P2SC-ROB-WR-426 - 20180521 Weekly report #426	**P2SC Weekly report**	
Period covered: Date: Written by: Approved by:	Mon May 21 to Sun May 27, 2017 29 May 2018 Laurence Wauters Matthew West	Royal Observatory of Belgium - PROBA2 Science Center
To:	LYRA PI, marie.dominique@sidc.be SWAP PI, david.berghmans@sidc.be	http://proba2.sidc.be ++ 32 (0) 2 3730559
cc:	ROB DIR, ronald@oma.be ESA Redu, Etienne.Tilmans@esa.int ESA D/SRE, Joe.Zender@esa.int ESA D/TEC, Juha-Pekka.Luntama@esa.int	

1. Science

Solar & Space weather events

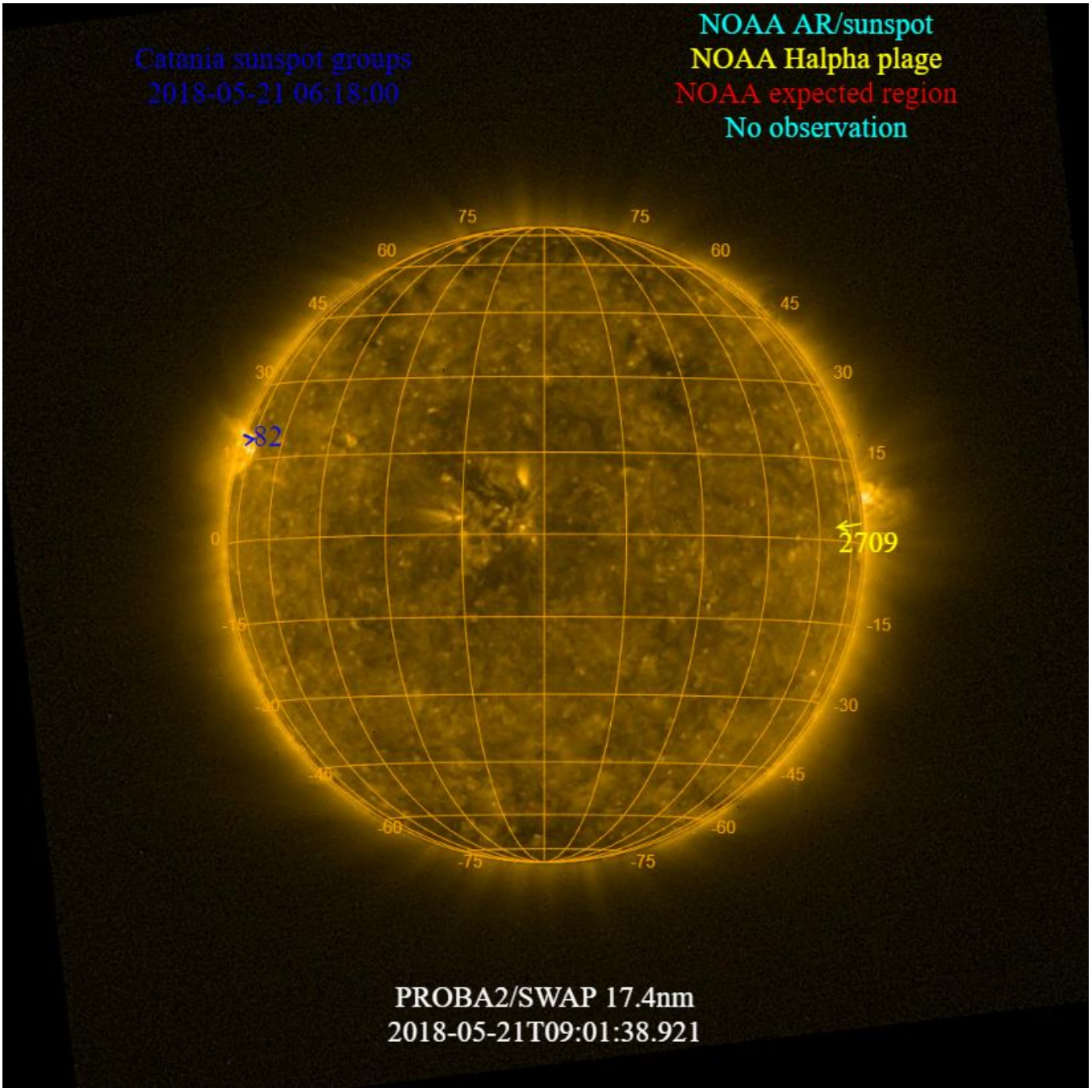
The level of solar activity[1] fluctuated between **very low and low** this week.

