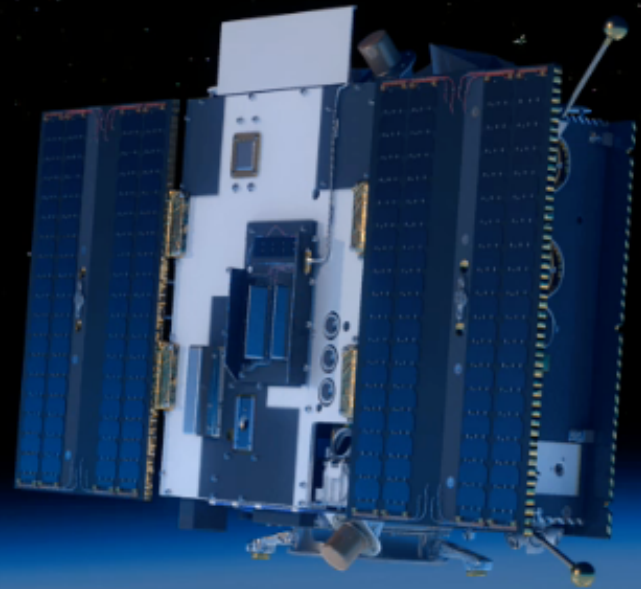


PROBA2

Confirmation 2017+2018

Extension 2019+2020



12 October 2016, ESTEC, SSEWG/AWG

David Berghmans, Royal Observatory of Belgium
Joe Zender, ESA/D-SCI



Overview

PROBA2 mission and 2017/2018 confirmation

Mission Achievements

Key Science for 2019/2020

Conclusion



The PROBA2 mission

- Developed by ESA's Technical Directorate
- Approved by SPC as national-led mission in 2006
- Launch on 30 November 2009 on Rokot launcher
- Space Situational Awareness Programme took over mission management from July 2013 onwards

Spacecraft:

Sun-synchronous Earth orbit

720km altitude

Communication via S-band



SWAP EUV imager

Wide-FOV

CMOS Detector

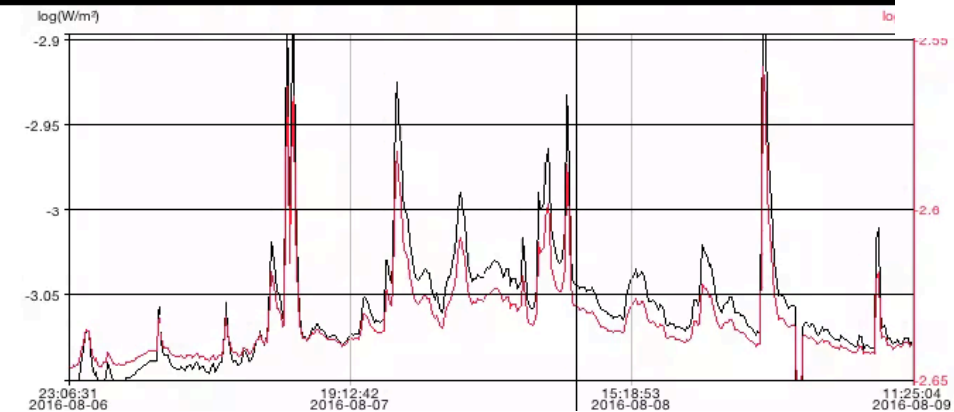
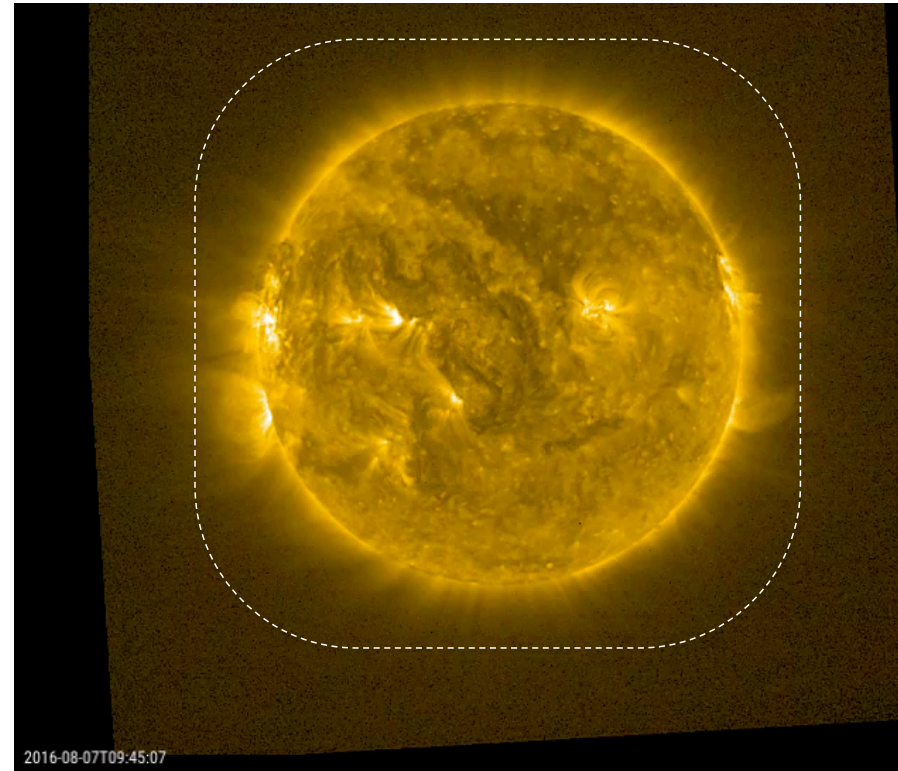
2 minute cadence since launch

