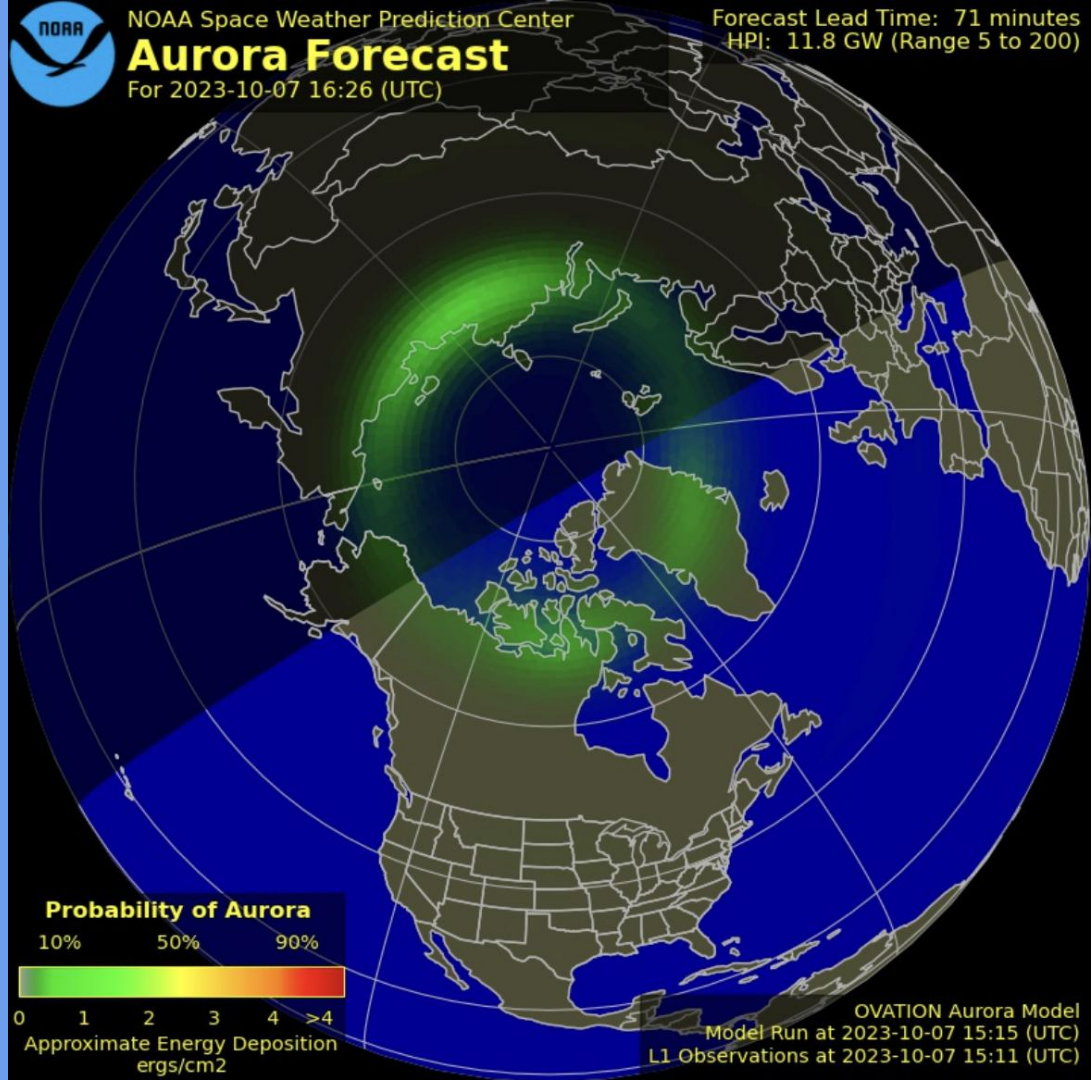

Chasing the Aurora
in the Great Lakes Region
Melissa F. Kaelin
Founder of Michigan Aurora Chasers

Let’s take a pulse…

Is it a good idea to chase Aurora tonight?

Insider Tip: Check the conditions during the day, so you can compare them to the conditions at nightfall.

When it comes to catching Aurora, how conditions are **trending** is often more important than one snapshot in time.



About the Author

Born Melissa F. Kaelin, Melissa is a writer, artist and social media guru who moved to Michigan in 2018, after living in Minnesota and Ohio. She began her career as a journalist, and she has published many books, including a creative anthology and “**Below the 45th Parallel,”** the beginner’s guide to Aurora Chasing.

In 2017, she co-founded the annual **Aurora Summit**, a retreat celebrating the art, culture, science and photography of the Northern Lights. She has moderated the Great Lakes Aurora Hunters and other groups. In January 2021, she founded the **Michigan Aurora Chasers.**

Residing in Ann Arbor, Michigan, Melissa has chased Aurora for 12 years. She’s has witnessed dozens of Aurora displays across four states, and she has led hundreds (maybe thousands) of beginners to their first Aurora sighting.

Melissa F. Kaelin
KaelinArt.com

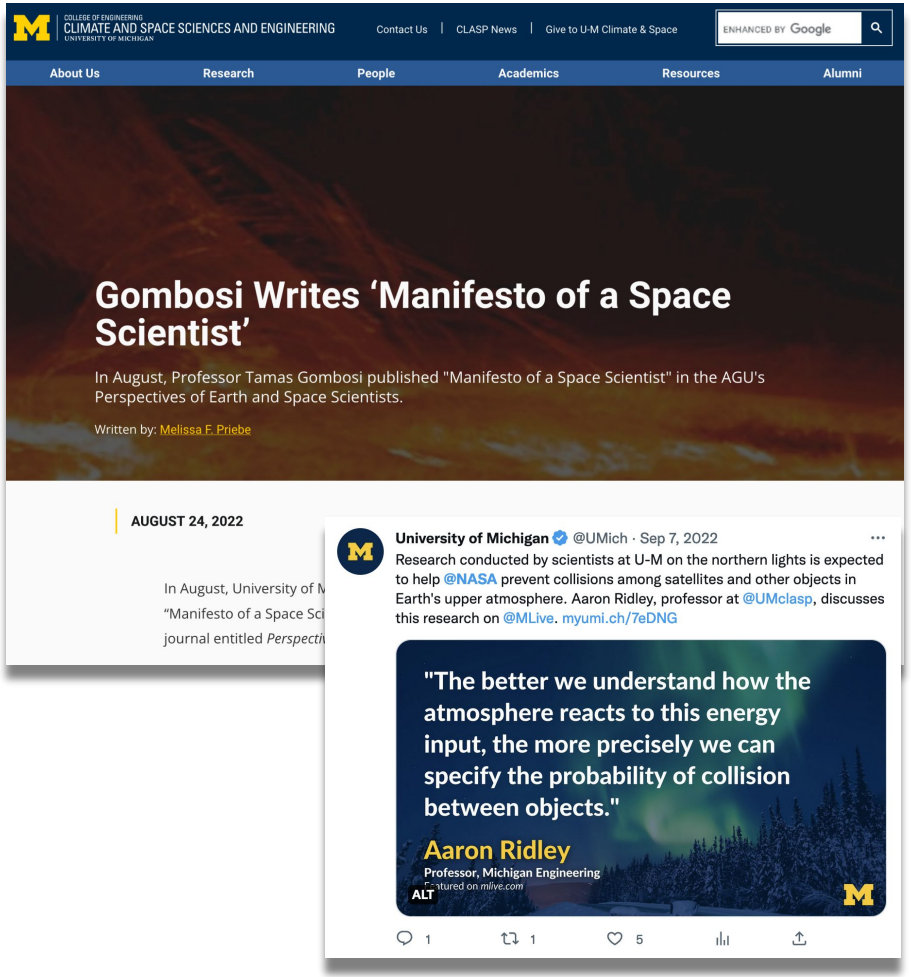
To name a few…

Founder of the Michigan Aurora Chasers
Co-Founder of the Aurora Summit: Art, Culture, Science and Photography
Author of “Below the 45th Parallel,” a beginner’s Aurora Chasing guide
Manager of Marketing & Communications at U-M Climate & Space

… and Science Communicator!

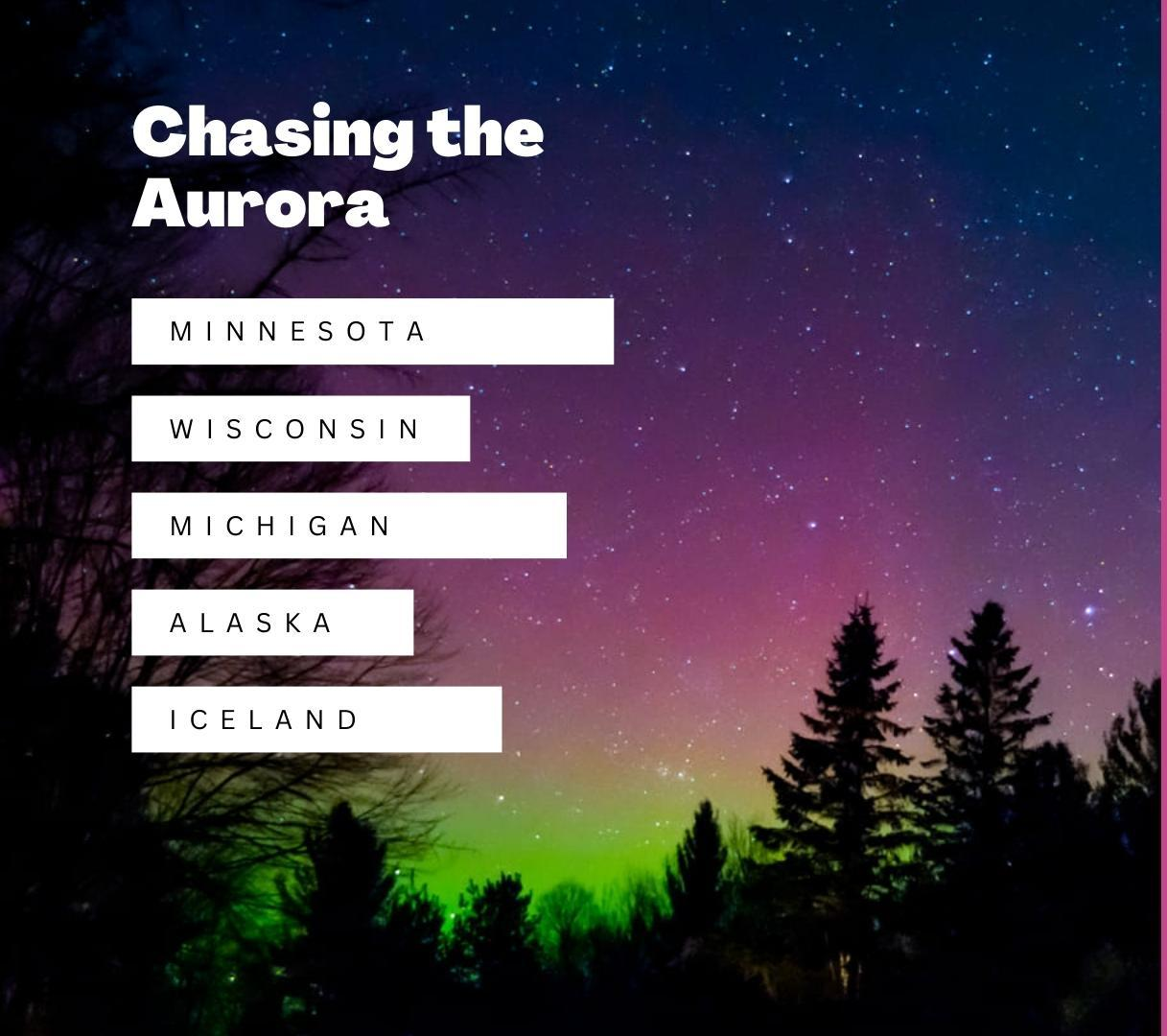
In the office, Melissa works as a Manager of Marketing & Communications for the **University of Michigan.**

- Interviews researchers in fields of space weather & climate change
- Writes breaking news in partnership with NASA, NOAA and other agencies
- Manages websites, social media, marketing and press relations at U-M



Also this…

Human of @ElioTheSpunkyPup
Driver of Sunspot, the Subie
#ALittleSunspot



THE NIGHT AURORA CHASED ME

Driving home from the Inaugural Upper Peninsula Dark Sky Festival along Lake Superior's Shore in the Upper Peninsula of Michigan, April 23-24, 2023.

Photo by Jessica Ellis Rorman

Featuring the Michigan Aurora Chasers

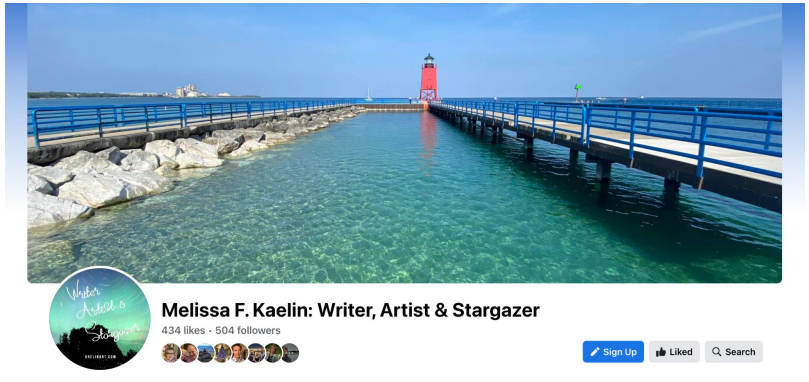
Melissa F. Kaelin
August 18, 2022 ·

Congratulations to all of the Michigan Aurora Chasers who caught the Northern Lights on August 17-18! It was a tough chase, but Aurora did appear above the 45th Parallel in Michigan, mostly on camera. Here are just a few of the early photos.

