| P2SC-ROB-WR-047-20110207 Weekly report #047	**P2SC Weekly report**	
Period covered: Date: Written by: Released by:	Mon Feb 07 to Sun Feb 13 2011 Thu Feb 10 2011 David Berghmans David Berghmans	Royal Observatory of Belgium PROBA2 Science Center
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1. Science

Solar & Space weather events

Solar activity was dominated in the beginning of the period by NOAA AR 11153 which strengthened into a beta-gamma group while rotating out of field over the solar west limb. The region triggered a handful of C-flares, and on Feb 12 an M1.9 flare.

More firework originated in NOAA AR 11159, from Feb 12 in the C-class and on Feb 13, 17:38 a M6.6 flare (see below).

SWAP Active Regions at the beginning and end of the reported period. The magenta squares and blue contours denote the output of (experimental) dynamics detectors in SWAP image sequences.
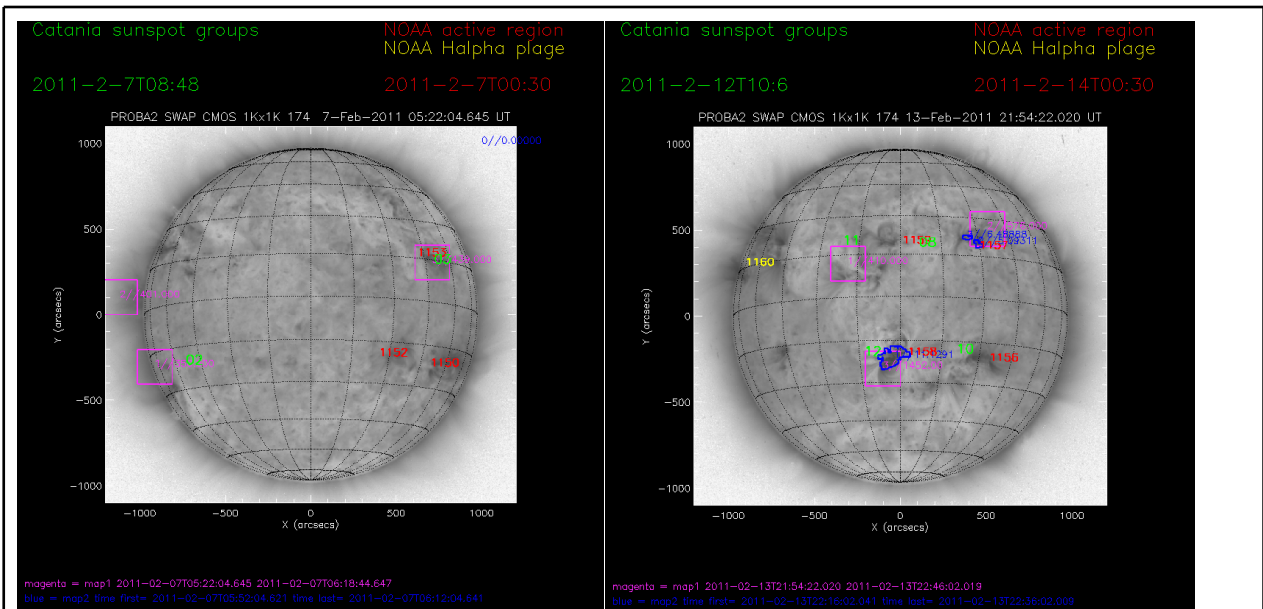
The overview of LYRA data over the week is given below. One can see the reducing depth of the downward peaks in Aluminum (Blue, X6) and Zirconium (black, X1) as we approach the end of the eclipse season. The wiggles in Herzberg (green, X2) on February 8, correspond to the SWAP high-cadence off-pointing campaign (see below). Note also the M6.6 flare (biggest peak on the right).
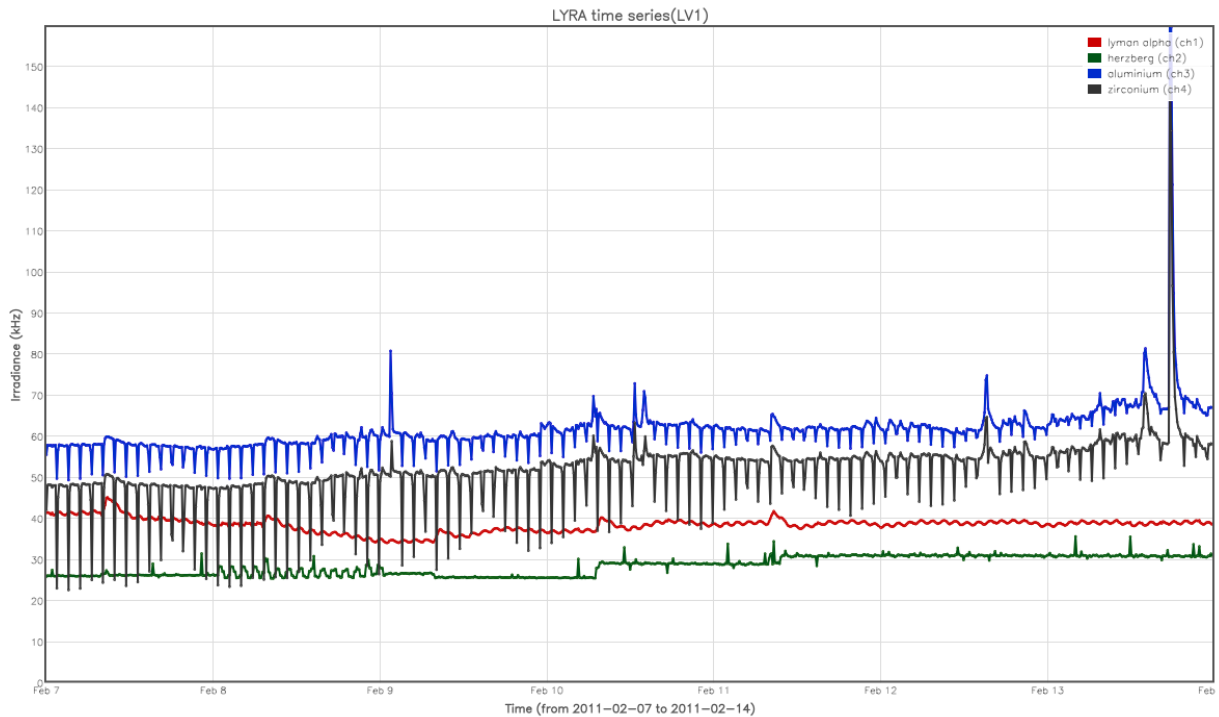
See below for a zoom in on this flare. It may be interesting to note that the strength of the M6.6 still fits perfectly in the log-log relationship with GOES flares that was made for channel 2-3 and channel 2-4. In other words, the X-ray signal is still not degrading.
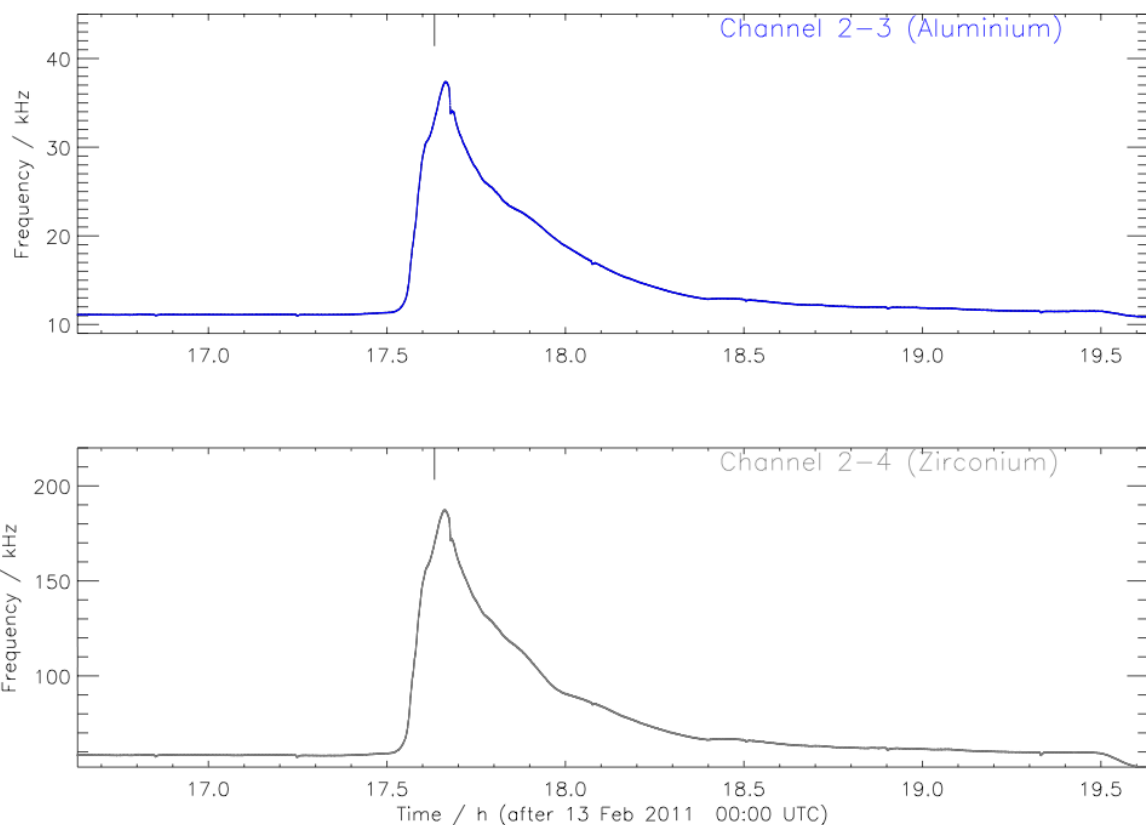
Outreach, papers, presentations, etc.

