



Peace Airshed Zone Association

Ambient Air Monitoring Network Summary

Ambient Air Quality Monitoring Program

Monthly Report

December 2021

January 31, 2022

Alberta Environment and Parks

11th Floor, Oxbridge Place
9820-106 Street
Edmonton Alberta T5K 2J6

Subject: **Peace Airshed Zone Association (PAZA)**
December 2021 Ambient Air Quality Monitoring Report

Please find enclosed the PAZA Ambient Air Quality Monitoring Network Report for the month of December 2021.

The representative of the Person Responsible for this monitoring program is:

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This report was prepared by Dr. Kevin McCullum and reviewed by Mandeep Dhaliwal.

PAZA has retained the services of WSP Canada Inc. to conduct continuous ambient monitoring and Dr Kevin McCullum to provide data validation and reporting.

This report is submitted by PAZA on behalf of the industrial member companies to satisfy the requirements of the facility Operating Approvals listed in Table A

The monthly summary report includes the operational summaries and hourly continuous monitoring and monthly passive results. The Wembley-Portable station was moved to the Poplar Portable station for the beginning of the month.

Continuous Monitoring:

Seven (7) Stations including Henry Pirker (Grande Prairie), Dunes, Smoky Heights, Beaverlodge, Valleyview, Donnelly and Poplar-Portable.
Detailed Summaries are included in the report

Calibration and Data Submission:

Monthly report, hourly data and calibration reports for December 2021 were submitted to the ETS data system.

Table A. PAZA members with Facility Operating Approvals

Company	Facility	LSD	EPEA Approval No.
Advantage Oil & Gas Ltd.	Glacier	05-02-076-13-W6	262479-00-00
Alberta Power (2000) Ltd. (an ATCO company)	Sturgeon	SW-06-069-21-W5	10283-02-02
ATCO Power Canada	Poplar Hill	11-19-073-08-W6	67774-01-01
ATCO Power Canada	Valleyview	SW-06-069-21-W5	147709-01-01
AltaGas Ltd.	Pouce Coupe	03-03-081-13-W6	247673-00-00
	Ante Creek	02-26-068-25-W5	266694-00-00
	Gordondale	02-26-068-25-W5	287474-00-00
Apache Canada Ltd.	House Mountain	01-08-070-10-W5	10137-02-02
Birchcliff Energy Ltd.	Pouce Coupe	03-22-078-12-W6	252529-00-00
Canadian Natural Resources Limited	Bonanza	11-25-081-11-W6	00000029-01-00
	Progress/Gordondale	01-01-077-10-W6	00010036-02-00
	Gold Creek	13-26-067-05-W6	00010446-02-00
	Teepee Creek	SE-2-074-04-W6	00001635-02-00
	Sturgeon/Valleyview	02-02-069-22-W5	1633-02-00
Canfor Forest Products	Grande Prairie	SW-23-071-06-W6	152645-01-00
Conocophillips Canada Energy Partnership	Wembley	06-19-073-08-W6	00000212-01-00
Encana Corporation	Sexsmith	04-08-075-07-W6	00010002-01-00
Enerplus Resources	Pouce Coupe	SW-06-069-21-W5	1464-02-03
Exshaw Oil Corporation	Spirit River	03-10-077-07-W6	344521-00-00
Grande Prairie Generation Inc.	Northern Prairie Power Project	04-19-073-08-W6	00238762-00-00
Inception Exploration Ltd.	Gold Creek	03-26-069-05-W6	00335317-00-02
KANATA Energy Group Ltd.	Valhalla	13-21-076-09-W6	00017620-02-02
Long Run Exploration	Eaglesham	01-25-076-01-W6	00241532-00-00
	Kakut	14-12-075-03-W6	00248469-00-00
	Donnelly	06-01-077-21-W5	00000087-02-00
	Puskwaskau	03-26-074-01-W6	00017524-01-00
Longview Oil Corp.	Sunset House	06-22-070-20-W5	138884-01-00
NorthRiver Midstream Inc.	Fourth Creek	16-11-082-09-W6	00000263-01-00
	Gordondale	11-26-079-09-W6	00011495-01-01
	Pouce Coupe/Bonanza	03-23-080-13-W6	00070203-01-01
Penn West Petroleum Ltd.	Tangent	13-29-080-23-W5	00001746-02-00
	Pouce Coupe	16-07-078-11-W6	00000614-01-00
Petrus Resources	Rycroft	08-25-077-06-W6	11351-02-00
	Spirit River	08-34-077-06-W6	11096-02-00
Strathcona Resources Ltd.	Jayar Sour Gas Processing Plant	06-08-062-03 W6	3612040
Suncor Energy Inc.	Progress	07-22-078-09-W6	00011428-02-00
Tidewater Midstream and Infrastructure Ltd.	Pipestone Sour Gas Plant	NW-35-70-9 W6	00403309-00-00
Veresen Energy	Hythe Brainard	11-18-074-12-W6	00010910-02-00
Weyerhaeuser Canada	Grande Prairie Pulp and Wood Plant	01-14-070-05-W6	00000113-02-00

Concentrations in excess of the Clean Air (Maximum Levels) Regulation:

There were no readings above the AAAQO or AAAQO in the month

Operational times less than 90 percent:

All stations reported above 90% operational times

Air Incidents

None were reported

Deviations from Authorized Monitoring Methods

None to report

Passive Monitoring

- 45 Stations throughout the PAZA zone
 - Passive sample analyses were performed by Bureau Veritas Laboratories
- There were 14 duplicates sampled in the month of December
 - Six SO₂ duplicates located at Sylvester, Spirit River, Bear Lake, East Prairie, Duvernay 1, Jayar Bone Yard; RPD ranging from 0% to 68% (1 fail, Duvernay 1)
 - One O₃ duplicate at Kinuso; RPD at 15%
 - Five NO₂ duplicates at Wanham, Gold Creek, Steeprock Creek, Peavine, Jayar 14-8; RPD ranging from 0% to 30% (no fails)
 - Three H₂S duplicates, Duvernay 1, Jayar Plant, Girouxville 4; RPD ranging from 12% to 43% (no fails)
- Girouxville 3 was not collected as there was no access for collection
- Milner Sites collected and reported separately.
- There were no exceedances of the AAAQOs for all monitored parameters at any of the passive monitoring stations during this month.

I certify that I have reviewed and verified this report and that the information is complete, accurate and representative of the monitoring results, reporting timeframe and the specified analysis, summarization and reporting requirements.

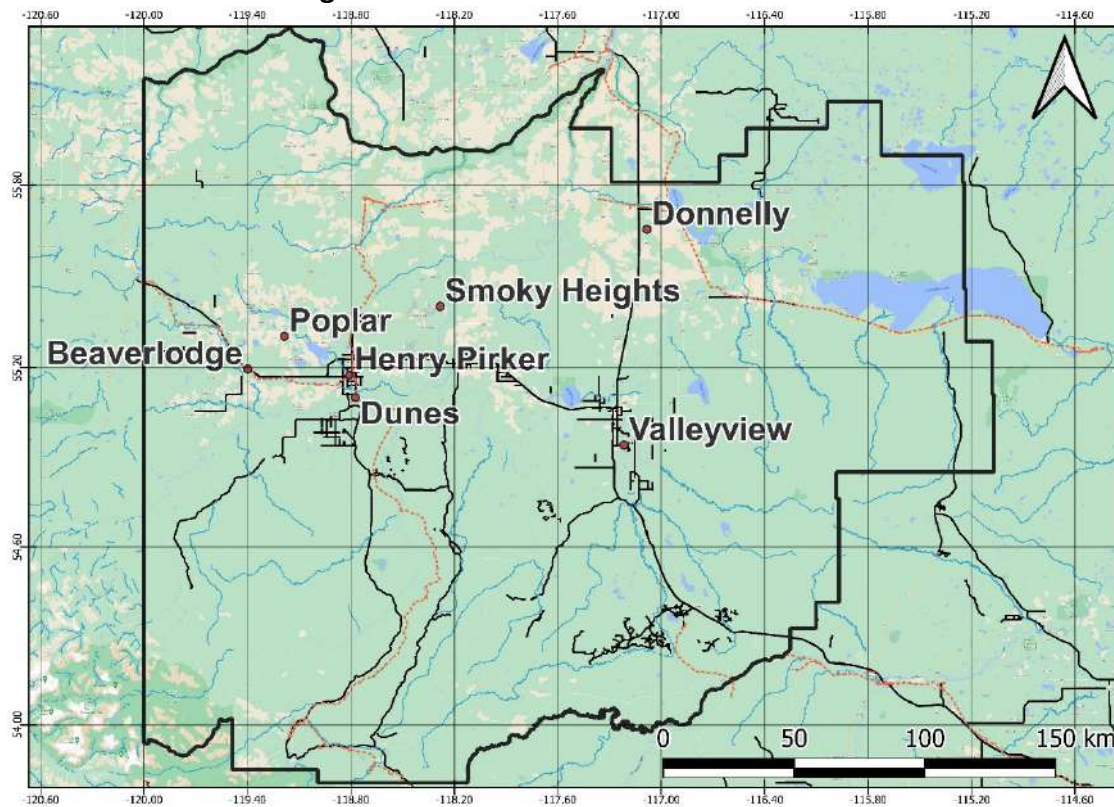


Mandeep Dhaliwal, B.Sc., P.Chem.
Program Manager

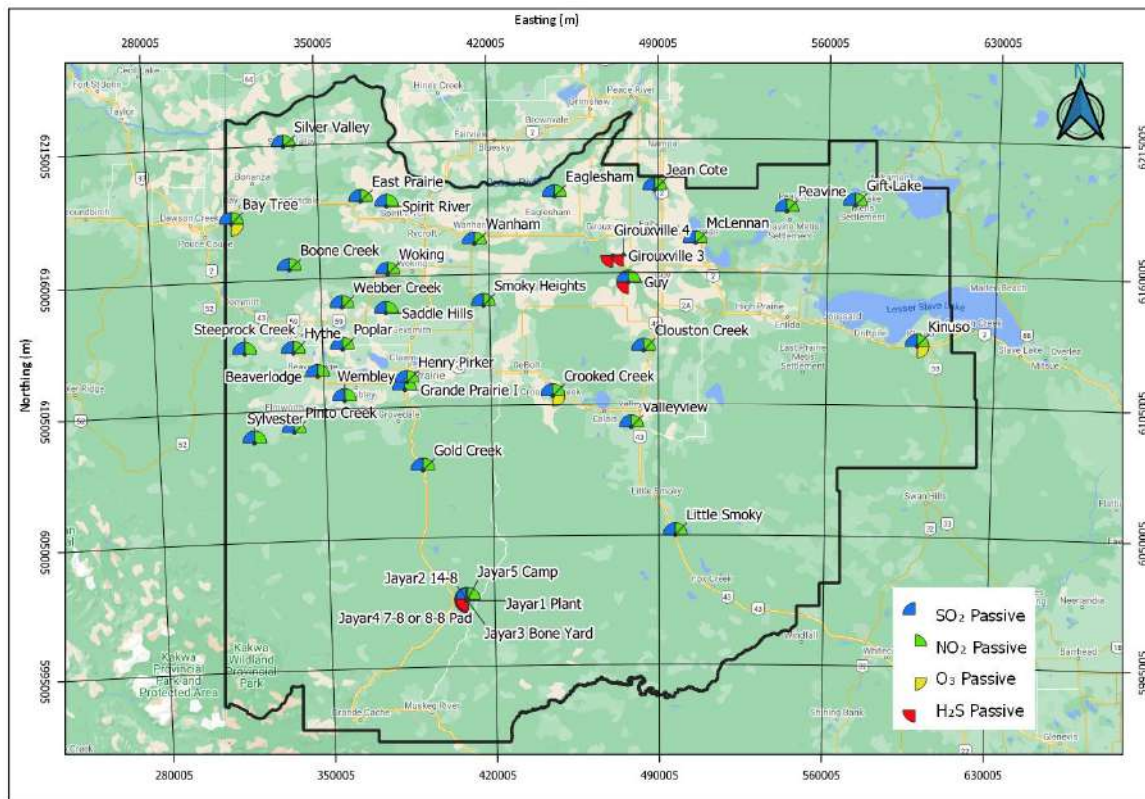
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PAZA Continuous Monitoring Station Locations



PAZA Passive Monitoring Station Locations



1 December Monthly Station Summaries

The following summaries are for the equipment and data results from the continuous ambient monitoring network

1.1 Beaverlodge Air Monitoring Station

PAZA - December 2021 Beaverlodge Station Report

December				1-hour			24-hour			Exceedance				Calibration	
Parameter	Average	Minimum	Valid	Operational	Max	Objective	Max Day and Time	Max	Objective	Max Day	1hr	8hr	24hr	30d	Date
NO (ppb)	1.7	0.0	95.2%	100.0%	49.7	-	Dec-15 14:00	13.2	-	Dec-15	-	-	-	-	Dec 08, 2021
NO ₂ (ppb)	7.3	0.2	95.2%	100.0%	41.3	159	Dec-29 22:00	23.5	-	Dec-15	0	-	-	-	Dec 08, 2021
NO _x (ppb)	9.0	0.3	95.2%	100.0%	75.6	-	Dec-15 14:00	36.9	-	Dec-15	-	-	-	-	Dec 08, 2021
O ₃ (ppb)	26.1	0.0	88.5%	92.8%	42.6	76	Dec-01 02:00	38.2	-	Dec-02	0	-	-	-	Dec 08, 2021
PM _{2.5} (µg/m³)	3.0	0.0	97.6%	98.0%	17.9	80	Dec-22 05:00	8.8	29	Dec-15	0	-	0	-	Dec 07, 2021
SO ₂ (ppb)	0.5	0.0	95.2%	100.0%	5.0	172	Dec-26 21:00	1.5	48	Dec-26	0	-	0	0	Dec 07, 2021
	Average	Minimum	Valid	Operational	Maximum										
Temp (°C)	-15.5	-36.4	100.0%	100.0%	6.0	Note: Valid hours must be greater than 75% Operational hours must be greater than 90%									
RH (%)	72.0	43.3	100.0%	100.0%	95.3										
WS (km/hr)	8.8	0.1	100.0%	100.0%	61.0										
WD (deg)	293	0.7	100.0%	100.0%	359.2	Average Wind Direction293WNW									

Update Summary:

Parameter	Make	Model	Equipment summary
NO/NO ₂ /NO _x	Thermo	42i	No Operational issues noted
O ₃	Thermo	49iQ	Analyzer froze, 54 hrs removed between Dec 24-26 spans
PM _{2.5}	Sharp	5030	Extreme cold resulted in equipment failure between Dec 26-27, 15hrs removed
SO ₂	Thermo	43i-TLE	No Operational issues noted
Met Equip	MetOne	50.5	No Operational issues noted

1.2 Dunes Air Monitoring Station

PAZA - December 2021 Dunes Station Report

December					1-hour			24-hour			Exceedance				Calibration	
Parameter	Average	Minimum	Valid	Operational	Max	Objective	Max Day and Time	Max	Objective	Max Day	1hr	8hr	24hr	30d	Date	
PM _{2.5} (µg/m³)	4.4	0.0	97.3%	97.7%	35.8	80	Dec-31 19:00	13.9	29	Dec-07	0	-	0	-	Dec-01-2021	
SO ₂ (ppb)	0.4	0.0	95.0%	99.9%	9.3	172	Dec-11 17:00	0.8	48	Dec-11	0	-	0	0	Dec-01-2021	
TRS (ppb)	0.3	0.0	93.7%	98.4%	2.4	-	Dec-07 10:00	1.1	-	Dec-18	-	-	-	-	Dec-01-2021	
	Average	Minimum	Valid	Operational	Maximum											
Temp (°C)	-16.7	-39.2	99.9%	99.9%	7.8	Note: Valid hours must be greater than 75% Operational hours must be greater than 90%										
RH (%)	70.5	35.8	99.9%	99.9%	95.6											
WS (km/hr)	3.3	0.0	99.9%	99.9%	15.9											
WD (deg)	285	1.1	99.9%	99.9%	359.9	Average Wind Direction 285 WNW										

Update Summary:

Parameter	Make	Model	Equipment summary
PM _{2.5}	Thermo	TEOM AB	Power failure Dec 14 (1hr); Extreme cold resulted in equipment failure Dec 26-27 and 31 (16hrs)
SO ₂	TECO	43i	Power failure Dec 14 (1hr)
TRS	TECO	43C	Power failure Dec 14 (1hr); TRS Rebuilt pump failed, data removed up to Dec01 Calibration (11hrs)
Met Equip	Gil/RMYoung	MetPak/RMY86004	Power failure Dec 14 (1hr)

1.3 Grande Prairie - Henry Pirkir Air Monitoring Station

PAZA - December 2021 Henry Pirkir Station Report

December					1-hour			8-hour / 24-hour			Exceedance				Calibration
Parameter	Average	Minimum	Valid	Operational	Max	Objective	Max Day and Time	Max	Objective	Max Day	1hr	8hr	24hr	30d	Date
NO (ppb)	9.8	0.0	95.0%	100.0%	101.9	-	Dec-31 14:00	44.3	-	Dec-31	-	-	-	-	Dec 07, 2021
NO ₂ (ppb)	17.7	1.0	95.0%	100.0%	47.0	159	Dec-20 19:00	36.3	-	Dec-31	0	-	-	-	Dec 07, 2021
NO _x (ppb)	27.7	0.9	95.0%	100.0%	148.1	-	Dec-31 14:00	81.0	-	Dec-31	-	-	-	-	Dec 07, 2021
O ₃ (ppb)	18.3	0.6	95.4%	100.0%	45.2	76	Dec-01 01:00	37.2	-	Dec-02	0	-	-	-	Dec 07, 2021
PM _{2.5} (µg/m³)	6.0	0.0	97.2%	97.4%	75.9	80	Dec-20 03:00	22.6	29	Dec-31	0	-	0	-	Dec 13, 2021
SO ₂ (ppb)	0.6	0.0	95.3%	100.0%	56.5	172	Dec-02 12:00	3.6	48	Dec-02	0	-	0	0	Dec 07, 2021
H ₂ S (ppb)	0.3	0.0	91.3%	95.8%	3.1	10	Dec-31 23:00	0.9	3	Dec-31	0	-	0	-	Dec 13, 2021
CH ₄ (ppm)	2.3	2.0	95.4%	100.0%	4.4	-	Dec-07 05:00	2.8	-	Dec-31	-	-	-	-	Dec 15, 2021
THC (ppm)	2.3	2.0	95.4%	100.0%	4.5	-	Dec-07 05:00	3.1	-	Dec-31	-	-	-	-	Dec 15, 2021
NMHC (ppm)	0.0	0.0	95.4%	100.0%	0.5	-	Dec-31 23:00	0.3	-	Dec-31	-	-	-	-	Dec 15, 2021
CO (ppm)	0.2	0.1	95.3%	100.0%	0.9	13	Dec-20 19:00	0.5	5	Dec-31	0	0	-	-	Dec 15, 2021
	Average	Minimum	Valid	Operational	Maximum										
Temp (°C)	-16.3	-41.8	100.0%	100.0%	6.5	Note: Valid hours must be greater than 75% Operational hours must be greater than 90%									
RH (%)	63.5	36.6	100.0%	100.0%	85.5										
SR (W/m²)	12.8	0.0	100.0%	100.0%	188.2										
WS (km/hr)	6.4	0.3	100.0%	100.0%	36.7										
WD (deg)	276	3.5	100.0%	100.0%	358.5										
Average Wind Direction									276		W				

Update Summary:

Parameter	Make	Model	Equipment summary
NO/NO ₂ /NO _x	Thermo	421Q	No Operational issues noted
O ₃	TECO	49I	No Operational issues noted
PM _{2.5}	Sharp	5030	Due to extreme cold conditions Dec 26-27 and Dec 31, 19hrs were removed
SO ₂	TEI	43I-TLE	No Operational issues noted
H ₂ S	TEI	450i	Maintenance with internal pump on H ₂ S as a result of span issues, 31hrs removed
THC/CH ₄ /NMHC	TEI	55i	No Operational issues noted
CO	TEI	48I-TLE	No Operational issues noted
Met Equip	MetOne	50.5	No Operational issues noted

1.4 Smoky Heights Air Monitoring Station

PAZA - December 2021 Smoky Heights Station Report

PART 2 - December 2021 Smoky Heights Station Report															
Parameter	December			Operational	1-hour			24-hour			Exceedance				Calibration Date
	Average	Minimum	Valid		Max	Objective	Max Day and Time	Max	Objective	Max Day	1hr	8hr	24hr	30d	
PM _{2.5} (µg/m³)	4.3	0.0	92.9%	93.3%	35.7	80	Dec-22 01:00	12.8	29	Dec-17	0	-	0	-	Dec 20, 2021
SO ₂ (ppb)	0.5	0.0	95.3%	100.0%	8.3	172	Dec-10 15:00	1.2	48	Dec-01	0	-	0	0	Dec 20, 2021
TRS (ppb)	0.3	0.0	95.0%	100.0%	1.9	-	Dec-26 19:00	0.5	-	Dec-18	-	-	-	-	Dec 20, 2021
	Average	Minimum	Valid	Operational	Maximum										
Temp (°C)	-17.9	-38.6	100.0%	100.0%	5.6	Note: Valid hours must be greater than 75% Operational hours must be greater than 90% Average Wind Direction260WNW									
WS (km/hr)	11.8	0.4	100.0%	100.0%	46.2										
WD (deg)	260	0.3	100.0%	100.0%	358.9										

Update Summary:

Parameter	Make	Model	Equipment summary
PM _{2.5}	Sharp	5030	Extreme cold resulted in equipment failure Dec 17 (6hrs), Dec 25-27 (33hrs) and Dec 31 (11hrs)
SO ₂	TECO	43i	No Operational issues noted
TRS	TEI	43I APSAA	No Operational issues noted
Met Equip	MetOne	50.5	No Operational issues noted

1.5 Valleyview Air Monitoring Station

PAZA - December 2021 Valleyview Station Report

AZ-7 - December 2021 Valley View Station Report																	
December					1-hour			24-hour			Exceedance				Calibration		
Parameter	Average	Minimum	Valid	Operational	Max	Objective	Max Day and Time	Max	Objective	Max Day	1hr	8hr	24hr	30d	Date		
SO ₂ (ppb)	0.1	0.0	94.8%	99.9%	1.6	172	Dec-02 22:00	0.4	48	Dec-19	0	-	0	0	Dec 01, 2021		
H ₂ S (ppb)	0.1	0.0	95.2%	100.0%	2.8	10	Dec-03 18:00	0.4	3	Dec-03	0	-	0	-	Dec 01, 2021		
Average		Minimum	Valid	Operational	Maximum												
Temp (°C)	-17.0	-40.5	100.0%	100.0%	7.7		Note: Valid hours must be greater than 75% Operational hours must be greater than 90%										
RH (%)	76.8	38.6	100.0%	100.0%	100.2												
WS (km/hr)	3.7	0.0	100.0%	100.0%	19.2												
WD (deg)	282	0.6	100.0%	100.0%	360.0												
Average Wind Direction									282		NW						

Update Summary:

Parameter	Make	Model	Equipment summary
SO ₂	TEI	43i-APSCB	No Operational issues noted; 1hr of data removed Dec 20 from zero failure
H ₂ S	TEI	450i-APHAA	No Operational issues noted
Met Equip	RMYoung	RM86004	No Operational issues noted

1.6 Donnelly Air Monitoring Station

PAZA - December 2021 Donnelly Station Report

FAZA - December 2021 Biweekly Station Report																
December					1-hour			24-hour			Exceedance				Calibration	
Parameter	Average	Minimum	Valid	Operational	Max	Objective	Max Day and Time	Max	Objective	Max Day	1hr	8hr	24hr	30d	Date	
SO ₂ (ppb)	0.3	0.0	95.2%	100.0%	3.2	172	Dec-12 01:00	0.7	48	Dec-20	0	-	0	0	Dec 02, 2021	
H ₂ S (ppb)	0.1	0.0	95.2%	100.0%	0.4	10	Dec-21 11:00	0.1	3	Dec-20	0	-	0	-	Dec 02, 2021	
Average		Minimum	Valid	Operational	Maximum											
Temp (°C)	-16.9	-38.1	100.0%	100.0%	4.8	Note: Valid hours must be greater than 75% Operational hours must be greater than 90%										
WS (km/hr)	10.4	0.0	100.0%	100.0%	41.8											
WD (deg)	244	0.0	100.0%	100.0%	359.9											
Average Wind Direction									244	WSW						

Update Summary:

Parameter	Make	Model	Equipment summary
SO ₂	Teco	43i	No Operational issues noted
H ₂ S	Thermo	45C	No Operational issues noted
Met Equip	RMYoung	5103	No Operational issues noted

1.7 Poplar Air Monitoring Station

PAZA - December 2021 Poplar Station Report

December 2021 - April Station Report																
December				Operational	1-hour			24-hour			Exceedance				Calibration	
Parameter	Average	Minimum	Valid		Max	Objective	Max Day and Time	Max	Objective	Max Day	1hr	8hr	24hr	30d	Date	
NO (ppb)	1.9	0.0	95.2%	100.0%	44.4	-	Dec-06 17:00	11.4	-	Dec-06	-	-	-	-	Dec 13, 2021	
NO ₂ (ppb)	9.1	0.3	95.2%	100.0%	40.1	159	Dec-29 18:00	29.9	-	Dec-07	0	-	-	-	Dec 13, 2021	
NO _x (ppb)	11.1	0.3	95.2%	100.0%	83.0	-	Dec-06 17:00	38.4	-	Dec-07	-	-	-	-	Dec 13, 2021	
O ₃ (ppb)	25.4	0.4	95.3%	100.0%	44.1	76	Dec-01 00:00	38.6	-	Dec-02	0	-	-	-	Dec 13, 2021	
PM _{2.5} (µg/m³)	2.7	0.0	99.3%	99.7%	27.9	80	Dec-18 18:00	7.5	29	Dec-31	0	-	0	-	Dec 14, 2021	
SO ₂ (ppb)	1.1	0.0	95.3%	100.0%	15.1	172	Dec-22 12:00	3.4	48	Dec-08	0	-	0	0	Dec 13, 2021	
TRS (ppb)	0.6	0.2	95.2%	100.0%	3.8	-	Dec-26 20:00	1.2	-	Dec-27	-	-	-	-	Dec 14, 2021	
CH ₄ (ppm)	2.3	1.9	94.4%	99.2%	3.3	-	Dec-17 08:00	2.8	-	Dec-06	-	-	-	-	Dec 14, 2021	
THC (ppm)	2.3	1.9	94.4%	99.2%	4.3	-	Dec-26 20:00	3.0	-	Dec-06	-	-	-	-	Dec 14, 2021	
NMHC (ppm)	0.0	0.0	94.4%	99.2%	2.0	-	Dec-26 20:00	0.2	-	Dec-25	-	-	-	-	Dec 14, 2021	
	Average	Minimum	Valid	Operational	Maximum											
Temp (°C)	-16.8	-42.7	100.0%	100.0%	6.0	Note: Valid hours must be greater than 75% Operational hours must be greater than 90%										
WS (km/hr)	11.4	0.2	100.0%	100.0%	51.2											
WD (deg)	290	0.3	100.0%	100.0%	359.5											
Average Wind Direction										290	WNW					

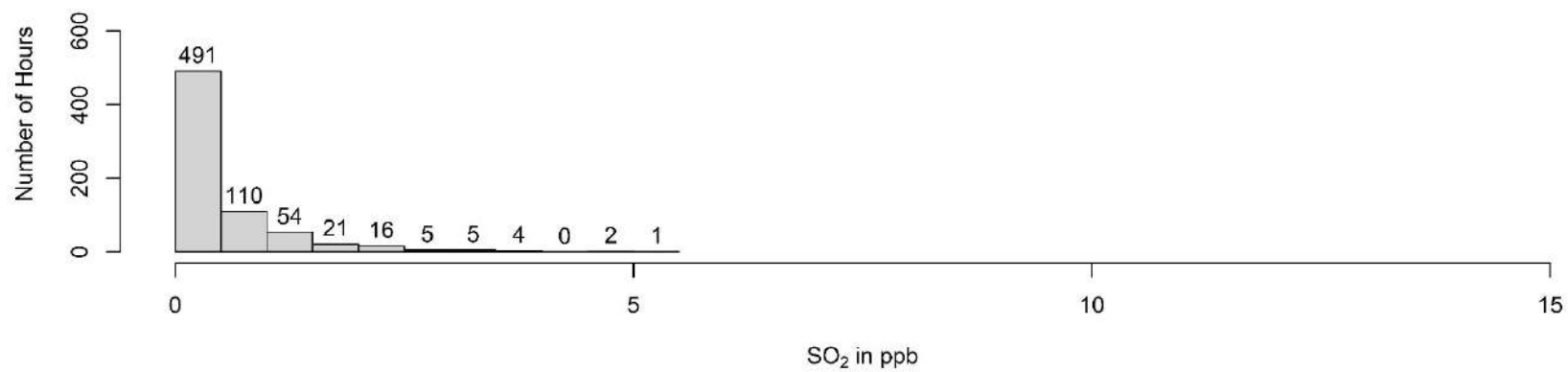
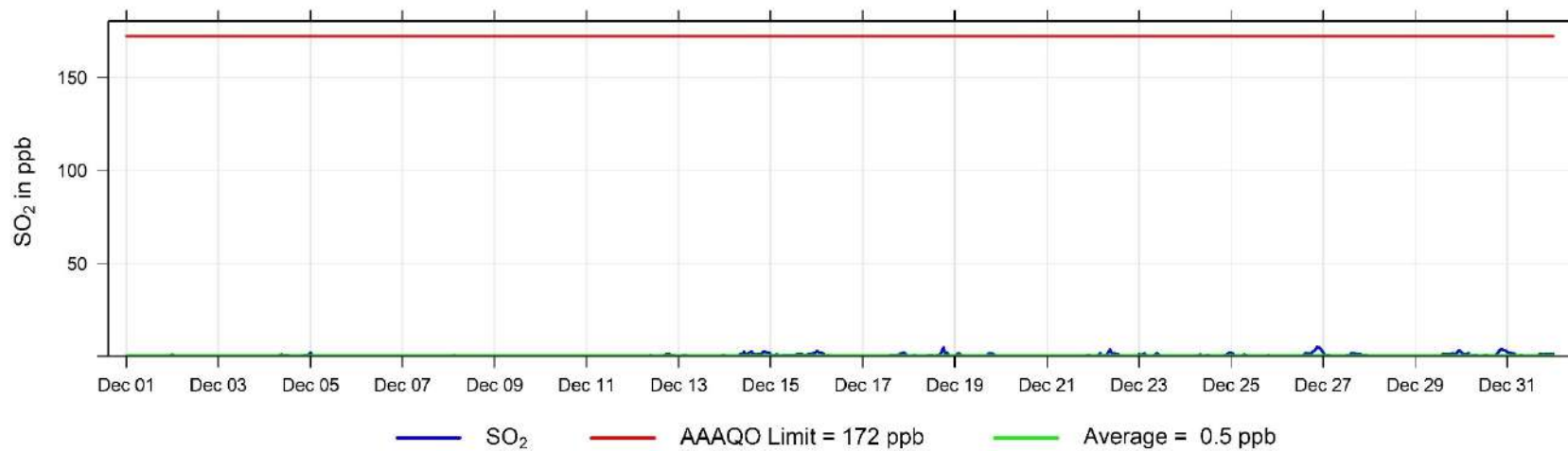
Update Summary:

Parameter	Make	Model	Equipment summary
NO/NO ₂ /NO _x	TEI	42i	No Operational issues noted
O ₃	TEI	49i	No Operational issues noted
PM _{2.5}	Thermo	TEOM AB	Extreme cold resulted in equipment failure Dec 26, 2hrs removed
SO ₂	TEI	43i	No Operational issues noted
TRS	TEI	43i	No Operational issues noted
THC/CH ₄ /NMHC	TEI	55i-A3PHAA	Replacement of zero air generator (6hrs maintenance); replaced hydrogen and span gas
Met Equip	MetOne	50.5	No Operational issues noted

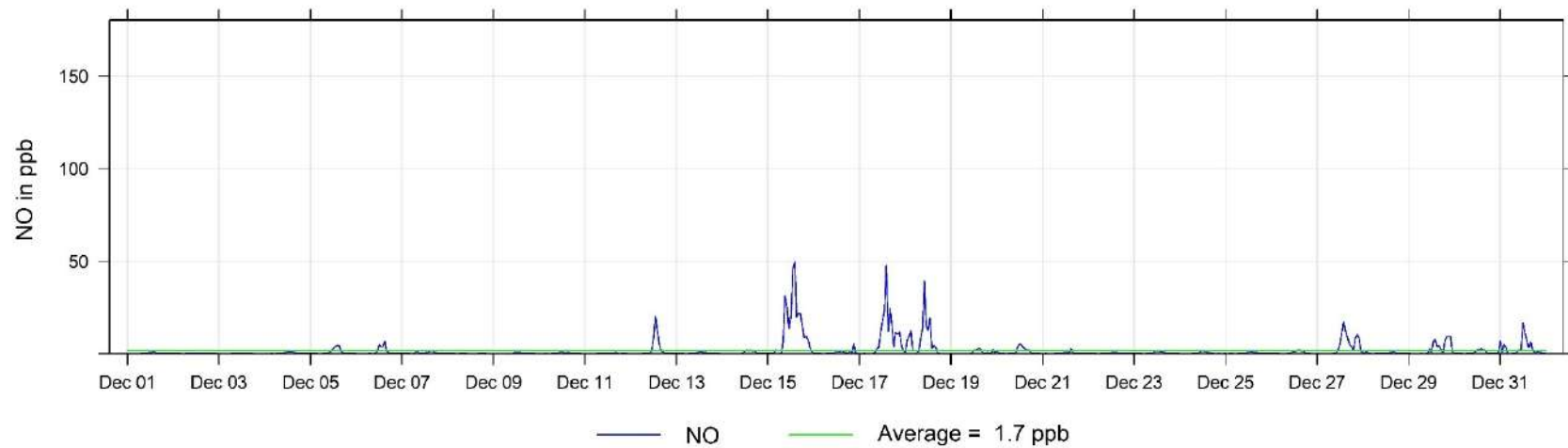
2 Beaverlodge Charts

The following pages include the charts and histograms for Beaverlodge Station

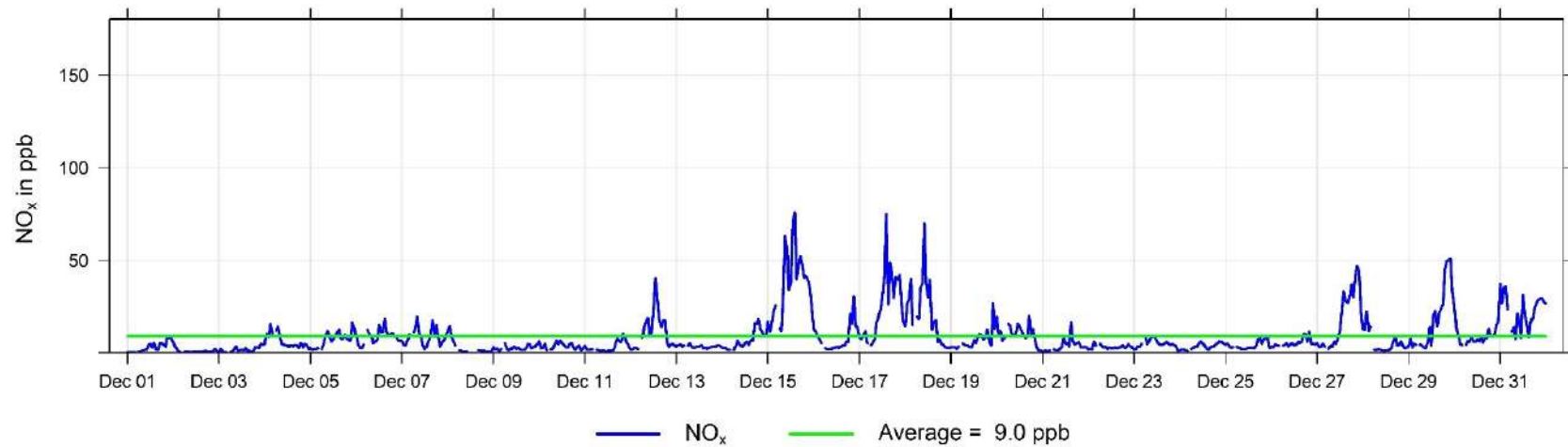
December Hourly Concentration Readings of SO₂ (in ppb) at Beaverlodge



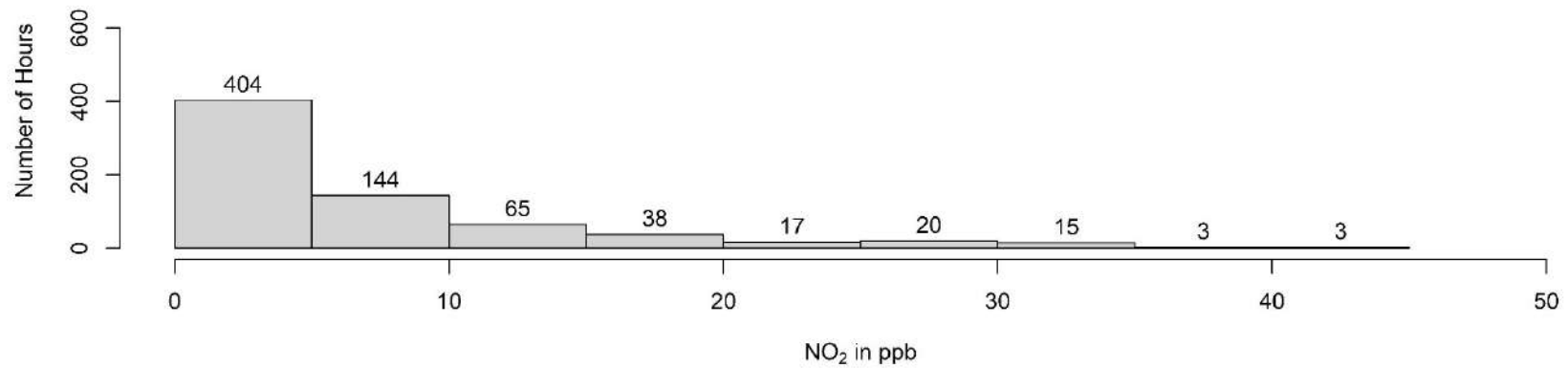
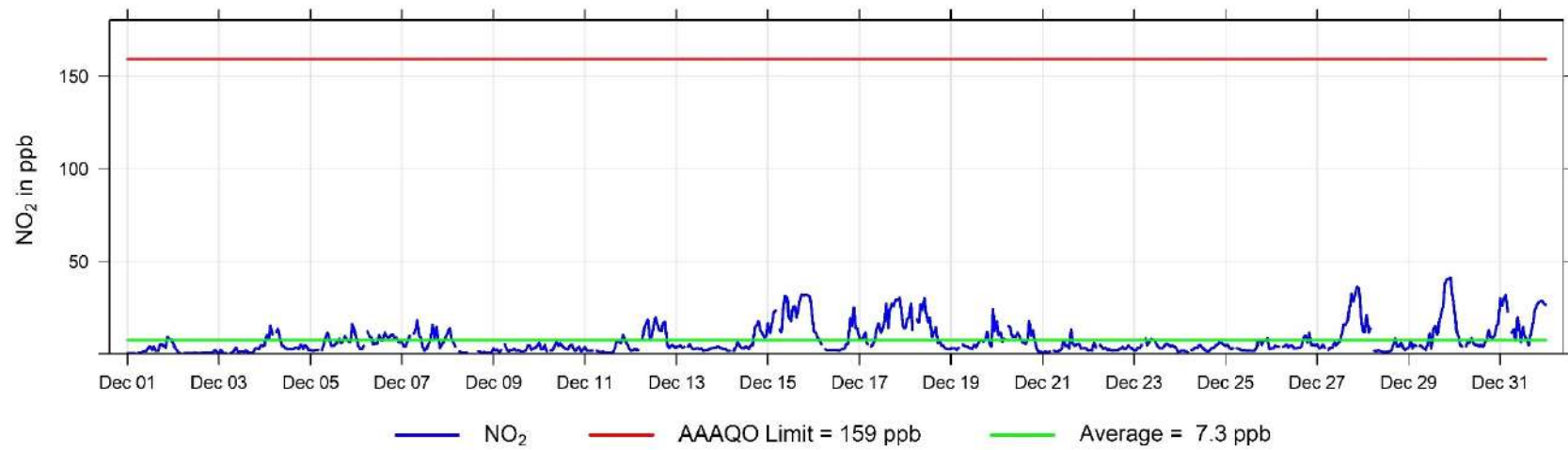
December Hourly Concentration Readings of NO (in ppb) at Beaverlodge



