A Fool-Proof Formula:
CATCH THE NORTHERN LIGHTS

The guide for absolute beginners

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Many methods of forecasting

There are many ways to forecast Aurora, and each method uses different tech and varying knowledge. Which method interests you?

- Webcams
- Live sightings
- Visual forecast tools
- Mobile apps
- Data right from the source
- Your own combination of resources

The Northern Lights are rare in the middle latitudes — a display is never guaranteed!

Tip

So, watching key indicators can help, as well as **social media.**

It also helps to have something else to look forward to, such as shooting the Milky Way or visiting waterfalls.

How does activity become a dud?

Knowing when NOT to view Northern Lights can be almost as important as knowing when to view them. Often, these factors become show stoppers:

- Midnight Sun or Daylight
- Rain or Cloud Cover *
- Wildfire Smoke
- Fog or Mist*
- The Full Moon *
- Bz, when it tips to northward/positive, ie: Bz +7

** Viewing may be possible during these conditions, with persistence or a camera.*

What you're about to see...

I take full responsibility for this formula
— a creature of my own design!

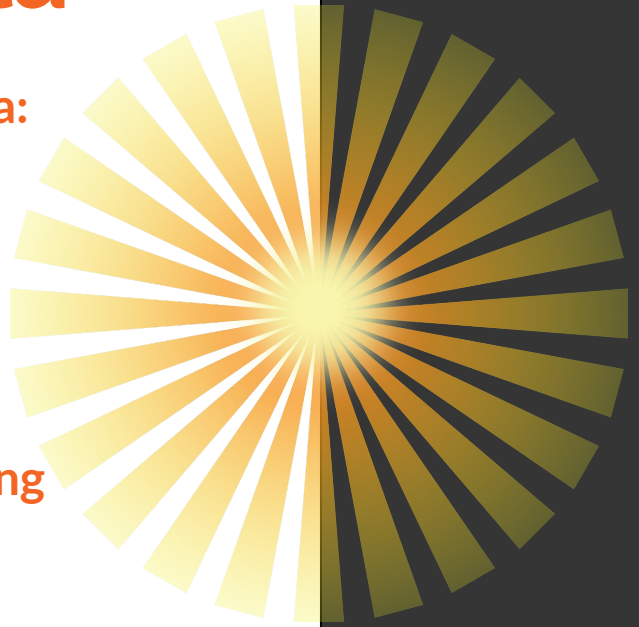
The formula!

$$\frac{\text{✶} - Bz + Kp}{\text{  }} + \mathbf{i}$$

A Fool-Proof Formula

My own fool-proof formula to catch Aurora:

1. Starry Skies
2. Negative Bz
3. Your Desired Kp
4. A Mapped Visual
5. Eye-Witness Account: One Live Sighting



1. Starry Skies

Find skies that are both **clear and dark**.

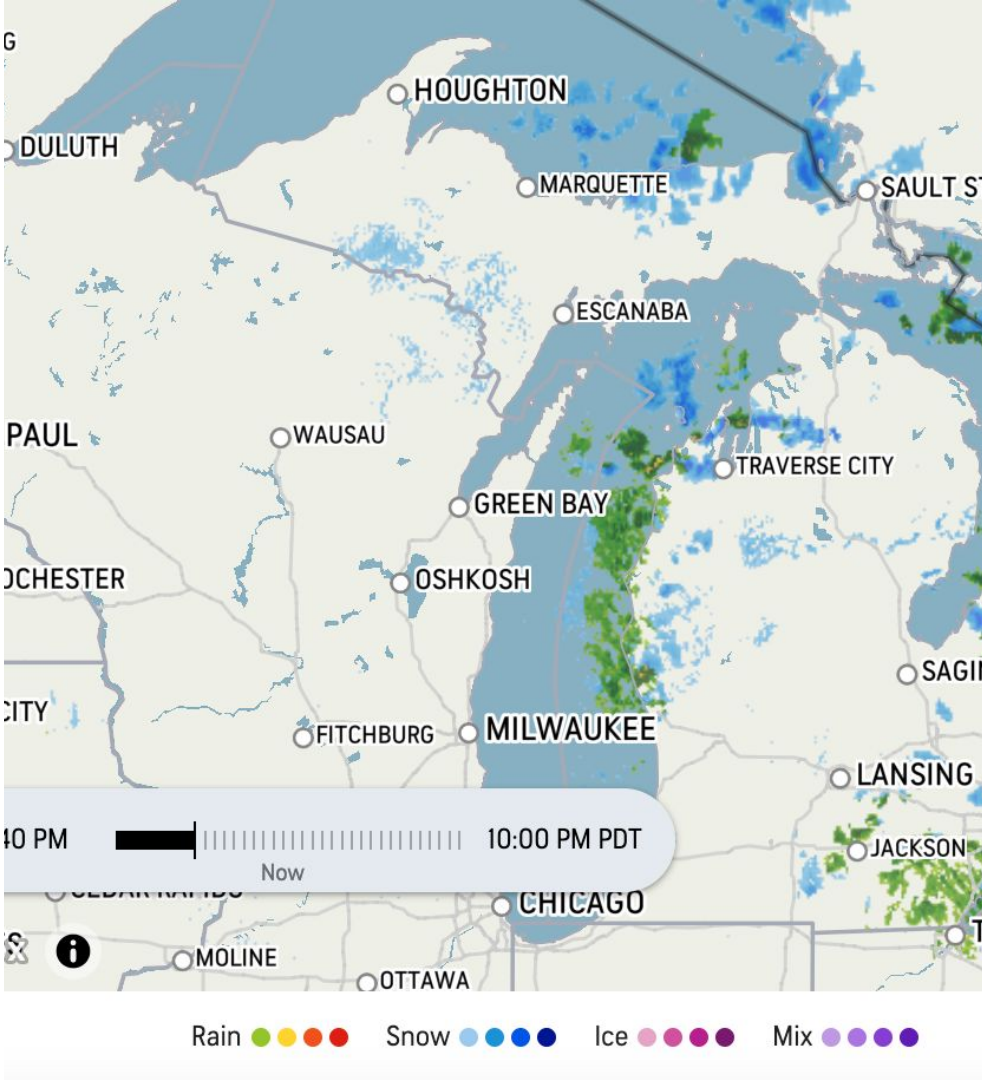
➔ **Clear Skies**
Check the weather & satellite maps

➔ **Avoid Light Pollution**
Use light pollution maps to find true dark sky.