1. An outreach event for young children (< 7 years) with an American school in the UK was set-up on February 8. The over-internet-event included a:
- presentation: http://proba2.sidc.be/Presentations/20110208_ASL_Students-DBS/ asl_sun_presentation.pdf
- live questions via Skype.

2. Claire Raftery was visitor during the period at the P2SC as Guest Investigator and made several presentations of her new technique to study instrument response as a function of EM of the emitting plasma. This work will become a paper soon.

3. Ines Keinrich was visitor during the period at the P2SC as Guest Investigator and presented an overview on Friday Feb 11 of the different EIT waves seen in the weeks before.

4. Mehmet S. Yalim submitted a paper to Journal of Space Weather and Space Climate with title: *Variations in EUV irradiance, comparison between LYRA and SWAP integrated flux*

5. Joe Zender submitted a paper to Journal of Space Weather and Space Climate titled: Temporal *and Frequency Variations of Flares observed by LYRA onboard PROBA2.*

To be explored

The M1.9 flare on 09 Feb 2011 (see below) is different from other flares. Although the occultation messed it up a bit, I think one can see that the curves from channel 2-3 and 2-4 do not look as similar as in all(?) other cases. The Zirconium curve peaks approx 5 minutes later

than the Aluminium curve.
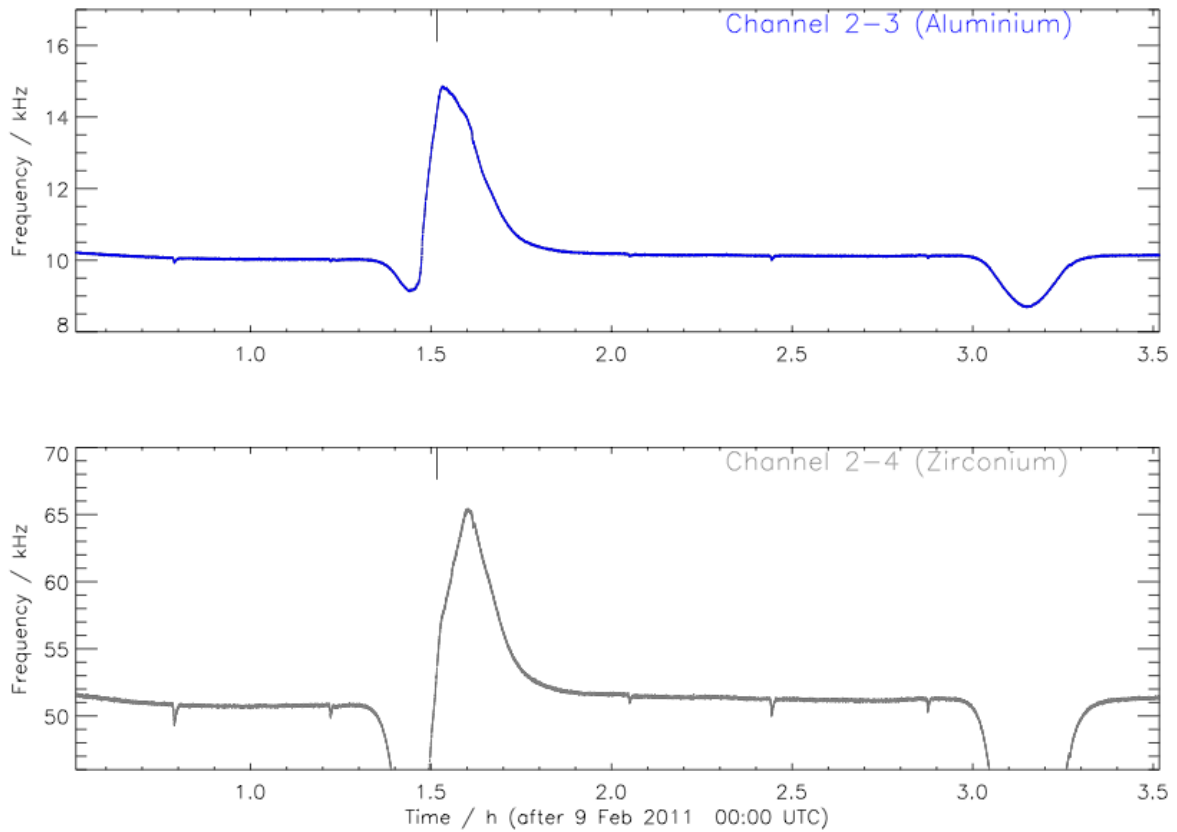
2. LYRA instrument status

