


P2SC-ROB-WR-312 - 20160314 Weekly report #312	<b>P2SC Weekly report</b>	
Period covered: Date:  Written by: Approved by:	Mon Mar 14 to Sun Mar 20, 2016 23 Mar 2016  Katrien Bonte Matthew West	Royal Observatory of Belgium  - PROBA2 Science Center
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## 1. Science

### Solar & Space weather events

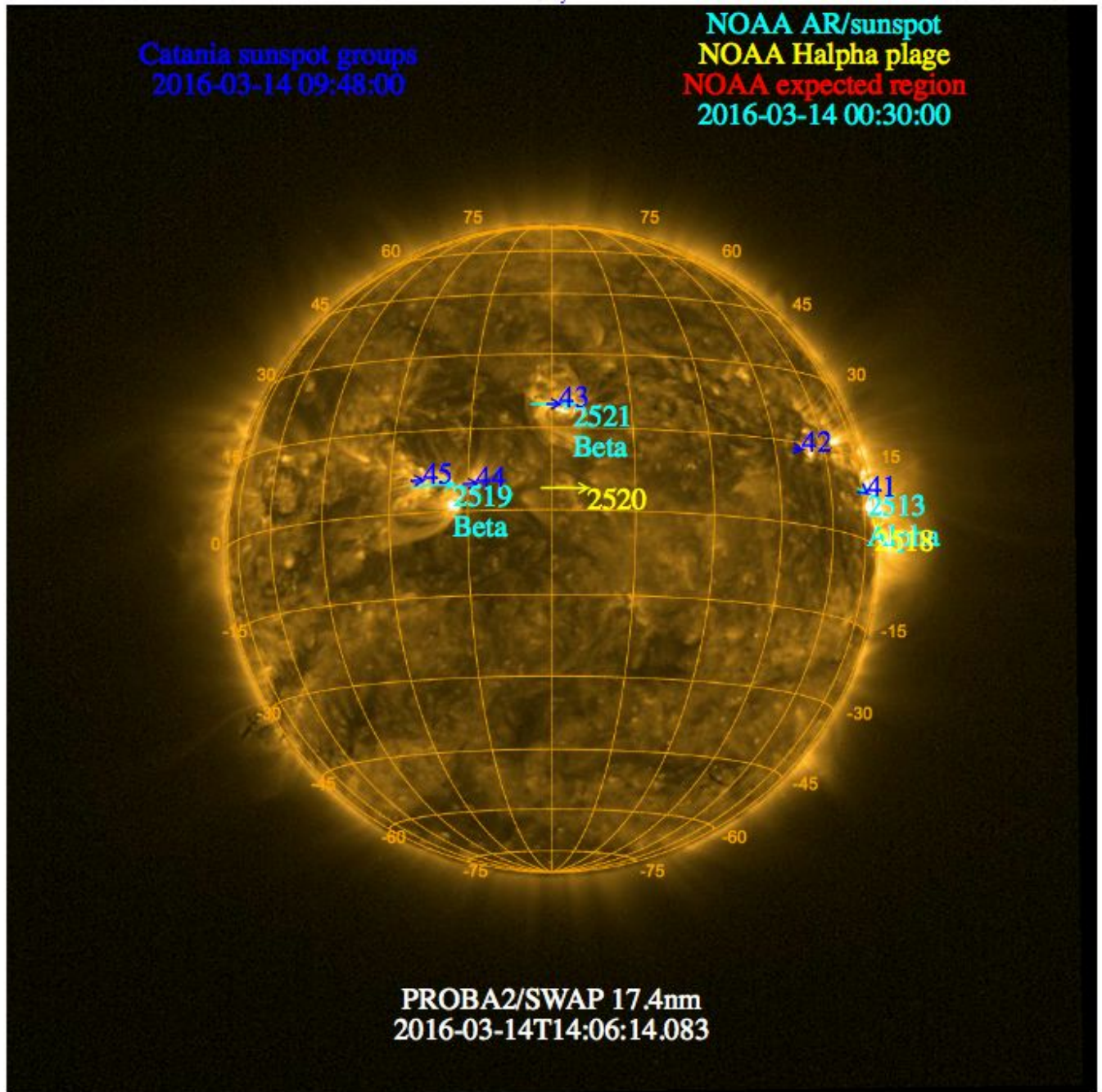
The level of solar activity<sup>1</sup> fluctuated between **very low** and **low** this week.

