

# SOLAR WEATHER

## 1 AUG 2023

Lewis Thompson  
W5IFQ



Taken by Catalin  
Tapardel on July 25,  
2023 @ Municipal  
District of  
Opportunity No 17,  
Alberta, Canada,

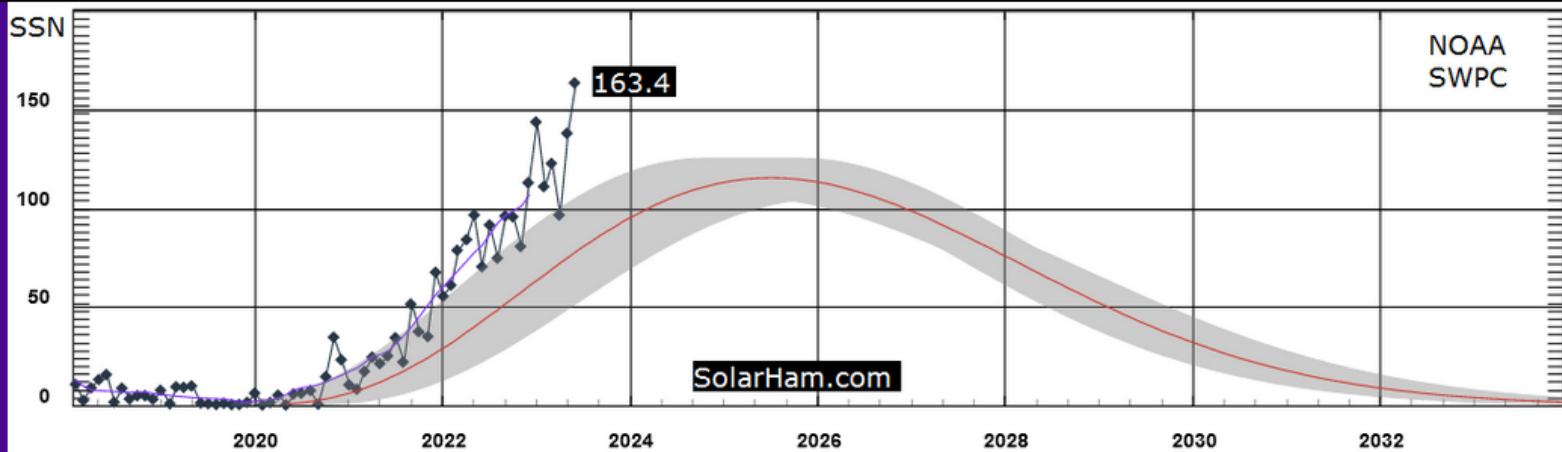
Alaska

# Solar Cycle 25 Progression

(Updated July 4, 2023)

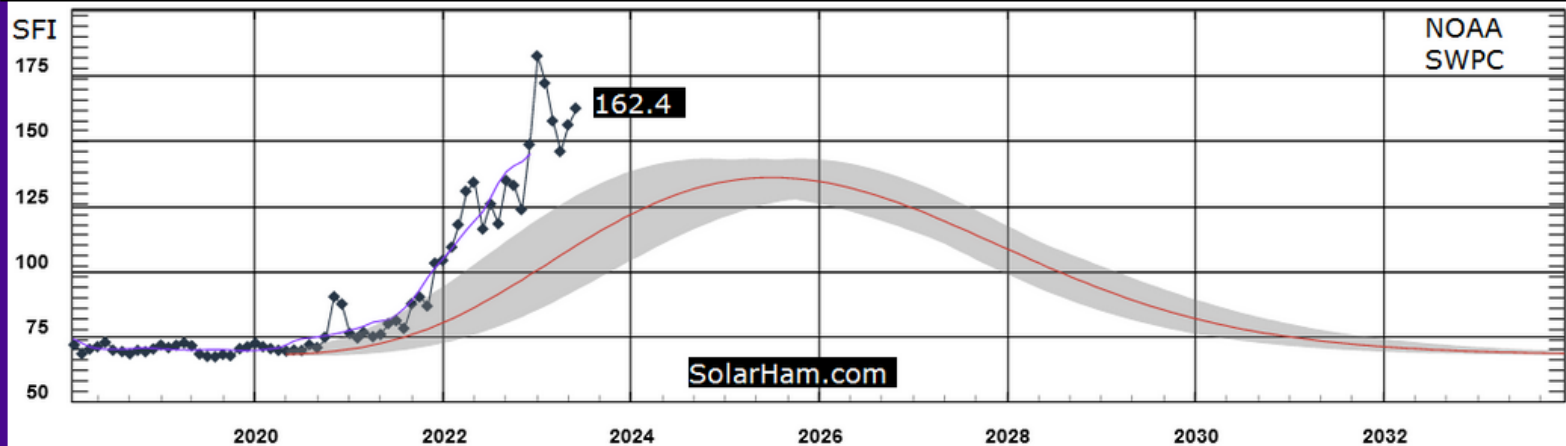
## Sunspot Number Progression (June 2023)

**Predicted SSN: 77.9**    **Actual: 163.4**    Latest **Smoothed Predicted SSN (12/2022): 60.6**    **Actual: 106.6**



## 10.7cm Solar Flux Progression (June 2023)

**Predicted SFI: 109.9**    **Actual: 162.4**    Latest **Smoothed Predicted SFI (12/2022): 98.6**    **Actual: 144.8**



# Present Conditions and Forecast



### Solar Indices (August 1 @ 00:35 UTC)

SFI	SSN	AREA
177	186	1280
▲ 3	▲ 47	▲ 270

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

Cycle 25 Progression

### 3 Day Geomagnetic Forecast

Aug 1	Aug 2	Aug 3
5 (G1)	4-5 (G1)	3 (G0)
<i>Max Kp</i>		
M-Lat 30%	M-Lat 25%	M-Lat 05%
H-Lat 60%	H-Lat 45%	H-Lat 20%
<i>Probabilities</i>		

