
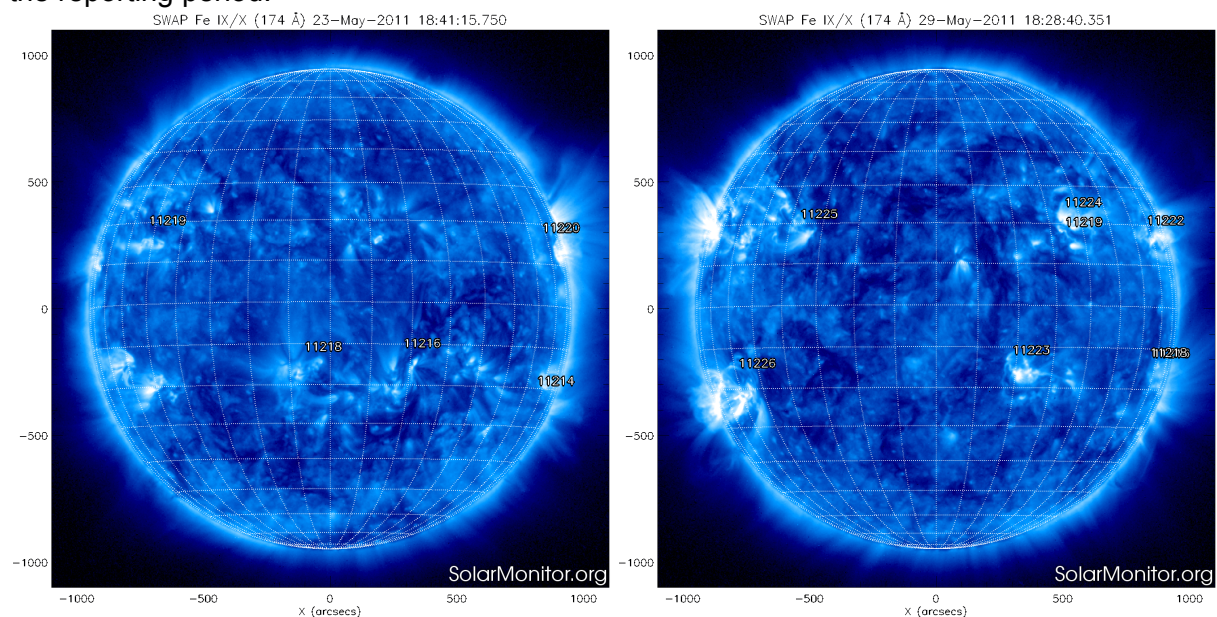


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|---|---|---|
| P2SC-ROB-WR-062-20110523 Weekly report #062 | P2SC Weekly report |  |
| Period covered: Date: Written by: Released by: | Mon May 23 to Sun May 29 2011 Mon May 30 2011 Anik De Groof Carlos Cabanas | Royal Observatory of Belgium PROBA2 Science Center |
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1. Science