Temperature evolution

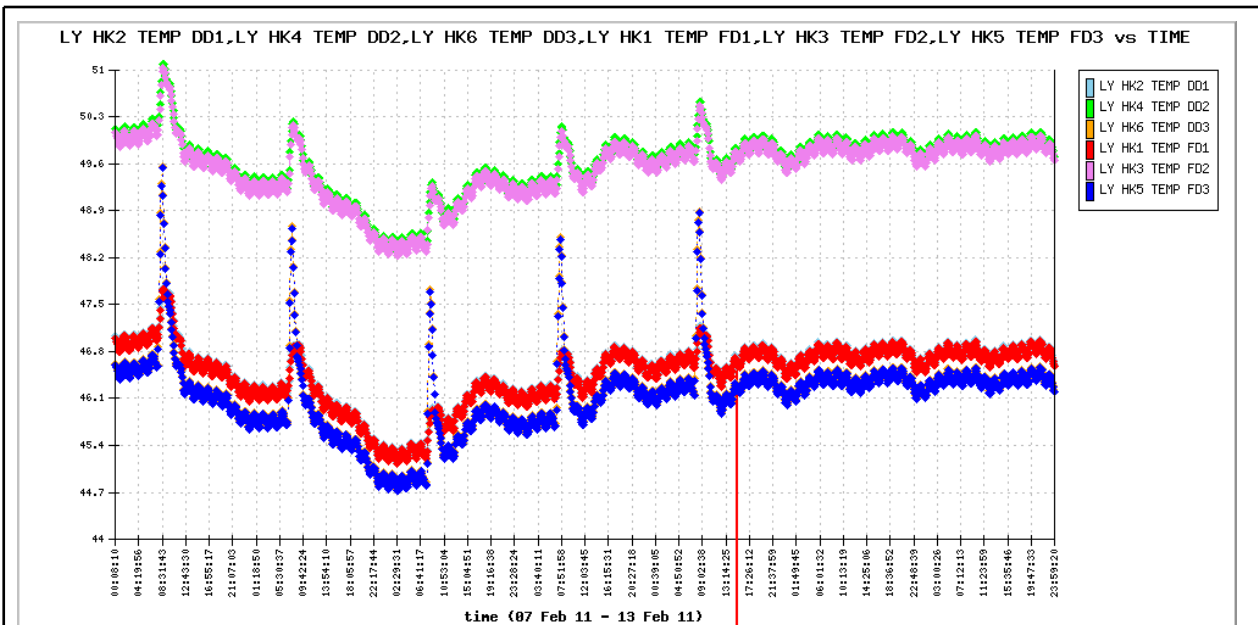Similar as for SWAP, see below, the LYRA temperatures dropped two degrees on Feb 8, following a reduced power consumption in PLASMA CURR CAL, BST CURR CAL (green) and FSXCCM CURR CAL.

LY HK2 TEMP DD1,LY HK4 TEMP DD2,LY HK6 TEMP DD3,LY HK1 TEMP FD1,LY HK3 TEMP FD2,LY HK5 TEMP FD3 vs TIME

time (07 Feb 11 – 13 Feb 11)

Legend:
- LY HK2 TEMP DD1
- LY HK4 TEMP DD2
- LY HK6 TEMP DD3
- LY HK1 TEMP FD1
- LY HK3 TEMP FD2
- LY HK5 TEMP FD3

Calibration
There was no calibration campaign during the period.

