4.0 Ancillary Data Products

This section describes the CERES data products which are permanently archived at the Langley DAAC. Each subsection contains a brief overview of the purpose and content of the data product followed by one or more tables which list every parameter contained in the product. The following data attributes are described in the overview sections:

- Level - The EOS data products are defined in terms of "levels"[1]
- Type - Data type (Archival, Internal, or Ancillary)
- Frequency - How often the product is received or produced
- Time Interval Covered -

  File - Time period covered within this file
  Record - Time period covered within one record of this file
- Portion of Globe Covered -

  File - Portion of the globe covered within this file
  Record - Portion of the globe covered within a record of this file
- Portion of Atmosphere Covered -

  File - Portion of the atmosphere covered within this file (Surface, Top-of-the-Atmosphere (TOA), etc.)

Additional tables may contain the following attributes for each parameter:

- Description - A textual description of the parameter
- Parameter Number - Arbitrary number assigned to the parameter
- Units - Units of the parameter value
- Range - Range of values for the parameter
- Elements/Record - Elements per record for this parameter (array definition)
- Bits/Element - Number of bits used to describe this parameter
- Elem Num - Element Number, a numbering of each element in the file/record

Total file sizes are also provided. The bolded entries within the file are names for the group of parameters which follow.

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1. **Level 0:** raw instrument data at full sensor resolution.
Level 1A: raw instrument data at full sensor resolution, time-referenced, and annotated with ancillary information (including radiometric calibration coefficients and geolocation parameters such as platform ephemeris) computed and appended but not applied to the Level 0 data.
Level 1B: Level 1A data processed to sensor units and geolocated.
Level 2: derived geophysical variables at the same resolution and location as the Level 1 source data.
Level 3: geophysical variables mapped on uniform space-time grids, usually with some completeness and consistency.
Level 4: model output or results from analyses of lower level data, e.g., variables derived from multiple measurements.

4.1 MODIS Cloud Imager Data (CID_MODIS)

EOSDIS Product Code: CERX04

MODIS Cloud Imager Data (CID_MODIS) from the EOS spacecraft is a Level-1B data set with nineteen of the MODIS channels. CID_MODIS consists of two or more data sets; the first is the Level-1B data set, which contains the calibrated radiances; and the second is the companion Geolocation data set. The sizes listed in the following data description reflect the estimated number of scan line records (200) in 5 minutes of data. The files are written in Hierarchical Data Format (HDF) and are composed of Scientific Data Sets (SDS) and Vdatas.

The MODIS Level-1B HDF Structure Summary, Table 4.1-1, lists the types of HDF structures contained in the Level-1B product along with the names of the structures. A complete listing of parameters for the Level 1B data product can be found in Tables 4.1-2 through 4.1-6. The MODIS Geolocation HDF Structure Summary, Table 4.1-7, lists the types of HDF structures contained in the geolocation product along with the names of the structures. A complete listing of the parameters for the MODIS Geolocation product can be found in Tables 4.1-8 through 4.1-12.

It is assumed that only Earth-viewing radiances and uncertainties and any information needed to interpret these values from the Level-1B product will be sent to the LaRC DAAC. The channels currently requested by the CERES Science Team are

Channels	Micron	Resolution (km)	Channels	Micron	Resolution (km)
Channel 1	0.645	0.25 & 1	Channel 26	1.38	1
Channel 6	1.64	1	Channel 27	6.7	1
Channel 7	2.13	1	Channel 29	8.55	1
Channel 17	0.91	1	Channel 31	11.0	1
Channel 18	0.93	1	Channel 32	12.0	1
Channel 19	0.94	1	Channel 33	13.3	1
Channel 20	3.75	1	Channel 34	13.6	1
Channel 23	4.0	1	Channel 35	13.9	1
Channel 24	4.46	1	Channel 36	14.2	1
Channel 25	4.52	1			

Level: 1-B
Type: Ancillary
Frequency: 1 per 5.0-Min

Portion of Globe Covered
File: Satellite Swath
Record: .25- - 1.0-km by .25- - 1.0-km

Time Interval Covered
File: 5.0-Min
Record: Instantaneous

Portion of Atmosphere Covered
File: Satellite Altitude

Table 4.1-1. MODIS Level-1B HDF Structure Summary

HDF Name	HDF Structure Type	Num Records	Table Number	Size (bytes)
MODIS Core Metadata	HDF Annotations	1	Table 4.1-2	10 000
MODIS Archive Metadata	HDF Annotations	1	Table 4.1-3	10 000
MODIS Product Specific Metadata	HDF Annotations	1	Table 4.1-4	10 000
MODIS Swath Data	Vdata Structure	1	Table 4.1-5	72
Latitude	SDS	1	Table 4.1-6	2 168 000
Longitude	SDS	1	Table 4.1-6	2 168 000
Dimensions	SDS	1	Table 4.1-6	180
Slope_and_Offset	SDS	1	Table 4.1-6	1 216
SD sector Pixel quality	SDS	1 .. 200	Table 4.1-6	120 000
SRCA sector Pixel quality	SDS	1 .. 200	Table 4.1-6	160 000
BB sector Pixel quality	SDS	1 .. 200	Table 4.1-6	200 000
SV sector Pixel quality	SDS	1 .. 200	Table 4.1-6	120 000
Earth sector Pixel quality	SDS	1 .. 200	Table 4.1-6	5 416 000
EV_250_RefSB	SDS	1	Table 4.1-6	86 656 000
EV_250_RefSB_Uncert_Indexes	SDS	1	Table 4.1-6	43 328 000
EV_250_Aggr1km_RefSB	SDS	1	Table 4.1-6	5 416 000
EV_250_Aggr1km_RefSB_Uncert_Indexes	SDS	1	Table 4.1-6	2 708 000
EV_500_Aggr1km_RefSB	SDS	1 .. 2	Table 4.1-6	10 832 000
EV_500_Aggr1km_RefSB_Uncert_Indexes	SDS	1 .. 2	Table 4.1-6	5 416 000
EV_1KM_RefSB	SDS	1 .. 4	Table 4.1-6	21 664 000
EV_1KM_RefSB_Uncert_Indexes	SDS	1 .. 4	Table 4.1-6	10 832 000
EV_1KM_Emissive	SDS	1 .. 12	Table 4.1-6	64 992 000
EV_1KM_Emissive_Uncert_Indexes	SDS	1 .. 12	Table 4.1-6	32 496 000
Total MODIS Level-1B Bytes/File:				**294 723 468**

