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 is a summary of zonal and global averages of the radiative fluxes and cloud properties, probably most suitable for inclusion in the Earth Observing System Data and Information System (EOSDIS) Information Management System (IMS) as a browse product. This product is the CERES equivalent to the zonal averages and global averages in the ERBE S-4 product. This product is written in HDF-EOS and contains metadata as well as gridded science data.

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

- Zonal/Global data
- Radiative fluxes for both Clear-sky and total-sky at TOA
- Cloud category properties for four cloud layers
- Column-averaged cloud properties for five weighting schemes
- Overlap data for eleven cloud conditions
- Angular model scene classes
- Adjustment parameters for four cloud layers
- Atmospheric flux profile for Clear-sky and total-sky
- Flux adjustments for Clear-sky and total-sky
- Surface data
- Adjustment parameters for clear-skies

A complete listing of metadata and science parameters for this data product can be found in Tables 2.11-1 and Table 2.11-2.

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: Global
Record: Zonal or Global

Product Version:
TRMM:
Terra:
Aqua:

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 2.11-2 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. ZAVG Grid Data (1 of 4)

Field No.	Field Name	Data Type	Units	Range	No. of Elements
	Zone/Globe Parameters				
1	Surface Type Percent Coverage	32-Bit Float	percent	0.0 .. 100.0	20
2	Surface Altitude	32-Bit Float	m	-1000 .. 10000	1
3	Snow/Ice Percent Coverage	32-Bit Float	percent	0.0 .. 100.0	1
4	Fire Percent Coverage	32-Bit Float	percent	0.0 .. 100.0	1
5	Total Aerosol Visible Optical Depth @ 0.63 microns	32-Bit Float	µm	-1 .. 5	1
6	Total Aerosol Visible Optical Depth @ 1.6 microns	32-Bit Float	µm	-1 .. 5	1
7	Aerosol Percent Coverage	32-Bit Float	percent	0.0 .. 20.0	1
	TOA Fluxes for Clear-sky (mean, stdev, num obs)				
8	Clear-sky TOA SW Flux	32-Bit Float	Wm^{-2}	0.0 .. 800.0	27
9	Clear-sky TOA LW Flux	32-Bit Float	Wm^{-2}	0.0 .. 400.0	27
10	Clear-sky TOA WN Flux	32-Bit Float	Wm^{-2}	0.0 .. 800.0	27
11	Clear-sky TOA Albedo	32-Bit Float	N/A	0.0 .. 1.0	27
	TOA Fluxes for Total-sky (mean, stdev, num obs)				
12	Total-sky TOA SW Flux	32-Bit Float	Wm^{-2}	0.0 .. 800.0	27
13	Total-sky TOA LW Flux	32-Bit Float	Wm^{-2}	0.0 .. 400.0	27
14	Total-sky TOA WN Flux	32-Bit Float	Wm^{-2}	0.0 .. 800.0	27
15	Total-sky TOA Albedo	32-Bit Float	N/A	0.0 .. 1.0	27

Table 2.11-2. ZAVG Grid Data (2 of 4)

