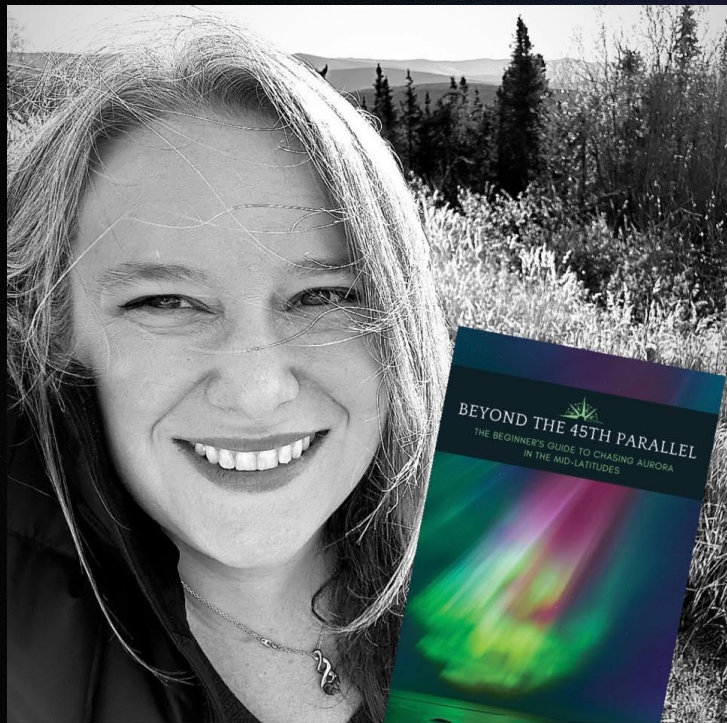


Bringing the Visions of our Dreams to Life

Melissa F. Kaelin

Michigan Aurora Chasers

Photo by Cristiano Saturno



About Melissa

Writer. Nature Lover. Great Lakes Girl.

- Writer at heart, poetry/fiction, started as a journalist
- There was a “lost decade”...
- Avid adventurer, Now traveled U.S., 5 Great Lakes
- Chasing the Northern Lights for over 13 years
- Author of “Beyond the 45th Parallel: The Beginner’s Guide to Chasing Aurora in the Mid-latitudes”
- Founder of the Michigan Aurora Chasers, 2021
- Co-founder of Aurora Summit, 2017
- Aurora Columnist, Science Communicator Award
- Caught Aurora in 4 states and 3 countries, Minnesota, Wisconsin, Michigan, Alaska & Iceland, Canada, U.S.
- October 2025: Norway
- February 2026: Finland



Dark Skies Ignite Our Imagination

More color than we know

- Creating an exciting astrotourism destination under the Milky Way
- 3 International Dark Sky Parks:
 - Keweenaw International DSP
 - Headlands International DSP
 - Dr. T.K. Lawless International DSP
- 1 International Dark Sky Sanctuary:
 - Beaver Island International Dark Sky Sanctuary



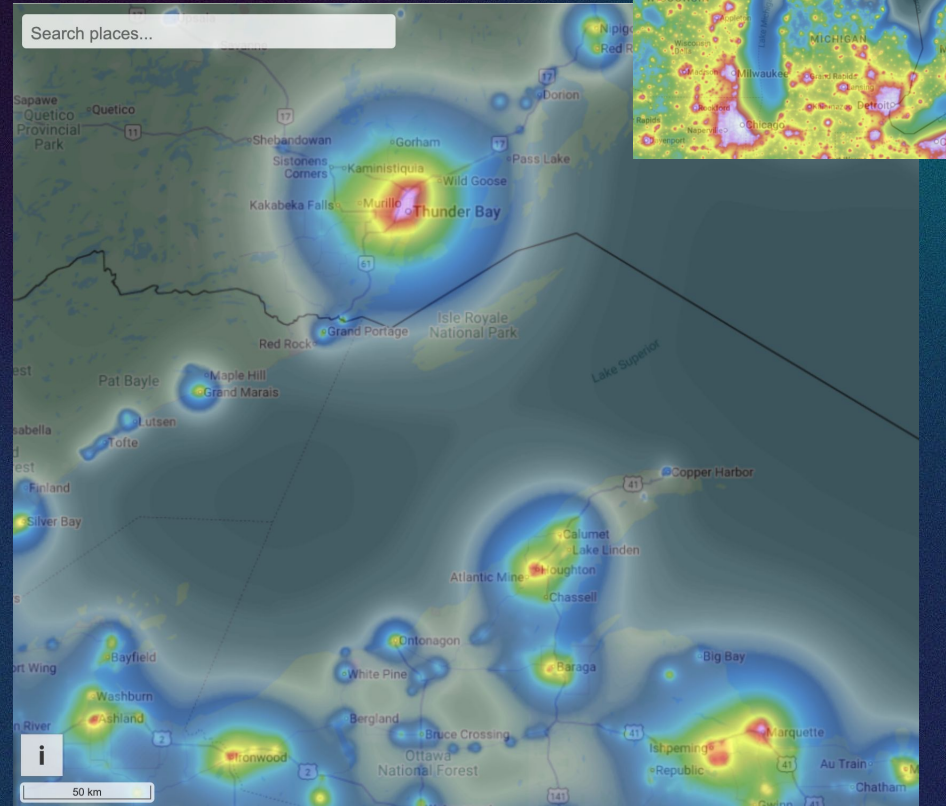
Photo by Justin Miller, Beaver Island International Dark Sky Sanctuary

Preserve Our Dark Skies

Right Here. Right Now.