Table 4.1-2. MODIS Level-1B Core Metadata

SHORTNAME	VERSIONID	SIZEMBECS DATAGRANULE	EASTBOUND-ING COORDINATE	WESTBOUND-ING COORDINATE	NORTH-BOUNDING COORDINATE
SOUTH BOUNDING COORDINATE	EXCLUSION-GRING FLAG.1	GRINGPOINT LATITUDE.1	GRINGPOINT LONGITUDE.1	GRINGPOINT-SEQUENCE NO.1	ORBIT NUMBER
RANGE BEGINNING DATETIME	RANGE ENDING DATETIME	QAPERCENT INTERPOLAT-EDDATA	QAPERCENT OUT OFBOUNDS-DATA	QAPERCENT MISSINGDATA	AUTOMATIC QUALITYFLAG
OPERATIONAL QUALITYFLAG	SCIENCE QUALITYFLAG	QUALITYFLAG EXPLANATION	REPROCESS-ING ACTUAL	REPROCESS-ING PLANNED	INPUT-POINTER
OPERATION-MODE					

Table 4.1-3. MODIS Level-1B Archive Metadata

LONGNAME	MODIS PRODUCT FILENAME	PROCESSING DATETIME	SPSO PARAMETERS	GRANULE-NUMBER	ALGORITHM PACKAGE ACCEPTANCE-DATE
ALGORITHM PACKAGE MATURITY-CODE	ALGORITHM PACKAGE-NAME	ALGORITHM PACKAGE VERSION	INSTRUMENT-NAME	PLATFORM-SHORT NAME	PROCESSING CENTER
ROUTINEINSTRUMENT OPERATIONS		CALIBRATIONDATAQUALITY		NADIR POINTING	MISSION-PHASE

Table 4.1-4. MODIS Level-1B Product-specific Metadata (1 of 2)

Software Version	Number of Scans	Number of Day mode scans	Number of Night mode scans	Max Total Frames	Max Earth View Frames
Max SD Frames	Max SRCA Frames	Max BB Frames	Max SV Frames	Scan types in product	250 M Band Numbers for Reflected Solar Bands
500 M Band Numbers for Reflected Solar Bands	1000 M Band Numbers for Reflected Solar Bands	1000 M Band Numbers for Emissive Thermal Bands	Scan Quality Array	Incomplete Scans	Missing Packets
Packets with bad CRC	Discarded Packets	Dead MODIS Detectors	Noisy MODIS Detectors	Saturated MODIS Detectors	Dead Thermistors

Table 4.1-4. MODIS Level-1B Product-specific Metadata (2 of 2)

Noisy Thermistors	Incomplete Scans	% Valid EV Observations	% Saturated EV Observations	Post Processing Indicates Bad data	Electronics Redundancy Vector
Reflective LUT Last Change Date	Emissive LUT Last Change Date	Focal Plane Set Point			

Table 4.1-5. MODIS Level-1B Swath Data Vdata (1 of 2)

Field Name	Description	Field Num	Num Records	Data Type	Units	Range
Scan Number	Scan number	1	1	32-bit integer	N/A	1 .. 200
Complete Scan Flag	1 = Complete scan , 0 = Incomplete scan	2	1	32-bit integer	N/A	0 .. 1
Total Frames	Total number of frames in scan	3	1	32-bit integer	N/A	TBD
EV_Frames	Total number of earth view frames	4	1	32-bit integer	N/A	TBD
SD_Frames	Total number of solar diffuser frames	5	1	32-bit integer	N/A	TBD
SRCA_Frame s	Total number of SRCA frames	6	1	32-bit integer	N/A	TBD
BB_Frames	Total number of blackbody frames	7	1	32-bit integer	N/A	TBD
SV_Frames	Total number of space view frames	8	1	32-bit integer	N/A	TBD
Scan Type	Type of scan (day, night, mixed)	9	1	8-bit character	N/A	N/A
Scan Start Time	Start time of scan	10	1	64-bit float	TBD	TBD
Mirror Side	TBD	11	1	8-bit integer	N/A	1 .. 2
Scan Data Presence	TBD	12	1	32-bit integer	TBD	TBD
Missing Pack-ets	TBD	13	1	32-bit integer	TBD	TBD
Packets with Bad CRC	TBD	14	1	32-bit integer	TBD	TBD
Discarded Packets	TBD	15	1	32-bit integer	TBD	TBD
Moon in SV Port	TBD	16	1	8-bit integer	TBD	0 .. 1

Table 4.1-5. MODIS Level-1B Swath Data Vdata (2 of 2)

Field Name	Description	Field Num	Num Records	Data Type	Units	Range
On-Orbit Maneuver	TBD	17	1	8-bit integer	TBD	0 .. 1
No. SV Outliers	TBD	18	1	32-bit integer	TBD	0 .. 15
No. BB Outliers	TBD	19	1	32-bit integer	TBD	0 .. 15
No. thermistor outliers	TBD	20	1	32-bit integer	TBD	0 .. 12

Table 4.1-6. MODIS Level-1B Science Data Sets (1 of 2)

