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

The Monthly Zonal and Global Radiative Fluxes and Clouds (ZAVG) product are the zonal and global averages of the monthly Regional Radiative and Clouds (AVG) product. This product is the CERES equivalent of the zonal and global averages in the ERBE ES-4 product of the CERES untuned and tuned radiative transfer modeled fluxes. This product is written in HDF_EOS and contains meta data as well as gridded science data.

The ZAVG contains the following apriori and observed input:

- Zonal/Global data
- Cloud category properties for four (low, lower middle, upper middle and high) cloud layers
- Observed CERES TOA clear-sky and all-sky fluxes
- MODIS based spectral aerosol optical depths

The ZAVG contains the following constrained (tuned) vertical flux profiles for both clear-sky and total-sky conditions evaluated at the TOA, 70mb, 200mb, 500mb, and surface:

- Longwave, Shortwave, and Window channels upward and downward.

The constrained (tuned) and initial (untuned) profiles for the following are included for pristine (clear-sky no-aerosol), clear-sky, total-sky-no-aerosol, and total-sky conditions:

- Longwave upward at the surface and TOA.
- Longwave downward at the surface.
- Shortwave upward at the surface and TOA.
- Shortwave downward at the surface.
- Window channel upward at the surface and TOA.
- Window channel downward at the surface.

The adjustments to the radiative transfer model input parameters between the initial and the constrained (adjusted) passes are also contained on the ZAVG. These parameters include:

- Surface albedo and skin temperature
- Total column precipitable water, upper tropospheric relative humidity, and column ozone
- Aerosol optical depth
- Cloud optical depth, fractional area, and effective temperature

The ZAVG contains the direct and diffuse shortwave surface fluxes for total-sky, clear-sky, pristine and actinic conditions. The ZAVG also contains surface UVA and UVB downwelling and direct diffuse ratios for total-sky, clear-sky, pristine, and total-sky-no-aerosol conditions.

A complete listing of metadata and science parameters for this data product can be found in Table 2.12-1 and Table 2.12-3.

Level: 3
Frequency: Monthly
Portion of Atmosphere Covered: Surface to TOA

Time Interval Covered:
File: 1 Month
Record: 1 Month

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

Product Version:
TRMM: N/A
Terra: Beta5, Beta6, Edition2C, Edition2F
Aqua: Beta6, Edition2B, Edition2C

ZAVG Metadata

The types of ZAVG metadata are summarized in Table 2.12-1 and contain information which need only be recorded once per product. The CERES metadata are listed in Appendix B.

Table 2.12-1. ZAVG Metadata Summary

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

ZAVG Science Data

All of the ZAVG science data are organized into the HDF-EOS Grid data type, which is shown in Table 2.12-3 below. This table contains a list of the parameters within each grid, including the field number, the field name, the data type, the units, the range, and the number of elements within each field.

Table 2.12-2 List of the Vgroups for different Gridded Categories.

Table 2.12-2. Gridded Categories of ZAVG

Vgroup Number	Vgroup Name	Description	Number of Records
2	1.0 Degree Zonal	See Table 2.12-3	180
3	Global	See Table 2.12-3	1

Table 2.12-3 List of the Vgroups contained in 1.0 Degree Zonal and Global Vgroups.

Table 2.12-3. Temporal Vgroups of ZAVG

Vgroup Number	Vgroup Name	Monthly Hourly Averages / Monthly (Hour) Averages
1	Monthly Hourly Averages	See Table 2.12-4
2	Monthly Averages	See Table 2.12-4

Table 2.12-4 List of the Vgroups contained in the Monthly Hourly Averages and Monthly Averages Vgroups in ZAVG.

Table 2.12-4. Temporal Vgroups of ZAVG

Vgroup Number	Vgroup Name	Monthly Hourly Averages / Monthly (Hour) Averages
1	Observed TOA Fluxes	See Table 2.12-5(a) & (b)
2	Cloud Layer - High	See Table 2.12-6(a) & (b)
3	Cloud Layer - UpperMid	See Table 2.12-6(a) & (b)
4	Cloud Layer - LowerMid	See Table 2.12-6(a) & (b)
5	Cloud Layer - Low	See Table 2.12-6(a) & (b)
6	Stowe-Ignatov Aerosol Optical Depth	See Table 2.12-7(a) & (b)
7	MODIS Aerosol Optical Depth	See Table 2.12-8(a) & (b)
8	Tuned Pristine Fluxes	See Table 2.12-9(a) & (b)
9	Tuned ClearSky Flux Profiles	See Table 2.12-10(a) & (b)
10	Tuned TotalSky-NoAerosol Fluxes	See Table 2.12-11(a) & (b)
11	Tuned TotalSky Flux Profiles	See Table 2.12-12(a) & (b)
12	Untuned Pristine Fluxes	See Table 2.12-13(a) & (b)
13	Untuned ClearSky Fluxes	See Table 2.12-14(a) & (b)
14	Untuned TotalSky-NoAerosol Fluxes	See Table 2.12-15(a) & (b)
15	Untuned TotalSky Fluxes	See Table 2.12-16(a) & (b)
16	Satellite Emulated WN TOA Fluxes	See Table 2.12-17(a) & (b)
17	TOA Flux Error	See Table 2.12-18(a) & (b)
18	Constrainment Adjustments	See Table 2.12-19(a) & (b)
19	Surface SW Direct/Diffuse Fluxes	See Table 2.12-20(a) & (b)
20	UVA - UVB Fluxes	See Table 2.12-21(a) & (b)
21	PAR Fluxes	See Table 2.12-22(a) & (b)
22	Pristine-Sky SW MultiStream Correction	See Table 2.12-23(a) & (b)

ZAVG Science Data

All of the ZAVG science data are organized into the HDF-EOS Grid data type, which is shown in Table 2.12-4 below. This table contains a list of the parameters within each grid, including the field number, the field name, the data type, the units, the range, and the number of elements within each field. The 18 under the Dimensions column in the following tables the 18 refers to 9 = 8 monthly hourly (3-hour GMT based) + 1 monthly regional x 2 mean and standard deviation.

