STCE Newsletter

2 Feb 2026 - 8 Feb 2026

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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.

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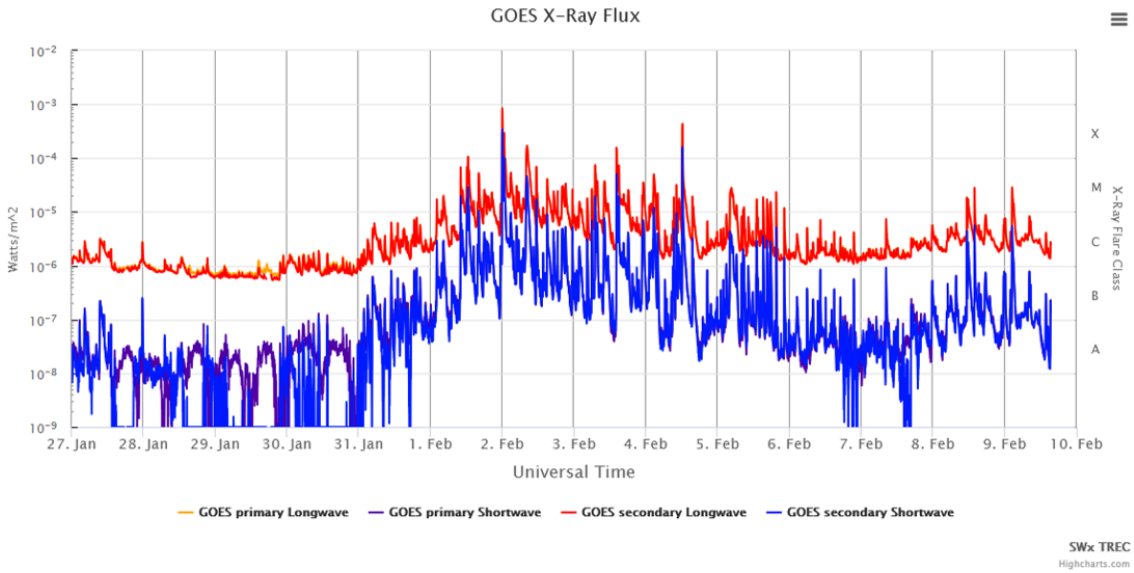
1. It's all flares on the menu!

The passage of NOAA 14366 over the solar disk has not gone unnoticed, as extensively discussed in these STCE newsflashes at https://www.stce.be/news/803/welcome.html This can best be seen in the GOES soft-x-ray curve underneath (LASP/University of Colorado - https://lasp.colorado.edu/space-weather-portal/now). As soon as this sunspot group started to develop on 31 January, there was also a strong increase in the recorded soft x-ray flux as well as in the number of produced solar flares. So far, this active region has produced 66 M- and 6 X-class flares (see "flare classes" at https://www.stce.be/educational/classification#xray). Most of this flare activity took place between 1 and 5 February, with a little burp on 8 and 9 February. In fact, the very large majority of the M- and X-class peaks in the graph can be attributed to enhanced activity in NOAA 14366.

