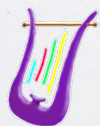


FLARE REPORTING WITH PROBA2

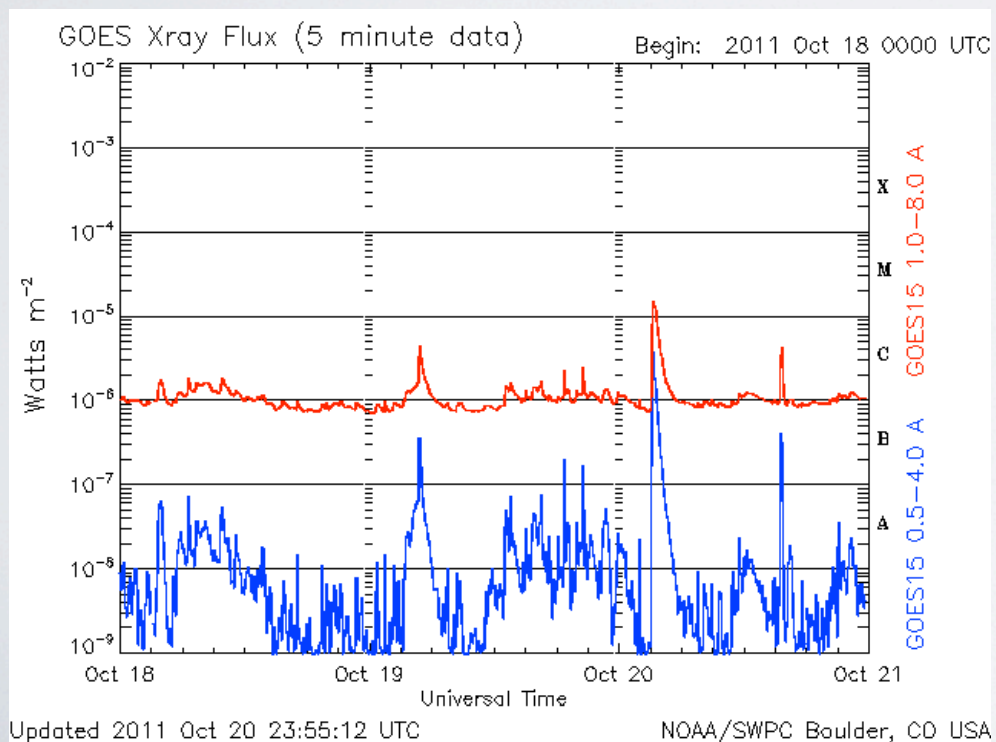
David Berghmans @ Royal Observatory of Belgium

ESWW8 ☀ Namur ☀ Dec 1, 2011

Special thanks to: Marie Dominique, Ingolf Dammasch, Koen Stegen, Matthieu Kretzschmar, Katrien Bonte, Elke D'Huys, Anik De Groof, PMOD-WRC, CSL



FLARE REPORTING = THE GOES X-RAY MONITOR



http://www.swpc.noaa.gov/ftpd/indices/events/20111020events.txt

Product: 20111020events.txt
Created: 2011 Oct 23 0332 UT
Date: 2011 10 20
Prepared by the U.S. Dept. of Commerce, NOAA, Space Weather Prediction Center
Please send comments and suggestions to SWPC.Webmaster@noaa.gov
Missing data: ////
Updated every 30 minutes.

Edited Events for 2011 Oct 20

#Event	Begin	Max	End	Obs	Q	Type	Loc/Frq	Particulars	Reg#
250	0028	0028	0028	LEA	G	RBR	245	110	
250	0028	////	0028	CUL	C	RSP	060-180	III/1	
260	0114	////	0114	CUL	C	RSP	300-550	III/1	
270 +	0114	0114	0114	LEA	G	RBR	410	630	
280	0200	0203	0205	G15	5	XRA	1-8A	C1.5	2.2E-04
280 +	0201	////	0203	CUL	C	RSP	100-400	III/1	
280 +	0201	0202	0202	LEA	G	RBR	245	370	
290	0229	////	0229	CUL	C	RSP	090-330	III/1	
300 +	0242	0242	0243	LEA	G	RBR	410	140	
300	0243	////	0243	CUL	C	RSP	150-500	III/1	
310 +	0302	////	0303	CUL	C	RSP	025-300	III/3	
310 +	0302	0302	0302	LEA	G	RBR	245	1300	
320	0310	0325	0344	G15	5	XRA	1-8A	M1.6	2.2E-02
320	0313	////	0347	LEA	C	RSP	088-178	CTM/1	
320	0314	////	0320	CUL	C	RSP	023-550	III/1	
320	0314	////	0336	LEA	C	RSP	025-060	VI/1	
320 +	0314	0314	0314	LEA	G	RBR	245	220	
320	0321	////	0344	LEA	3	SPY	////	12	B0A

Can PROBA2 provide such a flare reporting service within Europe-SSA?



CURRENT SERVICE

<http://proba2.oma.be>

SWAP

[PROBA2 SCIENCE CENTER]

http://proba2.oma.be/ RSS Google

IO Auctions ... veilingen - Jorisco - Soteria WMO Observ... EUV image Home'Bank USB 2.0 e-ID Card Reader Basics of Space Flight

[PROBA2 SCIENCE CENTER]

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Watch the latest SWAP image or movie

Go to the latest 3-day LYRA curve and quicklook daily image

Direct link to the scientific data:

- SWAP calibrated FITS - SWAP movies
- LYRA calibrated FITS - LYRA quicklook PNGs over a day and over 3 days - LYRA flare list

More info on all available data here. Consult the tutorial on SWAP analysis software.

Data gaps or unusual data? Please consult the Google Calendars for SWAP and LYRA to find out about special campaigns and off-pointing sequences (commanded via SWAP but also affecting LYRA signals).

NEW : LYRA flare list available on-line + an interactive Quicklook Viewer.

Contact us via swap_lyra@sidc.be.

