

ADEC's Community-Based Air Sensor Network

Quarterly Call
June 10, 2025
10:00 AM AKST

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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! December 9th 10-11am



Agenda

Welcome!

Sensor network overview and progress

Data findings

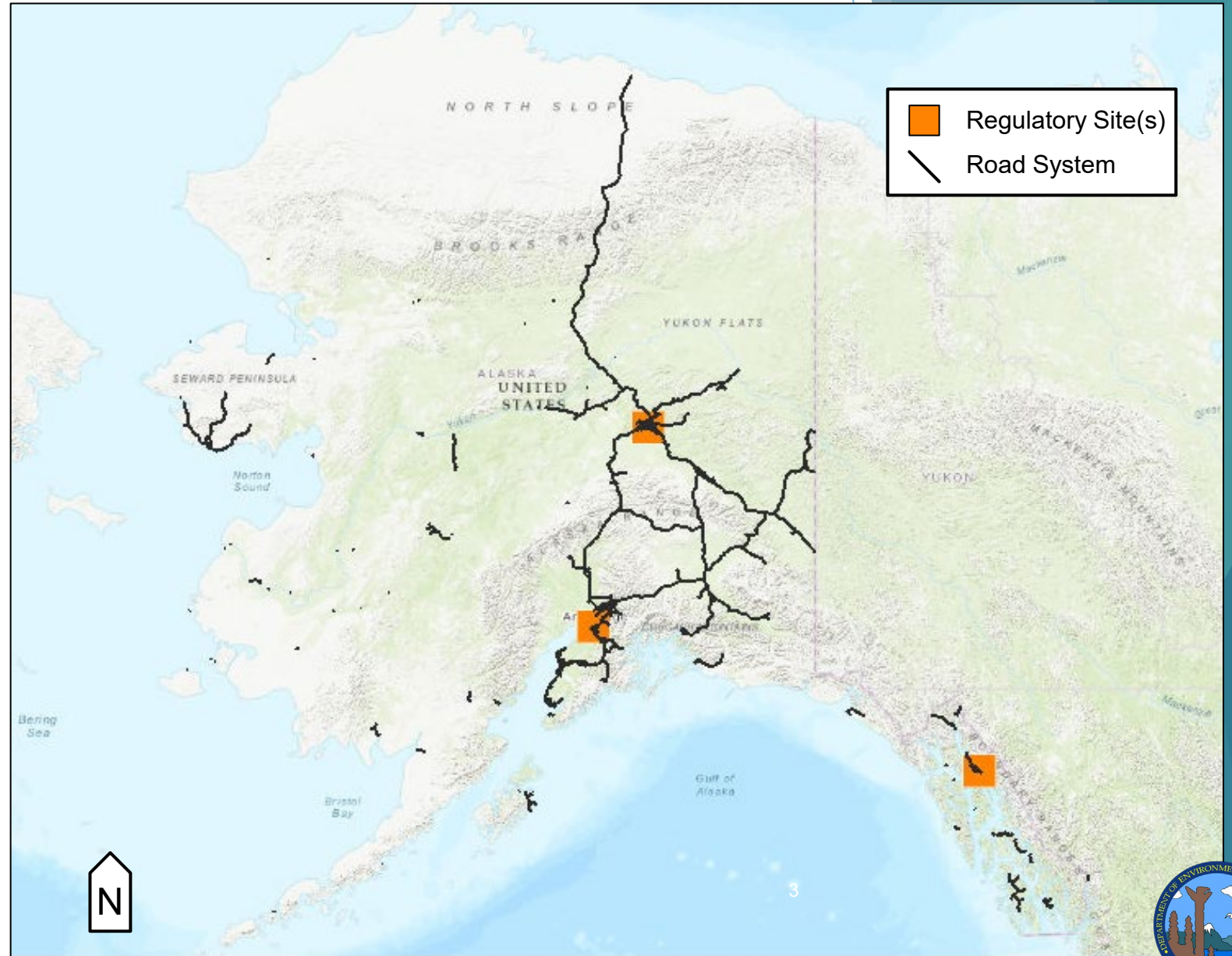
Next steps

Questions and discussion



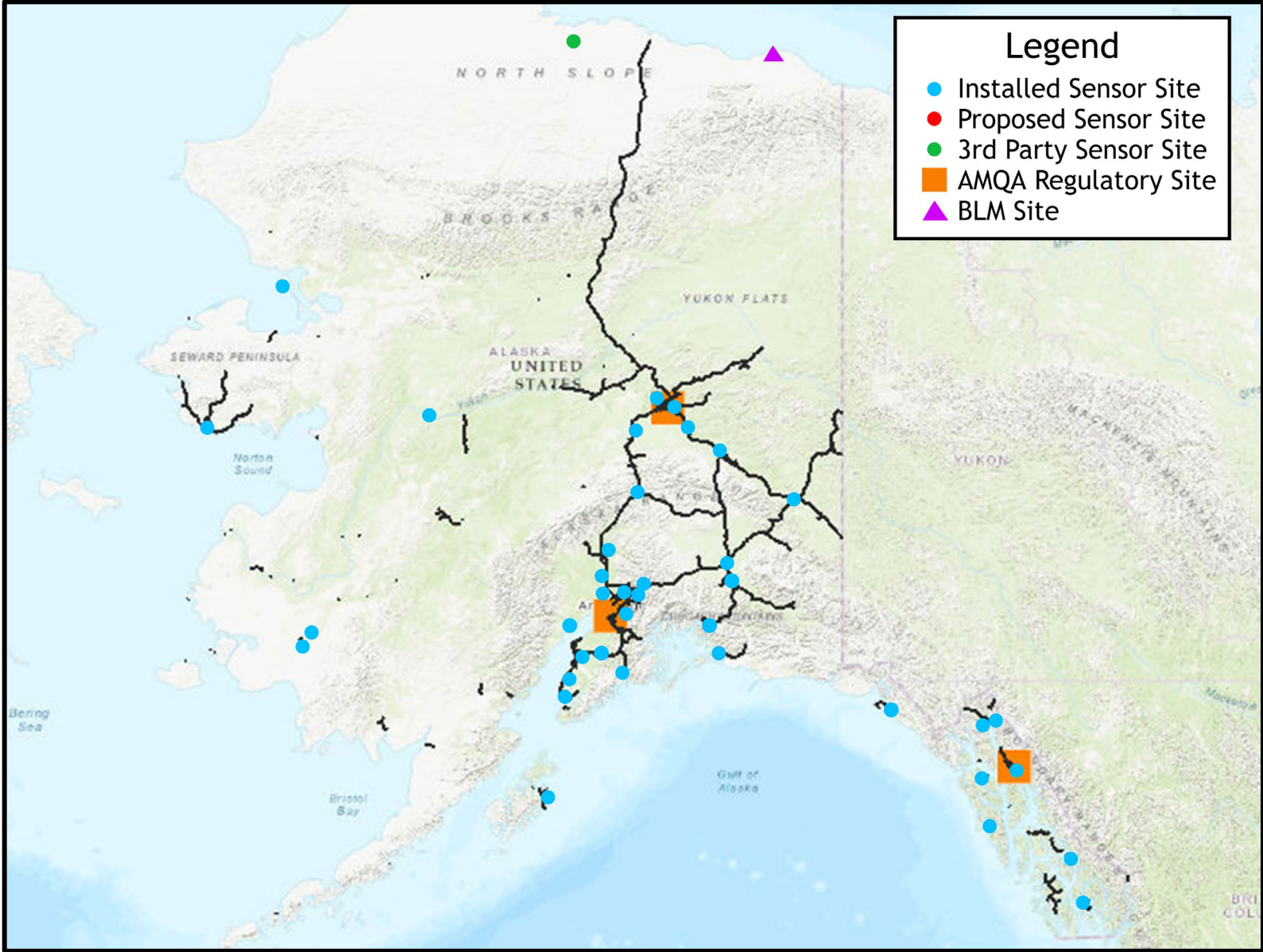
DEC's Regulatory Network

- ▶ 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)



DEC's Low-Cost Sensor Network

- ▶ Over 40 sensors currently deployed in 38 communities
- ▶ QuantAQ Modulair sensors:
 - ▶ PM₁₀ and PM_{2.5}, CO, NO, NO₂, O₃, temp, relative humidity
- ▶ Non-regulatory data
 - ▶ Trend analysis
- ▶ Network Coverage Limitations
 - ▶ Plans for expansion



Kotzebue



Nome



Nenana



Goldstream



Badger



Galena



Denali



Salcha



Delta Junction



Tok



Juneau



Alaska State Museum



Skagway



Haines



Hoonah



Cordova



Yakutat



Sitka



Wrangell



Ketchikan



Talkeetna



Willow



Wasilla



Palmer



Chickaloon



Tyonek



Big Lake



Campbell Creek Science Center



Glennallen



Valdez





Kenai



Soldotna



Seward



Ninilchik



Homer



Kodiak

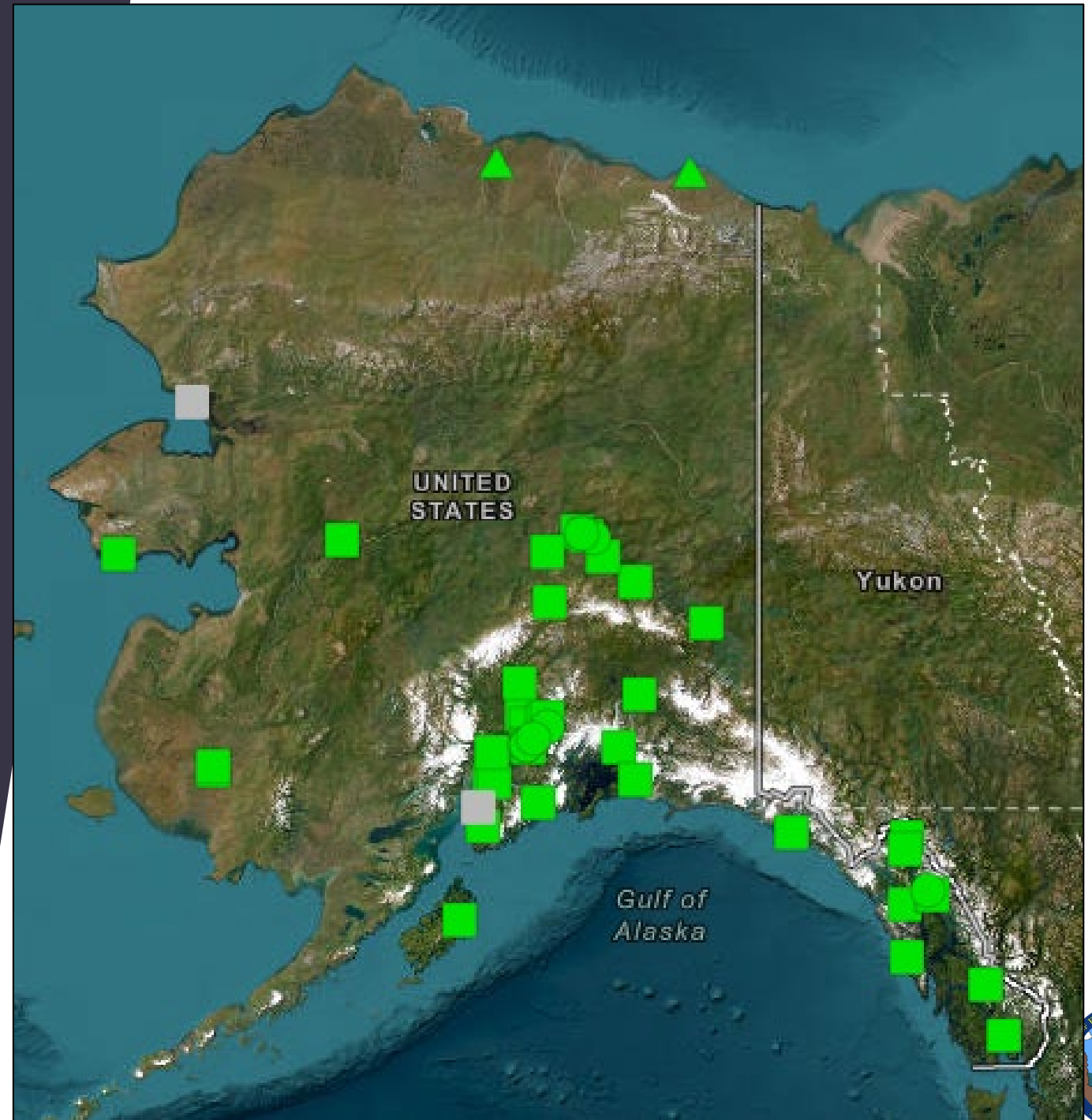
Huge shoutout to our partners in communities across Alaska!

Without them, this project would not be possible.



