

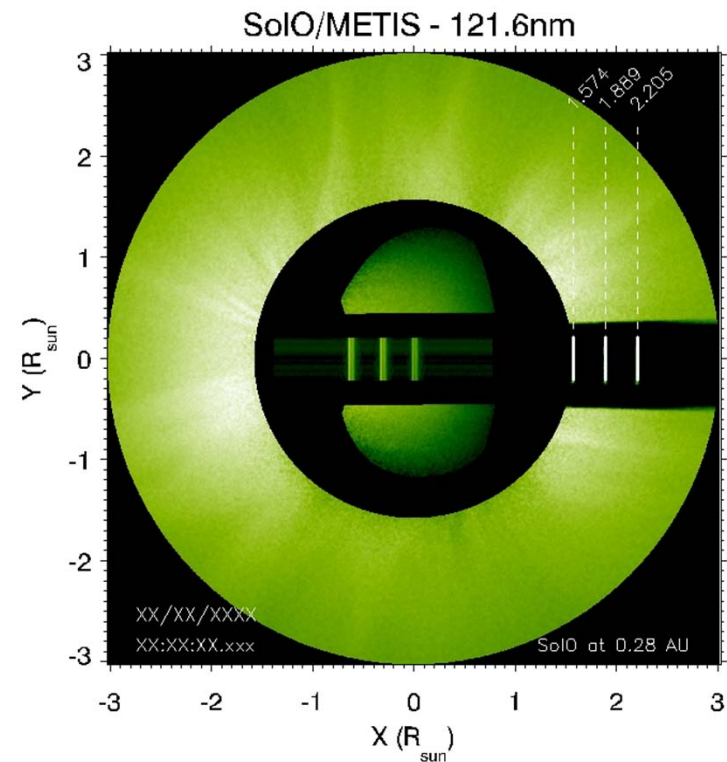
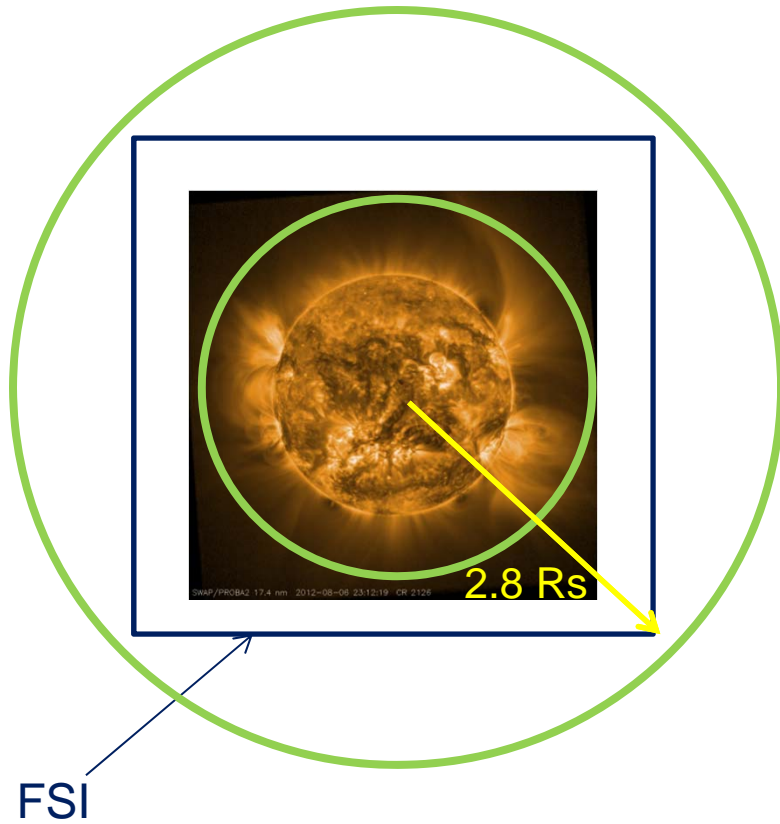
Solar Orbiter – METIS 2nd Science and technical Meeting



**EUI - SPICE joint science with METIS &
operational constraints**

**Susanna Parenti,
Royal Observatory of Belgium**

EUI & METIS at 0.28 AU



Courtesy A. Bemporad

How and where do the solar wind plasma and magnetic field originate in the corona?



