



SOLAR REPORTS: SOME UNDERSTANDING

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KE5HDF

Oct 2023

Solar-Terrestrial Data

05 Oct 2023 1629 GMT

SFI 155 SN 151

A 10 K 2

X-Ray C1.1

304A 157.4 @ SEM

Pf 2620 Ef 1680

Aurora 1/n=1.99

Bz 2.1 SW 425.9

HF Conditions

Band	Day	Night
30n-40n	Poor	Good
30n-20n	Fair	Good
17n-15n	Good	Good
12n-10n	Good	Poor

VHF Conditions

Aur Lat 67.5°
Aurora Band Closed
6n EsEU 50MHz ES
4n EsEU Band Closed
2n EsEU Band Closed
2n EsNA Band Closed
EME Deg Fair

Solar Flare Prb 60%



Geomag Field QUIET

Sig Noise Lvl S1-S2

MUF US Boulder 30.75

Current Solar Image



<http://www.n0nbh.com>

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By Ian Poole, G3YWX

Understanding Solar Indices

When someone tells you that the flux is up to 200 and the K is 3, do you know what they are talking about? You will after you read this article!

One of the key skills for any HF DXer is to know how to judge what band conditions may be like. Conditions may be excellent one day with many stations audible from all over the world, but a few days later it may be that only a few stations are audible. To be able to gain an idea about conditions, three main indices are used: solar flux, and the Ap and Kp indices. A good working knowledge of what these numbers represent and what they mean is an advantage even for the ham with most well-equipped station.

Synopsis

The ionosphere can be visualized as containing a number of layers. In fact, there is ionization throughout the ionosphere; the layers are really peaks in the levels of ionization, as we can see from Figure 1. The ionosphere affects radio waves because according to the level of



An ultra-close view of a sunspot taken by the NSO Sacramento Peak Vacuum Tower Telescope.

ionosphere is more capable of bending back radio signals to Earth. Also, high levels of ionization mean high maximum usable frequencies and better HF conditions.

The level of ionization at any given point above the Earth is dependent upon a number of factors including the time of day, the season and most important of all the sunspot cycle. It is found that the level of radiation from the Sun increases as the

number of sunspots increases. Accordingly, the level of radiation received from the Sun peaks around the top of the sunspot cycle. In fact, it is the bright area just around the sunspot called the *plage* that emits most of the extra radiation.

It is not all good news, though. At the sunspot peak the level of geomagnetic activity also rises. This happens as the Sun emits vast quantities of particles. There is normally a steady flow of these



LETS

LETS TAKE A CLOSER LOOK AT THAT ARTICLE!!

What are the numbers???

- Solar flux Index – a measure of the Sun's radiation on Earth at 10.7 cm (About 2800 Mhz)
- SN – sunspot number (sunspot number = $k(10G + s)$
where G is the number of groups, s is the number of individual spots (all of them, including the ones in groups), and k is some factor given to each observer based on how good their vision is.)
- A – a measure of geomagnetic activity (Ap is the planetary average)
- K – normalized logarithmic index based on A (Kp is planetary average)
- Bz – measure of the magnetic field in the solar wind
- MUF – Maximum Usable Frequency; highest frequency that will bounce off the Ionosphere

