

PROBA2: READY FOR SCIENCE & SPACE WEATHER

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ESA c/o PROBA2 Science Center
Royal Observatory of Belgium

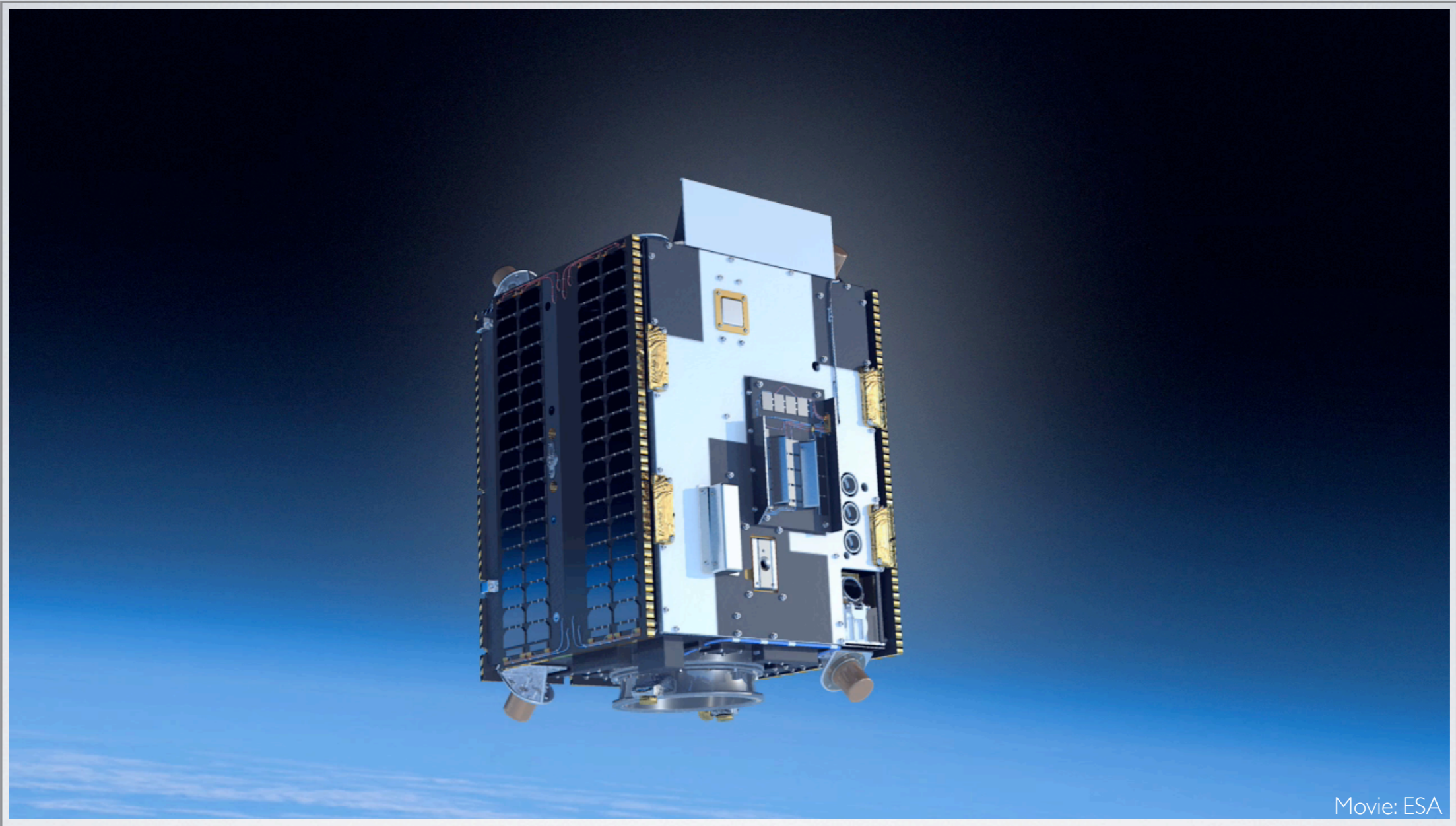
9th SECCHI meeting ☀ Trinity College Dublin, Ireland ☀ March 22, 2010





PROBA2

Microsatellite in sun-synchronous orbit
Launched on November 2, 2009 ☀ 725 km altitude