➔ **Watch for Fog, Mist & Smoke**
Even a small amount of fog or smoke in the air can obscure the view.

➔ **The Wild Card: Full Moons**
Full moonlight could wash out the view

Weather apps are available in many types and some have **SATELLITE MAPS** that can lead you to clear skies.

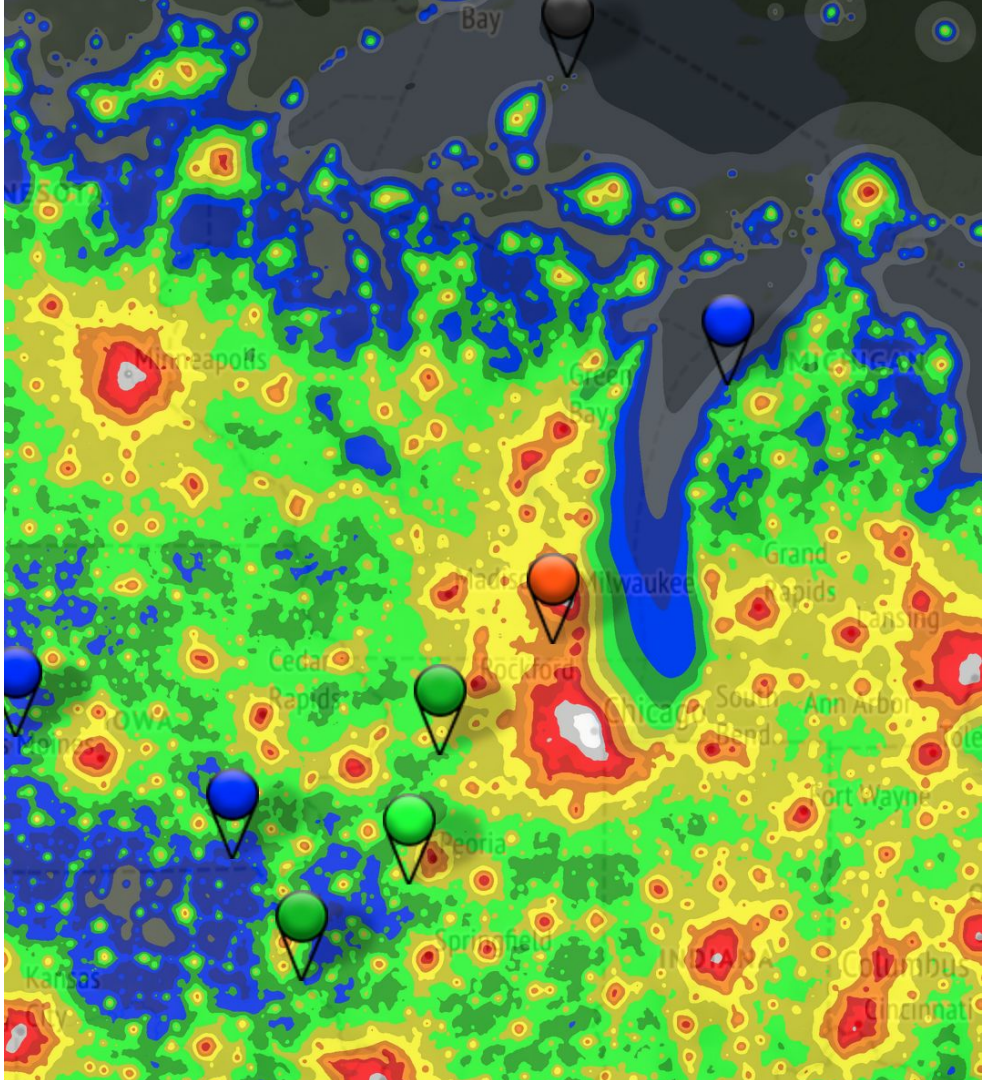


Maps and other tools can help you identify the

DARKEST SKIES

near you, and how far you may have to travel to reach the location.

Dark Sky Map:
https://darksitefinder.com/maps/world.html#12/43.2592/-84.4438



Not seeing Aurora? It may not be your fault. Other factors like fog, mist and wildfire smoke might

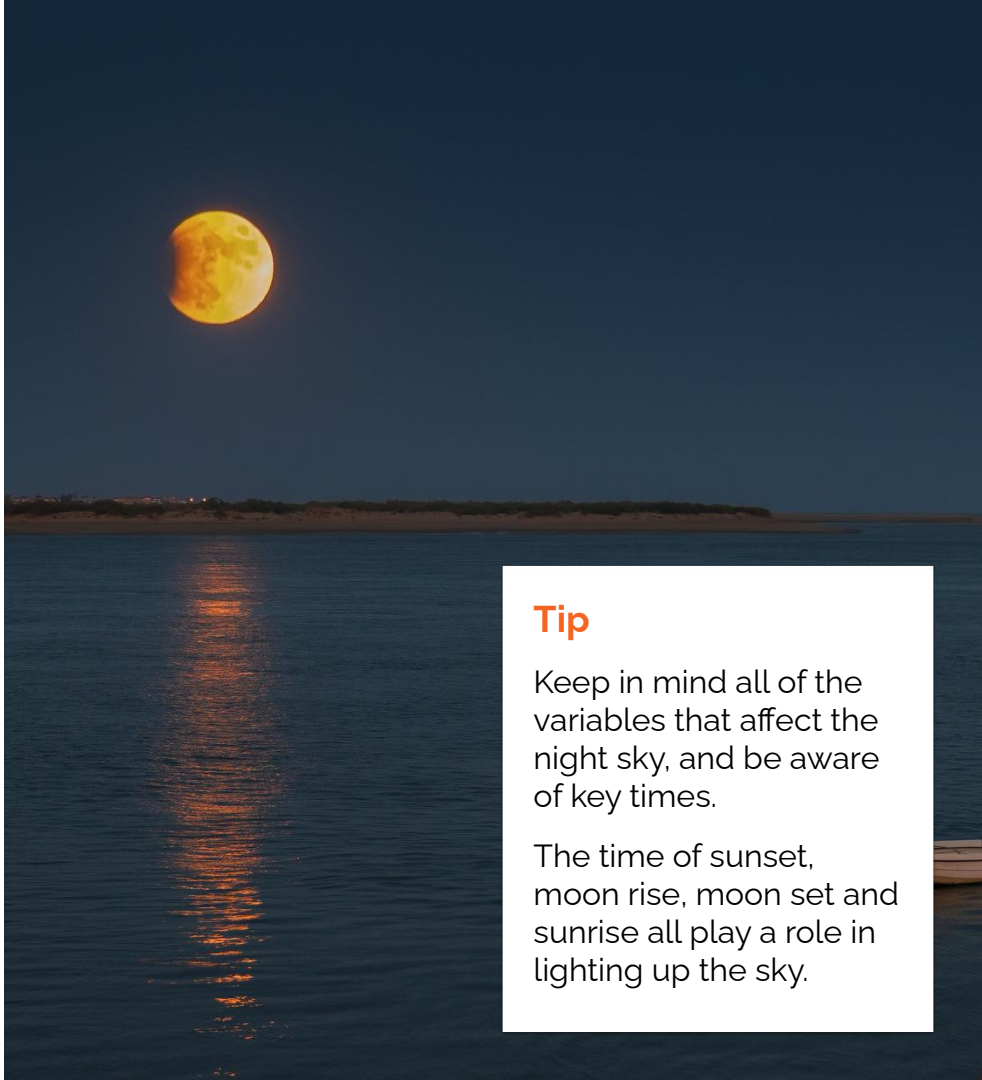
OBSCURE THE VIEW.