Detailed Forecast

### Solar Flare Detection

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

**X-Rays**  
**C5.3**  
 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: 55%
X-Flare: 10%	Proton: 10%

Probability Details

### Flare Events (M2+) Past 48 Hours

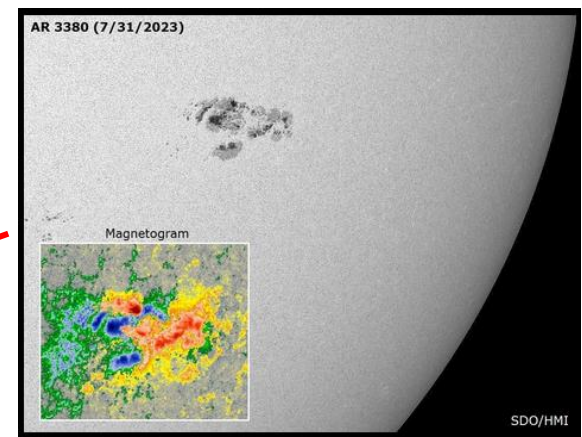
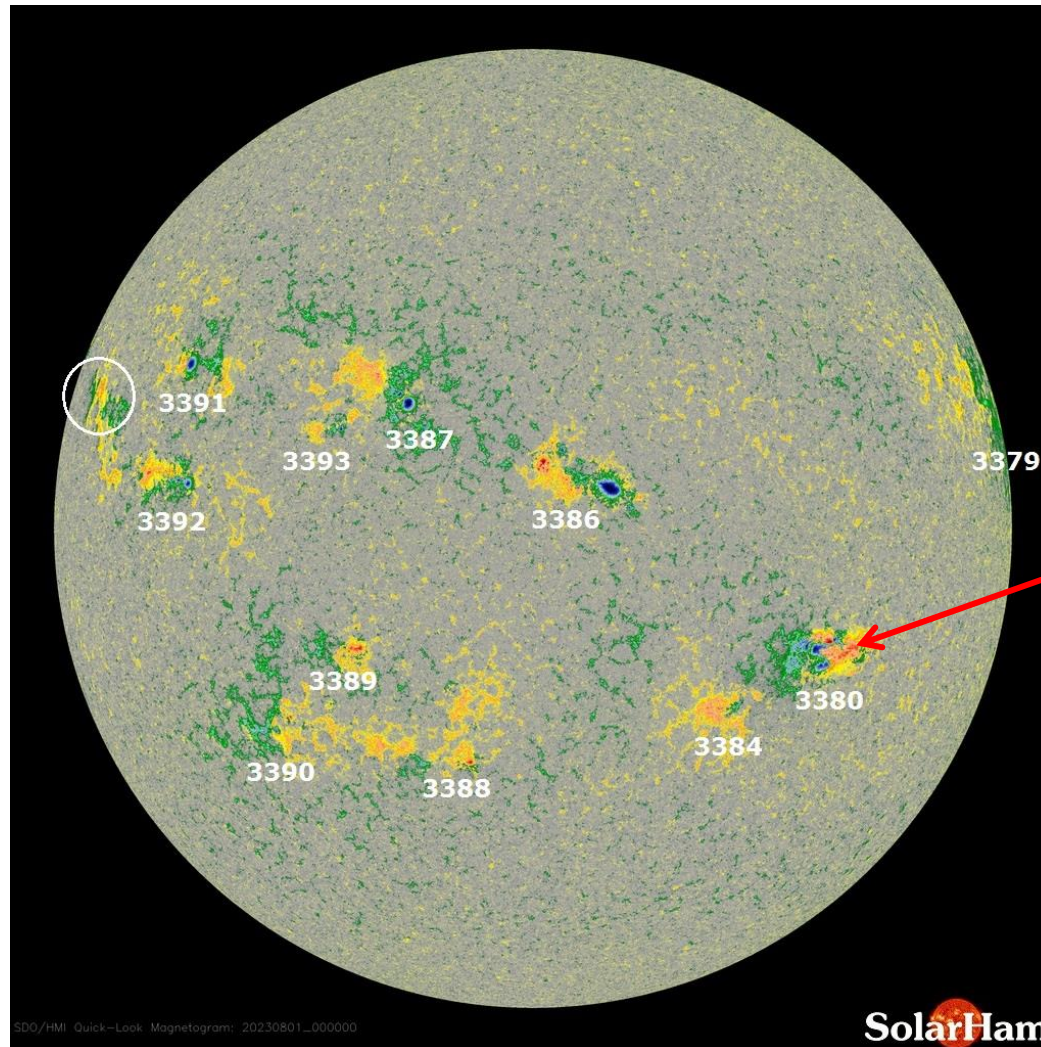
M2.2	M3.6
3380	3380

[Event Report](#) | [Top Solar Flares](#)

