P2SC-ROB-WR-115-20120604 Weekly report #115	**P2SC Weekly report**	
Period covered: Date: Written by: Approved by:	Mon Jun 04 to Sun Jun 10, 2012 13 June 2012 Erik Pylyser David Berghmans	Royal Observatory of Belgium PROBA2 Science Center
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1. Science

Solar & Space weather events

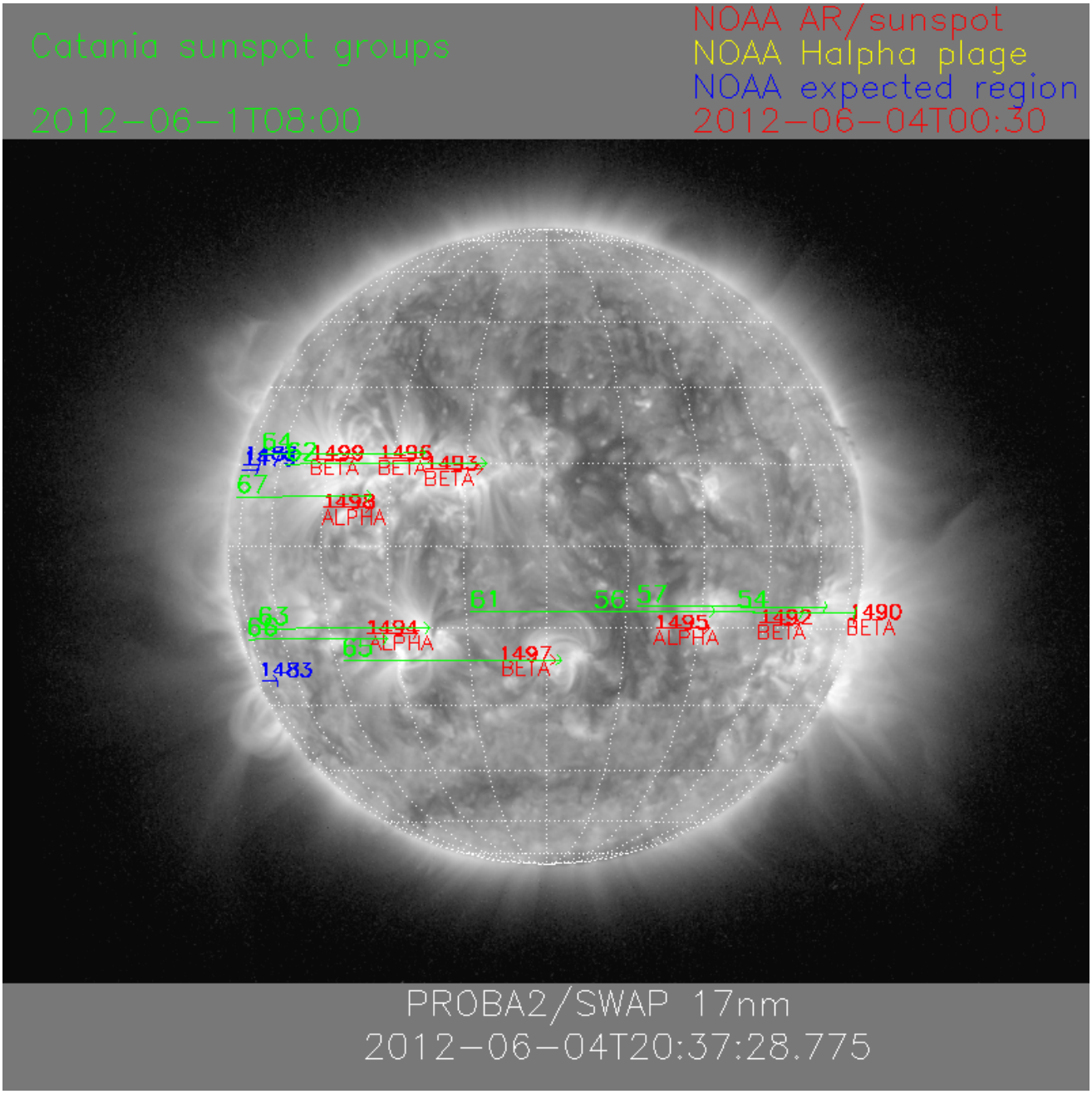
Overview

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

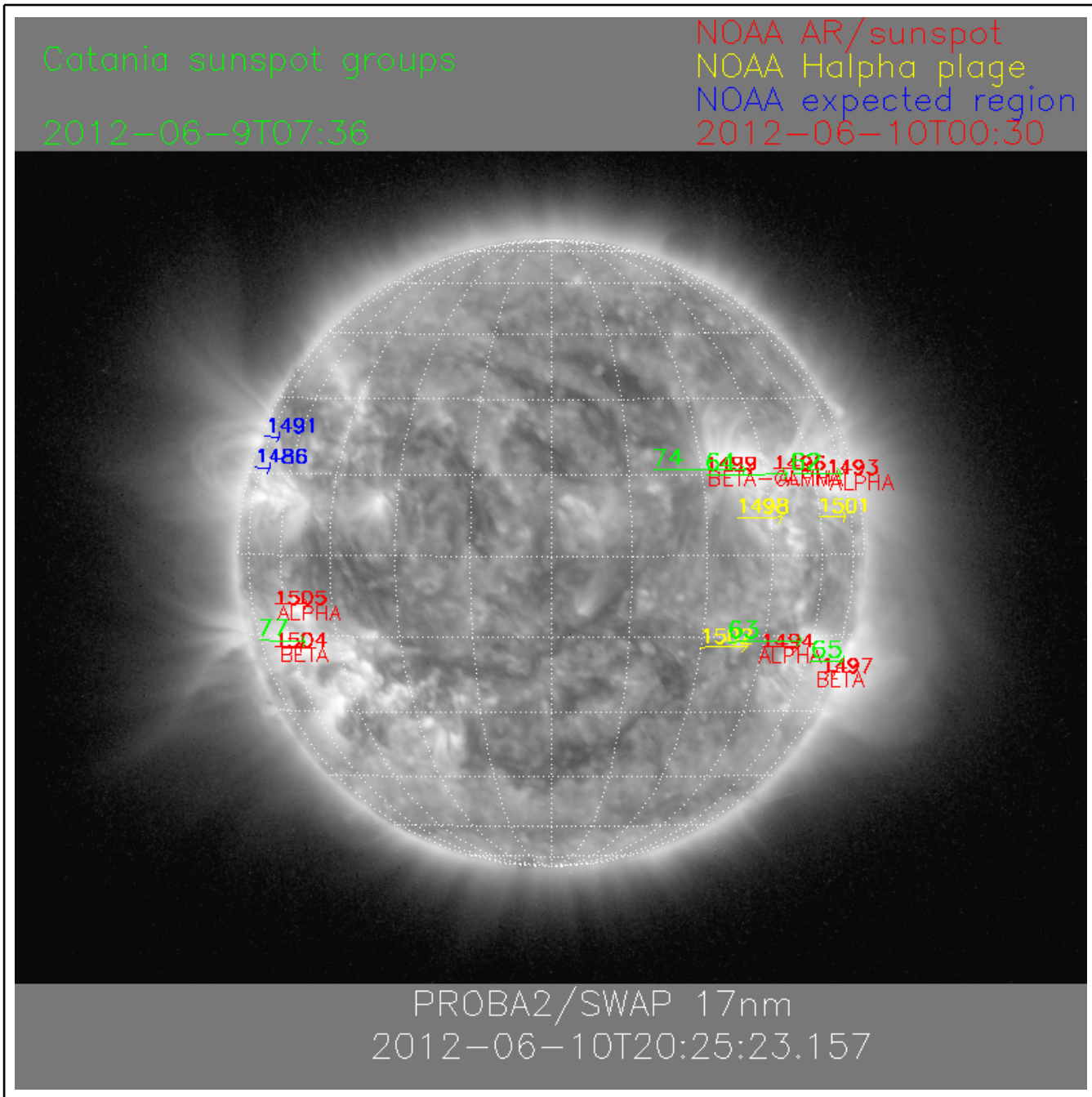
	Monday 04 Jun	Tuesday 05 Jun	Wednesday 06 Jun	Thursday 07 Jun	Friday 08 Jun	Saturday 09 Jun	Sunday 10 Jun
Activity	low	low	moderate	low	low	moderate	moderate
Flares	-	-	M2.1@19:54	-	-	M1.9@11:20 M1.8@16:45	M1.3@06:39

