

# **SOLAR WEATHER**

## **6 JUN 2023**

Lewis Thompson  
W5IFQ

Taken by Brandon  
Brown on May 19,  
2023 @ Northeast of  
Kenora, Ontario,  
Canada



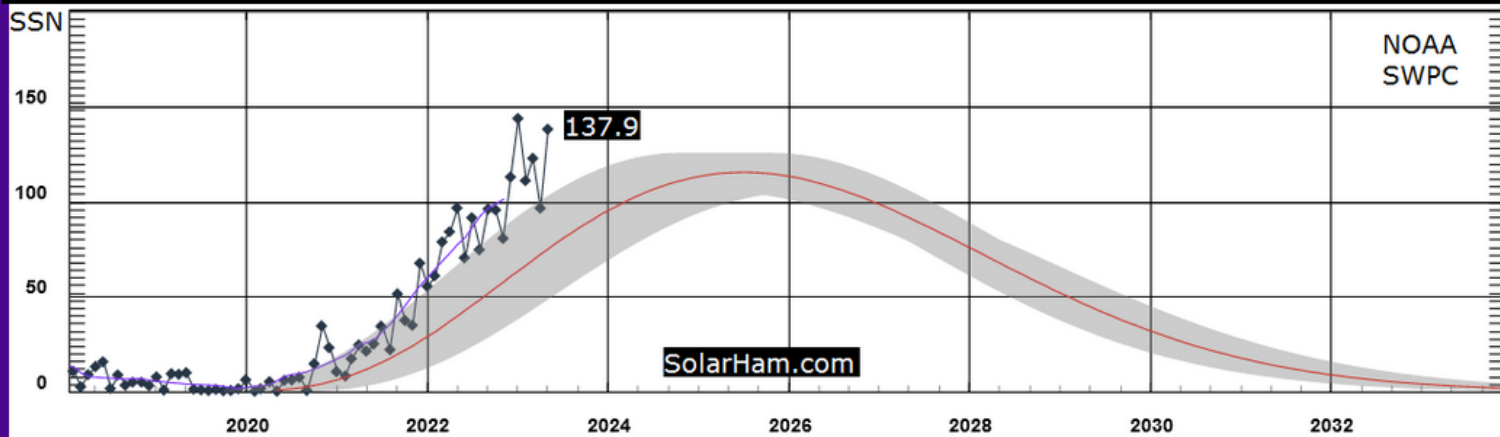
Tak  
Oct

# Solar Cycle 25 Progression

(Updated June 3, 2023)

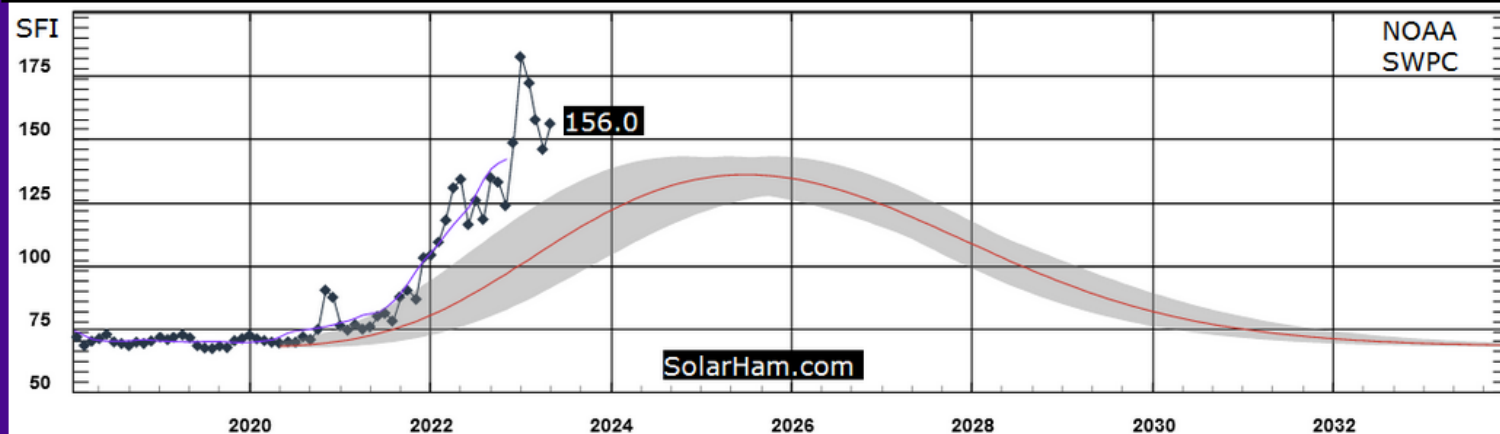
## Sunspot Number Progression (May 2023)

**Predicted SSN: 74.9**    **Actual: 137.9**    Latest **Smoothed Predicted SSN (11/2022): 57.4**    **Actual: 101.0**



## 10.7cm Solar Flux Progression (May 2023)

**Predicted SFI: 107.9**    **Actual: 156.0**    Latest **Smoothed Predicted SFI (11/2022): 96.5**    **Actual: 141.9**



# Present Conditions and Forecast



### Solar Indices (June 6 @ 00:35 UTC)

SFI	SSN	AREA
169	151	990
▲ 1	▲ 41	▲ 60

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

Cycle 25 Progression

### 3 Day Geomagnetic Forecast

June 6	June 7	June 8
2-3 (G0)	2 (G0)	3-4 (G0)
<i>Max Kp</i>		
M-Lat 01%	M-Lat 01%	M-Lat 05%
H-Lat 15%	H-Lat 15%	H-Lat 25%
<i>Probabilities</i>		

Detailed Forecast

### Solar Flare Detection

Data provided by NOAA/SWPC GOES-16 X-Ray Flux [Click to expand data](#)

[X-Rays](#)  
**C1.3**  
 Current  
[Solar Demon](#)  
[Solar SOFT](#)

Radio Blackout Level  
R5  
R3  
R1  
R0

#### Global D-LAYER Absorption

#### Current Solar Flare Threat

C-Flare: 99%	M-Flare: 30%
X-Flare: 10%	Proton: 10%

[Probability Details](#)

