

SOLAR WEATHER

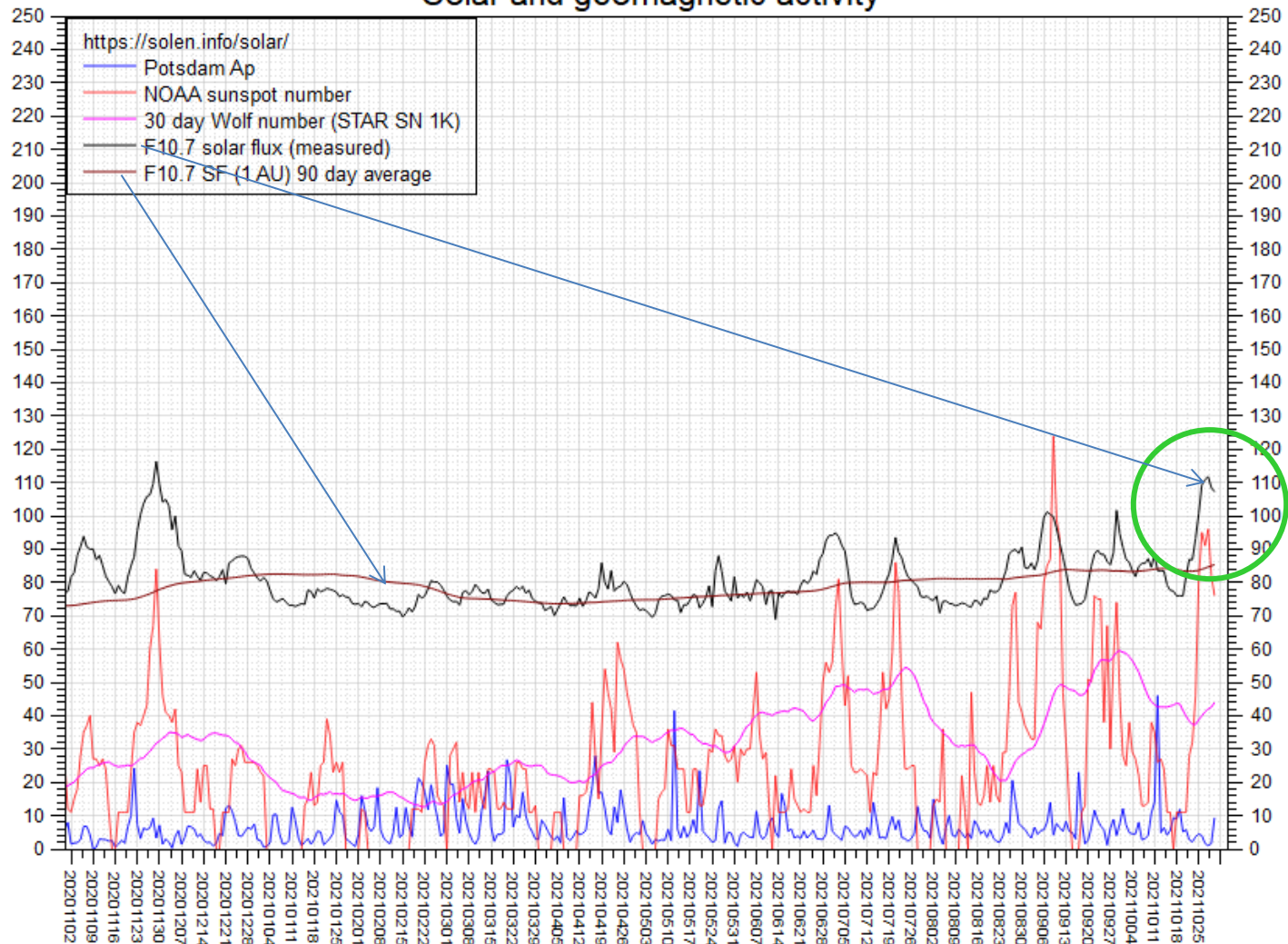
2 NOV 2021

Lewis Thompson
W5IFQ

Taken by Katarina
Srsenova on
October 30, 2021 @
Iceland

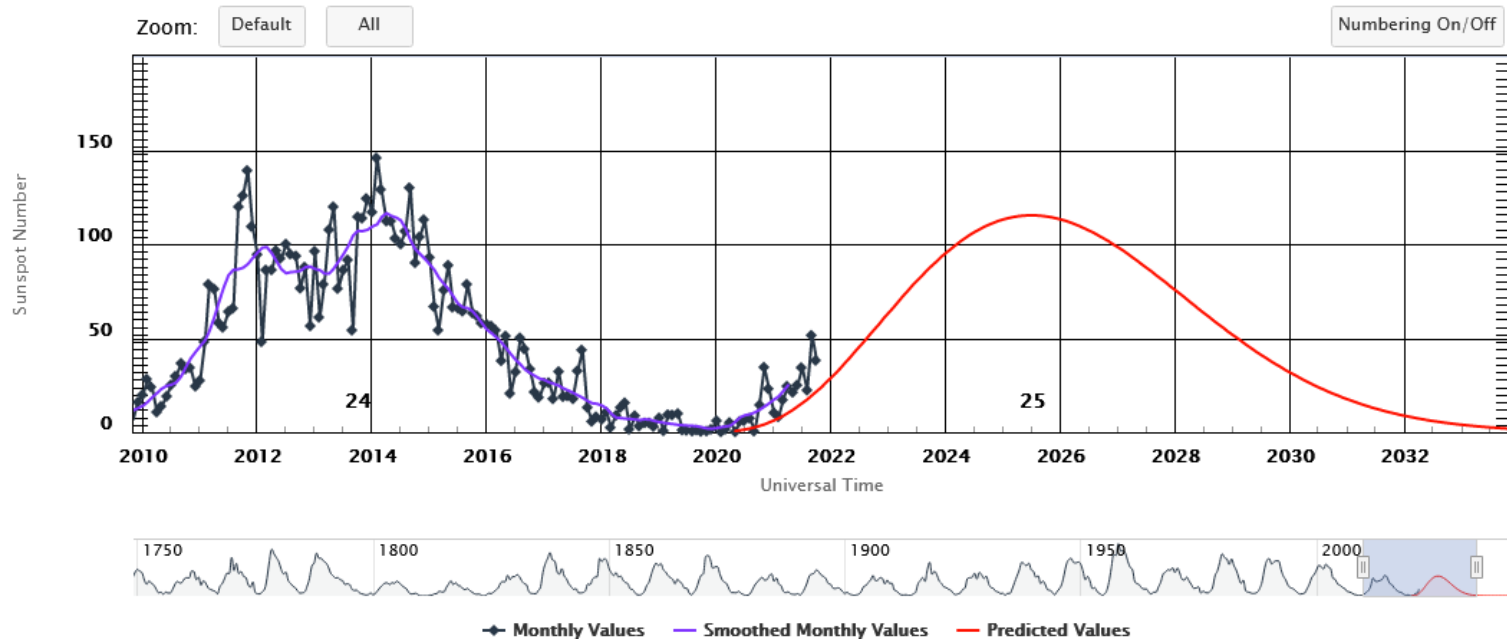
SOLAR FLUX INDEX – 2021

Solar and geomagnetic activity



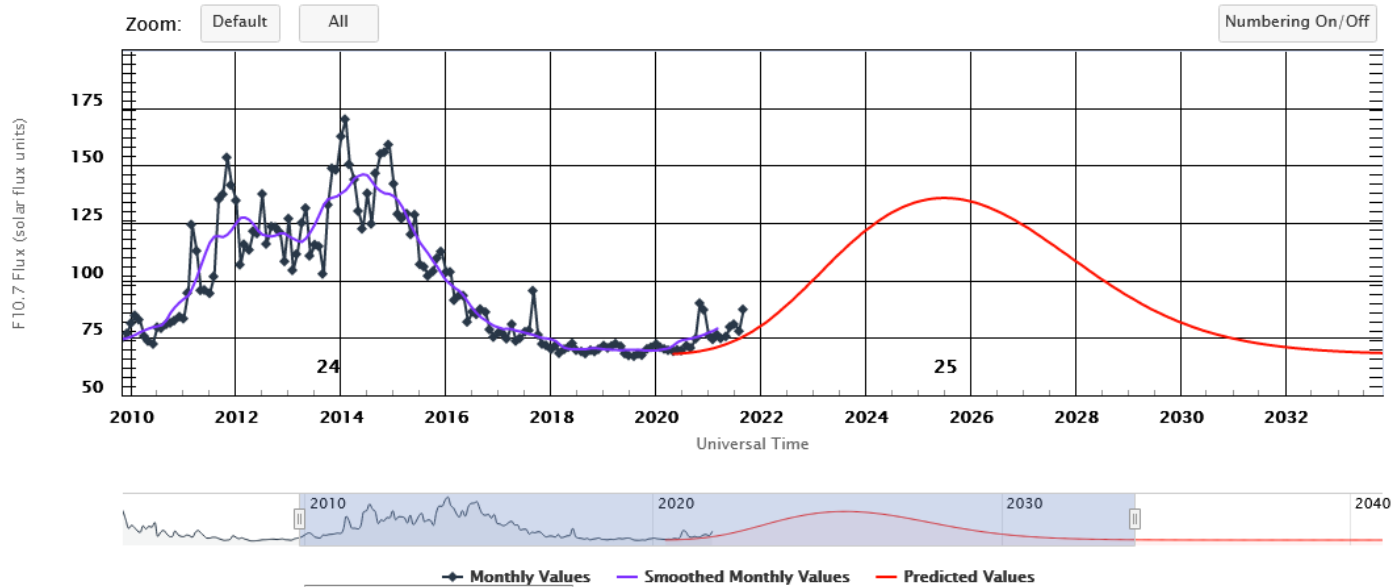
SF 107.2 (25.1 increase from one previous 27 day solar rotation)