SDS Name	Description	Rank	Dimensions	Data Type	Units	Range
Latitude	Subset of the geodetic latitude	2	{2000, 271} scan x pixel	32-bit float	deg	-90 .. 90
Longitude	Subset of the geodetic longitude	2	{2000, 271} scan x pixel	32-bit float	deg	-180 .. 180
Dimensions	Values of the various dimensions in the product	1	{45}	32-bit integer	N/A	N/A
Slope_and_ Offset	Values needed to convert scaled instrument data to radiances	2	{38, 8} band x scale quantity	32-bit float	N/A	N/A
SD sector Pixel quality	Solar diffuser pixel quality	3	{200, 30, 10} scan x SD frame x track	16-bit integer	TBD	TBD
SRCA sector Pixel quality	SRCA pixel quality	3	{200, 40, 10} scan x SRCA frame x track	16-bit integer	TBD	TBD
BB sector Pixel quality	Blackbody pixel quality	3	{200, 50, 10} scan x BB frame x track	16-bit integer	TBD	TBD
SV sector Pixel quality	Space view pixel quality	3	{200, 30, 10} scan x SV frame x track	16-bit integer	TBD	TBD
Earth sector Pixel quality	Earth View pixel quality	3	{200, 1354, 10} scan x EV frame x track	16-bit integer	TBD	TBD
EV_250_Ref SB	Band 1 radiances at 1/4 km resolution	3	{1, 8000, 5416} band x scan x pixel	16-bit integer	$W\ m^{-2} sr^{-1} mm^{-1}$	TBD

Table 4.1-6. MODIS Level-1B Science Data Sets (2 of 2)

SDS Name	Description	Rank	Dimensions	Data Type	Units	Range
EV_250_RefSB_Uncert_Indexes	Band 1 uncertainty indexes at 1/4 km resolution	3	{1, 8000, 5416} band x scan x pixel	8-bit integer	N/A	TBD
EV_250_Aggr1km_RefSB	Band 1 radiances at 1 km resolution	3	{1, 2000, 1354} band x scan x pixel	16-bit integer	$W\ m^{-2}sr^{-1}mm^{-1}$	TBD
EV_250_Aggr1km_RefSB_Uncert_Indexes	Band 1 uncertainty indexes at 1 km resolution	3	{1, 2000, 1354} band x scan x pixel	8-bit integer	N/A	TBD
EV_500_Aggr1km_RefSB	Band 6, 7 radiances at 1 km resolution	3	{2, 2000, 1354} band x scan x pixel	16-bit integer	$W\ m^{-2}sr^{-1}mm^{-1}$	TBD
EV_500_Aggr1km_RefSB_Uncert_Indexes	Band 6, 7 uncertainty indexes at 1 km resolution	3	{2, 2000, 1354} band x scan x pixel	8-bit integer	N/A	TBD
EV_1KM_RefSB	Band 17, 18, 19, 26 radiances at 1 km resolution	3	{4, 2000, 1354} band x scan x pixel	16-bit integer	$W\ m^{-2}sr^{-1}mm^{-1}$	TBD
EV_1KM_RefSB_Uncert_Indexes	Band 17, 18, 19, 26 uncertainty indexes at 1 km resolution	3	{4, 2000, 1354} band x scan x pixel	8-bit integer	N/A	TBD
EV_1KM_Emissive	Band 20, 23, 24, 25, 27, 29, 31, 32, 33, 34, 35, 36 radiances at 1 km resolution	3	{12, 2000, 1354} band x scan x pixel	16-bit integer	$W\ m^{-2}sr^{-1}mm^{-1}$	TBD
EV_1KM_Emissive_Uncert_Indexes	Band 20, 23, 24, 25, 27, 29, 31, 32, 33, 34, 35, 36 uncertainty indexes at 1 km resolution	3	{12, 2000, 1354} band x scan x pixel	8-bit integer	N/A	TBD

Table 4.1-7. MODIS Geolocation HDF Structure Summary (1 of 3)

HDF Name	HDF Structure Type	Num Records	Table Number	Size (bytes)
MODIS Geolocation Core Metadata	HDF Annotations	1	Table 4.1-8	10 000
MODIS Geolocation Archive Metadata	HDF Annotations	1	Table 4.1-9	10 000
MODIS Geolocation Product Specific Metadata	HDF Annotations	1	Table 4.1-10	10 000

Table 4.1-7. MODIS Geolocation HDF Structure Summary (2 of 3)

HDF Name	HDF Structure Type	Num Records	Table Number	Size (bytes)
MODIS Geolocation Swath Structural Metadata	HDF Annotations	1	Table 4.1-11	10 000
Focal_length	SDS	1	Table 4.1-12	296
band_position	SDS	1	Table 4.1-12	296
detector_space	SDS	1	Table 4.1-12	296
detector_offsets	SDS	1	Table 4.1-12	592
T_offset	SDS	1	Table 4.1-12	296
num_samples	SDS	1	Table 4.1-12	74
Scan number	SDS	1	Table 4.1-12	400
EV frames	SDS	1	Table 4.1-12	400
SD frames	SDS	1	Table 4.1-12	400
SV frames	SDS	1	Table 4.1-12	400
EV start time	SDS	1	Table 4.1-12	1 600
SD start time	SDS	1	Table 4.1-12	1 600
SV start time	SDS	1	Table 4.1-12	1 600
SD Sun zenith	SDS	1	Table 4.1-10	800
SD Sun azimuth	SDS	1	Table 4.1-12	800
Moon Vector	SDS	1	Table 4.1-12	2 400
sun_ref	SDS	1	Table 4.1-12	2 400
Mirror side	SDS	1	Table 4.1-12	400
num_impulse	SDS	1	Table 4.1-12	200
impulse_enc	SDS	1	Table 4.1-12	40 000
impulse_time	SDS	1	Table 4.1-12	40 000
L1 scan quality	SDS	1	Table 4.1-12	3 200
Geo scan quality	SDS	1	Table 4.1-12	800
EV center time	SDS	1	Table 4.1-12	1 600
orb_pos	SDS	1	Table 4.1-12	4 800
orb_vel	SDS	1	Table 4.1-12	4 800
T_inst2ECR	SDS	1	Table 4.1-12	14 400
attitude_angles	SDS	1	Table 4.1-12	4 800
ang_rates	SDS	1	Table 4.1-12	2 400
Longitude	SDS	1	Table 4.1-12	10 832 000
Latitude	SDS	1	Table 4.1-12	10 832 000
Height	SDS	1	Table 4.1-12	5 416 000
SensorZenith	SDS	1	Table 4.1-12	5 416 000

Table 4.1-7. MODIS Geolocation HDF Structure Summary (3 of 3)