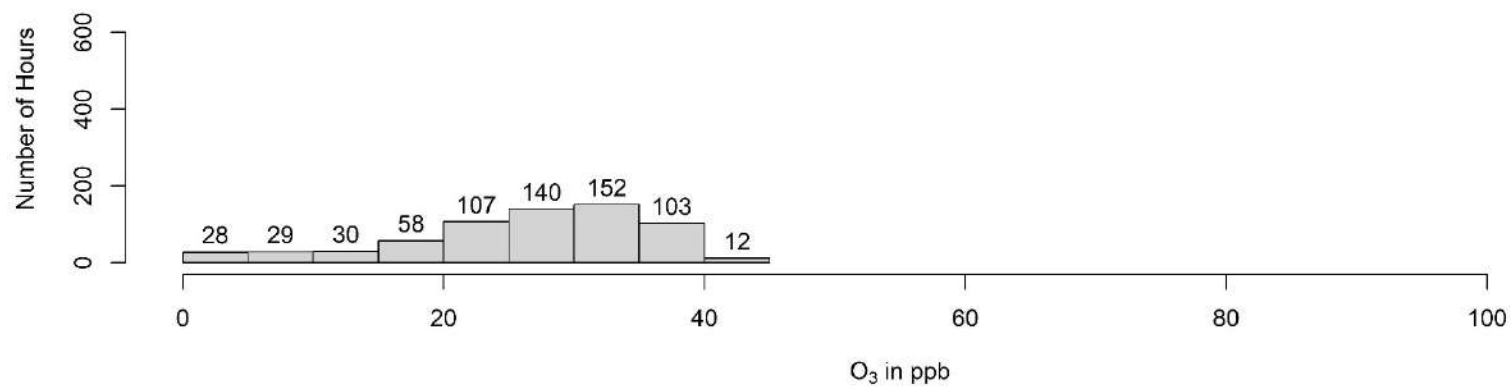
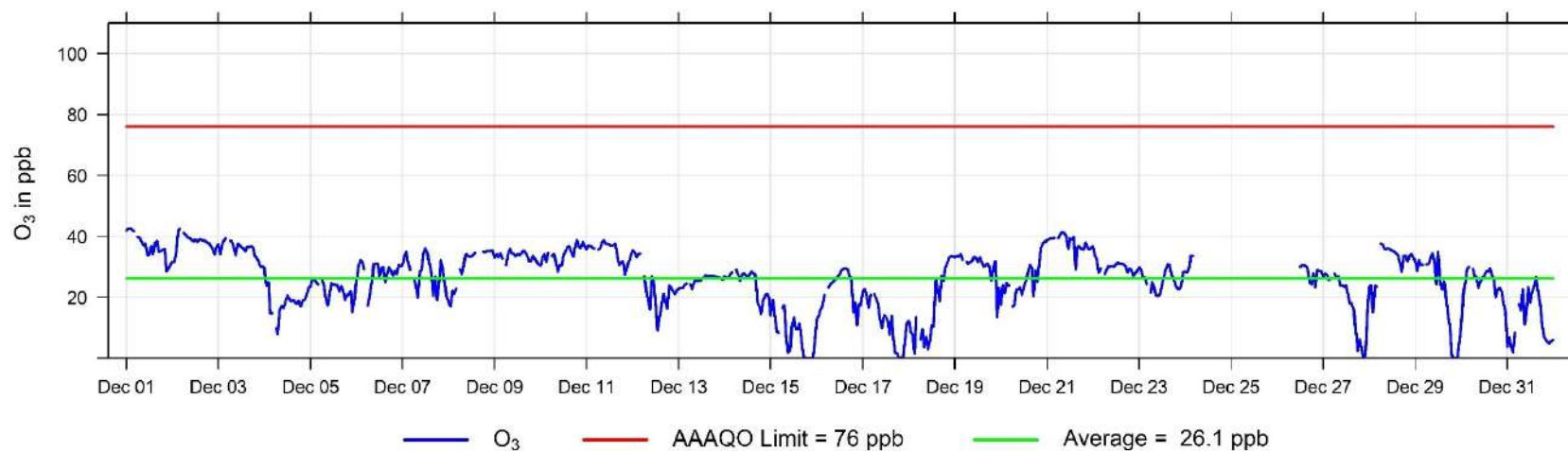
December Hourly Concentration Readings of NO_x (in ppb) at Beaverlodge



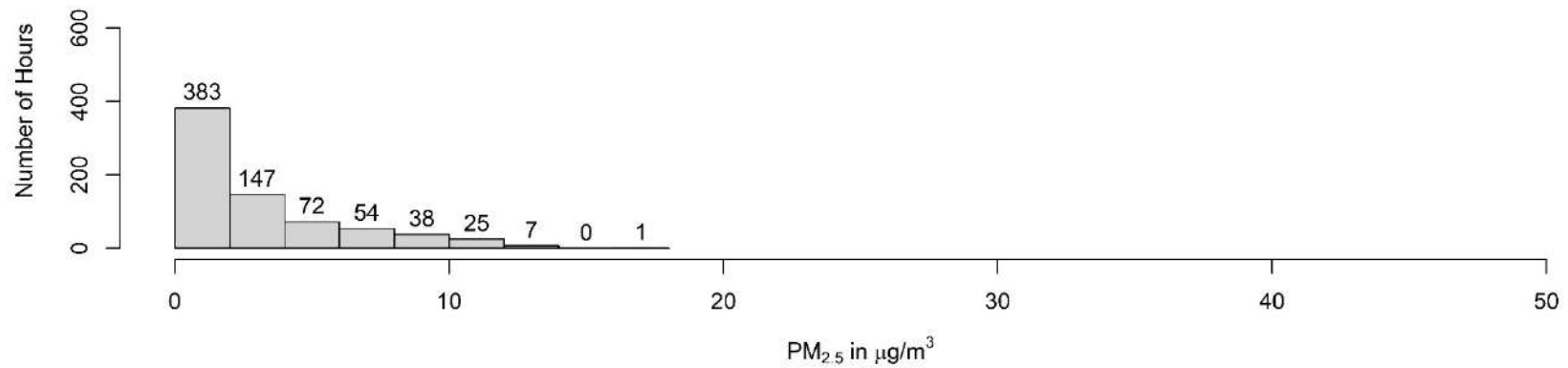
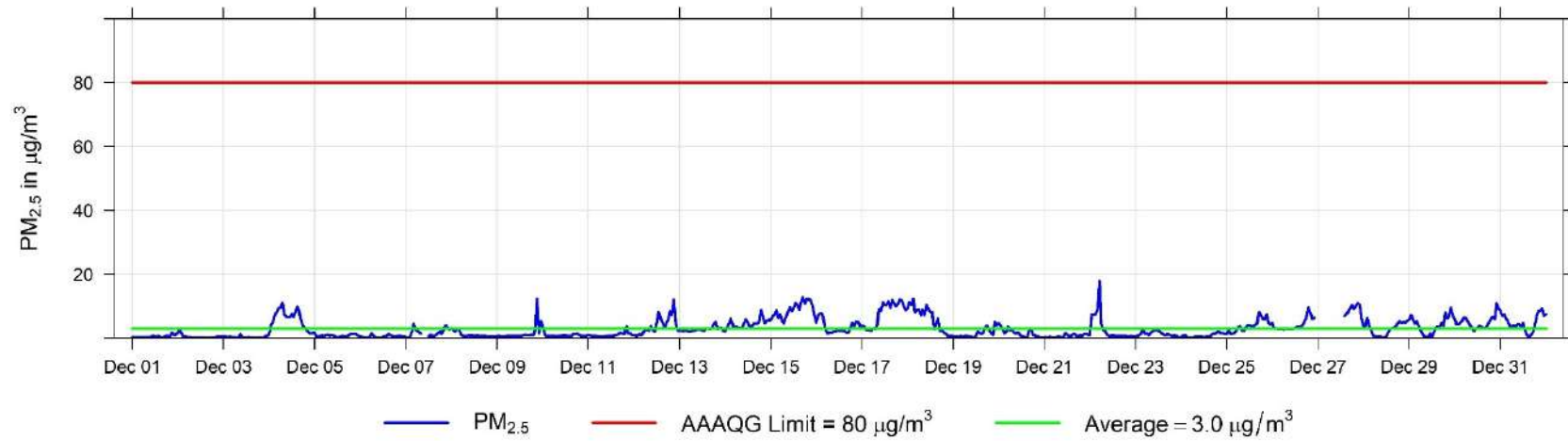
December Hourly Concentration Readings of NO₂ (in ppb) at Beaverlodge



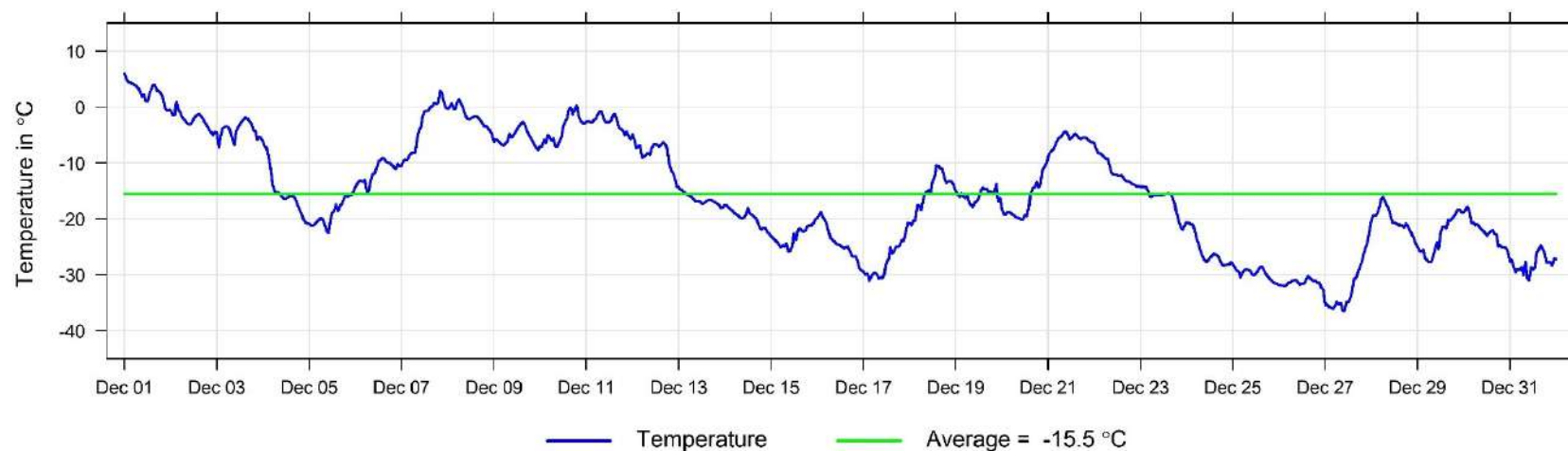
December Hourly Concentration Readings of O₃ (in ppb) at Beaverlodge



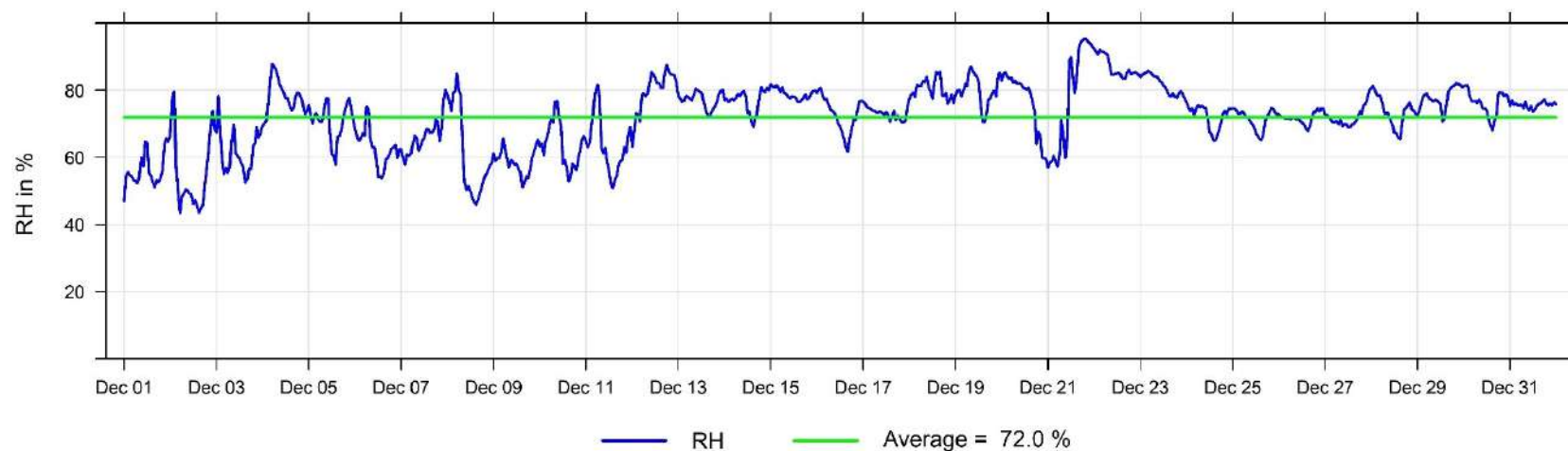
December Hourly Concentration Readings of PM_{2.5} in $\mu\text{g}/\text{m}^3$ at Beaverlodge



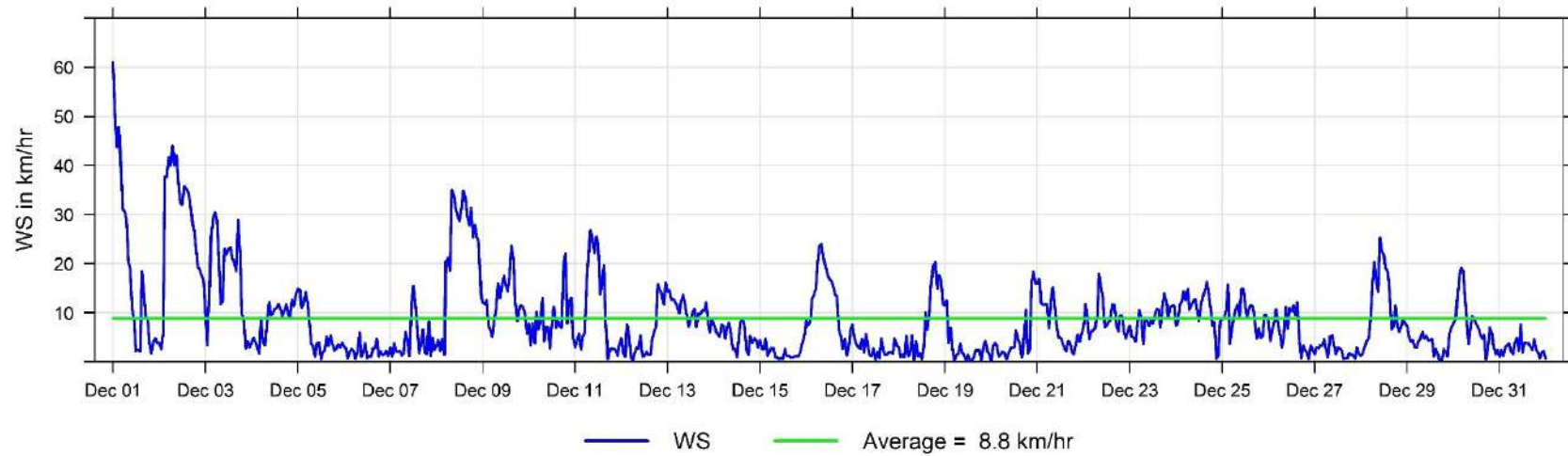
December Hourly Temperature Readings (in °C) at Beaverlodge



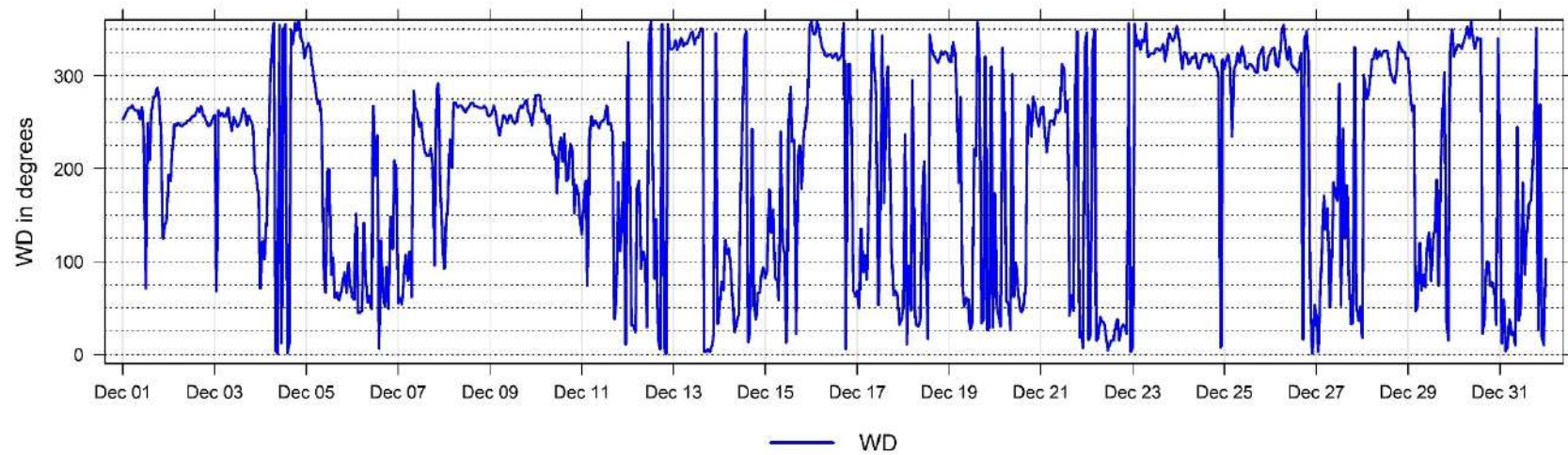
December Hourly Readings of Relative Humidity (in %) at Beaverlodge



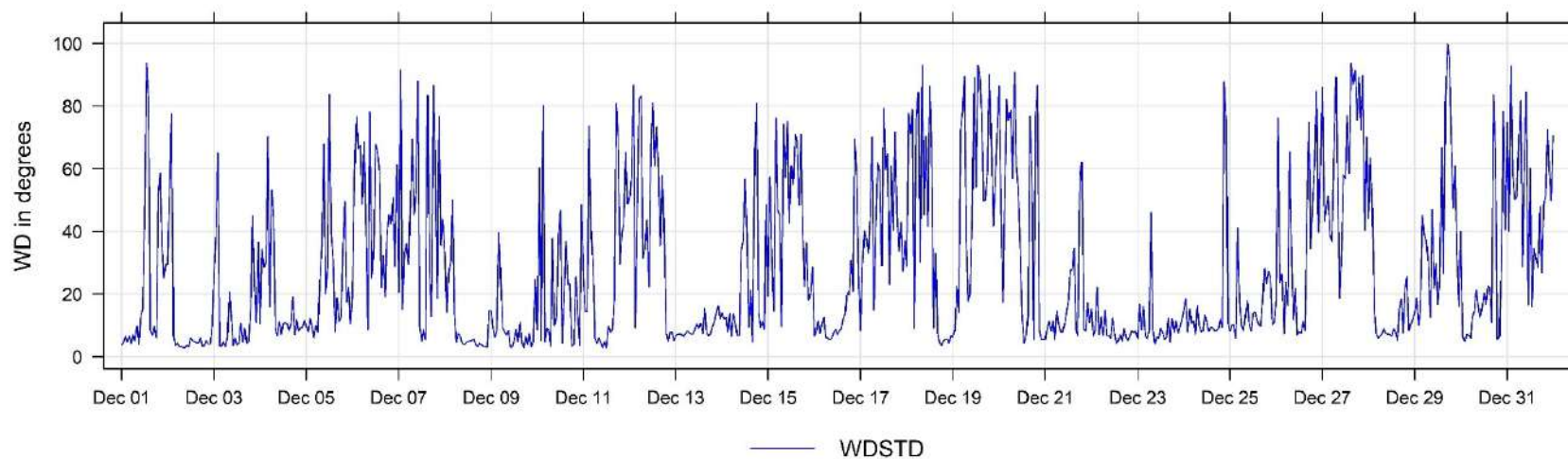
December Hourly Readings of Wind Speed (in km/hr) at Beaverlodge



December Hourly Readings of Wind Direction (in degrees) at Beaverlodge



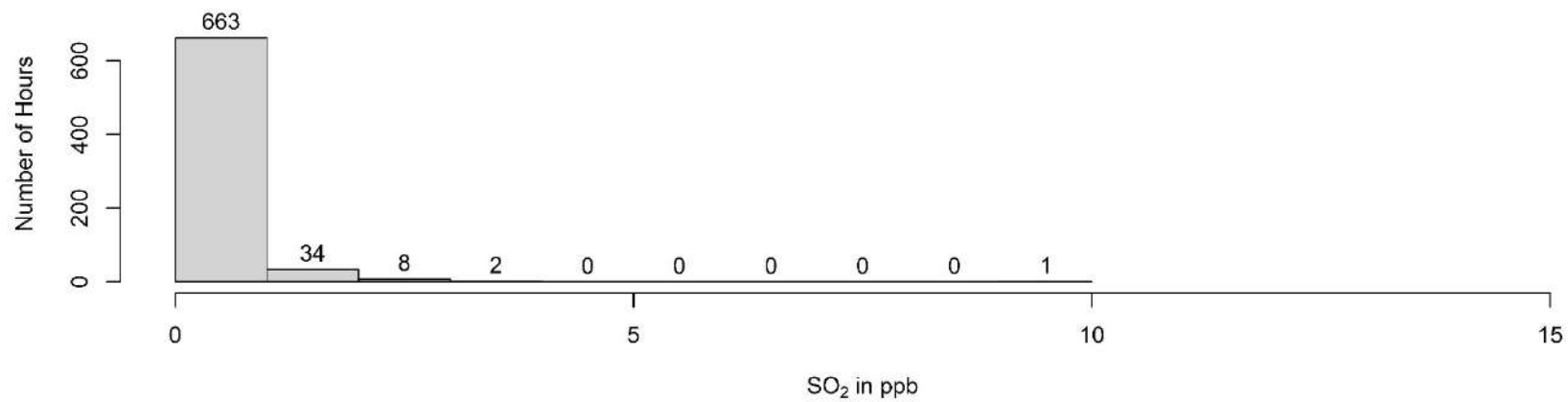
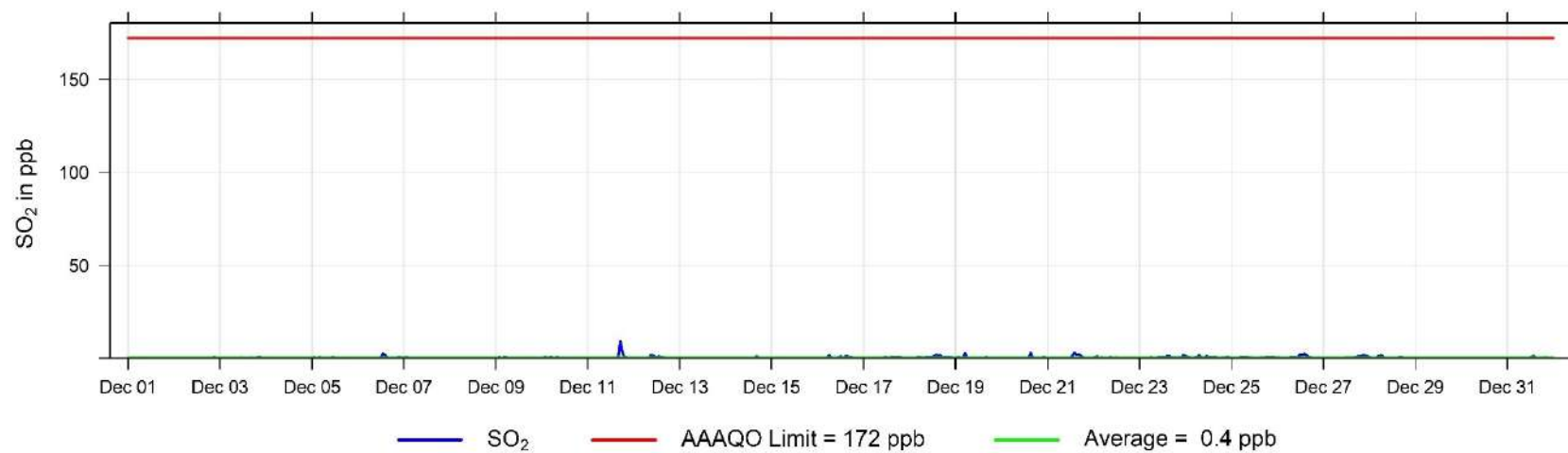
December Hourly Readings of Wind Direction Standard Deviation (in degrees) at Beaverlodge



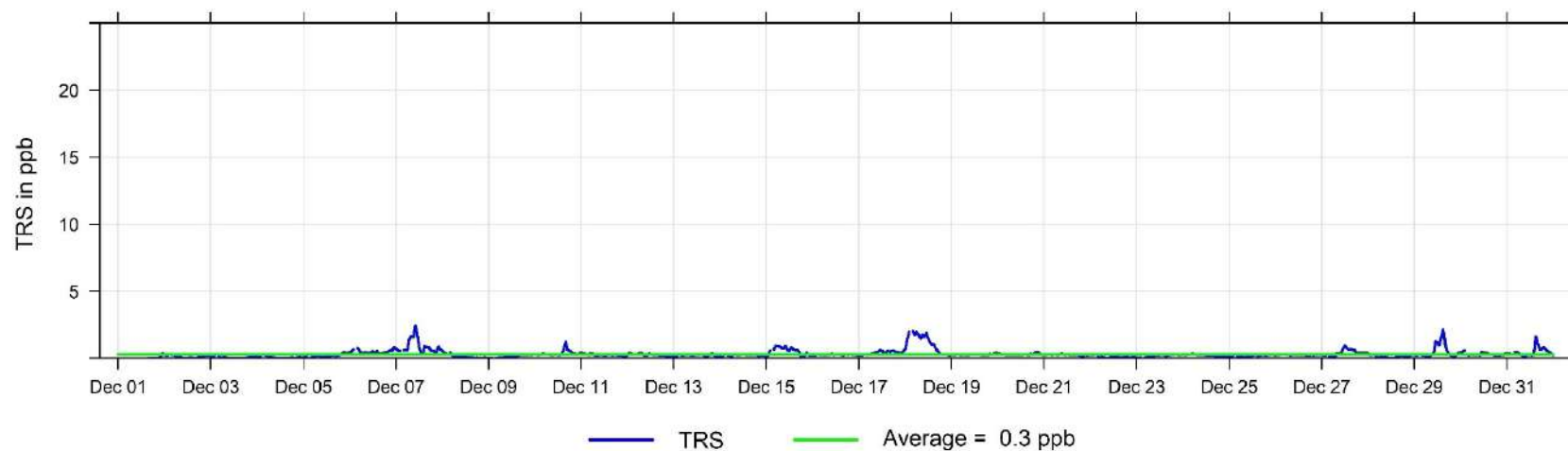
3 Dunes Charts

The following pages include the charts and histograms for Dunes Station

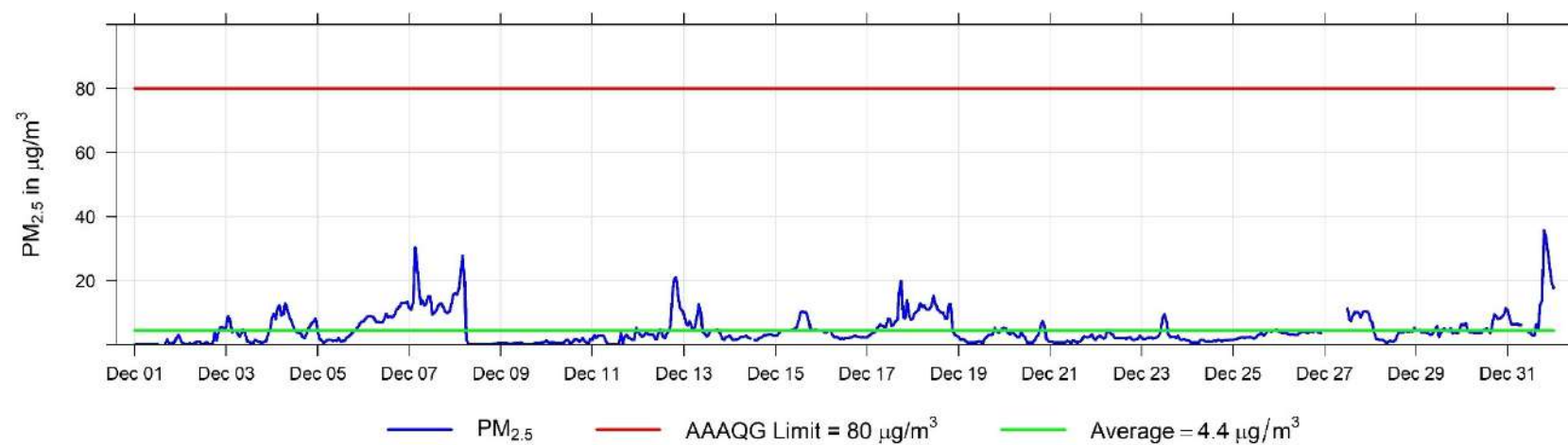
December Hourly Concentration Readings of SO₂ (in ppb) at Dunes

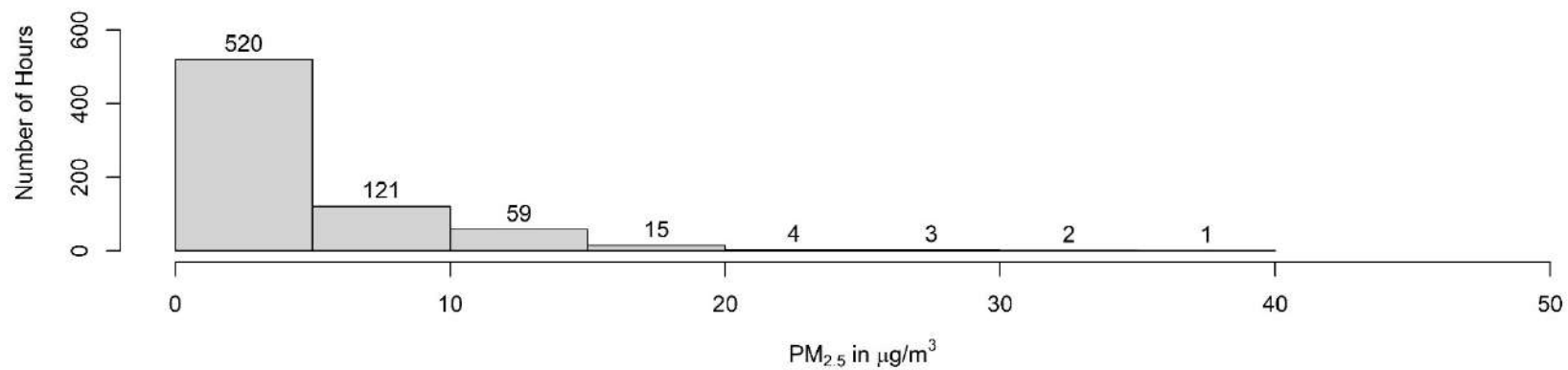


December Hourly Concentration Readings of TRS (in ppb) at Dunes

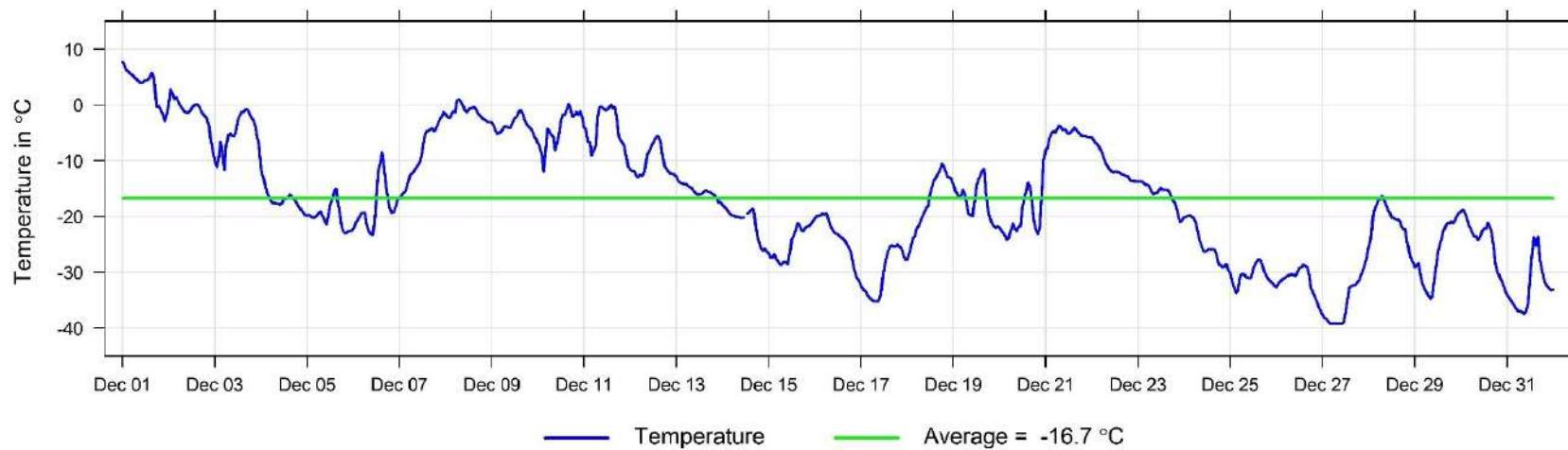


December Hourly Concentration Readings of PM_{2.5} in $\mu\text{g}/\text{m}^3$ at Dunes

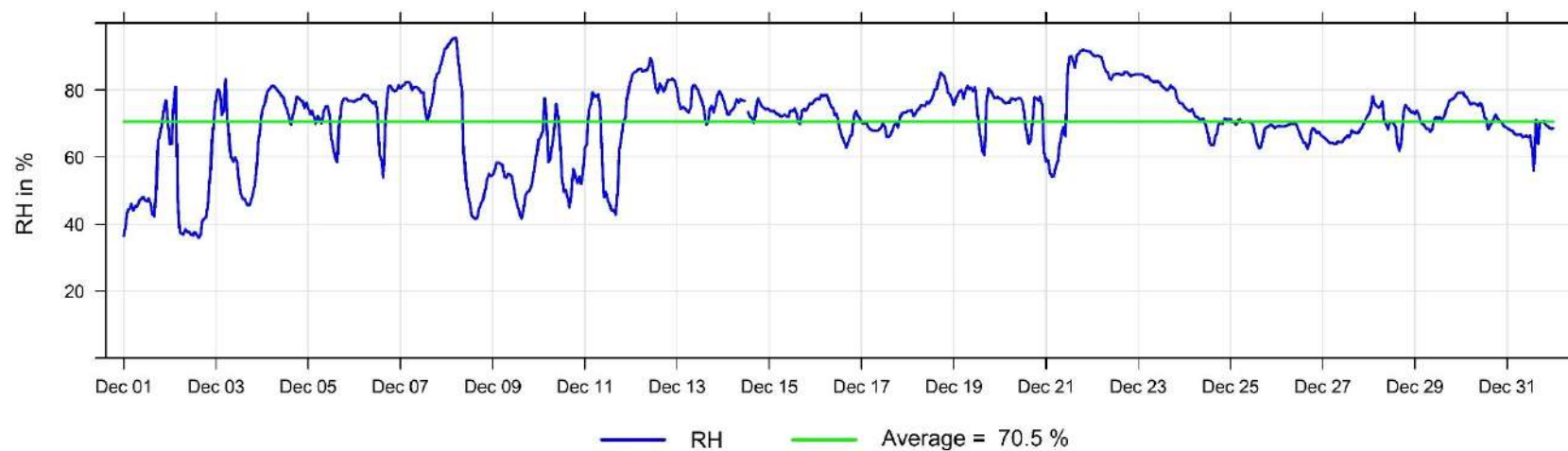




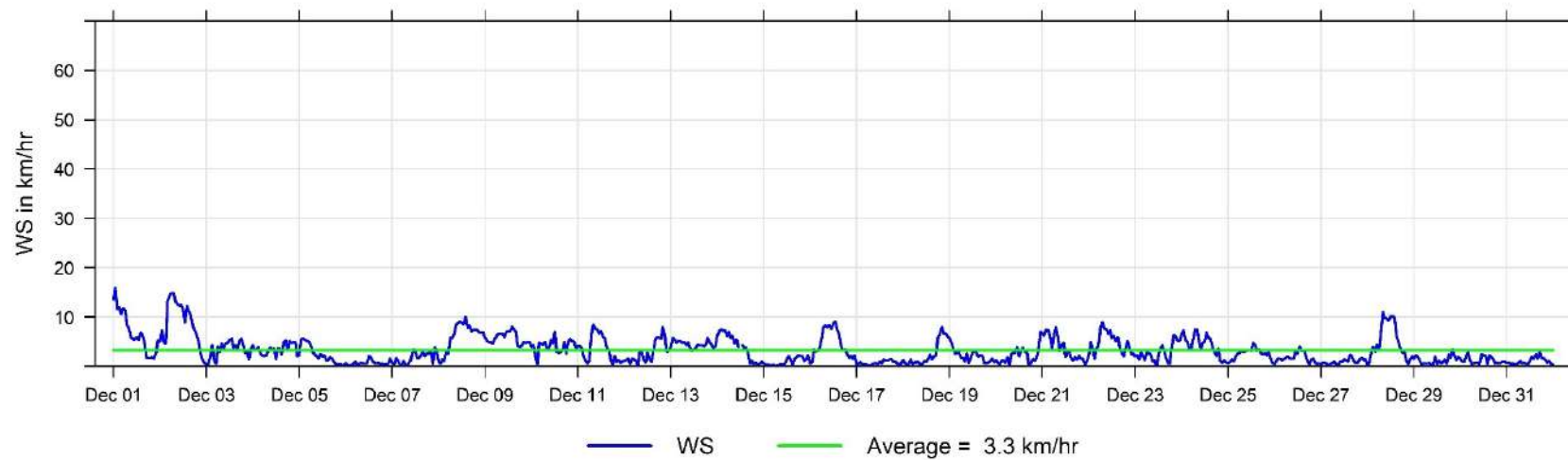
December Hourly Temperature Readings (in °C) at Dunes



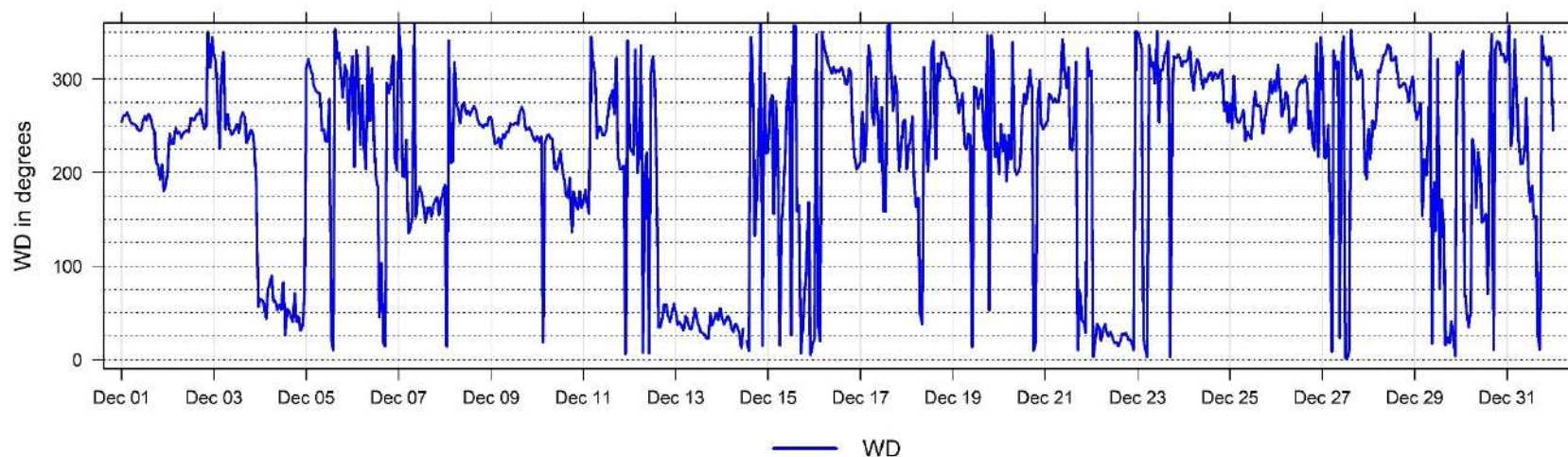
December Hourly Readings of Relative Humidity (in %) at Dunes



