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**Joint Polar Satellite System (JPSS) Ground Project  
Code 474  
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**Joint Polar Satellite System (JPSS)  
Algorithm Specification Volume II: Data  
Dictionary for the Surface Type**

**Block 2.0.0**



National Aeronautics and  
Space Administration

**Goddard Space Flight Center  
Greenbelt, Maryland**

# Joint Polar Satellite System (JPSS) Algorithm Specification Volume II: Data Dictionary for the Surface Type JPSS Review/Approval Page

**Prepared By:**

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JPSS Ground System  
(Electronic Approvals available online at [https://jpssmis.gsfc.nasa.gov/frontmenu\\_dsp.cfm](https://jpssmis.gsfc.nasa.gov/frontmenu_dsp.cfm))

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**Goddard Space Flight Center  
Greenbelt, Maryland**

## 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

<b>Revision</b>	<b>Effective Date</b>	<b>Description of Changes (Reference the CCR &amp; CCB/ERB Approve Date)</b>	<b>Sections Affected</b>
0200-	Aug. 8, 2013	This was approved by the JPSS Ground ERB via 474-CCR-13-1149 on the effective date shown.	All
0200A	Jan 30, 2014	This version incorporates 474-CCR-13-1443 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	Oct 30, 2014	This version incorporates 474-CCR-14-2088 which was approved by the JPSS Ground ERB on the effective date shown.	All
0200C	Jul 28, 2015	This version incorporates 474-CCR-15-2288 and 474-CCR-15-2506 which was approved by the JPSS Ground ERB on the effective date shown.	All
0200D	Mar 31, 2016	This version incorporates 474-CCR-15-2657, and 474-CCR-16-2826 which was approved by the JPSS Ground ERB on the effective date shown.	All
0200E	Jun 07, 2016	This version incorporates 474-CCR-16-2939 which was approved by the JPSS Ground ERB on the effective date shown.	All

**Table of TBDs/TBRs**

<b>TBx</b>	<b>Type</b>	<b>ID</b>	<b>Text</b>	<b>Action</b>
<b>None</b>				

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## 1 Introduction

### 1.1 Scope

The Joint Polar Satellite System (JPSS) Algorithm Specification for Surface Type - Volume II: Data Dictionary contains the specifications for the format of the Snow 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	Provides reference to acronyms and glossary of terms found within the JPSS Program Lexicon (470-00041).
Attachment A	Provides the list of applicable xml files for this Data Dictionary.

## 2 Related Documentation

The latest JPSS documents can be obtained from URL:

[https://jpssmis.gsfc.nasa.gov/frontmenu\\_dsp.cfm](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
474-00448-01-19	JPSS Algorithm Specification Volume I: Software Requirements Specification (SRS) for the Surface Type

### 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	Government Resource for Algorithm Verification, Independent Testing, and Evaluation (GRAVITE) Requirements Document
N/A	Hierarchical Data Format, Version 5 (HDF5), <a href="http://www.hdfgroup.org/HDF5/">http://www.hdfgroup.org/HDF5/</a>

### 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-S01-024	Operational Algorithm Description Document For VIIRS Surface Type Algorithm Theoretical Basis Document ATBD
474-00448-03-19	Joint Polar Satellite System (JPSS) Algorithm Specification Volume III: Operational Algorithm Description (OAD) for the Surface Type
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)
470-00041	Joint Polar Satellite System (JPSS) Program Lexicon

<b>Document Number</b>	<b>Title</b>
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

### 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 Vol. II: Data Dictionary for the Common Algorithms (474-00448-02-01). 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.

