

2.7 Monthly Gridded Radiative Fluxes and Clouds (FSW)

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 2.7-27](#).

Level: 3

Frequency: 1/Month

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

Time Interval Covered:

File: Month

Record: Hour

Portion of Globe Covered:

File: Gridded Satellite Swath

Record: 1.0-Deg Equal-angle Regions

Product Version:

TRMM:

Terra: Edition2C

Aqua: Beta1, Edition2A, Edition2B

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	Data Type	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 2.7-4](#) through [Table 2.7-13](#) and [Table 2.7-18](#) through [Table 2.7-24](#) including the SDS number, the SDS name, the data type, the units, the range, and the number of elements within each field. The Terra and Aqua FSW product parameter lists are summarized in [Table 2.7-4](#) through [Table 2.7-9](#) and [Table 2.7-14](#) through [Table 2.7-27](#) including the SDS number, the DS name, the data type, the units, the range, and the number of elements within each field. Terra and Aqua FSW products contain additional MODIS aerosol SDSs which are summarized in [Table 2.7-25](#) through [Table 2.7-27](#). The profile flux SDS names are defined differently between TRMM and Terra FSW products, therefore the profile flux SDSs are summarized in separate tables for TRMM and Terra products. 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

Vdata Name	Description Table	Records	Number of Fields	VData Size (MB)
Time and Position Data	Table 2.7-4	n	6	124.42
Regional Identification Data	Table 2.7-5	n	5	88.87
Surface Map And Clear Area Data	Table 2.7-6	n	11	533.23
Imager Radiances Statistics	Table 2.7-7	n	5	302.17
Angular Model Scene Type Data	Table 2.7-8	n	7	2150.73
TOA Fluxes	Table 2.7-9	n	12	639.88
Pristine Vertical Flux Profiles - TRMM	Table 2.7-10	n	12	1866.24

Table 2.7-3. FSW Vdata Summary

Vdata Name	Description Table	Records	Number of Fields	VData Size (MB)
Constrained Clear Sky Profiles - TRMM	Table 2.7-11	n	30	1555.20
Constrained Total Sky Profiles - TRMM	Table 2.7-12	n	30	1555.20
Constraintment - Initial Flux Deltas - TRMM	Table 2.7-13	n	27	1399.68
Pristine Vertical Flux Profiles - Terra/Aqua	Table 2.7-14	n	12	639.88
Constrained Clear Sky Profiles - Terra/Aqua	Table 2.7-15	n	30	1599.72
Constrained Total Sky Profiles - Terra/Aqua	Table 2.7-16	n	30	1599.72
Constraintment - Initial Flux Deltas - Terra/Aqua	Table 2.7-17	n	27	1261.99
Surface Emissivity	Table 2.7-18	n	7	124.42
Cloud Overlap Conditions	Table 2.7-19	n	11	195.52
Cloud Layer - High	Table 2.7-20	n	18	817.63
Cloud Layer - UpperMid	Table 2.7-21	n	18	817.63
Cloud Layer - LowerMid	Table 2.7-22	n	18	817.63
Cloud Layer - Low	Table 2.7-23	n	18	817.63
Constraintment - Adjustments	Table 2.7-24	n	7	124.42
Aerosol LAND	Table 2.7-25	n	3	53.32
Aerosol OCEAN	Table 2.7-26	n	7	124.42
Cloudy Skies With No Aerosols	Table 2.7-27	n	21	1261.99
Satellite Emulated Window Channel	Table 2.7-28	n	4	213.29
Aerosol Constituency Information	Table 2.7-29	n	1	124.42
TOTAL SIZE				14433.0

Table 2.7-4. Time and Position Data

TRMM/ Terra/ Aqua SDS Index	SDS Name / Parameter	Units	Range	SDS rank/ dim	Data Type	No. of Ele- ments
FSW-0	Julian Time	day	2 440 000.0 .. 2 480 000.0	3	64-Bit Float ^a	1
FSW-1	Sun Colatitude	deg	0.0 .. 180.0	3	32-Bit Float	1
FSW-2	Sun Longitude	deg	0.0 .. 360.0	3	32-Bit Float	1
FSW-3	Relative Azimuth Angle	deg	0.0 .. 360.0	3	32-Bit Float	1
FSW-4	Cos. Solar Zenith Angle	N/A	0.0 .. 1.0	3	32-Bit Float	1
FSW-5	Spacecraft Zenith Angle	deg	0.0 .. 90.0	3	32-Bit Float	1

a. Julian Time SDS Data Type is set to 32-Bit Float on TRMM products.

Table 2.7-5. Regional Identification Data

TRMM/ Terra/ Aqua SDS Index	SDS Name / Parameter	Units	Range	SDS rank/ dim	Data Type	No. of Ele- ments
FSW-6	Region Number	N/A	1 .. 64800	3	32-Bit Float	1
FSW-7	Hour Box Number	N/A	1 .. 744	3	32-Bit Float	1
FSW-8	Num. Footprints in Region	N/A	1 .. 500	3	32-Bit Float	1
FSW-9	Colatitude	N/A	1 - 180	3	32-Bit Float	1
FSW-10	Longitude	N/A	1 - 360	3	32-Bit Float	1

Table 2.7-6. Surface Map And Clear Area Data

TRMM/ Terra/ Aqua SDS Index	SDS Name / Parameter	Units	Range	SDS rank/ dim	Data Type	No. of Ele- ments
FSW-11	Alt. of Srf. above Sea	m	-1000 .. 10000	3	32-Bit Float	1
FSW-12	Surface Type Percentage	percent	0.0 .. 100.0	4	32-Bit Float	20
FSW-13	Snow/Ice Percentage	percent	0.0 .. 100.0	3	32-Bit Float	1
FSW-14	Smoke Percentage	percent	0.0 .. 100.0	3	32-Bit Float	1
FSW-15	Aerosol Percentage	percent	0.0 .. 100.0	3	32-Bit Float	1
FSW-16	Flag - Aerosol Type	N/A	0.0 .. 9999.0	3	32-Bit Float	1
FSW-17	Aerosol Opt. Depth at 0.63 μm in clr	μm	-1.0 .. 5.0	3	32-Bit Float	1
FSW-18	Aerosol Opt. Depth at 1.6 μm in clr	μm	-1.0 .. 5.0	3	32-Bit Float	1
FSW-19	Precipitable Water	cm	0.001 .. 10.0	3	32-Bit Float	1
FSW-20	Flag - Source Precip. H2O	N/A	0 .. 120	3	32-Bit Float	1
FSW-21	MOA - Relative Column Avg. Humidity	N/A	0.0 .. 100.0	3	32-Bit Float	1

Table 2.7-7. Imager Radiances Statistics

TRMM/ Terra/ Aqua SDS Index	SDS Name / Parameter	Units	Range	SDS rank/ dim	Data Type	No. of Ele- ments
FSW-22	Imager Viewing Zenith Angle	deg	0.0 .. 90.0	3	32-Bit Float	1
FSW-23	Imager Relative Azimuth Angle	deg	0.0 .. 360.0	3	32-Bit Float	1
FSW-24	Imager Channel Central Wavelength	μm	0.4 .. 15.0	4	32-Bit Float	5
FSW-25	Imager Radiance	$\text{W m}^{-2}\text{sr}^{-1}\mu\text{m}^{-1}$	-1000.0 .. 1000.0	4	32-Bit Float	5
FSW-26	Imager Radiance Clr-sky	$\text{W m}^{-2}\text{sr}^{-1}\mu\text{m}^{-1}$	-1000.0 .. 1000.0	4	32-Bit Float	5