HDF Name	HDF Structure Type	Num Records	Table Number	Size (bytes)
SensorAzimuth	SDS	1	Table 4.1-12	5 416 000
Range	SDS	1	Table 4.1-12	5 416 000
SolarZenith	SDS	1	Table 4.1-12	5 416 000
SolarAzimuth	SDS	1	Table 4.1-12	5 416 000
Land/Sea Mask	SDS	1	Table 4.1-12	2 708 000
gflags	SDS	1	Table 4.1-12	2 708 000
Total MODIS Geolocation Bytes/File:				59 748 050

Table 4.1-8. MODIS Geolocation Core Metadata

SHORTNAME	VERSIONID	PGEVERSION	RANGE BEGINNING DATE	RANGE BEGINNING TIME	RANGEEND-INGDATE
RANGE ENDINGTIME	DAYNIGHT-FLAG	ORBIT NUMBER.1	EQUATOR-CROSSING LONGITUDE.1	EQUATOR-CROSSING DATE.1	EQUATOR-CROSSING TIME.1
EXCLUSION-GRING FLAG.1	GRINGPOINT LATITUDE.1	GRINGPOINT LONGITUDE.1	GRINGPOINT SEQUENCE NO.1	GRANULE-NUMBER	SCI_STATE
SCI_ABNORM	PRODUCTION DATETIME	REPROCESS-ING ACTUAL	INPUT-POINTER	LOCAL-GRANULEID	

Table 4.1-9. MODIS Geolocation Archive Metadata

LOCALINPUT GRANULEID	EASTBOUNDING COORDINATE	NORTHBOUND-ING COORDINATE	SOUTHBOUNDING COORDINATE	WESTBOUNDING COORDINATE

Table 4.1-10. MODIS Geolocation Product-specific Metadata

SwathStructure	Dimensions	GeoFields	DataFields		

Table 4.1-11. MODIS Geolocation Product-specific Metadata

Number of Scans	Max Earth Frames	Max SD Frames	Max SV Frames	Incomplete Scans	Missing Packets
Packets with bad CRC	Discarded Packets	Ephemeris/Atti-tude Source	Parameter Version	GEO_EST_RMS_ERROR	

Table 4.1-12. MODIS Geolocation Science Data Sets (1 of 3)

SDS Name	Description	Rank	Dimensions	Data Type	Units	Range
Focal_length	Focal length for detectors	1	{37} band	64-bit float	m	TBD
band_position	Scan IFOV Offsets of band trailing edges with respect to the Optical Center	1	{37} band	64-bit float	TBD	TBD
detector_space	Nominal detector spacing in the cross-scan direction	1	{37} band	64-bit float	m	TBD
detector_ offsets	Offsets of detector positions from nominal locations on the focal plane	2	{37, 2} band x {scan, track}	64-bit float	m	TBD
T_offset	Offsets of the first sample for a band to time of 1km frame	1	{37} band	64-bit float	TBD	TBD
num_samples	Number of samples per frame for each band.	1	{37} band	16-bit integer	N/A	N/A
Scan number	Scan number in granule	1	{200} scan	16-bit integer	N/A	N/A
EV frames	Number of Earth view frames in scan	1	{200} scan	16-bit integer	N/A	N/A
SD frames	Number of solar diffuser frames in scan	1	{200} scan	16-bit integer	N/A	N/A
SV frames	Number of space view frames in scan	1	{200} scan	16-bit integer	N/A	N/A
EV start time	Earth view start time (TAI)	1	{200} scan	64-bit float	sec	TBD
SD start time	Solar diffuser view start time (TAI)	1	{200} scan	64-bit float	sec	TBD
SV start time	Space view start time (TAI)	1	{200} scan	64-bit float	sec	TBD
SD Sun zenith	Sun vector zenith angle in SD frame	1	{200} scan	32-bit float	deg	TBD

Table 4.1-12. MODIS Geolocation Science Data Sets (2 of 3)

SDS Name	Description	Rank	Dimensions	Data Type	Units	Range
SD Sun azimuth	Sun vector azimuth angle in SD frame (clockwise rotation about SD Z axis with respect to SD Y axis)	1	{200} scan	32-bit float	deg	TBD
Moon Vector	Moon unit vector in instrument frame	2	{200, 3} scan x vector dimension	32-bit float	TBD	TBD
sun_ref	Unit Sun vector in ECR frame at scan center time	2	{200, 3} scan x vector dimension	32-bit float	TBD	TBD
Mirror side	Mirror side	1	{200} scan	16-bit integer	TBD	TBD
num_impulse	Number of mirror encoder samples for this scan	1	{200} scan	8-bit integer	TBD	TBD
impulse_enc	Mirror angles from encoder data.	2	{200, 25} scan x encoder values	64-bit float	N/A	N/A
impulse_time	Mirror encoder sample times from start of scan	2	{200, 25} scan x encoder values	64-bit float	sec	TBD
L1 scan quality	L1A scan quality flags	2	{200, 4} scan x flag	32-bit integer	N/A	N/A
Geo scan quality	Geolocation scan quality flags	2	{200, 4} scan x flag	8-bit integer	N/A	N/A
EV center time	Earth view center frame time (TAI)	1	{200} scan	64-bit float	sec	TBD
orb_pos	ECR orbit velocity at scan center time	2	{200, 3} scan x vector dimension	64-bit float	m	TBD
orb_vel	ECR orbit position at scan center time	2	{200, 3} scan x vector dimension	64-bit float	m sec^{-1}	TBD
T_inst2ECR	instrument-to-ECR frame transformation matrix at scan center time	3	{200, 3, 3} scan x vector dimension x vector dimension	64-bit float	TBD	TBD
attitude_angles	Spacecraft attitude at scan center time expressed in the Orbital Reference frame (roll, pitch, yaw)	2	{200, 3} scan x vector dimension	64-bit float	deg	TBD
ang_rates	Spacecraft attitude rates in spacecraft reference frame (roll, pitch, yaw)	2	{200, 3} scan x vector dimension	32-bit float	deg sec^{-1}	TBD

