4.3 VIIRS Cloud Imager Data (VIIRS CID)

The VIIRS instrument on the NPP spacecraft has imagery, moderate, and day-night sensors. The instrument data are received by the IDPS. The geolocation, geometry, and Level-1 radiances are written to separate files as individual SDRs. The SDS Land PEATE aggregates the files into approximately five-minute granules. These aggregated granules are subset and sub-sampled by the CERES NPP VIIRS Sub-sample Processor. The processor sub-samples three VIIRS SDRs and combines them into one data file called NPP_VIMD. Because of the data name, many documents refer to the data as VIMD. Traditionally, CERES has called subsetted MODIS data MODIS CID; therefore in this document CERES will be referring to the subsetted VIIRS data, VIMD, as VIIRS CID.

The CID_VIIRS file contains VIIRS Cloud Imager Data (the calibrated radiances and geolocation data). The sizes listed in the following data description reflect the estimated number of scan line records (1536) for moderate resolution in about 5 minutes of data. The file is written in Hierarchical Data Format (HDF) and is composed of Scientific Data Sets (SDS).

The VIIRS Level-1B HDF Structure Summary, Table 4.3-1, lists the types and names 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 Table 4.3-2 through Table 4.3-4.

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 ASDC. The channels currently requested by the CERES Science Team are

Channels	Micron	Resolution (km)	Channels	Micron	Resolution (km)
I1	0.64	0.375 & 0.750	M9	1.378	0.750
I3	1.61	0.375 & 0.750	M10	1.61	0.750
I4	3.74	0.375 & 0.750	M11	2.25	0.750
I5	11.45	0.375 & 0.750	M12	3.70	0.750
M3	0.488	0.750	M14	8.55	0.750
M4	0.555	0.750	M15	10.763	0.750
M5	0.672	0.750	M16	12.013	0.750
M7	0.865	0.750	DNB	0.7	0.750
M8	1.24	0.750			

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

Time Interval Covered
File: ~5.0-Min
Record: Instantaneous

Portion of Globe Covered
File: Satellite Swath
Record: .375 – 0.750-km by .375 – 0.750-km

Portion of Atmosphere Covered
File: Satellite Altitude

Table 4.3-1. VIIRS Level-1B HDF Structure Summary

HDF Name	HDF Structure Type	Num Records	Table Number	Size (bytes)
VIIRS Global Attribute	HDF annotations	3		396,871
VIIRS Level 1-B Imagery SDS	SDSs	4…3200	Table 4.3-2	409,974,879
VIIRS Level 1-B Moderate SDS	SDSs	1…1600	Table 4.3-3	
VIIRS Level 1-B Day/Night SDS	SDSs	4064	Table 4.3-4	
Total VIIRS Level-1B Bytes/File (HDF compressed):				410,371,750

Table 4.3-2. VIIRS Level-1B Imagery Science Data Sets

SDS Name	Description	Rank	Dimensions	Data Type	Unit	Range
Radiance_Img_I1_Avg	Radiances for I1 in moderate resolution	2	(1536,1600)	Unsigned 2-byte integer	W $m^{-2}sr^{-1}$ mm^{-1}	TBD
Radiance_Img_I3_Avg	Radiances for I3 in moderate resolution	2	(1536,1600)	Unsigned 2-byte integer	W $m^{-2}sr^{-1}$ mm^{-1}	TBD
Radiance_Img_I4_Avg	Radiances for I4 in moderate resolution	2	(1536,1600)	Unsigned 2-byte integer	W $m^{-2}sr^{-1}$ mm^{-1}	TBD
Radiance_Img_I5_Avg	Radiances for I5 in moderate resolution	2	(1536,1600)	Unsigned 2-byte integer	W $m^{-2}sr^{-1}$ mm^{-1}	TBD
Reflectance_Img_I1_Sub	Reflectance for I1 in imagery resolution	2	(3072,3200)	Unsigned 2-byte integer	N/A	TBD
Reflectance_Img_I1_Avg	Reflectance for I1 in moderate resolution	2	(1536,1600)	Unsigned 2-byte integer	N/A	TBD
Reflectance_Img_I3 Sub	Reflectance for I3 in imagery resolution	2	(3072,3200)	Unsigned 2-byte integer	N/A	TBD
Reflectance_Img_I3_Avg	Reflectance for I3 in moderate resolution	2	(1536,1600)	Unsigned 2-byte integer	N/A	TBD
BrightTemp_Img_I4_Sub	Brightness temperature for I4 at imagery resolution	2	(3072,3200)	Unsigned 2-byte integer	°K	TBD
BrightTemp_Img_I4_Avg	Brightness temperature for I4 at moderate resolution	2	(1536,1600)	Unsigned 2-byte integer	°K	TBD

