



The Skagway Air Quality Monitoring Array and Public Dashboard: A First Look at Understanding Impacts from Local Sources



National Park Service, Air Resources Division
Barkley C. Sive

Skagway Traditional Council
Reuben Cash, Colton Belisle, Eric Dye

National Park Service, Klondike Gold Rush National Historical Park
C. Elaine Furbish, Anne E. Matsov, Kilipaki Harris, Wes Bacon-Shulte





Image U.S. Geological Survey
Image Landsat / Copernicus
Image IBCAO
Data SIO, NOAA, U.S. Navy, NGA, GEBCO





Potential Pollution Sources



Source: <https://www.nps.gov/articles/aps-9-2-6.htm>



Responsibility to protect
park resources and values
from adverse effects
resulting from air pollution

BUT no regulatory
authority to reduce
pollution!





GLBA	SITK	KLGO	SKAGWAY			
Bartlett Cove	Sitka	Chilkoot Saintly Hill	Dewey 1700	Dyea	Lower Dewey	Sturgills

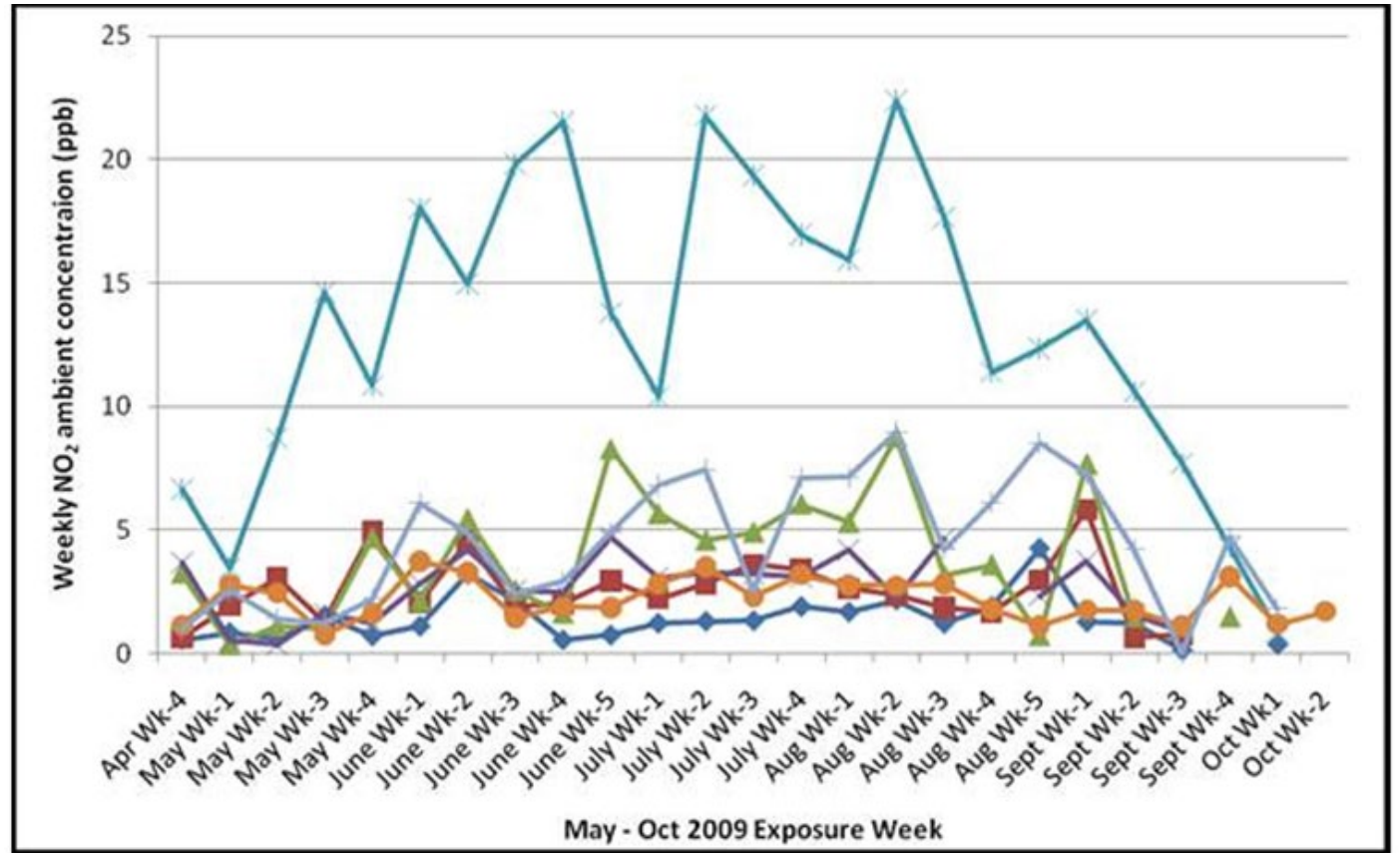


Figure 10. Weekly NO₂ ambient concentrations during May-Oct sampler exposure weeks in (a) 2008 and (b) 2009 for Glacier Bay NPP, Sitka NHP, and Klondike Gold Rush NHP study sites.

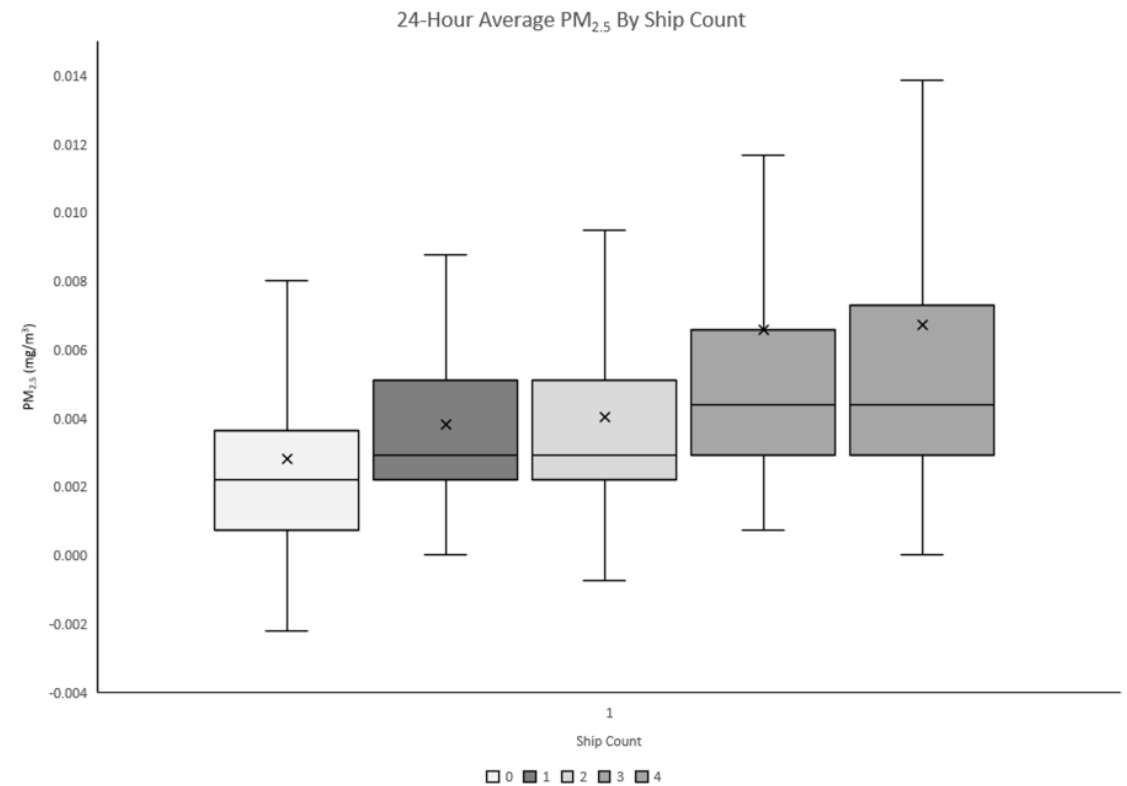
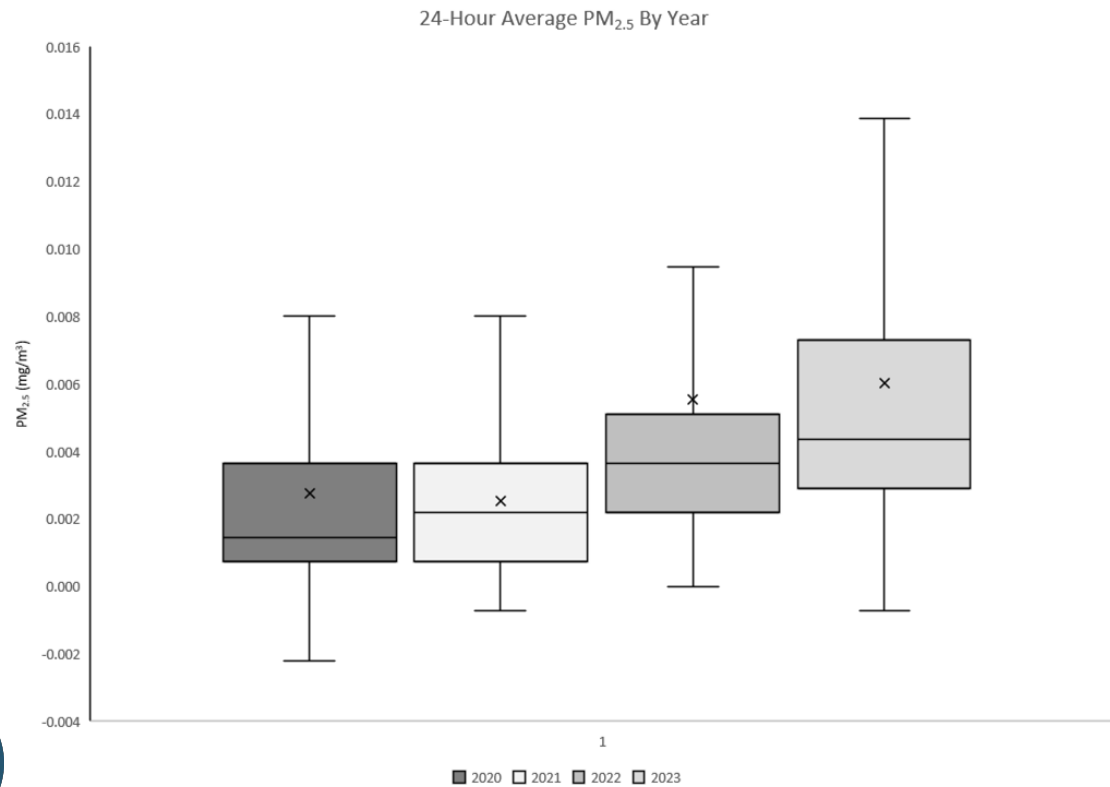


2023



STC PM_{2.5} study

- Began in 2020
 - TSI DustTrak II used to assess AQ related to the cruise season
- The program commenced during the pandemic
 - Provided robust datasets
 - 2 years of AQ data in Skagway without cruise ships





Community Air Pollution Monitoring Projects in Alaska to Receive \$1.3 million in EPA Funding

November 3, 2022

Contact Information

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206-553-2160

Today, the U.S. Environmental Protection Agency announced four community air pollution monitoring projects in Alaska will receive \$1,357,563 in funding to enhance air quality monitoring. The projects are among 132 air monitoring projects in 37 states to receive \$53.4 million in funding from the Inflation Reduction Act and the American Rescue Plan, with an emphasis on underserved, historically marginalized, and communities overburdened by pollution.

"I've traveled across the country and visited communities who've suffered from unhealthy, polluted air for far too long. I pledged to change that by prioritizing underserved communities and ensuring they have the resources they need to confront longstanding pollution challenges," **said EPA Administrator Michael S. Regan**. "The air monitoring projects we are announcing today, which include the first EPA grants funded by President Biden's Inflation Reduction Act, will ensure dozens of overburdened communities have the tools they need to better understand air quality challenges in their neighborhoods and will help protect people from the dangers posed by air pollution."

"With this historic funding, we can make a real difference in helping communities work to improve air quality at the local level, collect air quality information where they see the greatest need, and build partnerships to amplify the health benefits in underserved and overburdened communities across Alaska and the Northwest," **said EPA Region 10 Administrator Casey Sixkiller**.

