2.7 Monthly Gridded Radiative 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 HDF product for TRMM consists of eight files, each containing data for ten 1.0-degree equal-angle zones. The HDF product for Terra and Aqua consists of 60 files, each containing data for three 1.0-degree equal-angle zones. Each record contains spatially averaged data for an individual region.

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

- Region data
- Imager Radiances Statistics
- Angular model scene classes
- Radiative fluxes for both Clear-sky and Total-sky at TOA
- Atmospheric flux profiles for Pristine-sky, Clear-sky and Total-sky
- Flux Adjustments for Pristine-sky, Clear-sky and Total-sky
- Surface Emissivity
- Overlap data for eleven cloud conditions
- Cloud category properties for four cloud layers
- Adjustment parameters for four cloud layers
- Adjustment parameters for clear-skies

A complete listing of parameters for this data product can be found in Tables 2.7-4 through Table 2.7-22.

Level: 3
Frequency: 1/Month

Time Interval Covered
File: Month
Record: Hour

Applicable for Product Version(s)
TRMM: Edition2C
Terra: Beta3
Aqua: N/A

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

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FSW Metadata

The types of FSW metadata are summarized in Table 2.7-1 and contain information which need only be recorded once per product. The CERES metadata are listed in Appendix B. The FSW product-specific metadata parameters are listed in Table 2.7-2.

Table 2.7-1. 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 2.7-2	1	2

Table 2.7-2. 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 the Vdata structures summarized in Table 2.7-3. The TRMM FSW product parameter lists are summarized in Table 2.7-3 through Table 2.7-20 including the SDS number, the SDS name, the data type, the units, the range, and the number of elements within each field. Terra and Aqua FSW products contain an additional ten MODIS aerosol SDS parameters, summarized in Table 2.7-21 through Table 2.7-22. The number of records per Vdata is defined as n where n varies for each file. Sizing estimates are based on anticipated Terra sampling.

Table 2.7-3. FSW Vdata Summary (1 of 2)

Vdata Name	Description Table	Records	Number of Fields	VData Size (MB)
Time and Position Data	Table 2.7-4	n	6	311.04
Regional Identification Data	Table 2.7-5	n	5	115.20
Surface Map And Clear Area Data	Table 2.7-6	n	11	1555.20
Imager Radiances Statistics	Table 2.7-7	n	5	276.48
Angular Model Scene Type Data	Table 2.7-8	n	6	5235.84
TOA Fluxes	Table 2.7-9	n	12	1866.24
Pristine Vertical Flux Profiles	Table 2.7-10	n	12	1866.24
Constrained Clear Sky Profiles	Table 2.7-11	n	30	1555.20
Constrained Total Sky Profiles	Table 2.7-12	n	30	1555.20

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Table 2.7-3. FSW Vdata Summary (2 of 2)

Vdata Name	Description Table	Records	Number of Fields	VData Size (MB)
Constrainment - Initial Flux Deltas	Table 2.7-13	n	27	1399.68
Surface Emissivity	Table 2.7-14	n	7	362.88
Cloud Overlap Conditions	Table 2.7-15	n	11	570.24
Cloud Layer - High	Table 2.7-16	n	18	2799.36
Cloud Layer - UpperMid	Table 2.7-17	n	18	2799.36
Cloud Layer - LowerMid	Table 2.7-18	n	18	2799.36
Cloud Layer - Low	Table 2.7-19	n	18	2799.36
Constrainment - Adjustments	Table 2.7-20	n	7	362.88
Aerosol LAND	Table 2.7-21	n	3	155.52
Aerosol OCEAN	Table 2.7-22	n	7	362.88
TOTAL SIZE				28768.16

Table 2.7-4. Time and Position Data

SDS No.	SDS Name / Parameter	Data Type	Units	Range	No. of Elements
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 2.7-5. Regional Identification Data

SDS No.	SDS Name / Parameter	Data Type	Units	Range	No. of Elements
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 .. 500	1
4	Colatitude	32-Bit Float	N/A	1 - 180	1
5	Longitude	32-Bit Float	N/A	1 - 360	1

