


P2SC-ROB-WR-093-20111226 Weekly report #093	<b>P2SC Weekly report</b>	
Period covered: Date: Written by: Released by:	Mon Dec 26 to Sun Jan 08, 2012 9 Jan 2012 Joe Zender David Berghmans	Royal Observatory of Belgium PROBA2 Science Center
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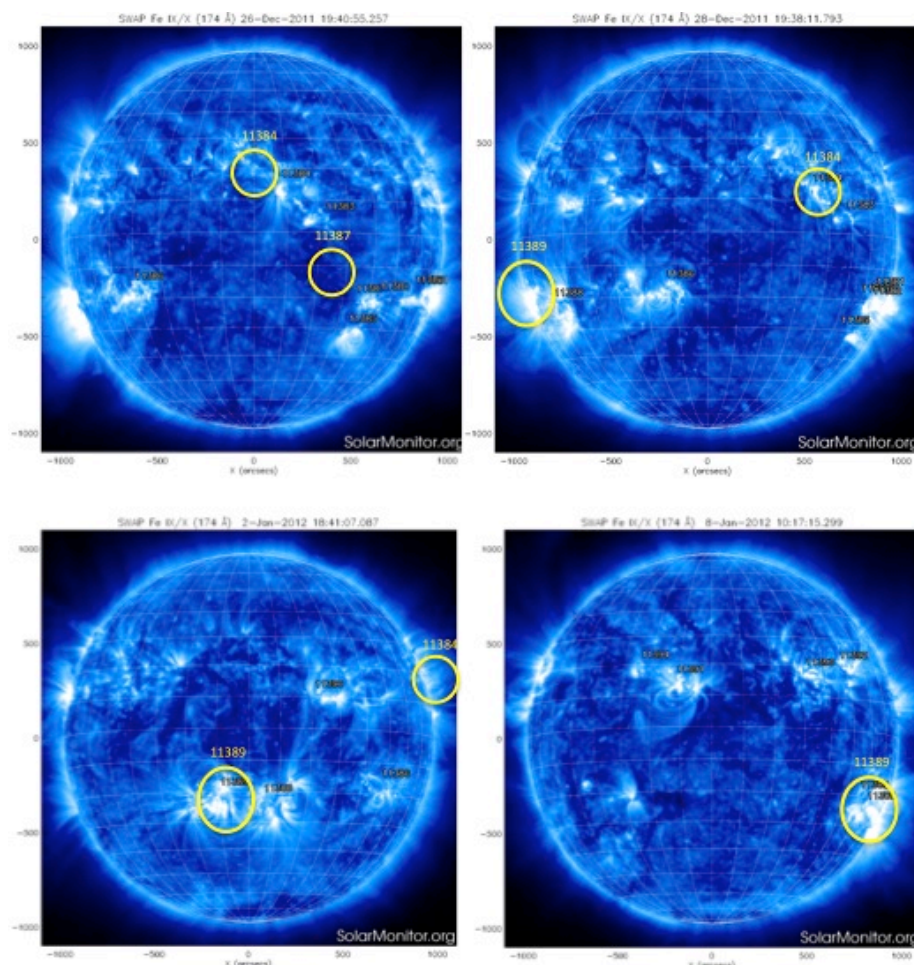
This is the report over the x-mas vacation period 2011/2012. The P2SC was not manned during the reporting period: operations were planned ahead and on-ground processing was checked only sporadically.

## 1. Science

### Solar & Space weather events

#### Overview

The SWAP images of December 26, December 28, January 2 and January 8 are shown below, with annotated active regions:



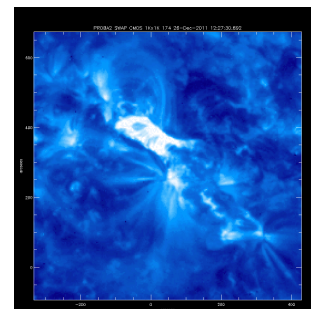
Just after midnight on 25 December, a filament eruption occurred in the northern hemisphere, central meridian. This event is quite impressive in SWAP.

