| | | |
|---|---|---|
| P2SC-ROB-WR-122-20120723<br>Weekly report #122 | **P2SC Weekly report** |  |
| Period covered:<br>Date:<br>Written by:<br>Approved by: | Mon Jul 23 to Sun Jul 29, 2012<br>01 Aug 2012<br>Erik Pylyser<br>David Berghmans | Royal Observatory of Belgium<br>PROBA2 Science Center |
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## 1. Science

**Solar & Space weather events**

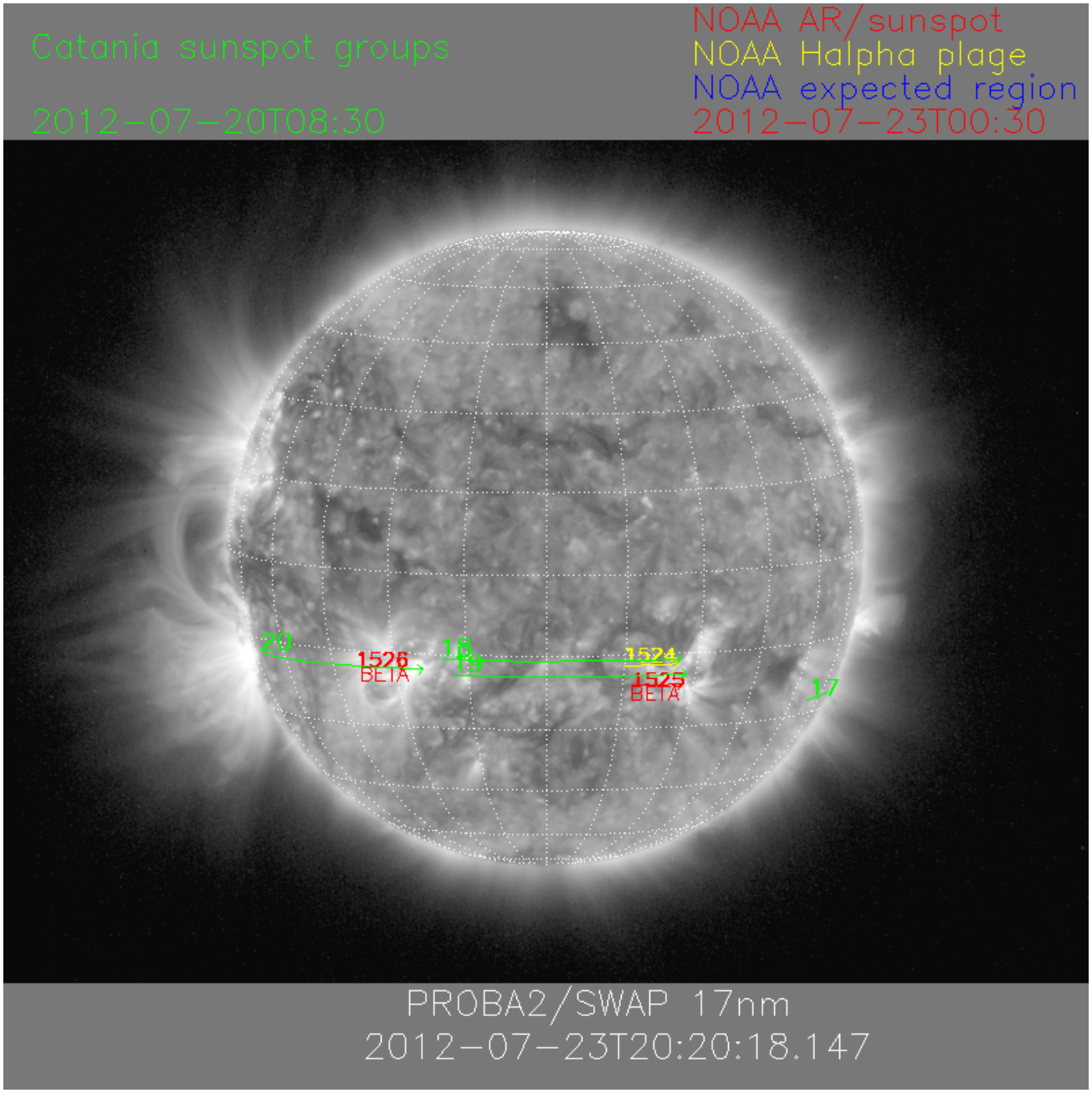
*Overview*

The level of solar activity this week[1] and associated M- and X-flares:

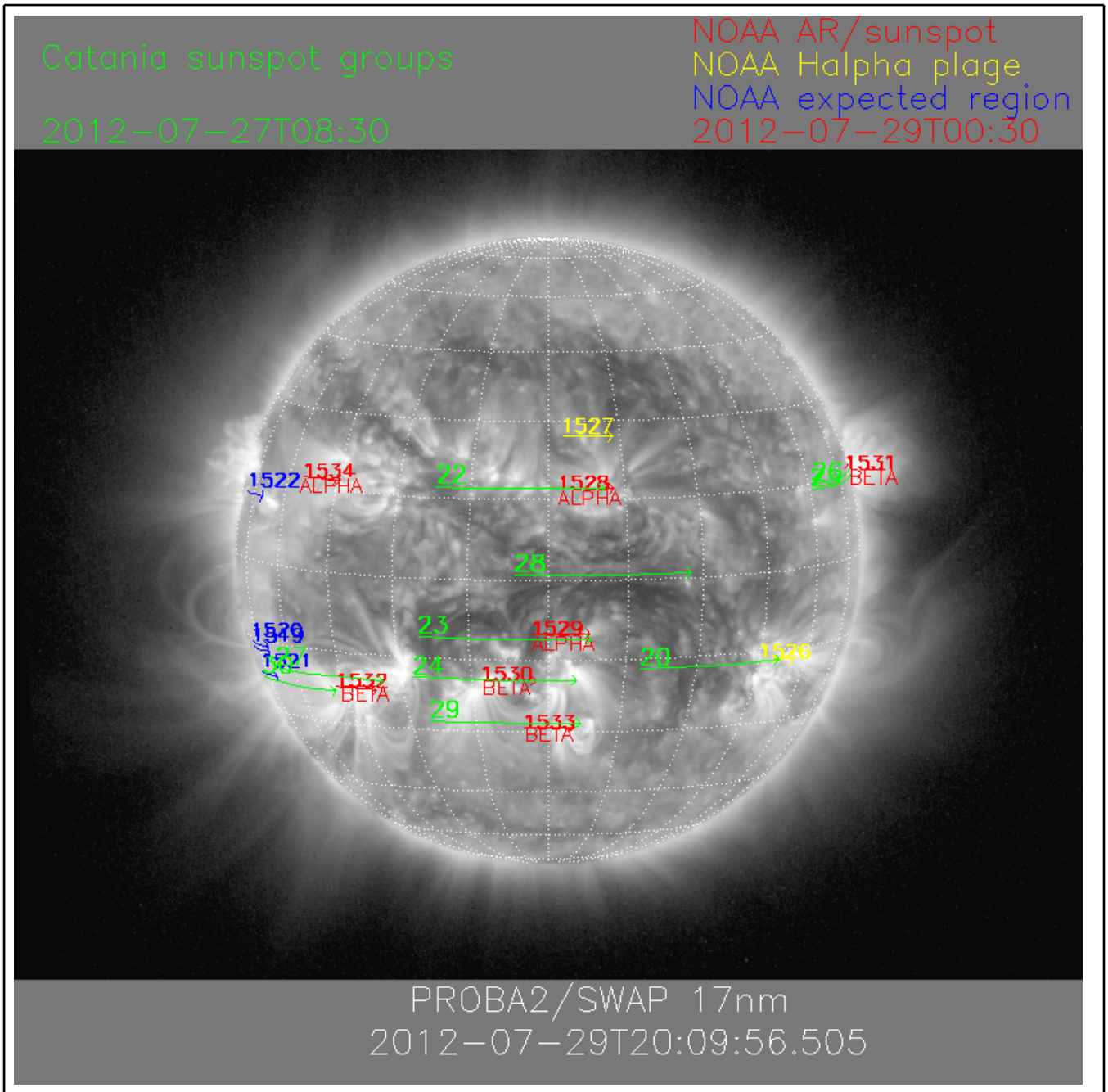
| | Monday 23 Jul | Tuesday 24 Jul | Wednesday 25 Jul | Thursday 26 Jul | Friday 27 Jul | Saturday 28 Jul | Sunday 29 Jul |
|---|---|---|---|---|---|---|---|
| Activity | low | low | very low | low | moderate | moderate | moderate |
| Flares | - | - | - | - | **M2.7@17:17** | **M6.1@20:44** | **M2.3@06:15** |

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

The SWAP images of Jul 23 and Jul 29 are shown below, with annotated active regions.




http://sidc.be/html/CmapPage.html

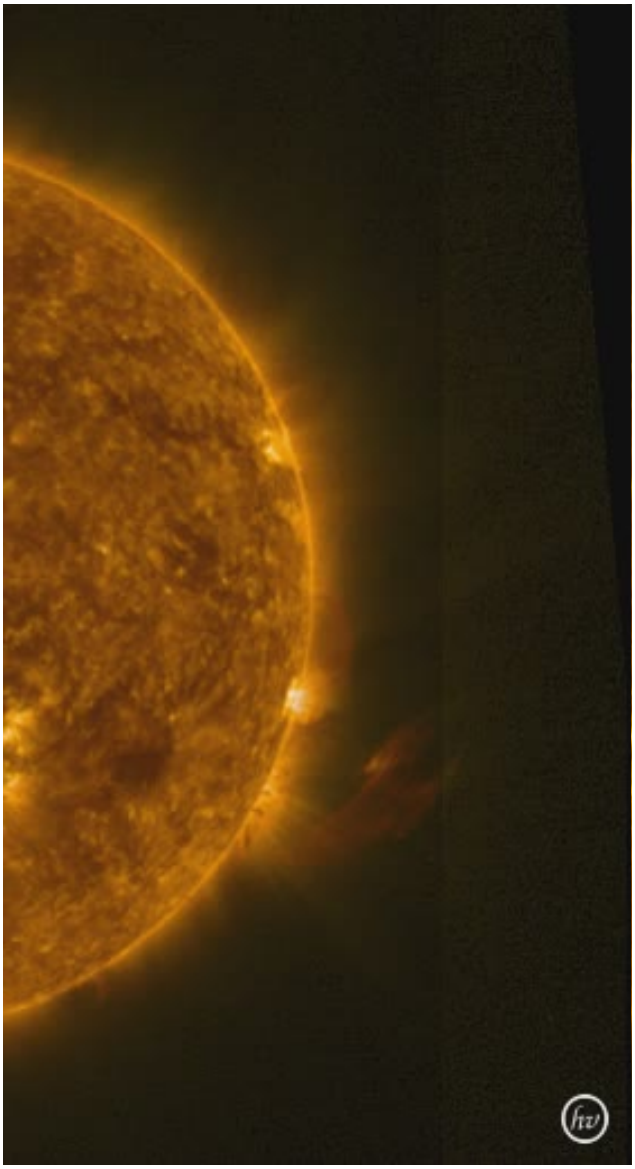

Catania sunspot groups
2012-07-27T08:30
NOAA AR/sunspot
NOAA Halpha plage
NOAA expected region
2012-07-29T00:30
1527
1522
1534
ALPHA
22
1528
ALPHA
1531
BETA
28
23
1529
ALPHA
20
1526
24
1530
BETA
29
1533
BETA
PROBA2/SWAP 17nm
2012-07-29T20:09:56.505

**Solar Activity**
Early this week, the Sun's activity level was generally *low* until AR 11532 crossed the East limb Thursday.

