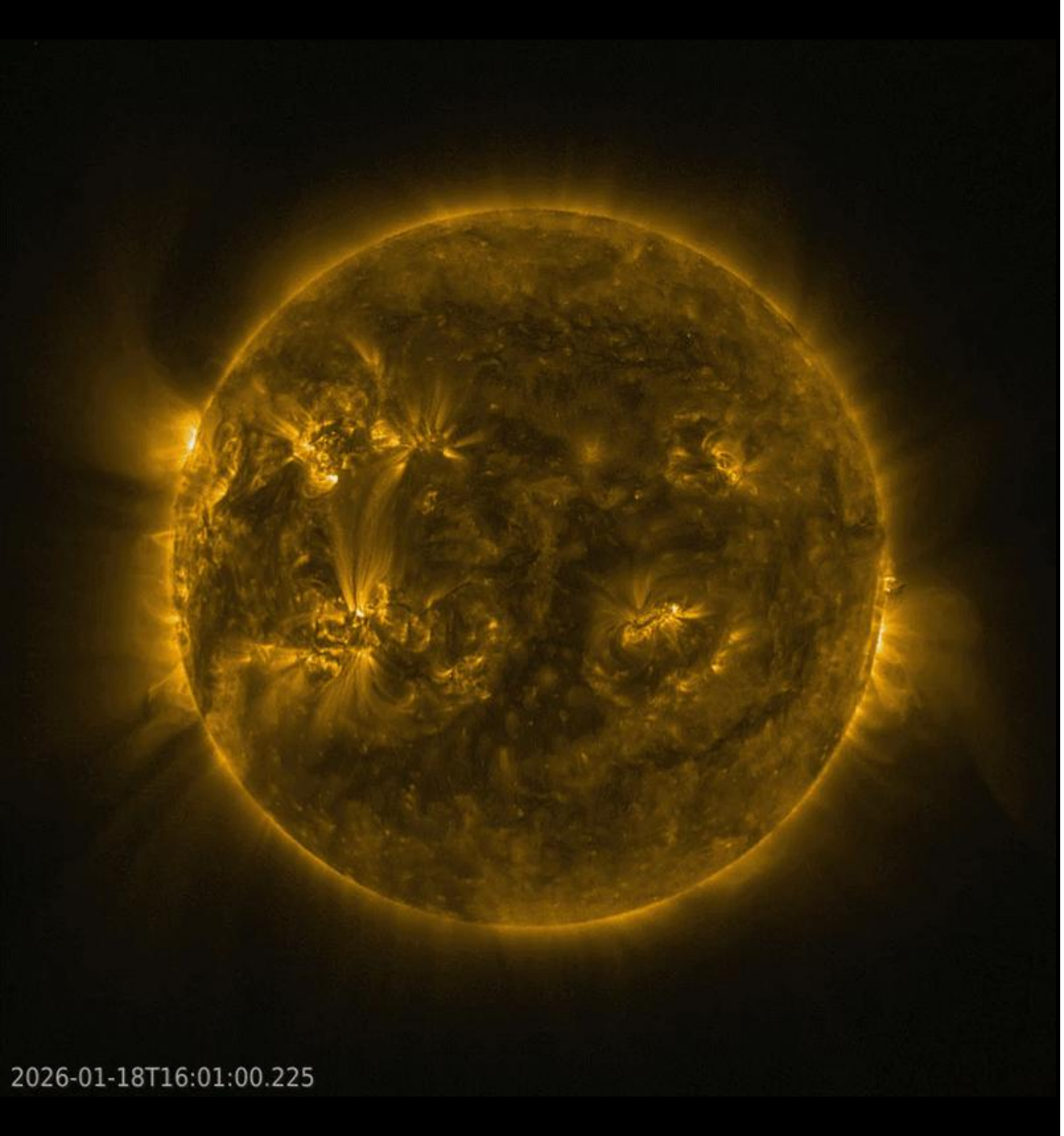


Ruimteweer: Hoe, waarom, en de zonnestorm van 19 januari 2026

Jan Janssens – 23 mei 2026

Space Weather Education Centre

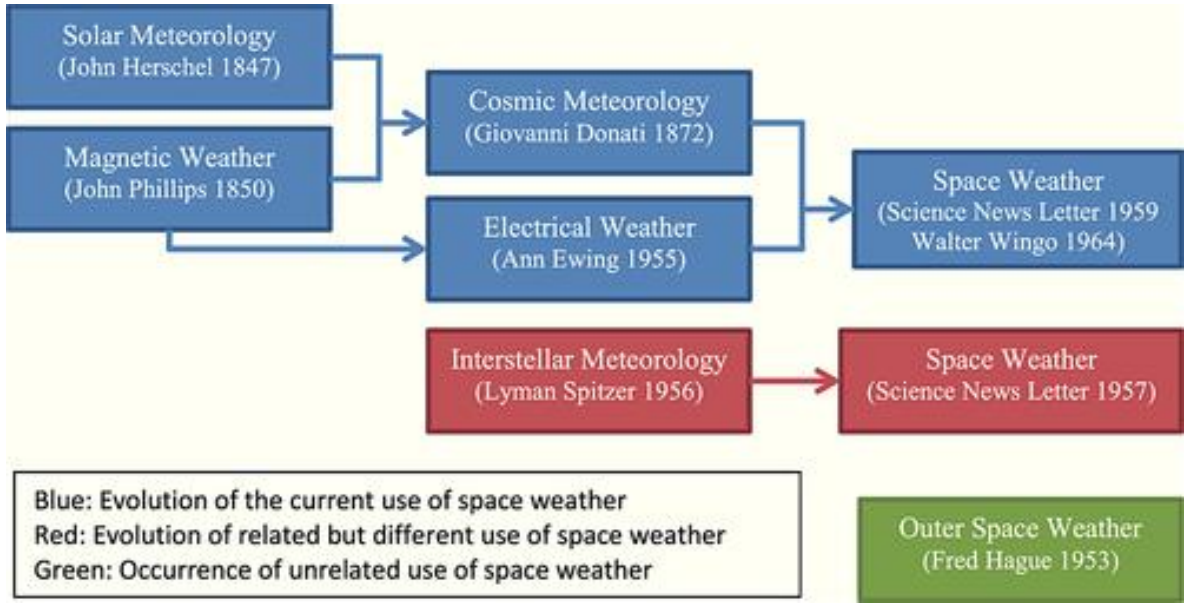
Het ruimteweer

…alle omstandigheden op de zon en in de zonnewind, magnetosfeer, ionosfeer en thermosfeer die de prestaties en de betrouwbaarheid van technologische systemen in de ruimte en op grond kunnen beïnvloeden en die een gevaar kunnen betekenen voor het menselijk leven of de gezondheid.

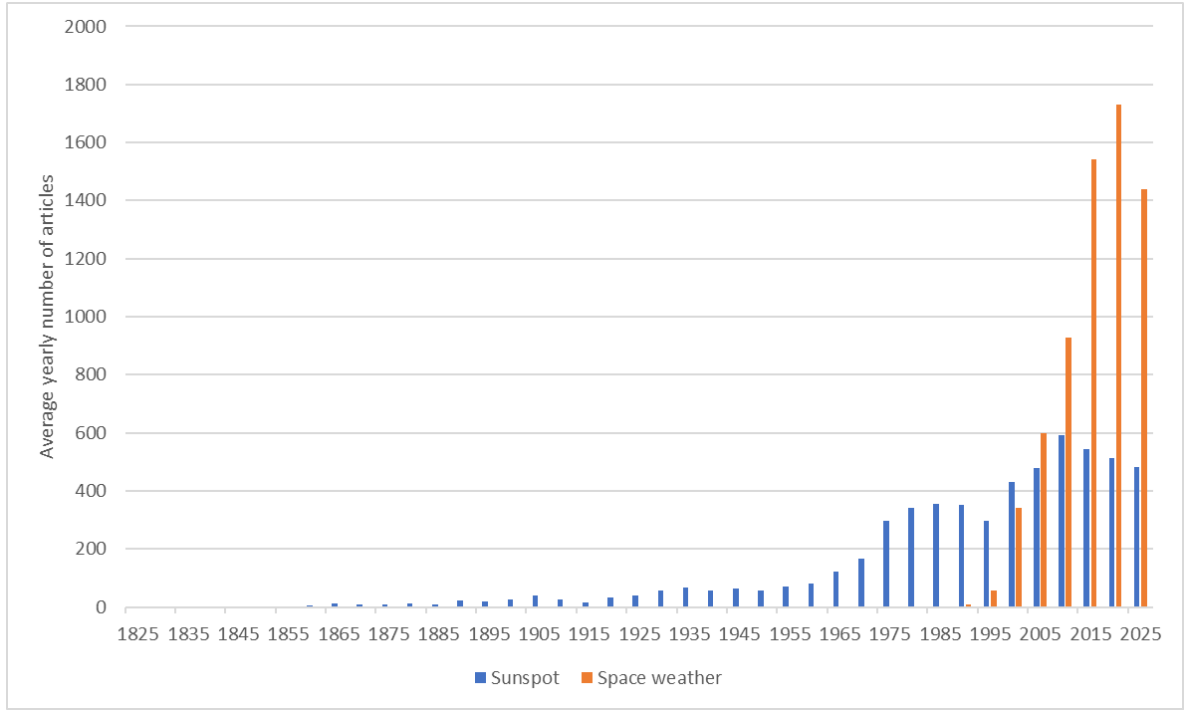
NSWP, ESA

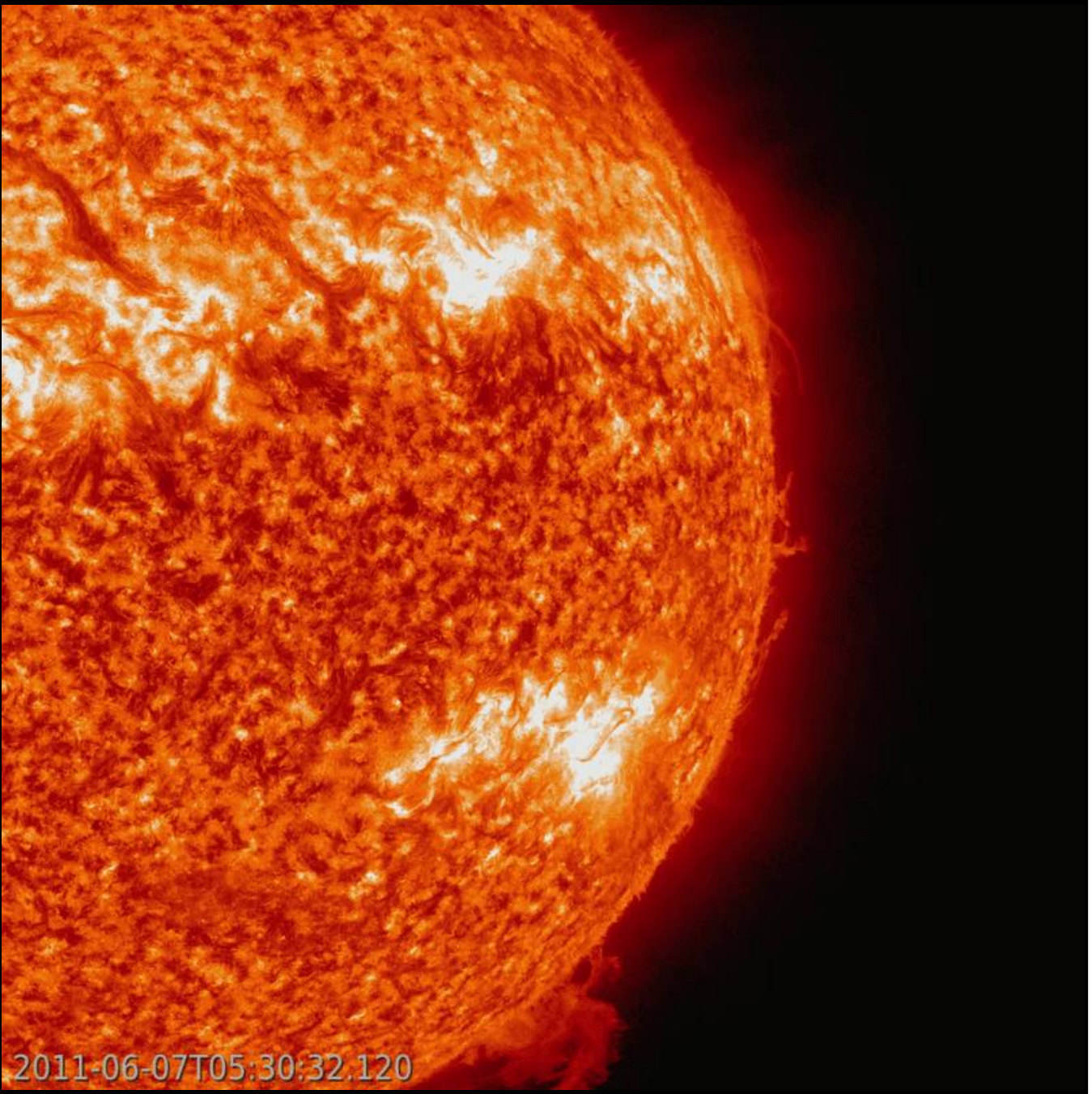
Recente term

- Eerste gebruik
  - Watson Davis (1957, 1959)
  - Thomas Gold (1959)
- Algemeen gebruik
  - Vroege jaren 1990



Cade & Chan-Park (2015) - ***The origin of space weather***
https://doi.org/10.1002/2014SW001141





Het waarom van ruimteweer

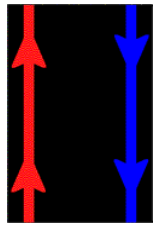
Over de oorzaken en gevolgen van verstoord ruimteweer

SWEC
Space Weather Education Centre

Verstoord ruimteweer: oorzaken

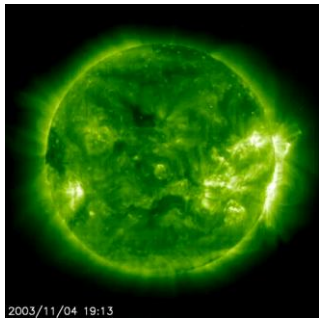
Zonneuitbarstingen

Magnetische Reconnectie



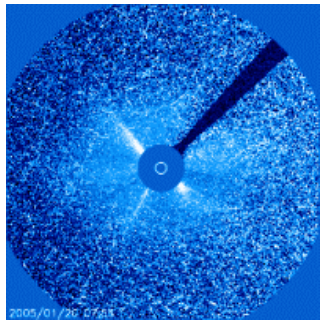
Straling

Zonnevlammen

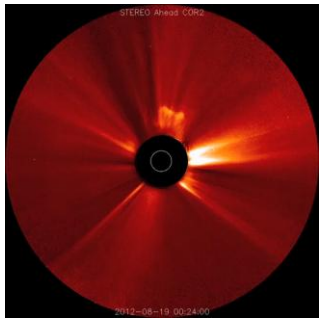


Deeltjes

Proton stormen



Coronale Massa Ejecties

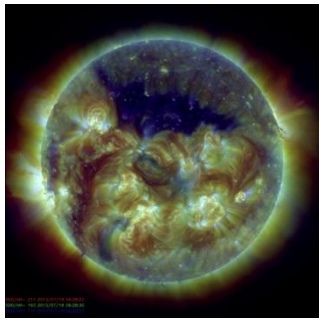


Corona

Zonnewind

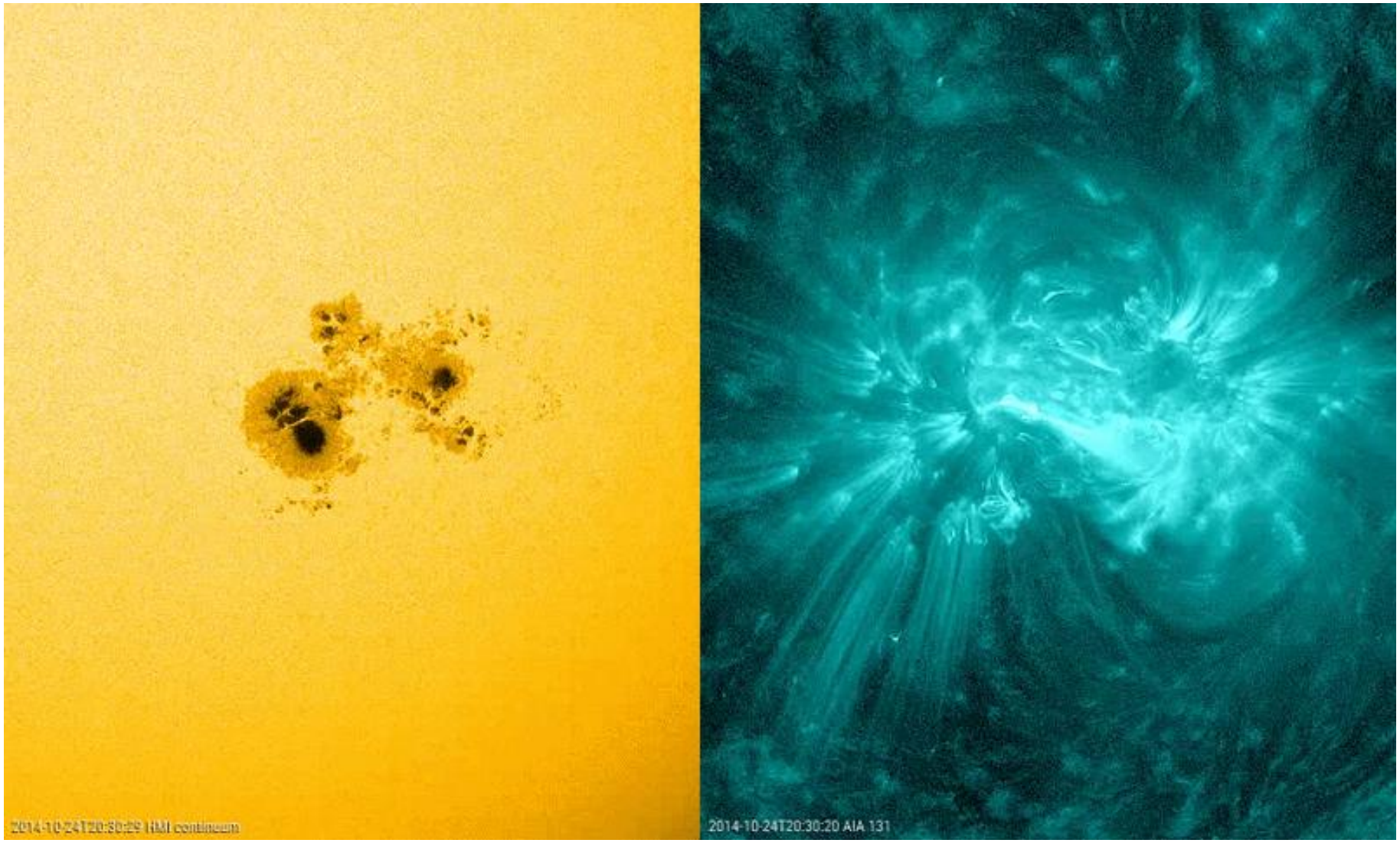
Deeltjes

Coronale Gaten



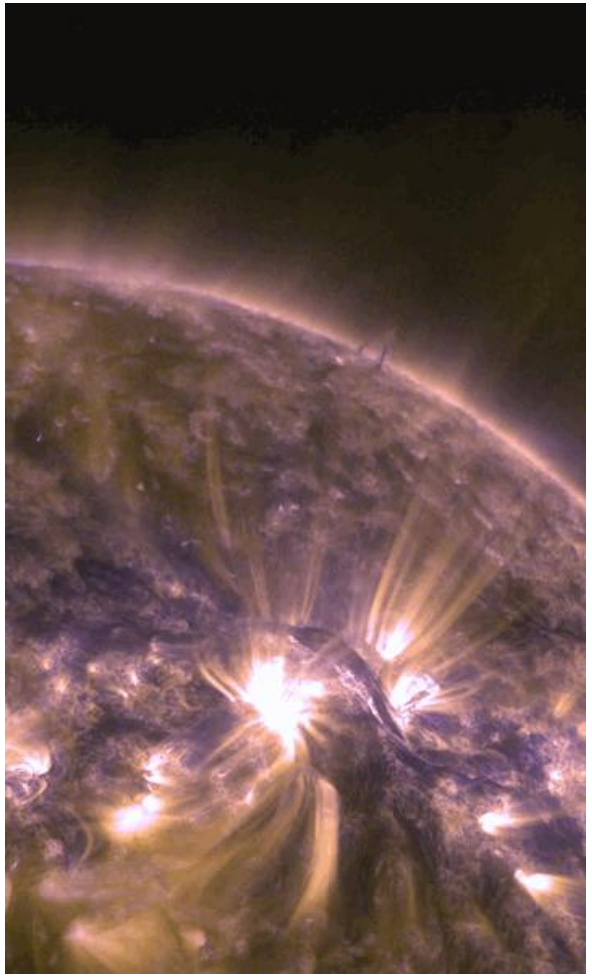
Zonnevlammen

NOAA 12192 (Oktober 2014)

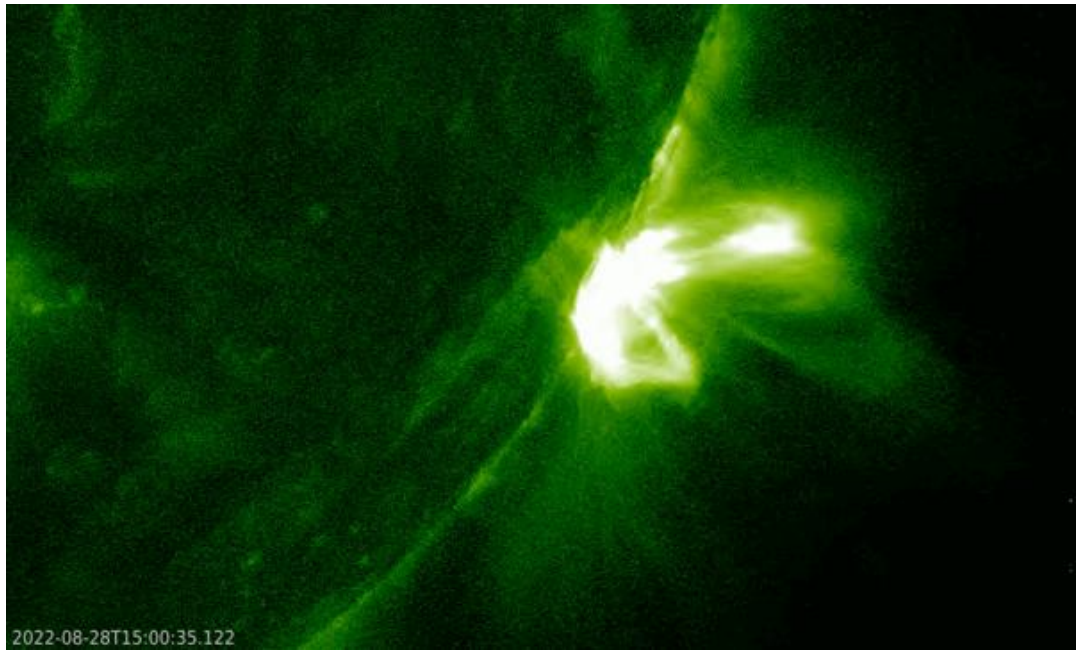


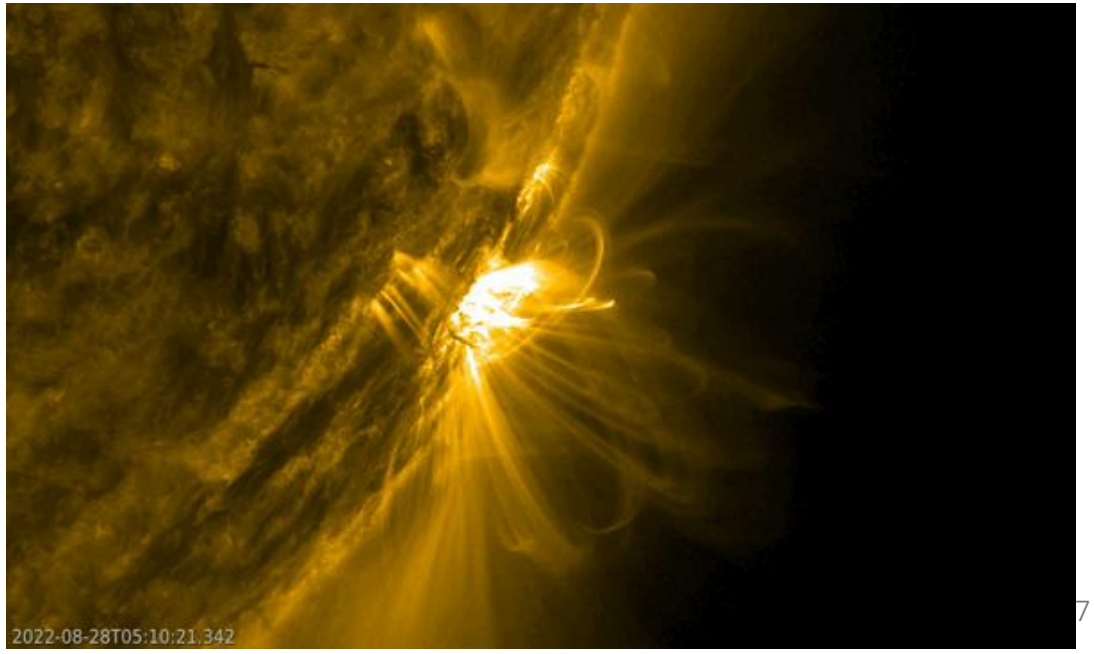
Zonnevlammen

NOAA 13088 =>



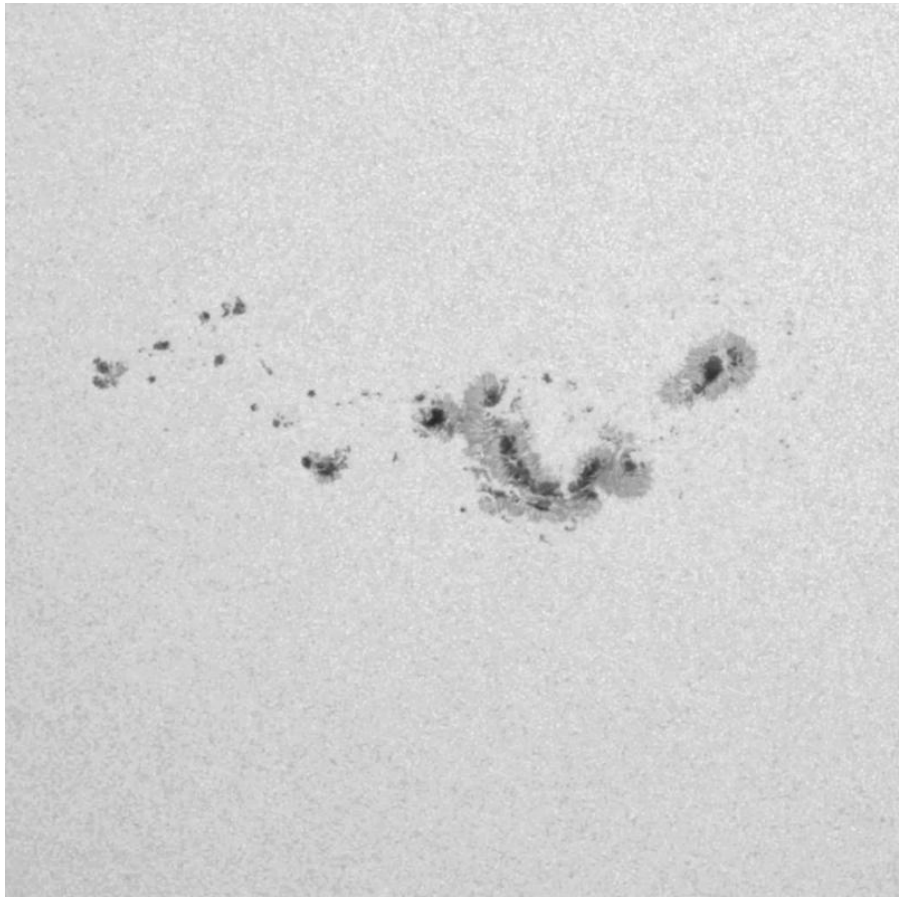
Filament – 24 Feb 2023

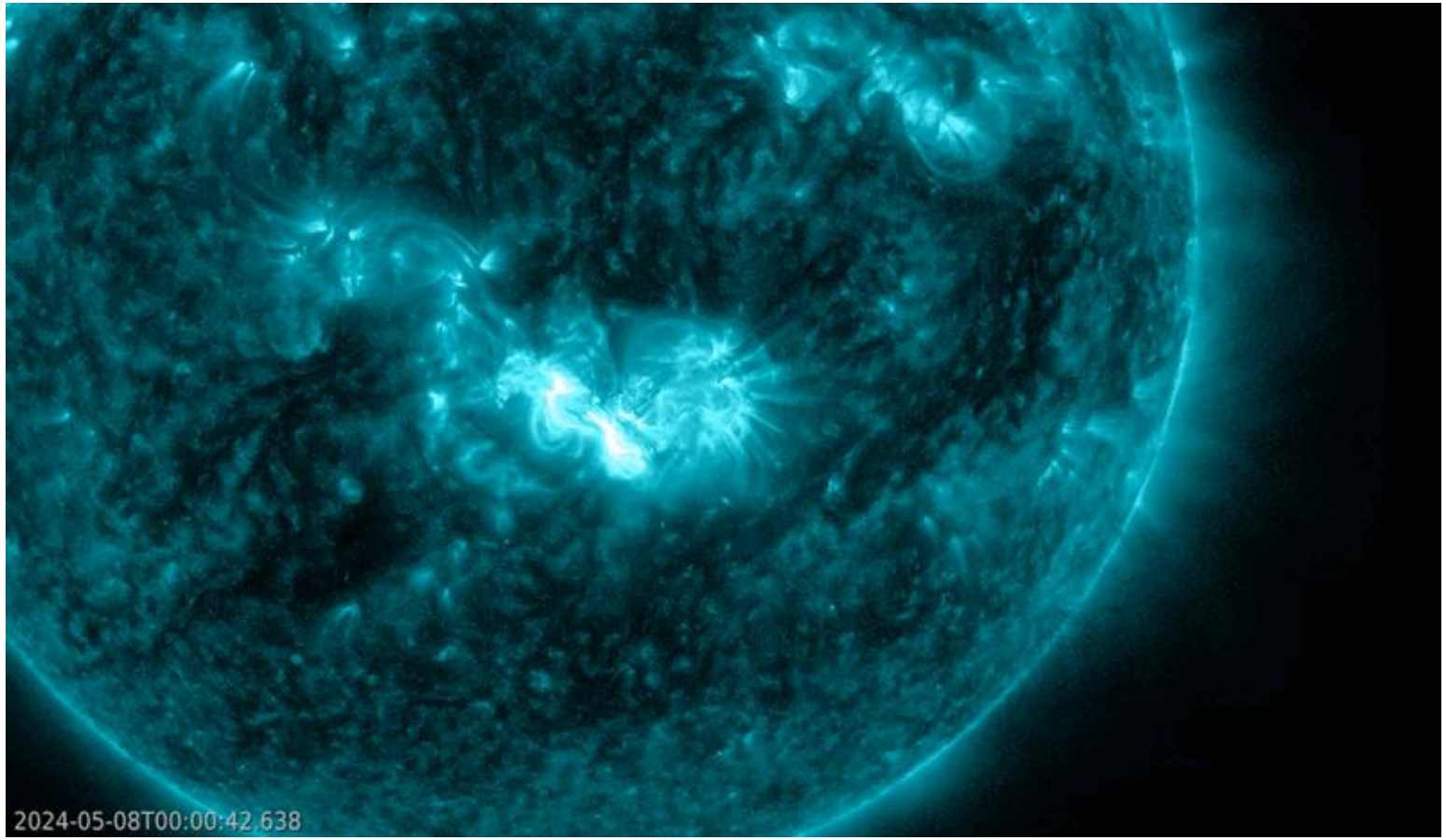




Zonnevlammen

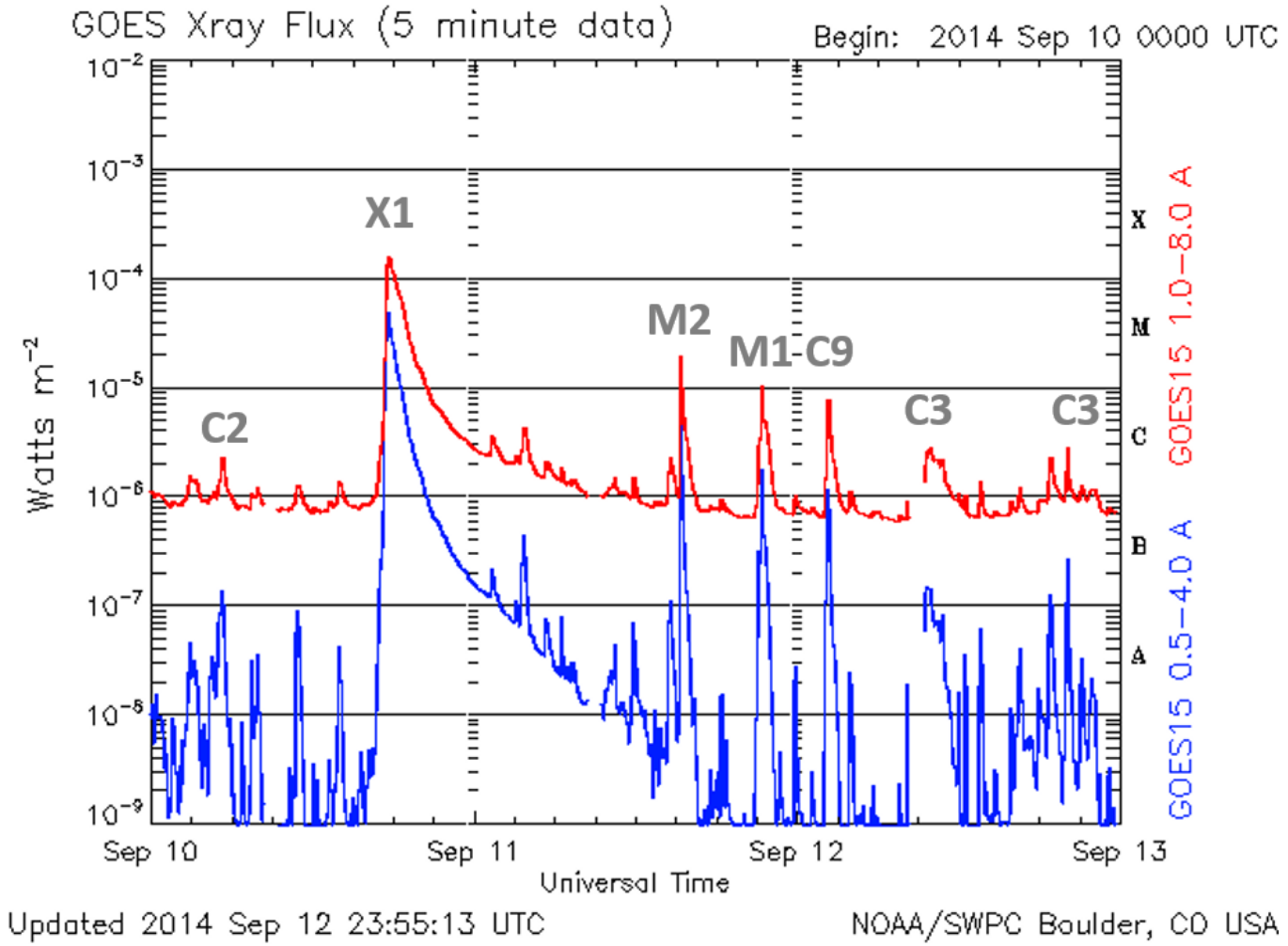
NOAA 13664 (Mei 2024)