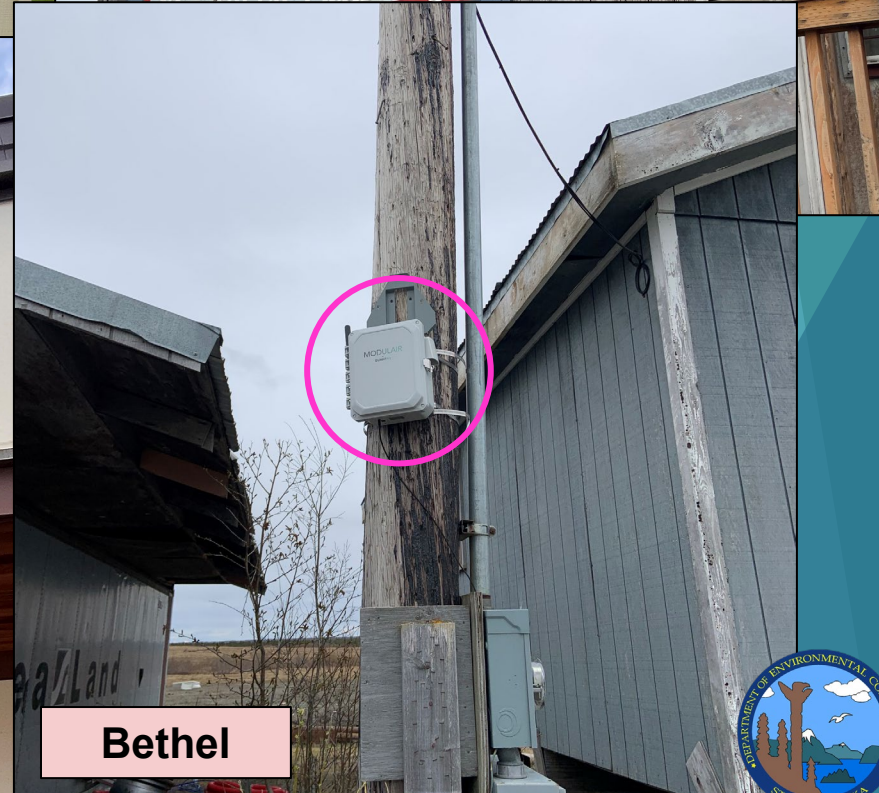
We are growing!

- ▶ Map as of May 2025
- ▶ Continued expansion as we...
 - ▶ Integrate new communities
 - ▶ Deploy sensors with Wi-Fi capabilities
 - ▶ Develop sub-networks
 - ▶ Interior wildfire monitoring network
 - ▶ Municipality of Anchorage network



Community-Based Air Monitoring Network Updates

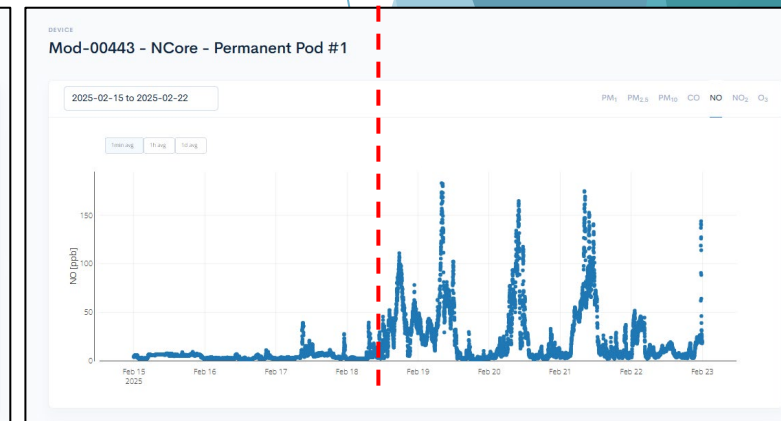
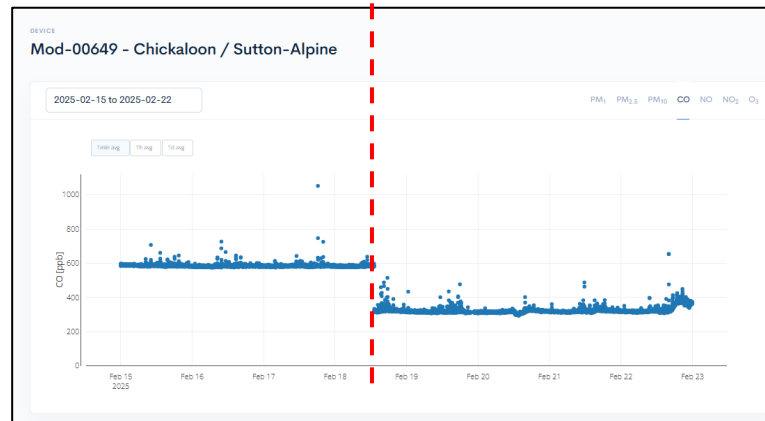
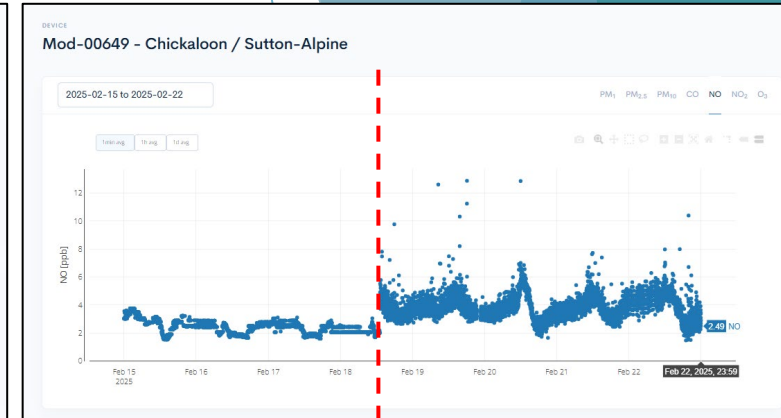
- ▶ Valdez has been added to the network!
 - ▶ Thank you to Jodi Fowler, Stan Porritt and the maintenance team at the Ike "Woody" Woodman Recreation Center for their hard work!
 - ▶ Successful sensor replacement by Stan and team after CO sensor in original sensor experienced intermittent failures.
- ▶ Salcha has been added to the network!
 - ▶ Thank you to Jahanara Carreon, Dennis Ferraro, Nicholas Hoy, and the staff at Salcha Elementary School for their assistance!
- ▶ Napaskiak pod is back online!
 - ▶ Started up afternoon of March 27th after being off-line due to issue with cell service provider.
- ▶ Bethel pod is back online!
 - ▶ Reinstalled on May 22nd after being off-line due to issue with cell service provider.



Community-Based Air Monitoring Network Updates – Gaseous Models

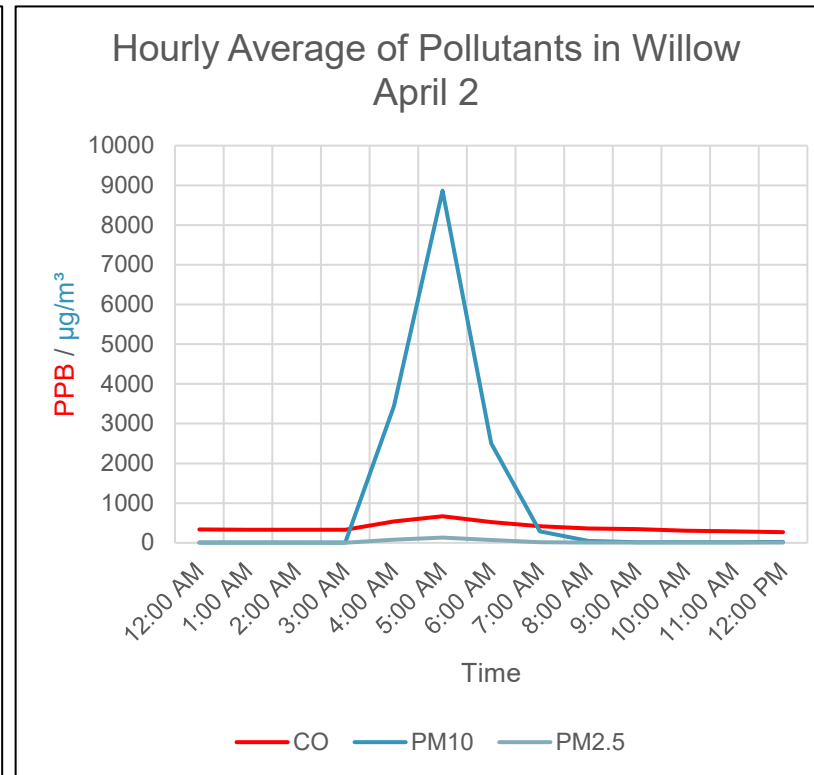
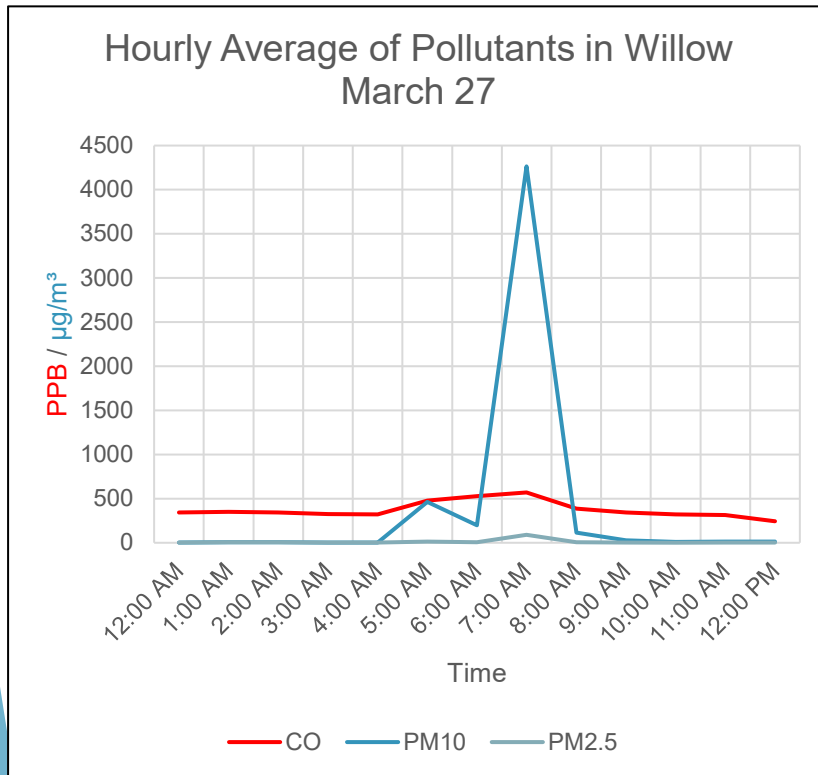
▶ Improved gaseous sensor models

- ▶ Updated February 18th, 2025
- ▶ Better performance at lower pollutant concentrations (ex: NO₂)
- ▶ Increased sensitivity to rapid changes in pollutant concentration (ex: NO)
- ▶ Reduced sensor error rate (ex: O₃)
- ▶ More accurate baseline (ex: CO)
 - ▶ Upcoming CO model update was partially informed with NCore data



Willow – Early morning of March 27 & April 2

- ▶ Sudden large spike in multiple pollutants, primarily PM_{2.5}, PM₁₀, CO
- ▶ Data pattern suggested a combustion source near the sensor pod
- ▶ Investigated the issue with our community contact

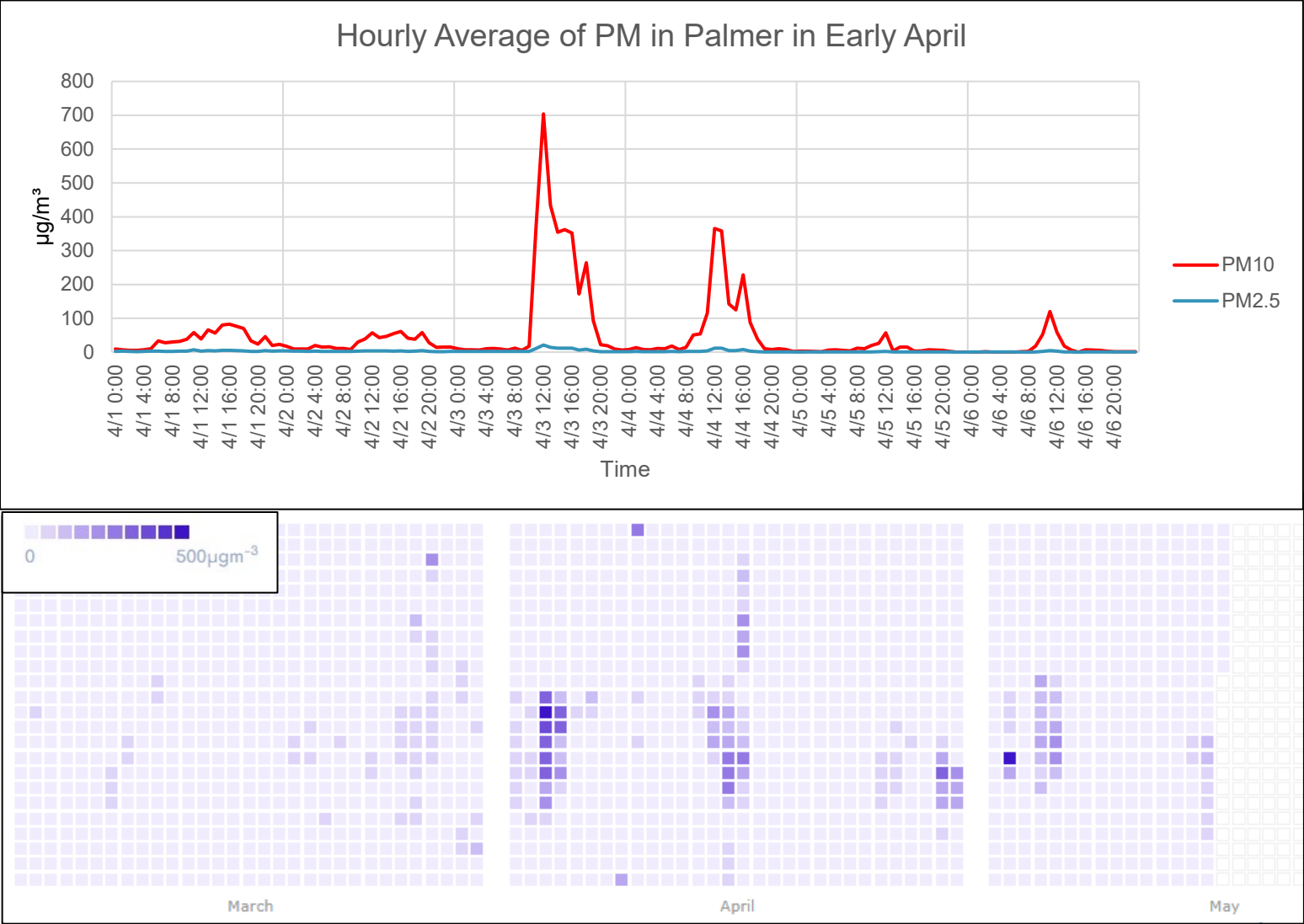


- ▶ Contact reported presence of maintenance workers performing duties
 - ▶ Gas-powered leaf blower was used to clean the sidewalk, parking lot, lawn
 - ▶ Good example of how every-day activities can affect our air quality
 - ▶ Pedestrians
 - ▶ People at SCHC
 - ▶ Maintenance Worker



