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**Joint Polar Satellite System (JPSS) Ground Project  
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**Joint Polar Satellite System (JPSS)  
Algorithm Specification Volume I:  
Software Requirement Specification  
(SRS) for the Cloud Mask**



National Aeronautics and  
Space Administration

**Goddard Space Flight Center  
Greenbelt, Maryland**

# **Joint Polar Satellite System (JPSS) Algorithm Specification Volume I: Software Requirement Specification (SRS) for the Cloud Mask 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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## Preface

This document is under JPSS Ground Project 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  
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## Change History Log

Revision	Effective Date	Description of Changes (Reference the CCR & CCB/ERB Approve Date)
Rev-	Aug. 29, 2013	This version incorporates 474-CCR-13-1182 which was approved by JPSS Ground ERB on the effective date shown.
A	Jan 30, 2014	This version incorporates 474-CCR-13-1431 which was approved by JPSS Ground ERB on the effective date shown.
A1	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.
B	Nov 05, 2014	This version incorporates 474-CCR-14-1721, 474-CCR-14-1741, 474-CCR-14-1781 and 474-CCR-14-2087 which was approved by JPSS Ground ERB on the effective date shown.
C	Feb 12, 2016	This version incorporates 474-CCR-14-2110, 474-CCR-15-2452 and 474-CCR-15-2480, 474-CCR-15-2657, and 474-CCR-16-2784 which was approved by JPSS Ground ERB on the effective date shown.

**List of TBx Items**

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

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## 1 Introduction

The Joint Polar Satellite System (JPSS) is the National Oceanic and Atmospheric Administration's (NOAA) next-generation operational Earth observation program that acquires and distributes global environmental data primarily from multiple polar-orbiting satellites. The program plays a critical role in NOAA's mission to understand and predict changes in weather, climate, oceans and coasts, and the space environment, which support the Nation's economy and protect lives and property. The first JPSS satellite mission, the Suomi National Polar-orbiting Partnership (S-NPP) satellite, successfully launched in October 2011. S-NPP, along with the legacy NOAA Polar Operational Environmental Satellites (POES), provides continuous environmental observations. Two JPSS satellites will follow S-NPP: JPSS-1, planned for launch in fiscal year (FY) 2017, with JPSS-2 to follow in FY2022.

In addition to the JPSS Program's own satellites operating in the 1330 ( $\pm 10$ ) Local Time of the Ascending Node (LTAN) orbit, NOAA also leverages mission partner assets for complete global coverage. These partner assets include the Department of Defense (DoD) Defense Meteorological Satellite Program (DMSP) operational weather satellites (in the 1730 - 1930 LTAN orbit), the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) Meteorological Operational (Metop) satellites (in the 2130 LTAN orbit) and the Japanese Aerospace Exploration Agency (JAXA) Global Change Observation Mission-Water (GCOM-W) satellite (in the 1330 LTAN orbit). JPSS routes Metop data from McMurdo Station, Antarctica to the EUMETSAT facility in Darmstadt, Germany and EUMETSAT, in turn, provides Metop data to NOAA. For GCOM, JPSS routes the GCOM-W data from Svalbard, Norway through the NOAA Satellite Operations Facility (NSOF) in Suitland, MD, processes GCOM-W data and delivers GCOM-W products to the JPSS users who have JAXA permissions.

Additionally, the JPSS Program provides data acquisition and routing support to the DMSP and the WindSat Coriolis Program. JPSS routes DMSP data from McMurdo Station to the 557<sup>th</sup> Weather Wing at Offutt Air Force Base in Omaha, NE. After processing, the 557<sup>th</sup> releases the DMSP data for public consumption over the Internet via the National Geophysical Data Center in Boulder, CO. The JPSS Program provides data routing support to the National Science Foundation (NSF), as well as the National Aeronautics and Space Administration (NASA) Space Communications and Navigation (SCaN)-supported missions, which include the Earth Observing System (EOS). As part of the agreements for the use of McMurdo Station, JPSS provides communications/network services for the NSF between McMurdo Station, Antarctica and Centennial, Colorado.

As a multi-mission ground infrastructure, the JPSS Ground System supports the heterogeneous constellation of the before-mentioned polar-orbiting satellites both within and outside the JPSS Program through a comprehensive set of services as listed in Table 1-1.

