

# International Polar Orbiter Processing Package (IPOPP) User's Guide

Version 2.5

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GODDARD SPACE FLIGHT CENTER  
GREENBELT, MARYLAND

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## 1. General

The International Polar Orbiter Processing Package (IPOP) processes science data and derivative products from the Suomi National Polar-orbiting Partnership (SNPP), Aqua, and Terra missions and, in the future, the Joint Polar Satellite System (JPSS) mission. IPOP was initially designed for real-time science data processing but has evolved into a more general data processing package equally suited for both real-time and non-real-time science data processing. IPOP's real-time data processing capability maximizes the utility of Earth science data for real-time applications and decision-making.

Please direct any comments or questions regarding this software to the Direct Readout Laboratory (DRL) via the "Contact DRL" mechanism at the DRL Web Portal:

<http://directreadout.sci.gsfc.nasa.gov/?id=dspContent&cid=66>

## 2. Purpose

This document provides instructions for installing and operating the IPOP software. IPOP can ingest SNPP Raw Data Record (RDR) and Terra/Aqua Production Data Set (PDS) files. It automates multi-level processing of the ingested RDR/PDS files and produces SNPP Sensor Data Records (SDRs), SNPP Environmental Data Records (EDRs), and Terra/Aqua Level-1 and Level-2 products. For a list of science algorithms and associated products included in this package, refer to Appendix C, "Science Processing Algorithms and Products."

IPOP can process both real-time sensor data (e.g., direct broadcast downlink), and non-real time sensor data (e.g., downloaded from global archives). A Front End System (FES) set up to receive raw sensor data from a direct broadcast downlink can serve as a real-time source of SNPP RDR files and/or Terra/Aqua PDS files. The FES is not part of this distribution; however, FES software technologies (e.g., RT-STPS and Simulcast), along with IPOP and Science Processing Algorithms (SPAs), are available at the DRL Web Portal for use by the commercial sector. IPOP architecture is depicted in Figure 1.

## 3. Software Version

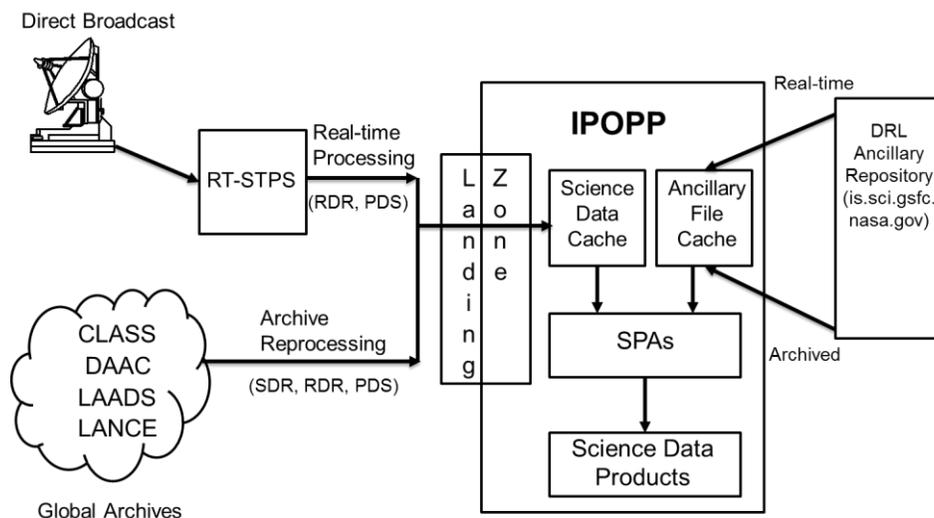
IPOP Version 2.5 was developed by the Direct Readout Laboratory (DRL), NASA Goddard Space Flight Center. This version includes the following enhancements:

- Java and MySQL are now bundled with IPOP to reduce external dependencies and permit installation without root access (the baseline code was also extended to accommodate both MySQL 5.6 and MariaDB 10.x).
- Extensive script-based command line tools for IPOP monitoring and control (beyond the Status/Event Logging System [SLS] Console):
  - Improved human readable log files that can be easily searched and filtered using standard Unix tools;
  - Remote monitoring capability that allows monitoring multiple instances of IPOP concurrently;
  - Measure elapsed execution time for one or more Science Processing Algorithms (SPA).
- Extended the input data and ancillary ingest module Landing Zone (legacy interface remains) that performs pre-ingest validations of sensor data in order to better synchronize science and ancillary data at execution time (extremely useful for reprocessing scenarios).
- Enhanced reprocessing capability featuring automatic identification, downloading and registration of Archived Ancillary sets for archive reprocessing.

- Improved performance of ingest services and file management services when processing large numbers of products concurrently.
- IPOPP Dashboard support for configuring various projections.
- IPOPP Dashboard support for configuring algorithms that are based on sinusoidal tile structure (e.g., aggregated output).
- Improved the Pass Manager and IPOPP Dashboard to enhance user experience (based on user feedback).
- Updated the Java Service Wrapper (Version 3.5.24) for control and synchronization of all IPOPP system services, improved SPA execution, and clean user-invoked SPA terminations.
- Restructured IPOPP User's Guide (8 pages, plus reference material) based on user feedback.

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#### 4. IPOPP Overview



**Figure 1. IPOPP Overview**

IPOPP is an autonomous multi-mission, multi-sensor data processing framework. The framework provides an environment for running plug-and-play Science Processing Algorithms (SPAs). The user only needs to configure IPOPP and place data in the Landing Zone.

IPOPP supports:

- real-time processing to meet user operational science data requirements;
- archive reprocessing for algorithm evaluation (e.g., multiple versions of an algorithm running in a single processing environment to eliminate ambiguity of measurement).

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.

## 5. IPOPP Installation

### Step 1: Download the IPOPP software package

- Users must be registered with the DRL to download IPOPP. New users must complete the "MyDRL Registration Form" at <https://directreadout.sci.gsfc.nasa.gov/dspRegister.cfm?id=registration> to request an account.
- Go to: <http://directreadout.sci.gsfc.nasa.gov/?id=software> and select "IPOPP" from the list of available packages. Enter your registered email address and password and follow the specific download and installation instructions, provided on the Web Portal, to download IPOPP.

### Step 2: Uninstall existing IPOPP installation, if any

Any previous IPOPP installation will be in the home directory of the IPOPP user account (e.g., /home/ipopp). Instructions to uninstall the existing IPOPP installation are as follows:

- Determine which version of IPOPP you have installed.

Run this command:

```
$ grep IPOPP_VERSION $HOME/drl/site.properties
```

The output should look like this:

```
IPOPP_VERSION = 2.3
```

- Close any open IPOPP Graphical User Interface (GUI) tools (e.g., the IPOPP Dashboard).
- If your IPOPP version is before 2.5, run the uninstall script in \$HOME/IPOPP:

```
$ cd $HOME
```

```
$ ./IPOPP/uninstall_ipopp.sh
```

- Otherwise, run the uninstall script in \$HOME/drl/tools:

```
$ cd $HOME
```

```
$ ./drl/tools/uninstall_ipopp.sh
```

Confirm your intent to uninstall by typing 'YES' at the prompt.

**NOTE: IPOPP uninstallation will delete all IPOPP-related directories including all data products. Copy data products that you wish to retain to another location before you uninstall IPOPP.**

Wait for the message "IPOPP X.Y uninstallation complete" to ensure that uninstallation is complete, where "X.Y" refers to the version number of your existing IPOPP installation.

### Step 3: Install IPOPP

The following steps must be completed by the IPOPP user account. The instructions contained in this User's Guide assume that \$HOME is the home directory of the IPOPP user account (e.g., /home/ipopp).

**NOTE:** IPOPP v2.5 may be installed to use /raid for storage, as in previous versions of IPOPP. Refer to Appendix J, "IPOPP Command Line Operation," prior to executing instruction (g).

- Log in as the IPOPP user.
- `rm -r $HOME/IPOPP` [delete the \$HOME/IPOPP directory, if it exists]
- `tar -C $HOME -xzf DRL-IPOPP_2.5.tar.gz` [Untar tar file obtained in Step 1 into \$HOME]

Execution takes several minutes and creates \$HOME/IPOPP.

- d) `rm DRL-IPOPP_2.5.tar.gz` [Optionally delete the source tar file]
- e) `chmod -R 755 $HOME/IPOPP` [Change \$HOME/IPOPP permission]
- f) `cd $HOME/IPOPP` [Change directory]
- g) `./install_ipopp.sh` [Install IPOPP from \$HOME/IPOPP]

Installation takes several minutes. Wait for the message "IPOPP installation complete" to ensure that installation is complete.

- h) `Log out and log back in` [Ensure environment is correct]

The IPOPP installer modifies the IPOPP user account environment, changing its PATH and LD\_LIBRARY\_PATH. Logging out and back in ensures those changes are available.

You are now ready to start IPOPP processing. Refer to Section 6, "IPOPP Operation."

## 6. IPOPP Operation

### NOTES:

1. All IPOPP operations must be performed by the IPOPP user account.
2. For legacy users, the system API has not changed. However, please note that for default installations the location used for ingest has changed from previous versions of IPOPP (for more information regarding the directory structure, refer to Appendix K, "IPOPP Directory Structure"). We recommend using the IPOPP Dashboard and the ingest procedure (Landing Zone) described below in Step 3. The Landing Zone is located at \$HOME/drl/data/dsm/ingest. Once RDR files and/or PDS file pairs are placed into \$HOME/drl/data/dsm/ingest, run the ingest\_ipopp.sh script to ingest them into IPOPP for processing and automatically ensure that all ancillary data files required to process the sensor data are resident in IPOPP. You may wish to automate the ingest\_ipopp.sh script for your real-time processing needs.
3. IPOPP is configured via the IPOPP Dashboard in Configuration Editor Mode. IPOPP operation may be controlled via the Dashboard in Process Monitor Mode, or via the command line. Users wishing to control operation from the command line should refer to Appendix J, "IPOPP Command Line Operation."

### Step 1. Configure IPOPP

- a) `$HOME/drl/tools/dashboard.sh &` [Open IPOPP Dashboard]

The IPOPP Dashboard is the user interface for IPOPP operations. The Dashboard has two modes: Configuration Editor Mode (see Figure 1a) and Process Monitor Mode (see Figure 1b). The Dashboard opens in the Process Monitor Mode when first invoked. IPOPP configuration is allowed only in the Configuration Editor Mode. Detailed descriptions of all IPOPP Dashboard components are contained in Appendix B, "IPOPP Dashboard."

[Click "Mode > IPOPP Configuration Editor"](#) [Switch to Configuration Editor Mode]

Confirm the stopping of all SPA services on the dialog box that appears. SPA services will be stopped to enter Configuration Editor Mode. Each square box on the Dashboard (see Figure 1a) represents an SPA service. The flow lines represent the hierarchical relationships among the SPA services. An SPA service is an IPOPP processing agent responsible for generating a subset of the output products available from the SPA as a whole. An SPA may thus have multiple services. Each SPA service on the Dashboard is labeled; the label includes the SPA name to associate the service to its source SPA. Information on data products available from each SPA service is available by clicking on the Product Information button labeled "i" on the SPA Service.