Palmer – Elevated PM₁₀ in April and May

▶ Multiple instances of elevated PM₁₀ lasting many hours



▶ Contact reported dust has been an issue lately

▶ Mostly occurs in midday and early afternoon

▶ Worst dust event was in early April

▶ Good example of how air quality is impacted by seasonal changes

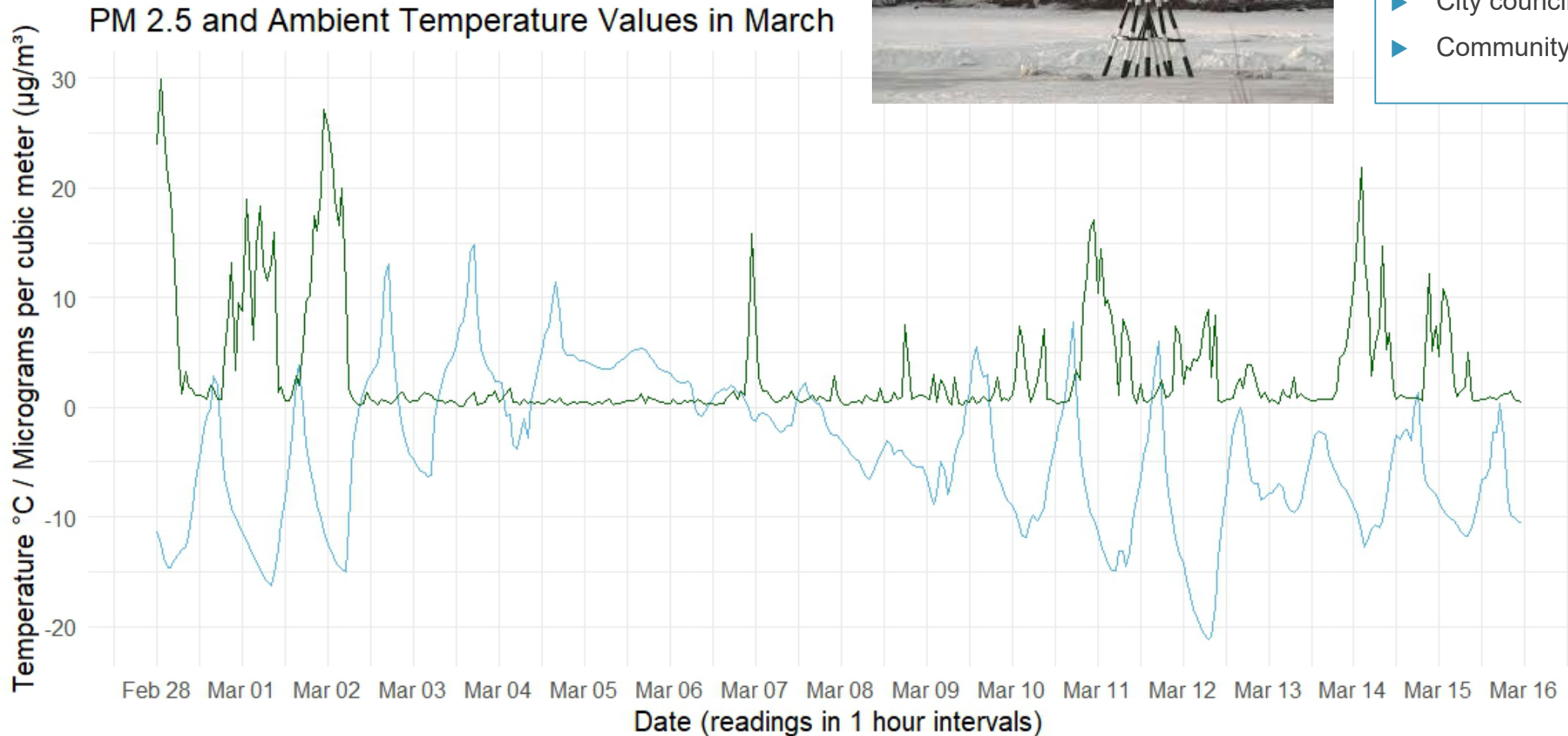


Nenana – Tripod Events Impact on PM_{2.5}

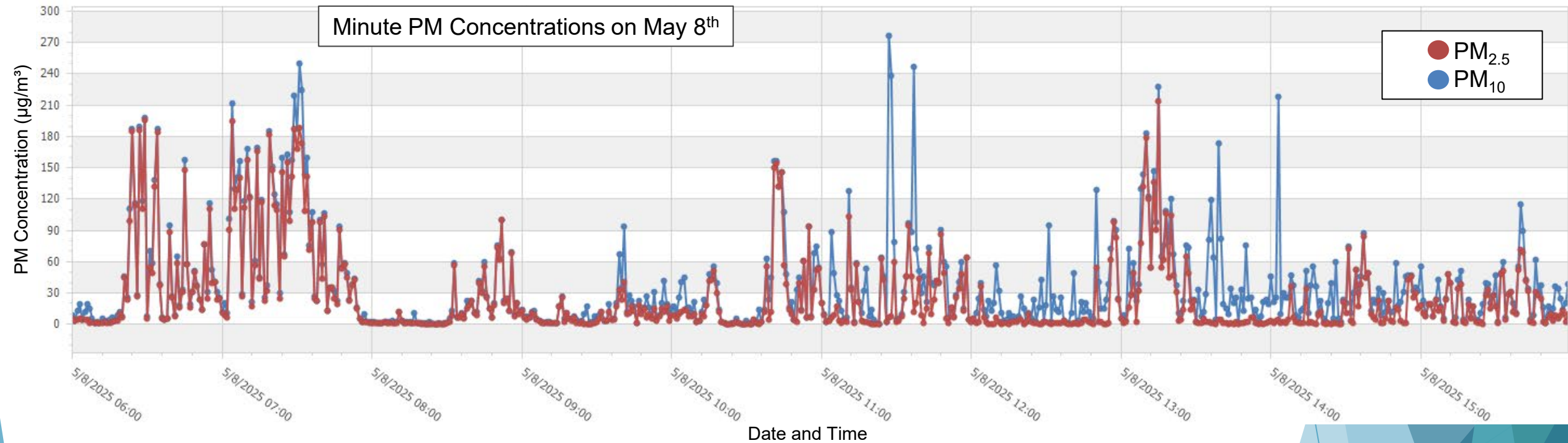


Events in March

- ▶ Tripod days - March 1-2
- ▶ Iditarod checkpoint - March 3
- ▶ City council meeting - March 11
- ▶ Community Health Fair - March 22



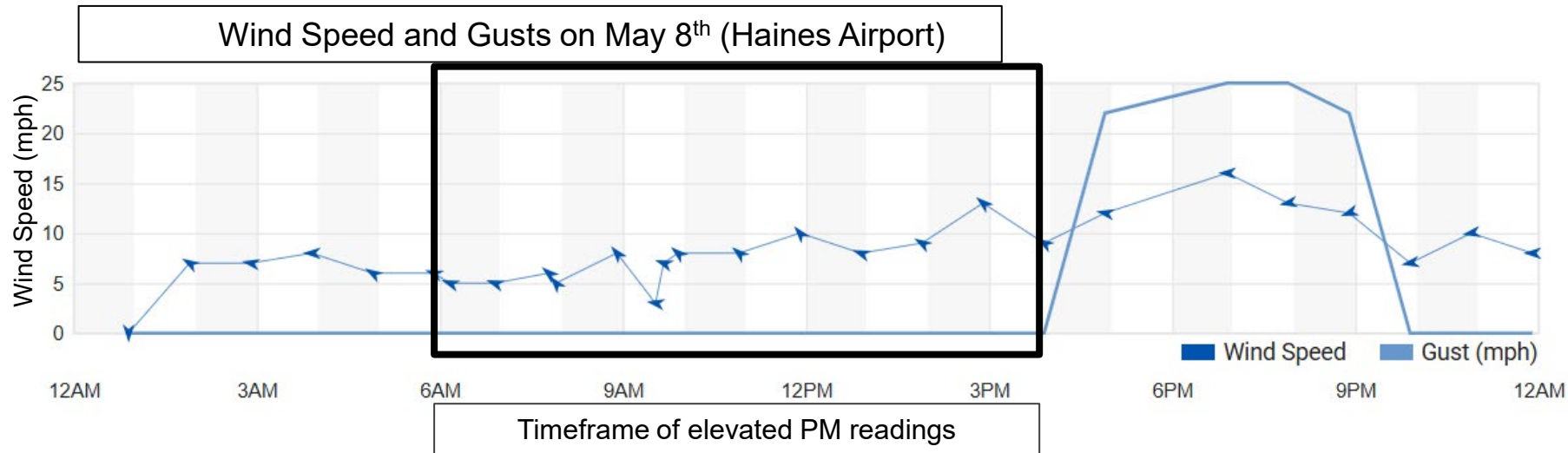
Haines – Construction Impacts on Air Quality



- ▶ Observed elevated PM values throughout the day between 6am and 5pm
- ▶ Reached out to community contact for additional insight:
 - ▶ The sensor is located between two large scale construction projects with frequent large vehicles traffic transporting fill and excavating.
 - ▶ “One is a block away and is a complete road rebuild, and the other is a filling in of the lot immediately adjacent to [the sensor].”

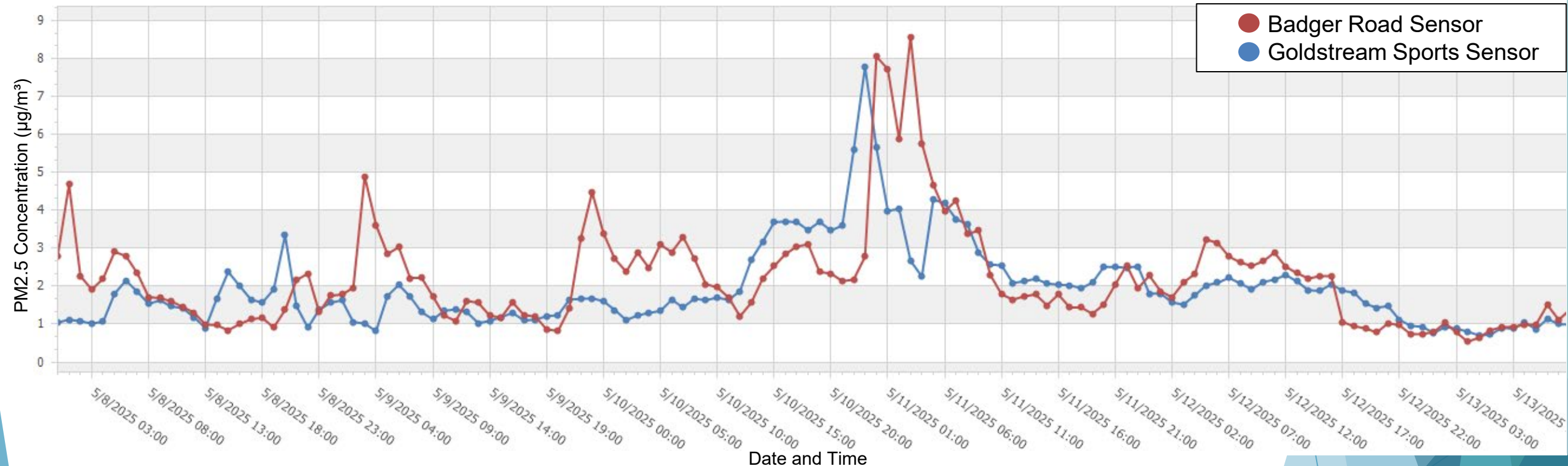
Haines – Weather Considerations

- ▶ Historical weather data gives further insight



- ▶ “If the winds were calm that actually would help explain the readings as it would allow the dust and emissions to stagnate around the office.”