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

The SWAP images of Jun 04 and Jun 10 are shown below, with annotated active regions.



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


Catania sunspot groups
2012-06-9T07:36
NOAA AR/sunspot
NOAA Halpha plage
NOAA expected region
2012-06-10T00:30
1491
1486
74
1493
BETA-GAMMA
ALPHA
1498
1501
1505
ALPHA
77
1504
BETA
63
1494
ALPHA
65
1497
BETA
PROBA2/SWAP 17nm
2012-06-10T20:25:23.157

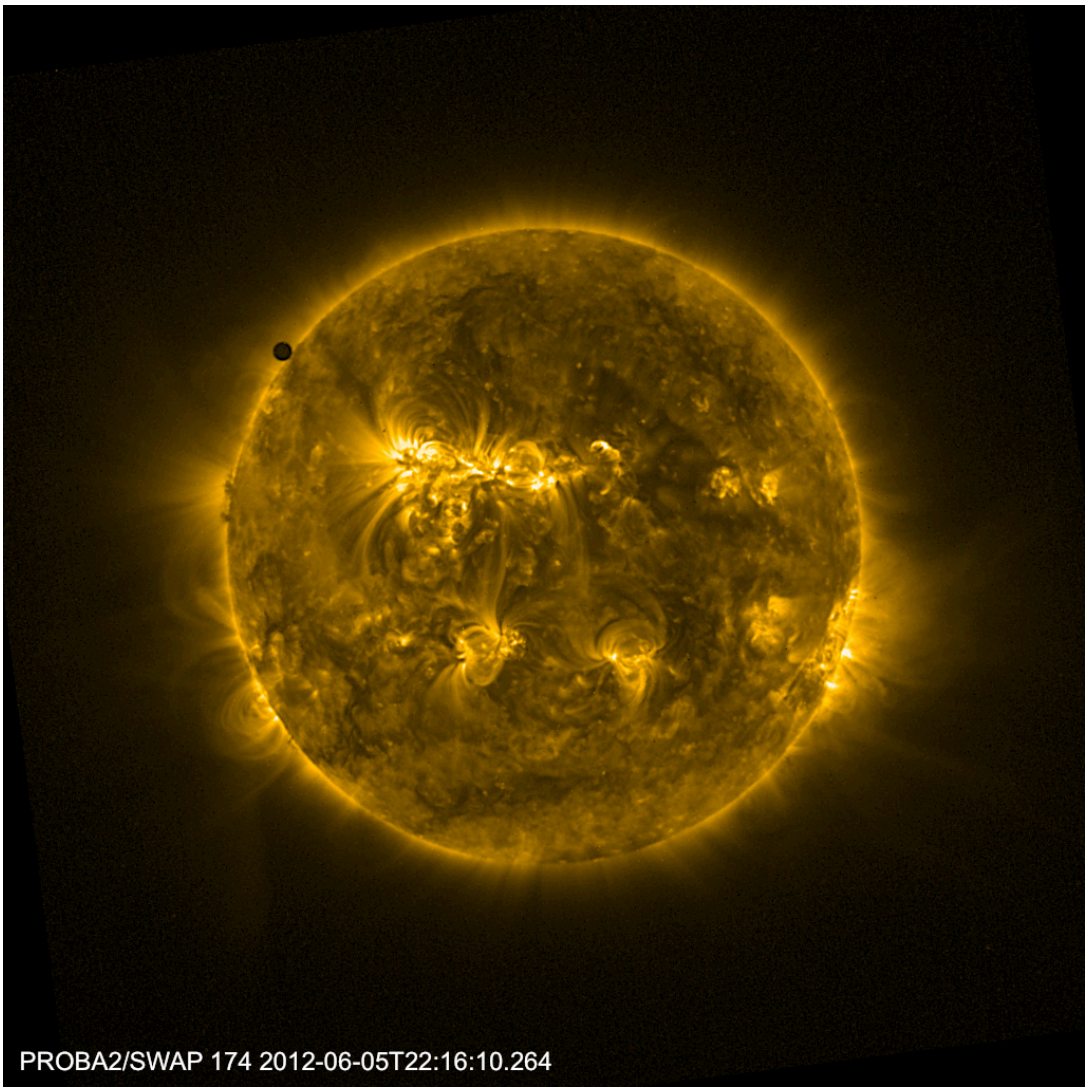
Venus Transit

The main science topic this week was the transit of Venus occurring - in UT - during the night of 5 to 6 of June. This is the first and only Venus solar transit for which SWAP and LYRA will be able to gather data.