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

	Monday 14 Mar	Tuesday 15 Mar	Wednesday 16 Mar	Thursday 17 Mar	Friday 18 Mar	Saturday 19 Mar	Sunday 20 Mar
Activity	very low	low	low	very low	very low	very low	low
Flares	-	-	-	-	-	-	-

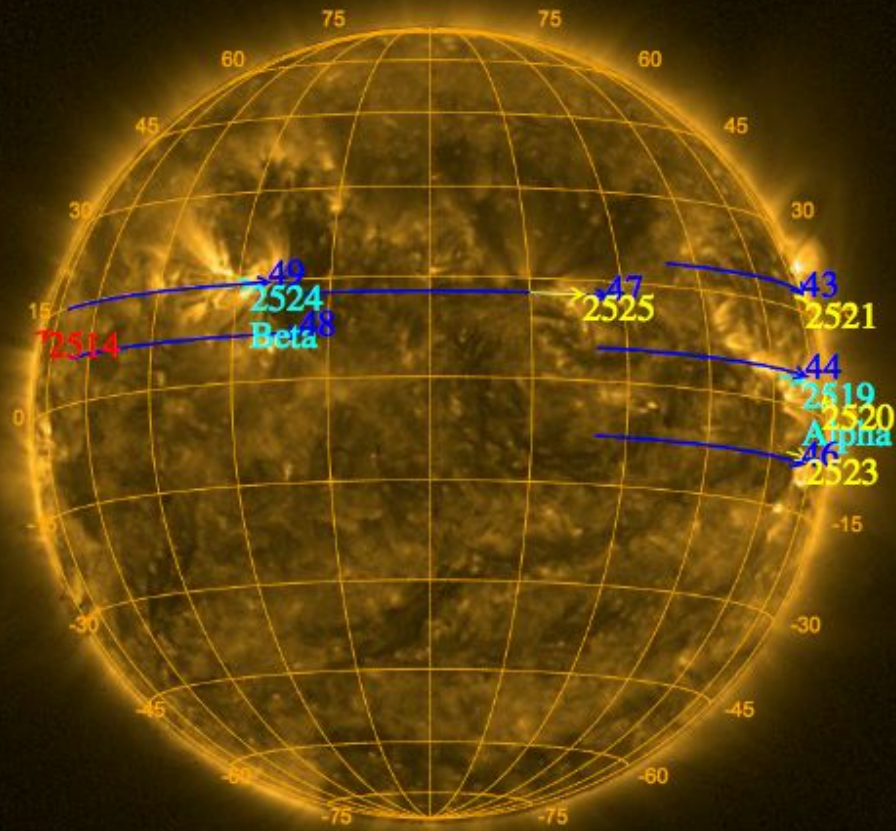
<sup>1</sup> See appendix. All timings are given in UT.

The SWAP images of Mar 14 and Mar 20 are shown below, with annotated active regions.