- b) [Select projection for IPOPP imagery](#) [Configure H2G\_SPA]

H2G\_SPA is configured for geographic projection by default. Click "Actions>Configure Projection" to switch between stereographic and geographic projections.

- c) [Enable/Disable SPA Services](#) [Edit IPOPP Configuration]

Each SPA on the Dashboard acts as a toggle button to allow users to enable or disable it. As you mouse over each SPA Service, the immediate upstream and downstream SPA services are highlighted. Note that the immediate upstream SPA services may depend on their own upstream SPA services, which in turn can have their own prerequisites. In order to correctly enable an SPA service you will need to follow the dependencies all the way up the processing chain and enable all predecessor SPA services. Refer to Appendix C, "Science Processing Algorithms and Products," for a list of the SPAs included in this software package and their associated products. Refer to Appendix E, "Installing/Updating/Configuring SPAs" for instructions to install, update or configure new SPAs.

**NOTES:**

1. VIIRS\_C-SDR and VIIRS-SDR are mutually exclusive and therefore should not be enabled simultaneously.
2. Be mindful of the number of enabled SPA services, as this impacts system load.

**Step 2: Start IPOPP Services**

- a) [Click "Mode> IPOPP Process Monitor"](#) [Switch to Process Monitor Mode]

Click 'Yes' to save the Configuration just edited, and press 'OK' on the "IPOPP configuration saved" prompt. The display will be synchronized before entering the Process Monitor Mode. IPOPP utilities including the one that starts IPOPP services are only available in the Process Monitor Mode. At this point all SPA services (including the ones that were enabled in Step 1) should report their status as "OFF".

- b) [Click "Actions> Start Services"](#) [Start IPOPP Services]

Confirm starting of IPOPP services. A progress bar dialog box shows progress until all services are started. All SPA services enabled in Step 1 should now appear as "ON" on the Dashboard Window. IPOPP Services include SPA services, Ancillary Retrieval and Registration Services, Ingest Services, File Management Services, Logging Services, and Database Maintenance Services.

**Step 3: Ingest Data**

- a) [Click "Actions>Check IPOPP Services"](#) [Ensure all IPOPP services are running]

Ensure that IPOPP Services are available when the Dashboard is in Process Monitor mode. A dialog box will report IPOPP status. If some services are reported as not running, use the Actions>Start Services option to start all services. If the utility reports an error, refer to Appendix B, "IPOPP Dashboard," for more details.

- b) [Place all RDR/PDS files into the Landing Zone at \\$HOME/drl/data/dsm/ingest](#) [Prepare for ingest]

**IMPORTANT:**

1. Please wait until the transfer of files into \$HOME/drl/data/dsm/ingest is complete before proceeding to the next step.
2. SNPP RDR files and Terra/Aqua PDS (packet file and CSR) file pairs must have mission-compliant file names (as shown in Tables 2a and 2b) in order to be registered correctly and processed by IPOPP. The CRECBuilder package can be used to rename nonconforming Aqua/Terra packet files and generate CSRs from packet files where CSRs are unavailable. The CRECBuilder software package is available at: <http://directreadout.sci.gsfc.nasa.gov/?id=software>

**Table 2a: SNPP RDR Files and Naming Conventions Required for IPOPP Ingest**

Sensor	RDR Files Required for IPOPP Ingest	Required Naming Convention
VIIRS	VIIRS RDR	RNSCA- RVIRS_npp_dYYYYMMdd_thhmmssS_ehhmmssS_bnnnnn_cnnnnn nnnnnnnnnnnnnnn aaa aaa.h5
ATMS	ATMS RDR	RATMS-RNSCA_npp_ dYYYYMMdd_thhmmssS_ehhmmssS_bnnnnn_cnnnnnnnnnnnnnnn nnnnn aaa aaa.h5
CrIS	CRIS RDR	RCRIS-RNSCA_npp_ dYYYYMMdd_thhmmssS_ehhmmssS_bnnnnn_cnnnnnnnnnnnnnnn nnnnn aaa aaa.h5
OMPS	OMPS ROTCS and RONPS RDRs	RNSCA-ROTCS_npp_ dYYYYMMdd_thhmmssS_ehhmmssS_bnnnnn_cnnnnnnnnnnnnnnn nnnnn_aaaa_aaa.h5 RNSCA-RONPS_npp_ dYYYYMMdd_thhmmssS_ehhmmssS_bnnnnn_cnnnnnnnnnnnnnnn nnnnn_aaaa_aaa.h5

**NOTE:** 'YYYYMMdd' represents the date of the start of the swath (YYYY: 4 digit year; MM: month; dd: day of month). The first and the second 'hhmmssS' represent the start and end of swath, respectively (hh: hour; mm: minutes; ss: seconds; S: 10<sup>th</sup> of a second). The n's represent numbers, and the a's represent alphabetic characters including '-'.

**Table 2b: Terra/Aqua PDS File Pairs and Naming Conventions Required for IPOPP Ingest**

Sensor	PDS File Pairs Required for IPOPP Ingest	Required Naming Convention
Terra MODIS	Terra MODIS packet file Terra MODIS CSR file	P0420064AAAAAAAAAAAAAAAAyyDDDhhmmss001.PDS P0420064AAAAAAAAAAAAAAAAyyDDDhhmmss000.PDS
Aqua MODIS	GBAD Packet file GBAD CSR file Aqua MODIS Packet file Aqua MODIS CSR file	P1540957AAAAAAAAAAAAAAAAyyDDDhhmmss001.PDS P1540957AAAAAAAAAAAAAAAAyyDDDhhmmss000.PDS P1540064AAAAAAAAAAAAAAAAyyDDDhhmmss001.PDS P1540064AAAAAAAAAAAAAAAAyyDDDhhmmss000.PDS

**NOTES:**

1. 'yyDDDhhmmss' represents the date/time of the start of the swath (yy: 2-digit year; DDD: Julian day; hh: hour; mm: minutes; ss: seconds).
2. SNPP RDR and Terra/Aqua PDS test data are available at the following locations:  
 VIIRS: <ftp://is.sci.gsfc.nasa.gov/gsfcddata/npp/viirs/level0/>  
 ATMS: <ftp://is.sci.gsfc.nasa.gov/gsfcddata/npp/atms/level0/>  
 CrIS: <ftp://is.sci.gsfc.nasa.gov/gsfcddata/npp/cris/level0/>  
 OMPS: <ftp://is.sci.gsfc.nasa.gov/gsfcddata/npp/omps/level0/>

Terra MODIS: <ftp://is.sci.gsfc.nasa.gov/gsfcddata/terra/modis/level0/>  
Aqua MODIS: <ftp://is.sci.gsfc.nasa.gov/gsfcddata/aqua/modis/level0/>  
Aqua GBAD: <ftp://is.sci.gsfc.nasa.gov/gsfcddata/aqua/gbad/>

c) `$HOME/drl/tools/ingest_ipopp.sh`

[Ingest data]

The `ingest_ipopp.sh` tool ingests sensor data files into IPOPP for processing and ensures that all ancillary data files required to process the sensor data are resident in IPOPP. You may wish to automate the `ingest_ipopp.sh` script for your real-time processing needs.

**NOTE:** Users who must run IPOPP without an Internet connection, refer to Appendix I, "Running IPOPP without an Internet Connection."

#### Step 4: Autonomous IPOPP Processing

As long as IPOPP services are running, IPOPP will autonomously discover ingested raw sensor data, retrieve current ancillaries from external ancillary repositories, register data/ancillaries in its database, manage resource requests from running SPAs, schedule SPA executions, produce and register outputs, and manage the IPOPP file system.

Users can monitor IPOPP activity with the Dashboard in Process Monitor Mode to confirm that enabled SPA services are processing, as well as to view the elapsed time since processing started for each service. Detailed monitoring of IPOPP processing is available via targeted queries to the System Event/Logging System (SLS) database. Refer to Appendix F, "IPOPP Monitoring."

**NOTE:** IPOPP autonomously manages its file system. User deletion of files from the IPOPP file system is not necessary or recommended. In the event that files are deleted from the file system, synchronize the database to the file system:

```
$HOME/drl/tools/sync_ipopp.sh
```

before continuing processing.

**NOTE:** In the event of unexpected behavior, refer to Appendix H, "Diagnosing and Recovering from IPOPP Operational Errors," and Appendix F, "IPOPP Monitoring."

#### Step 5: Stop IPOPP Services

As long as you are ingesting and processing data, there is no need to stop IPOPP services. However, IPOPP services can be stopped from the IPOPP Dashboard in its Process Monitor Mode:

Click "[Actions>Stop Services](#)"

[Stop IPOPP Services]

Confirm stopping of IPOPP services. A progress bar dialog box shows progress until all services are stopped. Return to Step 1 to restart IPOPP processing.

**NOTE:** Use "Action>Check IPOPP Services" to determine if services are running (services will be stopped if restoring system health; installing/updating/configuring an SPA; resetting IPOPP; and enabling/disabling an SPA).

## 7. Archive Reprocessing

Archive reprocessing is for algorithm evaluation (e.g., multiple versions of an algorithm running in a single processing environment to eliminate ambiguity of measurement). Archive Reprocessing allows users to download non-real time sensor data from global archives (such as CLASS, DAAC, LAADs, etc.) and ingest them into IPOPP for processing. The difference between real-time processing and archive reprocessing is transparent to the user from an IPOPP operation perspective. IPOPP's ingest system will automatically identify reprocessing sensor data and retrieve the required ancillaries from the DRL's Archived Ancillary repository. Please follow the steps described in Section 6, "IPOPP Operation."

## **Appendix A System Requirements**

### **Hardware**

IPOPP has been tested on computers with the following configuration:

Processors:	Dual 8-core AMD Opteron 6320 processors
RAM:	64 GB DDR3 buffered ECC
Operating System Disk:	SATA III RAID-1 (2 TB)
Data Disk:	SATA III RAID-10 (4 TB), mounted at /raid
Motherboard:	ASUS KGPE-D16 dual socket G34

It is possible that there may be performance benefits by using separate physical disks and raid controllers for the operating system and the data storage at /raid. Be mindful of the number of enabled SPA services, as this impacts system load. SNPP processing is CPU-intensive; processors with higher clock speeds will produce output proportionally faster.

### **Operating Systems**

IPOPP has been tested under these operating systems:

- a) Fedora 20 X86\_64 (with kernel 3.11.10);
- b) CentOS Linux 7 X86\_64;
- c) Open SUSE Linux 13.2 X86\_64; and
- d) Kubuntu 14.04 X86\_64.

### **System Time**

Some IPOPP ancillary file retrievals and product generations are time-dependent; the system must use 24-hour UTC time and be synchronized through a Network Time Protocol (NTP) Server.

### **Required Software**

The following software must be installed:

- a) libXp 1.0 or later;
- b) bash 4.1.2 or later;
- c) tcsh 6.17 or later;
- d) bc 1.06 or later;
- e) ed 1.1 or later;
- f) full 32-bit support;
- g) ftp utility;
- h) wget;
- i) gawk.