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

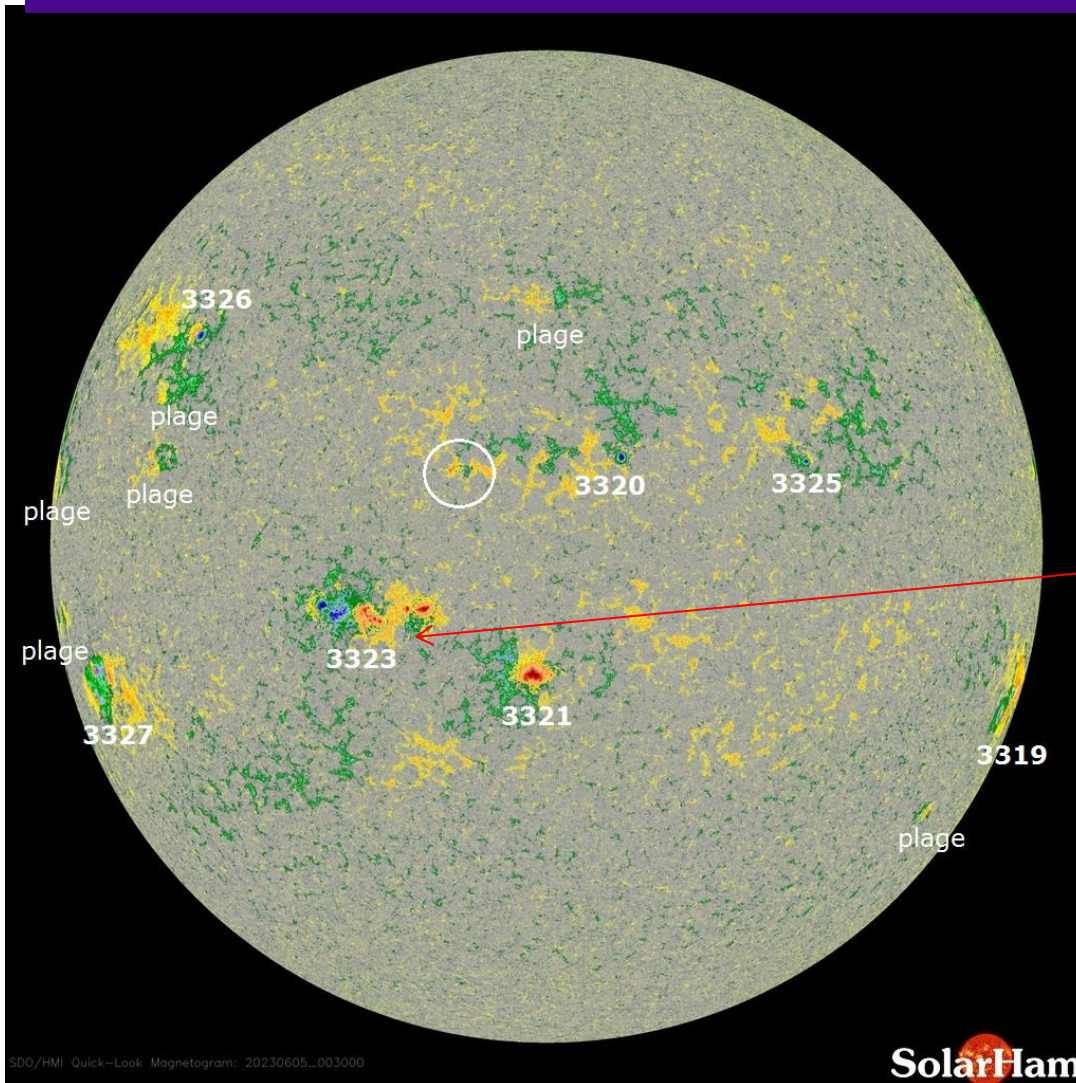
No Noteworthy Events Detected.

### Visible Sunspot Regions | Sunspot Summary | SRS (txt)

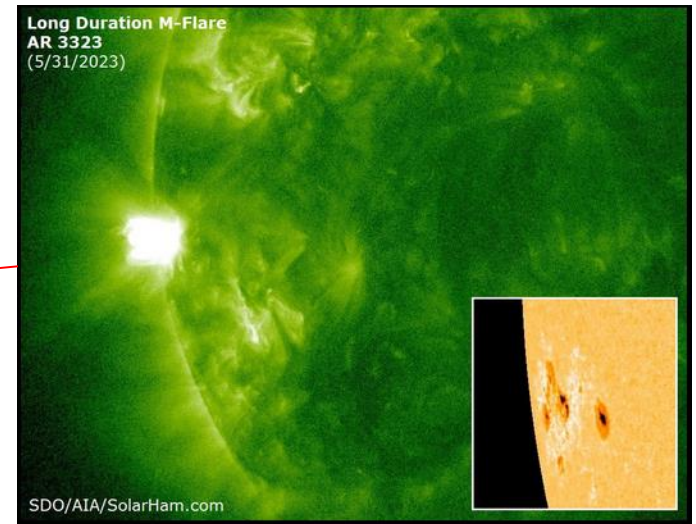
3320	3321	3323	3325	3326	3327
B	A	BG	A	A	B