Only M- and X-flares are mentioned, the most energetic one(s) per day are presented in **bold**:

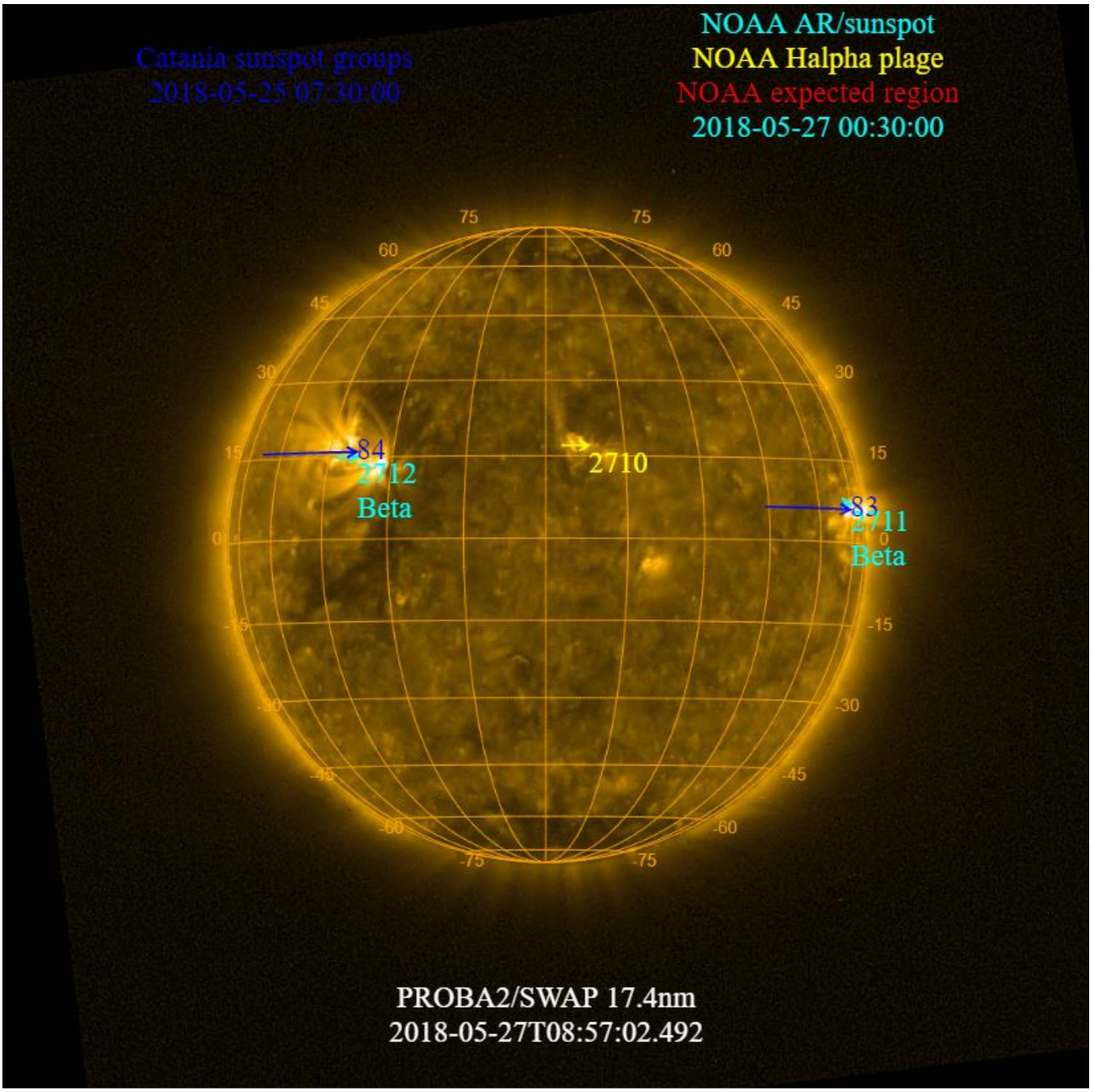
	Monday 21 May	Tuesday 22 May	Wednesday 23 May	Thursday 24 May	Friday 25 May	Saturday 26 May	Sunday 27 May
Activity	very low	very low	low	very low	very low	very low	very low
Flares	-	-	-	-	-	-	-