Table 2.12-5(a). Observed TOA Fluxes

SDS Name	Units	Range	Dimen-sions	DataType
SW TOA Total-Sky	W m^{-2}	0 .. 1400	18	32-bit real
LW TOA Total-Sky	W m^{-2}	0 .. 500	18	32-bit real
WN TOA Total-Sky	W m^{-2} μm^{-1}	2 .. 50	18	32-bit real

Table 2.12-5(a). Observed TOA Fluxes

SDS Name	Units	Range	Dimen-sions	DataType
SW TOA Clear-Sky	W m^{-2}	0 .. 1400	18	32-bit real
LW TOA Clear-Sky	W m^{-2}	0 .. 500	18	32-bit real
WN TOA Clear-Sky	W m^{-2} μm^{-1}	2 .. 50	18	32-bit real

Table 2.12-5(b). SDS Index of Observed TOA Fluxes

SDS Name	Zonal Monthly Hourly	Zonal Monthly	Global Monthly Hourly	Global Monthly
SW TOA Total-Sky	0	212	424	636
LW TOA Total-Sky	1	213	425	637
WN TOA Total-Sky	2	214	426	638
SW TOA Clear-Sky	3	215	427	639
LW TOA Clear-Sky	4	216	428	640
WN TOA Clear-Sky	5	217	429	641

Table 2.12-6(a). Cloud Properties for Four Cloud Layers

SDS Name	Units	Range	Dimen-sions	DataType
Area Fraction Percentage	Percent	0 .. 100	18 x 4	32-bit real
Vis. Opt. Depth (linear)	N/A	0 .. 400	18 x 4	32-bit real
Vis. Opt. Depth (log)	N/A	-6 .. 6	18 x 4	32-bit real
Infrared Emissivity	N/A	0 .. 1	18 x 4	32-bit real
Liquid Water Path	g m^{-2}	0 .. 10000	18 x 4	32-bit real
Ice Water Path	g m^{-2}	0 .. 10000	18 x 4	32-bit real
Top Pressure	hPa	0 .. 1100	18 x 4	32-bit real
Effective Pressure	hPa	0 .. 1100	18 x 4	32-bit real
Effective Temperature	K	100 .. 350	18 x 4	32-bit real
Effective Height	km	0 .. 20	18 x 4	32-bit real
Bottom Pressure	hPa	0 .. 1100	18 x 4	32-bit real
Liquid Particle Radius	μm	0 .. 40	18 x 4	32-bit real
Ice Particle Diameter	μm	0 .. 300	18 x 4	32-bit real
Particle Phase	N/A	1 .. 2	18 x 4	32-bit real
Vertical Aspect Ratio	N/A	0 .. 20	18 x 4	32-bit real

Table 2.12-6(b). SDS Index of High, Uppermid, Lowermid, Low (mean, stdev, num obs) in Cloud Properties

SDS Name	Zonal Monthly Hourly				Zonal Monthly				Global Monthly Hourly				Global Monthly			
Area Fraction Percentage	6	21	36	51	218	233	248	263	430	445	460	475	642	657	672	687
Vis. Opt. Depth (linear)	7	22	37	52	219	234	249	264	431	446	461	476	643	658	673	688
Vis. Opt. Depth (log)	8	23	38	53	220	235	250	265	432	447	462	477	644	659	674	689
Infrared Emissivity	9	24	39	54	221	236	251	266	433	448	463	478	645	660	675	690
Liquid Water Path	10	25	40	55	222	237	252	267	434	449	464	479	646	661	676	691
Ice Water Path	11	26	41	56	223	238	253	268	435	450	465	480	647	662	677	692
Top Pressure	12	27	42	57	224	239	254	269	436	451	466	481	648	663	678	693
Effective Pressure	13	28	43	58	225	240	255	270	437	452	467	482	649	664	679	694
Effective Temperature	14	29	44	59	226	241	256	271	438	453	468	483	650	665	680	695
Effective Height	15	30	45	60	227	242	257	272	439	454	469	484	651	666	681	696
Bottom Pressure	16	31	46	61	228	243	258	273	440	455	470	485	652	667	682	697
Liquid Particle Radius	17	32	47	62	229	244	259	274	441	456	471	486	653	668	683	698
Ice Particle Diameter	18	33	48	63	230	245	260	275	442	457	472	487	654	669	684	699
Particle Phase	19	34	49	64	231	246	261	276	443	458	473	488	655	670	685	700
Vertical Aspect Ratio	20	35	50	65	232	247	262	277	444	459	474	489	656	671	686	701

Color Red - High Cloud
Color Green - Uppermid Cloud
Color Blue - Lowermid Cloud
Color Black - Low Cloud

