

2.5 Single Scanner Footprint TOA/Surface Fluxes and Clouds (SSF)

The Single Scanner Footprint TOA/Surface Fluxes and Clouds (SSF) product contains one hour of instantaneous Clouds and the Earth's Radiant Energy System (CERES) data for a single scanner instrument. The SSF combines instantaneous CERES data with scene information from a higher-resolution imager such as Visible/Infrared Scanner (VIRS) on TRMM or Moderate-Resolution Imaging Spectroradiometer (MODIS) on Terra and Aqua. Scene identification and cloud properties are defined at the higher imager resolution and these data are averaged over the larger CERES footprint. For each CERES footprint, the SSF contains the number of cloud layers and for each layer the cloud amount, height, temperature, pressure, optical depth, emissivity, ice and liquid water path, and water particle size. The SSF also contains the CERES filtered radiances for the total, shortwave (SW), and window (WN) channels and the unfiltered SW, longwave (LW), and WN radiances. The SW, LW, and WN radiances at spacecraft altitude are converted to Top-of-the-Atmosphere (TOA) fluxes based on the imager defined scene. These TOA fluxes are used to estimate surface fluxes.

Only footprints with imager coverage are included on the SSF which is much less than the full set of footprints on the CERES ES-8 product. The number of possible footprints on an SSF depends on the elevation scan mode, azimuth scan mode, and height of the satellite. Since elevation and azimuth scan modes are programmable, the range on the number of footprints in an SSF product has been set to the largest possible range, namely 0 .. 360000 as shown in [Table 2.5-2](#). A smaller number of footprints is used in SSF sizing estimates, namely the estimated maximum number of TRMM full Earth-view footprints per hour given a normal elevation scan and an along-track azimuth scan. Accounting for the need for imager coverage, the actual number of footprints is expected to be even smaller. This reduction of footprints due to lack of imager coverage is very evident when CERES is operating in a cross-track azimuth scan mode. A complete listing of parameters for this data product can be found in [Tables 2.5-3](#) to [Table 2.5-15](#).

A more detailed listing of the data parameters for this product can be found in the SSF Collection Guide: http://ceres.larc.nasa.gov/collect_guide.php ([Reference 3](#)).

Level: 2

Frequency: 1/Hour

Portion of Atmosphere Covered: Surface to TOA

Time Interval Covered:

File: 1 Hour

Record: 1/100-Second

Portion of Globe Covered:

File: Satellite Swath

Record: 1 CERES Footprint

Product Version:

TRMM: Edition2B

Terra: Edition2B, Edition2F, Edition2G, Edition3A

Aqua: Edition1A, Edition1B, Ed2A-NoSW, Edition2A, Ed2B-NoSW, Edition2B,
Ed2C-NoSW, Edition2C, Ed2C-MOD-C4-Land-IGBP, Edition2D, Ed2D-NoSW,
Edition3A, Ed3A-NoSW



SSF Metadata

SSF metadata includes the CERES Baseline Header Metadata and CERES_metadata Vdata, which are listed in [Appendix B](#). The SSF product-specific metadata parameters are listed in [Table 2.5-1](#) and the SSF_Header parameters are listed in [Table 2.5-2](#). For TRMM SSF products, the SSF ID (SSF-H1) will be set to 117 and will contain 131 SDS parameters (SSF-1 through SSF-131). For Terra and Aqua SSF products, the SSF ID will be set to 1117 and these products will contain an additional 29 MODIS aerosol SDS parameters (SSF-132 through SSF-160).

Table 2.5-1. SSF 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

Table 2.5-2. SSF_Header

Item	Description	Units	Range	Elements	Bytes/Elem
SSF-H1	SSF ID	N/A	117 or 1117	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
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	Beta angle	deg	-90 .. 90	1	4
SSF-H10	Colatitude of subsatellite point at surface at hour start	deg	0 .. 180	1	4
SSF-H11	Longitude of subsatellite point at surface at hour start	deg	0 .. 360	1	4
SSF-H12	Colatitude of subsatellite point at surface at hour end	deg	0 .. 180	1	4
SSF-H13	Longitude of subsatellite point at surface at hour end	deg	0 .. 360	1	4
SSF-H14	Along-track angle of satellite at hour end	deg	0 .. 330	1	4
SSF-H15	Number of footprints in SSF product	N/A	0 .. 360000	1	4
SSF-H16	Subsystem 4.1 identification string	N/A	ASCII string	1	128
SSF-H17	Subsystem 4.2 identification string	N/A	ASCII string	1	128
SSF-H18	Subsystem 4.3 identification string	N/A	ASCII string	1	128