ISES Solar Cycle Sunspot Number Progression

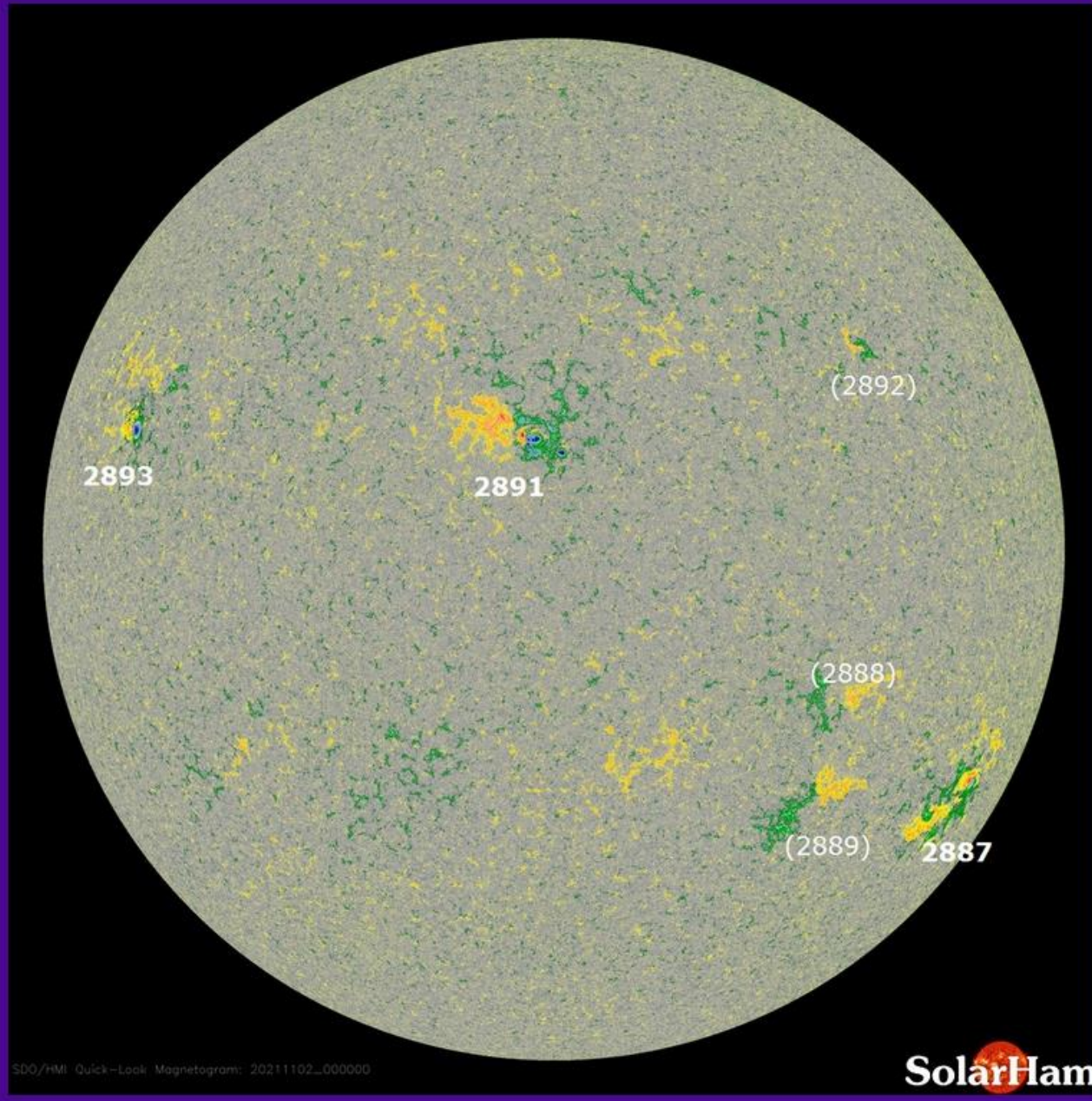


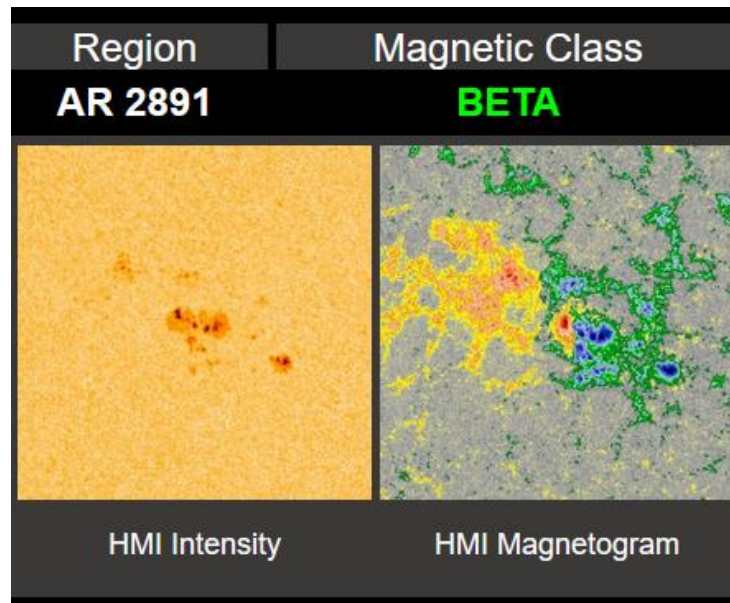
F10.7CM RADIO FLUX PROGRESSION

ISES Solar Cycle F10.7cm Radio Flux Progression



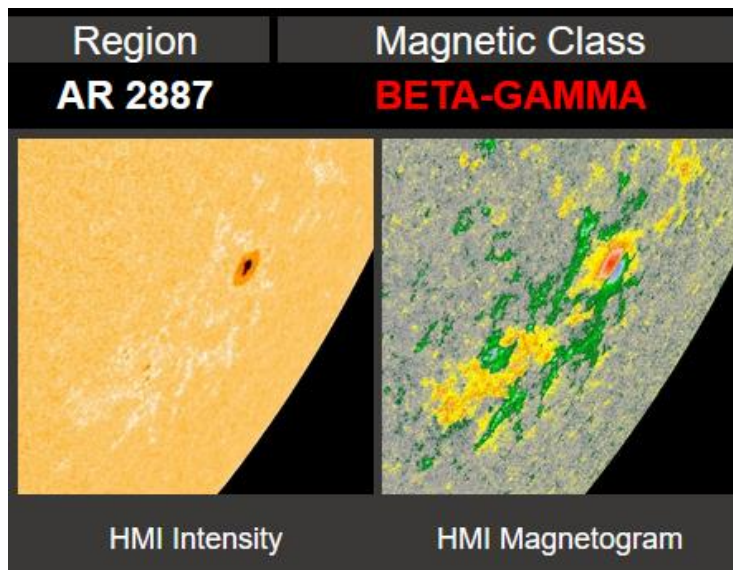
Magnetogram image on November 2, 2021





Noteworthy Events

M1.7 @ 03:01 UTC (Nov 2, 2021)
M1.5 @ 02:42 UTC (Oct 29, 2021)



Noteworthy Events

M1.5 @ 01:45 UTC (Nov. 1, 2021)
X1.0 @ 15:35 UTC (Oct 28, 2021)
M2.2 @ 10:28 UTC (Oct 28, 2021)

SolarHam.org Forecast

Solar Indices (Nov. 2 @ 00:35 UTC)

SFI SSN AREA

98

53

570

▼ 5

▼ 30

▲ 90

WWV | Flux Data | Last 30 Days

Cycle 25 Progression

3 Day Geomagnetic Forecast

November 2 November 3 November 4

4 (G0)

2 (G0)

5 (G1)