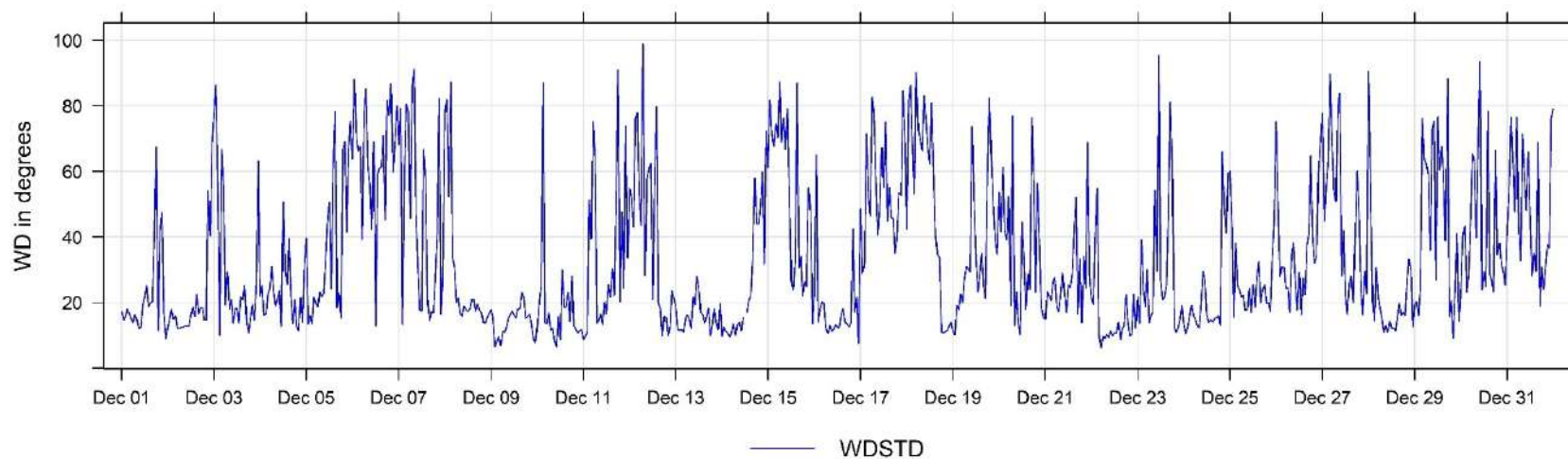
December Hourly Readings of Wind Speed (in km/hr) at Dunes



December Hourly Readings of Wind Direction (in degrees) at Dunes



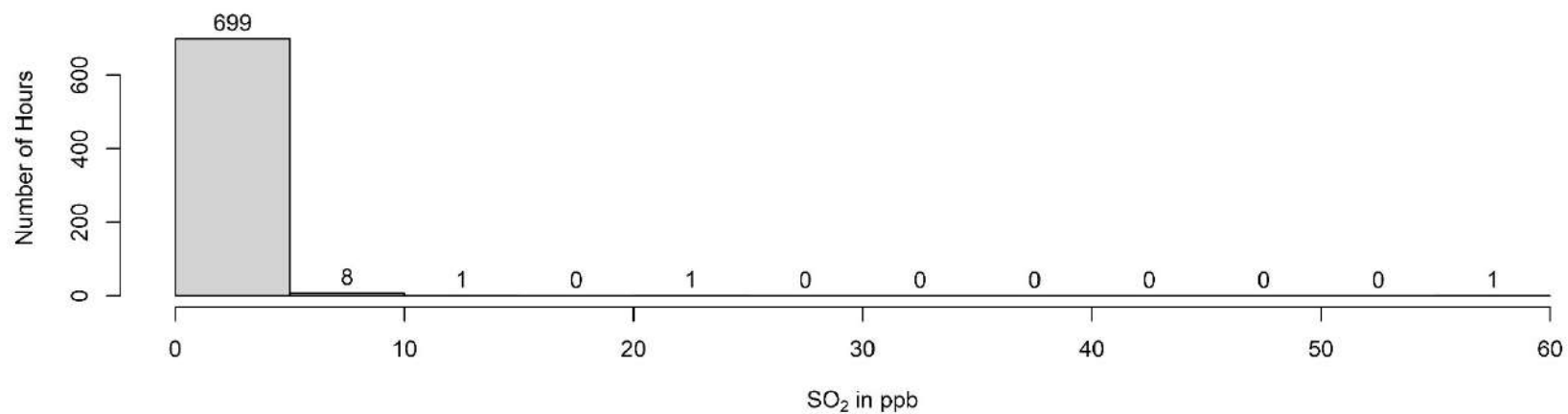
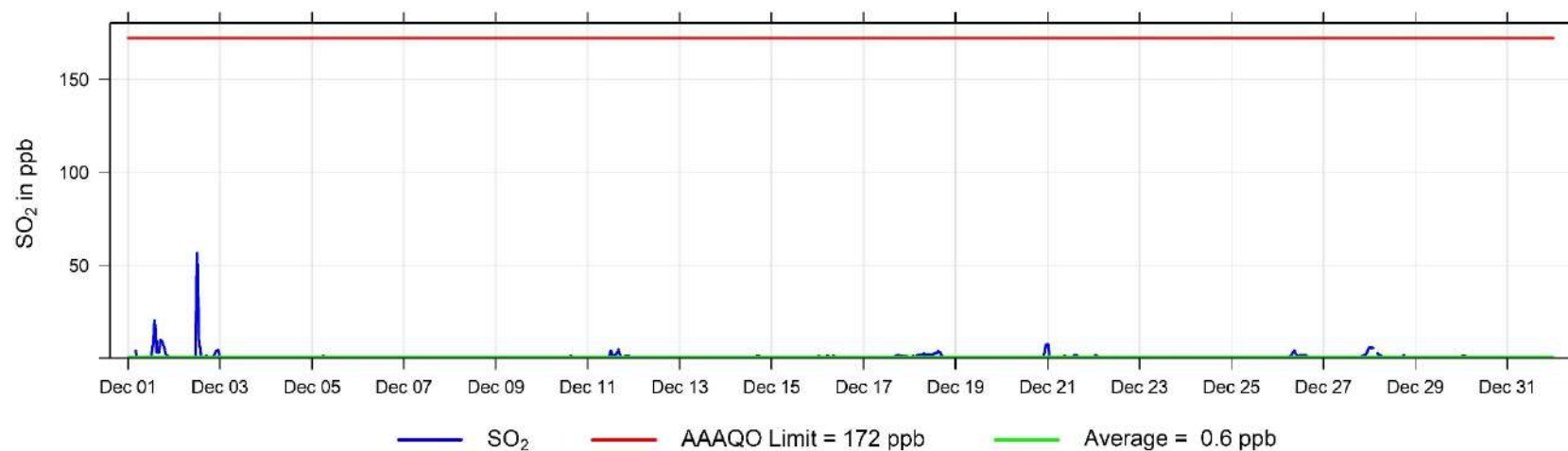
December Hourly Readings of Wind Direction Standard Deviation (in degrees) at Dunes



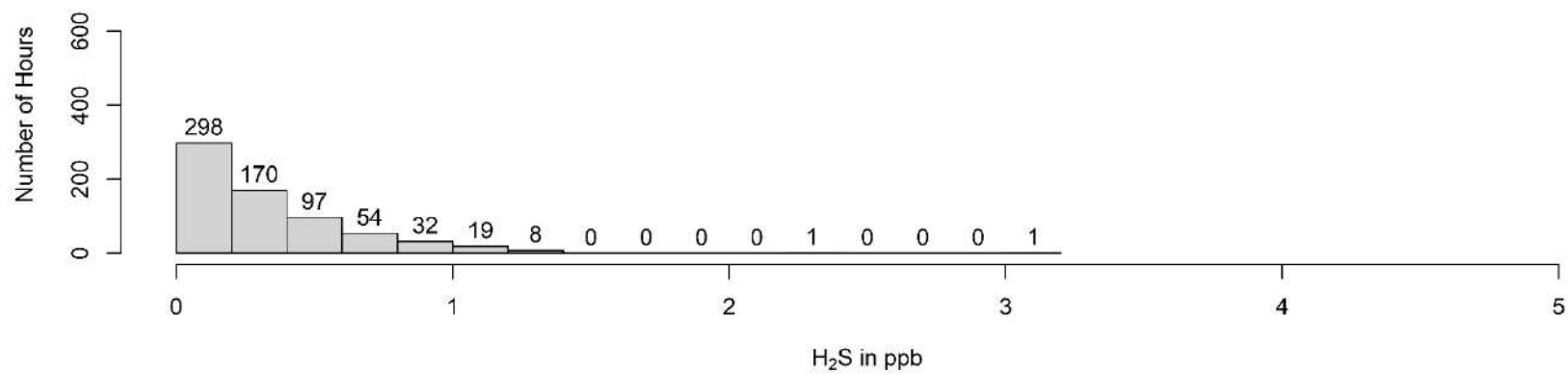
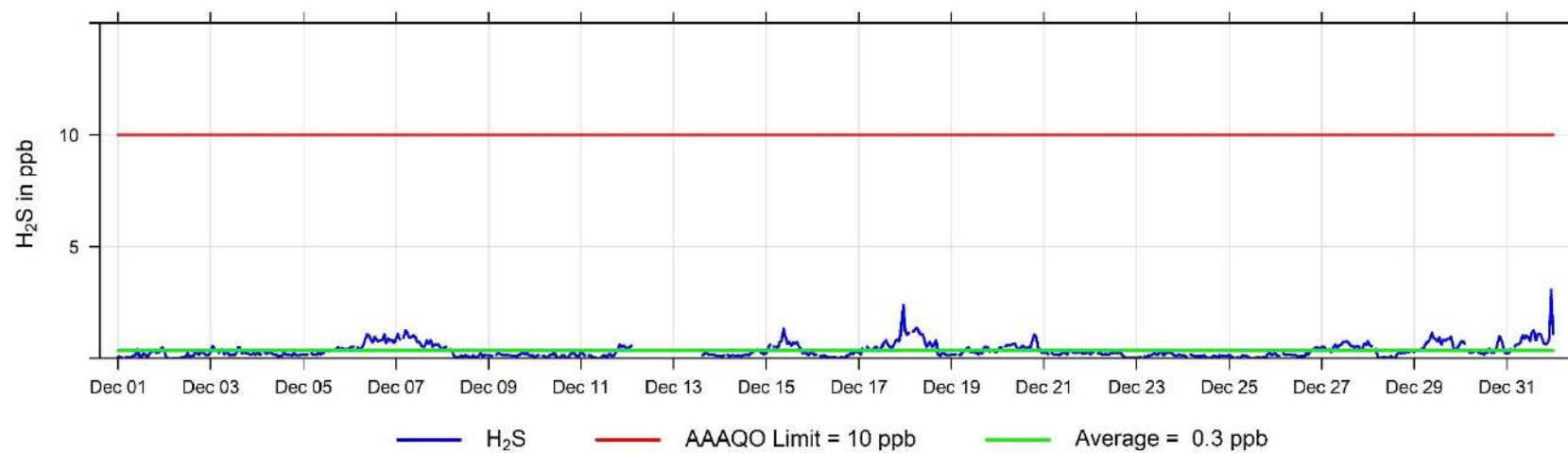
4 Grande Prairie - Henry Pirker Charts

The following pages include the charts and histograms for Henry Pirker Station in Grande Prairie

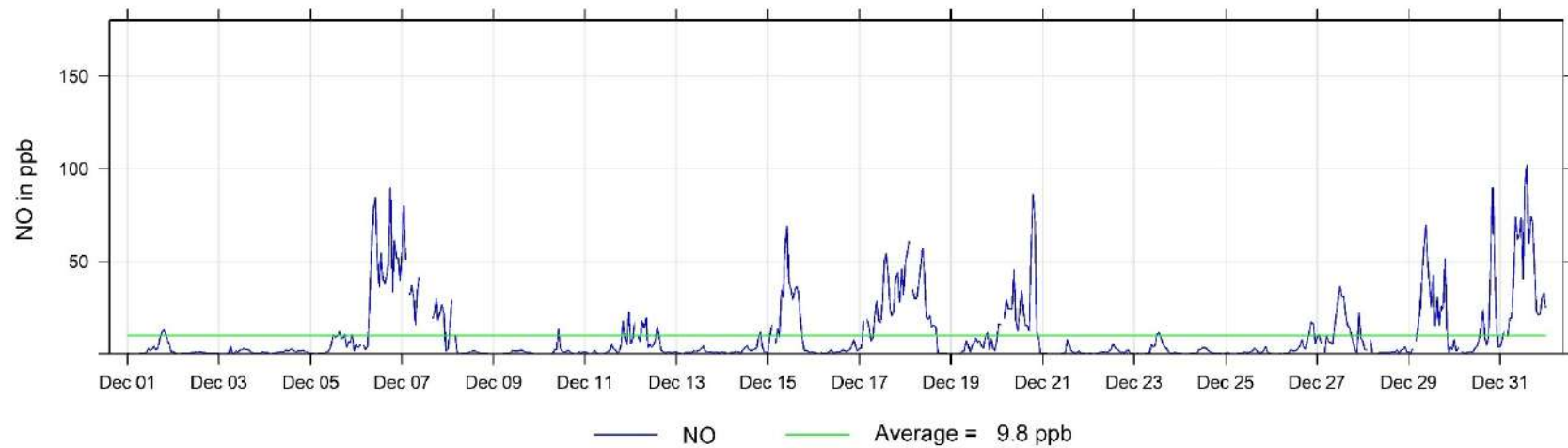
December Hourly Concentration Readings of SO₂ (in ppb) at Henry Pirker



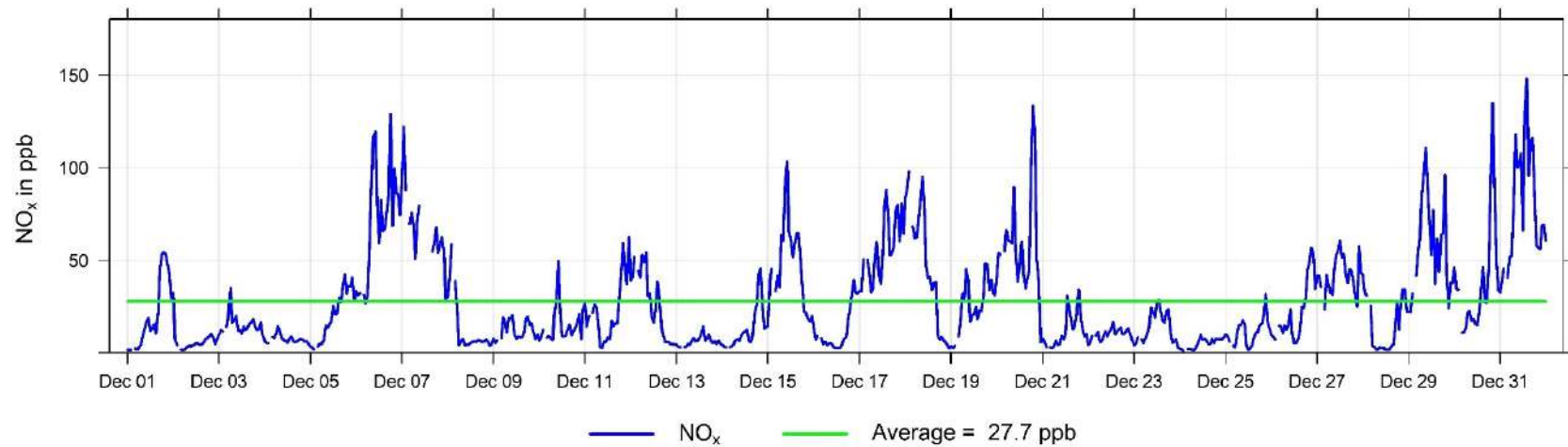
December Hourly Concentration Readings of H₂S (in ppb) at Henry Pirker



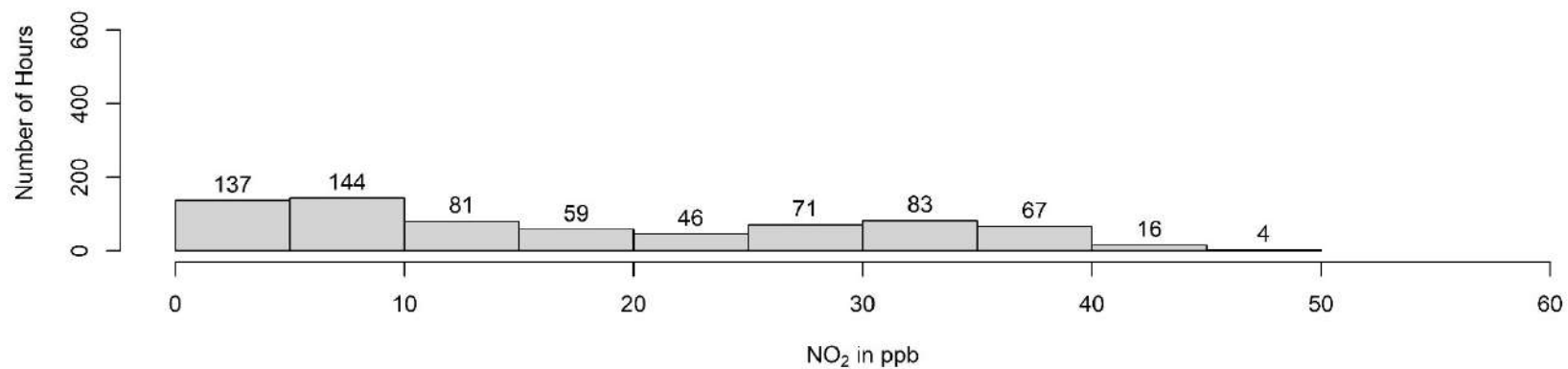
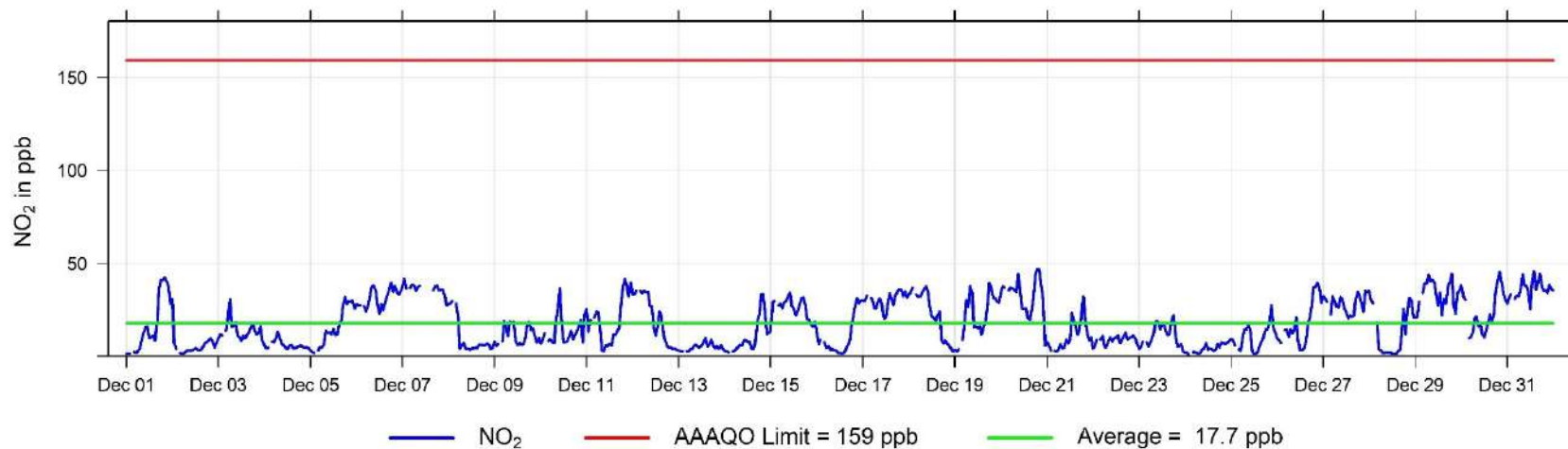
December Hourly Concentration Readings of NO (in ppb) at Henry Pirker



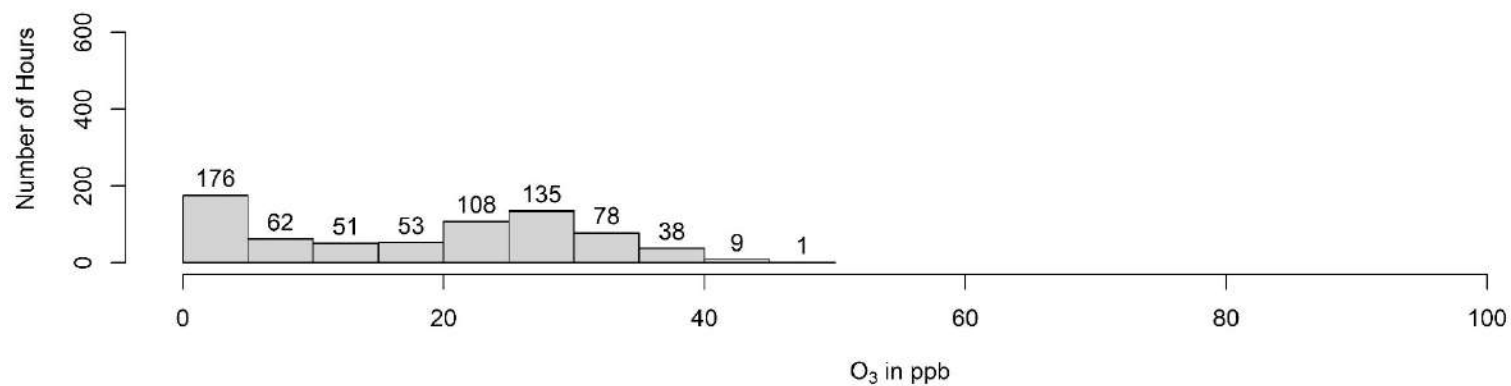
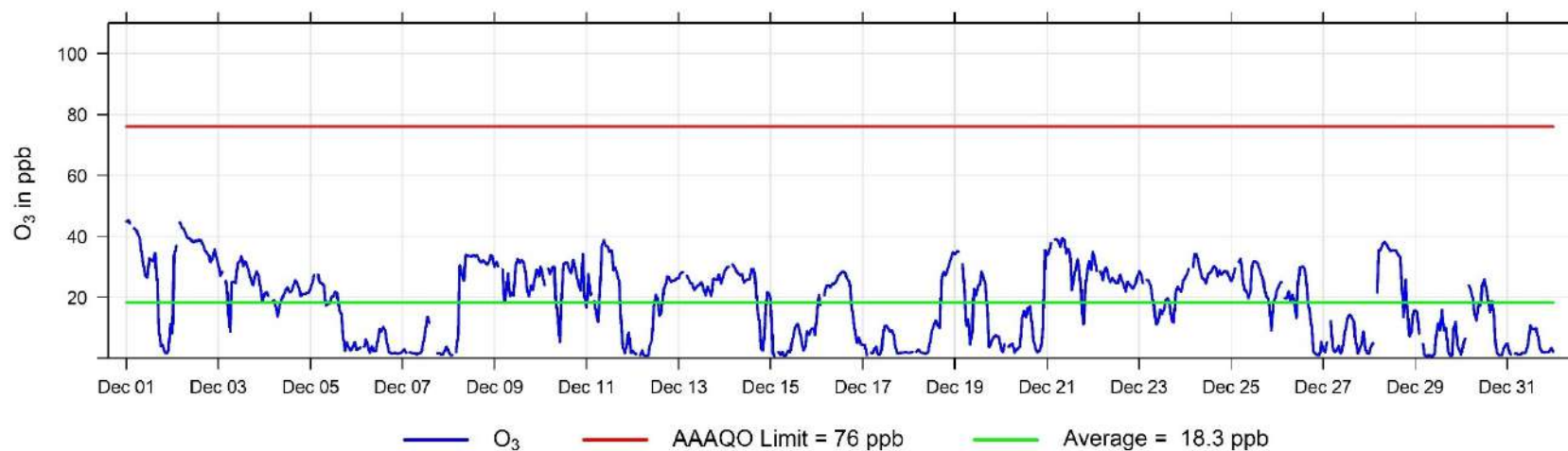
December Hourly Concentration Readings of NO_x (in ppb) at Henry Pirker



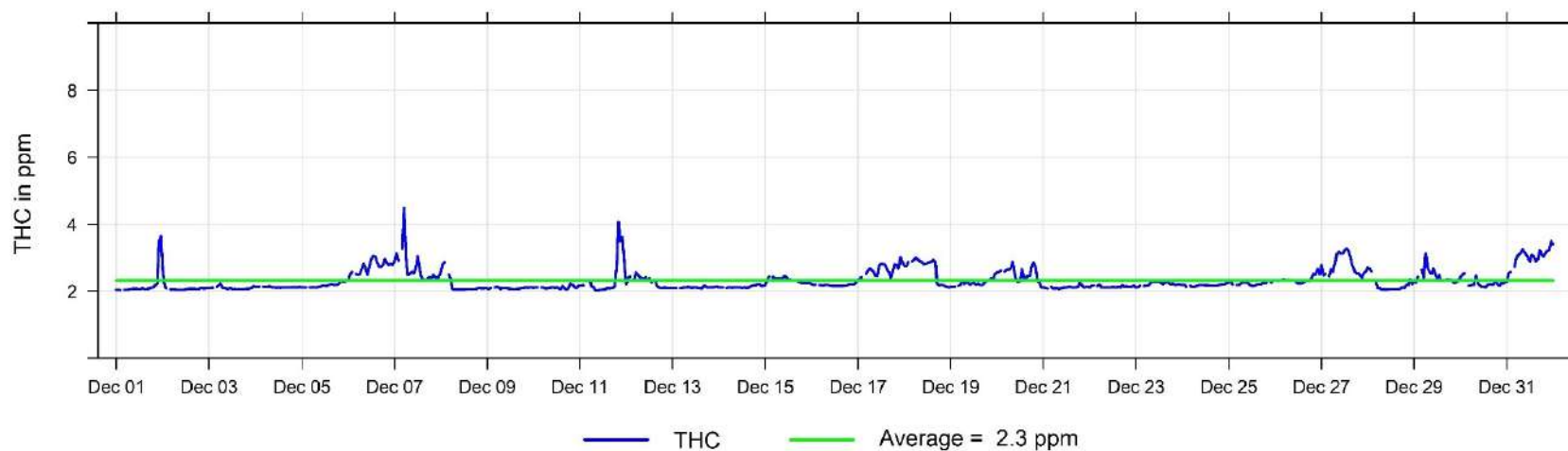
December Hourly Concentration Readings of NO₂ (in ppb) at Henry Pirker



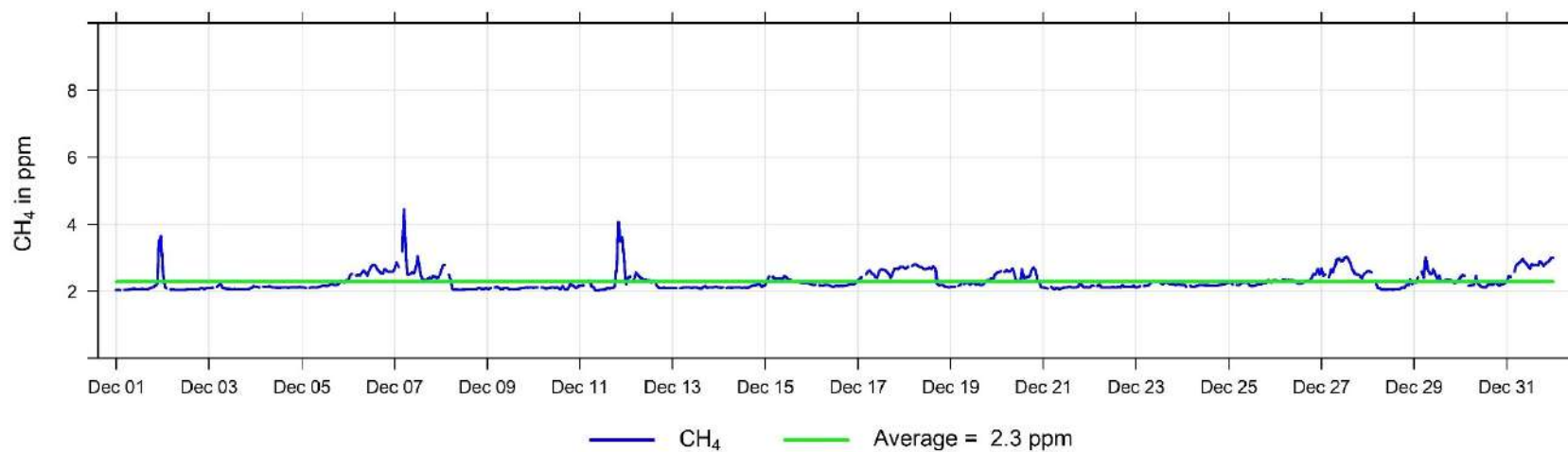
December Hourly Concentration Readings of O₃ (in ppb) at Henry Pirker



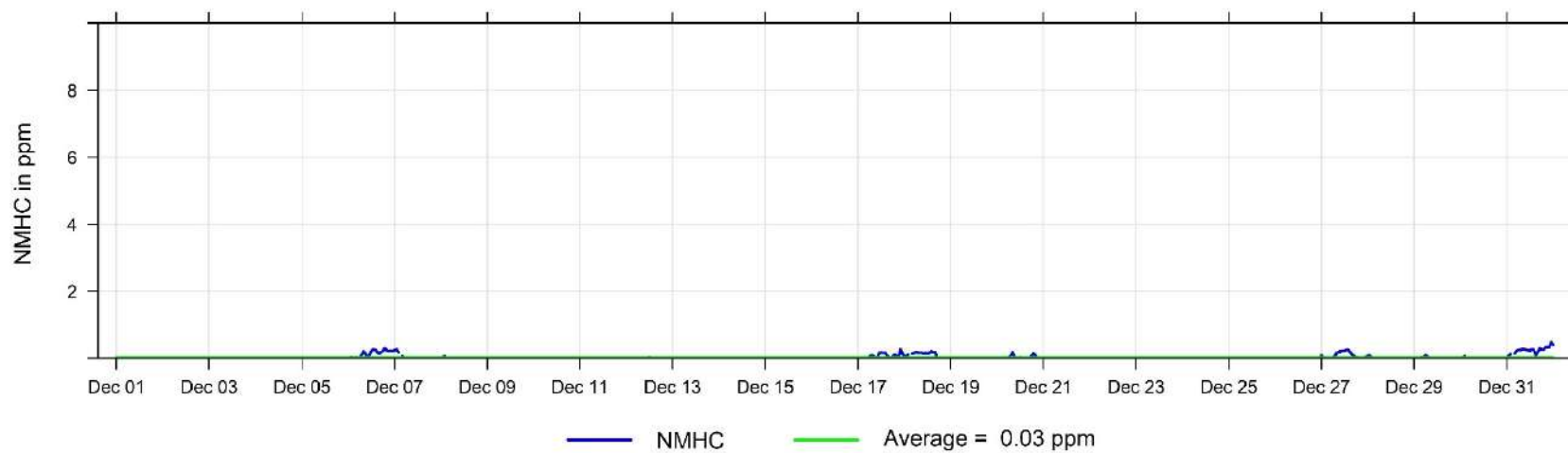
December Hourly Concentration Readings of THC (in ppm) at Henry Pirker



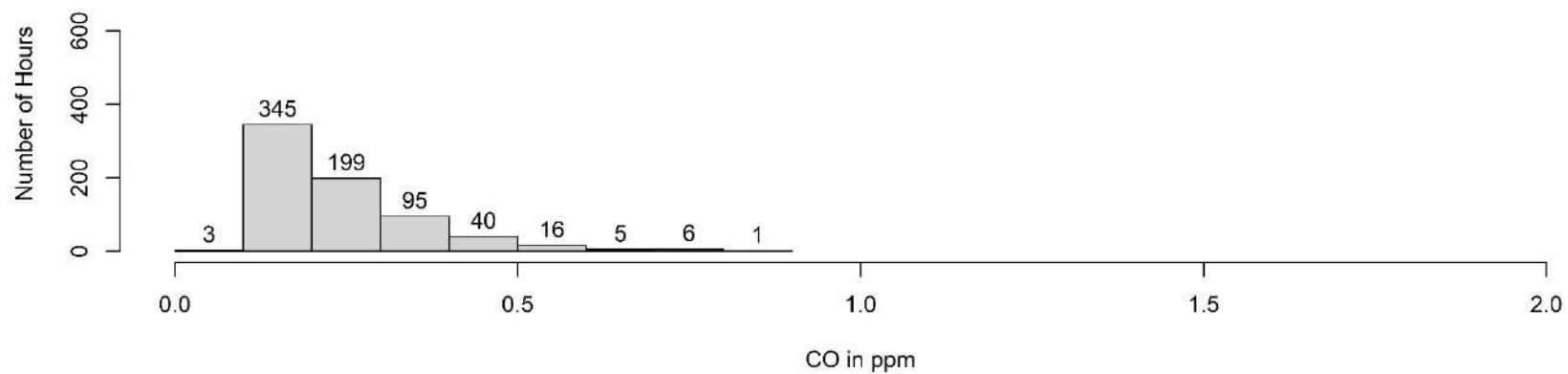
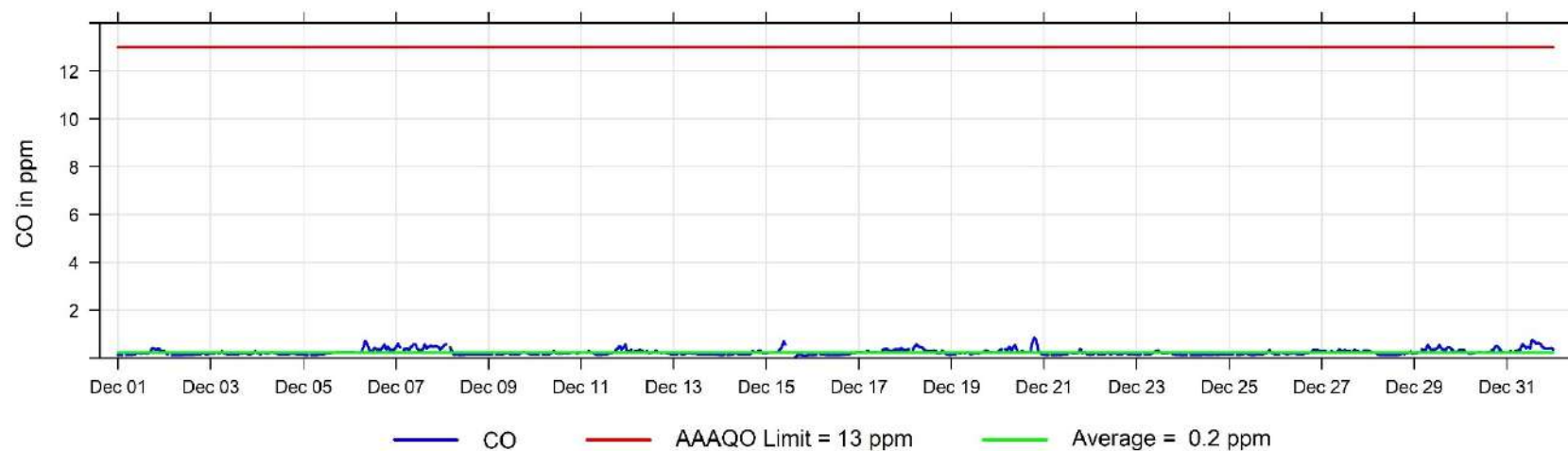
December Hourly Concentration Readings of CH₄ (in ppm) at Henry Pirker



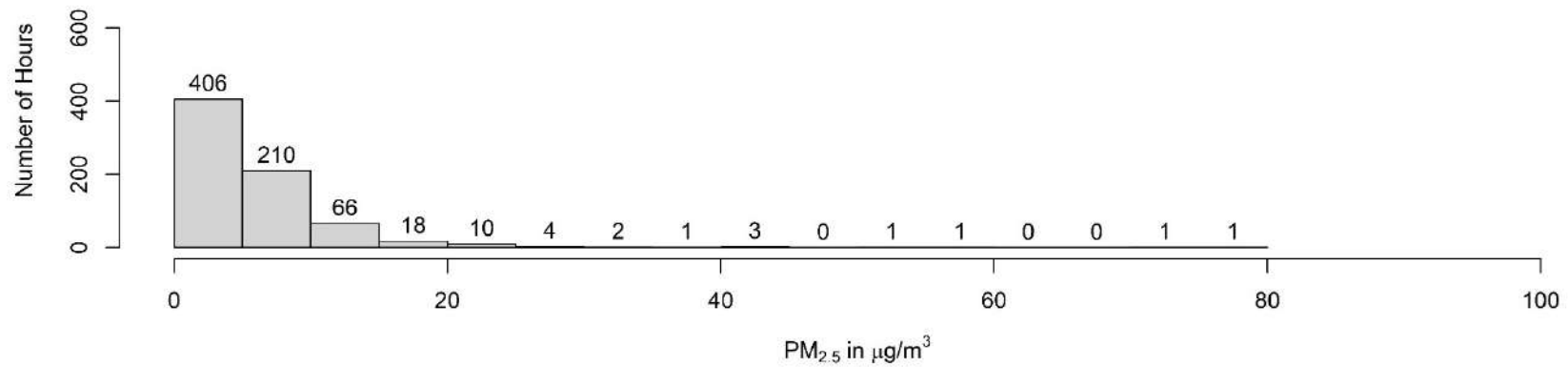
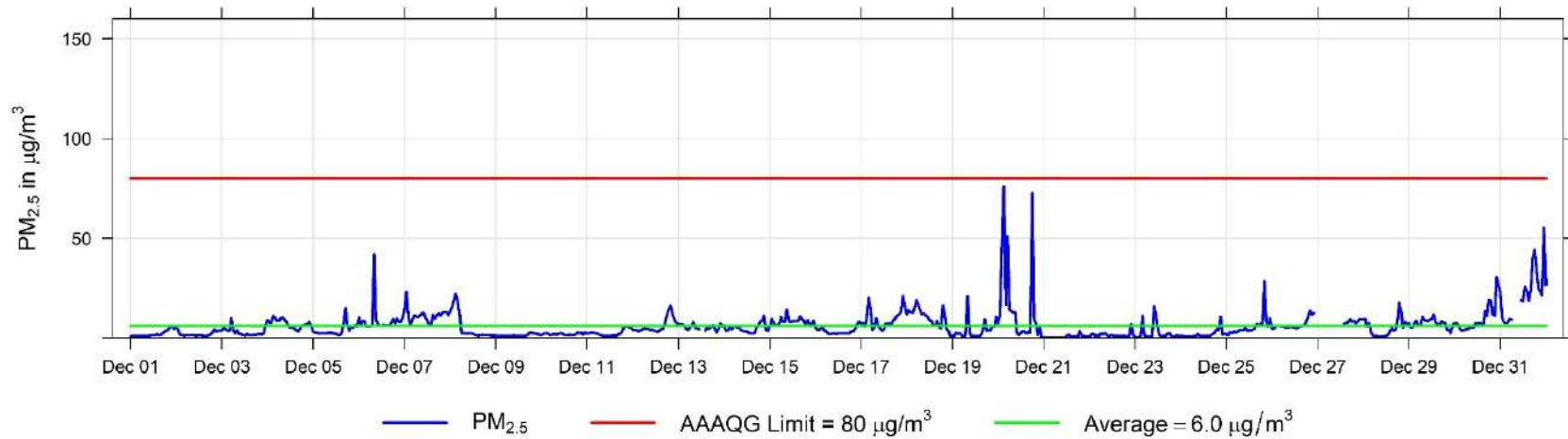
December Hourly Concentration Readings of NMHC (in ppm) at Henry Pirker