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Table 2.7-6. Surface Map And Clear Area Data

SDS No.	SDS Name / Parameter	Data Type	Units	Range	No. of Elements
1	Altitude of Surface above Sea Level	32-Bit Float	m	-1000 .. 10000	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	Smoke Percentage	32-Bit Float	percent	0.0 .. 100.0	
5	Aerosol Percentage	32-Bit Float	percent	0.0 .. 100.0	1
6	Flag - Aerosol Type	32-Bit Float	N/A	0.0 .. 9999.0	1
7	Aerosol Opt. Depth at 0.63 µm in clr	32-Bit Float	µm	-1.0 .. 5.0	1
8	Aerosol Opt. Depth at 1.6 µm in clr	32-Bit Float	µm	-1.0 .. 5.0	1
9	Precipitable Water	32-Bit Float	cm	0.001 .. 10.0	1
10	Flag - Source Precipitable Water	32-Bit Float	N/A	0 .. 120	1
11	MOA - Relative Column Avg. Humidity	32-Bit Float	N/A	0.0 .. 100.0	1

Table 2.7-7. Imager Radiances Statistics

SDS No.	SDS Name / Parameter	Data Type	Units	Range	No. of Elements
1	Imager Viewing Zenith Angle	32-Bit Float	deg	0.0 .. 90.0	1
2	Imager Relative Azimuth Angle	32-Bit Float	deg	0.0 .. 360.0	1
3	Imager Channel Central Wave-length	32-Bit Float	N/A	0.4 .. 15.0	5
4	Imager Radiance	32-Bit Float	$W\ m^{-2} sr^{-1} \mu m^{-1}$	-1000.0 .. 1000.0	5
5	Imager Radiance Clr-sky	32-Bit Float	$W\ m^{-2} sr^{-1} \mu m^{-1}$	-1000.0 .. 1000.0	5

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Table 2.7-8. Angular Model Scene Type Data

SDS No.	SDS Name / Parameter	Data Type	Units	Range	No. of Elements
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	20
3	SW Scene ID	32-Bit Float	N/A	0 .. 5000	20
4	Albedo (mean)	32-Bit Float	N/A	0.0 .. 1.0	20
4	Albedo (std)	32-Bit Float	N/A	0.0 .. 1.0	20
5	LW (mean)	32-Bit Float	W m^{-2}	0.0 .. 400.0	20
6	LW (std)	32-Bit Float	W m^{-2}	0.0 .. 400.0	20

Table 2.7-9. TOA Fluxes

SDS No.	SDS Name / Parameter	Data Type	Units	Range	No. of Elements
1	SW TOA Clear-Sky	32-Bit Float	W m^{-2}	0.0 .. 1400.0	3
2	LW TOA Clear-Sky	32-Bit Float	W m^{-2}	0.0 .. 500.0	3
3	WN TOA Clear-Sky	32-Bit Float	W m^{-2}	2.0 .. 50.0	3
4	ALB TOA Clear-Sky	32-Bit Float	N/A	0.0 .. 1.0	3
5	SW TOA DOWNWARD Clear-Sky	32-Bit Float	W m^{-2}	0.0 .. 1400.0	3
6	SW TOA UPWARD Clear-Sky	32-Bit Float	W m^{-2}	0.0 .. 500.0	3
7	LW TOA UPWARD Clear-Sky	32-Bit Float	W m^{-2}	2.0 .. 50.0	3
8	WN TOA UPWARD Clear-Sky	32-Bit Float	N/A	0.0 .. 1.0	3
9	SW TOA Total-Sky	32-Bit Float	W m^{-2}	0.0 .. 1400.0	3
10	LW TOA Total-Sky	32-Bit Float	W m^{-2}	0.0 .. 500.0	3
11	WN TOA Total-Sky	32-Bit Float	W m^{-2}	2.0 .. 50.0	3
12	ALB TOA Total-Sky	32-Bit Float	N/A	0.0 .. 1.0	3