Division of Forestry – Controlled Burns



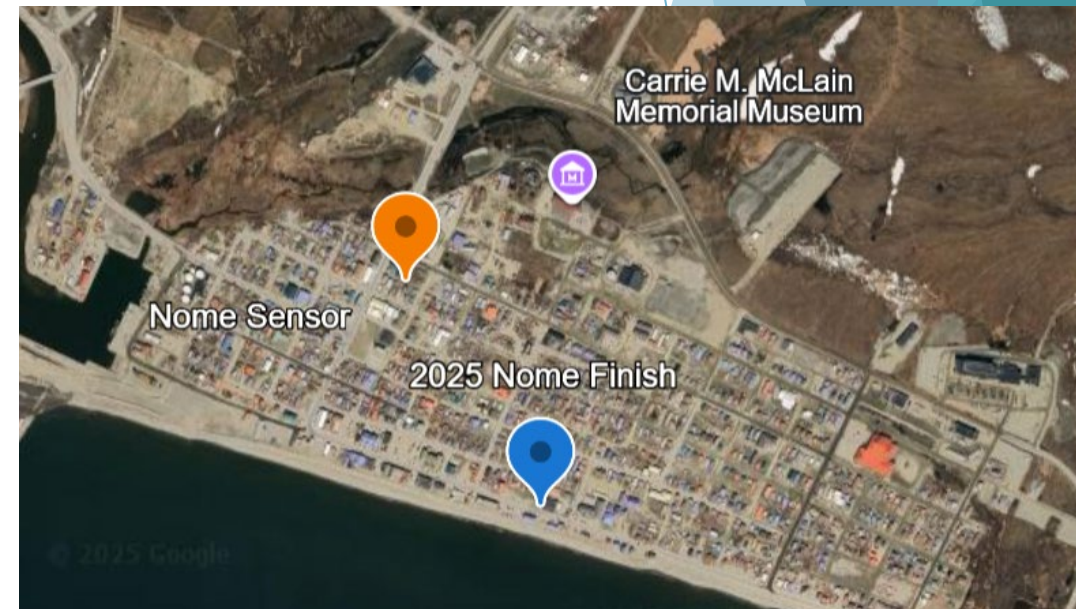
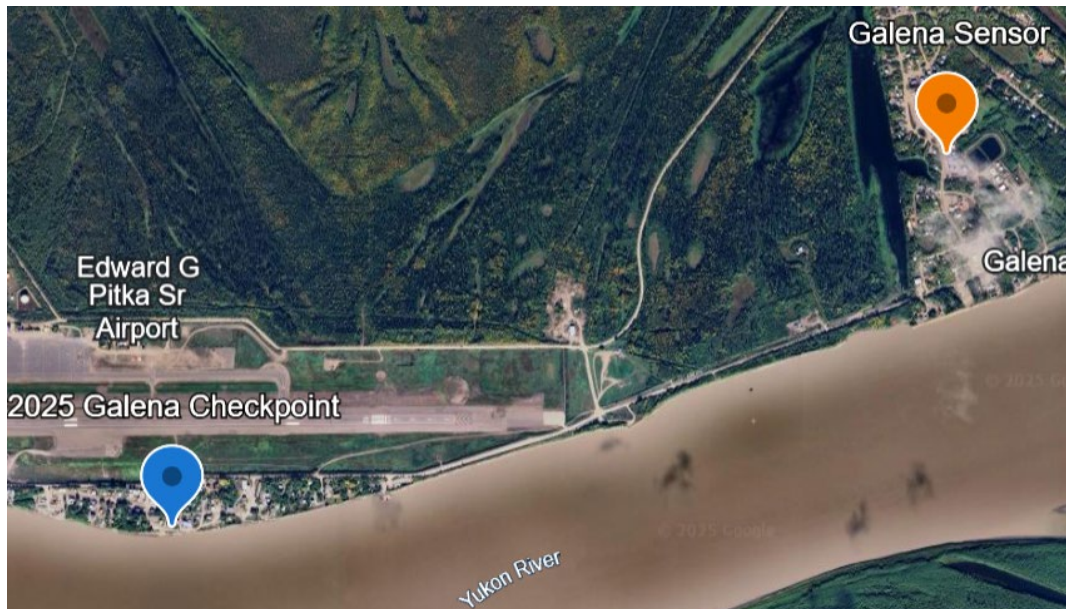
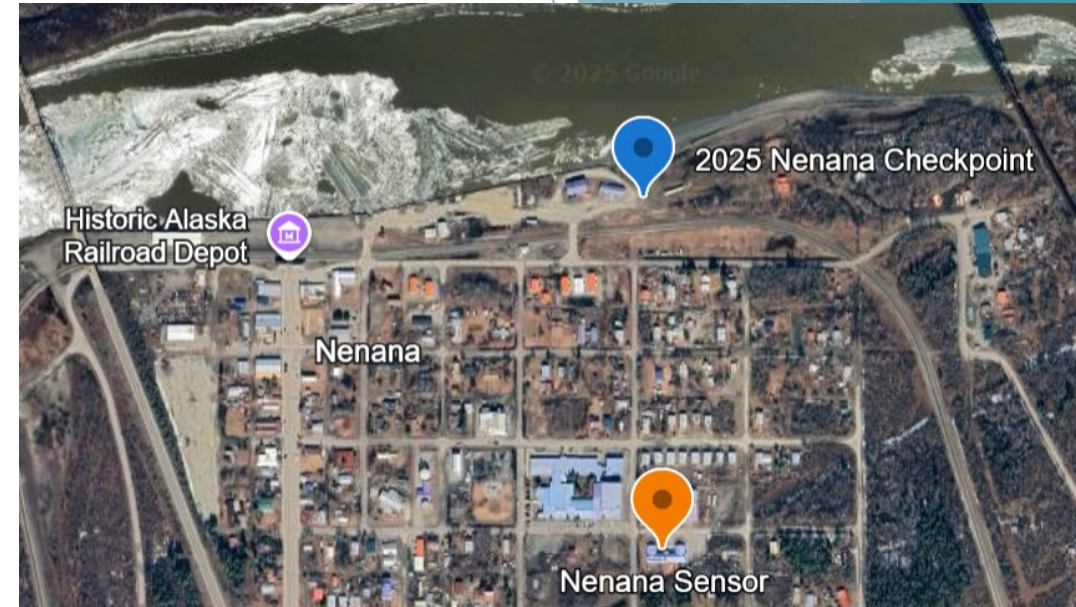
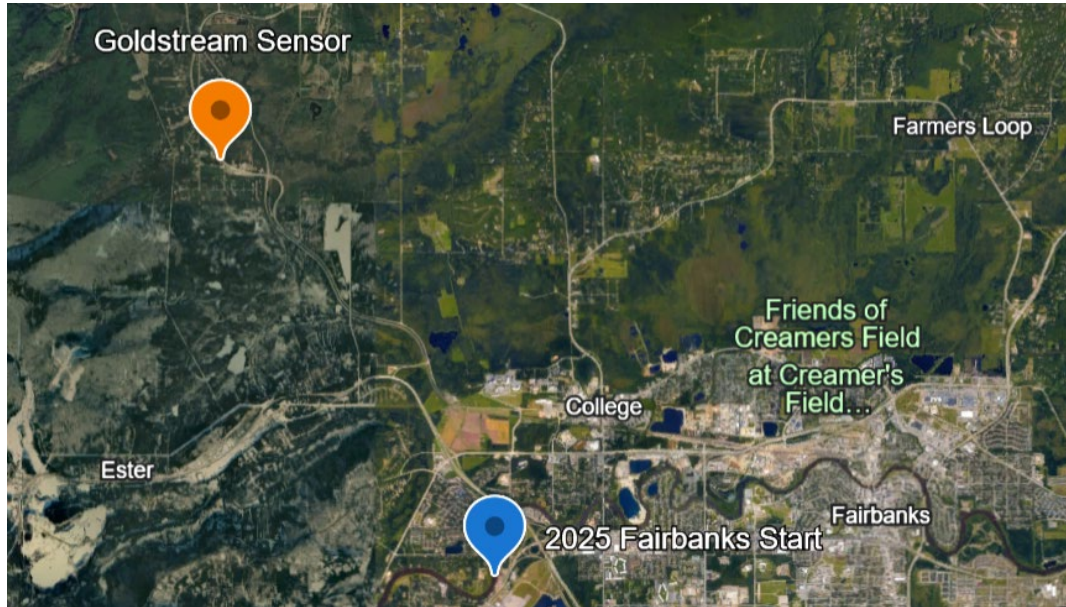
- ▶ Controlled burn at Creamer's Field, Fairbanks, May 10th & 11th
- ▶ Hourly PM_{2.5} data
- ▶ Sign up for ADEC's air quality advisories/episodes:
<https://dec.alaska.gov/Applications/Air/airtoolsweb/advisories/>
- ▶ More info on controlled burns: <https://forestry.alaska.gov/fire/fuelmitigation>



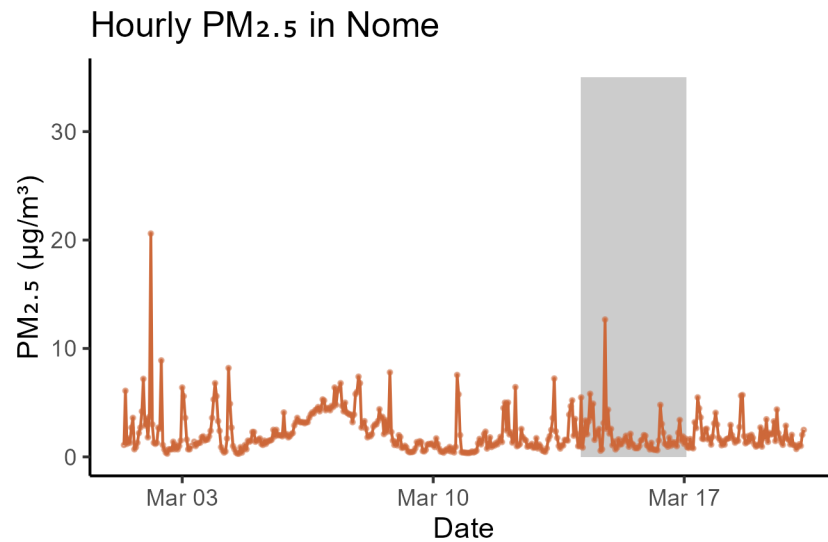
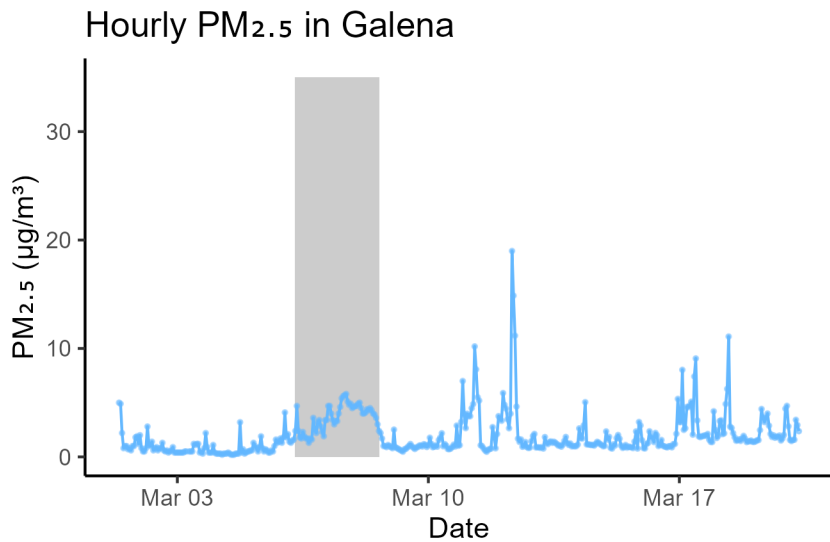
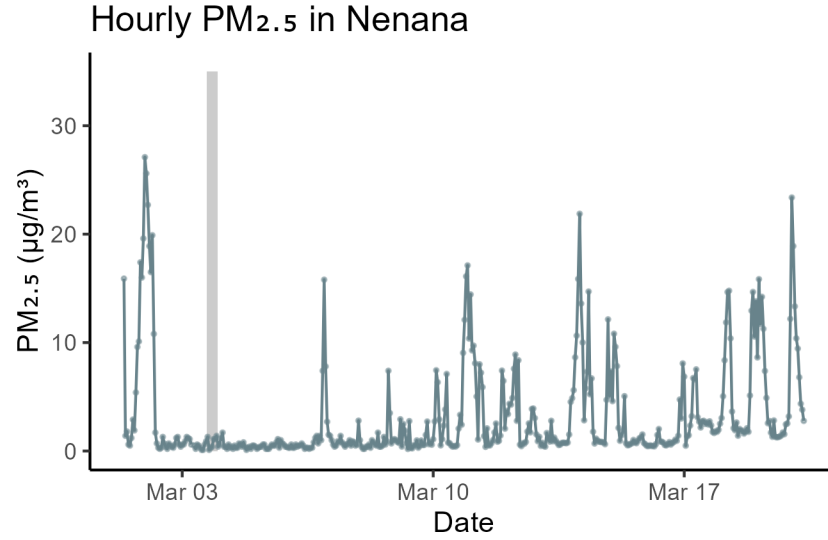
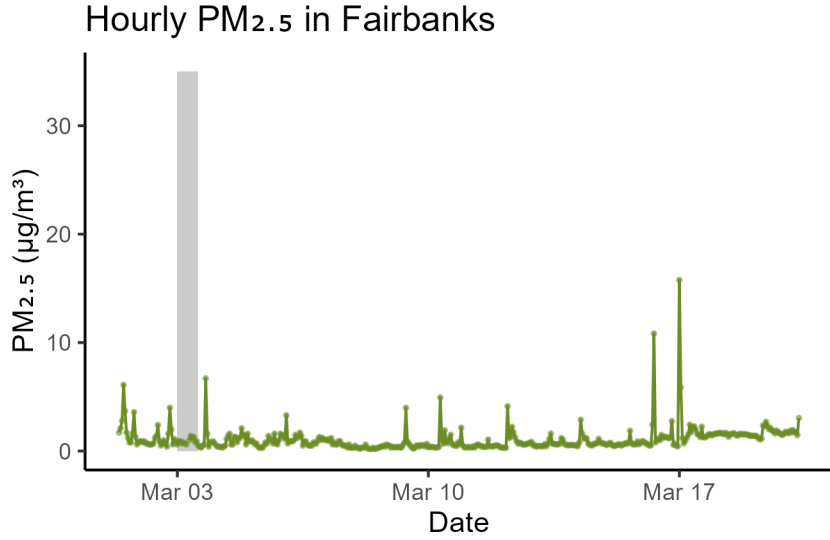
Sensors and Iditarod Checkpoints

