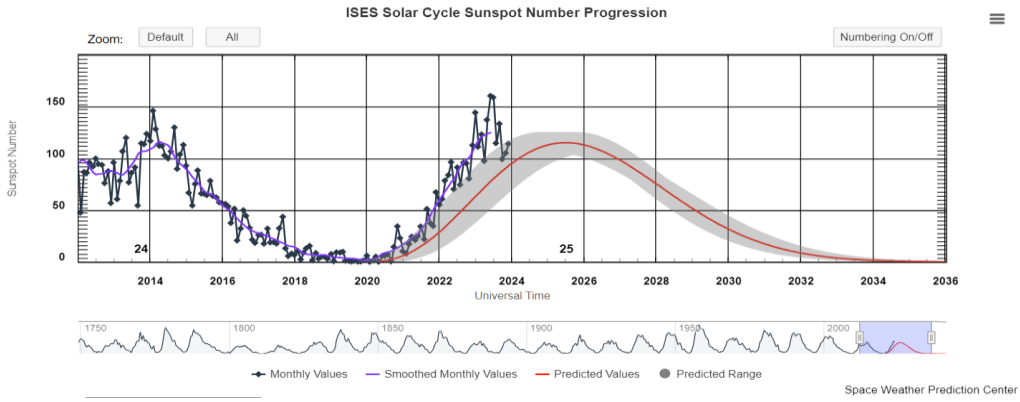
Month: December 2023

- **NEWS FROM THE SOLAR SECTION**

December 2023 solar news

December month was packed with Solar activities and looking at the solar cycle 25 progression graph, it is evident that sunspot numbers in December are once again on the rise. These numbers continue to surpass the predicted line, indicating that we are still approaching the peak of Solar Cycle 25.



- **SUNSPOT OBSERVATIONS**

Day	Time	Groups	Spots	W no.	North Groups	South groups	North spots	South spots
1	14h10	9	38	128	4	5	19	19
2				0				
3				0				
4				0				
5				0				
6	12h50	5	27	77	2	3	14	13
7	14h45	7	13	83	3	4	6	7
8				0				
9				0				
10				0				
11	13h45	5	16	66	3	2	13	3
12	14h20	5	22	72	3	2	17	5
13	14h35	6	24	84	3	3	17	7
14	13h55	7	28	98	2	5	8	20
15	13h15	6	28	88	3	3	18	10
16				0				
17				0				
18				0				
19	13h15	6	32	92	3	3	14	18
20				0				
21	13h45	6	28	88	3	3	18	10
22				0				
23	8h00	7	27	97	5	2	22	5
24				0				
25	13h15	9	19	109	6	3	14	5
26				0				
27	13h25	6	16	76	2	4	7	9
28				2				
29				0				
30				0				
31	13h45	4	11	51	2	2	7	4
	Observations	Groups	Spots	W no.	North Groups	South groups	North spots	South spots
	14	88	329	1211	44	44	194	135

	Monthly Means	
MDF	86,5	1 Observer
MDF g	6,3	1 Observer
MDF Ng	3,1	1 Observer
MDF Sg	3,1	1 Observer

Observers:

Jacques van Delft ASSA Bloemfontein South Africa

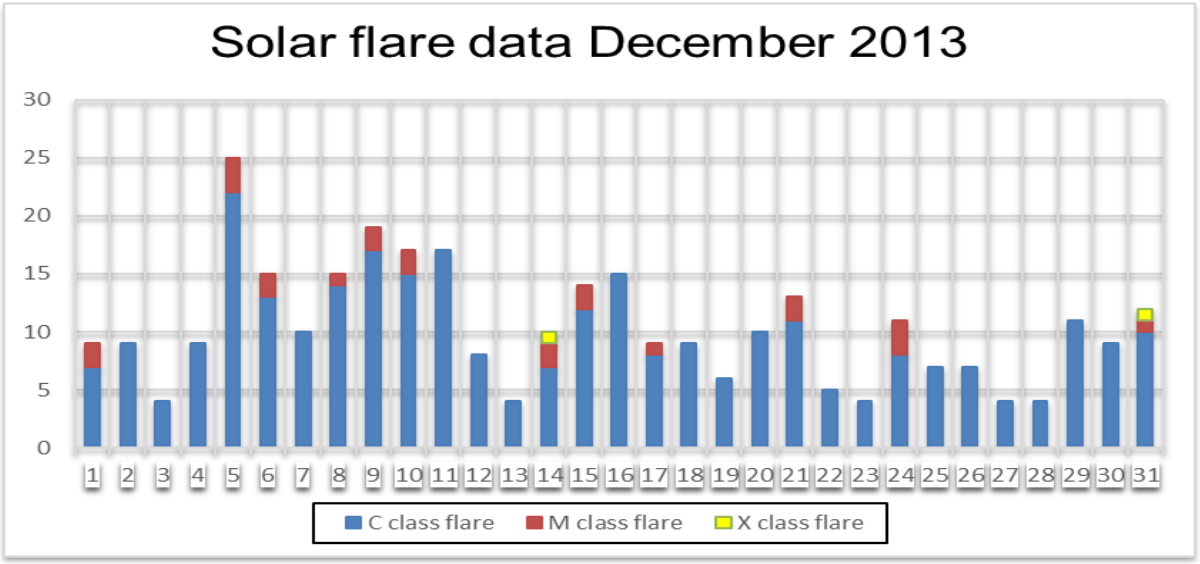
When more than 1 observer is submitting sunspots, the average per day is calculated and noted.