**Table: 1-1 JPSS Ground System Services**

Service	Description
Enterprise Management and Ground Operations	Provides mission management, mission operations, ground operations, contingency management and system sustainment
Flight Operations	Provides launch support and early orbit operations, telemetry and commanding, orbital operations, mission data playback, payload support, flight software upgrade, flight vehicle simulation, and disposal at the end of mission life
Data Acquisition	Provides space/ground communications for acquiring mission data
Data Routing	Provides routing of telemetry, mission and/or operations data through JPSS' global data network
Data Product Generation	Provides the processing of mission data to generate and distribute raw, sensor, environmental, and ancillary data products
Data Product Calibration and Validation	Provides calibration and validation of the data products
Field Terminal Support	Provides development and operational support to the Field Terminal customers

### 1.1 Identification

This SRS provides requirements for Cloud Mask EDR (Environmental Data Record) product. The Cloud Mask is a key input to numerous VIIRS (Visible Infrared Imaging Radiometer) EDRs. Cloud Mask was an Intermediate Product (IP) in S-NPP mission.

### 1.2 Algorithm Overview

The VIIRS Cloud Mask operates on VIIRS M-band pixels. It reports the results of cloud detection algorithms and, when clouds are detected, reports detection confidence and assigns a cloud phase of water, ice, or mixed. It also has detection algorithms for snow/ice, sun glint, land/water, shadow, aerosols, thin cirrus, conifer forest, dust, and smoke.

### 1.3 Document Overview

Section	Description
Section 1	Introduction - Provides a brief overview of the JPSS Ground System and the relevant algorithm, as reference material only.
Section 2	Related Documentation - Lists related documents and identifies them as Parent, Applicable, or Information Documents such as, MOAs, MOUs, technical implementation agreements, as well as Data Format specifications. This section also establishes an order of precedence in the event of conflict between two or more documents.
Section 3	Algorithm Requirements - Provides a summary of the science requirements for the products covered by this volume.
Appendix A	Requirements Attributes - Provides the mapping of requirements to verification methodology and attributes.

## 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.

Doc. No.	Document Title
470-00067	Joint Polar Satellite System (JPSS) Ground System Requirements Document (GSRD)
470-00067-02	Joint Polar Satellite System (JPSS) Ground System Requirements Document (GSRD), Volume 2 - Science Product Specification
474-00448-01-01	Joint Polar Satellite System (JPSS) Algorithm Specification Volume I: Software Requirements Specification (SRS) for the Common Algorithms

### 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.

Doc. No.	Document Title
D0001-M01-S01-011	Joint Polar Satellite System (JPSS) VIIRS Cloud Mask (VCM) Algorithm Theoretical Basis Document (ATBD)
474-00448-02-11	Joint Polar Satellite System (JPSS) Algorithm Specification Volume II: Data Dictionary for the Cloud Mask
474-00448-04-11	Joint Polar Satellite System (JPSS) Algorithm Specification Volume IV: Software Requirements Specification Parameter File (SRSPF) for the Cloud Mask

### 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.

Doc. No.	Document Title
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>Doc. No.</b>	<b>Document Title</b>
474-00448-03-11	Joint Polar Satellite System (JPSS) Algorithm Specification Volume III: Operational Algorithm Description (OAD) for the Cloud Mask
429-05-02-42	Joint Polar Satellite System (JPSS) Mission Data Format Control Book for NPP
472-00251	Joint Polar Satellite System (JPSS) Mission Data Format Control Book for JPSS-1

### 3 Algorithm Requirements

#### 3.1 States and Modes

##### 3.1.1 Normal Mode Performance

SRS.01.11\_346 The Cloud Mask EDR software shall calculate the cloud confidence over ocean in daytime, with a probability of correct typing of greater than 94% (COT > 1.0).

*Rationale:* The probability of correct typing was flowed down from the Level 1 and Level 2 documents.

*Mission Effectivity:* JPSS-1, JPSS-2

SRS.01.11\_347 The Cloud Mask EDR software shall calculate the cloud confidence over land in daytime, with a probability of correct typing of greater than 90% (COT > 1.0).

*Rationale:* The probability of correct typing was flowed down from the Level 1 and Level 2 documents.

*Mission Effectivity:* JPSS-1, JPSS-2

SRS.01.11\_348 The Cloud Mask EDR software shall calculate the cloud confidence over ocean at night, with a probability of correct typing of greater than 85% (COT > 1.0).

*Rationale:* The probability of correct typing was flowed down from the Level 1 and Level 2 documents.

*Mission Effectivity:* JPSS-1, JPSS-2

SRS.01.11\_349 The Cloud Mask EDR software shall calculate the cloud confidence over land at night, with a probability of correct typing of greater than 88% (COT > 1.0).

*Rationale:* The probability of correct typing was flowed down from the Level 1 and Level 2 documents.

*Mission Effectivity:* JPSS-1, JPSS-2

SRS.01.11\_350 The Cloud Mask EDR software shall calculate the cloud confidence over ocean in daytime, outside of sun glint regions, with a cloud leakage rate of less than or equal to 1% (COT > 1.0).