## Network Firewall Configuration and Port Access

These TCP ports should be open:

- a) Ports 20 and 21 for FTP;
- b) Port 3306 for MySQL;
- c) Ports 3500 through 3550 for SLS;
- d) Ports 4900 through 4950 for IPOPP Data Storage Manager (DSM); and
- e) Ports 49152 through 65535 for passive mode FTP.

## Known Issues and Resolutions

- a) GUI tools on OpenSUSE: On systems using older versions of OpenSUSE, GUI tools such as the Dashboard or Pass Manager may not work when you ssh into the system hosting IPOPP. This can be fixed by setting:

```
X11UseLocalhost no
```

in the configuration file `/etc/ssh/sshd_config` on the system hosting IPOPP. Setting `X11UseLocalhost` to "no" is a workaround for older OpenSUSE platforms where the `DISPLAY` environment variable may not be correctly set. On other platforms the `DISPLAY` environment variable is expected to be set regardless of the value of `X11UseLocalhost`.

- b) System Process Settings: In rare cases, processes may fail to start if the restriction on the number of processes allowed per user is set very low. This problem has been reported on Fedora and CentOS platforms. To avoid this issue on Fedora and CentOS platforms, this number can be increased by editing the `/etc/security/limits.d/90-nproc.conf` file and adding the following tab-separated text:

```
# Default limit for number of user's processes to prevent # accidental fork bombs.  
  
*      soft      nproc      65535
```

**NOTE:** These procedures must be performed as the root user.

## **Appendix B IPOPP Dashboard**

Purpose: The IPOPP Dashboard has two modes: Configuration Editor Mode and Process Monitor Mode. In Configuration Editor Mode, the Dashboard allows you to enable or disable SPAs that are already installed. In Process Monitor Mode, the Dashboard allows you to perform IPOPP operations (Start/Stop/Check/Reset), as well as Monitor the ON/OFF/Processing status of SPAs.

Invoking the Dashboard and Its Modes: The IPOPP Dashboard is invoked with the following command:

```
$HOME/drl/tools/dashboard.sh &
```

This command opens up the IPOPP Dashboard in Process Monitor Mode. The Process Monitor functionality and IPOPP utilities are available only in this mode. Enabling and disabling of SPAs and selection of projection (for H2G\_SPA) and compositing tiles (for BURNSCAR\_SPA and VIIRS-BURNSCAR\_SPA) can be done by switching to the Configuration Editor Mode. Switching between modes is available via the "Mode" Menu Item on the Dashboard Window.

Detailed Description: Please refer to Figures B-1a and B-1b depicting the IPOPP Dashboard in Configuration Editor Mode and Process Monitor Mode, respectively. Table B-1 contains descriptions of the GUI components of the Dashboard. Use the diagram indices to map the corresponding GUI component to its location in the figures.

