

An Evaluation of Fort McMurray's Air Quality Prior to, During and After the 2016 Horse River Wildfire

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Cristen Adams

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2016 Horse River Wildfire

Learn more about the new look.

Fort McMurray fires cause air pollution spike on other side of continent

Smoke from Alberta fire was so massive the plumes created their own environmental system

Margo McDiarmid · CBC News · Posted: Sep 26, 2017 5:00 AM ET | Last Updated: September 26, 2017



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FORT MCMURRAY WILDFIRE

Home Info for evacuees Live

CANADA

May 18, 2016 11:45 am

Updated: May 17, 2016 9:33 am

'Extreme' air quality conditions in Fort McMurray could delay re-entry plans



By Emily Mertz

Web Producer Global News

Edmonton

Learn more about the new look.



VIDEO

RCMP officers who worked Fort McMurray wildfire lacked proper safety masks

'I will guarantee you, there have been members' lives that will be shortened,' association spokesperson says



David Thurton · CBC News · Posted: Apr 17, 2018 6:00 AM MT | Last Updated: April 17



Credit: Marty Collins



The impact of the 2016 Fort McMurray Horse River Wildfire on ambient air pollution levels in the Athabasca Oil Sands Region, Alberta, Canada

Matthew S. Landis ^{a,✉}, Eric S. Edgerton ^b, Emily M. White ^c, Gregory R. Wentworth ^d, Amy P. Sullivan ^e, Ann M. Dillner ^f

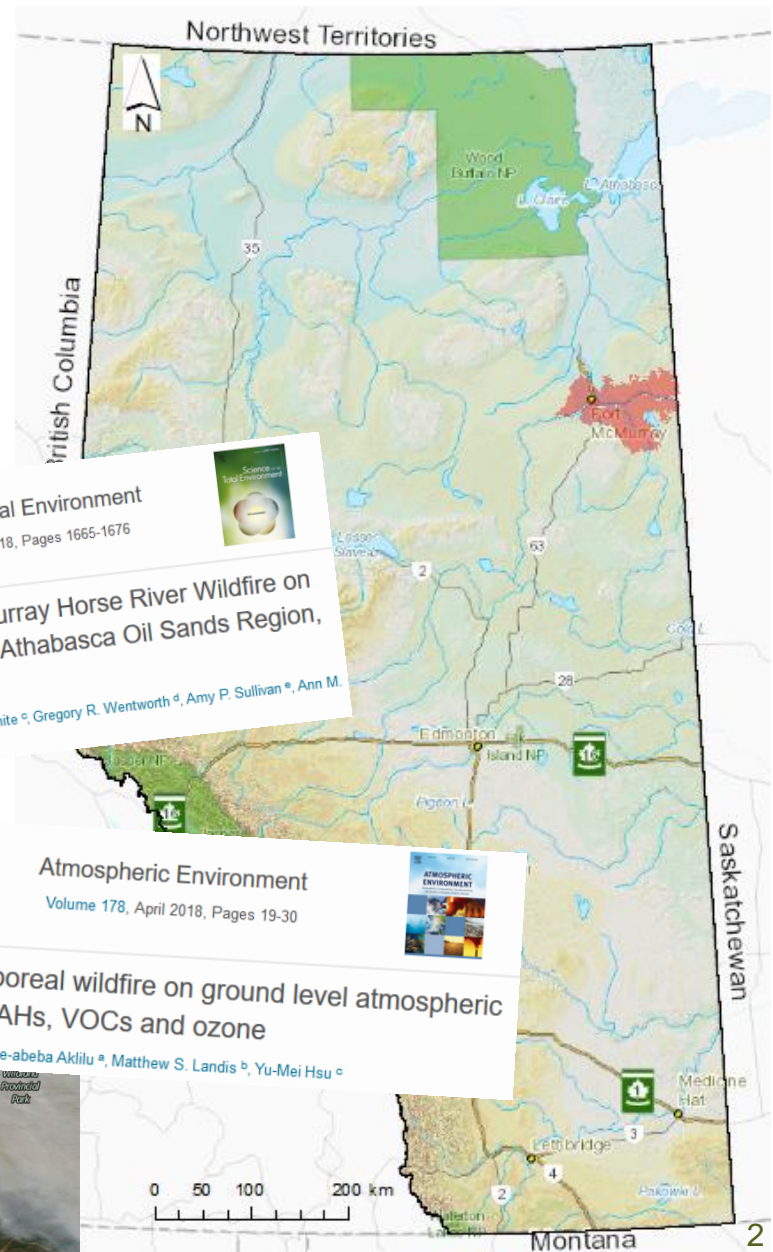
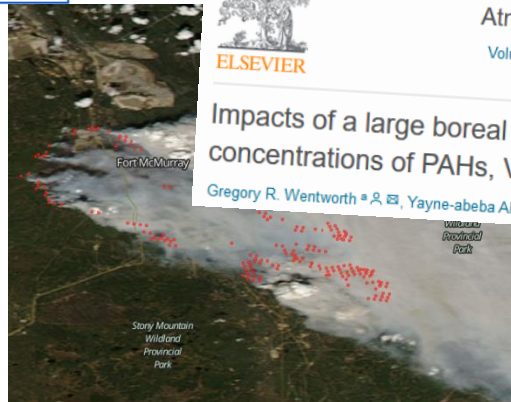


