

# Coronal and Interplanetary Structures associated with type III bursts

M. Pick, F. Auchère, A. Kerdraon, A. Bouteille, G. Stenborg

Stereo Science Workshop, April 21-22, 2008-Meudon

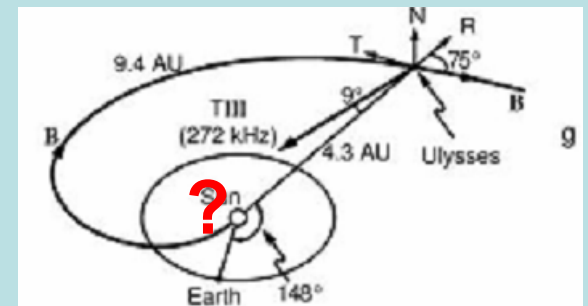
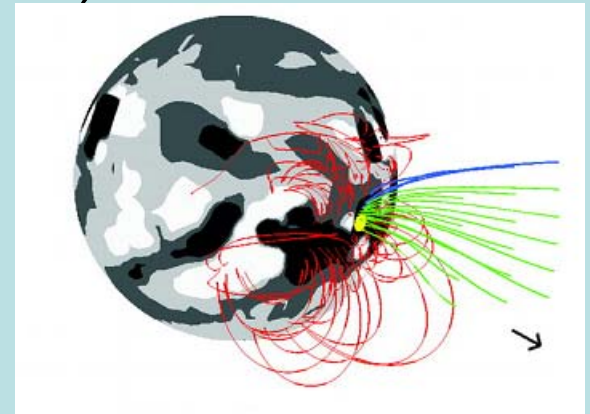
# Context

➤ NRH Type III burst sources resolved in components (cadence  $\leq 1$ s) located along diverging B field lines anchored in active regions (Raoult & Pick, 1980)

➤ SMM: Identification of diverging coronal structures (WL) barely detected (Trottet et al., 1982)

➤ Magnetic field extrapolation (Y. M. Wang et al., 2006; Pick et al., 2007)  
Link with electron events

➤ Ulysses: Narrow channels sites of type III electrons, Langmuir waves (Buttighoffer et al., 1995)

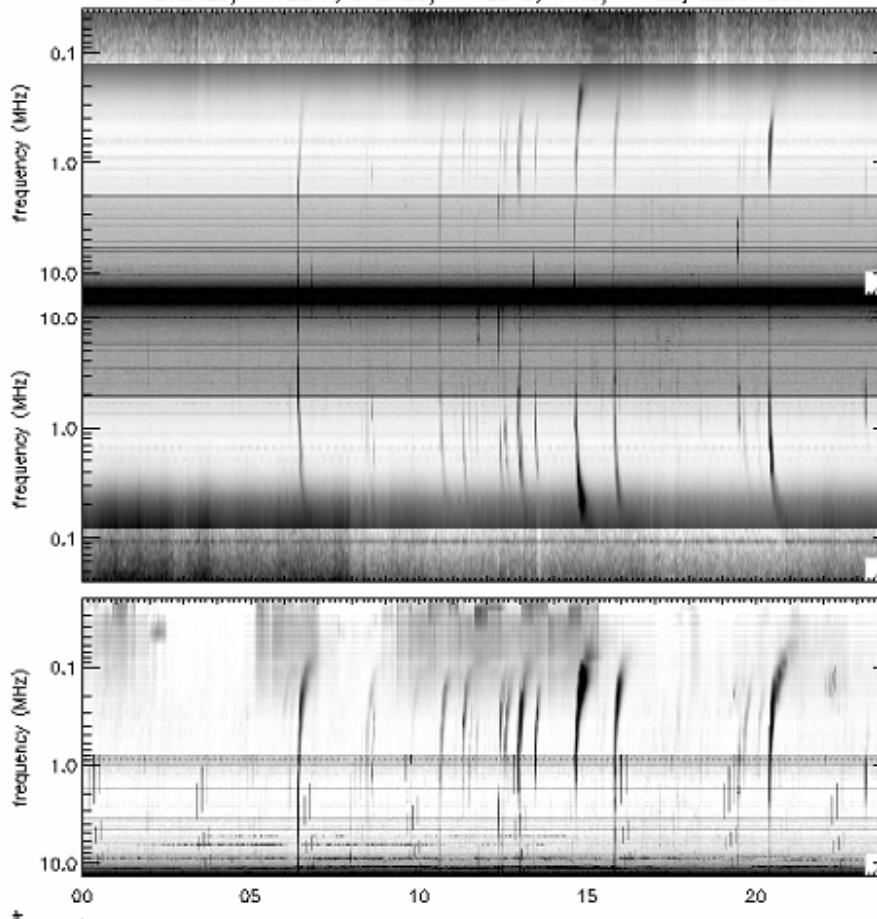


# First steps

- Identify in the corona the structures associated with type III burst sources
- Link with the high corona
  - Stereo A and B
  - EUVI high cadence
  - Complete spatial coverage from low corona to IP medium

# STEREO/WAVES A and B, WIND/WAVES

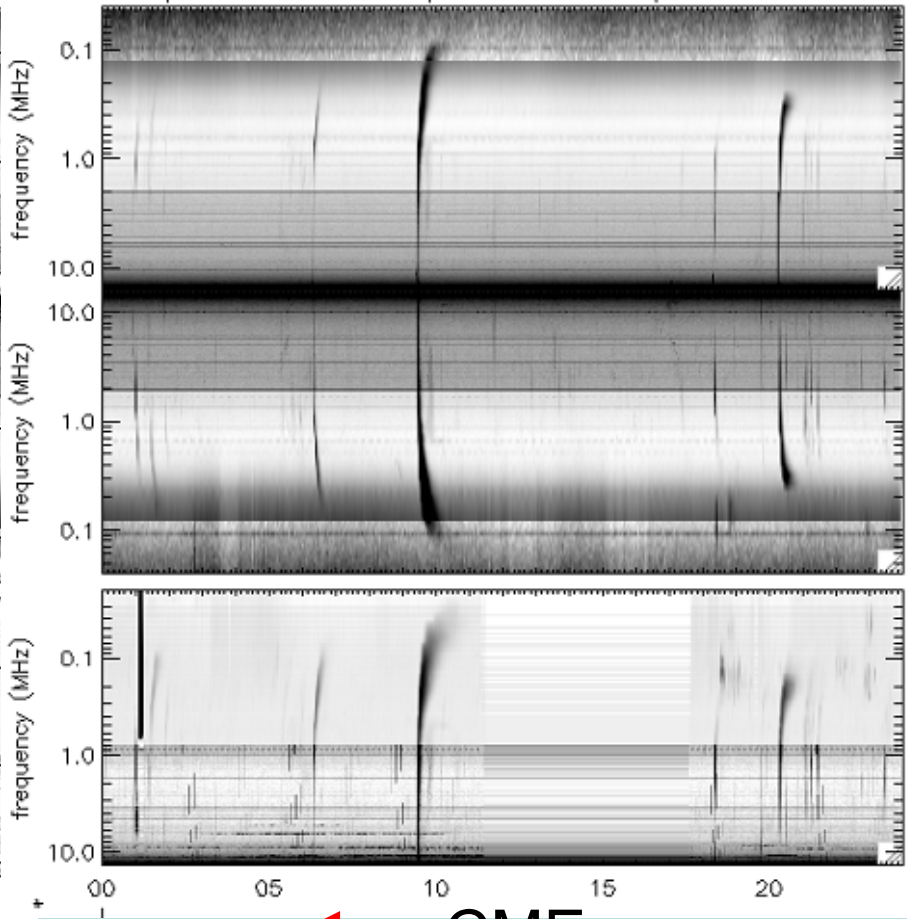
STEREO/WAVES A, STEREO/WAVES B, WIND/WAVES, 02JUN2007



2007 June 02

Quiet on June 01

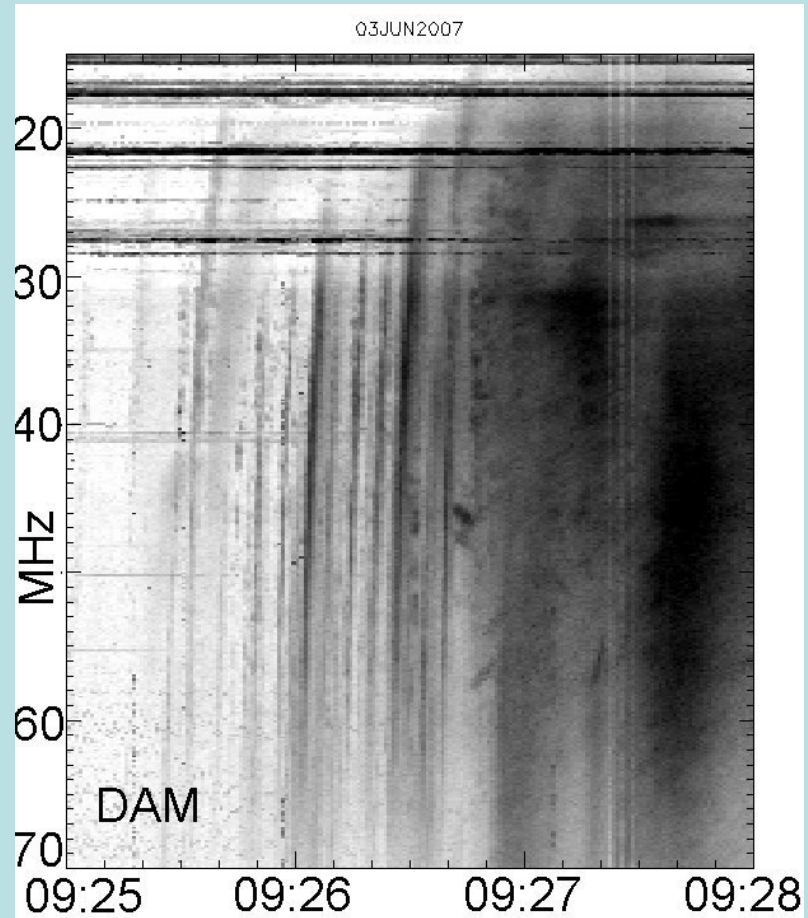
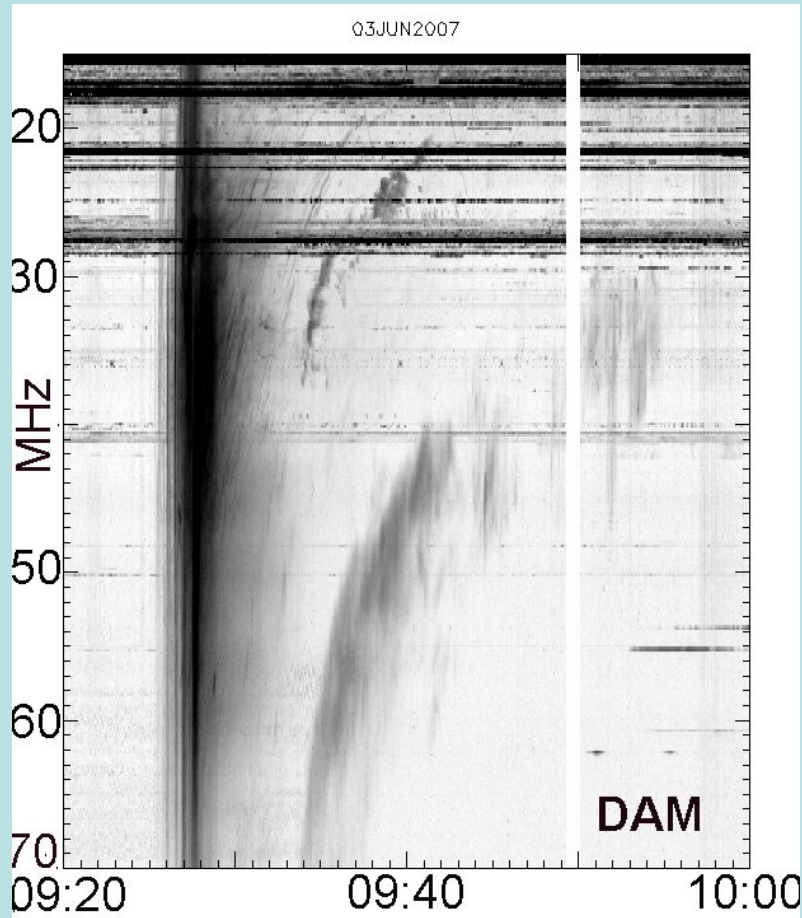
STEREO/WAVES A, STEREO/WAVES B, WIND/WAVES, 03JUN2007