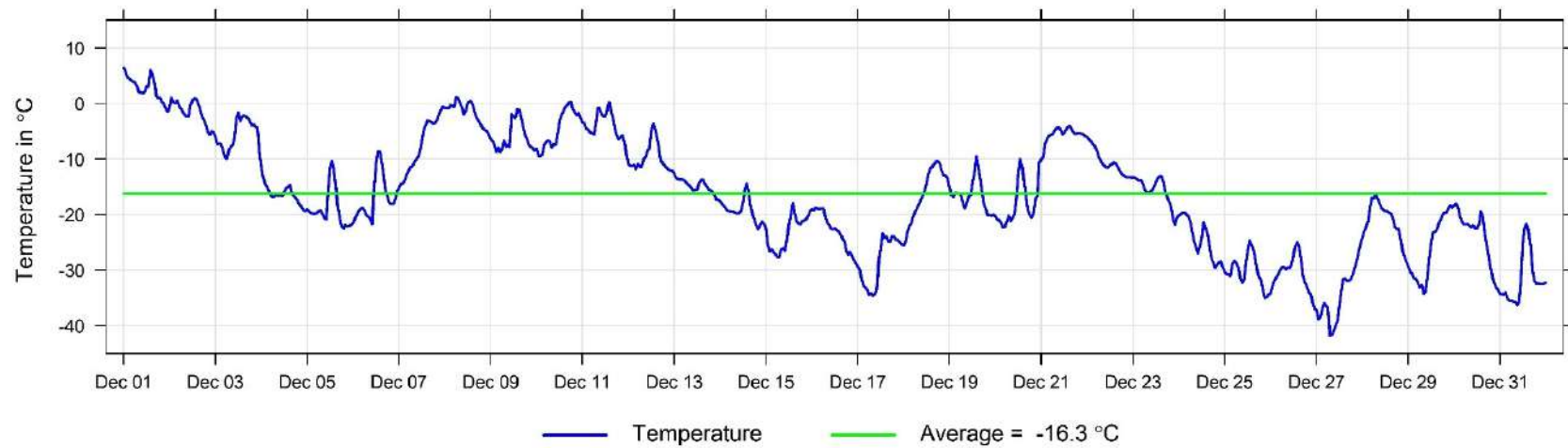
December Hourly Concentration Readings of CO (in ppm) at Henry Pirker



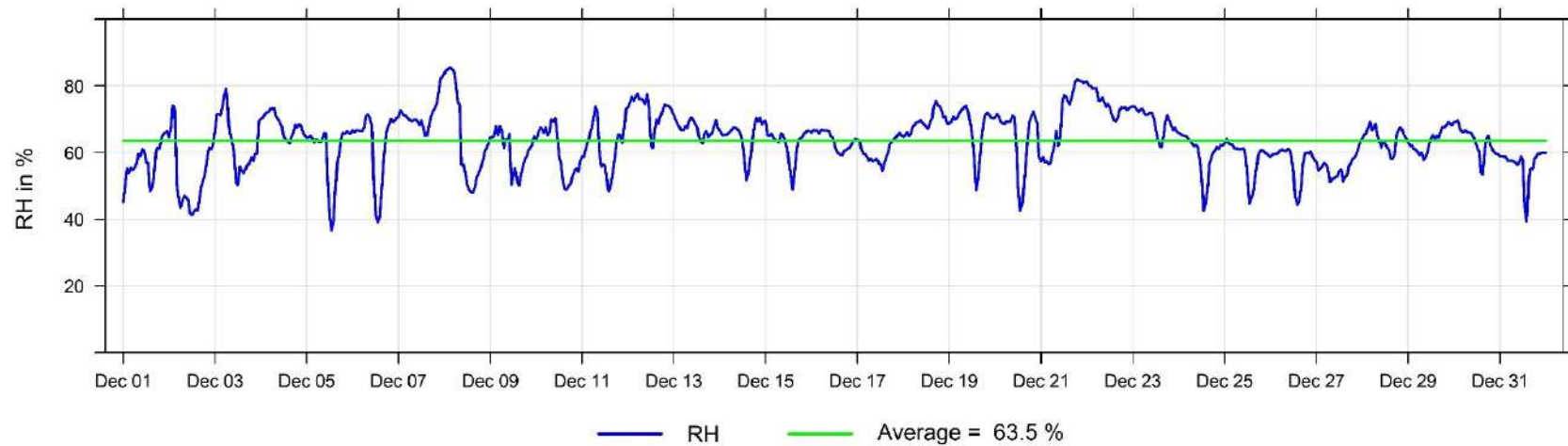
December Hourly Concentration Readings of PM_{2.5} in $\mu\text{g}/\text{m}^3$ at Henry Pirker



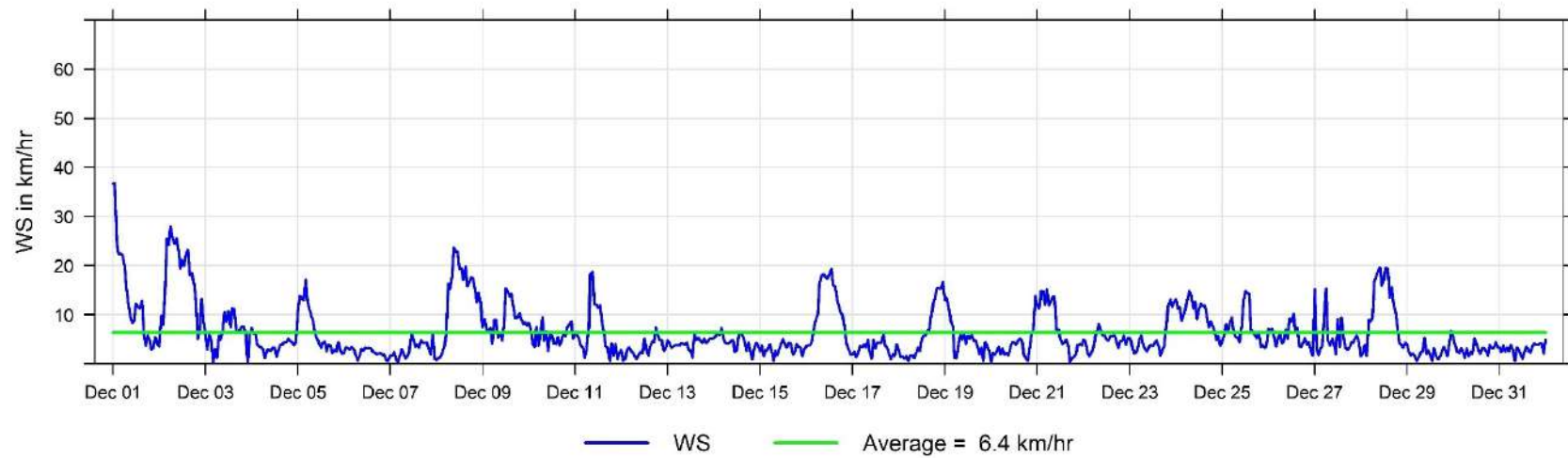
December Hourly Temperature Readings (in °C) at Henry Pirker



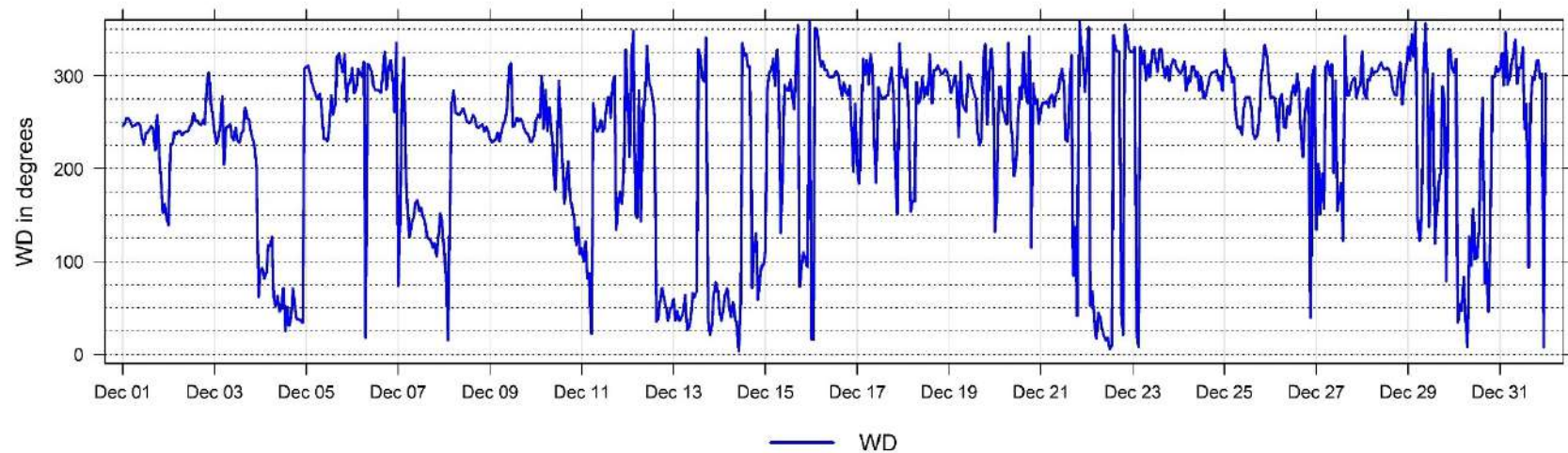
December Hourly Readings of Relative Humidity (in %) at Henry Pirker



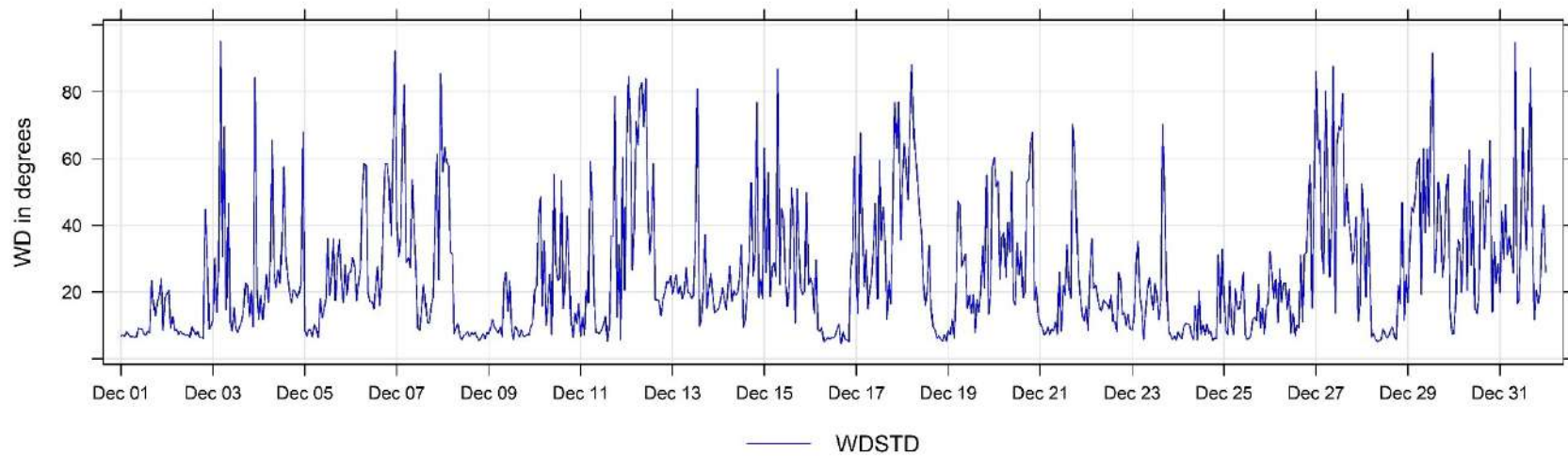
December Hourly Readings of Wind Speed (in km/hr) at Henry Pirker



December Hourly Readings of Wind Direction (in degrees) at Henry Pirker



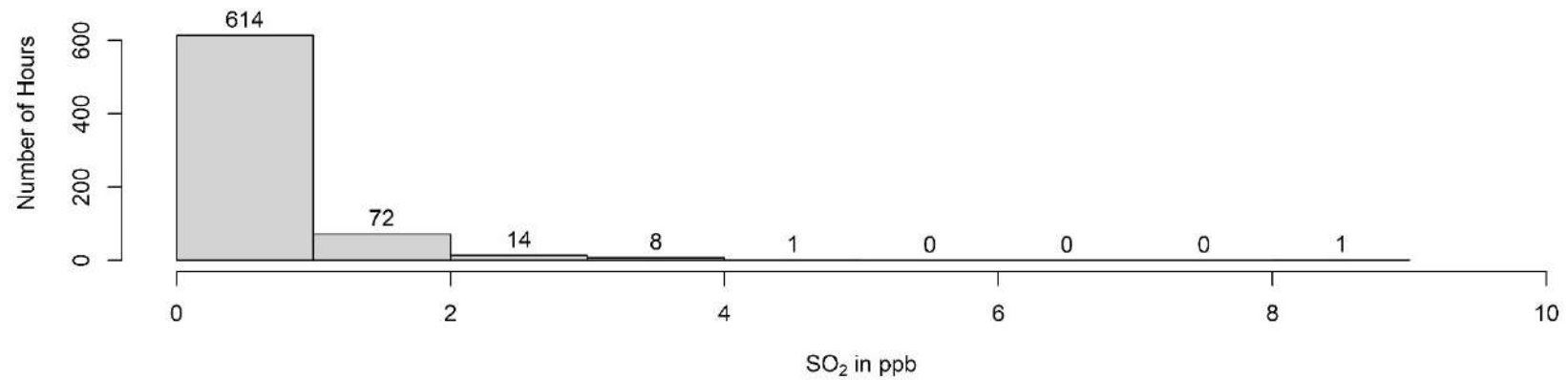
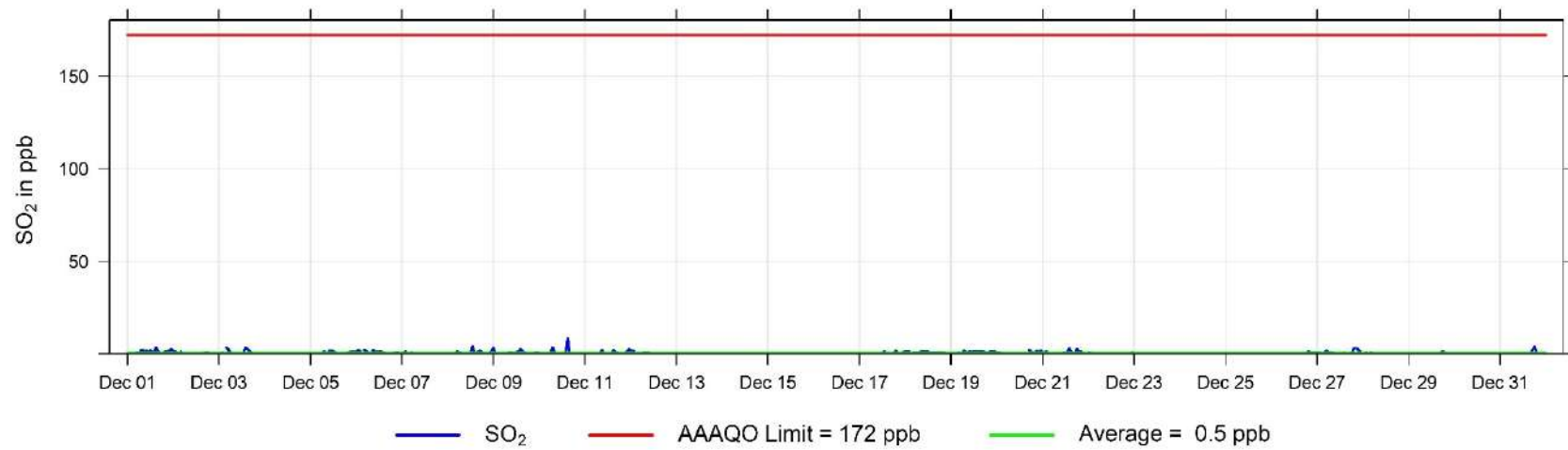
December Hourly Readings of Wind Direction Standard Deviation (in degrees) at Henry Pirker



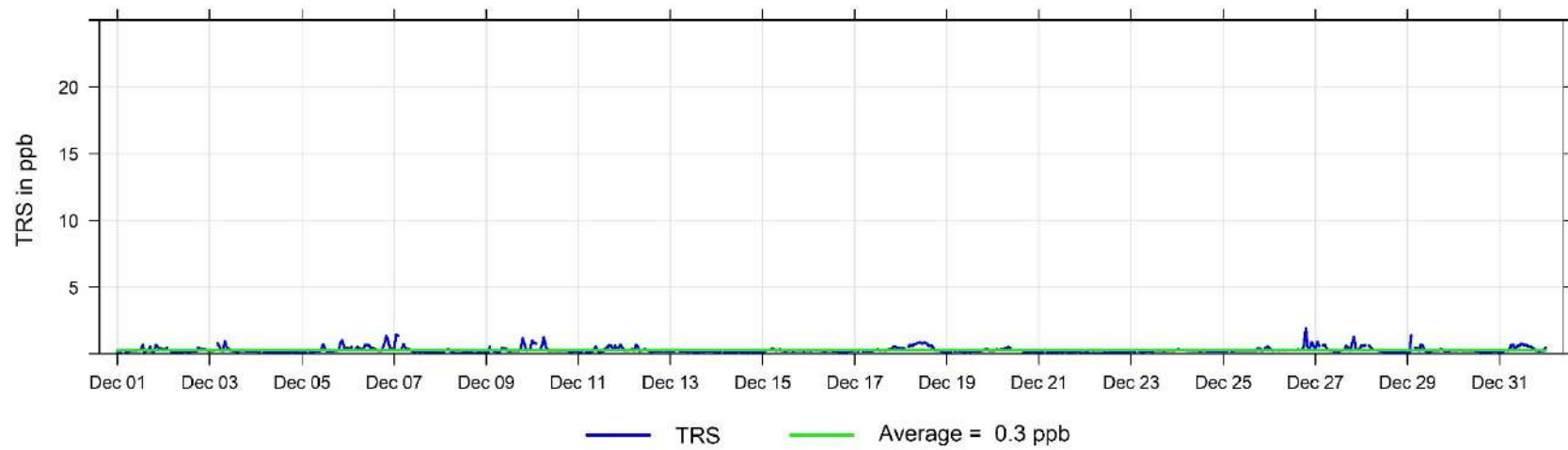
5 Smoky Heights Charts

The following pages include the charts and histograms for Smoky Heights Station

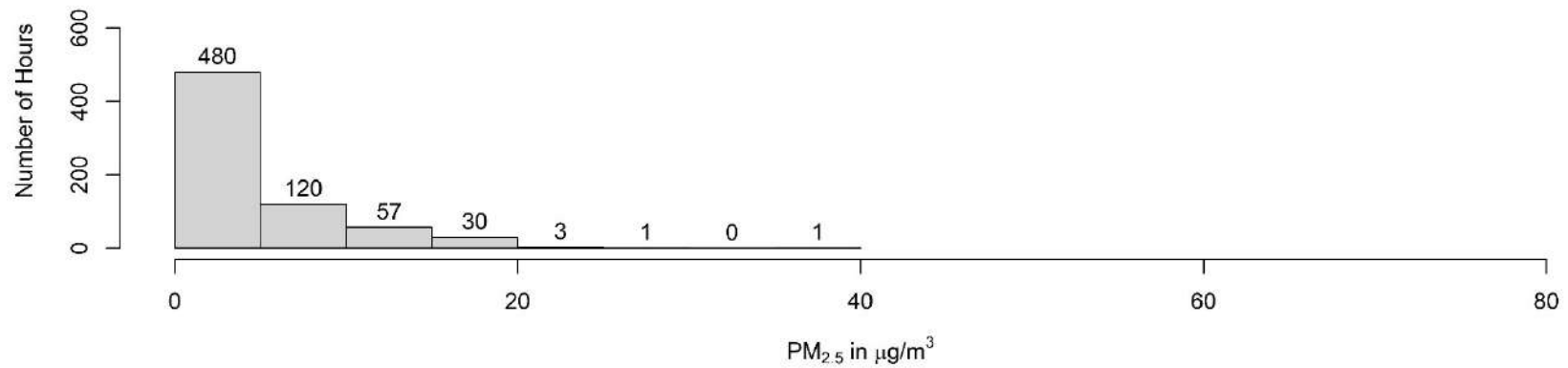
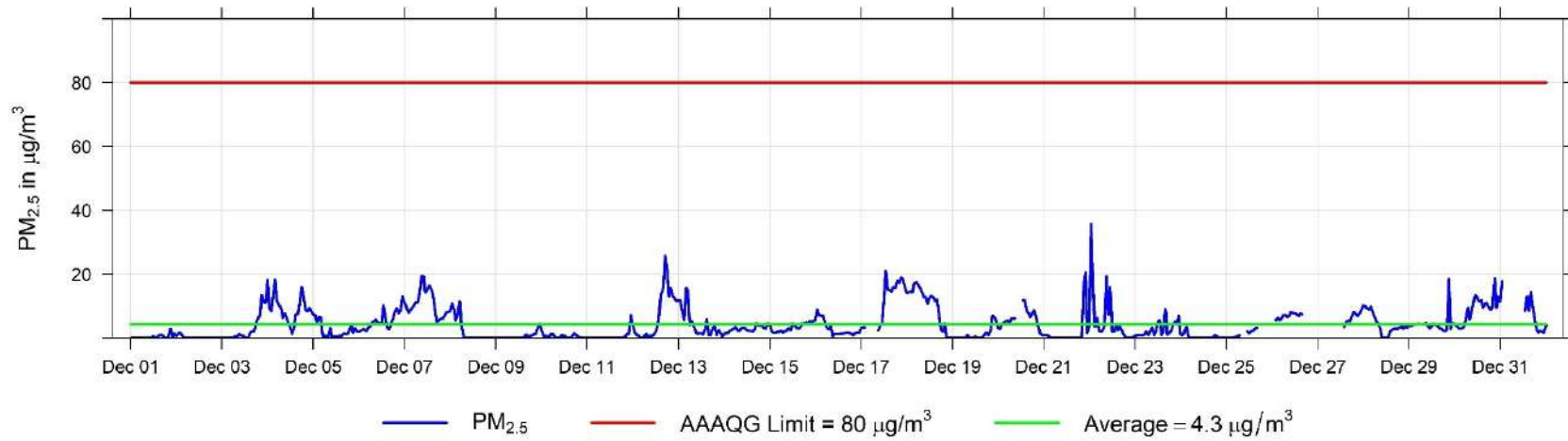
December Hourly Concentration Readings of SO₂ (in ppb) at Smoky Heights



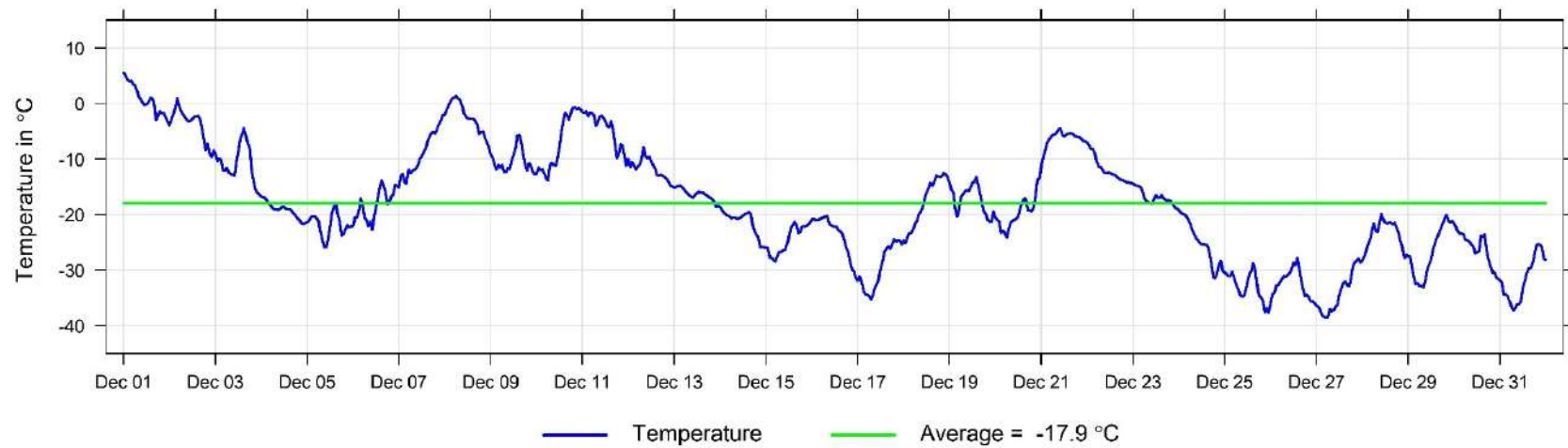
December Hourly Concentration Readings of TRS (in ppb) at Smoky Heights



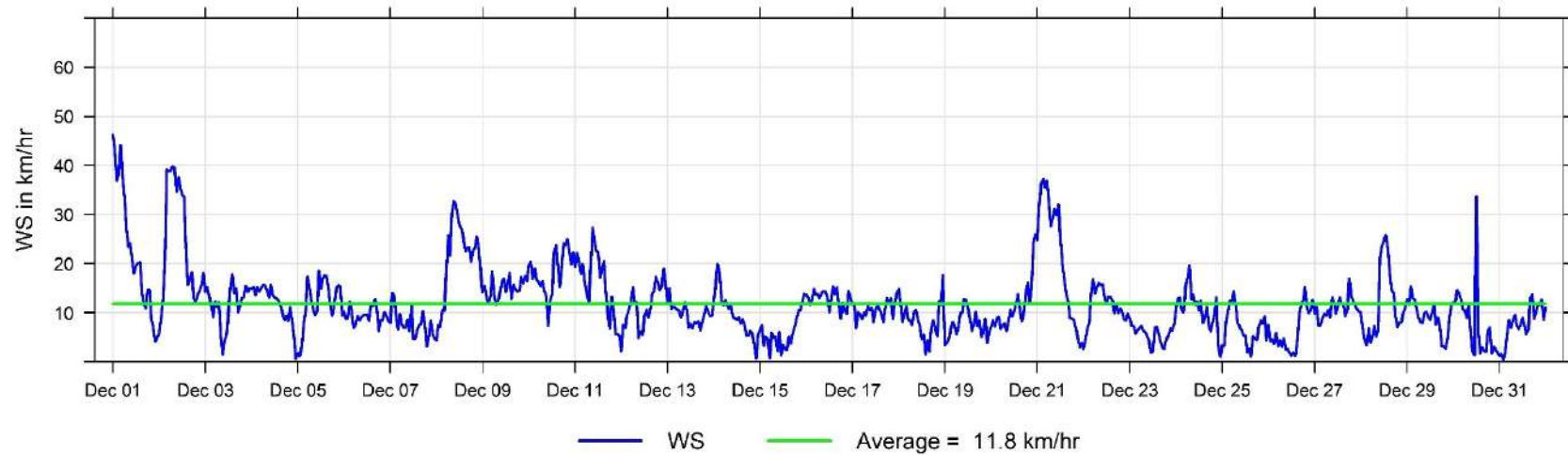
December Hourly Concentration Readings of PM_{2.5} in $\mu\text{g}/\text{m}^3$ at Smoky Heights



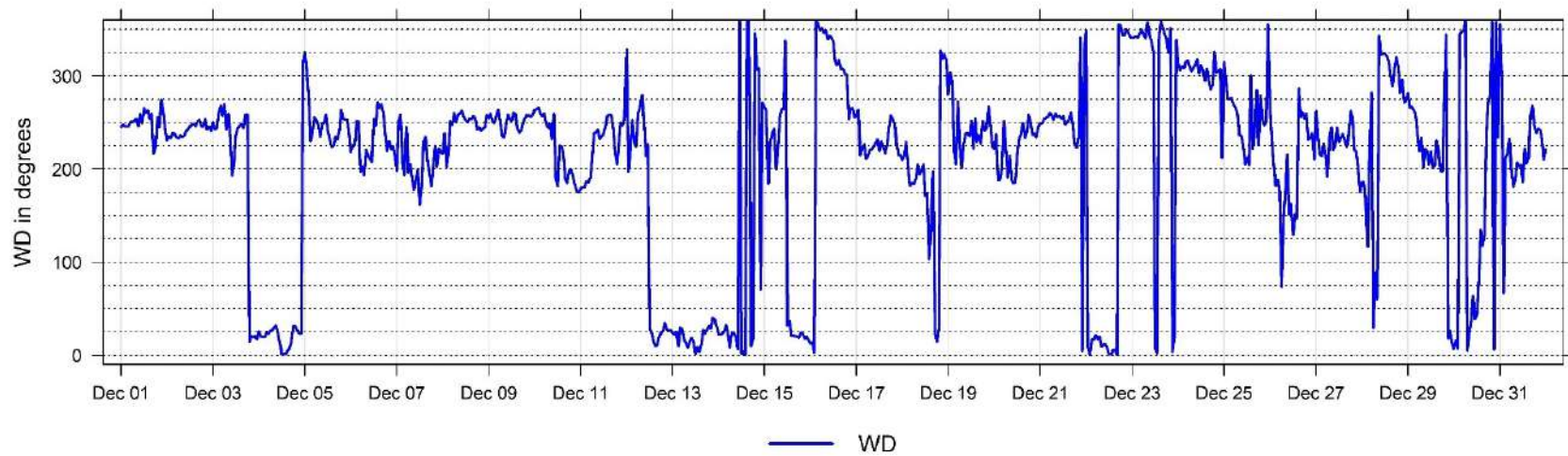
December Hourly Temperature Readings (in °C) at Smoky Heights



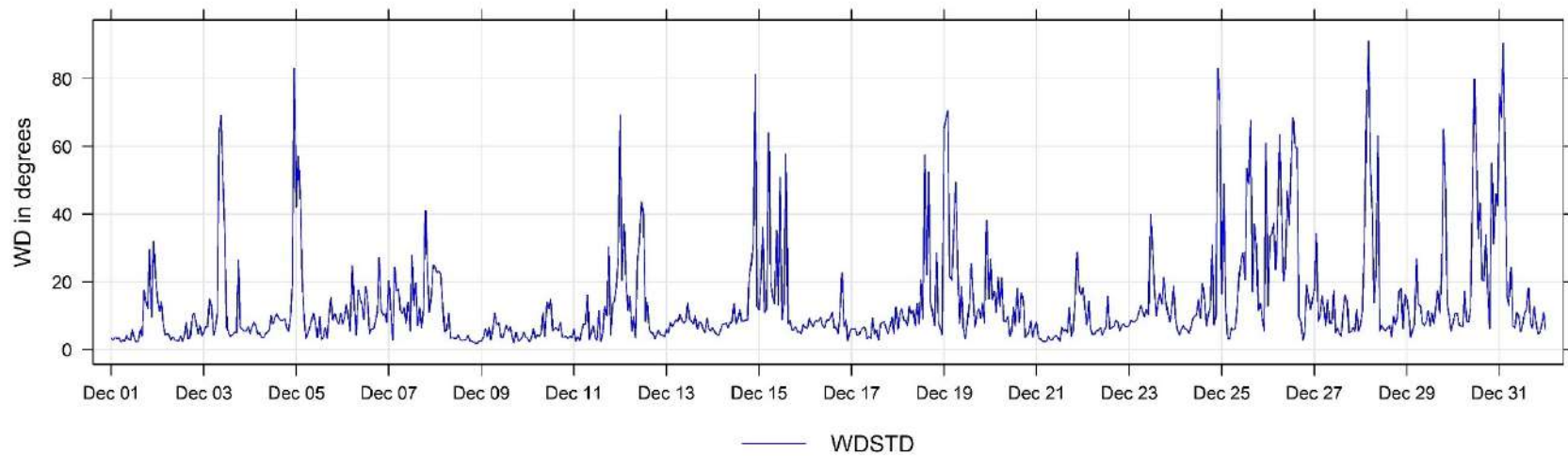
December Hourly Readings of Wind Speed (in km/hr) at Smoky Heights



December Hourly Readings of Wind Direction (in degrees) at Smoky Heights



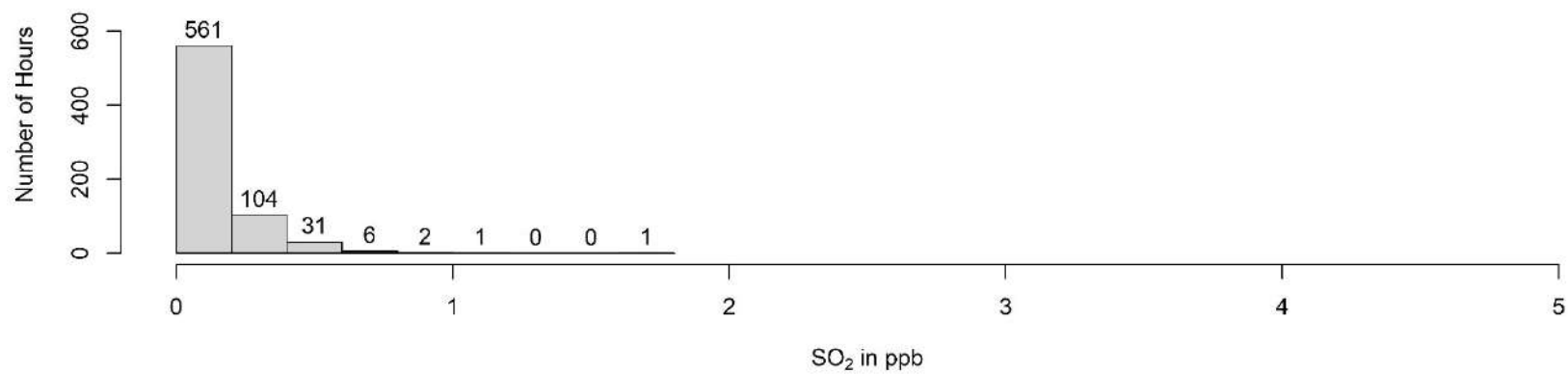
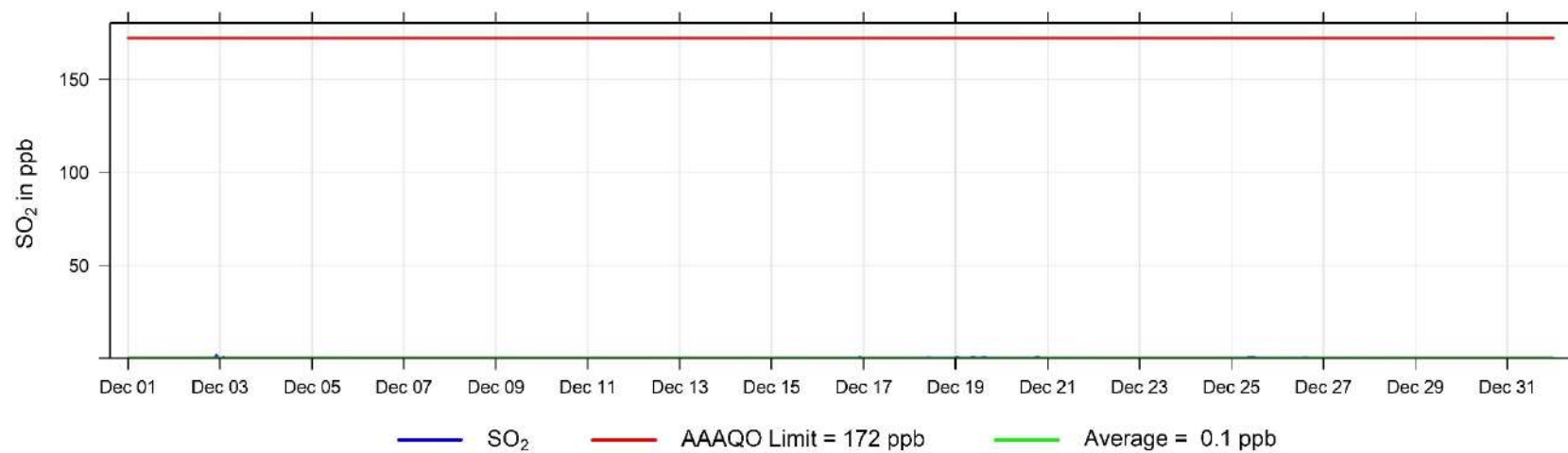
December Hourly Readings of Wind Direction Standard Deviation (in degrees) at Smoky Heights



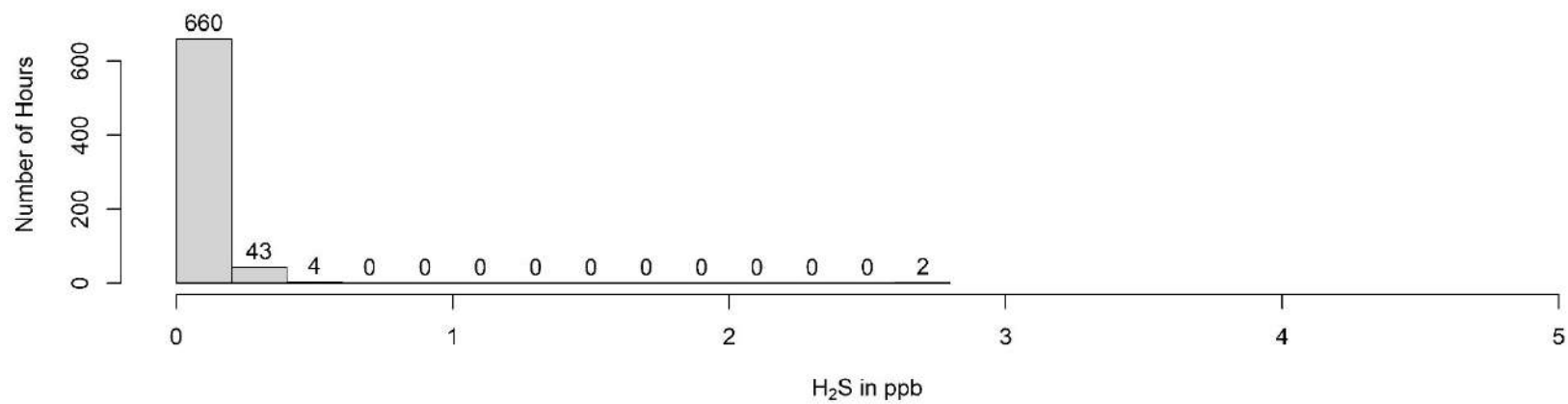
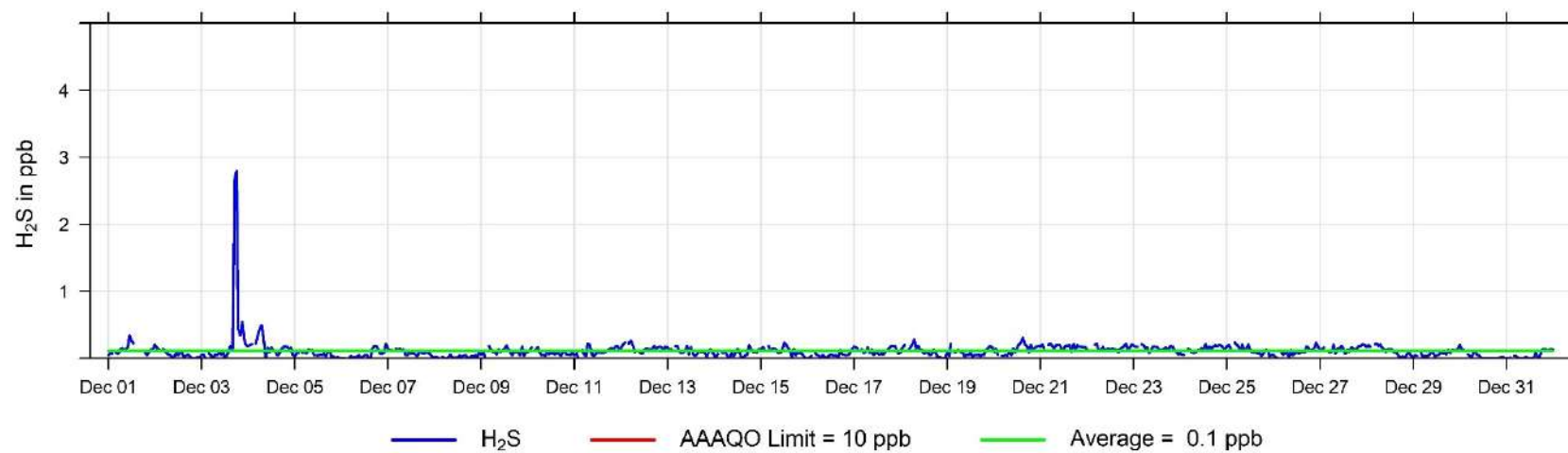
6 Valleyview Charts