off-pointing capabilities

LYRA radiometer

3 units of 4 detectors each,
including diamond detectors

20Hz sampling since launch



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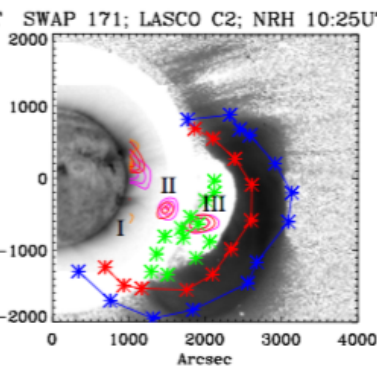
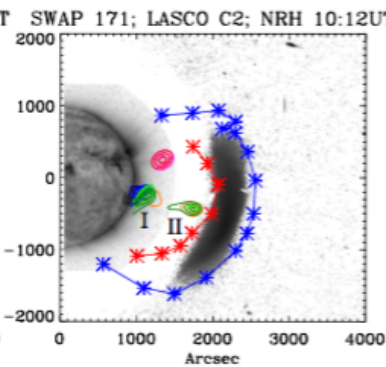
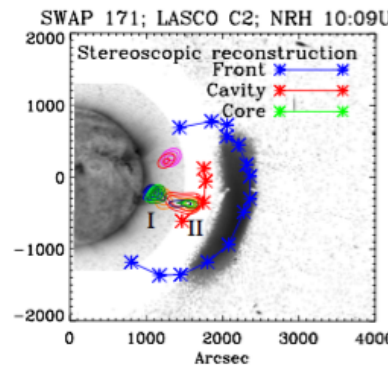
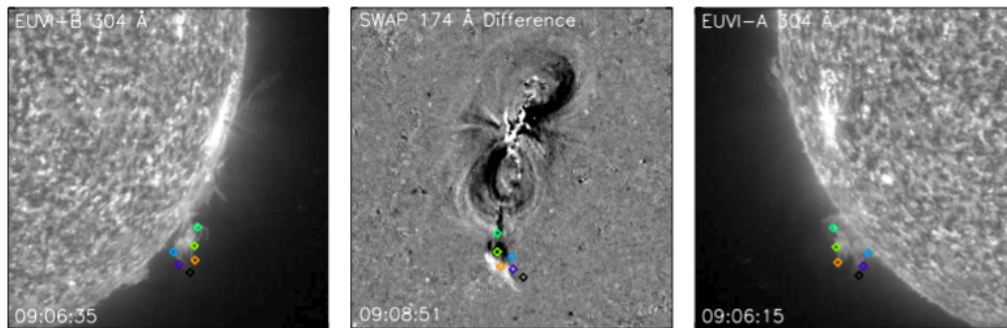
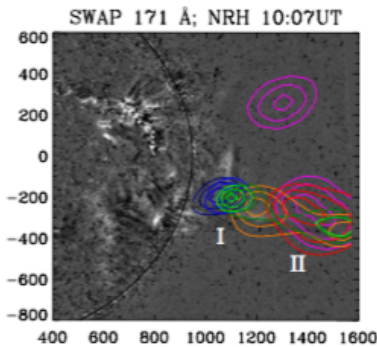
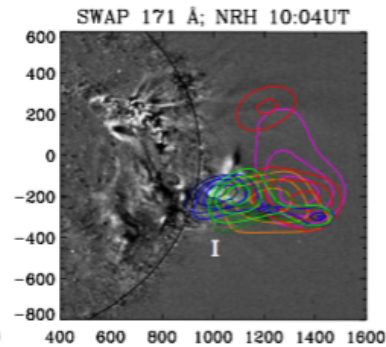
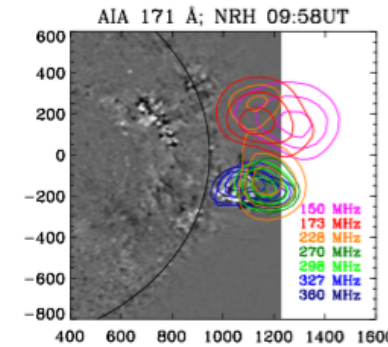
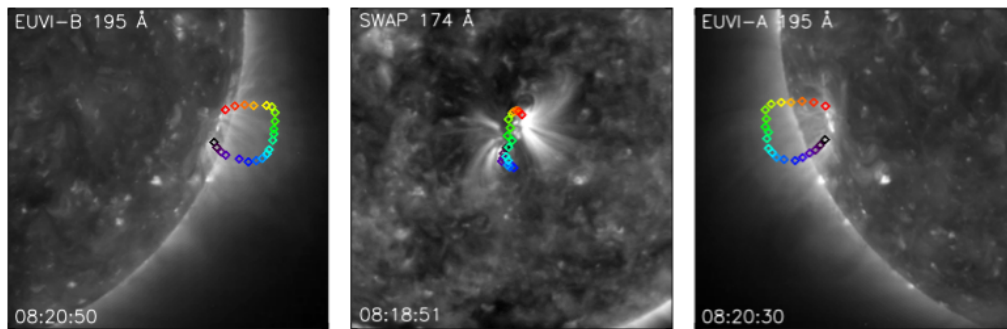
European Space Agency

Mission Extension Operations Review (MEOR) 2017/18

- all PROBA2 units work nominally (except TX1 transmitter)
- orbit stability confirmed till 2020
- managerial setup between different Directorates (TEC/OPS/SCI is beneficial for all partners)
- scientific instrumentation in good shape
- increasing impact on science, education and space weather