26 December showed two M-flares and a number of C-flares (in the following only flares bigger than C4.0 are listed; list elements are: start date, peak date, end date, size, active region, LYRA observations):

20111226T02:13	02:27	02:36	M1.5	1387; fully observed, no oscillations
20111226T11:23	11:50	12:18	C5.7	1384; initial phase in occultation, no oscillations
20111226T20:12	20:30	20:36	M2.3	1387; fully observed, oscillations seen

All flares are visible in SWAP and in LYRA. Both M-flares were directed towards Earth and Mars with predicted Earth arrival on 28 December 2011.

Around 12:27 a nice post-flare arcade loop system is visible above AR11384.



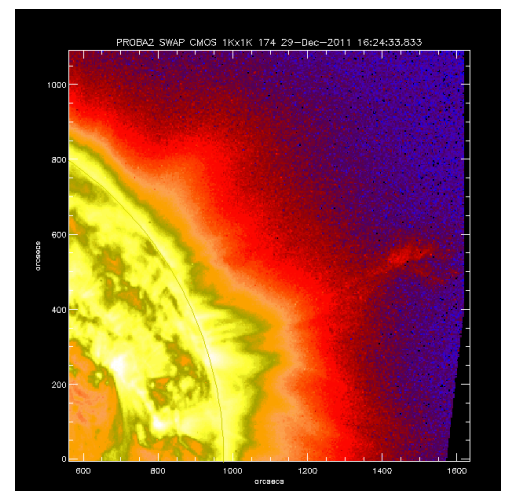
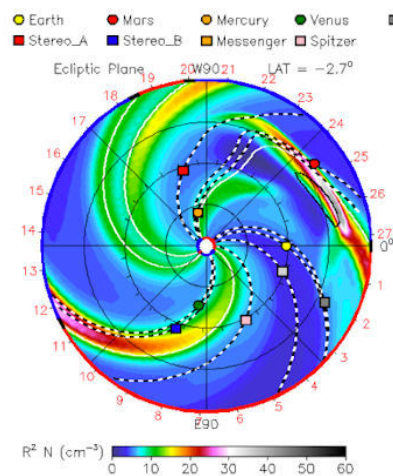
AR1387 continues to produce several C-flares on 27 December, all observed by SWAP and partly by LYRA (interrupted by occultations):

20111227T04:11	04:22	04:31	C8.9	1386; occulted
20111227T09:17	09:23	09:26	C4.0	1387; occulted
20111227T11:59	12:07	12:34	C6.2	1387; decay phase occulted, oscillations seen
20111227T18:31	18:36	18:43	C2.5	1387; fully observed, oscillations seen
20111227T21:46	22:26	22:49	C6.7	; decay phase occulted, no oscillations

AR11389 rotates into the FOV on the 28 December and producing several flaring activity for the rest of the year. Unfortunately, the LYRA detectors were often occulted by the Earth during several of the M-flares.

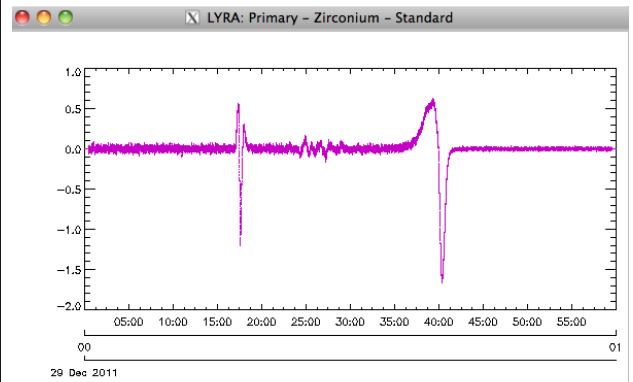
20111229T07:12	07:18	07:22	C7.3	1389; fully occulted
20111229T13:40	13:50	14:01	M1.9	1389; oscillations seen, two peaks seen at initial phase
20111229T20:53	21:01	21:14	C2.5	1389; end of occultation
20111229T21:43	21:51	21:59	M2.0	1389; oscillations seen, unfortunately LAR occurrence
20111230T03:03	03:09	03:13	M1.2	1389; fully occulted
20111230T10:27	10:32	10:37	C8.4	1389; oscillations seen
20111230T20:13	20:24	20:31	C4.4	; end of occultation
20111231T13:09	13:15	13:19	M2.4	1389; fully observed, occultations seen
20111231T16:16	16:26	16:34	M1.5	1389; fully observed, occultations seen