Catania sunspot groups  
2016-03-17 09:30:00

NOAA AR/sunspot  
NOAA Halpha plage  
NOAA expected region  
2016-03-20 00:30:00



PROBA2/SWAP 17.4nm  
2016-03-20T14:07:35.226



## 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 312).

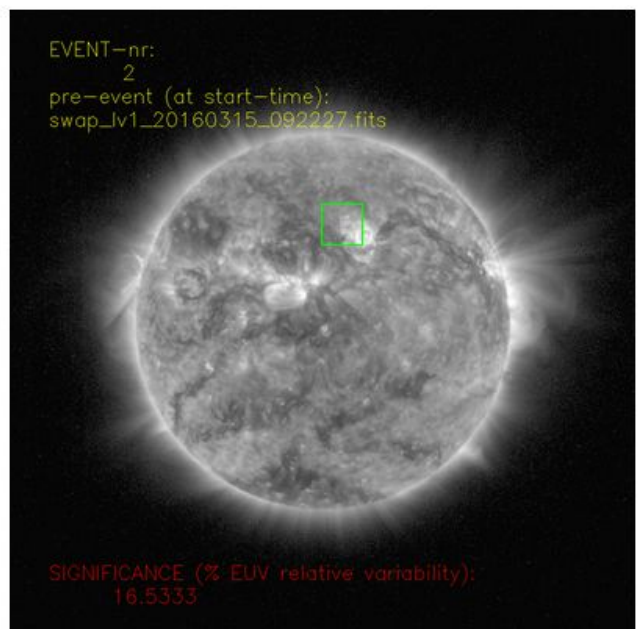
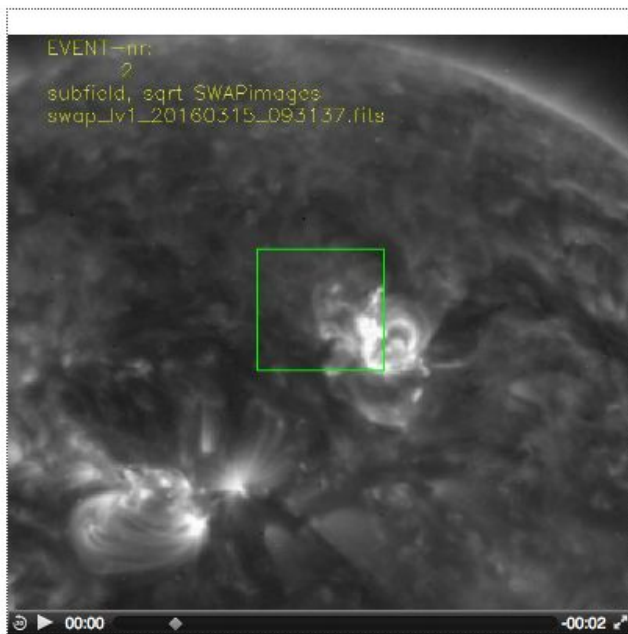
We did not observe any M or X-class flares this week, only a few C-class flares. Below we provide SWAP images showing an example flare, a C1.2 flare produced by NOAA Active Region (AR) 2521 on 2016-Mar-15, peaking at 09:34 UT. On 2016-Mar-14, a filament eruption was also observed.

The annotated snapshots of the flare are produced by the Solar Feature Automated Search Tool (SoFAST). This tool detects dynamic solar events in EUV images from SWAP in near real-time. The snapshots illustrate the location of the flare on the solar disk (right) and a zoomed image (left).

The complete SoFAST online event list and additional plots are available at: <http://www.sidc.be/sofast>.