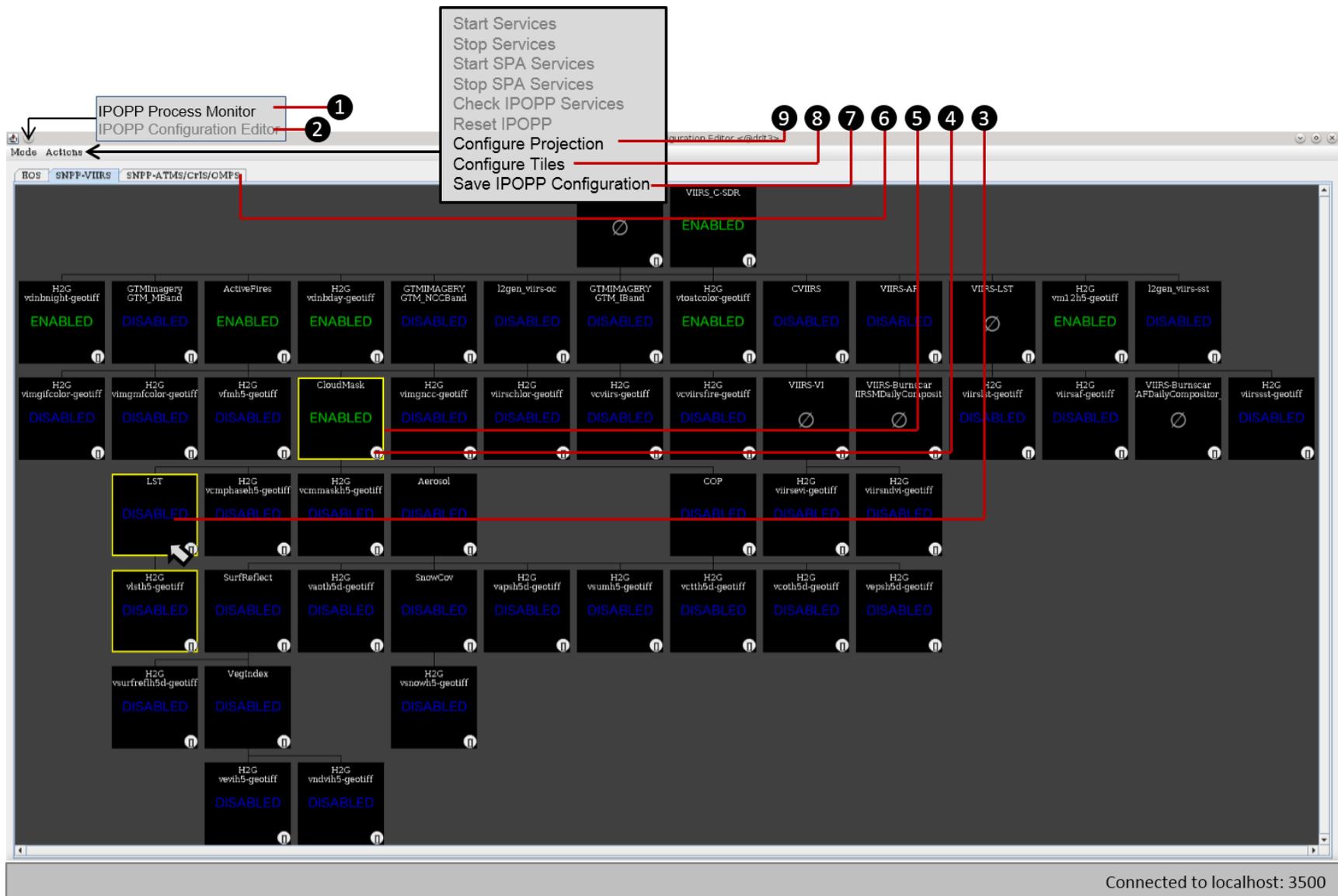


Figure B-1a. IPOPP Dashboard: Configuration Editor Mode

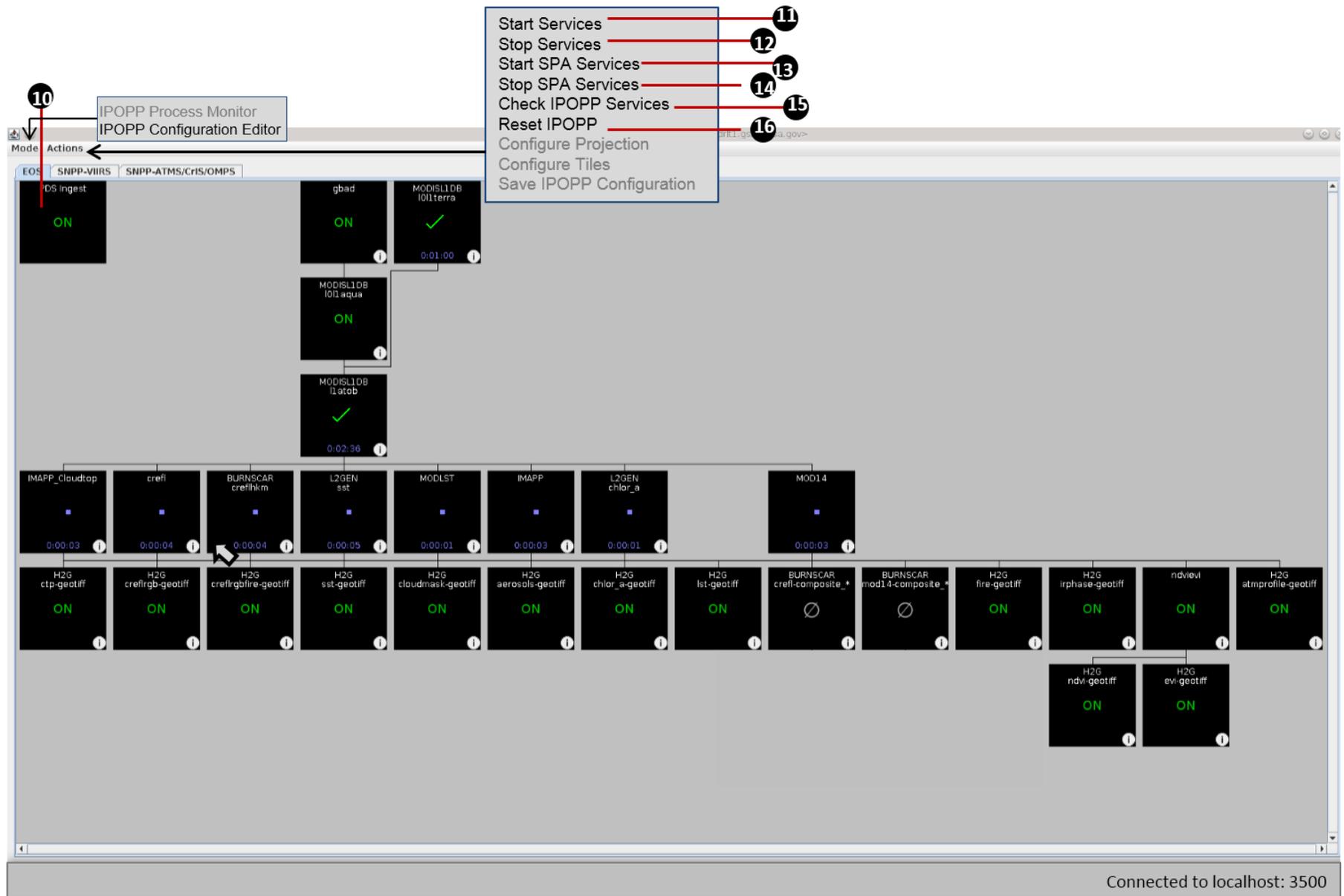


Figure B-1b. IPOPP Dashboard: Process Monitor Mode

**Table B-1: IPOPP Dashboard Description**

Diagram Index	GUI Component	Description																						
1	Mode> IPOPP Process Monitor	Switch to the Process Monitor Mode.																						
2	Mode> IPOPP Configuration Editor	Switch to the Configuration Editor Mode.																						
3	SPA Service	<p>In the Configuration Editor Mode this unit acts as a toggle button to allow users to enable or disable the SPA service. In this mode the state can be one of the following:</p> <table border="1"> <tr> <td data-bbox="581 541 748 590"></td> <td data-bbox="776 541 1425 590">The SPA service is enabled.</td> </tr> <tr> <td data-bbox="581 604 748 653"></td> <td data-bbox="776 604 1425 653">The SPA service is disabled.</td> </tr> <tr> <td data-bbox="581 667 748 716"></td> <td data-bbox="776 667 1425 779">The SPA service is not installed. You may download SPAs from the DRL Web Portal and install them as described in Appendix E, "Installing/Updating/Configuring SPAs."</td> </tr> </table> <p>Please note that an SPA service must be enabled to be started by 'Action&gt;Start Services' or 'Action&gt;Start SPA Services'. Starting of IPOPP Services (including SPA Services) has to be done as a separate step after returning to the Process Monitor Mode.</p> <p>In the Process Monitor Mode this unit reports the ON/OFF/Processing status of the SPA service. In this mode the state can be one of the following:</p> <table border="1"> <tr> <td data-bbox="581 1045 748 1094"></td> <td data-bbox="776 1045 1425 1094">The SPA service is running.</td> </tr> <tr> <td data-bbox="581 1108 748 1157"></td> <td data-bbox="776 1108 1425 1188">The SPA service is not running either because the SPA service is disabled or because IPOPP SPA services are not running.</td> </tr> <tr> <td data-bbox="581 1213 748 1262"></td> <td data-bbox="776 1213 1425 1262">The SPA service failed to start.</td> </tr> <tr> <td data-bbox="581 1283 748 1331"></td> <td data-bbox="776 1283 1425 1394">The SPA service is not installed. You may download SPAs from the DRL Web Portal and install them as described in Appendix E, "Installing/Updating/Configuring SPAs."</td> </tr> <tr> <td data-bbox="581 1423 748 1472"></td> <td data-bbox="776 1423 1425 1472">The SPA service is ingesting data. Processing is about to start.</td> </tr> <tr> <td data-bbox="581 1507 748 1598"></td> <td data-bbox="776 1507 1425 1556">The SPA service is processing. The timer below shows the time elapsed since processing started.</td> </tr> <tr> <td data-bbox="581 1619 748 1709"></td> <td data-bbox="776 1619 1425 1667">The SPA service successfully processed. The timer below shows the time it took to complete processing.</td> </tr> <tr> <td data-bbox="581 1717 748 1808"></td> <td data-bbox="776 1717 1425 1906">The SPA service generated a warning during processing but was otherwise successful. Some warnings are harmless. For example some algorithms are Daytime algorithms and generate warnings when enough daytime scans are not available. Additional information about the warning can be obtained from the SLS database. Refer to Appendix F., "IPOPP</td> </tr> </table>		The SPA service is enabled.		The SPA service is disabled.		The SPA service is not installed. You may download SPAs from the DRL Web Portal and install them as described in Appendix E, "Installing/Updating/Configuring SPAs."		The SPA service is running.		The SPA service is not running either because the SPA service is disabled or because IPOPP SPA services are not running.		The SPA service failed to start.		The SPA service is not installed. You may download SPAs from the DRL Web Portal and install them as described in Appendix E, "Installing/Updating/Configuring SPAs."		The SPA service is ingesting data. Processing is about to start.		The SPA service is processing. The timer below shows the time elapsed since processing started.		The SPA service successfully processed. The timer below shows the time it took to complete processing.		The SPA service generated a warning during processing but was otherwise successful. Some warnings are harmless. For example some algorithms are Daytime algorithms and generate warnings when enough daytime scans are not available. Additional information about the warning can be obtained from the SLS database. Refer to Appendix F., "IPOPP
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	The SPA service is running.																							
	The SPA service is not running either because the SPA service is disabled or because IPOPP SPA services are not running.																							
	The SPA service failed to start.																							
	The SPA service is not installed. You may download SPAs from the DRL Web Portal and install them as described in Appendix E, "Installing/Updating/Configuring SPAs."																							
	The SPA service is ingesting data. Processing is about to start.																							
	The SPA service is processing. The timer below shows the time elapsed since processing started.																							
	The SPA service successfully processed. The timer below shows the time it took to complete processing.																							
	The SPA service generated a warning during processing but was otherwise successful. Some warnings are harmless. For example some algorithms are Daytime algorithms and generate warnings when enough daytime scans are not available. Additional information about the warning can be obtained from the SLS database. Refer to Appendix F., "IPOPP																							

		 <p>Monitoring." The timer below shows the time it took to complete processing.</p> <p>The SPA service encountered an error during processing (refer to Appendix H). The timer below shows how long it ran before it failed.</p>
4	<b>Product Information Button</b>	Clicking on this button will open up a dialog box identifying the data products generated by the SPA service.
5	<b>SPA Relationship Highlight</b>	<u>Only available in Configuration Editor Mode.</u> Moving your mouse over an SPA Service highlights the SPA service's immediate upstream and downstream SPA services. Note that the immediate upstream SPA services may depend on their own upstream SPA services, which in turn can have their own prerequisites. In order to correctly enable a SPA service you must follow the dependencies all the way up the processing chain and enable all predecessor SPA services.
6	<b>Mission/Sensor Tabs</b>	SPA services are distributed in three tabs: (i) the "EOS" tab shows SPA services that process data from Terra/Aqua MODIS; (ii) the "SNPP-VIIRS" tab shows SPA services that process SNPP VIIRS data; and (iii) the "SNPP-ATMS/CrIS/OMPS" tab shows SPA services that process SNPP ATMS, CrIS and OMPS data.
7	<b>Action&gt;Save IPOPP Configuration</b>	<u>Only available in Configuration Editor Mode.</u> Allows you to save the current Configuration.
8	<b>Action&gt;Configure Tiles</b>	<u>Only available in Configuration Editor Mode.</u> Clicking on this button will open up a dialog box that allows you to select tiles (up to a maximum of 10) and configure IPOPP's BURNSCAR SPAs (if installed). See BURNSCAR SPA User's Guides for more details.
9	<b>Action&gt;Configure Projection</b>	<u>Only available in Configuration Editor Mode.</u> Clicking on this button will open up a dialog box that allows you to select either 'Geographic' or 'Stereographic' projection from a drop-down menu and configure IPOPP's H2G_SPA accordingly. See H2G_SPA User's Guide for more details.
10	<b>Ingest Display Unit</b>	<u>Only available in Process Monitor Mode.</u> This unit reports the ON/OFF status of the IPOPP Ingest Services. On the EOS tab it reports the status of the PDS Ingest Services, while on the SNPP tabs it reports the status of the xDR Ingest Services.
11	<b>Action&gt;Start Services<sup>1</sup></b>	<u>Only available in Process Monitor Mode.</u> Clicking on this will start all IPOPP Services.
12	<b>Action&gt;Stop Services<sup>2</sup></b>	<u>Only available in Process Monitor Mode.</u> Clicking on this will stop all IPOPP Services.
13	<b>Action&gt;Start SPA Services<sup>1</sup></b>	<u>Only available in Process Monitor Mode.</u> Clicking on this will start IPOPP's SPA Services. Caution: Starting SPA Services will not start other IPOPP services that are required for IPOPP processing. Use this option when you are sure that other IPOPP Services are already running. If in doubt, use the "Action>Start Services" option.

14	<b>Action&gt;Stop SPA Services<sup>2</sup></b>	<u>Only available in Process Monitor Mode.</u> Clicking on this will stop IPOPP's SPA Services.
15	<b>Action&gt;Check IPOPP Services<sup>1</sup></b>	<u>Only available in Process Monitor Mode.</u> This will check the status of all IPOPP services and determine System Health. It will list the services that are not running. If System Errors are detected, it will provide an option for users to restore IPOPP health. In that case, click 'OK' to restore System Health. This should resolve the detected system errors and stop services. Users will be provided an option to start services once the process is complete.
16	<b>Action&gt;Reset IPOPP</b>	<u>Only available in Process Monitor Mode.</u> Clicking on this will reset IPOPP. An IPOPP reset can be used to recover from unexpected IPOPP errors. A reset will stop the IPOPP Services, clear product registration from the IPOPP database and remove ancillary and data product files.  <b>NOTE:</b> IPOPP reset deletes all data products. Copy data products that you wish to retain to another location before you reset IPOPP.

<sup>1</sup>**NOTE:** Log files created by any failing SPA in its corresponding run directory are cleared by "Actions>Start Services", "Actions>Start SPA Services", or when restoring system health from "Actions> Check IPOPP Services". Refer to Appendix H, "Diagnosing and Recovering from IPOPP Operational Errors."

<sup>2</sup>**NOTE:** Choose a time of data processing inactivity to stop IPOPP services or stop SPA services.

## Appendix C

### Science Processing Algorithms and Products

Table C-1 lists Science Processing Algorithms (SPAs) included in this package, along with the data products they produce. More detailed descriptions of SPAs are contained in the respective SPA User's Guides available with the SPA packages.

**Table C-1: SPAs and Output Products**

SNPP SPAs	Version Included	Output Products
C-SDR	2.2	VIIRS Imagery resolution SDRs VIIRS Moderate resolution SDRs VIIRS Day/Night Band (DNB) SDR VIIRS On Board Calibrator Intermediate Product (IP) VIIRS Calibrated Dual Gain IP VIIRS Geolocation products ATMS SDR ATMS Temperature Data Record (TDR) ATMS Geolocation products CrIS SDR and Geolocation products
CVIIRS	1.1	VIIRS Imagery and Moderate Resolution Corrected Reflectance Level2 Products
ActiveFires	1.5.08.04	VIIRS Active Fires Application Related Product (ARP) (with Fire Mask)
GTMIMAGERY	1.5.08.04	VIIRS I-Band Ground Track Mercator (GTM) Imagery EDR VIIRS M-Band GTM Imagery EDR VIIRS Near Constant Contrast (NCC) Albedo GTM Imagery EDR
CloudMask	1.5.08.04	VIIRS Cloud Mask IP
LST	1.5.08.04	VIIRS Land Surface Temperature EDR
Aerosol	1.5.08.04	VIIRS Aerosol Optical Thickness (AOT) IP VIIRS Aerosol Model Index (AMI) IP VIIRS Aerosol Environmental Data Record (EDR) VIIRS Suspended Matter (SM) EDR VIIRS Aerosol Geolocation
SurfReflect	1.5.08.04	VIIRS Land Surface Reflectance IP
VegIndex	1.5.08.04	VIIRS Vegetation Index EDR
COP	1.5.08.04	VIIRS Cloud Optical Properties IP VIIRS Ice & Night Water Cloud Top Temperature IP
SnowCov	1.5.08.04	VIIRS Snow Binary Map EDR VIIRS Snow Fraction EDR
VIIRS-AF (NASA Algorithm)	1.3.6	VIIRS Active Fire Level 2 VIIRS Fire Location Text File
OMPSnadir	1.0.1	OMPS Total Column Level 1A EV (TCL1AEV) OMPS Total Column SDR EV(TCSDREV) OMPS Total Column Total Ozone (TCTO3) OMPS Total Column Total SO <sub>2</sub> NRT (TCTSO2NRT) OMPS Nadir Profile Level 1A EV (NPL1AEV) OMPS Nadir Profile SDR EV (NPSDREV) OMPS Nadir Profile SDR Deluxe (NPSDRDELUXE) OMPS Nadir Profile Ozone (NPO3) PNG image for Ozone PNG image for Reflectivity at 331nm PNG image for Ultraviolet Aerosol

