

SPACE WEATHER INTRODUCTORY COURSE



Collaboration of



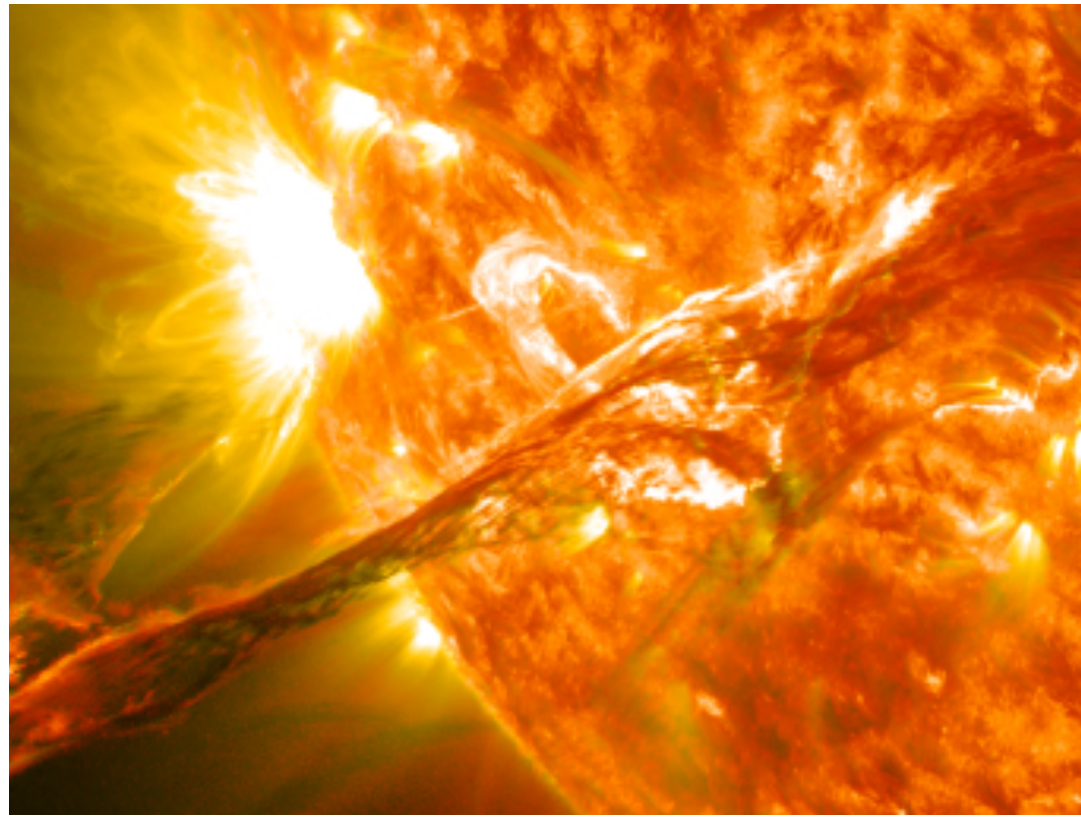
Solar-Terrestrial Centre of Excellence



Koninklijke luchtmacht



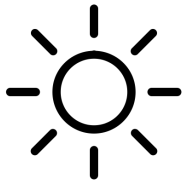
Koninklijk Nederlands
Meteorologisch Instituut
Ministerie van Infrastructuur en Milieu



SPACE WEATHER

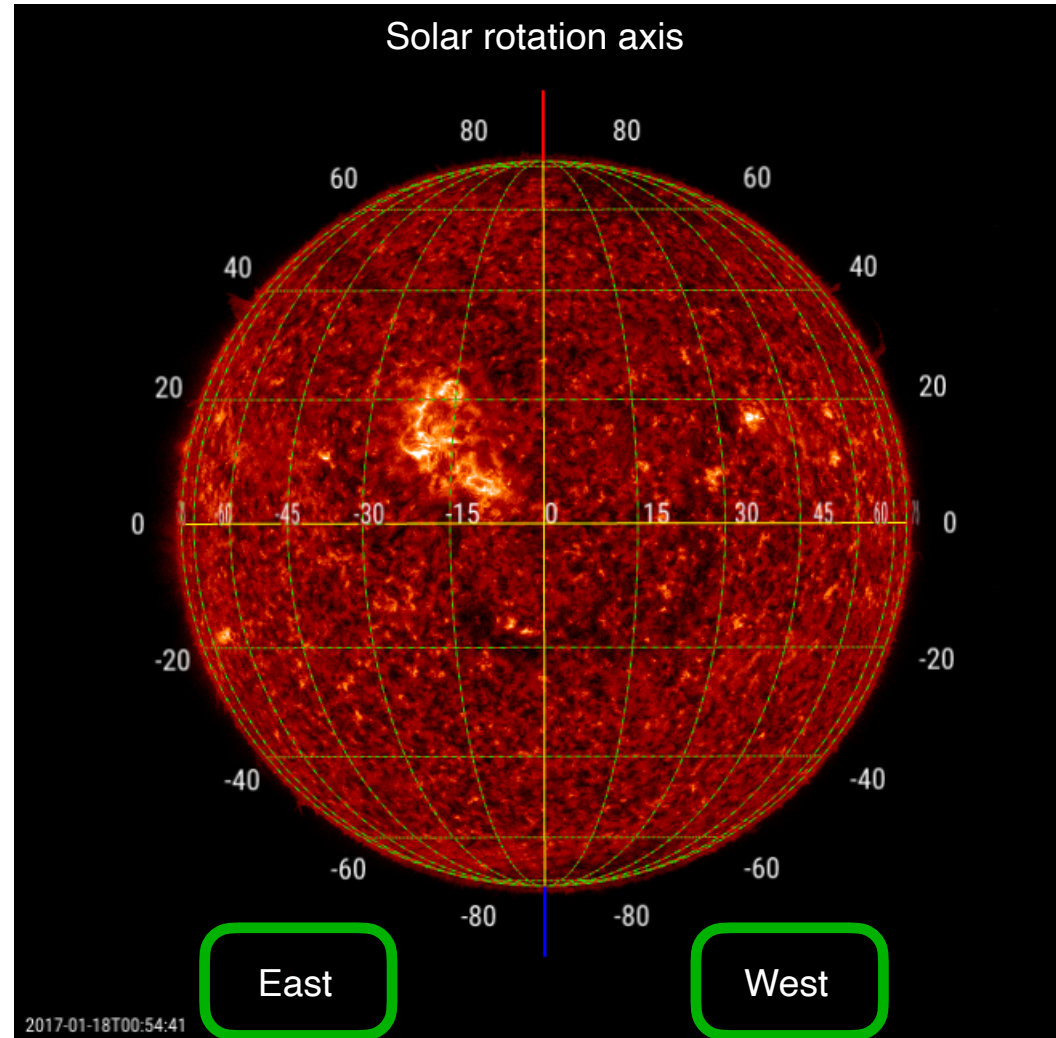
Basic Concepts

POSITIONING



Solar North Pole
Magnetic North Pole
Negative/Inward

Solar South Pole
Magnetic South Pole
Positive/Outward

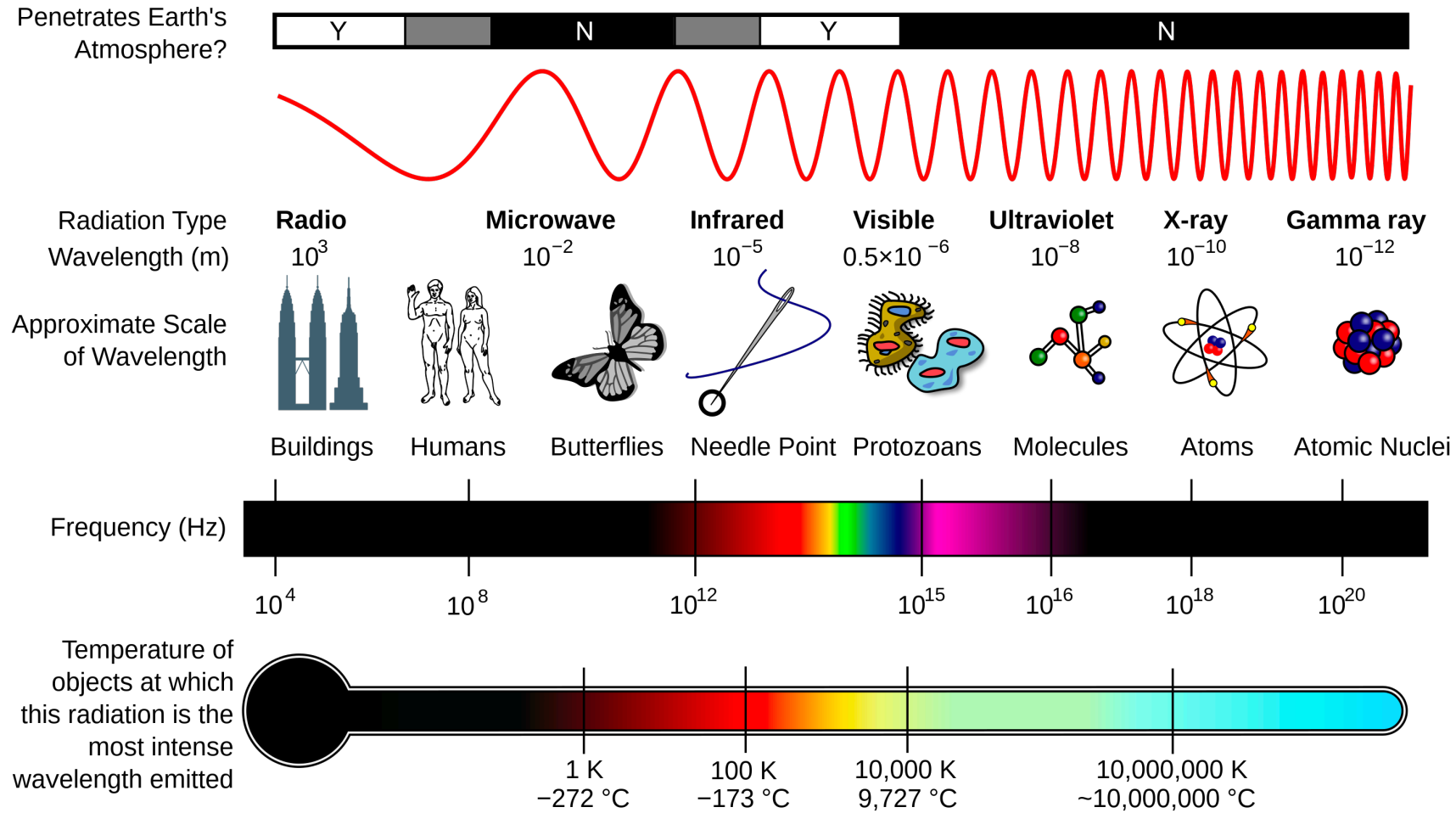


Northern hemisphere

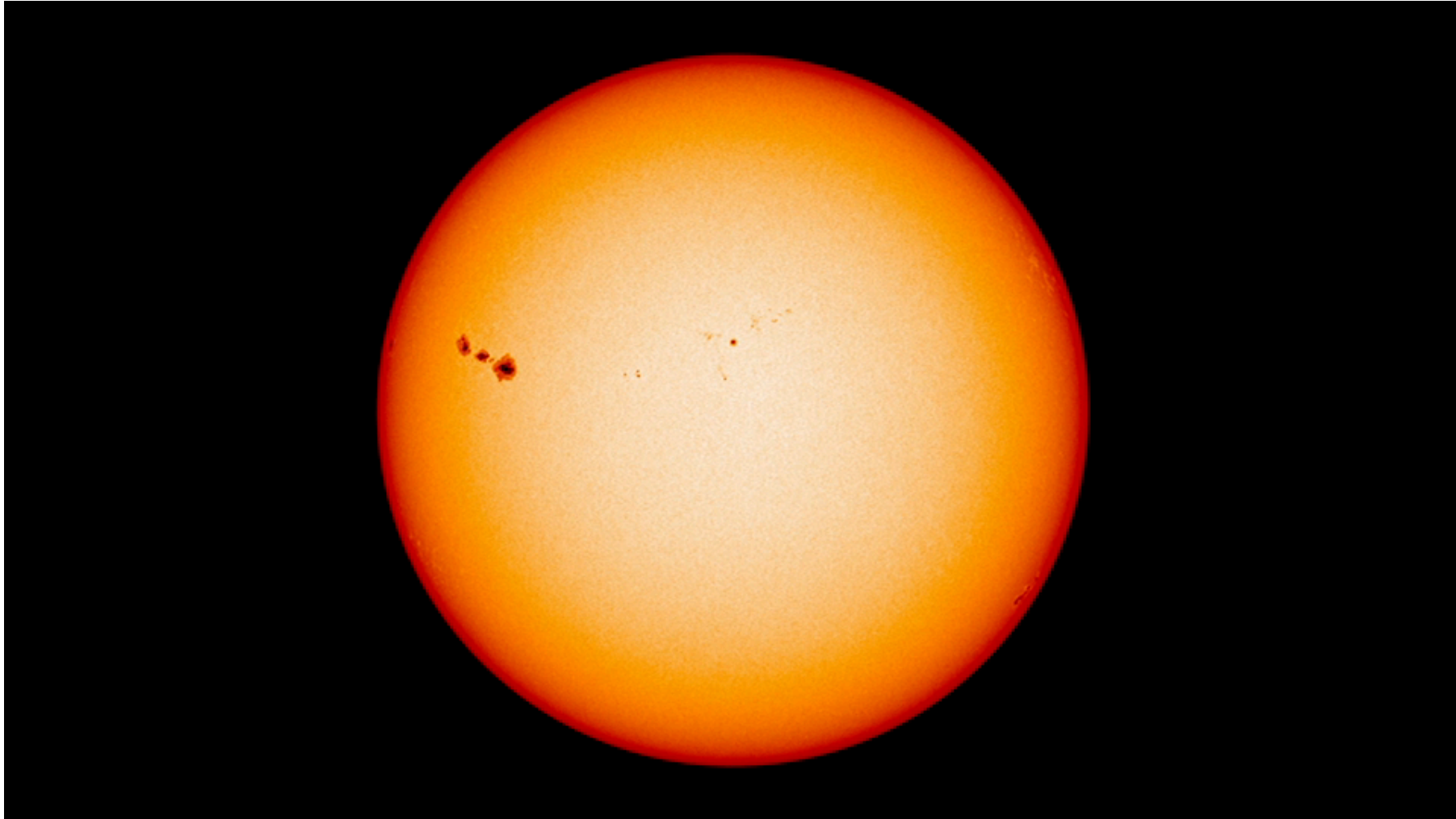
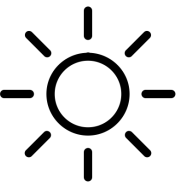
Solar Equator

Southern hemisphere

ELECTROMAGNETIC SPECTRUM



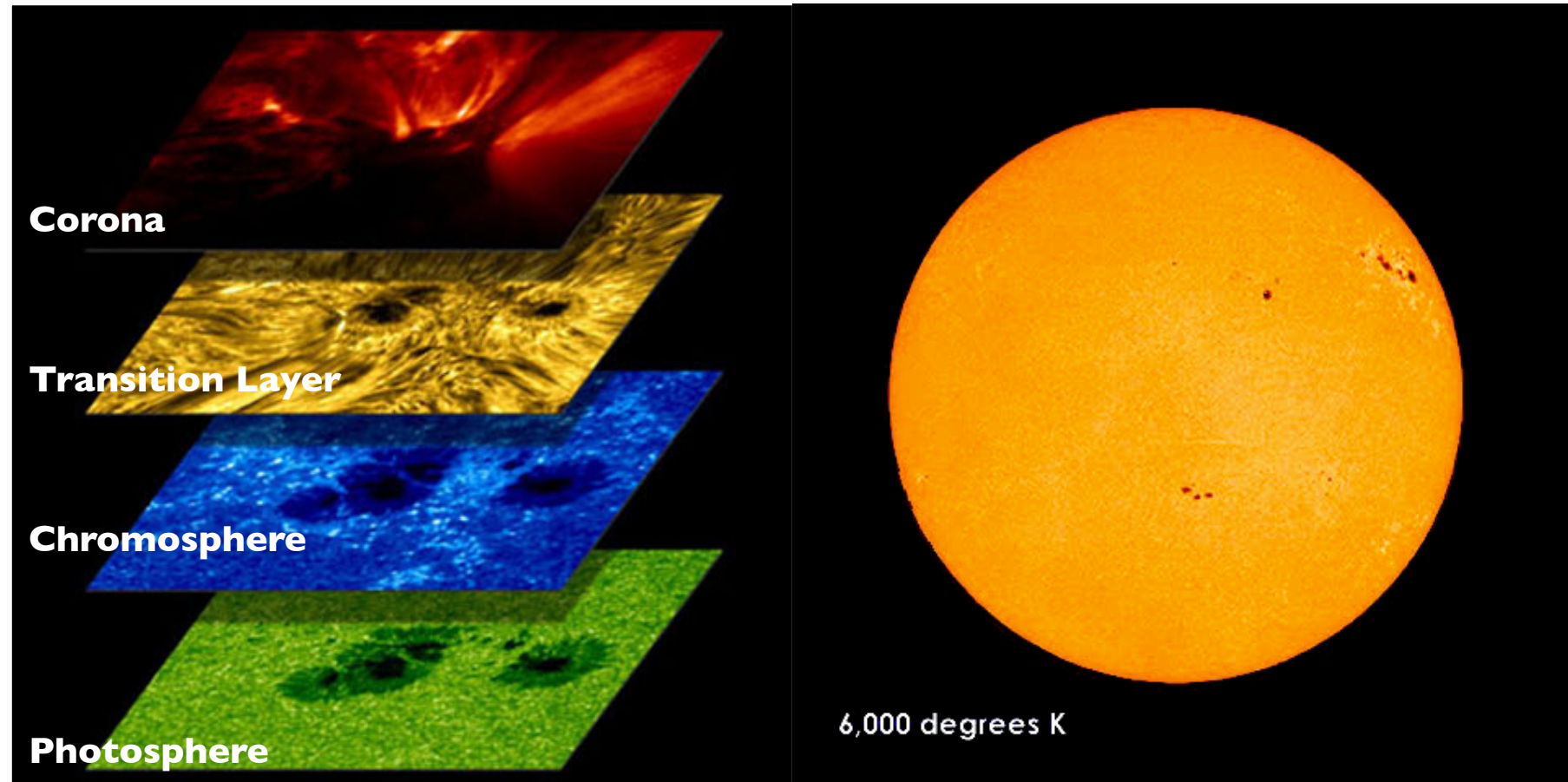
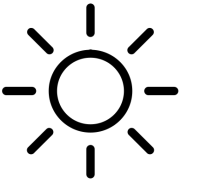
ELECTROMAGNETIC SPECTRUM