Tip

This is why I like to look for live sightings, especially in the summer months.

An eye-witness can tell you what the obstacles are to viewing Aurora.

Many Aurora Chasers avoid the **FULL MOON** but it can give light to your photos or help you see better in the dark.



Tip

Keep in mind all of the variables that affect the night sky, and be aware of key times.

The time of sunset, moon rise, moon set and sunrise all play a role in lighting up the sky.

2. Negative Bz

To avoid a dud, check for **negative Bz**.

➔ **The Game Changer**
This factor can stop activity in its tracks.

➔ **Like a Funnel**
When Bz drops, the “funnel” opens to let the Aurora flow into our atmosphere.

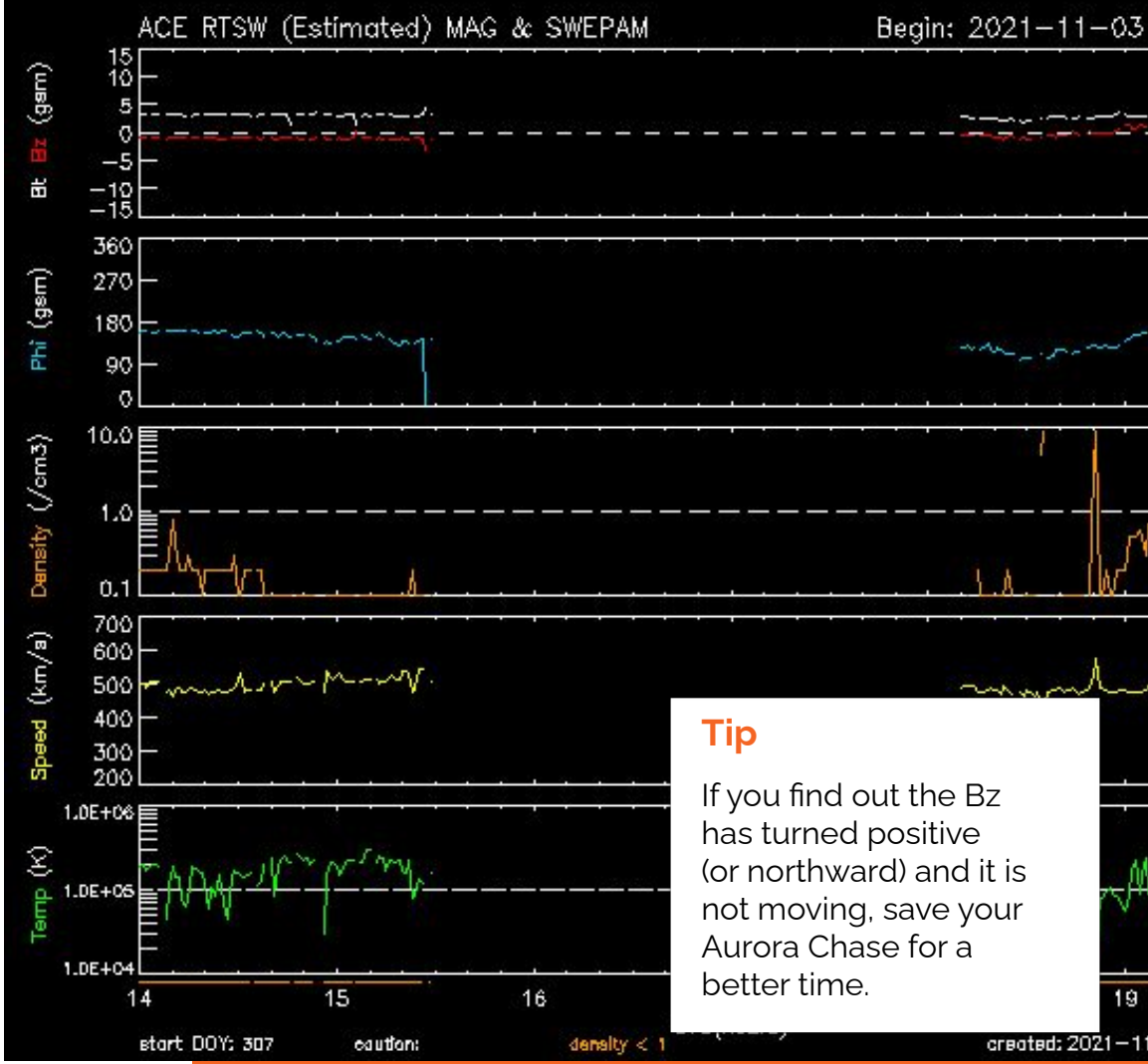
➔ **Negative or Southward**
If Bz switches back and forth or drops southward, conditions are better.

