

Three Eruptions Observed by EUI Onboard Solar Orbiter

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Royal Observatory
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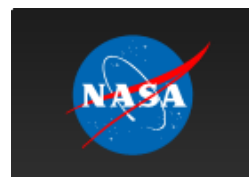
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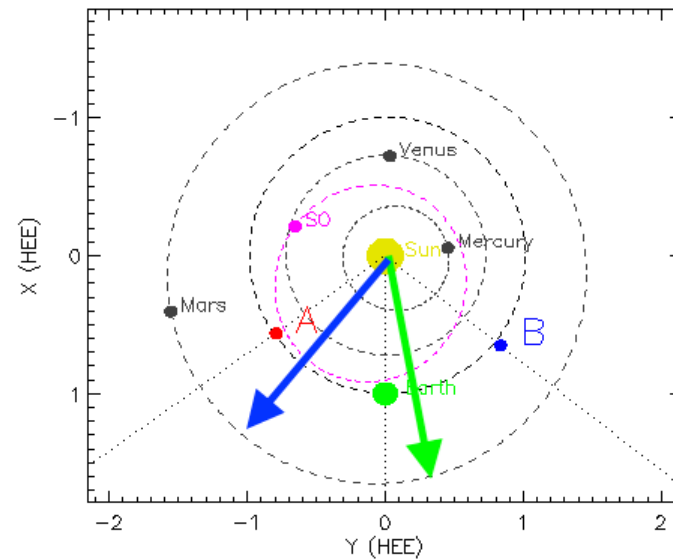
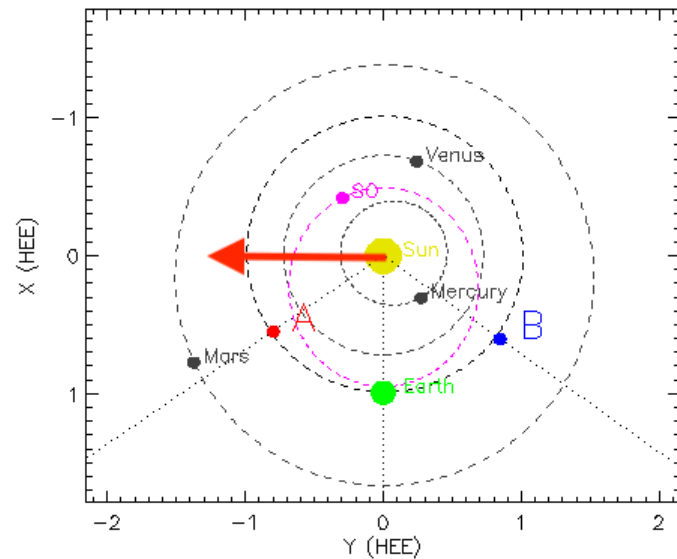
Observations

Three prominence eruptions observed by FSI 304:

1) February 21, ~07:00 UT, ~N36E97

2) March 21, ~ 18:00 UT, ~N24W18

3) March 21, ~ 22:00 UT, ~S27E35

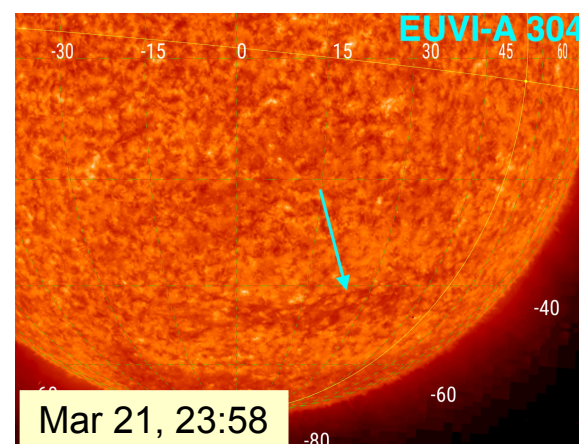
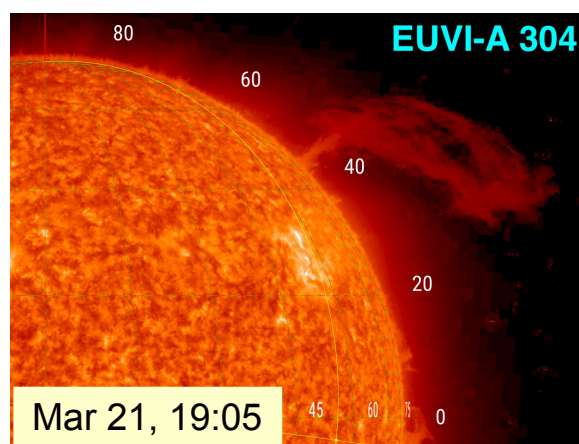
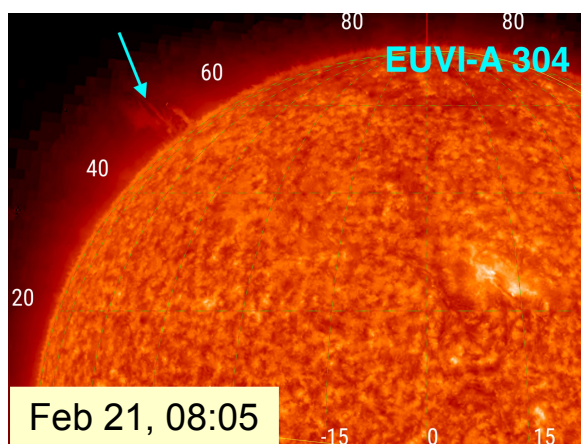
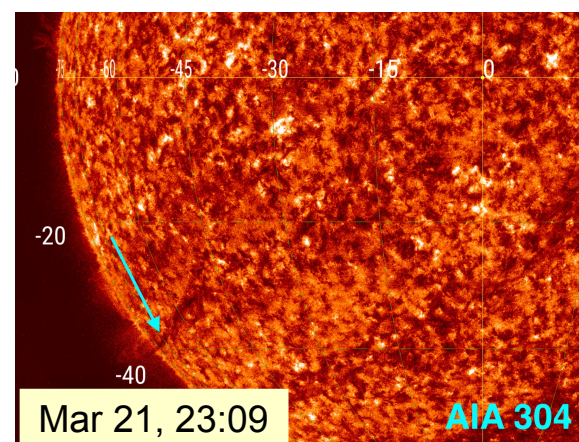
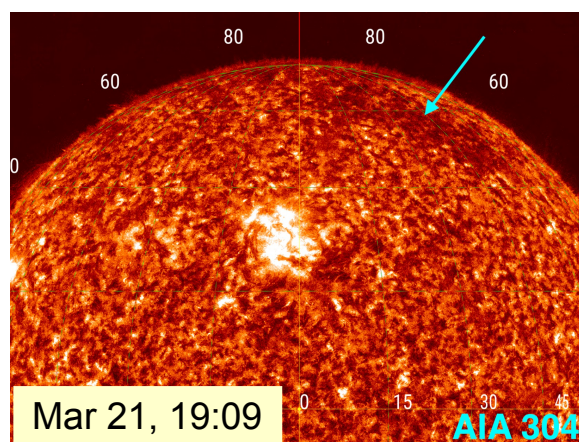
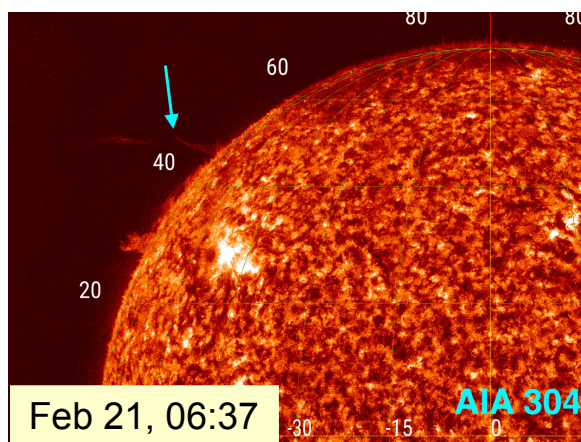
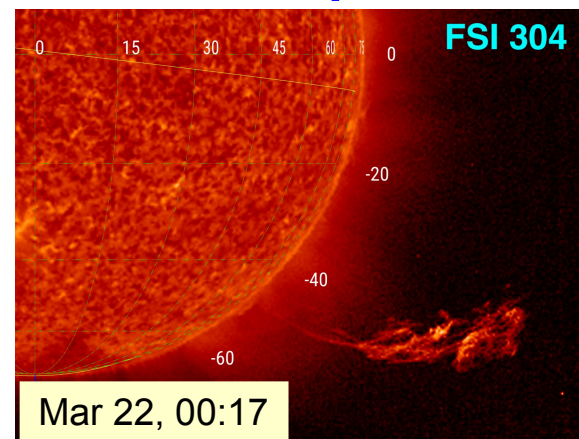
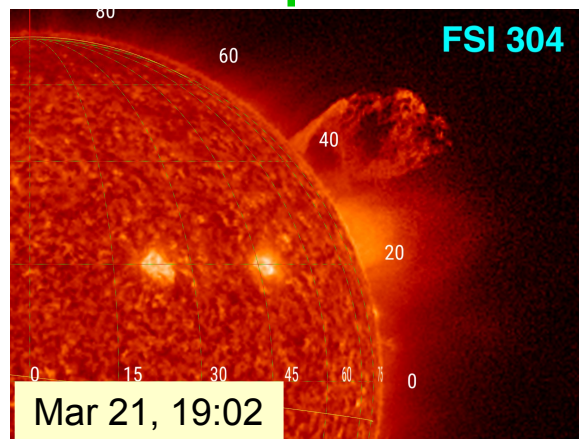
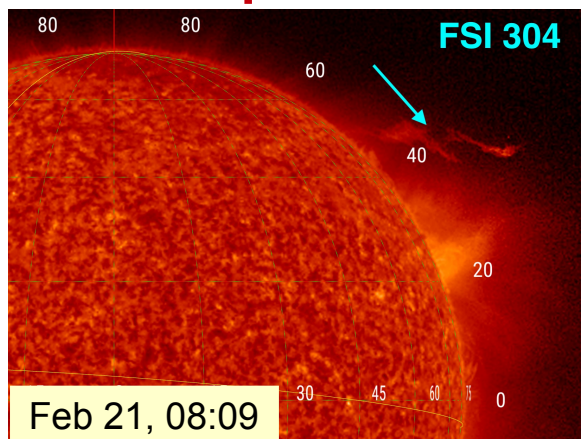