# Solar Flare Activity

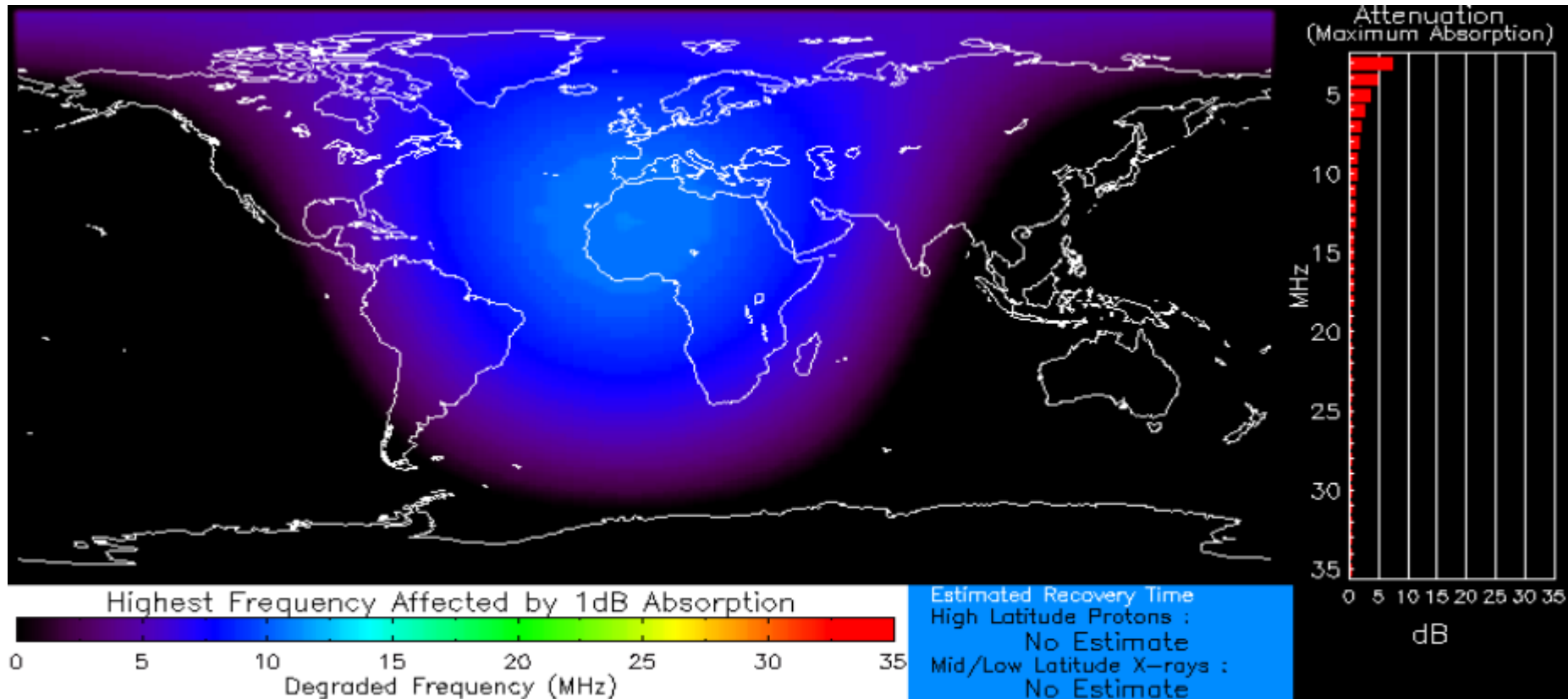
**Magnetogram Image** (Updated June 6, 2023)



Uses Zeeman effect to measure polarity of magnetic fields



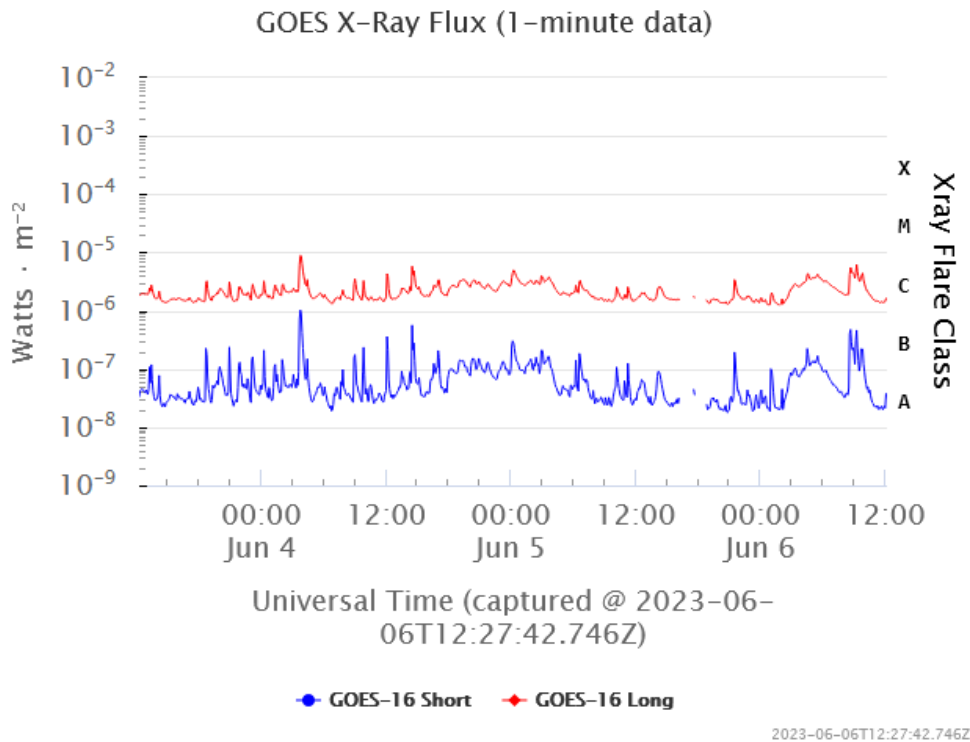
# NOAA – Unusual D-Region Absorption Patterns



Normal X-ray Background  
Product Valid At : 2023-06-06 12:22 UTC

Normal Proton Background  
NOAA/SWPC Boulder, CO USA

# Solar X-Ray Flux: 4 – 6 JUN 2023



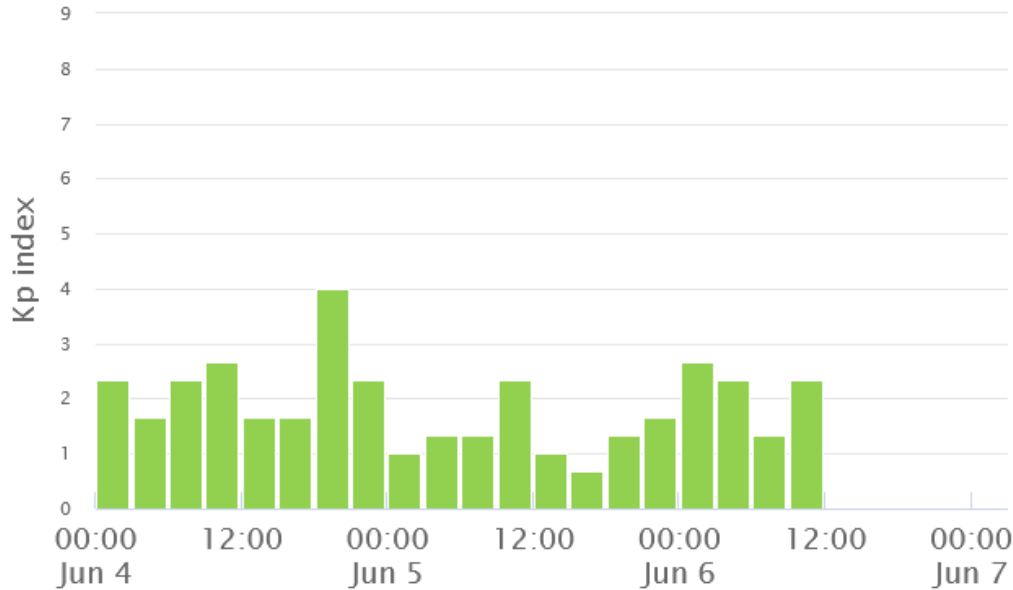
The X-ray radiation that ionizes the D-layer is the 1.0 - 8.0 Å (red) plot. These measurements currently taken from the [GOES 16](#) satellite.

