

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

EOSDIS Product Code: CER15

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 [Tables 2.11-1](#) and [Table 2.11-3](#).

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: Beta3

Aqua: N/A

ZAVG Metadata

The types of ZAVG metadata are summarized in [Table 2.11-1](#) and contain information which need only be recorded once per product. The CERES metadata are listed in [Appendix B](#).

Table 2.11-1. 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 2.11-3](#) 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 2.11-2](#) List of the Vgroups for different Gridded Categories.

Table 2.11-2. Gridded Categories of ZAVG

Vgroup Number	Vgroup Name	Description	Number of Records
2	1.0 Degree Zonal	See Table 2.11-3	180
3	Global	See Table 2.11-3	1

[Table 2.11-3](#) List of the Vgroups contained in 1.0 Degree Zonal and Global Vgroups.

Table 2.11-3. Temporal Vgroups of ZAVG

Vgroup Number	Vgroup Name	Monthly Hourly Averages / Monthly (Hour) Averages
1	Monthly Hourly Averages	See Table 2.11-4
2	Monthly Averages	See Table 2.11-4

Table 2.11-4 List of the Vgroups contained in the Monthly Hourly Averages and Monthly Averages Vgroups in ZAVG.

Table 2.11-4. Temporal Vgroups of ZAVG

Vgroup Number	Vgroup Name	Monthly Hourly Averages / Monthly (Hour) Averages
1	Observed TOA Fluxes	See Table 2.11-5
2	Cloud Layer - High	See Table 2.11-6
3	Cloud Layer - UpperMid	See Table 2.11-6
4	Cloud Layer - LowerMid	See Table 2.11-6
5	Cloud Layer - Low	See Table 2.11-6
6	Stowe-Ignatov Aerosol Optical Depth	See Table 2.11-7
7	MODIS Aerosol Optical Depth	See Table 2.11-8
8	Tuned Pristine Fluxes	See Table 2.11-9
9	Tuned ClearSky Flux Profiles	See Table 2.11-10
10	Tuned TotalSky-NoAerosol Fluxes	See Table 2.11-11
11	Tuned TotalSky Flux Profiles	See Table 2.11-12
12	Untuned Pristine Fluxes	See Table 2.11-13
13	Untuned ClearSky Fluxes	See Table 2.11-14
14	Untuned TotalSky-NoAerosol Fluxes	See Table 2.11-15
15	Untuned TotalSky Fluxes	See Table 2.11-16
16	Satellite Emulated WN TOA Fluxes	See Table 2.11-17
17	TOA Flux Error	See Table 2.11-18
18	Constrainment Adjustments	See Table 2.11-19
19	Surface SW Direct/Diffuse Fluxes	See Table 2.11-20
20	UVA - UVB Fluxes	See Table 2.11-21
21	PAR Fluxes	See Table 2.11-22
22	Pristine-Sky SW MultiStream Correction	See Table 2.11-23

ZAVG Science Data

All of the ZAVG science data are organized into the HDF-EOS Grid data type, which is shown in [Table 2.11-4](#) 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 2.11-5. Observed TOA Fluxes

SDS Name	Units	Range	Dimensions	Data Type
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
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 2.11-5(b). SDS Index of Observed TOA Fluxes

SDS Name	Zonal Monthly Hourly	Zonal Monthly	Global Monthly Hourly	Global Monthly
SW TOA Total-Sky	0	209	418	627
LW TOA Total-Sky	1	210	419	628
WN TOA Total-Sky	2	211	420	629
SW TOA Clear-Sky	3	212	421	630
LW TOA Clear-Sky	4	213	422	631
WN TOA Clear-Sky	5	214	423	632

Table 2.11-6. Cloud Properties for Four Cloud Layers (1 of 2)

SDS Name	Units	Range	Dimensions	Data Type
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

Table 2.11-6. Cloud Properties for Four Cloud Layers (1 of 2)

