Clouds and the Earth's Radiant Energy System (CERES)

Data Management System

CERES SIPS Data Management Plan

Version 1

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Document Date: September 2016

Document Revision Record

The Document Revision Record contains information pertaining to approved document changes. The table lists the date the Change was approved, the Version Number, a short description of the revision, and the revised sections. The document authors are listed on the cover.

Release Date	Version Number	Description of Revision	Section(s) Affected
09/06/16	V1	• Initial Document Release.	All

Clouds and the Earth's Radiant Energy System (CERES) Data Management System

CERES SIPS Data Management Plan

Version 1.0

Approved by:		Approved by:	
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Preface

The Clouds and the Earth's Radiant Energy System (CERES) Data Management System supports the data processing needs of the CERES Science Team research to increase understanding of the Earth's climate and radiant environment. The CERES Data Management Team works with the CERES Science Team to develop the software necessary to support the science algorithms. This software, being developed to operate at the Langley Atmospheric Science Data Center (ASDC), produces an extensive set of science data products.

The Data Management System consists of 12 subsystems; each subsystem represents one or more stand-alone executable programs. Each subsystem executes when all of its required input data sets are available and produces one or more archival science products.

A Data Management Plan was originally created in 1998 before the first CERES instrument was launched. The Plan was rewritten in an effort to account for an expanded number of CERES Instruments operating on multiple different space-based platforms. This Data Management Plan is the result and establishes a new Data Management Plan baseline for CERES.

Acknowledgment is given to the CERES Documentation Team for their support in preparing this document.

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1.0 Introduction

The CERES Instrument is a broadband scanning radiometer with extremely high radiometric measurement precision and accuracy that is designed to measure both solar reflected and Earth-emitted radiation from the TOA to the Earth's surface. The first CERES instrument (PFM) flew on TRMM, five instruments are currently operating on the EOS Terra (FM1 and FM2) and Aqua (FM3 and FM4) platforms, and SNPP (FM5) platform. One instrument will be operating on the JPSS-1 platform (FM6), which is scheduled to launch no earlier than March 2017. CERES measures radiances in three broadband channels: a shortwave channel (0.3 - 5 μm), a total channel (0.3 - 200 μm), and an infrared window channel (8 - 12 μm). The CERES FM6 instrument will measure radiances using the broadband channels listed above, with the exception that the window channel will be replaced with a longwave channel (5 - 50 μm). The last data processed from the PFM instrument aboard TRMM was March 2000; no additional data are expected.

CERES is a Principal Investigator lead instrument and the CERES project management and implementation responsibility is assigned to NASA Langley. The CERES Science Team is responsible for the instrument design and the derivation and validation of the scientific algorithms used to produce the data products distributed to the atmospheric sciences community. The CERES DMT is responsible for the development and maintenance of the software that implements science algorithms in the production environment to produce all CERES data products. The Langley ASDC is responsible for the production environment, data ingest, and the processing, archival, and distribution of all CERES data products.

1.1 Purpose and Scope

The CERES DMP serves to document data supporting and produced by the CERES mission. The purpose of this document is to document the data that will be created by the mission, and how that data is created and is dispositioned during and after the mission.

1.2 DMP Development, Maintenance and Management Responsibility

The CERES DMT is responsible for the development, maintenance, and management of the DMP. The CERES Data Manager has the overall responsibility for the plan and will have specific responsibility for approving any changes to the plan. All changes to the DMP will be controlled.

1.3 Document Organization

This document is organized as follows:

2.0 Mission and Sensor Overview

CERES climate data records involve an unprecedented level of data fusion: CERES measurements are combined with imager data (e.g., MODIS on Terra and Aqua, VIIRS on SNPP), 4-D weather assimilation data, microwave sea-ice observations, and measurements from five geostationary satellites to produce climate-quality radiative fluxes at the top-of-atmosphere, within the atmosphere and at the surface, together with the associated cloud and aerosol properties.

