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Block 2.0.0

Goddard Space Flight Center
Greenbelt, Maryland

National Aeronautics and
Space Administration

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Joint Polar Satellite System (JPSS) Algorithm Specification Volume II: Data Dictionary for the Cloud Optical Properties JPSS Review/Approval Page

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Preface

Preface

This document is under JPSS Ground ERB configuration control. Once this document is approved, JPSS approved changes are handled in accordance with Class I and Class II change control requirements as described in the JPSS Configuration Management Procedures, and changes to this document shall be made by complete revision.

Any questions should be addressed to:

JPSS Configuration Management Office
NASA/GSFC
Code 474
Greenbelt, MD 20771

Change History Log

Revision	Effective Date	Description of Changes (Reference the CCR & CCB/ERB Approve Date)	Sections Affected
0200-	Aug. 30, 2013	This version incorporates 474-CCR-13-1195 which was approved by JPSS Ground ERB on the effective date shown.	All
0200A	Feb 12, 2014	This version incorporates 474-CCR-13-1436 which was approved by JPSS Ground ERB on the effective date shown.	All
0200A1	Oct 23, 2014	This version incorporates 474-CCR-14-2091 which was approved by the JPSS Ground ERB for CO10 on the effective date shown.	All
0200B	Dec 05, 2014	This version incorporates 474-CCR-14-2131 which was approved by the JPSS Ground ERB on the effective date shown.	All
0200C	Jul 28, 2015	This version incorporates 474-CCR-14-2288, and 474-CCR-15-2506 which was approved by the JPSS Ground ERB on the effective date shown.	All
0200D	Mar 29, 2016	This version incorporates 474-CCR-15-2657, and 474-CCR-16-2817 which was approved by the JPSS Ground ERB on the effective date shown.	All

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List of TBx Items

TBx	Type	ID	Text	Action
None				

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1 Introduction

1.1 Scope

The Joint Polar Satellite System (JPSS) Algorithm Specification for Cloud Optical Properties - Volume II: Data Dictionary contains the specifications for the format of the Cloud Optical Properties Intermediate Products (IPs) and Environmental Data Records (EDRs). This specification includes the format of the Hierarchical Data Format Release 5 (HDF5) files, as well as the product definitions. These formats are available to external users of the JPSS. For an overview of the data product formats, see 474-00001-01, JPSS CDFCB-X Vol I. For an overview of the metadata formats for data products, see 474-00448-02-01, JPSS Algorithm Specification Volume II: Data Dictionary for the Common Algorithms.

1.2 Organization

Section	Contents
Section 1	Provides information regarding the scope, and organization of this document, as reference material only.
Section 2	Lists parent documents and related documents that were used as sources of information for this document or that provide additional background information to aid understanding of the interface implementations.
Section 3	Provides an overview of the HDF5 UML for the data product types
Section 4	Provides a description of the contents of each JPSS Intermediate Product associated with this algorithm grouping.
Section 5	Provides a description of the contents of each JPSS EDR associated with this algorithm grouping.
Section 6	Provides a description of the Ancillary and Auxiliary Data Inputs if applicable.
Section 7	Provides a description of relevant Look-Up Tables (LUTs) and Processing Coefficient Tables (PCTs) associated with this algorithm grouping.
Appendix A	Provides the Data Mnemonic to Interface Mapping for the data products in this volume.
Appendix B	Provides a mapping of quality flags by sensor and product that are reportable to the associated data product quality flag Test ID used in the processing environment
Appendix C	Reference 470-00041, JPSS Program Lexicon
Attachment A	Provides the list of applicable xml files for this Data Dictionary.

Check the JPSS MIS Server at https://jpssmis.gsfc.nasa.gov/frontmenu_dsp.cfm to verify that this is the correct version prior to use.

2 Related Documentation

The latest JPSS documents can be obtained from URL: https://jpssmis.gsfc.nasa.gov/frontmenu_dsp.cfm. JPSS Project documents have a document number starting with 470, 472 or 474 indicating the governing Configuration Control Board (CCB) (Program, Flight, or Ground) that has the control authority of the document.

2.1 Parent Documents

The following reference document(s) is (are) the Parent Document(s) from which this document has been derived. Any modification to a Parent Document will be reviewed to identify the impact upon this document. In the event of a conflict between a Parent Document and the content of this document, the JPSS Program Configuration Change Board has the final authority for conflict resolution.

Document Number	Title
474-00448-01-14	JPSS Algorithm Specification Volume I: Software Requirements Specification (SRS) for the Cloud Optical Properties

2.2 Applicable Documents

The following document(s) is (are) the Applicable Document(s) from which this document has been derived. Any modification to an Applicable Document will be reviewed to identify the impact upon this document. In the event of conflict between an Applicable Document and the content of this document, the JPSS Program Configuration Change Board has the final authority for conflict resolution.

Document Number	Title
NPR 7150.2A	NASA Software Engineering Requirements
474-00167	Joint Polar Satellite System (JPSS) Common Ground System (CGS) Requirements Document
474-00005	Joint Polar Satellite System (JPSS) Government Resource for Algorithm Verification, Independent Testing, and Evaluation (GRAVITE) Requirements Document
N/A	Hierarchical Data Format, Version 5 (HDF5), http://www.hdfgroup.org/HDF5/

2.3 Information Documents

The following documents are referenced herein and amplify or clarify the information presented in this document. These documents are not binding on the content of this document.

Document Number	Title
D0001-M01-S01-013	JPSS Cloud Effective Particle Size and Cloud Optical Thickness Algorithm Theoretical Basis Document (ATBD)
474-00448-03-14	Joint Polar Satellite System (JPSS) Algorithm Specification Volume III: Operational Algorithm Description (OAD) for the Cloud Optical Properties
474-00333	Joint Polar Satellite System (JPSS) Ground System (GS) Architecture Description Document (ADD)
474-00054	Joint Polar Satellite System (JPSS) Ground System (GS) Concept of Operations (ConOps)

Document Number	Title
470-00041	Joint Polar Satellite System (JPSS) Program Lexicon
474-00001-01	Joint Polar Satellite System (JPSS) Common Data Format Control Book, Vol I - Overview
474-00448-02-01	Joint Polar Satellite System (JPSS) Algorithm Specification Volume II: Data Dictionary for the Common Algorithms

Check the JPSS MIS Server at https://jpssmis.gsfc.nasa.gov/frontmenu_dsp.cfm to verify that this is the correct version prior to use.

3 UML for HDF5 Products

The following paragraphs describe the structure and contents of the IP and EDR granules formed by the JPSS ground processing software.

3.1 Intermediate Products and Environmental Data Records HDF5 Details - Statically Sized

Figure 3.1-1, Generalized UML Diagram for statically sized HDF5 IP/EDR Files, depicts the HDF5 IP/EDR organization as a Unified Modeling Language (UML) class diagram. Each HDF5 IP/EDR file contains an HDF5 Root Group, '/', a Data Products Group, Product Groups (Collection Short Name), an optional Geolocation Group (depending upon packaging option, see the JPSS CDFCB-X Vol. I, for a description of the geolocation packaging), and an All Data Group (dataset arrays). The Product Groups and Geolocation Group both contain datasets - an Aggregation Dataset (Collection Short Name_Agg) and Granule Datasets (Collection Short Name_Gran_n) - where n indicates the nth granule in a temporal aggregation of granules (0 .. n-1). A granule is a general term used to describe the minimum quanta of data collected per processing period, generally on the order of seconds. For the definition and organization of the metadata attributes contained in the HDF5 files, see the JPSS-Algorithm Specification Volume I: Data Dictionary for the Common Algorithms. Attributes that are specific to a particular IP/EDR are listed with the specific IP/EDR's data format definition. For the generalized formats and packaging options for the Geolocation data, see the JPSS CDFCB-X Vol. I - Overview.

Check the JPSS MIS Server at https://jpssmis.gsfc.nasa.gov/frontmenu_dsp.cfm to verify that this is the correct version prior to use.

