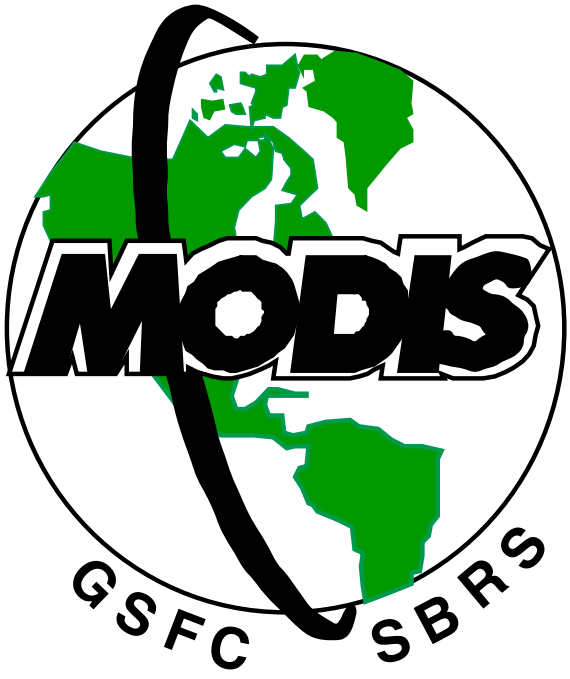
MODIS
Science Data Processing Software
Version 4.0 System Description



Volume I – Sections 1 - 3

May 2004

SDST-119B

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Version 4.0 System Description

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Change Record Page

This document is baselined and has been placed under Configuration Control. Any changes to this document will need the approval of the Configuration Control Board.

Document Title: MODIS Science Data Processing Software Version 4.0 System Description

Document Date: March, 2003

Issue	Date	Page Affected	Description
REVIEW DRAFT	3/25/99	All	Baseline
FINAL REVIEW	5/20/99	All	Baseline
REVISION A	6/30/01	All	Baseline
REVISION B	5/31/04	All	Baseline

MODIS
Science Data Processing Software
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1. INTRODUCTION

The Moderate Resolution Imaging Spectroradiometer (MODIS) Science Data Production Software (SDP S/W) System Description Document (SDD) is intended to meet the following key objectives:

Provide a description of the structure and high-level workings of the MODIS SDP S/W.

Serve as a basic reference to the more detailed documents related to the MODIS SDP S/W, products, and operations procedures.

Satisfy the SDD requirement specified in the Science Software Integration and Test (SSI&T) Procedures for the MODIS Instrument at the Goddard Space Flight Center (GSFC), EROS Data Center (EDC), and the National Snow and Ice Data Center (NSIDC) Distributed Active Archive Centers (DAACs). The DAAC at EDC is now named the Land Process (LP) DAAC and the DAAC at GSFC is now named the Goddard Earth Sciences (GES) DAAC.

1.1 Background

The overall MODIS science objective is to make long-term observations of the Earth for improved understanding of the global dynamics and processes occurring on the land, oceans, and lower atmosphere. Global product resolutions range from one day to one year in the temporal scale and from 250 meters to 1 degree on the spatial scale. The MODIS measurement objectives include surface temperature (land and ocean), cloud characteristics, aerosol concentrations and properties, atmospheric temperature and moisture structure, snow and ice cover characteristics, ocean color (sediment, phytoplankton), and ocean currents. Additional measurement objectives include vegetation properties, hemispherical albedo, bi-directional reflectance, cloud properties, aerosol radiances, chlorophyll concentration, primary productivity, sediment transport, standing water, and wetland extent. Derived MODIS products include global vegetation maps and global change (deforestation and desertification).

The Earth Observing System (EOS) Earth Sciences Data Information System (ESDIS) Project originally planned for GSFC, EDC, and NSIDC DAACs to run the MODIS Science Data Processing Software using the Planning and Data Processing System (PDPS) developed by the EOS Data and Information System (EOSDIS) Core System (ECS). The DAACs have always been solely responsible for the archive and distribution of the science data products.

1.2 History of the MODIS System Description Document

During the early days of the development of the MODIS Science Data Processing Software, Version 1 of the SDP S/W System Description document was written and published on April 18, 1997. The science software algorithms from the developers were each packaged into a Product Generation Executive (PGE) for execution at one of the DAACs. This document contained a brief outline of the PGE packages of science software being developed at the Science Computing Facilities (SCFs) and MODIS products to be generated for archive at the DAACs and released to the public. The description of the production rules and scenarios were based on plans for running the software under ECS at the DAACs.

During 1997 to 1998 MODIS had been developing the MODIS Emergency Backup System (MEBS) data processing core software to process the MODIS data if the ECS PDPS was not yet able to process the data at the DAACs. The MEBS development team implemented many of the production rules that ECS had planned to use in running the PGEs to generate the science products at the DAACs. As the SCFs began to deliver the first versions of the science software containing preliminary algorithms, MEBS was used to test the science software in a semi-production type of environment.

MODIS Version 2.0 PGEs were delivered to the MODIS SDST and integrated into the MODIS SDPS Version 2.0 System from September of 1997 until the system was baselined in May of 1998. Version 2.0 of the SDP S/W System Description document was written and published on May 19, 1998 and was updated August 25, 1998. This document contained a vastly expanded description of the PGEs, production rules and scenarios, a revised set of products, and new data flow diagrams to reflect the changes in PGEs since Version 1. The Version 2.0 System of Science Software grew rapidly as the planned Terra Launch approached. As significant changes were made to the PGEs, the second digit of the PGE Version was incremented; a third digit was added for minor changes.

In 1998 planning began for the PI-led MODIS Data Processing System to run the higher level MODIS SDP S/W. During this period, the MEBS team planned and developed a MODIS Data Processing System (MODAPS) to replace MEBS. MEBS became MODAPS V0 which was planned to be operational for system functional and stress testing before the Terra Launch. Further improvements were planned for the post-launch period.

MODAPS was built on the MEBS in several planned releases. MODAPS Version 1 consisted of the existing MEBS core system with the added Science Investigator-Led Processing System (SIPS) interface for transferring products. MODAPS Version 2 was being developed to provide a timely, stable processing environment to ingest the MODIS Level 1 products from the GSFC DAAC, support the production of MODIS Level 2 to 4 MODIS products at the EOS specified levels, and transfer these products to the DAACs for archive and distribution. MODAPS was also being developed to support

rapid changes to the MODIS processing algorithms and distribute at least 10% of all MODIS products to the MODIS Science Team for quality assurance and validation.

In the fall of 1998, the ESDIS Project transferred the responsibility for production of the MODIS Level 2 to Level 4 Science Data Products out of the ECS and into MODAPS, a Principal Investigator (PI) led Processing System. MODAPS was responsible for producing the MODIS Level 2 to Level 4 Products at the Team Leader Science Computing Facility (TL-SCF) at GSFC. The GSFC DAAC was responsible for producing the MODIS Level 1 Products at its facility using the ECS PDPS. The Level 1 products include Level 1 A (L1A) scans of Raw Radiance measurements, L1 Geolocation, Level 1 B (L1B) Calibrated Radiances, Cloud Mask, and Atmospheric Profiles. MODAPS would receive the Level 1 products needed for Level 2 to Level 4 processing from the GSFC DAAC. MODAPS would transfer the higher level MODIS Science Data Products to the appropriate DAAC for archive and distribution to the science data users.

As the improved Launch Ready versions of the MODIS PGEs were delivered from the SCFs to SDST for integration and test, Version 2.1 of the SDP S/W System Description document was written and published on May 20, 1999. MODAPS had been primarily running Versions 2.0 and 2.1 of the MODIS Science Data Software which comprise compatible MODIS Science Data Processing Systems. This is the science software described in Version 2.1 of the MODIS SDP S/W SDD.

The Version 2.1 of the SDD was intended to be the last version that would attempt to describe all of the MODIS Science Software Processes or groups of processes which are currently running or under testing at the MODIS facility and all of the known processes which are planned for future deliveries. Future versions of the SDD would describe only the MODIS Science Software and version of this software that were running, or close to being delivered, in the current MODIS Science Data Processing System or at the GSFC DAAC. The versions of the MODIS SDP System are determined primarily by the underlying system processing capabilities and processing scenarios, versions of the individual science software processes or groups of processes that are compatible or will execute correctly with this version of the MODIS SDP System and other MODIS processes in the system, and the resulting set of MODIS products.

Version 2.1 of the SDD was also intended to be the last version that would adequately describe how the science software was intended to be run under the ECS at the DAACs. The rules that the data processing system uses for staging product inputs and generating product outputs have been formulated for implementation under ECS. Under MEBS many of the rules had to be implemented manually. The MEBS to MODAPS transition would result in an operational system with many automated features and capabilities. The production rules for MODAPS would result in the same products, but the implementation of the rules would be different.

The primary changes to the science software between Version 2.0 of the SDD and Version 2.1 of the SDD have been in the Land Discipline. Some of the data products

that are produced in both day and night modes were now split into two separate products and new features were added to the production scenarios for the software that generates the Land products. References to specific ECS and DAAC functions and activities that had been cancelled were deleted from this SDD version. The data processing center for most MODIS products was now MODAPS. The disposition and transfer of products was indicated in updated tables and figures.

On December 18, 1999 Terra was launched at Vandenberg Air Force Base. MODAPS V1 was completed and put into operations just before the launch. Science algorithms and scenarios for running the PGEs were in a state of rapid change in the first year of the Terra Mission. Version 2.2 of the SDD was in a state of constant flux during this time. A section was added to each PGE description to describe the operational scenario for the PGE under MODAPS V1. Other sections were added to each PGE to list the dynamic and static runtime parameters required for the PGE in operations. The descriptions of the individual PGEs and sections of information from the SDD were put onto a WWW MODIS System Description Page. Thus the Version 2.2 MODIS SDP S/W SDD became a living document.

At the end of year 2000, plans were underway for reprocessing the MODIS data to make a “Consistent Year” Collection starting from November 2000, when the switch to the B-side electronics was made on the Terra spacecraft, and forward processing new data until a year was completed in November 2001. The new MODIS Data Collection to be archived at the DAACs was given the Version number of 3. In accord with the MODIS Collection, the Version 3.0 SDP S/W System Description document was written and published in June of year 2001.

In April of 2001, MODAPS V2 was installed into Terra operations, in time for the “Consistent Year” of reprocessing. A section was added to each PGE description to describe the operational scenario for the PGE under MODAPS V2. Production rules for each PGE were updated, input data sets to PGEs were updated, and new output products were added. Many new interim QC products, coarse resolution products, and subsetted products were added as outputs from PGEs for validation purposes. The Version 3.0 SDD contains several new PGEs, some of which replace PGEs that were deleted. The document also contains a few place holder type of descriptions for PGEs which the SCFs plan to deliver in the near future.

On May 4, 2002 the Aqua Satellite was launched and the MODIS Science Team made preparations for reprocessing the Terra science data into Collection 4 ESDTs with an update to Version 4.0 of the processing software. For almost all of the science software the same algorithms were used for the Forward Processing of Terra and Aqua data. The MODIS Terra Oceans data were reprocessed in June and the MODIS Terra Atmosphere and Land data were reprocessed in December. For the reprocessing, the map projection for the Land products was changed from Integerized Sinusoidal Grid to Sinusoidal Grid. The Land Group also delivered software to generate some products in the Climate Modeling Grid (CMG) format at 0.05 Degrees resolution. The algorithms for

the Level 1B calibration of the radiance data were improved and incorporated into the Version 4 L1B software. The L1B product was stored into its Collection 4 ESDT and archived for use by the other MODIS science software. Production rules in MODAPS were updated according to the changes in the science software. Version 4.0 of the MODIS SDP S/W SDD was written to describe all of these changes. At the same time obsolete sections describing ECS Production Rules and MODAPS V1 Production rules and processing information were removed from the document and replaced by updated MODAPS Production Rules and processing information.

From year 2001 through the completion of Version 4.0 of the SDD in the spring of 2004, MODIS products from the three MODIS Science Disciplines were generated by MODAPS and archived at the DAACs. At the completion of the re-competition for the MODIS science products and software development, NASA awarded the Ocean Color development and data production to another GSFC group, but at a much reduced production scenario. MODAPS will continue to generate and export the MODIS Land products and Atmosphere products to the DAACs. MODAPS will also generate the Aqua Oceans Sea Surface Temperature (SST) products through the reprocessing of all Aqua data into Collection 4 at the GES DAAC starting in January of 2004. Further Aqua SST production is to be determined.

1.3 Document Organization

The contents of the SDD have been organized to present and describe the MODIS SDP S/W from a system overview down to a detailed description for each of the individual science processes. The suggested guidelines for a system description document, which are outlined in Appendix C of the Science User's Guide and Operations Procedure Handbook for the EOS Core System (ECS) Project, Part 4: Software Developer's Guide to Preparation, Delivery, Integration, and Test with the ECS; 205-CD-002-005 (referred to as DID 205), have been included in the outlined sections for the MODIS SDD. This document also contains additional topics relevant to MODIS software and it's operations within the ECS.

The following sections are contained in this document:

- Section 1 contains an introduction to the Version 3.0 (V3.0) MODIS system.
  - Section 1.1 provides a brief background of the objectives for the MODIS Science Data and the MODIS Science Data Processing (SDP) System.
  - Section 1.2 relates the history of the MODIS Science Data Processing Software System Description document versions.
  - Section 1.3 provides the organization of this document.
- Section 2 contains a listing of related documentation.
- Section 3 describes the system architecture.
  - Section 3.1 provides a functional description of the MODIS SDP system concepts.

  - Section 3.2 contains an overview of the MODIS SDP system structure.
  - Section 3.3 provides a description of the MODIS SDP operational scenario.
- Section 3.4 provides a brief description of the various standard, interim/ intermediate, or temporary products.
- Section 3.5 provides an overview of PGE information to be described in more detail for each PGE in Section 4.
- Section 4 identifies and describes the Product Generation Executives (PGEs).
- Section 5 provides a description of the ECS Production Rules for Level 1 Processing and MODAPS Production Rules for Level 2 to Level 4 Processing.
- Section 6 describes nominal system performance measures for MODAPS and each PGE.
- Section 7 briefly describes the MODAPS system operations.
- Appendix A contains the Acronym List.
- Appendix B provides the requirements traceability.
- Appendix C provides the Production Rules Used by MODIS Data Processing Systems.

2. RELATED DOCUMENTATION

2.1 Parent Documents

- Team Leader Working Agreement for MODIS Between EOS AM & PM Projects GSFC and the MODIS Science Team Leader; GSFC 421-12-13-02, April 21, 1994.
- MODIS Science Data Processing Software Requirements Specification Version 2 and Beyond; SDST-089, Change Notice 1; November 10, 1997.

2.2 Applicable Documents

- MODIS Version 2 Processing Files Descriptions located on ftp://modular.gsfc.nasa.gov/pub/LatestFilespecs/
- MODIS Version 2 Science Software Integration and Test Procedures and Agreement with the GSFC DAAC; GSFC DAAC; March 9, 1998.
- Science User's Guide and Operations Procedure Handbook for the EOS Core System (ECS) Project, Part 4: Software Developer's Guide to Preparation, Delivery, Integration, and Test with the ECS; 205-CD-002-005; October 1997.
- MODIS Data Processing System Requirements Specification; SDST-117; March 1999.

2.3 Informational Documents

- MODIS Software Management Plan; SDST-002, October 24, 1995.
- MODIS Data Management Plan; SDST-006, October 25, 1995.
- MODIS Software Development Standards and Guidelines; SDST-022C Change Notice 1; September 11, 1997.
- M-API User's Guide, Version 2.3; SDST-064C; February 19, 1998.
- MODIS Version 2 Team Leader Computing Facility Product Generation Executive Test Plan; SDST-062, February 19, 1998.
- MODIS Version 2 Science Computing Facility Software Delivery Guide; SDST-096B, March 26, 1998.
- B.0 Implementation Earth Science Data Model for the ECS Project; 420-TP-015-002; December 1997.
- Data Production Software (DPS) and Science Computing Facility (SCF) Standards and Guidelines; October 1996.
- EOS Reference Handbook; 1996.
- Interface Control Document (ICD) Between EOSDIS Core System (ECS) and SCF, Revision A, (505-41-33); September 1996.
- Release B SDPS/CSMS Design Specification Overview for the ECS Project; 305-CD-020-002; March 1996.

- Release B.0 SCF Toolkit Users Guide for the ECS Project; 333-CD-003-001; April 1997.
- MODIS Science Data Processing Software Version 1 System Description; SDST 065, April 18, 1997.
- MODIS Science Data Processing Software Version 2.0 System Description; SDST-104, May 19, 1998.
- MODIS Science Data Processing Software Version 2.0 System Description; SDST-104, Change Notice 1; August 25, 1998.
- MODIS Science Data Processing Software Version 2.1 System Description; SDST-119, May 20, 1999.
- MODIS Science Data Processing Software Version 3.0 System Description; SDST-119A, June 30, 2001.

3. SYSTEM ARCHITECTURE

The MODIS SDPS S/W system integrates the science algorithms developed by investigators in atmosphere, oceans, and land disciplines into a common data processing environment. This processing environment will provide usable science information products in common formats for archive and distribution to science and educational communities throughout the world. The following sections briefly describe the concepts, structure, and operational scenarios of the MODIS Science Data Processing Software (SDPS) and its science data products and processing files.

3.1 System Concepts

The MODIS SDP S/W system is designed to run within the Earth Observing System (EOS) Data and Information System (EOSDIS) Core System (ECS). The MODIS system is a part of the SDPS of the EOS Ground System (EGS). Figure 3-1 shows the major subsystems comprising the SDPS. The reader should refer to the ECS design documents if more details about the SDPS are desired. These documents can be found on the internet at Universal Resource Locator:

(URL):http://romulus.gsfc.nasa.gov/PIMS/EMDS.html.

The actual data processing and product generation for MODIS Level 1 is performed at the DAAC at GSFC. The Cloud Mask and Atmospheric Profiles software are considered for the purpose of processing to be Level 1 even though they are actually create Level 2 swaths of data. The ECS SDPS is installed and operated at each of the DAACs, along with data processing hardware and other DAAC-specific systems. The MODIS Level 2 to Level 4 data processing is performed at MODAPS. The MODIS products are transferred to three DAACs located at GSFC, EDC, and NSIDC for archive and distribution.

Figure 3-2 is the context diagram for the purposes of the SDD. At the Goddard Earth Sciences (GES) DAAC (formerly named the GSFC DAAC) the MODIS Science Data Processing Software System receives MODIS Level 0 data and any required ancillary data via the ECS SDPS and produces the MODIS Level 1 products, which are archived by the ECS SDPS. The higher level products are produced by MODAPS and exported to the DAACs for archive. All processing software is categorized according to the level of data products it produces, with the data level definitions given in Table 3-1.

The original MODIS standard products are defined in Table B-1 of the MODIS Science Data Processing Software Requirements Specification Version 2 and Beyond. The software processes that produce these products are specified by the development teams. The SDPS design requires that the software be designed and installed at the DAACs or at MODAPS as a set of PGEs. The concept of the PGE is discussed in the following section.

The MODIS Level 1 PGEs are scheduled and executed entirely under control of the ECS SDPS Planning and Data Processing Subsystems operating at the GES DAAC. The SDPS also provides all data archive, inventory, query, distribution and other required services. Thus, the MODIS SDP S/W consists entirely of the individual PGEs that will run automatically in the SDPS or other environment that provides comparable functionality.

The MODIS Level 2 to Level 4 PGEs are scheduled and executed entirely under control of the MODAPS. The MODIS products are stored at the MODAPS site until the MODIS Science Team has completed the quality assurance and the products are no longer needed for downstream processing. Only MODIS standard products go to the DAACs for archive and distribution. MODIS interim products would only go to the GES DAAC if they are needed there for non-standard processing.

The MODIS instrument surveys the Earth's surface continuously, in one of two modes: day mode, in which data from all 36 bands are collected; and night-mode, in which data collection is limited to 17 infrared bands. The data collection mode is commanded by the Flight Operations Segment (FOS). This distinction is important because several of the Level 2 processes only use day mode data.

The fundamental units of MODIS processing and products are the swath granule for Level 1 (L1) and Level 2 (L2) products; the tile for Land Level 2G (L2G), Level 3 (L3), and Level 4 (L4) products; and the global grid for L3 and L4 Oceans products, Atmosphere L3 products, and Land Climate Modeling Grid (CMG) products. The granule definition is based on a fixed time interval of 5 minutes (e.g., the granule will contain all of the MODIS scans which start within a 5-minute interval), synchronized with the start of the Universal Time Coordinated (UTC) day. This results in 288 granules per day, of which about 144 will be day mode with the others being either night mode or a combination of both.

The Land tiles for most products have subsets of a global equal-area grid which is based on a Sinusoidal map projection. The tiles are about 10° x 10° and the grid resolution within the tiles is 250m, 500m, or 1 km, depending on the product. Sea ice products have tiles defined in the EASE-Grid Lambert polar projection. The global grids used by Oceans, Atmosphere, and Land CMG products are either equal-area or equal-angle grids, with the resolution defined for each product.

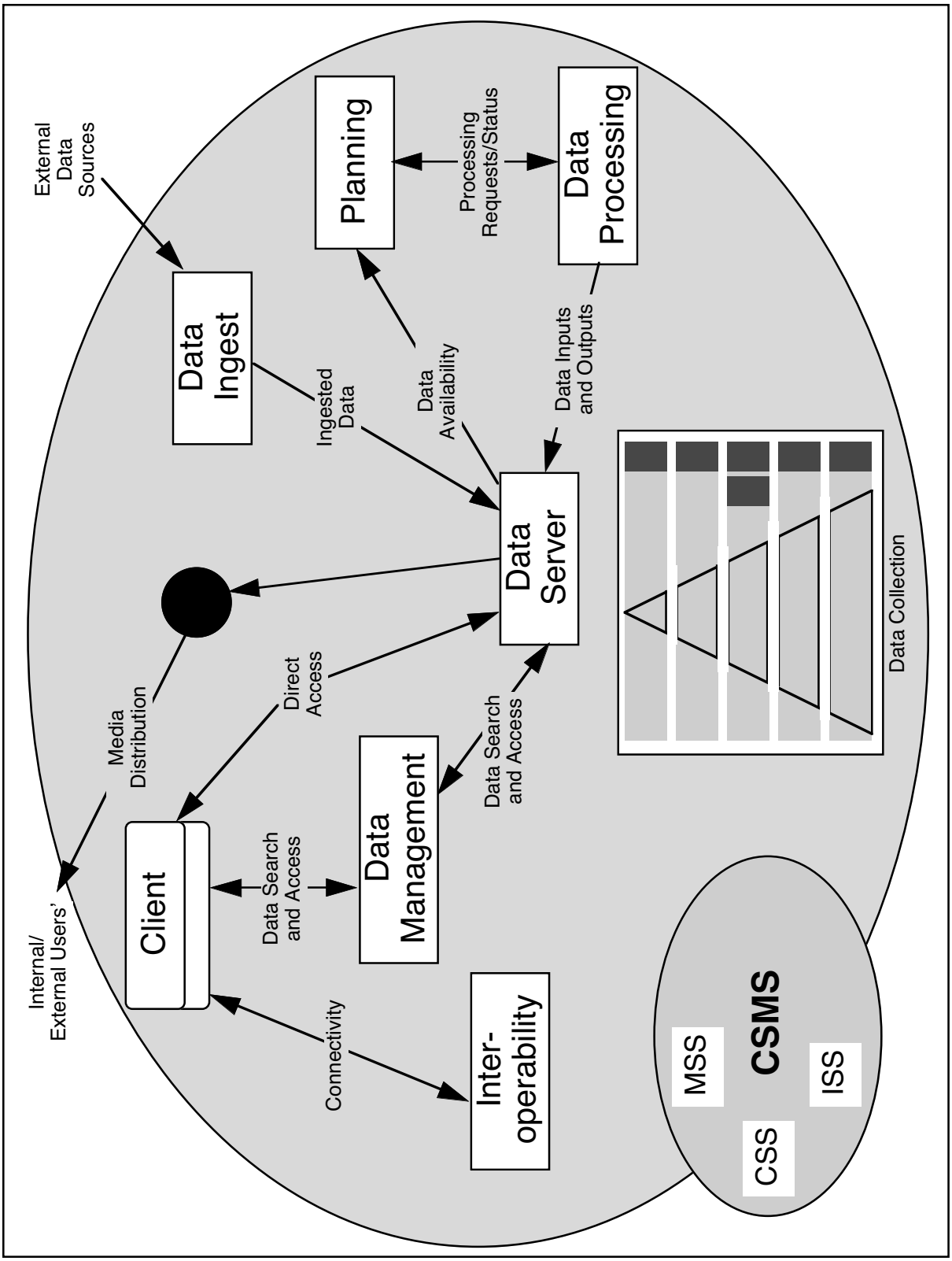

Figure 3-1SDPS Major Subsystems

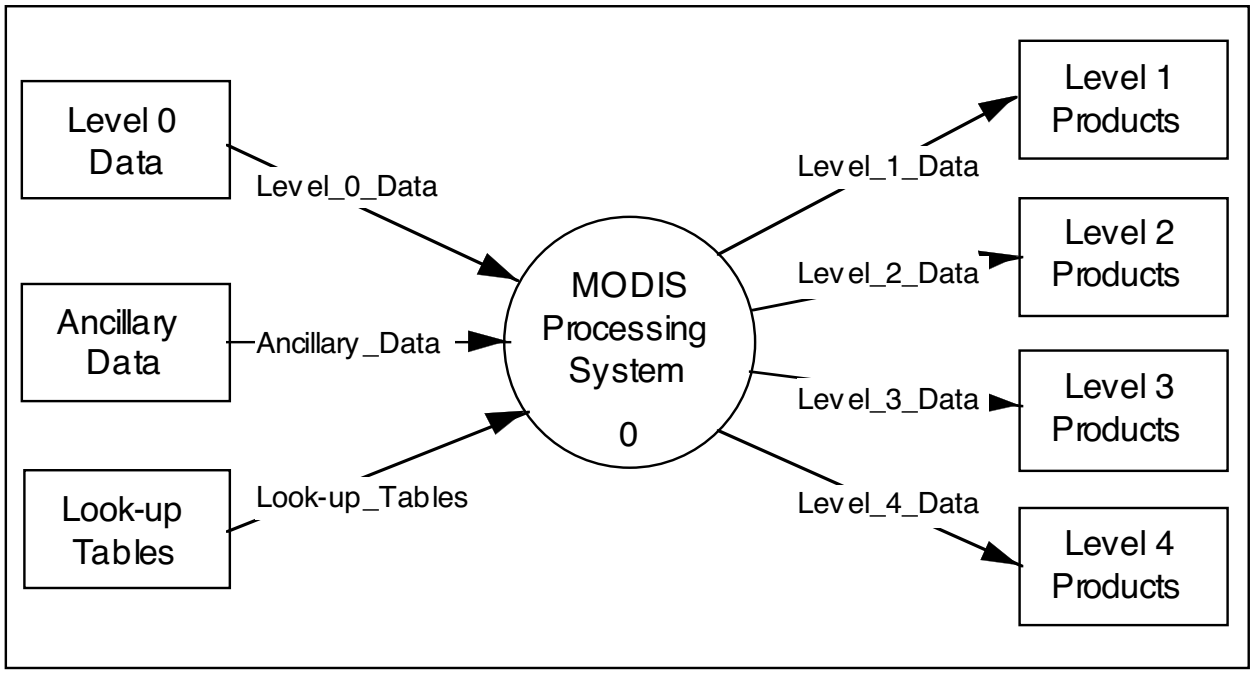

Figure 3-2 MODIS SDP S/W Context Diagram

Table 3-1 MODIS Data Level Definitions

Data Level	Data Definition
Level 0	Instrument data at original resolution, time order-restored, with duplicate packets removed.
Level 1A	Level 0 data which are reformatted with calibration data and other ancillary data included. Geolocation information for each 1 km spatial element of the reformatted swath data will be stored as a separate product.
Level 1B	L1A data to which the radiometric calibration algorithms have been applied to produce radiances or irradiances.
Level 2	Geophysical parameter data retrieved from the L1B data by application of geophysical parameter algorithms.
Level 2G	Similar to L2 but contains pixel to grid mappings within the product files.
Level 3	Earth-gridded geophysical parameter data, which have been averaged, gridded, or otherwise rectified or composited in time and space.
Level 4	Model output or results of analysis from lower-level data; for example, variables derived from multiple measurements.

