded to the user for his review/use. The user may provide additional processing to suit his requirements. (Page A-14)

Data Received during one TDRSS contact period which have been processed to Level-0 (to the extent possible for data from a single contact). This is data that have been identified as requiring priority processing on the order of a few hours. It is routed to the PGS from the DADS. (Page 7-18)

Quick-Look Product: Quick-look data that has been processed by a PGS prior to being sent to an ICC. (Page 7-35)

Spacecraft Ancillary Data: Data available on board a spacecraft, derived from spacecraft parameters, or resulting from the on-board substitution of backup spacecraft parameters, but not produced by an instrument, which are needed for the processing or interpretation of instrument data. Spacecraft ancillary data comprises data referred to as "engineering", "core housekeeping" or "subsystem" data and includes parameters such as orbit position and velocity, attitude and its rate of change, time, temperatures, pressures, jet firings, water dumps, internally produced magnetic fields, and other environmental measurements. (Page A-15)

Status Information: Information regarding schedules, hardware and software configuration, exception conditions, or processing performance. (Page 7-18)

REFERENCE

Functional and Performance Requirements Specification for ECS, Fourth Preliminary, September 14, 1990.

CONCEPTUAL MODIS LEVEL-1 CONTEXT DIAGRAM