The following pages include the charts and histograms for Valleyview Station

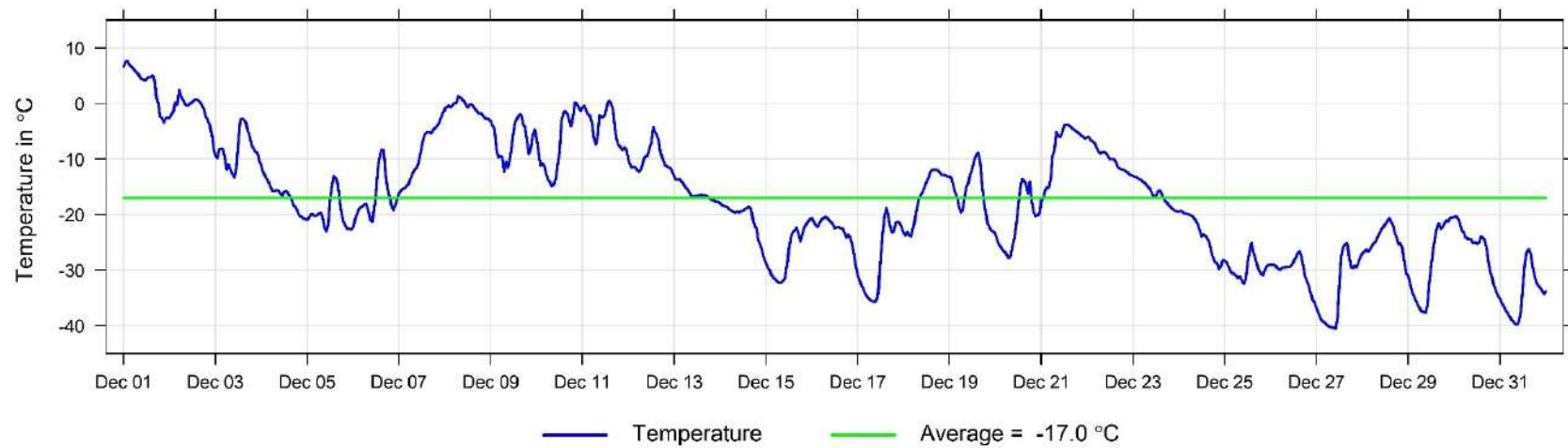
December Hourly Concentration Readings of SO₂ (in ppb) at Valleyview



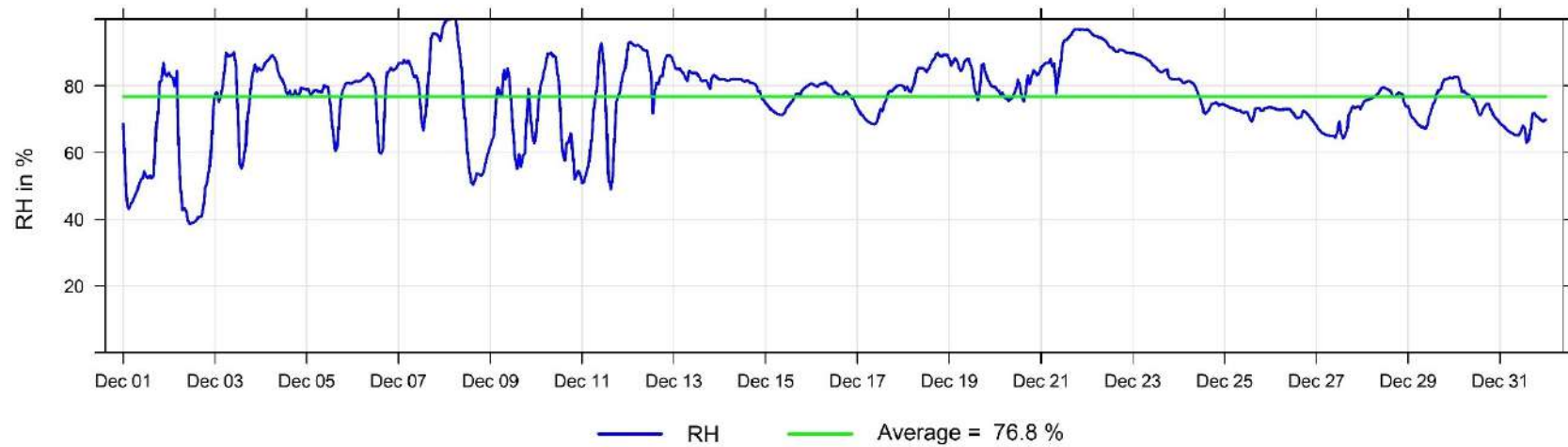
December Hourly Concentration Readings of H₂S (in ppb) at Valleyview



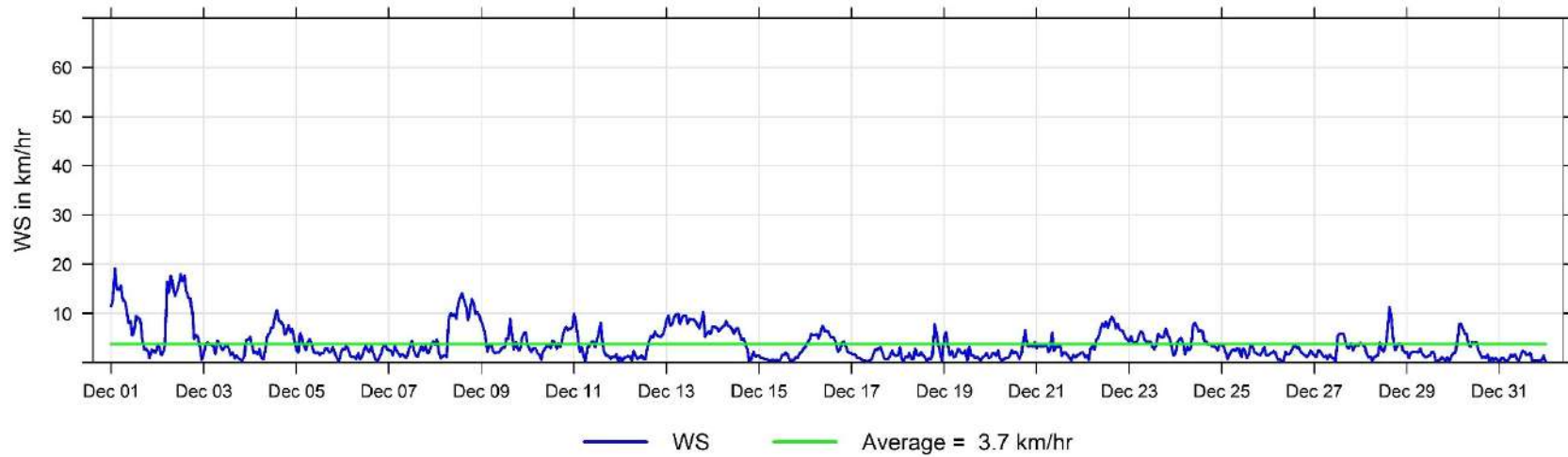
December Hourly Temperature Readings (in °C) at Valleyview



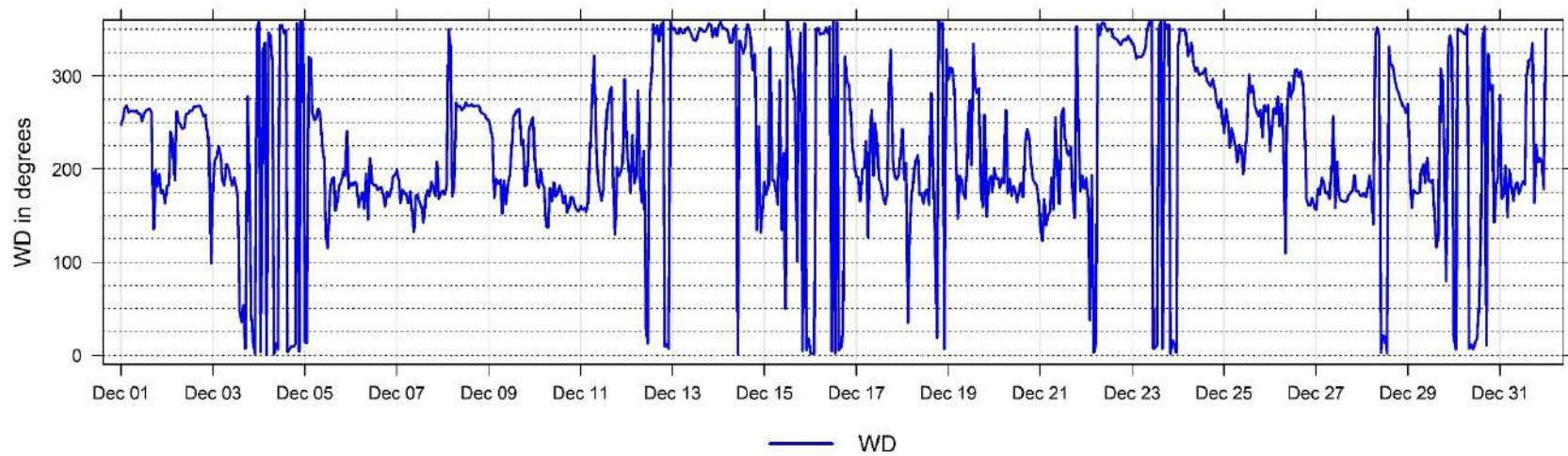
December Hourly Readings of Relative Humidity (in %) at Valleyview



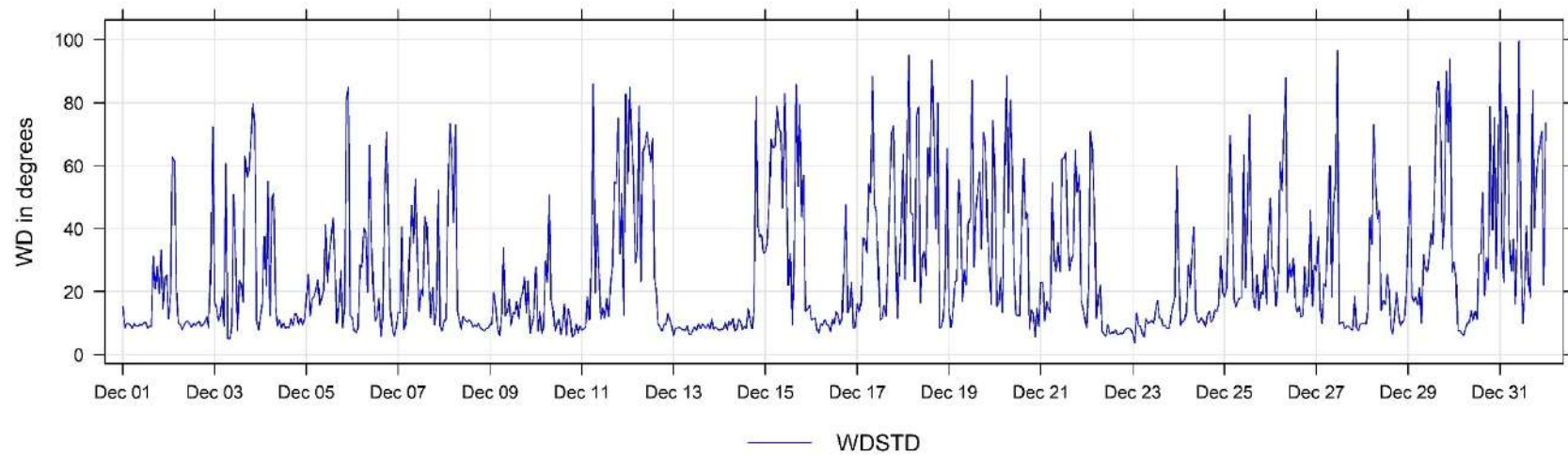
December Hourly Readings of Wind Speed (in km/hr) at Valleyview

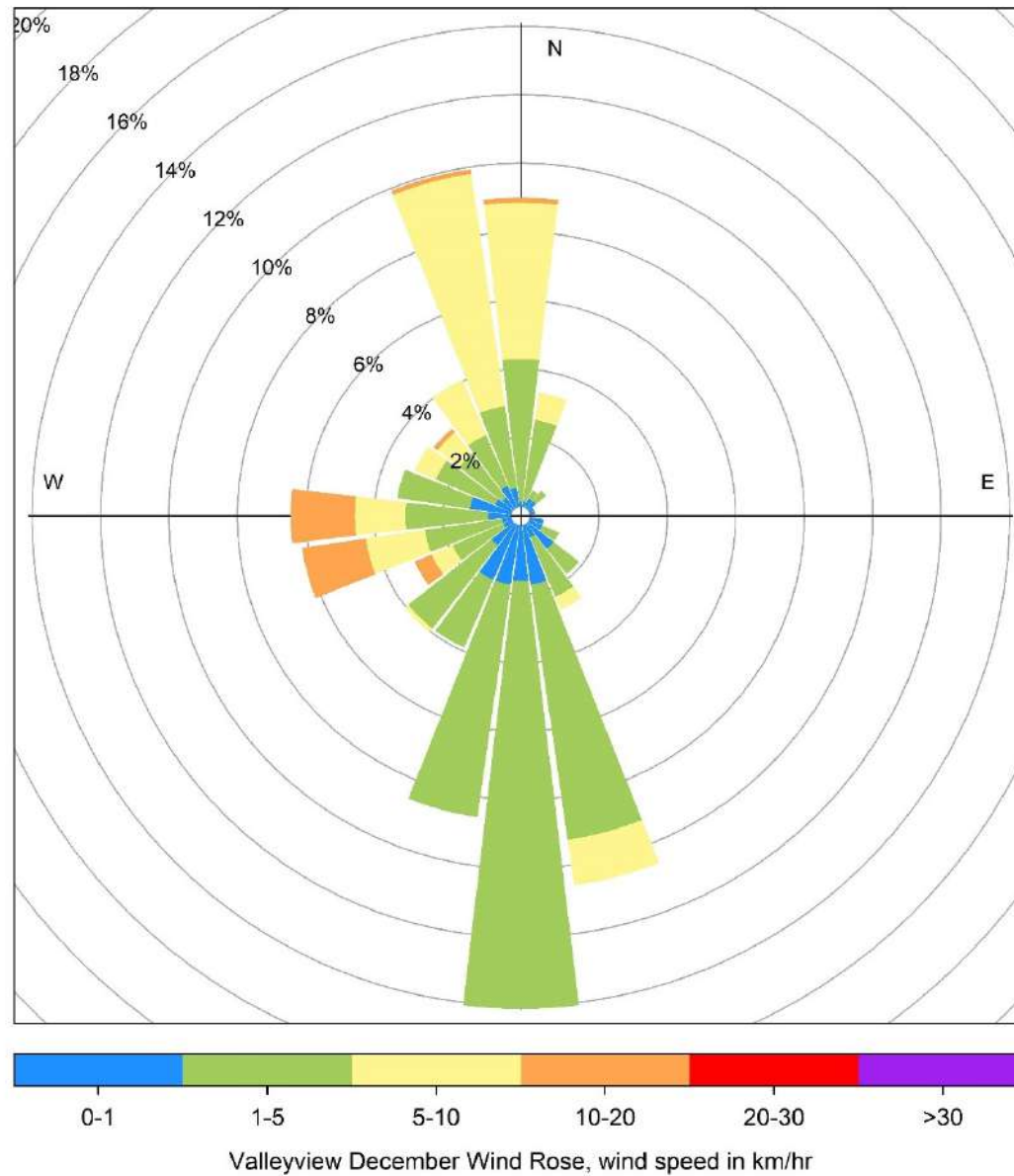


December Hourly Readings of Wind Direction (in degrees) at Valleyview



December Hourly Readings of Wind Direction Standard Deviation (in degrees) at Valleyview

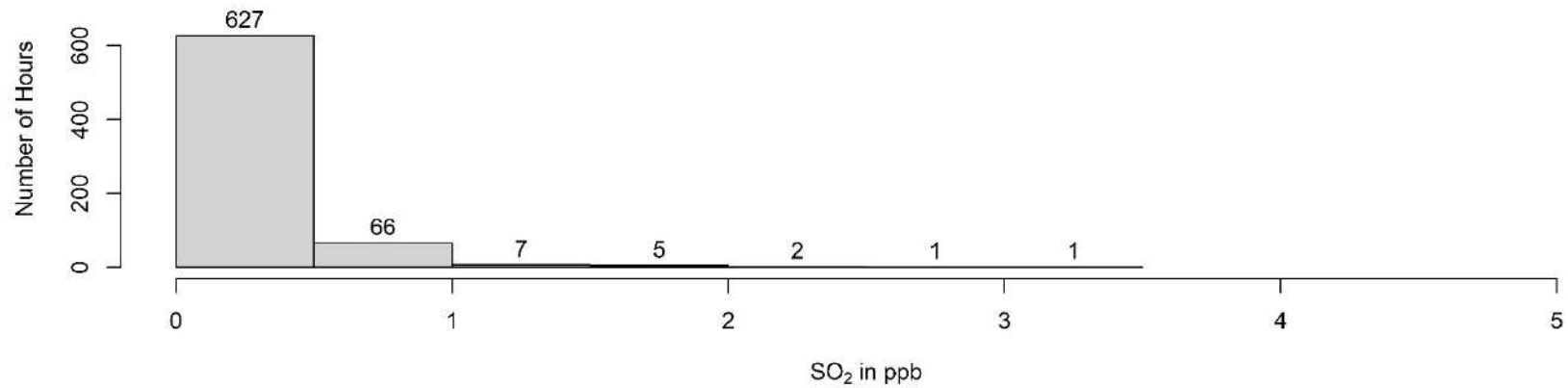
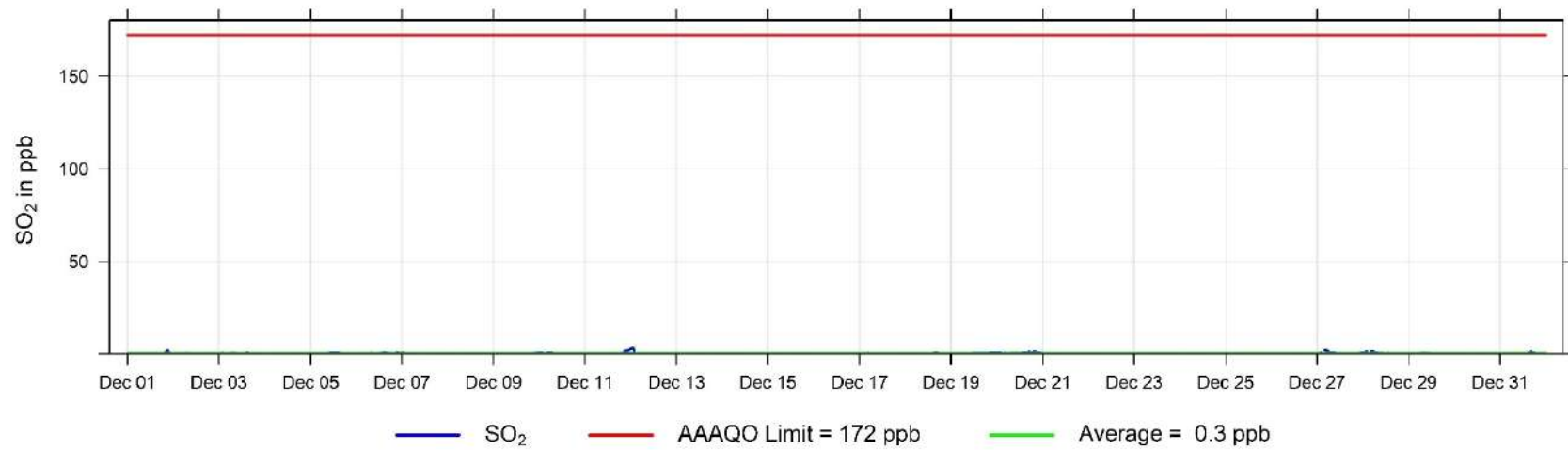




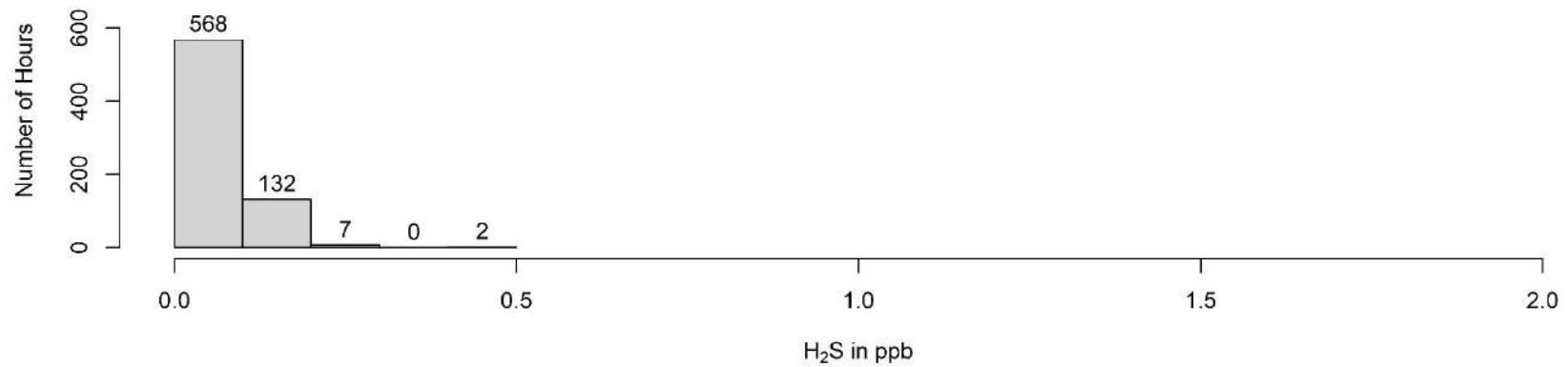
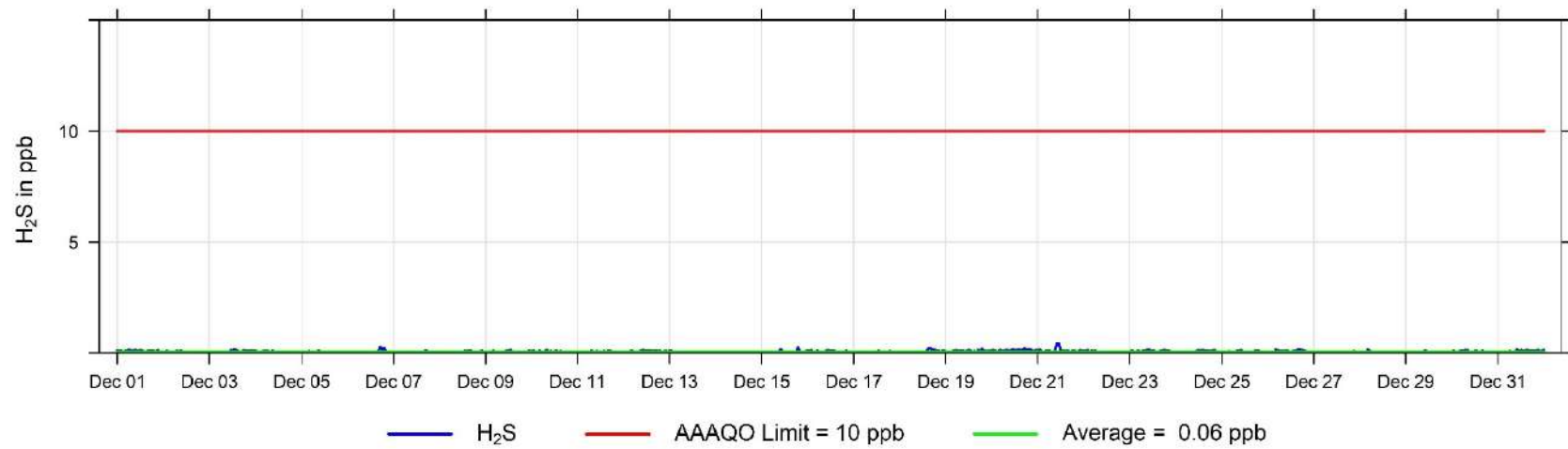
7 Donnelly Charts

The following pages include the charts and histograms for Donnelly Station

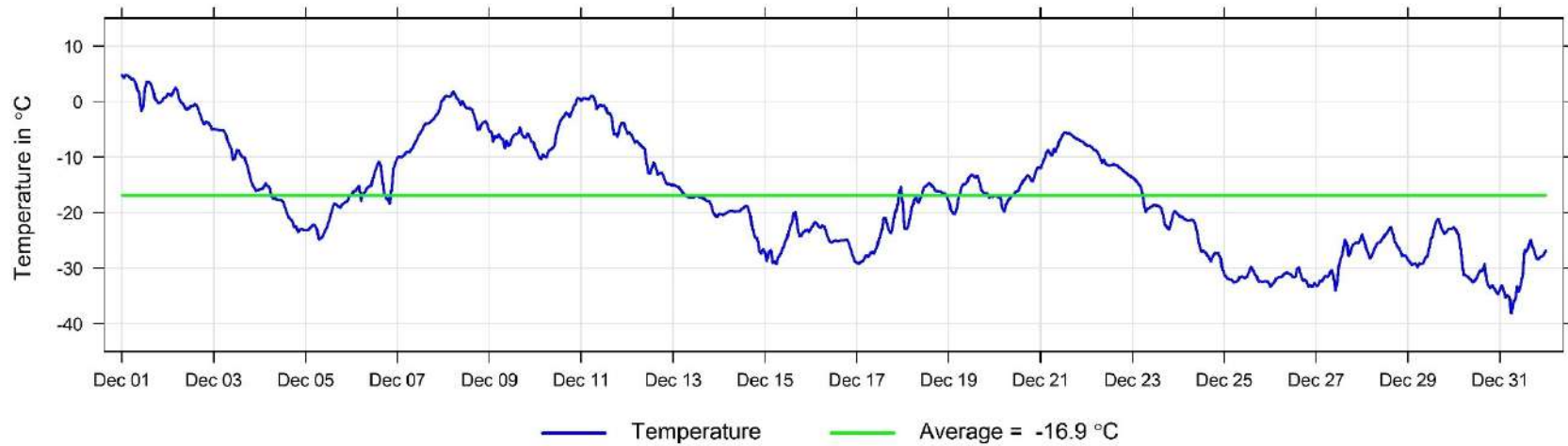
December Hourly Concentration Readings of SO₂ (in ppb) at Donnelly



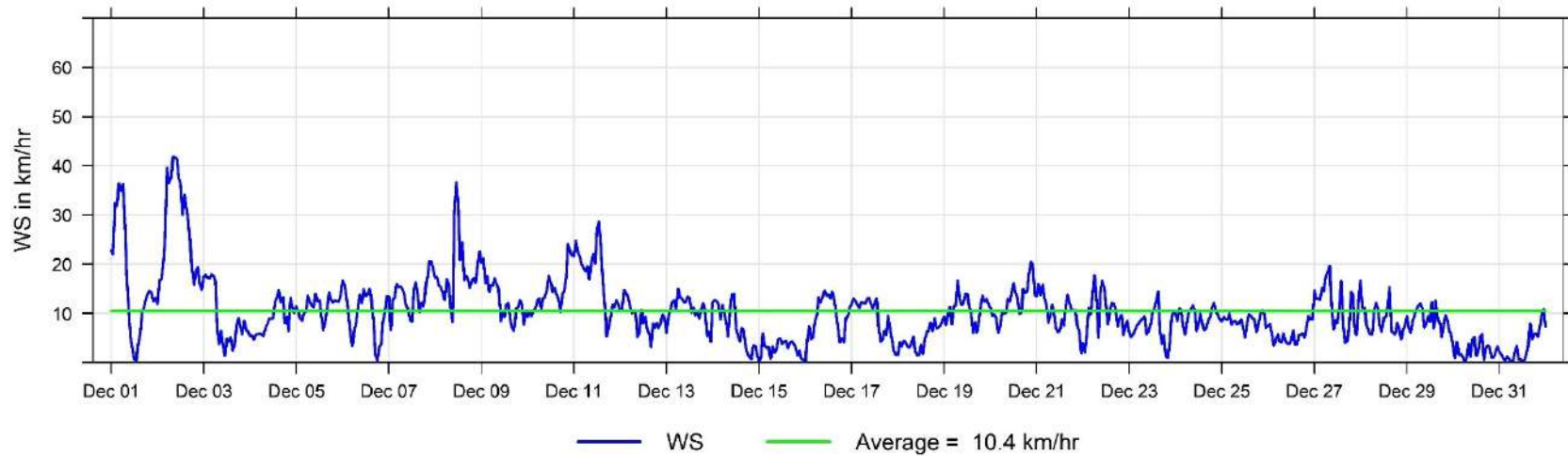
December Hourly Concentration Readings of H₂S (in ppb) at Donnelly



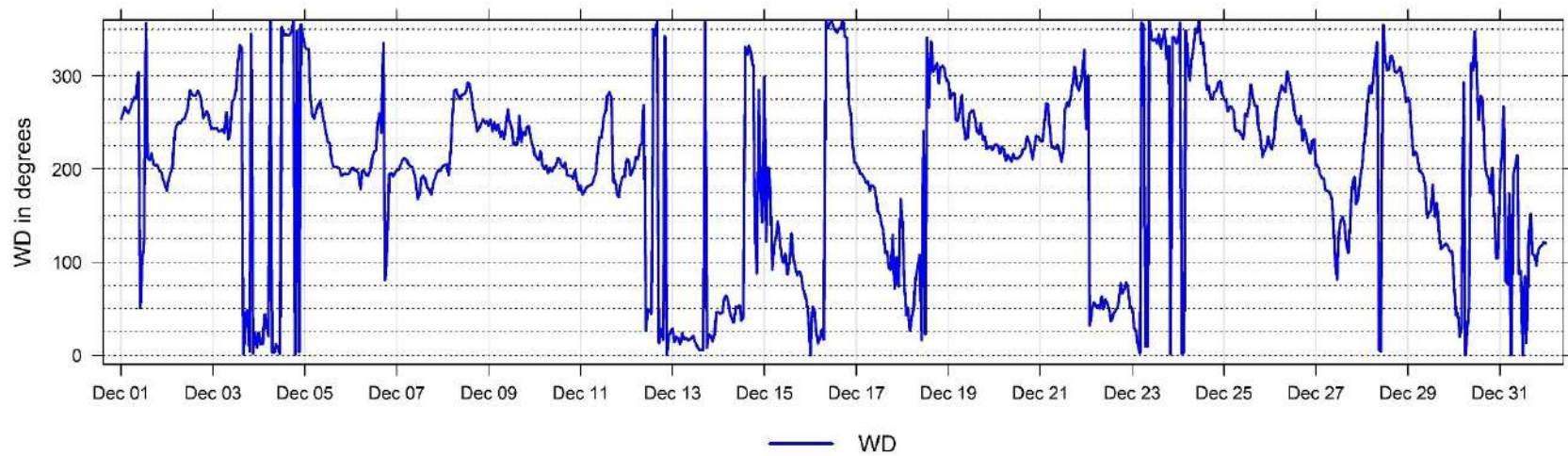
December Hourly Temperature Readings (in °C) at Donnelly



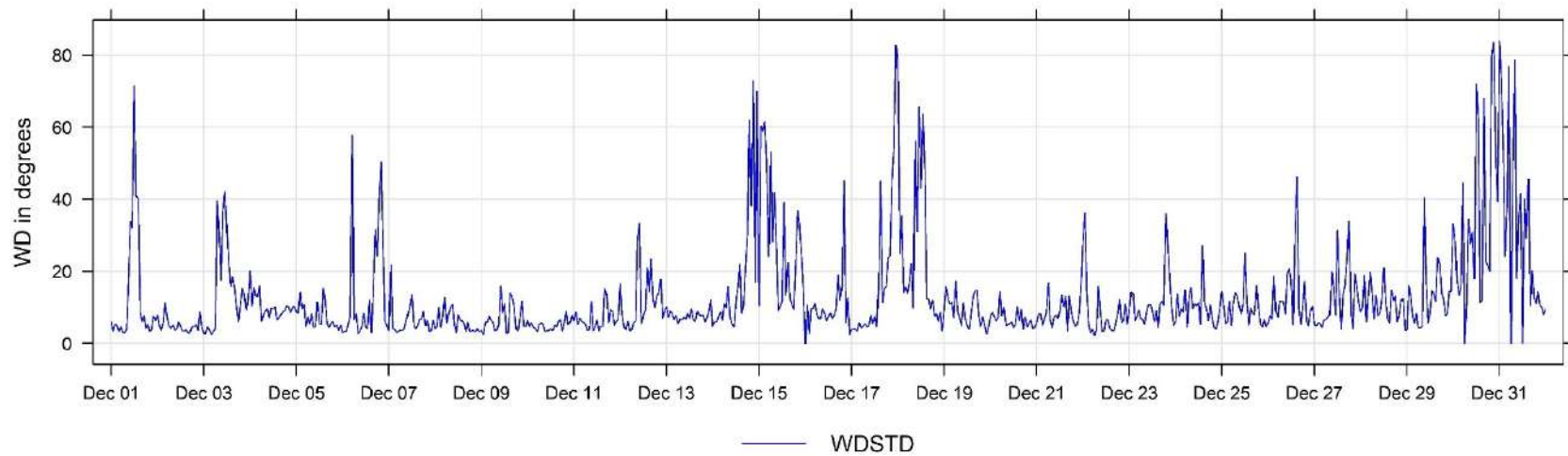
December Hourly Readings of Wind Speed (in km/hr) at Donnelly

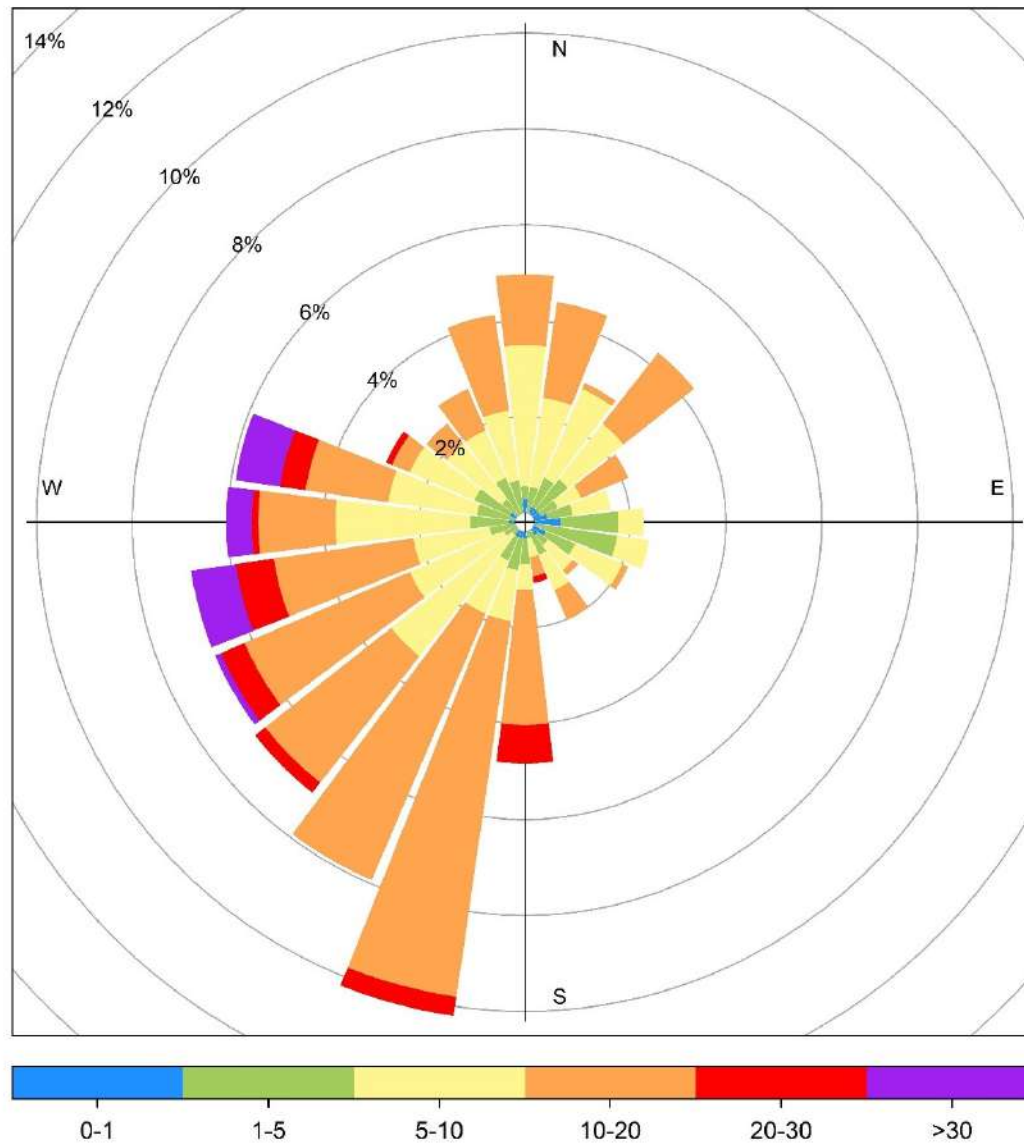


December Hourly Readings of Wind Direction (in degrees) at Donnelly



December Hourly Readings of Wind Direction Standard Deviation (in degrees) at Donnelly