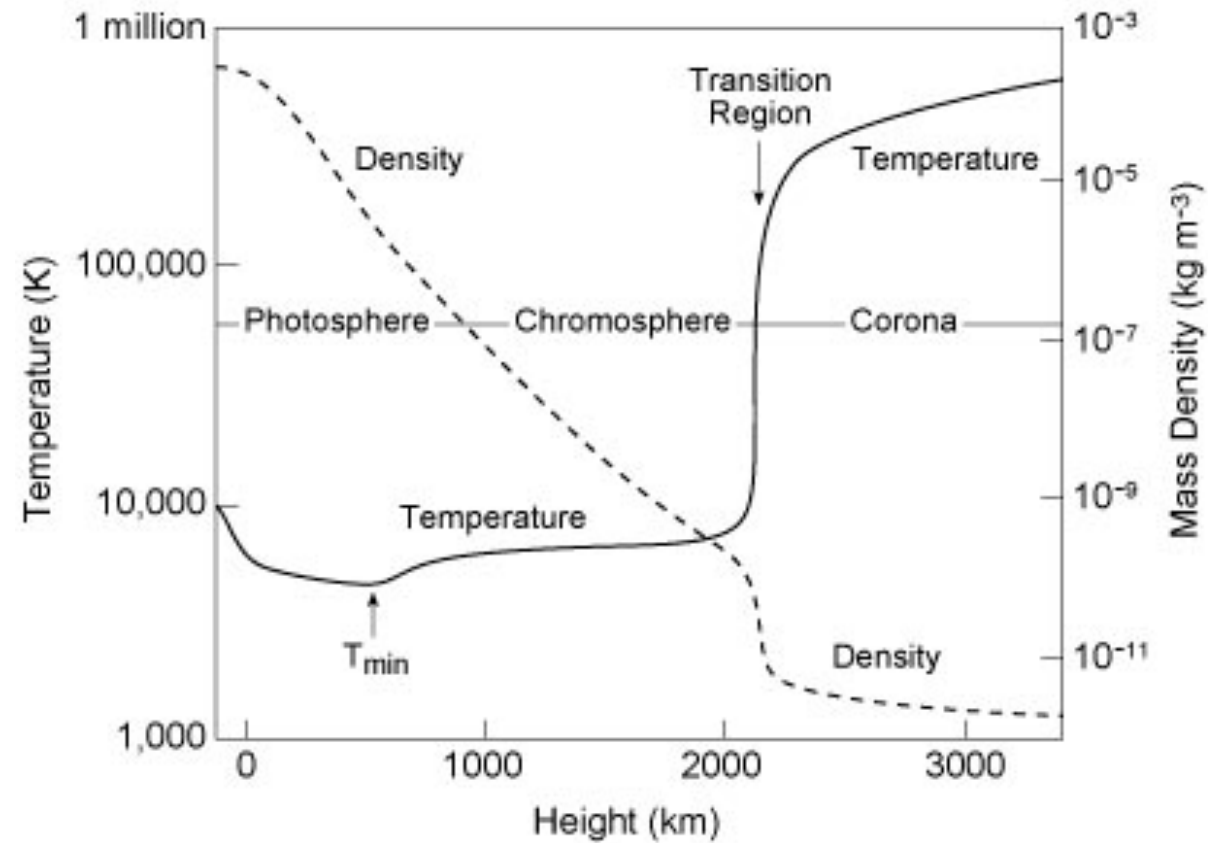
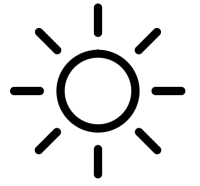
SDO/AIA



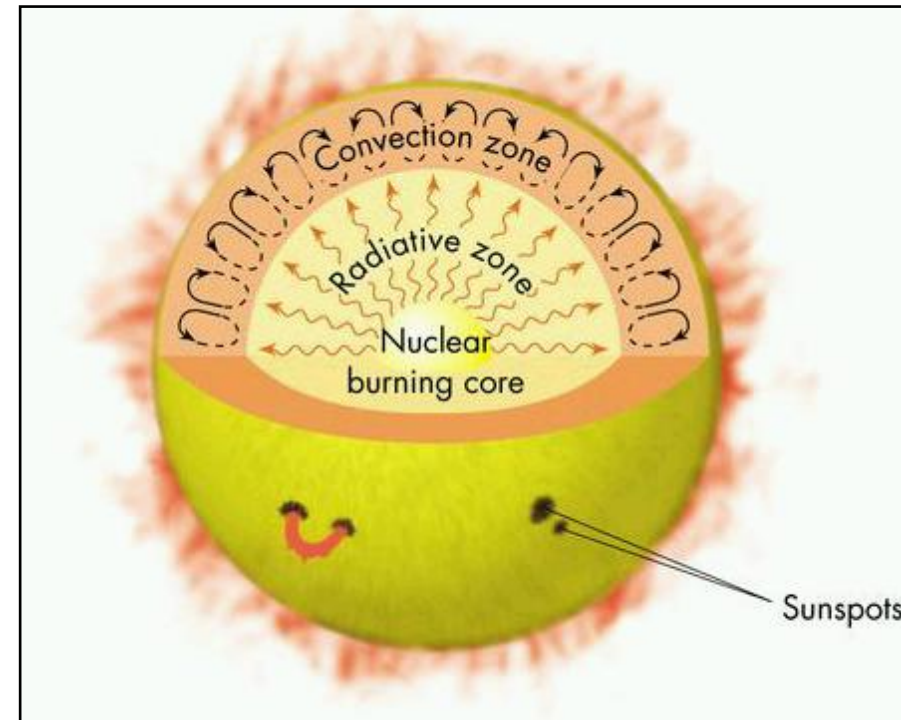
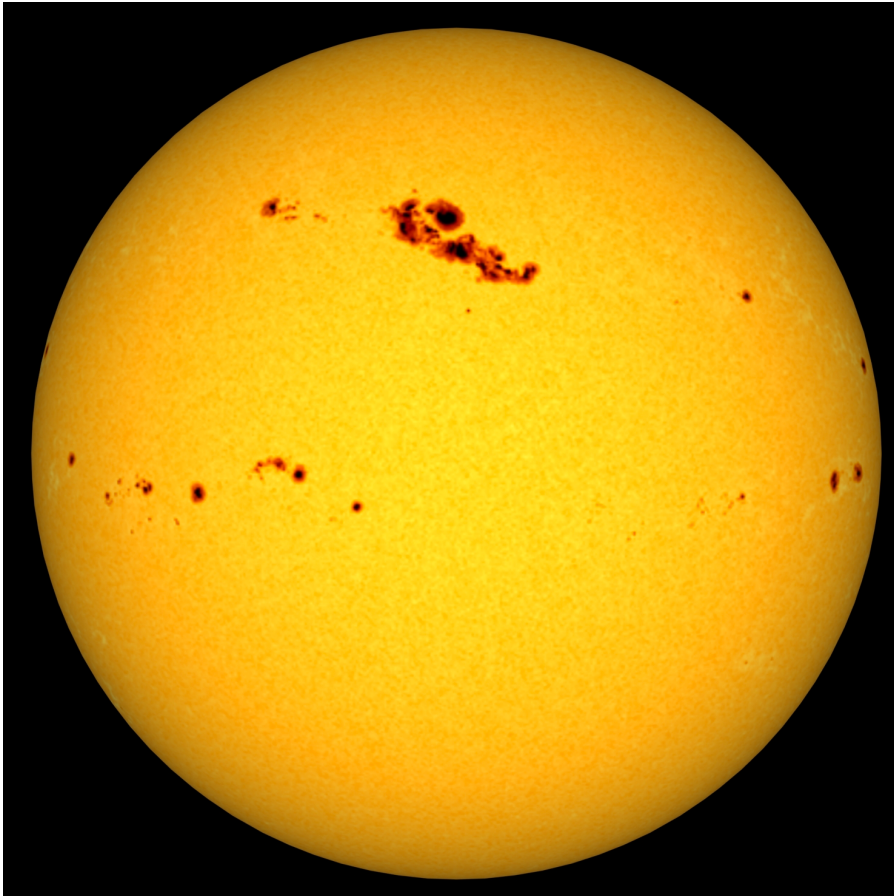
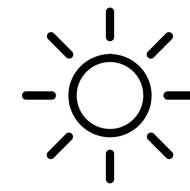
LAYERS OF THE SUN



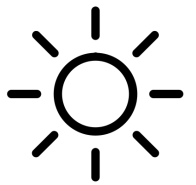
LAYERS OF THE SUN



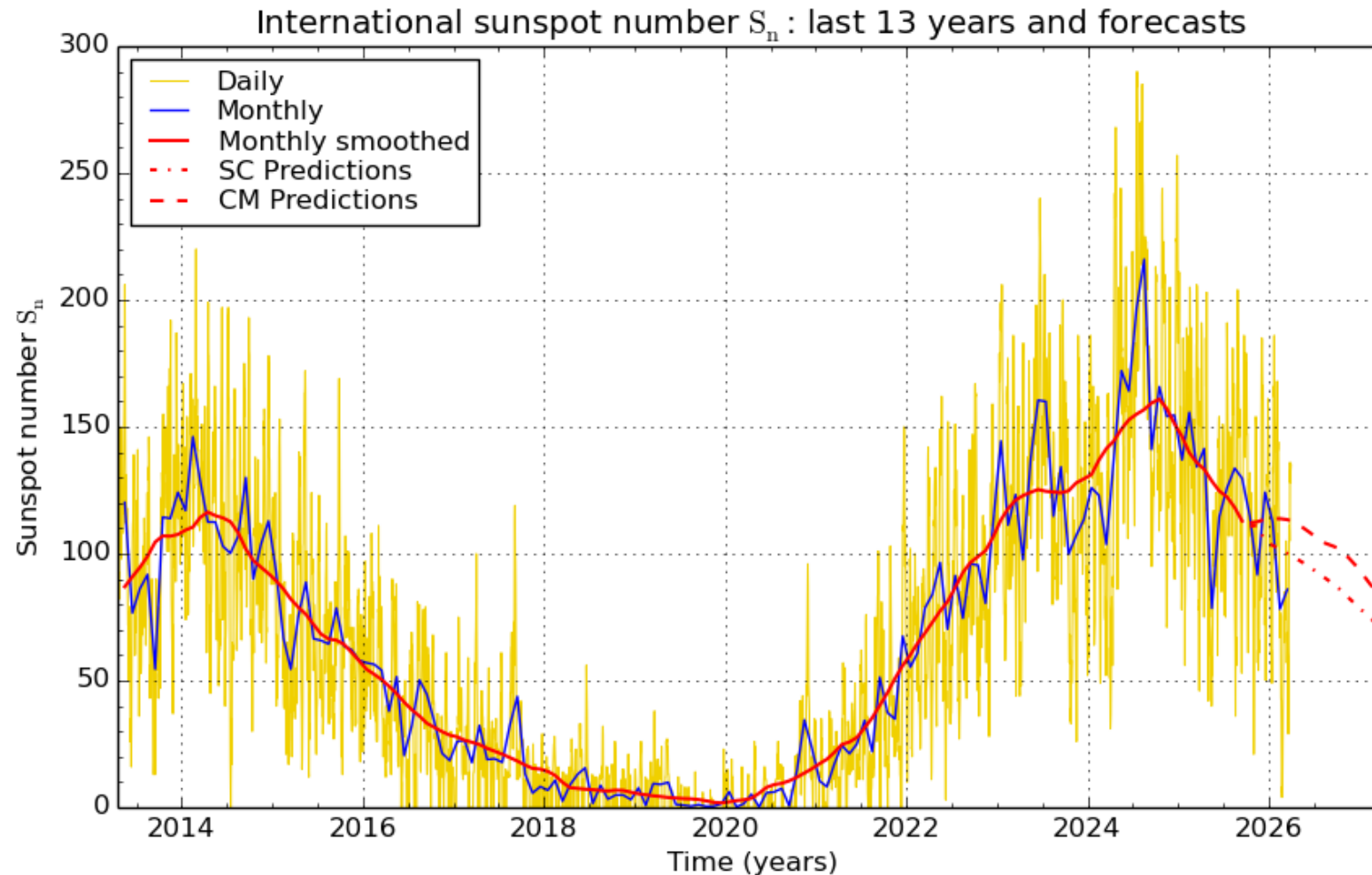
SUNSPOTS



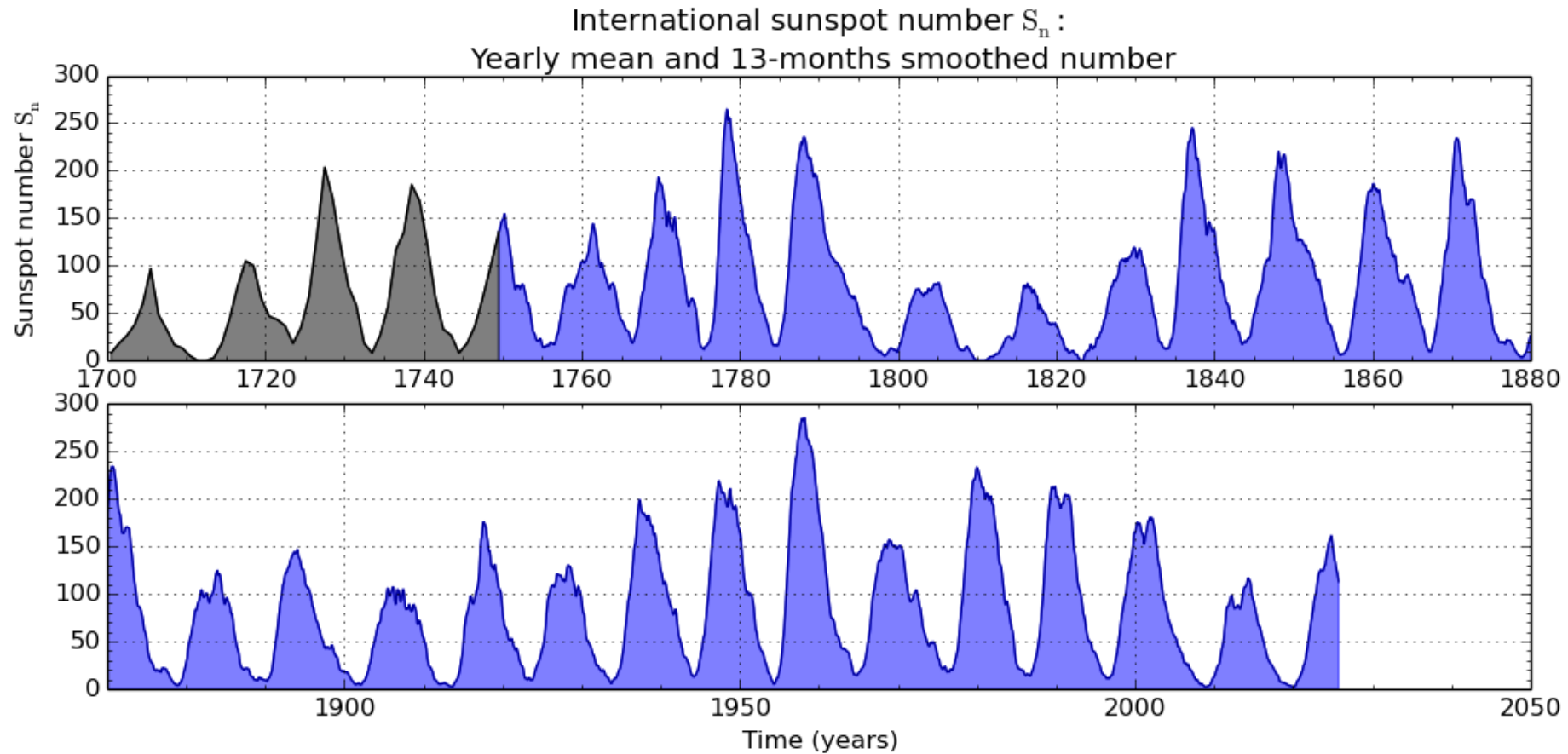
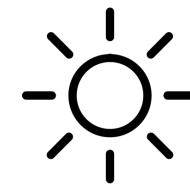
SUNSPOT NUMBER AND SOLAR CYCLE



$$R = K (10g + s)$$



LONG TERM SOLAR ACTIVITY



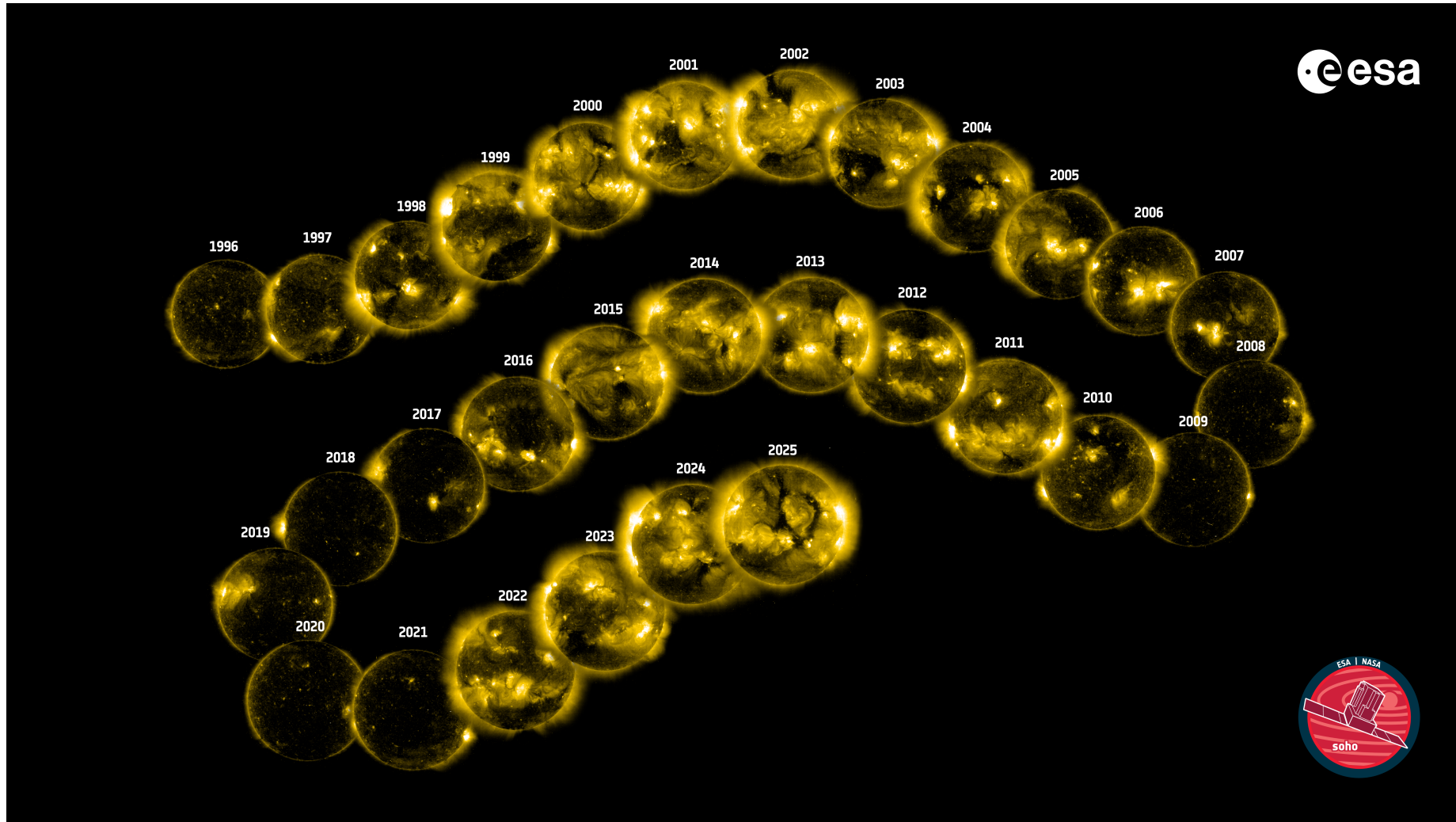
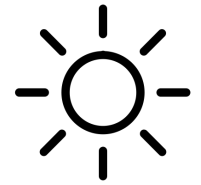
SILSO graphics (<http://sidc.be/silso>) Royal Observatory of Belgium 2026 April 14