Table 2.7-8. Angular Model Scene Type Data

TRMM/ Terra/ Aqua SDS Index	SDS Name / Parameter	Units	Range	SDS rank/ dim	Data Type	No. of Ele- ments
FSW-27	Incident Solar Flux	N/A	0.0 .. 1400.0	3	32-Bit Float	1
FSW-28	Area Coverage	percent	0.0 .. 100.0	4	32-Bit Float	20
FSW-29	SW Scene ID	N/A	0 .. 5000	4	32-Bit Float	20
FSW-30	Albedo (mean)	N/A	0.0 .. 1.0	4	32-Bit Float	20
FSW-31	Albedo (std)	N/A	0.0 .. 1.0	4	32-Bit Float	20
FSW-32	LW (mean)	W m^{-2}	0.0 .. 400.0	4	32-Bit Float	20
FSW-33	LW (std)	W m^{-2}	0.0 .. 400.0	4	32-Bit Float	20

Table 2.7-9. TOA Fluxes

TRMM/ Terra/ Aqua SDS Index	SDS Name / Parameter	Units	Range	SDS rank/ dim	Data Type	No. of Ele- ments
FSW-34	SW TOA Clear-Sky	W m^{-2}	0.0 .. 1400.0	4	32-Bit Float	3
FSW-35	LW TOA Clear-Sky	W m^{-2}	0.0 .. 500.0	4	32-Bit Float	3
FSW-36	WN TOA Clear-Sky	W m^{-2}	0.0 .. 200.0	4	32-Bit Float	3
FSW-37	ALB TOA Clear-Sky	N/A	0.0 .. 1.0	4	32-Bit Float	3

Table 2.7-9. TOA Fluxes

TRMM/ Terra/ Aqua SDS Index	SDS Name / Parameter	Units	Range	SDS rank/ dim	Data Type	No. of Ele- ments
FSW-38	SW TOA DOWNWARD Clear-Sky ^a	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3
FSW-39	SW TOA UPWARD Clear-Sky ^a	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3
FSW-40	LW TOA UPWARD Clear-Sky ^a	W m ⁻²	0.0 .. 850.0	4	32-Bit Float	3
FSW-41	WN TOA UPWARD Clear-Sky ^a	W m ⁻²	0.0 .. 370.0	4	32-Bit Float	3
FSW-42	SW TOA Total-Sky	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3
FSW-43	LW TOA Total-Sky	W m ⁻²	0.0 .. 500.0	4	32-Bit Float	3
FSW-44	WN TOA Total-Sky	W m ⁻²	0.0 .. 200.0	4	32-Bit Float	3
FSW-45	ALB TOA Total-Sky	N/A	0.0 .. 1.0	4	32-Bit Float	3

a. TOA Clear Sky SW, LW, WN upward & SW downward data is sorted according to the CERES Clear Sky definitions and the mean values are written in an additional set of SDSs.

Table 2.7-10. Pristine Vertical Flux Profiles (TRMM)

TRMM SDS Index	SDS Name / Parameter	Units	Range	SDS rank/ dim	Data Type	No. of Ele- ments
FSW-46	SW Upward Pristine Sky (TOA)	W m ⁻²	0.0 - 1400.0	4	32-Bit Float	3
FSW-47	SW Downward Pristine Sky (TOA)	W m ⁻²	0.0 - 1400.0	4	32-Bit Float	3
FSW-48	LW Upward Pristine Sky (TOA)	W m ⁻²	0.0 - 850.0	4	32-Bit Float	3
FSW-49	LW Downward Pristine Sky (TOA)	W m ⁻²	0.0 - 700.0	4	32-Bit Float	3
FSW-50	WN Upward Pristine Sky (TOA)	W m ⁻²	0.0 - 370.0	4	32-Bit Float	3
FSW-51	WN Downward Pristine Sky (TOA)	W m ⁻²	0.0 - 370.0	4	32-Bit Float	3
FSW-52	SW Upward Pristine Sky (SRF)	W m ⁻²	0.0 - 1400.0	4	32-Bit Float	3
FSW-53	SW Downward Pristine Sky (SRF)	W m ⁻²	0.0 - 1400.0	4	32-Bit Float	3
FSW-54	LW Upward Pristine Sky (SRF)	W m ⁻²	0.0 - 850.0	4	32-Bit Float	3
FSW-55	LW Downward Pristine Sky (SRF)	W m ⁻²	0.0 - 700.0	4	32-Bit Float	3

Table 2.7-10. Pristine Vertical Flux Profiles (TRMM)

TRMM SDS Index	SDS Name / Parameter	Units	Range	SDS rank/dim	Data Type	No. of Elements
FSW-56	WN Upward Prestine Sky (SRF)	W m ⁻²	0.0 - 370.0	4	32-Bit Float	3
FSW-57	WN Downward Prestine Sky (SRF)	W m ⁻²	0.0 - 370.0	4	32-Bit Float	3

Table 2.7-11. Constrained Clear Sky Profiles (TRMM)

TRMM SDS Index	SDS Name / Parameter	Units	Range	SDS rank/dim	Data Type	No. of Elements
FSW-58	SW Upward Clear Sky (TOA)	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3
FSW-59	SW Downward Clear Sky (TOA)	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3
FSW-60	LW Upward Clear Sky (TOA)	W m ⁻²	0.0 .. 850.0	4	32-Bit Float	3
FSW-61	LW Downward Clear Sky (TOA)	W m ⁻²	0.0 .. 700.0	4	32-Bit Float	3
FSW-62	WN Upward Clear Sky (TOA)	W m ⁻²	0.0 .. 370.0	4	32-Bit Float	3
FSW-63	WN Downward Clear Sky (TOA)	W m ⁻²	0.0 .. 370.0	4	32-Bit Float	3
FSW-64	SW Upward Clear Sky (70hPa)	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3
FSW-65	SW Downward Clear Sky (70hPa)	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3
FSW-66	LW Upward Clear Sky (70hPa)	W m ⁻²	0.0 .. 850.0	4	32-Bit Float	3
FSW-67	LW Downward Clear Sky (70hPa)	W m ⁻²	0.0 .. 700.0	4	32-Bit Float	3
FSW-68	WN Upward Clear Sky (70hPa)	W m ⁻²	0.0 .. 370.0	4	32-Bit Float	3
FSW-69	WN Downward Clear Sky (70hPa)	W m ⁻²	0.0 .. 370.0	4	32-Bit Float	3
FSW-70	SW Upward Clear Sky (200hPa)	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3
FSW-71	SW Downward Clear Sky (200hPa)	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3
FSW-72	LW Upward Clear Sky (200hPa)	W m ⁻²	0.0 .. 850.0	4	32-Bit Float	3

Table 2.7-11. Constrained Clear Sky Profiles (TRMM)

TRMM SDS Index	SDS Name / Parameter	Units	Range	SDS rank/dim	Data Type	No. of Elements
FSW-73	LW Downward Clear Sky (200hPa)	W m ⁻²	0.0 .. 700.0	4	32-Bit Float	3
FSW-74	WN Upward Clear Sky (200hPa)	W m ⁻²	0.0 .. 370.0	4	32-Bit Float	3
FSW-75	WN Downward Clear Sky (200hPa)	W m ⁻²	0.0 .. 370.0	4	32-Bit Float	3
FSW-76	SW Upward Clear Sky (500hPa)	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3
FSW-77	SW Downward Clear Sky (500hPa)	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3
FSW-78	LW Upward Clear Sky (500hPa)	W m ⁻²	0.0 .. 850.0	4	32-Bit Float	3
FSW-79	LW Downward Clear Sky (500hPa)	W m ⁻²	0.0 .. 700.0	4	32-Bit Float	3
FSW-80	WN Upward Clear Sky (500hPa)	W m ⁻²	0.0 .. 370.0	4	32-Bit Float	3
FSW-81	WN Downward Clear Sky (500hPa)	W m ⁻²	0.0 .. 370.0	4	32-Bit Float	3
FSW-82	SW Upward Clear Sky (SFC)	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3
FSW-83	SW Downward Clear Sky (SFC)	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3
FSW-84	LW Upward Clear Sky (SFC)	W m ⁻²	0.0 .. 850.0	4	32-Bit Float	3
FSW-85	LW Downward Clear Sky (SFC)	W m ⁻²	0.0 .. 700.0	4	32-Bit Float	3
FSW-86	WN Upward Clear Sky (SFC)	W m ⁻²	0.0 .. 370.0	4	32-Bit Float	3
FSW-87	WN Downward Clear Sky (SFC)	W m ⁻²	0.0 .. 370.0	4	32-Bit Float	3

