2.0 Archival Data Products

This section describes the CERES data products which are permanently archived at the Langley DAAC. Each subsection contains a brief overview of the purpose and content of the data product followed by one or more tables which list every parameter contained in the product. The following data attributes are described in the overview sections:

- Level - The EOS data products are defined in terms of "levels"[1]
- Type - Data type (Archival, Internal, or Ancillary)
- Frequency - How often the product is received or produced
- Time Interval Covered -

  File - Time period covered within this file
  Record - Time period covered within one record of this file
- Portion of Globe Covered -

  File - Portion of the globe covered within this file
  Record - Portion of the globe covered within a record of this file
- Portion of Atmosphere Covered -

  File - Portion of the atmosphere covered within this file (Surface, Top-of-the-Atmosphere (TOA), etc.)

Additional tables may contain the following attributes for each parameter:

- Description - A textual description of the parameter
- Parameter Number - Arbitrary number assigned to the parameter
- Units - Units of the parameter value
- Range - Range of values for the parameter
- Elements/Record - Elements per record for this parameter (array definition)
- Bits/Element - Number of bits used to describe this parameter
- Elem Num - Element Number, a numbering of each element in the file/record

Total file sizes are also provided. The bolded entries within the file are names for the group of parameters which follow.

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1. **Level 0:** raw instrument data at full sensor resolution.
Level 1A: raw instrument data at full sensor resolution, time-referenced, and annotated with ancillary information (including radiometric calibration coefficients and geolocation parameters such as platform ephemeris) computed and appended but not applied to the Level 0 data.
Level 1B: Level 1A data processed to sensor units and geolocated.
Level 2: derived geophysical variables at the same resolution and location as the Level 1 source data.
Level 3: geophysical variables mapped on uniform space-time grids, usually with some completeness and consistency.
Level 4: model output or results from analyses of lower level data, e.g., variables derived from multiple measurements.

2.1 Bidirectional Scans (BDS)

EOSDIS Product Code: CER01

The Bidirectional Scan (BDS) data product is an archival product containing Level-1b CERES scanner data obtained for a 24-hour period. All science scan modes are in the BDS. This includes the fixed and rotating azimuth scan modes that perform normal Earth scans, internal calibration, and short scan elevation profiles. The BDS product includes samples taken at all scan elevation positions (including space-looks and internal calibration views).

The BDS includes the raw (unconverted) science and instrument data from the Level 0 input file (excluding Level 0 header and footer data) as well as the geolocated converted science and instrument data. The BDS also contains additional data not found in the Level 0 input file, including converted satellite position and velocity data, celestial data, converted digital status data, and parameters used in the radiance count conversion equations.

All of the BDS data use Hierarchical Data Format (HDF) structures such as Vdata and Scientific Data Sets (SDSs). See the HDF User's Guide for additional information (Reference 1). Metadata for the BDS is implemented using the ECS Toolkit metadata routines (Reference 2), which are based on HDF Annotations.

The general composition of a BDS in terms of HDF components is as follows:

Data Structure	HDF Component
1. Metadata	HDF Vdata
2. Unconverted Science Data	HDF SDSs
3. Unconverted Engineering Data	HDF Vdata
4. Instrument Status Data	HDF SDS
5. Converted Science Data	HDF SDSs
6. Converted Engineering Data	HDF Vdata
7. Satellite-Celestial Data	HDF Vdata
8. Calibration Parameters	HDF SDSs and Vdata

A more detailed listing of the data parameters for this product can be found in the BDS Collection Guide (Reference 3).

Level: 1b
Type: Archival
Frequency: 1/Day

Portion of Globe Covered
File: Satellite Swath
Record: N/A

Time Interval Covered
File: 24 Hours
Record: Single 6.6-Second Scans

Portion of Atmosphere Covered
File: Satellite Altitude

BDS Metadata

The BDS has several kinds of metadata and contains information which need only be recorded once per product. Table 2.1-1 summarizes the BDS metadata.

Table 2.1-1. BDS Metadata Summary

HDF Name	Description Table	Records	Number of Fields
CERES Baseline Header Metadata	Table B-1	1	36
CERES_metadata Vdata	Table B-2	1	14
BDS Product-specific Metadata	Table 2.1-2	1	9

The CERES metadata are listed in Tables B-1 and B-2 in Appendix B. Table B-1 lists the CERES Baseline Header Metadata and Table B-2 list the parameters in the Vdata Metadata Table. Note that the Vdata Metadata is a subset of the CERES Baseline Header Metadata. In addition, there are BDS specific metadata parameters that are listed in Table 2.1-2.

Table 2.1-2. BDS Product-specific Metadata

Item	Parameter Name	Units	Range	Data Type
1	ScanMode	N/A	Raps Only, Faps Only, Raps/Faps	s(9)
2	Second Time Constant Mode	N/A	Off, On	s(3)
3	Ephemeris Data Used	N/A	Real, Pred, Sim	s(4)
4	Attitude Data Used	N/A	Real, Sim	s(4)
5	Percent Total Channel Bad	N/A	0.0 .. 100.0	F11.6
6	Percent Window Channel Bad	N/A	0.0 .. 100.0	F11.6
7	Percent Short Wave Channel Bad	N/A	0.0 .. 100.0	F11.6
8	Percent FAPS	N/A	0.0 .. 100.0	F11.6
9	Percent RAPS	N/A	0.0 .. 100.0	F11.6
10	Number Input Files	N/A	1 .. n	U32Int
11	TOA_Model_Used	N/A	CERES-TOA	s(9)

BDS Scientific Data Sets

Every Scientific Data Set (SDS) in the BDS file represents a time ordered collection of data where each row in the SDS corresponds to a packet of data, and each column corresponds to a single sample within a packet. Most of the SDSs have 660 samples per packet of a single parameter arranged as shown in Figure 2.1-1.

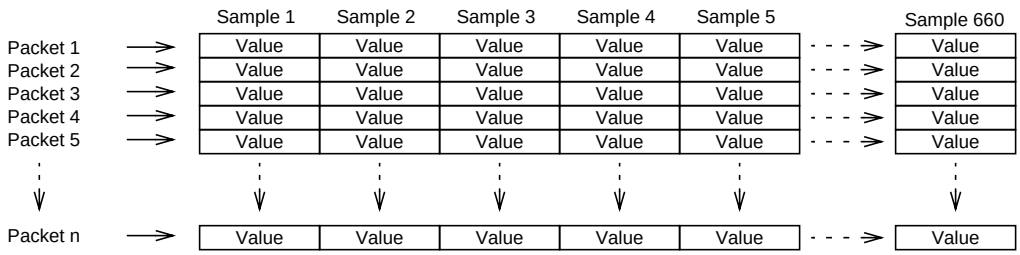

Figure 2.1-1. BDS SDS Schematic

(Note: n = the number of packets processed)

Table 2.1-3 summarizes the contents of each SDS contained within the BDS file.

Table 2.1-3. BDS SDS Summary (1 of 2)

SDS Name	HDF Rank	Number of Rows	Number of Columns	Data Type	Range	Units	Nominal Size (MB)*
Shortwave Detector Output	2	n	660	U16 Integer	0 .. 4095	count	16.48
Total Detector Output	2	n	660	U16 Integer	0 .. 4095	count	16.48
Window Detector Output	2	n	660	U16 Integer	0 .. 4095	count	16.48
Elevation Position Count	2	n	660	U16 Integer	0 .. 4095	count	16.48
Azimuth Position Count	2	n	660	U16 Integer	0 .. 4095	count	16.48
Raw Instrument Status Data	2	n	185	U16 Integer	Reference 3	N/A	4.62
CERES SW Filtered Radiance, Upwards	2	n	660	32-Bit Float	-10.0 .. 510.0	$Wm^{-2}sr^{-1}$	32.96
CERES TOT Filtered Radiance, Upwards	2	n	660	32-Bit Float	0.0 .. 700.0	$Wm^{-2}sr^{-1}$	32.96
CERES WN Filtered Radiance, Upwards	2	n	660	32-Bit Float	0.0 .. 50.0	$Wm^{-2}sr^{-1}$	32.96
Colatitude of CERES FOV at Surface	2	n	660	32-Bit Float	0.0 .. 180.0	deg	32.96
Longitude of CERES FOV at Surface	2	n	660	32-Bit Float	0.0 .. 360.0	deg	32.96
CERES Viewing Zenith at Surface	2	n	660	32-Bit Float	0.0 .. 90.0	deg	32.96
CERES Solar Zenith at Surface	2	n	660	32-Bit Float	0.0 .. 180.0	deg	32.96
CERES Relative Azimuth at Surface	2	n	660	32-Bit Float	0.0 .. 360.0	deg	32.96

Table 2.1-3. BDS SDS Summary (2 of 2)

SDS Name	HDF Rank	Number of Rows	Number of Columns	Data Type	Range	Units	Nominal Size (MB)*
Colatitude of CERES FOV at TOA	2	n	660	32-Bit Float	0.0 .. 180.0	deg	32.96
Longitude of CERES FOV at TOA	2	n	660	32-Bit Float	0.0 .. 360.0	deg	32.96
CERES Viewing Zenith at TOA - Geocentric	2	n	660	32-Bit Float	0.0 .. 90.0	deg	32.96
CERES Solar Zenith at TOA - Geocentric	2	n	660	32-Bit Float	0.0 .. 180.0	deg	32.96
CERES Relative Azimuth at TOA - Geocentric	2	n	660	32-Bit Float	0.0 .. 360.0	deg	32.96
Converted Elevation Angles	2	n	660	32-Bit Float	0.0 .. 180.0	deg	32.96
Converted Azimuth Angles	2	n	660	32-Bit Float	0.0 .. 270.0	deg	32.96
Radiance and Mode Flags	2	n	660	U32 Integer	Reference 3	N/A	32.96
Ancillary QA Flags, Set 1	2	n	660	U32 Integer	Reference 3	N/A	32.96
Ancillary QA Flags, Set 2	2	n	660	U32 Integer	Reference 3	N/A	32.96
Julian Date and Time	2	n	2	64-Bit Float	N/A	day	0.20
Cone Angles	2	n	660	32-Bit Float	0.0 .. 90.0	deg	32.96
Clock Angles	2	n	660	32-Bit Float	0.0 .. 360.0	deg	32.96
Cone Angle Rates	2	n	660	32-Bit Float	-100.0 .. 100.0	deg sec^{-1}	32.96
Clock Angle Rates	2	n	660	32-Bit Float	-10.0 .. 10.0	deg sec^{-1}	32.96
SW Spaceclamp Values	2	n	2	32-Bit Float	N/A	count	0.1
WN Spaceclamp Values	2	n	2	32-Bit Float	N/A	count	0.1
TOT Spaceclamp Values	2	n	2	32-Bit Float	N/A	count	0.1
Count Conversion SW Sample Offsets	2	n	660	32-Bit Float	N/A	count	0.01
Count Conversion WN Sample Offsets	2	n	660	32-Bit Float	N/A	count	0.01
Count Conversion Total Sample Offsets	2	n	660	32-Bit Float	N/A	count	0.01
SDS TOTAL SIZE (* assumes n = 13091 and does not include HDF overhead)							**812.67**

BDS Vdata

The BDS contains eight Vdatas which are collections of records containing one or more fields. Each of the eight Vdatas contains *n* records of packet level data, and there is a one-to-one correspondence of the Vdatas record numbers to the row numbers of the BDS SDSs. Table 2.1-4 summarizes each of the Vdatas contained within the BDS file. Reference 3 provides detailed descriptions of the parameters in each Vdata.

Table 2.1-4. BDS Vdata Summary

Vdata Name	Records	Number of Fields	Nominal Size (MB)
Temperature Counts	n	39	5.62
Voltage and Torque Counts	n	24	2.25
Position Counts	n	12	6.6
Converted Temperatures	n	35	8.84
Converted Voltages and Torques	n	23	4.35
Satellite-Celestial Data	n	11	1.6
Converted Instrument Status Data	n	25	1.1
Count Conversion Constants	1	9	~0.0
Vdata TOTAL SIZE			**30.36**

2.2 Instrument Production Data Set (INSTR)

EOSDIS Product Code: CERX00a
The Instrument Production Data Set (INSTR) is the Level 0 raw data from the CERES Scanner. It is structured into packets by the onboard software as programmed by the instrument developer, TRW. The packets are formatted according to Consultative Committee for Space Data Systems (CCSDS) standards. Although the CERES output is the same on each satellite, the packets contain ancillary information which is unique to a particular spacecraft. There are seven basic pieces of information contained in a normal CERES data packet (i.e., science output format):

1. Packet Header - Same format for all instruments
2. Time (secondary header) - formats specified by platform's selected CCSDS option
3. Radiometric Detector Outputs
4. Instrument Elevation and Azimuth Position Data
5. Instrument Analog Engineering Data (e.g., Temperatures and Voltages)
6. Instrument Digital Engineering Data

There are five types of packets currently defined for the CERES instrument - Science, Diagnostic Memory, Diagnostic Processor, Diagnostic Gimbal, and Diagnostic Fixed Pattern. Each of these packet types corresponds to a particular operation of the CERES instrument.

For processing purposes, packets are grouped into Level 0 files which typically represent data collected from the CERES instrument over a 24-hour period. The TRMM Level 0 file format is illustrated in Figure 2.2-2 and the EOS-AM1 Level 0 file format is illustrated in Figure 2.2-3. Table 2.2-1 lists the parameters for each packet type.

Level: 0
Type: Archival
Frequency: 1/Day

Portion of Globe Covered
File: Satellite Swath
Record: N/A

Time Interval Covered
File: 1 Day
Record: Single 6.6-Second Scans

Portion of Atmosphere Covered
File: N/A

Level 0 File Definitions

File Header (48 to 52 Bytes)
Instrument Data Packets (Number of Packets x 7132 Bytes)
File Footer (QAC) (Total = Length of QAC Footer (4) +[Number of Entries x 5] Bytes)
File Footer (MDUL) (Total = Length of MDUL Footer (4) + [Number of Entries x 5] Bytes)

(Minimum number of QAC entries is always = 1)

QAC - List of packet IDs known to be corrupted or unusable;
MDUL - List of packet IDs missing;

Figure 2.2-2. TRMM Level 0 File Format

File Header (TBD Bytes)
Instrument Data Packets (Number of Packets x 7051 Bytes)

Figure 2.2-3. EOS Level 0 File Format

Table 2.2-1. Instrument Production Data Set (INSTR) (1 of 3)

Description	Parameter Number	Units	Range	Elements/ Record	Bits/ Elem	Elem Num
INSTR_PDS						
INSTR_PDS File Header (TRMM)						
Spacecraft ID		N/A	N/A	1	16	
Spacecraft Clock (first packet)		N/A	N/A	1	72	
Spare		N/A	N/A	1	8	
Spacecraft Clock (last packet)		N/A	N/A	1	72	
Spare		N/A	N/A	1	8	
Number of Packets in file		N/A	N/A	1	32	
Processing Options		N/A	N/A	1	8	
Data Type Flag		N/A	N/A	1	8	
Time of Receipt at Originating Node		N/A	N/A	1	56	
Spare		N/A	N/A	1	24	
Select Options		N/A	N/A	1	8	
Number of APIDs		N/A	N/A	1	8	
APIDs		N/A	N/A	1 to 3	16	
Spare		N/A	N/A	1	8	
Number of QAC lists in file		N/A	N/A	1	8	
Offset to QAC List		N/A	N/A	1	32	
INSTR_PDS File Header (EOS)		N/A	N/A		TBD	
Contents TBD						
INSTR_PDS Data is Array[13091] of:						
INSTR_PDS_Data_Packet						
INSTR_PDS_Data_Packet_Header is selection of						
INSTR_Packet_Hdr (TRMM)						
INSTR_Packet_Header_Data						
Version Number	1	N/A	N/A	1	3	1
Type	2	N/A	N/A	1	1	2
Secondary Header Flag	3	N/A	N/A	1	1	3
APID	4	N/A	N/A	1	11	4
Sequence Flags	5	N/A	N/A	1	2	5
Packet Sequence Count	6	N/A	N/A	1	14	6
Packet Length	7	N/A	N/A	1	16	7
INSTR_Packet_Secondary_Hdr (TRMM)						
Time Data	8	N/A	N/A	1	64	8
INSTR_Packet_Status (TRMM)						
Spare 1	9	N/A	N/A	1	16	9
Timecode ID	10	N/A	N/A	1	1	10
Quicklook Flag	11	N/A	N/A	1	1	11
Instrument ID	12	N/A	N/A	1	5	12
Data Version	13	N/A	N/A	1	5	13
Data Indicator	14	N/A	N/A	1	4	14
Packet Counter	15	N/A	0..65535	1	16	15
Spare 2	16	N/A	N/A	1	16	16
Spare 3	17	N/A	N/A	1	16	17
INSTR_Packet_Hdr (EOS)						
INSTR_Packet_Header_Data						
Version Number	1	N/A	N/A	1	3	1
Type	2	N/A	N/A	1	1	2
Secondary Header Flag	3	N/A	N/A	1	1	3
APID	4	N/A	N/A	1	11	4

Table 2.2-1. Instrument Production Data Set (INSTR) (2 of 3)

Description	Parameter Number	Units	Range	Elements/ Record	Bits/ Elem	Elem Num
Segment Flags	5	N/A	N/A	1	2	5
Source Sequence Count	6	N/A	N/A	1	14	6
Packet Length	7	N/A	N/A	1	16	7
INSTR_Secondary_Hdr (EOS)						
Time Data	9	N/A	N/A	1	72	8
Quick Look Flag	10	N/A	N/A	1	8	9
INSTR_Packet_Status (EOS)						
Spare 1	11	N/A	N/A	1	8	10
Timecode ID	12	N/A	N/A	1	1	11
Quicklook Flag	13	N/A	N/A	1	1	12
Instrument ID	14	N/A	N/A	1	5	13
Data Version	15	N/A	N/A	1	5	14
Data Indicator	16	N/A	N/A	1	4	15
Packet Counter	17	N/A	N/A	1	16	16
Spare 2	18	N/A	N/A	1	16	17
Spare 3	19	N/A	N/A	1	16	18
INSTR_Measurement_Data is selection of						
INSTR_Science_Data is Array[660] of:						
INSTR_Science_Record						
Azimuth Position Count	19	count	0..65535	660	16	21
Elevation Position Count	20	count	0..65535	660	16	681
Total Detector Output	21	count	0..4095	660	12	1341
SW Detector Output	22	count	0..4095	660	12	2001
Window Detector Output	23	count	0..4095	660	12	2661
Instrument Analog Data - See Reference 3 for details	24	-	-	660	12	3321
INSTR_Diagnostic_Memory_Data is Array[660] of:						
INSTR_Memory_Record						
Azimuth Position Count	19	count	0..65535	660	16	21
Elevation Position Count	20	count	0..65535	660	16	681
DAP Memory Dump Data	21	N/A	0..65535	660	16	1341
ICP Memory Dump Data	22	N/A	0..65535	660	16	2001
Fill Data	23	N/A	0..15	660	4	2661
Instrument Analog Data - See Reference 3 for details	24	-	-	660	12	3321
INSTR_Diagnostic_Gimbal_Operation_Data is Array[660] of:						
INSTR_Gimbal_Record						
Azimuth Position Count	19	count	0..65535	660	16	21
Elevation Position Count	20	count	0..65535	660	16	681
Elevation Error	21	count	0..65535	660	16	1341
Azimuth Error	22	count	0..65535	660	16	2001
Fill Data	23	N/A	0..15	660	4	2661
Instrument Analog Data - See(Reference 3 for details	24	-	-	660	12	3321
INSTR_Diagnostic_Processor_Operation_Data is Array[660] of:						
INSTR_Processor_Op_Record						
Azimuth Position Count	19	count	0..65535	660	16	21
Elevation Position Count	20	count	0..65535	660	16	681
DAP Timing	21	N/A	0..65535	660	16	1341
ICP Timing	22	N/A	0..65535	660	16	2001
Fill Data	23	N/A	0..15	660	4	2661
Instrument Analog Data - See Reference 3 for details	24	-	-	660	12	3321

Table 2.2-1. Instrument Production Data Set (INSTR) (3 of 3)

Description	Parameter Number	Units	Range	Elements/ Record	Bits/ Elem	Elem Num
INSTR_Diagnostic_Fixed_Pattern_Data is Array[660] of:						
INSTR_Fixed_Record						
Fixed Pattern in Elevation Field	19	N/A	0..65535	660	16	21
Fixed Pattern for Azimuth Field	20	N/A	0..65535	660	16	681
Fixed Pattern for Total Channel Field	21	N/A	0..4095	660	12	1341
Fixed Pattern for Window Channel Field	22	N/A	0..4095	660	12	2001
Fixed Pattern for Shortwave Channel Field	23	N/A	0..4095	660	12	2661
Fixed Pattern for Analog Field	24	N/A	0..4095	660	12	3321
INSTR_Data						
INSTR_Digital_Status_Block is						
Instrument Digital Status - See Reference 3 for details	25	-	-	1	2960	3322
INSTR_Ancillary_Data is selection of						
INSTR-EOS_Ancillary_Data						
Ancillary Time Stamp	26	count	$0..1.84x10^{19}$	1	64	3323
GPS/UTC Time Conversion	27	count	$0..4.29x10^{9}$	1	32	3324
Solar Array Current	28	count	0..255	1	8	3325
Mag Coil Current X	29	count	0..255	1	8	3326
Mag Coil Current Y	30	count	0..255	1	8	3327
Mag Coil Current Z	31	count	0..255	1	8	3328
Satellite Position (X) Count	32	count	0..4.29x109	1	32	3329
Satellite Position (Y) Count	33	count	0..4.29x109	1	32	3330
Satellite Position (Z) Count	34	count	0..4.29x109	1	32	3331
Satellite Velocity (X) Count	35	count	0..4.29x109	1	32	3332
Satellite Velocity (Y) Count	36	count	0..4.29x109	1	32	3333
Satellite Velocity (Z) Count	37	count	0..4.29x109	1	32	3334
Satellite Attitude (Roll) Count	38	count	0..65535	1	16	3335
Satellite Attitude (Pitch) Count	39	count	0..65535	1	16	3336
Satellite Attitude (Yaw) Count	40	count	0..65535	1	16	3337
Satellite Attitude Rate (Roll) Count	41	count	0..65535	1	16	3338
Satellite Attitude Rate (Pitch) Count	42	count	0..65535	1	16	3339
Satellite Attitude Rate (Yaw) Count	43	count	0..65535	1	16	3340
Solar X Position	44	count	0..255	1	8	3341
Solar Y Position	45	count	0..255	1	8	3342
Solar Z Position	46	count	0..255	1	8	3343
Lunar X Position	47	count	0..255	1	8	3344
Lunar Y Position	48	count	0..255	1	8	3345
Lunar Z Position	49	count	0..255	1	8	3346
INSTR_Fill_Data is selection of						
TRMM	50	N/A	N/A	1	1104	3347
EOS	50	N/A	N/A	1	592	3347
INSTR_PDS File Footer (TRMM Only)						
INSTR_PDS_File_Footer is						
QAC List	N/A	N/A	N/A	1	32	
QAC Entries	N/A	N/A	N/A	variable	16	
MDUL	N/A	N/A	N/A	1	32	
MDU	N/A	N/A	N/A	variable	16	
Total Header Bits/File:	**416**					
Total Data Bits/Record:	**57056**					
Total Records/File:	**13091**					
Total Data Bits/File:	**746920096**					
Total Bits/File:	**745873296**					

2.3 ERBE-like Instantaneous TOA Estimates (ES-8)

EOSDIS Product Code: CER02

The ES-8 archival data product was created as an HDF-EOS Swath data structure. The product contains a 24-hour, single-satellite, instantaneous view of scanner fluxes at the top-of-atmosphere reduced from spacecraft altitude unfiltered radiances using the ERBE scanner Inversion algorithms and the ERBE shortwave (SW) and longwave (LW) angular distribution models (ADMs). The ES-8 also includes the SW, LW, and window (WN) channel radiometric data; SW, LW, and WN unfiltered radiance values; and the ERBE scene identification for each measurement. These data are organized according to the CERES 3.3-second scan into 6.6-second records. As long as there is one valid scanner measurement within a record, the ES-8 record will be generated. A complete listing of metadata and science parameters are listed in Tables 2.3-1 through Table 2.3-4.

Specifically, the ES-8 contains the following kinds of information:

1. Scan-level Data

   a) Julian date and time
   b) Earth-Sun distance
   c) Satellite position and velocity and Sun position

2. Measurement-level Data

   a) Satellite instrument Field-of-View (FOV) data
   b) Radiometric data
   c) Satellite and Sun geometry data
   d) Unfiltered radiances
   e) TOA fluxes
   f) ERBE scene identification
      (1) clear ocean(5) clear coastal (9) mostly cloudy ocean
      (2) clear land (6) partly cloudy ocean (10) mostly cloudy land-desert
      (3) clear snow (7) partly cloudy land-desert (11) mostly cloudy coastal
      (4) clear desert (8) partly cloudy coastal (12) overcast

Level: 2 **Portion of Globe Covered**
Type: Archival **File:** Satellite Swath
Frequency: 1/Day **Record:** N/A

Time Interval Covered Portion of Atmosphere Covered
File: 24 Hours **File:** Satellite Altitude and TOA
Record: 6.6-Seconds

ES-8 Metadata

The types of ES-8 data are summarized in Table 2.3-1. The metadata structures contain information which need only be recorded once per daily product. The CERES metadata are listed in Appendix B. Table B-1 lists the CERES Baseline Header Metadata and Table B-2 list the parameters in the Vdata Metadata Table. Note that the Vdata Metadata is a subset of the CERES Baseline Header Metadata. As explained in Appendix B, the CERES Baseline Header Metadata includes either the bounding rectangle or GRing attributes. The spatial boundaries of the ES-8 are defined with the bounding rectangle. The ES-8 also contains Product Specific Metadata, which are shown in Table 2.3-2.

Table 2.3-1. ES-8 Product Summary

HDF Name	Description Table	Number of Parameters	Nominal Size (MBytes)
CERES Baseline Header Metadata	Table B-1	35	
CERES_metadata Vdata	Table B-2	14	
ES-8 Product Specific Metadata	Table 2.3-2	1	
ES-8 SDS Summary	Table 2.3-4	20	467.1
ES-8 Vdata Summary	Table 2.3-3	20	1.1
ES-8 TOTAL SIZE (MB/Day)			468.2*

*Counting overhead, each ES-8 is about 480 MB.

Table 2.3-2. ES-8 Product Specific Metadata

Item	Parameter Name	Records	Units	Range	Data Type
1	ES8BinaryProcessDate	1	N/A	N/A	ASCII string
2	NumOfFAPRecords	1	N/A	N/A	Integer
3	NumOfRAPRecords	1	N/A	N/A	Integer

ES-8 Vdata Structures

The ES-8 contains science parameters written by HDF-EOS as HDF Vdata structures. Each of these structures contains multiple occurrences, or records, of a single parameter that corresponds to the maximum number of scans in a day (13,091).

Table 2.3-3. ES-8 Vdata Summary

Parameter Name (Vdata Name)	Units	Range	Maximum Number of Vdata Elements	Bits per Element	Maximum Vdata Size (KB)
Time of Observation	day	2449353 .. 999999999	13091	64	102.27
Earth-Sun distance at record start	AU	$-8x10^6$ .. $102x10^6$	13091	64	102.27
X component of satellite position at record start	m	$-8x10^6$ .. $8x10^6$	13091	32	51.14
X component of satellite position at record end	m	$-8x10^6$ .. $8x10^6$	13091	32	51.14
Y component of satellite position at record start	m	$-8x10^6$ .. $8x10^6$	13091	32	51.14
Y component of satellite position at record end	m	$-8x10^6$ .. $8x10^6$	13091	32	51.14
Z component of satellite position at record start	m	$-8x10^6$ .. $8x10^6$	13091	32	51.14
Z component of satellite position at record end	m	$-8x10^6$ .. $8x10^6$	13091	32	51.14
X component of satellite velocity at record start	m/sec	$-1x10^4$ .. $1x10^4$	13091	32	51.14
X component of satellite velocity at record end	m/sec	$-1x10^4$ .. $1x10^4$	13091	32	51.14
Y component of satellite velocity at record start	m/sec	$-1x10^4$ .. $1x10^4$	13091	32	51.14
Y component of satellite velocity at record end	m/sec	$-1x10^4$ .. $1x10^4$	13091	32	51.14
Z component of satellite velocity at record start	m/sec	$-1x10^4$ .. $1x10^4$	13091	32	51.14
Z component of satellite velocity at record end	m/sec	$-1x10^4$ .. $1x10^4$	13091	32	51.14
Colatitude of satellite nadir at record start	deg	0 .. 180	13091	32	51.14
Colatitude of satellite nadir at record end	deg	0 .. 180	13091	32	51.14
Longitude of satellite nadir at record start	deg	0 .. 360	13091	32	51.14
Longitude of satellite nadir at record end	deg	0 .. 360	13091	32	51.14
Colatitude of Sun at observation	deg	0 .. 180	13091	32	51.14
Longitude of Sun at observation	deg	0 .. 360	13091	32	51.14
Total Vdata Size (KB)					**1125.06**
Total Vdata Size (MB)					**1.10**

ES-8 Scientific Data Sets

The ES-8 contains science parameters written by HDF-EOS as HDF Scientific Data Sets (SDSs) which are 2-dimensional arrays of time ordered records where the first dimension corresponds to the maximum number of records in a 24-hour product (13,091). For measurement level data, the second dimension corresponds to the maximum number of measurements in each 6.6-second scan cycle (660). For flag words, the second dimension corresponds to the number of flag words recorded for each scan record (22) or to the single radiance flag word per channel for each scan record (3). Table 2.3-4 summarizes the contents and sizes of each SDS contained within the ES-8 file.

Table 2.3-4. ES-8 SDS Summary

Parameter Name (SDS Name)	Units	Range	Maximum Number of SDS Elements	Bits per Element	Maximum SDS Size (KB)
Colatitude of CERES FOV at TOA	deg	0 .. 180	13091 x 660	32	33750.23
Longitude of CERES FOV at TOA	deg	0 .. 360	13091 x 660	32	33750.23
CERES TOT filtered radiance	$W/(m^2\ sr)$	0 .. 700	13091 x 660	32	33750.23
CERES SW filtered radiance	$W/(m^2\ sr)$	-10 .. 510	13091 x 660	32	33750.23
CERES WN filtered radiance	$W/(m^2\ sr)$	0 .. 50	13091 x 660	32	33750.23
CERES viewing zenith at TOA	deg	0 .. 90	13091 x 660	32	33750.23
CERES solar zenith at TOA	deg	0 .. 180	13091 x 660	32	33750.23
CERES relative azimuth at TOA	deg	0 .. 360	13091 x 660	32	33750.23
CERES SW unfiltered radiance	$W/(m^2\ sr)$	-10 .. 510	13091 x 660	32	33750.23
CERES LW unfiltered radiance	$W/(m^2\ sr)$	0 .. 200	13091 x 660	32	33750.23
CERES WN unfiltered radiance	$W/(m^2\ sr)$	0 .. 50	13091 x 660	32	33750.23
CERES SW flux at TOA	W/m^2	0 .. 1400	13091 x 660	32	33750.23
CERES LW flux at TOA	W/m^2	50 .. 400	13091 x 660	32	33750.23
ERBE scene identification at observation	N/A	0 .. 12.4	13091 x 660	32	33750.23
TOT channel flag words	N/A	N/A	13091 x 22	32	1125.01
SW channel flag words	N/A	N/A	13091 x 22	32	1125.01
WN channel flag words	N/A	N/A	13091 x 22	32	1125.01
Scanner FOV flag words	N/A	N/A	13091 x 22	32	1125.01
Rapid retrace flag words	N/A	N/A	13091 x 22	32	1125.01
Scanner operations flag word	N/A	N/A	13091 x 3	32	153.41
Total SDS Size (KB)					**478281.68**
Total SDS Size (MB)					**467.07**

Maximum Meta Bits:
Maximum Data Bits*:3927300000
Maximum Bits: 3927300000
Maximum Product Size (MB)*:468.2

* Note: Maximum sizes are based on 13,091 total 6.6-sec data records.
* Note: Maximum sizes are based on 13,091 total 6.6-sec data records.

2.4 ERBE-like Monthly Regional Averages (ES-9)

EOSDIS Product Code: CER03

The ES-9 archival data product was created as HDF Scientific Data Sets (SDSs) and contains data for each 2.5-degree region observed during a month. There are 10368 possible regions; a given region is viewed by the scanner several times as the spacecraft passes overhead. For each region, data is stored by the hour for each hour of each day in the month. Stored data include the mean estimates of shortwave and longwave radiant flux at the TOA, the standard deviations of these estimates, the maximum and minimum estimate, and scene information or cloud condition. Similar parameters are determined for those scanner measurements that are identified as viewing clear-sky areas. Daily, monthly hourly, and monthly averages are also stored. A complete listing of parameters for this data product can be found in Tables 2.4-3 through 2.4-9.

Level: 3
Type: Archival
Frequency: 1/Month

Portion of Globe Covered
File: Global
Record: Regional

Time Interval Covered
File: 1 Month
Record: Hourbox Data

Portion of Atmosphere Covered
File: TOA

ES-9 Metadata

The types of ES-9 data are summarized in Table 2.4-1. The metadata structures contain information which need only be recorded once per monthly product. The CERES metadata are listed in Appendix B. Table B-1 lists the CERES Baseline Header Metadata and Table B-1 list the parameters in the Vdata Metadata Table. Note that the Vdata Metadata is a subset of the CERES Baseline Header Metadata. As explained in Appendix B, the CERES Baseline Header Metadata includes either the bounding rectangle or GRing attributes. The spatial boundaries of the ES-9 are defined with the bounding rectangle. The ES-9 also contains Product-specific Metadata, which are shown in Table 2.4-2.