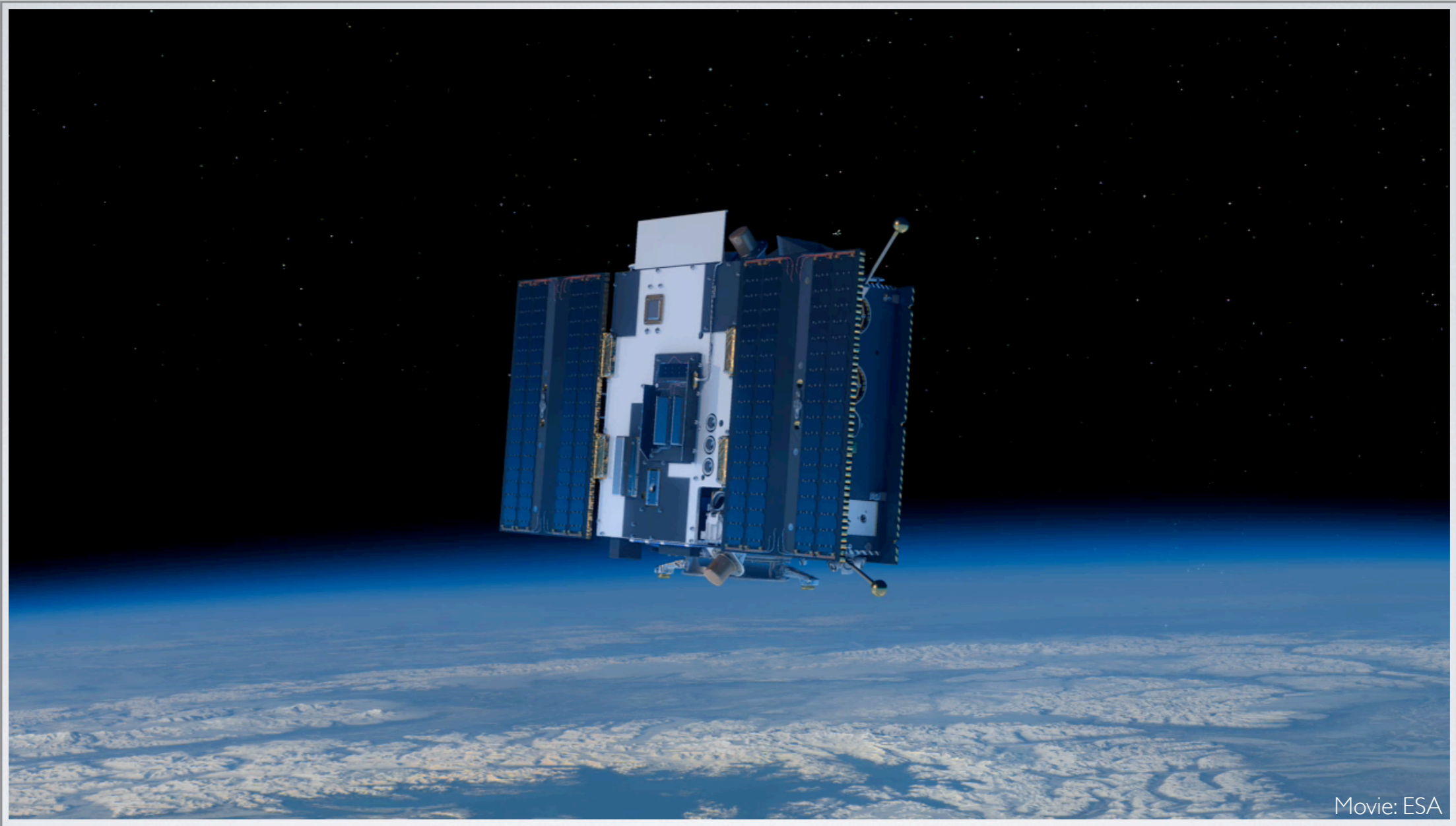


ESA TECHNOLOGY MISSION

4 innovative instruments: SWAP, LYRA, TPMU, DSLP

17 technological experiments

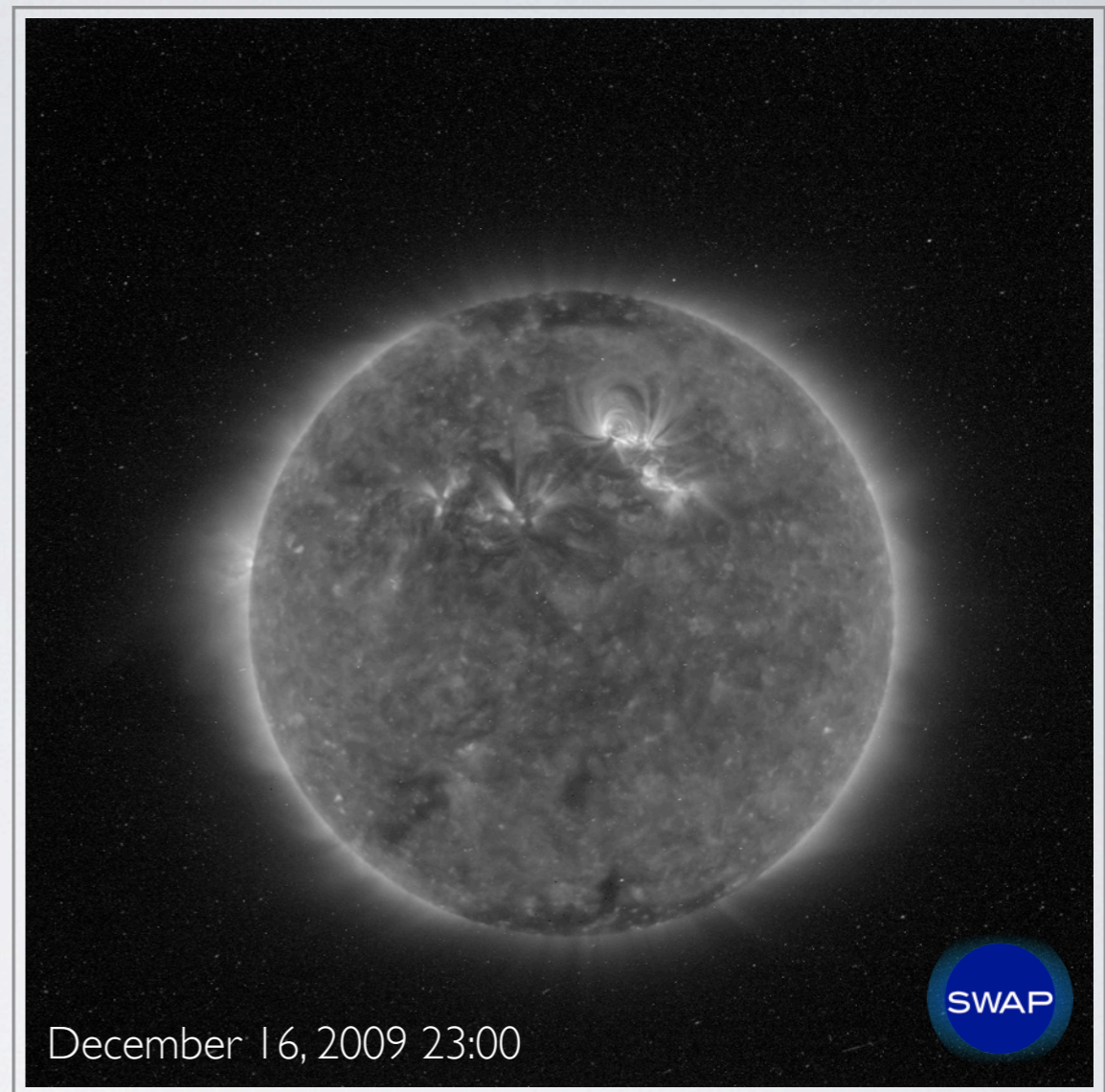
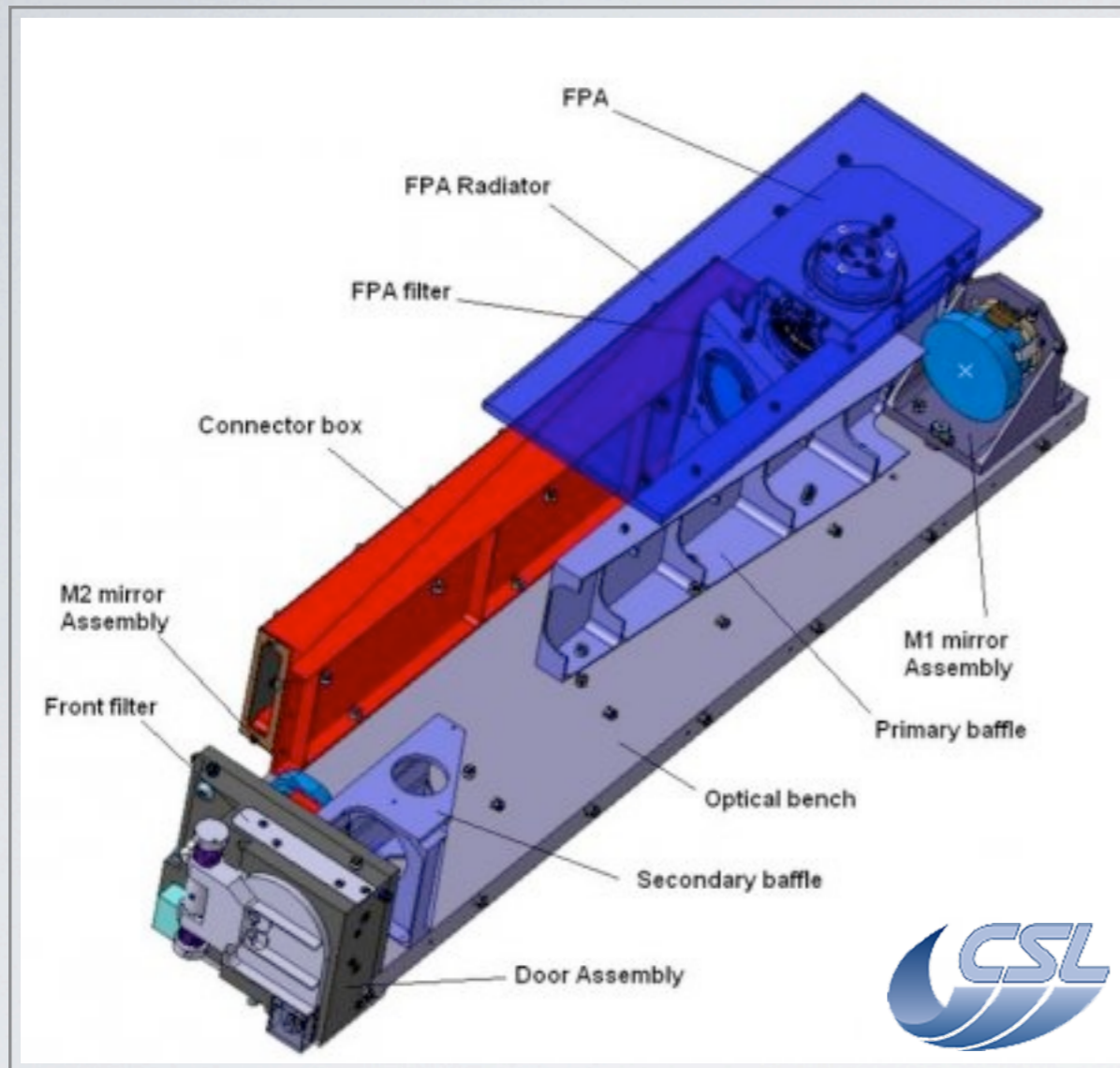
made in Belgium



ESA SCIENCE MISSION

SWAP and LYRA observe the Sun in UV and X rays
commanding and data processing at P2SC (ROB, Brussels)
PI SWAP: D. Berghmans ☀ PI LYRA: J.F. Hochedez

First RAW image with rough centre pointing



SWAP EUV IMAGER

Exercise in miniaturisation: off-axis Ritchey-Chrétien scheme

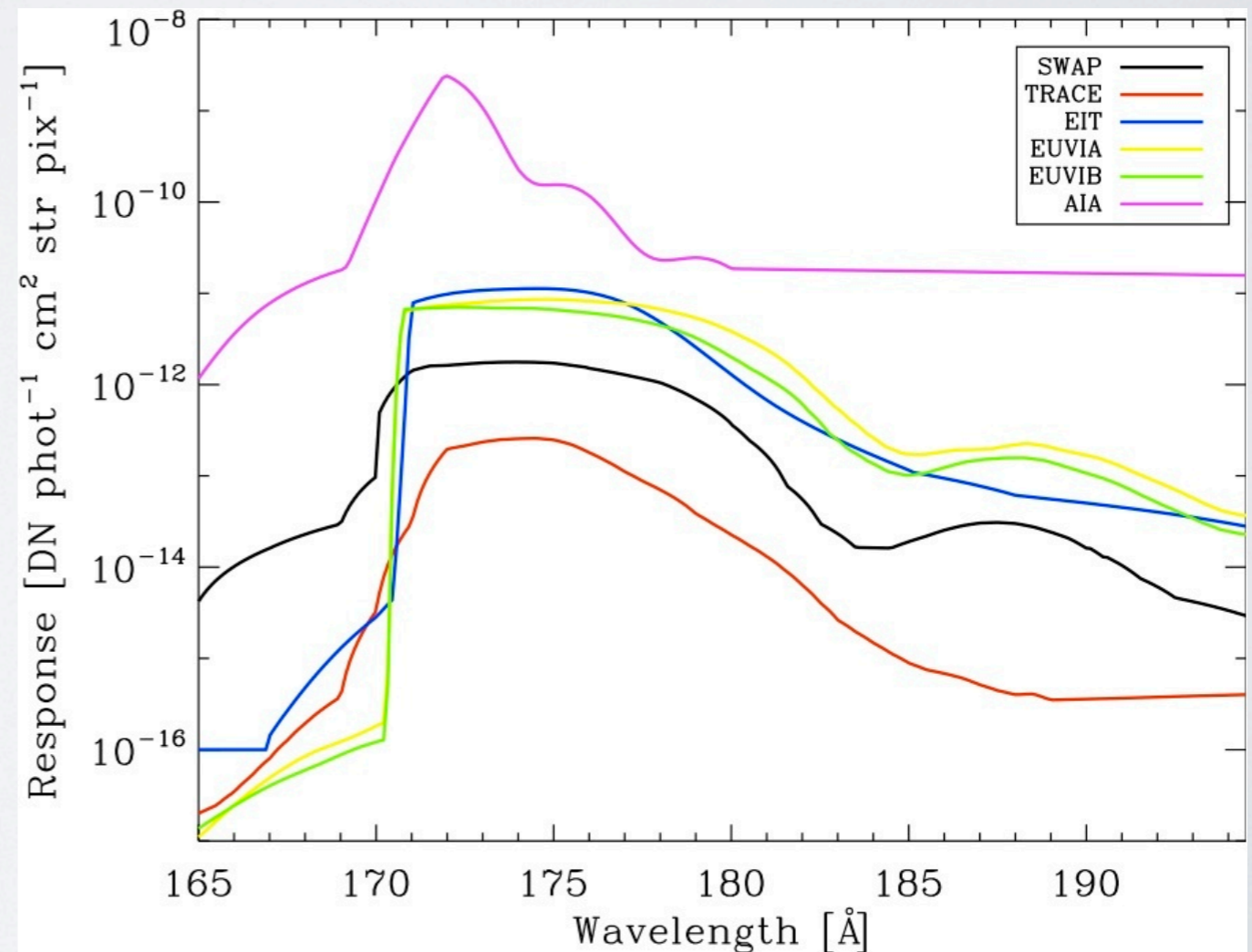
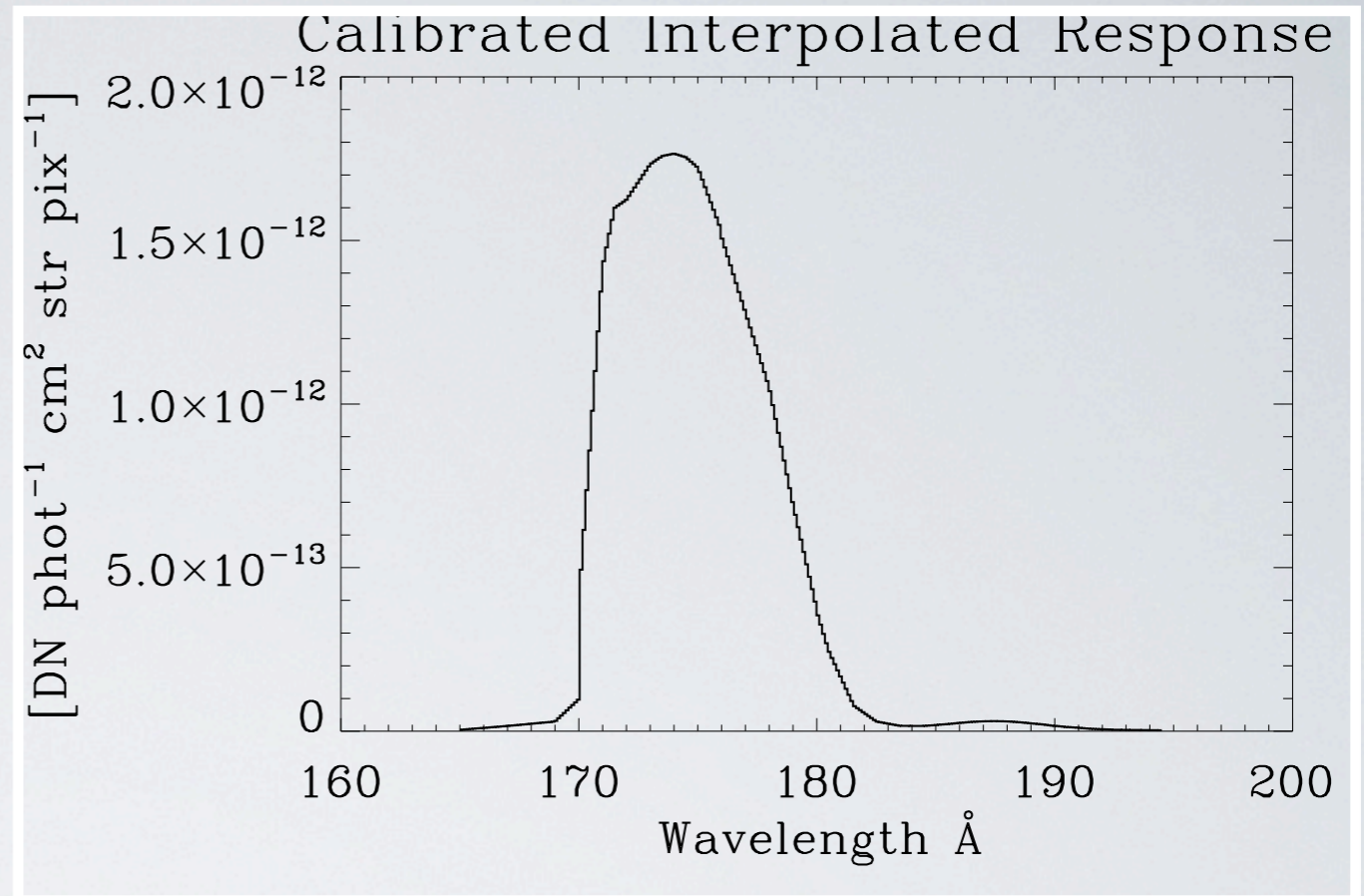
Observes the 1 million degree corona in EUV light