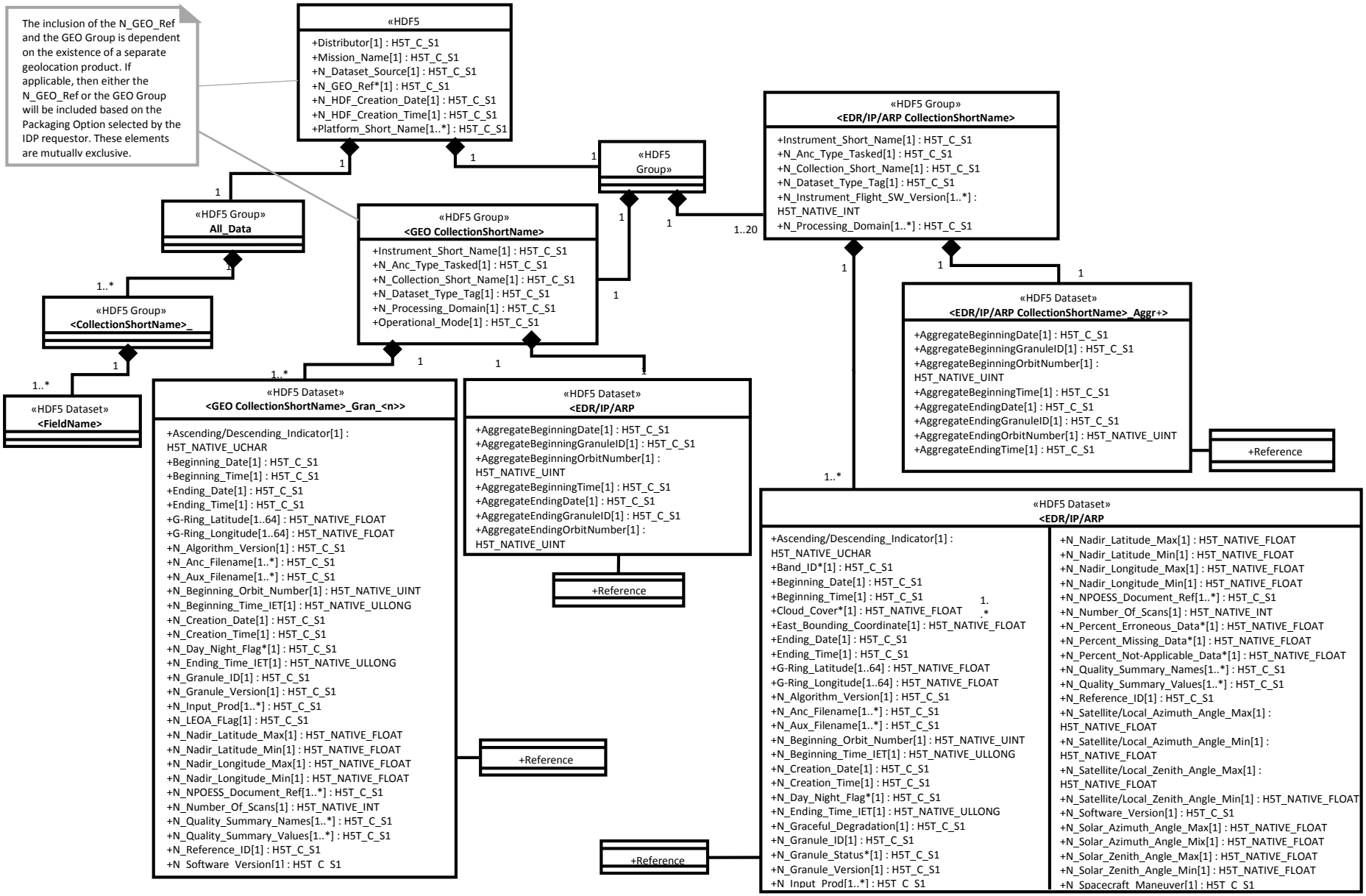

Figure: 3.1-1 Generalized UML Diagram for statically sized HDF5 IP/EDR Files

Check the JPSS MIS Server at https://jpssmis.gsfc.nasa.gov/frontmenu_dsp.cfm to verify that this is the correct version prior to use.

3.2 Intermediate Products, Application Related Products and Environmental Data Records HDF5 Details - Dynamically Sized

Figure 3.2-1, Generalized UML Diagram for dynamically sized HDF5 IP/EDR Files, depicts the HDF5 IP/EDR organization as a Unified Modeling Language (UML) class diagram for products that contain dynamically sized fields. Dynamically sized means that a field's length will vary from granule to granule. The organization of the HDF5 file is identical to the statically sized HDF5 file with the exception of the aggregation and corresponding All_Data group.For statically sized products, the object ID stored in the aggregation array points to a Dataset_Array under the All_Data group. This Dataset_Array is a single HDF5 dataset for each field. This single HDF5 dataset contains all the data for all granules in the file for a given field. However, for dynamically sized products, the object ID stored in the aggregation array points to an HDF5 group instead. This HDF5 group contains one or more datasets - a separate dataset for each granule for a given field. The dataset is named "Dataset_Array_Gran_n".

Check the JPSS MIS Server at https://jpssmis.gsfc.nasa.gov/frontmenu_dsp.cfm to verify that this is the correct version prior to use.

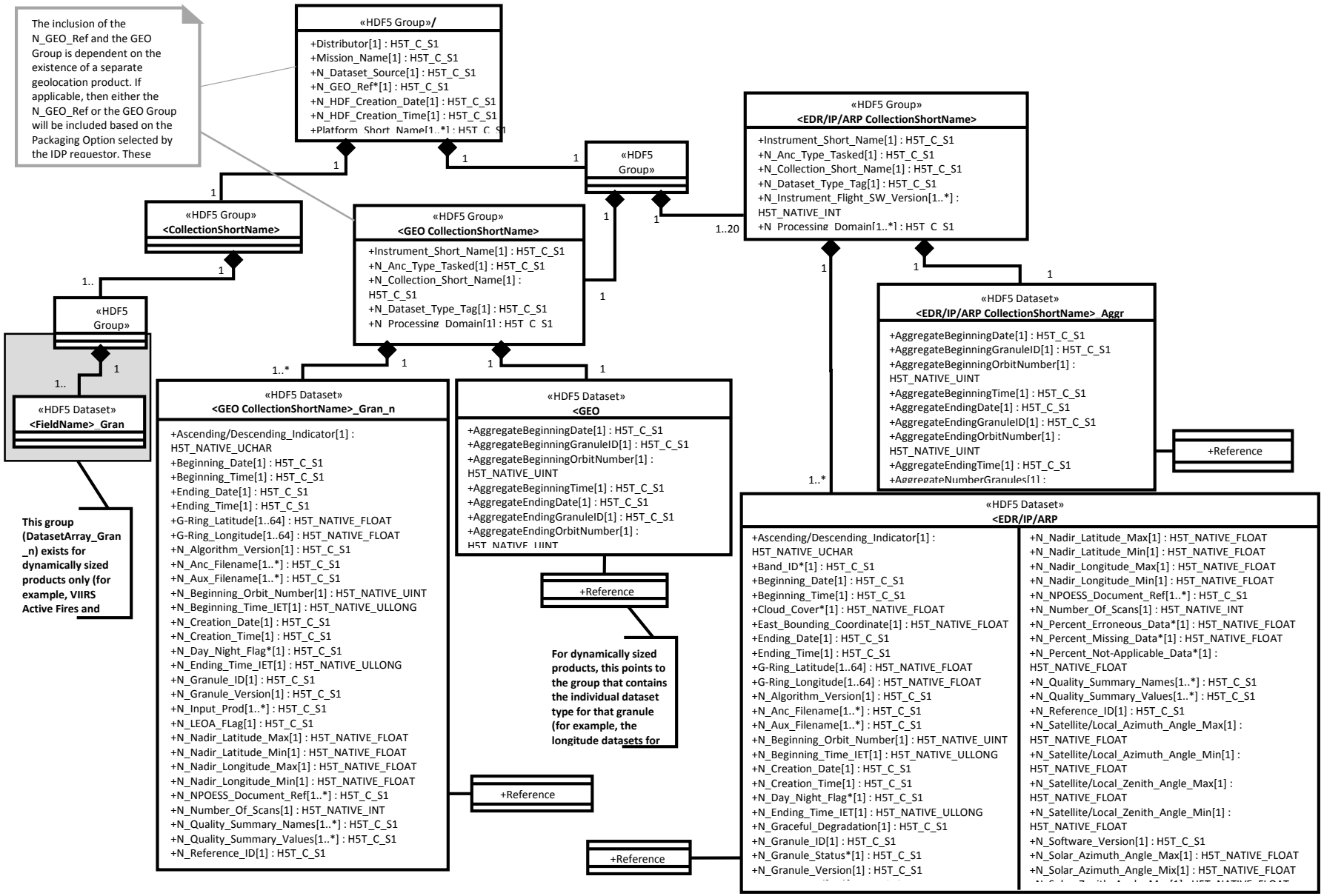

Figure: 3.2-1 Generalized UML Diagram for dynamically sized HDF5 IP/EDR Files

Check the JPSS MIS Server at https://jpssmis.gsfc.nasa.gov/frontmenu_dsp.cfm to verify that this is the correct version prior to use.

4 Intermediate Products (IPs)

IPs are defined as a data subset or retrieval by-product that is required within another primary data product's generation sequence or is used as an input to secondary processing or analysis. The IPs defined here can be packaged and delivered to the end-user. Other IPs are generated during the creation of EDRs but are not deliverable and are thus not documented here.

4.1 VIIRS Ice & Night Water Cloud Top Temperature IP

Data Mnemonic	IMPI_VIWT_R0100(Official) IMPI_VIWT_R0110 (Substitute)
Description/ Purpose	Cloud Top Temperature for each ice cloud and nighttime water cloud pixel in the VIIRS Moderate Resolution Granule Effectivity: S-NPP and JPSS
File-Naming Construct	See the JPSS CDFCB-X Vol. I, 474-00001-01, Section 3.0 for details.
File Size	See Table 4.1.1-1, VIIRS Ice & Night Water Cloud Top Temperature Data Content Summary for size.
File Format Type	HDF5
Production Frequency	As requested
Data Content and Data Format	The output data product consists of See Section 4.1.1 VIIRS Ice & Night Water Cloud Top Temperature IP Data Content Summary See Section 4.1.2 VIIRS Ice & Night Water Cloud Top Temperature IP Product Profile See Section 4.1.2 VIIRS Ice & Night Water Cloud Top Temperature IP HDF5 Details See Section 4.1.4 VIIRS Ice & Night Water Cloud Top Temperature IP Metadata Details See Section 4.1.5 VIIRS Ice & Night Water Cloud Top Temperature IP Geolocation Details

Check the JPSS MIS Server at https://jpssmis.gsfc.nasa.gov/frontmenu_dsp.cfm to verify that this is the correct version prior to use.

4.1.1 VIIRS Ice & Night Water Cloud Top Temperature IP Data Content Summary

Table: 4.1.1-1 VIIRS Ice & Night Water Cloud Top Temperature Data Content Summary

Name	Description	Data Type	Aggregate Dimension	Granule Dimension	Units
ctt	Cloud Top Temperature	32-bit floating point	[N*768, 3200]	[768, 3200]	Kelvin
cttQ	Quality Flags	unsigned 8-bit char	[N*768, 3200]	[768, 3200]	Unitless
File Size	**12,288,000 bytes**				

4.1.2 VIIRS Ice & Night Water Cloud Top Temperature IP Product Profile

Table: 4.1.2-1 VIIRS Ice & Night Water Cloud Top Temperature IP Product Profile

VIIRS Ice Night Water Cloud Top Temperature IP Product Profile

Fields

Name	Data Size	Dimensions
ctt	4byte(s)	

Name	Granule Boundary	Dynamic	Min Array Size	Max Array Size
M_VIIRS_SDR_ROWS	Yes	No	768	768
M_VIIRS_SDR_COLS	No	No	3200	3200

Datum

Description	Datum Offset	Unscaled Valid Range Min	Unscaled Valid Range Max	Measurement Units	Scaled	Scale Factor Name	Data Type	Fill Values		Legend Entries	
								Name	Value	Name	Value
Cloud Top Temperature	0	180	310	Kelvin	No		32-bit floating point	NA_FLOAT32_FILL	-999.9		
								MISS_FLOAT32_FILL	-999.8		
								ONBOARD_PT_FLOAT32_FILL	-999.7		
								ONGROUND_PT_FLOAT32_FILL	-999.6		
								ERR_FLOAT32_FILL	-999.5		
								ELLIPSOID_FLOAT32_FILL	-999.4		
								VDNE_FLOAT32_FILL	-999.3		
								SOUB_FLOAT32_FILL	-999.2		