Solar & Space weather events

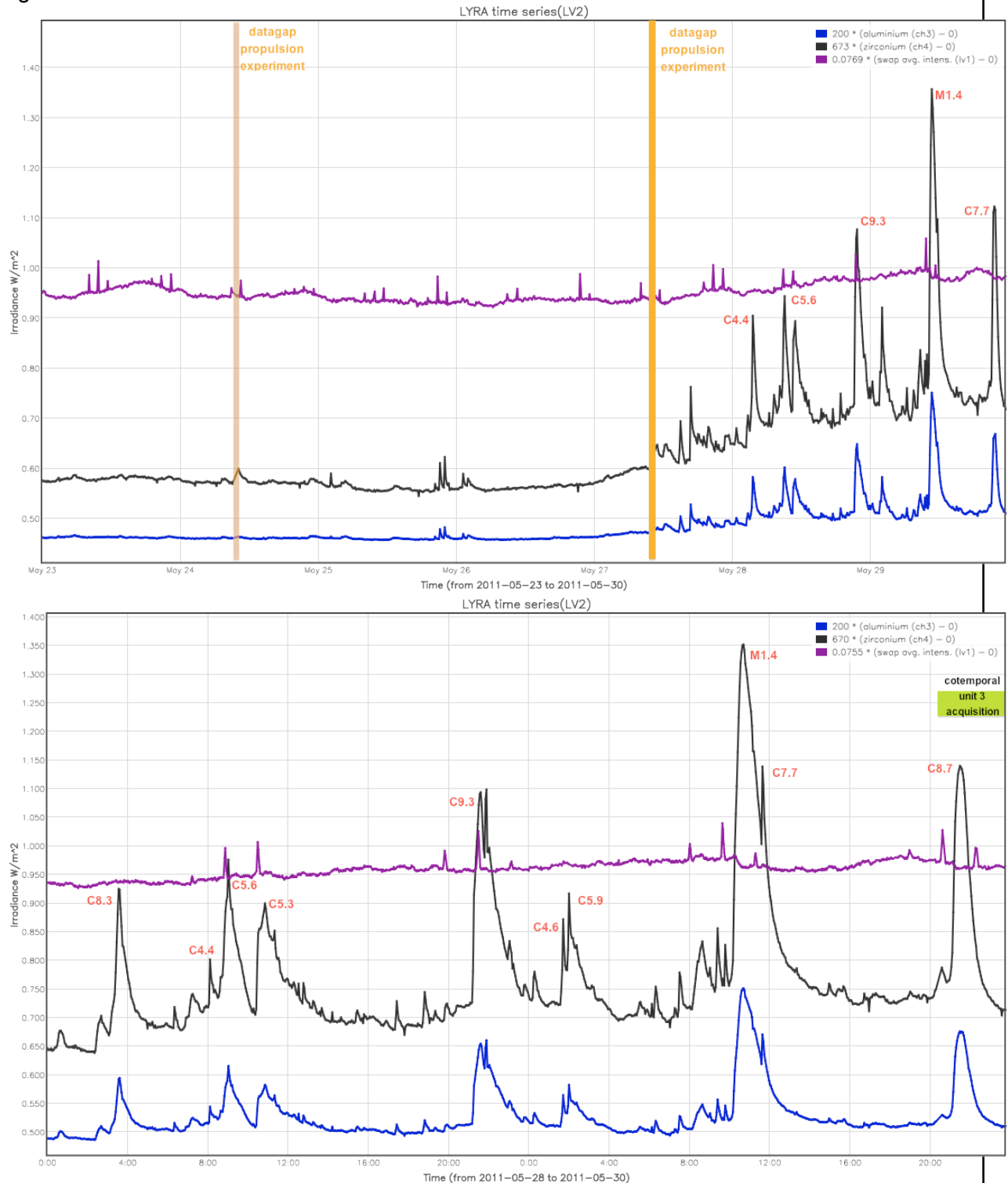
The two figures below show the active regions on SWAP images in the beginning and end of the reporting period.



The week started very quiet, with 5 active regions on the solar disk which had a very simple configuration (type alpha and beta) and did not produce any significant flares, except from 2 C1 flares on May 25.

On May 26, SWAP recorded a small collimated jet around 6:30UT in AR1225. This situation changed drastically on Fri May 27, when AR 11226 appeared on the East limb. Even before the region had turned completely on-disk (Friday), it produced several C flares. During the weekend, AR11226 produced a series of flares, ranging from C1 to M1.4: in total more than 30 events of C1-class or more.

LYRA registered all the flare signals, as shown in the overview of the week below. The bottom figure zooms in on the weekend events.



On the plots above, the overall rise in EUV signal can also be seen in the SWAP average intensity (SWAVINT) . The tiny spikes in this purple timeline are an effect of the SAA. The last flare of the week, a C8.7 flare, was also observed by LYRA unit 3. Unit 3 was observing together with unit 2 from May 29 20:20 until May 30 1UT (see green box in the plot above). The preliminary results of this campaign are summarized in the Subsection below.