"We are excited for this opportunity to expand air quality monitoring capacity on our Tribal lands and hope that this can help to identify pollution sources and aid in alleviating health risks to our Tribal citizens, community residents, and visitors," **said Skagway Traditional Council Environmental Coordinator Reuben Cash**. "Additionally, we look forward to a collaborative effort with our project partners to





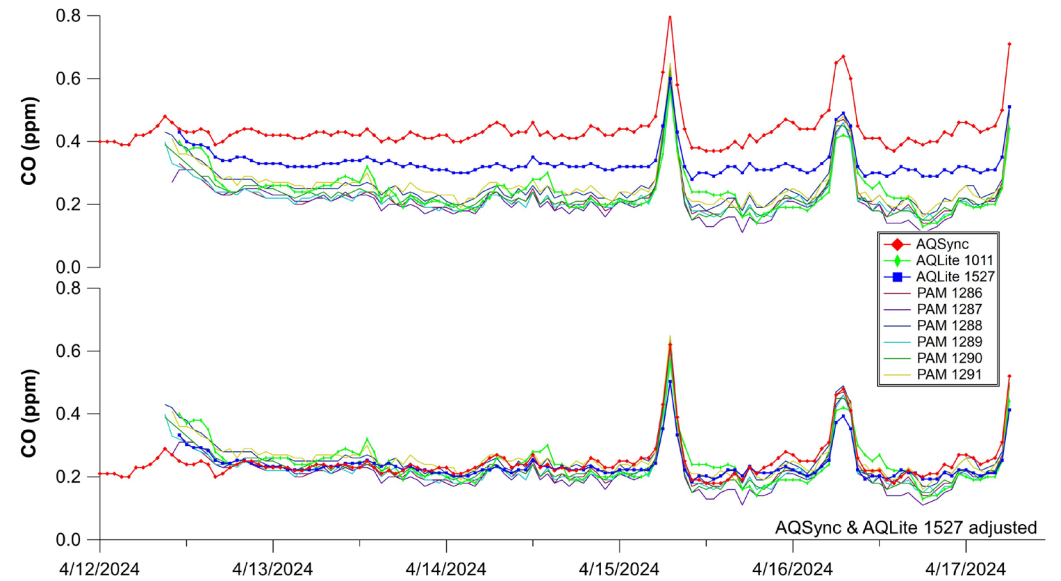
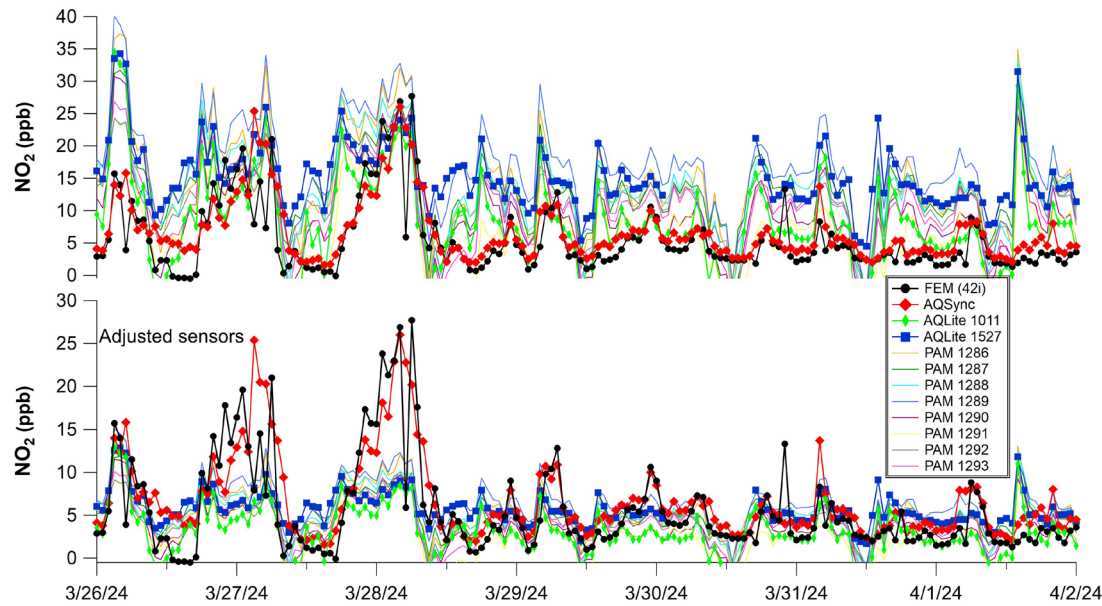
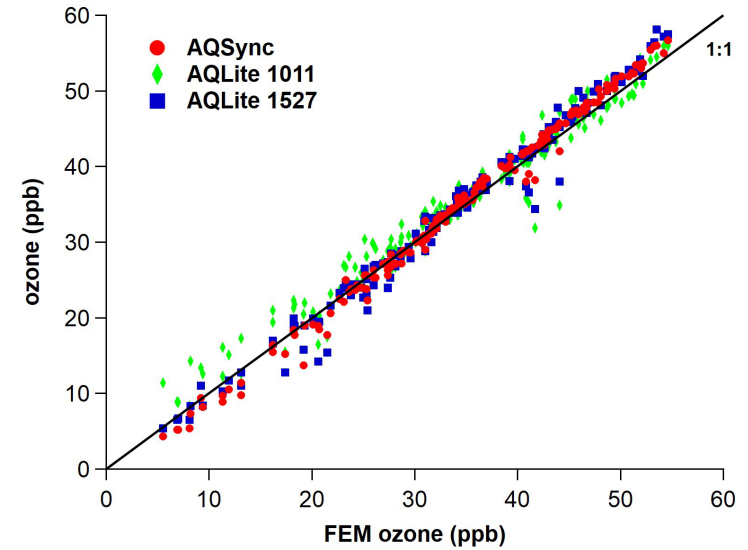
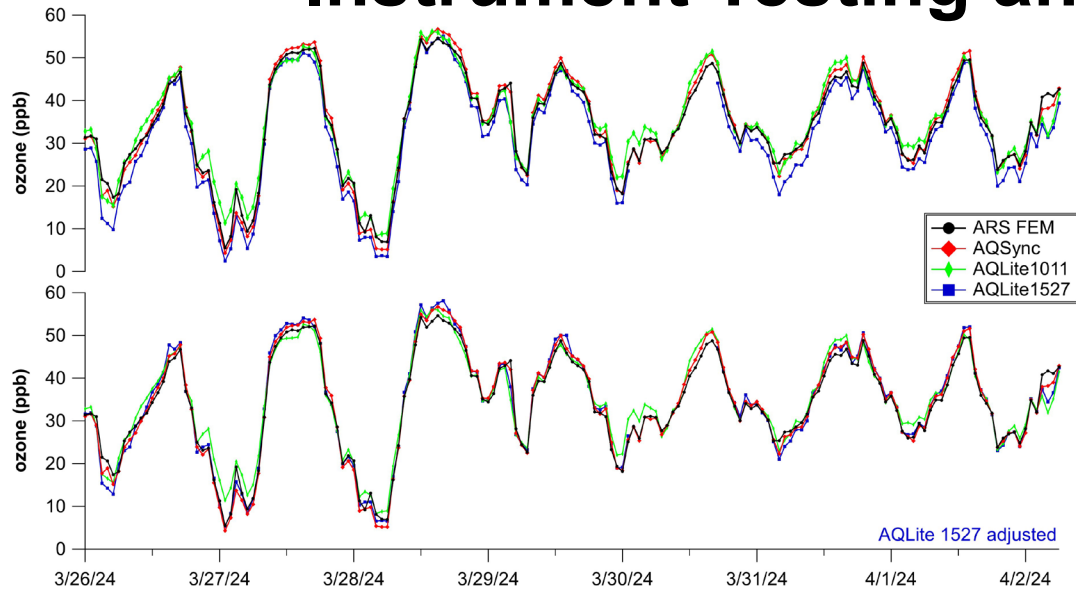
**Acceptance Testing
ARS Roof
Fort Collins, CO**



**Post Shipment Testing
Skagway Community Center
Skagway, AK**






Instrument Testing and Consensus Values





Array Nodes

Instrument

-  AQLite
-  AQSync
-  DustTrak II
-  MET
-  PAM
-  PurpleAir











PM_{2.5}



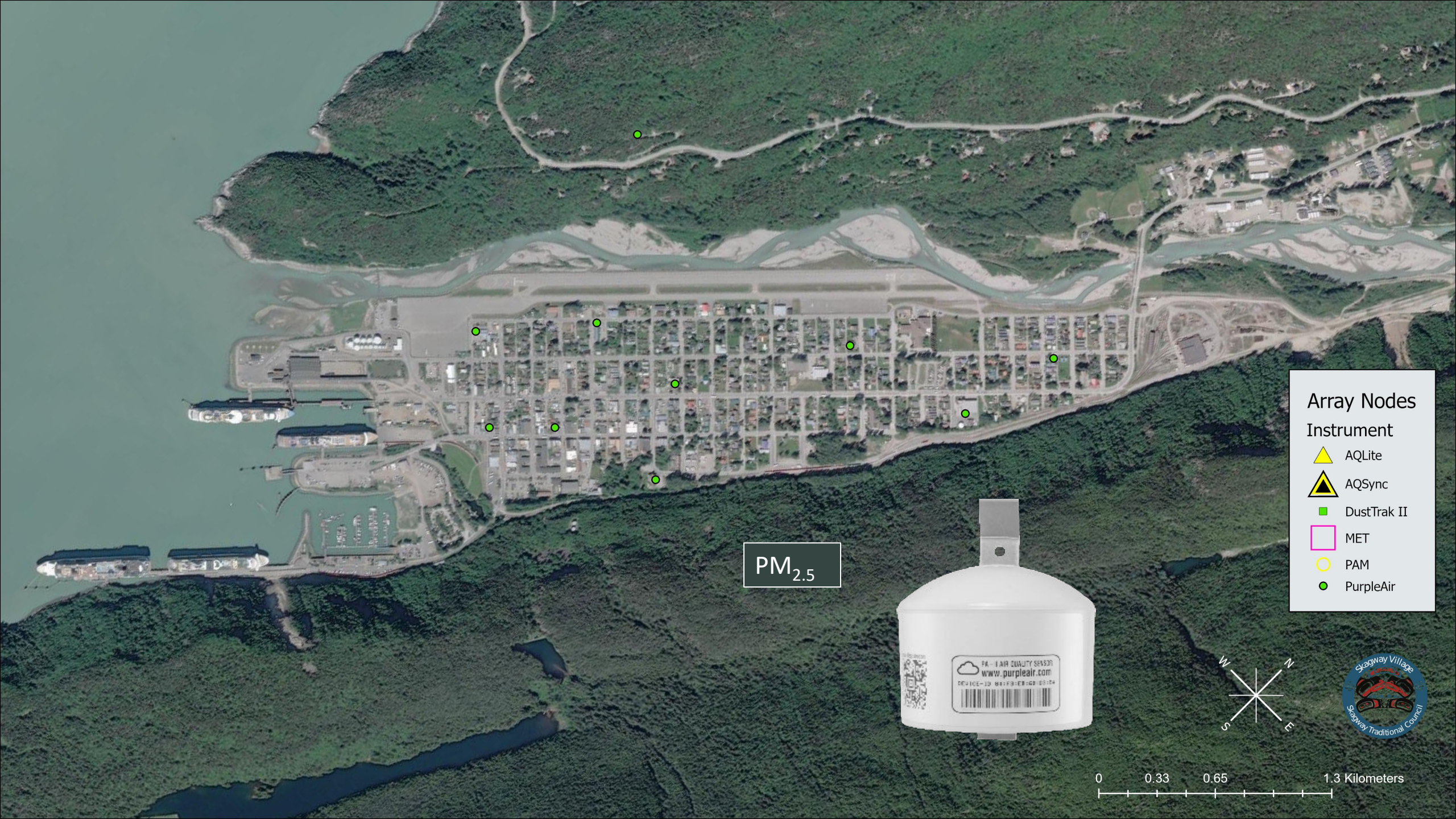
Array Nodes

Instrument

-  AQLite
-  AQSync
-  DustTrak II
-  MET
-  PAM
-  PurpleAir



0 0.33 0.65 1.3 Kilometers









PM_{2.5}



Array Nodes

Instrument





-  AQLite
-  AQSync
-  DustTrak II
-  MET
-  PAM
-  PurpleAir





Array Nodes

Instrument

-  AQLite
-  AQSync
-  DustTrak II
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-  PAM
-  PurpleAir