Table 2.7-10. Pristine Vertical Flux Profiles

SDS No.	SDS Name / Parameter	Data Type	Units	Range	No. of Elements
1	SW Upward Pristine Sky (TOA)	32-Bit Float	W m^{-2}	0 .. 1400	3
2	SW Downward Pristine Sky (TOA)	32-Bit Float	W m^{-2}	0 .. 1400	3

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Table 2.7-10. Pristine Vertical Flux Profiles

SDS No.	SDS Name / Parameter	Data Type	Units	Range	No. of Elements
3	LW Upward Pristine Sky (TOA)	32-Bit Float	W m^{-2}	0 .. 850	3
4	LW Downward Pristine Sky (TOA)	32-Bit Float	W m^{-2}	0 .. 700	3
5	WN Upward Pristine Sky (TOA)	32-Bit Float	W m^{-2}	0 .. 370	3
6	WN Downward Pristine Sky (TOA)	32-Bit Float	W m^{-2}	0 .. 370	3
7	SW Upward Pristine Sky (SRF)	32-Bit Float	W m^{-2}	0 .. 1400	3
8	SW Downward Pristine Sky (SRF)	32-Bit Float	W m^{-2}	0 .. 1400	3
9	LW Upward Pristine Sky (SRF)	32-Bit Float	W m^{-2}	0 .. 850	3
10	LW Downward Pristine Sky (SRF)	32-Bit Float	W m^{-2}	0 .. 700	3
11	WN Upward Pristine Sky (SRF)	32-Bit Float	W m^{-2}	0 .. 370	3
12	WN Downward Pristine Sky (SRF)	32-Bit Float	W m^{-2}	0 .. 370	3

Table 2.7-11. Constrained Clear Sky Profiles (1 of 2)

SDS No.	SDS Name / Parameter	Data Type	Units	Range	No. of Elements
1	SW Upward Clear Sky (TOA)	32-Bit Float	W m^{-2}	0 .. 1400	3
2	SW Downward Clear Sky (TOA)	32-Bit Float	W m^{-2}	0 .. 1400	3
3	LW Upward Clear Sky (TOA)	32-Bit Float	W m^{-2}	0 .. 850	3
4	LW Downward Clear Sky (TOA)	32-Bit Float	W m^{-2}	0 .. 700	3
5	WN Upward Clear Sky (TOA)	32-Bit Float	W m^{-2}	0 .. 370	3
6	WN Downward Clear Sky (TOA)	32-Bit Float	W m^{-2}	0 .. 370	3
7	SW Upward Clear Sky (70hPa)	32-Bit Float	W m^{-2}	0 .. 1400	3
8	SW Downward Clear Sky (70hPa)	32-Bit Float	W m^{-2}	0 .. 1400	3

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Table 2.7-11. Constrained Clear Sky Profiles (2 of 2)

