Auroral Citizen Science with Donna Lach



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Logos and icons from various websites have been included for identification.
Screenshots of websites will include QR codes to their web address.



When did you get hooked on aurora?

- When was your first time seeing it?
- Do you participate in citizen science?
- Have you seen any weird things in the aurora?
- March 17, 2015 was the night I got hooked!



What is citizen science?

- Participatory Science
- Photography
- Reporting observations
- Working with researchers
- Learning about the aurora
- Feeding an inquisitive mind
- Contributing to science
- Sharing with others
- Encouraging others
- 100% Volunteer work
- Reciprocity – not payment
- Rewarding to participate in a community that shares your passion

My “Citizen Science” Activities

1. Taking aurora photos
2. Reporting aurora observations
3. Aurorasaurus Ambassador
4. ISSI-ARCTICS Working Group
5. SolarMaX Mission
6. AurorEye portable all-sky camera
7. STEVE Workshop
8. Contributing to publications
9. Social Media
10. Aurora Event Campaigns

Taking Aurora Photos



First I will show you **HOW** I take my photos, then **WHAT** I report, then **WHERE** I report, And then **WHY** I do it all.

HOW - My Current Gear!

Canon 5D Mk IV + Sigma Art 14mm F1.8 lens
Canon RP + 7Artisans 10mm F2.8
Sony A7Sii with Sony 20mm F1.8
Sony ZV-E10 with Meike 6.5mm F2.0 lens
Tapo C325 WB version 2
GoPro Hero 11 Black
iPhone 17 Pro Max
Samsung S22 +
Various tripods
Process in Lightroom
Stored on DAS, Backed up online with Backblaze

Some of my settings are shared here and as I learn more I will change them.

Tapo C325 WB

Motion Detection – ON
Line Crossing Detection – ON
Night Mode – Light Off
Video Quality – Auto
Local Storage, Loop recording

Sony A7sii

Video Settings:
ISO 51200
1/25 second

Canon RP

Time Lapse Settings:
Continuous intervals
Unlimited shots
Auto ISO
3-15 seconds

GoPro

NightLapse Settings:
Lens - Wide
Interval - Auto
Shutter – 20 seconds
Duration – no limit
Timer – 3s
Bit Rate – High
ISO min – 1600
ISO Max – 1600
WB 4000K
Sharpness – Low
Color - Vibrant

HOW – I use many resources. . .

APPS

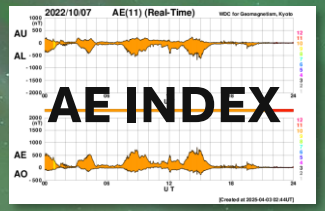


RESEARCH PAPERS



WEBSITES





KNOWLEDGABLE SOURCES THAT CURATE THE DATA



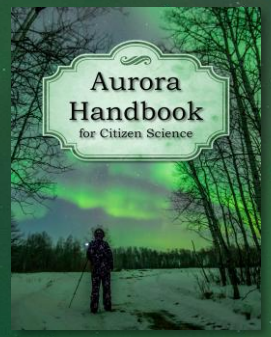






HANDBOOK + FIELD GUIDE





COLLABORATIVE DISCUSSIONS WITH OTHER PHOTOGRAPHERS, RESEARCHERS, SCIENTISTS

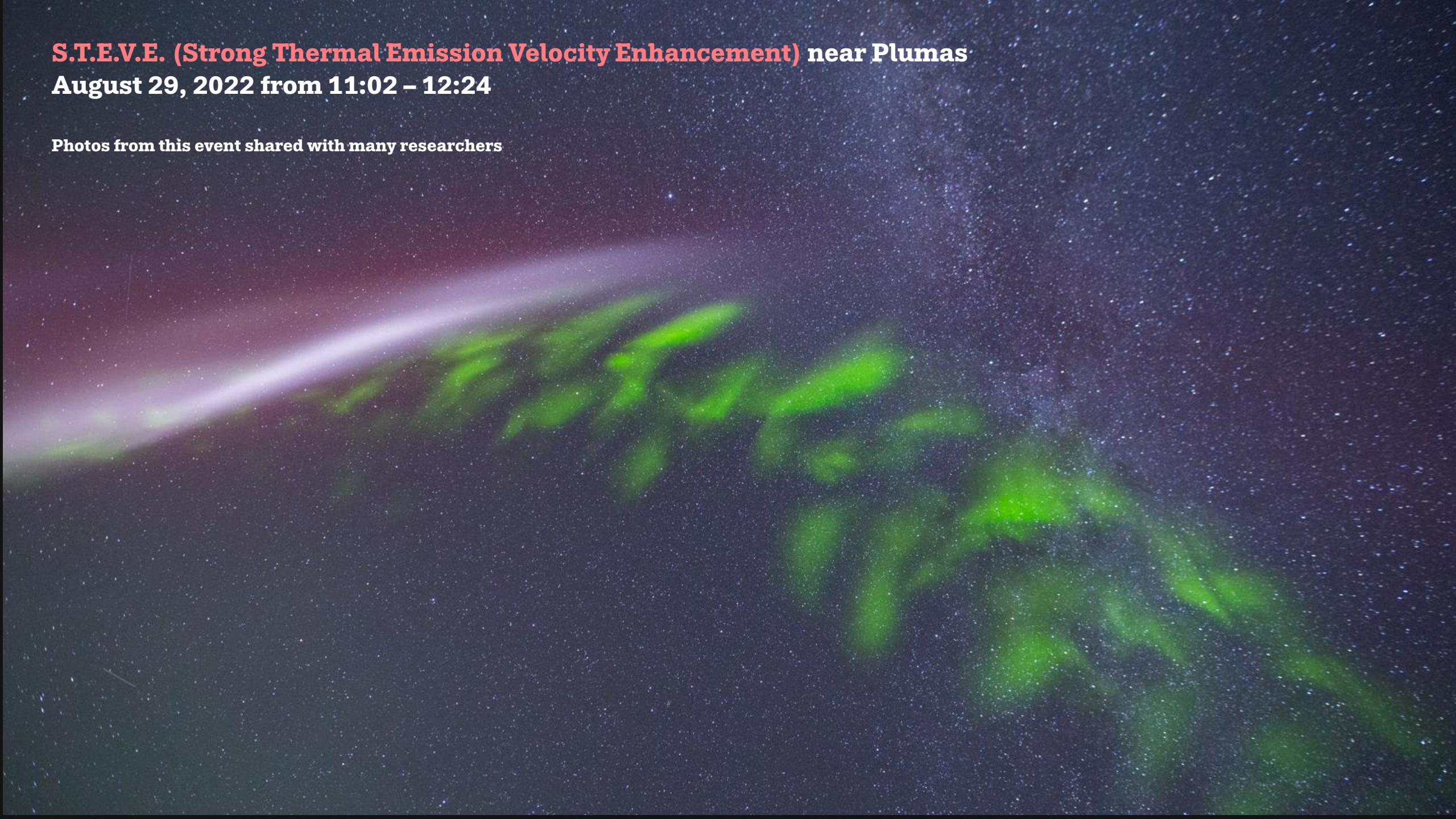
WHAT – My photos!