<b>MODIS SPAs</b>	<b>Version Included</b>	<b>Output Products</b>
GBAD	2.7	Aqua GBAD Ephemeris and Attitude files
MODISL1DB	1.8	MODIS Level 1A (MOD01/MYD01) and Geolocation (MOD03/MYD03) MODIS Level 1B 1 km (MOD021KM/MYD021KM), half km (MOD02HKM/MYD02QKM), and quarter km (MOD02QKM/MYD02QKM) products
IMAPP	3.1	MODIS Cloudmask Level 2(MOD35) MODIS Cloudtop Properties, Cloud Phase and Cloud Optical properties Level 2 (MOD06) MODIS Atmospheric Profiles Level 2(MOD07) MODIS Aerosol Level 2(MOD04) <b>NOTE:</b> The IPOPP package does not contain the optional IMAPP*_MOD06OD_COEFF.tar.gz coefficient files tar file. This file is available on the DRL Web Portal and may be optionally installed to enable the MODIS Cloud Optical Properties software module (MOD06OD). Additional instructions are available in the IMAPP_SPA User's Guide.
L2GEN	6.4.2	MODIS Ocean Color Level 2 (daytime product, includes Chlorophyll-a [CHLOR_A] concentration) MODIS Sea Surface Temperature (SST) Level 2
MOD14	6.2.1	MODIS Active Fire Level 2 MODIS Fire Location Text File
CREFL	1.7.1	MODIS Corrected Reflectance Level 2
NDVIEVI	2.2	MODIS Vegetation Indices (MOD13) Level 2
MODLST	4.14	MODIS Land Surface Temperature Level 2
<b>Other SPAs</b>	<b>Version Included</b>	<b>Output Products</b>
H2G	2.4	Geolocated GeoTIFF images, for various parameter datasets in SNPP SPA products and MODIS Level 2 SPA products. H2G also creates standard true color images for supported VIIRS and MODIS science products.

## Appendix D Location of Ancillaries and Data Products

Table D-1 contains the locations of the ancillaries and processed sensor data products.

**Table D-1. Locations of Ancillaries and Products**

Directory Location	Ancillaries/Products
\$HOME/drl/data/pub/ancillary	Subdirectories under this folder hold registered ancillaries required for real-time processing.
\$HOME/drl/data/pub/ArchivedAncillary	Subdirectories under this folder hold registered ancillaries required for non-real time processing.
\$HOME/drl/data/pub/gsfcddata/terra/modis/level{0,1,2}	Terra MODIS Level 0, Level 1 and Level 2 products
\$HOME/drl/data/pub/gsfcddata/aqua/modis/level{0,1,2}	Aqua MODIS Level 0, Level 1 and Level 2 products
\$HOME/drl/data/pub/gsfcddata/combined/modis/level3	Aqua/Terra Composite Daily products (produced only when MODIS BurnScar SPA is installed)
\$HOME/drl/data/pub/gsfcddata/aqua/gbad/	Aqua GBAD Level 0, ephemeris and attitude files
\$HOME/drl/data/pub/gsfcddata/npp/viirs/level{0,1,2}	SNPP VIIRS RDRs, SDRs and EDRs
\$HOME/drl/data/pub/gsfcddata/npp/atms/level{0,1}	SNPP ATMS RDRs, SDRs
\$HOME/drl/data/pub/gsfcddata/npp/cris/level{0,1}	SNPP CrIS RDRs, SDRs
\$HOME/drl/data/pub/gsfcddata/npp/omps/level{0,1,2}	SNPP OMPS RDRs, Level I and Level 2 products

## Appendix E Installing/Updating/Configuring SPAs

Science Processing Algorithms (SPAs) are remote sensing science algorithms packaged with the DRL's algorithm wrapping technique. This algorithm wrapper provides a common command and execution interface to encapsulate multi-discipline, multi-mission science processing algorithms. Once packaged as an SPA, a science algorithm can be plugged into IPOPP for automatic processing.

This version of IPOPP already contains the most current SNPP SPAs and Terra/Aqua MODIS SPAs available at the time of release. For the list of SPAs included in this package refer to Appendix C, "Science Processing Algorithms and Products." New or updated SPAs will be made available via the DRL Web Portal. Go to <http://directreadout.sci.gsfc.nasa.gov/?id=software> for the most current list of SPAs and products supported by IPOPP. Follow the instructions below for installing new or updated SPAs into an existing IPOPP.

**NOTE:** To pre-configure the H2G\_SPA and BURNSCAR SPAs without reinstallation, use the IPOPP Dashboard (refer to Table B-1, "IPOPP Dashboard Description"). For other SPAs that need some pre-configuration, please refer to the corresponding SPA User's Guide.

1. [Download algorithm\\_versionno\\_SPA\\_wrapperversionno.tar.gz into \\$HOME/drl](#)  
Go to <http://directreadout.sci.gsfc.nasa.gov/?id=software> and select the SPA to be installed by clicking on the hyperlink. Follow the prompts and download the compressed archive file to the \$HOME/drl/ subdirectory. The SPA compressed archive file name will be of the form: *algorithm\_versionno\_SPA\_wrapperversionno.tar.gz* (e.g, C-SDR\_2.2\_SPA\_2.2.tar.gz).
2. Close any open GUI tools (e.g., the Dashboard).
3. `cd $HOME/drl` [Change Directory]
4. `$HOME/drl/tools/install_spa.sh algorithm_version_SPA_wrapperversion.tar.gz` [Install SPA]  
This will uninstall the current version of the SPA directory (if it exists), create a new *<spaname>* subdirectory in the \$HOME/drl/SPA directory, and install the new SPA into IPOPP.
5. `rm $HOME/drl/algorithm_version_SPA_wrapperversion.tar.gz` [Delete tarball]
6. [Pre-configure if needed](#) [Skip this step if SPA(s) do not require pre-configuration]  
Some SPAs require pre-configuration (e.g., H2G\_SPA, BURNSCAR SPAs, GTMImagery\_SPA). Refer to the corresponding SPA User's Guide for details on pre-configuration.
7. [Configure IPOPP and start IPOPP services](#) [Refer to Section 6, "IPOPP Operation"]  
The SPA is now ready to be enabled and run within IPOPP. The SPA installation process will have stopped all SPA services and the IPOPP Ingest Services. Use the IPOPP Dashboard to configure IPOPP and restart all services.

## Appendix F IPOPP Monitoring

IPOPP logs are contained in the System Event/Logging System (SLS) database. IPOPP provides scripts that may be used to interrogate the SLS database in order to monitor IPOPP processing and enable the user to:

- get logs for IPOPP as a whole in text form, so they can be searched and filtered with standard Unix tools;
- monitor IPOPP remotely;
- analyze logs for a given SPA service, to determine how long it takes to create products;
- run a script whenever products of a given type are created.

### Monitoring IPOPP Logs

The script `ns/s/bin/print-logs.sh` prints out log messages for all of IPOPP in a manner similar to the log messages found in the `station.stationlog` files. Each log message consists of one line of output, with fields separated by tab characters:

- Level - message severity (INFO, WARNING, ERROR);
- Date - date/time stamp, format is "Wed Dec 09 15:18:00 UTC 2015";
- Host - host name of log client;
- Source - program that posted the message;
- Description - text of log message.

Here is an example WARNING log message:

```
WARNING   Wed Dec 09 05:47:00 UTC 2015   is.sci.gsfc.nasa.gov   IS/retriever   FDF   SFTP
Aqua TLE Source available? TERRA/MOC/TER_TLE_20151209.txt
```

Here is an example ERROR message:

```
ERROR   Wed Jan 20 15:47:34 UTC 2016   drlt2   NCS/VFIRE375 geotiff/VFIRE375 geotiff group1
NCS Error Exception Command Error:
  name = Dsm_command (Element)
    attribute = blockflag   value = true
    attribute = class      value = DSM
    attribute = debug      value = {cfg_debug}
    attribute = log        value = true
    attribute = method     value = reserveProduct
    attribute = result     value = drl.npp.viirs.activefires375.hdf.OBJ
```

The `ns/s/bin/print-logs.sh` script searches the log output for lines that begin with "INFO", "WARNING", or "ERROR". The script will select and print the log events without extra debug output.

The `ns/s/bin/print-logs.sh` script takes the following arguments to filter the log output:

`-startdate yyyy-mm-ddThh:mm:ss`  
Defaults to now - 1 day. Note that the date/time is specified in ISO 8601 compatible format.

`-enddate yyyy-mm-ddThh:mm:ss`  
Defaults to now. Note that the date/time is specified in ISO 8601 compatible format.

-eventlevel [iwe]

Selects for INFO(i), WARNING(w), ERROR(e) messages. More than one event type can be selected; for example, specifying -eventlevel we prints WARNING and ERROR messages. Defaults to iwe, or print all log messages.

-host NSLS-HOST

Defaults to localhost, i.e., the current IPOPP installation. The -host argument can be used to access log messages on a remote IPOPP installation.

### Examples:

To print ERROR messages from the time period beginning 2016-02-02T21:45:00 and ending 2016-02-02T23:59:00:

```
$ $HOME/drl/nsIs/bin/print-logs.sh -startdate 2016-02-02T21:45:00 -enddate 2016-02-02T23:59:00 -eventlevel e
```

To print all the log messages from the last 24 hours for a given IPOPP installation:

```
$ $HOME/drl/nsIs/bin/print-logs.sh
```

To print only the WARNING and ERROR messages from the last 24 hours for a given IPOPP installation:

```
$ $HOME/drl/nsIs/bin/print-logs.sh -eventlevel we
```

To print only the ERROR messages from the last 4 days for a given IPOPP installation:

```
$ $HOME/drl/nsIs/bin/print-logs.sh -eventlevel e -startdate `date -d "now - 4 days" -lseconds`
```

As an example of using print-logs.sh to automatically monitor IPOPP, here is a script named print\_ipopp\_errors.sh that will print all IPOPP ERROR messages from the last 24 hours and email them to [ipopp.monitor@nasa.gov](mailto:ipopp.monitor@nasa.gov). (Note that your IPOPP host machine must be configured to send email.)

```
#!/bin/bash

# Print all the error messages from the last 24 hours
$HOME/drl/nsIs/bin/print-logs.sh -eventlevel e > /tmp/ipopp.errors

# Count the number of messages in the file
howmany=`egrep '^ERROR' /tmp/ipopp.errors | wc -l`

# Format the output a little bit and put it into a mail message
(echo -n $howmany "IPOPP errors for 24 hours ending "; date;
 echo;
 cat /tmp/ipopp.errors) \
 | mail -s "IPOPP error log summary" ipopp.monitor@nasa.gov
```

Store this script in a convenient place (for example, \$HOME/drl), make it executable, and replace ipopp.monitor@nasa.gov with your email address. You can then create a cron job to run it once a day (look at the crontab(1) manual entry for details), and your chosen email address will receive a message

every day summarizing any errors detected by the IPOPP system. The body of the email message will look like this:

6 IPOPP errors for 24 hours ending Wed Jan 20 15:57:40 UTC 2016

```
ERROR Wed Jan 20 15:47:34 UTC 2016 drlt2 NCS/VFIRE375 geotiff/VFIRE375 geotiff group1
NCS Error Exception Command Error:
  name = Dsm_command (Element)
    attribute = blockflag value = true
    attribute = class value = DSM
    attribute = debug value = {cfg_debug}
    attribute = log value = true
    attribute = method value = reserveProduct
    attribute = result value = drl.npp.viirs.activefires375.hdf.OBJ
```

## Common Monitoring Tasks

Four common monitoring tasks utilizing the script `nsls/bin/print-logs.sh` are described in this section. Refer to Appendix H, "Diagnosing and Recovering from IPOPP Operational Errors" for specific applications of these tasks when diagnosing and resolving issues encountered during IPOPP processing.

