

TSI Product

The TSI Zonal Data product is generated monthly by the TISA subsystem (7.1). It contains data for every hour of the month for each 1-degree region; there are 180 zonal files each contains nested regions depending on the colatitude. The TSI data are the CERES Internal Data Product used to provide hourly TOA fluxes and cloud informations to Subsystem 8.1. The TSI contains the following data as determined on a regional basis.

- Julian time and region location with sun geometry, view zenith angles and relative azimuth angles.
- Radiative fluxes for both Clear-sky and Total-sky at TOA fluxes and land and ocean aerosol optical depths.
- The TOA flux data flags.
- Cloud category properties for four cloud layers.
- Surface Emissivities and Skin Temperature.
- Overlap data for eleven cloud conditions.

Level: 3

Frequency: 1/Month

Configuration Code: 000000 and greater

Portion of Globe Covered

File: 180 Zonal

Record: 1-Deg Equal-angle Regions

Time Interval Covered

File: Monthly

Record: Hour

TSI-1



Table 1. TSI Data Record

Description	Element Number	Units	Range	Elements/Record	Data Type	Bits/Elem
Julian Hour	1	N/A	0 .. 235959	1	32 bit real	32
Region Number	2	N/A	1 .. 64800	1	32 bit integer	32
Hour box number	3	N/A	1 .. 744	1	32 bit integer	32
Surface altitude	4	m	1000 .. 100000	1	32 bit real	32
Cosine – Solar Zenith Angle	5	deg	-1.0 .. 1.0	1	32 bit real	32
Surface percent coverage	6	N/A	0 .. 100	20	32 bit real	640
Spacecraft Zenith Angle	7	deg	0 .. 180	1	32 bit real	32
Geo-stationary satellite ID	8	N/A	N/A	1	32 bit integer	32
Relative Azimuth Angle	9	deg	0 .. 180	1	32 bit real	32
Aerosol Optical Depth at 0.63um in clr	10	N/A	0 .. 5.0	1	32 bit real	32
Aerosol Optical Depth at 1.60 um in clr	11	N/A	0 .. 5.0	1	32 bit real	32
Infrared Radiance	12	W m ⁻² sr ⁻¹ μm ⁻¹	1000.0 .. 1000.0	1	32 bit real	32
Imager Radiance Field of View	13	W m ⁻² sr ⁻¹ μm ⁻¹	1000.0 .. 1000.0	1	32 bit real	32
Data flag	14	N/A	1111 .. 3333	1	32 bit real	32
Total SW mean	15	W m ⁻²	0 .. 1400	1	32 bit real	32
Total SW std	16	N/A	N/A	1	32 bit real	32
Total LW mean	17	W m ⁻²	0 .. 500	1	32 bit real	32
Total LW std	18	N/A	N/A	1	32 bit real	32
Total albedo mean	19	W m ⁻²	0 .. 1	1	32 bit real	32
Total albedo std	20	N/A	N/A	1	32 bit real	32
Total WN mean	21	W m ⁻²	0 .. 50	1	32 bit real	32
Total WN std	22	N/A	N/A	1	32 bit real	32
Clear SW mean	23	W m ⁻²	0 .. 1400	1	32 bit real	32
Clear SW std	24	N/A	N/A	1	32 bit real	32
Clear LW mean	25	W m ⁻²	0 .. 500	1	32 bit real	32
Clear LW std	26	N/A	N/A	1	32 bit real	32
Clear albedo mean	27	W m ⁻²	0 .. 1	1	32 bit real	32
Clear albedo std	28	N/A	N/A	1	32 bit real	32
Clear WN mean	29	W m ⁻²	0 .. 50	1	32 bit real	32
Clear WN std	30	N/A	N/A	1	32 bit real	32
Cloud area fraction	31	Percent	0 .. 100	4	32 bit real	128
Cloud optical depth – linear - mean	32	N/A	0 .. 400	4	32 bit real	128