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.

On Monday 23rd, AR11520, from behind the West limb, expelled a very rapid CME. According to confirmed reports this could be the fastest CME ever recorded, with an ejection speed of around 3400 km/s.
A movie, showing the phenomenon can be found here. The movie was generated with HelioViewer, using (colored) SWAP (174, yellow) and SDO AIA (304, orange) images.

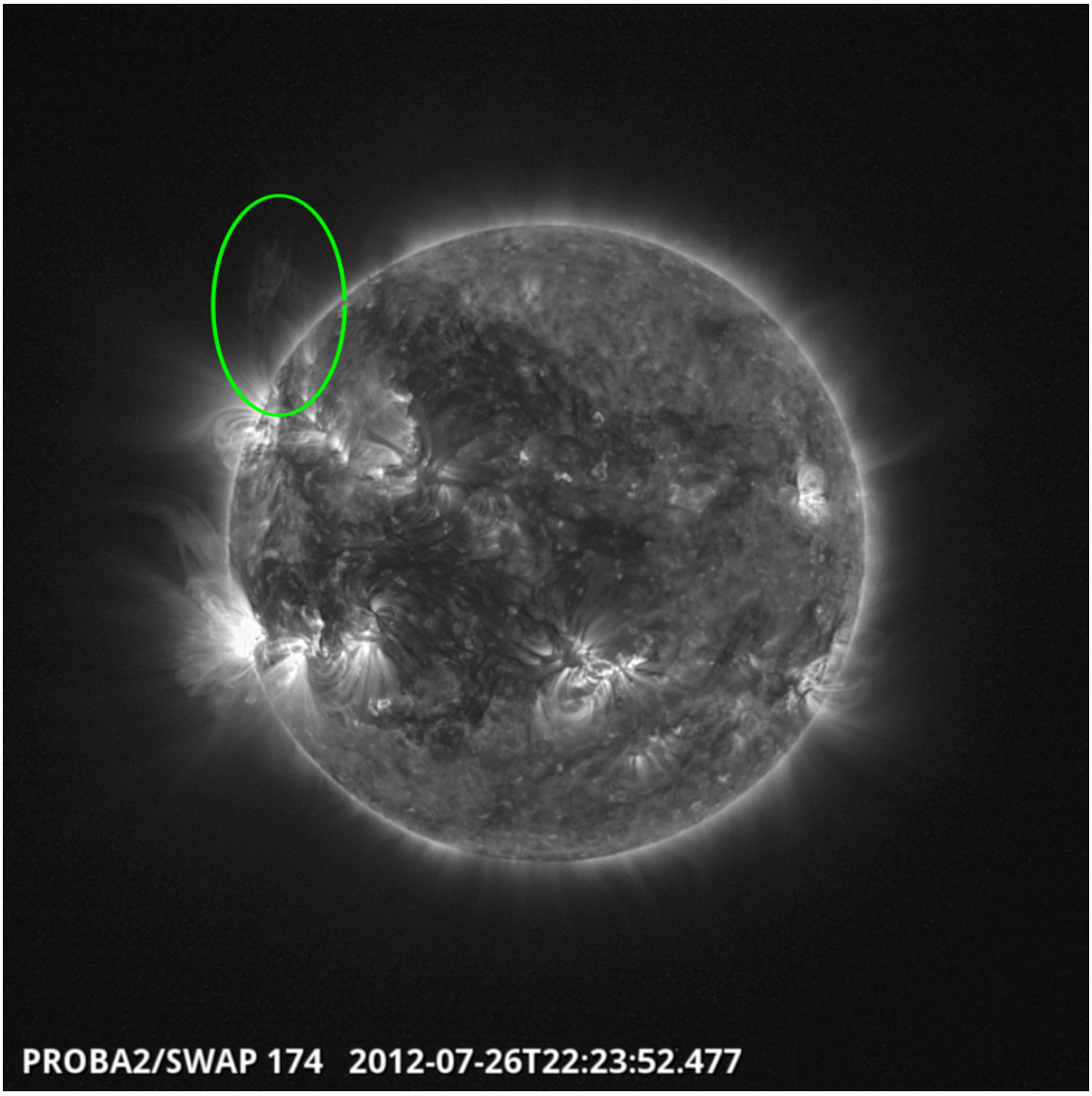
One image of the movie is shown below:



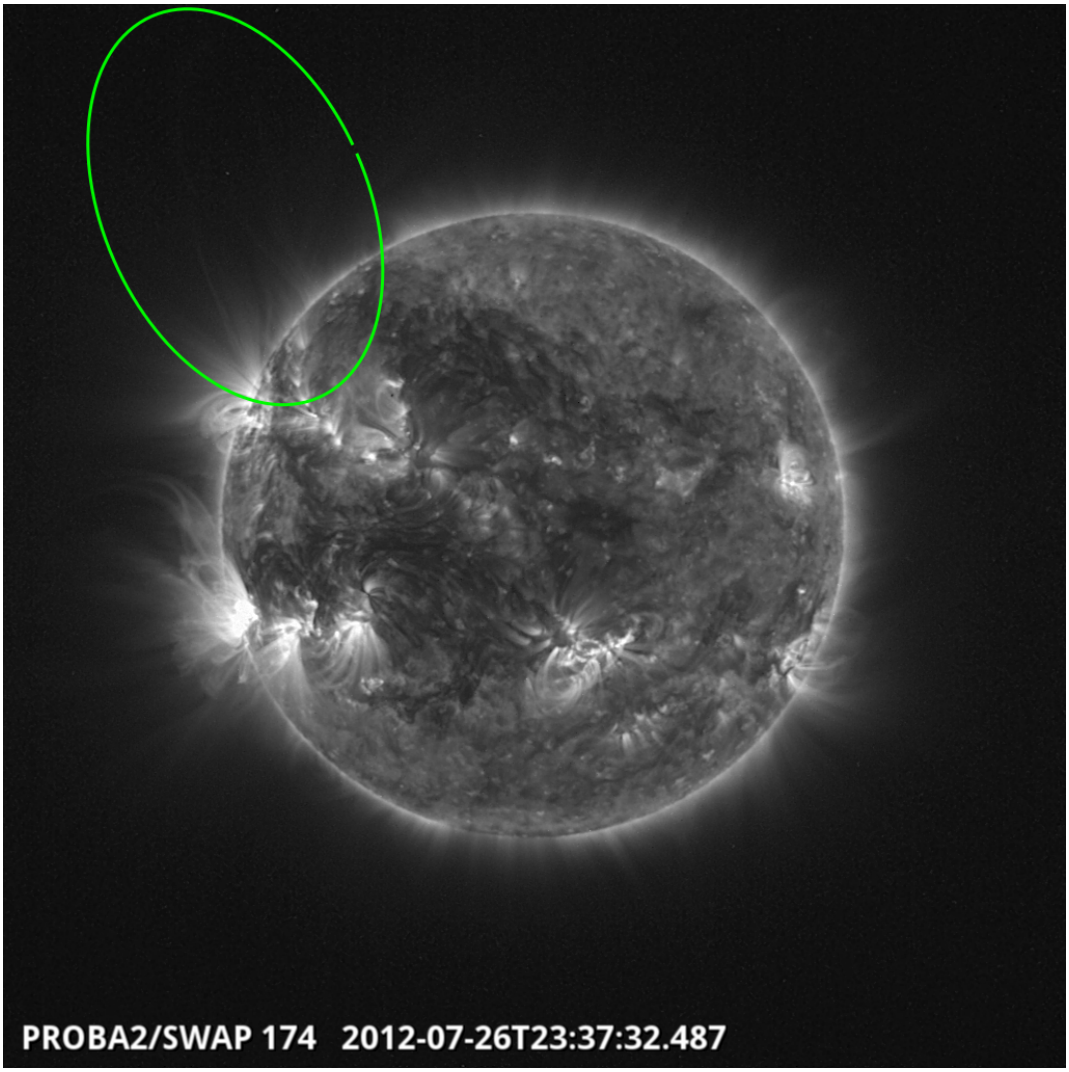
**SWAP/SDO Image - CME on Monday 23/07; at 16:37**

On Thursday 26th, an extended filament eruption occurred on the North-East limb.
A movie, showing the phenomenon can be found here. This movie was generated with HelioViewer, using (colored) SWAP (174, yellow) images. Right after the end of this eruption, another filament eruption occurred on the opposite side - North-West limb, starting after midnight on July 27th.

Some (original) SWAP pictures of this eruption are shown below:
1. Eruption in progress
2. Eruption at maximum extension