### Task 1: Check status of IPOPP ancillary retrieval system

To view any recent WARNING or ERROR messages from the IPOPP ancillary retrieval system:

```
$ $HOME/drl/nsls/bin/print-logs.sh -eventlevel we | grep IS/retriever
```

This command will print only the WARNING and ERROR log messages from the IPOPP ancillary retrieval system (known internally to the SLS database as "IS/retriever") for the last 24 hours. Some ancillary types are retrieved at weekly intervals, so to see warnings and errors related to all ancillaries it may be necessary to widen the `print-logs.sh` time window using a `-startdate `date -d "now - 7 days" -lseconds`` option, like this:

```
$ $HOME/drl/nsls/bin/print-logs.sh -eventlevel we -startdate `date -d "now - 7 days" -lseconds`
| grep IS/retriever
```

If there are no log messages, or the messages all look like transient network problems, then the ancillary retrieval system is running normally.

To examine any errors in more detail, pipe the log messages through the 'less' tool:

```
$ $HOME/drl/nsls/bin/print-logs.sh -eventlevel we | less
```

Search for the string "IS/retriever" with the '/' command to view details of any IPOPP ancillary retrieval system problems.

### Task 2: Check for SPA service warnings and errors, diagnose any found

To view any recent WARNING or ERROR messages from IPOPP SPA services:

```
$ $HOME/drl/nsls/bin/print-logs.sh -eventlevel we | grep NCS/
```

This command will print only the WARNING and ERROR log messages from IPOPP's SPA services (known internally to the SLS database as "NCS/<name-of-SPA-service>"). If there are no log messages, or the messages all look like transient conditions, IPOPP's SPAs are running normally.

To examine any errors in more detail, pipe the log messages through the 'less' tool:

```
$ $HOME/drl/nsis/bin/print-logs.sh -eventlevel we | less
```

Search for the string "NCS/" with the '/' command to see details of your IPOPP's SPA service warnings and errors. Table F-1 contains common warnings and errors.

**Table F-1. Common Warnings and Errors**

Level	"Text:" section of Diagnostic back trace text	Diagnosis
ERROR	"NCS Error Exception Command Error: ... attribute = methodvalue = getTimedAncillary attribute = resultvalue = <ancillary-type>"	Required ancillaries were missing during processing. The <ancillary-type> field will indicate the type of ancillary that is missing.
ERROR	"NCS Error Exception Command Error: name = RunAlgorithm (Element)"	The SPA service has failed while executing the algorithm. The point of failure can be obtained from the "Caused by: ...: RUN program failed with return code while executing: <command line>" line in the 'Throwable' section of the diagnostic back trace text.
ERROR	"Station ending on error maximum allowed failed jobs exceeded"	The SPA service has failed 5 times in a row and has been turned OFF automatically. This is a safeguard for user awareness. Previous ERROR messages from this SPA service will indicate the reason for the successive failures.
WARNING	"No ancillary for <ancillary-type> found: ...."	Optimal ancillaries were missing during processing. Processing has been done using alternative ancillaries.
WARNING	"Insufficient number of Day scans, processing will not continue on this granule"	This is a harmless warning and is intended to inform the users that a daytime product is not produced when an overpass does not have enough day scans.
WARNING	"The CrIS SDR will not process this CrIS RDR because it has less than 9 granules, or contains non-contiguous granules"	CrIS SDR does not process when there are not enough granules or the data is too noisy (i.e., missing granules).

### Task 3: Identify the overpass related to an SPA service warning or error

Use the procedure in Task 2 to get the log messages of interest. The second field of each log message contains the date and time when the error occurred. Make a note of this time stamp, then use `print-logs.sh` to view the log messages around that time (plus or minus 5 minutes is usually sufficient).

If, for example, you have an ERROR message with a time stamp of "Wed Jan 20 15:47:34 UTC 2016", this command will dump all the log messages near that time so you can search them with the 'less' command:

```
$ $HOME/drl/nsls/bin/print-logs.sh -startdate "2016-01-20T15:42:00" -enddate "2016-01-20T15:52:00" | less
```

Use the '/' command in 'less' to look for log messages from the SPA service in question; their Source fields will contain "NCS/" followed by the name of the SPA service.

Messages with text like "scan start time is <scan start date/time>" or "File name is <file-name-with-scan-start-time-stamp>" will provide the overpass start time.

### Task 4: Determine if the IPOPP system is missing required ancillaries

Use the procedure In Task 2 above to get log messages from SPA services, and see if any of them are caused by missing ancillary files. There will probably be other warning or error messages from the IPOPP ancillary retrieval system related to those ancillaries; use the procedure in Task 1 to view them.

## SPA Monitoring

In addition to storing log events in the SLS database, IPOPP SPA services store a text version of log events in a file in their station directory. Each SPA service is represented by a directory in `$HOME/drl/ncs/stations`; each of those directories contains a file named `station.stationlog` where log events are written as they occur, one line of text per event. Scripts that may be used to process and monitor these logs are contained in `$HOME/drl/tools`.

### SPAruntime.sh

This script processes a `station.stationlog` file, finds each execution of the SPA service, and prints how long the SPA service took to create each set of outputs. It takes one argument, the name of a `station.stationlog` file (the `I011aqua.station.stationlog` file is used in the example below). A typical run of `SPAruntime.sh` looks like this:

```
$ $HOME/drl/tools/SPAruntime.sh $HOME/drl/ncs/stations/I011aqua/station.stationlog
```

Outputs:

```
/home/ipopp/drl/data/pub/gsfcddata/aqua/modis/level1/MYD01.15287075951.hdf
```

```
/home/ipopp/drl/data/pub/gsfcddata/aqua/modis/level1/MYD03.15287075951.hdf
```

```
Elapsed time: 28 seconds
```

Outputs:

```
/home/ipopp/drl/data/pub/gsfcddata/aqua/modis/level1/MYD01.15287172626.hdf
```

```
/home/ipopp/drl/data/pub/gsfcddata/aqua/modis/level1/MYD03.15287172626.hdf
```

```
Elapsed time: 71 seconds
```

...

### SPArunonend.sh

This script can monitor an SPA service's `station.stationlog` file and run a command whenever the SPA service creates a new set of products. The script receives the list of output files created as arguments.

It takes one required argument, the name of a script to run (full path required), and one optional argument, the name of a station.stationlog file to monitor (it processes standard input if no argument is given, which is useful for testing).

Example: Do the following on an IPOPP system that has been run and created some products, but is not currently running. Create a simple command (a script named runme.sh) to run when an SPA service finishes processing:

```
$ echo echo SPA finished: outputs are '$*' > /tmp/runme.sh
$ cat /tmp/runme.sh
echo SPA finished: outputs are $*
$
```

Make the runme.sh script executable:

```
$ chmod a+x /tmp/runme.sh
```

Run SPArnonend.sh with the runme.sh script, feeding it a station.stationlog file. The example below uses the I011aqua station.stationlog file:

```
$ cd $HOME/drl/tools
$ ./SPArnonend.sh /tmp/runme.sh < $HOME/drl/ncs/stations/I011aqua/station.stationlog
```

If the I011aqua SPA service has created any outputs, the runme.sh script will print lines that look like this:

```
SPA finished: outputs are
/home/ipopp/drl/data/pub/gsfcddata/aqua/modis/level1/MYD01.15287075951.hdf
/home/ipopp/drl/data/pub/gsfcddata/aqua/modis/level1/MYD03.15287075951.hdf
:
SPA finished: outputs are
/home/ipopp/drl/data/pub/gsfcddata/aqua/modis/level1/MYD01.15287172626.hdf
/home/ipopp/drl/data/pub/gsfcddata/aqua/modis/level1/MYD03.15287172626.hdf
```

To make the SPArnonend.sh script monitor the SPA service and run when new outputs appear, run it in the background:

```
$ ./SPArnonend.sh /tmp/runme.sh $HOME/drl/ncs/stations/I011aqua/station.stationlog &
[1] 22437
$
```

The "[1] 22437" above are the job number and process ID of the SPArnonend.sh script; it is now watching the station.stationlog file from the background.

Start IPOPP services and ingest Aqua PDS file pairs for processing. As each set of Aqua data finishes Level 0 to Level 1 processing, the /tmp/runme.sh script will be executed and lines like these will be printed:

```
SPA finished: outputs are
/home/ipopp/drl/data/pub/gsfcddata/aqua/modis/level1/MYD01.15287075951.hdf
/home/ipopp/drl/data/pub/gsfcddata/aqua/modis/level1/MYD03.15287075951.hdf
```

To stop the monitoring, kill the background script using bash job control:

```
$ kill %1  
$  
[1]+ Terminated      ./SPArnonend.sh
```

## Appendix G Pass Manager

Purpose: The Pass Manager facilitates:

1. The reprocessing of SNPP RDR files and Terra/Aqua PDS (packet file and CSR) file pairs corresponding to a satellite overpass, resulting in the regeneration of all downstream science data products associated with the overpass. The Reprocess utility may be useful after the installation of a newer version of an SPA into IPOPP. When a newer version of an SPA is installed, it will start producing science products for all subsequent overpasses. You may use the Reprocess utility to reprocess older overpasses. Reprocessing may also be useful after a system error. The Pass Manager Table may be used to select and reprocess overpasses that were being processed at the time of the error. In this case reprocessing is recommended to ensure that all downstream data products are generated.
2. The deletion of all science data products (including the SNPP RDR file or Terra/Aqua PDS [packet file and CSR] file pairs) associated with a satellite overpass.

Invoking the Pass Manager: The Pass Manager Table can be launched using the command line:

```
$HOME/drl/dsm/gui-scripts/passmanager.sh &
```

Detailed Description: The Pass Manager Table is depicted in Figure G-1. Table G-1 describes its GUI components and how to use them to perform reprocessing and deletion. Use the diagram indices to map the corresponding GUI component to its location in Figure G-1.

