

ADEC's Community-Based Air Sensor Network

Quarterly Call
December 10, 2024
10:00 AM AKST

Lydia Johnson, lydia.johnson@alaska.gov

Simeon Ng, simeon.ng@alaska.gov

Kelly Ireland, kelly.ireland@alaska.gov

Grace Carico, grace.carico@alaska.gov

Isaac Van Flein, isaac.vanflein@alaska.gov

Ayla Crosby, ayla.crosby@alaska.gov

Housekeeping Items

- Mute – Please mute yourself for presentations.
- Please use chat during presentation as you have questions/comments.
 - 20-30 minutes of planned discussion time at end
 - Mark your calendar for next call! **March 11th 10-11am**



Agenda

Welcome!

Sensor network overview and progress

Data findings

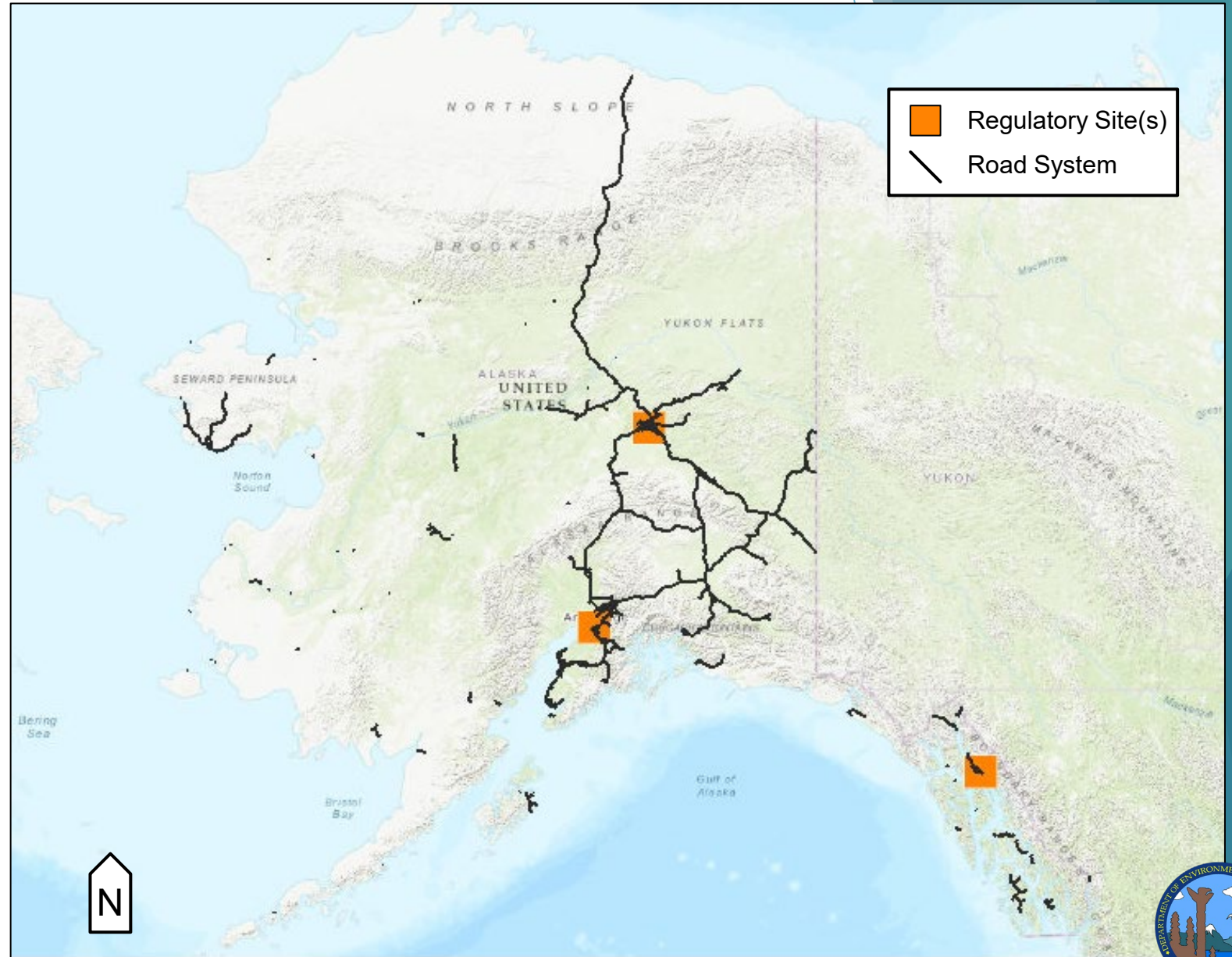
Next steps

Questions and discussion



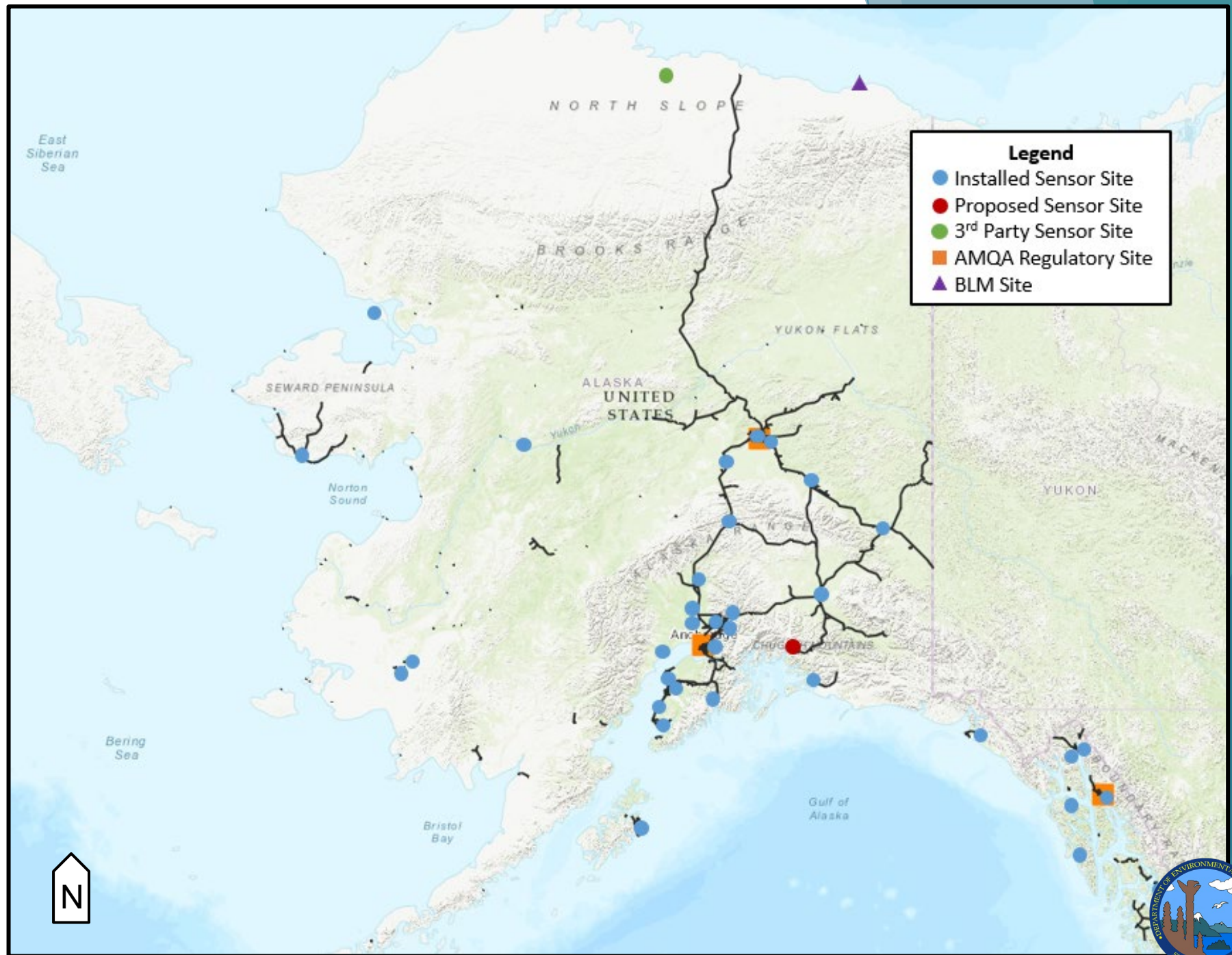
DEC's Regulatory Network

- ▶ Regulatory stations in 3 Metropolitan Statistical Areas (MSAs)
 - ▶ Anchorage / Mat-Su (4 sites)
 - ▶ Fairbanks (3 sites)
 - ▶ Juneau (1 site)
- ▶ Monitor criteria pollutants:
 - ▶ Particulate matter (PM_{2.5} and PM₁₀)
 - ▶ Gases:
 - ▶ Carbon monoxide (CO)
 - ▶ Nitrogen dioxide (NO₂)
 - ▶ Ozone (O₃)
 - ▶ Sulfur dioxide (SO₂)



Low-Cost Sensor Network

- ▶ Sensors deployed in 36 communities
- ▶ Plans for network expansion
 - ▶ Wi-Fi or satellite-enabled sensors
- ▶ Non-regulatory data