The CERES project supports the following past, present and future missions and instruments:

- TRMM
  - The CERES PFM instrument was launched in 1997 and operations began in late-December 1997. The PFM instrument suffered an anomaly of the +15V power converter on June 18, 2000, and all radiance data was lost from that date forward. Only eight months of data are available from the TRMM instrument.
  - To view daily instrument operations for TRMM, see the following URL: http://earth-www.larc.nasa.gov/shared_data/INSTRUMENT/Ops_Tables/TRMM/initial_ops.html.
- Terra
  - The CERES FM1 and FM2 instruments began operations in late-February 2000.
  - To view daily instrument operations for Terra, see the following URL: http://earth-www.larc.nasa.gov/shared_data/INSTRUMENT/Ops_Tables/Terra/terra_ops.html .
- Aqua
  - The CERES FM3 and FM4 instruments began operations in mid-June 2002.
  - The CERES FM4 instrument had an anomaly on March 30, 2005, which caused the instrument to lose data from the shortwave channel. The instrument continues to operate without the shortwave channel; however, FM4 data is only used in the Instrument and ERBE-like subsystem software.
  - To view daily instrument operations for Aqua, see the following URL: http://earth-www.larc.nasa.gov/shared_data/INSTRUMENT/Ops_Tables/Aqua/aqua_ops.html .
- SNPP
  - The CERES FM5 instrument began operating in February 2012 and continues to operate.
  - To view daily instrument operations for SNPP, see the following URL: http://earth-www.larc.nasa.gov/shared_data/INSTRUMENT/Ops_Tables/NPP/npp_ops.html .

- J01
  - The CERES FM6 instrument is scheduled for launch no earlier than March 2017. This instrument will differ from the other CERES instruments in that it will replace the window channel present on the other CERES instruments with a longwave channel.
  - After launch daily instrument operations for J01 will be available at the following URL: http://earth-www.larc.nasa.gov/shared_data/INSTRUMENT/Ops_Tables/J01/j01_ops.html .
- RBI
  - RBI is the next generation instrument. It is currently in the design phase and is scheduled to be launch in on the JPSS-02 mission in 2021.

During normal conditions, the CERES instruments operate in one of the following modes at any given time:

- Cross Track – The elevation scan plane is normal to the orbit plane.
- Along Track – The azimuth plane is coincident with orbit plane during elevation scanning.
- Unrestricted Biaxial – The azimuth plane rotates bidirectionally through 180° during elevation scanning.
- Restricted Biaxial – The azimuth plane rotation is restricted when solar beta angle is less than 22°.

3.0 Data Product Summary

CERES software is organized into 12 subsystems, which process data starting with the raw satellite data (Level-0), and continuing through to time and space averaged and gridded data products (Level-3). The following diagram shows interactions between the CERES subsystems including the data products, which are the interfaces between each of the subsystems.

