

MODIS
Science Data Processing Software
Requirements Specification
Version 2 and Beyond



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Change Notice 1

**MODIS
Science Data Processing Software
Requirements Specification
Version 2 and Beyond**

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MODIS Science Data Processing Software Requirements Specification Version 2 and Beyond

1. INTRODUCTION

1.1 Purpose

This document is the requirements specification for the Moderate Resolution Imaging Spectroradiometer (MODIS) Science Data Processing Software (SDP S/W) system. The MODIS SDP S/W will be integrated in the MODIS Team Leader Computing Facility (TLCF) at Goddard Space Flight Center (GSFC) and migrated to the EROS Data Center (EDC) Distributed Active Archive Center (DAAC), National Snow and Ice Data Center (NSIDC) DAAC, and the GSFC DAAC. The Team Leader Working Agreement (TLWA) serves as the parent document for this requirements specification. As specified in the TLWA, the programs in the SDP S/W for Version 2 shall constitute a launch ready, complete, verified, and operational software system.

The major software elements provided by the Science Data Support Team (SDST) and the MODIS Characterization Support Team (MCST) include:

- Level 1A (L1A) and Geolocation Processing Software.
- Level 1B (L1B) Processing Software.
- Product Generation Executive (PGE) scripts.
- MODIS-Application Program Interface (M-API) utilities.
- Other SDST-developed utilities.

The major software elements provided by the Science Team Members (STM) include:

- Level 2 (L2), Level 2 Gridding (L2G), Level 3 (L3), and Level 4 (L4) software processes.
- Gridding and binning utilities.

1.2 Scope

This document defines the system-level requirements which must be met by the software elements comprising the MODIS SDP S/W.

1.3 Content and Structure

This document's structure was derived from NASA-STD-2100-91 and is organized into the following sections:

- Section 1 provides the background and introduction to this document.
- Section 2 identifies the relevant documents.
- Section 3 details the system-level requirements.
- Section 4 details SDST's product-specific requirements.
- Section 5 identifies process-specific requirements.
- Section 6 identifies operational requirements.
- Section 7 provides the requirements traceability.
- Appendix A identifies the acronyms and abbreviations.
- Appendix B lists the standard data products.

2. RELATED DOCUMENTATION

This section provides the documentation relevant to the MODIS SDP S/W Requirements Specification.

2.1 Parent Document

- Team Leader Working Agreement for MODIS Between EOS AM & PM Projects GSFC and the MODIS Science Team Leader; GSFC 421-12-14-02; April 21, 1994.

2.2 Applicable Documents

- An ECS Data Producer's Guide to Metadata; August 1996 (Draft); 163-WP-001-001.
- Approach to Flexibility in EOSDIS Data Format Standards; H.K. Ramapruyan; July 1996.
- Definition of HDF-EOS; October 1996 (Draft).
- Earth Observing System (EOS) Reference Handbook; 1995.
- ECS Technical Baseline, Version 4.0; March 1996.
- Establishing Science Software Exit Conditions for the Production Environment; November 1996; 420-WP-006-001.
- Interface Control Document (ICD) Between EOSDIS Core System (ECS) and SCF (209-CD-005-001); December 1995.
- MODIS Software Development Standards and Guidelines, Version 1; SDST-022A; March 18, 1996.
- MODIS Data Aquisition and Processing Scenarios; D. Han, et. al; May 1989.
- MODIS Version 1 Science Software Integration and Test Procedures and Agreement with the GSFC DAAC; SDST-092; October 1996 (Draft).
- MODIS Version 1 Team Leader Computing Facility Integration and Test Plan; SDST-068; July 8, 1996.
- SDP Toolkit User's Guide for the ECS Project; June 1996; Data Item Description (DID) 333-CD-003-002.
- Science Data Processing Segment Database Design and Database Schema Specification for the ECS Project; DID 311-CD-008-001; July 1996.
- Science User's Guide and Operations Procedure Handbook for the EOS Core System Project, Part 4: Software Developer's Guide to Preparation, Delivery, Integration, and Test with the ECS; 205-CD-002-002; Final, August 1995.
- SWAMP and AM Session of the AGU Fall Meeting; The Earth Observer; Nov/Dec 1995, Vol. 7, No. 6, Page 11.

- Version 1 Science Computing Facility Software Delivery Guide; SDST-066 (CN 1), July 1996.

2.3 Information Documents

- Data Production Software (DPS) and Science Computing Facility (SCF) Standards and Guidelines; January 1994.
- MODIS Software Management Plan; October 24, 1995; SDST-002.
- MODIS Data Management Plan; October 25, 1995; SDST-006.
- MODIS Operations Concept Document-Version 1, SDST; August 1993.

3. SYSTEM-LEVEL REQUIREMENTS

3.1 External Constraints

This section describes the assumptions and dependencies affecting the MODIS SDP S/W.

In addition to the mandatory functions, the MODIS SDP S/W depends on ECS to provide the following capabilities implemented in Science Data Production Toolkit (SDPTK) routines:

- Access to solar system object positions.
- Values of mathematical and physical constants.
- Access to ECS-provided ancillary data.