Table 2.5-2. SSF_Header

Item	Description	Units	Range	Elements	Bytes/Elem
SSF-H19	Subsystem 4.4 identification string	N/A	ASCII string	1	128
SSF-H20	Subsystem 4.5 identification string	N/A	ASCII string	1	128
SSF-H21	Subsystem 4.6 identification string	N/A	ASCII string	1	128
SSF-H22	IES production date and time	N/A	ASCII string	1	24
SSF-H23	MOA production date and time	N/A	ASCII string	1	24
SSF-H24	SSF production date and time	N/A	ASCII string	1	24

SSF Scientific Data Sets

The SSF contains 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. The SDSs are divided into tables which map to Vgroups of the same name. [Table 2.5-3](#) to [Table 2.5-15](#) summarize the contents of each Vgroup and SDS contained within the SSF file. The MODIS land and ocean aerosol data (SDS parameters, SSF-132 through SSF-160) described in [Table 2.5-14](#) and [Table 2.5-15](#) are available only on Terra and Aqua SSF products.

(Note: the dimension n in the following tables is the number of footprints processed: Assuming n = 245475 for sizing)

Table 2.5-3. Time and Position

Item	SDS Name (Parameter Name)	Units	Range	Dimensions	Data Type	Maximum Hourly Size (MB)
SSF-1	Time of observation	day	2440000 .. 2480000	n	64-bit real	1.87
SSF-2	Radius of satellite from center of Earth at observation	km	6000 .. 8000	n	64-bit real	1.87
SSF-3	X component of satellite inertial velocity	km sec ⁻¹	-10 .. 10	n	64-bit real	1.87
SSF-4	Y component of satellite inertial velocity	km sec ⁻¹	-10 .. 10	n	64-bit real	1.87
SSF-5	Z component of satellite inertial velocity	km sec ⁻¹	-10 .. 10	n	64-bit real	1.87
SSF-6	Colatitude of subsatellite point at surface at observation	deg	0 .. 180	n	32-bit real	0.94
SSF-7	Longitude of subsatellite point at surface at observation	deg	0 .. 360	n	32-bit real	0.94

Table 2.5-3. Time and Position

Item	SDS Name (Parameter Name)	Units	Range	Dimen- sions	Data Type	Maximum Hourly Size (MB)
SSF-8	Colatitude of subsolar point at surface at observation	deg	0 .. 180	n	32-bit real	0.94
SSF-9	Longitude of subsolar point at surface at observation	deg	0 .. 360	n	32-bit real	0.94
SSF-10	Colatitude of CERES FOV at surface	deg	0 .. 180	n	32-bit real	0.94
SSF-11	Longitude of CERES FOV at surface	deg	0 .. 360	n	32-bit real	0.94
SSF-12	Scan sample number	N/A	1 .. 660	n	16-bit integer	0.47
SSF-13	Packet number	N/A	0 .. 13100	n	16-bit integer	0.47
SSF-14	Cone angle of CERES FOV at satellite	deg	0 .. 90	n	32-bit real	0.94
SSF-15	Clock angle of CERES FOV at satellite wrt inertial velocity	deg	0 .. 360	n	32-bit real	0.94
SSF-16	Rate of change of cone angle	deg sec ⁻¹	-300 .. 300	n	32-bit real	0.94
SSF-17	Rate of change of clock angle	deg sec ⁻¹	-20 .. 20	n	32-bit real	0.94
SSF-18	Along-track angle of CERES FOV at surface	deg	-30 .. 330	n	32-bit real	0.94
SSF-19	Cross-track angle of CERES FOV at surface	deg	-90 .. 90	n	32-bit real	0.94