SDS Name	Units	Range	Dimensions	Data Type
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 2.11-6(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	215 230 245 260	424 439 454 469	633 648 663 678
Vis. Opt. Depth (linear)	7 22 37 52	216 231 246 261	425 440 455 470	634 649 664 679
Vis. Opt. Depth (log)	8 23 38 53	217 232 247 262	426 441 456 471	635 650 665 680
Infrared Emissivity	9 24 39 54	218 233 248 263	427 442 457 472	636 651 666 681
Liquid Water Path	10 25 40 55	219 234 249 264	428 443 458 473	637 652 667 682
Ice Water Path	11 26 41 56	220 235 250 265	429 444 459 474	638 653 668 683
Top Pressure	12 27 42 57	221 236 251 266	430 445 460 475	639 654 669 684
Effective Pressure	13 28 43 58	222 237 252 267	431 446 461 476	640 655 670 685
Effective Temperature	14 29 44 59	223 238 253 268	432 447 462 477	641 656 671 686
Effective Height	15 30 45 60	224 239 254 269	433 448 463 478	642 657 672 687
Bottom Pressure	16 31 46 61	225 240 255 270	434 449 464 479	643 658 673 688
Liquid Particle Radius	17 32 47 62	226 241 256 271	435 450 465 480	644 659 674 689
Ice Particle Diameter	18 33 48 63	227 242 257 272	436 451 466 481	645 660 675 690
Particle Phase	19 34 49 64	228 243 258 273	437 452 467 482	646 661 676 691
Vertical Aspect Ratio	20 35 50 65	229 244 259 274	438 453 468 483	647 662 677 692

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

Table 2.11-7. Stowe-Ignatov Aerosol Optical Depth

SDS Name	Units	Range	Dimensions	Data Type
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 2.11-7(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	275	484	693
Aerosol visible optical depth - 1.6 μm	67	276	485	694

Table 2.11-8. MODIS Aerosol Optical Depth

Item	SDS Name	Units	Range	Dimensions	Data Type
ZAVG-1	Initial Aerosol Optical Depth	N/A	0 .. 5	18	32-bit real
ZAVG-2	Aerosol Opt. Depth at 0.47 μm in Land	N/A	0 .. 5	18	32-bit real
ZAVG-3	Aerosol Opt. Depth at 0.55 μm in Land	N/A	0 .. 5	18	32-bit real
ZAVG-4	Aerosol Opt. Depth at 0.66 μm in Land	N/A	0 .. 5	18	32-bit real
ZAVG-5	Aerosol Opt. Depth at 0.47 μm in Ocean	N/A	0 .. 5	18	32-bit real
ZAVG-6	Aerosol Opt. Depth at 0.55 μm in Ocean	N/A	0 .. 5	18	32-bit real
ZAVG-7	Aerosol Opt. Depth at 0.66 μm in Ocean	N/A	0 .. 5	18	32-bit real
ZAVG-8	Aerosol Opt. Depth at 0.87 μm in Ocean	N/A	0 .. 5	18	32-bit real
ZAVG-9	Aerosol Opt. Depth at 1.24 μm in Ocean	N/A	0 .. 5	18	32-bit real
ZAVG-10	Aerosol Opt. Depth at 1.64 μm in Ocean	N/A	0 .. 5	18	32-bit real
ZAVG-11	Aerosol Opt. Depth at 2.13 μm in Ocean	N/A	0 .. 5	18	32-bit real

Table 2.11-8(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	277	486	695
Aerosol Opt. Depth at 0.47 μm in Land	69	278	487	696
Aerosol Opt. Depth at 0.55 μm in Land	70	279	488	697
Aerosol Opt. Depth at 0.66 μm in Land	71	280	489	698
Aerosol Opt. Depth at 0.47 μm in Ocean	72	281	490	699
Aerosol Opt. Depth at 0.55 μm in Ocean	73	282	491	700
Aerosol Opt. Depth at 0.66 μm in Ocean	74	283	492	701
Aerosol Opt. Depth at 0.87 μm in Ocean	75	284	493	702
Aerosol Opt. Depth at 1.24 μm in Ocean	76	285	494	703
Aerosol Opt. Depth at 1.64 μm in Ocean	77	286	495	704
Aerosol Opt. Depth at 2.13 μm in Ocean	78	287	496	705

