P2SC-ROB-WR-101-20120227 Weekly report #101	**P2SC Weekly report**	
Period covered: Date: Written by: Released by:	Mon Feb 27 to Sun Mar 04, 2012 07 Mar 2012 Erik Pylyser David Berghmans	Royal Observatory of Belgium PROBA2 Science Center
To:	LYRA PI, marie.dominique@sidc.be SWAP PI, david@sidc.be	http://proba2.sidc.be ++ 32 (0) 2 373 0 559
cc:	ROB DIR, ronald@oma.be ESA Redu, Etienne.Tilmans@esa.int ESA D/SRE, Joe.Zender@esa.int ESA D/TEC, Stefano.Santandrea@esa.int	

1. Science

Solar & Space weather events

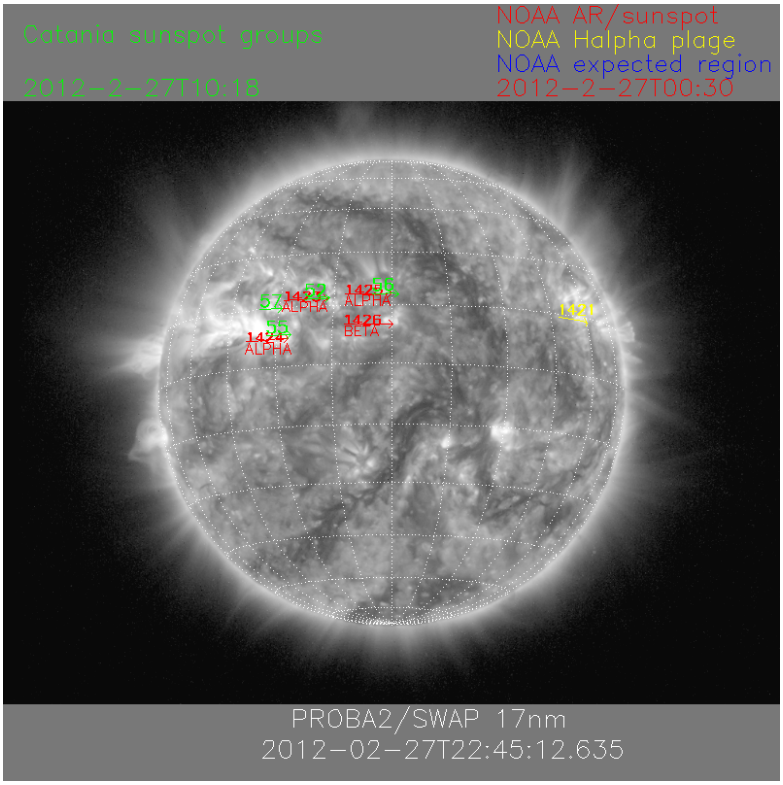
Overview

The level of solar activity this week[1]:

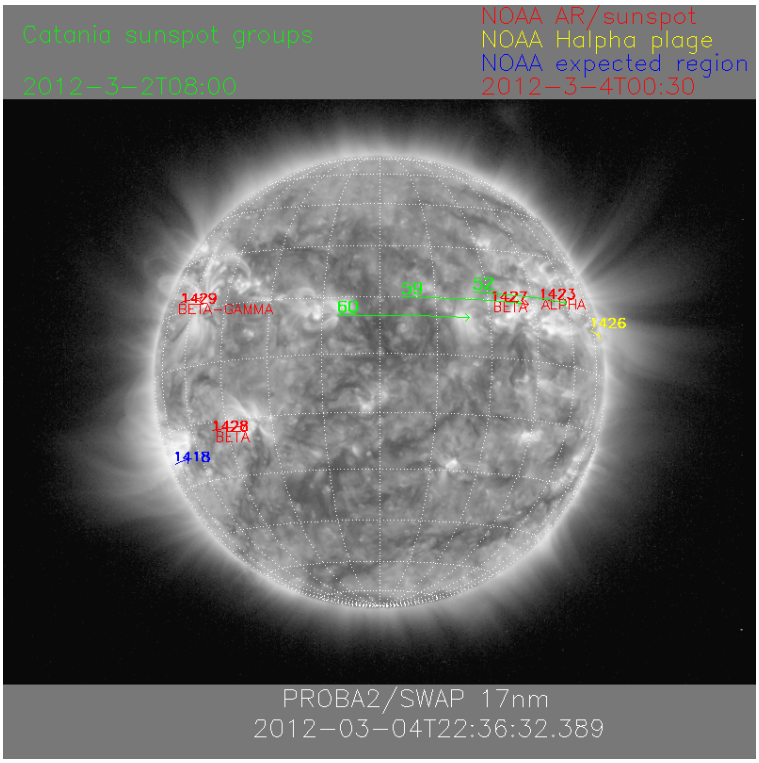
Monday 27 Feb	Tuesday 28 Feb	Wednesday 29 Feb	Thursday 01 Mar	Friday 02 Mar	Saturday 03 Mar	Sunday 04 Mar
very low	very low	very low	low	moderate	low	moderate

[1] See http://p2wiki.oma.be:8000/p2ops_wiki/wiki/P2SCWeeklyReport for a definition of the above-used solar activity standards.