Max Kp

M-Lat 10%

M-Lat 05%

M-Lat 15%

H-Lat 40%

H-Lat 20%

H-Lat 50%

Probabilities

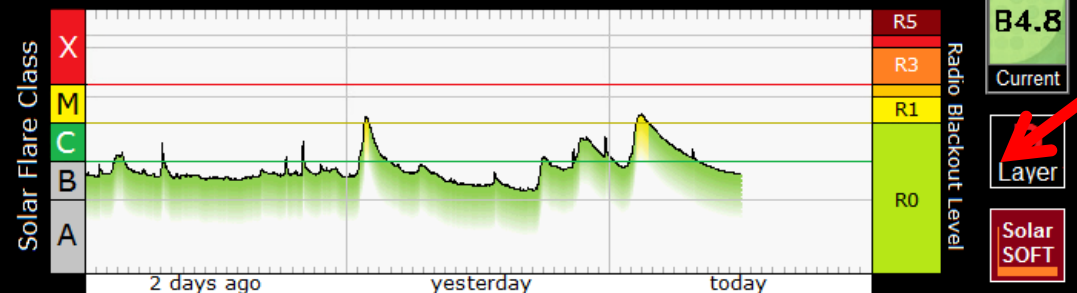
Detailed Forecast

Solar Flare Detection

Data provided by NOAA/SWPC

GOES-16 X-Ray Flux

Click to expand data



Current Solar Flare Threat | Probability Details

C-Flare: 70%

M-Flare: 30%

X-Flare: 05%

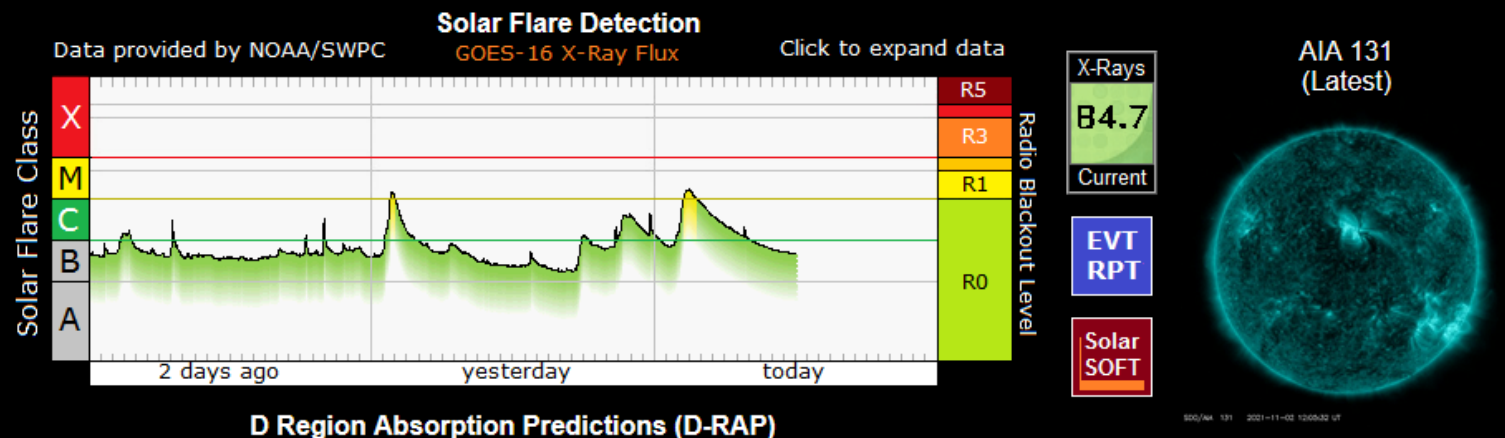
Proton: 15%

Flare Events (M1+) Past 48 Hours | Event Report | Top Solar Flares

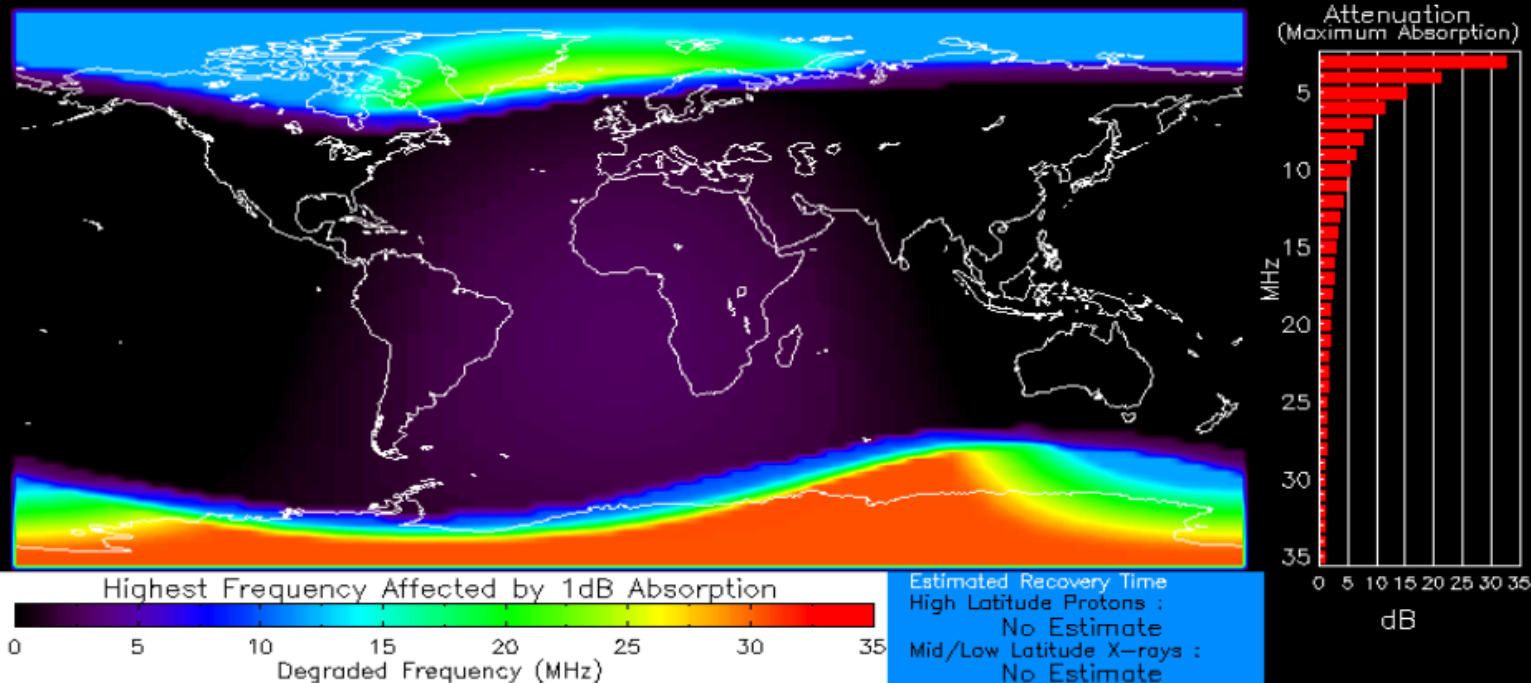
M1.5 M1.7

Global D-LAYER Absorption with X-Ray Flux

(This page updates every minute)



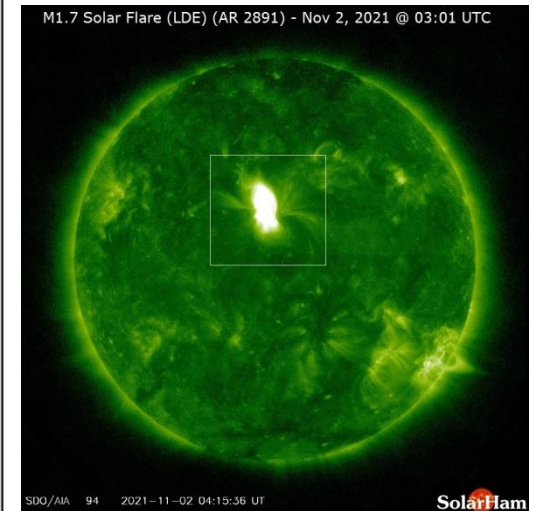
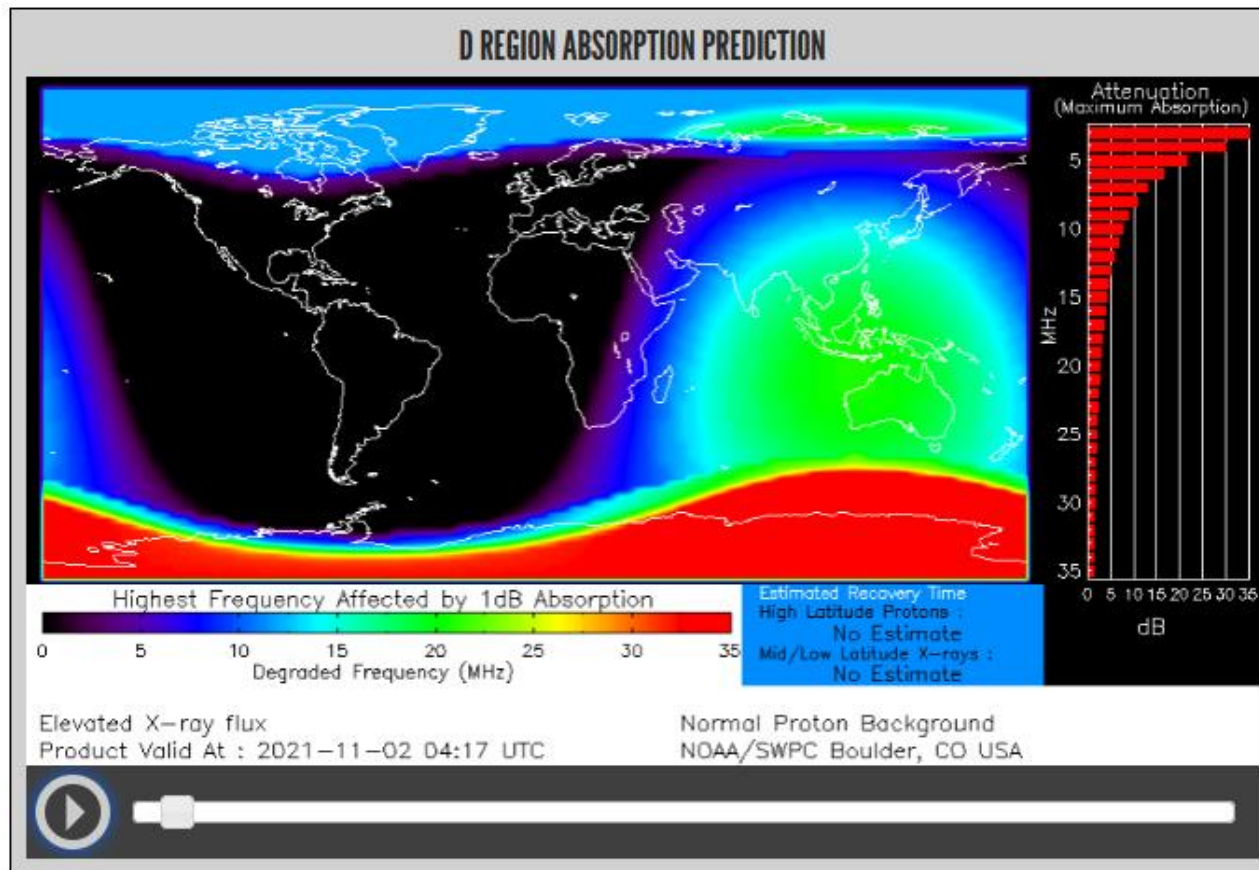
D Region Absorption Predictions (D-RAP)