SDS No.	SDS Name / Parameter	Data Type	Units	Range	No. of Elements
9	LW Upward Clear Sky (70hPa)	32-Bit Float	W m^{-2}	0 .. 850	3
10	LW Downward Clear Sky (70hPa)	32-Bit Float	W m^{-2}	0 .. 700	3
11	WN Upward Clear Sky (70hPa)	32-Bit Float	W m^{-2}	0 .. 370	3
12	WN Downward Clear Sky (70hPa)	32-Bit Float	W m^{-2}	0 .. 370	3
13	SW Upward Clear Sky (200hPa)	32-Bit Float	W m^{-2}	0 .. 1400	3
14	SW Downward Clear Sky (200hPa)	32-Bit Float	W m^{-2}	0 .. 1400	3
15	LW Upward Clear Sky (200hPa)	32-Bit Float	W m^{-2}	0 .. 850	3
16	LW Downward Clear Sky (200hPa)	32-Bit Float	W m^{-2}	0 .. 700	3
17	WN Upward Clear Sky (200hPa)	32-Bit Float	W m^{-2}	0 .. 370	3
18	WN Downward Clear Sky (200hPa)	32-Bit Float	W m^{-2}	0 .. 370	3
19	SW Upward Clear Sky (500hPa)	32-Bit Float	W m^{-2}	0 .. 1400	3
20	SW Downward Clear Sky (500hPa)	32-Bit Float	W m^{-2}	0 .. 1400	3
21	LW Upward Clear Sky (500hPa)	32-Bit Float	W m^{-2}	0 .. 850	3
22	LW Downward Clear Sky (500hPa)	32-Bit Float	W m^{-2}	0 .. 700	3
23	WN Upward Clear Sky (500hPa)	32-Bit Float	W m^{-2}	0 .. 370	3
24	WN Downward Clear Sky (500hPa)	32-Bit Float	W m^{-2}	0 .. 370	3
25	SW Upward Clear Sky (SFC)	32-Bit Float	W m^{-2}	0 .. 1400	3
26	SW Downward Clear Sky (SFC)	32-Bit Float	W m^{-2}	0 .. 1400	3
27	LW Upward Clear Sky (SFC)	32-Bit Float	W m^{-2}	0 .. 850	3
28	LW Downward Clear Sky (SFC)	32-Bit Float	W m^{-2}	0 .. 700	3
29	WN Upward Clear Sky (SFC)	32-Bit Float	W m^{-2}	0 .. 370	3
30	WN Downward Clear Sky (SFC)	32-Bit Float	W m^{-2}	0 .. 370	3

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Table 2.7-12. Constrained Total Sky Profiles (1 of 2)

SDS No.	SDS Name / Parameter	Data Type	Units	Range	No. of Elements
1	SW Upward Total Sky (TOA)	32-Bit Float	W m^{-2}	0 .. 1400	3
2	SW Downward Total Sky (TOA)	32-Bit Float	W m^{-2}	0 .. 1400	3
3	LW Upward Total Sky (TOA)	32-Bit Float	W m^{-2}	0 .. 850	3
4	LW Downward Total Sky (TOA)	32-Bit Float	W m^{-2}	0 .. 700	3
5	WN Upward Total Sky (TOA)	32-Bit Float	W m^{-2}	0 .. 370	3
6	WN Downward Total Sky (TOA)	32-Bit Float	W m^{-2}	0 .. 370	3
7	SW Upward Total Sky (70hPa)	32-Bit Float	W m^{-2}	0 .. 1400	3
8	SW Downward Total Sky (70hPa)	32-Bit Float	W m^{-2}	0 .. 1400	3
9	LW Upward Total Sky (70hPa)	32-Bit Float	W m^{-2}	0 .. 850	3
10	LW Downward Total Sky (70hPa)	32-Bit Float	W m^{-2}	0 .. 700	3
11	WN Upward Total Sky (70hPa)	32-Bit Float	W m^{-2}	0 .. 370	3
12	WN Downward Total Sky (70hPa)	32-Bit Float	W m^{-2}	0 .. 370	3
13	SW Upward Total Sky (200hPa)	32-Bit Float	W m^{-2}	0 .. 1400	3
14	SW Downward Total Sky (200hPa)	32-Bit Float	W m^{-2}	0 .. 1400	3
15	LW Upward Total Sky (200hPa)	32-Bit Float	W m^{-2}	0 .. 850	3
16	LW Downward Total Sky (200hPa)	32-Bit Float	W m^{-2}	0 .. 700	3
17	WN Upward Total Sky (200hPa)	32-Bit Float	W m^{-2}	0 .. 370	3
18	WN Downward Total Sky (200hPa)	32-Bit Float	W m^{-2}	0 .. 370	3
19	SW Upward Total Sky (500hPa)	32-Bit Float	W m^{-2}	0 .. 1400	3
20	SW Downward Total Sky (500hPa)	32-Bit Float	W m^{-2}	0 .. 1400	3

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Table 2.7-12. Constrained Total Sky Profiles (2 of 2)