➔ **Kp at Your Latitude**
Know your latitude and the Kp needed to view Aurora in your area.

What is Bz?

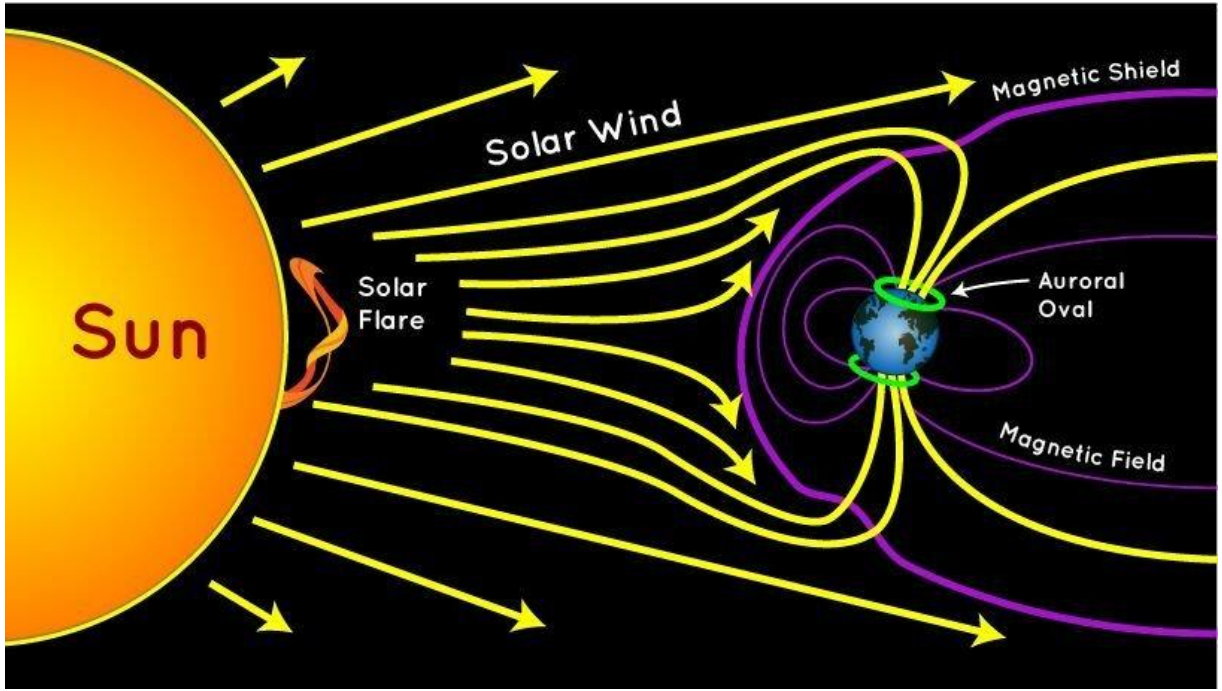
“A measure of the North/South orientation of the interplanetary magnetic field measured perpendicular to the ecliptic plane. When Bz is southward, or antiparallel to the Earth's magnetic field, geomagnetic disturbances become much more severe, than when Bz is northward.”

Source: NOAA’s Space Weather Prediction Center



Tip

If you find out the Bz has turned positive (or northward) and it is not moving, save your Aurora Chase for a better time.



The “Funnel”

Earth is designed to protect the planet from solar impacts. So, the Interplanetary Magnetic Field is crucial to determining whether solar wind reaches our skies. When the Bz turns positive, a.k.a. northward, it can block the Aurora Borealis, instantly.

3. Your Desired Kp

Know your **latitude and the Kp** (or K) that's needed to view Aurora at your latitude.

➔ **What is Kp?**

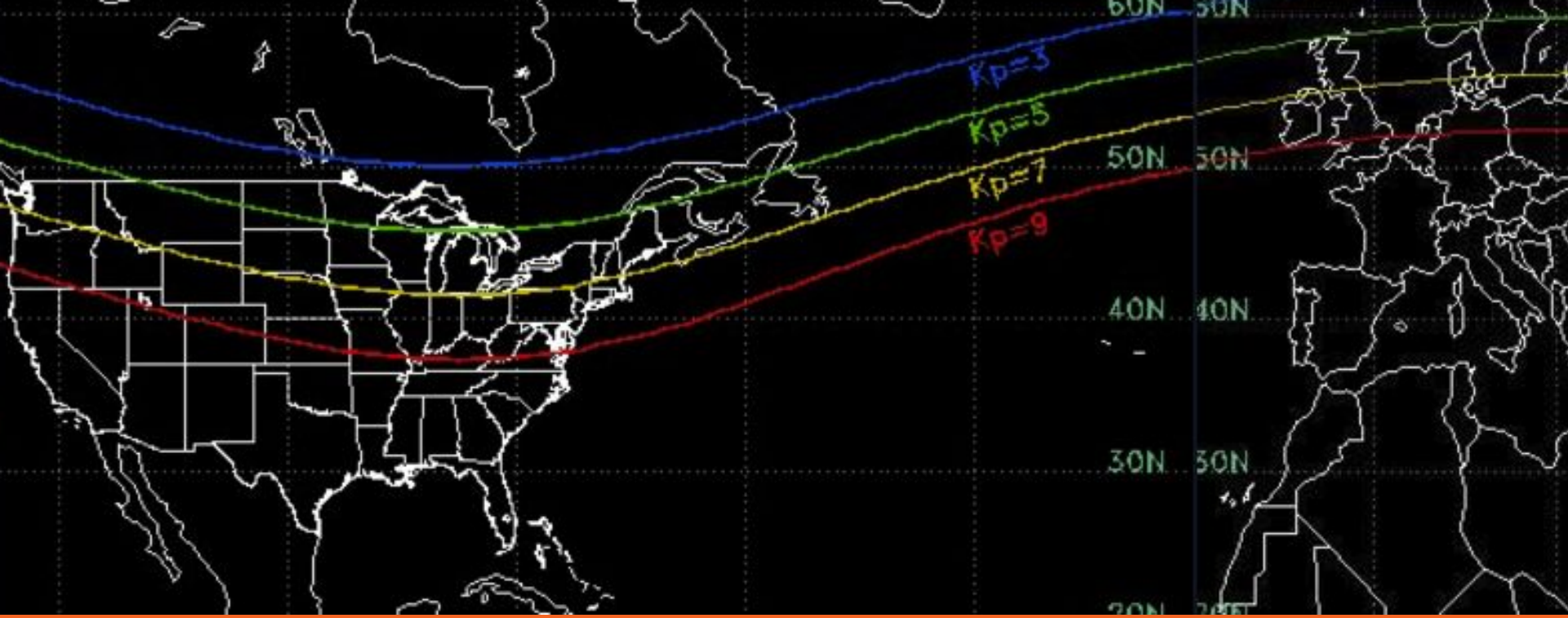
Used in Aurora forecasting, Kp indicates average Aurora strength measured on a scale of 0 to 9.