PM_{2.5}
CO
CO₂
NO₂



0 0.33 0.65 1.3 Kilometers



Array Nodes Instrument

-  AQLite
-  AQSync
-  DustTrak II
-  MET
-  PAM
-  PurpleAir

PM₁₀



PM_{2.5}
CO
CO₂
NO₂
O₃











PM_{2.5}
 PM₁₀
 CO
 CO₂
 NO
 NO₂
 O₃
 TVOC

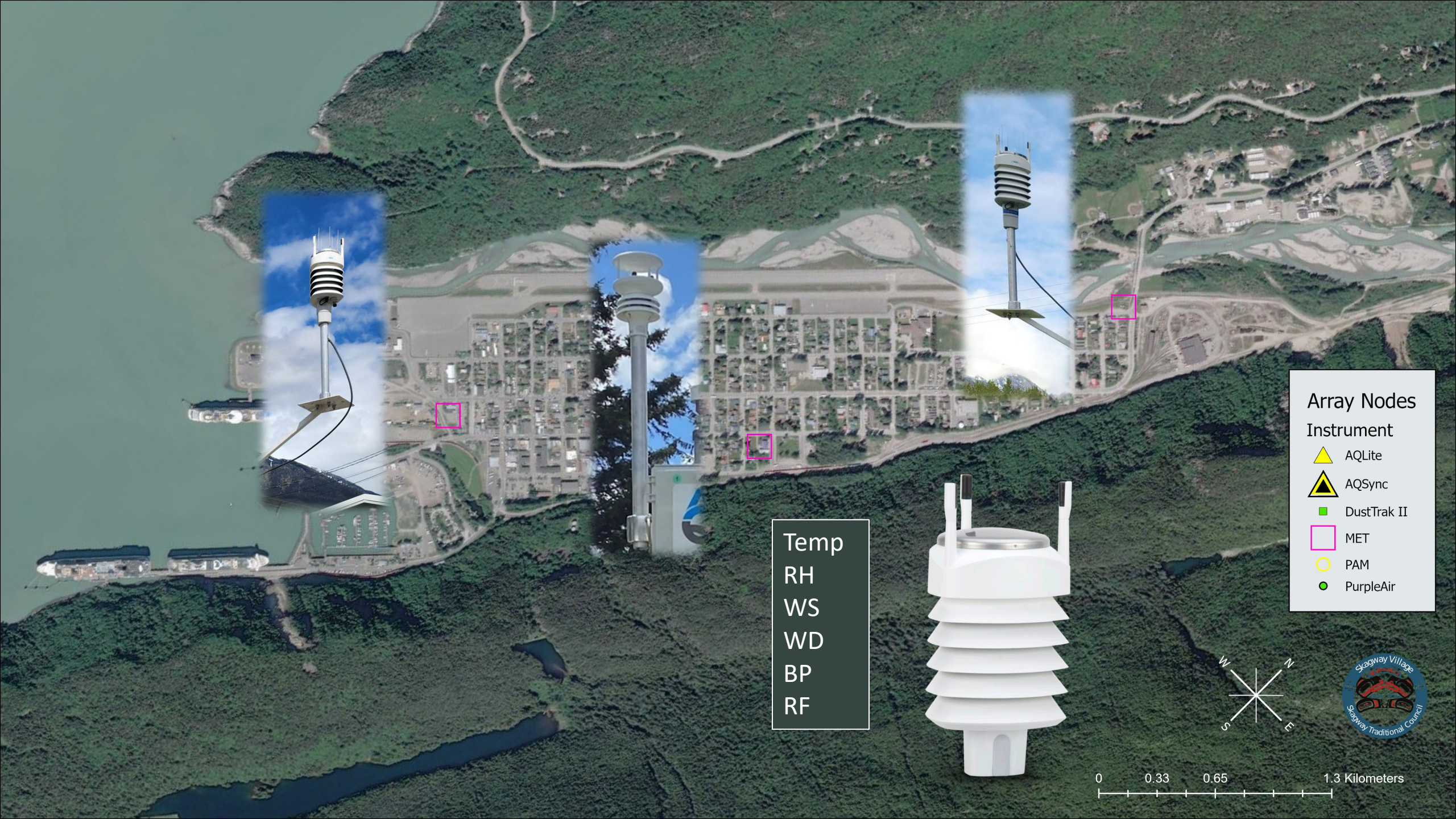


Array Nodes

Instrument

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-  AQSync
-  DustTrak II
-  MET
-  PAM
-  PurpleAir





Temp
RH
WS
WD
BP
RF

Array Nodes

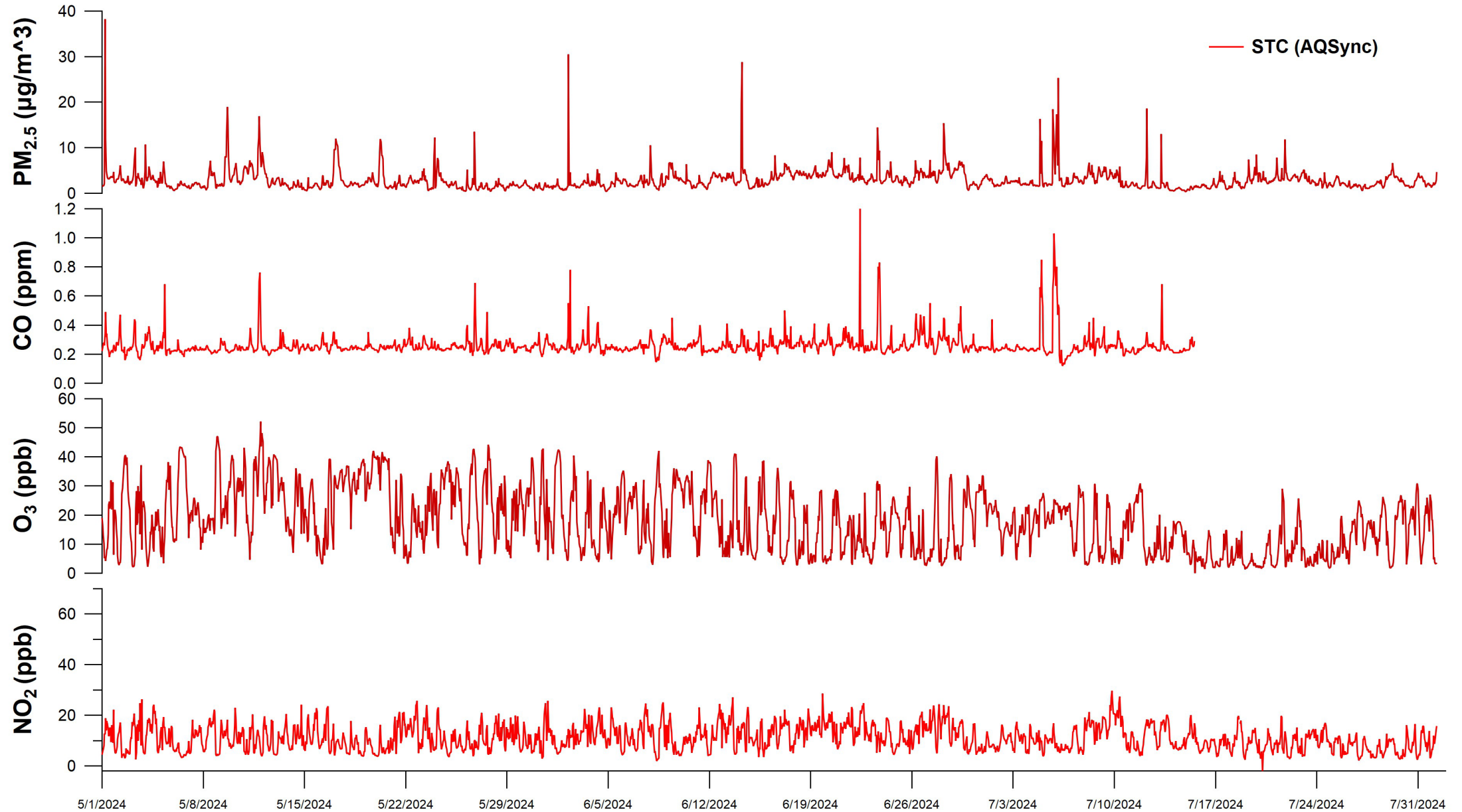
Instrument

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- ▲ AQSync
- DustTrak II
- MET
- PAM
- PurpleAir