Table 2.4-1. ES-9 Product Summary

HDF Name	Description Table	Records	Number of Fields	Nominal Size (MBytes)
CERES Baseline Header Metadata	Table B-1	1	35	
CERES_metadata Vdata	Table B-2	1	14	
ES-9 Product Specific Metadata	Table 0.1-2	1	1	
ES-9 SDS Summary	Table 0.1-4	1		1014.7
ES-9 TOTAL SIZE (MB/Month)				**1014.7**

Table 2.4-2. ES-9 Product-specific Metadata

Item	Parameter Name	Records	Units	Range	Data Type
1	ES9BinaryProductionDate	1	N/A	N/A	ASCII string

ES-9 Scientific Data Sets

The ES-9 contains science parameters written as HDF Scientific Data Sets (SDSs) which are 2- or 3-dimensional arrays of spatially ordered records where the first dimension corresponds to the maximum number of hourly samples for 2.5-degree regions in a monthly product (10,368).

Table 2.4-3 summarizes the contents and sizes of each SDS contained within the ES-9 file.

Table 2.4-3. ES-9 SDS Summary

SDS Name	SDS Size	Bits per Element	SDS Size (MB)
Region_HrBox_HrBoxStrt	10368 x 8[a]	32	0.3
Monthly_Average_Day	10368 x 28[a]	32	1.1
Monthly_Average_Hour	10368 x 28[a]	32	1.1
Monthly_Average_Daily	10368 x 25[a] x 31	32	30.7
Monthly_Average_Hourly	10368 x 42[a] x 24	32	39.9
HourBox_Data	10368 x 32[a] x 744[b]	32	941.6
Total SDS size			**1014.7**

a. This dimension represents the number of parameters contained in the SDS.
b. This dimension represents the number of hour boxes actually sampled. It can range from 0 - 744.

Tables 2.4-4 through 2.4-9 list all the parameters of each ES-9 SDS. The table below lists the eight parameters in the Region_HrBox_HrBoxStrt SDS.

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Table 2.4-4. Region_HrBox_HrBoxStrt

Parameter Name	Parameter Index	Units	Range	Maximum Number of Records	Bits per Element	SDS Size (KB)
Region Number	1	N/A	0 .. 10368	10368	32	40.5
Geographic scene type	2	N/A	0 .. 5	10368	32	40.5
Scene fraction histogram (4)	3 - 6	N/A	N/A	41472	32	162
Number of hourboxes	7	N/A	1 .. 744	10368	32	40.5
Start position of HourBox_Data	8	N/A	N/A	10368	32	40.5
Total SDS size (KB)						**324.0**
Total SDS size (MB)						**0.3**

For the Monthly_Average_Day SDS, the second parameter corresponds to daily data recorded for each region. The 28 parameters in this SDS are listed in the table below.

Table 2.4-5. Monthly_Average_Day

Parameter Name	Parameter Index	Units	Range	Maximum Number of Records	Bits per Element	SDS Size (KB)
SW flux	1	W/m^2	0 .. 1400	10368	32	40.5
SW flux minimum value	2	W/m^2	0 .. 1400	10368	32	40.5
SW flux maximum value	3	W/m^2	0 .. 1400	10368	32	40.5
SW flux standard deviation	4	W/m^2	0 .. 1400	10368	32	40.5
SW flux # of days w/at least one sample	5	day	0 .. 31	10368	32	40.5
LW flux	6	W/m^2	50 .. 400	10368	32	40.5
LW flux minimum value	7	W/m^2	50 .. 400	10368	32	40.5
LW flux maximum value	8	W/m^2	50 .. 400	10368	32	40.5
LW flux standard deviation	9	W/m^2	0 .. 350	10368	32	40.5
LW flux # of days w/at least one sample	10	day	0 .. 31	10368	32	40.5
Albedo	11	N/A	0 .. 1	10368	32	40.5
Net flux	12	W/m^2	-200 .. 200	10368	32	40.5
Monthly total integrated solar incidence (2)	13 -14	N/A	0 .. 500000	20736	32	81.0
Clear-sky SW flux	15	W/m^2	0 .. 1400	10368	32	40.5
Clear-sky SW flux minimum value	16	W/m^2	0 .. 1400	10368	32	40.5
Clear-sky SW flux maximum value	17	W/m^2	0 .. 1400	10368	32	40.5
Clear-sky SW flux standard deviation	18	W/m^2	0 .. 1400	10368	32	40.5
Clear-sky SW flux # of days with at least 1 sample	19	day	0 .. 31	10368	32	40.5
Clear-sky LW flux average flux	20	W/m^2	50 .. 400	10368	32	40.5
Clear-sky LW flux minimum value	21	W/m^2	50 .. 400	10368	32	40.5
Clear-sky LW flux maximum value	22	W/m^2	50 .. 400	10368	32	40.5
Clear-sky LW flux standard deviation	23	W/m^2	0 .. 350	10368	32	40.5
Clear-sky LW flux # of days with at least 1 sample	24	day	0 .. 31	10368	32	40.5
Clear-sky albedo	25	N/A	0 .. 1	10368	32	40.5
Clear-sky net radiant flux	26	W/m^2	-200 .. 200	10368	32	40.5
Clear-sky solar incidence (2)	27 - 28	N/A	0 .. 500000	20736	32	81.0
Total SDS size (KB)						**1134.0**
Total SDS size (MB)						**1.1**

For the Monthly_Average_Hour SDS, the second dimension corresponds to hourly data recorded for each region. The 28 parameters in this SDS are listed in the table below.

Table 2.4-6. Monthly_Average_Hour

Parameter Name	Parameter Index	Units	Range	Maximum Number of Records	Bits per Element	SDS Size (KB)
SW flux	1	W/m^2	0 .. 1400	10368	32	40.5
SW flux minimum value	2	W/m^2	0 .. 1400	10368	32	40.5
SW flux maximum value	3	W/m^2	0 .. 1400	10368	32	40.5
SW flux standard deviation	4	W/m^2	0 .. 1400	10368	32	40.5
SW flux # of hours w/at least one sample	5	day	0 .. 24	10368	32	40.5
LW flux	6	W/m^2	50 .. 400	10368	32	40.5
LW flux minimum value	7	W/m^2	50 .. 400	10368	32	40.5
LW flux maximum value	8	W/m^2	50 .. 400	10368	32	40.5
LW flux standard deviation	9	W/m^2	0 .. 350	10368	32	40.5
LW flux # of hours w/at least one sample	10	day	0 .. 24	10368	32	40.5
Albedo	11	N/A	0 .. 1	10368	32	40.5
Net flux	12	W/m^2	-200 .. 200	10368	32	40.5
Solar incidence (2)	13 - 14	N/A	0 .. 500000	20736	32	40.5
Clear-sky SW flux	15	W/m^2	0 .. 1400	10368	32	40.5
Clear-sky SW flux minimum value	16	W/m^2	0 .. 1400	10368	32	40.5
Clear-sky SW flux maximum value	17	W/m^2	0 .. 1400	10368	32	40.5
Clear-sky SW flux standard deviation	18	W/m^2	0 .. 1400	10368	32	40.5
Clear-sky SW flux # of hours with at least 1 sample	19	day	0 .. 24	10368	32	40.5
Clear-sky LW flux	20	$W/m^2 2$	50 .. 400	10368	32	40.5
Clear-sky LW flux minimum value	21	W/m^2	50 .. 400	10368	32	40.5
Clear-sky LW flux maximum value	22	W/m^2	50 .. 400	10368	32	40.5
Clear-sky LW flux standard deviation	23	W/m^2	0 .. 350	10368	32	40.5
Clear-sky LW flux # of hours with at least 1 sample	24	day	0 .. 24	10368	32	40.5
Clear-sky albedo	25	N/A	0 .. 1	10368	32	40.5
Clear-sky net radiant flux	26	W/m^2	-200 .. 200	10368	32	40.5
Clear-sky solar incidence (2)	27 - 28	N/A	0 .. 500000	20736	32	81.0
Total SDS size (KB)						**1134.0**
Total SDS size (MB)						**1.1**

For the Monthly_Average_Daily SDS, the second dimension corresponds to hourly data averaged per day for each scan record (31). The 25 parameters in this SDS are listed in the table below.

Table 2.4-7. Monthly_Average_Daily

Parameter Name	Parameter Index	Units	Range	Maximum Number of Records	Bits per Element	SDS Size (KB)
Solar constant, distance corrected	1	W/m^2	1300 .. 1450	10368 x 31	32	1255.5
SW flux	2	W/m^2	0 .. 1400	10368 x 31	32	1255.5
SW flux minimum value	3	W/m^2	0 .. 1400	10368 x 31	32	1255.5
SW flux maximum value	4	W/m^2	0 .. 1400	10368 x 31	32	1255.5
SW flux standard deviation	5	W/m^2	0 .. 1400	10368 x 31	32	1255.5
SW flux # of hours with at least one sample	6	day	0 .. 24	10368 x 31	32	1255.5
LW flux	7	W/m^2	50 .. 400	10368 x 31	32	1255.5
LW flux minimum value	8	W/m^2	50 .. 400	10368 x 31	32	1255.5
LW flux maximum value	9	W/m^2	50 .. 400	10368 x 31	32	1255.5
LW flux standard deviation	10	W/m^2	0 .. 350	10368 x 31	32	1255.5
LW flux # of hours with at least one sample	11	day	0 .. 24	10368 x 31	32	1255.5
Albedo	12	N/A	0 .. 1	10368 x 31	32	1255.5
Solar incidence (2)	13 - 14	N/A	0 .. 500000	10368 x 62	32	2511.0
Clear-sky SW flux	15	W/m^2	0 .. 1400	10368 x 31	32	1255.5
Clear-sky SW flux minimum value	16	W/m^2	0 .. 1400	10368 x 31	32	1255.5
Clear-sky SW flux maximum value	17	W/m^2	0 .. 1400	10368 x 31	32	1255.5
Clear-sky SW flux standard deviation	18	W/m^2	0 .. 1400	10368 x 31	32	1255.5
Clear-sky SW flux # of hours with at least 1 sample	19	day	0 .. 24	10368 x 31	32	1255.5
Clear-sky LW flux	20	W/m^2	50 .. 400	10368 x 31	32	1255.5
Clear-sky LW flux minimum value	21	W/m^2	50 .. 400	10368 x 31	32	1255.5
Clear-sky LW flux maximum value	22	W/m^2	50 .. 400	10368 x 31	32	1255.5
Clear-sky LW flux standard deviation	23	W/m^2	0 .. 350	10368 x 31	32	1255.5
Clear-sky LW flux # of hours with at least 1 sample	24	day	0 .. 24	10368 x 31	32	1255.5
Clear-sky albedo	25	N/A	0 .. 1	10368 x 31	32	1255.5
Total SDS size (KB)						**31387.5**
Total SDS size (MB)						**30.7**

For the Monthly_Average_Hourly SDS, the second dimension corresponds to daily data averaged per hour for each scan record (24). The 42 parameters in this SDS are listed in the table below.

Table 2.4-8. Monthly_Average_Hourly

Parameter Name	Parameter Index	Units	Range	Maximum Number of Records	Bits per Element	SDS Size (KB)
SW flux	1	W/m^2	0 .. 1400	10368 x 24	32	972
SW flux minimum value	2	W/m^2	0 .. 1400	10368 x 24	32	972
SW flux maximum value	3	W/m^2	0 .. 1400	10368 x 24	32	972
SW flux standard deviation	4	W/m^2	0 .. 1400	10368 x 24	32	972
SW flux # of days with at least 1 sample	5	day	0 .. 31	10368 x 24	32	972
SW sum of estimates (2)	6 - 7	W/m^2	0 .. 45000	10368 x 48	32	1944
SW sum of estimates squared (2)	8 - 9	W^2/m^4	0 .. $50x10^6$	10368 x 48	32	1944
LW flux	10	W/m^2	50 .. 400	10368 x 24	32	972
LW flux minimum value	11	W/m^2	50 .. 400	10368 x 24	32	972
LW flux maximum value	12	W/m^2	50 .. 400	10368 x 24	32	972
LW flux standard deviation	13	W/m^2	0 .. 350	10368 x 24	32	972
LW flux # of days with at least one sample	14	day	0 .. 31	10368 x 24	32	972
LW flux sum of estimates (2)	15 - 16	W/m^2	0 .. 15000	10368 x 48	32	1944
LW sum of estimates squared (2)	17 - 18	W^2/m^4	0 .. $5x10^6$	10368 x 48	32	1944
Albedo	19	N/A	0 .. 1	10368 x 24	32	972
Solar incidence (2)	20 - 21	N/A	0 .. 500000	10368 x 48	32	1944
Clear-sky SW flux	22	W/m^2	0 .. 1400	10368 x 24	32	972
Clear-sky SW flux minimum value	23	W/m^2	0 .. 1400	10368 x 24	32	972
Clear-sky SW flux maximum value	24	W/m^2	0 .. 1400	10368 x 24	32	972
Clear-sky SW flux standard deviation	25	W/m^2	0 .. 1400	10368 x 24	32	972
Clear-sky SW flux # of days with at least 1 sample	26	day	0 .. 31	10368 x 24	32	972
Clear-sky SW sum of estimates (2)	27 - 28	W/m^2	0 .. 45000	10368 x 48	32	1944
Clear-sky SW sum of estimates squared (2)	29 - 30	W^2/m^4	0 .. $50x10^6$	10368 x 48	32	1944
Clear-sky LW flux	31	W/m^2	50 .. 400	10368 x 24	32	972
Clear-sky LW flux minimum value	32	W/m^2	50 .. 400	10368 x 24	32	972
Clear-sky LW flux maximum value	33	W/m^2	50 .. 400	10368 x 24	32	972
Clear-sky LW flux standard deviation	34	W/m^2	0 .. 350	10368 x 24	32	972
Clear-sky LW flux # of days with at least 1 sample	35	day	0 .. 31	10368 x 24	32	972
Clear-sky LW sum of estimates (2)	36 - 37	W/m^2	0 .. 15000	10368 x 48	32	1944
Clear-sky LW sum of estimates squared (2)	38 - 39	W^2/m^4	0 .. $5x10^6$	10368 x 48	32	1944
Clear-sky albedo	40	W/m^2	0 .. 1	10368 x 24	32	972
Clear-sky solar incidence	41	W/m^2	0 .. 1450	10368 x 48	32	1944
Total SDS size (KB)						**39852.0**
Total SDS size (MB)						**38.9**

For the HourBox_Data SDS, the second dimension corresponds to monthly data averaged per hour for each scan record (744). The 32 parameters in this SDS are listed in the table below.

Table 2.4-9. HourBox_Data

Parameter Name	Parameter Index	Units	Range	Maximum Number of Records	Bits per Element	SDS Size (KB)
Hourbox Number	1	N/A	1 .. 744	10368 x 744	32	30132
Whole part of Julian date (2)	2 - 3	day	2449353 .. 2458500	10368 x 1488	32	60264
Fractional part of Julian day	4	day	0 .. 1	10368 x 744	32	30132
Scene fraction (4)	5 - 8	N/A	0 .. 1	10368 x 2976	32	120528
Albedo vector (4)	9 - 12	N/A	0 .. 1	10368 x 2976	32	120528
Cosine of the solar zenith angle	13	N/A	0 .. 1	10368 x 744	32	30132
Satellite zenith angle	14	deg	0 .. 90	10368 x 744	32	30132
Azimuth angle	15	deg	0 .. 360	10368 x 744	32	30132
Solar incidence	16	W/m^2	0 .. 1450	10368 x 744	32	30132
SW flux	17	W/m^2	0 .. 1400	10368 x 744	32	30132
SW flux minimum value	18	W/m^2	0 .. 1400	10368 x 744	32	30132
SW flux maximum value	19	W/m^2	0 .. 1400	10368 x 744	32	30132
SW flux standard deviation	20	W/m^2	0 .. 1400	10368 x 744	32	30132
SW flux number	21	N/A	TBD	10368 x 744	32	30132
LW flux	22	W/m^2	50 .. 400	10368 x 744	32	30132
LW flux minimum value	23	W/m^2	50 .. 400	10368 x 744	32	30132
LW flux maximum value	24	W/m^2	50 .. 400	10368 x 744	32	30132
LW flux standard deviation	25	W/m^2	0 .. 350	10368 x 744	32	30132
LW flux number	26	N/A	TBD	10368 x 744	32	30132
SW flux maximum difference	27	W/m^2	TBD	10368 x 744	32	30132
LW flux maximum difference	28	W/m^2	TBD	10368 x 744	32	30132
Clear-sky albedo	29	N/A	0 .. 1	10368 x 744	32	30132
Clear-sky LW flux	30	W/m^2	50 .. 400	10368 x 744	32	30132
Clear-sky LW flux standard deviation	31	W/m^2	0 .. 350	10368 x 744	32	30132
Clear-sky LW flux number	32	N/A	TBD	10368 x 744	32	30132
Total SDS size (KB)						**964224**
Total SDS size (MB)						**941.6**

Maximum Meta Bits: **TBD**
Maximum Data Bits: **8511713280**
Maximum Bits: **8511713280**
Maximum Product Size (MB): **1014.7**

Note: Sizing estimates shown in this table assume that all 2.5-deg regions and all hourboxes contain data. The sizing estimates per platform are

Product Size (TRMM): 66.0 MB
Product Size (EOS-AM): 170.0 MB
Product Size (EOS-PM): 175.2 MB

The sizing estimate for the ES-9 in the “Archival Products Summary” Table is for EOS-PM.

2.5 ERBE-like Monthly Geographical Averages (ES-4)

EOSDIS Product Code: CER13

The ES-4 archival data product was created as an HDF-EOS Grid Structure and contains regional, zonal, and global averages. The instantaneous scanner estimates at the TOA are arranged hourly, daily, and monthly. They are averaged spatially to regions, latitude zones, and the globe. The ES-4 product contains seven HDF Vgroups corresponding to regional, nested regional, zonal, and global averages (see Table 2.5-3). There are 10368 2.5-degree regions for the ERBE-like data; therefore, there is a maximum of 10368 records in the 2.5-degree regional data set. The second set of data is the 2.5-degree nested to 5.0-degree regional data, which constitutes a maximum of 2592 records. The third set of data is the 5.0-degree nested to 10.0-degree regional data, which constitutes up to 648 records. The fourth, fifth, and sixth sets of data are the 2.5-, 5.0-, and 10.0-degree zonally averaged data which constitute 72, 36, and 18 records, respectively. The last set is the global data, which constitutes three records. A complete listing of parameters for this data product can be found in Table 2.5-1.

Level: 3
Type: Archival
Frequency: 1/Month

Time Interval Covered
File: Month
Record: Month

Portion of Globe Covered
File: Regional, Zonal, Global
Record: Regional, Zonal, Global

Portion of Atmosphere Covered
File: TOA

ES-4 Metadata

The types of ES-4 data are summarized in Table 2.5-1. The metadata structures contain information which need only be recorded once per monthly product. The CERES metadata are listed in Appendix B. Table B-1 lists the CERES Baseline Header Metadata and Table B-2 lists the parameters in the Vdata Metadata Table. Note that the Vdata Metadata is a subset of the CERES Baseline Header Metadata. As explained in Appendix B, the CERES Baseline Header Metadata includes either the bounding rectangle or GRing attributes. The spatial boundaries of the ES-4 are defined with a bounding rectangle. The ES-4 also contains Product Specific Metadata, which are shown in Table 2.5-2.

Table 2.5-1. ES-4 Product Summary

HDF Name	Description Table	Number of Parameters	Nominal Size (MBytes)
CERES Baseline Header Metadata	Table B-1	35	
CERES_metadata Vdata	Table B-2	14	
ES-4 Product Specific Metadata	Table 2.5-2	1	
ES-4 Vgroup Summary	Table 2.5-3	7	25.38
ES-4 TOTAL SIZE (MB/Month)			**25.38[a]**

a. Counting overhead, each ES-4 is about .26 MB.

Table 2.5-2. ES-4 Product Specific Metadata

Parameter Name	Records	Units	Range	Data Type
ES4BinaryProductionDate	1	N/A	N/A	ASCII string

Table 2.5-3. ES-4 Vgroup Summary

Vgroup Number	Vgroup Name	Description Table	Number of Records	Total Size (MB)
1	2.5-degree Regional (2.5R)	Table 2.5-4	10368 (72 x 144)	19.15
2	2.5-degree Nested Regional (2.5NR)	Table 2.5-4	2592 (36 x 72)	4.79
3	5.0-degree Nested Regional (5NR)	Table 2.5-6	648 (18 x 36)	1.20
4	2.5-degree Zonal (2.5Z)	Table 2.5-7	72	0.13
5	5.0-degree Zonal (5Z)	Table 2.5-8	36	.07
6	10.0-degree Zonal (10Z)	Table 2.5-9	18	.03
7	Global (G)	Table 2.5-9	3	.01
Total Product Size (MB)				**25.38**

ES-4 Scientific Data Sets

The ES-4 contains science parameters written by HDF-EOS as HDF Scientific Data Sets (SDSs) which are 2- or 3-dimensional arrays of time ordered records where the first dimension corresponds to the maximum number of regions in a monthly product.

Table 2.5-4 lists the SDSs contained in the 2.5-degree Regional Vgroup. The number of elements in each SDS is determined by the number of 2.5-degree colatitudinal zones (72) and 2.5-degree longitudinal zones (144), and may also be a function of the number of days in the month (31) or the number of hours in a day (24).

Table 2.5-4. 2.5-degree Regional (1 of 2)

Parameter Name (SDS Name)	Units	Range	Number of SDS Elements	Bits per Element	SDS Size (KB)
Solar Incidence for Monthly Averages by Day (2.5R)	Wh/m^2	0 .. 500000	72 x 144	32	40.5
Monthly net radiant flux by day (2.5R)	W/m^2	-200 .. 200	72 x 144	32	40.5
Clear-sky net radiant flux, monthly by day (2.5R)	W/m^2	-200 .. 200	72 x 144	32	40.5
Clear-sky solar incidence, monthly by day (2.5R)	W/m^2	0 .. 500000	72 x 144	32	40.5
Monthly net radiant flux by hour (2.5R)	W/m^2	-200 .. 200	72 x 144	32	40.5
Solar incidence, monthly by hour (2.5R)	Wh/m^2	0 .. 500000	72 x 144	32	40.5
Clear-sky net radiant flux, monthly by hour (2.5R)	W/m^2	-200 .. 200	72 x 144	32	40.5
Clear-sky solar incidence, monthly by hour (2.5R)	Wh/m^2	0 .. 500000	72 x 144	32	40.5
Daily solar incidence (2.5R)	Wh/m^2	0 .. 500000	31 x 72 x 144	32	1255.5
Hourly solar incidence (2.5R)	Wh/m^2	0 .. 500000	24 x 72 x 144	32	972.0
Clear-sky solar incidence (2.5R)	Wh/m^2	0 .. 500000	24 x 72 x 144	32	972.0
Longwave flux (2.5R)	W/m^2	50 .. 400	72 x 144	32	40.5
Shortwave flux (2.5R)	W/m^2	0 .. 1400	72 x 144	32	40.5
Monthly mean albedo (2.5R)	N/A	0 .. 1	72 x 144	32	40.5
Clear-sky longwave flux (2.5R)	W/m^2	50 .. 400	72 x 144	32	40.5
Clear-sky shortwave flux (2.5R)	W/m^2	0 .. 1400	72 x 144	32	40.5
Monthly mean Clear-sky albedo (2.5R)	N/A	0 .. 1	72 x 144	32	40.5
Longwave flux by the hour (2.5R)	W/m^2	50 .. 400	72 x 144	32	40.5
Shortwave flux by the hour (2.5R)	W/m^2	0 .. 1400	72 x 144	32	40.5
Monthly average albedo by the hour (2.5R)	N/A	0 .. 1	72 x 144	32	40.5
Clear-sky longwave flux by the hour (2.5R)	W/m^2	50 .. 400	72 x 144	32	40.5
Clear-sky shortwave flux by the hour (2.5R)	W/m^2	0 .. 1400	72 x 144	32	40.5
Clear-sky Monthly averaged albedo by the hour (2.5R)	N/A	0 .. 1	72 x 144	32	40.5
Longwave flux, daily (2.5R)	W/m^2	50 .. 400	31 x 72 x 144	32	1255.5
Shortwave flux, daily (2.5R)	W/m^2	0 .. 1400	31 x 72 x 144	32	1255.5
Monthly mean albedo, daily (2.5R)	N/A	0 .. 1	31 x 72 x 144	32	1255.5
Clear-sky longwave flux, daily (2.5R)	W/m^2	50 .. 400	31 x 72 x 144	32	1255.5
Clear-sky shortwave flux, daily (2.5R)	W/m^2	0 .. 1400	31 x 72 x 144	32	1255.5
Monthly mean Clear-sky albedo, daily (2.5R)	N/A	0 .. 1	31 x 72 x 144	32	1255.5
Longwave flux, hourly (2.5R)	W/m^2	50 .. 400	24 x 72 x 144	32	972.0
Shortwave flux, hourly (2.5R)	W/m^2	0 .. 1400	24 x 72 x 144	32	972.0
Monthly average albedo, hourly (2.5R)	N/A	0 .. 1	24 x 72 x 144	32	972.0
Clear-sky longwave flux, hourly (2.5R)	W/m^2	50 .. 400	24 x 72 x 144	32	972.0

Table 2.5-4. 2.5-degree Regional (2 of 2)

Parameter Name (SDS Name)	Units	Range	Number of SDS Elements	Bits per Element	SDS Size (KB)
Clear-sky shortwave flux, hourly (2.5R)	W/m^2	0 .. 1400	24 x 72 x 144	32	972.00
Clear-sky Monthly averaged albedo, hourly (2.5R)	N/A	0 .. 1	24 x 72 x 144	32	972.00
Number of observations for LW, daily (2.5R)	hour	0 .. 24	31 x 72 x 144	8	313.87
Number of observations for SW, daily (2.5R)	hour	0 .. 24	31 x 72 x 144	8	313.87
Number of observations for Clear-sky LW, daily (2.5R)	hour	0 .. 24	31 x 72 x 144	8	313.87
Number of observations for Clear-sky SW, daily (2.5R)	hour	0 .. 24	31 x 72 x 144	8	313.87
Number of observations for LW, hourly (2.5R)	day	0 .. 31	24 x 72 x 144	8	243.00
Number of observations for SW, hourly (2.5R)	day	0 .. 31	24 x 72 x 144	8	243.00
Number of observations for Clear-sky LW, hourly (2.5R)	day	0 .. 31	24 x 72 x 144	8	243.00
Number of observations for Clear-sky SW, hourly (2.5R)	day	0 .. 31	24 x 72 x 144	8	243.00
Geotype (2.5R)	N/A	N/A	72 x 144	8	10.13
Total SDS Size (KB)					**19612.11**
Total SDS Size (MB)					**19.15**

The following table lists the SDSs contained in the 2.5-degree Nested Regional Vgroup. The number of elements in each SDS is determined by the number of 5-degree colatitudinal zones (36) and 5-degree longitudinal zones (72), and may also be a function of the number of days in the month (31) or the number of hours in a day (24).

Table 2.5-5. 2.5-degree Nested Regional (1 of 2)

Parameter Name (SDS Name)	Units	Range	Number of SDS Elements	Bits per Element	SDS Size (KB)
Solar Incidence for Monthly Averages by Day (2.5NR)	Wh/m^2	0 .. 500000	36 x 72	32	10.13
Monthly net radiant flux by day (2.5NR)	W/m^2	-200 .. 200	36 x 72	32	10.13
Clear-sky net radiant flux, monthly by day (2.5NR)	W/m^2	-200 .. 200	36 x 72	32	10.13
Clear-sky solar incidence, monthly by day (2.5NR)	W/m^2	0 .. 500000	36 x 72	32	10.13
Monthly net radiant flux by hour (2.5NR)	W/m^2	-200 .. 200	36 x 72	32	10.13
Solar incidence, monthly by hour (2.5NR)	Wh/m^2	0 .. 500000	36 x 72	32	10.13
Clear-sky net radiant flux, monthly by hour (2.5NR)	W/m^2	-200 .. 200	36 x 72	32	10.13
Clear-sky solar incidence, monthly by hour (2.5NR)	Wh/m^2	0 .. 500000	36 x 72	32	10.13
Daily solar incidence (2.5NR)	Wh/m^2	0 .. 500000	31 x 36 x 72	32	313.87
Hourly solar incidence (2.5NR)	Wh/m^2	0 .. 500000	24 x 36 x 72	32	243.0
Clear-sky solar incidence (2.5NR)	Wh/m^2	0 .. 500000	24 x 36 x 72	32	243.0
Longwave flux (2.5NR)	W/m^2	50 .. 400	36 x 72	32	10.13
Shortwave flux (2.5NR)	W/m^2	0 .. 1400	36 x 72	32	10.13
Monthly mean albedo (2.5NR)	N/A	0 .. 1	36 x 72	32	10.13
Clear-sky longwave flux (2.5NR)	W/m^2	50 .. 400	36 x 72	32	10.13
Clear-sky shortwave flux (2.5NR)	W/m^2	0 .. 1400	36 x 72	32	10.13
Monthly mean Clear-sky albedo (2.5NR)	N/A	0 .. 1	36 x 72	32	10.13
Longwave flux by the hour (2.5NR)	W/m^2	50 .. 400	36 x 72	32	10.13
Shortwave flux by the hour (2.5NR)	W/m^2	0 .. 1400	36 x 72	32	10.13

Table 2.5-5. 2.5-degree Nested Regional (2 of 2)

Parameter Name (SDS Name)	Units	Range	Number of SDS Elements	Bits per Element	SDS Size (KB)
Monthly average albedo by the hour (2.5NR)	N/A	0 .. 1	36 x 72	32	10.13
Clear-sky longwave flux by the hour (2.5NR)	W/m^2	50 .. 400	36 x 72	32	10.13
Clear-sky shortwave flux by the hour (2.5NR)	W/m^2	0 .. 1400	36 x 72	32	10.13
Clear-sky Monthly averaged albedo by the hour (2.5NR)	N/A	0 .. 1	36 x 72	32	10.13
Longwave flux, daily (2.5NR)	W/m^2	50 .. 400	31 x 36 x 72	32	313.87
Shortwave flux, daily (2.5NR)	W/m^2	0 .. 1400	31 x 36 x 72	32	313.87
Monthly mean albedo, daily (2.5NR)	N/A	0 .. 1	31 x 36 x 72	32	313.87
Clear-sky longwave flux, daily (2.5NR)	W/m^2	50 .. 400	31 x 36 x 72	32	313.87
Clear-sky shortwave flux, daily (2.5NR)	W/m^2	0 .. 1400	31 x 36 x 72	32	313.87
Monthly mean Clear-sky albedo, daily (2.5NR)	N/A	0 .. 1	31 x 36 x 72	32	313.87
Longwave flux, hourly (2.5NR)	W/m^2	50 .. 400	24 x 36 x 72	32	243.00
Shortwave flux, hourly (2.5NR)	W/m^2	0 .. 1400	24 x 36 x 72	32	243.00
Monthly average albedo, hourly (2.5NR)	N/A	0 .. 1	24 x 36 x 72	32	243.00
Clear-sky longwave flux, hourly (2.5NR)	W/m^2	50 .. 400	24 x 36 x 72	32	243.00
Clear-sky shortwave flux, hourly (2.5NR)	W/m^2	0 .. 1400	24 x 36 x 72	32	243.00
Clear-sky Monthly averaged albedo, hourly (2.5NR)	N/A	0 .. 1	24 x 36 x 72	32	243.00
Number of observations for LW, daily (2.5NR)	hour	0 .. 24	31 x 36 x 72	8	78.47
Number of observations for SW, daily (2.5NR)	hour	0 .. 24	31 x 36 x 72	8	78.47
Number of observations for Clear-sky LW, daily (2.5NR)	hour	0 .. 24	31 x 36 x 72	8	78.47
Number of observations for Clear-sky SW, daily (2.5NR)	hour	0 .. 24	31 x 36 x 72	8	78.47
Number of observations for LW, hourly (2.5NR)	day	0 .. 31	24 x 36 x 72	8	60.75
Number of observations for SW, hourly (2.5NR)	day	0 .. 31	24 x 36 x 72	8	60.75
Number of observations for Clear-sky LW, hourly (2.5NR)	day	0 .. 31	24 x 36 x 72	8	60.75
Number of observations for Clear-sky SW, hourly (2.5NR)	day	0 .. 31	24 x 36 x 72	8	60.75
Geotype (2.5NR)	N/A	N/A	36 x 72	8	2.53
Total SDS Size (KB)					**4903.1**
Total SDS Size (MB)					**4.79**

The following table lists the SDSs contained in the 5-degree Nested Regional Vgroup. The number of elements in each SDS is determined by the number of 10-degree colatitudinal zones (18) and 10-degree longitudinal zones (36), and may also be a function of the number of days in the month (31) or the number of hours in a day (24).