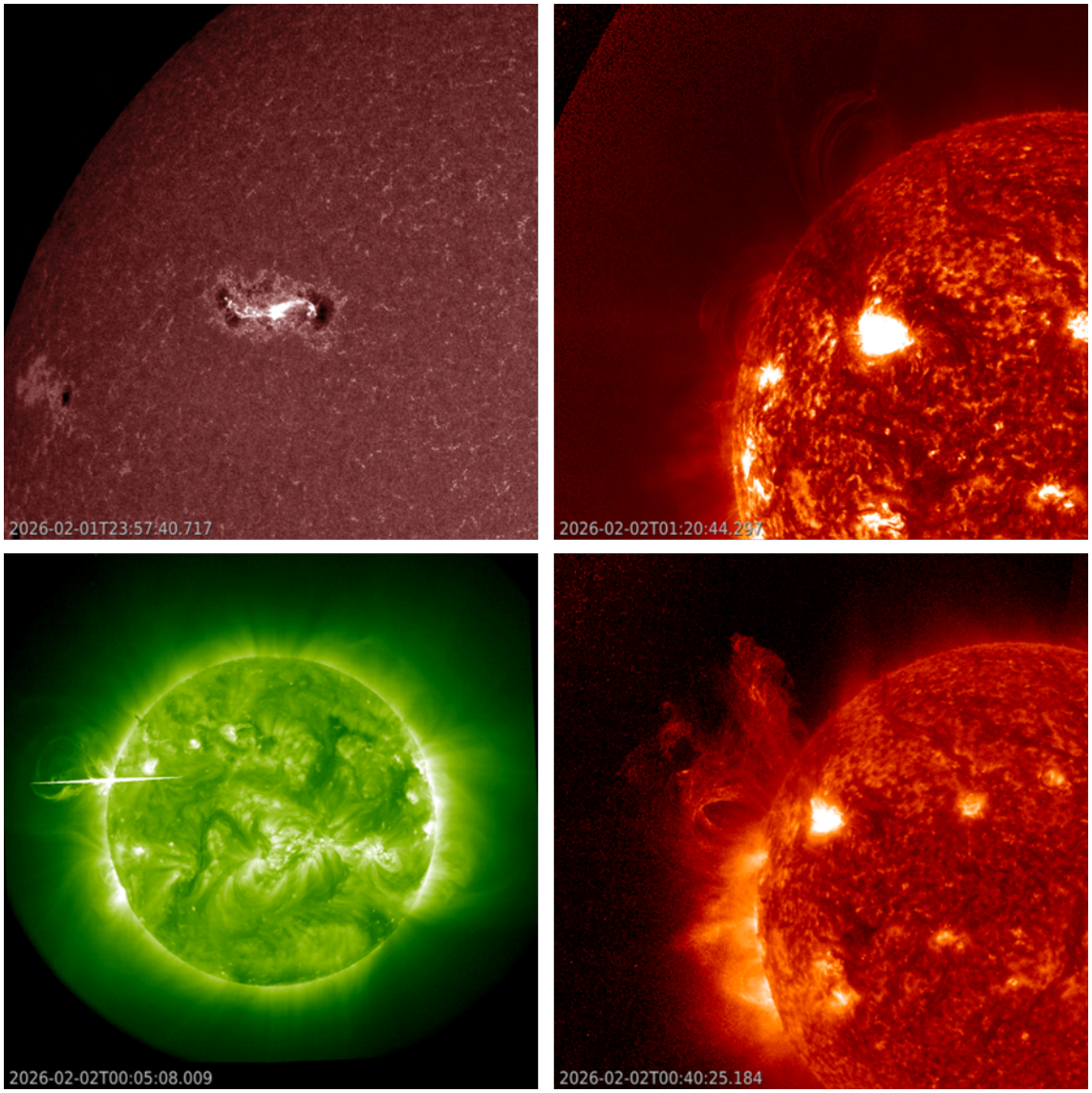


It's no surprize then that this sunspot group has been the most prolific M- and X-class flare producer so far this solar cycle (SC25). Though it has not produced as many X-class flares as the famous active region NOAA 13664 in May 2024, it is on top for the other flare statistics. The table underneath shows the Top 36 of active regions (NOAA number) that have produced the most M- and X-class flares. Also the solar cycle (SC) to which they belong has been mentioned. Note that all the flare intensities prior to SC25 have been upscaled by a factor 1.43 to allow comparison of the flare numbers on equal footing with the current GOES measurements (see the NOAA/SWPC note https://ngdc.noaa.gov/stp/satellite/goes/doc/GOES_XRS_readme.pdf). Following an analysis of the flaring statistics as recorded by the GOES family during the last half century, NOAA 14366 occupies already the third spot! Only the famous NOAA 5395 in March 1989 and NOAA 3804 in July 1982 were able to produce more M- and X-class flares.

Rank	NOAA	M	X	Total	SC	Rank	NOAA	M	X	Total	SC	Rank	NOAA	M	X	Total	SC
1	3804	77	10	87	21	13	5312	30	13	43	22	25	9393	34	3	37	23
2	5395	66	14	80	22	14	6659	36	7	43	22	27	10486	27	9	36	23
3	14366	66	6	72	25	15	10375	39	4	43	23	26	2776	30	6	36	21
4	3763	60	9	69	21	17	10808	30	11	41	23	28	12673	30	6	36	24
6	13664	53	12	65	25	16	4474	36	5	41	21	29	2099	32	3	35	21
5	2779	59	6	65	21	18	13663	36	5	41	25	32	13697	28	6	34	25
8	12192	49	8	57	24	19	3234	34	5	39	21	31	3781	30	4	34	21
7	5669	53	4	57	22	20	11515	38	1	39	24	30	3257	32	2	34	21
9	6555	43	8	51	22	21	11967	39	0	39	24	34	10720	25	7	32	23
10	3776	42	6	48	21	22	6538	32	6	38	22	33	3317	29	3	32	21
11	13615	45	1	46	25	23	10656	34	4	38	23	35	5747	23	8	31	22
12	6891	38	7	45	22	24	1203	31	6	37	21	36	3576	23	6	29	21

The strongest flare that NOAA 14366 has produced so far was the X8.1 late on 1 February. This is the third strongest so far this solar cycle, after the X9.0 flare produced by NOAA 13842 on 3 October

2024 (STCE newsitem at https://www.stce.be/news/727/welcome.html) and the X8.7 by NOAA 13664 on 14 May 2024 (STCE newsitem at https://www.stce.be/news/700/welcome.html). The compilation underneath shows this X8.1 flare as observed by 4 different spacecraft in the extreme ultraviolet (different wavelengths and zooms): SDO/AIA (upper left), GOES/SUVI (upper right), STEREO-A/EUVI (lower left) and Solar Orbiter/EUI (lower right). The latter two show the location of the eruption more to the east limb (left") because STEREO-A and Solar Orbiter are leading the Earth by respectively 51 and 15 degrees. The clips are in the online version of this newsitem at https://www.stce.be/news/805/welcome.html