Table 4.1-12. MODIS Geolocation Science Data Sets (3 of 3)

SDS Name	Description	Rank	Dimensions	Data Type	Units	Range
Longitude	Geodetic longitude	2	{2000, 1354} scan x pixel	32-bit float	deg	-180 .. 180
Latitude	Geodetic latitude	2	{2000, 1354} scan x pixel	32-bit float	deg	-90 .. 90
Height	Height above ellipsoid	2	{2000, 1354} scan x pixel	16-bit integer	m	TBD
SensorZenith	Sensor (spacecraft) zenith angle	2	{2000, 1354} scan x pixel	16-bit integer	deg	0 .. 180
Sensor Azimuth	Sensor (spacecraft) azimuth angle	2	{2000, 1354} scan x pixel	16-bit integer	deg	-180 .. 180
Range	Slant range (to spacecraft)	2	{2000, 1354} scan x pixel	16-bit integer	m	TBD
SolarZenith	Solar zenith angle	2	{2000, 1354} scan x pixel	16-bit integer	deg	0 .. 180
SolarAzimuth	Solar azimuth angle	2	{2000, 1354} scan x pixel	16-bit integer	deg	-180 .. 180
Land/SeaMask	EOS Land/Sea Mask	2	{2000, 1354} scan x pixel	8-bit integer	N/A	N/A
gflags	Geolocation flags	2	{2000, 1354} scan x pixel	8-bit integer	N/A	N/A

CID_MODIS Instrument Data

Total Bytes/File :	**294 ,723,468**
Total Mbytes/File:	**281.1**
Total Mbytes/Hour:	**3,372.2**
Total Mbytes/Day:	**80,948**

CID_MODIS Geolocation Data

Total Bytes/File:	**59,748,050**
Total Mbytes/File:	**56.98**
Total Mbytes/Hour:	**683.8**
Total Mbytes/Day:	**16,410**

CID_MODIS Total Data volume

Total Mbytes/Granule:	**338.1**
Total Mbytes/Hour:	**4057.0**
Total Mbytes/Day:	**97,367**
Total Mbytes/Month:	**3,018,378**

4.2 VIRS Cloud Imager Data (CID_VIRS)

EOSDIS Product Code: CERX05

The VIRS Cloud Imager Data (CID_VIRS) are Level-1B data from the five VIRS channels on the TRMM spacecraft. The data coverage is one orbit; however, the orbit files will be processed on an hourly basis. The sizes listed in the following data description reflect the estimated number of scan line records in 1 hour (11,817). The product is written in Hierarchical Data Format (HDF). It contains Vdata and Scientific Data Sets (SDS), which hold data for all of the scan line records. The VIRS HDF Structure Summary Table 4.2-1 lists the type of HDF structure along with the name of the structure. A complete listing of parameters for this data product can be found in Tables 4.2-2 through 4.2-7. The VIRS Level-1B product is described in more detail in the Level 1 File Specifications - Volume 3 (Reference 5), available on the World Wide Web at http://tsdis.gsfc.nasa.gov/tsdis/Documents/SelectedDocs.html. The five VIRS channels are:

Channels	Micron	Resolution
Channel 1	0.63	2-km
Channel 2	1.60	2-km
Channel 3	3.75	2-km
Channel 4	10.80	2-km
Channel 5	12.00	2-km

Level: 1-B
Type: Ancillary
Frequency: 1/Hour

Portion of Globe Covered
File: Satellite Swath
Record: 2-km by 2-km

Time Interval Covered
File: 1 Hour
Record: Instantaneous

Portion of Atmosphere Covered
File: Satellite Altitude

Table 4.2-1. VIRS HDF Structure Summary

HDFName	HDF Structure Type	Num Records	Table Number	Size (bits)
VIRS Core Metadata	HDF Annotations	1	Table 4.2-2	80 000
VIRS Product Specific Metadata	HDF Annotations	1	Table 4.2-3	80 000
VIRS Swath Data for product decoding	HDF Vgroup	1	None	40 000
Scan Time	Vdata Structures	1 .. 11, 817	Table 4.2-4	756 288
Scan Status	Vdata Structures	1 .. 11, 817	Table 4.2-5	1 796 184
Navigation	Vdata Structures	1 .. 11, 817	Table 4.2-6	8 319 168
Geolocation	SDS Data Structures	1 .. 11, 817	Table 4.2-7	197 391 168
Calibration Counts	SDS Data Structures	1 .. 11, 817	Table 4.2-7	5 672 160
Local Direction	SDS Data Structures	1 .. 11, 817	Table 4.2-7	20 419 776
Channels	SDS Data Structures	1 .. 11, 817	Table 4.2-7	246 738 960
Total VIRS Megabytes/File:				**57.37**

Table 4.2-2. VIRS Core Metadata

OrbitNumber	Range BeginningDate	Range BeginningTime	Range EndingDate	Range EndingTime	GranulePointer
ShortName	Size MBECSData Granule	LongitudeOf Maximum Latitude	Spatial CoverageType	EllipsoidName	Equatorial Radius
Denominator Flattening Ratio	Orbital ModelName	SemiMajorAxis	MeanAnomaly	Right AscensionNode	Argument OfPerigee
Eccentricity	Inclination	EpochTime	EpochDate	EpochMillisec	WestBounding Coordinate
EastBounding Coordinate	NorthBounding Coordinate	SouthBounding Coordinate	CenterLatitude	Center Longitude	RadiusValue
Latitude Resolution	Longitude Resolution	Geographic Coordinate Units	TemporalRange-Type	Quality Assurance Parameter Name	Quality Assurance ParameterValue
Reprocessing Actual	BrowsePointer	ScienceContact	MeanMotion	OrbitAdjustFlag	Attitude ModeFlag
Solar BetaAngleAt BeginningOf Granule	SolarBetaAngle AtEndOfGranule	Sensor Alignment	Sensor Alignment ChannelOffsets	ScanPathModel	ScanPath ModelParam
Ephemeris FileID					