Atmospheric Environment

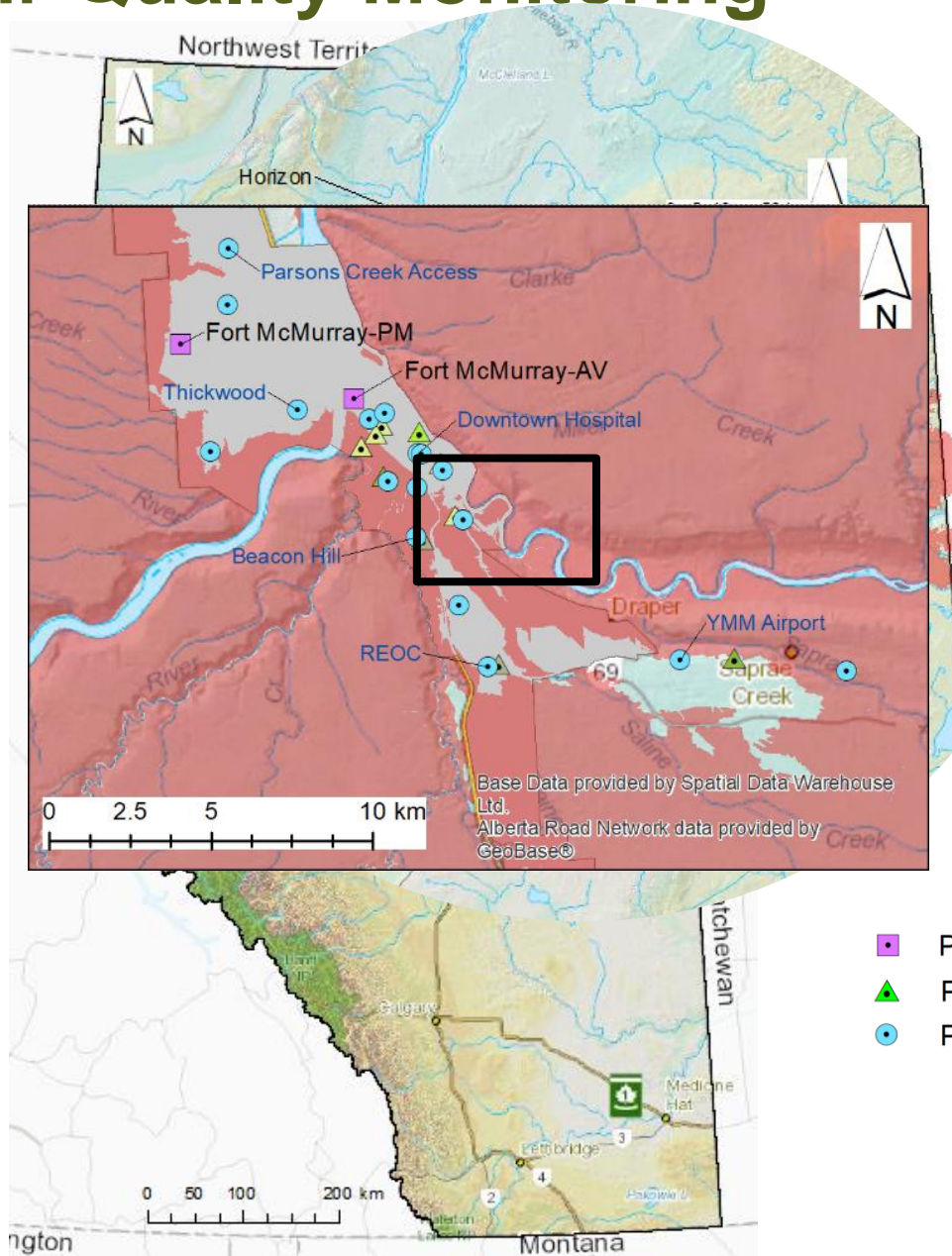
Volume 178, April 2018, Pages 19-30

Impacts of a large boreal wildfire on ground level atmospheric concentrations of PAHs, VOCs and ozone

Gregory R. Wentworth ^{a,✉}, Yayne-abebe Akilu ^a, Matthew S. Landis ^b, Yu-Mei Hsu ^c



Air Quality Monitoring



EBAM



Credit: Marty Collins

MAML



Credit: Marty Collins

- Permanent Continuous Air Monitoring
- ▲ Portable Monitoring: EBAM
- Portable Monitoring: MAML

Study Design

1. Air Quality Guidelines and Objectives

Parameters	AAAQO	AAAQG
Particulate Matter-Fine (PM _{2.5})	24-hour average: 30 µg/m ³	1-hour average: 80 µg/m ³
Nitrogen Dioxide (NO ₂)	1-hour average: 159 ppb	N/A
Ammonia (NH ₃)	1-hour average: 2,000 ppb	N/A
Sulfur Dioxide (SO ₂)	1-hour average: 172 ppb 24-hour average: 48.0 ppb	N/A
Carbon Monoxide (CO)	1-hour average: 13,000 ppb	N/A

2. Data Collected Prior to and after the Horse River Wildfire

- Prior to: 2013-2015 averaged data without wildfire smoke influences based on CAAQS assessment
- Post: 2017 data

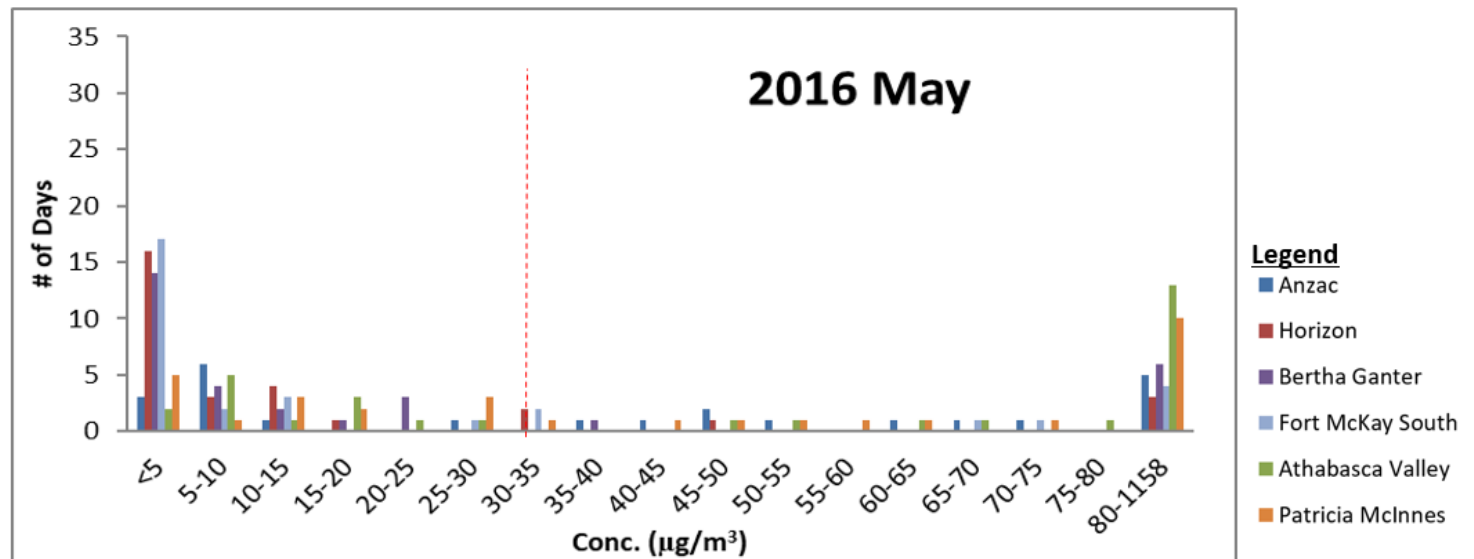
3. Results from Historical Wildfire Events

- 2011 Richardson Wildland Fire (Bytnerowicz et al. 2016)

Focus Parameters

- Fine Particulate Matter (PM_{2.5})
- Nitrogen Dioxide (NO₂)
- Ammonia (NH₃)
- Sulphur Dioxide (SO₂)
- Carbon Monoxide (CO)