Distance between checkpoint and sensor

- ▶ Fairbanks ~4.92 miles
- ▶ Nenana ~0.27 miles
- ▶ Galena ~1.92 miles
- ▶ Nome ~0.37 miles



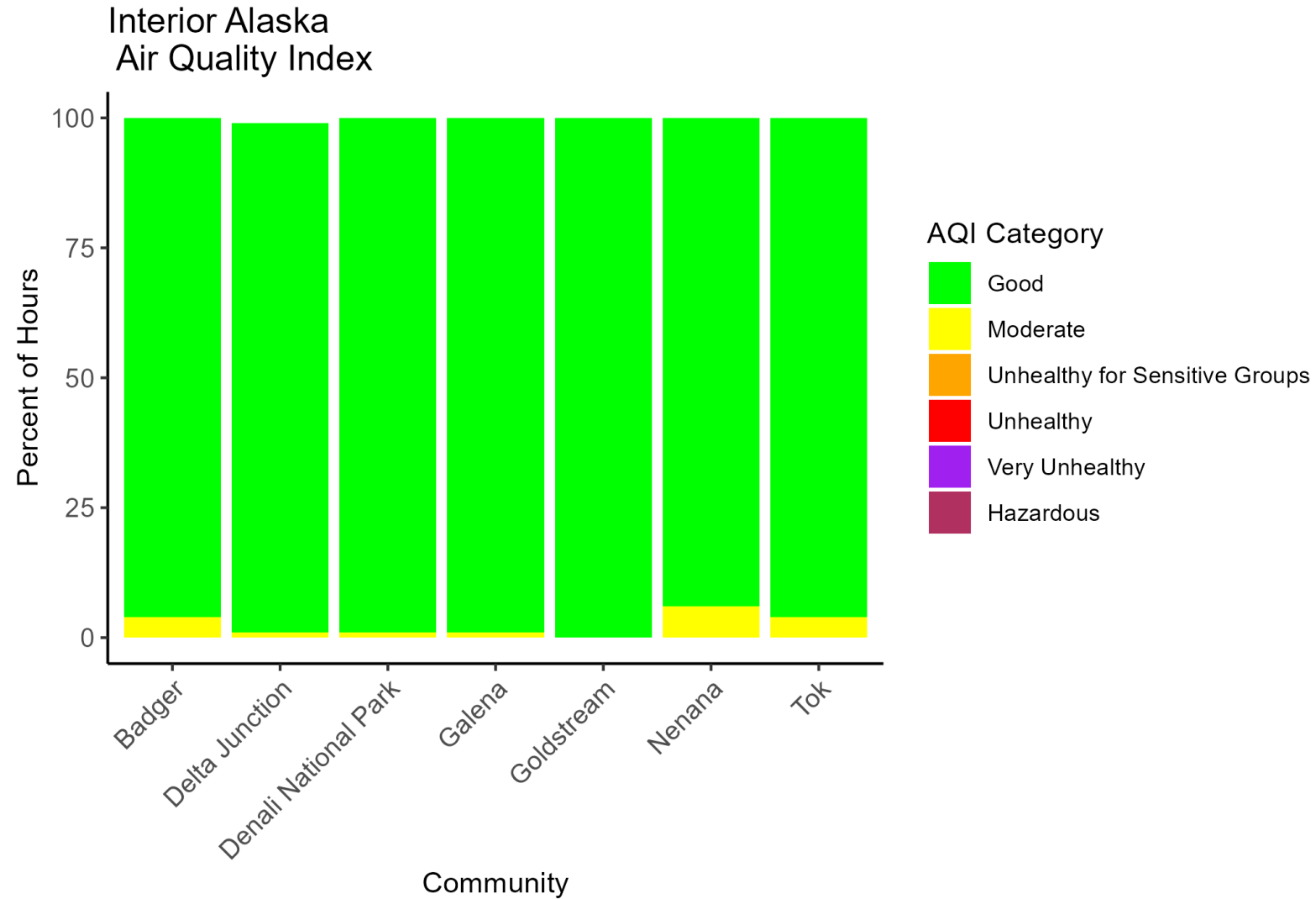
Impacts of Iditarod on PM_{2.5}



Community	Mean PM _{2.5} – no mushers present	Mean PM _{2.5} – mushers present
Fairbanks	1.16	0.88*
Nenana	3.54	0.81*
Galena	2.10	3.61*
Nome	2.28	1.97
All – combined	2.27	2.44