EUV Observations

Eruption1

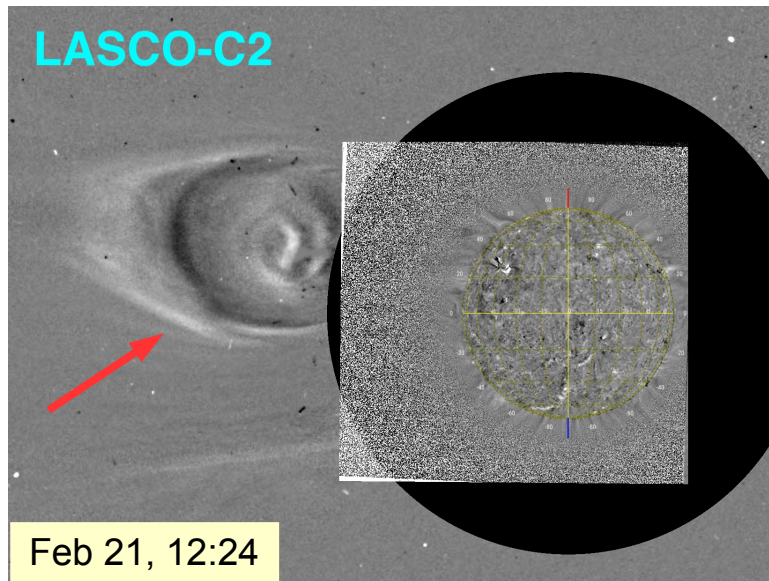
Eruption2

Eruption3

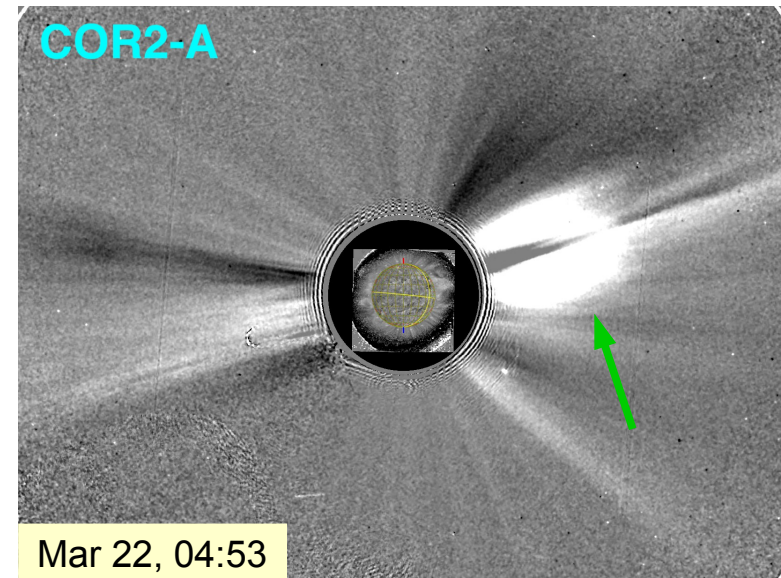
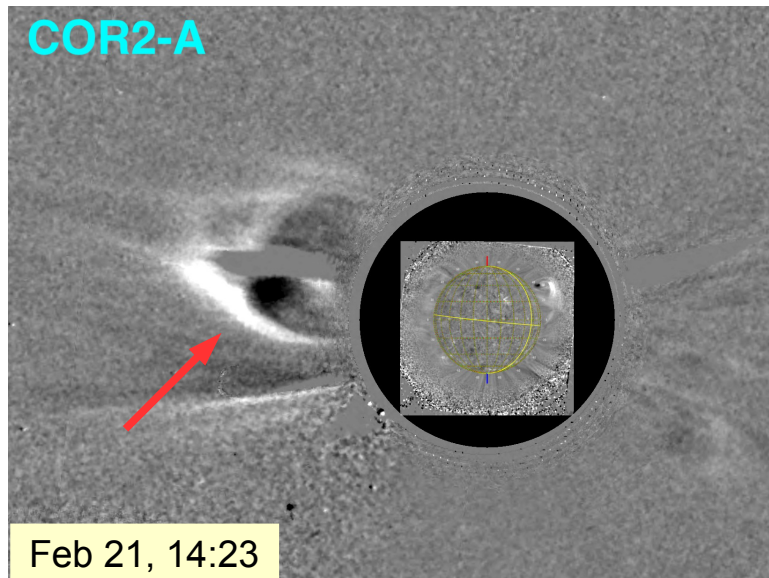
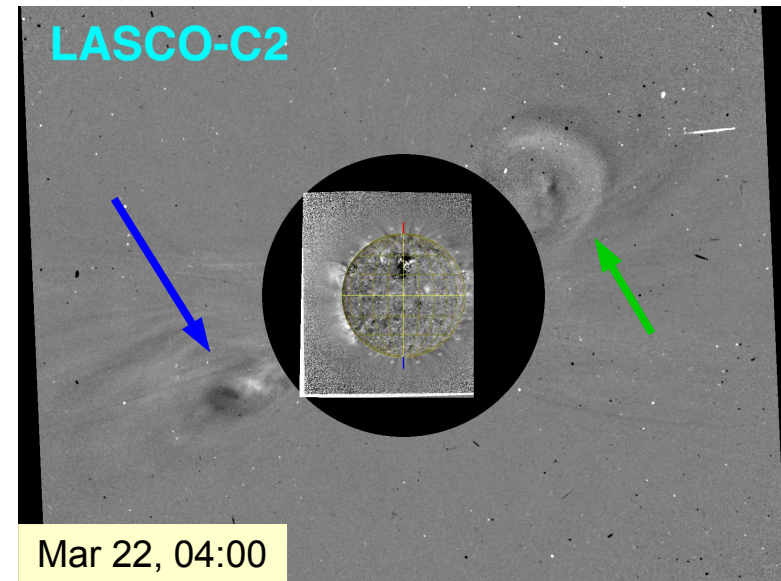


White Light Observations

Eruption1



Eruptions2&3

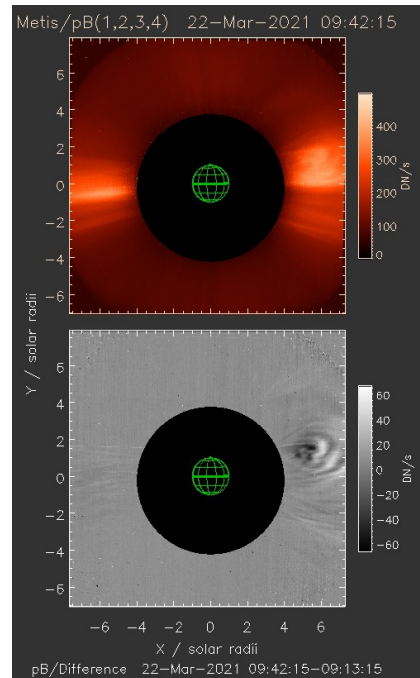
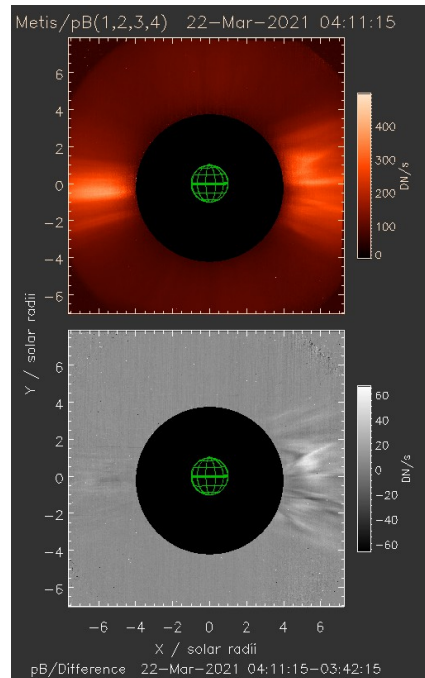
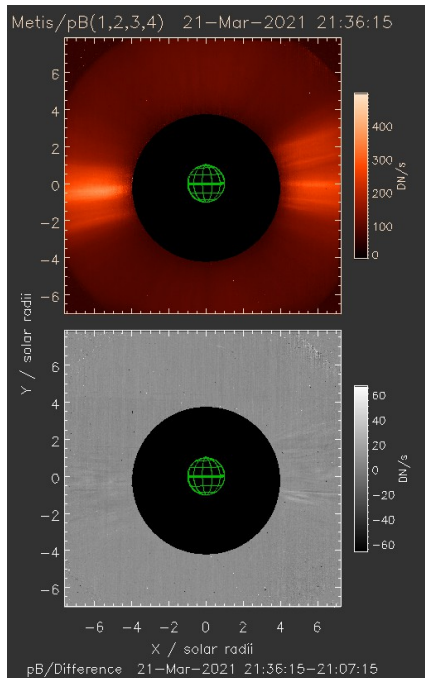
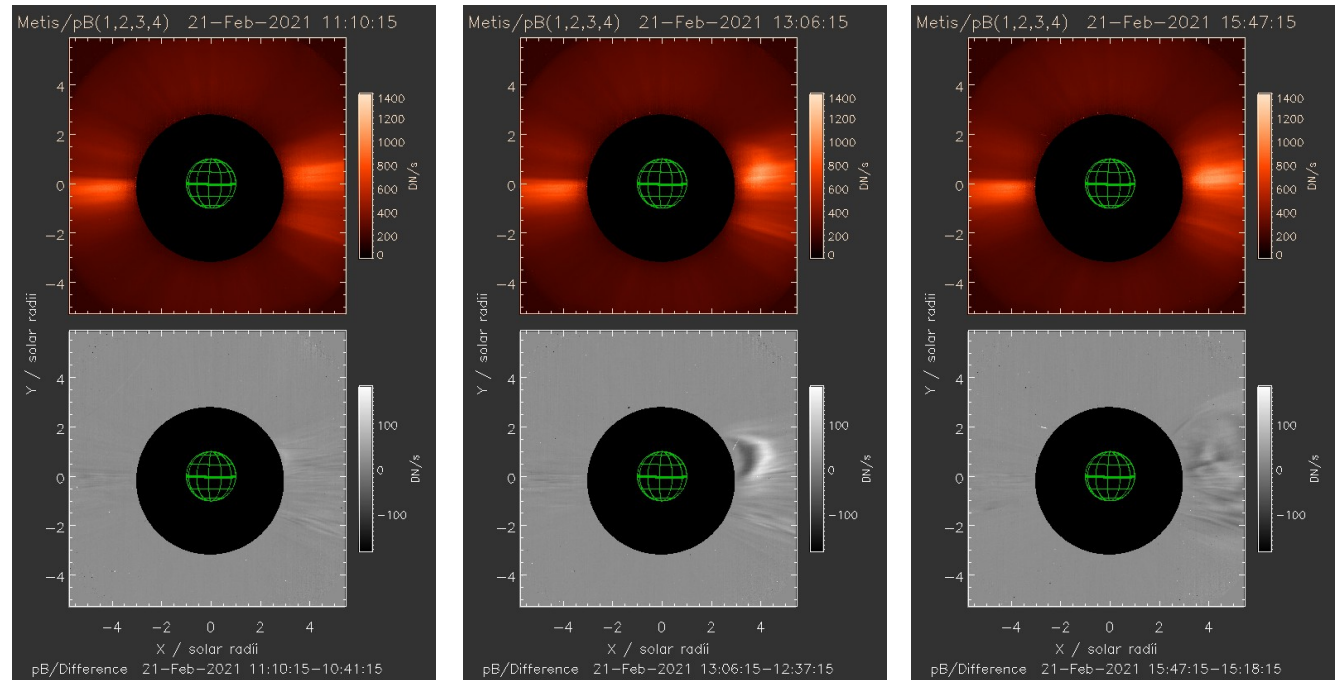