Last update: 25th of November 2011

Latest news

2 November 2011
Happy Birthday PROBA2

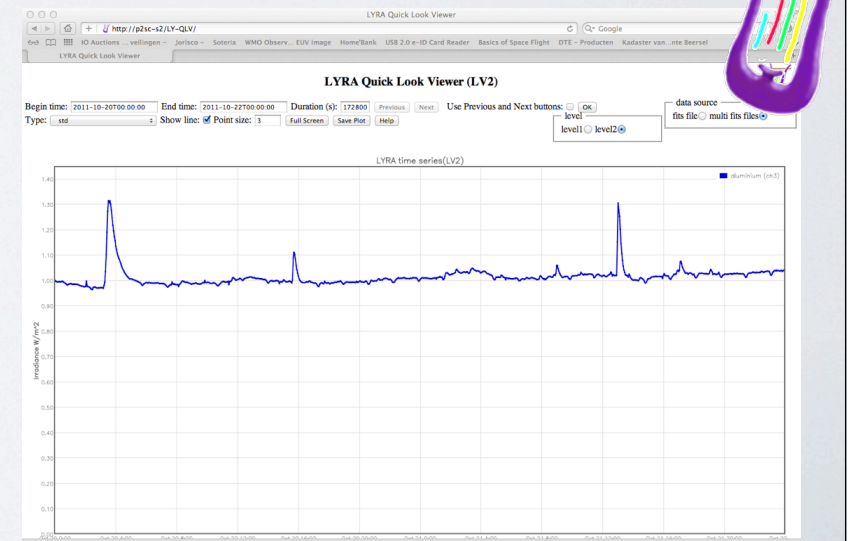
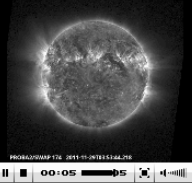
24 October 2011
SWAP Carrington Rotation Movies

11 August 2011
Largest solar flare so far in Cycle 24

Latest LYRA curve



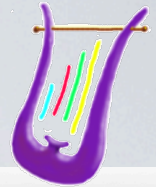
Latest SWAP movie



CURRENT SERVICE

<http://proba2.oma.be>

LYRA PI: Marie Dominique
Plots: Ingolf Dammasch



[PROBA2 SCIENCE CENTER]

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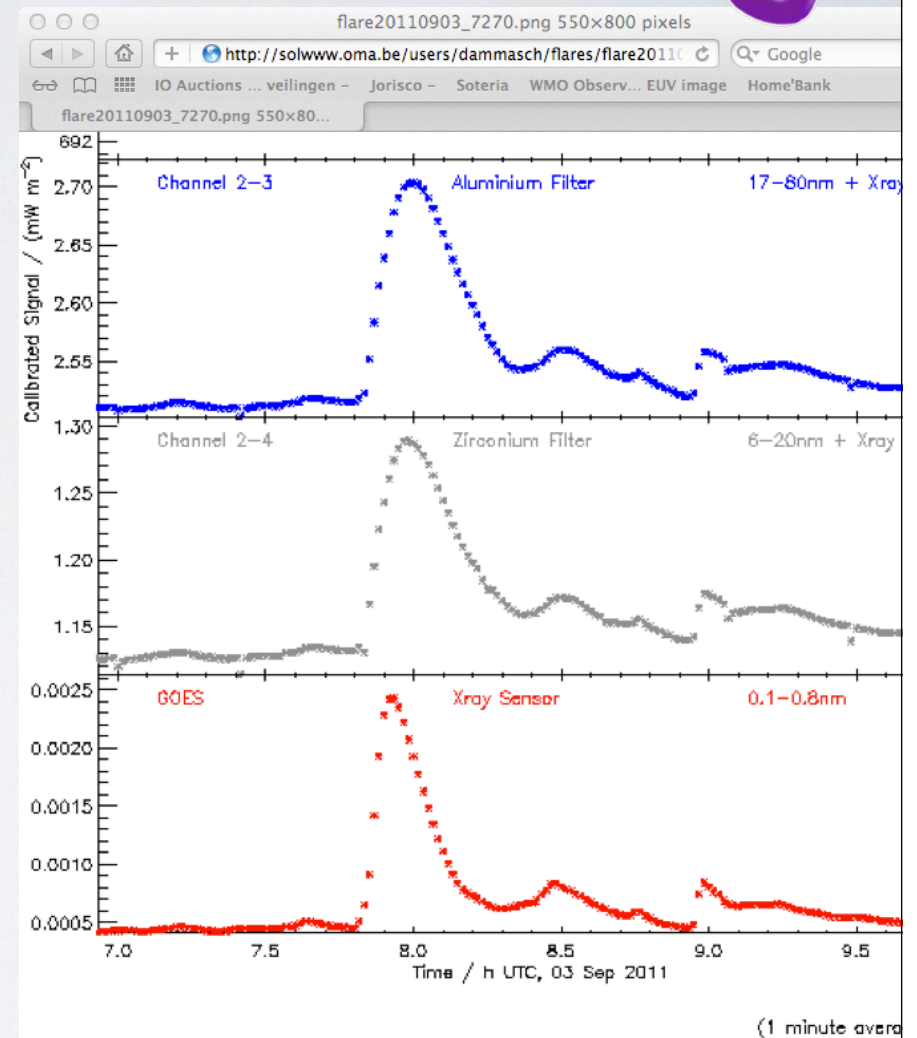
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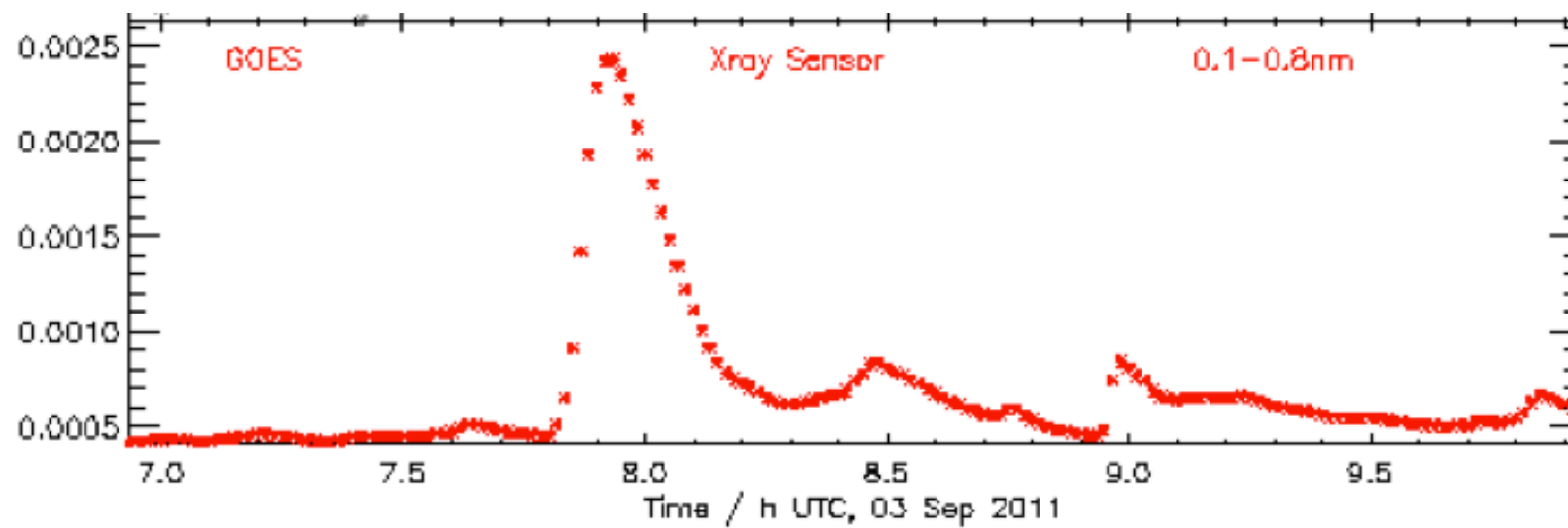
Latest LYRA curve