Table 2.12-7(a). Stowe-Ignatov Aerosol Optical Depth

SDS Name	Units	Range	Dimen-sions	DataType
Aerosol visible optical depth - 0.63 μm	N/A	0 .. 5	18	32-bit real
Aerosol visible optical depth - 1.6 μm	N/A	0 .. 5	18	32-bit real

Table 2.12-7(b). SDS Index of Stowe-Ignatov Aerosol Optical Depth

SDS Name	Zonal Monthly Hourly	Zonal Monthly	Global Monthly Hourly	Global Monthly
Aerosol visible optical depth - 0.63 μm	66	278	490	702
Aerosol visible optical depth - 1.6 μm	67	279	491	703

Table 2.12-8(a). MODIS Aerosol Optical Depth

Item	SDS Name	Units	Range	Dimen-sions	DataType
ZAVG-223	Initial Aerosol Optical Depth	N/A	0 .. 5	18	32-bit real
ZAVG-224	Aerosol Opt. Depth at 0.47 μm in Land	N/A	0 .. 5	18	32-bit real
ZAVG-225	Aerosol Opt. Depth at 0.55 μm in Land	N/A	0 .. 5	18	32-bit real
ZAVG-226	Aerosol Opt. Depth at 0.66 μm in Land	N/A	0 .. 5	18	32-bit real
ZAVG-227	Aerosol Opt. Depth at 0.47 μm in Ocean	N/A	0 .. 5	18	32-bit real
ZAVG-228	Aerosol Opt. Depth at 0.55 μm in Ocean	N/A	0 .. 5	18	32-bit real
ZAVG-229	Aerosol Opt. Depth at 0.66 μm in Ocean	N/A	0 .. 5	18	32-bit real
ZAVG-230	Aerosol Opt. Depth at 0.87 μm in Ocean	N/A	0 .. 5	18	32-bit real
ZAVG-231	Aerosol Opt. Depth at 1.24 μm in Ocean	N/A	0 .. 5	18	32-bit real
ZAVG-232	Aerosol Opt. Depth at 1.64 μm in Ocean	N/A	0 .. 5	18	32-bit real
ZAVG-233	Aerosol Opt. Depth at 2.13 μm in Ocean	N/A	0 .. 5	18	32-bit real

Table 2.12-8(b). SDS Index of MODIS Aerosol Optical Depth

SDS Name	Zonal Monthly Hourly	Zonal Monthly	Global Monthly Hourly	Global Monthly
Initial Aerosol Optical Depth	68	280	492	704
Aerosol Opt. Depth at 0.47 μm in Land	69	281	493	705
Aerosol Opt. Depth at 0.55 μm in Land	70	282	494	706
Aerosol Opt. Depth at 0.66 μm in Land	71	283	495	707
Aerosol Opt. Depth at 0.47 μm in Ocean	72	284	496	708
Aerosol Opt. Depth at 0.55 μm in Ocean	73	285	497	709
Aerosol Opt. Depth at 0.66 μm in Ocean	74	286	498	710
Aerosol Opt. Depth at 0.87 μm in Ocean	75	287	499	711
Aerosol Opt. Depth at 1.24 μm in Ocean	76	288	500	712
Aerosol Opt. Depth at 1.64 μm in Ocean	77	289	501	713
Aerosol Opt. Depth at 2.13 μm in Ocean	78	290	502	714

Table 2.12-9(a). Tuned Pristine Fluxes

SDS Name	Units	Range	Dimen-sions	DataType
Tuned Pristine SW Surface Up	W m^{-2}	0 .. 1400	18	32-bit real
Tuned Pristine SW Surface Down	W m^{-2}	0 .. 1400	18	32-bit real
Tuned Pristine SW TOA Up	W m^{-2}	0 .. 1400	18	32-bit real

Table 2.12-9(a). Tuned Pristine Fluxes

SDS Name	Units	Range	Dimen-sions	DataType
Tuned Pristine LW Surface Up	W m^{-2}	0 .. 850	18	32-bit real
Tuned Pristine LW Surface Down	W m^{-2}	0 .. 700	18	32-bit real
Tuned Pristine LW TOA Up	W m^{-2}	0 .. 850	18	32-bit real
Tuned Pristine WN Surface Up	W m^{-2}	0 .. 370	18	32-bit real
Tuned Pristine WN Surface Down	W m^{-2}	0 .. 370	18	32-bit real
Tuned Pristine WN TOA Up	W m^{-2}	0 .. 370	18	32-bit real

Table 2.12-9(b). SDS Index of Tuned Pristine Fluxes

SDS Name	Zonal Monthly Hourly	Zonal Monthly	Global Monthly Hourly	Global Monthly
Tuned Pristine SW Surface Up	79	291	503	715
Tuned Pristine SW Surface Down	80	292	504	716
Tuned Pristine SW TOA Up	81	293	505	717
Tuned Pristine LW Surface Up	82	294	506	718
Tuned Pristine LW Surface Down	83	295	507	719
Tuned Pristine LW TOA Up	84	296	508	720
Tuned Pristine WN Surface Up	85	297	509	721
Tuned Pristine WN Surface Down	86	298	510	722
Tuned Pristine WN TOA Up	87	299	511	723

Table 2.12-10(a). Tuned ClearSky Flux Profiles

SDS Name	Units	Range	Dimen-sions	DataType
Tuned Clear-Sky SW Up	W m^{-2}	0 .. 1400	18 x 5	32-bit real
Tuned Clear-Sky SW Down	W m^{-2}	0 .. 1400	18 x 5	32-bit real
Tuned Clear-Sky LW Up	W m^{-2}	0 .. 850	18 x 5	32-bit real
Tuned Clear-Sky LW Down	W m^{-2}	0 .. 700	18 x 5	32-bit real
Tuned Clear-Sky WN Up	W m^{-2}	0 .. 370	18 x 5	32-bit real
Tuned Clear-Sky WN Down	W m^{-2}	0 .. 370	18 x 5	32-bit real