Eruption2 is a slow-rise, streamer-blowout-CME type of eruption.

White Light Observations - Metis

Eruption1

Starting at around
11:00, Feb21, NW



Eruption2

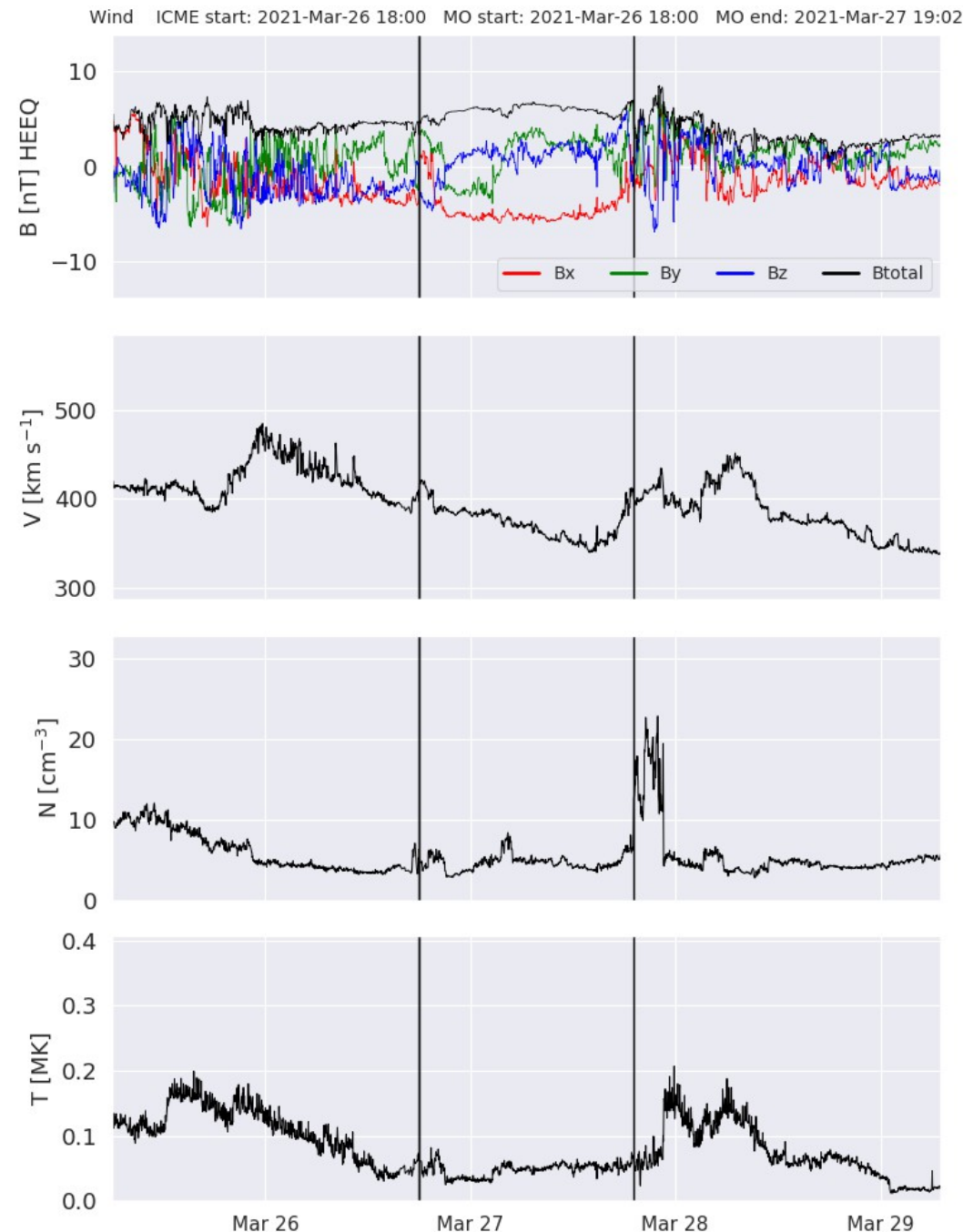
Starting around
03:00, March 22, NW

In-situ observations

► **Eruption1** and **Eruption3** did not arrive at any spacecraft

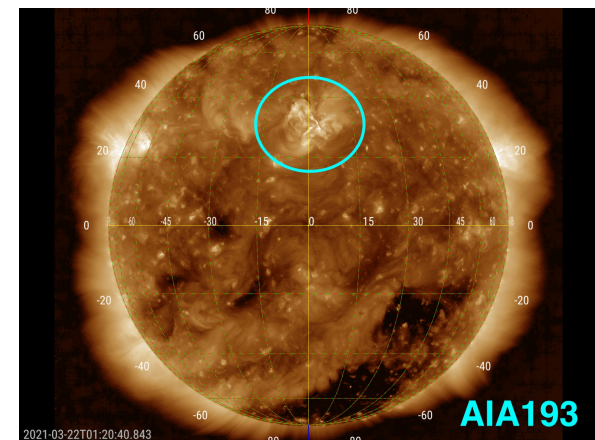
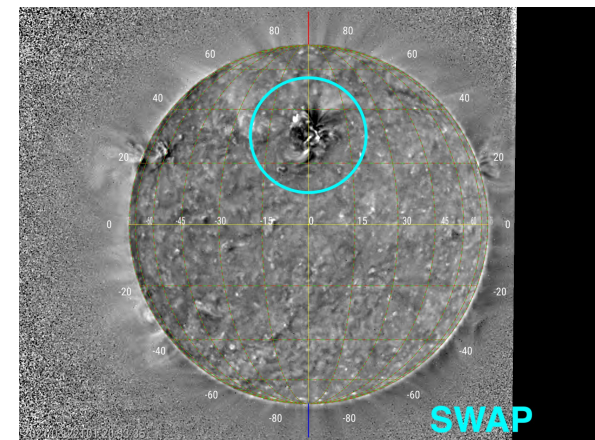
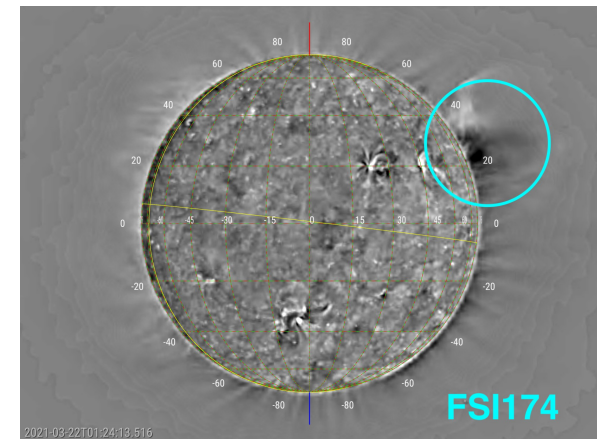
► **Eruption2** may be the source of an ICME (flux-rope) observed at Earth starting March 26 18:00 UT