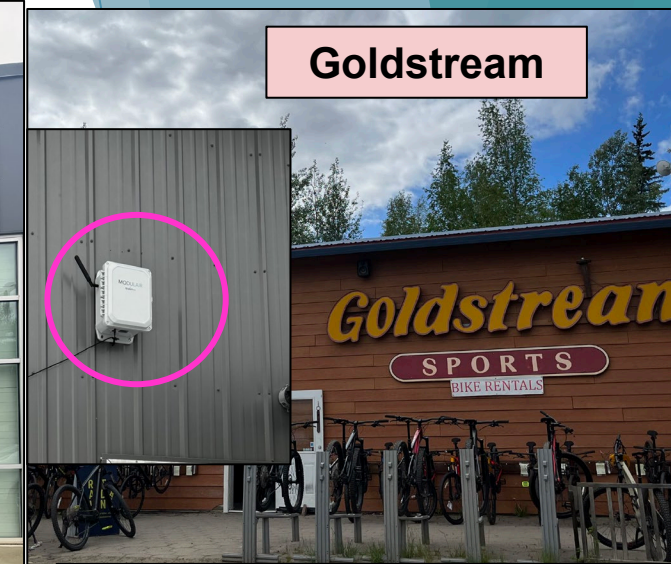
Napaskiak



Alaska State Museum



Wasilla



Goldstream



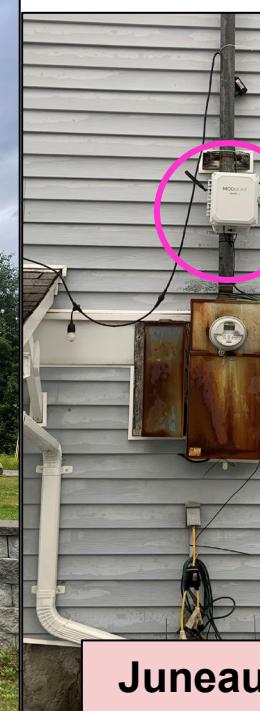
Wrangell



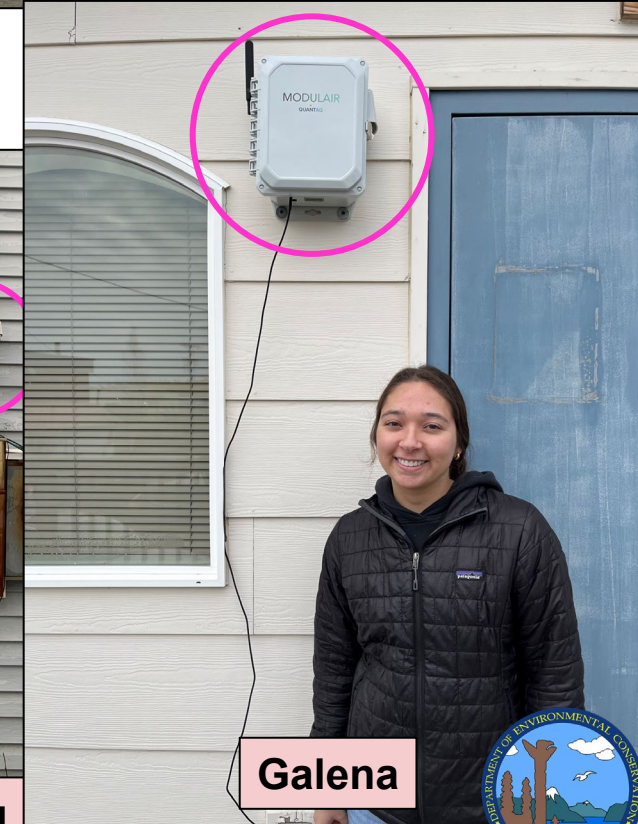
Tok



Chickaloon

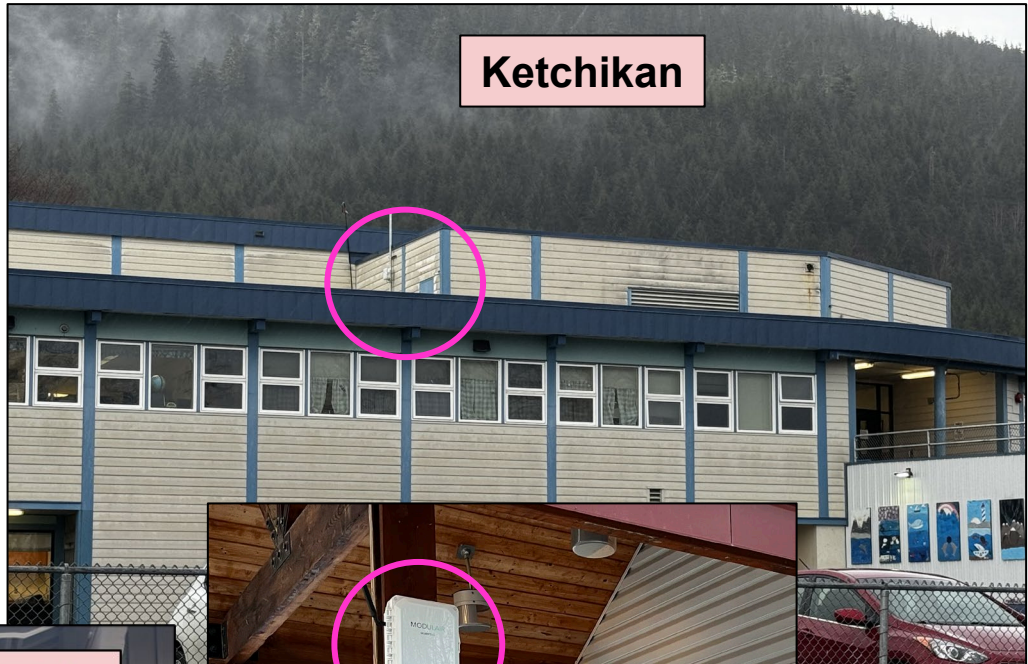
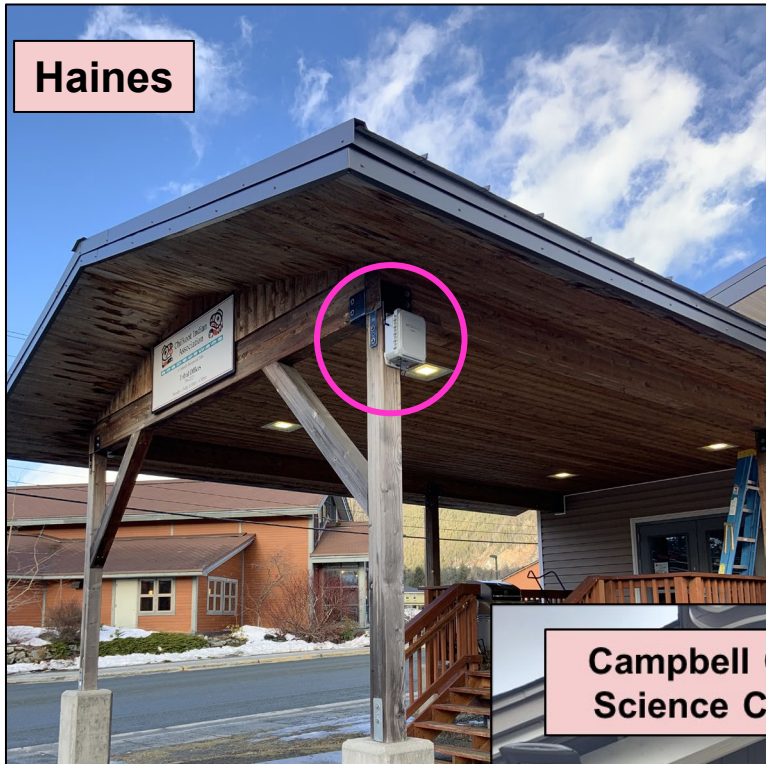


Juneau



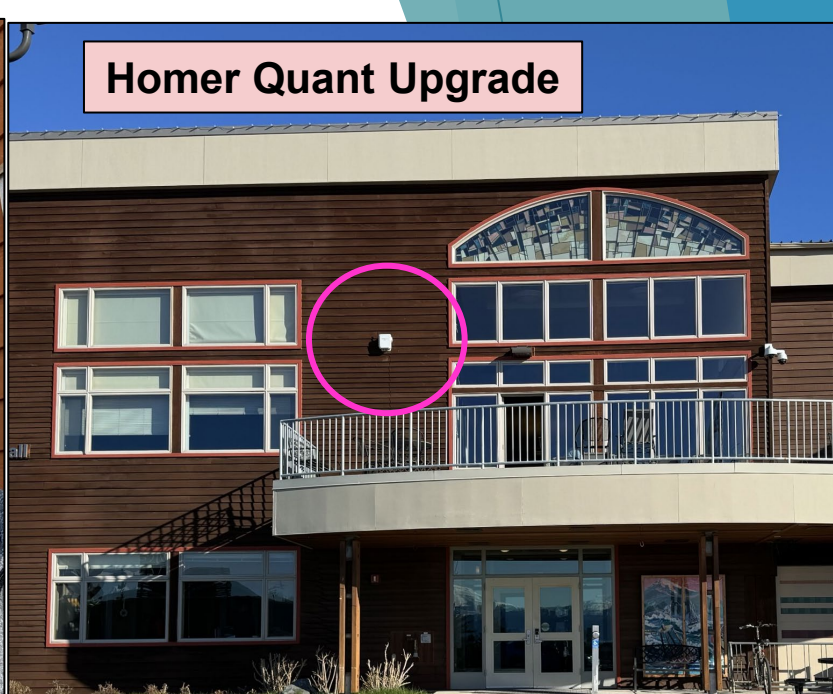
Galena







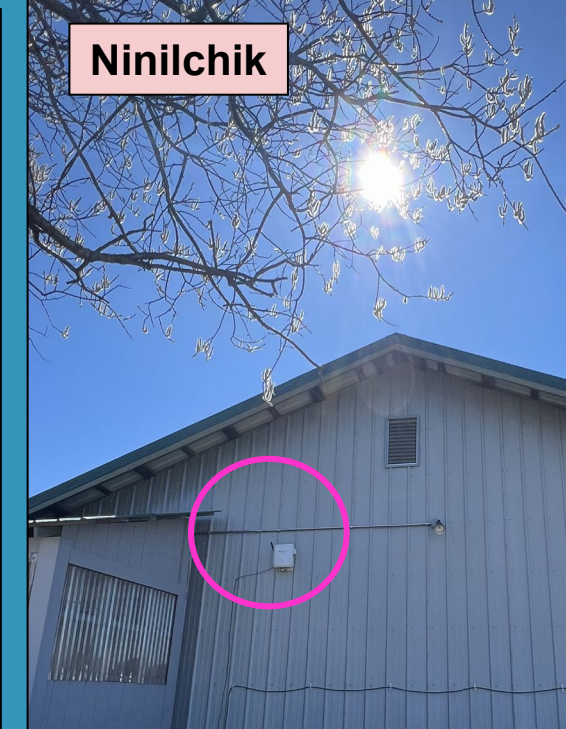
Soldotna



Homer Quant Upgrade



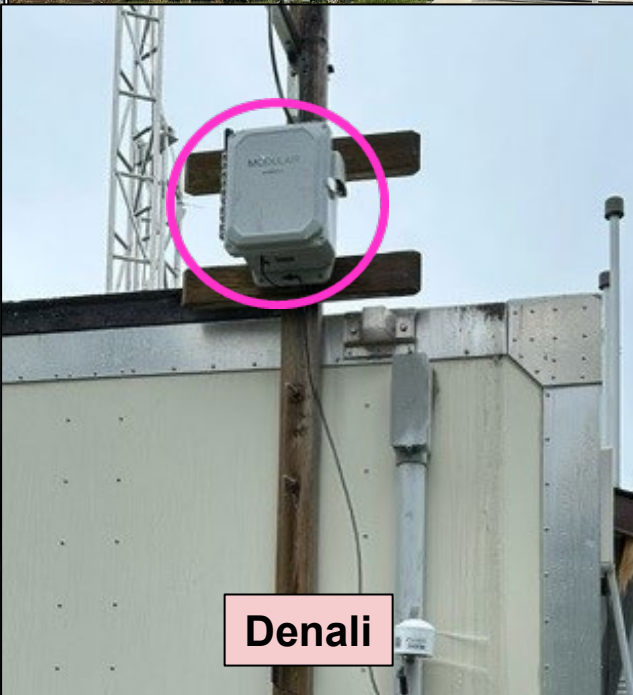
Seward Quant Upgrade



Ninilchik



Badger



Denali



Palmer



Nome

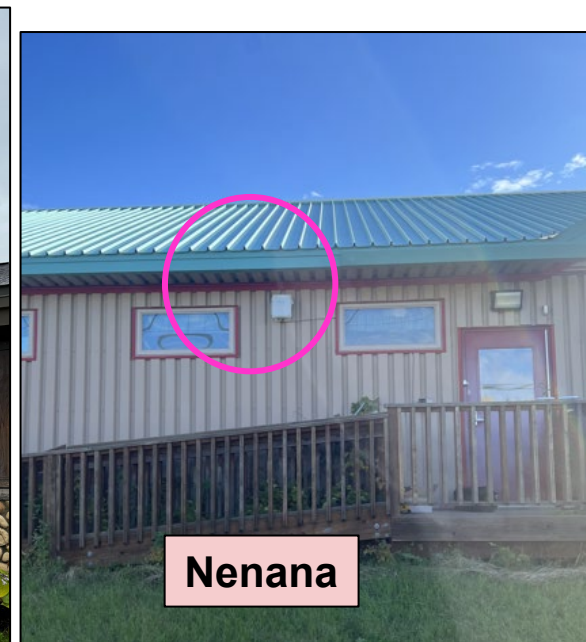




Kotzebue



Willow



Nenana



Glennallen



Big Lake



Kodiak



Bethel

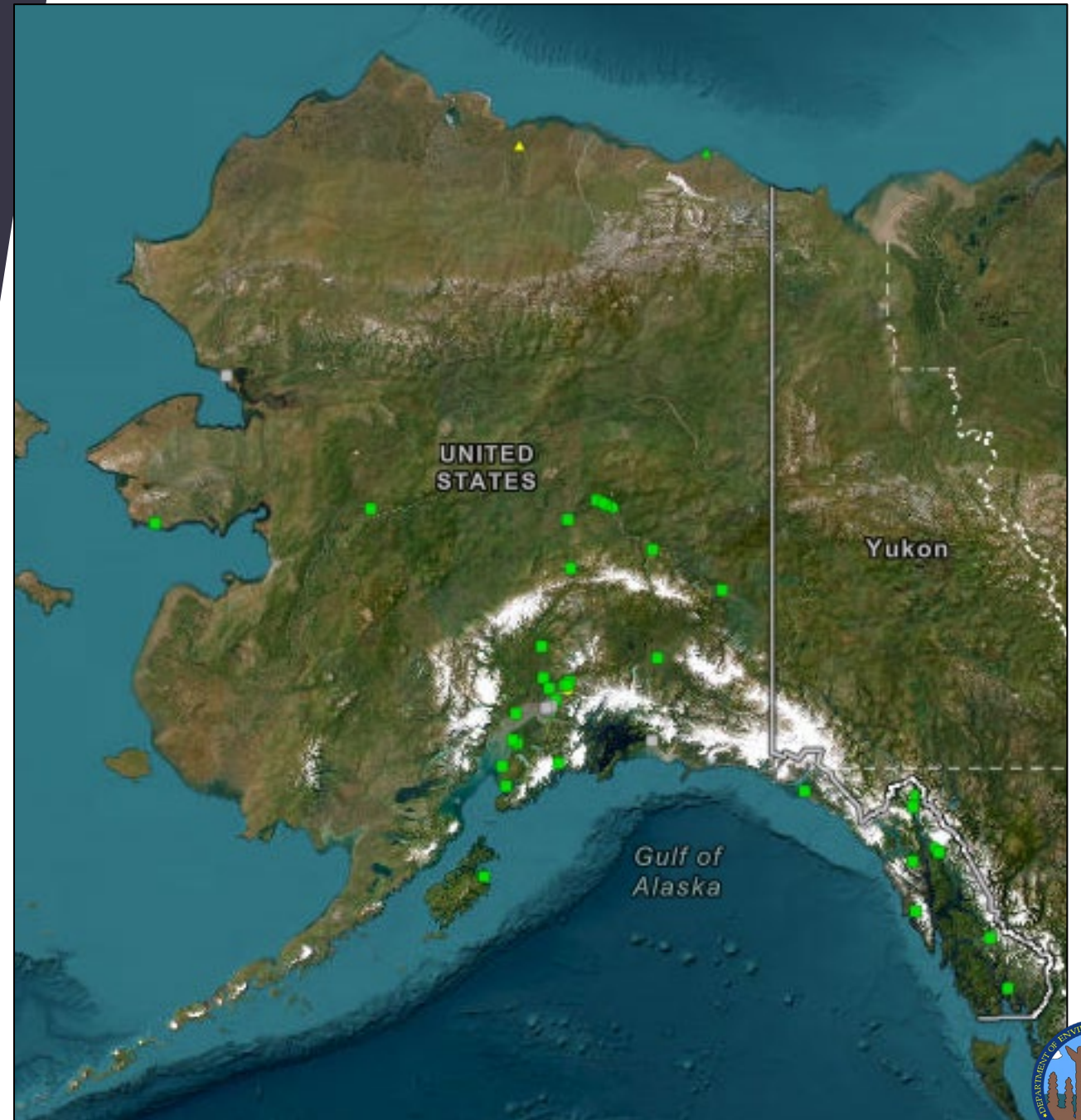


Talkeetna



We are growing!

