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|---|---|---|
| P2SC-ROB-WR-207<br>- 20140310<br>Weekly report #207         | <b>P2SC Weekly report</b>   |  |
| Period covered:<br>Date:<br><br>Written by:<br>Approved by: | Mon Mar 10 to Sun Mar 16, 2014<br>19 Mar 2014<br><br>Robbe Vansintjan<br>Matthew West   | Royal Observatory of Belgium<br>-<br>PROBA2 Science Center                          |
| To:   | LYRA PI, marie.dominique@sidc.be<br>SWAP PI, dseaton@sidc.be  | <a href="http://proba2.sidc.be">http://proba2.sidc.be</a><br>++ 32 (0) 2 3730559    |
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## 1. Science

### Solar & Space weather events

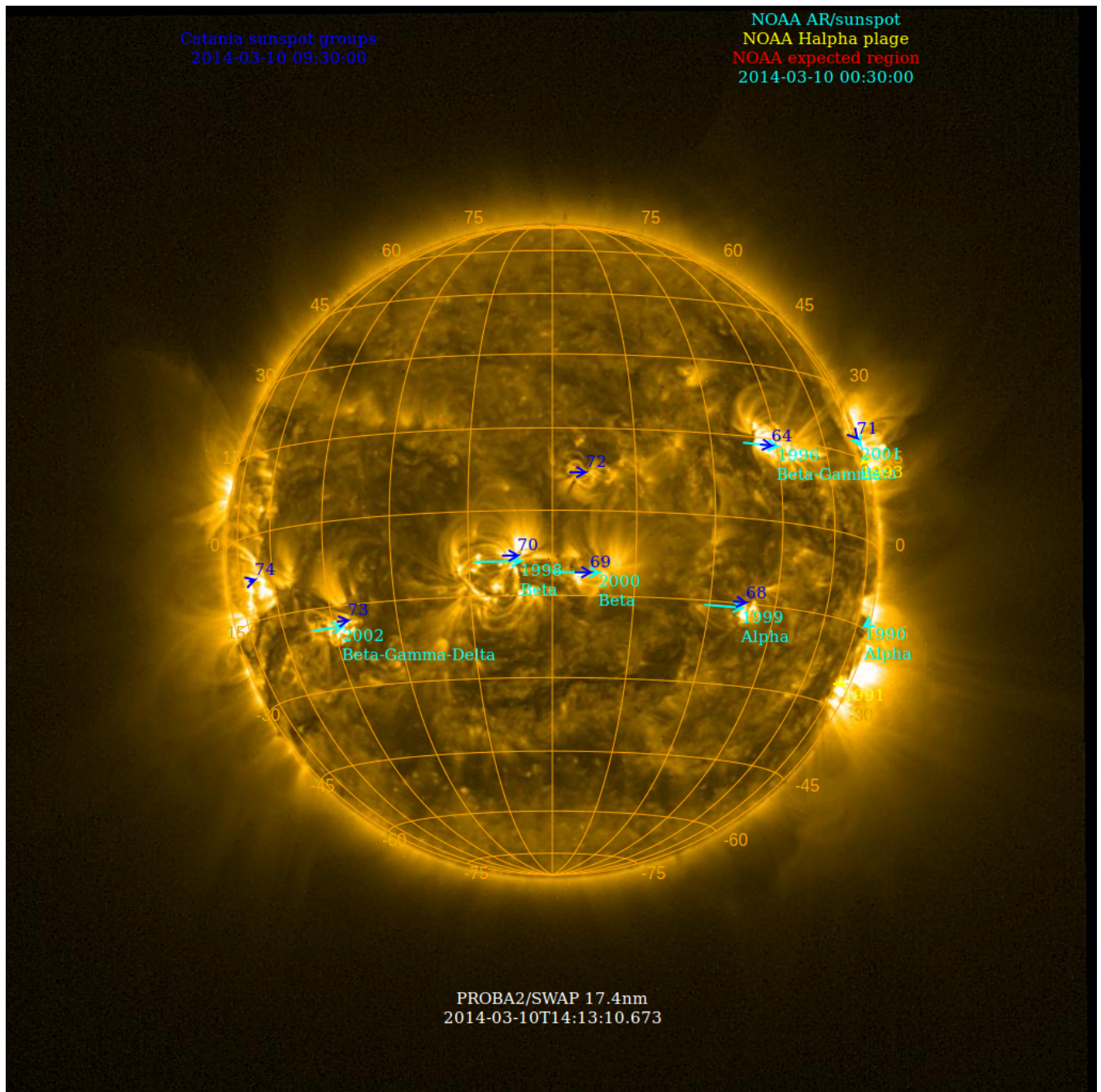
The level of solar activity<sup>1</sup> fluctuated between **low** and **moderate** this week.