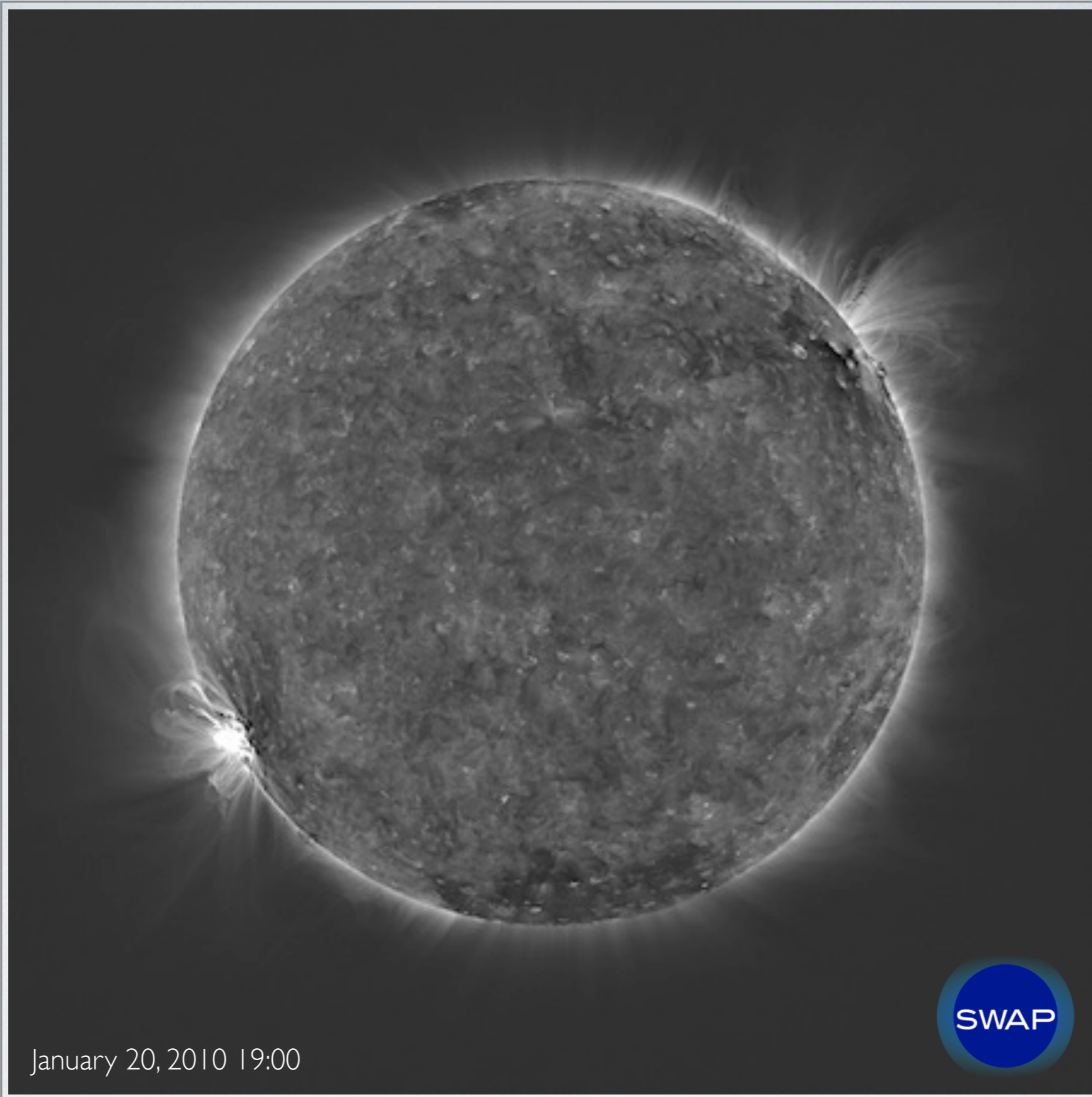
First light on December 14, 2009

Nominal operations start NOW

SPECTRAL RESPONSE

Peak at 17.4nm
Comparable to EUVI





January 20, 2010 19:00



Photos ESA

PROCESSED IMAGE

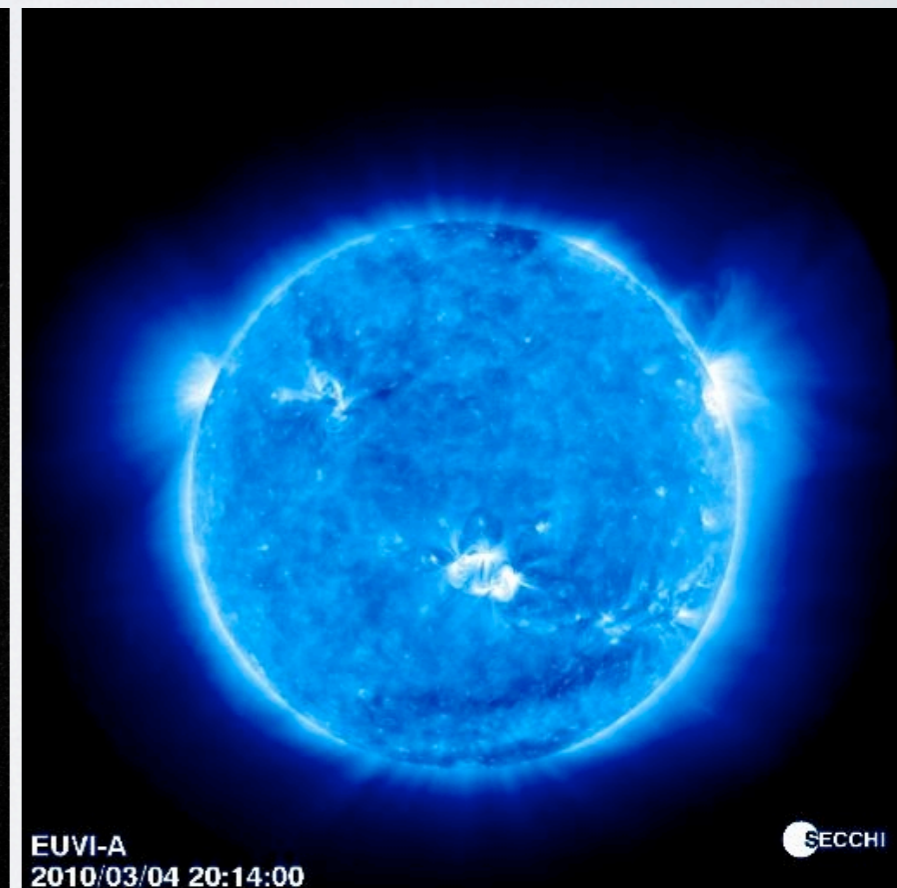
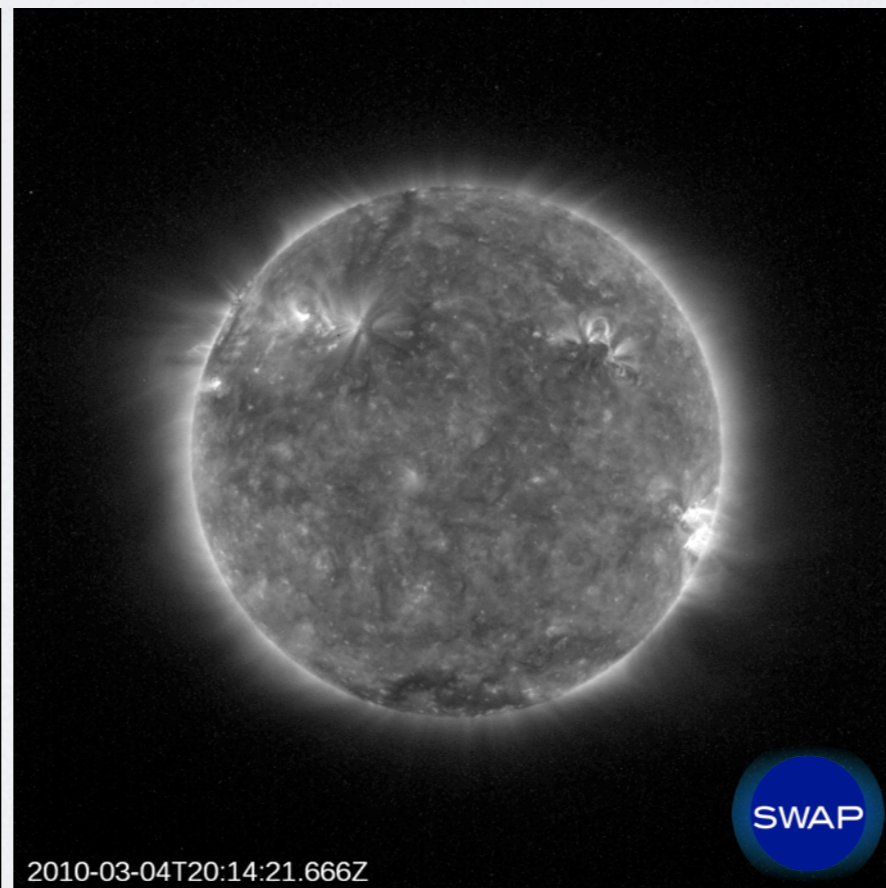
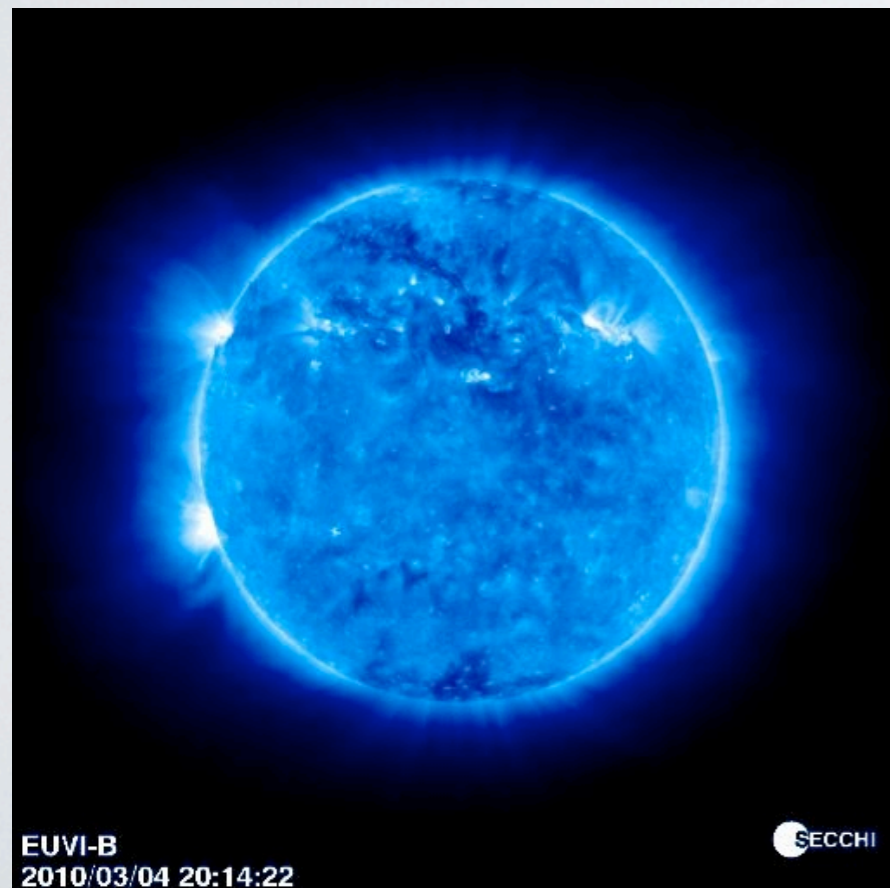
SWAP vs. EUVI

