


P2SC-ROB- WR-006-20100419 Weekly Report # 006	P2SC Weekly report	
Period Covered: Date: Written By: Released By:	Mon April 19 to Sun April 25 2010 April 27 2010 Anik De Groof Anik De Groof	Royal Observatory of Belgium PROBA2 Science Center
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1. PROBA2 Science Center Status

Anik De Groof was operator during this week.

The P2SC software was updated. In particular a complete new SWAP pipeline was installed.

2010-04-19 Quick look viewer for LYRA updated

The quick look viewer for LYRA was updated to r2968. The new version mainly differs in the starting values.

2010-04-19 Update of the LYRA engineering data generator

The engineering data generator for LYRA was updated to fix a bug that was slowing down the software.

2010-04-19 Update of the Event data processor

The Events data processor was updated to r2996 to correct for missing database commands.

2010-04-20 Update of the complete SWAP pipeline

All SWAP tools - SWTMR, SWEDG and SWBSDG - were updated to their latest versions. The main differences are:

- SWap Telemetry Formatter (SWTMR) now produces FITS files instead of the original pgm files + metadata in a database. The reformat database (still called swap_dda_meta.db) now contains some of the metadata relevant FITS keywords.
- SWap Engineering Data Generator (SWEDG) was rewritten from scratch entirely to better perform its task, make it robust and to increase the efficiency. A second update was done on April 21 to accommodate changes in the SWTMR database (columns contain strings now).
- SWap Base Science Data Generator (SWBSDG) now contains significantly improved calibration steps. Images are automatically dark subtracted, scaled, centered, rotated such that the solar North points up and despiked. Several problems were corrected and the FITS headers were brought close to the final form. An additional keyword (SWAVINT), representing the average intensity in the calibrated image was introduced.

2010-04-20 Conversion to a new auxiliary database & update of ADP & ADB

The old database containing all ancillary data is replaced by a new one which is structured in a more efficient way in order to reduce its size. LYRA temperatures will be

converted from counts to degrees Celcius and stored as such in the new database. Simultaneously, the Ancillary Data Processor and Ancillary Data Browser are updated to use this new database schema.

2010-04-21 Update of Pointing and Positioning Tool (PPT)

PPT was set to use Redu times for time correlation. This temporary change was done to solve the problem of time correlation extrapolation with AOCs derived data and solved the problem of incomplete LYRA FITS files (see Sect. 3). A permanent solution will be implemented later.

2010-04-22 Update of Data Consistency and Validation Checker

The DCVC was updated to take into account the new units of LYRA values and to give a warning every time the number of MCPM errors increases. The type 3 test (SWAP metadata vs auxiliary data) is cancelled for now because of the change in metadata database. We will investigate the need of further type 3 tests and adapt the software if needed.

2010-04-22 Update of SWAP Quick Look viewer

The SWAP Quick Look viewer now contains an extra window showing the most important SWAP ancillary parameters, using a color table highlighting possible problems: HK data gaps, out-of-range values.