➔ **Finding Your Latitude**

Look up the latitude for your location.

➔ **Hemispheric Power**

Hemispheric Power may be an easier factor for you to watch, based on models.



The K-index indicates Aurora strength on a scale of 0-9.

Tip

When shown as Kp, this means it is a planetary average taken over the last 3 hours.

Find Your Desired Kp

Let's consider questions like where you reside, where you want to view Aurora, and how strong you would like the display to be when you catch it. If you only want to see strong Aurora, wait until conditions reach a Kp5 (aka G1 Storm) or higher.

What is your latitude?

4. Mapped Visual

Often, a good **visual on a map** is all you need.

➔ **Ovation Model**
With the right URL, the Ovation Model shows actual, current conditions.

➔ **Geophysical Institute Maps**
This interactive forecasting tool can be changed based on day or location.

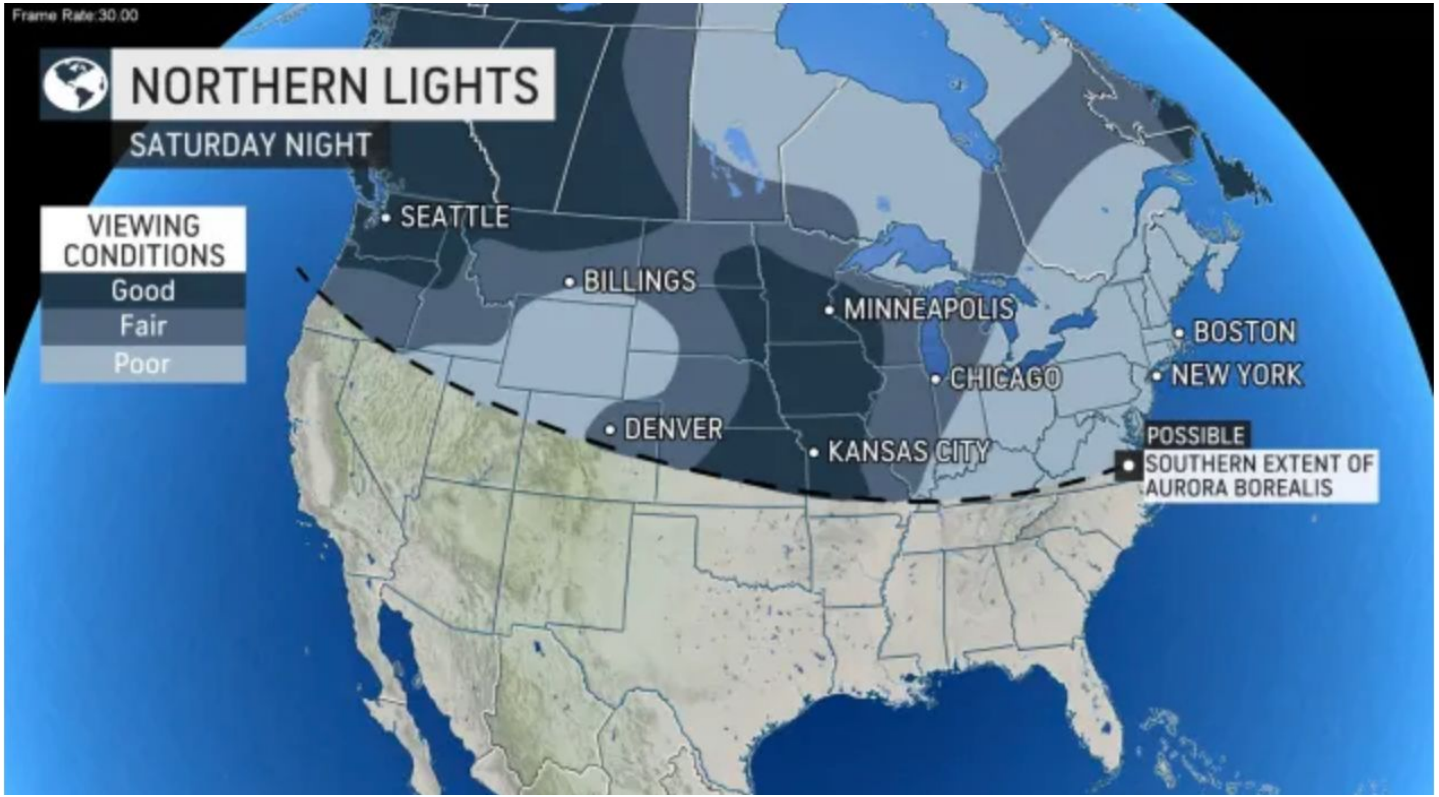
➔ **Weather Maps & Soft Serve News**
Some news outlets will produce maps that combine information, such as clear skies and Aurora potential. Take these with a grain of salt.

Explore these options for Aurora maps and choose one that works best for you.

The K-index and the Auroral Arc stay the same, but maps vary.

Tip

Visit your favorite forecast website or app often, and compare it with what you actually experience, to determine which resource is most accurate for you.