Table 2.7-12. Constrained Total Sky Profiles (TRMM)

TRMM SDS Index	SDS Name / Parameter	Units	Range	SDS rank/dim	Data Type	No. of Elements
FSW-88	SW Upward Total Sky (TOA)	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3
FSW-89	SW Downward Total Sky (TOA)	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3

Table 2.7-12. Constrained Total Sky Profiles (TRMM)

TRMM SDS Index	SDS Name / Parameter	Units	Range	SDS rank/dim	Data Type	No. of Elements
FSW-90	LW Upward Total Sky (TOA)	W m ⁻²	0.0 .. 850.0	4	32-Bit Float	3
FSW-91	LW Downward Total Sky (TOA)	W m ⁻²	0.0 .. 700.0	4	32-Bit Float	3
FSW-92	WN Upward Total Sky (TOA)	W m ⁻²	0.0 .. 370.0	4	32-Bit Float	3
FSW-93	WN Downward Total Sky (TOA)	W m ⁻²	0.0 .. 370.0	4	32-Bit Float	3
FSW-94	SW Upward Total Sky (70hPa)	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3
FSW-95	SW Downward Total Sky (70hPa)	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3
FSW-96	LW Upward Total Sky (70hPa)	W m ⁻²	0.0 .. 850.0	4	32-Bit Float	3
FSW-97	LW Downward Total Sky (70hPa)	W m ⁻²	0.0 .. 700.0	4	32-Bit Float	3
FSW-98	WN Upward Total Sky (70hPa)	W m ⁻²	0.0 .. 370.0	4	32-Bit Float	3
FSW-99	WN Downward Total Sky (70hPa)	W m ⁻²	0.0 .. 370.0	4	32-Bit Float	3
FSW-100	SW Upward Total Sky (200hPa)	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3
FSW-101	SW Downward Total Sky (200hPa)	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3
FSW-102	LW Upward Total Sky (200hPa)	W m ⁻²	0.0 .. 850.0	4	32-Bit Float	3
FSW-103	LW Downward Total Sky (200hPa)	W m ⁻²	0.0 .. 700.0	4	32-Bit Float	3
FSW-104	WN Upward Total Sky (200hPa)	W m ⁻²	0.0 .. 370.0	4	32-Bit Float	3
FSW-105	WN Downward Total Sky (200hPa)	W m ⁻²	0.0 .. 370.0	4	32-Bit Float	3
FSW-106	SW Upward Total Sky (500hPa)	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3
FSW-107	SW Downward Total Sky (500hPa)	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3
FSW-108	LW Upward Total Sky (500hPa)	W m ⁻²	0.0 .. 850.0	4	32-Bit Float	3
FSW-109	LW Downward Total Sky (500hPa)	W m ⁻²	0.0 .. 700.0	4	32-Bit Float	3

Table 2.7-12. Constrained Total Sky Profiles (TRMM)

TRMM SDS Index	SDS Name / Parameter	Units	Range	SDS rank/dim	Data Type	No. of Elements
FSW-110	WN Upward Total Sky (500hPa)	W m ⁻²	0.0 .. 370.0	4	32-Bit Float	3
FSW-111	WN Downward Total Sky (500hPa)	W m ⁻²	0.0 .. 370.0	4	32-Bit Float	3
FSW-112	SW Upward Total Sky (SFC)	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3
FSW-113	SW Downward Total Sky (SFC)	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3
FSW-114	LW Upward Total Sky (SFC)	W m ⁻²	0.0 .. 850.0	4	32-Bit Float	3
FSW-115	LW Downward Total Sky (SFC)	W m ⁻²	0.0 .. 700.0	4	32-Bit Float	3
FSW-116	WN Upward Total Sky (SFC)	W m ⁻²	0.0 .. 370.0	4	32-Bit Float	3
FSW-117	WN Downward Total Sky (SFC)	W m ⁻²	0.0 .. 370.0	4	32-Bit Float	3

Table 2.7-13. Constraint - Initial Flux Deltas (TRMM)

TRMM SDS Index	SDS Name / Parameter	Units	Range	SDS rank/dim	Data Type	No. of Elements
FSW-118	SW Upward Prestine Sky (TOA)	W m ⁻²	-1400.0 .. 1400.0	4	32-Bit Float	3
FSW-119	LW Upward Prestine Sky (TOA)	W m ⁻²	-700.0 .. 700.0	4	32-Bit Float	3
FSW-120	WN Upward Prestine Sky (TOA)	W m ⁻²	-50.0 .. 50.0	4	32-Bit Float	3
FSW-121	SW Upward Prestine Sky (SFC)	W m ⁻²	-1400.0 .. 1400.0	4	32-Bit Float	3
FSW-122	SW Downward Prestine Sky (SFC)	W m ⁻²	-1400.0 .. 1400.0	4	32-Bit Float	3
FSW-123	LW Upward Prestine Sky (SFC)	W m ⁻²	-700.0 .. 700.0	4	32-Bit Float	3
FSW-124	LW Downward Prestine Sky (SFC)	W m ⁻²	-600.0 .. 600.0	4	32-Bit Float	3
FSW-125	WN Upward Prestine Sky (SFC)	W m ⁻²	-50.0 .. 50.0	4	32-Bit Float	3
FSW-126	WN Downward Prestine Sky (SFC)	W m ⁻²	-50.0 .. 50.0	4	32-Bit Float	3

Table 2.7-13. Constraint - Initial Flux Deltas (TRMM)

TRMM SDS Index	SDS Name / Parameter	Units	Range	SDS rank/dim	Data Type	No. of Elements
FSW-127	SW Upward Clear Sky (TOA)	W m ⁻²	-1400.0 .. 1400.0	4	32-Bit Float	3
FSW-128	LW Upward Clear Sky (TOA)	W m ⁻²	-700.0 .. 700.0	4	32-Bit Float	3
FSW-129	WN Upward Clear Sky (TOA)	W m ⁻²	-50.0 .. 50.0	4	32-Bit Float	3
FSW-130	SW Upward Clear Sky (SFC)	W m ⁻²	-1400.0 .. 1400.0	4	32-Bit Float	3
FSW-131	SW Downward Clear Sky (SFC)	W m ⁻²	-1400.0 .. 1400.0	4	32-Bit Float	3
FSW-132	LW Upward Clear Sky (SFC)	W m ⁻²	-700.0 .. 700.0	4	32-Bit Float	3
FSW-133	LW Downward Clear Sky (SFC)	W m ⁻²	-600.0 .. 600.0	4	32-Bit Float	3
FSW-134	WN Upward Clear Sky (SFC)	W m ⁻²	-50.0 .. 50.0	4	32-Bit Float	3
FSW-135	WN Downward Clear Sky (SFC)	W m ⁻²	-50.0 .. 50.0	4	32-Bit Float	3
FSW-136	SW Upward Total Sky (TOA)	W m ⁻²	-1400.0 .. 1400.0	4	32-Bit Float	3
FSW-137	LW Upward Total Sky (TOA)	W m ⁻²	-700.0 .. 700.0	4	32-Bit Float	3
FSW-138	WN Upward Total Sky (TOA)	W m ⁻²	-50.0 .. 50.0	4	32-Bit Float	3
FSW-139	SW Upward Total Sky (SFC)	W m ⁻²	-1400.0 .. 1400.0	4	32-Bit Float	3
FSW-140	SW Downward Total Sky (SFC)	W m ⁻²	-1400.0 .. 1400.0	4	32-Bit Float	3
FSW-141	LW Upward Total-Sky (SFC)	W m ⁻²	-700.0 .. 700.0	4	32-Bit Float	3
FSW-142	LW Downward Total-Sky (SFC)	W m ⁻²	-600.0 .. 600.0	4	32-Bit Float	3
FSW-143	WN Upward Total-Sky (SFC)	W m ⁻²	-50.0 .. 50.0	4	32-Bit Float	3
FSW-144	WN Downward Total-Sky (SFC)	W m ⁻²	-50.0 .. 50.0	4	32-Bit Float	3