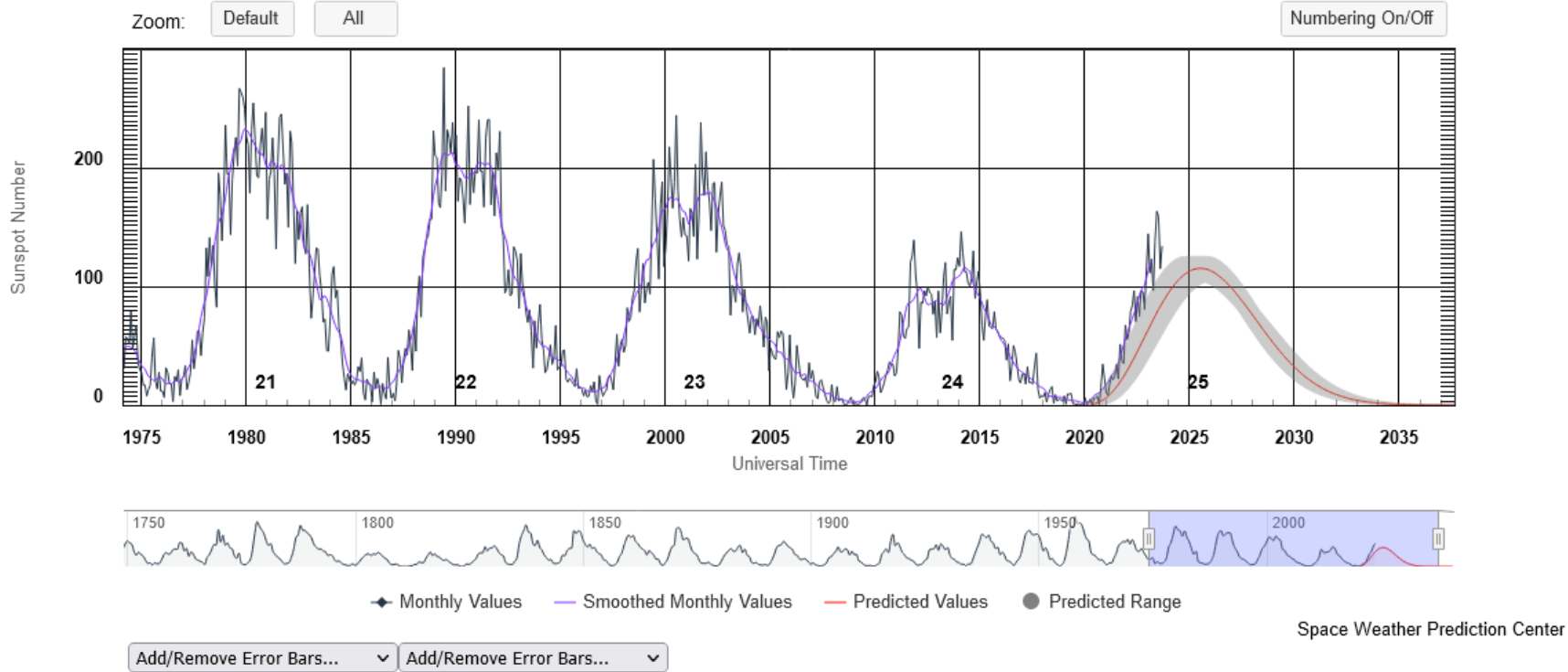
What are the numbers???

- X-RAY– maximum level of flare activity. C, M, X are the categories of flare; each one is measured in increments of 10 (C1.0 to C9.9, then M, etc)

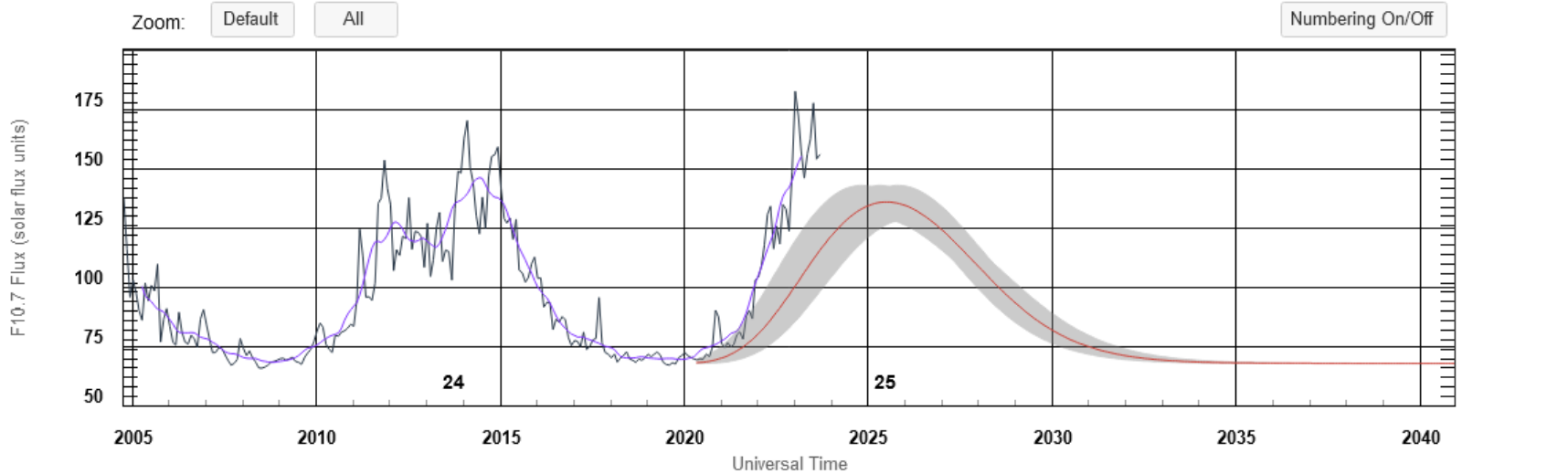
What do they mean??