Normal X-ray Background
Product Valid At : 2021-11-02 12:12 UTC

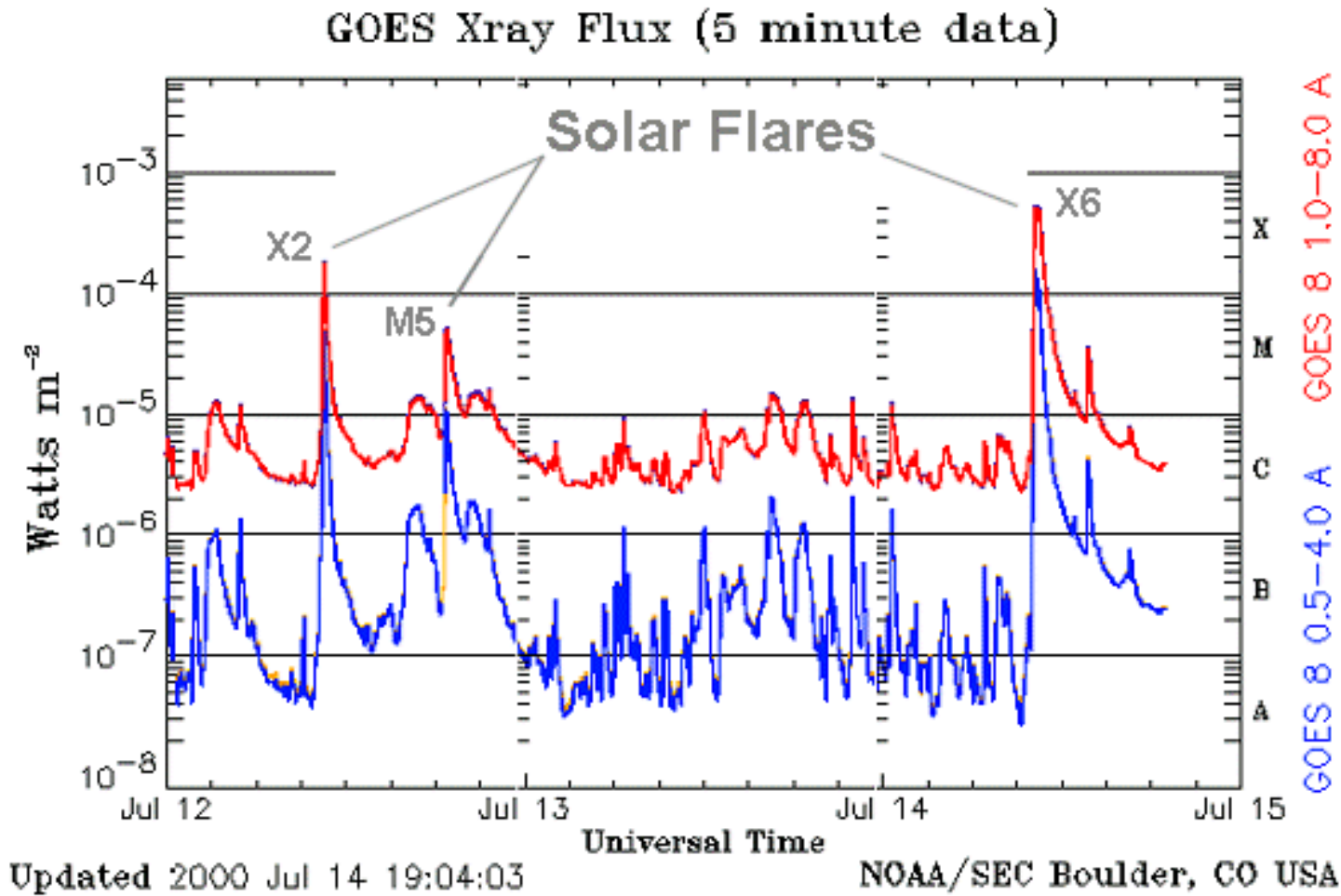
Normal Proton Background
NOAA/SWPC Boulder, CO USA

M1.5 LDE Flare from 2891 (03:01Z, 2 NOV)



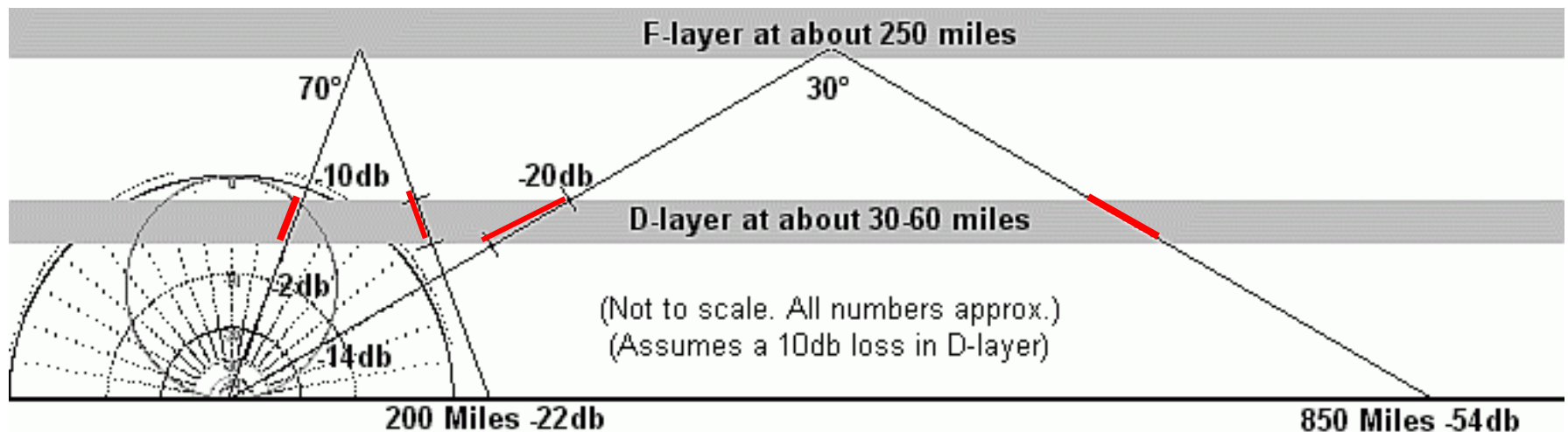
Solar Flare Classification – Intensity

(Why is This Important?)



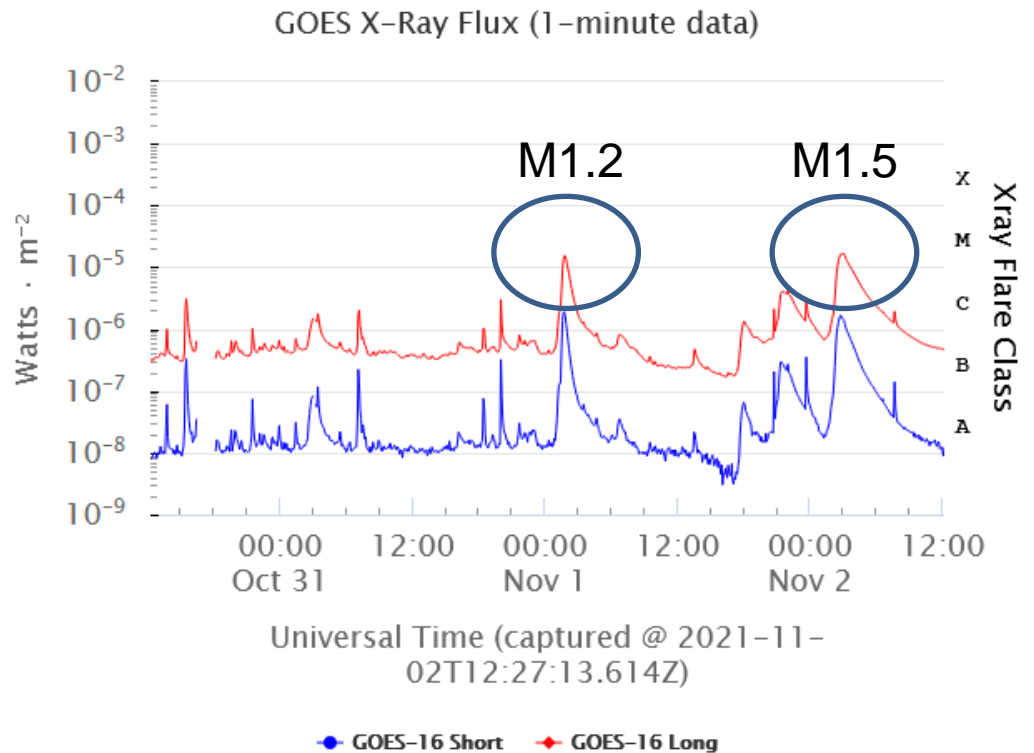
D-Layer Absorption

- Day-time effect
- Absorption is a function of $1/f^2$
- Can sometimes be compensated by power or bandwidth reduction