- **SOLAR FLARE ACTIVETY OCTOBER 2023**

Solar flares are classified according to their x-ray brightness in the wavelength range 1 to 8 Angstrom. There are 3 categories: C class – minor, M class – medium and X class – big. Each category has 9 subdivisions.

2023	December	C class	M class	X class	NOA No	
	1	7	2		3501/3500	
	2	9				
	3	4				
	4	9				
	5	22	3		3513	
	6	13	2		3513	
	7	10				
	8	14	1		3511	M5.4
	9	17	2		3511	
	10	15	2		3511	M2.3/M1.4
	11	17				
	12	8				
	13	4				
	14	7	2	1	3514	M5.8/M2.3/X2.8
	15	12	2		3514	M6.3/M6.9
	16	15				
	17	8	1		3514	M1.1
	18	9				
	19	6				
	20	10				
	21	11	2		3519	M2,4/M3,3
	22	5				
	23	4				
	24	8	3		3529/?	M2,9/M2,6/M1,1
	25	7				
	26	7				
	27	4				
	28	4				
	29	11				
	30	9				
	31	10	1	1	3536	M1.1/X5.0
	Totals	296	23	2		

Credit: NASA SDO



01 Dec 23: At 04h12 UT a M1,1 class flare was observed from AR 3501. At 20h55 UT a M1,0 a M1.1 class flare was observed from AR 3500.

05 Dec 23: At 06h39 a M1.5, at 20h59 a M1.0 and at 21h17 a M 1.4 class flares were observed al from AR 3513.

06 Dec 23: At 05h30 a M2.1 and at 21h26 a M2.3 flares were observed both from AR 3513.

08 Dec 23: At 22H57 a M5.1 class flare was observed from AR 3513.

09 Dec 23: At 09h41 a M1.5 and at 13h03 a M1.0 class flares were observed fro AR3511.

11 Dec 23: At 03h42 a M 2.3 and at 22h37 a M 1.4 class flares were observed from AR 3511

14 Dec 23: At 07h11 a M5.8, at 13h29 a M2.3 and at 16h47 a X2.8 flares were observed from AR3514.

15 Dec 23: At 07h03 a M6.3 and at 07h23 a M6.9 class flares were observed from AR3514.

17 Dev 23: At 20h08 a M1.1 class flare was observed from AR 3514.

21 Dec 23: At 23h42 a M3.3 class flare was observed from AR 3519.

24 Dec 23: At 11h09 A M2.9 and at 16h37 a M2.6 flares were observed from AR 3529. At 19h21 A M1.1 flare was observed possible from a Filament eruption.

31 Dec 23: At 18h44 a M1.0 class flare and at 21h36 a X5.0 class flare were observed from AR 3536.

- **Geomagnetic data**

K INDEX

Scientists monitor geomagnetic activity using various instruments, including magnetometers and satellites, to better understand the processes involved and predict potential impacts on technological systems such as power grids, communication networks, and navigation systems as well as changes in our climate. Severe geomagnetic storms have the potential to disrupt these systems, making the study of geomagnetic activity crucial for both scientific understanding and practical applications.
Increased geo-magnetic activities are caused by Coronal Mass Ejections (CME's) triggered by solar activities such as solar flares, filament eruptions and Coronal openings.
The K-index scale has a range from 0 to 9 and is directly related to the maximum amount of fluctuation (relative to a quiet day) in the geomagnetic field over a three-hour interval.

	0hrs to 03hrs	03hrs to 06hrs	06hrs to 09hrs	09hrs to 12hrs	12hrs to 15hrs	15hrs to 18hrs	18hrs to 21hrs	21hrs to 24hrs	A Index
1	4,33	4,00	4,00	7,00	6,33	4,67	5,00	5,00	56,00
2	5,33	4,00	2,00	1,00	1,00	1,67	1,33	1,67	14,00
3	2,67	3,00	3,00	1,67	2,33	3,33	2,00	2,33	11,00
4	2,33	2,33	3,00	2,67	2,33	2,33	2,00	1,33	9,00
5	3,33	3,33	2,67	3,33	3,00	3,00	2,33	3,00	15,00
6	2,67	2,67	2,67	2,33	2,67	2,67	2,00	2,00	10,00
7	1,33	2,67	2,67	2,33	2,67	2,67	2,00	2,00	5,00
8	1,00	0,33	1,33	1,33	0,67	1,67	1,67	1,33	5,00
9	0,33	0,33	1,00	0,67	0,33	0,67	0,67	0,33	3,00
10	0,67	1,33	1,00	0,33	1,00	1,00	1,33	1,00	4,00
11	0,67	1,33	1,00	0,33	0,67	0,67	0,33	0,33	3,00
12	0,33	2,00	1,33	1,00	4,00	3,67	2,33	1,33	10,00
13	0,67	2,00	1,67	1,67	2,00	2,67	2,33	3,00	8,00
14	4,00	4,00	3,33	3,67	2,67	2,00	1,33	2,33	16,00
15	2,00	1,33	1,33	2,67	3,33	3,00	3,33	3,33	12,00
16	3,33	4,00	3,00	1,67	2,33	1,00	3,00	3,00	14,00