Table 2.12-10(b). SDS Index of Tuned ClearSky Flux Profiles

SDS Name	Zonal Monthly Hourly	Zonal Monthly	Global Monthly Hourly	Global Monthly
Tuned Clear-Sky SW Up	88	300	512	724
Tuned Clear-Sky SW Down	89	301	513	725
Tuned Clear-Sky LW Up	90	302	514	726
Tuned Clear-Sky LW Down	91	303	515	727
Tuned Clear-Sky WN Up	92	304	516	728
Tuned Clear-Sky WN Down	93	305	517	729

Table 2.12-11(a). Tuned TotalSky-NoAerosol Fluxes

SDS Name	Units	Range	Dimen-sions	DataType
Tuned Total-Sky-NoAerosol SW Surface Up	W m^{-2}	0 .. 1400	18	32-bit real
Tuned Total-Sky-NoAerosol SW Surface Down	W m^{-2}	0 .. 1400	18	32-bit real
Tuned Total-Sky-NoAerosol SW TOA Up	W m^{-2}	0 .. 1400	18	32-bit real
Tuned Total-Sky-NoAerosol LW Surface Up	W m^{-2}	0 .. 850	18	32-bit real
Tuned Total-Sky-NoAerosol LW Surface Down	W m^{-2}	0 .. 700	18	32-bit real
Tuned Total-Sky-NoAerosol LW TOA Up	W m^{-2}	0 .. 850	18	32-bit real
Tuned Total-Sky-NoAerosol WN Surface Up	W m^{-2}	0 .. 370	18	32-bit real
Tuned Total-Sky-NoAerosol WN Surface Down	W m^{-2}	0 .. 370	18	32-bit real
Tuned Total-Sky-NoAerosol WN TOA Up	W m^{-2}	0 .. 370	18	32-bit real

Table 2.12-11(b). SDS Index of Tuned TotalSky-NoAerosol Fluxes

SDS Name	Zonal Monthly Hourly	Zonal Monthly	Zonal Monthly Hourly	Zonal Monthly
Tuned Total-Sky-NoAerosol SW Surface Up	94	306	518	730
Tuned Total-Sky-NoAerosol SW Surface Down	95	307	519	731
Tuned Total-Sky-NoAerosol SW TOA Up	96	308	520	732

Table 2.12-11(b). SDS Index of Tuned TotalSky-NoAerosol Fluxes

SDS Name	Zonal Monthly Hourly	Zonal Monthly	Zonal Monthly Hourly	Zonal Monthly
Tuned Total-Sky-NoAerosol LW Surface Up	97	309	521	733
Tuned Total-Sky-NoAerosol LW Surface Down	98	310	522	734
Tuned Total-Sky-NoAerosol LW TOA Up	99	311	523	735
Tuned Total-Sky-NoAerosol WN Surface Up	100	312	524	736
Tuned Total-Sky-NoAerosol WN Surface Down	101	313	525	737
Tuned Total-Sky-NoAerosol WN TOA Up	102	314	526	738

Table 2.12-12(a). Tuned TotalSky Flux Profiles

SDS Name	Units	Range	Dimen-sions	DataType
Tuned Total-Sky SW Up	W m^{-2}	0 .. 1400	18 x 5	32-bit real
Tuned Total-Sky SW Down	W m^{-2}	0 .. 1400	18 x 5	32-bit real
Tuned Total-Sky LW Up	W m^{-2}	0 .. 850	18 x 5	32-bit real
Tuned Total-Sky LW Down	W m^{-2}	0 .. 700	18 x 5	32-bit real
Tuned Total-Sky WN Up	W m^{-2}	0 .. 370	18 x 5	32-bit real
Tuned Total-Sky WN Down	W m^{-2}	0 .. 370	18 x 5	32-bit real

Table 2.12-12(b). SDS Index of Tuned TotalSky Flux Profiles

SDS Name	Zonal Monthly Hourly	Zonal Monthly	Global Monthly Hourly	Global Monthly
Tuned Total-Sky SW Up	103	315	527	739
Tuned Total-Sky SW Down	104	316	528	740
Tuned Total-Sky LW Up	105	317	529	741
Tuned Total-Sky LW Down	106	318	530	742
Tuned Total-Sky WN Up	107	319	531	743
Tuned Total-Sky WN Down	108	320	532	744

Table 2.12-13(a). Untuned Pristine Fluxes

SDS Name	Units	Range	Dimen-sions	DataType
Untuned Pristine SW Surface Up	W m^{-2}	0 .. 1500	18	32-bit real
Untuned Pristine SW Surface Down	W m^{-2}	0 .. 1500	18	32-bit real
Untuned Pristine SW TOA Up	W m^{-2}	0 .. 1400	18	32-bit real
Untuned Pristine LW Surface Up	W m^{-2}	0 .. 850	18	32-bit real
Untuned Pristine LW Surface Down	W m^{-2}	0 .. 700	18	32-bit real
Untuned Pristine LW TOA Up	W m^{-2}	0 .. 850	18	32-bit real
Untuned Pristine WN Surface Up	W m^{-2}	0 .. 370	18	32-bit real
Untuned Pristine WN Surface Down	W m^{-2}	0 .. 370	18	32-bit real
Untuned Pristine WN TOA Up	W m^{-2}	0 .. 370	18	32-bit real