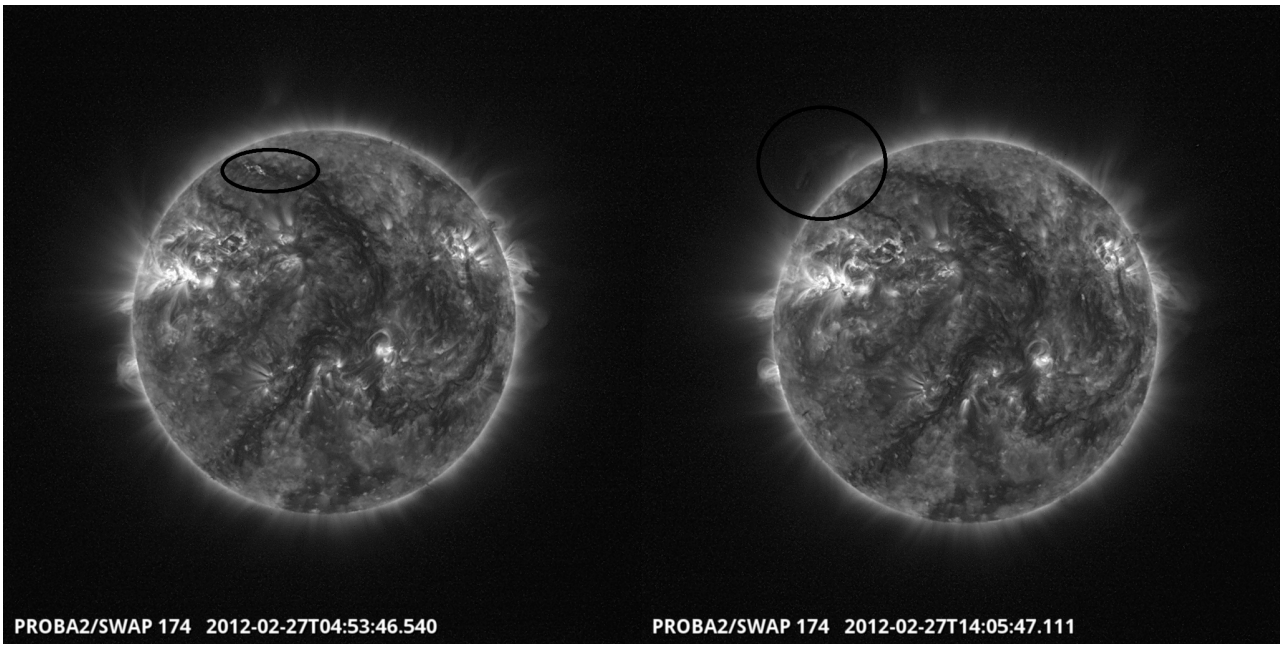
The SWAP images of Feb 27 and Mar 04 are shown below, with annotated active regions.