The production environment to be employed by each DAAC for each MODIS SDP S/W release will be described by the Science Software Integration and Test Procedures for the MODIS Instrument and verified prior to the start of system testing for that release. The environment specification consists of the hardware platform, operating system, SDPTK version, Hierarchical Data Format (HDF) version, HDF-EOS version, and Commercial Off-The-Shelf (COTS) software versions.

3.2 System Interface Requirements

- 3.2-1 The MODIS SDP S/W shall produce the standard data products shown in Table B-1.
- 3.2-2 Each MODIS standard data product shall be produced within the data volume and processing load allocation shown in Table B-1.
- 3.2-3 Each software developer shall provide an HDF file description for the standard MODIS data product(s) produced by his/her software describing the structure and format of the HDF data objects in the files.

3.3 Computer Software Configuration Item Requirements

A MODIS Computer Software Configuration Item (CSCI) is any independently tracked and configured unit of software within the MODIS SDP S/W, including processes, scripts, and utility libraries.

- 3.3-1 Each CSCI in the MODIS SDP S/W shall run in the ECS production environment.
- 3.3-2 Each CSCI within the MODIS SDP S/W system shall employ the Earth Science Data and Information System (ESDIS)-supplied SDPTK mandatory functions to access the DAAC production environment and services.

- 3.3-3 The numbering scheme for the logical numbers used by the CSCI to obtain data from the SDPTK shall follow the convention defined in the SCF Software Delivery Guide, and shall not conflict with the range of logical numbers reserved for use by the Toolkit routines (10,000 - 10,999).
- 3.3-4 Each CSCI shall be coded according to the standards specified in the MODIS Software Development Standards and Guidelines, SDST-022 .

4. SCIENCE DATA PRODUCT REQUIREMENTS

4.1 MODIS Standard Product Requirements

- 4.1-1 The definition of the level of a given product shall adhere to Table 4-1, MODIS Data Level Definitions.
- 4.1-2 The MODIS standard products defined in Table B-1 shall be stored in HDF file structures appropriate for the data product level and type.
- 4.1-3 Each HDF file description for a product shall be consistent with the format and content of the corresponding MODIS Standard Product.

Table 4-1. MODIS Data Level Definitions

Data Level	Data Definition
Level 0	Reconstructed, unprocessed instrument/payload data at full resolution; any and all communications artifacts (e.g., synchronization frames, communications headers, duplicate data) removed.
L1A	Reconstructed, unprocessed instrument data at full resolution, time-referenced, and annotated with ancillary information, including radiometric and geometric calibration coefficients and georeferencing parameters (e.g., platform ephemeris) computed and appended but not applied to the Level 0 data.
L1B	L1A data that have been processed to sensor units (not all instruments will have a L1B equivalent).
L2	Derived geophysical variables at the same resolution and location as the L1 source data.
L2G	L2 data that have been resorted onto a spatial grid, but not averaged or composited.
L3	Variables mapped on uniform space-time grid scales, usually with some completeness and consistency.
L4	Model output or results from analyses of lower level data (e.g., variables derived from multiple measurements).

4.2 Metadata Requirements

- 4.2-1 Each MODIS Standard Product shall contain ECS core metadata with the content and format specified in DID 311.

- 4.2-2 All searchable product-specific metadata in MODIS standard products shall be formatted as specified in DID 311.
- 4.2-3 Each MODIS standard product shall contain the MODIS product file name for all input product files as ECS archive metadata.

4.3 Product-Specific Requirements

4.3.1 Climate Modeling Grid Product Requirements

- 4.3-1 The allowed grid resolutions for Climate Modeling Grid (CMG) products shall use an equal angle grid at 1.0 degree (111 km), 0.5 degree (57 km), and/or 0.25 degree (28.5 km) resolution.
- 4.3-2 The spatial starting points for all CMG grids shall be defined such that vertically (latitudinal) the bottom of the first row of cells in the Northern hemisphere will touch the equator and horizontally (meridional) the left edge of the first cell on the left at the equator will be at 180 degrees West longitude.

5. SOFTWARE PROCESS REQUIREMENTS

5.1 Process Interface Requirements

- 5.1-1 The numbering scheme for the Status Message Facility (SMF) seed numbering assignments used by the software processes to log error messages using the SDPTK shall follow the convention defined in the SCF Software Delivery Guide within the range of values assigned by ECS to MODIS (35,000 - 39,999).
- 5.1-2 Each software developer shall provide the information required to define an Earth Science Data Type (ESDT) for each non-temporary file required by his/her software.
- 5.1-3 Each software process shall close all product output files prior to termination.
- 5.1-4 Each software process shall use the SDPTK function to designate files which are required by the SCF for diagnostic purposes.