EUVI: 17.1, 19.5, 28.4, 30.4 nm

- CCD detector with shutter
- cadence: 2h (171)- 5' (195)
- 2048x2048 pixels
- stereo view: ahead & behind Earth
- sun-centered FOV

SWAP: 17.4 nm

- shutterless CMOS detector
- \approx 1 minute cadence
- 1024x1024 pixels
- inside magnetosphere, Earth view
- flexible off-pointing



SWAP FOR SCIENCE & SPACE WEATHER

- High temporal cadence up to 18s (1min nominal)
- Onboard data-processing and prioritization
- Data available in near-real time (9 passes/24hrs + priority nr)
- Off-pointing capabilities (even automatically)
- Several compression schemes: LZW + JPEG (+options)
- Flexible commanding from the Science Center

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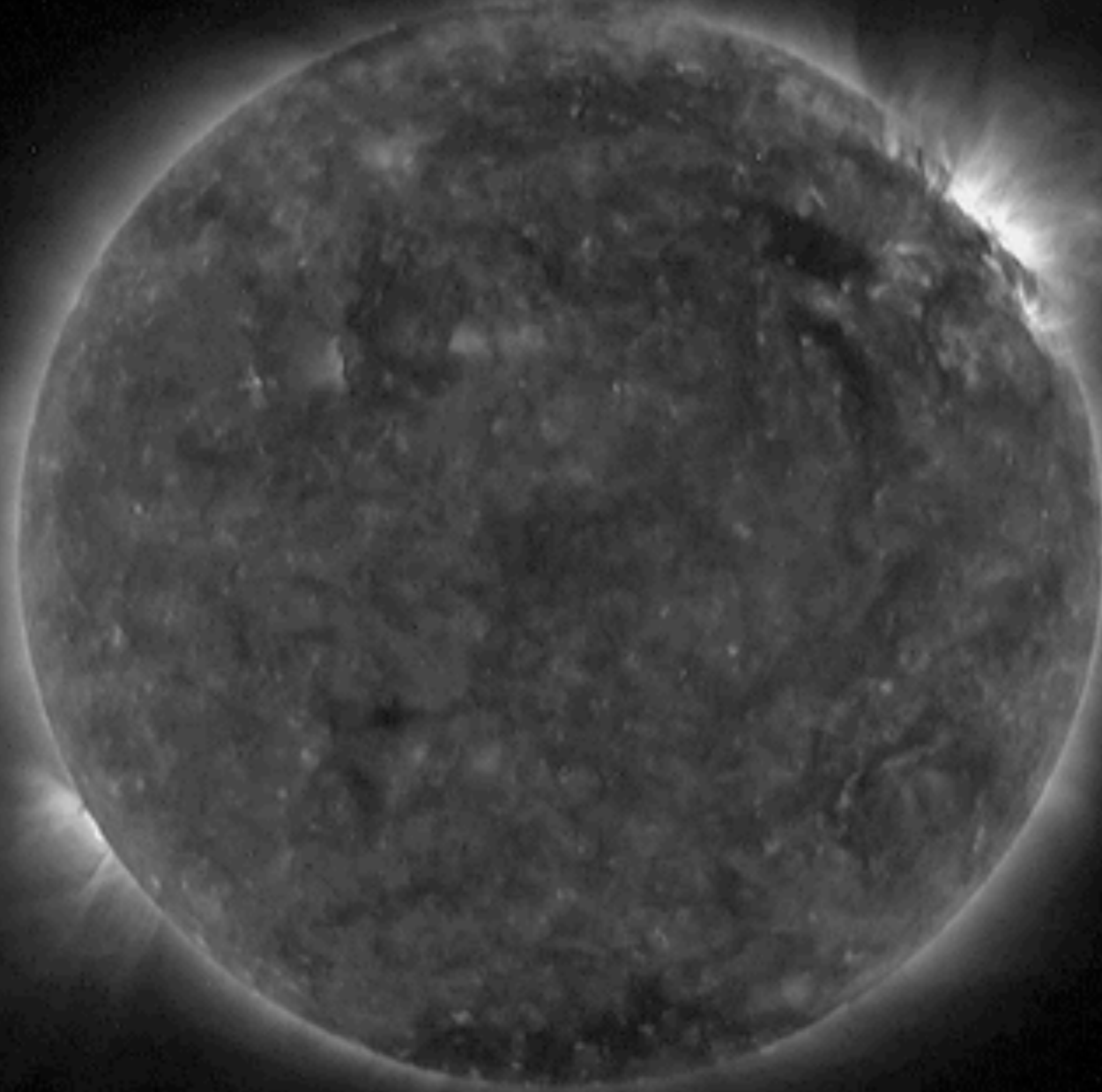
ANNULAR SOLAR ECLIPSE