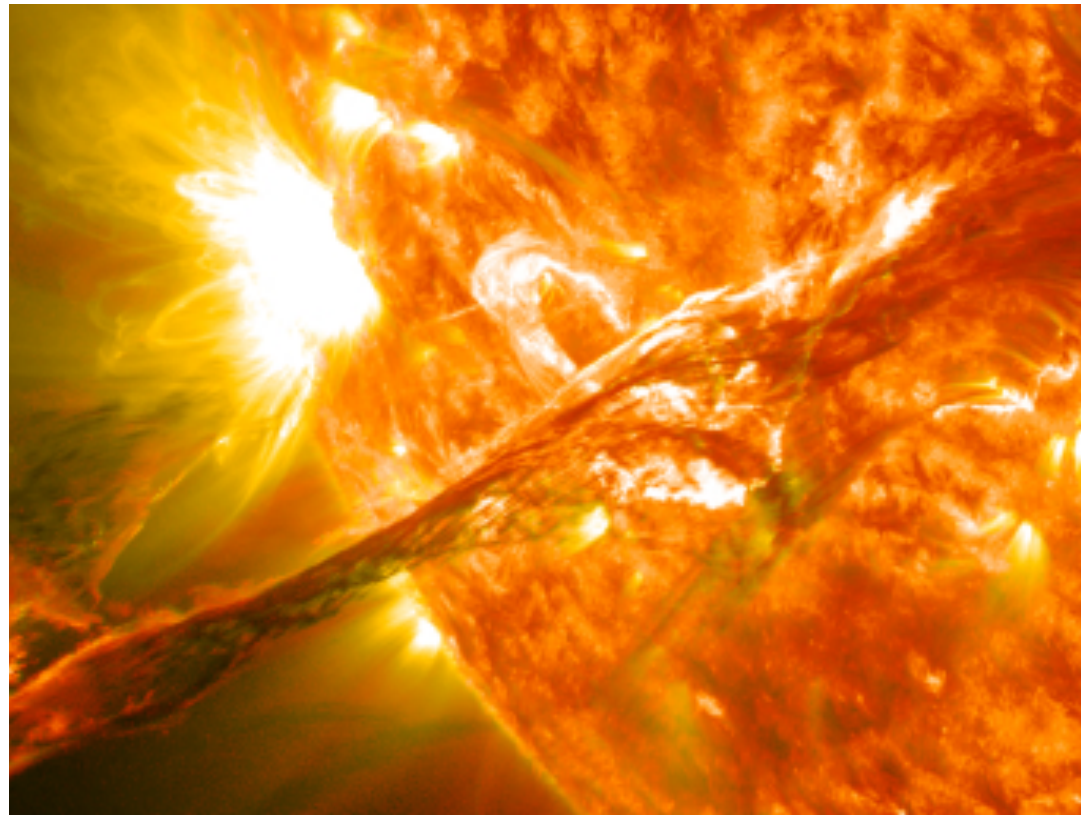


SOHO/EIT



SOLAR CYCLE





SPACE WEATHER BRIEFING

Sneak preview

Elke D'Huys & Jennifer O'Hara

SIDC Space Weather Briefing

29 December 2025-04 January 2026

Jennifer O'Hara

& the SIDC forecaster team



Royal Observatory
of Belgium

Solar Influences
Data analysis Centre
www.sidc.be

Summary Report

Solar activity from 2025-12-29 00:00 to 2026-01-04 23:59

Active regions	18 numbered regions over the week, most active were SIDC Sunspot Group 744 (NOAA AR4324) and SIDC Sunspot Group 745 (NOAA AR4325)
Flares	# C-class flare: 35 # M-class flare: 2 # X-class flare: 0
Coronal Holes	Negative polarity CH and a small positive polarity CH transited central meridian
CMEs	3 CMEs with possible Earth directed components observed

Proton flux	Below 10 pfu threshold
Electron flux	Above 1000 Pfu threshold, moderate fluence

Solar wind and geomagnetic conditions

ICMEs	ICME signatures on January 03 - 04
Solar wind conditions	B : 1.04 - 12.28 nT //Bz: -8.87 nT to 11.53 nT //Speed: 321.5 – 700.0km/s
Geomagnetic conditions	max K _{Be} : 4.0, max K _p (NOAA): 5.0, Minor Storm conditions

All Quiet Alert: Not quiet

Solar Activity

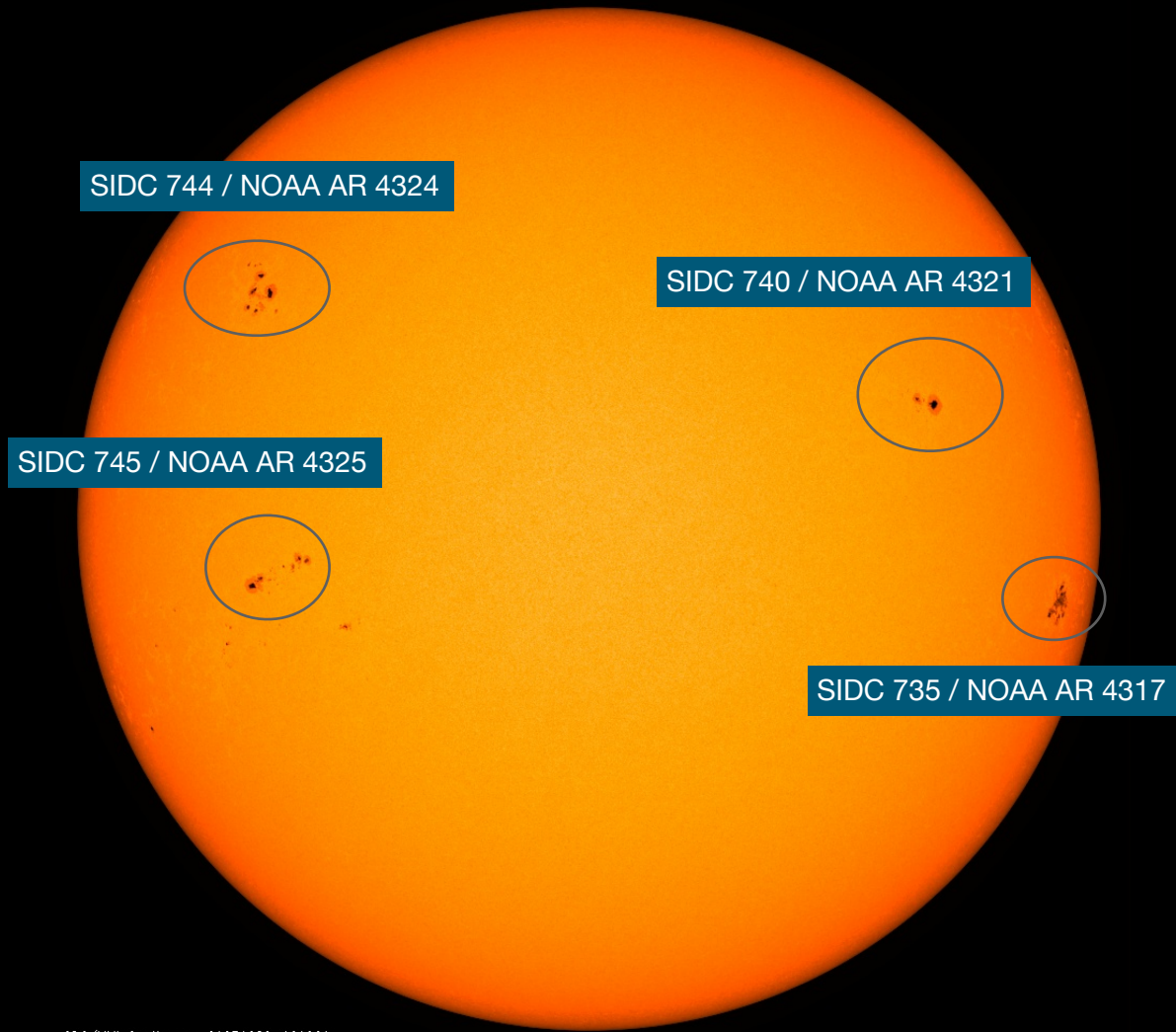


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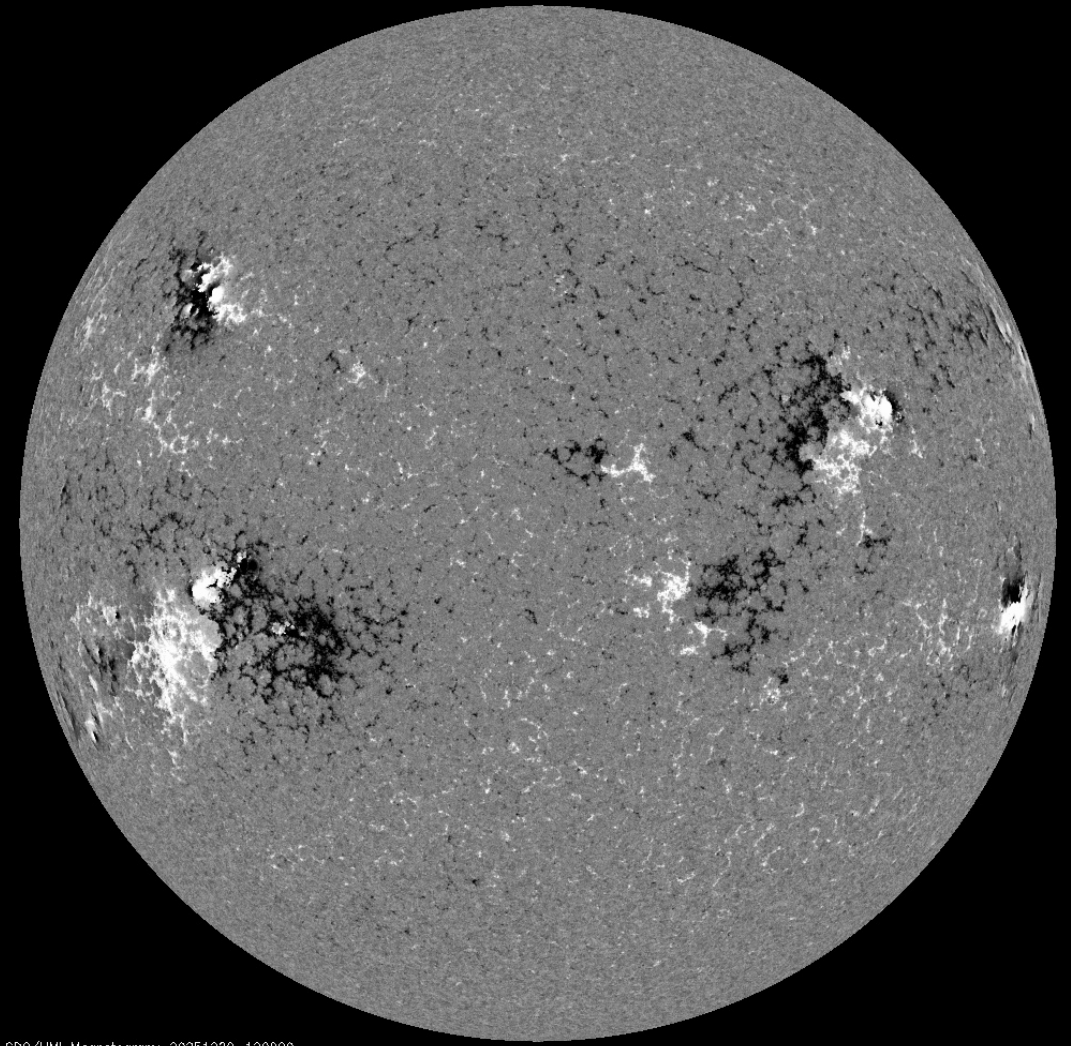
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Solar active regions