Mission health
confirmed for
2017/2018

Mission Achievements: tracking eruptions into the extended corona

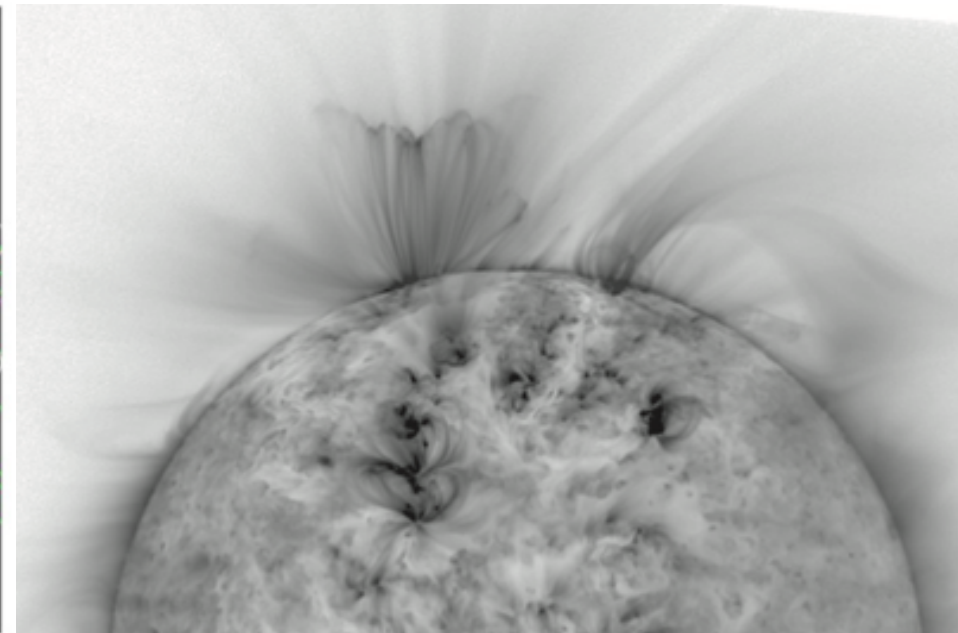
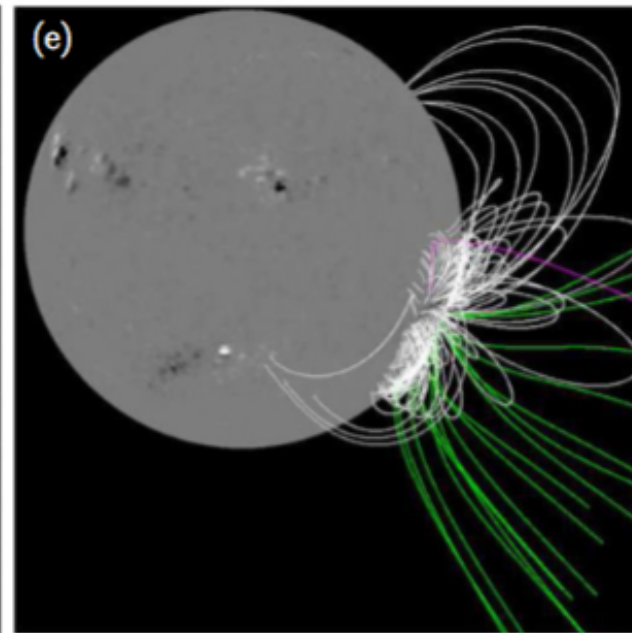
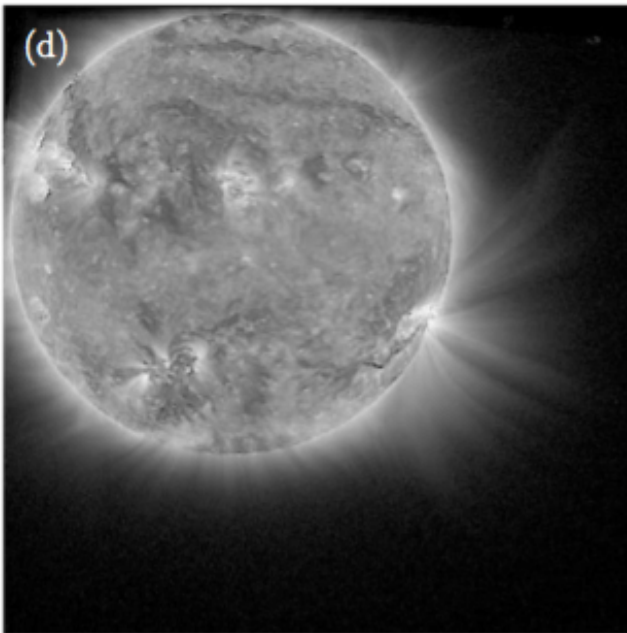


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Mission Achievements: tracking long lived structures into the extended corona