[1] See appendix. All timings are given in UT.

The SWAP images of May 21 and May 27 are shown below, with annotated active regions.



http://sidc.be/soteria/soteria.php


Catania sunspot groups
2018-05-25 07:30:00
NOAA AR/sunspot
NOAA Halpha plage
NOAA expected region
2018-05-27 00:30:00
84
2712
Beta
2710
83
2711
Beta
PROBA2/SWAP 17.4nm
2018-05-27T08:57:02.492

Solar Activity

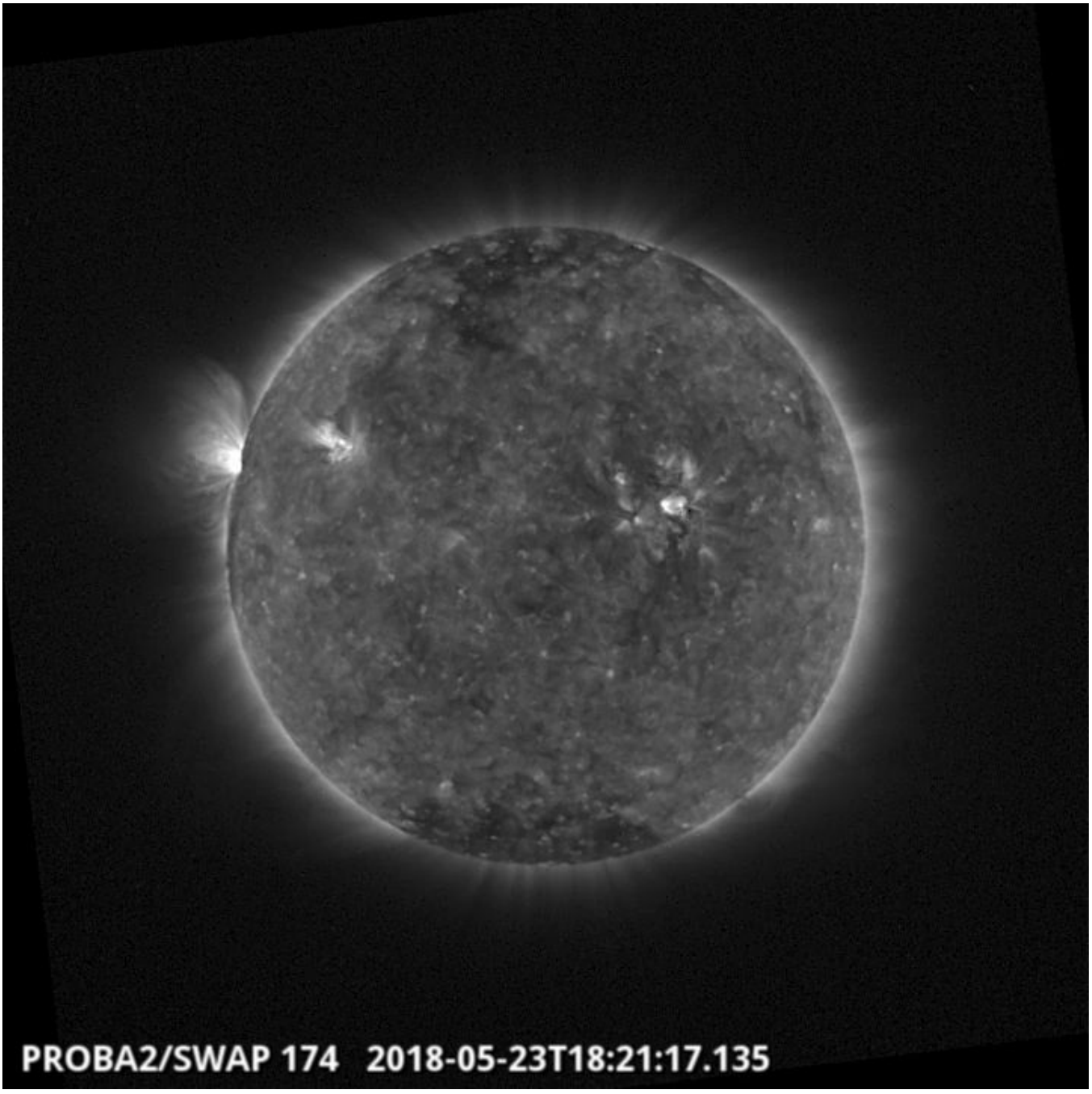
Solar flare activity fluctuated between very low and low during the week.
In order to view the activity of this week in more detail, we suggest to go to the following website from which all the daily (normal and difference) movies can be accessed: http://proba2.oma.be/ssa
This page also lists the recorded flaring events.