SDO/HMI White Light 2025-12-29

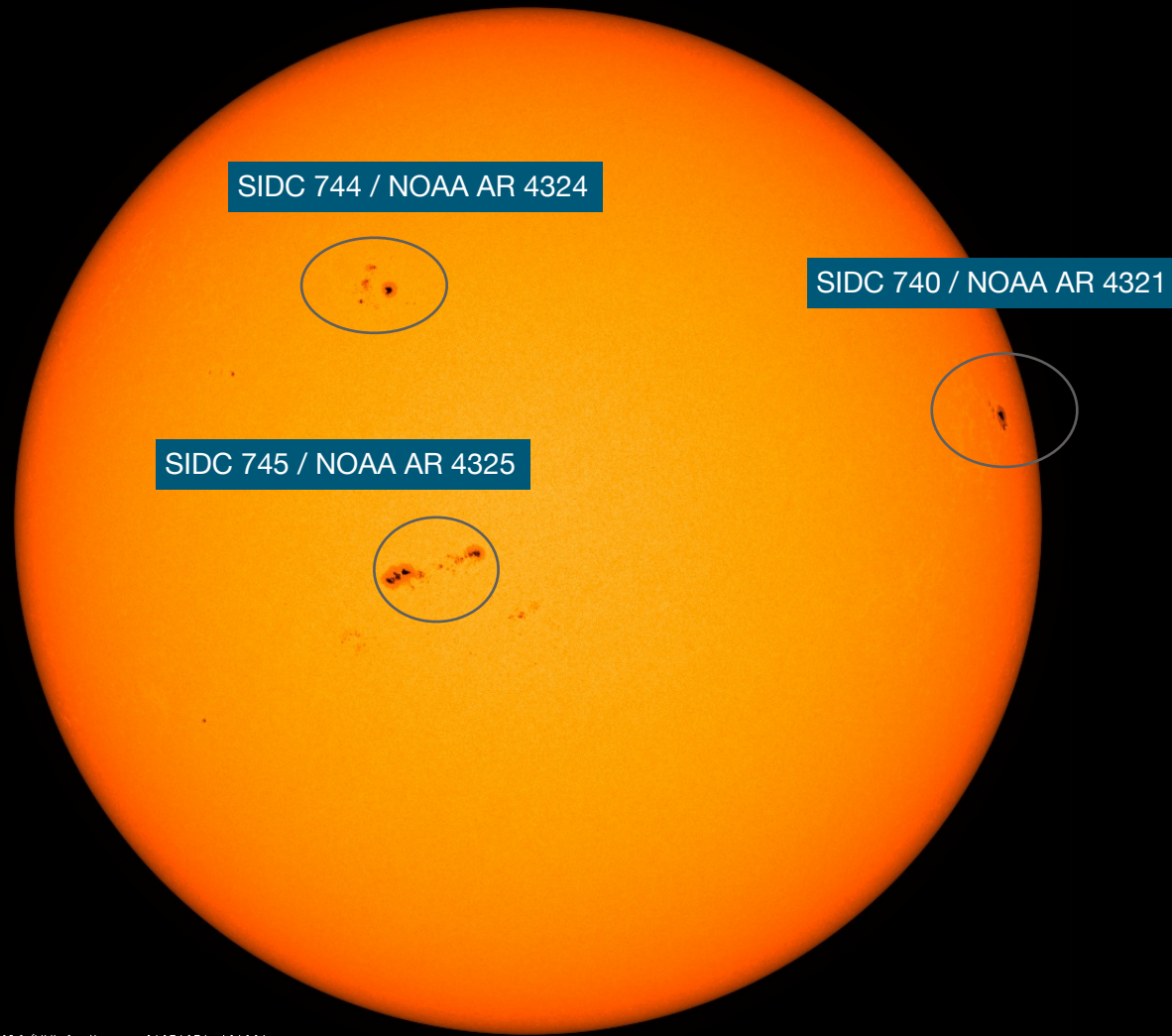


SDO/HMI Magnetogram 2025-12-29



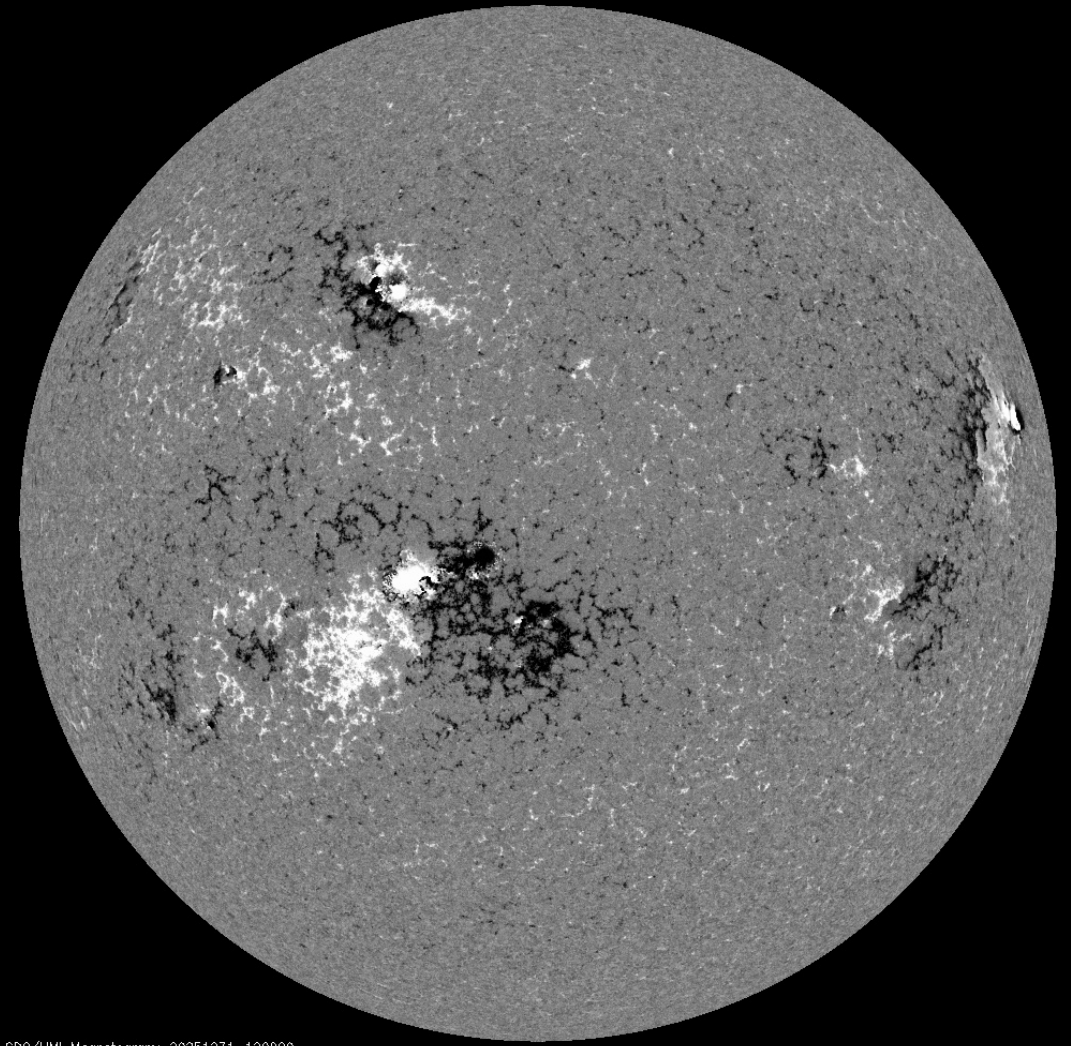
Solar active regions

SDO/HMI White Light 2025-12-31



SDO/HMI Continuum: 20251231_120000

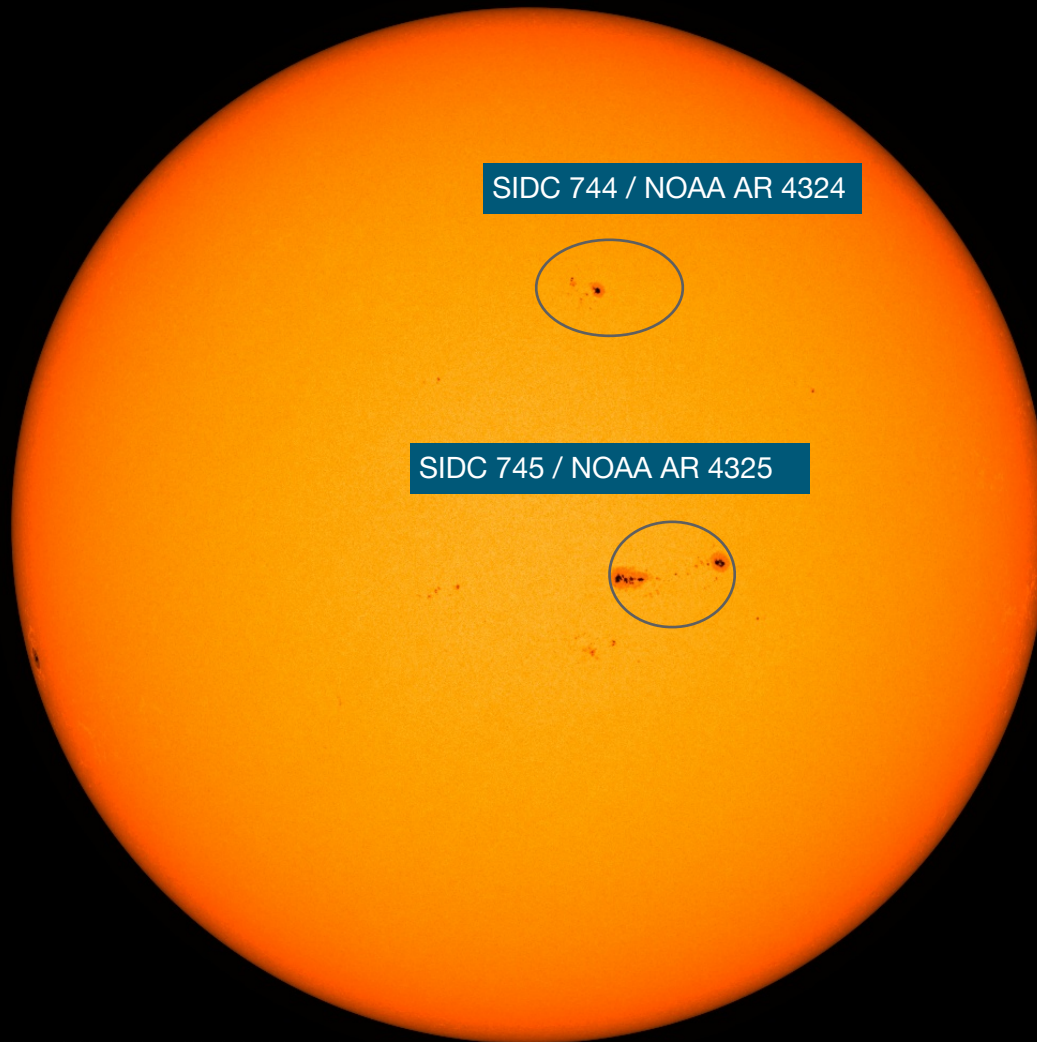
SDO/HMI Magnetogram 2025-12-31



SDO/HMI Magnetogram: 20251231_120000

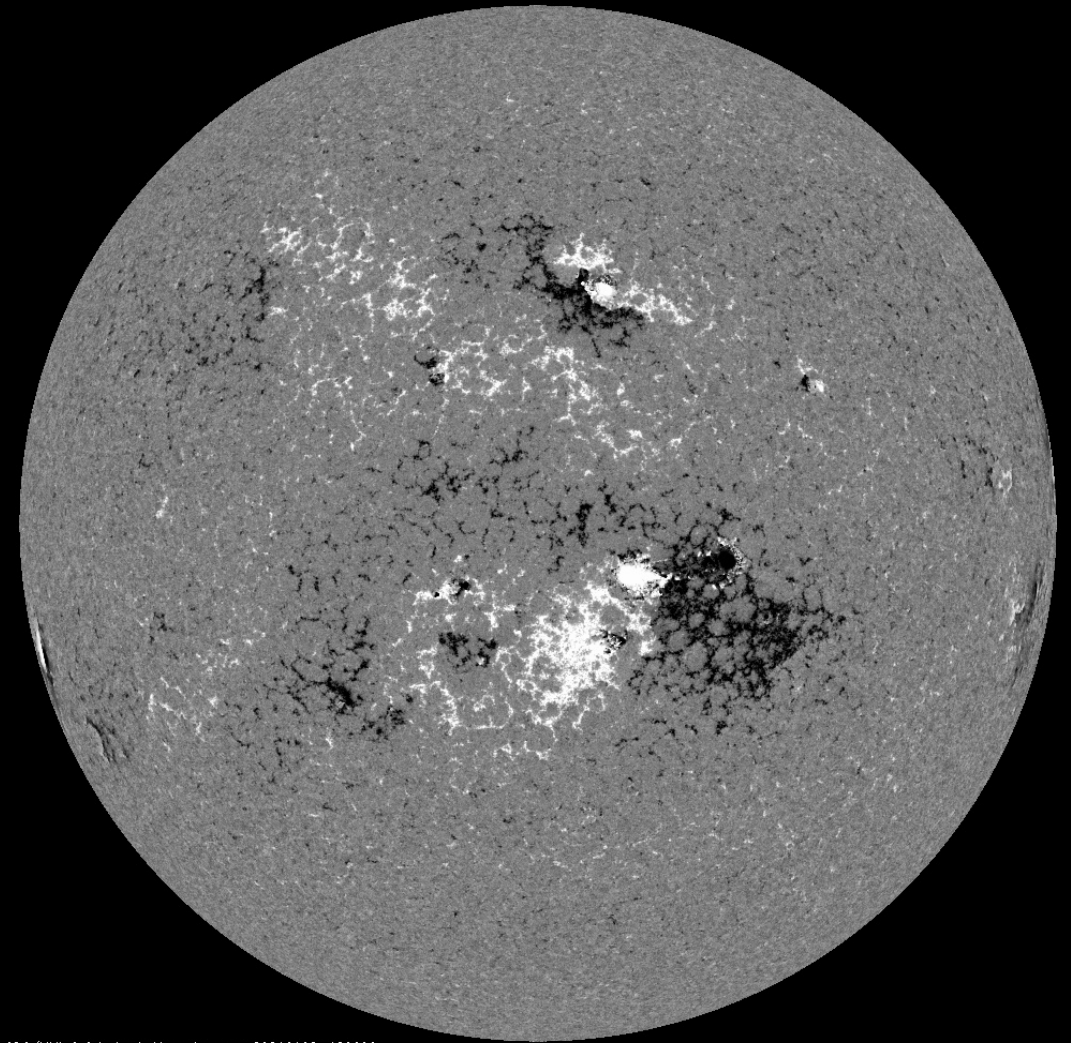
Solar active regions

SDO/HMI White Light 2026-01-02



SDO/HMI Quick-Look Continuum: 20260102_120000

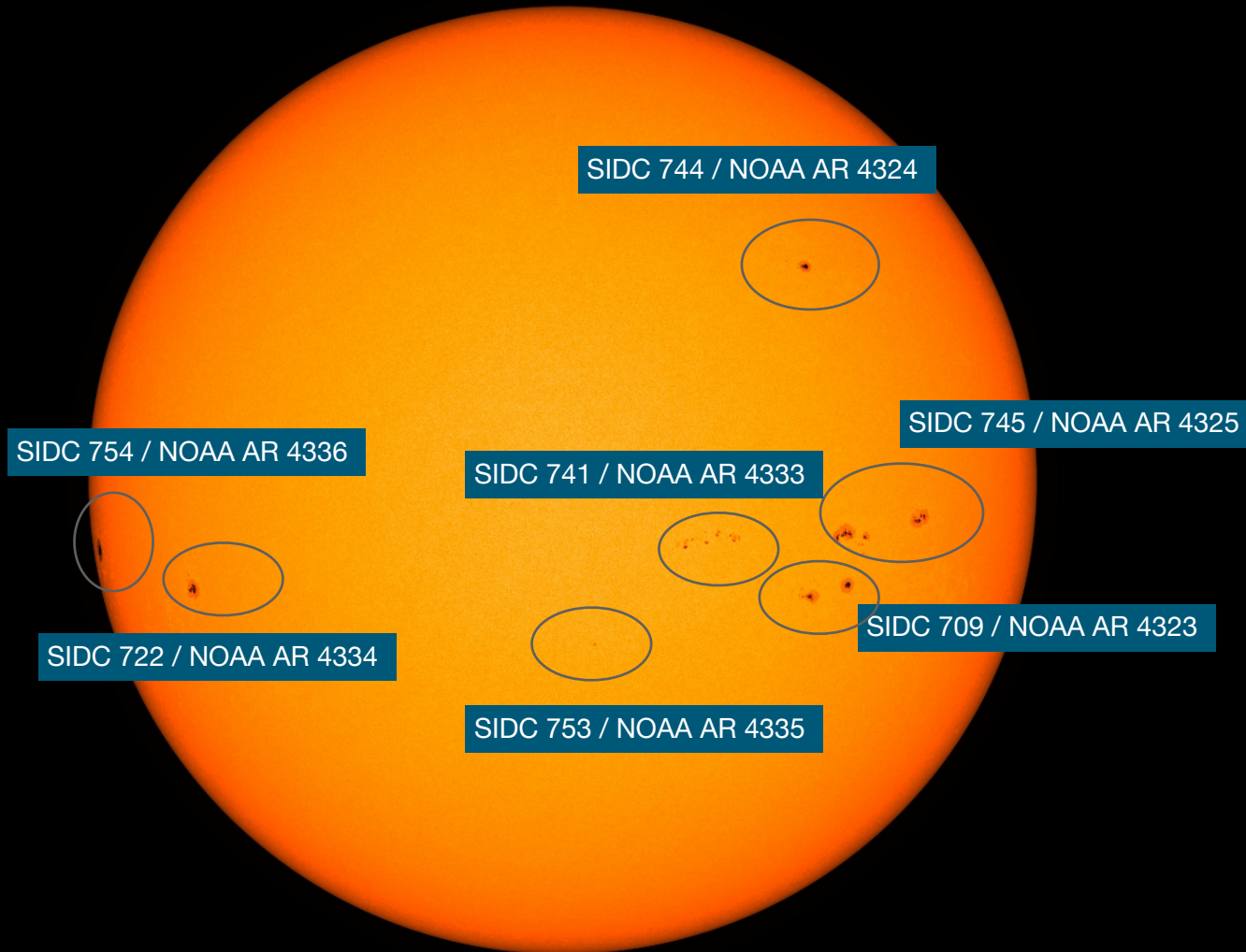
SDO/HMI Magnetogram 2026-01-02



SDO/HMI Quick-Look Magnetogram: 20260102_120000

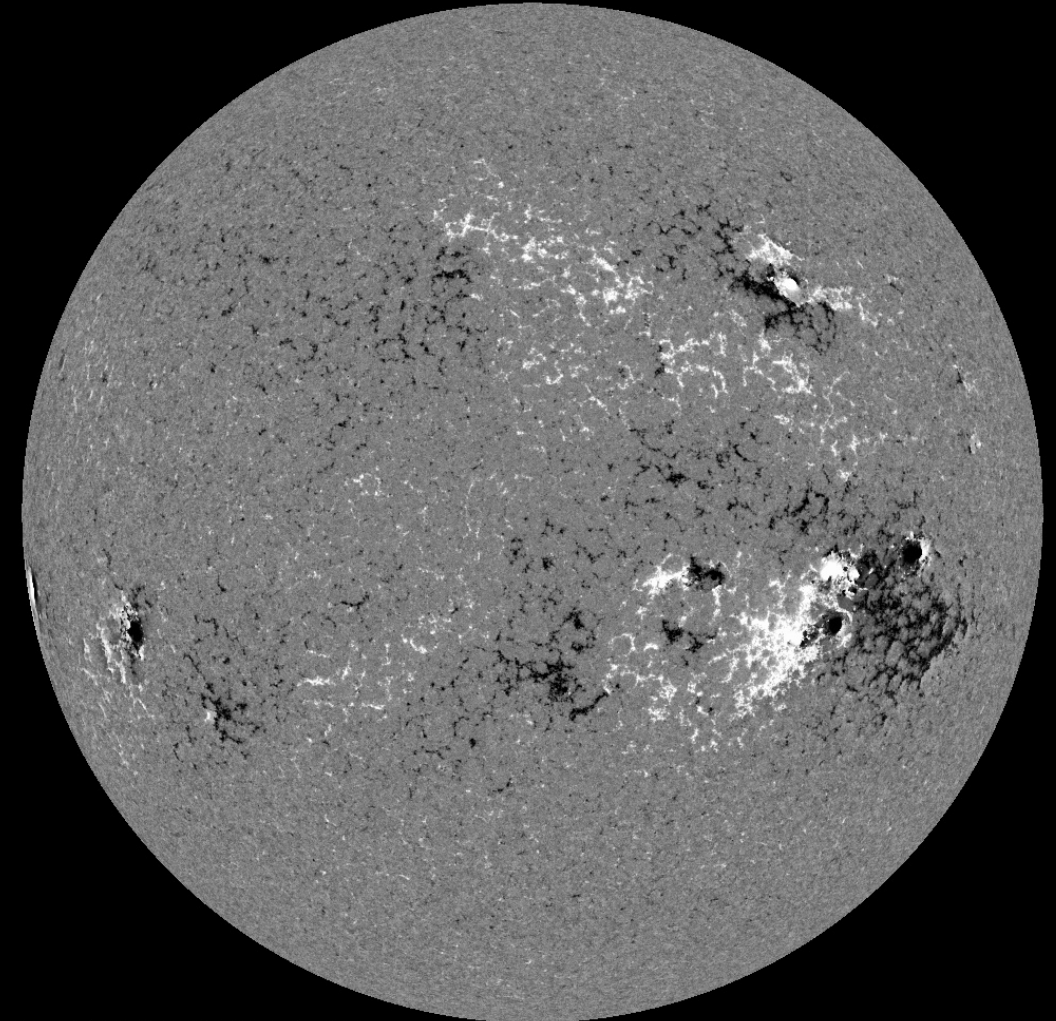
Solar active regions

SDO/HMI White Light 2026-01-05



SDO/HMI Quick-Look Continuum: 20260104_124500