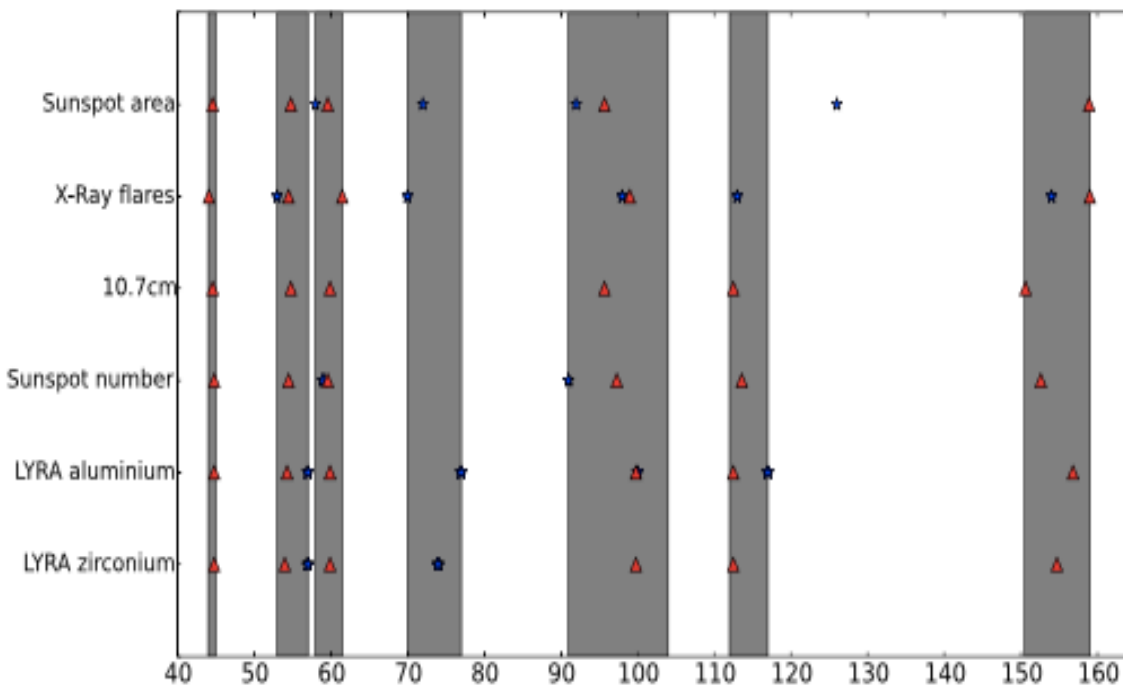


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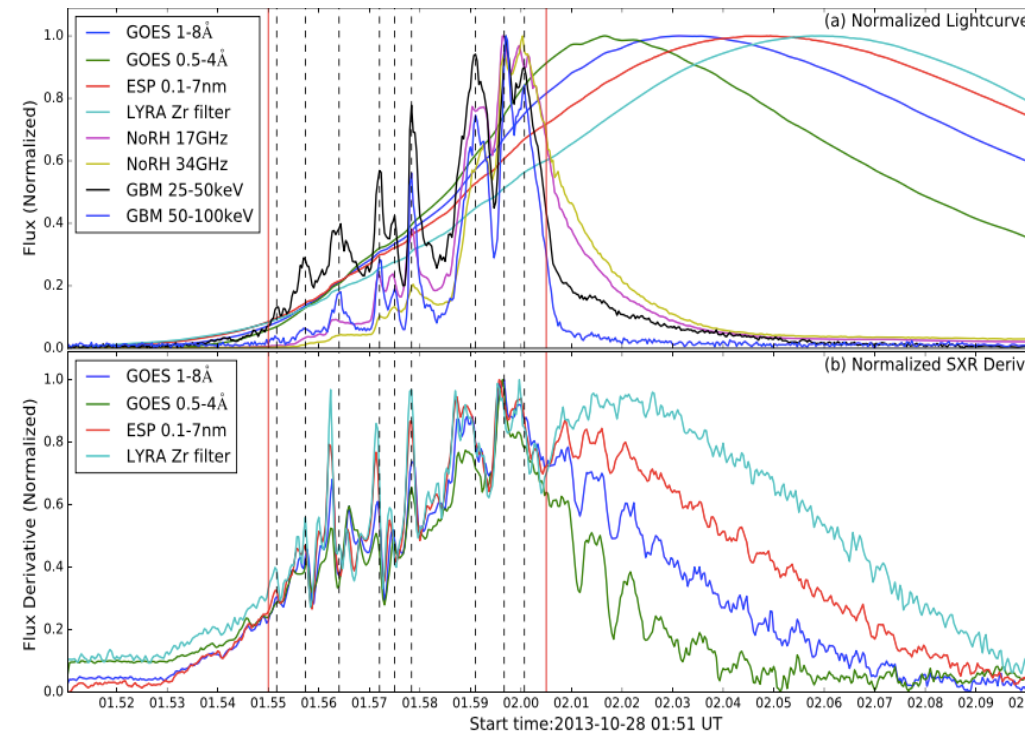


European Space Agency

Mission Achievements: LYRA EUV irradiance from long coverage to high time resolution



Mid-term periodicities (in days)



Quasi-Periodic pulsations in flares

PROBA2 international research community



51 visiting science teams

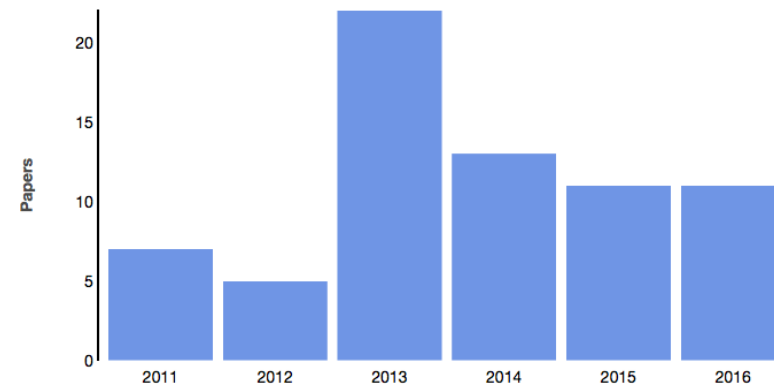
- Europe: 20
- US: 22
- Russia: 7
- India: 3

Most popular themes

- CMEs & EIT waves
- solar wind sources
- flare physics & irradiance
- extended coronal structures

69 refereed papers

11+5 PhD thesis



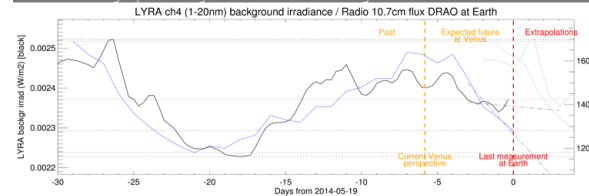
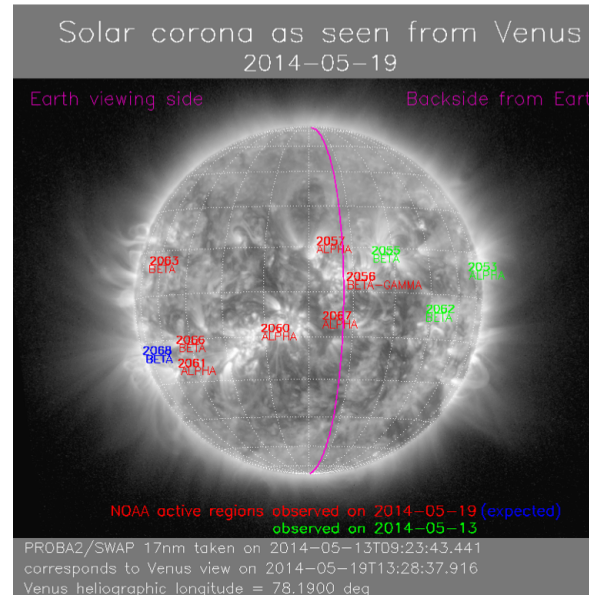
Technological and Outreach achievements

National and ESA outreach activities (eclipses, planetary transits)

Educational/School activities (PROBA2@School)