- Explore Houghton and the Keweenaw Peninsula
- Looking north to Thunder Bay
- Light Pollution Maps zoom in on problem areas
- Small steps make a big difference, even at home

The darker the sky...
the more wondrous the night!



Source: LightPollutionMap.info

Spend More Time Looking to the Stars

Chase Aurora & Beyond

- Expand your time in the dark to experience new wonders
- Track meteor shower peaks, comets, eclipses, and planetary conjunctions
- Spot the International Space Station (ISS), StarLink, or rocket launches
- Catch the unexpected and report it to astronomers and scientists



Photo by Jen Mainka, 2nd Michigan Aurora Experience, 2025

Witness Rare Celestial Events

A Secret World at Night

- Comet NeoWise, 2020
- Comet Tsuchinshan -ATLAS (C/2023 A3), 2024
- Perseid Meteor Shower, July-August
- Geminid Meteor Shower, December
- Many more



Photo by Justin Vrba

MILKY WAY

OUR GALAXY

When you look closely on a calm night under the darkest skies, you can see our galaxy reflected in the waters of the Great Lakes.

JMNATURESCAPES

Landscapes and Astro-Photography



Photo by Justin Miller

Meteors, Aurora & S.T.E.V.E.



Photo by Michele Aucello
Meteor & Aurora
Glen Haven, Michigan, December 14, 2023



Photo by Michele Aucello
Meteor & S.T.E.V.E., Michigan, September 18, 2023

AURORAL FORMATIONS

Clockwise from top left:
S.T.E.V.E. (Strong
Thermal Emission
Velocity Enhancement),
The Picket Fence,
Stable Aurora Red
(SAR) Arc,
Streaks,
Continuum Emission

Michigan Aurora Chasers
Photography by:
Nate Stovall
Pamela Teachout
Joanne Furton
Michele Aucello
Christina Cantu Sharp



The Unexpected

A 'SpaceX Spiral' Over Alaska

APRIL 18, 2023 / DR.TONY PHILLIPS

April 15, 2023: Longtime [aurora hunter](#) Todd Salat is no stranger to fantastic displays in the night skies of Alaska. But even he was not prepared for what happened after local midnight on Saturday, April 15th.

"I was utterly surprised and mystified when I first spotted a distant bright light coming toward me from the northern horizon," says Salat. "At first I thought it was a jet airliner flying through some clouds. Then it took on the spiral shape and grew big fast!" This is what he saw:

Salat witnessed a "SpaceX spiral." Three hours earlier (Saturday, April 15th at 0648 UT), SpaceX launched a Falcon 9 rocket from California's Vandenberg Space Force Base. It carried 51 small satellites to Earth-orbit, a mission known as [Transporter-7](#). When the rocket's discarded upper stage passed over Alaska, it vented its unused fuel. A bit of spin turned the harmless cloud into a spectacular spiral.

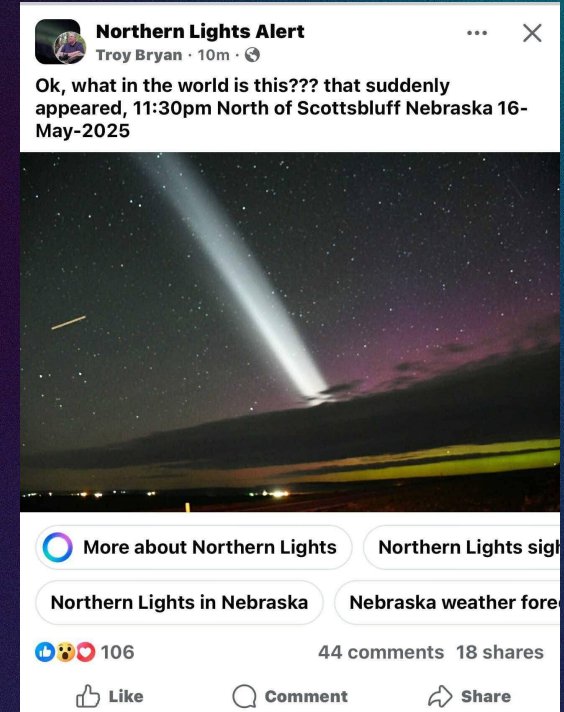
An all-sky camera at the University of Alaska's Poker Flat Research Range also recorded the phenomenon:



TODD SALAT ©
AURORAHUNTER.COM

Photo by Todd Salat, Aurora Hunter | Source: SpaceWeather.com

More of the Unexpected



1: ULA Rocket Launch (Joanne Furton). 2: ISS with Aurora. (Ed Hanlon). 3: Sun illuminates a methane plume from a spacecraft.

Visible Color in the Northern Lights

Position 3 people beside each other at the same time...

- Each person could have a wildly different experience!
- Our own unique eyesight & night vision
- Factors like colorblindness, corrective lenses, astigmatism, cataracts, laser eye surgery
- Demographics like youth, age or gender
- Take time to acclimate to the dark
- Color depends on location, Aurora strength, and space weather variables
- Dark skies can make a difference!



Three Michigan Aurora Chasers Admins chase the Aurora as the sun rises! We caught it!! iPhone by Melissa Kaelin



S.A.R.