Table 2.5-4. Viewing Angles

Item	SDS Name (Parameter Name)	Units	Range	Dimen- sions	Data Type	Maximum Hourly Size (MB)
SSF-20	CERES viewing zenith at surface	deg	0 .. 90	n	32-bit real	0.94
SSF-21	CERES solar zenith at surface	deg	0 .. 180	n	32-bit real	0.94
SSF-22	CERES relative azimuth at surface	deg	0 .. 360	n	32-bit real	0.94
SSF-23	CERES viewing azimuth at surface wrt North	deg	0 .. 360	n	32-bit real	0.94

Table 2.5-5. Surface Map

Item	SDS Name (Parameter Name)	Units	Range	Dimen- sions	Data Type	Maximum Hourly Size (MB)
SSF-24	Altitude of surface above sea level	m	-1000 .. 10000	n	32-bit real	0.94
SSF-25	Surface type index	N/A	1 .. 20	n x 8	16-bit integer	3.75
SSF-26	Surface type percent coverage	N/A	0 .. 100	n x 8	16-bit integer	3.75

Table 2.5-6. Scene Type

Item	SDS Name (Parameter Name)	Units	Range	Dimen- sions	Data Type	Maximum Hourly Size (MB)
SSF-27	CERES SW ADM type for inversion process	N/A	0 .. 5000	n	16-bit integer	0.47
SSF-28	CERES LW ADM type for inversion process	N/A	0 .. 5000	n	16-bit integer	0.47
SSF-29	Cloud Classification	N/A	0 .. 32766	n	16-bit integer	0.47
SSF-30	Snow/ice percent coverage clear-sky overhead-sun vis albedo	N/A	0 .. 9999	n	16-bit integer	0.47

Table 2.5-7. Filtered Radiances

Item	SDS Name (Parameter Name)	Units	Range	Dimen- sions	Data Type	Maximum Hourly Size (MB)
SSF-31	CERES TOT filtered radiance - upwards	$W m^{-2} sr^{-1}$	0 .. 700	n	32-bit real	0.94
SSF-32	CERES SW filtered radiance - upwards	$W m^{-2} sr^{-1}$	-10 .. 510	n	32-bit real	0.94
SSF-33	CERES WN filtered radiance - upwards	$W m^{-2} sr^{-1} mm^{-1}$	0 .. 15	n	32-bit real	0.94
SSF-34	Radiance and Mode flags	N/A	0 .. ($2^{31}-1$)	n	32-bit integer	0.94

Table 2.5-8. Unfiltered Radiances

Item	SDS Name (Parameter Name)	Units	Range	Dimen- sions	Data Type	Maximum Hourly Size (MB)
SSF-35	CERES SW radiance - upwards	$W m^{-2} sr^{-1}$	-10 .. 510	n	32-bit real	0.94
SSF-36	CERES LW radiance - upwards	$W m^{-2} sr^{-1}$	0 .. 200	n	32-bit real	0.94
SSF-37	CERES WN radiance - upwards	$W m^{-2} sr^{-1}$	0 .. 60	n	32-bit real	0.94

Table 2.5-9. TOA and Surface Fluxes

Item	SDS Name (Parameter Name)	Units	Range	Dimen- sions	Data Type	Maximum Hourly Size (MB)
SSF-38	CERES SW TOA flux - upwards	$W m^{-2}$	0 .. 1400	n	32-bit real	0.94
SSF-39	CERES LW TOA flux - upwards	$W m^{-2}$	0 .. 500	n	32-bit real	0.94
SSF-40	CERES WN TOA flux - upwards	$W m^{-2}$	0 .. 200	n	32-bit real	0.94