► It is a high-inclination and left-handed east-north-west (ENW) flux rope (consistent with the source region on the northern hemisphere and with the clearly tilted flux rope orientation in LASCO).

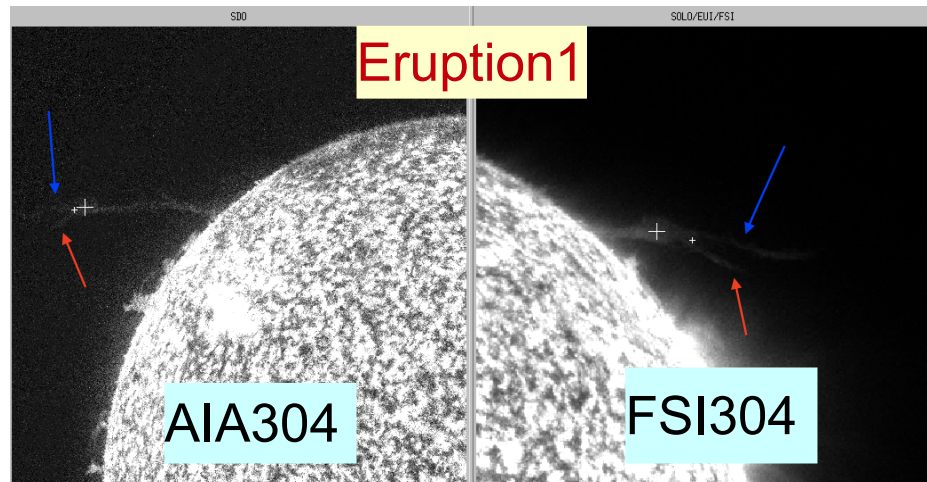


The source of the ICME

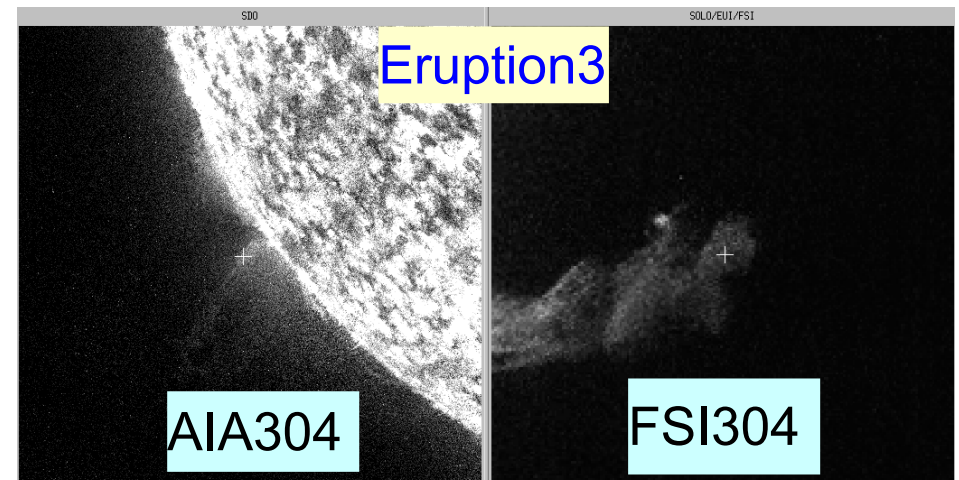
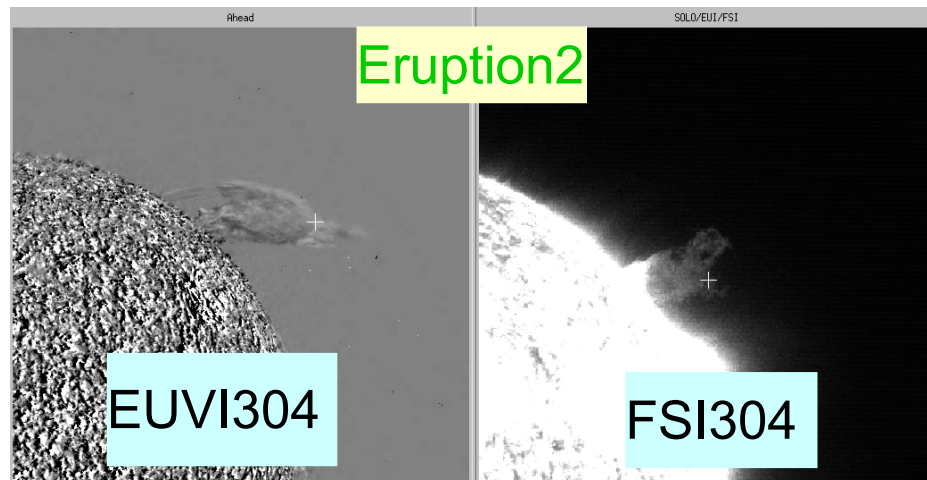
- ▶ The source of the ICME may also be another eruption observed in FSI174, SWAP and AIA images (starting at around 01:00 on March 22).
- ▶ The halo CME associated with this event (visible by LASCO-C2 from around 08:48 UT) is obscured by the **Eruption2**.