5.2 Process Reliability Requirements

- 5.2-1 Each software process shall trap and properly process all exceptions that may produce an abnormal termination and report all such events using the SDPTK error message functions.
- 5.2-2 Upon detection of a non-recoverable error condition each software process shall report the fatal error condition using the SDPTK error message functions, and return a defined exit code.
- 5.2-3 Each software process shall be able to process input data sets with the following nominal attributes:
 - 5.2-3.1 Time transitions, including Greenwich Meridian crossing, leap year, beginning of the year, beginning of the millennium, and/or start of data collection not on a granule boundary.
 - 5.2-3.2 Terminator crossing , International Date Line crossing, and/or Earth pole within a granule.
 - 5.2-3.3 Day, Night, or mixed mode data.
- 5.2-4 Each software process shall handle input data sets with the following error attributes:
 - 5.2-4.1 Fill data, including filled pixels, filled bands, and/or filled scans.
 - 5.2-4.2 Redundant data, consisting of repeated packets at Level 0 or duplicate input files at all product levels.

- 5.2-4.3 Corrupted data as indicated by Quality Assurance (QA) flags also located within the file.
- 5.2-4.4 Missing input MODIS product files, ancillary files, and look-up tables.
- 5.2-4.5 Wrong format input files.
- 5.2-4-6 Noisy or dead detectors, as indicated by QA flags located within the Level 1B file.

5.3 Process Quality Assurance Standards

Requirements for QA fields in the standard data products currently are limited to the ECS core metadata QA attributes. Additional product QA content requirements will be established from the MODIS QA Plan and ECS/ESDIS QA Plan when they are baselined.

- 5.3-1 Each software process shall perform quality checks on the input and output data and report on the degree to which the product conforms to instrument specification or science data accuracy specifications.

6. OPERATIONS REQUIREMENTS

6.1 Product Generation Executive Requirements

A PGE is a script which executes one or more MODIS software processes within the ECS environment.

6.1-1 The SDST shall integrate all software processes available to the SDST software integration team into a set of PGEs that execute all processes in the MODIS TLCF.

6.1-2 The SDST shall integrate subsets of these processes into sets of PGEs that execute in the GSFC DAAC, EDC DAAC, and the NSIDC DAAC as specified in Table B-1.

6.1-3 Each PGE shall return exit codes as defined by the developer according to the ECS standards.

6.1-4 A PGE shall not set or redefine environmental variables.

6.1-5 Each PGE shall be provided with one or more sets of production rules, which specify the inputs, outputs, and activation conditions for the PGE.

7. REQUIREMENTS TRACEABILITY MATRIX**Table 7-1. Requirements Traceability**

Req. #	Requirement	Traceability
3.2-1	The MODIS SDP S/W shall produce the standard data products shown in Table B-1.	TLWA 3.3.2
3.2-2	Each MODIS standard data product shall be produced within the data volume and processing load allocation shown in Table B-1.	ECS Technical Baseline
3.2-3	Each software developer shall provide an HDF file description for the standard MODIS data product(s) produced by his/her software describing the structure and format of the HDF data objects in the files.	TLWA 3.4.1
3.3-1	Each CSCI in the MODIS SDP S/W shall run in the ECS production environment.	TLWA 3.4.1
3.3-2	Each CSCI within the MODIS SDP S/W system shall employ the Earth Science Data and Information System (ESDIS)-supplied SDPTK mandatory functions to access the DAAC production environment and services.	TLWA 3.4.1
3.3-3	The numbering scheme for the logical numbers used by the CSCI to obtain data from the SDPTK shall follow the convention defined in the SCF Software Delivery Guide, and shall not conflict with the range of logical numbers reserved for use by the Toolkit routines (10,000 - 10,999).	TLWA 3.4.1, DID 333 (C.1.1)
3.3-4	Each CSCI shall be coded according to the standards specified in the most recent baselined version of the MODIS Software Development Standards and Guidelines, SDST-022 .	TLWA 3.4.3
4.1-1	The definition of the level of a given product shall adhere to Table 4-1, MODIS Data Level Definitions.	EOS Reference Handbook
4.1-2	The MODIS standard products defined in Table B-1 shall be stored in HDF file structures appropriate for the data product level and type.	Approach to Flexibility
4.1-3	Each HDF file description for a product shall be consistent with the format and content of the corresponding MODIS Standard Product.	TLWA 3.4.3
4.2-1	Each MODIS Standard Product shall contain ECS core metadata with the content and format specified in DID 311.	TLWA 3.4.1, DID 311
4.2-2	All searchable product-specific metadata in MODIS standard products shall be formatted as specified in DID 311.	TLWA 3.4.1
4.2-3	Each MODIS standard product shall contain the MODIS product file name for all input product files as ECS archive metadata.	TLWA 3.3.5
4.3-1	The allowed grid resolutions for Climate Modeling Grid (CMG) product shall use an equal angle grid at 1.0 degree (111 km), 0.5 degree (57 km), and/or 0.25 degree (28.5 km) resolution.	SWAMP