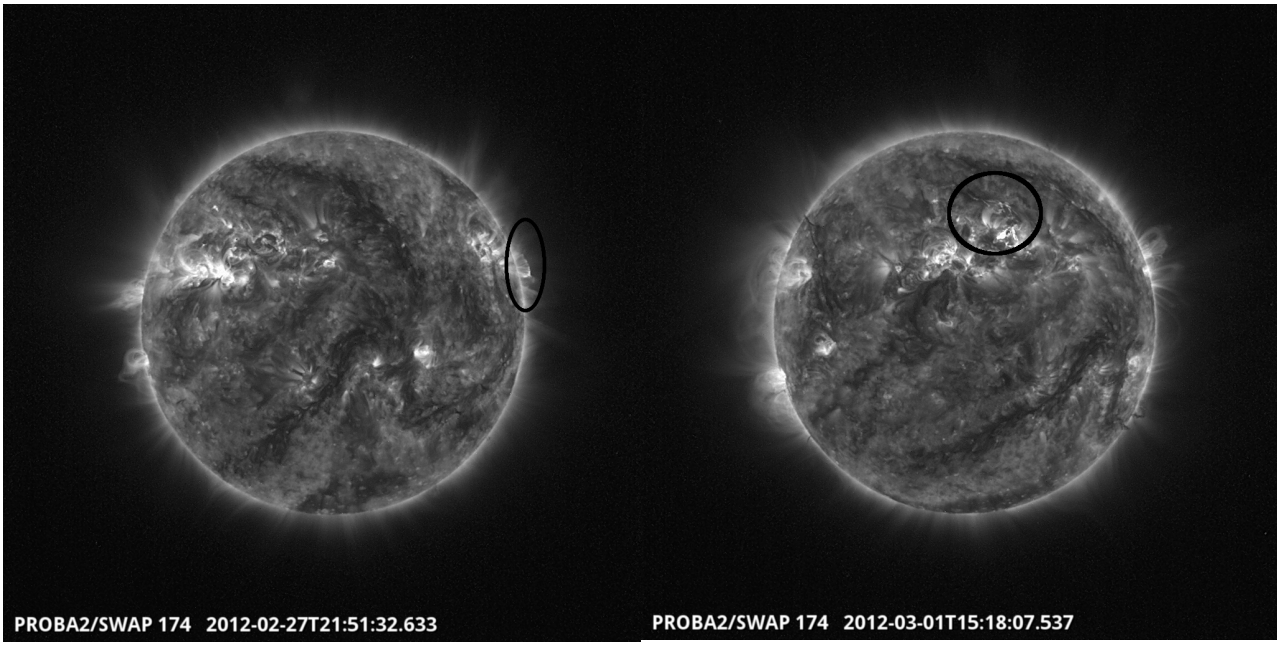


http://sidc.be/html/CmapPage.html

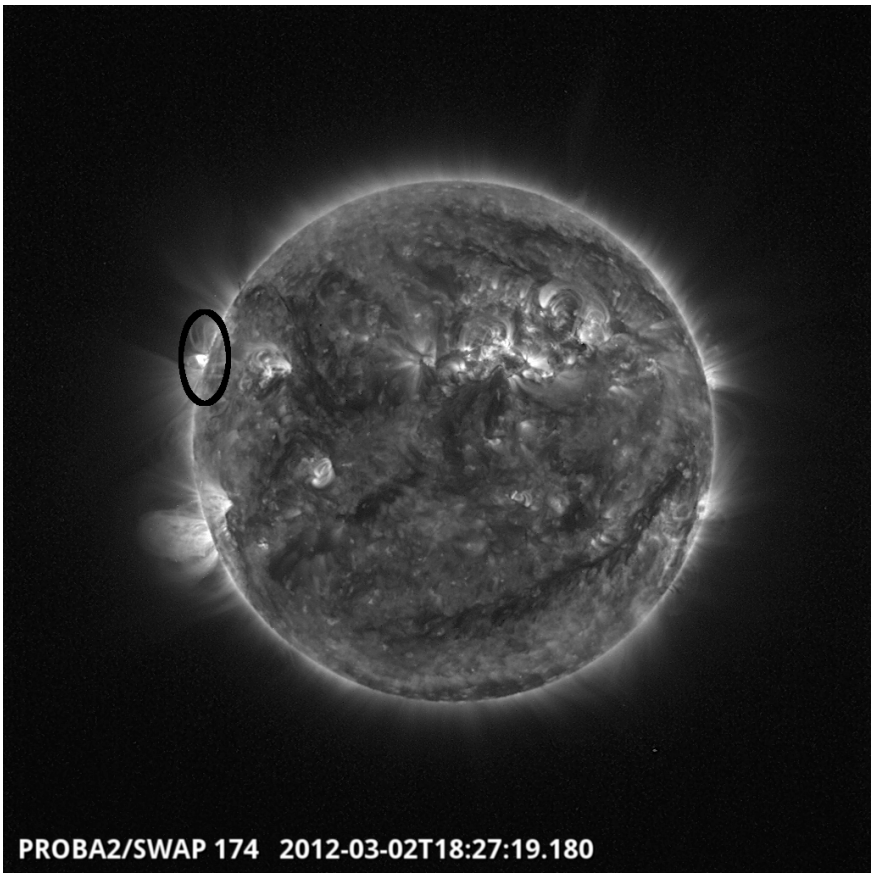


A few phenomena which occurred at the beginning of the week:
- 1. a filament brightening on Mon 27th of Feb, around 4:50, N quadrant - see picture top left;
- 2. a filament eruption on Mon 27th of Feb, around 12:00 - NE limb - see picture top right;
- 3. a filament eruption on Mon 27th of Feb, around 16:00, followed by the formation of an arcade on W limb - see picture bottom left;
- 4. a C3.3 flare on Thu 1st of March, at 15:15 - see picture bottom right.