What is the role of magnetic topology in controlling the wind speed?

EUI + SPICE + METIS

- On-disc small scale topology/flows maps
- Flux tubes expansion vs. abundances in the corona
- v vs. He, H abundances
- Connection with PHI & in-situ

Need to be coordinated

EUI

FSI: Maps of I in He⁺ 304 and Fe IX/X 174

- He⁺ coronagraph mode on-off

10 min-1h cad

HRI: Maps of I 174 & Ly α

- <30 sec and <15 sec cad.

SPICE

Maps of v , **N** and **T**

- Scan (2" res)

METIS

Maps of **N** (VL), v of H⁰ /VL

- 120 min cad (now ~ 1h?), 40" res.

Origin and early propagation of coronal mass ejections



What is the evolution in the inner heliosphere of the cool plasma ejected during CMes?

EUI + SPICE + METIS

- Connection to source regions with He⁺, Ly α , Ly β
- On-disk high spatial and temporal resolution context and dynamics for the off-limb expansion.
- Connection with PHI & in-situ

EUI

FSI: Maps of I in He⁺ and 174

- 0.5 - 5 min cad, 9" res

HRI: 1 – 10 sec cad

SPICE

Small and fast scan (*cadence?*)

METIS

Maps of **ne** (WL), **v** of H^{0/VI}

- < 10 min cad, 45" res.

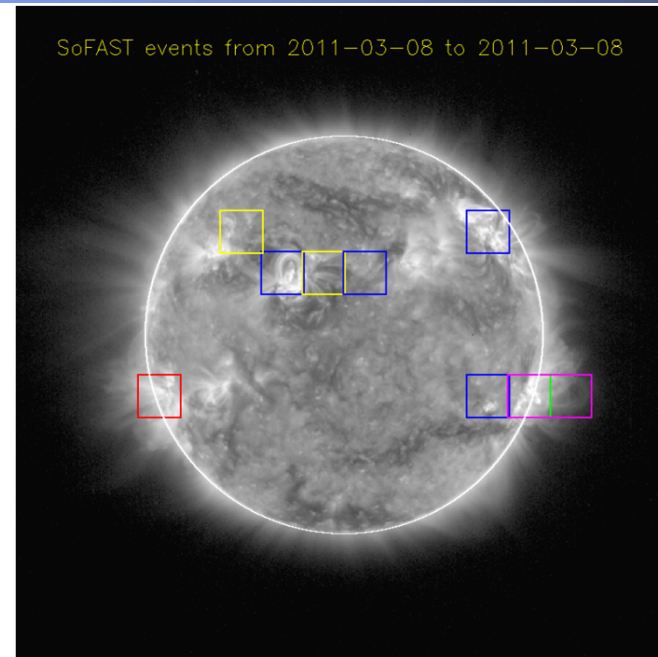
Need to be coordinated

Eruptions



- ❑ **Source regions** at high spatial resolution
 - ❑ Very difficult for EU/HRI & SPICE due to the mission profile.
 - ❑ Turn-around time of 2-3 days (off-pointing probably only once)
- ❑ **Corona:** we have data with complementary FOV, hot and cold plasma tracers.
- ❑ **Flags:**
 - ❑ EU-STIX flags used by METIS & SPICE (**TBC**) for CMEs programs.
 - ❑ METIS flag (**TBC**): if not a flag in EU-STIX, then we can recover FSI context images.
 - ❑ Priorities on flags:
 - ❑ HRI-SPICE pointing location
 - ❑ **Any request from METIS?**

SoFAST: a prototype system Solar Orbiter EUI



Katrien Bronte, ROB

**SoFAST: automated flare detection with the
PROBA2/SWAP EUV imager**
[Bonte *et al.*, 2012, SolPhys]

**A prototype system for onboard flare triggering in
Solar Orbiter EUI/FSI images**

SoFAST input

PROBA2/SWAP

- ❑ EUV full Sun images
 - ❑ 17.4 nm
 - ❑ CMOS detector, 1K x 1K
 - ❑ Cadence ~2 min

