

SPS 10.4.1 Release Notes

1. *Product Release Information*

Product: SPS

Contact: David Herceg, SSAI

Release Number: 10.4.1

Release Date: 03/12/2013

2. *Introduction*

SPS 10.4.1 Version is a major release to include the implementation of the GOES Imager IR Channel to Channel Co-Registration Correction Program. This program include the implementation of the resampling algorithm for the images in the IR channel 2 or channel 4, and the IR Channel to Channel Co-Registration Characterization program. The software for the IR Channel to Channel Co-Registration Characterization software is also included in this released. The SPS 10.4.1 version also includes the implementation of the GOES 15 channel 15 de-stripping algorithm. The last significant element to be included in this software release is the implementation of an algorithm which utilizes a second sync-bit code if the first is not found. This algorithm will allow the software to recover what was previously considered as lost data blocks which are depicted as missing pixels.

3. *Related WR/PR or Issues Fixed*

WR001026 Implement GOES IR Channel to Channel Co-Registration Correction Program in GOES Ground System

The implementation of the GOES IR Channel to Channel Co-Registration Correction program in SPS enables to resampling of the images in IR Channel 2 or 4 based on the IR Co-registration table generated by the IR Channel to Channel Co-Registration Correction Program. The main requirements are:

1. Provides the option for enable/disable the image resampling process.
2. Provides the option for the image resampling in channel 2 or channel 4.
3. The image resampling is based on the co-registration table generated by the offline program, IR Channel to Channel Co-registration Characterization program.
4. Provides the capability to ingest the new IR Co-Registration table.
5. Adding an image resampling status word in the GVAR block 0.

Based on these requirements, the following processes are modified:

- gmcif, the GTACS Interface process has an existing process that ingest the CORT table with the command:

set imp_cort 1 1

for the CORT table between visible and IR channels. The modification adds an additional option for ingesting the CORT table between IR channels with the command:

set imp_cort 1 2

- dbif process, after the IR CORT table is ingested, the gmcif process setup an flag to instruct the dbif process to update the SPS database tables for the IR CORT.
- imgf1 process. SPS has an existing code to determine the index for the CORT table based on the image start time. Once this index is determined, the co-registration error is determined from the CORT table. This process is modified to add the determination of the co-registration errors for the IR channels. This value is added to the DTS data structure for each scan, the same as the co-registration errors between the visible and IR channels.
- imgf2 process. The resampling process is added here, and it is added after the calibration and Straylight correction are performed for each scan. The images for which channel are resampled are determined by a new global parameter that comes from the SPS database. The resampling status word is also added here.
- gvarrecv process, this process performs the byte swap for the block 0. A line is added to perform the byte swap for the resampling status word, which is a short integer.

In addition, the IR CORT table is added to the ipsshm memory block 4, in which the CORT between the visible and IR channels is also located here. The SPS Database are also expanded with the following parameters

- ircort, a one dimensional 48 element array for the IR CORT table.
- ircoregon, the flag to enable the resampling of the images in the IR channels.
- reschan, the channel ID, of which the images are resampled. The valid values are 2 and 4.

Issue 1: Clean up the log file:

The straylight correction process output the sun angle for every scan, which generates quite large volume in the log file. This is not necessary. The straylight correction process is modified now so that only the sun angle for the first scan of an image is written to the log file. In addition, a time tag is added to the output to the log file for the bias after the spacelook when the bias is updated, which is very useful for the debugging purpose. The bias outputs are only written to the log file when the debug setting is set for SPS.

Issue 2: Compiler Error after the latest patch:

The system call, shm_open, for open the shared memory in the system generates the compiler errors after the latest patch. The function definition is changed from

```
shm_open(const char *, int, int)
```

To

```
shm_open(const char *, int, mode_t)
```

This affects two files, which is listed in the table of the source code changes.

Issue 3: The implementation of the GOES 15 De-Striping Algorithm for Channel 15 images

The de-striping algorithm for GOES15 channel 15 images includes the correction for PSPOT3 striping and the PSPOT6 striping. The De-Striping algorithm consists of three separate algorithms, which corrects the PSPOT3 striping, PSPOT6 striping, and the interference of signal with 3 pixel wave length. The detail formulism of the correction algorithms will be documented separately as an appendix for the SPS Software

Maintenance Manual. There are changes to the operation as the striping correct is done automatically.

The following process was modified to resolve this issue:

- Sndfm process represents the sounder data formatter. The de-striping algorithm has been moved here so that it is independently of any calibration mode.