Comet Neowise + Meteor + Aurora + S.T.E.V.E.

near Plumas July 14, 2020 at 1:06 a.m.

Featured on NASA Explore website
July 15, 2020





S.T.E.V.E. (Strong Thermal Emission Velocity Enhancement) near Plumas

August 29, 2022 from 11:02 – 12:24

Photos from this event shared with many researchers


Enhanced Aurora at Plumas
March 23, 2023 at 10:14 p.m.
Many Enhanced Aurora events shared with a researcher

Fragmented Auroral Emissions near Plumas

November 4, 2021 approx. 6:00 a.m.

Photos near dawn barely caught the fragments, but useful for research.







November 9, 2024 at 7:18 a.m.

Streamer near Plumas
February 15, 2026 approx. 11:20-12:20

Many other phenomena observed during this event



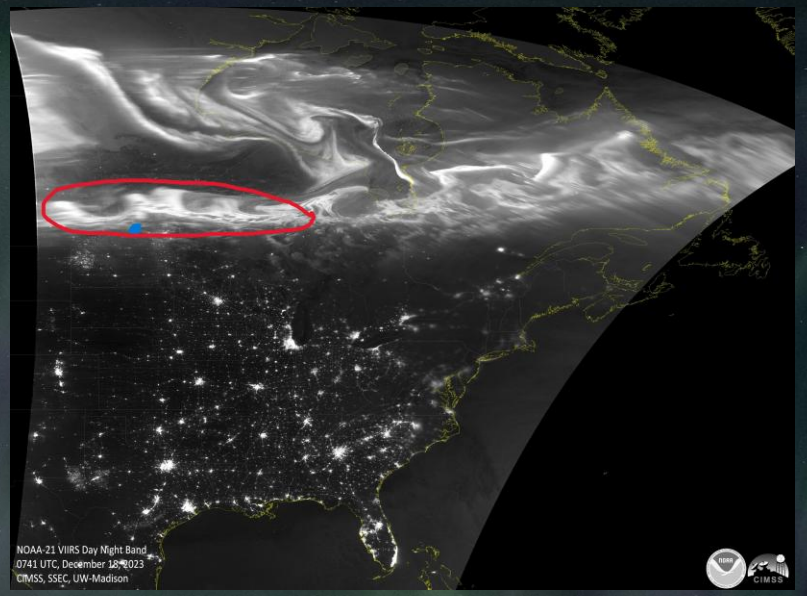


Overhead Spiral and Field Lines at Newdale, MB
April 23, 2023 at 2:16 a.m.

All night overhead aurora, from dusk until dawn


IPA (Isolated Proton Aurora) near Plumas
November 12, 2023 at 7:30 p.m.

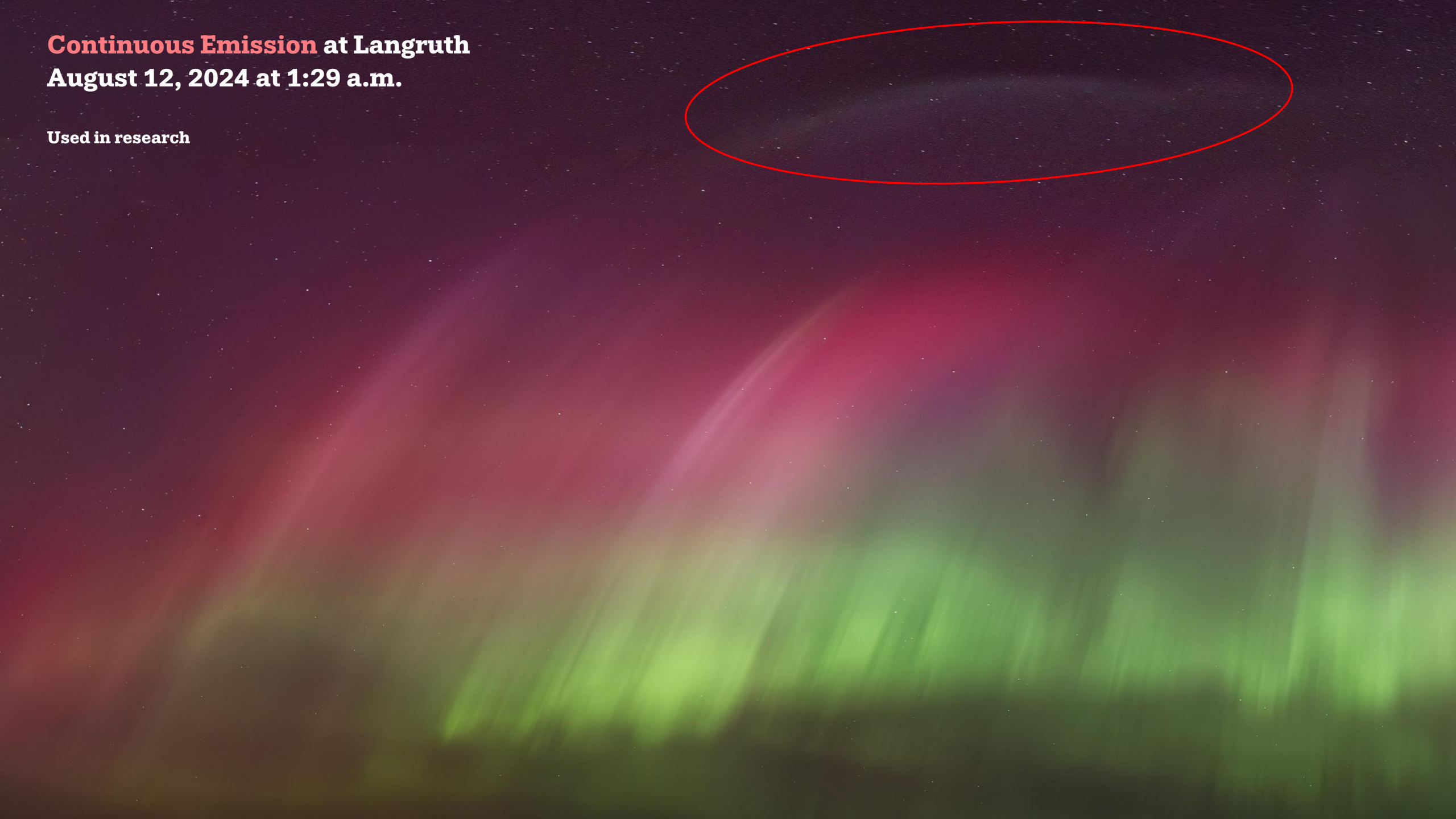
Omega Band and Pulsating Aurora near Plumas
December 18, 2023 at 1:41 a.m.