Flare Category	Effect
A1-B9	No or minor impact on HF
C1	Low absorption of HF signals
M1	Occasional loss of radio contact on sun-lit side
M5	Limited HF blackout for several minutes
X1	Wide area HF blackout for approx. 1 hr
X10	HF blackout over most of sun-lit side for 1-2 hrs
X20	Complete HF blackout of all sun-lit areas lasting hours

# Earth's Geomagnetic Activity

Estimated Planetary K index (3 hour data)

Begin: Sun, 04 Jun 2023 00:00:00 GMT



Universal Time (captured @ 2023-06-06T12:27:42.654Z)

Generally, as planetary K-Index rises, critical frequency is suppressed.

K-Index	Effect
0-2	Inactive/Quiet, no impact on HF
3-4	Unsettled/Active, minor HF fade in higher latitudes
5-6	HF fade at higher latitudes
7-8	HF sporadic
9	HF impossible above 40M

# Geomagnetic Conditions: 6 JUN 2023

Solar wind:

$B_z = 1 \text{ nT}$

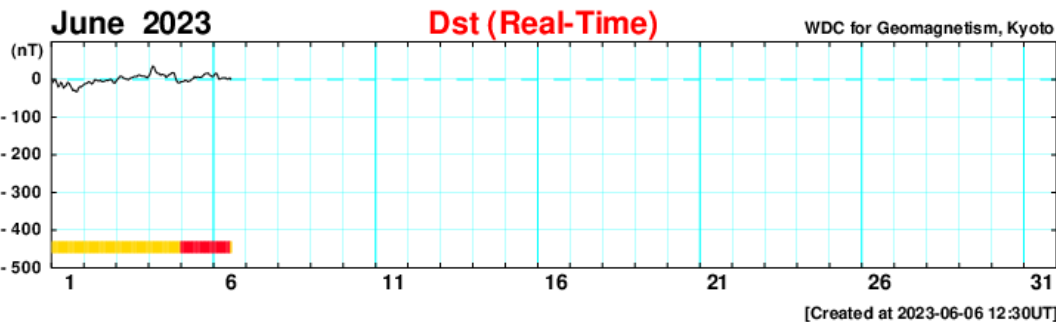
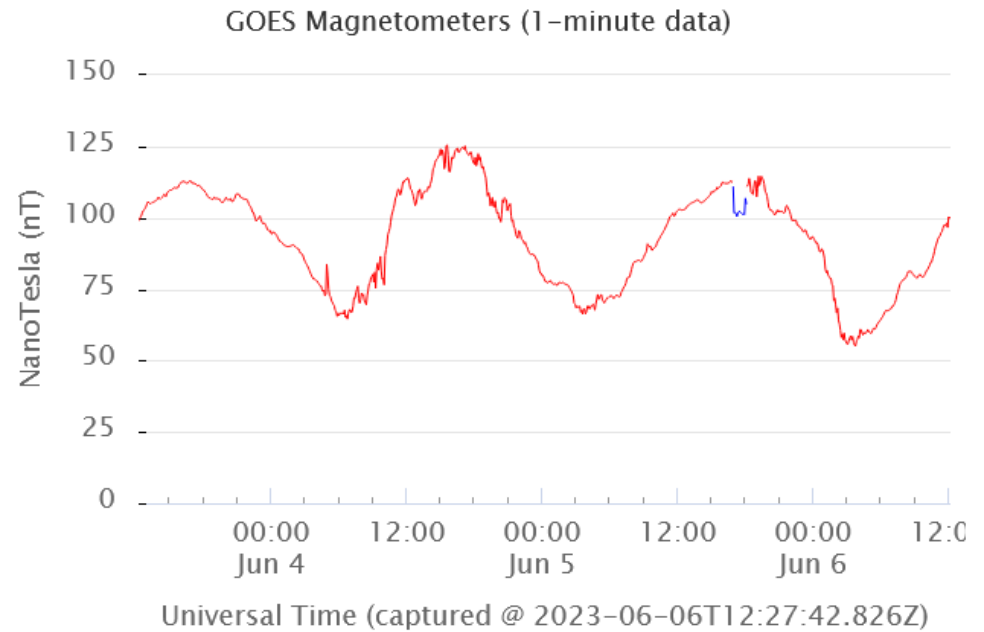
speed = 395 km/sec

density = 2.7 protons/cm<sup>3</sup>

(From – NOAA DSCOVR  
In L1, Lagrange Point)

Dst = 4 nT (Ring Field)