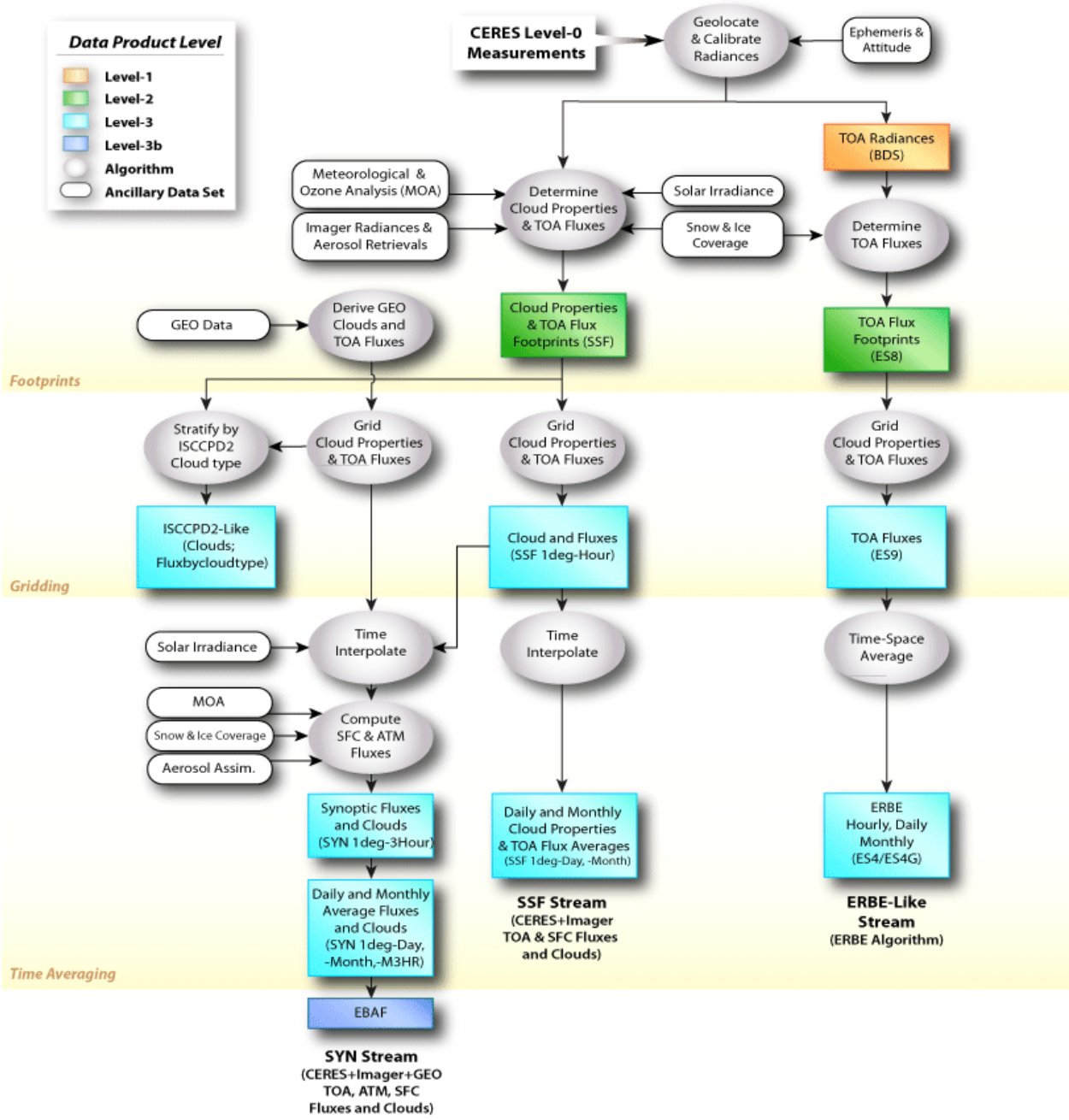

Figure 3-1. CERES Data Processing Flow Diagram

CERES data product descriptions can be found in the individual Data Products Catalogs available at: http://ceres.larc.nasa.gov/dpc_current.php. The main web page allows users to select the main data products by edition and also allows users to select to view internal and external ancillary data products.

Table 3-1. CERES Data Products

Product Name	Description	Temporal Resolution	Level
BDS	CERES geolocated and calibrated TOA filtered SW, TOT, and WN radiances for views of space, internal calibration, solar calibration and Earth	24 hours	1B
ES8	CERES observed TOA fluxes using original ERBE algorithms. For comparisons between CERES & ERBE data	24 hours	2
ES9		1 month	3
ES4		1 month	3
ES4G		1 month	3
SSF	CERES observed TOA fluxes, parameterized surface fluxes, and imager-derived cloud and aerosol properties	1 hour	2
SFC*	Hourly single satellite flux and cloud parameters averaged over regions in a 1.0-degree nested grid. The data are processed and written in local time	1 hour	3
SRBAVG**	Monthly and monthly hourly regional, zonal, and global averages of the TOA and surface LW and SW fluxes and the observed cloud conditions for each 1-degree equal-angle region	1 month	3
SSF1deg-Hour	Instantaneous TOA and parameterized surface fluxes and cloud/aerosol properties averaged onto a regular 1° equal-area grid and sorted by local hour	1 hour	3
SSF1deg-Day	CERES observed, temporally interpolated, daily, 1° equal-area, zonal and global averages of TOA fluxes and imager-derived clouds and aerosol properties	24 hours	3
SSF1deg-Month	Same as SSF1deg-Day but averaged over an entire Month	1 month	3
CRS***	Hourly instantaneous CERES fluxes at the TOA, within atmosphere and at the surface	1 hour	2
SYN1deg-1Hour	GEO enhanced CERES temporally interpolated 1-hourly average 1° equal-area TOA fluxes, imager/GEO cloud and imager aerosol properties	1 Hour	3
SYN1deg-3Hour	GEO enhanced CERES temporally interpolated 3-hourly average 1° equal-area TOA fluxes, imager/GEO cloud and imager aerosol properties	3 hours	3
SYN1deg-Day	GEO enhanced CERES temporally interpolated 1-Daily average 1° equal-area TOA fluxes, imager/GEO cloud and imager aerosol properties	1 day	3
SYN1deg-Month	GEO enhanced CERES temporally interpolated monthly average 1° equal-area TOA fluxes, imager/GEO cloud and imager aerosol properties	1 month	3