Table 2.12-13(b). SDS Index of Untuned Pristine Fluxes

SDS Name	Zonal Monthly Hourly	Zonal Monthly	Global Monthly Hourly	Global Monthly
Untuned Pristine SW Surface Up	109	321	533	745
Untuned Pristine SW Surface Down	110	322	534	746
Untuned Pristine SW TOA Up	111	323	535	747
Untuned Pristine LW Surface Up	112	324	536	748
Untuned Pristine LW Surface Down	113	325	537	749
Untuned Pristine LW TOA Up	114	326	538	750
Untuned Pristine WN Surface Up	115	327	539	751
Untuned Pristine WN Surface Down	116	328	540	752
Untuned Pristine WN TOA Up	117	329	541	753

Table 2.12-14(a). Untuned ClearSky Fluxes

SDS Name	Units	Range	Dimen-sions	DataType
Untuned Clear-Sky SW Surface Up	W m^{-2}	0 .. 1400	18	32-bit real
Untuned Clear-Sky SW Surface Down	W m^{-2}	0 .. 1400	18	32-bit real
Untuned Clear-Sky SW TOA Up	W m^{-2}	0 .. 1400	18	32-bit real
Untuned Clear-Sky LW Surface Up	W m^{-2}	0 .. 850	18	32-bit real
Untuned Clear-Sky LW Surface Down	W m^{-2}	0 .. 700	18	32-bit real
Untuned Clear-Sky LW TOA Up	W m^{-2}	0 .. 850	18	32-bit real
Untuned Clear-Sky WN Surface Up	W m^{-2}	0 .. 370	18	32-bit real
Untuned Clear-Sky WN Surface Down	W m^{-2}	0 .. 370	18	32-bit real
Untuned Clear-Sky WN TOA Up	W m^{-2}	0 .. 370	18	32-bit real

Table 2.12-14(b). SDS Index of Untuned ClearSky Fluxes

SDS Name	Zonal Monthly Hourly	Zonal Monthly	Global Monthly Hourly	Global Monthly
Untuned Clear-Sky SW Surface Up	118	330	542	754
Untuned Clear-Sky SW Surface Down	119	331	543	755
Untuned Clear-Sky SW TOA Up	120	332	544	756
Untuned Clear-Sky LW Surface Up	121	333	545	757
Untuned Clear-Sky LW Surface Down	122	334	546	758
Untuned Clear-Sky LW TOA Up	123	335	547	759
Untuned Clear-Sky WN Surface Up	124	336	548	760
Untuned Clear-Sky WN Surface Down	125	337	549	761
Untuned Clear-Sky WN TOA Up	126	338	550	762

Table 2.12-15(a). Untuned TotalSky-NoAerosol Fluxes

SDS Name	Units	Range	Dimen-sions	DataType
Untuned Total-Sky-NoAerosol SW Surface Up	W m^{-2}	0 .. 1400	18	32-bit real
Untuned Total-Sky-NoAerosol SW Surface Down	W m^{-2}	0 .. 1400	18	32-bit real
Untuned Total-Sky-NoAerosol SW TOA Up	W m^{-2}	0 .. 1400	18	32-bit real
Untuned Total-Sky-NoAerosol LW Surface Up	W m^{-2}	0 .. 850	18	32-bit real
Untuned Total-Sky-NoAerosol LW Surface Down	W m^{-2}	0 .. 700	18	32-bit real
Untuned Total-Sky-NoAerosol LW TOA Up	W m^{-2}	0 .. 850	18	32-bit real
Untuned Total-Sky-NoAerosol WN Surface Up	W m^{-2}	0 .. 370	18	32-bit real
Untuned Total-Sky-NoAerosol WN Surface Down	W m^{-2}	0 .. 370	18	32-bit real
Untuned Total-Sky-NoAerosol WN TOA Up	W m^{-2}	0 .. 370	18	32-bit real

Table 2.12-15(b). SDS Index of Untuned TotalSky-NoAerosol Fluxes

SDS Name	Zonal Monthly Hourly	Zonal Monthly	Global Monthly Hourly	Global Monthly
Untuned Total-Sky-NoAerosol SW Surface Up	127	339	551	763
Untuned Total-Sky-NoAerosol SW Surface Down	128	340	552	764
Untuned Total-Sky-NoAerosol SW TOA Up	129	341	553	765
Untuned Total-Sky-NoAerosol LW Surface Up	130	342	554	766
Untuned Total-Sky-NoAerosol LW Surface Down	131	343	555	767
Untuned Total-Sky-NoAerosol LW TOA Up	132	344	556	768
Untuned Total-Sky-NoAerosol WN Surface Up	133	345	557	769
Untuned Total-Sky-NoAerosol WN Surface Down	134	346	558	770
Untuned Total-Sky-NoAerosol WN TOA Up	135	347	559	771