View	ID	Spacecraft	AOS	LOS
View	103	TERRA	2012-06-30 15:03:26	2012-06-30 15:13:35
View	102	AQUA	2012-06-30 08:56:31	2012-06-30 08:58:07
View	101	NPP	2012-06-30 08:57:50	2012-06-30 09:02:26
View	100	NPP	2012-06-30 07:14:44	2012-06-30 07:26:41
View	99	AQUA	2012-06-30 05:45:49	2012-06-30 05:47:53
View	98	NPP	2012-06-30 05:35:37	2012-06-30 05:45:35
View	97	TERRA	2012-06-30 04:45:06	2012-06-30 04:49:19
View	96	TERRA	2012-06-30 03:02:59	2012-06-30 03:13:41
View	95	TERRA	2012-06-30 01:28:04	2012-06-30 01:34:11
View	94	AQUA	2012-06-29 19:18:37	2012-06-29 19:26:48
View	93	NPP	2012-06-29 18:57:20	2012-06-29 19:07:40
View	92	AQUA	2012-06-29 17:38:04	2012-06-29 17:49:42
View	91	NPP	2012-06-29 17:15:39	2012-06-29 17:27:28
View	90	TERRA	2012-06-29 15:57:49	2012-06-29 16:09:01
View	89	TERRA	2012-06-29 14:22:40	2012-06-29 14:27:56
View	88	AQUA	2012-06-29 08:11:46	2012-06-29 08:20:09
View	87	NPP	2012-06-29 07:33:41	2012-06-29 07:44:20
View	86	AQUA	2012-06-29 06:33:25	2012-06-29 06:45:10
View	85	NPP	2012-06-29 05:53:56	2012-06-29 06:05:14
View	84	TERRA	2012-06-29 03:58:39	2012-06-29 04:08:24
View	83	TERRA	2012-06-29 02:20:09	2012-06-29 02:30:49
View	82	NPP	2012-06-28 19:17:40	2012-06-28 19:25:53
View	81	AQUA	2012-06-28 18:32:43	2012-06-28 18:44:46
View	80	AQUA	2012-06-28 17:03:58	2012-06-28 17:06:07
View	79	NPP	2012-06-28 17:34:08	2012-06-28 17:46:32
View	78	TERRA	2012-06-28 16:53:28	2012-06-28 17:02:00
View	77	NPP	2012-06-28 15:59:11	2012-06-28 16:03:27
View	76	TERRA	2012-06-28 15:15:27	2012-06-28 15:26:09
View	75	AQUA	2012-06-28 07:28:15	2012-06-28 07:39:15

Figure G-1. Pass Manager Table

**Table G-1: Pass Manager Table Components**

Diagram Index	GUI Components	Description
1	<b>Pass Manager Display Window</b>	<p>Each row in the Pass Manager Table represents a satellite/sensor overpass that has been registered with the IPOPP database, and includes the following information associated with the overpass:</p> <ul style="list-style-type: none"> <li>a) Pass ID;</li> <li>b) Spacecraft;</li> <li>c) Acquisition of Signal (AOS) (start time of satellite overpass);</li> <li>d) Loss of Signal (LOS) (end time of satellite overpass).</li> </ul> <p>The table defaults to sorting by pass ID. Click on the column labels to sort the table by different values</p>
2	<b>View</b>	<p>The View button can be used to view details such as (start, stop and creation time) about products associated with an overpass.</p>
3	<b>Refresh</b>	<p>By clicking 'Refresh', the table will be updated to the most current state. The table does not update automatically.</p>
4	<b>Reprocess</b>	<p>Click on a single row or multiple rows (by holding down the CTRL key) to select a single overpass or multiple overpasses. Click on 'Reprocess', and a dialog box will ask for confirmation. Clicking 'Yes' on the confirmation dialog box will result in deletion of all science products associated with the selected overpass(es) (except the root SNPP sensor file(s) or the Terra/Aqua PDS file pair) and complete reprocessing of the overpass(es) (i.e., re-runs of relevant SPAs and regeneration of all science data products associated with the overpass).</p>
5	<b>Delete</b>	<p>Click on a single row or multiple rows (by holding down the CTRL key) to select a single overpass or multiple overpasses. Click on 'Delete', and a dialog box will ask for confirmation. Clicking 'Yes' on the confirmation dialog box will result in the unregistering and deletion of all science data products associated with the overpass(es), including the SNPP RDR files and Terra/Aqua PDS (packet file and CSR) file pairs. The delete operation may take some time. Wait for the message box to confirm that the delete was successful, then click on the 'Refresh' button to view the changes.</p> <p><b>NOTE:</b> Please use caution when using the Delete utility, as it is irreversible.</p>

## Appendix H

### Diagnosing and Recovering from IPOPP Operational Errors

The most common problems IPOPP users may encounter are described below, along with possible causes and resolution strategies. If you are experiencing a problem that is not described here, you may search the MyDRL Forum at: <http://directreadout.sci.gsfc.nasa.gov/?id=forum> for similar issues/resolutions reported by other users. If you are still unable to resolve your problem, please post a question to the MyDRL Forum or use "Contact DRL" to submit your question directly: <http://directreadout.sci.gsfc.nasa.gov/?id=dspContent&cid=66>

#### **Problem 1: An SPA service is failing (error messages returned by print-logs.sh, errors in Dashboard:Process Monitor):**

Are you running out of hard disk space? Remove unwanted files (tar files or other non-IPOPP files) from the drl/ folder and use the Pass Manager Table 'Delete' utility to reclaim space under \$HOME/drl/data.

Is your system running low on resources (e.g., low memory)? Try disabling some SPA services that are not needed (refer to Step 1 in Section 6, "IPOPP Operation"). Ensure that your system meets the recommended system requirements (refer to Appendix A, "System Requirements").

Are there clues in the FAIL directories? When a service fails, standard output (stdfile\*), standard error (errfile\*), and other log and intermediate files from the failed run are retained under drl/ncs/stations/<SPA service name>/FAIL\* directories. If the error is obvious and resolvable, correct the problem and use the Pass Manager Table 'Reprocess' utility to reprocess the overpass (refer to Appendix G, "Pass Manager").

Was the SNPP RDR file or Terra/Aqua PDS (packet file and CSR) file pair ingested correctly (i.e., is the RDR file or PDS file pair incomplete)? Delete the pass using the Pass Manager Table 'Delete' utility (refer to Appendix G, "Pass Manager") and follow the process documented in Step 3 in Section 6, "IPOPP Operation," to re-ingest the sensor data.

Does the error message indicate that the service is unable to obtain one or more ancillary files?

Are you trying to process a real-time swath but the ancillary retrieval service is not running? Check the status of IPOPP services using the "Check IPOPP Services" menu option on the IPOPP Dashboard and if 'Ancillary Retriever and Registration Services' is reported as 'OFF', start IPOPP services using the 'Actions>Start Services' menu item on the IPOPP Dashboard (refer to Appendix B, "IPOPP Dashboard").

None of the above seems to be the problem. It is possible that the IPOPP database has been corrupted and the existing ancillaries are not registered with the IPOPP database. Try resetting IPOPP using the "Actions>Reset IPOPP" menu option on the IPOPP Dashboard (refer to Appendix B, "IPOPP Dashboard").

Is your system able to run the core algorithm executables? An easy way to discover whether your system is able to run the core algorithm executables is to install the SPA testdata tar file and try to run the testscript (refer to the corresponding SPA User's Guide). If the testscript fails, your system may not meet the recommended system requirements (refer to Appendix A, "System Requirements" and the SPA User's Guide).

## **Problem 2: A product is not being produced.**

Is the corresponding SPA installed? Install the SPA (refer to Appendix G, "Installing/Updating/Configuring SPAs").

Is the SPA service enabled? Use IPOPP Dashboard in Configuration Editor Mode to verify that the service is enabled (refer to Appendix B, "IPOPP Dashboard").

Are prerequisite SPA services enabled? Use Dashboard in Configuration Editor Mode to verify that prerequisite SPA services are enabled (refer to Appendix B, "IPOPP Dashboard").

Is the SPA service ON? Use Dashboard in Process Monitor Mode to verify status (refer to Appendix B, "IPOPP Dashboard"). If the service is OFF, try starting the service using the "Start Services" menu option on the IPOPP Dashboard (refer to Appendix B, "IPOPP Dashboard").

Has the SPA service been automatically turned OFF? Services will be turned OFF automatically if they fail 5 times in a row. The auto OFF feature is a safeguard for user awareness. This can happen when:

- the services have encountered corrupt data; or
- the requisite ancillaries are not present.

If the errors are due to SPA execution failures, the cause may be corrupt data. Use the "Start Services" menu option on the IPOPP Dashboard to restart IPOPP services. If you want to reprocess the affected data, use the Pass Manager to reprocess the overpass data. Please refer to Appendix F, "Task 3: Identify the overpass related to an SPA service warning or error" to identify the overpasses for reprocessing. If you encounter the same problem again, delete the corresponding overpasses using the Pass Manager's Delete function. Refer to (Appendix G, "Pass Manager") for details. Re-ingest the source sensor files after confirming that they are not corrupt.

If the errors are due to missing ancillaries refer to Appendix F, "Task 1: Check status of IPOPP ancillary retrieval system" to determine if you are having a persistent network problem. Please consult with your system administrator to fix the problem and then use the "Start Services" menu option on the IPOPP Dashboard to restart IPOPP services. Once ancillary retrieval services are confirmed to be operating normally, you can use the Pass Manager to reprocess the affected overpass data. Please refer to Appendix F, "Task 3: Identify the overpass related to an SPA service warning or error" to identify the overpasses for reprocessing.

## **Problem 3: Actions performed from the IPOPP Dashboard take an unexpectedly long time or seem to wait indefinitely.**

Are you running out of resources? This rare event may occur if you are running all SPA services corresponding to both EOS and SNPP missions simultaneously, or your computer does not meet the recommended system requirements. Do the following:

```
Abort (Ctrl-C) any IPOPP scripts that you may have invoked on the command line.  
cd $HOME/drl [Change directory]  
$HOME/drl/tools/terminate_dashboard.sh [Execute the script]
```

This will terminate all IPOPP services along with the Dashboard and any actions issued by it.

At this point we recommend that you reduce the number of enabled SPAs, or increase system memory.

**Problem 4: An SPA service seems to be processing indefinitely (the timer on the SPA service on the IPOPP Dashboard reports an unreasonably long processing time).**

Are IPOPP services functioning properly? Stop IPOPP services using the "Stop Services" menu option on the IPOPP Dashboard. Next, restart IPOPP services using the "Start Services" menu option on the IPOPP Dashboard (refer to Appendix B, "IPOPP Dashboard"). Verify that the service is "ON" on the Dashboard Process Monitor. The SPA service should reinitiate processing of the same overpass that it was stuck on before the restart. If this results in another period of indefinite processing, proceed to the next step.