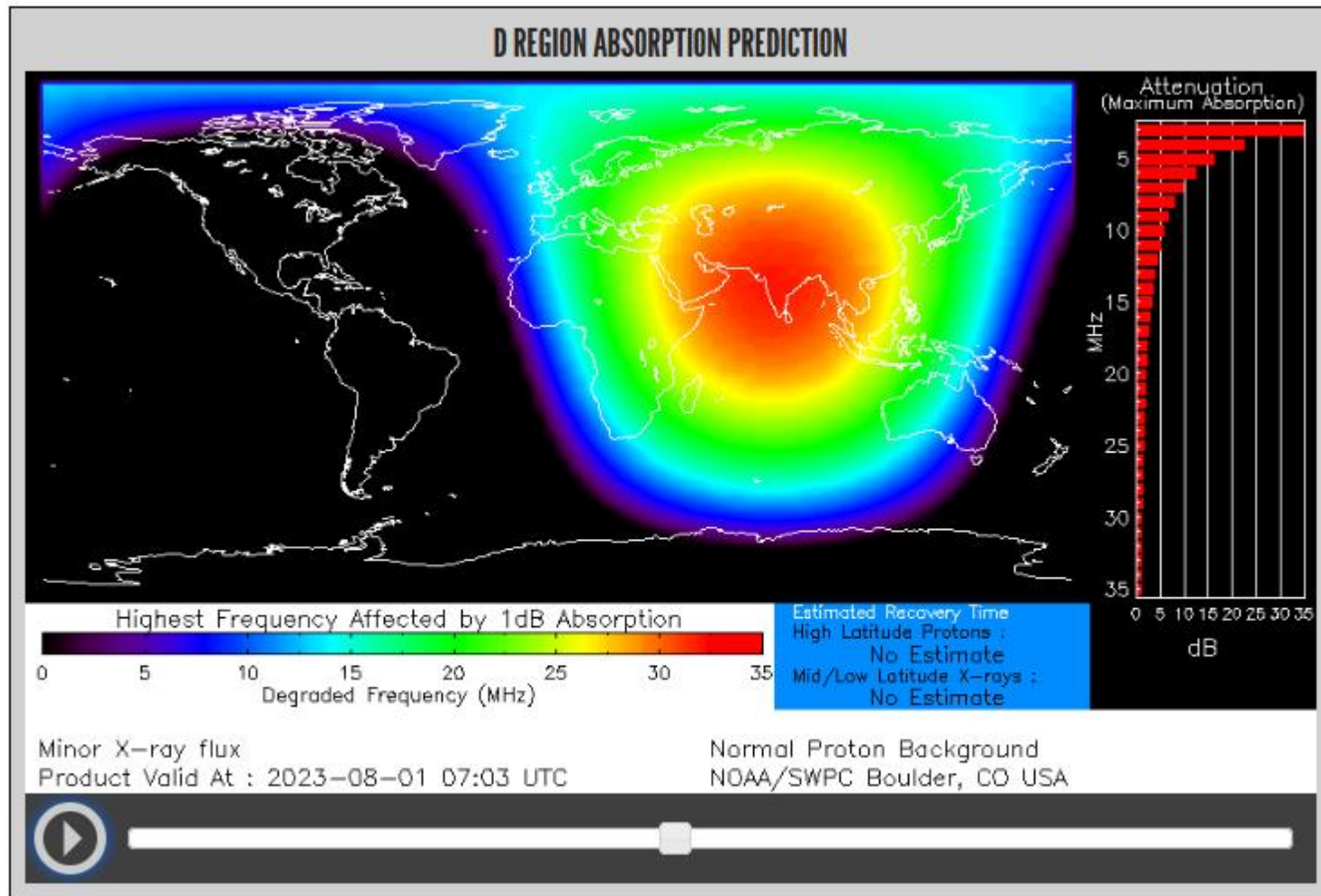
# Solar Flare Activity

Magnetogram Image (Updated August 1, 2023)

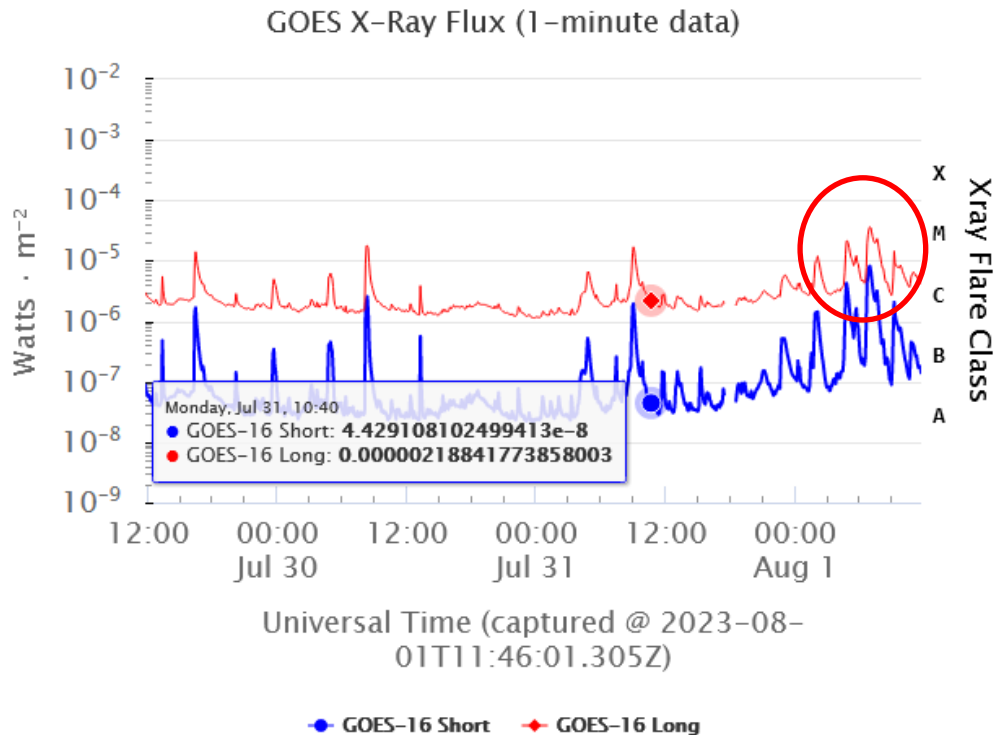
Uses Zeeman effect to measure polarity of magnetic fields



# NOAA – Unusual D-Region Absorption Patterns



# Solar X-Ray Flux: 30 JUL – 1 AUG 2023



2023-08-01T11:46:01.305Z

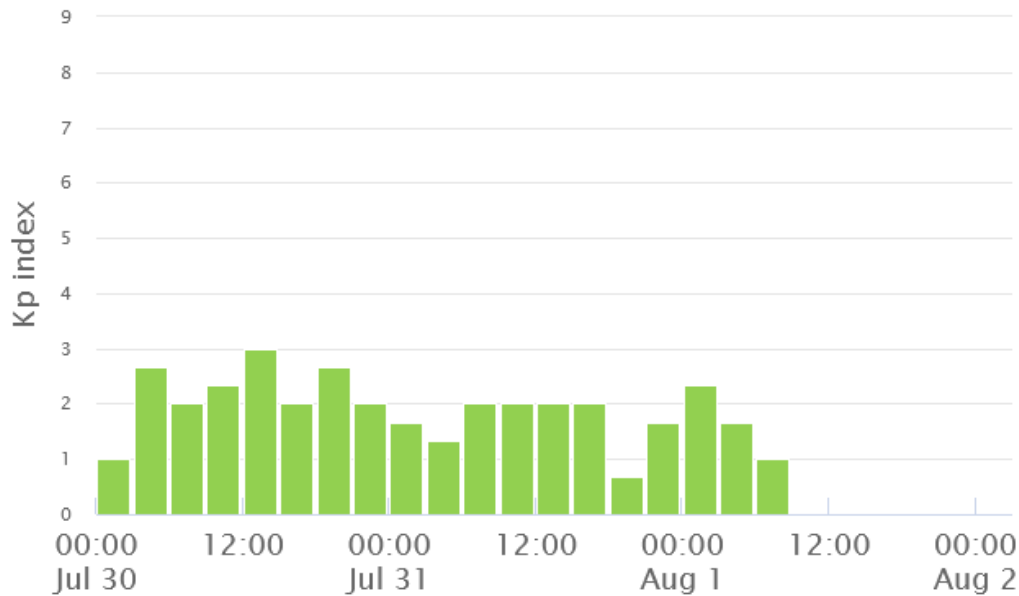
The X-ray radiation that ionizes the D-layer is the 1.0 - 8.0 A (red) plot. These measurements currently taken from the [GOES 16](#) satellite.