- The Solar Flux is related to how much UV radiation hits the Earth. It varies with the solar cycle. More UV = more ionization of the upper atmosphere and the better radio waves bounce.
- One solar flux unit = 10^{-22} watt per square meter-hertz. Symbol, sfu. 1 sfu = 10,000 [jansky](#).
- A and K tell us how calm (or excited) the geomagnetic field is. A gives us a short term view while K is longer term. A moderate "A" is OK, but a high "K" tells us there is a lot of turbulence in the ionosphere. Turbulence disrupts radio propagation.
- High A and high K and $-B_z$ means a geomagnetic storm is underway. There could be a total loss of radio communication.

ISES Solar Cycle Sunspot Number Progression

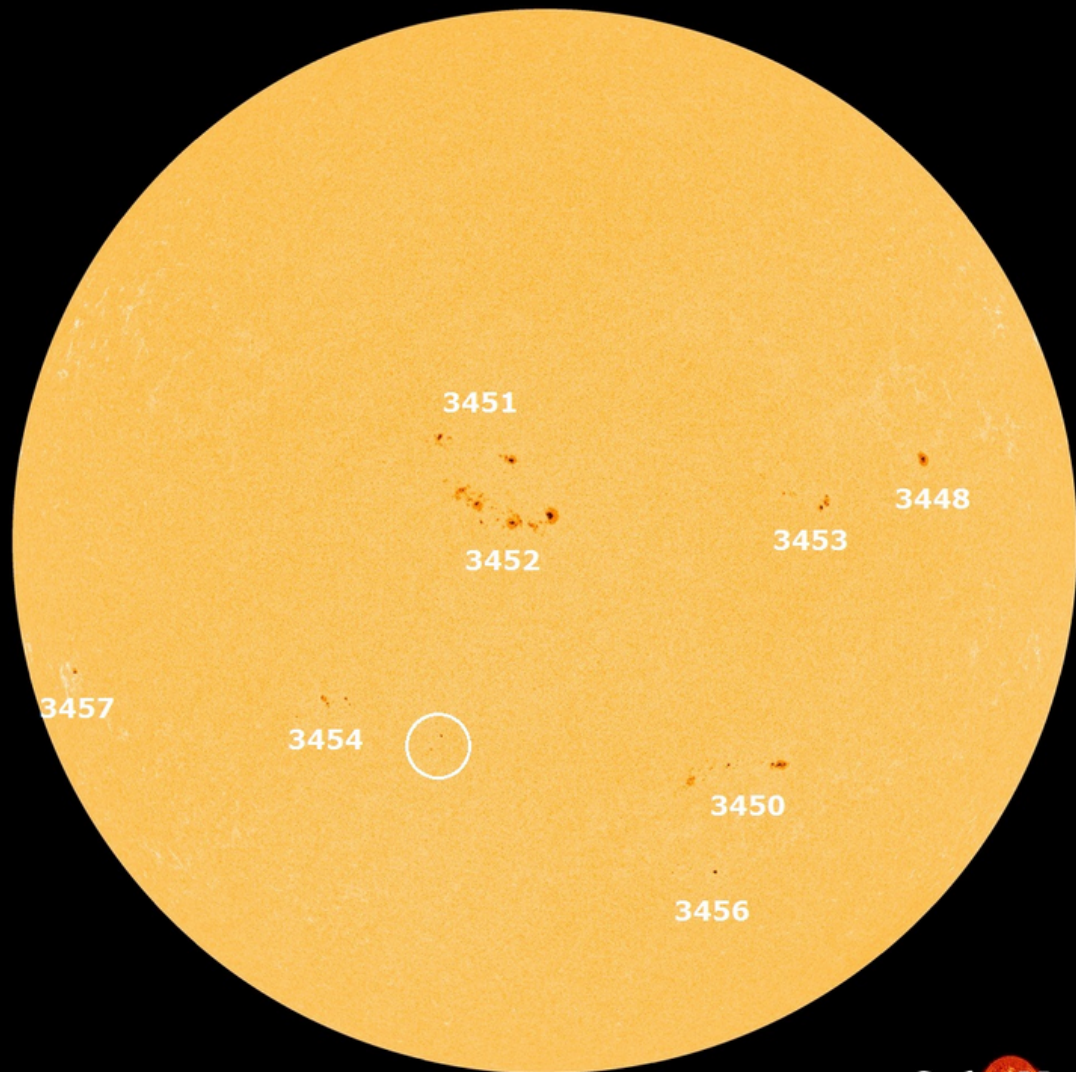


ISES Solar Cycle F10.7cm Radio Flux Progression



The Visible Solar Disk (Updated October 5, 2023)