Table 2.5-9. TOA and Surface Fluxes

Item	SDS Name (Parameter Name)	Units	Range	Dimen- sions	Data Type	Maximum Hourly Size (MB)
SSF-41	CERES downward SW surface flux - Model A	W m ⁻²	0 .. 1400	n	32-bit real	0.94
SSF-42	CERES downward LW surface flux - Model A	W m ⁻²	0 .. 700	n	32-bit real	0.94
SSF-43	CERES downward WN surface flux - Model A	W m ⁻²	0 .. 250	n	32-bit real	0.94
SSF-44	CERES net SW surface flux - Model A	W m ⁻²	0 .. 1400	n	32-bit real	0.94
SSF-45	CERES net LW surface flux - Model A	W m ⁻²	-250 .. 50	n	32-bit real	0.94
SSF-46	CERES downward SW surface flux - Model B	W m ⁻²	0 .. 1400	n	32-bit real	0.94
SSF-47	CERES downward LW surface flux - Model B	W m ⁻²	0 .. 700	n	32-bit real	0.94
SSF-48	CERES net SW surface flux - Model B	W m ⁻²	0 .. 1400	n	32-bit real	0.94
SSF-49	CERES net LW surface flux - Model B	W m ⁻²	-250 .. 50	n	32-bit real	0.94
SSF-50	CERES broadband surface albedo	N/A	0 .. 1	n	32-bit real	0.94
SSF-51	CERES LW surface emissivity	N/A	0 .. 1	n	32-bit real	0.94
SSF-52	CERES WN surface emissivity	N/A	0 .. 1	n	32-bit real	0.94

Table 2.5-10. Full Footprint Area

Item	SDS Name (Parameter Name)	Units	Range	Dimen- sions	Data Type	Maximum Hourly Size (MB)
SSF-53	Number of imager pixels in CERES FOV	N/A	0 .. 32766	n	16-bit integer	0.47
SSF-54	Imager percent coverage	N/A	0 .. 100	n	16-bit integer	0.47
SSF-55	Imager viewing zenith over CERES FOV	deg	0 .. 90	n	32-bit real	0.94
SSF-56	Imager relative azimuth over CERES FOV	deg	0 .. 360	n	32-bit real	0.94
SSF-57	Surface wind - U-vector	m sec ⁻¹	-100 .. 100	n	32-bit real	0.94
SSF-58	Surface wind - V-vector	m sec ⁻¹	-100 .. 100	n	32-bit real	0.94
SSF-59	Surface skin temperature	K	175 .. 375	n	32-bit real	0.94
SSF-60	Column averaged relative humidity	N/A	0 .. 100	n	32-bit real	0.94
SSF-61	Precipitable water	cm	0.001 .. 10	n	32-bit real	0.94
SSF-62	Flag - Source of precipitable water	N/A	0 .. 120	n	16-bit integer	0.47
SSF-63	Cloud property extrapolation over cloudy area	N/A	0 .. 100	n	16-bit integer	0.47
SSF-64	Notes on general procedure	N/A	0 .. 32766	n	16-bit integer	0.47
SSF-65	Notes on cloud algorithms	N/A	0 .. 32766	n	16-bit integer	0.47

Table 2.5-11. Clear Footprint Area

Item	SDS Name (Parameter Name)	Units	Range	Dimen- sions	Data Type	Maximum Hourly Size (MB)
SSF-66	Clear area percent coverage at subpixel resolution	N/A	0 .. 100	n	32-bit real	0.94
SSF-67	Cloud-mask clear-strong percent coverage	N/A	0 .. 100	n	16-bit integer	0.47
SSF-68	Cloud-mask clear-weak percent coverage	N/A	0 .. 100	n	16-bit integer	0.47
SSF-69	Cloud-mask snow/ice percent coverage	N/A	0 .. 100	n	16-bit integer	0.47
SSF-70	Cloud-mask aerosol B percent coverage	N/A	0 .. 100	n	16-bit integer	0.47
SSF-71	Flag - Type of aerosol B	N/A	0 .. 9999	n	16-bit integer	0.47
SSF-72	Cloud-mask percent coverage supplement	N/A	0 .. 32766	n	16-bit integer	0.47
SSF-73	Total aerosol A optical depth - visible	N/A	-1 .. 5	n	32-bit real	0.94
SSF-74	Total aerosol A optical depth - near IR	N/A	-1 .. 5	n	32-bit real	0.94
SSF-75	Aerosol A supplement 1	N/A	-1000 .. 1000	n	32-bit real	0.94
SSF-76	Aerosol A supplement 2	N/A	-1000 .. 1000	n	32-bit real	0.94
SSF-77	Aerosol A supplement 3	N/A	-1000 .. 1000	n	32-bit real	0.94
SSF-78	Aerosol A supplement 4	N/A	-1000 .. 1000	n	32-bit real	0.94
SSF-79	Imager-based surface skin temperature	K	175 .. 375	n	32-bit real	0.94
SSF-80	Vertical temperature change	K	-30 .. 90	n	32-bit real	0.94