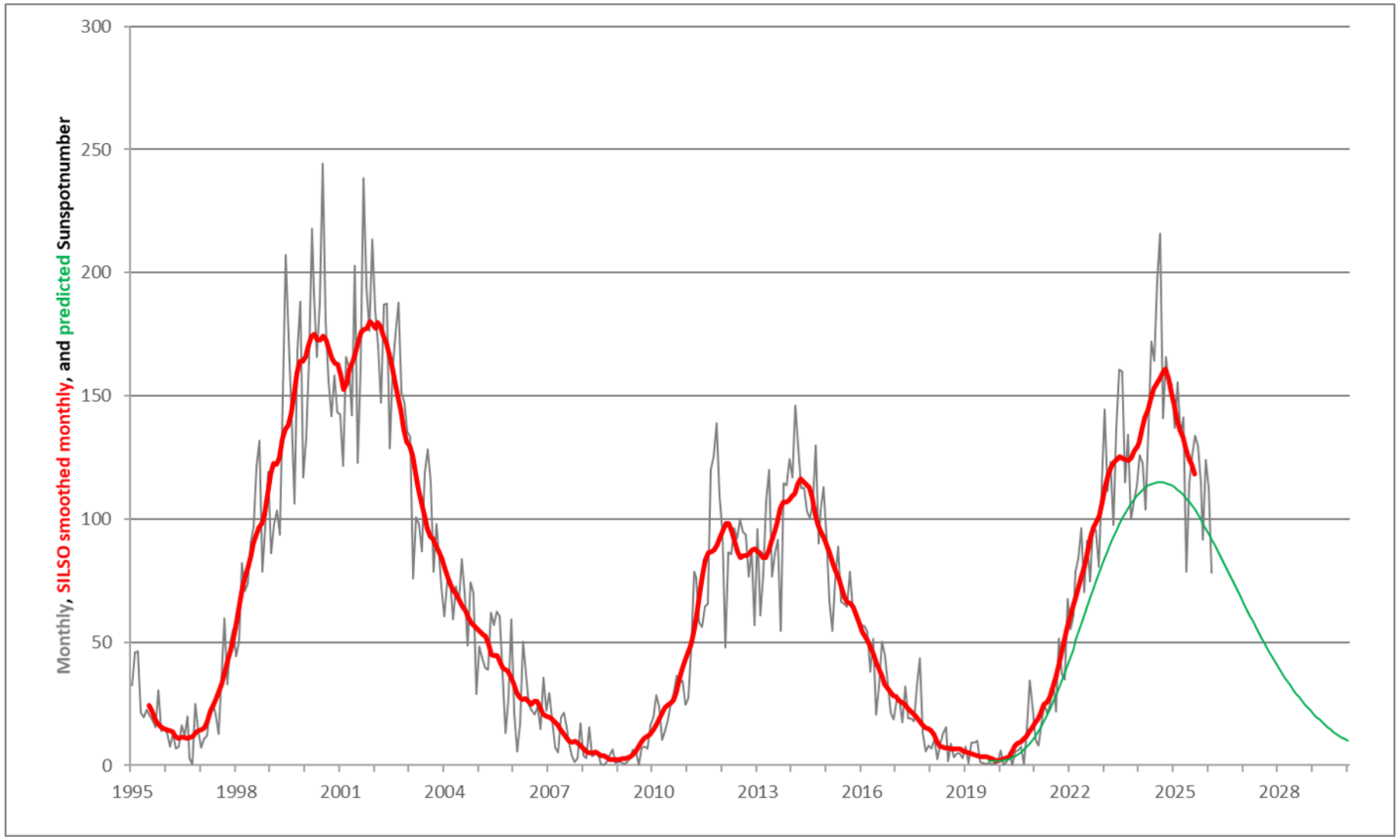
Zonnevlammen

Classificatie



Zonnevlammen

Evolutie met zonnecyclus

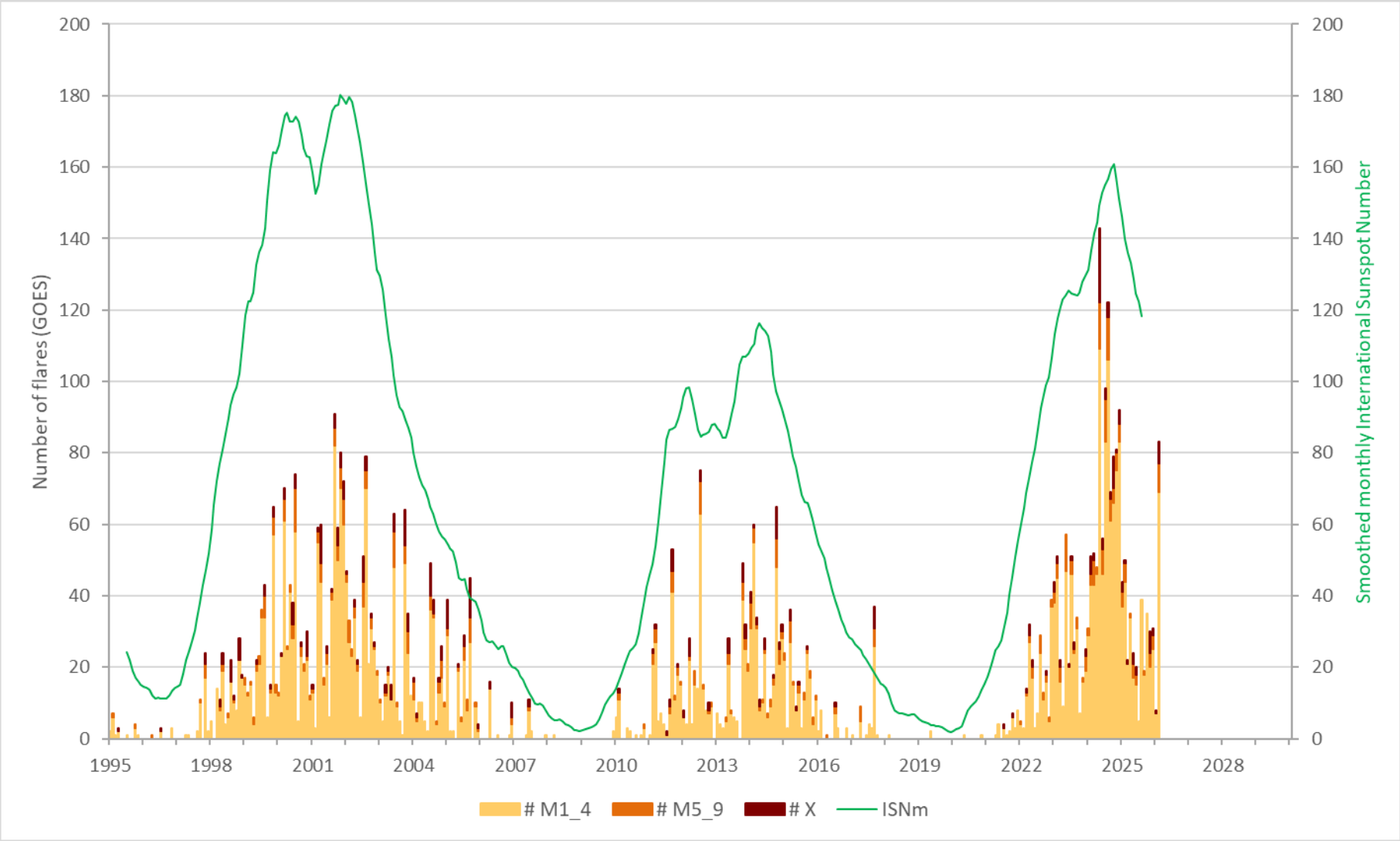


Zonnevlammen

Evolutie met zonnecyclus

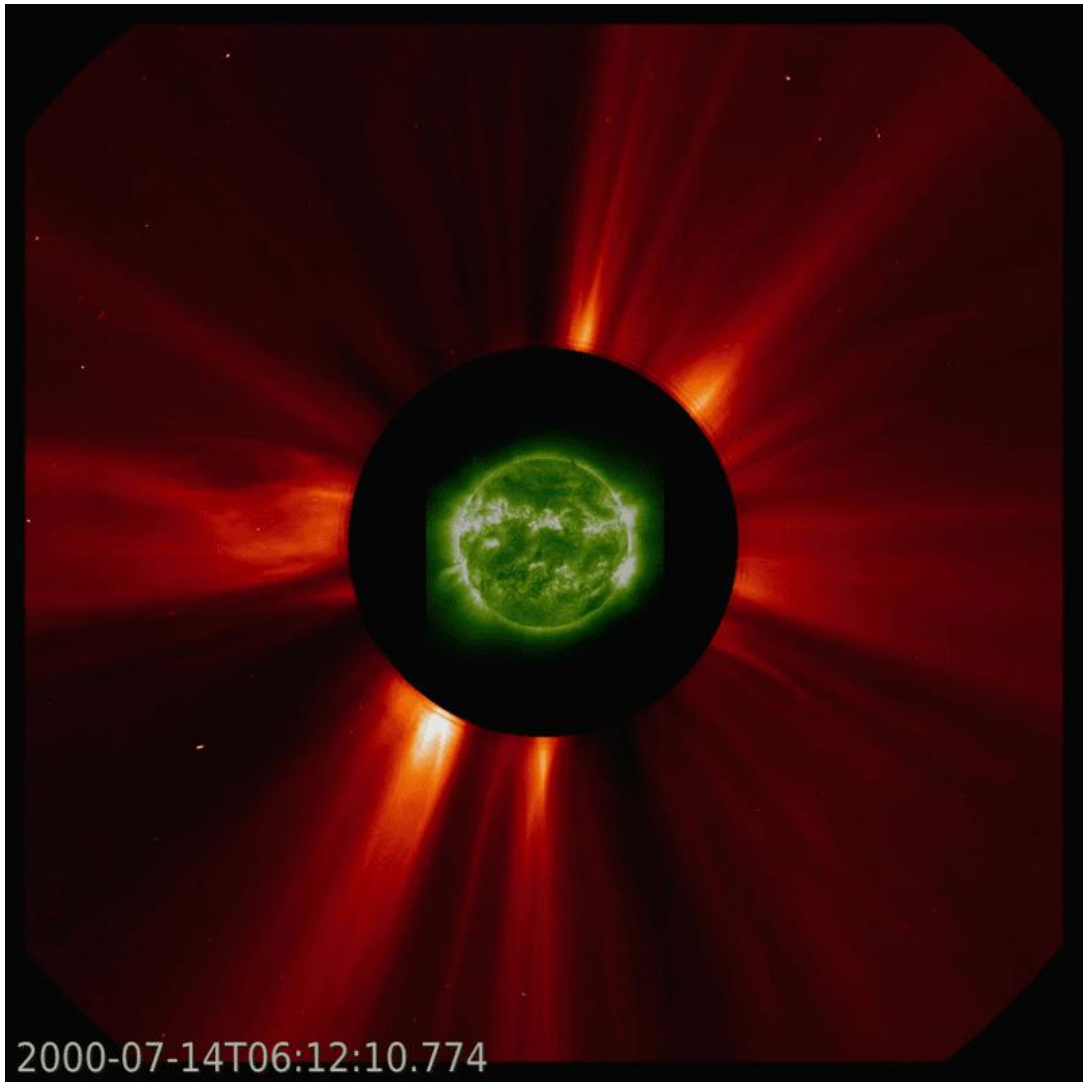
Zonnevlammen

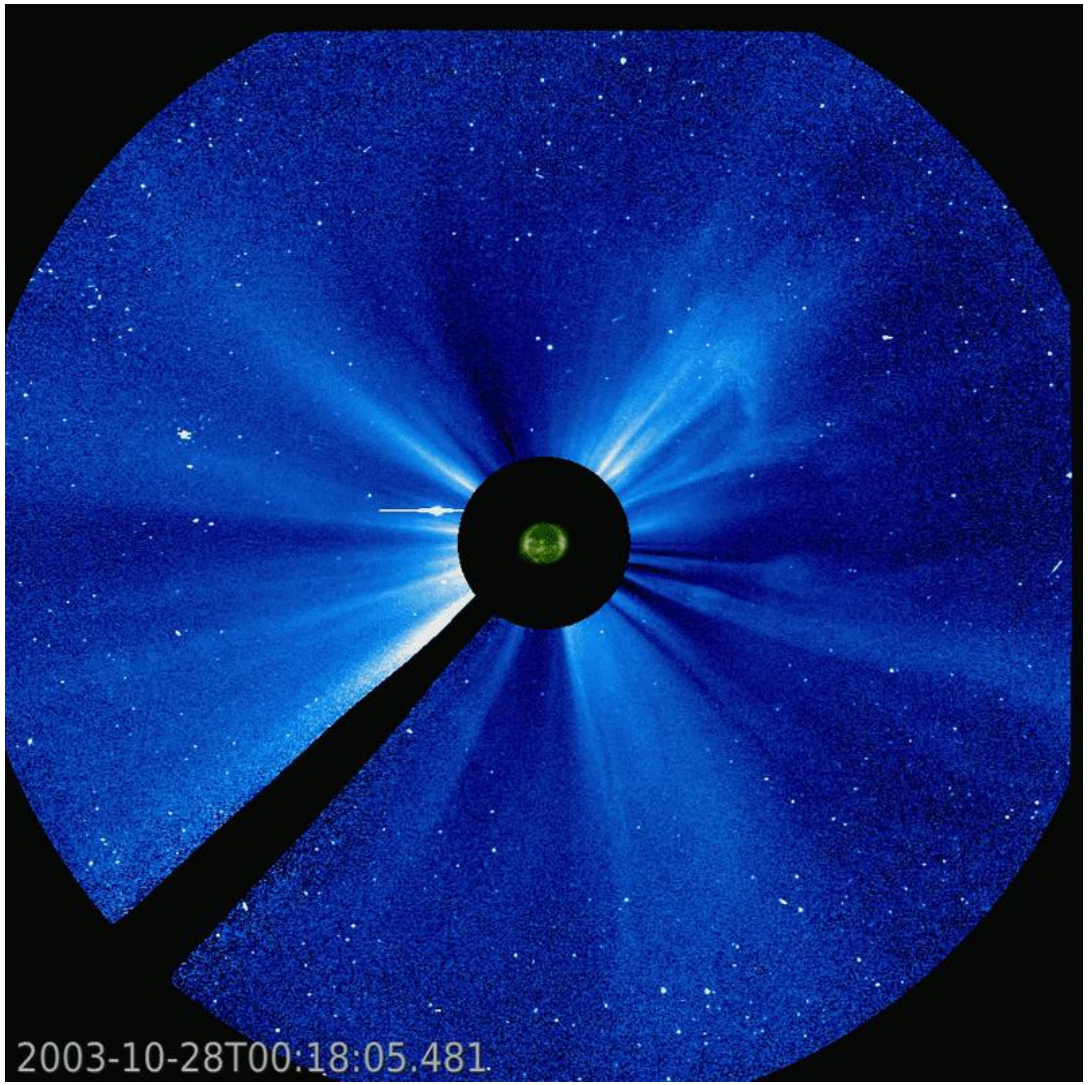
Evolutie met zonnecyclus



Proton stormen

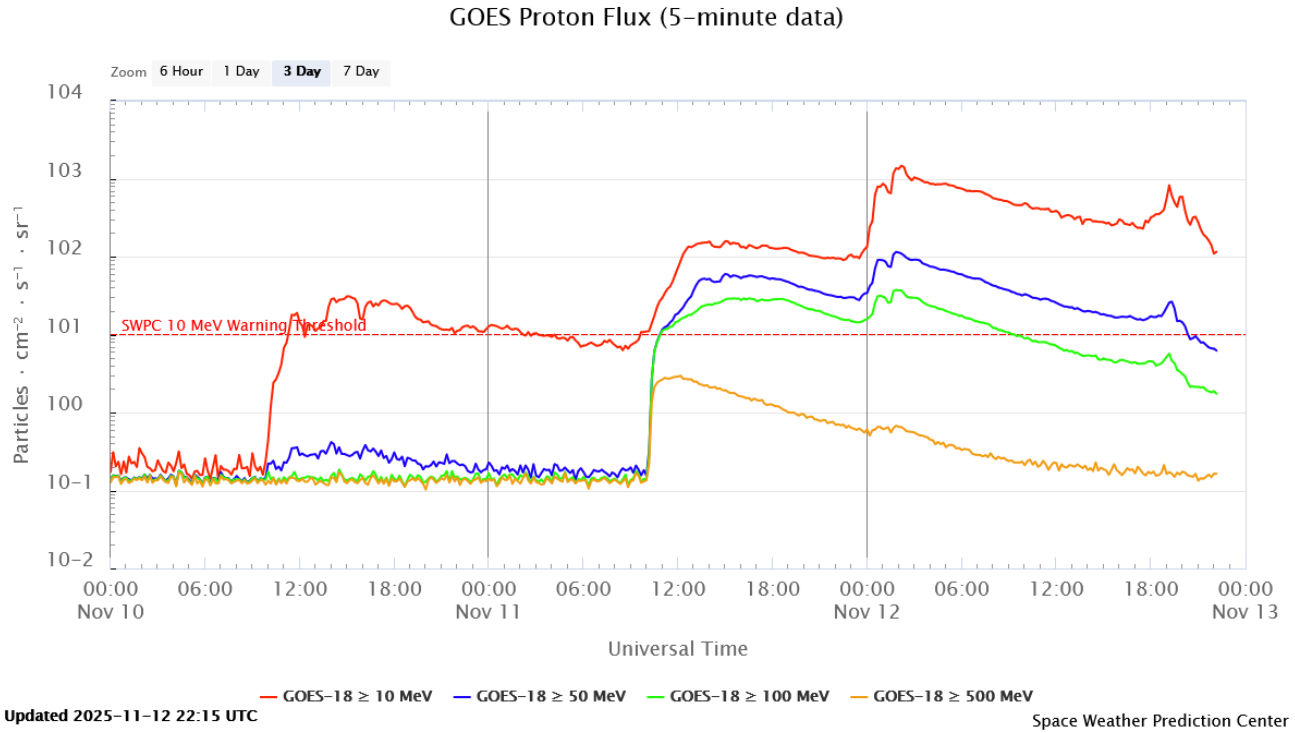
Bastille Day & Halloween proton stormen

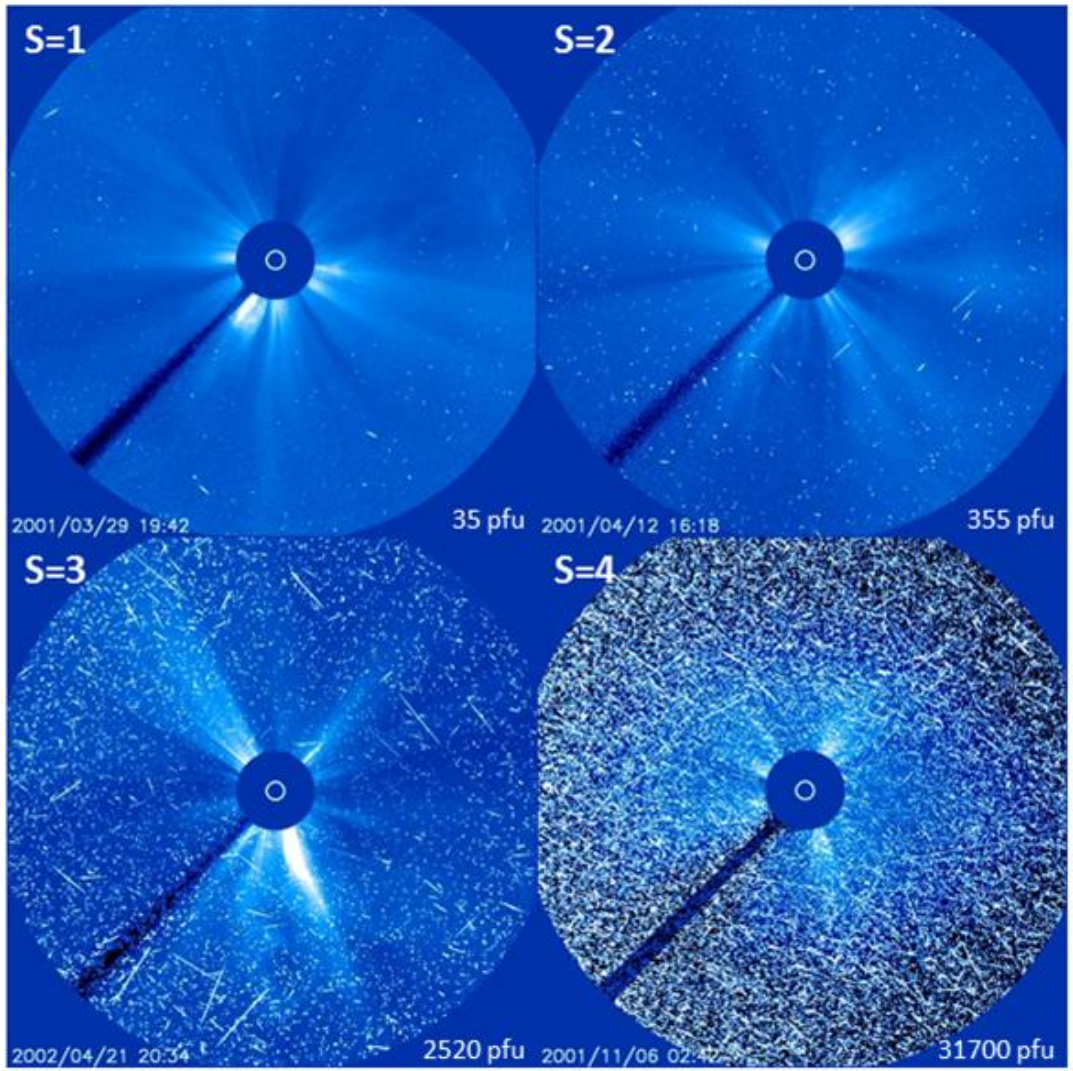




Proton stormen

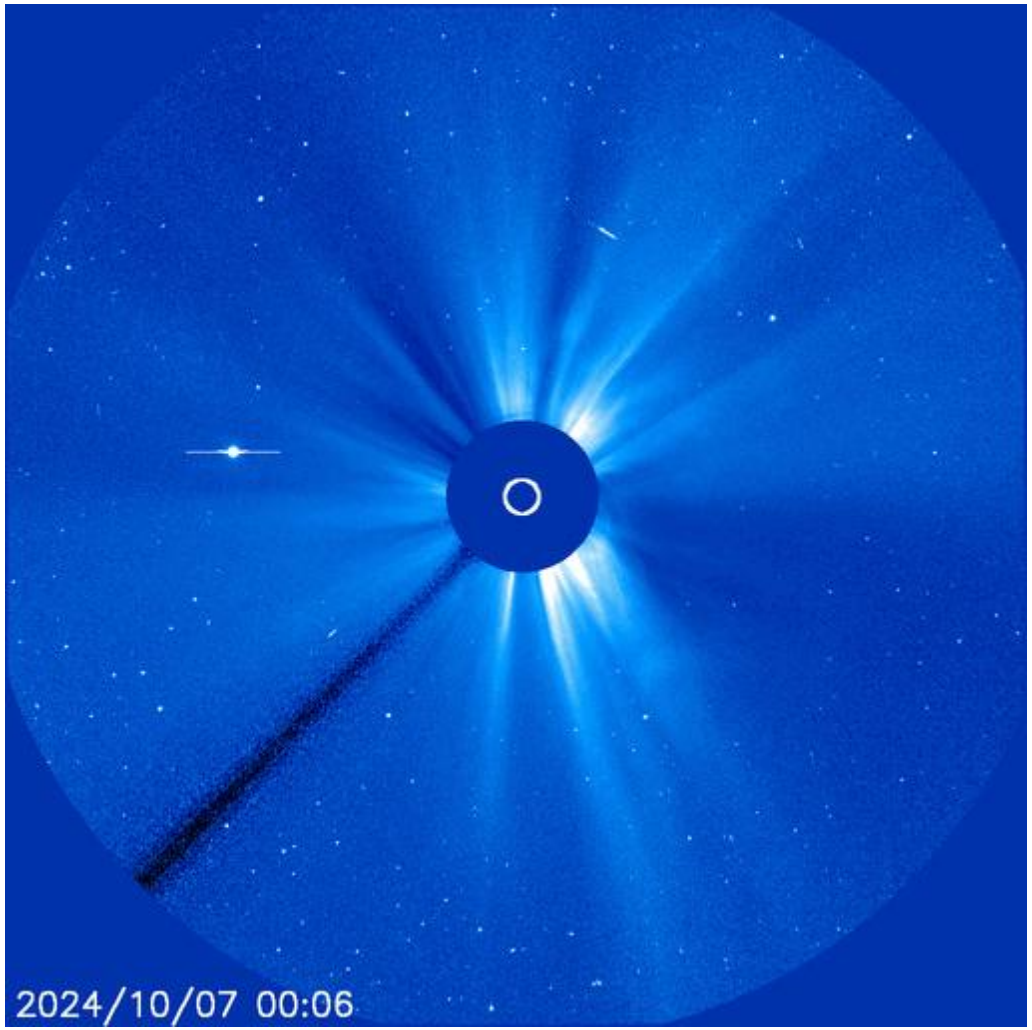
Classificatie



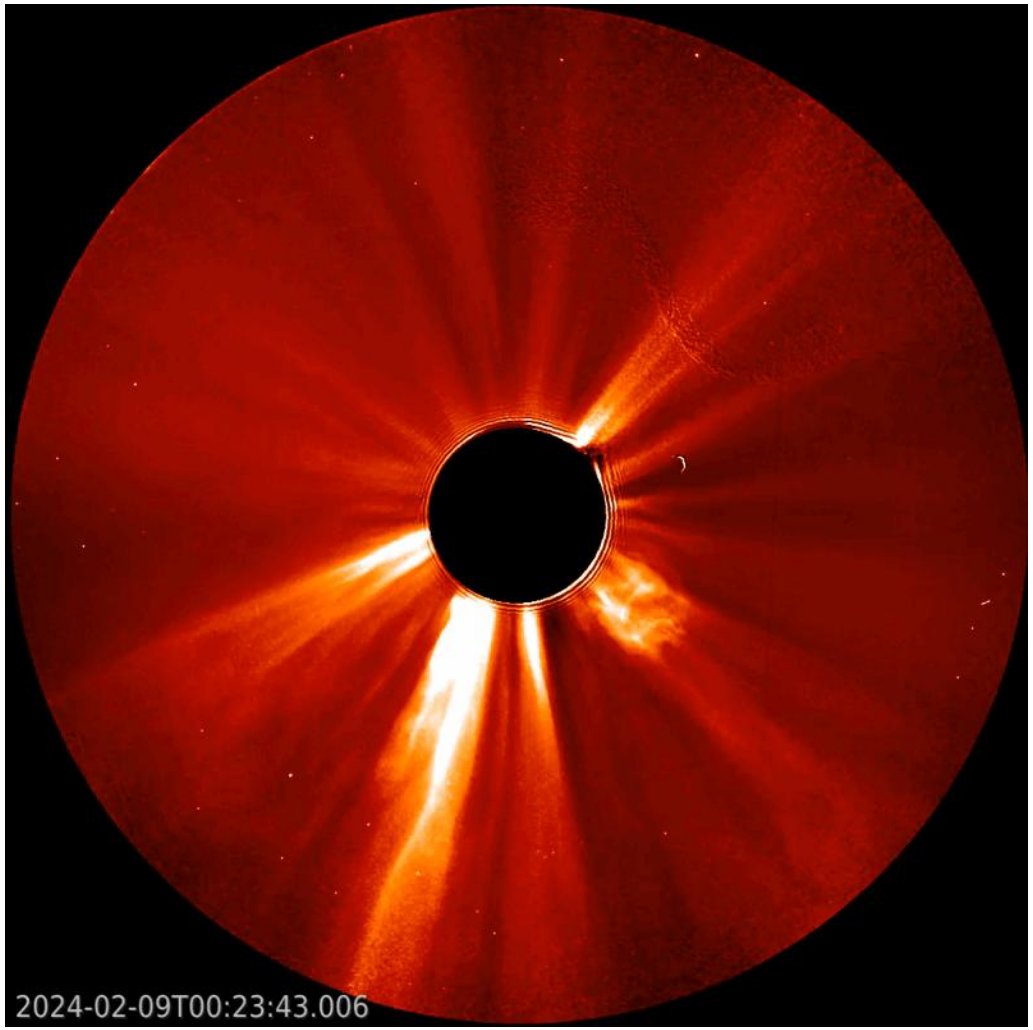


Coronale massa ejecties

SOHO/LASCO C2 & C3

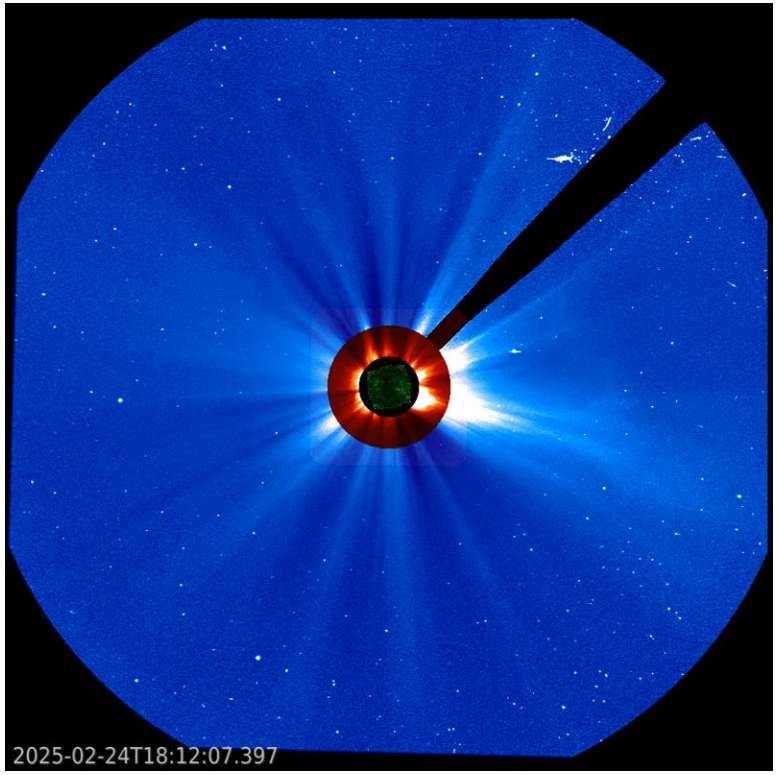


STEREO-A/COR2

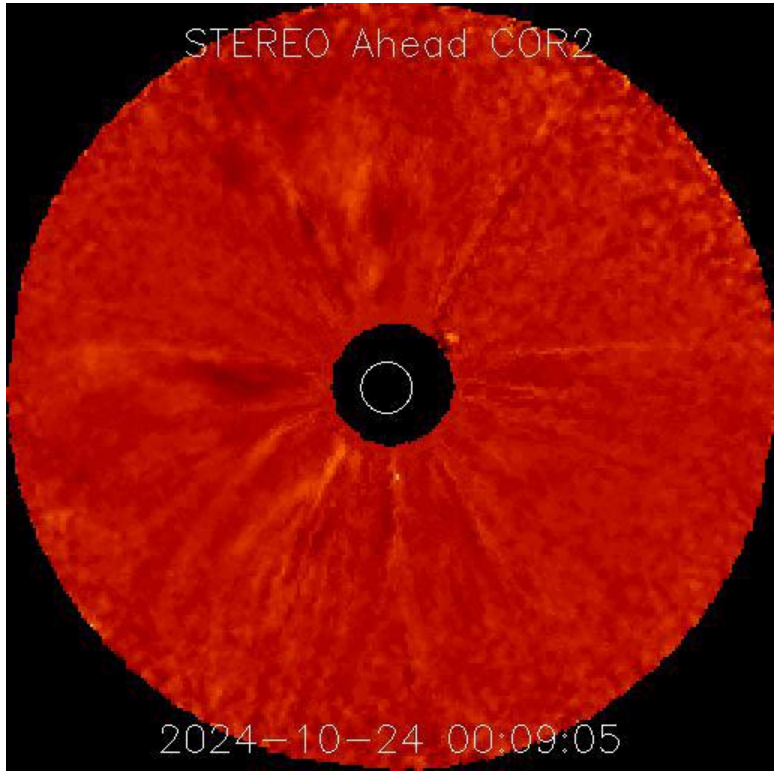


Coronale massa ejecties

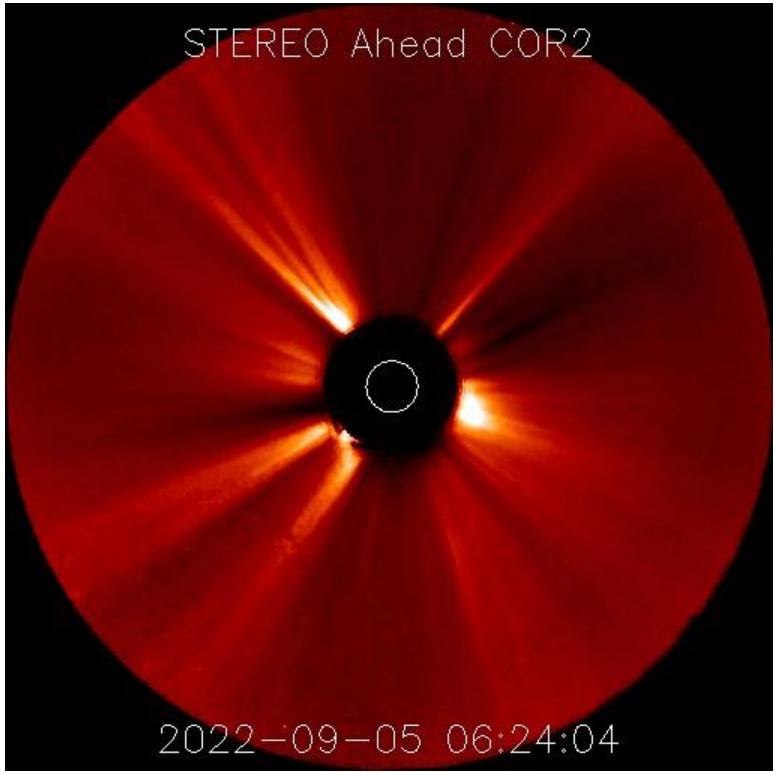
Breedte & symmetrie



Partiële halo CME (> 120°)