VIIRS Ice Night Water Cloud Top Temperature IP Product Profile - Quality Flags

Fields

Name	Data Size	Dimensions
cttQ	1byte(s)	

Name	Granule Boundary	Dynamic	Min Array Size	Max Array Size
M_VIIRS_SDR_ROWS	Yes	No	768	768
M_VIIRS_SDR_COLS	No	No	3200	3200

Datum

Description	Datum Offset	Unscaled Valid Range Min	Unscaled Valid Range Max	Measurement Units	Scaled	Scale Factor Name	Data Type	Fill Values		Legend Entries	
								Name	Value	Name	Value
Water CTT out of bounds	0	0	1	Unitless	No		1 bit(s)			out of bounds	1
										not	0
Ice CTT out of bounds	1	0	1	Unitless	No		1 bit(s)			out of bounds	1
										not	0
IR Ice CTT convergence for night water	2	0	1	Unitless	No		1 bit(s)			convergence	1

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										not	0
IR Ice CTT convergence for night ice	3	0	1	Unitless	No		1 bit(s)	**Name** **Value**	**Name**	**Value**	
									convergence	1	
									not	0	
IR Ice CTT convergence for day ice	4	0	1	Unitless	No		1 bit(s)	**Name** **Value**	**Name**	**Value**	
									convergence	1	
									not	0	
spare	5	0	0	Unitless	No		1 bit(s)	**Name** **Value**	**Name**	**Value**	
spare	6	0	0	Unitless	No		1 bit(s)	**Name** **Value**	**Name**	**Value**	
spare	7	0	0	Unitless	No		1 bit(s)	**Name** **Value**	**Name**	**Value**	

4.1.3 VIIRS Ice & Night Water Cloud Top Temperature IP HDF5 Details

Figure 4.1.3-1 provides the details on the content and data types of the VIIRS Ice & Night Water Cloud Top Temperature products. These UML diagrams provide details at the product level only. In addition to these UML diagrams, refer to figure 3.1-1, Generalized UML Diagram for statically sized HDF5 IP/EDR Files, for a complete UML rendering of this product.

VIIRS-INWCTT-IP
+ctt : H5T_NATIVE_FLOAT +cttQ : H5T_NATIVE_UCHAR

Figure: 4.1.3-1 VIIRS Ice & Night Water Cloud Top Temperature IP UML Diagram

4.1.4 VIIRS Ice & Night Water Cloud Top Temperature IP Metadata Details

The product metadata elements contained in the VIIRS Ice & Night Water Cloud Top Temperature IP are listed in 474-00448-02-01, JPSS Algorithm Specification Volume II: Data Dictionary for the Common Algorithms. These metadata elements include all common metadata at the root, product, aggregation, and granule level.

There are no granule level Quality Flags defined as metadata elements in the VIIRS Ice & Night Water Cloud Top Temperature IP. Therefore, there are no entries in the N_Quality_Summary_Name/Value metadata attributes for this product.

4.1.5 VIIRS Ice & Night Water Cloud Top Temperature IP Geolocation Details

See the JPSS Algorithm Specification Vol II: Data Dictionary for the VIIRS RDR/SDR (474-00448-02-06), Section 6.2.5.

4.2 VIIRS Cloud Optical Properties IP

Data Mnemonic	IMPI_VCOP_R0100 (Official) IMPI_VCOP_R0110 (Substitute)
Description/ Purpose	Cloud Optical Thickness and Effective Particle Size (diameter) information for each cloudy VIIRS Moderate Resolution Pixel. Effectivity: S-NPP and JPSS
File-Naming Construct	See the JPSS CDFCB-X Vol. I, 474-00001-01, Section 3.0 for details.
File Size	See Table 4.2.1-1, VIIRS Cloud Optical Properties Data Content Summary for size.
File Format Type	HDF5
Production Frequency	As requested
Data Content and Data Format	See Section 4.2.1 VIIRS Cloud Optical Properties IP Data Content Summary See Section 4.2.2 VIIRS Cloud Optical Properties IP Product Profile See Section 4.2.3 VIIRS Cloud Optical Properties IP HDF5 Details See Section 4.2.4 VIIRS Cloud Optical Properties IP Metadata Details See Section 4.2.5 VIIRS Cloud Optical Properties IP Geolocation Details

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4.2.1 VIIRS Cloud Optical Properties Data Content Summary

Table: 4.2.1-1 VIIRS Cloud Optical Properties IP Data Content Summary

Name	Description	Data Type	Aggregate Dimensions (N = Number of Granules)	Granule Dimensions	Units
cot	Cloud Optical Thickness	32-bit floating point	[N*768, 3200]	[768, 3200]	micrometer
eps	Effective Particle Size	32-bit floating point	[N*768, 3200]	[768, 3200]	micrometer
QF1_VIIRSCOPIP	Quality Flag	unsigned 8-bit char	[N*768, 3200]	[768, 3200]	Unitless
QF2_VIIRSCOPIP		unsigned 8-bit char	[N*768, 3200]	[768, 3200]	Unitless
QF3_VIIRSCOPIP		unsigned 8-bit char	[N*768, 3200]	[768, 3200]	Unitless
File Size	**27,033,600 Bytes**				

4.2.2 VIIRS Cloud Optical Properties IP Product Profile

Table: 4.2.2-1 VIIRS Cloud Optical Properties IP Product Profile

VIIRS Cloud Optical Properties IP Product Profile

Fields

Name	Data Size	Dimensions
cot	4byte(s)	

Name	Granule Boundary	Dynamic	Min Array Size	Max Array Size
M_VIIRS_SDR_ROWS	Yes	No	768	768
M_VIIRS_SDR_COLS	No	No	3200	3200

Datum

Description	Datum Offset	Unscaled Valid Range Min	Unscaled Valid Range Max	Measurement Units	Scaled	Scale Factor Name	Data Type	Fill Values		Legend Entries	
								Name	Value	Name	Value
Cloud Optical Thickness	0	0.0	124	micrometer	No		32-bit floating point	NA_FLOAT32_FILL	-999.9		
								MISS_FLOAT32_FILL	-999.8		
								ONBOARD_PT_FLOAT32_FILL	-999.7		
								ONGROUND_PT_FLOAT32_FILL	-999.6		
								ERR_FLOAT32_FILL	-999.5		
								ELLIPSOID_FLOAT32_FILL	-999.4		
								VDNE_FLOAT32_FILL	-999.3		
								SOUB_FLOAT32_FILL	-999.2		

eps	4byte(s)	

Name	Granule Boundary	Dynamic	Min Array Size	Max Array Size
M_VIIRS_SDR_ROWS	Yes	No	768	768
M_VIIRS_SDR_COLS	No	No	3200	3200

Datum

Description	Datum Offset	Unscaled Valid Range Min	Unscaled Valid Range Max	Measurement Units	Scaled	Scale Factor Name	Data Type	Fill Values		Legend Entries	
								Name	Value	Name	Value
Effective Particle Size	0	0	50	micrometer	No		32-bit floating point	NA_FLOAT32_FILL	-999.9		
								MISS_FLOAT32_FILL	-999.8		
								ONBOARD_PT_FLOAT32_FILL	-999.7		
								ONGROUND_PT_FLOAT32_FILL	-999.6		
								ERR_FLOAT32_FILL	-999.5		

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										ELLIPSOID_FLOAT32_FILL	-999.4
										VDNE_FLOAT32_FILL	-999.3
										SOUB_FLOAT32_FILL	-999.2

VIIRS Cloud Optical Properties IP Product Profile - Quality Flags

Fields

Name	Data Size	Dimensions
QF1_VIIRSCOPIP	1byte(s)	

Name	Granule Boundary	Dynamic	Min Array Size	Max Array Size
M_VIIRS_SDR_ROWS	Yes	No	768	768
M_VIIRS_SDR_COLS	No	No	3200	3200

Datum

Description	Datum Offset	Unscaled Valid Range Min	Unscaled Valid Range Max	Measurement Units	Scaled	Scale Factor Name	Data Type	Fill Values (Name, Value)	Legend Entries (Name, Value)
Overall Pixel level flag	0	0	1	Unitless	No		1 bit(s)		cop quality flag is set: 1 not: 0
Ice COT out of bounds	1	0	1	Unitless	No		1 bit(s)		out of bounds: 1 not: 0
Water COT out of bounds	2	0	1	Unitless	No		1 bit(s)		out of bounds: 1 not: 0
Ice EPS out of bounds	3	0	1	Unitless	No		1 bit(s)		out of bounds: 1 not: 0
Water EPS out of bounds	4	0	1	Unitless	No		1 bit(s)		out of bounds: 1 not: 0
Cloud phase	5	0	5	Unitless	No		3 bit(s)		Not exe: 0 Cirrus: 1 Opaque ice: 2 water: 3 mixed: 4 multiple layer: 5

Name	Data Size	Dimensions
QF2_VIIRSCOPIP	1byte(s)	

Name	Granule Boundary	Dynamic	Min Array Size	Max Array Size
M_VIIRS_SDR_ROWS	Yes	No	768	768
M_VIIRS_SDR_COLS	No	No	3200	3200

Datum

Description	Datum Offset	Unscaled Valid Range Min	Unscaled Valid Range Max	Measurement Units	Scaled	Scale Factor Name	Data Type	Fill Values (Name, Value)	Legend Entries (Name, Value)
Day water iteration convergence	0	0	1	Unitless	No		1 bit(s)		convergence: 1 not: 0
Day ice iteration convergence	1	0	1	Unitless	No		1 bit(s)		convergence: 1 not: 0
Water COT < 1 at daytime	2	0	1	Unitless	No		1 bit(s)		yes: 1 not: 0
Ice COT < 1 at daytime	3	0	1	Unitless	No		1 bit(s)		yes: 1 not: 0
Water COT < 1 at nightime	4	0	1	Unitless	No		1 bit(s)		

Check the JPSS MIS Server at https://jpssmis.gsfc.nasa.gov/frontmenu_dsp.cfm to verify that this is the correct version prior to use.

												yes 1 not 0
		Ice COT < 1 at nighttime	5	0	1	Unitless	No		1 bit(s)	Name Value		Name Value yes 1 not 0
		Exclude sun glint	6	0	1	Unitless	No		1 bit(s)	Name Value		Name Value in sunglint 1 not 0
		Probably/Confidently cloudy	7	0	1	Unitless	No		1 bit(s)	Name Value		Name Value yes 1 not 0
QF3_VIIRSCOPIP	1byte(s)											

Name	Granule Boundary	Dynamic	Min Array Size	Max Array Size
M_VIIRS_SDR_ROWS	Yes	No	768	768
M_VIIRS_SDR_COLS	No	No	3200	3200

Datum									
Description	**Datum Offset**	**Unscaled Valid Range Min**	**Unscaled Valid Range Max**	**Measurement Units**	**Scaled**	**Scale Factor Name**	**Data Type**	**Fill Values**	**Legend Entries**
Degraded condition for ice cloud cot>10	0	0	1	Unitless	No		1 bit(s)	Name Value	Name Value yes 1 not 0
qf_bad_sdr_data	1	0	2		No		2 bit(s)	Name Value	Name Value Good 0 Poor 1 No Calibration 2
Spare	3	0	0	Unitless	No		5 bit(s)	Name Value	Name Value

Check the JPSS MIS Server at https://jpssmis.gsfc.nasa.gov/frontmenu_dsp.cfm to verify that this is the correct version prior to use.