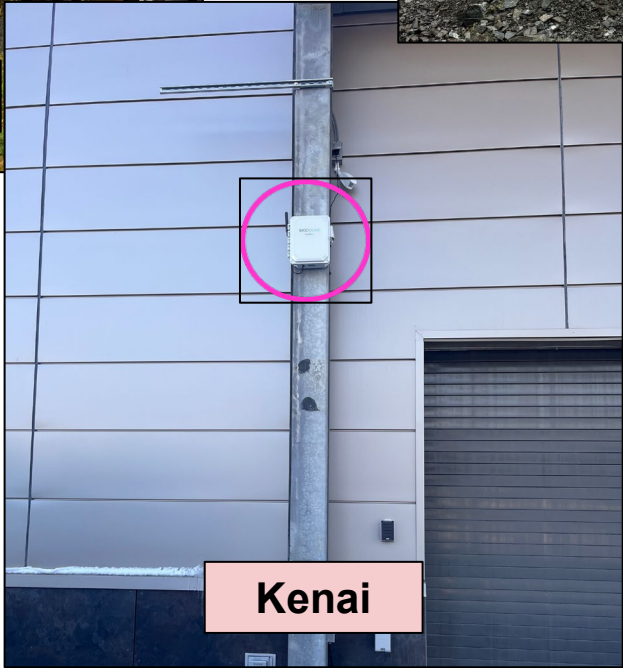
- ▶ Map as of December 2024
- ▶ Continued expansion as we...
 - ▶ Deploy more sensors
 - ▶ Collaborate with communities doing their own studies and display their data

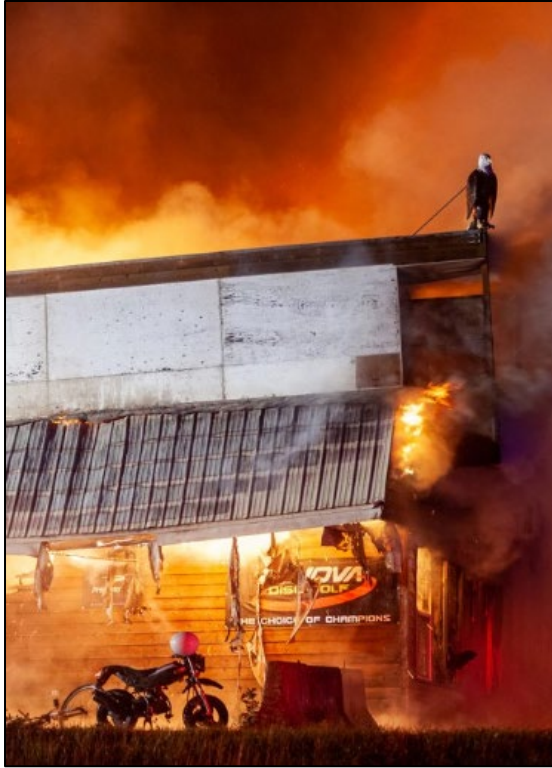


Recent Sensor Deployments

Deployed **new** sensors in:

- Yakutat
- Cordova
- Tyonek
- Kenai

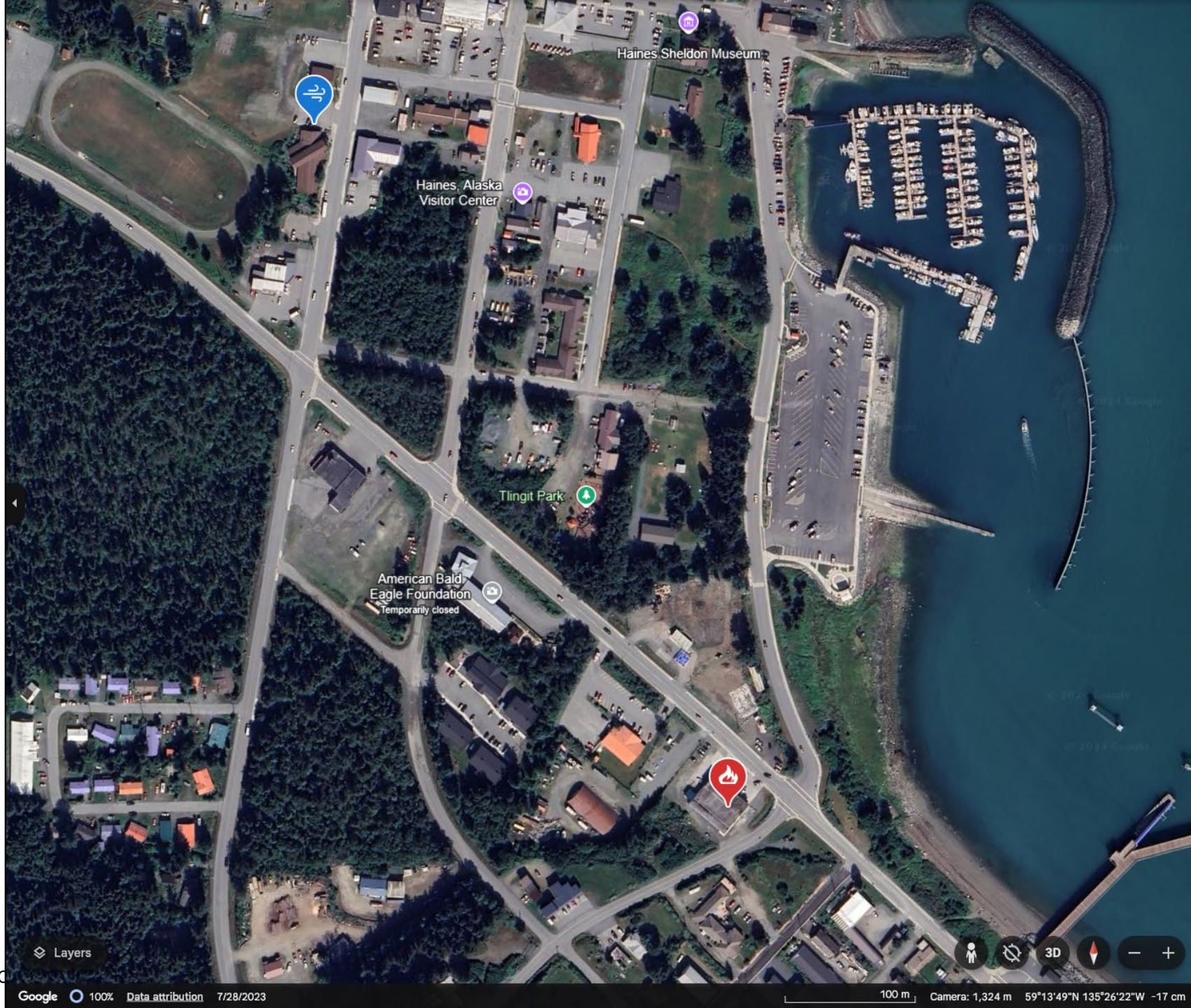




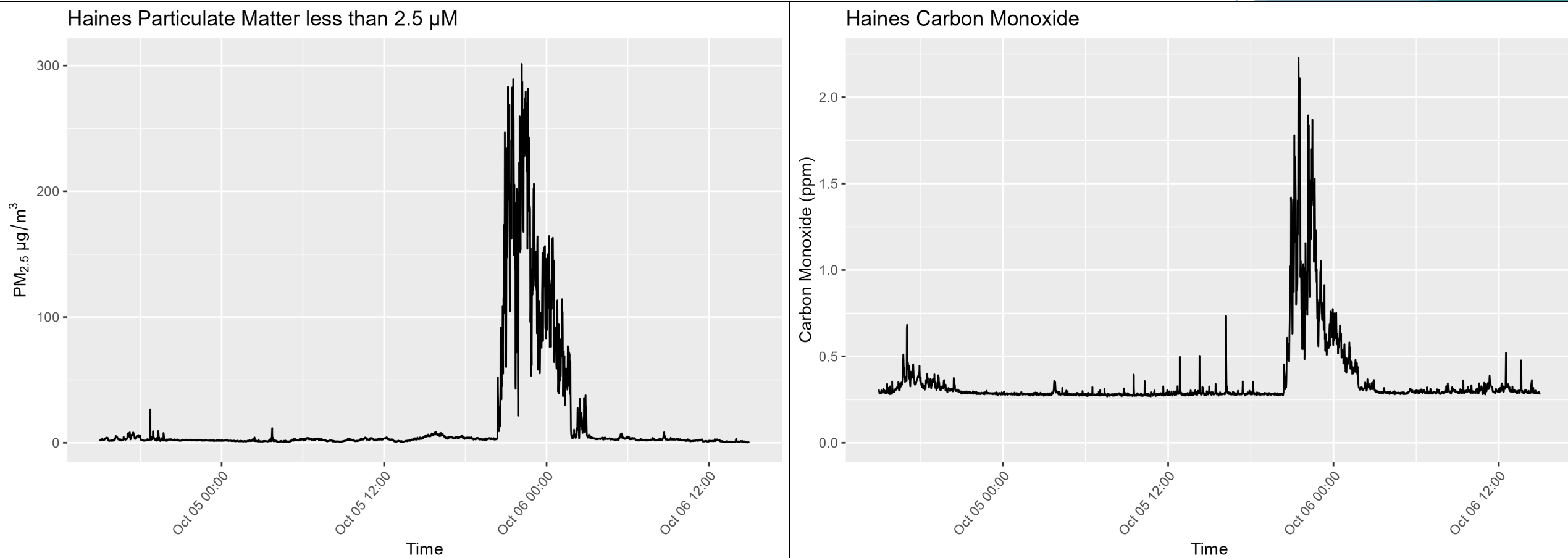
Photos from Rashah McChesney/Chilkat Valley News

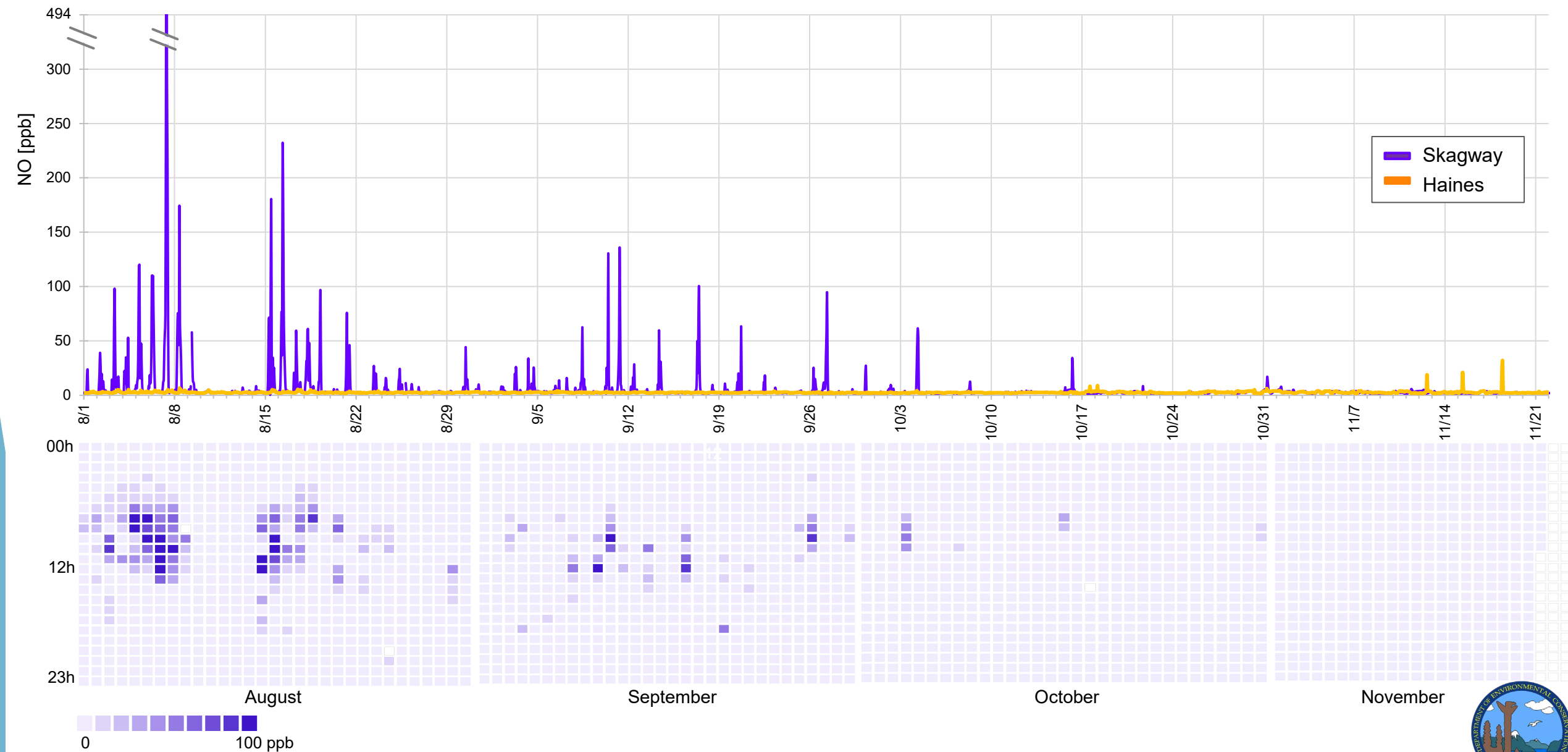
October 5 Fire in Haines





October 5 Fire in Haines PM2.5 and CO Spikes





Potential Source of Increased NO in Skagway

- ▶ White Pass and Yukon Route Railway
- ▶ Train and coach bus staging area close to sensor