Req. #	Requirement	Traceability
4.3-2	The spatial starting points for all CMG grids shall be defined such that vertically (latitudinal) the bottom of the first row of cells in the Northern hemisphere will touch the equator and horizontally (meridional) the left edge of the first cell on the left at the equator will be at 180 degrees West longitude.	SWAMP
5.1-1	The numbering scheme for the Status Message Facility (SMF) seed numbering assignments used by the software processes to log error messages using the SDPTK shall follow the convention defined in the SCF Software Delivery Guide within the range of values assigned by ECS to MODIS (35,000 - 39,999).	TLWA 3.4.1
5.1-2	Each software developer shall provide the information required to define an Earth Science Data Type (ESDT) for each non-temporary file required by his/her software.	Guide to Metadata, DID 311
5.1-3	Each software process shall close all product output files prior to termination.	TLWA 3.3-2, DID 205 (5.2.3)
5.1-4	Each software process shall use the SDPTK function to designate files which are required by the SCF for diagnostic purposes.	TLWA 3.4.1
5.2-1	Each software process shall trap and properly process all exceptions that may produce an abnormal termination and report all such events using the SDPTK error message functions.	TLWA 3.4.3, DID 205 (5.2.6)
5.2-2	Upon detection of a non-recoverable error condition each software process shall report the fatal error condition using the SDPTK error message functions, and return in defined exit code.	DID 205 (5.7.3)
5.2-3	Each software process shall be able to process input data sets with the following nominal attributes:	DID 205 (5.7.3)
5.2-3.1	Time transitions, including Greenwich Meridian crossing, leap year, beginning of the year, beginning of the millennium, and/or start of data collection not on a granule boundary.	DID 205 (5.7.3)
5.2-3.2	Terminator crossing, International Date Line crossing, and/or Earth pole within a granule.	DID 205 (5.7.3)
5.2-3.3	Day, Night, or mixed mode data.	DID 205 (5.7.3)
5.2-4	Each software process shall handle input data sets with the following error attributes:	DID 205 (5.7.3)
5.2-4.1	Fill data, including filled pixels, filled bands, and/or filled scans.	DID 205 (5.7.3)
5.2-4.2	Redundant data, consisting of repeated packets at Level 0 or duplicate input files at all product levels.	DID 205 (5.7.3)
5.2-4.3	Corrupted data as indicated by Quality Assurance (QA) flags also located within the file.	DID 205 (5.7.3)
5.2-4.4	Missing input MODIS product files, ancillary files, and look-up tables.	DID 205 (5.7.3)
5.2-4.5	Wrong format input files.	DID 205 (5.7.3)

Req. #	Requirement	Traceability
5.2-4.6	Noisy or dead detectors, as indicated by QA flags located within the Level 1B file.	TLWA 3.3.2
5.3-1	Each software process shall perform quality checks on the input and output data and report on the degree to which the product conforms to instrument specification or science data accuracy specifications.	TLWA 3.3.2
6.1-1	The SDST shall integrate all software processes available to the SDST software integration team into a set of PGEs that execute all processes in the MODIS TLCF.	TLWA 3.4.1, TLWA 3.4.3, DID 205 (5.2.4)
6.1-2	The SDST shall integrate subsets of these processes that execute in the GSFC DAAC, EDC DAAC, and the NSIDC DAAC as specified in Table B-1.	TLWA 3.4.1, TLWA 3.4.3, DID 205 (5.2.4)
6.1-3	Each PGE shall return exit codes as defined by the developer according to the ECS standards.	TLWA 3.4.1, DID 205 (5.2.4)
6.1-4	A PGE shall not set or redefine environmental variables.	TLWA 3.4.1
6.1-5	Each PGE shall be provided with one or more sets of production rules, which specify the inputs, outputs, and activation conditions for the PGE.	DID 205 (4.2.1)

APPENDIX A: ACRONYMS AND ABBREVIATIONS

AHWGP	Ad-Hoc Working Group on Production
CMG	Climate Modeling Grid
COTS	Commercial Off-The-Shelf
CSCI	Computer Software Configuration Item
DAAC	Distributed Active Archive Center
DAO	Data Assimilation Office
DID	Data Item Description
ECS	EOSDIS Core System
EDC	EROS Data Center
EOS	Earth Observing System
ESDIS	Earth Science Data and Information System
ESDT	Earth Science Data Type
GSFC	Goddard Space Flight Center
HDF	Hierarchical Data Format
ICD	Interface Control Document
L1A	Level 1A
L1B	Level 1B
L2	Level 2
L2G	Level 2 Gridding
L3	Level 3
L4	Level 4
M-API	MODIS Application Programming Interface
MCST	MODIS Characterization Support Team
MODIS	Moderate Resolution Imaging Spectroradiometer
NSIDC	National Snow and Ice Data Center
PGE	Product Generation Executive
PI	Principal Investigator
QA	Quality Assurance
SCF	Science Computing Facility
SDP S/W	Science Data Production Software
SDPTK	Science Data Production Toolkit
SDST	Science Data Support Team
SMF	Status Message Facility
SPSO	Science Processing Support Office
STM	Science Team Member
TLCF	Team Leader Computing Facility
TLWA	Team Leader Working Agreement

APPENDIX B: MODIS STANDARD DATA PRODUCTS

Table B-1 presents the list of MODIS standard data products for each product, the following information is given:

- Product ID, name, and level;
- Time coverage;
- Processing center (the DAAC that produces the product) and archive center (the DAAC where the product is stored);
- Daily data volume and processing load. These items are referenced to the February 1996 baseline provided to the Ad-Hoc Working Group on Production (AHWGP);
- Principal Investigator (PI).