17	3,67	4,33	4,33	4,67	5,33	5,33	3,33	4,33	36,00
18	2,67	3,33	6,00	4,00	3,33	3,00	2,67	4,67	28,00
19	3,67	3,67	2,67	1,67	1,67	2,33	2,00	2,67	12,00
20	4,00	3,33	2,33	2,00	2,33	2,33	1,67	1,00	11,00
21	2,67	0,67	0,67	2,33	0,67	1,00	0,67	0,33	5,00
22	0,67	1,33	1,67	0,67	0,33	1,00	0,67	0,67	4,00
23	0,67	1,00	2,67	1,33	2,00	2,67	1,00	1,33	7,00
24	2,67	2,67	2,67	3,00	2,00	1,67	1,33	1,00	9,00
25	0,33	1,00	1,00	0,67	0,33	1,33	1,67	0,67	4,00
26	0,33	1,67	1,67	2,00	1,67	1,33	1,33	0,33	5,00
27	1,67	1,33	1,33	1,67	0,67	1,00	0,67	0,67	4,00
28	0,33	0,33	1,33	0,33	0,33	0,67	0,33	2,00	3,00
29	1,00	1,67	1,67	2,33	1,67	1,00	1,67	2,33	6,00
30	1,00	2,33	1,00	1,00	1,00	1,33	1,00	0,33	5,00
31	0,33	1,00	0,67	0,67	0,67	1,00	1,33	1,33	4,00

Geomagnetic Storm Index

G1	G2	G3	G4	G5

Credit: NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

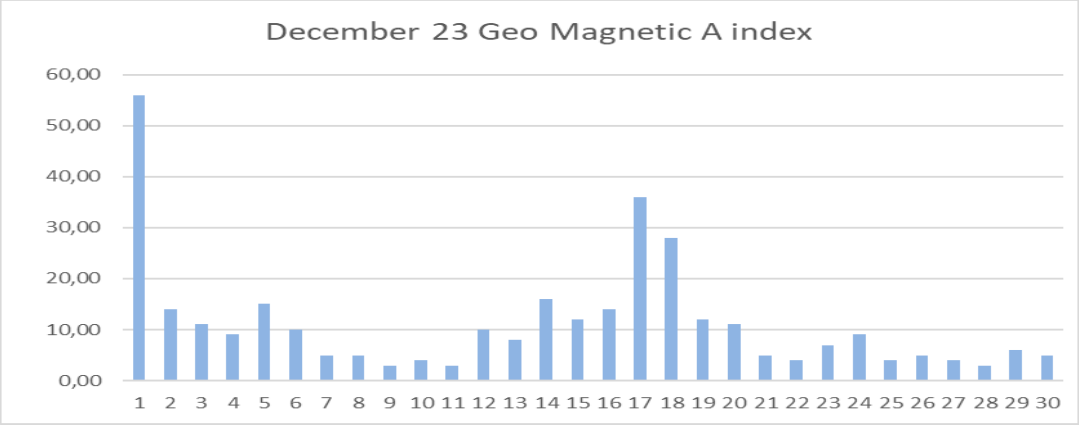
A INDEX

The solar A Index is a numerical scale that represents the geomagnetic activity in the Earth's ionosphere caused by solar flares and other solar phenomena. It measures the overall geomagnetic disturbance level on a scale from 0 to 400. The index is derived from the observed planetary A index, which quantifies the magnetic activity over a 24-hour period.

Here's a breakdown of the solar A Index scale:

- 0 to 7: Quiet geomagnetic conditions.
- 8 to 15: Unsettled geomagnetic conditions.
- 16 to 29: Active geomagnetic conditions.
- 30 to 49: Minor storm levels.
- 50 to 99: Major storm levels.
- 100 and above: Severe storm levels.

A higher A Index generally indicates more disturbed geomagnetic conditions. This index is valuable for radio operators, especially those involved in high-frequency (HF) radio communication, as it helps predict the likelihood of signal disruptions due to solar activity. The solar A Index is typically updated regularly and is an important tool for space weather monitoring and forecasting.



December 01:
A G3 - KP 7 Geo magnetic condition was experience from 09h00 which caused Ionospheric radio disturbance. The condition transitioned from 24h00 to a G1

December 02:
A minor G1 Geo magnetic condition that only lasted for 3 hrs was experienced.

December 17:
A minor G1 Geo magnetic condition lasting for 15 hrs started at 03h00.

December 18:
A G3 - KP 6 Geo magnetic condition started at 06h00 and lasted only for 3 hrs. At 21h00 a 3 hrs minor G1 Geo magnetic condition was observed.