Images provided by Reuban Cash, Skagway Traditional Council

Denali Park Smoke Incident – October 31st

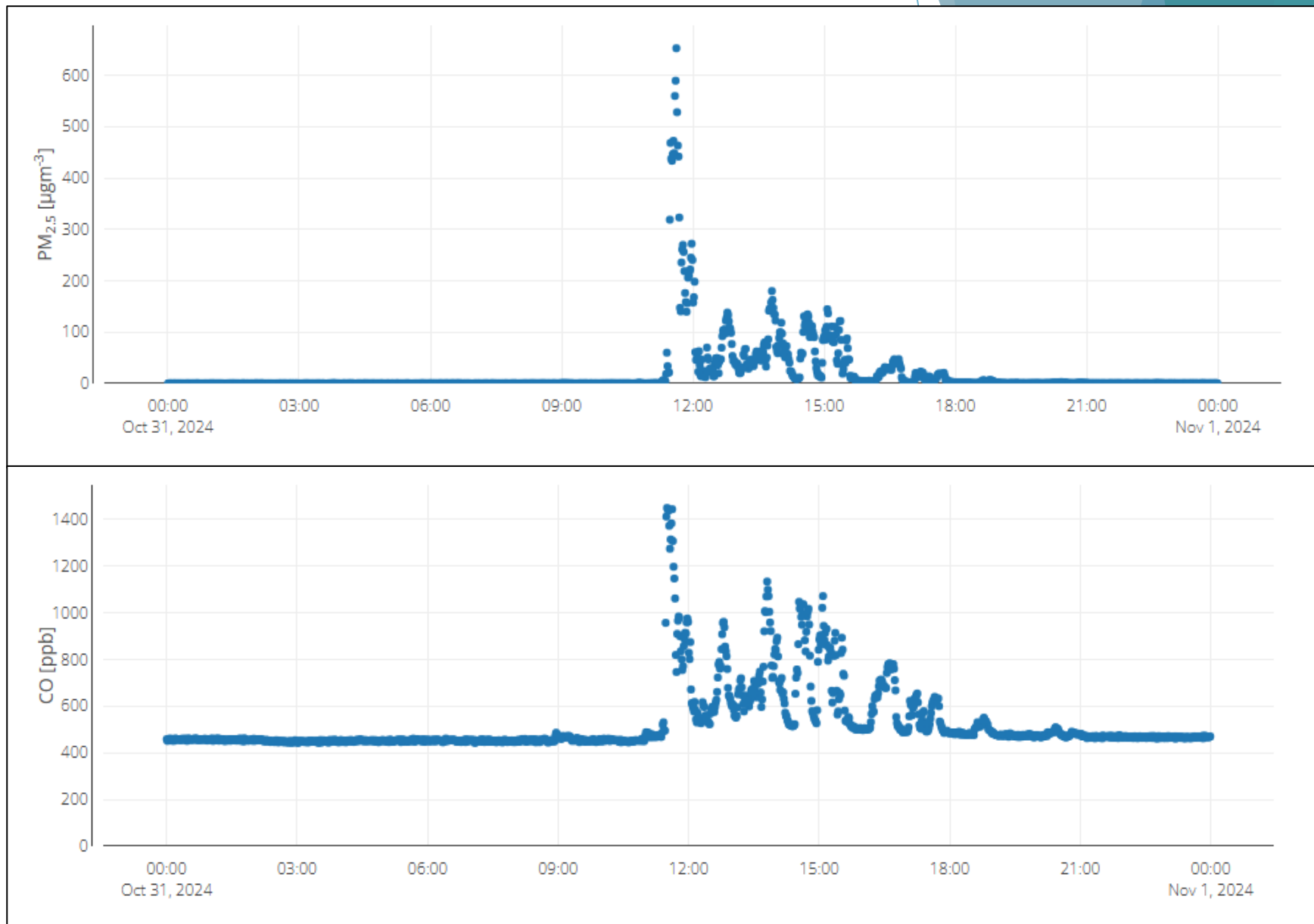
► Brief PM2.5 and CO spike

► PM2.5

- 600+ $\mu\text{grams}/\text{m}^3$ at peak
 - 'Hazardous' AQI
 - Hourly average: 175.7 $\mu\text{grams}/\text{m}^3$
- 50-150 $\mu\text{grams}/\text{m}^3$ for 3-4 hours after peak
 - Fluctuated between 'Moderate' to 'Unhealthy' AQI levels

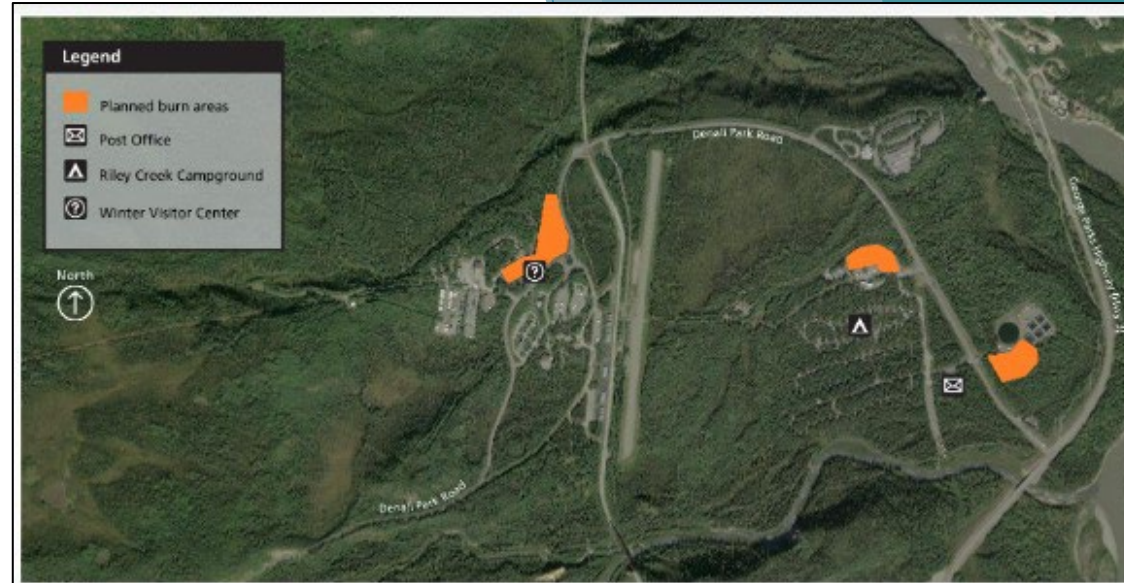
► CO

- 1400+ ppb at peak
- 500-1100 ppb after peak
- 1 hour NAAQS = 35,000 ppb

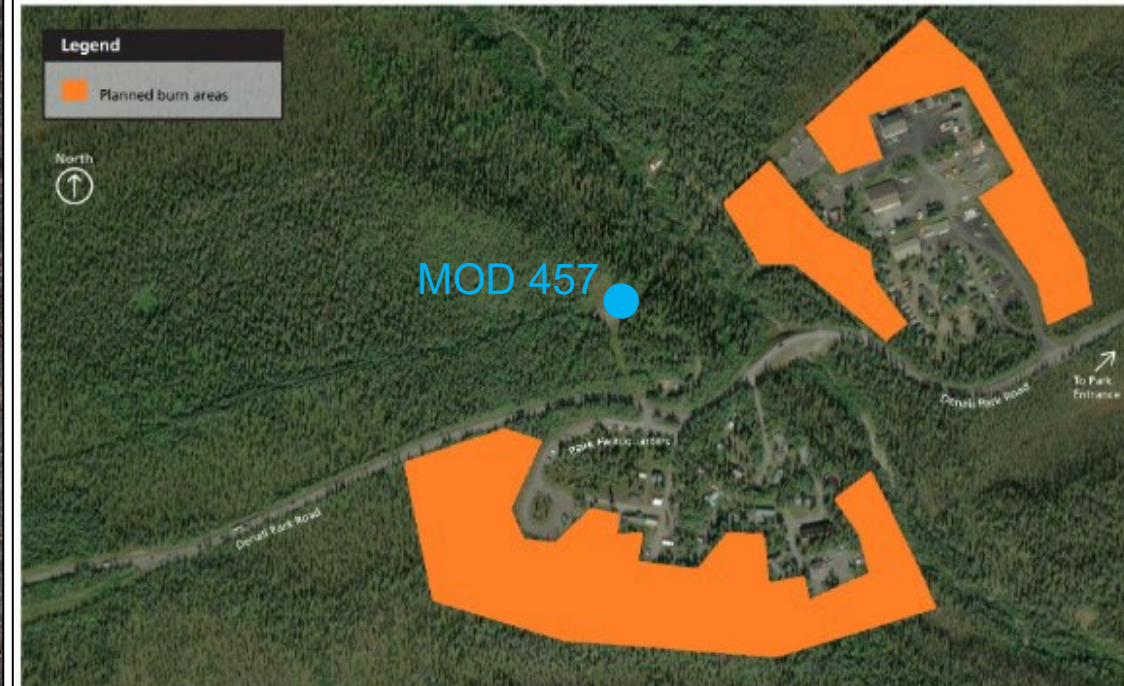


Denali Park Slash Burning Study – Oct. 31st

- ▶ Reason: Denali fire crew was performing a study of slash pile burn techniques in the area.
 - ▶ October 31st burns were conducted near park HQ
 - ▶ Denali Park contact: “It was very smoky at the air quality monitoring site that day.”



Map of the planned pile burning areas near the park entrance indicated in orange. NPS Photo.



Map of the planned pile burning areas near Park Headquarters indicated in orange. NPS Photo.

Cruise Ships in Juneau – Summer 2024

- ▶ Sensor location :

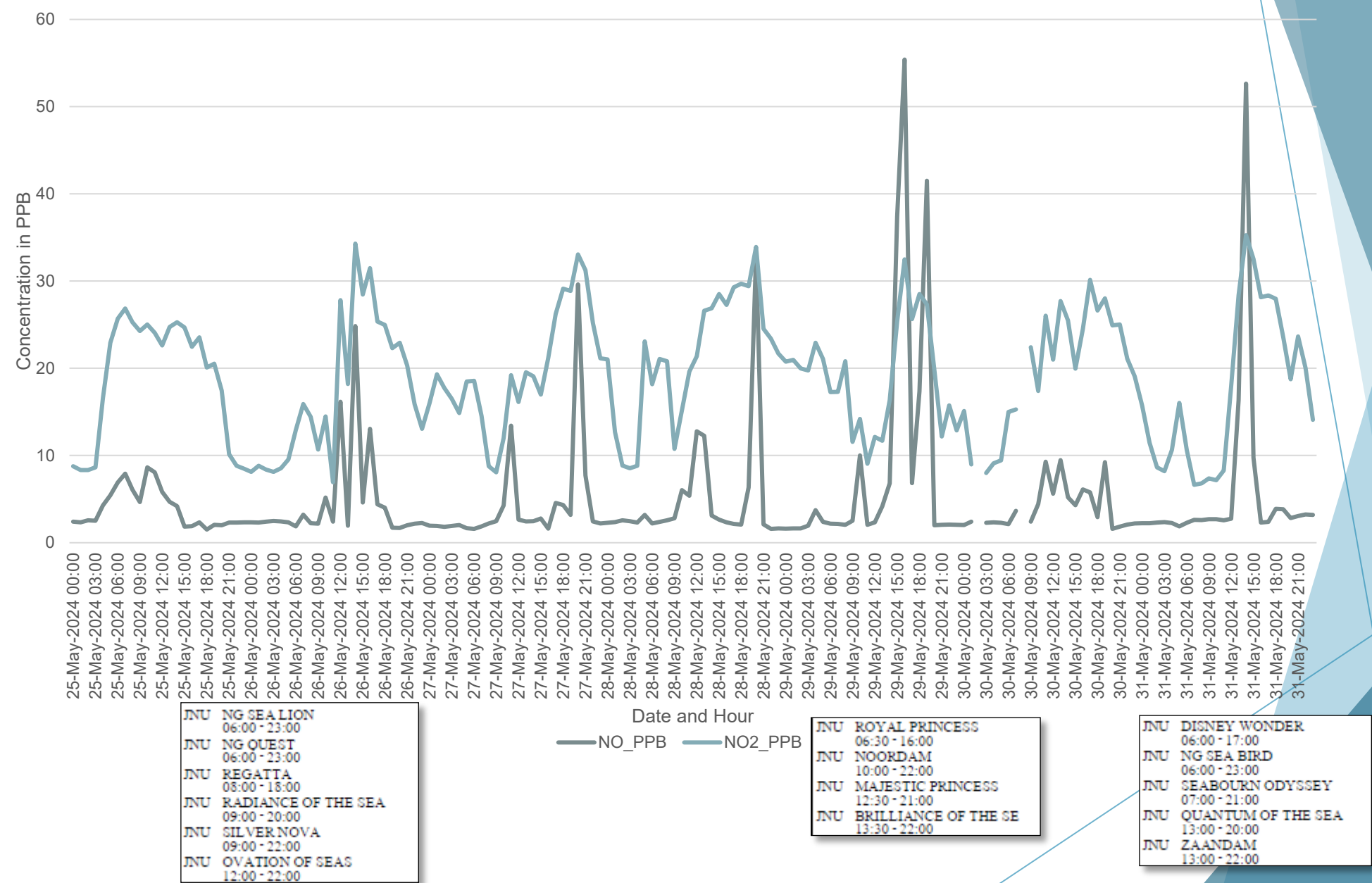


- ▶ Elevated gaseous readings
- ▶ Ships in port that accounts for increased traffic