4.2.3 VIIRS Cloud Optical Properties IP HDF5 Details

Figure 4.2.3-1 provides the details on the content and data types of the VIIRS Cloud Optical Properties products. These UML diagrams provide details at the product level only. In addition to these UML diagrams, refer to figure 3.1-1, Generalized UML Diagram for statically sized HDF5 IP/EDR Files, for a complete UML rendering of this product.

VIIRS-COP-IP
+QF1_VIIRSCOPIP : H5T_NATIVE_UCHAR +QF2_VIIRSCOPIP : H5T_NATIVE_UCHAR +QF3_VIIRSCOPIP : H5T_NATIVE_UCHAR +cot: H5T_NATIVE_FLOAT +eps: H5T_NATIVE_FLOAT

Figure: 4.2.3-1 VIIRS Cloud Optical Properties IP UML Diagram

4.2.4 VIIRS Cloud Optical Properties IP Metadata Details

The product metadata elements contained in the VIIRS Cloud Optical Properties IP are listed in 474-00448-02-01, JPSS Algorithm Specification Volume II: Data Dictionary for the Common Algorithms, Section 4 and 5. These metadata elements include all common metadata at the root, product, aggregation, and granule level.

There are no granule level Quality Flags defined as metadata elements in the VIIRS Cloud Optical Properties IP. Therefore, there are no entries in the N_Quality_Summary_Name/Value metadata attributes for this product.

4.2.5 VIIRS Cloud Optical Properties IP Geolocation Details

See the JPSS Algorithm Specification Vol II: Data Dictionary for the VIIRS RDR/SDR (474-00448-02-06), Section 6.2.5.

Check the JPSS MIS Server at https://jpssmis.gsfc.nasa.gov/frontmenu_dsp.cfm to verify that this is the correct version prior to use.

5 Environmental Data Records (EDRs)

Not Applicable

6 Ancillary and Auxiliary Data Inputs

Not Applicable

7 Look-up Tables and Processing Coefficient Tables

The template used for these formats in this document is described below.

Data Mnemonic: This is a unique identifier. JPSS CDFCB-X Vol. I, 474-00001-01 describes the data mnemonic definition methodology.

Description/Purpose: A brief description of the data format and its purpose.

Instrument: Identification of the Instrument associated with the table.

File-Naming Construct: A description of the file-naming constructs for those data units that apply. JPSS CDFCB-X Vol. I, 474-00001-01 defines file-naming conventions.

File Size: The size of the data file.

File Format Type: The format type of the data file.

Production Frequency: Production frequency is the interval of time for data generation. A production frequency equal to dynamic implies that it is only as requested or as needed.

Data Format/Structure: This defines the actual data format. The definitions provide information for every data element in the data unit.

The following rules apply to all tables:

1. All field names mandatory, unless specified otherwise.
2. Fill data is specified, where applicable.
3. Strings are left-aligned and integers are right-aligned, unless specified otherwise.
4. For information regarding Coordinated Universal Time (UTC) and IDPS Epoch Time (IET) conventions, see the JPSS CDFCB-X Vol. I, 474-00001-01.
5. For all references of the ASCII Standard, the corresponding International Standards Organization (ISO) standard is ISO/IEC 10646. The specific Unicode is UTF8, unless stated otherwise.
6. The fields are presented in order (either top - down or most significant first), unless stated otherwise.

7.1 Look-Up Tables

Algorithm Look-up Table (LUT) files contain tables of pre-computed values used in lieu of real-time algorithm computations to reduce processing resource demands. Table values are typically the result of RTM executions and other environmental model simulations. These data generally cover broad, multi-dimensional parameter spaces which are unique to each algorithm.

7.1.1 VIIRS COP Ice Cloud LUT

Data Mnemonic	NP_NU-LM0040-002
Description/ Purpose	The VIIRS Cloud Optical Properties (COP) Ice Cloud LUT is created from the University of California at Los Angeles' (UCLA) Line-by-Line Equivalent (LBLE) RTM for the purpose of simulating cloudy reflectance

	for a variety of cloud relationships. This file contains reflectances and radiances generated for a variety of conditions. This file is used by the VIIRS COP algorithm.
File-Naming Construct	See the File-Naming Convention for Auxiliary Data Formats, JPSS CDFCB-X Vol. I, 474-00001-01, Section 3.4. The Collection Short Name used in the filename is based on the table - see the JPSS CDFCB-X Vol. I, 474-00001-01, for the applicable Collection Short Names. Version Number Field provides Provenance Version Identifier.
File Size	See Table 7.1.1-1, VIIRS COP Ice Cloud LUT Data Format for size.
File Format Type	Little Endian Binary
Production Frequency	As needed
Data Content and Data Format	For details see Table 7.1.1-1, VIIRS COP Ice Cloud LUT Data Format.

Check the JPSS MIS Server at https://jpssmis.gsfc.nasa.gov/frontmenu_dsp.cfm to verify that this is the correct version prior to use.

Table: 7.1.1-1 VIIRS COP Ice Cloud LUT Data Format

Field Name	Length (Bytes)	Data Type	Range of Values	Units	Comments
sol_zen_bins	76	32-bit floating point	0 - pi/2	Radians	1 Dimensional Array: COP_ICE_SOL_ZEN_BINS Size of Dimension(s): 19
sen_zen_bins	76	32-bit floating point	0 - pi /2	Radians	1 Dimensional Array: COP_ICE_SEN_ZEN_BINS Size of Dimension(s): 19
rel_az_bins	88	32-bit floating point	0 - pi	Radians	1 Dimensional Array: COP_ICE_REL_AZ_BINS Size of Dimension(s): 22
sfc_albedo_bins	40	32-bit floating point	0 - 0.9	unitless	1 Dimensional Array: COP_ICE_ALBEDO_BINS Size of Dimension(s): 10
sfc_emiss_bins	4	32-bit floating point	0.9	unitless	1 Dimensional Array: COP_ICE_EMISS_BINS Size of Dimension(s): 1
eps_indexes	52	32-bit integer	MIN_VAL - MAX_VAL	unitless	1 Dimensional Array: COP_ICE_EPS_BINS Size of Dimension(s): 13
eps_bins	52	32-bit floating point	5-200	micrometer	1 Dimensional Array: COP_ICE_EPS_BINS Size of Dimension(s): 13
cot_bins	68	32-bit floating point	0.125 - 80	unitless	1 Dimensional Array: COP_ICE_COT_BINS Size of Dimension(s): 17
precalcM5_refl	70207280	32-bit floating point	MIN_VAL - MAX_VAL	unitless	7 Dimensional Array: COP_ICE_COT_BINS x COP_ICE_EPS_BINS x COP_ICE_EMISS_BINS x COP_ICE_ALBEDO_BINS x COP_ICE_REL_AZ_BINS x COP_ICE_SEN_ZEN_BINS x COP_ICE_SOL_ZEN_BINS Size of Dimension(s): 17 x 13 x 1 x 10 x 22 x 19 x 19

Check the JPSS MIS Server at https://jpssmis.gsfc.nasa.gov/frontmenu_dsp.cfm to verify that this is the correct version prior to use.

Field Name	Length (Bytes)	Data Type	Range of Values	Units	Comments
precalcM8_refl	70207280	32-bit floating point	MIN_VAL - MAX_VAL	unitless	7 Dimensional Array: COP_ICE_COT_BINS x COP_ICE_EPS_BINS x COP_ICE_EMISS_BINS x COP_ICE_ALBEDO_BINS x COP_ICE_REL_AZ_BINS x COP_ICE_SEN_ZEN_BINS x COP_ICE_SOL_ZEN_BINS Size of Dimension(s): 17 x 13 x 1 x 10 x 22 x 19 x 19
precalcM10_refl	70207280	32-bit floating point	MIN_VAL - MAX_VAL	unitless	7 Dimensional Array: COP_ICE_COT_BINS x COP_ICE_EPS_BINS x COP_ICE_EMISS_BINS x COP_ICE_ALBEDO_BINS x COP_ICE_REL_AZ_BINS x COP_ICE_SEN_ZEN_BINS x COP_ICE_SOL_ZEN_BINS Size of Dimension(s): 17 x 13 x 1 x 10 x 22 x 19 x 19
precalcM11_refl	70207280	32-bit floating point	MIN_VAL - MAX_VAL	unitless	7 Dimensional Array: COP_ICE_COT_BINS x COP_ICE_EPS_BINS x COP_ICE_EMISS_BINS x COP_ICE_ALBEDO_BINS x COP_ICE_REL_AZ_BINS x COP_ICE_SEN_ZEN_BINS x COP_ICE_SOL_ZEN_BINS Size of Dimension(s): 17 x 13 x 1 x 10 x 22 x 19 x 19
File Size	**280,829,576 Bytes**				

Check the JPSS MIS Server at https://jpssmis.gsfc.nasa.gov/frontmenu_dsp.cfm to verify that this is the correct version prior to use.