SDO/HMI Magnetogram 2026-01-05

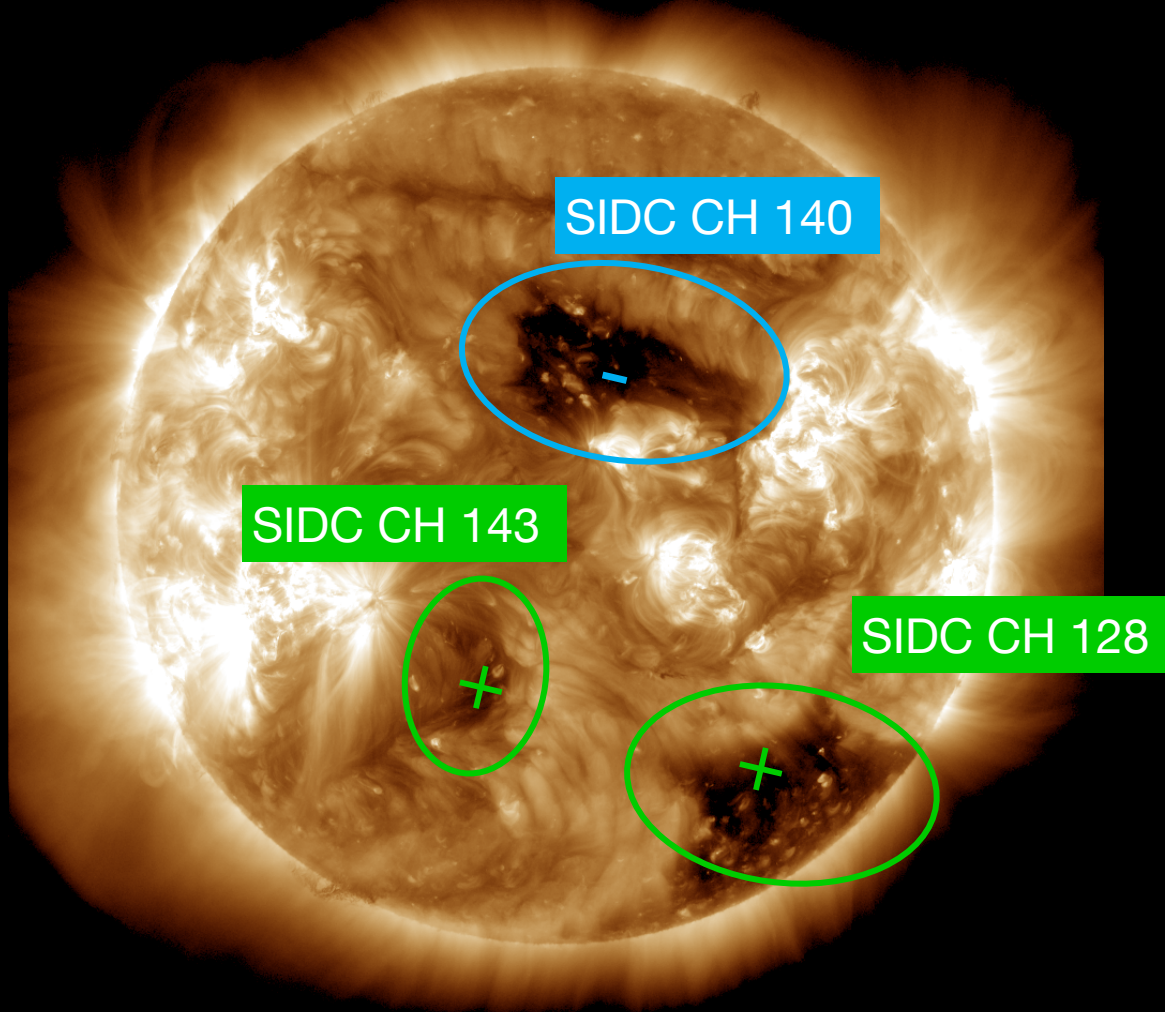


SDO/HMI Quick-Look Magnetogram: 20260104_121500

Coronal holes

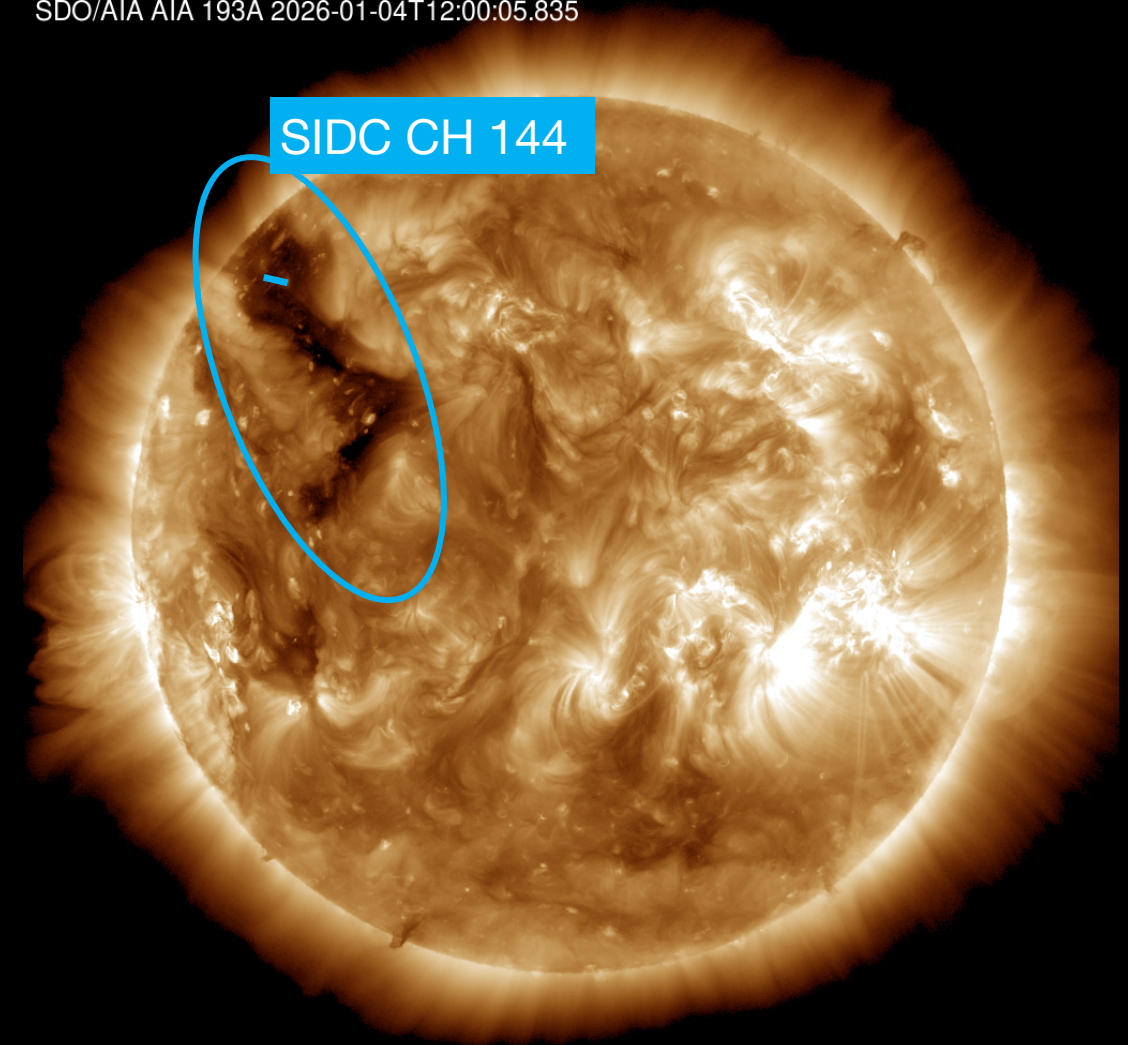
SDO/AIA 19.3 nm 2025-12-29

SDO/AIA AIA 193Å 2025-12-29T12:00:05.843



SDO/AIA 19.3 nm 2026-01-04

SDO/AIA AIA 193Å 2026-01-04T12:00:05.835



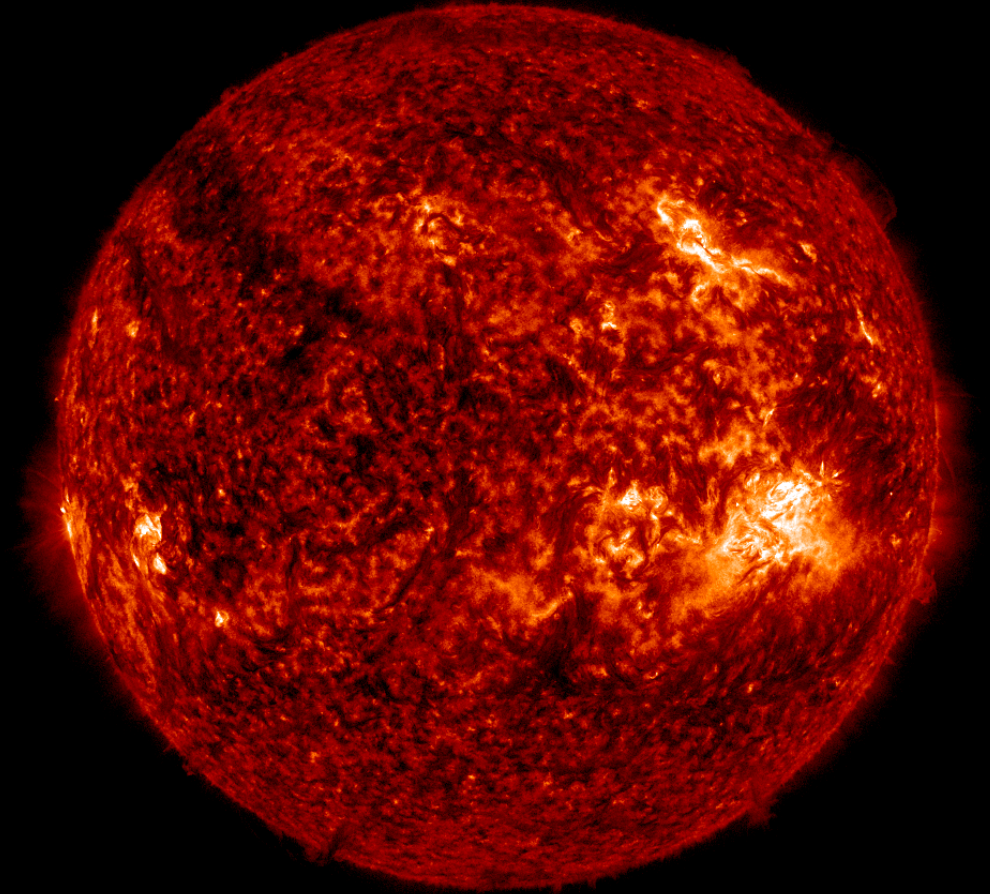
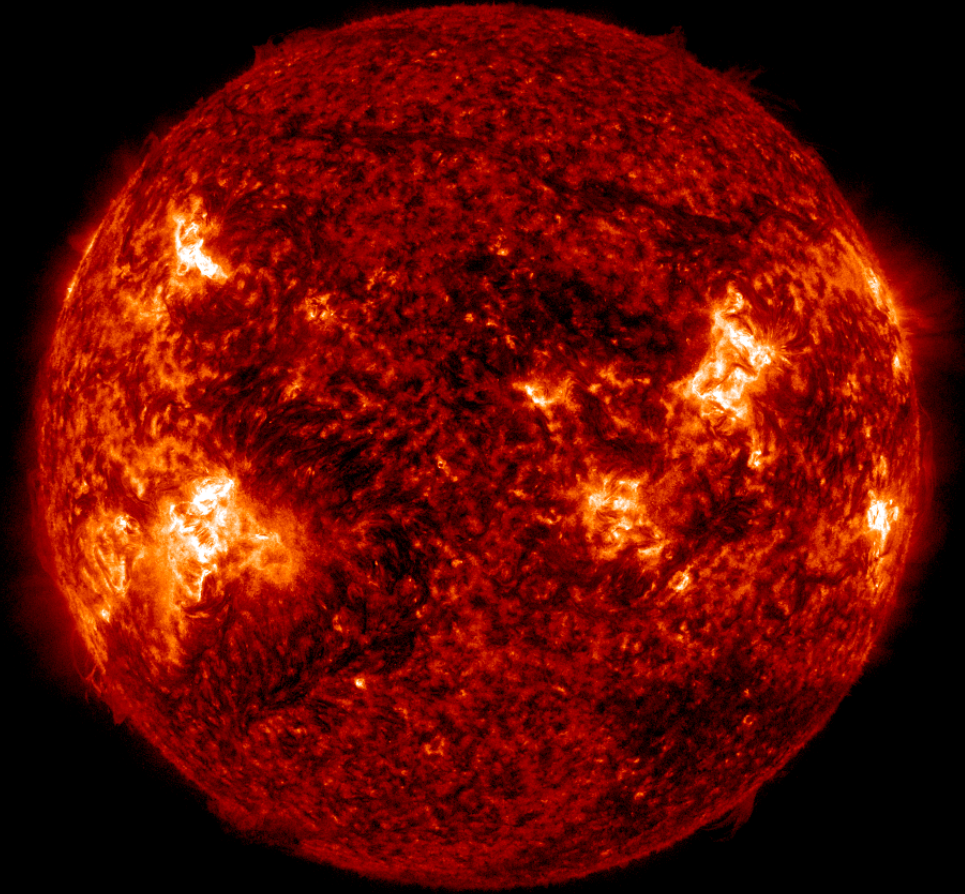
Filaments

SDO/AIA 30.4 nm 2025-12-29

SDO/AIA AIA 304Å 2025-12-29T12:00:06.581

SDO/AIA 30.4 nm 2026-01-04

SDO/AIA AIA 304Å 2026-01-04T12:00:06.580



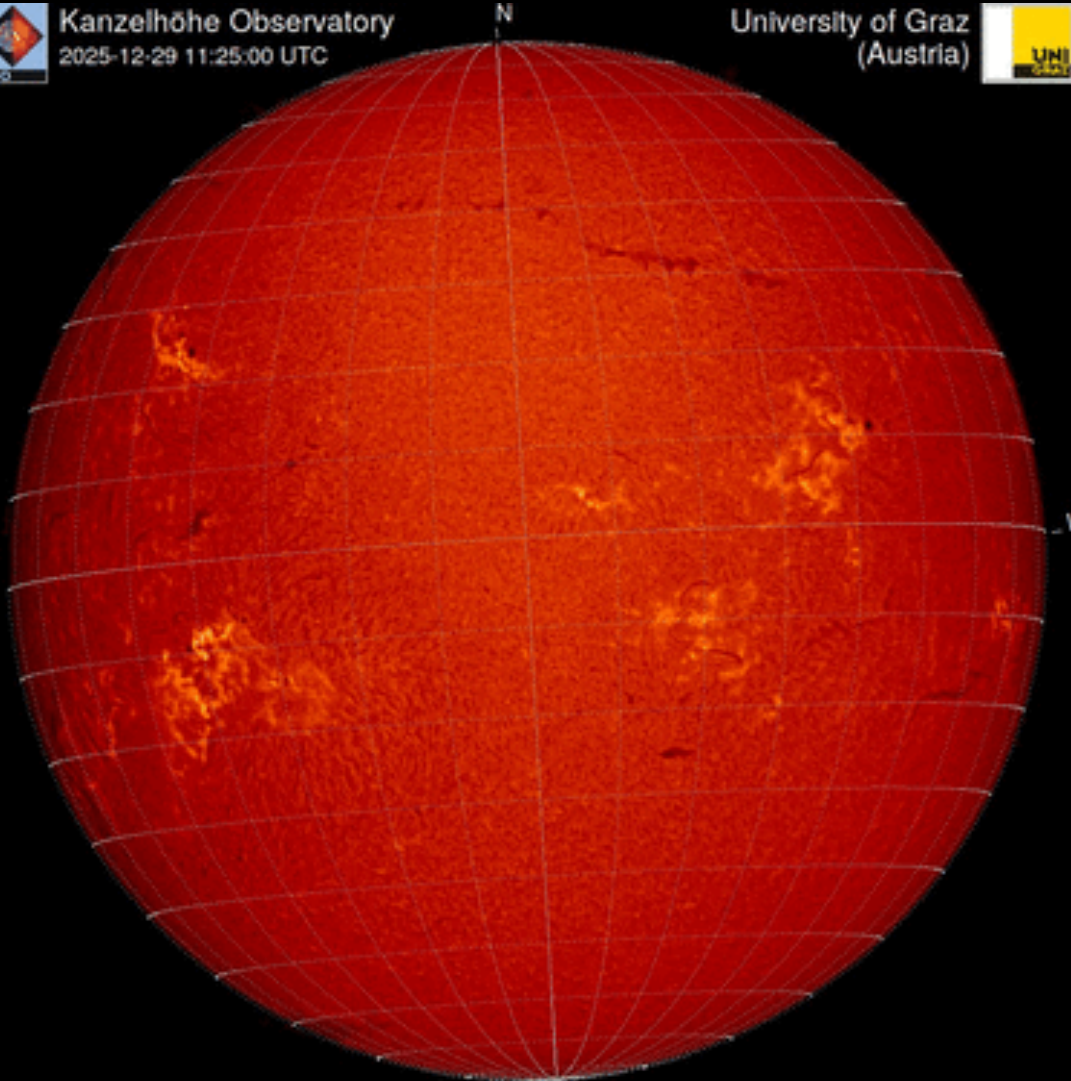
Filaments & Filament eruptions

H-alpha 2025-12-29



Kanzelhöhe Observatory
2025-12-29 11:25:00 UTC

University of Graz
(Austria)