← CME

2007 June 03

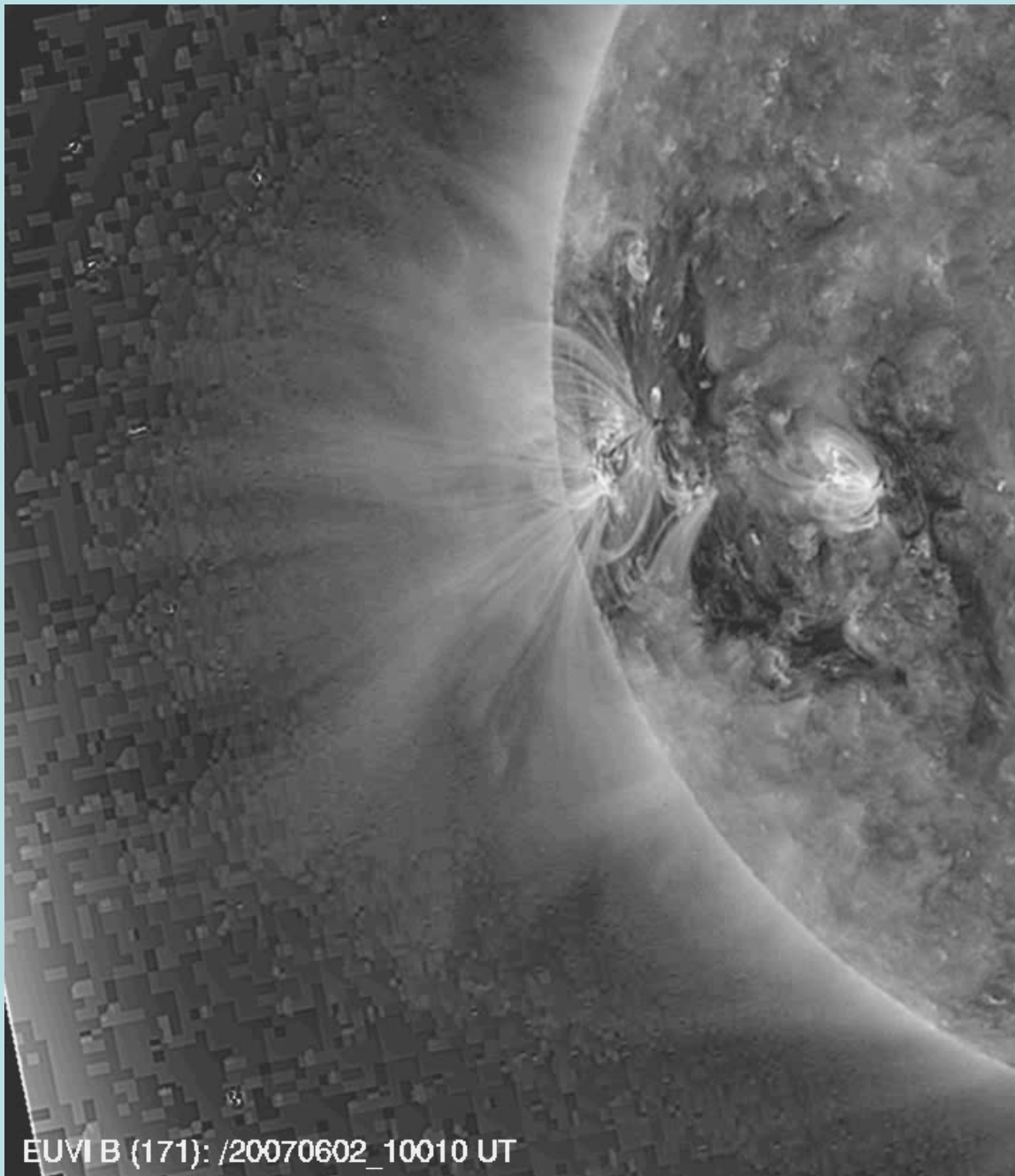
2007 June 03



Also HF



~09:27

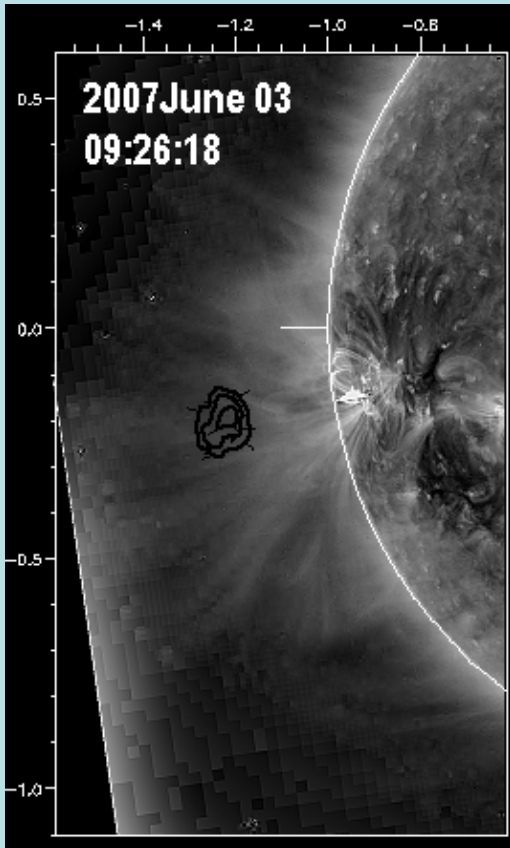


2007 June 02  
EUVI 171Å  
Stereo B

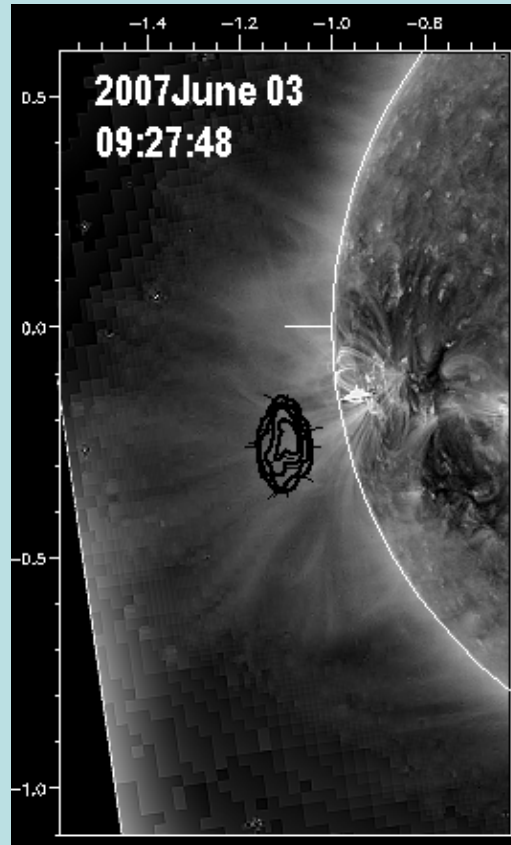
Separation  
A-B 11 deg  
B/Earth 4deg  
A/Earth 7deg

Wavelet processing  
G. Stenborg

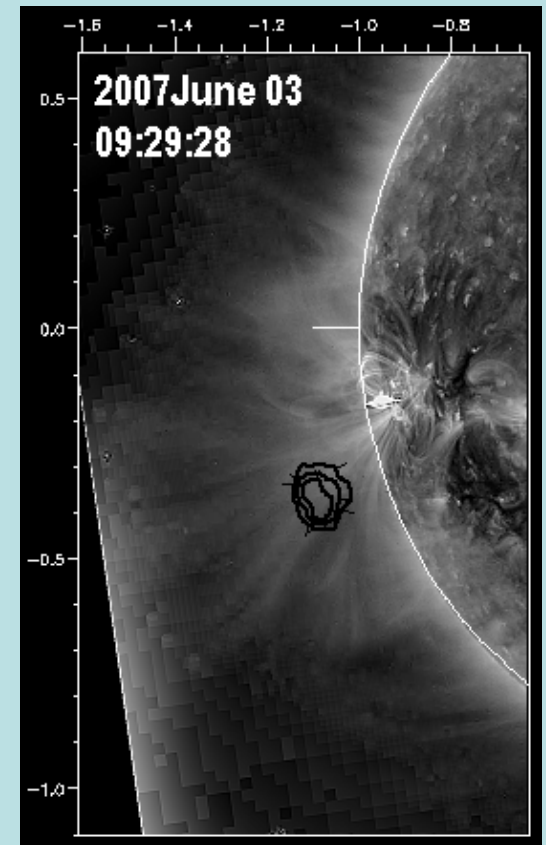
# 2007 June 03 A-EUVI 171 Å and NRH 150 MHz



<09:27



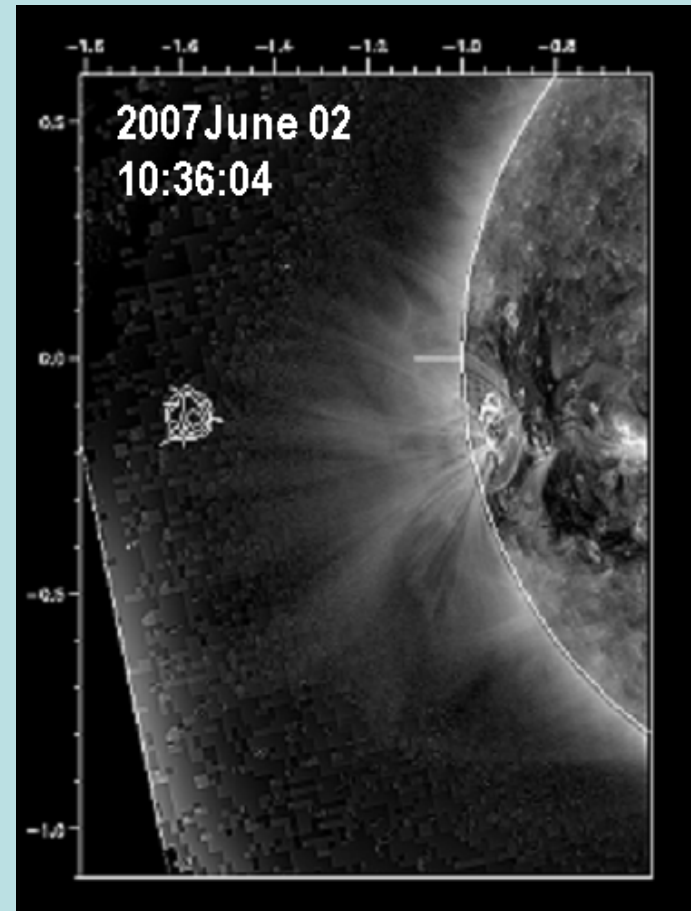
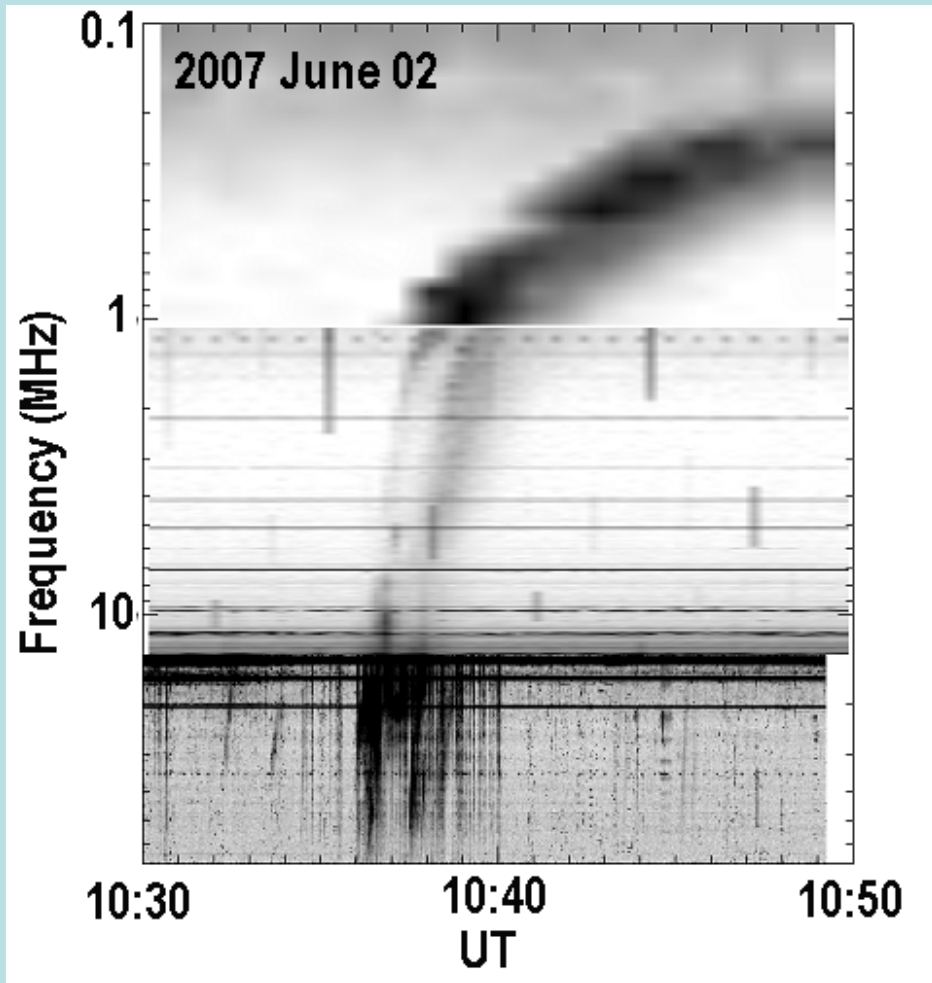
~ 09:27:35-09:28



~09:28:00-09:29:50

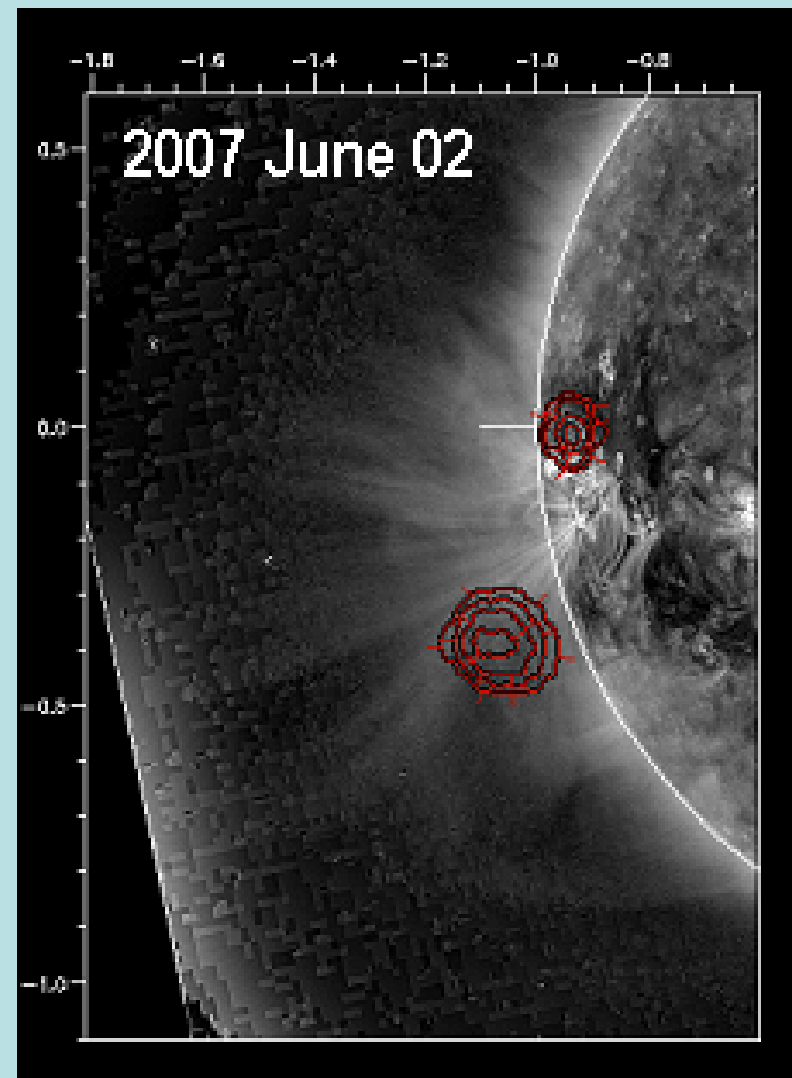
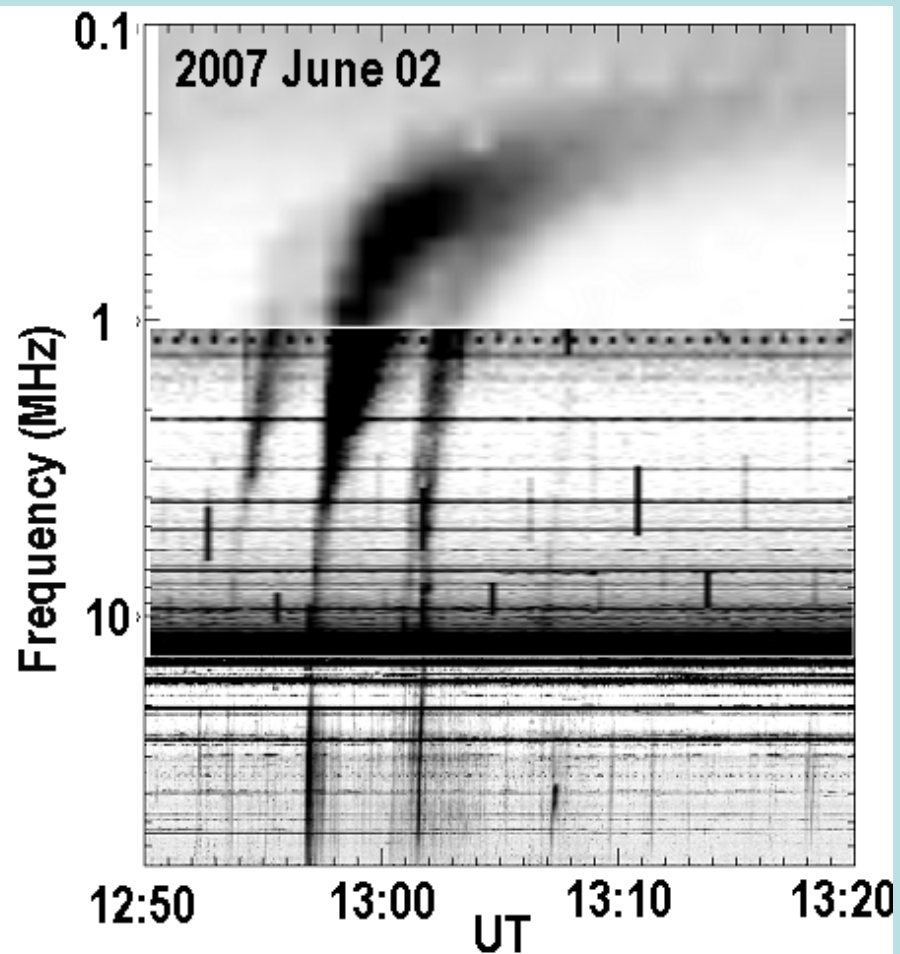
Separation A and B 11 deg  
B/Earth 4deg A/Earth 7deg