Scientific campaigns

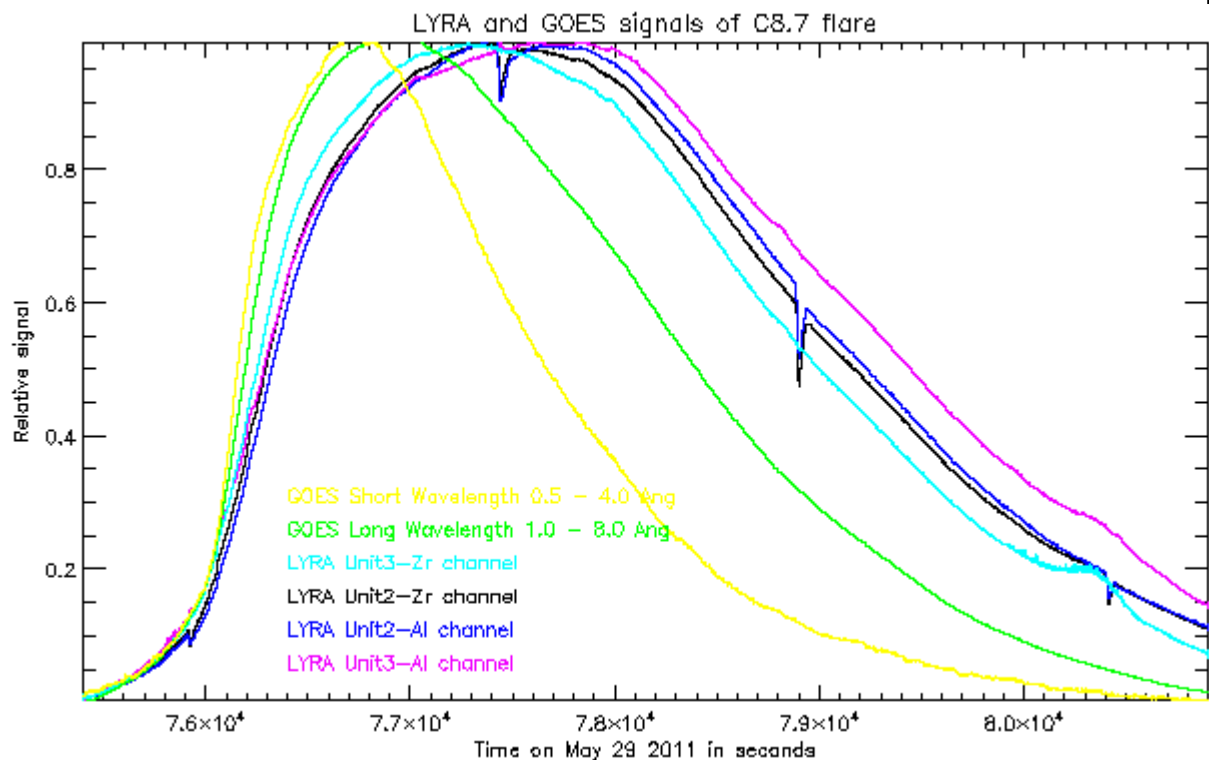
Backup acquisition campaign with unit 3

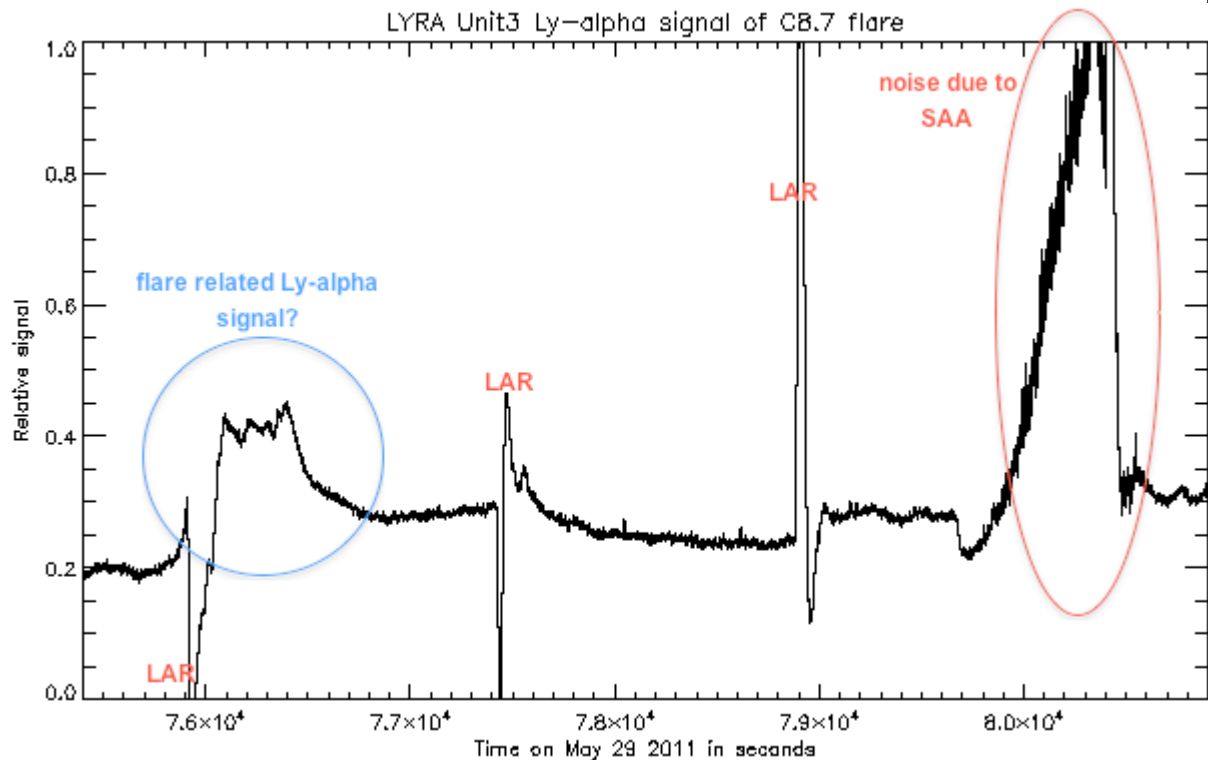
- Time period: May 29 20:20 - May 30 01:00UT
- Aim: flare hunting.

As AR11226 was very active during May 28-29, we commanded the backup acquisition campaign on May 29 from 20:20UT, aiming at catching a flare observed by the less-degraded unit 3 channels.

- First results:

Combining all relevant LYRA channels of units 2 and 3, with the GOES short and long X-ray wavelengths gives this interesting overview below. Unit 3 Ly-alpha is plotted on a separate graph to keep the graphs clear.





First (preliminary) conclusions:

- As usual, GOES channels (yellow, green) peak before LYRA Aluminium and Zirconium channels
- The Ly-alpha channel of unit 3, which is not yet degraded, shows a clear signal at the onset of the flare. This was also observed during the rising phase of impulsive flares in early 2010 - when the nominal unit 2 Ly-a channel was not yet degraded. Still, the Ly-alpha contribution to a flare is relatively small compared to the instrumental effects seen in the Ly-alpha channel.
- There are some interesting differences between the unit 2 and unit 3 Zirconium and Aluminium channels.

Some of these differences, e.g the broader flare peak in Unit3-Alum (pink) compared to Unit2-Alum (blue), are presumably due to the degradation in Unit 2 which primarily affects the EUV signal while the soft X-ray signal is non-degraded.