Product Name	Description	Temporal Resolution	Level
SYN1deg-M3Hour	GEO enhanced CERES temporally interpolated 1° equal-area averages of all days during the month for each of the eight 3-hourly GMT time increments (monthly 3-hourly) of TOA fluxes, imager/GEO cloud properties, imager/GEO aerosol properties, and computed TOA, surface, and profile fluxes.	1 month	3
SYN1deg-MHour	GEO enhanced CERES temporally interpolated monthly-hourly average 1° equal-area TOA fluxes, imager/GEO cloud and imager aerosol properties	1 month	3
SYN	GEO enhanced CERES temporally interpolated 3-hourly average 1° equal-area TOA fluxes, imager/GEO cloud properties, imager/GEO aerosol properties, and computed TOA, surface, and profile fluxes.	3 hours (1 file per day with 8 GMT times)	3
AVG	GEO enhanced CERES temporally interpolated monthly and monthly 3-hourly average 1° equal-area TOA fluxes, imager/GEO cloud properties, imager/GEO aerosol properties, and computed TOA, surface, and profile fluxes.	1 month	3
ZAVG	GEO enhanced CERES temporally interpolated monthly and monthly 3-hourly zonal and global averages of TOA fluxes, imager/GEO cloud properties, imager/GEO aerosol properties, and computed TOA, surface, and profile fluxes.	1 month	3
EBAF	1° equal-area monthly mean CERES TOA fluxes optimally constrained by the net TOA flux imbalance derived from ocean heat content data.	1 month	4
ISCCP-D2like-Day	Monthly 1° equal-area gridded archival product contains day time only MODIS cloud properties derived from CERES retrievals that emulates the ISCCP-D2 (NASA GISS) format.	1 hour	3
ISCCP-D2like-Nit	Monthly 1° equal-area gridded archival product contains night time only MODIS cloud properties derived from CERES retrievals that emulates the ISCCP-D2 (NASA GISS) format.	1 hour	3
ISCCP-D2like-GEO	Monthly 1° equal-area gridded archival product contains Geostationary cloud properties used in the CERES temporal interpolation algorithm.	3 hourly	3
ISCCP-D2like-Mrg	Monthly 1° equal-area gridded archival product contains merged Terra and Aqua MODIS and GEO cloud properties. The GEO clouds have been normalized to MODIS to provide diurnally consistent clouds.	3 hourly	3

Product Name	Description	Temporal Resolution	Level
* SFC produced through Edition 3. Starting with Edition 4, SFC was replaced by the SSF1deg-Hour product ** SRBAVG was produced through Edition 2. Starting with Edition 3, SRBAVG was replaced by the SSF1deg-Day and SSF1deg-Month products. *** CRS was only produced for Terra and Aqua Edition 2. ****SYN, AVG & ZAVG products were only produced for Edition 3. Starting with Edition 4, the SYN1deg product suite replaced these products.			

3.1 Data Acquisition

Table 3-2. Data sets required as input for CERES data processing

Product	Source
TRMM Level-0	TRMM Data Center
Terra Level-0	EDOS
Aqua Level-0	EDOS
NPP Level-0	EDOS
J01 Level-0	EDOS
NPP RDRs	SDS SD3E*
TRMM Ephemeris/Attitude	TRMM Data Center
Terra Ephmeris/Attitude	EDOS
Aqua Ephemeris/Attitude	NASA FDF
NPP Ephemeris/Attitude	EDOS
J01 Ephemeris/Attitude	EDOS
Snow & Ice	NSIDC
1/8th mesh Snow & Ice Maps	NOAA NCEI
1/16th mesh Snow & Ice Maps	AFWA
Solar Irradiance	Laboratory for Atmosphere & Space Physics
GEO Data	MCIDAS
Terra MODIS Radiances	MODAPS
Aqua MODIS Radiances	MODAPS
SNPP VIIRS Radiances	Land SIPS
Terra MODIS Aerosol Retrievals	MODAPS
Aqua MODIS Aerosol Retrievals	MODAPS
SNPP VIIRS Aerosol Retrievals	Land SIPS
Meteorological Reanalysis	GMAO
* No longer available after March 2016	