Onboard input



EUI / FSI

- ❑ EUV full Sun images
 - ❑ 17.1 nm & 30.4 nm
 - ❑ CMOS detector, 3K x 3K
 - ❑ Cadence ~2 min (science window, triggering)

SoFAST method

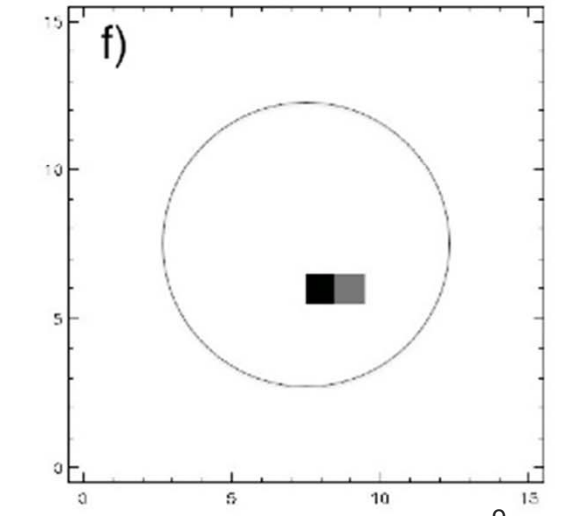
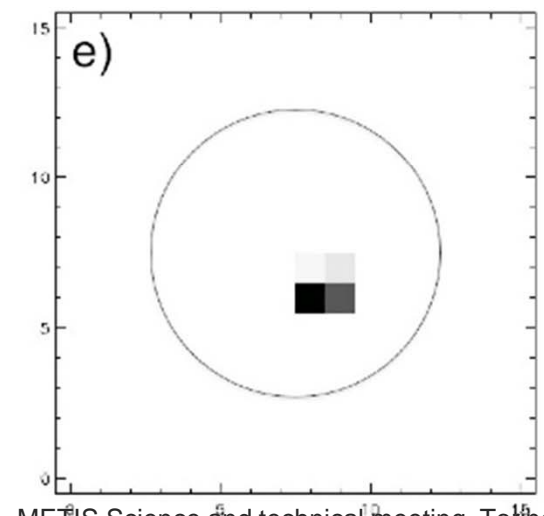
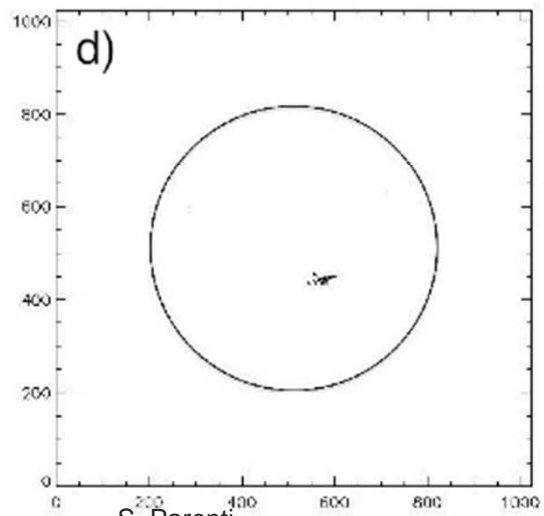
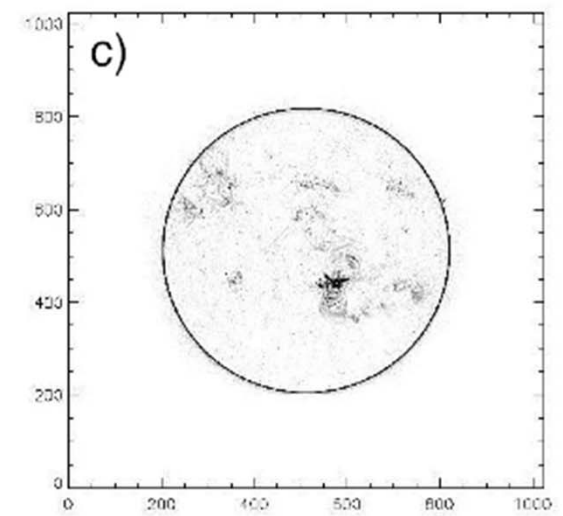
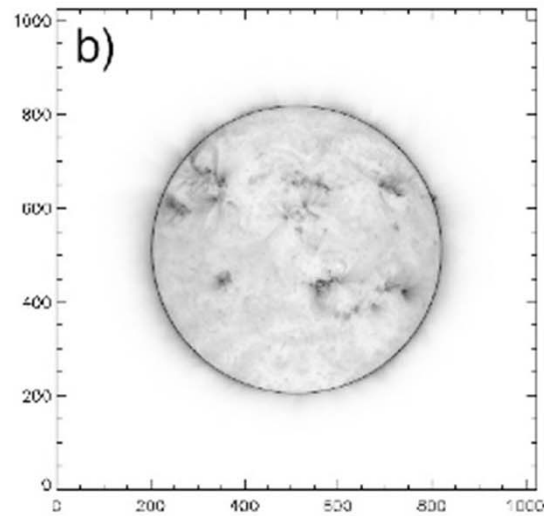
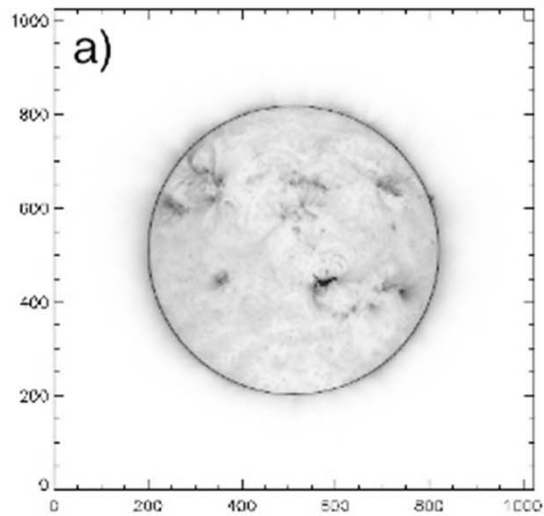
- ❑ Running-difference sequences (12min diff)
- ❑ Absolute value
- ❑ Subtracting offset
- ❑ Rebinning to 16x16 macropixels
- ❑ Thresholding to exclude false detection
- ❑ Thresholding for flare detection
- ❑ Clustering events in time and space