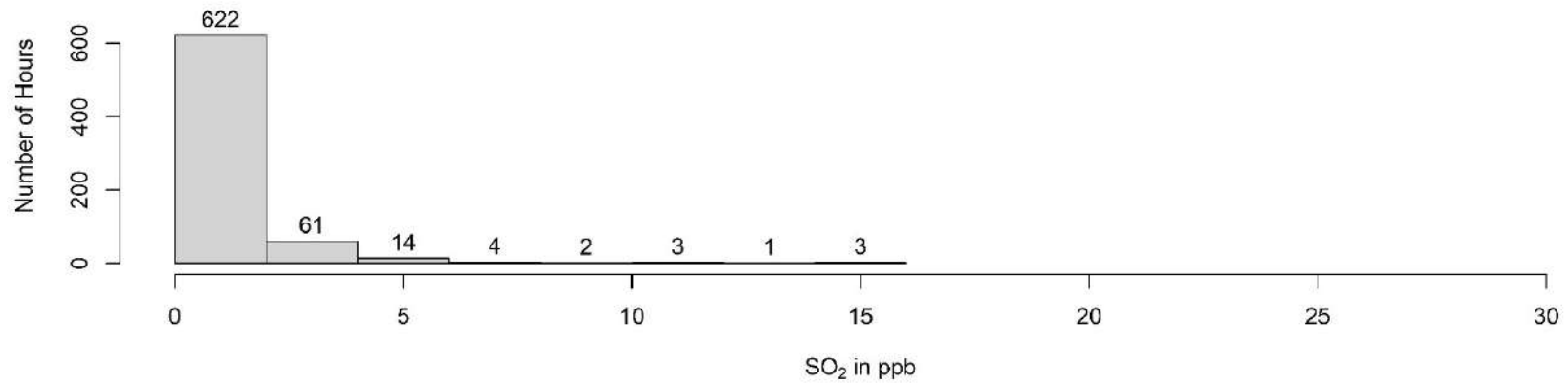
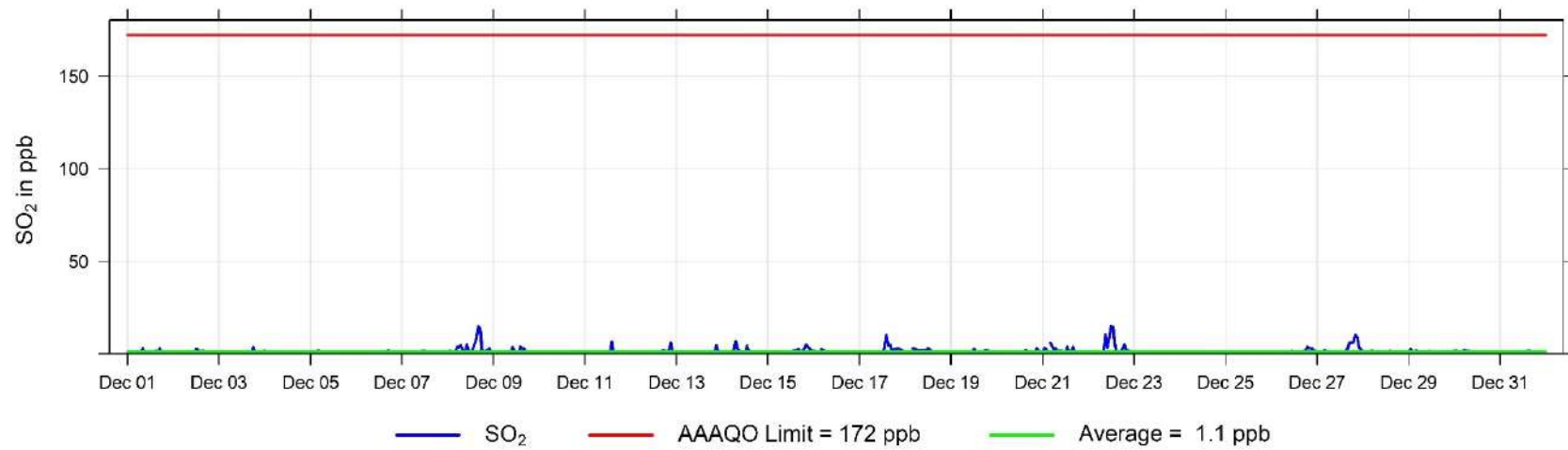


Donnelly December Wind Rose, wind speed in km/hr

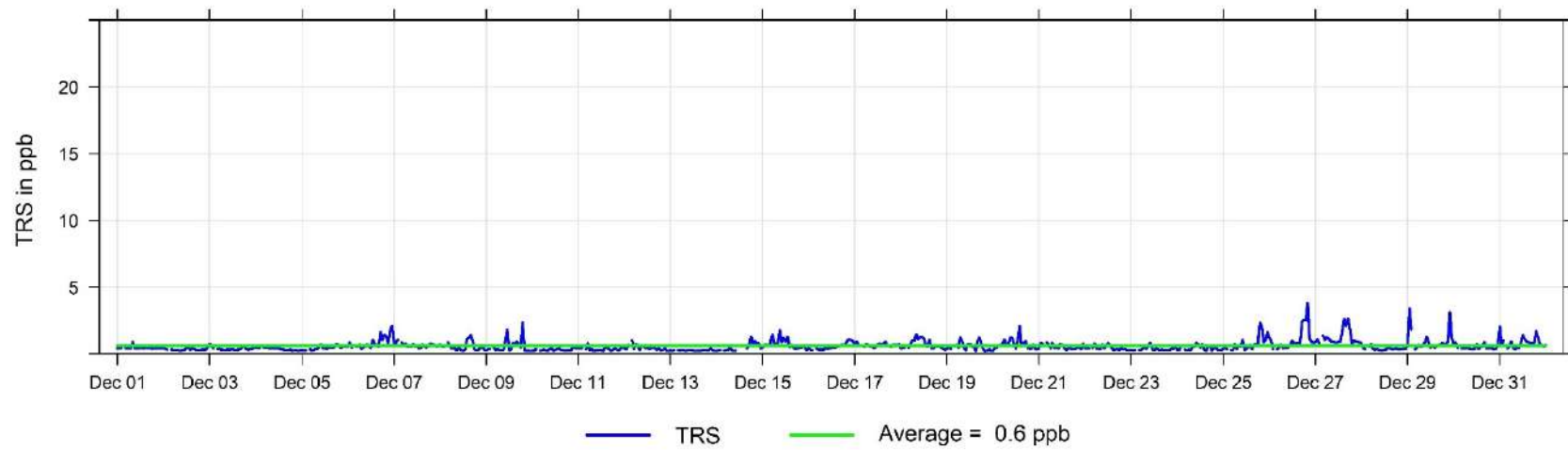
8 Poplar (Portable) Charts

The following pages include the charts and histograms for Poplar Portable Station

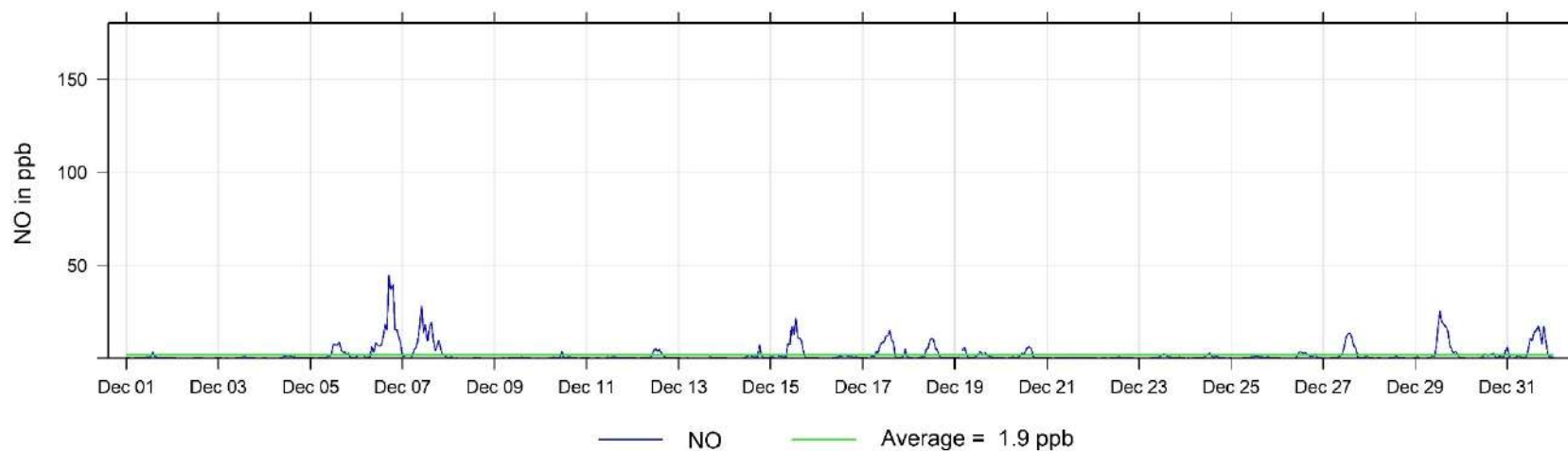
December Hourly Concentration Readings of SO₂ (in ppb) at Poplar



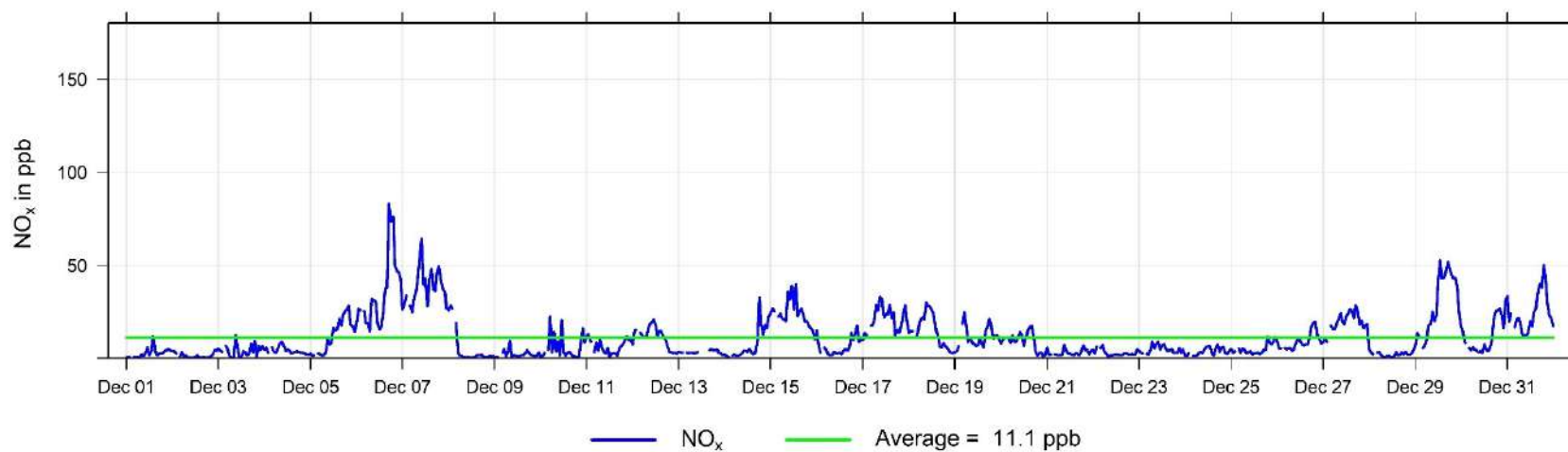
December Hourly Concentration Readings of TRS (in ppb) at Poplar



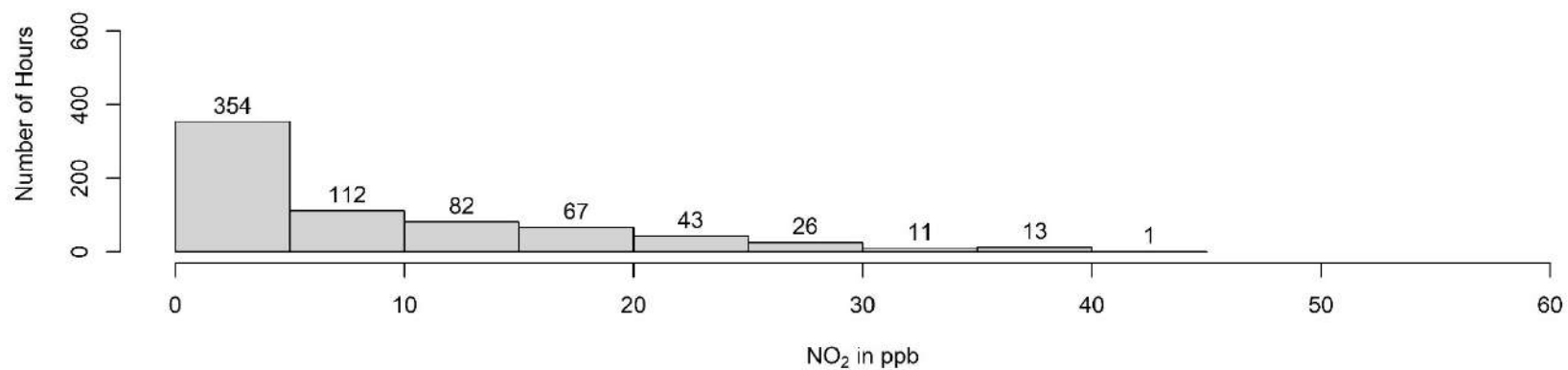
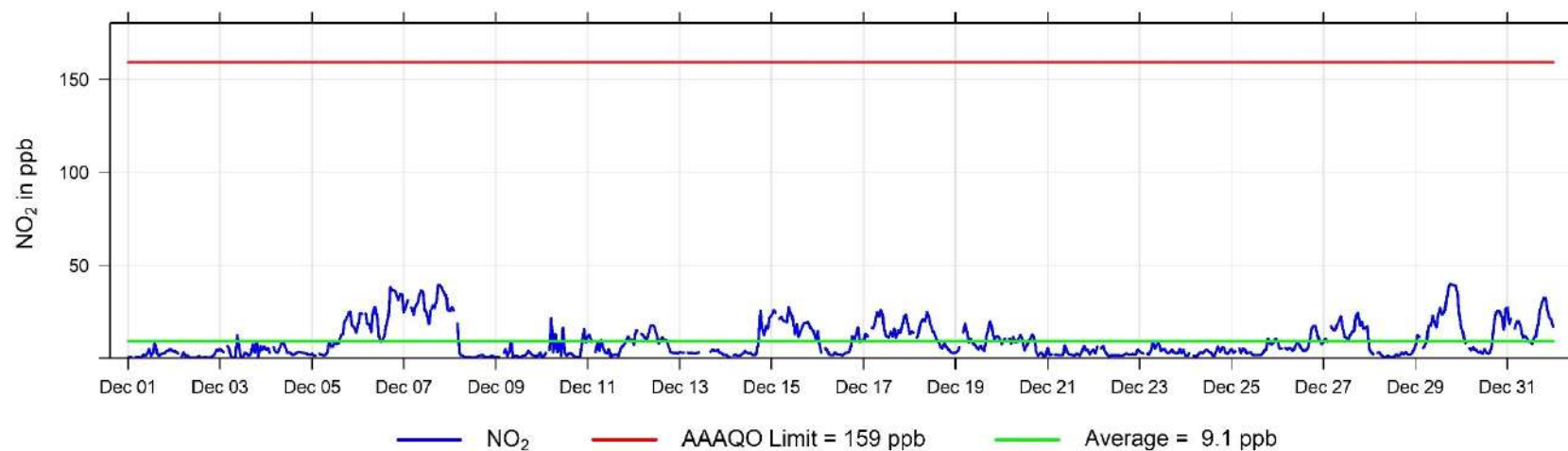
December Hourly Concentration Readings of NO (in ppb) at Poplar



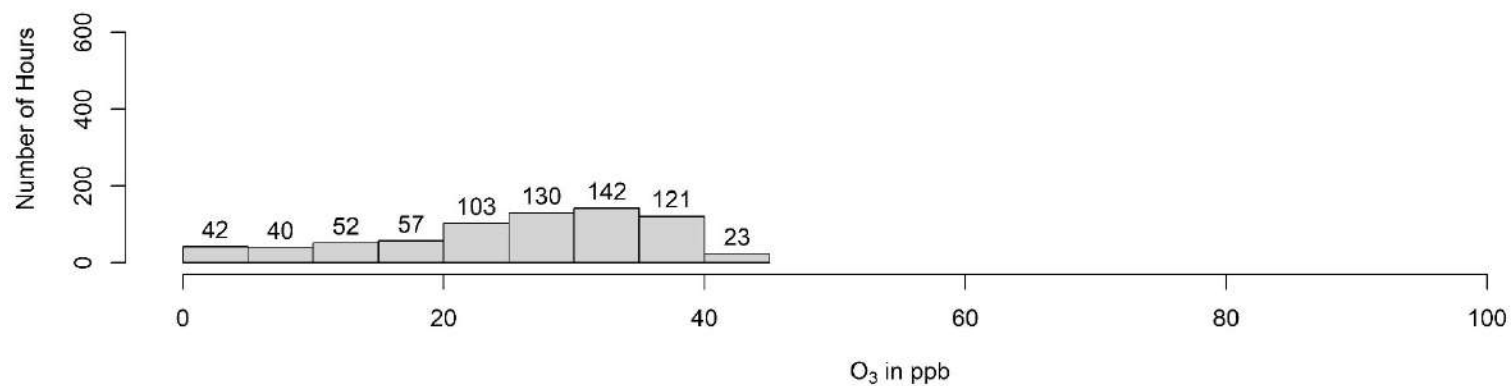
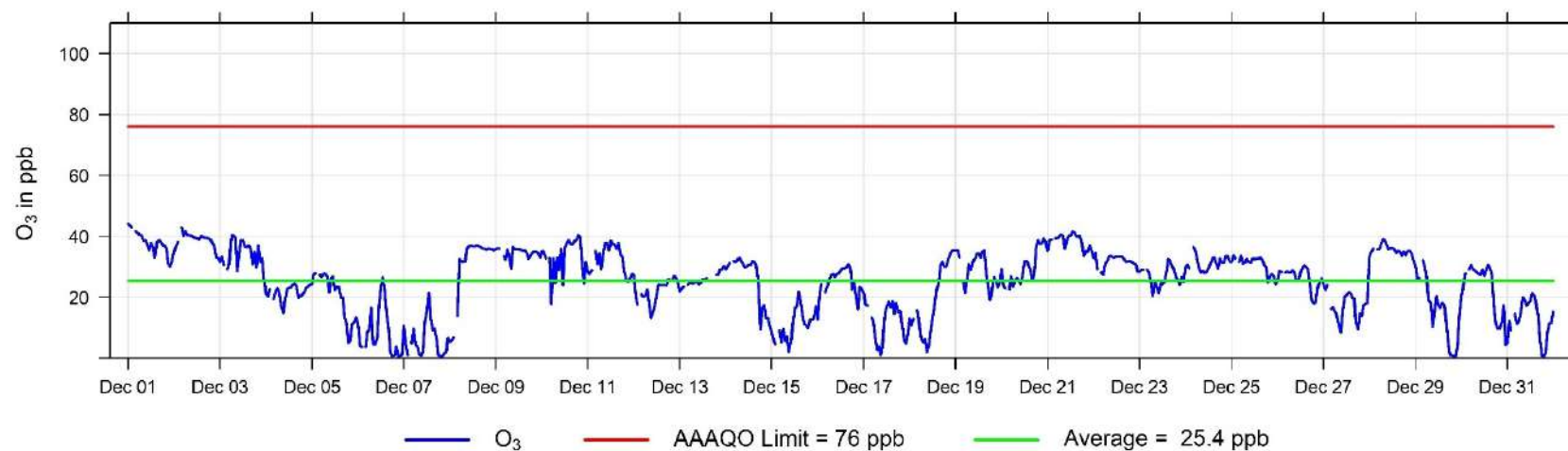
December Hourly Concentration Readings of NO_x (in ppb) at Poplar



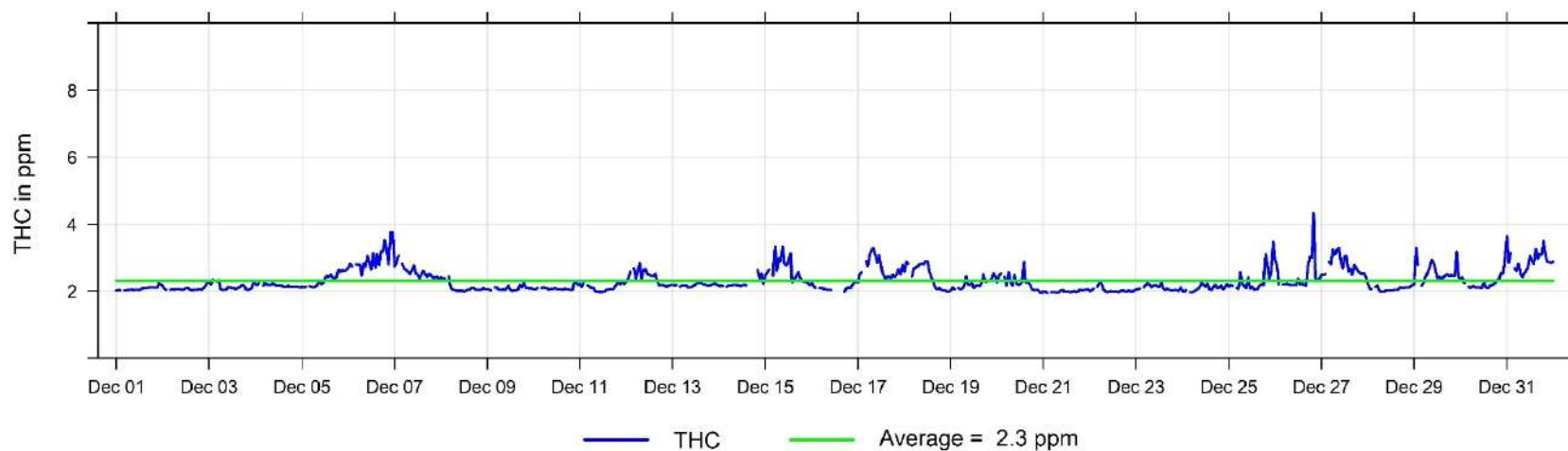
December Hourly Concentration Readings of NO₂ (in ppb) at Poplar



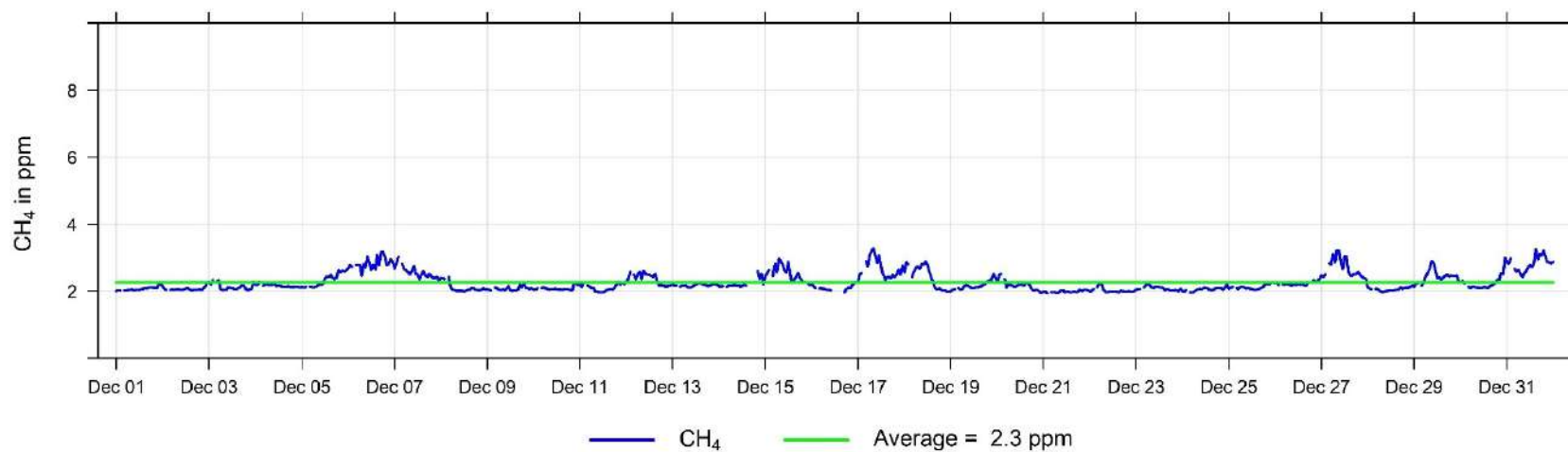
December Hourly Concentration Readings of O₃ (in ppb) at Poplar



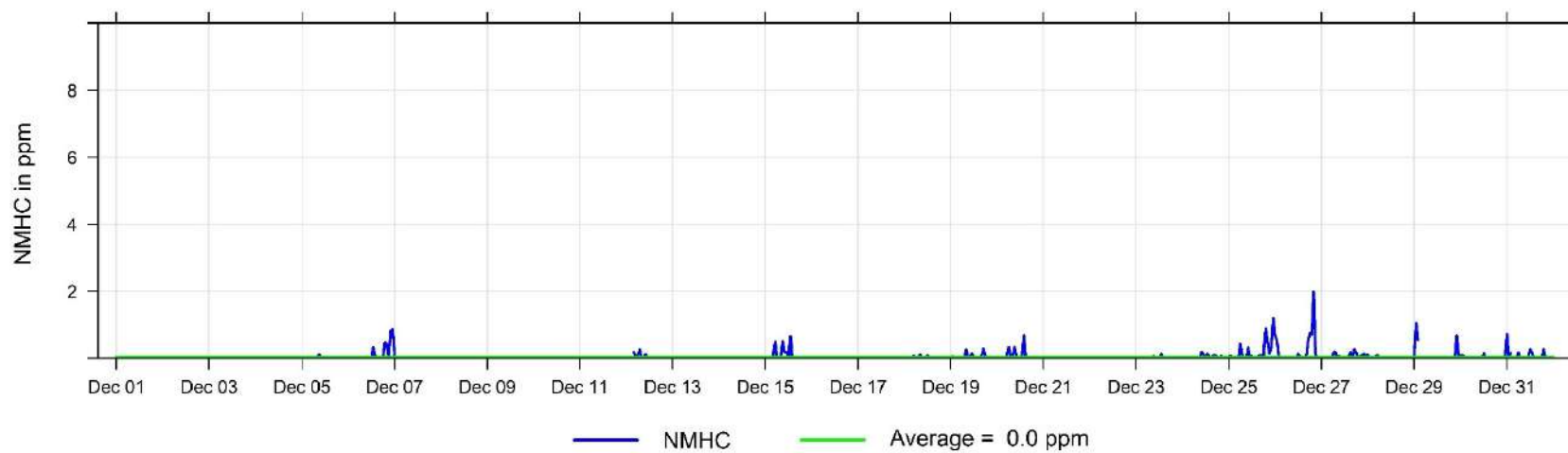
December Hourly Concentration Readings of THC (in ppm) at Poplar



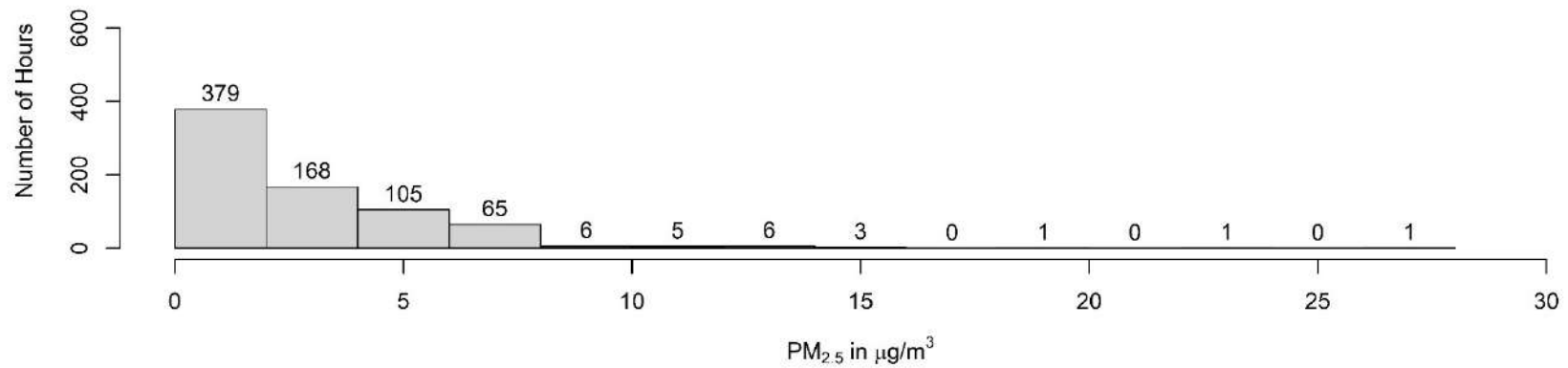
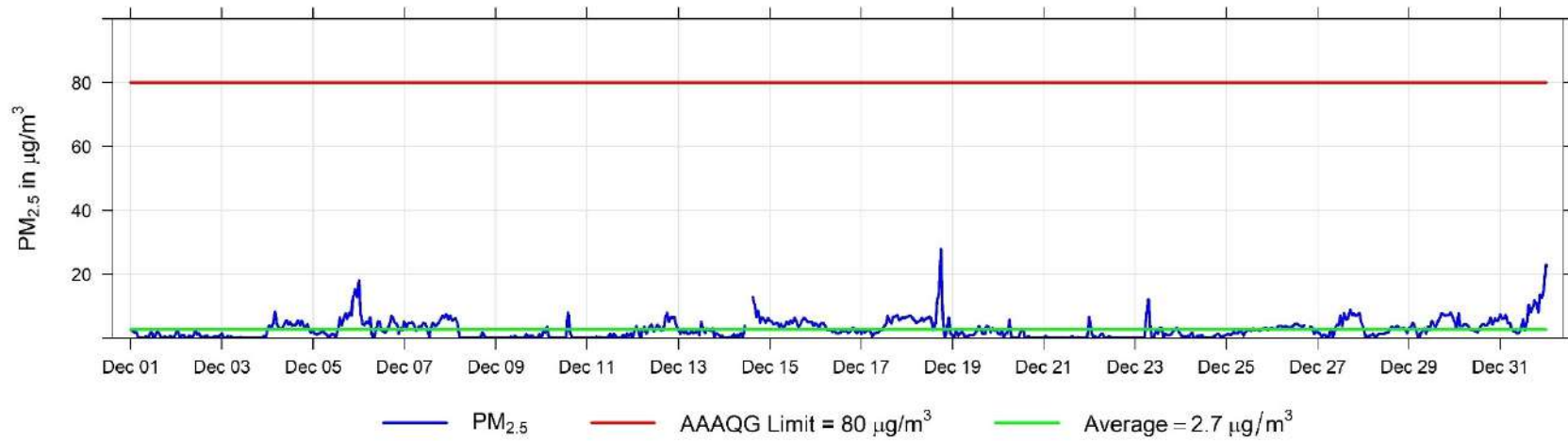
December Hourly Concentration Readings of CH₄ (in ppm) at Poplar



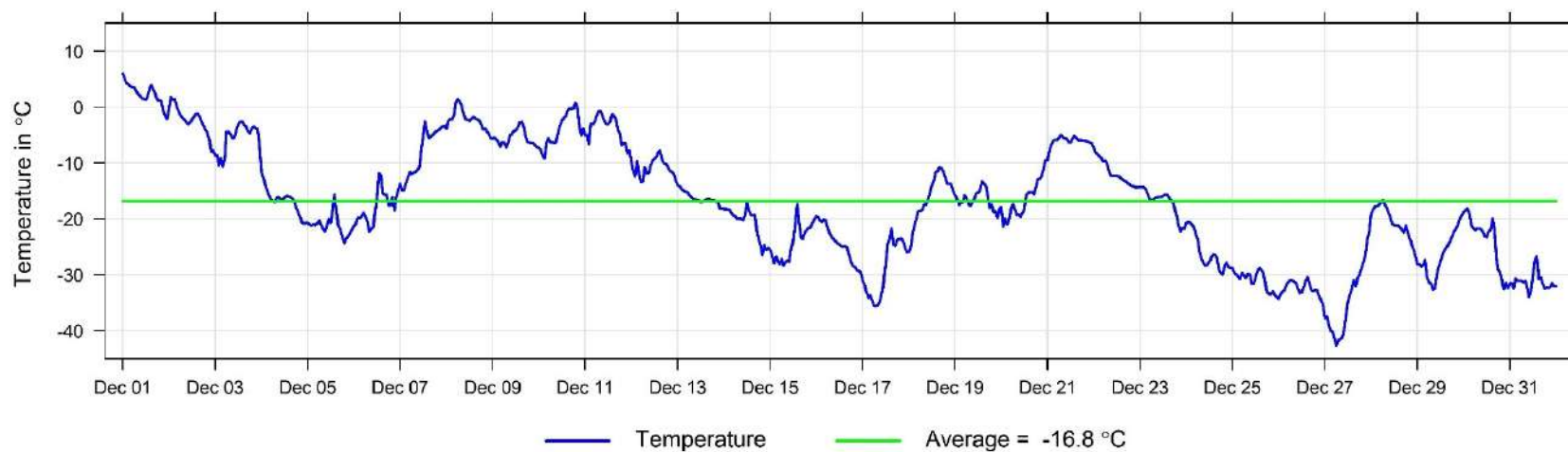
December Hourly Concentration Readings of NMHC (in ppm) at Poplar



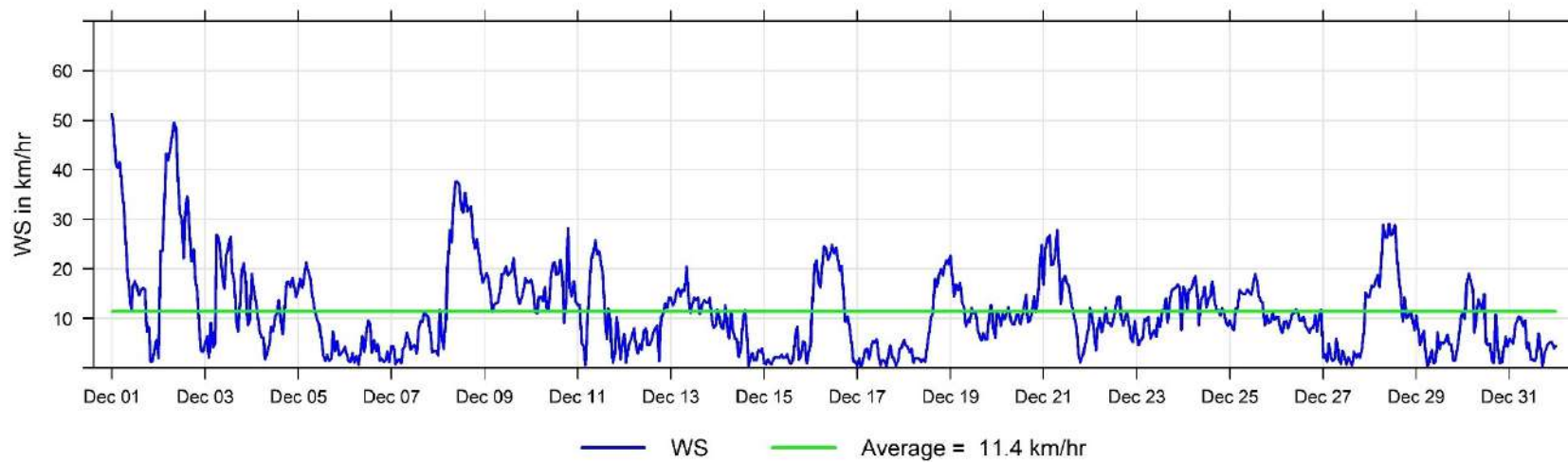
December Hourly Concentration Readings of PM_{2.5} in $\mu\text{g}/\text{m}^3$ at Poplar



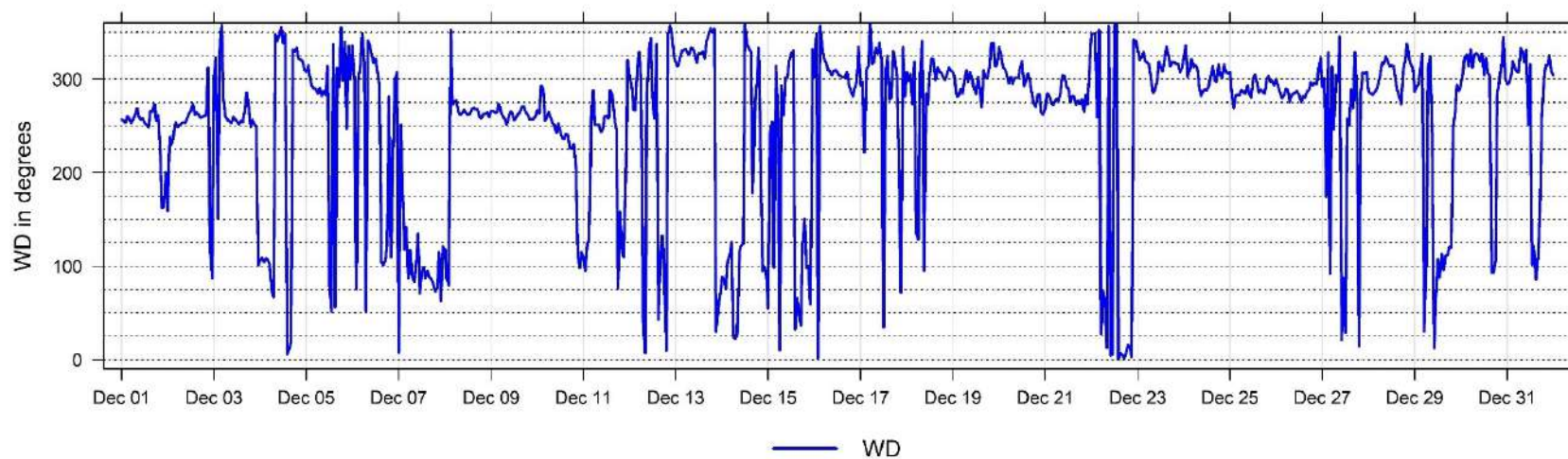
December Hourly Temperature Readings (in °C) at Poplar



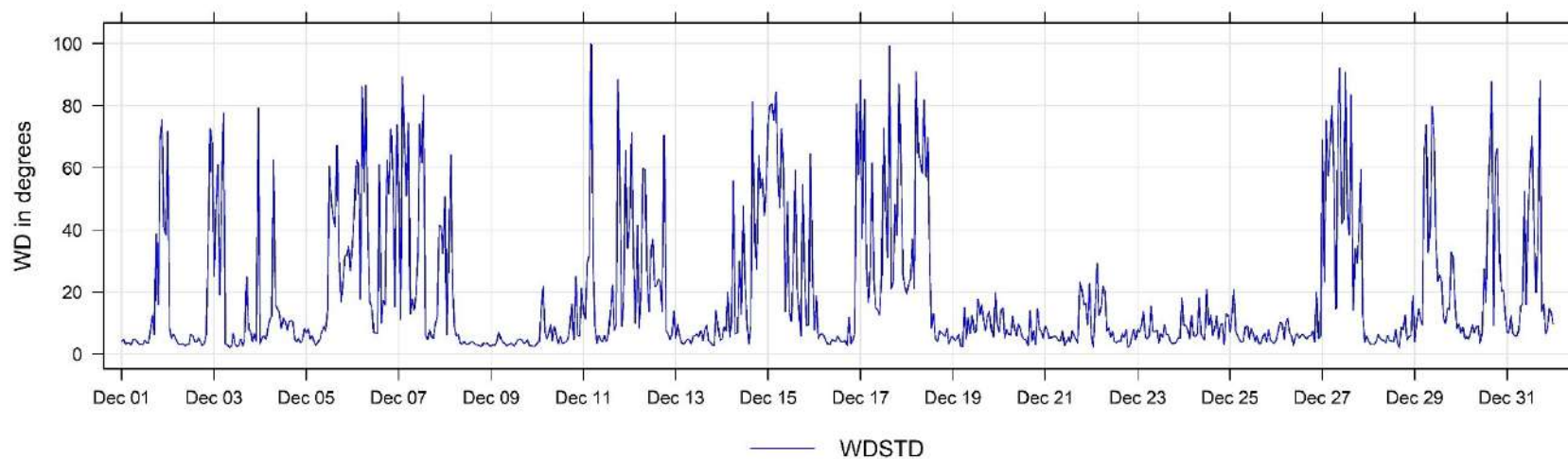
December Hourly Readings of Wind Speed (in km/hr) at Poplar