3D Reconstruction: source region identification

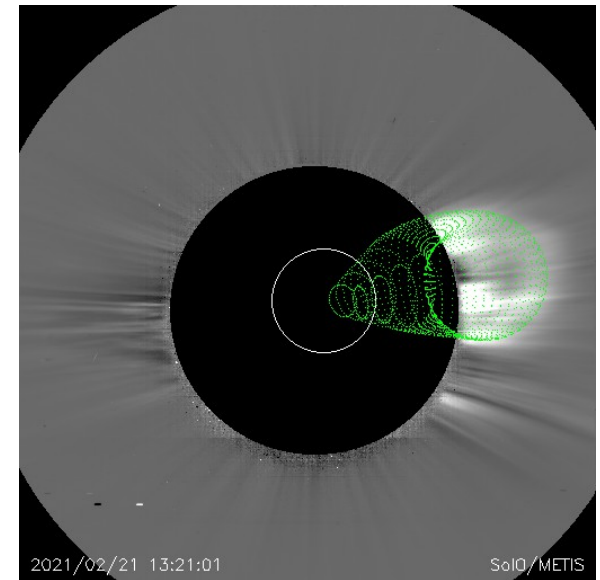
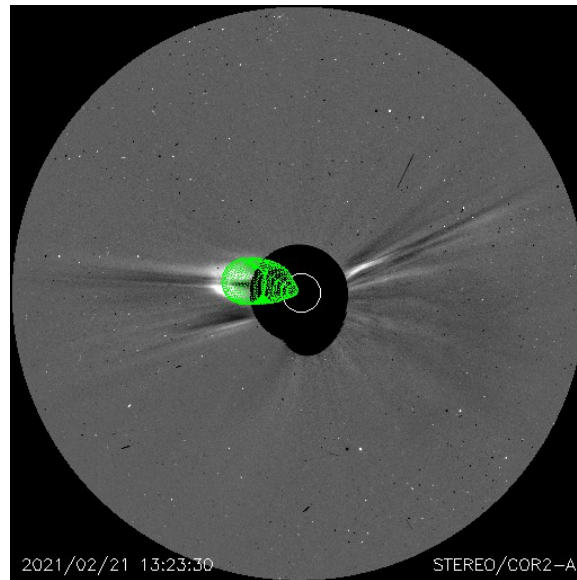
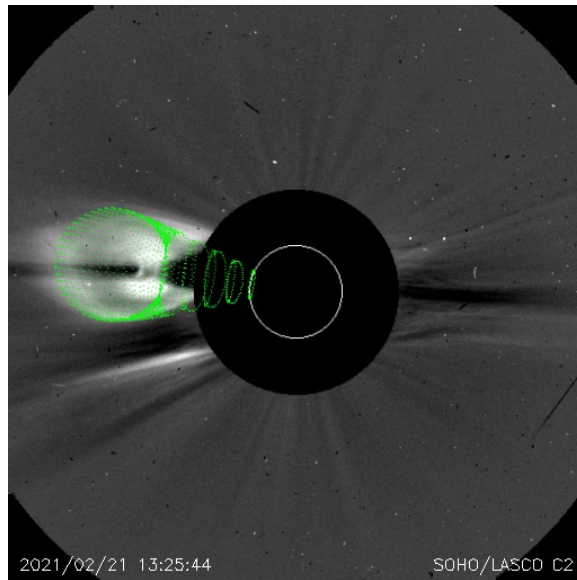


- ▶ Triangulation using FSI304, AIA304 and EUVI-A304 images.
- ▶ **Eruption1** on Feb 21, 07:39 UT.
- ▶ **Eruption2** on Mar 21, 16:02 UT.
- ▶ **Eruption3** on Mar 22, 00:02 UT.



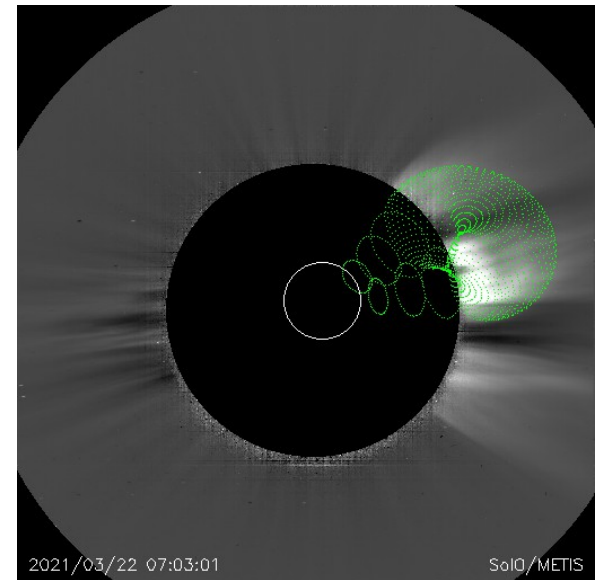
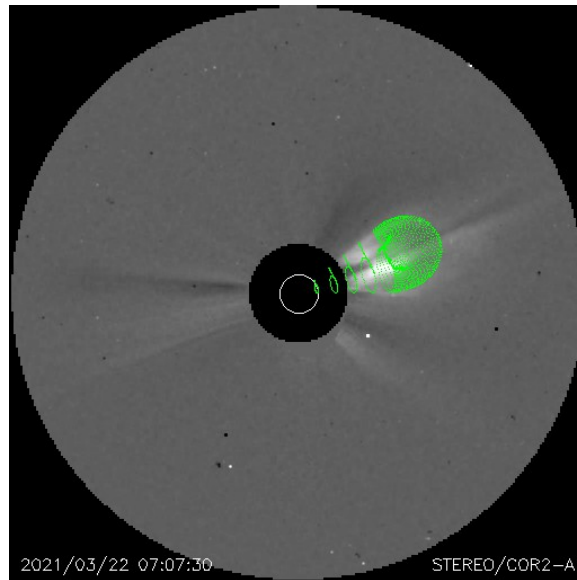
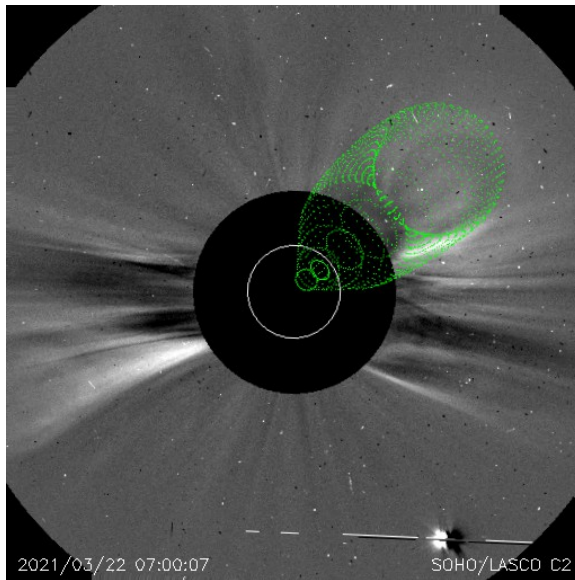
3D Reconstruction – direction of propagation