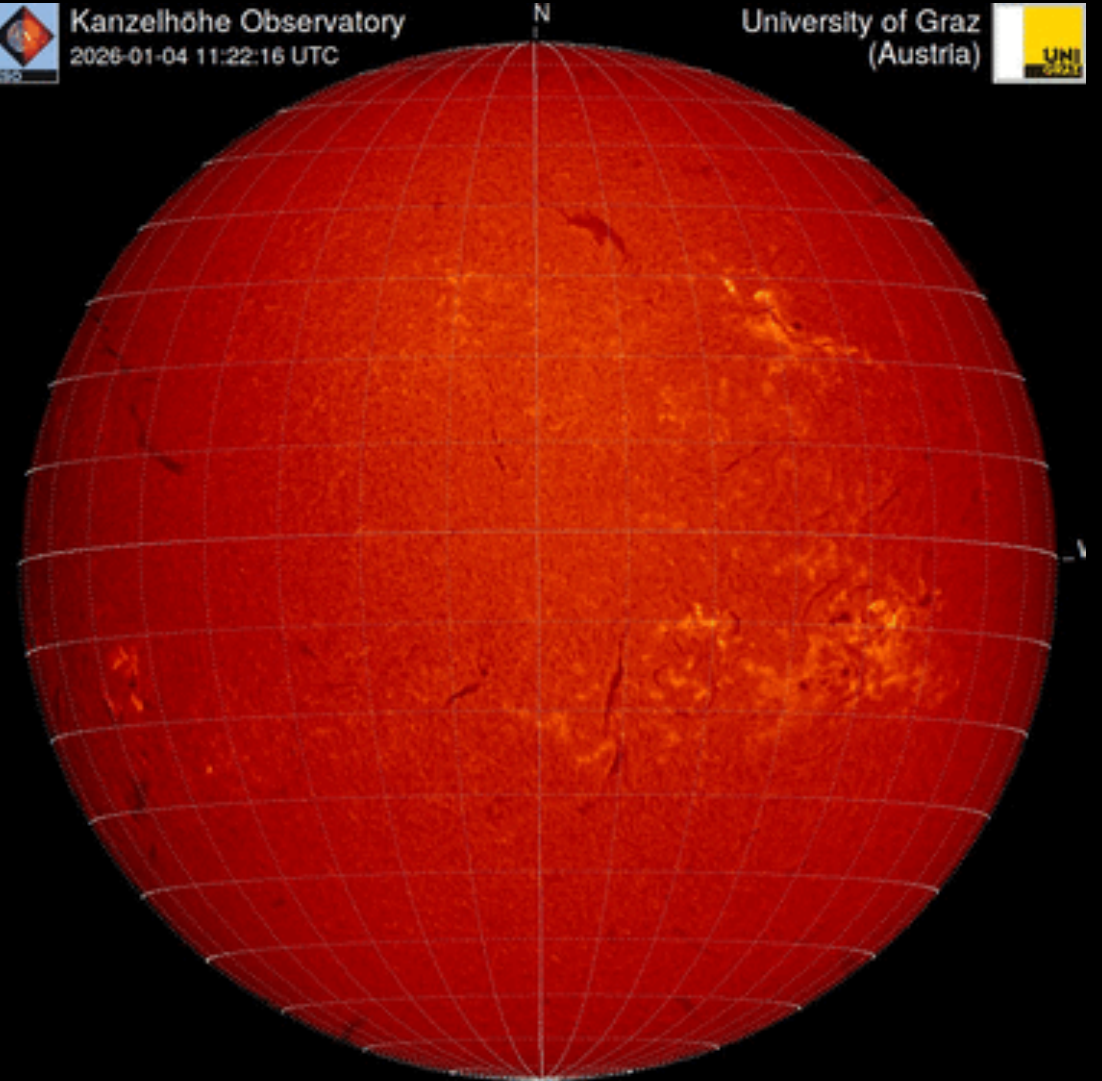


H-alpha 2026-01-04

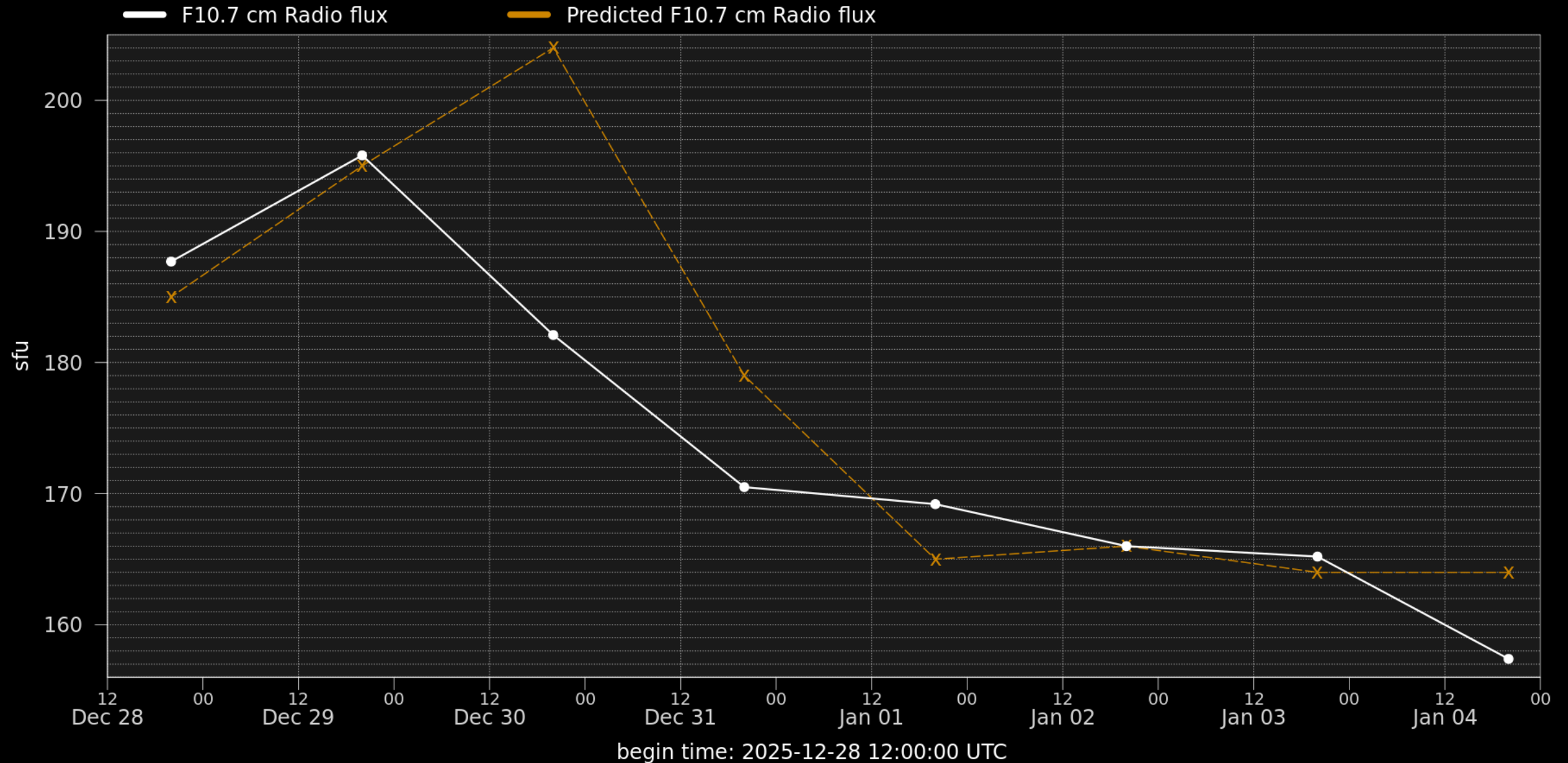


Kanzelhöhe Observatory
2026-01-04 11:22:16 UTC

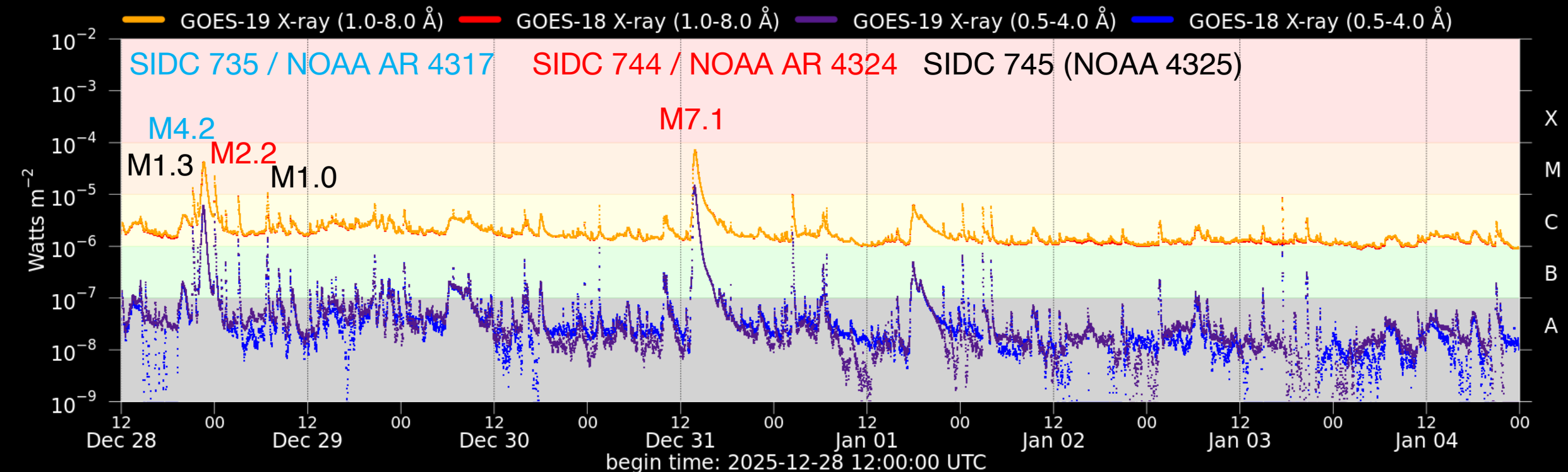
University of Graz
(Austria)



Solar F10.7cm radio flux



Flaring activity

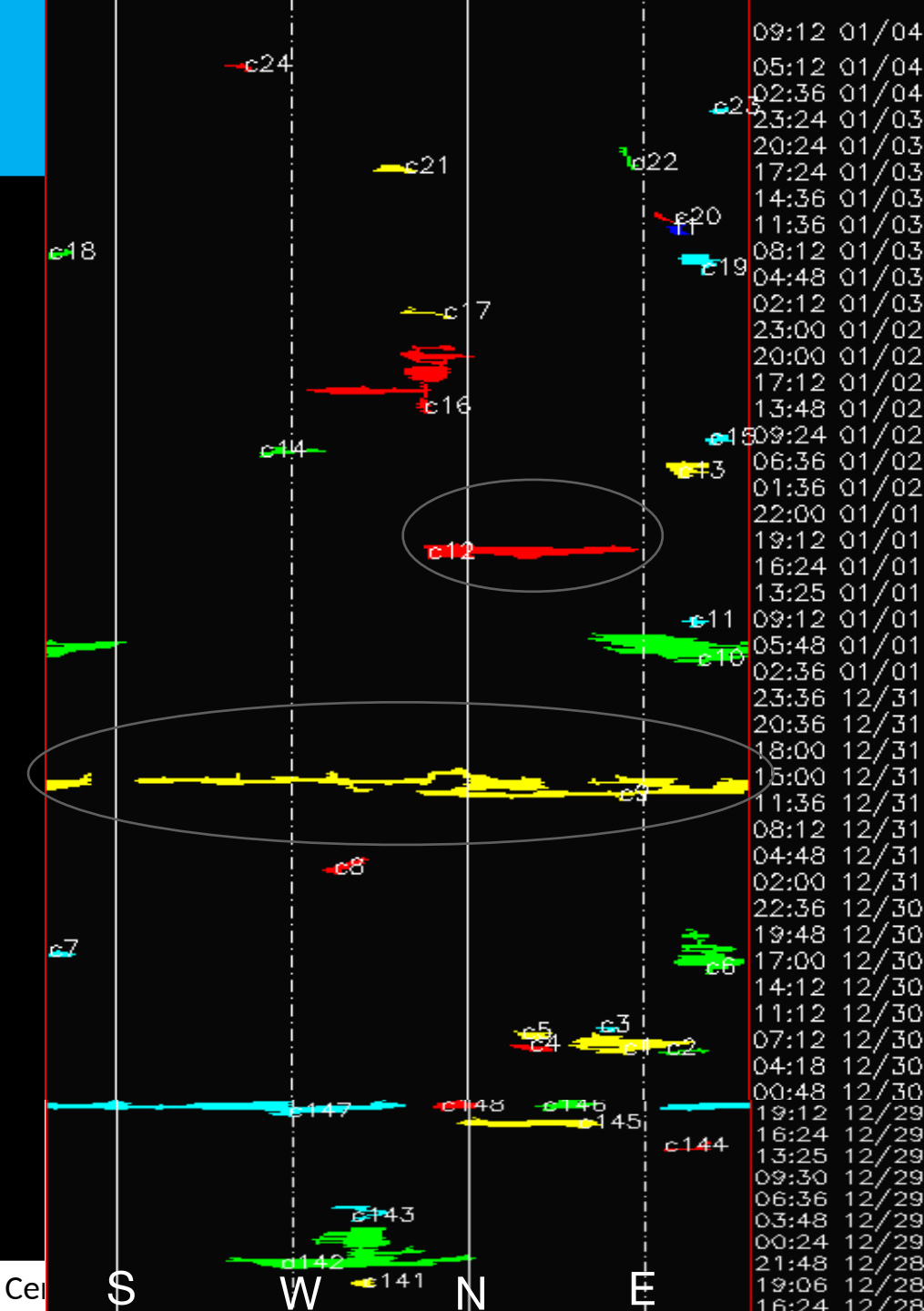
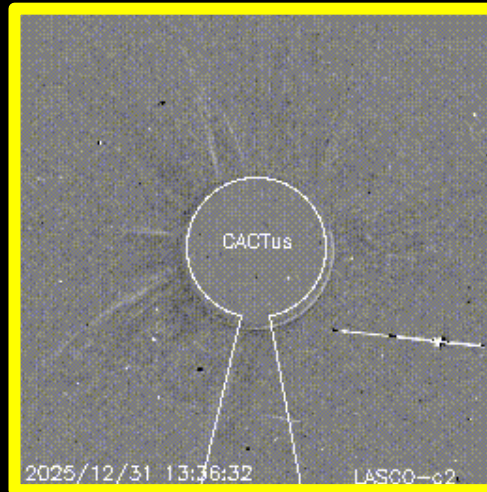
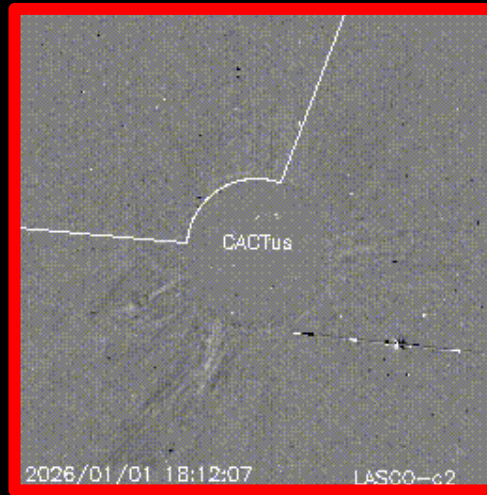
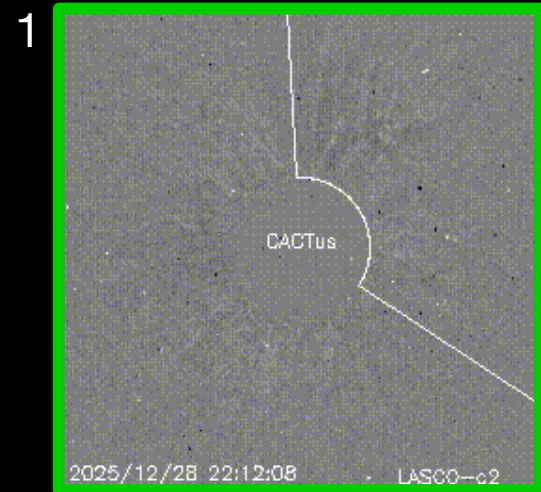
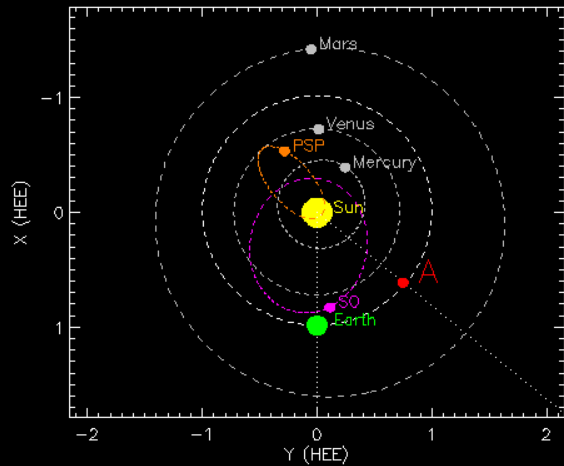


Probabilities (%) and occurrences (#) of C/M/X-flares daily, from noon to noon:

Issue date	2025-12-28	2025-12-29	2025-12-30	2025-12-31	2026-01-01	2026-01-02	2026-01-03	2026-01-04
Probability (%)	90 49 25	99 80 15	99 75 15	99 55 10	99 69 10	99 60 10	99 60 05	99 60 05
Observed (#)	07 04 00	06 00 00	05 00 00	04 01 00	06 00 00	02 00 00	04 00 00	01 00 00

Coronal Mass Ejections

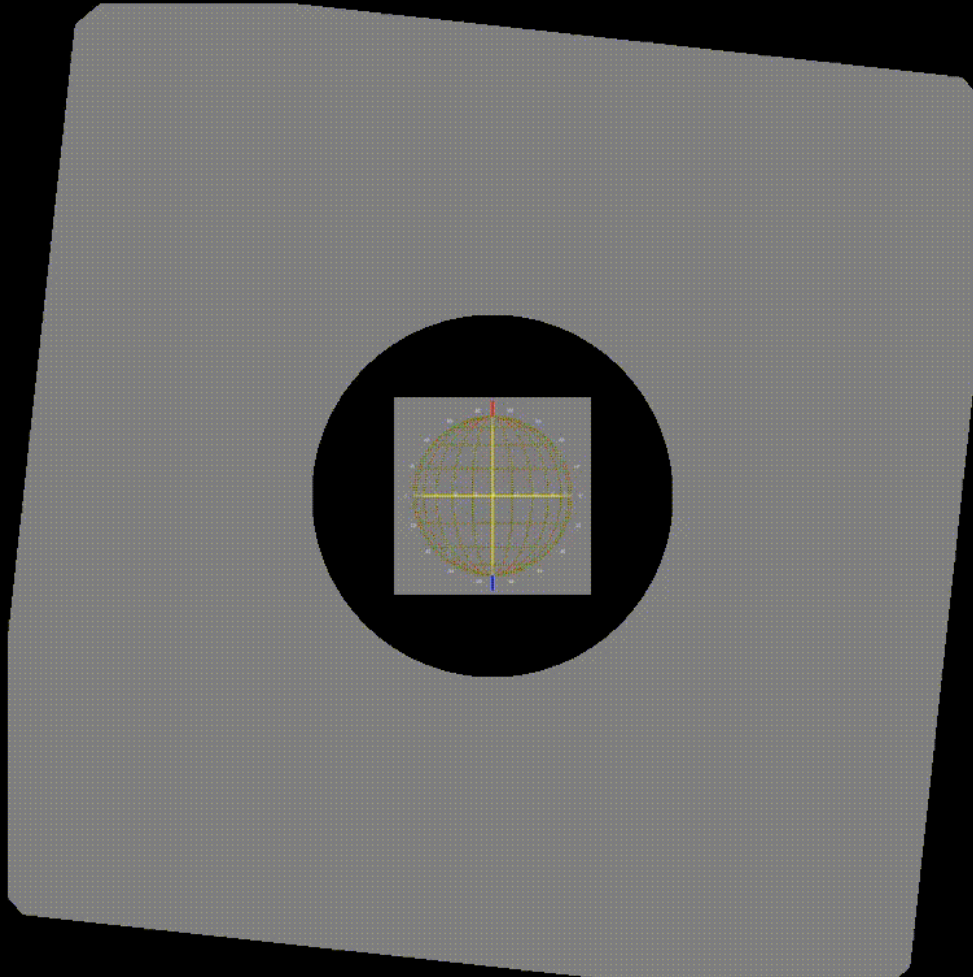
3 CMEs with Possible Earth Directed components: observed from SOHO/LASCO-C2 and STEREO-A/COR2



Coronal Mass Ejections

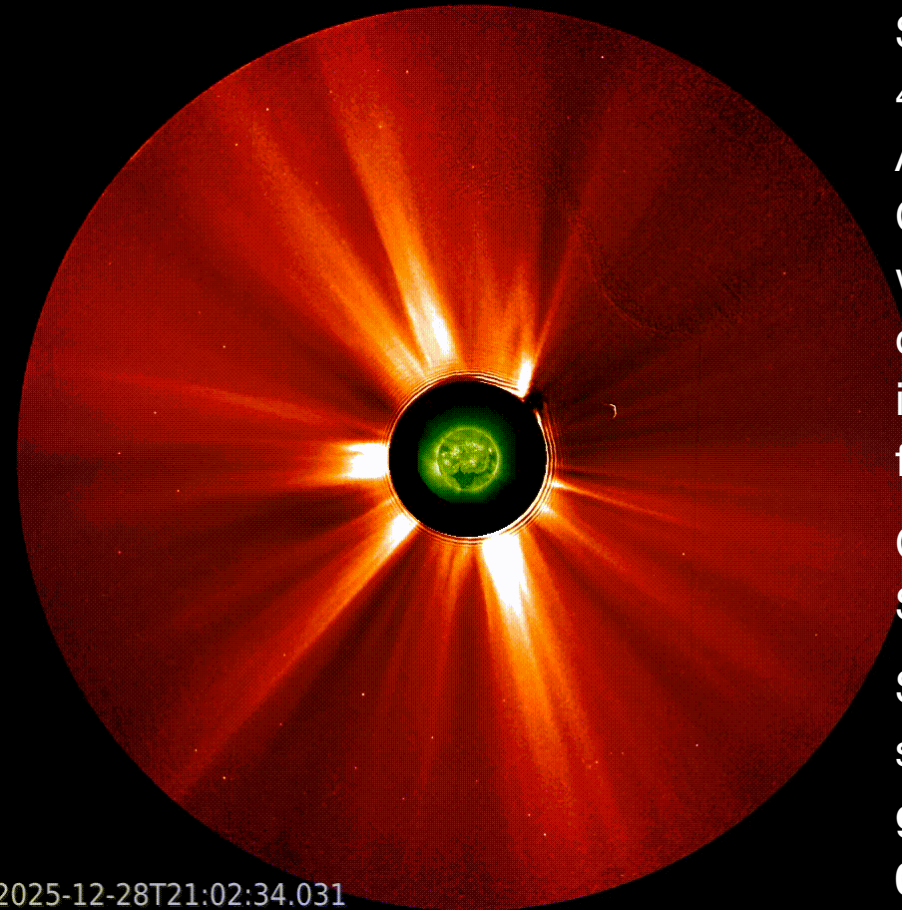
CME 1 Dec 28:

SOHO/LASCO-C2



2025-12-28T21:00:57.352

STEREO-A/COR2



2025-12-28T21:02:34.031

Associated with an M4.2 flare (SIDC Flare 6518) on December 28 at 22:39 UTC, SIDC SG735 (NOAA AR 4317).