IOS & operations

Monday Feb 7	Tuesday Feb 8	Wednesday Feb 9	Thursday Feb 10	Friday Feb 11	Saturday Feb 12	Sunday Feb 13
Nominal acquisition + Unit2/3 occultation campaign	Nominal acquisition + Unit2/3 occultation campaign Jumpy signal due to SWAP off-pointing campaign	Nominal acquisition + Unit2/3 occultation campaign	Nominal acquisition + Unit2/3 occultation campaign	Nominal acquisition + Unit2/3 occultation campaign	Nominal acquisition	Nominal acquisition
(LYRA00147)	(LYRA00147)	(LYRA00147)	(LYRA00147)	(LYRA00147)	(LYRA00147)	(LYRA00147)

The LYRA occultation studies for this eclipse season ended on Feb 11 2011.

To be explored
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3. SWAP instrument status

MCPM errors
The MCPM recoverable errors increased from 483 to 644 during this week. No unrecoverable error was seen.

IOS & operations

Monday Feb 7	Tuesday Feb 8	Wednesday Feb 9	Thursday Feb 10	Friday Feb 11	Saturday Feb 12	Sunday Feb 13
nominal imaging	High cadence-rebinned-off-pointing campaign fulll day	ESP test 08:16-08:33 jello campaign 08:42-13:39	nominal imaging: Hinode HOP 0180 support	nominal imaging: Hinode HOP 0180 support	nominal imaging: Hinode HOP 0180 support	nominal imaging: Hinode HOP 0180 support
cadence:100s #images: 666 IOS 246	cadence: 30s #images:2066 IOS 247	cadence:100s #images:835 IOS 248	cadence:100s #images:698 IOS 248	cadence:100 #images:698 IOS 248	cadence:100s #images:547 IOS 248	cadence:100s #images:720 IOS 248

Campaigns

<u>Off-pointing high-cadence campaign (Request: Claire Raftery)</u>
In an attempt to catch an off-limb eruption in high cadence, we offpointed westward, put rebinning on and increased the cadence to 30s. This resulted in a day of 2066 images! Note that with rebinned images, the buffer can be drained from full (285 images) to empty (0 images) in less than 1 pass. In principle the number of images could thus still be higher if the MCPM was configured differently.