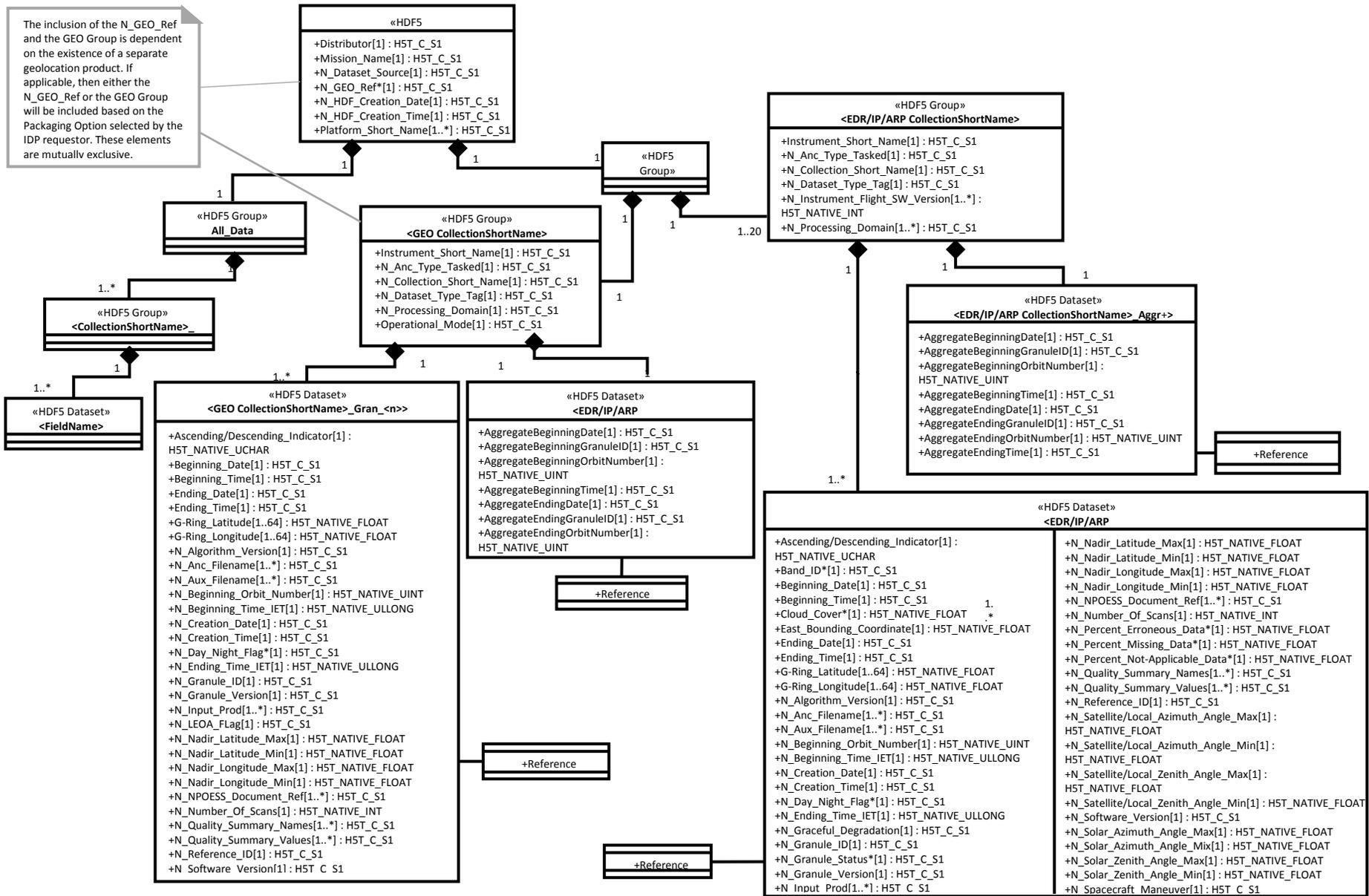


Figure: 3.1-1 Generalized UML Diagram for statically sized HDF5 IP/EDR Files

### **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".

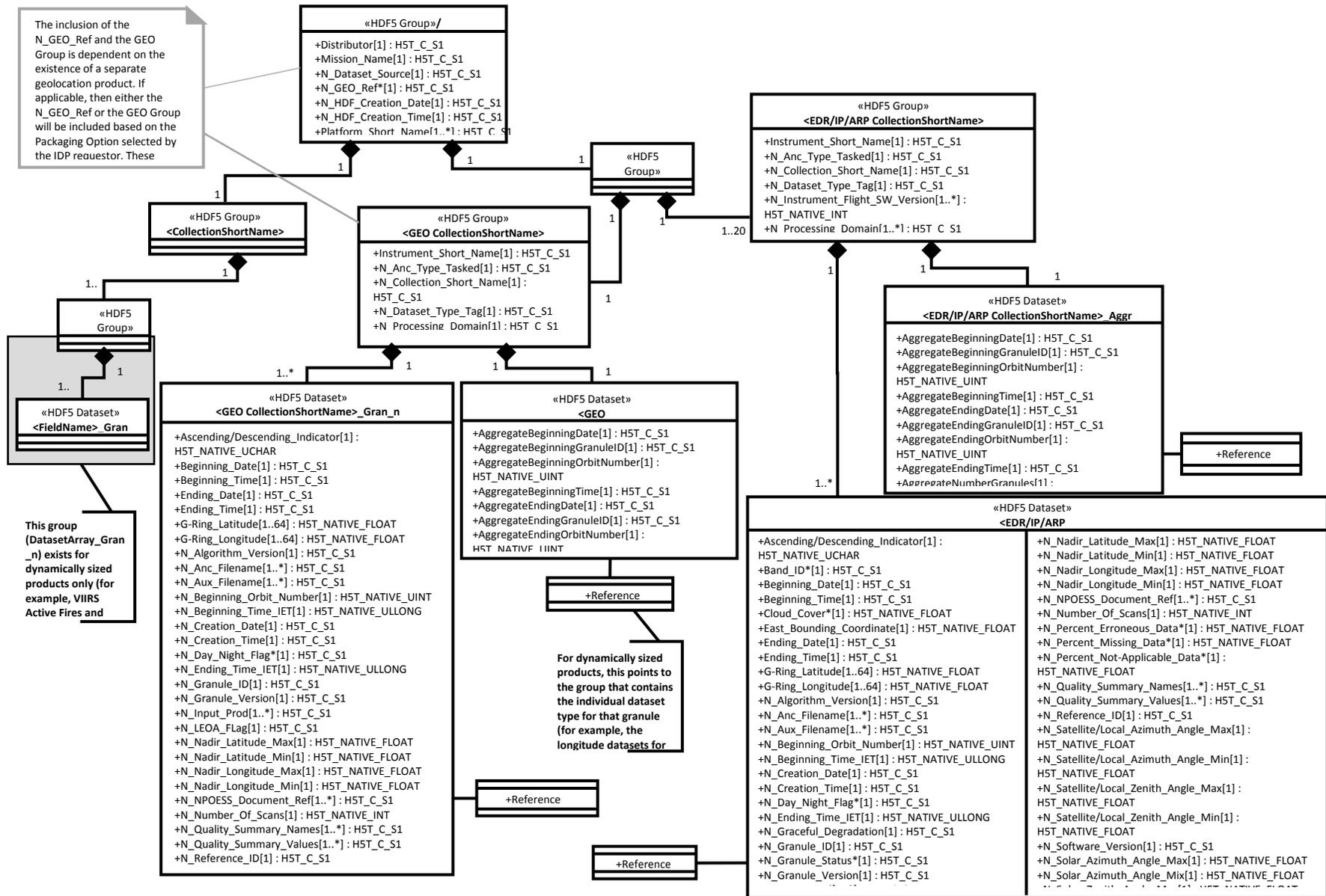


Figure: 3.2-1 Generalized UML Diagram for dynamically sized HDF5 IP/EDR Files

#### **4 Intermediate Products (IPs)**

Not applicable.

## 5 Environmental Data Records (EDRs)

Environmental Data Records (EDRs) are data records that contain the environmental parameters or imagery generated by the JPSS system as products deliverable to the user. The JPSS and S-NPP required set of EDRs are defined in 470-00067-02, the JPSS Ground System Requirements Document, Vol 2. An EDR is either an official EDR, which means that it is part of the set of official JPSS Data Products, or it is a substitute EDR. A substitute EDR is produced by substitute ancillary data, data defined by the IDP operator in order to create a data product using different input (specifically, different ancillary data) than that which is prescribed by JPSS. EDRs provide stable measurements useful for long-term trends. An EDR contains the following:

- EDR specific data (as described in each section)
- Appropriate geolocation values
- Quality Flags
- Metadata represented as Attributes in the HDF5 file that are provided at the granule and aggregation level
- The EDRs are separated by category and are presented alphabetically within each category. All S-NPP EDRs are also delivered during JPSS, thus only those EDRs which are JPSS-only are annotated as such within their respective Description/Purpose section of their interface definition.