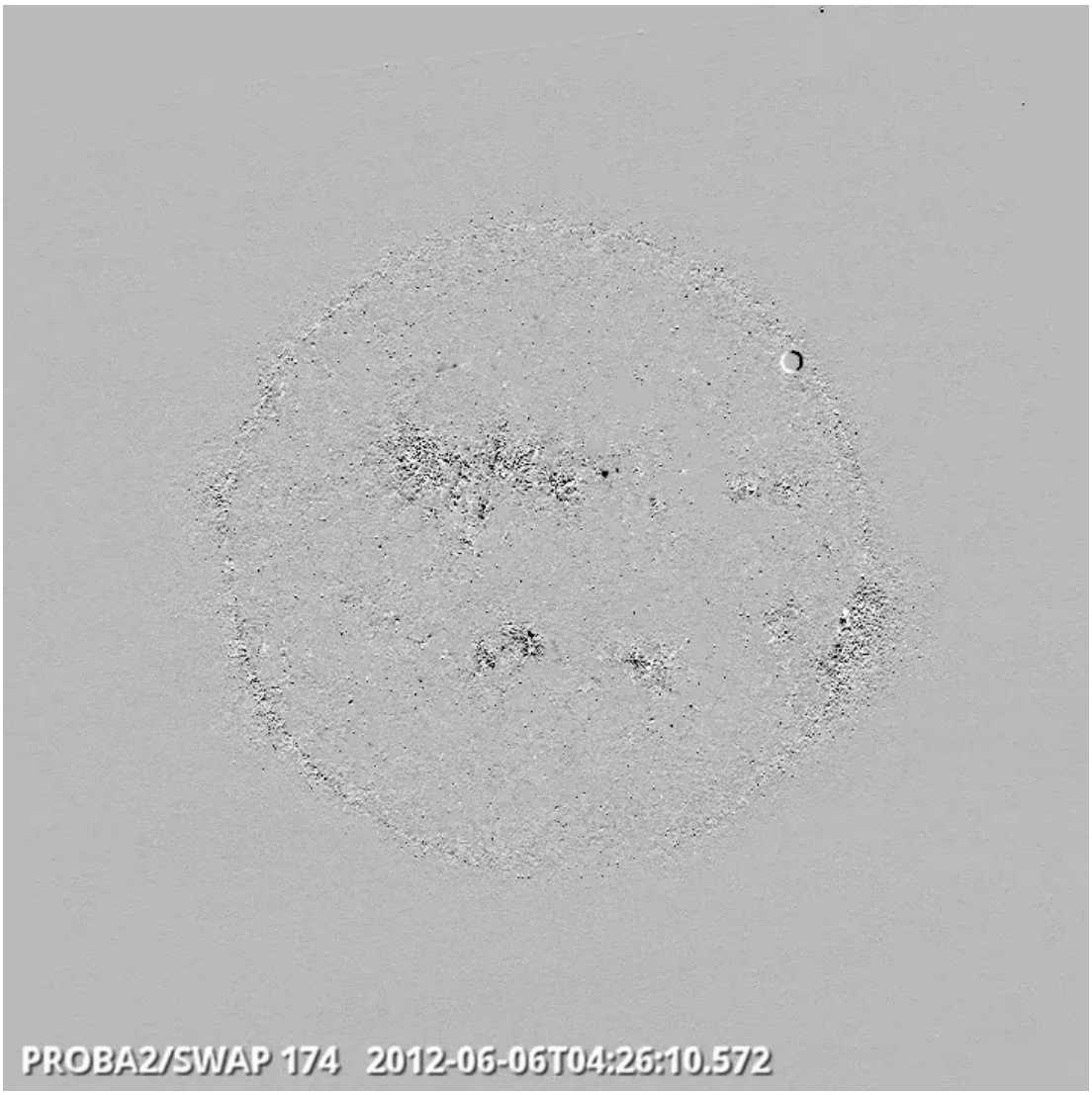
A specific campaign was prepared to allow both SWAP and LYRA to get the maximum potential science out of the transit.

Basically the following steps were performed:
1. Follow Venus crossing the East limb (first and second contact) with LYRA (Unit 2 and Unit 1) & SWAP (60s)
2. Follow Venus on the Solar disk with LYRA (Unit 2 and Unit3) & SWAP (60s cadence)
3. Follow Venus crossing the West limb (third and fourth contact) with LYRA (Unit 2 and Unit 3) & SWAP (60s)
4. Small Off-point (with West limb still in SWAP FOV) to follow Venus as far as possible with SWAP
5. Big off-point (with no Sun in LYRA FOV), to identify if LYRA Unit 1 can detect any potential radiation from Venus, when it enters the predefined FOV.

SWAP View of the Venus Transit first contact:

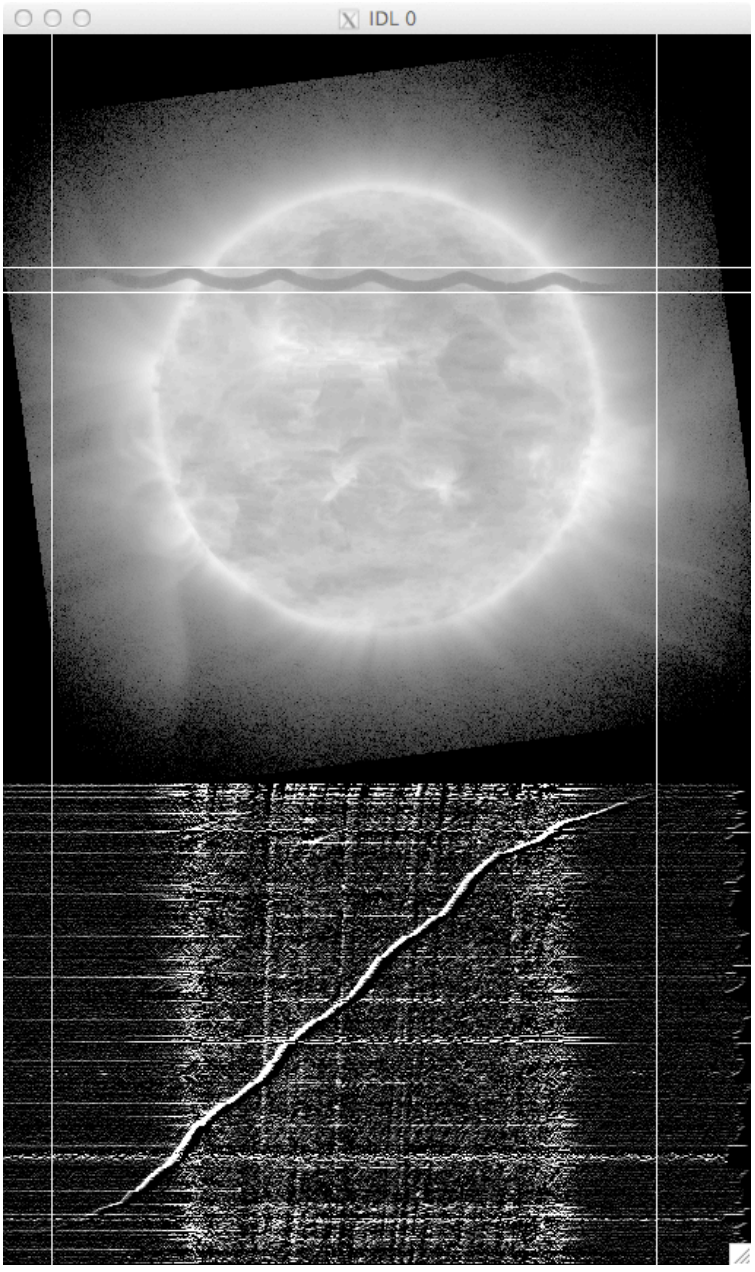


SWAP difference image of the Venus transit, close to the third contact point on the west limb:

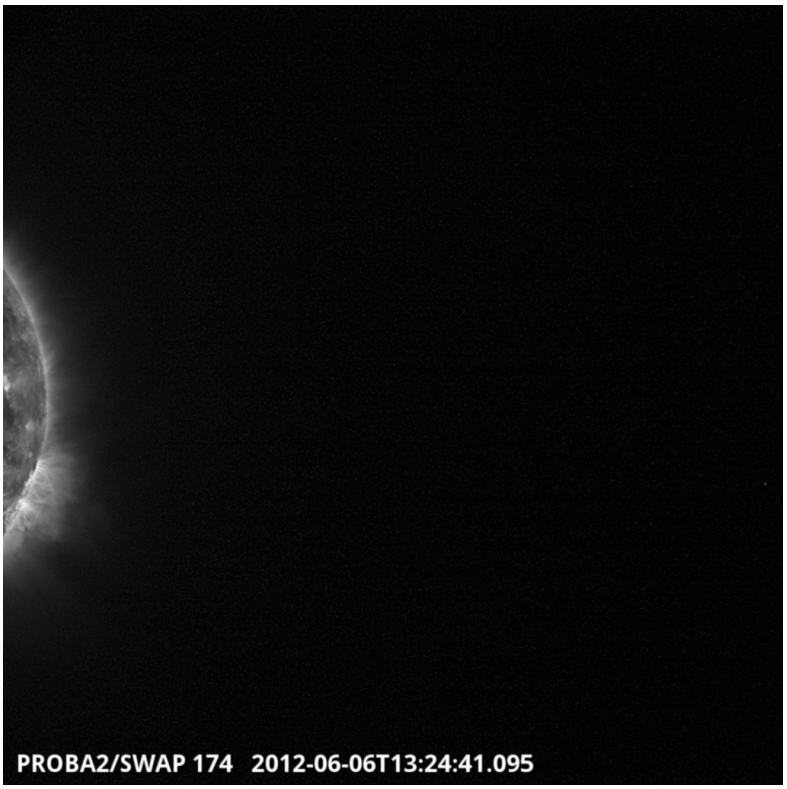


SWAP's complete Venus transit movie can be found here.

An analysis was made to find out how far off-limb Venus could be seen with normal Sun-centered FOV. The graph shows that Venus can be seen up to the end of the SWAP FOV (bottom of the graph).



After the end of the transit, PROBA2 was off-pointed, in order to be able to analyse how far Venus could be ‘seen’ by SWAP. The adjusted SWAP FOV, shown below, was defined for that purpose.

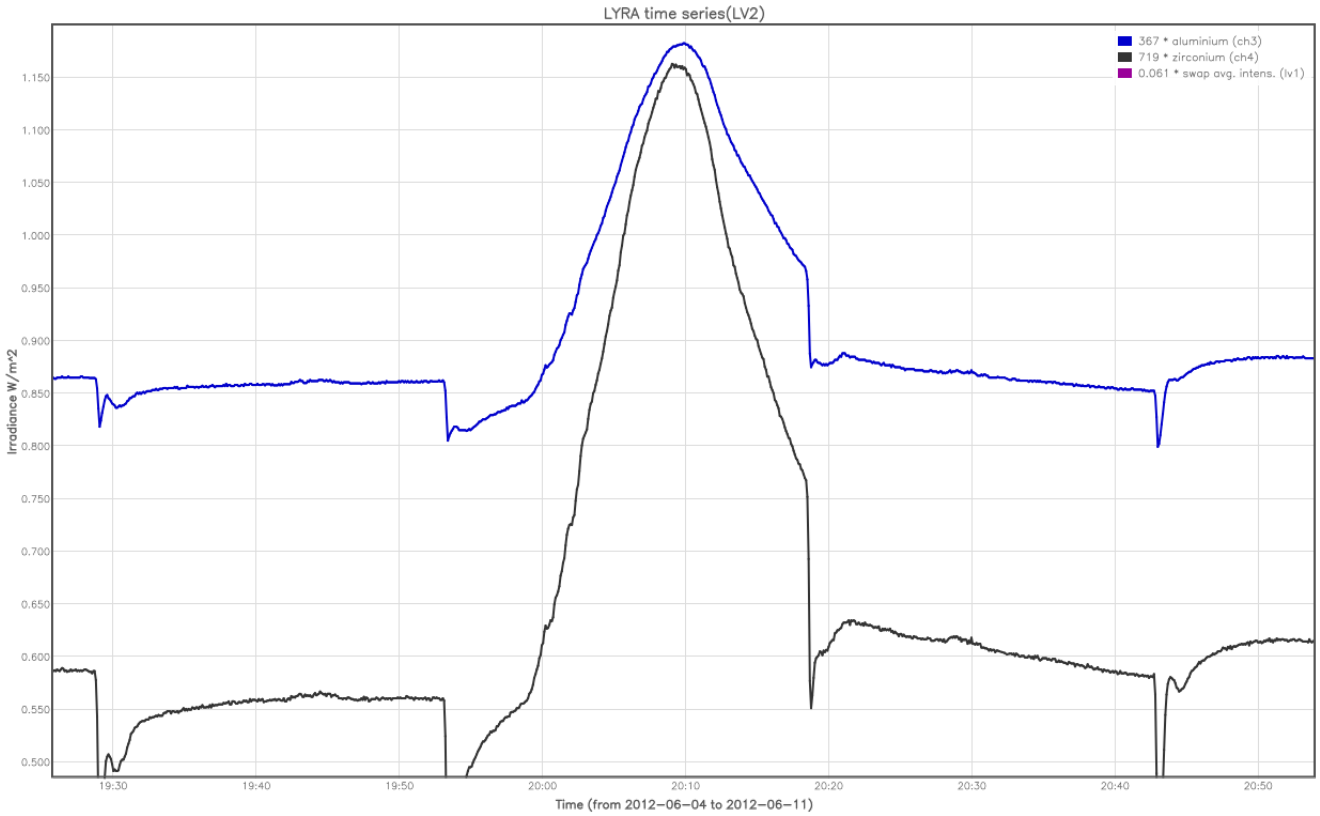


These images have not yet been fully analysed to be able to make conclusions.

Solar Activity

This week, the Sun's activity level fluctuated between low and moderate[2]. M-flares occurred on Wednesday 6th (1), Saturday 9th (2) and Sunday 10th (1). Active Region 11504 rounded the eastern limb during the week-end and erupted 3 times at M1 to M2 level.

On Wednesday 6th, at 19:54 UT, an M2.1 flare occurred in AR 11494, while the Sun was partially (80-90%) in the LYRA FOV. During that time the Sun was completely outside the SWAP FOV.