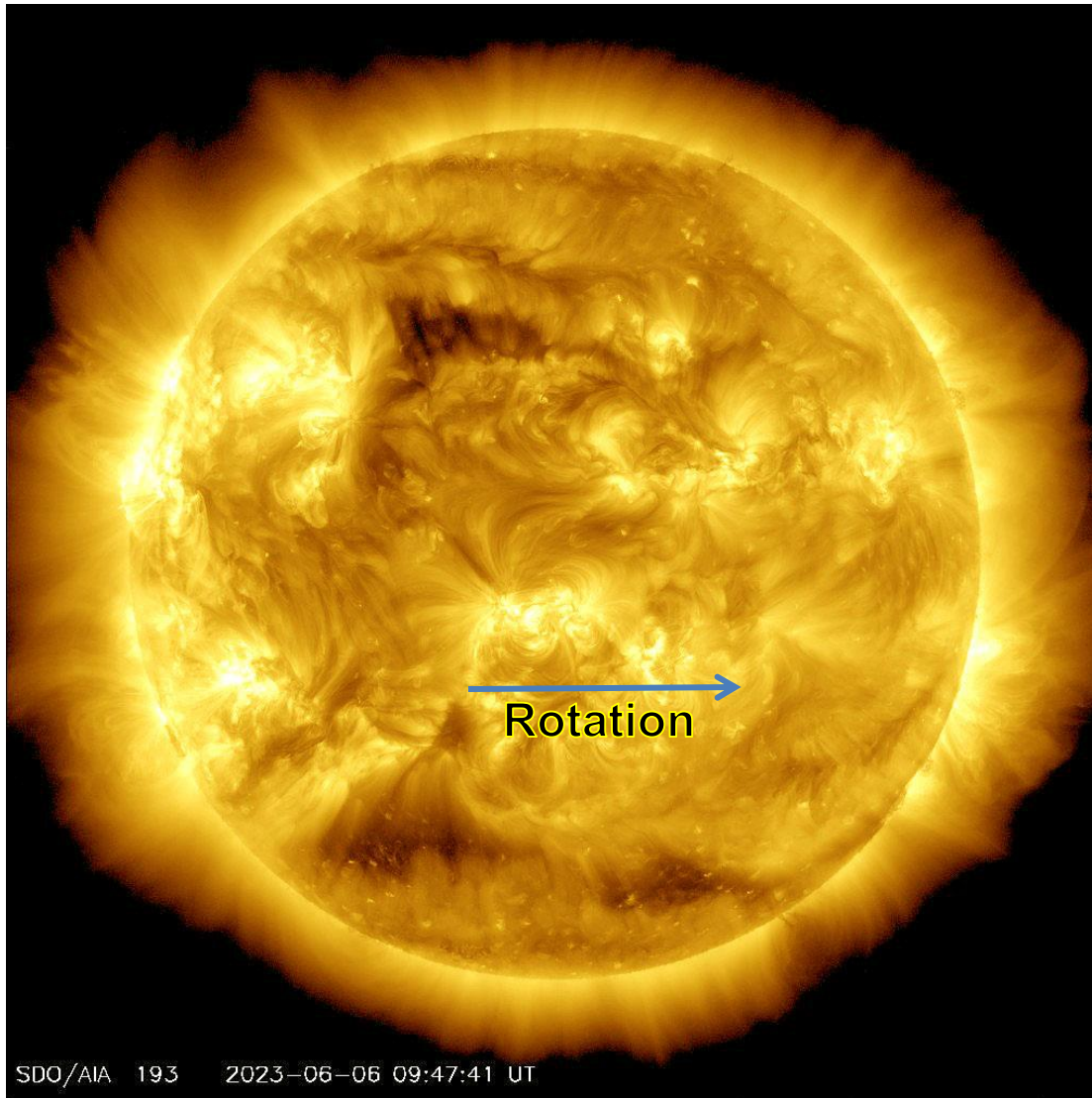
(From – Data Analysis Center  
For Geomagnetism and Space  
Magnetism – Kyoto University)



From – GOES 16  
In geostationary orbit



# Coronal Holes – 6 JUN 2023



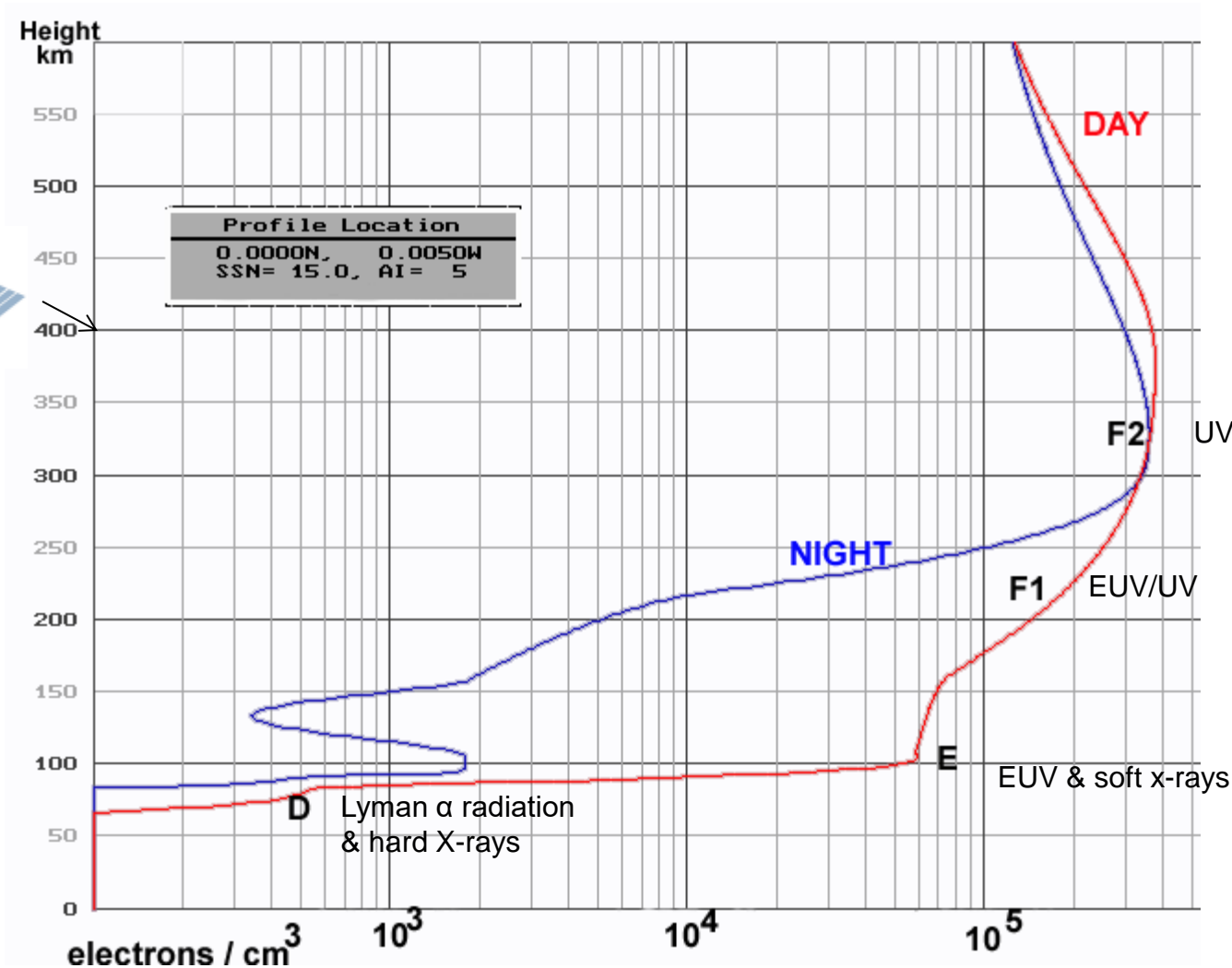
## Analysis

There are currently no large coronal holes facing Earth.