STABLE AURORA RED ARC

The Stable Aurora Red (SAR) Arc was visible frequently in the summer of 2024, appearing in a wide swatch of the sky and visible as far south as the state of Virginia. Admin Patrick Grubba spotted it numerous times and helped many see the arc.

Photo by Patrick Grubba

S.T.E.V.E.

STRONG THERMAL EMISSION VELOCITY ENHANCEMENT

In a wide-angle view, the double arc of S.T.E.V.E. stretches across the sky, outside of the Auroral Oval, where Northern Lights dance very low on the Northern horizon.

JMNATURESCAPES

Landscapes and Astro-Photography



Photo by Justin Miller

F.A.E.

FIRST RECORDED IN MICHIGAN

On the night of October 10-11, 2024, Admin Christina Cantu Sharp spotted a Fragment-Like Auroral Emission in Michigan for the first time, alongside other chasers. The F.A.E. has never before been seen outside of the Arctic region.

Photo by Christina Cantu Sharp



Christina Marie Photography

PROTON

AURORA

A rare type of Aurora called a Proton Aurora has been spotted several times outside of Mackinaw City by Admin Patrick Grubba.

Photo by Patrick Grubba

STEVE-SAR

TRANSITION

During a Live Chase held October 10-11, 2024, the Michigan Aurora Chasers witnessed a STEVE to SAR Transition. So many different phenomena were present, scientists will be studying this night for years to come.

Photo by “Live Chase Nate” Stovall

CORONA

OVERHEAD

Meaning “crown” in Latin, the corona forms during strong Aurora displays when the veils and rays of Aurora meet in the apex of the night sky.

Photo by “Live Chase Nate” Stovall

A Peak Time for Northern Lights!

The Solar Maximum

- Solar Maximum in 11-year-cycle peaked October 2024 — Gradual climb down to Solar Minimum (est. 2030)
- Peak hours occur 2 hours before and after local magnetic midnight
- Peak season occurs from September to April each year
- Note these are Generalizations
- We enjoy one of the only latitudes that can see Aurora year-round!



Photo of Melissa Kaelin and Nate Stovall leading #LiveChase, October 2024

It's a Northern Thing

Except when it's anywhere!

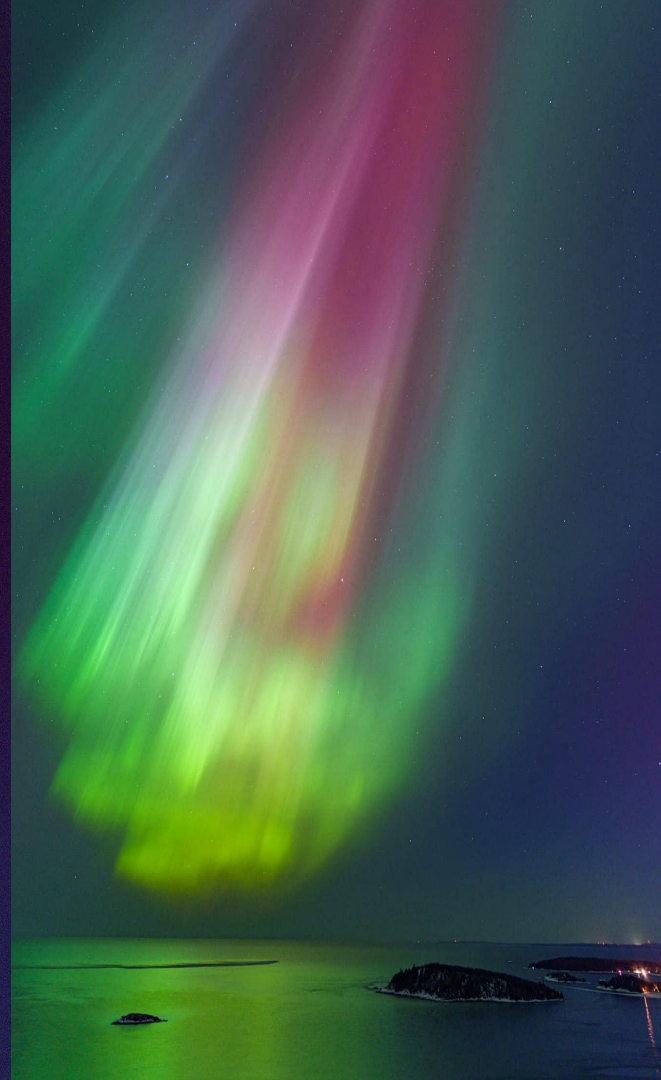
- Pristine dark locations off the beaten path
- Often remote wilderness spots
- As much as we love the North, you can see amazing phenomena in every direction