Table 4.2-3. VIRS Product-specific Attribute Metadata

NumberOfData Gaps	AlgorithmVersion	ProductVersion	ToolkitVersion	Calibration Coefficient Version
MissingData	PercentOfBad Or Missing Pixels	MaximumValid ValueofChannel	MinimumValid ValueofChannel	MinMaxUnits
OrbitSize	RadarWavelength	MinimumReflectivity Threshold	AlgorithmID	DataAccuracy
DataGaps	InputFiles	DateOfGeneration OfInputFiles	DataCenter SourceOfInputFiles	GenerationDate
DayNight	OrbitFirstScan UTCDate	OrbitFirstScan UTCTime	OrbitFirstScanUTC Milliseconds	OrbitFirstSCSecs
OrbitFirstSC Subsecs	OrbitLastScan UTCDate	OrbitLastScan UTCTime	OrbitLastScanUTC milliseconds	OrbitLastSCSecs
OrbitLastSC Subsecs	UTCFSeconds	UTCFSubseconds	UTCFflag	LeapSecondsFlag
Temperature Telemetry Abnormal	Number	NumberTroubled LNAUnits	RadarSiteName	RadarCity
RadarState	RadarCountry	NumberOfVOS	RadarGrid OriginLatitude	RadarGridOrigin Longitude
RadarGridOrigin Altitude	RadarGridSpacingX	RadarGridSpacingY	RadarGridSpacingZ	RadarGridSizeX
RadarGridSizeY	RadarGridSizeZ	DZCal	GVL1C_Scale	Alpha
RuntimeOptions	AnomalyFlag	SoftwareVersion	DatabaseVersion	TotalQualityCode
Longitude OnEquator	UTCDateOn Equator	UTCTimeOn Equator	UTCMillisecs OnEquator	CenterScanUTC Date
CenterScan UTCTime	CenterScan UTC Millisec	FirstScanLat	FirstScanLon	LastScanLat
LastScanLon	NumberOf Rain Scans			

Table 4.2-4. Scan Time VData

Field Name	Description	Field Num	Num Records	Data Type	Units	Range
scanTime	Time of the scan	1	1 .. 11, 817	64-bit float	sec	0 .. 86400

Table 4.2-5. Scan Status VData

Field Name	Description	Field Num	Num Records	Data Type	Units	Range
missing	Missing Information Flag	1	1 .. 11, 817	8-bit integer	N/A	0 .. 2
validity	Status Mode Flag	2	1 .. 11, 817	8-bit integer	N/A	N/A
qac	Quality and Accounting Capsule	3	1 .. 11, 817	8-bit integer	N/A	N/A
geoQuality	Geolocation Quality	4	1 .. 11, 817	8-bit integer	N/A	N/A
ch1Quality	Quality of Channel Data	5	1 .. 11, 817	8-bit integer	N/A	N/A
ch2Quality	Quality of Channel Data	6	1 .. 11, 817	8-bit integer	N/A	N/A
ch3Quality	Quality of Channel Data	7	1 .. 11, 817	8-bit integer	N/A	N/A
ch4Quality	Quality of Channel Data	8	1 .. 11, 817	8-bit integer	N/A	N/A
ch5Quality	Quality of Channel Data	9	1 .. 11, 817	8-bit integer	N/A	N/A
scOrient	Current Spacecraft Orientation	10	1 .. 11, 817	8-bit integer	N/A	0 .. 4
acsMode	Current ACS Mode	11	1 .. 11, 817	8-bit integer	N/A	0 .. 8
yawUpdateS	Yaw Update Status	12	1 .. 11, 817	8-bit integer	N/A	0 .. 2
virsInstS	VIRS Instrument Status	13	1 .. 11, 817	8-bit integer	N/A	0 .. 3
virsMode	VIRS Mode	14	1 .. 11, 817	8-bit integer	N/A	0 .. 3
virsAbnCon	VIRS Abnormal Conditions	15	1 .. 11, 817	8-bit integer	N/A	N/A
fractOrbitN	Fractional Orbit Number	16	1 .. 11, 817	32-bit float	N/A	N/A

Table 4.2-6. VIRS Navigation VData (1 of 2)

Field Name	Description	Field Num	Num Records	Data Type	Units	Range
scPosX	Spacecraft Geocentric Position	1	1 .. 11, 817	32-bit float	m	TBD
scPosY	Spacecraft Geocentric Position	2	1 .. 11, 817	32-bit float	m	TBD
scPosZ	Spacecraft Geocentric Position	3	1 .. 11, 817	32-bit float	m	TBD
scVelX	Spacecraft Geocentric Velocity	4	1 .. 11, 817	32-bit float	m sec-1	TBD
scVelY	Spacecraft Geocentric Velocity	5	1 .. 11, 817	32-bit float	m sec-1	TBD
scVelZ	Spacecraft Geocentric Velocity	6	1 .. 11, 817	32-bit float	m sec-1	TBD
scLat	Spacecraft Geodetic Position	7	1 .. 11, 817	32-bit float	deg	TBD
scLon	Spacecraft Geodetic Position	8	1 .. 11, 817	32-bit float	deg	TBD
scAlt	Spacecraft Geodetic Position	9	1 .. 11, 817	32-bit float	m	TBD
scAttRoll	Spacecraft Geocentric Attitude	10	1 .. 11, 817	32-bit float	deg	TBD
scAttPitch	Spacecraft Geocentric Attitude	11	1 .. 11, 817	32-bit float	deg	TBD
scAttYaw	Spacecraft Geocentric Attitude	12	1 .. 11, 817	32-bit float	deg	TBD
att1	Sensor Orientation Matrix	13	1 .. 11, 817	32-bit float	N/A	N/A
att2	Sensor Orientation Matrix	14	1 .. 11, 817	32-bit float	N/A	N/A
att3	Sensor Orientation Matrix	15	1 .. 11, 817	32-bit float	N/A	N/A
att4	Sensor Orientation Matrix	16	1 .. 11, 817	32-bit float	N/A	N/A

Table 4.2-6. VIRS Navigation VData (2 of 2)