- ▶ Graduated Cylindrical Shell model (GCS) (Thernisien+2011)
- ▶ LASCO-C2, COR2-A and Metis images
- ▶ **Eruption1** on February 21, 2021, 13:21 UT
- ▶ lon: -95° , lat: 11° , h: $5.3R_s$, tilt: -5° , ratio: 0.3, half angle: 15°



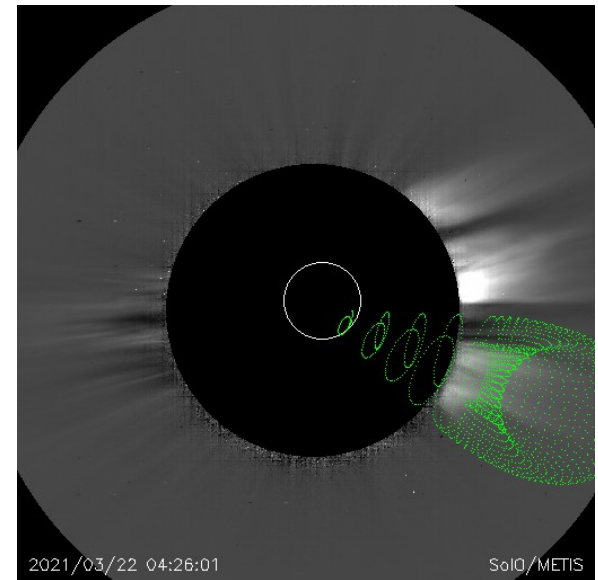
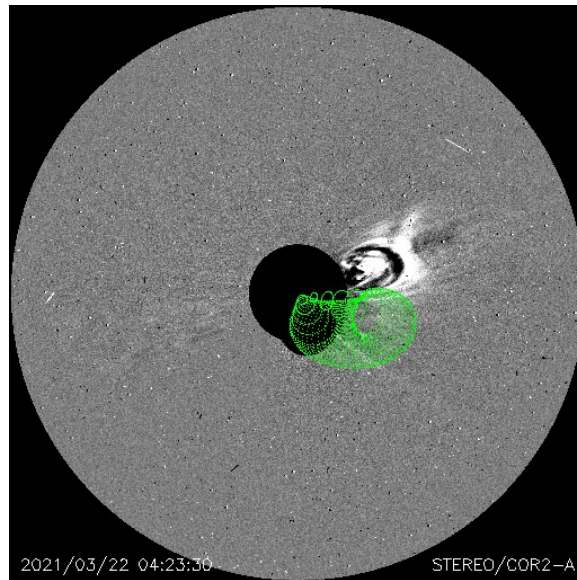
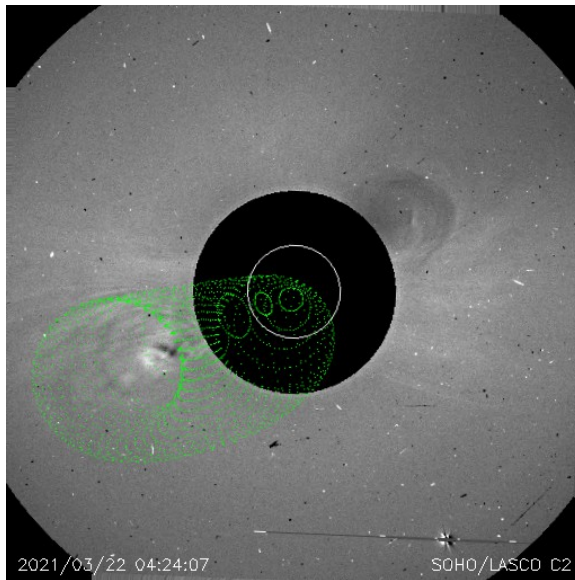
3D Reconstruction – direction of propagation

- ▶ GCS using LASCO-C2, COR2-A and METIS images.
- ▶ **Eruption2** on February 22, 2021, 07:03 UT
- ▶ lon: 21° , lat: 16° , h: 8.0Rs, tilt: 40° , ratio: 0.23, half angle: 12°



3D Reconstruction – direction of propagation

- ▶ GCS using LASCO-C2, COR2-A and METIS images.
- ▶ **Eruption3** on March 22, 2021, 04:26 UT. **Quite dim CME.**
- ▶ lon: -25° , lat: -23° , h: 8.9Rs, tilt: 10° , ratio: 0.25, half angle: 20°



3D Reconstruction – summary

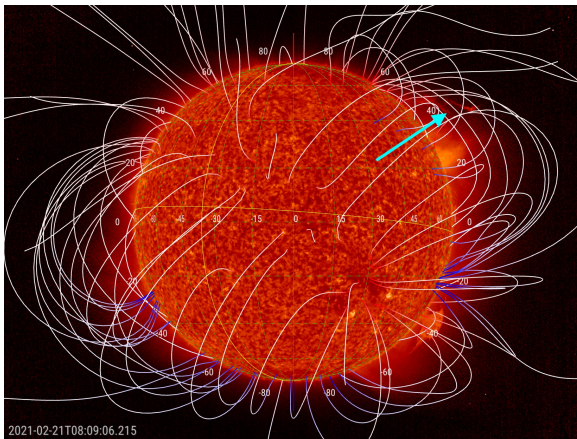
Date	Time	Lon (°)	Lat (°)	Height (Rs)	Comments
2021-02-21	07:39	E97	N36	1.33	FSI+AIA, triang
2021-02-21	13:21	E95	N11	5.30	C2+COR2+Metis, GCS
2021-03-21	16:02	W17	N29	1.36	FSI+EUVI, triang
2021-03-21	07:03	W21	N16	8.00	C2+COR2+Metis, GCS
2021-03-22	00:02	E35	S27	1.68	FSI+AIA, triang
2021-03-22	04:26	E25	S23	8.90	C2+COR2+Metis, GCS

- ▶ Longitude and Latitude are in Stonyhurst coordinates (as observed from the Earth perspective).
- ▶ Time is of the FSI image (triangulation) and Metis image (GCS).