January 15, 2010, 06:00 UTC



ACTIVE REGIONS



1st M-flare
of new
cycle

January 18-21, 2010

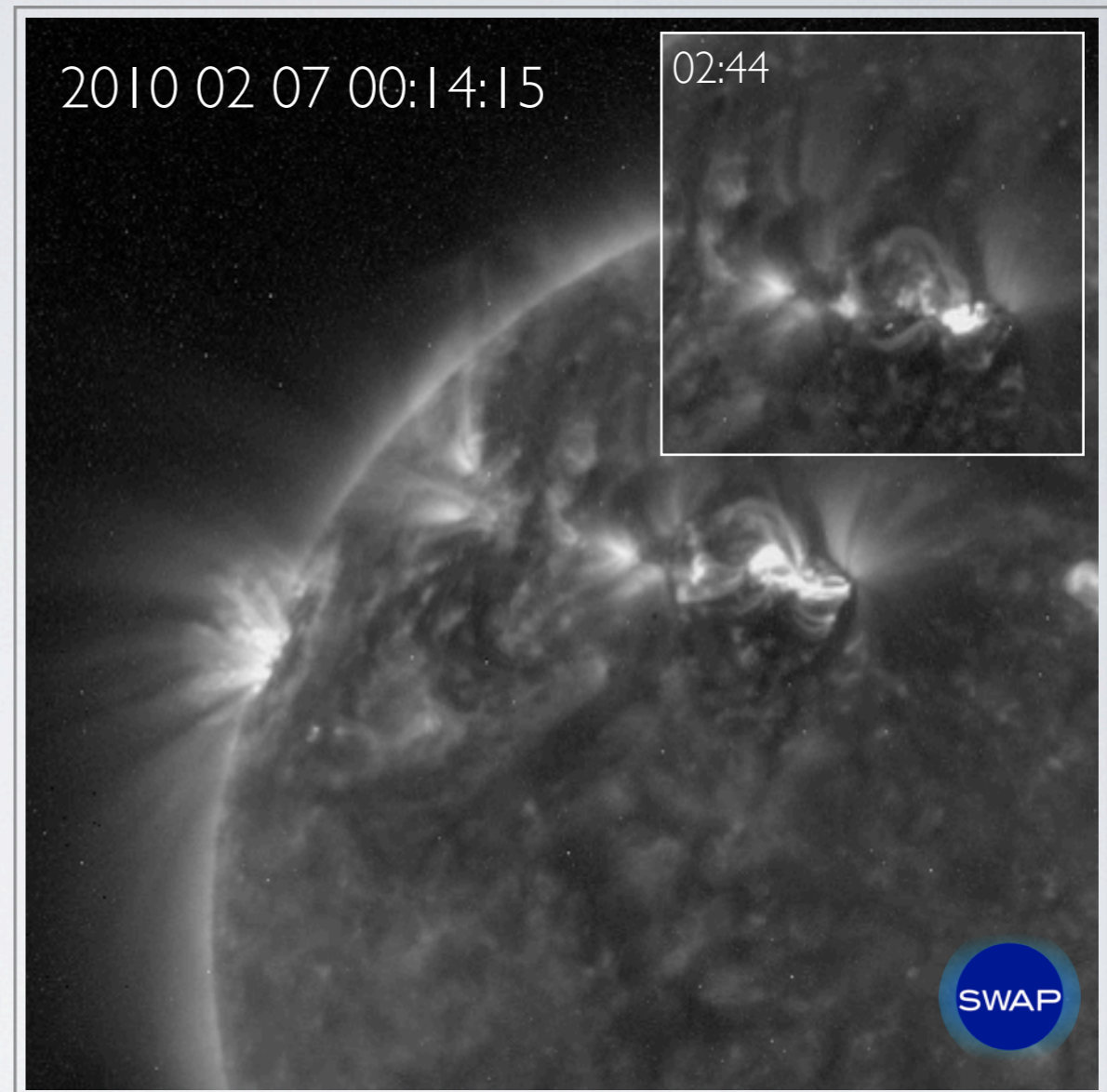
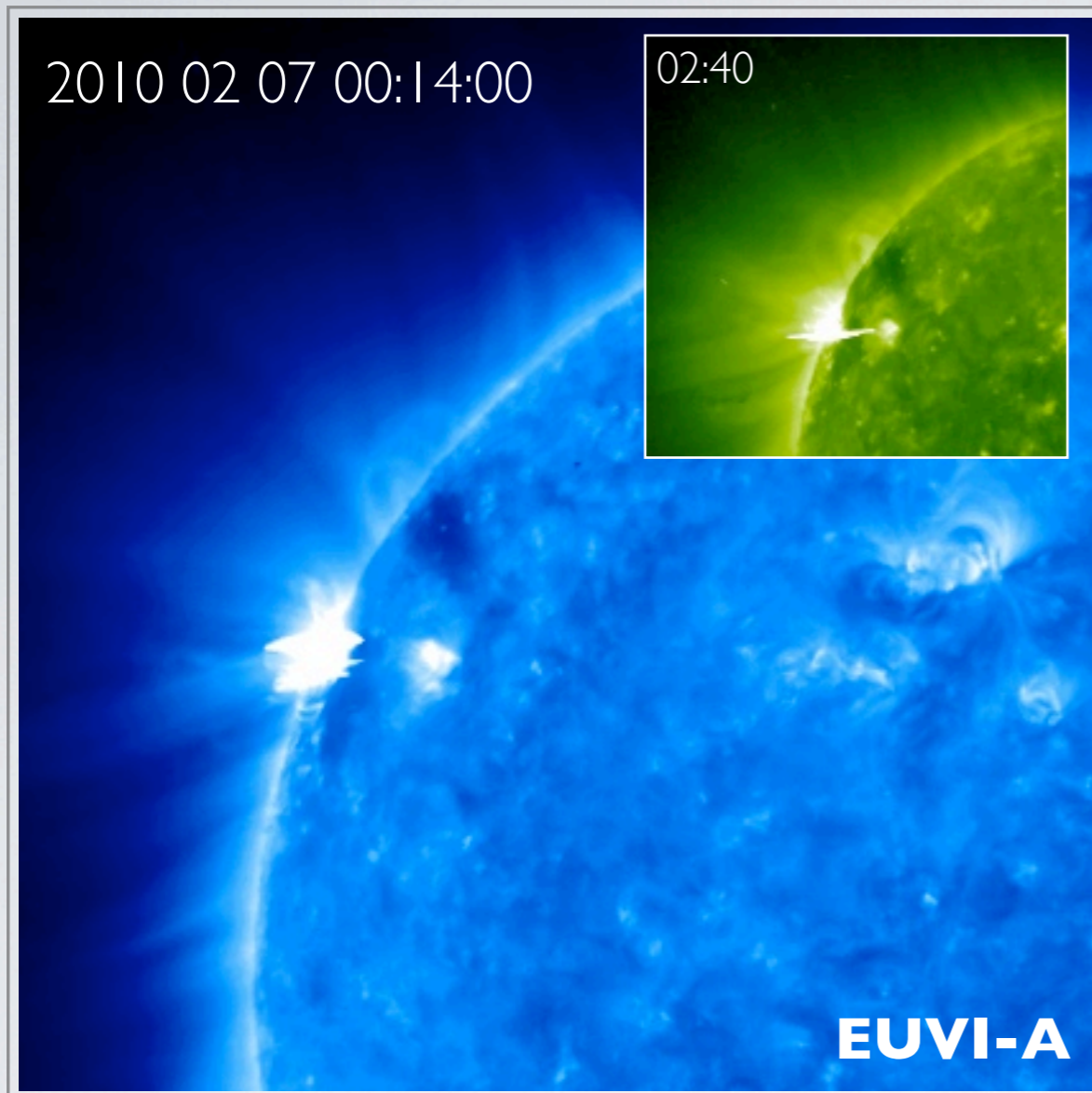


2010-02-05T22:23:17.871Z



SOLAR FLARES

limited blooming due to CMOS detector
high cadence up to 18s
LYRA gives detailed temporal evolution (10ms)



SOLAR FLARES

limited blooming due to CMOS detector
high cadence up to 18s

LYRA gives detailed temporal evolution (10ms)

LYRA FLARES

4 channels:

Ly alpha: ~120nm

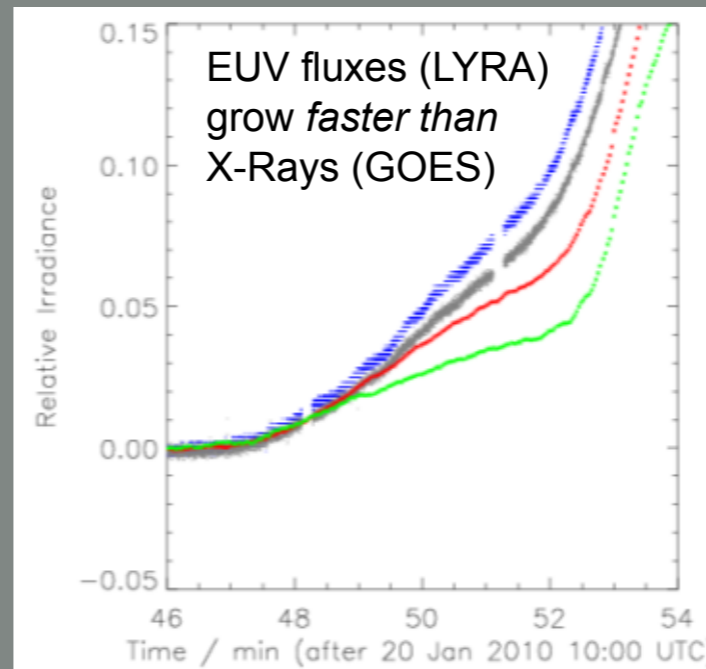
Herzberg: 200-220nm

Al: XUV & EUV (incl. HeII)

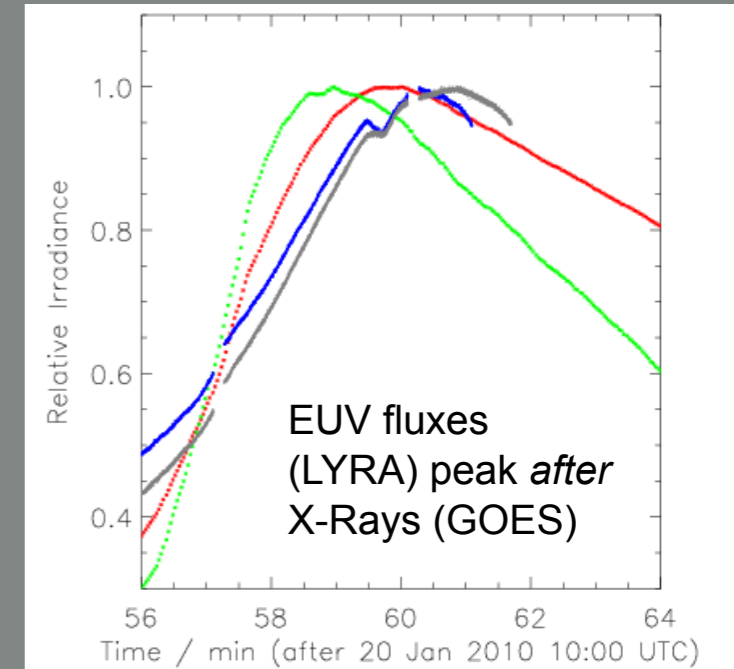
Zr: XUV & EUV(excl. HeII)