3.2 System Structure

The MODIS SDP S/W is comprised of a collection of PGEs that run under control of the MODAPS or the ECS SDPS. The definitions of the PGEs and the data flows between them constitute a structure of the MODIS system, which can be discussed independently from the overall MODAPS or ECS environments. This structure has two overall drivers: the need to define PGEs to run the MODIS science data processes and the interdependencies among the MODIS processes themselves. Each of these is discussed below, followed by a summary of the MODIS PGEs with version numbers starting with 4.0.0 at the beginning of the Terra data reprocessing into ECS Terra Collection 4, which is described in the ECS Database as “Version 4 Processing”.

3.2.1 Product Generation Executives

The PGE is a data processing concept that has been defined by ECS as part of the overall design of the SDPS. PGEs are described in detail in the Science User’s Guide and Operations Procedures Handbook, and much of this information is also summarized on the ECS information WWW site cited in Section 3.1. The characteristics of PGEs that influence the overall design of the MODIS system are summarized here.

A PGE is the smallest unit of science processing software that will be independently described, scheduled, and executed within a DAAC or other data processing center. A PGE can be a single process or multiple processes controlled by a script. There are no specific limits on the number of processes within a PGE or the number of products produced, although this document does provide guidelines in these areas; the definition of individual PGEs is the responsibility of the Instrument Teams (ITs).

In addition to the processes which comprise a PGE, the ITs also define the conditions that must be met to activate each instantiation of the PGE. These conditions, which are codified within the DAAC or MODAPS as a set of Production Rules, define the specific data products which must be available for a PGE to run. The Production Rules will be registered with the GES DAAC as a part of the overall SSI&T process or with MODAPS as part of the installation process. In this document, the activation rules for each PGE will be summarized as part of the overall description of the PGE for both PGEs running at the GES DAAC and at MODAPS.

In addition to the general guidelines contained in ECS documentation, ECS has determined that the number of PGE executions at a DAAC should be limited to about 4000 per day. This constraint is imposed by the ECS Planning and Data Processing System (PDPS) scheduling software, whose performance has been shown to degrade significantly when the number of executions rises much above this number. It is important for designing the PGEs that run at the GES DAAC, where the L1 processing is performed. The number of executions at the GES DAAC would significantly exceed the limit if each process were run as a separate PGE. Therefore, some combining of

processes in PGEs is indicated; this must be balanced against overall guidelines for minimizing the complexity of PGEs.

3.2.2 MODIS Process Dependencies

The order and timing of processing by individual MODIS science data processes is largely constrained by the MODIS products required as input for each process, which in turn are produced by other MODIS processes. For example, MODIS L2 processes require L1B and Geolocation data as input; these products are generated by processes which require L1A data, whose production in turn depends on the availability of Level 0 data. In addition, several L2 processes require other L2 products as input. These dependencies define the overall data flow and structure of the MODIS system. (Note that several MODIS processes require products from earlier time periods as input; for purposes of the PGE design these dependencies were assumed to not affect the order or timing of the processing.)

The data dependencies of the current MODIS processes and unmodified, compatible processes with previous versions have been analyzed based on the process definitions provided by the individual scientists and developers. This information was used to determine which processes have common data needs, in terms of both products and time scales, and are therefore candidates for being combined into a single PGE.

3.2.3 MODIS Product Generation Executives

The MODIS Version 4 PGEs and compatible PGEs with earlier versions are summarized in Table 3-2. The table contains the following information for each PGE: an identification number and a descriptive name; the Production Rules; the level of the products produced by the PGE; the data processing center where the PGE is run; the MODIS processes which comprise the PGE; Earth Science Data Type (ESDT) input files; ESDT output files; the upper limit on the number of executions per processing period per PGE profile (i.e., the number of executions per day or per longer time period if the PGE does not run every day); and the processing period associated with the PGE. If the PGE has multiple profiles, the upper limit on the number of executions must be multiplied by the number of profiles. The PGEs which use the Tiling Production Rule run once per tile per processing period for each profile. Each PGE is described in detail in Section 4.

Figures 3-3 through 3-13 illustrate the data flow among the PGEs. They show the inter-PGE dependencies for the MODIS SDP S/W, the order in which the PGEs must be executed, external ancillary data inputs, the ESDT input products, and ESDT output products. Data stores are used to indicate flows which feed into several processes (e.g., L1, Atmospheric Profiles, and Clouds) or which represent transfers between the GES DAAC and MODAPS. Because the diagrams are complex and space is limited for figures on each page, the figures do not show all of the additional sources of data required by the PGEs, The types of data that are not shown include bucket ESDTs that contain static input files such as specific Calibration Coefficient files and Look-Up-Tables (LUTs), the MODLM_QA that are common to all Land PGEs, and the BROWSE

products made by the PGEs. The figures do not show the data flow to the product archives or the specific number of each type of input product required. Most of this information is included in either the Tables in Section 3 or in the detailed PGE descriptions in Section 4.

Table 3-2. MODIS SDP S/W PGEs, Production Rules, and Data Files

Notes: Terra ESDT names begin with "MO"; Aqua ESDT names begin with "MY", and Terra plus Aqua Combined ESDT names begin with "MC".
nn = one of parameters 1 through 36; mm = one of the parameters D1, D2, N1, or N2;
D2 produced by PGE10 but not archived or passed to downstream PGEs;
= one of parameters 1 through 36, D1, N1, N2, 41-61, 63-66, 69-78;
pp = one of the parameters 1 through 36, D1, N1, N2 (Flag Byte3 maps produced only for parameters 13 through 25);
qq = one of parameters 41-61, 63-66; rr = one of parameters D1-D9, DA, N1-N9, NA;
xx = one of parameters M1, M2, ME, MD, N1, N2, F1, F2; yy = one of parameters M1, M2, S1, S2, W1, W2, N1, N2, F1, F2;
zz = one of parameters MP, MN, MX, MC, SC, WC, NC, FC; (s) = collection of static input files;
For PGEs that make tiled products, the number of tiles listed is the maximum number processed in operations.

PGE Name	Rules	Lev	Site	Process	ESDT Input	ESDT Output	Runs	Period
PGE01 Level 1A Raw Radiances/ Geolocation	Basic Temporal, Advanced Temporal, Optional Inputs	1	GSFC	MOD_PR01	MOD000, MOD01LUT(s)	MOD01	288 granules / day	5 min.
				MOD_PR03	MOD01, MOD03LUT(s), AM1EPHNF & AM1ATTN0 or PM1EPHND & PM1ATTNR	MOD03, MOD01		
PGE02 Level 1B Calibration	Basic Temporal, Advanced Temporal, Optional Inputs	1	GSFC	MOD_PR02	MOD01, MOD03, MOD02LUT(s)	MOD021KM, MOD02HKM, MOD02QKM, MOD02OBC, MOD021QA	288 granules / day	5 min.
				MOD_PR02QA	MOD021KM	MOD021QA		
PGE03 Level 2 Cloud Mask/ Atmospheric Profiles	Basic Temporal, Advanced Temporal, Optional Inputs	2	GSFC	MOD_PR35	MOD021KM, MOD02QKM, MOD03, MOD35ANC(s), GDAS_0ZF, NISE, SEA_ICE	MOD35_L2, MOD35_QC, MODCSR_G, Three temporary files	288 granules / d ay	5 min.
				MOD_PR07	MOD021KM, MOD03, MOD35_L2, MOD07LUT(s), GDAS_0ZF, NISE, SEA_ICE	MOD07_L2, MOD07_QC, Three temporary files		
				MOD_PRVOLC	MOD021KM, MOD03	MODVOLC		
PGE04 Level 2 Atmosphere	Basic Temporal, Advanced Temporal, Nearest Temporal Match	2	MODAPS	MOD_PR04_05	MOD03, MOD021KM, MOD02HKM, MOD02QKM, MOD35_L2, MOD07_L2, MOD05LUR(s), MOD05LUW(s), MOD5CLUR (s), MOD04LUT(s), GDAS_0ZF, OZ_DAILY	MOD04_L2, MOD04_QC, MOD05_L2, MOD05_QC, MOD5C_QC (Future), Three temporary files	288 granules / day	5 min.
PGE05 Level 3 Orbital Land Aerosol (Not currently run in operations)	Orbit-Based Activation, Min. # of Granules	3	MODAPS	MOD_PR04ORB	MOD04_L2	MOD04L_O	~15 orbits /day	1 orbit

PGE Name	Rules	Lev	Site	Process	ESDT Input	ESDT Output	Runs	Period
PGE06 Level 2 Clouds	Basic Temporal, Advanced Temporal, Optional Inputs	2	MODAPS	MOD_PR06CR	MOD021KM	MOD06_L2	288 granules / d ay	5 min.
				MOD_PR06CT	MOD021KM, MOD03, MOD35_L2, MOD04LUT (s), MOD06LUT(s), MOD35ANC(s), GDAS_0ZF, REYNSST, SEA_ICE, NISE	MOD06_L2, MOD6CTQC, Three temporary files		
				MOD_PR06CD	MOD021KM, MOD03, MOD35_L2, MOD06_L2, MOD06LUT(s)	MOD06_L2, MOD6CDQC		
				MOD_PR06OD	MOD021KM, MOD35_L2, MOD06_L2, MOD06LUT(s), MOD35ANC(s), GDAS_0ZF, REYNSST, SEA_ICE, NISE	MOD06_L2, MOD6ODQC, MOD6ANCT, Three temporary files		
PGE07 Level 2 Snow Cover	Basic Temporal, Meta. Based Query	2	MODAPS	MOD_PR10	MOD021KM, MOD02HKM, MOD03, MOD35_L2	MOD10_L2, MOD10L2C, BROWSE	144 granules / day	5 min.
				MOD_PRLQA	MOD10_L2	MODLM_QA		
PGE08 Level 2 Sea Ice	Basic Temporal, Meta. Based Query	2	MODAPS	MOD_PR29	MOD021KM, MOD03, MOD35_L2,	MOD29, M0D29L2C	288 granules / day	5 min.
				MOD_PRLQA	MOD29	MODLM_QA		
PGE09 Level 2 Ocean Color	Basic Temporal, Advanced Temporal, Meta. Based Query, Nearest Temporal Match	2, 3	MODAPS	MOD_PR18	MOD021KM, MOD03, MOD28L2(Terra), MOD28QC(Terra), MODOCNMC, MODOCREY(Aqua), MODOCOZN, MODOCLUT(s), MODOCAER(s), MODOCBIN(s), MODOCRAY(s), MODOCRAD (s), MOD28LST (s)	MODOCL2, MODOCL2A, MODOCL2B, MODOCQC, MOCOCL2, MOCOCCL2A, MOCOCL2B, MOCOCQC	165 granules / day	5 min.
				MOD_PRmsbin	MODOCL2, MODOCL2A, MODOCL2B, MODOCQC, MOD03, AM1EPHH{1,2,3} or PM1EPHH{1,2,3}	MODOCBnn, MODOQBqq		
PGE10 Level 2 Sea Surface Temperature	Basic Temporal, Advanced Temporal, Nearest Temporal Match	2, 3	MODAPS	MOD_PR28	MOD021KM, MOD03, MODOCNMC, MODOCOZN, MODOCREY, MOD28LUT(s), MOD28PAR(s), MODOCBIN(s), MOD28RAD (s), MOD28LST (s)	MOD28L2, MOD28QC, MOC28L2, MOC28QC	288 granules / day	5 min.
				MOD_PRmsbin	MOD28L2, MOD28QC, MOD03, MOD28LUT(s), AM1EPHH{1,2,3} or PM1EPHH{1,2,3}	MOD28Bmm, MODSQBrr		
PGE11 Level 2 Land Surface Reflectance	Orbit-Based Activation, Optional Inputs, Advanced Temporal, Min. # of Granules, Runtime Parameters	2	MODAPS	MOD_PR09	MOD021KM, MOD02HKM , MOD02QKM, MOD03, MOD35_L2, MOD09LU1(s), MOD09LU2(s), MOD09LU3(s), GDAS_0ZF, OZ_DAILY	MOD09, MOD09CRS, MOD09IDN, MOD09IDS, MOD09IDT, MOD02CRS, MOD02CSS	~15 orbits /day	1 orbit (covers ~18 5 min. granules)
				MOD_PRLQA	MOD09, MOD09IDN, MOD09IDS, MOD09IDT	MODLM_QA		

PGE Name	Rules	Lev	Site	Process	ESDT Input	ESDT Output	Runs	Period
PGE12 Level 2G Pointers	Period Specification, Lat/Long Tiling, Meta. Based Query, Min. # of Granules, Runtime Parameters	2 G	MODAPS	MOD_PRMGPNTR	MODO3	MODPT1KD, MODPT1KN, MODPTHKM, MODPTQKM, MODPTPGD, MODPTPGN, MODPTPHD (Future), MOD_SS	357 tiles/day	1 day
				MOD_PRMGR	MOD03, MODPT1KD, MODPT1KN	MODMGGAD, MODMGPGD		
				MOD_PRLQA	MODPT1KD, MODPT1KN, MODPTHKM, MODPTQKM, MODPTPGD, MODPTPGN, MODPTPHD, MODMGGAD, MODMGPGD	MODLM_QA		
PGE13 Level 2G Land Surface Reflectance/Fire	Period Specification, Lat/Long Tiling, Min. # of Granules, Runtime Parameters, Meta. Based Query	2 G	MODAPS	MOD_PRMGR	MOD09, MODPTHKM, MODPTQKM, MOD14, MODPT1KD, MODPT1KN	MOD09GHK, MOD09GQK, MOD09GST, MOD14GD, MOD14GN, MOD_SS	294 tiles/day	1 day
				MOD_PRLQA	MOD09GHK, MOD09GQK, MOD09GST, MOD14GD, MOD14GN	MODLM_QA		
PGE14 Level 2G Snow Cover	Period Specification, Lat/Long Tiling, Min. # of Granules, Runtime Parameters, Meta. Based Query	2 G	MODAPS	MOD_PRMGR	MOD10_L2, MODPTHKM	MOD10L2G, MOD_SS	317 tiles/day	1 day
				MOD_PRLQA	MOD10L2G	MODLM_QA		
PGE15 Level 2G Sea Ice Extent	Period Specification, Lat/Long Tiling, Meta. Based Query, Min. # of Granules, Runtime Parameters	2 G	MODAPS	MOD_PRMGR	MOD29, MODPTPGD, MODPTPGN, MODPT1KD (Alternate SIN), MODPT1KN (Alternate SIN)	MOD29PGD, MOD29PGN, MOD29GD (Alternate SIN), MOD29GN (Alternate SIN)	210 tiles/day	1 day
				MOD_PRLQA	MOD29PGD, MOD29PGN	MODLM_QA		
PGE16 Level 2 and Level 3 Land Surface Temperature	Period Specification, Advanced Temporal, Zonal Tiling, Min. # of Granules, File Update	2,3	MODAPS	MOD_PR11	MOD021KM, MOD03, MOD35_L2, MOD07_L2, MOD10_L2, MOD12Q1, MOD43B1C (Previous), MOD11LCV(s), MOD11LUW(s)	MOD11_L2, MOD11A1, MOD11B1, MOD11UPD, MOD_SS, BROWSE	288/day and 317 tiles/day	1 day
				MOD_PRLQA	MOD11_L2, MOD11A1, MOD11B1	MODLM_QA		
PGE17 Oceans Ancillary Meteorological	Basic Temporal	n/a	MODAPS	MOD_PRNMC	GDAS_0ZF	MODOCNMC	4 files/day	6 hrs.

PGE Name	Rules	Lev	Site	Process	ESDT Input	ESDT Output	Runs	Period
Preprocess								
PGE18 Oceans Ancillary Reynolds Sea Surface Temperature Preprocess	Basic Temporal	n/a	MODAPS	MOD_PRREY	REYNSST	MODOCREY	1/week	1 week
PGE19 Oceans Ancillary Ozone Preprocess	Basic Temporal	n/a	MODAPS	MOD_PROZN	OZONEEP or OZ_DAILY (if OZONEEP is missing)	MODOCOZN	1 file/day	1day
PGE20 Level 3 Daily Oceans	Period Specification, Data Day, Runtime Parameters	3	MODAPS	MOD_PRmtbin	MODSQBrr, MODOCBnn, MODOQBqq, MOD28Bmm, MODOCTB(s)	MODOCFnn or MOD28Fmm	39 Ocean params /day + 35 QA params /day	1 day
				MOD_PRmtbin	MODOCFnn or MOD28Fmm, MODOCTB(s)	MODOCDnn or MOD28Dmm, MODOQAqq or MODSQArr		
				MOD_PRmspc	MODOCDnn or MOD28Dmm , MODOQAqq or MODSQArr, MODOCSPC(s)	MODOCFnn or MOD28Fmm		
				MOD_PRmmap	MODOCFnn or MOD28Fmm, MODOCMAP(s)	MO{04,36,1D}{M,S,N,Q,F,1, 2,3}Dpp, MO{04,36}MA##		
PGE21 Level 3 Land 8-Day Surface Reflectance	Period Start of 8 Days, "Smart" Start of Year, Lat/Long Tiling, Runtime Parameters, Min. # of Granules	3	MODAPS	MOD_PR09A	MODPTHKM, MODPTQKM, MOD09GHK, MOD09GQK, MOD09GST, MODMGGAD	MOD09A1, MOD09A1C, MOD09Q1, MOD_SS, BROWSE	294 tiles/8 days	8 day
				MOD_PRLQA	MOD09A1, MOD09Q1	MODLM_QA		
PGE22 Level 3 Daily Aggregation	Period Specification, Lat/Long Tiling, Runtime Parameters, Min. # of Granules	3	MODAPS	MOD_PRAGG	MOD09GHK, MOD09GQK, MOD09GST, MODPTHKM, MODPTQKM, MODMGGAD	MODAGAGG, MODAGTEX, MOD_SS	294 tiles/day	1 day
				MOD_PRLQA	MODAGAGG, MODAGTEX	MODLM_QA		
PGE23 Level 3 16-Day Bi-Directional Reflectance Distribution Function/ BARS	Period Start of 16 Days, "Smart" Start of Year, Lat/Long Tiling, Runtime Parameters, Min. # of Granules	3	MODAPS	MOD_PR43B	MODAGAGG, MOD43LUA(s), MOD43LUP(s), MOD43LUT(s)	MOD43B1, MOD43B2, MOD43B3, MOD43B4, MOD43B1C, MOD43B2C, MOD43B3C, MOD43B4C, MOD_SS, BROWSE	294 tiles / 16 days	16 day
				MOD_PRLQA	MOD43B1, MOD43B2, MOD43B3, MOD43B4	MODLM_QA		

PGE Name	Rules	Lev	Site	Process	ESDT Input	ESDT Output	Runs	Period
PGE24 Level 3 16-Day Albedo CMG	Period Start of 16 Days, "Smart" Start of Year, Min. # of Granules	3	MODAPS	MOD_PR43C	MOD43B3	MOD43C1	1 / 16 days	16 day
				MOD_PRLQA	MOD43C1	MODLM_QA		
PGE25 Level 3 16-Day Vegetation Indices 250m and 500m	Period Start of 16 Days, "Smart" Start of Year, Lat/Long Tiling, Runtime Parameters, Min. # of Granules	3	MODAPS	MOD_PR13A1	MOD09GHK, MOD09GQK, MOD09GST, MODPTQKM, MODPTHKM, MODMGGAD	MOD13A1, MOD13Q1, MOD_SS, BROWSE	286 tiles /16 days	16 day
				MOD_PRLQA	MOD13A1, MOD13Q1	MODLM_QA		
PGE26 Level 3 Monthly Vegetation Indices 1km	Period Specification, Lat/Long Tiling, Runtime Parameters, Min. # of Granules	3	MODAPS	MOD_PR13A3	MOD13A2	MOD13A3	286 tiles / month	1 month
				MOD_PRLQA	MOD13A3	MODLM_QA		
PGE27 Level 3 16-Day Vegetation Indices CMG	Period Start of16 Days, "Smart" Start of Year, Min. # of Granules	3	MODAPS	MOD_PR13C1	MOD13A2	MOD13C1	1 / 16 days	16 day
				MOD_PRLQA	MOD13C1	MODLM_QA		
PGE28 Level 3 Monthly Vegetation Indices CMG (TBD)	Period Specification, Min. # of Granules	3	MODAPS	MOD_PR13C2	MOD13A3	MOD13C2	1 / month	1 month
				MOD_PRLQA	MOD13C2	MODLM_QA		
PGE29 Level 3 Daily and 8-Day Thermal Anomalies/Fire	Period Start of 8 Days, "Smart" Start of Year, Meta. Based Query, Lat/Lon Tiling, Runtime Parameters, Min. # of Granules	3	MODAPS	MOD_PR14A	MOD14GD, MOD14GN	MOD14A1, MOD14A2, MOD14A1C, MOD14A2C, MOD_SS	286 tiles / 8 days	8 day
				MOD_PRLQA	MOD14A1, MOD14A2	MODLM_QA		
PGE30 Level 2 Thermal Anomalies/Fire	Basic Temporal Runtime Parameters, Min. # of Granules	2	MODAPS	MOD_PR14	MODO21KM, MOD03	MOD14, MOD14CRS	288 granules/ day	5 min
				MOD_PRLQA	MOD14	MODLM_QA		

PGE Name	Rules	Lev	Site	Process	ESDT Input	ESDT Output	Runs	Period
PGE31 Level 3 8-Day Land Surface Temperature	Period Start of 8 Days, "Smart" Start of Year, Lat/Lon Tiling, Runtime Parameters, Min. # of Granules	3	MODAPS	MOD_PR11A	MOD11A1	MOD11A2, MOD_SS	317 tiles/ 8 days	8 day
				MOD_PRLQA	MOD11A	MODLM_QA		
PGE32 Level 3 Daily Land Surface Temperature CMG	Period Specification, Min. # of Granules	3	MODAPS	MOD_PR11C1	MOD11B1	MOD11C1	1 / day	1 day
				MOD_PRLQA	MOD11C1	MODLM_QA		
PGE33 Level 4 Daily Leaf Area Index/FPAR	Period Specification, Lat/Long Tiling, Runtime Parameters, Min. # of Granules, Advanced Temporal	4	MODAPS	MOD_PR15A1	MODAGAGG, MOD12Q1 (previous), MOD15LUT(s)	MOD15A1, MOD15A1C, MOD_SS, Temporary file	286 tiles/days	1 day
				MOD_PRLQA	MOD15A1	MODLM_QA		
PGE34 Level 4 8-Day Leaf Area Index/PFAR	Period Start of 8 Days, "Smart" Start of Year, Lat/Lon Tiling, Runtime Parameters, Min.#.of.Granules	4	MODAPS	MOD_PR15A2	MOD15A1	MOD15A2, MOD15A2C, MOD_SS, BROWSE, Temporary file	286 tiles / 8 days	8 day
				MOD_PRLQA	MOD15A2	MODLM_QA		
PGE35 Level 3 16-Day Vegetation Indices 1km	Period Start of 16 Days, "Smart" Start of Year, Lat/Lon Tiling, Runtime Parameters, Min.#.of.Granules	3	MODAPS	MOD_PR13A2	MODAGAGG	MOD13A2, MOD13A2C, MOD_SS, BROWSE	286 tiles /16 days	16 day
				MOD_PRLQA	MOD13A2	MODLM_QA		
PGE36 Level 4 Daily Net Photosynthesis	Period Specification, Advanced Temporal, Lat/Lon Tiling, Runtime Parameters, Min. # of Granules, File Update	4	MODAPS	MOD_PR17A1	MOD17A1 (Update), MOD15A2, MOD12Q1, MOD17LUT(s), D4LAXMNT	MOD17A1 (Update)	286 tiles / day	1 day
				MOD_PRLQA	MOD17A1	MODLM_QA		

PGE Name	Rules	Lev	Site	Process	ESDT Input	ESDT Output	Runs	Period
PGE37 Level 4 8-Day Net Photosynthesis	Period Start of 8 Days, "Smart" Start of Year, Lat/Long Tiling, Runtime Parameters, Min. # of Granules, File Update	4	MODAPS	MOD_PR17A2	MOD17A1,(Update), MOD15A2, MOD12Q1, MOD17LUT(s)	MOD17A2, MOD17A2C, MOD17A1 (Update) , MOD_SS	286 tiles / 8 days	8 day
				MOD_PRLQA	MOD17A2 (Update)	MODLM_QA		
PGE38 Level 4 Yearly Net Primary Production	Period Specification, Lat/Long Tiling, Runtime Parameters, Advanced Temporal, Optional Inputs, Min. # of Granules, File Update	4	MODAPS	MOD_PR17A3	MOD17A1 (Update), MOD15A2, MOD12Q1, MOD17LUT(s)	MOD17A3, MOD17A3C, MOD17A1(Update), MOD_SS	286 tiles / year	1 year
				MOD_PRLQA	MOD17A3	MODLM_QA		
PGE39 Level 4 8-Day Net Photosynthesis CMG (TBD)	Period Start of 8 Days, "Smart" Start of Year, Min. # of Granules	4	MODAPS	MOD_PR17C2	MOD17A2	MOD17C2	1 / 8 days	8 day
				MOD_PRLQA	MOD17C2	MODLM_QA		
PGE40 Level 3 32-Day Land Cover	Period Start of 32 Days, "Smart" Start of Year, Optional Inputs, Lat/Lon Tiling, Runtime Parameters, Min. # of Granules	3	MODAPS	MOD_PR12M	MOD13A2, MOD11A2, MODAGTEX, MOD43B1, MOD43B4, MOD35ANC (s)	MOD12M, MOD_SS	286 tiles/32 days	32 day
				MOD_PRLQA	MOD12M	MODLM_QA		
PGE41 Level 3 Yearly Land Cover Quarterly-Updated	Period Start of 96 Days, "Smart" Start of Year, Advanced Temporal, Lat/LonTiling, Runtime Parameters, Min. # of Granules	3	MODAPS	MOD_PR12Q	MOD12Q1 (Previous), MOD12LUT(s)	MOD12Q1, MOD12Q1C, MOD_SS	317 tiles / 96 days	96 day
				MOD_PRLQA	MOD12Q1	MODLM_QA		
PGE42 Level 3 Yearly Land Cover Quarterly-Updated CMG	Period Start of 96 Days, "Smart" Start of Year, Min. # of Granules	3	MODAPS	MOD_PR12C	MOD12Q1, MOD12LCD (s)	MOD12C1	1 / 96 days	96 day
				MOD_PRLQA	MOD12C1	MODLM_QA		