Currently **8** active regions visible. The sunspot number count is **151** with a solar flux of **154**.



SDO/HMI Quick-Look Continuum: 20231005_001500

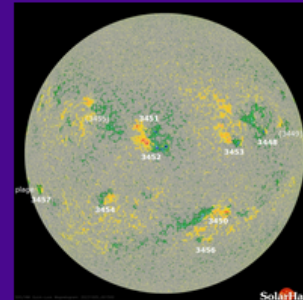
SolarHam

[Visible Sunspot Summary](#) | [Magnetogram](#) | [Coronal Holes](#)

Visible Disk Archive

Select Month:

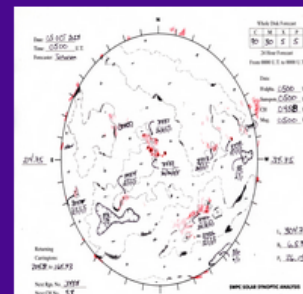
[One Year Ago Today](#)



Magnetogram



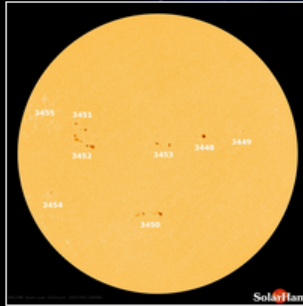
Intensity (Enhanced)



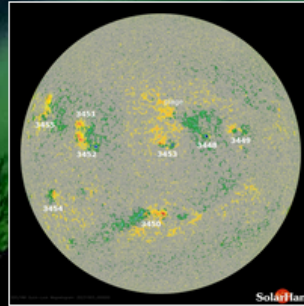
Synoptic Map (SWPC)

Space Weather for October 3, 2023

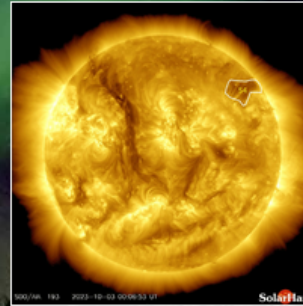
UTC Time 17:10:05 Thursday



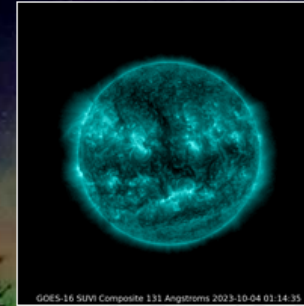
HMI Intensity
Latest | Movie | HARP



HMI Magnetogram
Latest | Movie



Coronal Holes
Analysis | Movie



AIA 131 (Latest)
Movie



SUVI 304 (Latest)
Movies

Latest Imagery: [SDO](#) | [AIA](#) | [GOES](#) | [GONG](#) | [STEREO](#) | [LASCO](#)