### **2016-Mar-15, AR 2521:**

#### **C1.2 peaking around 09:34 UT**

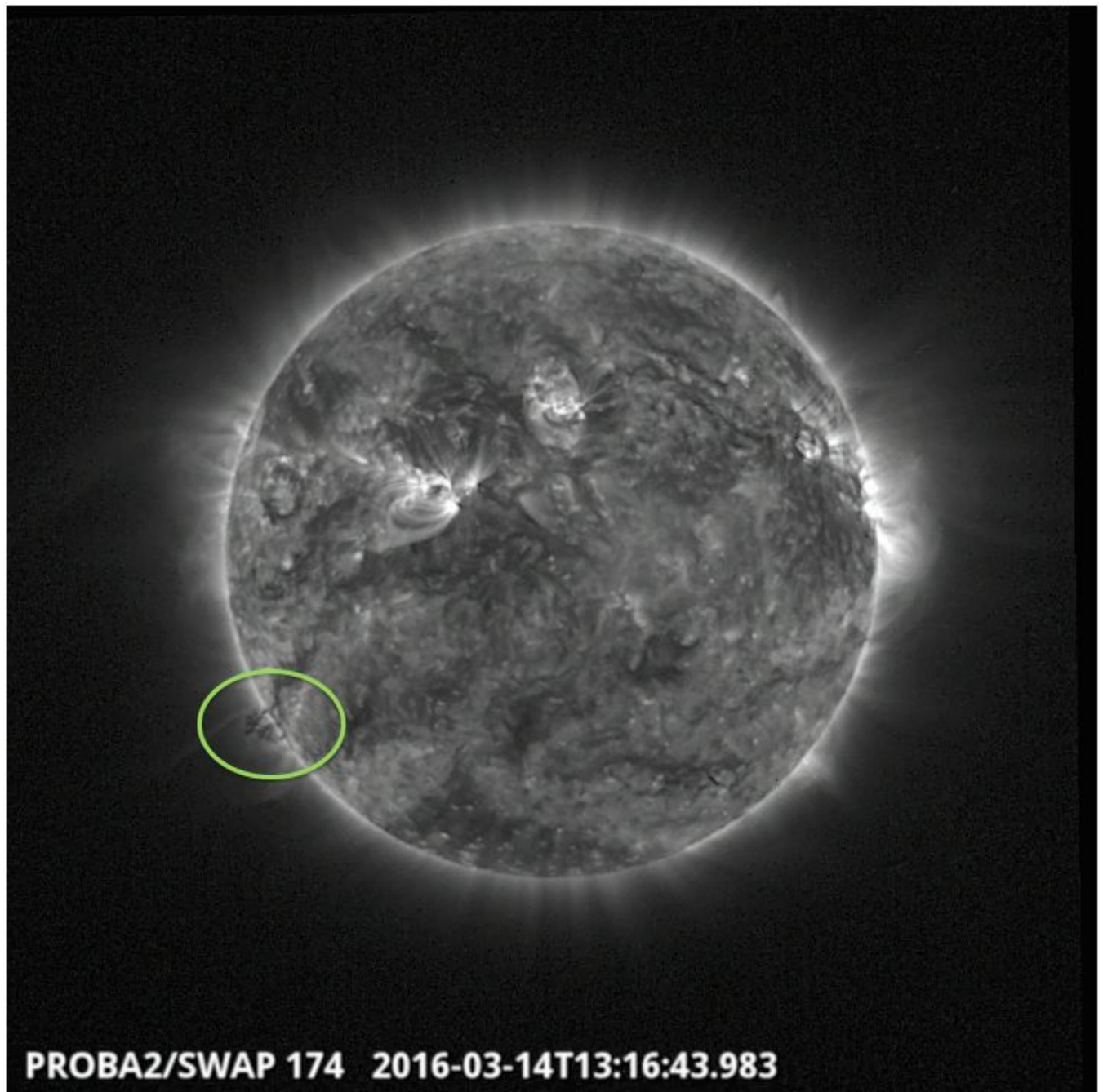


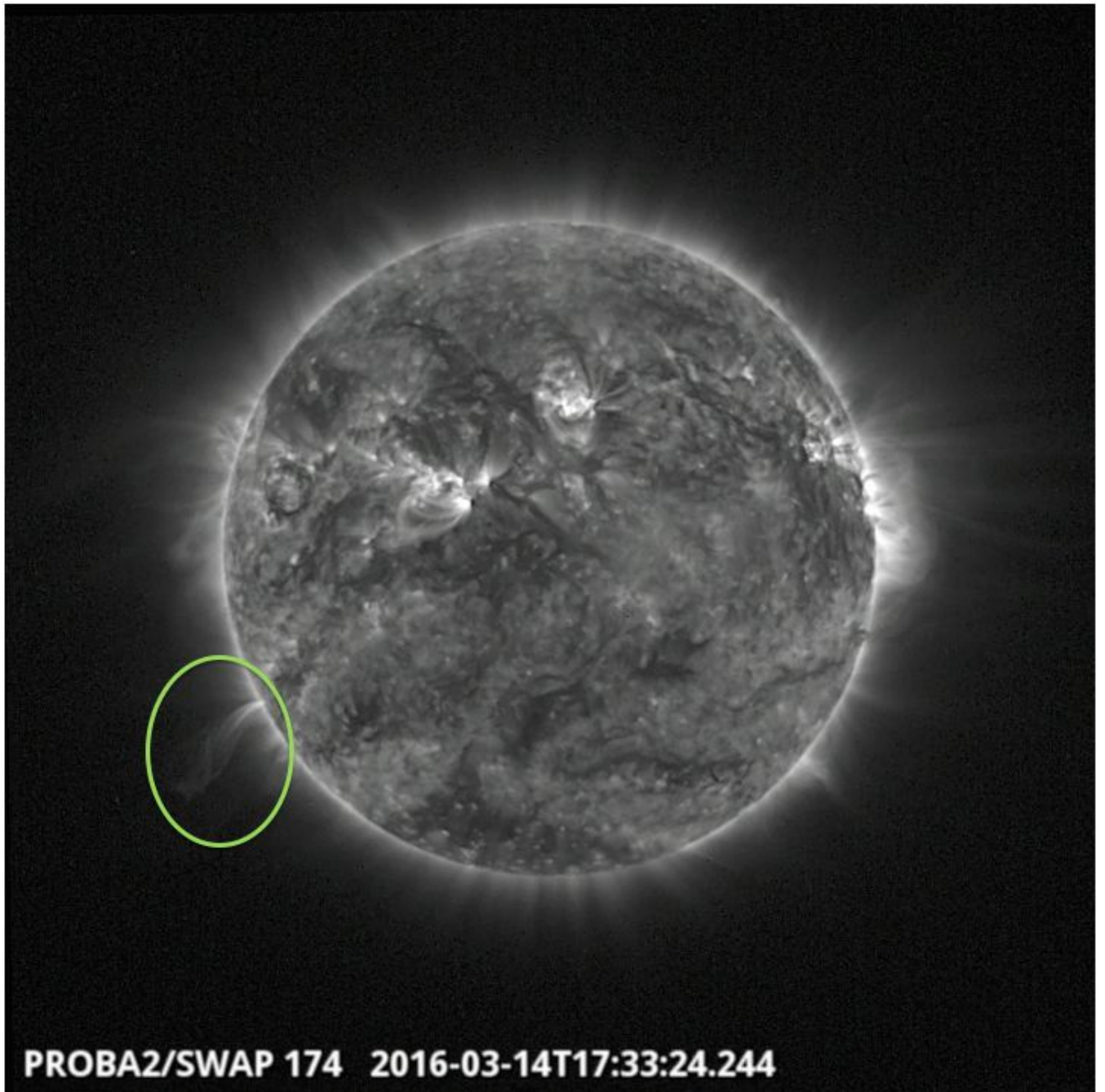
A movie of the event can be found [here](#) (SWAP daily movie)

**2016-Mar-14:**

**Filament eruption in the South-East quadrant, around 15:30 UT.**

Below we provide annotated SWAP images before and after the event.