Solar X-Ray Flux: 31 OCT – 2 NOV 2021

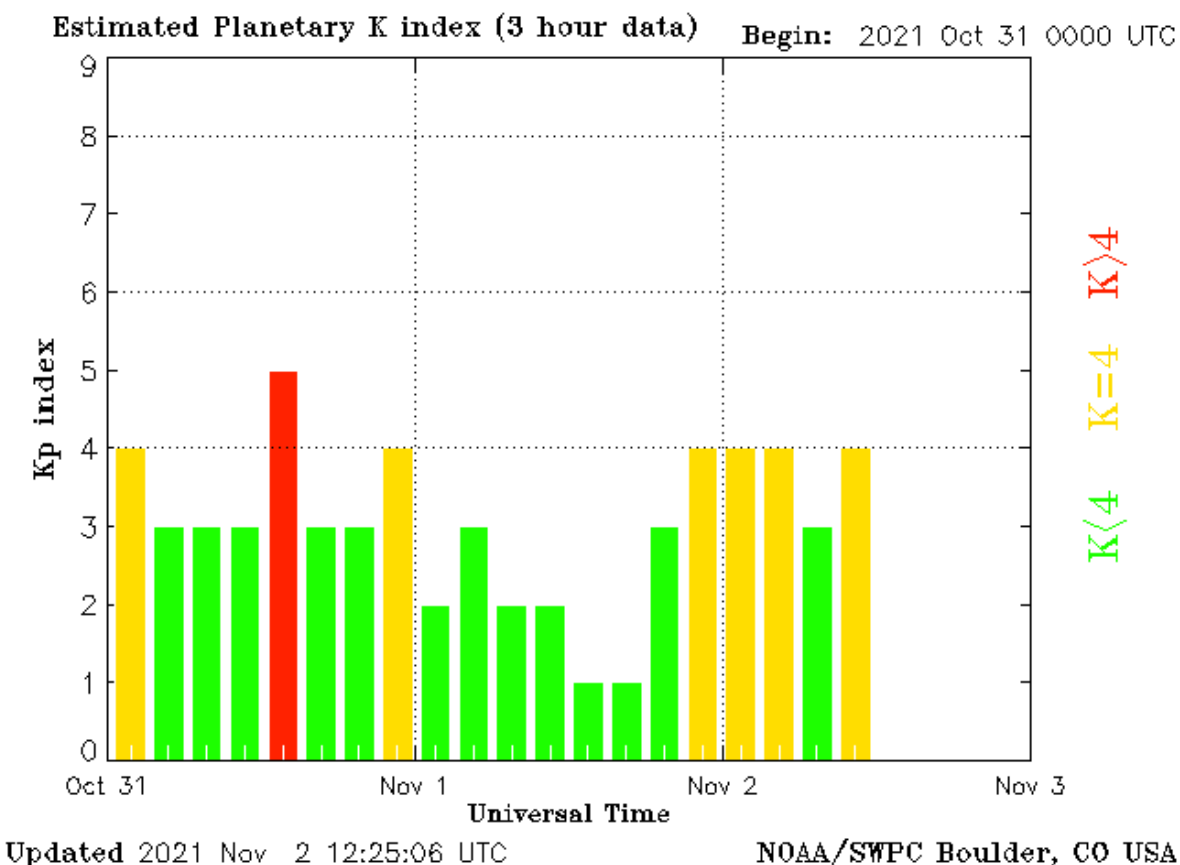
SOLAR X-RAY FLUX



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 |

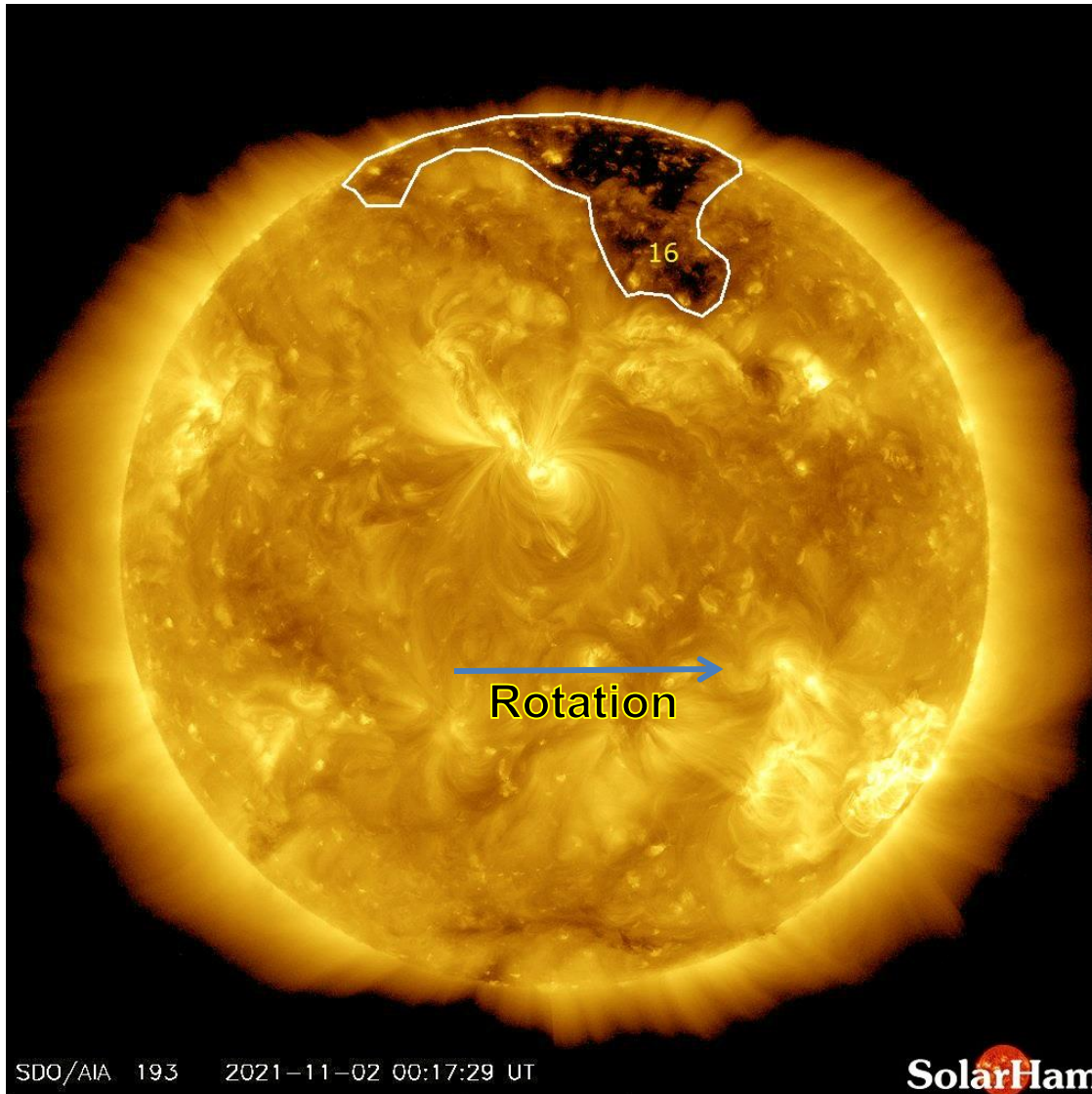
Planetary K index 31 OCT – 2 NOV 2021



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 |

Coronal Holes – 2 NOV 2021



Analysis

The southern extension of coronal hole #16 is currently facing Earth. A noticeable solar wind increase due to this CH is now currently expected.

Geomagnetic Conditions: 2 NOV 2021

Solar wind:

$B_z = 3$ nT North

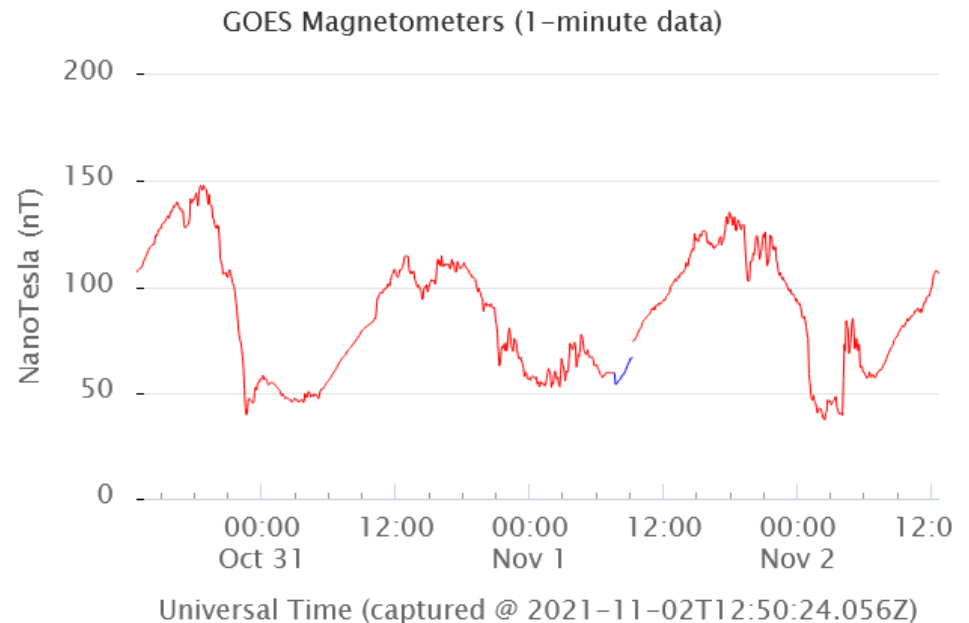
speed = 600 km/sec

density = 9.19 protons/cm³

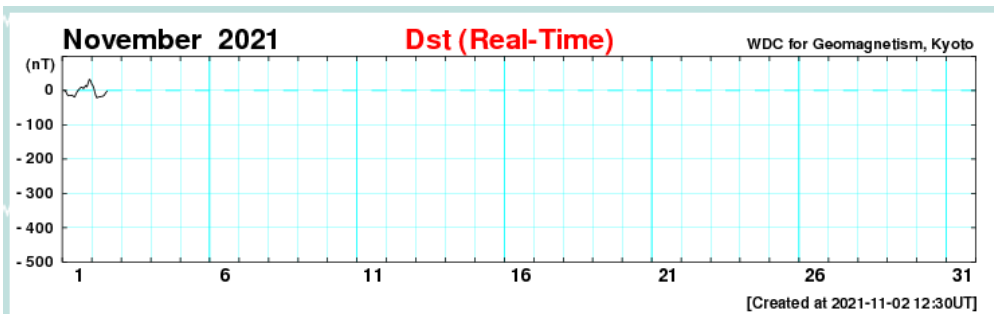
(From – NOAA DSCOVR
In L1, Lagrange Point)