SATELLITE IMAGE CREDIT:
https://cimss.ssec.wisc.edu/viirs/imagery-viewer


Colorful Corona and Field Lines at Reynold's Ponds, MB
Gannon Superstorm - May 11, 2024 at 1:42 a.m.


Colorful Aurora Curtain at Plumas
August 11, 2024 at 1:24 a.m.
Used in research for spectrum analysis


Continuous Emission at Langruth
August 12, 2024 at 1:29 a.m.
Used in research


Black Aurora at Thompson, MB
September 29, 2024 at 3:18 a.m.
Featured on NASA Explore website – January 21, 2025



S.A.R. Arc (stable auroral red arc) + Dunes at Plumas

October 6, 2024 at 9:07 p.m.

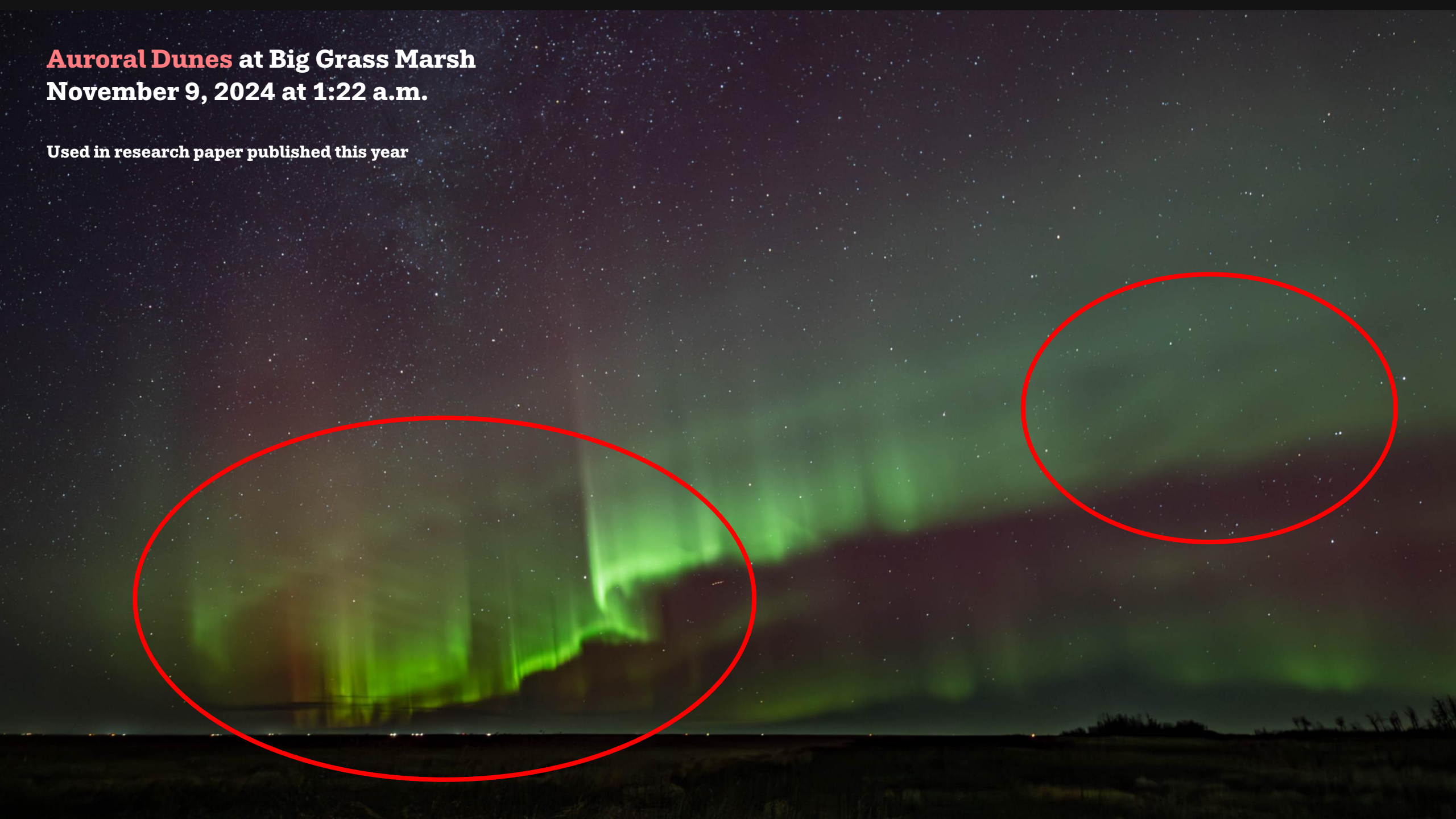
Used in research



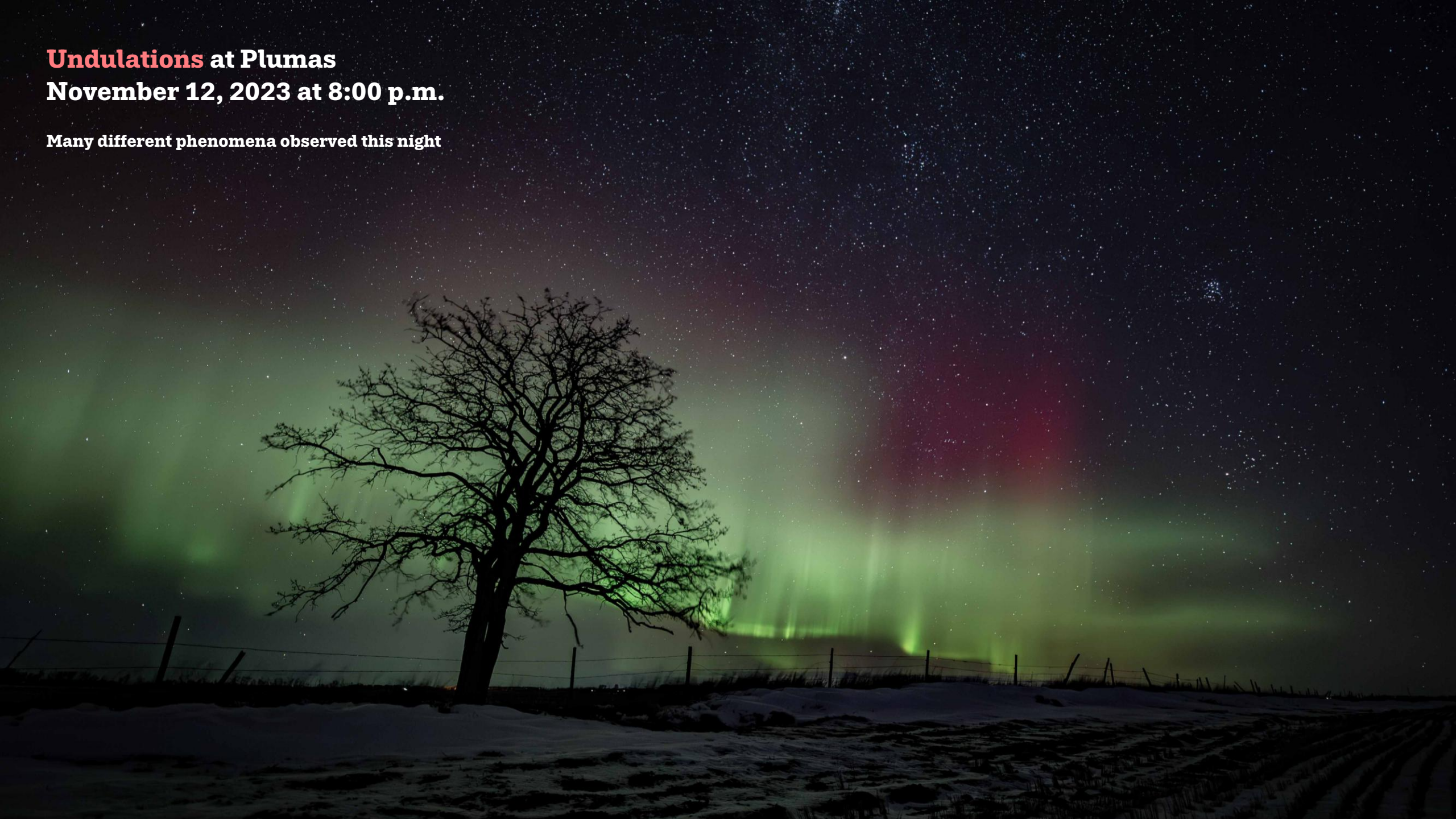
Westward Traveling Surge at Plumas
October 8, 2024 at 11:49 p.m.