Table 2.5-12. Cloudy Footprint Area

Item	SDS Name (Parameter Name)	Units	Range	Dimen- sions	Data Type	Maximum Hourly Size (MB)
SSF-81	Clear/layer/overlap percent coverages	N/A	0 .. 100	n x 4	32-bit real	3.74
SSF-82	Note for cloud layer	N/A	0 .. (2 ³¹ -1)	n x 2	32-bit integer	1.87
SSF-83	Mean visible optical depth for cloud layer	N/A	0 .. 400	n x 2	32-bit real	1.87
SSF-84	Stddev of visible optical depth for cloud layer	N/A	0 .. 300	n x 2	32-bit real	1.87
SSF-85	Mean logarithm of visible optical depth for cloud layer	N/A	-6 .. 6	n x 2	32-bit real	1.87
SSF-86	Stddev of logarithm of visible optical depth for cloud layer	N/A	0 .. 6	n x 2	32-bit real	1.87

Table 2.5-12. Cloudy Footprint Area

Item	SDS Name (Parameter Name)	Units	Range	Dimen- sions	Data Type	Maximum Hourly Size (MB)
SSF-87	Mean cloud infrared emissivity for cloud layer	N/A	0 .. 2	n x 2	32-bit real	1.87
SSF-88	Stddev of cloud infrared emissivity for cloud layer	N/A	0 .. 2	n x 2	32-bit real	1.87
SSF-89	Mean liquid water path for cloud layer (3.7)	g m ⁻²	0 .. 10000	n x 2	32-bit real	1.87
SSF-90	Stddev of liquid water path for cloud layer (3.7)	g m ⁻²	0 .. 8000	n x 2	32-bit real	1.87
SSF-91	Mean ice water path for cloud layer (3.7)	g m ⁻²	0 .. 10000	n x 2	32-bit real	1.87
SSF-92	Stddev of ice water path for cloud layer (3.7)	g m ⁻²	0 .. 8000	n x 2	32-bit real	1.87
SSF-93	Mean cloud top pressure for cloud layer	hPa	0 .. 1100	n x 2	32-bit real	1.87
SSF-94	Stddev of cloud top pressure for cloud layer	hPa	0 .. 600	n x 2	32-bit real	1.87
SSF-95	Mean cloud effective pressure for cloud layer	hPa	0 .. 1100	n x 2	32-bit real	1.87
SSF-96	Stddev of cloud effective pressure for cloud layer	hPa	0 .. 500	n x 2	32-bit real	1.87
SSF-97	Mean cloud effective temperature for cloud layer	K	100 .. 350	n x 2	32-bit real	1.87
SSF-98	Stddev of cloud effective temperature for cloud layer	K	0 .. 150	n x 2	32-bit real	1.87
SSF-99	Mean cloud effective height for cloud layer	km	0 .. 20	n x 2	32-bit real	1.87
SSF-100	Stddev of cloud effective height for cloud layer	km	0 .. 12	n x 2	32-bit real	1.87
SSF-101	Mean cloud base pressure for cloud layer	hPa	0 .. 1100	n x 2	32-bit real	1.87
SSF-102	Stddev of cloud base pressure for cloud layer	hPa	0 .. 600	n x 2	32-bit real	1.87
SSF-103	Mean water particle radius for cloud layer (3.7)	μm	0 .. 40	n x 2	32-bit real	1.87
SSF-104	Stddev of water particle radius for cloud layer (3.7)	μm	0 .. 20	n x 2	32-bit real	1.87
SSF-105	Mean ice particle effective diameter for cloud layer (3.7)	μm	0 .. 300	n x 2	32-bit real	1.87
SSF-106	Stddev of ice particle effective diameter for cloud layer (3.7)	μm	0 .. 200	n x 2	32-bit real	1.87