Table 2.5-6. 5-degree Nested Regional (1 of 2)

Parameter Name (SDS Name)	Units	Range	Number of SDS Elements	Bits per Element	SDS Size (KB)
Solar Incidence for Monthly Averages by Day (5NR)	Wh/m^2	0 .. 500000	18 x 36	32	2.53
Monthly net radiant flux by day (5NR)	W/m^2	-200 .. 200	18 x 36	32	2.53
Clear-sky net radiant flux, monthly by day (5NR)	W/m^2	-200 .. 200	18 x 36	32	2.53
Clear-sky solar incidence, monthly by day (5NR)	W/m^2	0 .. 500000	18 x 36	32	2.53
Monthly net radiant flux by hour (5NR)	W/m^2	-200 .. 200	18 x 36	32	2.53
Solar incidence, monthly by hour (5NR)	Wh/m^2	0 .. 500000	18 x 36	32	2.53
Clear-sky net radiant flux, monthly by hour (5NR)	W/m^2	-200 .. 200	18 x 36	32	2.53
Clear-sky solar incidence, monthly by hour (5NR)	Wh/m^2	0 .. 500000	18 x 36	32	2.53
Daily solar incidence (5NR)	Wh/m^2	0 .. 500000	31 x 18 x 36	32	78.47
Hourly solar incidence (5NR)	Wh/m^2	0 .. 500000	24 x 18 x 36	32	60.75
Clear-sky solar incidence (5NR)	Wh/m^2	0 .. 500000	24 x 18 x 36	32	60.75
Longwave flux (5NR)	W/m^2	50 .. 400	18 x 36	32	2.53
Shortwave flux (5NR)	W/m^2	0 .. 1400	18 x 36	32	2.53
Monthly mean albedo (5NR)	N/A	0 .. 1	18 x 36	32	2.53
Clear-sky longwave flux (5NR)	W/m^2	50 .. 400	18 x 36	32	2.53
Clear-sky shortwave flux (5NR)	W/m^2	0 .. 1400	18 x 36	32	2.53
Monthly mean Clear-sky albedo (5NR)	N/A	0 .. 1	18 x 36	32	2.53
Longwave flux by the hour (5NR)	W/m^2	50 .. 400	18 x 36	32	2.53
Shortwave flux by the hour (5NR)	W/m^2	0 .. 1400	18 x 36	32	2.53
Monthly average albedo by the hour (5NR)	N/A	0 .. 1	18 x 36	32	2.53
Clear-sky longwave flux by the hour (5NR)	W/m^2	50 .. 400	18 x 36	32	2.53
Clear-sky shortwave flux by the hour (5NR)	W/m^2	0 .. 1400	18 x 36	32	2.53
Clear-sky Monthly averaged albedo by the hour (5NR)	N/A	0 .. 1	18 x 36	32	2.53
Longwave flux, daily (5NR)	W/m^2	50 .. 400	31 x 18 x 36	32	78.47
Shortwave flux, daily (5NR)	W/m^2	0 .. 1400	31 x 18 x 36	32	78.47
Monthly mean albedo, daily (5NR)	N/A	0 .. 1	31 x 18 x 36	32	78.47
Clear-sky longwave flux, daily (5NR)	W/m^2	50 .. 400	31 x 18 x 36	32	78.47
Clear-sky shortwave flux, daily (5NR)	W/m^2	0 .. 1400	31 x 18 x 36	32	78.47
Monthly mean Clear-sky albedo, daily (5NR)	N/A	0 .. 1	31 x 18 x 36	32	78.47
Longwave flux, hourly (5NR)	W/m^2	50 .. 400	24 x 18 x 36	32	60.75
Shortwave flux, hourly (5NR)	W/m^2	0 .. 1400	24 x 18 x 36	32	60.75
Monthly average albedo, hourly (5NR)	N/A	0 .. 1	24 x 18 x 36	32	60.75
Clear-sky longwave flux, hourly (5NR)	W/m^2	50 .. 400	24 x 18 x 36	32	60.75
Clear-sky shortwave flux, hourly (5NR)	W/m^2	0 .. 1400	24 x 18 x 36	32	60.75
Clear-sky Monthly averaged albedo, hourly (5NR)	N/A	0 .. 1	24 x 18 x 36	32	60.75
Number of observations for LW, daily (5NR)	hour	0 .. 24	31 x 18 x 36	8	19.62
Number of observations for SW, daily (5NR)	hour	0 .. 24	31 x 18 x 36	8	19.62
Number of observations for Clear-sky LW, daily (5NR)	hour	0 .. 24	31 x 18 x 36	8	19.62
Number of observations for Clear-sky SW, daily (5NR)	hour	0 .. 24	31 x 18 x 36	8	19.62
Number of observations for LW, hourly (5NR)	day	0 .. 31	24 x 18 x 36	8	15.19
Number of observations for SW, hourly (5NR)	day	0 .. 31	24 x 18 x 36	8	15.19
Number of observations for Clear-sky LW, hourly (5NR)	day	0 .. 31	24 x 18 x 36	8	15.19
Number of observations for Clear-sky SW, hourly (5NR)	day	0 .. 31	24 x 18 x 36	8	15.19

Table 2.5-6. 5-degree Nested Regional (2 of 2)

Parameter Name (SDS Name)	Units	Range	Number of SDS Elements	Bits per Element	SDS Size (KB)
Geotype (5NR)	N/A	N/A	18 x 36	8	0.63
Total SDS Size (KB)					**1225.76**
Total SDS Size (MB)					**1.20**

Table 2.5-7 lists the SDSs contained in the 2.5-degree Zonal Vgroup. The number of elements in each SDS is determined by the number of colatitudinal zones (72), and may also be a function of the number of days in the month (31) or the number of hours in a day (24).

Table 2.5-7. 2.5-degree Zonal (1 of 2)

Parameter Name (SDS Name)	Units	Range	Number of SDS Elements	Bits per Element	SDS Size (KB)
Solar Incidence for Monthly Averages by Day (2.5Z)	Wh/m^2	0 .. 500000	72	32	0.28
Monthly net radiant flux by day (2.5Z)	W/m^2	-200 .. 200	72	32	0.28
Clear-sky net radiant flux, monthly by day (2.5Z)	W/m^2	-200 .. 200	72	32	0.28
Clear-sky solar incidence, monthly by day (2.5Z)	W/m^2	0 .. 500000	72	32	0.28
Monthly net radiant flux by hour (2.5Z)	W/m^2	-200 .. 200	72	32	0.28
Solar incidence, monthly by hour (2.5Z)	Wh/m^2	0 .. 500000	72	32	0.28
Clear-sky net radiant flux, monthly by hour (2.5Z)	W/m^2	-200 .. 200	72	32	0.28
Clear-sky solar incidence, monthly by hour (2.5Z)	Wh/m^2	0 .. 500000	72	32	0.28
Daily solar incidence (2.5Z)	Wh/m^2	0 .. 500000	31 x 72	32	8.72
Hourly solar incidence (2.5Z)	Wh/m^2	0 .. 500000	24 x 72	32	6.75
Clear-sky solar incidence (2.5Z)	Wh/m^2	0 .. 500000	24 x 72	32	6.75
Longwave flux (2.5Z)	W/m^2	50 .. 400	72	32	0.28
Shortwave flux (2.5Z)	W/m^2	0 .. 1400	72	32	0.28
Monthly mean albedo (2.5Z)	N/A	0 .. 1	72	32	0.28
Clear-sky longwave flux (2.5Z)	W/m^2	50 .. 400	72	32	0.28
Clear-sky shortwave flux (2.5Z)	W/m^2	0 .. 1400	72	32	0.28
Monthly mean Clear-sky albedo (2.5Z)	N/A	0 .. 1	72	32	0.28
Longwave flux by the hour (2.5Z)	W/m^2	50 .. 400	72	32	0.28
Shortwave flux by the hour (2.5Z)	W/m^2	0 .. 1400	72	32	0.28
Monthly average albedo by the hour (2.5Z)	N/A	0 .. 1	72	32	0.28
Clear-sky longwave flux by the hour (2.5Z)	W/m^2	50 .. 400	72	32	0.28
Clear-sky shortwave flux by the hour (2.5Z)	W/m^2	0 .. 1400	72	32	0.28
Clear-sky Monthly averaged albedo by the hour (2.5Z)	N/A	0 .. 1	72	32	0.28
Longwave flux, daily (2.5Z)	W/m^2	50 .. 400	31 x 72	32	8.72
Shortwave flux, daily (2.5Z)	W/m^2	0 .. 1400	31 x 72	32	8.72
Monthly mean albedo, daily (2.5Z)	N/A	0 .. 1	31 x 72	32	8.72
Clear-sky longwave flux, daily (2.5Z)	W/m^2	50 .. 400	31 x 72	32	8.72
Clear-sky shortwave flux, daily (2.5Z)	W/m^2	0 .. 1400	31 x 72	32	8.72
Monthly mean Clear-sky albedo, daily (2.5Z)	N/A	0 .. 1	31 x 72	32	8.72

Table 2.5-7. 2.5-degree Zonal (2 of 2)

Parameter Name (SDS Name)	Units	Range	Number of SDS Elements	Bits per Element	SDS Size (KB)
Longwave flux, hourly (2.5Z)	W/m^2	50 .. 400	24 x 72	32	6.75
Shortwave flux, hourly (2.5Z)	W/m^2	0 .. 1400	24 x 72	32	6.75
Monthly average albedo, hourly (2.5Z)	N/A	0 .. 1	24 x 72	32	6.75
Clear-sky longwave flux, hourly (2.5Z)	W/m^2	50 .. 400	24 x 72	32	6.75
Clear-sky shortwave flux, hourly (2.5Z)	W/m^2	0 .. 1400	24 x 72	32	6.75
Clear-sky Monthly averaged albedo, hourly (2.5Z)	N/A	0 .. 1	24 x 72	32	6.75
Number of observations for LW, daily (2.5Z)	hour	0 .. 24	31 x 72	8	2.18
Number of observations for SW, daily (2.5Z)	hour	0 .. 24	31 x 72	8	2.18
Number of observations for Clear-sky LW, daily (2.5Z)	hour	0 .. 24	31 x 72	8	2.18
Number of observations for Clear-sky SW, daily (2.5Z)	hour	0 .. 24	31 x 72	8	2.18
Number of observations for LW, hourly (2.5Z)	day	0 .. 31	24 x 72	8	1.69
Number of observations for SW, hourly (2.5Z)	day	0 .. 31	24 x 72	8	1.69
Number of observations for Clear-sky LW, hourly (2.5Z)	day	0 .. 31	24 x 72	8	1.69
Number of observations for Clear-sky SW, hourly (2.5Z)	day	0 .. 31	24 x 72	8	1.69
Geotype (2.5Z)	N/A	N/A	72	8	0.07
Total SDS Size (KB)					**136.19**
Total SDS Size (MB)					**0.13**

Table 2.5-8 lists the SDSs contained in the 5-degree Zonal Vgroup. The number of elements in each SDS is determined by the number of colatitudinal zones (36), and may also be a function of the number of days in the month (31) or the number of hours in a day (24).

Table 2.5-8. 5-degree Zonal (1 of 2)

Parameter Name (SDS Name)	Units	Range	Number of SDS Elements	Bits per Element	SDS Size (KB)
Solar Incidence for Monthly Averages by Day (5Z)	Wh/m^2	0 .. 500000	36	32	0.14
Monthly net radiant flux by day (5Z)	W/m^2	-200 .. 200	36	32	0.14
Clear-sky net radiant flux, monthly by day (5Z)	W/m^2	-200 .. 200	36	32	0.14
Clear-sky solar incidence, monthly by day (5Z)	W/m^2	0 .. 500000	36	32	0.14
Monthly net radiant flux by hour (5Z)	W/m^2	-200 .. 200	36	32	0.14
Solar incidence, monthly by hour (5Z)	Wh/m^2	0 .. 500000	36	32	0.14
Clear-sky net radiant flux, monthly by hour (5Z)	W/m^2	-200 .. 200	36	32	0.14
Clear-sky solar incidence, monthly by hour (5Z)	Wh/m^2	0 .. 500000	36	32	0.14
Daily solar incidence (5Z)	Wh/m^2	0 .. 500000	31 x 36	32	4.36
Hourly solar incidence (5Z)	Wh/m^2	0 .. 500000	24 x 36	32	3.38
Clear-sky solar incidence (5Z)	Wh/m^2	0 .. 500000	24 x 36	32	3.38
Longwave flux (5Z)	W/m^2	50 .. 400	36	32	0.14
Shortwave flux (5Z)	W/m^2	0 .. 1400	36	32	0.14
Monthly mean albedo (5Z)	N/A	0 .. 1	36	32	0.14

Table 2.5-8. 5-degree Zonal (2 of 2)

Parameter Name (SDS Name)	Units	Range	Number of SDS Elements	Bits per Element	SDS Size (KB)
Clear-sky longwave flux (5Z)	W/m^2	50 .. 400	36	32	0.14
Clear-sky shortwave flux (5Z)	W/m^2	0 .. 1400	36	32	0.14
Monthly mean Clear-sky albedo (5Z)	N/A	0 .. 1	36	32	0.14
Longwave flux by the hour (5Z)	W/m^2	50 .. 400	36	32	0.14
Shortwave flux by the hour (5Z)	W/m^2	0 .. 1400	36	32	0.14
Monthly average albedo by the hour (5Z)	N/A	0 .. 1	36	32	0.14
Clear-sky longwave flux by the hour (5Z)	W/m^2	50 .. 400	36	32	0.14
Clear-sky shortwave flux by the hour (5Z)	W/m^2	0 .. 1400	36	32	0.14
Clear-sky Monthly averaged albedo by the hour (5Z)	N/A	0 .. 1	36	32	0.14
Longwave flux, daily (5Z)	W/m^2	50 .. 400	31 x 36	32	4.36
Shortwave flux, daily (5Z)	W/m^2	0 .. 1400	31 x 36	32	4.36
Monthly mean albedo, daily (5Z)	N/A	0 .. 1	31 x 36	32	4.36
Clear-sky longwave flux, daily (5Z)	W/m^2	50 .. 400	31 x 36	32	4.36
Clear-sky shortwave flux, daily (5Z)	W/m^2	0 .. 1400	31 x 36	32	4.36
Monthly mean Clear-sky albedo, daily (5Z)	N/A	0 .. 1	31 x 36	32	4.36
Longwave flux, hourly (5Z)	W/m^2	50 .. 400	24 x 36	32	3.38
Shortwave flux, hourly (5Z)	W/m^2	0 .. 1400	24 x 36	32	3.38
Monthly average albedo, hourly (5Z)	N/A	0 .. 1	24 x 36	32	3.38
Clear-sky longwave flux, hourly (5Z)	W/m^2	50 .. 400	24 x 36	32	3.38
Clear-sky shortwave flux, hourly (5Z)	W/m^2	0 .. 1400	24 x 36	32	3.38
Clear-sky Monthly averaged albedo, hourly (5Z)	N/A	0 .. 1	24 x 36	32	3.38
Number of observations for LW, daily (5Z)	hour	0 .. 24	31 x 36	8	1.09
Number of observations for SW, daily (5Z)	hour	0 .. 24	31 x 36	8	1.09
Number of observations for Clear-sky LW, daily (5Z)	hour	0 .. 24	31 x 36	8	1.09
Number of observations for Clear-sky SW, daily (5Z)	hour	0 .. 24	31 x 36	8	1.09
Number of observations for LW, hourly (5Z)	day	0 .. 31	24 x 36	8	0.84
Number of observations for SW, hourly (5Z)	day	0 .. 31	24 x 36	8	0.84
Number of observations for Clear-sky LW, hourly (5Z)	day	0 .. 31	24 x 36	8	0.84
Number of observations for Clear-sky SW, hourly (5Z)	day	0 .. 31	24 x 36	8	0.84
Geotype (5Z)	N/A	N/A	36	8	0.035
Total SDS Size (KB)					**68.12**
Total SDS Size (MB)					**0.07**

Table 2.5-9 lists the SDSs contained in the 10-degree Zonal Vgroup. The number of elements in each SDS is determined by the number of colatitudinal zones (18), and may also be a function of the number of days in the month (31) or the number of hours in a day (24).

Table 2.5-9. 10-degree Zonal (1 of 2)

Parameter Name (SDS Name)	Units	Range	Number of SDS Elements	Bits per Element	SDS Size (KB)
Solar Incidence for Monthly Averages by Day (10Z)	Wh/m^2	0 .. 500000	18	32	.07
Monthly net radiant flux by day (10Z)	W/m^2	-200 .. 200	18	32	.07
Clear-sky net radiant flux, monthly by day (10Z)	W/m^2	-200 .. 200	18	32	.07
Clear-sky solar incidence, monthly by day (10Z)	W/m^2	0 .. 500000	18	32	.07
Monthly net radiant flux by hour (10Z)	W/m^2	-200 .. 200	18	32	.07
Solar incidence, monthly by hour (10Z)	Wh/m^2	0 .. 500000	18	32	.07
Clear-sky net radiant flux, monthly by hour (10Z)	W/m^2	-200 .. 200	18	32	.07
Clear-sky solar incidence, monthly by hour (10Z)	Wh/m^2	0 .. 500000	18	32	.07
Daily solar incidence (10Z)	Wh/m^2	0 .. 500000	31 x 18	32	2.18
Hourly solar incidence (10Z)	Wh/m^2	0 .. 500000	24 x 18	32	1.69
Clear-sky solar incidence (10Z)	Wh/m^2	0 .. 500000	24 x 18	32	1.69
Longwave flux (10Z)	W/m^2	50 .. 400	18	32	.07
Shortwave flux (10Z)	W/m^2	0 .. 1400	18	32	.07
Monthly mean albedo (10Z)	N/A	0 .. 1	18	32	.07
Clear-sky longwave flux (10Z)	W/m^2	50 .. 400	18	32	.07
Clear-sky shortwave flux (10Z)	W/m^2	0 .. 1400	18	32	.07
Monthly mean Clear-sky albedo (10Z)	N/A	0 .. 1	18	32	.07
Longwave flux by the hour (10Z)	W/m^2	50 .. 400	18	32	.07
Shortwave flux by the hour (10Z)	W/m^2	0 .. 1400	18	32	.07
Monthly average albedo by the hour (10Z)	N/A	0 .. 1	18	32	.07
Clear-sky longwave flux by the hour (10Z)	W/m^2	50 .. 400	18	32	.07
Clear-sky shortwave flux by the hour (10Z)	W/m^2	0 .. 1400	18	32	.07
Clear-sky Monthly averaged albedo by the hour (10Z)	N/A	0 .. 1	18	32	.07
Longwave flux, daily (10Z)	W/m^2	50 .. 400	31 x 18	32	2.18
Shortwave flux, daily (10Z)	W/m^2	0 .. 1400	31 x 18	32	2.18
Monthly mean albedo, daily (10Z)	N/A	0 .. 1	31 x 18	32	2.18
Clear-sky longwave flux, daily (10Z)	W/m^2	50 .. 400	31 x 18	32	2.18
Clear-sky shortwave flux, daily (10Z)	W/m^2	0 .. 1400	31 x 18	32	2.18
Monthly mean Clear-sky albedo, daily (10Z)	N/A	0 .. 1	31 x 18	32	2.18
Longwave flux, hourly (10Z)	W/m^2	50 .. 400	24 x 18	32	1.69
Shortwave flux, hourly (10Z)	W/m^2	0 .. 1400	24 x 18	32	1.69
Monthly average albedo, hourly (10Z)	N/A	0 .. 1	24 x 18	32	1.69
Clear-sky longwave flux, hourly (10Z)	W/m^2	50 .. 400	24 x 18	32	1.69
Clear-sky shortwave flux, hourly (10Z)	W/m^2	0 .. 1400	24 x 18	32	1.69
Clear-sky Monthly averaged albedo, hourly (10Z)	N/A	0 .. 1	24 x 18	32	1.69
Number of observations for LW, daily (10Z)	hour	0 .. 24	31 x 18	8	.54
Number of observations for SW, daily (10Z)	hour	0 .. 24	31 x 18	8	.54
Number of observations for Clear-sky LW, daily (10Z)	hour	0 .. 24	31 x 18	8	.54
Number of observations for Clear-sky SW, daily (10Z)	hour	0 .. 24	31 x 18	8	.54
Number of observations for LW, hourly (10Z)	day	0 .. 31	24 x 18	8	.42
Number of observations for SW, hourly (10Z)	day	0 .. 31	24 x 18	8	.42

Table 2.5-9. 10-degree Zonal (2 of 2)

Parameter Name (SDS Name)	Units	Range	Number of SDS Elements	Bits per Element	SDS Size (KB)
Number of observations for Clear-sky LW, hourly (10Z)	day	0 .. 31	24 x 18	8	.42
Number of observations for Clear-sky SW, hourly (10Z)	day	0 .. 31	24 x 18	8	.42
Geotype (10Z)	N/A	N/A	18	8	.018
Total SDS Size (KB)					**34.04**
Total SDS Size (MB)					**0.03**

Table 2.5-10 lists the SDSs contained in the Global Vgroup. Each SDS contains global averages based on 2.5-, 5-, and 10-degree regions (3), and may also be a function of the number of days in the month (31) or the number of hours in a day (24).

Table 2.5-10. Global (1 of 2)

Parameter Name (SDS Name)	Units	Range	Number of SDS Elements	Bits per Element	SDS Size (KB)
Solar Incidence for Monthly Averages by Day (G)	Wh/m^2	0 .. 500000	3	32	0.012
Monthly net radiant flux by day (G)	W/m^2	-200 .. 200	3	32	0.012
Clear-sky net radiant flux, monthly by day (G)	W/m^2	-200 .. 200	3	32	0.012
Clear-sky solar incidence, monthly by day (G)	W/m^2	0 .. 500000	3	32	0.012
Monthly net radiant flux by hour (G)	W/m^2	-200 .. 200	3	32	0.012
Solar incidence, monthly by hour (G)	Wh/m^2	0 .. 500000	3	32	0.012
Clear-sky net radiant flux, monthly by hour (G)	W/m^2	-200 .. 200	3	32	0.012
Clear-sky solar incidence, monthly by hour (G)	Wh/m^2	0 .. 500000	3	32	0.012
Daily solar incidence (G)	Wh/m^2	0 .. 500000	31 x 3	32	0.36
Hourly solar incidence (G)	Wh/m^2	0 .. 500000	24 x 3	32	0.28
Clear-sky solar incidence (G)	Wh/m^2	0 .. 500000	24 x 3	32	0.28
Longwave flux (G)	W/m^2	50 .. 400	3	32	0.012
Shortwave flux (G)	W/m^2	0 .. 1400	3	32	0.012
Monthly mean albedo (G)	N/A	0 .. 1	3	32	0.012
Clear-sky longwave flux (G)	W/m^2	50 .. 400	3	32	0.012
Clear-sky shortwave flux (G)	W/m^2	0 .. 1400	3	32	0.012
Monthly mean Clear-sky albedo (G)	N/A	0 .. 1	3	32	0.012
Longwave flux by the hour (G)	W/m^2	50 .. 400	3	32	0.012
Shortwave flux by the hour (G)	W/m^2	0 .. 1400	3	32	0.012
Monthly average albedo by the hour (G)	N/A	0 .. 1	3	32	0.012
Clear-sky longwave flux by the hour (G)	W/m^2	50 .. 400	3	32	0.012
Clear-sky shortwave flux by the hour (G)	W/m^2	0 .. 1400	3	32	0.012
Clear-sky Monthly averaged albedo by the hour (G)	N/A	0 .. 1	3	32	0.012
Longwave flux, daily (G)	W/m^2	50 .. 400	31 x 3	32	0.36
Shortwave flux, daily (G)	W/m^2	0 .. 1400	31 x 3	32	0.36

Table 2.5-10. Global (2 of 2)

Parameter Name (SDS Name)	Units	Range	Number of SDS Elements	Bits per Element	SDS Size (KB)
Monthly mean albedo, daily (G)	N/A	0 .. 1	31 x 3	32	0.36
Clear-sky longwave flux, daily (G)	W/m^2	50 .. 400	31 x 3	32	0.36
Clear-sky shortwave flux, daily (G)	W/m^2	0 .. 1400	31 x 3	32	0.36
Monthly mean Clear-sky albedo, daily (G)	N/A	0 .. 1	31 x 3	32	0.36
Longwave flux, hourly (G)	W/m^2	50 .. 400	24 x 3	32	0.28
Shortwave flux, hourly (G)	W/m^2	0 .. 1400	24 x 3	32	0.28
Monthly average albedo, hourly (G)	N/A	0 .. 1	24 x 3	32	0.28
Clear-sky longwave flux, hourly (G)	W/m^2	50 .. 400	24 x 3	32	0.28
Clear-sky shortwave flux, hourly (G)	W/m^2	0 .. 1400	24 x 3	32	0.28
Clear-sky Monthly averaged albedo, hourly (G)	N/A	0 .. 1	24 x 3	32	0.28
Number of observations for LW, daily (G)	hour	0 .. 24	31 x 3	8	0.091
Number of observations for SW, daily (G)	hour	0 .. 24	31 x 3	8	0.091
Number of observations for Clear-sky LW, daily (G)	hour	0 .. 24	31 x 3	8	0.091
Number of observations for Clear-sky SW, daily (G)	hour	0 .. 24	31 x 3	8	0.091
Number of observations for LW, hourly (G)	day	0 .. 31	24 x 3	8	0.07
Number of observations for SW, hourly (G)	day	0 .. 31	24 x 3	8	0.07
Number of observations for Clear-sky LW, hourly (G)	day	0 .. 31	24 x 3	8	0.07
Number of observations for Clear-sky SW, hourly (G)	day	0 .. 31	24 x 3	8	0.07
Geotype (G)	N/A	N/A	3	8	.0029
Total SDS Size (KB)					**5.65**
Total SDS Size (MB)					**0.01**

Maximum Meta Bits per Product:TBD
Maximum Data Bits per Product:212868552
Maximum Bits per Product:212868552
Maximum Product Size (MB) per Product:16.41

2.6 Single Satellite Footprint, TOA and Surface Flux, Clouds (SSF)

EOSDIS Product Code: CER11

The Single Satellite CERES Footprint TOA and Surface Fluxes, Clouds (SSF) product is produced from the cloud identification, convolution, inversion, and surface processing for CERES. Each SSF covers footprints, or CERES Fields-of-View (FOV), from a single hour and a single CERES scanner (3 channels) mounted on one satellite. This SSF parameter list is for HDF granules.

The major categories of data output on the SSF are

- CERES footprint geometry and CERES viewing angles
- CERES footprint radiance and flux (TOA and Surface)
- CERES footprint area statistics and imager viewing angles
- CERES footprint clear area statistics
- CERES footprint cloudy area statistics for two cloud height categories
- CERES footprint cloud overlap conditions (4 conditions)
- Imager radiance statistics (5 imager channels) over CERES Footprint

The SSF product will be produced daily starting with the TRMM launch. The SSF provides data needed to produce a production-quality set of CERES Angular Distribution Models (CADMs). At a later time, the archival SSF product will be reproduced using the production CADMs.

The current estimated SSF size of 245475 footprints per hour is a maximum and is based on the number of full Earth-view CERES footprints recorded in an hour assuming a normal elevation scan. For a CERES footprint to be recorded on the SSF, however, it must have adequate imager coverage. Therefore, when operating in a cross-track scan, the expected number of footprints on an SSF is reduced. For TRMM, this results in approximately 37% fewer footprints per hour. For EOS, the reduction is approximately 23%. When operating in Rotating Azimuth Plane Scan (RAPS) mode, the expected number of footprints per hour is also reduced, but not to the same extent as in cross-track. A complete listing of parameters for this data product can be found in Table 2.6-1.

Level: 2
Type: Archival
Frequency: 1/Hour

Portion of Globe Covered
File: Satellite Swath
Record: 1 CERES Footprint

Time Interval Covered
File: 1 Hour
Record: 1/100-Second

Portion of Atmosphere Covered
File: Surface to TOA

SSF Metadata

The types of SSF metadata are summarized in Table 2.6-1 and contain information which need only be recorded once per hour. The CERES metadata are listed in Tables B-1 and B-2 in Appendix B. Table B-1 lists the CERES Baseline Header Metadata and Table B-2 lists the parameters in the CERES_metadata Vdata Table. Note that the CERES_metadata Vdata is a subset of the CERES Baseline Header Metadata. The SSF_Header and the CERES_metadata Vdata are Vdata structures which are collections of records similar to records used in conventional database applications (multifield, various data types). The SSF product-specific metadata parameters are listed in Table 2.6-2 and the SSF_Header parameters are listed in Table 2.6-3.

Table 2.6-1. SSF Metadata Summary

HDF Name	Description Table	Records	Number of Fields
CERES Baseline Header Metadata	Table B-1	1	36
CERES_metadata Vdata	Table B-2	1	14
SSF Product-specific Metadata	Table 2.6-2	1	3
SSF_Header Vdata	Table 2.6-3	1	23

Table 2.6-2. SSF Product-specific Metadata

Item	Parameter Name	Units	Range	Data Type
1	PercentCrosstrackFOV	N/A	0.0 .. 100.0	4-byte real
2	PercentRapsFOV	N/A	0.0 .. 100.0	4-byte real
3	PercentOtherFOV	N/A	0.0 .. 100.0	4-byte real

Table 2.6-3. SSF_Header (1 of 2)

Item	Description	Units	Range	Elements	Bytes/ Elem
SSF-H1	SSF ID	N/A	112 .. 200	1	4
SSF-H2	Character name of CERES instrument	N/A	ASCII string	1	4
SSF-H3	Day and Time at hour start	N/A	ASCII string	1	28
SSF-H4	Character name of satellite	N/A	ASCII string	1	4
SSF-H5	Character name of high resolution imager instrument	N/A	ASCII string	1	8

Table 2.6-3. SSF_Header (2 of 2)

Item	Description	Units	Range	Elements	Bytes/ Elem
SSF-H6	Number of imager channels	N/A	1 .. 20	1	4
SSF-H7	Central wavelengths of imager channels	µm	0.4 .. 15.0	20	4
SSF-H8	Earth-Sun distance at hour start	AU	0.98 .. 1.02	1	4
SSF-H9	Colatitude of subsatellite point at surface at hour start	deg	0 .. 180	1	4
SSF-H10	Longitude of subsatellite point at surface at hour start	deg	0 .. 360	1	4
SSF-H11	Colatitude of subsatellite point at surface at hour end	deg	0 .. 180	1	4
SSF-H12	Longitude of subsatellite point at surface at hour end	deg	0 .. 360	1	4
SSF-H13	Along-track angle of satellite at hour end	deg	0 .. 330	1	4
SSF-H14	Number of Footprints in SSF product	N/A	0 .. 350000	1	4
SSF-H15	Subsystem 4.1 identification string	N/A	ASCII string	1	128
SSF-H16	Subsystem 4.2 identification string	N/A	ASCII string	1	128
SSF-H17	Subsystem 4.3 identification string	N/A	ASCII string	1	128
SSF-H18	Subsystem 4.4 identification string	N/A	ASCII string	1	128
SSF-H19	Subsystem 4.5 identification string	N/A	ASCII string	1	128
SSF-H20	Subsystem 4.6 identification string	N/A	ASCII string	1	128
SSF-H21	IES production date and time	N/A	ASCII string	1	24
SSF-H22	MOA production date and time	N/A	ASCII string	1	24
SSF-H23	SSF production date and time	N/A	ASCII string	1	24

SSF Scientific Data Sets

The SSF contains 24 Scientific Data Sets (SDS) which are parameter collections of along-track ordered footprints where the first dimension corresponds to the number of footprints; the last dimension corresponds to the number of parameters; and the middle dimension, if rank 3, corresponds to the number of elements in each parameter array. This ordering is used by the C programming language and most HDF viewers. In FORTRAN, the dimensions are reversed such that the number of footprints becomes the last dimension and the first dimension is the number of parameters in the SDS. Table 2.6-4 summarizes the contents of each SDS contained within the SSF file.

Table 2.6-4. SSF SDS Summary

SDS Name	HDF Rank	Dimensions	Data Type	Maximum Hourly Size (MB)
Julian_TIme	2	n x 2	8-byte real	3.93
Velocity	2	n x 3	8-byte real	5.89
Colat_Longitude	2	n x 8	4-byte real	7.86
Scan_Index	2	n x 2	2-byte integer	0.98
FOV_Angles	2	n x 6	4-byte real	5.89
TOA_ViewAngles	2	n x 5	4-byte real	4.91
Surface_Types	3	n x 8 x 2	2-byte integer	7.86
ADM_Types	2	n x 3	2-byte integer	1.47
Flags_Operations_Radiance	2	n x 1	4-byte integer	0.98
Unfiltered_Radiance	2	n x 3	4-byte real	2.95
TOA_Flux	2	n x 3	4-byte real	2.95
SurfaceFlux_ModelA	2	n x 6	4-byte real	5.89
SurfaceFlux_ModelB	2	n x 4	4-byte real	3.93
Full_FOV_Integers	2	n x 11	2-byte integer	5.40
Full_FOV_Reals	2	n x 6	4-byte real	5.89
Clear_FOV_Integers	2	n x 1	2-byte integer	0.49
Clear_FOV_Reals	2	n x 4	4-byte real	3.93
Cloudy_FOV_Integers	3	n x 2 x 2	2-byte integer	1.96
Cloudy_FOV_Reals	3	n x 2 x 21	4-byte real	41.24
Overlap_Conditions	3	n x 4 x 1	2-byte integer	1.96
Validation_Stddev	3	n x 2 x 7	4-byte real	13.75
Internal_Use_Integers	2	n x 3	2-byte integer	1.47
Internal_Use_Reals	2	n x 63	4-byte real	61.86
Imager_Radiance_Stats	3	n x 5 x 15	4-byte real	73.64
SDS TOTAL SIZE				**267.08**

(Note: n = the number of footprints processed)

Table 2.6-5 provides a complete listing of parameters for the SSF data product.