On 29 December around 16:24, SWAP observed a flare eruption on the north-west limb, clearly visible to the edge of the FOV. On 29th, the CME from 25th of December scratched the Earth early in the night and hit Mars at the end of the day.



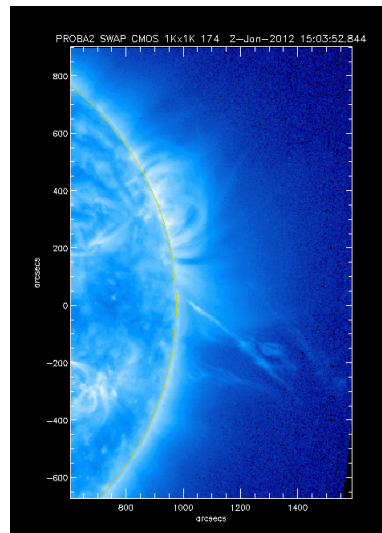
Also on the 29th, the LYRA Aluminium and Zirconium detector observed oscillations around 00:25. At this time, there was no flare, no South-Atlantic Anomaly crossing and nor large-angle rotation.

The plot on the right shows the difference signal of the Zirconium channel. The first peak at 00:16 is a LAR, the second peak at 00:38 is the start of an occultation (appearing as a peak in the difference signal).



The new year started with a nicely visible filament eruption in the north-east quadrant starting around 00:57.

On 2nd January around 15:00, the AR11384 - just disappeared behind the limb a few hours earlier - flared and is nicely visible in the SWAP images.



### Scientific campaigns

No scientific campaigns were executed during the x-mas vacation period.

### Outreach, papers, presentations, etc.

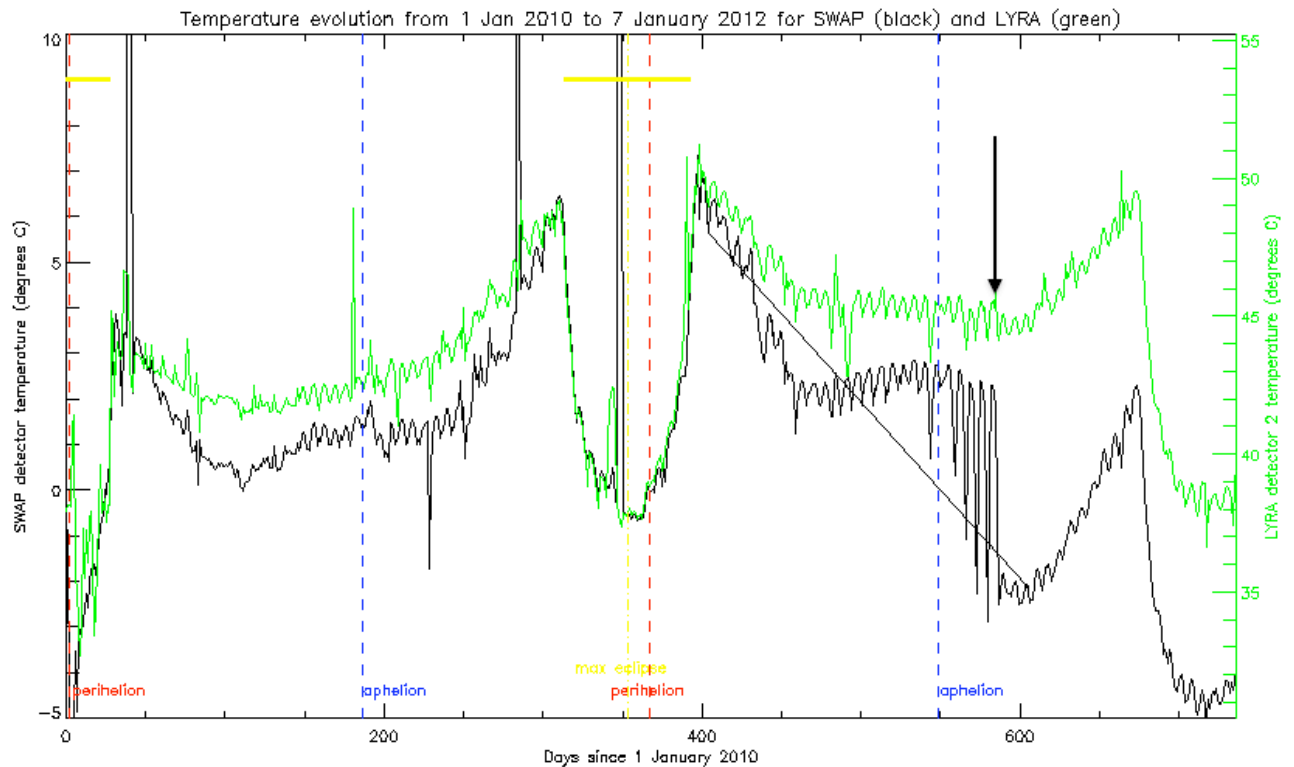
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## 1a. Temperature Evolution of SWAP and LYRA during 2010 and 2011