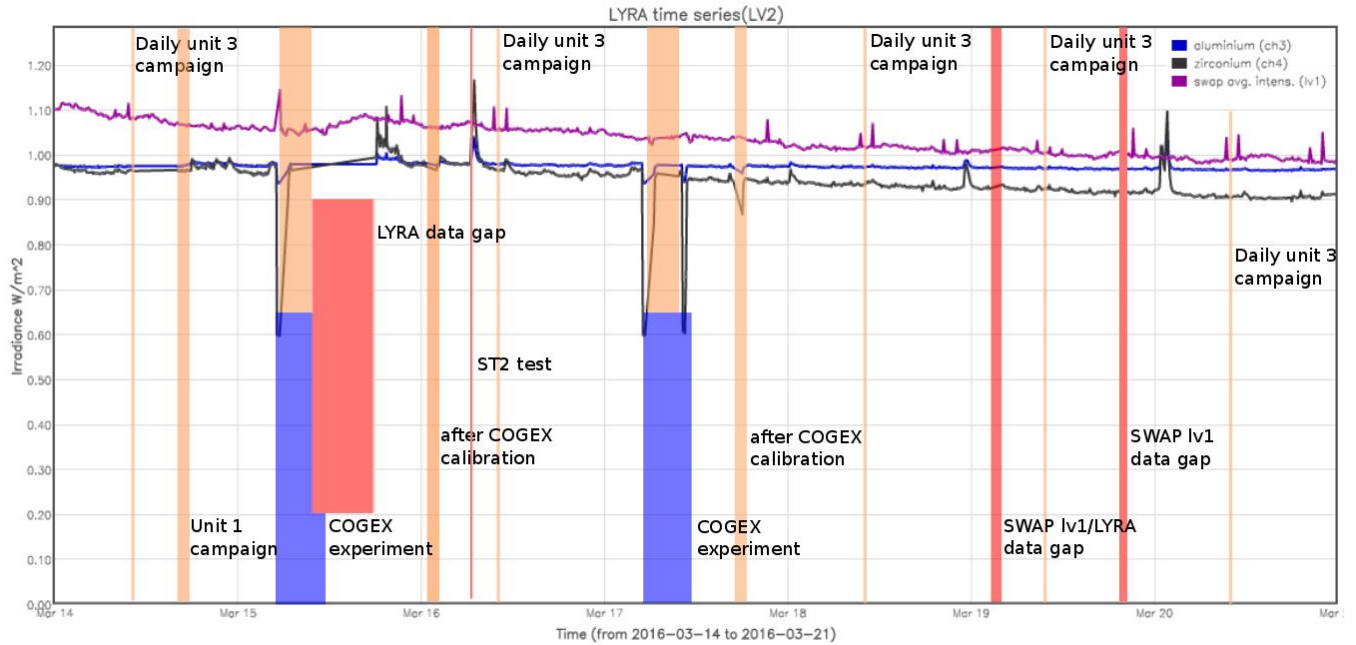


A movie of the event can be found [here](#) (SWAP daily movie)

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 correspond to, from left to right:

- SWAP campaign for COGEX experiment on 2016-Mar-15
- SWAP campaign for COGEX experiment on 2016-Mar-17

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

- LYRA daily unit 3 observation campaign on 2016-Mar-14
- LYRA monthly unit 1 campaign on 2016-Mar-14
- LYRA campaign for COGEX experiment on 2016-Mar-15
- LYRA calibration after COGEX experiment on 2016-Mar-16
- LYRA daily unit 3 observation campaign on 2016-Mar-16
- LYRA campaign for COGEX experiment on 2016-Mar-17
- LYRA calibration after COGEX experiment on 2016-Mar-17
- LYRA daily unit 3 observation campaign on 2016-Mar-18
- LYRA daily unit 3 observation campaign on 2016-Mar-19
- LYRA daily unit 3 observation campaign on 2016-Mar-20

The red shaded period corresponds to, from left to right:

- LYRA data gap on 2016-Mar-15 (LYRA switched to OFF mode so there was no data)
- SWAP and LYRA data gap due to Star Tracker 2 test on 2016-Mar-16 (both instruments were commanded to IDLE mode)
- SWAP level-1 & LYRA data gap on 2016-Mar-19 (due to missing HK & corrupt LYRA data)
- SWAP level-1 data gap on 2016-Mar-19 (due to missing HK)

## **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>).

## **Guest Investigator Program**

- L. Feng & J. Plowman were visiting ROB from 2016-Feb-15 until 2016-Mar-15 on the PROBA2 GI program, working with SWAP data for doing research on:
  - Morphology and Evolution of Three-dimensional CMEs and Coronal Waves.
  - Searching for EIT waves in coordinated SWAP and white-light observations.

Both these guest investigators plan to visit ROB again in the near future, to continue the close collaboration with the PROBA2 team.

- J. de Patoul was visiting ROB from 22-Feb-2016 until 15-Mar-2016 on the PROBA2 GI program, working with SWAP data for doing research on the “Morphology of evolution of plume and inter-plume regions”. This was her second visit to ROB within the frame of the GI program.
- In continuation of his research “Mapping Solar Cycles Through Polar Coronal Holes”, Michael Kirk is visiting ROB for the second time: from 2016-Mar-16 until 2016-Mar-24. Michael is using SWAP data for this study.