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, 30 Jul 2023 00:00:00 GMT



Universal Time (captured @ 2023-08-01T11:46:01.222Z)

2023-08-01T11:46:01.222Z

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: 1 AUG 2023

Solar wind:

$B_z = 0$  nT

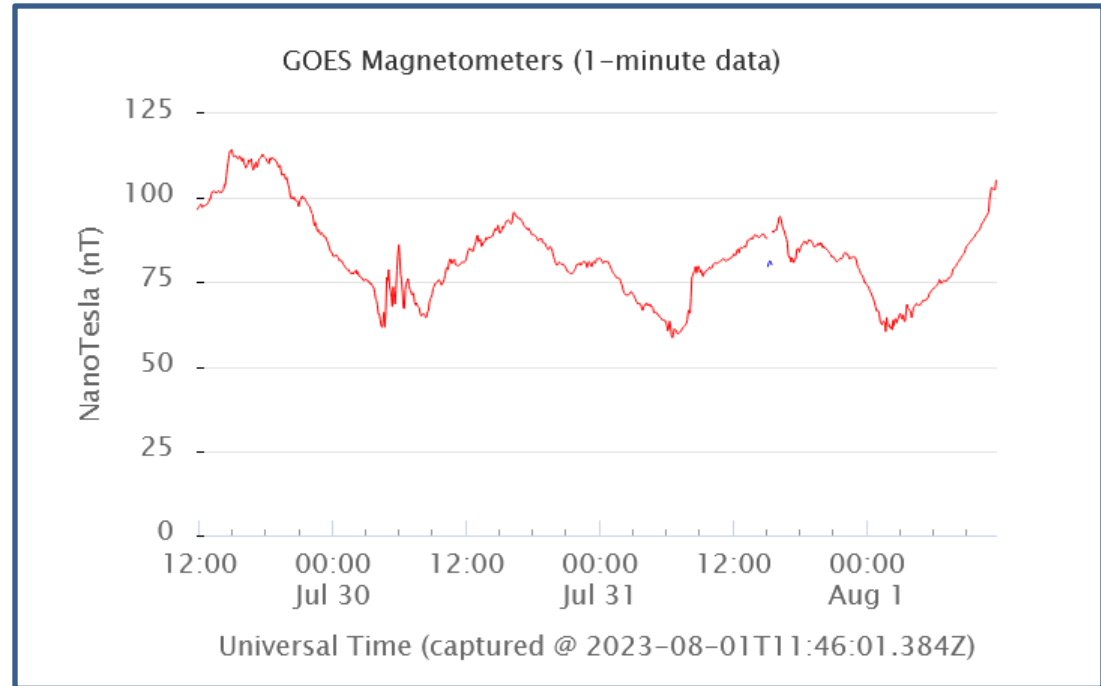
speed = 392 km/sec

density = 8.98 protons/cm<sup>3</sup>

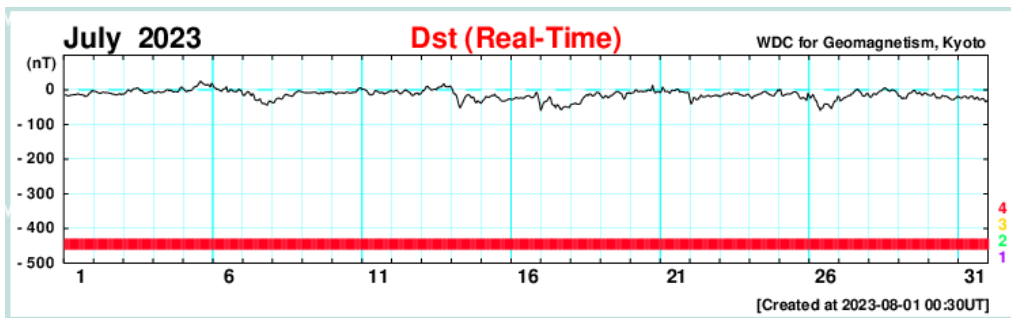
(From – NOAA DSCOVR  
In L1, Lagrange Point)

Dst = 4 nT (Ring Field)