7.1.2 VIIRS COP Water Cloud LUT

Data Mnemonic	NP_NU-LM0040-003
Description/ Purpose	The VIIRS COP Water Cloud LUT file is created from UCLA's LBLE RTM for the purpose of simulating cloudy reflectance for a variety of cloud relationships. This file is used in the VIIRS COP algorithm.
File-Naming Construct	See the File-Naming Convention for Auxiliary Data Formats, JPSS CDFCB-X Vol. I, 474-00001-01, Section 3.4. The Collection Short Name used in the filename is based on the table - see the JPSS CDFCB-X Vol. I, 474-00001-01, for the applicable Collection Short Names. Version Number Field provides Provenance Version Identifier.
File Size	See Table 7.1.2-1, VIIRS COP Water Cloud LUT Data Format for size.
File Format Type	Little Endian Binary
Production Frequency	As needed
Data Content and Data Format	For details see Table 7.1.2-1, VIIRS COP Water Cloud LUT Data Format.

Check the JPSS MIS Server at https://jpssmis.gsfc.nasa.gov/frontmenu_dsp.cfm to verify that this is the correct version prior to use.

Table: 7.1.2-1 VIIRS COP Water Cloud LUT Data Format

Field Name	Length (Bytes)	Data Type	Range of Values	Units	Comments
sol_zen_bins	76	32-bit floating point	0 - pi/2	Radians	1 Dimensional Array: COP_WATER_SOL_ZEN_BINS Size of Dimension(s): 19
sen_zen_bins	76	32-bit floating point	0 - pi/2	Radians	1 Dimensional Array: COP_WATER_SEN_ZEN_BINS Size of Dimension(s): 19
rel_az_bins	88	32-bit floating point	0 - pi	Radians	1 Dimensional Array: COP_WATER_REL_AZ_BINS Size of Dimension(s): 22
sfc_albedo_bins	40	32-bit floating point	0 - 0.9	unitless	1 Dimensional Array: COP_WATER_ALBEDO_BINS Size of Dimension(s): 10
sfc_emiss_bins	4	32-bit floating point	0.9	unitless	1 Dimensional Array: COP_WATER_EMISS_BINS Size of Dimension(s): 1
eps_indexes	36	32-bit integer	-MIN_VAL - MAX_VAL	unitless	1 Dimensional Array: COP_WATER_EPS_BINS Size of Dimension(s): 9
eps_bins	36	32-bit floating point	2 - 50	Micrometers	1 Dimensional Array: COP_WATER_EPS_BINS Size of Dimension(s): 9
cot_bins	76	32-bit floating point	0.125 - 200	unitless	1 Dimensional Array: COP_WATER_COT_BINS Size of Dimension(s): 19
precalcM5_refl	54323280	32-bit floating point	-MIN_VAL - MAX_VAL	unitless	7 Dimensional Array: COP_WATER_COT_BINS x COP_WATER_EPS_BINS x COP_WATER_EMISS_BINS x COP_WATER_ALBEDO_BINS x COP_WATER_REL_AZ_BINS x COP_WATER_SEN_ZEN_BINS x COP_WATER_SOL_ZEN_BINS Size of Dimension(s): 19 x 9 x 1 x 10 x 22 x 19 x 19

Check the JPSS MIS Server at https://jpssmis.gsfc.nasa.gov/frontmenu_dsp.cfm to verify that this is the correct version prior to use.

Field Name	Length (Bytes)	Data Type	Range of Values	Units	Comments
precalcM8_refl	54323280	32-bit floating point	-MIN_VAL - MAX_VAL	unitless	7 Dimensional Array: COP_WATER_COT_BINS x COP_WATER_EPS_BINS x COP_WATER_EMISS_BINS x COP_WATER_ALBEDO_BINS x COP_WATER_REL_AZ_BINS x COP_WATER_SEN_ZEN_BINS x COP_WATER_SOL_ZEN_BINS Size of Dimension(s): 19 x 9 x 1 x 10 x 22 x 19 x 19
precalcM10_refl	54323280	32-bit floating point	-MIN_VAL - MAX_VAL	unitless	7 Dimensional Array: COP_WATER_COT_BINS x COP_WATER_EPS_BINS x COP_WATER_EMISS_BINS x COP_WATER_ALBEDO_BINS x COP_WATER_REL_AZ_BINS x COP_WATER_SEN_ZEN_BINS x COP_WATER_SOL_ZEN_BINS Size of Dimension(s): 19 x 9 x 1 x 10 x 22 x 19 x 19
precalcM11_refl	54323280	32-bit floating point	-MIN_VAL - MAX_VAL	unitless	7 Dimensional Array: COP_WATER_COT_BINS x COP_WATER_EPS_BINS x COP_WATER_EMISS_BINS x COP_WATER_ALBEDO_BINS x COP_WATER_REL_AZ_BINS x COP_WATER_SEN_ZEN_BINS x COP_WATER_SOL_ZEN_BINS Size of Dimension(s): 19 x 9 x 1 x 10 x 22 x 19 x 19
File Size	**217,293,552 Bytes**				

7.1.3 VIIRS COP IR Band Spectral LUT

Data Mnemonic	NP_NU-LM0233-088
Description/ Purpose	The VIIRS Cloud Optical Properties (COP) IR Band Spectral LUT contains the VIIRS M12, M14, M15 and M16 band center in wavenumber, and clear radiance correction factors. This file is used by the VIIRS COP algorithm
File-Naming Construct	See the File-Naming Convention for Auxiliary Data Formats, JPSS CDFCB-X Vol. I, 474-00001-01, Section 3.4. The Collection Short Name used in the filename is based on the table - see the JPSS CDFCB-X Vol. I, 474-00001-01, for the applicable Collection Short Names.
File Size	See Table 7.1.3-1, VIIRS COP IR Band Spectral LUT Data Format for size.
File Format Type	Little Endian Binary
Production Frequency	As needed
Data Content and Data Format	For details see Table 7.1.3-1, VIIRS COP IR Band Spectral LUT Data Format

Check the JPSS MIS Server at https://jpssmis.gsfc.nasa.gov/frontmenu_dsp.cfm to verify that this is the correct version prior to use.

Table: 7.1.3-1 VIIRS COP IR Band Spectral LUT Data Format

Field Name	Length (Bytes)	Data Type	Range of Values	Units	Comments
cwn_band	16	32-bit floating point	MIN_VAL - MAX_VAL	inverse centimeters	Effective Central Wave Numbers 1 Dimensional Array: BANDS Size of Dimension(s): 4
tcs_band	16	32-bit floating point	MIN_VAL - MAX_VAL	unitless	Temperature Correction Slaps 1 Dimensional Array: BANDS Size of Dimension(s): 4
tci_band	16	32-bit floating point	MIN_VAL - MAX_VAL	deg. Kelvin	Temperature Correction Intercepts 1 Dimensional Array: BANDS Size of Dimension(s): 4
File Size	**48 Bytes**				

Check the JPSS MIS Server at https://jpssmis.gsfc.nasa.gov/frontmenu_dsp.cfm to verify that this is the correct version prior to use.

7.1.4 VIIRS COP Pfaast Regression LUT

Data Mnemonic	NP_NU-LM0233-089
Description/ Purpose	The VIIRS Cloud Optical Properties (COP) Pressure -Layer Fast Algorithm for Atmospheric Transmittance (Pfaast) Regression LUT contains the Pfaast regression coefficients for the level-to-space transmittance due to the absorption of the CO2 and water vapor in the atmosphere. The coefficient tables correspond to a number of predictors and pressure levels (fixed at 41). There are tables for M12, M14, M15 and M16 bands. This file is used by the VIIRS COP algorithm.
File-Naming Construct	See the File-Naming Convention for Auxiliary Data Formats, JPSS CDFCB-X Vol. I, 474-00001-01, Section 3.4. The Collection Short Name used in the filename is based on the table - see the JPSS CDFCB-X Vol. I, 474-00001-01, for the applicable Collection Short Names.
File Size	See Table 7.1.4-1, VIIRS COP Pfaast Regression LUT Data Format for size.
File Format Type	Little Endian Binary
Production Frequency	As needed
Data Content and Data Format	For details see Table 7.1.4-1, VIIRS COP Pfaast Regression LUT Data Format

Check the JPSS MIS Server at https://jpssmis.gsfc.nasa.gov/frontmenu_dsp.cfm to verify that this is the correct version prior to use.

Table: 7.1.4-1 VIIRS COP Pfaast Regression LUT Data Format

Field Name	Length (Bytes)	Data Type	Range of Values	Units	Comments
Pstd	168	32-bit floating point	0 - MAX_VAL	milibars	Pressure 1 Dimensional Array: PFAAST_LAYERS Size of Dimension(s): 42
Tstd	168	32-bit floating point	0 - MAX_VAL	kelvin	Temperature 1 Dimensional Array: PFAAST_LAYERS Size of Dimension(s): 42
Wstd	168	32-bit floating point	0 - MAX_VAL	gm/kg	Moisture 1 Dimensional Array: PFAAST_LAYERS Size of Dimension(s): 42
Ostd	168	32-bit floating point	0 - MAX_VAL	ppmv	Ozone1 Dimensional Array: PFAAST_LAYERS Size of Dimension(s): 42
coefd37	1476	32-bit floating point	MIN_VAL - MAX_VAL	unitless	2 Dimensional Array: 41 x 9 Size of Dimension(s): 41 x 9
coefo37	1640	32-bit floating point	MIN_VAL - MAX_VAL	unitless	2 Dimensional Array: 41 x 10 Size of Dimension(s): 41 x 10
coefs37	1968	32-bit floating point	MIN_VAL - MAX_VAL	unitless	2 Dimensional Array: 41 x 12 Size of Dimension(s): 41 x 12
coefl37	492	32-bit floating point	MIN_VAL - MAX_VAL	unitless	2 Dimensional Array: COP_NM x COP_NCL Size of Dimension(s): 41 x 3
coefc37	820	32-bit floating point	MIN_VAL - MAX_VAL	unitless	2 Dimensional Array: 41 x 5 Size of Dimension(s): 41 x 5
coefd84	1476	32-bit floating point	MIN_VAL - MAX_VAL	unitless	2 Dimensional Array: 41 x 9 Size of Dimension(s): 41 x 9
coefo84	1640	32-bit floating point	MIN_VAL - MAX_VAL	unitless	2 Dimensional Array: 41 x 10

Check the JPSS MIS Server at https://jpssmis.gsfc.nasa.gov/frontmenu_dsp.cfm to verify that this is the correct version prior to use.