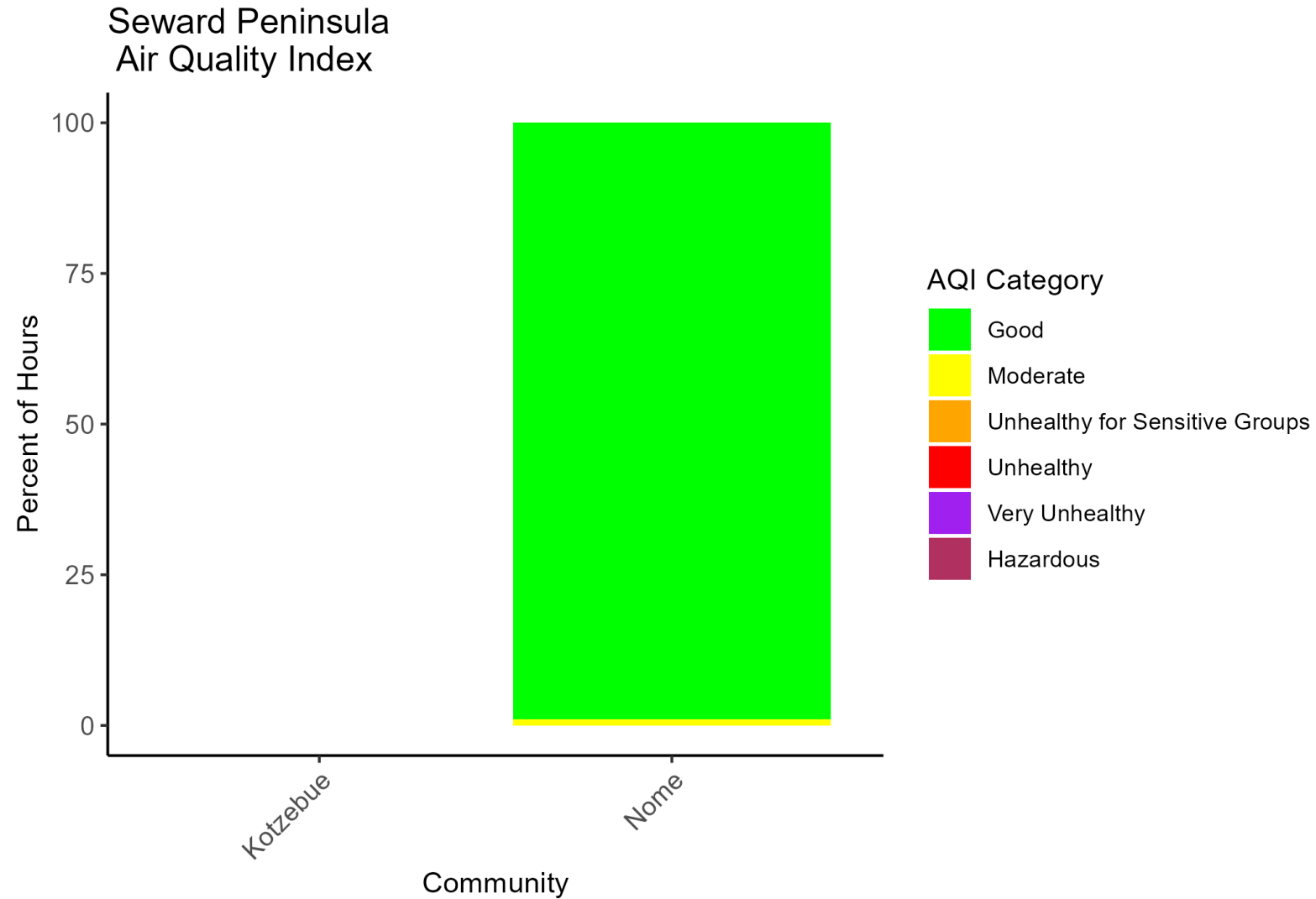
Interior Alaska AQI



Data represents hourly data from March 1, 2025 to May 28, 2025



Seward Peninsula AQI

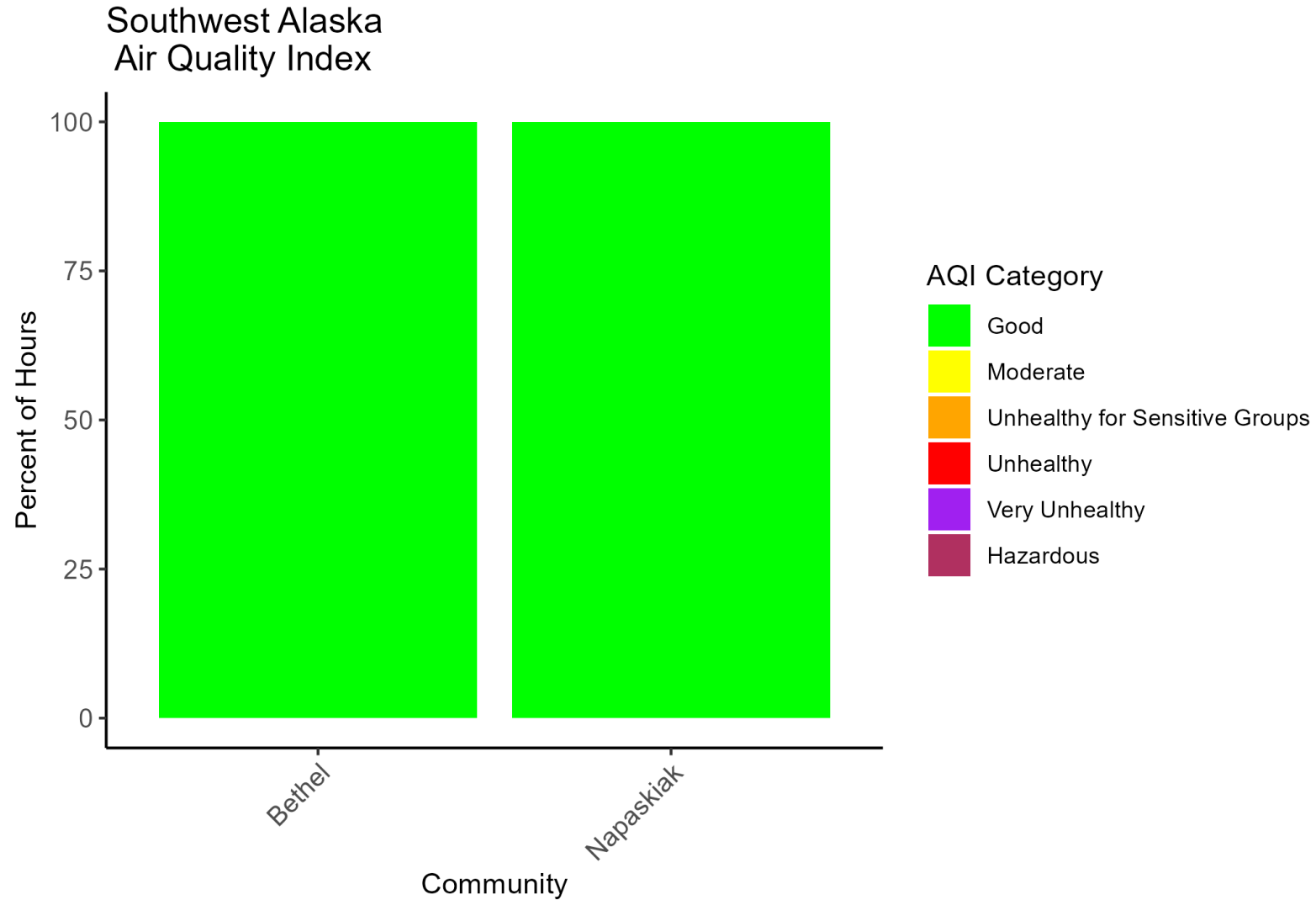


Data represents hourly data from March 1, 2025 to May 28, 2025



Southwest Alaska AQI

Bethel was installed on May 22, 2025

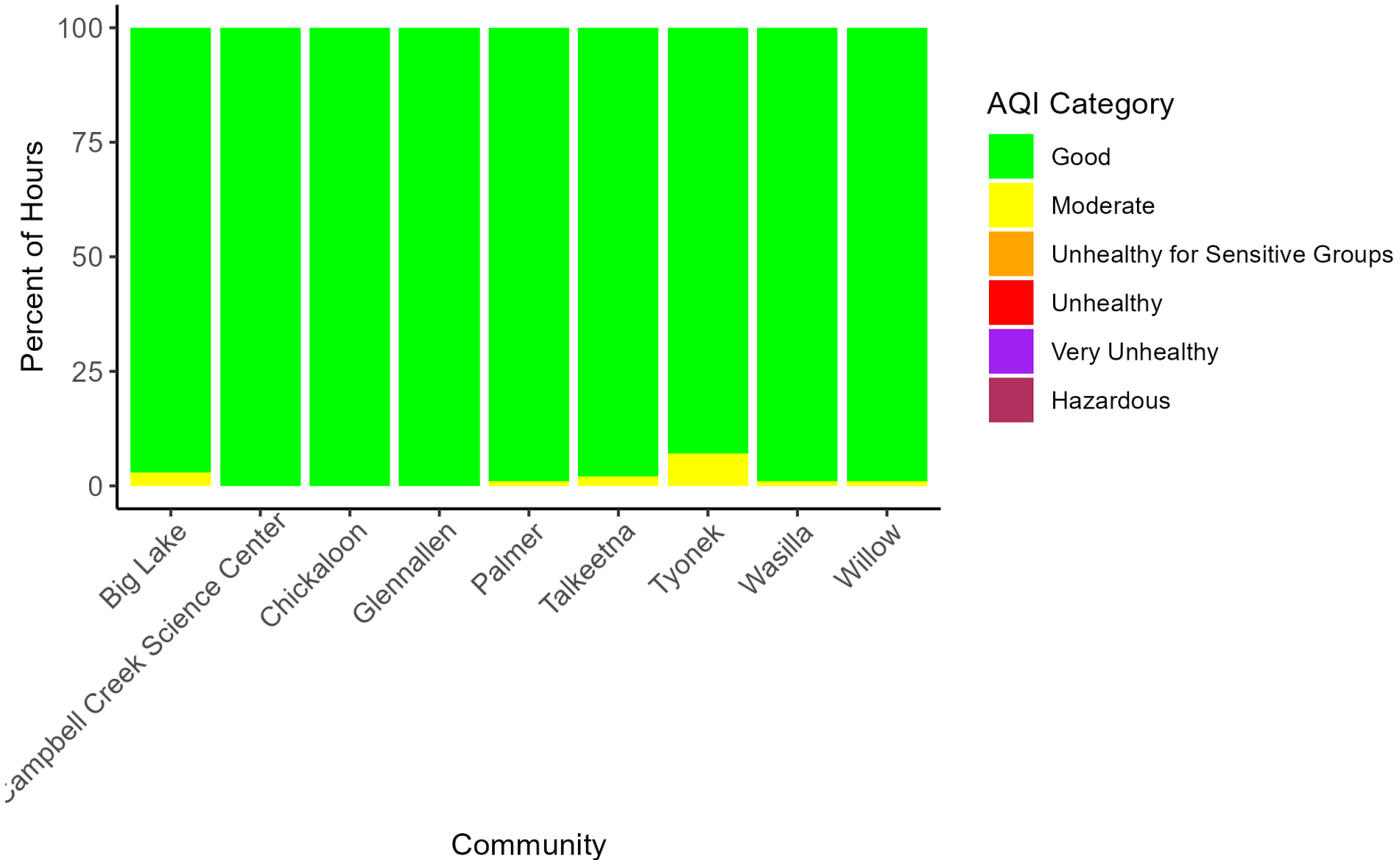


Data represents hourly data from March 1, 2025 to May 28, 2025



Southcentral – Anchorage/MatSu AQI

Southcentral Alaska - Anchorage/MatSu Valley
Air Quality Index

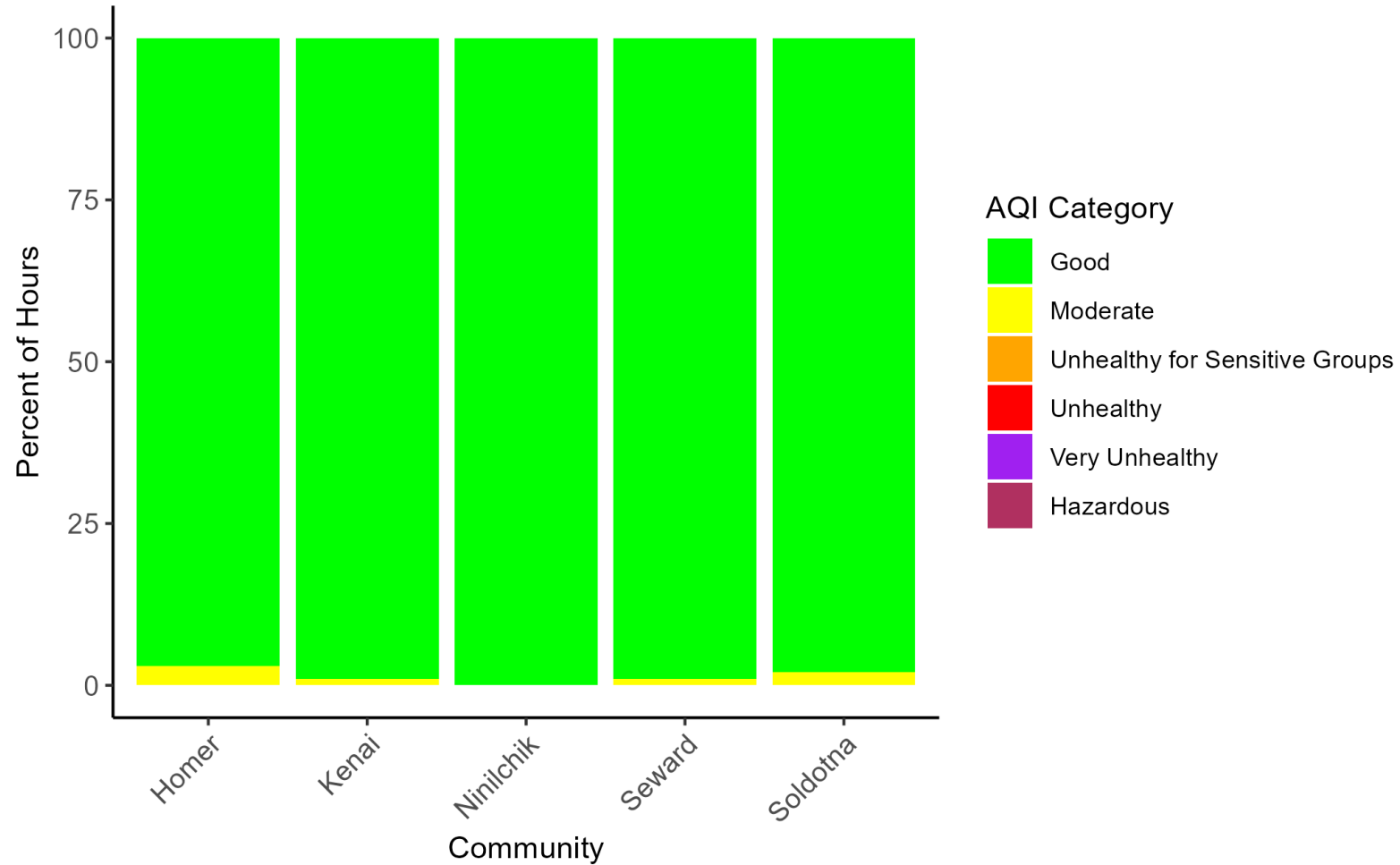


Data represents hourly data from March 1, 2025 to May 28, 2025



Southcentral – Kenai Peninsula AQI

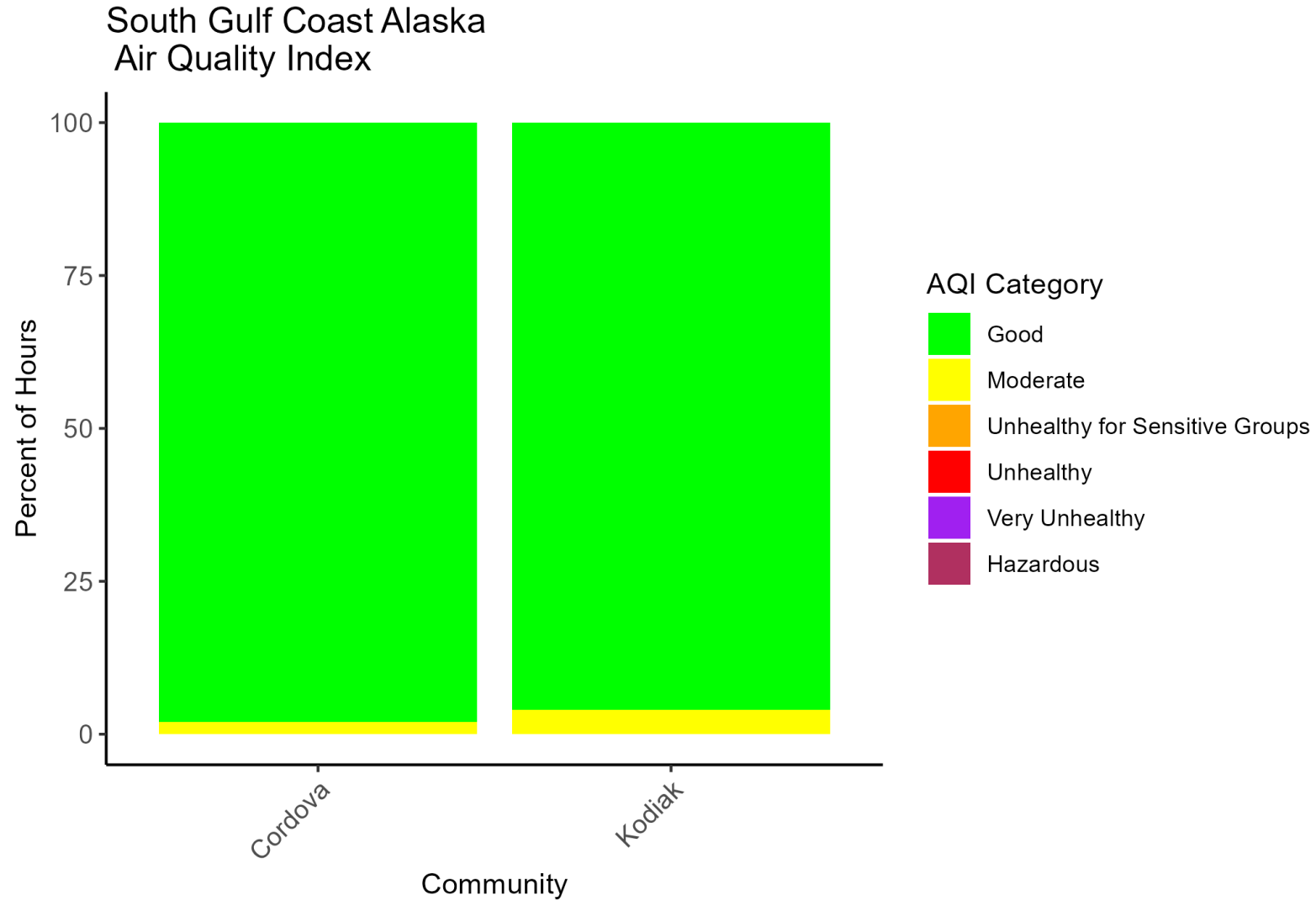
Southcentral Alaska - Kenai Peninsula
Air Quality Index