high temporal resolution
up to 10ms

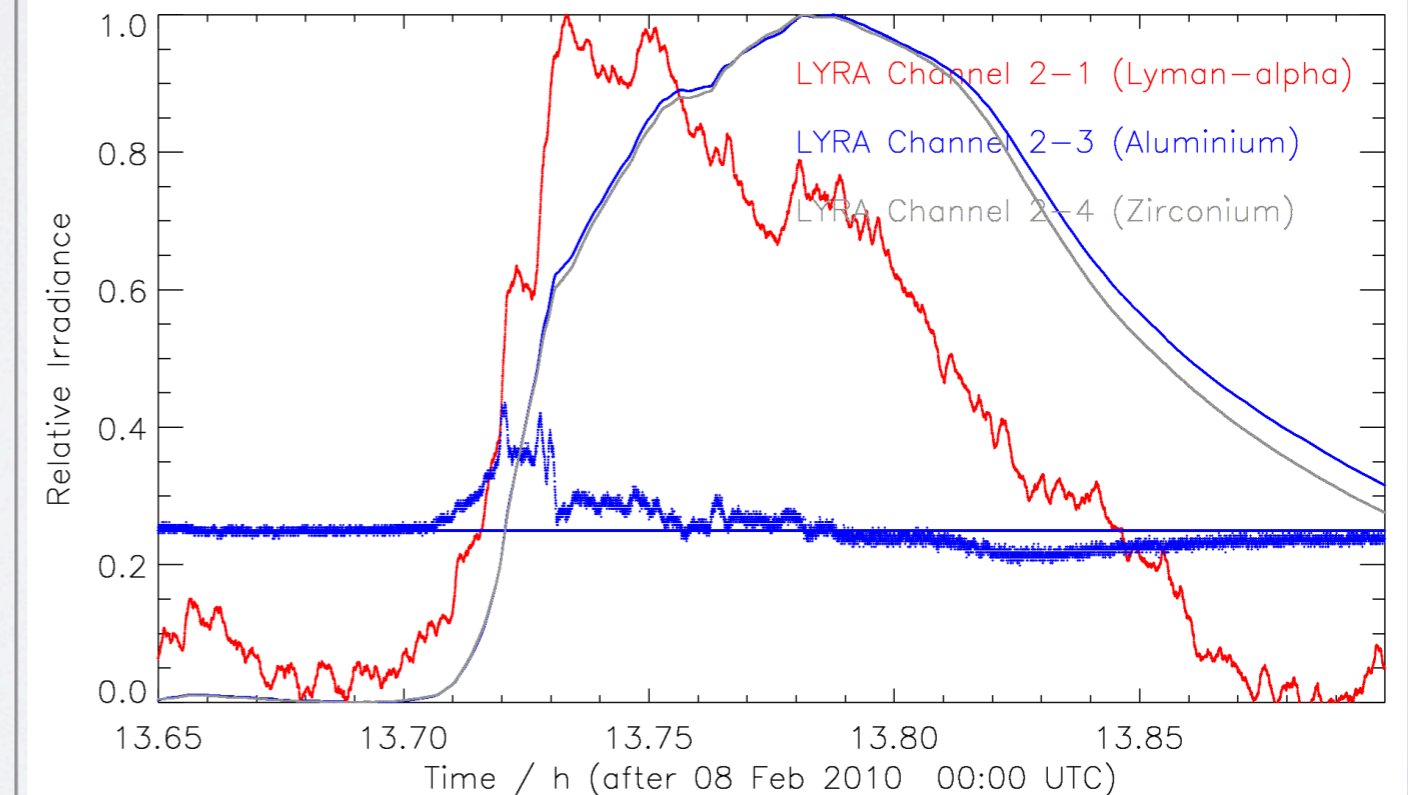
Onset of the flare

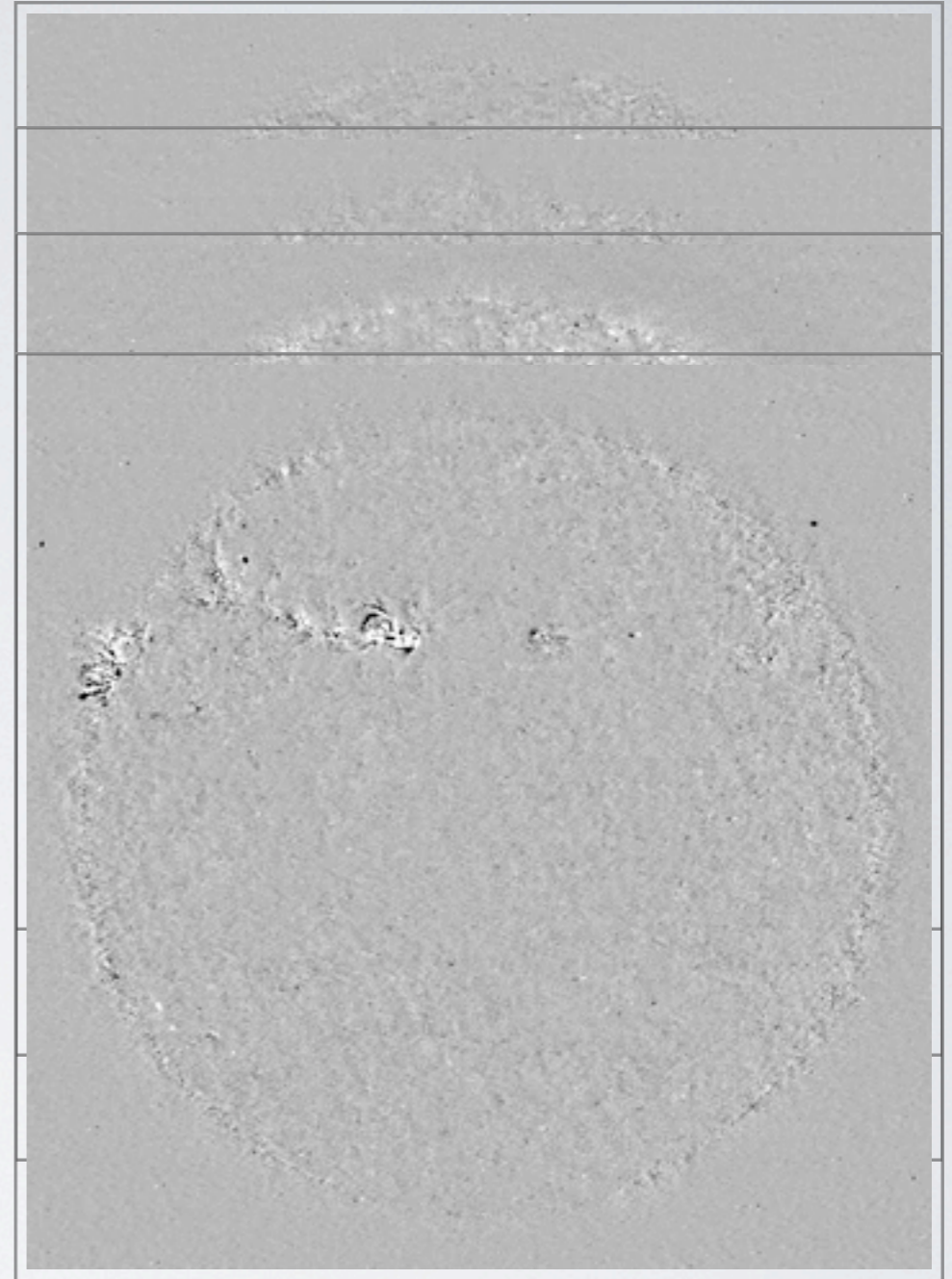
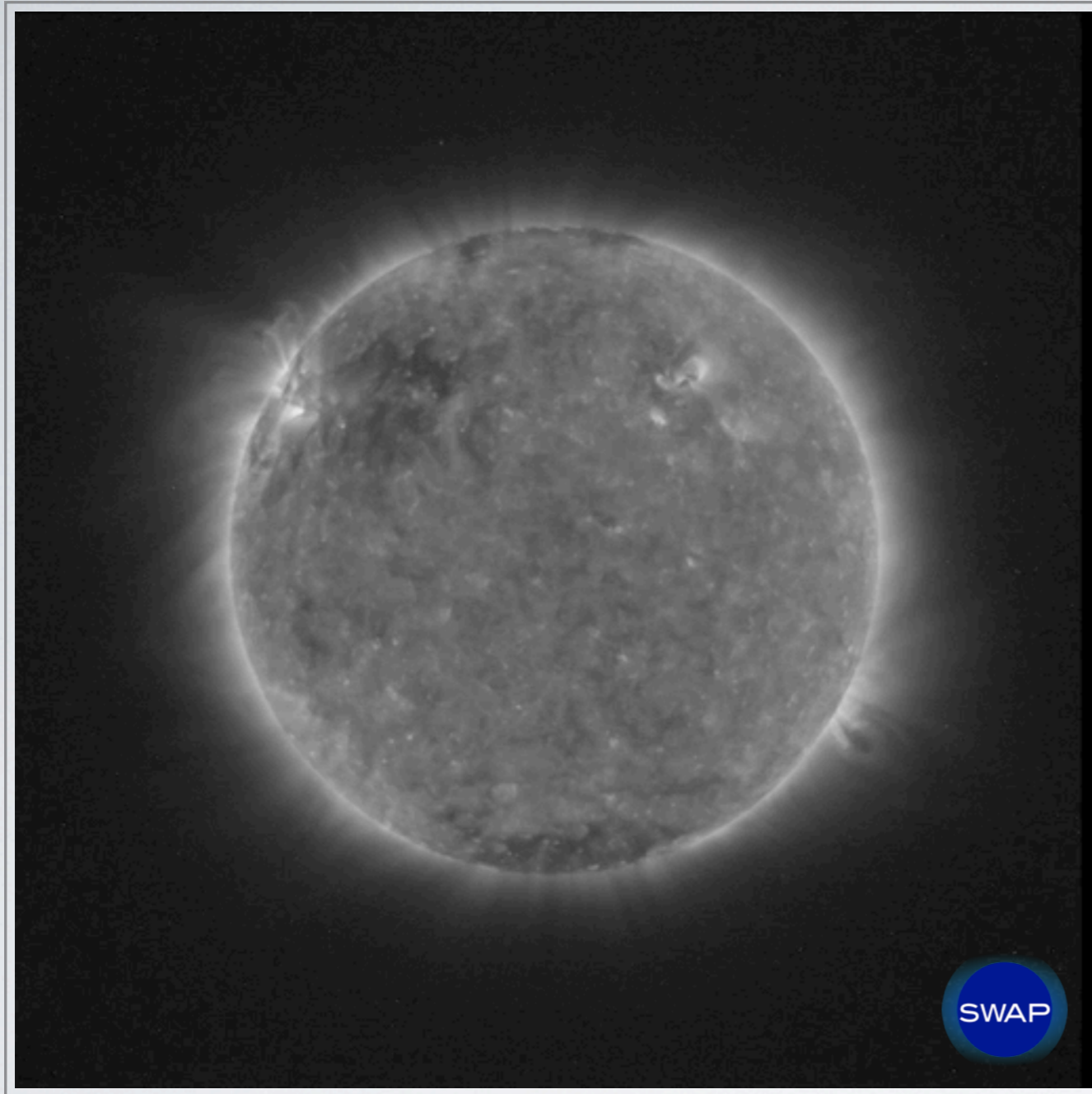