Table 2.6-5. Single Satellite Footprint, TOA and Surface Flux, Clouds (SSF) (1 of 4)

Product Code Key:
- **A:** Archival - Parameters of interest to the general user community
- **I:** Internal - Parameters required by subsequent subsystems or reprocessing
- **V:** Validation - Parameters used for validation

Description	Parameter Number	Units	Range	Elements/ Record	Bytes/ Elem	Product Code
SDS 1: Julian_Time						
1 Time of observation	1	day	2440000 .. 2480000	1	8	A
2 Radius of satellite from center of Earth at observation	2	km	6000 .. 8000	1	8	A
SDS 2: Velocity						
1 X component of satellite inertial velocity	3	km sec^{-1}	-10 .. 10	1	8	A
2 Y component of satellite inertial velocity	4	km sec^{-1}	-10 .. 10	1	8	A
3 Z component of satellite inertial velocity	5	km sec^{-1}	-10 .. 10	1	8	A
SDS 3: Colat_Longitude						
1 Colatitude of subsatellite point at surface at observation	6	deg	0 .. 180	1	4	A
2 Longitude of subsatellite point at surface at observation	7	deg	0 .. 360	1	4	A
3 Colatitude of subsolar point at surface at observation	8	deg	0 .. 180	1	4	A
4 Longitude of subsolar point at surface at observation	9	deg	0 .. 360	1	4	A
5 Colatitude of CERES FOV at TOA	10	deg	0 .. 180	1	4	A
6 Longitude of CERES FOV at TOA	11	deg	0 .. 360	1	4	A
7 Colatitude of CERES FOV at surface	12	deg	0 .. 180	1	4	A
8 Longitude of CERES FOV at surface	13	deg	0 .. 360	1	4	A
SDS 4: Scan_Index						
1 Scan sample number	14	N/A	1 .. 660	1	2	A
2 Packet number	15	N/A	0 .. 32766	1	2	A
SDS 5: FOV_Angles						
1 Cone angle of CERES FOV at satellite	16	deg	0 .. 90	1	4	A
2 Clock angle of CERES FOV at satellite wrt inertial velocity	17	deg	0 .. 360	1	4	A
3 Rate of change of cone angle	18	deg sec^{-1}	-300 .. 300	1	4	A
4 Rate of change of clock angle	19	deg sec^{-1}	-20 .. 20	1	4	A
5 Along-track angle of CERES FOV at surface	20	deg	-30 .. 330	1	4	A
6 Cross-track angle of CERES FOV at surface	21	deg	-90 .. 90	1	4	A
SDS 6: ViewAngles						
1 CERES viewing zenith at surface	22	deg	0 .. 90	1	4	A
2 CERES solar zenith at surface	23	deg	0 .. 180	1	4	A
3 CERES relative azimuth at surface	24	deg	0 .. 360	1	4	A
4 CERES viewing azimuth at surface wrt North	25	deg	0 .. 360	1	4	A
5 Altitude of surface above sea level	26	m	-1000 .. 10000	1	4	A
SDS 7: Surface_Types						
1 Surface type index	27	N/A	1 .. 20	8	2	A
2 Surface type percent coverage	28	N/A	0 .. 100	8	2	A
SDS 8: ADM_Types						
1 CERES SW ADM type for inversion process	29	N/A	0 .. 5000	1	2	A
2 CERES LW ADM type for inversion process	30	N/A	0 .. 5000	1	2	A
3 CERES WN ADM type for inversion process	31	N/A	0 .. 5000	1	2	A
SDS 9: Flags_Operations_Radiance						
1 Radiance and Mode flags	36	N/A	see Table 3.1-6	1	4	A

Table 2.6-5. Single Satellite Footprint, TOA and Surface Flux, Clouds (SSF) (2 of 4)

Description	Parameter Number	Units	Range	Elements/ Record	Bytes/ Elem	Product Code
SDS 10: Unfiltered_Radiance						
1 CERES SW radiance, upwards	37	W m^{-2} sr^{-1}	-10 .. 510	1	4	A
2 CERES LW radiance, upwards	38	W m^{-2} sr^{-1}	0 .. 200	1	4	A
3 CERES WN radiance, upwards	39	W m^{-2} $sr^{-1}\mu m^{-1}$	0 .. 50	1	4	A
SDS 11: TOA_Flux						
1 CERES SW flux at TOA, upwards	40	W m^{-2}	0 .. 1400	1	4	A
2 CERES LW flux at TOA, upwards	41	W m^{-2}	0 .. 500	1	4	A
3 CERES WN flux at TOA, upwards	42	W m^{-2} μm^{-1}	2 .. 50	1	4	A
SDS 12: SurfaceFlux_ModelA						
1 CERES downward SW surface flux, Model A	43	W m^{-2}	0 .. 1400	1	4	A
2 CERES downward LW surface flux, Model A	44	W m^{-2}	0 .. 700	1	4	A
3 CERES downward WN surface flux, Model A	45	W $m^{-2}\mu m^{-1}$	0 .. 250	1	4	A
4 CERES net SW surface flux, Model A	46	W m^{-2}	0 .. 1400	1	4	A
5 CERES net LW surface flux, Model A	47	W m^{-2}	-250 .. 50	1	4	A
6 CERES WN surface emissivity	55	N/A	0 .. 1	1	4	A
SDS 13: SurfaceFlux_ModelB						
1 CERES downward SW surface flux, Model B	48	W m^{-2}	0 .. 1400	1	4	A
2 CERES downward LW surface flux, Model B	49	W m^{-2}	0 .. 700	1	4	A
3 CERES net SW surface flux, Model B	50	W m^{-2}	0 .. 1400	1	4	A
4 CERES net LW surface flux, Model B	51	W m^{-2}	-250 .. 50	1	4	A
SDS 14: Full_FOV_Integers						
1 Number of imager pixels in CERES FOV	56	N/A	0 .. 9000	1	2	A
2 Imager percent coverage	57	N/A	0 .. 100	1	2	A
3 Flag, Source of precipitable water	64	N/A	0 .. 120	1	2	A
4 Shadowed imager pixels percent coverage (TBD)	65	N/A	0 .. 100	1	2	A
5 Imager sunglint percent coverage	66	N/A	0 .. 100	1	2	A
6 Imager-based snow/Ice percent coverage	67	N/A	0 .. 100	1	2	A
7 Imager-based fire percent coverage	68	N/A	0 .. 100	1	2	A
8 Imager-based aerosol percent coverage	69	N/A	0 .. 100	1	2	A
9 Flag, Type of aerosol	70	N/A	0 .. 9999	1	2	A
10 Notes on general procedure	71	N/A	1 .. 32766	1	2	A
11 Notes on Cloud Algorithms	72	N/A	1 .. 32766	1	2	A
SDS 15: Full_FOV_Reals						
1 Imager viewing zenith over CERES FOV	58	deg	0 .. 90	1	4	A
2 Imager relative azimuth over CERES FOV	59	deg	0 .. 180	1	4	A
3 Surface wind, U-Vector	60	m sec^{-1}	-100 .. 100	1	4	A
4 Surface wind, V-Vector	61	m sec^{-1}	-100 .. 100	1	4	A
5 Surface Skin Temperature	62	K	175 .. 375	1	4	A
6 Precipitable water	63	cm	0.001 .. 10	1	4	A
SDS 16: Clear_FOV_Integers						
1 Clear area percent coverage at subpixel resolution	73	N/A	0 .. 100	1	2	A
SDS 17: Clear_FOV_Reals						
1 Total aerosol optical depth at 0.63 μm in clear area	74	N/A	0 .. 2	1	4	A
2 Total aerosol optical depth at 1.6 μm in clear area	75	N/A	0 .. 2	1	4	A
3 Imager-based surface skin temperature	76	K	175 .. 375	1	4	A
4 Temperature contrast	77	K	-30 .. 90	1	4	A
SDS 18: Cloudy_FOV_Integers						
1 Cloud layer area percent coverage	78	N/A	0 .. 100	2	2	A
2 Cloud layer note (TBD)	79	N/A	1 .. 32766	2	2	A

Table 2.6-5. Single Satellite Footprint, TOA and Surface Flux, Clouds (SSF) (3 of 4)

Description	Parameter Number	Units	Range	Elements/ Record	Bytes/ Elem	Product Code
SDS 19: Cloudy_FOV_Reals						
1 Mean linearly averaged visible optical depth for cloud layer	80	N/A	0 .. 400	2	4	A
2 Stddev of linearly averaged visible optical depth for cloud layer	81	N/A	0 .. 300	2	4	A
3 Mean logarithmically averaged visible optical depth for cloud layer	82	N/A	0 .. 400	2	4	A
4 Stddev of logarithmically averaged visible optical depth for cloud layer	83	N/A	0 .. 300	2	4	A
5 Mean cloud infrared emissivity for cloud layer	84	N/A	0 .. 1	2	4	A
6 Stddev of cloud infrared emissivity for cloud layer	85	N/A	0 .. 1	2	4	A
7 Mean liquid water path for cloud layer	86	$g\ m^{-2}$	0 .. 10000	2	4	A
8 Mean ice water path for cloud layer	88	$g\ m^{-2}$	0 .. 10000	2	4	A
9 Mean cloud top pressure for cloud layer	90	hPa	0 .. 1100	2	4	A
10 Mean cloud effective pressure for cloud layer	92	hPa	0 .. 1100	2	4	A
11 Stddev of cloud effective pressure for cloud layer	93	hPa	0 .. 150	2	4	A
12 Mean cloud effective temperature for cloud layer	94	K	100 .. 350	2	4	A
13 Stddev of cloud effective temperature for cloud layer	95	K	0 .. 150	2	4	A
14 Mean cloud effective height for cloud layer	96	km	0 .. 20	2	4	A
15 Mean cloud base pressure for cloud layer	98	hPa	0 .. 1100	2	4	A
16 Mean water particle radius for cloud layer	100	µm	0 .. 40	2	4	A
17 Stddev of water particle radius for cloud layer	101	µm	0 .. 20	2	4	A
18 Mean ice particle effective diameter for cloud layer	102	µm	0 .. 300	2	4	A
19 Stddev of ice particle effective diameter for cloud layer	103	µm	0 .. 200	2	4	A
20 Mean cloud particle phase for cloud layer	104	N/A	1 .. 2	2	4	A
21 Mean vertical aspect ratio for cloud layer (TBD)	106	N/A	0 .. 20	2	4	A
SDS 20: Overlap_Conditions						
1 Overlap condition weighted area percentage	110	N/A	0 .. 100	4	2	A
SDS 21: Validation_Stddev						
1 Stddev of liquid water path for cloud layer	87	$g\ m^{-2}$	0 .. 8000	2	4	V
2 Stddev of ice water path for cloud layer	89	$g\ m^{-2}$	0 .. 8000	2	4	V
3 Stddev of cloud top pressure for cloud layer	91	hPa	0 .. 600	2	4	V
4 Stddev of cloud effective height for cloud layer	97	km	0 .. 12	2	4	V
5 Stddev of cloud base pressure for cloud layer	99	hPa	0 .. 600	2	4	V
6 Stddev of cloud particle phase for cloud layer	105	N/A	0 .. 1	2	4	V
7 Stddev of vertical aspect ratio for cloud layer (TBD)	107	N/A	0 .. 15	2	4	V
SDS 22: Internal_Use_Integers						
1 ADM geo (TBD)	32	N/A	> 0	1	2	I
2 Clear area percent coverage at imager resolution	112	N/A	0 .. 100	1	2	I
3 Overcast cloud area percent coverage at imager resolution	113	N/A	0 .. 100	1	2	I
SDS 23: Internal_Use_Reals						
1 CERES TOT filtered radiance, upwards	33	$W\ m^{-2}\ sr^{-1}$	0 .. 700	1	4	I
2 CERES SW filtered radiance, upwards	34	$W\ m^{-2}\ sr^{-1}$	-10 .. 510	1	4	I
3 CERES WN filtered radiance, upwards	35	$W\ m^{-2}\ sr^{-1}\mu m^{-1}$	0 .. 50	1	4	I
4 CERES spectral albedo	52	N/A	0 .. 1	6	4	I
5 CERES broadband surface albedo	53	N/A	0 .. 1	1	4	I
6 CERES LW surface emissivity	54	N/A	0 .. 1	1	4	I
7 Percentiles of visible optical depth for lower cloud layer	108	N/A	0 .. 400	13	4	I
8 Percentiles of IR emissivity for lower cloud layer	109	N/A	0 .. 1	13	4	I
9 Percentiles of visible optical depth for upper cloud layer	108	N/A	0 .. 400	13	4	I
10 Percentiles of IR emissivity for upper cloud layer	109	N/A	0 .. 1	13	4	I

Table 2.6-5. Single Satellite Footprint, TOA and Surface Flux, Clouds (SSF) (4 of 4)

Description	Parameter Number	Units	Range	Elements/ Record	Bytes/ Elem	Product Code
SDS 24: Imager_Radiance_Stats						
1 Imager channel central wavelength	111	µm	0.4 .. 15.0	5	4	I
2 Mean of imager radiances over clear area	114	W m^{-2} sr^{-1} μm^{-1}	0 .. 1000	5	4	I
3 Stddev of imager radiances over clear area	115	W m^{-2} sr^{-1} μm^{-1}	0 .. 1000	5	4	I
4 Mean of imager radiances over overcast cloud area	116	W m^{-2} sr^{-1} μm^{-1}	0 .. 1000	5	4	I
5 Stddev of imager radiances over overcast cloud area	117	W m^{-2} sr^{-1} μm^{-1}	0 .. 1000	5	4	I
6 Mean of imager radiances over full CERES FOV	118	W m^{-2} sr^{-1} μm^{-1}	0 .. 1000	5	4	I
7 Stddev of imager radiances over full CERES FOV	119	W m^{-2} sr^{-1} μm^{-1}	0 .. 1000	5	4	I
8 5th percentile of imager radiances over full CERES FOV	120	W m^{-2} sr^{-1} μm^{-1}	0 .. 1000	5	4	I
9 95th percentile of imager radiances over full CERES FOV	121	W m^{-2} sr^{-1} μm^{-1}	0 .. 1000	5	4	I
10 Mean of imager radiances over cloud layer 1 (no overlap)	122	W m^{-2} sr^{-1} μm^{-1}	0 .. 1000	5	4	I
11 Stddev of imager radiances over cloud layer 1 (no overlap)	123	W m^{-2} sr^{-1} μm^{-1}	0 .. 1000	5	4	I
12 Mean of imager radiances over cloud layer 2 (no overlap)	124	W m^{-2} sr^{-1} μm^{-1}	0 .. 1000	5	4	I
13 Stddev of imager radiances over cloud layer 2 (no overlap)	125	W m^{-2} sr^{-1} μm^{-1}	0 .. 1000	5	4	I
14 Mean of imager radiances over cloud layer 1 and 2 overlap	126	W m^{-2} sr^{-1} μm^{-1}	0 .. 1000	5	4	I
15 Stddev of imager radiances over cloud layer 1 and 2 overlap	127	W m^{-2} sr^{-1} μm^{-1}	0 .. 1000	5	4	I
Total GigaBytes / Day		**6.4**				

SSF parameter distribution is as follows: (See Product Code Key)

A - Archival Parameters 2.6 GigaBytes/Day (41.5%)
I - Internal Parameters 3.4 GigaBytes/Day (52.9%)
V - Validation Parameters 0.4 GigaBytes/Day (5.6%)

2.7 Clear Reflectance History (CRH)

EOSDIS Product Code: CER16

The Clear Reflectance/Temperature History (CRH) data are organized on a global equal-area grid that is approximately 1/6-degree by 1/6-degree (2160x1080=2,332,800 grid boxes). The data coverage is 24 hours and is produced every day. The CRH data consists of two data products. One data product has visible albedo information, and the other has top-of-atmosphere Clear-sky brightness temperature and satellite viewing angles information.

The parameters are derived from cloud imager measurements by Subsystem 4. 0. The CRH product is the same structure for both Moderate Resolution Imaging Spectrometer (MODIS) values and Visible Infrared Scanner (VIRS) values, and are differentiated by their file names. The CRH product is archived because the product is needed for reprocessing. A complete listing of parameters for these data products can be found in Table 2.7-1.

Level: 3
Type: Archival
Frequency: Every Day

Portion of Globe Covered
File: Entire Globe
Record: 1/6-Deg by 1/6-Deg

Time Interval Covered
File: Life of Mission
Record: Every Day

Portion of Atmosphere Covered
File: Surface

Table 2.7-1. Clear Reflectance History (CRH)

Description	Param Num	Units	Range	Bits/Elem
CRH_albedo				
Visible albedo for collimated, overhead sun illumination	1	x10 percent	0...1000	16
Visible albedo running mean, overhead sun illumination	2	x10 percent	0...1000	16
Number of albedo counts, since last updated	3	N/A	>= 0	32
Total Data Bits/Grid:				64
Total Grids/File:				2,332,800
Total Data Bits/File:				149,299,200
CRH_temperature				
Temperature derived from 11 mm imager channel	1	K	TBD	16
Mean imager viewing zenith over CERES FOV	2	deg	0 .. 90	16
Time of observation	3	N/A	>= 0	32
Total Data Bits/Grid:				64
Total Grids/File:				2,332,800
Total Data Bits/File:				149,299,200
Total Bits/CRH Data Set:				**298,598,400**

2.8 Clouds and Radiative Swath (CRS)

EOSDIS Product Code: CER04

The Clouds and Radiative Swath (CRS) product is produced by the CERES Instantaneous Surface and Atmospheric Radiation Budget (SARB) Subsystem. Each CRS file contains instantaneous data for one hour from one CERES instrument. Each CRS record contains data for one CERES field-of-view (FOV). The CRS contains the same data as the SSF, with the addition of longwave and shortwave vertical flux profile data.

Each CRS record contains:

- CERES FOV geometry, time, and scene data
- CERES FOV satellite altitude radiance data
- CERES FOV estimated TOA flux data
- CERES FOV surface flux data
- CERES FOV total-sky area data
- CERES FOV Clear-sky area data
- Cloud properties for up to two cloud layers over the CERES FOV
- CERES FOV Data for four cloud overlap conditions
- FOV imager radiance statistics for five imager channels
- CERES FOV surface radiative parameters
- Atmospheric flux profiles for both Clear-sky and total-sky at the surface, 500 hPa, 70 hPa, and the TOA over the CERES FOV
- Flux adjustments (constrained-initial) for Clear-sky and total-sky at the surface and TOA over the CERES FOV
- Adjustment parameters for Clear-sky (note that these are calculated for both Clear-sky and total-sky FOV)
- Adjustment parameters for the two cloud categories over the CERES FOV

Level: 2
Type: Archival
Frequency: 1/ Hour

Time Interval Covered
File: 1 Hour
Record: 1/100-Second

Portion of Globe Covered
File: Satellite Swath
Record: 1 CERES FOV

Portion of Atmosphere Covered
File: Surface to TOA

CRS Metadata

The types of CRS metadata are summarized in Tables 2.8-1 and 2.8-2. These data contain information which need only be recorded once per hour. The CERES metadata are listed in Tables B-1 and B-2 in Appendix B. Table B-1 lists the CERES Baseline Header Metadata and Table B-2 lists the parameters in the CERES_Metadata Vdata.

Table 2.8-1. CRS Metadata Summary

HDF Name	Description Table	Records	Number of Fields
CERES Baseline Header Metadata	Table B-1	1	36
CERES_Metadata Vdata	Table B-2	1	14
CRS Product-specific Metadata	Table 2.8-2	1	3

Table 2.8-2. CRS Product-specific Metadata

Item	Parameter Name	Units	Range	Data Type
1	PercentCrosstrackFOV	N/A	0.0 .. 100.0	32-bit real
2	PercentRapsFOV	N/A	0.0 .. 100.0	32-bit real
3	PercentOtherFOV	N/A	0.0 .. 100.0	32-bit real

CRS Vdata

The CRS contains one Vdata. This Vdata contains information which need only be recorded once per hour. The CRS_Header_Vdata contains CRS- specific data.

Table 2.8-3 summarizes the contents of the Vdata contained within the CRS file.

Table 2.8-3. CRS Vdata Summary

Vdata Name	Description Table	Records	Number of Fields	Nominal Size (Bytes)
CRS_Header_Vdata	Table 2.8-4	1	25	1152
Vdata TOTAL SIZE				**1152**

Table 2.8-4. CRS Header

Item	Description	Units	Range	Elements	Bytes/ Elem
CRS-H1	SSF ID	N/A	112 .. 200	1	4
CRS-H2	Character name of CERES instrument	N/A	ASCII string	1	4
CRS-H3	Day and Time at hour start	N/A	ASCII string	1	28
CRS-H4	Character name of satellite	N/A	ASCII string	1	4
CRS-H5	Character name of high resolution imager instrument	N/A	ASCII string	1	8
CRS-H6	Number of imager channels	N/A	1 .. 20	1	4
CRS-H7	Central wavelengths of imager channels	μm	0.4 .. 15.0	20	4
CRS-H8	Earth-Sun distance at hour start	AU	0.98 .. 1.02	1	4
CRS-H9	Colatitude of subsatellite point at surface at hour start	deg	0 .. 180	1	4
CRS-H10	Longitude of subsatellite point at surface at hour start	deg	0 .. 360	1	4
CRS-H11	Colatitude of subsatellite point at surface at hour start	deg	0 .. 180	1	4
CRS-H12	Longitude of subsatellite point at surface at hour start	deg	0 .. 360	1	4
CRS-H13	Along-track angle of satellite at hour end	deg	0 .. 330	1	4
CRS-H14	Number of FOV in CRS product	N/A	0 .. 360000	1	4
CRS-H15	Subsystem 4.1 identification string	N/A	ASCII string	1	128
CRS-H16	Subsystem 4.2 identification string	N/A	ASCII string	1	128
CRS-H17	Subsystem 4.3 identification string	N/A	ASCII string	1	128
CRS-H18	Subsystem 4.4 identification string	N/A	ASCII string	1	128
CRS-H19	Subsystem 4.5 identification string	N/A	ASCII string	1	128
CRS-H20	Subsystem 4.6 identification string	N/A	ASCII string	1	128
CRS-H21	Subsystem 5.0 identification string	N/A	ASCII string	1	128
CRS-H22	IES production date and time	N/A	ASCII string	1	24
CRS-H23	MOA production date and time	N/A	ASCII string	1	24
CRS-H24	SSF production date and time	N/A	ASCII string	1	24
CRS-H25	CRS production date and time	N/A	ASCII string	1	24

CRS Scientific Data Sets

The CRS contains 31 Scientific Data Sets (SDS) which are collections of along-track ordered parameters where each row corresponds to a FOV and each column corresponds to a single parameter. The ith row of every SDS contains those parameters associated with the ith FOV. Table 2.8-5 summarizes the contents of each SDS contained within the CRS file. (Note: n = the number of FOVs processed.)

Table 2.8-5. CRS SDS Summary (1 of 2)

SDS Name	HDF Rank	Dimensions	Data Type	Maximum Hourly Size (MB)
Julian_Time	2	n x 2	64-Bit Real	3.75
Velocity	2	n x 3	64-Bit Real	5.62
Colat_Longitude	2	n x 8	32-Bit Real	7.49
Scan_Index	2	n x 2	16-Bit Integer	0.94
FOV_Angles	2	n x 6	32-Bit Real	5.62
ViewAngles	2	n x 5	32-Bit Real	4.68
Surface_Types	3	n x 8 x 2	16-Bit Integer	7.49
ADM_Types	2	n x 3	16-Bit Integer	1.40
Flags_Operations_Radiance	2	n x 1	32-Bit Integer	0.94
Unfiltered_Radiance	2	n x 3	32-Bit Real	2.81
TOA_Flux	2	n x 3	32-Bit Real	2.81
SurfaceFlux_ModelA	2	n x 6	32-Bit Real	5.62
SurfaceFlux_ModelB	2	n x 4	32-Bit Real	3.75
Full_FOV_Integers	2	n x 11	16-Bit Integer	5.15
Full_FOV_Reals	2	n x 6	32-Bit Real	5.62
Clear_FOV_Integers	2	n x 1	16-Bit Integer	0.47
Clear_FOV_Reals	2	n x 4	32-Bit Real	3.75
Cloudy_FOV_Integers	3	n x 2 x 2	16-Bit Integer	0.94
Cloudy_FOV_Reals	3	n x 2 x 21	32-Bit Real	39.33
Overlap_Conditions	3	n x 4 x 1	16-Bit Integer	1.87
Validation_Stddev	3	n x 2 x 7	32-Bit Real	13.11
Internal_Use_Integers	2	n x 3	16-Bit Integer	2.34

Table 2.8-5. CRS SDS Summary (2 of 2)

SDS Name	HDF Rank	Dimensions	Data Type	Maximum Hourly Size (MB)
Internal_Use_Reals	2	n x 63	32-Bit Real	58.99
Imager_Radiance_Stats	3	n x 5 x 15	32-Bit Real	70.23
Surface_Radiative	2	n x 3	32-Bit Real	2.81
NumLev_Profile	2	n x 1	32-Bit Integer	0.04
Vert_Flux_Profiles	3	n x 4 x 9	32-Bit Real	33.71
Flux_Adjust	2	n x 12	32-Bit Real	0.50
Adj_Clear	2	n x 7	32-Bit Real	0.29
Adj_Cloudy	3	n x 2 x 3	32-Bit Real	0.25
Adjust_QC	2	n x 2	32-Bit Integer	0.08
SDS TOTAL SIZE				**293.32**

Table 2.8-6 provides a complete listing of parameters for the CRS data product.

Table 2.8-6. Clouds and Radiative Swath (CRS) (1 of 4)

Description	Parameter Number	Units	Range	Elements/ Record	Bits/ Elem	Product Code
Vdata 1 : CRS_Header_Vdata						
SSF ID		N/A	112 .. 200	1	32	A
Character name of CERES instrument		N/A	ASCII string	1	32	A
Day and time at hour start		N/A	ASCII string	1	224	A
Character name of satellite		N/A	ASCII string	1	32	A
Character name of high resolution imager instrument		N/A	ASCII string	1	64	A
Number of imager channels used		N/A	1 .. 20	1	32	A
Central wavelengths of imager channels		µm	0.4 .. 15.0	20	32	A
Earth-Sun distance at hour start		AU	.98 .. 1.02	1	32	A
Colatitude of satellite at hour start		deg	0 .. 180	1	32	A
Longitude of satellite at hour start		deg	0 .. 360	1	32	A
Colatitude of satellite at hour end		deg	0 .. 180	1	32	A
Longitude of satellite at hour end		deg	0 .. 360	1	32	A
Along-track angle of satellite at hour end		N/A	ASCII string	1	32	A
Number of FOVs in CRS product		N/A	0 .. 245275	1	32	A
Subsystem 4.1 identification string		N/A	ASCII string	1	1024	A
Subsystem 4.2 identification string		N/A	ASCII string	1	1024	A
Subsystem 4.3 identification string		N/A	ASCII string	1	1024	A
Subsystem 4.4 identification string		N/A	ASCII string	1	1024	A
Subsystem 4.5 identification string		N/A	ASCII string	1	1024	A
Subsystem 4.6 identification string		N/A	ASCII string	1	1024	A
Subsystem 5.0 identification string		N/A	ASCII string	1	1024	A
IES production date and time		N/A	ASCII string	1	192	A
MOA production date and time		N/A	ASCII string	1	192	A
SSF production date and time		N/A	ASCII string	1	192	A
CRS production date and time		N/A	ASCII string	1	192	A
SDS 1 : Julian_Time						
Time of observation	1	day	2440000 .. 2480000	1	64	A
Radius of satellite from center of Earth at observation	2	km	6000 .. 8000	1	64	A
SDS 2 : Velocity						
X component of satellite inertial velocity vector	3	km sec^{-1}	-10 .. 10	1	64	A
Y component of satellite inertial velocity vector	4	km sec^{-1}	-10 .. 10	1	64	A
Z component of satellite inertial velocity vector	5	km sec^{-1}	-10 .. 10	1	64	A
SDS 3 : Colat_Longitude						
Colatitude of subsatellite point at surface at observation	6	deg	0 .. 180	1	32	A
Longitude of subsatellite point at surface at observation	7	deg	0 .. 360	1	32	A
Colatitude of subsolar point at surface at observation	8	deg	0 .. 180	1	32	A
Longitude of subsolar point at surface at observation	9	deg	0 .. 360	1	32	A
Colatitude of CERES FOV at TOA	10	deg	0 .. 180	1	32	A
Longitude of CERES FOV at TOA	11	deg	0 .. 360	1	32	A
Colatitude of CERES FOV at surface	12	deg	0 .. 180	1	32	A
Longitude of CERES FOV at surface	13	deg	0 .. 360	1	32	A
SDS 4 : Scan_Index						
Scan sample number	14	N/A	1 .. 660	1	16	A
Packet number	15	N/A	0 .. 32766	1	16	A
SDS 5 : FOV_Angles						
Cone angle of CERES FOV at satellite	16	deg	0 .. 90	1	32	A
Clock angle of CERES FOV at satellite wrt inertial velocity	17	deg	0 .. 360	1	32	A
Rate of change of cone angle	18	deg sec^{-1}	-300 .. 300	1	32	A
Rate of change of clock angle	19	deg sec^{-1}	-20 .. 20	1	32	A
Along-track angle of CERES FOV at surface	20	deg	-30 .. 330	1	32	A
Cross-track angle of CERES FOV at surface	21	deg	-90 .. 90	1	32	A
SDS 6 : ViewAngles						
CERES viewing zenith angle at surface	22	deg	0 .. 90	1	32	A
CERES solar zenith angle at surface	23	deg	0 .. 180	1	32	A
CERES relative azimuth angle at surface	24	deg	0 .. 360	1	32	A
CERES viewing azimuth angle at surface wrt North	25	deg	0 .. 360	1	32	V
Surface altitude above sea level	26	m	-1000 .. 10000	1	32	A

Table 2.8-6. Clouds and Radiative Swath (CRS) (2 of 4)

Description	Parameter Number	Units	Range	Elements/ Record	Bits/ Elem	Product Code
SDS 7 : Surface_Types						
Surface type index	27	N/A	1 .. 20	8	16	A
Surface type percent coverage	28	N/A	0 .. 100	8	16	A
SDS 8 : ADM_Types						
CERES SW ADM type for inversion process	29	N/A	0 .. 5000	1	16	A
CERES LW ADM type for inversion process	30	N/A	0 .. 5000	1	16	A
CERES WN ADM type for inversion process	31	N/A	0 .. 5000	1	16	A
SDS 9 : Flags_Operations_Radiance						
Radiance and Mode Flags	32	N/A	Reference 3	1	32	A
SDS 10 : Unfiltered_Radiance						
CERES SW unfiltered radiance, satellite altitude, upwards	33	$W\ m^{-2}sr^{-1}$	-10 .. 510	1	32	A
CERES LW unfiltered radiance, satellite altitude, upwards	34	$W\ m^{-2}sr^{-1}$	0 .. 200	1	32	A
CERES WN unfiltered radiance, satellite altitude, upwards	35	$W\ m^{-2}sr^{-1}\mu m^{-1}$	0 .. 15	1	32	A
SDS 11 : TOA_Flux						
CERES SW flux, TOA, upwards	36	$W\ m^{-2}$	0 .. 1400	1	32	A
CERES LW flux, TOA, upwards	37	$W\ m^{-2}$	0 .. 500	1	32	A
CERES WN flux, TOA, upwards	38	$W\ m^{-2}\mu m^{-1}$	2 .. 50	1	32	A
SDS 12 : SurfaceFlux_ModelA						
CERES SW flux, surface, downwards, Model A	39	$W\ m^{-2}$	0 .. 1400	1	32	A
CERES LW flux, surface, downwards, Model A	40	$W\ m^{-2}$	0 .. 700	1	32	A
CERES WN flux, surface, downwards, Model A	41	$W\ m^{-2}\mu m^{-1}$	0 .. 65	1	32	A
CERES SW flux, surface, net, Model A	42	$W\ m^{-2}$	0 .. 1400	1	32	A
CERES LW flux, surface, net, Model A	43	$W\ m^{-2}$	-250 .. 50	1	32	A
CERES WN surface emissivity	44	N/A	0 .. 1	1	32	A
SDS 13 : SurfaceFlux_ModelB						
CERES SW flux, surface, downwards, Model B	45	$W\ m^{-2}$	0 .. 1400	1	32	A
CERES LW flux, surface, downwards, Model B	46	$W\ m^{-2}$	0 .. 700	1	32	A
CERES SW flux, surface, net, Model B	47	$W\ m^{-2}$	0 .. 1400	1	32	A
CERES LW flux, surface, net, Model B	48	$W\ m^{-2}$	-250 .. 50	1	32	A
SDS 14 : Full_FOV_Integers						
Number of imager pixels in CERES FOV	49	N/A	0 .. 9000	1	16	A
Imager percent coverage	50	N/A	0 .. 100	1	16	A
Flag, Source precipitable water	51	N/A	0 .. 120	1	16	A
Shadowed pixels percent coverage (TBD)	52	N/A	0 .. 100	1	16	A
Imager sunglint percent coverage	53	N/A	0 .. 100	1	16	A
Imager-based snow/ice percent coverage	54	N/A	0 .. 100	1	16	A
Imager-based fire percent coverage	55	N/A	0 .. 100	1	16	A
Imager-based aerosol percent coverage	56	N/A	0 .. 100	1	16	A
Flag, aerosol type	57	N/A	0 .. 9999	1	16	A
Notes on general procedures	58	N/A	0 .. 32766	1	16	A
Notes on cloud algorithms	59	N/A	0 .. 32766	1	16	A
SDS 15 : Full_FOV_Reals						
Imager viewing zenith angle over CERES FOV, mean	60	deg	0 .. 90	1	32	A
Imager relative azimuth angle over CERES FOV, mean	61	deg	0 .. 360	1	32	A
Surface wind, U-vector	62	$m\ sec^{-1}$	-100 .. 100	1	32	A
Surface wind, V-vector	63	$m\ sec^{-1}$	-100 .. 100	1	32	A
Surface skin temperature	64	K	175 .. 375	1	32	A
Precipitable water	65	cm	0.001 .. 10.000	1	32	A
SDS 16 : Clear_FOV_Integers						
Clear area percent coverage at subpixel resolution	66	N/A	0 .. 100	1	16	A
SDS 17 : Clear_FOV_Reals						
Total aerosol visible optical depth, 0.63 μm, Clear-sky area	67	N/A	0 .. 2	1	32	A
Total aerosol visible optical depth, 1.6 μm, Clear-sky area	68	N/A	0 .. 2	1	32	A
Imager-based surface skin temperature	69	K	175 .. 375	1	32	A
Temperature contrast from surface to surface-300 hPa	70	K	-30 .. 90	1	32	A
SDS 18 : Cloudy_FOV_Integers						
Cloud layer area percent coverage	71	N/A	0 .. 100	2	16	A
Cloud layer note (TBD)	72	N/A	0 .. 32766	2	16	I