### 5.1 VIIRS Surface Type EDR

<b>Data Mnemonic</b>	EDRE-VSTV-C0030 (Official) EDRE-VSTV-C0031 (Substitute)
<b>Description/ Purpose</b>	<p>Surface type is defined as one of the seventeen International Geosphere Biosphere Program (IGBP) classes; see Table 5.1-1, Land Cover Classifications.</p> <p>The Surface Type EDR consists of the Surface Type product and the Vegetation Fraction product. The Surface Type Product is the granulation of the IGBP surface type tiles. The vegetation product is produced when the solar zenith angle is less than 70 degrees and where it is confidently clear (not heavy aerosols).</p> <p>The confidence value is provided in percent ranging from 0 - 100. The value of 247 in this field indicates that the surface type is defined by the NIMA Vector Map (VMap) Level 0.</p> <p>Sensors: VIIRS Effectivity: S-NPP and JPSS</p>
<b>File-Naming Construct</b>	See the JPSS CDFCB-X Vol. I, 474-00001-01, Section 3.4 for details.
<b>File Size</b>	<p>Estimated Granule Size: See Table: 5.1.1-1 VIIRS Surface Type EDR Data Content Summary for size</p> <p>This granule size includes VIIRS Surface Type EDR related fields and quality flags only. Geolocation and metadata attributes are not included. Additional size added by HDF5 packaging is also not included.</p>
<b>File Format Type</b>	HDF5

<b>Data Content and Data Format</b>	See Section 5.1.1, VIIRS Surface Type EDR Data Content Summary See Section 5.1.2, VIIRS Surface Type EDR Product Profile See Section 5.1.3, VIIRS Surface Type EDR HDF5 Details See Section 5.1.4, VIIRS Surface Type EDR HDF5 Metadata Details See Section 5.1.5, VIIRS Surface Type EDR Geolocation Details
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**Table: 5.1-1 Land Cover Classifications**

<b>Land Cover Class</b>	<b>Definition</b>
Evergreen Needleleaf Forests	Lands dominated by woody vegetation with a percent cover >60% and height exceeding 2 meters. Almost all trees remain green all year. Canopy is never without green foliage.
Deciduous Needleleaf Forests	Lands dominated by woody vegetation with a percent cover >60% and height exceeding 2 meters. Consists of seasonal, needleleaf tree communities with an annual cycle of leaf-on and leaf-off periods.
Evergreen Broadleaf Forests	Lands dominated by woody vegetation with a percent cover >60% and height exceeding 2 meters. Almost all trees and shrubs remain green all year. Canopy is never without green foliage.
Deciduous Broadleaf Forests	Lands dominated by woody vegetation with a percent cover >60% and height exceeding 2 meters. Consists of broadleaf tree communities with an annual cycle of leaf-on and leaf-off periods.
Mixed Forests	Lands dominated by woody vegetation with a percent cover >60% and height exceeding 2 meters. Consists of tree communities with interspersed mixtures or mosaics of the other four forest types. None of the forest types exceeds 60% of landscape.
Closed Shrublands	Lands with woody vegetation less than 2 meters tall and with shrub canopy cover >60%. The shrub foliage can be either evergreen or deciduous.
Open Shrublands	Lands with woody vegetation less than 2 meters tall and with shrub canopy cover between 10-60%. The shrub foliage can be either evergreen or deciduous.
Woody Savannas	Lands with herbaceous and other understory systems and with forest canopy cover between 30-60%. The forest cover height exceeds 2 meters.
Savannas	Lands with herbaceous and other understory systems and with forest canopy cover between 10-30%. The forest cover height exceeds 2 meters.
Grasslands	Lands with herbaceous types of cover. Tree and shrub cover is less than 10%.
Permanent Wetlands	Lands with a permanent mixture of water and herbaceous or woody vegetation. The vegetation can be present in either salt, brackish, or fresh water.
Croplands	Lands covered with temporary crops followed by harvest and a bare soil period (e.g., single and multiple cropping systems). Note that perennial woody crops will be classified as the appropriate forest or shrubland cover type.
Urban and Built-Up	Land covered by buildings and other man-made structures.
Cropland/Natural Vegetation Mosaics	Lands with a mosaic of croplands, forests, shrubland, and grasslands in which no one component comprises more than 60% of the landscape.
Snow and Ice	Lands under snow/ice cover.