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

|          | Monday<br>10 Mar   | Tuesday<br>11 Mar               | Wednesday<br>12 Mar                    | Thursday<br>13 Mar | Friday<br>14 Mar | Saturday<br>15 Mar | Sunday<br>16 Mar |
|----------|--|---------------------------------|--|--------------------|------------------|--------------------|------------------|
| Activity | moderate   | moderate                        | moderate                               | moderate           | low              | low                | low              |
| Flares   | <b>M1.4@23:00</b><br><b>M1.7@15:21</b><br>M1.0@04:08<br>M1.1@00:26 | M1.7@12:07<br><b>M3.5@03:50</b> | <b>M9.3@22:34</b><br><b>M2.5@11:05</b> | <b>M1.2@19:19</b>  | -                | -                  | -                |

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

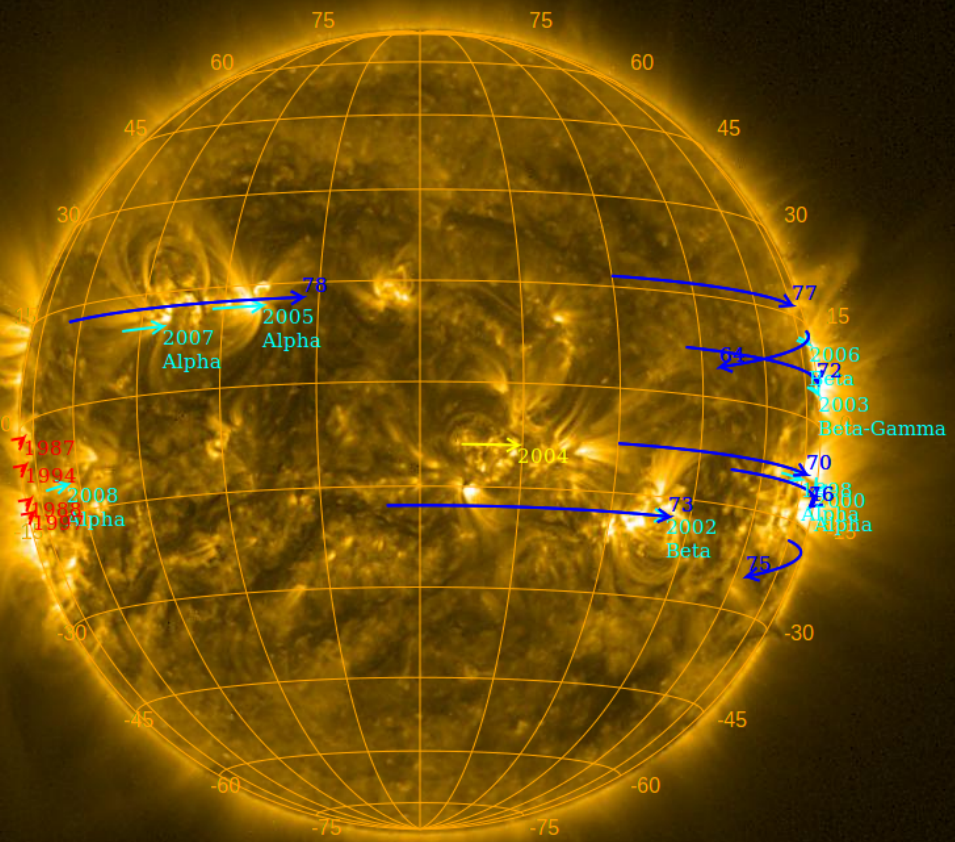
The SWAP images of Mar 10 and Mar 16 are shown below, with annotated active regions.