# Ionospheric Conditions



Gravity  
↓



# Austin Ionosonde – 6 JUN 1325Z (0825 CDT)



Statio YYYY DAY DDD HHMMSS P1 FFS S AXII PPS IGA PS  
 Austin 2023 Jun06 157 132505 MMM 1 045 100 32+ A1

foF2 7.300  
 foF1 N/A  
 foF1p N/A  
 foE 2.62  
 foEp 2.80  
 fxI 8.20  
 foEs 3.90  
 fmin 1.20

---

MUF(D) 20.68  
 M(D) 2.83  
 D 3000.0

---

h`F 257.0  
 h`F2 N/A  
 h`E 85.0  
 h`Es 125.0

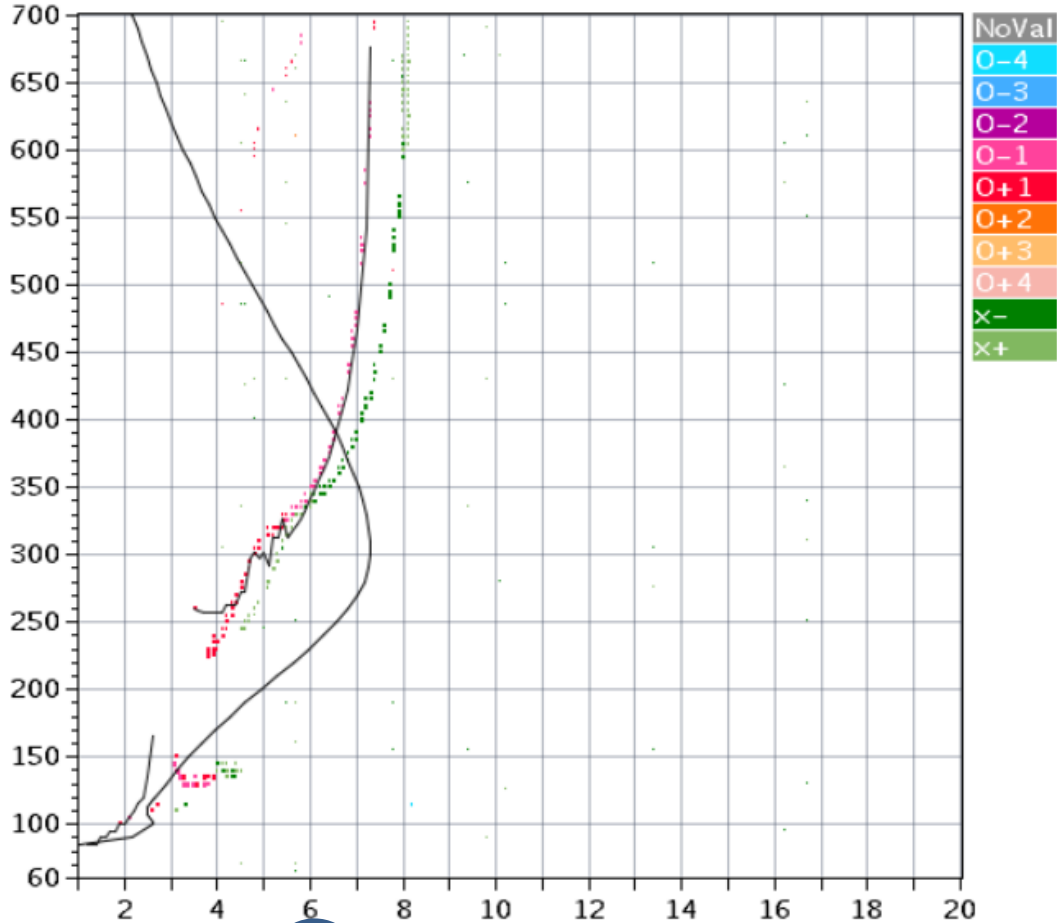
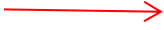
---

hmF2 303.1  
 hmF1 N/A  
 hmE 101.2  
 yF2 130.9  
 yF1 N/A  
 yE 19.7  
 B0 141.2  
 B1 2.00