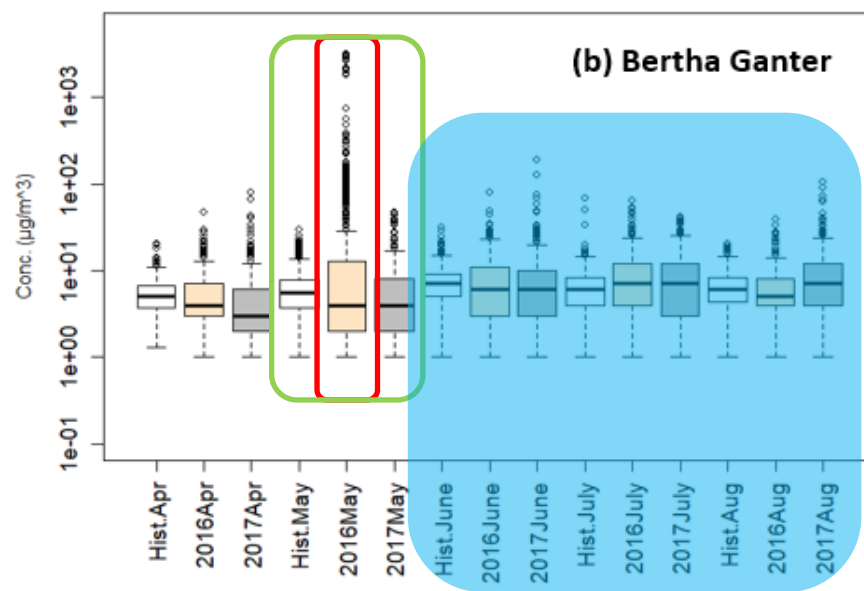
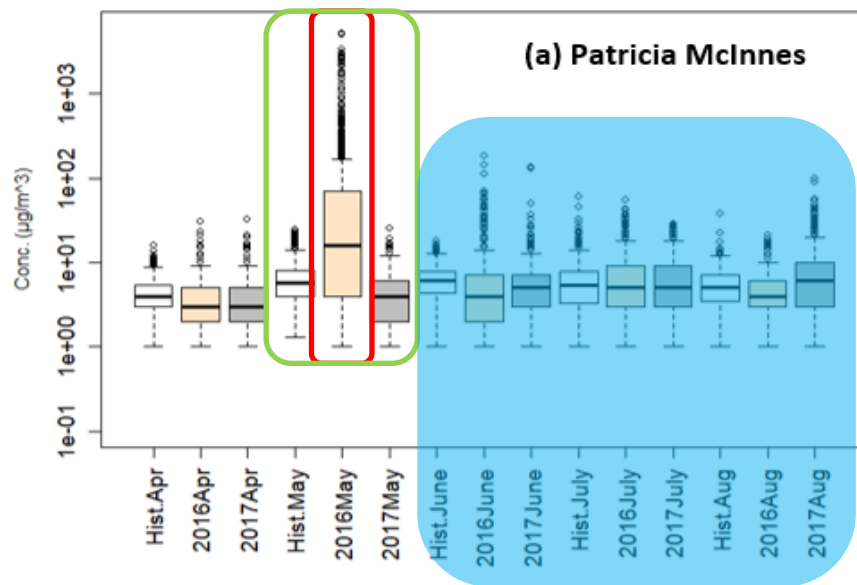
Fine Particulate Matter (PM_{2.5})



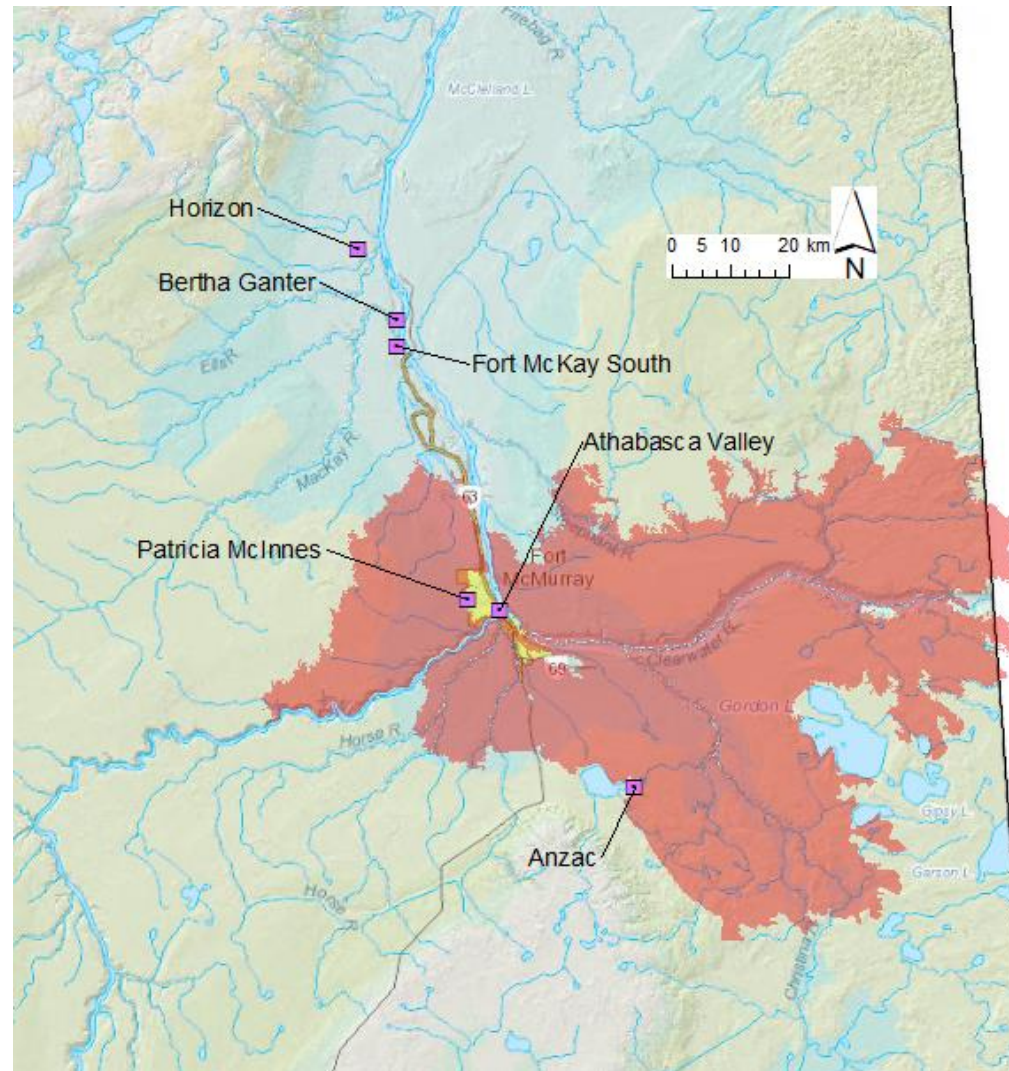
	AAAQO	Maximum Daily PM _{2.5}
Horse River Wildfire		
<i>Athabasca Valley Station</i>	18 days	1035 µg/m ³
<i>Patricia McInnes Station</i>	17 days	1131 µg/m ³
2011 Richardson Wildland Fire	20 days	^[1] 368 µg/m ³
2006-2007 Victorian Alpine Fire	N/A	1100 µg/m ³