Data represents hourly data from March 1, 2025 to May 28, 2025



South Gulf Coast AQI

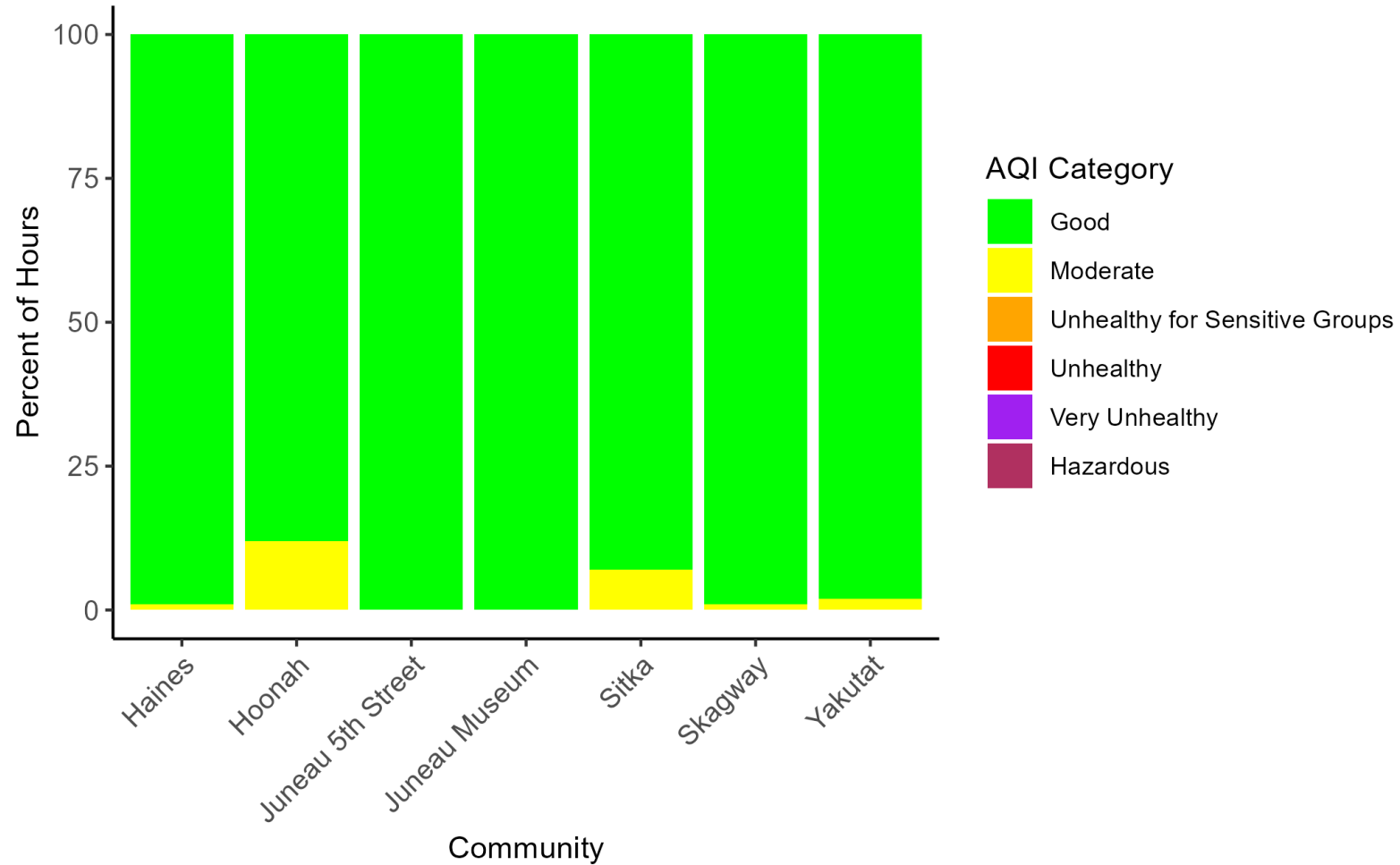


Data represents hourly data from March 1, 2025 to May 28, 2025



Southeast – Northern AQI

Panhandle - Northern Southeast Alaska
Air Quality Index

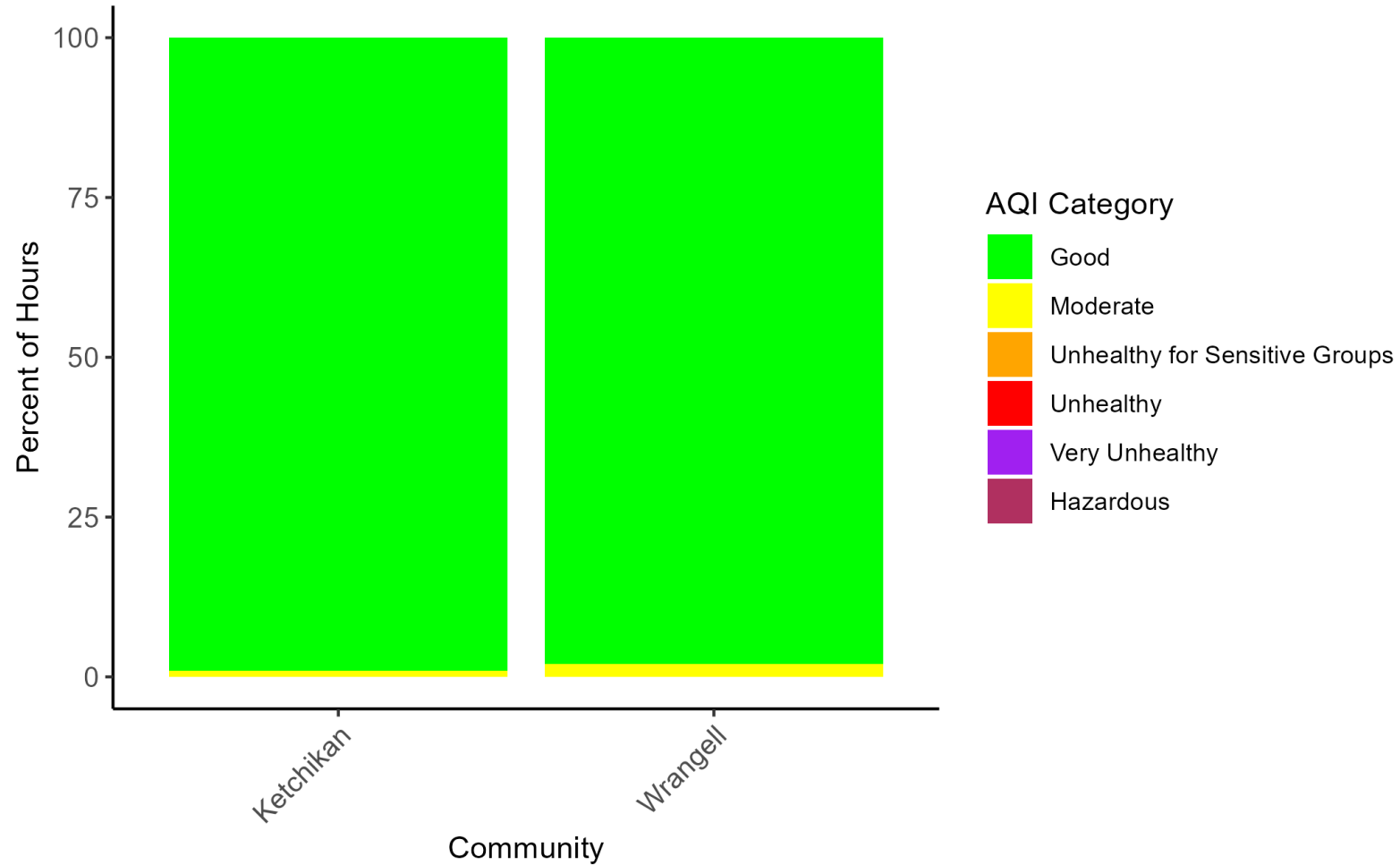


Data represents hourly data from March 1, 2025 to May 28, 2025



Southeast – Southern AQI

Panhandle - Southern Southeast Alaska
Air Quality Index

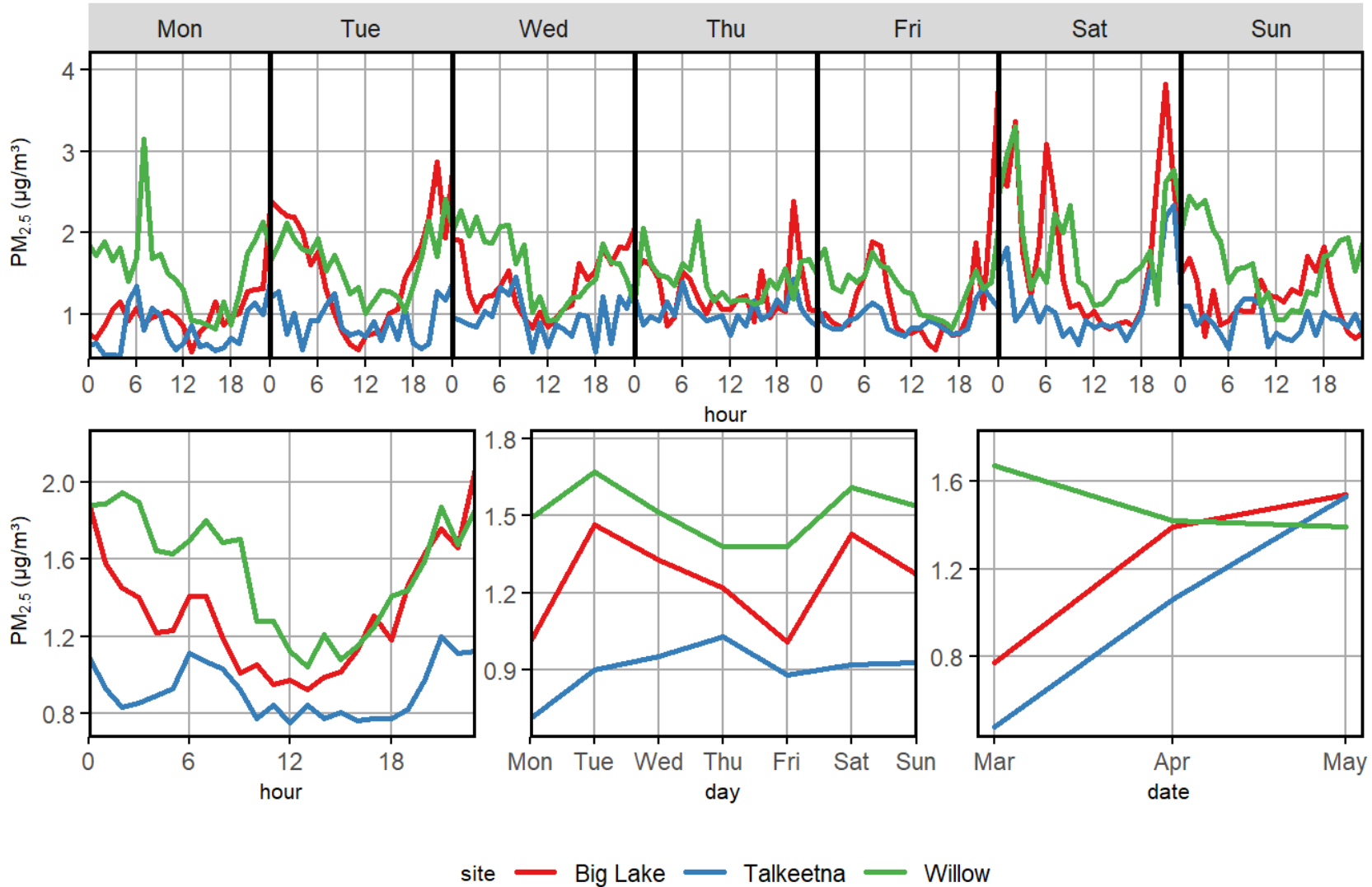


Data represents hourly data from March 1, 2025 to May 28, 2025



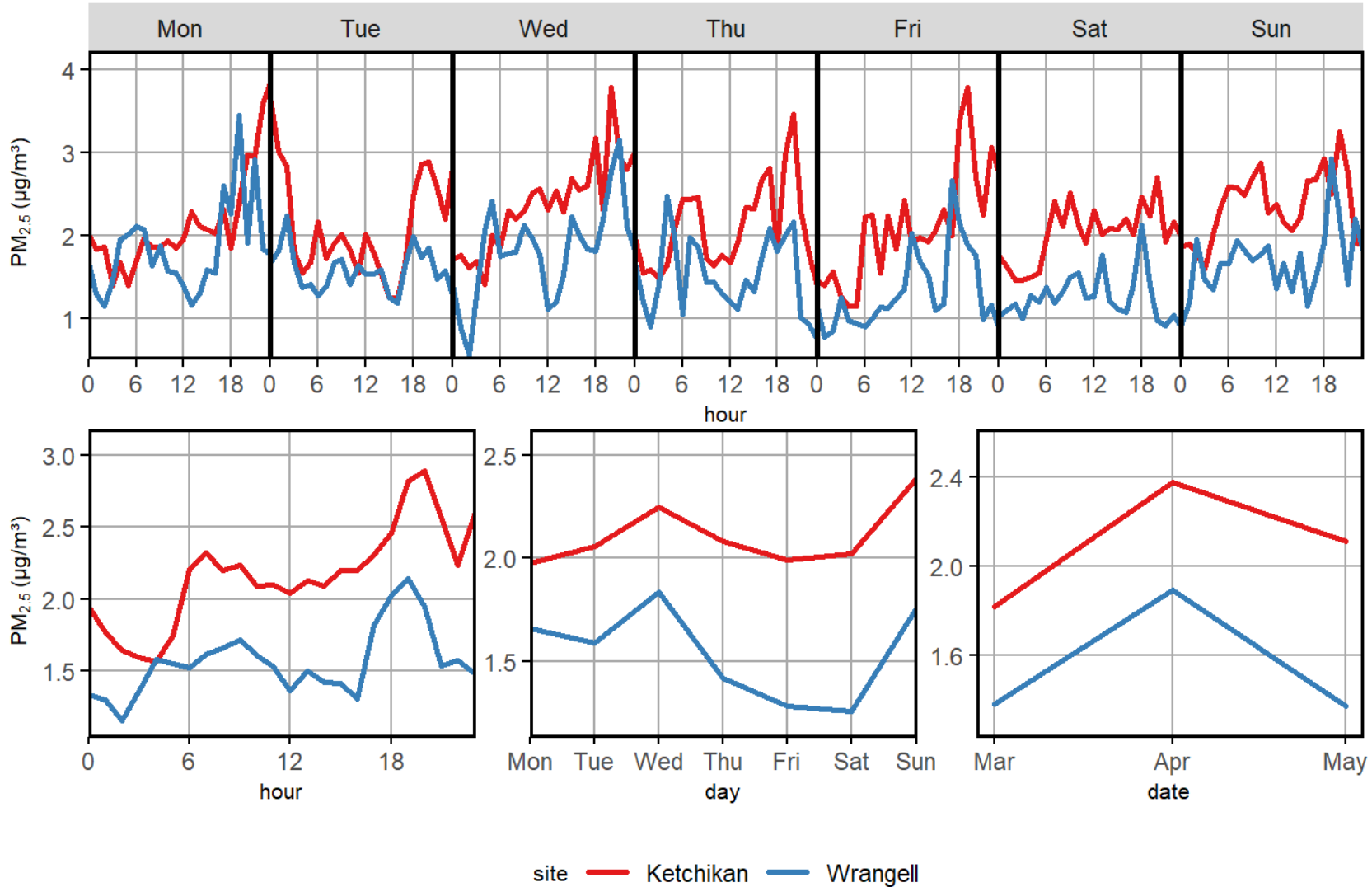
Diurnal PM_{2.5} Trends by Ecoregion

West Mat-Su Valley Quants: Median PM_{2.5} Concentrations Mar 2025 - May 2025



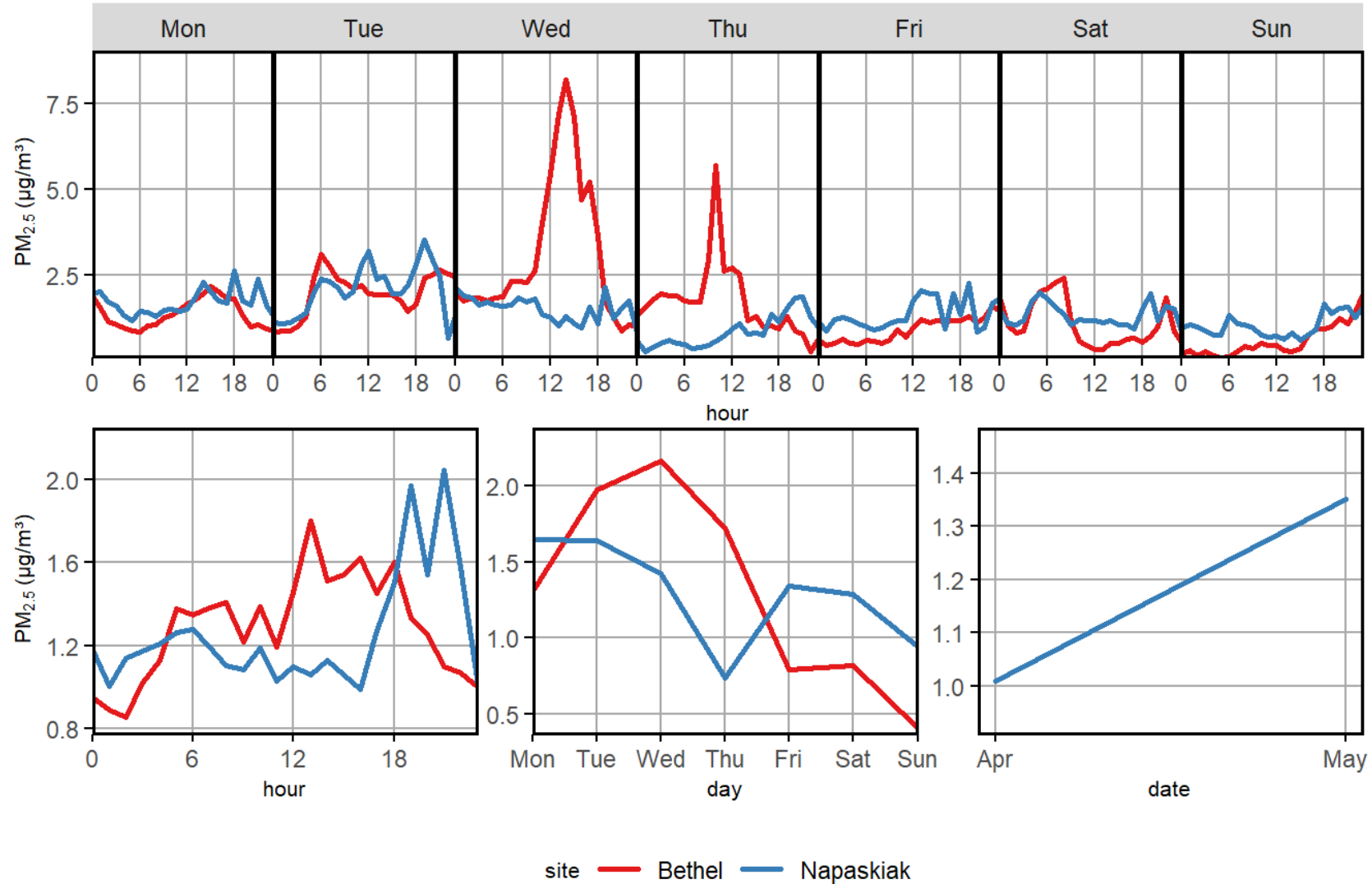
Diurnal PM_{2.5} Trends by Ecoregion

Southern Southeast Alaska Quants: Median PM_{2.5} Concentrations Mar 2025 - May 2025



Diurnal PM_{2.5} Trends by Ecoregion

Napaskiak & Bethel Quants: Median PM_{2.5} Concentrations Mar 2025 - May 2025



Interested about a specific sensor within a range of dates?

- ▶ [Community Sensor Network Diurnal Comparisons](#)



WiFi Sensor Comparison Study

Goals:

- ▶ Research commercially available “low-cost” sensors equipped with WiFi connection capabilities
- ▶ Compare multiple models to determine data accuracy, precision, and ability to operate in Alaska outdoor conditions
- ▶ Determine optimal models to integrate into our Community Sensor Network to reach communities without adequate cell service
- ▶ Establish a network across interior Alaska to monitor wildfire smoke



WiFi Sensor Comparison Study Sensors

Parameters Measured:

- ▶ $PM_{2.5}$
- ▶ PM_{10}
- ▶ Current AQI
- ▶ Temp
- ▶ RH



AirSENCE Dust Watch



iMonPM



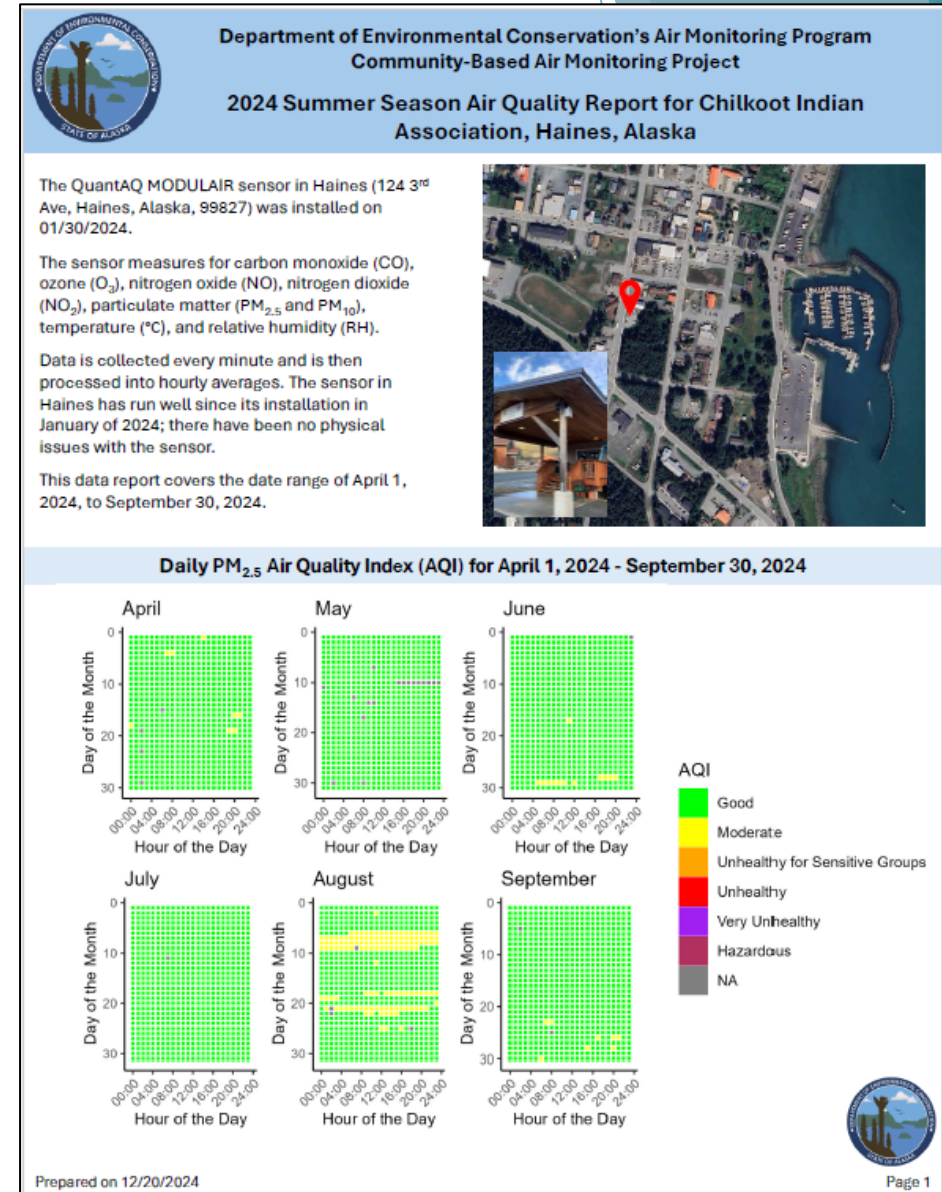
TSI BlueSky



Tellus AirU Pro WiFi

Community Data Reports

- ▶ Semi-annual reports giving overview of sensor performance, data preview, and air quality education resources