Table 4.3-2. VIIRS Level-1B Imagery Science Data Sets

SDS Name	Description	Rank	Dimensions	Data Type	Unit	Range
BrightTemp_Img_I5_Sub	Brightness temperature for I5 at imagery resolution	2	(3072,3200)	Unsigned 2-byte integer	°K	TBD
BrightTemp_Img_I5_Avg	Brightness temperature for I5 at moderate resolution	2	(1536,1600)	Unsigned 2-byte integer	°K	TBD
QF_VIIRS_I1_SDR_1_Sub	Quality control flag for I1	2	(3072,3200)	Unsigned 1-byte integer	N/A	TBD
QF_VIIRS_I3_SDR_1_Sub	Quality control flag for I3	2	(3072,3200)	Unsigned 1-byte integer	N/A	TBD
QF_VIIRS_I4_SDR_1_Sub	Quality control flag for I4	2	(3072,3200)	Unsigned 1-byte integer	N/A	TBD
QF_VIIRS_I5_SDR_1_Sub	Quality control flag for I5	2	(3072,3200)	Unsigned 1-byte integer	N/A	TBD

Table 4.3-3. VIIRS Level-1B Moderate Science Data Sets

SDS Name	Description	Rank	Dimensions	Data Type	Unit	Range
scanStartTime_V	Time at the beginning of the scan	1	(192)	8-byte float	Sec	TBD
scanMidTime_V	Time at the mid of the scan	1	(192)	8-byte float	Sec	TBD
NumScans	Number of scan lines	1	(1)	4-byte integer	N/A	TBD
Latitude_Sub	Geodetic latitude	2	(1536,1600)	4-byte float	Deg	-90 to 90
Longitude_Sub	Geodetic longitude	2	(1536,1600)	4-byte float	Deg	-180 to 180
TerrainHgt_Mod_Sub	Terrain height	2	(1536,1600)	4-byte float	TBD	TBD
SatelliteRange_Sub	Sensor location	2	(1536,1600)	4-byte float	TBD	TBD
SenAziAng_Mod_Sub	Sensor azimuth angle	2	(1536,1600)	4-byte float	Deg	TBD
SenZenAng_Mod_Sub	Sensor zenith angle	2	(1536,1600)	4-byte float	Deg	TBD
SolAziAng_Mod_Sub	Solar azimuth angle	2	(1536,1600)	4-byte float	Deg	TBD
SolZenAng_Mod_Sub	Solar zenith angle	2	(1536,1600)	4-byte float	Deg	TBD
Radiance_Mod_M10_Sub	Radiances for M10 in moderate resolution	2	(1536,1600)	Unsigned 2-byte integer	$W\ m^{-2} sr^{-1}$ mm	TBD