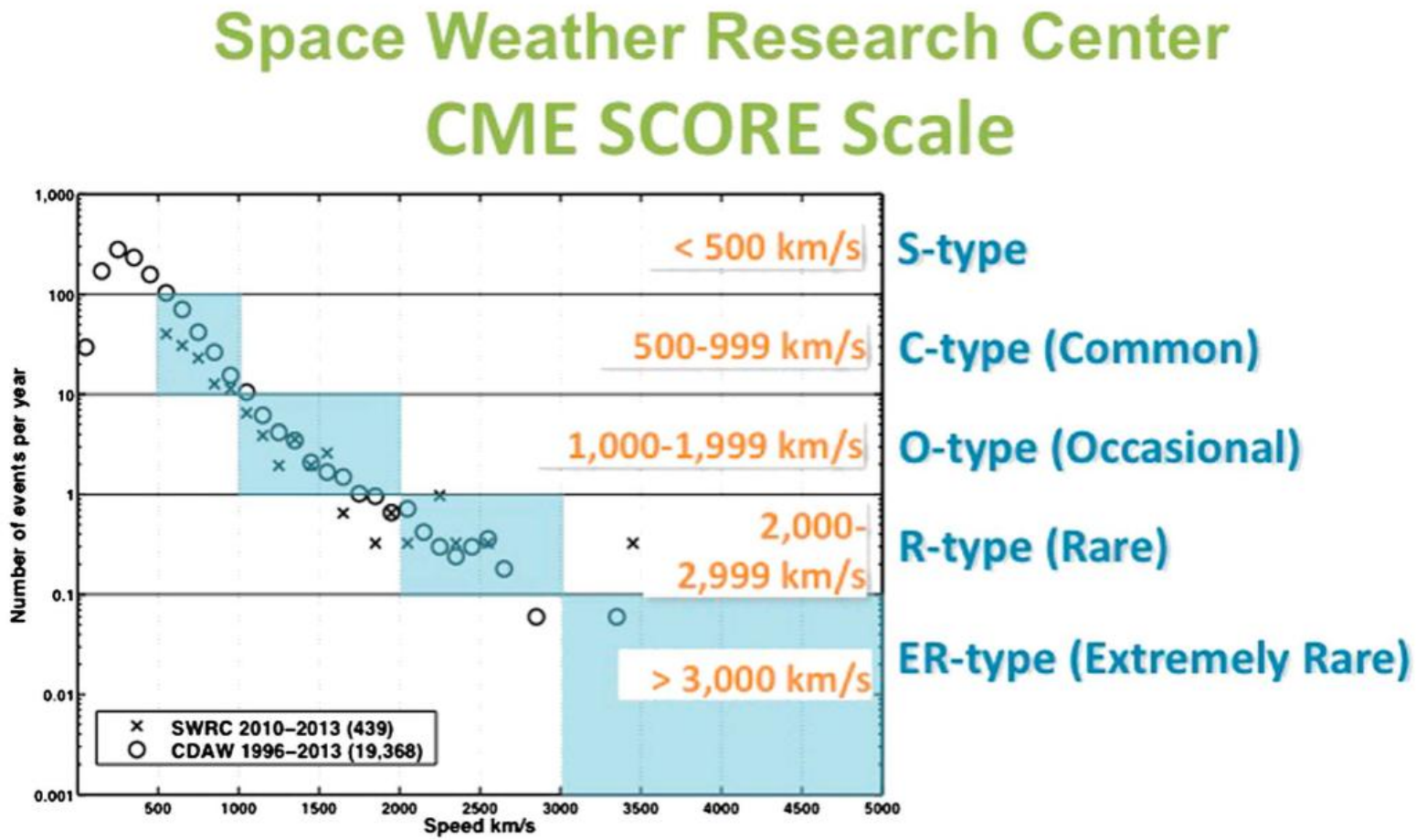
Asymmetrische halo CME



(Symmetrische) halo CME

Coronale massa ejecties

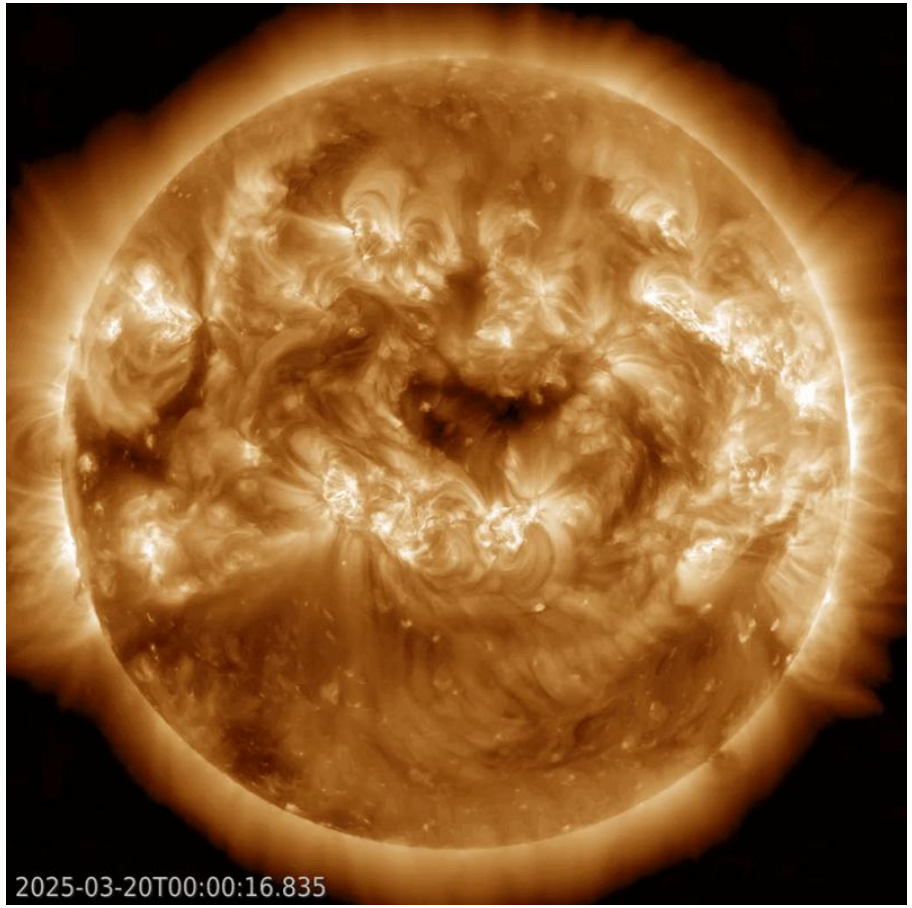
Snelheid

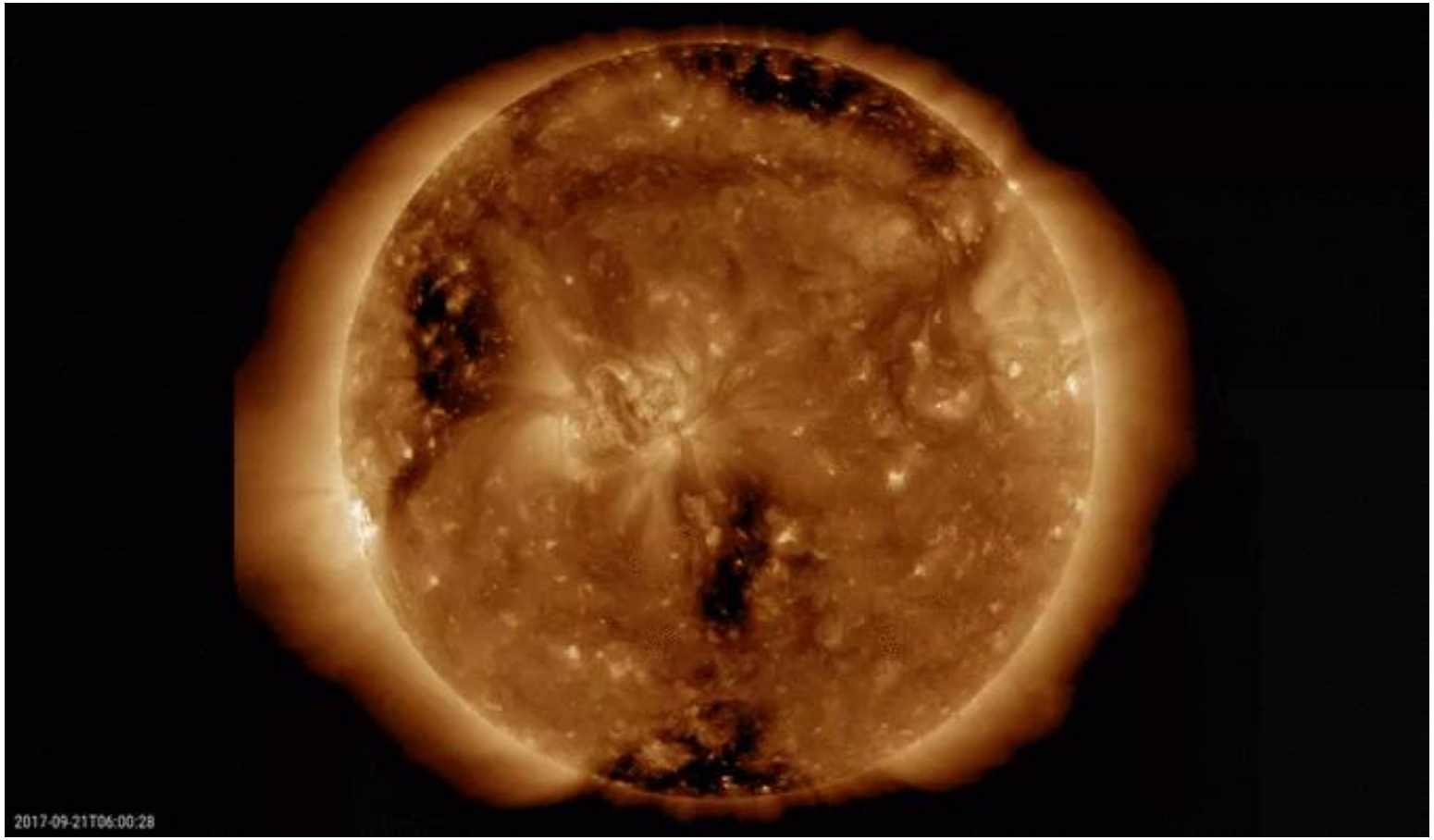


Evans et al. 2015 - https://doi.org/10.1002/swe.20058

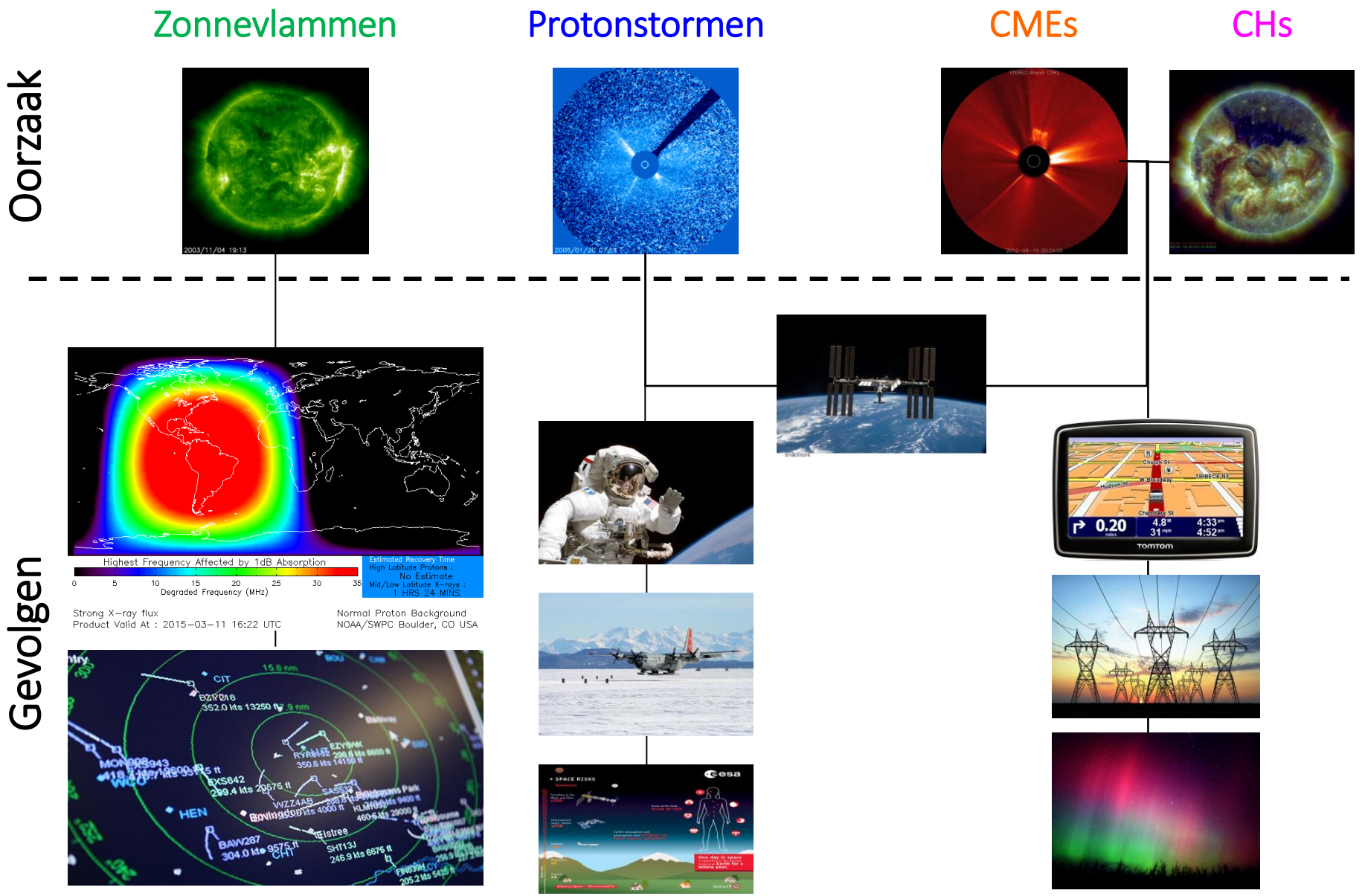
Coronale gaten

Non-eruptief



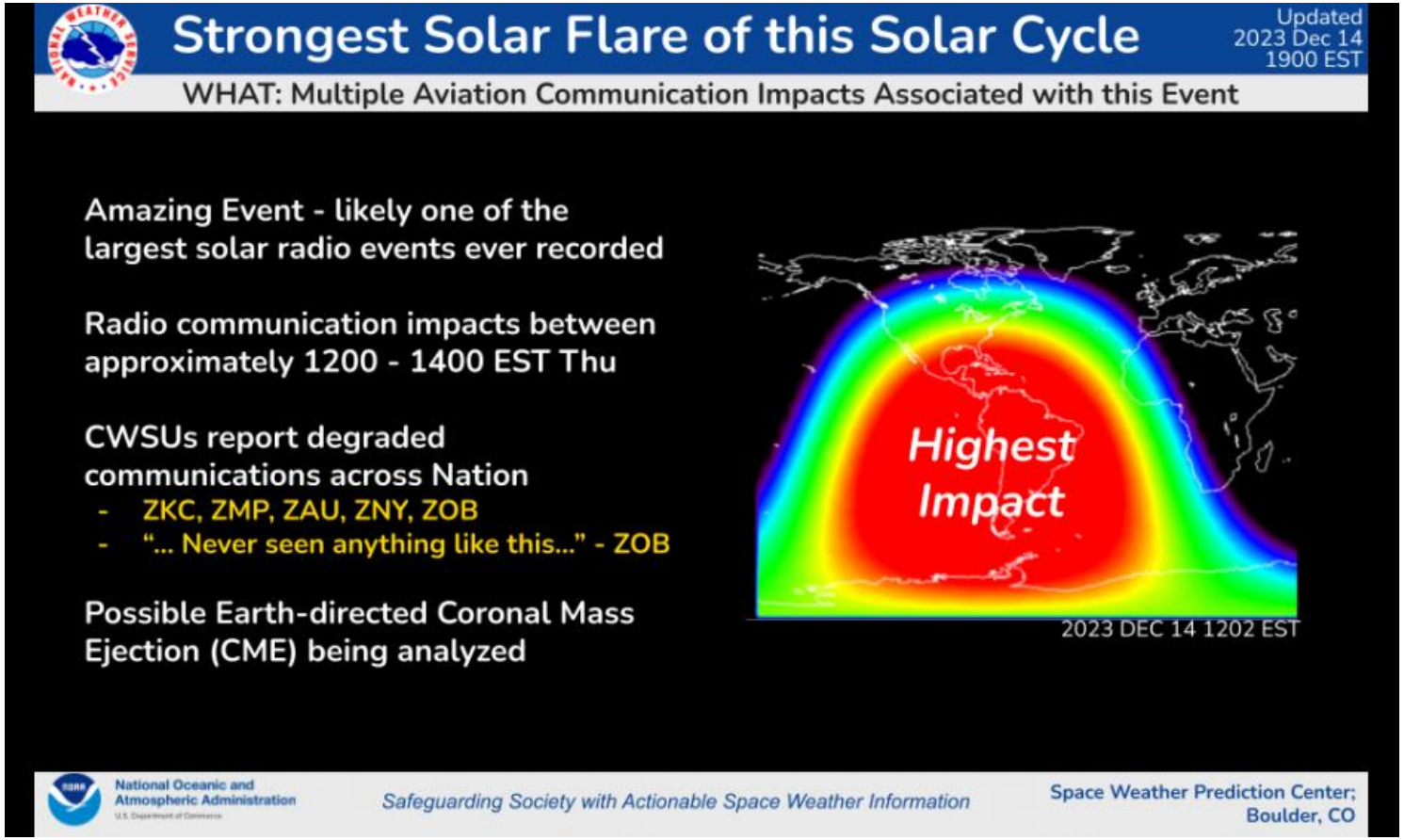


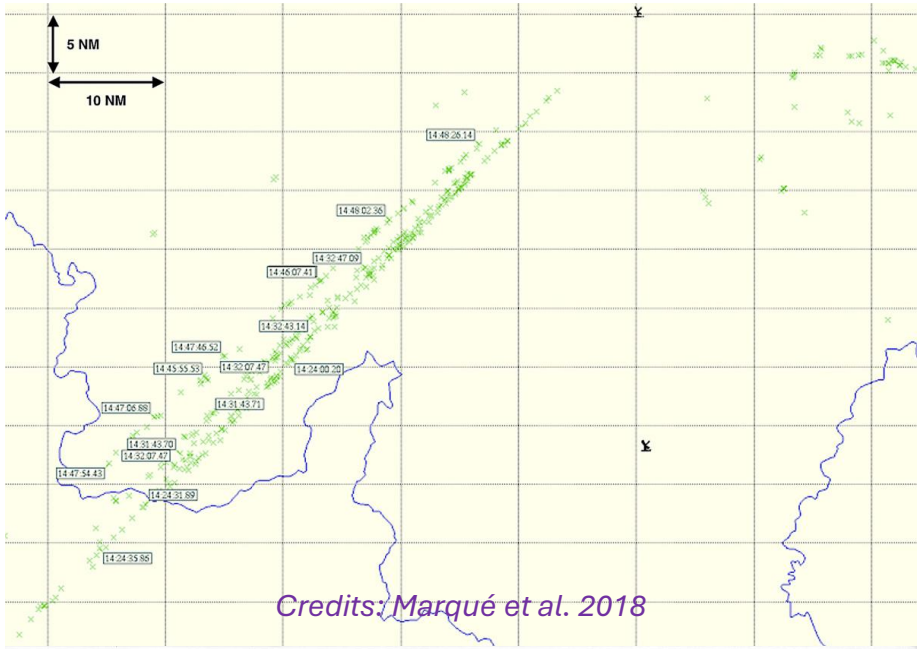
Verstoord ruimteweer: effecten



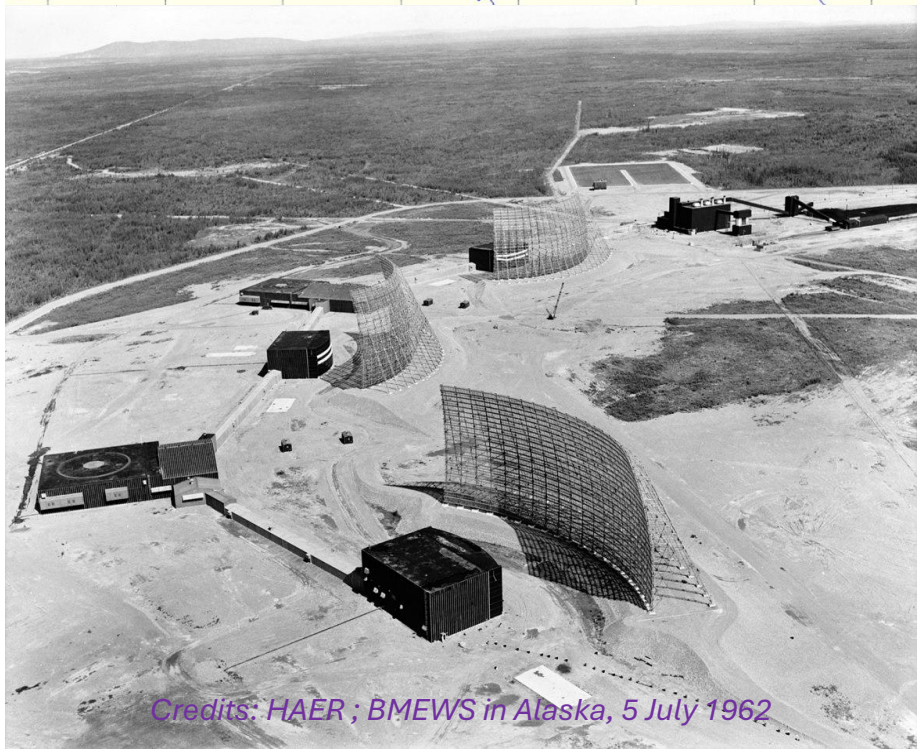
Zonnevlammen – Effecten

14 Dec 2023, 4 Nov 2015, 23 Mei 1967





Credits: Marqué et al. 2018



Credits: HAER ; BMEWS in Alaska, 5 July 1962

Proton stormen

1956, 1972, 2014, 2024

Net Paid Circulation Over 13,350

Amsterdam Evening Recorder

AND DAILY DEMOCRAT

Weather: Milder, Snow or Sleet

Vol. LXXVII, No. 158 — Amsterdam, N.Y., Friday, February 24, 1956 — 7 CENTS

Critics Demand Dulles Explain Policies, Acts

Secretary Faces Questioning by Senators on Sale Of Tanks, 'Brink of War' Statement, Other Issues

Ousted Soviet Premier Draws Fire of Leader

Deputy Prime Minister Denounces Malenkov's Administration of Power Ministry as Wasteful

Missing British Sub Feared Lost, Safe; Search Called Off

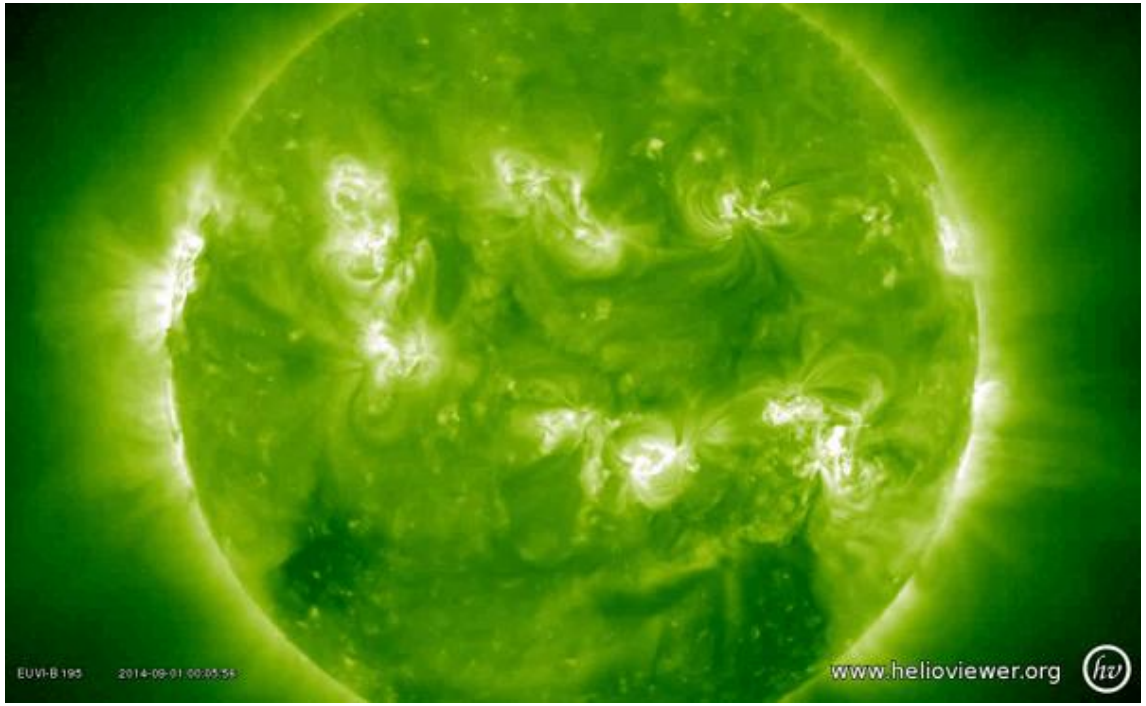
Acheron Sighted in Gale-Swept Arctic Sea by Minesweeper; Failure of Communications System Made Contact With Admiralty Impossible; Was Unreported Since Wednesday When It Made Trial Dive

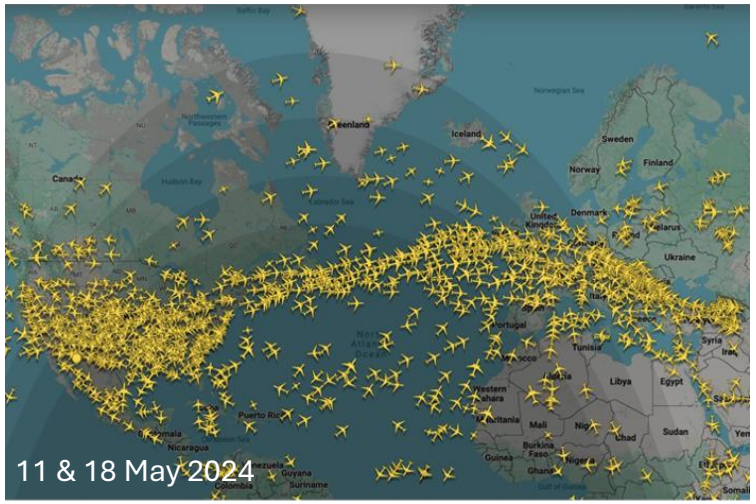
3d Dixie Party Urged in Fight On Integration

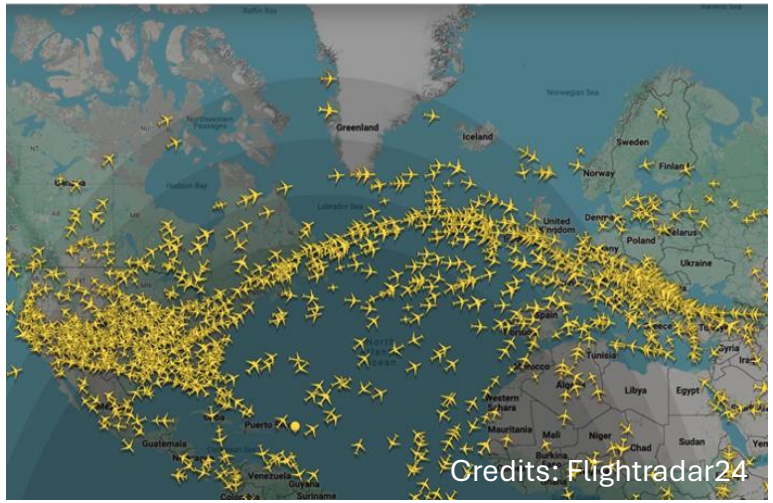
5 Die, 100 Hurt In Derailment Of P.R.R. Train

Seven Coaches Jump Rails With Train Speeding at 80 Miles Per Hour; Cause Of Accident Unknown

10 Aboard Safe State Agencies

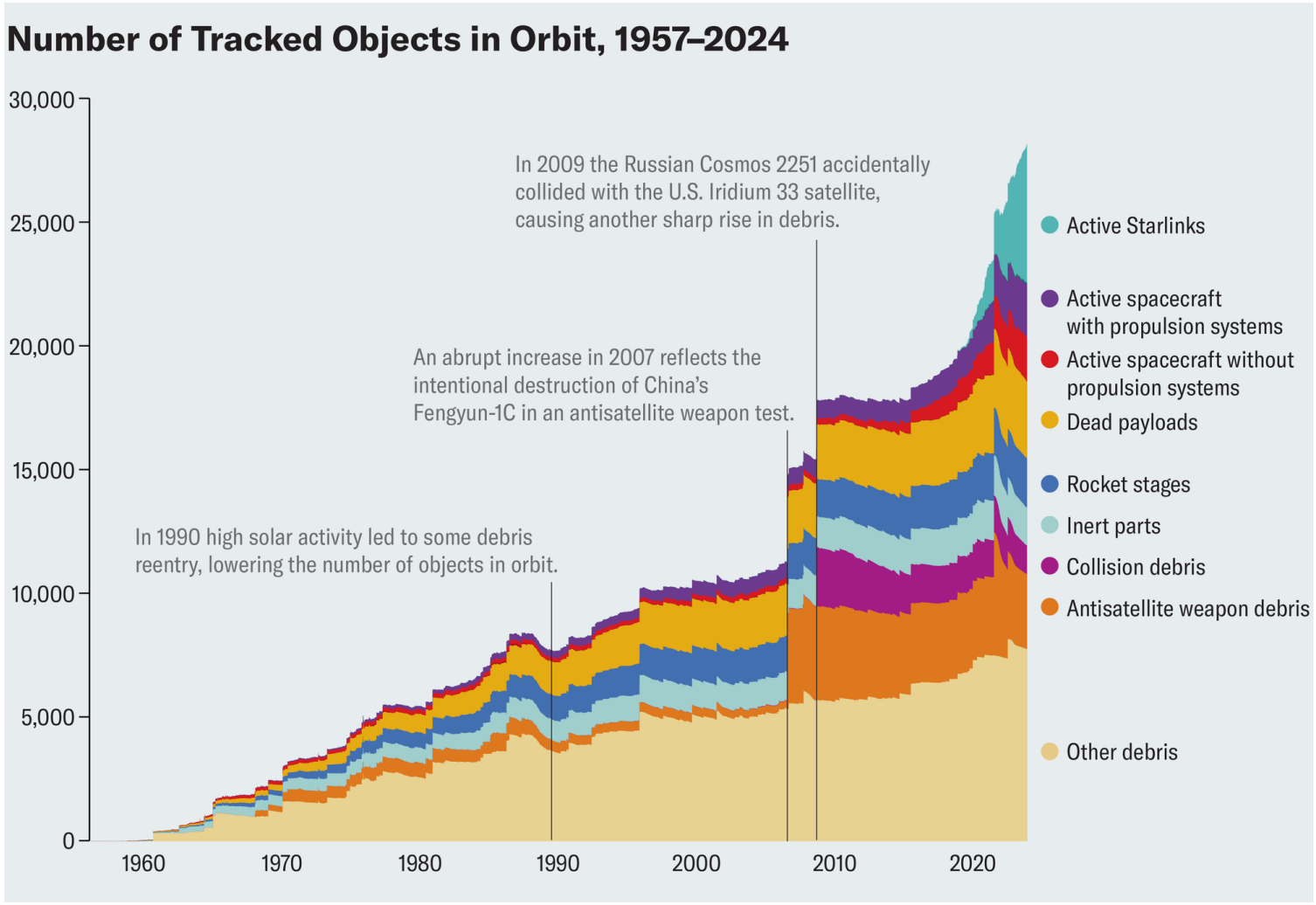


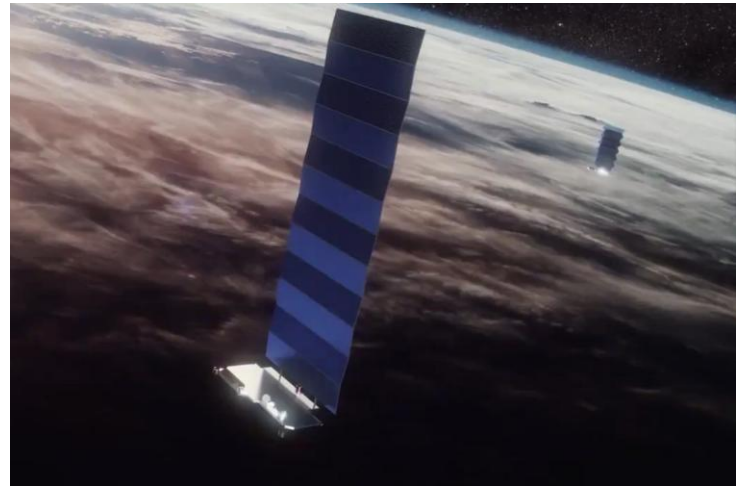


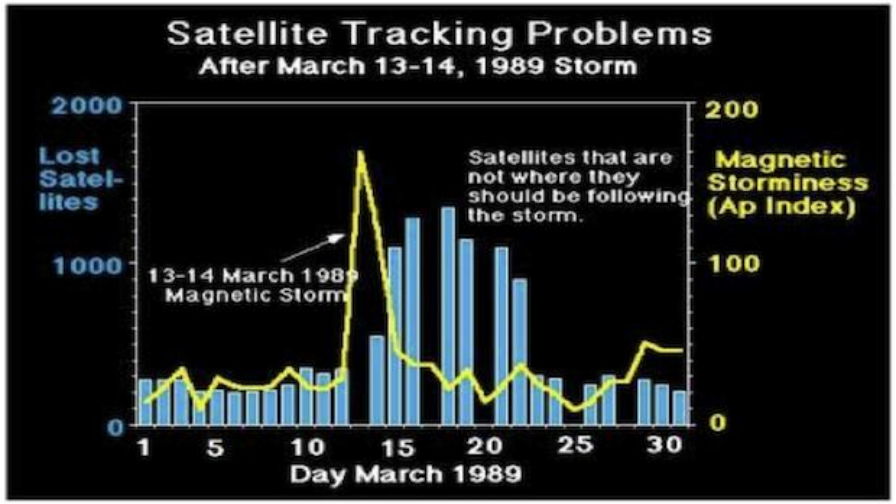


Coronale massa ejecties – Effecten (1/2)

Drag, 1989, 2022

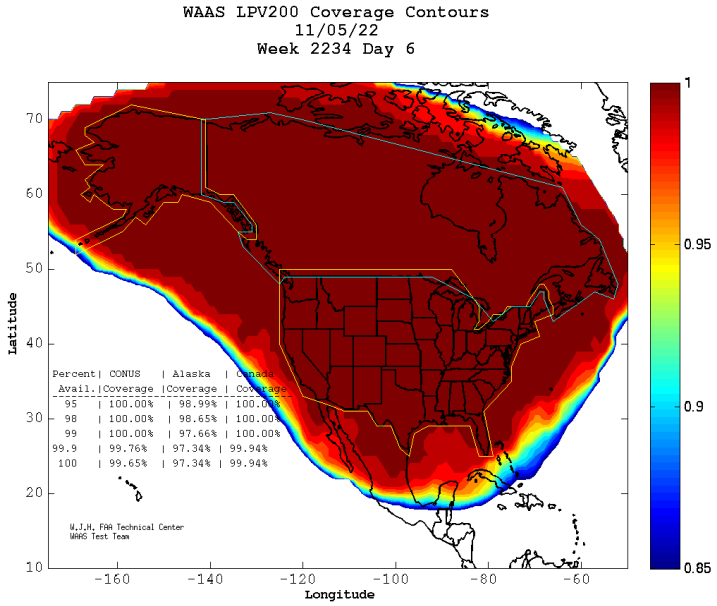


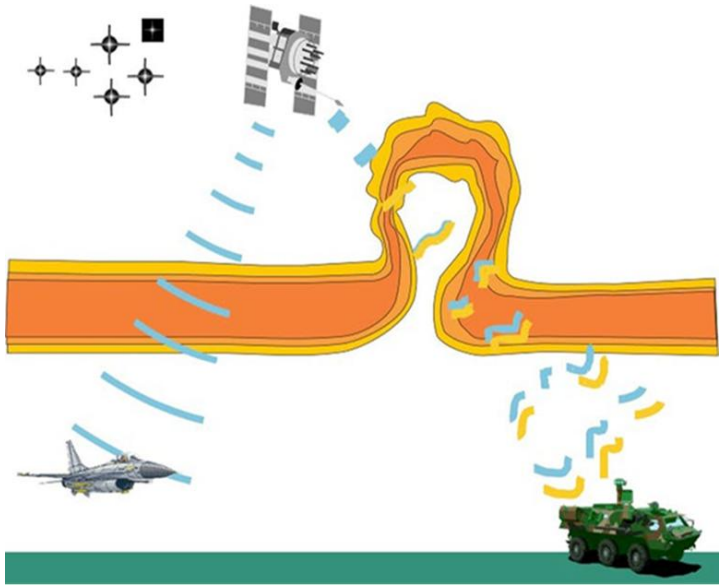




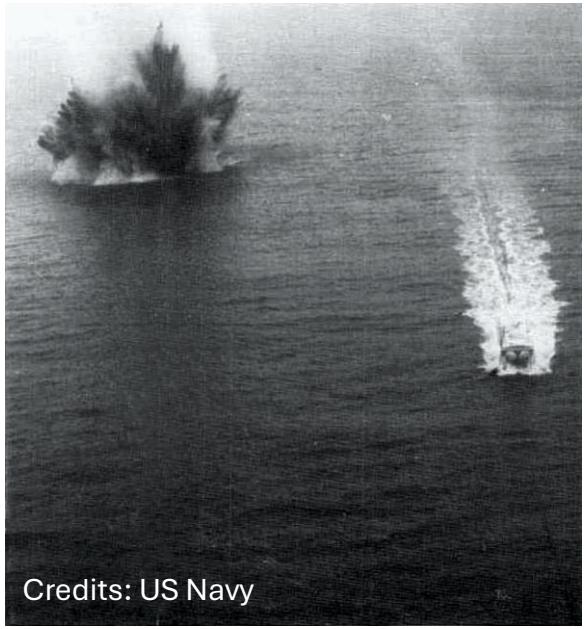
Amanda Montañez; Source: "Satellite Statistics: Satellite and Debris Population," Jonathan's Space Report (*data*)