- ▶ Winter Season covers October 1, 2024 -March 31, 2025
- ▶ Summer Season covers April 1, 2025 - September 30, 2025 – COMING SOON!
- ▶ View all reports at <https://dec.alaska.gov/air/air-monitoring/instruments-sites/community-based-monitoring/>



Local Air Quality Observations

- ▶ [Local Air Quality Observations jot form](https://dec.alaska.gov/air/air-monitoring/instruments-sites/aqmesh-community-based-monitoring/) at <https://dec.alaska.gov/air/air-monitoring/instruments-sites/aqmesh-community-based-monitoring/>

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?

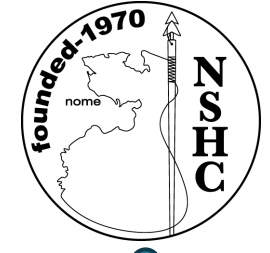
Please provide any additional details about what you observed if you have any. For example: does this observation seem out of the norm for your local community?



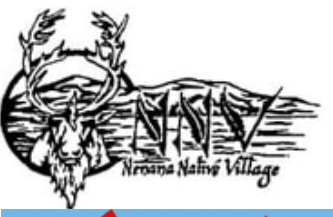


Rowing in the same direction

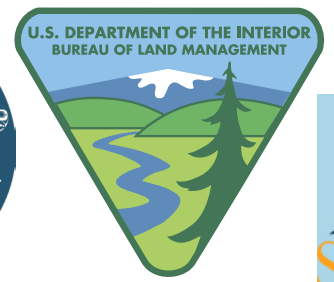
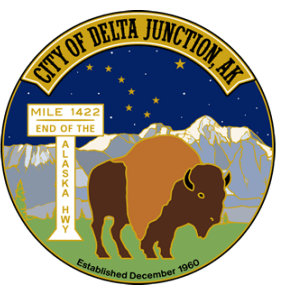
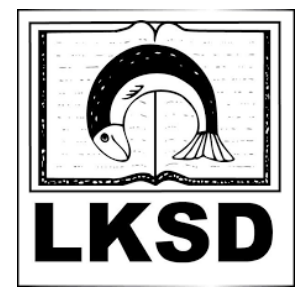
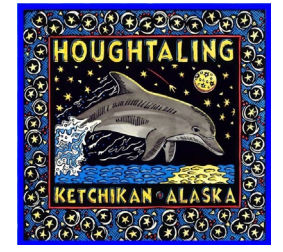
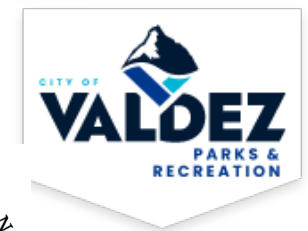
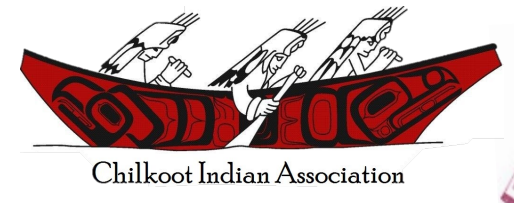
- ▶ **Sensor Network Expansion**
 - ▶ Wi-Fi sensors
 - ▶ Interior wildfire network
 - ▶ Municipality of Anchorage network
- ▶ **We want to host your air quality data on our website!**
- ▶ **DEC sensor network collaboration**
 - ▶ Contact us for direct collaboration
 - ▶ Future calls and knowledge share
 - ▶ Data available at request
 - ▶ *What data do you want to see?*



Thank you to all our community partners!



- ▶ Cathedral of the Nativity of the Blessed Virgin Mary
- ▶ Tok Community Library
- ▶ Palmer Public Library
- ▶ Big Lake Public Library
- ▶ Ninilchik Library



Questions

- ▶ Next quarterly call date: December 9th 10-11am. Registration link 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](https://www.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
- ▶ EPA Air Sensor Loan Program - <https://www.epa.gov/air-sensor-toolbox/air-sensor-loan-programs>

Contact us