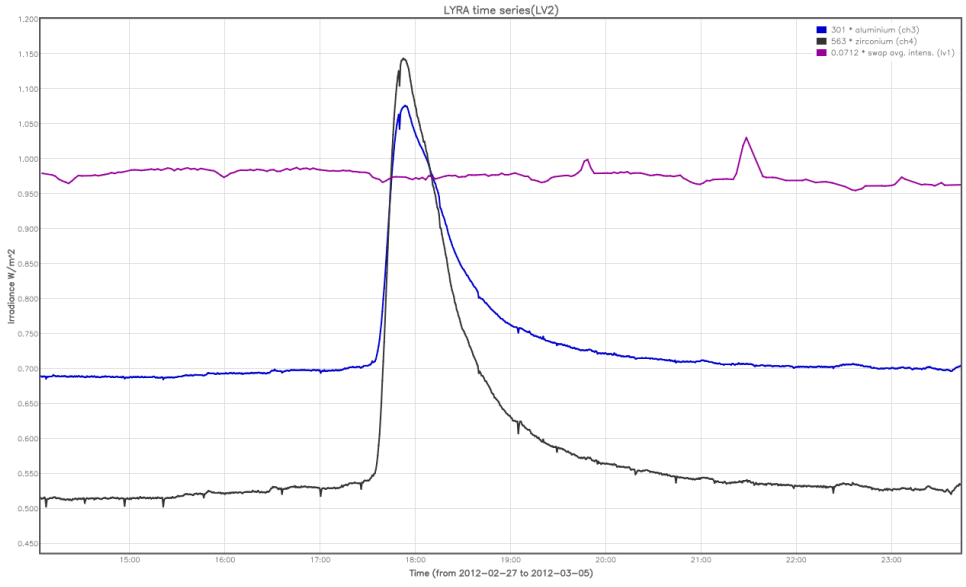


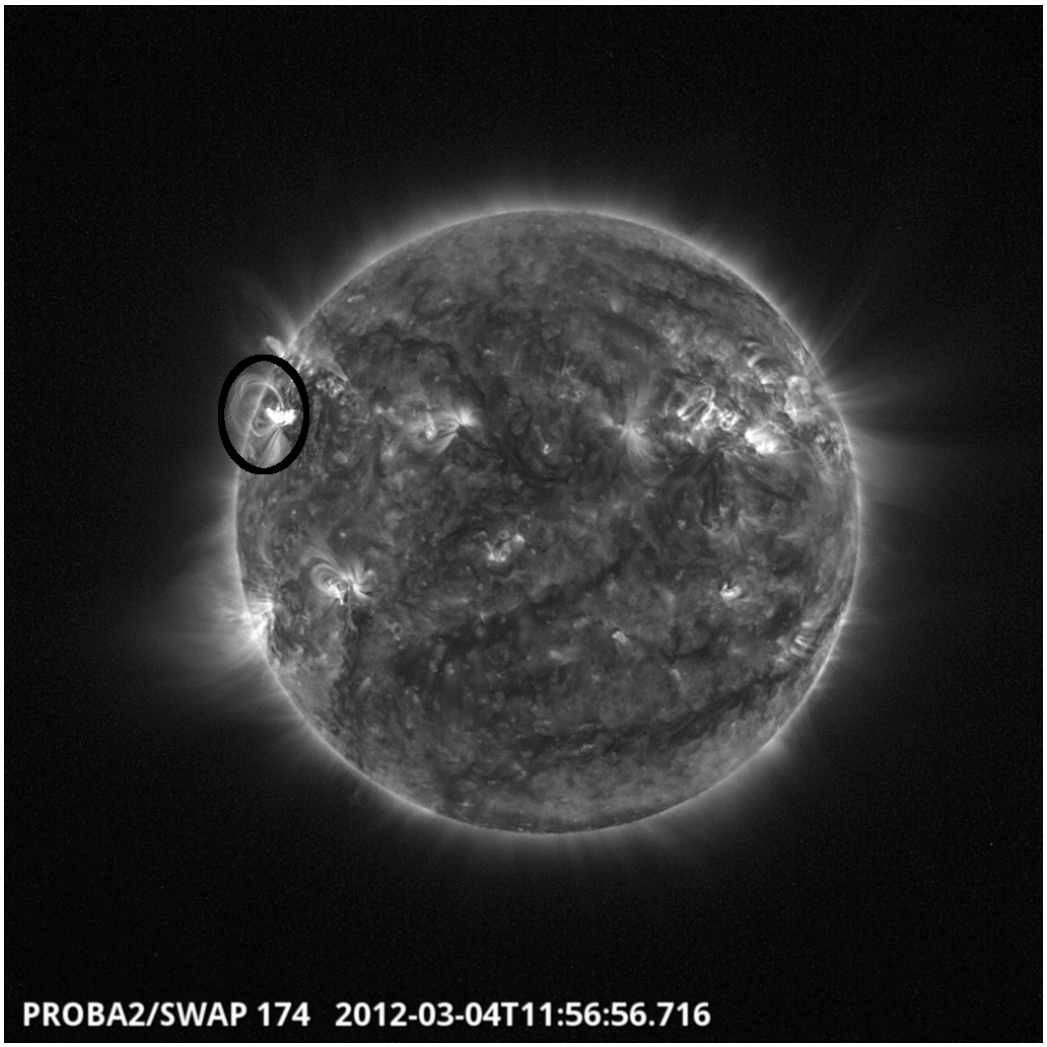


On Friday, as well as on Sunday, an active sunspot group (AR 11429) appearing on the East limb generated an M-flare (and an X-flare early, the next Monday (see next week's report WR 102)):