Peak of the flare



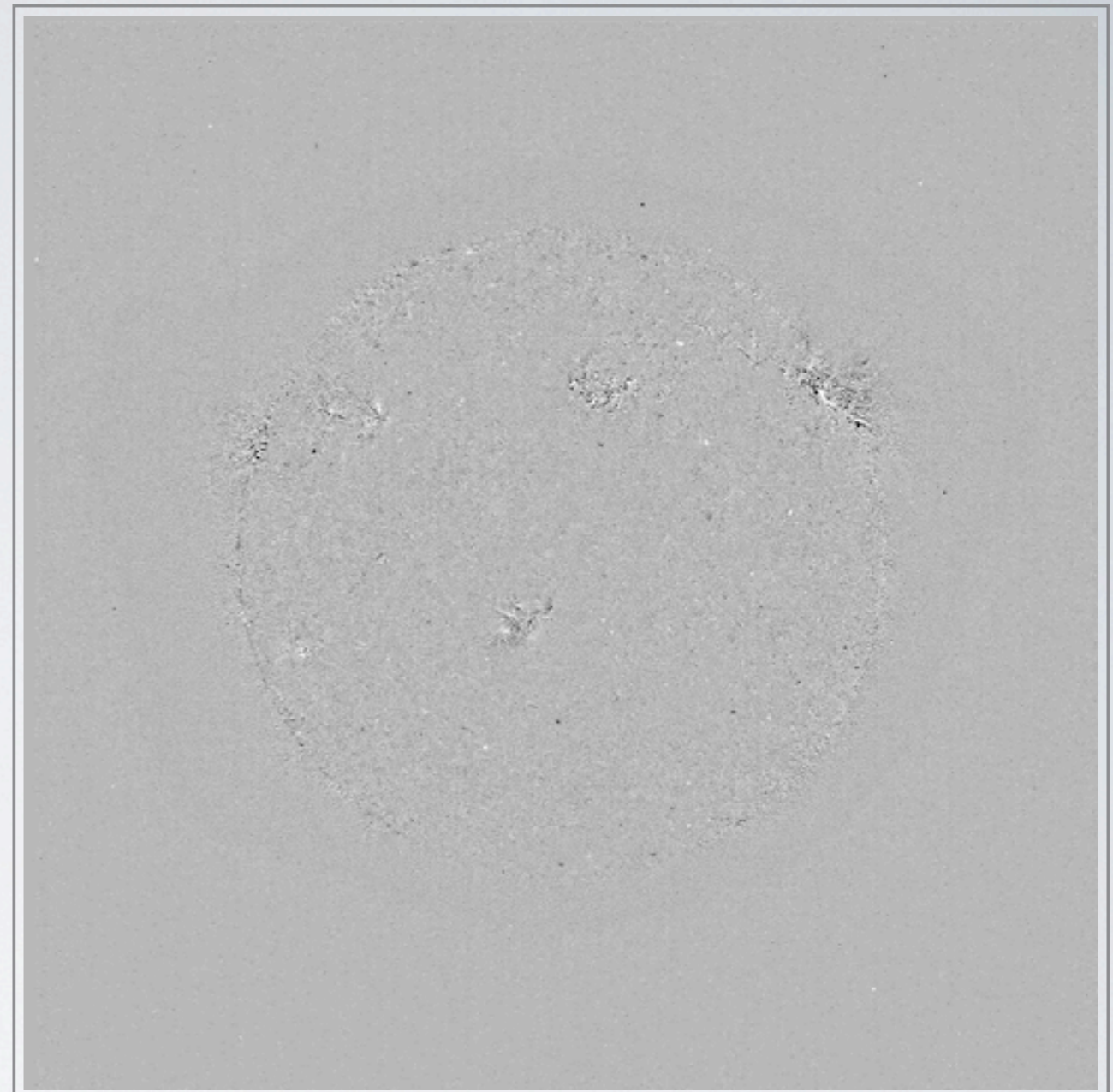
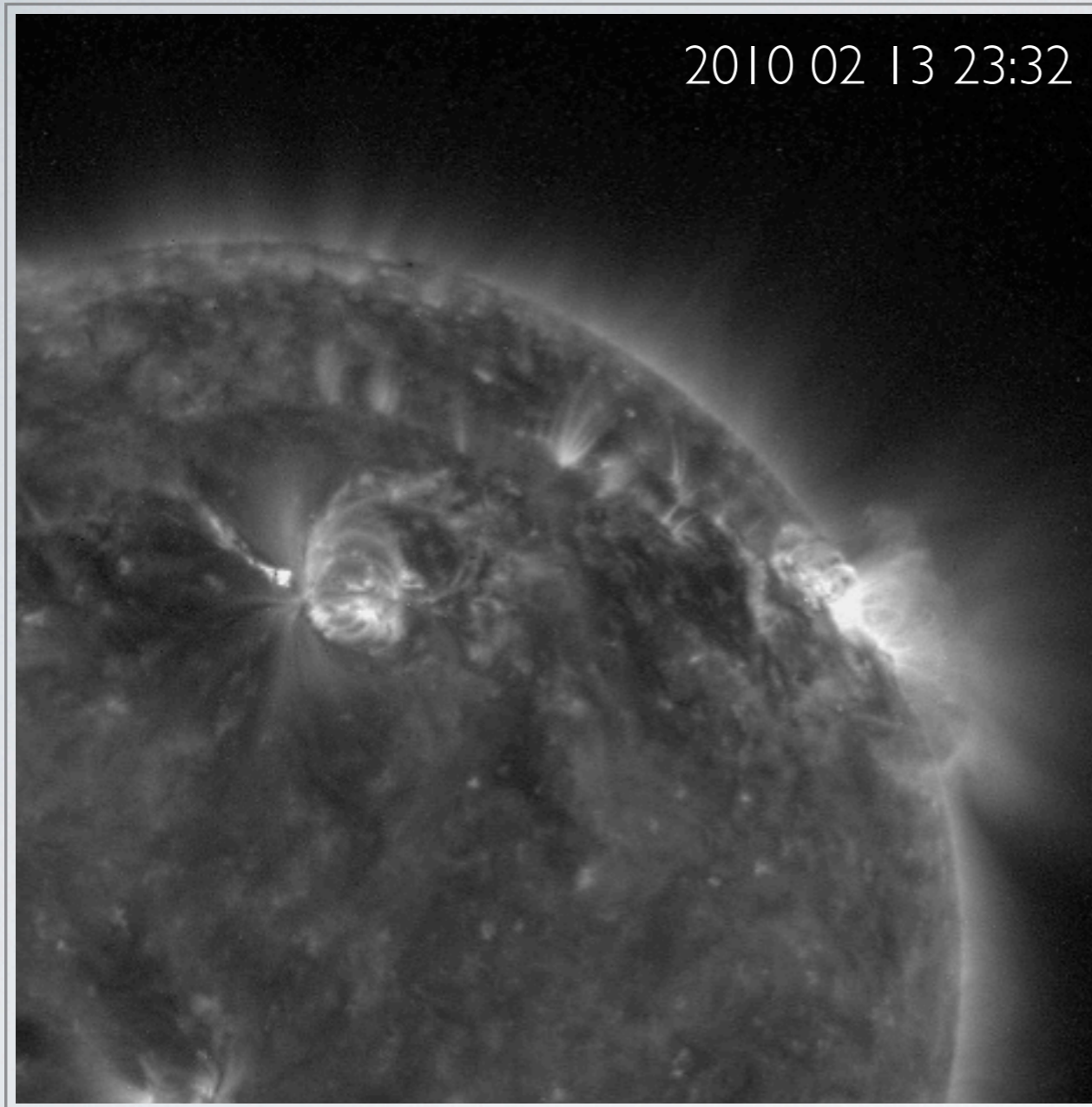
M2.0 Flare





EIT WAVES

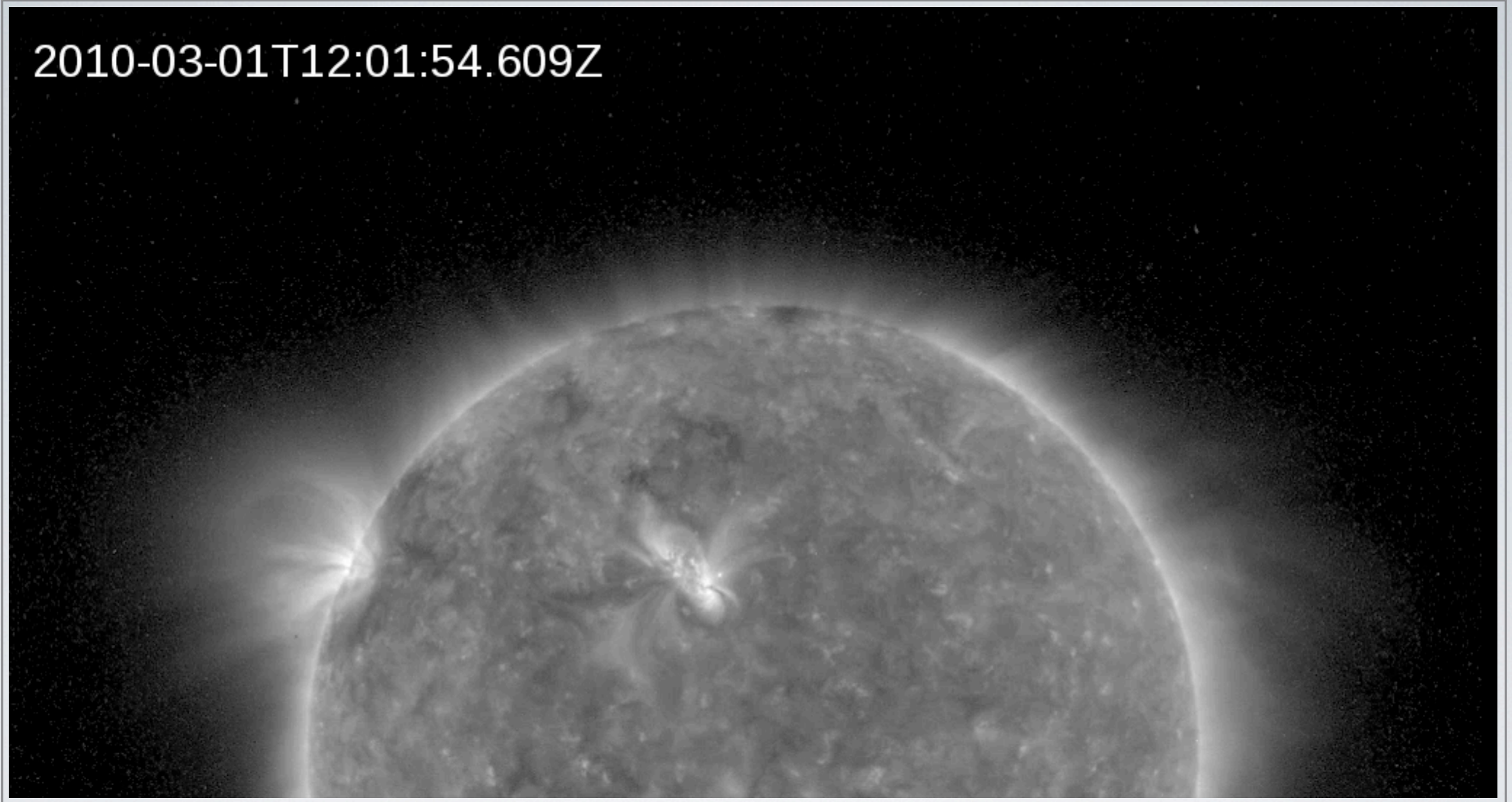
several waves associated with the flares of Feb. 5-6, 2010