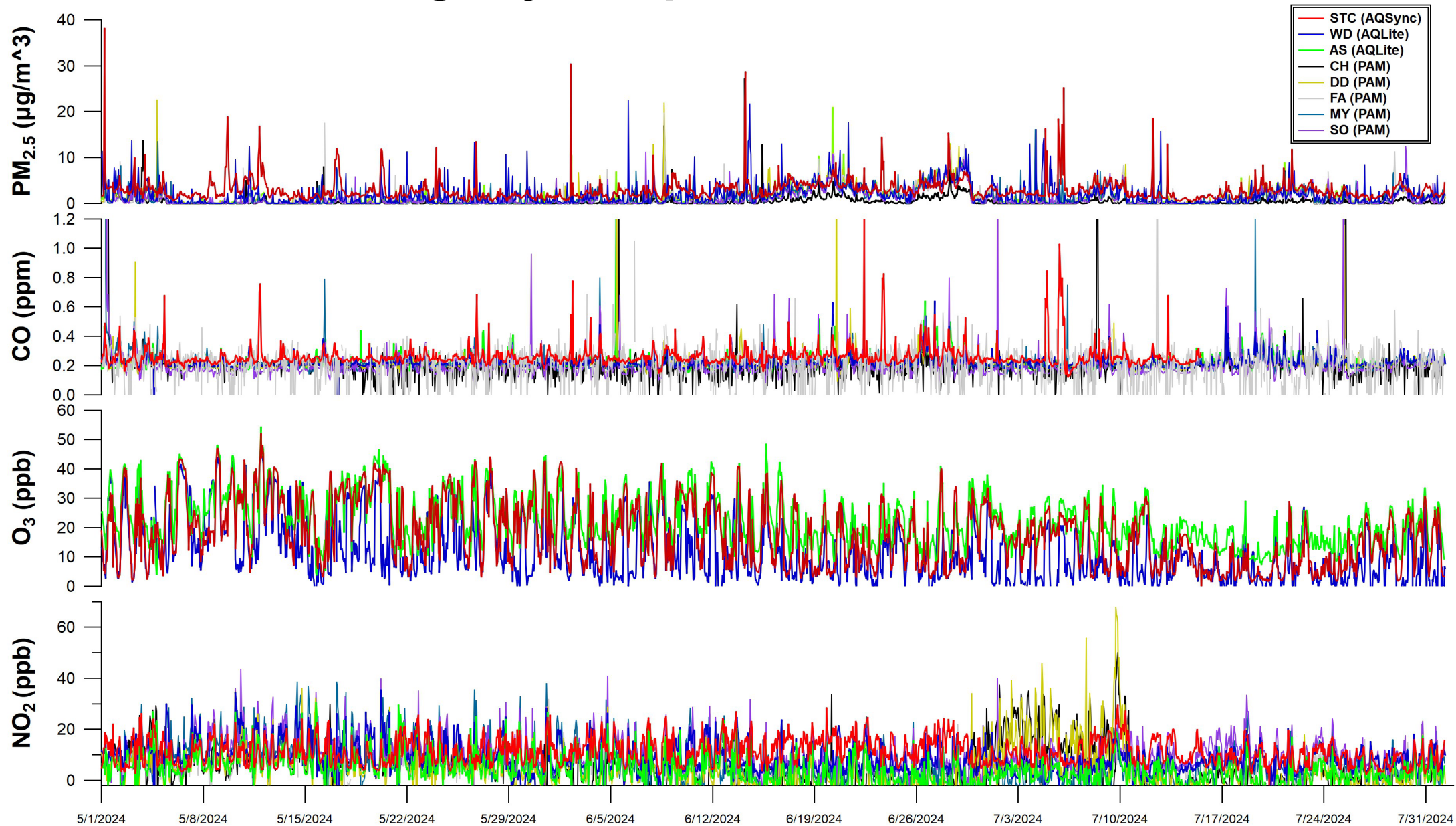
0 0.33 0.65 1.3 Kilometers



Skagway Temporal Distributions

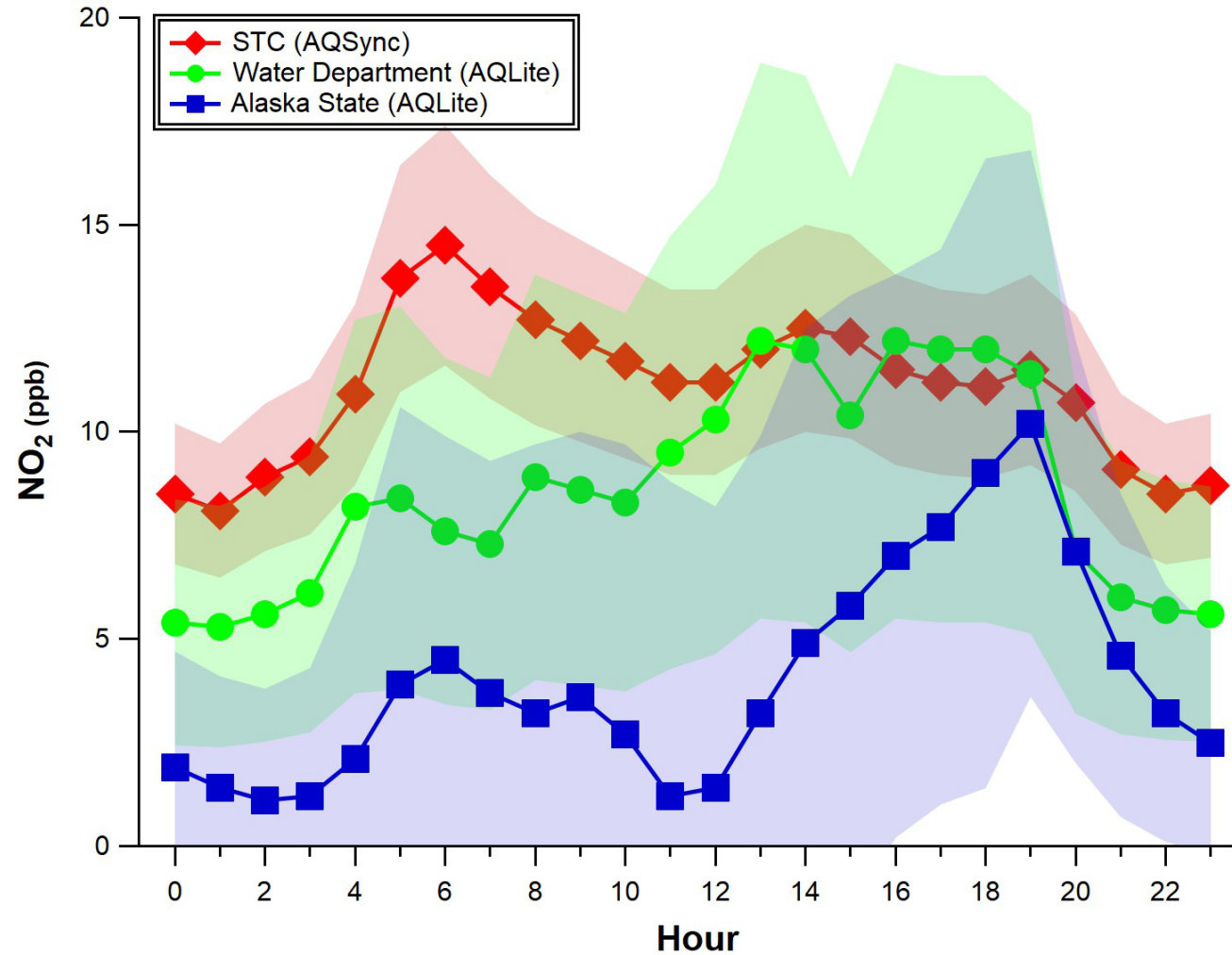


Skagway Temporal Distributions



NO₂ Diurnal Patterns

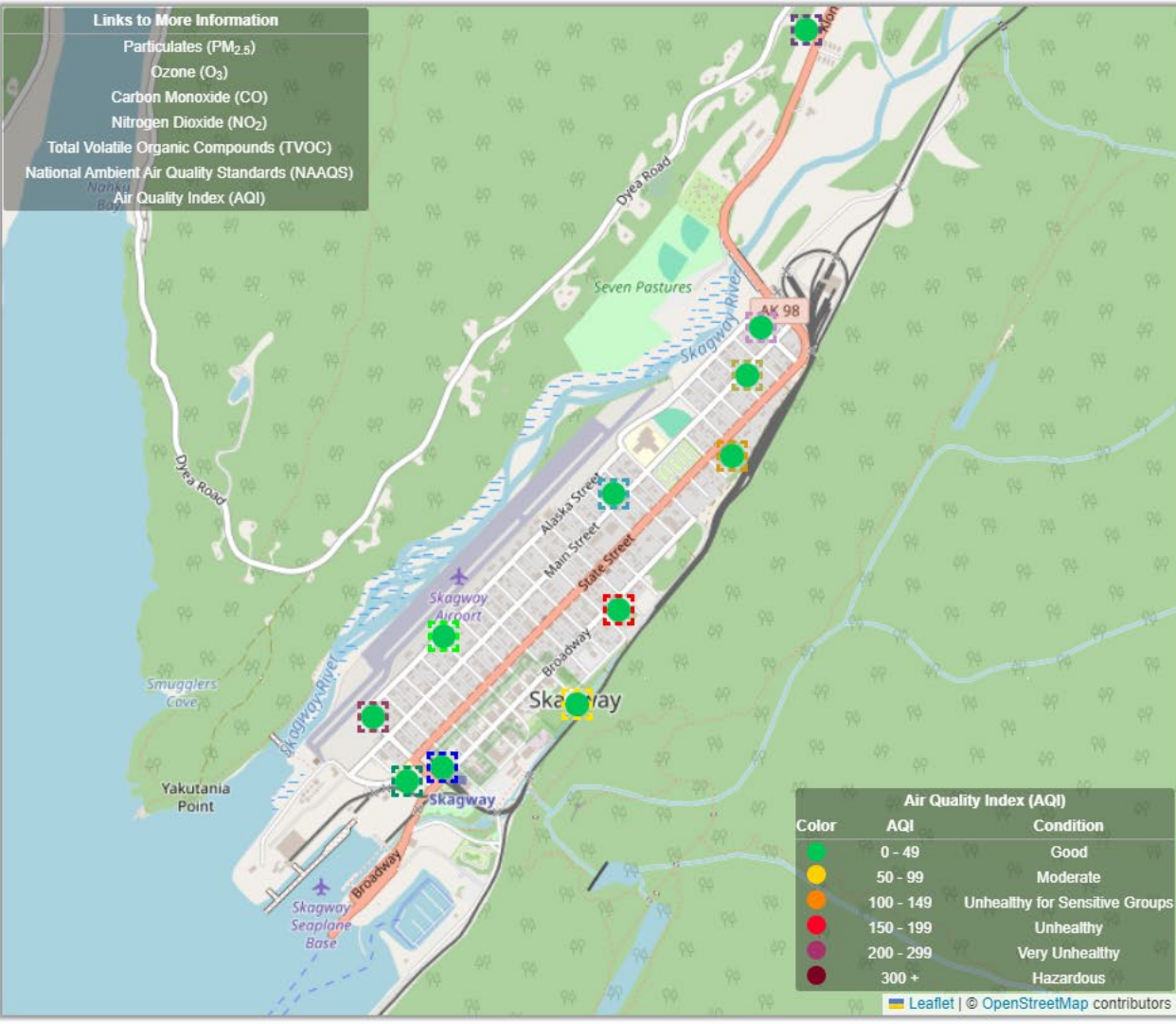
Factoring uncertainty into the sensor measurements





SKAGWAY AIR MONITORING PROGRAM

- Links to More Information**
- Particulates (PM_{2.5})
 - Ozone (O₃)
 - Carbon Monoxide (CO)
 - Nitrogen Dioxide (NO₂)
 - Total Volatile Organic Compounds (TVOC)
 - National Ambient Air Quality Standards (NAAQS)
 - Air Quality Index (AQI)



Current Weather

78 °F
26 °C

33 %

8 mph
4 m/s

0 in/hr
0 mm/hr

Site(s)
11 sites selected

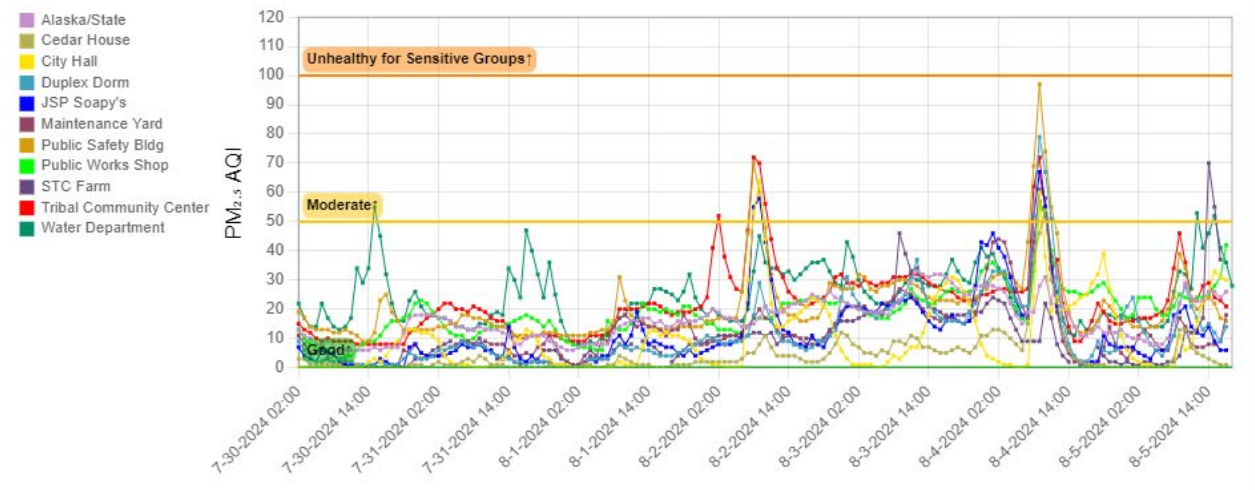
Parameter(s)
PM_{2.5} AQI

End Date
08/05/2024

Days to Chart
7

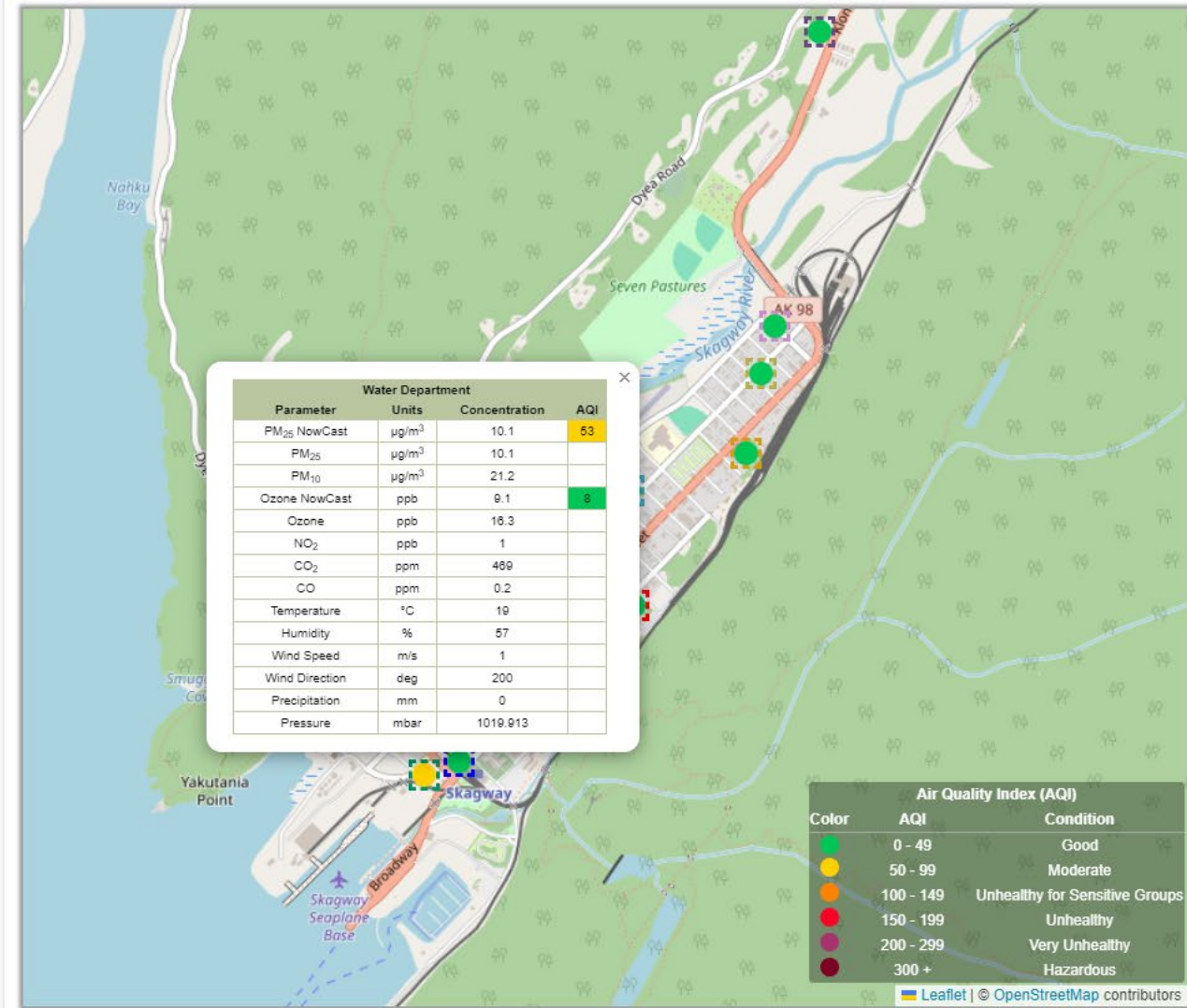
Draw Charts

Export Data





SKAGWAY AIR MONITORING PROGRAM



Current Weather

69 °F
 21 °C

49 %

4 mph
 2 m/s

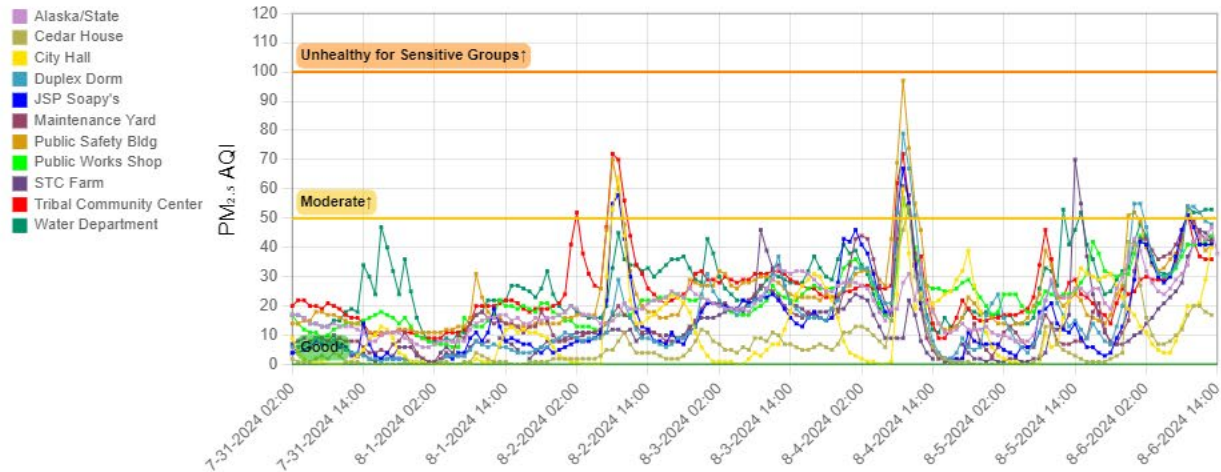
0 in/hr
 0 mm/hr

Site(s)