Latest SWAP movie



Can LYRA independently identify flares and their magnitude?

response



GOES

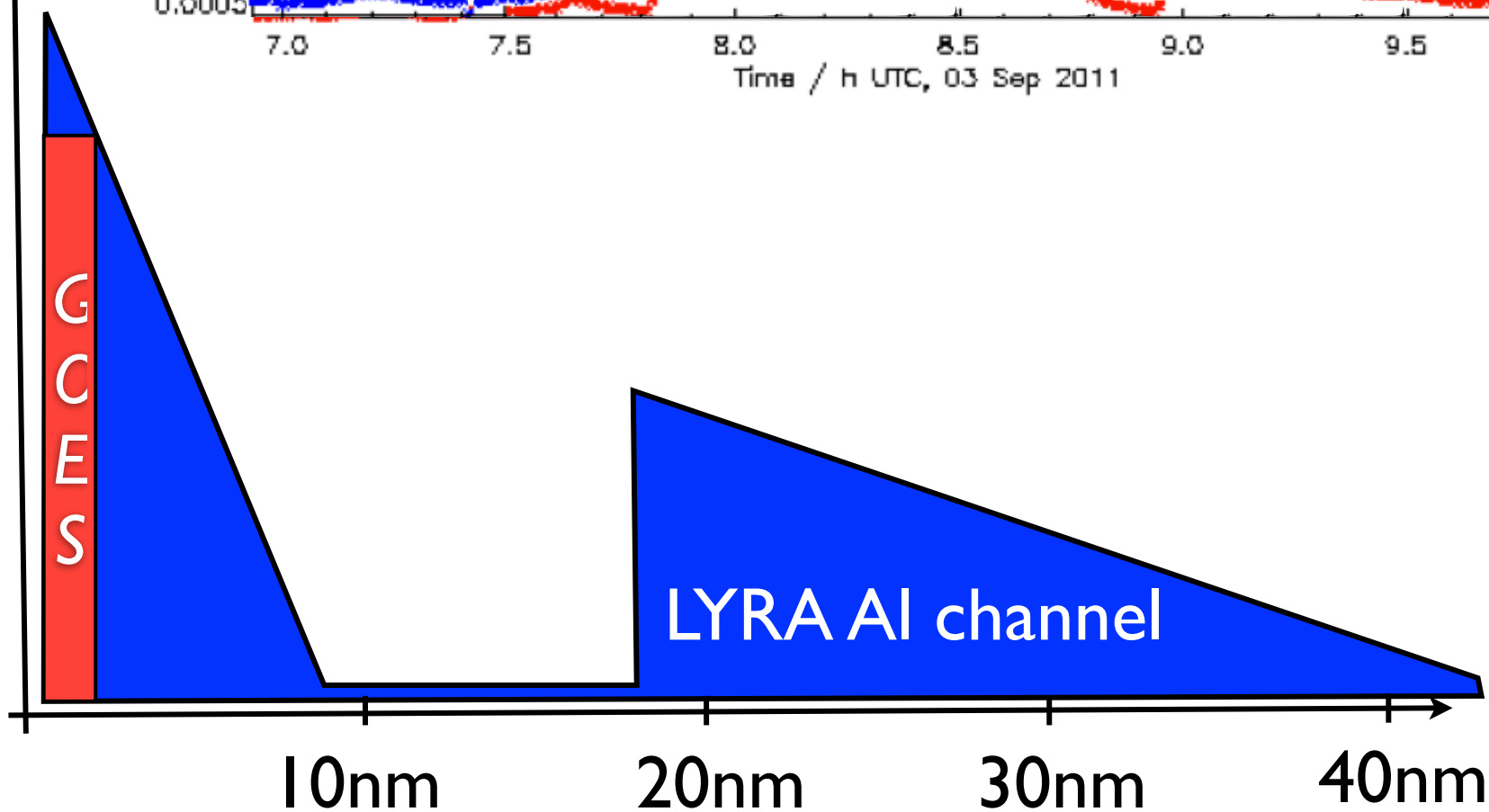
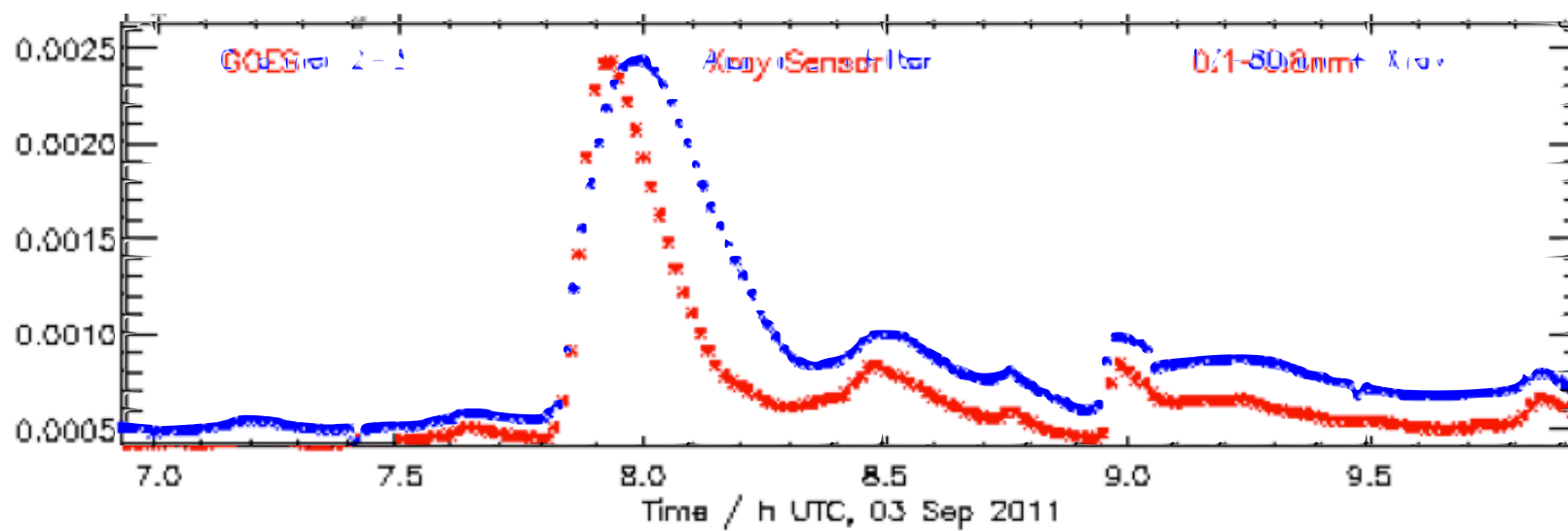
10nm