## 2. LYRA instrument status

### Calibration

No regular calibration campaign this week.

### IOS & operations

Monday 14 Mar	Tuesday 15 Mar	Wednesday 16 Mar	Thursday 17 Mar	Friday 18 Mar	Saturday 19 Mar	Sunday 20 Mar
Nominal acquisition + daily U3 + monthly U1	Nominal acquisition + COGEX experiment	Nominal acquisition + daily U3 + ST2 test	Nominal acquisition + COGEX experiment	Nominal acquisition + daily U3	Nominal acquisition + daily U3	Nominal acquisition + daily U3
LYIOS00532	LYIOS00533 ->LYIOS00534	LYIOS00534	LYIOS00534	LYIOS00535	LYIOS00535	LYIOS00535

Special operations for LYRA this week:

- Daily U3 observation campaigns (not on days when a COGEX experiment is planned)

On 2016-Mar-14

- Monthly U1 campaign

On 2016-Mar-15

- Calibration before COGEX experiment
- IDLE mode for COGEX experiment
- Covers closed during 1 orbit after COGEX experiment (U2+U1 dark current measurement)

On 2016-Mar-16

- Calibration after COGEX experiment
- IDLE mode for ST2 test

On 2016-Mar-17

- Calibration before COGEX experiment
- IDLE mode for COGEX experiment
- Covers closed during 1 orbit after COGEX experiment (U2+U1 dark current measurement)
- Calibration after COGEX experiment

### LYRA detector temperature

LYRA detector 2 temperature globally varied between 47.98 and 52.41 °C.

### 3. SWAP instrument status

#### Calibration

Regular calibration campaign on Tuesday and Thursday this week, before and after the COGEX experiments.

#### MCPM errors

The number of MCPM recoverable errors increased from 2227 to 2367.

The number of MCPM unrecoverable errors remained 0.

#### IOS & operations

Monday 14 Mar	Tuesday 15 Mar	Wednesday 16 Mar	Thursday 17 Mar	Friday 18 Mar	Saturday 19 Mar	Sunday 20 Mar
Nominal acquisition	Nominal acquisition + COGEX experiment	Nominal acquisition + ST2 test	Nominal acquisition + COGEX experiment	Nominal acquisition	Nominal acquisition	Nominal acquisition
IOS00637 572 images	IOS00638 708 images	IOS00638 585 images	IOS00638 604 images	IOS00639 701 images	IOS00639 673 images	IOS00639 641 images

Special operations for SWAP this week:

On 2016-Mar-15

- Calibration before COGEX experiment
- High cadence imaging before COGEX experiment
- IDLE mode for COGEX experiment
- Calibration after COGEX experiment
- High cadence imaging after COGEX experiment

On 2016-Mar-16

- IDLE mode for ST2 test

On 2016-Mar-17

- Calibration before COGEX experiment
- High cadence imaging before COGEX experiment
- IDLE mode for COGEX experiment
- Calibration after COGEX experiment
- High cadence imaging after COGEX experiment

#### SWAP detector temperature

The SWAP Cold Finger Temperature globally varied between -1.21 and 4.63 °C.

## **4. PROBA2 Science Center Status**

The main operator is Katrien Bonte.

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 20102 to 20164) was nominal, except for:

- None.

### Data coverage HK

All HK data files (LYRA\_AD) have been received, except:

- None.

### Data coverage SWAP

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

- None.

Total number of images between 2016 Mar 14 00:00 UT and 2016 Mar 21 00:00 UT: 4484

Highest cadence in this period: 29 seconds

Average cadence in this period: 134.84 seconds

Number of image gaps larger than 300 seconds: 207

Largest data gap: 40.78 minutes

### Data coverage LYRA

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

- BINLYRA\_20115 and BINLYRA\_20116 (LYRA was switched to OFF mode so there was no data)



## 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
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)