A surprising result is that the Unit3-Zr channel (light blue) peaks as first of the LYRA EUV channels. Further analysis will need to reveal why.

Some comments on the instrumental effects seen in the plot above:

- LARs primarily affect the signal in Unit 2 Zr, Unit 2 Alum. Unit 3 is less affected. The Unit 3 Ly-alpha signal in the plot above was stretched a lot to show the small increase in signal during the flare onset. As a side effect the LARs result in huge peaks.
- The steep rise in Ly-alpha around 8×10^4 seconds coincides with the little bumps in the other Unit 3 channels. These are all caused by the South Atlantic Anomaly, increasing noise in Silicon detectors. Unit 2 is much less affected as it has radiation hard, diamond detectors.

Outreach, papers, presentations, etc.

Guest investigator R. Kariyappa (India) was visiting this week.

Daniel Vagg, a student working with Joe Zender at ESTEC, also visited and presented the software tools he has developed for the (semi-automated) wavelet analysis of LYRA data.

To be explored

- Search for oscillations in the May 29 flare

- Why are there 2 data gaps of 20 mins in the unit 3 acquisition during the flare? The ascii files of LYTMR run 115070 seem complete and there was no VFC calibration ongoing during these times.

2. LYRA instrument status

Calibration

No calibration campaign this week.