Innovative sensor technology and instrument concepts

Space Situational Awareness



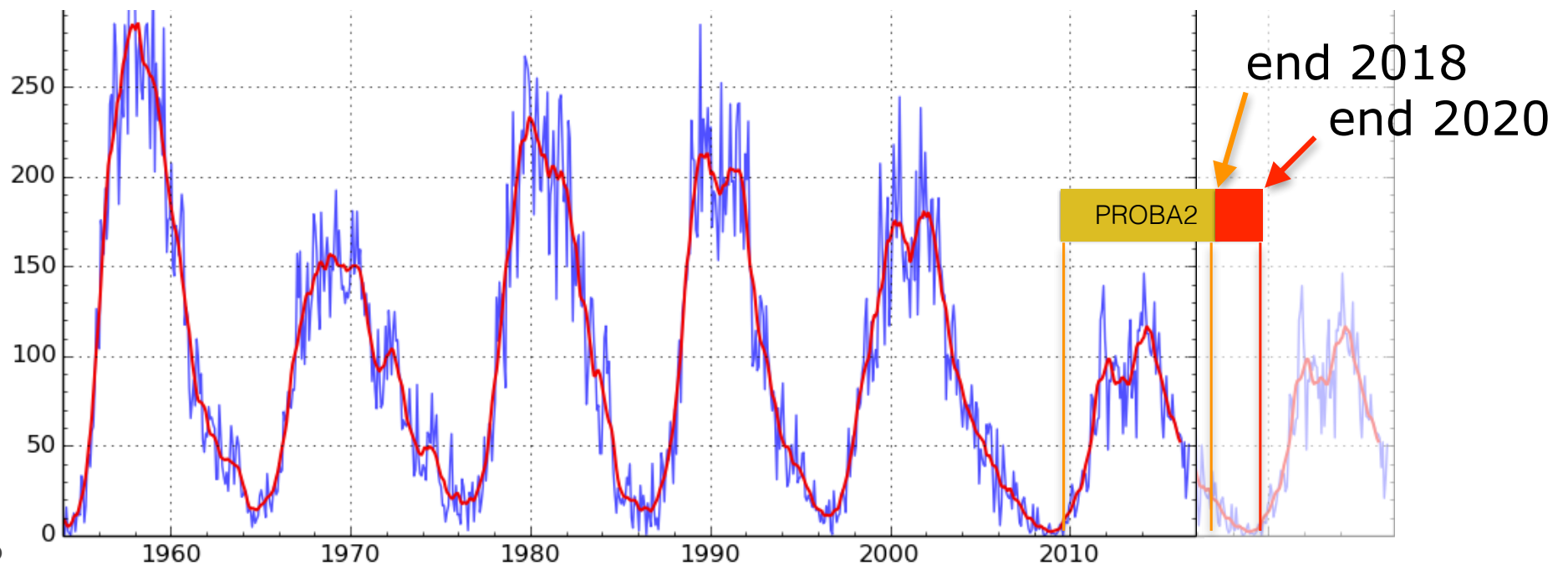
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Key Science for 2019/2020

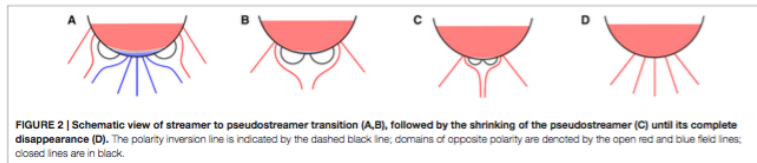
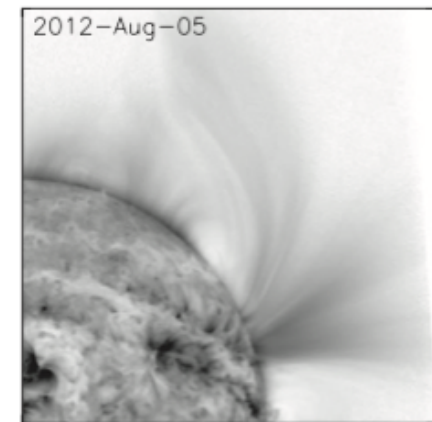
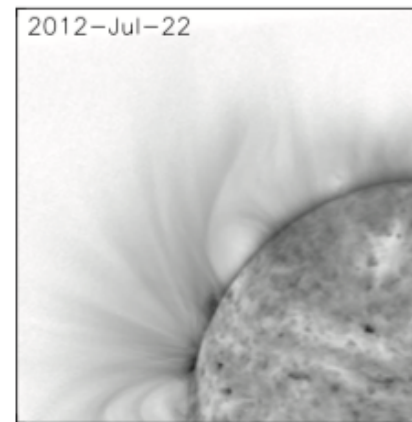
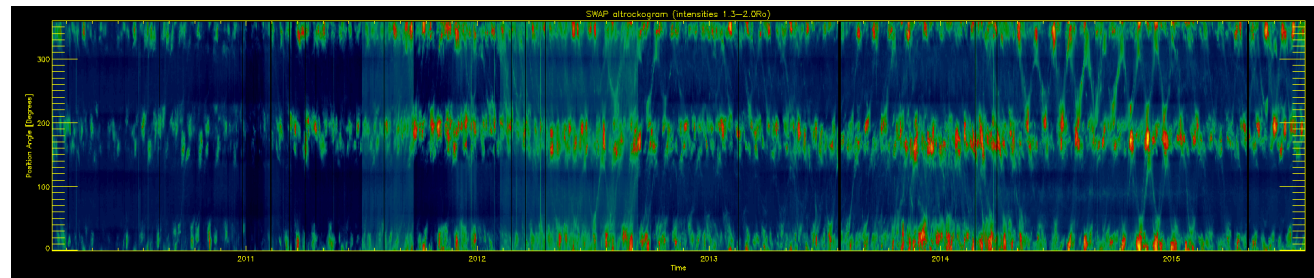
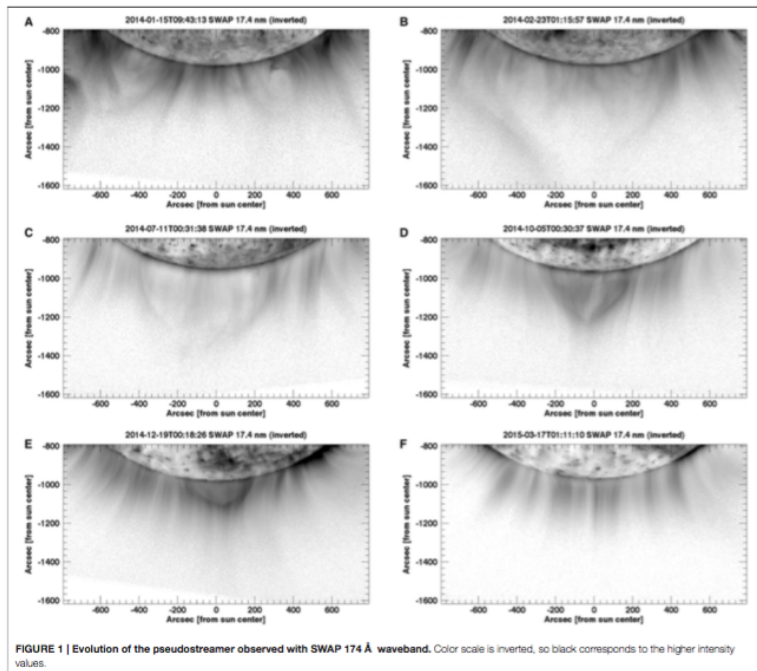
1. Full solar cycle coverage, in particular of the large scale EUV corona
2. Cross-comparison with next generation instruments, in particular Solar Orbiter