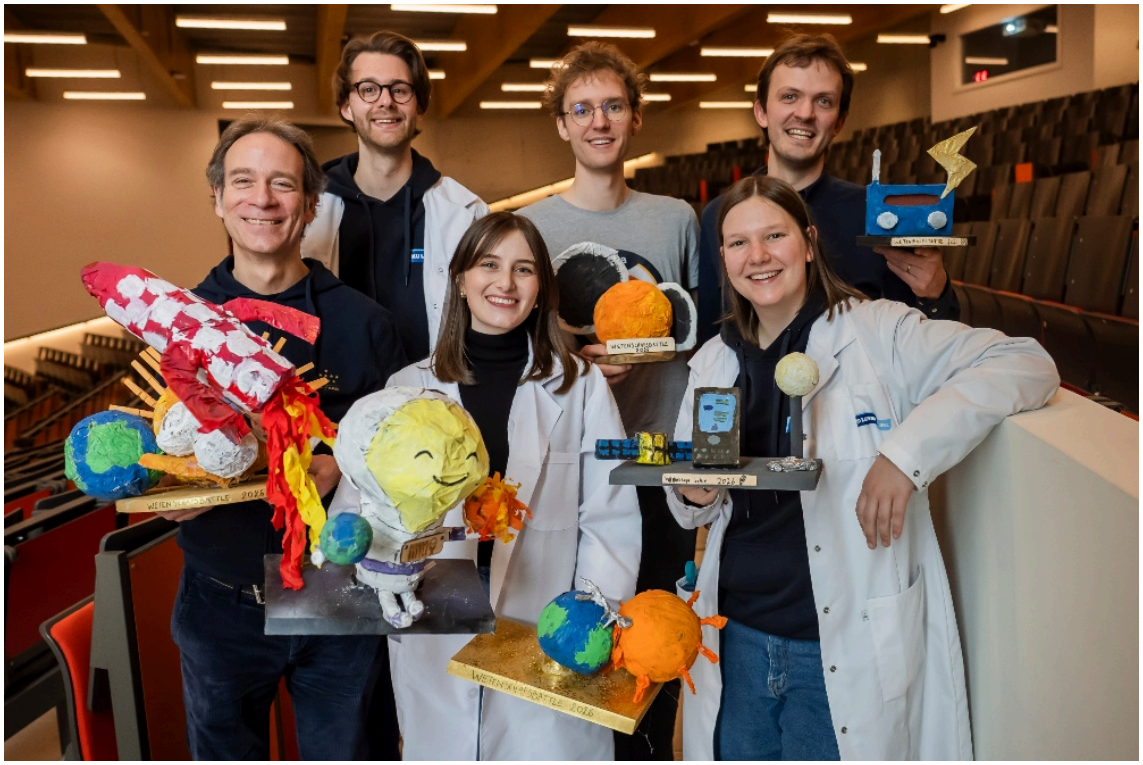


2. 5x10 min Space Weather research

On February 6, the finalists of the 'Battle of the Scientists' explained their space weather research to an audience of children between 6 and 12 years: 500 onsite and 2100 online.
The energy release was in the order of an X-flare, accompanied by an Earth-directed CME of olympic speed and a major proton storm.

Get ready for these brilliant researchers (Dutch):

Cis Verbeeck (Koninklijke Sterrenwacht van België): Hoe voorspel je een super-zonnestorm? - https://youtu.be/k2mQgDVWmLM
Esmee Tackx en Stefan De Raedemaeker (KU Leuven): Marsrover Marcel en de wraak van de zon - https://youtu.be/SU0zwjMq6W4
Dries Van Baelen (Defensie): Hoe bel je een soldaat in het midden van de woestijn? - https://youtu.be/1oCgrrf_XGs
Myrthe Flossie (KU Leuven): Help! Zonnedeeltjes vallen astronauten aan - https://youtu.be/qoIpGnIC6zA
Andreas Debrabandere (Koninklijke Sterrenwacht van België): Een eclips bouwen om ruimteweer te zien - https://youtu.be/-yhCZPh0ScI



Enjoy!

The Wetenschapsbattle 2026 is an organisation of 'The floor is yours' in collaboration with the Solar-Terrestrial Centre of Excellence, with the support of Redwire, KU Leuven and the Research Foundation - Flanders (FWO): https://wetenschapsbattle.be/editie2026/

3. Review of space weather

Solar Active Regions (ARs) and flares

This week, SIDC Sunspot Group 740 (NOAA 4345) to SIDC Sunspot Group 790 (NOAA 4373) were observed from Earth. The most active of these groups was SIDC 784 (NOAA 4366), producing most of the flaring activity. Six (6) X-class flares (all from SIDC 784) and 49 M-class flares were observed by the GOES satellite. The largest was an X8.1. SIDC Flare 6808 peaked on February 01 at 23:57 UTC and originated from SIDC Sunspot Group 784. This region had a beta-gamma-delta magnetic field configuration, it increased in size until 4 February. While crossing the central meridian from 4 February, the sunspot group stopped producing X-class flares.

Coronal mass ejections (CME)

A partial halo CME was observed at 00:48 UTC on February 2 by LASCO C2, associated with the X8.1 flare peaking at 23:57 UTC on February 1. This CME was accompanied by a large EUV wave. The CME had an angular width of about 150 degrees, directed to the northeast, with an Earth directed component and an estimated speed of 700 km/s.

Coronal Holes

Three negative polarity coronal holes could be allocated in solar EUV-images: two equatorial (SIDC CH 136 and 149), and one in the northern hemisphere at high latitudes (SIDC CH 142).

Proton flux levels

The greater than 10 MeV proton flux remained below the 10 pfu threshold.

Electron fluxes at GEO

The greater than 2 MeV electron flux measured by GOES 19 was mostly above the threshold until 5 February. After this date, the flux went below the threshold for most of the remaining week.