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[Real Time Solar Wind](#)

[Protons and Electrons](#)

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Solar Indices (Oct. 3 @ 21:05 UTC)

SFI	SSN	AREA
154	146	810
▼ 4	▲ 10	▲ 230

[WWV](#) | [Flux Data](#) | [Last 30 Days](#)

[Cycle 25 Progression](#)

Solar Flare Detection

Data provided by NOAA/SWPC

GOES-16 X-Ray Flux

[Click to expand data](#)

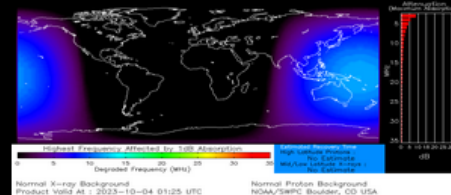


X-Rays
C1.8
Current
Solar Demon
Solar SOFT

3 Day Geomagnetic Forecast

Oct 3	Oct 4	Oct 5
3-4 (G0)	2-3 (G0)	3-4 (G0)
Max Kp		
M-Lat 15%	M-Lat 05%	M-Lat 15%
H-Lat 30%	H-Lat 20%	H-Lat 55%
Probabilities		

Global D-LAYER Absorption



Current Solar Flare Threat

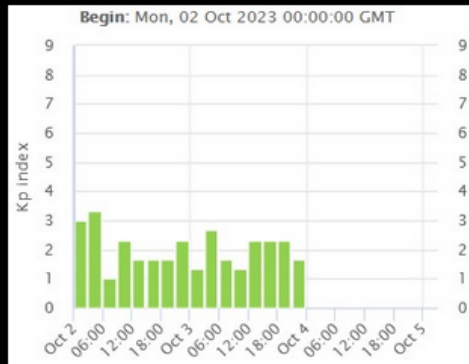
C-Flare: 99%	M-Flare: 40%
X-Flare: 05%	Proton: 05%

[Probability Details](#)

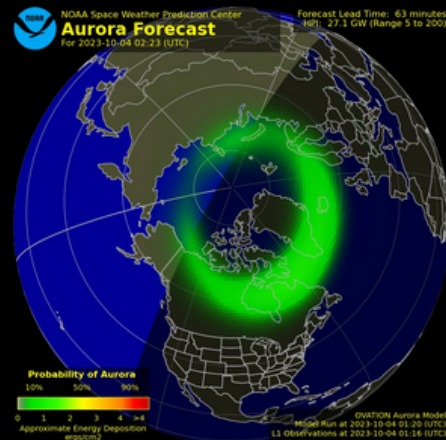
Flare Events (M2+) Past 48 Hours | [Event Report](#) | [Top Solar Flares](#)

Geomagnetic Field and Aurora

Past 24 Hours: **Unsettled**



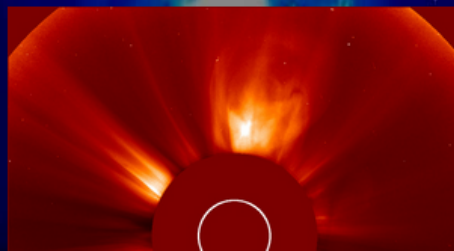
Kp-Index | [A-Indices](#) | [Magnetometers](#)



Auroral Oval Forecast | [South Pole](#)

CME Tracking

No CME Event(s) Logged



Visible Sunspot Regions | [Sunspot Summary](#) | [SRS \(txt\)](#)