*Rationale:* The cloud leakage rate was flowed down from the Level 1 and Level 2 documents.

*Mission Effectivity:* JPSS-1, JPSS-2

SRS.01.11\_351 The Cloud Mask EDR software shall calculate the cloud confidence over land in daytime, with a cloud leakage rate of less than or equal to 3% (COT > 1.0).

*Rationale:* The cloud leakage rate was flowed down from the Level 1 and Level 2 documents.

*Mission Effectivity:* JPSS-1, JPSS-2

SRS.01.11\_352 The Cloud Mask EDR software shall calculate the cloud confidence over land and ocean at night, with a cloud leakage rate of less than or equal to 5% (COT > 1.0).

*Rationale:* The cloud leakage rate was flowed down from the Level 1 and Level 2 documents.

*Mission Effectivity:* JPSS-1, JPSS-2

SRS.01.11\_353 The Cloud Mask EDR software shall calculate the cloud confidence over ocean in daytime, with a false alarm rate of 5% (COT > 1.0).

*Rationale:* The false alarm rate was flowed down from the Level 1 and Level 2 documents.

*Mission Effectivity:* JPSS-1, JPSS-2

SRS.01.11\_354 The Cloud Mask EDR software shall calculate the cloud confidence over land in daytime with a false alarm rate of less than or equal to 7% (TOC NDVI <0.2 or TOC NDVI >0.4 and COT > 1.0).

*Rationale:* The false alarm rate was flowed down from the Level 1 and Level 2 documents.

*Mission Effectivity:* JPSS-1, JPSS-2

SRS.01.11\_355 The Cloud Mask EDR software shall calculate the cloud confidence over land and ocean at night, with a false alarm rate of 8% and (COT > 1.0).

*Rationale:* The false alarm rate was flowed down from the Level 1 and Level 2 documents.

*Mission Effectivity:* JPSS-1, JPSS-2

SRS.01.11\_356 The Cloud Mask EDR software shall calculate the cloud confidence over desert in daytime, with a false alarm rate of less than or equal to 7% (COT > 1.0).

*Rationale:* The false alarm rate was flowed down from the Level 1 and Level 2 documents.

*Mission Effectivity:* JPSS-1, JPSS-2

### **3.1.2 Graceful Degradation Mode Performance**

SRS.01.11\_358 The Cloud Mask EDR software shall use NCEP Sea Surface Winds, Atmospheric Moisture Profile, and/or Surface Temperature [750m Granulation] extended forecast data for fallback processing when the relevant NCEP current forecast input is not available.

*Rationale:* The EDR software through its algorithm must generate products using back up data sources to meet the graceful degradation requirement. These degraded products are not required to meet the algorithm performance requirements.

*Mission Effectivity:* S-NPP, JPSS-1, JPSS-2

## 3.2 Algorithm Functional Requirements

### 3.2.1 Product Production Requirements

### 3.2.2 Algorithm Science Requirements

SRS.01.11\_336 The Cloud Mask EDR software shall incorporate a computing algorithm provided for cloud confidence.

*Rationale:* Algorithms are established in accordance with the JPSS VIIRS Cloud Mask (VCM) Algorithm Theoretical Basis Document (ATBD) (D0001-M01-S01-011).

*Mission Effectivity:* S-NPP, JPSS-1, JPSS-2

SRS.01.11\_337 The Cloud Mask EDR software shall incorporate a computing algorithm provided for cloud phase.

*Rationale:* Algorithms are established in accordance with the JPSS VIIRS Cloud Mask (VCM) Algorithm Theoretical Basis Document (ATBD) (D0001-M01-S01-011).

*Mission Effectivity:* S-NPP, JPSS-1, JPSS-2

SRS.01.11\_338 The Cloud Mask EDR software shall incorporate a computing algorithm provided to separate heavy aerosols from clouds.

*Rationale:* Algorithms are established in accordance with the JPSS VIIRS Cloud Mask (VCM) Algorithm Theoretical Basis Document (ATBD) (D0001-M01-S01-011).

*Mission Effectivity:* S-NPP, JPSS-1, JPSS-2

SRS.01.11\_339 The Cloud Mask EDR software shall incorporate a computing algorithm provided for identification of cloud shadows.

*Rationale:* Algorithms are established in accordance with the JPSS VIIRS Cloud Mask (VCM) Algorithm Theoretical Basis Document (ATBD) (D0001-M01-S01-011).

*Mission Effectivity:* S-NPP, JPSS-1, JPSS-2

### 3.2.3 Algorithm Exception Handling

Not applicable.

## 3.3 External Interfaces

### 3.3.1 Inputs

SRS.01.11\_343 The Cloud Mask EDR software shall incorporate inputs per Table 3-1.