May Event - Juneau

May 25th - May 31st



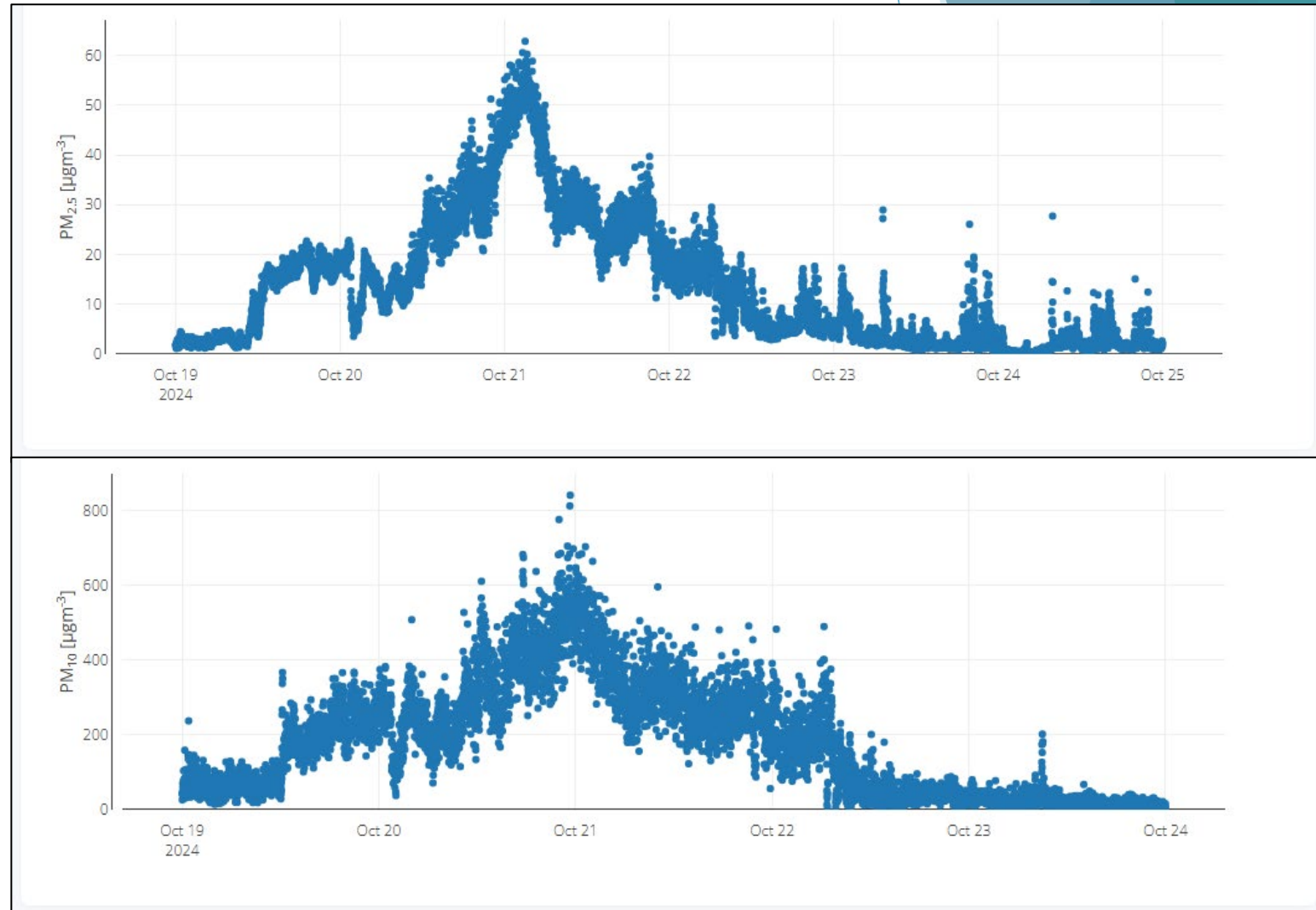
Contextualizing Data

- ▶ PM2.5 and PM10 readings may be ‘false positives’
 - ▶ Sensors detect particles, indicating dust or ash
 - ▶ Follow-up with community contacts reveals snow or fog
 - ▶ Interference with OPC/Nephelometer
 - ▶ Hygroscopic effects
 - ▶ No health risks, not actually a PM pollution incident
- ▶ Demonstrates importance of community feedback



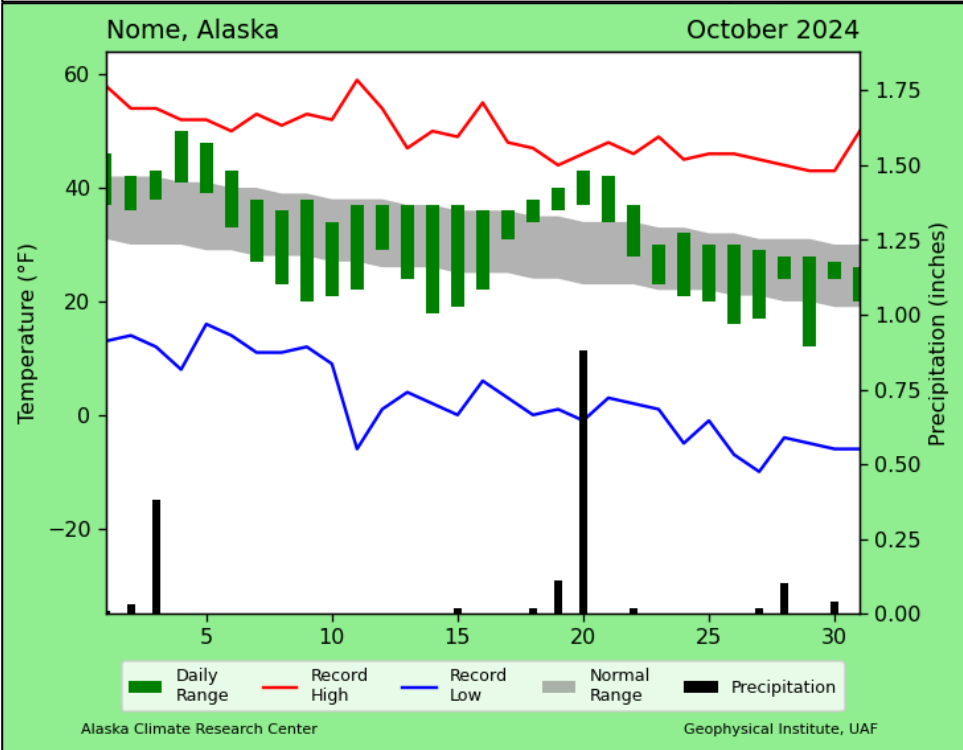
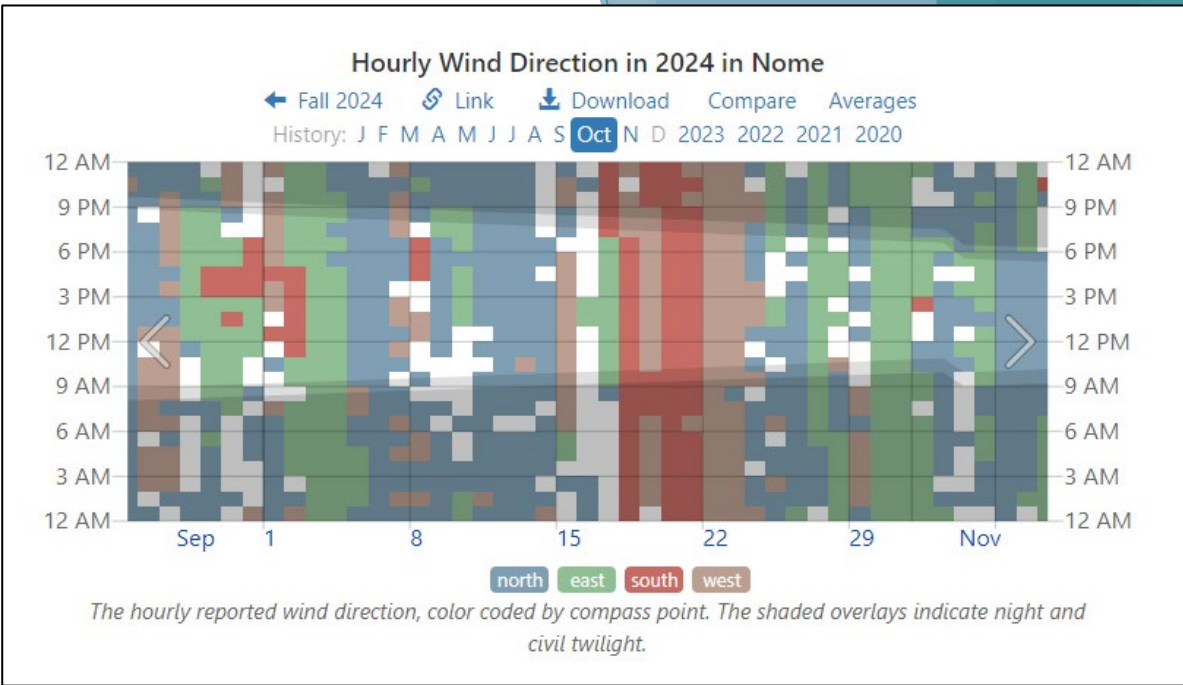
Nome PM Event – October 20th - 23rd

- ▶ Large surge in PM_{2.5} and PM₁₀ in late October
 - ▶ PM_{2.5}
 - ▶ Barely exceeded 'Good' AQI range on Oct 21
 - ▶ PM₁₀
 - ▶ Aberrant spike on Oct 20 to 22



Nome Snow Storm – October 20th - 23rd

- ▶ Nome community contact reported a large snowstorm
- ▶ Weather data
 - ▶ Warm, wet winds came up from the south/southwest
 - ▶ Increased local air temperature
 - ▶ Created thick fog night of Oct 20 and morning of Oct 21
 - ▶ Heavy snowfall on Oct 22
- ▶ PM10 data is a result of hygroscopic effects from fog, snow