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

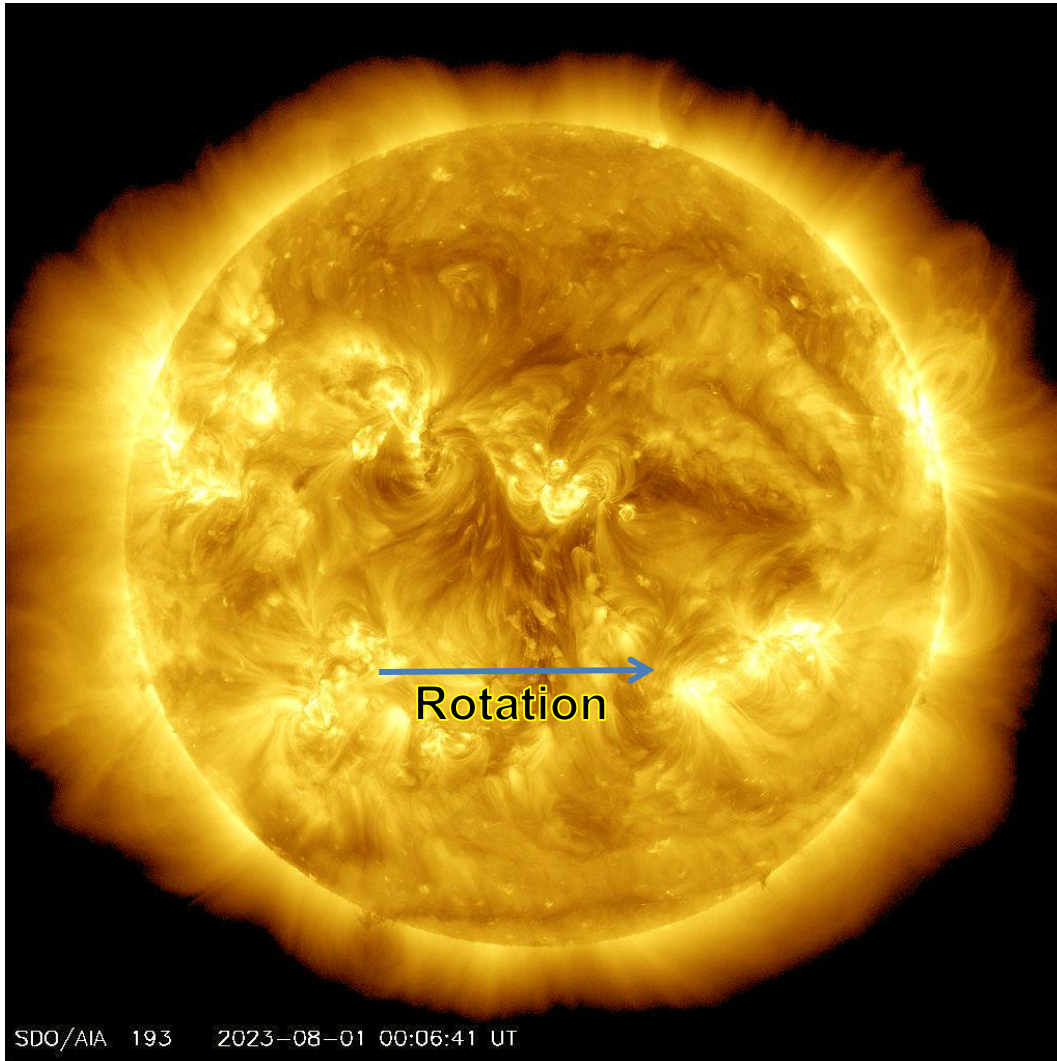


From – GOES 16  
In geostationary orbit





# Coronal Holes – 1 AUG 2023



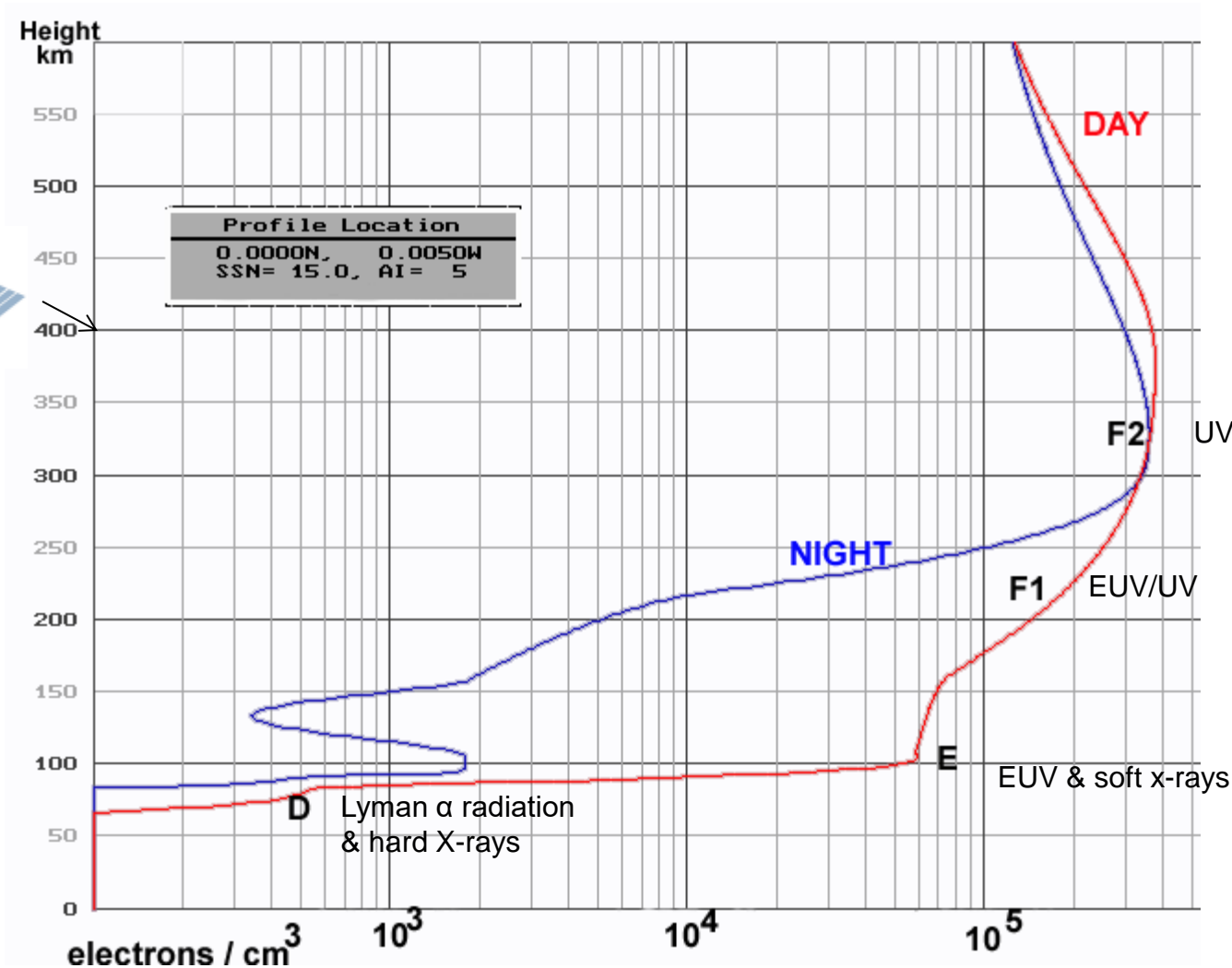
## Analysis

There are currently no large coronal holes facing Earth.