PROBA2/SWAP 174 2011-02-08T02:06:33.179
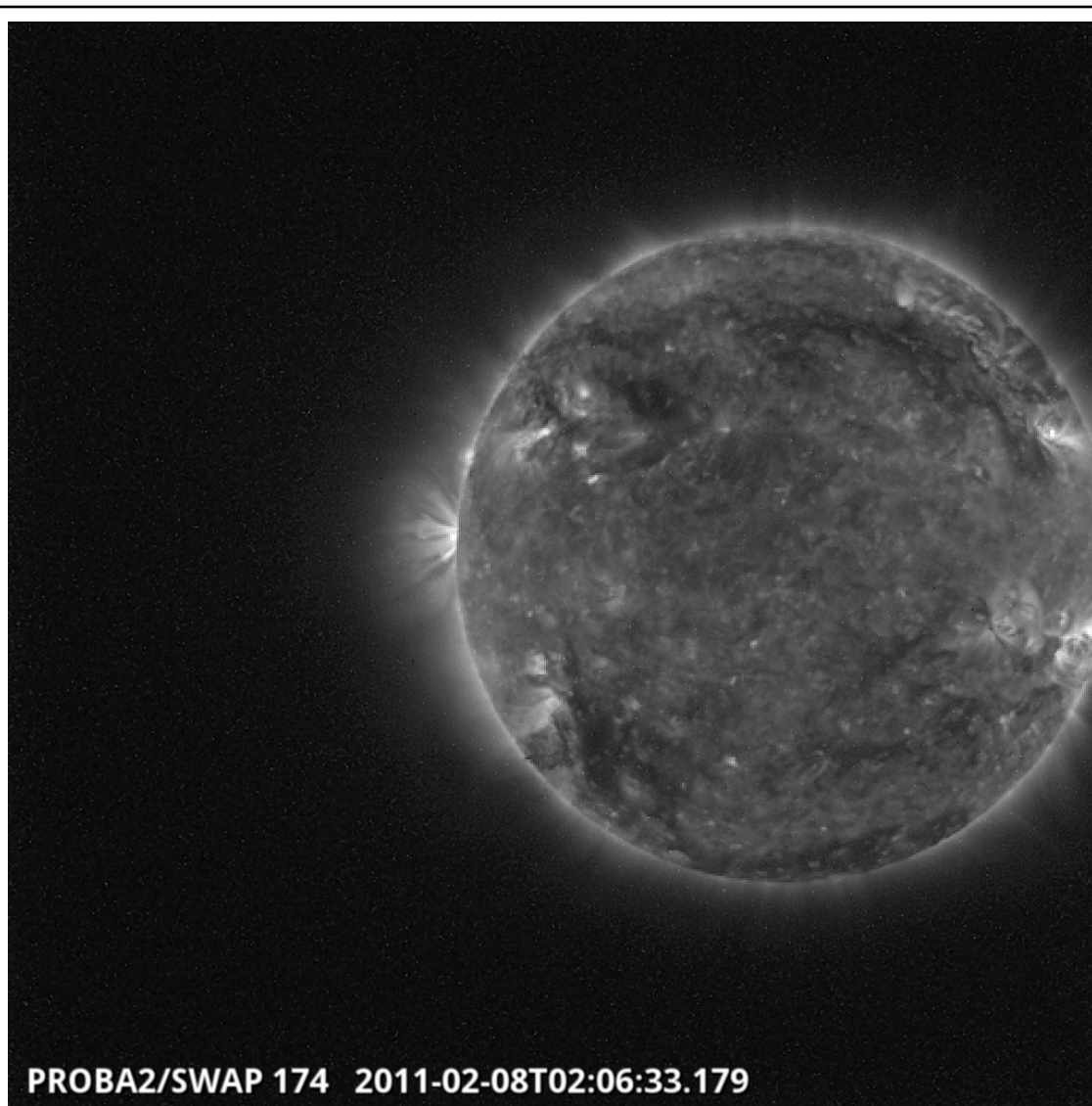
Hinode HOP0180 support campaign (Request: Ines Keinrich, GI)
Feb 10-17
See http://www.isas.jaxa.jp/home/solar/hinode_op/hop.php?hop=0180 for a description.

Jello campaign (Request: D.Berghmans)
GOAL: to study jello effect on SWAP CMOS detector as a techonology demonstrator for Solar Orbiter/ EUI. The aim was to try to observe the "jello effect" by increasing the read-out time up to the integration time of SWAP. The procedure using the direct PE command was updated to use TT TCs. The integration time was set to 10s and the readout divider:

- T0 = 2011-02-09T08:42:00.000 : set read out divider = 3   readout time = (0.4*2.^3 = 3.2s)
- T0 + 1 orbit= 2011-02-09T10:21:00.000 set read out divider = 5 ,   readout time = (0.4*2.^5 = 12.8s)
- T0 + 2 orbits= 2011-02-09T12:00:00.000: set read out divider = 7 , readout time = (0.4*2.^7 = 51.2s)
- T0 + 3 orbits= 2011-02-09T13:39:00.000: set read out divider = 0 ,   readout time = (0.4*2.^0 = 0.4s) = back to normal

However, inspection of the data revealed that no images where received with a read-out divider different from zero!

This was partly explained by a hardware limitation (?) that the integration time has to be larger

than the read-out time:

```
if ((integration_time < PE_MIN_INTEGRATION_TIME_VALUE) ||
    (integration_time > PE_MAX_INTEGRATION_TIME_VALUE) ||
    (((float32)integration_time) < (((float32)PE_INTEGRATION_TIME_COMPUTATION_FACTOR) *
                (float32)(1<<readout_rate_divider))))
    {
    TCVS_send_report(TC,
            INVALID_PARAMETER,
            (int8*)&par_index,
            sizeof(par_index),
            TMTC_TC_ACCEPTANCE_REPORT_NOK);
      return;
    }
```

With PE_MIN_INTEGRATION_TIME_VALUE = 1 and PE_MAX_INTEGRATION_TIME_VALUE = 1023
PE_INTEGRATION_TIME_COMPUTATION_FACTOR = (0.4194304)

This test in software is a transcription of the following sentence from the PE Programming Manual:

> Integration time: ADPMS software should care that the integration time is always greater than the readout rate.