Our Latitude:
47.1° North

Isle Royale NP:
48° North

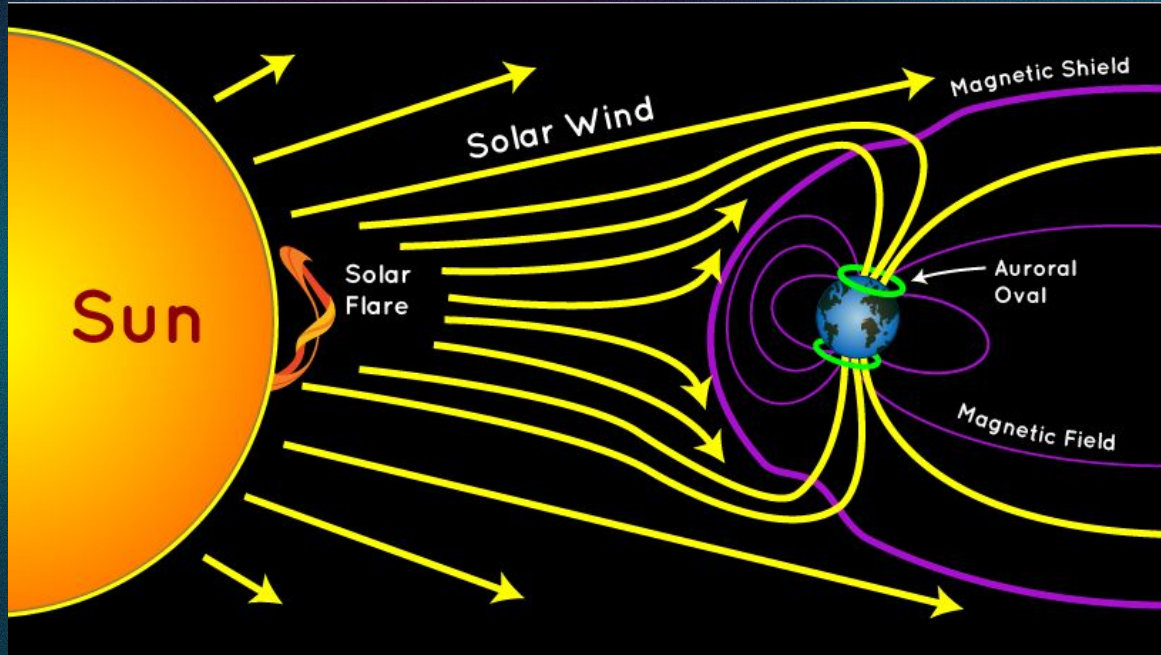
Photo by Shannon Kivi,
906 Images



Understand the Science

Solar Activity. Space Weather. Earth's Magnetic Field.

- A steady solar wind constantly flows by Earth
- Strong solar activity (a solar flare) create CMEs or HSS
- Travels 93 million miles
- Activity must be strong, released, Earth-directed, and hold a favorable polarity, to create strong Aurora
- Energized particles collide with air molecules to emit color and light

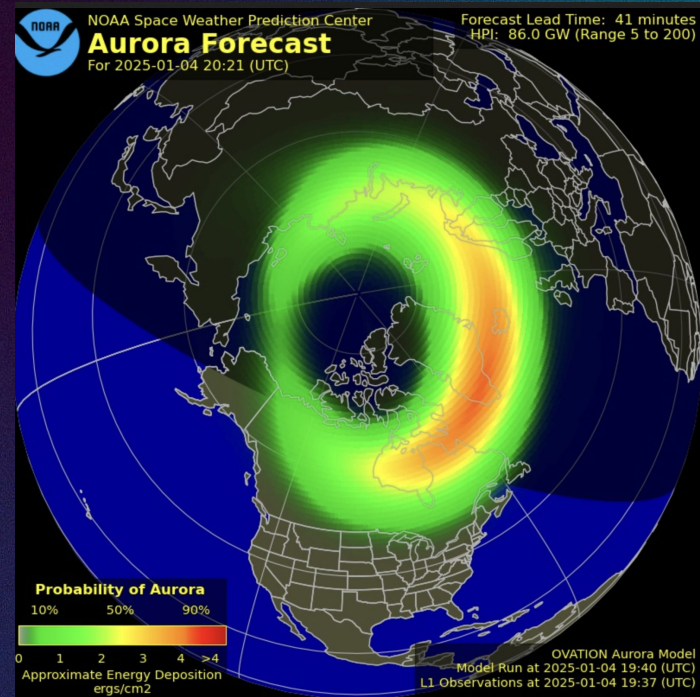


Source: NOAA Space Weather Prediction Center

Chasing Means Embracing the Night

3 Nights. 4 Hours. 15 Seconds. 60 Minutes.

- Dark skies often matter more than northern skies
- Devote 3-4 hours to stargazing
- Better part of a week in the north
- Learn your skies to recognize the patterns of light pollution & identify passing ships or greenhouses
- Depending on the event, sightings can be as brief as 30 seconds or 5 minutes



Great Lakes, Great Location

Positioned south of the Auroral Oval



Photo by Patrick Grubba

Colors of Aurora

Aurora is brighter on camera; before editing

- Imagine a photo of a nebula
- Sensitive camera lens & long exposure photos
- Aurora formations may be more important than color
- To the eye, it's often a transparent white/silver veil
- Camera serves as an early detection device



Photos by Pandora Biskner (above) and Christina Cantu Sharp (right)

How Lucky Are We?

Rare. Elusive. Fleeting. Mysterious. Awe-inspiring.

"Aurora is Rare in Michigan."

— *No one*

"Aurora is always possible,
but it is never guaranteed."

— *Melissa Kaelin*

"There is an exception to every rule."

— *Patrick Grubba*

"L1 or Bust!"

— *Everyone, probably*

"Once in a lifetime..."