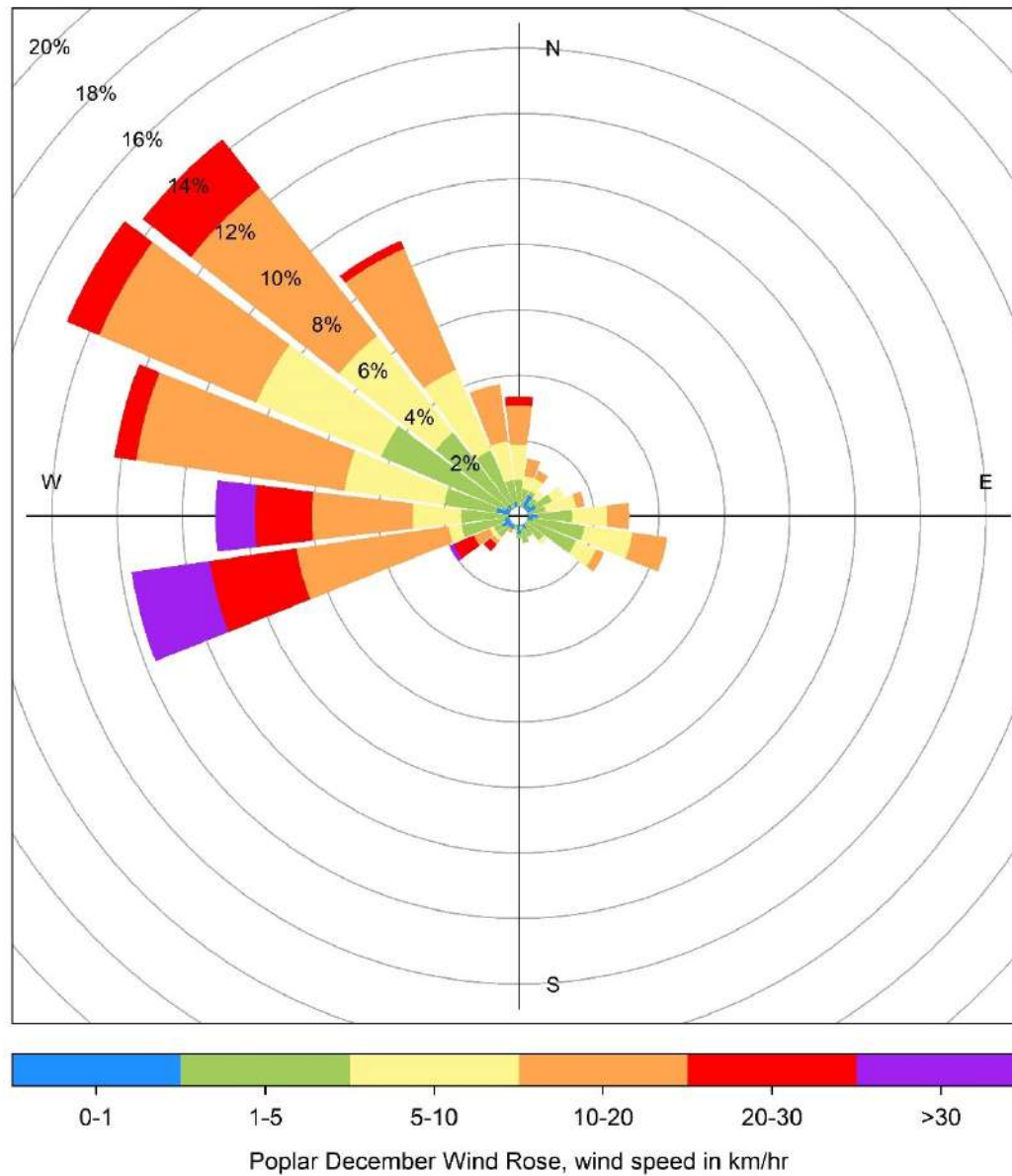


December Hourly Readings of Wind Direction (in degrees) at Poplar

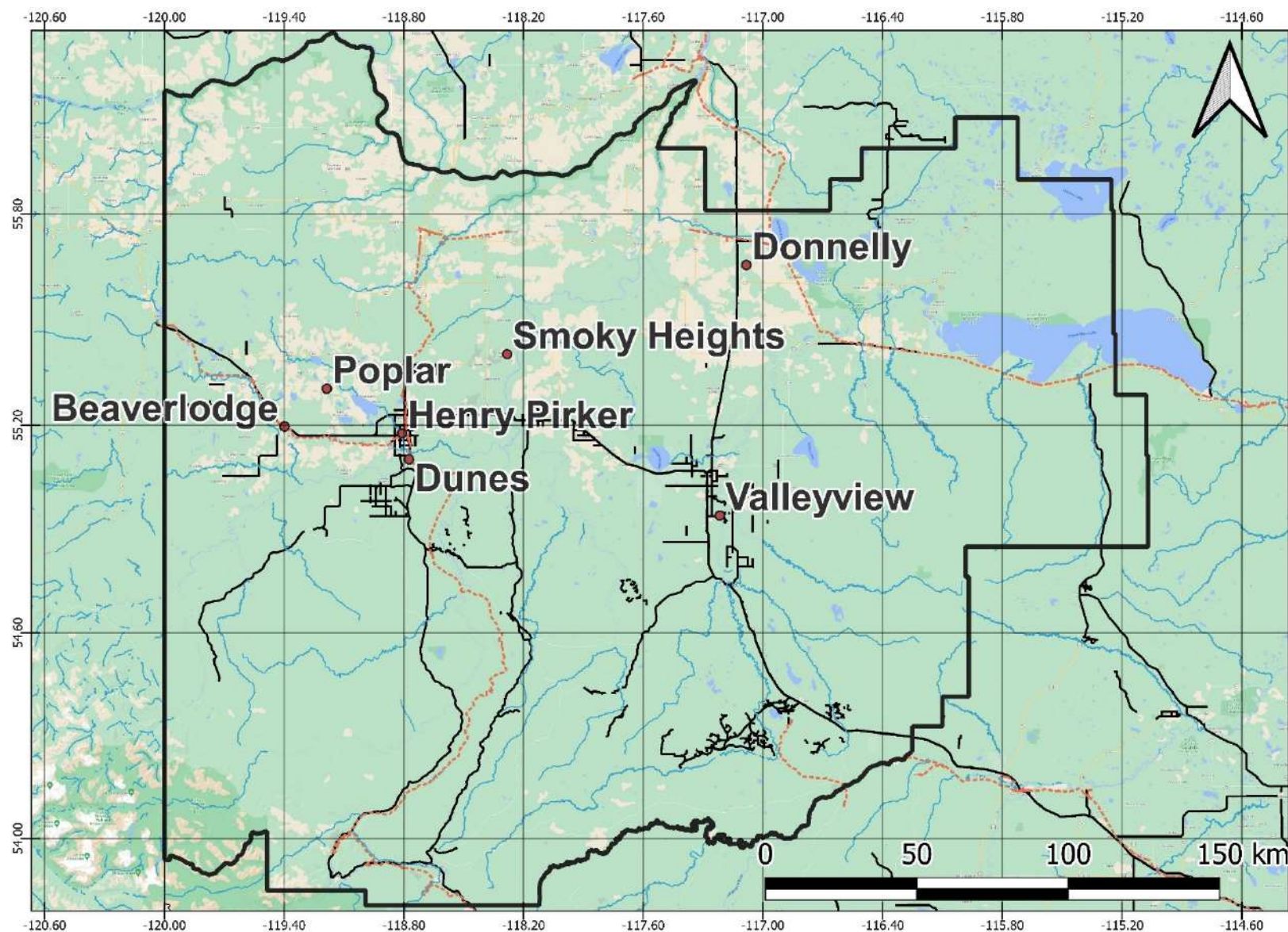


December Hourly Readings of Wind Direction Standard Deviation (in degrees) at Poplar

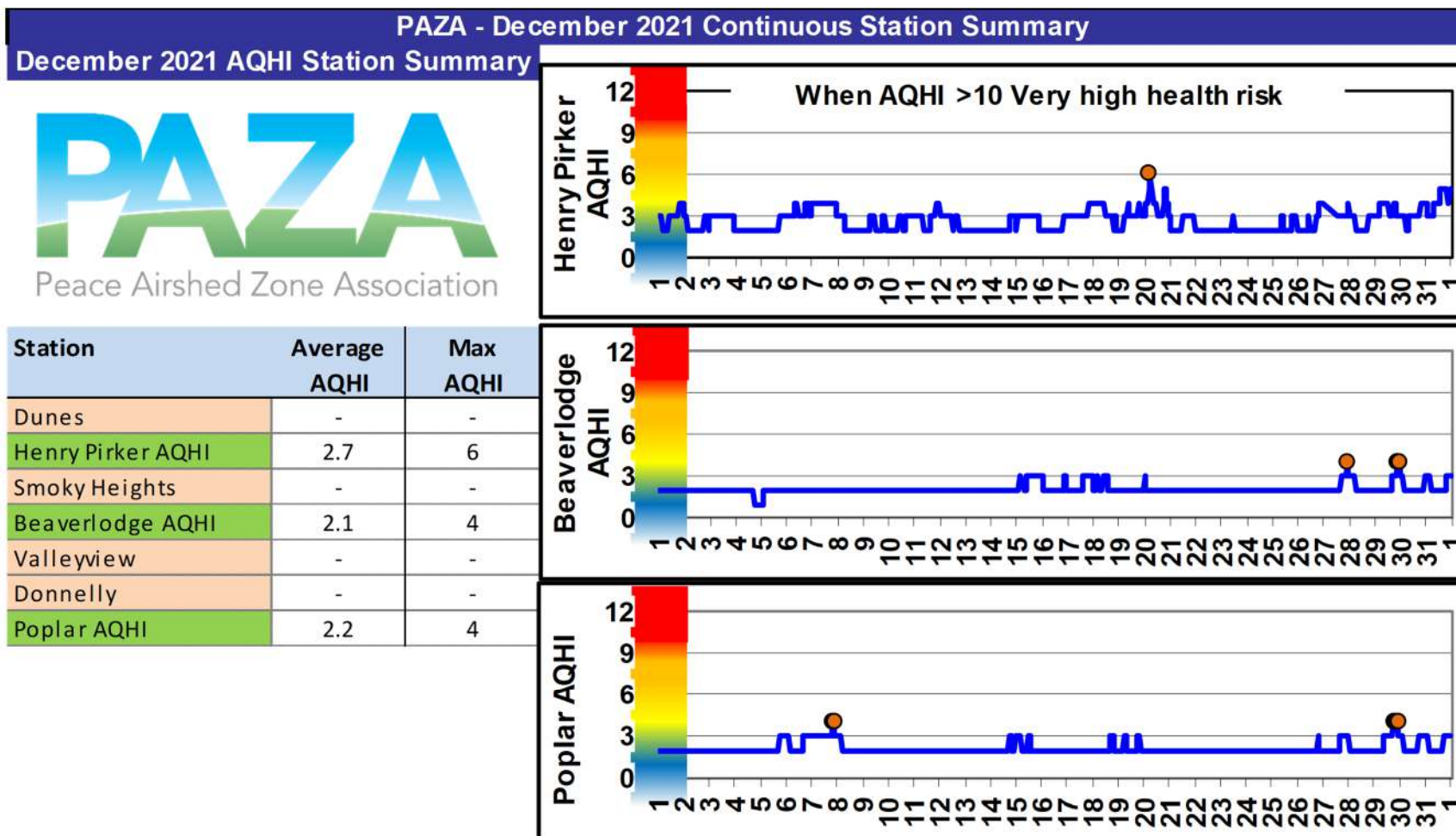




9 Concentration Summaries and Roses for PAZA

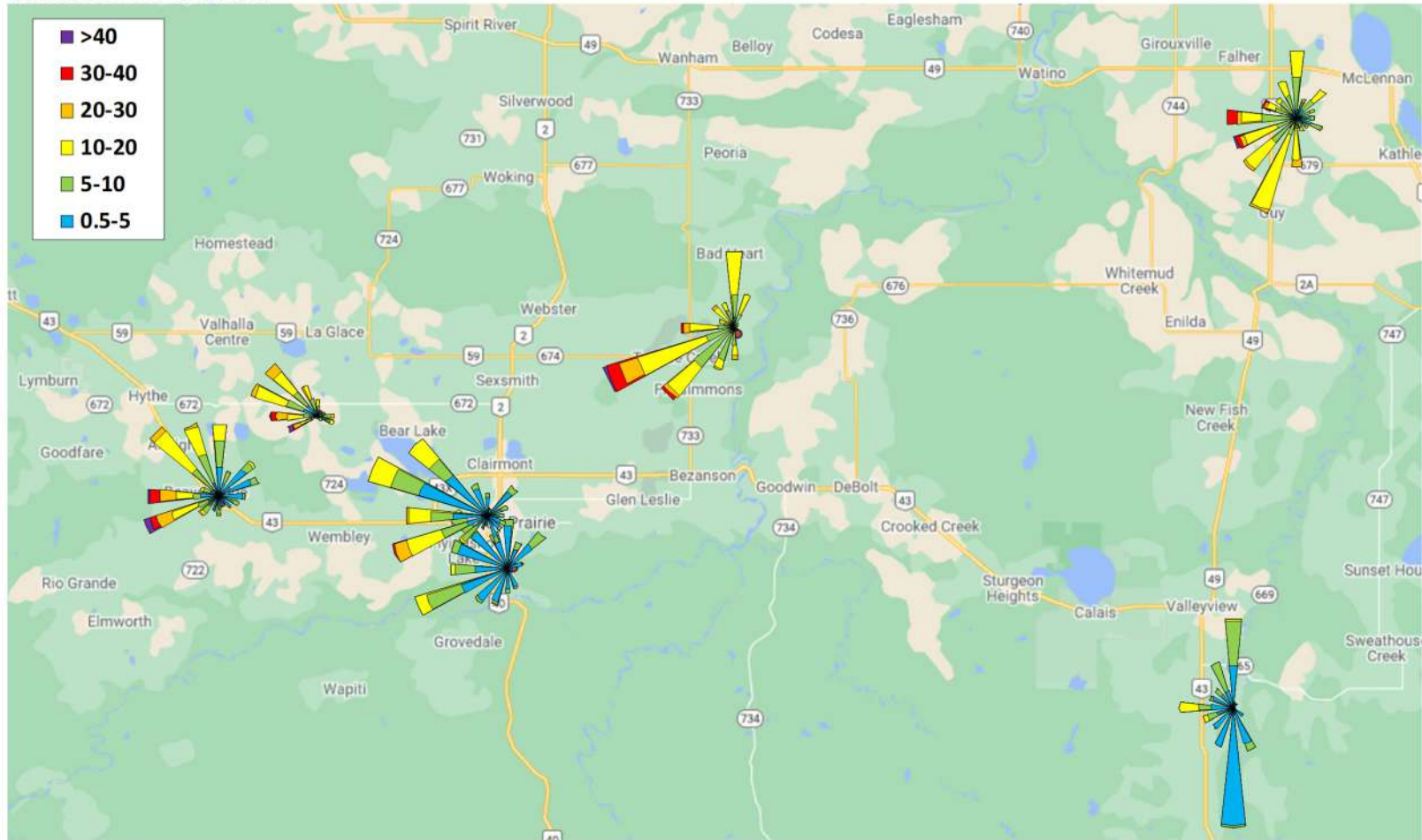


9.1 Air Quality Health Index (AQHI) Plots



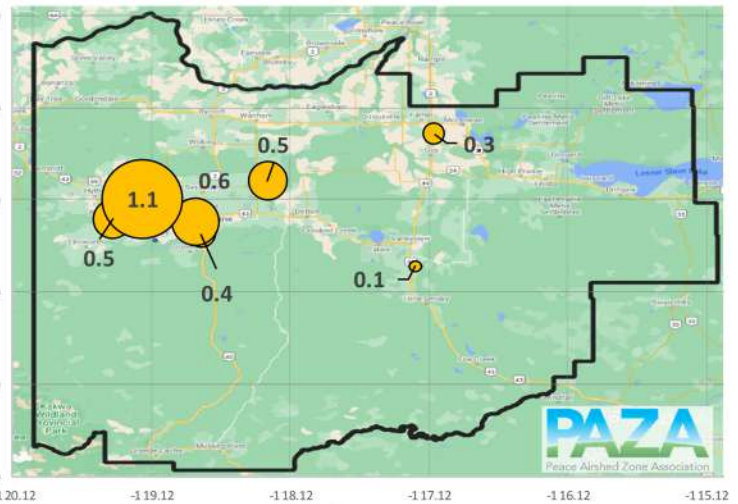
9.2 Wind Roses

Wind Roses in km/hr

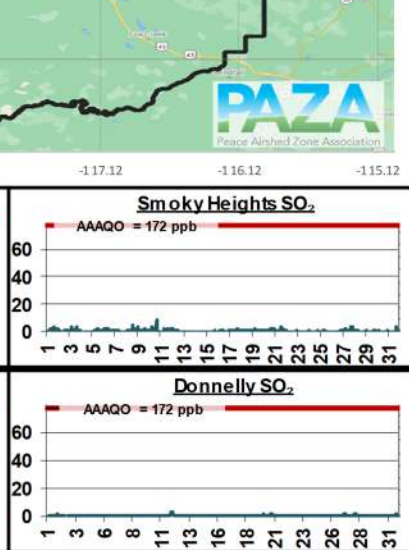
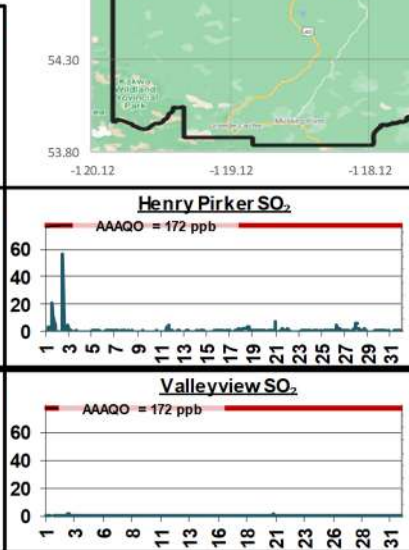
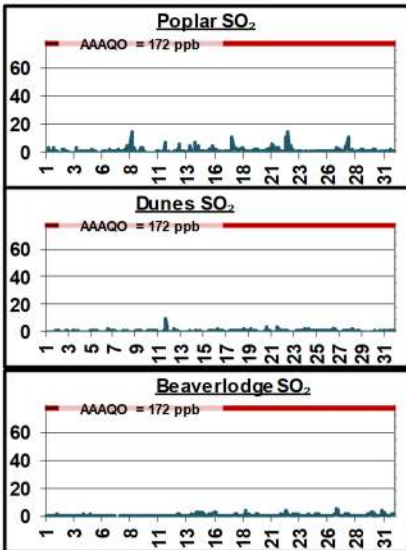


9.3 Sulphur Dioxide (SO₂) Plots

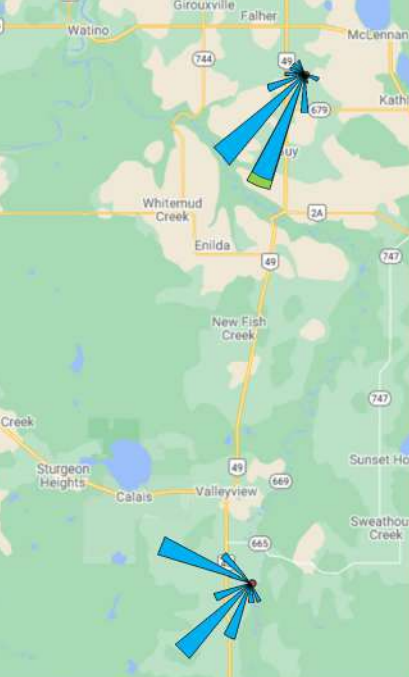
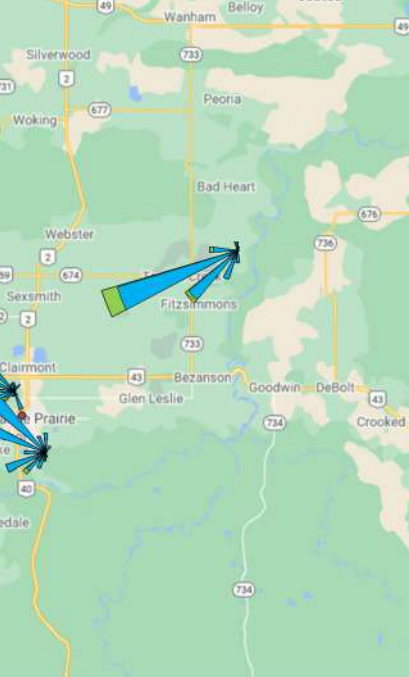
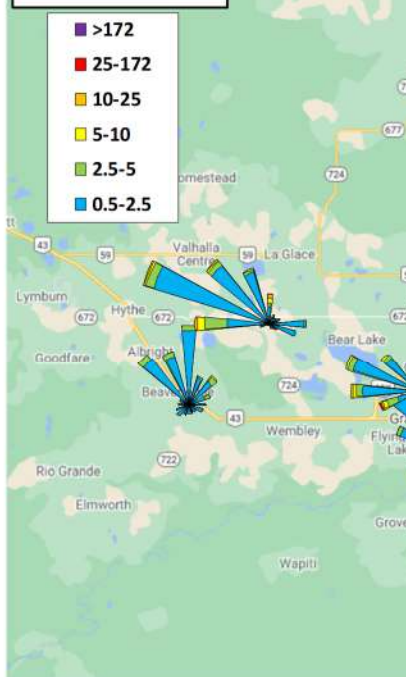
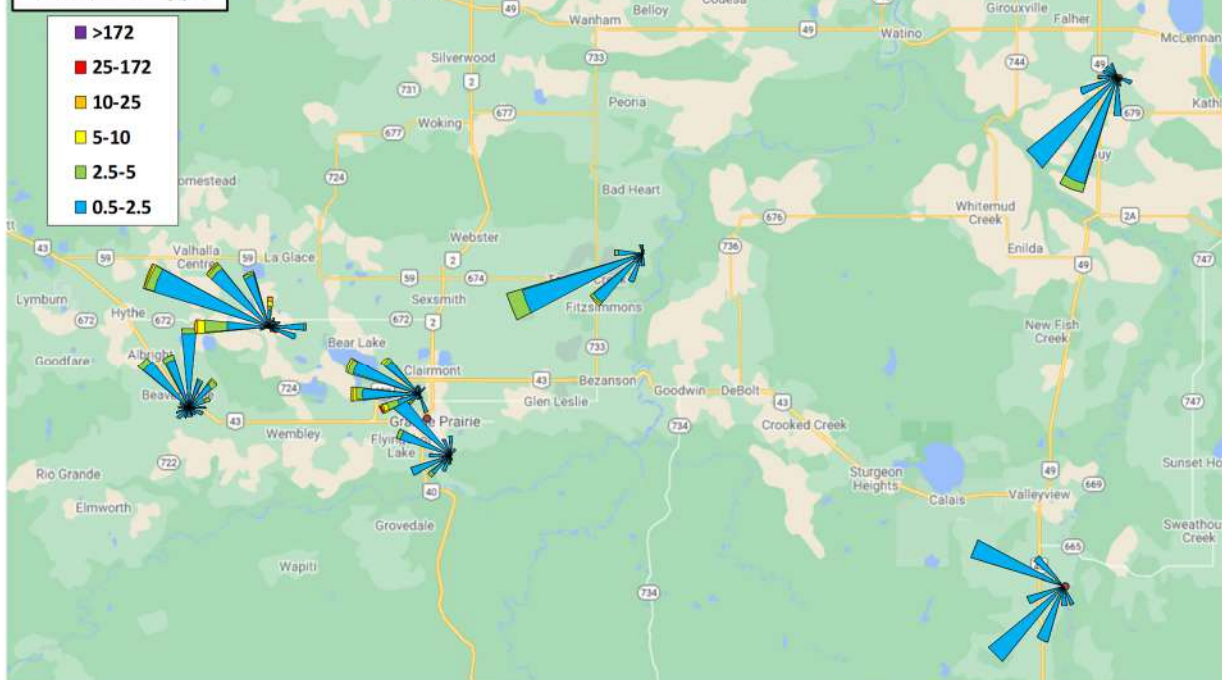
December 2021 SO ₂ Station Summary		
Station	Avg (ppb)	Max (ppb)
Dunes SO ₂	0.4	9.3
Henry Pirker SO ₂	0.6	56.5
Smoky Heights SO ₂	0.5	8.3
Beaverlodge SO ₂	0.5	5.0
Valleyview SO ₂	0.1	1.6
Donnelly SO ₂	0.3	3.2
Poplar SO ₂	1.1	15.1



Sulphur Dioxide in ppb



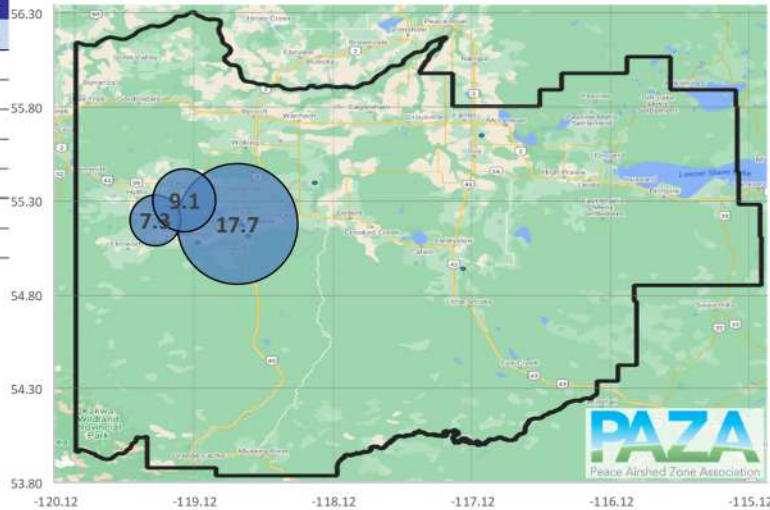
SO₂ Roses in ppb



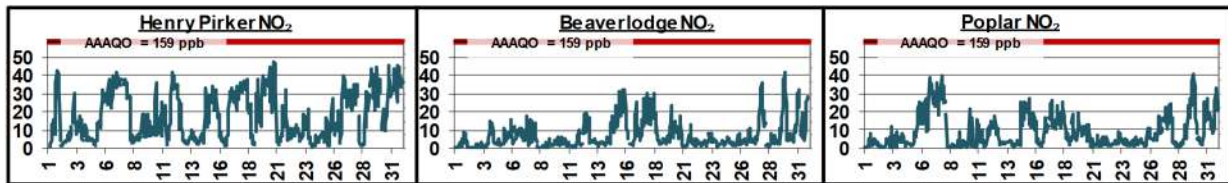
9.4 Nitrogen Dioxide (NO₂) Plots

December 2021 NO₂ Station Summary

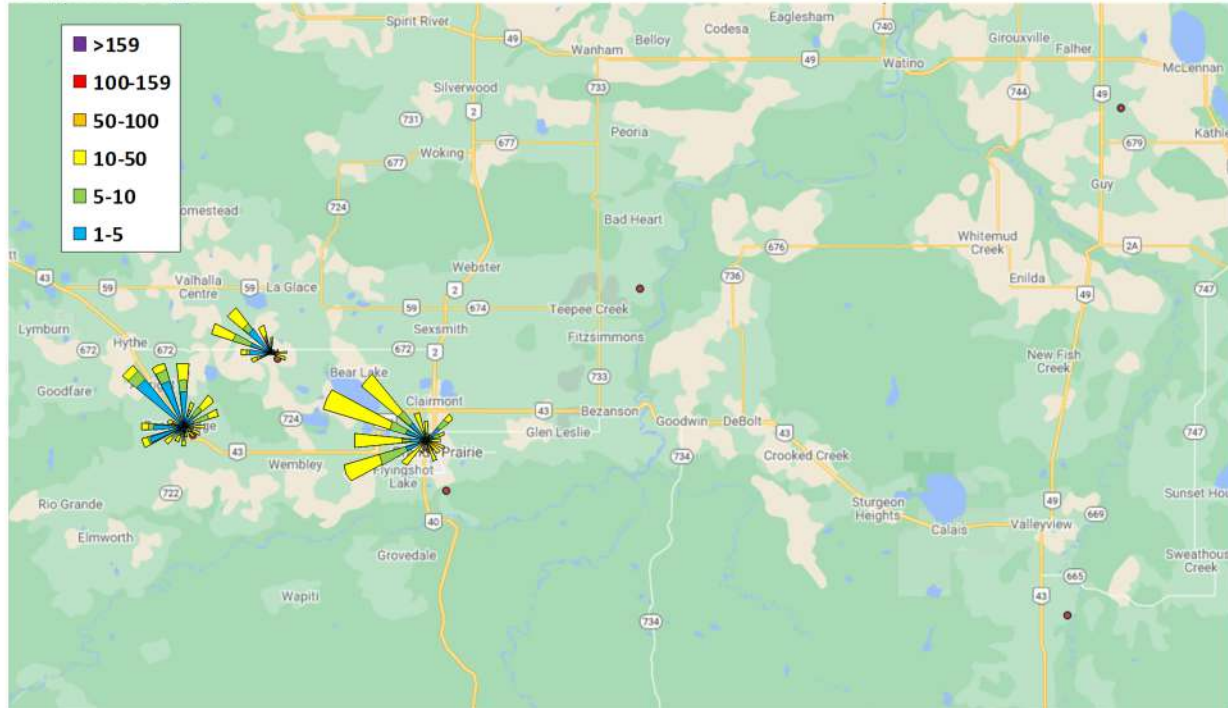
Station	Avg (ppb)	Max (ppb)
Dunes NO ₂	-	-
Henry Pirker NO ₂	17.7	47.0
Smoky Heights NO ₂	-	-
Beaverlodge NO ₂	7.3	41.3
Valleyview NO ₂	-	-
Donnelly NO ₂	-	-
Poplar NO ₂	9.1	40.1



Nitrogen Dioxide in ppb

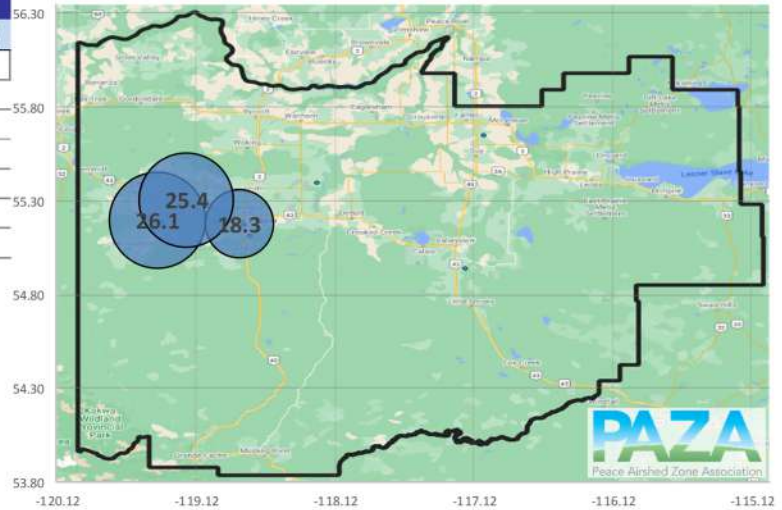


NO₂ Roses in ppb

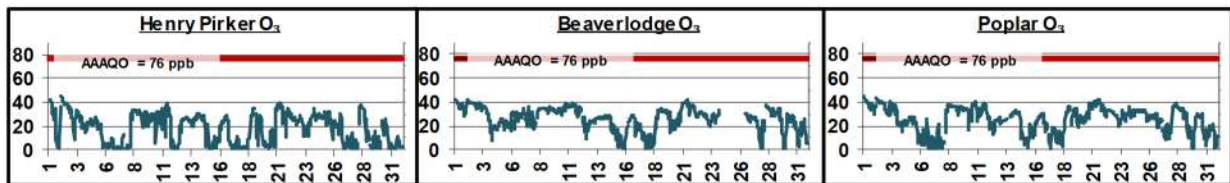


9.5 Ozone (O₃) Plots

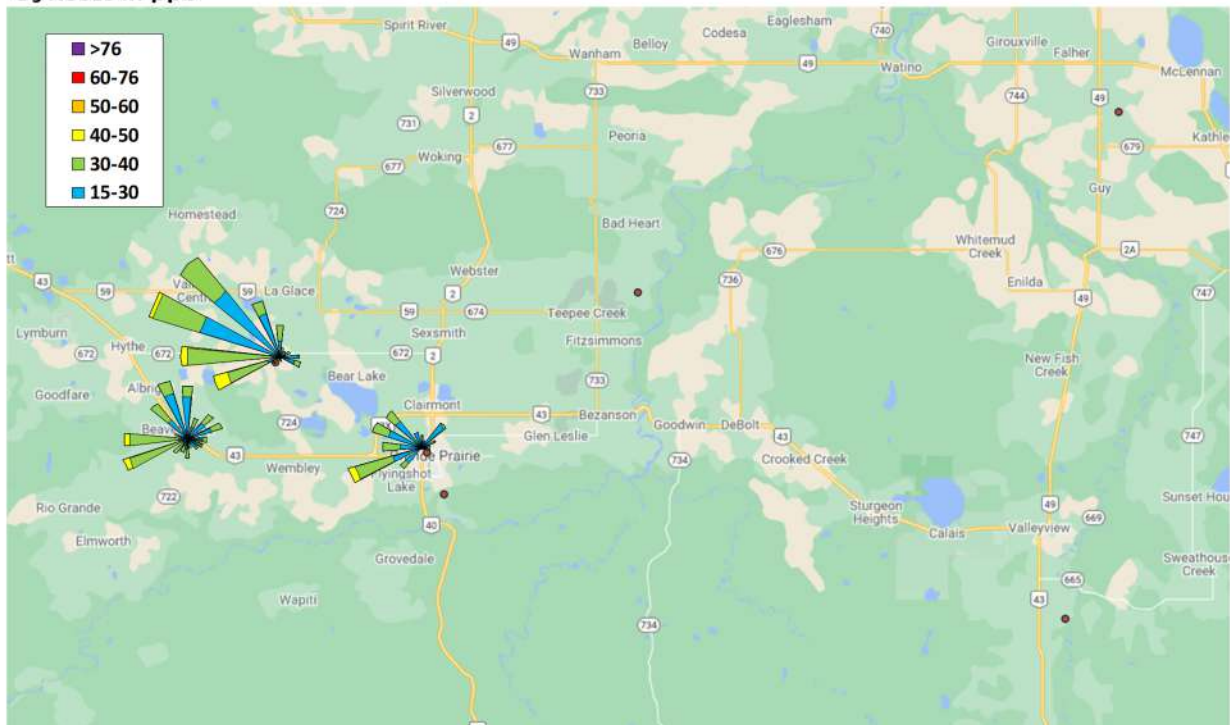
December 2021 O ₃ Station Summary		
Station	Avg (ppb)	Max (ppb)
Dunes O ₃	-	-
Henry Pirker O ₃	18.3	45.2
Smoky Heights O ₃	-	-
Beaverlodge O ₃	26.1	42.6
Valleyview O ₃	-	-
Donnelly O ₃	-	-
Poplar O ₃	25.4	44.1



Ozone in ppb



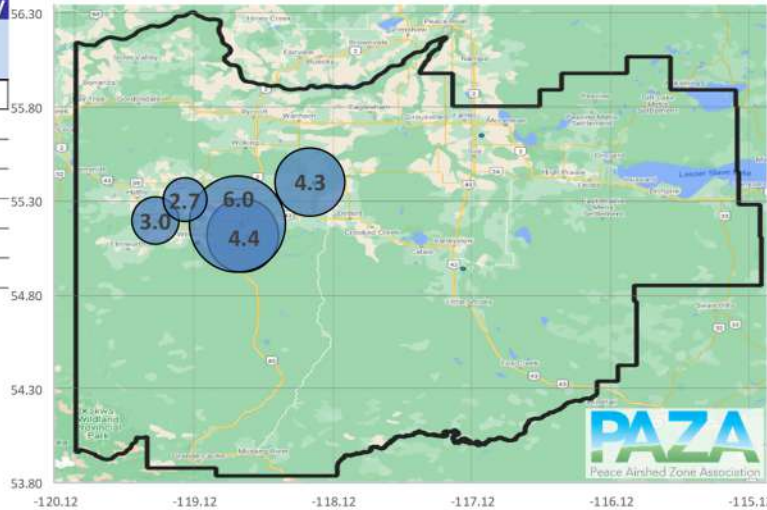
O₃ Roses in ppb



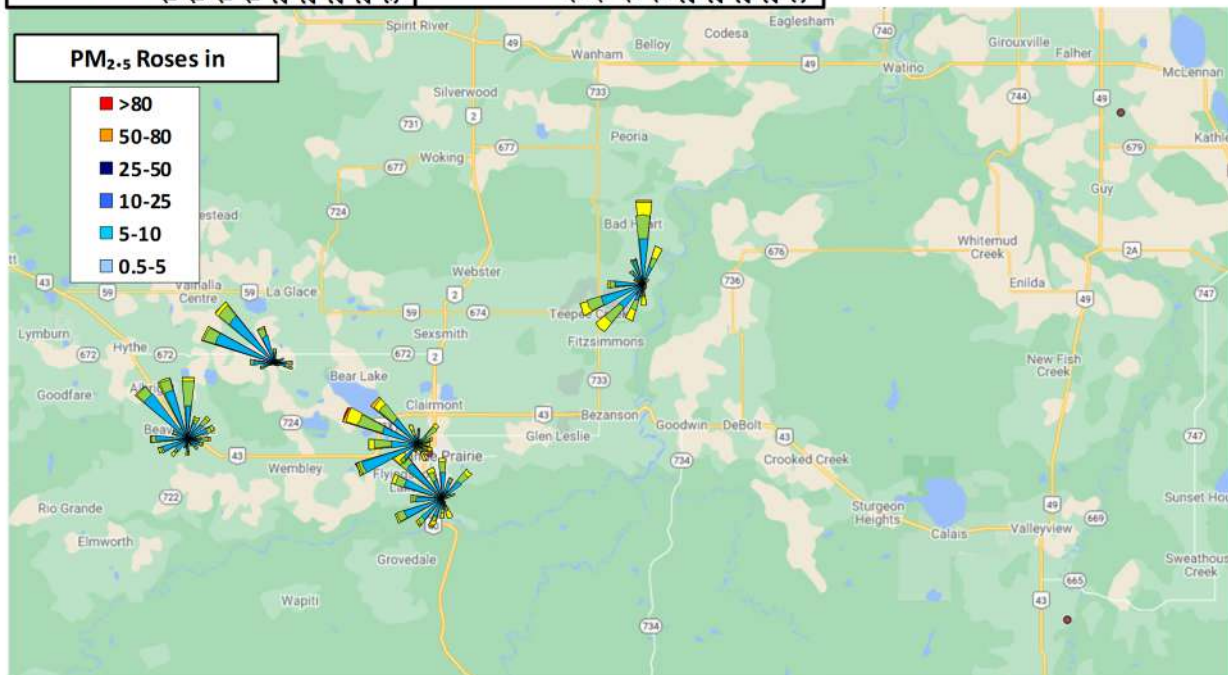
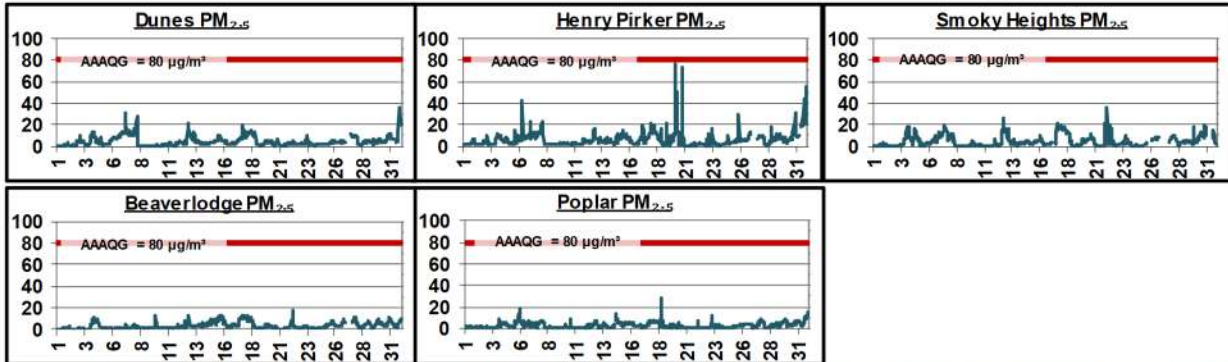
9.6 Fine Particulate Matter (PM_{2.5}) Plots

December 2021 PM_{2.5} Station Summary

Station	Avg µg/m ³	Max µg/m ³
Dunes PM _{2.5}	4.4	35.8
Henry Pirker PM _{2.5}	6.0	75.9
Smoky Heights PM _{2.5}	4.3	35.7
Beaverlodge PM _{2.5}	3.0	17.9
Valleyview PM _{2.5}	-	-
Donnelly PM _{2.5}	-	-
Poplar PM _{2.5}	2.7	27.9