# Ionospheric Conditions



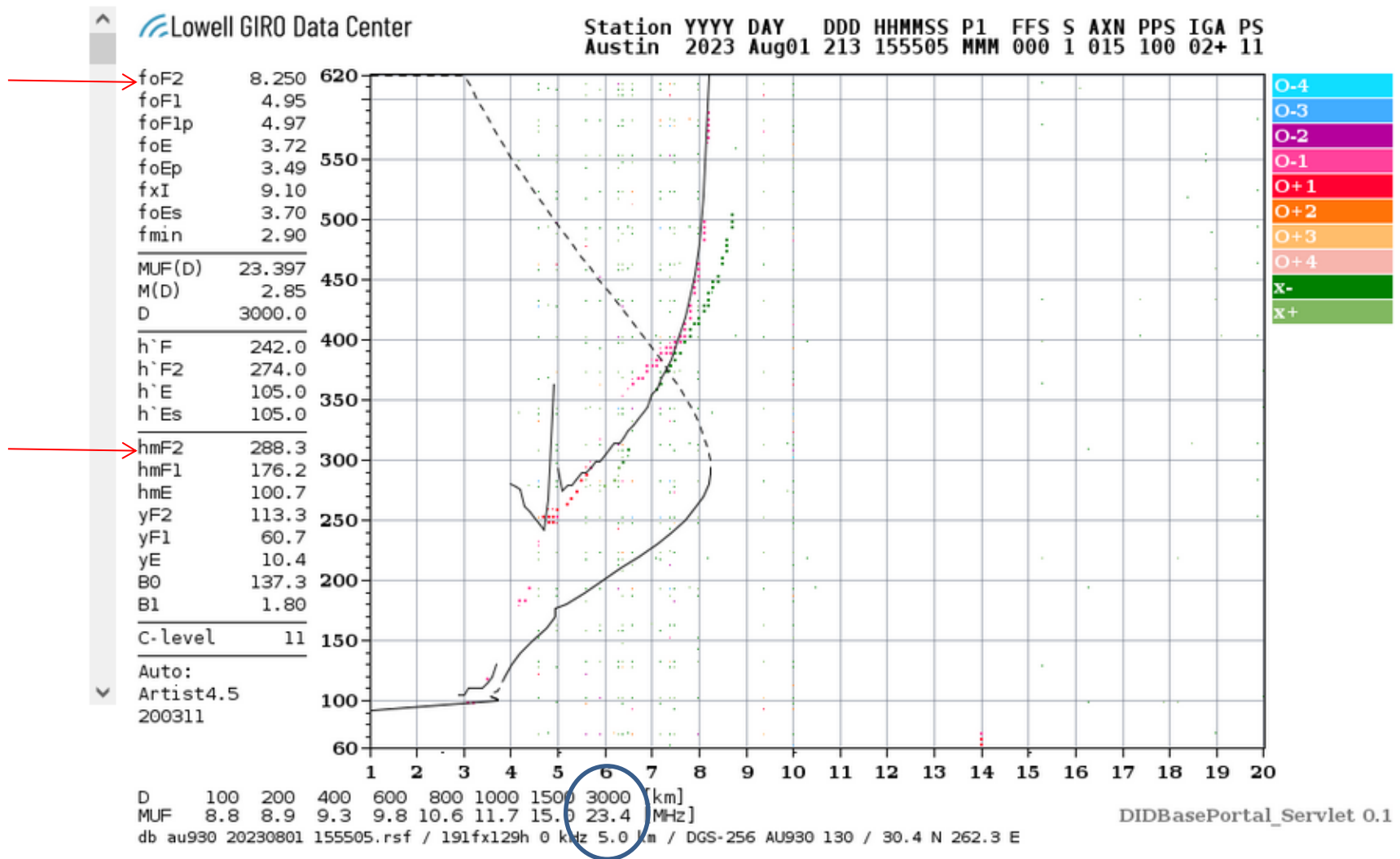
Gravity  
↓



Solar Radiation  
↓

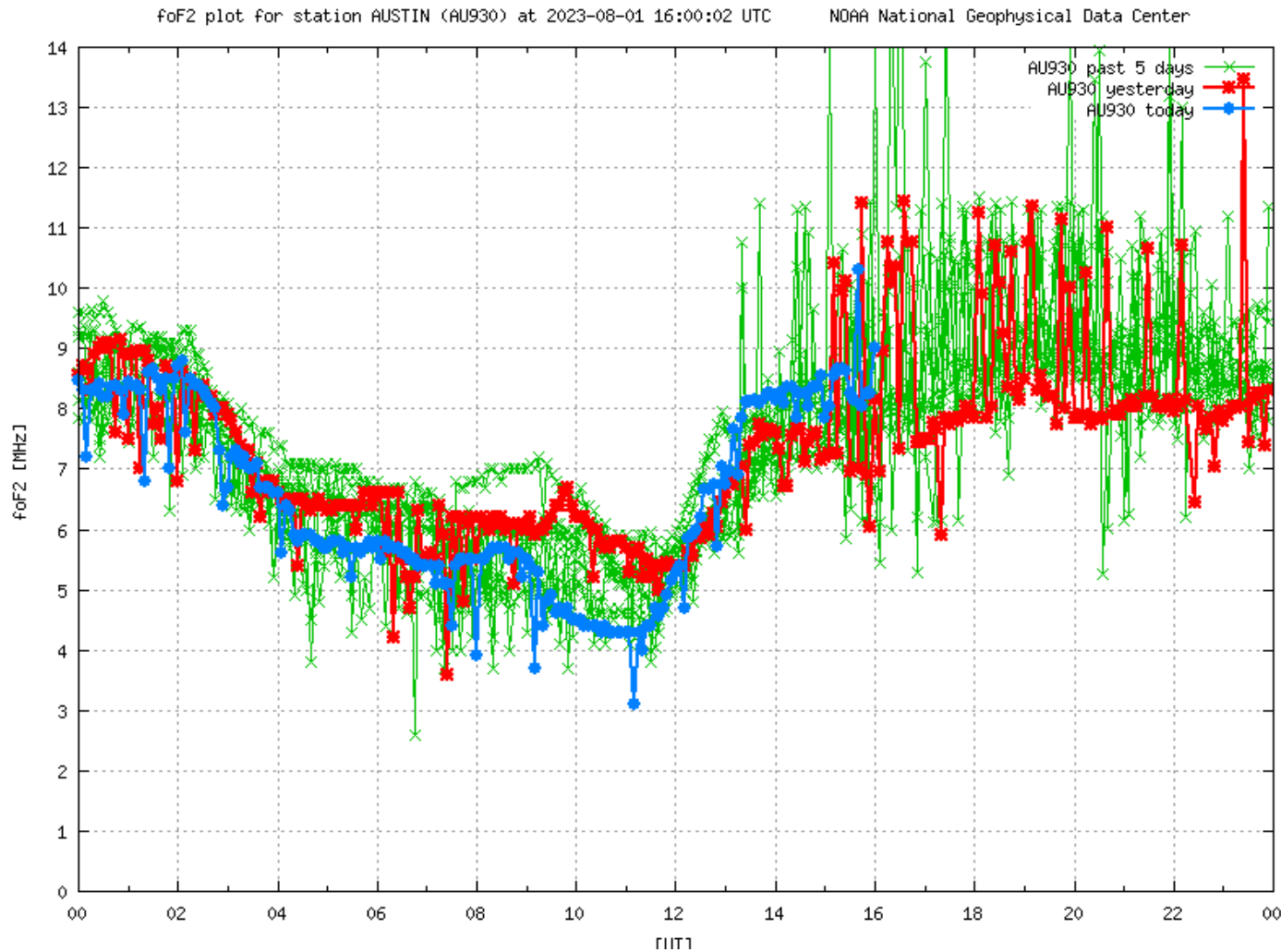
Monoatomic oxygen

# Austin Ionosonde – 1 AUG 1555 (1055 CDT)



# 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

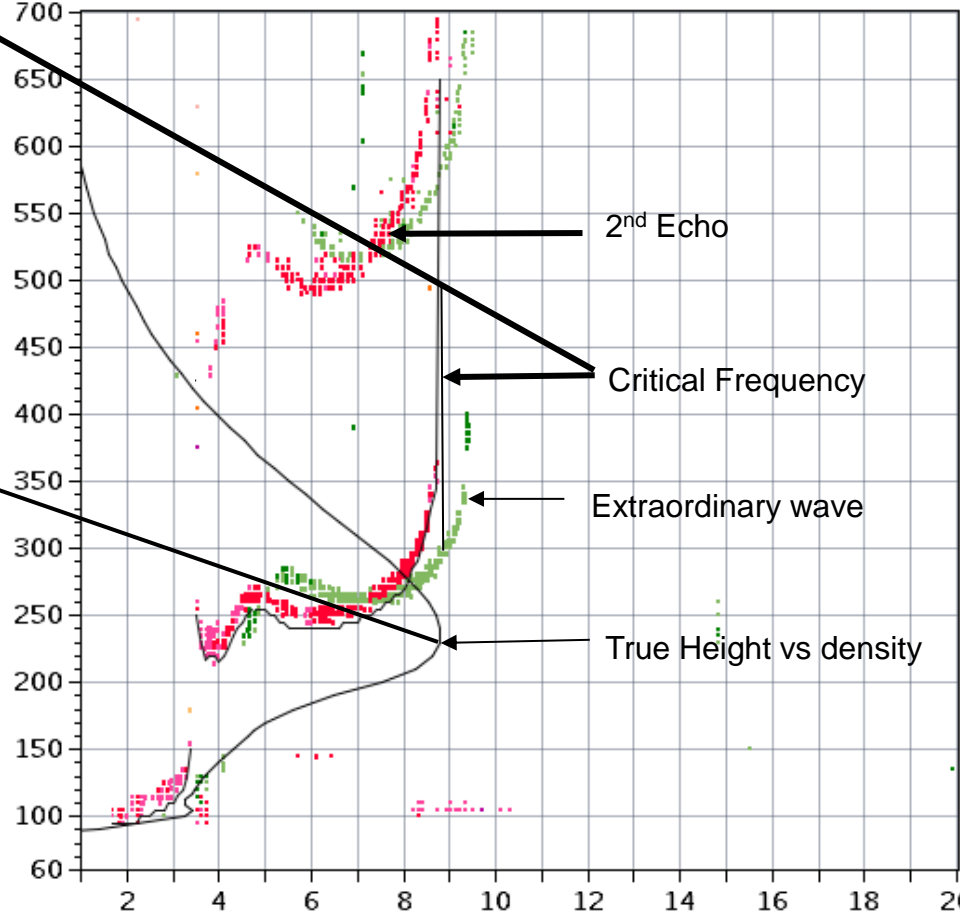
- The large variation of FoF2 (spiking) in the afternoon is due to low signal to noise ratio due to afternoon ionospheric absorption.
- To obtain the correct critical frequency, look at the Austin Ionogram plot. The correct foF2, is the frequency where the red plot disappears off the graph at the top. See next slide.