3.2 Data Processing

CERES production data processing takes place at the LaRC ASDC. Prior to processing, the ASDC ingests CERES Level-0, ephemeris and attitude data for each CERES instrument and platform. Instrument level-0 data consists of 13,091 6.6-second packets for each 24-hour period. Each 6.6 second CERES packet consists of one Earth scan and contains 660 samples of radiance, elevation and azimuth measurements along with instrument housekeeping measurements (temperatures, voltages, etc). The Instrument subsystem reads the Level-0, ephemeris and attitude data and creates an output file containing 24-hours of geolocated and filtered radiance values for each footprint paired with a Julian date/time. Each footprint consists of a surface and TOA (30km) radiance values (SW, Total and WN for TRMM, Terra, Aqua & SNPP; SW, Total and LW for JPSS-1) as well quality flags and view angle geometry values. Each 24-hour output file, referred to as a BDS file, also contains instrument health and status data which is used to monitor the instrument performance. The Instrument subsystem also creates intermediate data products used by the ERBE-like and Clouds subsystems. These intermediate data products contain subsets of specific parameters from the BDS data product that are needed by the follow-on subsystems.

The ERBE-like subsystem reads a PRES8 intermediate data product created from the Level-1B BDS product from the Instrument subsystem and processes data in 24-hour increments. The subsystem applies spectral correction coefficients and uses unfiltering methods developed by the ERBE project to produce unfiltered radiances. ERBE unfiltering techniques are used to maintain a consistent record of radiance data from the launch of the first ERBE instrument in 1984. The ERBE-like subsystem produces a Level-2 daily ES8 data products and Level-3 ES4 and ES9 monthly data products. The subsystem produced ES4 and ES9 products by reading one month of ES8 data and applying ERBE-like time and space averaging algorithms to create monthly gridded data sets.

The Clouds subsystem reads input data from several sources to generate Level-2 imager-derived cloud properties. The satellite-based inputs are high spectral and spatial resolution imager radiances and geolocation (Level-1B) and CERES geolocated, calibrated radiances. The imagers used are MODIS from the Terra and Aqua spacecraft, and VIIRS from SNPP spacecraft. Additional inputs include those that describe the Earth's surface (snow depth, ice coverage, water content, scene ID, ecosystem, and a terrain map on a 10-minute equal-angle grid), MOA information from the GMAO GEOS model (Surface temperature, surface pressure, atmospheric temperature, humidity, ozone and wind velocity profiles, precipitable water, and column ozone), and imager-based instantaneous aerosol optical depth. From the imager radiances a cloud mask, cloud macrophysical properties (cloud top and base pressure, temperature, and heights), and cloud microphysical properties (particle phase, particle size, optical, and water/ice path, and emissivity) are produced. To support cloud identification a daily updated overhead-sun albedo clear-sky albedo map is produced for several imager channels. The CERES PSF is used to weight imager radiances, derived cloud and surface properties, and aerosol optical depths. These are included in the output science product, the SSF. The SSF is an hourly CERES archival product that contains CERES footprint geometry, CERES radiance and flux information, and the statistics for imager-derived cloud properties at the full (surface type), clear (skin temperature and aerosol), and cloudy (macro- and microphysical properties) footprint areas.

The Inversion subsystem calculates footprint-based estimates of the radiant flux at the TOA based on input from the preliminary SSF product produced by the Clouds subsystem. This inversion process is dependent on several factors including Earth surface features, the extent of cloudiness, and the relative geometry of the spacecraft, the Sun, and the measurement field-of-view. Each radiometric measurement is spectrally corrected to give an unfiltered measurement. Estimates of the radiant flux at the TOA are computed based on scene information, geometrical considerations, and the unfiltered measurements. The Surface Flux Estimation calculates footprint-based estimates of radiant flux at the Earth's surface based on input from the preliminary SSF, the TOA fluxes and meteorological data provided through the MOA product. Multiple algorithms are used to generate both the LW and SW surface products.

The Instantaneous SARB subsystem reads TOA and surface data from SSF and MOA products and computes vertical-flux profiles for each SSF footprint of every data hour. The profiles are obtained from a radiative transfer model using boundary conditions at the surface and TOA.

The Synoptic SARB subsystem reads TOA and surface data from the TSI and MOA products and computes vertical flux and entropy data. This subsystem uses algorithms similar to Instantaneous SARB except that the output is grouped for the entire data month into 180 latitudinal outputs.