Table 2.11-9. Tuned Pristine Fluxes

SDS Name	Units	Range	Dimensions	Data Type
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
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 2.11-9(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	288	497	706
Tuned Pristine SW Surface Down	80	289	498	707
Tuned Pristine SW TOA Up	81	290	499	708
Tuned Pristine LW Surface Up	82	291	500	709
Tuned Pristine LW Surface Down	83	292	501	710
Tuned Pristine LW TOA Up	84	293	502	711
Tuned Pristine WN Surface Up	85	294	503	712
Tuned Pristine WN Surface Down	86	295	504	713
Tuned Pristine WN TOA Up	87	296	505	714

Table 2.11-10. Tuned ClearSky Flux Profiles

SDS Name	Units	Range	Dimensions	Data Type
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 2.11-10(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	297	506	715
Tuned Clear-Sky SW Down	89	298	507	716
Tuned Clear-Sky LW Up	90	299	508	717
Tuned Clear-Sky LW Down	91	300	509	718
Tuned Clear-Sky WN Up	92	301	510	719
Tuned Clear-Sky WN Down	93	302	511	720

Table 2.11-11. Tuned TotalSky-NoAerosol Fluxes

SDS Name	Units	Range	Dimensions	Data Type
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 2.11-11(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	303	512	721
Tuned Total-Sky-NoAerosol SW Surface Down	95	304	513	722
Tuned Total-Sky-NoAerosol SW TOA Up	96	305	514	723
Tuned Total-Sky-NoAerosol LW Surface Up	97	306	515	724
Tuned Total-Sky-NoAerosol LW Surface Down	98	307	516	725
Tuned Total-Sky-NoAerosol LW TOA Up	99	308	517	726
Tuned Total-Sky-NoAerosol WN Surface Up	100	309	518	727
Tuned Total-Sky-NoAerosol WN Surface Down	101	310	519	728
Tuned Total-Sky-NoAerosol WN TOA Up	102	311	520	729

Table 2.11-12. Tuned TotalSky Flux Profiles

SDS Name	Units	Range	Dimensions	Data Type
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 2.11-12(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	312	521	730
Tuned Total-Sky SW Down	104	313	522	731
Tuned Total-Sky LW Up	105	314	523	732
Tuned Total-Sky LW Down	106	315	524	733
Tuned Total-Sky WN Up	107	316	525	734
Tuned Total-Sky WN Down	108	317	526	735

Table 2.11-13. Untuned Pristine Fluxes (1 of 2)

SDS Name	Units	Range	Dimensions	Data Type
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

Table 2.11-13. Untuned Pristine Fluxes (2 of 2)

SDS Name	Units	Range	Dimensions	Data Type
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 2.11-13(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	318	527	736
Untuned Pristine SW Surface Down	110	319	528	737
Untuned Pristine SW TOA Up	111	320	529	738
Untuned Pristine LW Surface Up	112	321	530	739
Untuned Pristine LW Surface Down	113	322	531	740
Untuned Pristine LW TOA Up	114	323	532	741
Untuned Pristine WN Surface Up	115	324	533	742
Untuned Pristine WN Surface Down	116	325	534	743
Untuned Pristine WN TOA Up	117	326	535	744

Table 2.11-14. Untuned ClearSky Fluxes (1 of 2)

SDS Name	Units	Range	Dimensions	Data Type
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

Table 2.11-14. Untuned ClearSky Fluxes (2 of 2)

SDS Name	Units	Range	Dimen- sions	Data Type
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 2.11-14(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	327	536	745
Untuned Clear-Sky SW Surface Down	119	328	537	746
Untuned Clear-Sky SW TOA Up	120	329	538	747
Untuned Clear-Sky LW Surface Up	121	330	539	748
Untuned Clear-Sky LW Surface Down	122	331	540	749
Untuned Clear-Sky LW TOA Up	123	332	541	750
Untuned Clear-Sky WN Surface Up	124	333	542	751
Untuned Clear-Sky WN Surface Down	125	334	543	752
Untuned Clear-Sky WN TOA Up	126	335	544	753

Table 2.11-15. Untuned TotalSky-NoAerosol Fluxes (1 of 2)