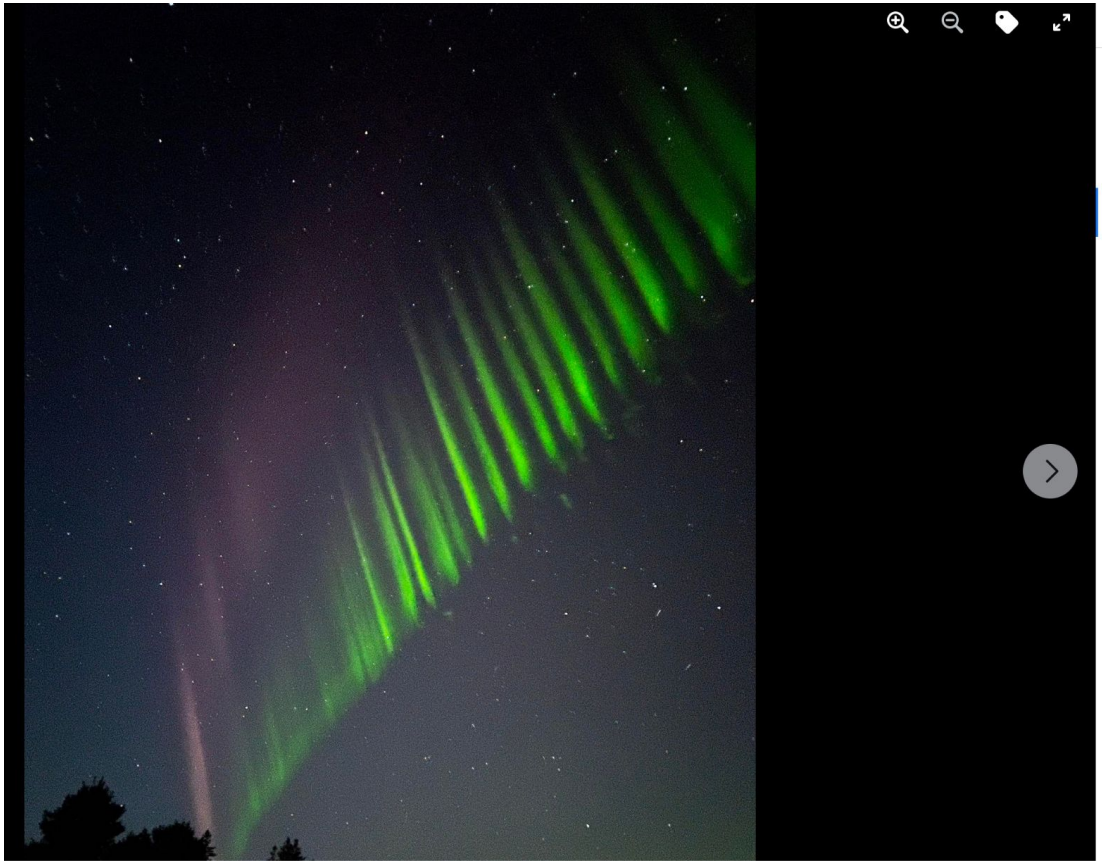
With no geomagnetic storm conditions, we had no luck at the 43rd Parallel Live Chase.

#MiAurora #LiveChase

LINK



STEVE



Pamela Hofacker Teachout
9h ·
I cannot believe I saw this. Just now. Highw
23 by Hammond Bay Harbor Marina.

622 34 Comn

Wow Comment

View 24 previous comments All comments

Shama Padakannaya
What an amazing photo!!
Like Reply 1h

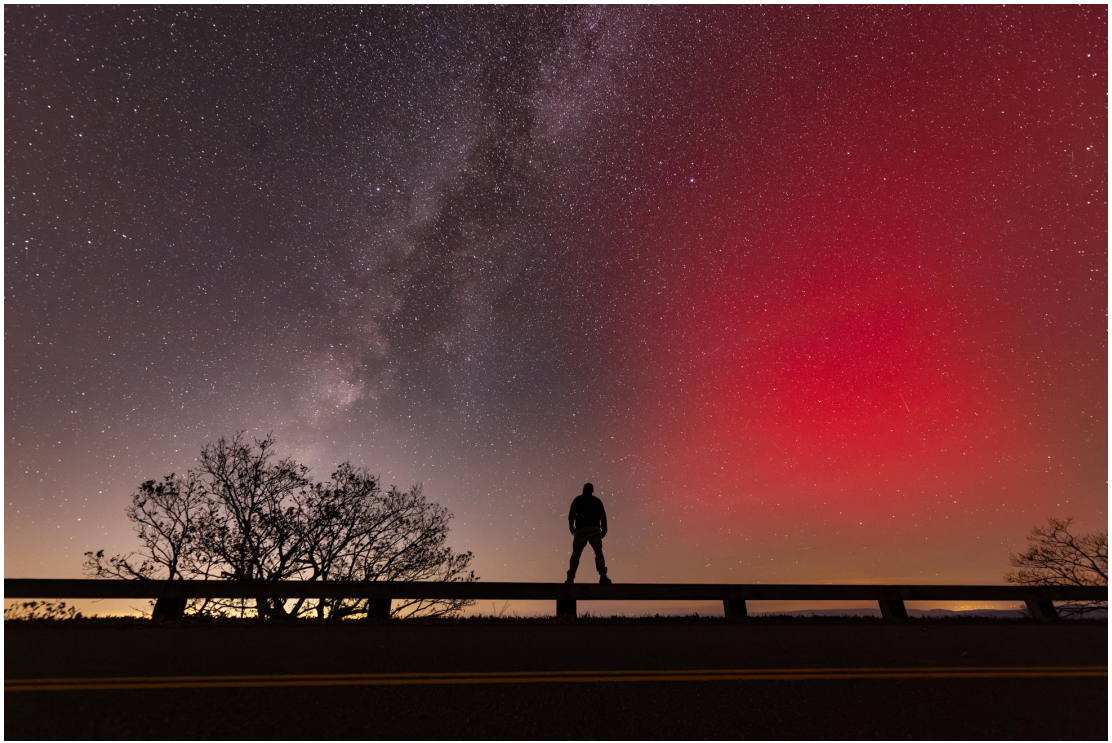
Bridgett Titus Sutton
Simply amazing. I could/should have been camping up north this weekend. 😢
Like Reply 1h

Tim Wenzel
AWESOME SHOT, simply awesome. Frame it and show it to everybody, especially U Alberta folks. Note exact time and location for them.
Like Reply 1h

Anita De La Cruz
Juan De La Cruz
Like Reply 1h

Destri Zoe Nettell
STEVE!!!!

Stable Aurora Red (SAR) Arc



Jason Rinehart added 5 new photos to the album: **Virginia/Mid-Atlantic Auroras**.
November 6 at 10:41 PM ·

So, this has been a dream capture of mine for a while now, ever since I first captured the Aurora on camera 2017. Well last night that dream frame presented itself and of all places the 37th parallel here in Virginia. For those that don't know much about the night sky, the milky way rises In the Northern Hemisphere, between East and West while looking towards the South. Auroras happen facing North in the Northern Hemisphere so both appear on opposite sides of the night sky, it's pretty much an unrealistic shot below the 45th parallel. Well yesterday's incredible solar storm that happened as night fell across Europe, produced a rare phenomenon across Americas night skies called SAR or Stable Auroral Red arcs basically an aroural rainbow. SAR arcs are seen as relatively featureless, slowly changing bands of red light that can extend over the entire night sky. They can appear simultaneously in both the northern and southern hemispheres. SAR arcs occur on approximately 10-12% of nights throughout the 11 year solar cycle. Pretty excited about these frames and definitely means a lot to me personally. It's always amazing seeing hard work pay off and last night was absolutely amazing.

Corona

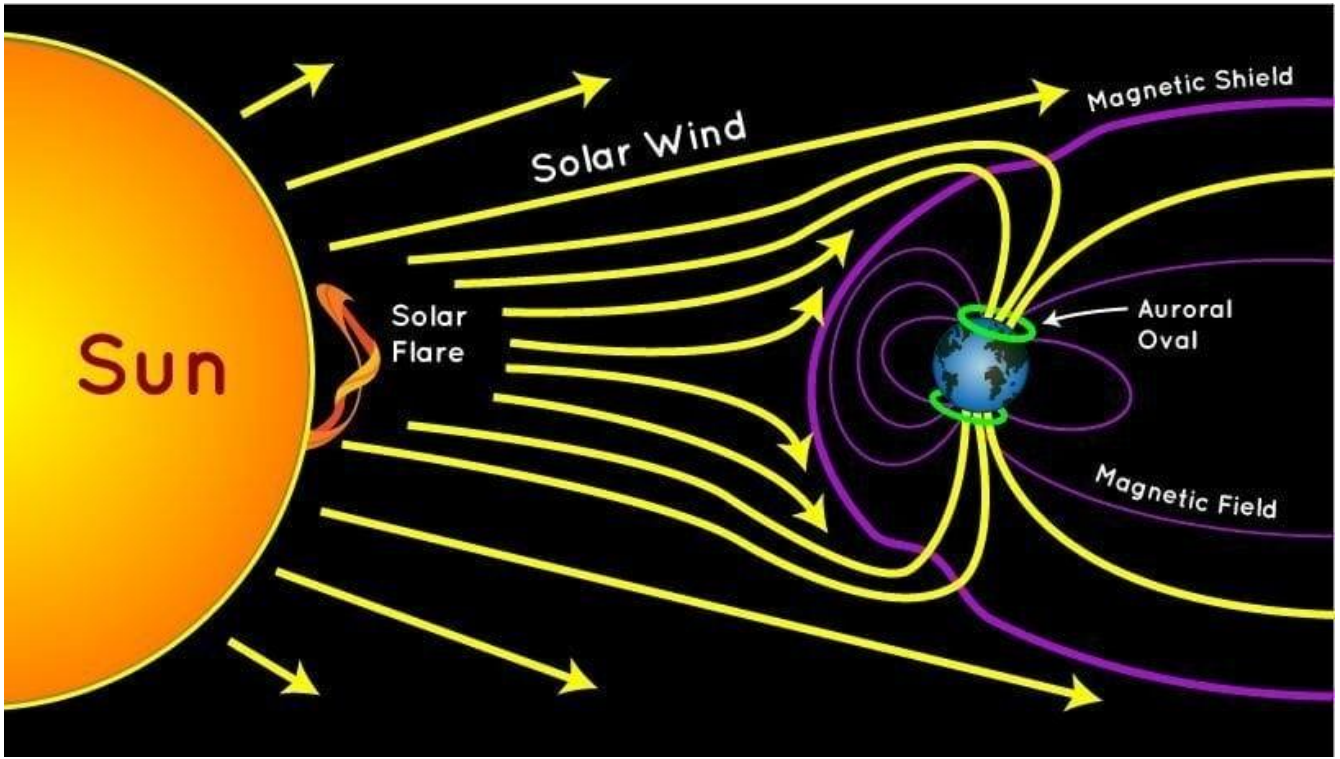

Photography
This photo is from a post.
View post
Isaac Diener
March 24 ·
201
28
Love
Comment
Send
Most recent
Beth Ann Giannosa
One of the best Aurora shots I've ever seen !! Permission to share, with credit to you ?
34w Like Reply
View all 3 replies
Holly Belian
Hope you're on the mend ❤️This is mind blowing! Would you mind sharing your camera settings?
34w Like Reply
View all 2 replies
Deane Johnson Wynsma
Whaaaaaaaat!?!?
34w Like Reply
Kimberly Musich Laviolette
Wowza!
34w Like Reply
Julia Strohmer Brott
Wow wow wow!!
34w Like Reply
Ashlyn Bolts
No words 😍😍
34w Like Reply
View more comments
6 of 23
Write a comment...

Space Weather Forecasts

Understanding Space Weather & The Solar Wind

Solar Activity

- Solar Plasma
- Eruptions
- CMEs
- CH HSS: Coronal Hole High Speed Stream
- Filaments
- Glancing Blow
- Co-rotating Interactive Regions
- **Ever Present Solar Wind**

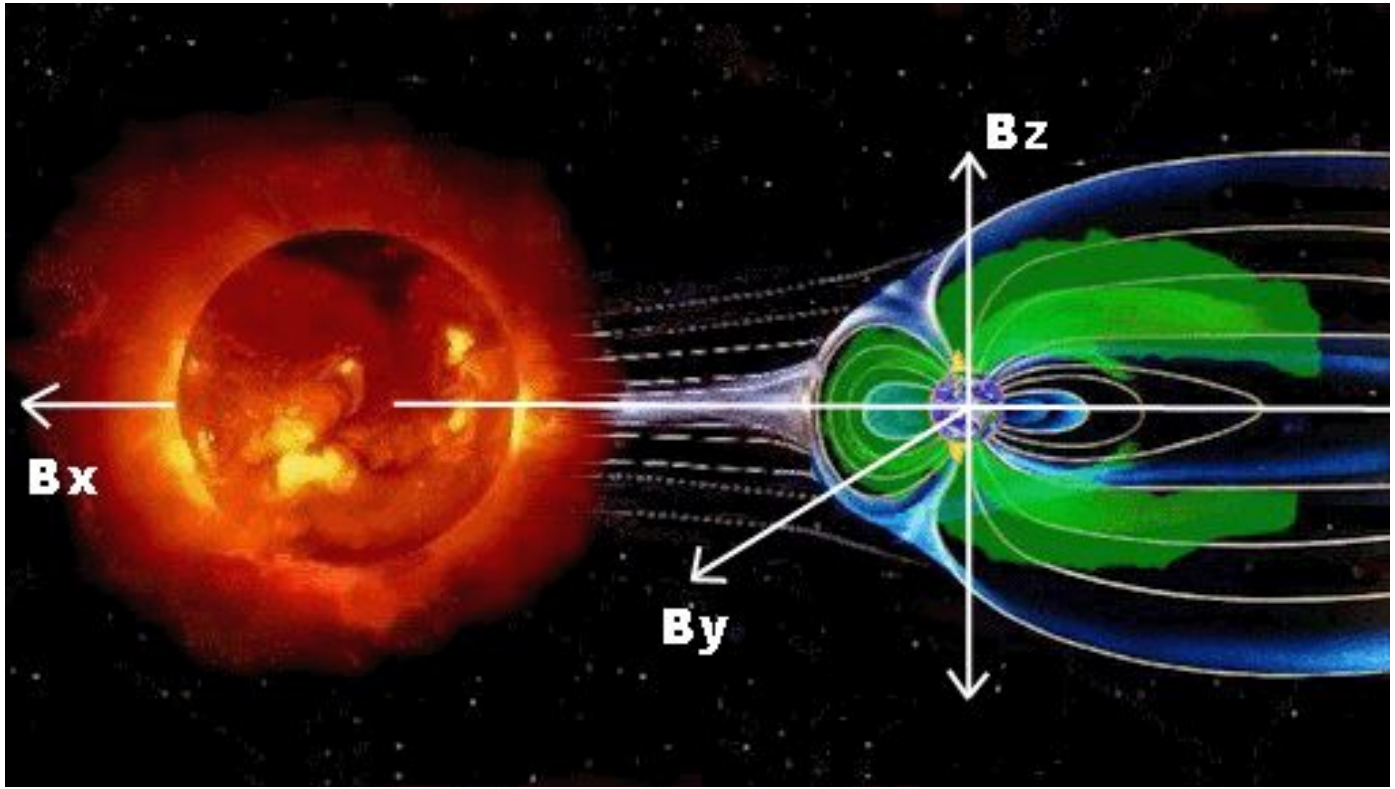


Source: Space Weather Prediction Center

Meet “the Gatekeeper”: That Pesky Bz

On an Axis

- Like a magnet!
- Southward Bz = Open flow of energy
- Northward Bz = Closed to energy flow
- Oscillating is good
- Trends in data
- Enter the Bt