*Rationale:* VIIRS SDR (Sensor Data Record) reflectance are used as inputs to generate the Cloud Mask products.

*Mission Effectivity:* S-NPP, JPSS-1, JPSS-2

SRS.01.11\_362 The Cloud Mask EDR software shall ingest tables and coefficients formatted in accordance with Section 7 of the JPSS Algorithm Specification Vol II: Data Dictionary for Cloud Mask (474-00448-02-11).

*Rationale:* This defines the formats for Lookup Tables, and Processing Coefficients for input into the algorithm module.

*Mission Effectivity:* S-NPP, JPSS-1, JPSS-2

Table 3-1 and Figure 3-1 are best viewed together since they describe the processes governed by this SRS in different ways. The figure diagrams the data flowing into, out of, and within the code governed by this SRS. The table lists these same data interactions as well as all downstream dependencies for outputs from this SRS.

Each row in the table describes a single software interaction - data flowing from one software item to another. The data is listed in the first column. The second and third columns include the short name and mnemonic for the data. Blanks indicate there is no mnemonic. The fourth and fifth columns contain the SRS that generates the data product(s) in the first column, and the SRS that receives those products. The final two columns contain the actual function name in Algorithm Development Library (ADL) that produces those products, and the function that inputs those products. The SRS's titled "Ingest MSD" and "Store/Retrieve" are non-existent SRS's functioning as data handling for the IDPS. The software functions "Store Products" and "Retrieve Products" are similar non-existent functions that operate as IDPS data handling.