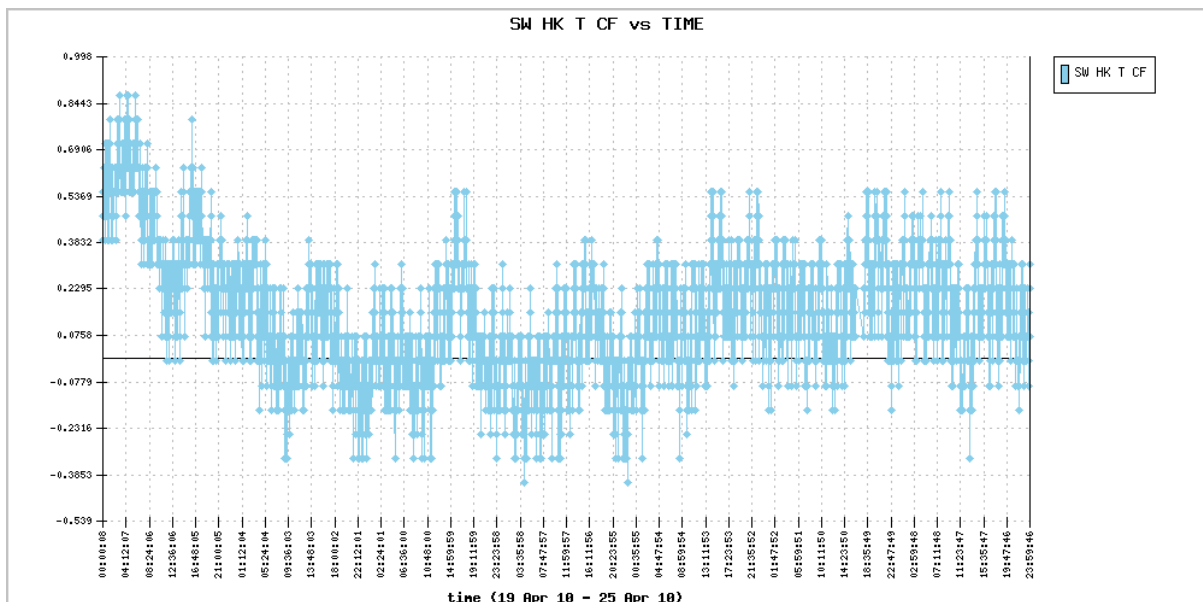
2010-04-23 Update of SWAP Base Science Data Generator

The SWAP BSDG was updated over several days to further improve the header of the generated base science FITS files.

2. SWAP instrument status

The SWAP instrument functioned normally during the period. The 'MCPM NB RECOV ER' remains fixed at 143.

The detector temperature ('SW HK T CF') decreased on Monday from 0.5 degrees to 0 degrees Celsius. The temperature then stabilized and even increased a bit towards the end of the week and is now stable around 0.2 degrees.



2010-04-19 Nominal Imaging (IOS00104)

Table acquisition at 120s cadence without jumping over LARs.

2010-04-20 10:00-10:47 SREP_02_LED_Sequence (IOS00105)

The weekly LED calibration sequence was run. Apart from the 3s LED and dark images, and the 10s darks, we also took more than 10 solar images without any processing. The time of off-pointing was kept as it was before: from 10:00 to 10:27.

One point is not understood: When coming out of off-pointing, the shift in pointing seems to have happened to late:

- *10:26:55Z acquisition_configuration correlated_double_sampling 10 0 0 1023 1023 59 1 led_off 100 30 12bits 0.0 0.0*
-> command to shift from off-point back to sun pointing
- *10:27:21 20 NORMAL PROGRESS 300*
EVT_SWAP_IMAGE_ACQUISITION_COMPLETED
-> image acquisition starts at 10:27:07 BUT STILL BLACK!!
- *10:29:01 20 NORMAL PROGRESS 300*
EVT_SWAP_IMAGE_ACQUISITION_COMPLETED
-> first solar image

2010-04-20 -> 2010-04-25 Nominal Imaging (IOS00105)

After the calibration, SWAP remains imaging through a table of 3 entries, with 3 different priority numbers and with a cadence of 120 seconds, without jumping over LARS.

2010-04-22 Paving campaign for LYRA (LREP_05_PavingDetector) (IOS00106)

Off-pointings were commanded from 06:20 onwards to 09:30 to support the LYRA paving campaign.

2010-04-23 SWAP acquisition during LARs was disabled around 13:40

Information received from Redu (email PhR at 16:27) and QinetiC (email SIL at 12:54):

Through the manual telecommand

ECP7512_SWAP_Enable_Disable_Image_Acquisition_During_Spacecraft_Rotation_args_Status.TOPE 0 ,

the SWAP acquisition during LARs was disabled at pass 1061 (13:37-13:46).