20nm

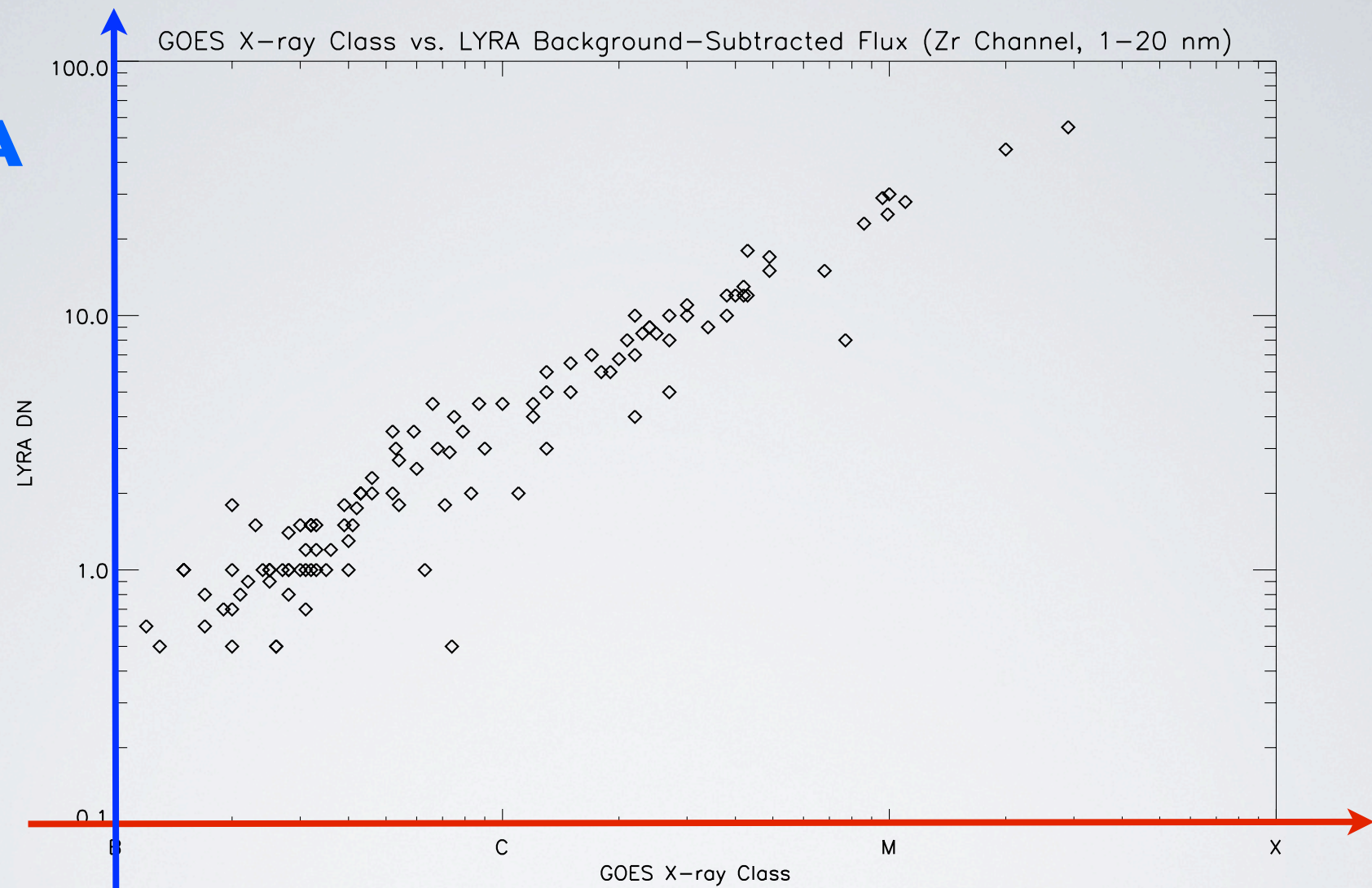
30nm

40nm

response



LYRA



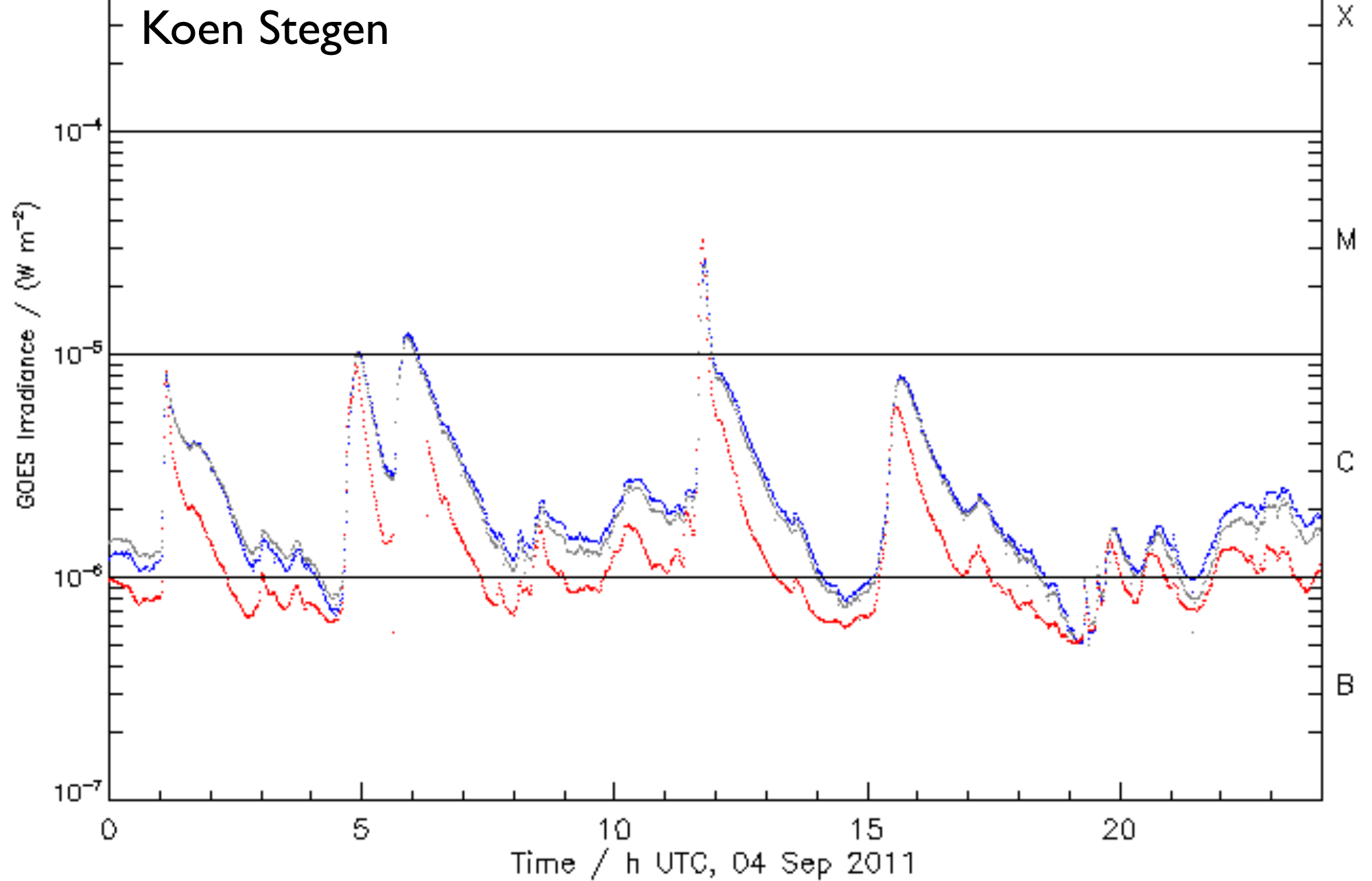
GOES