3448 **3449** **3450** **3451** **3452** **3453** **3454** **3455**
A A BG B B B B B

Latest Space Weather News

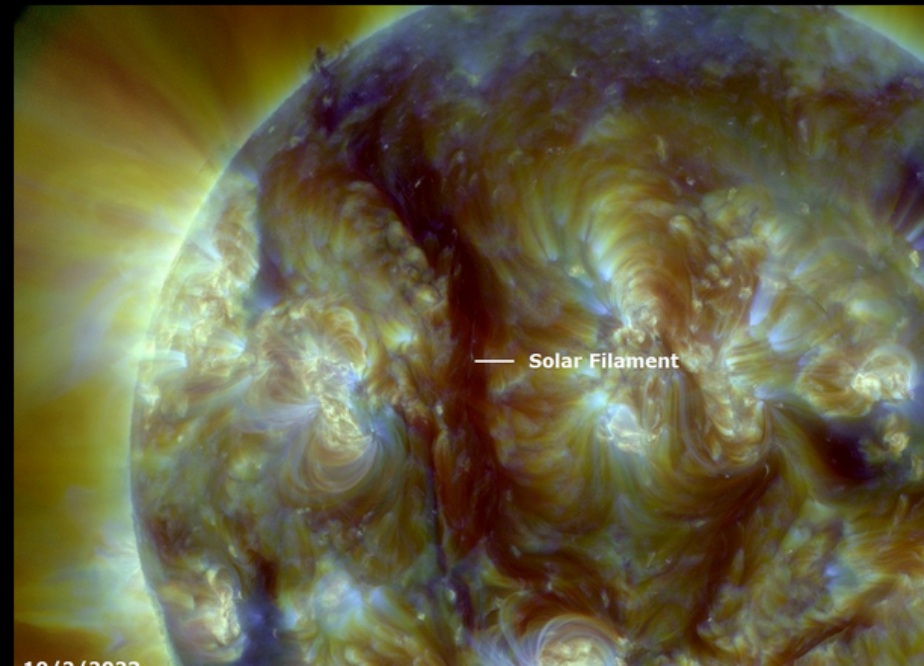
[SolarHam News Archive](#)

Large Filament Facing Earth

October 2, 2023 @ 19:20 UTC

Greetings. Solar activity so far on Monday has been at moderate levels. Newly assigned sunspot region 3455 in the northeast quadrant produced an M1.9 solar flare at 12:46 UTC (Oct 2). A number of sunspots on the disk also produced occasional C-Flares throughout the day.

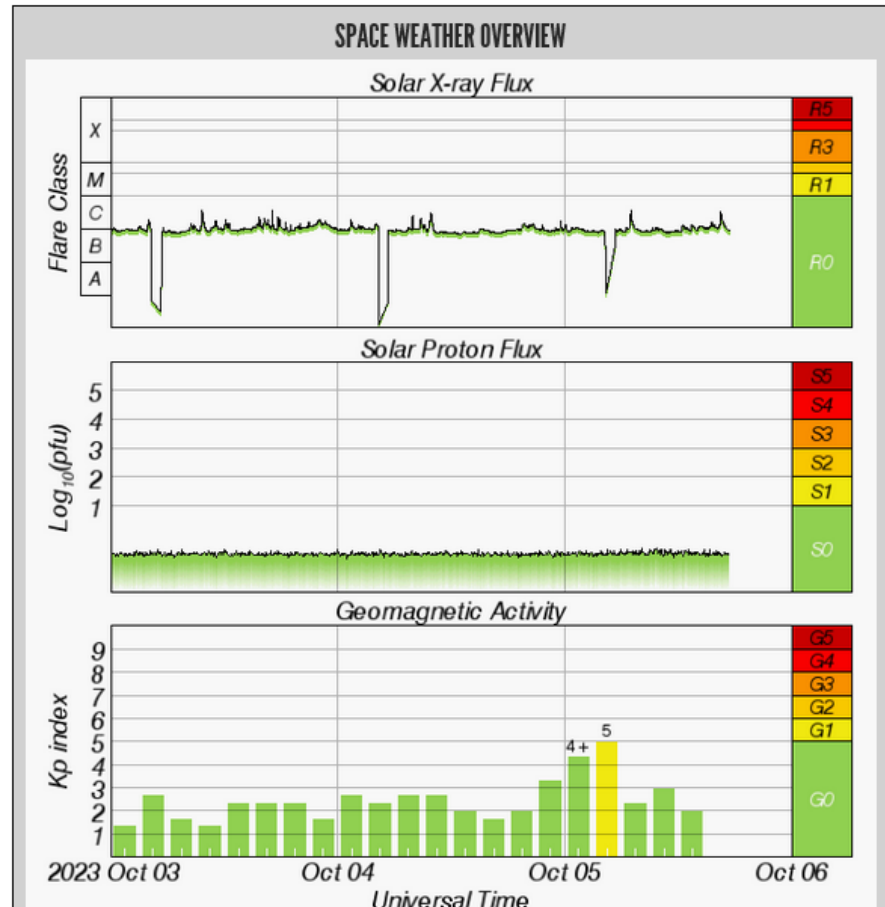
A very large filament stretching from the Sun's southern hemisphere into the northeast quadrant is currently front and center. It remains magnetically anchored in place for now, however should it collapse, a noteworthy coronal mass ejection would be very likely. I will monitor this very closely and provide any updates whenever necessary. Image below by SDO/HMI.