PGE Name	Rules	Lev	Site	Process	ESDT Input	ESDT Output	Runs	Period
PGE43 Level 3 Daily Snow Cover	Period Specification, Lat/Lon Tiling, Runtime Parameters, Min. # of Granules	3	MODAPS	MOD_PR10A1	MOD10L2G, MODMGGAD, MODPTHKM, MOD09GHK, MOD12Q1, MOD10LUTs)	MOD10A1, MOD_SS, BROWSE	317 tiles / day	1 day
				MOD_PRLQA	MOD10A1	MODLM_QA		
PGE44 Level 3 Daily Sea Ice Extent	Period Specification, Meta. Based Query, Lat/Lon Tiling, Runtime Parameters, Min. # of Granules	3	MODAPS	MOD_PR29A1	MOD29PGD or MOD29PGN, MODPTPGD or MODPTPGN, MODMGPGD	MOD29P1D or MOD29P1N, MOD_SS, BROWSE	210 tiles / day	1 day
				MOD_PRLQA	MOD29P1D or MOD29P1N	MODLM_QA		
PGE 45 Level 3 8-Day Snow Cover	Period Start of 8 Days, "Smart" Start of Year, Lat/Lon Tiling, Runtime Parameters, Min. # of Granule	3	MODAPS	MOD_PR10A2	MOD10A1	MOD10A2, MOD_SS, BROWSE	317 tiles / 8 days	8 day
				MOD_PRLQA	MOD10A2	MODLM_QA		
PGE46 Level 3 Daily Snow Cover CMG	Period Specification, Min. # of Granules	3	MODAPS	MOD_PR10C1	MOD10A1, MOD10LUC(s)	MOD10C1	1 / day	1 day
				MOD_PRLQA	MOD10C1	MODLM_QA		
PGE47 Level 3 8-Day Sea Ice Extent (TBD)	Period Start of 8 Days, "Smart" Start of Year, Meta. Based Query, Lat/Lon Tiling, Runtime Parameters, Min. # of Granules	3	MODAPS	MOD_PR29A2	MOD29P1D or MOD29P1N	MOD29P2D or MOD29P2N	210 tiles/8 days	8 day
				MOD_PRLQA	MOD29P2D or MOD29P2N	MODLM_QA		
PGE48 Level 3 Daily Sea Ice Extent CMG (TBD)	Period Specification, Meta. Based Query, Min. # of Granules	3	MODAPS	MOD_PR29C1	MOD29P1D or MOD29P1N	MOD29C1D or MOD29C1N	1/day	1 day
				MOD_PRLQA	MOD29C1D or MOD29C1N	MODLM_QA		
PGE49 Level 3 8-Day Oceans Interim (Not currently run in operations)	Period Start of 8 Days, "Smart" Start of Year, Data Day, Runtime Parameters, Min. # of Granules	3	MODAPS	MOD_PRmtbin	MODOCAnn or MOD28Amm, MODOCTB(s)	MODOCEnn or MOD28Emm	39 params /8 days	8 day

PGE Name	Rules	Lev	Site	Process	ESDT Input	ESDT Output	Runs	Period
PGE50 Level 3 24-Day Oceans Reference (Not currently run in operations)	Period Start of 8 Days, "Smart" Start of Year, Advanced Temporal, Data Day, Runtime Parameters, Min. # of Granules	3	MODAPS	MOD_PRmtbin	MODOCEnn or MOD28Emm, MODOCTB(s)	MODOCFnn or MOD28Fmm	39 params /8 days	8 day
				MOD_PRmfill	MODOCFnn or MOD28Fmm, MODOCMSK(s)	MODOCRnn or MOD28Rmm		
PGE51 Level 4 8-Day and Running Yearly Oceans Productivity Indices	Period Start of 8 Days, "Smart" Start of Year, Optional Inputs, Data Day, Runtime Parameters, Min. # of Granules, Advanced Temporal	4	MODAPS	MOD_PRWK	MODOCW27, MOD28WD1, MOD27LUT(s), FNMOC_ML, D4LAXMNT	MOD27W, MOAPWAxx, MOAPWBxx, MOAPW1xx	1 / 8 days	8 day
				MOD_PRYR	MOD27W (current), MOD27W (all previous year	MOD27Y, MOAPYAyy , MOAPYByy, MOAPY1yy		
PGE52 Level 4 8-Day Oceans Chlorophyll Running Year Average and Annual Empirical Productivity (TBD)	Period Start of 8 Days, "Smart" Start of Year, Data Day, Runtime Parameters	4	MODAPS	MOD_Prmtbin	MODOCW27, MODOCTB(s)	MODOCY27, MODOCF[27] (Temporary)	1 / 8 days	8 day
				MOD_PR27HV	MODOCY27	MOD27HV, MOSPYAzz, MOSPYBzz, MOSPY1zz		
PGE53 Level 3 Daily De-clouded Oceans (Not currently run in operations)	Period Specification, Advanced Temporal, Data Day, Runtime Parameters	3	MODAPS	MOD_Prmcloud	MODOCAnn or MOD28Amm, MODOCRnn or MOD28Rmm	MODOCDnn or MOD28Dmm	39 Ocean params /day	1 day
				MOD_PRmspc	MODOCDnn or MOD28Dmm, MODOCSPC(s)	MODOCFnn or MOD28Fmm		
				MOD_Prmmap	MODOCFnn or MOD28Fmm, MODOCMAP(s)	MO{04,36,1D}{M,S,N,Q,F,1, 2,3}Dpp		

PGE Name	Rules	Lev	Site	Process	ESDT Input	ESDT Output	Runs	Period
PGE54 Level 3 8-Day Oceans	Period Start of 8 Days, "Smart" Start of Year, Data Day, Runtime Parameters, Min. # of Granules	3	MODAPS	MOD_PRmtbin	MODOCDnn or MOD28Dmm , MODOCTB(s)	MODOCWnn or MOD28Wmm	39 Ocean params/ 8 days	8 day
				MOD_PRmspc	MODOCWnn , or MOD28Wmm, MODOCSPC(s)	MODOCFnn or MOD28Fmm		
				MOD_Prmmap	MODOCFnn or MOD28Fmm, MODOCMAP(s)	MO{04,36,1D}{M,S,N,Q,F,1, 2,3}Wpp		
PGE55 Level 3 Daily Clear Sky (TBD)	Period Specification, Advanced Temporal, Min. # of Granules	3	MODAPS	MOD_PRCSR_D	MODCSR_G	MODCSR_D	1/day	1 day
PGE56 Level 3 Daily Atmosphere	Period Specification, Min. # of Granules	3	MODAPS	MOD_PR08D	MOD08_TL, MOD08TLH	MOD08_D3, MOD08D3H	1/day	1 day
PGE57 Level 3 Monthly Atmosphere	Period Specification, Min. # of Granules	3	MODAPS	MOD_PR08M	MOD08_D3	MOD08_M3	1 /calendar month	1 calendar month
PGE58 Level 3 8-Day Land Surface Temperature CMG	Period Start of 8 Days, "Smart" Start of Year, Min. # of Granules	3	MODAPS	MOD_PR11C2	MOD11C1	MOD11C2	1 / 8 days	8 day
				MOD_PRLQA	MOD11C2	MODLM_QA		
PGE59 Level 3 Monthly Land Surface Temperature CMG	Period Specification , Min. # of Granules	3	MODAPS	MOD_PR11C3	MOD11C1	MOD11C3	1/ calendar month	1 calendar month
				MOD_PRLQA	MOD11C3	MODLM_QA		
PGE60 Geolocation Control Point	Basic Temporal, Optional Inputs, Meta. Based Query	2	MODAPS	MOD_PR03CP	MOD02QKM, MOD03, MOD09, MOD35_L2, MOD10_L2, MOD29, MODCPLUT(s)	MOD03CP	288 granules/ day	5 min
PGE61 Level 3 Yearly Vegetation Continuous Fields (TBD)	Period Specification Lat/Long Tiling, Runtime parameters Min. # of Granules	3	MODAPS	MOD_PR44B	MOD44CQ, MOD44CH	MOD44B	289 tiles / year	1 year
				MOD_PRLQA	MOD44B	MODLM_QA		

PGE Name	Rules	Lev	Site	Process	ESDT Input	ESDT Output	Runs	Period
PGE62 Level 3 32-Day Thermal Anomalies/Fire CMG (TBD)	Period Start of 32 Days, "Smart" Start of Year, Min. # of Granules	3	MODAPS	MOD_PR14C	MOD14A1 or MOD14A2	MOD14C3	1 / 32 days	32 day
				MOD_PRLQA	MOD14C3	MODLM_QA		
PGE63 Level 4 Monthly Leaf Area Index /FPAR CMG (TBD)	Period Specification , Min. # of Granules	4	MODAPS	MOD_PR15CM	MOD15A2	MOD15C2	1/ month	1 month
				MOD_PRLQA	MOD15C2	MODLM_QA		
PGE64 Level 4 Yearly Net Primary Production CMG (TBD)	Period Specification, Min. # of Granules	4	MODAPS	MOD_PR17C3	MOD17A3	MOD17C3	1/year	1 year
				MOD_PRLQA	MOD17C3	MODLM_QA		
PGE65 Level 3 16-Day Bi-Directional Reflectance Distribution Function/Albedo CMG	Period Start of 16 Days, "Smart" Start of Year, Min. # of Granules	3	MODAPS	MOD_PR43C2	MOD43B1	MOD43C2	1 / 16 days	16 day
				MOD_PRLQA	MOD43C2	MODLM_QA		
PGE66 Level 3 96-Day Vegetation Cover Conversion 250m	Period Start of 96 Days, "Smart" Start of Year, Advanced Temporal, Optional Inputs, Meta. Based Query, Lat/Long Tiling, Runtime Parameters Min. # of Granules	3	MODAPS	MOD_PR44A	MOD44CH, MOD44CQ, MOD44A (Previous), MOD44LUT(s)	MOD44A , MOD_SS	286 tiles / 96 days	96 day
				MOD_PRLQA	MOD44A	MODLM_QA		
PGE67 Level 3 8-Day Snow Cover CMG	Period Start of 8 Days, "Smart" Start of Year, Min. # of Granules	3	MODAPS	MOD_PR10C2	MOD10A2, MOD10LUC(s)	MOD10C2	1 / 8 days	8 day
				MOD_PRLQA	MOD10C2	MODLM_QA		

PGE Name	Rules	Lev	Site	Process	ESDT Input	ESDT Output	Runs	Period
PGE68 Level 3 8-Day Sea Ice Extent CMG (TBD)	Period Start of 8 Days, "Smart" Start of Year, Meta. Based Query, Min. # of Granules	3	MODAPS	MOD_PR29C2	MOD29P2D or MOD29P2N	MOD29C2D or MOD29C2N	1 / 8 days	8 day
				MOD_PRLQA	MOD29C2D or MOD29C2N	MODLM_QA		
PGE69 Level 3 Daily Atmosphere Zonal Tiling	Period Specification, Meta. Based Query, Zonal Tiling, Min. # of Granules	3	MODAPS	MOD_PR08T	MOD04_L2, MOD05_L2, MOD06_L2, MOD07_L2	MOD08_TL, MOD08TLH	36 tiles / day	1 day
PGE70 Level 3 8-Day Atmosphere	Period Start of 8 Days, Min. # of Granules	3	MODAPS	MOD_PR08E	MOD08_D3	MOD08_E3	1 / 8 days	8 days
PGE71 Level 1A Oceans Sub-Setting	Basic Temporal	1 A	GSFC	MOD_PR01SS	MOD01	MOD01SS	288 granules/ day	5 min
PGE72 Level 4 16-Day Vegetation Intermediate Composite	Period Start of 16 Days, "Smart" Start of Year, Optional Input, Lat/Lon Tiling , Runtime Parameters, Min. # of Granules	4	MODAPS	MOD_PR44C	MODPTQKM, MOD09GQK, MODMGGAD, MOD09GST, MODPTHKM, MOD09GHK, MOD14GD, MOD11A1, MOD44LUC (s)	MOD44CQ, MOD44CH, MOD44CT	286 tiles/16 days	16 day
				MOD_PRLQA	MOD44CQ, MOD44CH, MOD44CT	MODLM_QA		
PGE73 Level 3 Monthly Oceans	Period Specification, Advanced Temporal, Data Day, Runtime Parameters, Min..# of Granules	3	MODAPS	MOD_Prmtbin	MODOCDnn, MODOCWnn, MOD28Dmm, MOD28Wmm, MODOCTB(s)	MODOCMnn or MOD28Mmm	39 Ocean params/ month	1 month
				MOD_PRmspc	MODOCMnn or MOD28Mmm, MODOCSPC(s)	MODOCFnn or MOD28Fmm		
				MOD_PRmmap	MODOCFnn or MOD28Fmm, MODOCMAP(s)	MO{04,36,1D}{M,S,N,Q,F,1, 2,3}Mpp	39 Ocean params/ month	1 month
PGE74 Level 3 Yearly Oceans	Period Specification, Data Day, Runtime Parameters, Min. # of Granules	3	MODAPS	MOD_Prmtbin	MODOCMnn or MOD28Mmm, MODOCTB(s)	MODOCNnn or MOD28Nmm	39 Ocean params/ year	1 year
				MOD_PRmspc	MODOCNnn or MOD28Nmm, MODOCSPC(s)	MODOCFnn or MOD28Fmm		
				MOD_PRmmap	MODOCFnn or MOD28Fmm, MODOCMAP(s)	MO{04,36,1D}{M,S,N,Q,F,1, 2,3}Npp		

PGE Name	Rules	Lev	Site	Process	ESDT Input	ESDT Output	Runs	Period
PGE75 Level 3 Daily Surface Reflectance CMG	Period Specification, Min. # of Granules	3	MODAPS	MOD_PR09C	MOD09IDN, MOD09IDS, MOD09IDT	MOD09CMG	1 / day	1 day
				MOD_PRLQA	MOD09CMG	MODLM_QA		
PGE76 Level 1 Daily Ephemeris Predictor	Basic Temporal Advanced Temporal, Runtime Parameters	1	MODAPS	MOD_PRpred	AM1EPHNF or PM1EPHND	AM1EPHH, AM1EPHH1, AM1EPHH2, AM1EPHH3 or PM1EPHH, PM1EPHH1, PM1EPHH2, PM1EPHH3	1/day	1 day
PGE77 Level 4 Daily Evapotranspiration Fraction (TBD; Aqua)	TBD	4	MODAPS	TBD	TBD	MYD16A1	1 / day	1 day
PGE78 Level 4 8-Day Evapotranspiration Fraction (TBD; Aqua)	TBD	4	MODAPS	TBD	TBD	MYD16A2	1 / 8 days	8 days
PGE79 Level 1B Geographic Cutout Subsetter	Basic Temporal, Meta. Based Query	2	MODAPS	MOD_PRmsubl	MOD021KM, MOD28LST (s)	MOC021KM	288 granules / day	5 min.
PGE80 Level 3 Intermediate Daily Filtered Surface Reflectance	Period Specification, Lat/Lon Tiling , Runtime Parameters, Min. # of Granules	3	MODAPS	MOD_PRHDF	MODMGGAD, MOD09GQK, MOD09GHK, MOD09GST, MODPTHKM, MODPTQKM	MODHDFSR, MODQDFSR	18 tiles / day	1 day
PGE81 Level 3 8-Day Composite Clear Sky Radiance (TBD)	Period Specification, Advanced Temporal	3	GDAAC	MOD_PRCSR_8	MODCSR_8	MODCSR_8	1 / day	8 days
PGE82 Level 3 16-Day Nadir BRDF-Adjusted Reflectance CMG	Period Start of 16 Days, "Smart" Start of Year, Min. # of Granules	3	MODAPS	MOD_PR43C3	MOD43B4	MOD43C3	1 / 16 days	16 days
				MOD_PRLQA	MOD43C3	MODLM_QA		
PGE83 Level 2 Subsetted Atmosphere L2 Products	Basic Temporal, Optional Inputs	2	MODAPS	MOD__PRATML2	MOD03, MOD04_L2, MOD05_L2, MOD06_L2, MOD07_L2, MOD35_L2	MODATML2	288 granules / day	5 min.
PGE84 Level 3 Daily Sea Ice Extent and IST at 4km	Period Specification, Min. # of Granules	3	MODAPS	MOD_PR29E	MOD29P1D	MOD29E1D	1 / day	1 day
				MOD_PRLQA	MOD29E1D	MODLM_QA		
PGE85 Level 2 Clear Sky Radiance Statistics (TBD)	Basic Temporal	2	MODAPS	MOD_PRCSR_G	MOD021KM, MOD03, MOD35_L2,, GDAS_0ZF	MODCSR_G, MODCSRQC	288 granules/ day	5 min.