SDS No.	SDS Name / Parameter	Data Type	Units	Range	No. of Elements
21	LW Upward Total Sky (500hPa)	32-Bit Float	W m^{-2}	0 .. 850	3
22	LW Downward Total Sky (500hPa)	32-Bit Float	W m^{-2}	0 .. 700	3
23	WN Upward Total Sky (500hPa)	32-Bit Float	W m^{-2}	0 .. 370	3
24	WN Downward Total Sky (500hPa)	32-Bit Float	W m^{-2}	0 .. 370	3
25	SW Upward Total Sky (SFC)	32-Bit Float	W m^{-2}	0 .. 1400	3
26	SW Downward Total Sky (SFC)	32-Bit Float	W m^{-2}	0 .. 1400	3
27	LW Upward Total Sky (SFC)	32-Bit Float	W m^{-2}	0 .. 850	3
28	LW Downward Total Sky (SFC)	32-Bit Float	W m^{-2}	0 .. 700	3
29	WN Upward Total Sky (SFC)	32-Bit Float	W m^{-2}	0 .. 370	3
30	WN Downward Total Sky (SFC)	32-Bit Float	W m^{-2}	0 .. 370	3

Table 2.7-13. Constrainment - Initial Flux Deltas

SDS No.	SDS Name / Parameter	Data Type	Units	Range	No. of Elements
1	SW Upward Pristine Sky (TOA)	32-Bit Float	W m^{-2}	-1400 .. 1400	3
2	LW Upward Pristine Sky (TOA)	32-Bit Float	W m^{-2}	-700 ..700	3
3	WN Upward Pristine Sky (TOA)	32-Bit Float	W m^{-2}	-50 .. 50	3
4	SW Upward Pristine Sky (SFC)	32-Bit Float	W m^{-2}	-1400 .. 1400	3
5	SW Downward Pristine Sky (SFC)	32-Bit Float	W m^{-2}	-1400 .. 1400	3
6	LW Upward Pristine Sky (SFC)	32-Bit Float	W m^{-2}	-600 ..600	3
7	LW Downward Pristine Sky (SFC)	32-Bit Float	W m^{-2}	-700 ..700	3
8	WN Upward Pristine Sky (SFC)	32-Bit Float	W m^{-2}	-50 .. 50	3

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Table 2.7-13. Constrainment - Initial Flux Deltas

SDS No.	SDS Name / Parameter	Data Type	Units	Range	No. of Elements
9	WN Downward Pristine Sky (SFC)	32-Bit Float	W m^{-2}	-50 .. 50	3
10	SW Upward Clear Sky (TOA)	32-Bit Float	W m^{-2}	-1400 .. 1400	3
11	LW Upward Clear Sky (TOA)	32-Bit Float	W m^{-2}	-700 ..700	3
12	WN Upward Clear Sky (TOA)	32-Bit Float	W m^{-2}	-50 .. 50	3
13	SW Upward Clear Sky (SFC)	32-Bit Float	W m^{-2}	-1400 .. 1400	3
14	SW Downward Clear Sky (SFC)	32-Bit Float	W m^{-2}	-1400 .. 1400	3
15	LW Upward Clear Sky (SFC)	32-Bit Float	W m^{-2}	-600 ..600	3
16	LW Downward Clear Sky (SFC)	32-Bit Float	W m^{-2}	-700 ..700	3
17	WN Upward Clear Sky (SFC)	32-Bit Float	W m^{-2}	-50 .. 50	3
18	WN Downward Clear Sky (SFC)	32-Bit Float	W m^{-2}	-50 .. 50	3
19	SW Upward Total Sky (TOA)	32-Bit Float	W m^{-2}	-1400 .. 1400	3
20	LW Upward Total Sky (TOA)	32-Bit Float	W m^{-2}	-700 ..700	3
21	WN Upward Total Sky (TOA)	32-Bit Float	W m^{-2}	-50 .. 50	3
22	SW Upward Total Sky (SFC)	32-Bit Float	W m^{-2}	-1400 .. 1400	3
23	SW Downward Total Sky (SFC)	32-Bit Float	W m^{-2}	-1400 .. 1400	3
24	LW Upward Total-Sky (SFC)	32-Bit Float	W m^{-2}	-600 ..600	3
25	LW Downward Total-Sky (SFC)	32-Bit Float	W m^{-2}	-700 ..700	3
26	WN Upward Total-Sky (SFC)	32-Bit Float	W m^{-2}	-50 .. 50	3
27	WN Downward Total-Sky (SFC)	32-Bit Float	W m^{-2}	-50 .. 50	3