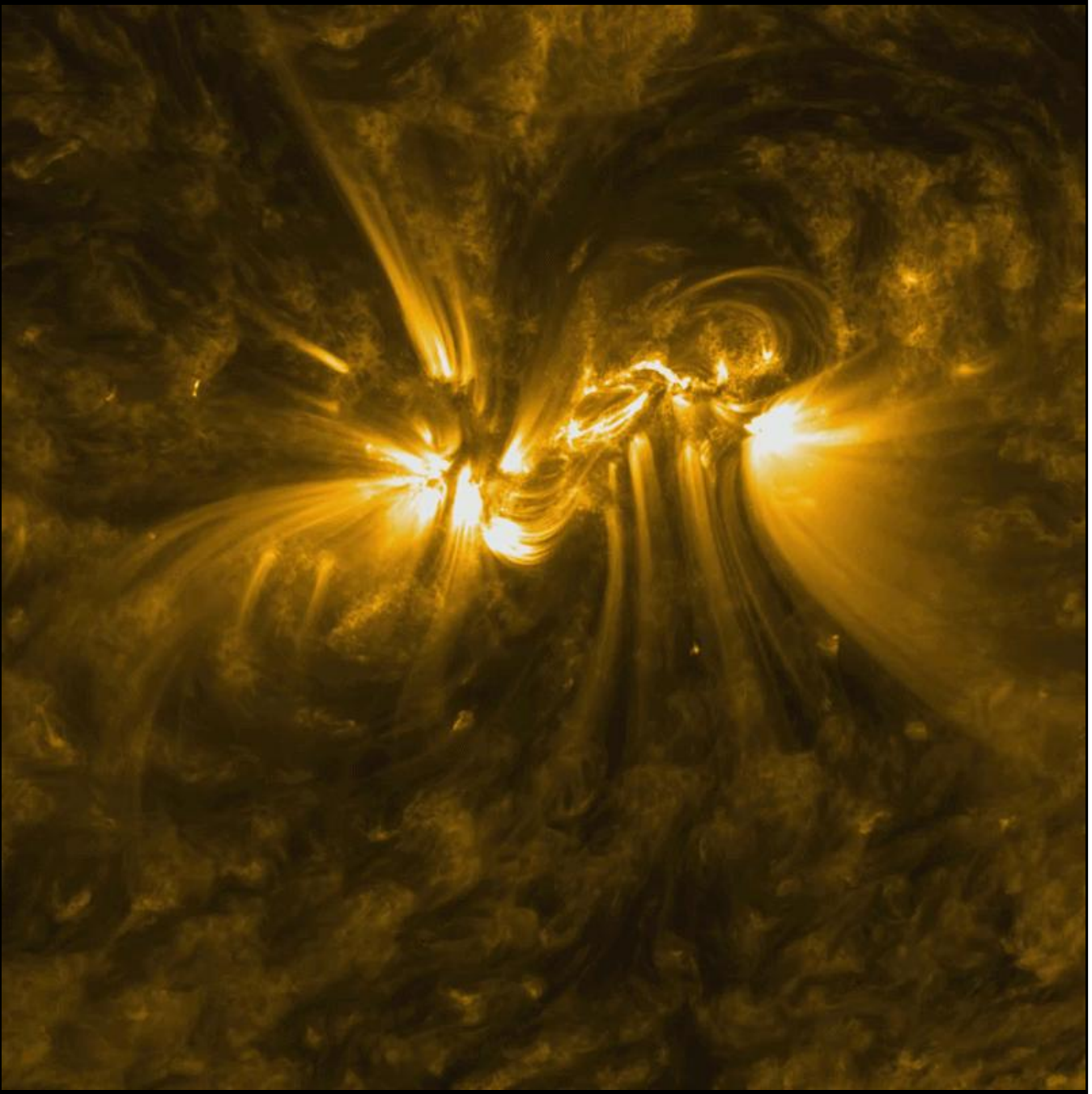
Coronale massa ejecties – Effecten (2/2)





Credits: US Air Force Research Laboratory





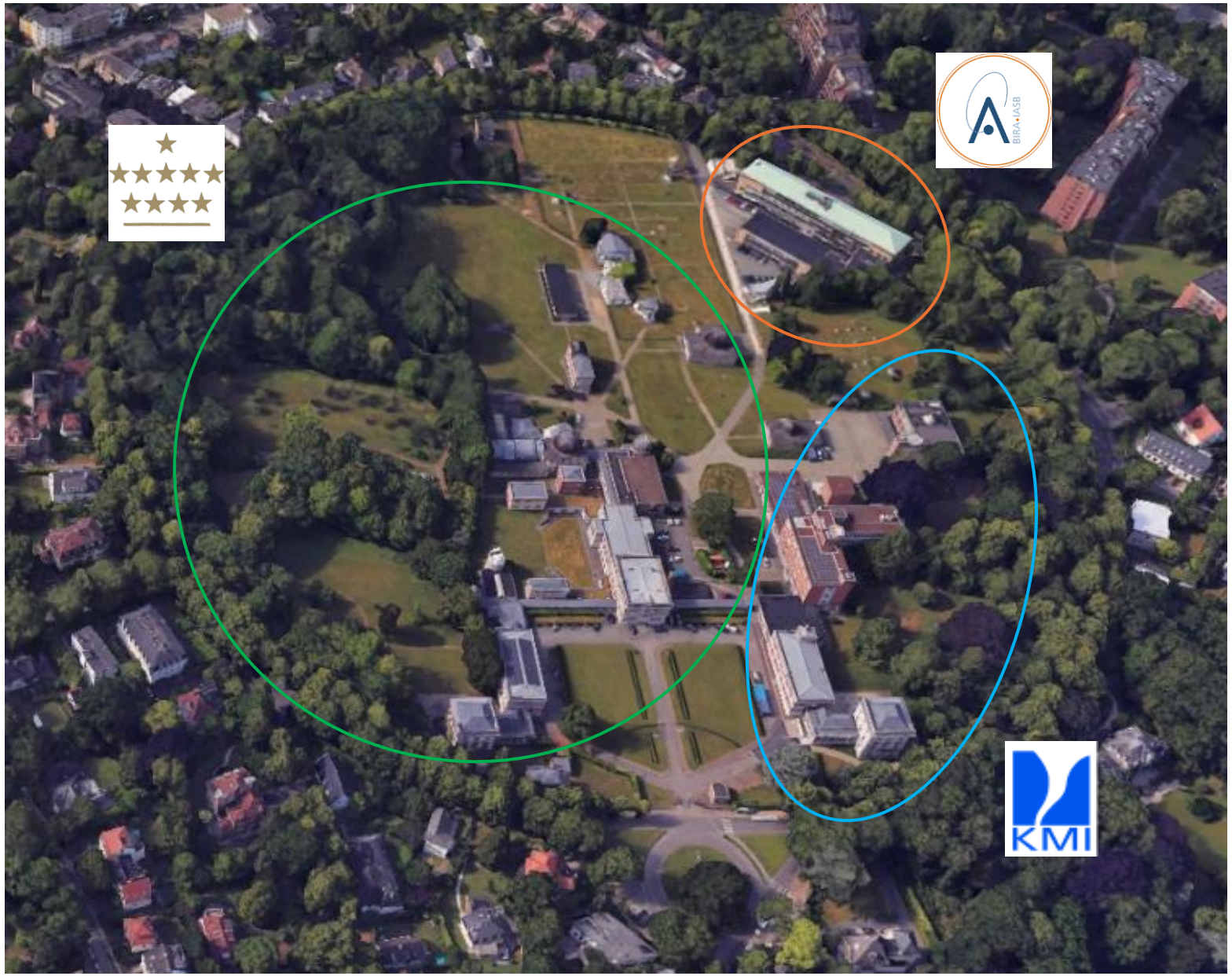
Het hoe van ruimteweer

Over de opvolging en voorspelling van verstoord ruimteweer

SWEC
Space Weather Education Centre

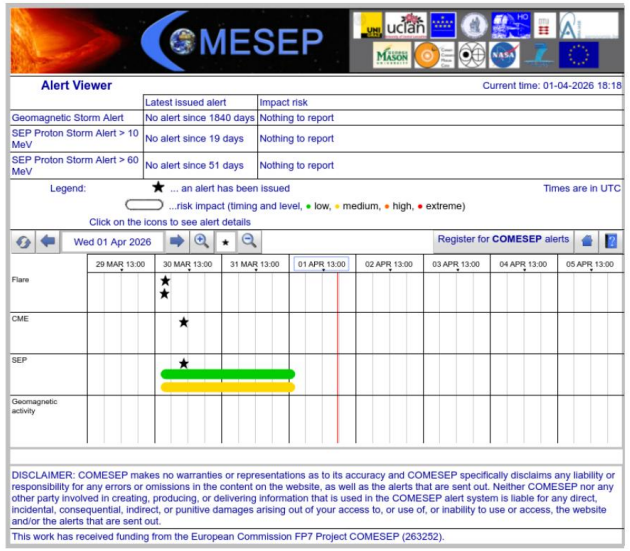
De Pool Ruimte

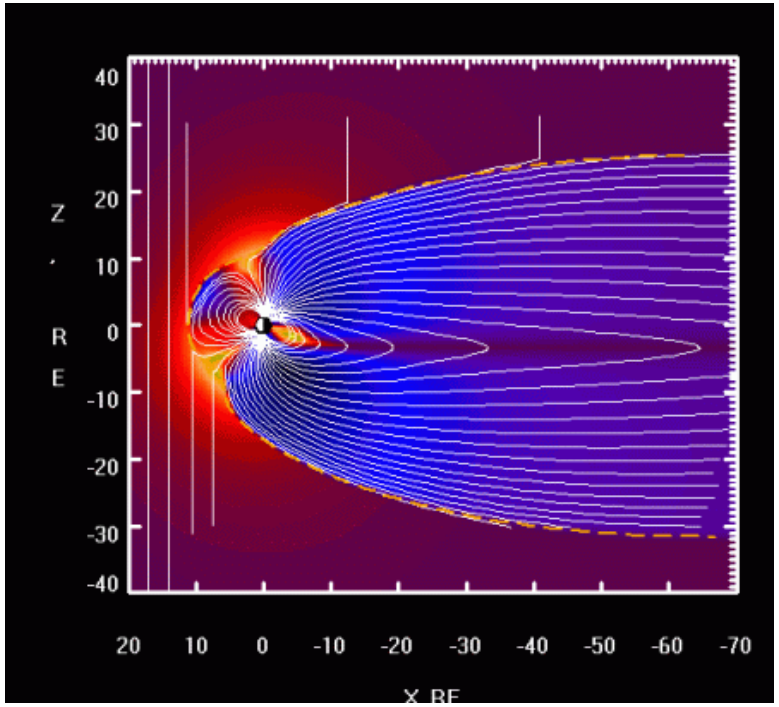
- Koninklijke Sterrenwacht van België (KSB)
  - 1826
- Koninklijk Meteorologisch Instituut (KMI)
  - 1913
- Koninklijk Belgisch Instituut voor Ruimte-Aëronomie (BIRA-IASB)
  - 1964

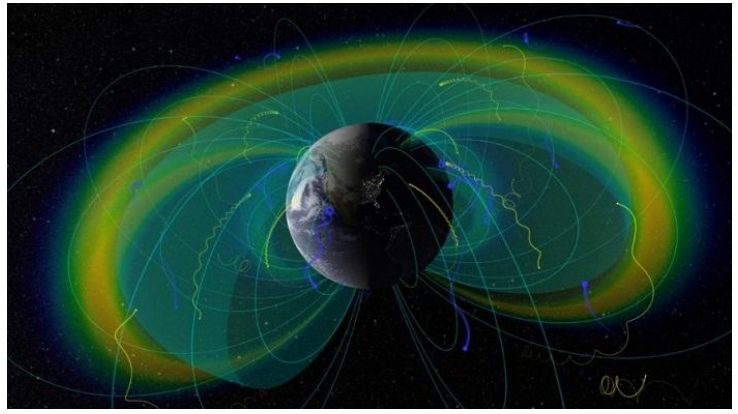


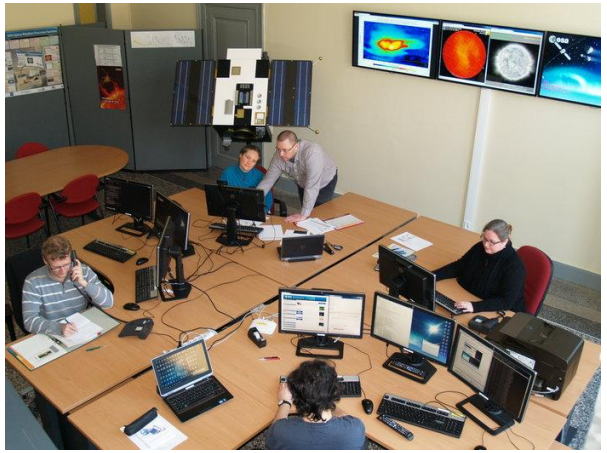
BIRA-IASB

- Magnetosfeer
  - Aurora
- Energetische deeltjes
  - Proton storm alarm
- Stralingsdosissen
- …
- SSCC (ESA)
  - Coördinatie ESC
    - Ruimtemissies
    - Extreme SWx situaties
  - Lead R-ESC



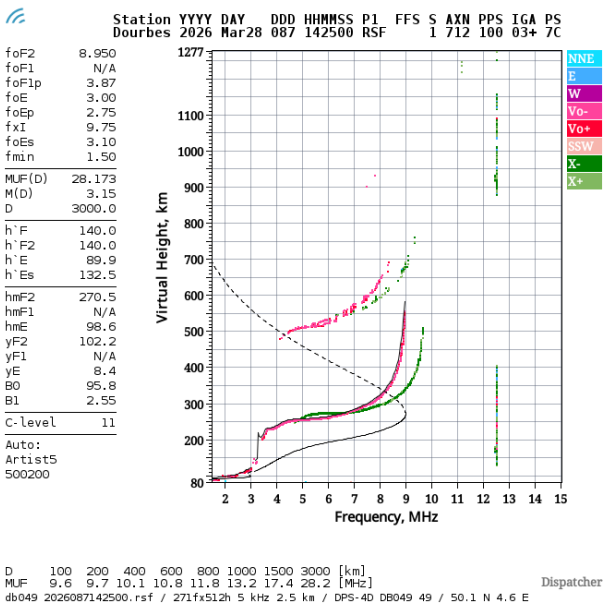






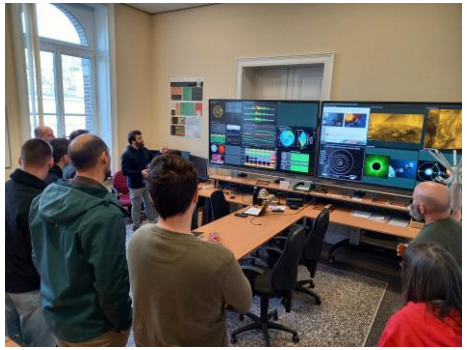
KMI

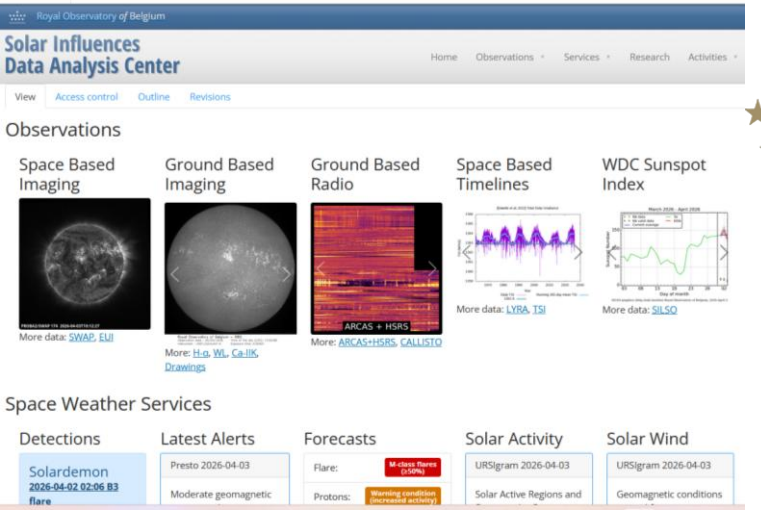
- Dourbes (1953)
  - Magnetisch veld van de aarde
    - K_BEL (2021)
  - Ionosfeer (1957)
    - Radio communicatie
      - HF Com
    - GNSS (2009)
      - GPS, Galileo,…
  - Neutron monitor (1965)
    - Hoogenergetische deeltjes
      - Kosmische straling
      - Proton stormen
      - …



KSB

- SIDC
  - Solar Influences Data analysis Centre
    - OD4: "Zonnefysica en Ruimteweer"
  - Ruimteweercentrum (2000)
    - RWC België *(ISES)*
      - 12-tal voorspellers
      - 24/7
      - Bulletins (dagelijks,…)
      - PRESTO alerts
      - Advisories PECASUS / ICAO
      - Sterk IT ondersteund
        - Dashboards, webpage, tools, Interfaces, Previmaster,…
    - End users i.g.v. extreem SWx
      - NCCN
      - Elia, Eurocontrol, Mil,…
      - PECASUS (2019)
    - SSCC / ESA (2013)
      - S-ESC : lead
        - Ruimtemissies
        - Extreem ruimteweer





PECASUS DASHBOARD on 2024-05-11 10:00 UTC

GNSS	Moderate	Severe	Time UTC	Values	Status	Alert	Max-3h values	Max-3h status
Amplitude Scintillation	0.5	0.8	2024-05-11 10:00	0.30	QUIET		0.37	QUIET
Phase Scintillation	0.4	0.7	2024-05-11 10:00	1.17	SEVERE		1.17	SEVERE
Vertical TEC	125	175	2024-05-11 10:00	105.29	QUIET		109.98	QUIET

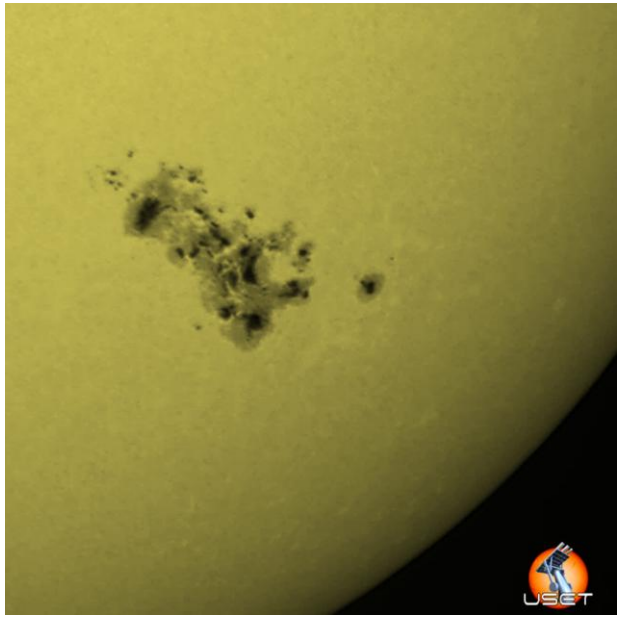
RADIATION	Moderate	Severe	Time UTC	Flags	Status	Alert	Max-3h flags	Max-3h status
Effective Dose FL ≤ 460	30	80	2024-05-11 10:00	0	QUIET		0	QUIET
Effective Dose FL > 460	/	80	2024-05-11 10:00	0	QUIET		0	QUIET

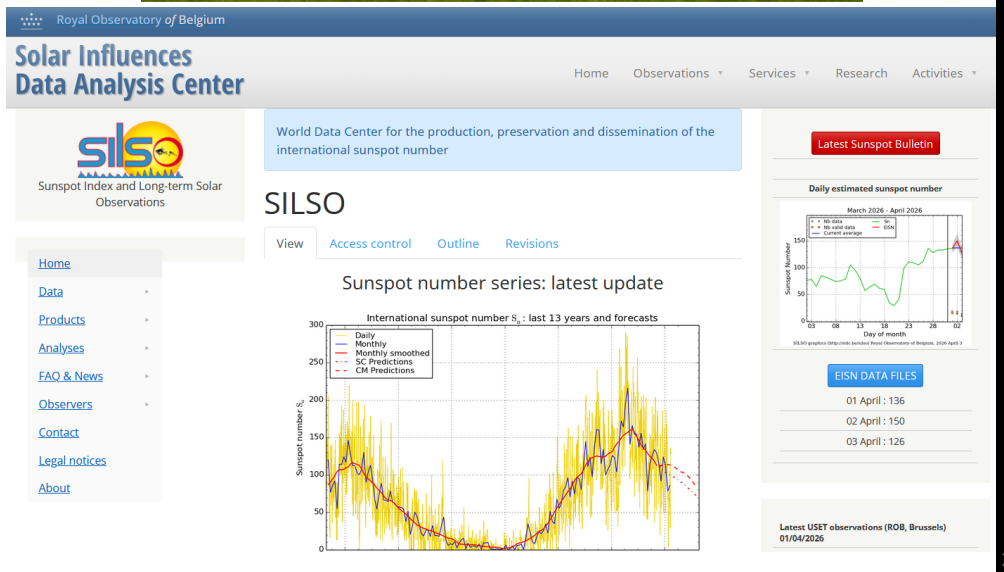
HF COM	Moderate	Severe	Time UTC	Values/Flags	Status	Alert	Max-3h values	Max-3h status
Auroral Absorption (AA)	8	9	2024-05-11 10:00	9.0	SEVERE		9.0	SEVERE
Polar Cap Absorption (PCA)	2	5	2024-05-11 10:00	3.96	MODERATE		4.83	MODERATE
Shortwave Fadeout (SWF)	x1.0	x10.0	2024-05-11 10:00	< M5 flare	QUIET		< M5 flare	QUIET
Post-Storm Depression (PSD)	30%	50%	2024-05-11 10:00	2	SEVERE		2	SEVERE

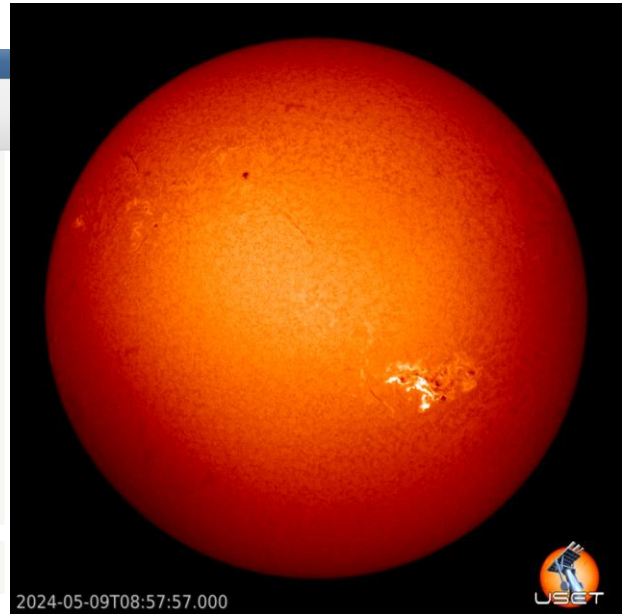
:Issued: 2024 May 11 0058 UTC
:Product: documentation at http://www.sidc.be/products/presto
#---#
FAST WARNING 'PRESTO' MESSAGE from the SIDC (RWC-Belgium)
#---#
Geomagnetic conditions have reached extreme storm levels (NOAA Kp=9) globally and severe storm levels (K_Bel=8) locally starting at 21:00 UTC on May 10. Currently, the North-South component (Bz) is at -48nT (00:43 UTC on May 11) and follows a further decreasing trend. Extreme storm levels are possibly expected to continue in the coming hours.

KSB

- SIDC
  - Solar Influences Data analysis Centre
  - Ruimteweercentrum (2000)
    - RWC België *(ISES)*
    - End users i.g.v. extreem SWx
    - SSCC / ESA (2013)
      - S-ESC : lead
  - SILSO (2013)
    - SIDC (1981)
      - WDC sunspot index
    - USET (1957)
      - WL, Hα, Ca K, tekening

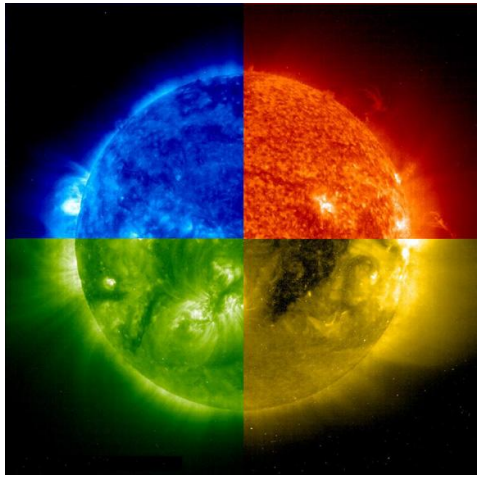


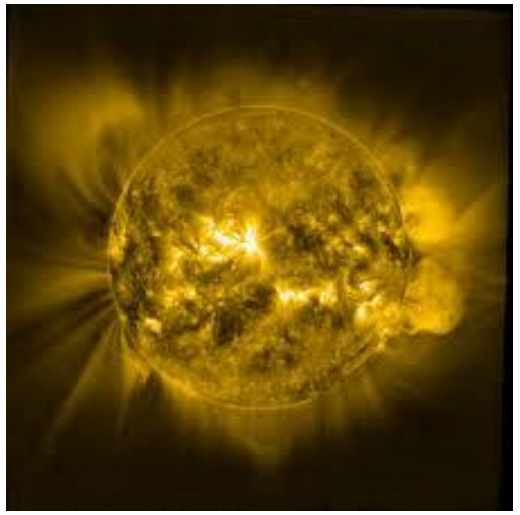


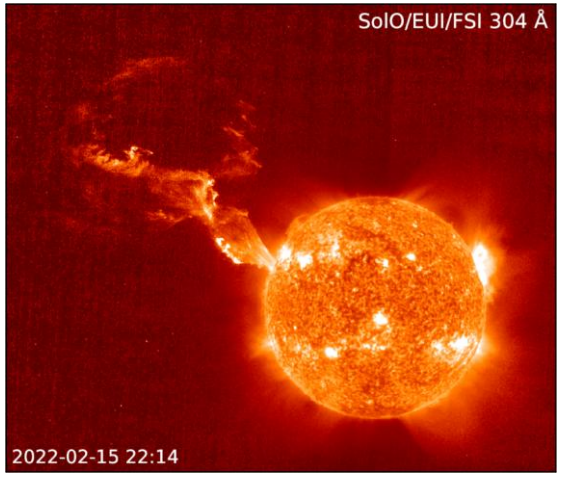


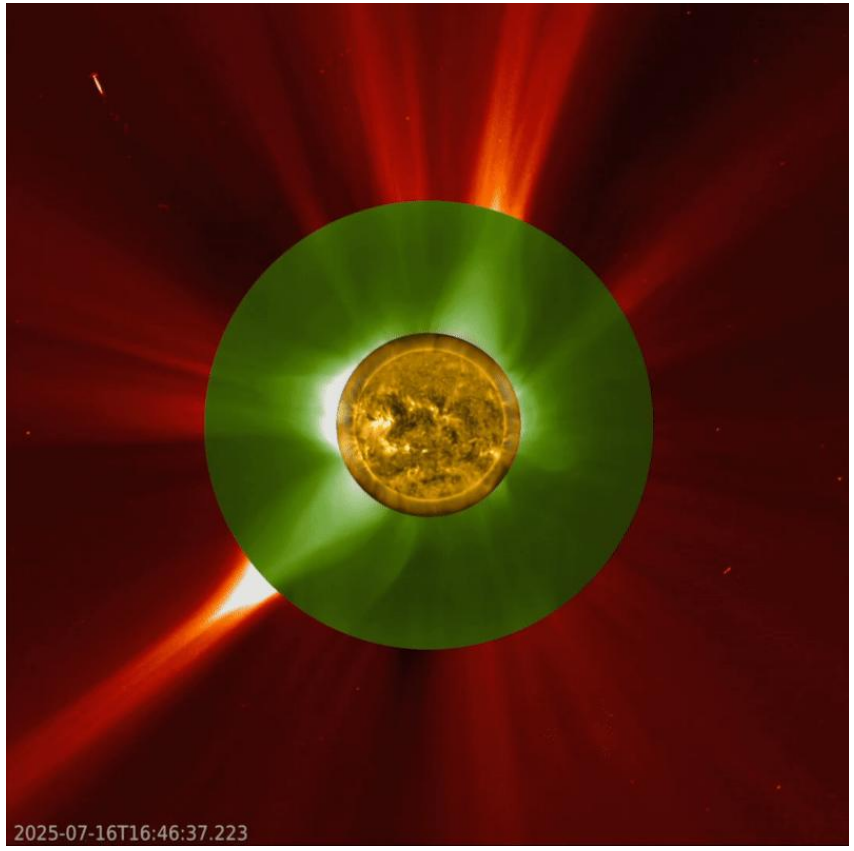
KSB

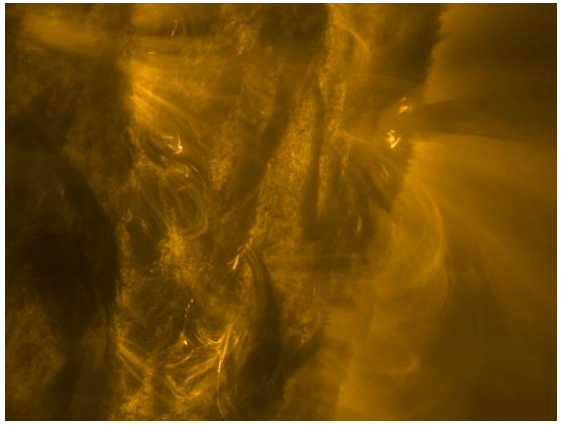
- SIDC
  - Solar Influences Data analysis Centre
  - Ruimteweercentrum (2000)
    - RWC België
    - End users i.g.v. extreem SWx
    - SSCC / ESA (2013)
      - S-ESC : lead
  - SILSO (2013)
    - SIDC (1981)
      - WDC sunspot index
    - USET (1957)
      - WL, Hα, Ca K, tekening
  - Expertise in EUV telescopen
    - SOHO / EIT (1995), PROBA2 / SWAP (2009), SolO / EUI (2020), Proba-3 / ASPIICS (2024)





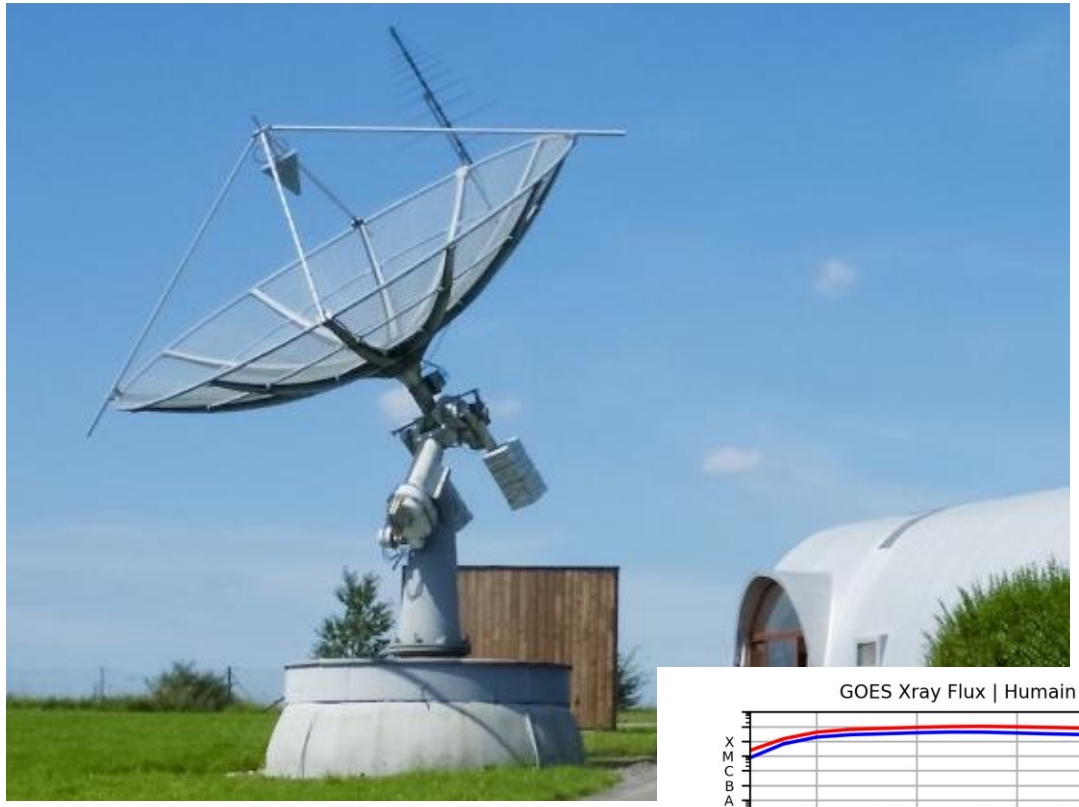


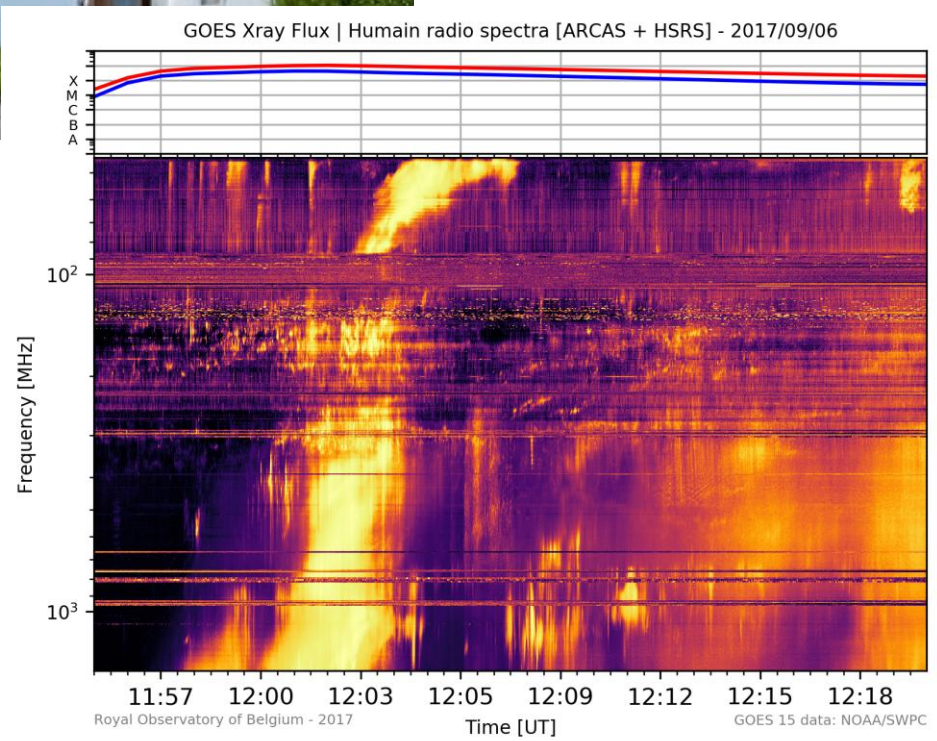




KSB

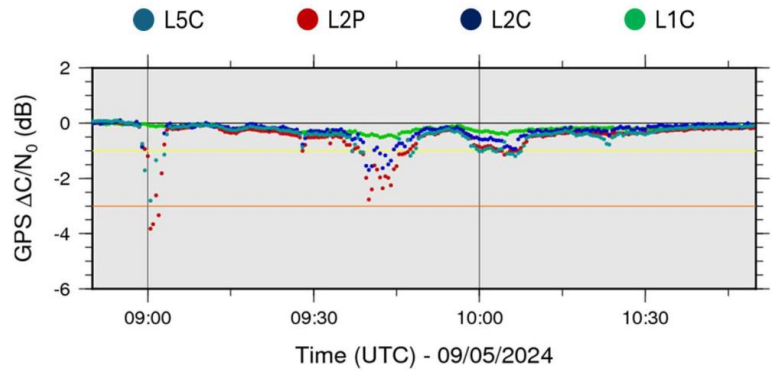
- SIDC
  - Solar Influences Data analysis Centre
  - Ruimteweercentrum (2000)
    - RWC België
    - End users i.g.v. extreem SWx
    - SSCC / ESA (2013)
      - S-ESC : lead
  - SILSO (2013)
    - SIDC (1981)
      - WDC sunspot index
    - USET (1957)
      - WL, Hα, Ca K, tekening
  - Expertise in EUV telescopen
    - SOHO / EIT (1995), PROBA2 / SWAP (2009), SolO / EUI (2020), Proba-3 / ASPIICS (2024)
  - Humain (1953/2008)
    - Radio waarnemingen zon