2007 June 02



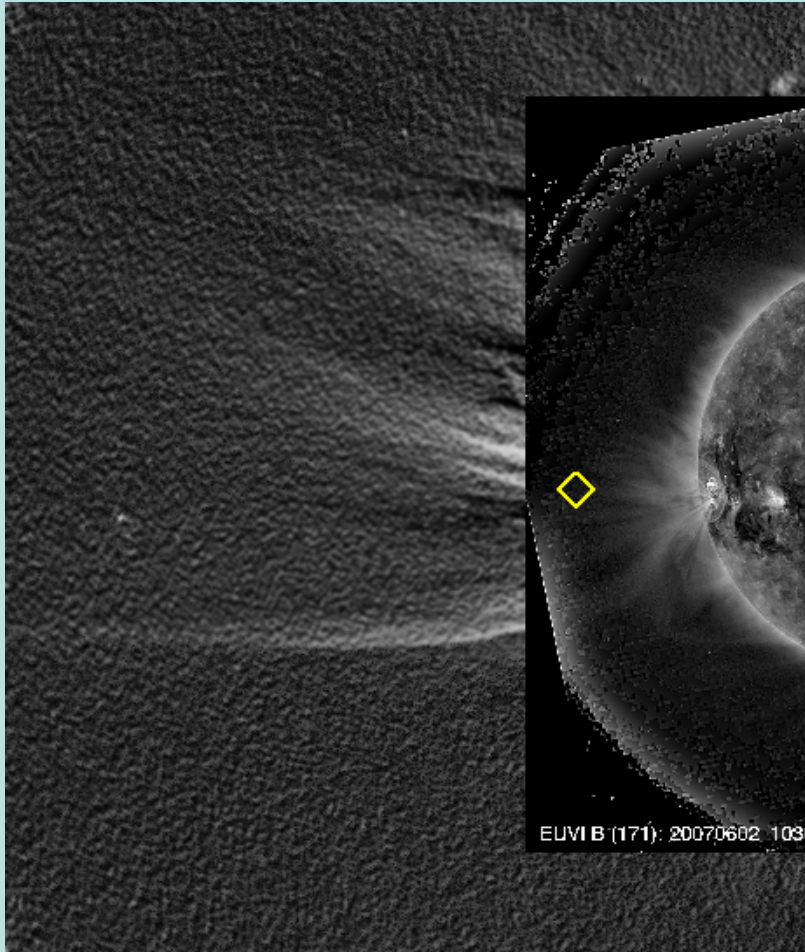


2007 June 02



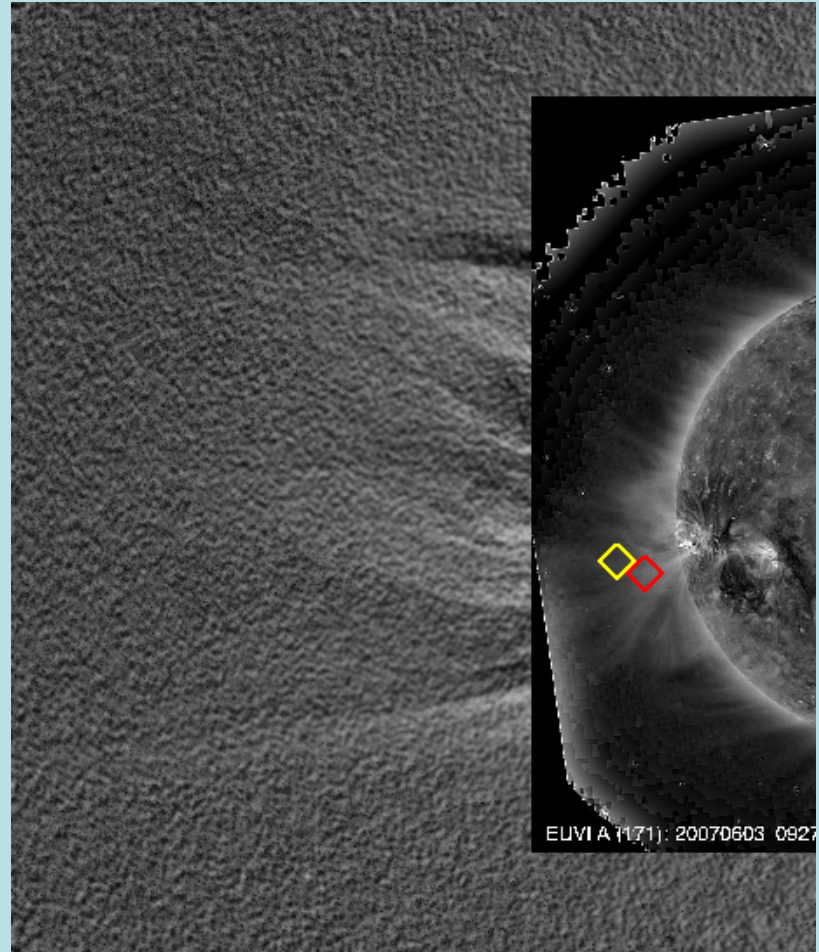
# 2007 June 02 and 03 Comparison

2007 June 02



Stereo B

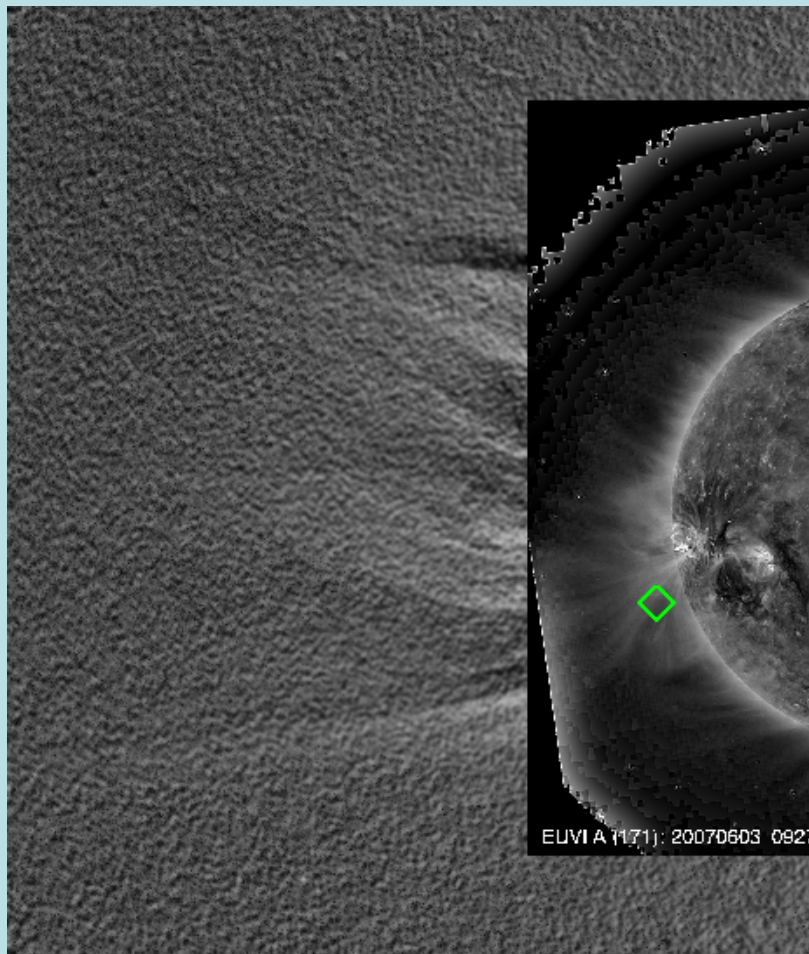
2007 June 03



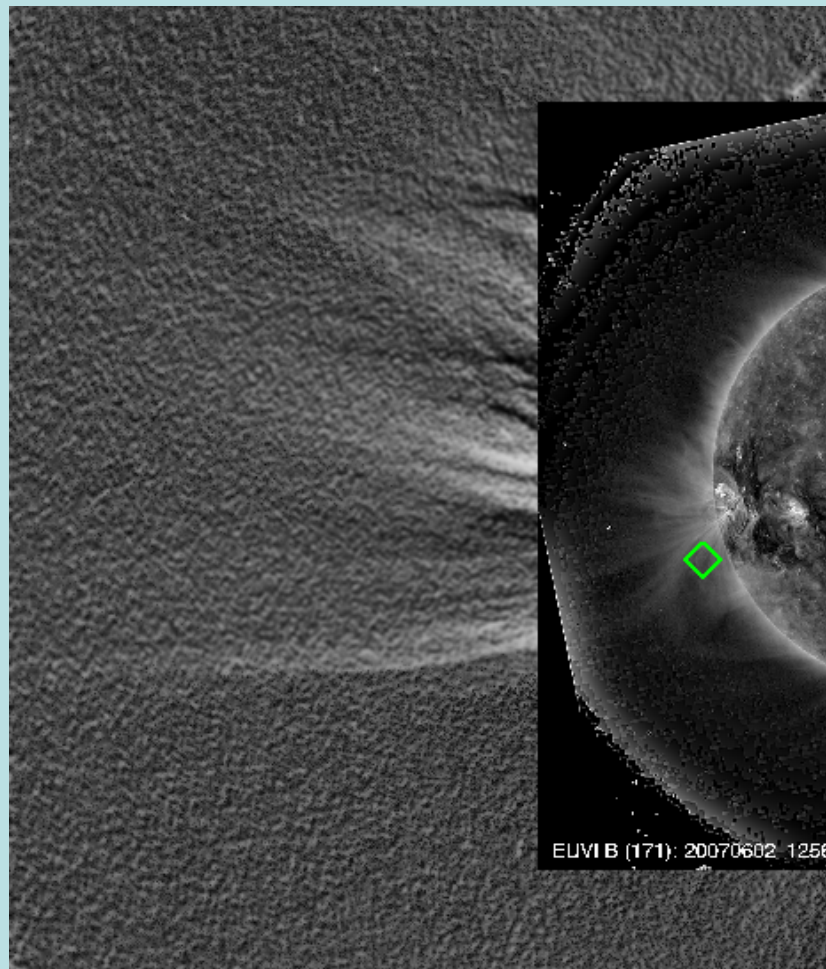
Stereo A

COR1 Wavelet transform

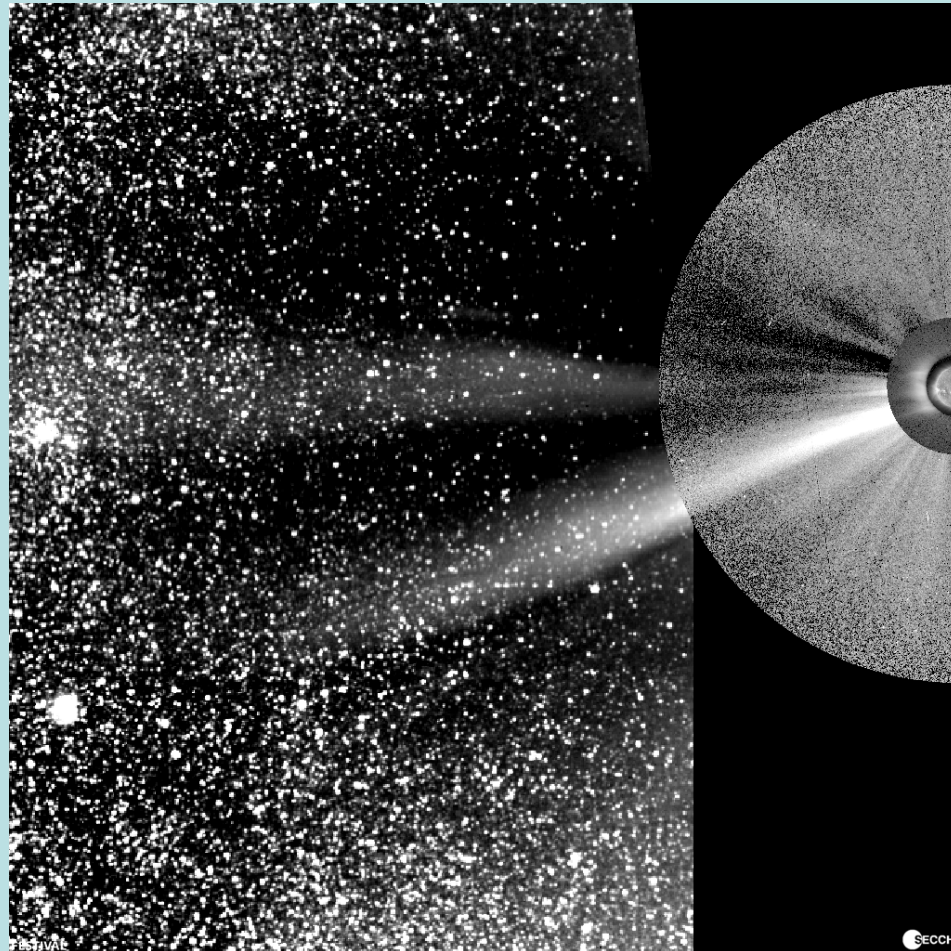
Stereo B 2007 June 2



Stereo A 2007 June 3



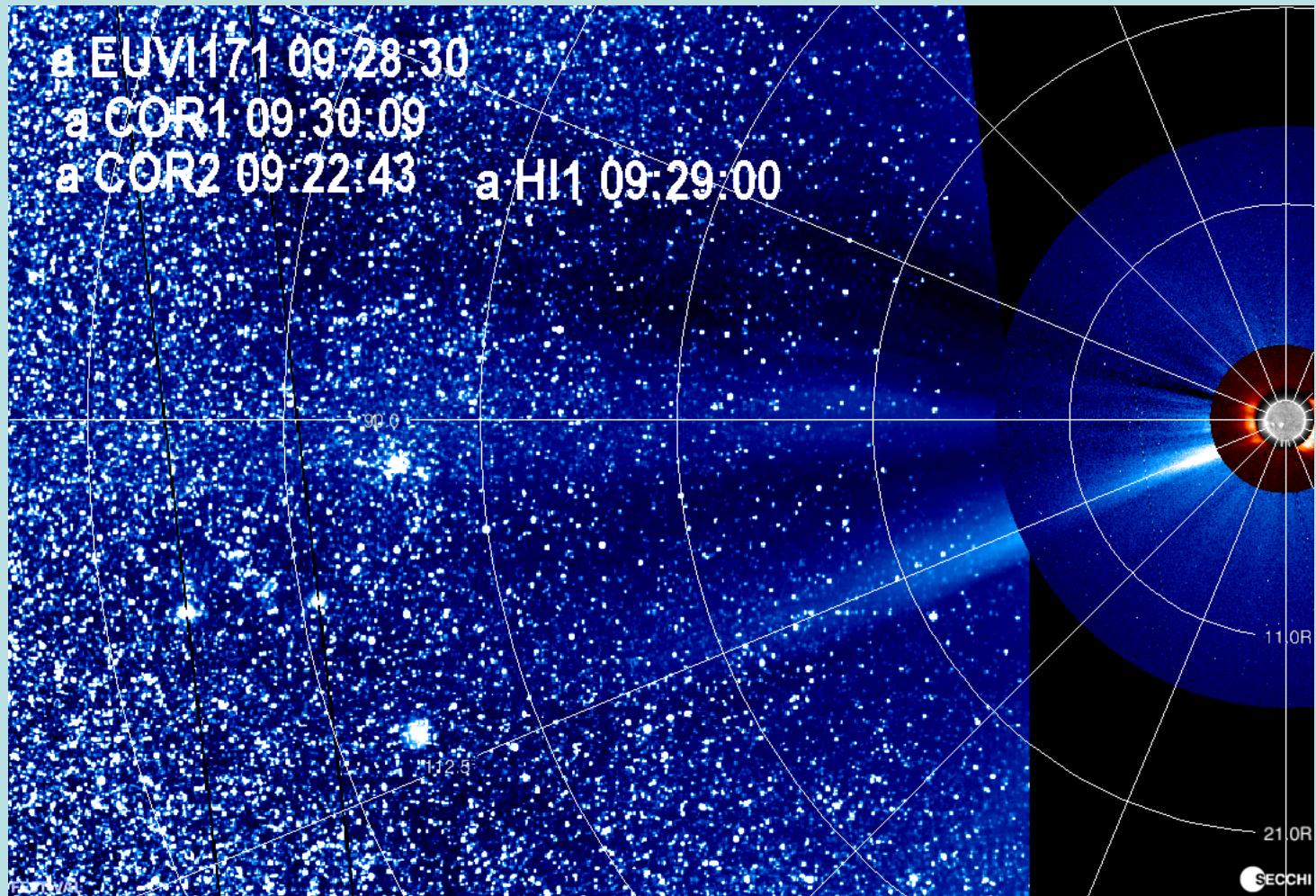
# 2007 June 3 Stereo A



ESA/VLT

SECCHI

# 2007 June 3 Stereo A

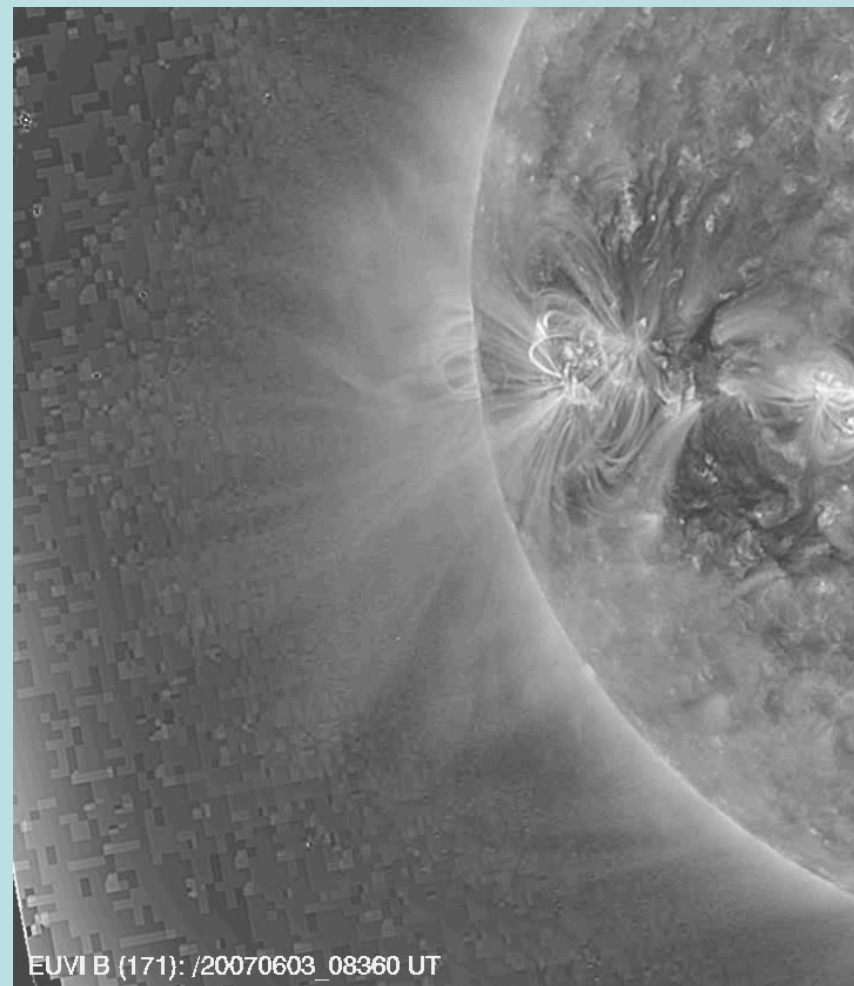
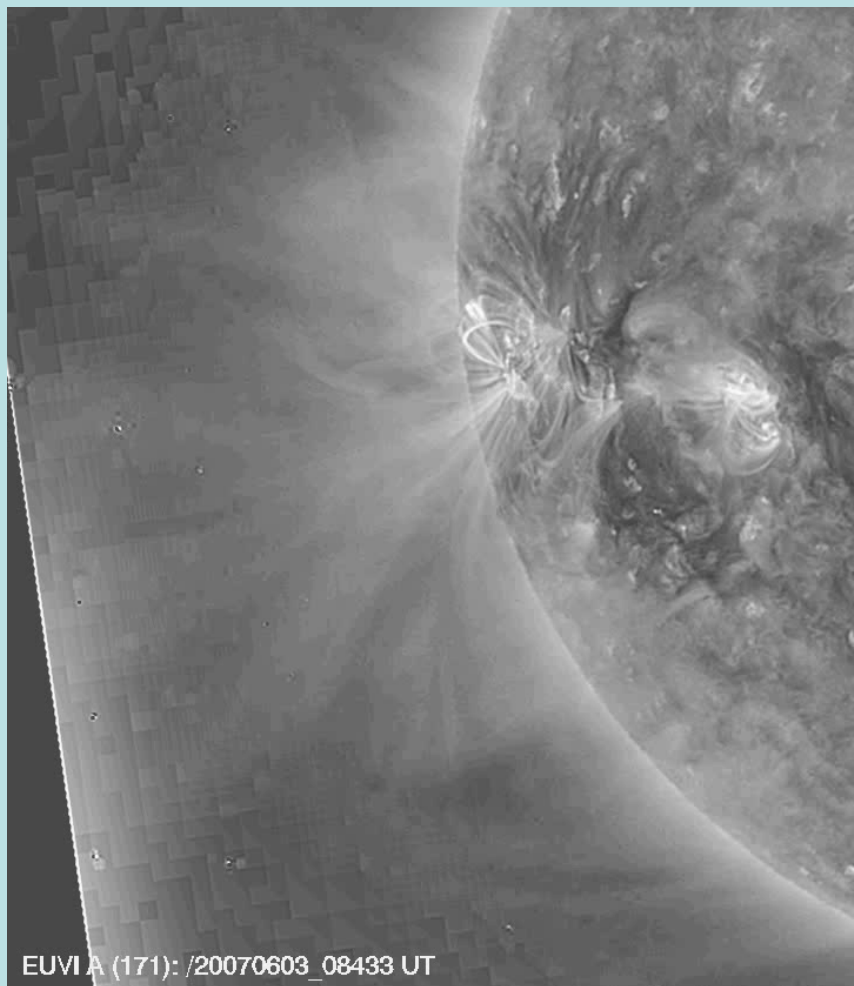


# Summary and next steps

- Association between type III sources and coronal structures
  - Identification on EUVI-COR1-COR2-H1
  - Widely separated structures in H1
- Physical parameters, density structure
- 3D geometry (often non radial)
- Locate IP type III bursts (direction finding)
- Association with impulsive electron events; complementary tools of B field extrapolation