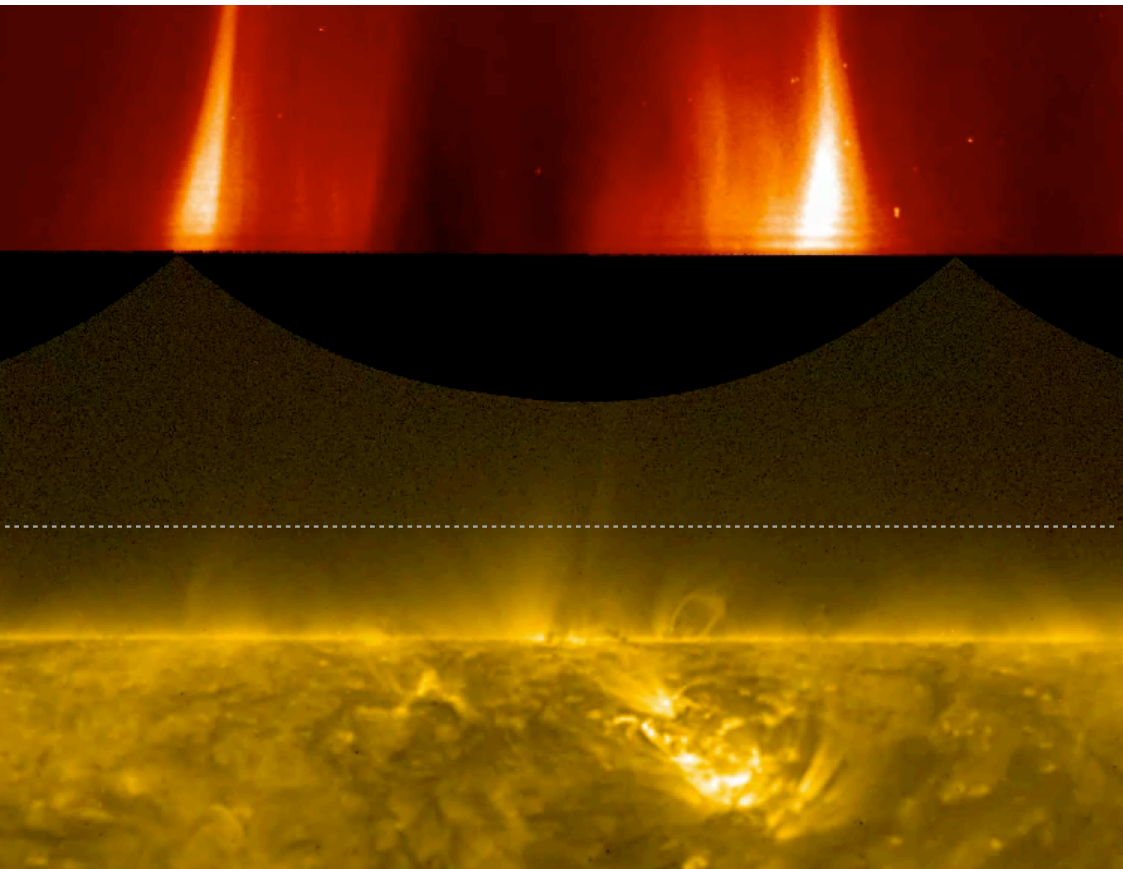


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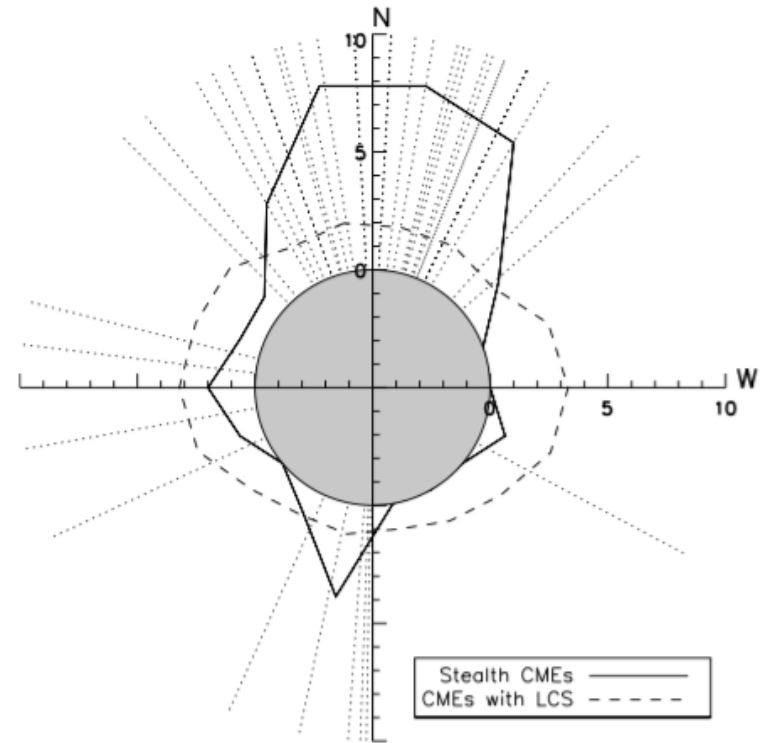


Mission extension opportunities: How does the large corona reorganize over the solar cycle?