Associated dimming. CME to north-west, with a width of 120 degrees, was detected in LASCO-C2 data from 23:00 UTC.

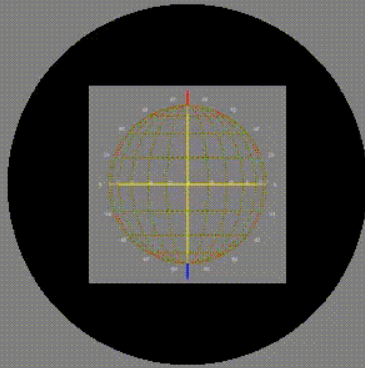
CME to north-east in STEREO A.

Speed around 450 km/s **predicted possible glancing blow on Jan 01.**

Coronal Mass Ejections

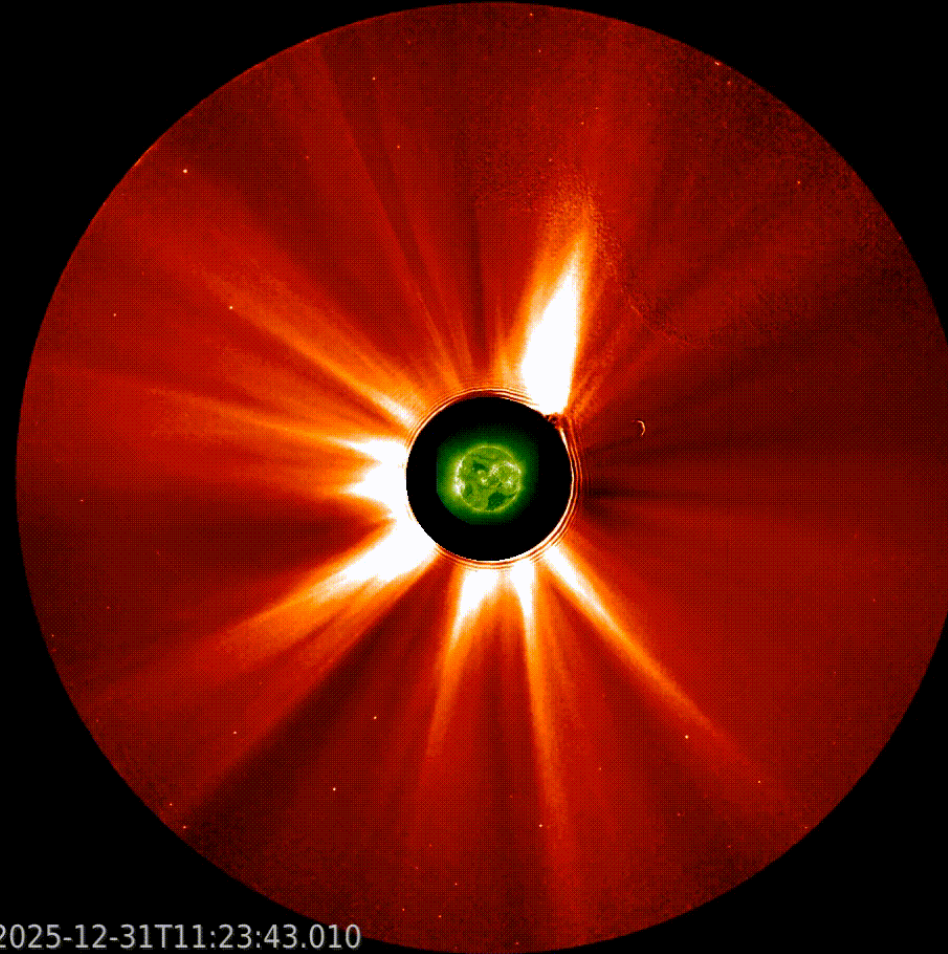
CME 2 Dec 31:

SOHO/LASCO-C2



2025-12-31T11:01:09.353

STEREO-A/COR2



2025-12-31T11:23:43.010

A partial halo, north-east, was observed in LASCO-C2 data from 14:12 UTC on Dec 31.

Associated with M7.1 flare at 13:51 UTC from SDC SG 744 (NOAA AR 4324) in the north-east quadrant.

Dimming and Type II and IV radio emission ,

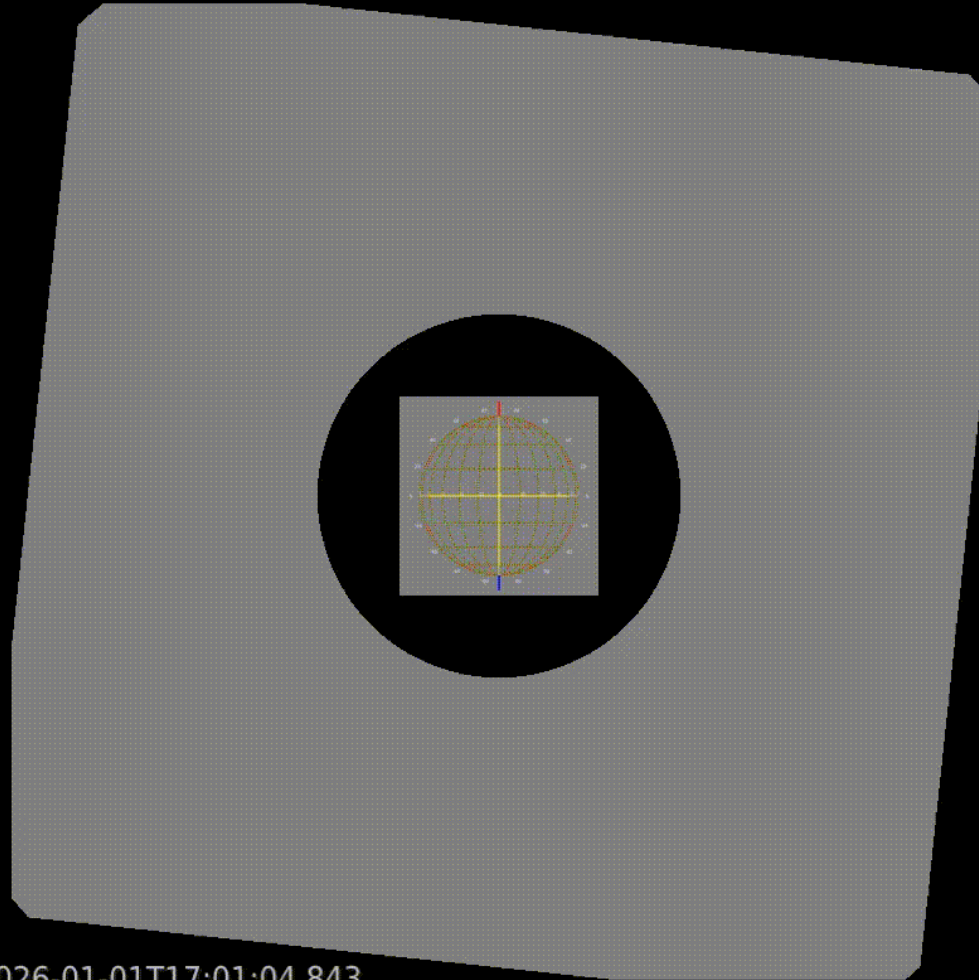
Speed around 800 km/s

Predicted to arrive at Earth early Jan 03.

Coronal Mass Ejections

CME 3 on January 01/02:

SOHO/LASCO-C2

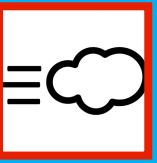


A partial halo CME directed to the north-east . First seen in LACSCO-C2 data from 18:48 UTC on January 01.

Associated with the C6.2 flare from SIDC SG 744 (NOAA AR 4324), with peak time 17:59 UTC.

Speed around 530 km/s.

Predicted possible glancing blow early Jan 05.



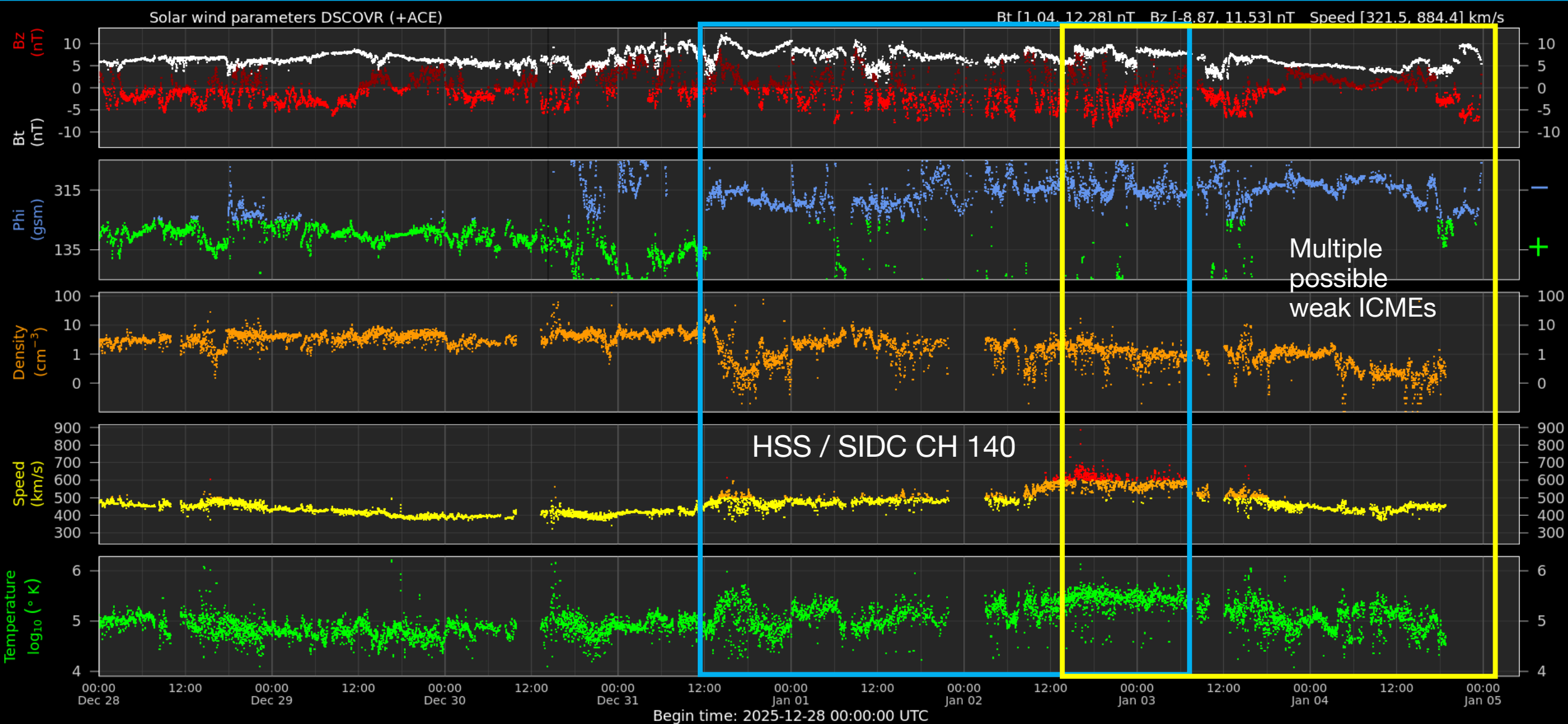
Solar Wind and Geomagnetic Activity



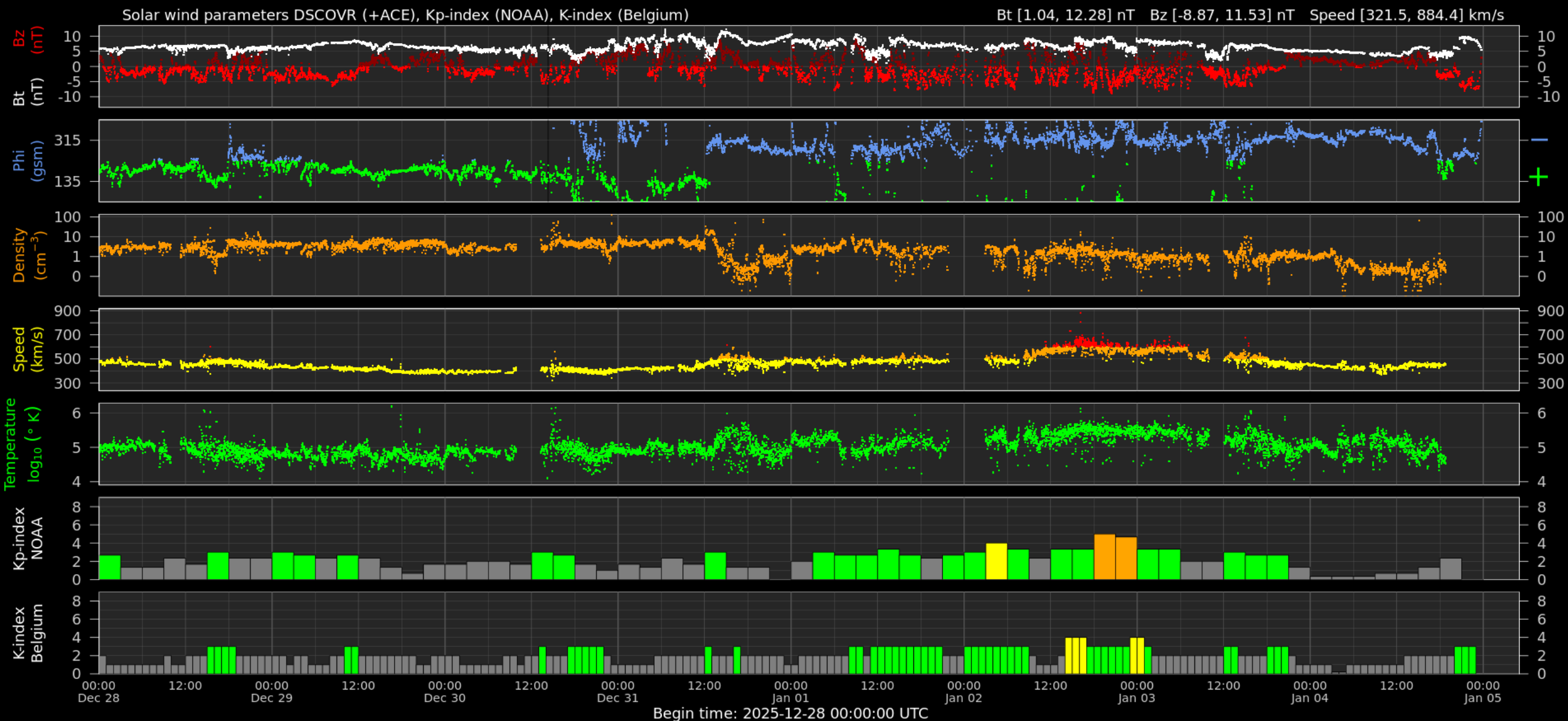
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of Belgium

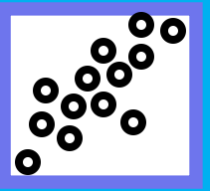
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Solar wind parameters