Table 2.12-16(a). Untuned TotalSky Fluxes

SDS Name	Units	Range	Dimen-sions	DataType
Untuned Total-Sky SW Surface Up	W m^{-2}	0 .. 1400	18	32-bit real
Untuned Total-Sky SW Surface Down	W m^{-2}	0 .. 1400	18	32-bit real
Untuned Total-Sky SW TOA Up	W m^{-2}	0 .. 1400	18	32-bit real
Untuned Total-Sky LW Surface Up	W m^{-2}	0 .. 850	18	32-bit real
Untuned Total-Sky LW Surface Down	W m^{-2}	0 .. 700	18	32-bit real
Untuned Total-Sky LW TOA Up	W m^{-2}	0 .. 850	18	32-bit real
Untuned Total-Sky WN Surface Up	W m^{-2}	0 .. 370	18	32-bit real
Untuned Total-Sky WN Surface Down	W m^{-2}	0 .. 370	18	32-bit real
Untuned Total-Sky WN TOA Up	W m^{-2}	0 .. 370	18	32-bit real

Table 2.12-16(b). SDS Index of Untuned TotalSky Fluxes

SDS Name	Zonal Monthly Hourly	Zonal Monthly	Global Monthly Hourly	Global Monthly
Untuned Total-Sky SW Surface Up	136	348	560	772
Untuned Total-Sky SW Surface Down	137	349	561	773
Untuned Total-Sky SW TOA Up	138	350	562	774
Untuned Total-Sky LW Surface Up	139	351	563	775
Untuned Total-Sky LW Surface Down	140	352	564	776
Untuned Total-Sky LW TOA Up	141	353	565	777
Untuned Total-Sky WN Surface Up	142	354	566	778

Table 2.12-16(b). SDS Index of Untuned TotalSky Fluxes

SDS Name	Zonal Monthly Hourly	Zonal Monthly	Global Monthly Hourly	Global Monthly
Untuned Total-Sky WN Surface Down	143	355	567	779
Untuned Total-Sky WN TOA Up	144	356	568	780

Table 2.12-17(a). Satellite Emulated WN TOA Fluxes

SDS Name	Units	Range	Dimen-sions	DataType
Untuned Satellite Emulated WN TOA	W m^{-2}	-1400 .. 1400	18	32-bit real
Tuned Satellite Emulated WN TOA	W m^{-2}	-1400 .. 1400	18	32-bit real

Table 2.12-17(b). SDS Index of Satellite Emulated WN TOA Fluxes

SDS Name	Zonal Monthly Hourly	Zonal Monthly	Global Monthly Hourly	Global Monthly
Untuned Satellite Emulated WN TOA	145	357	569	781
Tuned Satellite Emulated WN TOA	146	358	570	782

Table 2.12-18(a). TOA Fluxes Error

SDS Name	Units	Range	Dimen-sions	DataType
Tuned Minus Observed SW TOA	W m^{-2}	-1400 .. 1400	18	32-bit real
Untuned Minus Observed SW TOA	W m^{-2}	-1400 .. 1400	18	32-bit real
Tuned Minus Observed LW TOA	W m^{-2}	-600 .. 600	18	32-bit real
Untuned Minus Observed LW TOA	W m^{-2}	-600 .. 600	18	32-bit real

Table 2.12-18(b). SDS Index of TOA Fluxes Error

SDS Name	Zonal Monthly Hourly	Zonal Monthly	Global Monthly Hourly	Global Monthly
Tuned Minus Observed SW TOA	147	359	571	783
Untuned Minus Observed SW TOA	148	360	572	784
Tuned Minus Observed LW TOA	149	361	573	785
Untuned Minus Observed LW TOA	150	362	574	786

Table 2.12-19(a). Constrainment Adjustments

SDS Name	Units	Range	Dimen-sions	DataType
Total column precipitable water - initial	cm	0 .. 10	18	32-bit real
Total column precipitable water - adjusted	cm	-10 .. 10	18	32-bit real
Upper tropospheric precipitable water - initial	cm	0 .. 10	18	32-bit real
Upper tropospheric precipitable water - adjusted	cm	0 .. 10	18	32-bit real
Upper tropospheric humidity - initial	N/A	0.0 .. 100.0	18	32-bit real
Upper tropospheric humidity - adjusted	N/A	0.0 .. 100.0	18	32-bit real
Aerosol optical depth - initial	N/A	0 .. 5	18	32-bit real
Aerosol optical depth - adjusted	N/A	0 .. 5	18	32-bit real
Skin temperature - initial	K	175 .. 375	18	32-bit real
Skin temperature - adjusted	K	175 .. 375	18	32-bit real
Surface pressure	hPa	0 .. 800	18	32-bit real
Column ozone - initial	du	0 .. 800	18	32-bit real
Mean visible optical depth- adjusted	N/A	0 .. 400	18	32-bit real
Mean cloud fractional area - adjusted	%	0 .. 1 00	18	32-bit real
Mean cloud effective temperature - adjusted	K	175 .. 375	18	32-bit real

Table 2.12-19(b). SDS Index of Constrainment Adjustments

SDS Name	Zonal Monthly Hourly	Zonal Monthly	Global Monthly Hourly	Global Monthly
Total column precipitable water - initial	151	363	575	787
Total column precipitable water - adjusted	152	364	576	788
Upper tropospheric precipitable water - initia	153	365	577	789
Upper tropospheric precipitable water - adjusted	154	366	578	790
Upper tropospheric humidity - initial	155	367	579	791
Upper tropospheric humidity - adjusted	156	368	580	792
Aerosol optical depth - initial	157	369	581	793
Aerosol optical depth - adjusted	158	370	582	794
Skin temperature - initial	159	371	583	795
Skin temperature - adjusted	160	372	584	796
Surface pressure	161	373	585	797