Table 2.7-14. Pristine Vertical Flux Profiles (Terra/Aqua)

Terra/ Aqua SDS Index	SDS Name / Parameter	Units	Range	SDS rank/ dim	Data Type	No. of Ele- ments
FSW-46	SW flux - upward - pristine - TOA	W m ⁻²	0.0 - 1400.0	4	32-Bit Float	3
FSW-47	SW flux - upward - pristine - surface	W m ⁻²	0.0 - 1400.0	4	32-Bit Float	3
FSW-48	SW flux - downward - pristine - TOA	W m ⁻²	0.0 - 1400.0	4	32-Bit Float	3
FSW-49	SW flux - downward - pristine - surface	W m ⁻²	0.0 - 1400.0	4	32-Bit Float	3
FSW-50	LW flux - upward - pristine - TOA	W m ⁻²	0.0 - 850.0	4	32-Bit Float	3
FSW-51	LW flux - upward - pristine - surface	W m ⁻²	0.0 - 850.0	4	32-Bit Float	3
FSW-52	LW flux - downward - pristine - TOA	W m ⁻²	0.0 - 700.0	4	32-Bit Float	3
FSW-53	LW flux - downward - pristine - surface	W m ⁻²	0.0 - 700.0	4	32-Bit Float	3
FSW-54	WN flux - upward - pristine - TOA	W m ⁻²	0.0 - 370.0	4	32-Bit Float	3
FSW-55	WN flux - upward - pristine - surface	W m ⁻²	0.0 - 370.0	4	32-Bit Float	3
FSW-56	WN flux - downward - pristine - TOA	W m ⁻²	0.0 - 370.0	4	32-Bit Float	3
FSW-57	WN flux - downward - pristine - surface	W m ⁻²	0.0 - 370.0	4	32-Bit Float	3

Table 2.7-15. Constrained Clear Sky Profiles (Terra/Aqua)

Terra/ Aqua SDS Index	SDS Name / Parameter	Units	Range	SDS rank/ dim	Data Type	No. of Ele- ments
FSW-58	SW flux - upward - clear-sky - TOA	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3
FSW-59	SW flux - upward - clear-sky - 70hPa	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3
FSW-60	SW flux - upward - clear-sky - 200hPa	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3
FSW-61	SW flux - upward - clear-sky - 500hPa	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3
FSW-62	SW flux - upward - clear-sky - SFC	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3

Table 2.7-15. Constrained Clear Sky Profiles (Terra/Aqua)

Terra/ Aqua SDS Index	SDS Name / Parameter	Units	Range	SDS rank/ dim	Data Type	No. of Ele- ments
FSW-63	SW flux - downward - clear-sky - TOA	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3
FSW-64	SW flux - downward - clear-sky - 70hPa	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3
FSW-65	SW flux - downward - clear-sky - 200hPa	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3
FSW-66	SW flux - downward - clear-sky - 500hPa	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3
FSW-67	SW flux - downward - clear-sky - SFC	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3
FSW-68	LW flux - upward - clear-sky - TOA	W m ⁻²	0.0 .. 850.0	4	32-Bit Float	3
FSW-69	LW flux - upward - clear-sky - 70hPa	W m ⁻²	0.0 .. 850.0	4	32-Bit Float	3
FSW-70	LW flux - upward - clear-sky - 200hPa	W m ⁻²	0.0 .. 850.0	4	32-Bit Float	3
FSW-71	LW flux - upward - clear-sky - 500hPa	W m ⁻²	0.0 .. 850.0	4	32-Bit Float	3
FSW-72	LW flux - upward - clear-sky - SFC	W m ⁻²	0.0 .. 850.0	4	32-Bit Float	3
FSW-73	LW flux - downward - clear-sky - TOA	W m ⁻²	0.0 .. 700.0	4	32-Bit Float	3
FSW-74	LW flux - downward - clear-sky - 70hPa	W m ⁻²	0.0 .. 700.0	4	32-Bit Float	3
FSW-75	LW flux - downward - clear-sky - 200hPa	W m ⁻²	0.0 .. 700.0	4	32-Bit Float	3
FSW-76	LW flux - downward - clear-sky - 500hPa	W m ⁻²	0.0 .. 700.0	4	32-Bit Float	3
FSW-77	LW flux - downward - clear-sky - SFC	W m ⁻²	0.0 .. 700.0	4	32-Bit Float	3
FSW-78	WN flux - upward - clear-sky - TOA	W m ⁻²	0.0 .. 370.0	4	32-Bit Float	3
FSW-79	WN flux - upward - clear-sky - 70hPa	W m ⁻²	0.0 .. 370.0	4	32-Bit Float	3
FSW-80	WN flux - upward - clear-sky - 200hPa	W m ⁻²	0.0 .. 370.0	4	32-Bit Float	3
FSW-81	WN flux - upward - clear-sky - 500hPa	W m ⁻²	0.0 .. 370.0	4	32-Bit Float	3
FSW-82	WN flux - upward - clear-sky - SFC	W m ⁻²	0.0 .. 370.0	4	32-Bit Float	3

Table 2.7-15. Constrained Clear Sky Profiles (Terra/Aqua)

Terra/ Aqua SDS Index	SDS Name / Parameter	Units	Range	SDS rank/ dim	Data Type	No. of Ele- ments
FSW-83	WN flux - downward - clear-sky - TOA	W m ⁻²	0.0 .. 370.0	4	32-Bit Float	3
FSW-84	WN flux - downward - clear-sky - 70hPa	W m ⁻²	0.0 .. 370.0	4	32-Bit Float	3
FSW-85	WN flux - downward - clear-sky - 200hPa	W m ⁻²	0.0 .. 370.0	4	32-Bit Float	3
FSW-86	WN flux - downward - clear-sky - 500hPa	W m ⁻²	0.0 .. 370.0	4	32-Bit Float	3
FSW-87	WN flux - upward - clear-sky - SFC	W m ⁻²	0.0 .. 370.0	4	32-Bit Float	3

Table 2.7-16. Constrained Total Sky Profiles (Terra/Aqua)