The command with the readout divider set to 5 and 7 were thus rejected on board with the error "INVALID_PARAMETER" for the integration time. The onboard check consists of verifying that the resulting readout time is lower than the integration time. With the readout divider set to 5, the readout time value is 12.8s (=0.4 * 2^5) and for the readout divider set to 7 the readout time value is 51.2s (=0.4 * 2^7).

It remains unexplained why we did not receive images with the readout time value is 3.2s (=0.4 * 2^3).

Christian Bajot (Redu) proposes to use, in next test, instead of the direct FID_SWAP_CONFIGURE_PE command, to send the usual IOS FID_SWAP_SWIM_PARAMETERS command.

SWAP detector and IIU temperature
The SWAP Cold Finger Temperature decreased from the extreme temperatures last week and fluctuated between 7.1C and 4.8C during the period. In the overlay picture below, we show the period by vertical black lines. The picture is the SWAP detector temperature (vertical axis on the left in degrees C), overlaid with various power consumption profiles. It can be seen that the reduction in power consumption in PLASMA CURR CAL (orange) and BST CURR CAL (green) on Feb 7 triggered a SWAP temperature reduction from about 7C to 6C and the reduction in power consumption in FSXCCM CURR CAL (red) on Feb 8 triggered a further SWAP temperature reduction from about 6C to 5C.

time (04 Feb 11 – 17 Feb 11)
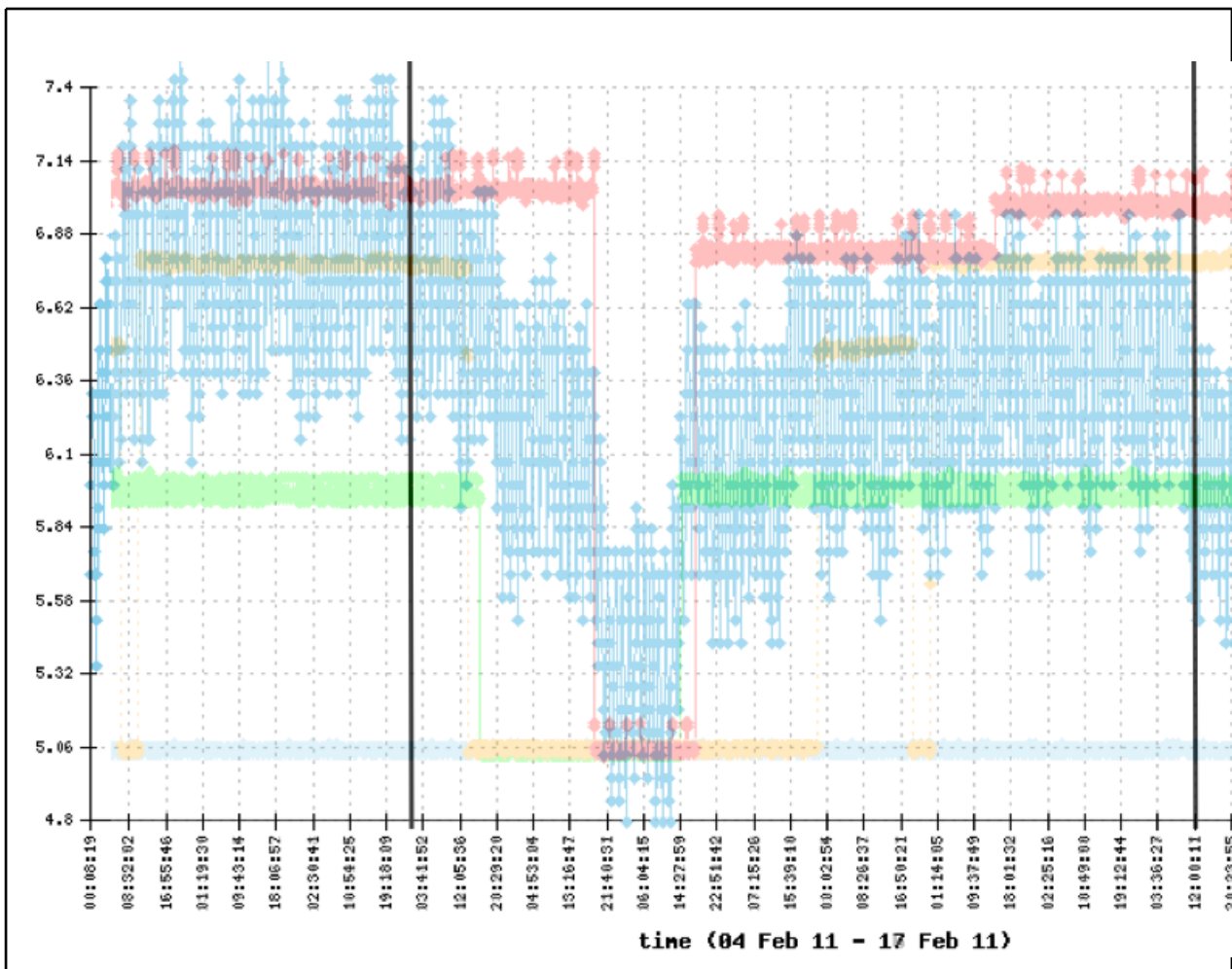
4. PROBA2 Science Center Status