Big Lake PM Event – November 13th

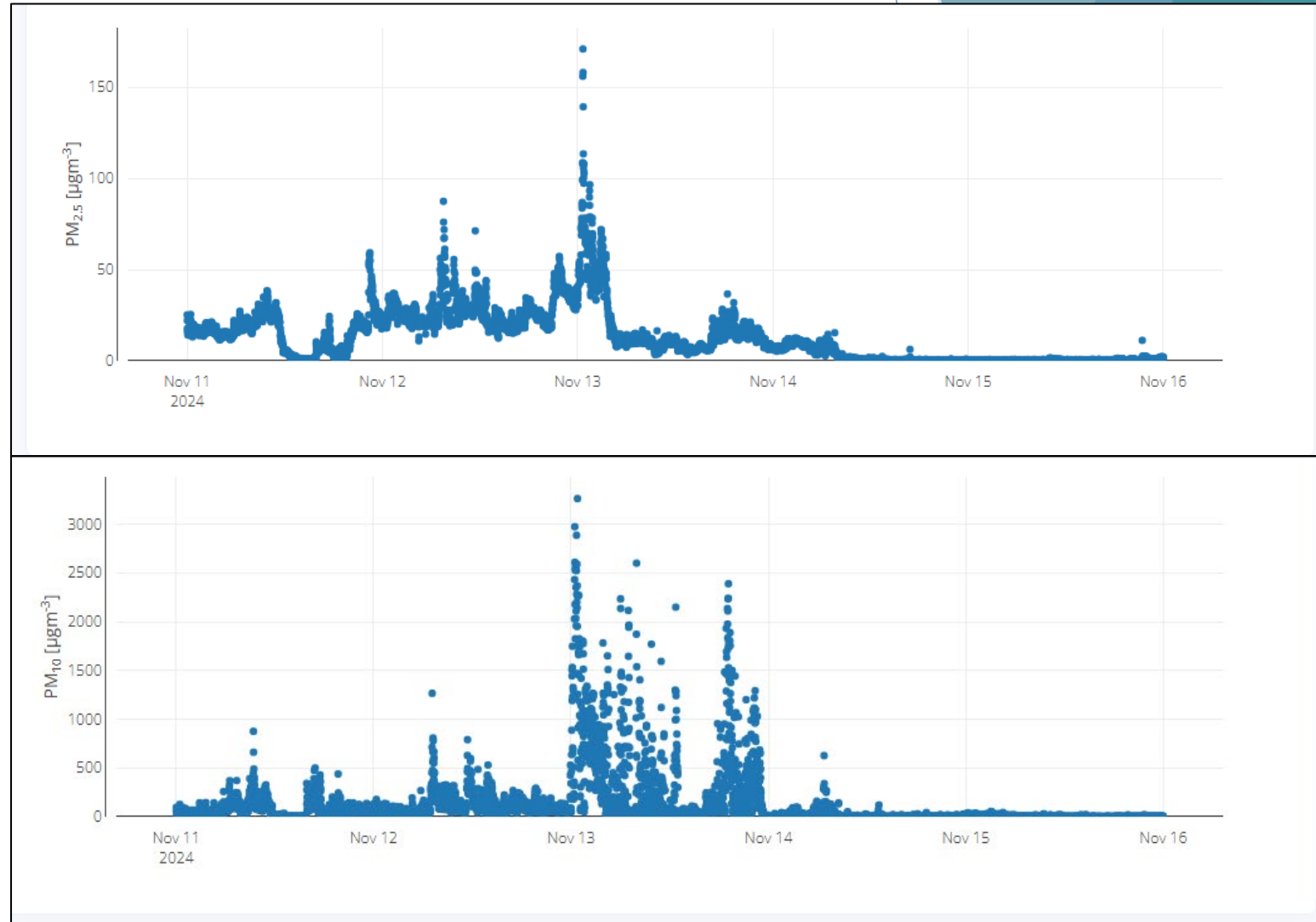
- ▶ Large surge in PM_{2.5} and PM₁₀ in mid November

- ▶ PM_{2.5}

- ▶ Briefly exceeded 'Good' AQI range on Nov 12 and 13











- ▶ PM₁₀

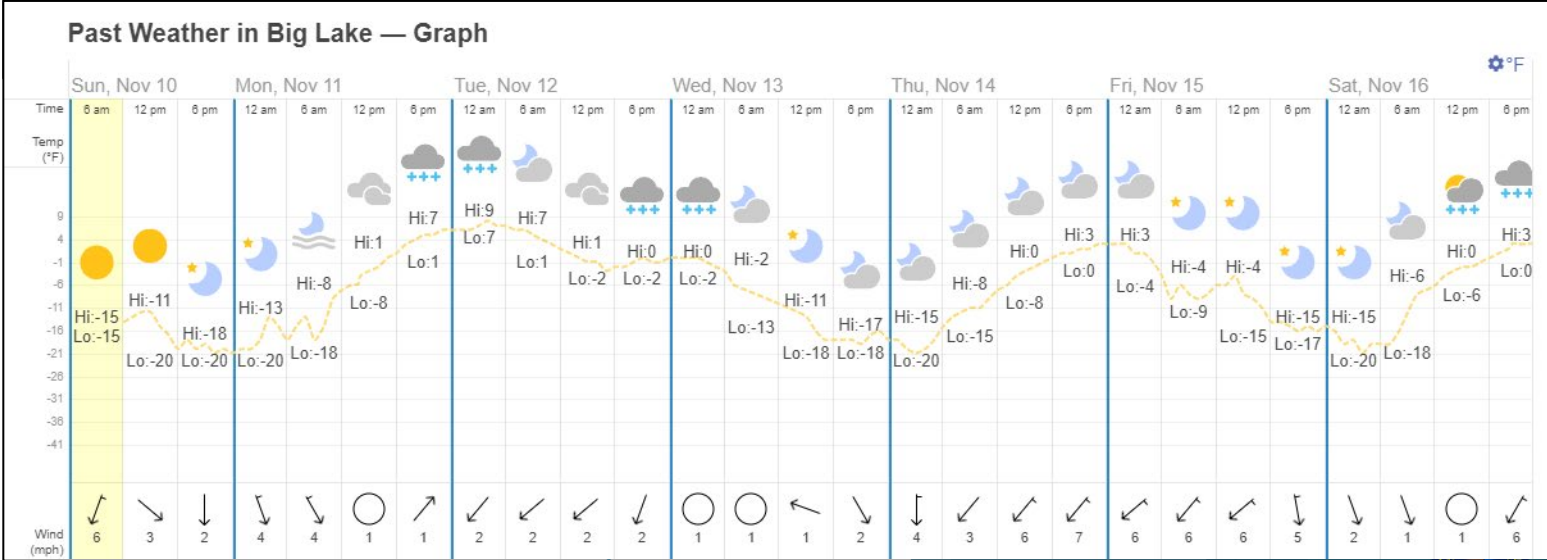
- ▶ Aberrant spike on Nov 13



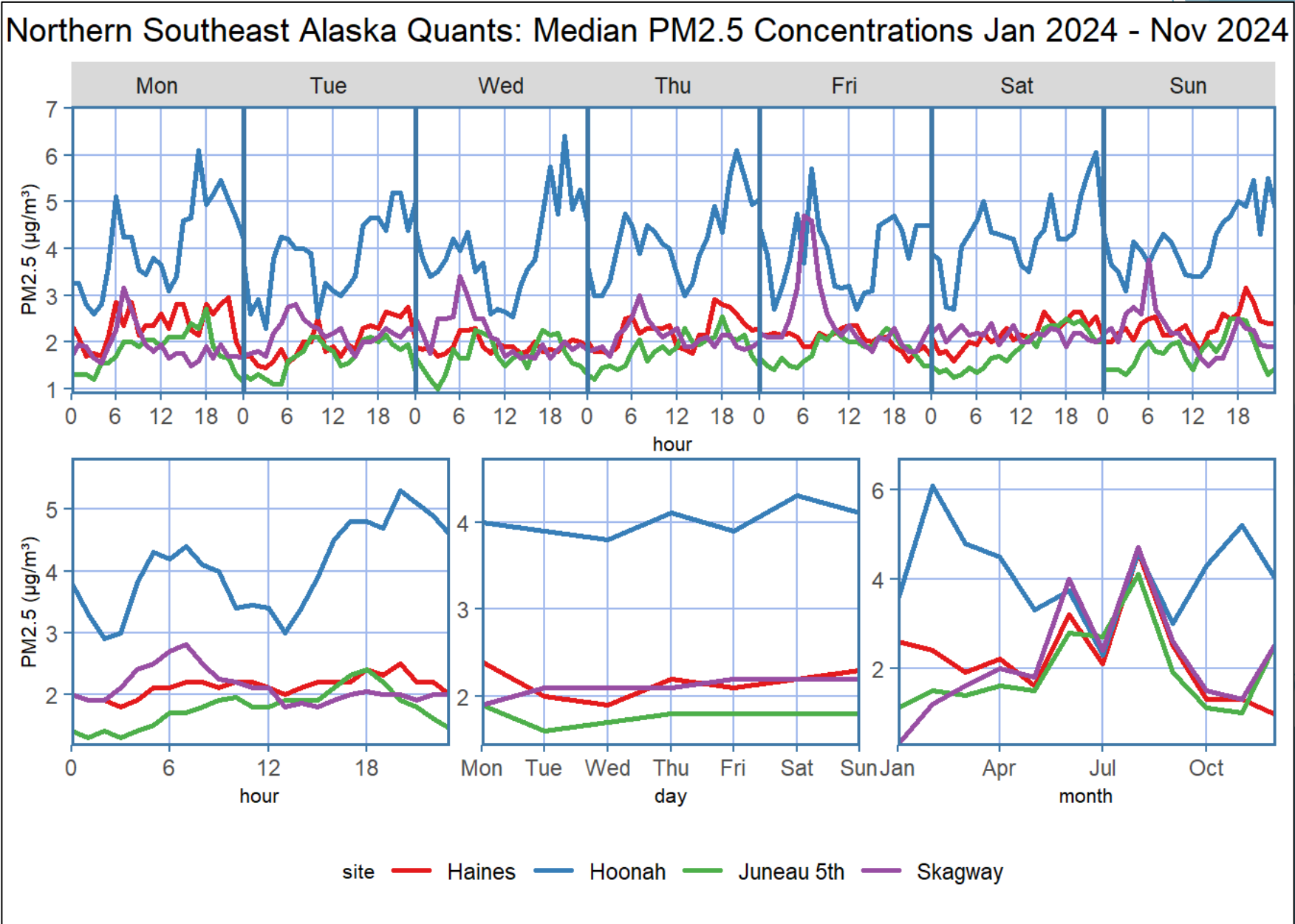
Big Lake Heavy Fog – November 13th

- ▶ Big Lake community contact reported heavy fog
- ▶ Weather data
 - ▶ Nov 11 saw increased cloudiness and rising temperatures
 - ▶ Lead to night / morning snowfall and daily fog
 - ▶ Temperatures dropped over Nov 12 and 13, producing freezing fog
- ▶ PM10 data is a result of hygroscopic effects from fog

Time		Temp	Weather	Wind	Humidity	Barometer	Visibility
12:56 am Wed, Nov 13		0 °F	Light snow. Overcast.	No wind	↓ 79%	30.04 "Hg	8 mi
1:56 am		0 °F	Light snow. Overcast.	No wind	↓ 79%	30.05 "Hg	10 mi
2:56 am		0 °F	Light snow. Overcast.	No wind	↓ 79%	30.05 "Hg	8 mi
3:56 am		-1 °F	Light snow. Overcast.	No wind	↓ 79%	30.05 "Hg	9 mi
4:56 am		-2 °F	Light snow. Overcast.	No wind	↓ 83%	30.06 "Hg	8 mi
5:56 am		-3 °F	Overcast.	No wind	↓ 78%	30.06 "Hg	9 mi
6:56 am		-6 °F	Overcast.	No wind	↓ 78%	30.07 "Hg	10 mi
7:56 am		-8 °F	Overcast.	3 mph ←	83%	30.08 "Hg	10 mi
8:56 am		N/A	Overcast.	No wind	↓ N/A	30.09 "Hg	10 mi
9:56 am		-11 °F	Passing clouds.	No wind	↓ 82%	30.09 "Hg	7 mi