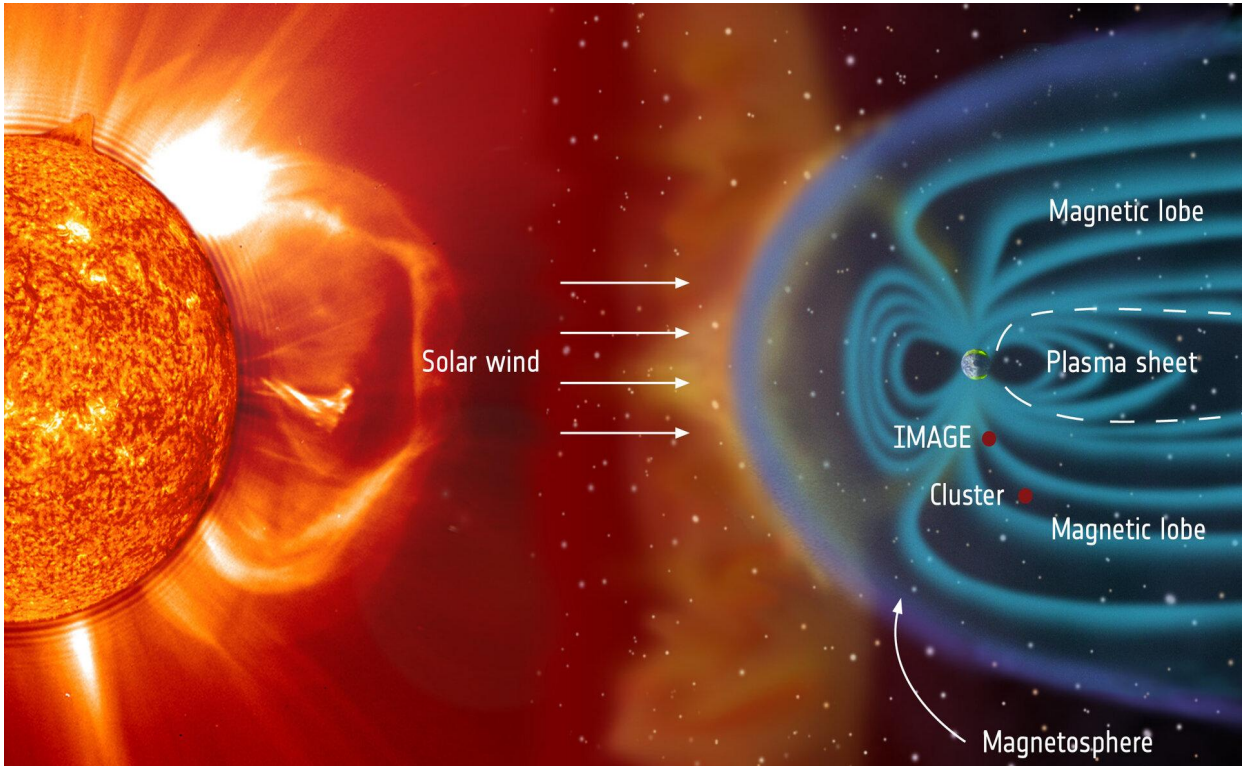
Source: Aurorasaurus

The Solar Wind's Journey to Earth's Magnetic Field

Winds Traveling in Space

- Monitoring the Sun
- Monitoring the Earth
- 93 Million Miles
- 2-3 Days Notice
- Aging satellites and spacecraft
- Data measured in outer space takes time to propagate to Earth

SDO: Solar Dynamics Observatory
ACE: Advanced Composition Explorer
SOHO: Solar and Heliospheric Observatory

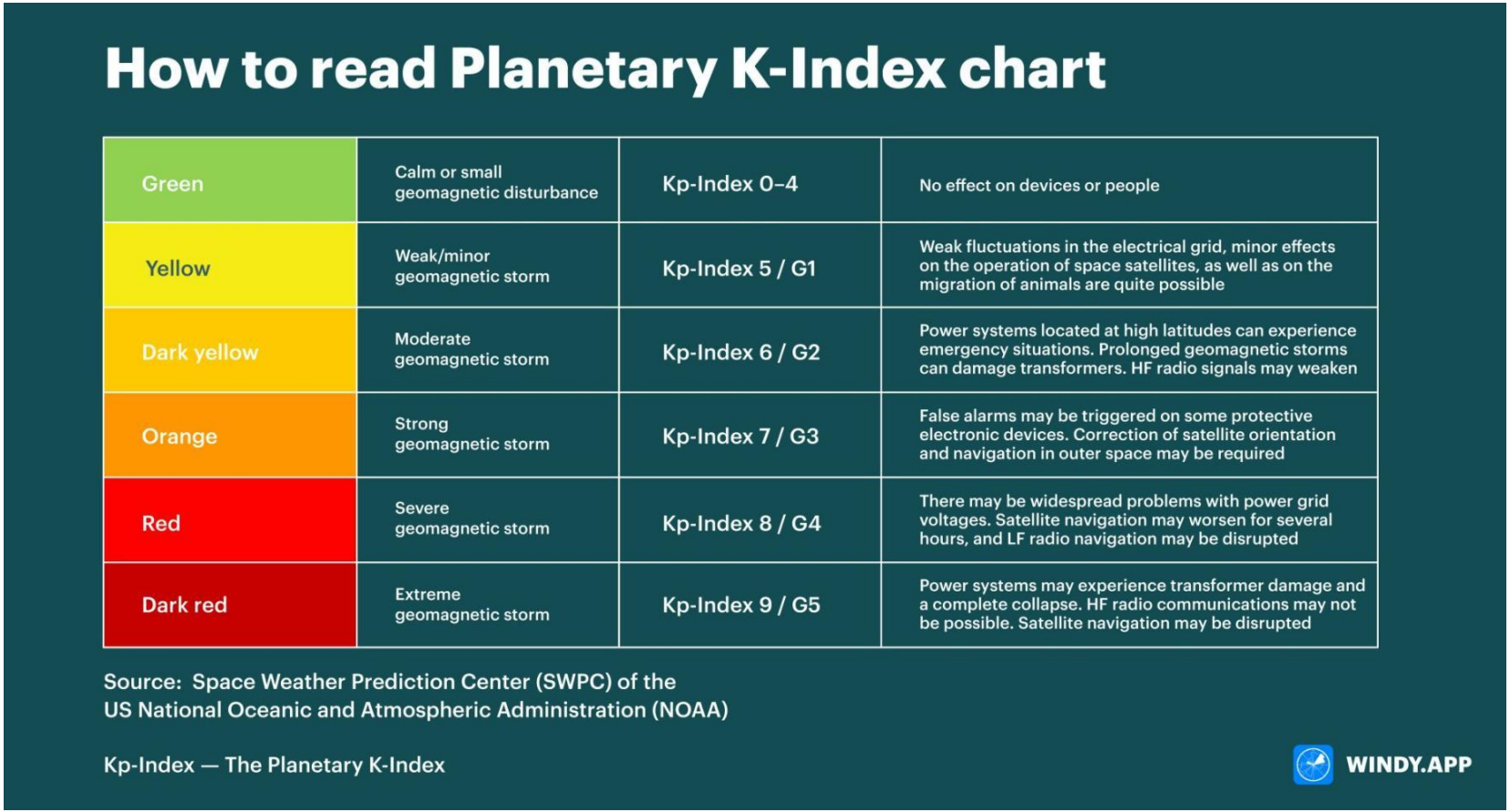


Source: ESA

Many Methods for Predicting Aurora

Beginner	Apps, Kp Alerts, Webcams
Beginner	K-Index, Predictions, Ovation Model, HPI
Intermediate	Space Weather Live, Real Time Solar Wind
Intermediate	Coronographs, SolarHam, Ap-Index
Advanced	WSA-Enlil, CME Scoreboard, Solar Activity
Advanced	Analyzing CMEs, Understanding Flux Ropes

Kp: The Most Widely Distributed Measure of Geomagnetic Activity



The Limitations of the K-Index: Be Weary of Kp

The K-Index describes the strength of geomagnetic activity correlated to Aurora. When referred to as a “planetary average,” this is called Kp. Kp is not a perfect tool.

Aurora Chasing

The Pros and Cons of Relying on Kp

When you’re trying to catch the Northern Lights for the first time, it’s natural to wonder when you can see them and where. The answer to these questions, it turns out, is not so easy.

- National forecasting standard
- A forecasting tool, not a good real-time tool
- Data from magnetometers across the world
- An average over 3 hours
- Often refers to the past
- Available on many apps, which may lag
- Other data more important in real time

NOAA's Geomagnetic Storm Scales

A Geomagnetic Storm is essentially an Aurora happening at storm level conditions.

G5 Storm (aka K9)

G4 Storm (K8)

G3 Storm (K7)

G2 Storm (K6)

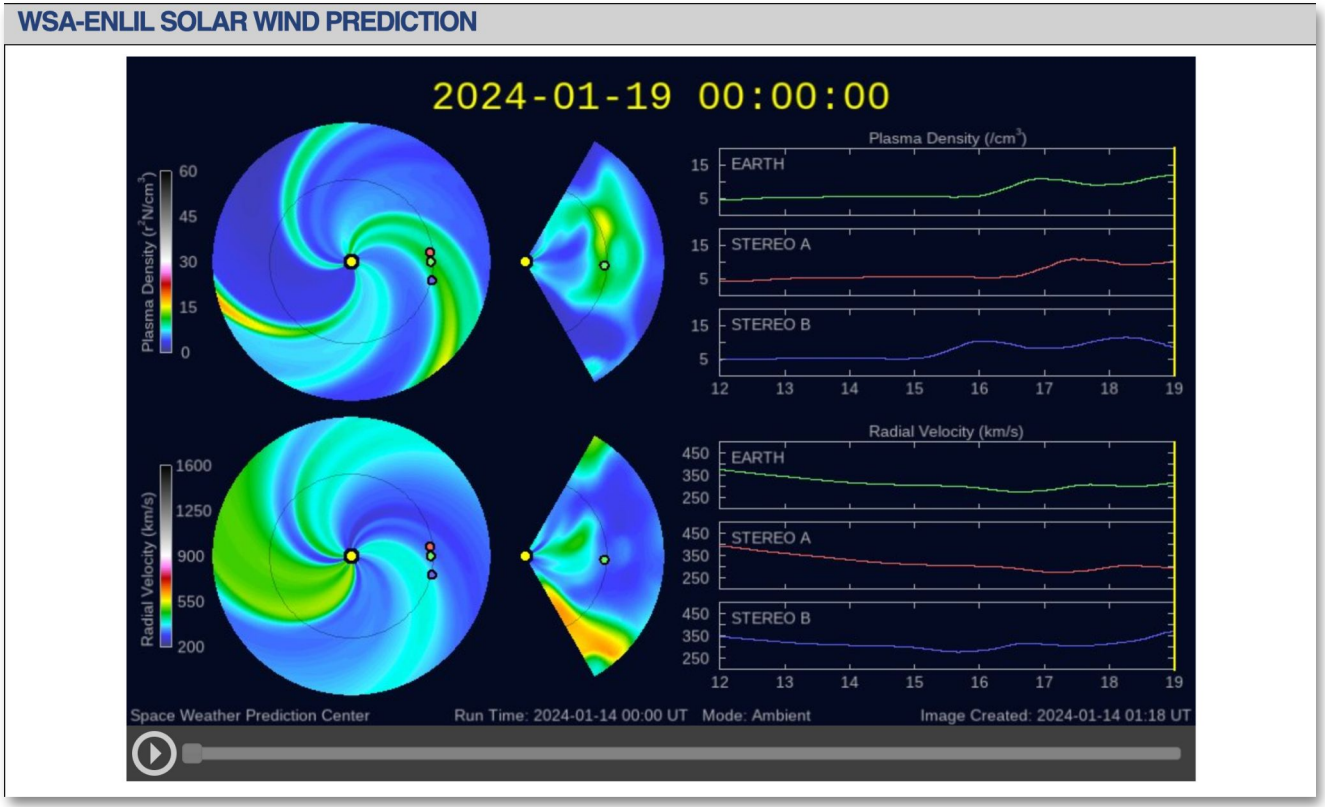
G1 Storm (K5)

K4 or Kp4 is below storm levels.