Is this indefinite processing due to data corruption? Identify the problematic overpass (refer to Appendix F, "Task 3: Identify the overpass related to an SPA service warning or error"). Stop IPOPP services using the "Stop Services" menu option on the IPOPP Dashboard (refer to Appendix B, "IPOPP Dashboard"). Next, use the Pass Manager utility to delete the problematic overpass (refer to Appendix G, "Pass Manager"). Now, restart IPOPP services using the "Start Services" menu option on the IPOPP Dashboard (refer to Appendix B, "IPOPP Dashboard"). Do not re-ingest the SNPP RDR file or Terra/Aqua PDS (packet file and CSR) file pair corresponding to the corrupt overpass.

Has the IPOPP database been corrupted? Try resetting IPOPP using the "Actions>Reset IPOPP" menu option on the IPOPP Dashboard (refer to Appendix B, "IPOPP Dashboard"). Now, restart IPOPP services using the "Start Services" menu option on the IPOPP Dashboard (refer to Appendix B, "IPOPP Dashboard"). Restart IPOPP operation (refer to Section 6, "IPOPP Operation").

Was the SPA installed correctly? Download the latest version of the SPA from the DRL Web Portal and reinstall it (refer to Appendix E, "Installing/Updating/Configuring SPAs").

**Problem 5. Data have been placed in the Landing Zone and ingest\_ipopp.sh was run. Services were running, but no output was created.**

Are the data still present in the Landing Zone after ingest\_ipopp.sh completed execution? The data may be currently unsupported by IPOPP, or may not have mission-compliant filenames. Refer to Tables 2a and 2b for a list of all data types currently supported by IPOPP ingest, and their respective mission-compliant file naming conventions. Ensure that all data being ingested are supported by IPOPP and have mission-compliant filenames. Some data types may require corresponding file pairs to be present in order to be ingested (i.e., Aqua/Terra PDS file pairs, OMPS NP and TC RDRs); for such data types, ensure that corresponding files are also present in the Landing Zone.

Did the data end up in the \$HOME/drl/data/dsm/nisfes\_data/FAILED subdirectory after running ingest\_ipopp.sh? This indicates that the data were ingested, but failed registration; this occurs when data from the same overpass have already been ingested and registered previously, and still exist within the IPOPP file system. To allow such data to be ingested and registered again, use the Pass Manager Table's 'Delete' utility to delete the existing overpass (refer to Appendix G, "Pass Manager"). After the Pass Manager displays a message indicating a successful deletion of the overpass, move the data from \$HOME/drl/data/dsm/nisfes\_data/FAILED back to the Landing Zone and run ingest\_ipopp.sh again. Observe the IPOPP Dashboard to see SPA services start processing once data ingest and registration completes.

**Problem 6. SPAs failed, and I want to reprocess.**

Identify and fix the source of the failures. Refer to "Problem 1: An SPA service is failing (error messages returned by print-logs.sh, errors in Dashboard: Process Monitor)". Now identify the problematic overpass (refer to Appendix F, "Task 3: Identify the overpass related to an SPA service warning or error"). Next, use the Pass Manager's 'Reprocess' utility to reprocess the problematic overpass (refer

to Appendix G, "Pass Manager"). Do not re-ingest the SNPP RDR file or Terra/Aqua PDS (packet file and CSR) file pairs corresponding to the problematic overpass.

## Appendix I Running IPOPP without an Internet Connection

IPOPP needs an Internet connection (i) to update its real-time ancillary repository for real-time sensor data processing and (ii) to retrieve and register archived ancillaries for reprocessing. However users who need to run IPOPP without an Internet connection should do so using the following procedures.

- i. Copy the `$HOME/drl/tools/utilities/retrieve_archived_ancillaries.sh` and `$HOME/drl/tools/utilities/retrieve_cumulative_ancillaries.sh` scripts to a directory on another Linux system that has an Internet connection. **The Linux ftp and wget command must be available on this system.**
- ii. Create a download directory (separate from the script directory).
- iii. cd to the directory where you copied the scripts and run them as follows:

```
./retrieve_cumulative_ancillaries.sh <path-to-download-directory>
```

```
Example: ./retrieve_cumulative_ancillaries.sh $HOME/Download/
```

```
./retrieve_archived_ancillaries.sh -searcharchive <yyyy-mm-dd> <path-to-download-directory>
```

```
Example: ./retrieve_archived_ancillaries.sh -searcharchive 2014-02-15 $HOME/Download/
```

Where `<yyyy-mm-dd>` refers to the date for which you wish to do processing. The date is available from the names of the RDR/PDS files that you wish to ingest. Refer to Tables 2a and 2b for mission-compliant file-naming conventions. These scripts will automatically identify and download archived cumulative ancillaries (leapsec\*, utcpole\*, MXD02\_\*.hdf) and ancillary tarballs (DRLAncillary\_YYYY-MM-DD.tgz) from the DRL's ancillary repository into the `<download-directory>` identified on the command lines above.

**NOTE:** You will have to run the `retrieve_archived_ancillaries.sh` script more than once with unique date arguments if you wish to process sensor data from unique dates.

- iv. Transfer all the downloaded ancillary files into the `$HOME/drl/data/pub/CompressedArchivedAncillary` directory of the IPOPP system.
- v. Refer to Step 3: "Ingest Data" in Section 6, "IPOPP Operation" and ingest RDR/PDS files as specified there, except give the `"-nonet"` argument to `ingest_ipopp.sh`:

```
$ $HOME/drl/tools/ingest_ipopp.sh -nonet
```

The `"-nonet"` argument makes `ingest_ipopp.sh` use only the `$HOME/drl/data/pub/CompressedArchivedAncillary` directory as a source for new ancillary files. If required archived ancillary tar files are missing, the script will print an error message and abort. For example:

```
Found RNSCA-RVIRS_npp_d20110422_t1456080_e1457333_b00001_c20120422161344756000_all-  
_dev.h5 ...
```

```
Overpass Date:2011-04-22
```

```
Overpass Time Extent: 14:56:08 - 14:57:33
```

```
NO ARCHIVED ANCILLARIES for 2011-04-22!
```

```
ERROR: Archived Ancillary Download Failed
```

```
Terminating IPOPP Ingest
```

To correct the error, go back to step (iii) above and retrieve the missing archived ancillary files, then try steps (iv) and (v) again. The previously transferred files will still be available on the IPOPP machine.

**NOTE:** When IPOPP is running on a machine without an Internet connection, its ancillary retrievers will fail, and the failures will be reported on the SLS database. (refer to Appendix F, "IPOPP Monitoring"). These errors are harmless and will not affect IPOPP's processing capabilities.

## Appendix J IPOPP Command Line Operation

IPOPP operations can be controlled via the command line. This is useful for automating the running of IPOPP for data processing without GUI access, and for remote control and monitoring of IPOPP.

### IPOPP Installation

IPOPP installation is performed from the command line (refer to Section 5, "IPOPP Installation" for detailed procedures).

```
Install IPOPP (default installation):      $ ./install_ipopp.sh
Install IPOPP (use /raid for storage):    $ ./install_ipopp.sh -datadir /raid
```

**NOTE:** Installation using the command `./install_ipopp.sh -datadir /raid` will result in a directory structure that is different from the directory structure of the default installation. Refer to Appendix K, "IPOPP Directory Structure."

### IPOPP Operation

```
Start Services                          $HOME/drl/tools/services.sh start
Stop Services                            $HOME/drl/tools/services.sh stop
Ingest Data:                             $HOME/drl/tools/ingest_ipopp.sh
Check IPOPP Services                     $HOME/drl/tools/check_ipopp_services.sh
Reset IPOPP                              $HOME/drl/tools/reset_ipopp.sh
Synchronize database with file system    $HOME/drl/tools/sync_ipopp.sh
```

#### **`$HOME/drl/tools/services.sh start`**

Use this command to start IPOPP services. To run IPOPP when a machine starts up, it is sufficient to put this command in an appropriate system startup script file.

#### **`$HOME/drl/tools/services.sh stop`**

Use this command to stop IPOPP services. To shut down IPOPP cleanly as a machine is being shut down, it is sufficient to put this command in an appropriate system shutdown script file.

#### **`$HOME/drl/tools/ingest_ipopp.sh`**

Use this command to ingest data into IPOPP for processing. Refer to Section 6, "IPOPP Operation: Step 3, Ingest Data," for details.

#### **`$HOME/drl/tools/check_ipopp_services.sh`**

Use this command to view IPOPP's current status. Example output:

Checking status of IPOPP enabled services...

```
NLS Server                ON
IS Retriever              ON
IS Deleter                ON
DSM ValidateDB (Database Checker)  ON
DSM PDS Mover             ON
DSM NPP RDR Mover        ON
VIIRS_C-SDR               ON
VIIRS_C-SDR-copy1        ON
VIIRS-SDR-BTemp-geotiff  ON
```

VIIRS-SDR-Refl-geotiff	ON
CVIIRS	ON
vcviirs-geotiff	ON
VIIRS-AF	ON
vcviirsfire-geotiff	ON
VFIRE375	ON
vfire375-geotiff	ON

done.

Checking for rogue processes...  
Everything looks OK  
done.

IPOPP services check complete.

### **\$HOME/drl/tools/reset\_ipopp.sh**

Use this command to reset IPOPP. An IPOPP reset can be used to recover from unexpected IPOPP errors. A reset will stop the IPOPP Services, clear product registration from the IPOPP database, and remove ancillary and data product files.

**NOTE:** An IPOPP reset deletes all data products. Copy data products that you wish to retain to another location before you reset IPOPP.

### **\$HOME/drl/tools/sync\_ipopp.sh**

IPOPP autonomously manages its file system. User deletion of files from the IPOPP file system is not necessary or recommended. In the event that files are deleted from the file system, use this command to synchronize the database to the file system before continuing processing.

### **IPOPP Monitoring**

Command line queries for IPOPP monitoring are contained in Appendix F, "IPOPP Monitoring."

## Appendix K IPOPP Directory Structure

Figure K-1 depicts the directory structure for the IPOPP default installation, achieved by using the command `./install_ipopp.sh`. Refer to Section 5, "IPOPP Installation," for complete installation procedures.

Figure K-2 depicts the directory structure for an IPOPP installation using `/raid` for storage, achieved by using the command `./install_ipopp.sh -datadir /raid`.

```
Home/
  drl/
    data/
      dsm/
        ingest/ [Landing Zone for data ingest]
        nisfes_data/
      nisgs/
      pub/
    dsm/
    file2file/
    geo/
    interp/
    is/
    ncs/
    nsls/
    properties/
    reprocessing/
    site.properties
    SPA/
    standalone
    SUA Open Source IPOPP GSC-15570-1.pdf
    tools/
    VERSIONLOG
    VIIRS-RDR-granule_dispatcher/
```

**Figure K-1. Directory Structure for Default Installation**

```
Home/
  drl/
    dsm/
    file2file/
    geo/
    interp/
    is/
    ncs/
    nsls/
    properties/
    reprocessing/
    site.properties
    SPA/
    standalone
    SUA Open Source IPOPP GSC-15570-1.pdf
    tools/
    VERSIONLOG
    VIIRS-RDR-granule_dispatcher/
  raid/
    dsm/
    ingest/ [Landing Zone for data ingest]
    nisfes_data/
  nisgs/
  pub/
```

**Figure K-2. Directory Structure for Installation Using /raid for Storage**