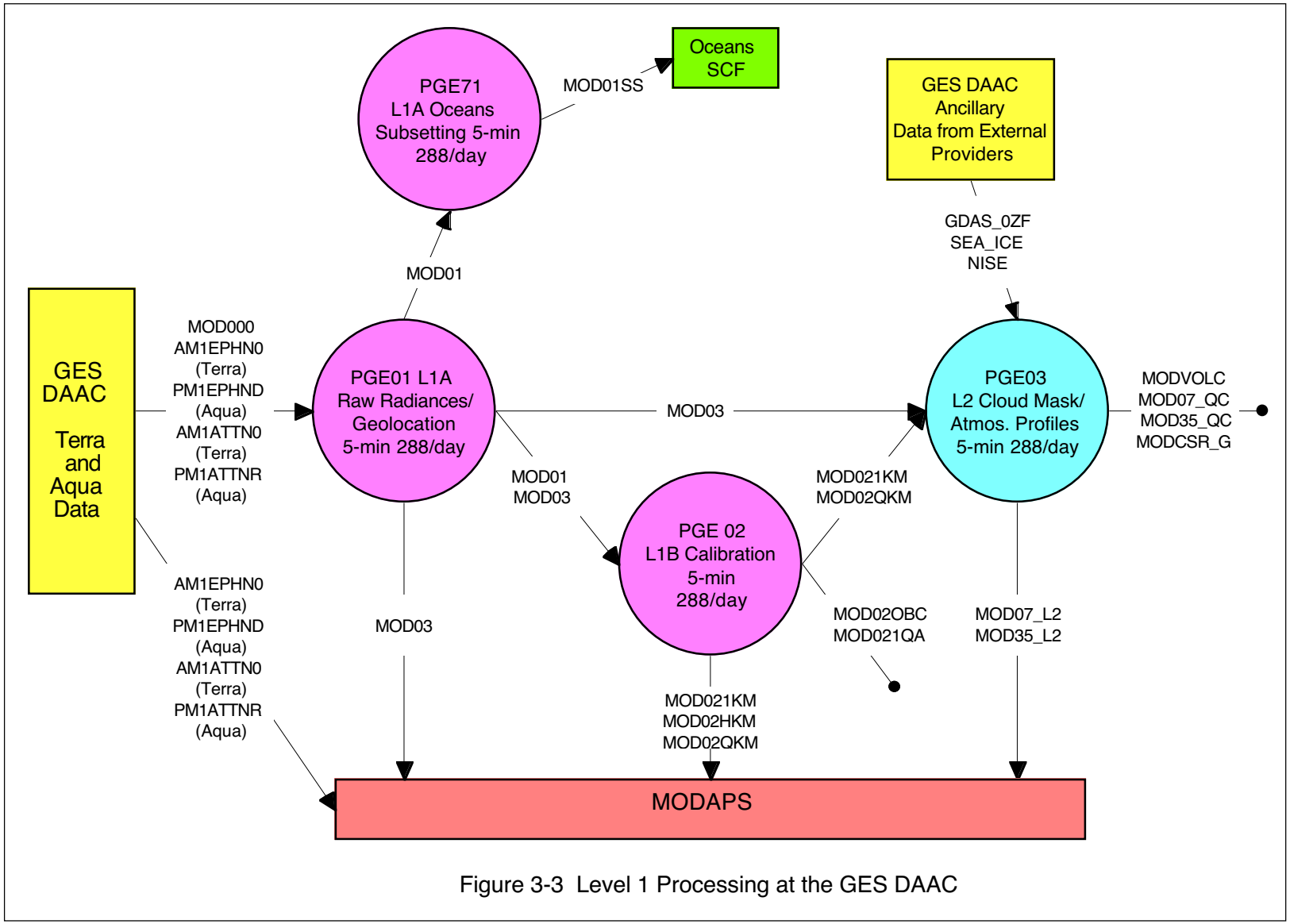

Figure 3-3 Level 1 Processing at the GES DAAC

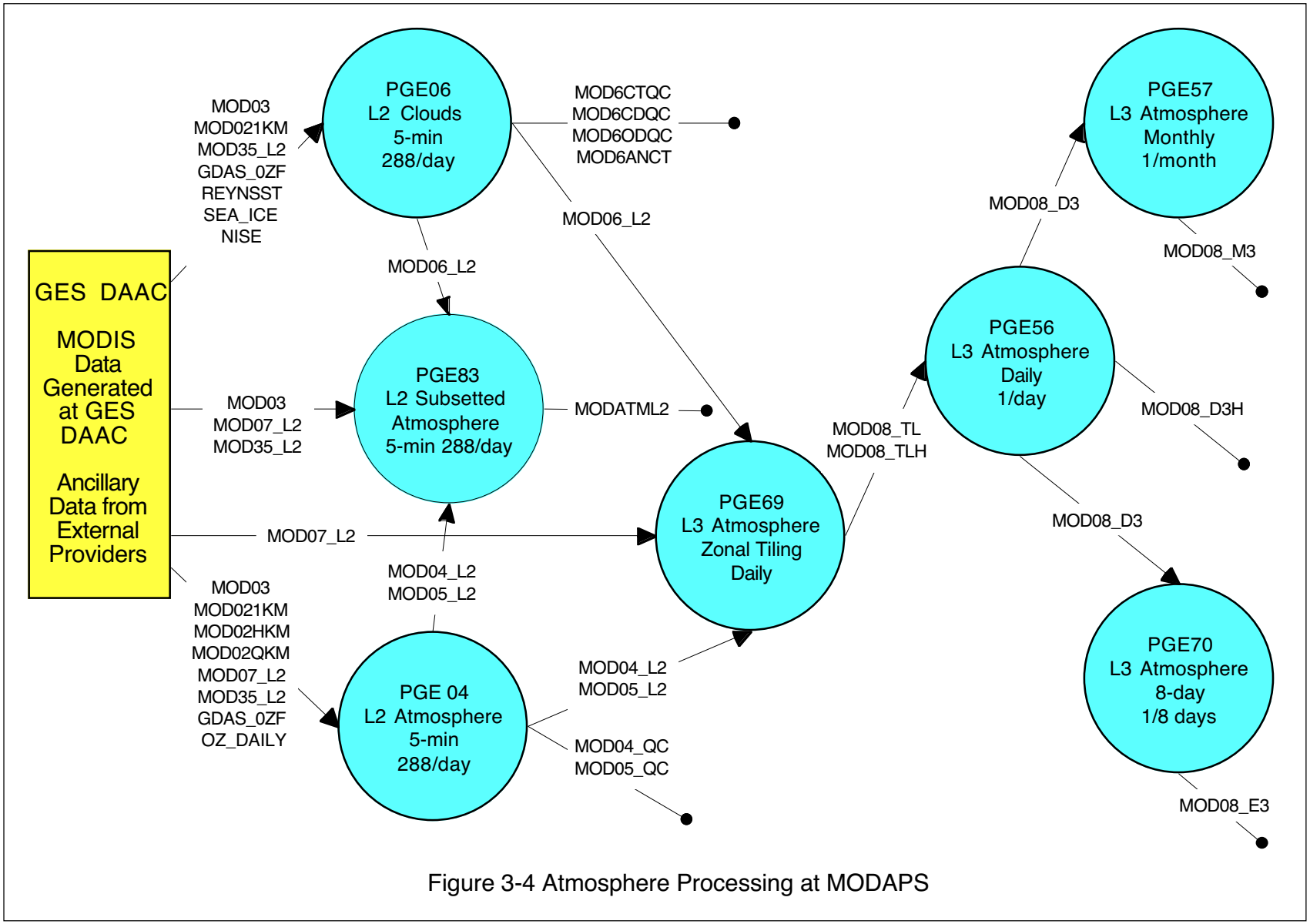

Figure 3-4 Atmosphere Processing at MODAPS

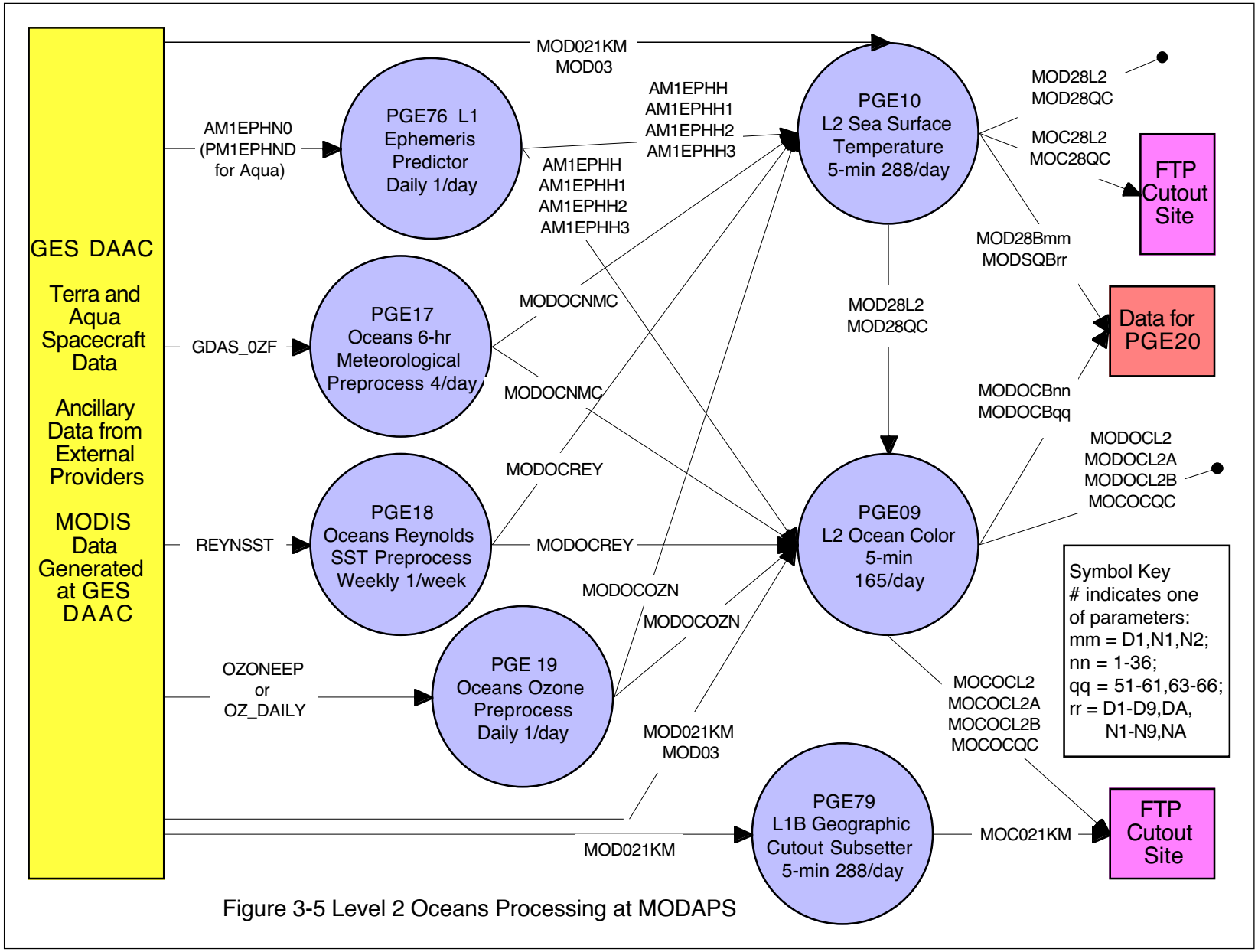

Figure 3-5 Level 2 Oceans Processing at MODAPS

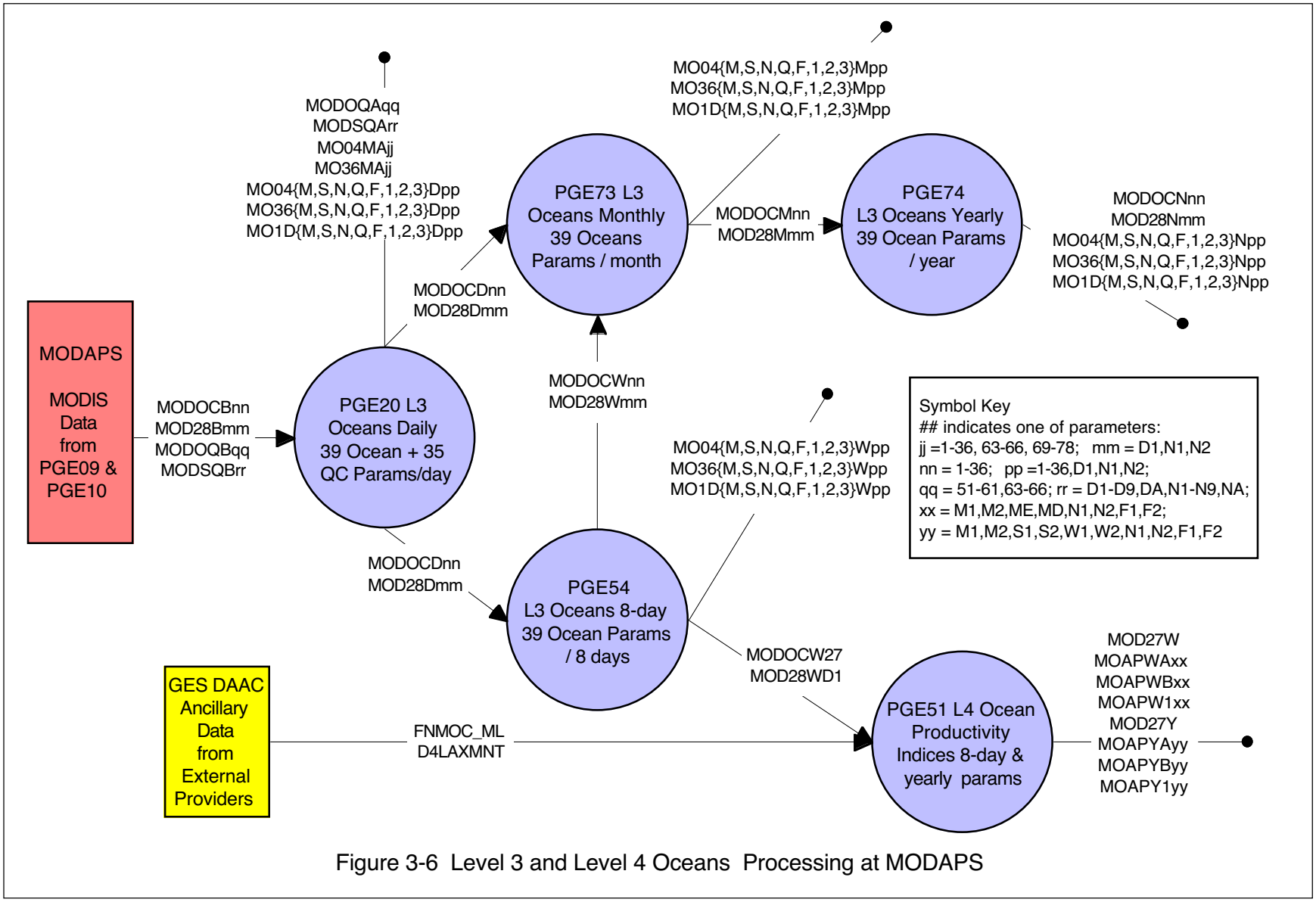

Figure 3-6 Level 3 and Level 4 Oceans Processing at MODAPS

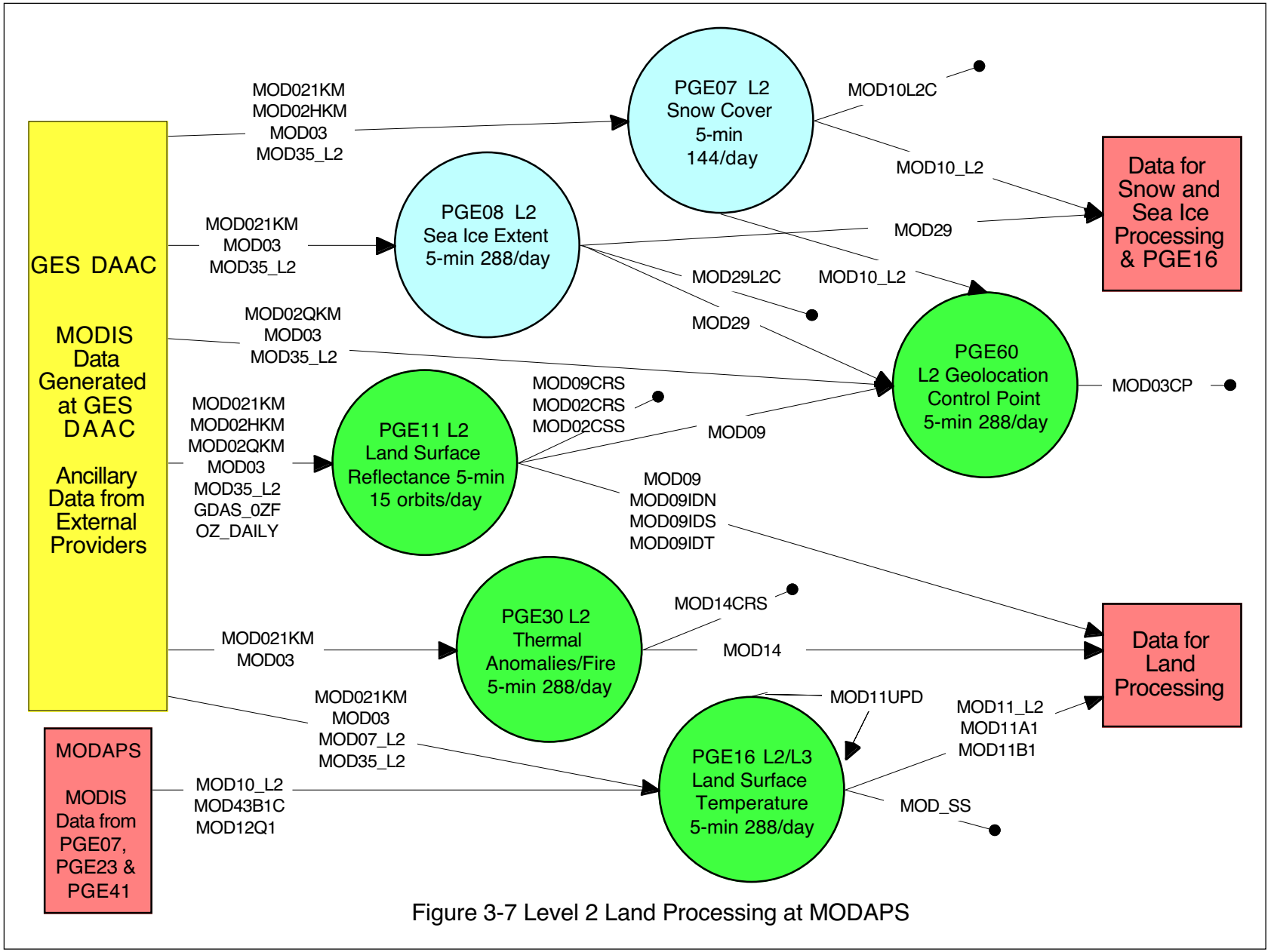

Figure 3-7 Level 2 Land Processing at MODAPS

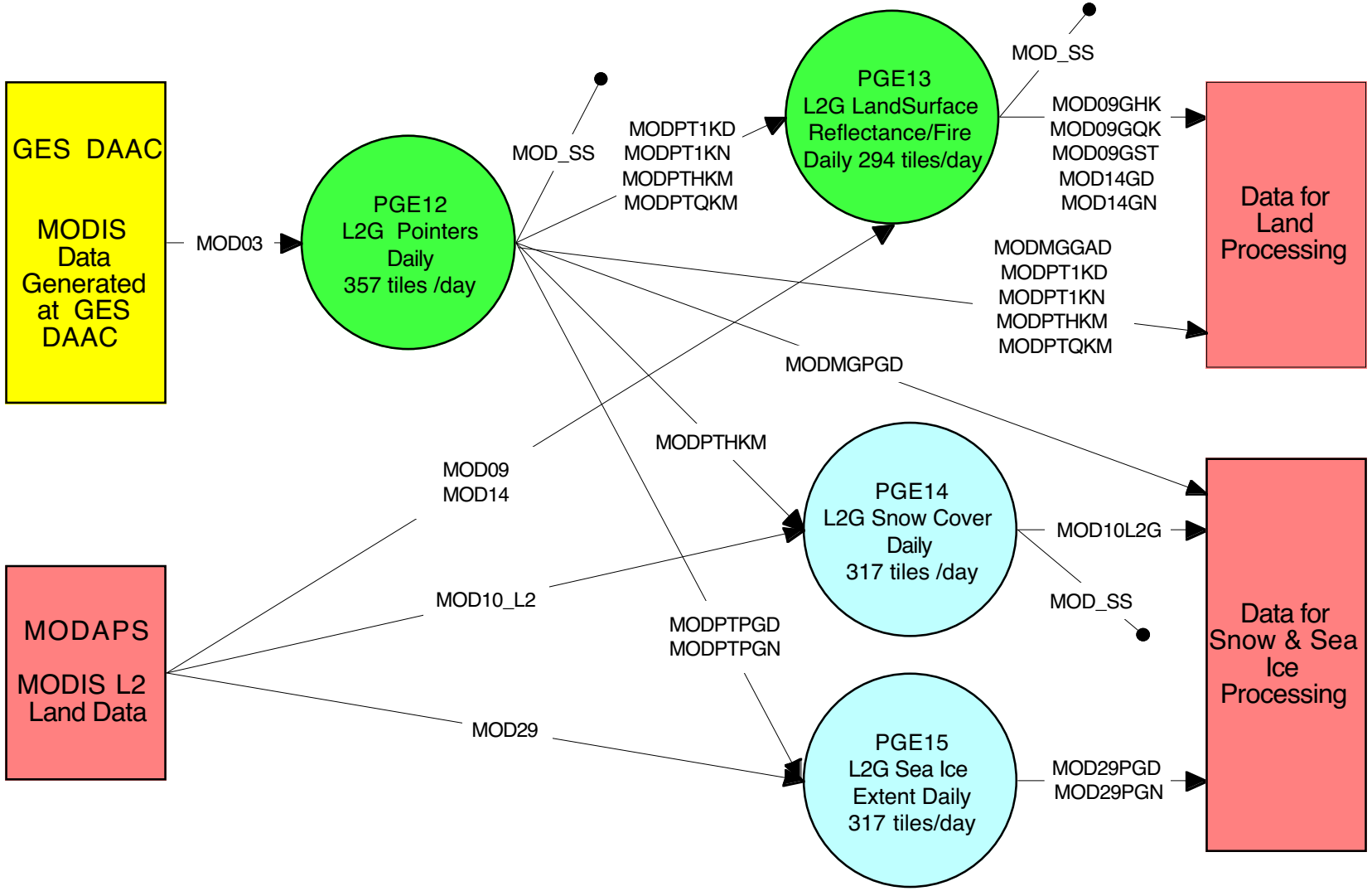

Figure 3-8 Level 2G Land Processing at MODAPS

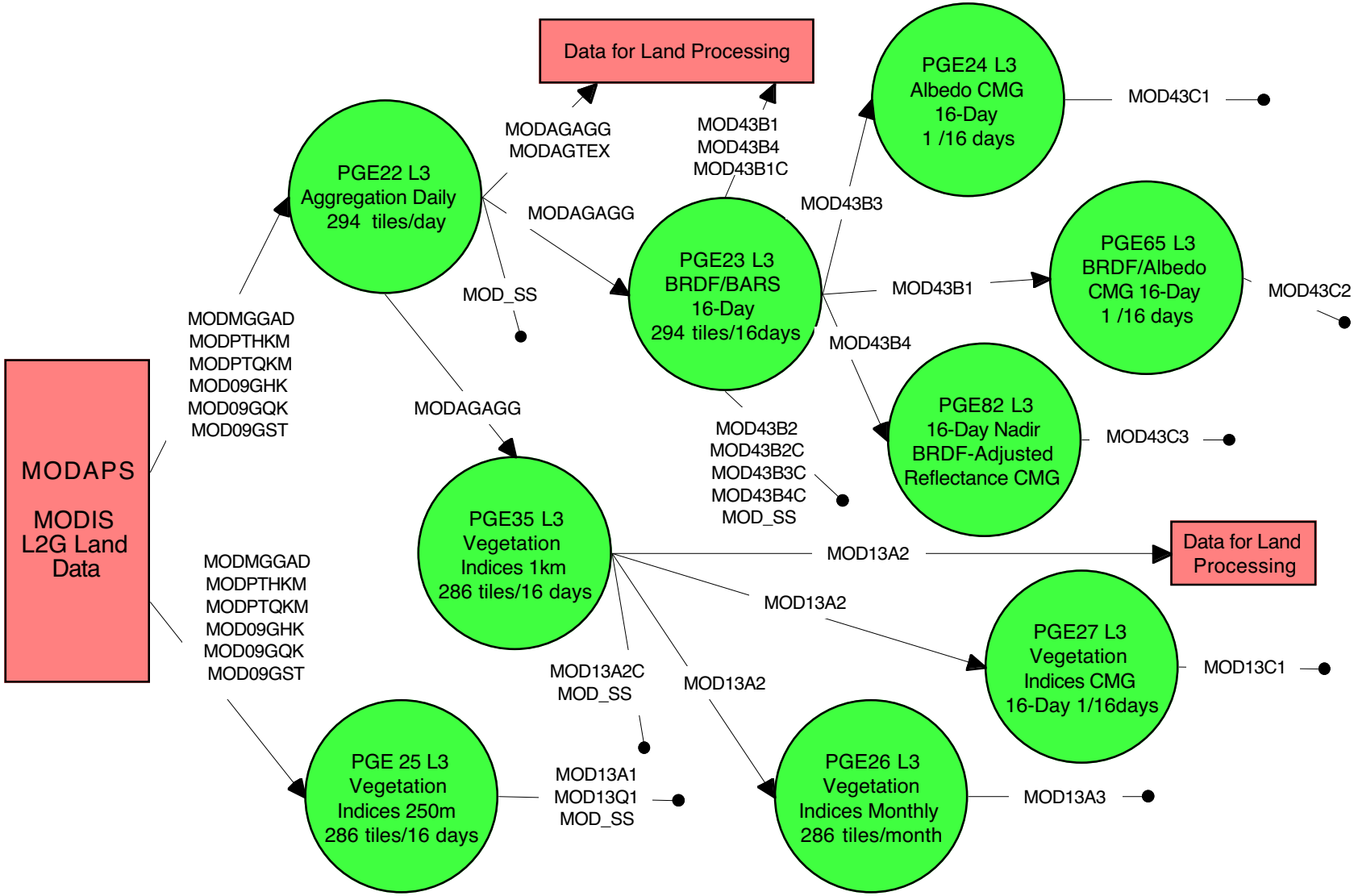

Figure 3-9 Level 3 Aggregation, BRDF, Albedo, and VI Land Processing at MODAPS

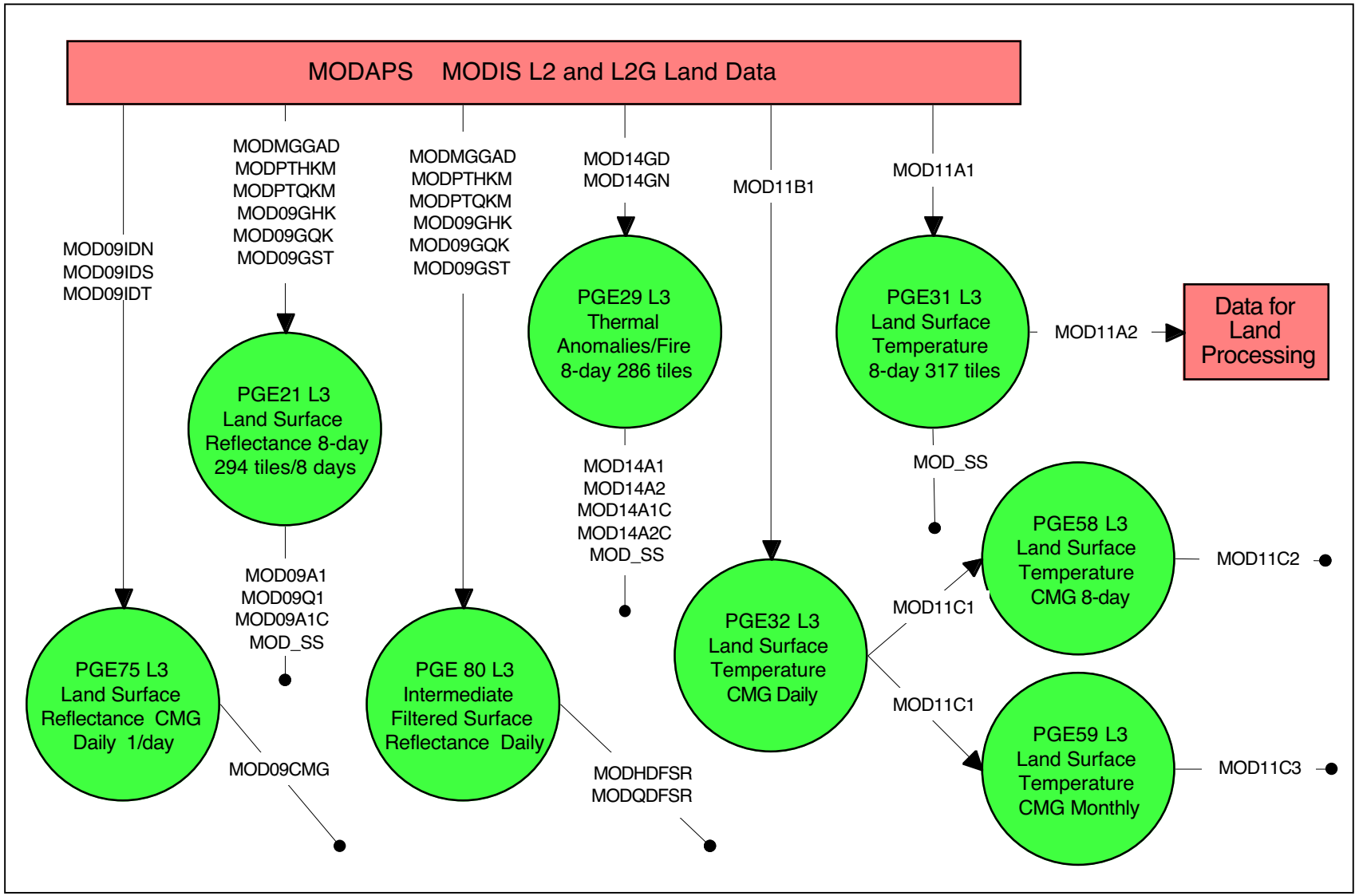

Figure 3-10 Level 3 Reflectance and Thermal Land Processing at MODAPS

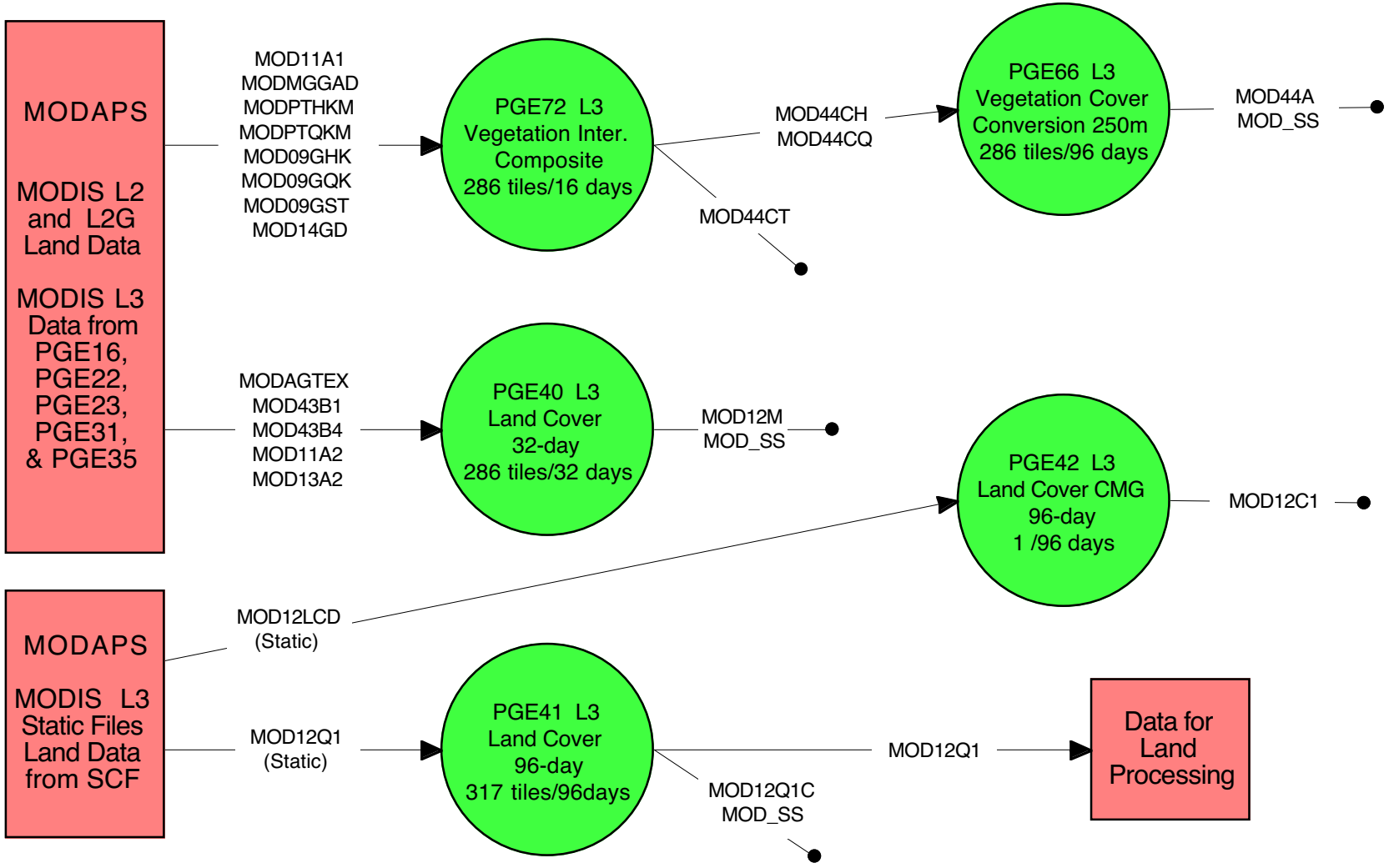

Figure 3-11 Level 3 Vegetation and Land Cover Processing at MODAPS

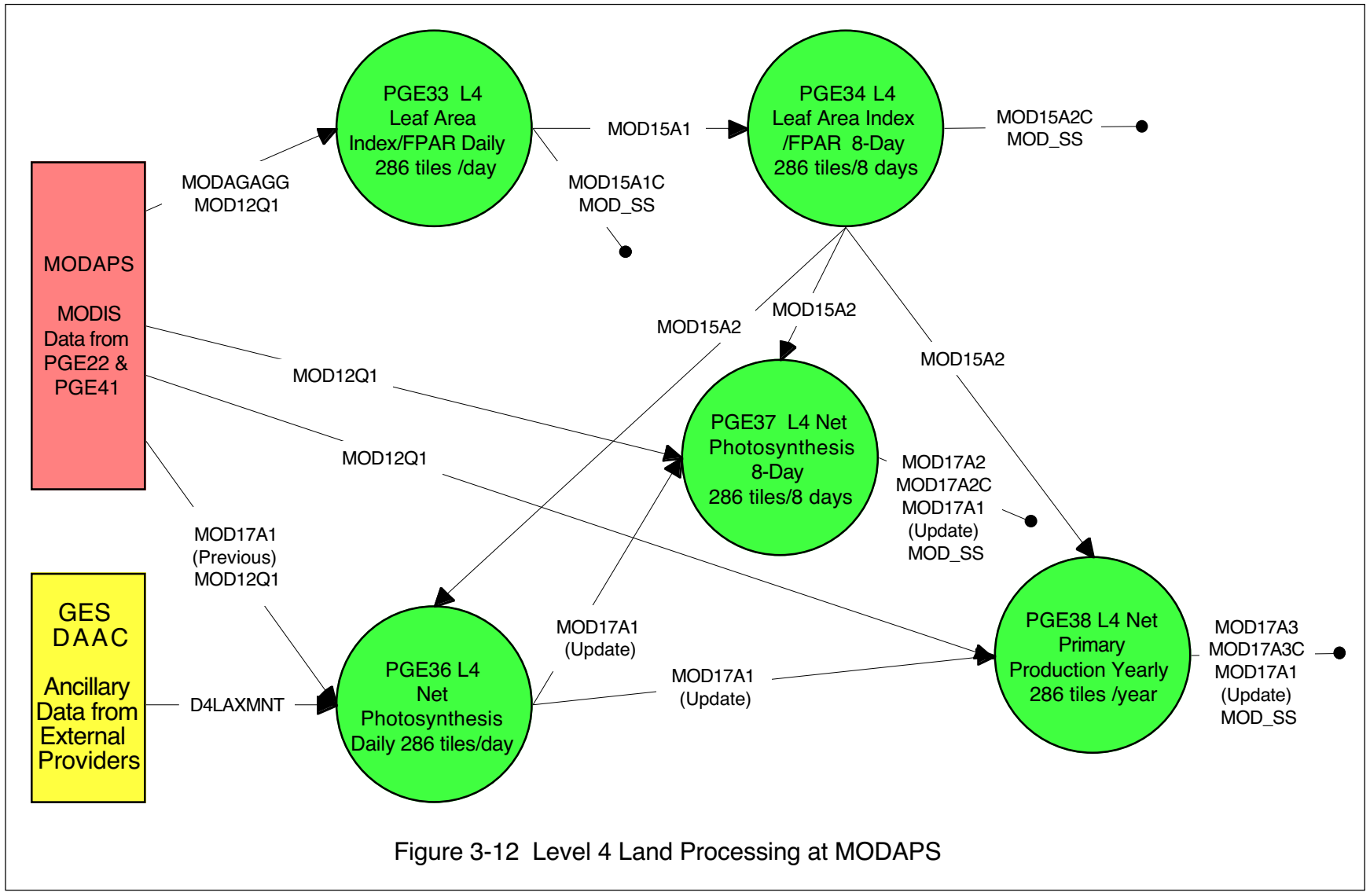

Figure 3-12 Level 4 Land Processing at MODAPS

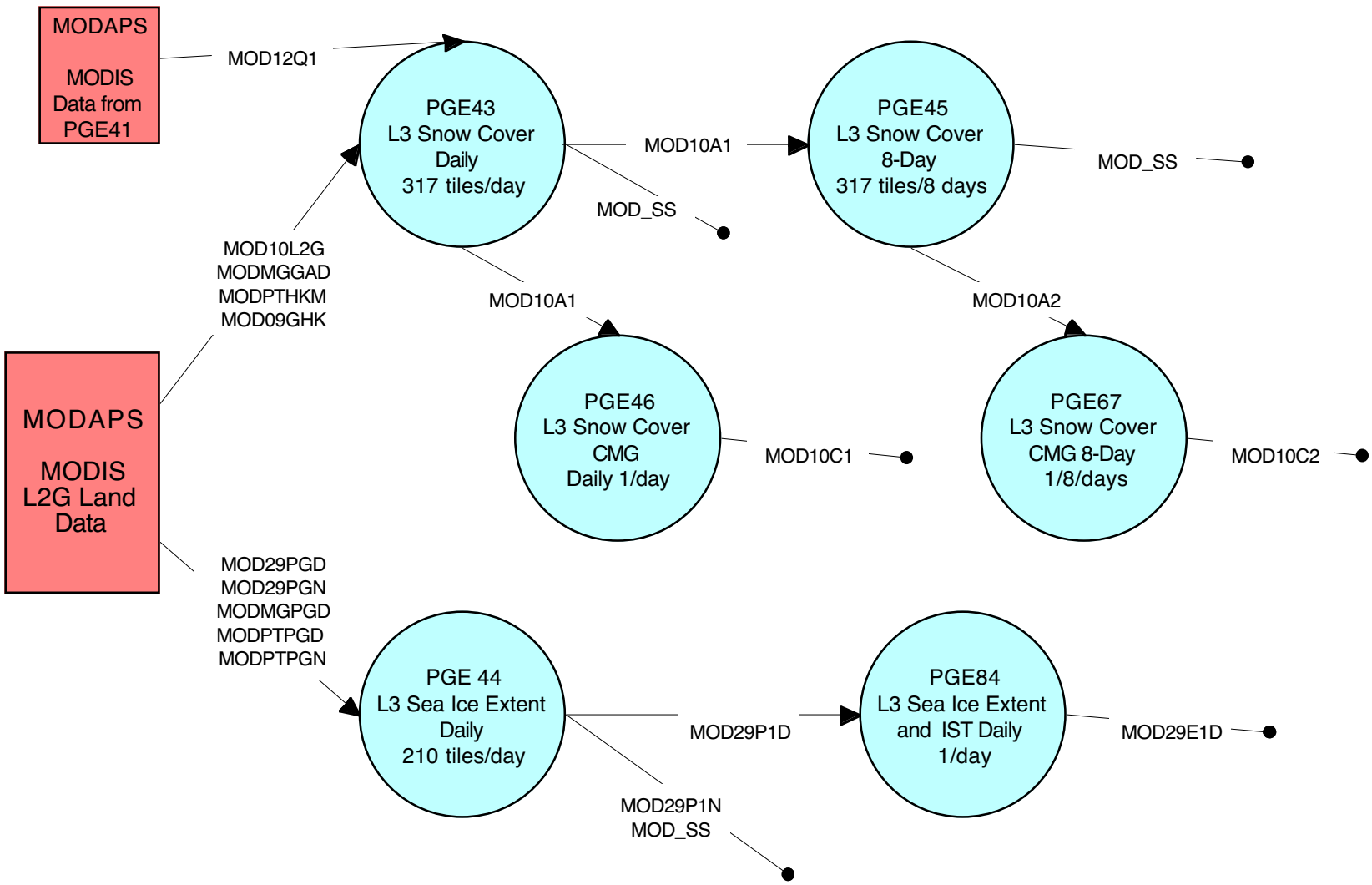

Figure 3-13 Level 3 Snow and Sea Ice Processing at MODAPS

3.2.4 PGE Profiles

Some of the MODIS PGEs may be run in multiple ways to produce different output products. The same code is used for the process or processes within the PGE. However, the input products as well as the output products will generally be different. The automated data processing system must be able to recognize the different ways of running the PGE, stage the proper inputs, and produce the proper outputs. MODAPS and ECS perform this function by associating different PGE profiles for each variation of the PGE.