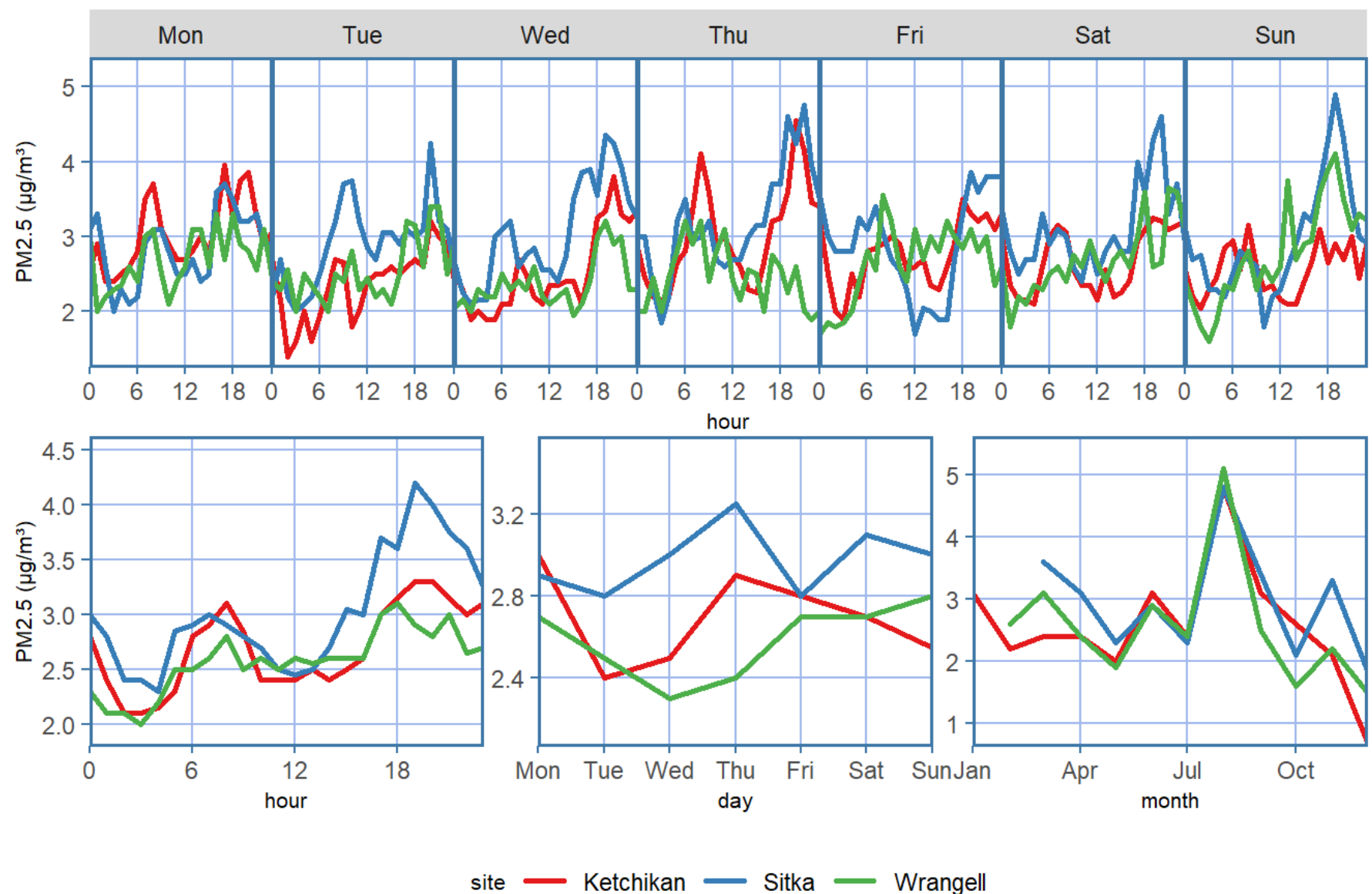


Sensors by Ecoregion – N Southeast

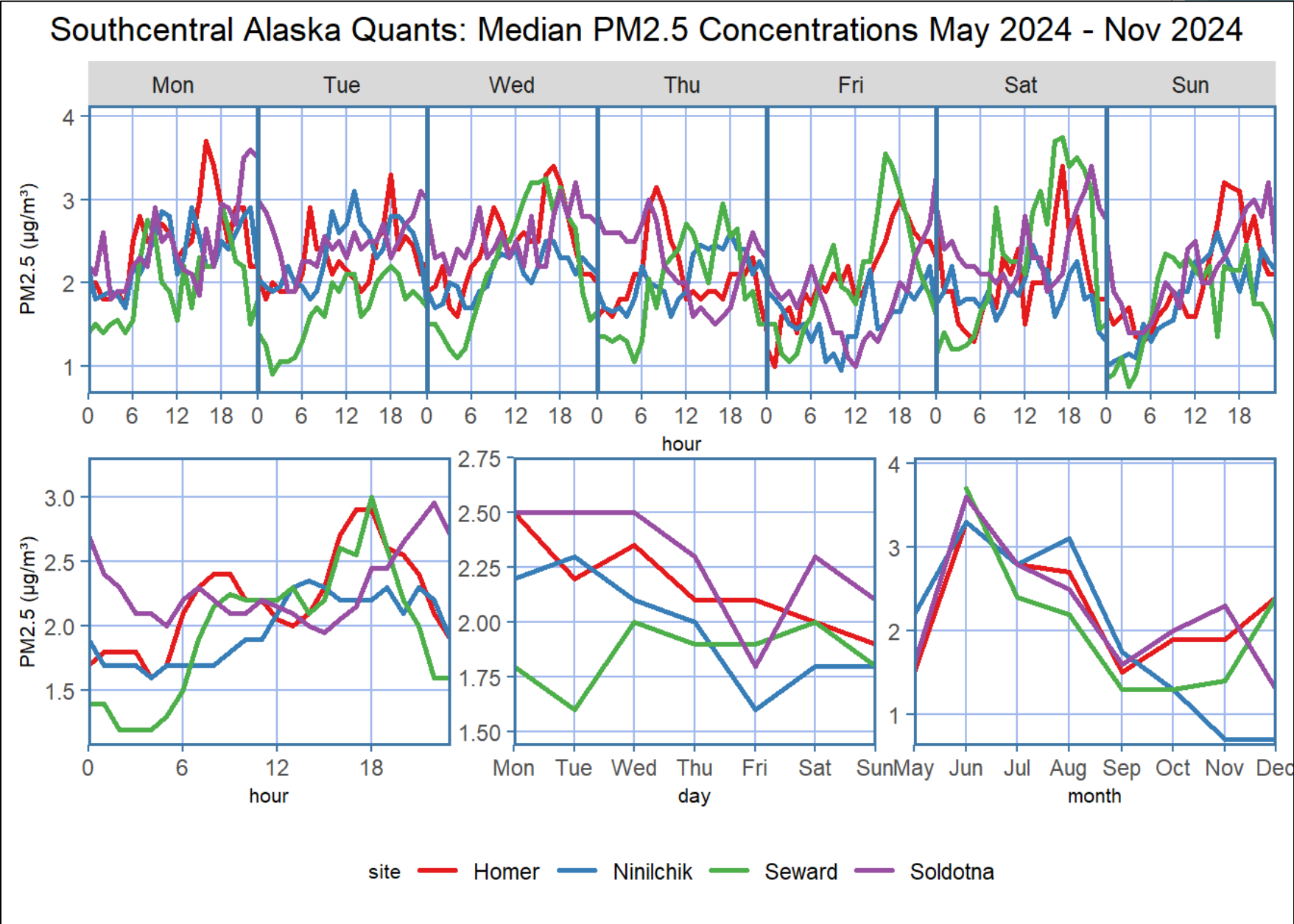


Sensors by Ecoregion – S Southeast

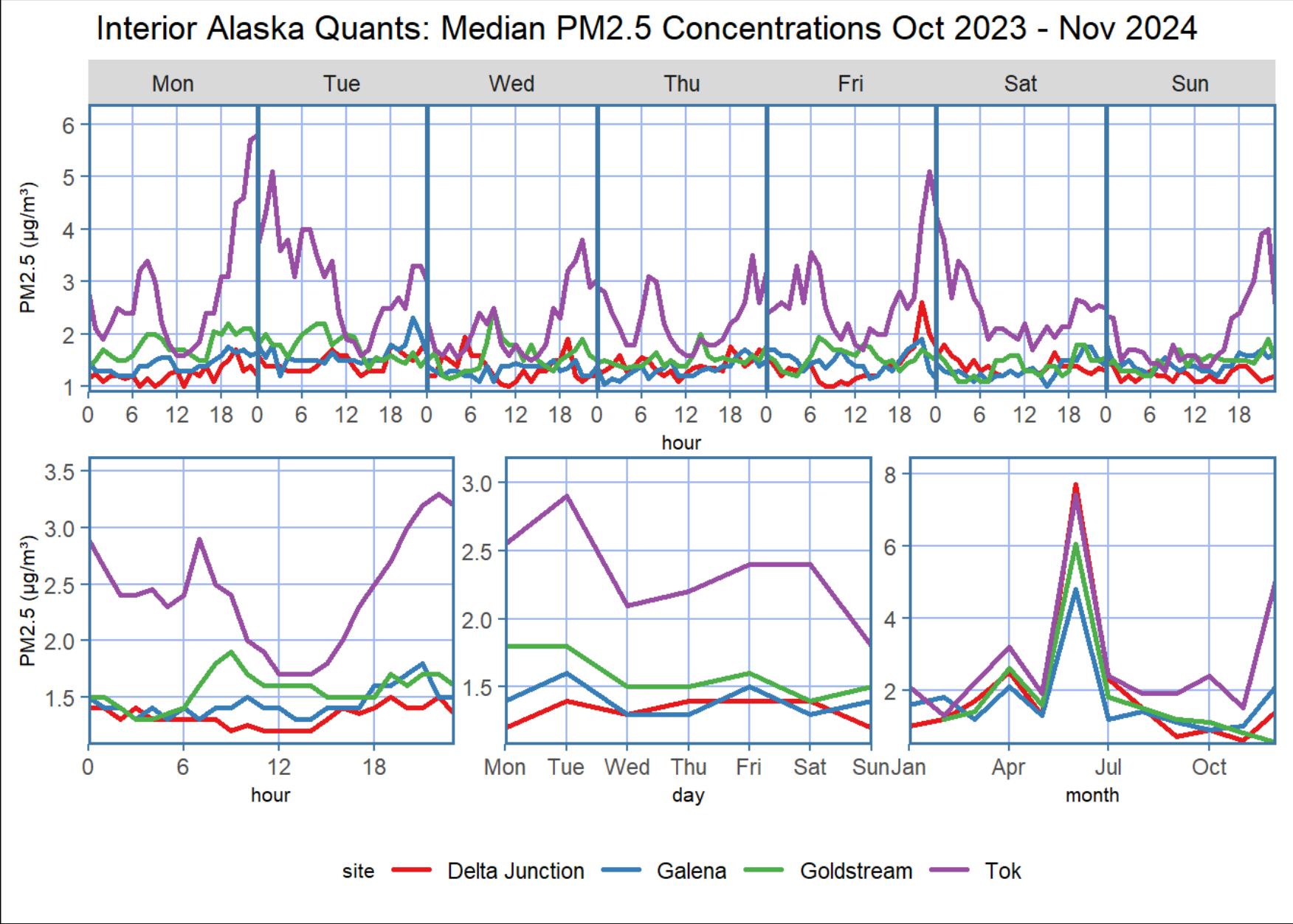
Southern Southeast Alaska Quants: Median PM2.5 Concentrations Jan 2024 - Nov 2024



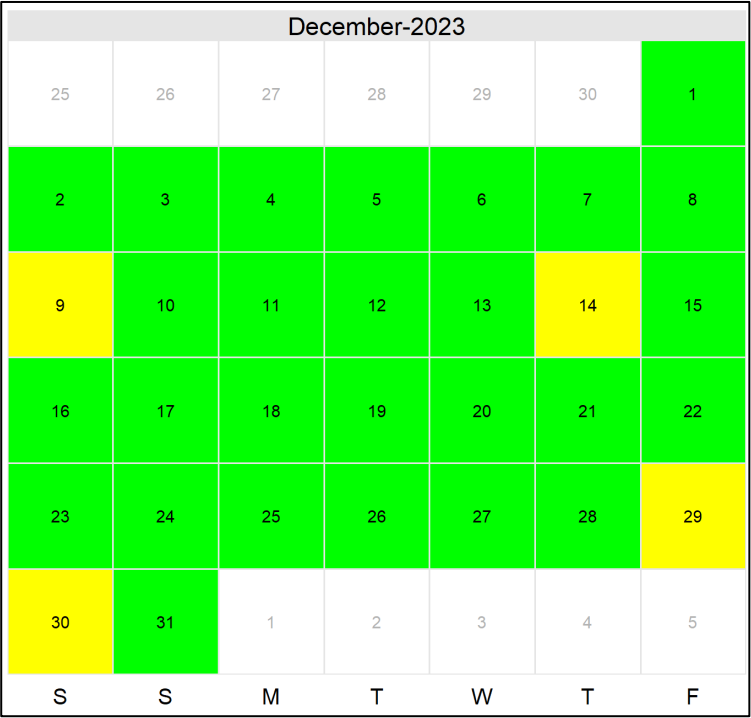
Sensors by Ecoregion - Southcentral



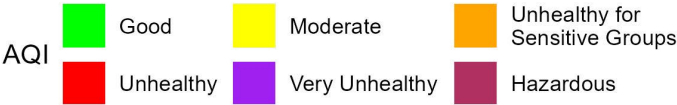
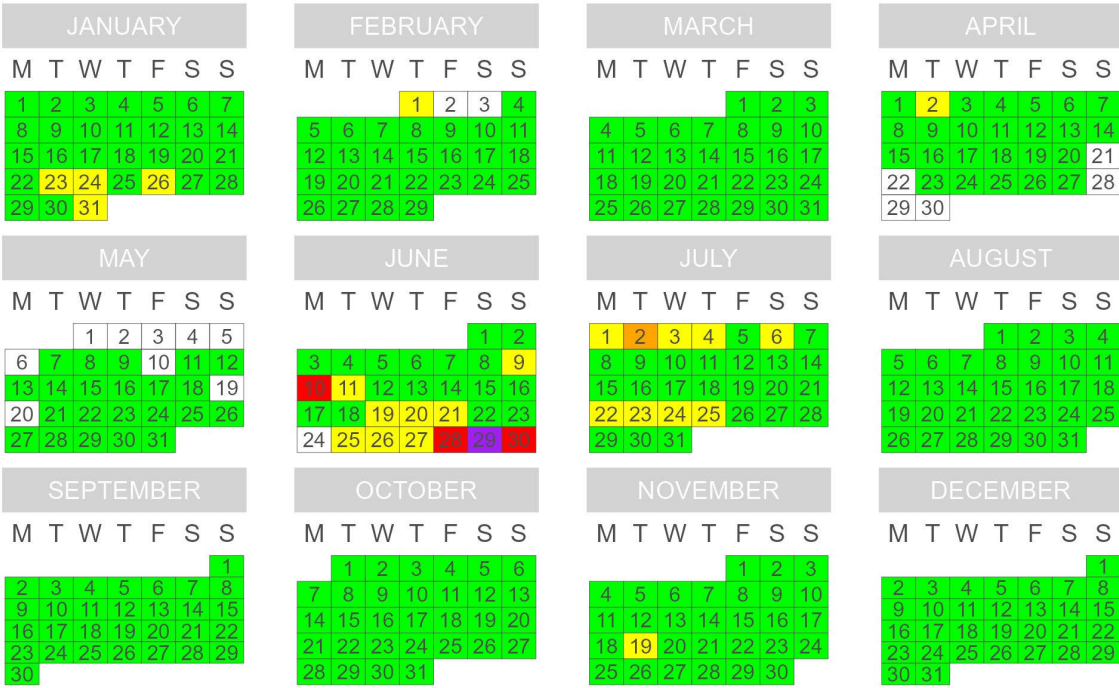
Sensors by Ecoregion - Interior