Scale	Description	Effect	Physical measure	Average Frequency (1 cycle = 11 years)
G 5	Extreme	**Power systems:** Widespread voltage control problems and protective system problems can occur, some grid systems may experience complete collapse or blackouts. Transformers may experience damage. **Spacecraft operations:** May experience extensive surface charging, problems with orientation, uplink/downlink and tracking satellites. **Other systems:** Pipeline currents can reach hundreds of amps, HF (high frequency) radio propagation may be impossible in many areas for one to two days, satellite navigation may be degraded for days, low-frequency radio navigation can be out for hours, and aurora has been seen as low as Florida and southern Texas (typically 40° geomagnetic lat.).	Kp = 9	4 per cycle (4 days per cycle)
G 4	Severe	**Power systems:** Possible widespread voltage control problems and some protective systems will mistakenly trip out key assets from the grid. **Spacecraft operations:** May experience surface charging and tracking problems, corrections may be needed for orientation problems. **Other systems:** Induced pipeline currents affect preventive measures, HF radio propagation sporadic, satellite navigation degraded for hours, low-frequency radio navigation disrupted, and aurora has been seen as low as Alabama and northern California (typically 45° geomagnetic lat.).	Kp = 8, including a 9-	100 per cycle (60 days per cycle)
G 3	Strong	**Power systems:** Voltage corrections may be required, false alarms triggered on some protection devices. **Spacecraft operations:** Surface charging may occur on satellite components, drag may increase on low-Earth-orbit satellites, and corrections may be needed for orientation problems. **Other systems:** Intermittent satellite navigation and low-frequency radio navigation problems may occur, HF radio may be intermittent, and aurora has been seen as low as Illinois and Oregon (typically 50° geomagnetic lat.).	Kp = 7	200 per cycle (130 days per cycle)
G 2	Moderate	**Power systems:** High-latitude power systems may experience voltage alarms, long-duration storms may cause transformer damage. **Spacecraft operations:** Corrective actions to orientation may be required by ground control; possible changes in drag affect orbit predictions. **Other systems:** HF radio propagation can fade at higher latitudes, and aurora has been seen as low as New York and Idaho (typically 55° geomagnetic lat.).	Kp = 6	600 per cycle (360 days per cycle)
G 1	Minor	**Power systems:** Weak power grid fluctuations can occur. **Spacecraft operations:** Minor impact on satellite operations possible. **Other systems:** Migratory animals are affected at this and higher levels; aurora is commonly visible at high latitudes (northern Michigan and Maine).	Kp = 5	1700 per cycle (900 days per cycle)

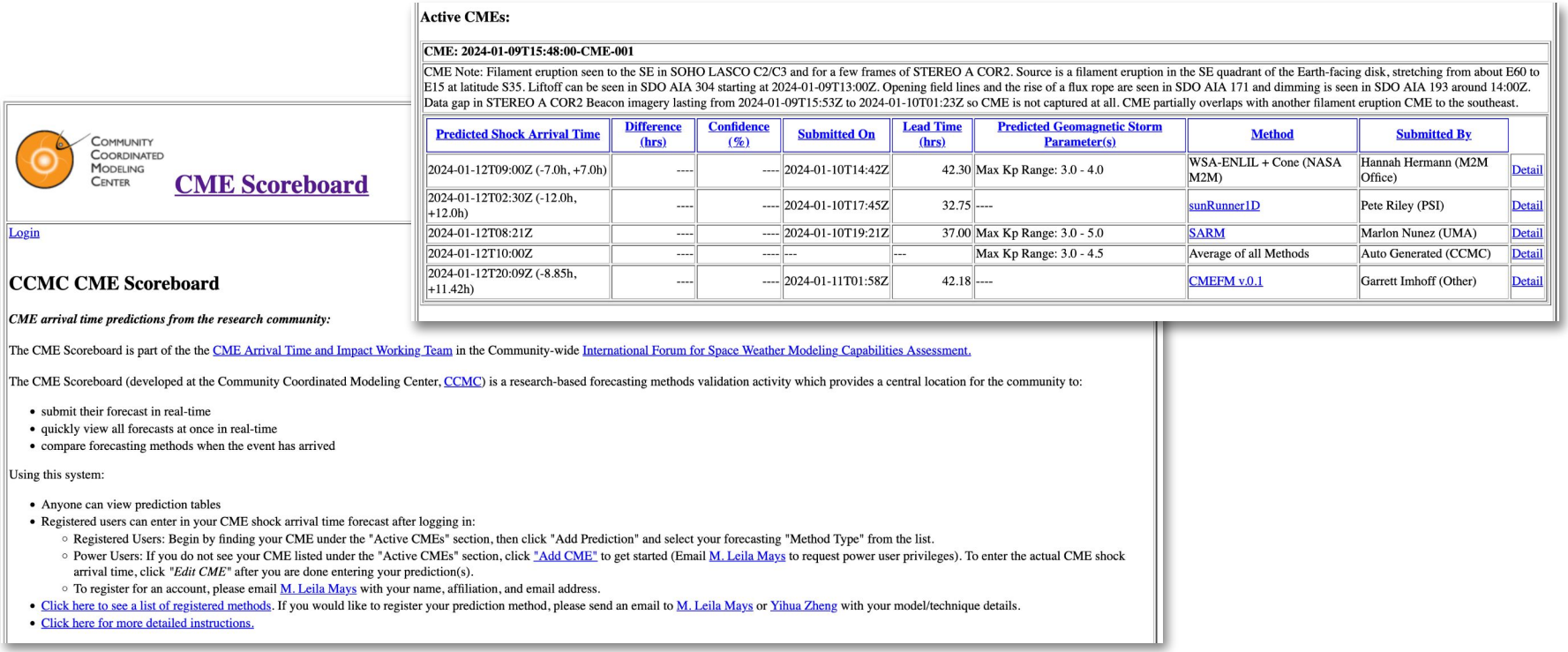
WSA-ENLIL Solar Wind Prediction Model

Tracking Coronal Mass Ejections from the minute they leave the sun's surface.



Community Coordinated Modeling Center's CME Scoreboard

The CME Scoreboard gives analysis of each potential impact, with the method used, the timing, and details of each blast. Sample details include the source, strength, and Earth-facing potential.



COMMUNITY COORDINATED MODELING CENTER

CME Scoreboard

Login

CCMC CME Scoreboard

CME arrival time predictions from the research community:

The CME Scoreboard is part of the the CME Arrival Time and Impact Working Team in the Community-wide International Forum for Space Weather Modeling Capabilities Assessment.

The CME Scoreboard (developed at the Community Coordinated Modeling Center, CCMC) is a research-based forecasting methods validation activity which provides a central location for the community to:

- submit their forecast in real-time
- quickly view all forecasts at once in real-time
- compare forecasting methods when the event has arrived

Using this system:

- Anyone can view prediction tables
- Registered users can enter in your CME shock arrival time forecast after logging in:
  - Registered Users: Begin by finding your CME under the "Active CMEs" section, then click "Add Prediction" and select your forecasting "Method Type" from the list.
  - Power Users: If you do not see your CME listed under the "Active CMEs" section, click "Add CME" to get started (Email M. Leila Mays to request power user privileges). To enter the actual CME shock arrival time, click "*Edit CME*" after you are done entering your prediction(s).
  - To register for an account, please email M. Leila Mays with your name, affiliation, and email address.
- Click here to see a list of registered methods. If you would like to register your prediction method, please send an email to M. Leila Mays or Yihua Zheng with your model/technique details.
- Click here for more detailed instructions.

Active CMEs:

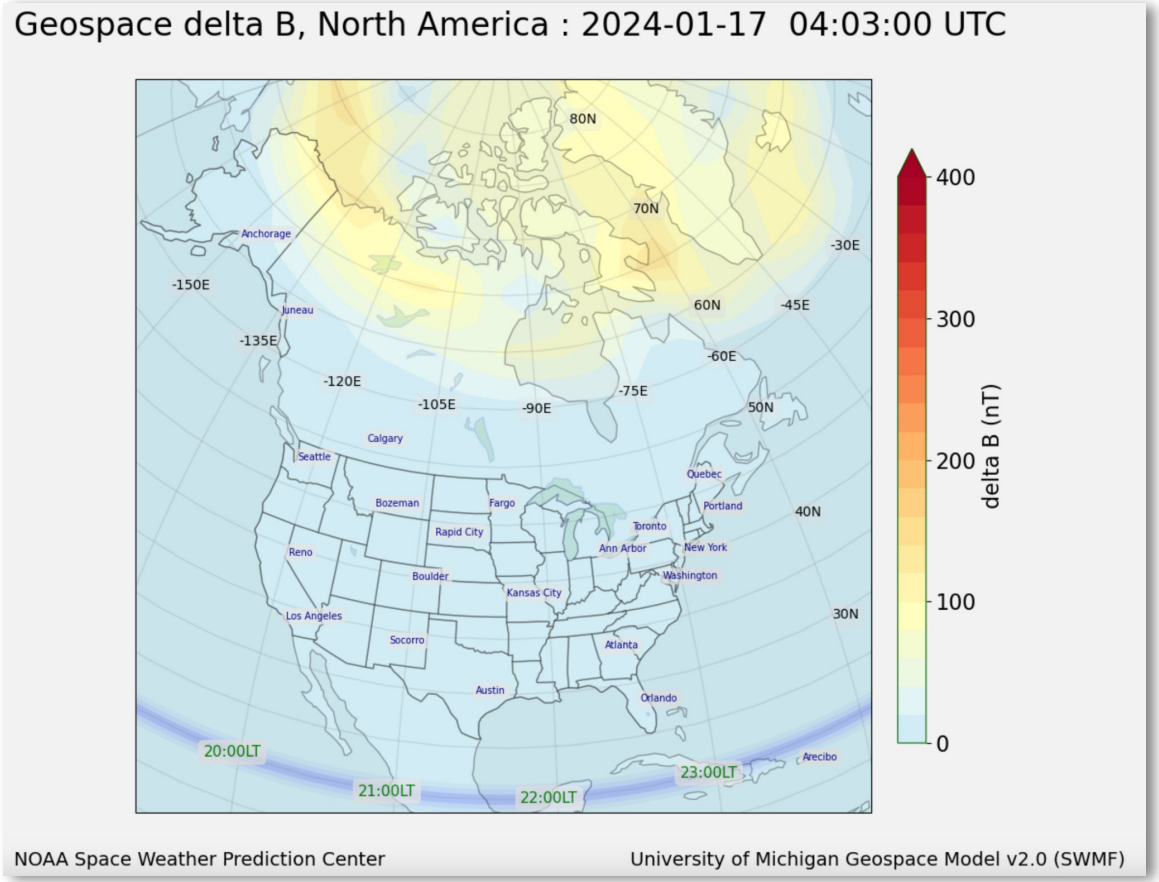
CME: 2024-01-09T15:48:00-CME-001

CME Note: Filament eruption seen to the SE in SOHO LASCO C2/C3 and for a few frames of STEREO A COR2. Source is a filament eruption in the SE quadrant of the Earth-facing disk, stretching from about E60 to E15 at latitude S35. Liftoff can be seen in SDO AIA 304 starting at 2024-01-09T13:00Z. Opening field lines and the rise of a flux rope are seen in SDO AIA 171 and dimming is seen in SDO AIA 193 around 14:00Z. Data gap in STEREO A COR2 Beacon imagery lasting from 2024-01-09T15:53Z to 2024-01-10T01:23Z so CME is not captured at all. CME partially overlaps with another filament eruption CME to the southeast.

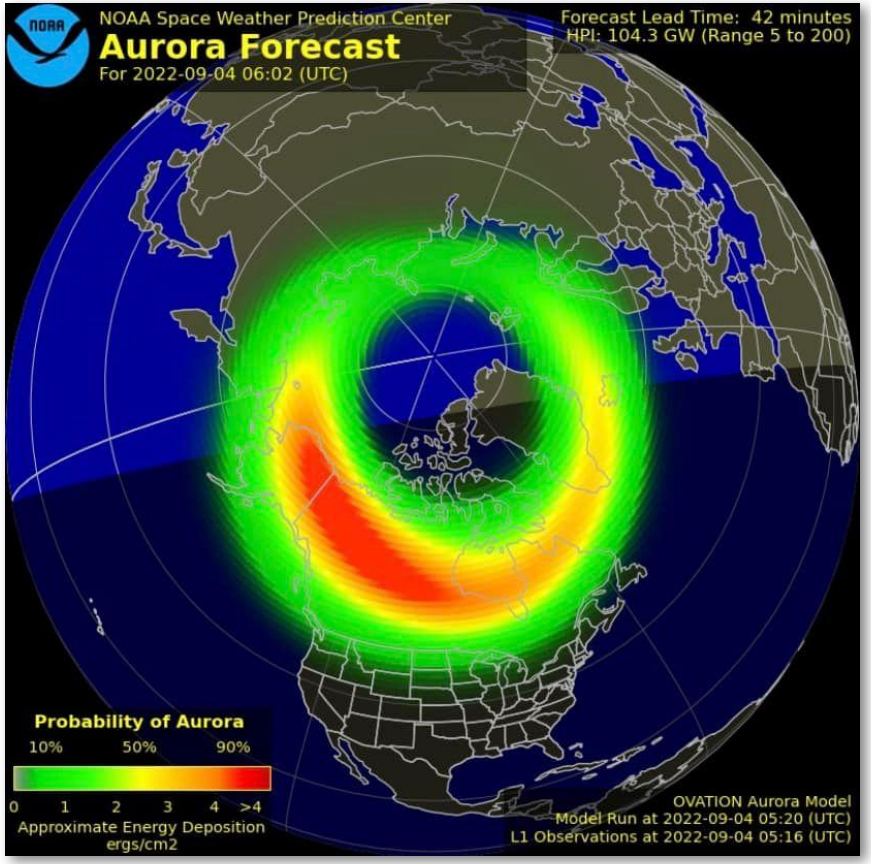
Predicted Shock Arrival Time	Difference (hrs)	Confidence (%)	Submitted On	Lead Time (hrs)	Predicted Geomagnetic Storm Parameter(s)	Method	Submitted By	
2024-01-12T09:00Z (-7.0h, +7.0h)	----	----	2024-01-10T14:42Z	42.30	Max Kp Range: 3.0 - 4.0	WSA-ENLIL + Cone (NASA M2M)	Hannah Hermann (M2M Office)	Detail
2024-01-12T02:30Z (-12.0h, +12.0h)	----	----	2024-01-10T17:45Z	32.75	----	sunRunner1D	Pete Riley (PSI)	Detail
2024-01-12T08:21Z	----	----	2024-01-10T19:21Z	37.00	Max Kp Range: 3.0 - 5.0	SARM	Marlon Nunez (UMA)	Detail
2024-01-12T10:00Z	----	----	---	---	Max Kp Range: 3.0 - 4.5	Average of all Methods	Auto Generated (CCMC)	Detail
2024-01-12T20:09Z (-8.85h, +11.42h)	----	----	2024-01-11T01:58Z	42.18	----	CMEFM v.0.1	Garrett Imhoff (Other)	Detail

Geospace Ground Magnetic Perturbation Maps

Magnetic Perturbations over North America collected by the University of Michigan Geospace Model