---

C-level 11

Auto:  
 Artist4.5  
 200311

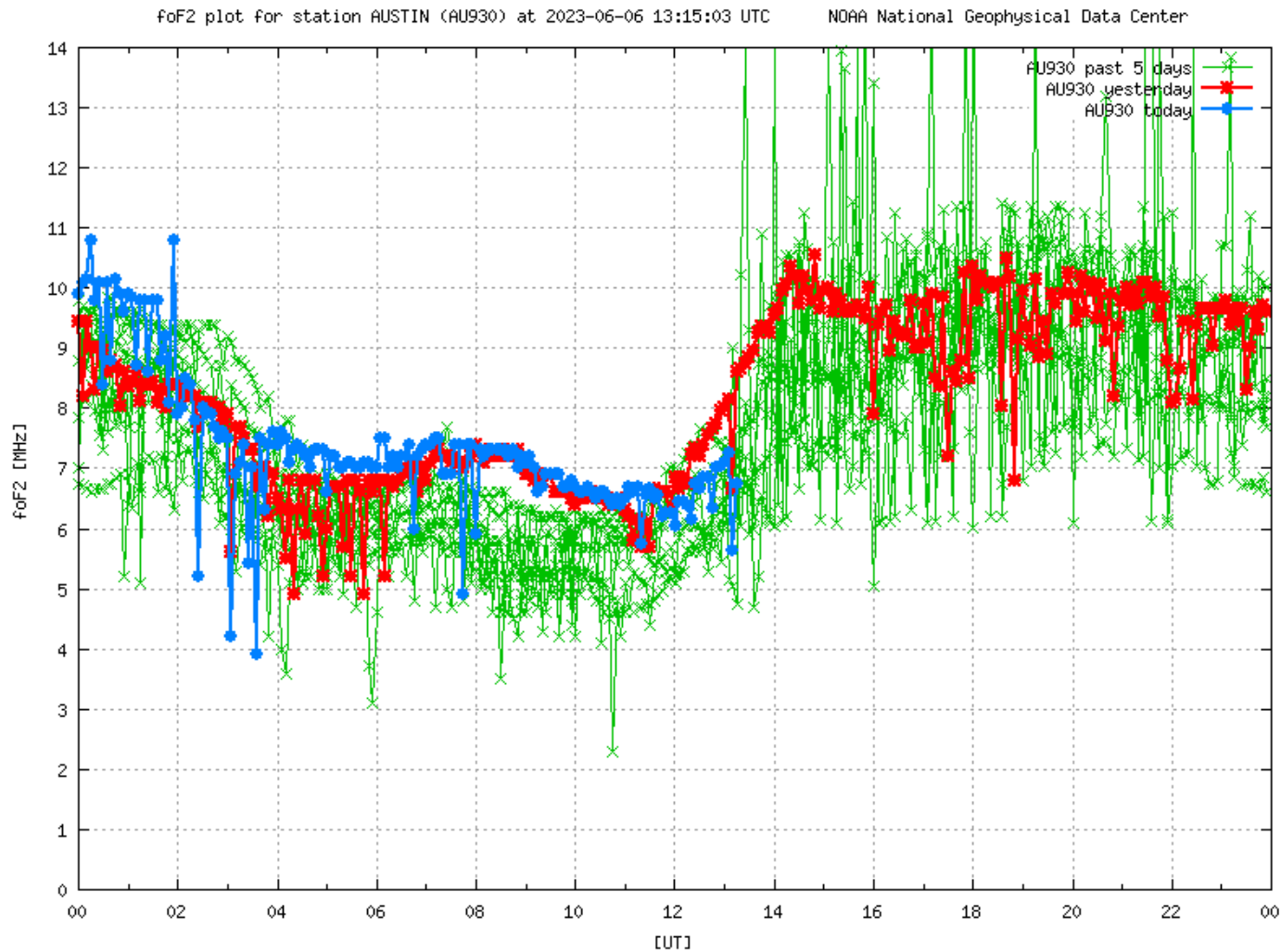


D 100 200 400 600 800 1000 1500 3000 [km]  
 MUF 7.9 8.0 8.3 8.7 9.4 10.4 13.8 20.7 [MHz]

AUS930\_2023157132505.MMM / 190fx128h 100 kHz 5.0 km / DGS-256 AUS930 130 / 30.4 N 262.3 E IonCPng v. 1.3.11

# foF2 Trend – Austin Ionosonde

This is a graph of real-time data from the Austin, TX ionosonde in comparison with historic data from the same site. Updated every 15 minutes



# Austin Ionosonde Trending Chart Errors

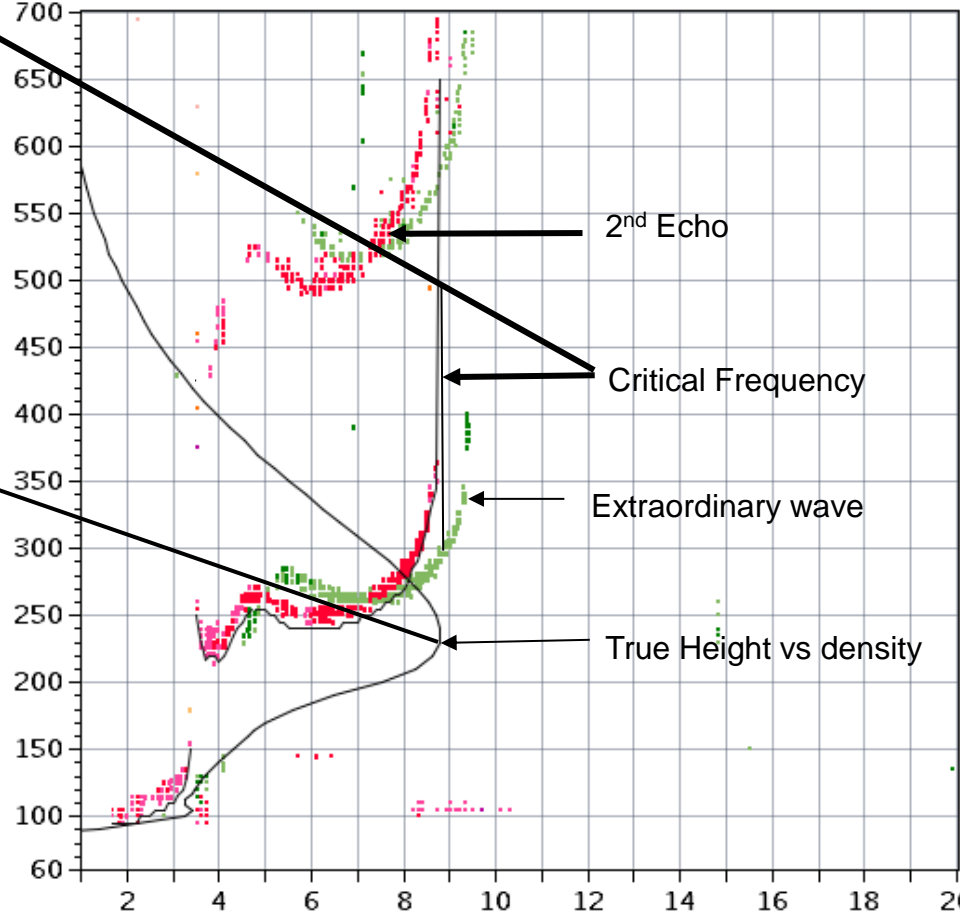
- The large variation of FoF2 (spiking) in the afternoon is due to curve fitting errors in the ionosonde software. The curve fitting error causes the critical frequency, foF2, to be incorrectly calculated.
- To obtain the correct critical frequency, look at the Austin Ionogram plot. The correct foF2, is the frequency where the red plot disappears off the graph at the top. See next slide.

# Ionogram Interpretation



Statio YYYY DAY DDD HHMMSS P1 FFS S AXN PPS IGA PS  
 Austin 2013 Jan03 003 185505 MMM 1 045 100 32+ A1