The multiple Level 1 PGE profiles must be registered at SSI&T at the GES DAAC and L2, L3, and L4 PGE profiles must be installed at MODAPS. Each PGE profile has its own Process Control File (PCF) which contains the various input and output data types, different runtime parameters, and possibly different numbers of input and output files. The ECS SDPS treats these PGE profiles as if they were different PGEs when they are executed in production. MODAPS also runs the PGE profiles separately.

3.3 Operational Scenario

The following sections will describe the environment, interfaces, and processing scenarios.

3.3.1 Environment

The following subsections describe the ECS environment and the MODIS-Application Program Interface (M-API).

3.3.1.1 ECS Interfaces

The MODIS SDP S/W is designed to run under control of the ECS SDPS. The EOS Project has provided to the MODIS Science Data Support Team (SDST) an SDP Toolkit (SDPTK) that isolates the science software from hardware, system, and language interface library dependencies of the ECS SDPS environment. Any access to DAAC data staging areas to retrieve or store data is managed by an SDPTK call issued from the MODIS SDP S/W to the SDPS. The SDPTK is implemented in two versions: a Science Computing Facility (SCF) version and an ECS SDPS version for use in the DAACs. The SDPTK provides a library of callable functions and subroutines including generic Input/Output (I/O), Status Message Facility (SMF), and PCF support. The SDPTK was integrated into the Science Team Member (STM)-supplied software in preparation for delivery to the DAAC or to MODAPS.

3.3.1.2 M-API Interface

In addition to the SDP Toolkit interface to the ECS SDPS environment, MODIS SDP S/W has a customized M-API. The information on M-API is based on the M-API User's Guide, Version 2.3. M-API was developed by the MODIS SDST for both reading and writing science data sets associated with land, ocean, and atmosphere algorithms.

All standard products for EOSDIS are required to be written in Hierarchical Data Format (HDF). HDF is a self-describing format developed by the National Center for Supercomputing Applications (NCSA). M-API is available to scientists and programmers who are building algorithm-based software and delivering MODIS code to the ECS.

M-API is designed to simplify the process of reading the L1B radiance bands and higher level science data in HDF and for writing products and metadata to the HDF files. In addition, M-API includes the interfaces to HDF-EOS files, which were specifically designed and developed for the ECS to contain data in the swath, grid, and point structures. M-API shields the users from the low-level details of HDF so that they can focus on their science algorithms. At the same time, M-API allows enough flexibility for users to customize the structures of the HDF output to meet their own research needs. M-API handles the generation of low-level objects with HDF and efficiently organizes them to facilitate access to their contents by other software. M-API is delivered as a software library by the same process as the PGEs to the DAACs for use with the MODIS science software.

3.3.2 Data Interfaces

The MODIS SDP S/W requires the following external data as input:

- MODIS Level 0 data, transmitted to the GES DAAC.
- Spacecraft data, transmitted to the GES DAAC, ingested by the SDPS, and made available to processing software via the SDP Toolkit. The primary specific spacecraft data sets required by MODIS are the attitude and ephemeris. The SDP Toolkit also requires the leap second and UTC conversion files. External data sets include the planetary ephemeris data from Jet Propulsion Laboratory (JPL).
- Ancillary data, both static and dynamic. The specific ancillary data required by each PGE are included with the PGE descriptions in Section 4. The sources of the ancillary data are either external data producers [i.e., the National Center for Environmental Prediction (NCEP), the Atmospheric Chemistry Group at GSFC, the National Snow Ice Data Center (NSIDC), and the Data Assimilation Office (DAO)] or the software developers.

All of these data are acquired and archived at the DAACs. In addition, all MODIS processes beyond L1A require MODIS products as input. The specific data required for each PGE are staged by the SDPS for execution of the PGE.

The MODIS SDP S/W produces the following outputs:

- MODIS standard products, which are archived and inventoried at the designated DAAC, as defined in the V2 Requirements Specification
- MODIS interim products, which are archived and inventoried either at the GES DAAC for a short period of time or at MODAPS

- QA products, which are transmitted to the appropriate SCF
- ASCII metadata files for all products
- Log status files and production histories that are saved in the processing log for each PGE run at the GES DAAC and MODAPS.
- Temporary files that are deleted after the software execution is completed.

All of the outputs are managed by the SDPS following completion of each PGE.

3.3.3 Processing Scenarios

When the MODIS Instrument and the SDPS were stabilized after the launch, a global data set of one month of all the MODIS products from the PGEs running at launch was produced for the use of the scientific community. Since data processing resources were limited for the first year of the EOS AM-1 mission, only about 25 percent of the total products were to be generated and archived at the DAACs. The L1 Raw Radiances, L1 Geolocation product, and L2 Cloud Masks and Atmospheric Profiles are required by MODIS Atmosphere, Ocean, and Land PGEs. Since the volumes of Level 1 and Atmosphere products are less than the volume for products from other disciplines, all of the Level 1 and Atmosphere products are produced globally for every day of the year and are archived at the GES DAAC. Each MODIS Team implemented its own reduced production scenario or modified plans for archive of selected products. The MODIS Oceans Team changed some Oceans products to interim products and modified their data processing software to store some data values as integers plus scaling factors to reduce the volume. The MODIS Ocean Team planned to produce a combination of products from a subset of the MODIS radiance bands and sub-sampled data in the future if allowable volumes were not increased. The MODIS Land Team planned to limit the products by processing data only for selected geographical regions on the Earth. The Land processing is based on tile schemas which are defined to the SDPS for use with the Land PGEs. The regions included in the plan for the MODIS PGEs are North America, South America, parts of Africa, and parts of Asia. After the early mission, the MODIS Terra data products were generated at 100% for all operational PGEs. However, the Land products at the highest resolution of 250m were limited to selected tiles. The following sections describe the processing scenarios for the MODIS L1, Atmosphere, Oceans, and Land PGEs.

3.3.3.1 Level 1 Processing Scenario

The MODIS L1 processing, performed at the GES DAAC, consists of L1A/Geolocation and L1B. This processing is initiated each time MODIS Level 0 data are received at the DAAC from EDOS.

The L1A process defines the processing granule size that is used by all subsequent L1 and L2 processing. A single Level 0 data delivery from EDOS consists of two hours (nominally) of data. For each 2-hour delivery of Level 0 data, the L1A process is executed 24 times to produce 24 five-minute L1A granules. The Geolocation process,

within the same PGE, inputs each L1A granule and produces a five-minute geolocation granule. A total of 24 Geolocation granules are generated from each 2-hours of Level 0 data. In actual production, the GES DAAC currently runs PGE01 in 15-minute segments.

The L1B processing is then initiated using the L1A granules as input, one PGE execution per granule. These will run in parallel, within the available resources of the DAAC. The Atmosphere Cloud Mask and Profiles, run at the GES DAAC, are considered to be part of the Level 1 processing. These are described in the following section.

3.3.3.2 Atmosphere Processing Scenario

The MODIS Atmosphere processing consists of the L2 generation of Cloud Mask, Atmospheric Profiles, Clouds, Atmospheric Aerosols, and Total Precipitable Water Vapor, the L3 generation of Interim Land Aerosol, and the L3 generation of combined Atmosphere products. Atmosphere Cloud Mask and Atmospheric Profiles processing is performed at the GES DAAC. All of the other atmosphere processing is performed at MODAPS. The L2 processing scenario is straightforward: each PGE is run once per input L1B calibrated radiance granule, also using other MODIS products as input.

The processing begins with L2 Cloud Mask/Atmospheric Profiles, which performs ancillary data preprocessing and processes each granule of L1B and Geolocation data. This is followed by L2 Atmosphere and L2 Clouds, which are performed for every granule. Although the L2 Atmosphere processes are run on both the day and night mode granules, different processing scenarios are required. The aerosol product will not be produced at night and the total precipitable water vapor product will only contain a small amount of data at night. For the first part of the Terra Mission, upon completion of processing for all granules containing data within an orbit, the L3 Interim Land Aerosol PGE was executed on an orbital period to produce the interim Land Aerosol product for use by the Land PGEs. When the Land Discipline Group examined the resulting Land products, the quality was not as good as expected and this PGE was discontinued from operations. The description of this PGE is still included in Section 4 as a place holder for future restoration.

The L3 Atmosphere processing combines the Aerosol, Water Vapor, Atmospheric Profiles, and Cloud products into a single gridded product, which is produced daily, every eight days, and monthly. The daily L3 processing is performed in two phases. The first phase uses a day of L2 products as input to produce a set of interim files based on zonal tiles. The zonal tiles consist of 36 latitude-bounded bands around the Earth, starting at the North Pole and ending at the South Pole, and each tile is written to a separate interim file. The second phase of processing is to combine these files into a single, global, daily product. The daily products are then used as input to produce the 8-day and monthly L3 products.

3.3.3.3 Ocean Processing Scenario

The Oceans Processing, performed by MODAPS, is organized around two overall product types: Ocean Color and Sea Surface Temperature (SST). The processing for the two product types differs at L2 but is essentially the same for all L3 products.

MODAPS has processed all of the MODIS Ocean data since the Terra Launch. In January of 2004 NASA discontinued funding for production of Terra Ocean data due to an inability of the MODIS instrument on Terra to produce the quality of data expected and moved the Aqua Ocean Color processing to another group at a significantly reduced production scenario of fewer Ocean parameters. MODAPS is continuing the production of Aqua Ocean Sea Surface Temperature (SST) at least through the reprocessing of Aqua data. The description of the Oceans PGEs and data processing will not be changed to eliminate the Ocean Color products for this version of SDD.

The initial Oceans processing is performed on one granule per PGE execution using L1B, Geolocation, and Cloud Mask data as input. The L2 Ocean Color processing is performed for day mode granules only, while the L2 SST processing is performed for all granules. Both PGEs perform both L2 and the first stage of L3 processing to produce L2 and granule-based L3 binned products. These PGEs perform the space binning of 36 Ocean Color parameters and separate day and night space binning of two SST parameters. During the data validation, the MODIS Oceans Group decided to discontinue making the second daytime SST parameter due to failure to meet quality expectations. The next stage of L3 processing performs the time binning of the 36 Ocean Color parameters, one SST parameter in day mode, and two SST parameters in night mode into the 39 daily L3 products. The time binning is based on the Ocean Data Day. The determination of data that fall into a Data Day is defined on the basis of equator crossing of the satellite near the international date line.

The subsequent Oceans processing is performed to aggregate the L3 binned products over progressively longer time scales starting with eight days. During the first year of Terra operations, the MODIS data were processed through two interim PGEs. The first PGE made interim 8-day (weekly) products and the second PGE made a sliding 3-week (24-day) reference file of L3 binned data to be used in making the final quality controlled products. Due to problems with the cloud removal algorithms, this processing stream was discontinued. The Oceans interim PGE descriptions were retained in Section 4 as place holders for possible improvements in algorithms in the future. Currently, the daily products are input directly into a PGE to produce the 8-day (weekly) parameter products. The daily and 8-day products are used to produce the monthly and yearly binned Ocean Color products, the monthly and yearly binned SST products, Ocean Primary Productivity products, yearly Chlorophyll averaged products, high-variance statistical products, and Oceans weekly running-year product averages. Ocean products also include corresponding maps of some of these products at the daily, 8-day, monthly, and yearly stages of processing.

3.3.3.4 Land Processing Scenario

The Land Discipline contains the largest number and variety of science data products**.** Some of these are Land Surface Reflectance, Land Surface Temperature, Thermal Anomalies, Bi-directional Reflectance Distribution Function, Albedo, Vegetation Indices, Vegetation Continuous Fields, Vegetation Cover Conversion, Land Cover, Snow Cover, Sea Ice Extent, Leaf Area Indices, Fraction of Photosynthetically Active Radiation, Net Photosynthesis, and Net Primary Production. The Land Science Data Processing generates several levels of products that include granules covering several periods of observation time.

The following list shows the correspondence between product level and data period:

Level 2 Products – Five-minute swath granules.
Level 2G Products – Daily pointers to granules overlapping predefined Land tiles
Level 3 and 4 Products – Daily, 8-day, 16-day, monthly, 32-day, 96-day, and yearly tiled granules and CMG maps

The MODIS channels range over the spectral bands from visible to infrared. Some of the MODIS channels in the visible range are turned off at night. Many of the Land products use only day mode data. The sea ice and thermal anomalies products are separated into day and night mode. For products produced in both day and night, the PGEs may be executed once for the day mode data and once for the night mode data. The entire sequence of sea ice products is performed in this way.

Different ways of running the PGEs to produce the different types of products or different Land tiles require separate Process Control Files (PCFs) in the Science Data Processing System. Each PCF for a PGE is called a PGE Profile. Some of the Land PGEs are designed with the capability of producing more than one product per PGE execution.

During the first year of the EOS AM-1 mission, the MODIS SDP System with the associated PGE Production Rules produced global Land data sets for use by the science community. The global tiling scheme is implemented with each version of the MODIS SDP system. One month of the Land tiled products, starting with L2G and continuing through L3, was generated using the Integerized Sinusoidal map projection and Tile Schemas covering the land areas over the globe. The Sea Ice Extent products were later changed to the EASE-Grid polar projection. Later the Integerized Sinusoidal Land maps were changed to Sinusoidal maps. Through the launch and first year of the mission, 50 percent of many of the science products were generated under the reduced production scenario. The Land science products are now generated at full production for most land areas over the globe.

The MODIS Land Science Data Processing begins with the generation of Level 2 Land products consisting of five minute granules of Land data created from five minute input

granules of Level 1B Calibrated Radiances and L1 Geolocation. The Level 2 Land products are Land Surface Reflectance, Thermal Anomalies/Fire, Snow Cover, Sea Ice Extent, and Land Surface Temperature. Each of the Land products are created by different Product Generation Executives (PGEs).

The L2 Land processing is similar to that for the other disciplines. One 5-minute granule of L2 product is created from one 5-minute granule of L1B Calibrated Radiance data. The L2 Land Surface Reflectance/Fire processing is performed for one orbit at a time for all granules using L1B, Geolocation, and L2 Atmosphere products as input. The remaining MODIS L2 Land processes are run separately in the L2 PGEs. The L2 Snow Cover PGE is executed once for every L1B day mode granule and its corresponding Geolocation granule. The L2 Sea Ice Extent PGE is executed once for each L1B and Geolocation granule in both day and night modes. The L2/L3 Land Surface Temperature (LST) processing is also performed at this point using the L1B Calibrated Radiances at 1km resolution, Geolocation, Cloud Mask, Atmospheric Profiles, and L2 Snow Cover as input.

The transition from a swath product to a gridded, tiled product occurs at the L2G stage of Land processing. The MODLAND Team has built into their PGEs a capability of making Land products in several projections and tile sizes for the MODIS Land tiling. Some of these projections are Integerized Sinusoidal, Sinusoidal, Goode's Homolosine, Lambert Azimuthal Equal-Area with projection center at the North Pole, and Lambert Azimuthal Equal-Area with projection center at the South Pole. After the Level 2 products are produced, the higher level products are binned and gridded into Land Tiles in several projections and resolutions. The Integerized Sinusoidal Projection was being used in production for the Land Surface Reflectance, Thermal Anomalies/Fire, Land Surface Temperature, and Snow Cover in all previous versions of the MODIS SDPS System Description. At some period under the MODIS V2.2 SDP System, the Sea Ice Extent products were switched to a polar projection. The Land Group also has plans for making some Snow Cover products in the polar projection. The tile sizes are full, quarter, and one-sixteenth. The full size is to be used in production. The tiles selected for production may be changed over the life of the mission and new tile schemas may be defined and used. For the Version 4 Processing all products in the Integerized Sinusoidal map projection were changed to the Sinusoidal map projection. There are a total of 460 Sinusoidal Grid tiles covering the Earth, but Land products are made only for the tiles containing land or sea ice. There are several streams of products made from the Land PGEs, each stream containing a different number of tiles. Some products have geographical boundaries over which the tiled products are made. In general the total numbers of tiles made range from 286 to 360.

The L2G processing begins when all of the granules for one Greenwich Mean Time (GMT) day have been processed. Some L2G PGEs require two primary profiles, one for day mode and one for night mode. All L2G PGE profiles are run once per tile; the inputs for an execution consist of all granules which overlap geographically with the

specified tile for the required MODIS products. The first step in the data processing is the generation of tiles of L2G Pointers to L2 granules and corresponding Geolocation Angles. Using the Pointers and Geolocation Angles, the L2G Products of Surface Reflectance, Thermal Anomalies/Fire, Snow Cover, and Sea Ice Extent are produced. L3 and L4 tiled Land Products are created from the basic L2 and L2G Land products. The tiles of data are produced and stored separately throughout the entire data processing chains until the global Climate Modeling Grid (CMG) products are created.

As in the previous MODIS SDP Systems, the MODIS V4.0 SDP System will process the Land products using several basic tile schemas based on global land coverage or regions of high priority. Table 3-8 lists the tile schemas, MODAPS Recipes that use each tile schema, and PGEs in each recipe. This table is discussed in Section 3.5.

The L3 processing for products to be archived and distributed at NSIDC consists of the daily and 8-day processing for both Snow Cover and Sea Ice Extent. Daily and 8-day PGEs are executed on a per tile basis. After the tiled products have been made, daily and 8-day CMG PGEs are executed on a global basis.

The L3 and L4 processing for products to be archived and distributed at the Land Process (LP) DAAC at EDC consists of separate processing streams for each product type. The primary product types are Land Surface Reflectance, Land Surface Temperature (LST), Thermal Anomalies/Fire, Vegetation Indices, Bi-directional Reflectance Distribution Function (BRDF), Leaf Area Indices (LAI)/Fraction Photosynthetically Active Radiation (FPAR), Net Primary Production (NPP), Land Cover, Vegetation Continuous Fields, and Vegetation Cover Conversion. Each product is generated over progressively longer time scales. Daily, 8-day or 16-day, 32-day or monthly, quarterly, and yearly products are made on a per tile basis. CMG products are then produced on a global basis.

All of the Land PGEs contain a common process, which will run in the PGE script after all of the other science modules in the PGE have completed operation. This common process extracts all of the metadata from each of the output product granules and writes the extracted metadata to Quality Assurance (QA) files corresponding to each output granule. These QA files are transported back to the SCFs for analysis at the completion of the PGE and can then be deleted from the system. The Land PGEs also make many sub-setted products from the standard products. These are transported to Land product validation sites. Currently there are about 15 validation sites.

Some of the primary differences between the data processing in previous versions of the MODIS SDPS Systems and Version 4.0 are production of more CMG products and additional interim products for more detailed study of the science granules, QA, and validation. More coarse resolution, subsetted, and sub-sampled products are being made from many of the standard Land products.

3.4 Science Data Products and Processing Files

An overview of the MODIS standard data products and the parameters they contain is presented in a catalog of MODIS Data Products. This information is available on the World Wide Web (WWW) MODIS site at URL:

http://modis.gsfc.nasa.gov/data/dataproducts.html

Some images of MODIS products are found on the WWW site at URL:

http://visibleearth.nasa.gov/Sensors/Terra/MODIS.html

For the scientific derivation of each product, the user may consult the Algorithm Theoretical Basis Document (ATBD) for each product that is located on the WWW at URL:

http://modis.gsfc.nasa.gov/data/algorithms.html

The full details of the structure, size, and characteristics of every file produced or utilized by the MODIS SDP S/W are provided in the on-line MODIS Processing Files Description area, which is a collection of the file specifications for each MODIS product. The location is referenced here in Section 2 under, “Related Documentation”, URL:

ftp://modular.gsfc.nasa.gov/pub/LatestFilespecs

Each file or group of files has been assigned an ESDT designation by the ECS Project in cooperation with the MODIS SDST. The MODIS ESDTs are listed in Table 3-3-1 and 3-3-2, along with a description, processing level, file-type, file name, and the MODIS process associated with the ESDTs. ESDT collections for dynamic MODIS products are described in Table 3-3-1. ESDT collections for grouping and storing static input files are described in Table 3-3-2. The Time-Varying Ancillary Data ESDTs are listed in Table 3-4. The Ancillary Data ESDTs used by the SDP Toolkit are listed in Table 3-5. The file types include P (product), S (static, e.g., LUT), Q (quality control or diagnostic output), and T (temporary). The file names consist of a complete name for all but MODIS products. An asterisk (*) listed for a MODIS product ESDT indicates the file name uses the MODIS Science Data Product Naming Convention as defined in the MODIS Version 2 Science Computing Facility Software Delivery Guide. The Oceans L3 products consist of 36 Ocean Color parameters and two Sea Surface Temperature (SST) parameters for both day and night modes. However, the production of the D2 SST product has been temporarily stopped due to algorithms that produced a lower quality of the product than expected. Table 3-6 lists the mapping of the L3 Oceans ESDTs to the Product LongName. The ESDTs will be used in the remainder of the document for all references to processing files. Table 3-3-1 also includes several data sets associated with future deliveries of MODIS processes (labeled in the Description column). These data sets are not described in any detail in the individual PGE descriptions in Section 4.

Table 3-3-1. MODIS Dynamic Product ESDTs

Note: (1) A MODIS Science Data Product Naming Convention is used for most products; for File Name * = standard naming convention.
(2) File Types are noted by: P = MODIS product; Q = MODIS QC product; T = Temporary product files
(3) Ocean multi-type granule ESDTs have 6 character names for the DAAC followed by 2 character extensions for MODAPS indicated by subscripts
(4) In the PGE column the following apply: O = Several Oceans PGEs; L = Several Land PGEs
(5) Most ESDTs have Terra and Aqua versions; some ESDTs have combined Terra plus Aqua versions.
(6) Terra ESDT Names begin with "MO"; Aqua ESDT names begin with "MY"; Combined Terra plus Aqua ESDTs begin with "MC".

ESDT	LongName/Product Description	Lev	Type	File Name	PGE	Process
MO{04, 36}MA##	MODIS/Terra Interim Ocean Color and SST QC Mean Maps Daily L3 Global {4km} CylEqDis {36km} (Where: M = MODIS O = Oceans {04, 36) = resolution and size: 04 = 4 km 36 = 36 km M = Mean A = Interim Daily ## = 1 through 36 for Ocean Color parameters or D1, N1, and N2 for SST parameters or 41 through 61, 63 through 66, and 69 through 78 for QC parameters)	3	P	*	20	MOD_PRmtbin

ESDT	LongName/Product Description	Lev	Type	File Name	PGE	Process
MO {04,36,1D} {M, S, N, Q, F, 1, 2, 3}Dpp	MODIS/Terra Ocean Color and SST {Mean} Maps Daily L3 Global {4km} CylEqDis {Std. Dev.} {36km} {Number {1Deg} {Quality} {Common Flags} {Flag Byte 1} {Flag Byte 2} {Flag Byte 3} (Where: M = MODIS O = Oceans {04, 36, 1D} = resolution and size: 04 = 4 km 36 = 36 km 1D = 1 Degree {M, S, N, Q, F, 1, 2, 3} = values mapped: M = Mean S = Standard deviation N = Number of observations Q = Quality F = Common flags 1 = L2 Flag Byte 1 2 = L2 Flag Byte 2 3 = L2 Flag Byte 3 (only produced for pp = 13 through 25) D = Daily pp = 1 through 36 for Ocean Color parameters or D1, N1, and N2 for SST parameters.)	3	P	*	53	MOD_PRmtbin

ESDT	LongName/Product Description	Lev	Type	File Name	PGE	Process
MO{04, 36, 1D}{M, S, N, Q, F, 1, 2, 3}Mpp	MODIS/Terra Ocean Color and SST {Mean} Maps Monthly L3 Global {4km} CylEqDis {Std. Dev.} {36km} {Number {1Deg} {Quality} {Common Flags} {Flag Byte 1} {Flag Byte 2} {Flag Byte 3} (Where: M = MODIS O = Oceans {04, 36, 1D} = resolution and size: 04 = 4 km 36 = 36 km 1D = 1 Degree {M, S, N, Q, F, 1, 2, 3} = values mapped: M = Mean S = Standard deviation N = Number of observations Q = Quality F = Common flags 1 = L2 Flag Byte 1 2 = L2 Flag Byte 2 3 = L2 Flag Byte 3 (only produced for pp = 13 through 25) M = Monthly pp = 1 through 36 for Ocean Color parameters or D1, N1, and N2 for SST parameters.)	3	P	*	73	MOD_PRmtbin

ESDT	LongName/Product Description	Lev	Type	File Name	PGE	Process
M0O{04, 36, 1D}{M, S, N, Q, F, 1, 2, 3}Npp	MODIS/Terra Ocean Color and SST {Mean} Maps Yearly L3 Global {4km} CylEqDis {Std. Dev.} {36km} {Number {1Deg} {Quality} {Common Flags} {Flag Byte 1} {Flag Byte 2} {Flag Byte 3} (Where: M = MODIS O = Oceans {04, 36, 1D} = resolution and size: 04 = 4 km 36 = 36 km 1D = 1 Degree {M, S, N, Q, F, 1, 2, 3} = values mapped: M = Mean S = Standard deviation N = Number of observations Q = Quality F = Common flags 1 = L2 Flag Byte 1 2 = L2 Flag Byte 2 3 = L2 Flag Byte 3 (only produced for pp = 13 through 25) N = Yearly pp = 1 through 36 for Ocean Color parameters or D1, N1, and N2 for SST parameters.)	3	P	*	74	MOD_PRmtbin