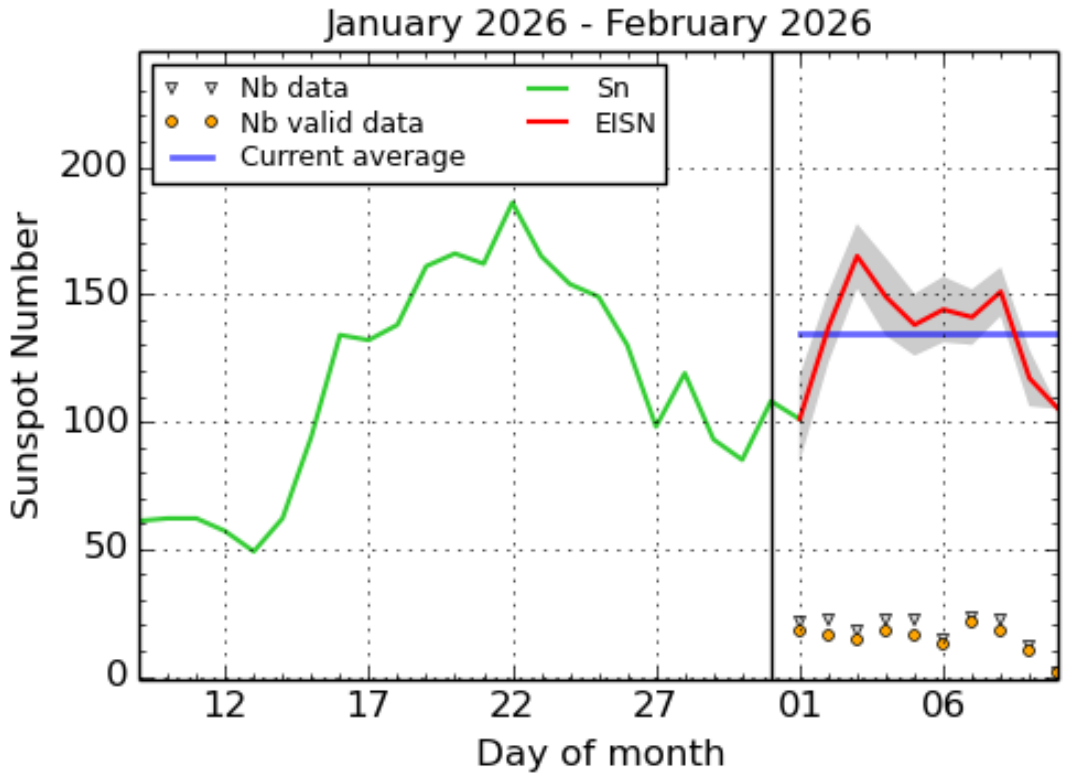
Solar wind at L1

The Earth was inside a slow solar wind stream at the beginning of the week, with speeds around 400 km/s and a magnetic field around 5 nT. On 4 February at 14:20 UT, a shock driven by the partial halo CME from 2 February, arrived. The magnetic field of the solar wind jumped from 11 to 22 nT, its speed increased instantaneously from 320 to 400 km/s. It took the interplanetary CME 1 day to pass the L1 point. After its passage, the high speed stream from SIDC CH 136 and 149 arrived. It reached speeds up to 700 km/s. By the end of the week, the wind had slowed down.

Geomagnetism

The week was mostly quiet to unsettled both locally and globally (K_Bel and K_p up to 3), except when the ICME corresponding to the 2 February partial halo CME arrived triggering a minor storm (K_Bel and K_p up to 5) in the first half of 5 February. The high speed stream following the ICME triggered active conditions (Kp and K_Bel up to 4) on 7 February.

4. International Sunspot Number by SILSO



SILSO graphics (http://sidc.be/silso) Royal Observatory of Belgium, 2026 February 10

The daily Estimated International Sunspot Number (EISN, red curve with shaded error) derived by a simplified method from real-time data from the worldwide SILSO network. It extends the official Sunspot Number from the full processing of the preceding month (green line), a few days more than one solar rotation. The horizontal blue line shows the current monthly average. The yellow dots give the number of stations that provided valid data. Valid data are used to calculate the EISN. The triangle gives the number of stations providing data. When a triangle and a yellow dot coincide, it means that all the data is used to calculate the EISN of that day.

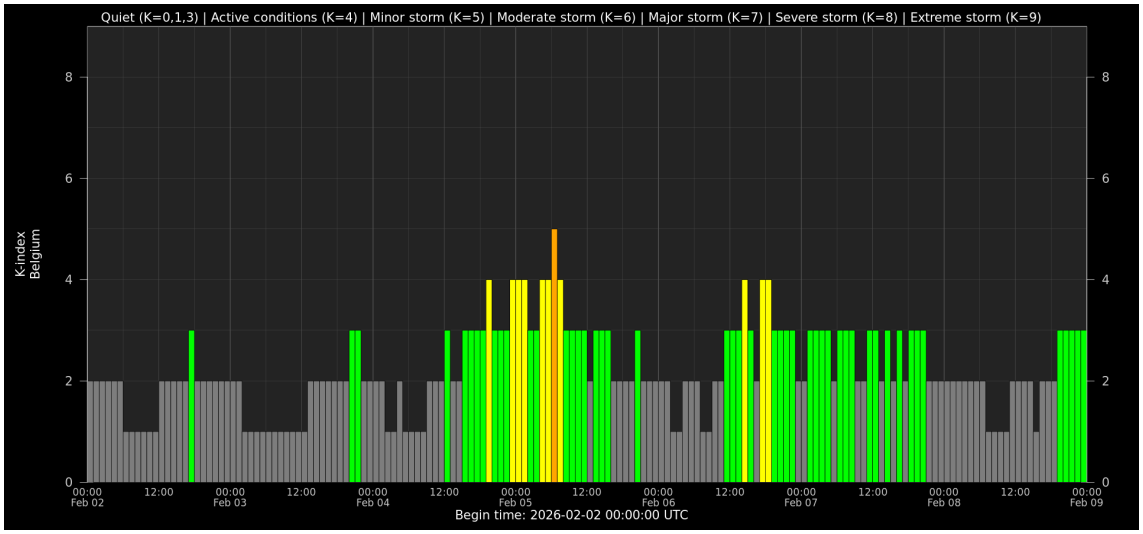
5. Noticeable Solar Events

DAY	BEGIN	MAX	END	LOC	XRAY	OP	10CM	TYPE	Cat	NOAA
02	0031	0036	0040		X2.8				10	4366
02	0235	0242	0244		M4.4				10	4366
02	0245	0251	0259		M5.2				10	4366
02	0344	0346	0349		M1.9				10	4366
02	0439	0447	0456		M3.0				10	4366
02	0510	0516	0519		M1.6			VI/2	10	4366
02	0519	0527	0535		M2.3			VI/2	10	4366
02	0739	0814	0840	N14E30	X1.6	2			10	4366
02	1017	1024	1034		M1.9				10	4366
02	1115	1124	1130		M6.7				10	4366