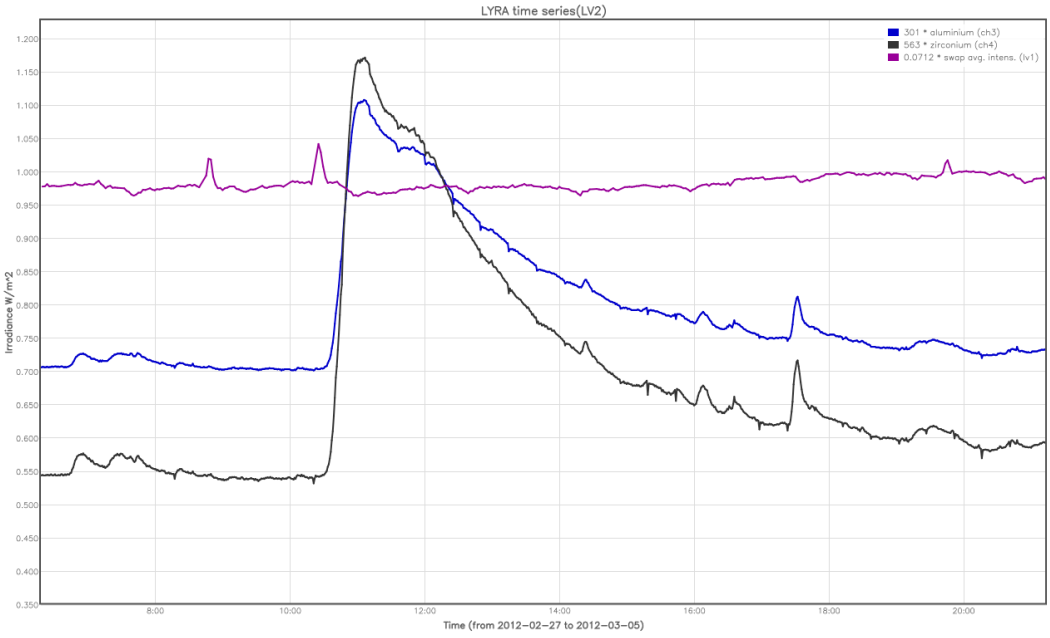


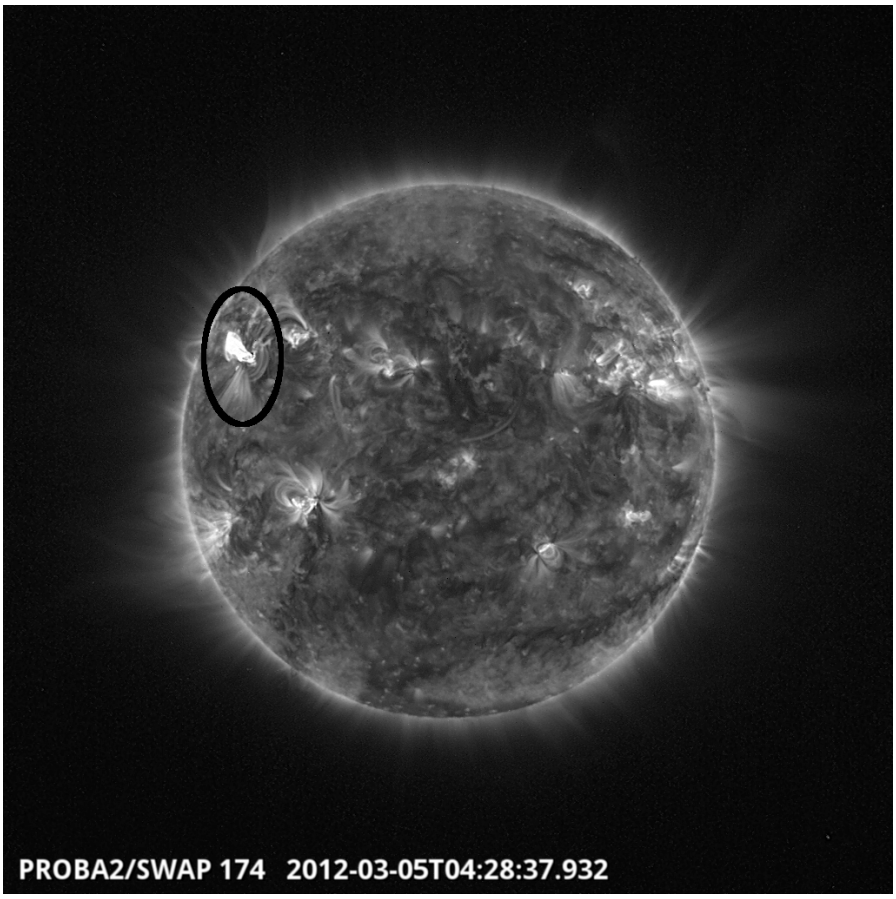
M3.3 Flare on Fri March 02; 18:27



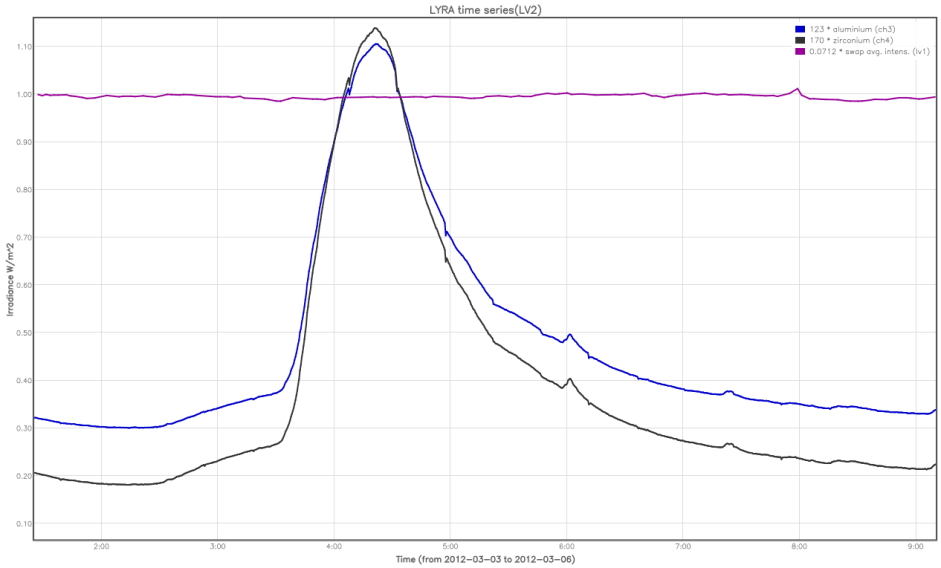


M2.0 Flare on Sun March 04; 11:57





X1.1 Flare on Mon March 05; 04:28

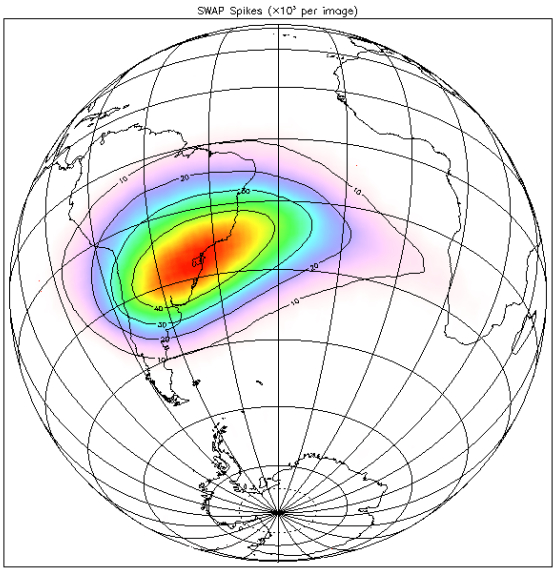


A color movie of the X1.1 flare can be found on:

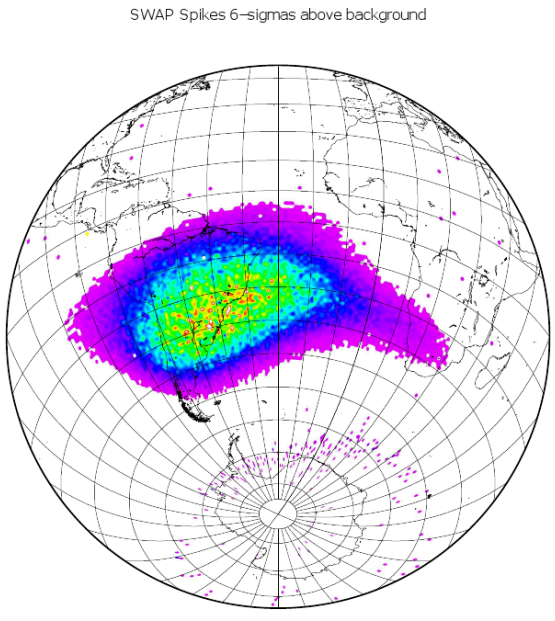
http://proba2.oma.be/swap/movies/campaign_movies/20120305_swap_movie_yellow.mp4

SWAP images & SAA intensity map

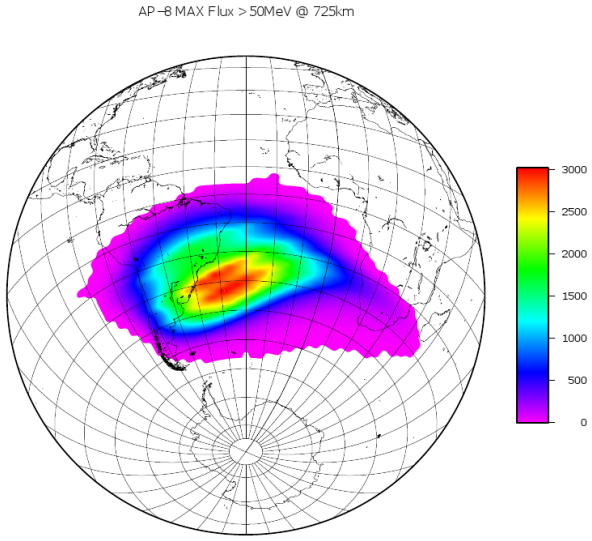
We studied the evolution of the number of pixels automatically detected as spiky, i.e. standing out in their spatial neighbourhood, in the series of SWAP images. The following maps include the whole PROBA2 mission data. The aim is to study the influence on SWAP of the magnetosphere trapped particles and of the solar energetic particles (SEP) and to try to understand the evolution of the total dose received by the instrument (e.g., MCPM detected memory errors).