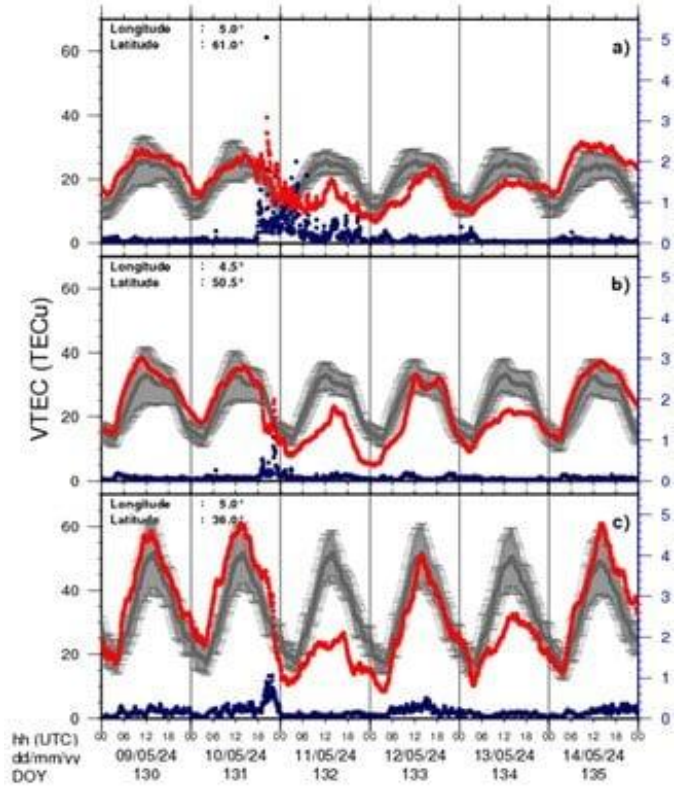




KSB

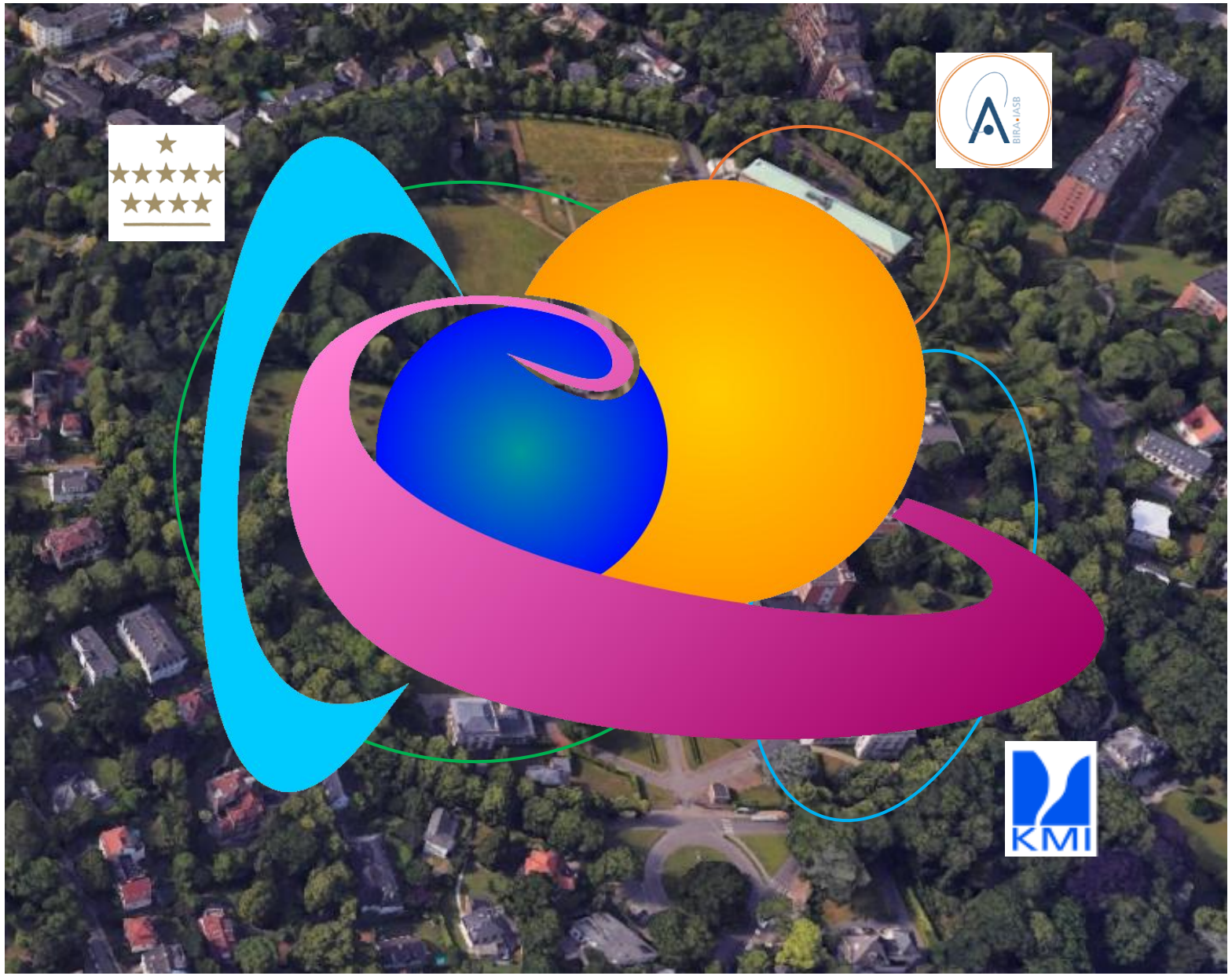
- SIDC
  - Solar Influences Data analysis Centre
  - Ruimteweercentrum (2000)
    - RWC België
    - End users i.g.v. extreem SWx
    - SSCC / ESA (2013)
      - S-ESC : lead
  - SILSO (2013)
    - SIDC (1981)
      - WDC sunspot index
    - USET (1957)
      - WL, Hα, Ca K, tekening
  - Expertise in EUV telescopen
    - SOHO / EIT (1995), PROBA2 / SWAP (2009), SolO / EUI (2020), Proba-3 / ASPIICS (2024)
  - Humain (1953/2008)
    - Radio waarnemingen zon
- GNSS (1988)
  - Diensten en producten GPS, Galileo, GLONASS





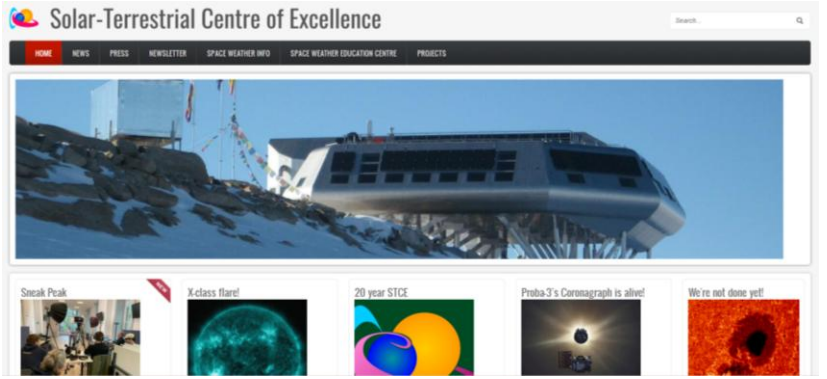
De Pool Ruimte

- Koninklijke Sterrenwacht van België (KSB)
  - 1826
- Koninklijk Meteorologisch Instituut (KMI)
  - 1913
- Koninklijk Belgisch Instituut voor Ruimte-Aëronomie (BIRA-IASB)
  - 1964



Het STCE

- Solar-Terrestrial Centre of Excellence
  - 22 maart 2006
  - "Ruimteweercentrum van België"
  - Coördinatie Zon-Ruimte-Aarde
    - Intern
      - KSB, KMI, BIRA-IASB
    - Extern
      - Eindgebruikers, Industrie, Universiteiten, Policymakers,…
      - Brede Publiek
  - Public Outreach
    - STCE Nieuwsbrief
    - Newsitem/flashes
    - Press releases
    - Lezingen, artikels, interviews,…
    - Organisatie events
  - ESWW
    - European Space Weather Week (2006-2019)
  - SWEC
    - Space Weather Education Centre
      - Cursussen, educatief materiaal,…
      - Ook internationaal
        - E-SWAN, ESWW,…



SWEC
Space Weather Education Centre

STCE Newsletter

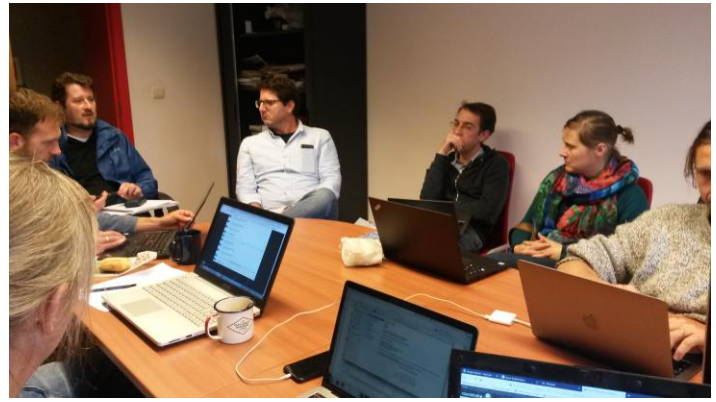
23 Mar 2026 - 29 Mar 2026

Published by the STCE - this issue : 3 Apr 2026. Available online at https://www.stce.be/newsletter/.

The Solar-Terrestrial Centre of Excellence (STCE) is a collaborative network of the Belgian Institute for Space Aeronomy, the Royal Observatory of Belgium and the Royal Meteorological Institute of Belgium.

Content	Page
1. The STCE in 2024	2
2. Sneak peak	3
3. Review of Solar and Geomagnetic Activity	3
4. International Sunspot Number by SILSO	5
5. PROBA2 Observations	5
6. Noticeable Solar Events	7
7. Geomagnetic Observations in Belgium	8
8. Review of Ionospheric Activity	9
9. The SIDC Space Weather Briefing	11
10. Upcoming Activities	11

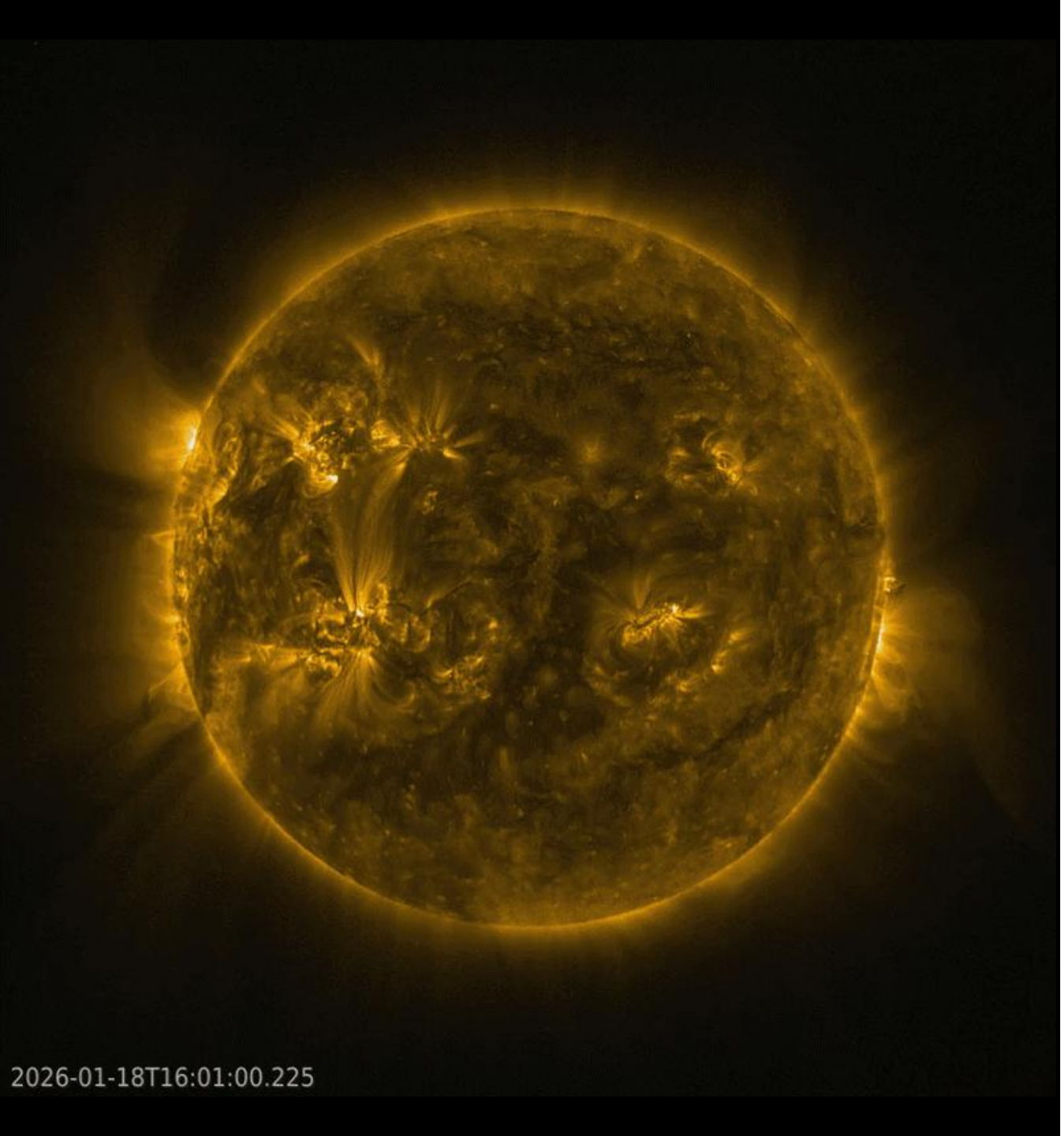
Final Editor : Petra Vanlommel
Contact : R. Van der Linden, General Coordinator STCE, Ringlaan - 3 - Avenue Circulaire, 1180 Brussels, Belgium



2026 – Een feestelijk jaar!...

- *200 jaar Koninklijke Sterrenwacht van België*
  - https://www.astro.oma.be/
- *50 jaar Planetarium*
  - http://www.planetarium.be/
- *25 jaar SIDC*
  - https://www.sidc.be/
- *20 jaar STCE*
  - https://www.stce.be/

https://200year.observatory.be/nl/home2



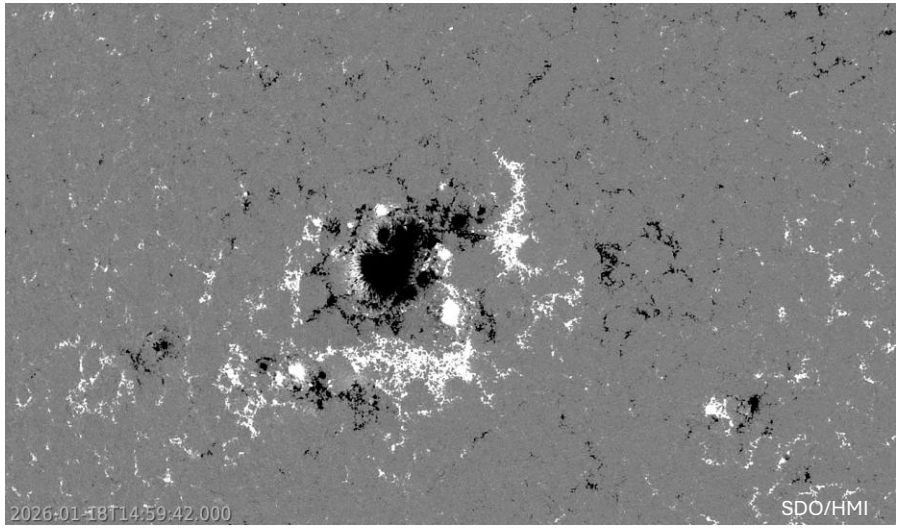
De verrassende zonnestorm van 19 januari 2026

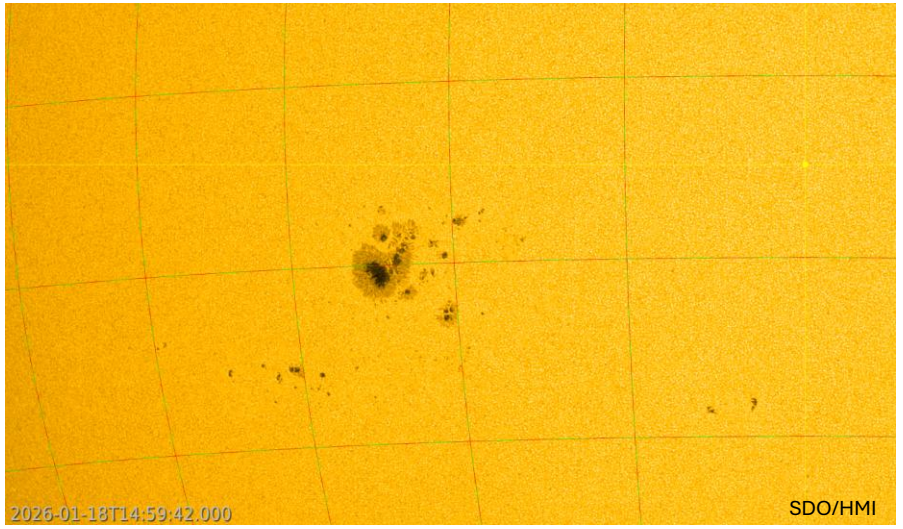
Over ruimteweervoorspellingen:

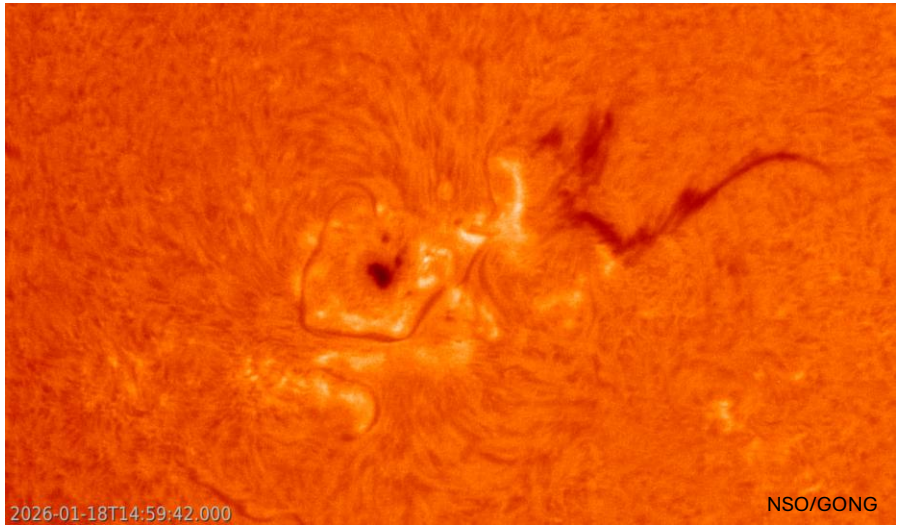
Vallen, opstaan en weer doorgaan

Space Weather Education Centre

Zonnevlekkengroep NOAA 4341



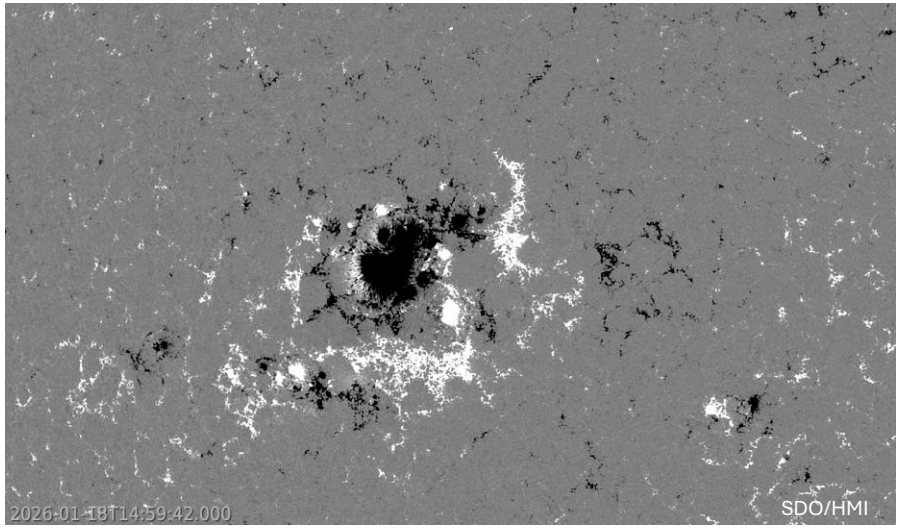


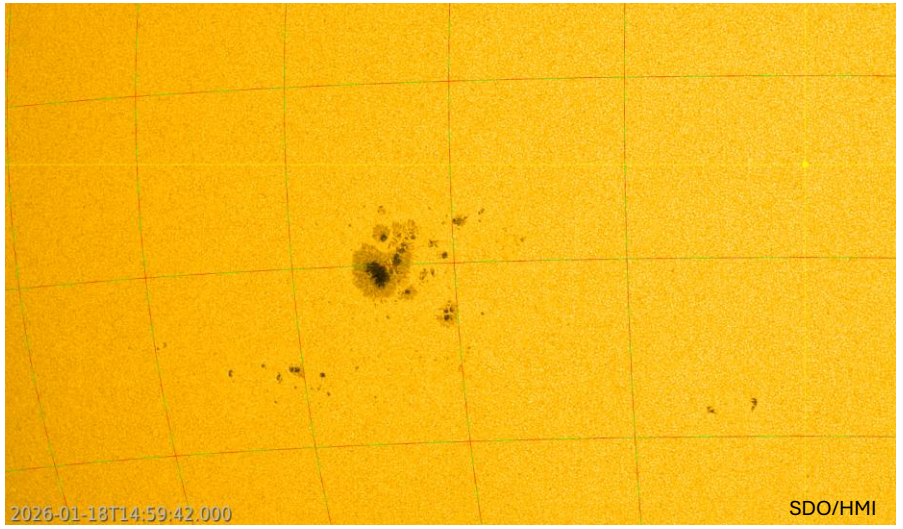


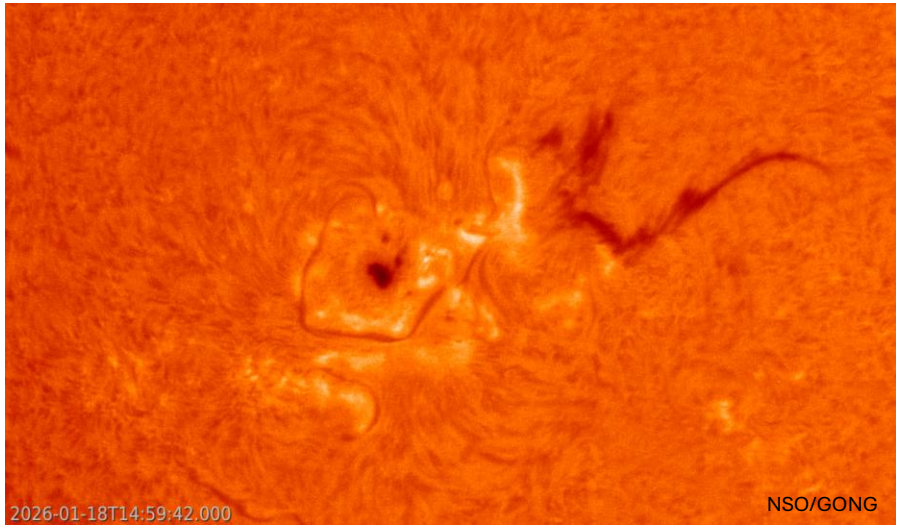
- Voorspelling zonnevlammen
  - McIntosh: Dkc *(Dki)*
    - M+ / X: 77% / 22% *(48% / 6%)*
  - Mount Wilson: Beta Gamma
    - Geen delta
  - Andere
    - Zonnevlam historiek, groep filament,…

https://www.stce.be/educational/classification

Zonnevlekkengroep NOAA 4341



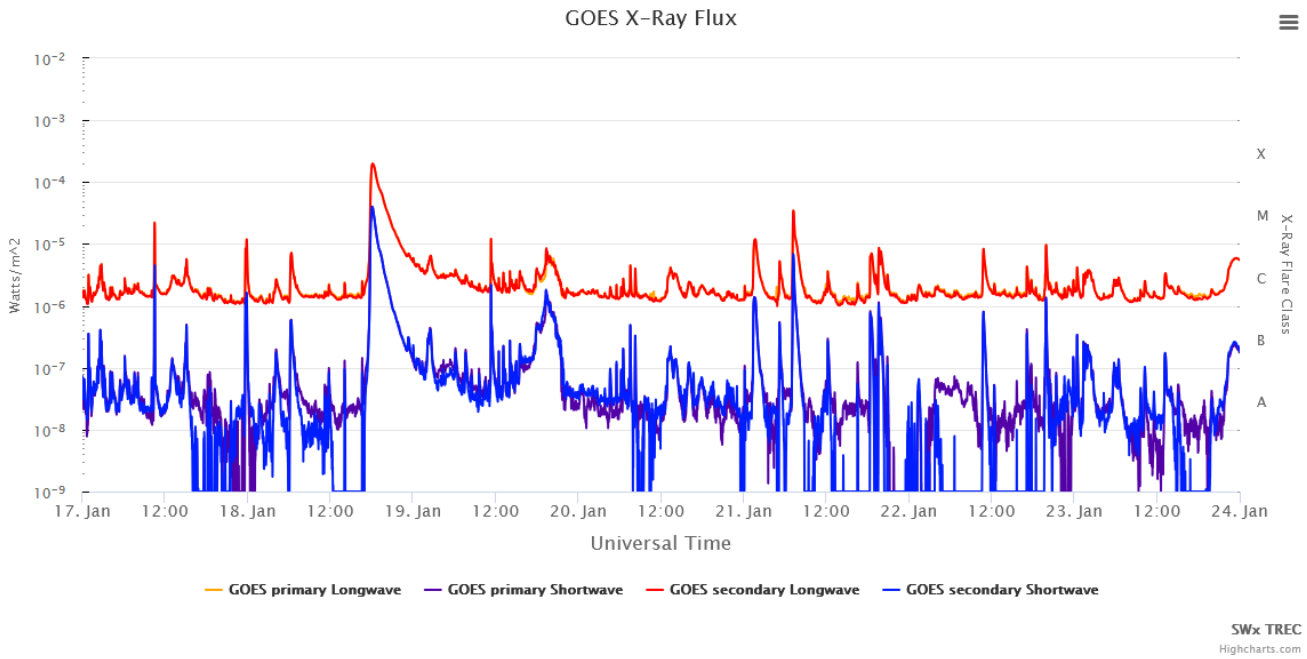




- SIDC SWx voorspeller
  - URSIgram 18 Jan 2026:
    - *… Solar flaring activity is expected to be moderate over the next 24 hours, with M-class flares very likely and a small chance for X-class flares. …*

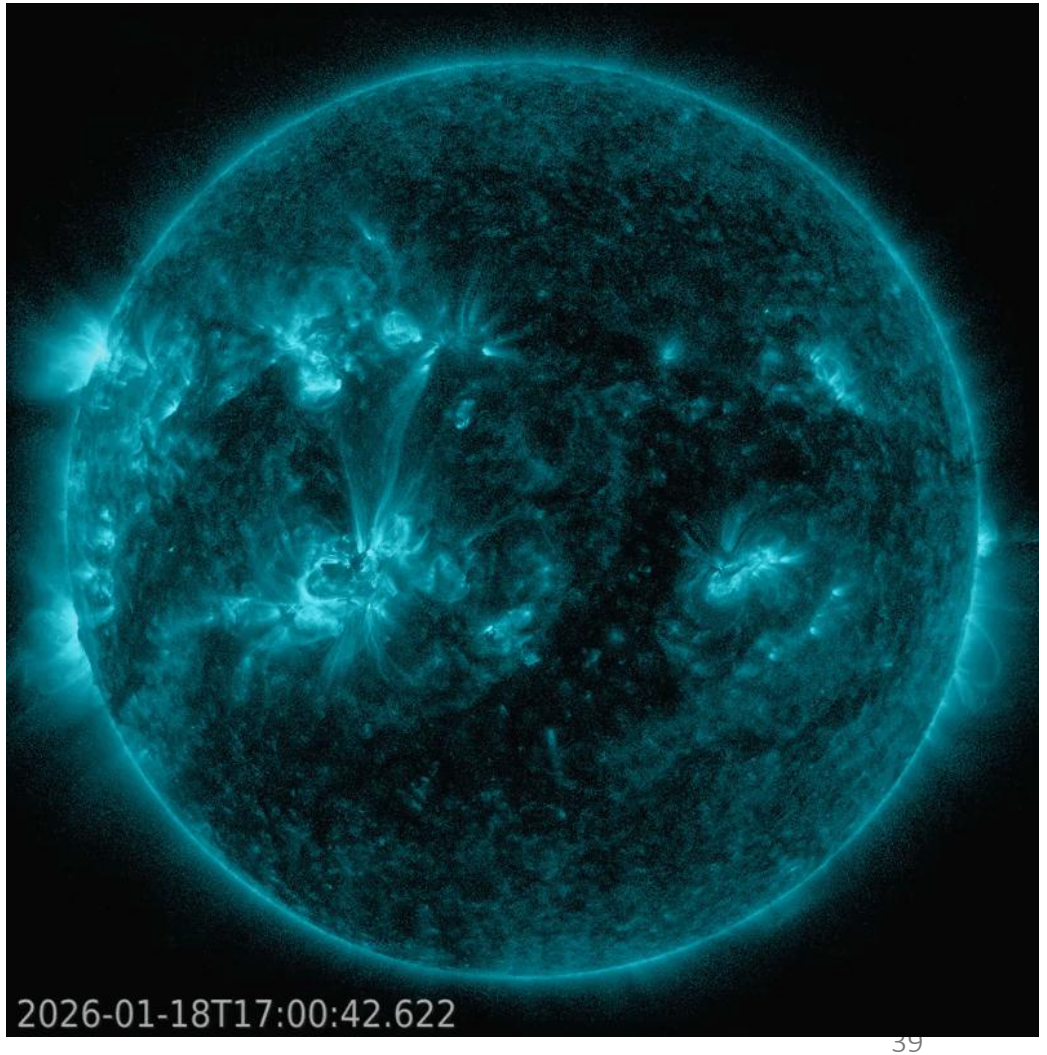
https://www.stce.be/educational/classification

X1.9 zonnevlam van NOAA 4341 (18 Jan/18:09 UTC ; 3B)



https://www.stce.be/news/800/welcome.html

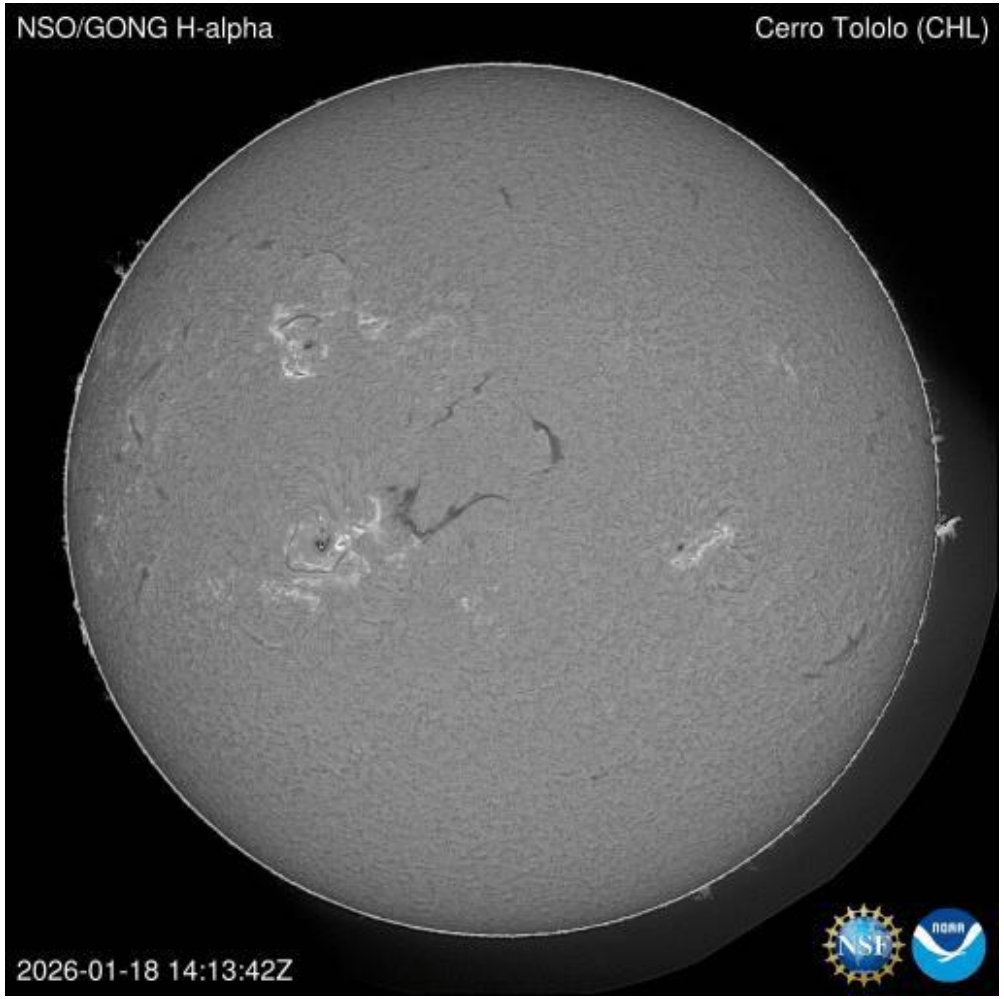
SDO/AIA 131 - EUV



X1.9 zonnevlam van NOAA 4341 (18 Jan/18:09 UTC ; 3B)

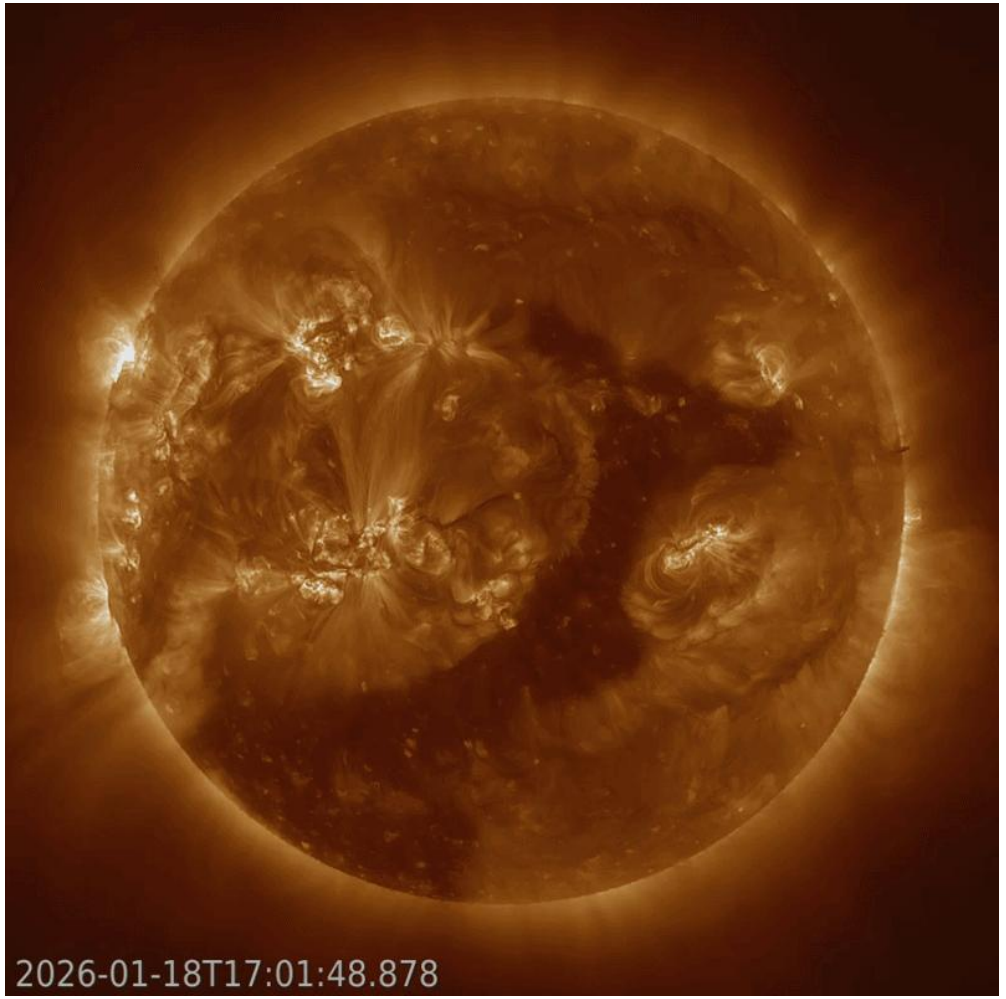
Filamenten zijn "verdwenen"