Onboard method



- ❑ Similar but working immediately on rebinned images: (16x16 or) 32x32 thumbnails
- ❑ No clustering in time and space. Basic way for keeping track of detection history will be foreseen instead.

SoFAST method visualized



S. Parenti

METIS Science and technical meeting, Torino, 2012

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Onboard: similar but rebinning in earlier stage (a)

Onboard response/action



- ❑ (Possible) response when an event is detected:
- ❑ Retrieve eventual priority from the detection parameters
- ❑ Send notification / main event parameters / priority to ground (to check)
- ❑ No further response at all: action in response to trigger algorithm disabled
- ❑ If enabled, copying a pattern of the corresponding (HRI) data from the 1hr queue to the s/c buffer
- ❑ If required, changing observation sequence to e.g. increase exposure time...
- ❑ If required, send priority to other instruments

Points of discussion (splinter)



- ❑ Need efforts on the modeling coordination
 - ❑ Connectivity and operations planning.
- ❑ S/C – instruments communication:
 - ❑ Triggers priorities
 - ❑ S/C pointing
- ❑ Need 1 person of reference for the SOOPs

Remote sensing instruments plan: **SOOP**



Science: What are the sources of the slow solar wind?

- Decide the instrument leader
- Flags priority, repointing options/priority, telemetry redistribution,

Instrument	target	channel	Cadence (s)	Exp (s)	Resolution (")	Duration (min)	# per orbit	TM (Gbits)	Instrument Leader
EUI	CH/str. /AR boundaries	F174	600	10	9	60	15	29.7	
		F304	600	3	9				
		H174	10	3	1				
		HLya	5	1	1				
SPICE									
METIS		CoVL	7200	120	40				
		CoLya	7200	600					
STIX									