A weekly overview movie can be found here (SWAP week 426).

Details about some of this week's events, can be found further below.

If any of the linked movies are unavailable they can be found in the P2SC movie repository here

Wednesday May 23

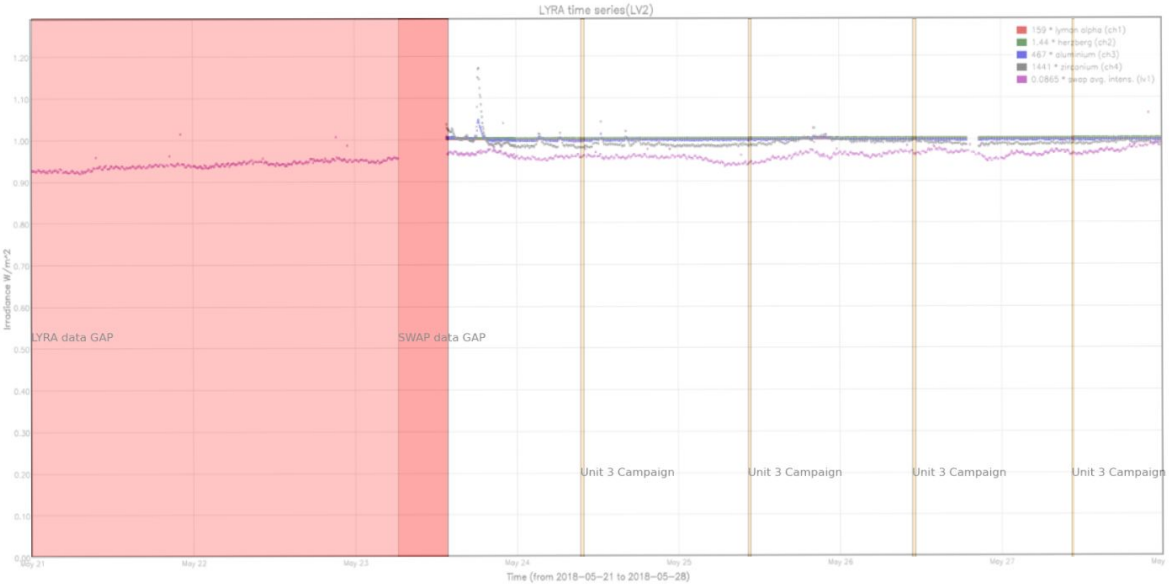


The largest flare of the week was a C2.0, the flare is visible on the East limb in the SWAP image above at 18:21 UT.