Issue 4: Recover GOES 13 Missing Data Block

The process of recovering the GOES 13 bad data blocks involves introducing a secondary sync bit algorithm as well as modifying several parameters related to bit slip and sync bit error tolerance. Specifically the requirements are as follow:

- Implement a second sync bit code algorithm
- Increase the sounder allowable sync code bit errors from 0 to 3. This is completed through the SPS control console and is completed by entering the following command at the time of operation:

- `set si_scher 1 3`

Based on these requirements, the following process was modified:

- Ingest process, which is responsible for processing the incoming data blocks. This process has been modified to include an algorithm to check for a secondary sync code if the first sync code does not match with the incoming sync pattern.

4. Source Code Changes

Source files modified/added	Related Issue
<i>/Version.mk</i>	New version number
<i>/ws/src/spsopr/gui/spscontrol.sh</i>	New Version number
<i>/ws/src/spsopr/gui/spsmonitor.sh</i>	New Version number
<i>/ips/src/imgf2/f2slc.c</i>	Issue 1
<i>/ips/src/dbif/dbif.c</i>	WR001026
<i>/ips/src/dbif/dbif.h</i>	WR001026
<i>/ips/src/dbif/fbsircort.c</i>	New file, WR001026
<i>/ips/src/dnif/Makefile</i>	WR001026
<i>/ips/src/gmcif/gmc_imp_cort.c</i>	WR001026
<i>/ips/src/gmcif/gmc_main.c</i>	WR001026
<i>/ips/src/gmcif/prcort.c</i>	New file, WR001026
<i>/ips/src/gmcif/Makefile</i>	WR001026
<i>/ips/src/imgcp/cpcoef.c</i>	Issue 1
<i>/ips/src/imgf1/f1cortim.c</i>	WR001026
<i>/ips/src/imgf1/f1dtsfin.c</i>	WR001026
<i>/ips/src/imgf1/imgf1.h</i>	WR001026
<i>/ips/src/img2/f1bldbl0.c</i>	WR001026
<i>/ips/src/img2/f2blscan.c</i>	WR001026
<i>/ips/src/img2/f2fft.c</i>	New file, WR001026
<i>/ips/src/img2/f2ircoreg.c</i>	New file, WR001026
<i>/ips/src/img2/f2slc.c</i>	Issue 1.
<i>/ips/src/img2/imgf2.h</i>	WR001026

<i>/ips/src/master/corss_ref.xrf</i>	WR001026
<i>/ips/src/inc/ipsshm1.h</i>	WR001026
<i>/ips/src/inc/ipsshm1_redefine.h</i>	WR001026
<i>/ips/src/inc/ipsshm4.h</i>	WR001026
<i>/ips/src/inc/ipsshm4_redefine.h</i>	WR001026
<i>/ips/src/inc/ibsb10.h</i>	WR001026
<i>/ips/src/inc/dtsdef.h</i>	WR001026
<i>/ips/src/inc/dbifcmddef.h</i>	WR001026
<i>/ips/src/gvarrecv/gr_bytereverse_blk0.c</i>	WR001026
<i>/ips/lib/sps_util.c</i>	Issue 2
<i>/ips/src/diag/gvardmp.c</i>	Issue 2.
<i>/ws/src/ingest/pndec_Sounder.c</i>	Issue 4
<i>/ips/src/sndfm/Makefile</i>	Issue 3
<i>/ips/src/sndfm/sfm.h</i>	Issue 3
<i>/ips/src/sndfm/sfm_fft.c</i>	New – Issue 3
<i>/ips/src/sndfm/sfm_init.c</i>	Issue 3
<i>/ips/src/sndfm/sfm_pspot3.c</i>	New – Issue 3
<i>/ips/src/sndfm/sfm_pspot6.c</i>	New – Issue 3
<i>/ips/src/sndfm/sfm_scan.c</i>	Issue 3

INSTALLATION INSTRUCTIONS

1. General Instructions

Installation of the SPS application software is described in Section 5.7 of the SPS Software Maintenance Manual (DRL 504-06).

2. Additional Instructions

Before installation:

- For the development environment, make sure to delete/rename the existing */sps/develop* directory before installing the software. This will overwrite the existing */sps/develop* directory

Installation:

1. Load the **SPS Application Software CD** into the CD-Drive on SPSAMI
2. **Extract** the application software from the CD by issuing the following command from an AMI terminal window:

```
tar xvf /cdrom/cdrom0/baseline*.tar
```

(This creates two directories */sps/baseline_10.1* and */sps/develop*)
3. **Define** the new SPS run directory (e.g., */sps/baseline_8.8*) to configure the “*/sps/current_sps_code*” link to point to the correct run directory. From an AMI terminal window:

```
cd /sps
```

```
switch_BL baseline_10.1
```

4. **Install** the SPS operator interface software. From an AMI terminal window type:

```
cd /sps/current_sps_code/ws/src/spsopr
su (login as root)
./spsmmi*.install
exit
```

This registers the version number of the software with *master* on each server and defines paths for various files (e.g., audio files, home directory).