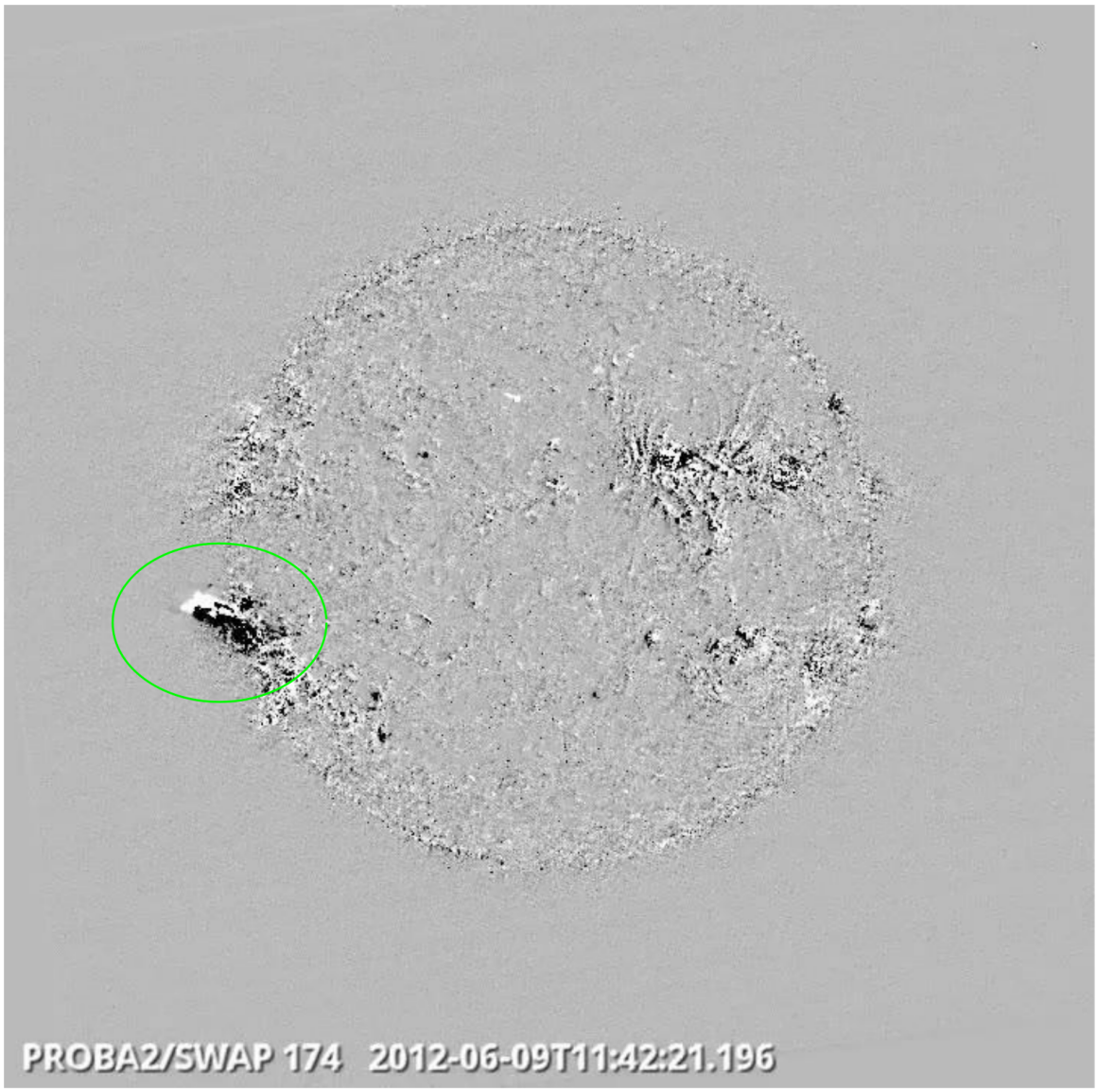


M2.1 flare as recorded by LYRA, 06/06 @ 19:54

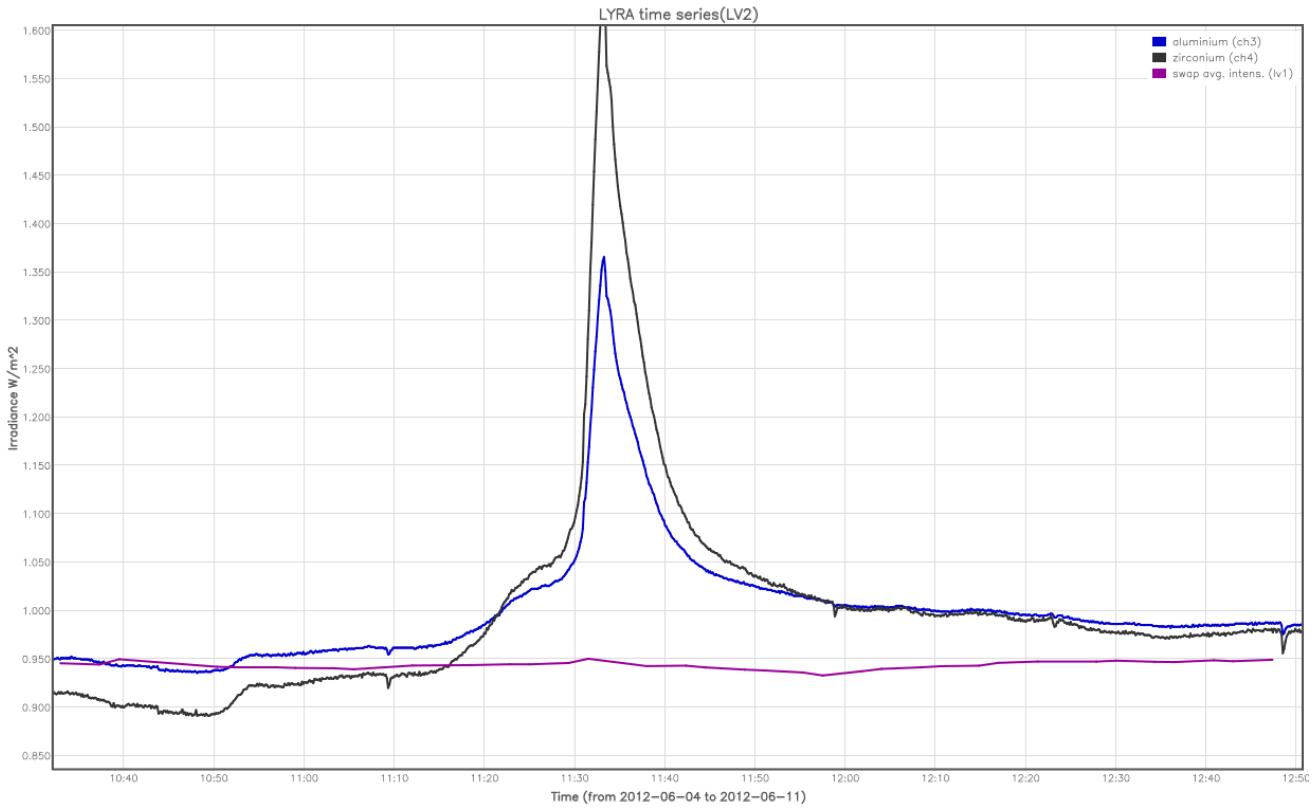
On Saturday 9th, two M flares (M1.9, M1.8) occurred in AR 11504. A full normal SWAP movie, exhibiting the two M flares can be found here