David Berghmans was operator during this week.

<u>The following tools were updated</u> on the operational server:

Software name	Update	Date	Comment
SWBSDG	r3903, 3905, 3908, 3909	2011-02-07 2011-02-10	Various improvements by D. Seaton: -update dark calibration -bug withLAR-affected files -pixel map correction for rebinned images -improved error logging for LAR-affected files

On 06-02-2010, following software updates for the complete LYRA pipeline, we initiated the reprocessing of all LYRA data, starting with the data from January 1, 2010. By 13-02-2010 all fits files up to March 2010 were (re)created and all the data from 01-01-2010 to 31-08-2010 was processed up to LYTMR level. This reprocessing effort will continue until we catch up with the operational server.

5. Data reception & discussions with MOC

Passes
Various passes came in late, presumably because they had to be re-extracted but the data coverage was pretty complete in the end, see below.

Data coverage HK
Housekeeping data was complete during the period.

Data coverage SWAP
Total number of images between 2011 Feb 07 0UT and 2011 Feb 13 0UT: 5501
Highest cadence in this period: 30 seconds
Average cadence in this period: 94.23 seconds
Number of image gaps larger than 300 seconds: 82 (all eclipses + ESP campaign)
Largest data gap: 45.33 minutes (= ESP campaign)

Data coverage LYRA
LYRA data was complete during the period.

6. APPENDIX Frequently used acronyms

ADP	Ancillary Data Processor
ADPMS	Advanced Data and Power Management System
AOCS	Attitude and Orbit Control System
APS	Active Pixel image Sensor
ASIC	Application Specific Integrated Circuit
BBE	Base Band Equipment
CME	Coronal Mass Ejection
COGEX	Cool Gas Generator Experiment
CRC	Cyclic Redundancy Check
DR	Destructive Readout
DSLP	Dual Segmented Langmuir Probe
EIT	Extreme ultraviolet Imaging Telescope
FITS	Flexible Image Transport System
FOV	Field Of View FPA Focal Plane Assembly
FPGA	Field Programmable Gate Arrays
GPS	Global Positioning System
HAS	High Accuracy Star tracker
HK	Housekeeping
ICD	Interface Control Document
IIU	Instrument Interface Unit
IOS	Instrument Operations Sheet
LED	Light Emitting Diode
LEO	Low Earth Orbit
LYRA	LYman alpha RAdiometer
LYTMR	LYRA Telemetry Reformatter (software module of P2SC)
LYEDG	LYRA Engineering Data Generator (software module of P2SC)
MCPM	Mass Memory, Compression and Packetisation Module
MOC	Mission Operation Center
NDR	Non Destructive Readout

OBET	On board Elapsed Time
OBSW	On board Software
PE	Proximity Electronics
PGA	Programmable Gain Amplifier
PI	Principal Investigator
P2SC	PROBA2 Science Center
PPT	Pointing, Positioning and Time (software module of P2SC)
ROB	Royal Observatory of Belgium
SAA	South Atlantic Anomaly
SCOS	Spacecraft Operation System
SEU	Single Event Upset
SOHO	Solar and Heliospheric Observatory
SWAP	Sun Watcher using APS detector and image Processing
SWBSDG	SWAP Base Science Data Generator
SWEDG	SWAP Engineering Data Generator (software module of P2SC)
SWTMR	SWAP Telemetry Reformatter (software module of P2SC)
TBC	To Be Confirmed
TBD	To Be Defined
TBW	To Be Written
TC	Telecommand
TPMU	Thermal Plasma Measurement Unit
UTC	Coordinated Universal Time
UV	Ultraviolet