Table 2.5-12. Cloudy Footprint Area

Item	SDS Name (Parameter Name)	Units	Range	Dimen- sions	Data Type	Maximum Hourly Size (MB)
SSF-107	Mean cloud particle phase for cloud layer (3.7)	N/A	1 .. 2	n x 2	32-bit real	1.87
SSF-108	Mean water particle radius for cloud layer (1.6)	μm	0 .. 40	n x 2	32-bit real	1.87
SSF-109	Mean ice particle effective diameter for cloud layer (1.6)	μm	0 .. 300	n x 2	32-bit real	1.87
SSF-110	Mean cloud particle phase for cloud layer (1.6)	N/A	1 .. 2	n x 2	32-bit real	1.87
SSF-111	Mean vertical aspect ratio for cloud layer (TBD)	N/A	0 .. 20	n x 2	32-bit real	1.87
SSF-112	Stddev of vertical aspect ratio for cloud layer (TBD)	N/A	0 .. 15	n x 2	32-bit real	1.87
SSF-113	Percentiles of visible optical depth for cloud layer	N/A	0 .. 400	n x 13 x 2	32-bit real	24.35
SSF-114	Percentiles of IR emissivity for cloud layer	N/A	0 .. 2	n x 13 x 2	32-bit real	24.35

Table 2.5-13. Footprint Imager Radiance Statistics

Item	SDS Name (Parameter Name)	Units	Range	Dimen- sions	Data Type	Maximum Hourly Size (MB)
SSF-115	Imager channel central wavelength	μm	0.4 .. 15.0	n x 5	32-bit real	4.68
SSF-116	All subpixel clear area percent coverage	N/A	0 .. 100	n	32-bit real	0.94
SSF-117	All subpixel overcast cloud area percent coverage	N/A	0 .. 100	n	32-bit real	0.94
SSF-118	Mean imager radiances over clear area	W m ⁻² sr ⁻¹ μm ⁻¹	-1000 .. 1000	n x 5	32-bit real	4.68
SSF-119	Stddev of imager radiances over clear area	W m ⁻² sr ⁻¹ μm ⁻¹	0 .. 1000	n x 5	32-bit real	4.68
SSF-120	Mean imager radiances over overcast cloud area	W m ⁻² sr ⁻¹ μm ⁻¹	-1000 .. 1000	n x 5	32-bit real	4.68
SSF-121	Stddev of imager radiances over overcast cloud area	W m ⁻² sr ⁻¹ μm ⁻¹	0 .. 1000	n x 5	32-bit real	4.68
SSF-122	Mean imager radiances over full CERES FOV	W m ⁻² sr ⁻¹ μm ⁻¹	-1000 .. 1000	n x 5	32-bit real	4.68
SSF-123	Stddev of imager radiances over full CERES FOV	W m ⁻² sr ⁻¹ μm ⁻¹	0 .. 1000	n x 5	32-bit real	4.68

Table 2.5-13. Footprint Imager Radiance Statistics

Item	SDS Name (Parameter Name)	Units	Range	Dimen- sions	Data Type	Maximum Hourly Size (MB)
SSF-124	5th percentile of imager radiances over full CERES FOV	$W m^{-2} sr^{-1} \mu m^{-1}$	-1000 .. 1000	n x 5	32-bit real	4.68
SSF-125	95th percentile of imager radiances over full CERES FOV	$W m^{-2} sr^{-1} \mu m^{-1}$	-1000 .. 1000	n x 5	32-bit real	4.68
SSF-126	Mean imager radiances over cloud layer 1 (no overlap)	$W m^{-2} sr^{-1} \mu m^{-1}$	-1000 .. 1000	n x 5	32-bit real	4.68
SSF-127	Stddev of imager radiances over cloud layer 1 (no overlap)	$W m^{-2} sr^{-1} \mu m^{-1}$	0 .. 1000	n x 5	32-bit real	4.68
SSF-128	Mean imager radiances over cloud layer 2 (no overlap)	$W m^{-2} sr^{-1} \mu m^{-1}$	-1000 .. 1000	n x 5	32-bit real	4.68
SSF-129	Stddev of imager radiances over cloud layer 2 (no overlap)	$W m^{-2} sr^{-1} \mu m^{-1}$	0 .. 1000	n x 5	32-bit real	4.68
SSF-130	Mean imager radiances over cloud layer 1 and 2 overlap	$W m^{-2} sr^{-1} \mu m^{-1}$	-1000 .. 1000	n x 5	32-bit real	4.68
SSF-131	Stddev of imager radiances over cloud layer 1 and 2 overlap	$W m^{-2} sr^{-1} \mu m^{-1}$	0 .. 1000	n x 5	32-bit real	4.68

The MODIS land aerosol parameters described in [Table 2.5-14](#) are only available on Terra and Aqua SSF products.