Find a movie of the event here (SWAP movie)

An overview of the weekly LYRA & SWAP data is provided below:
The following curves are visible:

- black: Zirconium Channel LYRA Unit 2
- blue: Aluminium Channel of LYRA Unit 2
- purple: SWAVINT (SWAP Average Intensity; integrated solar intensity per SWAP image pixel)



The blue shaded periods related to SWAP, correspond to, from left to right:

- None

The orange shaded periods related to LYRA correspond to, from left to right:

- Daily unit 3 campaign, 2018-05-24
- Daily unit 3 campaign, 2018-05-25
- Daily unit 3 campaign, 2018-05-26
- Daily unit 3 campaign, 2018-05-27

The red shaded periods related to other issues corresponds to:

- LYRA data gap from 2018-05-21 00:00 (buffer overflow in LYRA Data Manager data structure) until 2018-05-23 13:44:30 (LYRA restarted time after PROBA2 reboot which occur at 9:53)
- SWAP data GAP between 2018-05-23 7:41 and SWAP switched ON at 2018-05-23 13:44:30. The data gap before PROBA2 reboot at 9:53 is due to the small size of BINSWAP file for pass 27539.
- See REDU bulletin for details

Outreach, papers, presentations, etc.

Please consult http://proba2.oma.be/science/publications for a list of interesting articles using SWAP & LYRA data, as well as a link to the complete article list.

The science section of this weekly report is also published in the weekly STCE newsletter (http://www.stce.be/newsletter/newsletter.php).

Hahn et al. published a paper entitled: “Density Fluctuations in a Polar Coronal Hole”. The authors carefully analysed PROBA2/SWAP images to determine density fluctuations in a plume and inter-plume region of a polar coronal hole. Their analysis is based on the root-mean-square (RMS) amplitude of the intensity fluctuations in the images, which relates to the density. To determine what portion of these fluctuations is physical, instrumental effects need to be taken out. Therefore, a thorough analysis of the detector noise and scattered light in SWAP was performed and these contributions were taken out of the RMS calculations. Using SWAP data, the authors were able to extend their analysis up to a height of about 1.35~$R_{\sun}$. which was not done before. At this height, the authors find density fluctuations of Δne/ne≈~10--20\%, generated in the corona itself. One possibility is that these density fluctuations are generated by an instability of Alfven waves. This generation mechanism is consistent with some theoretical models and with observations of Alfven wave amplitudes in coronal holes. Although the authors find that the energy of the observed density fluctuations is small, these fluctuations are likely to play an important indirect role in coronal heating by promoting the reflection of Alfven waves and driving turbulence.

Guest Investigator Program

- Palmerio, E used SWAP to work on Earth-impacting coronal mass ejections erupting from the solar limb, and will be visiting ROB from May 21 – Jun 1.

2. LYRA instrument status

Calibration

No calibration campaign on Wednesday this week.

IOS & operations

Monday 21 May	Tuesday 22 May	Wednesday 23 May	Thursday 24 May	Friday 25 May	Saturday 26 May	Sunday 27 May
Nominal acquisition LYIOS00697	Nominal acquisition LYIOS00697	Nominal acquisition LYIOS00699 & LYIOS00704	Nominal acquisition + daily U3 LYIOS00704	Nominal acquisition + daily U3 LYIOS00704	Nominal acquisition + daily U3 LYIOS00705	Nominal acquisition + daily U3 LYIOS00705

The following science campaigns were performed by LYRA:

- daily U3 observation campaigns

LYRA detector temperature

LYRA detector 2 temperature globally varied between 39.28 and 51.90 °C.