**SWAP Image - Filament eruption on Thursday 26/07; at 22:24**

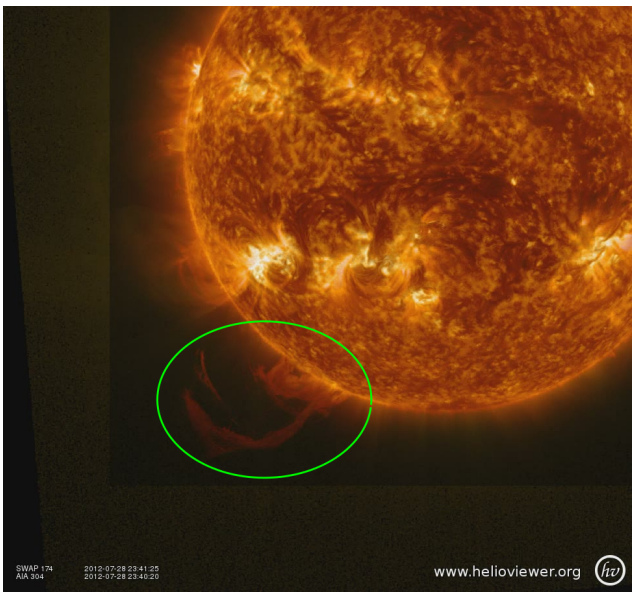


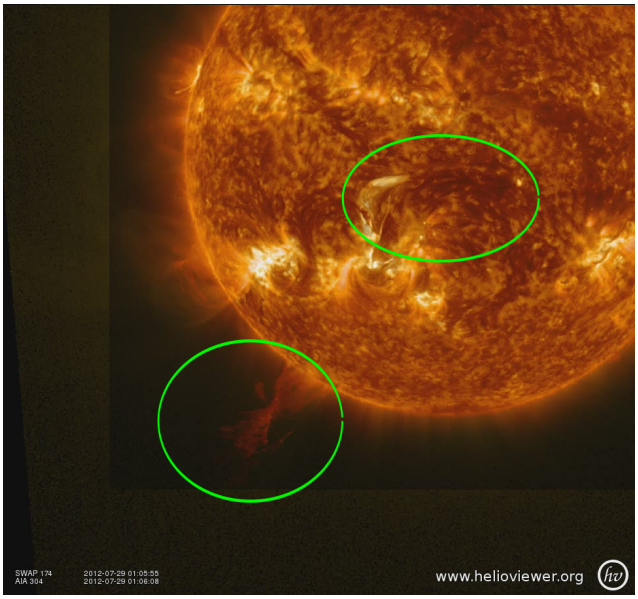

**SWAP Image - Filament eruption in maximum extension on Thursday 26/07; at 23:37**

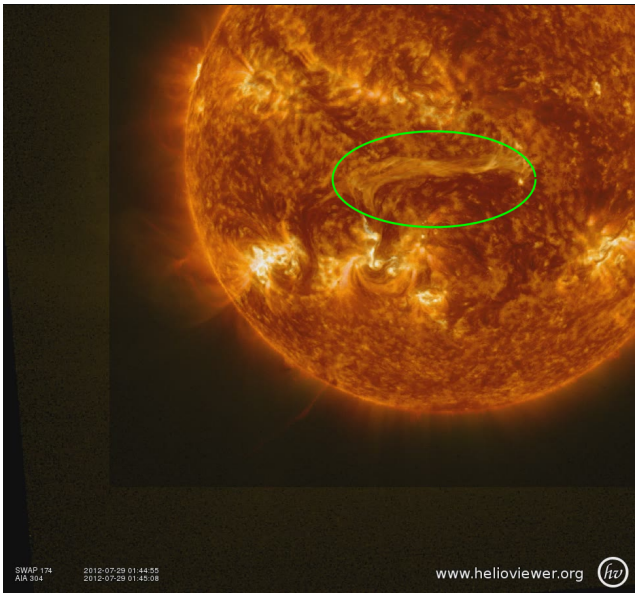
On Saturday 28th, several spectacular phenomena occurred.
Filamenent/prominence activity could be followed from Saturday 28th around 15:00 until Sunday 29th 03:00, starting behind (TBC) the south east limb and evolving into on-disk filament brightening / activation between AR 11530 (southern) and and AR 11528 (northern). Also on July 27th such a (more reduced) filament brightening occurred.

Several SWAP (and SDO) movies about these phenomena can be found in the following directory:
http://proba2.oma.be/swap/data/mpg/movies/campaign_movies/2012_07_272829/

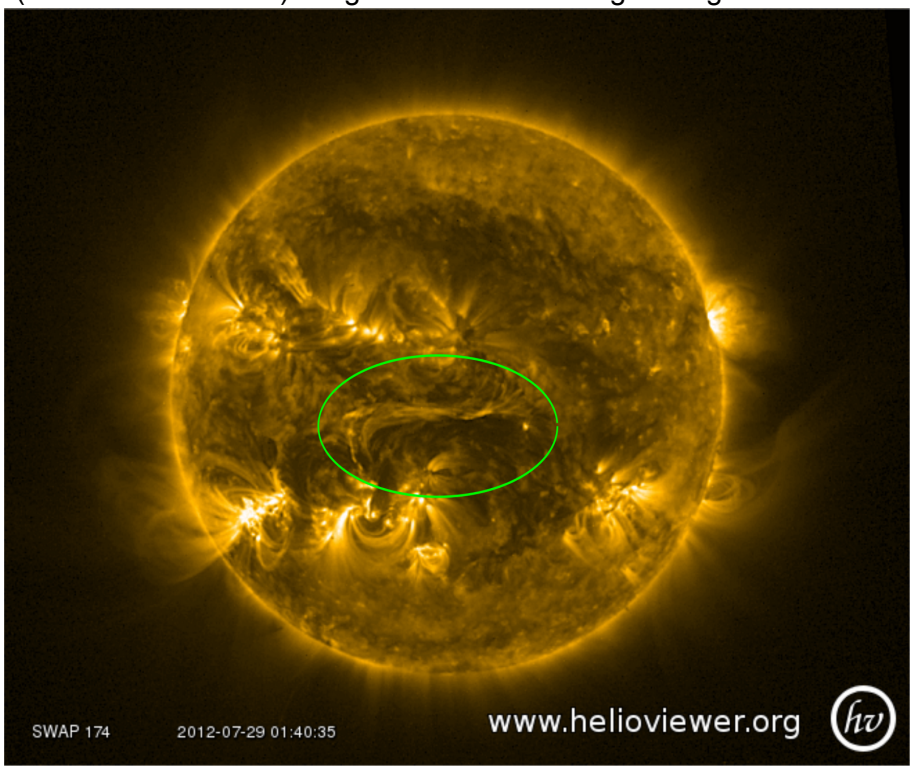
The following pictures (combined SWAP 174 - yellow - and SDO 304 - orange) show the evolution of:
1. the swiring filament eruption having started at (behind?) the south east limb
2. the end of the eruption and the start of the filament brightening between ARs 11530 and 11528.
3. the filament brightening at its brightest