11 sites selected Draw Charts Export Data

Parameter(s) End Date Days to Chart

PM_{2.5} AQI 08/06/2024 7

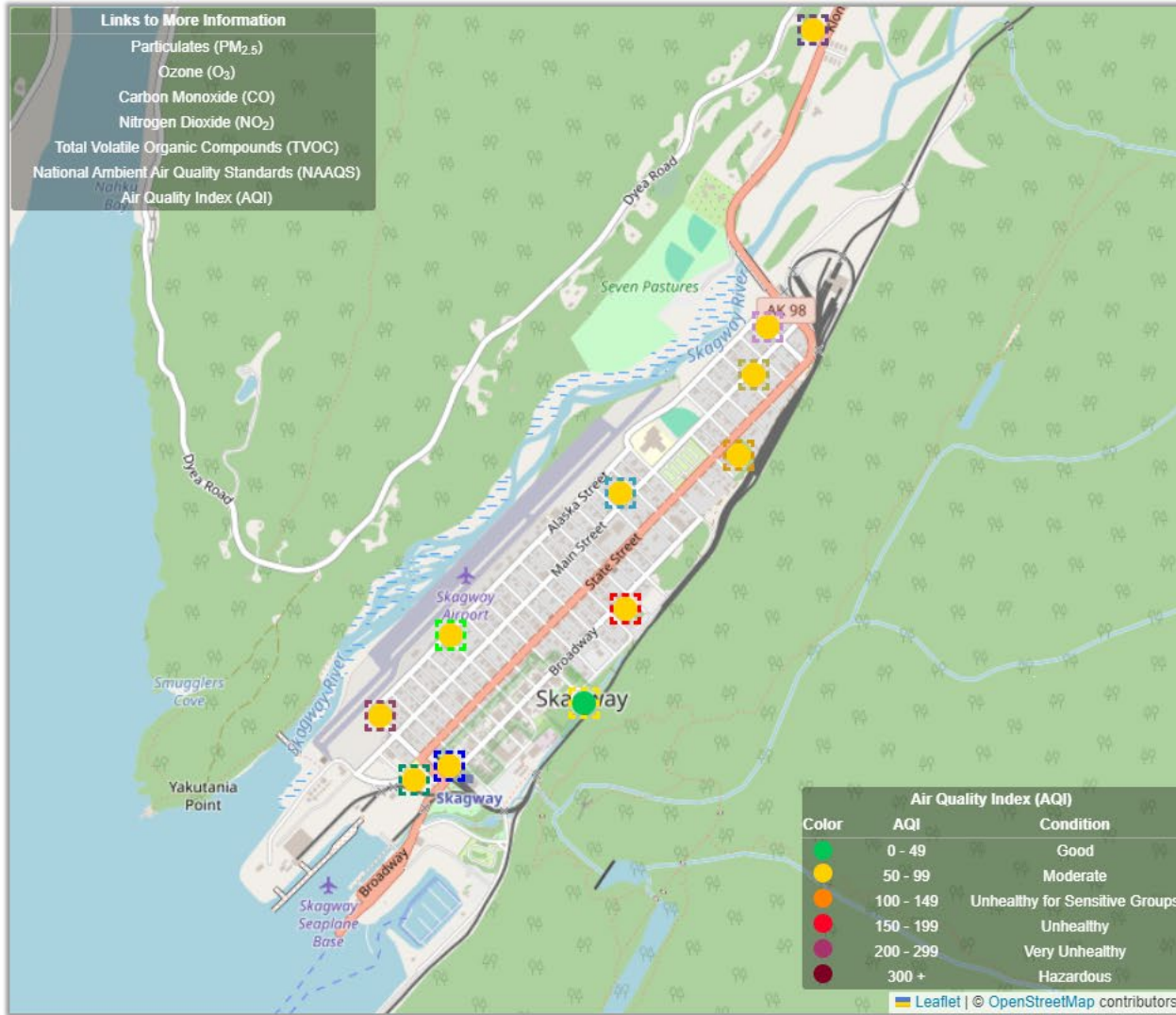




SKAGWAY AIR MONITORING PROGRAM

Links to More Information

- Particulates (PM_{2.5})
- Ozone (O₃)
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- Total Volatile Organic Compounds (TVOC)
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- Air Quality Index (AQI)



Current Weather

55 °F
 13 °C
 91 %
 2 mph
 1 m/s
 0 in/hr
 0 mm/hr

Site(s)

11 sites selected

Draw Charts

Export Data

Parameter(s)

End Date

Days to Chart

PM_{2.5} AQI

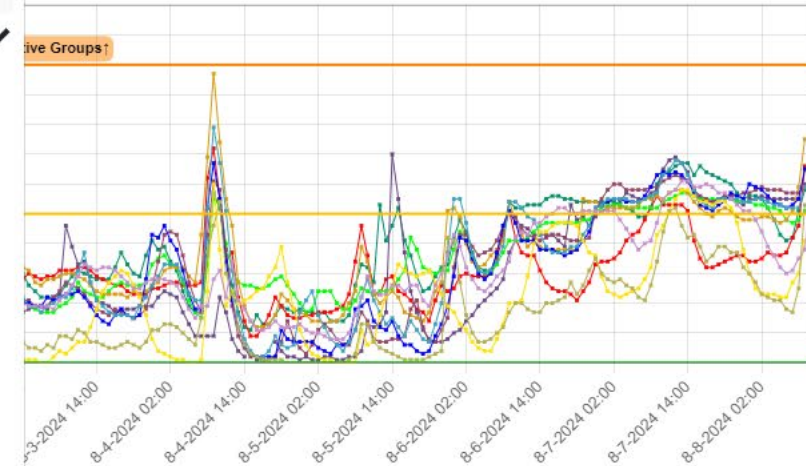
08/08/2024

7

Select All

Deselect All

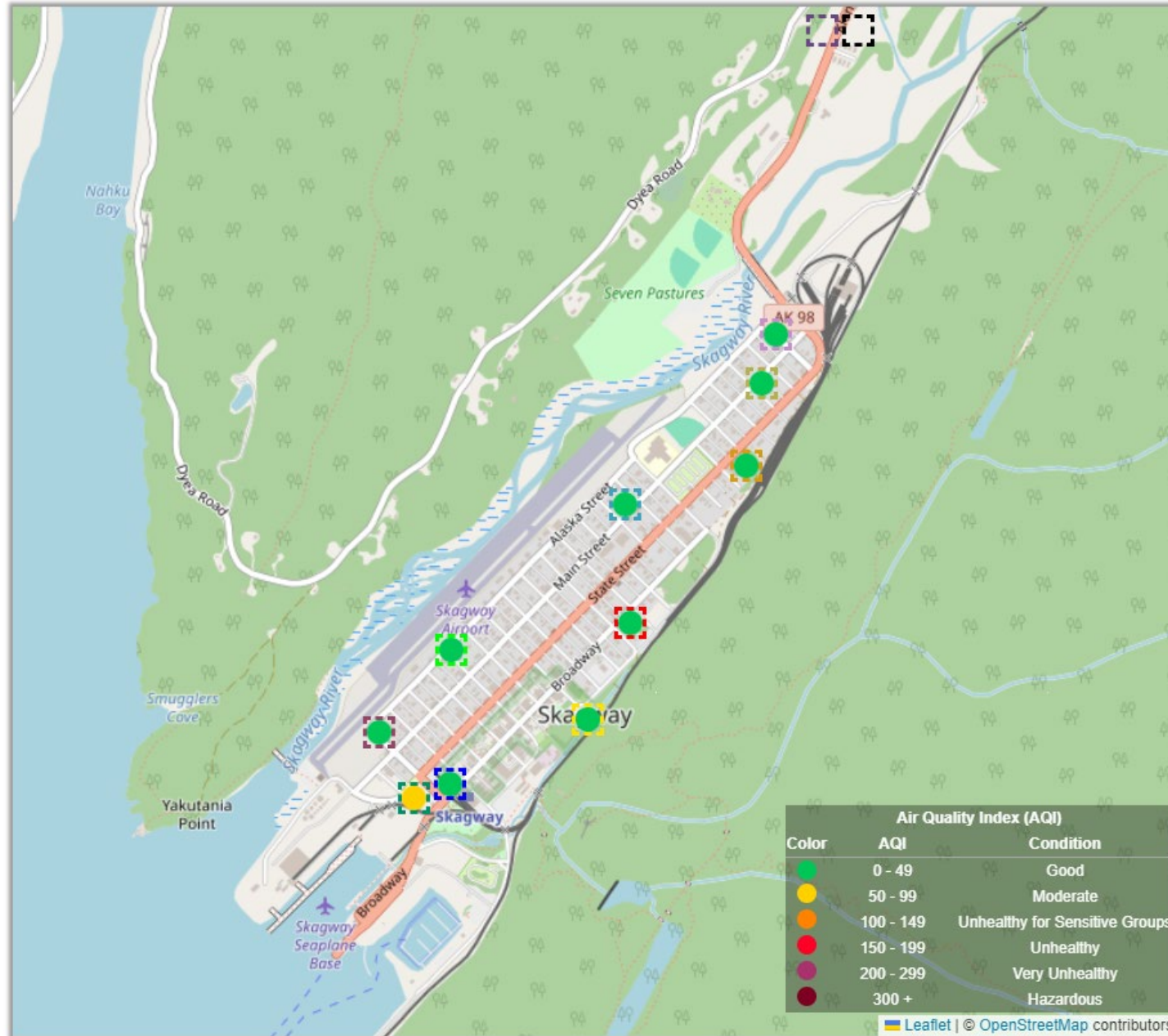
- PM_{2.5} AQI
- PM_{2.5} Particulate Matter
- PM₁₀ Particulate Matter
- O₃ Ozone AQI
- O₃ Ozone
- NO Nitrogen Oxide
- NO₂ Nitrogen Dioxide
- NO_x Nitrogen Oxides
- CO₂ Carbon Dioxide
- CO Carbon Monoxide
- Total Volatile Organic Compounds
- Temperature
- Relative Humidity
- Wind Speed
- Wind Direction
- Precipitation
- Barometric Pressure