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Description	Element Number	Units	Range	Elements/Record	Data Type	Bits/Elem
Cloud optical depth – linear - std	33	N/A	N/A	4	32 bit real	128
Cloud optical depth – log – mean	34	N/A	-6 .. 6	4	32 bit real	128
Cloud optical depth – log – std	35	N/A	N/A	4	32 bit real	128
Cloud infrared emissivity – mean	36	N/A	0 .. 2	4	32 bit real	128
Cloud infrared emissivity – std	37	N/A	N/A	4	32 bit real	128
Cloud liquid water path – mean	38	g m ⁻²	0 .. 10000	4	32 bit real	128
Cloud liquid water path – std	39	N/A	N/A	4	32 bit real	128
Cloud ice water path – mean	40	g m ⁻²	0 .. 10000	4	32 bit real	128
Cloud ice water path – std	41	N/A	N/A	4	32 bit real	128
Cloud top pressure – mean	42	hPA	0 .. 1100	4	32 bit real	128
Cloud top pressure – std	43	N/A	N/A	4	32 bit real	128
Cloud effective pressure - mean	44	hPA	0 .. 1100	4	32 bit real	128
Cloud effective pressure - std	45	N/A	N/A	4	32 bit real	128
Cloud effective temperature – mean	46	K	100 .. 350	4	32 bit real	128
Cloud effective temperature - std	47	N/A	N/A	4	32 bit real	128
Cloud effective height - mean	48	km	0 .. 20	4	32 bit real	128
Cloud effective height - std	49	N/A	N/A	4	32 bit real	128
Cloud bottom pressure - mean	50	hPA	0 .. 20	4	32 bit real	128
Cloud bottom pressure - std	51	N/A	N/A	4	32 bit real	128
Cloud liquid particle size - mean	52	µm	0 .. 12	4	32 bit real	128
Cloud liquid particle size - std	53	N/A	N/A	4	32 bit real	128
Cloud ice particle size - mean	54	µm	0 .. 300	4	32 bit real	128
Cloud ice particle size -std	55	N/A	N/A	4	32 bit real	128
Cloud phase - mean	56	N/A	1.0 .. 2.0	4	32 bit real	128
Cloud phase - std	57	N/A	N/A	4	32 bit real	128
Cloud aspect ratio - mean	58	N/A	1.0 .. 20.0	4	32 bit real	128
Cloud aspect ratio - std	59	N/A	N/A	4	32 bit real	128
Area fraction overlap	60	N/A	0 .. 1.0	4	32 bit real	128
LW surface emissivity	61	N/A	0 .. 1	1	32 bit real	32
WN surface emissivity	62	N/A	0 .. 1	1	32 bit real	32
Surface skin temperature	63	K	175 .. 375	1	32 bit real	32
Initial aerosol optical depth	64	N/A	0.0 .. 5.0	1	32 bit real	32
Aerosol constituency ratio	65	N/A	0.0 .. 100.0	7	32 bit real	224
Aerosol optical depth - 0.47 µm - land	66	N/A	0.0 .. 5.0	1	32 bit real	32
Aerosol optical depth - 0.55 µm - land	67	N/A	0.0 .. 5.0	1	32 bit real	32



Table 1. TSI Data Record

Description	Element Number	Units	Range	Elements/Record	Data Type	Bits/Elem
Aerosol optical depth - 0.66 μm - land	68	N/A	0.0 .. 5.0	1	32 bit real	32
Aerosol optical depth - 0.47 μm - ocean	69	N/A	0.0 .. 5.0	1	32 bit real	32
Aerosol optical depth - 0.55 μm - ocean	70	N/A	0.0 .. 5.0	1	32 bit real	32
Aerosol optical depth - 0.66 μm - ocean	71	N/A	0.0 .. 5.0	1	32 bit real	32
Aerosol optical depth - 0.47 μm - ocean	72	N/A	0.0 .. 5.0	1	32 bit real	32
Aerosol optical depth - 0.55 μm - ocean	73	N/A	0.0 .. 5.0	1	32 bit real	32
Aerosol optical depth - 0.66 μm - ocean	74	N/A	0.0 .. 5.0	1	32 bit real	32
Aerosol optical depth - 0.87 μm - ocean	75	N/A	0.0 .. 5.0	1	32 bit real	32
Aerosol optical depth - 1.24 μm - ocean	76	N/A	0.0 .. 5.0	1	32 bit real	32
Aerosol optical depth - 1.64 μm - ocean	77	N/A	0.0 .. 5.0	1	32 bit real	32
Aerosol optical depth - 2.13 μm - ocean	78	N/A	0.0 .. 5.0	1	32 bit real	32

Total Data Bits/Record: 5408
Total Data Bytes/Record: 676
Max. Total Records/File: 267,840
Total Data Bits/File: 1,448,478,720
Total Data Bytes/File: 181,059,840
Total MBytes/File: 181.06



TSI 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.

TSI Revision Record

SCCR Approval Date	Release/Version Number	SCCR Number	Description of Revision	Section(s) Affected
N/A	R4V1	N/A	<ul style="list-style-type: none"> • New Data Products Catalog section. (6/24/2008) • The ASDC footer was added to the bottom of the document. (06/06/2013) • Eliminated section numbers from the Data Products Catalog. Specifically, in this document, section number 3.6 was removed. (12/18/2013) • Updated document to change “mm” to “μm.” (09/12/2019) 	<p>All</p> <p>All</p> <p>All</p> <p>Table 1</p>