NSO/GONG – H-alpha



Nabijheid coronaal gat

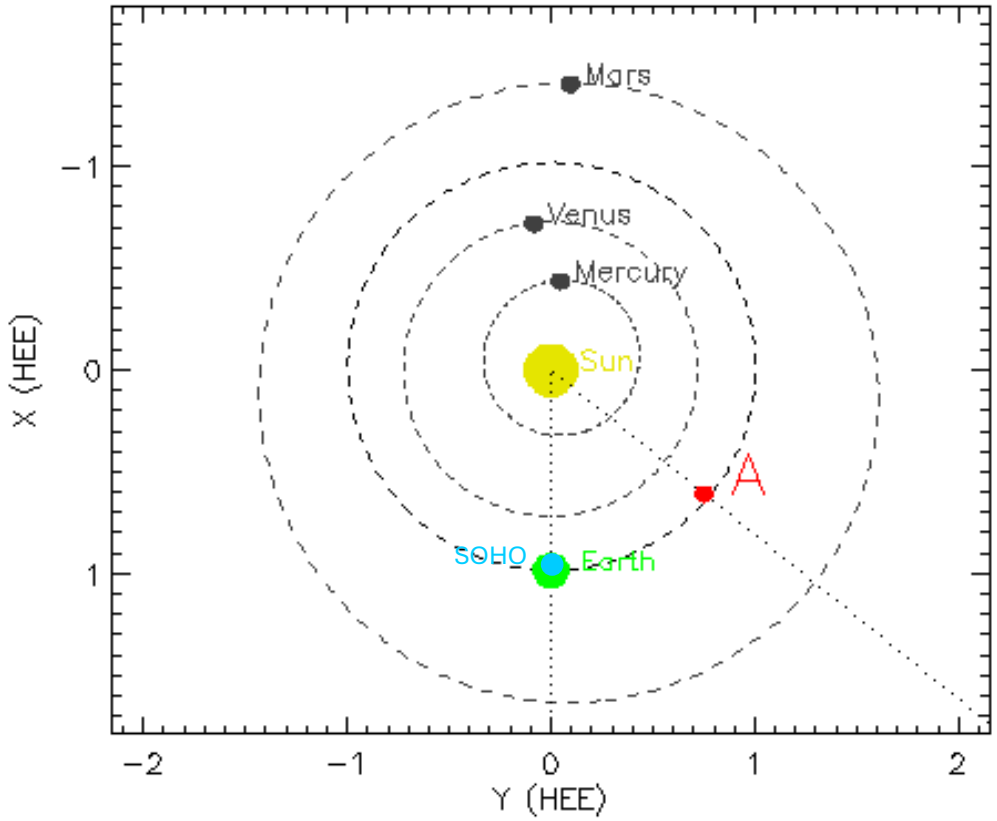
GOES/SUVI 195 - EUV



Coronale Massa Ejectie (18 Jan/18:09 UTC ; 3B)

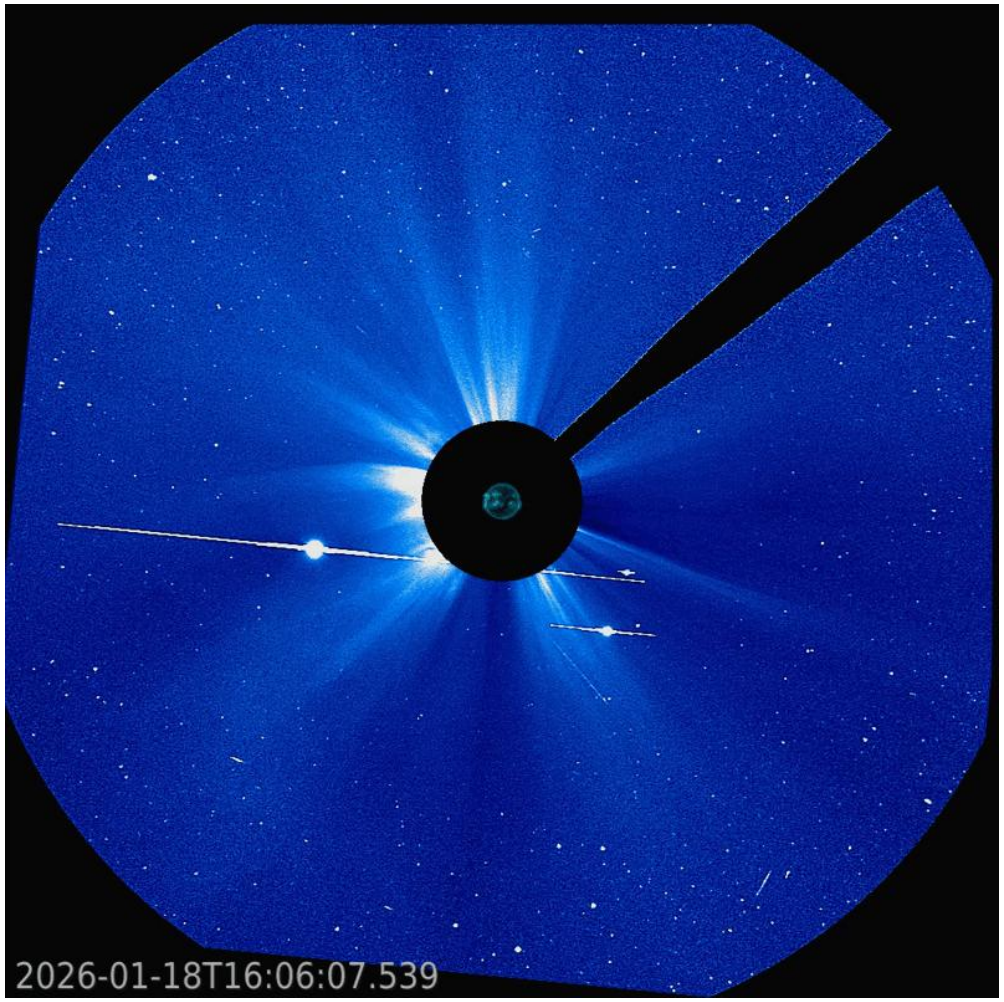
SOHO / LASCO C3

STEREO-A / COR2

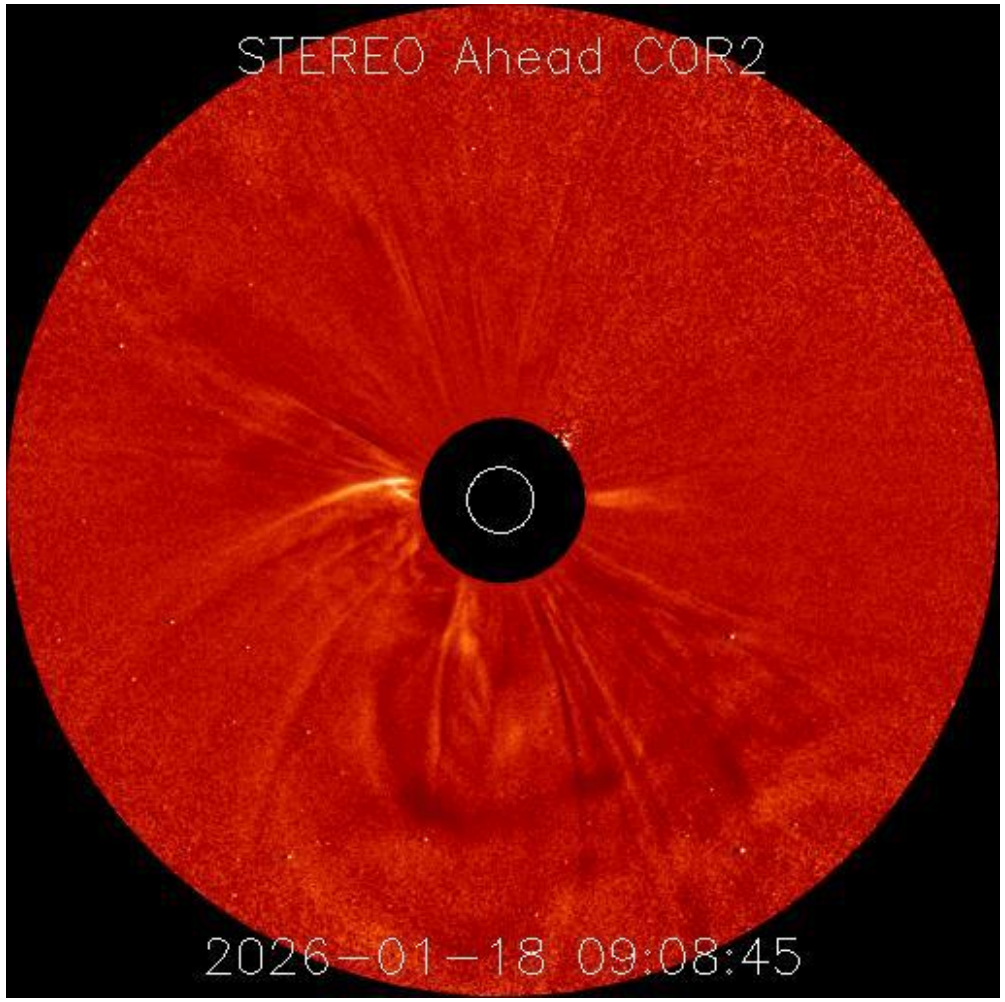


Coronale Massa Ejectie (18 Jan/18:12 UTC)

SOHO / LASCO C3

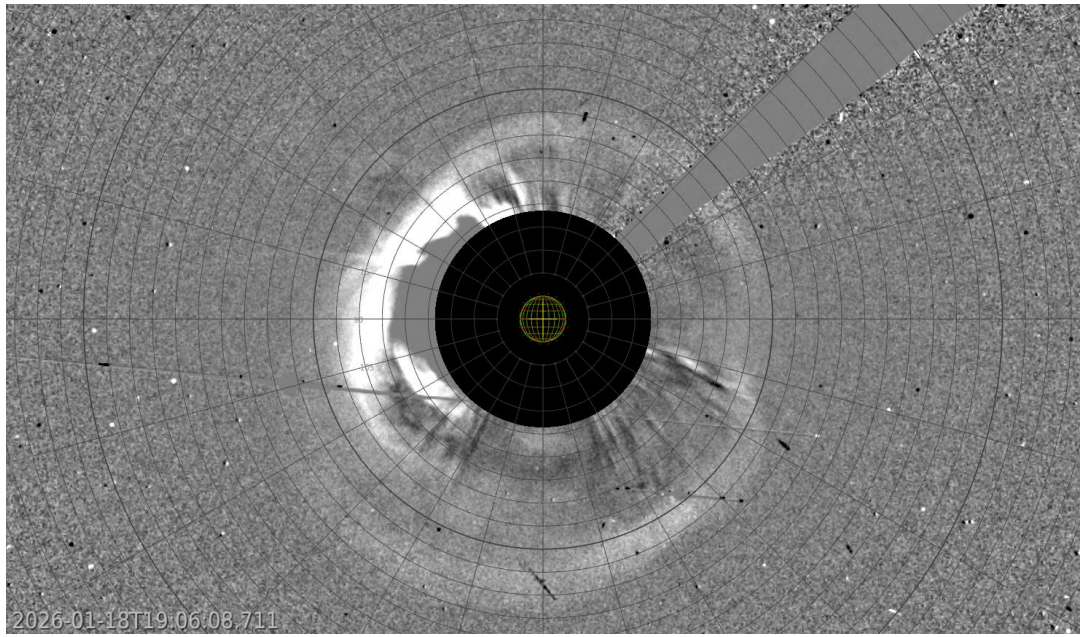


STEREO-A / COR2



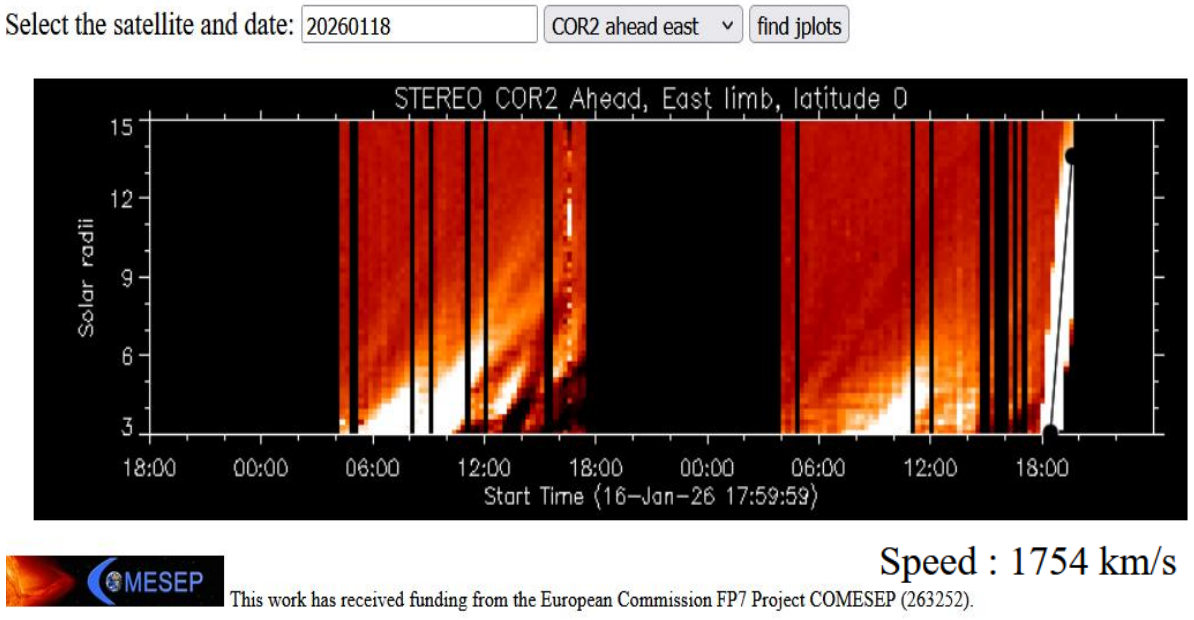
Coronale Massa Ejectie - snelheid

SOHO / LASCO C3



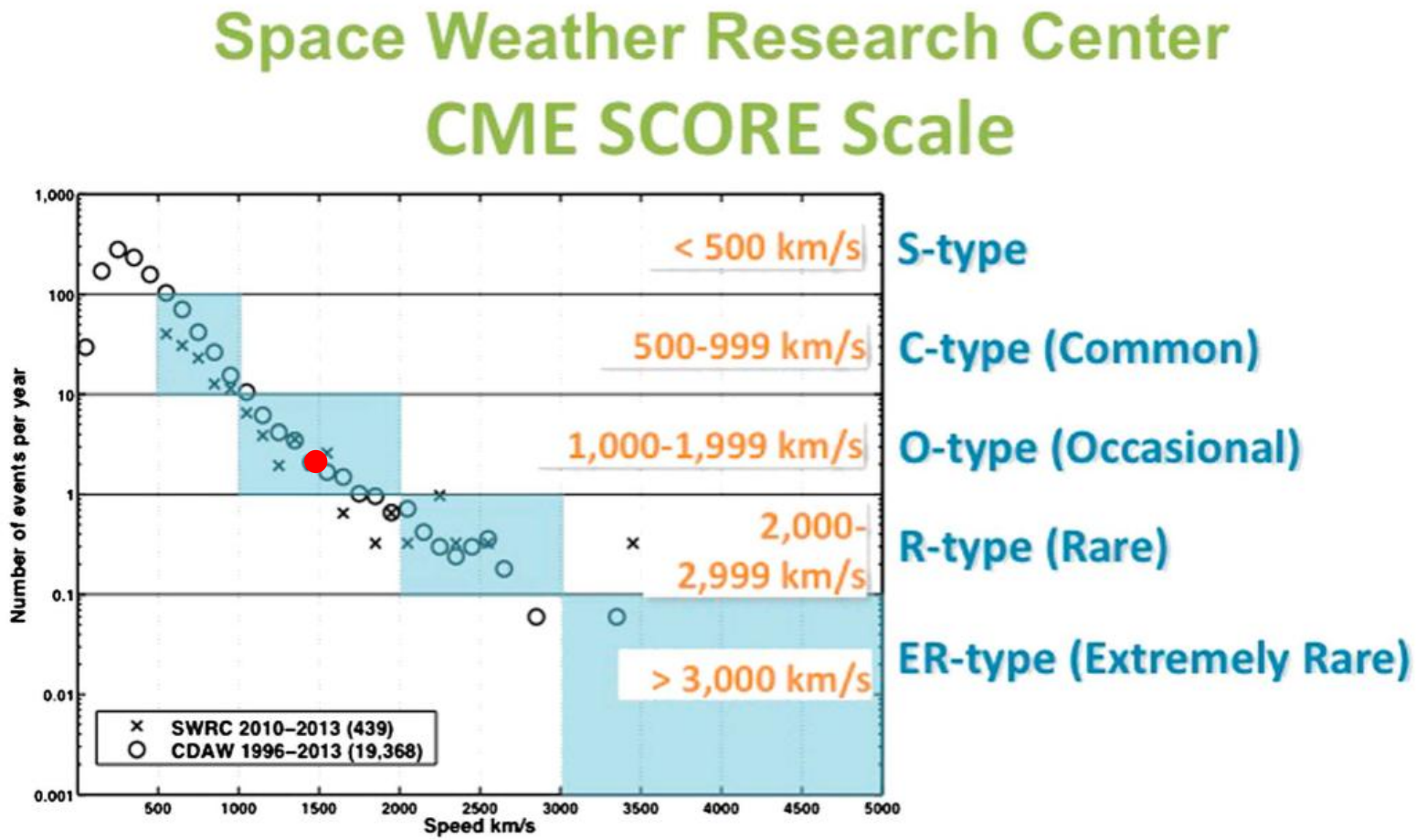
- SIDC SWx voorspeller
  - 1000-1500 km/s
    - **1400 km/s**

STEREO-A / COR2



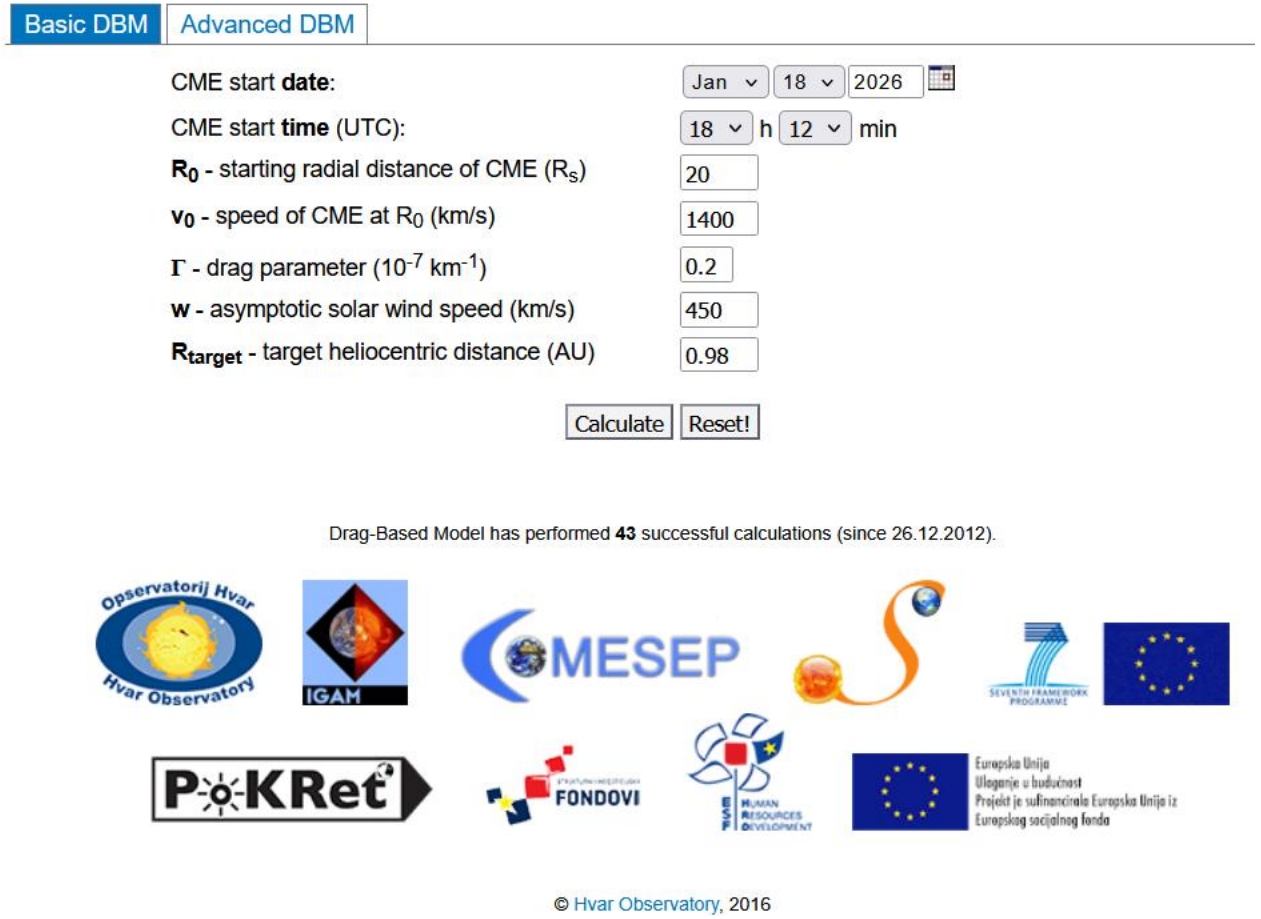
- STEREO-A (ecliptica, meer aarde-gericht)
  - 1600-1900 km/s
    - **1700 km/s**

Coronale Massa Ejectie - snelheid



Evans et al. 2015 - https://doi.org/10.1002/swe.20058

CME – Aankomsttijd: (1) Hvar DBM



Results | v-R-t plots | Documentation — **1400 km/s**

Output:

CME arrival at target (date & time): **20.01.2026 at 10h:56min**
Transit time: **40.75** h
Impact speed at target (at 0.98 AU): **701** km/s

Results | v-R-t plots | Documentation — **1700 km/s**

Output:

CME arrival at target (date & time): **20.01.2026 at 06h:57min**
Transit time: **36.76** h
Impact speed at target (at 0.98 AU): **740** km/s

Results | v-R-t plots | Documentation — **1900 km/s**

Output:

CME arrival at target (date & time): **20.01.2026 at 04h:50min**
Transit time: **34.64** h
Impact speed at target (at 0.98 AU): **764** km/s

https://oh.geof.unizg.hr/DBM/dbm.php

CME – Aankomsttijd: (2) EUHFORIA

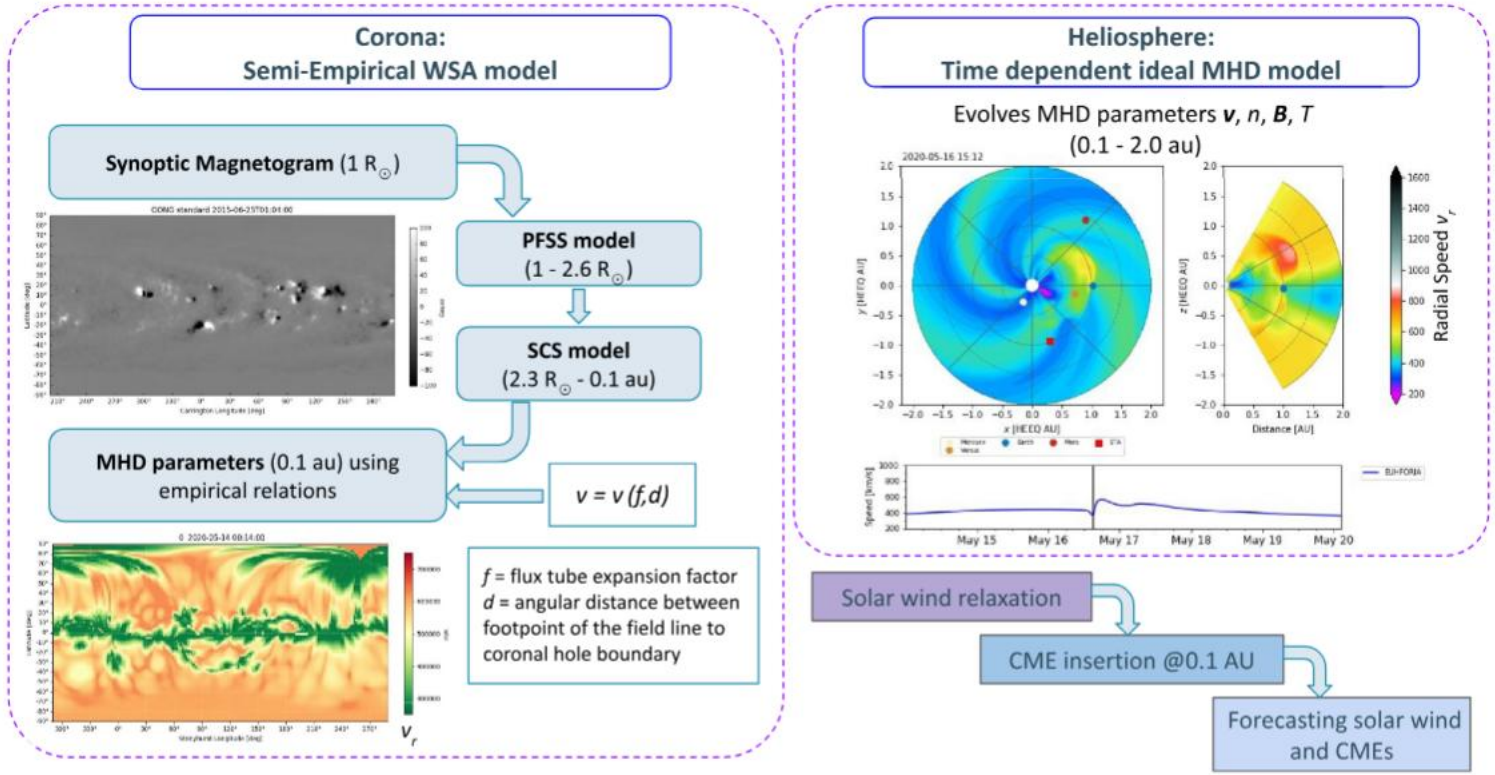
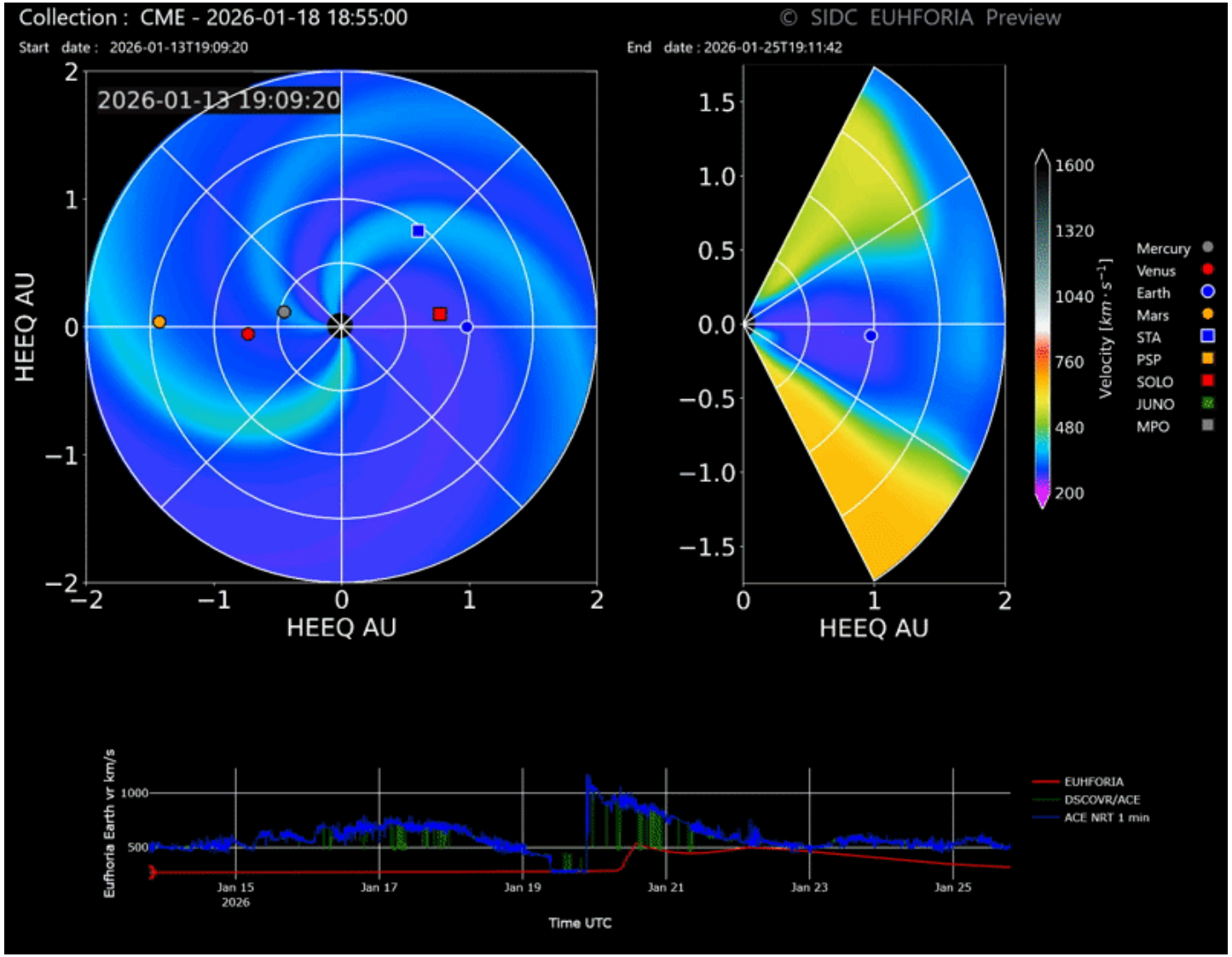


Figure 1. Schematic showing the different models within EUHFORIA and the outputs they produce. On the left, the corona is modeled using the semi-empirical Wang-Sheeley-Arge (WSA) model, driven by the synoptic magnetogram maps (e.g., top left figure). WSA model employs the potential field source surface (PFSS) model in the low corona and the Schatten current sheet (SCS) in the upper corona to extrapolate the magnetic field lines up to 0.1 au, and empirical relations to compute MHD parameters at 0.1 au (e.g., bottom left figure). The output of the coronal model is provided as a boundary condition to the 3D time-dependent ideal MHD model of the heliosphere, shown on the right. Figure on the right is an example showing the radial speed (v_r) profile in the EUHFORIA domain depicting a propagating CME on a relaxed solar wind background (equatorial and meridional planes containing Earth). The flowchart (bottom right) depicts the chronology of steps involved in a typical EUHFORIA simulation.

Maharana et al. 2024 - https://doi.org/10.1029/2023SW003715
Pomoell & Poedts 2018 - https://doi.org/10.1051/swsc/2018020

CME – Aankomsttijd: (2) EUHFORIA



- Aankomsttijd
  - 20 Jan – 07:10UTC
    - CME snelheid: 1403 km/s
  - Max. snelheid: 540 km/s
- SIDC SWx voorspeller

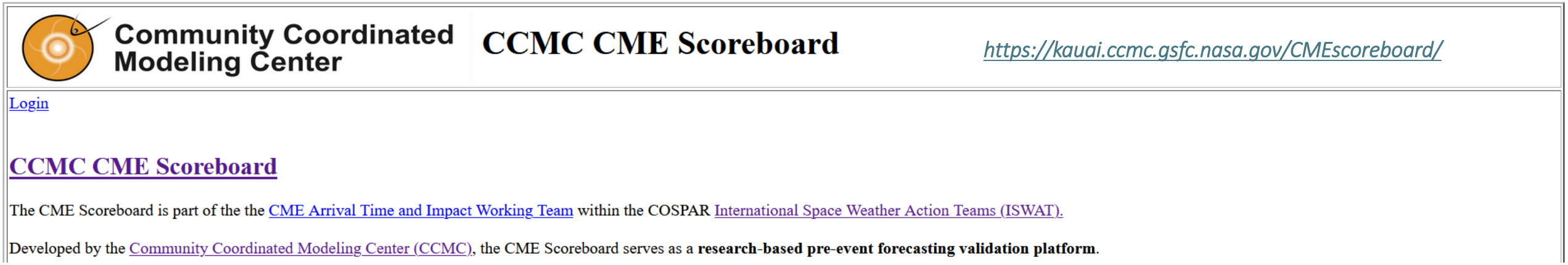
CME arrival alert (see json attachment).