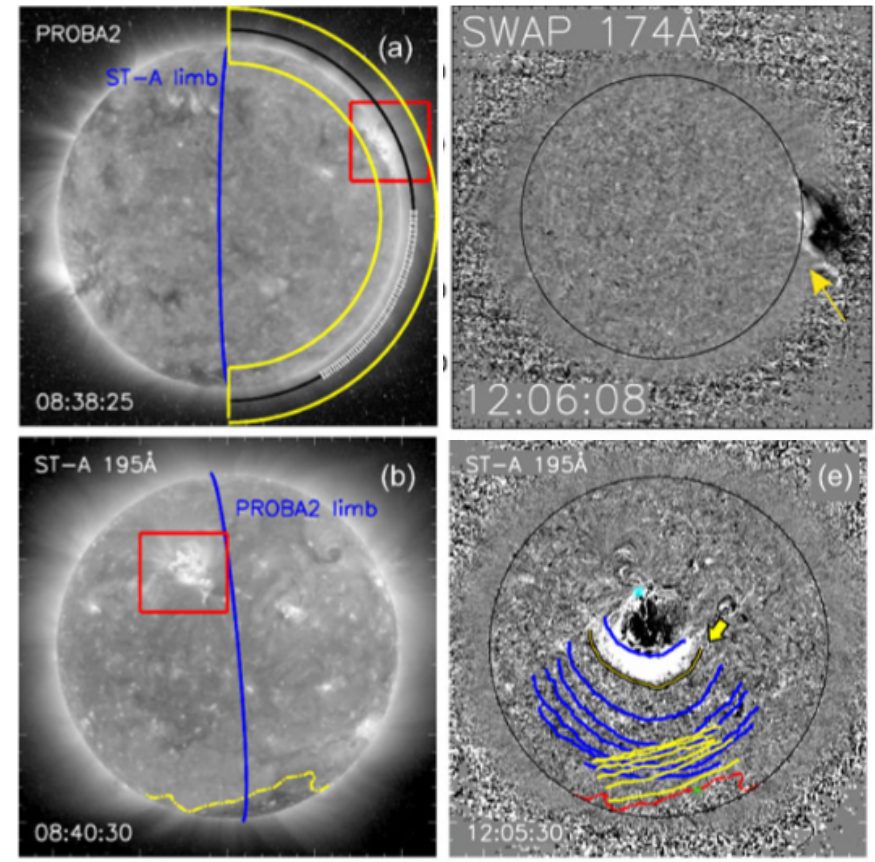
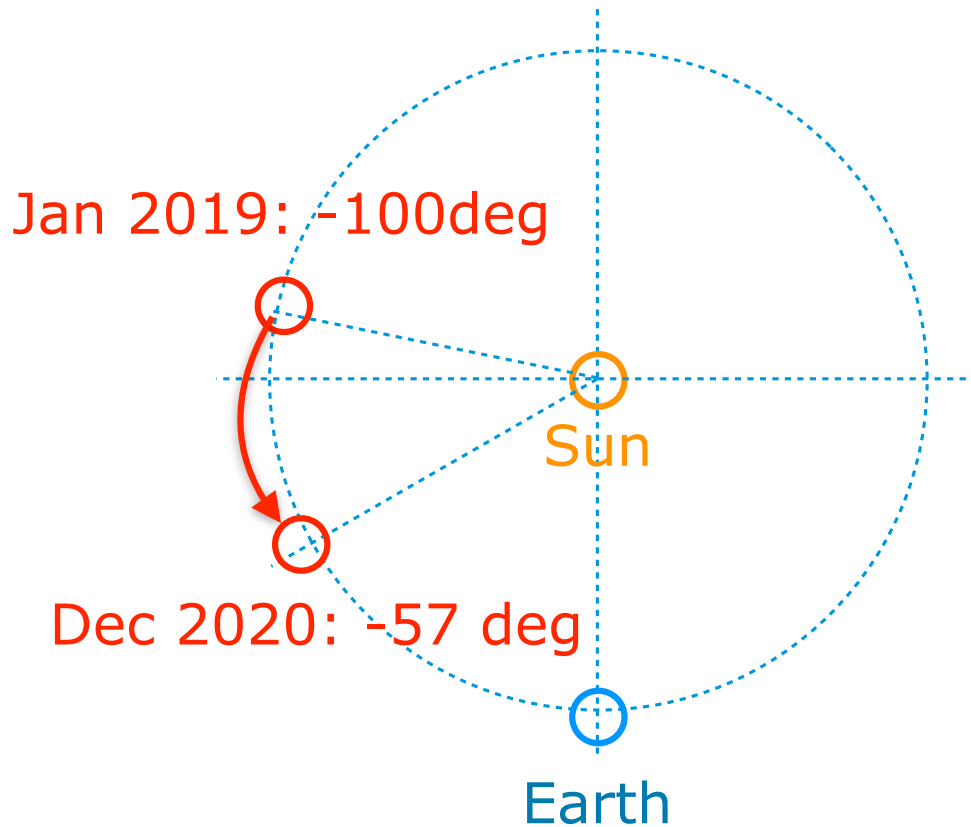
Large FOV helps tracing back the source region of CMEs.



Why do 2012 stealth CMEs come from the Northern solar hemisphere?