EUV JETS

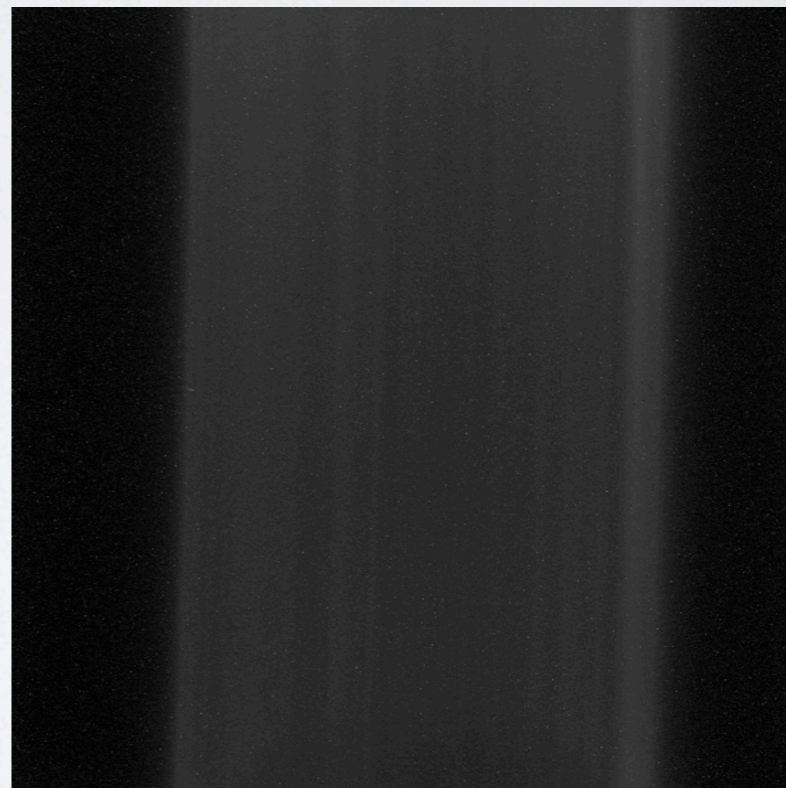
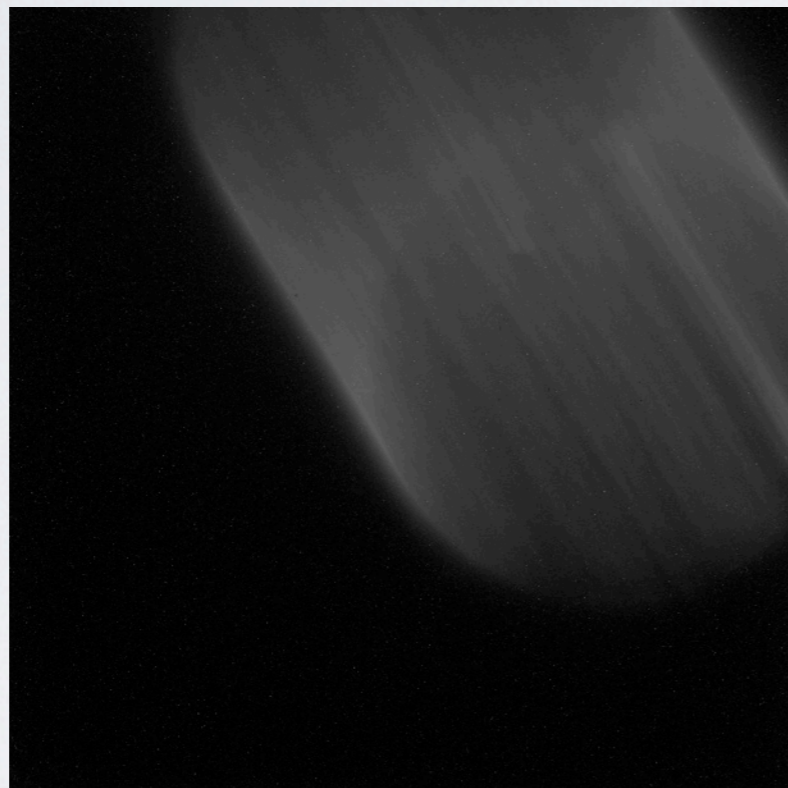
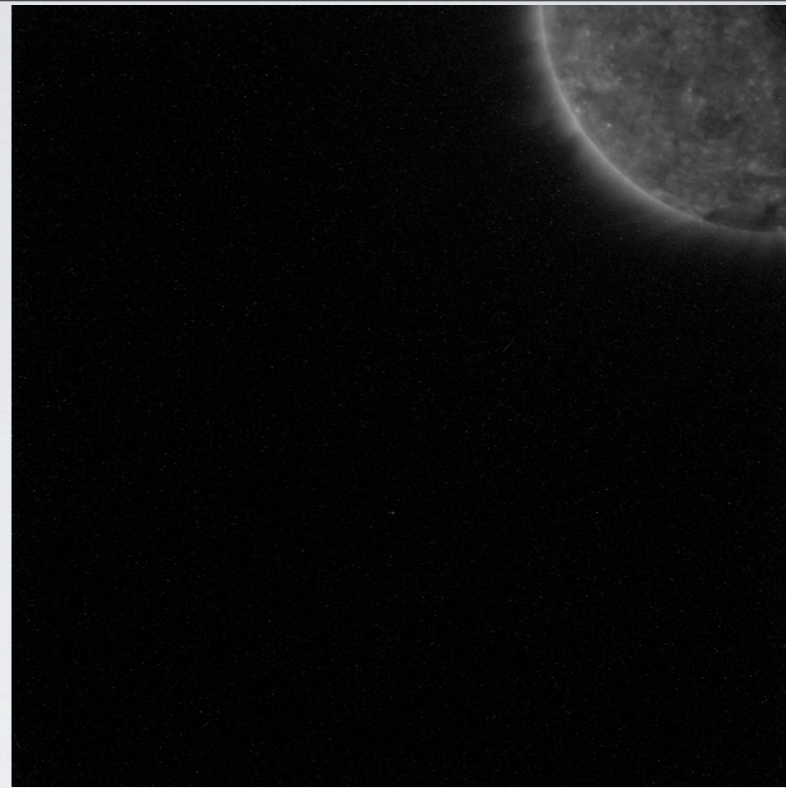
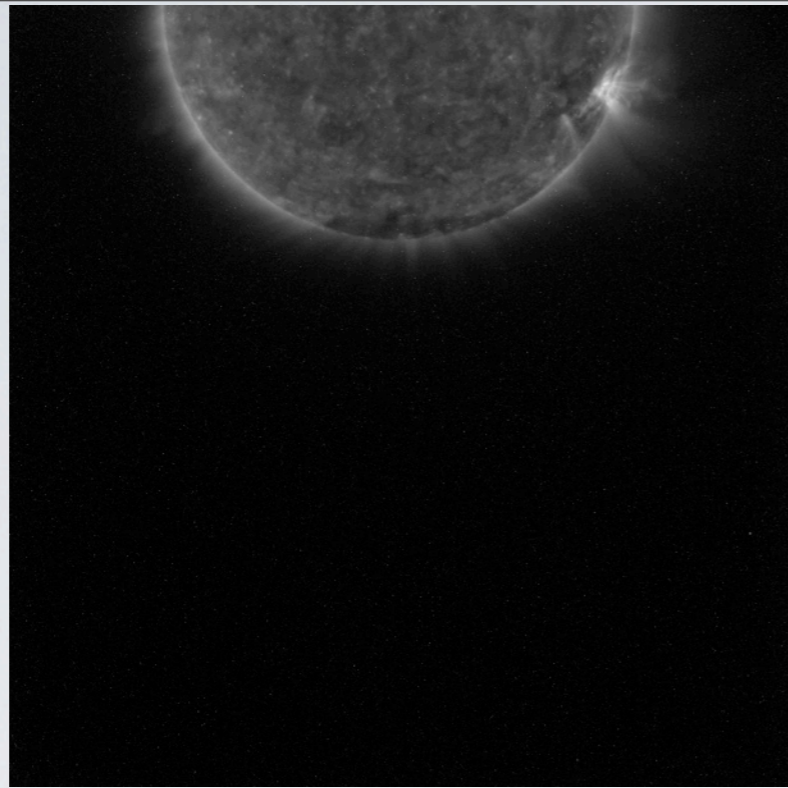
12-13 February: co-temporal jets leave from 2 separated ARs
speed roughly 500km/h
observed both in SWAP and EUVI

2010-03-01T12:01:54.609Z



CORONAL MASS EJECTIONS

waiting for more clear events in SWAP off-limb region
automatic CME tracking probably hampered by unstable pointing



OFF-POINTING

up to now mostly interesting for calibration
could be used for CME tracking

OPEN DATA POLICY

Data will be freely available to all users from mid April onwards

<http://proba2.sidc.be>

All data ordered in year/month/day folders
Fancy data browser to come

Raw Engineering FITS: reformatted, decompressed, long header
Base Science Data FITS: (preliminary) calibrated, science header
PNG files: for quicklook purposes (available now)

SSW will have software trees SWAP & LYRA
thanks to Trinity College Dublin

HOW TO BE INVOLVED?

Scientists are welcome to:

- use PROBA2 data,
- propose special observation campaigns

Guest Investigator Program welcomes proposals for dedicated (joint) observations in the frame of a science project

- funds available for a stay at PROBA2 Science Center
- scientist can take part in the commanding of the instruments
- will gain expertise in the instrumental effects

- Announcement: May 3, 2010
- GI proposal deadline: June 1st (visits from Sep 2010 onwards)
- First Science Working Team - GI selection: June 7-9

FOR MORE INFORMATION

<http://proba2.sidc.be/>

The screenshot shows a Safari browser window with the address bar displaying <http://proba2.oma.be/index.html/>. The website header includes the title "[PROBA2 SCIENCE CENTER]" and a navigation menu with links for Home, About, SWAP, LYRA, Data, Community, Meetings, Outreach, and Gallery. A search bar and an "OK" button are also present. The main content area features an article titled "PROBA2 witnesses an annular eclipse" with several paragraphs of text. The sidebar on the right contains three sections: "Latest news" with three entries, "Best picture" with a photo of the satellite, and "Best movie" with a video player showing a man speaking. The bottom of the browser window shows a system tray with the date "Monday 22 March 2010" and the time "17:43".

PROBA2 SCIENCE CENTER

Home About SWAP LYRA Data Community Meetings Outreach Gallery

Last update: 17th of March 2010

PROBA2 witnesses an annular eclipse

People across Africa and Asia marvelled at the solar eclipse that took place on 15 January. At the same time it was being recorded from orbit - by ESA's Sun-watching PROBA2.

The small satellite is demonstrating new space technologies but also hosts scientific instruments to monitor the Sun and space weather. PROBA2's SWAP (Sun Watcher using APS detectors and imaging processing) instrument acquired the images used to produce this animation. It is a miniaturised version of a similar instrument on the ESA/NASA SOHO observatory, but while SOHO produces a new image only around every quarter of an hour, SWAP can do so every minute.

The 15 January eclipse was the longest eclipse of the millennium so far, known as 'annular' because the outer part of the Sun's disc is left uncovered - the Moon being further away from Earth than during 'total' eclipses.

SOHO has never had the opportunity to witness a solar eclipse because it operates 1.5 million km from Earth in order to give it an uninterrupted view of the Sun. Proba-2 by comparison is in orbit around Earth a scant 720 km away, giving the satellite a high probability of passing the band of an eclipse as one occurs.

For the Royal Observatory of Belgium team overseeing SWAP, this initial eclipse sighting has proved a useful means of characterising the instrument's optical performance and assessing double-checking orbital calculations while PROBA2 continues in its commissioning phase.

[Press Release: Technology-testing PROBA2 opens new eye on the Sun](#)

Attached documents

Annular Eclipse
29 January 2010
Document : MPEG4
Solar eclipse seen from space by SWAP on January 15,2010

Latest news

- 21 January 2010
PROBA2 Press Event (26 January 2010)
- 18 December 2009
SWAP First Light!
- 12 November 2009
PROBA2 Passes First Health Checks

Best picture

Best movie