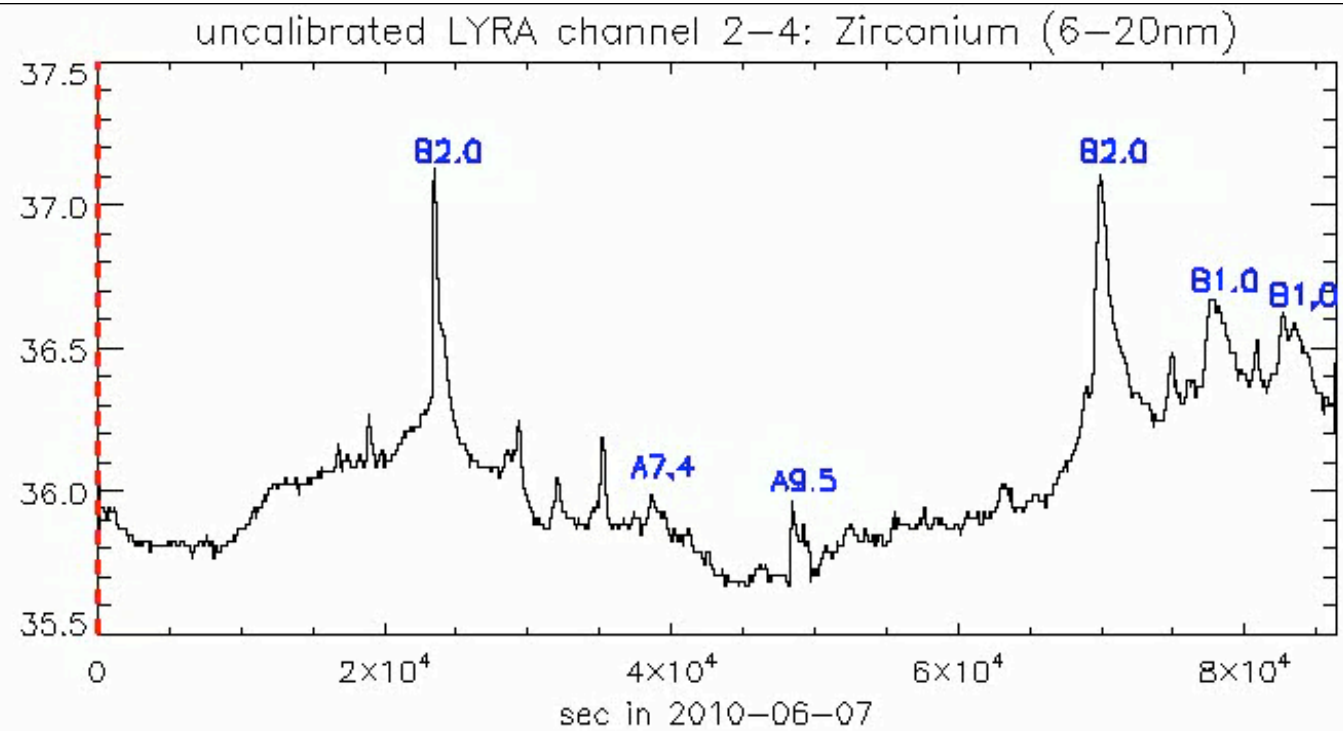
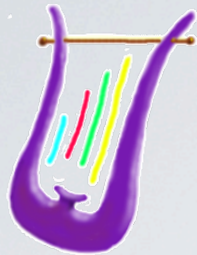
Flares observed in 2010, LYRA Zr Channel