Terra/ Aqua SDS Index	SDS Name / Parameter	Units	Range	SDS rank/ dim	Data Type	No. of Ele- ments
FSW-88	SW flux - upward - total-sky - TOA	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3
FSW-89	SW flux - upward - total-sky - 70hPA	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3
FSW-90	SW flux - upward - total-sky - 200hPa	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3
FSW-91	SW flux - upward - total-sky - 500hPa	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3
FSW-92	SW flux - upward - total-sky - SFC	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3
FSW-93	SW flux - downward - total-sky - TOA	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3
FSW-94	SW flux - downward - total-sky - 70hPA	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3
FSW-95	SW flux - downward - total-sky - 200hPa	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3
FSW-96	SW flux - downward - total-sky - 500hPa	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3
FSW-97	SW flux - downward - total-sky - SFC	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3
FSW-98	LW flux - upward - total-sky - TOA	W m ⁻²	0.0 .. 850.0	4	32-Bit Float	3

Table 2.7-16. Constrained Total Sky Profiles (Terra/Aqua)

Terra/ Aqua SDS Index	SDS Name / Parameter	Units	Range	SDS rank/ dim	Data Type	No. of Ele- ments
FSW-99	LW flux - upward - total-sky - 70hPa	W m ⁻²	0.0 .. 850.0	4	32-Bit Float	3
FSW-100	LW flux - upward - total-sky - 200hPa	W m ⁻²	0.0 .. 850.0	4	32-Bit Float	3
FSW-101	LW flux - upward - total-sky - 500hPa	W m ⁻²	0.0 .. 850.0	4	32-Bit Float	3
FSW-102	LW flux - upward - total-sky - SFC	W m ⁻²	0.0 .. 850.0	4	32-Bit Float	3
FSW-103	LW flux - downward - total-sky - TOA	W m ⁻²	0.0 .. 700.0	4	32-Bit Float	3
FSW-104	LW flux - downward - total-sky - 70hPa	W m ⁻²	0.0 .. 700.0	4	32-Bit Float	3
FSW-105	LW flux - downward - total-sky - 200hPa	W m ⁻²	0.0 .. 700.0	4	32-Bit Float	3
FSW-106	LW flux - downward - total-sky - 500hPa	W m ⁻²	0.0 .. 700.0	4	32-Bit Float	3
FSW-107	LW flux - downward - total-sky - SFC	W m ⁻²	0.0 .. 700.0	4	32-Bit Float	3
FSW-108	WN flux - upward - total-sky - TOA	W m ⁻²	0.0 .. 370.0	4	32-Bit Float	3
FSW-109	WN flux - upward - total-sky - 70hPa	W m ⁻²	0.0 .. 370.0	4	32-Bit Float	3
FSW-110	WN flux - upward - total-sky - 200hPa	W m ⁻²	0.0 .. 370.0	4	32-Bit Float	3
FSW-111	WN flux - upward - total-sky - 500hPa	W m ⁻²	0.0 .. 370.0	4	32-Bit Float	3
FSW-112	WN flux - upward - total-sky - SFC	W m ⁻²	0.0 .. 370.0	4	32-Bit Float	3
FSW-113	WN flux - downward - total-sky - TOA	W m ⁻²	0.0 .. 370.0	4	32-Bit Float	3
FSW-114	WN flux - downward - total-sky - 70hPa	W m ⁻²	0.0 .. 370.0	4	32-Bit Float	3
FSW-115	WN flux - downward - total-sky - 200hPa	W m ⁻²	0.0 .. 370.0	4	32-Bit Float	3
FSW-116	WN flux - downward - total-sky - 500hPa	W m ⁻²	0.0 .. 370.0	4	32-Bit Float	3
FSW-117	WN flux - upward - total-sky - SFC	W m ⁻²	0.0 .. 370.0	4	32-Bit Float	3

Table 2.7-17. Constraint - Initial Flux Deltas (Terra/Aqua)

Terra/ Aqua SDS Index	SDS Name / Parameter	Units	Range	SDS rank/ dim	Data Type	No. of Ele- ments
FSW-118	SW flux adjustment at surface upward - pristine	W m ⁻²	-1400.0 .. 1400.0	4	32-Bit Float	3
FSW-119	SW flux adjustment at TOA - upward - pristine	W m ⁻²	-1400.0 .. 1400.0	4	32-Bit Float	3
FSW-120	SW flux adjustment at surface - downward - pristine	W m ⁻²	-1400.0 .. 1400.0	4	32-Bit Float	3
FSW-121	LW flux adjustment at surface - upward - pristine	W m ⁻²	-700.0 .. 700.0	4	32-Bit Float	3
FSW-122	LW flux adjustment at surface - downward - pristine	W m ⁻²	-600.0 .. 600.0	4	32-Bit Float	3
FSW-123	LW flux adjustment at TOA - upward - pristine	W m ⁻²	-700.0 .. 700.0	4	32-Bit Float	3
FSW-124	WN flux adjustment at surface - upward - pristine	W m ⁻²	-50.0 .. 50.0	4	32-Bit Float	3
FSW-125	WN flux adjustment at surface - downward - pristine	W m ⁻²	-50.0 .. 50.0	4	32-Bit Float	3
FSW-126	WN flux adjustment at TOA - upward - pristine	W m ⁻²	-50.0 .. 50.0	4	32-Bit Float	3
FSW-127	SW flux adjustment at surface upward - clear-sky	W m ⁻²	-1400.0 .. 1400.0	4	32-Bit Float	3
FSW-128	SW flux adjustment at TOA - upward - clear-sky	W m ⁻²	-1400.0 .. 1400.0	4	32-Bit Float	3
FSW-129	SW flux adjustment at surface - downward - clear-sky	W m ⁻²	-1400.0 .. 1400.0	4	32-Bit Float	3
FSW-130	LW flux adjustment at surface - upward - clear-sky	W m ⁻²	-700.0 .. 700.0	4	32-Bit Float	3
FSW-131	LW flux adjustment at surface - downward - clear-sky	W m ⁻²	-600.0 .. 600.0	4	32-Bit Float	3
FSW-132	LW flux adjustment at TOA - upward - clear-sky	W m ⁻²	-700.0 .. 700.0	4	32-Bit Float	3
FSW-133	WN flux adjustment at surface - upward - clear-sky	W m ⁻²	-50.0 .. 50.0	4	32-Bit Float	3
FSW-134	WN flux adjustment at surface - downward - clear-sky	W m ⁻²	-50.0 .. 50.0	4	32-Bit Float	3
FSW-135	WN flux adjustment at TOA - upward - clear-sky	W m ⁻²	-50.0 .. 50.0	4	32-Bit Float	3
FSW-136	SW flux adjustment at surface upward - total-sky	W m ⁻²	-1400.0 .. 1400.0	4	32-Bit Float	3
FSW-137	SW flux adjustment at TOA - upward - total-sky	W m ⁻²	-1400.0 .. 1400.0	4	32-Bit Float	3

Table 2.7-17. Constraint - Initial Flux Deltas (Terra/Aqua)

Terra/ Aqua SDS Index	SDS Name / Parameter	Units	Range	SDS rank/ dim	Data Type	No. of Ele- ments
FSW-138	SW flux adjustment at surface - downward - total-sky	W m ⁻²	-1400.0 .. 1400.0	4	32-Bit Float	3
FSW-139	LW flux adjustment at surface - upward - total-sky	W m ⁻²	-700.0 .. 700.0	4	32-Bit Float	3
FSW-140	LW flux adjustment at surface - downward - total-sky	W m ⁻²	-600.0 .. 600.0	4	32-Bit Float	3
FSW-141	LW flux adjustment at TOA - upward - total-sky	W m ⁻²	-700.0 .. 700.0	4	32-Bit Float	3
FSW-142	WN flux adjustment at surface - upward - total-sky	W m ⁻²	-50.0 .. 50.0	4	32-Bit Float	3
FSW-143	WN flux adjustment at surface - downward - total-sky	W m ⁻²	-50.0 .. 50.0	4	32-Bit Float	3
FSW-144	WN flux adjustment at TOA - upward - total-sky	W m ⁻²	-50.0 .. 50.0	4	32-Bit Float	3