[1] Underestimated PM_{2.5} Concentrations

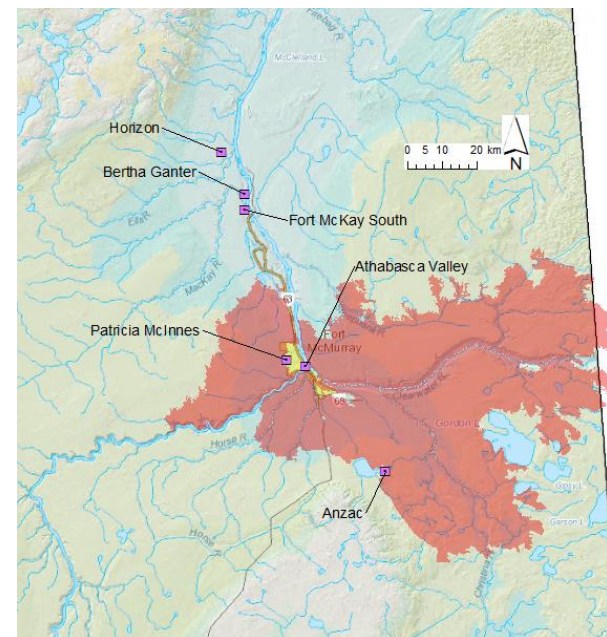
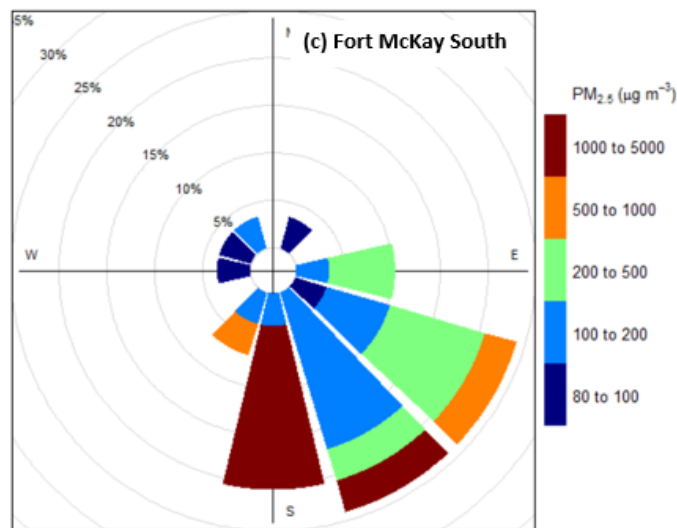
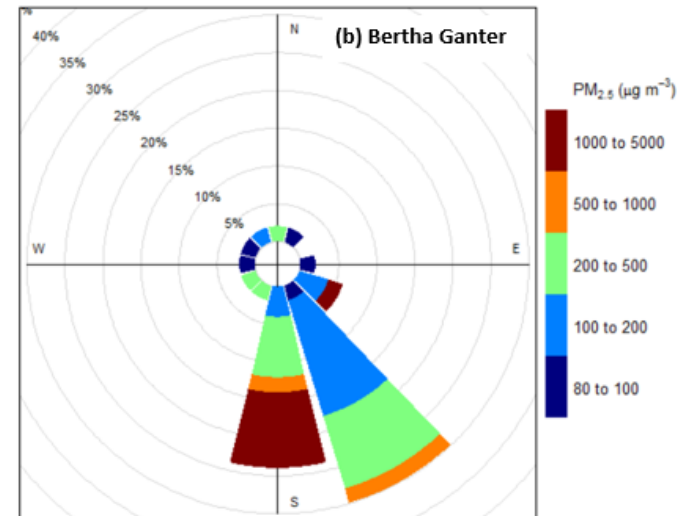
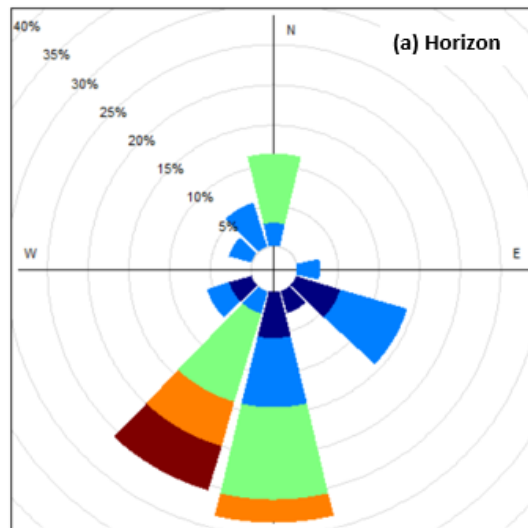
Fine Particulate Matter (PM_{2.5})



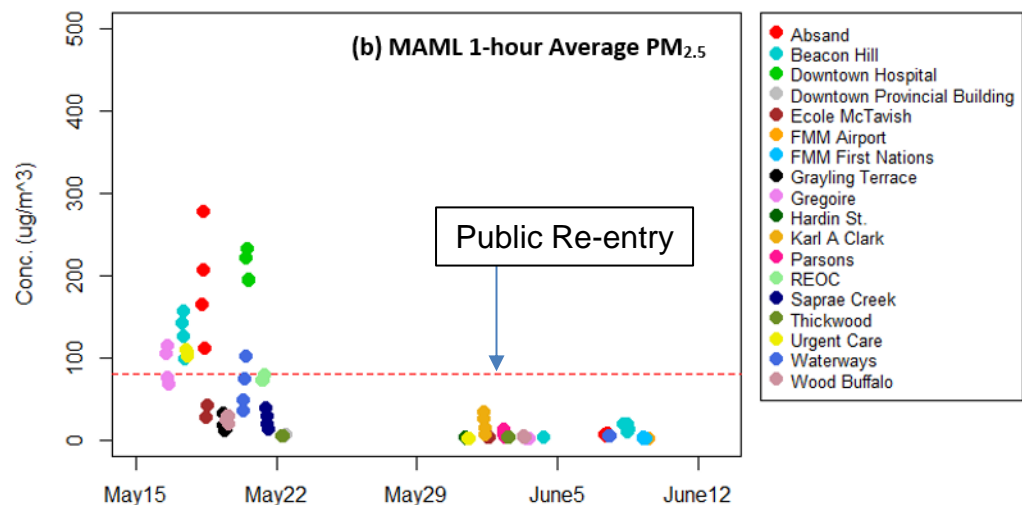
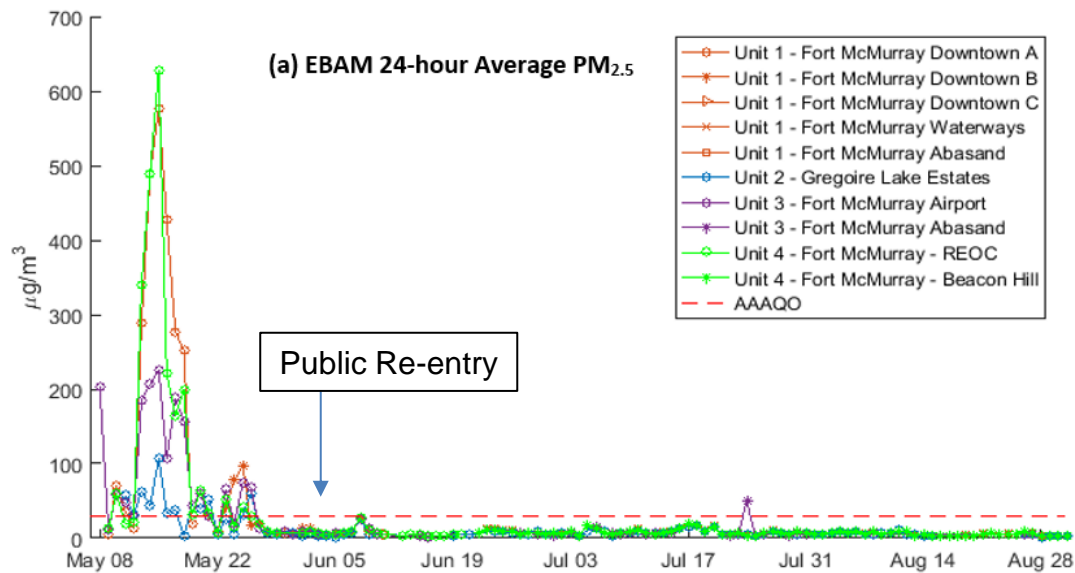
Fine Particulate Matter (PM_{2.5})