<b>Land Cover Class</b>	<b>Definition</b>
Barren	Lands with exposed soil, sand, rocks, or snow and never having more than 10% vegetative cover during any time of the year.
Water Bodies	Oceans, seas, lakes, reservoirs, and rivers. Can be either fresh or salt-water bodies.

**5.1.1 VIIRS Surface Type EDR Data Content Summary**

**Table: 5.1.1-1 VIIRS Surface Type EDR Data Content Summary**

Name	Description	Data Type	Aggregate Dimensions (N = Number of Granules)	Granule Dimensions	Units
SurfaceType	Surface Type	unsigned 8-bit char	[N*768, 3200]	[768, 3200]	unitless
VegetationFraction	Vegetation Fraction	unsigned 8-bit char	[N*768, 3200]	[768, 3200]	unitless
QF1_VIIRSSTEDR	Pixel Level Quality Flags	unsigned 8-bit char	[N*768, 3200]	[768, 3200]	unitless
QF2_VIIRSSTEDR		unsigned 8-bit char	[N*768, 3200]	[768, 3200]	unitless
Confidence	QST EDR Pixel Confidence (Pixel level confidence in percent for each of the Surface Types). Quality flowed down from QST EDR Surface Type Confidence. Confidence associated with IGBP Surface Type Classification. Values 0 - 100 = percent confidence. 247 = Surface Type defined by NIMA Vector Map (VMap) Level 0	unsigned 8-bit char	[N*768, 3200]	[768, 3200]	percent
VegetationFractionFactors	Scale = First Array Element; Offset = 2nd Array Element	32-bit floating point	[N*2]	[2]	unitless
<b>File Size</b>	<b>12,288,008 Bytes</b>				