The timing which is currently onboard is stored in the parameter *SWIM_SC_rotation_movement_duration* which is set to 120 seconds. It is the time of a spacecraft rotation and is used by the SWIM to re-enable image acquisition after SC rotation. This means that image acquisition will be disabled for 120 seconds.

In practice, we noticed the following behaviour around LARs:

- It seems that the disabling of image acquisition during LARs only took place after 14:12. There were no images skipped around the LARs of 13:46 and 14:11 and indeed the images started at 13:47:47 and 14:11:47 are blurred (show rotation).
- If an image is skipped due to a LAR, the next image starts with a delay. This is typically 1s or 2s delay. In some cases however, the delay is around 20-30s!

Examples:

- 2010/ 4/23 14:36:22 CHANGE ATTITUDE FROM 3 TO 2
- 2010-04-23T14:33:47: image taken, no blurring
- 2010-04-23T14:35: image skipped as expected
- 2010-04-23T14:37:**48**: image taken, no blurring, starts with a **delay of 1s**
- 2010/ 4/23 15: 1:12 CHANGE ATTITUDE FROM 2 TO 1
- 2010-04-23T14:57:48: image taken, no blurring

- 2010-04-23T15:02:**15**: image taken, bit blurred, and starts with **delay of 27s**
 - 2010-04-23T15:04:15: image taken, no blurring
 - see also examples around 16:14 (20s delay), 17:28 (21s delay), 18:44 (23s delay)
- Sometimes, there is **no image skipped at all**, and the image scheduled is taken and therefore is blurred.
- Example:
- [2010/ 4/23 17:54:50 CHANGE ATTITUDE FROM 3 TO 2](#)
 - 2010-04-23T17:54:58: this image is **not skipped and is indeed blurred, showing the rotation**

As a conclusion, it will be very hard to predict when images will be taken! This will make commanding even harder.

3. LYRA instrument status

The LYRA instrument functioned normally during the period.

2010-04-19 (IOS00057)

LYRA remains acquiring at high cadence.

2010-04-19 LYRA Engineering Data Generator shows problems

The LYEDG has shown that it takes too long to process the data of one pass. This causes a queue in scheduled P2SC tools. Therefore the LYEDG will be removed from the pipeline and run manually once a day on data of the previous day, until the problems are solved.

In addition, the FITS files which are generated the last few days are truncated around 12:30.

2010-04-21 07:00 LREP_02_Calibration (IOS00058)

The weekly calibration with back-up units and LEDs was performed.

2010-04-21 Problem of incomplete FITS files resolved

The LYEDG was still suffering from incomplete FITS files as output. The reason for this seemed to be the call to the Pointing and Positioning Tool (PPT). Incomplete AOCS information (due to the GPS which is only switched on 1 orbit per day) can cause errors in the extrapolation of the time correlation. This became especially clear in the LYEDG which consults the Pointing and Positioning Tool (PPT) to calculate the end of the present day (i.e. in the future).

As a mitigation action until this issue can be fully studied and remedied, we set the PPT to take the time correlation calculated by MOC into account when doing extrapolations.

This PPT change indeed solved the problem of the incomplete FITS files! Complete plots were generated for 19 and 20 April.

The LYEDG however still has performance issues. It took more than 2 hours to process 1 day's data and at one point it used 5Gb of memory. Most of the time was spent waiting. The CPU time showed that only 20% of the runtime was used calculating.

2010-04-22 06:00 LREP_05_PavingDetector (IOS00059 & SWAP IOS00106)

LYRA performed a paving campaign, with the help of SWAP commands. At the same time, the exact timings of the 4 large angle rotations were monitored. For this purpose the cadence of the HK parameters qsc_I_est_1,2,3,4 was increased to 1Hz for the period 06:15 to 09:20 (almost 2 consecutive orbits). These data are still under investigation.

The temperature response of the calibration campaign on Wednesday and the paving campaign on Thursday are interesting and shown below. In blue, the detector temperature of unit 2 is plotted, in green the times at which warmup commands are given show up.