# Ionogram Interpretation



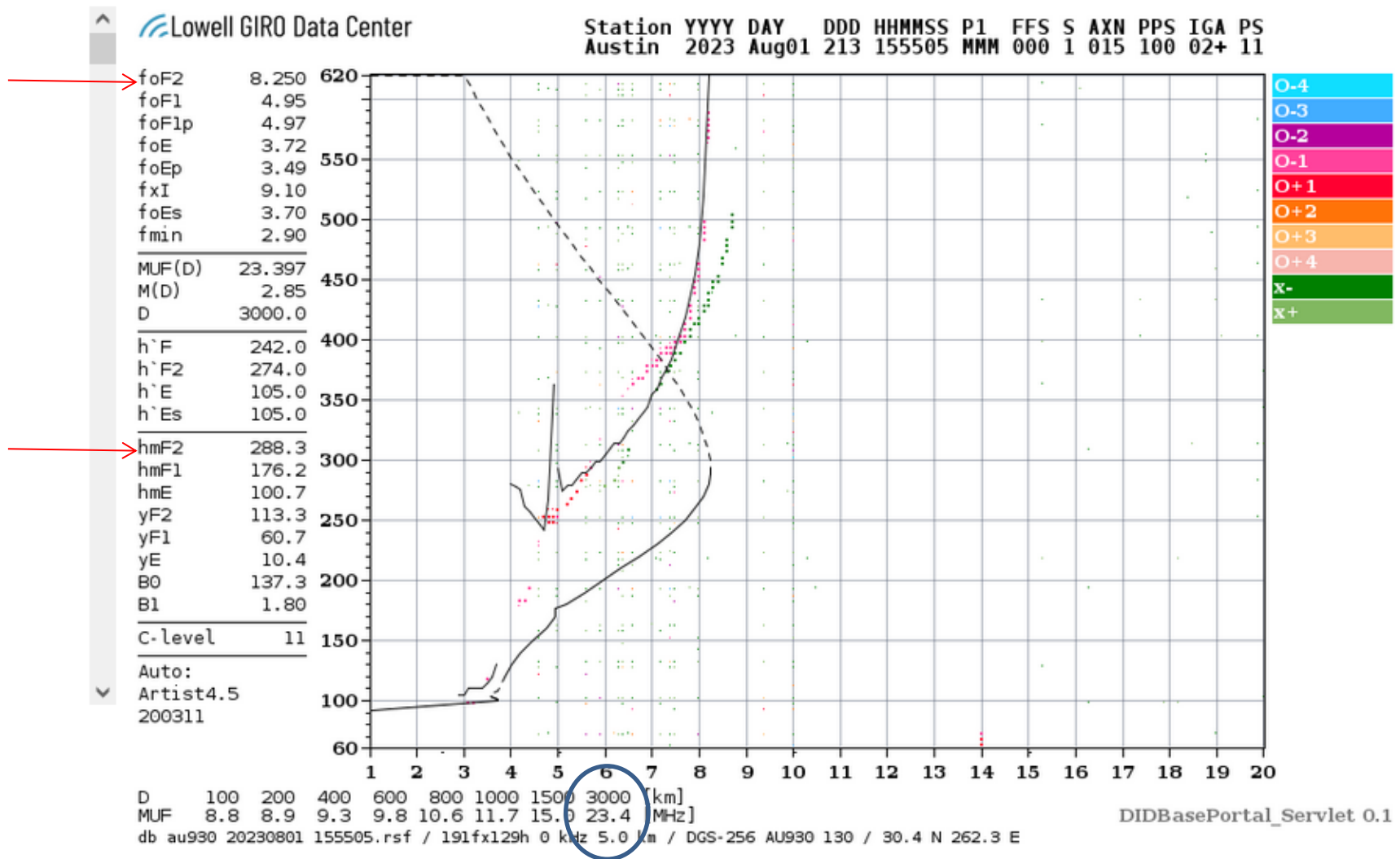
Statio YYYY DAY DDD HHMMSS P1 FFS S AXN PPS IGA PS  
 Austin 2013 Jan03 003 185505 MMM 1 045 100 32+ A1

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	



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

# Austin Ionosonde – 1 AUG 1555 (1055 CDT)



# Solar Weather Data

The screenshot shows the website for Region 6 Army MARS. The top navigation menu includes: Home, What is MARS?, Join, Contact Us, Solar Weather, and Login. A red arrow points from the text 'Menu' to the navigation menu. Another red arrow points from the text 'Solar Weather' to the 'Solar Weather' menu item. Below the navigation menu, the main content area features a large green header with the text 'REGION 6 ARMY MARS' and 'Military Auxiliary Radio System'. Below this is a section titled 'WHO WE ARE' with a paragraph of text describing the MARS system.

Solar Weather

## Other Solar Weather Links of Interest

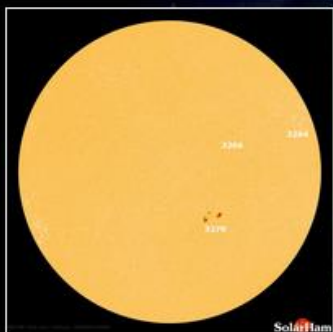
All Ionosondes

- [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.

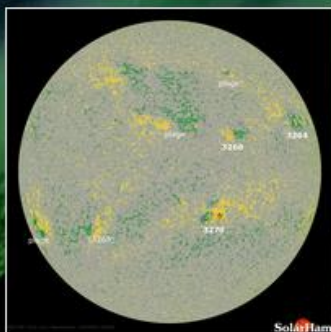


## Space Weather for April 4, 2023

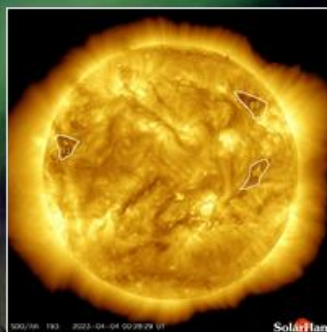
UTC Time 13:17:34 Tuesday



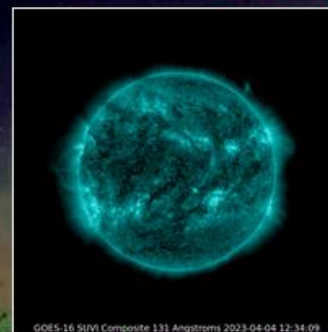
**HMI Intensity**  
Latest | Movie | HARP



**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](#)



X-Rays

85.3

Current

[Solar Demon](#)

[Solar SOFT](#)

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

## Current Conditions

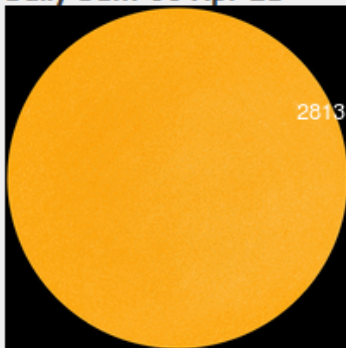
### Solar wind

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 a 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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