Field Name	Description	Field Num	Num Records	Data Type	Units	Range
att5	Sensor Orientation Matrix	17	1 .. 11, 817	32-bit float	N/A	N/A
att6	Sensor Orientation Matrix	18	1 .. 11, 817	32-bit float	N/A	N/A
att7	Sensor Orientation Matrix	19	1 .. 11, 817	32-bit float	N/A	N/A
att8	Sensor Orientation Matrix	20	1 .. 11, 817	32-bit float	N/A	N/A
att9	Sensor Orientation Matrix	21	1 .. 11, 817	32-bit float	N/A	N/A
green HourAng	Greenwich Hour Angle	22	1 .. 11, 817	32-bit float	deg	TBD

Table 4.2-7. VIRS Science Data Sets

SDS Name	Description	Rank	Dimensions	Data Type	Units	Range
geolocation	Earth location of the cernter of the field of view	3	(11817, 261, 2) scan line x pixel x (latitude, longitude)	32-bit float	deg	-90 .. 90 -180 .. 180
calCounts	Raw calibration counts	4	(11817, 3, 2, 5) scan line x {blackbody, space view, solar diffuser} x data word x channel	16-bit integer	count	N/A
local Direction	Angles to the satellite and sun from the center of the field of view	4	(11817, 27, 2, 2) scan line x pixel x {satellite, sun} x {zenith angle, azimuth angle}.	16-bit integer	deg	TBD
channels	Radiances	3	(11817, 261, 5) scan line x pixel x channel	16-bit integer	mW cm-2sr-1mm-1	TBD

4.3 Surface Map (SURFMAP)

EOSDIS Product Code: CERX07

The Surface Map (SURFMAP) product is a composite of various products each containing a different surface condition. The individual products each contain a single parameter arranged on a global 1/6-degree by 1/6-degree equal-angle grid (2160x1080 = 2,332,800 cells).

The SURFMAP products are updated at different frequencies, depending on the type of data. See Table 4.3-1 for a list of the individual products and their update frequency, units, and sizes. The last entry in the table is a static ASCII file of surface directional models and other relevant surface information.

Level: 3
Type: Ancillary
Frequency: Variable

Portion of Globe Covered
File: Entire Globe
Record: 1/6-Deg by 1/6-Deg

Time Interval Covered
File: Variable
Record: Variable

Portion of Atmosphere Covered
File: Surface

Table 4.3-1. SURFMAP Product

Data Type	Description	Update Frequency	Units	Range	Bits/ Element	Size in MB
SURFMAP(ECO)	IGBP Ecosystem map	1 / mission	N/A	0 .. 18	8	2.22
SURFMAP(TER)	Characteristic Terrain Map	1 / mission	N/A	0 .. 99	8	2.22
SURFMAP(DEM)	Digital elevation map	1 / mission	m	-120 .. 8000	16	4.44
SURF-MAP(EM03.75)	Emissivity Map for 3.75 micron channel	1 / mission	N/A	.0 .. 1.0	8	2.22
SURF-MAP(EM10.80)	Emissivity Map for 10.80 micron channel	1 / mission	N/A	.0 .. 1.0	8	2.22
SURF-MAP(EM11.90)	Emissivity Map for 11.90 micron channel	1 / mission	N/A	.0 .. 1.0	8	2.22
SURFMAP(EMBR)	Emissivity Map for 0.2 - 50 micron channel (Broadband)	1 / mission	N/A	.0 .. 1.0	8	2.22
SURFMAP(EMWN)	Emissivity Map for 8 - 12 micron channel (Window)	1 / mission	N/A	.0 .. 1.0	8	2.22
SURFMAP(ERBE)	ERBE scene id map	1 / mission	N/A	1 .. 6	8	2.22
SURFMAP(ICE)	Ice map	1 / day	percent	0 .. 100	8	2.22
SURFMAP(SNOW)	Snow map	1 / day	in	0 .. 255	8	2.22
SURFMAP(H2O)	Percent water content map	1 / mission	percent	0 .. 100	8	2.22
SURFMAP(LIB)	Surface Models	1/mission	N/A	--	--	~5K
Total SURFMAP Size						**28.93**

4.4 Geostationary Narrowband Radiances (GEO)

EOSDIS Product Code:CERX09

Currently, CERES will use geostationary satellite data collected by the International Satellite Cloud Climatology Project (ISCCP).

The ISCCP B1 dataset consists of a narrowband infrared channel radiance (near 10.8 micrometer) and a narrowband visible channel radiance (near 0.68 micrometer). The radiances are sampled at about 10-km resolution every 3 hours. These data are in the form of eight- or ten-bit counts that can be converted to radiances using either nominal, normalized, or updated calibration formulae.

There are four sets of B1 data currently available. Others may be added in the future as other satellites are launched. The four sets currently available are

1) Geostationary Meteorological Satellite (GMS) in GMS format
2) Meteorological Satellite (METEOSAT) in METEOSAT format
3) Geostationary Operational Environmental Satellite (GOES-8) in Canadian format
4) GOES-9 in McIDAS format

These data will be provided by EOSDIS which will acquire them from NOAA, the designated archive center for ISCCP B1 data. The data volume is as follows:

1) GMS: eight 3480 cartridges
2) METEOSAT: eight 3480 cartridges
3) GOES-8: fifteen 3480 cartridges
4) GOES-9: seven 3480 cartridges

Each 3480 cartridge holds about 200 MB, so the data volume will be about 7.6 GB per month. NOAA will package these data in 8-millimeter tape format.

Level: 1B
Type: Ancillary
Frequency: Every Third Hour

Portion of Globe Covered
File: 1 Hemisphere
Record: 10-km Pixel

Time Interval Covered
File: 1 Hour
Record: Instantaneous

Portion of Atmosphere Covered
File: TOA

NOTE: Geostationary products are produced by the International Satellite Cloud Climatology Project(ISCCP). They are used by, but are not archived by, the CERES Project. Please contact the ISCCP Project for product information.