Map of the accumulated number of spikes detected in the SWAP images

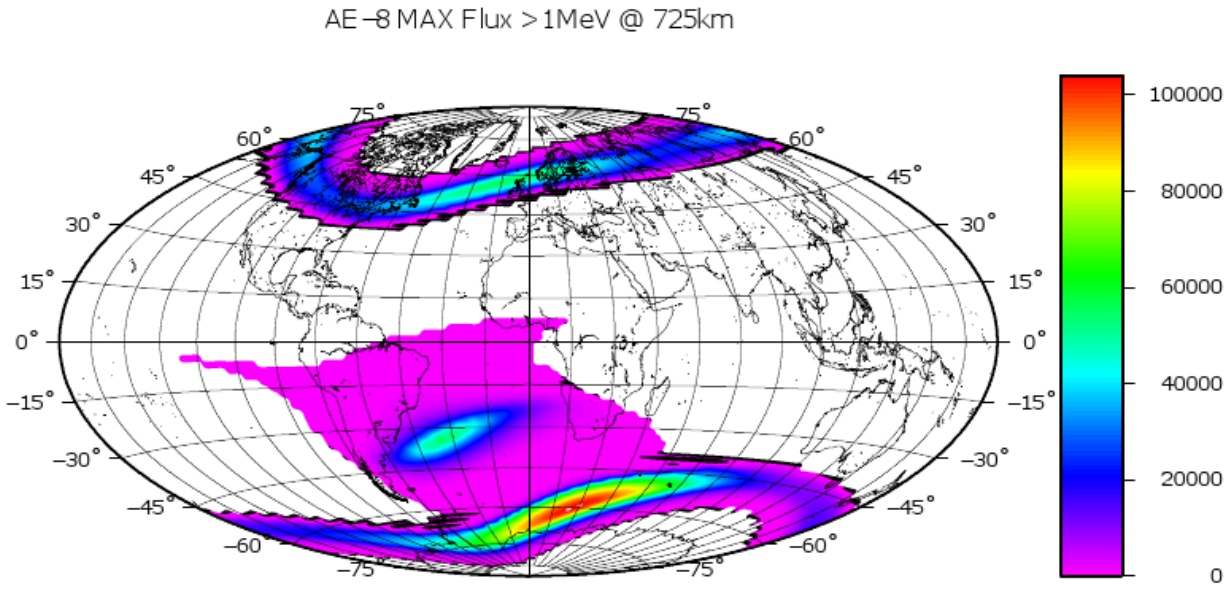


Map of deviations above 6-sigma in the time series of spikes detected in the SWAP images

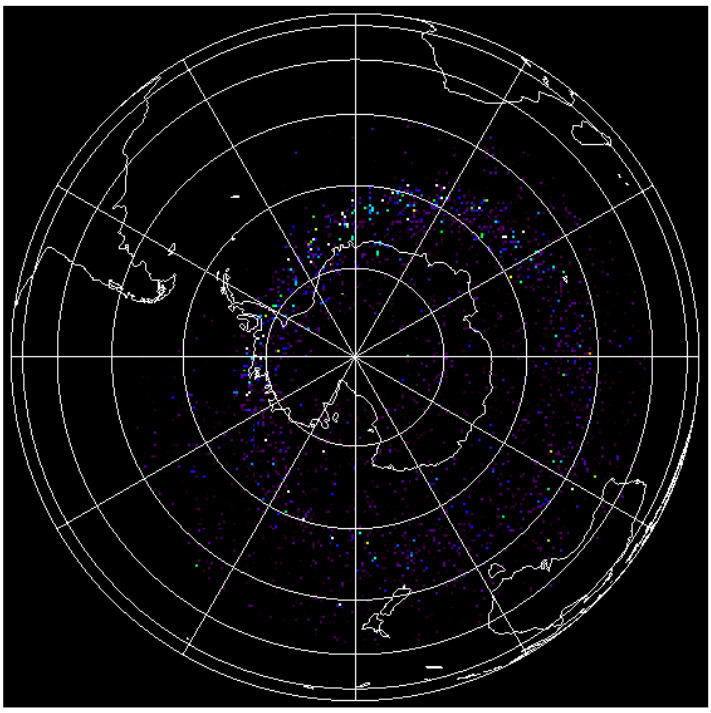


Map of proton flux > 50 Mev @ a height of 725km - SPENVIS trapped particles model at maximum solar activity (omnidirectional flux = number of particles/cm^2/s).