Discovered it in my photos after hearing about it in the Field Guide.


Spirals over Lake Manitoba
October 11, 2024 at 2:12 a.m.
Will be in 2027 GWC Calendar


Auroral Dunes at Big Grass Marsh
November 9, 2024 at 1:22 a.m.
Used in research paper published this year


R.A.G.D.A. (red arc with green diffuse aurora) at Plumas
February 2, 2021 at 8:48 p.m.



Undulations at Plumas
November 12, 2023 at 8:00 p.m.

Many different phenomena observed this night



Red Coronal Aurora + Field Lines near Dauphin, MB
November 11, 2025 at 9:18 p.m.

Naked eye reds, all night aurora



Auroral Dunes + Curtain + Purple Ribbon near Minnedosa, MB

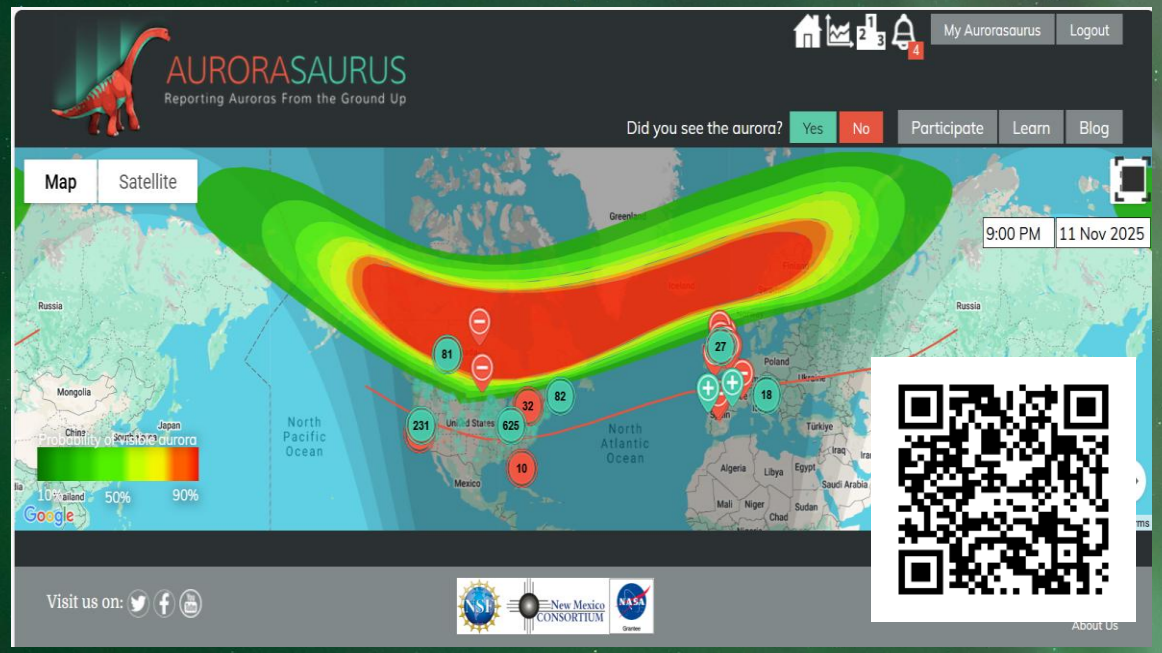
November 12, 2025 at 7:24 p.m.

Not sure of classification of the purple ribbon

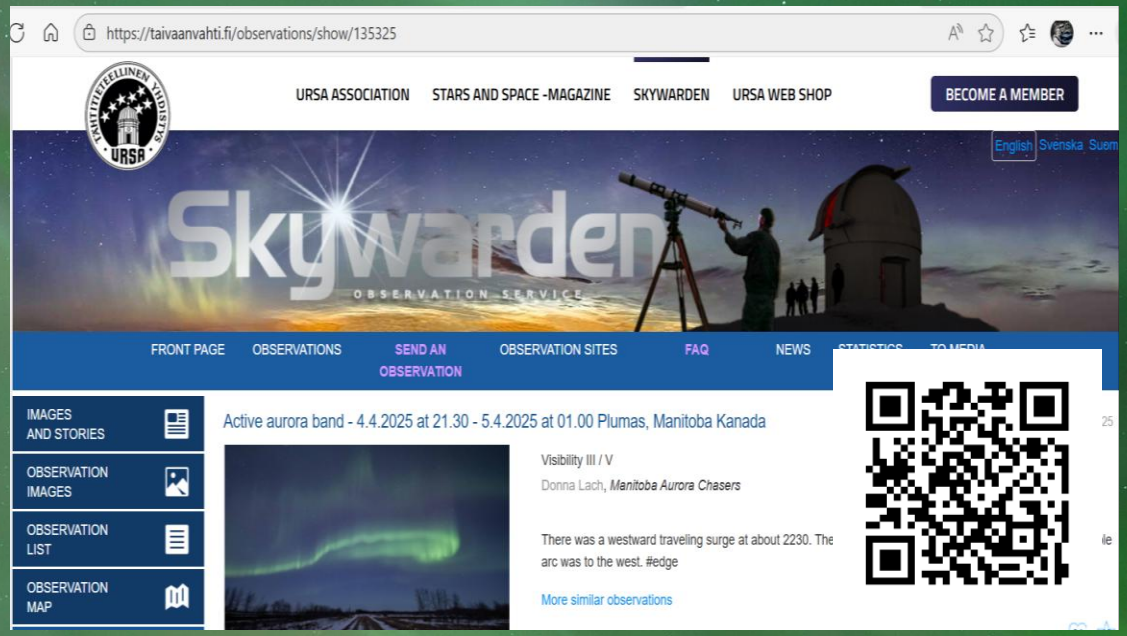
Reporting My Observations

I regularly report to these websites and collaborate with the researchers who access their data.
There are other sites that gather reports, and other methods of observation reporting.