02	1332	1339	1343		M1.1				10	4366
02	1449	1501	1514	N13E25	M4.0	1			10	4366
02	1703	1710	1730		M2.3			CTM/2	10	4366
02	1826	1829	1831		M2.3				10	4366
02	1941	2005	2032		M2.9			III/1		
02	2052	2108	2117		M3.3				10	4366
02	2321	2327	2331		M2.5				10	4366
03	0131	0149	0221	N12E23	M1.5	1F		CTM/2	10	4366
03	0413	0422	0435	N12E20	M1.7	1F			10	4366
03	0545	0555	0603	N12E16	M2.6	SN			10	4366
03	0643	0701	0719	N12E16	M7.2	1N		VI/2	10	4366
03	0743	0747	0752	N12E15	M3.6	1			10	4366
03	0941	1012	1028	N14E14	M3.6	1F			10	4366
03	1358	1408	1418		X1.5				10	4366
03	1445	1456	1503		M7.2			III/1	10	4366
03	1629	1636	1640		M2.1				10	4366
03	1753	1808	1822		M2.5				10	4366
03	2231	2250	2256		M2.0				10	4366
03	2256	2309	2320	N14E12	M3.4	SF		III/2	10	4366
04	0102	0110	0116	N12E5	M1.2	1F			10	4366
04	0126	0139	0145	N12E6	M1.4	SF			10	4366
04	0232	0239	0255	N12E6	M4.9	S			10	4366
04	0348	0355	0402	N13E6	M2.1	SF			10	4366
04	0912	0920	0923		M1.8				10	4366
04	1051	1055	1058		M1.5				10	4366
04	1131	1135	1141		M1.1				10	4366
04	1202	1213	1218		X4.2			CTM/2		
04	1525	1534	1555	N12W4	M1.8	2B			10	4366
05	0355	0421	0425	N15W9	M2.5	SF			10	4366
05	0425	0436	0441	N15W9	M2.7	S			10	4366
05	0613	0619	0627	N15W9	M1.3	S		III/2	10	4366
05	0819	0833	0838	N15W9	M1.0	SF			10	4366
05	0838	0846	0850	N15W9	M1.2	SF			10	4366
05	1259	1304	1309		M1.6				10	4366
05	1508	1513	1520	S18W16	M1.8	1N		III/2	9	4362
05	1620	1630	1646		M1.6			III/2	10	4366
05	1731	1741	1756		M1.5				10	4366
05	1928	1934	1938	S17W18	M2.2	1N		V/3VI/1	9	4362
05	2210	2217	2220	S22W73	M1.1	1N		CTM/2		4372
08	1113	1118	1121	N18W48	M1.8	SF			10	4366
08	1132	1143	1159		M1.7				10	4366
08	1346	1353	1357		M2.7				10	4366

LOC: approximate heliographic location
XRAY: X-ray flare class
OP: optical flare class
10CM: peak 10 cm radio flux
TYPE: radio burst type
Cat: Catania sunspot group number
NOAA: NOAA active region number

6. Geomagnetic Observations in Belgium



Local K-type magnetic activity index for Belgium based on data from Dourbes (DOU) and Manhay (MAB). Comparing the data from both measurement stations allows to reliably remove outliers from the magnetic data. At the same time the operational service availability is improved: whenever data from one observatory is not available, the single-station index obtained from the other can be used as a fallback system.
Both the two-station index and the single station indices are available here: http://ionosphere.meteo.be/geomagnetism/K_BEL/

7. PROBA2 Observations (2 Feb 2026 - 8 Feb 2026)

Solar Activity

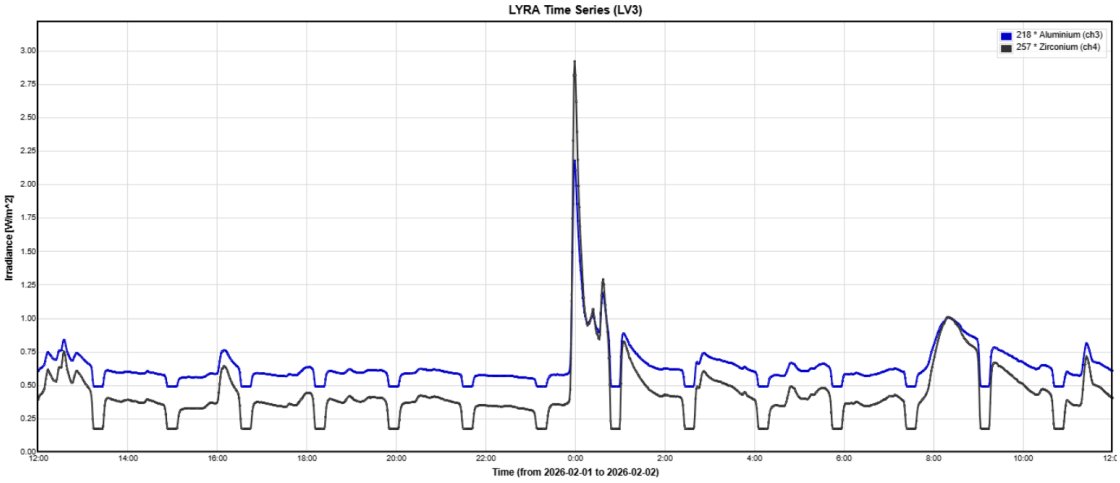
Solar flare activity fluctuated from low to very high during the week.
In order to view the activity of this week in more detail, we suggest to go to the following website from which all the daily (normal and difference) movies can be accessed: https://proba2.oma.be/ssa
This page also lists the recorded flaring events.