Subsystems 7.1, 8.0 and 10.0 share commonalities and are all considered TISA Averaging subsystems. TISA Averaging 7.1 reads Level-3 gridded instantaneous CERES and geostationary radiance data and uses a temporal interpolation process to produce hourly instantaneous Level-3 combined Terra, Aqua and geostationary fluxes and cloud properties on a 1-degree equal-area grid. TISA Averaging 8.0 reads hourly instantaneous Level-3 combined Terra, Aqua and geostationary fluxes and cloud properties along with computed vertical flux profiles on a 1-degree equal-area grid. The output data products are hourly, 3-hourly, daily, and monthly-hourly regional averages and monthly regional, zonal, and global averages of geostationary-enhanced temporally interpolated combined Terra and Aqua TOA fluxes and cloud properties and computed vertical flux profiles on a 1-degree equal-angle grid. TISA Averaging 10.0 reads Level-3 gridded instantaneous CERES flux and cloud properties, temporally interpolates them, and produces monthly and daily mean CERES TOA radiative fluxes and coincident MODIS-derived cloud and aerosol properties at 1-degree-regional, zonal, and global scales.

The TISA Gridding Subsystem reads single scanner footprint TOA/surface fluxes and clouds data from the Level-2 SSF product. The first function is the gridding function, in which individual footprints are assigned to the appropriate CERES 1-degree equal-angle grid system. The second is the averaging function, in which spatial averages of TOA/surface fluxes and clouds are computed. The output product is a monthly gridded TOA/surface fluxes and clouds archival product containing hourly single satellite fluxes and cloud parameters averaged over regions in a 1.0-degree nested grid. The second archival product from this subsystem is the ISCCP-D2like monthly product. This product provides the CERES MODIS-derived and geostationary-derived cloud property retrievals where the cloud properties are stratified by optical depth and cloud pressure levels similar to the ISCCP-D2 products. The daytime Terra-MODIS, Aqua-MODIS Level-2 SSF footprint data and MODIS-normalized geostationary data are assigned to the appropriate CERES 1-degree equal-angle grid system and the averages of

cloud parameters are computed over monthly and monthly 3-hourly temporal resolution.

The MOA subsystem reads temperature, humidity, and ozone data from the G5-CERES data provided by GMAO at NASA Goddard. This data is then spatially and temporally interpolated to the grid common with CERES for every sixth data hour. Three demensional data is also vertically interpolated to 58 pressure levels.

The GGEO subsystem (11.0) reads data from geostationary satellites collected by the ISCCP. geostationary satellites orbit at very high altitudes over the equator, and global coverage can be achieved with five strategically-located satellites. The input satellite dataset consists of narrowband infrared, water vapor, visible-channel radiances, and clouds. The visible, infrared, and water vapor data are in the form of eight- or ten-bit counts and temperatures that can be converted to radiances using calibration formulae. Then the measurements are assigned to the appropriate CERES 1-degree equal-angle grid system similar to the TISA Gridding process and the averages of VIS and IR, WV narrowband radiances and clouds are computed. The output product is a monthly gridded product containing visible, IR, and WV radiances and cloud parameters averaged over a region in a 1.0-degree nested grid at 1-hourly temporal resolution.

3.3 Data Quality

A Data Quality Summary is available for each of the orderable CERES data products. These Data Quality Summaries are distributed along with orders of CERES data. The Data Quality Summaries can be found at: http://ceres.larc.nasa.gov/dqs.php.

3.4 Data Archival

The Langley ASDC is the long-term archive for CERES data products, per NASA Headquarters. The ASDC performs ingest, archive, and distribution of CERES data products.

Standard science data products and associated metadata are made publicly available including provision of Directory Interchange Format files to the Global Change Master Directory and use of the ESDIS Common Metadata Repository. The most up-to-date versions of science data products remain on low-latency storage while older legacy products are deprecated to archive storage (tape). The ASDC also performs capacity planning based on CERES project inputs.

3.5 Post-Mission Stewardship

The CERES DMT will ensure all data products, associated scientific algorithm software, coefficients, and ancillary data used to generate these products are documented and transferred to the ASDC before the end of the project. This will ensure post-mission access to the products and provide capability to retain corporate knowledge and regenerate products as needed in the future. These products are in accordance with the ESDIS Preservation Content Specification (423-SPEC-001). The CERES DMT will provide associated documentation and software as each new product is released to ensure the post-mission availability of data and supporting information, on a timely basis for use by the science community. These products are defined in the CERES Data Products Catalogs. The individual subsystem's Operator's Manual provides tables, for each PGE, showing which data products will be archived at the LaRC ASDC.