The lower plot shows the temperature evolution of the SWAP cold finger sensor (CF) and the LYRA detector FD2 over the years 2010 and 2011.

The black curve represents the SWAP detector temperature. The black arrow indicates the time when the shift of the LAR was exercised in September 2011. The temperature dropped by several degrees and is following a temperature evolution similar to the year before - including this temperature drop.

Also for LYRA, the green curve, the temperature dropped by a small amount and is following the 2010 trend.



A preliminary conclusion is that the current temperature environment for SWAP and LYRA detectors is similar to the one measured at commissioning.

## 2. LYRA instrument status

**Calibration**

LED calibration campaign on 20120104T0900 until 20120104T1826 performed nominally.

**IOS & operations**

Monday 26 Dec	Tuesday 27 Dec	Wednesday 28 Dec	Thursday 29 Dec	Friday 30 Dec	Saturday 31 Dec	Sunday 01 Jan
Nominal acquisition	Nominal acquisition	Nominal acquisition	Nominal acquisition	Nominal acquisition	Nominal acquisition	Nominal acquisition
LYIOS00209	LYIOS00209	LYIOS00209	LYIOS00209	LYIOS00209	LYIOS00209	LYIOS00209

Monday 02 Jan	Tuesday 03 Jan	Wednesday 04 Jan	Thursday 05 Jan	Friday 06 Jan	Saturday 07 Jan	Sunday 08 Jan
Nominal acquisition	Nominal acquisition + occultation on unit3 and unit1	Nominal acquisition + LED calibration + unit2 dark current from 17:45	Nominal acquisition + occultation on unit3 + unit2 dark current till 09:55	Nominal acquisition + occultation on unit3	Nominal acquisition + occultation on unit 3	Nominal acquisition + occultation on unit3
LYIOS00209	LYIOS00209	LYIOS00209	LYIOS00210	LYIOS00210	LYIOS00210+2 11	LYIOS00211

At the end of the calibration of January 4, the command to open cover 2 was deleted accidentally from the IOS by the operator, resulting in the acquisition of dark current instead of solar signal till January 05 09:55.

On January 07, during the whole calibration campaign, the reported status of cover 3 is obviously wrong (*cover3 open* = 0 AND *cover3 closed* = 0). When looking at the data, it appears that cover3 must actually be open. We have no idea why the *cover3 open* status is incorrect at the beginning of the campaign, but since it is only read after the release of one command, no update was expected before the end of the occultation campaign.