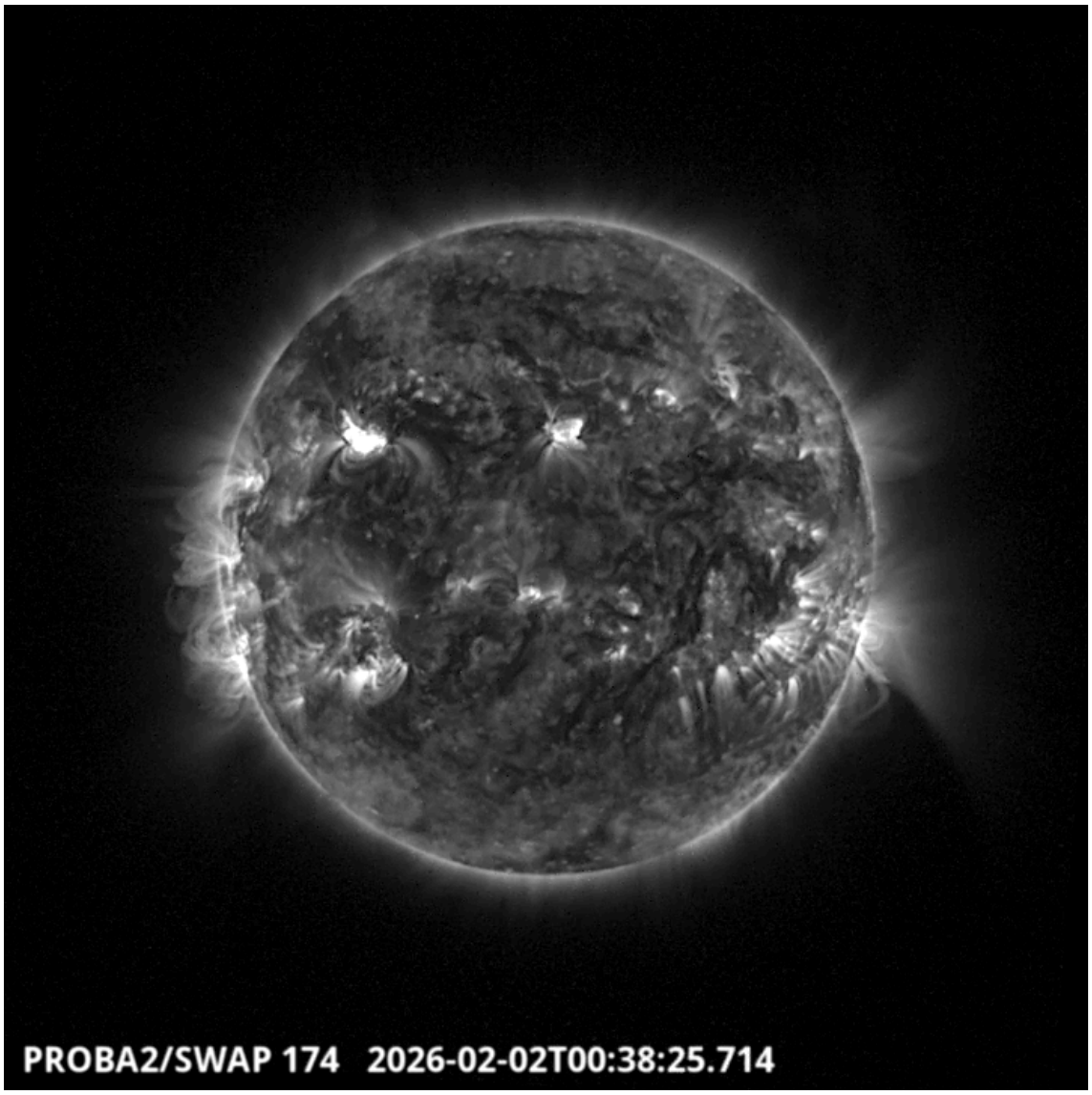
A weekly overview movie (SWAP week 828) can be found here: https://proba2.sidc.be/swap/data/mpg/movies/weekly_movies/weekly_movie_2026_02_02.mp4.

Details about some of this week's events can be found further below.

If any of the linked movies are unavailable they can be found in the P2SC movie repository here: https://proba2.oma.be/swap/data/mpg/movies/.

Monday February 02





This week, active region NOAA 4366 (SIDC 784) was very dynamic, producing 4 X-flares and numerous M-flares. The largest flare was an X4.2, but the one fully observed by PROBA2 (outside of occultations) was the second largest, the X2.8, seen by LYRA (top panel) and SWAP (bottom panel). The flare peaked on 2026-Feb-02 at 00:36 UT and occurred in the north-eastern quadrant of the Sun.
Find a SWAP movie of the event here: https://proba2.sidc.be/swap/movies/20260202_swap_movie.mp4.