Dst = -3 nT (Ring Field)

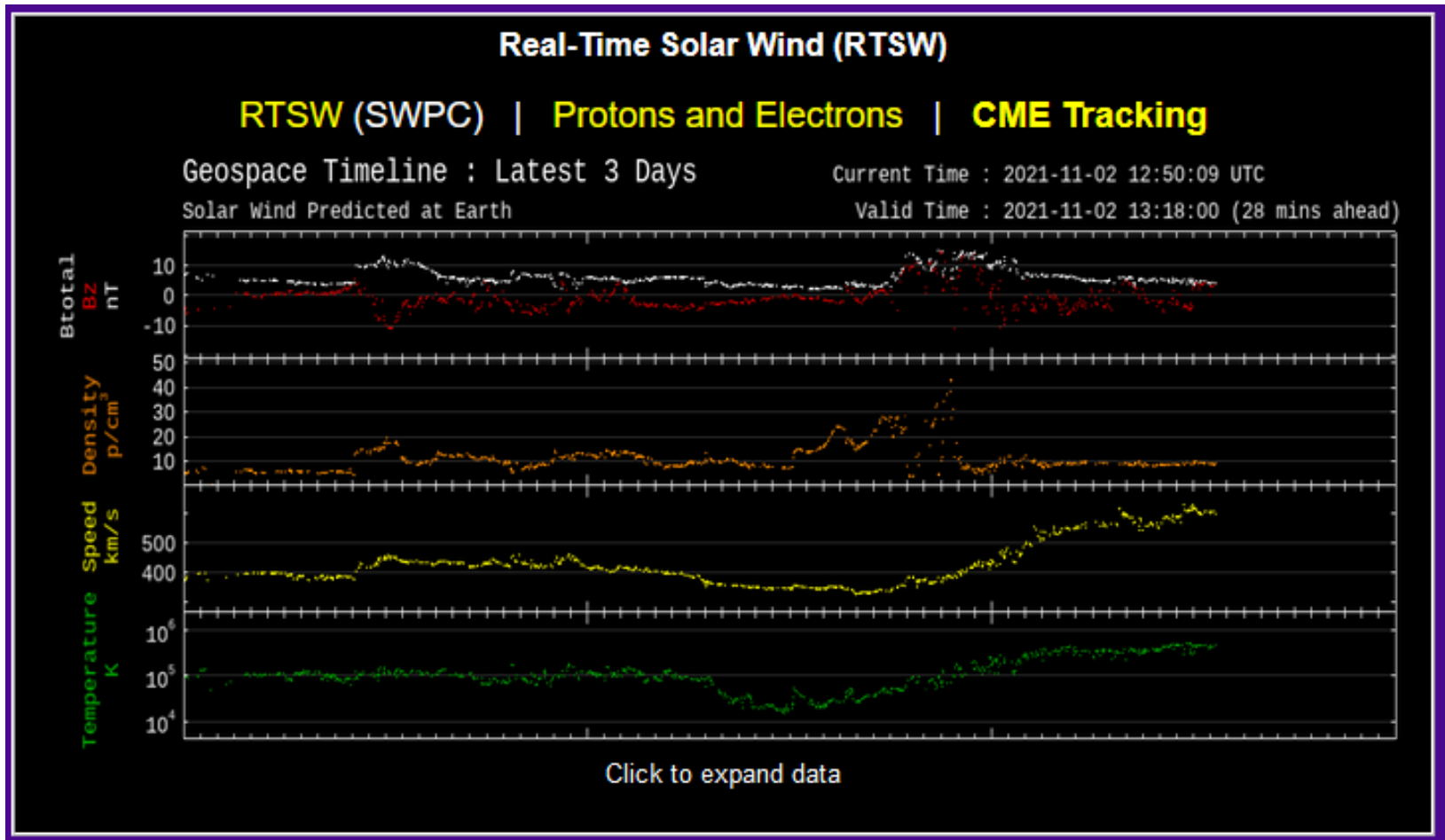
(From – Data Analysis Center
For Geomagnetism and Space
Magnetism – Kyoto University)



From – GOES 16
In geostationary orbit



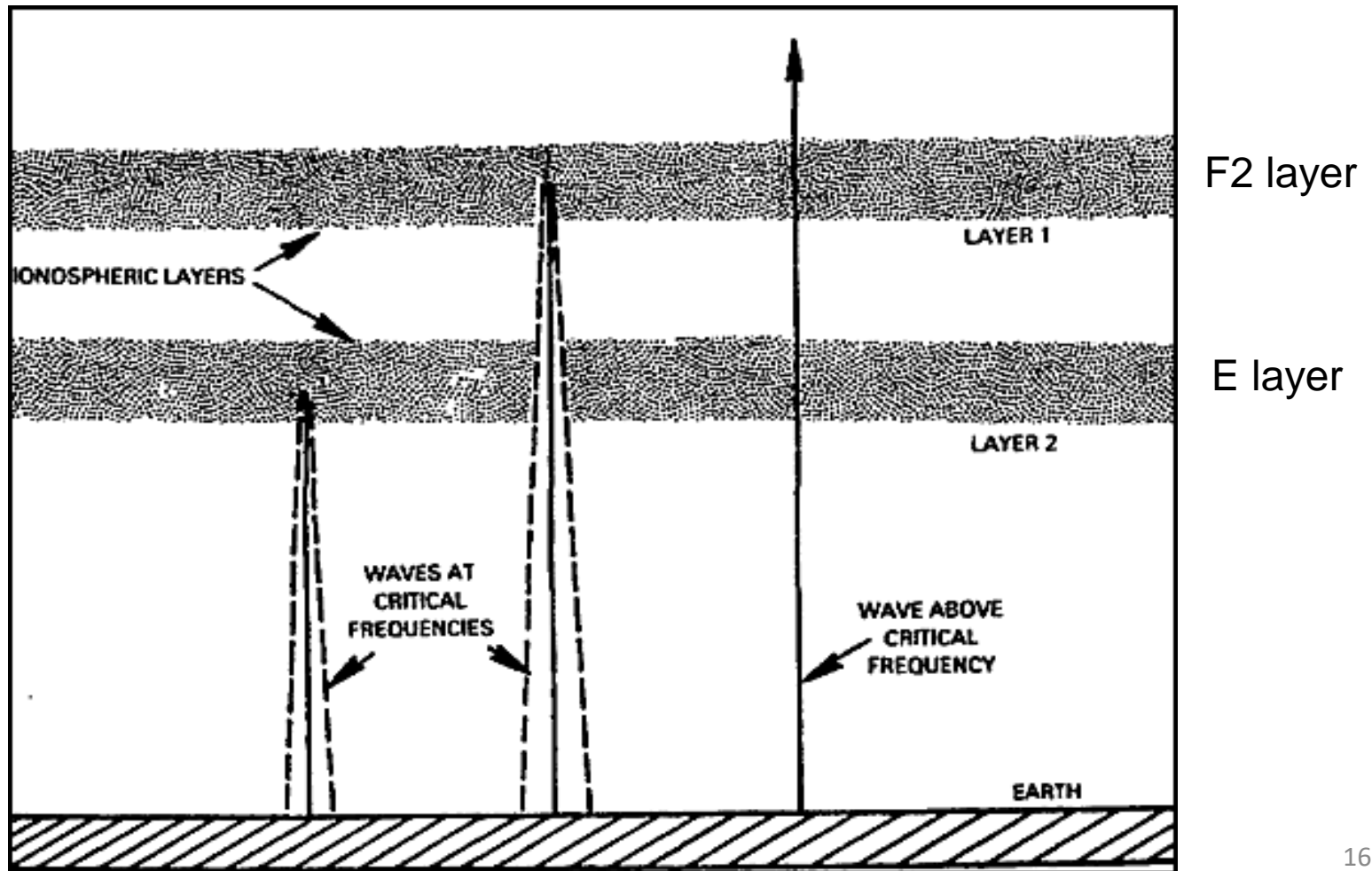
Real Time Solar Wind



Critical or foF2 Frequency Definition

(Why is This Important?)