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

Catania sunspot groups  
2014-03-13 09:18:00

NOAA AR/sunspot  
NOAA Halpha plage  
NOAA expected region  
2014-03-16 00:30:00



PROBA2/SWAP 17.4nm  
2014-03-16T14:14:07.208

## **Solar Activity**

Solar flare activity fluctuated between low and moderate 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 207).

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



Monday Mar 10

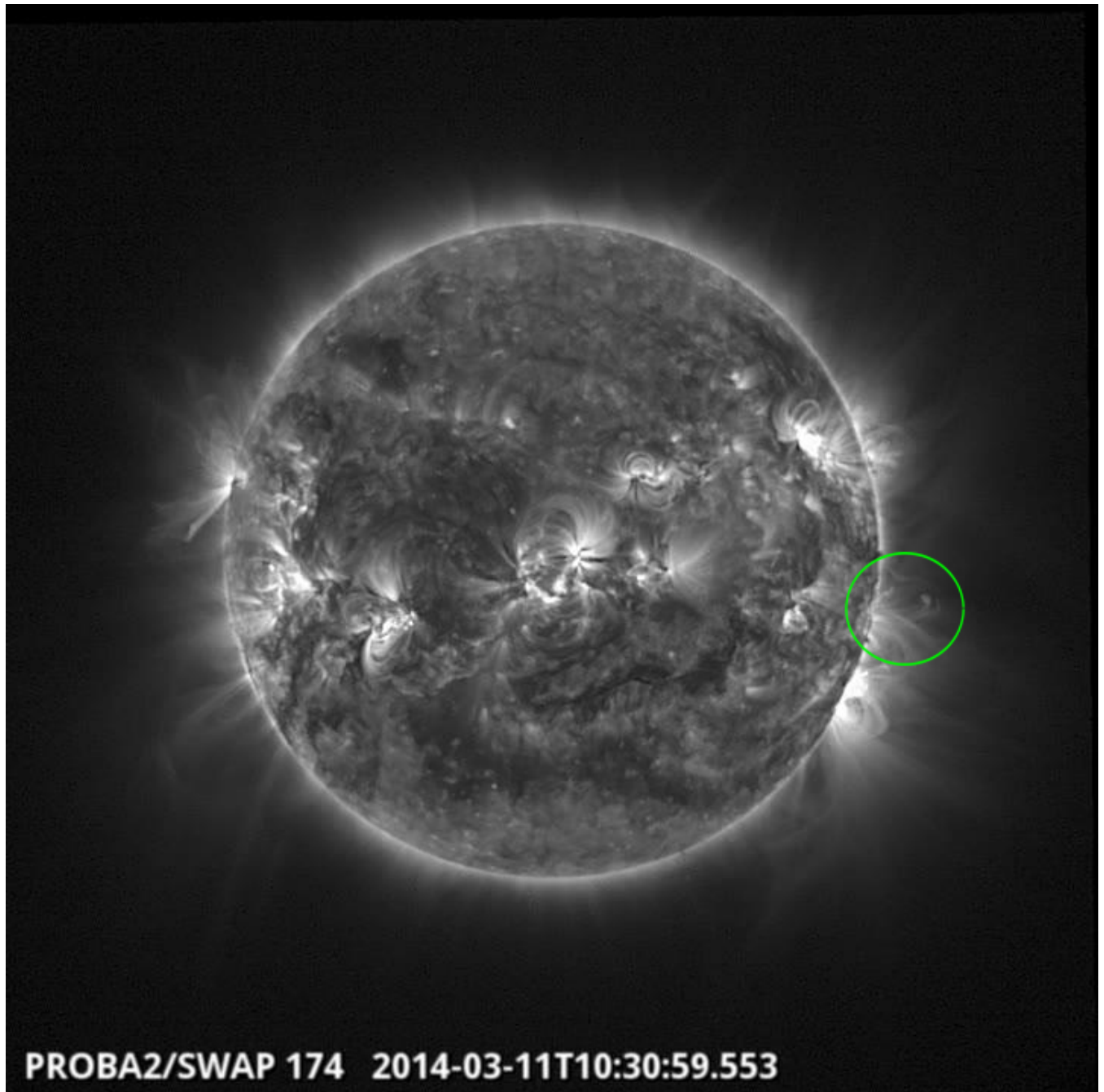


**Eruption on the southeast quad @ 20:04 - SWAP difference image**



**Flows in the southeast quadrant @ 23:30 - SWAP difference image**  
Find a movie of the events [here](#) (SWAP daily difference movie)