# 2007 June 03 Stereo A and B EUVI 171Å



A

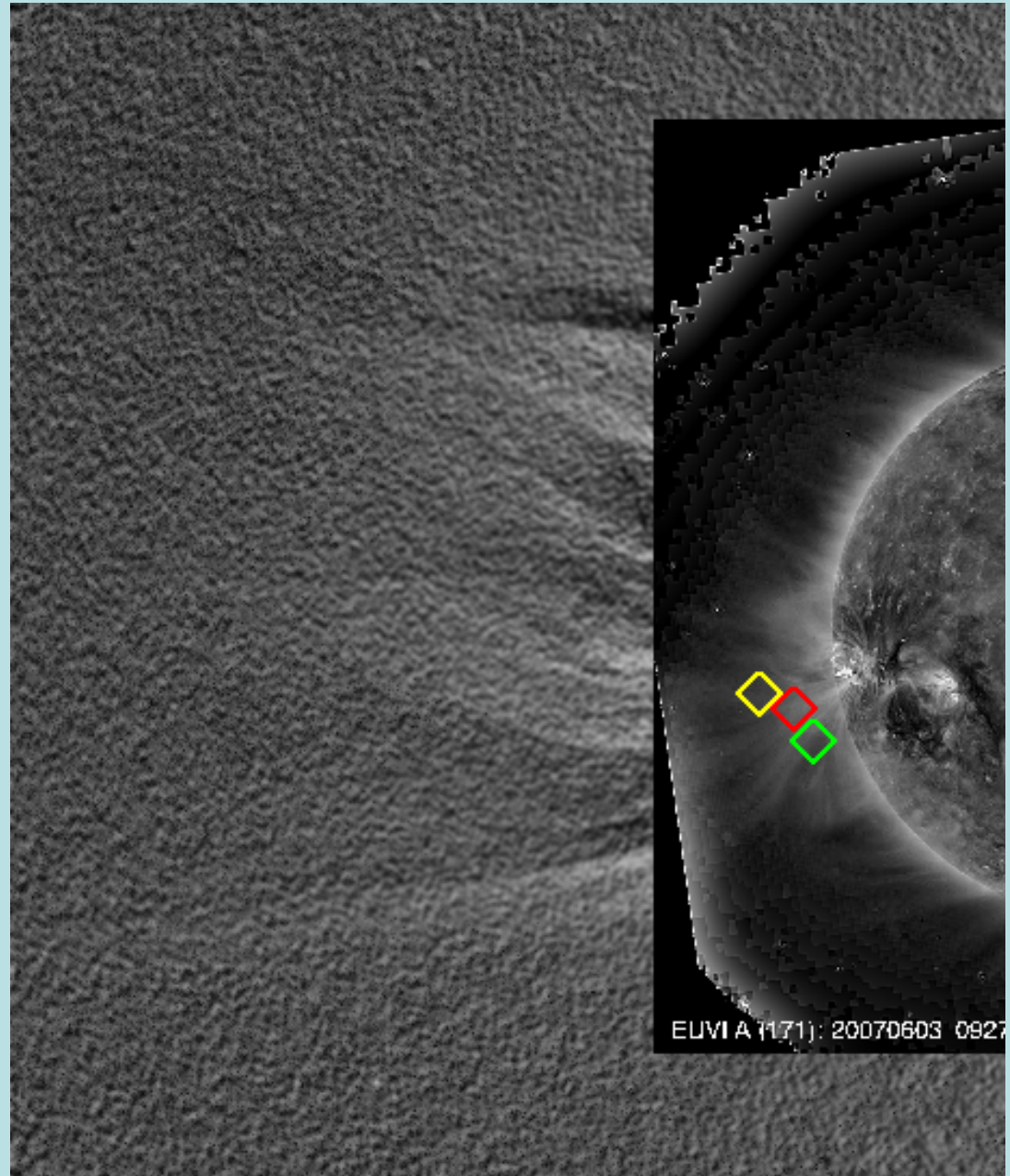
B

Separation A et B 11 deg  
B/Earth 4deg A/Earth 7deg

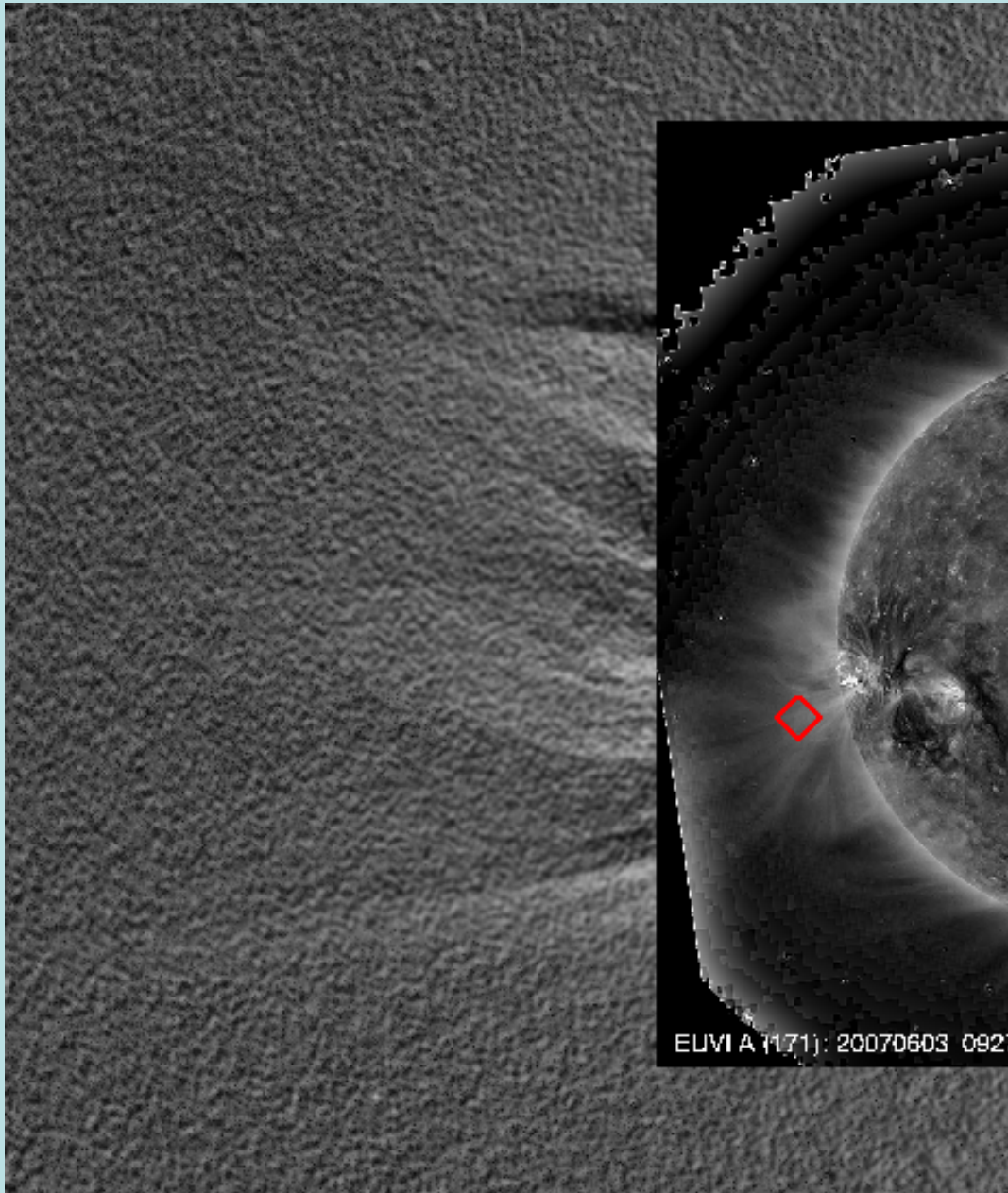


2007 June 03 A - EUVI 171 Å , NRH 150 MHz and COR1

COR1  
Wavelet transform  
G. Stenborg

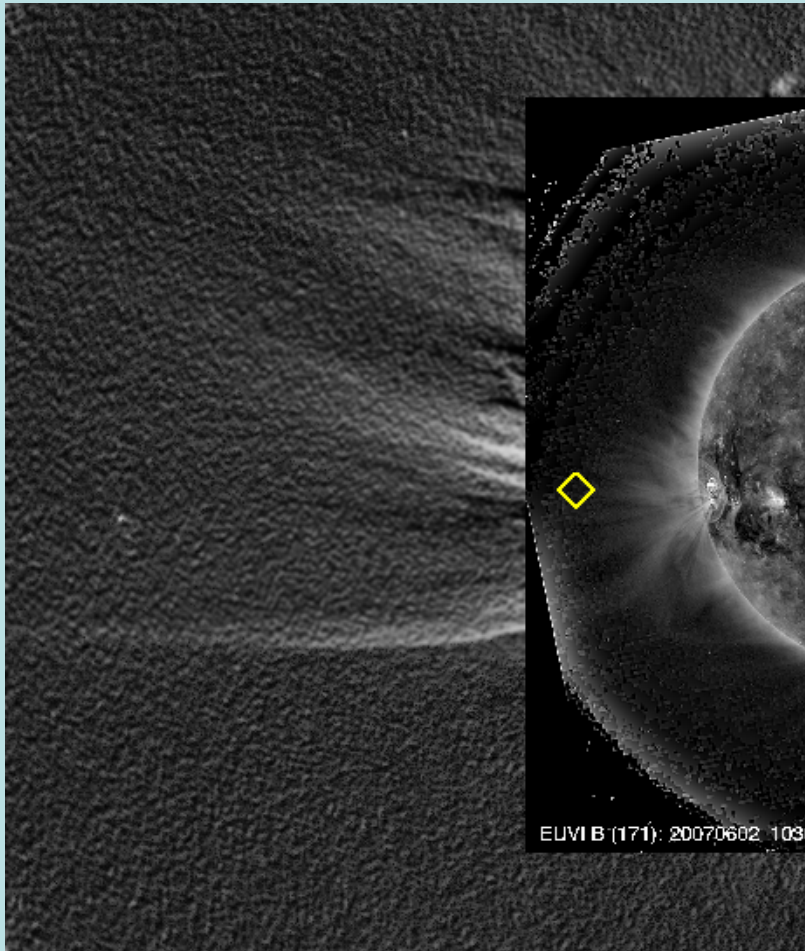






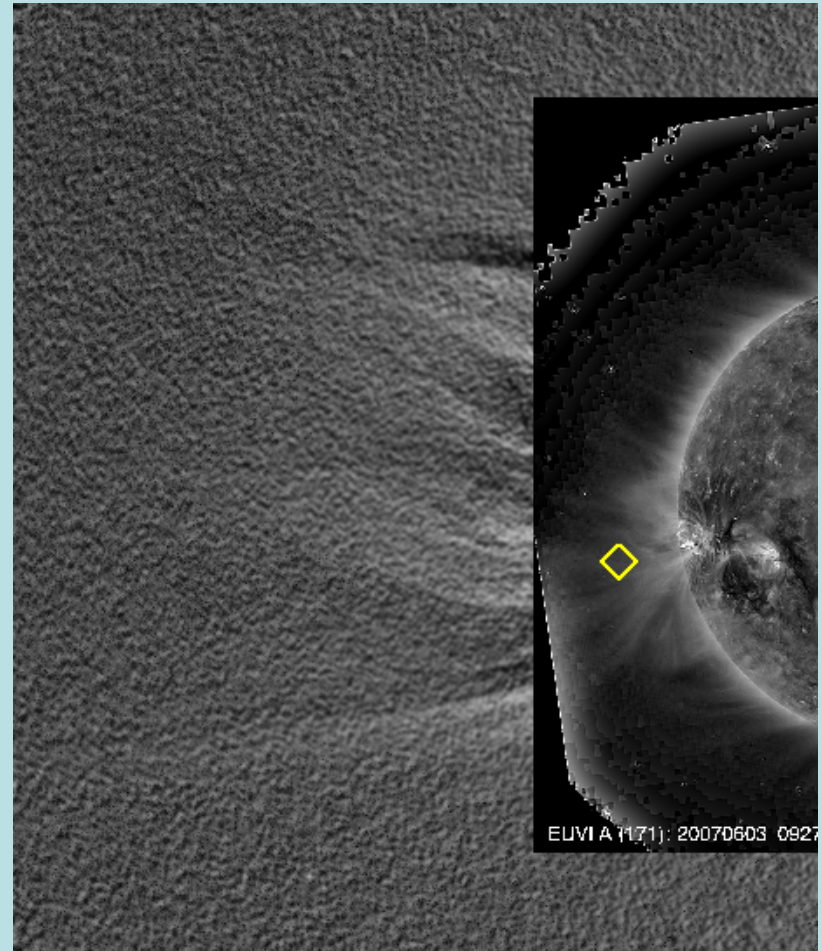
# 2007 June 02 and 03 Comparison

02 June 07