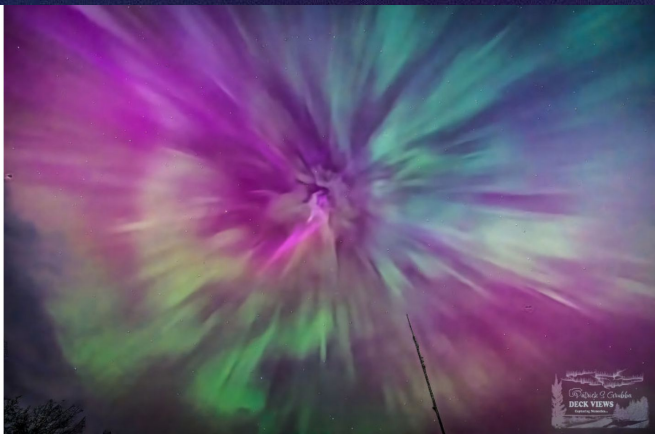
Photo by Michele Aucello

Leading You to the Dance

Guided Aurora Chases and Dark Sky Experiences

- The Michigan Aurora Experience
- Our #LiveChase
- Annual Michigan Aurora Workshop
- The Aurora Summit
- Festivals, Programs & Talks

Become a Citizen Scientist



*Above: Image captured by Patrick Grubba on 5/10/2024 outside Cheboygan at 10:15 PM.
Opposite page: Image take by Justin Miller on the same date.*

Historic Aurora: Severe Geomagnetic Storm Lights Up the World

By Melissa F. Kaelin

Some called it the Olympics of Aurora Chasing. The Aurora display of May 10, 2024, changed everything. From the way we discuss Northern Lights to the size and scope of the audience that searches for them, a G5 Storm changed the game on that historic night.

A testament to our advances in space weather forecasting, scientists predicted that solar matter from five X-flares and at least one M-flare would impact Earth's magnetic field on May 10th. On the surface of the sun, Active Region 3364 had launched so many Coronal Mass Ejections, or CMEs, in Earth's direction that forecasters began to lose count. There was a media frenzy, a boom in Aurora communities, and an excitement that was palpable. There was also a mess of risks to Earth's infrastructure, as officials backed up power grids and rerouted commercial flights near the poles.

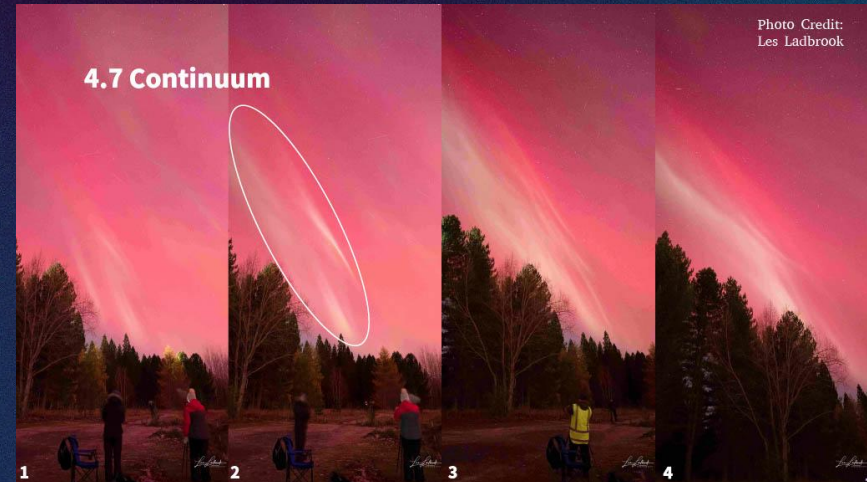
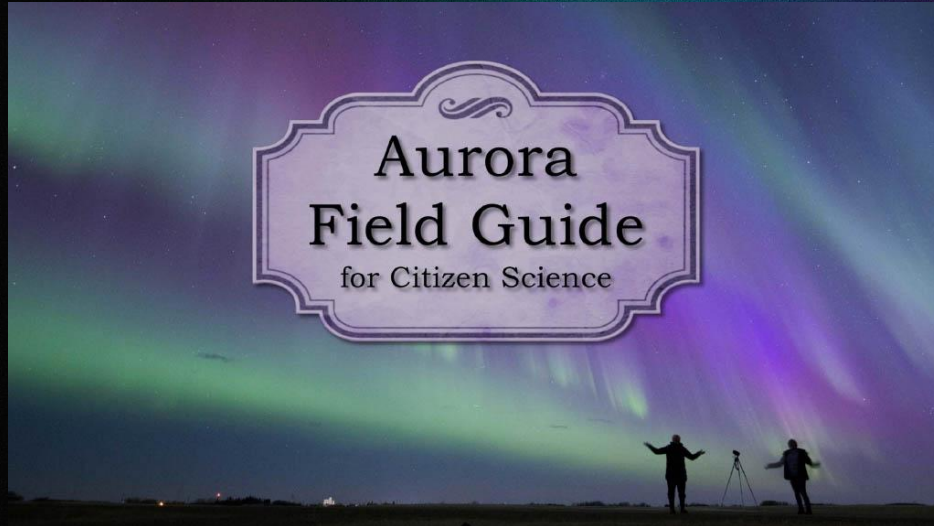
Sure enough, the resulting solar storm maxed out the forecast scales. That afternoon, the blast to our planet sent Aurora spiraling around the world, reaching extreme latitudes in both the southern hemisphere and the northern hemisphere – creating spectacular displays of both the Aurora Australis and the Aurora Borealis. A formal-

You can help create the future of science, especially as it relates to space and rare natural phenomena, by reporting your findings.