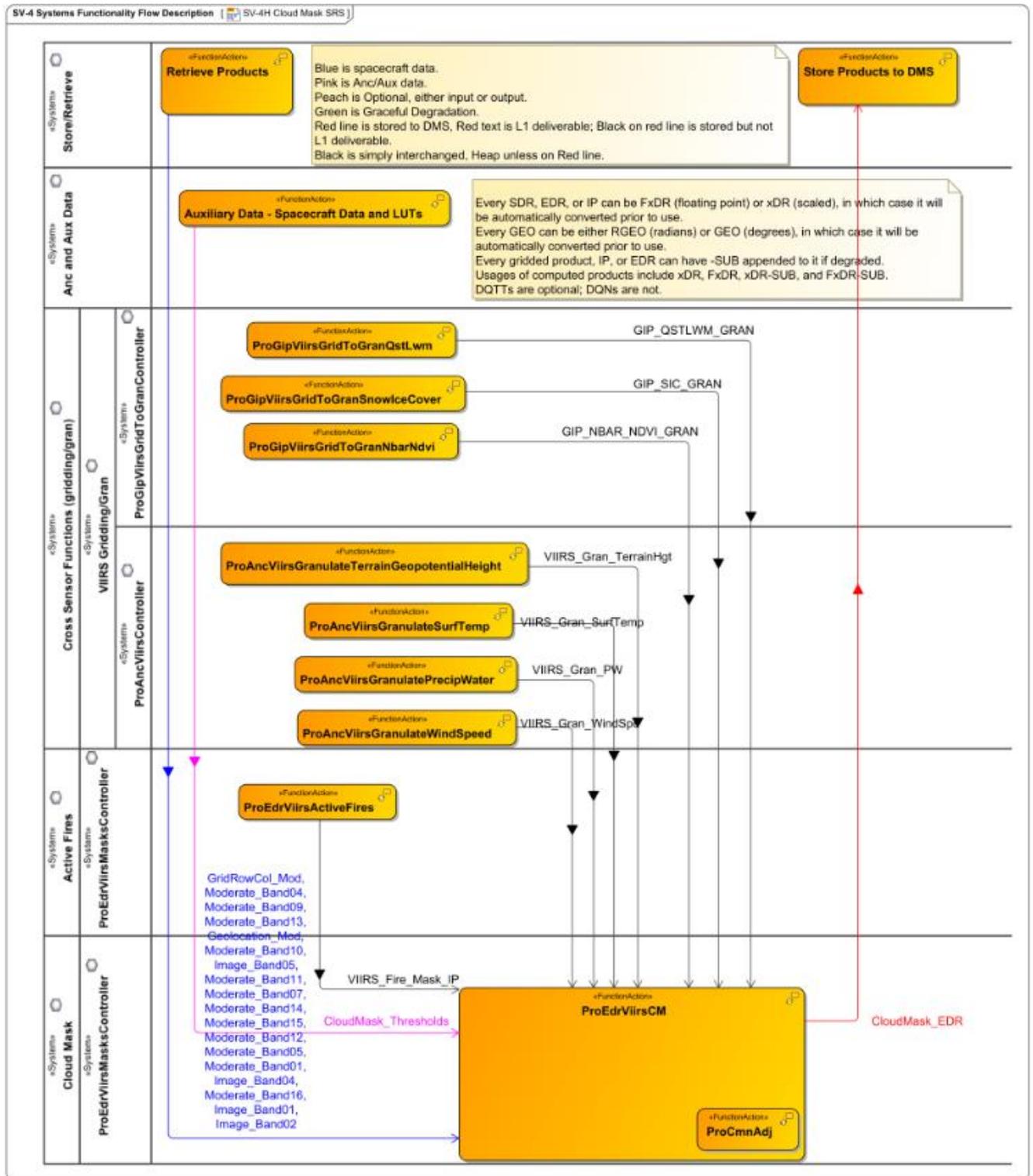


Figure: 3-1 Cloud Mask Data Flows

**Table: 3-1 Systems Resource Flow Matrix: Cloud Mask**

	<b>Data Product Name</b>	<b>Collection Short Name</b>	<b>Mnemonic</b>	<b>Sending SRS</b>	<b>Receiving SRS</b>	<b>Sending Function</b>	<b>Receiving Function</b>
1	<ul style="list-style-type: none"> <li>•GridRowCol_Mod</li> <li>•Moderate_Band04</li> <li>•Moderate_Band09</li> <li>•Moderate_Band13</li> <li>•Geolocation_Mod</li> <li>•Moderate_Band10</li> <li>•Image_Band05</li> <li>•Moderate_Band11</li> <li>•Moderate_Band07</li> <li>•Moderate_Band14</li> <li>•Moderate_Band15</li> <li>•Moderate_Band12</li> <li>•Moderate_Band05</li> <li>•Moderate_Band01</li> <li>•Image_Band04</li> <li>•Moderate_Band16</li> <li>•Image_Band01</li> <li>•Image_Band02</li> </ul>	<ul style="list-style-type: none"> <li>•VIIRS-MOD-GRC</li> <li>•VIIRS-M4-SDR</li> <li>•VIIRS-M9-SDR</li> <li>•VIIRS-M13-SDR</li> <li>•VIIRS-MOD-RGEO</li> <li>•VIIRS-M10-SDR</li> <li>•VIIRS-I5-SDR</li> <li>•VIIRS-M11-SDR</li> <li>•VIIRS-M7-SDR</li> <li>•VIIRS-M14-SDR</li> <li>•VIIRS-M15-SDR</li> <li>•VIIRS-M12-SDR</li> <li>•VIIRS-M5-SDR</li> <li>•VIIRS-M1-SDR</li> <li>•VIIRS-I4-SDR</li> <li>•VIIRS-M16-SDR</li> <li>•VIIRS-I1-SDR</li> <li>•VIIRS-I2-SDR</li> </ul>	<ul style="list-style-type: none"> <li>•None</li> <li>•SDRE-VM04-C0030</li> <li>•SDRE-VM09-C0030</li> <li>•SDRE-VM13-C0030</li> <li>•None</li> <li>•SDRE-VM10-C0030</li> <li>•SDRE-VI05-C0030</li> <li>•SDRE-VM11-C0030</li> <li>•SDRE-VM07-C0030</li> <li>•SDRE-VM14-C0030</li> <li>•SDRE-VM15-C0030</li> <li>•SDRE-VM12-C0030</li> <li>•SDRE-VM05-C0030</li> <li>•SDRE-VM01-C0030</li> <li>•SDRE-VI04-C0030</li> <li>•SDRE-VM16-C0030</li> <li>•SDRE-VI01-C0030</li> <li>•SDRE-VI02-C0030</li> </ul>	Store/Retrieve (VIIRS SDR)	Cloud Mask	Retrieve Products	ProEdrViirsCM
2	•GIP_NBAR_NDVI_GRAN	•VIIRS-GridIP-VIIRS-Nbar-Ndvi-Mod-Gran	•None	Grid Gran	Cloud Mask	ProGipViirsGridToGranNbarNdvi	ProEdrViirsCM
3	•GIP_QSTLWM_GRAN	•VIIRS-GridIP-VIIRS-	•None	Grid Gran	Cloud Mask	ProGipViirsGrid	ProEdrViirsCM