ESDT	LongName/Product Description	Lev	Type	File Name	PGE	Process
MO{04, 36, 1D}{M, S, N, Q, F, 1, 2, 03}Wpp	MODIS/Terra Ocean Color and SST {Mean} Maps 8-Day L3 Global {4km} CylEqDis {Std. Dev.} {36km} {Number} {1Deg} {Quality} {Common Flags} {Flag Byte 1} {Flag Byte 2} {Flag Byte 3} (Where: M = MODIS O = Oceans {04, 36, 1D} = resolution and size: 04 = 4 km 36 = 36 km 1D = 1 Degree {M, S, N, Q, F, 1, 2, 3} = values mapped: M = Mean S = Standard deviation N = Number of observations Q = Quality F = Common flags 1 = L2 Flag Byte 1 2 = L2 Flag Byte 2 3 = L2 Flag Byte 3 (only produced for pp = 13 through 25) W = 8-Day weekly pp = 1 through 36 for Ocean Color parameters or D1, N1, and N2 for SST parameters.)	3	P	*	54	MOD_PRmtbin
MOAPWAxx	MODIS/Terra Ocean SemiAnalytic Primary Production 8-Day L4 Global 4km CylEqDis (where xx = one of parameters M1, M2, ME, MD, N1, N2, F1, F2)	4	P	*	51	MOD_PR27W
MOAPWBxx	MODIS/Terra Ocean SemiAnalytic Primary Production 8-Day L4 Global 36km CylEqDis (where xx = one of parameters M1, M2, ME, MD, N1, N2, F1, F2)	4	P	*	51	MOD_PR27W
MOAPW1xx	MODIS/Terra Ocean SemiAnalytic Primary Production 8-Day L4 Global 1Deg CylEqDis (where xx = one of parameters M1, M2, ME, MD, N1, N2, F1, F2)	4	P	*	51	MOD_PR27W
MOAPYAyy	MODIS/Terra Ocean SemiAnalytic Primary Production Yearly L4 Global 4km CylEqDis (where xx = one of parameters M1, M2, S1, S2, W1, W2, N1, N2, F1, F2)	4	P	*	51	MOD_PR27Y
MOAPYByy	MODIS/Terra Ocean SemiAnalytic Primary Production Yearly L4 Global 36km CylEqDis (where xx = one of parameters M1, M2, S1, S2, W1, W2, N1, N2, F1, F2)	4	P	*	51	MOD_PR27Y
MOAPY1yy	MODIS/Terra Ocean SemiAnalytic Primary Production Yearly L4 Global 1Deg CylEqDis (where xx = one of parameters M1, M2, S1, S2, W1, W2, N1, N2, F1, F2)	4	P	*	51	MOD_PR27Y

ESDT	LongName/Product Description	Lev	Type	File Name	PGE	Process
MOC021KM	MODIS/Terra Calibrated Radiances Site Cutouts L1B 1km	2	P	*	79	MOD_PRmsubl
MOC28L2	MODIS/Terra Ocean Sea Surface Temperature Products Site Cutouts L2 1km	2	P	*	10	MOD_PRmsub
MOC28QC	MODIS/Terra Ocean Sea Surface Temperature QC Products Site Cutouts L2 1km	2	P	*	10	MOD_PRmsub
MOCOCL2	MODIS/Terra Ocean Color Radiance Products Site Cutouts L2 1km	2	P	*	09	MOD_PRmsub
MOCOCL2A	MODIS/Terra Ocean Color Radiance Products Group 1 Site Cutouts L2 1km	2	P	*	09	MOD_PRmsub
MOCOCL2B	MODIS/Terra Ocean Color Radiance Products Group 2 Site Cutouts L2 1km	2	P	*	09	MOD_PRmsub
MOCOCQC	MODIS/Terra Ocean Color QC Products Site Cutouts L2 1km	2	P	*	09	MOD_PRmsub
MOD000	MODIS/Terra Raw Instrument Packets 2-Hr L0 Swath	1	P	*	N/A	MOD_PR01
MOD01	MODIS/Terra Raw Radiances in Counts 5-Min L1A Swath	1	P	*	01	MOD_PR01
MOD01SS	MODIS/Terra Subsetted Raw Radiances in Counts 5-Min L1A Swath	1	P	*	71	MOD_PR01SS
MOD021KM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 1km	1	P	*	02	MOD_PR02
MOD02CRS	MODIS/Terra Coarse Calibrated Radiances 5-Min L2 Swath 5km	2	P	*	11	MOD_PR02CRS
MOD02CSS	MODIS/Terra Subsampled Coarse Calibrated Radiances 5-min L2 Swath 5km	2	P	*	11	MOD_PR02CRS
MOD02HKM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 500m	1	P	*	02	MOD_PR02
MOD02OBC	MODIS/Terra On-Board Calibrator and Engineering Data 5-Min L1B	1	P	*	02	MOD_PR02
MOD02QKM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 250m	1	P	*	02	MOD_PR02
MOD021QA	MODIS/Terra QA Summary of Calibrated Radiances 5-Min L1B 1km	1	Q	*	02	MOD_PR02
MOD03	MODIS/Terra Geolocation Fields 5-Min L1A Swath 1km	1	P	*	01	MOD_PR03
MOD03CP	MODIS/Terra Geolocation Control Point Residuals 5-Min L2 50m	N/A	Q	*	60	MOD_PR03CP
MOD04L_O	MODIS/Terra Orbital Aerosol Product 1-Orbit L3 Swath 18km SIN Grid (Not produced in current operations)	3	P	*	05	MOD_PR04ORB
MOD04_L2	MODIS/Terra Aerosol 5-Min L2 Swath 10km	2	P	*	04	MOD_PR04_05
MOD04_QC	MODIS/Terra MOD_PR04 Diagnostic File for Uncorrected Water Vapor 5-Min L2	2	Q	*	04	MOD_PR04_05
MOD05_L2	MODIS/Terra Total Precipitable Water Vapor 5-Min L2 Swath 1km and 5km	2	P	*	04	MOD_PR04_05
MOD05_QC	MODIS/Terra MOD_PR05 Diagnostic File for Uncorrected Water Vapor 5-Min L2	2	Q	*	04	MOD_PR04_05
MOD06_L2	MODIS/Terra Clouds 5-Min L2 Swath 1km and 5km	2	P	*	06	MOD_PR06CT, MOD_PR06CD, MOD_PR06OD
MOD07_L2	MODIS/Terra Temperature and Water Vapor Profiles 5-Min L2 Swath 5km	2	P	*	03	MOD_PR07
MOD07_QC	MODIS/Terra Vertical Profiles Diagnostics 5-Min L2 5km	2	Q	*	03	MOD_PR07
MOD08D3H	MODIS/Terra Aerosol Cloud Water Vapor Ozone Daily L3 Global 0.1Deg CMG	3	Q	*	56	MOD_PR08DH
MOD08_D3	MODIS/Terra Aerosol Cloud Water Vapor Ozone Daily L3 Global 1Deg CMG	3	P	*	56	MOD_PR08D

ESDT	LongName/Product Description	Lev	Type	File Name	PGE	Process
MOD08_E3	MODIS/Terra Aerosol Cloud Water Vapor Ozone 8-Day L3 Global 1Deg CMG	3	P	*	70	MOD_PR08E
MOD08_M3	MODIS/Terra Aerosol Cloud Water Vapor Ozone Monthly L3 Global 1Deg CMG	3	P	*	57	MOD_PR08MC, MOD_PR08M
MOD08TLH	MODIS/Terra Atmosphere Zonal Tiling Daily L3 Latitude Zone 0.1Deg CMG	3	Q	*	69	MOD_PR08TH
MOD08_TL	MODIS/Terra Atmosphere Zonal Tiling Daily L3 Latitude Zone 1Deg CMG	3	P	*	69	MOD_PR08T
MOD09	MODIS/Terra Surface Reflectance 5-Min L2 Swath 250m, 500m and 1km	2	P	*	11	MOD_PR09
MOD09A1	MODIS/Terra Surface Reflectance 8-Day L3 Global 500m SIN Grid	3	P	*	21	MOD_PR09A
MOD09A1C	MODIS/Terra Coarse Surface Reflectance 8-Day L3 Global 5km SIN Grid	3	P	*	21	MOD_PR09A
MOD09CMG	MODIS/Terra Surface Reflectance Daily L3 Global 0.05Deg CMG	3	P	*	75	MOD_PR09C
MOD09CRS	MODIS/Terra Coarse Surface Reflectance 5-Min L2 Swath 5km	2	P	*	11	MOD_PR09
MOD09GHK	MODIS/Terra Surface Reflectance Daily L2G Global 500m SIN Grid	2G	P	*	13	MOD_PRMGR
MOD09GQK	MODIS/Terra Surface Reflectance Daily L2G Global 250m SIN Grid	2G	P	*	13	MOD_PRMGR
MOD09GST	MODIS/Terra Surface Reflectance Quality Daily L2G Global 1km SIN Grid	2G	P	*	13	MOD_PRMGR
MOD09IDN	MODIS/Terra Interim Surface Reflectance North Polar Region 1-Orbit L3 5km CMG	3	P	*	11	MOD_PR09
MOD09IDS	MODIS/Terra Interim Surface Reflectance South Polar Region 1-Orbit L3 5km CMG	3	P	*	11	MOD_PR09
MOD09IDT	MODIS/Terra Interim Surface Reflectance Non-Polar Region 1-Orbit L3 5km CMG	3	P	*	11	MOD_PR09
MOD09Q1	MODIS/Terra Surface Reflectance 8-Day L3 Global 250m SIN Grid	3	P	*	21	MOD_PR09A
MOD10A1	MODIS/Terra Snow Cover Daily L3 Global 500m SIN Grid	3	P	*	43	MOD_PR10A
MOD10A2	MODIS/Terra Snow Cover 8-Day L3 Global 500m SIN Grid	3	P	*	45	MOD_PR10A2
MOD10C1	MODIS/Terra Snow Cover Daily L3 Global 0.05Deg CMG	3	P	*	46	MOD_PR10C1
MOD10C2	MODIS/Terra Snow Cover 8-Day L3 Global 005Deg CMG	3	P	*	67	MOD_PR10C2
MOD10L2C	MODIS/Terra Coarse Snow Cover 5-Min L2 Swath 5km	2	P	*	07	MOD_PR10
MOD10L2G	MODIS/Terra Snow Cover Daily L2G Global 500m SIN Grid	2G	P	*	14	MOD_PRMGR
MOD10_L2	MODIS/Terra Snow Cover 5-Min L2 Swath 500m	2	P	*	07	MOD_PR10
MOD11A1	MODIS/Terra Land Surface Temperature/Emissivity Daily L3 Global 1km SIN Grid	3	P	*	16	MOD_PR11
MOD11A2	MODIS/Terra Land Surface Temperature/Emissivity 8-Day L3 Global 1km SIN Grid	3	P	*	31	MOD_PR11A
MOD11B1	MODIS/Terra Land Surface Temperature/Emissivity Daily L3 Global 5km SIN Grid	3	P	*	16	MOD_PR11
MOD11C1	MODIS/Terra Land Surface Temperature/Emissivity Daily L3 Global 0.05Deg CMG	3	P	*	32	MOD_PR11C
MOD11C2	MODIS/Terra Land Surface Temperature/Emissivity 8-Day L3 Global 0.05Deg CMG	3	P	*	58	MOD_PR11C
MOD11C3	MODIS/Terra Land Surface Temperature/Emissivity Monthly L3 Global 0.05Deg CMG	3	P	*	59	MOD_PR11C

ESDT	LongName/Product Description	Lev	Type	File Name	PGE	Process
MOD11UPD	MODIS/Terra Land Surface Temperature Update Files L3 Global 1km SIN Grid	3	P	Non-standard data date/time field	16	MOD_PR11
MOD11_L2	MODIS/Terra Land Surface Temperature/Emissivity 5-Min L2 Swath 1km	2	P	*	16	MOD_PR11
MOD12C1	MODIS/Terra Land Cover Type Yearly L3 Global 0.05Deg CMG	3	P	*	42	MOD_PR12C
MOD12M	MODIS/Terra Land Cover Database 32-Day L3 Global 1km SIN Grid	3	P	*	40	MOD_PR12M
MOD12Q1	MODIS/Terra Land Cover Type Yearly L3 Global 1km SIN Grid	3	P	*	41	MOD_PR12Q
MOD12Q1C	MODIS/Terra Coarse Land Cover Type Yearly L3 Global 5km SIN Grid	3	P	*	41	MOD_PR12Q
MOD13A1	MODIS/Terra Vegetation Indices 16-Day L3 Global 500m SIN Grid	3	P	*	25	MOD_PR13A1
MOD13A2	MODIS/Terra Vegetation Indices 16-Day L3 Global 1km SIN Grid	3	P	*	35	MOD_PR13A2
MOD13A2C	MODIS/Terra Coarse Vegetation Indices 16-Day L3 Global 5km SIN Grid	3	P	*	35	MOD_PR13A2
MOD13A3	MODIS/Terra Vegetation Indices Monthly L3 Global 1km SIN Grid	3	P	*	26	MOD_PR13A3
MOD13C1	MODIS/Terra Vegetation Indices 16-Day L3 Global 0.05Deg CMG	3	P	*	27	MOD_PR13C1
MOD13C2	MODIS/Terra Vegetation Indices Monthly L3 Global 0.05Deg CMG (Future)	3	P	*	28	MOD_PR13C2
MOD13Q1	MODIS/Terra Vegetation Indices 16-Day L3 Global 250m SIN Grid	3	P	*	25	MOD-PR13A1
MOD14	MODIS/Terra Thermal Anomalies/Fire 5-Min L2 Swath 1km	2	P	*	30	MOD_PR09
MOD14A1	MODIS/Terra Thermal Anomalies/Fire Daily L3 Global 1km SIN Grid	3	P	*	29	MOD_PR14A
MOD14A1C	MODIS/Terra Coarse Thermal Anomalies/Fire Daily L3 Global 5km SIN Grid	3	P	*	29	MOD_PR14A
MOD14A2	MODIS/Terra Thermal Anomalies/Fire 8-Day L3 Global 1km SIN Grid	3	P	*	29	MOD_PR14A
MOD14A2C	MODIS/Terra Coarse Thermal Anomalies/Fire 8-Day L3 Global 5km SIN Grid	3	P	*	29	MOD_PR14A
MOD14C3	MODIS/Terra Thermal Anomalies/Fire 32-Day L3 Global 0.05Deg CMG (Future)	3	P	*	62	MOD_PR14C
MOD14GD	MODIS/Terra Thermal Anomalies/Fire Daily L2G Global 1km SIN Grid Day	2G	P	*	13	MOD_PRMGR
MOD14GN	MODIS/Terra Thermal Anomalies/Fire Daily L2G Global 1km SIN Grid Night	2G	P	*	13	MOD_PRMGR
MOD15A1	MODIS/Terra Leaf Area Index/FPAR Daily L4 Global 1km SIN Grid	4	P	*	33	MOD_PR15A1
MOD15A1C	MODIS/Terra Coarse Leaf Area Index/FPAR Daily L4 Global 5km SIN Grid	4	P	*	33	MOD_PR15A1
MOD15A2	MODIS/Terra Leaf Area Index/FPAR 8-Day L4 Global 1km SIN Grid	4	P	*	34	MOD_PR15A2
MOD15A2C	MODIS/Terra Coarse Leaf Area Index/FPAR 8-Day L4 Global 5km SIN Grid	4	P	*	34	MOD_PR15A2
MOD15C2	MODIS/Terra Leaf Area Index/FPAR Monthly L4 Global 0.05Deg CMG (Future)	4	P	*	63	MOD_PR15C2
MOD17A1	MODIS/Terra Net Photosynthesis Daily L4 Global 1km SIN Grid	4	P	*	36	MOD_PR17A1
MOD17A2	MODIS/Terra Net Photosynthesis 8-Day L4 Global 1km SIN Grid	4	P	*	37	MOD_PR17A2
MOD17A2C	MODIS/Terra Coarse Net Photosynthesis 8-Day L4 Global 5km SIN Grid	4	P	*	37	MOD_PR17A2

ESDT	LongName/Product Description	Lev	Type	File Name	PGE	Process
MOD17A3	MODIS/Terra Net Primary Production Yearly L4 Global 1km SIN Grid	4	P	*	38	MOD_PR17A3
MOD17A3C	MODIS/Terra Coarse Net Primary Production Yearly L4 Global 5km SIN Grid	4	P	*	38	MOD_PR17A3
MOD17C2	MODIS/Terra Net Photosynthesis 8-Day L4 Global 0.05Deg CMG (Future)	4	P	*	39	MOD_PR17C2
MOD17C3	MODIS/Terra Net Primary Production Yearly L4 Global 0.05Deg CMG (Future)	4	P	*	64	MOD_PR17C3
MOD27HV	MODIS/Terra Ocean Annual Empirical Productivity 8-Day L4 Global 4km ISEAG (Future)	4	P	*	52	MOD_PR27HV
MOD27W	MODIS/Terra Ocean Weekly Productivity Indices 8-Day L4 Global 4km ISEAG	4	P	*	51	MOD_PR27W
MOD27Y	MODIS/Terra Ocean Annual Productivity Indices Yearly L4 Global 4km ISEAG	4	P	*	51	MOD_PR27Y
MOD28Amm	MODIS/Terra Sea Surface Temperature Time-Binned Interim Params Daily L3 Global 4km ISEAG (where mm = one of parameters D1, N1, N2) (Not produced in current operations)	3	P	*	20	MOD_PRmtbin
MOD28Bmm	MODIS/Terra Sea Surface Temperature Space-Binned Composite Params 5-Min L3 Global 4km ISEAG (where mm = one of parameters D1, D2, N1, N2)	3	P	*	10	MOD_PRmsbin
MOD28Dmm	MODIS/Terra Sea Surface Temperature QC'd Composite Params Daily L3 Global 4km ISEAG (where mm = one of parameters D1, N1, N2)	3	P	*	20	MOD_PRmtbin
MOD28Emm	MODIS/Terra Sea Surface Temperature Interim Composite Params 8-Day L3 Global 4km ISEAG (where mm = one of parameters D1, N1, N2) (Not produced in current operations)	3	P	*	49	MOD_PRmtbin
MOD28Fmm	MODIS/Terra Sea Surface Temperature Temporary Composite Params <varies> L3 Global 4km ISEAG (where mm = one of parameters D1, D2, N1, N2)	3	T	*	O	MOD_PRmtbin MOD_PRmspc
MOD28L2	MODIS/Terra Sea Surface Temperature Products 5-Min L2 Swath 1km	2	P	*	10	MOD_PR28
MOD28Mmm	MODIS/Terra Sea Surface Temperature QC'd Params Monthly L3 Global 4km ISEAG (where mm = one of parameters D1, N1, N2)	3	P	*	73	MOD_PRmtbin
MOD28Nmm	MODIS/Terra Sea Surface Temperature QC'd Params Yearly L3 Global 4km ISEAG (where mm = one of parameters D1, N1, N2)	3	P	*	74	MOD_Prmtbin
MOD28QC	MODIS/Terra Sea Surface Temperature QC Products 5-Min L2 Swath 1km	2	Q	*	10	MOD_PR28
MOD28Rmm	MODIS/Terra Sea Surface Temperature Interim Composite Params 24-Day L3 Global 4km ISEAG (where mm = one of parameters D1, N1, N2) (Not produced in current operations)	3	P	*	50	MOD_Prmtbin MOD_Prmfill
MOD28Wmm	MODIS/Terra Sea Surface Temperature QC'd Params 8-Day L3 Global 4km ISEAG (where mm = one of parameters D1, N1, N2)	3	P	*	54	MOD_Prmtbin
MOD29	MODIS/Terra Sea Ice Extent 5-Min L2 Swath 1km	2	P	*	08	MOD_PR29
MOD29C1D	MODIS/Terra Sea Ice Extent Daily L3 Global 0.05Deg CMG Day (Future)	3	P	*	48	MOD_PR29C1
MOD29C1N	MODIS/Terra Sea Ice Extent Daily L3 Global 0.05Deg CMG Night (Future)	3	P	*	48	MOD_PR29C1
MOD29C2D	MODIS/Terra Sea Ice Extent 8-Day L3 Global 0.05Deg CMG Day (Future)	3	P	*	68	MOD_PR29C2

ESDT	LongName/Product Description	Lev	Type	File Name	PGE	Process
MOD29C2N	MODIS/Terra Sea Ice Extent 8-Day L3 Global 0.05Deg CMG Night (Future)	3	P	*	68	MOD_PR29C2
MOD29E1D	MODIS/Terra Sea Ice Extent and IST Daily L3 Global 4km EASE-Grid Day	3	P	*	84	MOD_PR29E1
MOD29GD	MODIS/Terra Sea Ice Extent Daily L2G Global 1km SIN Grid Day (Alternate products, not currently produced in operations)	2G	P	*	15	MOD_PRMGR
MOD29GN	MODIS/Terra Sea Ice Extent Daily L2G Global 1km SIN Grid Night (Alternate products, not currently produced in operations)	2G	P	*	15	MOD_PRMGR
MOD29L2C	MODIS/Terra Coarse Sea Ice Extent 5-Min L2 Swath 5km	2	P	*	08	MOD_PR29
MOD29PGD	MODIS/Terra Sea Ice Extent Daily L2G Global 1km EASE-Grid Day	2G	P	*	15	MOD_PRMGR
MOD29PGN	MODIS/Terra Sea Ice Extent Daily L2G Global 1km EASE-Grid Night	2G	P	*	15	MOD_PRMGR
MOD29P1D	MODIS/Terra Sea Ice Extent Daily L3 Global 1km EASE-Grid Day	3	P	*	44	MOD_PR29A1
MOD29P1N	MODIS/Terra Sea Ice Extent Daily L3 Global 1km EASE-Grid Night	3	P	*	44	MOD_PR29A1
MOD29P2D	MODIS/Terra Sea Ice Extent 8-Day L3 Global 1km EASE-Grid Day (Future)	3	P	*	47	MOD_PR29A2
MOD29P2N	MODIS/Terra Sea Ice Extent 8-Day L3 Global 1km EASE-Grid Night (Future)	3	P	*	47	MOD_PR29A2
MOD35_L2	MODIS/Terra Cloud Mask and Spectral Test Results 5-Min L2 Swath 250m and 1km	2	P	*	03	MOD_PR35
MOD35_QC	MODIS/Terra Cloud Mask and Spectral Test Diagnostics 5-Min L2 250m and 1km	2	Q	*	03	MOD_PR35
MOD43B1	MODIS/Terra BRDF/Albedo Model-1 16-Day L3 Global 1km SIN Grid	3	P	*	23	MOD_PR43B
MOD43B1C	MODIS/Terra Coarse BRDF/Albedo Model-1 16-Day L3 Global 5km SIN Grid	3	P	*	23	MOD_PR43B
MOD43B2	MODIS/Terra BRDF/Albedo Model-2 16-Day L3 Global 1km SIN Grid	3	P	*	23	MOD_PR43B
MOD43B2C	MODIS/Terra Coarse BRDF/Albedo Model-2 16-Day L3 Global 5km SIN Grid	3	P	*	23	MOD_PR43B
MOD43B3	MODIS/Terra Albedo 16-Day L3 Global 1km SIN Grid	3	P	*	23	MOD_PR43B
MOD43B3C	MODIS/Terra Coarse Albedo 16-Day L3 Global 5km ISIN Grid	3	P	*	23	MOD_PR43B
MOD43B4	MODIS/Terra Nadir BRDF-Adjusted Reflectance 16-Day L3 Global 1km SIN Grid	3	P	*	23	MOD_PR43B
MOD43B4C	MODIS/Terra Coarse Nadir BRDF-Adjusted Reflectance 16-Day L3 Global 5km SIN Grid	3	P	*	23	MOD_PR43B
MOD43C1	MODIS/Terra BRDF/Albedo 16-Day L3 Global 0.05Deg CMG	3	P	*	24	MOD_PR43C1
MOD43C2	MODIS/Terra BRDF/Albedo Parameters 16-Day L3 Global 0.05Deg CMG	3	P	*	65	MOD_PR43C2
MOD43C3	MODIS/Terra Nadir BRDF-Adjusted Reflectance 16-Day L3 Global 0.05Deg CMG	3	P	*	82	MOD_PR43C3
MOD44A	MODIS/Terra Vegetation Cover Conversion 32-Day L3 Global 250m SIN Grid	3	P	*	66	MOD_PR44A
MOD44B	MODIS/Terra Vegetation Continuous Fields Yearly L3 Global 500m SIN Grid (Future)	3	P	*	61	MOD_PR44B
MOD44CH	MODIS/Terra Vegetation Intermediate Composite 16-Day L3 Global 500m SIN Grid	3	P	*	72	MOD_PR44C
MOD44CQ	MOSIS/Terra Vegetation Intermediate Composite 16-Day L3 Global 250m SIN Grid	3	P	*	72	MOD_PR44C
MOD44CT	MODIS/Terra Vegetation Intermediate Composite Metadata 16-Day L3 Global	3	P	*	72	MOD_PR44C

ESDT	LongName/Product Description	Lev	Type	File Name	PGE	Process
MOD5C_QC	MODIS/Terra MOD_PR05 Final Diagnostic File for Corrected Water Vapor 5-Min L2 (Future)	2	Q	*	04	MOD_PR04_05
MOD6ANCT	MODIS/Terra Cloud Product Temporary File in HDF Format 5-Min L2	2	T	*	06	MOD_PR06
MOD6CTQC	MODIS/Terra MOD_PR06CT QC File for Cloud Top Algorithm 5-Min L2	2	Q	*	06	MOD_PR06CT
MOD6CDQC	MODIS/Terra MOD_PR06CD QC File for Cirrus Detection Algorithm 5-Min L2	2	Q	*	06	MOD_PR06CD
MOD6ODQC	MODIS/Terra MOD_PR06OD QC File for Cloud Optical Depth Algorithm 5-Min L2	2	Q	*	06	MOD_PR06OD
MODAGAGG	MODIS/Terra BRDF Preprocessing Database Daily L3 Global 1km SIN Grid	3	P	*	22	MOD_PRAGG
MODAGTEX	MODIS/Terra BRDF Texture Database Daily L3 Global 1km SIN Grid	3	P	*	22	MOD_PRAGG
MODATML2	MODIS/Terra Aerosol Cloud Water Vapor Subset 5-Min L2 Swath 5km and 10km	2	P	*	83	MOD_PRATML2
MODCSR_8	MODIS/Terra Clear Sky Radiances 8-Day Composite Daily L3 Global 25km Equal Area (Future)	3	P	*	81	MOD_PRCSR8
MODCSR_D	MODIS/Terra Clear Sky Radiances Statistics Daily L3 Global 25km Equal Area (Future)	3	P	*	55	MOD_PRCSRD
MODCSR_G	MODIS/Terra Clear Sky Radiance Statistics 25km Global Index 5-Min L2 Swath	2	P	*	03	MOD_PR35
MODHDFSR	MODIS/Terra Filtered Surface Reflectance Daily L3 Global 500m SIN Grid	3	P	*	80	MOD_PRDFSR
MODMGGAD	MODIS/Terra Geolocation Angles Daily L2G Global 1km SIN Grid Day	2G	P	*	12	MOD_PRMGR
MODMGGAN	MODIS/Terra Geolocation Angles Daily L2G Global 1km SIN Grid Night (Not produced in current operations)	2G	P	*	12	MOD_PRMGR
MODMGPGD	MODIS/Terra Geolocation Angles Daily L2G Global 1km EASE-Grid Day	2G	P	*	12	MOD_PRMGR
MODOCAnn	MODIS/Terra Ocean Color Time-Binned Interim Params 1-36 Daily L3 Global 4km ISEAG (where nn = one of parameters 1-36) (Not produced in current operations)	3	P	*	20	MOD_PRmtbin
MODOCBnn	MODIS/Terra Ocean Color Space-Binned Composite Params 1-36 5-Min L3 Global 1km ISEAG (where nn = one of parameters 1-36)	3	P	*	09	MOD_PRmsbin
MODOCDnn	MODIS/Terra Ocean Color QC'd Composite Params 1-36 Daily L3 Global 4km ISEAG (where nn = one of parameters 1-36)	3	P	*	20	MOD_PRmtbin
MODOCEnn	MODIS/Terra Ocean Color Interim Composite Params 1-36 8-Day L3 Global 4km ISEAG (where nn = one of parameters 1-36) (Not produced in current operations)	3	P	*	49	MOD_PRmtbin
MODOCFnn	MODIS/Terra Ocean Color Temporary Composite Params 1-36 <varies> L3 Global 4km ISEAG (where nn = one of parameters 1-36)	3	T	*	O	MOD_PRmfill MOD_PRmtbin MOD_PRmspc
MODOCL2	MODIS/Terra Ocean Color Radiance Products 5-Min L2 Swath 1km Day	2	P	*	09	MOD_PR18
MODOCL2A	MODIS/Terra Ocean Color Derived Products Group 1 5-Min L2 Swath 1km Day	2	P	*	09	MOD_PR18
MODOCL2B	MODIS/Terra Ocean Color Derived Products Group 2 5-Min L2 Swath 1km Day	2	P	*	09	MOD_PR18