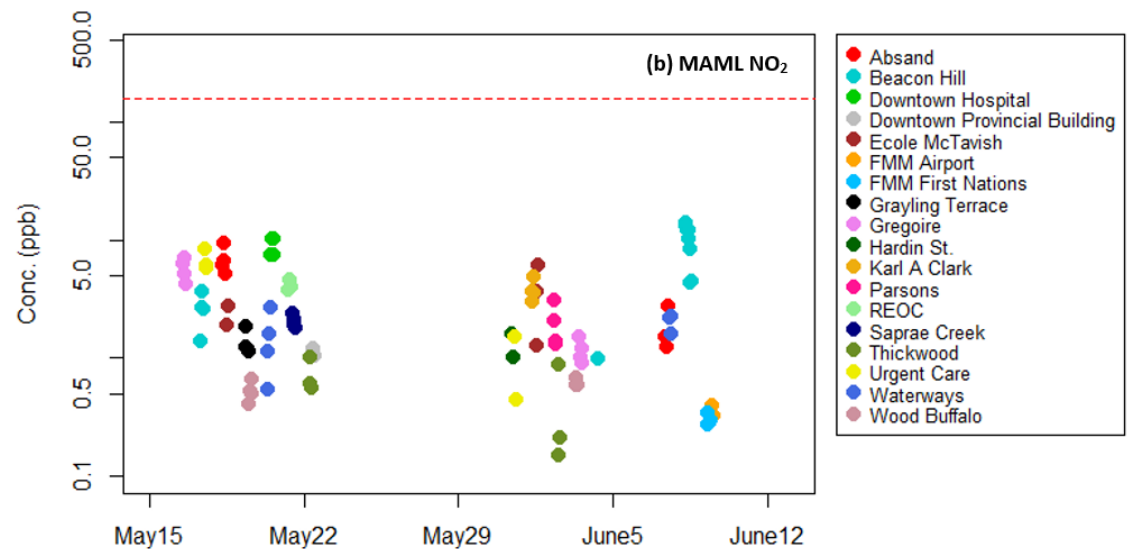
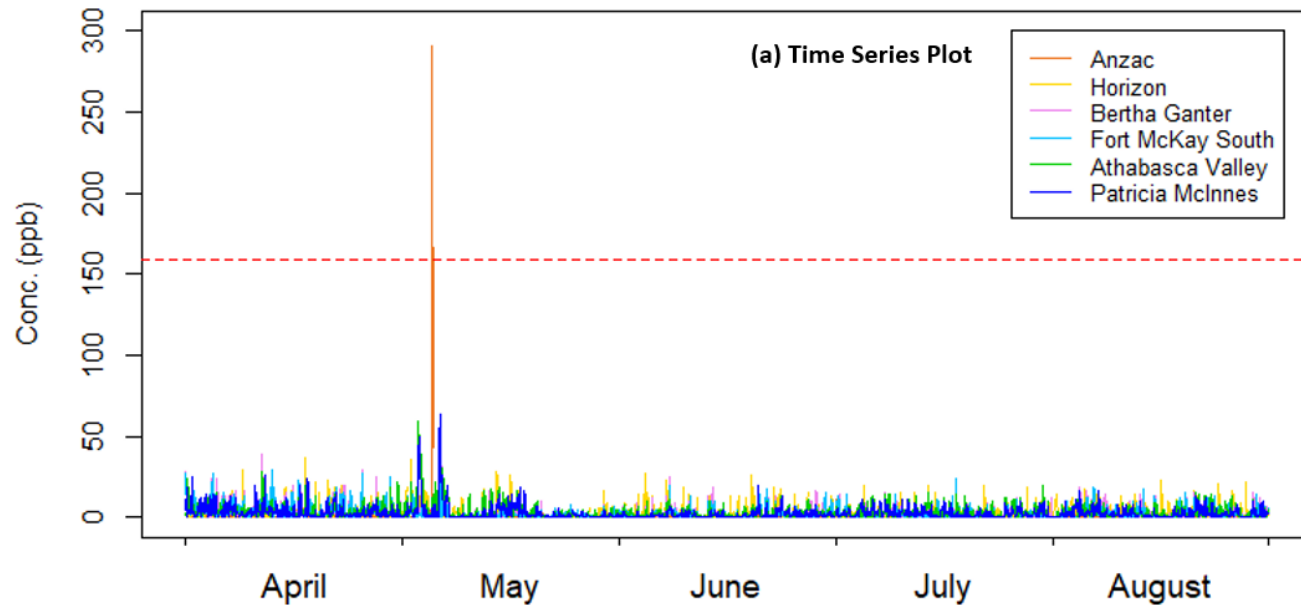
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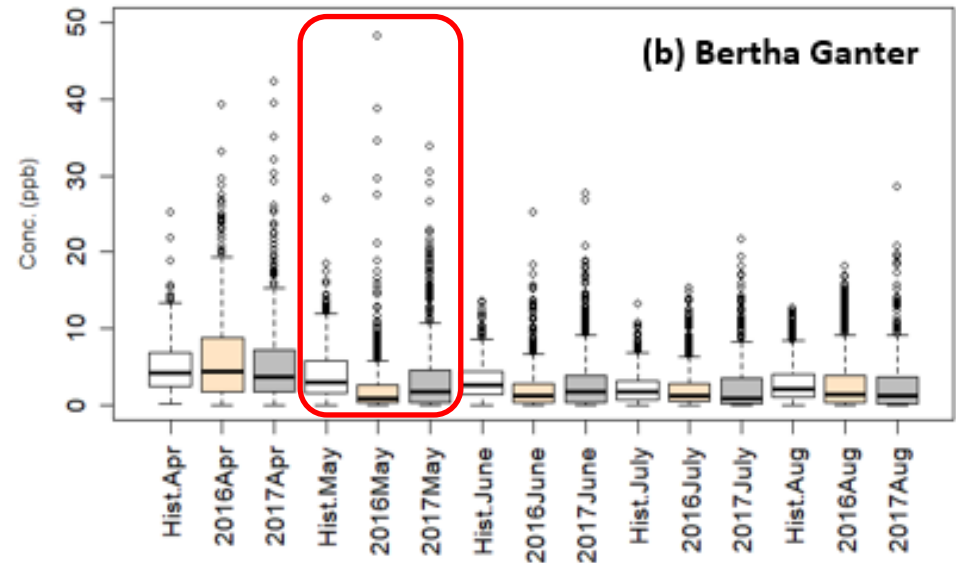
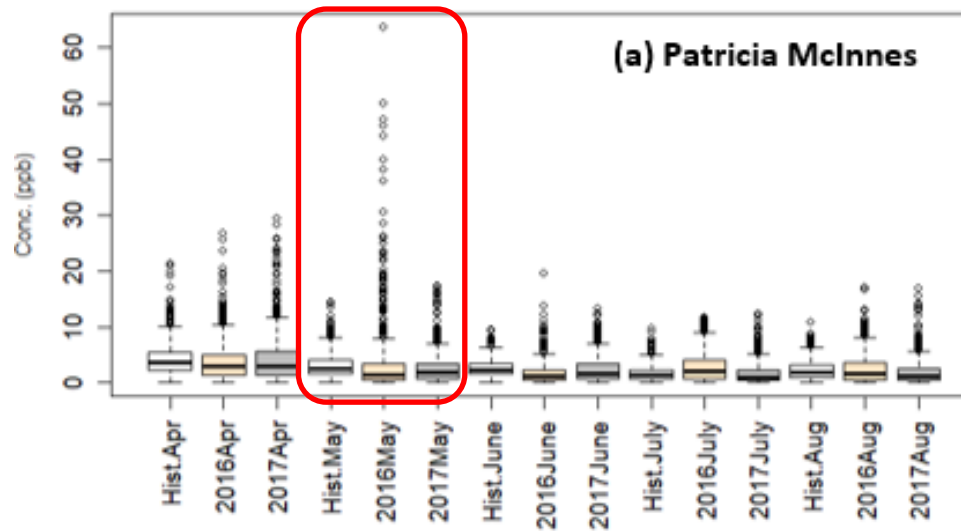
Fine Particulate Matter (PM_{2.5})