GOES 0.1–0.8nm (red), LYRA Al (blue) & Zr (grey) proxy

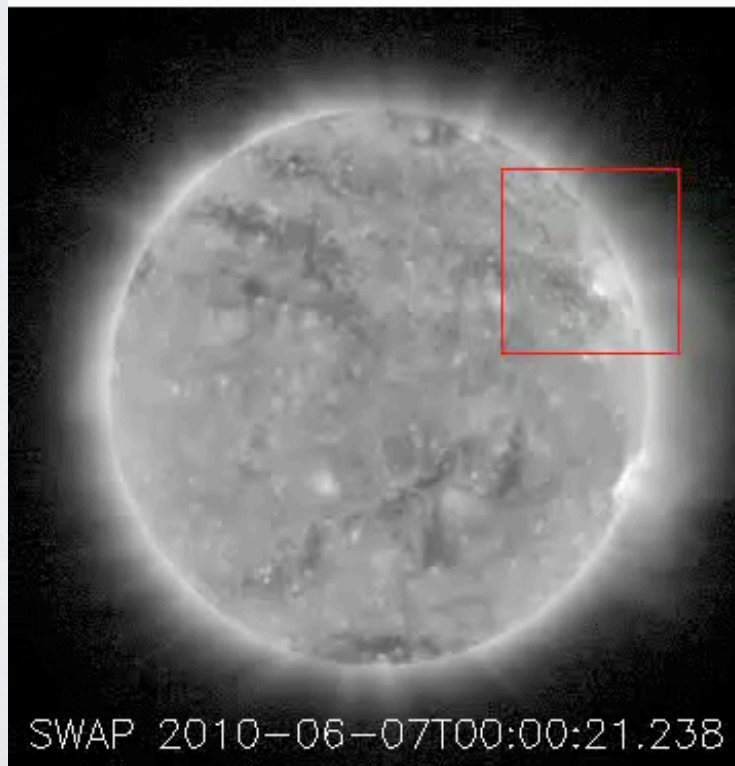
<http://proba2.oma.be/lyra/data/GoesLyra>

Koen Stegen





SWAP



SWAP 2010-06-07T00:00:21.238

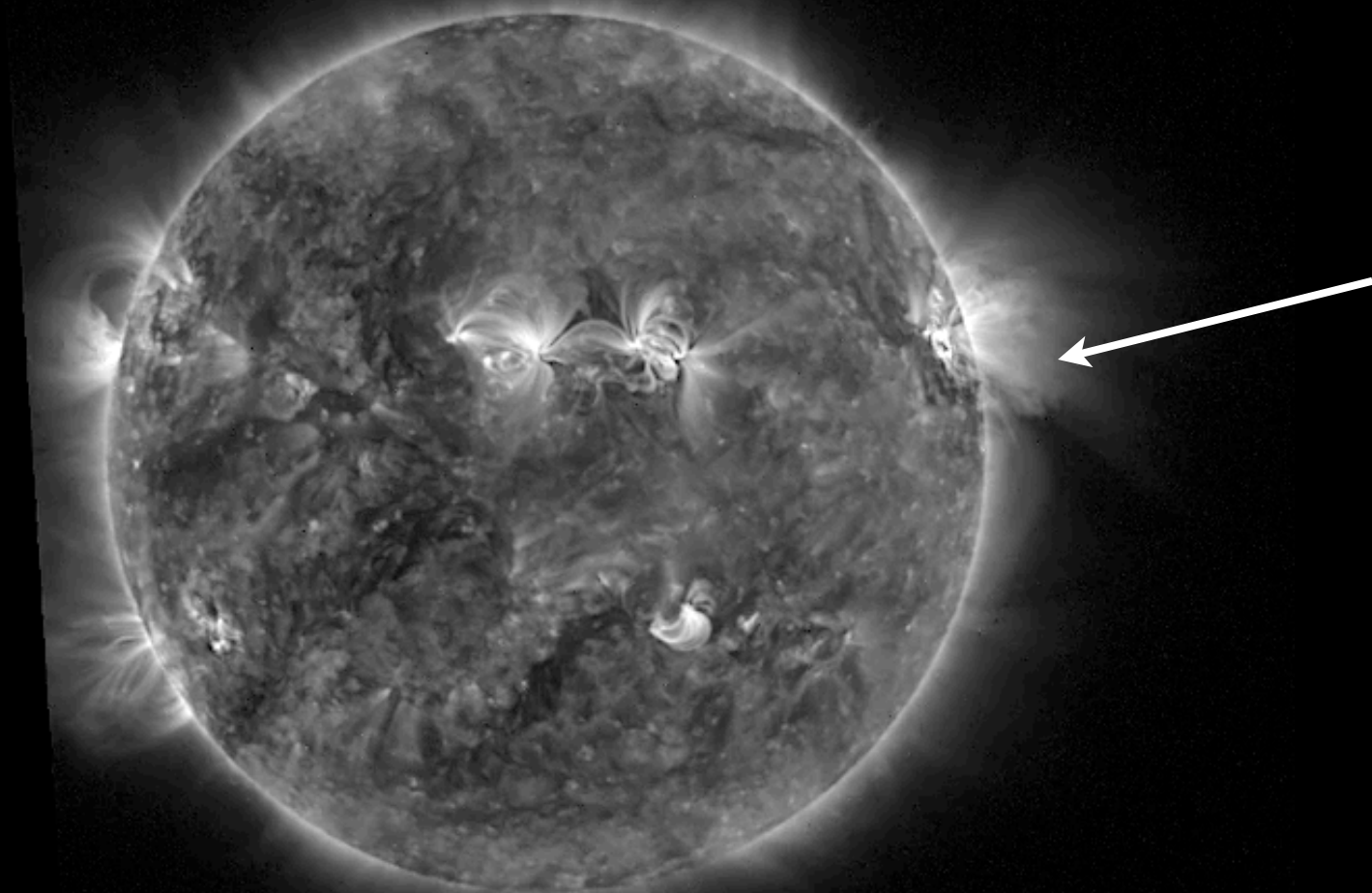


SWAP 10 arcmin² subfield

Can SWAP detect and localize the flares?