Table 4.3-3. VIIRS Level-1B Moderate Science Data Sets

SDS Name	Description	Rank	Dimensions	Data Type	Unit	Range
Radiance_Mod_M11_Sub	Radiances for M11 in moderate resolution	2	(1536,1600)	Unsigned 2-byte integer	W $m^{-2}sr^{-1}$ mm	TBD
Radiance_Mod_M12_Sub	Radiances for M12 in moderate resolution	2	(1536,1600)	Unsigned 2-byte integer	W $m^{-2}sr^{-1}$ mm	TBD
Radiance_Mod_M14_Sub	Radiances for M14 in moderate resolution	2	(1536,1600)	Unsigned 2-byte integer	W $m^{-2}sr^{-1}$ mm	TBD
Radiance_Mod_M15_Sub	Radiances for M15 in moderate resolution	2	(1536,1600)	Unsigned 2-byte integer	W $m^{-2}sr^{-1}$ mm	TBD
Radiance_Mod_M16_Sub	Radiances for M16 in moderate resolution	2	(1536,1600)	Unsigned 2-byte integer	W $m^{-2}sr^{-1}$ mm	TBD
Radiance_Mod_M3_Sub	Radiances for M3 in moderate resolution	2	(1536,1600)	4-byte float	W $m^{-2}sr^{-1}$ mm	TBD
Radiance_Mod_M4_Sub	Radiances for M4 in moderate resolution	2	(1536,1600)	4-byte float	W $m^{-2}sr^{-1}$ mm	TBD
Radiance_Mod_M5_Sub	Radiances for M5 in moderate resolution	2	(1536,1600)	4-byte float	W $m^{-2}sr^{-1}$ mm	TBD
Radiance_Mod_M7_Sub	Radiances for M7 in moderate resolution	2	(1536,1600)	4-byte float	W $m^{-2}sr^{-1}$ mm	TBD
Reflectance_Mod_M10_Sub	Reflectance for M10 in moderate resolution	2	(1536,1600)	Unsigned 2-byte integer	N/A	TBD
Reflectance_Mod_M11_Sub	Reflectance for M11 in moderate resolution	2	(1536,1600)	Unsigned 2-byte integer	N/A	TBD
Reflectance_Mod_M3_Sub	Reflectance for M3 in moderate resolution	2	(1536,1600)	Unsigned 2-byte integer	N/A	TBD
Reflectance_Mod_M4_Sub	Reflectance for M4 in moderate resolution	2	(1536,1600)	Unsigned 2-byte integer	N/A	TBD
Reflectance_Mod_M5_Sub	Reflectance for M5 in moderate resolution	2	(1536,1600)	Unsigned 2-byte integer	N/A	TBD
Reflectance_Mod_M7_Sub	Reflectance for M7 in moderate resolution	2	(1536,1600)	Unsigned 2-byte integer	N/A	TBD

Table 4.3-3. VIIRS Level-1B Moderate Science Data Sets

SDS Name	Description	Rank	Dimensions	Data Type	Unit	Range
Reflectance_Mod_M8_Sub	Reflectance for M8 in moderate resolution	2	(1536,1600)	Unsigned 2-byte integer	N/A	TBD
Reflectance_Mod_M9_Sub	Reflectance for M9 in moderate resolution	2	(1536,1600)	Unsigned 2-byte integer	N/A	TBD
BrightTemp_Mod_M12_Sub	Brightness temperature for M12 at moderate resolution	2	(1536,1600)	Unsigned 2-byte integer	°K	TBD
BrightTemp_Mod_M14_Sub	Brightness temperature for M14 at moderate resolution	2	(1536,1600)	Unsigned 2-byte integer	°K	TBD
BrightTemp_Mod_M15_Sub	Brightness temperature for M15 at moderate resolution	2	(1536,1600)	4-byte float	°K	TBD
BrightTemp_Mod_M16_Sub	Brightness temperature for M16 at moderate resolution	2	(1536,1600)	Unsigned 2-byte integer	°K	TBD
QF_VIIRS_GEO_MOD_2_Sub	Quality control flag for geolocation	2	(1536,1600)	Unsigned 1-byte integer	N/A	TBD
QF_VIIRS_M10_SDR_1_Sub	Quality control flag for M10	2	(1536,1600)	Unsigned 1-byte integer	N/A	TBD
QF_VIIRS_M11_SDR_1_Sub	Quality control flag for M11	2	(1536,1600)	Unsigned 1-byte integer	N/A	TBD
QF_VIIRS_M12_SDR_1_Sub	Quality control flag for M12	2	(1536,1600)	Unsigned 1-byte integer	N/A	TBD
QF_VIIRS_M14_SDR_1_Sub	Quality control flag for M14	2	(1536,1600)	Unsigned 1-byte integer	N/A	TBD
QF_VIIRS_M15_SDR_1_Sub	Quality control flag for M15	2	(1536,1600)	Unsigned 1-byte integer	N/A	TBD
QF_VIIRS_M16_SDR_1_Sub	Quality control flag for M16	2	(1536,1600)	Unsigned 1-byte integer	N/A	TBD
QF_VIIRS_M3_SDR_1_Sub	Quality control flag for M3	2	(1536,1600)	Unsigned 1-byte integer	N/A	TBD
QF_VIIRS_M4_SDR_1_Sub	Quality control flag for M4	2	(1536,1600)	Unsigned 1-byte integer	N/A	TBD
QF_VIIRS_M5_SDR_1_Sub	Quality control flag for M5	2	(1536,1600)	Unsigned 1-byte integer	N/A	TBD
QF_VIIRS_M7_SDR_1_Sub	Quality control flag for M7	2	(1536,1600)	Unsigned 1-byte integer	N/A	TBD