The term “granule” for time coverage refers to the specific time interval chosen for L1 and L2 products, as opposed to the ECS definition of a granule as the smallest independently tested unit of data. Level 3 CMG products include “CMG” in the product name.

Table B-1. Standard Data Products Definitions

Product ID	Product Name	Prod Level	Time Cover	Process Center	Archive Center	Daily Volume (GB/day)	Processing Load (MFLOPS)	PI
MODMGA	Tiled Geolocation Angular Data	2G	1 day	GSFC	EDC	8.097	33.053	Justice
MODMGPNTNR	L2G Pointer Map - 250m	2G	1 day	GSFC	EDC	240.123	1308.932	Justice
	L2G Pointer Map - 500m	2G	1 day	GSFC	EDC	50.266		Justice
	L2G Pointer Map - 1km	2G	1 day	GSFC	EDC	8.460		Justice
N/A	Early Warning Volcano Alert	2	granule	GSFC	N/A	?	?	N/A
MOD01	Level-1A Counts, MODIS	1	granule	GSFC	GSFC	115.099	99.917	SDST
MOD02QKM	Level-1B Radiance, 250m	1	granule	GSFC	GSFC	45	1298.89	MCST
MOD02HKM	Level-1B Radiance, 500m	1	granule	GSFC	GSFC	35	(3)	MCST
MOD01HKM	Level-1B Radiance, 1km	1	granule	GSFC	GSFC	90	(3)	MCST
MOD02OBC	Level-1B On Board Calibration Engineering	1	granule	GSFC	GSFC	10	(3)	MCST
MOD03	Geolocation Fields	1	granule	GSFC	GSFC	13.455	40.964	SDST
MOD04	Aerosol Product	2	granule	GSFC	GSFC	1.8	200.0	Kaufman/ Tanre
MOD04LA	Gridded Land Aerosol	3	orbit	GSFC	GSFC	0.6	14.6	Vermote
MOD05	Total Precipitable Water	2	granule	GSFC	GSFC	2.9	27.0	Gao/ Kaufman
MOD06	Cloud Product	2	granule	GSFC	GSFC	5.0	440.0	Gao/King/ Menzel
MOD07	Atmospheric Profiles	2	granule	GSFC	GSFC	6.0	54.0	Menzel
MOD08	Gridded Atmospheric Product Daily	3	1 day	GSFC	GSFC	0.3	Not Avail.	Gao/ Kaufman/ King/ Menzel/ Tanre
	Gridded Atmospheric Product 8-day	3	8 days	GSFC	GSFC	0.3	Not Avail.	Gao/ Kaufman/ King/ Menzel/ Tanre
	Gridded Atmospheric Product Monthly	3	calendar month	GSFC	GSFC	0.3	Not Avail.	Gao/ Kaufman/ King/ Menzel/ Tanre
MOD09	Surface Reflectance	2	granule	GSFC	EDC	72.891	72.871	Vemote
MOD09A	Gridded Surface Reflectance - 250m	3	8-day	GSFC	EDC	?	?	Vemote
	Gridded Surface Reflectance - 500m	3	8-day	GSFC	EDC	?	?	Vemote
MOD09G	Tiled Surface Reflectance - 250m	2G	day	GSFC	EDC	97.772	169.645	Vemote
	Tiled Surface Reflectance - 500m	2G	day	GSFC	EDC	48.185		Vemote
MOD10	Snow Cover	2	granule	GSFC	NSIDC	1.579	2.048	Hall
MOD10G	Tiled Snow Cover	2G	day	GSFC	NSIDC	4.820	30.445	Hall
MOD10A1	Gridded Daily Snow Cover - daily	3	day	NSIDC	NSIDC	8.112	0.070	Hall
MOD10A2	Gridded Daily Snow Cover - 8-day	3	8-day	NSIDC	NSIDC	1.159	0.030	Hall
MOD10A3	Gridded Daily Snow Cover - monthly	3	month	NSIDC	NSIDC	?	?	Hall