Field Name	Length (Bytes)	Data Type	Range of Values	Units	Comments
					Size of Dimension(s): 41 x 10
coefs84	1968	32-bit floating point	MIN_VAL - MAX_VAL	unitless	2 Dimensional Array: 41 x 12 Size of Dimension(s): 41 x 12
coefl84	492	32-bit floating point	MIN_VAL - MAX_VAL	unitless	2 Dimensional Array: COP_NM x COP_NCL Size of Dimension(s): 41 x 3
coefc84	820	32-bit floating point	MIN_VAL - MAX_VAL	unitless	2 Dimensional Array: 41 x 5 Size of Dimension(s): 41 x 5
coefd107	1476	32-bit floating point	MIN_VAL - MAX_VAL	unitless	2 Dimensional Array: 41 x 9 Size of Dimension(s): 41 x 9
coefo107	1640	32-bit floating point	MIN_VAL - MAX_VAL	unitless	2 Dimensional Array: 41 x 10 Size of Dimension(s): 41 x 10
coefs107	1968	32-bit floating point	MIN_VAL - MAX_VAL	unitless	2 Dimensional Array: 41 x 12 Size of Dimension(s): 41 x 12
coefl107	492	32-bit floating point	MIN_VAL - MAX_VAL	unitless	2 Dimensional Array: 41 x 5 Size of Dimension(s): 41 x 5
coefc107	820	32-bit floating point	MIN_VAL - MAX_VAL	unitless	2 Dimensional Array: 41 x 5 Size of Dimension(s): 41 x 5
coefd12	1476	32-bit floating point	MIN_VAL - MAX_VAL	unitless	2 Dimensional Array: 41 x 9 Size of Dimension(s): 41 x 9
coefo12	1640	32-bit floating point	MIN_VAL - MAX_VAL	unitless	2 Dimensional Array: 41 x 10 Size of Dimension(s): 41 x 10
coefs12	1968	32-bit floating point	MIN_VAL - MAX_VAL	unitless	2 Dimensional Array: 41 x 12 Size of Dimension(s): 41 x 12
coefl12	492	32-bit floating point	MIN_VAL - MAX_VAL	unitless	2 Dimensional Array: COP_NM x COP_NCL Size of Dimension(s): 41 x 3

Check the JPSS MIS Server at https://jpssmis.gsfc.nasa.gov/frontmenu_dsp.cfm to verify that this is the correct version prior to use.

Field Name	Length (Bytes)	Data Type	Range of Values	Units	Comments
coefc12	820	32-bit floating point	MIN_VAL - MAX_VAL	unitless	2 Dimensional Array: 41 x 5 Size of Dimension(s): 41 x 5
File Size	**26,256 Bytes**				

7.1.5 VIIRS COP Surface LUT

Data Mnemonic	NP_NU-LM0233-063
Description/ Purpose	The VIIRS COP Surface LUT file contains the Surface Albedo and emissivity for the surface types identified by the VCM. This file is used in the VIIRS Cloud Optical Properties (COP) IP algorithm.
File-Naming Construct	See the File-Naming Convention for Auxiliary Data Formats, JPSS CDFCB-X Vol. I, 474-00001-01, Section 3.4. The Collection Short Name used in the filename is based on the table - see the JPSS CDFCB-X Vol. I, 474-00001-01, for the applicable Collection Short Names.
File Size	See Table 7.1.5-1, VIIRS COP Surface PC Data Format for size.
File Format Type	Little Endian Binary
Production Frequency	As needed
Data Content and Data Format	For details see Table 7.1.5-1, VIIRS COP Surface LUT Data Format

Table: 7.1.5-1 VIIRS COP Surface LUT Data Format

Field Name	**Length (Bytes)**	**Data Type**	**Range of Values**	**Units**	**Comments**
Albedo	120	32-bit floating point	0 - 1	unitless	2 Dimensional Array: COP_SURFACE_TYPES x COP_ALBEDO_BANDS Size of Dimension(s): 6 x 5
Emissivity	192	32-bit floating point	0 - 1	unitless	2 Dimensional Array: COP_SURFACE_TYPES x COP_EMISSIVITY_BANDS Size of Dimension(s): 6 x 8
File Size	**312 Bytes**				

7.1.6 VIIRS COP Transmittance LUT

Data Mnemonic	NP_NU-LM0040-017
Description/ Purpose	This file is used in the VIIRS COP algorithm.
File-Naming Construct	See the File-Naming Convention for Auxiliary Data Formats, JPSS CDFCB-X Vol. I, 474-00001-01, Section 3.4. The Collection Short Name used in the filename is based on the table - see the JPSS CDFCB-X Vol. I, 474-00001-01, for the applicable Collection Short Names.
File Size	See Table 7.1.6-1, VIIRS COP Transmittance LUT Data Format for size.
File Format Type	Little Endian Binary
Production Frequency	As needed
Data Content and Data Format	For details see Table 7.1.6-1, VIIRS COP Transmittance LUT Data Format

Check the JPSS MIS Server at https://jpssmis.gsfc.nasa.gov/frontmenu_dsp.cfm to verify that this is the correct version prior to use.

Table: 7.1.6-1 VIIRS COP Transmittance LUT Data Format

Field Name	Length (Bytes)	Data Type	Range of Values	Units	Comments
Altitude	208	32-bit floating point	0 - 100	meters	1 Dimensional Array: COP_ALTITUDE_LAYERS Size of Dimension(s): 52
Trans_ref	416	64-bit floating point	0 - 1	unitless	1 Dimensional Array: COP_ALTITUDE_LAYERS Size of Dimension(s): 52
transdT_ref	1664	64-bit floating point	0 - 1	unitless	2 Dimensional Array: 4 x COP_ALTITUDE_LAYERS Size of Dimension(s): 4 x 52
transdq_ref	1664	64-bit floating point	0 - 1	unitless	2 Dimensional Array: 4 x COP_ALTITUDE_LAYERS Size of Dimension(s): 4 x 52
t_ref	408	64-bit floating point	0 - 1	unitless	1 Dimensional Array: COP_TRANSMITTANCE_LAYERS Size of Dimension(s): 51
du_ref	408	64-bit floating point	0 - 1	unitless	1 Dimensional Array: COP_TRANSMITTANCE_LAYERS Size of Dimension(s): 51
File Size	**4,768 Bytes**				

Check the JPSS MIS Server at https://jpssmis.gsfc.nasa.gov/frontmenu_dsp.cfm to verify that this is the correct version prior to use.

7.2 Processing Coefficient Tables

The S-NPP/JPSS-1 ground system data product generation subsystem uses Processing Coefficient Table (PCT) file parameters. PCT files can be either Automated or Manual coefficient tables. Within the Manual table type are two coefficient classes: Initial and Ephemeral. Sections below describe all three and any tables of that type for the product.

7.2.1 Automated Processing Coefficients

Automated Processing Coefficient (PC) files contain parameters updated and/or created during the processing of the S-NPP/JPSS Data Products by the processing algorithms. The processing environment subsequently uses these files without human review of their contents. Files can be used immediately after creation or in future processing such as the next granule in the production data stream processing.

7.2.1.1 VIIRS Cloud Optical Properties Automated PCs

VIIRS Cloud Optical Properties product generation currently uses no Automated PCs.

7.2.2 Manual Processing Coefficients

Manual Processing Coefficient (PC) files contain parameters used for S-NPP/JPSS Data Product generation which require human review prior to operational processing environment insertion. Manual Processing Coefficients have two classes:

- Initialization PCTs contain infrequently updated initial parameters sets S-NPP/JPSS uses for data product generation.
- Ephemeral PCTs contain frequently updated parameters sets S-NPP/JPSS uses for data product generation.

7.2.2.1 VIIRS Cloud Optical Properties Initialization PCTs

VIIRS Cloud Optical Properties product generation currently uses no Initialization PCTs

7.2.2.2 VIIRS COP Ephemeral PCT

Data Mnemonic	DP_NU-LM2020-015
Description/ Purpose	The VIIRS Cloud Optical Property IP Ephemeral PC provides tunable processing coefficients for use by the algorithm during execution. The coefficients can be modified (tuned) through a configuration control process in response to algorithm, performance, inputs, sensitivity, etc. changes.
File-Naming Construct	See the File-Naming Convention for Auxiliary Data Formats, JPSS CDFCB-X Vol. I, 474-00001-01, Section 3.4. The Collection Short Name used in the filename is based on the table - see the JPSS CDFCB-X Vol. I, 474-00001-01, Table B-1 for the applicable Collection Short Names.
File Size	See Table 7.2.2.2 -1 VIIRS COP Ephemeral PC Data Format for size.
File Format Type	Little Endian Binary
Production Frequency	As needed

Data Mnemonic	DP_NU-LM2020-015
Data Content and Data Format	For details see Table 7.2.2.2 -1 VIIRS COP Ephemeral PC Data Format