Table 2.5-14. MODIS Land Aerosols

Item	SDS Name (Parameter Name)	Units	Range	Dimen- sions	Data Type	Maximum Hourly Size (MB)
SSF-132	Percentage of CERES FOV with MODIS land aerosol	N/A	0 .. 100	n	16-bit integer	0.47
SSF-133	PSF-wtd MOD04 cloud fraction land	N/A	0 .. 100	n	16-bit integer	0.47
SSF-134	PSF-wtd MOD04 aerosol types land	N/A	0 .. 9999	n	32-bit integer	0.94
SSF-135	PSF-wtd MOD04 dust weighting factor land	N/A	0.0 .. 1.0	n	32-bit real	0.94
SSF-136	PSF-wtd MOD04 corrected optical depth land (0.470)	N/A	0.0 .. 5.0	n	32-bit real	0.94
SSF-137	PSF-wtd MOD04 corrected optical depth land (0.550)	N/A	0.0 .. 5.0	n	32-bit real	0.94
SSF-138	PSF-wtd MOD04 corrected optical depth land (0.659)	N/A	0.0 .. 5.0	n	32-bit real	0.94
SSF-139	MOD04 number pixels percentile land (0.659) in CERES FOV	N/A	0 .. (2 ³¹ -1)	n	32-bit integer	0.94
SSF-140	PSF-wtd MOD04 mean reflectance land (0.470)	N/A	0.0 .. 1.0	n	32-bit real	0.94

Table 2.5-14. MODIS Land Aerosols

Item	SDS Name (Parameter Name)	Units	Range	Dimen- sions	Data Type	Maximum Hourly Size (MB)
SSF-141	PSF-wtd MOD04 mean reflectance land (0.659)	N/A	0.0 .. 1.0	n	32-bit real	0.94
SSF-142	PSF-wtd MOD04 mean reflectance land (0.865)	N/A	0.0 .. 1.0	n	32-bit real	0.94
SSF-143	PSF-wtd MOD04 mean reflectance land (2.130)	N/A	0.0 .. 1.0	n	32-bit real	0.94
SSF-144	PSF-wtd MOD04 mean reflectance land (3.750)	N/A	0.0 .. 1.0	n	32-bit real	0.94
SSF-145	PSF-wtd MOD04 std reflectance land (0.470)	N/A	0.0 .. 2.0	n	32-bit real	0.94

The MODIS ocean aerosol parameters described in [Table 2.5-15](#) are only available on Terra and Aqua SSF products.

Table 2.5-15. MODIS Ocean Aerosols

Item	SDS Name (Parameter Name)	Units	Range	Dimen- sions	Data Type	Maximum Hourly Size (MB)
SSF-146	Percentage of CERES FOV with MODIS ocean aerosol	N/A	0 .. 100	n	16-bit integer	0.47
SSF-147	PSF-wtd MOD04 cloud fraction ocean	N/A	0 .. 100	n	16-bit integer	0.47
SSF-148	PSF-wtd MOD04 solution indices ocean small, average	N/A	0 .. 99999	n	32-bit integer	0.94
SSF-149	PSF-wtd MOD04 solution indices ocean large, average	N/A	0 .. 99999	n	32-bit integer	0.94
SSF-150	PSF-wtd MOD04 effective optical depth average ocean (0.470)	N/A	0.0 .. 5.0	n	32-bit real	0.94
SSF-151	PSF-wtd MOD04 effective optical depth average ocean (0.550)	N/A	0.0 .. 5.0	n	32-bit real	0.94
SSF-152	PSF-wtd MOD04 effective optical depth average ocean (0.659)	N/A	0.0 .. 5.0	n	32-bit real	0.94
SSF-153	PSF-wtd MOD04 effective optical depth average ocean (0.865)	N/A	0.0 .. 5.0	n	32-bit real	0.94
SSF-154	PSF-wtd MOD04 effective optical depth average ocean (1.240)	N/A	0.0 .. 5.0	n	32-bit real	0.94
SSF-155	PSF-wtd MOD04 effective optical depth average ocean (1.640)	N/A	0.0 .. 5.0	n	32-bit real	0.94
SSF-156	PSF-wtd MOD04 effective optical depth average ocean (2.130)	N/A	0.0 .. 5.0	n	32-bit real	0.94