Product ID	Product Name	Prod Level	Time Cover	Process Center	Archive Center	Daily Volume (GB/day)	Processing Load (MFLOPS)	PI
MOD10C1	Gridded Daily Snow Cover daily CMG	3	1 day	NSIDC	NSIDC	?	?	Hall
MOD10C2	Gridded Daily Snow Cover - 8-day CMG	3	8-day	NSIDC	NSIDC	?	?	Hall
MOD10C3	Gridded Daily Snow Cover - monthly CMG	3	month	NSIDC	NSIDC	?	?	Hall
MOD11	Land_surface Temperature/ Emissivity	2	granule	GSFC	EDC	6.376	6.908	Wan
MOD11A1	Gridded Daily Land_sfc Temp/ Emissivity - 1km	3	1 day	GSFC	GSFC	6.57	13.452	Wan
	Gridded Daily Land_sfc Temp/ Emissivity - 5km	3	1 day	GSFC	GSFC			Wan
MOD11A2	Gridded 8-day Land_sfc Temp/ Emissivity - 1km	3	8 days	EDC	EDC	2.974	0.103	Wan
	Gridded 8-day Land_sfc Temp/ Emissivity - 5km	3	8 days	EDC	EDC			Wan
MOD11C1	Gridded Daily Land_sfc Temp/ Emissivity - CMG	3	1 day	EDC	EDC	?	?	Wan
MOD11C2	Gridded 8-day Land_sfc Temp/ Emissivity - CMG	3	8 days	EDC	EDC	?	?	Wan
MOD11C3	Gridded Monthly Land_sfc Temp/ Emissivity - CMG	3	month	EDC	EDC	?	?	Wan
MOD12M	Monthly Land_Cover Database	3	month	EDC	EDC	4.411	13.677	Strahler
MOD12Q1	Quarterly Land Cover Type	3	3 mos.	EDC	EDC	1.014?	2.857	Strahler
MOD12Q2	Quarterly Land Cover Change	3	3 mos.	EDC	EDC	?	2.857	Strahler
MOD12C1	Land Cover Type - CMG	3	3 mos.	EDC	EDC	?	?	Strahler
MOD12C2	Land Cover Change - CMG	3	3 mos.	EDC	EDC	?	?	Strahler
MOD13A1	Gridded Vegetation Indices - 250m (Max NDVI and Integrated MVI), 16-day	3	16 days	EDC	EDC	9.356	123.185	Huete/ Justice
MOD13A2	Gridded Vegetation Indices - 1km (Max NDVI and Integrated MVI), 16-day	3	16 days	EDC	EDC	?	?	Huete/ Justice
MOD13A3	Gridded Vegetation Indices - 1km (Max NDVI and Integrated MVI), Monthly	3	month	EDC	EDC	3.119	108.363	Huete/ Justice
MOD13C2	Gridded Vegetation Indices -1km (Max NDVI and Integrated MVI), 16-day - CMG	3	16 days	EDC	EDC	?	?	Huete/ Justice
MOD13C3	Gridded Vegetation Indices -1km (Max NDVI and Integrated MVI), Monthly - CMG	3	month	EDC	EDC	?	?	Huete/ Justice
MOD14	Thermal Anomalies	2	granule	GSFC	EDC	3.569		Justice
MOD14A1	Gridded Daily Thermal Anomalies (Fire Size and Temp)	3	1 day	EDC	EDC	0.450	10.833	Justice
MOD14A2	Gridded 8-Day Thermal Anomalies (Fire Size and Temp)	3	8 days	EDC	EDC	?	?	Justice
MOD14A3	Gridded Monthly Thermal Anomalies (Fire Size and Temp)	3	month	EDC	EDC	0.150	9.530	Justice
MOD14C1	Gridded Daily Thermal Anomalies (Fire Size and Temp) - CMG	3 P.L.	1 day	EDC	EDC	0.450	10.833	Justice
MOD14C2	Gridded 8-Day Thermal Anomalies (Fire Size and Temp) - CMG	3 P.L.	8 days	EDC	EDC	?	?	Justice

Product ID	Product Name	Prod Level	Time Cover	Process Center	Archive Center	Daily Volume (GB/day)	Processing Load (MFLOPS)	PI
MOD14C3	Gridded Monthly(???) Thermal Anomalies (Fire Size and Temp) - CMG	3 P.L.	month ???	EDC	EDC	?	?	Justice
MOD14G	Tiled Thermal Anomalies	2G	1 day	GSFC	EDC	7.446	15.319	Justice
MOD15	Leaf Area Indices (LAI) & FPAR	4	8 days	EDC	EDC	0.150	0.050	Running
MOD15A1	Daily intermediate LAI/FPAR	3	1 day	EDC	EDC			Running
MOD15A2	Daily LAI and FPAR	4	1 day	EDC	EDC			Running
MOD15C1	LAI and FPAR - CMG	4	8 days	EDC	EDC			Running
MOD15C2	LAI and FPAR - CMG	4	month	EDC	EDC			Running
MOD17A1	Vegetation Production, Net Primary (PSN) - 8-day	4	8 days	EDC	EDC	0.075	0.030	Running
MOD17A2	Vegetation Production, Net Primary (NPP), Yearly	4	year	EDC	EDC	0.003	0.020	Running
MOD17C1	Vegetation Production, Net Primary (PSN), 8-day - CMG	4	8 days	EDC	EDC	?	?	Running
MOD17C2	Vegetation Production, Net Primary (NPP), Yearly - CMG	4	year	EDC	EDC	?	?	Running
MOD18	Water-leaving Radiance	2	granule	GSFC	GSFC	49.108	279.893	Gordon
	Water-leaving Radiance 3-week Reference, Weekly	3	24 days	GSFC	GSFC	?	?	Gordon
	Water-leaving Radiance, Daily	3	1 day	GSFC	GSFC	6.340	57.300	Gordon
	Water-leaving Radiance, Weekly	3	8 days	GSFC	GSFC	0.906	0.070	Gordon
MOD18_QC	Ocean Color QC	2	granule	GSFC	GSFC	(2)	(2)	Evans
MOD19	CZCS Pigment Conc 3-week Reference, Weekly	3	24 days	GSFC	GSFC	(2)	(2)	Clark
	CZCS Pigment Conc, Daily	3	1 day	GSFC	GSFC	(2)	(2)	Clark
	CZCS Pigment Conc, Weekly	3	8 days	GSFC	GSFC	(2)	(2)	Clark
	CZCS Pigment Concentration	2	granule	GSFC	GSFC	(2)	(2)	Clark
MOD20	Chlorophyll Fluorescence 3-week Reference, Weekly	3	24 days	GSFC	GSFC	(2)	(2)	Abbott
	Chlorophyll Fluorescence, Daily	3	1 day	GSFC	GSFC	(2)	(2)	Abbott
	Chlorophyll Fluorescence, Weekly	3	8 days	GSFC	GSFC	(2)	(2)	Abbott
	Chlorophyll Fluorescence	2	granule	GSFC	GSFC	(2)	(2)	Abbott
MOD21	Chlorophyll_a Pigment Conc 3-week Reference, Weekly	3	24 days	GSFC	GSFC	(2)	(2)	Clark
	Chlorophyll_a Pigment Conc, Daily	3	1 day	GSFC	GSFC	(2)	(2)	Clark
	Chlorophyll_a Pigment Conc, Weekly	3	8 days	GSFC	GSFC	(2)	(2)	Clark
	Chlorophyll_a Pigment Conc	2	granule	GSFC	GSFC	(2)	(2)	Clark
MOD22	PAR 3-week Reference, Weekly	3	24 days	GSFC	GSFC	(2)	(2)	Carder
	PAR, Daily	3	1 day	GSFC	GSFC	(2)	(2)	Carder
	PAR, Weekly	3	8 days	GSFC	GSFC	(2)	(2)	Carder
	PAR	2	granule	GSFC	GSFC	(2)	(2)	Carder