Table 2.12-19(b). SDS Index of Constrainment Adjustments

SDS Name	Zonal Monthly Hourly	Zonal Monthly	Global Monthly Hourly	Global Monthly
Column ozone - initial	162	374	586	798
Mean visible optical depth- adjusted	163	375	587	799
Mean cloud fractional area - adjusted	164	376	588	800
Mean cloud effective temperature - adjusted	165	377	589	801

Table 2.12-20(a). Surface SW Direct/Diffuse Fluxes

SDS Name	Units	Range	Dimen-sions	DataType
Total-Sky SW flux - Diffuse	W m^{-2}	0 .. 1400	18	32-bit real
Clear-Sky SW flux - Diffuse	W m^{-2}	0 .. 1400	18	32-bit real
Pristine-Sky SW flux - Diffuse	W m^{-2}	0 .. 1400	18	32-bit real
Actinic-Sky SW flux - Diffuse	W m^{-2}	0 .. 1400	18	32-bit real
Total-Sky SW flux - Direct	W m^{-2}	0 .. 1400	18	32-bit real
Clear-Sky SW flux - Direct	W m^{-2}	0 .. 1400	18	32-bit real
Pristine-Sky SW flux - Direct	W m^{-2}	0 .. 1400	18	32-bit real
Actinic-Sky SW flux - Direct	W m^{-2}	0 .. 1400	18	32-bit real

Table 2.12-20(b). SDS Index of Surface SW Direct/Diffuse Fluxes

SDS Name	Zonal Monthly Hourly	Zonal Monthly	Global Monthly Hourly	Global Monthly
Total-Sky SW flux - Diffuse	166	378	590	802
Clear-Sky SW flux - Diffuse	167	379	591	803
Pristine-Sky SW flux - Diffuse	168	380	592	804
Actinic-Sky SW flux - Diffuse	169	381	593	805
Total-Sky SW flux - Direct	170	382	594	806
Clear-Sky SW flux - Direct	171	383	595	807
Pristine-Sky SW flux - Direct	172	384	596	808
Actinic-Sky SW flux - Direct	173	385	597	809

Table 2.12-21(a). UVA - UVB Fluxes

SDS Name	Units	Range	Dimen-sions	DataType
TOA Downwelling UVB Flux	W m^{-2}	0 .. 1400	18	32-bit real
TOA Downwelling UVA Flux	W m^{-2}	0 .. 1400	18	32-bit real
Pristine UVB Surface flux - Direct	W m^{-2}	0 .. 1400	18	32-bit real
Pristine UVB Surface flux - Diffuse	W m^{-2}	0 .. 1400	18	32-bit real
Pristine UVA Surface flux - Direct	W m^{-2}	0 .. 1400	18	32-bit real
Pristine UVA Surface flux - Diffuse	W m^{-2}	0 .. 1400	18	32-bit real
Clear-Sky UVB Surface flux - Direct	W m^{-2}	0 .. 1400	18	32-bit real
Clear-Sky UVB Surface flux - Diffuse	W m^{-2}	0 .. 1400	18	32-bit real
Clear-Sky UVA Surface flux - Direct	W m^{-2}	0 .. 1400	18	32-bit real
Clear-Sky UVA Surface flux - Diffuse	W m^{-2}	0 .. 1400	18	32-bit real
Total-Sky-NoAerosol UVB Surface flux - Direct	W m^{-2}	0 .. 1400	18	32-bit real
Total-Sky-NoAerosol UVB Surface flux - Diffuse	W m^{-2}	0 .. 1400	18	32-bit real
Total-Sky-NoAerosol UVA Surface flux - Direct	W m^{-2}	0 .. 1400	18	32-bit real
Total-Sky-NoAerosol UVA Surface flux - Diffuse	W m^{-2}	0 .. 1400	18	32-bit real
Total-Sky UVB Surface flux - Direct	W m^{-2}	0 .. 1400	18	32-bit real
Total-Sky UVB Surface flux - Diffuse	W m^{-2}	0 .. 1400	18	32-bit real
Total-Sky UVA Surface flux - Direct	W m^{-2}	0 .. 1400	18	32-bit real
Total-Sky UVA Surface flux - Diffuse	W m^{-2}	0 .. 1400	18	32-bit real
Total-Sky Surface UV Index	N/A	0 .. 30	18	32-bit real
Clear-Sky Surface UV Index	N/A	0 .. 30	18	32-bit real
Pristine Surface UV Index	N/A	0 .. 30	18	32-bit real
Total-Sky-NoAerosol Surface UV-Index	N/A	0 .. 30	18	32-bit real
Total-Sky UVB Surface Up	W m^{-2}	0 .. 5	18	32-bit real
Snow Grain Size	μm	50 .. 2000	18	32-bit real
Match Total Aerosol Optical Depth at 0.55 μm	N/A	0 .. 10	18	32-bit real