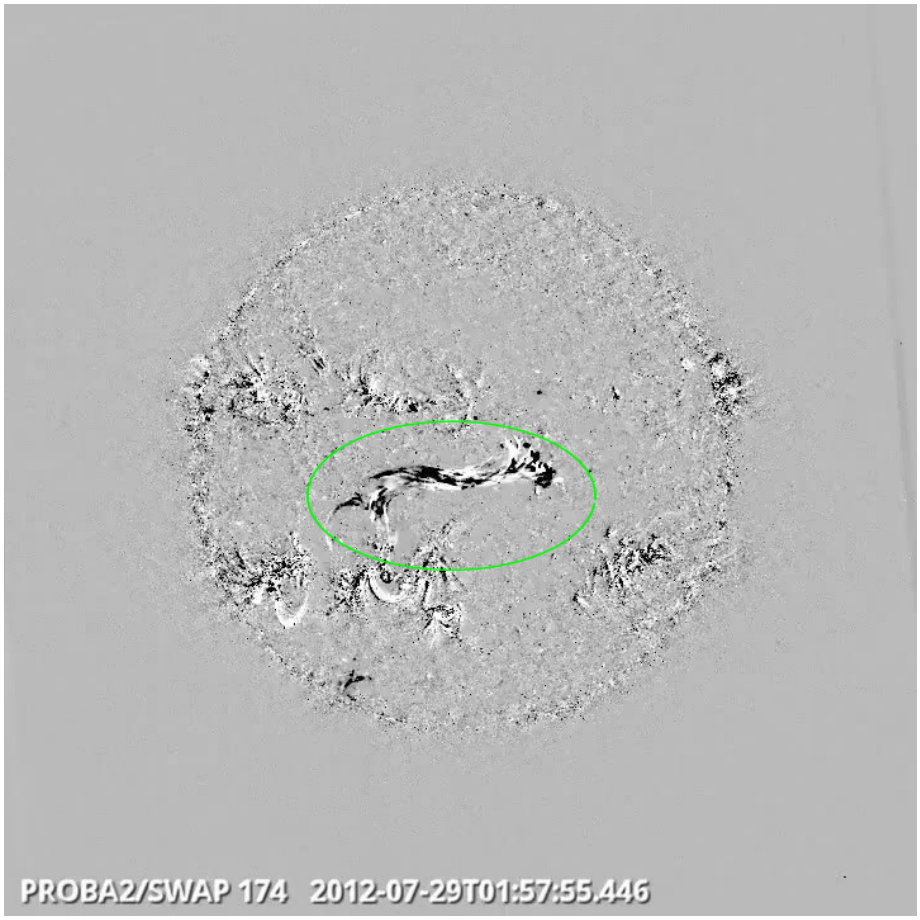

SWAP 174
AIA 304
2012-07-28 23:41:25
2012-07-28 23:40:20
www.helioviewer.org


SWAP 174
AIA 304
2012-07-29 01:05:55
2012-07-29 01:06:08
www.helioviewer.org


SWAP 174
AIA 304
2012-07-29 01:44:55
2012-07-29 01:45:08
www.helioviewer.org

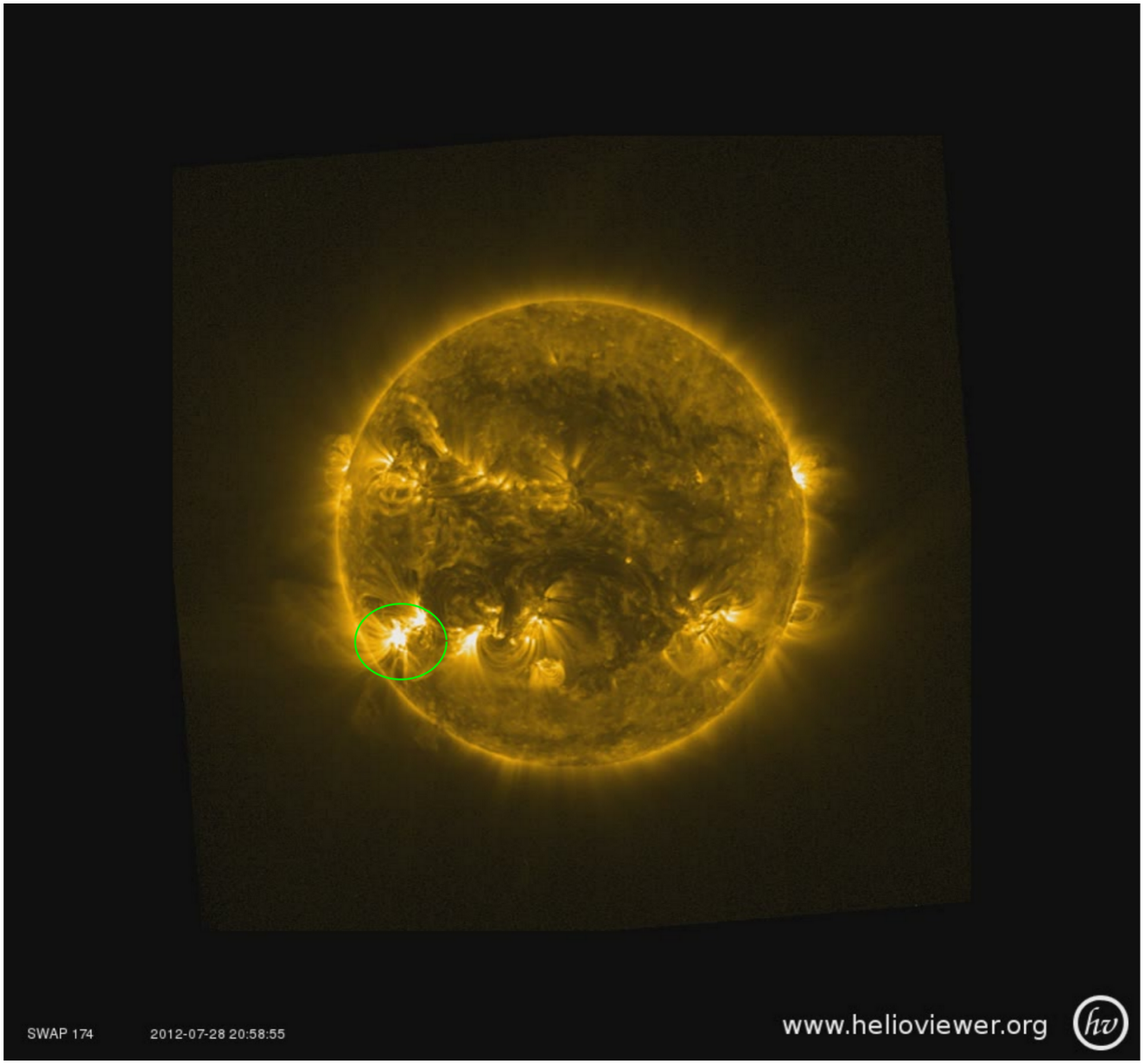
Below, a SWAP (normal & difference) image of the filament brightening:

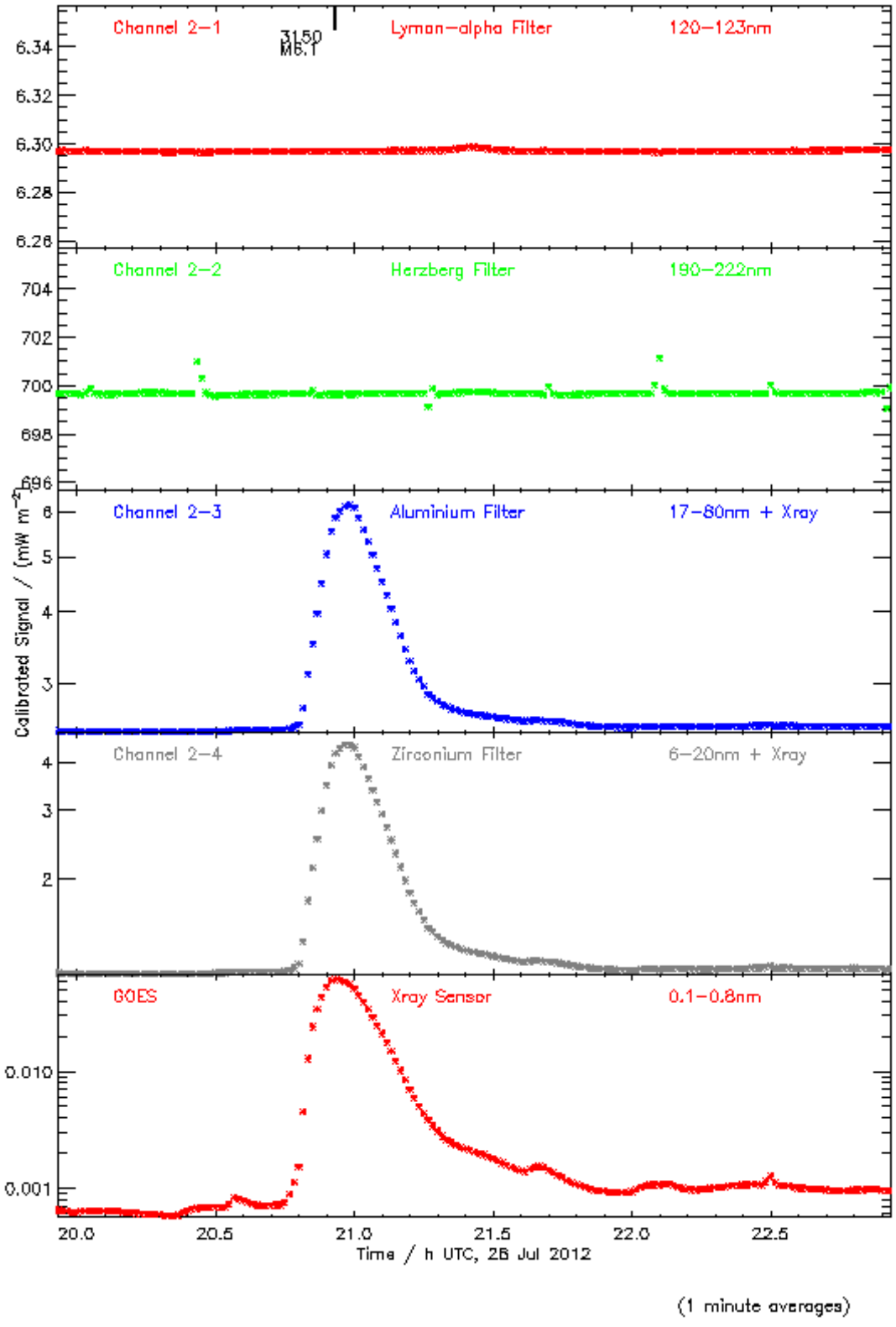


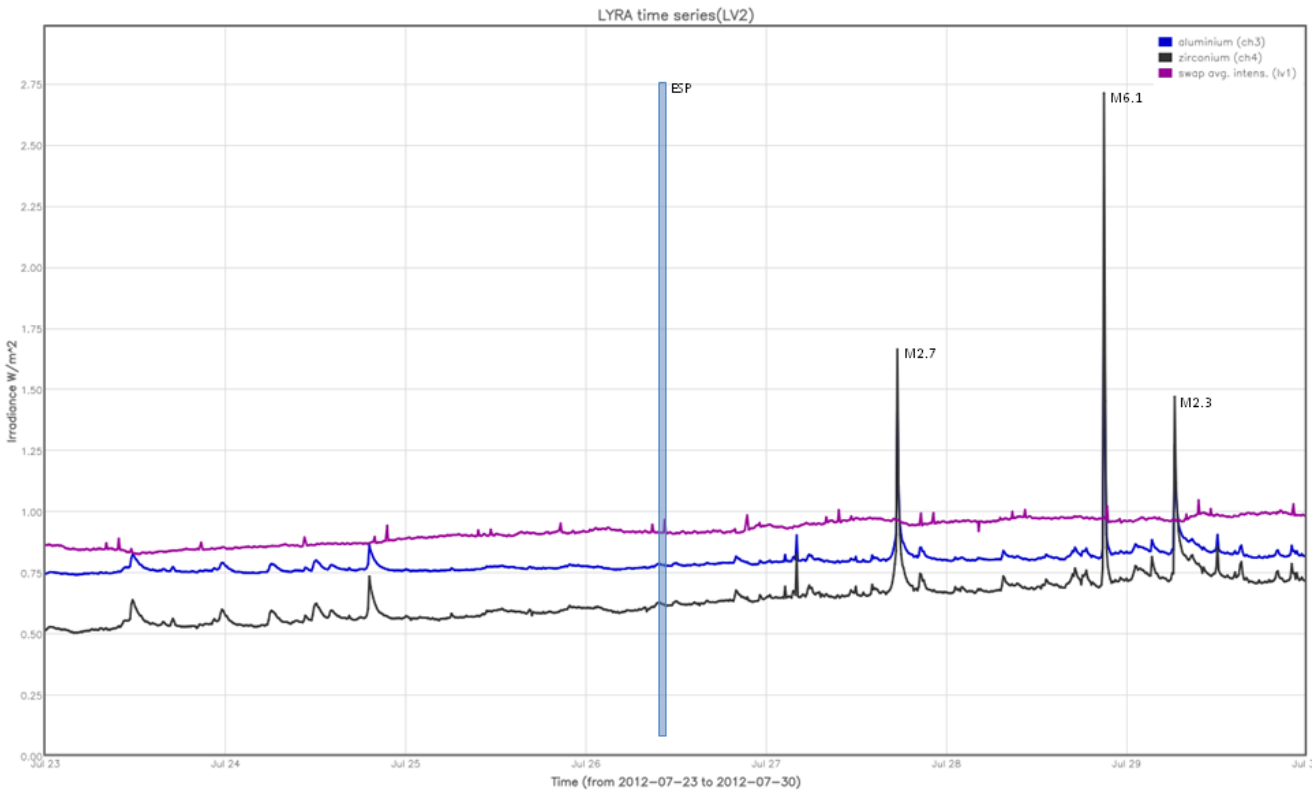
From Friday on, AR 11532 generated M-flares on a daily basis (1 flare per day) - see the table above.