Mission extension opportunities: 3D CME tracking in quadrature with STEREO-A

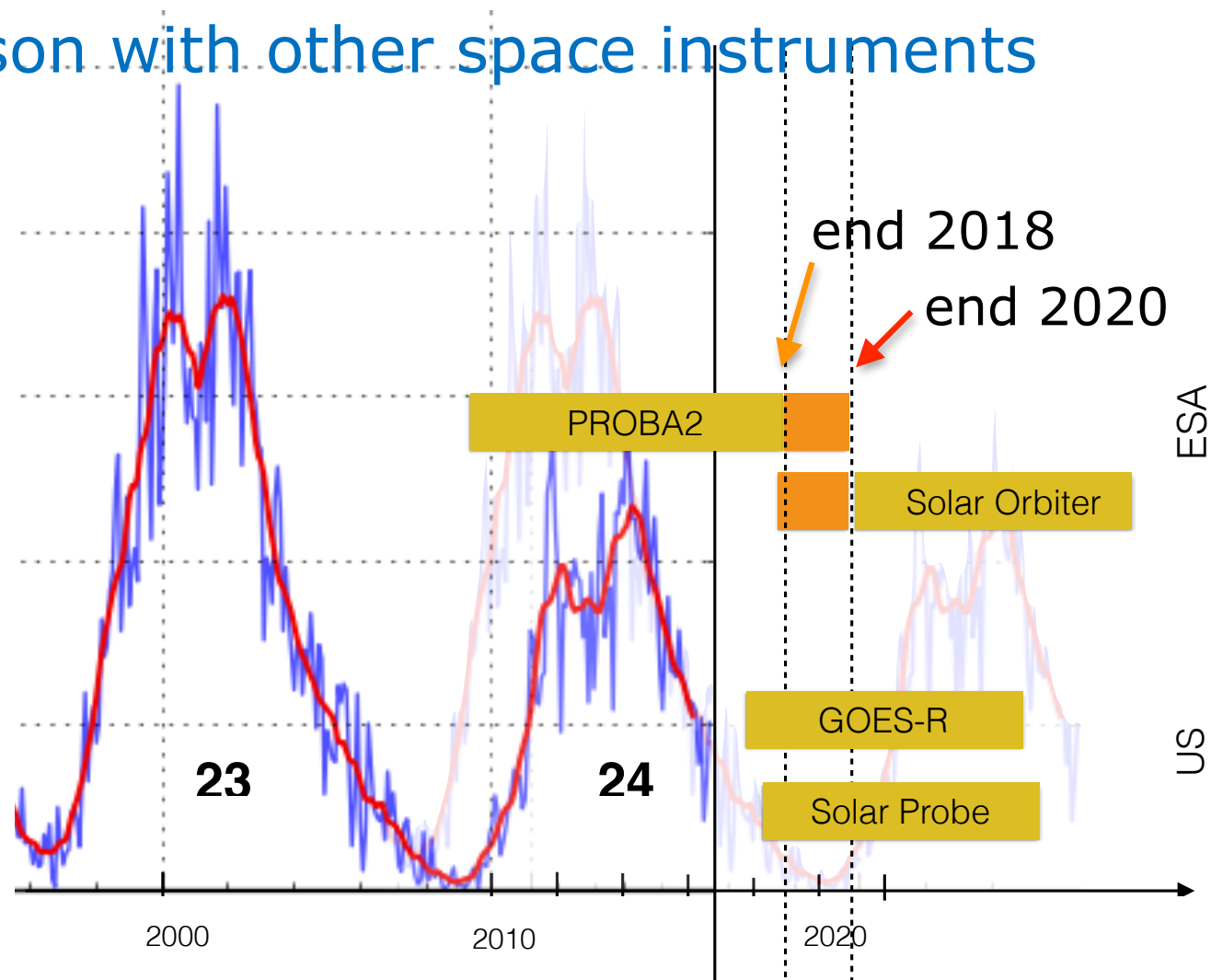


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Cross comparison with other space instruments



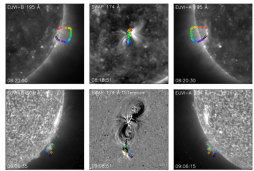
Conclusions

Micro-satellite operated since end of 2009

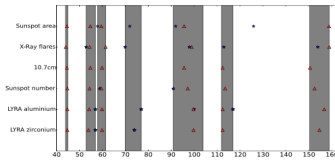
Good health is confirmed by MEOR for 2017/2018.

We request mission extension 2019-2020 to
study the global coronal restructuring over a full solar cycle
observe eruptions in quadrature with STEREO-A
cross-calibrate/compare with next generation instruments.

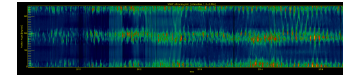
References



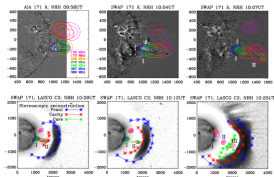
Seaton et al (2011)
doi:
10.1088/2041-8205/727/1/L10



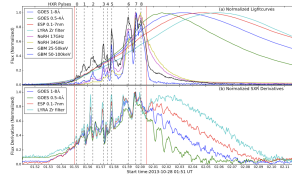
Wauters et al (2016)
DOI: 10.1007/s11207-016-0960-8



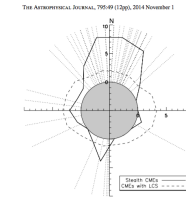
De Groof et al (2016)
ongoing work



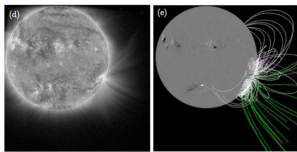
Bain et al (2014)
doi:
10.1088/0004-637X/782/1/43



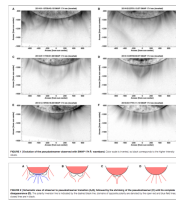
Hayes et al (2016)
doi:
10.3847/2041-8205/827/2/L30



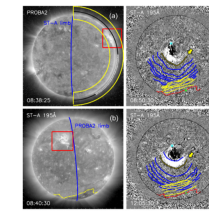
D'Huys et al (2014)
doi:10.1088/0004-637X/795/1/49



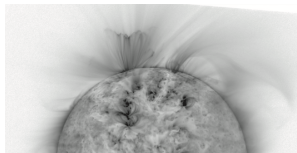
Goryaev et al (2014)
doi:
10.1088/0004-637X/781/2/100



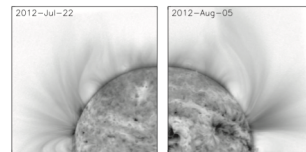
Guennou et al (2016)
doi: 10.3389/fspas.2016.00014



Kienreich et al (2013)
10.1007/s11207-012-0023-8



West et al (2016)
doi:
10.1088/2041-8205/801/1/L6



Seaton et al (2013)
10.1088/0004-637X/777/1/72