Table 2.7-18. Surface Emissivity

TRMM/ Terra/ Aqua SDS Index	SDS Name / Parameter	Units	Range	SDS rank/ dim	Data Type	No. of Ele- ments
FSW-145	LW Surface Emissivity	N/A	0.0 .. 1.0	3	32-Bit Float	1
FSW-146	WN Surface Emissivity	N/A	0.0 .. 1.0	3	32-Bit Float	1
FSW-147	Photo. Syn. Radiation	W m ⁻²	0.0 .. 780.0	3	32-Bit Float	1
FSW-148	Direct/Diffuse	N/A	0.0 .. 30.0	3	32-Bit Float	1
FSW-149	Initial Broadband Albedo	N/A	0.0 .. 1.0	3	32-Bit Float	1
FSW-150	Surface Albedo	N/A	0.0 .. 1.0	3	32-Bit Float	1
FSW-151	Skin Temperature	K	175.0 .. 375.0	3	32-Bit Float	1

Table 2.7-19. Cloud Overlap Conditions

TRMM/ Terra/ Aqua SDS Index	SDS Name / Parameter	Units	Range	SDS rank/ dim	Data Type	No. of Ele- ments
FSW-152	Clear	percent	0.0 .. 100.0	3	32-Bit Float	1
FSW-153	Low	percent	0.0 .. 100.0	3	32-Bit Float	1

Table 2.7-19. Cloud Overlap Conditions

TRMM/ Terra/ Aqua SDS Index	SDS Name / Parameter	Units	Range	SDS rank/ dim	Data Type	No. of Ele- ments
FSW-154	Lowermid	percent	0.0 .. 100.0	3	32-Bit Float	1
FSW-155	Uppermid	percent	0.0 .. 100.0	3	32-Bit Float	1
FSW-156	High	percent	0.0 .. 100.0	3	32-Bit Float	1
FSW-157	High Uppermid	percent	0.0 .. 100.0	3	32-Bit Float	1
FSW-158	High Lowermid	percent	0.0 .. 100.0	3	32-Bit Float	1
FSW-159	High Low	percent	0.0 .. 100.0	3	32-Bit Float	1
FSW-160	Uppermid - Lowermid	percent	0.0 .. 100.0	3	32-Bit Float	1
FSW-161	Uppermid - Low	percent	0.0 .. 100.0	3	32-Bit Float	1
FSW-162	Lowermid - Low	percent	0.0 .. 100.0	3	32-Bit Float	1

Table 2.7-20. Cloud Layer - High (mean std num_obs)

TRMM/ Terra/ Aqua SDS Index	SDS Name / Parameter	Units	Range	SDS rank/ dim	Data Type	No. of Ele- ments
FSW-163	Area Fraction Percentage - high cloud	percent	0.0 .. 100.0	3	32-Bit Float	1
FSW-164	Effective Pressure - high cloud	hPa	0.0 .. 1100.0	4	32-Bit Float	3
FSW-165	Effective Temperature - high cloud	K	100.0 .. 350.0	4	32-Bit Float	3
FSW-166	Effective Height - high cloud	km	0.0 .. 20.0	4	32-Bit Float	3
FSW-167	Top Pressure - high cloud	hPa	0.0 .. 1100.0	4	32-Bit Float	3
FSW-168	Bottom Pressure - high cloud	hPa	0.0 .. 1100.0	4	32-Bit Float	3
FSW-169	Particle Phase - high cloud	N/A	1.0 .. 2.0	4	32-Bit Float	3
FSW-170	Liquid Water Path - high cloud	gm ⁻²	0.0 .. 10000.0	4	32-Bit Float	3
FSW-171	Ice Water Path - high cloud	gm ⁻²	0.0 .. 10000.0	4	32-Bit Float	3
FSW-172	Liquid Particle Radius - high cloud	μm	0.0 .. 40.0	4	32-Bit Float	3
FSW-173	Ice Particle Diameter - high cloud	μm	0.0 .. 300.0	4	32-Bit Float	3
FSW-174	Vis. Opt. Depth (linear) - high cloud	N/A	0.0 .. 400.0	4	32-Bit Float	3
FSW-175	Vis. Opt. Depth (log) - high cloud	N/A	-6.0 .. 6.0	4	32-Bit Float	3
FSW-176	Infrared Emissivity - high cloud	N/A	0.0 .. 2.0	4	32-Bit Float	3
FSW-177	Vertical Aspect Ratio - high cloud	N/A	0.0 .. 20.0	4	32-Bit Float	3
FSW-178	Adj. Vis. Opt. Depth - high cloud	N/A	-400.0 .. 400.0	3	32-Bit Float	1

Table 2.7-20. Cloud Layer - High (mean std num_obs)

TRMM/ Terra/ Aqua SDS Index	SDS Name / Parameter	Units	Range	SDS rank/ dim	Data Type	No. of Ele- ments
FSW-179	Adj. Fractional Area - high cloud	N/A	-1 ..1	3	32-Bit Float	1
FSW-180	Adj. Effective Temp. - high cloud	K	TBD	3	32-Bit Float	1

Table 2.7-21. Cloud Layer - UpperMid (mean std num_obs)

TRMM/ Terra/ Aqua SDS Index	SDS Name / Parameter	Units	Range	SDS rank/ dim	Data Type	No. of Ele- ments
FSW-181	Area Fraction Percentage - upper mid cloud	percent	0.0 .. 100.0	3	32-Bit Float	1
FSW-182	Effective Pressure - upper mid cloud	hPa	0.0 .. 1100.0	4	32-Bit Float	3
FSW-183	Effective Temperature - upper mid cloud	K	100.0 .. 350.0	4	32-Bit Float	3
FSW-184	Effective Height - upper mid cloud	km	0.0 .. 20.0	4	32-Bit Float	3
FSW-185	Top Pressure - upper mid cloud	hPa	0.0 .. 1100.0	4	32-Bit Float	3
FSW-186	Bottom Pressure - upper mid cloud	hPa	0.0 .. 1100.0	4	32-Bit Float	3
FSW-187	Particle Phase - upper mid cloud	N/A	1.0 .. 2.0	4	32-Bit Float	3
FSW-188	Liquid Water Path - upper mid cloud	gm ⁻²	0.0 .. 10000.0	4	32-Bit Float	3
FSW-189	Ice Water Path - upper mid cloud	gm ⁻²	0.0 .. 10000.0	4	32-Bit Float	3
FSW-190	Liquid Particle Radius - upper mid cloud	μm	0.0 .. 40.0	4	32-Bit Float	3
FSW-191	Ice Particle Diameter - upper mid cloud	μm	0.0 .. 300.0	4	32-Bit Float	3
FSW-192	Vis. Opt. Depth (linear) - upper mid cloud	N/A	0.0 .. 400.0	4	32-Bit Float	3
FSW-193	Vis. Opt. Depth (log) - upper mid cloud	N/A	-6.0 .. 6.0	4	32-Bit Float	3
FSW-194	Infrared Emissivity - upper mid cloud	N/A	0.0 .. 2.0	4	32-Bit Float	3
FSW-195	Vertical Aspect Ratio - upper mid cloud	N/A	0.0 .. 20.0	4	32-Bit Float	3
FSW-196	Adj. Vis. Opt. Depth - upper mid cloud	N/A	-400.0 .. 400.0	3	32-Bit Float	1

Table 2.7-21. Cloud Layer - UpperMid (mean std num_obs)