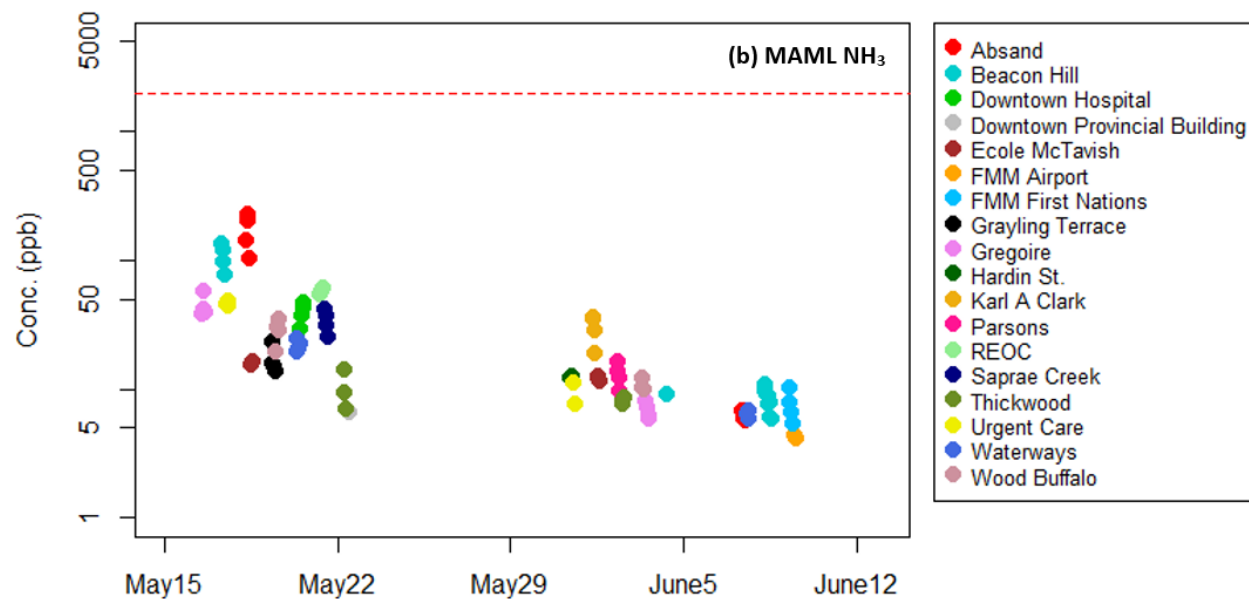
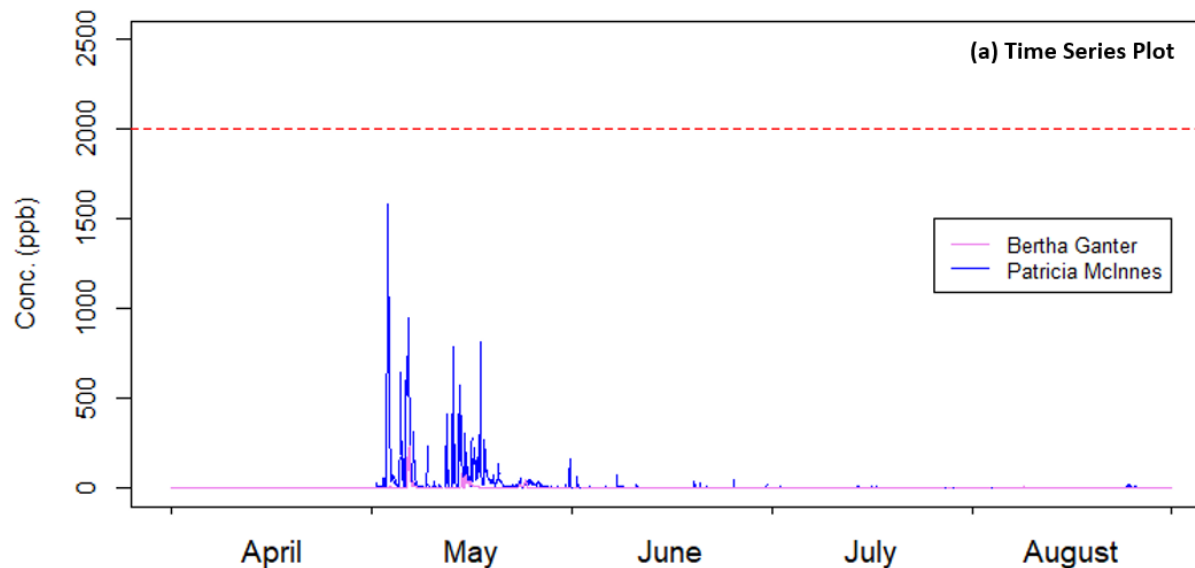
Nitrogen Dioxide (NO₂)