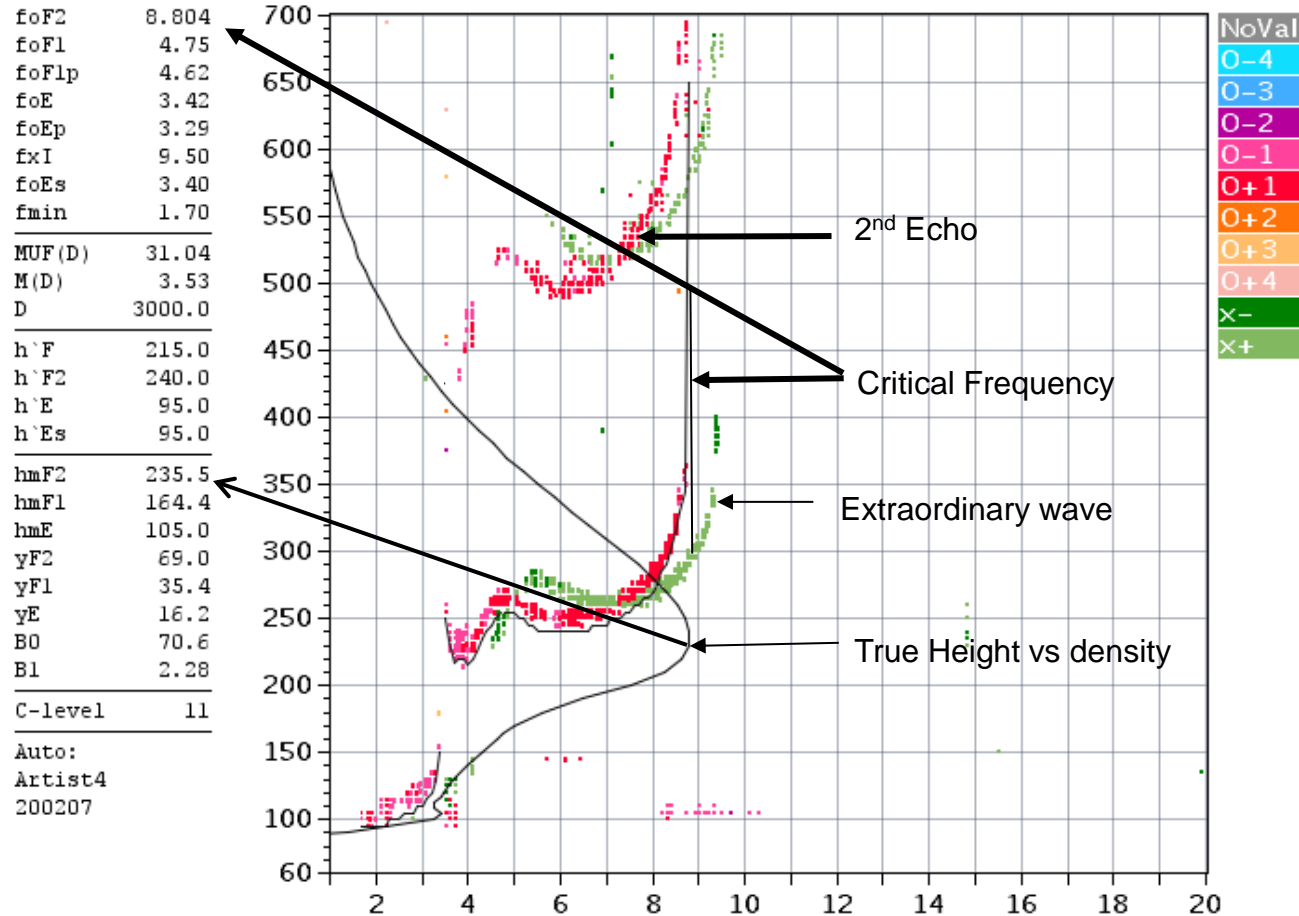
- For State-Wide HF communications (NVIS), must operate at or below CF



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



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

AU930_2013003185505.MMM / 190fx128h 100 kHz 5.0 km / DGS-256 AU930 130 / 30.4 N 262.3 E

Ion2Png v. 1.3.11

Austin Ionogram – 2 NOV 1300Z (0800 CDT)

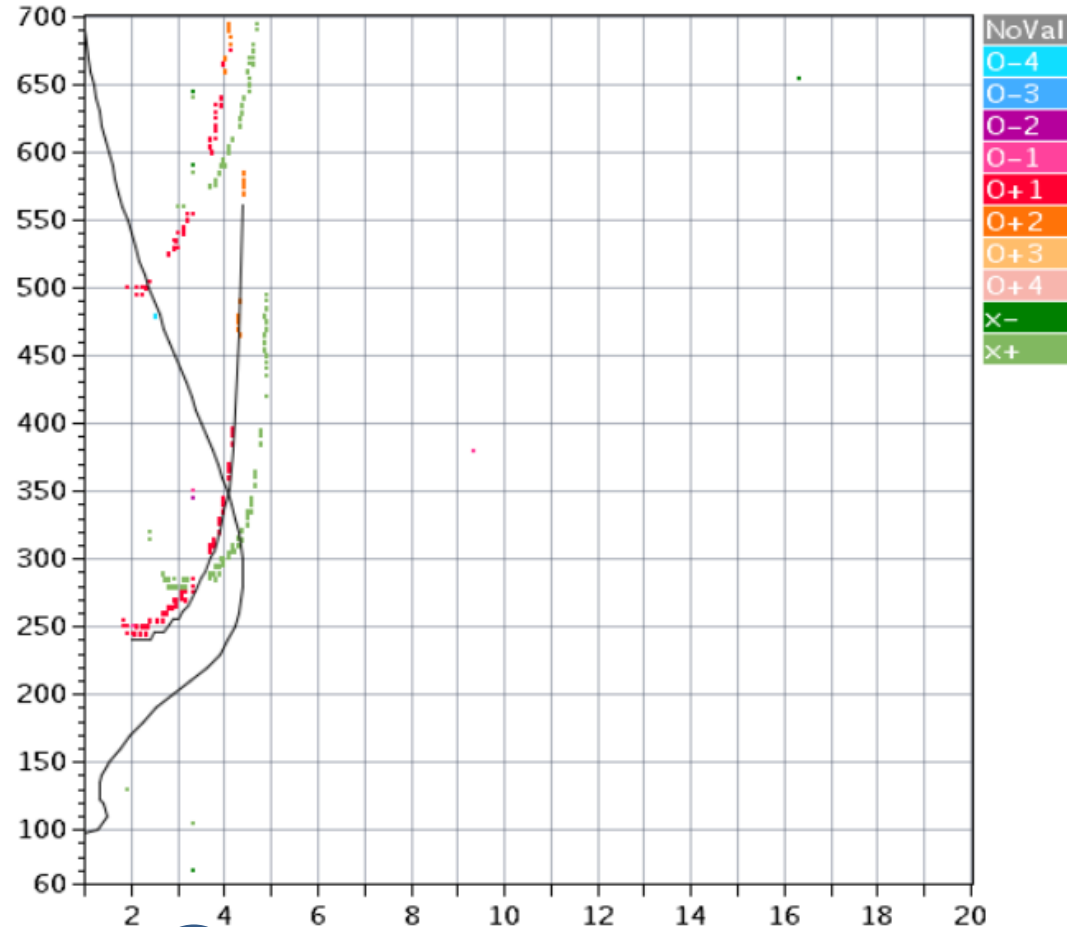
Note: Local (NVIS) open on 75m but not 40m



Statio YYYY DAY DDD HHMMSS P1 FFS S AXN PPS IGA PS
Austin 2021 Nov02 306 130005 MMM 1 045 100 33+ A1

foF2 4.400
foF1 N/A
foFlp N/A
foE N/A
foEp 1.49
fxI 5.10
foEs N/A
fmin 2.00
MUF(D) 13.73
M(D) 3.12
D 3000.0
h'F 241.0
h'F2 N/A
h'E N/A
h'Es N/A
hmF2 285.8
hmF1 N/A
hmE 110.0
yF2 115.3
yF1 N/A
yE 20.0
B0 89.8
B1 6.00
C-level 11