Field No.	Field Name	Data Type	Units	Range	No. of Elements
	Atmospheric Flux Profile for Clear-sky for 4 Layers - sfc, 500hpa, 70hpa, & TOA (mean, stdev, num obs)				
16	Clear-sky Upward SW Flux Profile	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	108
17	Clear-sky Downward SW Flux Profile	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	108
18	Clear-sky Upward LW Flux Profile	32-Bit Float	Wm^{-2}	0.0 .. 700.0	108
19	Clear-sky Downward LW Flux Profile	32-Bit Float	Wm^{-2}	0.0 .. 600.0	108
	Atmospheric Flux Profile for Total-sky for 4 Layers - sfc, 500hpa, 70hpa, & TOA (mean, stdev, num obs)				
20	Total-sky Upward SW Flux Profile	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	108
21	Total-sky Downward SW Flux Profile	32-Bit Float	Wm^{-2}	0.0 .. 1400.0	108
22	Total-sky Upward LW Flux Profile	32-Bit Float	Wm^{-2}	0.0 .. 700.0	108
23	Total-sky Downward LW Flux Profile	32-Bit Float	Wm^{-2}	0.0 .. 600.0	108
24	Number of Atmospheric Layers	32-Bit Float	N/A	0 .. 4	9
25	Pressure - Atmospheric Layer	32-Bit Float	hPa	0 .. 1100	36
	Flux Adjustments Clear-sky - sfc, TOA (mean, stdev, num obs)				
26	Clear-sky Downward Sfc SW Flux Adj	32-Bit Float	Wm^{-2}	-1400.0 .. 1400.0	27
27	Clear-sky Downward Sfc LW Flux Adj	32-Bit Float	Wm^{-2}	-500.0 .. 500.0	27
28	Clear-sky Upward Sfc SW Flux Adj	32-Bit Float	Wm^{-2}	-1400.0 .. 1400.0	27
29	Clear-sky Upward Sfc LW Flux Adj	32-Bit Float	Wm^{-2}	-500.0 .. 500.0	27
30	Clear-sky Upward TOA SW Flux Adj	32-Bit Float	Wm^{-2}	-1400.0 .. 1400.0	27
31	Clear-sky Upward TOA LW Flux Adj	32-Bit Float	Wm^{-2}	-500.0 .. 500.0	27
	Flux Adjustments Total-sky - sfc, TOA (mean, stdev, num obs)				
32	Total-sky Downward Sfc SW Flux Adj	32-Bit Float	Wm^{-2}	-1400.0 .. 1400.0	27
33	Total-sky Downward Sfc LW Flux Adj	32-Bit Float	Wm^{-2}	-500.0 .. 500.0	27
34	Total-sky Upward Sfc SW Flux Adj	32-Bit Float	Wm^{-2}	-1400.0 .. 1400.0	27
35	Total-sky Upward Sfc LW Flux Adj	32-Bit Float	Wm^{-2}	-500.0 .. 500.0	27
36	Total-sky Upward TOA SW Flux Adj	32-Bit Float	Wm^{-2}	-1400.0 .. 1400.0	27
37	Total-sky Upward TOA LW Flux Adj	32-Bit Float	Wm^{-2}	-500.0 .. 500.0	27
	Clear-sky Adjustment Parameters (mean, stdev, num obs)				
38	Clear-sky Adj Precipitable Water	32-Bit Float	cm	-10.0 .. 10.0	27
39	Clear-sky Adj Suface Albedo	32-Bit Float	N/A	-1.0 .. 1.0	27
40	Clear-sky Adj Aerosol Optical Depth	32-Bit Float	N/A	-2.0 .. 2.0	27
41	Clear-sky Adj Skin Temperature	32-Bit Float	k	175.0 .. 375.0	27
	Surface Data				
42	Spectral Albedo	32-Bit Float	N/A	0.0 .. 1.0	54
43	Broadband Surface Albedo	32-Bit Float	N/A	0.0 .. 1.0	9
44	LW Surface Emissivity	32-Bit Float	N/A	0.0 .. 1.0	9
45	WN Surface Emissivity	32-Bit Float	N/A	0.0 .. 1.0	9
46	Imager_based Surf Skin Temp	32-Bit Float	k	175.0 .. 375.0	9
47	Photosynthetically Active Radiation	32-Bit Float	Wm^{-2}	0.0 .. 780.0	9
48	Direct/Diffuse Ratio at Surface, mean	32-Bit Float	N/A	0.0 .. 30	9
49	Corrected Initial Broadband Surf Albedo	32-Bit Float	N/A	0.0 .. 1.0	9

Table 2.11-2. ZAVG Grid Data (3 of 4)