Table 2.8-6. Clouds and Radiative Swath (CRS) (3 of 4)

Description	Parameter Number	Units	Range	Elements/ Record	Bits/ Elem	Product Code
SDS 19 : Cloudy_FOV_Reals						
Cloud layer visible optical depth, linear, mean	73	N/A	0 .. 400	2	32	A
Cloud layer visible optical depth, linear, std	74	N/A	0 .. 300	2	32	A
Cloud layer visible optical depth, logarithmic, mean	75	N/A	0 .. 400	2	32	A
Cloud layer visible optical depth, logarithmic, std	76	N/A	0 .. 300	2	32	A
Cloud layer infrared emissivity, mean	77	N/A	0 .. 1	2	32	A
Cloud layer infrared emissivity, std	78	N/A	0 .. 1	2	32	A
Cloud layer liquid water path, mean	79	$g\ m^{-2}$	0 .. 10000	2	32	A
Cloud layer ice water path, mean	80	$g\ m^{-2}$	0 .. 10000	2	32	A
Cloud layer top pressure, mean	81	hPa	0 .. 1100	2	32	A
Cloud layer effective pressure, mean	82	hPa	0 .. 1100	2	32	A
Cloud layer effective pressure, std	83	hPa	0 .. 150	2	32	A
Cloud layer effective temperature, mean	84	K	100 .. 350	2	32	A
Cloud layer effective temperature, std	85	K	0 .. 150	2	32	A
Cloud layer effective height, mean	86	km	0 .. 20	2	32	A
Cloud layer base pressure, mean	87	hPa	0 .. 1100	2	32	A
Cloud layer water particle radius, mean	88	µm	0 .. 40	2	32	A
Cloud layer water particle radius, std	89	µm	0 .. 20	2	32	A
Cloud layer ice particle effective diameter, mean	90	µm	0 .. 300	2	32	A
Cloud layer ice particle effective diameter, std	91	µm	0 .. 200	2	32	A
Cloud layer particle phase, mean	92	N/A	1 .. 2	2	32	A
Cloud layer vertical aspect ratio, mean (TBD)	93	N/A	0 .. 20	2	32	A
SDS 20 : Cloud_Overlap_Conditions						
Overlap condition weighted area percentage	94	N/A	0 .. 100	4	16	A
SDS 21 : Validation_Stddev						
Cloud layer liquid water path, std	95	$g\ m^{-2}$	0 .. 8000	2	32	V
Cloud layer ice water path, std	96	$g\ m^{-2}$	0 .. 8000	2	32	V
Cloud layer top pressure, std	97	hPa	0 .. 600	2	32	V
Cloud layer effective height, std	98	km	0 .. 12	2	32	V
Cloud layer base pressure, std	99	hPa	0 .. 600	2	32	V
Cloud layer particle phase, std	100	N/A	0 .. 1	2	32	V
Cloud layer vertical aspect ratio, std (TBD)	101	N/A	0 .. 15	2	32	V
SDS 22 : Internal_Use_Integers						
ADM geo (TBD)	102	N/A	> 0	1	16	I
Clear area percent coverage at imager resolution	103	N/A	0 .. 100	1	16	I
Overcast area percent coverage at imager resolution	104	N/A	0 .. 100	1	16	I
SDS 23 : Internal_Use_Reals						
CERES TOT filtered radiance, satellite altitude, upwards	105	$W\ m^{-2}sr^{-1}$	0 .. 700	1	32	I
CERES SW filtered radiance, satellite altitude, upwards	106	$W\ m^{-2}sr^{-1}$	-10 .. 510	1	32	I
CERES WN filtered radiance, satellite altitude, upwards	107	$W\ m^{-2}sr^{-1}\mu m^{-1}$	0 .. 50	1	32	I
CERES spectral albedo	108	N/A	0 .. 1	6	32	I
CERES broadband surface albedo (uncorrected)	109	N/A	0 .. 1	1	32	I
CERES LW surface emissivity	110	N/A	0 .. 1	1	32	I
Cloud layer visible optical depth, 13 percentiles (upper & lower)	111	N/A	0 .. 400	26	32	I
Cloud layer IR emissivity, 13 percentiles (upper & lower)	112	N/A	0 .. 1	26	32	I
SDS 24 : Imager_Radiance_Stats						
Imager channel central wavelength (5 channels)	113	µm	0.4 .. 15.0	5	32	I
Imager radiance, Clear-sky area, mean	114	$W\ m^{-2}sr^{-1}\mu m^{-1}$	0 .. 1000	5	32	I
Imager radiance, Clear-sky area, std	115	$W\ m^{-2}sr^{-1}\mu m^{-1}$	0 .. 1000	5	32	I
Imager radiance, overcast area, mean	116	$W\ m^{-2}sr^{-1}\mu m^{-1}$	0 .. 1000	5	32	I
Imager radiance, overcast area, std	117	$W\ m^{-2}sr^{-1}\mu m^{-1}$	0 .. 1000	5	32	I
Imager radiance over full CERES FOV, mean	118	$W\ m^{-2}sr^{-1}\mu m^{-1}$	0 .. 1000	5	32	I
Imager radiance over full CERES FOV, std	119	$W\ m^{-2}sr^{-1}\mu m^{-1}$	0 .. 1000	5	32	I
Imager radiance over full CERES FOV, 5th percentile	120	$W\ m^{-2}sr^{-1}\mu m^{-1}$	0 .. 1000	5	32	I
Imager radiance over full CERES FOV, 95th percentile	121	$W\ m^{-2}sr^{-1}\mu m^{-1}$	0 .. 1000	5	32	I
Imager radiance over cloud layer 1, no overlap, mean	122	$W\ m^{-2}sr^{-1}\mu m^{-1}$	0 .. 1000	5	32	I
Imager radiance over cloud layer 1, no overlap, std	123	$W\ m^{-2}sr^{-1}\mu m^{-1}$	0 .. 1000	5	32	I
Imager radiance over cloud layer 2, no overlap, mean	124	$W\ m^{-2}sr^{-1}\mu m^{-1}$	0 .. 1000	5	32	I
Imager radiance over cloud layer 2, no overlap, std	125	$W\ m^{-2}sr^{-1}\mu m^{-1}$	0 .. 1000	5	32	I
Imager radiance over cloud layers 1 and 2, overlap, mean	126	$W\ m^{-2}sr^{-1}\mu m^{-1}$	0 .. 1000	5	32	I
Imager radiance over cloud layers 1 and 2, overlap, std	127	$W\ m^{-2}sr^{-1}\mu m^{-1}$	0 .. 1000	5	32	I
SDS 25 : Surface_Radiative						
Photosynthetically active radiation, surface (TBD)	128	$W\ m^{-2}$	0 .. 780	1	32	A
Direct/diffuse ratio, surface	129	N/A	0 .. 30	1	32	A
Corrected initial broadband surface albedo	130	N/A	0 .. 1	1	32	A

Table 2.8-6. Clouds and Radiative Swath (CRS) (4 of 4)

Description	Parameter Number	Units	Range	Elements/ Record	Bits/ Elem	Product Code
SDS 26 : NumLev_Profile						
Number atmospheric levels	131	N/A	0 .. 4	1	32	A
SDS 27 : Vert_Flux_Profiles						
Level pressures	132	hPa	0 .. 1100	4	32	A
SW flux, atmospheric level, upwards, Clear-sky	133	W m^{-2}	0 .. 1400	4	32	A
SW flux, atmospheric level, downwards, Clear-sky	134	W m^{-2}	0 .. 1400	4	32	A
LW flux, atmospheric level, upwards, Clear-sky	135	W m^{-2}	0 .. 700	4	32	A
LW flux, atmospheric level, downwards, Clear-sky	136	W m^{-2}	0 .. 600	4	32	A
SW flux, atmospheric level, upwards, total-sky	137	W m^{-2}	0 .. 1400	4	32	A
SW flux, atmospheric level, downwards, total-sky	138	W m^{-2}	0 .. 1400	4	32	A
LW flux, atmospheric level, upwards, total-sky	139	W m^{-2}	0 .. 700	4	32	A
LW flux, atmospheric level, downwards, total-sky	140	W m^{-2}	0 .. 600	4	32	A
SDS 28 : Flux_Adjust						
SW flux, surface, downwards, Clear-sky, delta	141	W m^{-2}	-1400 .. 1400	1	32	A
SW flux, surface, upwards, Clear-sky, delta	142	W m^{-2}	-1400 .. 1400	1	32	A
SW flux, TOA, upwards, Clear-sky, delta	143	W m^{-2}	-1400 .. 1400	1	32	A
LW flux, surface, downwards, Clear-sky, delta	144	W m^{-2}	-600 .. 600	1	32	A
LW flux, surface, upwards, Clear-sky, delta	145	W m^{-2}	-700 .. 700	1	32	A
LW flux, TOA, upwards, Clear-sky, delta	146	W m^{-2}	-700 .. 700	1	32	A
SW flux, surface, downwards, total-sky, delta	147	W m^{-2}	-1400 .. 1400	1	32	A
SW flux, surface, upwards, total-sky, delta	148	W m^{-2}	-1400 .. 1400	1	32	A
SW flux, TOA, upwards, total-sky, delta	149	W m^{-2}	-1400 .. 1400	1	32	A
LW flux, surface, downwards, total-sky, delta	150	W m^{-2}	-600 .. 600	1	32	A
LW flux, surface, upwards, total-sky, delta	151	W m^{-2}	-700 .. 700	1	32	A
LW flux, TOA, upwards, total-sky, delta	152	W m^{-2}	-700 .. 700	1	32	A
SDS 29 : Adj_Clear						
Initial precipitable water	153	cm	0 .. 10	1	32	A
Adjusted precipitable water, delta	154	cm	-10 .. 10	1	32	A
Adjusted surface albedo, delta	155	N/A	-1 .. 1	1	32	A
Initial aerosol optical depth	156	N/A	0 .. 2	1	32	A
Adjusted aerosol optical depth, delta	157	N/A	-2 .. 2	1	32	A
Initial skin temperature	158	K	TBD	1	32	A
Adjusted skin temperature, delta	159	K	TBD	1	32	A
SDS 30 : Adj_Cloudy						
Adjusted mean visible optical depth, delta	160	N/A	-400 .. 400	2	32	A
Adjusted mean cloud fractional area, delta	161	N/A	-1 .. 1	2	32	A
Adjusted mean cloud effective temperature, delta	162	K	TBD	2	32	A
SDS 31 : Adust_QC						
Constrainment status flag	163	N/A	TBD	1	32	A
Sigma table version number	164	N/A	1 .. 20	1	32	A

Total Meta Bits/File:	**9216**
Total Data Bits/Record:	**10848**
Total Records/File:	**245475**
Total Data Bits/File:	**2662912800**
Total Bits/FIle:	**2662922016**

2.9 Monthly Gridded Single Satellite Fluxes and Clouds (FSW)

EOSDIS Product Code: CER05

The Monthly Gridded Single Satellite Fluxes and Clouds (FSW) archival data product contains hourly single satellite flux and cloud parameters averaged over 1.0-degree regions. Input to the FSW Subsystem is the Clouds and Radiative Swath (CRS) archival data product. Each FSW covers a single month swath from a single CERES instrument mounted on one satellite. The product is written in HDF and contains metadata as well as gridded science data. The science data are Vdata with multiple records. Vdata structures are collections of records similar to records used in conventional database applications (multifield, various data types). Each record contains spatially averaged data for an individual region.

The major categories of data output on the FSW are as follows:

- Region data
- Total-sky radiative fluxes at TOA, surface, and atmospheric levels
- Clear-sky radiative fluxes at TOA, surface, and atmospheric levels
- Cloud overlap conditions
- Cloud category properties
- Column-averaged cloud properties
- Angular model scene classes
- Surface-only data
- Adjustment parameters

FSW is an archival product generated on a monthly basis. Initially, at the launch of the TRMM spacecraft, this product will be produced in validation mode once every 3 months, or for 4 data months a year. During the first 18 months after the launch of TRMM, the CERES Science Team will derive a production quality set of ADMs, which are needed to produce the SW and LW instantaneous fluxes. Eighteen months after the launch of TRMM, this product will be archived and will contain SW and LW fluxes at the tropopause and at the 500 hPa pressure level, in addition to fluxes at TOA and at the surface. A complete listing of parameters for this data product can be found in Tables 2.9-4 through Table 2.9-23.

Level: 3
Type: Archival
Frequency: 1/Month

Time Interval Covered
File: Month
Record: Hour

Portion of Globe Covered
File: Gridded Satellite Swath
Record: 1.0-Deg Equal-angle Regions

Portion of Atmosphere Covered
File: TOA, Surface, and Atmospheric Pressure Levels

FSW Metadata

The types of FSW metadata are summarized in Table 2.9-1 and contain information which need only be recorded once per product. The CERES metadata are listed in Tables B-1 and B-2 in Appendix B. Table B-1 lists the CERES Baseline Header Metadata and Table B-2 lists the parameters in the CERES_metadata Vdata Table. Note that the CERES_metadata Vdata is a subset of the CERES Baseline Header Metadata. The FSW product-specific metadata parameters are listed in Table 2.9-2.

Table 2.9-1. FSW Metadata Summary

HDF Name	Description Table	Records	Number of Fields
CERES Baseline Header Metadata	Table B-1	1	36
CERES_metadata Vdata	Table B-2	1	14
FSW Product Specific Metadata	Table 2.9-2	1	2

Table 2.9-2. FSW Product-specific Metadata

Item	Parameter Name	Description	DataType	Units	Range
1	ZoneBeginning	Beginning zone number	I4	N/A	1 .. 180
2	ZoneEnding	Ending zone number	I4	N/A	1 .. 180

All of the FSW science data are organized into various Vdata Structures, which are summarized in Table 2.9-3. Tables 2.9-4 through Table 2.9-23 contain a list of the parameters within each Vdata, including the field number, the field name, the data type, the units, the range, and the number of components within each field.

The size of each Vdata is based on the FSW HDF product which consist of 18 files containing data for 10 1.0-degree equal-angle zones in each file. The number of records per Vdata is defined as n where n varies for each file. Sizing estimates are based on anticipated TRMM sampling.

Table 2.9-3. FSW Vdata Summary

Vdata Name	Description Table	Records	Number of Fields	VData Size (MB)
Time and Position Data	Table 2.9-4	n	6	97.1
Regional Identification Data	Table 2.9-5	n	3	48.6
Other Regional Parameters	Table 2.9-6	n	13	501.7
Regional Imager Data	Table 2.9-7	n	8	453.2
TOA FLuxes (mean std num_obs)	Table 2.9-8	n	8	388.4
Atmos. Flux Profiles for 4 Layers (mean std num_obs)	Table 2.9-9	n	32	1553.7
Flux Adjustments (Tuned-Untuned) Data (mean std num_obs)	Table 2.9-10	n	12	582.6
Other Flux Related Data	Table 2.9-11	n	8	210.4
Cloud Overlap Conditions	Table 2.9-12	n	11	178.0
Cloud Property Data - High Layer (mean std num_obs)	Table 2.9-13	n	19	744.5
Cloud Property Data - UpperMid Layer (mean std num_obs)	Table 2.9-14	n	19	744.5
Cloud Property Data - LowerMid Layer (mean std num_obs)	Table 2.9-15	n	19	744.5
Cloud Property Data - Low Layer (mean std num_obs)	Table 2.9-16	n	19	744.5
Column Weighted Cloud Data - SW TOA (mean std num_obs)	Table 2.9-17	n	16	695.9
Column Weighted Cloud Data - LW TOA (mean std num_obs)	Table 2.9-18	n	16	695.9
Column Weighted Cloud Data - LW SRF (mean std num_obs)	Table 2.9-19	n	16	695.9
Column Weighted Cloud Data - LWP (mean std num_obs)	Table 2.9-20	n	16	695.9
Column Weighted Cloud Data - IWP (mean std num_obs)	Table 2.9-21	n	16	695.9
Angular Model Scene Type Data for 12 Scenes	Table 2.9-22	n	6	987.2
Clear-sky Adjustment Parameters (mean std)	Table 2.9-23	n	4	129.5
Vdata TOTAL SIZE				**11587.9**

Table 2.9-4. Time and Position Data

Field No.	Field Name / Parameter	Data Type	Units	Range	No. of Components
1	Julian Time	32-Bit Float	day	2 440 000.0 .. 2 480 000.0	1
2	Sun Colatitude	32-Bit Float	deg	0.0 .. 180.0	1
3	Sun Longitude	32-Bit Float	deg	0.0 .. 360.0	1
4	Relative Azimuth Angle	32-Bit Float	deg	0.0 .. 360.0	1
5	Cos. Solar Zenith Angle	32-Bit Float	N/A	0.0 .. 1.0	1
6	Spacecraft Zenith Angle	32-Bit Float	deg	0.0 .. 90.0	1

Table 2.9-5. Regional Identification Data

Field No.	Field Name / Parameter	Data Type	Units	Range	No. of Components
1	Region Number	32-Bit Float	N/A	1 .. 64800	1
2	Hour Box Number	32-Bit Float	N/A	1 .. 744	1
3	Num. Footprints in Region	32-Bit Float	N/A	1 .. 40	1

Table 2.9-6. Other Regional Parameters

Field No.	Field Name / Parameter	Data Type	Units	Range	No. of Components
1	Alt. of Srf. above Sea	32-Bit Float	m	-1000 .. 10000	1
2	Surface Type Percentage	32-Bit Float	percent	0.0 .. 100.0	20
3	Sunglint Percentage	32-Bit Float	percent	0.0 .. 100.0	1
4	Snow/Ice Percentage	32-Bit Float	percent	0.0 .. 100.0	1
5	Fire Percentage	32-Bit Float	percent	0.0 .. 100.0	1
6	Aerosol Percentage	32-Bit Float	percent	0.0 .. 100.0	1
7	Flag - Aerosol Type	32-Bit Float	N/A	0.0 .. 9999.0	1
8	Total Aerosol Opt. Depth at 0.63 µm in clear area	32-Bit Float	N/A	0.0 .. 2.0	1
9	Total Aerosol Opt. Depth at 1.6 µm in clear area	32-Bit Float	µm	0.0 .. 2.0	1
10	Precipitable Water	32-Bit Float	cm	0.0001 .. 10.0	1
11	Flag - Source Precip. H2O	32-Bit Float	N/A	0 .. 120	1
12	Shadowed Pixels Percent	32-Bit Float	percent	0.0 .. 100.0	1

Table 2.9-7. Regional Imager Data

Field No.	Field Name / Parameter	Data Type	Units	Range	No. of Components
1	Imager Percent Coverage	32-Bit Float	percent	0.0 .. 100.0	1
2	Imager View. Zen. Angle	32-Bit Float	deg	0.0 .. 90.0	1
3	Imager Rel. Azth. Angle	32-Bit Float	deg	0.0 .. 360.0	1
4	Imager Channel Id	32-Bit Float	N/A	1 .. 20	5
5	Imager Rad. 5TH Percent	32-Bit Float	$Wm^{-2}sr^{-1}\mu m^{-1}$	0.0 .. 1000.0	5
6	Imager Radiance	32-Bit Float	$Wm^{-2}sr^{-1}\mu m^{-1}$	0.0 .. 1000.0	5
7	Imager Rad. 95TH Percent	32-Bit Float	$Wm^{-2}sr^{-1}\mu m^{-1}$	0.0 .. 1000.0	5
8	Imager Radiance Clr-sky	32-Bit Float	$Wm^{-2}sr^{-1}\mu m^{-1}$	0.0 .. 1000.0	5

Table 2.9-8. TOA Fluxes (mean std num_obs)

Field No.	Field Name / Parameter	Data Type	Units	Range	No. of Components
1	SW TOA Clear-sky	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	3
2	LW TOA Clear-sky	32-Bit Float	Wm^{-2}	100.0 .. 500.0	3
3	WN TOA Clear-sky	32-Bit Float	Wm^{-2}	0.0 .. 800.0	3
4	ALB TOA Clear-sky	32-Bit Float	N/A	0.0 .. 1.0	3
5	SW TOA Total-Sky	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	3
6	LW TOA Total-Sky	32-Bit Float	Wm^{-2}	100.0 .. 500.0	3
7	WN TOA Total-Sky	32-Bit Float	Wm^{-2}	0.0 .. 800.0	3
8	ALB TOA Total-Sky	32-Bit Float	N/A	0.0 .. 1.0	3

Table 2.9-9. Atmosmospheric Flux Profiles for 4 Layers (mean std num_obs)

Field No.	Field Name / Parameter	Data Type	Units	Range	No. of Components
1	Downward SW Clear-sky (sfc)	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	3
2	Downward SW Clear-sky (500hPa)	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	3
3	Downward SW Clear-sky (70 hPa)	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	3
4	Downward SW Clear-sky (TOA AVG)	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	3
5	Upward SW Clear-sky (sfc)	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	3
6	Upward SW Clear-sky (500hPa)	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	3
7	Upward SW Clear-sky (70 hPa)	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	3
8	Upward SW Clear-sky (TOA AVG)	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	3
9	Downward LW Clear-sky (sfc)	32-Bit Float	Wm^{-2}	0.0 .. 600.0	3
10	Downward LW Clear-sky (500hPa)	32-Bit Float	Wm^{-2}	0.0 .. 600.0	3
11	Downward LW Clear-sky (70 hPa)	32-Bit Float	Wm^{-2}	0.0 .. 600.0	3
12	Downward LW Clear-sky (TOA AVG)	32-Bit Float	Wm^{-2}	0.0 .. 600.0	3
13	Upward LW Clear-sky (sfc)	32-Bit Float	Wm^{-2}	0.0 .. 700.0	3
14	Upward LW Clear-sky (500hPa)	32-Bit Float	Wm^{-2}	0.0 .. 700.0	3
15	Upward LW Clear-sky (70 hPa)	32-Bit Float	Wm^{-2}	0.0 .. 700.0	3
16	Upward LW Clear-sky (TOA AVG)	32-Bit Float	Wm^{-2}	0.0 .. 700.0	3
17	Downward SW Total-Sky (sfc)	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	3
18	Downward SW Total-Sky (500hPa)	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	3
19	Downward SW Total-Sky (70 hPa)	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	3
20	Downward SW Total-Sky (TOA AVG)	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	3
21	Upward SW Total-Sky (sfc)	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	3
22	Upward SW Total-Sky (500hPa)	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	3
23	Upward SW Total-Sky (70 hPa)	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	3
24	Upward SW Total-Sky (TOA AVG)	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	3
25	Downward LW Total-Sky (sfc)	32-Bit Float	Wm^{-2}	0.0 .. 600.0	3
26	Downward LW Total-Sky (500hPa)	32-Bit Float	Wm^{-2}	0.0 .. 600.0	3
27	Downward LW Total-Sky (70 hPa)	32-Bit Float	Wm^{-2}	0.0 .. 600.0	3
28	Downward LW Total-Sky (TOA AVG)	32-Bit Float	Wm^{-2}	0.0 .. 600.0	3
29	Upward LW Total-Sky (sfc)	32-Bit Float	Wm^{-2}	0.0 .. 700.0	3
30	Upward LW Total-Sky (500hPa)	32-Bit Float	Wm^{-2}	0.0 .. 700.0	3
31	Upward LW Total-Sky (70 hPa)	32-Bit Float	Wm^{-2}	0.0 .. 700.0	3
32	Upward LW Total-Sky (TOA AVG)	32-Bit Float	Wm^{-2}	0.0 .. 700.0	3

Table 2.9-10. Flux Adjustments (Tuned-Untuned) Data (mean std num_obs)

Field No.	Field Name / Parameter	Data Type	Units	Range	No. of Components
1	Down. SW Srf. Clear-sky	32-Bit Float	Wm^{-2}	-1400.0 .. 1400.0	3
2	Up. SW Srf. Clear-sky	32-Bit Float	Wm^{-2}	-1400.0 .. 1400.0	3
3	Down. LW Srf. Clear-sky	32-Bit Float	Wm^{-2}	-600.0 .. 600.0	3
4	Up. LW Srf. Clear-sky	32-Bit Float	Wm^{-2}	-700.0 .. 700.0	3
5	Up. SW TOA Clear-sky	32-Bit Float	Wm^{-2}	-1400.0 .. 1400.0	3
6	Up. LW TOA Clear-sky	32-Bit Float	Wm^{-2}	-700.0 .. 700.0	3
7	Down. SW Srf. Total-Sky	32-Bit Float	Wm^{-2}	-1400.0 .. 1400.0	3
8	Up. SW Srf. Total-Sky	32-Bit Float	Wm^{-2}	-1400.0 .. 1400.0	3
9	Down. LW Srf. Total-Sky	32-Bit Float	Wm^{-2}	-600.0 .. 600.0	3
10	Up. LW Srf. Total-Sky	32-Bit Float	Wm^{-2}	-700.0 .. 700.0	3
11	Up. SW TOA Total-Sky	32-Bit Float	Wm^{-2}	-1400.0 .. 1400.0	3
12	Up. LW TOA Total-Sky	32-Bit Float	Wm^{-2}	-700.0 .. 700.0	3

Table 2.9-11. Other Flux Related Data

Field No.	Field Name / Parameter	Data Type	Units	Range	No. of Components
1	LW Surface Emissivity	32-Bit Float	N/A	0.0 .. 1.0	1
2	WN Surface Emissivity	32-Bit Float	N/A	0.0 .. 1.0	1
3	Photosynthetically Active Radiation, Surface	32-Bit Float	Wm^{-2}	0.0 .. 780.0	1
4	Direct/Diffuse, Surface	32-Bit Float	N/A	0.0 .. 30.0	1
5	Corrected Initial Broadband Surface Albedo	32-Bit Float	N/A	0.0 .. 1.0	1
6	CERES Spectral Albedo	32-Bit Float	N/A	0.0 .. 1.0	6
7	CERES Broadband Surface Albedo (uncorrected)	32-Bit Float	N/A	0.0 .. 1.0	1
8	Skin Temperature	32-Bit Float	K	175.0 .. 375.0	1

Table 2.9-12. Cloud Overlap Conditions

Field No.	Field Name / Parameter	Data Type	Units	Range	No. of Components
1	Clear	32-Bit Float	percent	0.0 .. 100.0	1
2	Low	32-Bit Float	percent	0.0 .. 100.0	1
3	Lowermid	32-Bit Float	percent	0.0 .. 100.0	1
4	Uppermid	32-Bit Float	percent	0.0 .. 100.0	1
5	High	32-Bit Float	percent	0.0 .. 100.0	1
6	High Uppermid	32-Bit Float	percent	0.0 .. 100.0	1
7	High Lowermid	32-Bit Float	percent	0.0 .. 100.0	1
8	High Low	32-Bit Float	percent	0.0 .. 100.0	1
9	Uppermid - Lowermid	32-Bit Float	percent	0.0 .. 100.0	1
10	Uppermid - Low	32-Bit Float	percent	0.0 .. 100.0	1
11	Lowermid - Low	32-Bit Float	percent	0.0 .. 100.0	1

Table 2.9-13. Cloud Property Data - High Layer (mean std num_obs)

Field No.	Field Name / Parameter	Data Type	Units	Range	No. of Components
1	Area Coverage Percentage	32-Bit Float	percent	0.0 .. 100.0	1
2	Effective Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3
3	Effective Temperature	32-Bit Float	K	100.0 .. 350.0	3
4	Effective Height	32-Bit Float	km	0.0 .. 20.0	3
5	Top Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3
6	Cloud Base Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3
7	Particle Phase	32-Bit Float	fraction	1.0 .. 2.0	3
8	Liquid Water Path	32-Bit Float	gm^{-2}	0.0 .. 10000.0	3
9	Ice Water Path	32-Bit Float	gm^{-2}	0.0 .. 10000.0	3
10	Water Particle Radius	32-Bit Float	µm	0.0 .. 40.0	3
11	Ice Particle Effective Diameter	32-Bit Float	µm	0.0 .. 300.0	3
12	Vis. Opt. Depth (linear)	32-Bit Float	N/A	0.0 .. 100.0	3
13	Vis. Opt. Depth (log)	32-Bit Float	N/A	0.0 .. 100.0	3
14	Infrared Emissivity	32-Bit Float	N/A	0.0 .. 2.0	3
15	Vertical Aspect Ratio	32-Bit Float	N/A	0.0 .. 20.0	3
16	Adj. Vis. Opt. Depth	32-Bit Float	N/A	0.0 .. 400.0	1
17	Adj. Fractional Area	32-Bit Float	N/A	0.0 .. 100.0	1
18	Adj. Effective Temp.	32-Bit Float	K	0.0 .. 250.0	1

Table 2.9-14. Cloud Property Data - UpperMid Layer (mean std num_obs)

Field No.	Field Name / Parameter	Data Type	Units	Range	No. of Components
1	Area Coverage Percentage	32-Bit Float	percent	0.0 .. 100.0	1
2	Effective Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3
3	Effective Temperature	32-Bit Float	K	100.0 .. 350.0	3
4	Effective Height	32-Bit Float	km	0.0 .. 20.0	3
5	Top Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3
6	Cloud Base Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3
7	Particle Phase	32-Bit Float	fraction	1.0 .. 2.0	3
8	Liquid Water Path	32-Bit Float	gm^{-2}	0.0 .. 10000.0	3
9	Ice Water Path	32-Bit Float	gm^{-2}	0.0 .. 10000.0	3
10	Water Particle Radius	32-Bit Float	µm	0.0 .. 40.0	3
11	Ice Particle Effective Diameter	32-Bit Float	µm	0.0 .. 300.0	3
12	Vis. Opt. Depth (linear)	32-Bit Float	N/A	0.0 .. 100.0	3
13	Vis. Opt. Depth (log)	32-Bit Float	N/A	0.0 .. 100.0	3
14	Infrared Emissivity	32-Bit Float	N/A	0.0 .. 2.0	3
15	Vertical Aspect Ratio	32-Bit Float	N/A	0.0 .. 20.0	3
16	Adj. Vis. Opt. Depth	32-Bit Float	N/A	0.0 .. 400.0	1
17	Adj. Fractional Area	32-Bit Float	N/A	0.0 .. 100.0	1
18	Adj. Effective Temp.	32-Bit Float	K	0.0 .. 250.0	1

Table 2.9-15. Cloud Property Data - LowerMid Layer (mean std num_obs)

Field No.	Field Name / Parameter	Data Type	Units	Range	No. of Components
1	Area Coverage Percentage	32-Bit Float	percent	0.0 .. 100.0	1
2	Effective Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3
3	Effective Temperature	32-Bit Float	K	100.0 .. 350.0	3
4	Effective Height	32-Bit Float	km	0.0 .. 20.0	3
5	Top Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3
6	Cloud Base Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3
7	Particle Phase	32-Bit Float	fraction	1.0 .. 2.0	3
8	Liquid Water Path	32-Bit Float	gm^{-2}	0.0 .. 10000.0	3
9	Ice Water Path	32-Bit Float	gm^{-2}	0.0 .. 10000.0	3
10	Water Particle Radius	32-Bit Float	µm	0.0 .. 40.0	3
11	Ice Particle Effective Diameter	32-Bit Float	µm	0.0 .. 300.0	3
12	Vis. Opt. Depth (linear)	32-Bit Float	N/A	0.0 .. 100.0	3
13	Vis. Opt. Depth (log)	32-Bit Float	N/A	0.0 .. 100.0	3
14	Infrared Emissivity	32-Bit Float	N/A	0.0 .. 2.0	3
15	Vertical Aspect Ratio	32-Bit Float	N/A	0.0 .. 20.0	3
16	Adj. Vis. Opt. Depth	32-Bit Float	N/A	0.0 .. 400.0	1
17	Adj. Fractional Area	32-Bit Float	N/A	0.0 .. 100.0	1
18	Adj. Effective Temp.	32-Bit Float	K	0.0 .. 250.0	1

Table 2.9-16. Cloud Property Data - Low Layer (mean std num_obs)