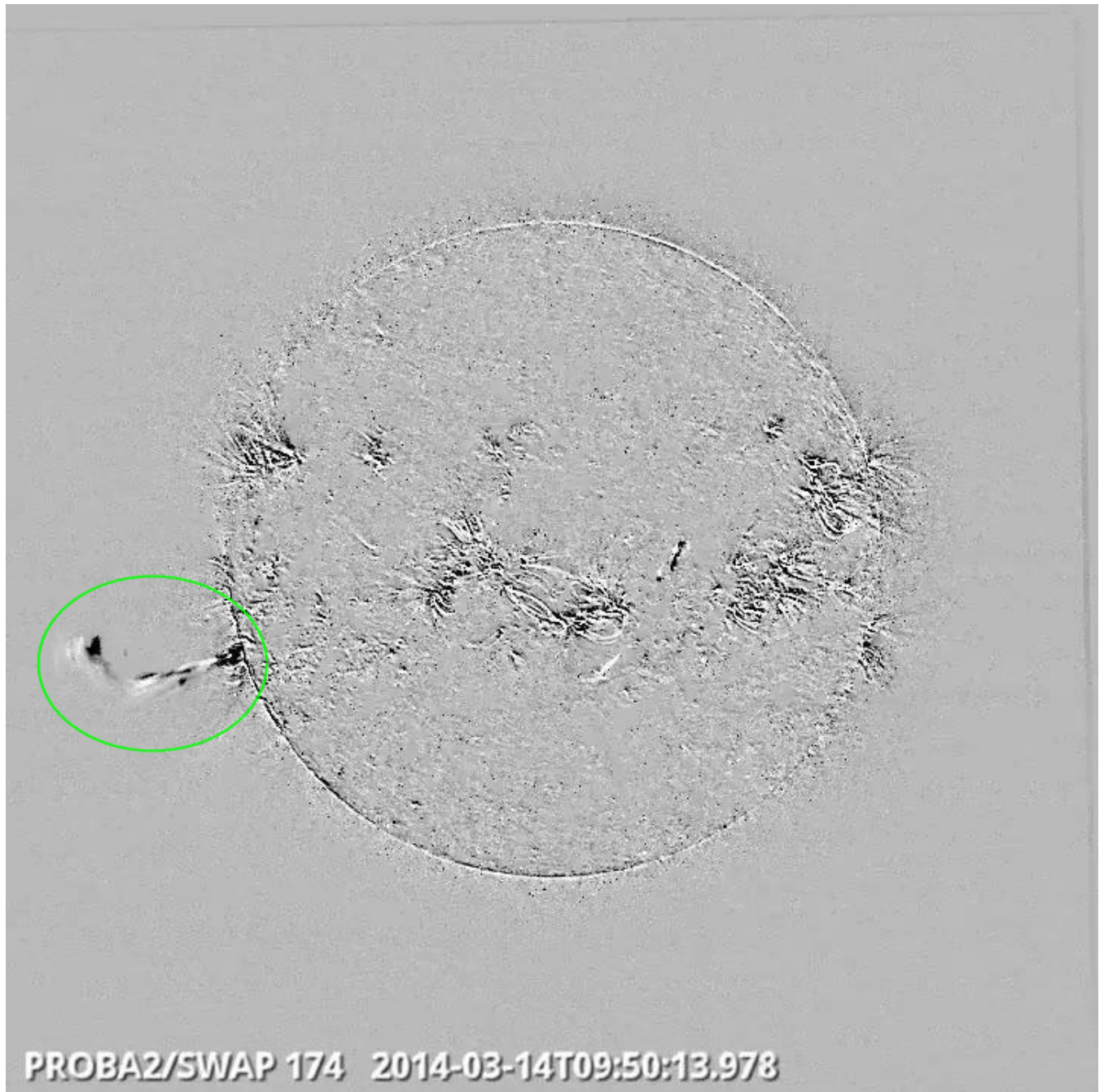
Tuesday Mar 11



**Eruption on the west limb @ 10:30 - SWAP difference image**  
Find a movie of the event [here](#) (SWAP daily movie)



Friday Mar 14



**Eruption on the east limb @ 09:50 - SWAP difference