8. The SIDC Space Weather Briefing

The forecaster on duty presented the SIDC briefing that gives an overview of space weather from 2 to 8 February, 2026 .
The pdf of the presentation: https://www.stce.be/briefings/20260209_SWbriefing.pdf

SIDC Space Weather Briefing

02 February 2026-08 February 2026

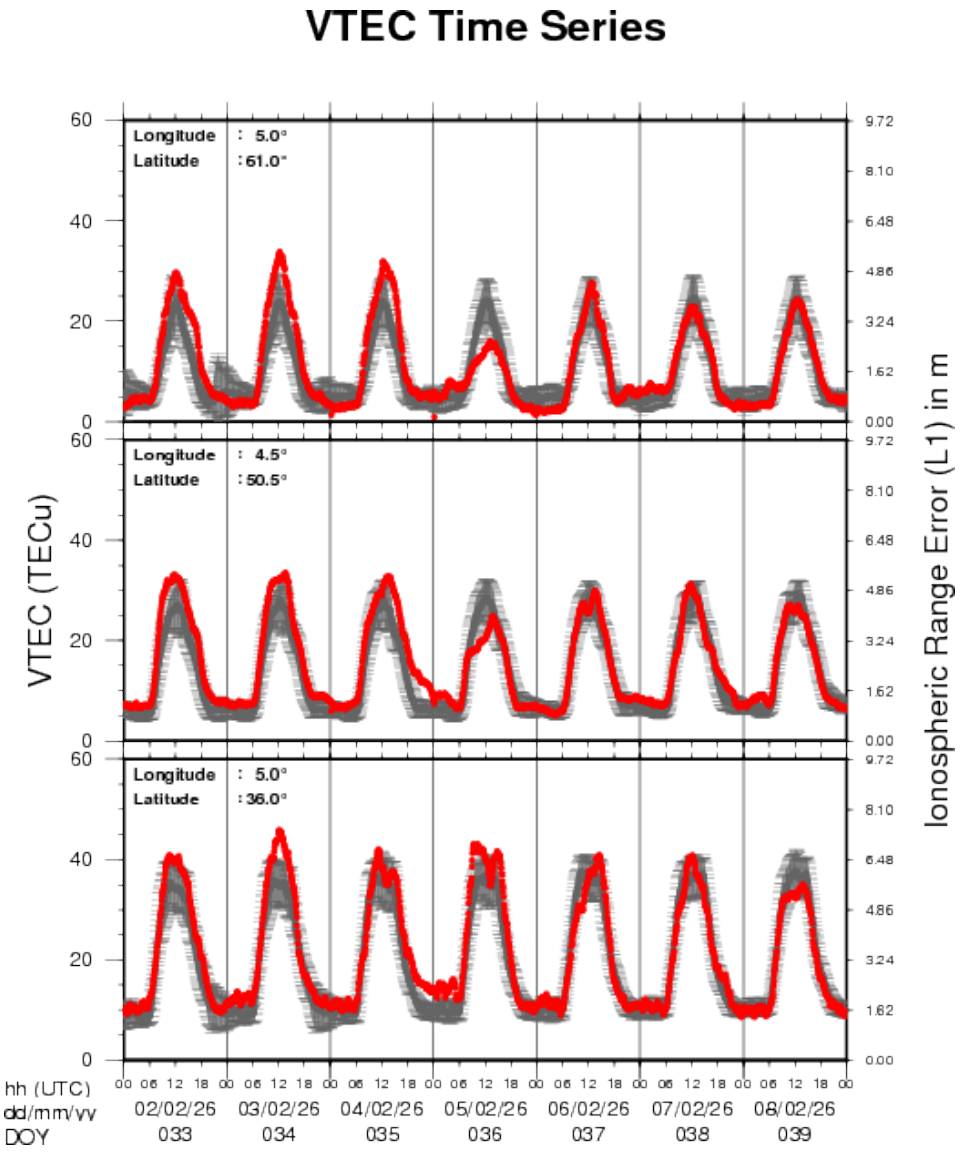
Rodriguez Luciano

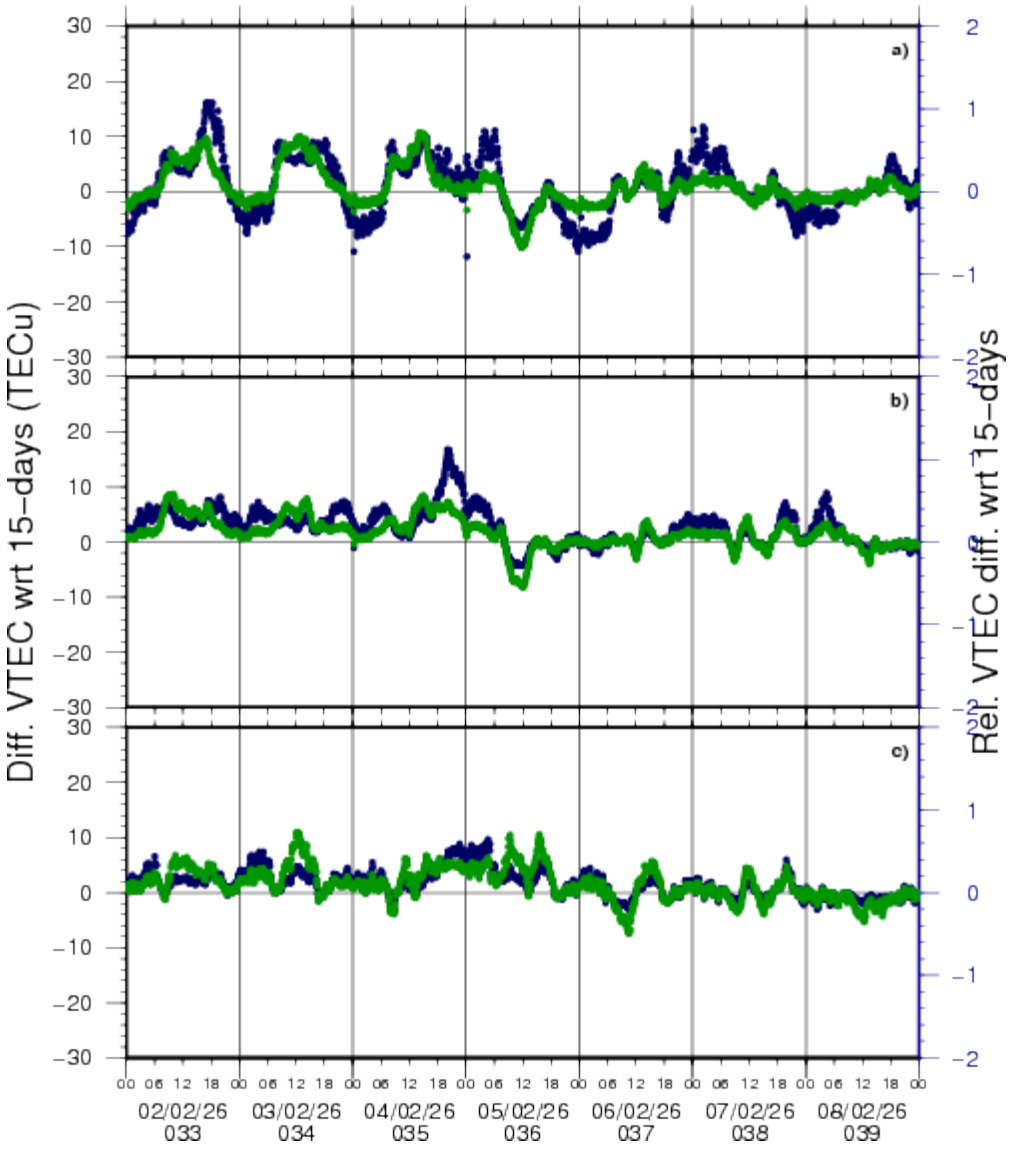
& the SIDC forecaster team

Royal Observatory of Belgium

Solar Influences Data analysis Centre
www.sidc.be

9. Review of Ionospheric Activity





VTEC time series at 3 locations in Europe from 2 Feb 2026 till 8 Feb 2026

The top figure shows the time evolution of the Vertical Total Electron Content (VTEC) (in red) during the last week at three locations:
a) in the northern part of Europe(N 61deg E 5deg)
b) above Brussels(N 50.5deg, E 4.5 deg)
c) in the southern part of Europe(N 36 deg, E 5deg)
This top figure also shows (in grey) the normal ionospheric behaviour expected based on the median VTEC from the 15 previous days.

The time series below shows the VTEC difference (in green) and relative difference (in blue) with respect to the median of the last 15 days in the North, Mid (above Brussels) and South of Europe. It thus illustrates the VTEC deviation from normal quiet behaviour.

The VTEC is expressed in TECu (with TECu=10^16 electrons per square meter) and is directly related to the signal propagation delay due to the ionosphere (in figure: delay on GPS L1 frequency).

The Sun's radiation ionizes the Earth's upper atmosphere, the ionosphere, located from about 60km to 1000km above the Earth's surface.The ionization process in the ionosphere produces ions and free electrons. These electrons perturb the propagation of the GNSS (Global Navigation Satellite System) signals by inducing a so-called ionospheric delay.

See http://stce.be/newsletter/GNSS_final.pdf for some more explanations; for more information, see https://gnss.be/SpaceWeather