TRMM/ Terra/ Aqua SDS Index	SDS Name / Parameter	Units	Range	SDS rank/ dim	Data Type	No. of Ele- ments
FSW-197	Adj. Fractional Area - upper mid cloud	N/A	-1 ..1	3	32-Bit Float	1
FSW-198	Adj. Effective Temp. - upper mid cloud	K	TBD	3	32-Bit Float	1

Table 2.7-22. Cloud Layer - LowerMid (mean std num_obs)

TRMM/ Terra/ Aqua SDS Index	SDS Name / Parameter	Units	Range	SDS rank/ dim	Data Type	No. of Ele- ments
FSW-199	Area Fraction Percentage - lower mid cloud	percent	0.0 .. 100.0	3	32-Bit Float	1
FSW-200	Effective Pressure - lower mid cloud	hPa	0.0 .. 1100.0	4	32-Bit Float	3
FSW-201	Effective Temperature - lower mid cloud	K	100.0 .. 350.0	4	32-Bit Float	3
FSW-202	Effective Height - lower mid cloud	km	0.0 .. 20.0	4	32-Bit Float	3
FSW-203	Top Pressure - lower mid cloud	hPa	0.0 .. 1100.0	4	32-Bit Float	3
FSW-204	Bottom Pressure - lower mid cloud	hPa	0.0 .. 1100.0	4	32-Bit Float	3
FSW-205	Particle Phase - lower mid cloud	N/A	1.0 .. 2.0	4	32-Bit Float	3
FSW-206	Liquid Water Path - lower mid cloud	gm ⁻²	0.0 .. 10000.0	4	32-Bit Float	3
FSW-207	Ice Water Path - lower mid cloud	gm ⁻²	0.0 .. 10000.0	4	32-Bit Float	3
FSW-208	Liquid Particle Radius - lower mid cloud	μm	0.0 .. 40.0	4	32-Bit Float	3
FSW-209	Ice Particle Diameter - lower mid cloud	μm	0.0 .. 300.0	4	32-Bit Float	3
FSW-210	Vis. Opt. Depth (linear) - lower mid cloud	N/A	0.0 .. 400.0	4	32-Bit Float	3
FSW-211	Vis. Opt. Depth (log) - lower mid cloud	N/A	-6.0 .. 6.0	4	32-Bit Float	3
FSW-212	Infrared Emissivity - lower mid cloud	N/A	0.0 .. 2.0	4	32-Bit Float	3
FSW-213	Vertical Aspect Ratio - lower mid cloud	N/A	0.0 .. 20.0	4	32-Bit Float	3
FSW-214	Adj. Vis. Opt. Depth - lower mid cloud	N/A	-400.0 .. 400.0	3	32-Bit Float	1

Table 2.7-22. Cloud Layer - LowerMid (mean std num_obs)

TRMM/ Terra/ Aqua SDS Index	SDS Name / Parameter	Units	Range	SDS rank/ dim	Data Type	No. of Ele- ments
FSW-215	Adj. Fractional Area - lower mid cloud	N/A	-1 .. 1	3	32-Bit Float	1
FSW-216	Adj. Effective Temp. - lower mid cloud	K	TBD	3	32-Bit Float	1

Table 2.7-23. Cloud Layer - Low (mean std num_obs)

TRMM/ Terra/ Aqua SDS Index	SDS Name / Parameter	Units	Range	SDS rank/ dim	Data Type	No. of Ele- ments
FSW-217	Area Fraction Percentage - low cloud	percent	0.0 .. 100.0	3	32-Bit Float	1
FSW-218	Effective Pressure - low cloud	hPa	0.0 .. 1100.0	4	32-Bit Float	3
FSW-219	Effective Temperature - low cloud	K	100.0 .. 350.0	4	32-Bit Float	3
FSW-220	Effective Height - low cloud	km	0.0 .. 20.0	4	32-Bit Float	3
FSW-221	Top Pressure - low cloud	hPa	0.0 .. 1100.0	4	32-Bit Float	3
FSW-222	Bottom Pressure - low cloud	hPa	0.0 .. 1100.0	4	32-Bit Float	3
FSW-223	Particle Phase - low cloud	N/A	1.0 .. 2.0	4	32-Bit Float	3
FSW-224	Liquid Water Path - low cloud	gm ⁻²	0.0 .. 10000.0	4	32-Bit Float	3
FSW-225	Ice Water Path - low cloud	gm ⁻²	0.0 .. 10000.0	4	32-Bit Float	3
FSW-226	Liquid Particle Radius - low cloud	μm	0.0 .. 40.0	4	32-Bit Float	3
FSW-227	Ice Particle Diameter - low cloud	μm	0.0 .. 300.0	4	32-Bit Float	3
FSW-228	Vis. Opt. Depth (linear) - low cloud	N/A	0.0 .. 400.0	4	32-Bit Float	3
FSW-229	Vis. Opt. Depth (log) - low cloud	N/A	-6.0 .. 6.0	4	32-Bit Float	3
FSW-230	Infrared Emissivity - low cloud	N/A	0.0 .. 2.0	4	32-Bit Float	3
FSW-231	Vertical Aspect Ratio - low cloud	N/A	0.0 .. 20.0	4	32-Bit Float	3
FSW-232	Adj. Vis. Opt. Depth - low cloud	N/A	-400.0 .. 400.0	3	32-Bit Float	1
FSW-233	Adj. Fractional Area - low cloud	N/A	-1 .. 1	3	32-Bit Float	1
FSW-234	Adj. Effective Temp. - low cloud	K	TBD	3	32-Bit Float	1

Table 2.7-24. Constraintment - Adjustments (mean)

TRMM/ Terra/ Aqua SDS Index	SDS Name / Parameter	Units	Range	SDS rank/ dim	Data Type	No. of Ele- ments
FSW-235	Init. Precipitable H2O	cm	0 .. 10	3	32-Bit Float	1
FSW-236	Adj. Precipitable H2O	cm	-10 .. 10	3	32-Bit Float	1
FSW-237	Adj. Surface Albedo	N/A	-1 .. 1	3	32-Bit Float	1
FSW-238	Init. Aerosol Opt. Dep.	N/A	0 .. 2	3	32-Bit Float	1
FSW-239	Adj. Aerosol Opt. Dep.	N/A	-2 .. 2	3	32-Bit Float	1
FSW-240	Init. Skin Temperature	K	TBD	3	32-Bit Float	1
FSW-241	Adj. Skin Temperature	K	TBD	3	32-Bit Float	1

Table 2.7-25. Aerosol LAND

Terra/ Aqua SDS Index	SDS Name / Parameter	Units	Range	SDS rank/ dim	Data Type	No. of Ele- ments
FSW-242	cor_optdepth047_land	N/A	0.0..5.0	3	32-Bit Float	1
FSW-243	cor_optdepth055_land	N/A	0.0..5.0	3	32-Bit Float	1
FSW-244	cor_optdepth066_land	N/A	0.0..5.0	3	32-Bit Float	1

Table 2.7-26. Aerosol OCEAN

Terra/ Aqua SDS Index	SDS Name / Parameter	Units	Range	SDS rank/ dim	Data Type	No. of Ele- ments
FSW-245	eff_optdepth047_ocean	N/A	0.0..5.0	3	32-Bit Float	1
FSW-246	eff_optdepth055_ocean	N/A	0.0..5.0	3	32-Bit Float	1
FSW-247	eff_optdepth066_ocean	N/A	0.0..5.0	3	32-Bit Float	1
FSW-248	eff_optdepth087_ocean	N/A	0.0..5.0	3	32-Bit Float	1
FSW-249	eff_optdepth124_ocean	N/A	0.0..5.0	3	32-Bit Float	1
FSW-250	eff_optdepth164_ocean	N/A	0.0..5.0	3	32-Bit Float	1
FSW-251	eff_optdepth213_ocean	N/A	0.0..5.0	3	32-Bit Float	1