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

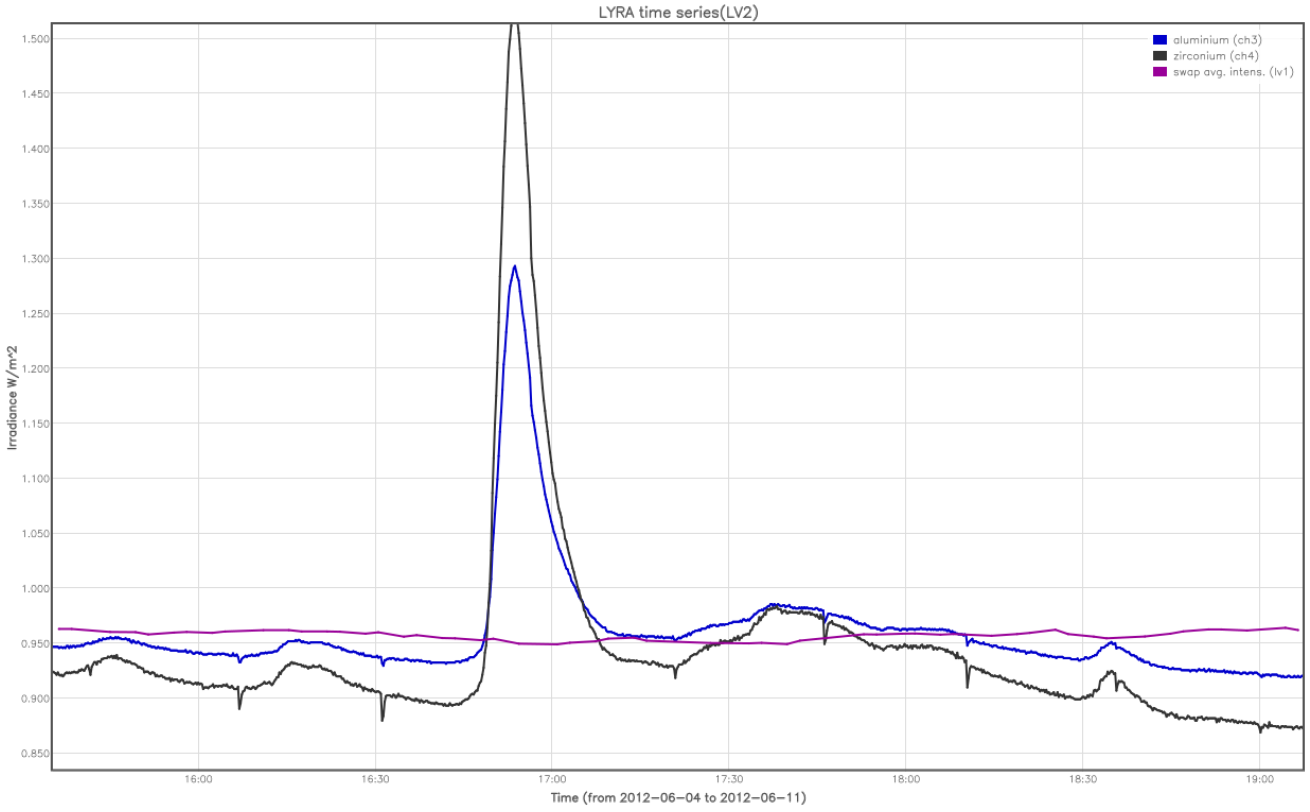
A SWAP difference image for the M1.9 flare is provided below as well as the LYRA curves for the M1.9 and M1.8 flares:



M1.9 flare as seen in the SWAP difference movie, 09/06 @ 11:20



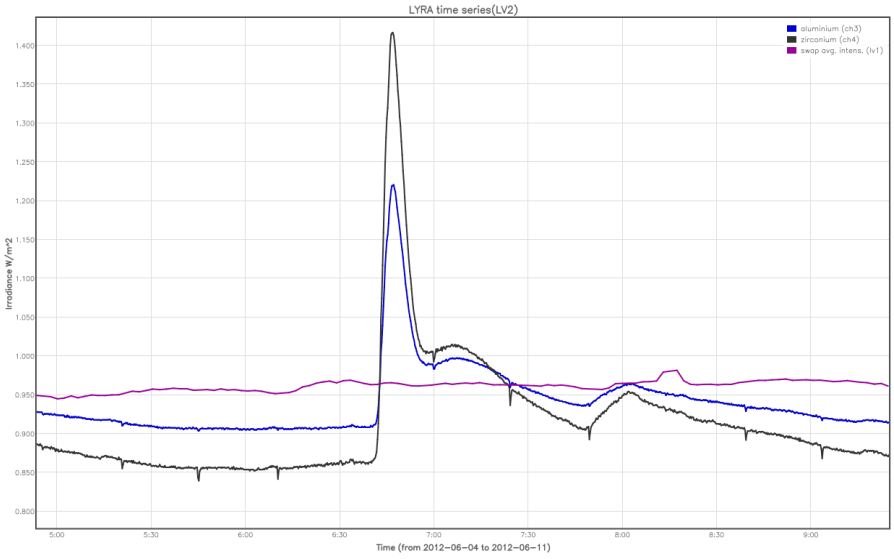
M1.9 flare as recorded by LYRA, 09/06 @ 11:20



M1.8 flare as recorded by LYRA, 09/06 @ 16:45

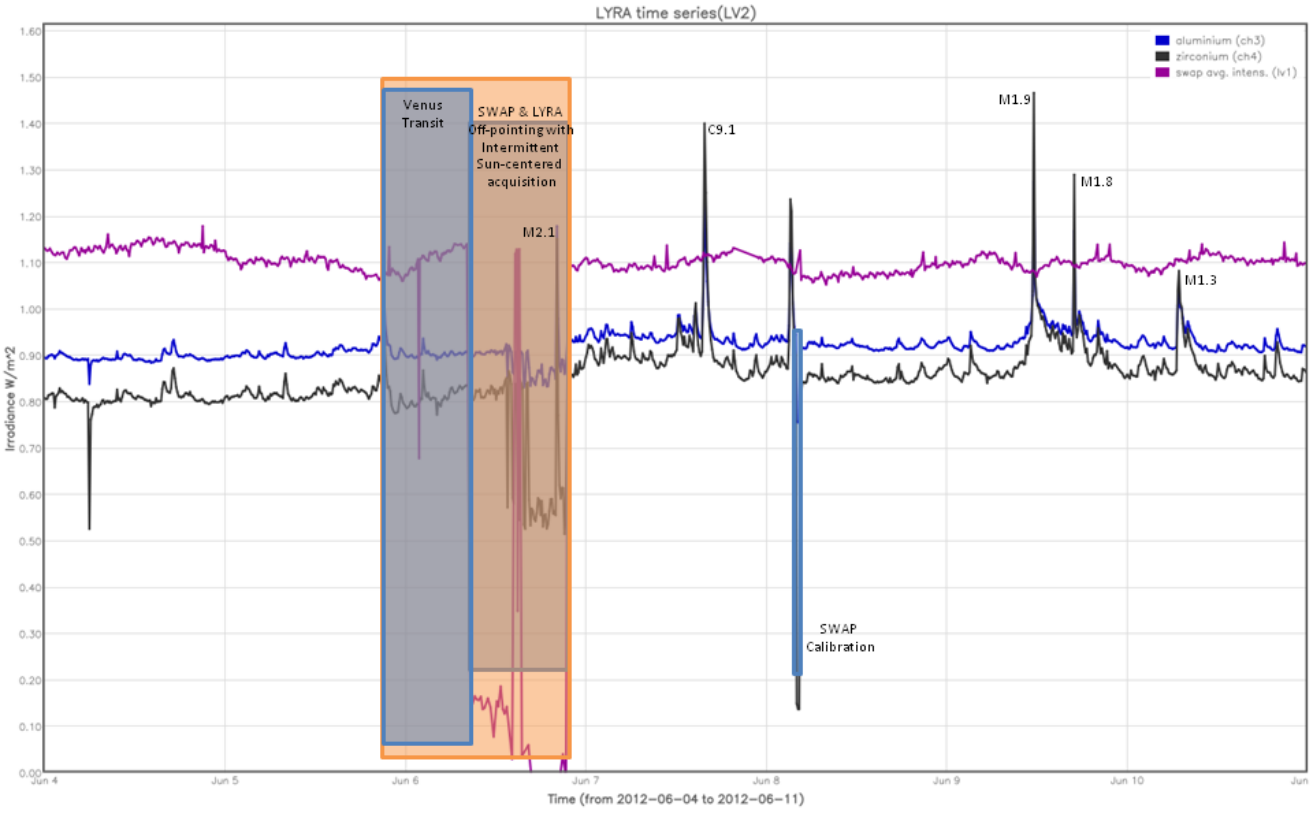
On Sunday 10th, an M1.3 flare occurred in AR 11504.