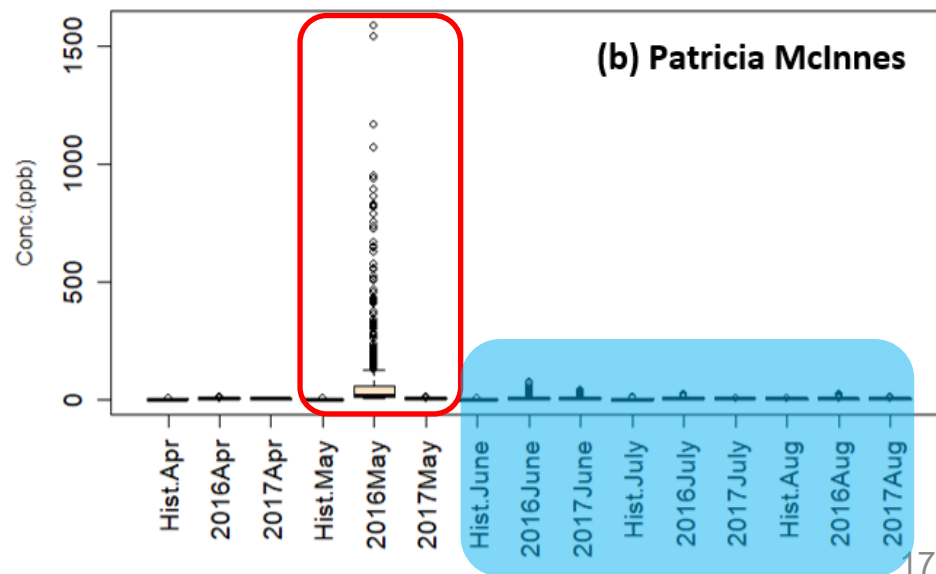
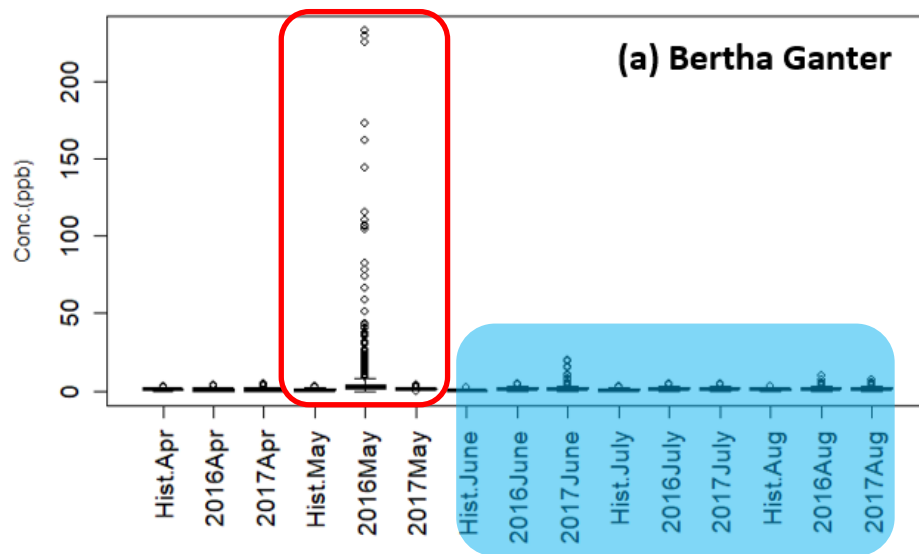
Nitrogen Dioxide (NO₂)



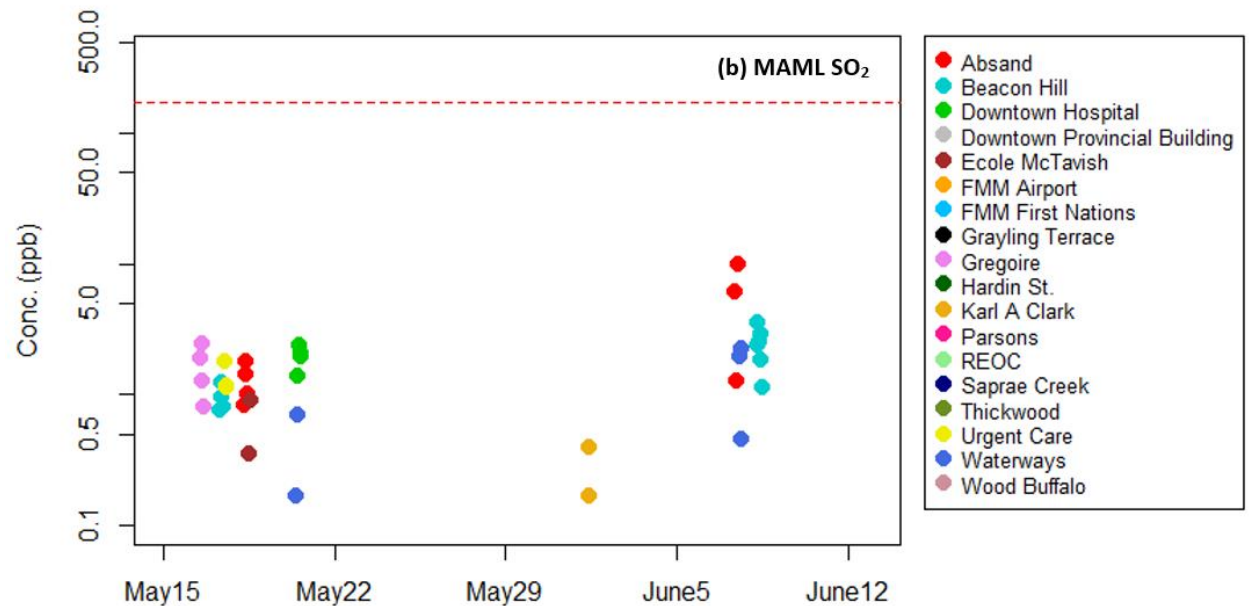
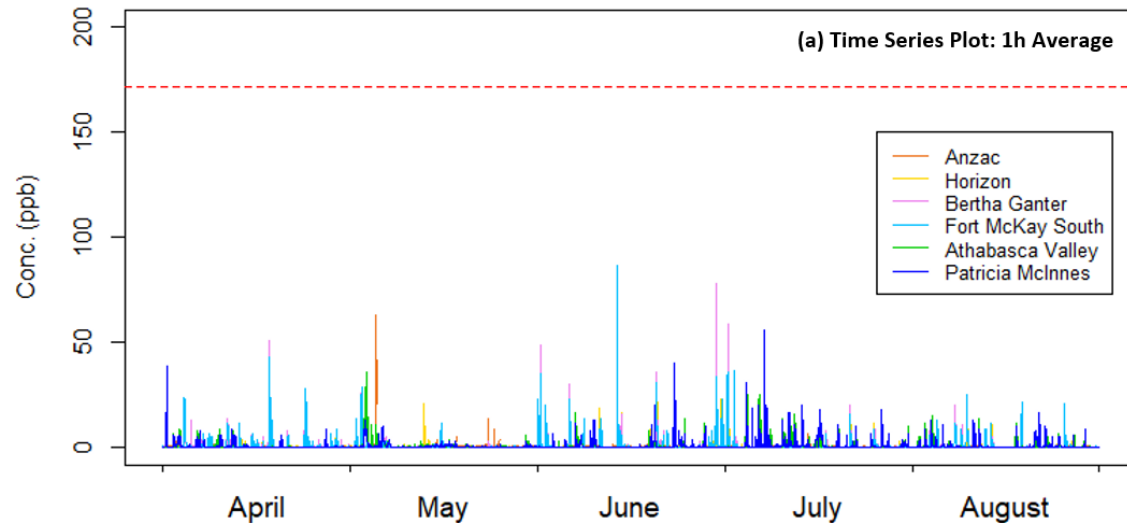
Ammonia (NH_3)