Table 2.7-27. Cloudy Skies with No Aerosols

Terra/ Aqua SDS Index	SDS Name / Parameter	Units	Range	SDS rank/ dim	Data Type	No. of Ele- ments
FSW-252	SW flux - upward cloudy skies with no aerosol - TOA	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3
FSW-253	SW flux - upward cloudy skies with no aerosol - surface	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3
FSW-254	SW flux - downward cloudy skies with no aerosol - TOA	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3
FSW-255	SW flux - downward cloudy skies with no aerosol - surface	W m ⁻²	0.0 .. 1400.0	4	32-Bit Float	3
FSW-256	LW flux - upward cloudy skies with no aerosol - TOA	W m ⁻²	0.0 .. 850.0	4	32-Bit Float	3
FSW-257	LW flux - upward cloudy skies with no aerosol - surface	W m ⁻²	0.0 .. 850.0	4	32-Bit Float	3
FSW-258	LW flux - downward cloudy skies with no aerosol - TOA	W m ⁻²	0.0 .. 700.0	4	32-Bit Float	3
FSW-259	LW flux - downward cloudy skies with no aerosol - surface	W m ⁻²	0.0 .. 700.0	4	32-Bit Float	3
FSW-260	WN flux - upward cloudy skies with no aerosol - TOA	W m ⁻²	0.0 .. 370.0	4	32-Bit Float	3
FSW-261	WN flux - upward cloudy skies with no aerosol - surface	W m ⁻²	0.0 .. 370.0	4	32-Bit Float	3
FSW-262	WN flux - downward cloudy skies with no aerosol - TOA	W m ⁻²	0.0 .. 370.0	4	32-Bit Float	3
FSW-263	WN flux - downward cloudy skies with no aerosol - surface	W m ⁻²	0.0 .. 370.0	4	32-Bit Float	3
FSW-264	SW flux adjustments at surface-upward-cloudy skies/no aerosol	W m ⁻²	-1400.0 .. 1400.0	4	32-Bit Float	3
FSW-265	SW flux adjustments at TOA-upward-cloudy skies/no aerosol	W m ⁻²	-1400.0 .. 1400.0	4	32-Bit Float	3
FSW-266	SW flux adjustments at surface-downward-cloudy skies/no aerosol	W m ⁻²	-1400.0 .. 1400.0	4	32-Bit Float	3
FSW-267	LW flux adjustments at surface-upward-cloudy skies/no aerosol	W m ⁻²	-600.0 .. 600.0	4	32-Bit Float	3
FSW-268	LW flux adjustments at surface-downward-cloudy skies/no aerosol	W m ⁻²	-700.0 .. 700.0	4	32-Bit Float	3
FSW-269	LW flux adjustments at TOA-upward-cloudy skies/no aerosol	W m ⁻²	-700.0 .. 700.0	4	32-Bit Float	3
FSW-270	WN flux adjustments at surface-upward-cloudy skies/no aerosol	W m ⁻²	-50.0 .. 50.0	4	32-Bit Float	3

Table 2.7-27. Cloudy Skies with No Aerosols

Terra/ Aqua SDS Index	SDS Name / Parameter	Units	Range	SDS rank/ dim	Data Type	No. of Ele- ments
FSW-271	WN flux adjustments at surface- downward- cloudy skies/no aerosol	W m ⁻²	-50.0 .. 50.0	4	32-Bit Float	3
FSW-272	WN flux adjustments at TOA- upward-cloudy skies/ no aerosol	W m ⁻²	-50.0 .. 50.0	4	32-Bit Float	3

Table 2.7-28. Satellite Emulated Window Channel

Terra/ Aqua SDS Index	SDS Name / Parameter	Units	Range	SDS rank/ dim	Data Type	No. of Ele- ments
FSW-273	WN flux - satellite emulated - TOA Total-Sky	W m ⁻²	2.0 .. 50.0	4	32-Bit Float	3
FSW-274	WN flux adjustment - satellite emulated - TOA Total-Sky	W m ⁻²	2.0 .. 50.0	4	32-Bit Float	3
FSW-275	WN flux - satellite emulated - TOA Clear-Sky	W m ⁻²	2.0 .. 50.0	4	32-Bit Float	3
FSW-276	WN flux adjustment - satellite emulated - TOA Clear-Sky	W m ⁻²	2.0 .. 50.0	4	32-Bit Float	3

Table 2.7-29. Aerosol Constituency Information

Terra/ Aqua SDS Index	SDS Name / Parameter	Units	Range	SDS rank/ dim	Data Type	No. of Ele- ments
FSW-277	Aerosol Constituency Ratio	Percent	0.0 .. 100.0	4	32-Bit Float	7

FSW Revision Record

The product 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.

FSW Revision Record

SCCR Approval Date	Release/Version Number	SCCR Number	Description of Revision	Section(s) Affected
N/A	R3V1	N/A	<ul style="list-style-type: none"> • Updated format to comply with standards. 	All
02/07/03	R3V2	424	<ul style="list-style-type: none"> • 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
10/23/03	R3V3	476	<ul style="list-style-type: none"> • Added cloudy skies with no Aerosols. • Updated flux profile parameters. • Added Snow/Ice Percentage from Imager History parameter to Angular Model Scene type. • Updated format to comply with standards. 	Tables 2.7.3, 2.7-23 Tables 2.7-11 - 2.7-13 Table 2.7.8 All
10/23/03 01/28/04	R3V4	476 499	<ul style="list-style-type: none"> • Added two new columns to include SDS index numbers for TRMM & Terra. • Julian Time SDS data type is set to 64-bit. Added a note. • Added new tables for TRMM profile flux SDSs, since these names are defined differently for TRMM and Terra. • Updated units and range values. • Updated format to comply with standards. 	All Table 2.7.4 Tables 2.7.10 - 2.7.13 Tables 2.7.19 - 2.7.23 & 2.7.25 - 2.7.26 All
06/04/04	R4V1	530	<ul style="list-style-type: none"> • Deleted Snow/Ice Percentage from Imager History parameter to Angular Model Scene type. • Updated SDS Indices. • Deleted Terra SDS Index columns where ever SDS Indices are the same for TRMM, Terra and Aqua. Updated Column Titles. 	Table 2.7.8 Tables 2.7.9, 2.7.14 - 2.7.27 Tables 2.7.9, 2.7.8, 2.7.18 - 2.7.24

FSW Revision Record

SCCR Approval Date	Release/Version Number	SCCR Number	Description of Revision	Section(s) Affected
06/04/04 Cont'd.	R4V1	530	<ul style="list-style-type: none"> Updated Terra SDS Indices. Added product name in front of SDS index in the first column of the table. Updated format to comply with standards. 	Tables 2.7.15 - 2.7.17, 2.7.25 - 2.7.27 Tables 2.7.4 - 2.7.27 All
02/07/05	R4V2	575	<ul style="list-style-type: none"> Added Total-Sky and Clear-sky Satellite Emulated Window Channel parameters. Added Aerosol Constituency Ratio Parameter. Updated parameter names. Updated sds sizes. Updated format to comply with standards. 	Table 2.7.28 Table 2.7.29 Tables 2.7.14, 2.7.20 - 2.7.23 Table 2.7-3 All
02/07/06	R4V3	575	<ul style="list-style-type: none"> Added Edition2A and Edition2B to the Product Version category Aqua. The EOSDIS Product Code line was removed from the document. (6/17/2008) 	Sec. 2.7 Sec. 2.7