https://www.aurorasaurus.org/



https://taivaanvahti.fi/



Aurorasaurus Ambassador

- **2019** - I became an Aurorasaurus Ambassador.
- Dr. Elizabeth MacDonald –Heliophysicist
- Laura Edson – Project Manager
- Monthly zoom meetings
- Worldwide network of citizen scientists, scientists & researchers
- Listen and learn
- Dr. Akasofu's research paper "The development of the auroral substorm" was a game changer for me in my understanding.
- Report aurora observations
- Encourage others to report
- Semi-annual report-a-thons
- Check out the incredible information on their website www.aurorasaurus.org



ISSI-Bern
ARCTICS Working Group

ISSI Bern > Working Groups > Auroral Research Coordination: Towards Internationalised...

INTERNATIONAL SPACE SCIENCE INSTITUTE

Auroral Research Coordination: Towards Internationalised Citizen Science (ARCTICS)

Working Group

Purpose | Members | Outcome & Publications | Venue | ISSI Apps



IMAGE CREDIT – Emma Bruus

June 2024 Meeting 2 in Bern

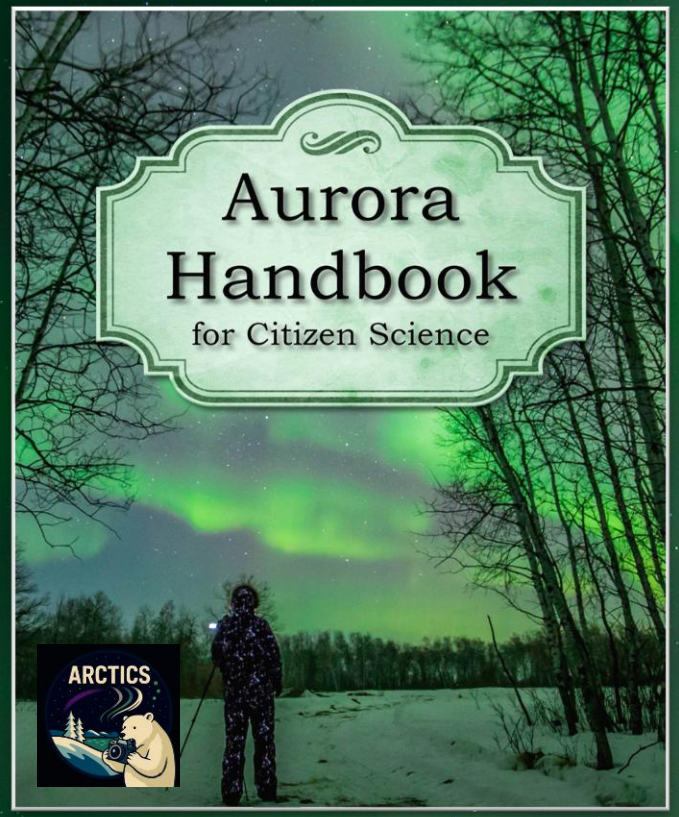


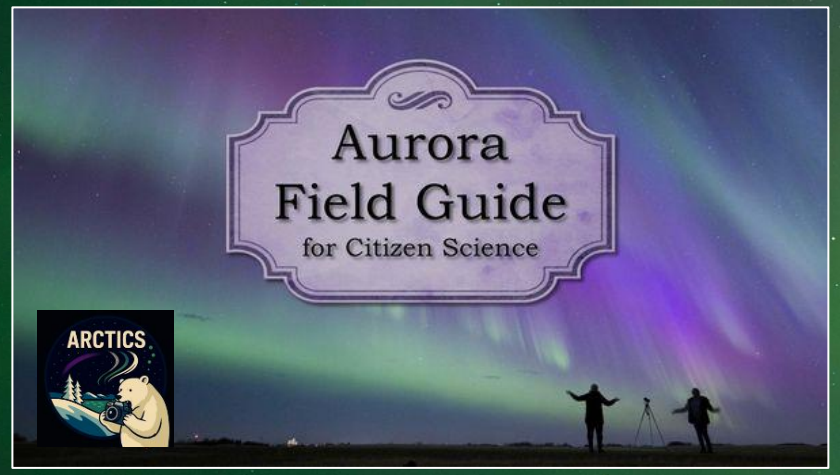


May 2025 Meeting 3 in Bern

- Led by Maxime Grandin and Bea Gallardo-Lacourt
- 2 Year Project, beginning in fall of 2023
- 30 collaborators from over 15 countries
- Online meetings and collaborations all summer 2024 and I worked over 20 hours per week on the project in July and August.
- I learned so much in our online discussions.
- We met in Brussels in June 2026 and discussed future collaboration.







September 2024

ISSI-ARCTICS published free resources:

Aurora Handbook for Citizen Science

Aurora Field Guide

December 2025

ISSI-ARCTICS working group concluded.

Currently 11 Published Peer-Reviewed Articles and 3 in Preprint stage.

Handbook and Field Guide has been used and shared worldwide.

****Working group of the*
International Space Science Institute – Bern, Switzerland

SolarMaX Mission

April 1-4, 2025

Dr. Katie Herlingshaw + Jannicke Mikkelsen proposed and led this project.

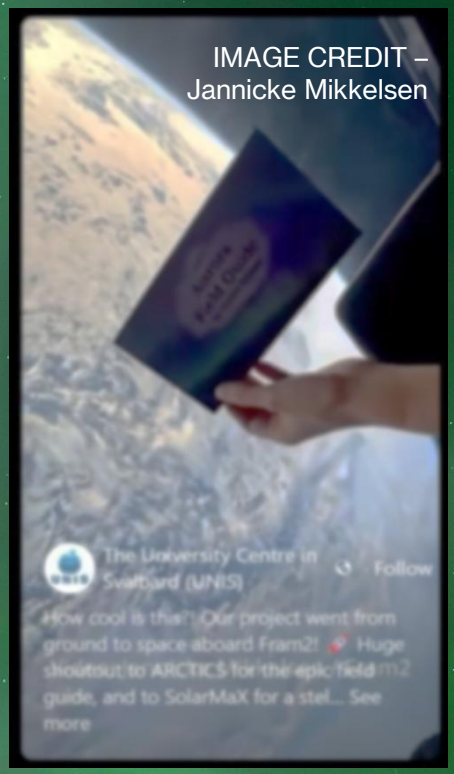
Fram2 was the first human space mission to travel around the Earth's polar regions.