Field No.	Field Name / Parameter	Data Type	Units	Range	No. of Components
1	Area Coverage Percentage	32-Bit Float	percent	0.0 .. 100.0	1
2	Effective Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3
3	Effective Temperature	32-Bit Float	K	100.0 .. 350.0	3
4	Effective Height	32-Bit Float	km	0.0 .. 20.0	3
5	Top Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3
6	Cloud Base Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3
7	Particle Phase	32-Bit Float	fraction	1.0 .. 2.0	3
8	Liquid Water Path	32-Bit Float	gm^{-2}	0.0 .. 10000.0	3
9	Ice Water Path	32-Bit Float	gm^{-2}	0.0 .. 10000.0	3
10	Water Particle Radius	32-Bit Float	µm	0.0 .. 40.0	3
11	Ice Particle Effective Diameter	32-Bit Float	µm	0.0 .. 300.0	3
12	Vis. Opt. Depth (linear)	32-Bit Float	N/A	0.0 .. 100.0	3
13	Vis. Opt. Depth (log)	32-Bit Float	N/A	0.0 .. 100.0	3
14	Infrared Emissivity	32-Bit Float	N/A	0.0 .. 2.0	3
15	Vertical Aspect Ratio	32-Bit Float	N/A	0.0 .. 20.0	3
16	Adj. Vis. Opt. Depth	32-Bit Float	N/A	0.0 .. 400.0	1
17	Adj. Fractional Area	32-Bit Float	N/A	0.0 .. 100.0	1
18	Adj. Effective Temp.	32-Bit Float	K	0.0 .. 250.0	1

Table 2.9-17. Column Weighted Cloud Data - SW TOA (mean std num_obs)

Field No.	Field Name / Parameter	Data Type	Units	Range	No. of Components
1	Area Coverage Percentage	32-Bit Float	percent	0.0 .. 100.0	1
2	Effective Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3
3	Effective Temperature	32-Bit Float	K	100.0 .. 350.0	3
4	Effective Height	32-Bit Float	km	0.0 .. 20.0	3
5	Top Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3
6	Cloud Base Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3
7	Particle Phase	32-Bit Float	fraction	1.0 .. 2.0	3
8	Liquid Water Path	32-Bit Float	gm^{-2}	0.0 .. 10000.0	3
9	Ice Water Path	32-Bit Float	gm^{-2}	0.0 .. 10000.0	3
10	Water Particle Radius	32-Bit Float	μm	0.0 .. 40.0	3
11	Ice Particle Effective Diameter	32-Bit Float	μm	0.0 .. 300.0	3
12	Vis. Opt. Depth (linear)	32-Bit Float	N/A	0.0 .. 100.0	3
13	Vis. Opt. Depth (log)	32-Bit Float	N/A	0.0 .. 100.0	3
14	Infrared Emissivity	32-Bit Float	N/A	0.0 .. 2.0	3
15	Vertical Aspect Ratio	32-Bit Float	N/A	0.0 .. 20.0	3

Table 2.9-18. Column Weighted Cloud Data - LW TOA (mean std num_obs)

Field No.	Field Name / Parameter	Data Type	Units	Range	No. of Components
1	Area Coverage Percentage	32-Bit Float	percent	0.0 .. 100.0	1
2	Effective Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3
3	Effective Temperature	32-Bit Float	K	100.0 .. 350.0	3
4	Effective Height	32-Bit Float	km	0.0 .. 20.0	3
5	Top Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3
6	Cloud Base Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3
7	Particle Phase	32-Bit Float	fraction	1.0 .. 2.0	3
8	Liquid Water Path	32-Bit Float	gm^{-2}	0.0 .. 10000.0	3
9	Ice Water Path	32-Bit Float	gm^{-2}	0.0 .. 10000.0	3
10	Water Particle Radius	32-Bit Float	μm	0.0 .. 40.0	3
11	Ice Particle Effective Diameter	32-Bit Float	μm	0.0 .. 300.0	3
12	Vis. Opt. Depth (linear)	32-Bit Float	N/A	0.0 .. 100.0	3
13	Vis. Opt. Depth (log)	32-Bit Float	N/A	0.0 .. 100.0	3
14	Infrared Emissivity	32-Bit Float	N/A	0.0 .. 2.0	3
15	Vertical Aspect Ratio	32-Bit Float	N/A	0.0 .. 20.0	3

Table 2.9-19. Column Weighted Cloud Data - LW SRF (mean std num_obs)

Field No.	Field Name / Parameter	Data Type	Units	Range	No. of Components
1	Area Coverage Percentage	32-Bit Float	percent	0.0 .. 100.0	1
2	Effective Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3
3	Effective Temperature	32-Bit Float	K	100.0 .. 350.0	3
4	Effective Height	32-Bit Float	km	0.0 .. 20.0	3
5	Top Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3
6	Cloud Base Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3
7	Particle Phase	32-Bit Float	fraction	1.0 .. 2.0	3
89	Liquid Water Path	32-Bit Float	gm^{-2}	0.0 .. 10000.0	3
9	Ice Water Path	32-Bit Float	gm^{-2}	0.0 .. 10000.0	3
10	Water Particle Radius	32-Bit Float	µm	0.0 .. 40.0	3
11	Ice Particle Effective Diameter	32-Bit Float	µm	0.0 .. 300.0	3
12	Vis. Opt. Depth (linear)	32-Bit Float	N/A	0.0 .. 100.0	3
13	Vis. Opt. Depth (log)	32-Bit Float	N/A	0.0 .. 100.0	3
14	Infrared Emissivity	32-Bit Float	N/A	0.0 .. 2.0	3
15	Vertical Aspect Ratio	32-Bit Float	N/A	0.0 .. 20.0	3

Table 2.9-20. Column Weighted Cloud Data - LWP (mean std num_obs)

Field No.	Field Name / Parameter	Data Type	Units	Range	No. of Components
1	Area Coverage Percentage	32-Bit Float	percent	0.0 .. 100.0	1
2	Effective Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3
3	Effective Temperature	32-Bit Float	K	100.0 .. 350.0	3
4	Effective Height	32-Bit Float	km	0.0 .. 20.0	3
5	Top Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3
6	Cloud Base Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3
7	Particle Phase	32-Bit Float	fraction	1.0 .. 2.0	3
8	Liquid Water Path	32-Bit Float	gm^{-2}	0.0 .. 10000.0	3
9	Ice Water Path	32-Bit Float	gm^{-2}	0.0 .. 10000.0	3
10	Water Particle Radius	32-Bit Float	µm	0.0 .. 40.0	3
11	Ice Particle Effective Diameter	32-Bit Float	µm	0.0 .. 300.0	3
12	Vis. Opt. Depth (linear)	32-Bit Float	N/A	0.0 .. 100.0	3
13	Vis. Opt. Depth (log)	32-Bit Float	N/A	0.0 .. 100.0	3
14	Infrared Emissivity	32-Bit Float	N/A	0.0 .. 2.0	3
15	Vertical Aspect Ratio	32-Bit Float	N/A	0.0 .. 20.0	3

Table 2.9-21. Column Weighted Cloud Data - IWP (mean std num_obs)

Field No.	Field Name / Parameter	Data Type	Units	Range	No. of Components
1	Area Coverage Percentage	32-Bit Float	percent	0.0 .. 100.0	1
2	Effective Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3
3	Effective Temperature	32-Bit Float	K	100.0 .. 350.0	3
4	Effective Height	32-Bit Float	km	0.0 .. 20.0	3
5	Top Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3
6	Cloud Base Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3
7	Particle Phase	32-Bit Float	fraction	1.0 .. 2.0	3
8	Liquid Water Path	32-Bit Float	gm^{-2}	0.0 .. 10000.0	3
9	Ice Water Path	32-Bit Float	gm^{-2}	0.0 .. 10000.0	3
10	Water Particle Radius	32-Bit Float	µm	0.0 .. 40.0	3
11	Ice Particle Effective Diameter	32-Bit Float	µm	0.0 .. 300.0	3
12	Vis. Opt. Depth (linear)	32-Bit Float	N/A	0.0 .. 100.0	3
13	Vis. Opt. Depth (log)	32-Bit Float	N/A	0.0 .. 100.0	3
14	Infrared Emissivity	32-Bit Float	N/A	0.0 .. 2.0	3
15	Vertical Aspect Ratio	32-Bit Float	N/A	0.0 .. 20.0	3

Table 2.9-22. Angular Model Scene Type Data for 12 Scenes

Field No.	Field Name / Parameter	Data Type	Units	Range	No. of Components
1	Incident Solar Flux	32-Bit Float	N/A	0.0 .. 1400.0	1
2	Area Coverage	32-Bit Float	percent	0.0 .. 100.0	12
3	Albedo (mean)	32-Bit Float	N/A	0.0 .. 1.0	12
4	Albedo (std)	32-Bit Float	N/A	0.0 .. 1.0	12
5	LW (mean)	32-Bit Float	Wm^{-2}	0.0 .. 400.0	12
6	LW (std)	32-Bit Float	Wm^{-2}	0.0 .. 400.0	12

Table 2.9-23. Clear-sky Adjustment Parameters (mean std)

Field No.	Field Name / Parameter	Data Type	Units	Range	No. of Components
1	Precipitable H2O	32-Bit Float	cm	0.001 .. 8.0	2
2	Surface Albedo	32-Bit Float	N/A	0.0 .. 1.0	2
3	Aerosol Opt. Dep.	32-Bit Float	N/A	0.0 .. 2.0	2
4	Skin Temperature	32-Bit Float	K	175 .. 375	2

2.10 Synoptic Radiative Fluxes and Clouds (SYN)

EOSDIS Product Code: CER07

The Synoptic Radiative Fluxes and Clouds (SYN), a CERES archival product, is produced by the CERES Synoptic Surface and Atmospheric Radiation Budget (SARB) Subsystem. Each SYN file contains regional longwave and shortwave radiative fluxes for the surface, internal atmosphere, and TOA. The data are computed at 3-hour intervals on the CERES grid, and are based on measurements from multiple EOS CERES instruments. Since there are eight synoptic times for a day, there are eight SYN products in a single file. As a single run of the Synoptic SARB Subsystem processes data for 1 hour only, data on this file are grouped according to hour. Within an hour's data, the data are organized according to CERES region number.

The SYN contains averaged:

- Regional data
- Clear-sky area scene data
- Observed CERES TOA data for both Clear-sky and total-sky
- Cloud category properties for four (low, lower middle, upper middle and high) cloud height categories
- Column averaged cloud properties for five (TOA SW, TOA LW, SFC LW, Liquid Water Content (LWC), and Ice Water Content (IWC)) weighting schemes
- Overlap data for eleven (clear, low (L), lower middle (LM), upper middle (UM), high (H), H/UM, H/LM, H/L, UM/LM, UM/L, and LM/L) cloud overlap conditions
- Angular model scene classes for the twelve ERBE scene types
- Surface radiative parameters
- Atmospheric flux profiles for both Clear-sky and total-sky at the surface, 500 hPa, 70 hPa, and the TOA
- Flux adjustments (constrained-initial) for Clear-sky and total-sky at the surface and TOA over the CERES region
- Adjustment parameters for Clear-sky
- Adjustment parameters for four (L, LM, UM, and H) cloud height categories
- Auxiliary adjustment quality control flags

Level: 3
Type: Archival
Frequency: Every 3 Hours

Time Interval Covered
File: 3 Hours
Record: 3 Hours

Portion of Globe Covered
File: Global
Record: 1 CERES region

Portion of Atmosphere Covered
File: Surface, Internal and TOA

SYN Metadata

The types of SYN metadata are summarized in Table 2.10-1 and contain information which need only be recorded once per hour. The CERES metadata are listed in Table B-1 and B-2 in Appendix B. Table B-1 lists the CERES Baseline Header Metadata and Table B-2 lists the parameters in the CERES_Metadata Vdata.

Table 2.10-1. SYN Metadata Summary

HDF Name	Description Table	Records	Number of Fields
CERES Baseline Header Metadata	Table B-1	1	36
CERES_Metadata Vdata	Table B-2	1	14

SYN Grid Fields

The SYN contains 19 data fields for each region in the grid (Table 2.10-2). Each region corresponds to a 1-degree global region.

Table 2.10-2. SYN Grid Fields Summary

Grid Field Name	HDF Rank	Dimension (360x180x)	Data Type
Reg_Data	3	4	4-byte Real
Reg_Data_Int	3	2	4-byte Integer
Reg_Data_Surface	4	1 x 20	4-byte Real
Clear_Sky_Data	3	8	4-byte Real
TOA_Flux	3	12	4-byte Real
TOA_Albedo	3	4	4-byte Real
Cld_Props	4	29 x 4	4-byte Real
Col_Avg_Cld_Props	4	29 x 5	4-byte Real
Overlap	4	1 x 11	4-byte Real
Solar_Flux	3	1	4-byte Real
Ang_Scenes	4	5 x 12	4-byte Real
Sfc_Rad_Spec_Alb	4	1 x 6	4-byte Real
Sfc_Rad_Params	3	8	4-byte Real
Flux_Profile_Levels	3	2	4-byte Integer
Flux_Profile_SW_LW	4	9 x 4	4-byte Real
Flux_Adjustments_SW_LW	3	12	4-byte Real
Adj_Params_ClrSky	3	7	4-byte Real
Adj_Params_Cld_Layers	4	3 x 4	4-byte Real
QC_Flags	3	2	4-byte Real

Table 2.10-3 provides a complete listing of parameters for the SYN data product.

Table 2.10-3. Synoptic Radiative Fluxes and Clouds (SYN) (1 of 3)

Description	Parameter Number	Units	Range	Elements/ Record	Bits/ Elem	Elem Num
Meta Data						
SYN Header FIle		N/A		1	15168	
Field 1: Reg_Data						
Julian date at hour start	1	day	2440000 .. 2480000	1	32	1
Julian time at hour start	2	day	-0.01 .. 1.01	1	32	2
Surface altitude above sea level, mean	3	m	-1000 .. 10000	1	32	3
Cosine of solar zenith angle	4	deg	0 .. 1	1	32	4
Field 2: Reg_Data_Int						
Region number	5	N/A	1 .. 44012	1	32	5
Hour-box number	6	N/A	1 .. 744	1	32	6
Field 3: Reg_Data_Surface						
Surface type percent coverage	7	N/A	0 .. 100	20	32	7
Field 4: Clear_Sky_Data						
Snow/ice percent coverage	8	N/A	0 .. 100	1	32	27
Smoke percent coverage	9	N/A	0 .. 100	1	32	28
Fire percent coverage	10	N/A	0 .. 100	1	32	29
Total aerosol visible optical depth, 0.63 µm, clear area	11	N/A	0 .. 2	1	32	30
Total aerosol visible optical depth, 1.60 µm, clear area	12	N/A	0 .. 2	1	32	31
Total aerosol effective radius, clear area	13	N/A	0 .. 20	1	32	32
Aerosol percent coverage	14	N/A	0 .. 100	1	32	33
Sunglint percent coverage	15	N/A	0 .. 100	1	32	34
Field 5: TOA_Flux						
CERES SW flux, TOA, upwards, Clear-sky, mean	16	$W\ m^{-2}$	0 .. 1400	1	32	35
CERES SW flux, TOA, upwards, Clear-sky, std	17	$W\ m^{-2}$	TBD	1	32	36
CERES LW flux, TOA, upwards, Clear-sky, mean	18	$W\ m^{-2}$	0 .. 500	1	32	37
CERES LW flux, TOA, upwards, Clear-sky, std	19	$W\ m^{-2}$	TBD	1	32	38
CERES WN flux, TOA, upwards, Clear-sky, mean	20	$W\ m^{-2}$	10 .. 400	1	32	39
CERES WN flux, TOA, upwards, Clear-sky, std	21	$W\ m^{-2}$	TBD	1	32	40
CERES SW flux, TOA, upwards, total-sky, mean	22	$W\ m^{-2}$	0 .. 1400	1	32	41
CERES SW flux, TOA, upwrads, total-sky, std	23	$W\ m^{-2}$	TBD	1	32	42
CERES LW flux, TOA, upwards, total-sky, mean	24	$W\ m^{-2}$	0 .. 500	1	32	43
CERES LW flux, TOA, upwards, total-sky, std	25	$W\ m^{-2}$	TBD	1	32	44
CERES WN flux, TOA, upwards, total-sky, mean	26	$W\ m^{-2}$	10 .. 400	1	32	45
CERES WN flux, TOA, upwards, total-sky, std	27	$W\ m^{-2}$	TBD	1	32	46
Field 6: TOA_Albedo						
Albedo, TOA, Clear-sky, mean	28	N/A	0 .. 1	1	32	47
Albedo, TOA, Clear-sky, std	29	N/A	0 .. 1	1	32	48
Albedo, TOA, total-sky, mean	30	N/A	0 .. 1	1	32	49
Albedo, TOA, total-sky, std	31	N/A	0 .. 1	1	32	50
Field 7: Cld_Props						
Total cloud area percentage	32	N/A	0 .. 100	4	32	51
Cloud visible optical depth, linear, mean	33	N/A	0 .. 400	4	32	55
Cloud vsible optical depth, linear, std	34	N/A	TBD	4	32	59
Cloud visible optical depth, logarithmic, mean	35	N/A	0 .. 6	4	32	63
Cloud vsible optical depth, logarithmic, std	36	N/A	TBD	4	32	67
Cloud infrared emissivity, mean	37	N/A	0 .. 1	4	32	71
Cloud infrared emissivity, std	38	N/A	TBD	4	32	75
Cloud liquid water path, mean	39	$g\ m^{-2}$	TBD	4	32	79
Cloud liquid water path, std	40	$g\ m^{-2}$	TBD	4	32	83
Cloud ice water path, mean	41	$g\ m^{-2}$	TBD	4	32	87
Cloud ice water path, std	42	$g\ m^{-2}$	TBD	4	32	91
Cloud top pressure, mean	43	hPa	0 .. 1100	4	32	95
Cloud top pressure, std	44	hPa	TBD	4	32	99
Cloud effective pressure, mean	45	hPa	0 .. 1100	4	32	103
Cloud effective pressure, std	46	hPa	TBD	4	32	107
Cloud effective temperature, mean	47	K	100 .. 350	4	32	111
Cloud effective temperature, std	48	K	TBD	4	32	115

Table 2.9-3. Synoptic Radiative Fluxes and Clouds (SYN) (2 of 3)

Description	Parameter Number	Units	Range	Elements/ Record	Bits/ Elem	Elem Num
Field 7: Cld_Props (cont'd)						
Cloud effective height, mean	49	km	0 .. 20	4	32	119
Cloud effective height, std	50	km	TBD	4	32	123
Cloud bottom pressure, mean	51	hPa	0 .. 1100	4	32	127
Cloud bottom pressure, std	52	hPa	TBD	4	32	131
Cloud liquid particle radius, mean	53	µm	TBD	4	32	135
Cloud liquid particle radius, std	54	µm	TBD	4	32	139
Cloud ice particle effective radius, mean	55	µm	TBD	4	32	143
Cloud ice particle effective radius, std	56	µm	TBD	4	32	147
Cloud particle phase, mean	57	N/A	1 .. 2	4	32	151
Cloud particle phase, std	58	N/A	TBD	4	32	155
Vertical aspect ratio, mean (TBD)	59	N/A	0 .. 20	4	32	159
Vertical aspect ratio, std (TBD)	60	N/A	TBD	4	32	163
Field 8: Col_Avg_Cld_Props						
Total cloud area percentage	61	N/A	0 .. 100	5	32	167
Cloud visible optical depth, linear, mean	62	N/A	0 .. 400	5	32	172
Cloud vsible optical depth, linear, std	63	N/A	TBD	5	32	177
Cloud visible optical depth, logarithmic, mean	64	N/A	0 .. 6	5	32	182
Cloud vsible optical depth, logarithmic, std	65	N/A	TBD	5	32	187
Cloud infrared emissivity, mean	66	N/A	0 .. 1	5	32	192
Cloud infrared emissivity, std	67	N/A	TBD	5	32	197
Cloud liquid water path, mean	68	$g\ m^{-2}$	TBD	5	32	202
Cloud liquid water path, std	69	$g\ m^{-2}$	TBD	5	32	207
Cloud ice water path, mean	70	$g\ m^{-2}$	TBD	5	32	212
Cloud ice water path, std	71	$g\ m^{-2}$	TBD	5	32	217
Cloud top pressure, mean	72	hPa	0 .. 1100	5	32	222
Cloud top pressure, std	73	hPa	TBD	5	32	227
Cloud effective pressure, mean	74	hPa	0 .. 1100	5	32	232
Cloud effective pressure, std	75	hPa	TBD	5	32	237
Cloud effective temperature, mean	76	K	100 .. 350	5	32	242
Cloud effective temperature, std	77	K	TBD	5	32	247
Cloud effective height, mean	78	km	0 .. 20	5	32	252
Cloud effective height, std	79	km	TBD	5	32	257
Cloud bottom pressure, mean	80	hPa	0 .. 1100	5	32	262
Cloud bottom pressure, std	81	hPa	TBD	5	32	267
Cloud liquid particle radius, mean	82	µm	TBD	5	32	272
Cloud liquid particle radius, std	83	µm	TBD	5	32	277
Cloud ice particle effective radius, mean	84	µm	TBD	5	32	282
Cloud ice particle effective radius, std	85	µm	TBD	5	32	287
Cloud particle phase, mean	86	N/A	1 .. 2	5	32	292
Cloud particle phase, std	87	N/A	TBD	5	32	297
Vertical aspect ratio, mean (TBD)	88	N/A	0 .. 20	5	32	302
Vertical aspect ratio, std (TBD)	89	N/A	TBD	5	32	307
Field 9: Overlap						
Overlap condition weighted area percentage	90	N/A	0 .. 100	11	32	312
Field 10: Solar_Flux						
Incident solar flux	91	$W\ m^{-2}$	0 .. 1400	1	32	323
Field 11: Ang_Scenes						
Area percent coverage	92	N/A	0 .. 100	12	32	324
Albedo, mean	93	N/A	0 .. 1	12	32	336
Albedo, std	94	N/A	0 .. 1	12	32	348
LW flux, mean	95	$W\ m^{-2}$	0 .. 400	12	32	360
LW flux, std	96	$W\ m^{-2}$	0 .. 400	12	32	372
Field 12: Sfc_Rad_Spec_Alb						
Spectral albedo	97	N/A	0 .. 1	6	32	384

Table 2.9-3. Synoptic Radiative Fluxes and Clouds (SYN) (3 of 3)

Description	Parameter Number	Units	Range	Elements/ Record	Bits/ Elem	Elem Num
Field 13: Sfc_Rad_Params						
Broadband surface albedo (uncorrected)	98	N/A	0 .. 1	1	32	390
LW surface emissivity	99	N/A	0 .. 1	1	32	391
WN surface emissivity	100	N/A	0 .. 1	1	32	392
Imager-based surface skin temperature	101	K	175 .. 375	1	32	393
Corrected initial broadband surface albedo	102	N/A	0 .. 1	1	32	394
Photosynthetically active radiation (TBD)	103	W m^{-2}	0 .. 780	1	32	395
DIrect/diffuse ratio (TBD)	104	N/A	0 .. 30	1	32	396
Corrected initial broadband surface albedo ratio	105	N/A	0 .. 1	1	32	397
Field 14: Flux_Profile_Levels						
Number atmospheric levels	106	N/A	0 .. 4	1	32	398
Number of constrainment iterations	107	N/A	0 .. 1	1	32	399
Field 15: Flux_Profile_SW_LW						
Pressure, atmospheric levels	108	hPa	0 .. 1100	4	32	400
SW flux, atmospheric level, upwards, Clear-sky, constrained	109	W m^{-2}	0 .. 1400	4	32	404
SW flux, atmospheric level, downwards, Clear-sky, constrained	110	W m^{-2}	0 .. 1400	4	32	408
LW flux, atmospheric level, upwards, Clear-sky, constrained	111	W m^{-2}	0 .. 700	4	32	412
LW flux, atmospheric level, downwards, Clear-sky, constrained	112	W m^{-2}	0 .. 600	4	32	416
SW flux, atmospheric level, upwards, total-sky, constrained	113	W m^{-2}	0 .. 1400	4	32	420
SW flux, atmospheric level, downwards, total-sky, constrained	114	W m^{-2}	0 .. 1400	4	32	424
LW flux, atmospheric level, upwards, total-sky, constrained	115	W m^{-2}	0 .. 700	4	32	428
LW flux, atmospheric level, downwards, total-sky, constrained	116	W m^{-2}	0 .. 600	4	32	432
Field 16: Flux_Adjustments						
SW flux, surface, downwards, Clear-sky, delta	117	W m^{-2}	-1400 .. 1400	1	32	436
SW flux, surface, upwards, Clear-sky, delta	118	W m^{-2}	-1400 .. 1400	1	32	437
SW flux, TOA, upwards, Clear-sky, delta	119	W m^{-2}	-1400 .. 1400	1	32	438
LW flux, surface, downwards, Clear-sky, delta	120	W m^{-2}	-500 .. 500	1	32	439
LW flux, surface, upwards, Clear-sky, delta	121	W m^{-2}	-500 .. 500	1	32	440
LW flux, TOA, upwards, Clear-sky, delta	122	W m^{-2}	-500 .. 500	1	32	441
SW flux, surface, downwards, total-sky, delta	123	W m^{-2}	-1400 .. 1400	1	32	442
SW flux, surface, upwards, total-sky, delta	124	W m^{-2}	-1400 .. 1400	1	32	443
SW flux, TOA, upwards, total-sky, delta	125	W m^{-2}	-1400 .. 1400	1	32	444
LW flux, surface, downwards, total-sky, delta	126	W m^{-2}	-500 .. 500	1	32	445
LW flux, surface, upwards, total-sky, delta	127	W m^{-2}	-500 .. 500	1	32	446
LW flux, surface, upwards, total-sky, delta	128	W m^{-2}	-500 .. 500	1	32	447
Field 17: Adj_Params_ClrSky						
Initial precipitable water	129	cm	0 .. 10	1	32	448
Adjusted precipitable water, delta	130	cm	-10 .. 10	1	32	449
Adjusted surface albedo, delta	131	N/A	-1 ..1	1	32	450
Initial aerosol optical depth	132	N/A	0 .. 2	1	32	451
Adjusted aerosol optical depth, delta	133	N/A	-2 .. 2	1	32	452
Initial skin temperature	134	K	TBD	1	32	453
Adjusted skin temperature, delta	135	K	TBD	1	32	454
Field 18: Adj_Params_Cld_Layers						
Adjusted mean visible optical depth (logarithmic), delta	136	N/A	-400 .. 400	4	32	455
Adjusted mean cloud fractional area, delta	137	N/A	-1 .. 1	4	32	459
Adjusted mean cloud effective temperature, delta	138	K	TBD	4	32	463
Field 19: QC_Flags						
Constrainment status flag	139	N/A	TBD	1	32	467
Sigma table configuration flag	140	N/A	TBD	1	32	468

Total Meta Bits/File:	**15168**
Total Data Bits/Record:	**15168**
Total Records/File:	**352096**
Total Data Bits/File:	**5340592128**
Total Bits/File:	**5340607296**

2.11 Monthly Regional Radiative Fluxes and Clouds (AVG)

EOSDIS Product Code: CER08

The Monthly Regional Radiative Fluxes and Clouds (AVG) product contains monthly and monthly hourly averages of the Top-of-the-Atmosphere (TOA) and surface longwave (LW) and shortwave (SW) radiative fluxes, together with LW and SW fluxes at standard pressure levels in between. The product is written in HDF-EOS and contains metadata as well as gridded science data.

The major categories of data output on the AVG are as follows:

- Regional data
- Radiative fluxes for both Clear-sky and total-sky at TOA
- Cloud category properties for four (low, lower middle, upper middle and high) cloud layers
- Adjustment parameters for four cloud layers
- Column-averaged cloud properties for five (TOASW, TOALW, Hourly Gridded Single Satellite TOA and Surface Fluxes and Clouds (SFC) LW, Liquid Water Path (LWP), and Ice Water Path (IWP)) weighting schemes
- Adjustment parameters for five weighting schemes
- Overlap data for eleven (clear, low (L), lower middle (LM), upper middle (UM), high (H), H/UM, H/LM, H/L, UM/LM, UM/L, LM/L) cloud conditions
- Angular model scene classes
- Atmospheric flux profile for Clear-sky and total-sky
- Flux adjustments for Clear-sky and total-sky
- Adjustment parameters for clear-skies
- Surface data

A complete listing of metadata and science parameters for this data product can be found in Table 2.11-1 and Table 2.11-2.

Level: 3
Type: Archival
Frequency: 1/Month

Time Interval Covered
File: 1 Month
Record: 1 Month

Portion of Globe Covered
File: Entire Globe
Record: 1.0-Deg Regions

Portion of Atmosphere Covered
File: Surface to TOA

AVG Metadata

The types of AVG metadata are summarized in Table 2.11-1 and contain information which need only be recorded once per product. The CERES metadata are listed in Tables B-1 and B-2 in Appendix B. Table B-1 lists the CERES Baseline Header Metadata and Table B-2 lists the parameters in the CERES_metadata Vdata Table.

Table 2.11-1. AVG Metadata Summary

HDF Name	Description Table	Records	Number of Fields
CERES Baseline Header Metadata	Table B-1	1	36
CERES_metadata gridded data	Table B-2	1	14

All of the AVG science data are organized into the HDF-EOS Grid data type, which is shown in Table 2.11-2 below. This table contains a list of the parameters within each grid, including the field number, the field name along with the parameter name as it is stored in the HDF-EOS file, the data type, the units, the range, and the number of components within each field.