Product ID	Product Name	Prod Level	Time Cover	Process Center	Archive Center	Daily Volume (GB/day)	Processing Load (MFLOPS)	PI
MOD23	Suspended-Solids Concentration, Ocean Water, 3-week Reference, Weekly	3	24 days	GSFC	GSFC	(2)	(2)	Clark
	Suspended-Solids Conc, Ocean Water, Daily	3	1 day	GSFC	GSFC	(2)	(2)	Clark
	Suspended-Solids Conc, Ocean Water, Weekly	3	8 days	GSFC	GSFC	(2)	(2)	Clark
	Suspended-Solids Conc, Ocean Water	2	granule	GSFC	GSFC	(2)	(2)	Clark
MOD24	Organic Matter Conc, 3-week Reference, Weekly	3	24 days	GSFC	GSFC	(2)	(2)	Clark
	Organic Matter Conc, Daily	3	1 day	GSFC	GSFC	(2)	(2)	Clark
	Organic Matter Conc, Weekly	3	8 days	GSFC	GSFC	(2)	(2)	Clark
	Organic Matter Conc	2	granule	GSFC	GSFC	(2)	(2)	Clark
MOD25	Coccolith Concentration, Detached, 3-week Reference, Weekly	3	24 days	GSFC	GSFC	(2)	(2)	Gordon
	Coccolith Conc, Detached, Daily	3	1 day	GSFC	GSFC	(2)	(2)	Gordon
	Coccolith Conc, Detached, Weekly	3	8 days	GSFC	GSFC	(2)	(2)	Gordon
	Coccolith Conc, Detached	2	granule	GSFC	GSFC	(2)	(2)	Gordon
MOD26	Ocean Water Attenuation Coefficient 3-week Reference, Weekly	3	24 days	GSFC	GSFC	(2)	(2)	Clark
	Ocean Water Attenuation Coefficient, Daily	3	1 day	GSFC	GSFC	(2)	(2)	Clark
	Ocean Water Attenuation Coefficient, Weekly	3	8 days	GSFC	GSFC	(2)	(2)	Clark
	Ocean Water Attenuation Coefficient	2	granule	GSFC	GSFC	(2)	(2)	Clark
MOD27	Ocean Productivity, Yearly	4	year	GSFC	GSFC	<0.001	0.010	Esaias
MOD28	Sea_sfc Temperature Day Mode 3-week Reference, Weekly	3	24 days	GSFC	GSFC	?	?	Brown
	Sea_sfc Temperature Day Mode, Daily	3	1 day	GSFC	GSFC	0.792	76.600	Brown
	Sea_sfc Temperature Day Mode, Weekly	3	8 days	GSFC	GSFC	0.113	0.270	Brown
	Sea_sfc Temperature Night Mode 3-week Reference, Weekly	3	24 days	GSFC	GSFC	?	?	Brown
	Sea_sfc Temperature Night Mode, Daily	3	1 day	GSFC	GSFC	?	?	Brown
	Sea_sfc Temperature Night Mode, Weekly	3	8 days	GSFC	GSFC	?	?	Brown
	Sea_sfc Temperature	2	granule	GSFC	GSFC	3.159	146.453	Brown
MOD28_QC	Sea_sfc Temperature QC	2	granule	GSFC	GSFC			Evans
MOD29	Sea_Ice Max Extent	2	granule	GSFC	NSIDC	1.579	4.980	Hall
MOD29A1	Gridded Daily Sea_Ice Max Extent	3	1 day	NSIDC	NSIDC	3.120	0.070	Hall
MOD29A2	Gridded Daily Sea_Ice - 8-day	3	8-day	NSIDC	NSIDC	0.446	13.631	Hall
MOD29A3	Gridded Daily Sea_Ice - Monthly	3	month	NSIDC	NSIDC	?	?	Hall
MOD29C1	Gridded Daily Sea_Ice Daily CMG	3	1 day	NSIDC	NSIDC	?	?	Hall
MOD29C2	Gridded Daily Sea_Ice - 8-day CMG	3	8-day	NSIDC	NSIDC	?	?	Hall