Table: 7.2.2.2-1 VIIRS COP Ephemeral PC Data Format

Field Name	Length (Bytes)	Data Type	Range of Values	Units	Comments
sza_threshold	4	32-bit floating point	MIN_VAL - MAX_VAL	radians	Solar Zenith Angle Threshold
water_increment	4	32-bit floating point	MIN_VAL - MAX_VAL	unitless	Together with the hi_water_ctt and low_water_ctt defined the maximum iterations for the solution of the IR equation
lo_water_ctt	4	32-bit floating point	MIN_VAL - MAX_VAL	Kelvin	The minimum water cloud top temperature
hi_water_ctt	4	32-bit floating point	MIN_VAL - MAX_VAL	Kelvin	The maximum water cloud top temperature
lo_water_re	4	32-bit floating point	MIN_VAL - MAX_VAL	Micrometer	The minimum water cloud particle radius
hi_water_re	4	32-bit floating point	MIN_VAL - MAX_VAL	Micrometer	The maximum water cloud particle radius
ice_increment	4	32-bit floating point	MIN_VAL - MAX_VAL	unitless	Together with the hi_ice_ctt and lo_ice_ctt defined the maximum iterations for the solution of the IR equation
lo_ice_ctt	4	32-bit floating point	MIN_VAL - MAX_VAL	Kelvin	The minimum ice cloud top temperature
hi_ice_ctt	4	32-bit floating point	MIN_VAL - MAX_VAL	Kelvin	The maximum ice cloud top temperature
ice_thresh_btM15	4	32-bit floating point	MIN_VAL - MAX_VAL	unitless	Threshold for determining which CTT alg to use
min_day_cot_ice	4	32-bit floating point	MIN_VAL - MAX_VAL	unitless	The minimum daytime ice cloud optical thickness boundary value for quality flag
max_day_cot_ice	4	32-bit floating point	MIN_VAL - MAX_VAL	unitless	The maximum daytime ice cloud optical thickness boundary value for quality flag
min_night_cot_ice	4	32-bit floating point	MIN_VAL - MAX_VAL	unitless	The minimum night ice cloud optical thickness boundary value for quality flag
max_night_cot_ice	4	32-bit floating point	MIN_VAL - MAX_VAL	unitless	The maximum night ice cloud optical thickness boundary value for quality flag
min_day_cot_water	4	32-bit floating point	MIN_VAL - MAX_VAL	unitless	The minimum daytime water cloud optical thickness boundary value for quality flag

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Field Name	Length (Bytes)	Data Type	Range of Values	Units	Comments
max_day_cot_water	4	32-bit floating point	MIN_VAL - MAX_VAL	unitless	The maximum daytime water cloud optical thickness boundary value for quality flag
min_night_cot_water	4	32-bit floating point	MIN_VAL - MAX_VAL	unitless	The minimum night water cloud optical thickness boundary value for quality flag
max_night_cot_water	4	32-bit floating point	MIN_VAL - MAX_VAL	unitless	The maximum night water cloud optical thickness boundary value for quality flag
min_eps_ice	4	32-bit floating point	MIN_VAL - MAX_VAL	Micrometer	The minimum ice effective particle size boundary value for quality flag
max_eps_ice	4	32-bit floating point	MIN_VAL - MAX_VAL	Micrometer	The maximum ice effective particle size boundary value for quality flag
min_eps_water	4	32-bit floating point	MIN_VAL - MAX_VAL	Micrometer	The minimum water effective particle size boundary value for quality flag
max_eps_water	4	32-bit floating point	MIN_VAL - MAX_VAL	Micrometer	The maximum water effective particle size boundary value for quality flag
min_ctt_ice	4	32-bit floating point	MIN_VAL - MAX_VAL	Kelvin	The minimum ice cloud top temperature boundary value for quality flag
max_ctt_ice	4	32-bit floating point	MIN_VAL - MAX_VAL	Kelvin	The maximum ice cloud top temperature boundary value for quality flag
min_ctt_water	4	32-bit floating point	MIN_VAL - MAX_VAL	Kelvin	The minimum water cloud top temperature boundary value for quality flag
max_ctt_water	4	32-bit floating point	MIN_VAL - MAX_VAL	Kelvin	The maximum water cloud top temperature boundary value for quality flag
night_ice_cot_convergence_thin	4	32-bit floating point	MIN_VAL - MAX_VAL	unitless	
night_ice_cot_convergence_thick	4	32-bit floating point	MIN_VAL - MAX_VAL	unitless	
night_ice_eps_convergence_thin	4	32-bit floating point	MIN_VAL - MAX_VAL	micrometer	
night_ice_eps_convergence_thick	4	32-bit floating point	MIN_VAL - MAX_VAL	micrometer	
night_ice_ctt_convergence_thin	4	32-bit floating point	MIN_VAL - MAX_VAL	Kelvin	
night_ice_ctt_convergence_thick	4	32-bit floating point	MIN_VAL - MAX_VAL	Kelvin	

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Field Name	Length (Bytes)	Data Type	Range of Values	Units	Comments
night_water_cot_convergence_thin	4	32-bit floating point	MIN_VAL - MAX_VAL	unitless	
night_water_cot_convergence_thick	4	32-bit floating point	MIN_VAL - MAX_VAL	unitless	
night_water_eps_convergence_thin	4	32-bit floating point	MIN_VAL - MAX_VAL	micrometer	
night_water_eps_convergence_thick	4	32-bit floating point	MIN_VAL - MAX_VAL	micrometer	
night_water_ctt_convergence_thin	4	32-bit floating point	MIN_VAL - MAX_VAL	Kelvin	
night_water_ctt_convergence_thick	4	32-bit floating point	MIN_VAL - MAX_VAL	Kelvin	
day_ice_cot_convergence_thin	4	32-bit floating point	MIN_VAL - MAX_VAL	unitless	
day_ice_cot_convergence_thick	4	32-bit floating point	MIN_VAL - MAX_VAL	unitless	
day_ice_eps_convergence_thin	4	32-bit floating point	MIN_VAL - MAX_VAL	micrometer	
day_ice_eps_convergence_thick	4	32-bit floating point	MIN_VAL - MAX_VAL	micrometer	
day_ice_ctt_convergence_thin	4	32-bit floating point	MIN_VAL - MAX_VAL	Kelvin	
day_ice_ctt_convergence_thick	4	32-bit floating point	MIN_VAL - MAX_VAL	Kelvin	
day_water_cot_convergence_thin	4	32-bit floating point	MIN_VAL - MAX_VAL	unitless	
day_water_cot_convergence_thick	4	32-bit floating point	MIN_VAL - MAX_VAL	unitless	
day_water_eps_convergence_thin	4	32-bit floating point	MIN_VAL - MAX_VAL	micrometer	
day_water_eps_convergence_thick	4	32-bit floating point	MIN_VAL - MAX_VAL	micrometer	
day_water_ctt_convergence_thin	4	32-bit floating point	MIN_VAL - MAX_VAL	Kelvin	
day_water_ctt_convergence_thick	4	32-bit floating point	MIN_VAL - MAX_VAL	Kelvin	

Field Name	Length (Bytes)	Data Type	Range of Values	Units	Comments
m12_conversion_factor	8	64-bit floating point	MIN_VAL - MAX_VAL	micrometer/ (1000 * cm^-1)	Conversion factor for M12 to convert from SDR radiance units W/m^2/um/sr to the radiance needed by the algorithm mW/m^2/sr/cm^-1
m12_center_microns	8	64-bit floating point	MIN_VAL - MAX_VAL	micrometer	Center value of M12
m12_bwidth_microns	8	64-bit floating point	MIN_VAL - MAX_VAL	micrometer	Bandwidth value of M12
m12_lowlimit_wavenum	4	32-bit floating point	0.0-2820.0	cm^-1	Lower wave number limit of M12
m12_upplimit_wavenum	4	32-bit floating point	0.0-2688.52	cm^-1	Upper wave number limit of M12
m15_conversion_factor	8	64-bit floating point	MIN_VAL - MAX_VAL	micrometer/ (1000 * cm^-1)	Conversion factor for M15 to convert from SDR radiance units W/m^2/um/sr to the radiance needed by the algorithm mW/m^2/sr/cm^-1
m15_center_microns	8	64-bit floating point	MIN_VAL - MAX_VAL	micrometer	Center value of M15 in microns
m_coeffs	16	32-bit floating point	MIN_VAL - MAX_VAL	unitless	Coefficients used to calculate scaling factor in nighttime IR Water Cloud Retrieval 1 Dimensional Array: Size of Dimension(s): 4
m15_center_wavenum	4	32-bit floating point	MIN_VAL - MAX_VAL	cm^-1	Center value of M15 in wave number
equation57_alpha	4	32-bit floating point	-50.0-1000.0	unitless	Empirical constant used in Nighttime IR Cirrus Cloud Retrieval
equation57_beta	4	32-bit floating point	MIN_VAL - MAX_VAL	unitless	Empirical constant used in Nighttime IR Cirrus Cloud Retrieval
k2	4	32-bit floating point	MIN_VAL - MAX_VAL	unitless	Extinction coefficient for M15
init_mean_de_coeffs	16	32-bit floating point	MIN_VAL - MAX_VAL	unitless	Coefficients to determine initial temperature (averaged EPS) from equation 52 1 Dimensional Array: Size of Dimension(s): 4

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Field Name	Length (Bytes)	Data Type	Range of Values	Units	Comments
de_coeffs	12	32-bit floating point	MIN_VAL - MAX_VAL	unitless	Coefficients De of equation 49 in the ATBD 1 Dimensional Array: Size of Dimension(s): 3
pad1	4	unsigned 8-bit char	0 - 255	unitless	Pad bytes for natural alignment Size of Dimension(s): 4
d_coeffs	96	64-bit floating point	-365.-1000.0	unitless	Coefficients Dn of Equation 50 in the ATBD 2 Dimensional Array: DIM_NUM3 x DIM_NUM4 Size of Dimension(s): 3 x 4
m15_emiss_min_ice	4	32-bit floating point	MIN_VAL - MAX_VAL	unitless	Minimum emissivity for ice cloud
m15_emiss_max_ice	4	32-bit floating point	MIN_VAL - MAX_VAL	unitless	Maximum emissivity ice cloud
m15_emiss_min_water	4	32-bit floating point	MIN_VAL - MAX_VAL	unitless	Minimum emissivity for water cloud
m15_emiss_max_water	4	32-bit floating point	MIN_VAL - MAX_VAL	unitless	Maximum emissivity water cloud
init_cot_min	4	32-bit floating point	MIN_VAL - MAX_VAL	unitless	Minimum initial cloud optical thickness
init_cot_max	4	32-bit floating point	MIN_VAL - MAX_VAL	unitless	Maximum initial cloud optical thickness
k_ratio_min	4	32-bit floating point	MIN_VAL - MAX_VAL	unitless	Minimum value for K ratio
k_ratio_max	4	32-bit floating point	MIN_VAL - MAX_VAL	unitless	Maximum value for K ratio
de_min	4	32-bit floating point	MIN_VAL - MAX_VAL	Micrometers	Minimum value for Mean Effective Size (De)
de_max	4	32-bit floating point	MIN_VAL - MAX_VAL	Micrometers	Maximum value for Mean Effective Size (De)
init_mean_de_min	4	32-bit floating point	MIN_VAL - MAX_VAL	Micrometers	Minimum value for the initial mean temperature
init_mean_de_max	4	32-bit floating point	MIN_VAL - MAX_VAL	Micrometers	Maximum value for the initial mean temperature
mean_iwc_min	4	32-bit floating point	MIN_VAL - MAX_VAL	g/m3	Minimum value for the mean ice water content