5. **Refresh the GIU zone by running**

```
su (login as root)
/sps/shutdown_all_zones.ksh
```

and

```
/sps/start_all_zones.ksh
```

on the ami console.

6. Refresh the GRU zone by running the same procedure on the **gzb** consle.

SPS database update

Create a sub-directory in /export/home/sps for the utility routine to make a new version of SPS database with enlarged dataset.

```
mkdir dbexpansion
```

Copy database utility routine for generating the new version of the database table with new visible channel calibration parameters and enlarged emissivity coefficients.

```
cp /cdrom/cdrom0/dbexpansion.tar /export/home/sps/dbexpansion
```

Extract the files from the tar file:

```
tar xvf dbexpansion.tar
```

Edit the SPSDB.xml with appropriate user name and password that allows write privileges for GOES database. Before running the utility file, make sure the workstation has Java 7 installed. To check Java version, enter the command

```
java -version
```

on a terminal, which will display the java version. If the java version is the earlier version, Java 7 needs to be installed.

Run the utility file with the directive:

```
java -jar dbexpansion.jar
```

which will update the SPS database to make it compatible with SPS 10.4.

The SPS Operations Change

1. Co-Registration Correction

To ingest the IR CORT table, take the following procedure:

1. Copy the IR CORT table file to /rt/gmcif_in directory in SPS GIU, and rename the file as **ircort.exp**.
2. Enter the following directive on the SPS control console:
set imp_cort 1 2
3. The ingest status will be displayed on the SPS console event window. If successfully ingested, the SPS will update the SPS Database, and an event message will be displayed on the event window for the SPS Database update status.

The IR CORT table file is a binary file, which contains the satellite ID, the time tag when the table is created, and a 48 element array of CORT table that represents the co-registration error at every half hour for a given day. SPS will perform some basic validation to check the satellite ID and to determine if the CORT table is too old. If the satellite ID is different from the SPS configuration, the CORT table will be rejected. If the creation of the CORT table is more than 7 days old, the CORT table will be rejected.

To enable the image resampling, enter the following command:

set ircoregon 1 1

SPS will start the image resampling at the start of the next image.

2. **GOES13 Sounder Data Recovery**

For GOES 13, the sync error tolerance is now changed from 0 to 3, while other parameters remain unchanged. The Sounder sync error tolerance parameter, SI_SCBER, is located in SPS parameter table in the SPS Database, it is spacecraft independent. The change to SI_SCBER in the SPS database is not recommended, since it would impact to the operation to the other spacecraft. SI_SCBER parameter should be changed in the SPS command console, after the SPS is configured for GOES 13, by the following command:

set SI_SCBER 1 3

The GVAR Block 0 Change

The GVAR block 0 changes are shown in the following table. The resampling status word is located at word 261 and 262.

Table 1 GVAR Block 0 with the image resampling status word. Refer to Table 3-6 in GOES Interface Document 504-02 for complete information

Words	Name	Description									
2	SPSID	SPS Identity: a binary number identifying the source SPS which formatted the GVAR data stream. Values 1–9 are assigned to SPS1–SPS9, respectively.									
...	...										
251-258	CIFST	Current Imager Frame Start Time. CDA time tag - 8 words formatted in same manner as defined for words 23-150.									
259-260	SLC_STATUS	The Straylight Status									
261-262	RES_STATUS	IR Channel Resampling status word, the bit zero is defined as the least significant bit (LSB) of the word 262. The status bits are defined below: <table border="0"> <thead> <tr> <th>Bit</th> <th>Value</th> <th>Condition</th> </tr> </thead> <tbody> <tr> <td>0-12</td> <td></td> <td>Resampling parameter, Related to the co-registration error value by $\text{INT}(1000 * (\delta + 2.0))$</td> </tr> <tr> <td>13</td> <td>= 0</td> <td>The image is not resampled.</td> </tr> </tbody> </table>	Bit	Value	Condition	0-12		Resampling parameter, Related to the co-registration error value by $\text{INT}(1000 * (\delta + 2.0))$	13	= 0	The image is not resampled.
Bit	Value	Condition									
0-12		Resampling parameter, Related to the co-registration error value by $\text{INT}(1000 * (\delta + 2.0))$									
13	= 0	The image is not resampled.									

		13	=	1	The image is resampled.
		14	=	0	The images in channel 2 are resampled.
		14	=	1	The images in channel 4 are resampled.
		15	=	1.	The re-sampling in EW direction is enabled.
		15	=	0	The re-sampling in EW direction is disabled.