An M6.1 flare occurred on Saturday - a SWAP picture around 21:00 and the associated LYRA/GOES curves are shown below:




Channel 2-1
Lyman-alpha Filter
120-123nm
3150
M6.1
6.34
6.32
6.30
6.28
6.26
Channel 2-2
Herzberg Filter
190-222nm
704
702
700
698
696
Channel 2-3
Aluminium Filter
17-80nm + Xray
Calibrated Signal / (mW m$^{-2}$)
8
5
4
3
Channel 2-4
Zirconium Filter
6-20nm + Xray
4
3
2
GOES
Xray Sensor
0.1-0.8nm
0.010
0.001
20.0
20.5
21.0
21.5
22.0
22.5
Time / h UTC, 26 Jul 2012
(1 minute averages)

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 (solar intensity derived from ‘integrated’ SWAP images)




The blue shaded periods correspond to, from left to right:
- weekly ESP campaign support.

The orange shaded periods correspond to, from left to right:
- None.

The red shaded period corresponds to:
- None.

**Scientific campaigns**

***LYRA***

The following scientific LYRA campaigns were performed this week:
- None.

***SWAP***

The following scientific SWAP campaign was performed this week:
- None.

***Interesting, campaign associated, solar activity:***

- None.

**Outreach, papers, presentations, etc.**

Papers/Posters presented @ 9th Thermospheric, Ionospheric, Geospheric (TIGER) Symposium, COSPAR, Mysore, India:

***Sunday 15th July:***

M. Dominique:
" LYRA on-board PROBA2: instrument performances and latest results"

I.Dammasch:
" Thermal evolution of flares observed by PROBA2/LYRA"

***Tuesday 17th July***

G. Cessateur
" New observational strategies for reconstructing the solar UV flux for space weather applications"

***Saturday 21st July***

G. Cessateur
" Solar Spectral Irradiance as observed by LYRA/PROBA2 and PREMOS/PICARD"

S.T. Kumara
" Segmentation of Coronal Features to Understand the UV and EUV Irradiance Variations"

M. Kretzschmar:
" Variations of solar extreme ultraviolet irradiance in the rising phase of solar cycle 24 as observed by PROBA2/LYRA."

## 2. LYRA instrument status

**Calibration**

No calibration this week

**IOS & operations**

| Monday 23 Jul | Tuesday 24 Jul | Wednesday 25 Jul | Thursday 26 Jul | Friday 27 Jul | Saturday 28 Jul | Sunday 29 Jul |
|---|---|---|---|---|---|---|
| Nominal acquisition+ daily U3<br><br>LYIOS00260 | Nominal acquisition + daily U3<br><br>LYIOS00260 | Nominal acquisition + daily U3<br><br>LYIOS00260 | Nominal acquisition + daily U3 +<br><br>LYIOS00260 | Nominal acquisition + daily U3<br><br>LYIOS00260-> 261 | Nominal acquisition + daily U3<br><br>LYIOS00261 | Nominal acquisition+ daily U3<br><br>LYIOS00261 |

Activities performed this week with LYRA:
- daily U3 campaign.

**LYRA detector temperature**

LYRA detector 2 temperature fluctuated between 45.2 and 46.0 degrees.

**To be explored**
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## 3. SWAP instrument status

**Calibration**

No calibration this week.

**MCPM errors**

The number of MCPM recoverable errors increased from 2049 to 2295.

The number of MCPM unrecoverable errors is still 0.

**IOS & operations**

| Monday 23 Jul | Tuesday 24 Jul | Wednesday 25 Jul | Thursday 26 Jul | Friday 27 Jul | Saturday 28 Jul | Sunday 29 Jul |
|---|---|---|---|---|---|---|
| Nominal acquisition<br><br>IOS00406<br>630 images | Nominal acquisition<br><br>IOS00406<br>597 images | Nominal acquisition<br><br>IOS00406->407<br>665 images | Nominal acquisition + ESP<br><br>IOS00407<br>632 images | Nominal acquisition<br><br>IOS00407<br>655 images | Nominal acquisition<br><br>IOS00407<br>534 images | Nominal acquisition<br><br>IOS00407<br>494 images |

Activities performed this week with SWAP:
- support to the weekly ESP campaign (on Thu).

**SWAP detector temperature**

The SWAP Cold Finger Temperature fluctuated between - 1.3 and - 1.8 degrees Celsius, under nominal operations.

**To be explored**

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## 4. PROBA2 Science Center Status

The main operator is Koen Stegen.

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 8479 to 8538) was nominal, except for:
- none

**Data coverage HK**

All HK data files (LYRA_AD) have been received, except for:
- none

**Data coverage SWAP**

All SWAP Science data files (BINSWAP) have been received, except for:
- none

Total number of images between 2012 Jul 23 0UT and 2012 Jul 30 0UT: 4207
Highest cadence in this period: 130 seconds
Average cadence in this period: 143.78 seconds
Number of image gaps larger than 300 seconds: 2
Largest data gap: 34.33 minutes

**Data coverage LYRA**

All LYRA Science data files (BINLYRA) have been received, except for:
- none

## 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 |
| DSLP | 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) |
| 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 |
| 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 |
| TC | Telecommand |
| UTC | Coordinated Universal Time |
| UV | Ultraviolet |

## 7. APPENDIX Solar Activity Definitions

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

The standard scale for solar activity used 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)
(+ extreme?)