Table 2.5-15. MODIS Ocean Aerosols

Item	SDS Name (Parameter Name)	Units	Range	Dimen- sions	Data Type	Maximum Hourly Size (MB)
SSF-157	PSF-wtd MOD04 optical depth small average ocean (0.550)	N/A	0.0 .. 5.0	n	32-bit real	0.94
SSF-158	PSF-wtd MOD04 optical depth small average ocean (0.865)	N/A	0.0 .. 5.0	n	32-bit real	0.94
SSF-159	PSF-wtd MOD04 optical depth small average ocean (2.130)	N/A	0.0 .. 5.0	n	32-bit real	0.94
SSF-160	PSF-wtd MOD04 cloud condensation nuclei ocean, average	CCN cm ⁻²	0.0 .. 1*10 ¹⁰	n	32-bit real	0.94

Estimated GigaBytes / Day: 6.8

SSF 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.

SSF 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 document to reflect new formats and to comply with standards. 	All
6/21/02	R3V2	367	<ul style="list-style-type: none"> Changed range of SSF ID in SSF_Header. Added 2 tables for data available on Terra and Aqua products. Added explanation about differences between TRMM products and the Terra and Aqua products. Modified cover page to add information for all CERES satellites. Added Revision Record page. Updated format to comply with standards. 	SSF Metadata Tables 2.5-14 & 2.5-15 SSF Scientific Data Sets Cover page SSF Revision Record All
5/21/03	R3V3	438	<ul style="list-style-type: none"> Changed range of PSF-wtd MOD04 effective optical depths (SSF-136 to SSF-138; SSF-150 to SSF-159) from 0.0 .. 3.0 to 0.0 .. 5.0 based on changes to v003 MOD04 inputs starting with data date 01.Apr.2002. Added Beta1 data set for Aqua satellite. Updated format to comply with standards 	Tables 2.5-14 & 2.5-15 Cover page All
8/27/03	R3V4	463	<ul style="list-style-type: none"> Changed range for ADM geo (SSF-30) and removed the '(TBD)' in the parameter name. Updated format to comply with standards. 	Table 2.5-6 All
6/04/04	R4V1	533	<ul style="list-style-type: none"> Changed (SSF-30) SDS name from "ADM geo" to "Snow/ice percent coverage clear-sky overhead-sun vis albedo." Changed (SSF-29) SDS name from "CERES WN ADM type for inversion process" to "Cloud Classification." Changed (SSF-29) Range from "0 .. 5000" to "0 .. 32766." Updated format to comply with standards. 	Table 2.5-6 Table 2.5-6 Table 2.5-6 All

SSF Revision Record

SCCR Approval Date	Release/Version Number	SCCR Number	Description of Revision	Section(s) Affected
6/15/07	R4V2	659	<ul style="list-style-type: none"> Added additional versions for Terra and Aqua. The EOSDIS Product Code line was removed from the document. (6/17/2008) 	Product Version Section Sec. 2.5
5/28/08	R4V3	673	<ul style="list-style-type: none"> Added Edition2C-MOD-C4-Land-IGBP version for Terra and Aqua. 	Product Version Section
12/08/08 12/18/09	R5V1	690 751	<ul style="list-style-type: none"> Added Edition2D/Ed2D-NoSW for Aqua. Added Edition2G version for Terra. Some links were not working. They have now been modified. (12/09/2010) 	Product Version Section All
10/13/10 10/13/10	R5V2	811 812	<ul style="list-style-type: none"> Added Edition3A version for Terra. Added Edition3A/Ed3A-NoSW for Aqua. 	Product Version Product Version