Ovation Model



Source: Space Weather Prediction Center

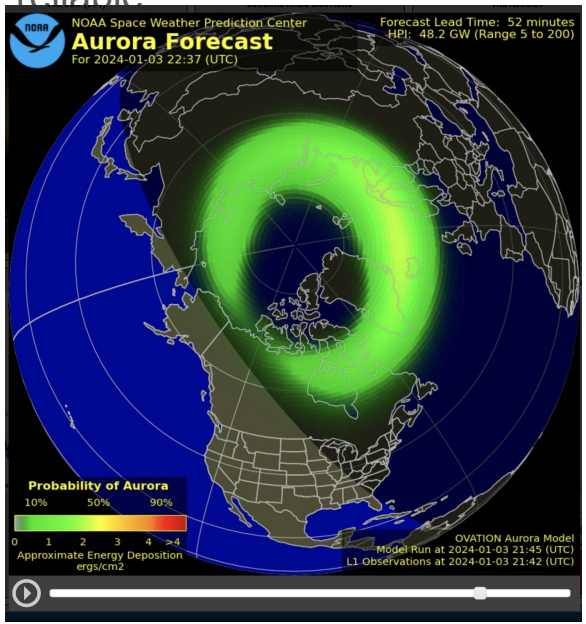
Components of the Ovation

The model uses the solar wind velocity and interplanetary magnetic field measured at the L1 orbit position, located one million miles from Earth, to calculate three types of electron precipitation and proton precipitation which strongly correlate with the aurora. (SWPC)

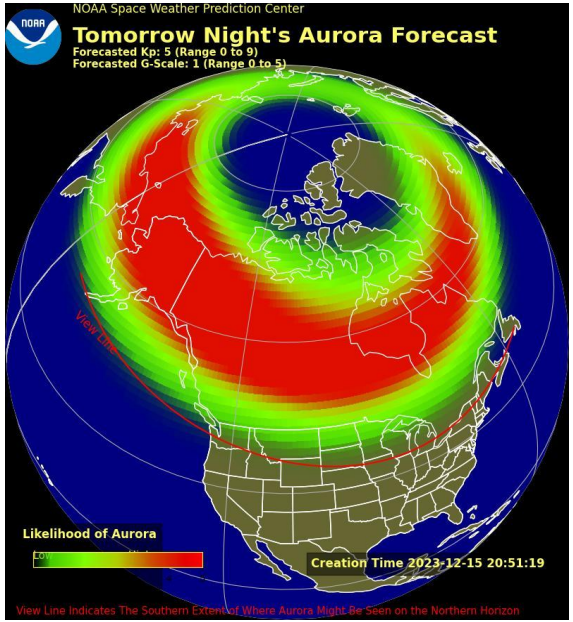
- Simpler than it looks, beginning with labels & dates
- Top left: Agency name, Forecast, Date of Forecast
- Top right: Covers important aurora strength details
- HPI (Hemispheric Power Index) — Hemispheric Power is another measure of aurora strength.
- Lead Time
- Bottom right: Times of the last model run and actual observations
- Bottom left: Legend with colors showing the probability
- Energy Deposition: Measures the energy flux or amount of energy Aurora is putting into the atmosphere

Variations of Ovation

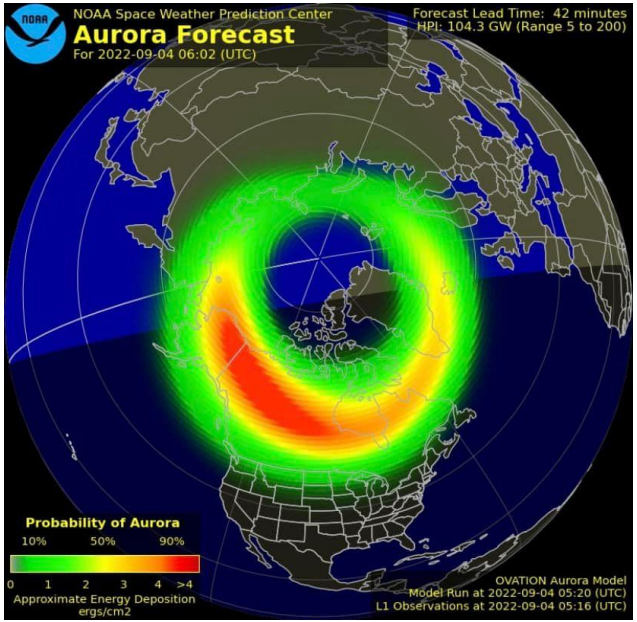
Many sources give you the Ovation Model in a video loop, but only the last second or so refers to the forecast. The new “Aurora Forecast” version is overstated. The still image forecast model is more reliable



Video



Forecast Version



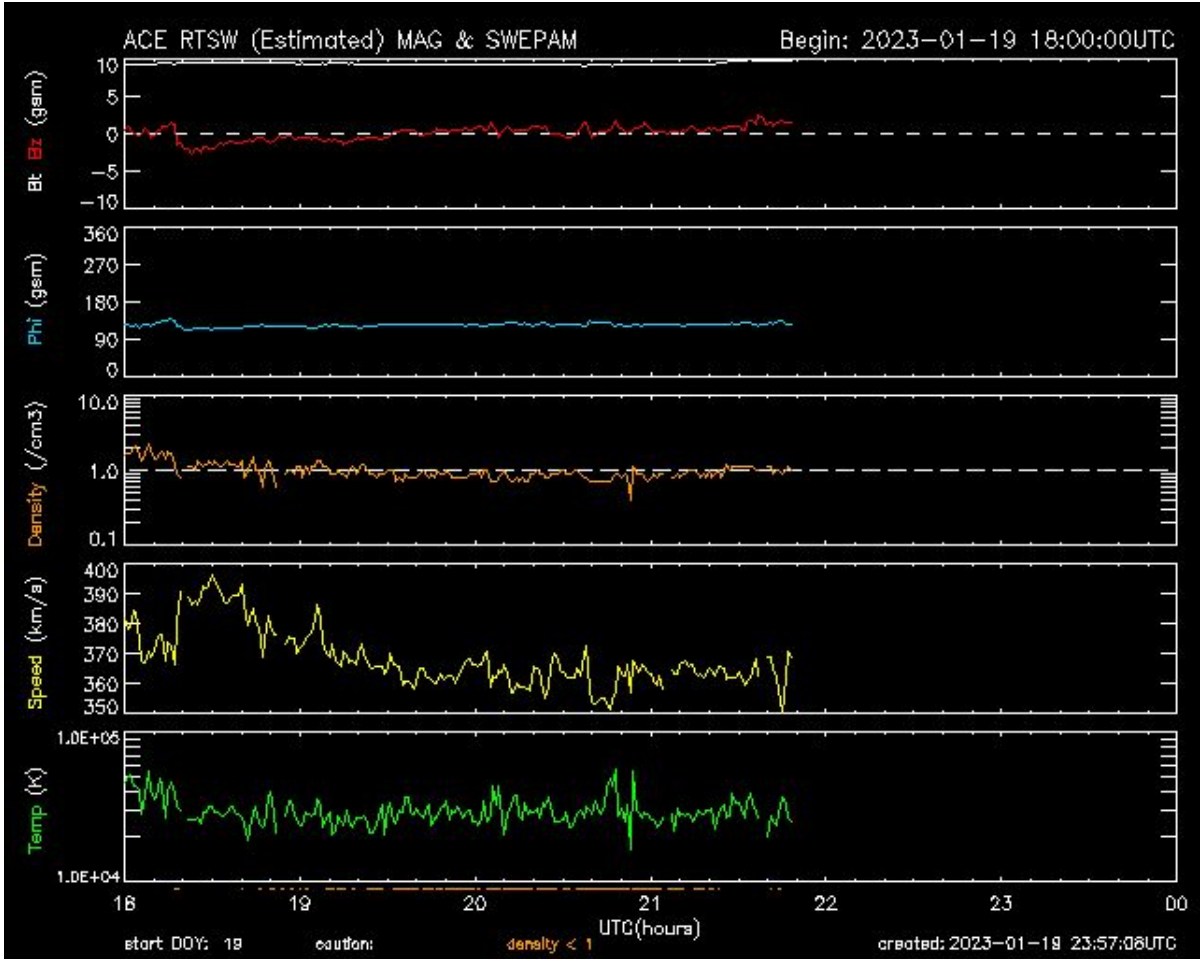
Real-Time Model

Source: Space Weather Prediction Center

ACE Real-Time Solar Wind

What's trending?

The NASA Advanced Composition Explorer (ACE) satellite enables the SWPC (Space Weather Prediction Center) to give advance warning of geomagnetic storms. This 6-hour plot shows the conditions of the solar wind, from speed, density and temperature to Phi, Bz and Bt.

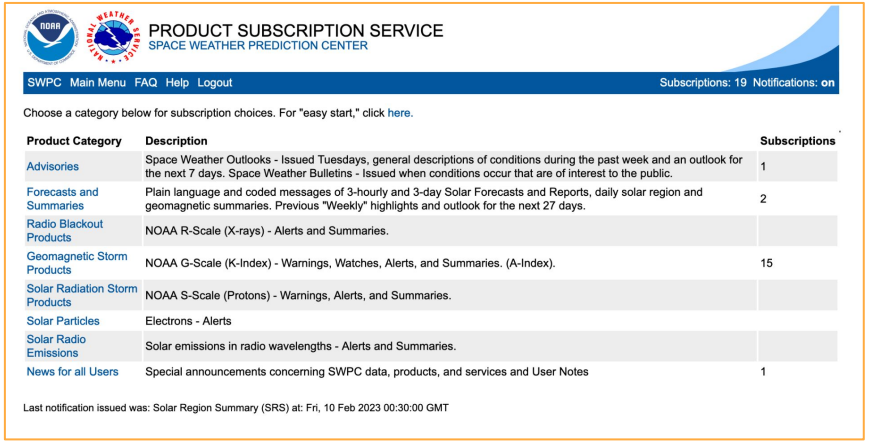


Source: SWPC

Space Weather Prediction Center

Break it down:

- **Universal Time** (UT) *Example: 0000-0300*
- Kp is given in **3-hour periods** of time.
  Kp is average geomagnetic strength from 0-9
- It's a **prediction** — a very difficult one at that!
  Space Weather is an emerging science.
- Understanding the **Rationale**



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SPACE WEATHER PREDICTION CENTER

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Choose a category below for subscription choices. For "easy start," click here.

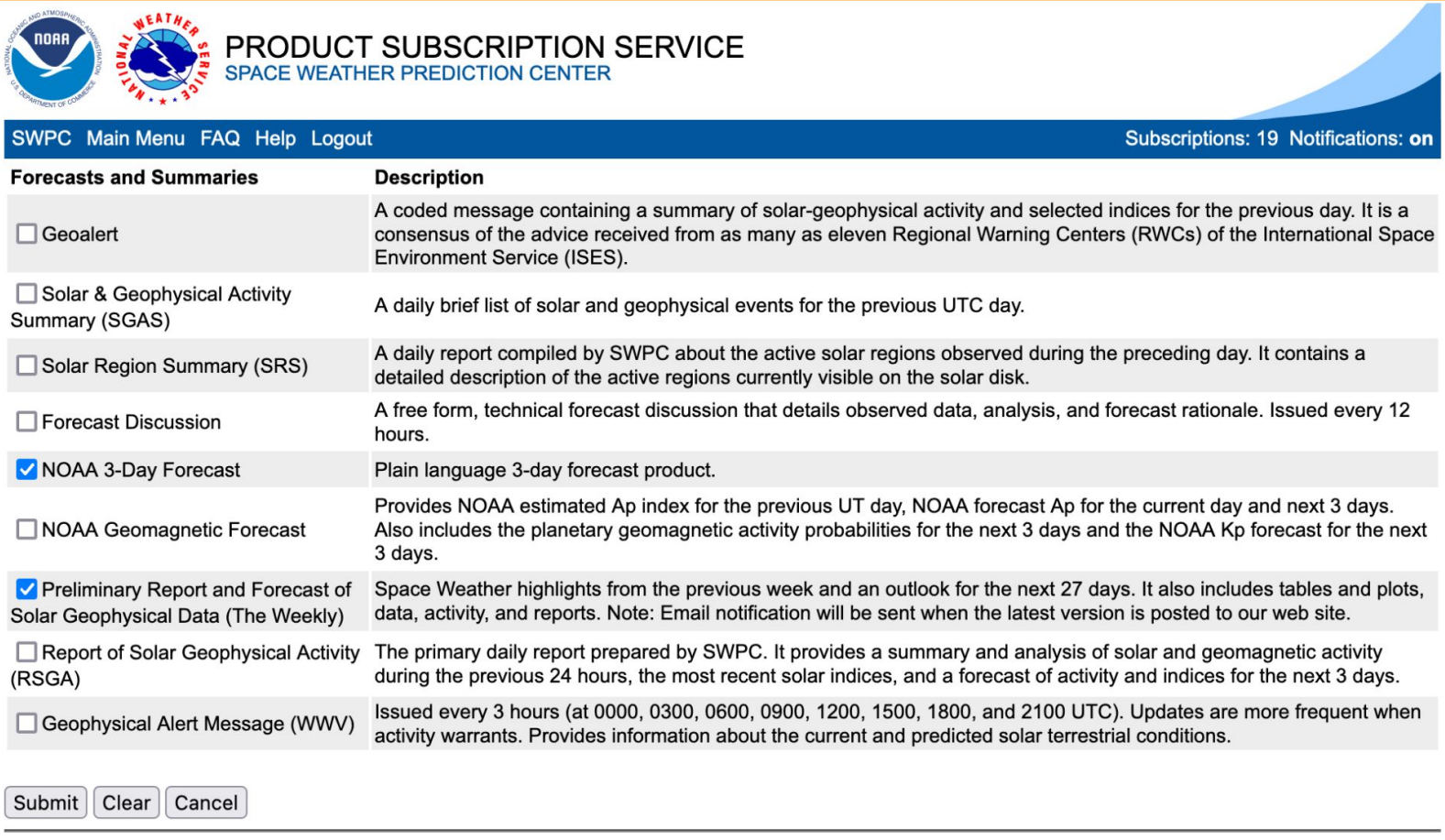
Product Category	Description	Subscriptions
Advisories	Space Weather Outlooks - Issued Tuesdays, general descriptions of conditions during the past week and an outlook for the next 7 days. Space Weather Bulletins - Issued when conditions occur that are of interest to the public.	1
Forecasts and Summaries	Plain language and coded messages of 3-hourly and 3-day Solar Forecasts and Reports, daily solar region and geomagnetic summaries. Previous "Weekly" highlights and outlook for the next 27 days.	2
Radio Blackout Products	NOAA R-Scale (X-rays) - Alerts and Summaries.	
Geomagnetic Storm Products	NOAA G-Scale (K-Index) - Warnings, Watches, Alerts, and Summaries. (A-Index).	15
Solar Radiation Storm Products	NOAA S-Scale (Protons) - Warnings, Alerts, and Summaries.	
Solar Particles	Electrons - Alerts	
Solar Radio Emissions	Solar emissions in radio wavelengths - Alerts and Summaries.	
News for all Users	Special announcements concerning SWPC data, products, and services and User Notes	1