IOS & operations

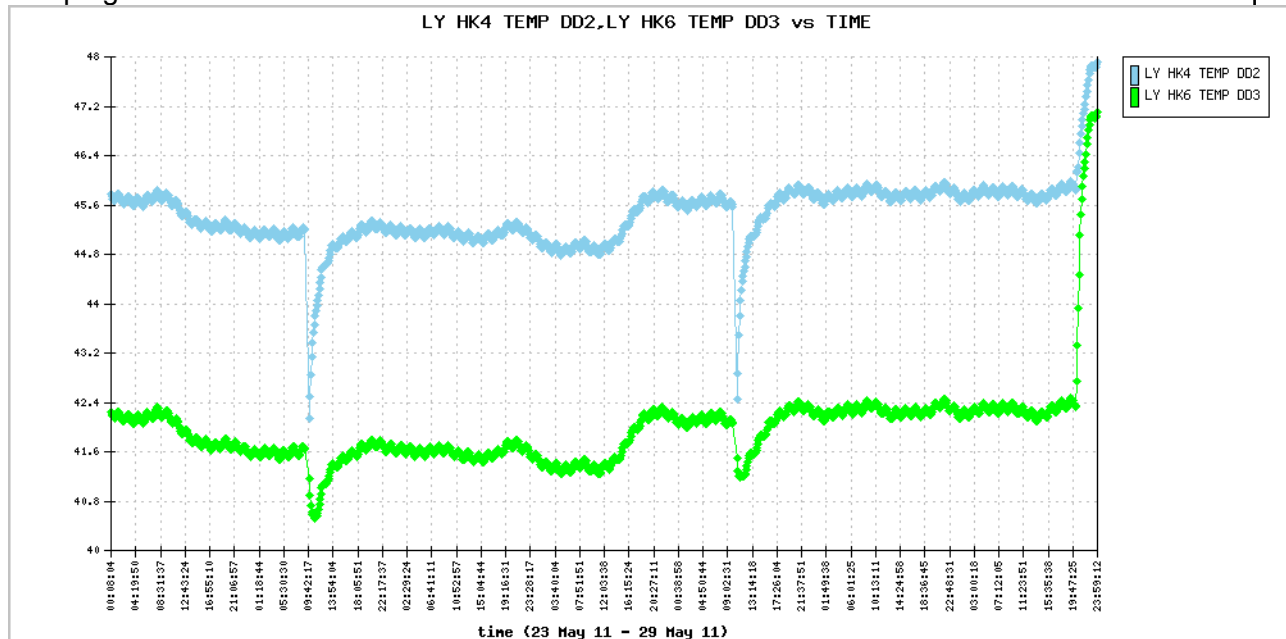
| Monday 23 May | Tuesday 24 May | Wednesday 25 May | Thursday 26 May | Friday 27 May | Saturday 28 May | Sunday 29 May |
|---|--|-------------------------------------|-------------------------------------|--|-------------------------------------|---|
| Nominal acquisition (LYIOS00166) | Nominal acquisition + propulsion experiment (LYIOS00167) | Nominal acquisition (LYIOS00167) | Nominal acquisition (LYIOS00167) | Nominal acquisition + propulsion experiment (LYIOS00167) | Nominal acquisition (LYIOS00167) | Nominal acquisition + flare hunting campaign (LYIOS00169) |

An ASIC reload (automatically scheduled onboard every 100 orbits) took place on 2011-05-25T02:09:10.

LYRA detector temperature

The LYRA detector 2 temperature (nominal unit) fluctuated between 42 and 48 degrees Celsius. Effects were seen of the propulsion experiments in which PROBA2 is flying in flight mode or anti-flight mode and LYRA is switched off.

The steep rise on Sunday evening is due to unit 3 being switched on for the backup acquisition campaign.