Collaboration between scientists, citizen scientists and astronauts.

Part of a global effort, we collected and coordinated photography from the ground while images were collected from Fram2.











AurorEye

All-sky portable camera

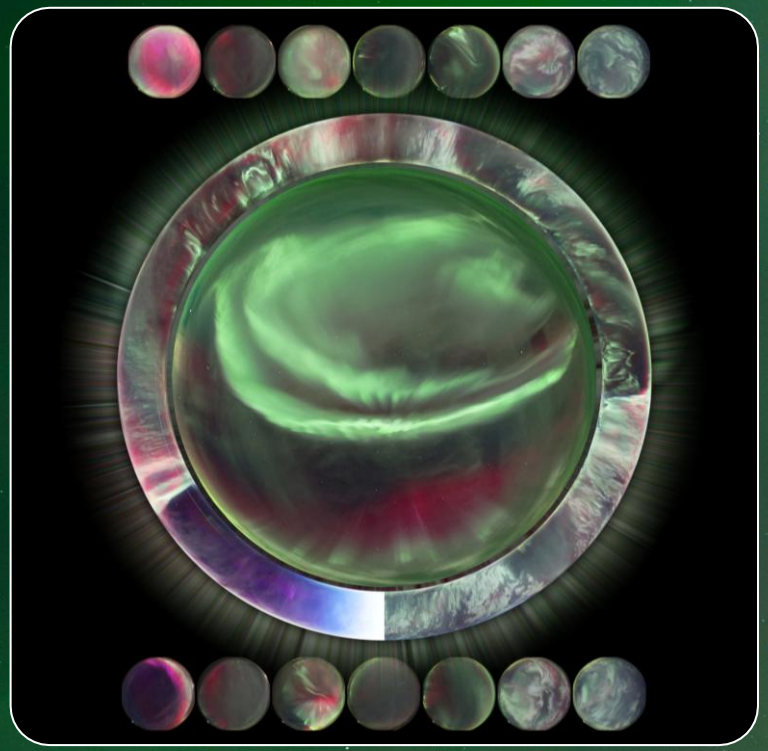


IMAGE CREDIT – Jeremy Kuzub - AurorEye

Time lapse videos are posted on https://auroreye.ca and CaptureNorth YouTube channel

Jeremy Kuzub – Engineer, Photographer, Citizen Scientist
Jeremy does all this work voluntarily as a citizen scientist using his computer and electrical engineering expertise. He has units in North America and New Zealand. In 2023 his unit captured a quiet time STEVE in Yellowknife.

Fisheye Lens Time Lapse

These units are designed for "rapid deployment and consistent data."

Footage from the various AurorEye units has been used in planetariums.

My captures include 2 incredible all-night events and one overhead STEVE:
August 11, 2024
October 10, 2024
March 23, 2026



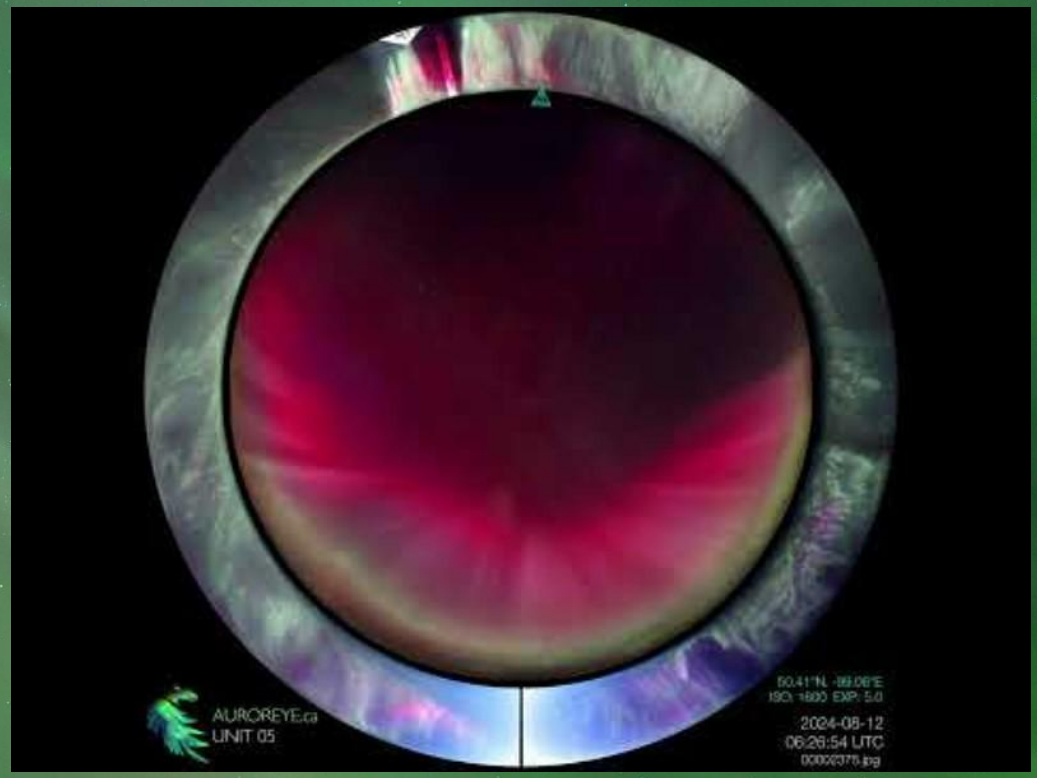
Unit 5

August 2024 - March 2025



Unit 15

January 2026 - Present



S.T.E.V.E. Workshop

October 2022

Observed the STEVE Workshop online

- **Many of my photos from Aug 29, 2022 STEVE event were shown by one of the presenters.**
- **I learned about Skywarden reporting website in Finland and began reporting there.**