image**

Find a movie of the event [here](#) (SWAP daily diff movie)



Sunday Mar 16



**Eruption in the southeast quadrant @ 03:11 - SWAP difference image**

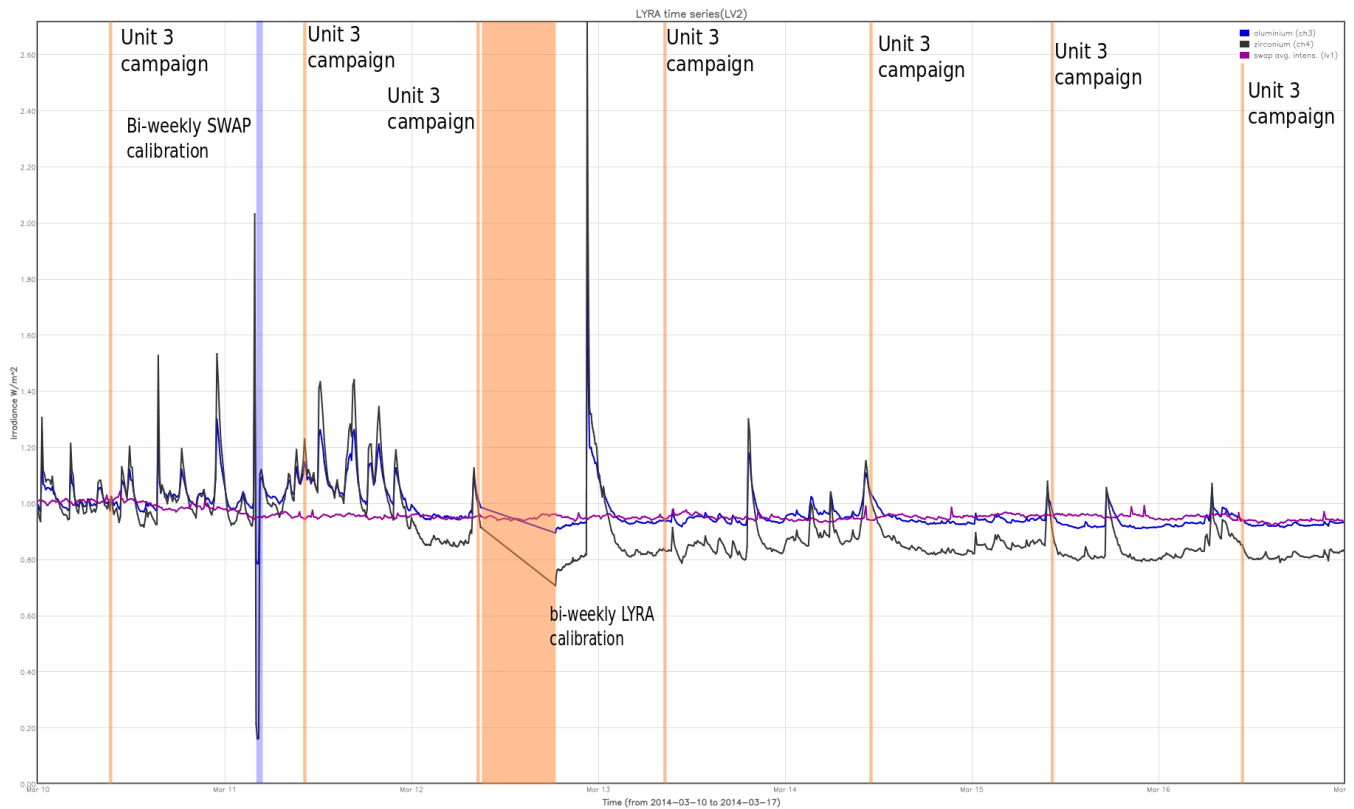
Find a movie of the event [here](#) (SWAP diff movie)