Table 2.11-2. AVG Grid Data (1 of 3)

Field No.	Field Name / Parameter	Data Type	Units	Range	No. of Components
	Region Parameters				
1	Surface type percent coverage (surface_percent)	32-Bit Float	N/A	0.0 .. 100.0	20
2	Surface altitude (surface_altitude)	32-Bit Float	m	-1000 .. 10000	1
3	Snow/Ice percent coverage(snow_ice_cover)	32-Bit Float	N/A	0.0 .. 100.0	1
4	Fire percent coverage (fire_perc_cov)	32-Bit Float	N/A	0.0 .. 100.0	1
5	Total aerosol visible optical depth @ 0.63 microns	32-Bit Float		0.0 .. 2.0	1
	(aero_vis_opt_depth063)		N/A		1
6	Total aerosol visible optical depth @ 1.6 microns	32-Bit Float		0.0 .. 2.0	
	(aero_vis_opt_depth160)		N/A		1
7	Aerosol percent coverage (aero_perc_cov)	32-Bit Float		0.0 .. 20.0	
					1
	Clear-sky TOA Fluxes (mean, stdev, num obs)				
8	SW Flux (TOA_sw_clr)	32-Bit Float	Wm^{-2}	0.0 .. 800.0	27
9	LW Flux (TOA_lw_clr)	32-Bit Float	Wm^{-2}	0.0 .. 400.0	27
10	WN Flux (TOA_wn_clr)	32-Bit Float	Wm^{-2}	0.0 .. 800.0	27
11	Total albedo (TOA_alb_clr)	32-Bit Float	N/A	0.0 .. 1.0	27
	Total-sky TOA Fluxes (mean, stdev, num obs)				
12	SW Flux (TOA_sw_tot)	32-Bit Float	Wm^{-2}	0.0 .. 800.0	27
13	LW Flux (TOA_lw_tot)	32-Bit Float	Wm^{-2}	0.0 .. 400.0	27
14	WN Flux (TOA_wn_tot)	32-Bit Float	Wm^{-2}	0.0 .. 800.0	27
15	Total albedo (TOA_alb_tot)	32-Bit Float	N/A	0.0 .. 1.0	27

Table 2.11-2. AVG Grid Data (2 of 3)

Field No.	Field Name / Parameter	Data Type	Units	Range	No. of Components
	Atmospheric Flux Profile for Clear-sky for 4 Layers - sfc, 500hpa, 70hpa, & TOA (mean, stdev, num obs)				
17	Upward SW flux (flx_lvl_up_sw_clr)	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	108
18	Downward SW flux (flx_lvl_down_sw_clr)	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	108
19	Upward LW flux (flx_lvl_up_lw_clr)	32-Bit Float	Wm^{-2}	0.0 .. 700.0	108
20	Downward LW flux (flx_lvl_down_lw_clr)	32-Bit Float	Wm^{-2}	0.0 .. 600.0	108
	Atmospheric Flux Profile for Total-sky for 4 Layers - sfc, 500hpa, 70hpa, & TOA (mean, stdev, num obs)				
21	Upward SW flux (flx_lvl_up_sw_tot)	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	108
22	Downward SW flux (flx_lvl_down_sw_tot)	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	108
23	Upward LW flux (flx_lvl_up_lw_tot)	32-Bit Float	Wm^{-2}	0.0 .. 700.0	108
24	Downward LW flux (flx_lvl_down_lw_tot)	32-Bit Float	Wm^{-2}	0.0 .. 600.0	108
25	Number of Atmospheric Layers (num_atmos_layers)	32-Bit Float	N/A	0 .. 4	9
26	Pressure, atmospheric layer (atmos_layer_press)	32-Bit Float	hPa	0 .. 1100	36
	Flux Adjustments Clear-sky - sfc, TOA (mean, stdev, num obs)				
27	Downward SW flux (flx_adj_srf_dn_sw_clr)	32-Bit Float	Wm^{-2}	-1400.0 .. 1400.0	27
28	Downward LW flux (flx_adj_srf_dn_lw_clr)	32-Bit Float	Wm^{-2}	-500.0 .. 500.0	27
29	Upward SW flux (flx_adj_srf_up_sw_clr)	32-Bit Float	Wm^{-2}	-1400.0 .. 1400.0	27
30	Upward LW flux (flx_adj_srf_up_lw_clr)	32-Bit Float	Wm^{-2}	-500.0 .. 500.0	27
31	Upward SW flux (flx_adj_toa_up_sw_clr)	32-Bit Float	Wm^{-2}	-1400.0 .. 1400.0	27
32	Upward LW flux (flx_adj_toa_up_lw_clr)	32-Bit Float	Wm^{-2}	-500.0 .. 500.0	
	Flux Adjustments Total-sky - sfc, TOA (mean, stdev, num obs)				
33	Downward SW flux (flx_adj_srf_dn_sw_tot)	32-Bit Float	Wm^{-2}	-1400.0 .. 1400.0	27
34	Downward LW flux (flx_adj_srf_dn_lw_tot)	32-Bit Float	Wm^{-2}	-500.0 .. 500.0	27
35	Upward SW flux (flx_adj_srf_up_sw_tot)	32-Bit Float	Wm^{-2}	-1400.0 .. 1400.0	27
36	Upward LW flux (flx_adj_srf_up_lw_tot)	32-Bit Float	Wm^{-2}	-500.0 .. 500.0	27
37	Upward SW flux (flx_adj_toa_up_sw_tot)	32-Bit Float	Wm^{-2}	-1400.0 .. 1400.0	27
38	Upward LW flux (flx_adj_toa_up_lw_tot)	32-Bit Float	Wm^{-2}	-500.0 .. 500.0	27
	Clear-sky Adjustment Parameters (mean, stdev, num obs)				
39	Adjusted precipitable water (clrsky_adj_prec_H2O)	32-Bit Float	cm	-10.0 .. 10.0	27
40	Adjusted suface albedo (clrsky_adj_srf_albedo)	32-Bit Float	N/A	-1.0 .. 1.0	27
41	Adjusted aerosol optical depth (clrsky_adj_aero_opt_depth)	32-Bit Float	N/A	-2.0 .. 2.0	27
42	Adjusted skin temperature (clrsky_adj_skin_temp)	32-Bit Float	k	175 .. 375	27
	Surface Data				
43	Spectral albedo (spectral_albedo)	32-Bit Float	N/A	0.0 .. 1.0	54
44	Broadband surface albedo (bband_surf_alb)	32-Bit Float	N/A	0.0 .. 1.0	9
45	LW Surface Emissivity (srf_lw_emissivity)	32-Bit Float	N/A	0.0 .. 1.0	9
46	WN Surface Emissivity (srf_wn_emissivity)	32-Bit Float	N/A	0.0 .. 1.0	9
47	Imager_based surface skin temperature (surf_skin_temp)	32-Bit Float	k	175.0 .. 375.0	9
48	Photosynthetically active radiation (photo_active_rad)	32-Bit Float	Wm^{-2}	0.0 .. 780.0	9
49	Direct/Diffuse ratio at surface (dir_dif_ratio), mean	32-Bit Float	N/A	0.0 .. 30.0	9
50	Corrected initial broadband surface albedo (corr_bband_surf_alb)	32-Bit Float	N/A	0.0 .. 1.0	9
	Angular Model Scene Types				
51	Incident solar flux (angmod_inc_sol)	32-Bit Float	N/A	0.0 .. 1400.0	9
52	Fractional area coverage (angmod_frac_cov)	32-Bit Float	percent	0.0 .. 100	108
53	Albedo (angmod_alb), mean, stdev	32-Bit Float	N/A	0.0 .. 1.0	216
54	LW flux (angmod_lw), mean, stdev	32-Bit Float	Wm^{-2}	0.0 .. 400.0	216
	Column Averaged Cloud Properties for 5 Weightings - TOA SW, TOA LW, SFC LW, LWP, & IWP (mean, stdev, num obs)				
55	Total cloud area fraction (wtd_cld_total_area_frac)	32-Bit Float	percent	0.0 .. 100.0	45
56	Cloud effective pressure (wtd_cld_eff_press)	32-Bit Float	hPa	0.0 .. 1100.0	135
57	Cloud effiective temperature (wtd_cld_eff_temp)	32-Bit Float	K	100.0 .. 350.0	135
58	Cloud effective height (wtd_cld_eff_alt)	32-Bit Float	km	0.0 .. 20.0	135
59	Cloud top pressure (wtd_cld_top_press)	32-Bit Float	hPa	0.0 .. 1100.0	135
60	Cloud base pressure (wtd_cld_bot_press)	32-Bit Float	hPa	0.0 .. 1100.0	135
61	Cloud particle phase (wtd_cld_particle_phase)	32-Bit Float	N/A	1.0 .. 2.0	135
62	Liquid water path (wtd_cld_liq_H2O)	32-Bit Float	gm^{-2}	0.0 .. 10000.0	135
63	Ice water path (wtd_cld_ice_H2O)	32-Bit Float	gm^{-2}	0.0 .. 10000.0	135
64	Water particle radius (wtd_cld_liq_part_radius)	32-Bit Float	µm	0.0 .. 40.0	135
65	Ice particle effective diameter (wtd_cld_ice_eff_diameter)	32-Bit Float	µm	0.0 .. 300.0	135
66	Cloud visible optical depth, linear (wtd_cld_vis_opdep_linear)	32-Bit Float	N/A	0.0 .. 100.0	135
67	Cloud visible optical depth, log (wtd_cld_vis_opdep_log)	32-Bit Float	N/A	0.0 .. 100.0	135
68	Infrared emissivity (wtd_cld_ired_emis)	32-Bit Float	N/A	0.0 .. 2.0	135
69	Cloud vertical aspect ratio (wtd_cld_vert_asp_ratio)	32-Bit Float	N/A	0.0 .. 20.0	135

Table 2.11-2. AVG Grid Data (3 of 3)

Field No.	Field Name / Parameter	Data Type	Units	Range	No. of Components
	Adjustment Parameters for Column-Averaged Data for 5 Weightings - TOA SW, TOA LW, SFC LW, LWP, & IWP (mean, stdev, num obs)				
70	Adjusted optical depth (logarithmic) (wtd_cld_adj_opt_depth)	2-Bit Float	N/A	-400.0 .. 400.0	135
71	Adjusted cloud fractional area (wtd_cld_adj_frac_area)	32-Bit Float	N/A	-1.0 .. 1.0	135
72	Adjusted cloud effective temperature (wtd_cld_adj_eff_temp)	32-Bit Float	K	100.0 .. 350.0	135
	Cloud Properties for 4 Layers - H, UM, LM, & L (mean, stdev, num obs)				
73	Total cloud area fraction (cld_layer_total_area_frac)	32-Bit Float	percent	0.0 .. 100.0	4
74	Cloud effective pressure (cld_layer_eff_press)	32-Bit Float	hPa	0.0 .. 1100.0	12
75	Cloud effective temperature (cld_layer_eff_temp)	32-Bit Float	K	100.0 .. 350.0	12
76	Cloud effective height (cld_layer_eff_alt)	32-Bit Float	km	0.0 .. 20.0	12
77	Cloud top pressure (cld_layer_top_press)	32-Bit Float	hPa	0.0 .. 1100.0	12
78	Cloud base pressure (cld_layer_bot_press)	32-Bit Float	hPa	0.0 .. 1100.0	12
79	Cloud particle phase(cld_layer_particle_phase)	32-Bit Float	N/A	1.0 .. 2.0	12
80	Liquid water path (cld_layer_liq_H2O)	32-Bit Float	gm^{-2}	0.0 .. 10000.0	12
81	Ice water path (cld_layer_ice_H2O)	32-Bit Float	gm^{-2}	0.0 .. 10000.0	12
82	Water particle radius (cld_layer_liq_part_radius)	32-Bit Float	µm	0.0 .. 40.0	12
83	Ice particle effective diameter (cld_layer_ice_eff_diameter)	32-Bit Float	µm	0.0 .. 300.0	12
84	Cloud visible optical depth, linear (cld_layer_vis_opdep_linear)	32-Bit Float	N/A	0.0 .. 100.0	12
85	Cloud visible optical depth, log (cld_layer_vis_opdep_log)	32-Bit Float	N/A	0.0 .. 100.0	12
86	Infrared emissivity (cld_layer_ired_emis)	32-Bit Float	N/A	0.0 .. 2.0	12
87	Cloud vertical aspect ratio (cld_layer_vert_asp_ratio)	32-Bit Float	N/A	0.0 .. 20.0	12
	Adjustment Parameters for 4 Layers - H, UM, LM, & L (mean, stdev, num obs)				
88	Adjusted optical depth (cld_lay_adj_opt_depth)	32-Bit Float	N/A	-400.0 .. 400.0	12
89	Adjusted cloud fractional area (cld_lay_adj_frac_area)	32-Bit Float	N/A	-1.0 .. 1.0	12
90	Adjusted cloud effective temperature (cld_lay_adj_eff_temp)	32-Bit Float	K	100.0 .. 350.0	12
	Overlap Data for 11 Cloud Conditions - clear, L, LM, UM, H, H/UM, H/LM, H/L, UM/LM, UM/L, LM/L (mean, stdev, num obs)				
91	Overlap condition weighted area fraction (overlap_cond_area_frac)	32-Bit Float	percent	0.0 .. 100.0	11

Total Bits / Record: **153856**
Total Records / File: **64800**
Total Bits / File: **9969868800**

Total Bytes / Record: **19232**
Total Bytes / File: **1246233600**

2.12 Monthly Zonal and Global Radiative Fluxes and Clouds (ZAVG)

EOSDIS Product Code: CER15

The Monthly Zone and Global Radiative Fluxes and Clouds (ZAVG) product is a summary of zonal and global averages of the radiative fluxes and cloud properties, probably most suitable for inclusion in the Earth Observing System Data and Information System (EOSDIS) Information Management System (IMS) as a browse product. This product is the CERES equivalent to the zonal averages and global averages in the ERBE S-4 product. This product is written in HDF-EOS and contains metadata as well as gridded science data.

The major categories of data output on the ZAVG are as follows:

- Zonal/Global data
- Radiative fluxes for both Clear-sky and total-sky at TOA
- Cloud category properties for four cloud layers
- Column-averaged cloud properties for five weighting schemes
- Overlap data for eleven cloud conditions
- Angular model scene classes
- Adjustment parameters for four cloud layers
- Atmospheric flux profile for Clear-sky and total-sky
- Flux adjustments for Clear-sky and total-sky
- Surface data
- Adjustment parameters for clear-skies

A complete listing of metadata and science parameters for this data product can be found in Table 2.12-1 and Table 2.12-2.

Level: 3
Type: Archival
Frequency: Monthly

Time Interval Covered
File: 1 Month
Record: 1 Month

Portion of Globe Covered
File: Entire Globe
Record: Zonal or Global

Portion of Atmosphere Covered
File: Surface to TOA

ZAVG Metadata

The types of ZAVG metadata are summarized in Table 2.12-1 and contain information which need only be recorded once per product. The CERES metadata are listed in Tables B-1 and B-2 in Appendix B. Table B-1 lists the CERES Baseline Header Metadata and Table B-2 lists the parameters in the CERES_metadata Vdata Table.

Table 2.12-1. AVG Metadata Summary

HDF Name	Description Table	Records	Number of Fields
CERES Baseline Header Metadata	Table B-1	1	36
CERES_metadata science data	Table B-2	1	14

All of the ZAVG science data are organized into the HDF-EOS Grid data type, which is shown in Table 2.12-2 below. This table contains a list of the parameters within each grid, including the field number, the field name along with the parameter name as it is stored in the HDF-EOS file, the data type, the units, the range, and the number of components within each field.

Table 2.12-2. ZAVG Grid Data (1 of 3)

Field No.	Field Name / Parameter	Data Type	Units	Range	No. of Components
	Zone/Globe Parameters				
1	Surface type percent coverage (surface_percent)	32-Bit Float	N/A	0.0 .. 100.0	20
2	Surface altitude (surface_altitude)	32-Bit Float	m	-1000 .. 10000	1
3	Snow/Ice percent coverage (snow_ice_cover)	32-Bit Float	N/A	0.0 .. 100.0	1
4	Fire percent coverage (fire_perc_cov)	32-Bit Float	N/A	0.0 .. 100.0	1
5	Total aerosol visible optical depth @ 0.63 microns (aero_vis_opt_depth063)	32-Bit Float	N/A	0.0 .. 2.0	1
6	Total aerosol visible optical depth @ 1.6 microns (aero_vis_opt_depth160)	32-Bit Float	N/A	0.0 .. 2.0	1
7	Aerosol percent coverage (aero_perc_cov)	32-Bit Float	N/A	0.0 .. 20.0	1
	TOA Fluxes for Clear-sky (mean, stdev, num obs)				
8	SW Flux (TOA_sw_clr)	32-Bit Float	Wm^{-2}	0.0 .. 800.0	27
9	LW Flux (TOA_lw_clr)	32-Bit Float	Wm^{-2}	0.0 .. 400.0	27
10	WN Flux (TOA_wn_clr)	32-Bit Float	Wm^{-2}	0.0 .. 800.0	27
11	Total Albedo (TOA_alb_clr)	32-Bit Float	N/A	0.0 .. 1.0	27
	TOA Fluxes for Total-sky (mean, stdev, num obs)				
12	SW Flux (TOA_sw_tot)	32-Bit Float	Wm^{-2}	0.0 .. 800.0	27
13	LW Flux (TOA_lw_tot)	32-Bit Float	Wm^{-2}	0.0 .. 400.0	27
14	WN Flux (TOA_wn_tot)	32-Bit Float	Wm^{-2}	0.0 .. 800.0	27
15	Total Albedo (TOA_alb_tot)	32-Bit Float	N/A	0.0 .. 1.0	27

Table 2.12-2. ZAVG Grid Data (2 of 3)

Field No.	Field Name / Parameter	Data Type	Units	Range	No. of Components
	Atmospheric Flux Profile for Clear-sky for 4 Layers - sfc, 500hpa, 70hpa, & TOA (mean, stdev, num obs)				
17	Upward SW flux (flx_lvl_up_sw_clr)	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	108
18	Downward SW flux (flx_lvl_down_sw_clr)	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	108
19	Upward LW flux (flx_lvl_up_lw_clr)	32-Bit Float	Wm^{-2}	0.0 .. 700.0	108
20	Downward LW flux (flx_lvl_down_lw_clr)	32-Bit Float	Wm^{-2}	0.0 .. 600.0	108
	Atmospheric Flux Profile for Total-sky for 4 Layers - sfc, 500hpa, 70hpa, & TOA (mean, stdev, num obs)				
21	Upward SW flux (flx_lvl_up_sw_tot)	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	108
22	Downward SW flux (flx_lvl_down_sw_tot)	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	108
23	Upward LW flux (flx_lvl_up_lw_tot)	32-Bit Float	Wm^{-2}	0.0 .. 700.0	108
24	Downward LW flux (flx_lvl_down_lw_tot)	32-Bit Float	Wm^{-2}	0.0 .. 600.0	108
25	Number of Atmospheric Layers (num_atmos_layers)	32-Bit Float	N/A	0 .. 4	9
26	Pressure, atmospheric layer (atmos_layer_press)	32-Bit Float	hPa	0 .. 1100	36
	Flux Adjustments Clear-sky - sfc, TOA (mean, stdev, num obs)				
27	Downward SW flux (flx_adj_srf_dn_sw_clr)	32-Bit Float	Wm^{-2}	-1400.0 .. 1400.0	27
28	Downward LW flux (flx_adj_srf_dn_lw_clr)	32-Bit Float	Wm^{-2}	-500.0 .. 500.0	27
29	Upward SW flux (flx_adj_srf_up_sw_clr)	32-Bit Float	Wm^{-2}	-1400.0 .. 1400.0	27
30	Upward LW flux (flx_adj_srf_up_lw_clr)	32-Bit Float	Wm^{-2}	-500.0 .. 500.0	27
31	Upward SW flux (flx_adj_toa_up_sw_clr)	32-Bit Float	Wm^{-2}	-1400.0 .. 1400.0	27
32	Upward LW flux (flx_adj_toa_up_lw_clr)	32-Bit Float	Wm^{-2}	-500.0 .. 500.0	27
	Flux Adjustments Total-sky - sfc, TOA (mean, stdev, num obs)				
33	Downward SW flux (flx_adj_srf_dn_sw_tot)	32-Bit Float	Wm^{-2}	-1400.0 .. 1400.0	27
34	Downward LW flux (flx_adj_srf_dn_lw_tot)	32-Bit Float	Wm^{-2}	-500.0 .. 500.0	27
35	Upward SW flux (flx_adj_srf_up_sw_tot)	32-Bit Float	Wm^{-2}	-1400.0 .. 1400.0	27
36	Upward LW flux (flx_adj_srf_up_lw_tot)	32-Bit Float	Wm^{-2}	-500.0 .. 500.0	27
37	Upward SW flux (flx_adj_toa_up_sw_tot)	32-Bit Float	Wm^{-2}	-1400.0 .. 1400.0	27
38	Upward LW flux (flx_adj_toa_up_lw_tot)	32-Bit Float	Wm^{-2}	-500.0 .. 500.0	27
	Clear-sky Adjustment Parameters (mean, stdev, num obs)				
39	Adjusted precipitable water (clrsky_adj_prec_H2O)	32-Bit Float	cm	-10.0 .. 10.0	27
40	Adjusted suface albedo (clrsky_adj_srf_albedo)	32-Bit Float	N/A	-1.0 .. 1.0	27
41	Adjusted aerosol optical depth (clrsky_adj_aero_opt_depth)	32-Bit Float	N/A	-2.0 .. 2.0	27
42	Adjusted skin temperature (clrsky_adj_skin_temp)	32-Bit Float	k	175.0 .. 375.0	27
	Surface Data				
43	Spectral albedo (spectral_albedo)	32-Bit Float	N/A	0.0 .. 1.0	54
44	Broadband surface albedo (bband_surf_alb)	32-Bit Float	N/A	0.0 .. 1.0	9
45	LW Surface Emissivity (srf_lw_emissivity)	32-Bit Float	N/A	0.0 .. 1.0	9
46	WN Surface Emissivity (srf_wn_emissivity)	32-Bit Float	N/A	0.0 .. 1.0	9
47	Imager-based surface skin temperature (surf_skin_temp)	32-Bit Float	k	175.0 .. 375.0	9
48	Photosynthetically active radiation (photo_active_rad)	32-Bit Float	Wm^{-2}	0.0 .. 780.0	9
49	Direct/Diffuse ratio at surface (dir_dif_ratio), mean	32-Bit Float	N/A	0.0 .. 30	9
50	Corrected initial broadband surface albedo (corr_bband_surf_alb)	32-Bit Float	N/A	0.0 .. 1.0	9
	Angular Model SceneTypes				
51	Incident solar flux (angmod_inc_sol)	32-Bit Float	N/A	0.0 .. 1400.0	9
52	Fractional area coverage (angmod_frac_cov)	32-Bit Float	percent	0.0 .. 100	108
53	Albedo (angmod_alb), mean, stdev	32-Bit Float	N/A	0.0 .. 1.0	216
54	LW flux (angmod_lw), mean, stdev	32-Bit Float	Wm^{-2}	0.0 .. 400.0	216

Table 2.12-2. ZAVG Grid Data (3 of 3)

Field No.	Field Name / Parameter	Data Type	Units	Range	No. of Components
	Column Averaged Cloud Properties for 5 Weightings -TOA SW, TOA LW, SFC LW, LWP, & IWP (mean, stdev, num obs)				
55	Total cloud area fraction (wtd_cld_total_area_frac)	32-Bit Float	percent	0.0 .. 100.0	45
56	Cloud effective pressure (wtd_cld_eff_press)	32-Bit Float	hPa	0.0 .. 1100.0	135
57	Cloud effiective temperature (wtd_cld_eff_temp)	32-Bit Float	K	100.0 .. 350.0	135
58	Cloud effective height (wtd_cld_eff_alt)	32-Bit Float	km	0.0 .. 20.0	135
59	Cloud top pressure (wtd_cld_top_press)	32-Bit Float	hPa	0.0 .. 1100.0	135
60	Cloud base pressure (wtd_cld_bot_press)	32-Bit Float	hPa	0.0 .. 1100.0	135
61	Cloud particle phase (wtd_cld_particle_phase)	32-Bit Float	N/A	1.0 .. 2.0	135
62	Liquid water path (wtd_cld_liq_H2O)	32-Bit Float	gm^{-2}	0.0 .. 10000.0	135
63	Ice water path (wtd_cld_ice_H2O)	32-Bit Float	gm^{-2}	0.0 .. 10000.0	135
64	Water particle radius (wtd_cld_liq_part_radius)	32-Bit Float	µm	0.0 .. 40.0	135
65	Ice particle effective diameter (wtd_cld_ice_eff_diameter)	32-Bit Float	µm	0.0 .. 300.0	135
66	Cloud visible optical depth, linear (wtd_cld_vis_opdep_linear)	32-Bit Float	N/A	0.0 .. 100.0	135
67	Cloud visible optical depth, log (wtd_cld_vis_opdep_log)	32-Bit Float	N/A	0.0 .. 100.0	135
68	Infrared emissivity (wtd_cld_ired_emis)	32-Bit Float	N/A	0.0 .. 2.0	135
69	Cloud vertical aspect ratio (wtd_cld_vert_asp_ratio)	32-Bit Float	N/A	0.0 .. 20.0	135
	Adjustment Parameters for Column-Averaged Data for 5 Weightings - TOA SW, TOA LW, SFC LW, LWP, & IWP (mean, stdev, num obs)				
70	Adjusted optical depth (logarithmic) (wtd_cld_adj_opt_depth)	32-Bit Float	N/A	-400.0 .. 400.0	135
71	Adjusted cloud fractional area (wtd_cld_adj_frac_area)	32-Bit Float	N/A	-1.0 .. 1.0	135
72	Adjusted cloud effective temperature (wtd_cld_adj_eff_temp)	32-Bit Float	K	100.0 .. 350.0	135
	Monthly Only Cloud Properties for 4 Layers -H, UM, LM, & L (mean, stdev, num obs)				
73	Total cloud area fraction (cld_layer_total_area_frac)	32-Bit Float	percent	0.0 .. 100.0	4
74	Cloud effective pressure (cld_layer_eff_press)	32-Bit Float	hPa	0.0 .. 1100.0	12
75	Cloud effective temperature (cld_layer_eff_temp)	32-Bit Float	K	100.0 .. 350.0	12
76	Cloud effective height (cld_layer_eff_alt)	32-Bit Float	km	0.0 .. 20.0	12
77	Cloud top pressure (cld_layer_top_press)	32-Bit Float	hPa	0.0 .. 1100.0	12
78	Cloud base pressure (cld_layer_bot_press)	32-Bit Float	hPa	0.0 .. 1100.0	12
79	Cloud particle phase(cld_layer_particle_phase)	32-Bit Float	N/A	1.0 .. 2.0	12
80	Liquid water path (cld_layer_liq_H2O)	32-Bit Float	gm^{-2}	0.0 .. 10000.0	12
81	Ice water path (cld_layer_ice_H2O)	32-Bit Float	gm^{-2}	0.0 .. 10000.0	12
82	Water particle radius (cld_layer_liq_part_radius)	32-Bit Float	µm	0.0 .. 40.0	12
83	Ice particle effective diameter (cld_layer_ice_eff_diameter)	32-Bit Float	µm	0.0 .. 300.0	12
84	Cloud visible optical depth, linear (cld_layer_vis_opdep_linear)	32-Bit Float	N/A	0.0 .. 100.0	12
85	Cloud visible optical depth, log (cld_layer_vis_opdep_log)	32-Bit Float	N/A	0.0 .. 100.0	12
86	Infrared emissivity (cld_layer_ired_emis)	32-Bit Float	N/A	0.0 .. 2.0	12
87	Cloud vertical aspect ratio (cld_layer_vert_asp_ratio)	32-Bit Float	N/A	0.0 .. 20.0	12
	Adjustment Parameters for 4 Layers - H, UM, LM, & L (mean, stdev, num obs)				
88	Adjusted optical depth (cld_lay_adj_opt_depth)	32-Bit Float	N/A	-400.0 .. 400.0	12
89	Adjusted cloud fractional area (cld_lay_adj_frac_area)	32-Bit Float	N/A	-1.0 .. 1.0	12
90	Adjusted cloud effective temperature (cld_lay_adj_eff_temp)	32-Bit Float	K	100.0 .. 350.0	12
	Overlap Data for 11 cloud conditions - clear, L, LM, UM, H, H/UM, H/LM, H/L, UM/LM, UM/L, LM/L (mean, stdev, num obs)				
91	Overlap condition weighted area fraction (overlap_cond_area_frac)	32-Bit Float	percent	0.0 .. 100.0	11

Total Bits / Record: **153856**
Total Records / File: **181**
Total Bits / File: **27847936**

Total Bytes / Record:: **19232**
Total Bytes / File: **3480992**

2.13 Monthly Gridded Single Satellite TOA and Surface Fluxes/Clouds (SFC)

EOSDIS Product Code: CER12

The Monthly Gridded Single Satellite Fluxes and Clouds (SFC) archival data product contains hourly single satellite flux and cloud parameters averaged over 1.0-degree regions. Input to the SFC Subsystem is the Single Satellite CERES Footprint TOA and Surface Fluxes, Clouds (SSF) archival data product. Each SFC covers a single month swath from a single CERES instrument mounted on one satellite. The product is written in HDF and contains metadata as well as gridded science data. The science data are Vdata with multiple records. Vdata structures are collections of records similar to records used in conventional database applications (multifield, various data types). Each record contains spatially averaged data for an individual region.

The major categories of data output on the SFC are as follows:

- Region data
- Total-sky radiative fluxes at TOA and surface
- Clear-sky radiative fluxes at TOA and surface
- Column-averaged cloud properties
- Angular model scene classes
- Surface-only data

A complete listing of metadata and science parameters for this data product can be found in Tables 2.13-1 through Table 2.13-16.

Level: 3
Type: Archival
Frequency: 1/Month

Time Interval Covered
File: Month
Record: Hour

Portion of Globe Covered
File: Gridded Satellite Swath
Record: 1.0-Deg Equal-angle Region

Portion of Atmosphere Covered
File: TOA and Surface

SFC Metadata

The types of SFC metadata are summarized in Table 2.13-1 and contain information which need only be recorded once per product. The CERES metadata are listed in Tables B-1 and B-2 in Appendix B. Table B-1 lists the CERES Baseline Header Metadata and Table B-2 lists the parameters in the CERES_metadata Vdata Table. Note that the CERES_metadata Vdata is a subset of the CERES Baseline Header Metadata. The SFC product-specific metadata parameters are listed in Table 2.13-2.

Table 2.13-1. SFC Metadata Summary

HDF Name	Description Table	Records	Number of Fields
CERES Baseline Header Metadata	Table B-1	1	36
CERES_metadata Vdata	Table B-2	1	14
SFC Product Specific Metadata	Table 2.13-2	1	2

Table 2.13-2. SFC Product-specific Metadata

Item	Parameter Name	Description	DataType	Units	Range
1	ZoneBeginning	Beginning zone number	I4	N/A	1 .. 180
2	ZoneEnding	Ending zone number	I4	N/A	1 .. 180

All of the FSW science data are organized into various Vdata Structures, which are summarized in Table 2.13-3. Tables 2.13-4 through Table 2.13-16 contain a list of parameters within each Vdata, including the field number, the field name, the data type, the units, the range, and the number of components within each field.

The size of each Vdata is based on the SFC HDF product which consist of 18 files containing data for 10 1.0-degree equal-angle zones in each file. The number of records per Vdata is defined as n where n varies for each file. Sizing estimates are based on anticipated TRMM sampling.

Table 2.13-3. SFC Vdata Summary (1 of 2)

Vdata Name	Description Table	Records	Number of Fields	Vdata Size (MB)
Time and Position Data	Table 2.13-4	n	6	97.1
Regional Identification Data	Table 2.13-5	n	3	48.6
Other Regional Parameters	Table 2.13-6	n	4	372.2
TOA FLuxes (mean std num_obs)	Table 2.13-7	n	8	388.4
Surface Clear-sky Flux (mean std num_obs)	Table 2.13-8	n	9	437.0
Surface Total-Sky Flux (mean std num_obs)	Table 2.13-9	n	9	437.0

Table 2.13-3. SFC Vdata Summary (2 of 2)

Vdata Name	Description Table	Records	Number of Fields	Vdata Size (MB)
Emissivity	Table 2.13-10	n	2	32.4
Column Weighted Cloud Data - SW TOA (mean std num_obs)	Table 2.13-11	n	15	695.9
Column Weighted Cloud Data - LW TOA (mean std num_obs)	Table 2.13-12	n	15	695.9
Column Weighted Cloud Data - LW SRF (mean std num_obs)	Table 2.13-13	n	15	695.9
Column Weighted Cloud Data - LWP (mean std num_obs)	Table 2.13-14	n	15	695.9
Column Weighted Cloud Data - IWP (mean std num_obs)	Table 2.13-15	n	15	695.9
Angular Model Scene Type Data for 12 Scenes	Table 2.13-16	n	6	987.2
Vdata TOTAL SIZE				**5842.4**

Table 2.13-4. Time and Position Data

Field No.	Field Name / Parameter	Data Type	Units	Range	No. of Components
1	Julian Time	32-Bit Float	day	2 440 000.0 .. 2 480 000.0	1
2	Sun Colatitude	32-Bit Float	deg	0.0 .. 180.0	1
3	Sun Longitude	32-Bit Float	deg	0.0 .. 360.0	1
4	Relative Azimuth Angle	32-Bit Float	deg	0.0 .. 360.0	1
5	Cos. Solar Zenith Angle	32-Bit Float	N/A	0.0 .. 1.0	1
6	Spacecraft Zenith Angle	32-Bit Float	deg	0.0 .. 90.0	1

Table 2.13-5. Regional Identification Data

Field No.	Field Name / Parameter	Data Type	Units	Range	No. of Components
1	Region Number	32-Bit Float	N/A	1 .. 64800	1
2	Hour Box Number	32-Bit Float	N/A	1 .. 744	1
3	Num. Footprints in Region	32-Bit Float	N/A	1 .. 40	1

Table 2.13-6. Other Regional Parameters

Field No.	Field Name / Parameter	Data Type	Units	Range	No. of Components
1	Alt. of Srf. above Sea	32-Bit Float	m	-1000.0 .. 10000.0	1
2	Surface Type Percentage	32-Bit Float	percent	0.0 .. 100.0	20
3	Snow/Ice Percentage	32-Bit Float	percent	0.0 .. 100.0	1
4	Precipitable Water	32-Bit Float	cm	0.0001 .. 10.0	1

Table 2.13-7. TOA FLuxes (mean std num_obs)

Field No.	Field Name / Parameter	Data Type	Units	Range	No. of Components
1	SW TOA Clear-sky	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	3
2	LW TOA Clear-sky	32-Bit Float	Wm^{-2}	0.0 .. 500.0	3
3	WN TOA Clear-sky	32-Bit Float	Wm^{-2}	10.0 .. 400.0	3
4	ALB TOA Clear-sky	32-Bit Float	N/A	0.0 .. 1.0	3
5	SW TOA Total-Sky	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	3
6	LW TOA Total-Sky	32-Bit Float	Wm^{-2}	0.0 .. 500.0	3
7	WN TOA Total-Sky	32-Bit Float	Wm^{-2}	10.0 .. 400.0	3
8	ALB TOA Total-Sky	32-Bit Float	N/A	0.0 .. 1.0	3

Table 2.13-8. Surface Clear-sky Flux (mean std num_obs)

Field No.	Field Name / Parameter	Data Type	Units	Range	No. of Components
1	Downward SW Flux, Model A	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	3
2	Downward LW Flux, Model A	32-Bit Float	Wm^{-2}	0.0 .. 700.0	3
3	SW Net Flux, Model A	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	3
4	LW Net Flux, Model A	32-Bit Float	Wm^{-2}	-250.0 .. 50.0	3
5	Downward WN Flux, Model A	32-Bit Float	Wm^{-2}	0.0 .. 250.0	3
6	Downward SW Flux, Model B	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	3
7	Downward LW Flux, Model B	32-Bit Float	Wm^{-2}	0.0 .. 700.0	3
8	SW Net Flux, Model B	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	3
9	LW Net Flux, Model B	32-Bit Float	Wm^{-2}	-250.0 .. 50.0	3

Table 2.13-9. Surface Total-sky Flux (mean std num_obs)

Field No.	Field Name / Parameter	Data Type	Units	Range	No. of Components
1	Downward SW Flux, Model A	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	3
2	Downward LW Flux, Model A	32-Bit Float	Wm^{-2}	0.0 .. 700.0	3
3	SW Net Flux, Model A	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	3
4	LW Net Flux, Model A	32-Bit Float	Wm^{-2}	-250.0 .. 50.0	3
5	Downward WN Flux, Model A	32-Bit Float	Wm^{-2}	0.0 .. 250.0	3
6	Downward SW Flux, Model B	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	3
7	Downward LW Flux, Model B	32-Bit Float	Wm^{-2}	0.0 .. 700.0	3
8	SW Net Flux, Model B	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	3
9	LW Net Flux, Model B	32-Bit Float	Wm^{-2}	-250.0 .. 50.0	3

Table 2.13-10. Emissivity

Field No.	Field Name / Parameter	Data Type	Units	Range	No. of Components
1	LW Surface	32-Bit Float	N/A	0.0 .. 1.0	1
2	WN Surface	32-Bit Float	N/A	0.0 .. 1.0	1

Table 2.13-11. Column Weighted Cloud Data - SW TOA (mean std num_obs)