SDS Name	Units	Range	Dimen- sions	Data Type
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

Table 2.11-15. Untuned TotalSky-NoAerosol Fluxes (2 of 2)

SDS Name	Units	Range	Dimensions	Data Type
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 2.11-15(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	336	545	754
Untuned Total-Sky-NoAerosol SW Surface Down	128	337	546	755
Untuned Total-Sky-NoAerosol SW TOA Up	129	338	547	756
Untuned Total-Sky-NoAerosol LW Surface Up	130	339	548	757
Untuned Total-Sky-NoAerosol LW Surface Down	131	340	549	758
Untuned Total-Sky-NoAerosol LW TOA Up	132	341	550	759
Untuned Total-Sky-NoAerosol WN Surface Up	133	342	551	760
Untuned Total-Sky-NoAerosol WN Surface Down	134	343	552	761
Untuned Total-Sky-NoAerosol WN TOA Up	135	344	553	762

Table 2.11-16. Untuned TotalSky Fluxes (1 of 2)

SDS Name	Units	Range	Dimensions	Data Type
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

Table 2.11-16. Untuned TotalSky Fluxes (2 of 2)

SDS Name	Units	Range	Dimensions	DataType
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 2.11-16(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	345	554	763
Untuned Total-Sky SW Surface Down	137	346	555	764
Untuned Total-Sky SW TOA Up	138	347	556	765
Untuned Total-Sky LW Surface Up	139	348	557	766
Untuned Total-Sky LW Surface Down	140	349	558	767
Untuned Total-Sky LW TOA Up	141	350	559	768
Untuned Total-Sky WN Surface Up	142	351	560	769
Untuned Total-Sky WN Surface Down	143	352	561	770
Untuned Total-Sky WN TOA Up	144	353	562	771

Table 2.11-17. Satellite Emulated WN TOA Fluxes

SDS Name	Units	Range	Dimensions	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 2.11-17(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	354	563	772
Tuned Satellite Emulated WN TOA	146	355	564	773

Table 2.11-18. TOA Fluxes Error

SDS Name	Units	Range	Dimensions	Data Type
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 2.11-18(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	356	565	774
Untuned Minus Observed SW TOA	148	357	566	775
Tuned Minus Observed LW TOA	149	358	567	776
Untuned Minus Observed LW TOA	150	359	568	777

Table 2.11-19. Constraint Adjustments (1 of 2)

SDS Name	Units	Range	Dimensions	Data Type
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

Table 2.11-19. Constraintment Adjustments (2 of 2)

SDS Name	Units	Range	Dimen- sions	DataType
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 .. 100	18	32-bit real
Mean cloud effective temperature - adjusted	K	175 .. 375	18	32-bit real

Table 2.11-19(b). SDS Index of Constraintment Adjustments

SDS Name	Zonal Monthly Hourly	Zonal Monthly	Global Monthly Hourly	Global Monthly
Total column precipitable water - initial	151	360	569	778
Total column precipitable water - adjusted	152	361	570	779
Upper tropospheric precipitable water - initial	153	362	571	780
Upper tropospheric precipitable water - adjusted	154	363	572	781
Upper tropospheric humidity - initial	155	364	573	782
Upper tropospheric humidity - adjusted	156	365	574	783
Aerosol optical depth - initial	157	366	575	784
Aerosol optical depth - adjusted	158	367	576	785
Skin temperature - initial	159	368	577	786
Skin temperature - adjusted	160	369	578	787
Surface pressure	161	370	579	788
Column ozone - initial	162	371	580	789
Mean visible optical depth- adjusted	163	372	581	790
Mean cloud fractional area - adjusted	164	373	582	791
Mean cloud effective temperature - adjusted	165	374	583	792

Table 2.11-20. Surface SW Direct/Diffuse Fluxes

SDS Name	Units	Range	Dimensions	Data Type
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 2.11-20(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	375	584	793
Clear-Sky SW flux - Diffuse	167	376	585	794
Pristine-Sky SW flux - Diffuse	168	377	586	795
Actinic-Sky SW flux - Diffuse	169	378	587	796
Total-Sky SW flux - Direct	170	379	588	797
Clear-Sky SW flux - Direct	171	380	589	798
Pristine-Sky SW flux - Direct	172	381	590	799
Actinic-Sky SW flux - Direct	173	382	591	800