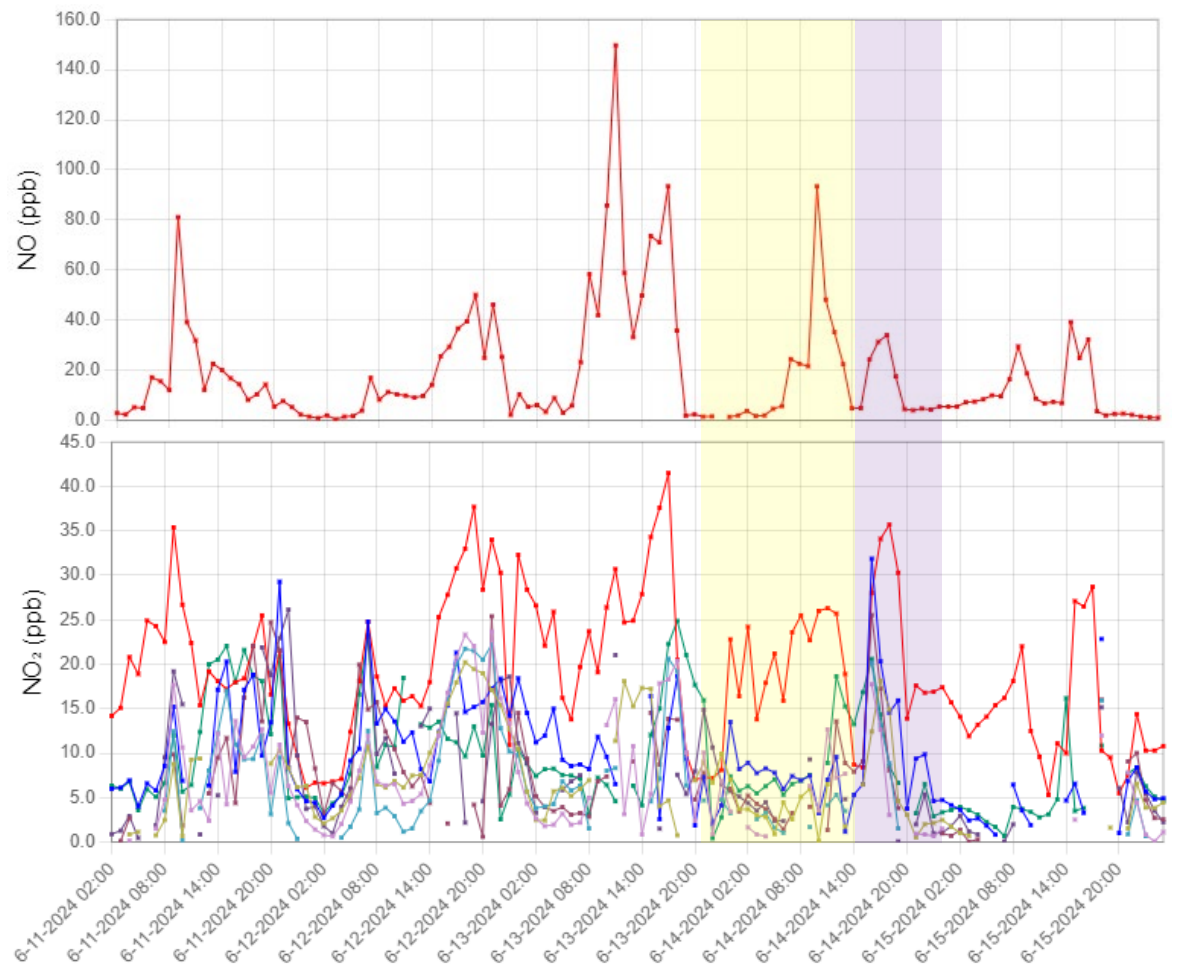


PM Event 14 June 2024



14 June 2024





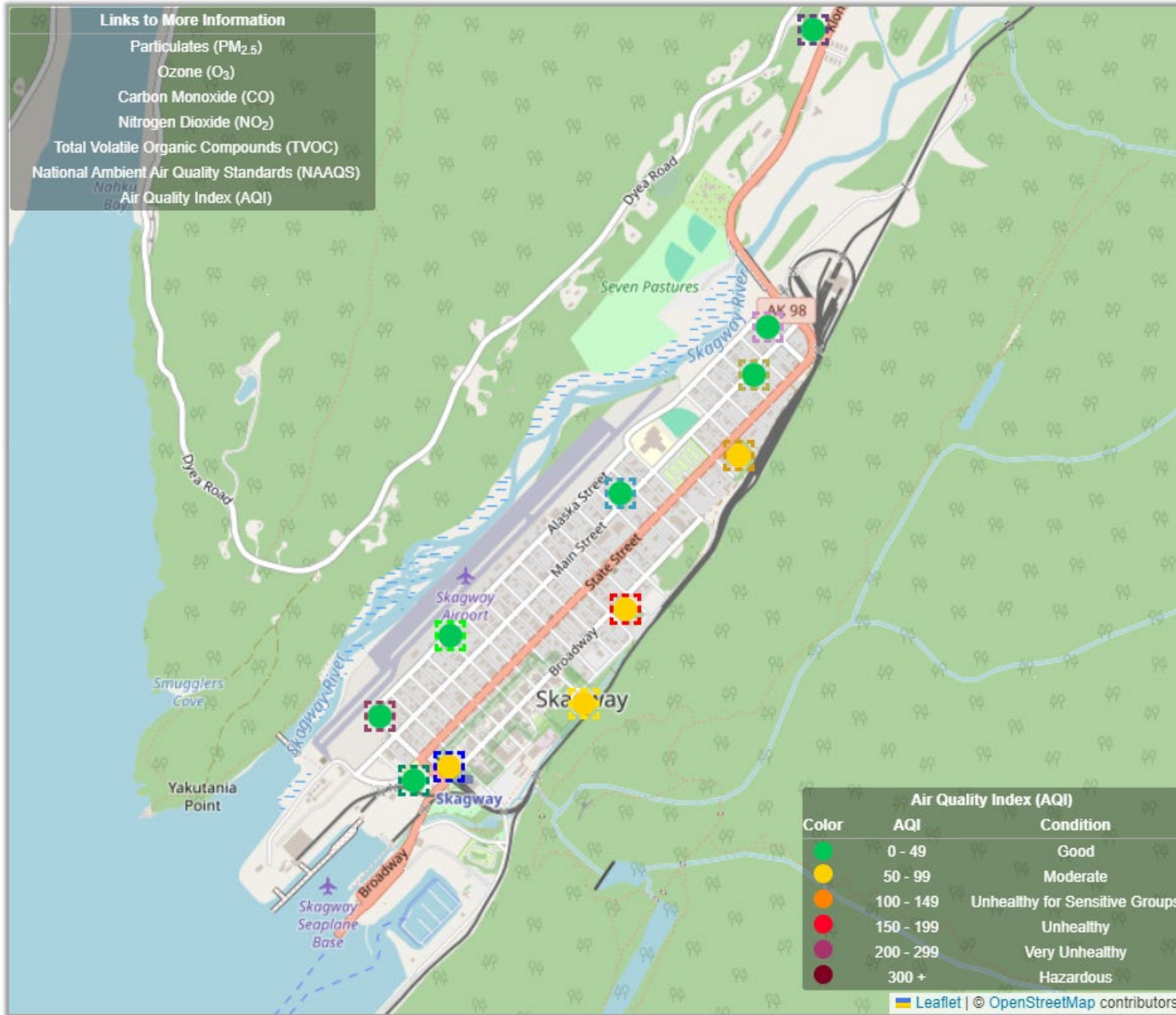
- Alaska/State
- Cedar House
- City Hall
- Duplex Dorm
- JSP Soapy's
- Maintenance Yard
- Public Safety Bldg
- Public Works Shop
- STC Farm
- Tribal Community Center
- Water Department

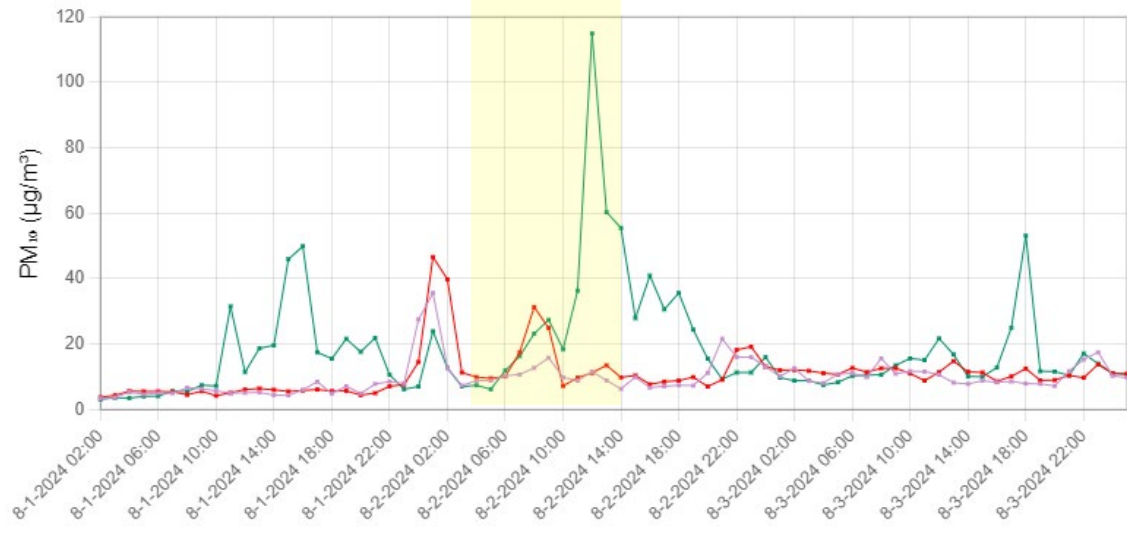
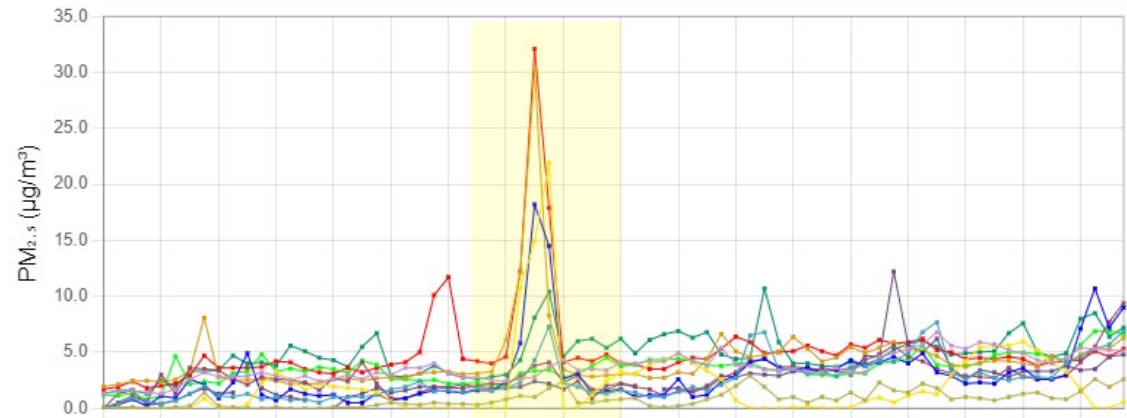


PM Event 2 August 2024

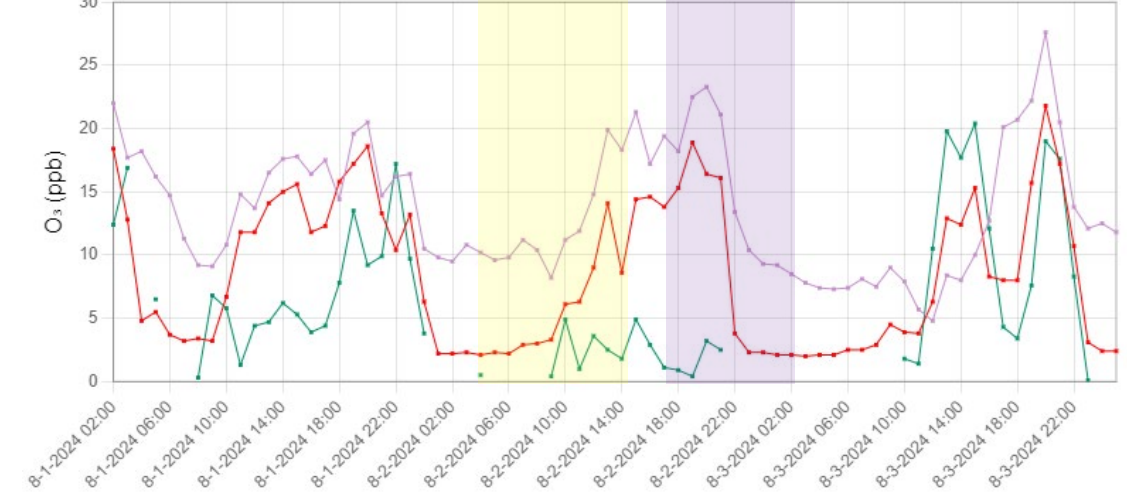
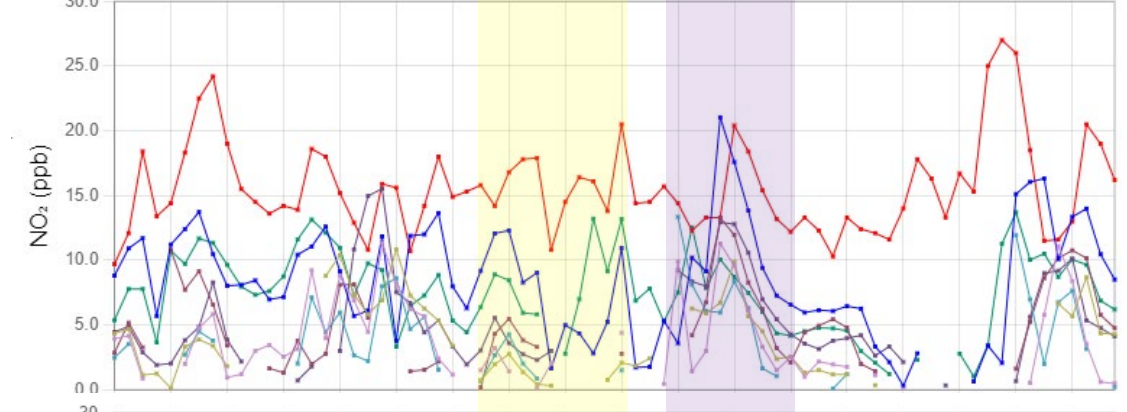
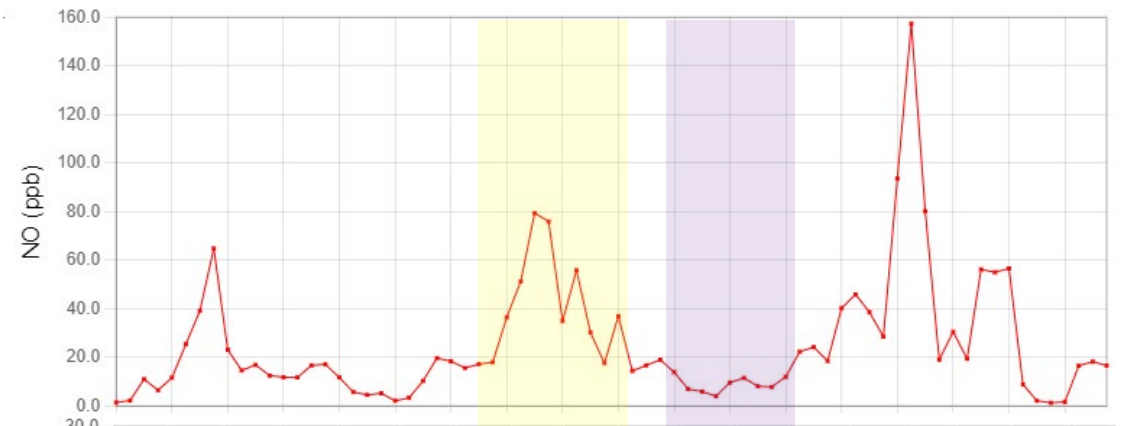


