



LYRA and SWAP

the two Solar Instruments on-board PROBA2

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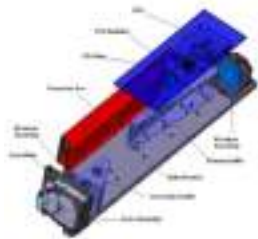
SWAP and LYRA teams

SWAP

Sun Watcher using Active Pixel System detector and Image Processing
(PI: D. Berghmans)

SWAP ID

- ◇ instrument: EUV imager
- ◇ wavelength: 17.4 nm
- ◇ acquisition cadence: 1-2 min
- ◇ detector: 1K x 1K CMOS APS
- ◇ target : the one-million-degree solar corona



LYRA

Large Yield RAdiometer
(PI: M. Dominique)

LYRA ID

- ◇ instrument: photometer, 4 channels from XUV to MUV
- ◇ wavelengths (in nm):

Ly-alpha	Herzberg	Aluminium	Zirconium
120-123	190-222	17-80 + <5	6-20 + <2

- ◇ acquisition cadence: 20 Hz nominal
- ◇ detectors: Silicon + 2 types of diamond (PIN, MSM)
- ◇ target : solar chromosphere and corona

ASSETS

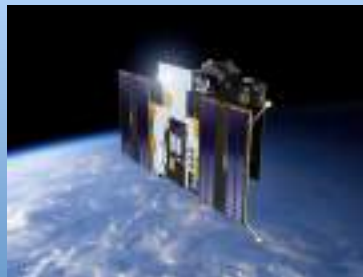
- **large field-of-view:** 54 arcmin (≈ twice the solar diameter)
- very **favorable CMOS dynamics**
- **flexible off-pointing** capabilities

=> All these characteristics allow SWAP **tracking ejections of plasma** from the Sun (e.g. CME) on a bigger distance than the other instruments.

Main Subjects Investigated with SWAP and LYRA

- Flares
- Solar irradiance variability
- CME
- Global coronal waves
- Solar wind sources
- Structure of the corona (eclipses)
- ...

PROBA2 (**PR**oject for **O**n-**B**oard **A**utonomy) is an ESA micro-satellite that was launched in November 2009. It revolves on a dawn-dusk heliosynchronous orbit, with an altitude of about 725km.



On-board, two instruments from the Royal Observatory of Belgium, viz. SWAP and LYRA, observe the Sun in (E)UV and XUV continuously since Jan 2010.

ASSETS

- **three redundant heads:**
 - ◇ **unit2 is used continuously**, but therefore faces strong degradation, especially in Lyman alpha and Herzberg channels
 - ◇ **unit3 is used for special campaigns** (e.g. tracking Lyman alpha flares)
 - ◇ **unit 1 is only used for calibrating the two others units**
- **high sampling rate** (up to 100 Hz), allowing the observation of short timescale phenomena, like quasi-periodic pulsations in flares
- **diamond detectors:**
 - ◇ **radiation-hard**, and therefore less perturbed by the SAA ...
 - ◇ **insensitive to the visible and infrared ranges**

Data Products



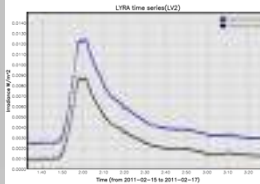
SWAP uncalibrated and calibrated data (fits files) and quicklooks (png)



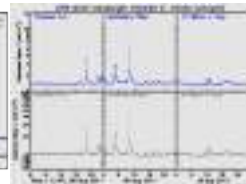
SWAP daily movies (mp4)



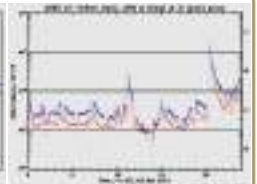
SWAP daily running differences movies (mp4)



LYRA calibrated and uncalibrated data, SWAP average intensity time-series (fits files)



LYRA daily quicklooks (png)



LYRA flare list (with measurement of the flare intensity in GOES scale)

<http://proba2.sidc.be>