To be explored

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3. SWAP instrument status

MCPM recoverable errors

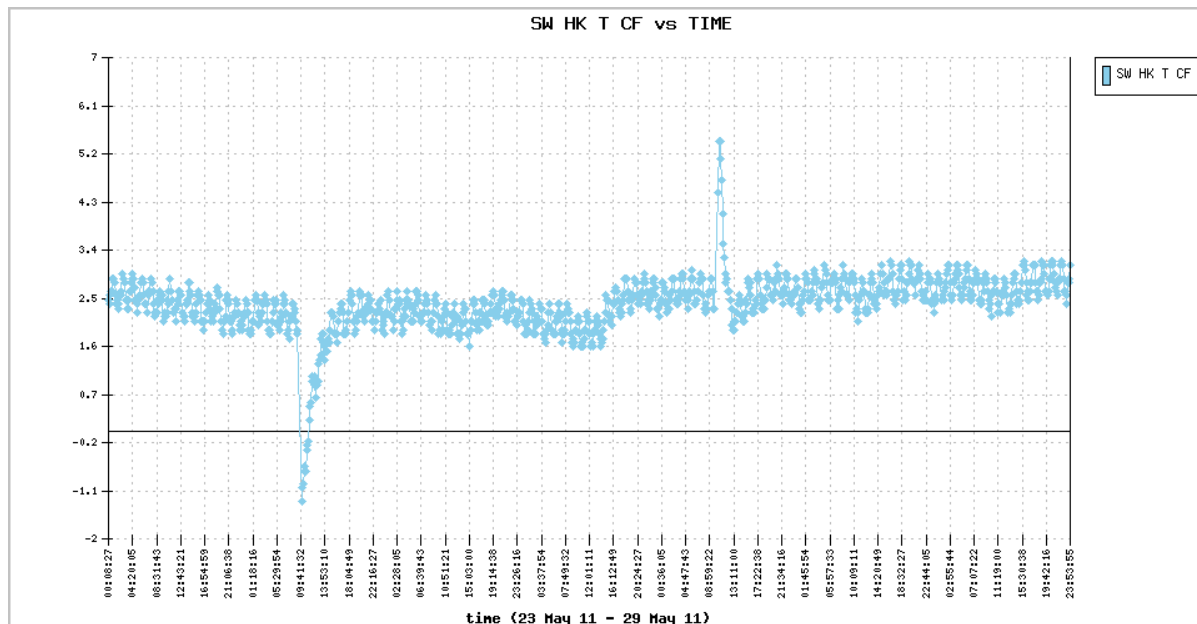
kept constant at 1212. The number of MCPM unrecoverable errors is still 0.

IOS & operations

| Monday 23 May | Tuesday 24 May | Wednesday 25 May | Thursday 26 May | Friday 27 May | Saturday 28 May | Sunday 29 May |
|------------------------|--|---|--------------------------------------|--|------------------------|------------------------|
| Nominal acquisition | Nominal acquisition + propulsion experiment | Nominal acquisition + switch to 110s cadence | Nominal acquisition + ESP test | Nominal acquisition + propulsion experiment | Nominal acquisition | Nominal acquisition |
| (IOS00298) | (IOS00299) | (IOS00300) | (IOS00300) | (IOS00300) | (IOS00300) | (IOS00300) |
| 720 images | 701 images | 738 images | 768 images | 674 images | 765 images | 687 images |

SWAP detector temperature

The SWAP Cold Finger Temperature fluctuated between -1,5 and 5,4 degrees Celsius. The two peaks are an effect of the propulsion experiments in which PROBA2 is flying in flight mode or anti-flight mode and SWAP is switched to IDLE.



To be explored

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4. PROBA2 Science Center Status

Anik De Groof was operator during this week.

There were no P2SC tools updated on the operational server this week.

5. Data reception & discussions with MOC

Passes

There were no big problems with the passes this week.

Data coverage HK

Complete.

Data coverage SWAP

The overall data coverage was very good this week. Apart from 3 gaps due to ongoing experiments (see below), SWAP was acquiring at 110s or 120s cadence with very minimal image loss.

Statistics for complete week:

Total number of images between 2011 May 23 OUT and 2011 May 30 OUT: 5053

Highest cadence in this period: 110 seconds

Average cadence in this period: 119.68 seconds

Number of image gaps larger than 300 seconds: 3

Largest data gap: 39.45 minutes

The 3 data gaps were respectively 39, 29 and 40mins long and were caused by the 2 propulsion tests and the ESP test (29mins gap).

Data coverage LYRA

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 |
| IU | 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 |
| SWAVINT | SWAP AVerage INTensity |
| 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 |