October 2025

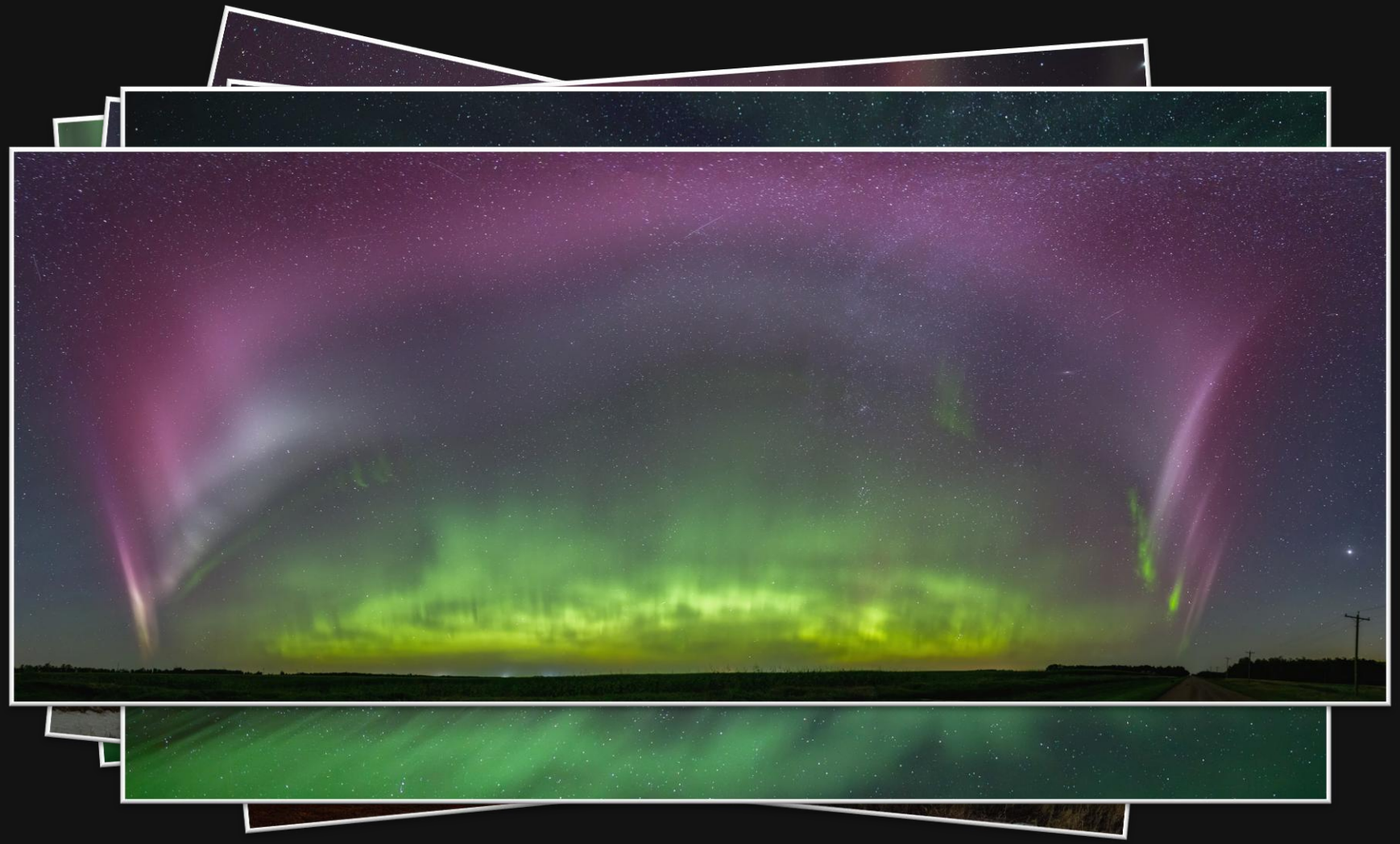
Attended the 3rd STEVE Workshop in Alaska

- **Over 30 scientists + citizen scientists from around the world**
- **3 day workshop - sharing, learning, discussion**



This project is funded by the US National Science Foundation under Grant AGS-2025-481

Contributions to Research and Publications



By requests or invitations from journalists, authors and researchers, I have contributed to many publications.

This has been entirely volunteer.

- **Multiple Research Papers**
- **ARCTICS Handbook & Field Guide**
- **STEVE Event List – Michael Hunnekuhl**
- **Auroral Types paper by Samuel L Warfel**
- **Magnificent Aurora by Bob King**
- **Newspaper articles**
- **NASA Science Live**
- **And many others**

Social Media

Manitoba Aurora Chasers Facebook Group



This group was created with a focus on Citizen Science, sharing information and an interactive community.

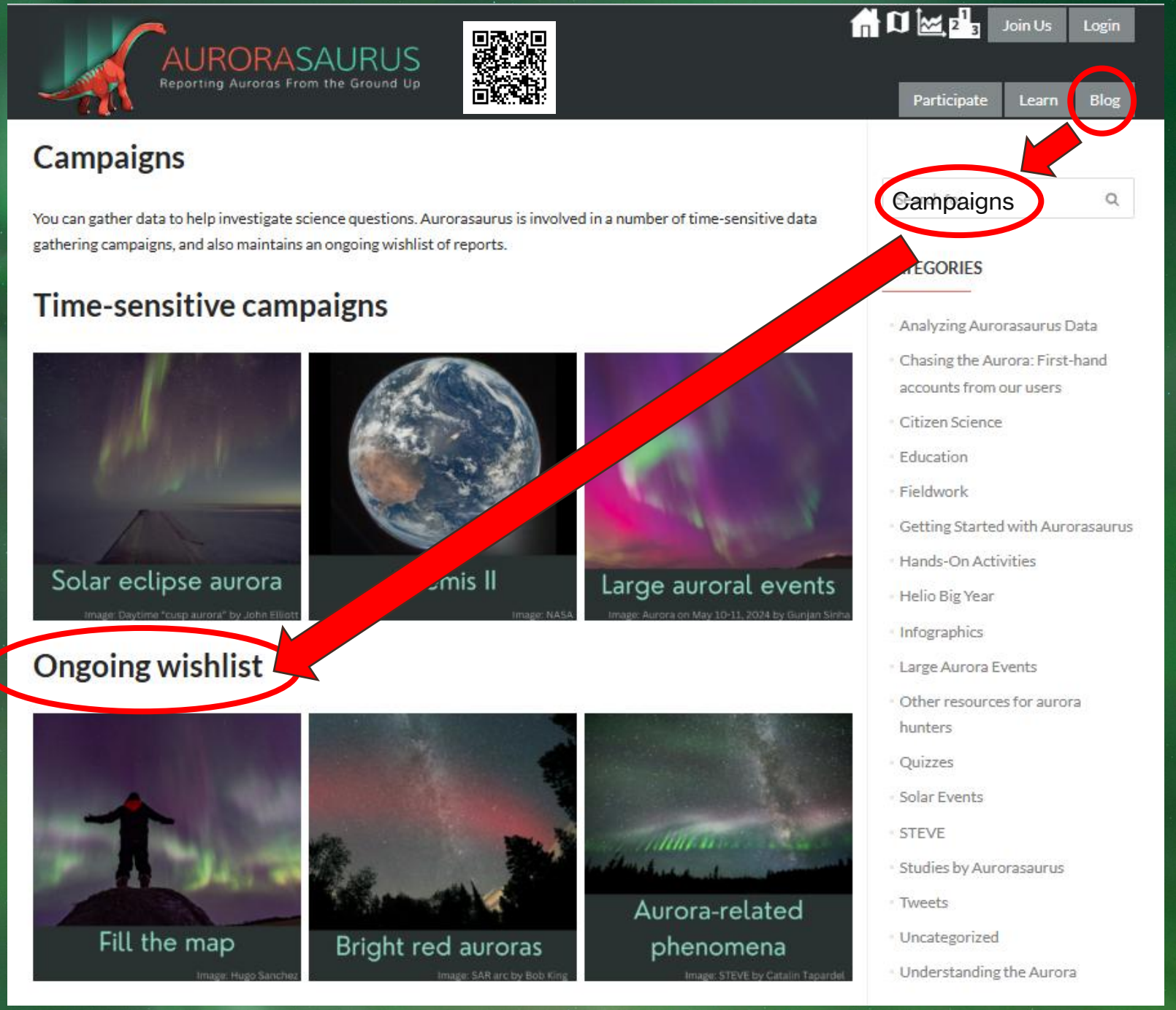
We welcome you to our group!