**5.1.2 VIIRS Surface Type EDR Product Profile**

**Table: 5.1.2-1 VIIRS Surface Type EDR Product Profile**

**VIIRS Surface Type EDR Product Profile**

Name		Data Size	Dimensions	Fields

SurfaceType	lbyte(s)	Name	Granule Boundary	Dynamic	Min Array Size	Max Array Size																																																																													
		AlongTrack	Yes	No	768	768																																																																													
		CrossTrack	No	No	3200	3200																																																																													
<b>Datum</b>																																																																																			
		Description	Datum Offset	Unscaled Valid Range Min	Unscaled Valid Range Max	Measurement Units	Scaled	Scale Factor Name	Data Type	Fill Values	Legend Entries																																																																								
		Surface Type	0	MIN_VAL	MAX_VAL	unitless	No		unsigned 8-bit char	<table border="1"> <thead> <tr> <th>Name</th> <th>Value</th> <th>Name</th> <th>Value</th> </tr> </thead> <tbody> <tr><td>NA_UINT8_FILL</td><td>255</td><td>Evergreen Needleleaf Forests</td><td>1</td></tr> <tr><td>MISS_UINT8_FILL</td><td>254</td><td>Evergreen Broadleaf Forests</td><td>2</td></tr> <tr><td>ONBOARD_PT_UINT8_FILL</td><td>253</td><td>Deciduous Needleleaf Forests</td><td>3</td></tr> <tr><td>ONGROUND_PT_UINT8_FILL</td><td>252</td><td>Deciduous Broadleaf Forests</td><td>4</td></tr> <tr><td>ERR_UINT8_FILL</td><td>251</td><td>Mixed Forests</td><td>5</td></tr> <tr><td>ELLIPSOID_UINT8_FILL</td><td>250</td><td>Closed Shrublands</td><td>6</td></tr> <tr><td>VDNE_UINT8_FILL</td><td>249</td><td>Open Shrublands</td><td>7</td></tr> <tr><td>SOUB_UINT8_FILL</td><td>248</td><td>Woody Savannas</td><td>8</td></tr> <tr><td></td><td></td><td>Savannas</td><td>9</td></tr> <tr><td></td><td></td><td>Grasslands</td><td>10</td></tr> <tr><td></td><td></td><td>Permanent Wetlands</td><td>11</td></tr> <tr><td></td><td></td><td>Croplands</td><td>12</td></tr> <tr><td></td><td></td><td>Urban and Built-up</td><td>13</td></tr> <tr><td></td><td></td><td>Cropland/Natural Vegetation Mosaics</td><td>14</td></tr> <tr><td></td><td></td><td>Snow and Ice</td><td>15</td></tr> <tr><td></td><td></td><td>Barren or sparsely vegetated</td><td>16</td></tr> <tr><td></td><td></td><td>Water</td><td>17</td></tr> </tbody> </table>	Name	Value	Name	Value	NA_UINT8_FILL	255	Evergreen Needleleaf Forests	1	MISS_UINT8_FILL	254	Evergreen Broadleaf Forests	2	ONBOARD_PT_UINT8_FILL	253	Deciduous Needleleaf Forests	3	ONGROUND_PT_UINT8_FILL	252	Deciduous Broadleaf Forests	4	ERR_UINT8_FILL	251	Mixed Forests	5	ELLIPSOID_UINT8_FILL	250	Closed Shrublands	6	VDNE_UINT8_FILL	249	Open Shrublands	7	SOUB_UINT8_FILL	248	Woody Savannas	8			Savannas	9			Grasslands	10			Permanent Wetlands	11			Croplands	12			Urban and Built-up	13			Cropland/Natural Vegetation Mosaics	14			Snow and Ice	15			Barren or sparsely vegetated	16			Water	17	
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		Description	Datum Offset	Unscaled Valid Range Min	Unscaled Valid Range Max	Measurement Units	Scaled	Scale Factor Name	Data Type	Fill Values	Legend Entries																																																																								
		Vegetation Fraction	0	0	1	unitless	Yes	VegetationFractionFactors	unsigned 8-bit char	<table border="1"> <thead> <tr> <th>Name</th> <th>Value</th> <th>Name</th> <th>Value</th> </tr> </thead> <tbody> <tr><td>NA_UINT8_FILL</td><td>255</td><td></td><td></td></tr> <tr><td>MISS_UINT8_FILL</td><td>254</td><td></td><td></td></tr> <tr><td>ONBOARD_PT_UINT8_FILL</td><td>253</td><td></td><td></td></tr> <tr><td>ONGROUND_PT_UINT8_FILL</td><td>252</td><td></td><td></td></tr> <tr><td>ERR_UINT8_FILL</td><td>251</td><td></td><td></td></tr> <tr><td>ELLIPSOID_UINT8_FILL</td><td>250</td><td></td><td></td></tr> <tr><td>VDNE_UINT8_FILL</td><td>249</td><td></td><td></td></tr> <tr><td>SOUB_UINT8_FILL</td><td>248</td><td></td><td></td></tr> </tbody> </table>	Name	Value	Name	Value	NA_UINT8_FILL	255			MISS_UINT8_FILL	254			ONBOARD_PT_UINT8_FILL	253			ONGROUND_PT_UINT8_FILL	252			ERR_UINT8_FILL	251			ELLIPSOID_UINT8_FILL	250			VDNE_UINT8_FILL	249			SOUB_UINT8_FILL	248																																							
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SOUB_UINT8_FILL	248																																																																																		