M1.3 flare as seen in the SWAP difference movie, 10/06 @ 06:39



M1.3 flare as recorded by LYRA, 10/06 @ 06:39

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, SWAP imaging campaigns for:
- Venus transit
- off-pointing in order to follow Venus, with intermittent returns to Sun-centered imaging, in order to ensure sufficient continuity in the Sun-centered image flow.

The orange shaded periods correspond to, from left to right, LYRA data acquisition campaigns for:
- Venus transit
- data acquisition during off-pointing periods

The red shaded period corresponds to:
- None.

Scientific campaigns

The following LYRA and SWAP specific scientific campaigns have been performed this week:
- Test campaigns for LYRA & SWAP on Monday 04/06, before the Venus transit of 06/06.
- Venus transit campaign on 06/06 (for more details see below).

Outreach, papers, presentations, etc.

Venus Transit, June 6, 2012
A press event, organised by ESA in Svalbard. The P2SC provided real time images (during the night!). A text accompanying the image and movie was provided.
A press release, sent by email, 3 languages.

http://www.stce.be/news/146/welcome.html
http://proba2.oma.be/index.html/outreach/breve/venus-transit-nl
http://proba2.oma.be/index.html/outreach/breve/venus-transit-fr
http://proba2.oma.be/index.html/outreach/breve/venus-transit

Looking back, it was a good thing that the press release for the Belgian press was sent just when the Venus Transit was over: 07:10 LT. The Venus transit was a topic of the early morning news.
* ESA's Venus Flickr http://www.flickr.com/photos/esa_events/sets/72157629888955980/
* VTM news - movie available on Petra's laptop. http://nieuws.vtm.be/binnenland/201206064772-belgen-krijgen-venusovergang-niet-te-zien
* The SWAP movie was played on the VRT journal, without reference
* De Morgen 7/6/2012: an image of PROBA2/SWAP was used without any reference (the bottom was cut off)
* La Libre Belgique: http://www.lalibre.be/archives/divers/article/739215/breves.html
* RTBF radio: Marie was in a discussion panel http://www.rtbf.be/lapremiere/emission/programme_le-forum-de-midi?id=2202&scope=past
* FR press http://www.lefigaro.fr/sciences/2012/06/06/01008-20120606DIMFIG00362-le-splendide-passage-de-venus-devant-le-soleil.php
* ESA front page and http://www.esa.int/esaCP/SEM2535XX2H_index_0.html
* ESA kids http://www.esa.int/esaKIDSnl/SEMEH45XX2H_OurUniverse_0.html
* ESA Transit of Venus Blog http://blogs.esa.int/venustransit/2012/06/05/proba-2-sees-venus-approach-the-sun/
* More on Emily's blog :
  * http://blogs.esa.int/venustransit/2012/06/06/transit-of-venus-2012-in-pictures/
  * http://blogs.esa.int/venustransit/2012/06/06/proba-2s-ringside-seat/
  * http://blogs.esa.int/venustransit/2012/06/05/esas-missions-gear-up-for-the-transit-of-venus/ (no picture - this was before the actual transit)
* Mareike's blog: http://blogs.esa.int/venustransit/2012/06/06/proba-2s-journey-across-the-sun/
* Amateur websites
  * http://www.slashgear.com/proba-2-satellite-records-video-of-venus-solar-transit-06232451/
  * http://www.astronomy.com/~/link.aspx?_id=d928a2fb-3ed0-4864-87cd-983d58ccbb85
  * http://technabob.com/blog/2012/06/06/esa-proba-2-satellite-venus-solar-transit/
  * http://www.universetoday.com/95675/stunning-timelapse-spacecraft-capture-the-transit-of-venus/
  * http://www.allesoversterrenkunde.nl/content.shtml?http://www.allesoversterrenkunde.nl/cgi-bin/scripts/db.cgi?db=nieuws&ww=on&ID=5418&view_records=1

* Facebook groups informed:
  * European Solar Zone
  * Astrophotography/ Amateur Astronomy Enthusiasts
  * Charlie Bates Solar Astronomy Project
  * VVS Werkgroep deepsky
  * Aotearoa Astrophotography

* Venus transit movie provided on www.webastro.net forum.

2. LYRA instrument status

Calibration

No calibration of LYRA this week.