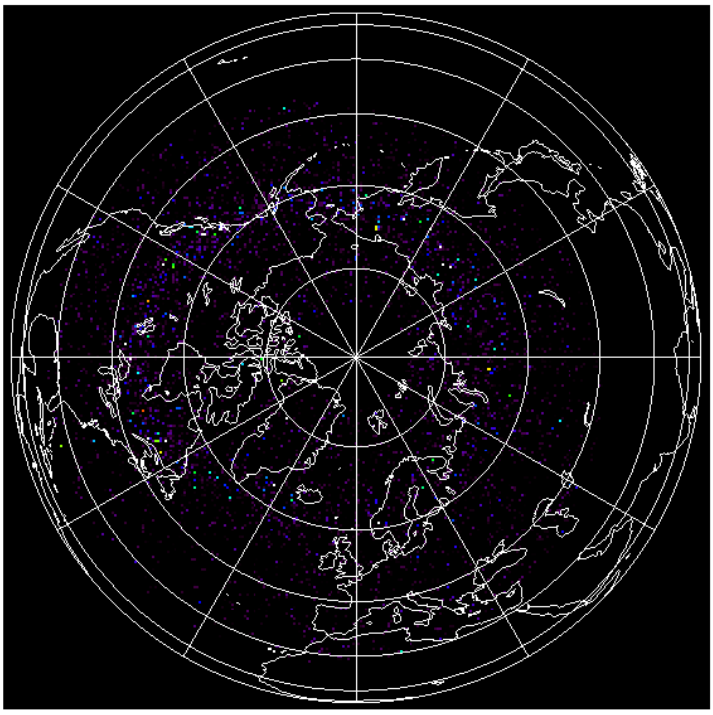
Note that the South Atlantic Anomaly (SAA), as based on data from the SWAP images, has drifted westward towards the South American coastline and is no longer situated above the South Atlantic (as is the case in the SPENVIS graphs below).
Further analysis to discriminate between seasons and/or solar activity is planned to be performed in the following weeks.



Map of electron flux > 1Mev @ a height of 725km - SPENVIS trapped particles model at maximum solar activity (omnidirectional flux = number of particles/cm^2/s).



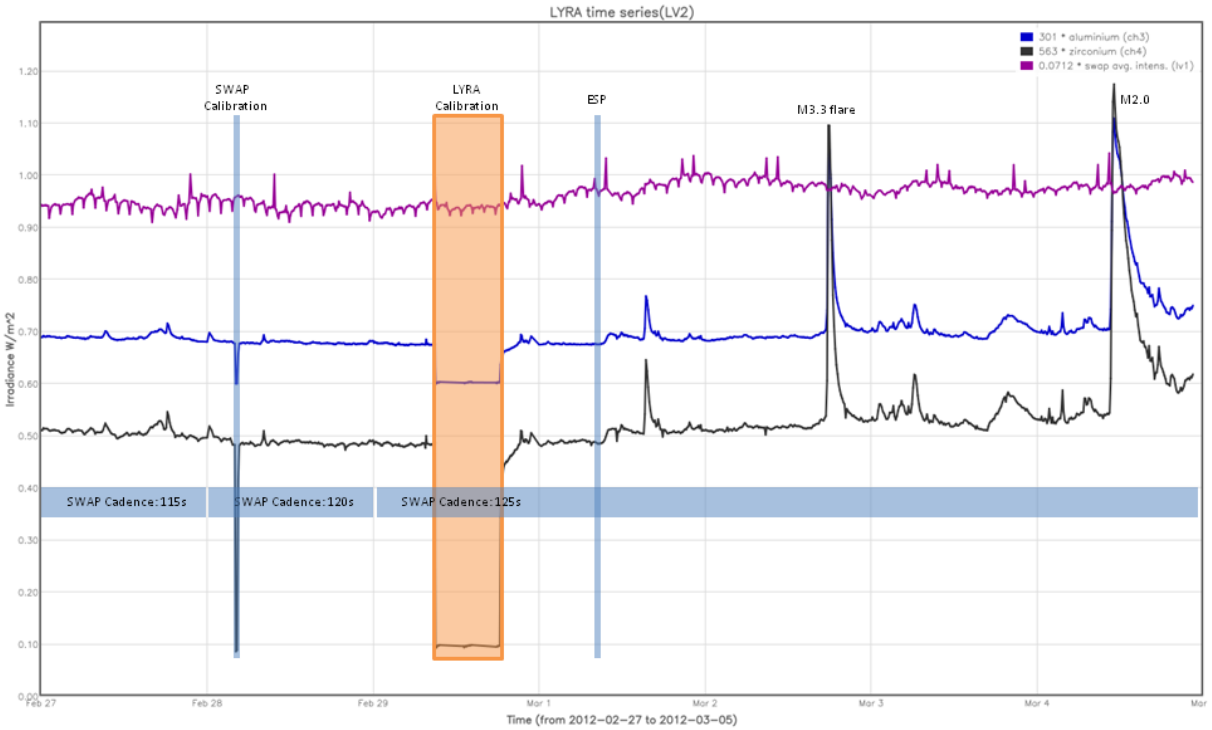
SWAP registered spikes in the southern auroral band



SWAP registered spikes in the northern auroral band

The fact that SWAP is able to register & be influenced by particles in the auroral bands is an unexpected result. Preliminary investigations show that the major southern auroral events can be linked to disturbed geomagnetic conditions in Apr, May 2010 and Sep 2011. We suspect that some of the registered events could be linked to SEPs.

An overview of the weekly LYRA & SWAP data is provided below:



The blue shaded periods correspond, from left to right, to 1. SWAP Calibration, 2. the ESP campaign on Thu. The orange shaded period corresponds with the LYRA calibration on Wednesday.
On Friday and Sunday the two peaks correspond to M-flares.

Scientific campaigns

The following LYRA and SWAP specific scientific campaigns have been performed this week:
- Daily LYRA campaign with Unit 3, opening the cover for 15 minutes.
- LYRA campaign with Unit 1, on Monday,, every 3 months, opening the cover for 15 minutes.

Outreach, papers, presentations, etc.

Time delays in quasi-periodic pulsations observed during the X2.2 solar flare on 15 February 2011;
L. Dolla, C. Marque, D. B. Seaton, T. Van Doorsselaere, M. Dominique, D. Berghmans, C. Cabanas, A. De Groof, W. Schmutz, A. Verdini, M. J. West, J. Zender and A. N. Zhukov.

Study of a Prominence Eruption using SWAP/PROBA2 and EUVI/STEREO Data;
M. Mierla, D.B. Seaton, D. Berghmans, I. Chifu, A. De Groof, B. Inhester, L. Rodriguez, G. Stenborg, A.N. Zhukov.