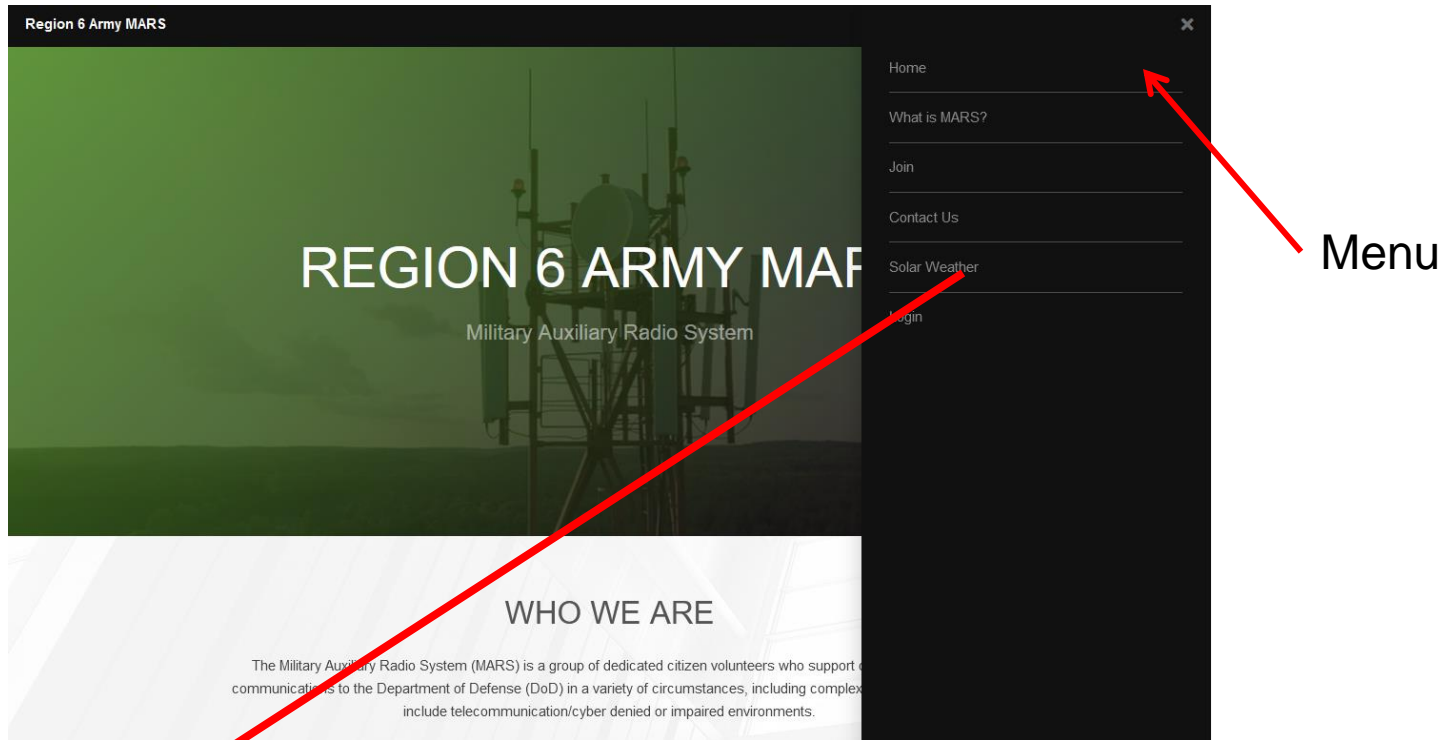
foF2	8.804
foF1	4.75
foF1p	4.62
foE	3.42
foEp	3.29
fxI	9.50
foEs	3.40
fmin	1.70
<hr/>	
MUF(D)	31.04
M(D)	3.53
D	3000.0
<hr/>	
h`F	215.0
h`F2	240.0
h`E	95.0
h`Es	95.0
<hr/>	
hmF2	235.5
hmF1	164.4
hmE	105.0
yF2	69.0
yF1	35.4
yE	16.2
B0	70.6
B1	2.28
<hr/>	
C-level	11
<hr/>	
Auto:	
Artist4	
200207	



NoVal  
 O-4  
 O-3  
 O-2  
 O-1  
 O+1  
 O+2  
 O+3  
 O+4  
 x-  
 x+

D 100 200 400 600 800 1000 1500 3000 [km] ← Oblique propagation MUF Chart  
 MUF 9.4 9.5 10.0 10.8 12.0 13.7 18.5 31.0 [MHz] i.e. 31 MHz to 3000 km

# Solar Weather Data



Solar Weather

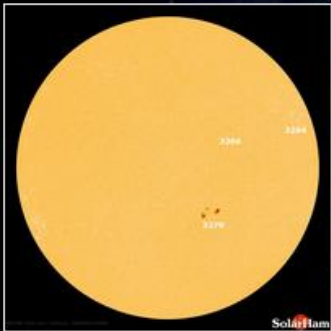
## Other Solar Weather Links of Interest

All Ionosondes

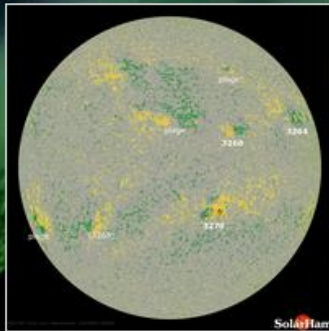
- • [DIDBase](#) - Select Station List then EGLIN then year/month/day/time for Ionosonde plot.
- [NOAA Solar Weather](#) - Solar Weather plots of Kp and X-Ray and other solar emissions.
- [Solen Solar Weather](#) - Good general solar forecast from an individual.
- [Solar Ham](#) - SolarHam provides real time solar news, as well as consolidated data from various sources.

## Space Weather for April 4, 2023

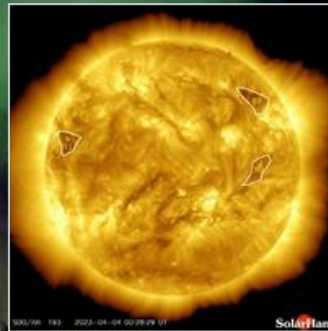
UTC Time 13:17:34 Tuesday



**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-16](#) | [GONG](#) | [STEREO](#) | [LASCO](#)

Video: [SDO](#) | [SOHO](#) | [STEREO](#) | [Helioviewer](#) | [YouTube](#)

[Solar Report](#)

[Space Weather Alerts](#) >

[Real Time Solar Wind](#)

[Protons and Electrons](#)

[Satellite Environment](#) >

### Solar Indices (Apr. 4 @ 00:35 UTC)

SFI	SSN	AREA
134	56	420
▲ 7	▲ 2	▲ 210

[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](#)





<https://www.spaceweather.com/>

## Current Conditions

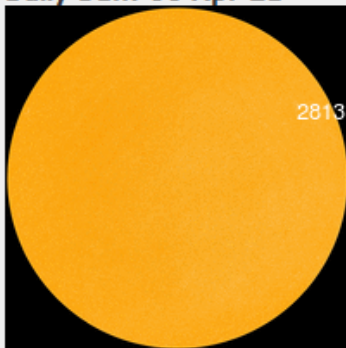
### Solar wind

speed: **314.8** km/sec  
density: **9.9** protons/cm<sup>3</sup>  
more data: [ACE](#), [DSCOVR](#)  
Updated: Today at 1225 UT

### X-ray Solar Flares

6-hr max: **A1** 1027 UT Apr06  
24-hr: **A1** 1515 UT Apr05  
[explanation](#) | [more data](#)  
Updated: Today at: 1230 UT

### Daily Sun: 06 Apr 21



Sunspot AR2813 is decaying, and poses no threat for strong flares.  
Credit: SDO/HMI

**FLYING TO THE VOLCANO:** Iceland's Geldingadalur volcano has turned into an popular tourist attraction—especially since auroras were sighted [above the glowing lava](#). Early this morning, Tuesday, April 6th, Brian Emfinger saw auroras before he even reached the Reykjanes peninsula:



# QUESTIONS?

Lewis Thompson

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