**VIIRS Surface Type EDR Product Profile - Quality Flags**

Fields																							
Name	Data Size	Dimensions																					
QF1_VIIRSSSTEDR	lbyte(s)	Name	Granule Boundary	Dynamic	Min Array Size	Max Array Size																	
		AlongTrack	Yes	No	768	768																	
		CrossTrack	No	No	3200	3200																	
<b>Datum</b>																							
		Description	Datum Offset	Unscaled Valid Range Min	Unscaled Valid Range Max	Measurement Units	Scaled	Scale Factor Name	Data Type	Fill Values	Legend Entries												
		Fire detected in pixel (from the VIIRS Cloud Mask)	0	MIN_VAL	MAX_VAL	unitless	No		1 bit(s)	<table border="1"> <thead> <tr> <th>Name</th> <th>Value</th> <th>Name</th> <th>Value</th> </tr> </thead> <tbody> <tr><td></td><td></td><td>False</td><td>0</td></tr> <tr><td></td><td></td><td>True</td><td>1</td></tr> </tbody> </table>	Name	Value	Name	Value			False	0			True	1	
Name	Value	Name	Value																				
		False	0																				
		True	1																				
		Snow or Ice in Pixel (fraction detected within the pixel exceeded threshold). Applies up to SZA<=85 deg.	1	MIN_VAL	MAX_VAL	unitless	No		1 bit(s)	<table border="1"> <thead> <tr> <th>Name</th> <th>Value</th> <th>Name</th> <th>Value</th> </tr> </thead> <tbody> <tr><td></td><td></td><td>False</td><td>0</td></tr> <tr><td></td><td></td><td>True</td><td>1</td></tr> </tbody> </table>	Name	Value	Name	Value			False	0			True	1	
Name	Value	Name	Value																				
		False	0																				
		True	1																				
		Vegetation in Pixel (Vegetation fraction detected within the pixel exceeded threshold)	2	MIN_VAL	MAX_VAL	unitless	No		1 bit(s)	<table border="1"> <thead> <tr> <th>Name</th> <th>Value</th> <th>Name</th> <th>Value</th> </tr> </thead> <tbody> <tr><td></td><td></td><td>False</td><td>0</td></tr> </tbody> </table>	Name	Value	Name	Value			False	0					
Name	Value	Name	Value																				
		False	0																				



VegetationFractionFactors	4byte(s)	<b>Name</b>	<b>Granule Boundary</b>	<b>Dynamic</b>	<b>Min Array Size</b>	<b>Max Array Size</b>					
		Granule	Yes	No	2	2					
		<b>Datum</b>									
		<b>Description</b>	<b>Datum Offset</b>	<b>Unscaled Valid Range Min</b>	<b>Unscaled Valid Range Max</b>	<b>Measurement Units</b>	<b>Scaled</b>	<b>Scale Factor Name</b>	<b>Data Type</b>	<b>Fill Values</b>	<b>Legend Entries</b>
Scale = First Array Element; Offset = 2nd Array Element		0	MIN_VAL	MAX_VAL	unitless	No		32-bit floating point	Name   Value	Name   Value	

### 5.1.3 VIIRS Surface Type EDR HDF5 Details

Figure 5.1.3-1, VIIRS Surface Type EDR UML Diagram, provides details on the contents and data types of the Surface Type EDR product. This UML provides details at the product level detail only. In addition to this UML, refer to, figure 3.1-1, Generalized UML Diagram for statically sized HDF5 IP/EDR Files, for a complete UML rendering of this product.

<b>VIIRS-ST-EDR</b>
+SurfaceType : H5T_NATIVE_UCHAR
+VegetationFraction : H5T_NATIVE_UCHAR
+QF1_VIIRSSTEDR : H5T_NATIVE_UCHAR
+QF2_VIIRSSTEDR : H5T_NATIVE_UCHAR
+Confidence : H5T_NATIVE_UCHAR
+VegetationFractionFactors : H5T_NATIVE_FLOAT

**Figure: 5.1.3-1 VIIRS Surface Type EDR HDF5 UML Diagram**

### 5.1.4 VIIRS Surface Type EDR HDF5 Metadata Details

The HDF5 metadata elements associated with the VIIRS Surface Type EDR are listed in the JPSS Algorithm Specification Vol. II: Data Dictionary for the Common Algorithms, 474-00448-02-01.