10. STCE training courses, lectures and workshops

Courses, seminars, presentations and events with the Sun-Space-Earth system and Space Weather as the main theme. We provide occasions to get submerged in our world through educational, informative and instructive activities.
* Feb 18, 2026, STCE Public Lecture on Proba-3, Volkssterrenwacht Beisbroek, Bruges, Belgium
* Feb 19, 2026, Imagine Space Weather, Science Communication Course, KULeuven, Leuven, Belgium
* Feb 28, 2026, In het oog van de ruimtestorm, Workshop Talim, Beringen, Belgium
* Mar 16-18, 2026, STCE course: Role of the ionosphere and space weather in military communications, Brussels, Belgium - register: https://events.spacepole.be/event/258/
* Apr 20-21, 2026, STCE cursus: inleiding tot het ruimteweer, Brussels, Belgium - register: https://events.spacepole.be/event/260/
* Mar 23, 2026, STCE lecture: From physics to forecasting, Space Weather course, ESA Academy, Redu, Belgium
* Mar 25, 2026, the Belgian Space Weather centre, Space Weather course, ESA Academy, Brussels, Belgium
* Jun 15-17, 2026, STCE Space Weather Introductory Course, Brussels, Belgium - register: https://events.spacepole.be/event/256/
* Oct 12-14, 2026, STCE Space Weather Introductory Course, Brussels, Belgium - register: https://events.spacepole.be/event/257/
* Nov 23-25, 2026, STCE course: Role of the ionosphere and space weather in military communications, Brussels, Belgium - register: https://events.spacepole.be/event/259/
* Dec 7-9, 2026, STCE Space Weather Introductory Course for Aviation, Brussels, Belgium - register: https://events.spacepole.be/event/262/

To register for a course and check the seminar details, navigate to the STCE Space Weather Education Center: https://www.stce.be/SWEC
If you want your event in the STCE newsletter, contact us: stce_coordination at stce.be

Website: https://www.stce.be/SWEC