Master your photos for accuracy, record the time, date, location and duration of what you see, then submit your findings!

Aurora Field Guide

- Identify & Classify
- Catch them all
- Submit your photographs to inform new discoveries



SPACE IS THE LIMIT...



Michigan Aurora Chasers Launched

Melissa Kaelin founded the Michigan Aurora Chasers on January 20, 2021.



First #LiveChase

Our first official #LiveChase was held on April 1, 2021, inspired by Admin Nate Stovall.



Featured in book "Magnificent Aurora"

Author Bob King featured the Michigan Aurora Chasers in a chapter on the Aurora Community in his book "Magnificent Aurora."

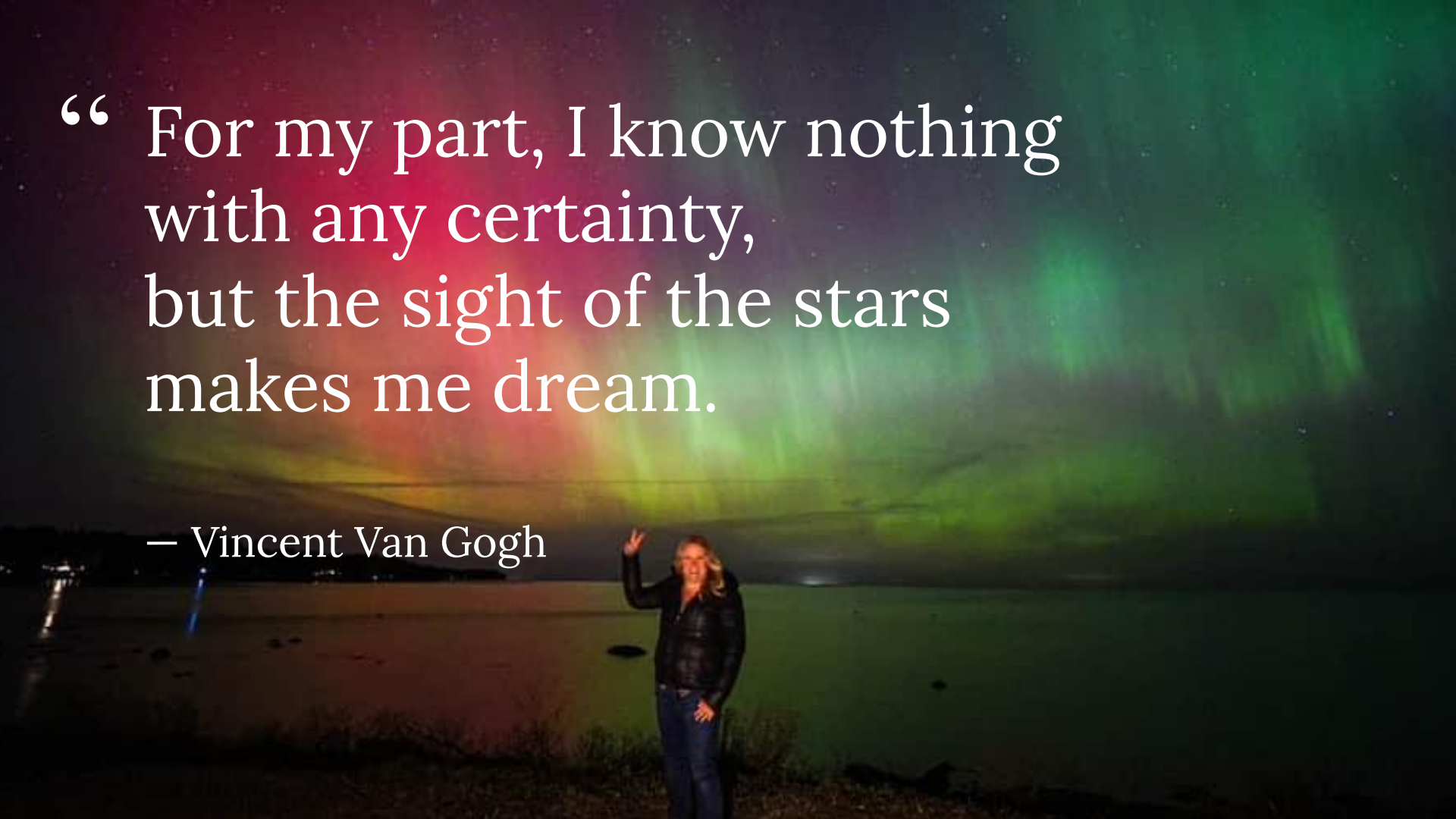


SolarMax Mission Ground Support Team

Patrick Grubba and Melissa Kaelin served on the Ground Support Team for the SolarMax Mission in 2025.

“ For my part, I know nothing
with any certainty,
but the sight of the stars
makes me dream.