Last notification issued was: Solar Region Summary (SRS) at: Fri, 10 Feb 2023 00:30:00 GMT

Using SWPC Forecasts

```
Product: 3-Day Forecast
Issued: 2023 May 11 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 May 11-May 13 2023 is 6.67 (NOAA Scale
G3).

NOAA Kp index breakdown May 11-May 13 2023

             May 11       May 12       May 13
00-03UT       3.00         4.67 (G1)    3.00
03-06UT       3.00         5.67 (G2)    3.67
06-09UT       2.33         4.67 (G1)    2.67
09-12UT       1.33         4.00         2.33
12-15UT       2.33         3.33         1.67
15-18UT       2.67         3.67         2.33
18-21UT       4.33         3.00         2.67
21-00UT       6.67 (G3)    2.67         2.33

Rationale: Arrival of the anticipated CME later on 11 May/early 12 May
will likely lead to G1-G3 (Minor to Strong) storm levels. Unsettled to
active levels are expected on 13 May as CME influences wane.
```

How to Subscribe to SWPC



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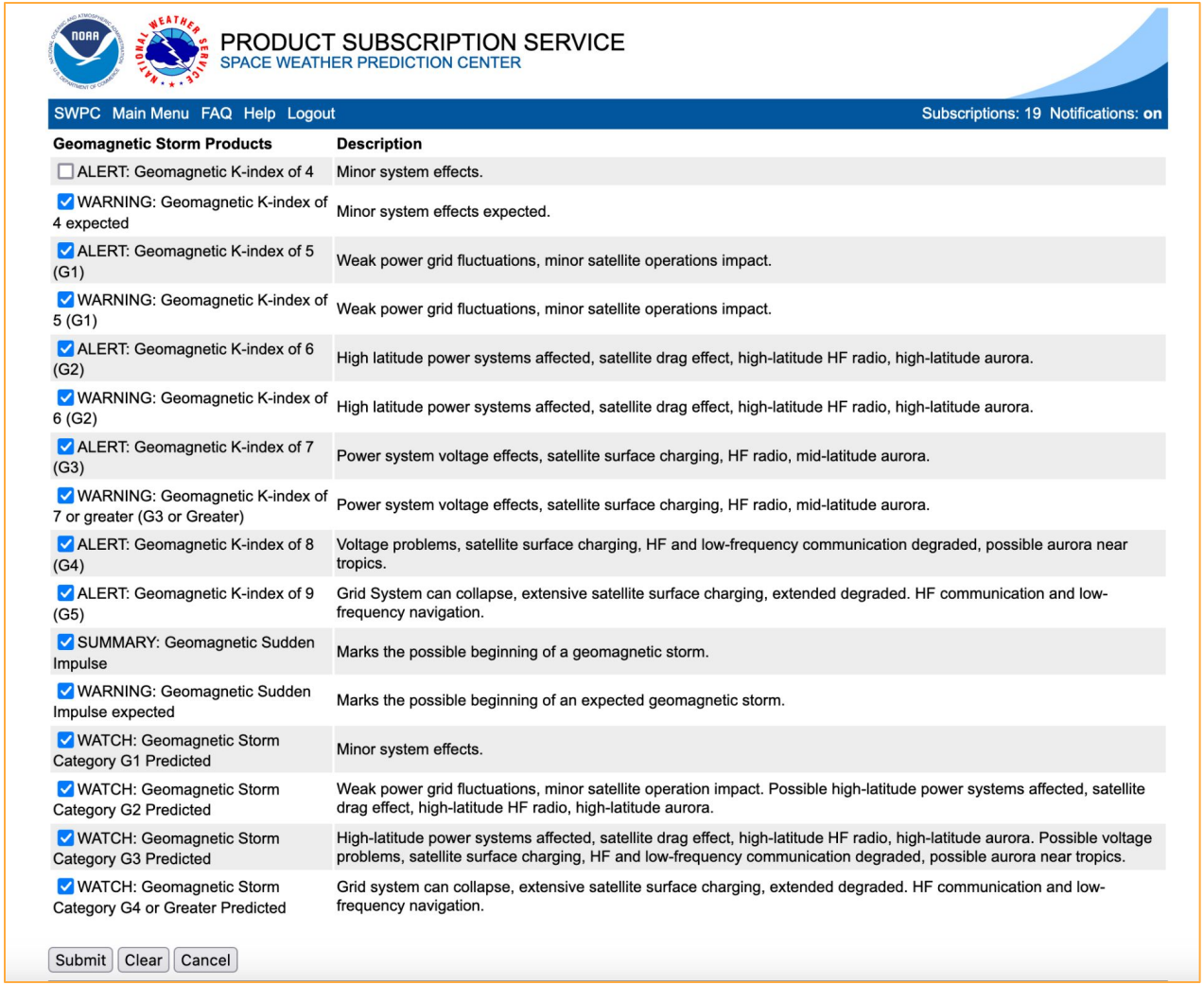
Forecasts and Summaries	Description
☐ Geoalert	A coded message containing a summary of solar-geophysical activity and selected indices for the previous day. It is a consensus of the advice received from as many as eleven Regional Warning Centers (RWCs) of the International Space Environment Service (ISES).
☐ Solar & Geophysical Activity Summary (SGAS)	A daily brief list of solar and geophysical events for the previous UTC day.
☐ Solar Region Summary (SRS)	A daily report compiled by SWPC about the active solar regions observed during the preceding day. It contains a detailed description of the active regions currently visible on the solar disk.
☐ Forecast Discussion	A free form, technical forecast discussion that details observed data, analysis, and forecast rationale. Issued every 12 hours.
☑ NOAA 3-Day Forecast	Plain language 3-day forecast product.
☐ NOAA Geomagnetic Forecast	Provides NOAA estimated Ap index for the previous UT day, NOAA forecast Ap for the current day and next 3 days. Also includes the planetary geomagnetic activity probabilities for the next 3 days and the NOAA Kp forecast for the next 3 days.
☑ Preliminary Report and Forecast of Solar Geophysical Data (The Weekly)	Space Weather highlights from the previous week and an outlook for the next 27 days. It also includes tables and plots, data, activity, and reports. Note: Email notification will be sent when the latest version is posted to our web site.
☐ Report of Solar Geophysical Activity (RSGA)	The primary daily report prepared by SWPC. It provides a summary and analysis of solar and geomagnetic activity during the previous 24 hours, the most recent solar indices, and a forecast of activity and indices for the next 3 days.
☐ Geophysical Alert Message (WWV)	Issued every 3 hours (at 0000, 0300, 0600, 0900, 1200, 1500, 1800, and 2100 UTC). Updates are more frequent when activity warrants. Provides information about the current and predicted solar terrestrial conditions.

Submit Clear Cancel



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SPACE WEATHER PREDICTION CENTER

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Geomagnetic Storm Products	Description
☐ ALERT: Geomagnetic K-index of 4	Minor system effects.
☑ WARNING: Geomagnetic K-index of 4 expected	Minor system effects expected.
☑ ALERT: Geomagnetic K-index of 5 (G1)	Weak power grid fluctuations, minor satellite operations impact.
☑ WARNING: Geomagnetic K-index of 5 (G1)	Weak power grid fluctuations, minor satellite operations impact.
☑ ALERT: Geomagnetic K-index of 6 (G2)	High latitude power systems affected, satellite drag effect, high-latitude HF radio, high-latitude aurora.
☑ WARNING: Geomagnetic K-index of 6 (G2)	High latitude power systems affected, satellite drag effect, high-latitude HF radio, high-latitude aurora.
☑ ALERT: Geomagnetic K-index of 7 (G3)	Power system voltage effects, satellite surface charging, HF radio, mid-latitude aurora.
☑ WARNING: Geomagnetic K-index of 7 or greater (G3 or Greater)	Power system voltage effects, satellite surface charging, HF radio, mid-latitude aurora.
☑ ALERT: Geomagnetic K-index of 8 (G4)	Voltage problems, satellite surface charging, HF and low-frequency communication degraded, possible aurora near tropics.
☑ ALERT: Geomagnetic K-index of 9 (G5)	Grid System can collapse, extensive satellite surface charging, extended degraded. HF communication and low-frequency navigation.
☑ SUMMARY: Geomagnetic Sudden Impulse	Marks the possible beginning of a geomagnetic storm.
☑ WARNING: Geomagnetic Sudden Impulse expected	Marks the possible beginning of an expected geomagnetic storm.
☑ WATCH: Geomagnetic Storm Category G1 Predicted	Minor system effects.
☑ WATCH: Geomagnetic Storm Category G2 Predicted	Weak power grid fluctuations, minor satellite operation impact. Possible high-latitude power systems affected, satellite drag effect, high-latitude HF radio, high-latitude aurora.
☑ WATCH: Geomagnetic Storm Category G3 Predicted	High-latitude power systems affected, satellite drag effect, high-latitude HF radio, high-latitude aurora. Possible voltage problems, satellite surface charging, HF and low-frequency communication degraded, possible aurora near tropics.
☑ WATCH: Geomagnetic Storm Category G4 or Greater Predicted	Grid system can collapse, extensive satellite surface charging, extended degraded. HF communication and low-frequency navigation.

Submit Clear Cancel

Watches, Warnings & Alerts Using NOAA Scales

Subscribe for free:

swpc.noaa.gov

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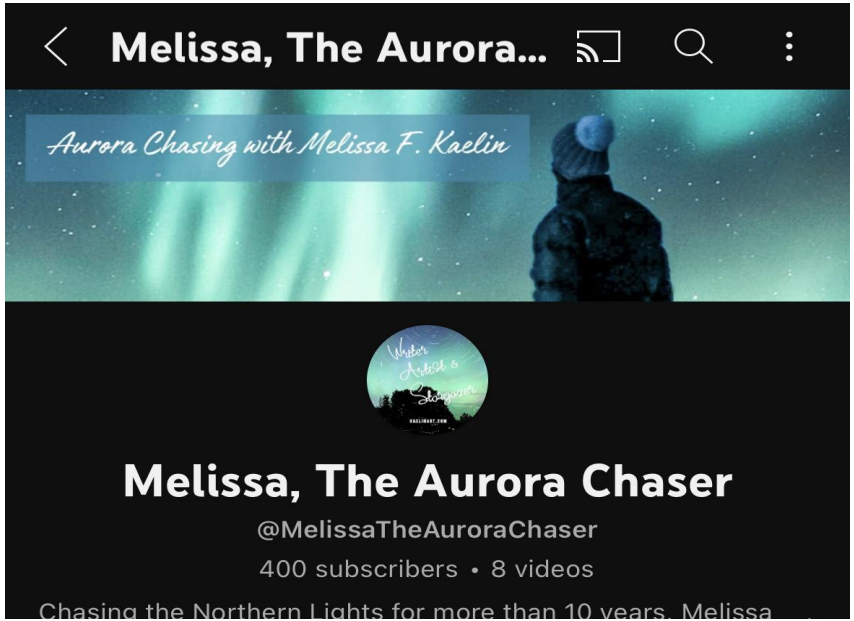
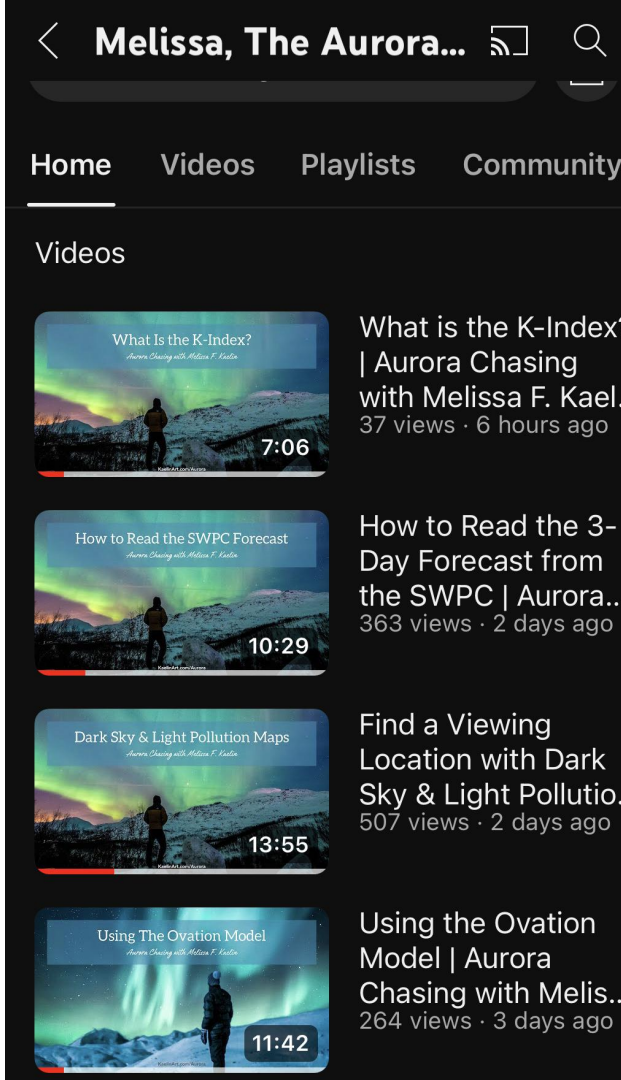
Learn More on YouTube!

If you'd like to spend more time learning how to use these tools, check out my channel.