Aug 9 07:48: X6.9 flare

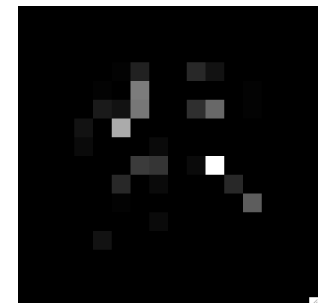
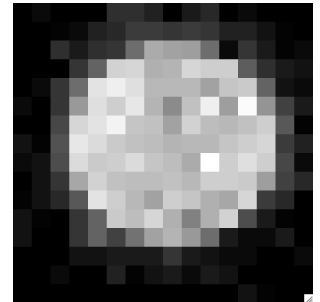
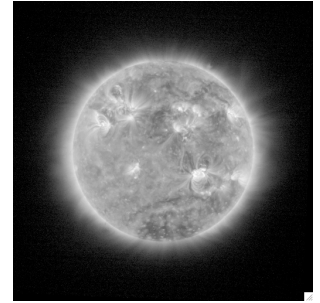
SWAP
17nm



PROBA2/SWAP 174 2011-08-09T07:18:19.048

A simple algorithm

- rebin the images to 16 x 16 macropixels
- make (absolute/relative) difference images, 12 minutes apart
- mark places where threshold is exceeded
- identify images with a few hits, disregard images with many hits

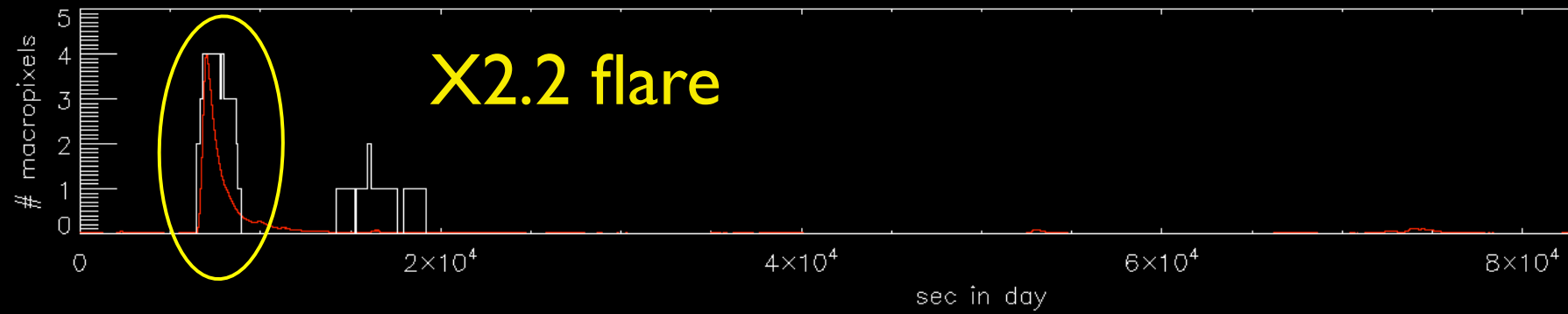


Demo: Feb 2011

Score:
8/10

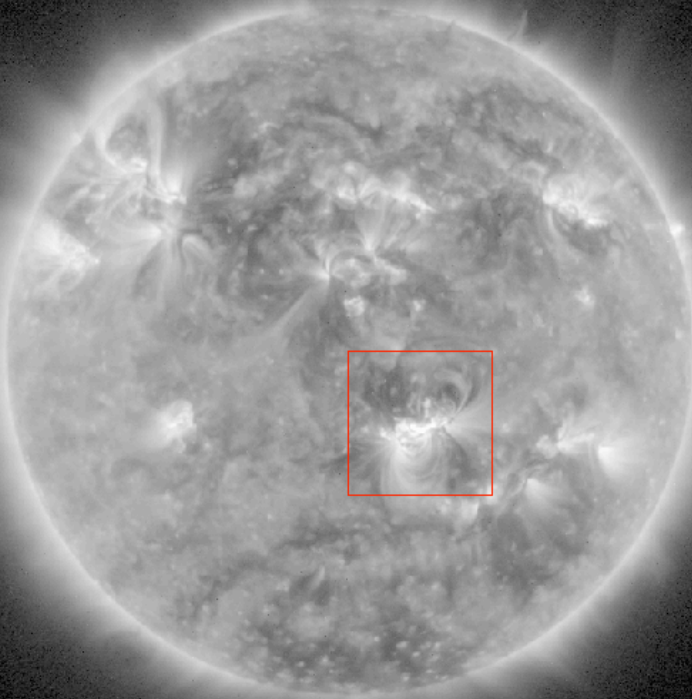
2011-02-15	X2.2	detected
2011-02-13	M6.6	detected
2011-02-18	M6.6	detected (late phase)
2011-02-24	M3.5	detected
2011-02-14	M2.2	detected
(2011-02-09	M1.9	missed (no data))
2011-02-16	M1.6	detected
2011-02-18	M1.4	detected
2011-02-18	M1.3	detected (early phase)
2011-02-28	M1.1	missed (?)
2011-02-16	M1.1	missed (?)