Table 2.11-21. UVA - UVB Fluxes (1 of 2)

SDS Name	Units	Range	Dimensions	Data Type
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

Table 2.11-21. UVA - UVB Fluxes (2 of 2)

SDS Name	Units	Range	Dimensions	Data Type
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

Table 2.11-21(b). SDS Index of UVA - UVB Fluxes

SDS Name	Zonal Monthly Hourly	Zonal Monthly	Global Monthly Hourly	Global Monthly
TOA Downwelling UVB Flux	174	383	592	801
TOA Downwelling UVA Flux	175	384	593	802
Pristine UVB Surface flux - Direct	176	385	594	803
Pristine UVB Surface flux - Diffuse	177	386	595	804
Pristine UVA Surface flux - Direct	178	387	596	805
Pristine UVA Surface flux - Diffuse	179	388	597	806
Clear-Sky UVB Surface flux - Direct	180	389	598	807
Clear-Sky UVB Surface flux - Diffuse	181	390	599	808
Clear-Sky UVA Surface flux - Direct	182	391	600	809
Clear-Sky UVA Surface flux - Diffuse	183	392	601	810
Total-Sky-NoAerosol UVB Surface flux - Direct	184	393	602	811
Total-Sky-NoAerosol UVB Surface flux - Diffuse	185	394	603	812
Total-Sky-NoAerosol UVA Surface flux - Direct	186	395	604	813
Total-Sky-NoAerosol UVA Surface flux - Diffuse	187	396	605	814
Total-Sky UVB Surface flux - Direct	188	397	606	815
Total-Sky UVB Surface flux - Diffuse	189	398	607	816
Total-Sky UVA Surface flux - Direct	190	399	608	817
Total-Sky UVA Surface flux - Diffuse	191	400	609	818
Total-Sky Surface UV Index	192	401	610	819
Clear-Sky Surface UV Index	193	402	611	820
Pristine Surface UV Index	194	403	612	821
Total-Sky-NoAerosol Surface UV- Index	195	404	613	822

Table 2.11-22. PAR Fluxes (1 of 2)

SDS Name	Units	Range	Dimensions	Data Type
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 2.11-22. PAR Fluxes (2 of 2)

SDS Name	Units	Range	Dimensions	Data Type
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 2.11-22(b). SDS Index of PAR Fluxes

SDS Name	Zonal Monthly Hourly	Zonal Monthly	Global Monthly Hourly	Global Monthly
TDA Downwelling PAR Flux	196	405	614	823
Total-Sky PAR Surface flux - Direct	197	406	615	824
Total-Sky PAR Surface flux - Diffuse	198	407	616	825
Total-Sky PAR PURV Surface flux - Direct	199	408	617	826
Total-Sky PAR PURV Surface flux - Diffuse	200	409	618	827
Total-Sky PAR ChlorA Surface flux - Direct	201	410	619	828
Total-Sky PAR ChlorA Surface flux - Diffuse	202	411	620	829
Clear-Sky PAR Surface flux - Direct	203	412	621	830
Clear-Sky PAR Surface flux - Diffuse	204	413	622	831
Pristine PAR Surface flux - Direct	205	414	623	832
Pristine PAR Surface flux - Diffuse	206	415	624	833

Table 2.11-23. Pristine-Sky SW MultiStream Correction

SDS Name	Units	Range	Dimensions	Data Type
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 2.11-23(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	207	416	625	834
SW Surface Flux - Down- Pristine-Sky - Corrected	208	417	626	835

Total Bits / Record: 149760
Total Bytes / Record: 18720
Total Records / File: 181
Total Bytes / File: 3,388,320
Total MBytes / File: 3.39

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	<ul style="list-style-type: none"> • Updated format to comply with standards. 	All
N/A	R3V2	639	<ul style="list-style-type: none"> • Updated to change all tables and added SDS Index tables. 	All