Table 4.3-3. VIIRS Level-1B Moderate Science Data Sets

SDS Name	Description	Rank	Dimensions	Data Type	Unit	Range
QF_VIIRS_M8_SDR_1_Sub	Quality control flag for M8	2	(1536,1600)	Unsigned 1-byte integer	N/A	TBD
QF_VIIRS_M9_SDR_1_Sub	Quality control flag for M9	2	(1536,1600)	Unsigned 1-byte integer	N/A	TBD

Table 4.3-4. VIIRS Level-1B DNB Science Data Sets

SDS Name	Description	Rank	Dimensions	Data Type	Unit	Range
Latitude_Dnb_Sub	Geodetic latitude	2	(1536,2032)	4-byte float	Deg	-90 to 90
Longitude_Dnb_Sub	Geodetic longitude	2	(1536,2032)	4-byte float	Deg	-180 to 180
TerrainHgt_Dnb_Sub	Terrain height	2	(1536,2032)	4-byte float	TBD	TBD
MoonAziAng_Dnb_Sub	Lunar azimuth angle	2	(1536,2032)	4-byte float	Deg	TBD
MoonZenAng_Dnb_Sub	Lunar zenith angle	2	(1536,2032)	4-byte float	Deg	TBD
SenAziAng_Dnb_Sub	Sensor azimuth angle	2	(1536,2032)	4-byte float	Deg	TBD
SenZenAng_Dnb_Sub	Sensor zenith angle	2	(1536,2032)	4-byte float	Deg	TBD
SolAziAng_Dnb_Sub	Solar azimuth angle	2	(1536,2032)	4-byte float	Deg	TBD
SolZenAng_Dnb_Sub	Solar senith angle	2	(1536,2032)	4-byte float	Deg	TBD
Radiance_Dnb_Sub	Radiances for DNB in DNB resolution	2	(1536,2032)	4-byte float	$W\ m^{-2} sr^{-1}$ mm	TBD
QF_VIIRS_DNB_SDR_1_Sub	Quality control flag for DNB	2	(1536,2032)	Unsigned 1-byte integer	N/A	TBD
QF_VIIRS_GEO_DNB_2_Sub	Quality control flag for DNB geolocation	2	(1536,2032)	Unsigned 1-byte integer	N/A	TBD

CID_VIIRS Total Data Volume

Total Mbytes/Granule: 205.6
Total Mbytes/Hour: 2,467.2
Total Mbytes/Day: 59,212.8
Total Mbytes/Month: 1,835,597

VIIRS CID 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.

VIIRS CID Revision Record

SCCR Approval Date	Release/ Version Number	SCCR Number	Description of Revision	Section(s) Affected
N/A	R5V1	N/A	• New CERES-NPP Data Products Catalog section.	All
N/A	R5V2	N/A	• 3 more SDSs from M5 (0.672 micro meter), M10 (1.61 micro meter) and M12 (3.7 micro meter) were added with the same sub-sampling scheme as the other sub-setted Moderate bands.	Table 4.3-3
			• Created the dimensions in Table 4.3-4.	Table 4.3-4
			• Modified first paragraph for clarity. (07/10/2009)	Sec. 4.3
			• Channels M1 and M2 were removed from the chart on the first page of this section. (07/22/2009)	Sec. 4.3
			• Modified SDS Names and deleted some SDS files. (09/01/2009)	Tables 4.3.2, 4.3.3, & 4.3.4
			• Channels M12 and M14 were added. (09/08/2009)	Sec. 4.3