Table 2.12-21(b). SDS Index of UVA - UVB Fluxes

SDS Name	Zonal Monthly Hourly	Zonal Monthly	Global Monthly Hourly	Global Monthly
TOA Downwelling UVB Flux	174	386	598	810
TOA Downwelling UVA Flux	175	387	599	811
Pristine UVB Surface flux - Direct	176	388	600	812
Pristine UVB Surface flux - Diffuse	177	389	601	813
Pristine UVA Surface flux - Direct	178	390	602	814
Pristine UVA Surface flux - Diffuse	179	391	603	815
Clear-Sky UVB Surface flux - Direct	180	392	604	816
Clear-Sky UVB Surface flux - Diffuse	181	393	605	817
Clear-Sky UVA Surface flux - Direct	182	394	606	818
Clear-Sky UVA Surface flux - Diffuse	183	395	607	819
Total-Sky-NoAerosol UVB Surface flux - Direct	184	396	608	820
Total-Sky-NoAerosol UVB Surface flux - Diffuse	185	397	609	821
Total-Sky-NoAerosol UVA Surface flux - Direct	186	398	610	822
Total-Sky-NoAerosol UVA Surface flux - Diffuse	187	399	611	823
Total-Sky UVB Surface flux - Direct	188	400	612	824
Total-Sky UVB Surface flux - Diffuse	189	401	613	825
Total-Sky UVA Surface flux - Direct	190	402	614	826
Total-Sky UVA Surface flux - Diffuse	191	403	615	827
Total-Sky Surface UV Index	192	404	616	828
Clear-Sky Surface UV Index	193	405	617	829
Pristine Surface UV Index	194	406	618	830
Total-Sky-NoAerosol Surface UV- Index	195	407	619	831
Total-Sky UVB Surface Up	196	408	620	832
Snow Grain Size	197	409	621	833
Match Total Aerosol Optical Depth at 0.55 μm	198	410	622	834

Table 2.12-22(a). PAR Fluxes

SDS Name	Units	Range	Dimen-sions	DataType
TOA Downwelling PAR Flux	W m^{-2}	0 .. 1400	18	32-bit real
Total-Sky PAR Surface flux - Direct	W m^{-2}	0 .. 1400	18	32-bit real
Total-Sky PAR Surface flux - Diffuse	W m^{-2}	0 .. 1400	18	32-bit real
Total-Sky PAR PURV Surface flux - Direct	W m^{-2}	0 .. 1400	18	32-bit real

Table 2.12-22(a). PAR Fluxes

SDS Name	Units	Range	Dimen-sions	DataType
Total-Sky PAR PURV Surface flux - Diffuse	W m^{-2}	0 .. 1400	18	32-bit real
Total-Sky PAR ChlorA Surface flux - Direct	W m^{-2}	0 .. 1400	18	32-bit real
Total-Sky PAR ChlorA Surface flux - Diffuse	W m^{-2}	0 .. 1400	18	32-bit real
Clear-Sky PAR Surface flux - Direct	W m^{-2}	0 .. 1400	18	32-bit real
Clear-Sky PAR Surface flux - Diffuse	W m^{-2}	0 .. 1400	18	32-bit real
Pristine PAR Surface flux - Direct	W m^{-2}	0 .. 1400	18	32-bit real
Pristine PAR Surface flux - Diffuse	W m^{-2}	0 .. 1400	18	32-bit real

Table 2.12-22(b). SDS Index of PAR Fluxes

SDS Name	Zonal Monthly Hourly	Zonal Monthly	Global Monthly Hourly	Global Monthly
TOA Downwelling PAR Flux	199	411	623	835
Total-Sky PAR Surface flux - Direct	200	412	624	836
Total-Sky PAR Surface flux - Diffuse	201	413	625	837
Total-Sky PAR PURV Surface flux - Direct	202	414	626	838
Total-Sky PAR PURV Surface flux - Diffuse	203	415	627	839
Total-Sky PAR ChlorA Surface flux - Direct	204	416	628	840
Total-Sky PAR ChlorA Surface flux - Diffuse	205	417	629	841
Clear-Sky PAR Surface flux - Direct	206	418	630	842
Clear-Sky PAR Surface flux - Diffuse	207	419	631	843
Pristine PAR Surface flux - Direct	208	420	632	844
Pristine PAR Surface flux - Diffuse	209	421	633	845

Table 2.12-23(a). Pristine-Sky SW MultiStream Correction

SDS Name	Units	Range	Dimen-sions	DataType
SW TOA Flux - Up - Pristine-Sky - Corrected	W m^{-2}	0 .. 1000	18	32-bit real
SW Surface Flux - Down-Pristine-Sky - Corrected	W m^{-2}	0 .. 1000	18	32-bit real

Table 2.12-23(b). SDS Index of Pristine-Sky SW MultiStream Correction

SDS Name	Zonal Monthly Hourly	Zonal Monthly	Global Monthly Hourly	Global Monthly
SW TOA Flux - Up - Pristine-Sky - Corrected	210	422	634	846
SW Surface Flux - Down- Pristine-Sky - Corrected	211	423	635	847

Total Bits / Record: **150144**
Total Bytes / Record: **18768**
Total Records / File: **181**
Total Bytes / File: **3,397,008**
Total MBytes / File: **3.40**

ZAVG 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.

ZAVG 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
11/15/06	R3V2	639	• Updated to change all tables and added SDS Index tables. • The EOSDIS Product Code line was removed from the document. (6/17/2008)	All Sec. 2.11
02/08/08	R3V3	667	• Updated to add three parameters. (08/20/2008) • Changed SDS Index tables. (08/20/2008) • Section numbering was changed due to insertion of the ISCCP D2-like DPC. (09/23/2008)	Table 2.11-21(a) Tables 2.11-5(b) to 2.11-23(b) All
11/12/08	R5V1	689	• Updated “Product Version” category. • Removed Beta3 from “Product Version” category. (11/17/2008) • Corrected the Terra and Aqua product versions. (12/08/2008) • Corrected the Terra and Aqua product versions. (12/16/2008)	Sec. 2.12 Sec. 2.12 Sec. 2.12 Sec. 2.12