	Data Product Name	Collection Short Name	Mnemonic	Sending SRS	Receiving SRS	Sending Function	Receiving Function
		Qst-Lwm-Mod-Gran				dToGranQstLwm	
4	•GIP_SIC_GRAN	•VIIRS-GridIP-VIIRS-Snow-Ice-Cover-Mod-Gran	•IMPI_VSIC_R0100	Grid Gran	Cloud Mask	ProGipViirsGridToGranSnowIceCover	ProEdrViirsCM
5	•VIIRS_Gran_PW	•VIIRS-ANC-Preci-Wtr-Mod-Gran	•None	Grid Gran	Cloud Mask	ProAncViirsGranulatePrecipWater	ProEdrViirsCM
6	•VIIRS_Gran_SurfTemp	•VIIRS-ANC-Temp-Surf2M-Mod-Gran	•None	Grid Gran	Cloud Mask	ProAncViirsGranulateSurfTemp	ProEdrViirsCM
7	•VIIRS_Gran_TerrainHgt	•VIIRS-ANC-Surf-Ht-Mod-Gran	•None	Grid Gran	Cloud Mask	ProAncViirsGranulateTerrainGeopotentialHeight	ProEdrViirsCM
8	•VIIRS_Gran_WindSpd	•VIIRS-ANC-Wind-Speed-Mod-Gran	•None	Grid Gran	Cloud Mask	ProAncViirsGranulateWindSpeed	ProEdrViirsCM
9	•CloudMask_Thresholds	•VIIRS-CM-EDR-AC	•DP_NU-LM2020-014	Anc and Aux Data	Cloud Mask	Auxiliary Data - Spacecraft Data and LUTs	ProEdrViirsCM
10	•VIIRS_Fire_Mask_IP	•VIIRS-AF-IP	•None for IP	Active Fires	Cloud Mask	ProEdrViirsActiveFires	ProEdrViirsCM
11	•CloudMask_EDR	•VIIRS-CM-EDR	•EDRE_CMIP_C0030	Cloud Mask	Ocean Color and Chlorophyll	ProEdrViirsCM	ProEdrViirsOCC
12	•CloudMask_EDR	•VIIRS-CM-EDR	•EDRE_CMIP_C0030	Cloud Mask	Sea Surface Temperature	ProEdrViirsCM	ProEdrViirsSst
13	•CloudMask_EDR	•VIIRS-CM-EDR	•EDRE_CMIP_C0030	Cloud Mask	Cryosphere	ProEdrViirsCM	ProEdrViirsIceSurfTemp
14	•CloudMask_EDR	•VIIRS-CM-EDR	•EDRE_CMIP_C0030	Cloud Mask	Cryosphere	ProEdrViirsCM	ProEdrViirsIceQual
15	•CloudMask_EDR	•VIIRS-CM-EDR	•EDRE_CMIP_C0030	Cloud Mask	Land Surface Temperature	ProEdrViirsCM	ProEdrViirsLst
16	•CloudMask_EDR	•VIIRS-CM-EDR	•EDRE_CMIP_C00	Cloud Mask	Surface Type	ProEdrViirsCM	ProEdrViirsSur

	<b>Data Product Name</b>	<b>Collection Short Name</b>	<b>Mnemonic</b>	<b>Sending SRS</b>	<b>Receiving SRS</b>	<b>Sending Function</b>	<b>Receiving Function</b>
			30				fType
17	•CloudMask_EDR	•VIIRS-CM-EDR	•EDRE_CMIP_C00 30	Cloud Mask	Snow Cover	ProEdrViirsCM	ProEdrViirsSnow
18	•CloudMask_EDR	•VIIRS-CM-EDR	•EDRE_CMIP_C00 30	Cloud Mask	Surface Reflectance	ProEdrViirsCM	ProEdrViirsSurfReflect
19	•CloudMask_EDR	•VIIRS-CM-EDR	•EDRE_CMIP_C00 30	Cloud Mask	Cloud Physical Properties	ProEdrViirsCM	ProEdrViirsPpc
20	•CloudMask_EDR	•VIIRS-CM-EDR	•EDRE_CMIP_C00 30	Cloud Mask	Cloud Physical Properties	ProEdrViirsCM	ProEdrViirsCtp
21	•CloudMask_EDR	•VIIRS-CM-EDR	•EDRE_CMIP_C00 30	Cloud Mask	Cloud Optical Properties	ProEdrViirsCM	ProEdrViirsCop
22	•CloudMask_EDR	•VIIRS-CM-EDR	•EDRE_CMIP_C00 30	Cloud Mask	Aerosol Products	ProEdrViirsCM	ProEdrViirsAerosol
23	•CloudMask_EDR	•VIIRS-CM-EDR	•EDRE_CMIP_C00 30	Cloud Mask	Surface Albedo	ProEdrViirsCM	ProEdrViirsNH F
24	•CloudMask_EDR	•VIIRS-CM-EDR	•EDRE_CMIP_C00 30	Cloud Mask	Store/Retrieve	ProEdrViirsCM	Store Products to DMS

### 3.3.2 Outputs

SRS.01.11\_341 The Cloud Mask EDR software shall generate the Cloud Mask EDR product in conformance with the XML format file in Attachment A.1 of the JPSS Algorithm Specification Vol II: Data Dictionary for the Cloud Mask (474-00448-02-11).