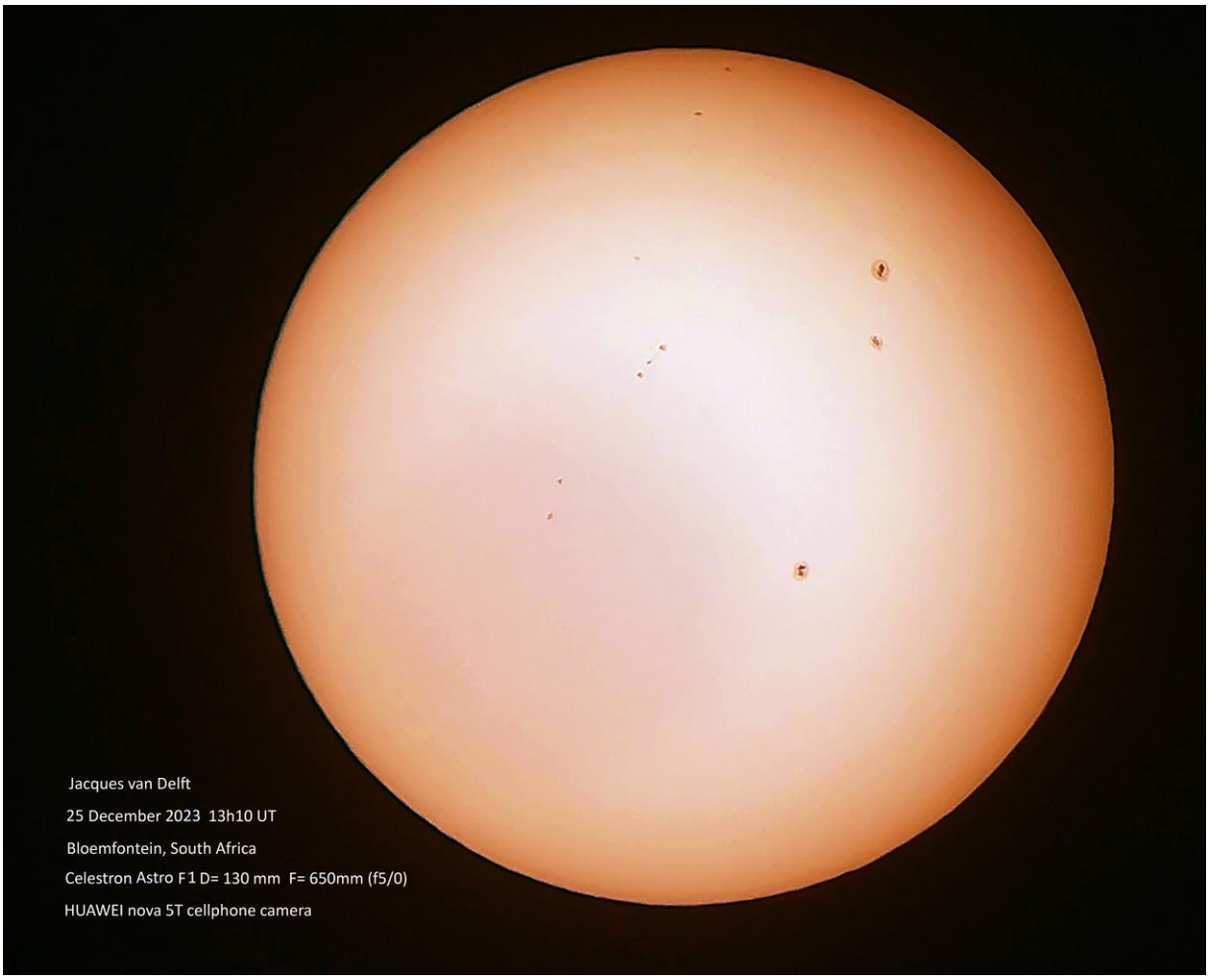
- **H Alpha Observations**

One observer shared his H-Alpha data for December 2023. Andrew Devey from BAA & MSAS living in Spain using a PST double stack H Alpha telescope.

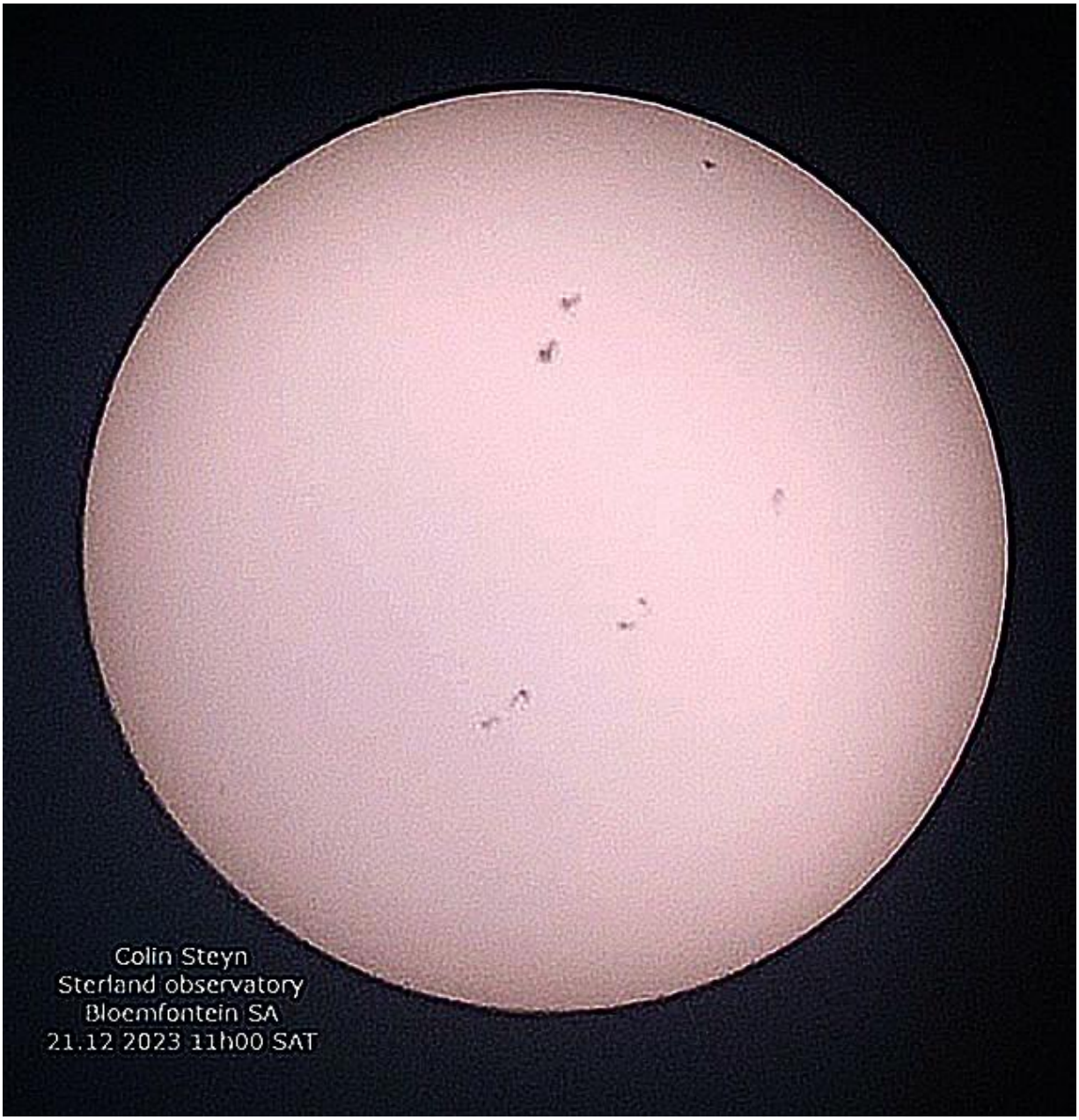
December. 2023	Counts	Observations	MDF
Prominance	89	17	5,2
Plage Areas	67	17	3,9
Filaments	99	17	5,8
Flares	3	17	0,2