**LYRA detector temperature**

The LYRA detector 2 temperature (nominal unit) fluctuated between 37.5 and 40.3 degrees during nominal operations.

**To be explored**

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### 3. SWAP instrument status

**Calibration**

No calibration was executed during the reporting period.

**MCPM errors**

The number of MCPM recoverable errors increased from 1485 to 1494.

The number of MCPM unrecoverable errors is still 0.

**IOS & operations**

Monday 26 Dec	Tuesday 27 Dec	Wednesday 28 Dec	Thursday 29 Dec	Friday 30 Dec	Saturday 31 Dec	Sunday 01 Jan
Nominal acquisition 80s cadence + occult. jumps	Nominal acquisition + + occult. jumps	Raw images acquisition + occult. jumps	Nominal acquisition + + occult. jumps	Nominal acquisition + occult. jumps	Nominal acquisition + occult. jumps	Nominal acquisition + occult. jumps
IOS00353 749 images	IOS00353+357 768 images	IOS00357 761 images	IOS00357 744 images	IOS00358 762 images	IOS00358 592 images	IOS00358 687 images

Monday 02 Jan	Tuesday 03 Jan	Wednesday 04 Jan	Thursday 05 Jan	Friday 06 Jan	Saturday 07 Jan	Sunday 08 Jan
Nominal acquisition 80s cadence + occult. jumps	Nominal acquisition + occult. jumps	Raw images acquisition + occult. jumps	Nominal acquisition + + occult. jumps	Nominal acquisition + occult. jumps	Nominal acquisition + occult. jumps	Nominal acquisition + occult. jumps
IOS00358 756 images	IOS00359 734 images	IOS00359 752 images	IOS00359 683 images	IOS00359 639 images	IOS00359 547 images	IOS00360 564 images

IOS00354 was sent on Dec 26th, immediately followed by sending IOS00355 accidentally. This resulted in too many telecommands for the duration of pass 6622 (only 220 out of 290 commands could be uploaded). Both these IOSes contained exactly the same commands, so no harm should have been done, but as a safety measure, additional IOSes (356-358) were sent to make sure a complete and consistent commanding table was on board.

**SWAP detector temperature**

The SWAP Cold Finger Temperature fluctuated between -5.6 and -3.0 degrees Celsius, under nominal operations.



To be explored

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#### 4. PROBA2 Science Center Status

There was no dedicated P2SC operator during the reporting period. D. Berghmans and K. Stegen checked the P2SC status sporadically.

#### 5. Data reception & discussions with MOC

##### Passes

The following SWAP data gaps were observed

- > 20120107, pass 6726, 1 image missing
- > 20120107, pass 6721, 1 image missing
- > 20120105, pass 6704, 1 image missing
- > 20120103, pass 6687, 1 image missing
- > 20120101, pass 6669, 2 images missing
- > 20111231, pass 6666, 3 images missing
- > 20111230, pass 6652, 3 images missing
- > 20111228, pass 6641, 2 images missing
- > 20111227, pass 6626, 2 images missing
- > 20111226, pass 6622, 6 images missing
- > 20111225, pass 6608, 7 images missing

##### Data coverage HK

The HK data were complete over this period.

##### Data coverage SWAP

Some data gaps were observed, see above.

Statistics for the two weeks individually:

Total number of images between 2011 Dec 26 0UT and 2012 Jan 01 0UT: 4376

Highest cadence in this period: 80 seconds

Average cadence in this period: 117.96 seconds

Number of image gaps larger than 300 seconds: 87

Largest data gap: 30.67 minutes

Total number of images between 2012 Jan 02 0UT and 2012 Jan 08 0UT: 4187

Highest cadence in this period: 80 seconds

Average cadence in this period: 123.82 seconds

Number of image gaps larger than 300 seconds: 87

Largest data gap: 60.40 minutes



**Data coverage LYRA**

The LYRA data were complete.

**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
DSLIP	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)
MCMP	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
SWAVINT	SWAP AVerage INTensity
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