— Vincent Van Gogh





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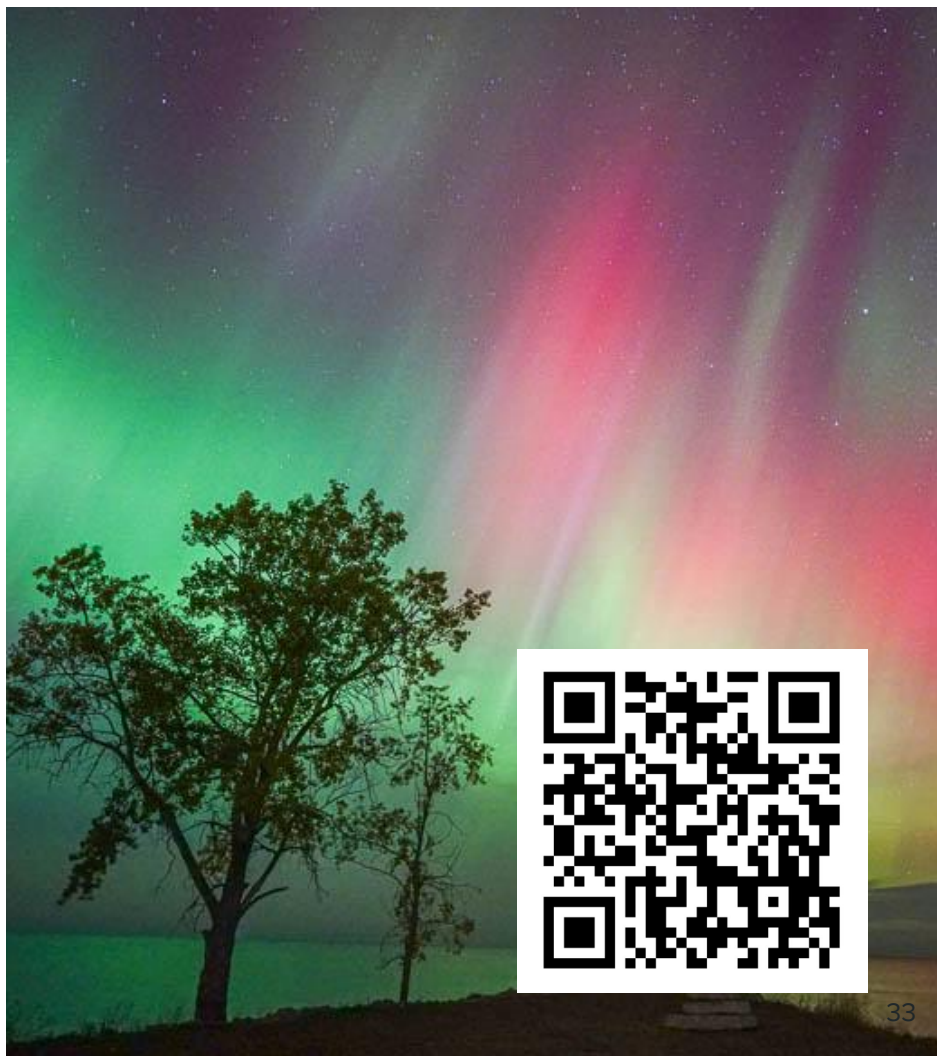
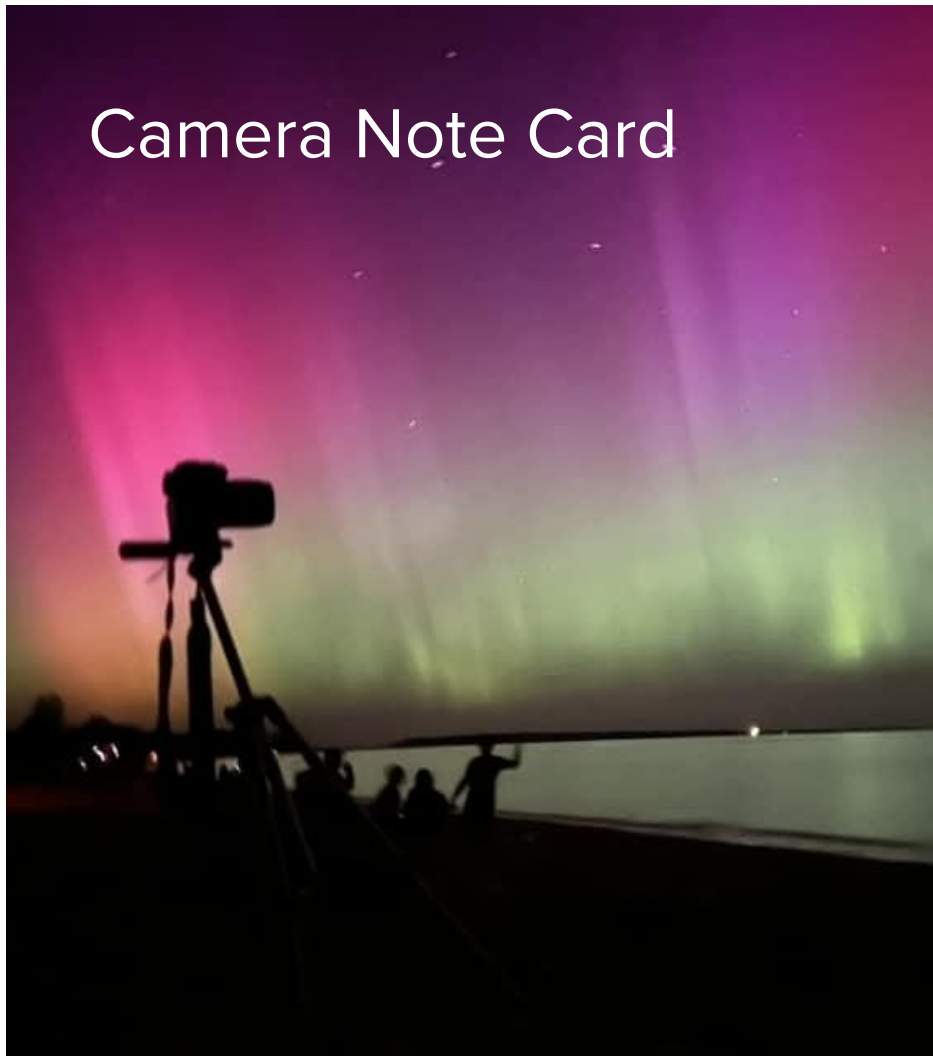
Aurora Alerts Only