Auto:
Artist4.5
200311

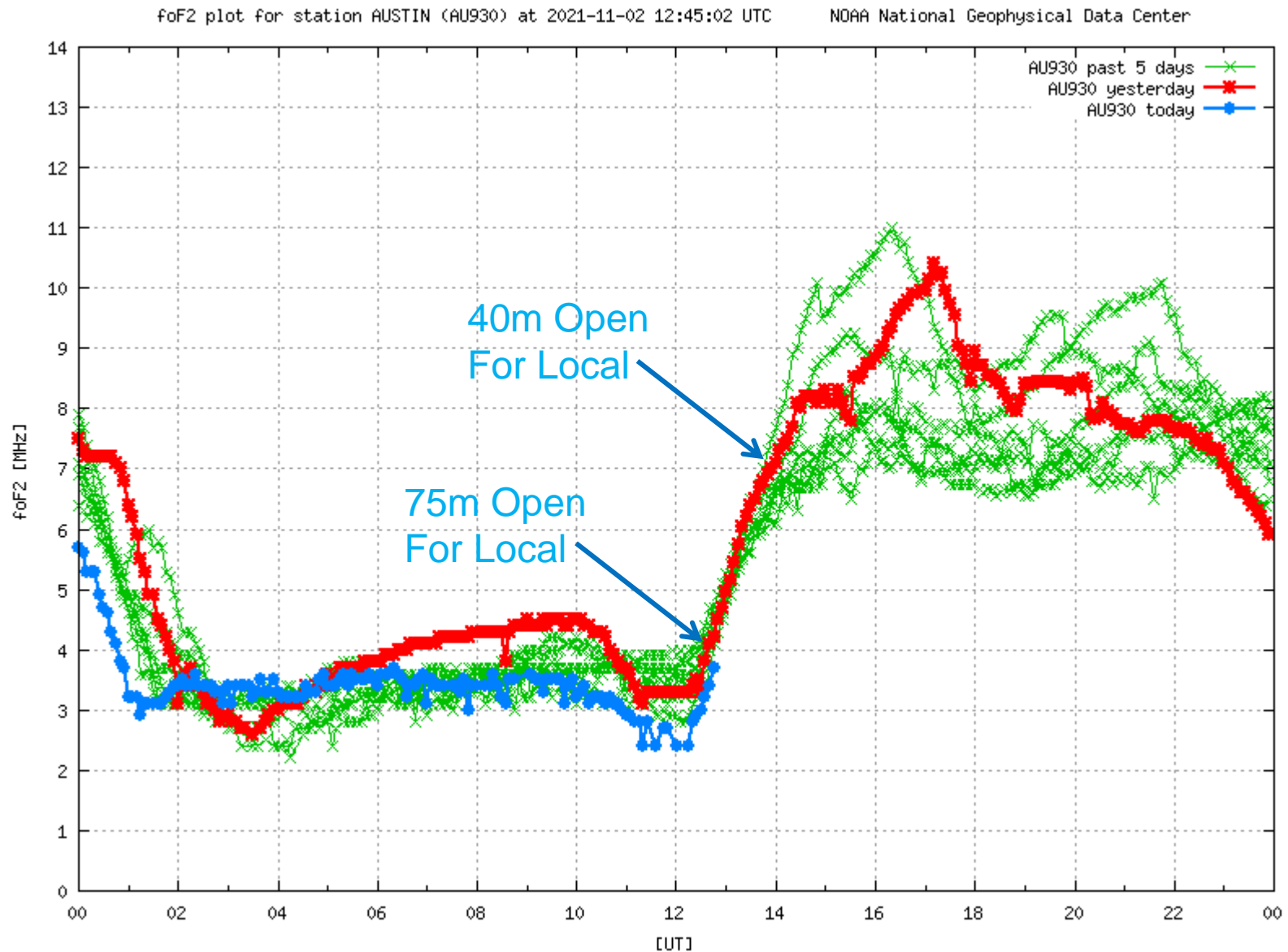


D 100 200 400 600 800 1000 1500 3000 [km]
MUF 5.0 5.0 5.2 5.6 6.0 6.7 8.7 13.7 [MHz]

AU930_2021306130005.MMM / 190fx128K 100 km 5.0 km / DGS-256 AU930 120 / 30.4 N 262.3 E

Ion2Png v. 1.3.11

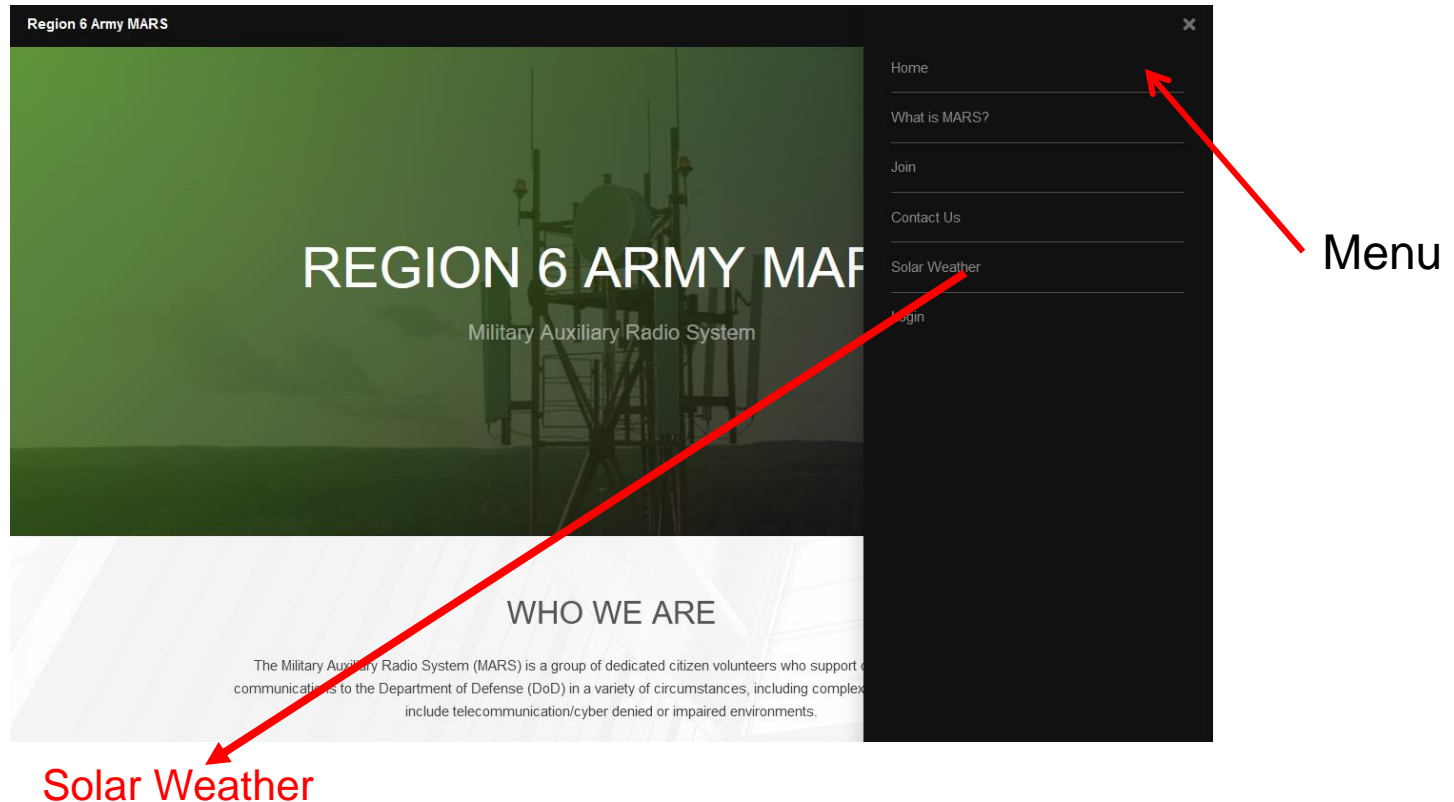
foF2 Trend – Austin Ionosonde



Verification of foF2 Trending Chart

- When it is important to have the correct Critical Frequency (foF2) and you see an unexpected trend, check actual Ionogram.
- The Ionosonde can be “fooled” by echo drop out due to exclusion of certain transmit frequencies by US government.

Solar Weather Data



Other Solar Weather Links of Interest

All Ionosondes

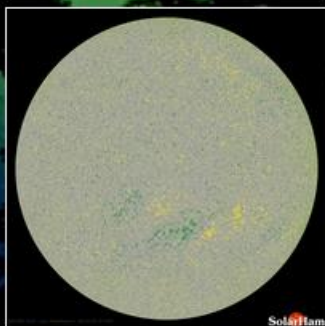
- • [DIDBase](#) - Select Station List then EGLIN then year/month/day/time for Ionosonde plot.
- [NOAA Solar Weather](#) - Solar Weather plots of Kp and X-Ray and other solar emissions.
- [Solen Solar Weather](#) - Good general solar forecast from an individual.
- [Solar Ham](#) - SolarHam provides real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

Space Weather for January 5, 2021

UTC Time 17:46:22 Tuesday



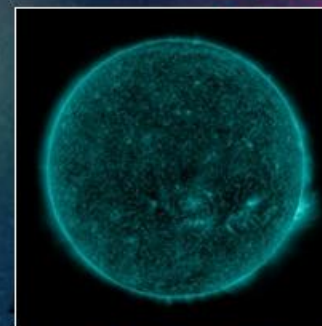
HMI Intensity
Analysis | Latest | Movie



HMI Magnetogram
Latest | Movie



Coronal Holes
Analysis | Movie



AIA 131 (Latest)
Movie



Farside Watch
Analysis | Latest

Latest Imagery: [SDO](#) | [GOES-16](#) | [GONG](#) | [STEREO](#) | [LASCO](#)

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

Solar Indices (Jan 05 @ 00:35 UTC)

SFI SSN AREA

78

0

0

▼ 2

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

3 Day Geomagnetic Forecast

Jan 5

Jan 6

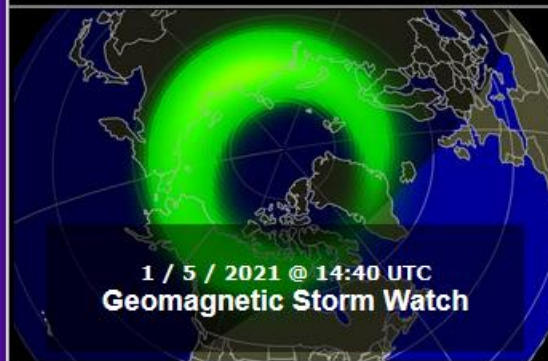
Jan 7

5 (G1)

4-5 (G1)

3 (G0)

Solar activity remains at very low levels.



1 / 5 / 2021 @ 14:40 UTC
Geomagnetic Storm Watch



1 / 2 / 2021 @ 19:15 UTC
Quiet Sun

[Latest Solar Report](#)

[SWPC Space Weather Alerts](#)

[SolarHam News Archive](#)



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

Current Conditions

Solar wind

speed: **314.8** km/sec

density: **9.9** protons/cm³

more data: [ACE](#), [DSCOVR](#)

Updated: Today at 1225 UT

X-ray Solar Flares

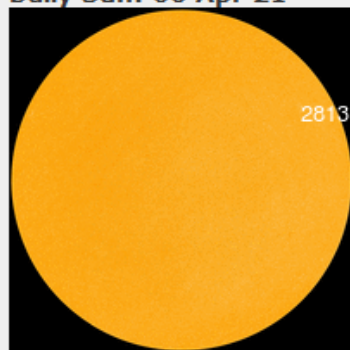
6-hr max: **A1** 1027 UT Apr06

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?

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