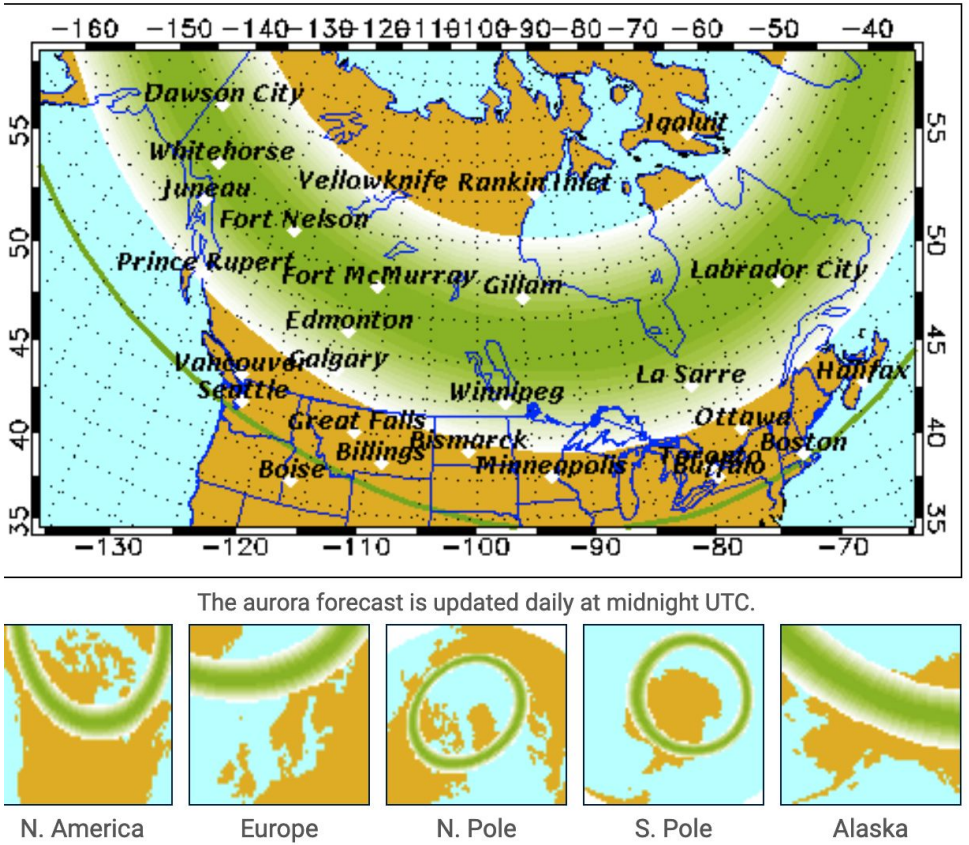


Some sources will publish **WEATHER MAPS** showing both clear skies and potential for Aurora.

Source: Accuweather

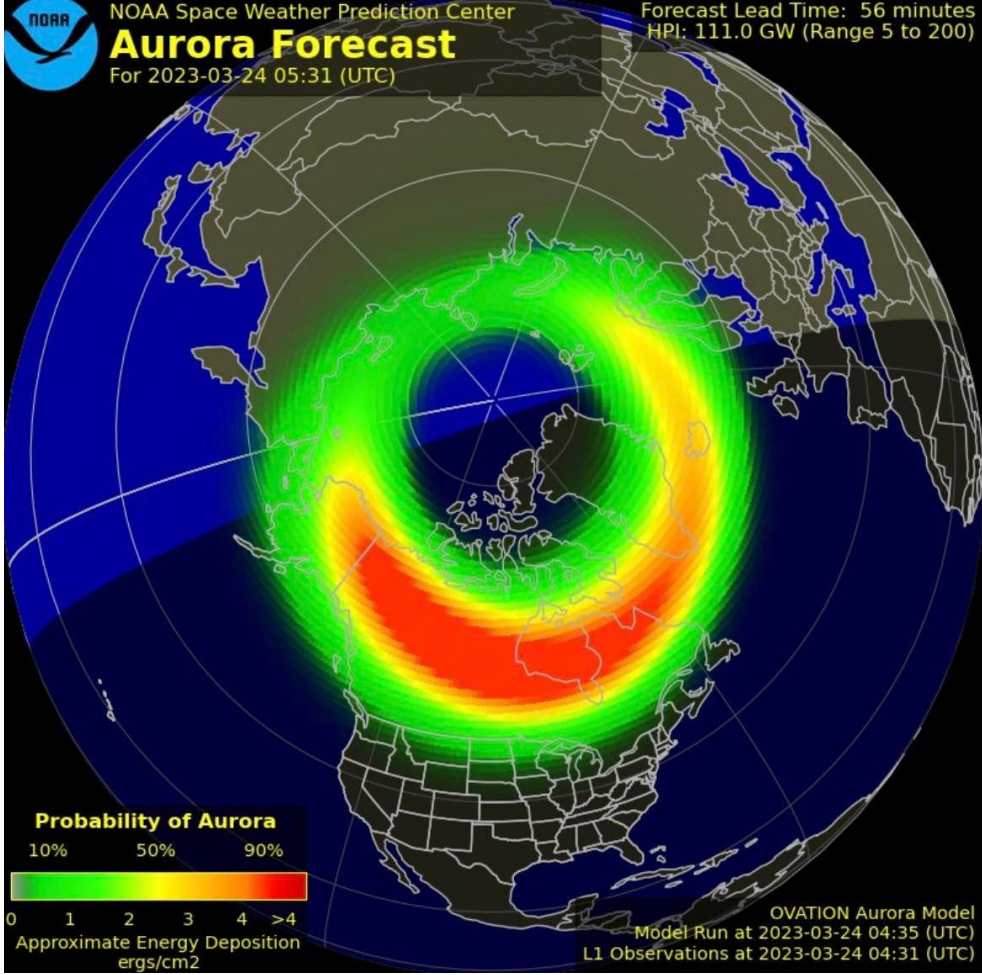
If you want to use an **INTERACTIVE MAP** to try to predict the Aurora, check out the Geophysical Institute at the University of Alaska — Fairbanks.

Geophysical Institute:
https://www.gi.alaska.edu/monitors/aurora-forecast



The stronger the Northern Lights are, the farther south they extend.

ONCE, THE AURORA DANCED IN CUBA BUT SUCH SHOWS ARE EXTREMELY RARE.



Ovation Model: https://services.swpc.noaa.gov/images/aurora-forecast-northern-hemisphere.jpg

5. One Eye-Witness

The only way to know with certainty is to find information from an eye-witness, so try to find **one alert or live sighting** before going out.