The VIIRS EDR metadata includes all of the common metadata at the root, product, aggregation, and granule levels.

In addition to the common metadata items for this product, Table 5.1.4-1, VIIRS Surface Type EDR Quality Summary Metadata Values, provides the following items as name/value pairs. The listed name/value pair items in the table are the granule level quality flags for the VIIRS Surface Type EDR.

**Table: 5.1.4-1 VIIRS Surface Type EDR Quality Summary Metadata Values**

<b>N_Quality_Summary</b>			
<b>Name</b>	<b>Value</b>	<b>Description</b>	<b>Comments</b>
Surface Type EDR Exclusion Summary	0 - 100	Percent of pixels with one or more exclusion criteria flags	
Surface Type EDR Summary Quality	0 - 100	Percent of pixels not classified as snow or fire within the current granule	

### 5.1.5 VIIRS Surface Type EDR Geolocation Details

VIIRS Surface Type EDR is produced on the VIIRS Moderate Resolution Geolocation - Terrain Corrected. See the JPSS Algorithm Specification Vol. II: Data Dictionary for VIIRS RDR/SDR, 474-00448-02-06, Section 6.2, VIIRS Moderate Resolution Geolocation - Terrain Corrected for details.

## **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 Surface Type LUTs

VIIRS Surface Type product generation currently uses no LUTs.

### 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 Surface Type Automated PCs

VIIRS Surface Type 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 Surface Type Initialization PCs

VIIRS Surface Type product generation currently uses no Initialization PCs.

#### 7.2.2.2 VIIRS Surface Type EDR Ephemeral PCT

<b>Data Mnemonic</b>	DP_NU-LM2020-030
<b>Description/ Purpose</b>	The VIIRS Surface Type EDR 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.
<b>File-Naming Construct</b>	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.
<b>File Size</b>	See Table 7.2.2.2-1, VIIRS Surface Type EDR Ephemeral PC Data Format for size
<b>File Format Type</b>	Little Endian Binary
<b>Production Frequency</b>	As needed
<b>Data Content and Data Format</b>	For details see Table 7.2.2.2-1, VIIRS Surface Type EDR Ephemeral PC Data Format

**Table: 7.2.2.2-1 VIIRS Surface Type EDR Ephemeral PC Data Format**

Field Name	Length (Bytes)	Data Type	Range of Values	Units	Comments
Vegetation_Threshold	4	32-bit floating point	Initially set to 0.05	unitless	Threshold test for vegetation update
Snow_Fraction_Threshold	4	32-bit floating point	Initially set to 0.49	unitless	Threshold test for snow cover update
Veg_Fraction_Scale	4	32-bit integer	Initially set to 100	unitless	Veg_Fraction_Scale Value
Solar_Zenith_Angle_Threshold	4	32-bit floating point	Initially set to 1.22173	radians	Solar Zenith Angle Threshold Value
Solar_Zenith_Angle_Snow_Ice_Threshold	4	32-bit floating point	Initially set to 1.48353	radians	Solar Zenith Angle Snow/Ice Threshold Value
Snow_Fraction_Quality_Threshold	4	32-bit integer	Initially set to 1	unitless	Threshold test for VSCDO snow fraction quality
<b>File Size</b>	<b>24 Bytes</b>				

## **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 for Geolocation data.

**Appendix B. DQTT Quality Flag Mapping**

The following table maps the quality flags by sensor and product that are reportable to the associated data product quality flag Test ID used in the processing environment.

**Table: B-1 DQTT Quality Flag Mapping**

<b>Algorithm</b>	<b>Product</b>	<b>Test ID</b>	<b>Quality Flag</b>
Surface Type	VIIRS-ST-EDR	400	Surface Type Quality
Surface Type	VIIRS-ST-EDR	401	Exclusion Summary

## **Appendix C. Abbreviations and Acronyms**

See is 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	474-00448-02-19_JPSS-ST-DD-Part-19_0200E_VIIRS-ST-EDR-PP.xml