Solar Wind Speed: **465** km/sec Solar Wind Magnetic Fields: Bt **3** nT, Bz **1** nT Noon 10.7cm Radio Flux: **155** sfu

SPACE WEATHER ENTHUSIASTS DASHBOARD



:Product: 3-Day Forecast
 :Issued: 2023 Oct 05 1230 UTC
 # Prepared by the U.S. Dept. of Commerce, NOAA, Space Weather Prediction Center
 #
 A. NOAA Geomagnetic Activity Observation and Forecast

The greatest observed 3 hr Kp over the past 24 hours was 5 (NOAA Scale G1).
 The greatest expected 3 hr Kp for Oct 05-Oct 07 2023 is 5.00 (NOAA Scale G1).

NOAA Kp index breakdown Oct 05-Oct 07 2023

	Oct 05	Oct 06	Oct 07
00-03UT	4.33	3.67	3.33
03-06UT	5.00 (G1)	3.00	3.67
06-09UT	2.33	2.00	2.00
09-12UT	3.67	1.67	2.33
12-15UT	3.00	1.67	3.00
15-18UT	3.67	2.33	3.67
18-21UT	3.00	3.67	3.00
21-00UT	2.67	2.67	3.00

Rationale: There is a chance for an isolated G1 (Minor) storming period on 07 Oct with weak, glancing effects from the 02 Sep CME event.

B. NOAA Solar Radiation Activity Observation and Forecast

Solar radiation, as observed by NOAA GOES-16 over the past 24 hours, was below S-scale storm level thresholds.

Solar Radiation Storm Forecast for Oct 05-Oct 07 2023

	Oct 05	Oct 06	Oct 07
S1 or greater	5%	5%	5%

Rationale: No S1 (Minor) or greater solar radiation storms are expected. No significant active region activity favorable for radiation storm

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Space Weather for a Modern World

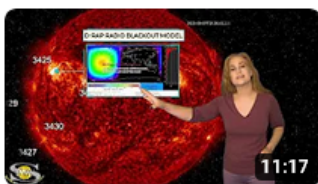
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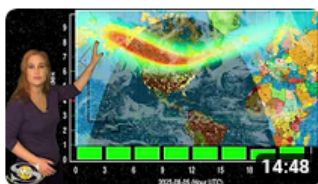
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- Article –Understanding Solar Indices
- <https://www.arri.org/files/file/Technology/tis/info/pdf/0209038.pdf>
- Solar Cycle Progress
- <https://www.swpc.noaa.gov/products/solar-cycle-progression>
- Current Solar Activity
- <https://www.solarham.net/>
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- Space Weather Conditions and Forecast
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