ESDT	LongName/Product Description	Lev	Type	File Name	PGE	Process
MODOCMnn	MODIS/Terra Ocean Color QC'd Composite Params 1-36 Monthly L3 Global 4km ISEAG (where nn = one of parameters 1-36)	3	P	*	73	MOD_PRmtbin
MODOCNnn	MODIS/Terra Ocean Color QC'd Composite Params 1-36 Yearly L3 Global 4km ISEAG (where nn = one of parameters 1-36)	3	P	*	74	MOD_PRmtbin
MODOCNMC	MODIS Preprocessed NMC Ancillary Data for MODIS Oceans Processes 6-Hr L3 Global 1Deg	N/A	P	*	17	MOD_PRNMC
MODOCOZN	MODIS Preprocessed TOMS Ozone Data for MODIS Oceans Processes Daily L3 Global 1x1.25Deg	N/A	P	*	19	MOD_PROZN
MODOCQC	MODIS/Terra Ocean Color QC Products 5-Min L2 Swath 1km Day	2	Q	*	09	MOD_PR18
MODOCRnn	MODIS/Terra Ocean Color Interim Composite Params 1-36 24-Day L3 Global 4km ISEAG (where nn = one of parameters 1-36) (Not produced in current operations)	3	P	*	50	MOD_PRmfill
MODOCREY	MODIS Preprocessed REYNSST Ancillary Data Weekly L3 Global 1x1Deg	N/A	P	*	18	MOD_PRREY
MODOCWnn	MODIS/Terra Ocean Color QC'd Composite Params 1-36 8-Day L3 Global 4km ISEAG (where nn = one of parameters 1-36)	3	P	*	54	MOD_PRmtbin
MODOCY27	MODIS/Terra Ocean Chlorophyll Running Year Average 8-Day L3 Global 4km ISEAG (Future)	3	P	*	52	MOD_PRmtbin
MODOQAqq	MODIS/Terra Interim Composite Ocean Color QC Products Daily L3 Global 4km ISEAG (where qq = one of parameters 51-61, 63-66)	3	P	*	20	MOD_PRmtbin
MODOQBqq	MODIS/Terra Ocean Color Space-Binned Composite QC Products 5-Min L3 Global 1km ISEAG (where qq = one of parameters 51-61, 63-66)	3	P	*	09	MOD_PRmtbin
MODPT1KD	MODIS/Terra Observation Pointers Daily L2G Global 1km SIN Grid Day	2G	P	*	12	MOD_PRMGPNTR
MODPT1KN	MODIS/Terra Observation Pointers Daily L2G Global 1km SIN Grid Night	2G	P	*	12	MOD_PRMGPNTR
MODPTHKM	MODIS/Terra Observation Pointers Daily L2G Global 500m SIN Grid	2G	P	*	12	MOD_PRMGPNTR
MODPTQKM	MODIS/Terra Observation Pointers Daily L2G Global 250m SIN Grid	2G	P	*	12	MOD_PRMGPNTR
MODPTPGD	MODIS/Terra Observation Pointers Daily L2G Global 1km EASE-Grid Day	2G	P	*	12	MOD_PRMGPNTR
MODPTPGN	MODIS/Terra Observation Pointers Daily L2G Global 1km EASE-Grid Night	2G	P	*	12	MOD_PRMGPNTR
MODPTPHD	MODIS/Terra Observation Pointers Daily L2G Global 500m EASE-Grid Day (Future)	2G	P	*	12	MOD_PRMGPNTR
MODQDFSR	MODIS/Terra Filtered Surface Reflectance Daily L3 Global 250m SIN Grid	3	P	*	80	MOD_PRDFSR

ESDT	LongName/Product Description	Lev	Type	File Name	PGE	Process
MODSQArr	MODIS/Terra Interim Sea Surface Temperature QC Product Daily L3 Global 4km ISEAG (where rr = one of parameters D1-D9, DA, N1-N9, NA)	3	P	*	20	MOD_PRmtbin
MODSQBrr	MODIS/Terra Sea Surface Temperature Space-Binned Composite QC Product 5-Min L3 Global 4km ISEAG (where rr = one of parameters D1-D-9, DA, N1-N9, NA)	3	P	*	10	MOD_PRmsbin
MOD_SS	MODIS/Terra Land Subsetting QA Files (These will have unique file names for each PGE.)	N/A	P	*	L	MOD_PRSS
MODVOLC	MODIS/Terra Volcano Alert 5-Min L2	2	Q	*	03	MOD_PRVOLC
MOSPY1zz	MODIS/Terra Ocean Statistical Primary Production Yearly L4 Global 1Deg CylEqDis (where zz = one of parameters MP, MN, MX, MC, SC, WC, NC, FC) (Future)	4	P	*	52	MOD_PR27HV
MOSPYAzz	MODIS/Terra Ocean Statistical Primary Production Yearly L4 Global 4km CylEqDis (where zz = one of parameters MP, MN, MX, MC, SC, WC, NC, FC) (Future)	4	P	*	52	MOD_PR27HV
MOSPYBzz	MODIS/Terra Ocean Statistical Primary Production Yearly L4 Global 36km CylEqDis (where zz = one of parameters MP, MN, MX, MC, SC, WC, NC, FC) (Future)	4	P	*	52	MOD_PR27HV

Table 3-3-2. MODIS Static File Container ESDTs

Notes: 1. Most PGEs use the same static files for Aqua and Terra processing. The Terra names are shown in the table. If the Aqua PGE uses entirely different static files, they may be grouped in an ESDT with "MO" in the ShortName replaced by "MY". If some files have "Terra or TERRA" in the file names, a substitution of "Aqua or AQUA" will show the Aqua file names. Other files may have characters such as "x" or "xx" for which a substitution of "MO" or "MY" may be made.
2. V# or v# or # = Version number of file, appended at end or incorporated within the file name.

ESDT	LongName/Product Description	Lev	Type	File Name	Process
MOD01LUT	MODIS/Terra Engineering List of Data Structures for Production of MOD01	1	S	ENGINEERING_DATA_LIST_{TERRA,AQUA}	MOD_PR01
MOD02LUT	MODIS/Terra Instrument Calibration Parameters LUT for Production of MOD02 Products	1	S S S	MxD02_Reflective_LUTs.hdf MxD02_Emissive_LUTs.hdf MxD02_QA_LUTs.hdf where x="O" for Terra & x="Y" for Aqua	MOD_PR02
MOD03LUT	MODIS/Terra Input Instrument and Satellite Parameters for Production of MOD03 Product	1	S	MOD03LUT.coeff_v#	MOD_PR03
MOD04LUT	MODIS/Terra Radiative Transfer LUTs for Production of MOD04_L2 Products	2	S S S S S S S S S S S	phsomega.input.V# lookup.wav466.V# lookup.wav655.V# mod04ocean.in.V# big_v1c1.dat.V# big_v2c1.dat .V# big_v3c1.dat.V# small_v1c1.dat.V# small_v2c1.dat.V# small_v3c1.dat.V# TRANSM_H2O_1P38_MICRON.V#	MOD_PR04_05 MOD_PR06CD
MOD05LUR	MODIS/Terra Radiative Transfer LUTs for Production of MOD05_L2 Products	2	S S S S S S	TRANSM_H2O.MDL_1.V# TRANSM_H2O.MDL_2.V# TRANSM_H2O.MDL_3.V# TRANSM_H2O.MDL_4.V# TRANSM_H2O.MDL_5.V# TRANSM_H2O.MDL_6.V#	MOD_PR04_05
MOD05LUW	MODIS Weight Factors LUTs for Production of MOD05_L2 Products	2	S S S	WEIGHT_TABLE.V# Ratio_Ch19_To_Ch2_Ascii.V# Refl_Ch2_Ascii.V#	MOD_PR04_05

ESDT	LongName/Product Description	Lev	Type	File Name	Process
MOD06LUT	MODIS/Terra Cloud Product LUTs for Production of MOD06_L2 Products from MOD_PR06CT and MOD_PR06OD	2	S S S S S S S S S S S S S S S	Library_05x_water.hdf.V# Library_05x_ice.hdf.V# tau.hdf.V# IGBP_map.hdf.V# modisdet.dry.042.v# (Terra) modisdet.ozo.042.v# (Terra) modisdet.wco.042.v# (Terra) modisdet.wt1.042.v# (Terra) modisdet.wts.042.v# (Terra) modisdet.dry.101.v# (Aqua) modisdet.ozo.101.v# (Aqua) modisdet.wco.101.v# (Aqua) modisdet.wt1.101.v# (Aqua) modisdet.wts.101.v# (Aqua)	MOD_PR06CT MOD_PR06OD
MOD07LUT	MODIS/Terra Regression Coefficients and MODIS Sensor Zenith Angle Parameter Files	2	S S S S S S S	MODIS_senzen.bin MODIS_REGCOEF_FACTORS.terra.v# terra_bias.dat.v# terra_det.dat.v# MODIS_REGCOEF_FACTORS.aqua.v# aqua_bias.dat.v# aqua_det.dat.v#	MOD_PR07
MOD09LU1	MODIS/TerraAerosol Transmittance LUTs for Production of MOD09 Products	2	S S S S S S S S	SraTable.V# AeroTrans.0469.V# AeroTrans.0547.V# AeroTrans.0664.V# AeroTrans.0875.V# AeroTrans.1240.V# AeroTrans.1640.V# AeroTrans.2142.V#	MOD_PR09
MOD09LU2	MODIS/Terra Concentration LUTs for Production of MOD09 Products	2	S S S S S S S	Con_0469.V# Con_0547.V# Con_0664.V# Con_0875.V# Con_1240.V# Con_1640.V# Con_2142.V#	MOD_PR09

ESDT	LongName/Product Description	Lev	Type	File Name	Process
MOD09LU3	MODIS/Terra Various LUTs for Production of MOD09 Products	2	S S S S S S S S	toms_10yr.anc ANC_OORT_WV.CLIMATOLOGY landcov_8km.V# VALID_COORDS 1_km_z8.hdf new_modis_pol_corr4.hdf rayleigh_modis_412_iqu2.hdf global_AOTR_rejection_mask.hdf	MOD_PR09
MOD10LUC	MODIS/Terra LUTs for Production of MOD10C Products	3	S S S S	cmgTL5km_global_anc.hdf cmgSnowImp5km_global_anc.hdf TileHxxVyy_ColIndexCMG.bin TileHxxVyy_RowIndexCMG.bin where xx= horizontal & yy= vertical cell	MOD_PR10C1 MOD_PR10C2
MOD10LUT	MODIS/Terra LUTs for Production of MOD10A1 Products	3	S S	modis_brdf_luts_anc.hdf SlopeAspect.TileHxxVyy.anc.hdf where xx= horizontal & yy= vertical cell	MOD_PR10A1
MOD11LUW	MODIS/Terra Land Surface Temperature Split Window LUT for Production of MOD11 Products	2	S S	sol_term_2x6x2tbls_V# tir_term_2x6x2tbls_V#	MOD_PR11
MOD12LCD	MODIS/Terra Land Cover Databases for Production of MOD12C Products	3	S S	MLCT_{1,1_A,2,2_A,3,3_A}.Ayyyyddd.0_05d.hdf LCT_{1_P,2_P,3_P}.Ayyyyddd.0_05d.hdf where yyyy= year; ddd= Julian day	MOD_PR12C
MOD12LUT	MODIS/Terra LUTs for Production of MOD12Q Products (Land Cover Types 1-5, Land Cover Type Assessments 1-5, Land Cover Type 1 Secondary, Land Cover Type 1 Secondary Percent, LC Property 1-3, Land Water Mask)	3	S S S S S S	LC{1,2,3,4,5}.Ayyyyddd.hxxvyy.hdf LC{1,2,3,4,5}A.Ayyyyddd.hxxvyy.hdf LCS.Ayyyyddd.hxxvyy.hdf LCSP.Ayyyyddd.hxxvyy.hdf LCP{1,2,3}.Ayyyyddd.hxxvyy.hdf LC_LW_TEMP.Ayyyyddd.hdf where xx= horizontal & yy= vertical cell; yyyy= year; ddd= Julian day	MOD_PR12Q
MOD15LU8	MODIS/Terra LUTs for Production of MOD15A2 8-Day Products	3	S	MOD15A2_ANC_RI3.hdf	MOD_PR15A2
MOD15LUT	MODIS/Terra LUTs for Production of MOD15A1 Daily Products	3	S	MOD15A1_ANC_RI4.hdf	MOD_PR15A1
MOD17LUT	MODIS/Terra LUTs for Production of MOD17A Products	3	S	MOD17_ANC_RI8.hdf	MOD_PR17A
MOD27LUT	MODIS/Terra LUTs for Production of MOD27W Products	4	S S	mld.bin par.bin	MOD_PR27W

ESDT	LongName/Product Description	Lev	Type	File Name	Process
MOD28LST	MODIS/Terra Ocean SDS List and Cutout Site Location List	2	S S S S S S S S S S	LocationList_Variable.txt LocationList_Fixed.txt SDSList28L2.txt SDSList28QC.txt SDSListL1B.txt SDSListL2.txt SDSListL2A.txt SDSListL2B.txt SDSListQC.txt	MOD_PRmsub MOD_PRmsubl
MOD28LUT	MODIS/Terra SST Generic Input Files	2,3	S S S S	emissivity.dat.coeff spectra.coeff modsst_sst4.coeff modsst_sst.coeff	MOD_PR28
MOD28PAR	MODIS/Terra SST Parameters	2,3	S	modsst_params1.dat.coeff	MOD_PR28
MOD28RAD & MYD28RAD	MODIS/Terra Ocean SST Radiative Correction LUT MODIS/Aqua Ocean SST Radiative Correction LUT	3	S S	modis_radcor_v4_0_b.sst.hdf modis_radcor_aqua_nocorr_b.sst.hdf	MOD_PR28
MOD35ANC	MODIS/Terra Olson World Ecosystem Maps at 10 Minute and 1km Resolution and Cloud Mask Thresholds Parameter File (Shared Atmosphere ESDT)	2	S S S S	thresholds.dat.terraV# thresholds.dat.aquaV# ecosystem.img.V# goge1_2_img.V#	MOD_PR35 MOD_PR12M MOD_PR06CT
MOD43LUA	MODIS/Terra BRDF Surface Albedo LUT for Production of MOD43B Products	3	S	amb_albedos.dat	MOD_PR43B
MOD43LUP	MODIS/Terra BRDF Set-up Table Database and Ancillary BRDF Database for Production of MOD43 Products	3	S S	amb_brdfdbsetup.dat hxxvyydb.hdf where xx= horizontal & yy= vertical cell	MOD_PR43B
MOD43LUT	MODIS/Terra BRDF Code and Model Set-up Table for Production of MOD43 Products	3	S	amb_setup.dat	MOD_PR43B
MOD44LUC	MODIS/Terra Land Sea Mask and Training Files for Production of MOD44C Products	3	S	DEM_IS.hxxvyy.003.hdf where xx= horizontal & yy= vertical cell training.0	MOD_PR44C
MOD44LUT	MODIS/Terra LUTs for Production of MOD44A Products	3	S S	LUT_location.v# Month_1CoverType.v#	MOD_PR44A
MOD5CLUR	MODIS/Terra Atmospheric Correction Reflectance and Channel Ratio LUT for Production of MOD05_L2 Products	2	S S	Refl_Ch2_Ascii.V# Ratio_Ch19_To_Ch2_Ascii.V#	MOD_PR04_05

ESDT	LongName/Product Description	Lev	Type	File Name	Process

MODCPLUT	MODIS/Terra Parameters and Control Point Library Files for Production of MOD03CP Product	2	S
			S
				islands.lac
				MOD03CHP.Lyyyyddd.ppprrrcc.vvv.hdf
				where yyyy= year; ddd= Julian day;
				ppp= Landsat WRS Path Number;
				rrr= Landsat WRS Row Number;
				cc= Sequence Number of Chip from Scene;
				vvv= Chip Format
					MOD_PR03CP

MODOCAER	MODIS/Terra Ocean Color Aerosol Coefficients	2	S S S S S S S S S S S S S S S S	ocean_h99_v00_s00_d35_3.hdf ocean_h90_v00_s00_d35_3.hdf ocean_h70_v00_s00_d35_3.hdf ocean_h50_v00_s00_d35_3.hdf marit_h99_v00_s00_d35_3.hdf marit_h90_v00_s00_d35_3.hdf coast_h99_v00_s00_d35_3.hdf coast_h90_v00_s00_d35_3.hdf marit_h70_v00_s00_d35_3.hdf marit_h50_v00_s00_d35_3.hdf coast_h70_v00_s00_d35_3.hdf coast_h50_v00_s00_d35_3.hdf tropo_h99_v00_s00_d35_3.hdf tropo_h90_v00_s00_d35_3.hdf tropo_h70_v00_s00_d35_3.hdf tropo_h50_v00_s00_d35_3.hdf	MOD_PR18
MODOCBIN	MODIS/Terra Ocean Space Binning Parameters	2	S	msbin_params#.dat.coeff	MOD_PRmsbin
MODOCLUT	MODIS/Terra Ocean Color Generic Input Files		S S S S S S S S S S S S S S S S	coccolith_tables.dat.coeff modisdob.cal.coeff modiswhite.cal.coeff modisf0_1.cal.coeff modcol_params22.dat.coeff clark_params4.dat.coeff hoge_params2*.dat.coeff carder_params8.dat.coeff ipar_prms.dat.coeff new_modis_pol_corr5a.hdf modislcw.cal.coeff global_ndt4.hdf modisoob2.cal.coeff modisSW_afrid_h06_v00_s00_d35_3.hdf modisSW_asiad_h02_v00_s00_d35_3.hdf	MOD_PR18

ESDT	LongName/Product Description	Lev	Type	File Name	Process
MODOCMAP	MODIS/Terra Oceans Mapper Parameters	3	S S S	mmap_params3_{4km,36km,1d}_a.coeff mmap_params3_{4km,36km,1d}_n.coeff mmap_params3_{mmm,q,f,smm,f1,f2,f3}.coeff where $mm is set uniquely for each Ocean parameter PGE profile	MOD_PRmmap
MODOCMSK	MODIS/Terra Oceans Processing Land and Shallow Water Masks	3	S S	global_land_7.p04bit-180.hdf global_icemask.b04bit_180.hdf	MOD_PRmfill
MODOCRAD & MYDOCRAD	MODIS/Terra Ocean Color Radiative Correction LUT MODIS/Aqua Ocean Color Radiative Correction LUT	3	S S	modis_radcor_terra_v21_84s.col.hdf modis_radcor_aqua_v2_18.col.hdf	MOD_PR18
MODOCSPC	MODIS/Terra Ocean Space Converter Parameters	3	S S	mspc_params_36km_b.dat.coeff mspc_params_1d_b.dat.coeff	MOD_PRmspc
MODOCTB	MODIS/Terra Ocean Time Binner Parameters	3	S	mtbin_params1.dat.coeff	MOD_PRmtbin
MODOCRAY	MODIS/Terra Ocean Color Rayleigh Coefficents	3	S S S S S S S S	rayleigh_modis_412_iqu8.dat.coeff rayleigh_modis_443_iqu8.dat.coeff rayleigh_modis_488_iqu8.dat.coeff rayleigh_modis_531_iqu8.dat.coeff rayleigh_modis_551_iqu8.dat.coeff rayleigh_modis_667_iqu8.dat.coeff rayleigh_modis_678_iqu8.dat.coeff rayleigh_modis_748_iqu8.dat.coeff rayleigh_modis_869_iqu8.dat.coeff	MOD_PR18

Table 3-4. MODIS Time-Varying Ancillary Data ESDTs

ESDT	Data Set Description	File Name	Metadata Type	Time Range of Data in File	Data Type Description	PGE	Process
D4LAXMNT	DAO GEOS-4 High Time Resolution Global Analysis, GE05-3 Gridded Output for AM-1	DAS.llk.asm.V_Montana.GEOS4nn.yyyymmddhh.yyyymmddhh.V##, where nn begins at 01 for GEOS4 operations, nn is incremented for improvements; and where ## is 01 for the first generation and ## is incremented for reprocessing.	Range Date Time	Daily Product; 8 averaged times appended per day in daily files; Start ddhh, where hh = 00Z and end ddhh, where hh = 21Z. Time averaged data in the file ranges from 00Z on current day to 00Z on next day; instantaneous (synoptic) data ranges from 22.5Z on previous day to 22.5Z on current day.	Late Look; 2D Gridded (L3) 3 hour upstream time averaged fields, energy related fields, single level data and instantaneous fields at synoptic times, pressure level data; mixture of prognostic and diagnostic fields; HDF_EOS format; 1.25 X 1.0 degree global latitude – longitude horizontal grid. Variables : Q10M, RADSWG, T10M from D4LAXENG; T10M1, PS from D4LAXMIS	51	MOD_PR27W (Started Data Day 10/01/02)
						36	MOD_PR17A1 (Started Data Day 11/01/02)
FNMOC_ML	1 Degree FNMOC Ocean Mixed-Layer Model Output	NPR.TOPS.SP.Dyyddd.JHR00_Zhhmm	Single Date Time	Daily file on Julian day ddd at 00Z hour; file covers 00Z hour -12 hours to 00Z hour +12 hours	8X Daily 2-D Gridded (L3) Ocean Surface Mixed Layer Depth; GRIB format	51	MOD_PR27W
GDAS_0ZF	1 Degree NCEP GDAS	gdas1.PGrb00.yymmdd.hhz	Single Date Time	6-Hour Product; file covers 6 data hours; hhZ-3 hours to hhZ+3 hours	4X Daily 2-D and 3-D Gridded (L3) Met Data; mainly 3-D; GRIB format	03	MOD_PR35 MOD_PR07
						04	MOD_PR04_05
						06	MOD_PR06CT MOD_PR06OD
						11	MOD_PR09
						17	MOD_PRNMC (Converts to HDF-EOS)

ESDT	Data Set Description	File Name	Metadata Type	Time Range of Data in File	Data Type Description	PGE	Process
NISE	Near Real-Time SSM/I EASE-Grid Daily Global Ice Concentration and Snow Extent Product	NISE_SSMIF13_yyyymmdd.HDFEOS	Range Date Time	Daily file covering 00Z hour to 24Z hour; last available observation for each pixel for the day	Daily Gridded (L3) SSM/I Microwave Sensor, EASE-Grid equal area projection; two 25-km azimuthal, equal area projections; Northern Hemisphere low resolution (NL) and Southern Hemisphere low resolution (SL); HDF_EOS format	03	MOD_PR35 MOD_PR07
						06	MOD_PR06CT, MOD_PR06OD
OZ_DAILY	TOVS Column Ozone Daily Product	yymmdd.grb	Single DateTime	Daily file (averaged data) 00Z hours to 24Z hours; Time of Day in metadata is set to 12Z	Daily 2-D Column Integrated Gridded (L3) Ozone; GRIB format	04	MOD_PR04_05
						11	MOD_PR09
						19	MOD_PROZN (Converts to HDF-EOS)
OZONEEP	TOMS Column Ozone (Earth Probe)	gayymmdd.ept	Single DateTime	Daily file (averaged data) 00Z hours to 24Z hours; Time of Day in metadata is set to 12Z	Daily 2-D Column Integrated Gridded (L3) Ozone; ASCII format	19	MOD_PROZN (Converts to HDF-EOS)
REYNSST	Reynolds Weekly SST	Version 1: oi.mean.bias.yymmdd Version 2: oisst.yyyymmdd	Range DateTime	Weekly data file; dd denotes middle day of 7-day period; exact start and end days in header; Start at 00Z hour on first day of week and end at last hour, minute, and second on last day of week; each day is 00Z to 24Z hours	Weekly 2-D Gridded (L3) SST from AVHRR; Version 1 in ASCII format; Version 2 in binary format.	06	MOD_PR06CT, MOD_PR06CD
						18	MOD_PRREY (Converts to HDF-EOS)
SEA_ICE	NCEP Ice Concentration at 0.5 Degree Latitude/Longitude Projection	eng.yymmdd	Single DateTime	Daily file; 00Z -12 hours to 00Z +12 hours (00 denotes 00Z on day yymmdd)	Daily Gridded (L3) Sea Ice from SSMI Microwave sensor; Sea Ice Modeler's Grid Data; Lat/Lon Projection; GRIB format	03	MOD_PR35, MOD_PR07
						06	MOD_PR06CT, MOD_PR06OD

Table 3-5. Ancillary Data Used by MODIS through SDP Toolkit

ESDT	File Name	Data Type Description	Process
DEM_1KM	dem30ARC_E60N0 dem30ARC_E60N90 dem30ARC_W180N0 dem30ARC_W180N9 dem30ARC_W60N0 dem30ARC_W60N90	Digital elevation model data sets in Geographic Projection at 30 arc second resolution in HDF-EOS GRID format to be read via the SDP Toolkit (MODIS plans to use 30 arc second resolution only)	MOD_PR03
AM1EPHNF	AM1EPHNF#vvvmmddyyyyhhmmss… where vvv = version id, mm = month, dd = day, yyyy = year, hh = hour, mm = minutes, ss = secs, etc.	Spacecraft ephemeris/orbit data files to be read via SDP Toolkit, native format, where N = native and F = Flight Dynamics Division (FDD); 2-hour file	MOD_PR03, MOD_Prpred (Preferred, better quality)
AM1EPHN0	AM1EPHN0#vvvmmddyyyyhhmmss… where vvv = version id, mm = month, dd = day, yyyy = year, hh = hour, mm = minutes, ss = secs, etc.	Spacecraft ephemeris/orbit data files to be read via SDP Toolkit, native format, where N = native and 0 = spacecraft Level 0; 2-hour file	MOD_PR03, MOD_Prpred (Alternate, quality not as good)
AM1ATTN0	AM1 ATTN0#vvvmmddyyyyhhmmss … where vvv = version id, mm = month, dd = day, yyyy = year, hh = hour, mm= minutes, ss = secs, etc.	Spacecraft attitude data files to be read via SDP Toolkit, native format, where N = native and 0 = spacecraft Level 0; 2-hour file	MOD_PR03 (Preferred, better quality)
AM1ATTNF	AM1ATTNF#vvvmmddyyyyhhmmss … where vvv = version id, mm = month, dd = day, yyyy = year, hh = hour, mm= minutes, ss = secs, etc.	Spacecraft definitive attitude data files to be read via SDP Toolkit, native format, where N = native and F = Flight Dynamics Division (FDD); 2-hour file	MOD_PR03 (Alternate, quality not as good)
PM1EPHND	PM1EPHND#vvvmmddyyyyhhmmss… where vvv=version id, mm=month, dd = day, yyyy = year, hh = hour, mm= minutes, ss = secs, etc.	Spacecraft ephemeris/orbit data files to be read via SDP Toolkit, where N=native format and D=definitive; daily file	MOD_PR03, MOD_PRpred
PM1ATTNR	PM1ATTNR#vvvmmddyyyyhhmmss... where vvv = version id, mm = month, dd = day, yyyy = year, hh = hour, mm= minutes, ss = secs, etc.	Spacecraft attitude data files, produced from definitive ephemeris data, to be read via the SDP Toolkit, where N=native format and R=refined; 2-hour file	MODPR03
N/A	leapsec.dat	Data file used by the SDP Toolkit that relates leap second (TAI-UTC) values to UTC Julian dates	MOD_PR01, MOD_PR03
N/A	utcpole.dat	Data file used by the SDP Toolkit that relates UT1-UTC values to UTC dates	MOD_PR03
N/A	de200.eos	Planetary ephemeris files from the Jet Propulsion Laboratory	MOD_PR03