2 August 2024





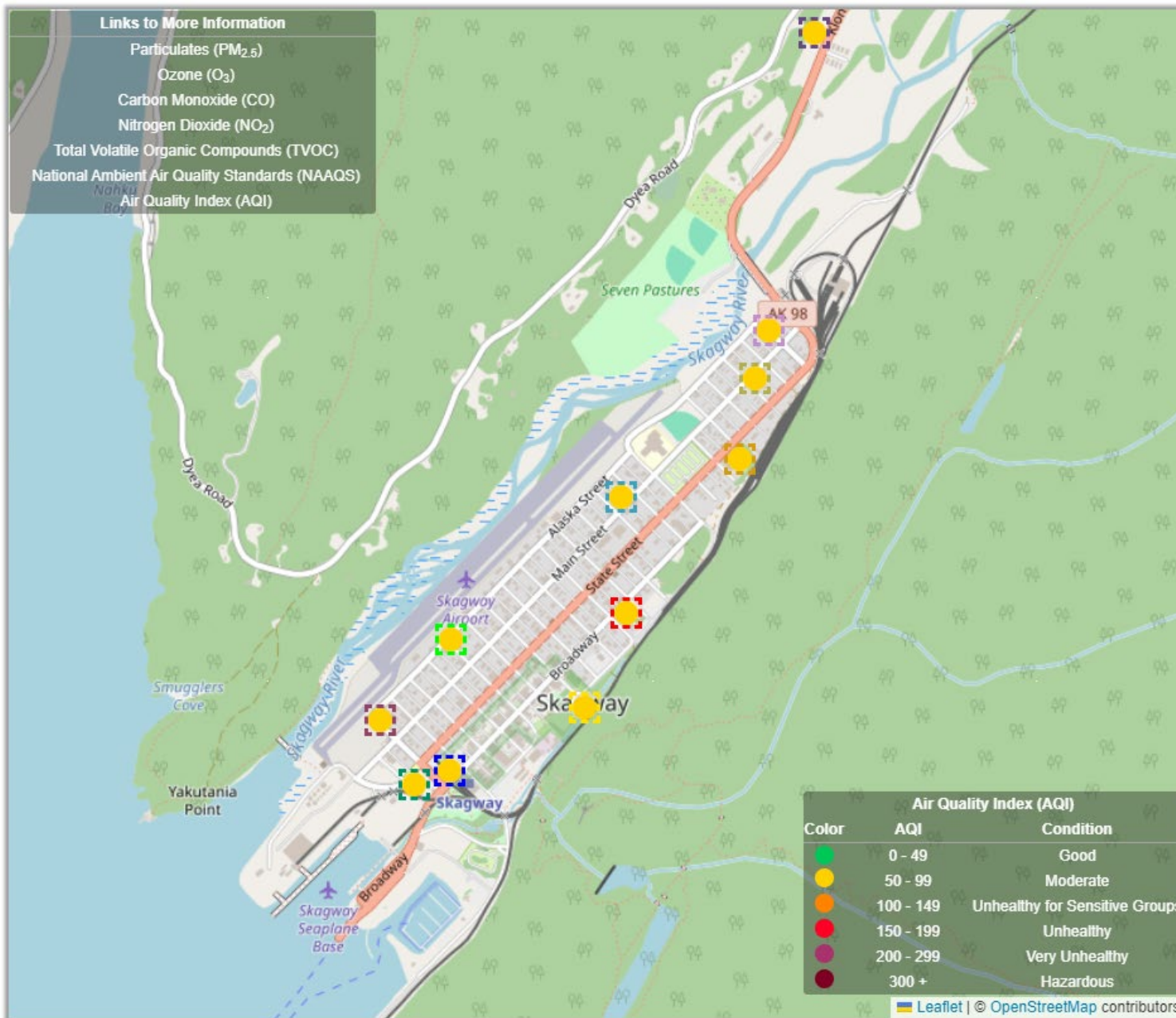
- Alaska/State
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Wildfire Smoke Event 7 August 2024



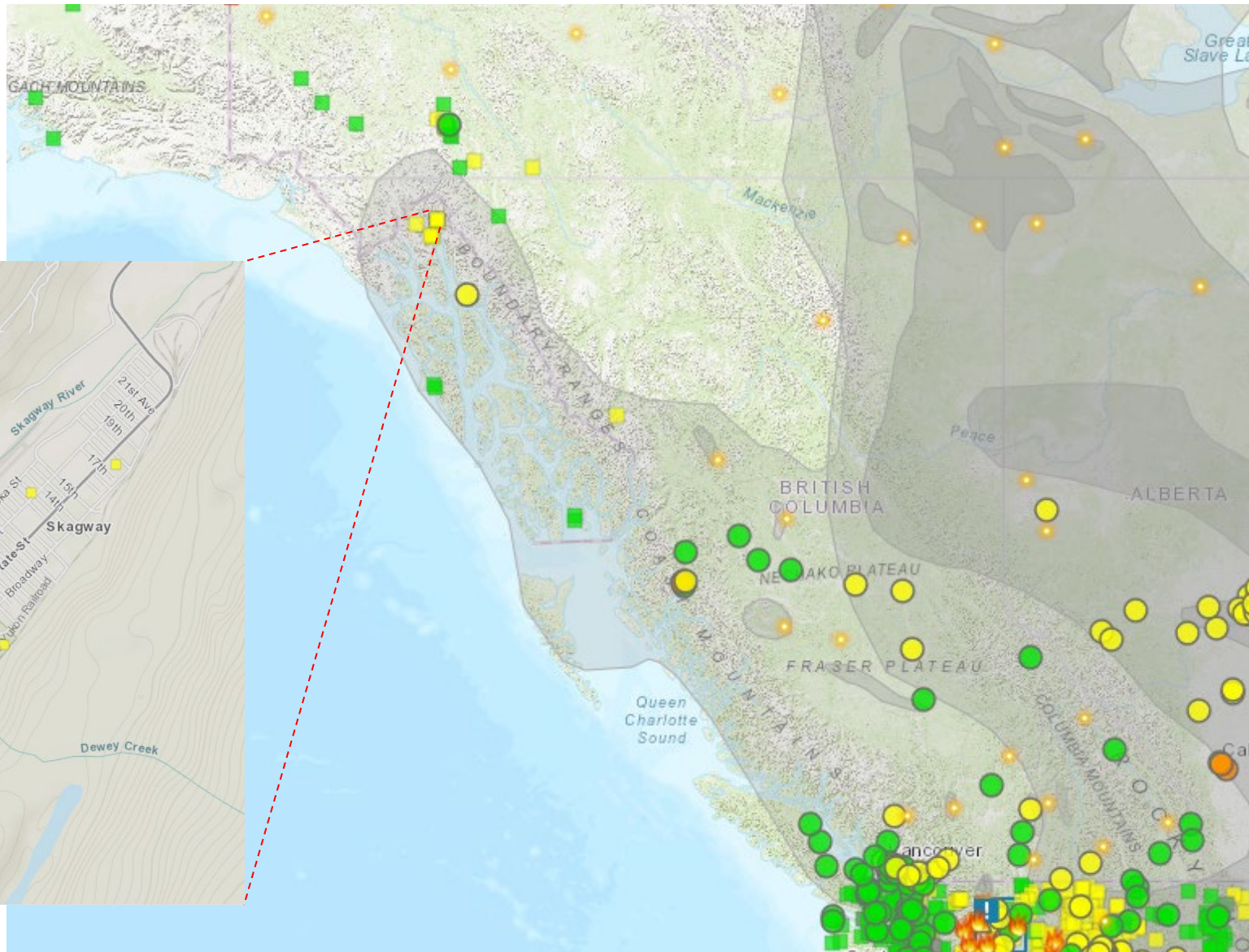
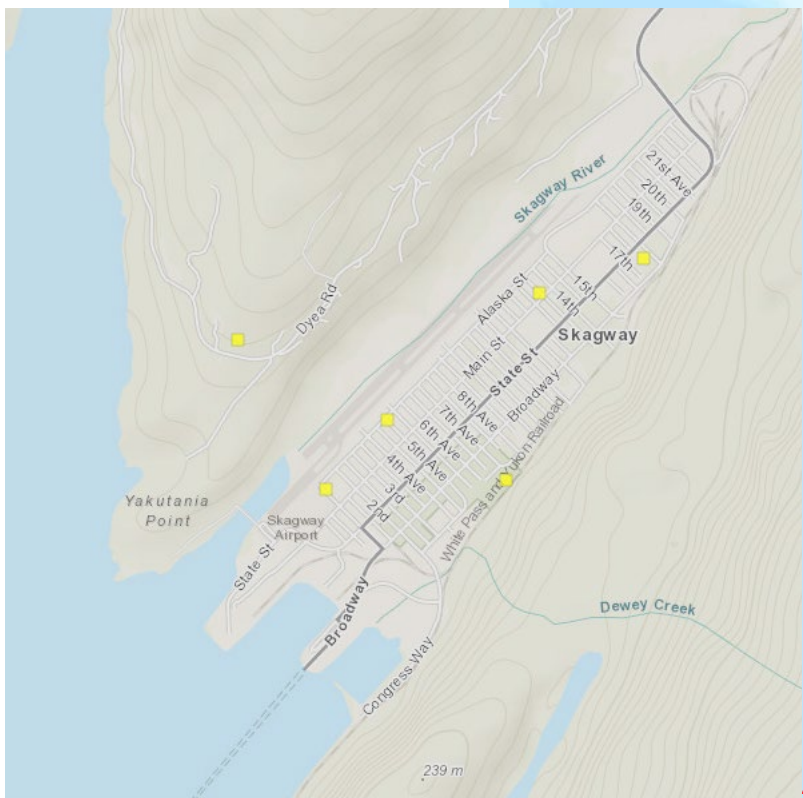
7 August 2024