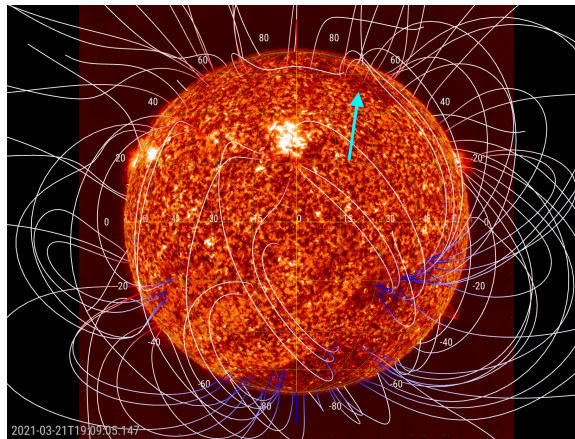
Magnetic Field configuration of the corona - PFSS

<https://www.jhelioviewer.org/>

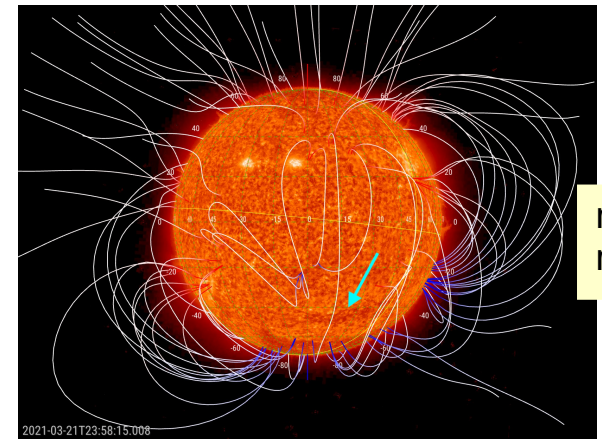
Eruption1



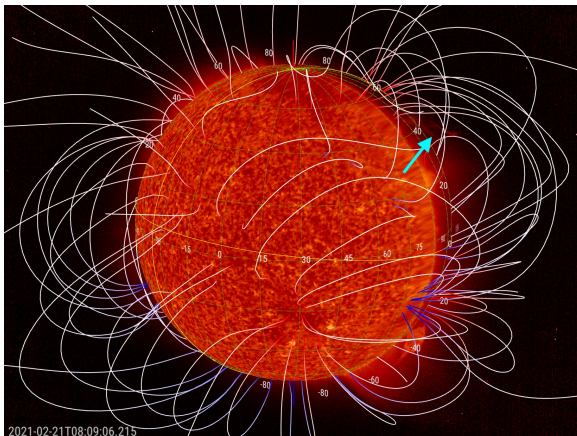
Eruption2



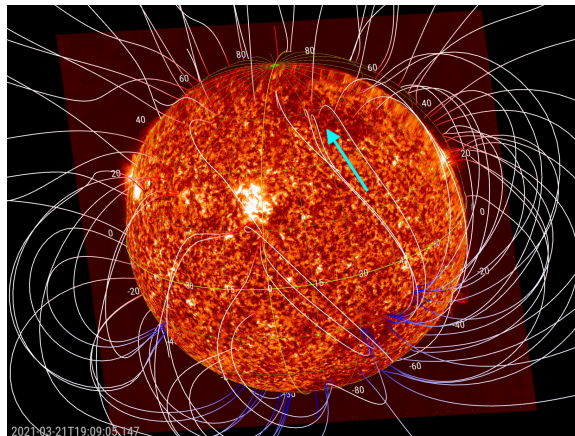
Eruption3



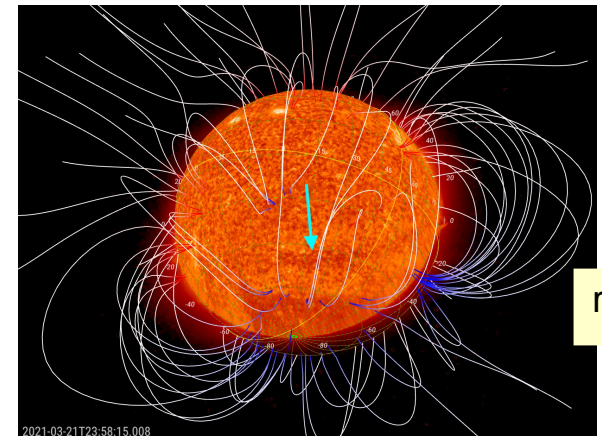
not
rotated



FSI304, Feb 21, 08:09



AIA304, Mar 21, 19:09



rotated

EUVI304, Mar 21, 23:58

Concluding remarks



► **Eruption1** is an extended filament seen both on-disk, North, and at NW limb by FSI304. Left side is seen at NE limb by EUVI304 and the right side is seen at NE limb by AIA304. **Well visible also in Metis data.**

► **Eruption2** is an extended filament seen on-disk, North, by AIA304. The left side is seen at NW limb by FSI304 and the right side is seen at NW limb by EUVI304. **Well visible also in Metis data.**

► **Eruption3** is an extended filament seen on-disk, South, by EUVI304. The left side is seen at SE limb by AIA304 and the right side is seen at SW limb by FSI304. **Dim CME in Metis data.**

Concluding remarks



- ▶ The features chosen for triangulation (**Eruption2** and **Eruption3**) are most probably different parts of the same filament.
- ▶ GCS shows deflection to the equator for **Eruption1**.
- ▶ **Eruption1** and **Eruption2** start from below a big arcade of closed field-lines and they seem to propagate towards Northern pole.
- ▶ **Eruption3** starts from a quiet-sun region (below closed field-lines) and it seems to propagate towards Southern pole.