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Table 2.7-14. Surface Emissivity

SDS No.	SDS Name / Parameter	Data Type	Units	Range	No. of Elements
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	Photo. Syn. Radiation	32-Bit Float	$W\ m^{-2}$	0.0 .. 780.0	1
4	Direct/Diffuse	32-Bit Float	N/A	0.0 .. 30.0	1
5	Initial Broadband Albedo	32-Bit Float	N/A	0.0 .. 1.0	1
6	Surface Albedo	32-Bit Float	N/A	0.0 .. 1.0	1
7	Skin Temperature	32-Bit Float	K	175.0 .. 375.0	1

Table 2.7-15. Cloud Overlap Conditions

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

Table 2.7-16. Cloud Layer - High (mean std num_obs) (1 of 2)

SDS No.	SDS Name / Parameter	Data Type	Units	Range	No. of Elements
1	Area Fraction Percentage	32-Bit Float	N/A	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	Bottom Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3

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Table 2.7-16. Cloud Layer - High (mean std num_obs) (2 of 2)

SDS No.	SDS Name / Parameter	Data Type	Units	Range	No. of Elements
7	Particle Phase	32-Bit Float	N/A	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	Liquid Particle Radius	32-Bit Float	mm	0.0 .. 40.0	3
11	Ice Particle Diameter	32-Bit Float	mm	0.0 .. 300.0	3
12	Vis. Opt. Depth (linear)	32-Bit Float	N/A	0.0 .. 400.0	3
13	Vis. Opt. Depth (log)	32-Bit Float	N/A	-6.0 .. 6.0	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	-400.0 .. 400.0	1
17	Adj. Fractional Area	32-Bit Float	N/A	-1 ..1	1
18	Adj. Effective Temp.	32-Bit Float	K	0.0 .. 250.0	1

Table 2.7-17. Cloud Layer - UpperMid (mean std num_obs)

SDS No.	SDS Name / Parameter	Data Type	Units	Range	No. of Elements
1	Area Fraction Percentage	32-Bit Float	N/A	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	Bottom Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3
7	Particle Phase	32-Bit Float	N/A	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	Liquid Particle Radius	32-Bit Float	mm	0.0 .. 40.0	3
11	Ice Particle Diameter	32-Bit Float	mm	0.0 .. 300.0	3
12	Vis. Opt. Depth (linear)	32-Bit Float	N/A	0.0 .. 400.0	3
13	Vis. Opt. Depth (log)	32-Bit Float	N/A	-6.0 .. 6.0	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	-400.0 .. 400.0	1
17	Adj. Fractional Area	32-Bit Float	N/A	-1 ..1	1
18	Adj. Effective Temp.	32-Bit Float	K	0.0 .. 250.0	1

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Table 2.7-18. Cloud Layer - LowerMid (mean std num_obs)

SDS No.	SDS Name / Parameter	Data Type	Units	Range	No. of Elements
1	Area Fraction Percentage	32-Bit Float	N/A	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	Bottom Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3
7	Particle Phase	32-Bit Float	N/A	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	Liquid Particle Radius	32-Bit Float	mm	0.0 .. 40.0	3
11	Ice Particle Diameter	32-Bit Float	mm	0.0 .. 300.0	3
12	Vis. Opt. Depth (linear)	32-Bit Float	N/A	0.0 .. 400.0	3
13	Vis. Opt. Depth (log)	32-Bit Float	N/A	-6.0 .. 6.0	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 2.7-19. Cloud Layer - Low (mean std num_obs) (1 of 2)