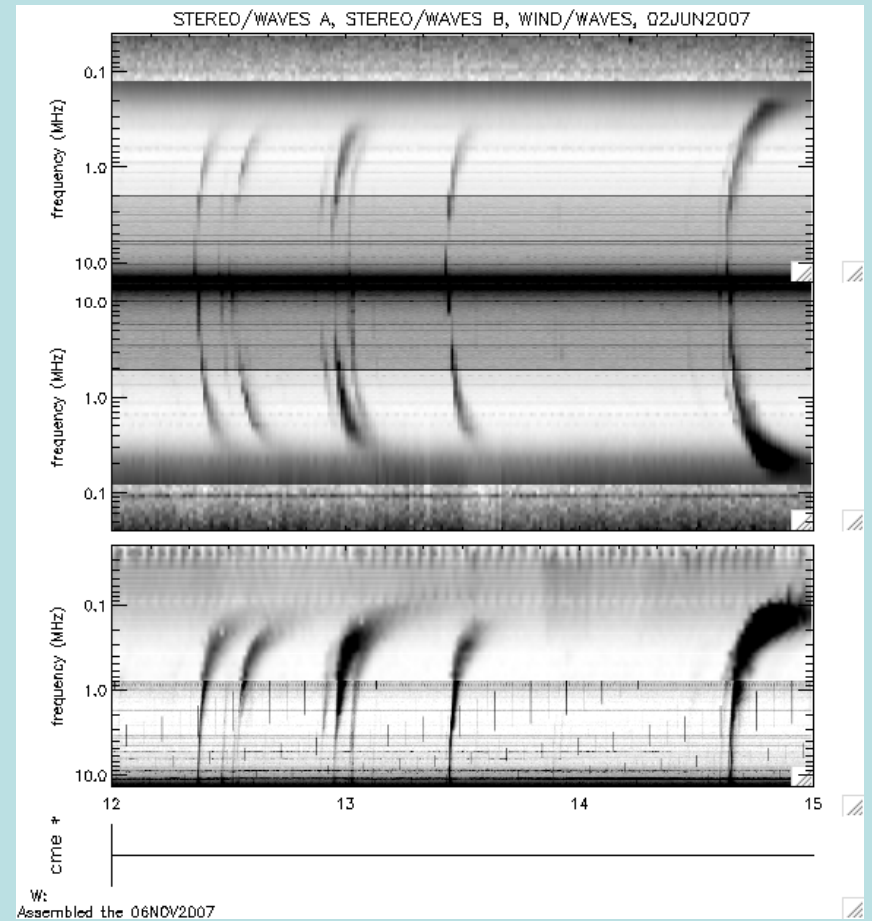
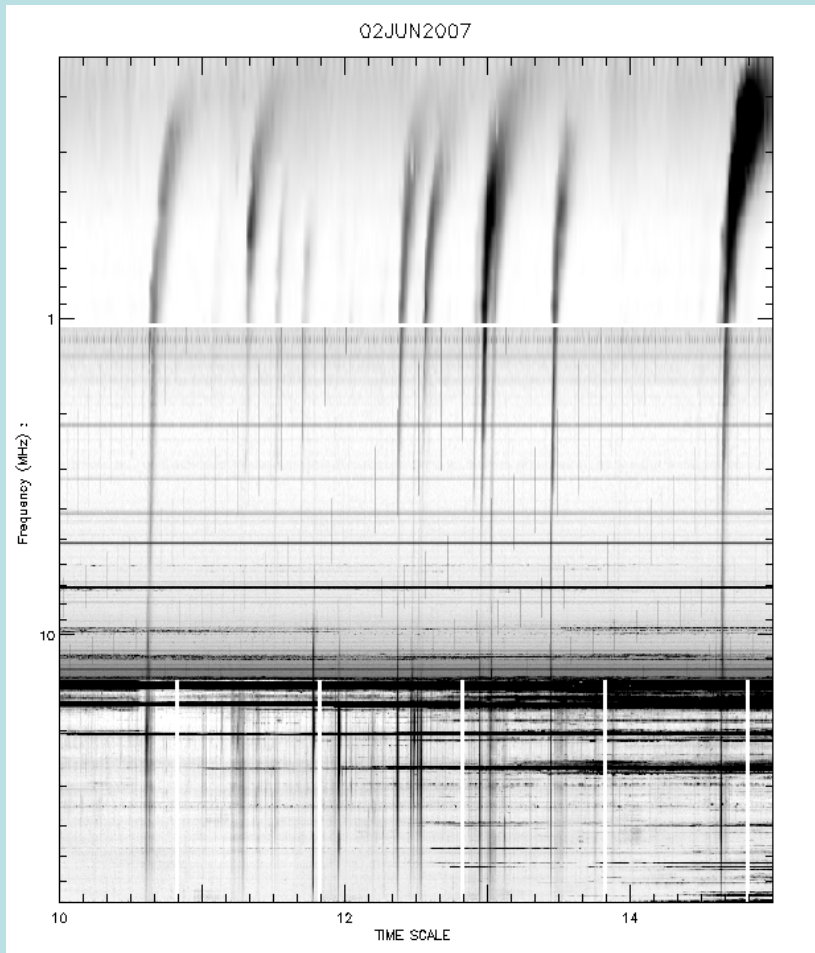
Stereo B

03 June 07

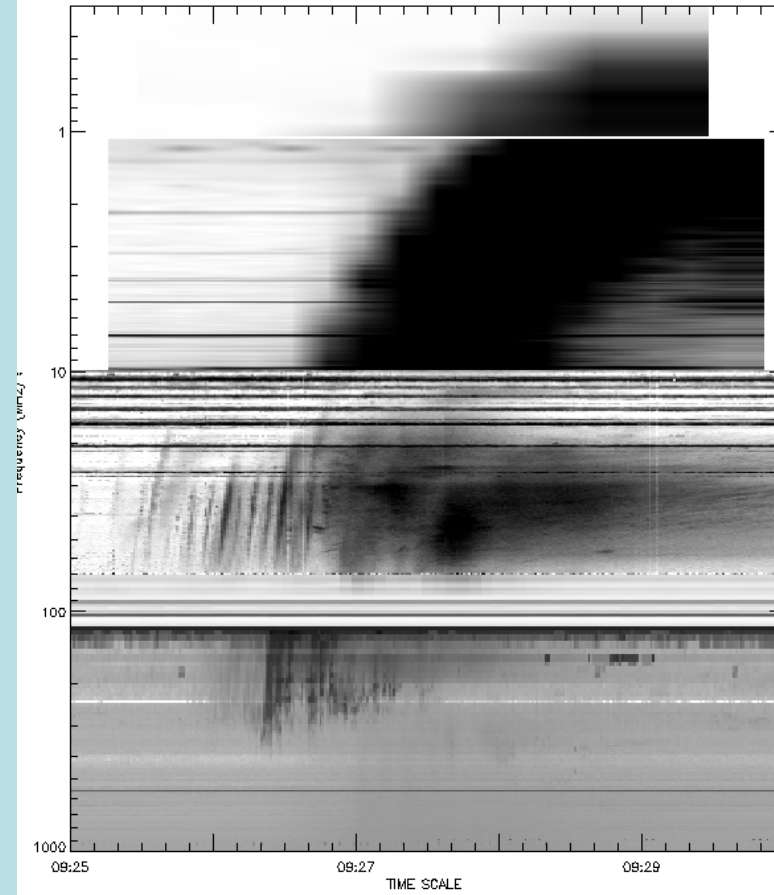


Stereo A

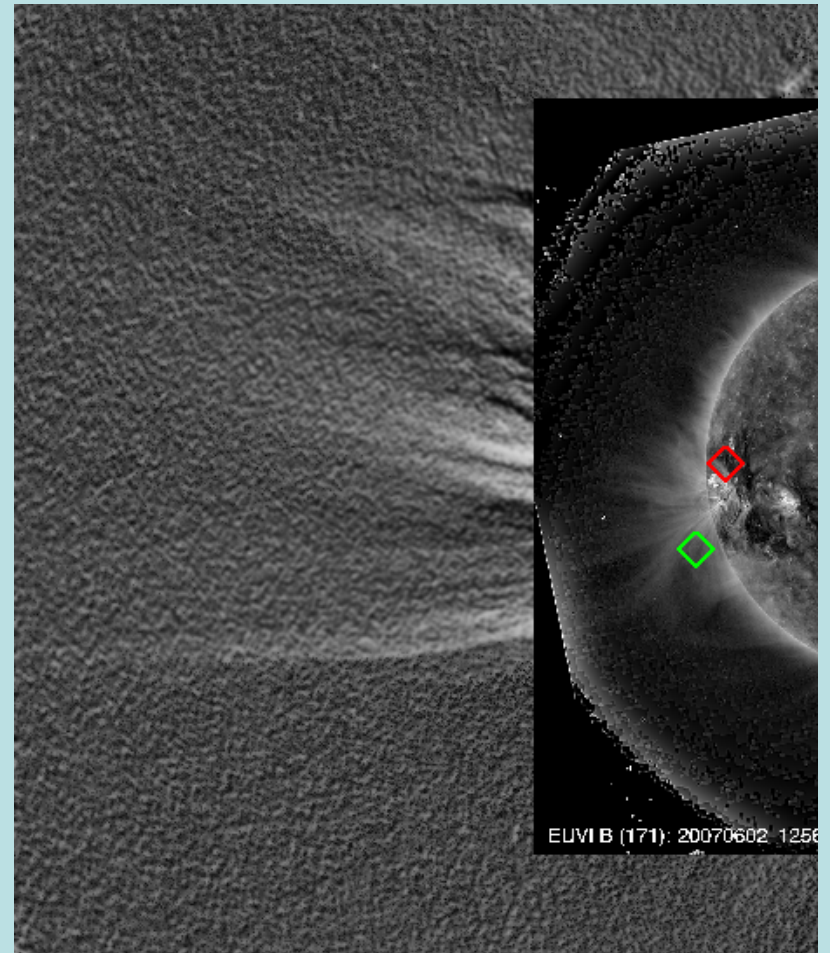
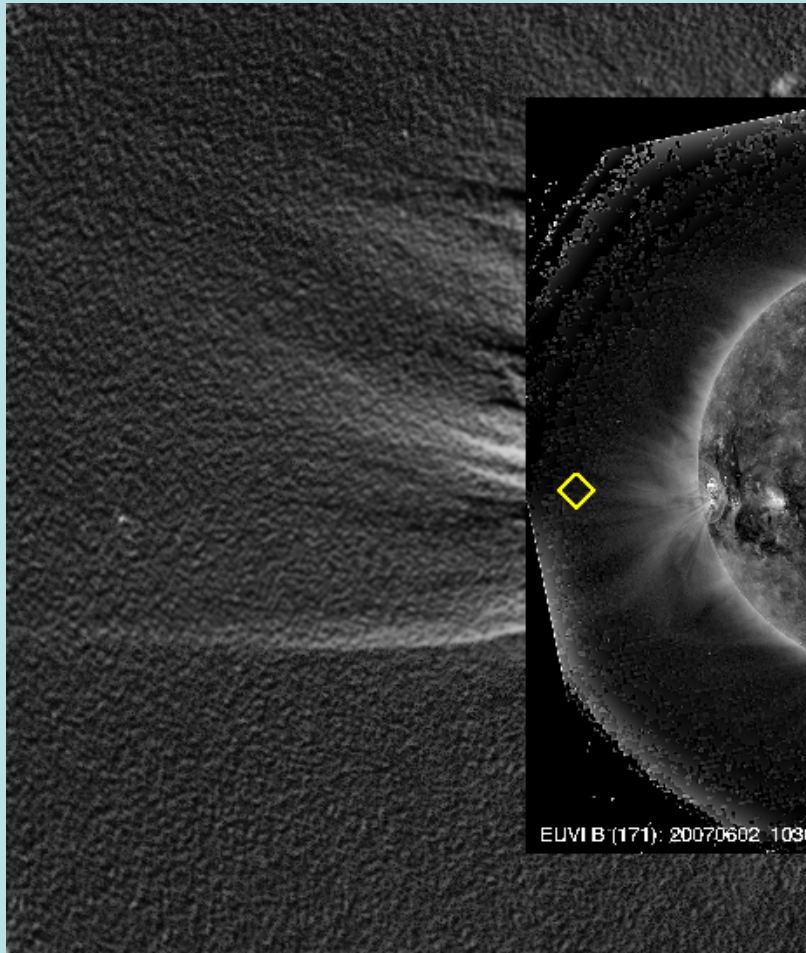
# 02 JUNE 2007



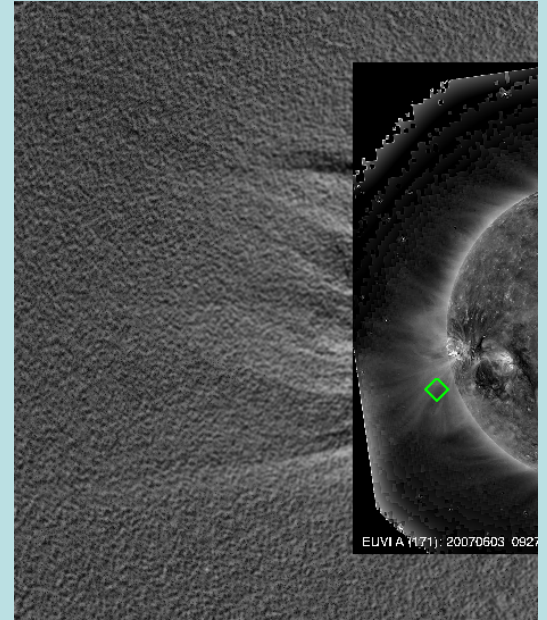
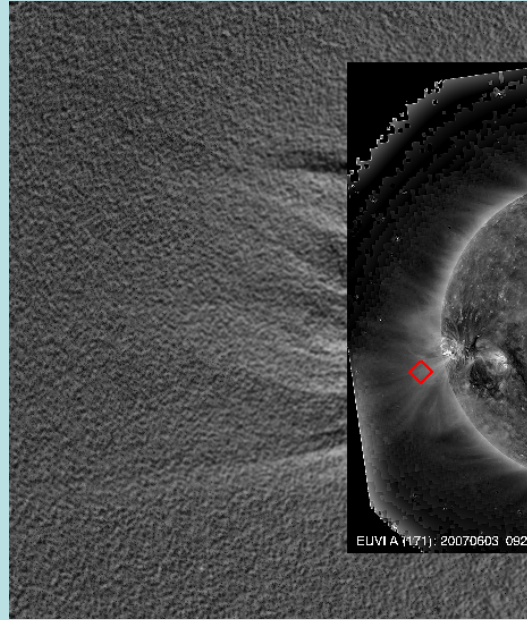
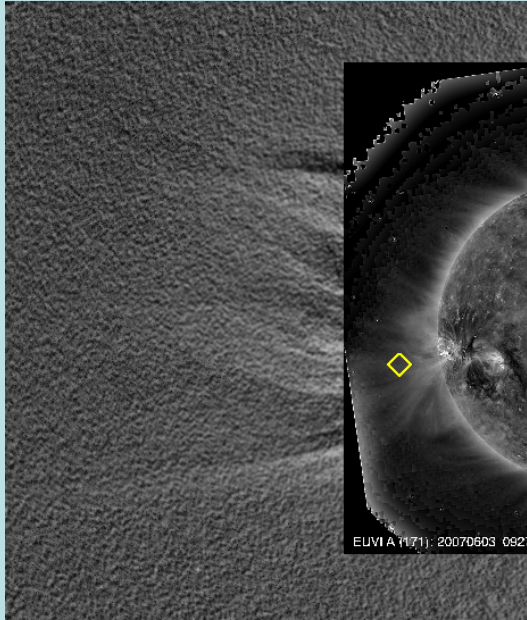
03JUN2007 : WAVES + DAM + ARTEMIS + PHOENIX