- Download the Free Telegram App
- Subscribe to @MichiganAuroraAlerts



Photo by Michele Aucello

Camera Note Card



Melissa's Official Website

- YouTube Tutorials
- Aurora Advice Blog
- Programs & Events
- 45th Parallel Series Books

KaelinArt.com



Ice Roads Northwest Territories

Our Aurora Chase
captured by Guide
Cristiano Saturno

Time-lapse

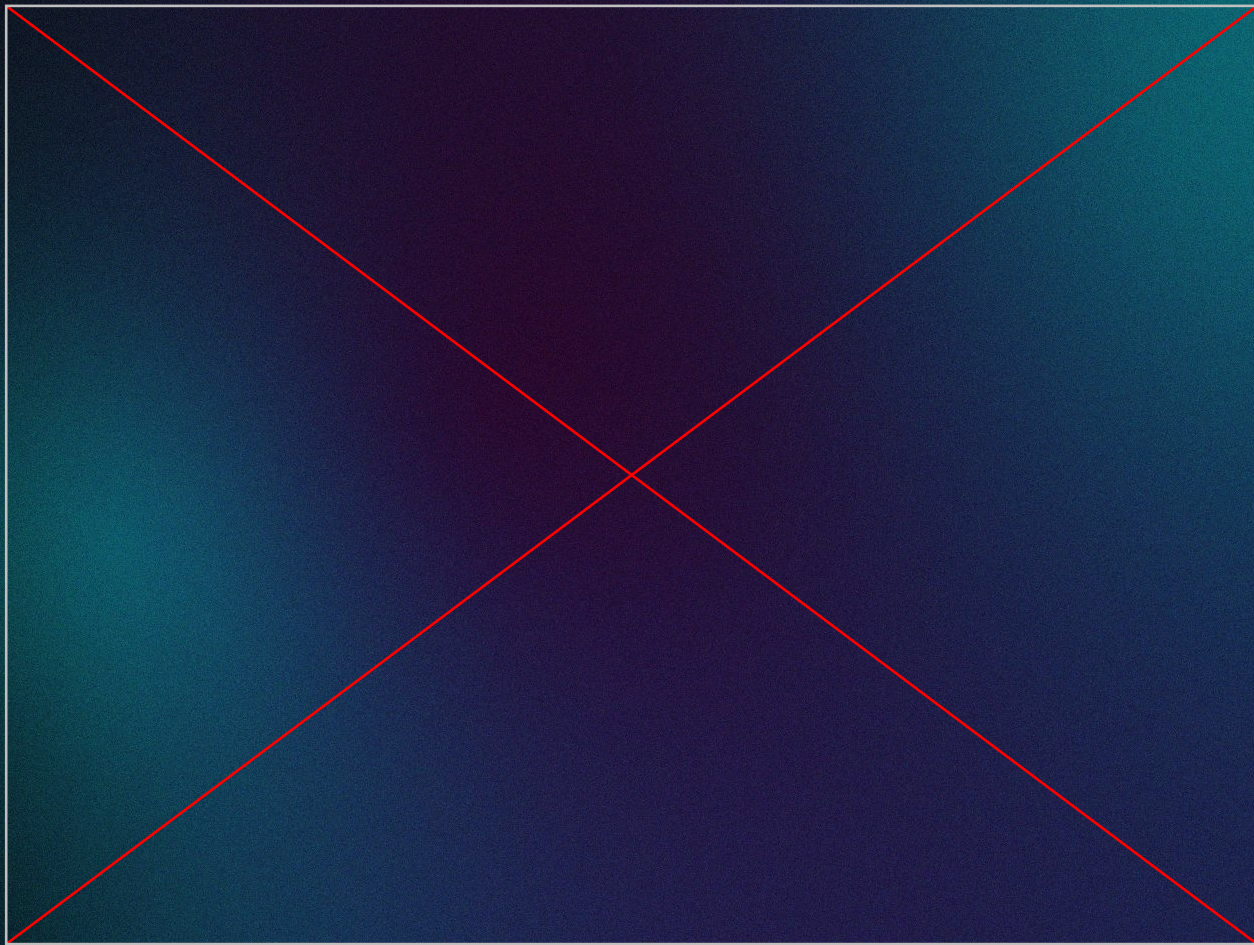




Photo by Cristiano Saturno

A photograph of the Aurora Borealis (Northern Lights) over a dark lake at night. The sky is filled with stars, and the aurora displays vibrant green and pinkish-red light curtains. The foreground shows the dark silhouettes of trees and the calm surface of the water.

Thank you! Good luck tonight!

MichiganAuroraChasers.com | KaelinArt.com