From no-reply-sidc@oma.be
To SWforecasters@sidc.be
Date 2026-01-19 15:41

```
Expected arrival time: 2026-01-20T07:11:00Z

Arrival time uncertainty: 12

Estimated peak K: 7

Peak K uncertainty: 1

Probability of arrival: 85

CME start time: 2026-01-18T18:12:00Z
```

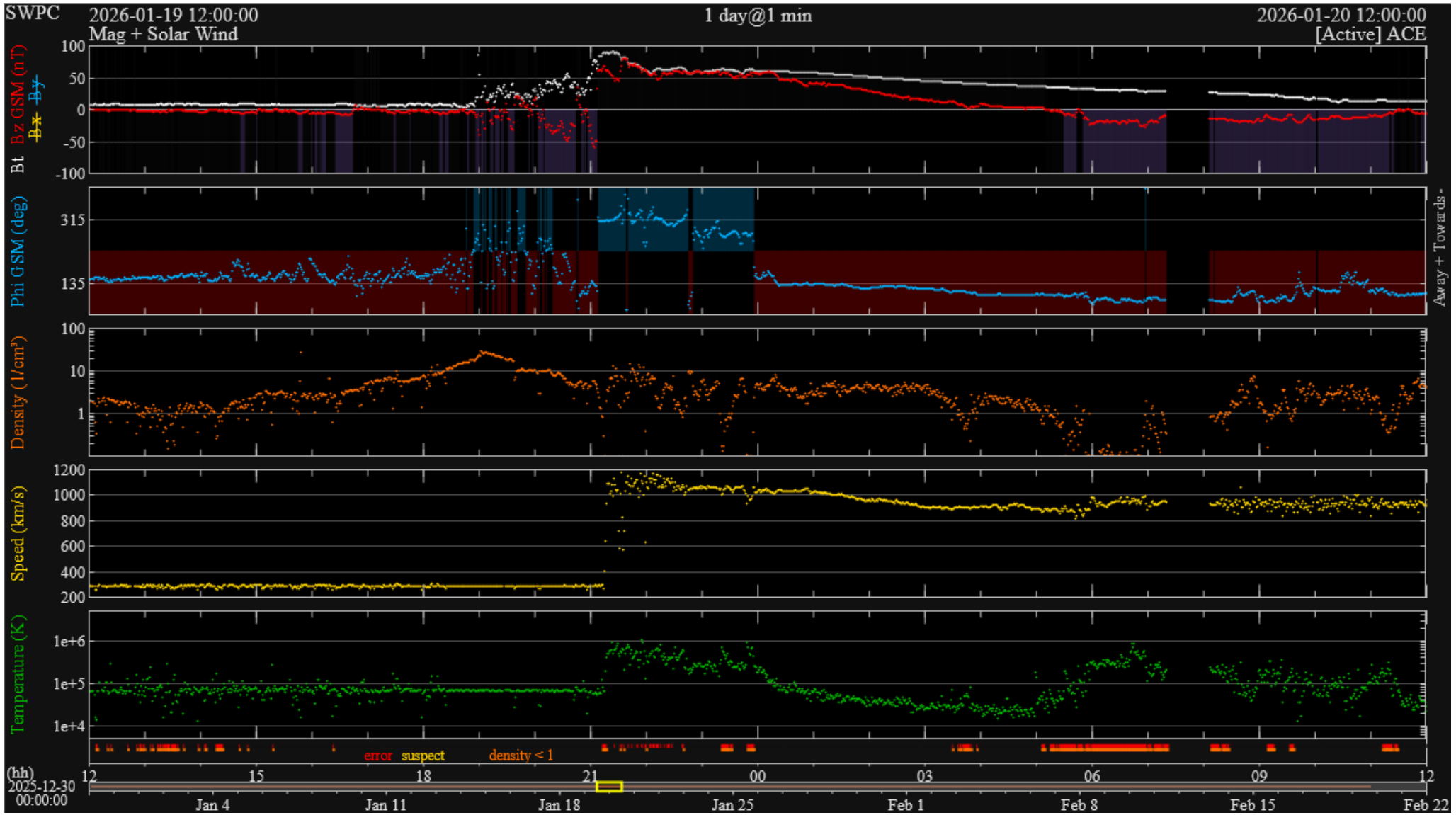
SIDC: SIDC: https://sidcweb.swhv.oma.be/ ; ESA: https://swe.ssa.esa.int/ral-euhforia-e-federated

CME – Aankomsttijd: (3) Overzicht



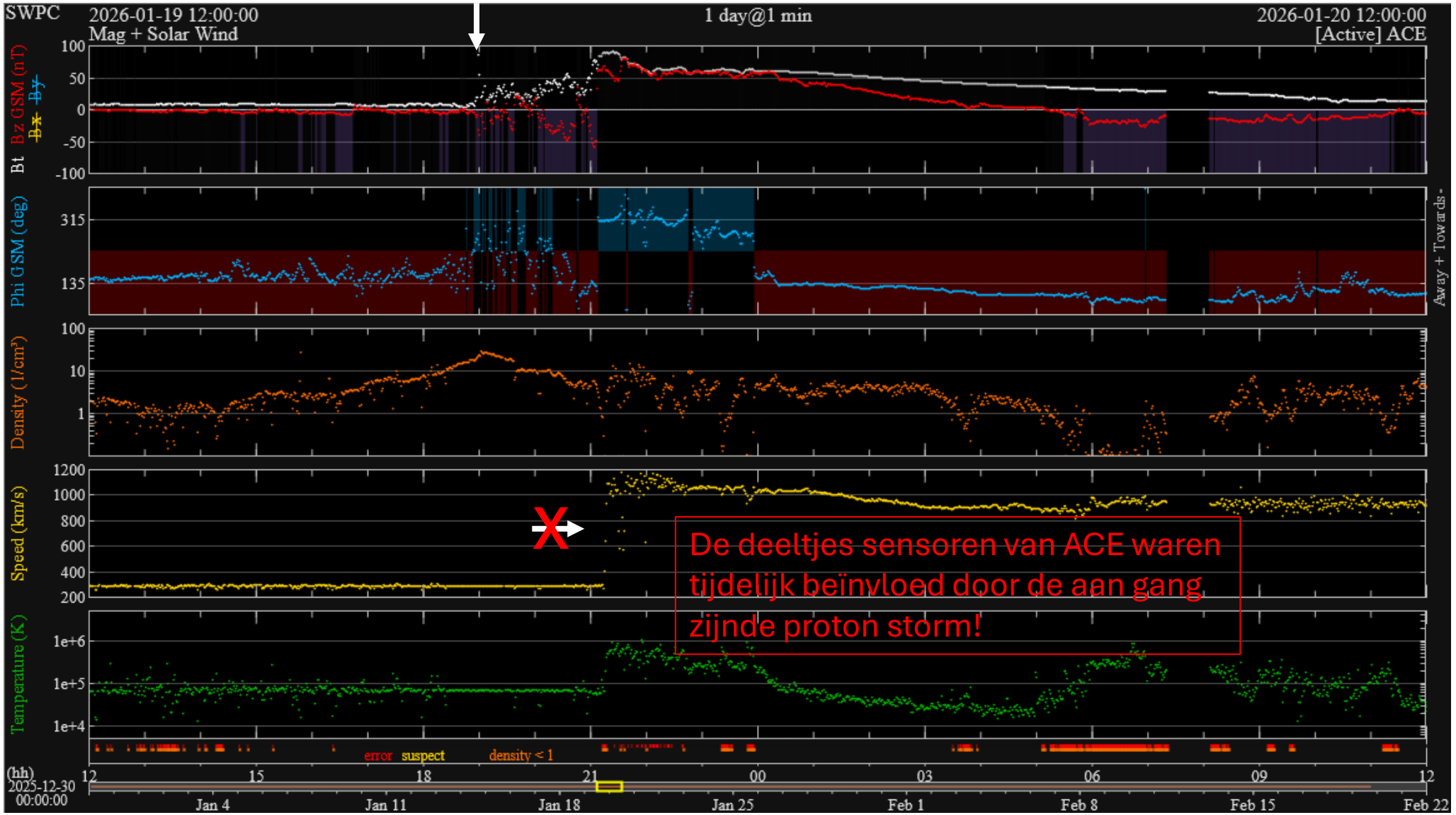
Instituut	Model	In (18:09UTC)	Aankomst verwacht	Onzekerheid	Kp verwacht
NASA	WSA/ENLIL + Cone	+3.5h	**20 Jan / 02:38**	+/- 7h	8.0 - 9.0
JHU /APL	EAM	+5.7h	**19 Jan / 19:53**	-2.5h - +7.5h	
SEPC/NSSC/CAS	Cone + HAF	+8.2h	**19 Jan / 22:00**		7.0-9.0
KSWC	WSA/ENLIL + Cone	+8.7h	**20 Jan / 05:00**		
UK Met Office	WSA/ENLIL + Cone	+12.4h	**20 Jan / 04:00**	+/- 6h	7.0-8.0
ASWO	ELEvo	+15.3h	**20 Jan / 02:46**	+/- 5.3h	
NOAA/SWPC	WSA/ENLIL + Cone	+16.7h	**20 Jan / 01:00**		5.0-8.0
SIDC	***EUHFORIA + Hvar DBM***	***+20.5h***	***20 Jan / 07:11***	***+/- 12h***	***6.0-8.0***

CME – Aankomst: 19 Jan / 18:56UTC (ACE/L1)



https://www.swpc.noaa.gov/products/real-time-solar-wind

CME – Aankomst: 19 Jan / 18:56UTC (ACE/L1)



https://www.stce.be/news/801/welcome.html

CME – Aankomst: 19 Jan / 18:56UTC (ACE/L1)

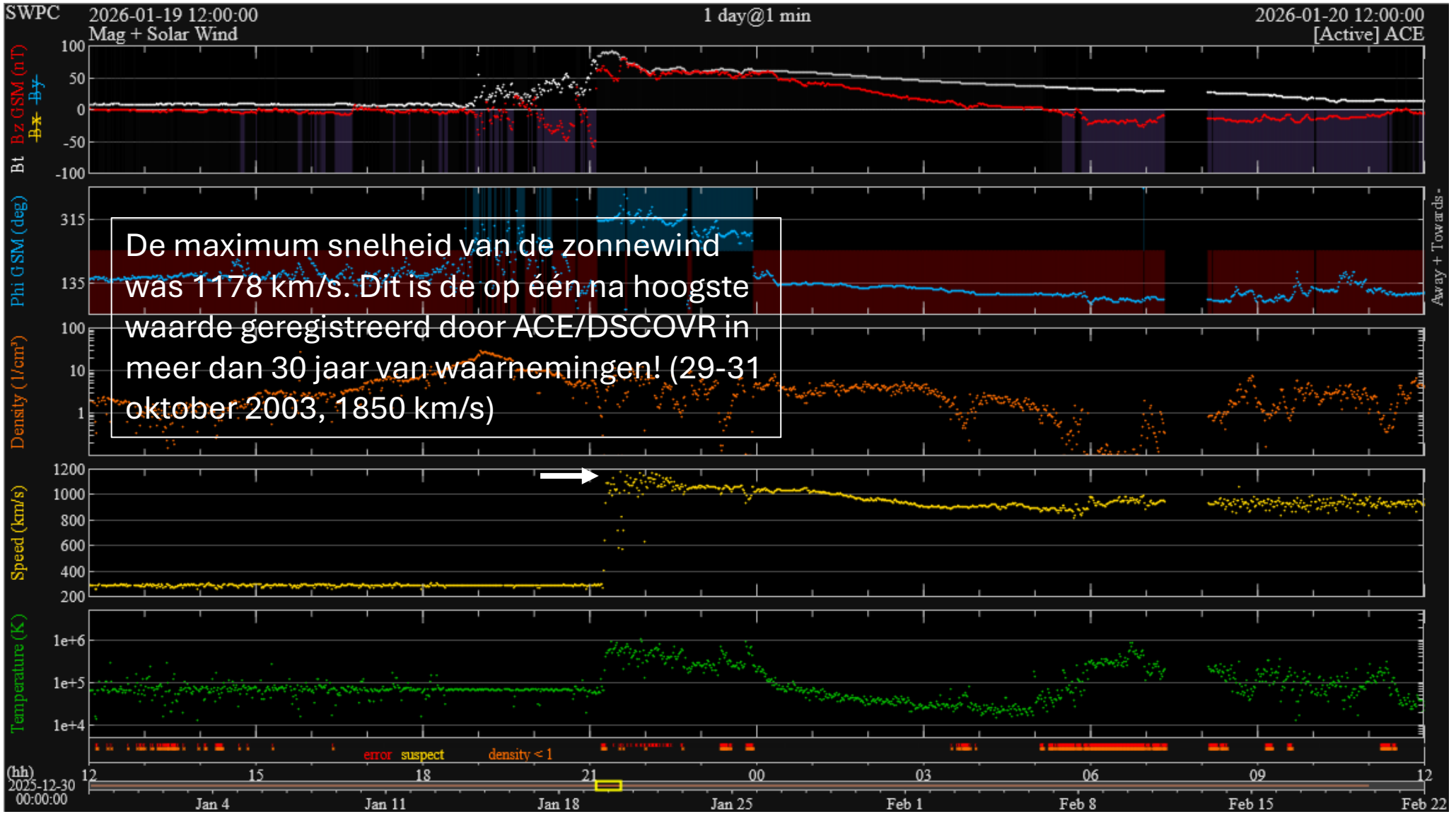
Bt haalde een maximum waarde van 91 nT. Dit is de hoogste Bt waarde geregistreerd door ACE/DSCOVR in meer dan 30 jaar van waarnemingen!

https://www.stce.be/news/807/welcome.html

CME – Aankomst: 19 Jan / 18:56UTC (ACE/L1)

https://www.stce.be/news/807/welcome.html

CME – Aankomst: 19 Jan / 18:56UTC (ACE/L1)

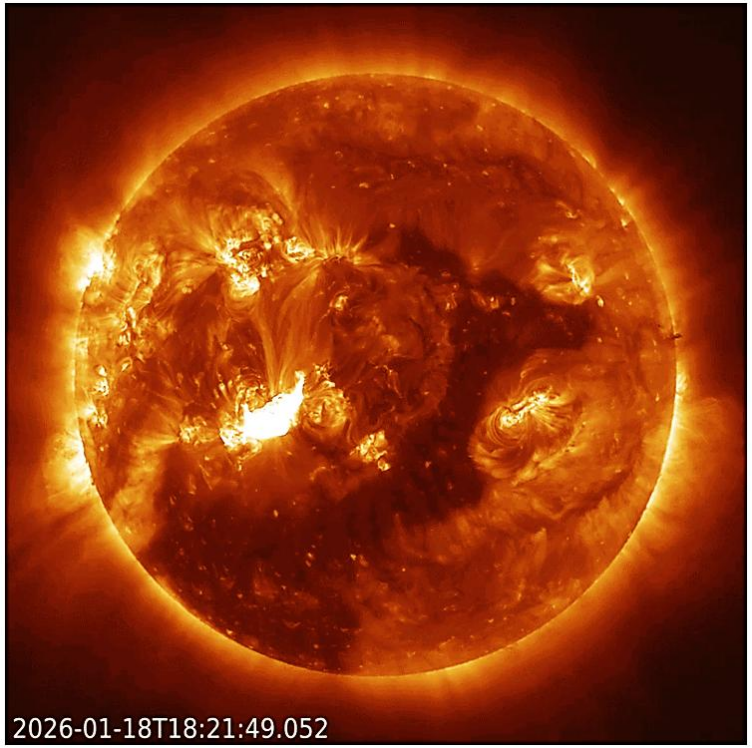


https://www.stce.be/news/807/welcome.html

CME – Aankomst: Waarom zoveel vroeger?

Basic DBM | Advanced DBM

CME start **date**:	Jan 18 2026
CME start **time** (UTC):	18 h 12 min
R_0 - starting radial distance of CME (R_s)	20
v_0 - speed of CME at R_0 (km/s)	1900
Γ - drag parameter (10^{-7} km^{-1})	0.1
w - asymptotic solar wind speed (km/s)	450
R_{target} - target heliocentric distance (AU)	0.98



- CME snelheid te laag ingeschat
  - Eerder rond 1900 km/s
- Invloed coronaal gat onderschat
  - Pad effenen voor CME

Results | v-R-t plots | Documentation

1900 km/s

Drag: 0.2

Output:

CME arrival at target (date & time): **20.01.2026 at 04h:50min**
Transit time: **34.64** h
Impact speed at target (at 0.98 AU): **764** km/s

Results | v-R-t plots | Documentation

1900 km/s

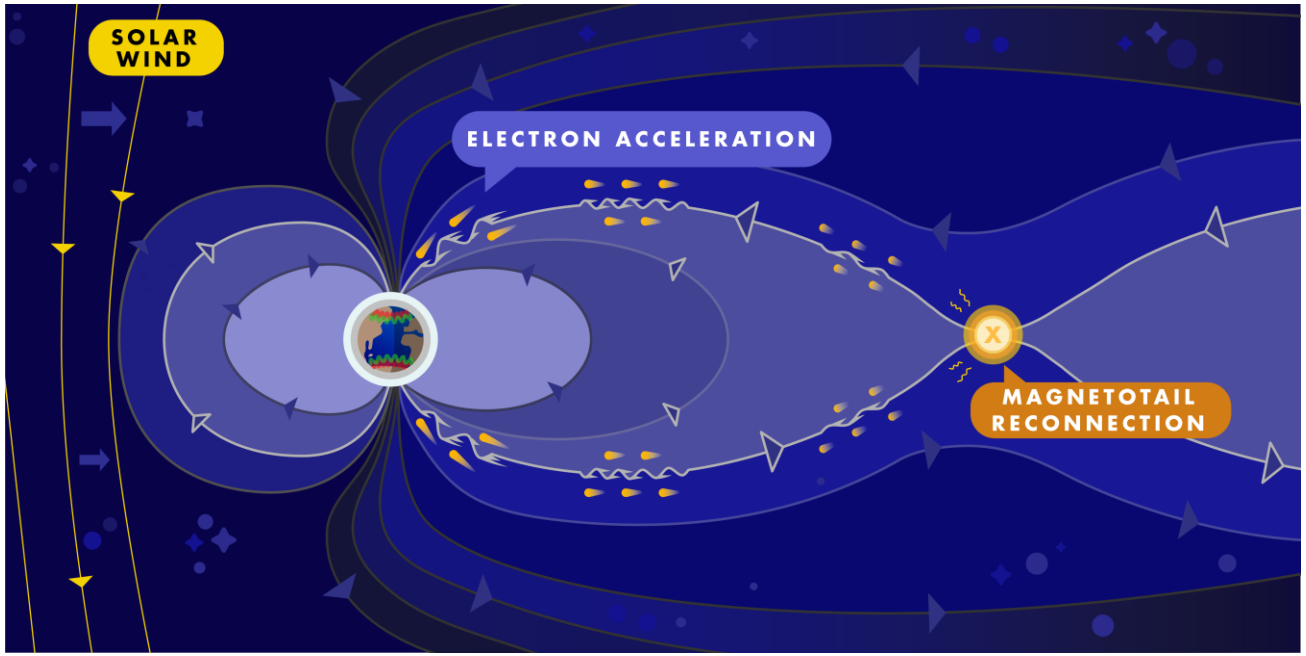
Drag: 0.1

Output:

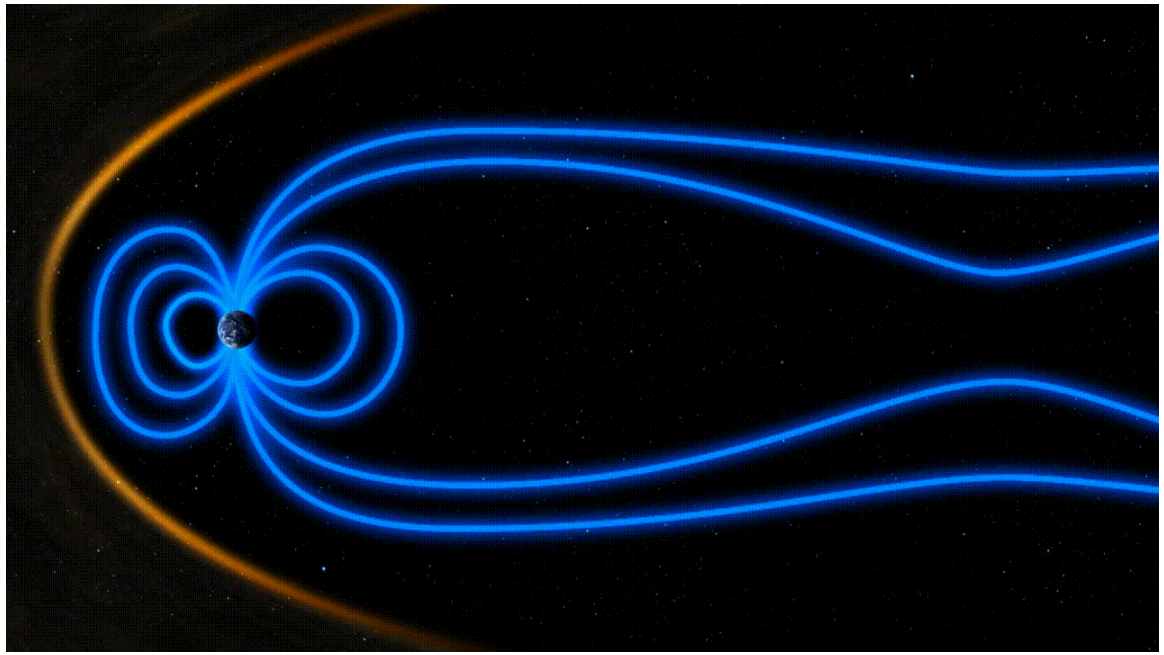
CME arrival at target (date & time): **19.01.2026 at 21h:26min**
Transit time: **27.24** h
Impact speed at target (at 0.98 AU): **1 049** km/s

Recept voor een zware geomagnetische storm

Bz < 0



© G. G. Howes, University of Iowa, 2021



© ESA / CLUSTER

Recept voor een zware geomagnetische storm

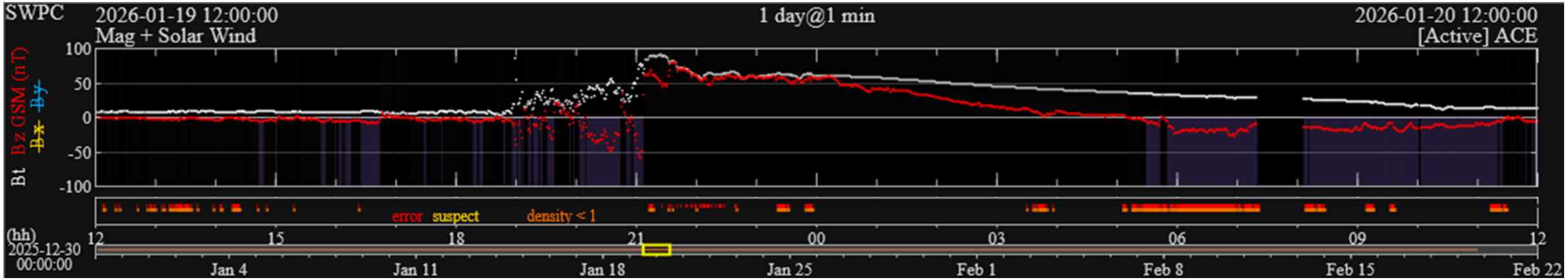
Bz dient zo negatief mogelijk te zijn

Bz dient zo lang mogelijk negatief te zijn

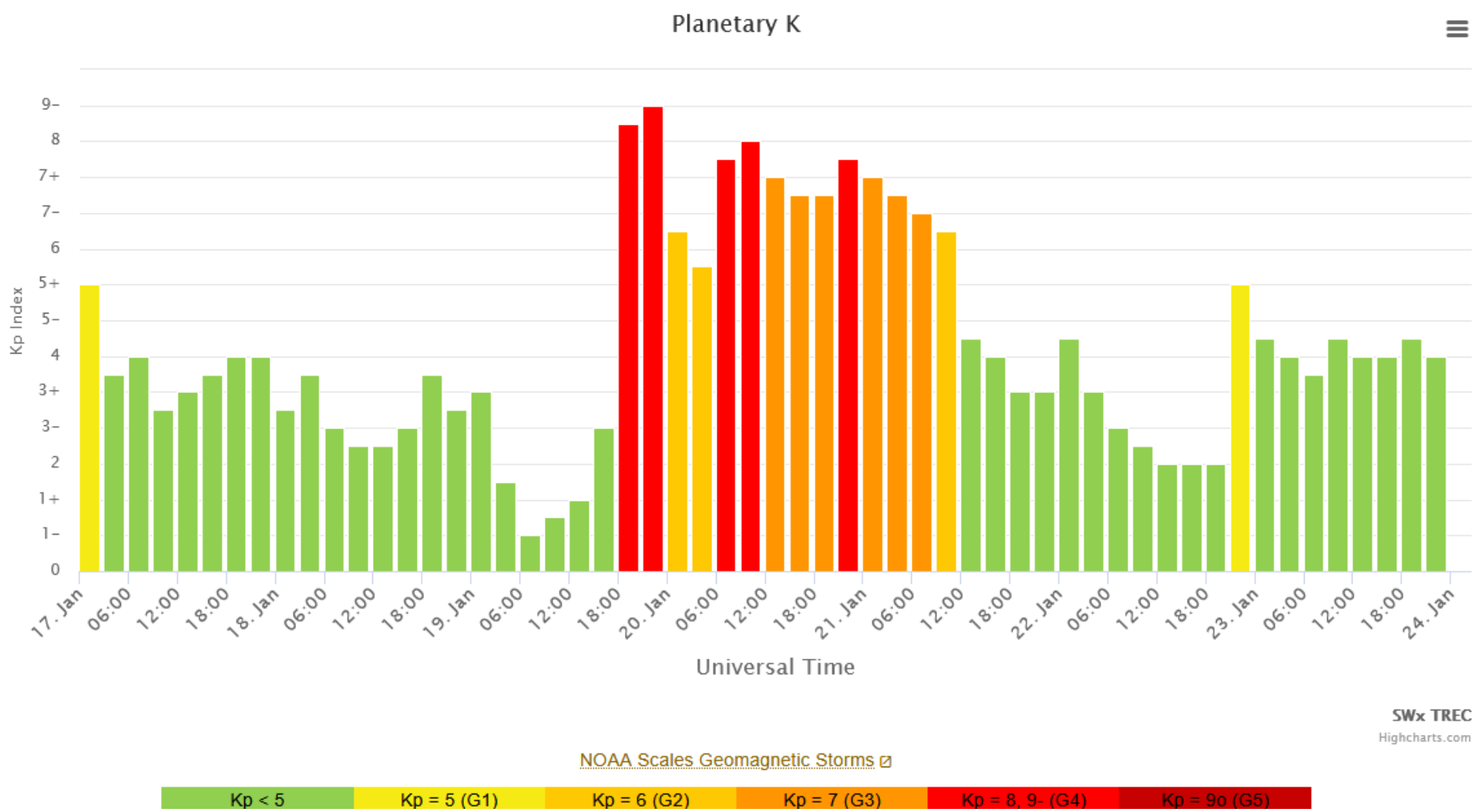
Recept voor een zware geomagnetische storm

Bz dient zo negatief mogelijk te zijn ✓

Bz dient zo lang mogelijk negatief te zijn ✗



19-20 januari - Zware geomagnetische storm

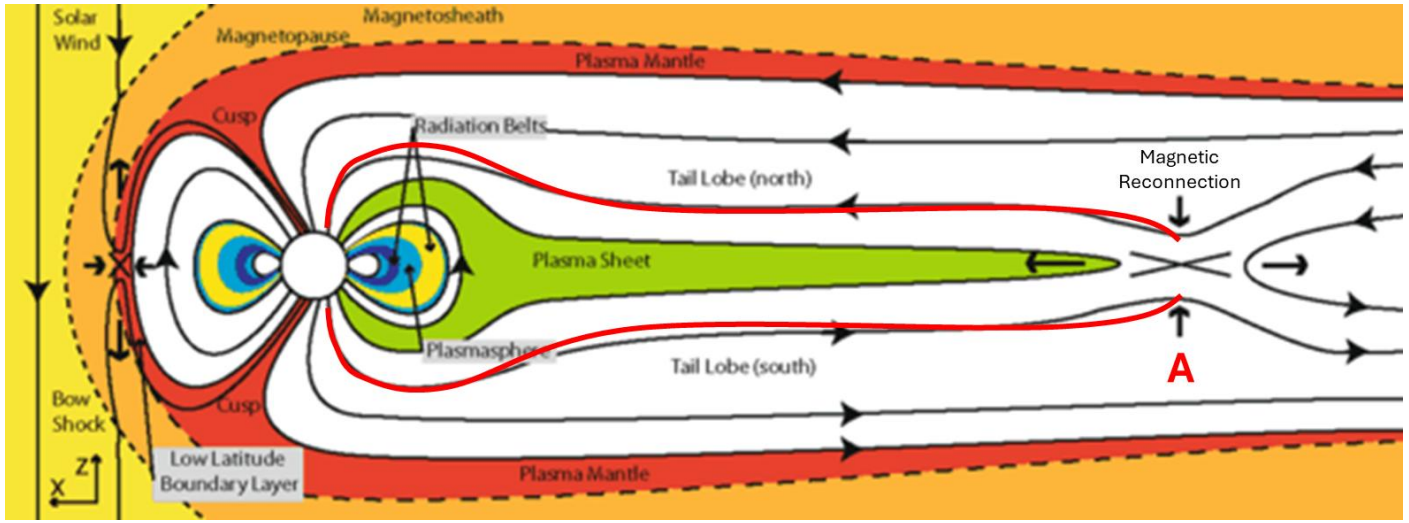


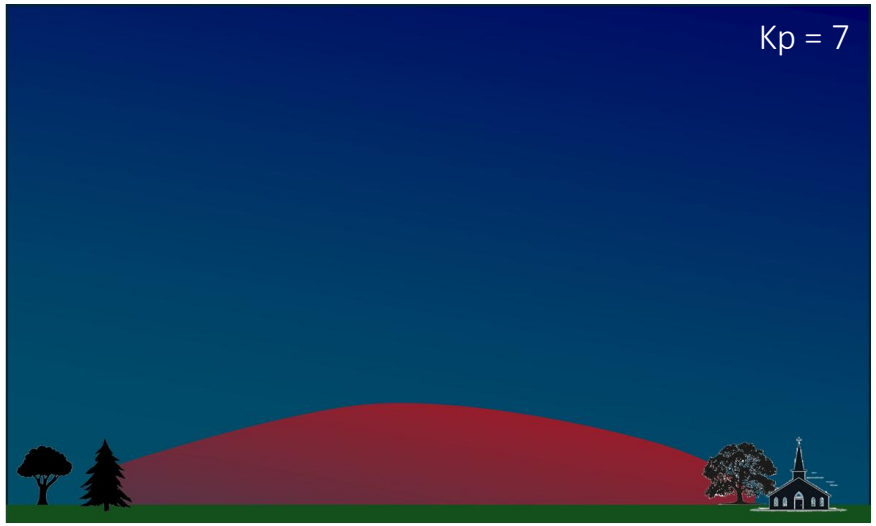
Aurora boven België

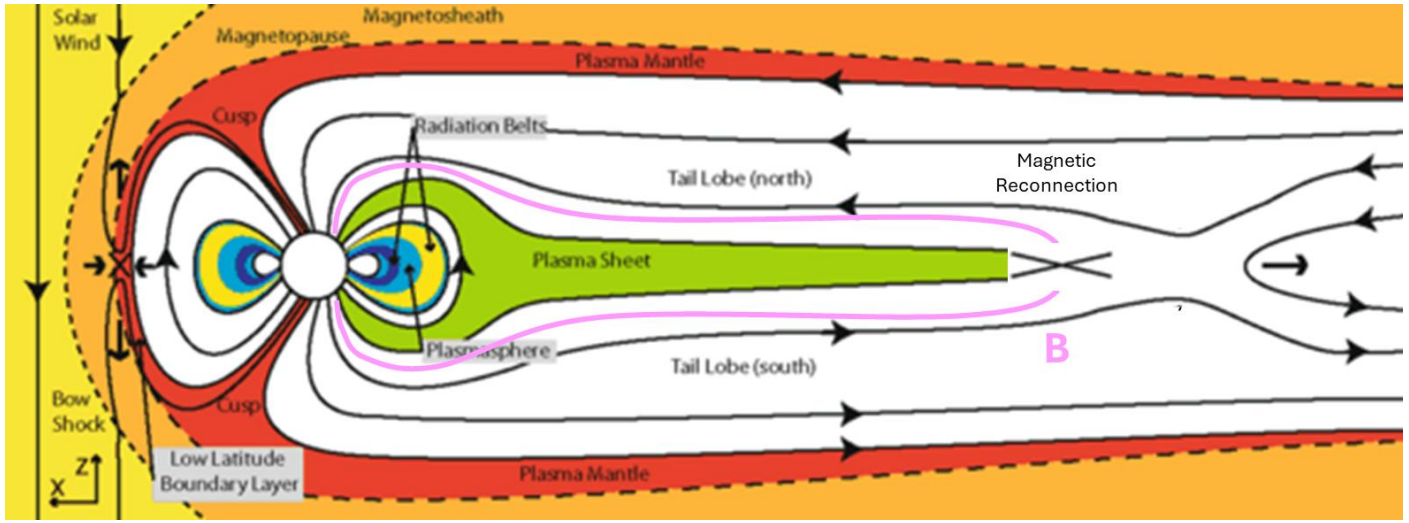
© G. Gonzales, Iowa State University, oktober 2003

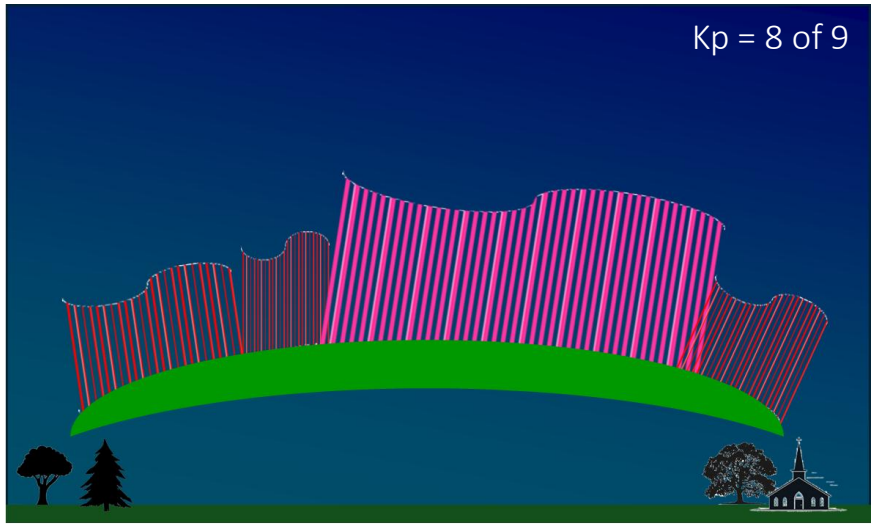
© Nancy Narang, Brussel, 12 november 2025

Recept voor aurora boven België







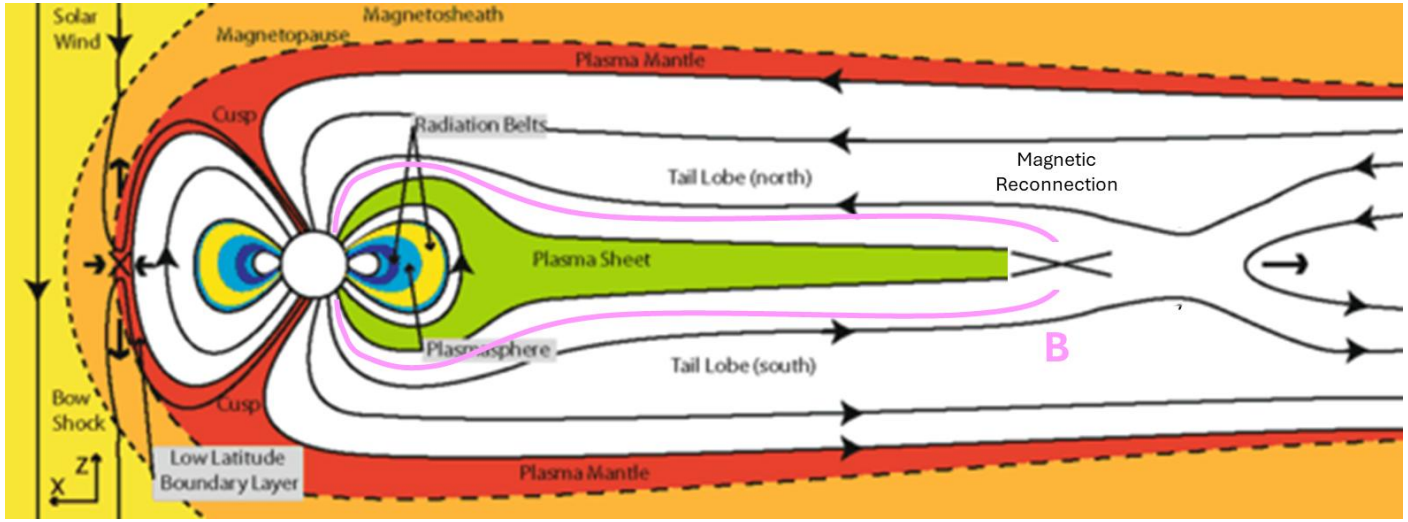


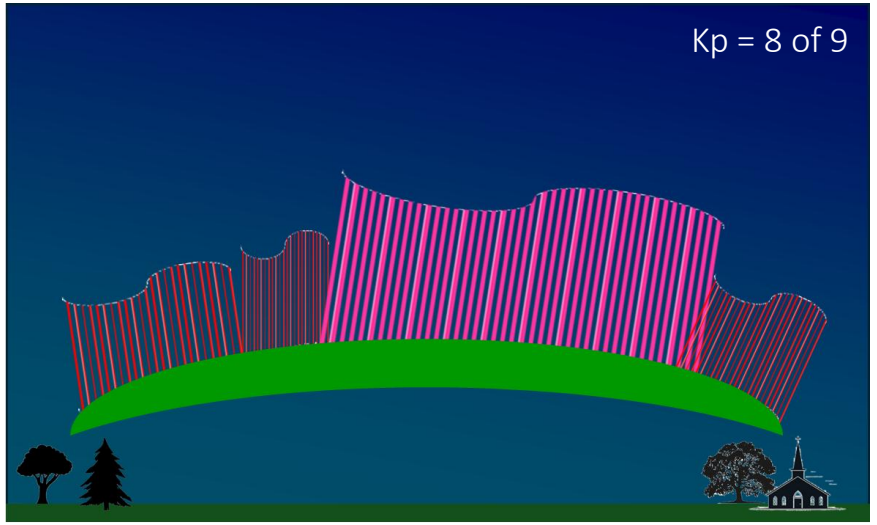
https://www.stce.be/news/802/welcome.html