# June 02

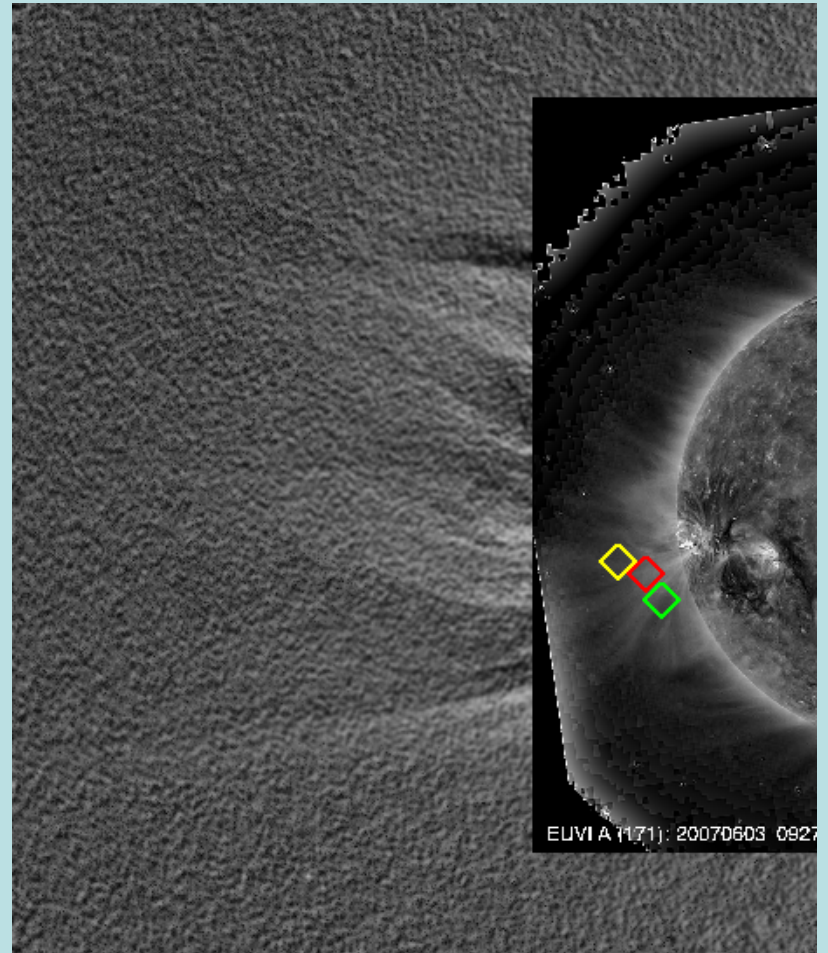
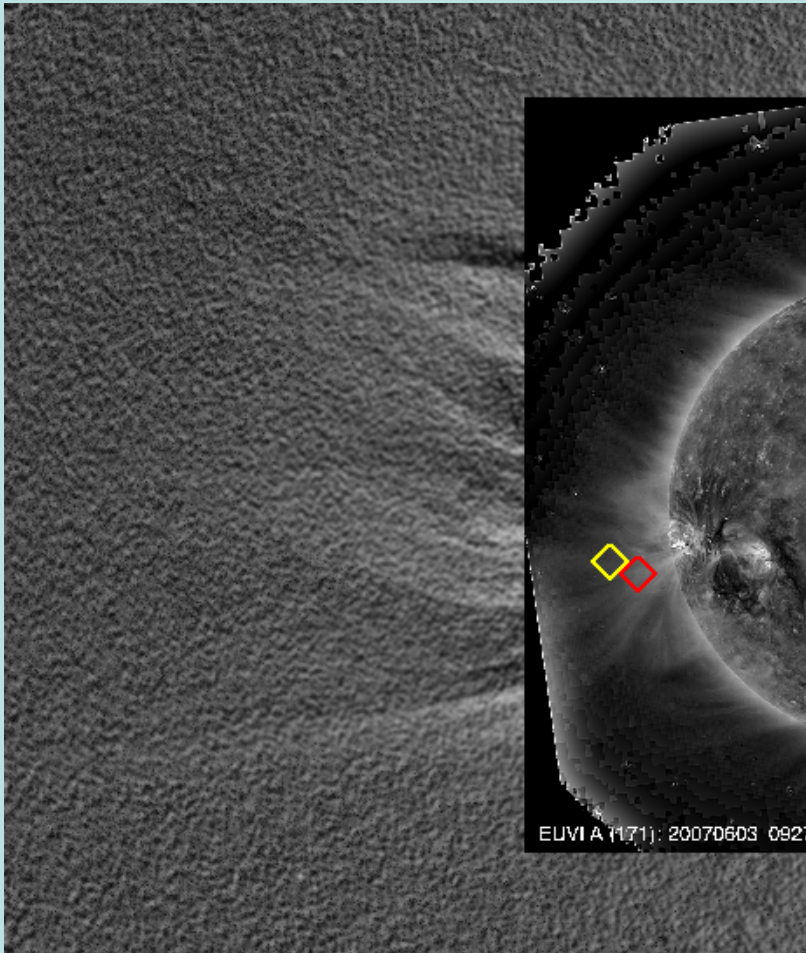


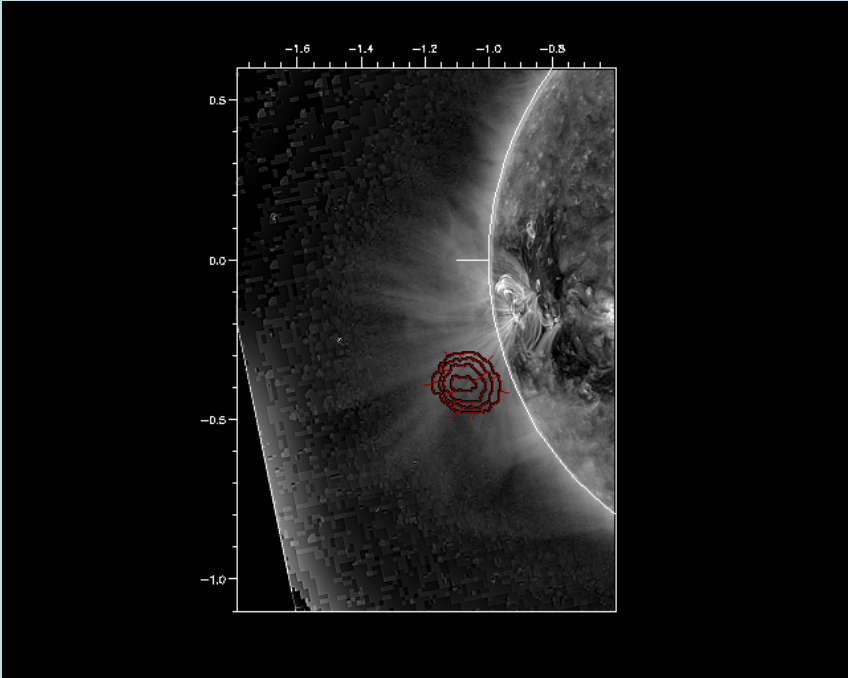
# 03 june



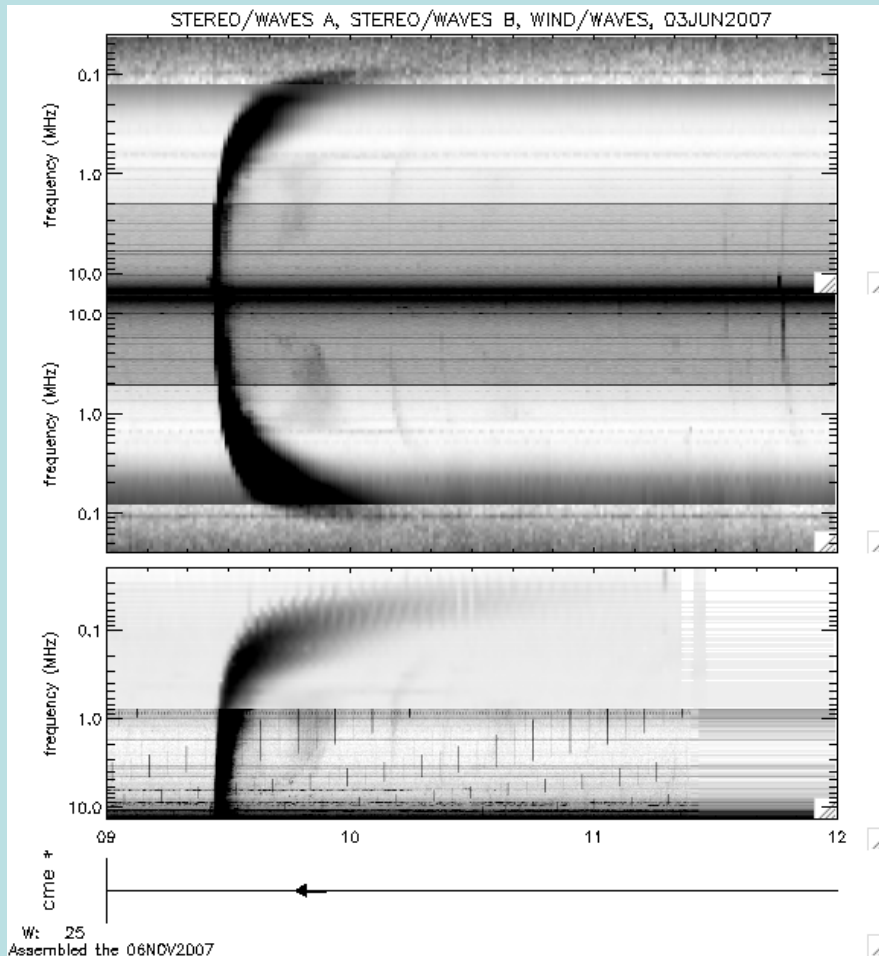


03 june07





# SWAVES and WAVES



Zoom 3 heures

Séparation a et b 11 deg  
b/terre 4deg a/terre 7deg

<http://Secchirh.obspm.fr>

SOHO C2 12:54:04-C3 12:42:04  
NRH 12:56:49

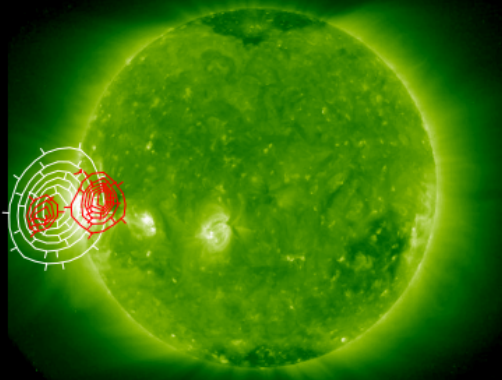
FESTIVAL

SOHO C2 13:06:04-C3 12:42:44  
NRH 13:01:26

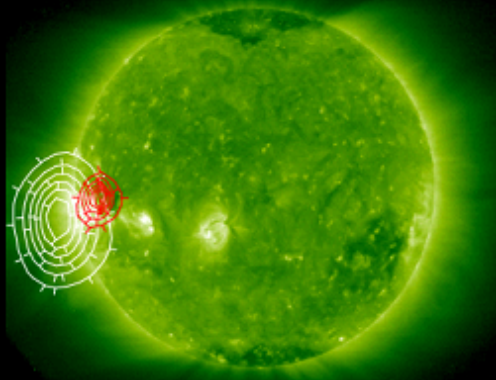
SOHO C2 13:06:04-C3 12:42:04  
NRH 13:07:03

