VIIRS-L1 Science Processing Algorithm (VIIRS-L1_SPA) User's Guide

Version 3.1.0

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GODDARD SPACE FLIGHT CENTER
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VIIRS-L1 Science Processing Algorithm
VIIRS-L1_SPA

General

The NASA Goddard Space Flight Center's (GSFC) Direct Readout Laboratory (DRL), Code 619.0, developed this software for the International Planetary Observation Processing Package (IPOPP). IPOPP maximizes the utility of Earth science data for making real-time decisions by giving fast access to instrument data and derivative products from the NOAA-20 [Joint Polar Satellite System [JPSS]), Suomi National Polar-orbiting Partnership (SNPP), Aqua, and Terra missions.

Users must agree to all terms and conditions in the Software Usage Agreement on the DRL Web Portal before downloading this software.

Software and documentation published on the DRL Web Portal may occasionally be updated or modified. The most current versions of DRL software are available at the DRL Web Portal:

https://directreadout.sci.gsfc.nasa.gov/?id=software

Questions relating to the contents or status of this software and its documentation should be addressed to the DRL via the Contact DRL mechanism at the DRL Web Portal:

https://directreadout.sci.gsfc.nasa.gov/?id=dspContent&cid=66

Algorithm Wrapper Concept

The DRL has developed an algorithm wrapper to provide a common command and execution interface to encapsulate multi-discipline, multi-mission science processing algorithms. The wrapper also provides a structured, standardized technique for packaging new or updated algorithms with minimal effort.

A Science Processing Algorithm (SPA) is defined as a wrapper and its contained algorithm. SPAs will function within IPOPP to serve the needs of the broad Direct Readout community. Detailed information about SPAs and other DRL technologies is available at the DRL Web Portal.

Software Description

This software package includes the VIIRS-L1 algorithm. The VIIRS-L1 algorithm processes SNPP and NOAA-20 (JPSS-1) Spacecraft packet files for APID 0, 8, and 11 along with Visible Infrared Imaging Radiometer Suite (VIIRS) Science Production Data Set (PDS) files to produce NASA-format Level 1A and 1B NetCDF products. The SPA functions as an IPOPP plug-in.

Software Version

Version 1.9 of the DRL algorithm wrapper was used to package the SPA described in this document. The VIIRS-L1 algorithm has been ported from the VIIRS-L1 Version 3.1.0. Note that the VIIRS L1 algorithm continues to evolve under the auspices of the multi-discipline VIIRS L1 Team.

Enhancements to this SPA include:

- update to version 3.1.0 of the VIIRS L1 algorithm;

- updated NetCDF Look-up Tables (LUTs) to version 3.1;

- updated test data, test scripts, and template files.

This software will execute on a 64-bit computer. This software has been tested on a computer with 32GB of RAM and a CentOS Linux 7 X86_64 operating system.

Credits

The VIIRS-L1 algorithm was provided to the DRL by the multi-discipline VIIRS L1 Team.

Prerequisites

To run this package, you must have the Java Development Kit (JDK) or Java Runtime Engine (JRE) (Java 1.6.0_25 or higher) installed on your computer, and have the Java installation bin/ subdirectory in your PATH environment variable. This package contains 64-bit binaries statically pre-compiled on an x86-compatible 64-bit computer running under CentOS 7, using gcc 7.3.1.

Program Inputs and Outputs

The VIIRS-L1 algorithm takes VIIRS Science PDS files, Spacecraft packet files for APIDs 0, 8, and 11, and required ancillaries as input and outputs the NASA-format VIIRS Level 1A, Level 1B [for Day/Night Band (DNB), I, and M-bands], Geolocation (for DNB, I, and M-bands), Dual-Gain Intermediate Level 1B, and Onboard Calibrator Data in NetCDF format.

The following table describes the SPA outputs.