2011-02-15

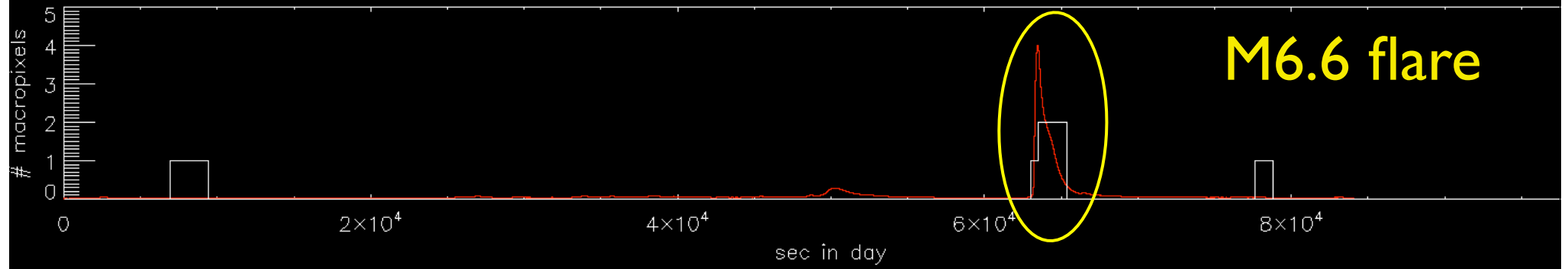


pre-event

20110215_014824.fits

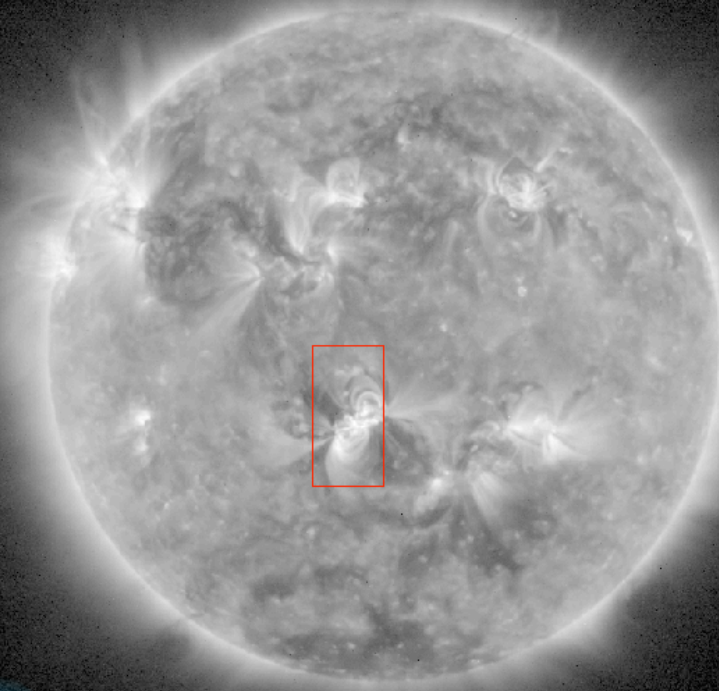


2011-02-13

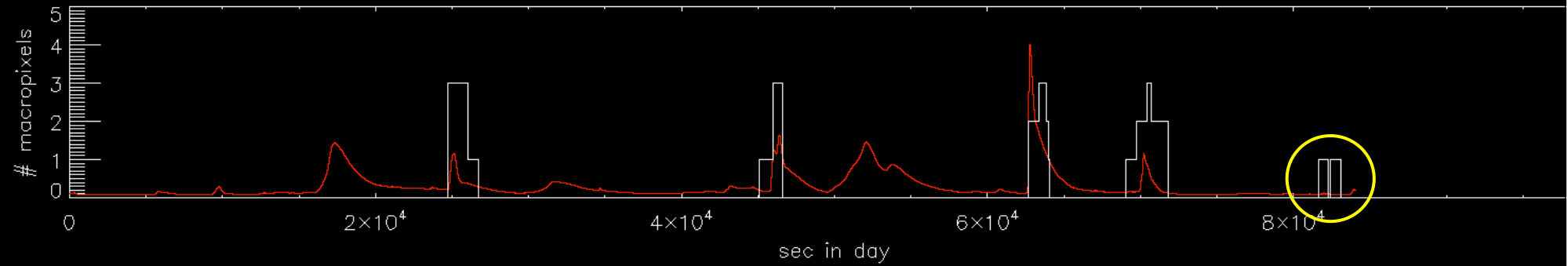


pre-event

20110213_173102.fits



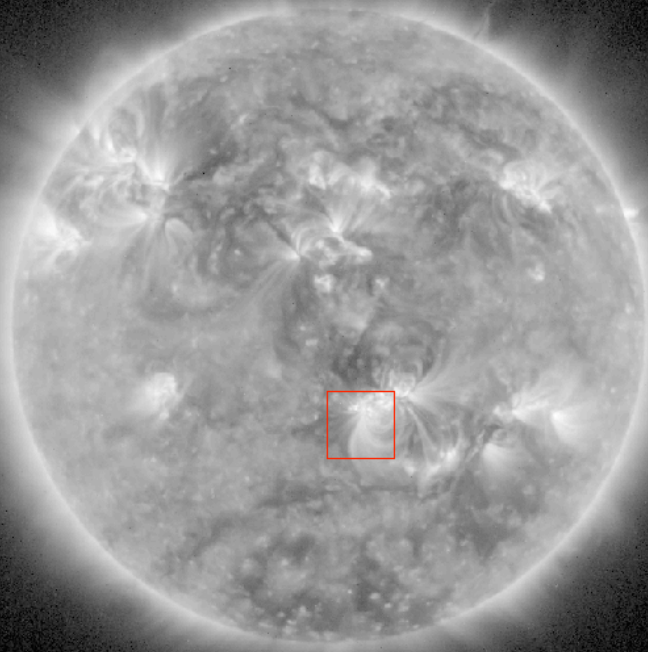
2011-02-14



No X-rays but type III burst!

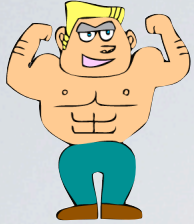
pre-event

20110214_224209.fits



***Can PROBA2 provide a complementary,
European service within SSA?***

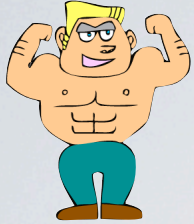
Can PROBA2 provide a complementary, European service within SSA?



Sure!

- LYRA can identify flares down to A-level
- LYRA can estimate the magnitude of flares (10% error)
- SWAP can localize strong flares

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Sure!

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- SWAP can localize strong flares

... but



- PROBA2 occultation season hinders full coverage
- SWAP 17nm bandpass might not be the best choice for flare detection

<http://proba2.oma.be>