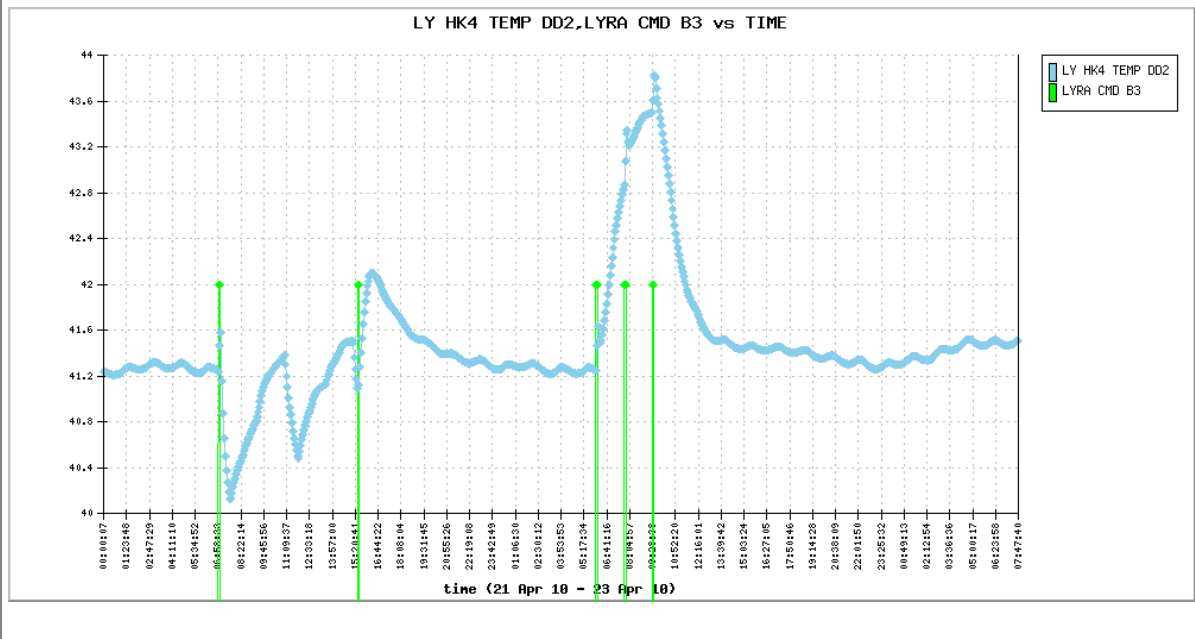
The detector of the nominal unit (unit 2) cools down:

- when closing the door (see first drop at 21 April around 7:00)
- when switching from back-up acquisition to acquisition with only the nominal unit (see last drop on 22 April from 09:30 to 12:30)

The detector typically warms up:

- when giving a warm up command (see 5 peaks associated with the 5 commands)
- when switching on the LEDs (see e.g. 21 April around 09:30)
- when switching to back-up acquisition (see rise in temperature on April 22)

These temperature variations are also reflected in the IIU temperature.



4. Science

P2SC gets more and more interest in the scientific data of SWAP and LYRA. We also got a visit of Serge Koutchmy discussing with the SWAP team the events seen on April 3, 8 and 13.

5. Data reception & discussions with MOC

Overview of the received data.

This section overviews the recovery data from pass 1020 to pass 1083 (19-04-2010 / 25-04-2010).

House keeping data

No aberrant values. No gaps in HK (or filled after reprocessing).

Science data

Few corrupted images in SWAP: in BINSWAP_1029, 1045, 1046, 1068

Corrupt filenames and data in LYRA packets: in BINLYRA_1056, 1072, 1075

e.g. *the filename BINLYRA201101271741120001174951RAW-866112963 doesn't match the naming conventions*

The LYTMR cannot process those packets. The content seems to be corrupt.