- **Solar images**

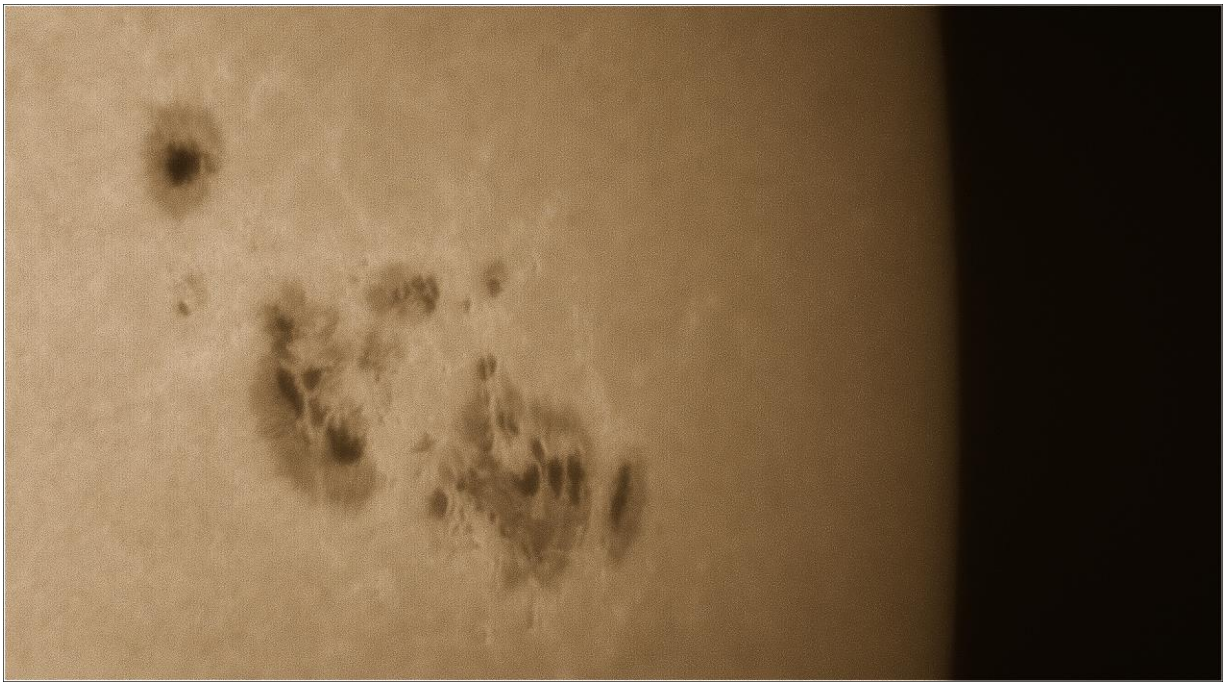
WHITE LIGHT



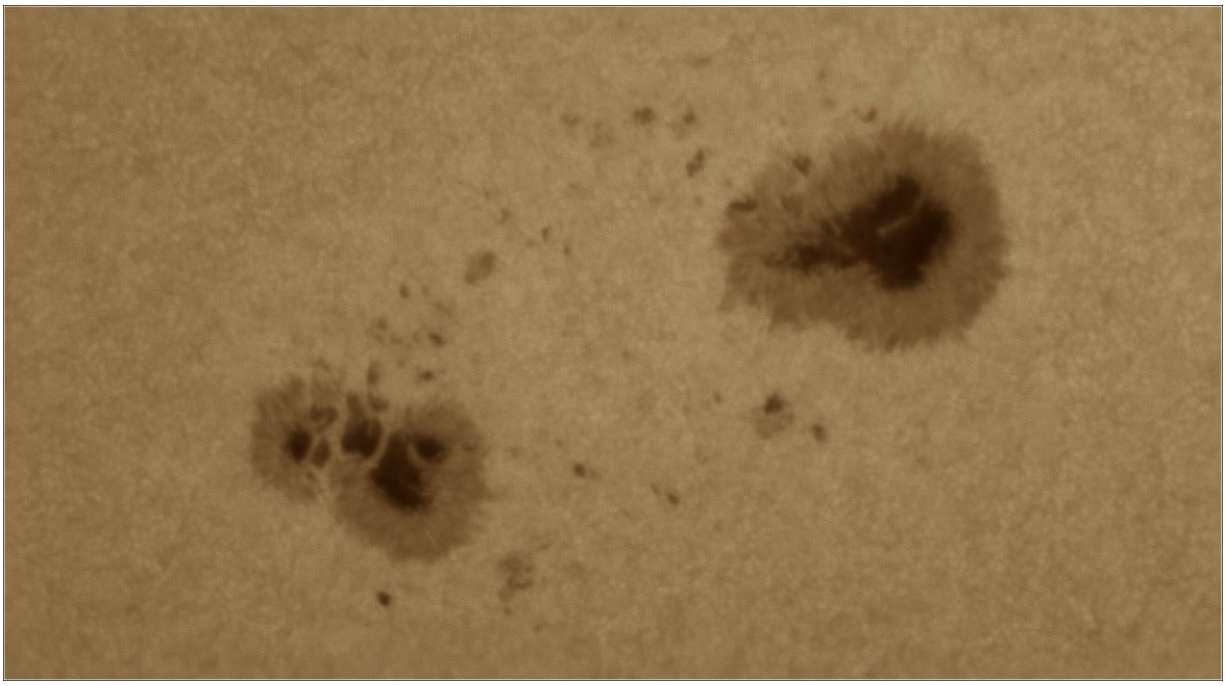
Jacques van Delft, ASSA Bloemfontein



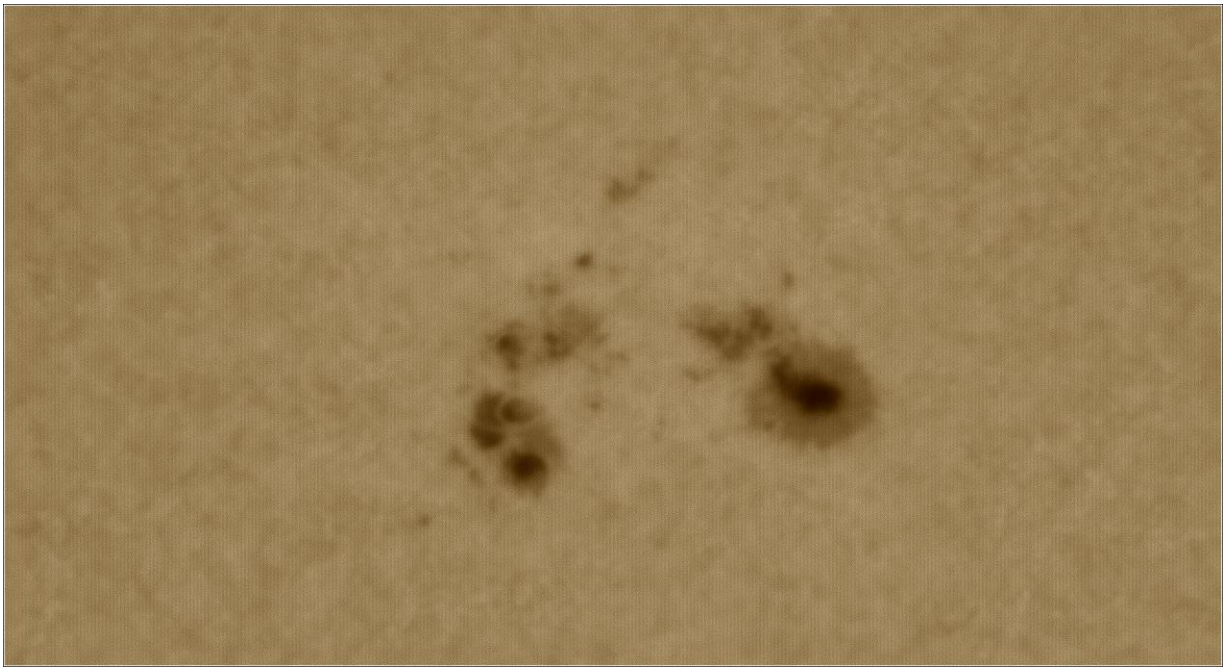