2. LYRA instrument status

Calibration

LYRA calibration on Wednesday.

IOS & operations

Monday 27 Feb	Tuesday 28 Feb	Wednesday 29 Feb	Thursday 01 Mar	Friday 02 Mar	Saturday 03 Mar	Sunday 04 Mar
Nominal acquisition LYIOS00223	Nominal acquisition LYIOS00223->224	Nominal acquisition LYIOS00224	Nominal acquisition LYIOS00224	Nominal acquisition LYIOS00224	Nominal acquisition LYIOS00224	Nominal acquisition LYIOS00224

LYRA detector temperature

The LYRA detector 2 temperature (nominal unit) fluctuated between 49.3 (peak value during Unit 3 activation) and 47.2 degrees (lower peak during calibration).

To be explored
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3. SWAP instrument status

Calibration

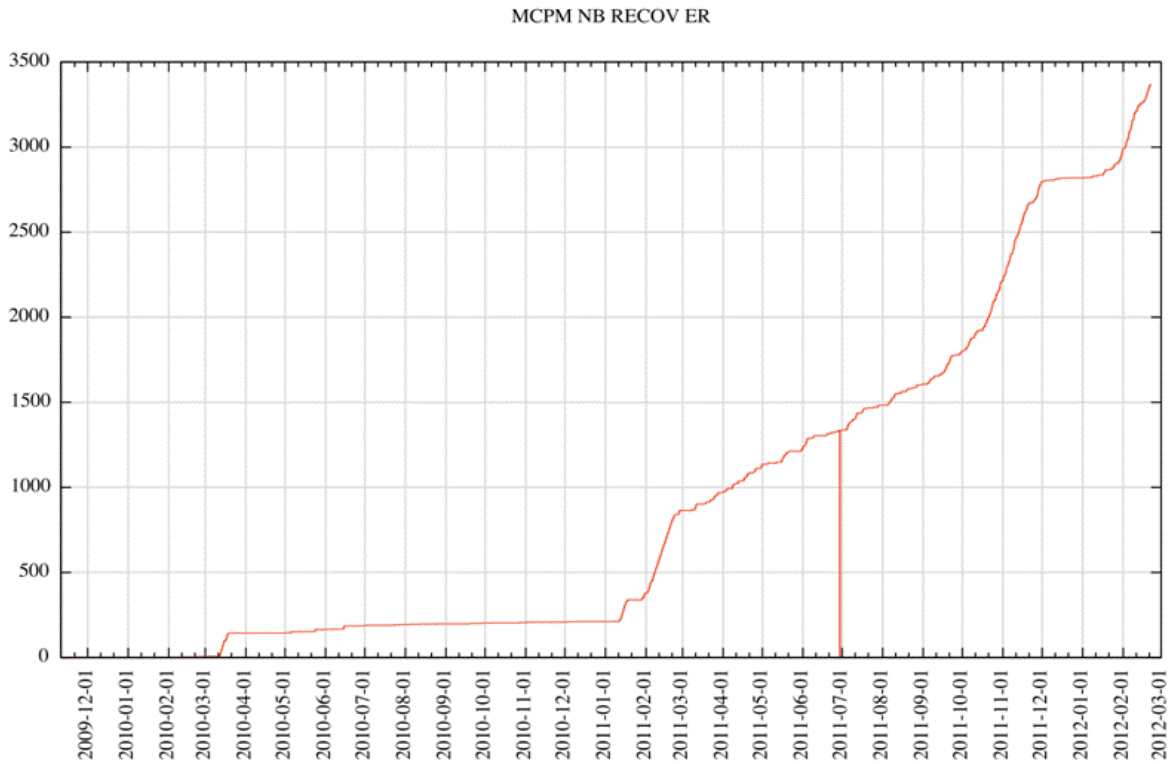
SWAP calibration on Tuesday.

MCPM errors

The number of MCPM recoverable errors increased from 2118 to 2303.

The number of MCPM unrecoverable errors is still 0.

The cumulative evolution of the MCPM recoverable errors since the start of the mission is provided below. Although some additional analysis is necessary, there are indications that the behavior of this curve is linked to (some type of) solar activity, i.e. being steeper with higher activity.



IOS & operations

Monday 27 Feb	Tuesday 28 Feb	Wednesday 29 Feb	Thursday 01 Mar	Friday 02 Mar	Saturday 03 Mar	Sunday 04 Mar
Nominal acquisition 115 s cadence IOS00370 613 images	Nominal acquisition 120 cadence IOS00371 701 images	Nominal acquisition 125 cadence IOS00372 626 images	Nominal acquisition + ESP jump IOS00372 670 images	Nominal acquisition IOS00372 659 images	Nominal acquisition IOS00372 657 images	Nominal acquisition IOS00372 686 images

SWAP cadence was increased progressively in the beginning of the week during the week (e.g. from 115 -> 120 -> 125) until the maximum buffer value was no longer reached.

SWAP detector temperature

The SWAP Cold Finger Temperature diminished from 1.4 to 0.0 degrees Celsius, under nominal operations.

To be explored
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4. PROBA2 Science Center Status

The main operator is Koen Stegen; Erik Pylyser provides support, when needed.

The weekly ‘P2SC Operations meeting’ was held on 29/02/2012.

Updates to P2SC, this week:
- None.

5. Data reception & discussions with MOC

Passes

The delivery of the following passes for this week (passes 7168 till 7230) was nominal, except:
- none

Data coverage HK

All data was received.

Data coverage SWAP

Total number of images between 2012 Feb 27 0UT and 2012 Mar 05 0UT: 4683
Highest cadence in this period: 30 seconds
Average cadence in this period: 129.14 seconds
Number of image gaps larger than 300 seconds: 5
Largest data gap: 34.17 minutes

Data coverage LYRA

All data was received.

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