4.5 Aerosol Data (APD)

EOSDIS Product Code: CERX10

The ancillary data product, Aerosol Product Data (APD), is input to the CERES Regrid Meteorological, Ozone, and Aerosol Data Subsystem. The APD is the source of backup climatological total column aerosol optical depth data, and is made up of one data file for each month. The first record of each file is based on global three-hourly data provided by Dr. Rachel Pinker that are monthly averaged over two years. These averages are on a 2.5° equal-area grid. The second record of each file is based on monthly data provided by Dr. Larry Stowe that are also averaged over two years. These averages are on a 1.0° equal-angle grid for the area between 70S and 70N. The Regrid Meteorological, Ozone, and Aerosol Data Subsystem interpolates these data horizontally to conform with the MOA horizontal grid, and then stores the value from one source on the MOA product.

Level: 3
Type: Ancillary
Frequency: Monthly

Portion of Globe Covered
File: Global
Record: One region

Time Interval Covered
File: Monthly
Record: Monthly

Portion of Atmosphere Covered
File: Total column

Table 4.5-1. APD File Sizes

Source	Size (Monthly)
University of Maryland, College Park (Dept. of Meteorology) (Pinker) and NOAA/NESDIS (Stowe)	406 KB

4.6 Gridded Analysis Product (GAP)

EOSDIS Product Code: CERX12

The external ancillary data product, Gridded Analysis Product (GAP), is input to the CERES Regrid Meteorological, Ozone, and Aerosol Data Subsystem. The GAP is made up of multiple files that contain vertical profiles of temperature, specific humidity, and wind speed profiles as a function of pressure, along with surface temperature and pressure. Prior to the EOS-AM launch, these data are available from the Data Assimilation Office (DAO) on a 2.0° latitude x 2.5° longitude grid. DAO's diagnostic products are available every three hours, while their prognostic products are available every 6 hours. The Regrid Meteorological, Ozone, and Aerosol Data Subsystem interpolates these data temporally and vertically to conform with CERES processing requirements. The DAO Input Products are shown in Table 4.6-1.

Level: 3
Type: Ancillary
Frequency: Every 3 or 6 hours

Portion of Globe Covered
File: Global
Record: 2° x 2.5° region

Time Interval Covered
File: Every 3 or 6 hours
Record: Every 3 or 6 hours

Portion of Atmosphere Covered
File: Surface to TOA

Table 4.6-1. DAO Input Products

DAO File Name	DAO File Size (Daily)	Temporal Resolution	Products Used by CERES
ceres_dao_trmm.pave.yyyymmdd	419 KB	Three-hourly	Surface pressure
ceres_dao_trmm.phis.yyyymmdd	209 KB	Six-hourly	Surface height
ceres_dao_trmm.ps.yyyymmdd	209 KB	Six-hourly	Surface pressure
ceres_dao_trmm.q10m.yyyymmdd	419 KB	Three-hourly	Specific humidity at 10 meters
ceres_dao_trmm.sphu.yyyymmdd	3774 KB	Six-hourly	Vertical profiles of specific humidity
ceres_dao_trmm.t10m.yyyymmdd	419 KB	Three-hourly	Temperature at 10 meters
ceres_dao_trmm.tg.yyyymmdd	209 KB	Six-hourly	Ground Temperature
ceres_dao_trmm.tmpu.yyyymmdd	3774 KB	Six-hourly	Vertical profiles of temperature
ceres_dao_trmm.tropp.yyyymmdd	209 KB	Six-hourly	Tropopause height
ceres_dao_trmm.u10m.yyyymmdd	419 KB	Three-hourly	Wind speed u-vectors at 10 meters
ceres_dao_trmm.uwnd.yyyymmdd	3774 KB	Six-hourly	Vertical profiles of wind speed u-vectors
ceres_dao_trmm.v10m.yyyymmdd	419 KB	Three-hourly	Wind speed v-vectors at 10 meters
ceres_dao_trmm.vwnd.yyyymmdd	3774 KB	Six-hourly	Vertical profiles of wind speed v-vectors
TOTAL SIZE	**18.027 MB**		

4.7 Microwave Humidity (MWH)

EOSDIS Product Code: CERX13

The external ancillary data product, Microwave Humidity (MWH), is input to the CERES Regrid Meteorological, Ozone, and Aerosol Data Subsystem. The MWH is the source of the column precipitable water as measured by the Spectral Sensor Microwave/Imager (SSM/I) microwave instrument. These data have a 0.5° latitude x 0.5° longitude horizontal resolution. The column precipitable water data are stored on the MOA files in their original resolution to conform with CERES processing requirements. MWH file size is shown in Table 4.7-1.

Level: 3
Type: Ancillary
Frequency: Daily

Portion of Globe Covered
File: Global
Record: One region

Time Interval Covered
File: Daily
Record: Daily

Portion of Atmosphere Covered
File: Total column

Table 4.7-1. MWH File Sizes

Source	Size (Daily)
Global Hydrology Resource Center (GHRC)	2.14 MB

4.8 Ozone Profile Data (OPD)

EOSDIS Product Code: CERX11

The external ancillary data product, Ozone Profile Data (OPD), is input to the CERES Regrid Meteorological, Ozone, and Aerosol Data Subsystem. The OPD is the source of total column ozone data. Daily files for NCEP/Stratospheric Monitoring-Group Ozone Blended Analysis (SMOBA) data are the primary input data source. These data have a 2.5° latitude x 2.5° longitude equal-angle horizontal resolution on 24 vertical profile levels and total column values. As a backup source, daily data from Earth Probe-Total Ozone Mapping Spectrometer (EP-TOMS) may be used. These data have a 1.25° latitude x 1.25° longitude equal-angle horizontal resolution of *only* total column values. The Regrid Meteorological, Ozone, and Aerosol Data Subsystem interpolates these data temporally, horizontally and vertically to conform with CERES processing requirements. OPD file sizes are shown in Table 4.8-1.

Level: 3
Type: Ancillary
Frequency: Daily

Portion of Globe Covered
File: Global
Record: One region

Time Interval Covered
File: Daily
Record: Daily

Portion of Atmosphere Covered
File: 300hPa to TOA

Table 4.8-1. OPD File Sizes

Source	Size (Daily)
SMOBA	2.430 MB
EP-TOMS	0.163 MB