Field No.	Field Name	Data Type	Units	Range	No. of Elements
	Angular Model Scene Types				
50	Angular Model Incident Solar Flux	32-Bit Float	N/A	0.0 .. 1400.0	9
51	Angular Model Fractional Area Coverage	32-Bit Float	percent	0.0 .. 100	108
52	Angular Model Albedo, mean, stdev	32-Bit Float	N/A	0.0 .. 1.0	216
53	Anugular Model LW Flux, mean, stdev	32-Bit Float	Wm^{-2}	0.0 .. 400.0	216
	Column Averaged Cloud Properties for 5 Weightings -TOA SW, TOA LW, SFC LW, LWP, & IWP (mean, stdev, num obs)				
54	Col Wtd Total Cld Area Fraction	32-Bit Float	percent	0.0 .. 100.0	45
55	Col Wtd Cld Effective Pressure	32-Bit Float	hPa	0.0 .. 1100.0	135
56	Col Wtd Cld Effective Temperature	32-Bit Float	K	100.0 .. 350.0	135
57	Col Wtd Cld Effective Height	32-Bit Float	km	0.0 .. 20.0	135
58	Col Wtd Cld Top Pressure	32-Bit Float	hPa	0.0 .. 1100.0	135
59	Col Wtd Cld Base Pressure	32-Bit Float	hPa	0.0 .. 1100.0	135
60	Col Wtd Cld Particle Phase	32-Bit Float	N/A	1.0 .. 2.0	135
61	Col Wtd Liquid Water Path	32-Bit Float	gm^{-2}	0.0 .. 10000.0	135
62	Col Wtd Ice Water Path	32-Bit Float	gm^{-2}	0.0 .. 10000.0	135
63	Col Wtd Water Particle Radius	32-Bit Float	mm	0.0 .. 40.0	135
64	Col Wtd Ice Particle Effective Diam	32-Bit Float	mm	0.0 .. 300.0	135
65	Col Wtd Cld Visible Optical Depth - lin	32-Bit Float	N/A	0.0 .. 100.0	135
66	Col Wtd Cld Visible Optical Depth - log	32-Bit Float	N/A	0.0 .. 100.0	135
67	Col Wtd Infrared Emissivity	32-Bit Float	N/A	0.0 .. 2.0	135
68	Col Wtd Cld Vertical Aspect Ratio	32-Bit Float	N/A	0.0 .. 20.0	135
	Adjustment Parameters for Column-Averaged Data for 5 Weightings - TOA SW, TOA LW, SFC LW, LWP, & IWP (mean, stdev, num obs)				
69	Col Wtd Adj Optical Depth - log	32-Bit Float	N/A	-400.0 .. 400.0	135
70	Col Wtd Adj Cld Fractional Area	32-Bit Float	N/A	-1.0 .. 1.0	135
71	Col Wtd Adj Cld Effective Temperature	32-Bit Float	K	100.0 .. 350.0	135
	Monthly Only Cloud Properties for 4 Layers -H, UM, LM, & L (mean, stdev, num obs)				
72	Cld Layer Total Cld Area Fraction	32-Bit Float	percent	0.0 .. 100.0	4
73	Cld Layer Effective Pressure	32-Bit Float	hPa	0.0 .. 1100.0	12
74	Cld Layer Effective Temperature	32-Bit Float	K	100.0 .. 350.0	12
75	Cld Layer Effective Height	32-Bit Float	km	0.0 .. 20.0	12
76	Cld Layer Top Pressure	32-Bit Float	hPa	0.0 .. 1100.0	12
77	Cld Layer Base Pressure	32-Bit Float	hPa	0.0 .. 1100.0	12
78	Cld Layer Particle Phase	32-Bit Float	N/A	1.0 .. 2.0	12
79	Cld Layer Liquid Water Path	32-Bit Float	gm^{-2}	0.0 .. 10000.0	12
80	Cld Layer Ice Water Path	32-Bit Float	gm^{-2}	0.0 .. 10000.0	12
81	Cld Layer Water Particle Radius	32-Bit Float	mm	0.0 .. 40.0	12
82	Cld Layer Ice Particle Effective Diam	32-Bit Float	mm	0.0 .. 300.0	12
83	Cld Layer Visible Optical Depth - lin	32-Bit Float	N/A	0.0 .. 100.0	12
84	Cld Layer Visible Optical Depth - log	32-Bit Float	N/A	0.0 .. 100.0	12
85	Cld Layer Infrared Emissivity	32-Bit Float	N/A	0.0 .. 2.0	12
86	Cld Layer Vertical Aspect Ratio	32-Bit Float	N/A	0.0 .. 20.0	12

Table 2.11-2. ZAVG Grid Data (4 of 4)

Field No.	Field Name	Data Type	Units	Range	No. of Elements
Adjustment Parameters for 4 Layers - H, UM, LM, & L (mean, stdev, num obs)					
87	Adj Cld Layer Optical Depth	32-Bit Float	N/A	-400.0 .. 400.0	12
88	Adj Cld Layer Fractional Area	32-Bit Float	N/A	-1.0 .. 1.0	12
89	Adj Cld Layer Effective Temperature	32-Bit Float	K	100.0 .. 350.0	12
Overlap Data for 11 cloud conditions - clear, L, LM, UM, H, H/UM, H/LM, H/L, UM/LM, UM/L, LM/L (mean, stdev, num obs)					
90	Overlap Condition Weighted Area Fraction	32-Bit Float	percent	0.0 .. 100.0	11

Total Bits / Record:	**153856**
Total Bytes / Record:	**19232**
Total Records / File:	**181**
Total Bytes / File:	**3,480,992**
Total MBytes/File	**3.32**

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