FESTIVAL

150-450 MHz 092645  
A-EUVI 092530



150-432 MHz 092735  
A-EUVI 092530



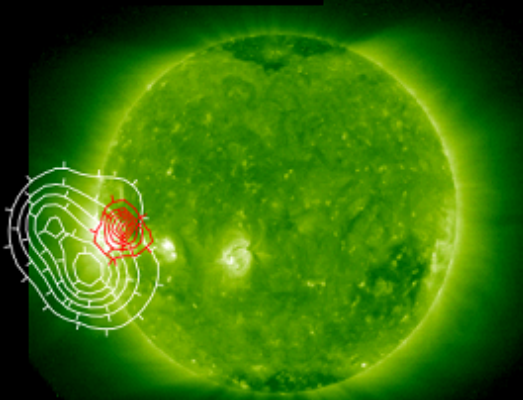
03 Juin 2007

# SWB Browser

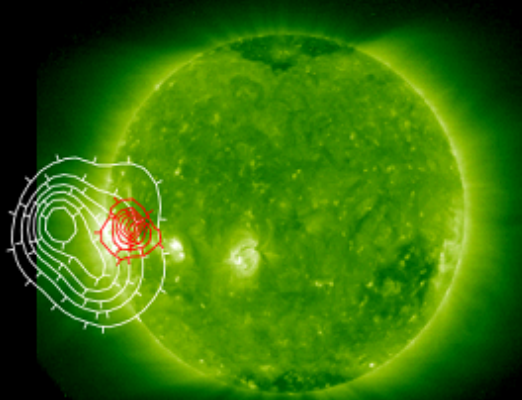
09:26:45

09:27:35

150 432 MHz  
A EUVI 09:25:30

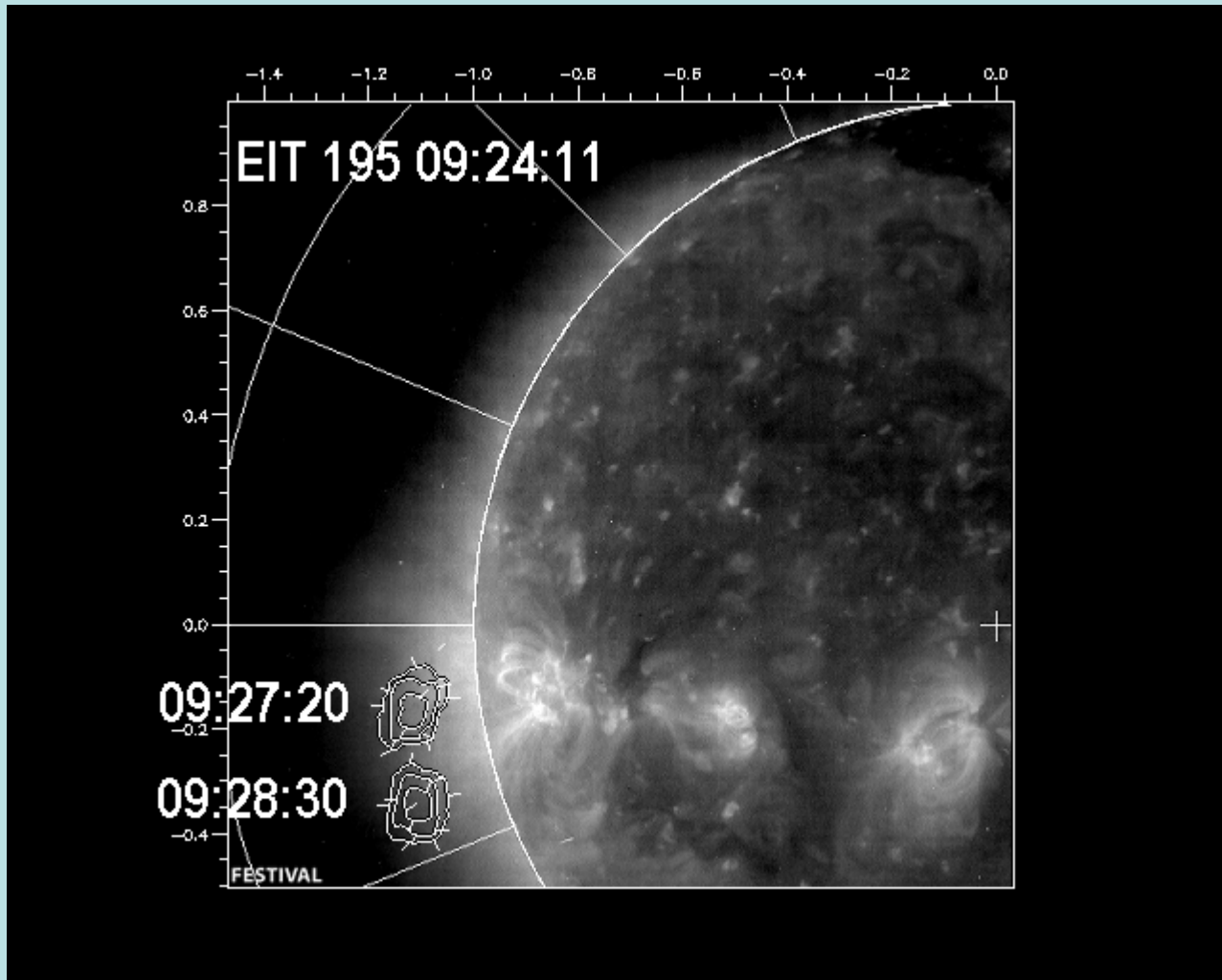


150 432 MHz  
A EUVI 09:25:30

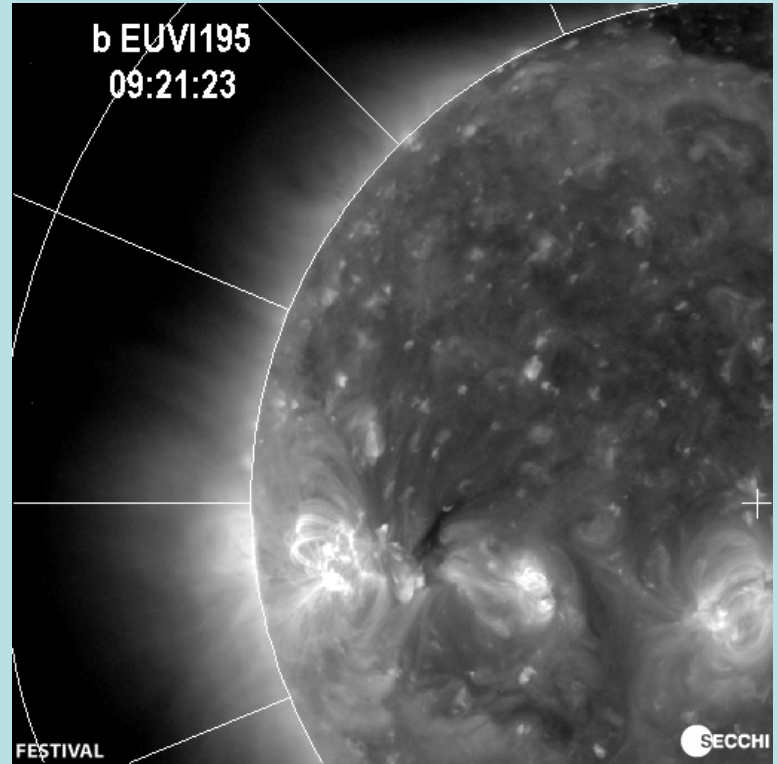
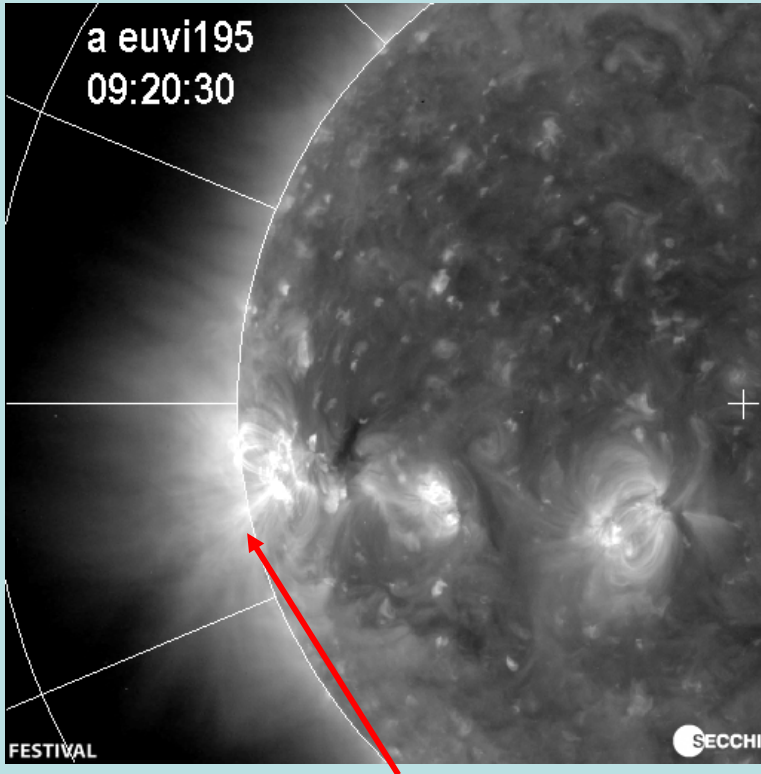


092913

093003

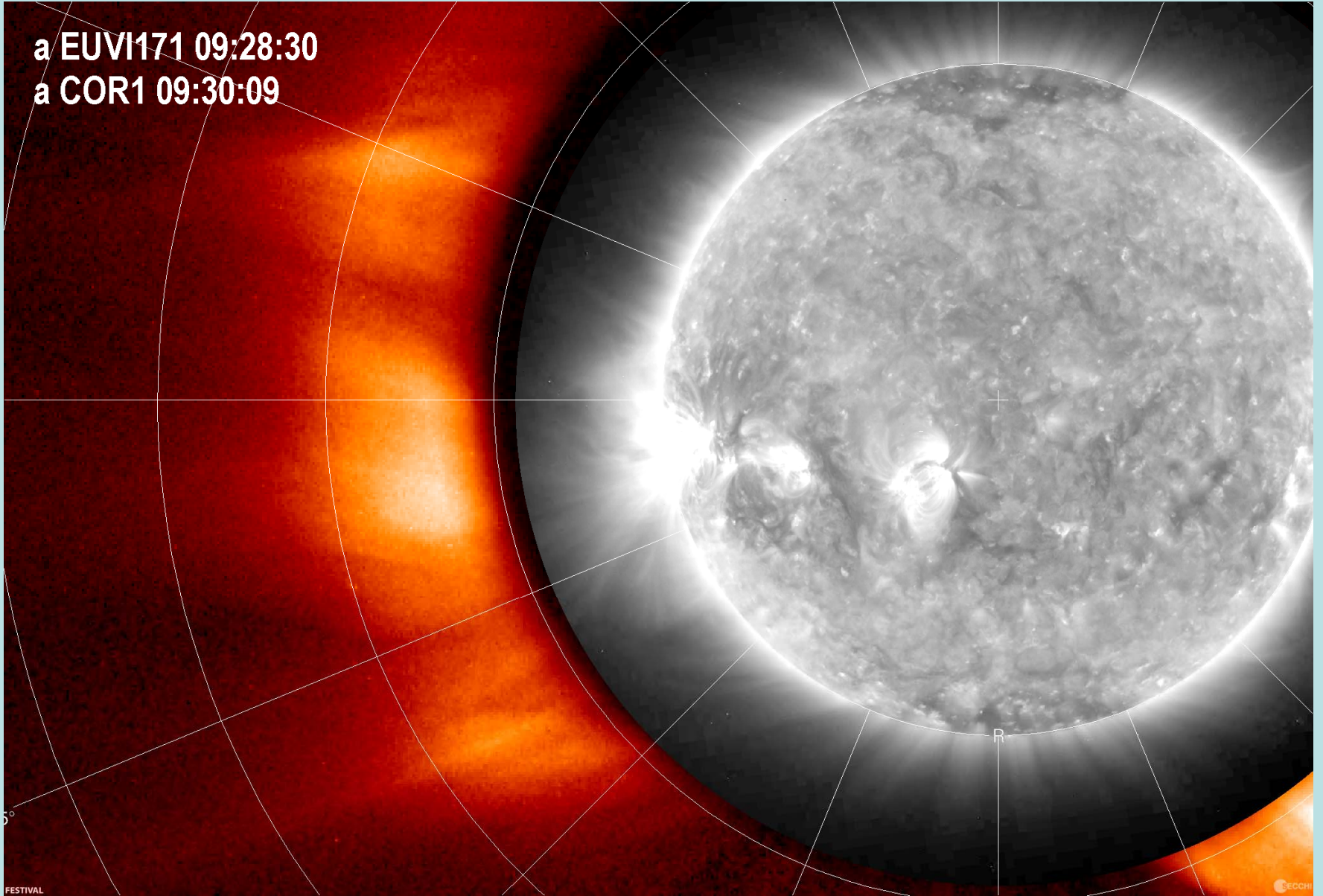


NRH 150 MHz



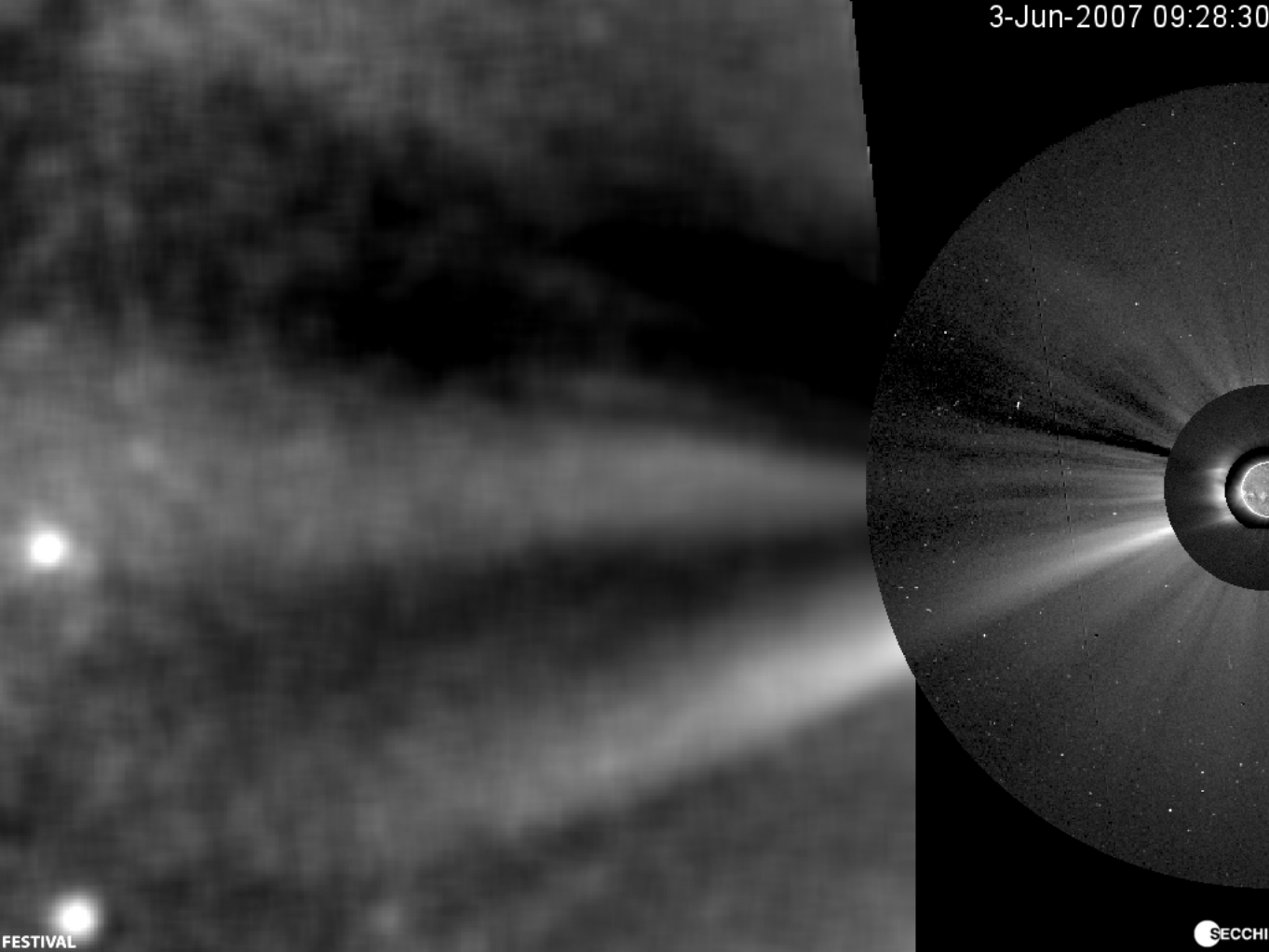
Inserer film EUVI  
Composite COR1/EUVI

a EUV171 09:28:30  
a COR1 09:30:09



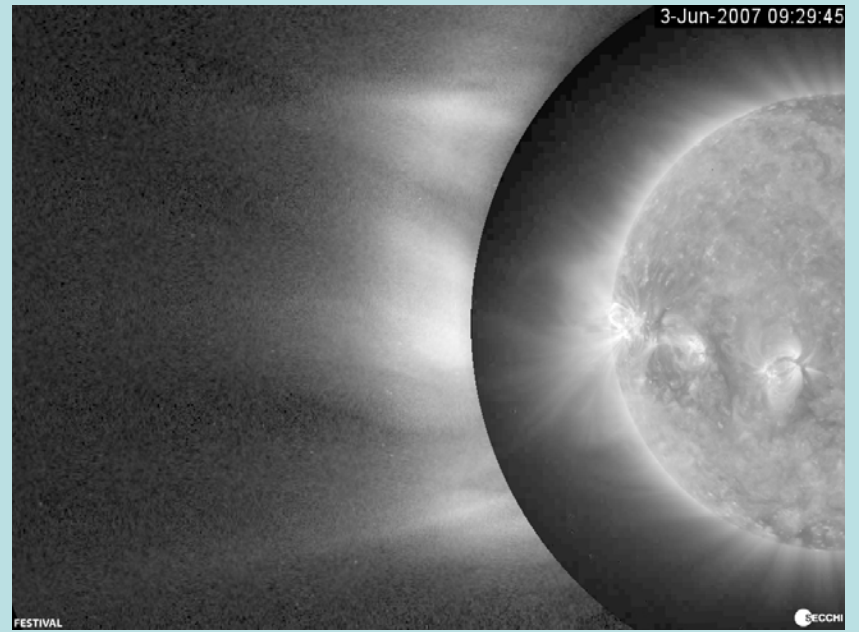
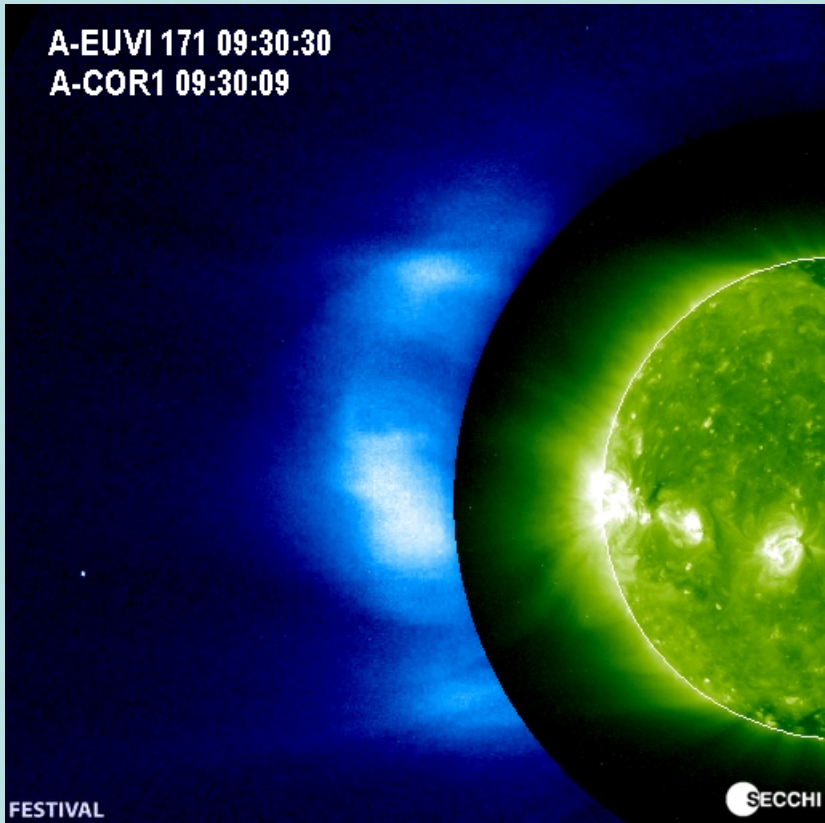