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 correspond to, from left to right:

- Bi-weekly SWAP calibration

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

- Unit 3 daily campaign, three times
- bi-weekly LYRA calibration
- Unit 3 daily campaign, four times

## **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>).

- Several proba related talks were given at the second e-Heroes Annual Meeting
  - M.West – The PROBA2 mission and some rather intriguing observations
  - Slemzin – Analysis of effects of the Earth upper atmosphere on solar EUV, observations from CORONAS and PROBA 2 satellites
  - Dominique – Progress towards understanding the degradation affecting the PROBA2/LYRA instrument
  - Katsiyannis – In-situ detections of Space Weather by the LYRA radiometer on board the PROBA2 satellite

## **Guest Investigator Program**

- None



## 2. LYRA instrument status

### Calibration

Calibration campaign on Wednesday this week.

### IOS & operations

| Monday<br>10 Mar                     | Tuesday<br>11 Mar                    | Wednesday<br>12 Mar  | Thursday<br>13 Mar                   | Friday<br>14 Mar                     | Saturday<br>15 Mar                   | Sunday<br>16 Mar                     |
|--------------------------------------|--------------------------------------|--|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| Nominal<br>acquisition +<br>daily U3 | Nominal<br>acquisition +<br>daily U3 | Nominal<br>acquisition +<br>daily U3 +<br>bi-weekly<br>calibration | Nominal<br>acquisition +<br>daily U3 | Nominal<br>acquisition +<br>daily U3 | Nominal<br>acquisition +<br>daily U3 | Nominal<br>acquisition +<br>daily U3 |
| LYIOS00382                           | LYIOS00383                           | LYIOS00383   | LYIOS00383                           | LYIOS00383                           | LYIOS00383                           | LYIOS00383                           |

The following science campaigns were performed by LYRA:

- daily U3 observations campaign
- bi weekly calibration

### LYRA detector temperature

LYRA detector 2 temperature globally varied between 48.2 and 50.3 °C, taking into account the daily U3 activation periods.

### To be explored

- None

### 3. SWAP instrument status

#### Calibration

Calibration campaign on Tuesday this week.

#### MCPM errors

The number of MCPM recoverable errors increased from 16885 to 17056.

The number of MCPM unrecoverable errors remained at 1127.

#### IOS & operations

| Monday<br>10 Mar       | Tuesday<br>11 Mar                                    | Wednesday<br>12 Mar    | Thursday<br>13 Mar     | Friday<br>14 Mar       | Saturday<br>15 Mar     | Sunday<br>16 Mar       |
|------------------------|--|------------------------|------------------------|------------------------|------------------------|------------------------|
| Nominal<br>acquisition | Nominal<br>acquisition +<br>bi weekly<br>calibration | Nominal<br>acquisition | Nominal<br>acquisition | Nominal<br>acquisition | Nominal<br>acquisition | Nominal<br>acquisition |
| IOS00506<br>530 images | IOS00507<br>643 images                               | IOS00507<br>516 images | IOS00507<br>589 images | IOS00507<br>605 images | IOS00507<br>613 images | IOS00507<br>526 images |

Special operations for SWAP, this week:

- bi-weekly calibration

#### SWAP detector temperature

The SWAP Cold Finger Temperature globally varied between 0.4 and 1.19 °C.

#### To be explored

- None

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

The main operator is Robbe Vansintjan.

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 13591 to 13648) 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 2014 Mar 10 0UT and 2014 Mar 17 0UT: 4238

Highest cadence in this period: 30 seconds

Average cadence in this period: 142.70 seconds

Number of image gaps larger than 300 seconds: 2

Largest data gap: 6.50 minutes

The data gap was caused by a poor signal during pass 13647 there were some missing packet at ~ 19:16:26 and at 19:20:03. (Estimated number of missed/bad packets: 9) .

### **Data coverage LYRA**

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

- None

## 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  |
| 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)