Field No.	Field Name / Parameter	Data Type	Units	Range	No. of Components
1	Area Coverage Percentage	32-Bit Float	percent	0.0 .. 100.0	1
2	Effective Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3
3	Effective Temperature	32-Bit Float	K	100.0 .. 350.0	3
4	Effective Height	32-Bit Float	km	0.0 .. 20.0	3
5	Top Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3
6	Cloud Base Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3
7	Particle Phase	32-Bit Float	fraction	1.0 .. 2.0	3
8	Liquid Water Path	32-Bit Float	gm^{-2}	0.0 .. 10000.0	3
9	Ice Water Path	32-Bit Float	gm^{-2}	0.0 .. 10000.0	3
10	Water Particle Radius	32-Bit Float	µm	0.0 .. 40.0	3
11	Ice Particle Effective Diameter	32-Bit Float	µm	0.0 .. 300.0	3
12	Vis. Opt. Depth (linear)	32-Bit Float	N/A	0.0 .. 100.0	3
13	Vis. Opt. Depth (log)	32-Bit Float	N/A	0.0 .. 100.0	3
14	Infrared Emissivity	32-Bit Float	N/A	0.0 .. 2.0	3
15	Vertical Aspect Ratio	32-Bit Float	N/A	0.0 .. 20.0	3

Table 2.13-12. Column Weighted Cloud Data - LW TOA (mean std num_obs)

Field No.	Field Name / Parameter	Data Type	Units	Range	No. of Components
1	Area Coverage Percentage	32-Bit Float	percent	0.0 .. 100.0	1
2	Effective Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3
3	Effective Temperature	32-Bit Float	K	100.0 .. 350.0	3
4	Effective Height	32-Bit Float	km	0.0 .. 20.0	3
5	Top Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3
6	Cloud Base Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3
7	Particle Phase	32-Bit Float	fraction	1.0 .. 2.0	3
8	Liquid Water Path	32-Bit Float	gm^{-2}	0.0 .. 10000.0	3
9	Ice Water Path	32-Bit Float	gm^{-2}	0.0 .. 10000.0	3
10	Water Particle Radius	32-Bit Float	µm	0.0 .. 40.0	3
11	Ice Particle Effective Diameter	32-Bit Float	µm	0.0 .. 300.0	3
12	Vis. Opt. Depth (linear)	32-Bit Float	N/A	0.0 .. 100.0	3
13	Vis. Opt. Depth (log)	32-Bit Float	N/A	0.0 .. 100.0	3
14	Infrared Emissivity	32-Bit Float	N/A	0.0 .. 2.0	3
15	Vertical Aspect Ratio	32-Bit Float	N/A	0.0 .. 20.0	3

Table 2.13-13. Column Weighted Cloud Data - LW SRF (mean std num_obs)

Field No.	Field Name / Parameter	Data Type	Units	Range	No. of Components
1	Area Coverage Percentage	32-Bit Float	percent	0.0 .. 100.0	1
2	Effective Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3
3	Effective Temperature	32-Bit Float	K	100.0 .. 350.0	3
4	Effective Height	32-Bit Float	km	0.0 .. 20.0	3
5	Top Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3
6	Cloud Base Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3
7	Particle Phase	32-Bit Float	fraction	1.0 .. 2.0	3
8	Liquid Water Path	32-Bit Float	gm^{-2}	0.0 .. 10000.0	3
9	Ice Water Path	32-Bit Float	gm^{-2}	0.0 .. 10000.0	3
10	Water Particle Radius	32-Bit Float	µm	0.0 .. 40.0	3
11	Ice Particle Effective Diameter	32-Bit Float	µm	0.0 .. 300.0	3
12	Vis. Opt. Depth (linear)	32-Bit Float	N/A	0.0 .. 100.0	3
13	Vis. Opt. Depth (log)	32-Bit Float	N/A	0.0 .. 100.0	3
14	Infrared Emissivity	32-Bit Float	N/A	0.0 .. 2.0	3
15	Vertical Aspect Ratio	32-Bit Float	N/A	0.0 .. 20.0	3

Table 2.13-14. Column Weighted Cloud Data - LWP (mean std num_obs)

Field No.	Field Name / Parameter	Data Type	Units	Range	No. of Components
1	Area Coverage Percentage	32-Bit Float	percent	0.0 .. 100.0	1
2	Effective Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3
3	Effective Temperature	32-Bit Float	K	100.0 .. 350.0	3
4	Effective Height	32-Bit Float	km	0.0 .. 20.0	3
5	Top Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3
6	Cloud Base Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3
7	Particle Phase	32-Bit Float	fraction	1.0 .. 2.0	3
8	Liquid Water Path	32-Bit Float	gm^{-2}	0.0 .. 10000.0	3
9	Ice Water Path	32-Bit Float	gm^{-2}	0.0 .. 10000.0	3
10	Water Particle Radius	32-Bit Float	µm	0.0 .. 40.0	3
11	Ice Particle Effective Diameter	32-Bit Float	µm	0.0 .. 300.0	3
12	Vis. Opt. Depth (linear)	32-Bit Float	N/A	0.0 .. 100.0	3
13	Vis. Opt. Depth (log)	32-Bit Float	N/A	0.0 .. 100.0	3
14	Infrared Emissivity	32-Bit Float	N/A	0.0 .. 2.0	3
15	Vertical Aspect Ratio	32-Bit Float	N/A	0.0 .. 20.0	3

Table 2.13-15. Column Weighted Cloud Data - IWP (mean std num_obs)

Field No.	Field Name / Parameter	Data Type	Units	Range	No. of Components
1	Area Coverage Percentage	32-Bit Float	percent	0.0 .. 100.0	1
2	Effective Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3
3	Effective Temperature	32-Bit Float	K	100.0 .. 350.0	3
4	Effective Height	32-Bit Float	km	0.0 .. 20.0	3
5	Top Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3
6	Cloud Base Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3
7	Particle Phase	32-Bit Float	fraction	1.0 .. 2.0	3
8	Liquid Water Path	32-Bit Float	gm^{-2}	0.0 .. 10000.0	3
9	Ice Water Path	32-Bit Float	gm^{-2}	0.0 .. 10000.0	3
10	Water Particle Radius	32-Bit Float	µm	0.0 .. 40.0	3
11	Ice Particle Effective Diameter	32-Bit Float	µm	0.0 .. 300.0	3
12	Vis. Opt. Depth (linear)	32-Bit Float	N/A	0.0 .. 100.0	3
13	Vis. Opt. Depth (log)	32-Bit Float	N/A	0.0 .. 100.0	3
14	Infrared Emissivity	32-Bit Float	N/A	0.0 .. 2.0	3
15	Vertical Aspect Ratio	32-Bit Float	N/A	0.0 .. 20.0	3

Table 2.13-16. Angular Model Scene Type Data for 12 Scenes

Field No.	Field Name / Parameter	Data Type	Units	Range	No. of Components
1	Incident Solar Flux	32-Bit Float	N/A	0.0 .. 1400.0	1
2	Area Coverage	32-Bit Float	percent	0.0 .. 100.0	12
3	Albedo (mean)	32-Bit Float	N/A	0.0 .. 1.0	12
4	Albedo (std)	32-Bit Float	N/A	0.0 .. 1.0	12
5	LW (mean)	32-Bit Float	Wm^{-2}	0.0 .. 400.0	12
6	LW (std)	32-Bit Float	Wm^{-2}	0.0 .. 400.0	12

2.14 Monthly TOA and SRB Averages (SRBAVG)

EOSDIS Product Code: CER06

The SRBAVG product contains 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. This product differs from the AVG product in three ways. First, the surface fluxes have been calculated from the TOA fluxes using parameterizations provided by the science team, instead of using the models provided by the SARB Subsystem. Secondly, no flux fields are calculated at levels between TOA and the surface. Lastly, the regional TOA fluxes are calculated using two methods.

SRBAVG is an archival product produced by Subsystem 10. There is one produced for each spacecraft and one for each combination of spacecraft. This product is written in HDF-EOS and contains metadata as well as gridded science data.

SRBAVG is composed of the following structures:

On a Regional, Zonal, and Global Basis:

- Regional parameters
- Total-sky radiative fluxes at TOA and surface
- Clear-sky radiative fluxes at TOA and surface
- Angular model scene types
- Column-averaged cloud properties for five weighting schemes:
  TOA SW, TOA LW, SFC LW, LWP and IWP
- Surface data

A complete listing of metadata and gridded science parameters for this data product can be found in Table 2.14-1 through Table 2.14-5.

Level: 3
Type: Archival
Frequency: 1/ Month

Time Interval Covered
File: 1 Month
Record: 1 Month

Portion of Globe Covered
File: Entire Globe
Record: 1-Deg Regions

Portion of Atmosphere Covered
File: Surface and TOA

SRBAVG Metadata

The types of SRBAVG metadata are summarized in Table 2.14-1 and contain information which need only be recorded once per product. The CERES metadata are listed in Tables B-1 and B-2 in Appendix B. Table B-1 lists the CERES Baseline Header Metadata and Table B-2 lists the parameters in the CERES_metadata Vdata table.

Table 2.14-1. SRBAVG Metadata Summary

HDF Name	Description Table	Records	Number of Fields
CERES Baseline Header Metadata	Table B-1	1	36
CERES_metadata science data	Table B-2	1	14

All of the SRBAVG science data are organized into the HDF-EOS Grid data type contained in two files, SRBAVG1 and SRBAVG2, which are shown in Tables 2.14-2 through 2.14-5 below. Each table contains a list of the parameters within each grid, including the field number, the field name along with the parameter name as it is stored in the HDF-EOS file, the data type, the units, the range, and the number of components within each field.

Table 2.14-2. SRBAVG1 Regional Grid Data (1 of 2)

Field No.	Field Name (Parameter)	Data Type	Units	Range	No. of Components
	Region Parameters				
1	Surface type percent coverage (surface_percent)	32-Bit Float	percent	0.0 .. 100.0	20
2	Altitude of surface above sea level (surface_altitude)	32-Bit Float	km	-1000.0 .. 10000	1
3	Snow/Ice Percent Coverage (snow_ice_cover)	32-Bit Float	percent	0.0 .. 100.0	1
4	Precipitable Water (precip_water)	32-Bit Float	cm	0.0001 .. 10.0	1
	Total-sky TOA Fluxes - ERBE method (mean, stdev, num obs)				
5	SW flux (TOA_sw_tot)	32-Bit Float	Wm^{-2}	0.0 .. 800.0	75
6	LW flux (TOA_lw_tot)	32-Bit Float	Wm^{-2}	0.0 .. 400.0	75
7	WN flux (TOA_wn_tot)	32-Bit Float	Wm^{-2}	0.0 .. 800.0	75
8	Albedo (TOA_alb_tot)	32-Bit Float	N/A	0.0 .. 1.0	75
	Total-sky TOA Fluxes - GEO method (mean, stdev, num obs)				
9	SW flux (TOA_sw_tot_geo)	32-Bit Float	Wm^{-2}	0.0 .. 800.0	75
10	LW flux (TOA_lw_tot_geo)	32-Bit Float	Wm^{-2}	0.0 .. 400.0	75
11	WN flux (TOA_wn_tot_geo)	32-Bit Float	Wm^{-2}	0.0 .. 800.0	75
12	Albedo (TOA_alb_tot_geo)	32-Bit Float	N/A	0.0 .. 1.0	75
	Clear-sky TOA Fluxes (mean, stdev, num obs)				
13	SW flux (TOA_sw_clr)	32-Bit Float	Wm^{-2}	0.0 .. 800.0	75
14	LW flux (TOA_lw_clr)	32-Bit Float	Wm^{-2}	0.0 .. 400.0	75
15	WN flux (TOA_wn_clr)	32-Bit Float	Wm^{-2}	0.0 .. 800.0	75
16	Albedo (TOA_alb_clr)	32-Bit Float	N/A	0.0 .. 1.0	75

Table 2.14-2. SRBAVG1 Regional Grid Data (2 of 2)

Field No.	Field Name (Parameter)	Data Type	Units	Range	No. of Components
	Surface Fluxes - Sfc_Down Total-sky (mean, stdev, num obs)				
17	SW flux, Model A (srf_sw_tot_dn_moda)	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	75
18	LW flux, Model A (srf_lw_tot_dn_moda)	32-Bit Float	Wm^{-2}	0.0 .. 700.0	75
19	SW flux, Model B (srf_sw_tot_dn_modb)	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	75
20	LW flux, Model B (srf_lw_tot_dn_modb)	32-Bit Float	Wm^{-2}	0.0 .. 700.0	75
21	WN flux, Model A (srf_wn_tot_dn_moda)	32-Bit Float	Wm^{-2}	0.0 .. 700.0	75
	Surface Fluxes - Sfc_Net Total-sky(mean, stdev, num obs)				
22	SW flux, Model A (srf_sw_tot_net_moda)	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	75
23	LW flux, Model A (srf_lw_tot_net_moda)	32-Bit Float	Wm^{-2}	-250.0 .. 50.0	75
24	SW flux, Model B (srf_sw_tot_net_modb)	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	75
25	LW flux, Model B (srf_lw_tot_net_modb)	32-Bit Float	Wm^{-2}	-250.0 .. 50.0	75
	Surface Fluxes - Sfc_Down Clear-sky (mean, stdev, num obs)				
26	SW flux, Model A (srf_sw_clr_dn_moda)	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	75
27	LW flux, Model A (srf_lw_clr_dn_moda)	32-Bit Float	Wm^{-2}	0.0 .. 700.0	75
28	SW flux, Model B (srf_sw_clr_dn_modb)	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	75
29	LW flux, Model B (srf_lw_clr_dn_modb)	32-Bit Float	Wm^{-2}	0.0 .. 700.0	75
30	WN flux, Model A (srf_wn_clr_dn_moda)	32-Bit Floa	Wm^{-2}	0.0 .. 700.0	75
	Surface Fluxes - Sfc_Net Clear-sky (mean, stdev, num obs)				
31	SW flux, Model A (srf_sw_clr_net_moda)	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	75
32	LW flux, Model A (srf_lw_clr_net_moda)	32-Bit Float	Wm^{-2}	-250.0 .. 50.0	75
33	SW flux, Model B (srf_sw_clr_net_modb)	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	75
34	LW flux, Model B (srf_lw_clr_net_modb)	32-Bit Float	Wm^{-2}	-250.0 .. 50.0	75
	Surface Data				
35	LW surface emissivity (srf_lw_emissivity)	32-Bit Float	N/A	0.0 .. 1.0	25
36	WN surface emissivity (srf_wn_emissivity)	32-Bit Float	N/A	0.0 .. 1.0	25

Table 2.14-3. SRBAVG1 Zonal and Global Grid Data

Field No.	Field Name / Parameter	Data Type	Units	Range	No. of Components
	Region Parameters				
37	Altitude of surface above sea level (surface_altitude)	32-Bit Float	km	-1000.0 .. 10000	1
38	Surface type percent coverage (surface_percent)	32-Bit Float	percent	0.0 .. 100.0	20
39	Snow/Ice Percent Coverage (snow_ice_cover)	32-Bit Float	percent	0.0 .. 100.0	1
40	Precipitable Water (precip_water)	32-Bit Float	cm	0.0001 .. 10.0	1
	Total-sky TOA Fluxes - ERBE method (mean, stdev, num obs)				
41	SW flux (TOA_sw_tot)	32-Bit Float	Wm^{-2}	0.0 .. 800.0	75
42	LW flux (TOA_lw_tot)	32-Bit Float	Wm^{-2}	0.0 .. 400.0	75
43	WN flux (TOA_wn_tot)	32-Bit Float	Wm^{-2}	0.0 .. 800.0	75
44	Albedo (TOA_alb_tot)	32-Bit Float	N/A	0.0 .. 1.0	75
	Total-sky TOA Fluxes - GEO method (mean, stdev, num obs)				
45	SW flux (TOA_sw_tot_geo)	32-Bit Float	Wm^{-2}	0.0 .. 800.0	75
46	LW flux (TOA_lw_tot_geo)	32-Bit Float	Wm^{-2}	0.0 .. 400.0	75
47	WN flux (TOA_wn_tot_geo)	32-Bit Float	Wm^{-2}	0.0 .. 800.0	75
48	Albedo (TOA_alb_tot_geo)	32-Bit Float	N/A	0.0 .. 1.0	75
	Clear-sky TOA Fluxes (mean, stdev, num obs)				
49	SW flux (TOA_sw_clr)	32-Bit Float	Wm^{-2}	0.0 .. 800.0	75
50	LW flux (TOA_lw_clr)	32-Bit Float	Wm^{-2}	0.0 .. 400.0	75
51	WN flux (TOA_wn_clr)	32-Bit Float	Wm^{-2}	0.0 .. 800.0	75
52	Albedo (TOA_alb_clr)	32-Bit Float	N/A	0.0 .. 1.0	75
	Surface Fluxes - Sfc_Down Total-sky (mean, stdev, num obs)				
53	SW flux, Model A (srf_sw_tot_dn_moda)	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	75
54	LW flux, Model A (srf_lw_tot_dn_moda)	32-Bit Float	Wm^{-2}	0.0 .. 700.0	75
55	SW flux, Model B (srf_sw_tot_dn_modb)	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	75
56	LW flux, Model B (srf_lw_tot_dn_modb)	32-Bit Float	Wm^{-2}	0.0 .. 700.0	75
57	WN flux, Model A (srf_wn_tot_dn_moda)	32-Bit Float	Wm^{-2}	0.0 .. 700.0	75
	Surface Fluxes - Sfc_Net Total-sky (mean, stdev, num obs)				
58	SW flux, Model A (srf_sw_tot_net_moda)	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	75
59	LW flux, Model A (srf_lw_tot_net_moda)	32-Bit Float	Wm^{-2}	-250.0 .. 50.0	75
60	SW flux, Model B (srf_sw_tot_net_modb)	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	75
61	LW flux, Model B (srf_lw_tot_net_modb)	32-Bit Float	Wm^{-2}	-250.0 .. 50.	75
	Surface Fluxes - Sfc_Down Clear-sky (mean, stdev, num obs)				
62	SW flux, Model A (srf_sw_clr_dn_moda)	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	75
63	LW flux, Model A (srf_lw_clr_dn_moda)	32-Bit Float	Wm^{-2}	0.0 .. 700.0	75
64	SW flux, Model B (srf_sw_clr_dn_modb)	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	75
65	LW flux, Model B (srf_lw_clr_dn_modb)	32-Bit Float	Wm^{-2}	0.0 .. 700.0	75
66	WN flux, Model A (srf_wn_clr_dn_moda)	32-Bit Floa	Wm^{-2}	0.0 .. 700.0	75
	Surface Fluxes - Sfc_Net Clear-sky (mean, stdev, num obs)				
67	SW flux, Model A (srf_sw_clr_net_moda)	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	75
68	LW flux, Model A (srf_lw_clr_net_moda)	32-Bit Float	Wm^{-2}	-250.0 .. 50.0	75
69	SW flux, Model B (srf_sw_clr_net_modb)	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	75
70	LW flux, Model B (srf_lw_clr_net_modb)	32-Bit Float	Wm^{-2}	-250.0 .. 50.0	75
	Surface Data				
71	LW surface emissivity (srf_lw_emissivity)	32-Bit Float	N/A	0.0 .. 1.0	25
72	WN surface emissivity (srf_wn_emissivity)	32-Bit Float	N/A	0.0 .. 1.0	25

Total Bits/Record: **74336**
Total Records/File: **64981**
Total Bits/File: **4830427616**

Total Bytes/Record: **9292**
Total Bytes/File: **603803452**

Table 2.14-4. SRBAVG2 Regional Grid Data

Field No.	Field Name (Parameter)	Data Type	Units	Range	No. of Components
	Angular Model Scene Types				
1	Incident solar flux (angmod_inc_sol)	32-Bit Float	N/A	0.0 .. 1400.0	25
2	Fractional area coverage (angmod_frac_cov)	32-Bit Float	percent	0.0 .. 100.0	300
3	Albedo (angmod_alb), mean, stdev	32-Bit Float	N/A	0.0 .. 1.0	600
4	LW flux (angmod_lw), mean, stdev	32-Bit Float	Wm^{-2}	0.0 .. 400.0	600
	Weighted_Cloud Properties for 5 Weightings - TOA SW, TOA LW, SFC LW, LWP, & IWP (mean, stdev, num obs)				
5	Total cloud area fraction (wtd_cld_total_area_frac)	32-Bit Float	N/A	0.0 .. 100.0	125
6	Cloud effective pressure (wtd_cld_eff_press)	32-Bit Float	hPa	0.0 .. 1100.0	375
7	Cloud effiective temperature (wtd_cld_eff_temp)	32-Bit Float	K	100.0 .. 350.0	375
8	Cloud effective altitude (wtd_cld_eff_alt)	32-Bit Float	km	0.0 .. 20.0	375
9	Cloud top pressure (wtd_cld_top_press)	32-Bit Float	hPa	0.0 .. 1100.0	375
10	Cloud base pressure (wtd_cld_bot_press)	32-Bit Float	hPa	0.0 .. 1100.0	375
11	Cloud particle phase (wtd_cld_particle_phase)	32-Bit Float	fraction	1.0 .. 2.0	375
12	Liquid water path (wtd_cld_liq_H2O)	32-Bit Float	gm^{-2}	0.0 .. 10000.0	375
13	Ice water path (wtd_cld_ice_H2O)	32-Bit Float	gm^{-2}	0.0 .. 10000.0	375
14	Water particle radius (wtd_cld_liq_part_radius)	32-Bit Float	micron	0.0 .. 40.0	375
15	Ice particle effective diameter (wtd_cld_ice_eff_diameter)	32-Bit Float	micron	0.0 .. 300.0	375
16	Cloud visible optical depth, linear (wtd_cld_vis_opdep_linear)	32-Bit Float	N/A	0.0 .. 100.0	375
17	Cloud visible optical depth, log (wtd_cld_vis_opdep_log)	32-Bit Float	N/A	0.0 .. 100.0	375
18	Infrared emissivity (wtd_cld_ired_emis)	32-Bit Float	N/A	0.0 .. 2.0	375
19	Cloud vertical aspect ratio (wtd_cld_vert_asp_ratio)	32-Bit Float	N/A	0.0 .. 20.0	375

Table 2.14-5. SRBAVG2 Zonal and Global Grid Data

Field No.	Field Name (Parameter)	Data Type	Units	Range	No. of Components
	Angular_Model Scene_Types				
20	Incident solar flux (angmod_inc_sol)	32-Bit Float	N/A	0.0 .. 1400	25
21	Fractional area coverage (angmod_frac_cov)	32-Bit Float	percent	0.0 .. 100.0	300
22	Albedo (angmod_alb), mean, stdev	32-Bit Float	N/A	0.0 .. 1.0	600
23	LW flux (angmod_lw), mean, stdev	32-Bit Float	Wm^{-2}	0.0 .. 400.0	600
	Weighted_Cloud Properties for 5 Weightings - TOA SW, TOA LW, SFC LW, LWP, & IWP (mean, stdev, num obs)				
24	Total cloud area fraction (wtd_cld_total_area_frac)	32-Bit Float	N/A	0.0 .. 100.0	125
25	Cloud effective pressure (wtd_cld_eff_press)	32-Bit Float	hPa	0.0 .. 1100.0	375
26	Cloud effiective temperature (wtd_cld_eff_temp)	32-Bit Float	K	100.0 .. 350.0	375
27	Cloud effective altitude (wtd_cld_eff_alt)	32-Bit Float	km	0.0 .. 20.0	375
28	Cloud top pressure (wtd_cld_top_press)	32-Bit Float	hPa	0.0 .. 1100.0	375
29	Cloud base pressure (wtd_cld_bot_press)	32-Bit Float	hPa	0.0 .. 1100.0	375
30	Cloud particle phase (wtd_cld_particle_phase)	32-Bit Float	fraction	1.0 .. 2.0	375
31	Liquid water path (wtd_cld_liq_H2O)	32-Bit Float	gm^{-2}	0.0 .. 10000.0	375
32	Ice water path (wtd_cld_ice_H2O)	32-Bit Float	gm^{-2}	0.0 .. 10000.0	375
33	Water particle radius (wtd_cld_liq_part_radius)	32-Bit Float	micron	0.0 .. 40.0	375
34	Ice particle effective diameter (wtd_cld_ice_eff_diameter)	32-Bit Float	micron	0.0 .. 300.0	375
35	Cloud visible optical depth, linear (wtd_cld_vis_opdep_linear)	32-Bit Float	N/A	0.0 .. 100.0	375
36	Cloud visible optical depth, log (wtd_cld_vis_opdep_log)	32-Bit Float	N/A	0.0 .. 100.0	375
37	Infrared emissivity (wtd_cld_ired_emis)	32-Bit Float	N/A	0.0 .. 2.0	375
38	Cloud vertical aspect ratio (wtd_cld_vert_asp_ratio)	32-Bit Float	N/A	0.0 .. 20.0	375

Total Bits / Record: **220800**
Total Records / File: **64981**
Total Bits / File: **14347804800**

Total Bytes / Record: **27600**
Total Bytes / File: **1793475600**

Total Bytes / Product: **2397279052**

2.15 Gridded Geostationary Narrowband Radiances (GGEO)

EOSDIS Product Code: CERX14

The GGEO product is a single file containing metadata, a header record, and multiple data records. The metadata are the CERES Baseline Header Metadata listed in Table B-1 of Appendix B. The header record contains the data starting and ending dates.

Each data record, called an hourbox, contains data particular to a single grid region and hour. The number of hourboxes on the file is constant and is determined by the number of data hours per day, the maximum number of days per month, and the number of regions in the grid (8 hours per day x 31 days per month x 64800 regions on globe = 16,070,400 hourboxes). Hourboxes for which there are no International Satellite Cloud Climatology Project (ISCCP) data are filled with default values.

A listing of the parameters contained within each data record can be found in Table 2.15-1. Following is a brief explanation of the parameters.

- The Region Number and Hour Number identify the hourbox.
- The Satellite Number identifies the satellite which collected the hourbox radiance data.
- The Time parameter gives the Grenwich mean time (GMT) time for the "key" pixel in the hourbox (the pixel which lies closest to the region centroid).
- The three angle measurements are derived from the centroid of the region at the time indicated in the Time parameter.
- The visible and infrared radiance statistics give the mean, variance, and number for the pixels within the hourbox.

Level: 3
Type: Ancillary
Frequency: Monthly

Portion of Globe Covered
File: Entire Globe
Record: 1-Deg Equal-angle Regions

Time Interval Covered
File: Monthly
Record: Every Third Hour

Portion of Atmosphere Covered
File: TOA

Table 2.15-1. Gridded GEO Narrowband Radiances (GGEO)

Description	Parameter Num	Unit	Range	Elements/ Record	Bits/ Elem	Elem Num	Bits/ Rec
GGEO							
GGEO Header							
Data Starting Date			N/A	N/A	1	32	32
Data Ending Date			N/A	N/A	1	32	32
GGEO Data Record							
Satellite and Hourbox ID							
Satellite Number	1		N/A	N/A	1	32	132
Region Number	2	N/A	1 .. 64800	1	32	2	32
Hour Number	3	N/A	1 .. 744	1	32	3	32
Time	4	hhmmss	0 .. 235959	1	32	4	32
Cos of Satellite Zenith Angle	5	N/A	-1.0 .. 1.0	1	32	5	32
Cos of Solar Zenith Angle	6	N/A	-1.0 .. 1.0	1	32	6	32
Relative Azimuth Angle	7	deg	0.0 .. 180.0	1	32	7	32
visible radiance: mean, var, num obs	8	$W\ m^{-2} sr^{-1}$	0.0 .. 20.0	3	32	8	96
infrared radiance: mean, var, num obs	9	$W\ m^{-2} sr^{-1} \mu m^{-1}$	0.0 .. 600.0	3	32	11	96

Total Meta Bits/File:	**160**
Total Data Bits/Record:	**416**
Total Records/File:	**10 914 976**
Total Data Bits/File:	**4 540 630 016**
Total Bits/File:	**4 540 630 176**
Total Data Bytes/Record:	**52**
Total Data Bytes/File:	**567 578 752**
Total Files/Product:	**1**

2.16 Meteorological, Ozone, and Aerosol Data (MOA)

EOSDIS Product Code: CERX06

The CERES archival product Meteorological, Ozone, and Aerosol Data (MOA) is produced by the CERES Regrid MOA Subsystem. Each MOA file contains meteorological, ozone, and aerosol data for 1 hour, and is used by several of the CERES subsystems. Data on the MOA file are derived from several data sources external to the CERES system, such as the Data Assimilation Office (DAO), NOAA, and various other meteorological satellites. These data have various horizontal and temporal resolutions. The Regrid MOA Subsystem interpolates the aerosol and ozone data horizontally to conform with the horizontal resolution of the meteorological data. An index number is assigned to each of the possible meteorological horizontal grids and the number of global regions, records and file sizes will also change accordingly. Profile data are interpolated vertically to conform with CERES requirements. The MOA file also contains column precipitable water data measured by the Special Sensor Microwave/Imager (SSM/I) on their native grid (0.5-deg x 0.5-deg). All data are temporally interpolated to provide data to the CERES processing system on an hourly basis.

The MOA contains:

- Surface pressure, geopotential height, skin temperature and surface u-vector and v-vector wind data
- Vertical profiles of temperature and humidity for 58 atmospheric levels
- Vertical profiles for 18 atmospheric levels below the tropopause of u-vector and v-vector wind data
- Tropopause height
- Air mass index
- Column precipitable water based on humidity profiles
- Column precipitable water based on microwave measurements
- Column averaged relative humidity
- Vertical profile of ozone mixing ratios for 58 atmospheric levels
- Column ozone
- Aerosol optical depth

A complete listing of parameters for this data product can be found in Table 2.16-1.

Level: 3
Type: Archival
Frequency: 1/Hour

Portion of Globe Covered
File: Global
Record: One region

Time Interval Covered
File: 1 hour
Record: 1 hour

Portion of Atmosphere Covered
File: Surface to TOA

Table 2.16-1. Meteorological, Ozone, and Aerosol (MOA)

Description	Parameter Number	Units	Range	Elements/ Record	Bits/ Elem	Elem Num
Header						
Date and Hour		N/A	ASCII string	1	216	
MOA Processing Date		N/A	ASCII string	1	216	
MOA Grid Index		N/A	1 .. 1	1	16	
Number of MOA Regions		N/A	13104 .. 13104	1	32	
Temperature, Humidity, and Ozone Profile Fixed Pressure Levels		hPa	0 .. 1100	58	32	
Wind Speed Profile Pressure levels		hPa	0 .. 1100	18	32	
MOA Regional Record						
MOA Region Number	1	N/A	1 .. 13104	1	32	1
Surface Pressure	2	hPa	0 .. 1100	1	32	2
Surface Geopotential Height	3	m	-100 .. 10000	1	32	3
Surface Skin Temperature	4	K	175 .. 375	1	32	4
Surface Wind Speed, U-Vector	5	m sec-1	-100 .. 100	1	32	5
Surface Wind Speed, V-Vector	6	m sec-1	-100 .. 100	1	32	6
Flag, Sea Surface State	7	N/A	0 .. 9	1	32	7
Flag, Source Surface Data	8	N/A	0 .. 4	1	32	8
Temperature Profiles	9	K	175 .. 375	58	32	9
Specific Humidity Profiles	10	g kg-1	0.001 .. 30.000	58	32	67
Wind Speed Profile, U-Vector	11	m sec-1	-100 .. 100	18	32	125
Wind Speed Profile, V-Vector	12	m sec-1	-100 .. 100	18	32	143
Flag, Source Meteorological Profiles	13	N/A	0 .. 4	1	32	161
Tropopause Height	14	hPa	50 .. 450	1	32	162
Air Mass Index	15	N/A	0 .. 10	1	32	163
Column Precipitable Water	16	cm	0.001 .. 10.000	1	32	164
Column Averaged Relative Humidity	17	N/A	0 .. 100	1	32	165
Microwave Precipitable Water	18	g cm^{-2}	0.001 .. 10.000	1	32	166
Microwave Precipitable Water, std	19	g cm^{-2}	TBD	1	32	167
Flag, Source Microwave Column Precipitable Water	20	N/A	0 .. 6	1	32	168
Ozone Mass Mixing Ratio Profiles	21	g g^{-1}	0.0 .. 0.00005	58	32	169
Flag, Source Ozone Profile Data	22	N/A	0 .. 2	1	32	227
Column Ozone	23	DU	0 .. 500	1	32	228
Flag, Source Column Ozone	24	N/A	0 .. 2	1	32	229
Optical Depth, Total Column	25	N/A	0 .. 2	1	32	230
Flag, Source Optical Depth, Total Column	26	N/A	0 .. 1	1	32	231
SSM/I Regional Water Vapor Data						
Microwave Precipitable Water for SSM/I Region		g cm^{-2}	0.001 .. 10.000	1	32	

Total Meta Bits/File:	**544**
Total Data Bits/MOA Regional Record:	**7392**
Total MOA Regional Records/File:	**13104**
Total MOA Regional Records Data Bits/File:	**96864768**
Total Data Bits/SSM/I Record (200 Regions)	**6400**
Total SSM/I Records	**1296**
Total SSM/I Data Bits/File	**8294400**
Total Bits/File:	**105159712**

Total Megabytes/File:	**12.5360145568848**
Total Gigabytes/File:	**1.22422017157078E-02**
Total Megabytes/Day:	**300.864349365234**
Total Gigabytes/Day:	**0.293812841176987**
Total Megabytes/Month:	**9326.79483032227**
Total Gigabytes/Month:	**9.10819807648659**