3. SWAP instrument status

Calibration

No calibration campaign on Tuesday this week.

MCPM errors

The number of MCPM recoverable errors increased from 0 to 4800.
The number of MCPM unrecoverable errors remained at 0.

IOS & operations

Monday 21 May	Tuesday 22 May	Wednesday 23 May	Thursday 24 May	Friday 25 May	Saturday 26 May	Sunday 27 May
Nominal acquisition IOS00772 682 images	Nominal acquisition IOS00772 652 images	Nominal acquisition IOS00773 462 images	Nominal acquisition IOS00773 770 images	Nominal acquisition IOS00773 701 images	Nominal acquisition IOS00774 674 images	Nominal acquisition IOS00774 662 images

Special operations for SWAP, this week:

- None

SWAP detector temperature

The SWAP Cold Finger Temperature globally varied between -5.85 and 0.07 °C.

4. PROBA2 Science Center Status

The main operator is Laurence Wauters.

The following changes were made to the P2SC:

- None.

5. Data reception & discussions with MOC

Passes

The delivery of the passes for this week (passes 27518 to 27581) was nominal, except for:

- 27518 to 27540 (Due to a buffer overflow in the LYRA Data Manager data structure. This was rectified by a PROBA2 reboot and LYRA was restarted.)

Data coverage HK

All HK data files (LYRA_AD) have been received, except:

- 27540 non nominal, operations after PROBA2 reboot (9:53:35z) , (Due to a buffer overflow in the LYRA Data Manager data structure. This was rectified by a PROBA2 reboot and LYRA was restarted.)
- 27539 has a very small size (The reboot of the satellite was triggered on pass 27539 before the store dumps have finished.)

Data coverage SWAP

All SWAP Science data files (BINSWAP) have been received, except:

- 27540, operations after PROBA2 reboot (9:53:35z),
- 27539 has a very small size (The reboot of the satellite was triggered on pass 27539 before the store dumps have finished. The SWAP images onboard were also lost)

Total number of images between 2018 May 21 00:00 UT and 2018 May 28 00:00 UT: 4616
Highest cadence in this period: 110 seconds
Average cadence in this period: 131.00 seconds
Number of image gaps larger than 300 seconds: 113
Largest data gap: 361.42 minutes

Data coverage LYRA

All LYRA Science data files (BINLYRA) have been received, except:

- 27518 to 27540 (Due to a buffer overflow in the LYRA Data Manager data structure. This was rectified by a PROBA2 reboot and LYRA was restarted. All data was lost)

6. APPENDIX: Frequently used acronyms

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
DAC	Data Acquisition Controller
DBR	Deployment, backup & recovery
DDA	Decommutated data archive
ESP	Experimental Solar Panel
FITS	Flexible Image Transport System
FOV	Field Of View FPA Focal Plane Assembly
FPGA	Field Programmable Gate Arrays
GPS	Global Positioning System
HK	Housekeeping
IOS	Instrument Operations Sheet
LED	Light Emitting Diode
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
OBSW	On board Software
PI	Principal Investigator
P2SC	PROBA2 Science Center
ROB	Royal Observatory of Belgium
SAA	South Atlantic Anomaly
SEU	Single Event Upset
SoFAST	Solar Feature Automated Search Tool
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
TC	Telecommand
UTC	Coordinated Universal Time
UV	Ultraviolet
VFC	Voltage to Frequency Converter

7. APPENDIX Solar Activity Definitions

In the science section we use the following solar activity standards.

The standard scale for solar activity is:
- very low (almost no flares, only B)
- low (a few C flares)
- moderate (many C flares and at least an M flare)
- high (several M flares and an X flare)
- very high (continuous background of C flares, numerous M flares, more than one X flare)