*Rationale:* The product profile must conform to the XML format file.

*Mission Effectivity:* S-NPP, JPSS-1, JPSS-2

SRS.01.11\_342 The Cloud Mask EDR software shall use the geolocation for the VIIRS M-band.

*Rationale:* The product must be associated with the VIIRS M-band geolocation to meet the geolocation accuracy requirement.

*Mission Effectivity:* S-NPP, JPSS-1, JPSS-2

### 3.4 Science Standards

Not applicable.

### 3.5 Metadata Output

Not applicable.

### 3.6 Quality Flag Content Requirements

SRS.01.11\_357 The Cloud Mask EDR software shall report for each <FlagScope> quality flags using <FlagLogic> as specified in the JPSS Algorithm Specification Vol IV: SRSPF for the Cloud Mask (474-00448-04-11)<CloudMask><EDR><QF>.

*Rationale:* Quality Flags must be generated based on the established flag conditions, logic, and format.

*Mission Effectivity:* S-NPP, JPSS-1, JPSS-2

### 3.7 Data Quality Notification Requirements

### 3.8 Adaptation

Not applicable.

### 3.9 Provenance Requirements

Not applicable.

### 3.10 Computer Software Requirements

Not applicable.

### **3.11 Software Quality Characteristics**

Not applicable.

### **3.12 Design and Implementation Constraints**

SRS.01.11\_335 The JPSS Common Ground System shall execute the cloud mask algorithms.

*Rationale:* The CGS must incorporate algorithm changes as provided by the algorithm vendor.

*Mission Effectivity:* S-NPP, JPSS-1, JPSS-2

### **3.13 Personnel Related Requirements**

Not applicable.

### **3.14 Training Requirements**

Not applicable.

### **3.15 Logistics Related requirements**

Not applicable.

### **3.16 Other Requirements**

Not applicable.

### **3.17 Packaging Requirements**

Not applicable.

### **3.18 Precedence and Criticality**

Not applicable.

**Appendix A. Requirements Attributes**

The Requirements Attributes Table lists each requirement with CM-controlled attributes including requirement type, mission effectivity, requirement allocation(s), block start and end, method(s) for verifying each requirement, etc.

Req ID	Requirement Text	Level 3 Type	Product Type	Mission Effectivity	Allocated To	Block Start	Block End	Block 2.0.0 VM	Block 2.1.0 VM
SRS.01.11_346	The Cloud Mask EDR software shall calculate the cloud confidence over ocean in daytime, with a probability of correct typing of greater than 94% (COT > 1.0).	P	EDR	JPSS-1 JPSS-2	algorithm provider	2.0.0	3.0.0	Test	NA
SRS.01.11_347	The Cloud Mask EDR software shall calculate the cloud confidence over land in daytime, with a probability of correct typing of greater than 90% (COT > 1.0).	P	EDR	JPSS-1 JPSS-2	algorithm provider	2.0.0	3.0.0	Test	NA
SRS.01.11_348	The Cloud Mask EDR software shall calculate the cloud confidence over ocean at night, with a probability of correct typing of greater than 85% (COT > 1.0).	P	EDR	JPSS-1 JPSS-2	algorithm provider	2.0.0	3.0.0	Test	NA
SRS.01.11_349	The Cloud Mask EDR software shall calculate the cloud confidence over land at night, with a probability of correct typing of greater than 88% (COT > 1.0).	P	EDR	JPSS-1 JPSS-2	algorithm provider	2.0.0	3.0.0	Test	NA
SRS.01.11_350	The Cloud Mask EDR software shall calculate the cloud confidence over ocean in daytime, outside of sun glint regions, with a cloud leakage rate of less than or equal to 1% (COT > 1.0).	P	EDR	JPSS-1 JPSS-2	algorithm provider	2.0.0	3.0.0	Test	NA
SRS.01.11_351	The Cloud Mask EDR software shall calculate the cloud confidence over land in daytime, with a cloud leakage rate of less than or equal to 3% (COT > 1.0).	P	EDR	JPSS-1 JPSS-2	algorithm provider	2.0.0	3.0.0	Test	NA
SRS.01.11_352	The Cloud Mask EDR software shall	P	EDR	JPSS-1	algorithm	2.0.0	3.0.0	Test	NA