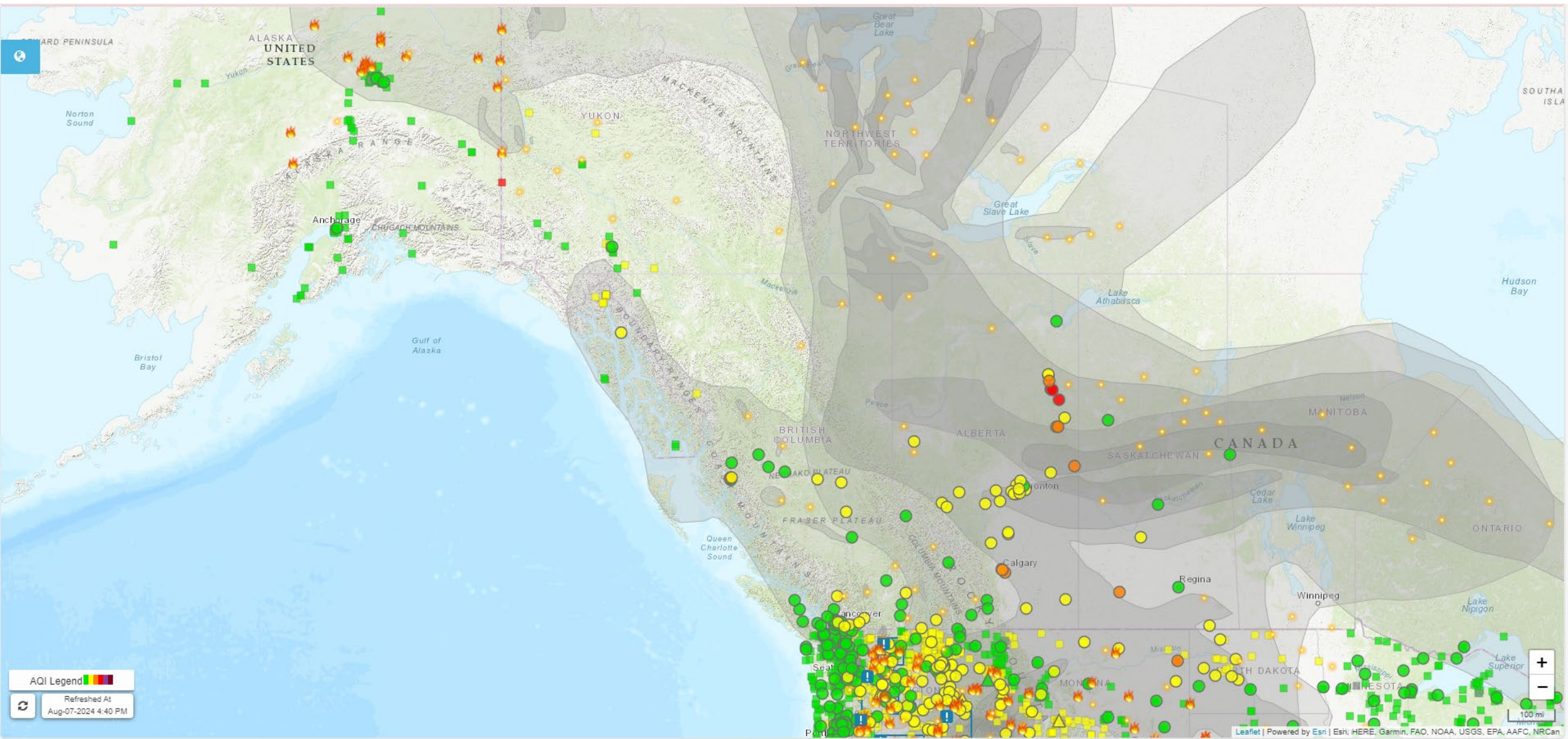


7 August 2024

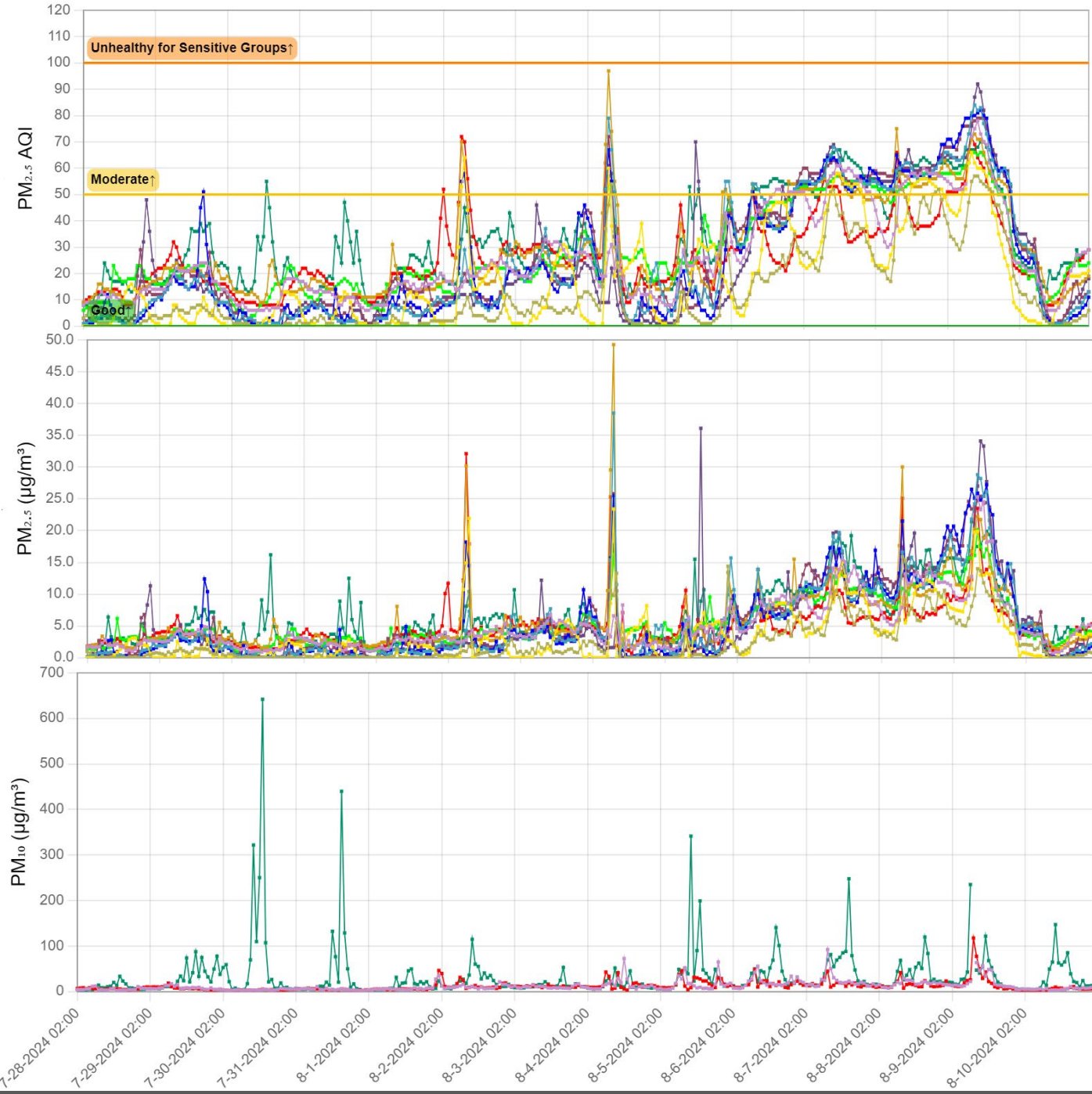


[Fire and Smoke Map \(airnow.gov\)](https://airnow.gov)

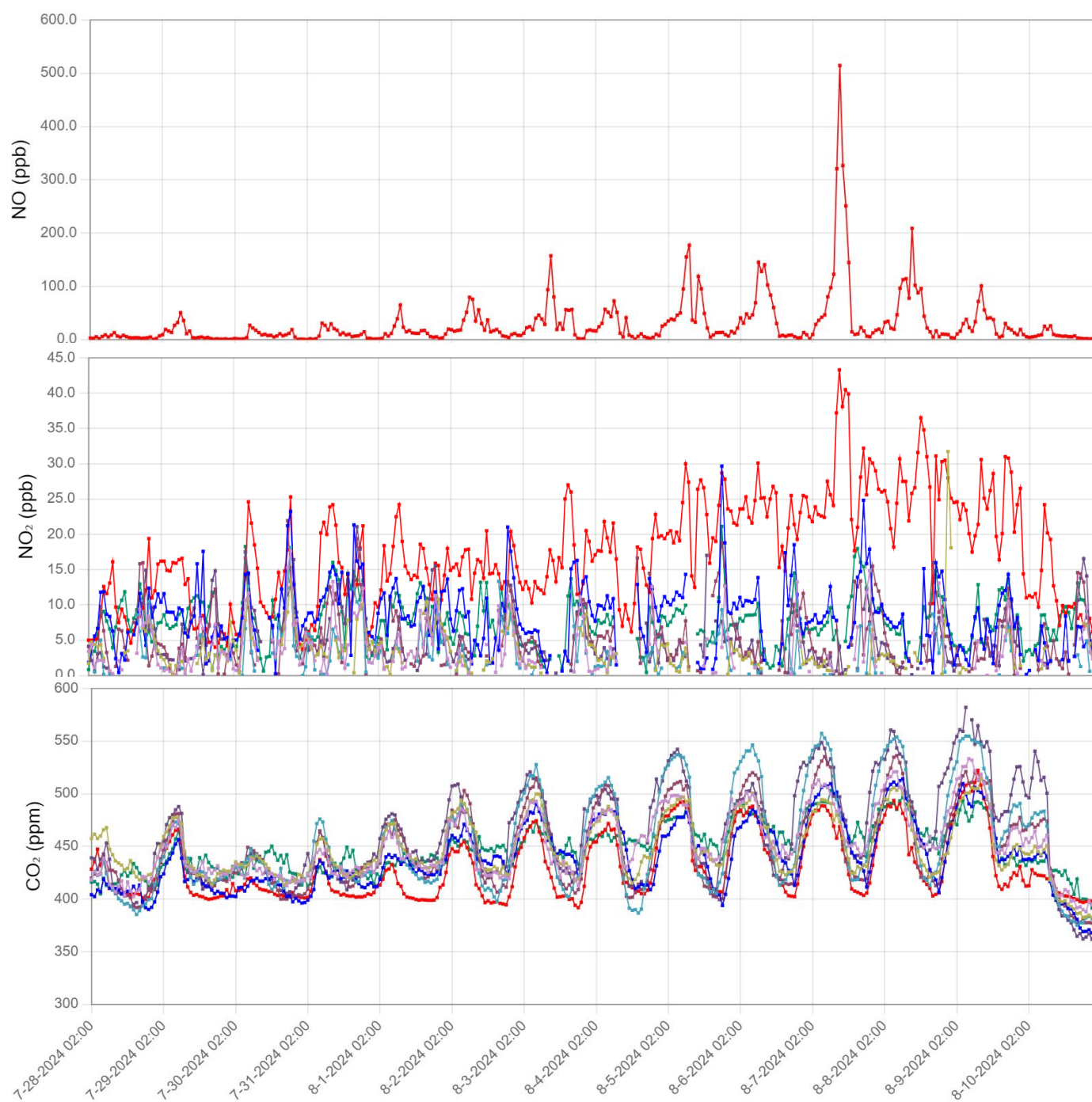




- Alaska/State
- Cedar House
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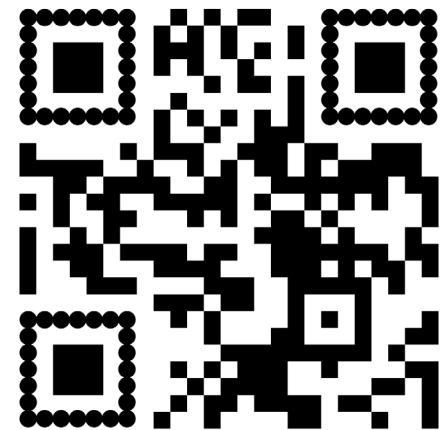
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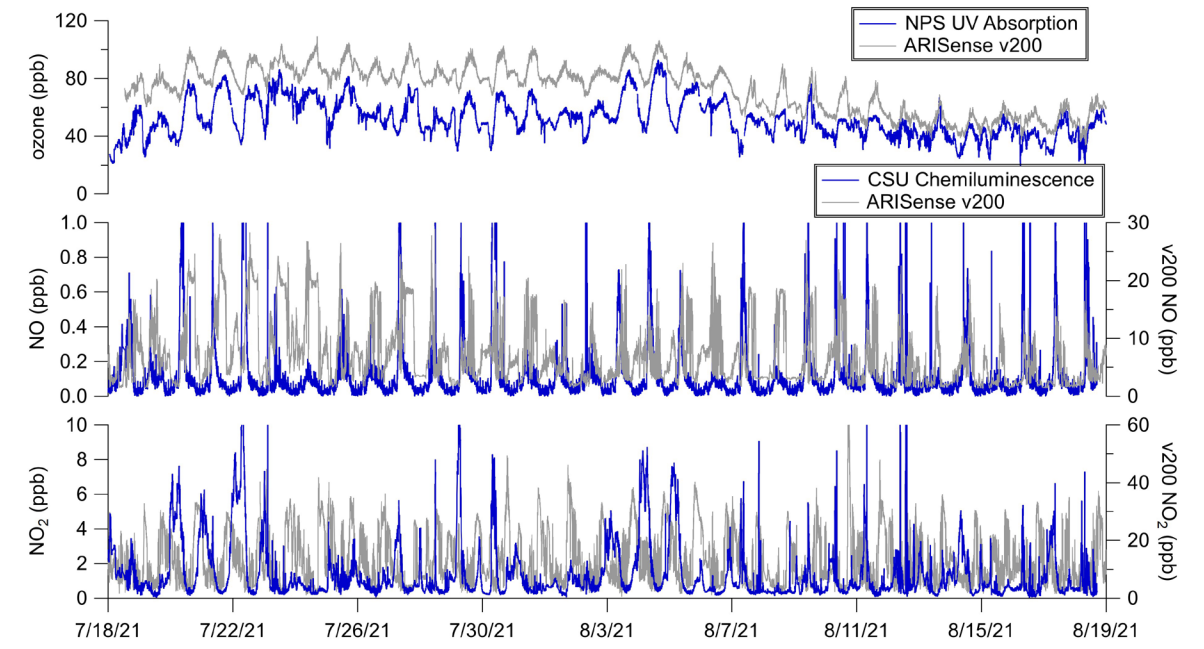
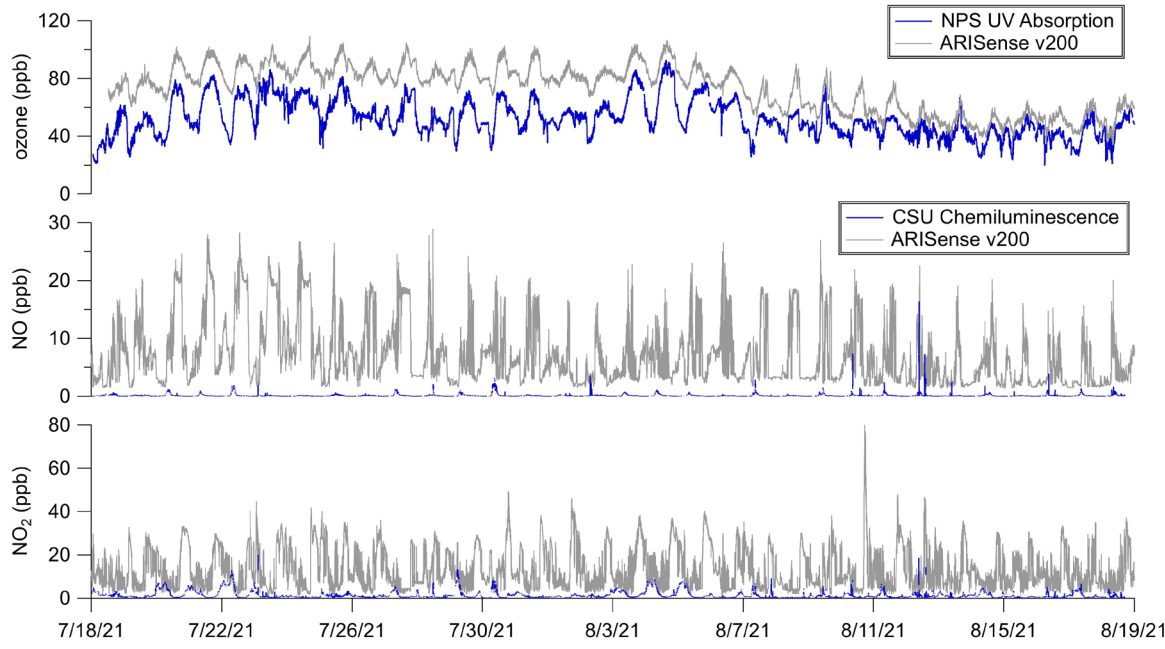
Summary

- Out of the gates, a strong partnership betw STC and NPS has facilitated a successful AQ monitoring endeavor.
- A comprehensive AQ measurement and real-time advisory dashboard has been successfully deployed in Skagway, AK
- Several events have clearly demonstrated the network's ability to capture and accurately display and disseminate information.
- Data sets are already providing insight on the various sources, such as idling cruise ships, railroad engines, and wildfires on local air quality; moreover, we will examine how meteorology is affecting pollutant levels and distributions.
- Instrumentation has proven to be reliable and is providing robust information.

Future work: More to do with the current season, but very rich & comprehensive data sets being generated will allow for a more detailed understanding of source impacts on AQ in Skagway.







NO₂-B43F Nitrogen Dioxide Sensor

Response from 200 ppb to 0 ppb NO₂