IOS & operations

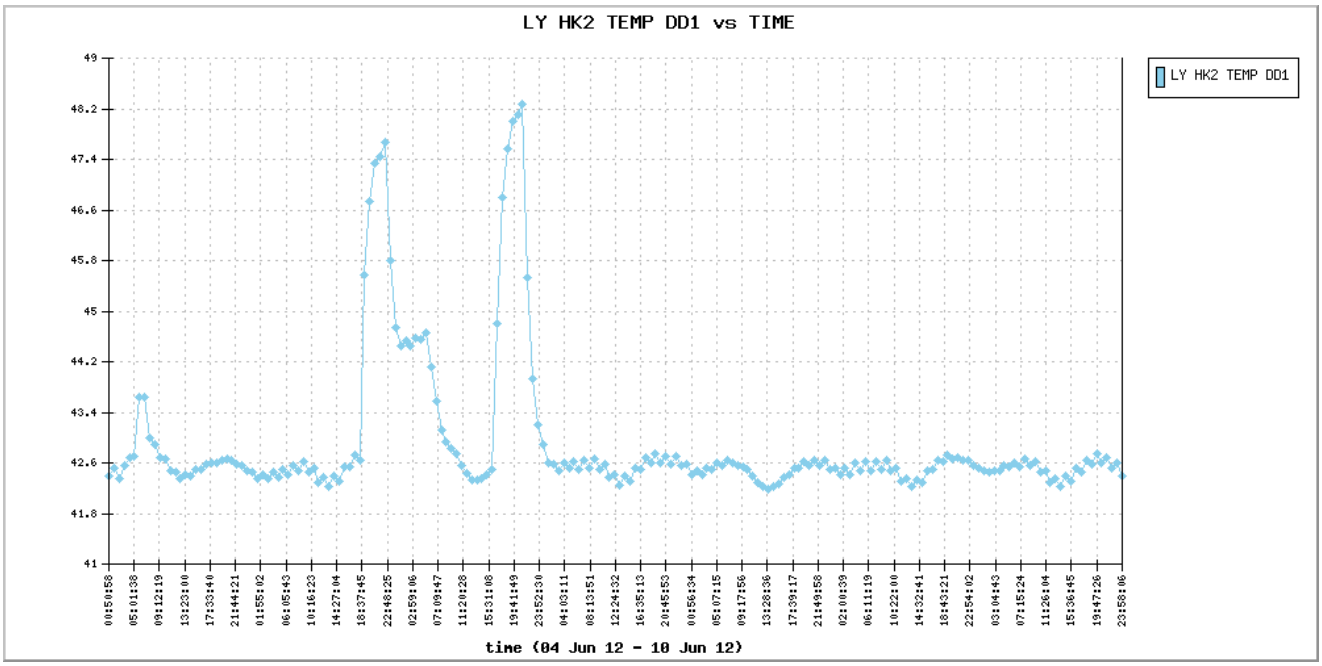
Monday 04 Jun	Tuesday 05 Jun	Wednesday 06 Jun	Thursday 07 Jun	Friday 08 Jun	Saturday 09 Jun	Sunday 10 Jun
Nominal acquisition LYIOS00247 -> 248	Nominal acquisition LYIOS00248	Nominal acquisition + Venus transit LYIOS00248 -> 249	Nominal acquisition + Venus transit LYIOS00249	Nominal acquisition + calibration LYIOS00249	Nominal acquisition LYIOS00249	Nominal acquisition LYIOS00249

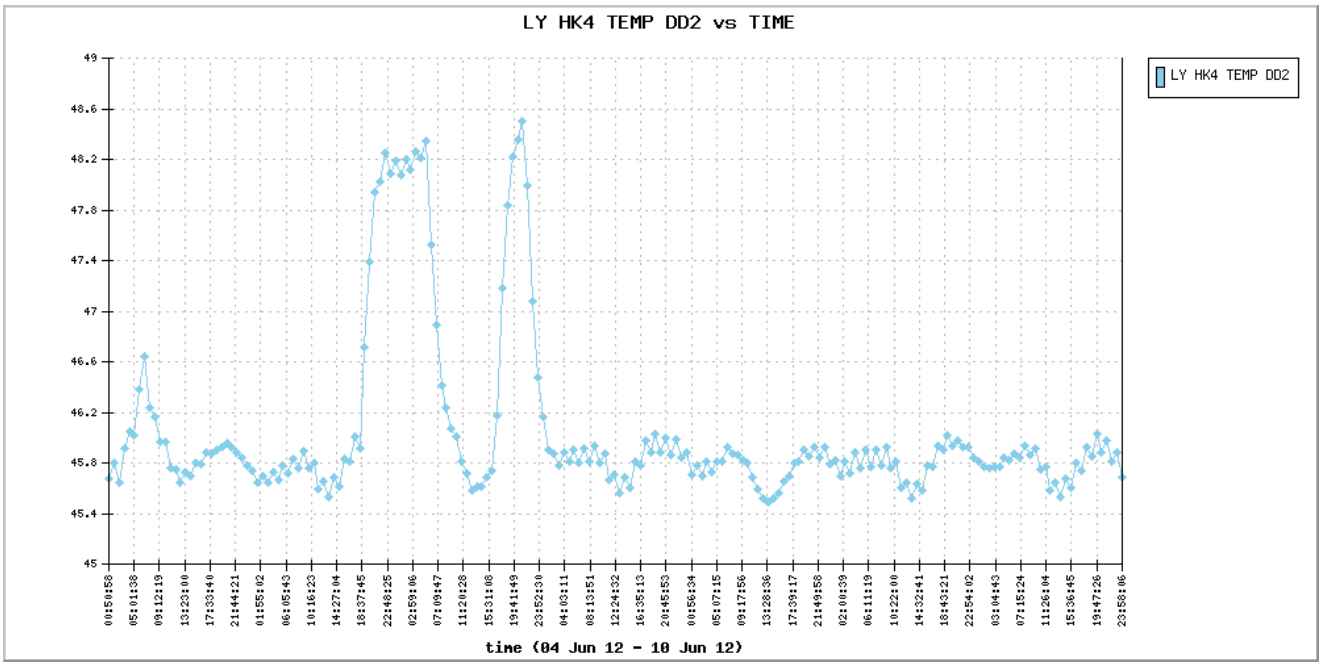
The following LYRA campaign was performed this week:
- Venus Transit

LYRA detector temperature

LYRA detector 1 temperature fluctuated between 42.5 (nominal ops) and 48.3 (during the Venus transit campaign).
LYRA detector 2 temperature fluctuated between 45.6 (nominal ops) and 48.5 (during the Venus transit campaign).
LYRA detector 3 temperature fluctuated between 42 (nominal ops) and 47.6 (during the Venus transit campaign).

For Detector 1 and 2, see the following temperature graphs:





To be explored

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3. SWAP instrument status

Calibration

Calibration of SWAP occurred on Friday, 04:00.

MCPM errors

The number of MCPM recoverable errors increased from 948 to 1093.

The number of MCPM unrecoverable errors is still 0.

IOS & operations

Monday 04 Jun	Tuesday 05 Jun	Wednesday 06 Jun	Thursday 07 Jun	Friday 08 Jun	Saturday 09 Jun	Sunday 10 Jun
Nominal acquisition IOS00394->396 604 images	Nominal acquisition IOS00396 815 images	Nominal acquisition IOS00397->398 633 images	Nominal acquisition IOS00398->400 706 images	Nominal acquisition IOS00400 -> 401 761 images	Nominal acquisition IOS00401 518 images	Nominal acquisition IOS00401 512 images

The following SWAP campaign was performed this week:
- Venus Transit
- Calibration

SWAP detector temperature

The SWAP Cold Finger Temperature fluctuated between -0.70 and -1.7 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 7972 to 8032) 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

All SWAP Science data files (BINSWAP) have been processed successfully, except for:
- 8035, 8043, 8049 (CRC problem)
- 8080 (no calibrated images) - gap between 19:44 and 22:47 in the SWAVINT curve. Uncalibrated images are available. Solution is being implemented.

Total number of images between 2012 Jun 04 0UT and 2012 Jun 11 0UT: 4550
Highest cadence in this period: 30 seconds
Average cadence in this period: 132.88 seconds
Number of image gaps larger than 300 seconds: 25
Largest data gap: 13.00 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 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?)