Solar wind parameters & K-indices





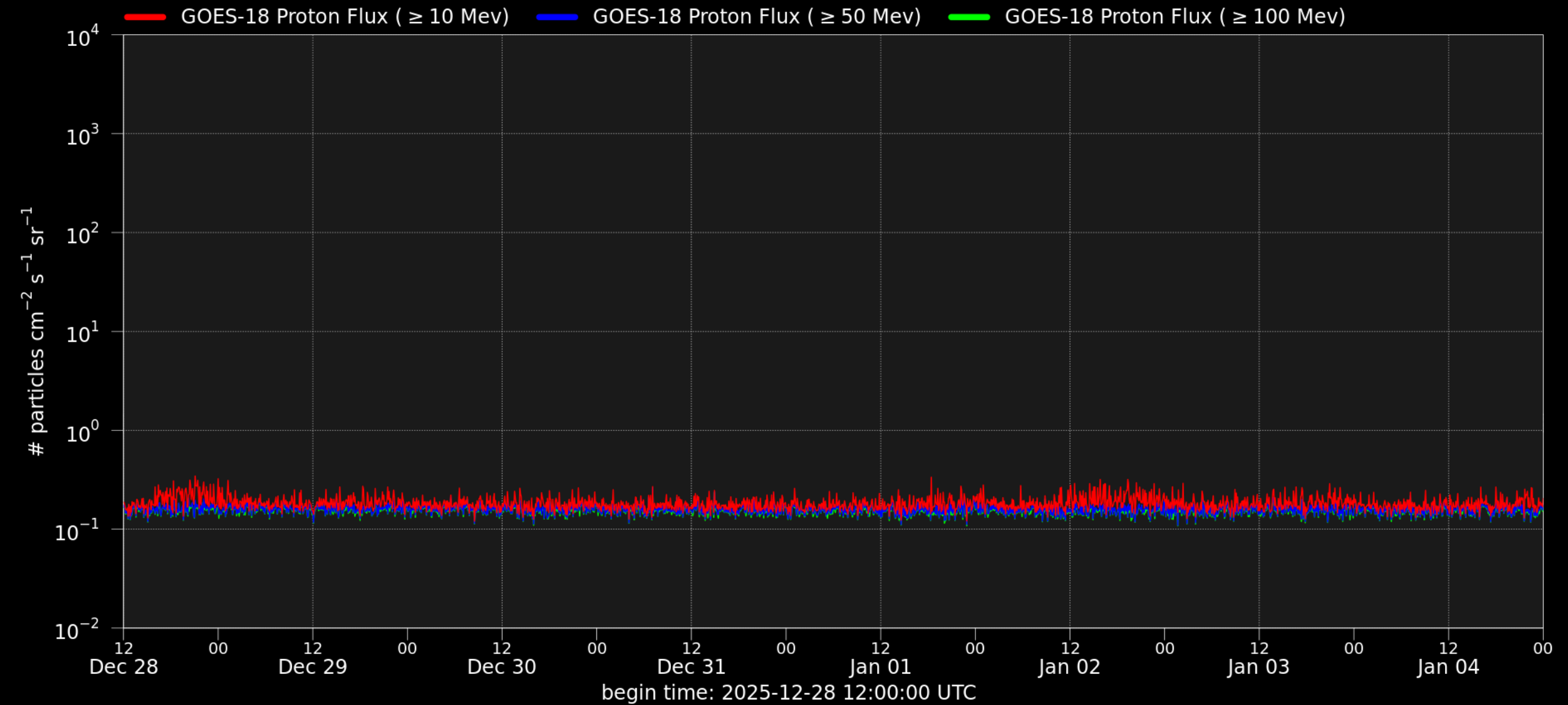
Energetic Particles



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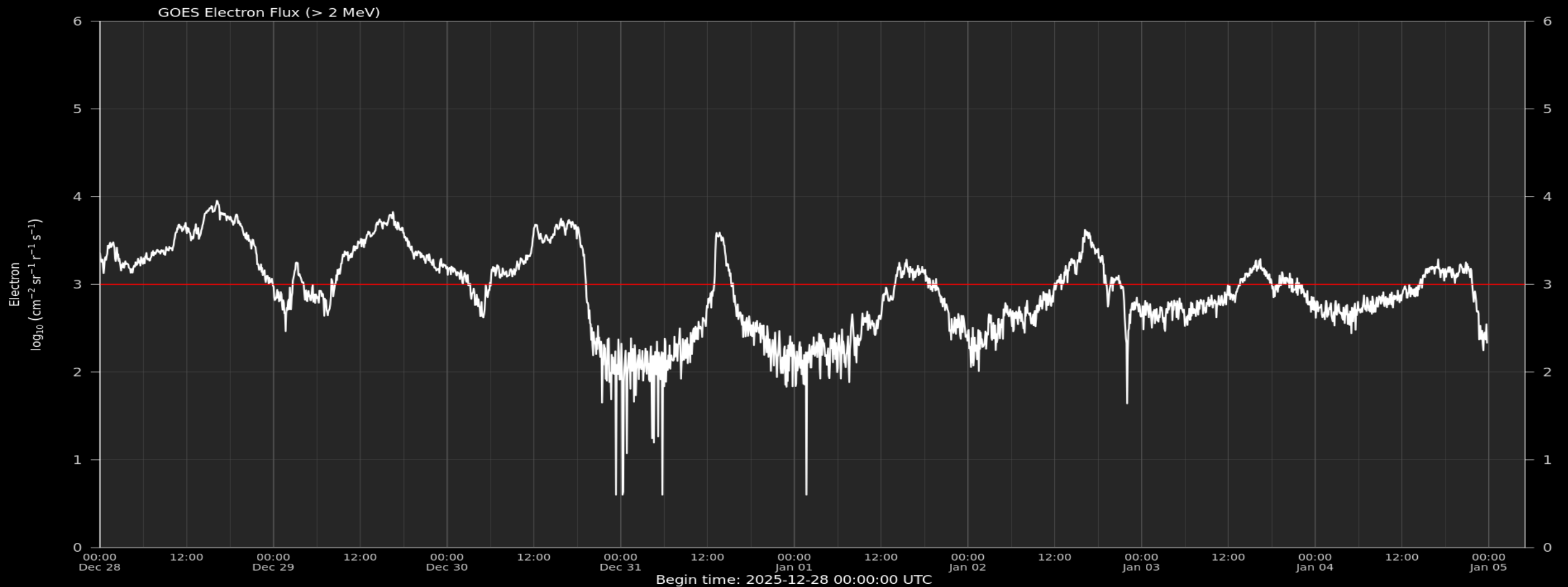
Solar proton flux



Electron flux at GEO

www.stce.be/educational/classification#electrons

www.spaceweather.gc.ca/forecast-prevision/space-spatiale/sffl-en.php



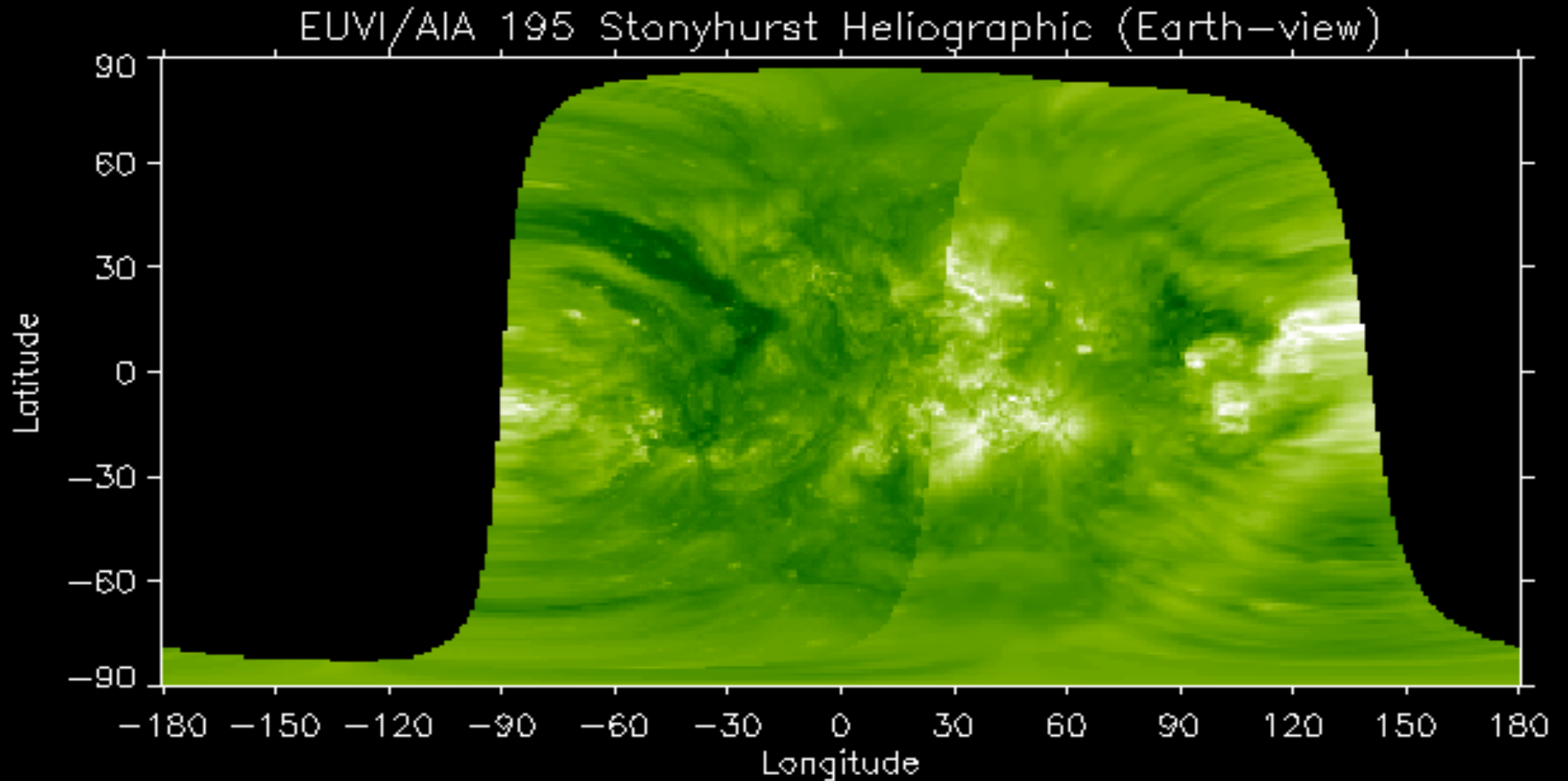
Outlook



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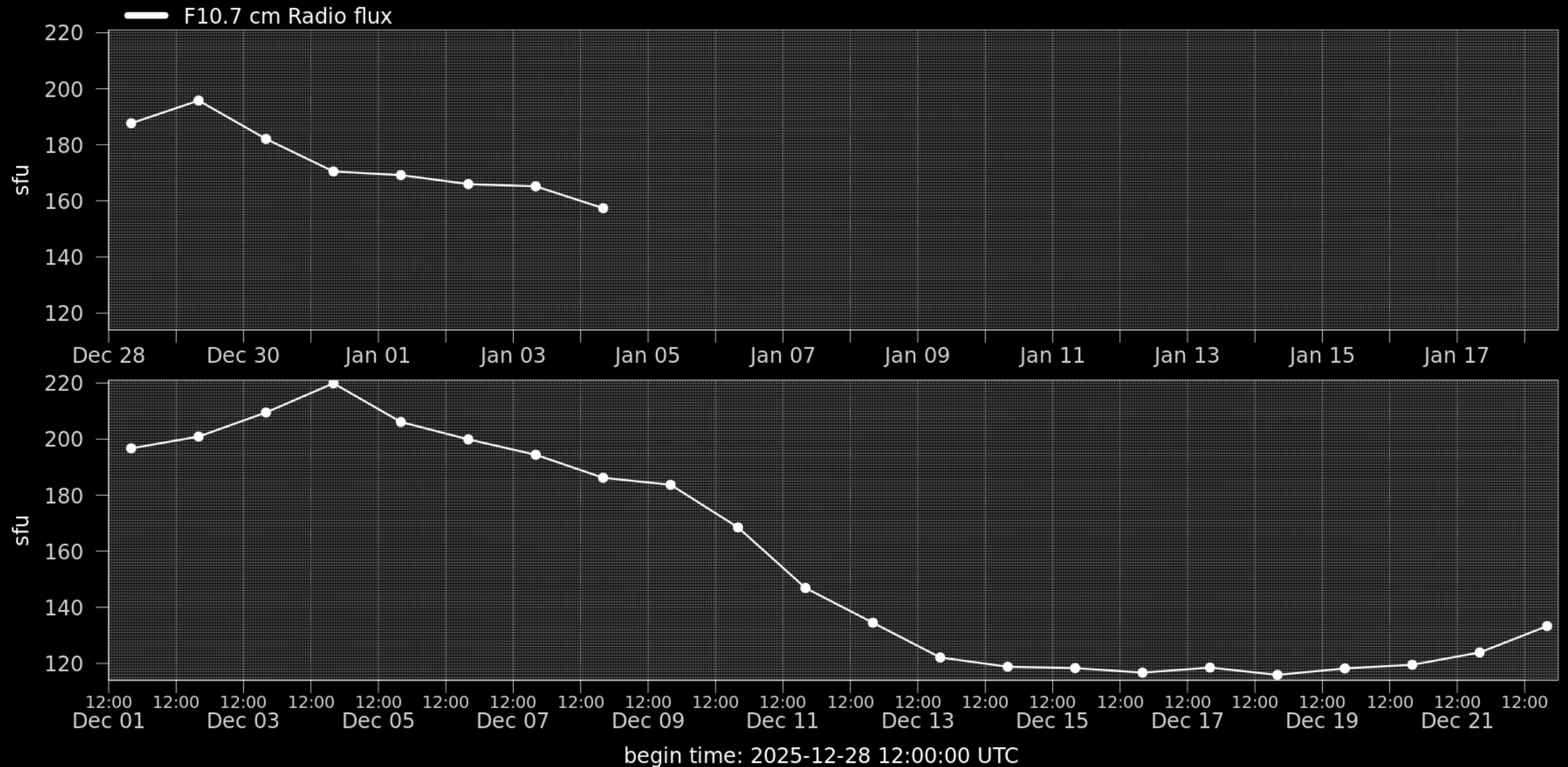
Solar Influences
Data analysis Centre
www.sidc.be

Outlook: Solar activity

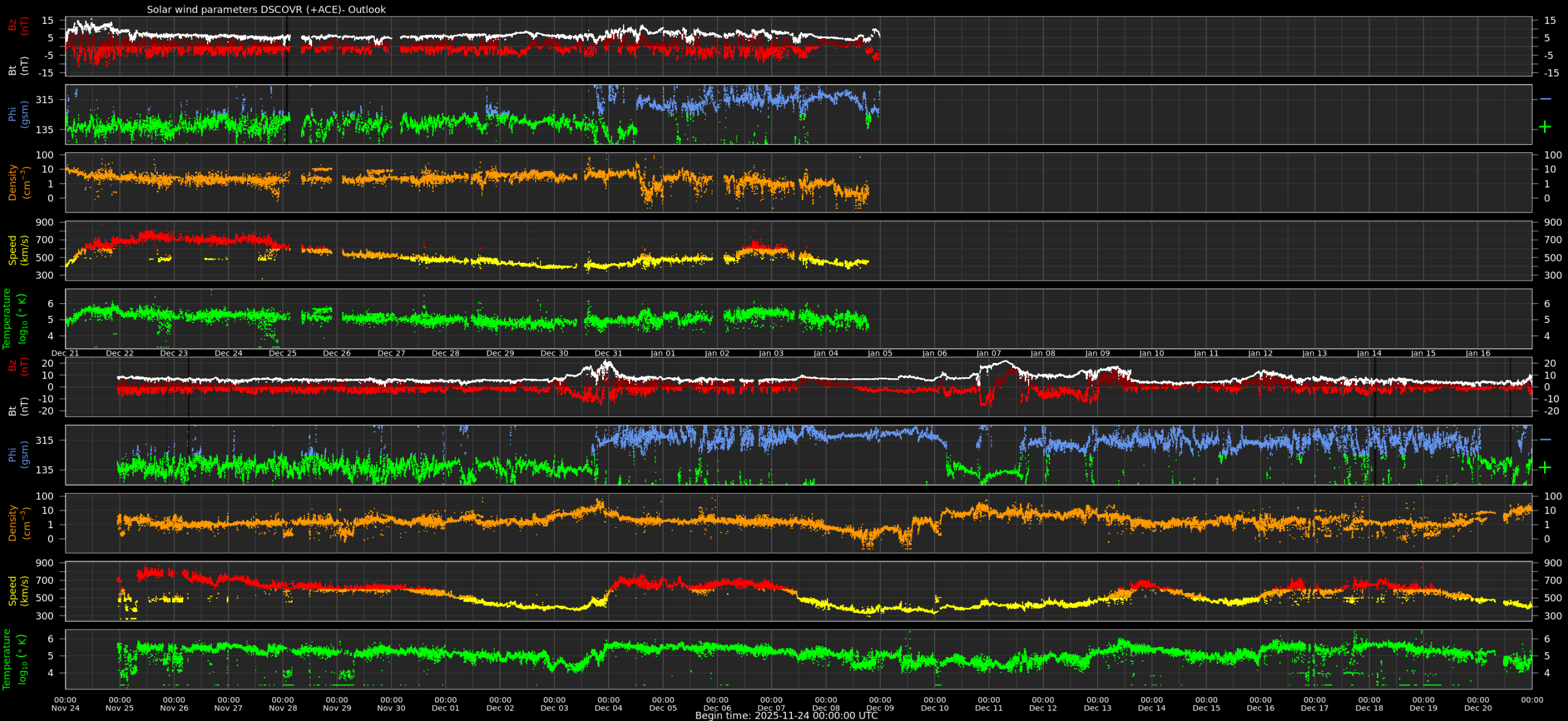


Observation date: 2026/01/04 20:35:00

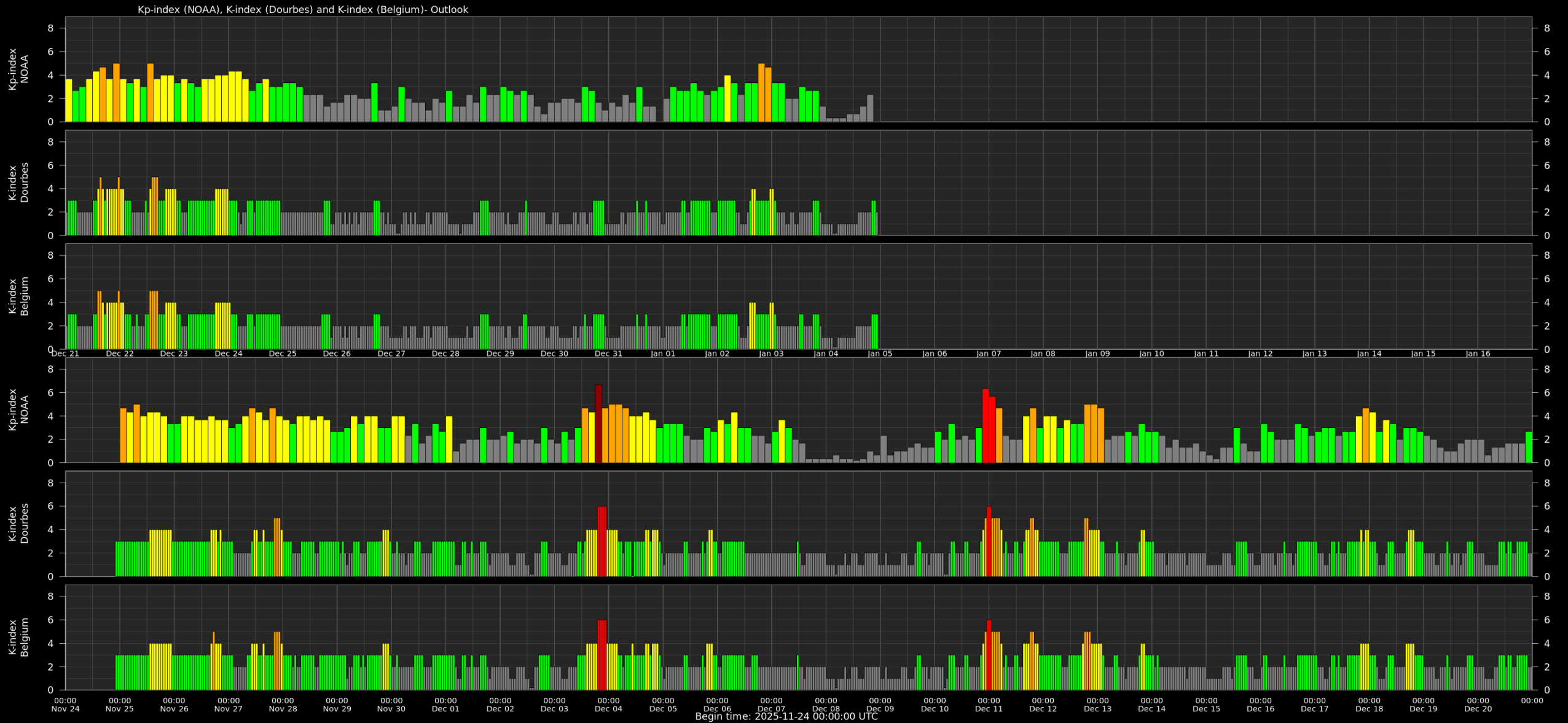
Outlook: Solar F10.7cm radio flux



Outlook: Solar wind parameters



Outlook: Geomagnetic activity



Outlook: Electron Flux at GEO Outlook



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