Subscribe:

YouTube.com/@MelissaTheAuroraChaser

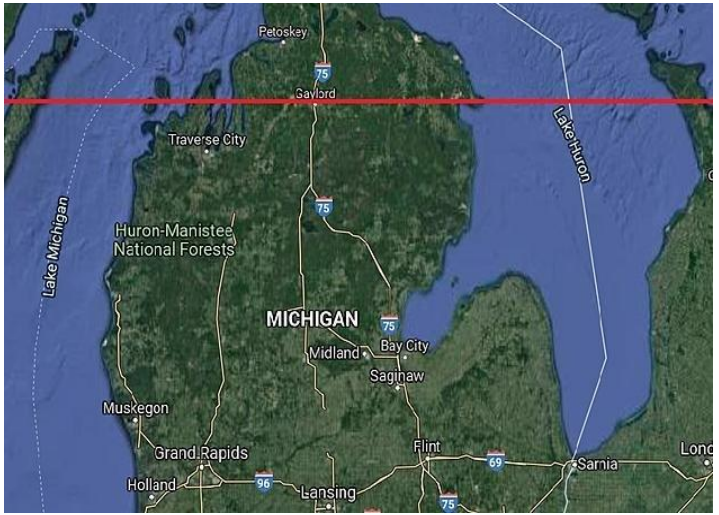




Observing Aurora on the Ground

Mapping Out the Chase: Part I

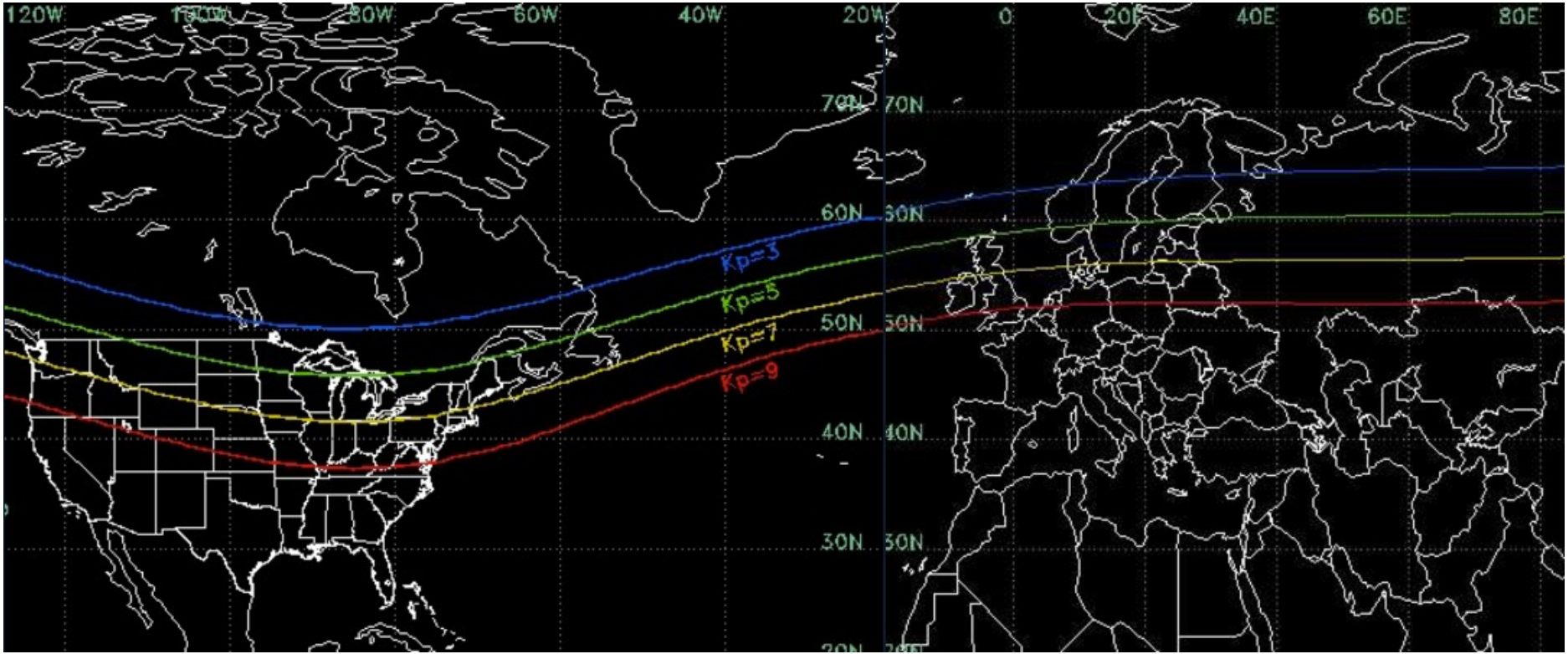
What's your latitude?



What parallel do you live near? The 45th Parallel is regarded as a magical line where northern life happens. But we believe that Aurora can frequently be seen as low as the 44th Parallel, in a line from Manistee to Houghton Lake to Tawas City to Port Austin.

Mapping Out the Chase: Part II

What value should you look for on the K-index or other sources? (K/Kp)

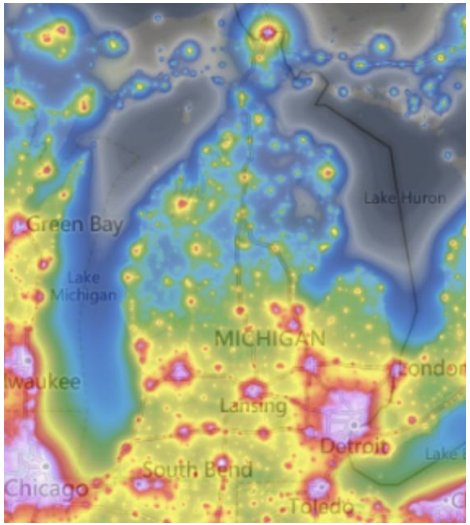


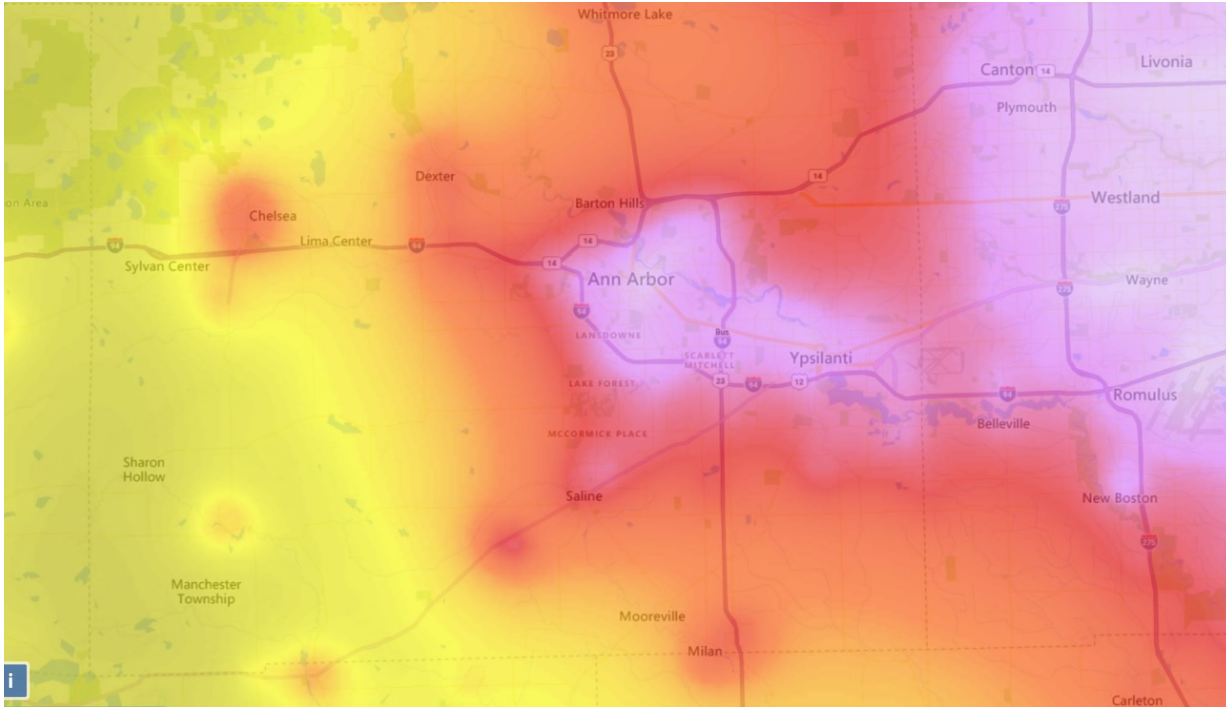
Source: Space Weather Prediction Center

Mapping Out the Chase: Part III

Light pollution by Location

Search your area at
www.LightPollutionMap.info

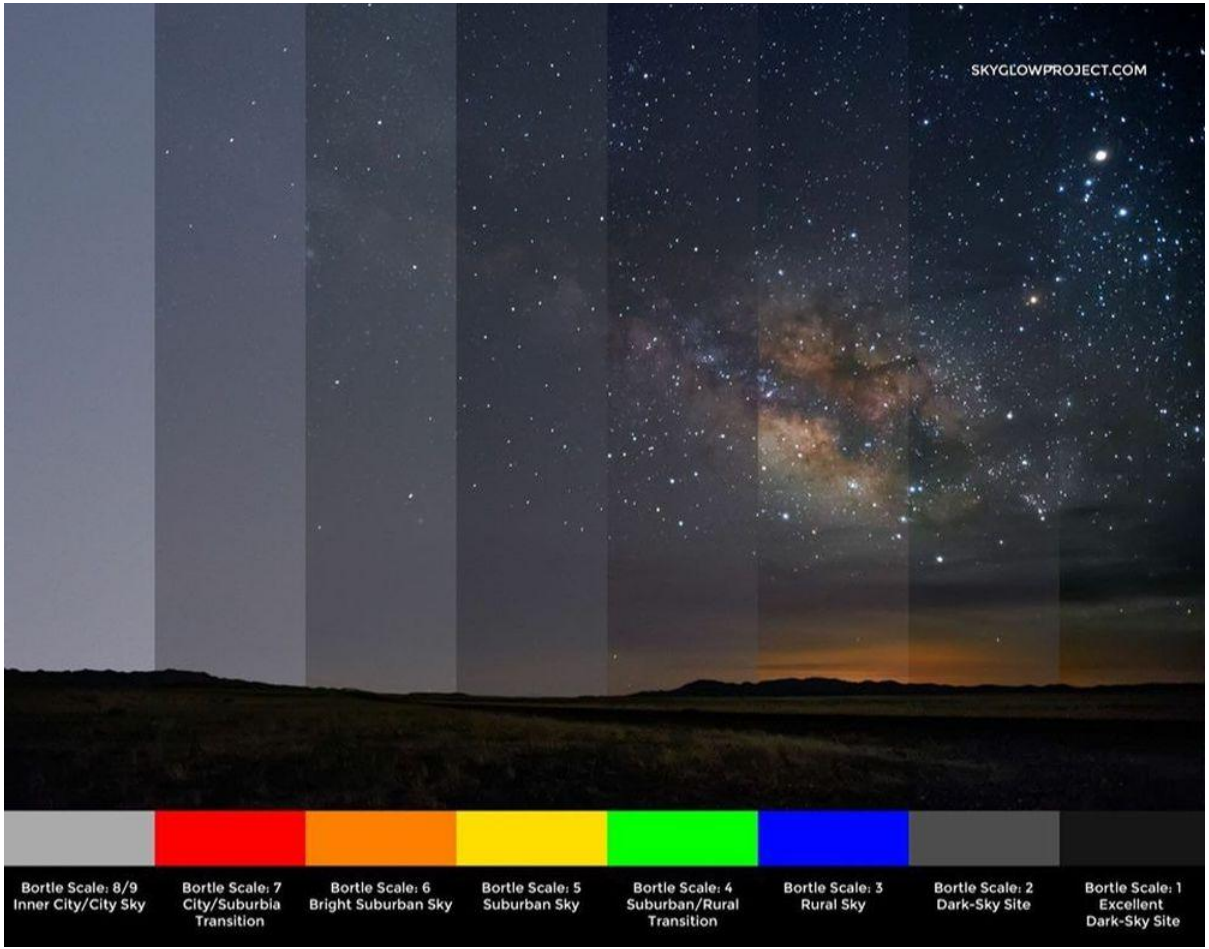




The Bortle Scale

Light pollution could be the only thing stopping you from catching the Aurora.

Q: How far would you drive to find dark skies? Are there steps you can take to improve darkness in your backyard?



Chasing in the Great Lakes

What it takes to see Aurora

Many factors have to align to create the Northern Lights, especially for strong activity to reach lower latitudes.

The Right Conditions in Space

- Solar activity
- Direction of the solar wind
- Solar wind composition: Speed, Density, Bt, Bz
- A favorable Bz: This is essentially the gatekeeper
- Conditions can change instantly

The Right Conditions on Earth

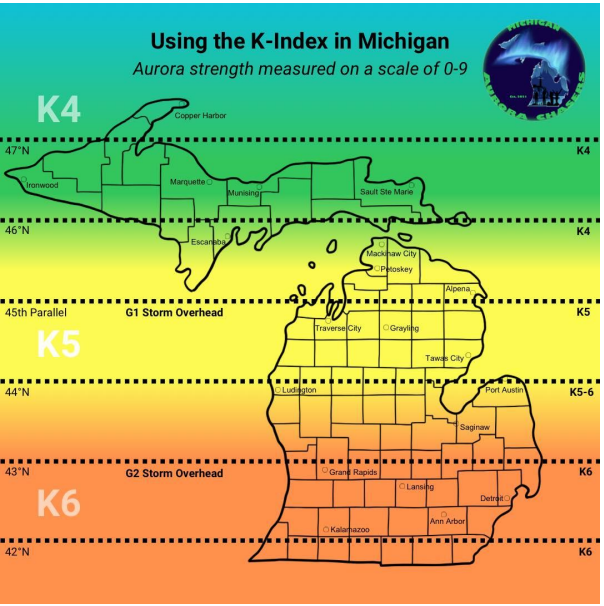
- Starry nights
- Dark skies
- Moon phase & obstacles
- Northern location
- Eyesight visibility

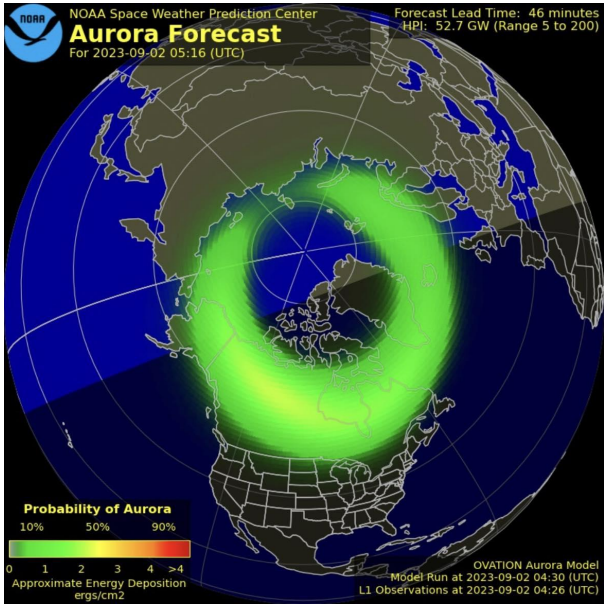
Things to Consider

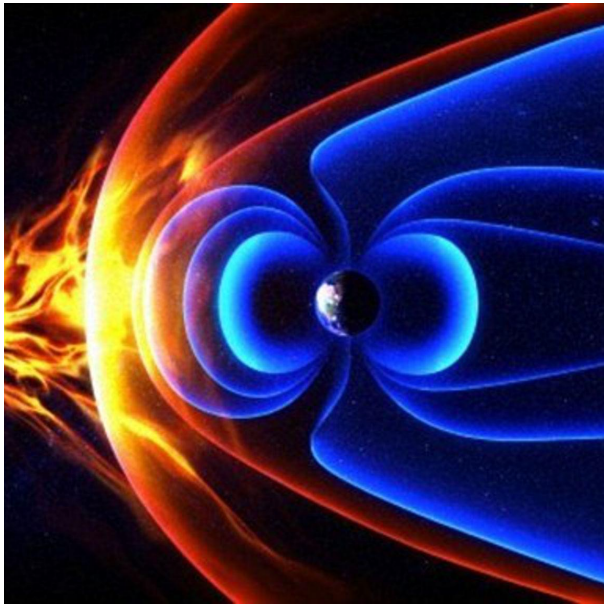
- Scout Out a Location
- Light Pollution
- Cloud Cover & Weather
- Sunset, Twilight & Moonrise
- Reliability of the Forecasts
- Patterns of the Northern Lights
- Safety, Sleep & Sanity

Number #1 Tip: Plan something exciting in case you get aced!