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Field Name	Length (Bytes)	Data Type	Range of Values	Units	Comments
mean_iwc_max	4	32-bit floating point	MIN_VAL - MAX_VAL	g/m3	Maximum value for the mean ice water content
ctt_min_water	4	32-bit floating point	MIN_VAL - MAX_VAL	Kelvin	Minimum value for water cloud top temperature
ctt_max_water	4	32-bit floating point	MIN_VAL - MAX_VAL	Kelvin	Maximum value for water cloud top temperature
ctt_min_ice	4	32-bit floating point	MIN_VAL - MAX_VAL	Kelvin	Minimum value for ice cloud top temperature
ctt_max_ice	4	32-bit floating point	MIN_VAL - MAX_VAL	Kelvin	Maximum value for ice cloud top temperature
diff_threshold	4	32-bit floating point	MIN_VAL - MAX_VAL	Kelvin	Difference threshold for refinement of ice ctt
diff_max	4	32-bit floating point	MIN_VAL - MAX_VAL	Kelvin	Maximum difference for refinement of ice ctt
weight_of_De_of_k	4	32-bit floating point	MIN_VAL - MAX_VAL	unitless	Weight of De_of_k in final determination of De
pad2	4	unsigned 8-bit char	0 - 255	unitless	Pad bytes for natural alignment 1 Dimensional Array: PAD_DIM4 Size of Dimension(s): 4
m14_center_microns	8	64-bit floating point	MIN_VAL - MAX_VAL	Micrometer	Center value of M14 in microns
m16_center_microns	8	64-bit floating point	MIN_VAL - MAX_VAL	Micrometer	Center value of M16 in microns
m14_conversion_factor	8	64-bit floating point	MIN_VAL - MAX_VAL	micrometer/ (1000 * cm^-1)	Conversion factor for M14 to convert from SDR radiance units W/m^2/um/sr to the radiance needed by the algorithm mW/m^2/sr/cm^-1
m16_conversion_factor	8	64-bit floating point	MIN_VAL - MAX_VAL	micrometer/ (1000 * cm^-1)	Conversion factor for M16 to convert from SDR radiance units W/m^2/um/sr to the radiance needed by the algorithm mW/m^2/sr/cm^-1
min_night_cot_water_init	4	32-bit floating point	MIN_VAL - MAX_VAL	unitless	Initial minimum value of night over water for cloud optical thickness
max_night_cot_water_init	4	32-bit floating point	MIN_VAL - MAX_VAL	unitless	Initial maximum value of night over water for cloud optical thickness

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Field Name	Length (Bytes)	Data Type	Range of Values	Units	Comments
k_ratio_inbound_min	4	32-bit floating point	MIN_VAL - MAX_VAL	unitless	Minimum inbound value for k ratio
night_alpha_min	4	32-bit floating point	MIN_VAL - MAX_VAL	unitless	Minimum value of night alpha
night_alpha_max	4	32-bit floating point	MIN_VAL - MAX_VAL	unitless	Maximum value of night alpha
hi_water_ctt_conv	4	32-bit floating point	MIN_VAL - MAX_VAL	Kelvin	The maximum water cloud top temperature
tmin	8	64-bit floating point	MIN_VAL - MAX_VAL	Kelvin	Minimum temperature
tmax	8	64-bit floating point	MIN_VAL - MAX_VAL	Kelvin	Maximum temperature
B12min	8	64-bit floating point	MIN_VAL - MAX_VAL	Kelvin	Minimum value for polynomial fit equations applicable for VIIRS temperature in deg K, radiance in W/m**2/micron/ster
B12max	8	64-bit floating point	MIN_VAL - MAX_VAL	Kelvin	Maximum value for polynomial fit equations applicable for VIIRS temperature in deg K, radiance in W/m**2/micron/ster
B14min	8	64-bit floating point	MIN_VAL - MAX_VAL	Kelvin	Minimum value for polynomial fit equations applicable for VIIRS temperature in deg K, radiance in W/m**2/micron/ster
B14max	8	64-bit floating point	MIN_VAL - MAX_VAL	Kelvin	Maximum value for polynomial fit equations applicable for VIIRS temperature in deg K, radiance in W/m**2/micron/ster
B15min	8	64-bit floating point	MIN_VAL - MAX_VAL	Kelvin	Minimum value for polynomial fit equations applicable for VIIRS temperature in deg K, radiance in W/m**2/micron/ster
B15max	8	64-bit floating point	MIN_VAL - MAX_VAL	Kelvin	Maximum value for polynomial fit equations applicable for VIIRS temperature in deg K, radiance in W/m**2/micron/ster

Check the JPSS MIS Server at https://jpssmis.gsfc.nasa.gov/frontmenu_dsp.cfm to verify that this is the correct version prior to use.

Field Name	Length (Bytes)	Data Type	Range of Values	Units	Comments
B16min	8	64-bit floating point	MIN_VAL - MAX_VAL	Kelvin	Minimum value for polynomial fit equations applicable for VIIRS temperature in deg K, radiance in W/m**2/micron/ster
B16max	8	64-bit floating point	MIN_VAL - MAX_VAL	Kelvin	Maximum value for polynomial fit equations applicable for VIIRS temperature in deg K, radiance in W/m**2/micron/ster
M12_B_COEF	48	64-bit floating point	MIN_VAL - MAX_VAL	unitless	VIIRS Polynomial fit coefficients used to calculate temperature (K) at a given band averaged Planck function value (W/m^2/micron/ster) 1 Dimensional Array: Size of Dimension(s): 6
M12_TEMP_COEF	48	64-bit floating point	MIN_VAL - MAX_VAL	unitless	VIIRS Polynomial fit coefficients used to calculate band averaged Planck function value (W/m^2/micron/ster) at a given temperature (K) 1 Dimensional Array: Size of Dimension(s): 6
M14_B_COEF	48	64-bit floating point	MIN_VAL - MAX_VAL	unitless	VIIRS Polynomial fit coefficients used to calculate temperature (K) at a given band averaged Planck function value (W/m^2/micron/ster) 1 Dimensional Array: Size of Dimension(s): 6
M14_TEMP_COEF	48	64-bit floating point	MIN_VAL - MAX_VAL	unitless	VIIRS Polynomial fit coefficients used to calculate band averaged Planck function value (W/m^2/micron/ster) at a given temperature (K)

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Field Name	Length (Bytes)	Data Type	Range of Values	Units	Comments
					1 Dimensional Array: Size of Dimension(s): 6
M15_B_COEF	48	64-bit floating point	MIN_VAL - MAX_VAL	unitless	VIIRS Polynomial fit coefficients used to calculate temperature (K) at a given band averaged Planck function value (W/m^2/micron/ster) 1 Dimensional Array: Size of Dimension(s): 6
M15_TEMP_COEF	48	64-bit floating point	MIN_VAL - MAX_VAL	unitless	VIIRS Polynomial fit coefficients used to calculate band averaged Planck function value (W/m^2/micron/ster) at a given temperature (K) 1 Dimensional Array: Size of Dimension(s): 6
M16_B_COEF	48	64-bit floating point	MIN_VAL - MAX_VAL	unitless	VIIRS Polynomial fit coefficients used to calculate temperature (K) at a given band averaged Planck function value (W/m^2/micron/ster) 1 Dimensional Array: Size of Dimension(s): 6
M16_TEMP_COEF	48	64-bit floating point	MIN_VAL - MAX_VAL	unitless	VIIRS Polynomial fit coefficients used to calculate band averaged Planck function value (W/m^2/micron/ster) at a given temperature (K) 1 Dimensional Array: Size of Dimension(s): 6
degraded_ice_gt_ten	8	64-bit floating point	MIN_VAL - MAX_VAL	unitless	Ice cloud pixel exclusion value for cot > 10

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Field Name	Length (Bytes)	Data Type	Range of Values	Units	Comments
qf_excl_day_ice	8	64-bit floating point	MIN_VAL - MAX_VAL	unitless	Day ice cloud pixel exclusion value for cot < 1
qf_excl_day_water	8	64-bit floating point	MIN_VAL - MAX_VAL	unitless	Day water cloud pixel exclusion value for cot < 1
qf_excl_night_ice	8	64-bit floating point	MIN_VAL - MAX_VAL	unitless	Night ice cloud pixel exclusion value for cot < 1
qf_excl_night_water	8	64-bit floating point	MIN_VAL - MAX_VAL	unitless	Night water cloud pixel exclusion value for cot < 1
transdq-ref	80	32-bit floating point	MIN_VAL - MAX_VAL	unitless	SDR rescaling coefficients
File Size	**1,152 Bytes**				

Appendix A. Data Mnemonic to Interface Mapping

For a complete list of Data Mnemonic to Interface Mapping, see 474-00001-01, JPSS CDFCB-X Vol I. The CDFCB contains Data Mnemonics, Identifiers, Collection Short Names, Interface Documents, and Collection Long Names for each JPSS Data Product and Geolocation data.

Check the JPSS MIS Server at https://jpssmis.gsfc.nasa.gov/frontmenu_dsp.cfm to verify that this is the correct version prior to use.

Appendix B. DQTT Quality Flag Mapping

Not Applicable

Appendix C. Abbreviations and Acronyms

See 470-00041 JPSS Program Lexicon for abbreviations and acronyms.

Attachment A. XML Formats for Related Products

Table: ATT-1 XML Formats for Related Products

File Number	XML Filename
1	474-00448-02-14_JPSS-COP-DD-Part-14_0200D_VIIRS-Cd-Opt-Prop-IP-PP.xml
2	474-00448-02-14_JPSS-COP-DD-Part-14_0200D_VIIRS-INWCTT-IP-PP.xml

Check the JPSS MIS Server at https://jpssmis.gsfc.nasa.gov/frontmenu_dsp.cfm to verify that this is the correct version prior to use.