➔ **Is Aurora Low on the Horizon?**
Know how high Aurora are visible.

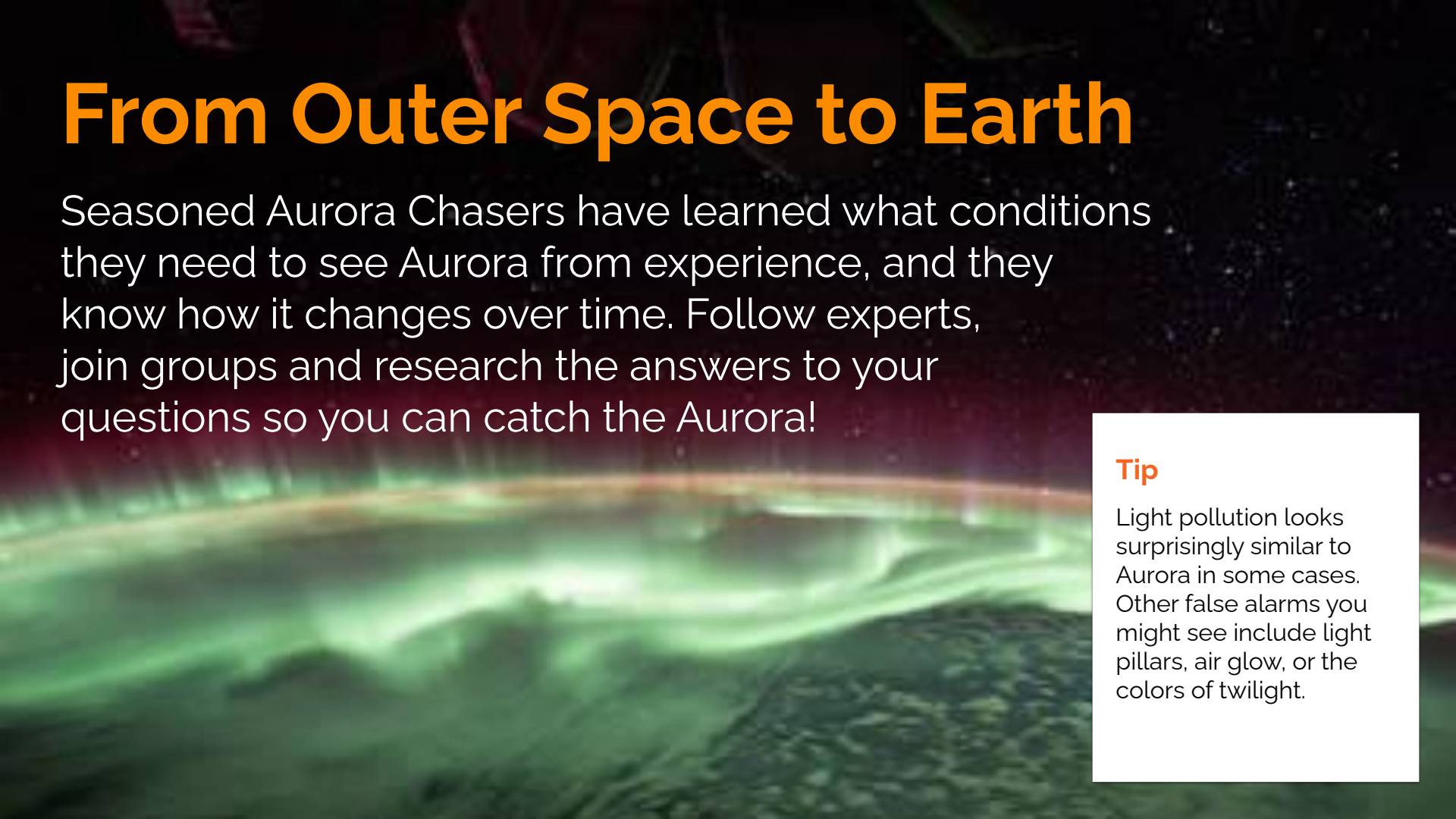
➔ **Is Aurora Naked-Eye Visible?**
This detail may be key to your success.

➔ **Is the View Obscured?**
Live sightings usually include tips like this.

➔ **Is Aurora Activity Sustained?**
This can help you determine if the display will last until you arrive or fizzle out.

From Outer Space to Earth

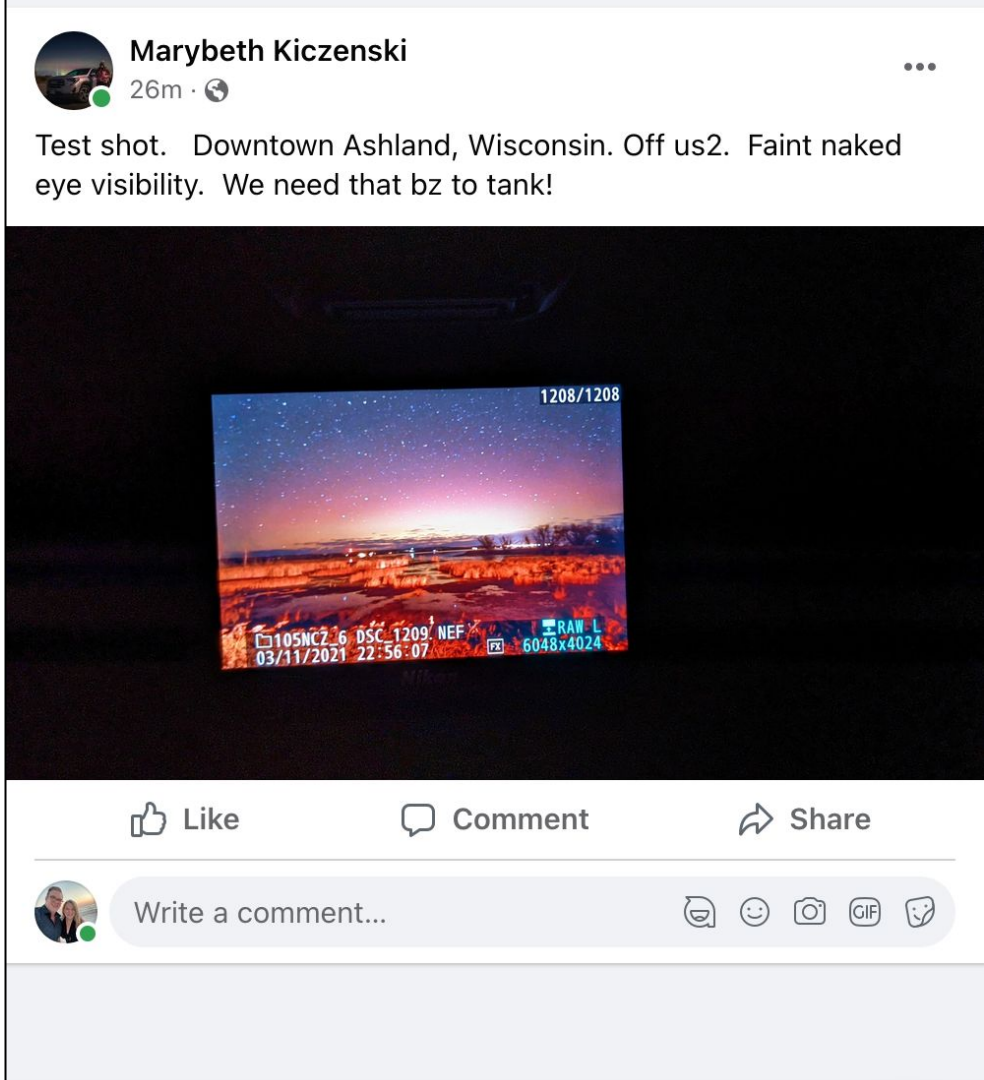
Seasoned Aurora Chasers have learned what conditions they need to see Aurora from experience, and they know how it changes over time. Follow experts, join groups and research the answers to your questions so you can catch the Aurora!