Product ID	Product Name	Prod Level	Time Cover	Process Center	Archive Center	Daily Volume (GB/day)	Processing Load (MFLOPS)	PI
MOD29C3	Gridded Daily Sea_Ice - Monthly CMG	3	month	NSIDC	NSIDC	?	?	Hall
MOD29G	Tiled Sea_Ice Max Extent	2G	1 day	GSFC	NSIDC	1.854	27.626	Hall
MOD30	Temperature and Moisture Profiles	2	granule	GSFC	GSFC	7.192	(1)	Menzel
MOD31	Phycoerthrin Conc, 3-week Reference, Weekly	3	24 days	GSFC	GSFC	(2)	(2)	Hoge
	Phycoerthrin Conc, Daily	3	1 day	GSFC	GSFC	(2)	(2)	Hoge
	Phycoerthrin Conc, Weekly	3	8 days	GSFC	GSFC	(2)	(2)	Hoge
	Phycoerthrin Concentration	2	granule	GSFC	GSFC	(2)	(2)	Hoge
MOD32	Calibration Data, BUOYMDB	2	granule	GSFC	GSFC	4.072	1.415	Evans
MOD32A1	Calibration Data, GLOBSUBS	2	granule	GSFC	GSFC	12.800	111.956	Evans
MOD35	Cloud Mask	2	granule	GSFC	GSFC	4.700	800.000	Menzel
MOD36	Absorption Coef, Gelbstof and Total, 3-week Reference, Weekly	3	24 days	GSFC	GSFC	(2)	(2)	Carder
	Absorption Coef, Gelbstof and Total, Daily	3	1 day	GSFC	GSFC	(2)	(2)	Carder
	Absorption Coef, Gelbstof and Total, Weekly	3	8 days	GSFC	GSFC	(2)	(2)	Carder
	Absorption Coef, Gelbstof and Total	2	granule	GSFC	GSFC	(2)	(2)	Carder
MOD37	Ocean Aerosol Radiance Properties	2	granule	GSFC	GSFC	(2)	(2)	Gordon
	Ocean Aerosol Radiance Properties 3-week Reference, Weekly	3	24 days	GSFC	GSFC	(2)	(2)	Gordon
	Ocean Aerosol Radiance Properties, Daily	3	1 day	GSFC	GSFC	(2)	(2)	Gordon
	Ocean Aerosol Radiance Properties, Weekly	3	8 days	GSFC	GSFC	(2)	(2)	Gordon
MOD38A1	Water Vapor, Atmospheric (Thermal IR), Monthly	3	month	GSFC	GSFC	(1)	(1)	Menzel
MOD39	Clear Water Epsilon, 3-week Reference, Weekly	3	24 days	GSFC	GSFC	(2)	(2)	Carder
	Clear Water Epsilon, Daily	3	1 day	GSFC	GSFC	(2)	(2)	Carder
	Clear Water Epsilon, Weekly	3	8 days	GSFC	GSFC	(2)	(2)	Carder
	Clear Water Epsilon	2	granule	GSFC	GSFC	(2)	(2)	Carder
MOD40	Burn Scars	4 P.L.	8 days	EDC?	EDC?	?	?	
MOD43B1	SemiEmpirical BRDF/Albedo	3	16 days	EDC	EDC	58.170	698.760	Strahler
MOD43B2	Empirical BRDF/Albedo	3	16 days	EDC	EDC	(4)	(4)	Strahler
MOD43B3	Minimal Albedo	3	16 days	EDC	EDC	(4)	(4)	Strahler
MOD43B4	BRDF-adjusted Nadir Reflectances	3	16 days	EDC	EDC	0.473	(4)	Strahler
MOD43C1	BRDF/Albedo - 16-day CMG	3	16 days	EDC	EDC	?	?	Strahler
MOD43C2	BRDF/Albedo - Monthly CMG	3	month	EDC	EDC	?	?	Strahler
MOD44A	1km Land Cover Change	4	32 days	EDC?	EDC?	?	?	Townsend
MOD44B	1km Land Cover Continuous Field	4	32 days	EDC?	EDC?	?	?	Townsend
(1) Included in the corresponding MOD07 allocation. (2) Included in the corresponding MOD18 allocation. (3) Included in the corresponding MOD02QKM allocation. (4) Included in the corresponding MOD43B1 allocation.								