3-Jun-2007 09:28:30



FESTIVAL

SECCHI



-1.4 -1.2 -1.0 -0.8 -0.6 -0.4 -0.2 0.0

EIT 195 09:24:11

0.8  
0.6  
0.4  
0.2  
0.0

09:27:20

-0.2

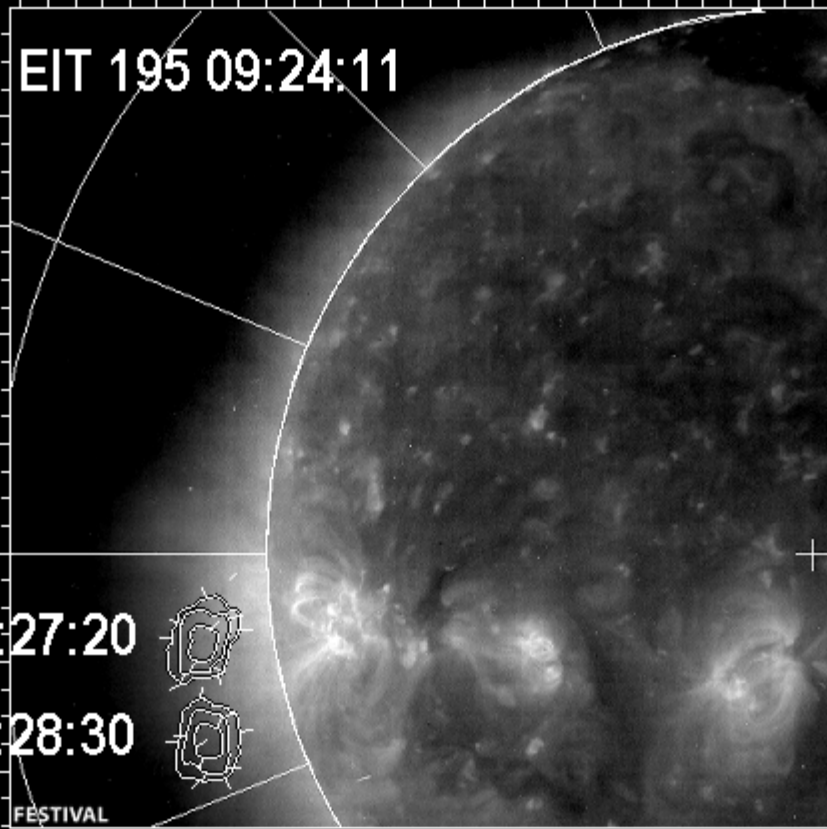


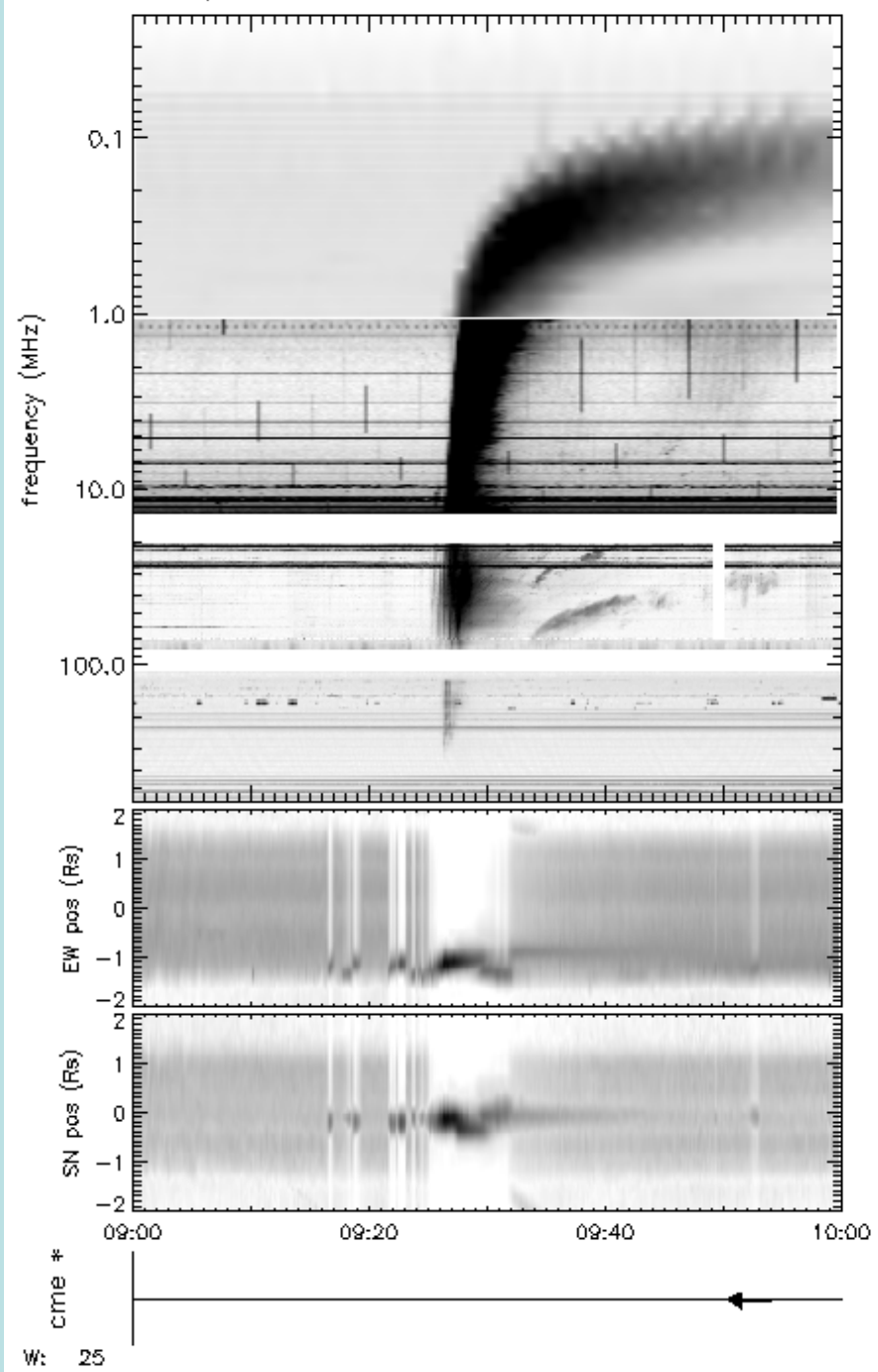
09:28:30

-0.4

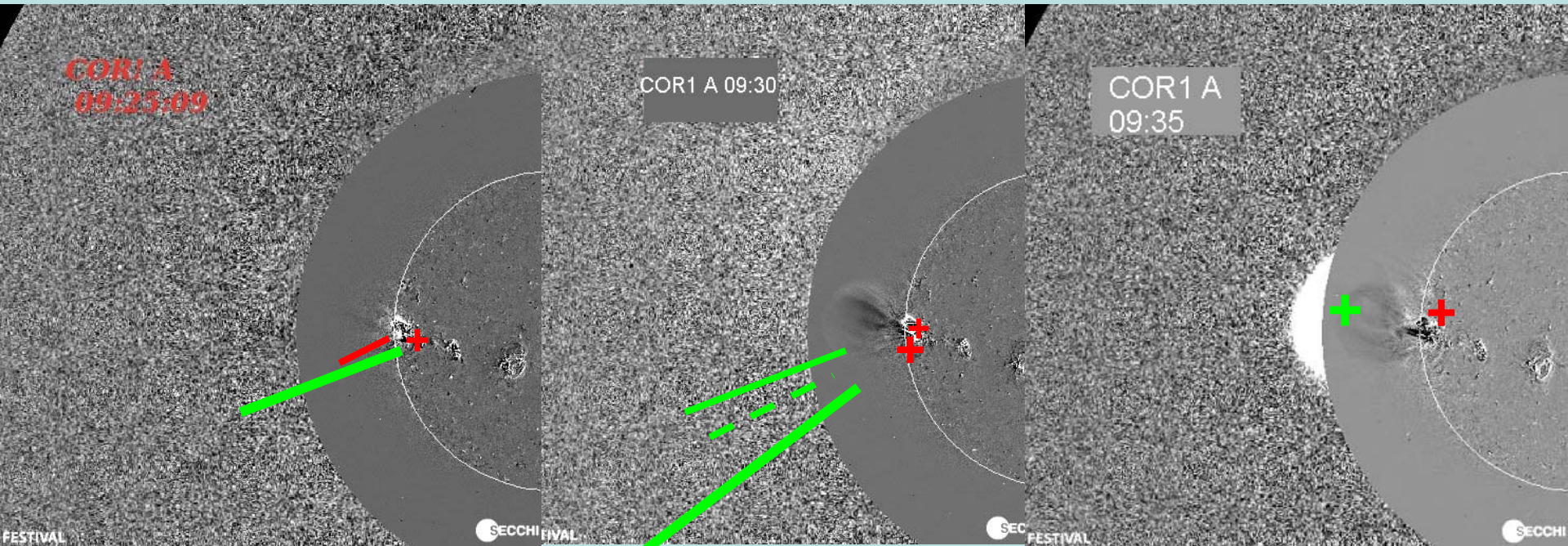


FESTIVAL





# Summary

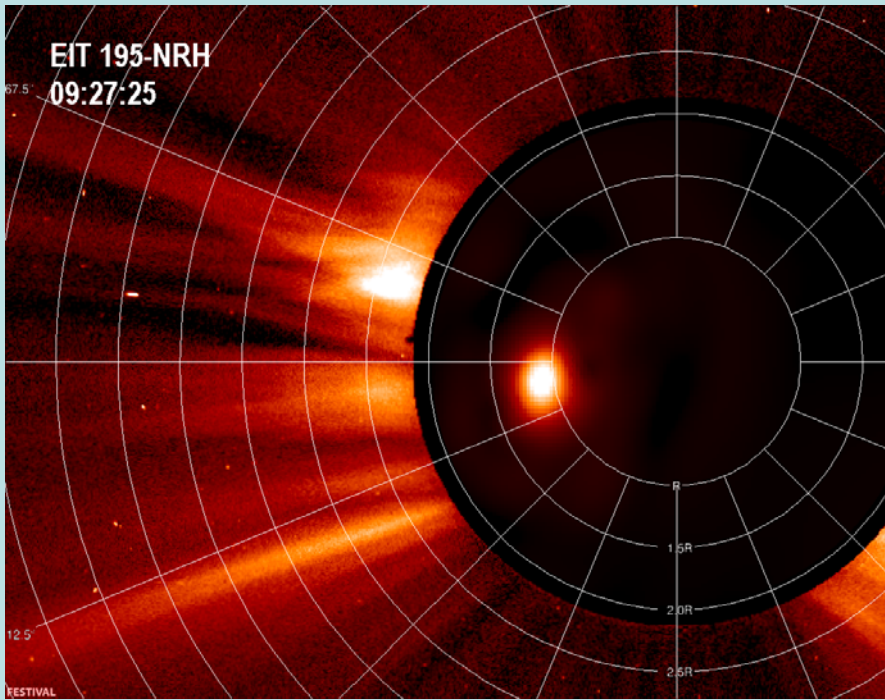


09:25-09:27  
Type III 600- 20 MHz  
RHESSI max # 09:27  
onset flaring loops

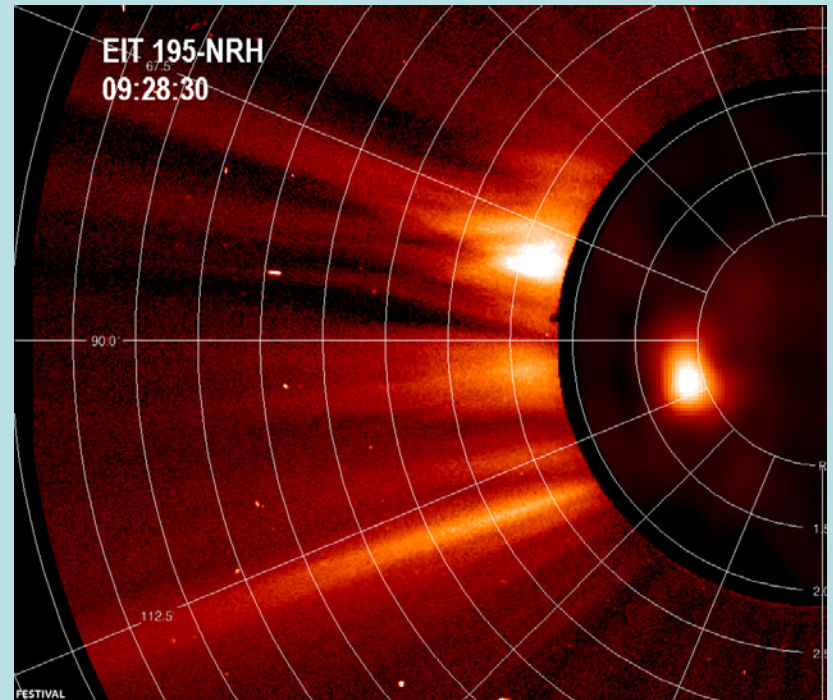
09:27-09:30  
Southward shift type III  
**Waves type III**  
Microwave continuum  
Radio polarization  
change

Metric continuum  
Behind CME  
> post eruptive  
loops 150 MHz





09:27:25



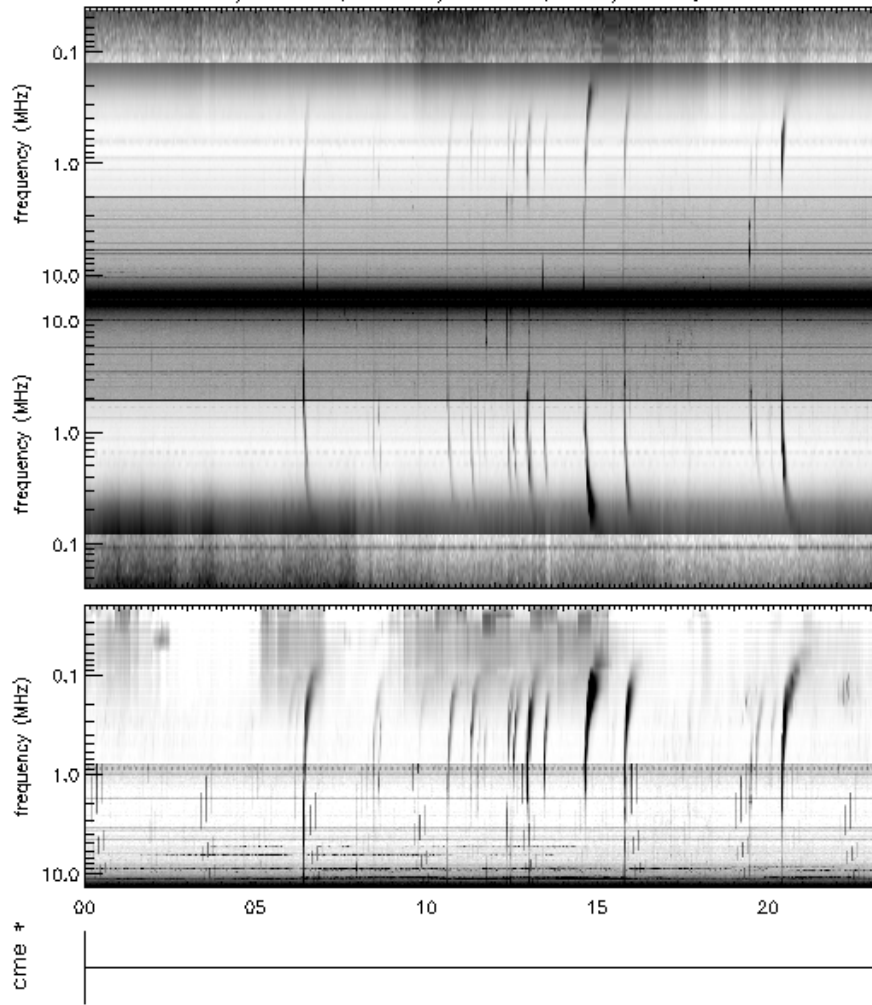
09:28:30

03 Juin 2007  
SOHO/LASCO C2  
NRH 150 MHz



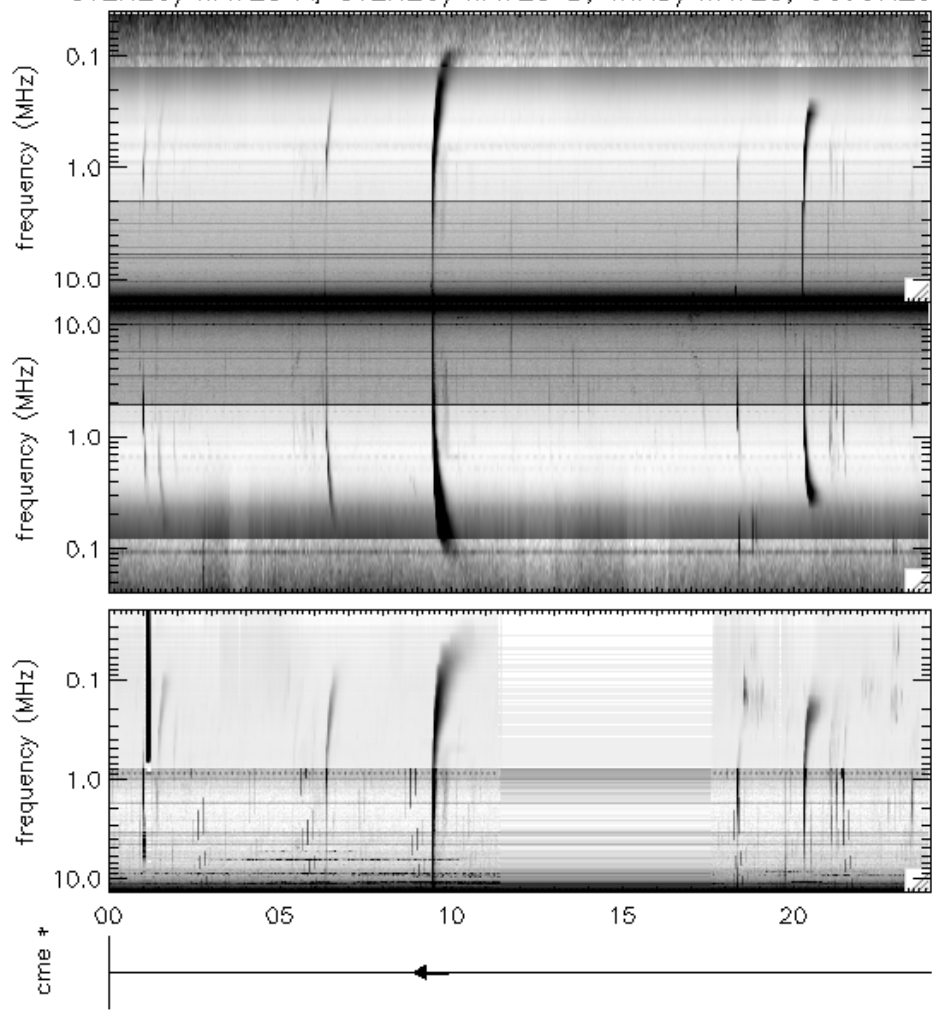


STEREO/WAVES A, STEREO/WAVES B, WIND/WAVES, 02JUN2007



W:  
Assembled the 06NOV2007

STEREO/WAVES A, STEREO/WAVES B, WIND/WAVES, 03JUN2007



W: 25  
Assembled the 03DEC2007