Colin Steyn, ASSA 21 December 2023. Sterland observatory Bloemfontein



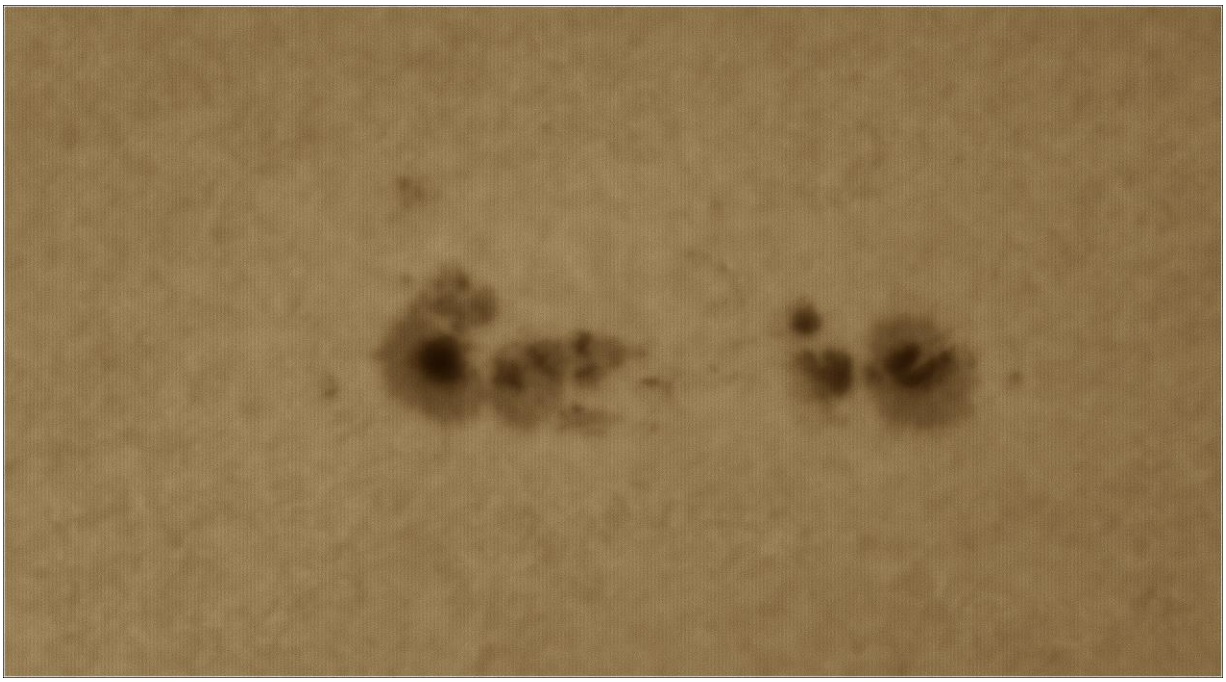
Andrew Devey, BAA/MSAS Spain. AR2520 and AR3514 Complex 2023-12-15 1200UT