Signs of Aurora Activity Approaching 42nd Parallel







K6 Warnings/Watches
(at least a K5 Watch)

60-90 Gigawatts of Hemispheric
Power (at least 30gw)

Extremely Low Bz at -10/-15
(at least -4 or -5 usually)

Sunspot

Southeast of Lansing,
February 26, 2023,
iPhone 14

#MIAuroraChasers

Suburban Lake

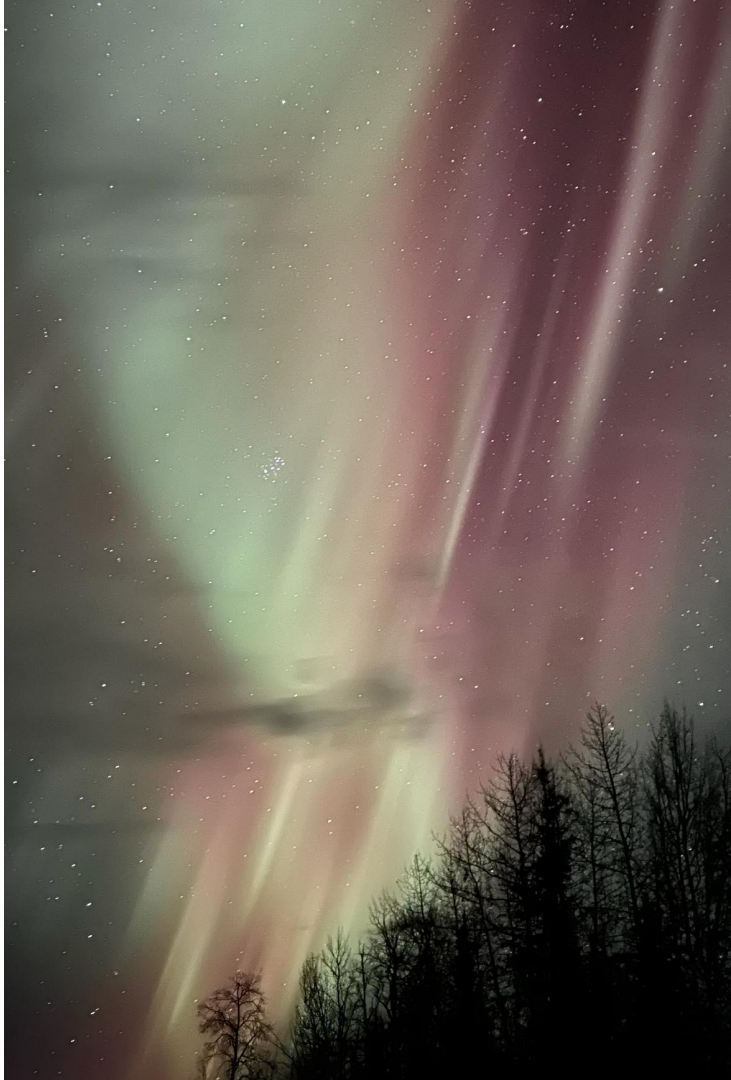
Just North of Flint,
March 23, 2023,
iPhone 14

#MIAuroraChasers

Arctic Circle

Near Coldfoot, Alaska, October 2022, iPhone 14

#MlAuroraChasers



Featuring the Michigan Aurora Chasers

Melissa F. Kaelin
September 5, 2022 ·

Our Michigan Aurora Chasers have been dancing like no one's watching, with the Northern Lights dancing above them September 3-5! We've had several nights of exciting chases, with Aurora captured all the way from the Keweenaw Peninsula in Michigan's Upper Peninsula down to Cleveland, Ohio! We even captured an unusually vivid and distinctive appearance of STEVE, the sub-auroral arc, and its "picket fence" as it stretched directly overhead in the Michigan night.

My own chase was plagued by clouds, but finally ended in a successful Aurora sighting in the sand dunes of Ludington after 2am Monday morning. It was a gorgeous night, with millions of stars and the Milky Way glimmering above Lake Michigan.

Congratulations to all of the photographers and viewers who caught the Northern Lights, and especially to those who found Aurora for the first time!

Photos by Pamela Hofacker Teachout, Lucas McIlvenna, Lucy McClellan-Hunter, Karen Farrell, Jeremiah Chappelle, Alicea Howell, Travis Stevens, Matt Honold, Luke Lauderback, Lisa Hunter, Tracy Gray Keck III, and Matt Shiffler.

#MiAurora #10YearsofAurora
Melissa F. Kaelin: Writer, Artist & Stargazer

Looking forward to The 5th Annual Aurora Summit!

LINK

Join us!

We lead an engaged and active community!

- Instagram **@MiAuroraChasers**
- Facebook Group
- FB.com/MichiganAuroraChasers
- Resources: **Linktr.ee/MiAuroraChasers**

#MIAuroraChasers

More Advice

Blog: Aurora Chasing in the U.S.
KaelinArt.com/aurora-blog

Video Tutorials
YouTube.com/@MelissaTheAuroraChaser

My Favorite Aurora Chasing Hacks
KaelinArt.com/Aurora

Guidebook: Below the 45th Parallel
Sold in stores and online

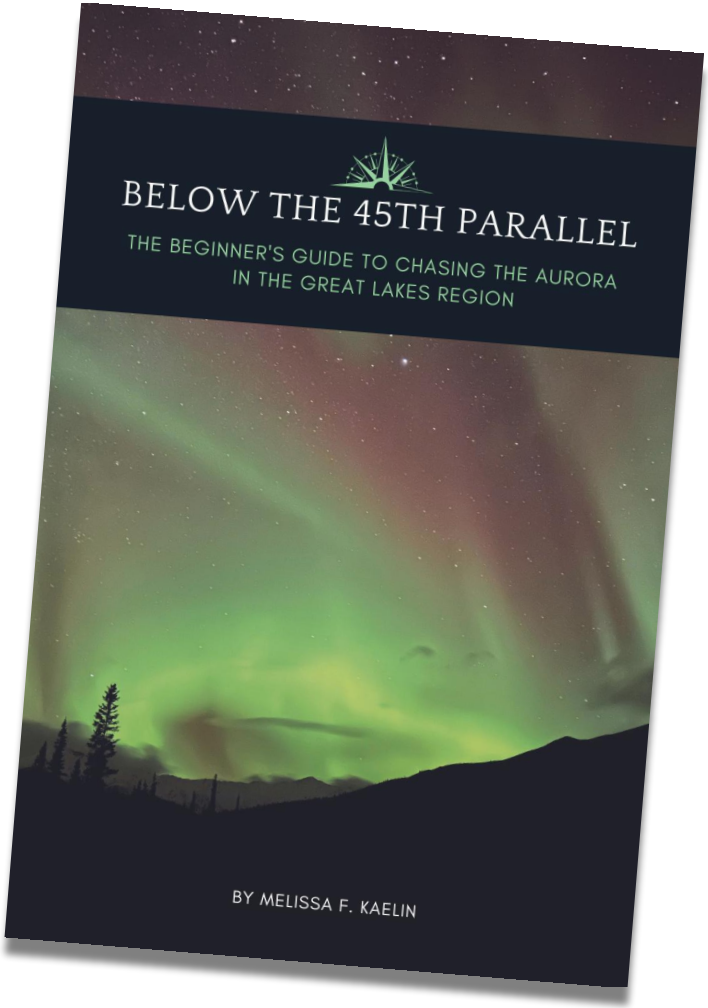
Upcoming Events
KaelinArt.com/events

“Below the 45th Parallel”

The Beginner’s Guidebook!
If you are new to the adventure, this advice is designed to beat the dozens of obstacles Aurora Chasers face.

The guidebook will give you the information you need to finally catch an Aurora display near your home, complete with a Digital Resource Guide.

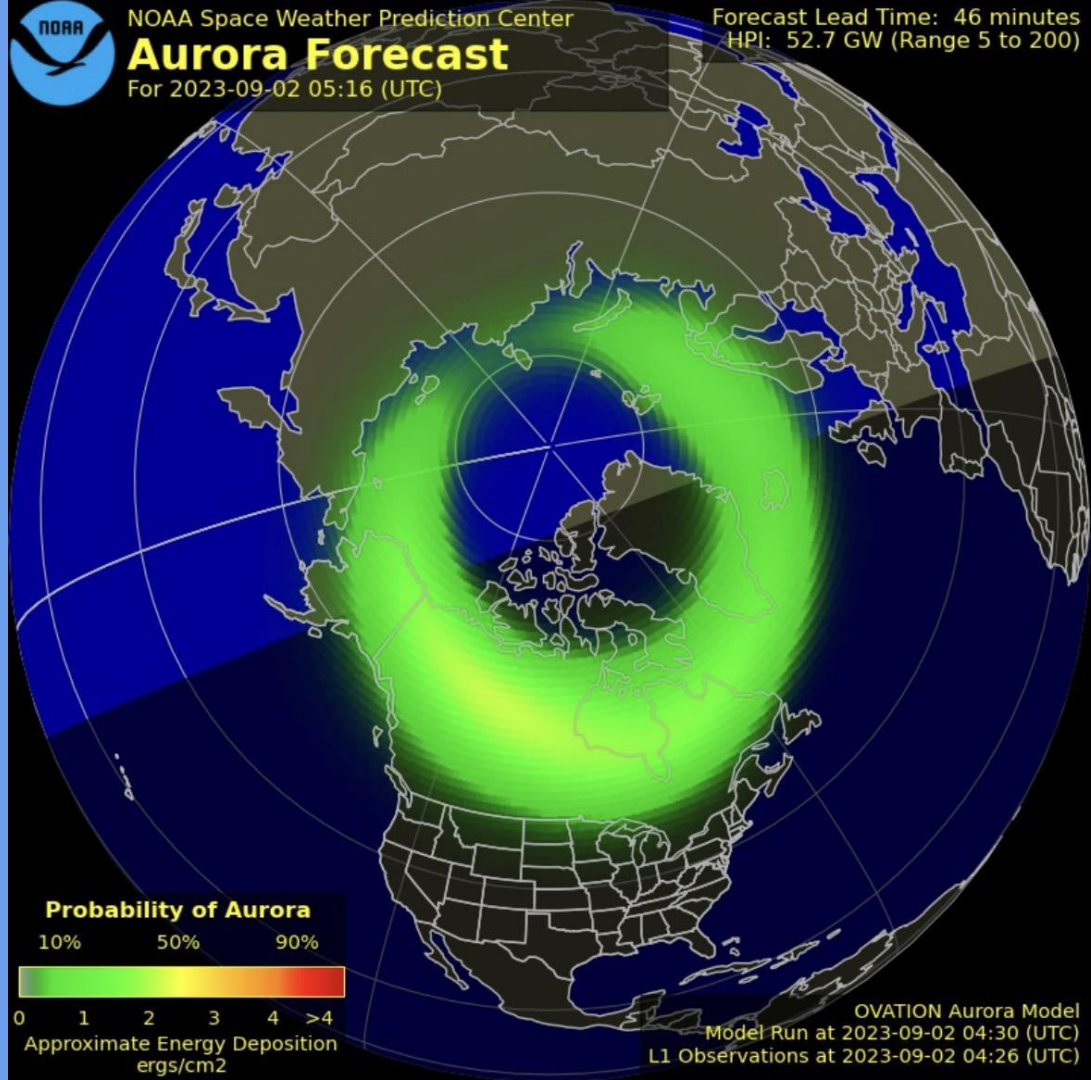
Available at Dark Sky Parks, Stores & Online!
KaelinArt.com/45thParallel



But wait… Would you chase Aurora tonight?

Let's check the updated conditions….

Beginner Advice: We wait to see at least 30gw of Hemispheric Power before we even start talking about chances in Michigan and much of the Great Lakes region.



Q & A

Find More Tips at KaelinArt.com/Aurora

More Resources

KaelinArt.com/Aurora — Melissa's Aurora Chasing Tips

swpc.noaa.gov — Space Weather Prediction Center, ACE Real-Time Solar Wind

www.gi.alaska.edu — Geophysical Institute, UAF

SpaceWeatherLive.com — Also available in the app

Facebook.com/SolarHam — Solar Activity & Forecasts

Apps: SpaceWeatherLive, The Glendale App, Aurora Forecast

Paid Alert Services: Aurora Notifier, SWPC Texts

Live Sightings: Michigan Aurora Chasers, Upper Midwest Aurora Chasers, Northern Lights Alert, Webcams