Campaigns

Many researchers and organizations have campaigns for specific observations from time to time.

Aurorasaurus has a blog post about their campaigns.

- **Go to "Blog" and Search for "Campaigns".**
- **Also see the "Wishlist" to get ideas for what to take photos of, or report.**
- **SolarMaX Mission was a campaign.**
- **Seeking Auroral Fragments for research was a campaign.**
- **There will be more coming up - watch social media for notices.**
- **Auroral Citizen Science is a growing field, gaining momentum and accelerating scientific advancement.**

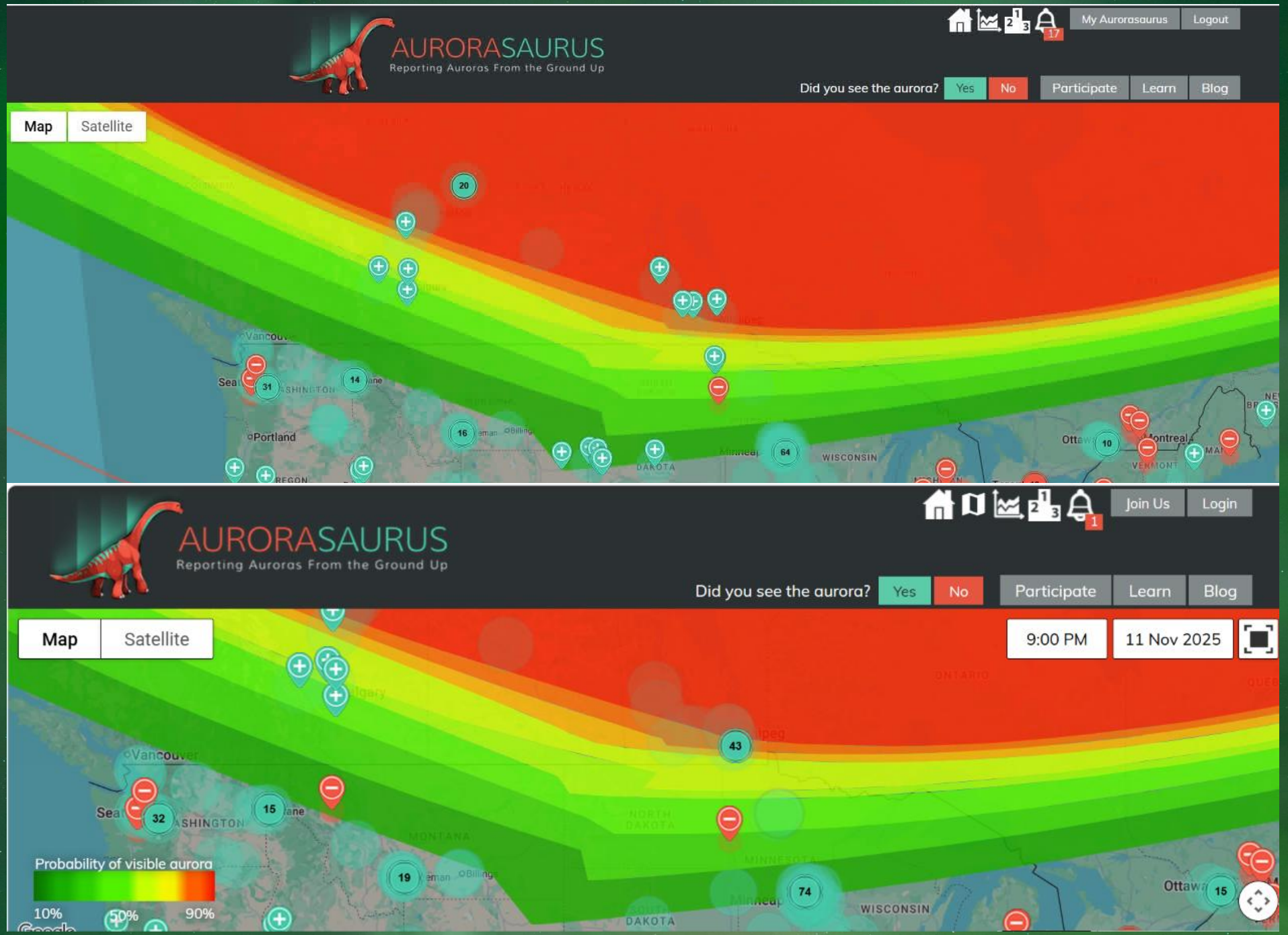


Campaign Example:

November 11, 2025 was a big aurora night for many of us in Manitoba but Aurorasaurus only saw 4 sightings reported in Manitoba, compared to hundreds in the USA.

They contacted me to see if that was the case. I said no, there were many who shared photos that night. They asked us to encourage others to make reports which I did in my Manitoba Facebook groups.

Now the map shows 43 reports in southern Manitoba and one No aurora report under the clouds in Thompson.







WHY DO I DO IT?

- Small town Volunteerism IYKYK
- Contributing to something worthwhile
- Serving the community
- Working together
- Participating
- Not for money
- Not for fame
- For the experience
- For the joy of sharing
- To encourage others
- To learn and grow



How can you participate in Citizen Science?

Report your observations to these websites:
https://www.aurorasaurus.org/
https://taivaanvahti.fi/

- **Make sure your camera clock is accurate!!!!**
- **Write Comments in your report - list possible phenomenon you saw.**
- **Learn about the aurora – EXAMPLES…**
  - **Read ISSI-ARCTICS Handbook & Field Guide**
  - **Check Aurorasaururs website > Blog > Campaigns for Wish List**
  - **Read Dr. Akasofu's "The Development of the Auroral Substorm"**

Download the cheat sheet on my website.

Contact me if you wish to know more!

www.facebook.com/donnalachphotography
www.donnalach.weebly.com
YOUTUBE @donnalachcanada





I am so grateful to the many
people and organizations that have
supported my efforts,
collaborated with me,
sent opportunities my way,
promoted my work,
taught me about the aurora,
encouraged me,
chased the aurora with me,
and appreciated my photography.
There are far too many to name,
but within these organizations mentioned you will find them.

Any questions??