4.0 References

1. Reference "Sampling Strategy, Production Strategy, and Configuration Code Implementation at the Langley TRMM and Terra Information System (LATIS)" internal paper for detail description of the CERES environment parameters. URL: http://ceres.larc.nasa.gov/Internal/intern_docs.php
2. Reference "DMT to DAAC Production Request." URL: http://ceres.larc.nasa.gov/dmt2daac.php
3. Reference CERES Data Quality Summaries: http://ceres.larc.nasa.gov/dqs.php
4. Reference to Data Products Catalogs: http://ceres.larc.nasa.gov/dpc_current.php
5. Reference to Collection Guides: http://ceres.larc.nasa.gov/collect_guide.php
6. Referenced to NASA Earth Science Data Preservation Spec, 423-SPEC-002: https://earthdata.nasa.gov/files/423-SPEC-001_NASA%20ESD_Preservation_Spec_OriginalCh01_0.pdf

5.0 Acronyms and Abbreviations

AFWA	Air Force Weather Agency
Aqua	Alias for EOS-PM1
ASDC	Atmospheric Science Data Center
AVG	Monthly Regional Radiative Fluxes and Clouds
BDS	Science Bi-Directional Scan HDF data product
CERES	Clouds and the Earth's Radiant Energy System
CRS	Cloud and Radiation Swath Product
DAAC	Distributed Active Archive Center
DMP	Data Management Plan
DMT	Data Management Team
EBAF	Energy Balanced And Filled, CERES net balanced Top-of-Atmosphere fluxes
ECS	EOSDIS Core System
EDOS	EOS Data and Operations System
EOS	Earth Observing System
EOS-AM	EOS Morning Crossing Mission
EOS-PM	EOS Afternoon Crossing Mission
ERBE	Earth Radiation Budget Experiment
ES4	ERBE-like S-4 data product
ES8	ERBE-like daily data product
ES9	ERBE-like S-9 data product
ES4G	ERBE-like Regional, Zonal, and Global Averages
ESDIS	Earth Science Data and Information System
FDF	Flight Dynamics Facility
FM1, 2, 3, 4, 5, 6	Flight Model
GEOS	Goddard Earth Observing System
GGEO	Grid GEOstationary data subsystem
GISS	Goddard Institute for Space Studies
GMAO	Global Modeling and Assimilation Office
GMT	Greenwich Mean Time
HDF	Hierarchical Data Format
ICD	Interface Control Document
IR	Infrared
ISCCP	International Satellite Cloud Climatology Project
J01	JPSS-1 spacecraft

JPSS	Joint Polar Satellite System
LaRC	Langley Research Center
LaTIS	Langley TRMM Information System
LW	Longwave
μm	microns
McIDAS	Man computer Interactive Data Access System
MOA	Meteorological, Ozone, and Aerosol
MODIS	Moderate-resolution Imaging Spectroradiometer
NASA	National Aeronautics and Space Administration
NCDC	National Climatic Data Center
NCEI	National Center for Envoronmental Information
NOAA	National Oceanic and Atmospheric Administration
NPP	National Polar-orbition Partnership
NSIDC	National Snow and Ice Data Center
PFM	PreFlight Model
PGE	Product Generation Executives
PSF	Point Spread Function
RBI	Radiation Budget Instrument
RDR	Raw Data Record
SARB	Surface and Atmospheric Radiation Budget
SD3E	Science Data Depository & Distribution Element
SDS	Science Data Segment
SFC	Surface Flux and Clouds
SIPS	Science Investigator-led Processing System
SNPP	Soumi-National Polar-orbition Partnership
SRBAVG	Monthly and Regional TOA and Surface Radiation Budget AVeraGe
SSAI	Science Systems and Applications Incorporated
SSF	Single Satellite CERES Footprint TOA and Surface Fluxes, Clouds
SW	Shortwave
SYN	Synoptic Radiative Fluxes and Clouds
TBD	To Be Determined
Terra	alias for EOS-AM1
TISA	Time Interpolation and Space Averaging
TOA	Top-of-Atmosphere
TOT	Total
TRMM	Tropical Rainfall Measuring Mission
TSI	Time & Space Interpolated data set
URL	Uniform Resource Identifier

UT	Universal Time
VIIRS	Visible Infrared Imaging Radiometer
VIS	Visible
WN	Window
WV	Water Vapor
ZAVG	Monthly Zonal and Global Radiative Fluxes and Clouds