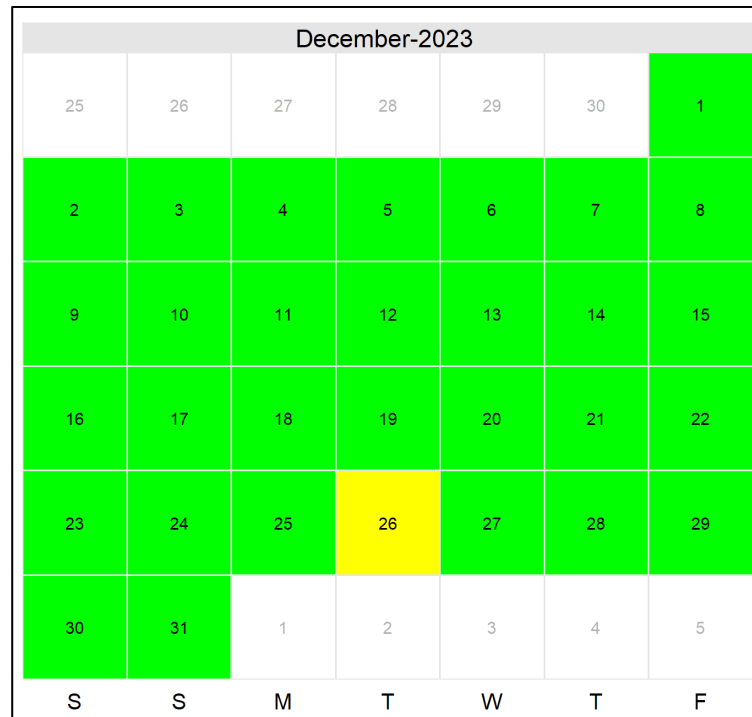
Happy Birthday to the Delta Junction Quant sensor, collecting data since November 3, 2023!



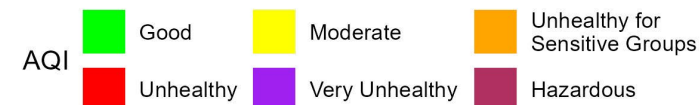
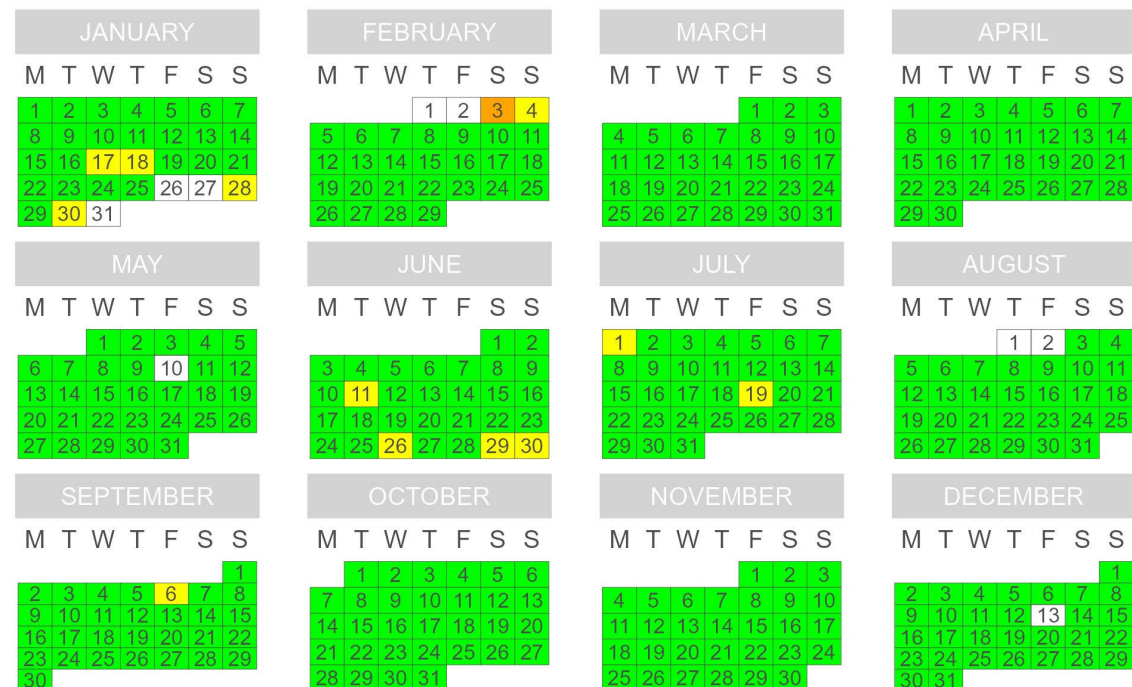
Delta Junction Air Quality Index - 2024



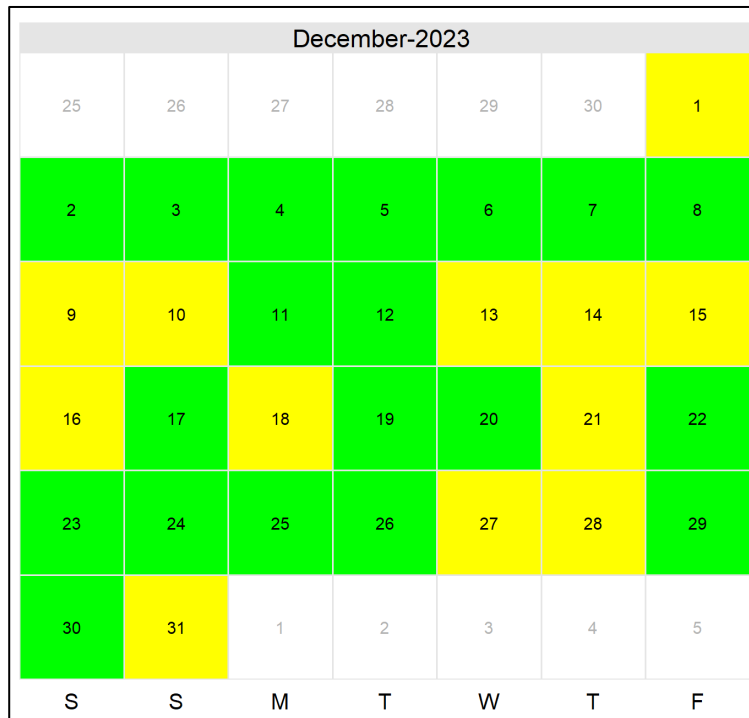
Happy Birthday to the Galena Quant sensor, collecting data since September 27, 2023!



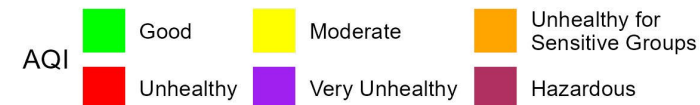
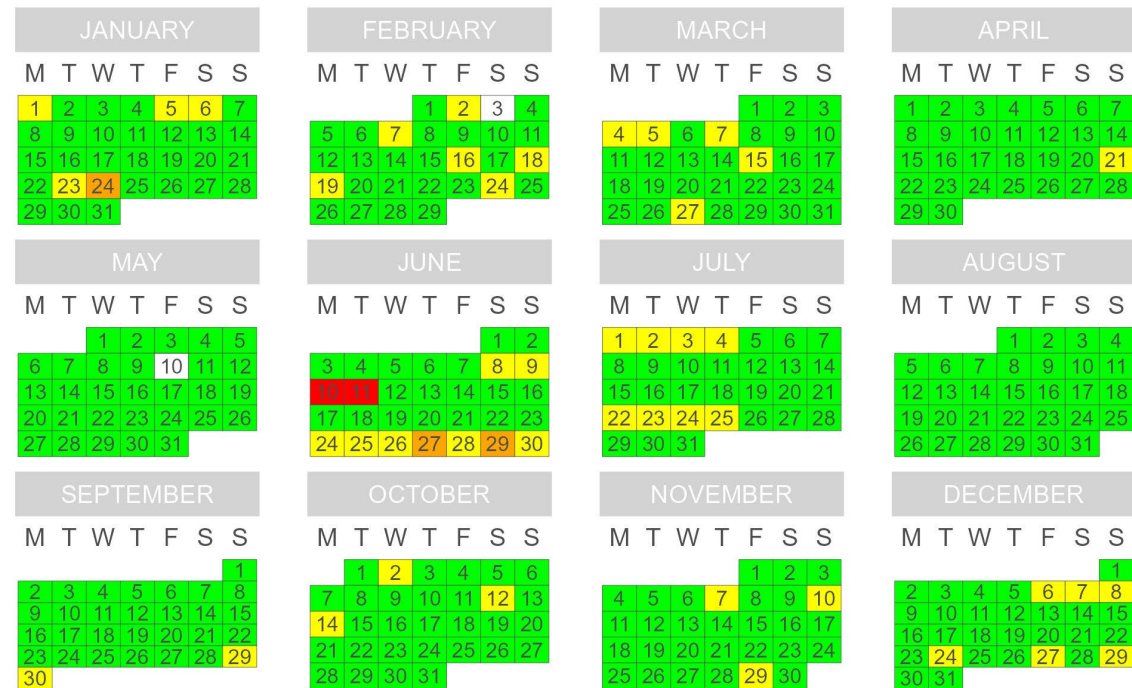
Galena Air Quality Index - 2024



Happy Birthday to the Tok Quant sensor, collecting data since October 26, 2023!



Tok Air Quality Index - 2024



Interested about a specific sensor within a range of dates?

- ▶ Community Sensor Network Diurnal Comparisons



Local Air Quality Observations

Link for: [Local Air Quality Observations jot form](#)

Local Air Quality Observations

This form serves as a repository for Alaska Department of Environmental Conservation's Air Monitoring and Quality Assurance (DEC AMQA) team to collect observations on local conditions or events in a community that may impact air quality or air quality sensor data validity.

What community sensor do you have a local observation for? *

What time does this local condition/event start?



Date

Hour Minutes

What time does this local condition/event start?



Date

Hour Minutes

What local condition or event occurred?

Please provide any additional details about what you observed if you have any. For example: does this observation seem out of the norm for your local community?





Rowing in the same direction

- ▶ **Looking for Community Champions**
 - ▶ Finding a location and deployment
 - ▶ Receive training on sensor
 - ▶ Join the network! On the map, network calls, semiannual data reports
 - ▶ Data available at request
- ▶ **We want to host your air quality data on our website!**
- ▶ **Researching new sensor technology**
- ▶ **DEC sensor network collaboration**
 - ▶ Contact us for direct collaboration
 - ▶ Future calls and knowledge share
 - ▶ What data do you want to see?



Thank you to all our community partners!

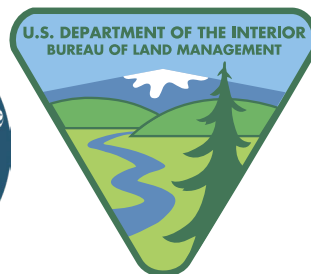


- ▶ Ninilchik Library
- ▶ Big Lake Public Library

- ▶ Cathedral of the Nativity of the Blessed Virgin Mary
- ▶ Tok Community Library



Kenai Peninsula College
UNIVERSITY of ALASKA ANCHORAGE



Questions

- ▶ Next quarterly call date: March 11th @ 10-11am. Link in chat will take you to registration and will be emailed to our contact list.
- ▶ Visit our [Air Quality Index Map](#) (or Google 'Alaska air quality' and look for DEC AQI link)
- ▶ Contact info is in chat and in QR code

Resources

- ▶ Not sure what sensor to buy?
 - ▶ EPA Air Sensor Toolbox: epa.gov/air-sensor-toolbox
 - ▶ South Coast AQMD's AQ-SPEC program and evaluations: aqmd.gov/aq-spec
 - ▶ Contact us!
- ▶ ANTHC's PurpleAir program – contact ANTHC

Contact us