Andrew Devey, BAA/MSAS Spain. 2023-12-21-1133UT AR3529

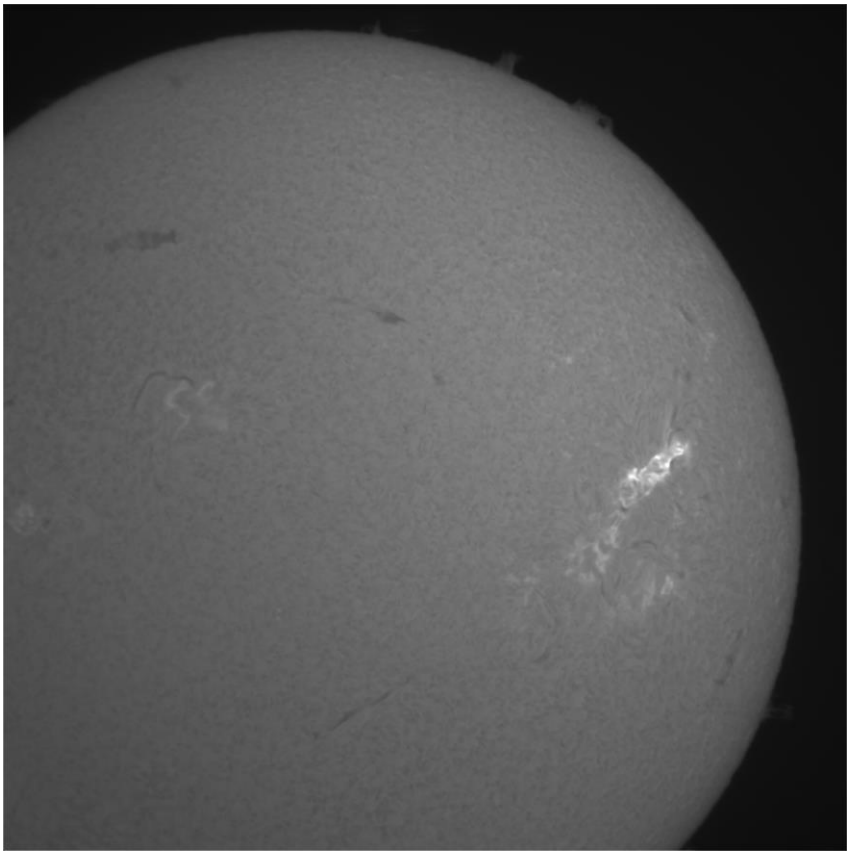


Andrew Devey, BAA/MSAS Spain. 2023-12-21-1159UT AR3521



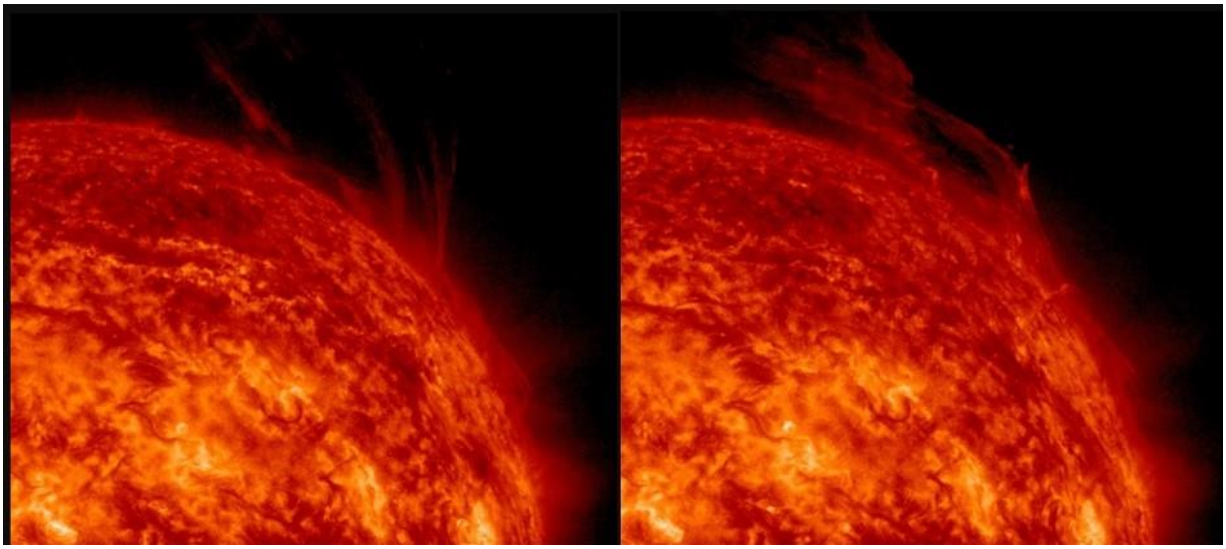
Andrew Devey, BAA/MSAS Spain. 2023-12-21-1200UT AR 3528