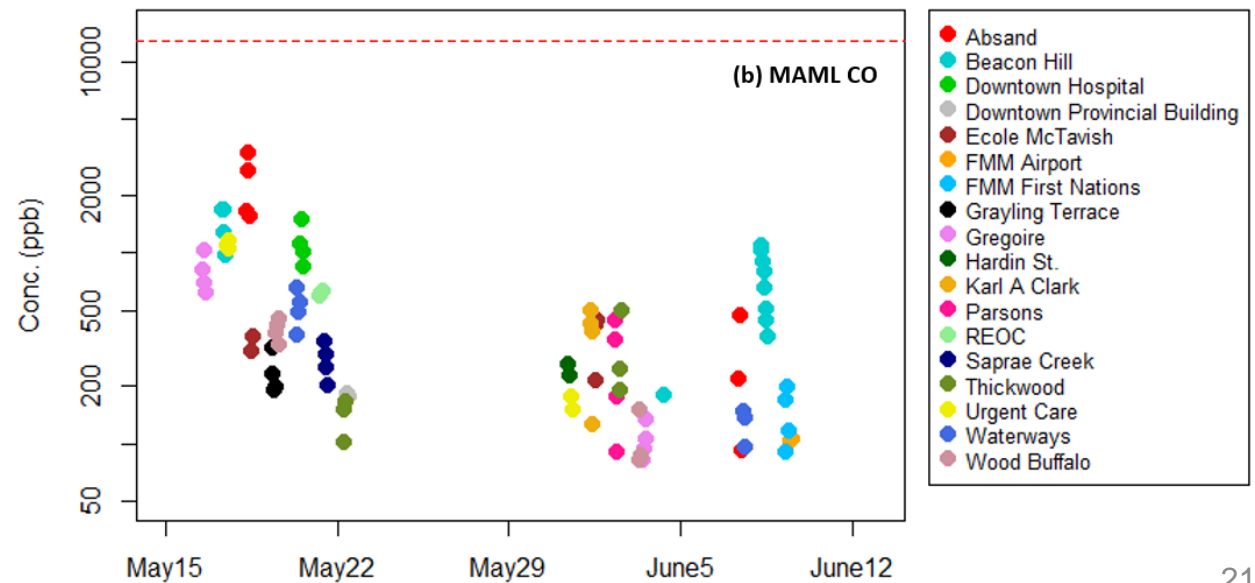
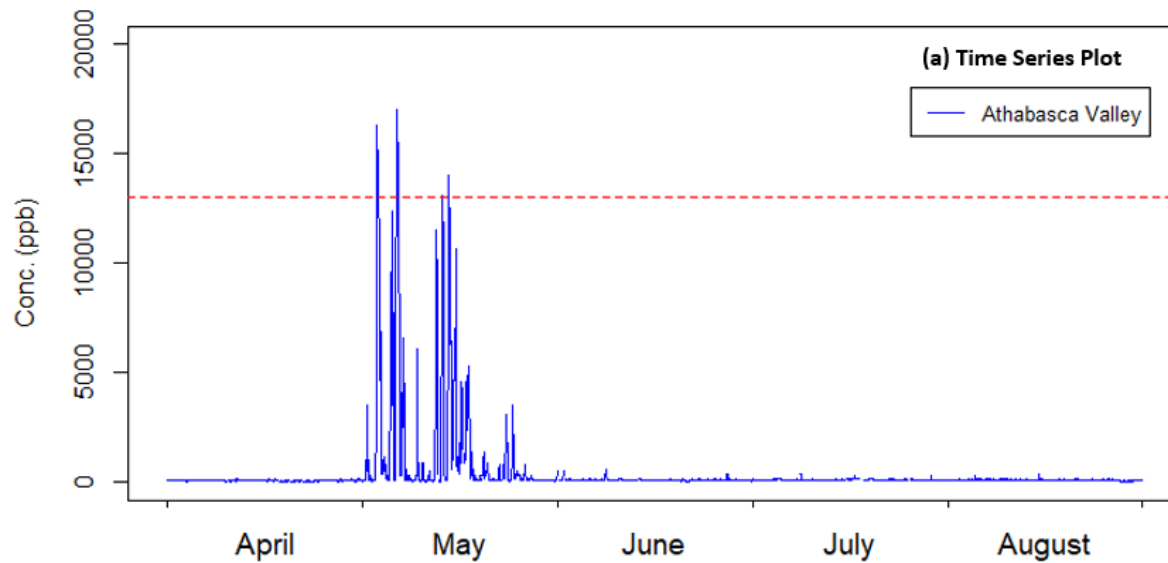
Ammonia (NH₃)



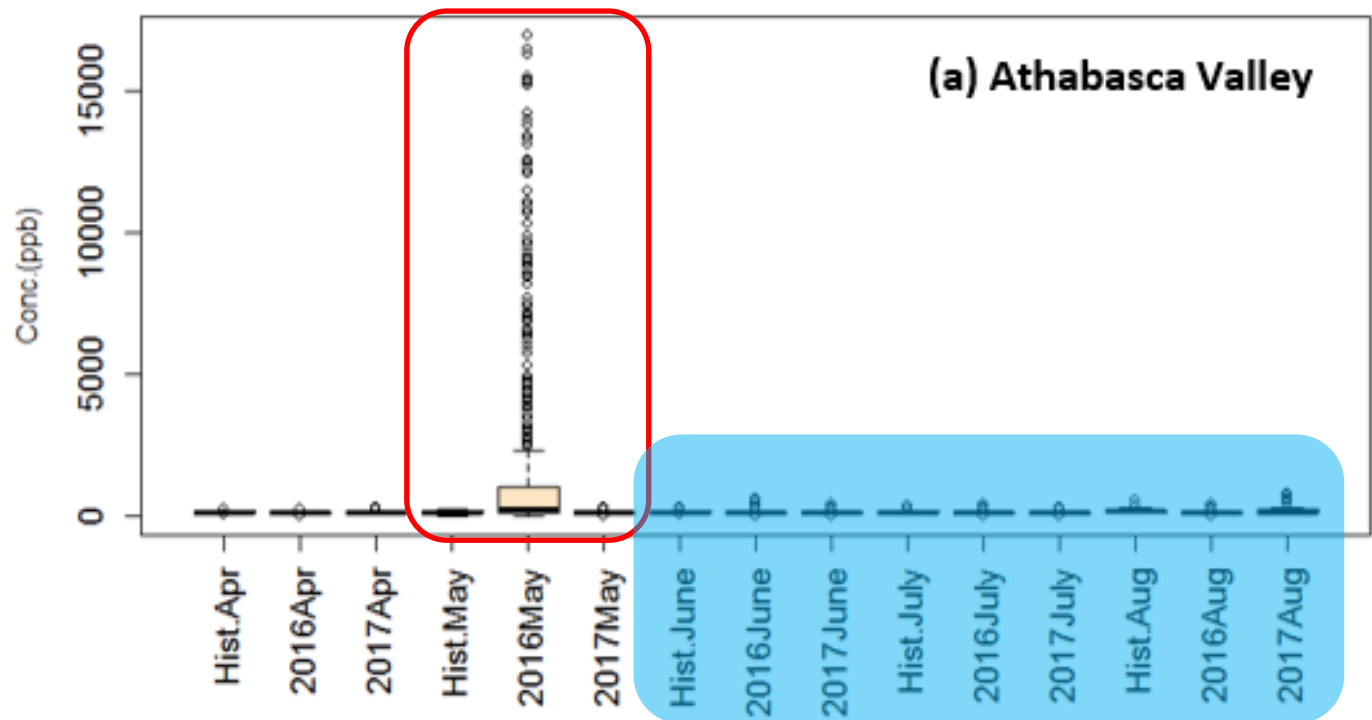
Sulphur Dioxide (SO₂)



Carbon Monoxide (CO)



Carbon Monoxide (CO)



Summary of Findings

Wildfire smoke impacted the Fort McMurray's air quality the most in May 2016

- Elevated median concentrations of $\text{PM}_{2.5}$, NH_3 and CO are observed with higher concentrations measured within Fort McMurray
- Only peak levels of NO_2 and SO_2 were influenced; average ambient NO_2 and SO_2 concentrations likely impacted by anthropogenic sources
- Long-term air quality impacts were not observed

Portable Monitoring Platforms

- Provided additional information to assess the air quality
- Align with findings with permanent continuous air monitoring stations



Questions?



Thank you.