Req ID	Requirement Text	Level 3 Type	Product Type	Mission Effectivity	Allocated To	Block Start	Block End	Block 2.0.0 VM	Block 2.1.0 VM
	calculate the cloud confidence over land and ocean at night, with a cloud leakage rate of less than or equal to 5% (COT > 1.0).			JPSS-2	provider				
SRS.01.11_353	The Cloud Mask EDR software shall calculate the cloud confidence over ocean in daytime, with a false alarm rate of 5% (COT > 1.0).	P	EDR	JPSS-1 JPSS-2	algorithm provider	2.0.0	3.0.0	Test	NA
SRS.01.11_354	The Cloud Mask EDR software shall calculate the cloud confidence over land in daytime with a false alarm rate of less than or equal to 7% (TOC NDVI <0.2 or TOC NDVI >0.4 and COT > 1.0).	P	EDR	JPSS-1 JPSS-2	algorithm provider	2.0.0	3.0.0	Test	NA
SRS.01.11_355	The Cloud Mask EDR software shall calculate the cloud confidence over land and ocean at night, with a false alarm rate of 8% and (COT > 1.0).	P	EDR	JPSS-1 JPSS-2	algorithm provider	2.0.0	3.0.0	Test	NA
SRS.01.11_356	The Cloud Mask EDR software shall calculate the cloud confidence over desert in daytime, with a false alarm rate of less than or equal to 7% (COT > 1.0).	P	EDR	JPSS-1 JPSS-2	algorithm provider	2.0.0	3.0.0	Test	NA
SRS.01.11_358	The Cloud Mask EDR software shall use NCEP Sea Surface Winds, Atmospheric Moisture Profile, and/or Surface Temperature [750m Granulation] extended forecast data for fallback processing when the relevant NCEP current forecast input is not available.	G	EDR	S-NPP JPSS-1 JPSS-2	CGS	2.0.0	3.0.0	Inspection	NA
SRS.01.11_336	The Cloud Mask EDR software shall incorporate a computing algorithm provided for cloud confidence.	Ap	EDR	S-NPP JPSS-1 JPSS-2	algorithm provider	2.0.0	3.0.0	Inspection	NA
SRS.01.11_337	The Cloud Mask EDR software shall	Ap	EDR	S-NPP	algorithm	2.0.0	3.0.0	Inspection	NA

Req ID	Requirement Text	Level 3 Type	Product Type	Mission Effectivity	Allocated To	Block Start	Block End	Block 2.0.0 VM	Block 2.1.0 VM
	incorporate a computing algorithm provided for cloud phase.			JPSS-1 JPSS-2	provider				
SRS.01.11_338	The Cloud Mask EDR software shall incorporate a computing algorithm provided to separate heavy aerosols from clouds.	Ap	EDR	S-NPP JPSS-1 JPSS-2	algorithm provider	2.0.0	3.0.0	Inspection	NA
SRS.01.11_339	The Cloud Mask EDR software shall incorporate a computing algorithm provided for identification of cloud shadows.	Ap	EDR	S-NPP JPSS-1 JPSS-2	algorithm provider	2.0.0	3.0.0	Inspection	NA
SRS.01.11_343	The Cloud Mask EDR software shall incorporate inputs per Table 3-1.	I	EDR	S-NPP JPSS-1 JPSS-2	CGS	2.0.0	3.0.0	Inspection	NA
SRS.01.11_362	The Cloud Mask EDR software shall ingest tables and coefficients formatted in accordance with Section 7 of the JPSS Algorithm Specification Vol II: Data Dictionary for Cloud Mask (474-00448-02-11).	Ft	EDR	S-NPP JPSS-1 JPSS-2	CGS	2.0.0	3.0.0	Inspection	NA
SRS.01.11_341	The Cloud Mask EDR software shall generate the Cloud Mask EDR product in conformance with the XML format file in Attachment A.1 of the JPSS Algorithm Specification Vol II: Data Dictionary for the Cloud Mask (474-00448-02-11).	F	EDR	S-NPP JPSS-1 JPSS-2	CGS	2.0.0	3.0.0	Inspection	NA
SRS.01.11_342	The Cloud Mask EDR software shall use the geolocation for the VIIRS M-band.	Fg	EDR	S-NPP JPSS-1 JPSS-2	CGS	2.0.0	3.0.0	Inspection	NA
SRS.01.11_357	The Cloud Mask EDR software shall report for each <FlagScope> quality flags using <FlagLogic> as specified in the JPSS Algorithm Specification Vol IV:	Q	EDR	S-NPP JPSS-1 JPSS-2	CGS	2.0.0	3.0.0	Inspection	NA

Req ID	Requirement Text	Level 3 Type	Product Type	Mission Effectivity	Allocated To	Block Start	Block End	Block 2.0.0 VM	Block 2.1.0 VM
	SRSPF for the Cloud Mask (474-00448-04-11)<CloudMask><EDR><QF>.								
SRS.01.11_335	The JPSS Common Ground System shall execute the cloud mask algorithms.	Ai	EDR	S-NPP JPSS-1 JPSS-2	CGS	2.0.0	3.0.0	Inspection	NA