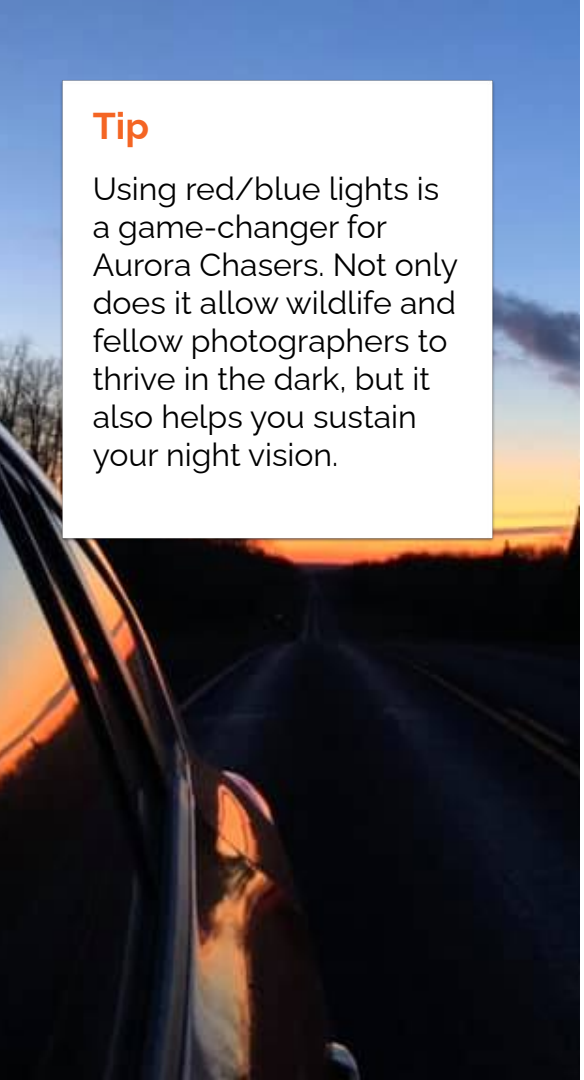


Tip

Light pollution looks surprisingly similar to Aurora in some cases. Other false alarms you might see include light pillars, air glow, or the colors of twilight.

Live sightings offer you **PROOF** that the Northern Lights are active. They may not last, but this shows the data has held steady long enough for a chaser to take a photo.





Tip

Using red/blue lights is a game-changer for Aurora Chasers. Not only does it allow wildlife and fellow photographers to thrive in the dark, but it also helps you sustain your night vision.

A simple gesture

Let's chase Aurora the right way — with respect for the land, dark skies, and other people you may encounter.

1. Be polite and treat others with respect.
2. When arriving in a car, dim your vehicle lights.
3. At a destination, point headlights away from scene.
4. Use a blue light or headlamp with a red light option.
5. Switch off any lights when you are not using them.
6. Avoid using phones or screens beside photographers..
7. Never walk in front of a camera.
8. Consider others before you add sources of light.
9. Leave no trace.
10. Enjoy a friendly and welcoming atmosphere.

Why are you not seeing Aurora?

Turn out the lights! Then let your eyes adjust to the dark for a full minute.

Know what you are looking for, beginning with the arc low on the northern horizon.

How much is visible to the naked eye? It takes more to see color versus “grey clouds.”

Resources

Ovation Model Live:
https://services.swpc.noaa.gov/images/aurora-forecast-northern-hemisphere.jpg

Geophysical Institute (Interactive Forecast):
https://www.gi.alaska.edu/monitors/aurora-forecast

SWPC Amateur Space Weather Enthusiast Dashboard:
https://www.swpc.noaa.gov/communities/space-weather-enthusiasts

SWPC's Glossary of Terms:
https://www.swpc.noaa.gov/content/space-weather-glossary

3-Day Forecast:
https://www.swpc.noaa.gov/products/3-day-forecast

27-Day Outlook (low confidence):
https://www.swpc.noaa.gov/products/27-day-outlook-107-cm-radio-flux-and-geomagnetic-indices

Tip

Use only the best sources. Avoid apps and websites that have hype but no credibility.

Good luck!

I hope these tips help you to chase — and catch — your first Aurora! Let me know if you have questions or want more ideas for apps or websites to use on your adventures.

For more information, visit:
TheAuroraSummit.com/Resources

Check out my work at:
Melissa F. Kaelin: Writer, Artist & Stargazer &
KaelinArt.com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