SDS No.	SDS Name / Parameter	Data Type	Units	Range	No. of Elements
1	Area Fraction Percentage	32-Bit Float	N/A	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	Bottom Pressure	32-Bit Float	hPa	0.0 .. 1100.0	3
7	Particle Phase	32-Bit Float	N/A	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	Liquid Particle Radius	32-Bit Float	mm	0.0 .. 40.0	3
11	Ice Particle Diameter	32-Bit Float	mm	0.0 .. 300.0	3
12	Vis. Opt. Depth (linear)	32-Bit Float	N/A	0.0 .. 400.0	3
13	Vis. Opt. Depth (log)	32-Bit Float	N/A	-6.0 .. 6.0	3

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Table 2.7-19. Cloud Layer - Low (mean std num_obs) (2 of 2)

SDS No.	SDS Name / Parameter	Data Type	Units	Range	No. of Elements
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 2.7-20. Constrainment - Adjustments (mean)

SDS No.	SDS Name / Parameter	Data Type	Units	Range	No. of Elements
1	Init. Precipitable H2O	32-Bit Float	cm	0 .. 10	1
2	Adj. Precipitable H2O	32-Bit Float	cm	-10 .. 10	1
3	Adj. Surface Albedo	32-Bit Float	N/A	-1 .. 1	1
4	Init. Aerosol Opt. Dep.	32-Bit Float	N/A	0 .. 2	1
5	Adj. Aerosol Opt. Dep.	32-Bit Float	N/A	-2 .. 2	1
6	Init. Skin Temperature	32-Bit Float	K	TBD	1
7	Adj. Skin Temperature	32-Bit Float	K	TBD	1

Table 2.7-21. Aerosol LAND

SDS No.	SDS Name / Parameter	Data Type	Units	Range	No. of Elements
1	cor_optdepth047_land	32-Bit Float	N/A	0.0..3.0	1
2	cor_optdepth055_land	32-Bit Float	N/A	0.0..3.0	1
3	cor_optdepth066_land	32-Bit Float	N/A	0.0..3.0	1

Table 2.7-22. Aerosol OCEAN (1 of 2)

SDS No.	SDS Name / Parameter	Data Type	Units	Range	No. of Elements
1	eff_optdepth047_ocean	32-Bit Float	N/A	0.0..3.0	1
2	eff_optdepth055_ocean	32-Bit Float	N/A	0.0..3.0	1

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Table 2.7-22. Aerosol OCEAN (2 of 2)

SDS No.	SDS Name / Parameter	Data Type	Units	Range	No. of Elements
3	eff_optdepth066_ocean	32-Bit Float	N/A	0.0..3.0	1
4	eff_optdepth087_ocean	32-Bit Float	N/A	0.0..3.0	1
5	eff_optdepth124_ocean	32-Bit Float	N/A	0.0..3.0	1
6	eff_optdepth164_ocean	32-Bit Float	N/A	0.0..3.0	1
7	eff_optdepth213_ocean	32-Bit Float	N/A	0.0..3.0	1

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FSW Revision Record

The Revision Record contains information pertaining to approved section changes. The table lists the date the Software Configuration Change Request (SCCR) was approved, the Release and Version Number, the SCCR number, a short description of the revision, and the revised sections. The authors are listed on the document cover. The Head of the CERES Data Management Team approves or disapproves the requested changes based on recommendations of the Configuration Control Board.

FSW Revision Record

SCCR Approval Date	Release/ Version Number	SCCR Number	Description of Revision	Section(s) Affected
N/A	R3V1	N/A	• Updated format to comply with standards.	All
02/07/03	R3V2	424	• Updated parameters in Regional Identification Data, Regional Imager Data. • Updated Angular model scene category • Updated vdata sizes. • Added MODIS aerosols for land and Ocean. • Updated format to comply with standards.	Tables 2.11-5, 2.11-7 Table 2.7-8 Table 2.7-3 Tables 2.7-21, 2.7-22 All

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