H-Alpha

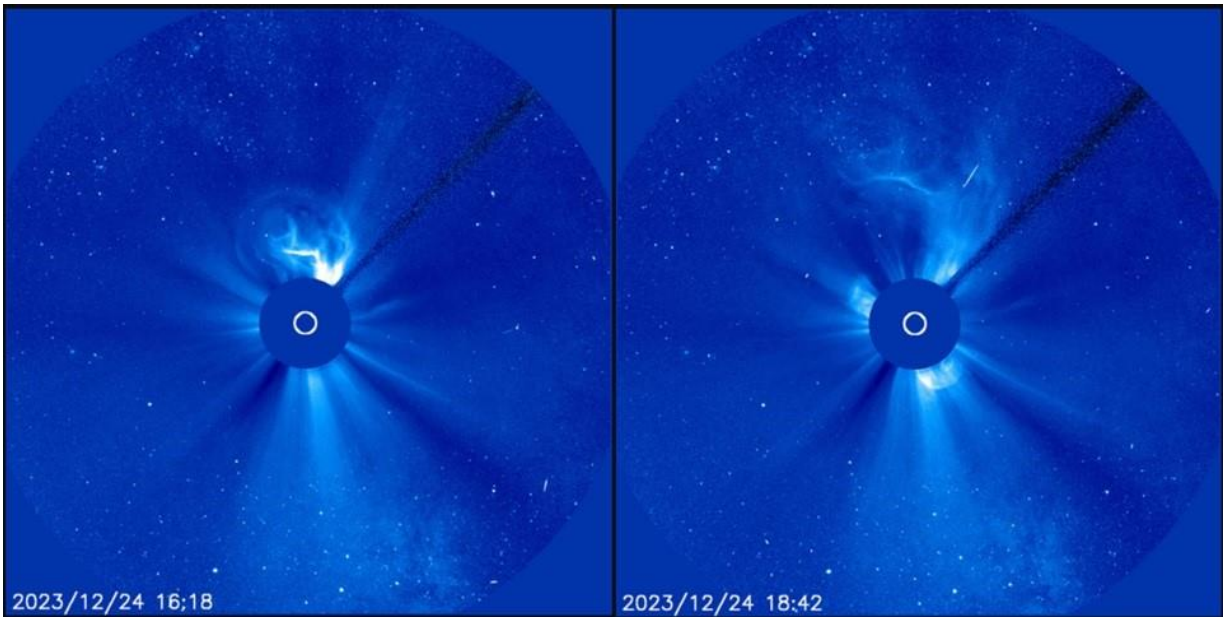


Andrew Devey, BAA/MSAS Spain. AR3514 M6 class flare.

EVENTS IN DECEMBER

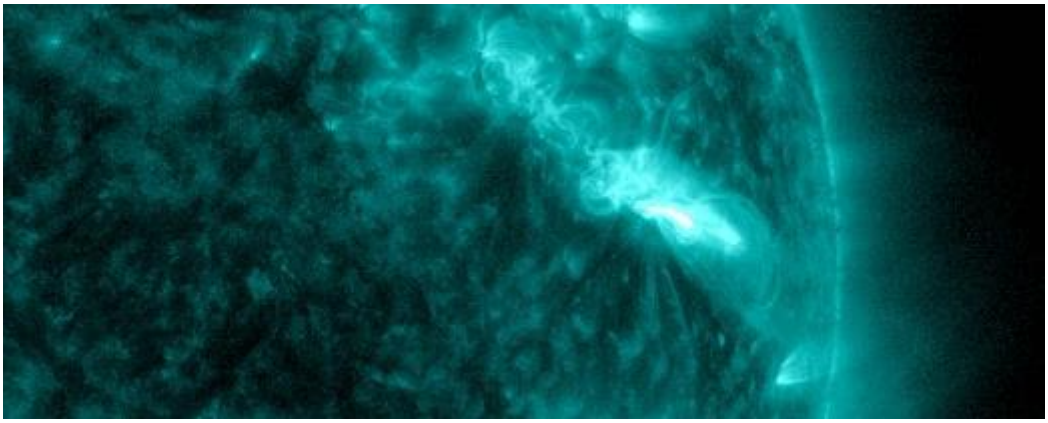


A filament eruption on 14 December 2023



CME from the Filament eruption on 14 December leaving the sun.
(Images from Spaceweather.com)

STRONGEST FLARE OF THE CURRENT SOLAR CYCLE: Sunspot 3514 erupted on Dec. 14th (1702 UT), producing a strong X2.8-class solar flare. This is the strongest flare of Solar Cycle 25 (so far) and the most powerful eruption the sun has produced since the great storms of Sept. 2017. NASA's Solar Dynamics Observatory recorded the extreme ultraviolet flash:



Radiation from the flare has caused a deep shortwave radio blackout over the Americas: blackout map. Ham radio operators may have noticed loss of signal at all frequencies below 30 MHz for more than 30 minutes after the flare.

It's too soon to know for sure, but this explosion probably launched a fast coronal mass ejection (CME) with an Earth-directed component. The US Air Force is reporting a Type II solar radio burst, which typically comes from the leading edge of a CME. Based on the drift rate of the radio burst, the emerging CME's velocity could exceed 2100 km/s (4.7 million mph).

(Credit: Spaceweather.com)

I would like to thank the contributors for their valuable inputs and wish all of you a Merry Christmas and a happy new year.

Clear Skies

Jacques van Delft

Solar Section ASSA