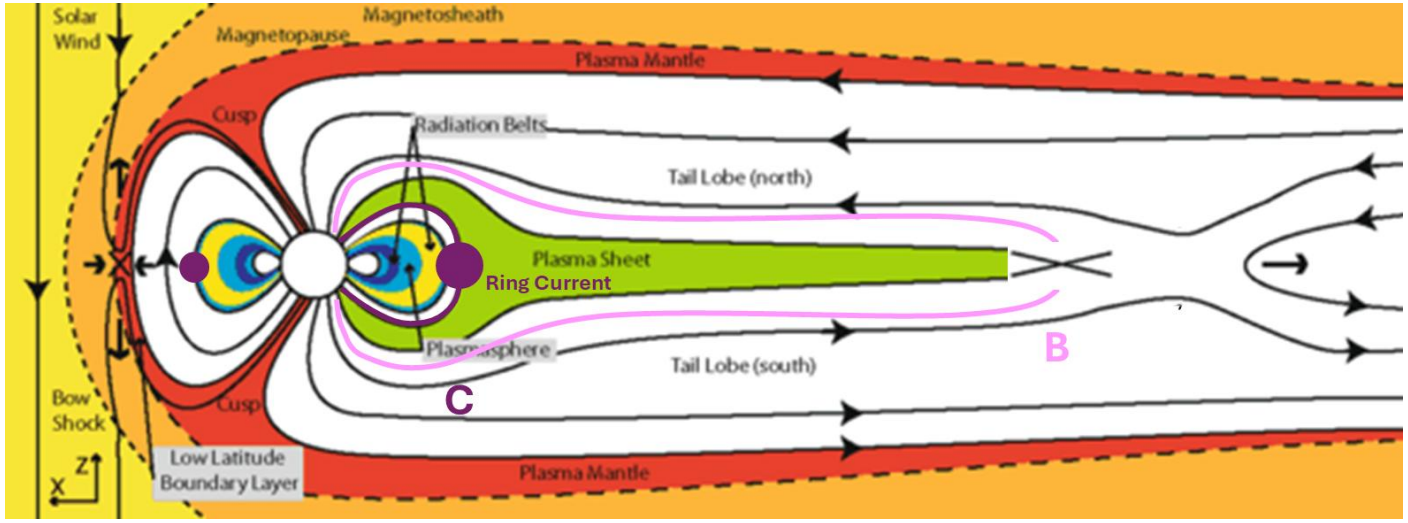
Poollicht boven België – 19 januari 2026

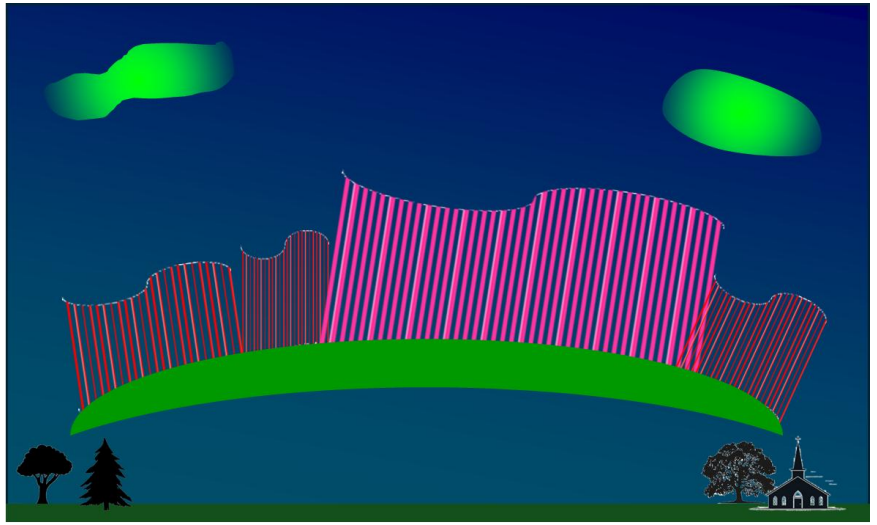
Credits: Jonas Piontek - https://www.youtube.com/watch?v=MxM-h5pU9mE ; STCE newsitem: https://www.stce.be/news/802/welcome.html

Poollicht in België – Proton aurora









https://www.stce.be/news/802/welcome.html

Poollicht boven België – 19 januari 2026

https://www.stce.be/news/801/welcome.html

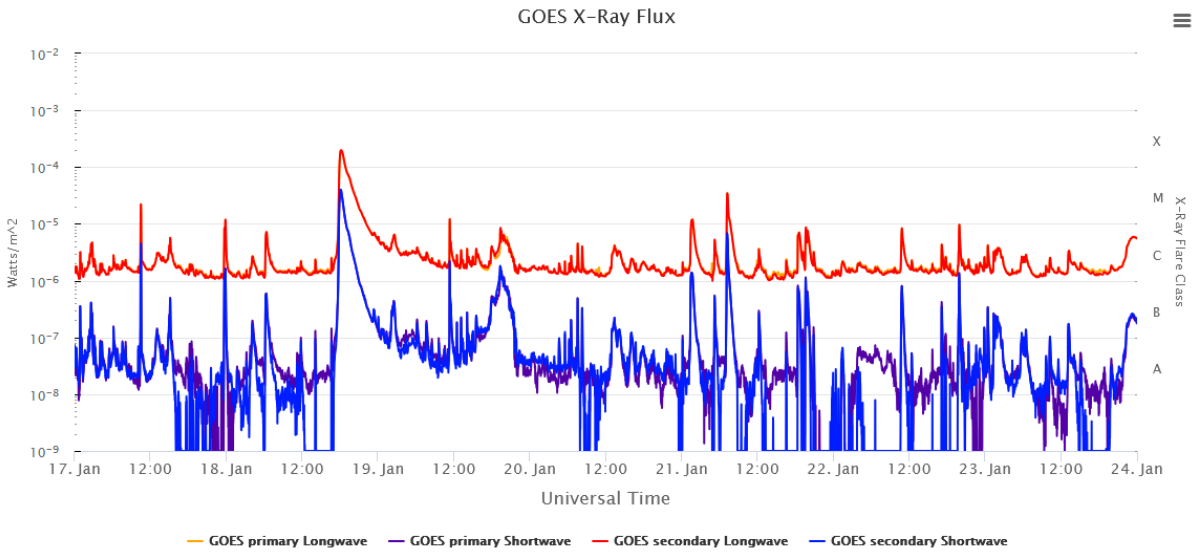
Poollicht boven Nederland – 19 januari 2026

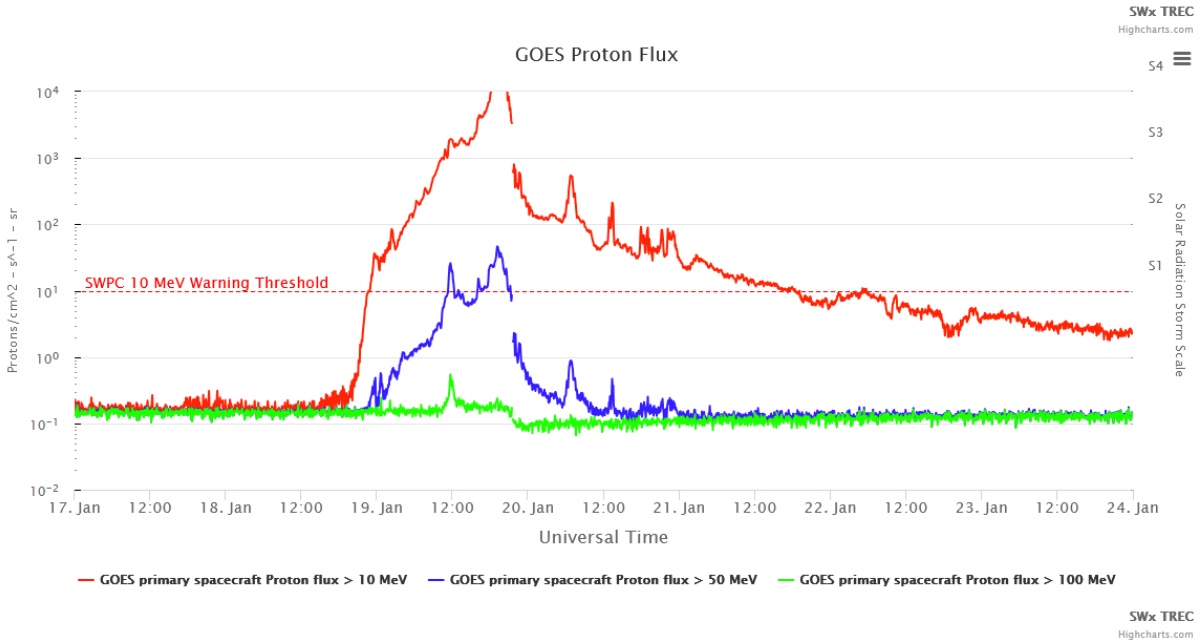
Credits: Samantha Filoso on January 19, 2026 @ Veldhoven, Netherlands

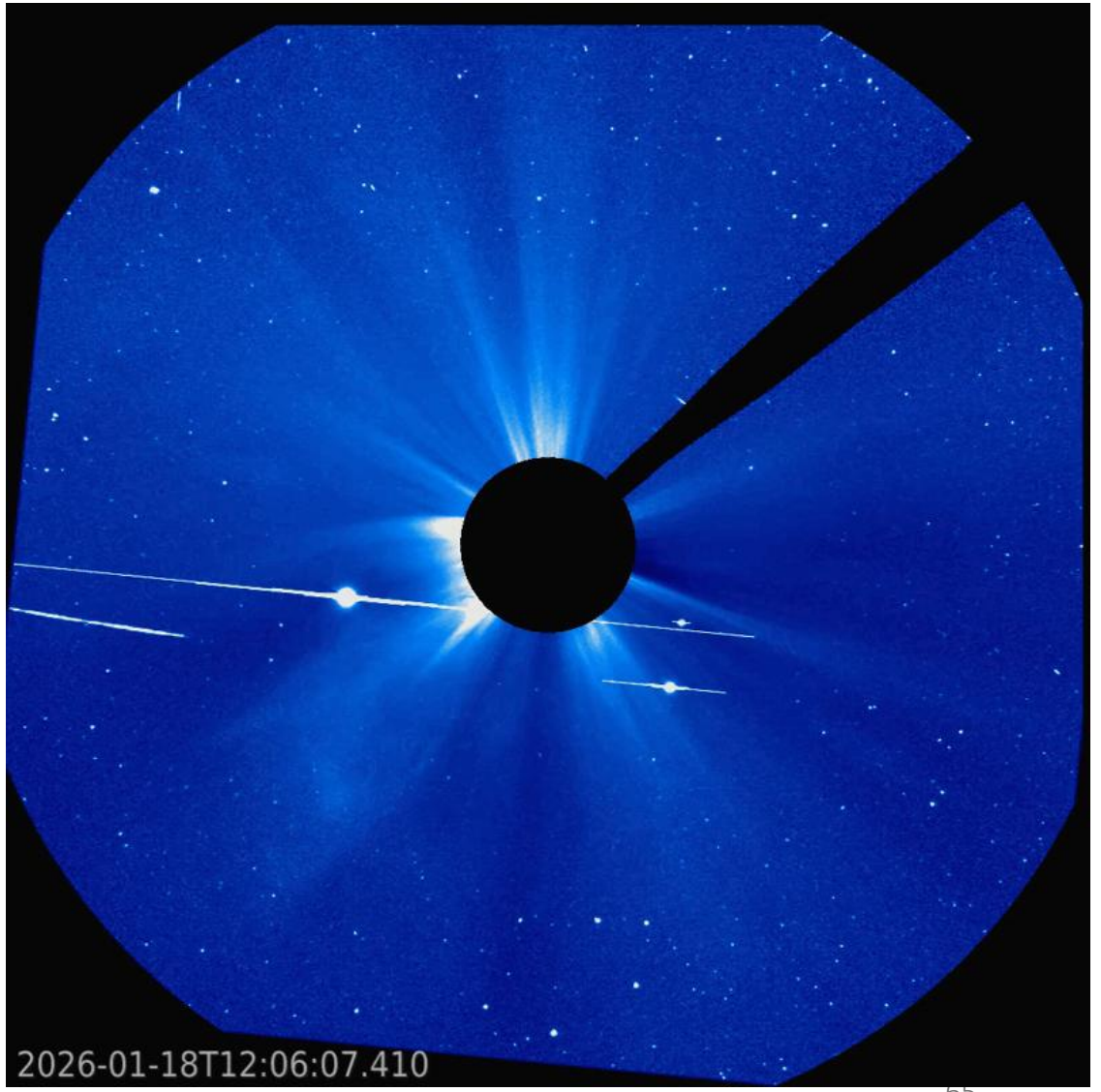
Credits: Richard on January 19, 2026 @ Geleen, Netherlands

https://spaceweathergallery2.com/index.php?title=aurora

Laatste verrassing: Zware proton storm







https://www.stce.be/news/804/welcome.html

Zwaarste proton storm in 20-35 jaar

NOAA Space Weather Prediction Center

Solar Proton Events Affecting the Earth Environment

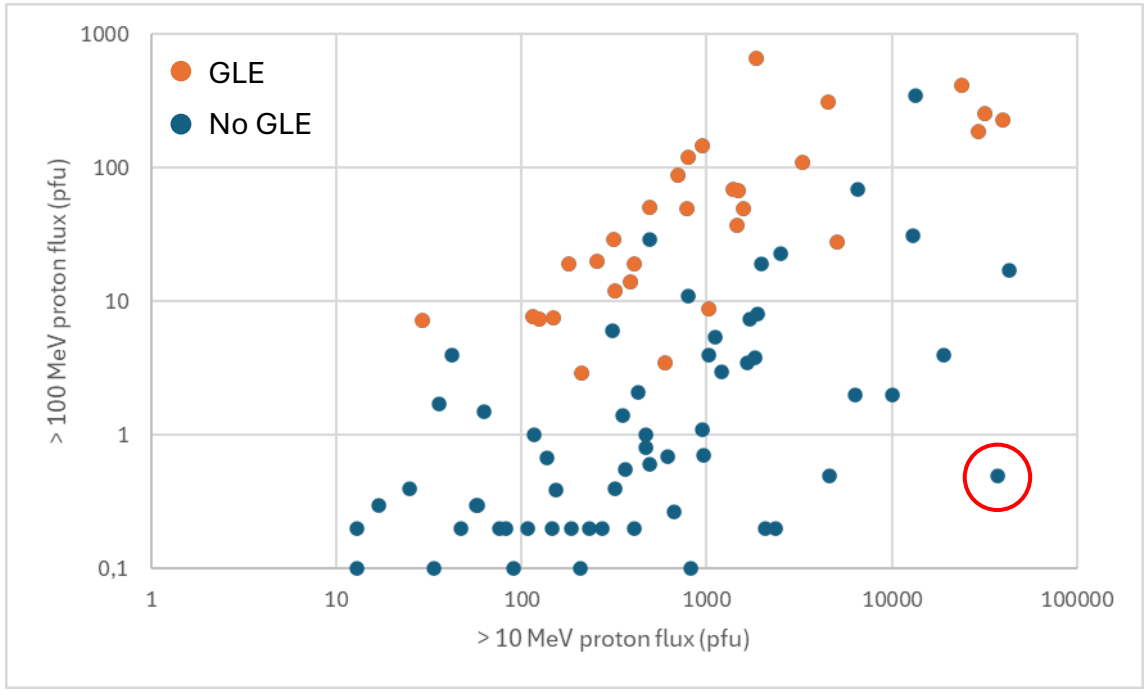
1976 - Present

Search for year... Clear search 1809

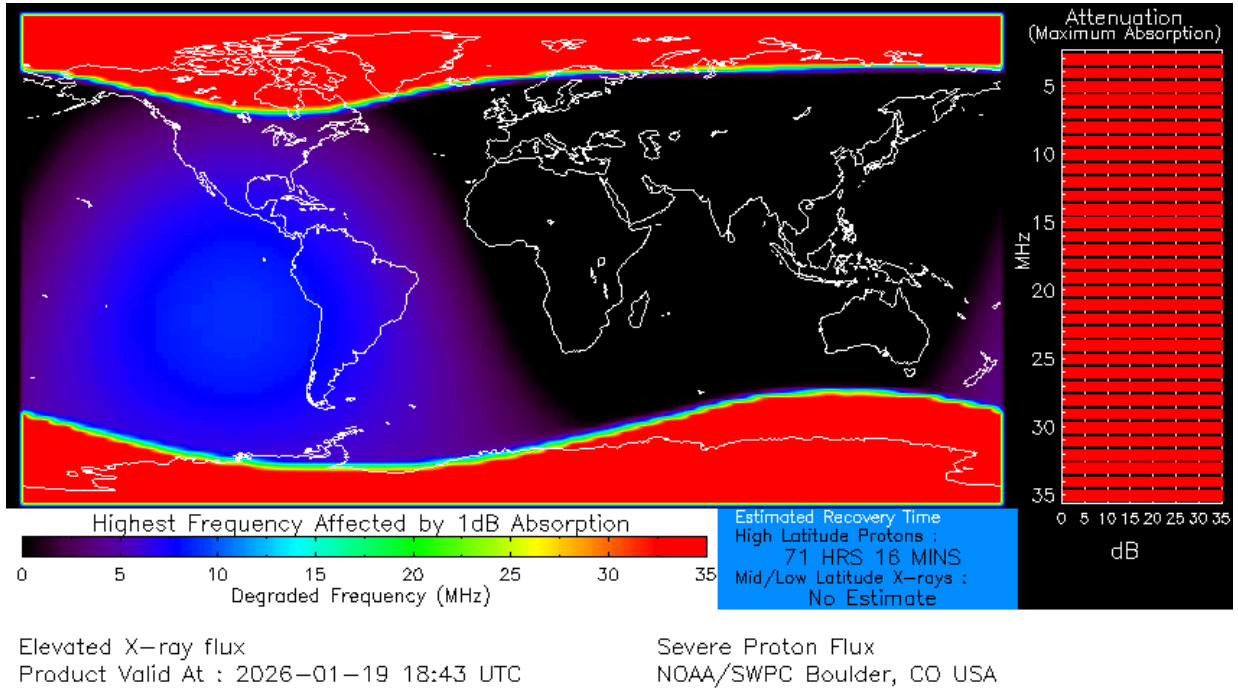
Begin Time Yr M/D (UTC)	Maximum Time Yr M/D (UTC)	>10 MeV Maximum (pfu) ▲▼	Region	Location	Flare Maximum (UTC)	Type II Radio Emission	Type IV	Linear Speed ▲▼	Imagery/Misc
1991 03/23 0820	1991 03/24 0350	43,500	6555	S26E28	X9/3B 03/22 2246	Yes	No	N/A	N/A
1989 10/19 1310	1989 10/20 1600	42,200	5747	S27E10	X13/4B 10/19 1306	Yes	Yes	N/A	N/A
2026 01/18 2255	2026 01/19 1915	37,000	14341	S11E24	X1.9/3B 01/18 1809	Yes	Yes	ESP enhanced at CME arrival	Flux Plot
2001 11/04 1705	2001 11/06 0215	31,700	9684	N06W18	X1/3B 11/04 1620	Yes	Yes	1329 km/s	C2
2003 10/28 1215	2003 10/29 0615	29,500	10486	S16E08	X17/4B 10/28 1110	Yes	Yes	2459 km/s	C2 EIT
2000 07/14 1045	2000 07/15 1230	24,000	9077	N22W07	X5/3B 07/14 1024	Yes	Yes	1674 km/s	C2 EIT

https://www.ngdc.noaa.gov/stp/space-weather/interplanetary-data/solar-proton-events/SEP%20page%20code.html

Zware proton storm: vooral HF Com boven polen

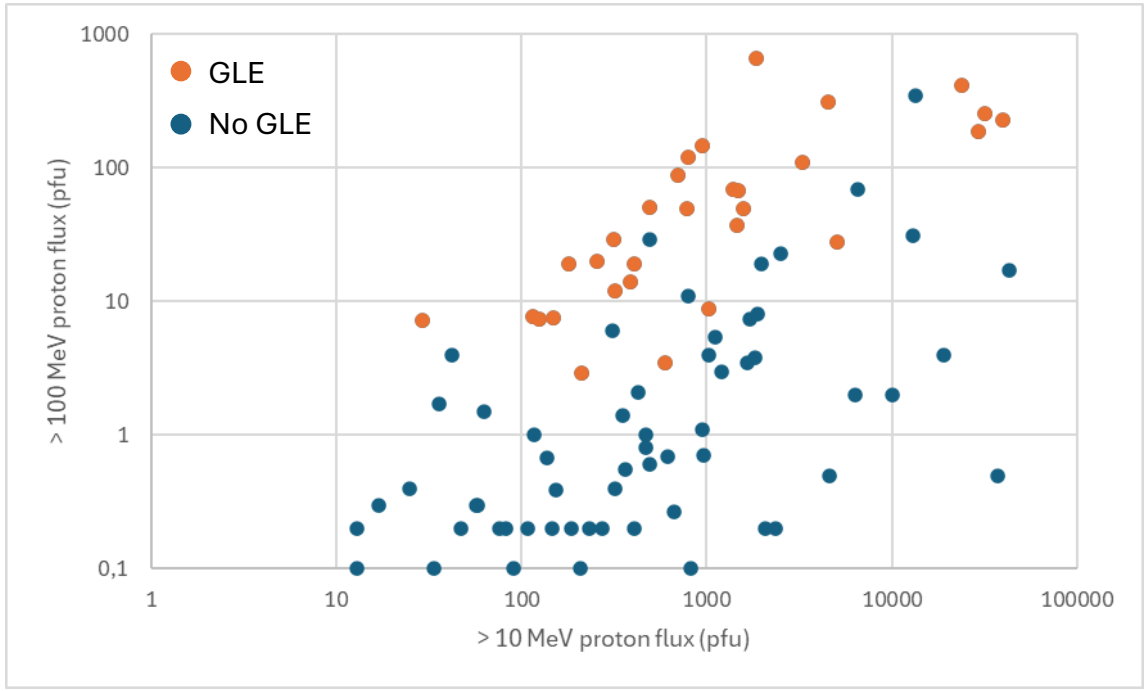


GLE: Ground Level Enhancement

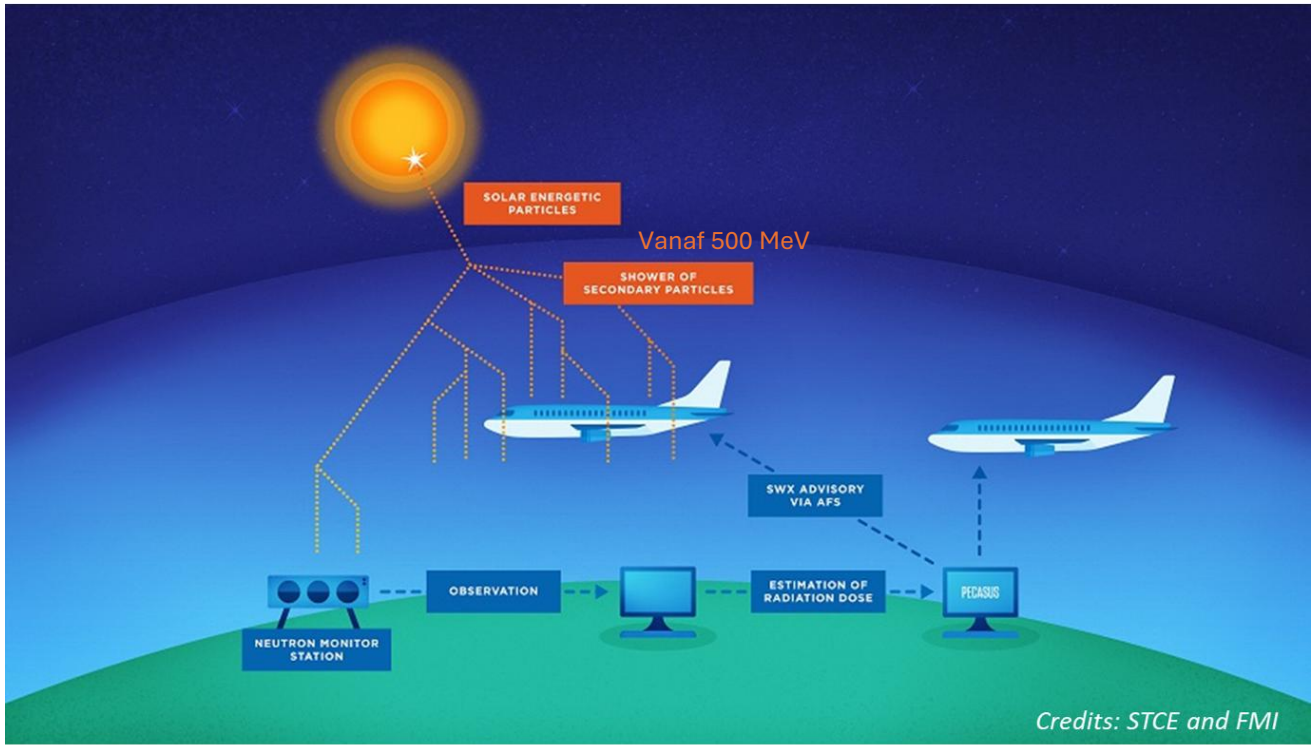


https://www.swpc.noaa.gov/products/d-region-absorption-predictions-d-rap

Zware proton storm: lage extra stralingsdosis

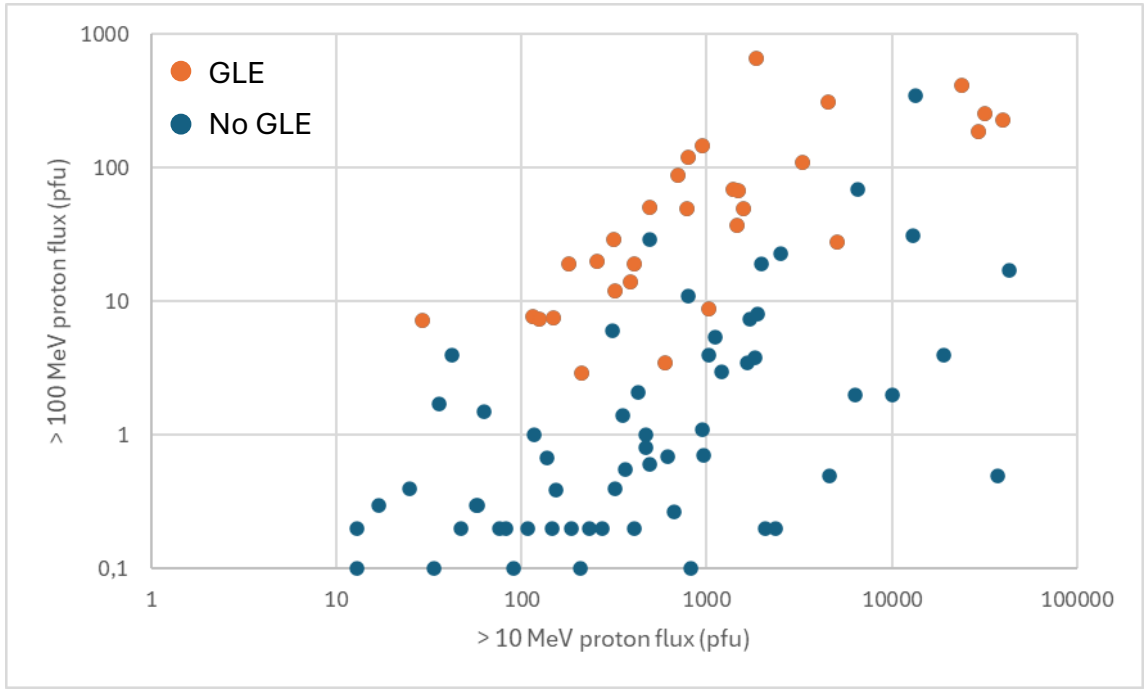


GLE: Ground Level Enhancement



https://www.stce.be/news/797/welcome.html

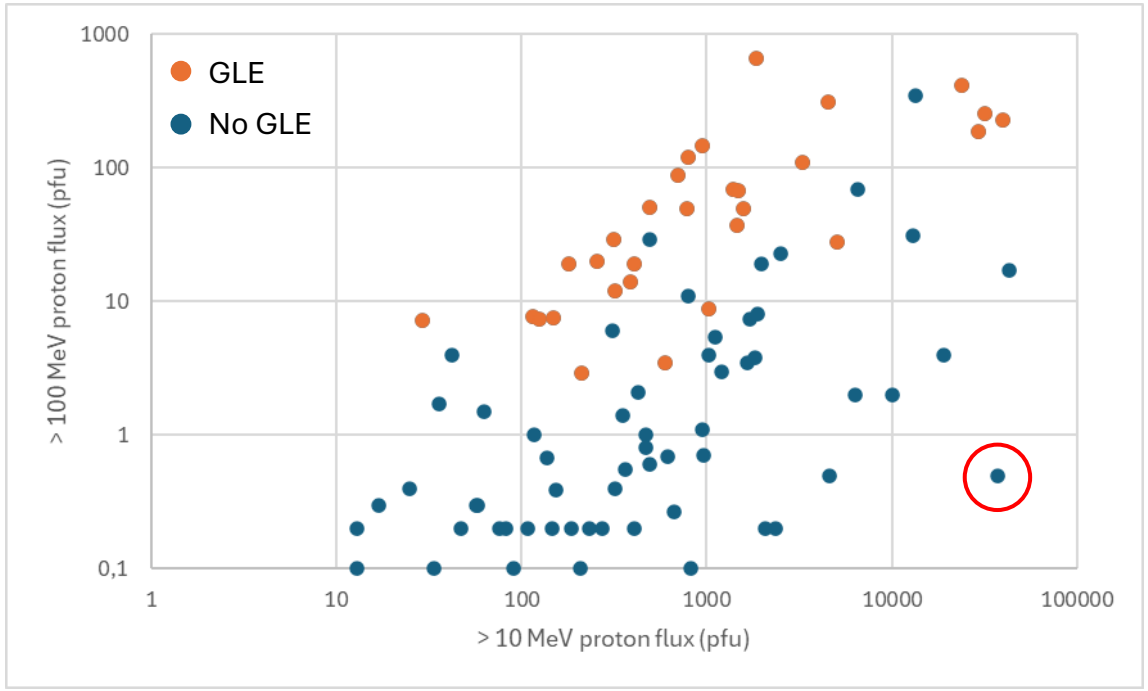
Zware proton storm: lage extra stralingsdosis



GLE: Ground Level Enhancement

https://swe.ssa.esa.int/web/guest/avidos-federated

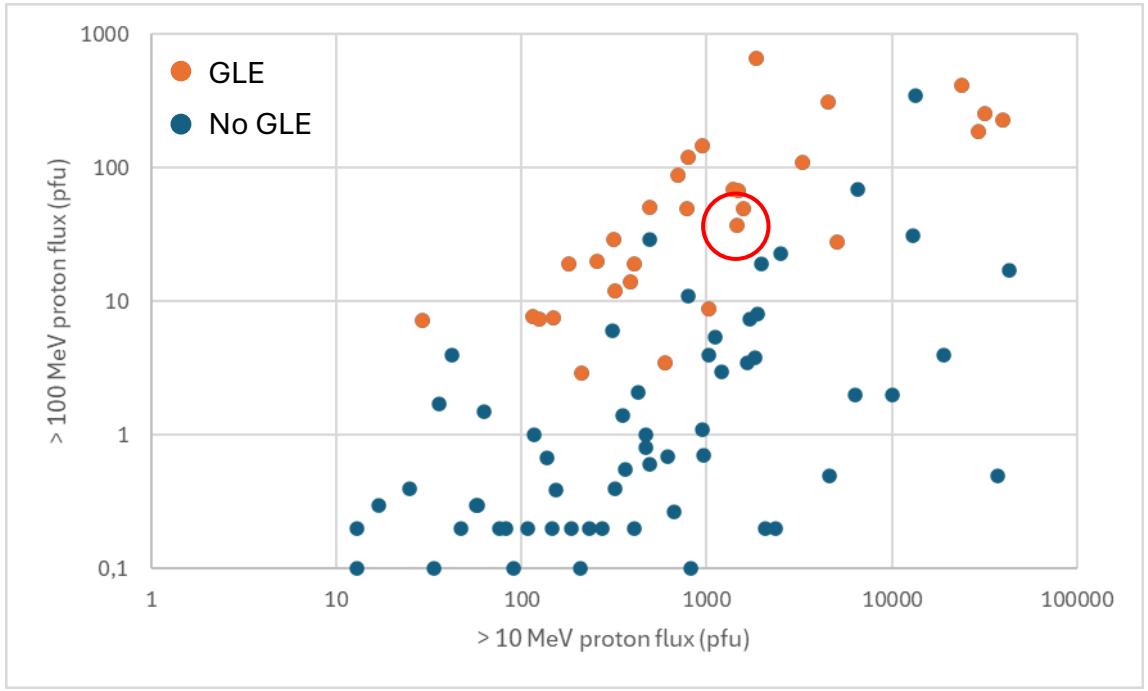
Zware proton storm: lage extra stralingsdosis



GLE: Ground Level Enhancement

https://swe.ssa.esa.int/web/guest/avidos-federated

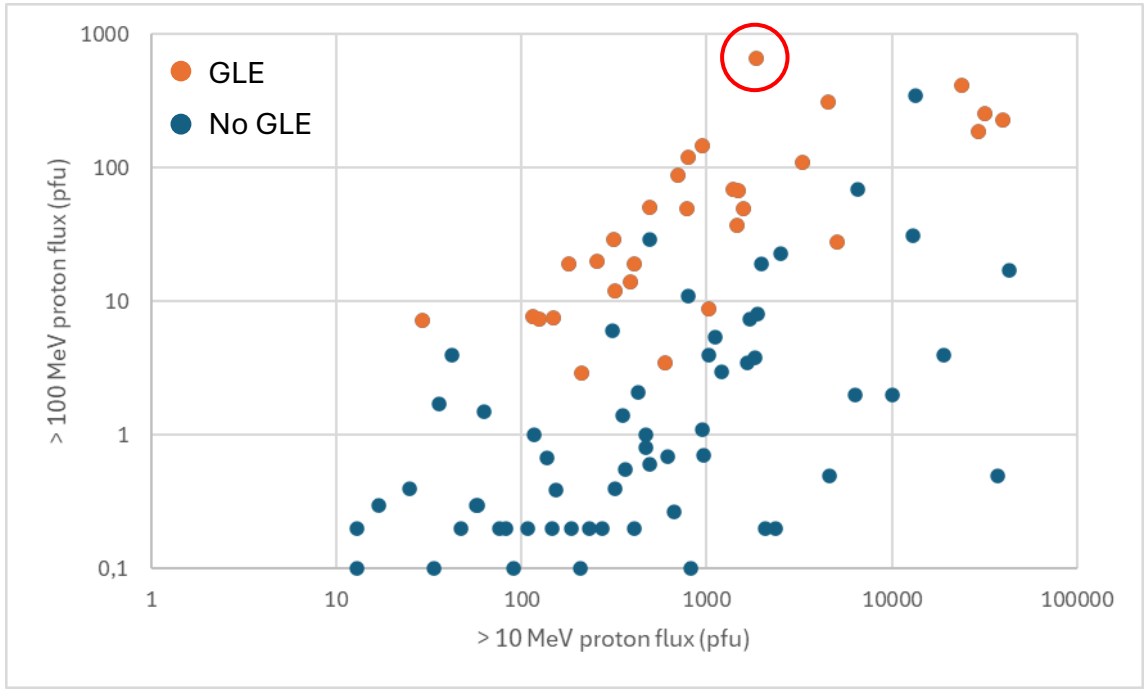
Zware proton storm: GLE 11 november 2025



GLE: Ground Level Enhancement

https://swe.ssa.esa.int/web/guest/avidos-federated

Zware proton storm: GLE 20 januari 2005



GLE: Ground Level Enhancement

https://swe.ssa.esa.int/web/guest/avidos-federated

Vragen?

https://200year.observatory.be/nl/home2