Table 3-6. Oceans ESDTs to Product LongName Mapping

Note: x = A, B, D, E, F, M, N, R, W

L2	L3	Product	long_name (LONGNAME is same with "MODIS V1 L3:" prefixed)
MODOCL2	MODOCx01	MOD18	"Normalized water-leaving radiance at 412 nm"
	MODOCx02	MOD18	"Normalized water-leaving radiance at 443 nm"
	MODOCx03	MOD18	"Normalized water-leaving radiance at 490 nm"
	MODOCx04	MOD18	"Normalized water-leaving radiance at 531 nm"
	MODOCx05	MOD18	"Normalized water-leaving radiance at 555 nm"
	MODOCx06	MOD18	"Normalized water-leaving radiance at 667 nm"
	MODOCx07	MOD18	"Normalized water-leaving radiance at 678 nm"
	MODOCx08	MOD37	"Aerosol optical thickness at 865 nm"
	MODOCx09	MOD37	"Epsilon of aerosol correction at 765 and 865 nm"
	MODOCx10	MOD37	"Aerosol model identification number 1"
	MODOCx11	MOD37	"Aerosol model identification number 2"
	MODOCx12	MOD39	"Epsilon of clear water aerosol correction at 531 and 667 nm"
MODOCL2A	MODOCx13	MOD19	"CZCS-like pigment concentration"
	MODOCx14	MOD19	"MODIS chlorophyll concentration"
	MODOCx15	MOD19	"Total case 1 pigment concentration"
	MODOCx16	MOD20	"Chlorophyll fluorescence line height"
	MODOCx17	MOD20	"Chlorophyll fluorescence baseline"
	MODOCx18	MOD20	"Chlorophyll fluorescence line efficiency"
	MODOCx19	MOD23	"Suspended-solids concentration in ocean"
	MODOCx20	MOD25	"Pigment concentration in coccolithophore blooms"
	MODOCx21	MOD25	"Concentration of detached coccolithophores"
	MODOCx22	MOD25	"Calcite concentration"

Table 3-6. Oceans ESDTs to Product LongName Mapping (con't)

L2	L3	Product	Long_name (LONGNAME is same with "MODIS V1 L3" prefixed)
MODOCL2A	MODOCx23	MOD26	"Ocean water diffuse attenuation coefficient at 490 nm"
	MOCOCx24	MOD31	"Phycoerythrobilin concentration"
	MODOCx25	MOD31	"Phycourobilin concentration"
MODOCL2B	MODOCx26	MOD21	"Chlorophyll a concentration (2 band)"
	MODOCx27	MOD21	"Chlorophyll a concentration (3 band)"
	MODOCx28	MOD22	"Instaneous photosynthetically available radiation"
	MODOCx29	MOD22	"Photosynthetically available radiation"
	MODOCx30	MOD24	"(Seawater light) absorption coefficient, gelbstof at 400nm"
	MODOCx31	MOD36	"Chlorophyll absorption at 675nm"
	MODOCx32	MOD36	"Total absorption at 412nm"
	MODOCx33	MOD36	"Total absorption at 443nm"
	MODOCx34	MOD36	"Total absorption at 488nm"
	MODOCx35	MOD36	"Total absorption at 531nm"
	MODOCx36	MOD36	"Total absorption at 551nm"
MOD28L2	MOD28xD1	MOD28	"Sea Surface Temperature"
	MOD28xD2	MOD28	"Sea Surface Temperature, 4 micrometer"
	MOD28xN1	MOD28	"Sea Surface Temperature"
	MOD28xN2	MOD28	"Sea Surface Temperature, 4 micrometer"

3.5 PGE Information Overview

One of the primary purposes of the MSDPS SDD is to provide detailed descriptions of the individual PGEs in an organized and structured format. Section 4 accomplishes this task. For each PGE, the following information is provided:

3.5.1 A Brief Description of the PGE

- Purpose of the PGE, including the products generated.
- PGE structure, including both a brief description of the processes and a data flow diagram if there are multiple processes, except for the Land metadata QA process and sub-setting processes that run for all Land PGEs, the PGE02 metadata process, and processes that run independently within the same PGE.
- Summary of production under MODAPS for Level 2 to Level 4 MODIS products and under ECS for MODIS Level 1 products.
- Summary of the Production Rules for the PGE, including differences for each PGE profile. All PGEs have a temporal production rule. The temporal rules are based on the start and end dates and times for the output data granules and the basic period over which the PGE is run. All multiple-day PGEs have a minimum number of granules specification for required input data types. Some have spatial production rules and some have metadata queries for input products. The spatial rules are based on geographical specifications for tiles and latitude/longitude boundaries for the products. Input products are specified as required or optional. A discussion of the runtime parameters for a PGE is generally included only if the values are to be dynamically inserted into the PCF when the PGE is executed or if the runtime parameters are used to distinguish among the profiles of the PGE. Some PGEs and their profiles have static runtime parameters, with associated logical IDs and values, defined in their PCFs. The PGE is run on a routine basis using the static runtime parameter values as defined in the PCF during PGE registration at SSI&T at the GSFC DAAC or as built by the PGE scripts in MODAPS. Most of the static runtime parameters are not discussed in any great detail, except for the ones that determine differences in output products from operational scenarios. This document does not include some of the low-level details for all PGEs, e.g., individual data set time-out periods, since these details must be estimated at delivery and fine-tuned at the GSFC DAAC and at MODAPS.
- PGE profiles (if any exist) to be registered and installed in the production system.
- List of primary Production Rules used by the PGE. The list always has one or more temporal production rules. Some PGEs have spatial production rules, some have rules for input products based on metadata queries, and some have minumim number of granules. The Runtime Parameters Production Rule is specified for a PGE in the Production Rule list only when the values are dynamically inserted into the production requests on a routine basis by the ECS or MODAPS planning system.

3.5.2 Static Input to the PGE

Static ESDT collections are used as containers to group and organize static files delivered by the Science Instrument Teams and their software developers as input for the PGEs. These ESDTs are sometimes called “Bucket ESDTs”. These input files are called “static” files because they are used only as input to the PGEs and their contents do not change as frequently as the dynamic input files and output files from the PGE executions. If their contents do change, either a new version of the PGE must be delivered with the modified files or a different version number must be appended to the filenames of the updated files so that the older files may be replaced for operations and the change may be tracked by configuration management. For most PGEs, the Aqua and Terra static files are the same. Static files to be used only for Aqua are grouped into the same ESDT collections as the Terra files.

Detailed descriptions of the contents of the ESDTs that contain static files, such as look-up tables, coefficient files, and climatological data sets to be input to the PGEs, are found in Table 3-3-2. Some SCF developers have made changes to the set of static files for a PGE more frequently than expected. Thus Table 3-3-2 is difficult to keep up-to-date and the snapshot taken when a new version of the SDD is built for release may not be entirely accurate. For each of the static input ESDTs, the table contains a one-line description in a semi-table format:

- **ShortName** – Earth Science Data Type (limited to 8 characters) required to uniquely identify the data set in the ECS Database and the MODAPS Database. For collections at the GSFC DAAC, the ShortName is defined in the ESDT descriptor configured in the ECS Database at the DAACs. For MODAPS, the ESDT is used to group the static input files for tracking and documentation purposes.
- **LongName** – A more detailed description (limited to 80 characters), in MODIS static ESDT standard format, for the ESDT collection. For collections at the GSFC DAAC, the LongName is defined in the ESDT descriptor configured in the ECS Database at the DAACs.

3.5.3 Dynamic Product Input to the PGE

Detailed descriptions of the MODIS files can be found in the MODIS Processing Files Description document, which is a collection of the file specifications for each product. Alll of the MODIS dynamic input ESDTs are listed and described in Table 3-3-1. For each of the input ESDTs, this document contains a one-line description of the input product:

- **ShortName** – Earth Science Data Type (limited to 8 characters) required to uniquely identify the data set in the ECS Database and the MODAPS Database. For multi-type granule ESDTs at the DAACs, the MODAPS extension of 2 characters (not to exceed the 8-character total) to uniquely identify each type of granule or parameter in MODAPS is appended at the end of the ShortName. An explanation of the 2 characters is included. In the document the two appended characters in lower case

letters equate to one of the MODAPS ESDTs in the list. At MODAPS the 2 characters in the expanded ESDT name are in upper case letters or numerals.

- **LongName** – A more detailed description (limited to 80 characters), in MODIS standard format, for the ESDT product. The LongName is defined in the ESDT descriptor configured in the ECS Database at the DAACs. For some ESDTs, any unique features or functions for the data set in the PGE, e.g., specification that a previous file is to be staged or a listing of MODAPS specific ESDTs comprising the multi-type granule ESDT for the DAAC, are enclosed in parentheses. The MODIS Standard Naming Convention for the LongName contains the following, ordered fields:

– Instrument/Platform (MODIS/Terra or MODIS/Aqua or MODIS/Terra+Aqua)
– Brief Product Description (Free text provided by SCF)
– Temporal Data Coverage Period in File (5-Min, Daily, 8-Day, 16-Day, Monthly, 32-Day, 96-Day, Yearly)
– Processing Level (L0, L1A, L1B, L2, L2G, L3, L4)
– Spatial Data Coverage (Swath, Global, Point)
– Data Resolution (250m, 500m, 1km, 5km, 0.05Deg, …)
– Grid Type or Map Projection (SIN Grid, ISIN Grid, EASE-Grid, CMG, Equal Area, ISEAG, CylEqDis, …)
– Day or Night Product Only (Specified when day and night products are made separately or optionally if product made only in one mode: Day, Night)

- **Required or Optional Input** – An identification of whether the granules of this ESDT are required for the PGE to run or whether they are optional and the PGE can be run without them are indicated in parentheses: Values = **R** for required or **O** for optional. If both **R** and **O** are listed for the input ESDT, then multiple files of this ESDT are expected, such as a granule with a date and time range matching the current processing period is required and a granule from a previous or subsequent date and time range is optional.
- **Minimum Number of Granules** – The number in the last field indicates the minimum number of granules required for the PGE to be run. A number of “0” means the input is optional. Many of the required input ESDTs have a value of “1”. Unless the one particular required granule is unique for the PGE run, the value of “1” indicates that Operations has been given a wait time for the input granules and when the time expires, the PGE is to run if there is at least one granule of this ESDT available. Other values for input ESDTs have the same associated meaning.

3.5.4 Dynamic Ancillary Product Input

Ancillary data files from external organizations are also included as inputs to the PGEs. Dynamic ancillary data ESDTs are listed and described in Tables 3-4 and 3-5. On ingest of ancillary data, ECS associates date and time range metadata with each granule. For ancillary data based on predictions centered on a nominal verify time (Z time), the

algorithm acquiring the data granules associates ± half the time interval between the nominal verify times with each current ancillary file. For PGE production requests, the SDPS stages an ancillary data file whose nominal verify time is nearest the science granule start time. This may require setting delta times to the start and end of the processing period. Different algorithms will be required to determine the delta times for each type of ancillary data. The fields in the one line description are the same as the fields for MODIS input ESDTs.

3.5.5 Dynamic Output Generated by the PGE

Detailed descriptions of the MODIS files can be found in the MODIS Processing Files Description document. All of the MODIS dynamic output ESDTs are listed and described in Table 3-3-1. For each of the output ESDTs, this document contains a one-line description of the output product:

- **ShortName** – Earth Science Data Type (limited to 8 characters) required to uniquely identify the data set in the ECS Database and the MODAPS Database. For multi-type granule ESDTs at the DAACs, the MODAPS extension of 2 characters (not to exceed the 8-character total) to uniquely identify each type of granule or parameter in MODAPS is appended at the end of the ShortName. An explanation of the 2 characters is included. In the document the two appended characters in lower case letters equate to one of the MODAPS ESDTs in the list. At MODAPS the 2 characters in the expanded ESDT name are in upper case letters or numerals.
- **LongName** – A more detailed description (limited to 80 characters), in MODIS standard format, for the ESDT product. The LongName is defined in the ESDT descriptor configured in the ECS Database at the DAACs. The MODIS Standard Naming Convention for the LongName is shown above under Dynamic Product Input to the PGE. For some ESDTs, any unique features or functions for the data set in the PGE, e.g., a listing of MODAPS specific ESDTs comprising the multi-type granule ESDT for the DAAC or a designation of this ESDT as a future product, are enclosed in parentheses.
- **Archived or Interim Product Output** – An identification of whether the granules of this ESDT are archived or interim products. In this document a label of Interim means archived for a specified period of time, usually long enough for validation and QA of the products.

At the DAACs the labels mean the following:

– **(A_D)** - Means the product will be archived on tapes or other media for a long period of time at the DAAC

– **(I_D)** - Means the product will be archived for only a specified, interim short period of time, which must be specified on delivery of the PGE to the GSFC DAAC or product to any of the DAACs.

At MODAPS the labels mean the following:

– **(A_M)** - Means the product will be archived at MODAPS for a specified period of time for use in downstream PGEs and for validation and QA by the Science Team. If (A_D) is also specified for this product, it will be exported to one of the DAACs for more permanent archive and will be archived at MODAPS until it has been used for any downstream processing and it has been available to the Science Team for a minimum of 12 days. If (A_D) is not specified for this product, it will be archived for a minimum of 90 days at MODAPS.

– **(I_M)** - Means the product is either a QA/QC or diagnostic type of product that will be archived at MODAPS for a specified short time period at MODAPS for use by the Science Team, but will not be exported to one of the DAACs, or the product is one that will be sent immediately to an SCF or validation site and then deleted in a short period of time.

– **(T_M)** – Means the product is a temporary file and will be deleted immediately after the completion of the PGE run.

- **Number of Granules Output** – The number in the last field indicates the expected number of granules of this ESDT to be output during one PGE execution.

3.5.6 List of Dynamic Runtime Parameters

The dynamic runtime parameters include several runtime parameters that the ECS and the MODAPS PDPS makes available to all PGEs. Since these are available to all PGEs, they are listed here but not in the individual PGE descriptions unless they are used in production runs. These parameters and their logical IDs are the following:

- **Data Collection Start and End Times**

  10258 | Collection (or Data Observation) Start Time (UTC)

  10259 | Collection (or Data Observation) Stop (End) Time (UTC)

- **Parameter for Diagnostic Runs**

  10911 | ECS_DEBUG | values: 1=enabled; 0=disabled

- **SatelliteInstrument**

Identifies the Spacecraft Platform. All of the PGEs will use the Data Processing System's dynamic runtime parameter indicating that the production system is processing either Terra or Aqua data. The Spacecraft Platform for MODIS Instrument is supplied by either MODAPS or ECS PDPS. Values = "AM1M" or "PM1M" or "AMPM".

- **ProcessingEnvironment**

Identification of operating system versions and other information for computer platform on which the PGE is run. This is determined by the PGE perl script at MODAPS and by the ECS data processing system at the GES DAAC.

- **Ocean Data Day**

Many of the Oceans PGEs, starting with the Level 3 Oceans Interim Daily, require specification of the Ocean Data Day using runtime parameters inserted dynamically by the MODAPS PDPS. Both the start and end of the data day are required for the staging of the correct input data granules for the PGE execution. These dynamic runtime parameters are specified by the following:

– **start dataday** - start of the data day in yyyyddd format

– **end dataday** - end of the data day in yyyyddd format

–

The Ocean data is binned into spatially-defined, rather than temporally-defined data days to perform temporally based binning (i.e., computing daily files). This spatially-based scheme is used to avoid problems inherent with the temporally-based scheme for sun-synchronous polar-orbiting satellite coverages. Some of the problems with the temporally-based scheme include:

– Coverage gaps at day boundaries
– Coincident areas with large temporal differences
– Inconsistent locations for the start and end of data days

An ocean data day can be defined using the following spatially-derived rules:

– The start of an ocean data day, in terms of satellite coverage, commences with the descending crossing of the 180 degree meridian closest to the equator. (This definition also implicitly defines the end of the previous ocean data day.)
– Data east of the 180 degree meridian, collected up to 12 hours after the start of the ocean data day, are excluded.
– Data west of the 180 degree meridian, collected up to 12 hours before the end of the ocean data day, are excluded.
– Data collected up to 100 minutes (orbital period) before the beginning of the ocean data day and covering an area west of the 180 degree meridian, are included to fill gaps south of the first orbit track of the ocean data day.
– Data collected up to 100 minutes after the end of the ocean data day and covering an area east of the 180 degree meridian, are included to fill gaps north of the last track of the ocean data day.
– Satellite scan lines that traverse the 180 degree meridian are broken into separate data days; pixels east of the meridian are assigned to ocean data day k, those to the west are assigned to data day k+1.

- **Ocean Parameters**

The Oceans L3 and L4 PGEs are run once for each Oceans parameter. The Parameter to be generated is specified by MODAPS at runtime.

– **band to map** **-** Oceans parameter to be generated in product

- **Tile Identification**

  The L2G Land PGEs and higher level Land PGEs generate products on a tile-by-tile basis. The Land tiles are defined in several sets of tile schemas, which were discussed in Section 3 under Land Processing Scenario. MODAPS implements the Land latitude/longitude tiling by a method which requires its SDPS to insert the TileID only for the L2G Pointers (PGE12) because this is the first PGE in the transition from L2 time-ordered data to L2G tiled data. Subsequent PGEs can extract the TileID from their input products. The TileID is defined as follows:

– **TileID** – Dynamic runtime parameter inserted by MODAPS PDPS, which specifies the current TileID from the Tile Schema registered with the PGE profile.

The TileID is set to be an 8-digit integer. The first digit (the leftmost digit) is used to identify the projection. The possible values are the following:

1 – Integerized Sinusoidal projection
2 – Goode's Homolosine projection
3 – Lambert Azimuthal Equal-Area projection with projection center at the North Pole
4 – Lambert Azimuthal Equal-Area projection with projection center at the South Pole
5 – Sinusoidal projection

The second digit is used to specify the tile size; it has three values:

1 – full size
2 – quarter tile size
4 – one-sixteenth tile size

Digits 3 to 5 specify the horizontal tile number and digits 6 to 8 specify the vertical tile number. The ranges of horizontal and vertical tile numbers depend on the projection and tile size. Table 3-7 shows the projection, size, and ranges of the tiles.

Table 3-7. Land Tile Projections, Sizes, and Ranges

Projection	Size	Horizontal Tile Range	Vertical Tile Range
1 & 2	1	0 to 35	0 to 17
1 & 2	2	0 to 71	0 to 35
1 & 2	4	0 to 143	0 to 71
3 & 4	1	0 to 8	0 to 8
3 & 4	2	0 to 17	0 to 17
3 & 4	4	0 to 35	0 to 35

– **Tile Schema**

Land PGEs that process one tile at a time require that a list of tiles to process be installed in the data processing system before the PGE is executed. The lists of tiles are called Tile Schemas, The data processing system reads the name of the tile schema associated with the PGE, looks up this schema, and plans a series of recipe instances for processing one tile at a time from the tile schema. As each recipe instance is scheduled for execution, the PGE loader stages input data for the tile being processed.

Table 3-8 shows the Tile Schemas defined for all of the Land Recipes in MODAPS. The descriptions in the table describe the use of each tile schema in MODAPS Operations and SDST testing and the types of products generated by each of the tile schemas. The Level 2 and CMG PGEs do not need to select specific tiles for the PGE run. A selection of Tile SchemeId 1 indicates this to the data processing system. One Atmosphere PGE has its own Tile Schema 900 to process by latitude zones. This is mentioned in the table under Tile SchemeId 1.

Table 3-9 shows the MODIS Land L2G PGE profiles that use tile schemas. The information from this table is used in building the Production Rules for these L2G PGE profiles. The tile schemas for the downstream L3 Land PGE profiles are determined by the tile schemas that were used to generate the L2G input products for these PGEs. Most of the Land tiled products are now generated in the Sinusoidal Grid. The Sea Ice Extent tiled products are generated in the EASE-Grid polar projection.

Table 3-8 - Land Tile Schema IDs for Recipes

Tile Schema Number	Number of Tiles	Description	Recipes Using Tile Schema
TileSchemeId 1	N/A	Used for non-tiled PGE processings, including all Level 2 Recipes, all Oceans and Atmosphere Recipes, except PGE69(AM1M_A2), which uses Atmosphere TileSchemeId 900.	Level 2 PGE Recipes: L1,L2,L3 Level 3 & 4 CMG PGE Recipes: L9, L11, L13, L19
TileSchemeId 3	Maximum 353 Actually Made 210	Contains all Land polar schema tiles and is used for L5P Recipe. Other TileSchemeIds cannot be used for L5P.	Level 3 PGE Polar Tile Recipes: L5P
TileSchemeId 9	6	Contains 6 zonal tiles divided by latitude bands and is only used for L4 and L4_2 Recipes. It cannot be used for any other recipes.	Level 2 & 3 PGE Recipes: L4
TileSchemeId 502	Maximum 360 Actually Made 286 - 317	Contains all Land SIN Grid tiles and is used for all Recipes that generate Land SIN Grid tiled products, except L4d and L18.	Level 3 & 4 PGE Recipes: L5, L10, L12, L14, L14c, L16a, L16b, L16c
TileSchemeId 510	Maximum 360 Actually Made 317	Contains all Land SIN Grid tiles and is used only for Recipe L4d.	Level 3 PGE Recipes: L4d
TileSchemeId 541	Maximum 322 Actually Made 317	Contains all Land SIN Grid tiles for Land Cover Type products and is used only for Recipe L18.	Level 3 Land Cover PGE Recipes: L18

Table 3-9. MODIS Land L2G PGE Profiles and Tile Schemas

PGE Primary Profile	MOD Recipe	MOD Process	Level 2G Product	Output ESDT	Product Resolution	Day-Night Flag Value	Runtime L Product Value	Tile Schema
PGE12.1	L5	MGPNTR	Pointers	MODPT1KD	1 km	Day/Both	G	502
PGE12.1	L5	MGPNTR	Pointers	MODPTHKM	500 m	Day/Both	G	502
PGE12.1	L5	MGPNTR	Pointers	MODPTQKM	250 m	Day/Both	G	502
PGE12.1	L5	PRMGR	Geoangles	MODMGGAD	1 km	Day/Both	G	502
PGE12.1	L5P	MGPNTR	Pointers	MODPTPGD	1 km	Day/Both	G	3
PGE12.1	L5P	PRMGR	Geoangles	MODMGPGD	1 km	Day/Both	G	3
PGE12.2	L5	MGPNTR	Pointers	MODPT1KN	1 km	Night	g	502
PGE12.2	L5P	MGPNTR	Pointers	MODPTPGN	1 km	Night	g	3
PGE13.1	L5	PRMGR	Surf. Refl.	MOD09GHK	500 m	Day/Both	R	502
PGE13.2	L5	PRMGR	Surf. Refl.	MOD09GQK	250 m	Day/Both	r	502
PGE13.3	L5	PRMGR	Fire	MOD14GD	1km	Day/Both	F	502
PGE13.4	L5	PRMGR	Surf. Refl.	MOD09GST	1 km	Day/Both	t	502
PGE13.5	L5	PRMGR	Fire	MOD14GN	1 km	Night	f	502
PGE14	L5	PRMGR	Snow	MOD10L2G	500 m	Day/Both	s	502
PGE15.1	L5	PRMGR	Sea Ice	MOD29GD	1 km	Day/Both	I	502
PGE15.2	L5	PRMGR	Sea Ice	MOD29GN	1 km	Night	i	502
PGE15.1	L5P	PRMGR	Sea Ice	MOD29PGD	1 km	Day/Both	I	3
PGE15.2	L5P	PRMGR	Sea Ice	MOD29PGN	1 km	Night	i	3

3.5.7 List of Static Runtime Parameters

The static runtime parameters are defined as those that are constant or fixed for a specific version of the PGE. These parameters are specified in the PGE scripts that are associated with the PGE executable code. The PGE scripts are very specific to the execution of the PGE under MODAPS. There are some static runtime parameters that are common to all PGEs, such as the PGE Version, and some that are common to groups of similar PGEs primarily within a MODIS Science Discipline. There are also static runtime parameters that are unique to one or a few PGEs. Most of the static runtime parameters that control the characteristics of the products or identify either the algorithms used to produce the products or the instrument from which the data came are listed under the individual PGE descriptions in Section 4 of the document. Typical values of these parameters for operations are shown. However, these values may be changed by the Science Discipline Teams in subsequent versions of the PGEs.

All PGE scripts access the PGE Version from a MODAPS PGE data structure and set the PGE Version as a static runtime parameter for use in the PGE code to write the PGE Version metadata. MODAPS reads the PGE Version from a ciList that must be delivered with each version of the PGE code and sets the PGE Version in a PGE data structure.

- **PGE Version or PGExx Version** - Version of PGExx that appears in the ciList delivered with the code (where xx = PGE version number).

Many of the Land PGEs can be executed in several ways to produce different sets of products. Each of the MODIS Disciplines uses different static runtime parameters. To accomplish this for L2G PGEs, several static runtime parameters must be set in the PCF that is generated at runtime by the PGE script that builds the PCF.

- **L_Product** – Parameter which determines the geolocation angles product: G = day mode, g = night mode.

- **Exactmatch –** Parameter which is used for multi-product runs. ExactMatch means that the number of Exactmatch values shall be the same as that of L_Product values. If one product cannot be generated, then the PGE stops with an error status and the following products are not generated. Values are: Y, N.

- **Tilemode** – Selects either day mode data or night mode data. Values are: Day, Night. For Day mode, granules with the DayNightFlag set to Day or Both are staged. For Night mode, only granules with the DayNightFlag set to Night are staged.

- **Maxoutputres** – Selects the number of output products, which equates to the number of pointer resolutions to be produced. The resolution is indicated in the ShortName of the ESDT product. Values are: 1km, 500m, 250m. The results of selecting each value are the following:

  - 1km – produces only the 1km pointers,
  - 500m – produces 500m and 1km pointers,
  - 250m – produces 250m, 500m, and 1km pointers.

- **Deepocnflag** – Selects all pixels or all but deep-sea pixels. Values are: Yes, No. In general, this parameter should be set to “Yes” for L2G Sea Ice production and set to “No” for all other L2G products. The results of selecting each value are the following:

  - Yes – produces pointer for all pixels,
  - No – pixels flagged as deep-sea (in the geolocation land-sea mask) are skipped.

- **Coverage_min** – In general, this parameter should be set to 24.0. It may be increased to a higher value to reduce the pointer volume size. The polar areas may require a higher value.

- **Layer_1st_sel** – The first layer selection criteria has the values of either “nearest neighbor” or “maximum observation coverage”. In general, the “maximum observation coverage” should be selected.

- **Cov_cal_method** – Selects the coverage calculation method. Values are:“area” or “simple PSF”. Only the “area” option is currently implemented.

- **Pntrformat** – Selects the output format of the pointer products. Values are: compact, full, “one layer only”. In general, the compact value should selected to reduce the L2G volume.

- **L2Gformat** – Selects the output format of the geolocation angle products. Values are: compact, full, “one layer only”. In general, the compact value should selected to reduce the L2G volume. The value should be the same as the value for Pntrformat for a particular PGE profile.

Several Atmosphere and Land PGEs have the following static runtime parameters:

- **LocalVersionID –** Version that the Atmosphere Discipline Group uses internally to identify the processing algorithm and product.

- **InstrumentName –** LongName for the Instrument, “Moderate Resolution Imaging Spectroradiometer.

- **AlgorithmPackageAcceptanceDate -** Date on which the Science Discipline Group accepted the algorithm used in the processing code to make the product.

- **AlgorithmPackageMaturityCode -** Classification of maturity of the algorithm code as determined by the Science Discipline Group, e.g., “at launch”, “stable”, “final”.

- **AlgorithmPackageName -** Name of the algorithm used in the processing code, e.g., product name specified in the Algorithm Theoretical Basis Document (ATBD).

- **AlgorithmPackageVersion -** Version of the algorithm used in the processing code.

- **ReprocessingPlanned -** Indication of whether the data product is to be reprocessed or not. The value is read by the PGE and written into the product metadata. The current value for Terra and Aqua is “further update is anticipated”.

- **ReprocessingActual -** Indication of whether this is the first time the data were processed or this is a reprocessing of the data. The value is read by the PGE and written into the product metadata. The current value for Terra and Aqua is “reprocessed” if the PGE is being used to reprocess the data products or “processed once” if the PGE is making the products for the first time.

Several Oceans PGEs have static runtime parameters to allow the data to be sub-sampled, to control the output of messages, and to specify values of parameters to be

used in generation of the map products. Some of these static runtime parameters are the following:

- **subsamplex** – Operational value “0” indicates no sub-sampling.
- **subsampley** – Operational value “0” indicates no sub-sampling.
- **SMFLOG_SCREEN Switch** – Control for destination of message output. Operational value of “0” sends messages to the Log Report