Description	Output Format Description
VIIRS Level-1A NetCDF	Please refer to the "VIIRS Level-1 Data Product Users Guide" document in the algorithm/docs/ directory within the VIIRS-L1_SPA package.
VIIRS DNB Geolocation NetCDF	
VIIRS I-Band Geolocation NetCDF	
VIIRS M-Band Geolocation NetCDF	
VIIRS Dual-Gain Intermediate Level-1B NetCDF	
VIIRS DNB Level-1B NetCDF	
VIIRS I-Band Level-1B NetCDF	
VIIRS M-Band Level-1B NetCDF	
VIIRS Onboard Calibrator NetCDF	

Installation and Configuration

NOTE: Due to limited resources, as well as the many variables that impact scientific integrity and algorithm stability, the DRL will soon no longer support the Standalone Mode for SPA processing. We strongly encourage you now to run SPAs in IPOPP Mode exclusively, that is, from within the IPOPP processing framework. IPOPP will autonomously:

- discover and register raw sensor data;
- retrieve ancillaries from the DRL's real-time and archived ancillary repositories;
- register ancillaries in its Ancillary File Cache;
- schedule SPA executions;
- fulfill science data/ancillary requests from SPAs;
- generate science data products; and
- manage the IPOPP file system.

Installing into an IPOPP Framework: This SPA must be installed dynamically into an IPOPP framework to automate production of VIIRS Level 1A, 1B, Geolocation, and Onboard Calibrator data products. The SPA installation process will install its SPA service(s) into IPOPP. An SPA service is an IPOPP agent that provides the mechanism necessary for running an SPA automatically within the IPOPP framework.

Download the VIIRS-L1_3.1.0_SPA_1.9.tar.gz and follow the instructions as contained in the IPOPP User's Guide (available on the DRL Web Portal) for installing an SPA.

Running the SPA in the IPOPP Framework: Once this SPA is installed, users must enable the SPA service(s) corresponding to this SPA along with any other prerequisite SPA service(s). Furthermore, users who wish to generate image products from the data products generated by this SPA will need to enable the downstream image-generating SPA services. Please refer to the IPOPP User's Guide for instructions on how to enable the SPA services. Table 1 lists the SPA services available in this SPA. Table 2 and Table 3 lists the prerequisite and the image generating SPA services respectively. The SPAs containing the prerequisite and the image-generating SPA services listed in Tables 2 and 3 can be downloaded from the DRL Web Portal, in case they are not already available in your IPOPP installation. Details about these other SPAs are available in the respective SPA User's Guide.

Table 1. SPA Services

SPA services for this SPA	Data Products produced	
VIIRS-L1	**Product Name**	**Destination (when installed in IPOPP)**
	VIIRS Level-1A, 1B, Geolocation, and Onboard Calibrator Data	$HOME/drl/data/pub/gsfcdata/*spacecraft*/viirs/level1/V*yyyydddhhmmss*.CDG_*pfn*.nc
		$HOME/drl/data/pub/gsfcdata/*spacecraft*/viirs/level1/V*yyyydddhhmmss*.GEO-D_*pfn*.nc
		$HOME/drl/data/pub/gsfcdata/*spacecraft*/viirs/level1/V*yyyydddhhmmss*.GEO-I_*pfn*.nc
		$HOME/drl/data/pub/gsfcdata/*spacecraft*/viirs/level1/V*yyyydddhhmmss*.GEO-M_*pfn*.nc
		$HOME/drl/data/pub/gsfcdata/*spacecraft*/viirs/level1/V*yyyydddhhmmss*.L1A_*pfn*.nc
		$HOME/drl/data/pub/gsfcdata/*spacecraft*/viirs/level1/V*yyyydddhhmmss*.L1B-D_*pfn*.nc
		$HOME/drl/data/pub/gsfcdata/*spacecraft*/viirs/level1/V*yyyydddhhmmss*.L1B-I_*pfn*.nc
		$HOME/drl/data/pub/gsfcdata/*spacecraft*/viirs/level1/V*yyyydddhhmmss*.L1B-M_*pfn*.nc
		$HOME/drl/data/pub/gsfcdata/*spacecraft*/viirs/level1/V*yyyydddhhmmss*.OBC_*pfn*.nc
		$HOME/drl/data/pub/gsfcdata/*spacecr*

		aft/viirs/level1/V*yyyydddhhmmss*.CDG_*pfn*.nc

[1] Where *spacecraft* represents the spacecraft name ('npp' or 'jpss1') and *pfn* represents the spacecraft's full uppercase name ('SNPP' or 'JPSS-1'). The *yyyy*, *ddd*, represents the year and day of year for the start of the swath; the *hh*, *mm*, *ss* represents the hour, minutes, and seconds for the start of the swath.

Table 2. Prerequisite SPA services

Prerequisite SPA services	SPA in which they are available
N/A	N/A

Table 3. Image-generating SPA services

Image-generating SPA services	SPA in which they are available
N/A	N/A