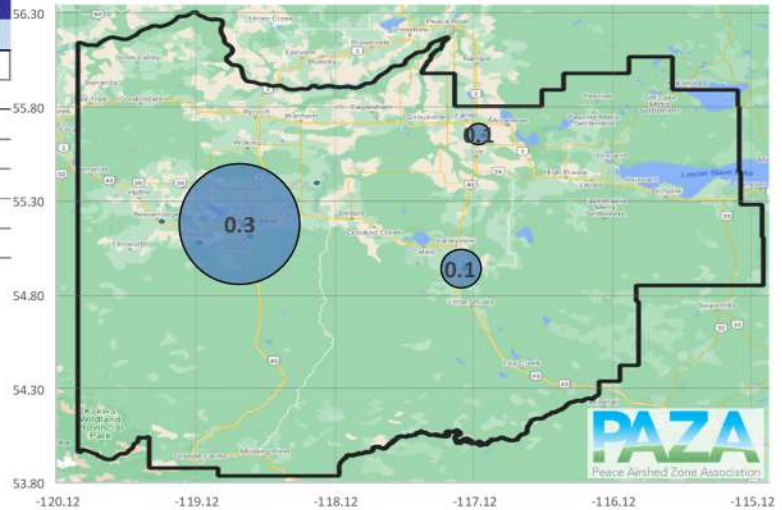


Fine Particulate Matter in µg/m³

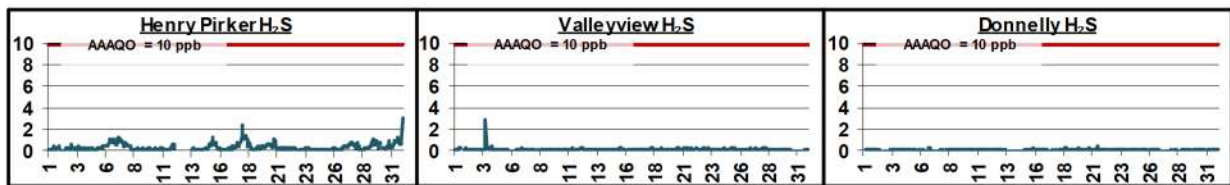


9.7 Hydrogen Sulphide (H₂S) Plots

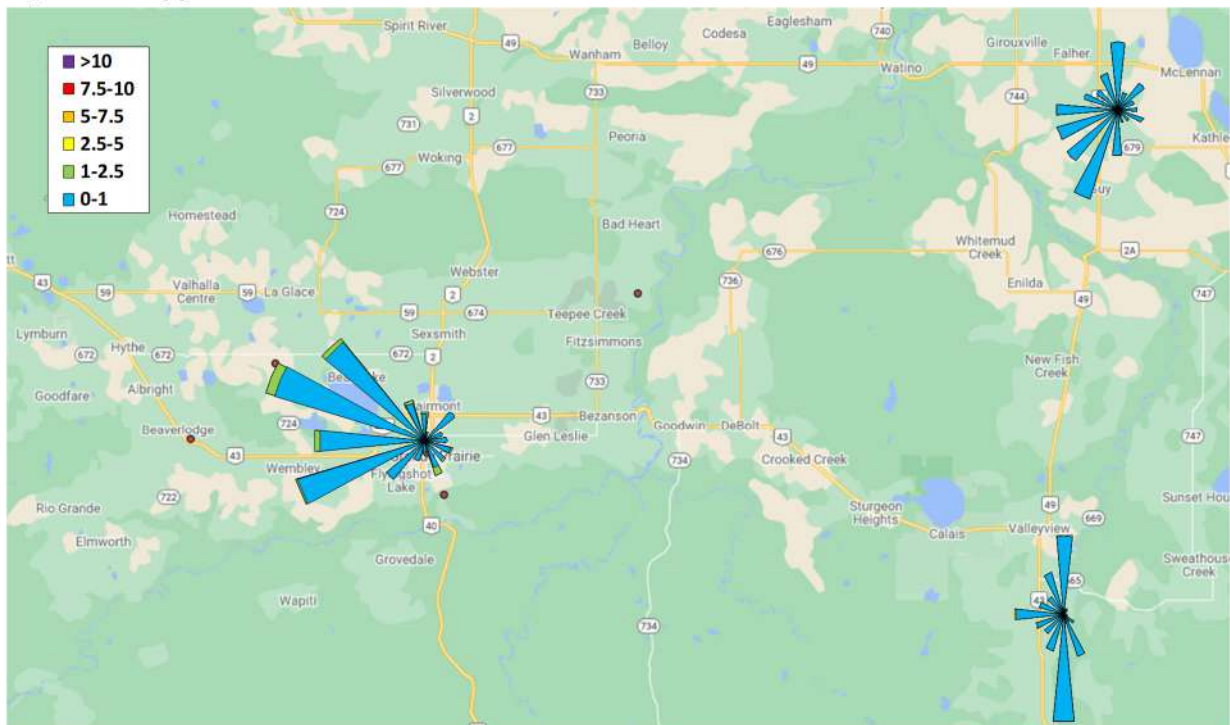
Station	Avg (ppb)	Max (ppb)
Dunes H ₂ S	-	-
Henry Pirker H ₂ S	0.3	3.1
Smoky Heights H ₂ S	-	-
Beaverlodge H ₂ S	-	-
Valleyview H ₂ S	0.1	2.8
Donnelly H ₂ S	0.1	0.4
Poplar H ₂ S	-	-



Hydrogen Sulphide in ppb



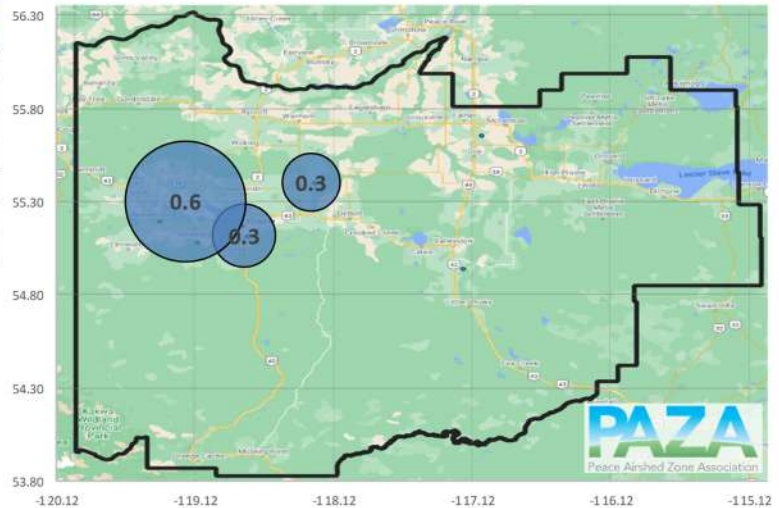
H₂S Roses in ppb



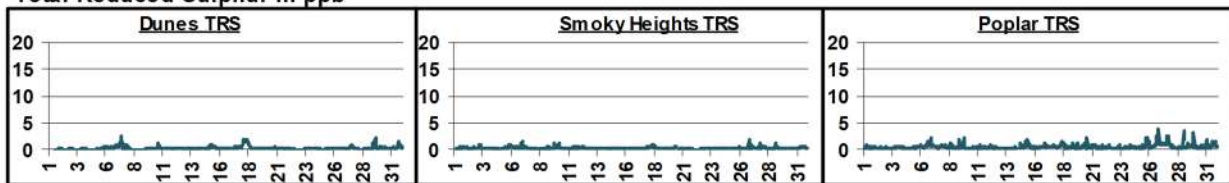
9.8 Total Reduced Sulphur (TRS) Plots

December 2021 TRS Station Summary

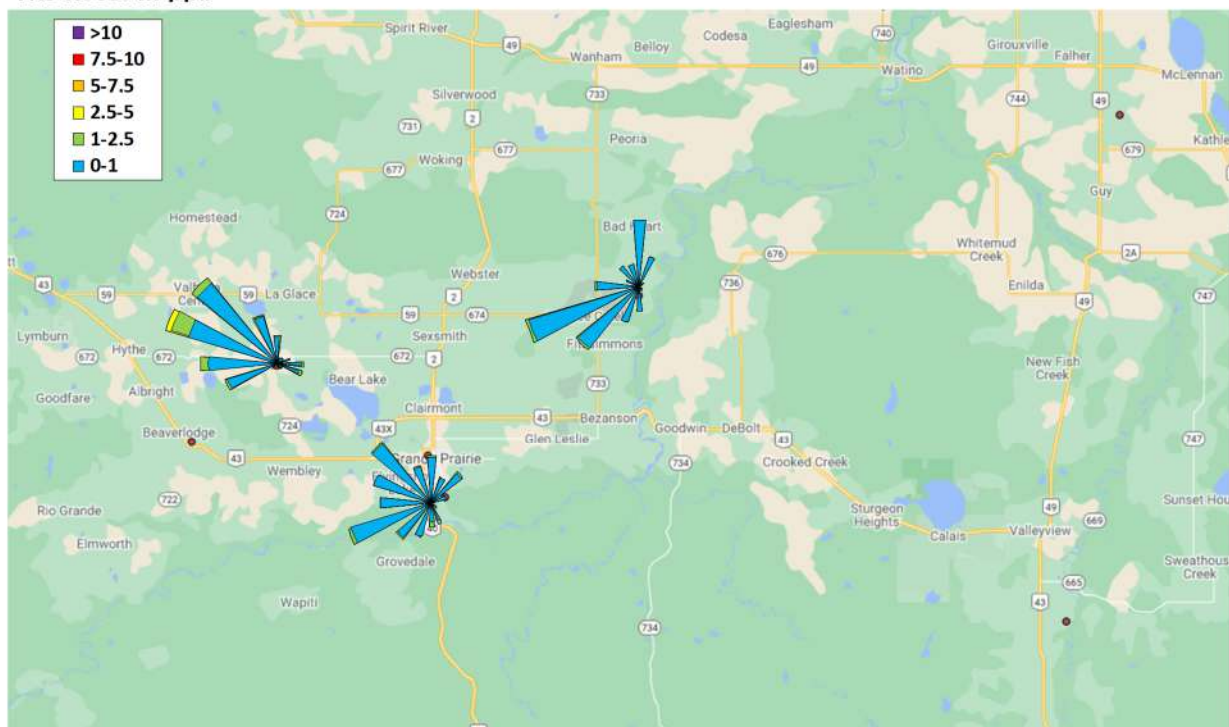
Station	Avg (ppb)	Max (ppb)
Dunes TRS	0.3	2.4
Henry Pirker TRS	-	-
Smoky Heights TRS	0.3	1.9
Beaverlodge TRS	-	-
Valleyview TRS	-	-
Donnelly TRS	-	-
Poplar TRS	0.6	3.8



Total Reduced Sulphur in ppb



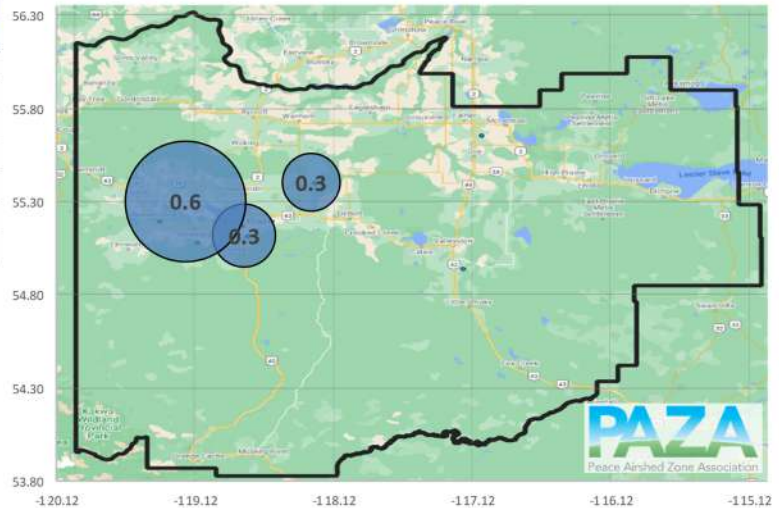
TRS Roses in ppb



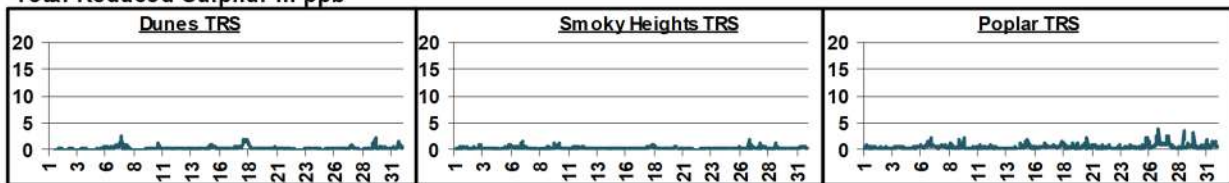
9.9 Total Hydrocarbon (THC) Plots

December 2021 TRS Station Summary

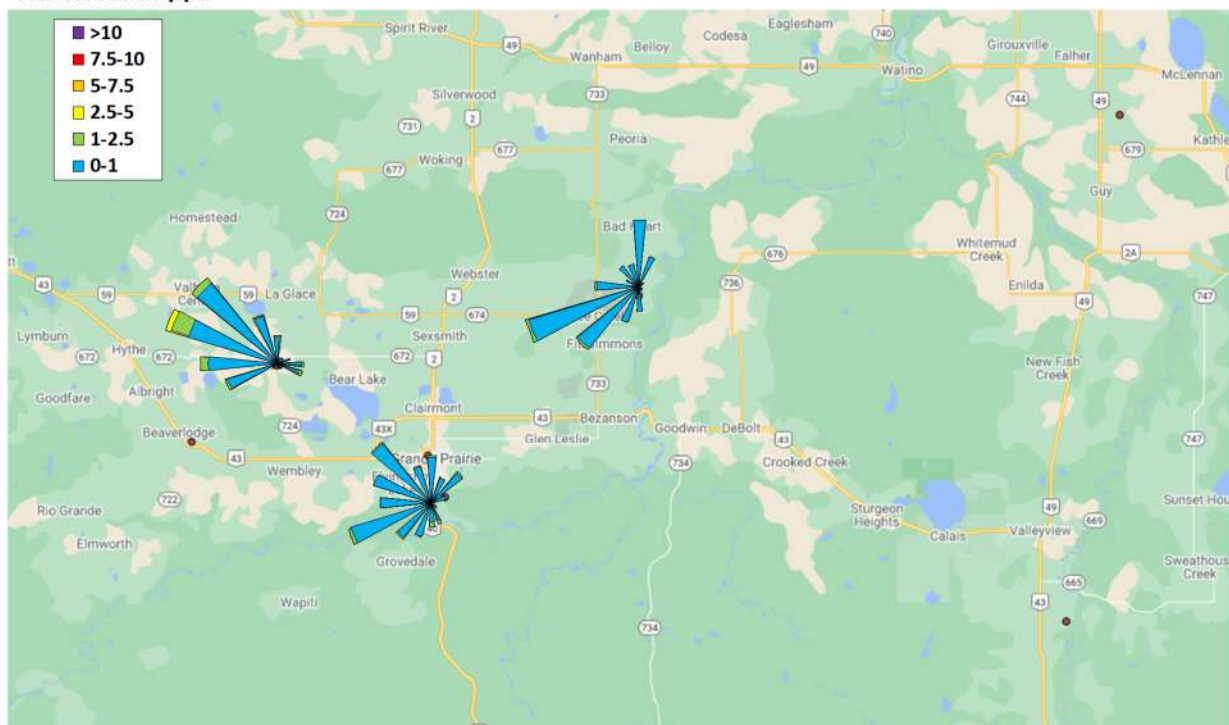
Station	Avg (ppb)	Max (ppb)
Dunes TRS	0.3	2.4
Henry Pirker TRS	-	-
Smoky Heights TRS	0.3	1.9
Beaverlodge TRS	-	-
Valleyview TRS	-	-
Donnelly TRS	-	-
Poplar TRS	0.6	3.8



Total Reduced Sulphur in ppb



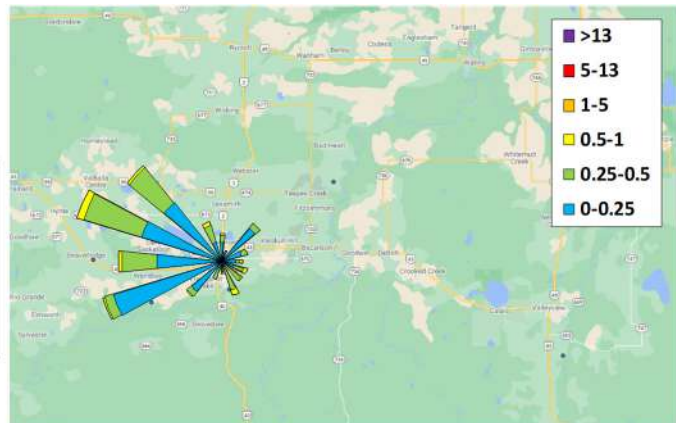
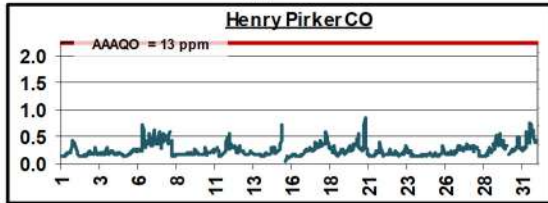
TRS Roses in ppb



9.10 Carbon Monoxide (CO) Plots

December 2021 CO Station Summary		
Station	Avg (ppm)	Max (ppm)
Henry Pirker CO	0.25	0.85

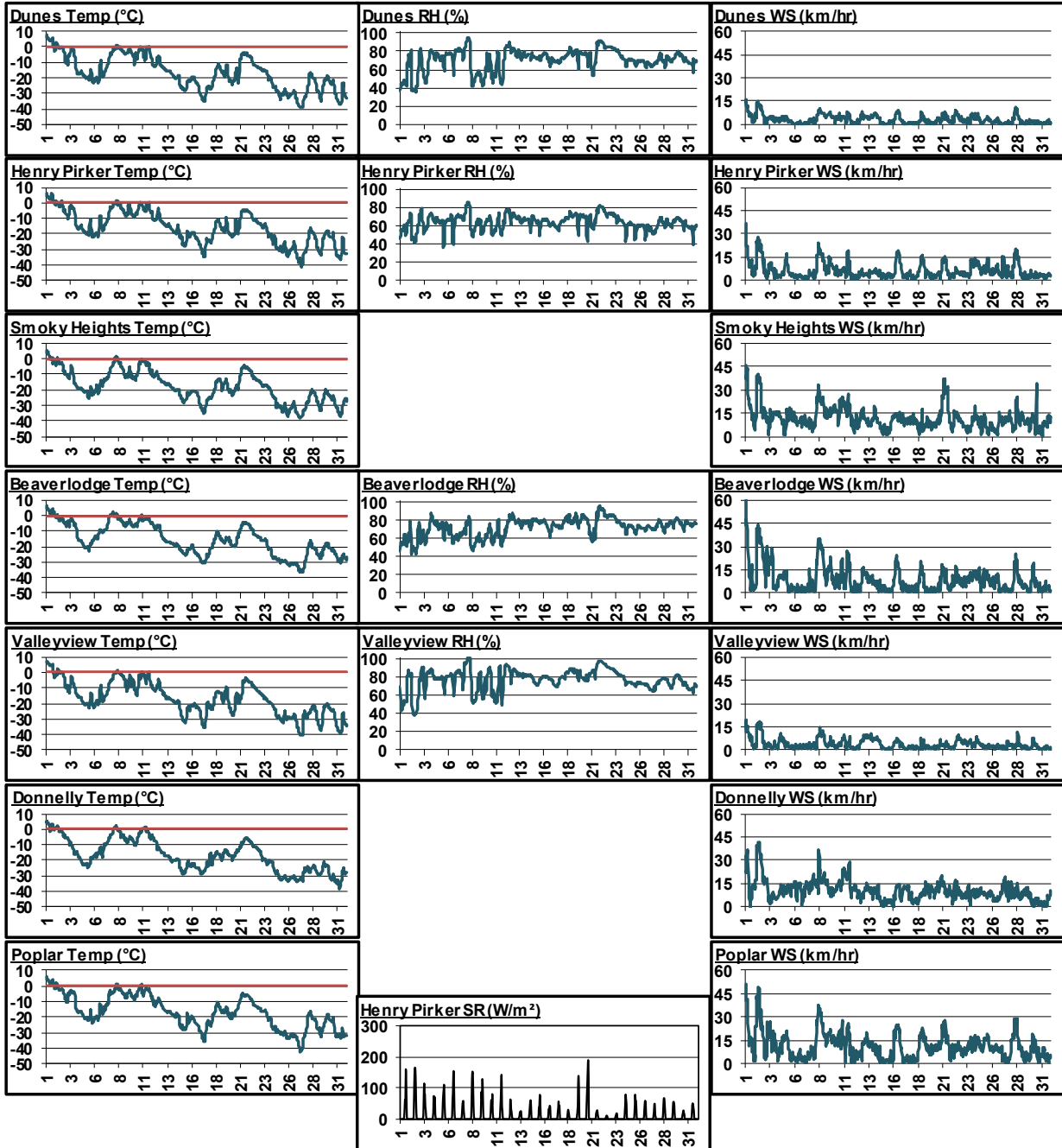
Carbon Monoxide in ppm



9.11 Meteorology Summary

December 2021 Meteorological Summary						
Station	Temp (°C)	RH (%)	SR (W/m ²)	WS (km/hr)	WD (deg)	WD
Dunes	-16.7	70.5	-	3.3	285	WNW
Henry Pirker	-16.3	63.5	12.8	6.4	276	W
Smoky Heights	-17.9	-	-	11.8	260	W
Beaverlodge	-15.5	72.0	-	8.8	293	WNW
Valleyview	-17.0	76.8	-	3.7	282	WNW
Donnelly	-16.9	-	-	10.4	244	WSW
Poplar	-16.8	-	-	11.4	290	WNW

Temp (°C) Outside Temperature
 RH (%) Relative Humidity
 SR (W/m²) Solar Radiation
 WS (km/hr) Wind Speed
 WD (deg) Wind Direction
 WD Wind Direction



10 Passive Monitoring Data – need update

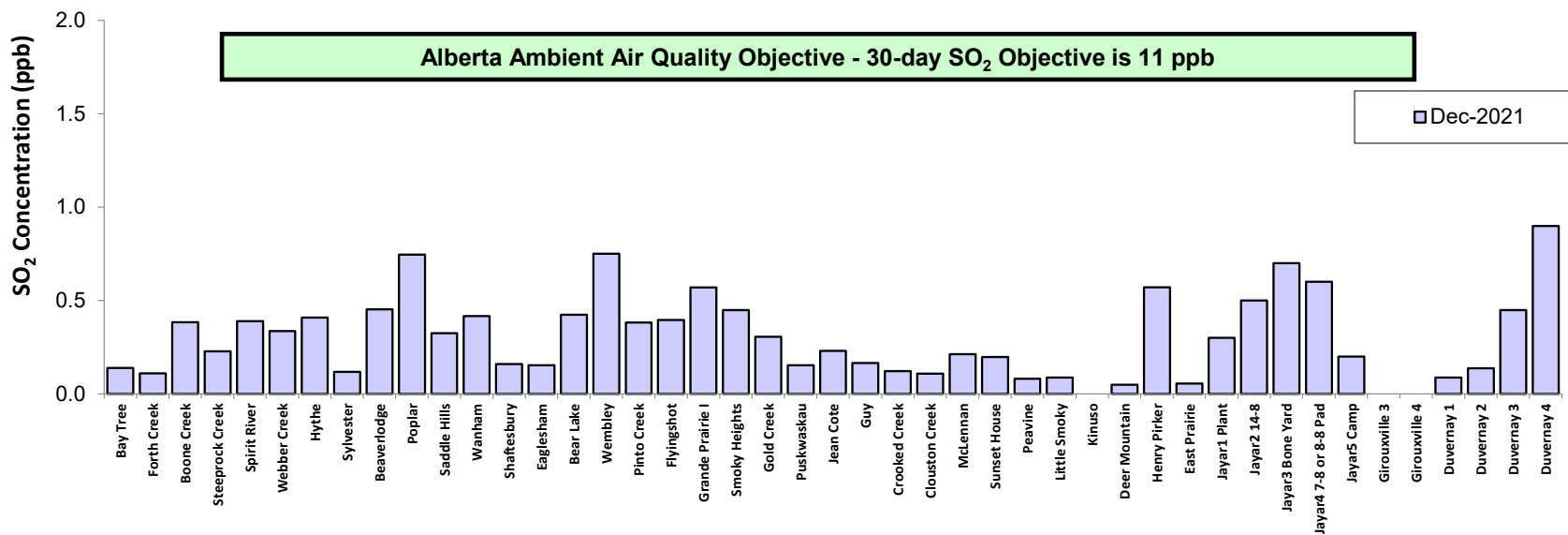
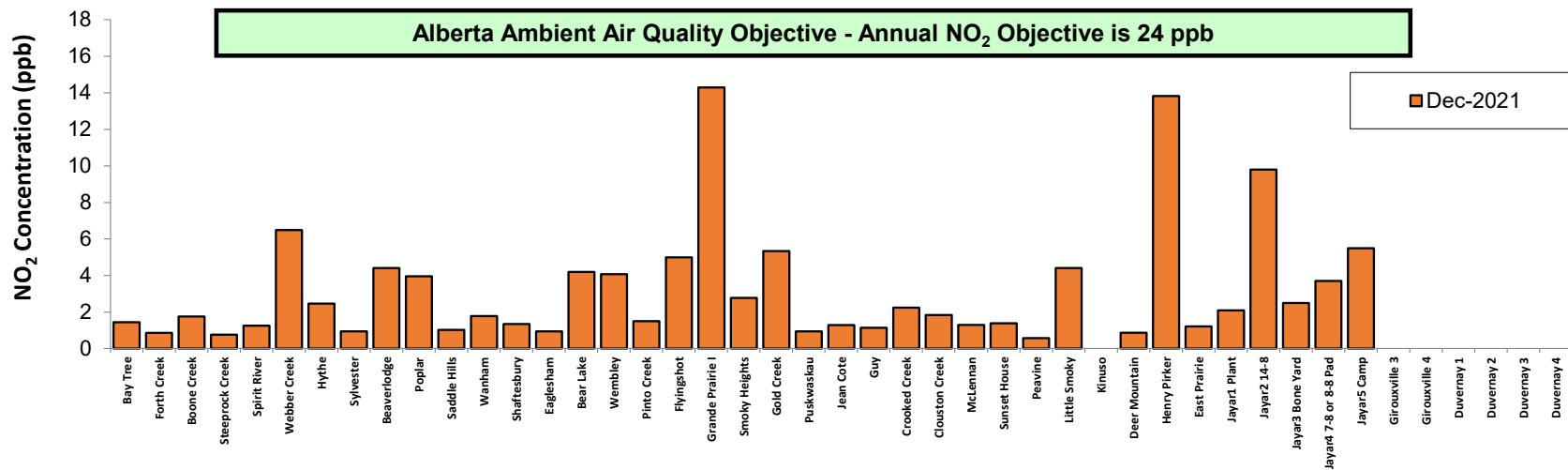
Peace Airshed Zone Association - PAZA Passive Stations for December 2021

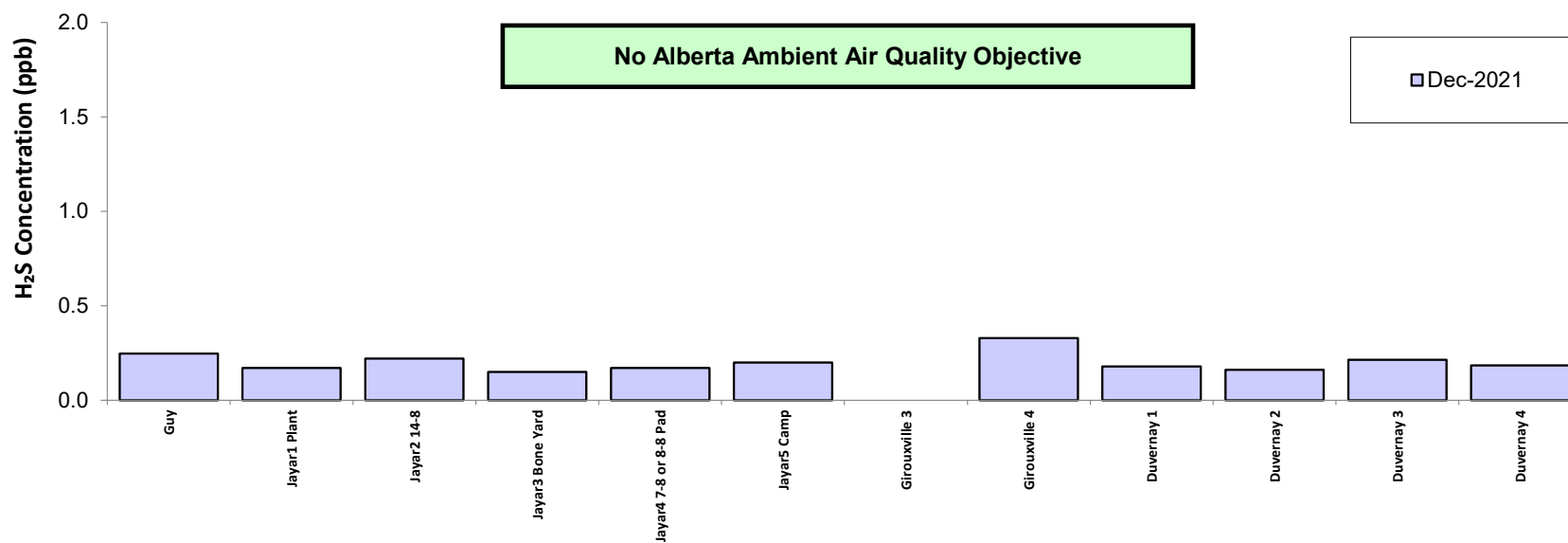
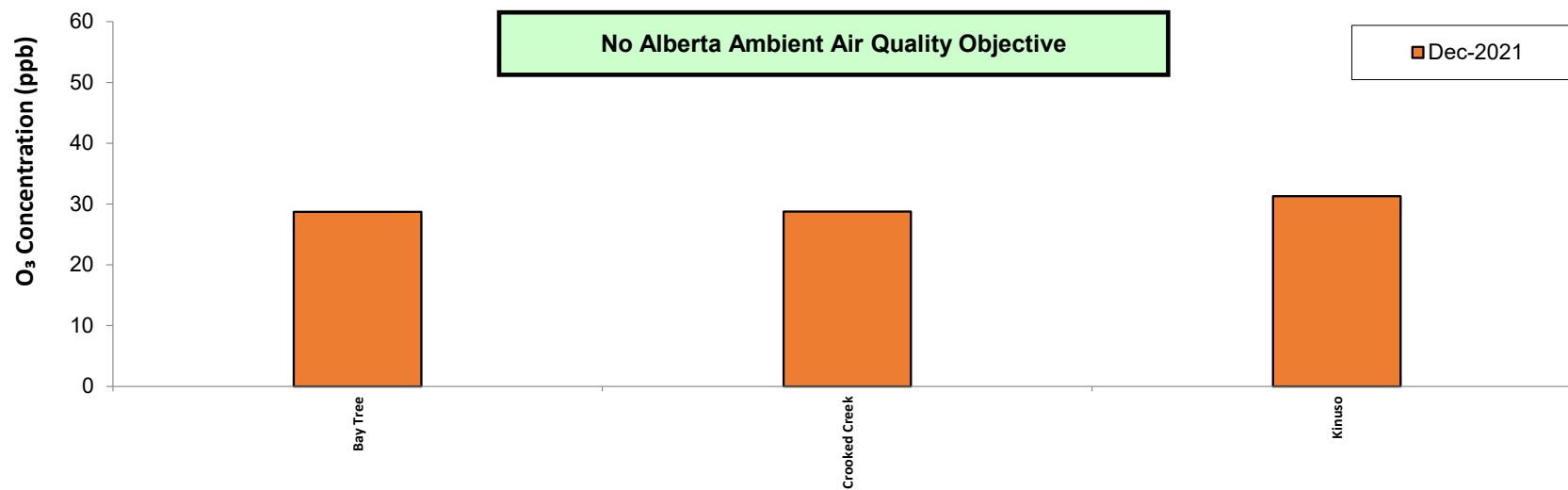
Station Number	Station Name	SO2 ppb	O3 ppb	NO2 ppb	H2S ppb	LSD
Duplicates						
7a	Steeprock Creek			0.6		
7b	Steeprock Creek			0.9		
9a	Spirit River	0.4				
9b	Spirit River	0.4				
14a	Sylvester	0.1				
14b	Sylvester	0.1				
19a	Wanham			2.0		
19b	Wanham			1.6		
23a	Bear Lake	0.4				
23b	Bear Lake	0.4				
32a	Gold Creek			5.4		
32b	Gold Creek			5.2		
44a	Peavine			0.6		
44b	Peavine			0.6		
47a	Kinuso		29.0			
47b	Kinuso		33.6			
50a	East Prairie	0.1				
50b	East Prairie	0.0				
D1a	Duvernay 1	0.1			0.2	
D1b	Duvernay 1	0.1			0.2	
J1a	Bone Yard	0.7				
J1b	Bone Yard	0.7				
J2a	14-8			10.5		
J2b	14-8			9.1		
J3a	Plant				0.2	
J3b	Plant				0.2	
G4a	Girouxville 4				0.4	
G4b	Girouxville 4				0.3	

2	Bay Tree	0.1	28.7	1.4	-	13-16-078-13 W6M
3	Forth Creek	0.1	-	0.9	-	04-13-082-07 W6M
5	Boone Creek	0.4	-	1.8	-	01-23-076-11 W6M
7	Steeprock Creek	0.2	-	0.8	-	09-35-072-13 W6M
9	Spirit River	0.4	-	1.3	-	08-12-079-07 W6M
11	Webber Creek	0.3	-	6.5	-	09-36-074-09 W6M
12	Hythe	0.4	-	2.5	-	14-36-072-11 W6M
14	Sylvester	0.1	-	0.9	-	08-06-069-12 W6M
16	Beaverlodge	0.5	-	4.4	-	15-36-071-10 W6M
17	Poplar	0.7	-	4.0	-	13-06-073-08 W6M
18	Saddle Hills	0.3	-	1.0	-	04-25-074-07 W6M
19	Wanham	0.4	-	1.8	-	16-22-077-03 W6M
20	Shaftesbury	0.2	-	1.3	-	04-03-082-23 W5M
21	Eaglesham	0.2	-	0.9	-	16-21-079-25 W5M
23	Bear Lake	0.4	-	4.2	-	15-31-072-06 W6M
24	Wembley	0.7	-	4.1	-	12-31-070-08 W6M
25	Pinto Creek	0.4	-	1.5	-	04-24-069-11 W6M
26	Flyingshot	0.4	-	5.0	-	15-36-070-07 W6M
27	Grande Prairie I	0.6	-	14.3	-	08-15-071-06 W6M
29	Smoky Heights	0.4	-	2.8	-	04-06-075-02 W6M
32	Gold Creek	0.3	-	5.3	-	06-33-067-05 W6M
34	Puskwaskau	0.2	-	0.9	-	15-35-074-25 W5M
35	Jean Cote	0.2	-	1.3	-	12-35-079-21 W5M
36	Guy	0.2	-	1.1	0.2	03-04-076-22 W5M
37	Crooked Creek	0.1	28.8	2.2	-	16-01-071-26 W5M
39	Clouston Creek	0.1	-	1.8	-	12-01-073-22 W5M
40	McLennan	0.2	-	1.3	-	03-29-077-19 W5M
42	Sunset House	0.2	-	1.4	-	05-32-070-19 W5M
44	Peavine	0.1	-	0.6	-	03-05-079-15 W5M
46	Little Smoky	0.1	-	4.4	-	12-01-065-21 W5M
47	Kinuso	-	31.3	-	-	12-10-073-10 W5M
48	Deer Mountain	0.0	-	0.9	-	15-22-068-09 W5M
49	Henry Pirker	0.6	-	13.8	-	17-26-071-06 W6M
50	East Prairie	0.1	-	1.2	-	11-13-079-08 W6M
57	Jayar1 Plant	0.3	-	2.1	0.2	06-08-062-03 W6M
58	Jayar2 14-8	0.5	-	9.8	0.2	07-08-062-03 W6M
59	Jayar3 Bone Yard	0.7	-	2.5	0.2	14-08-062-03 W6M
60	Jayar4 7-8 or 8-8 Pad	0.6	-	3.7	0.2	10-08-062-03 W6M
61	Jayar5 Camp	0.2	-	5.5	0.2	11-08-062-03 W6M
G3	Girouxville 3	-	-	-	missing	14-02-077-23 W5M
G4	Girouxville 4	-	-	-	0.3	04-08-077-22 W5M
D1	Duvernay 1	0.1	-	-	0.2	04-33-062-20 W5M
D2	Duvernay 2	0.1	-	-	0.2	04-33-062-20 W5M
D3	Duvernay 3	0.4	-	-	0.2	04-33-062-20 W5M
D4	Duvernay 4	0.9	-	-	0.2	04-33-062-20 W5M

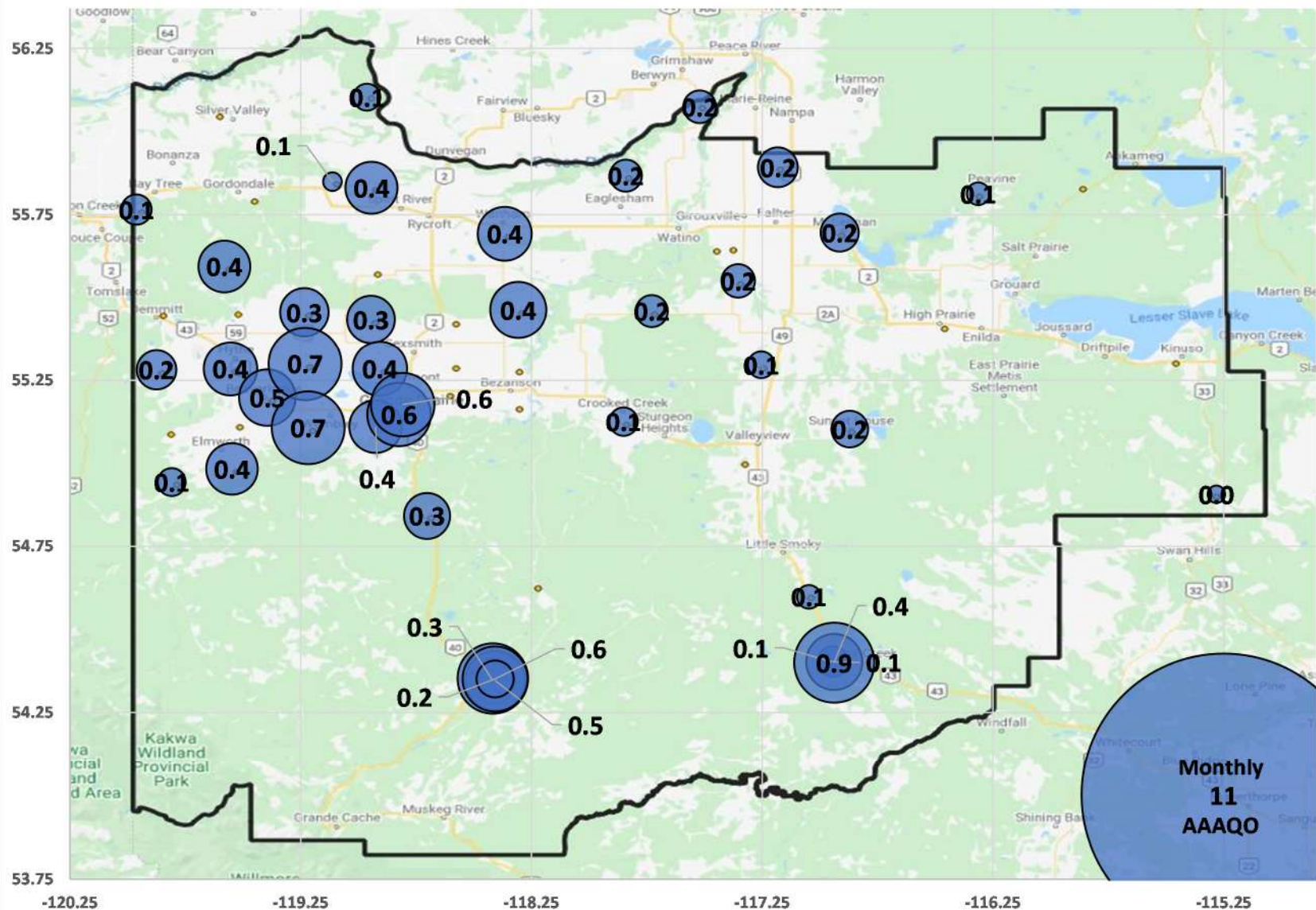
Passive Summary for December 2021

Stats	Sulphur Dioxide	Ozone	Nitrogen Dioxide	Hydrogen Sulphide
	SO ₂	O ₃	NO ₂	H ₂ S
	ppb	ppb	ppb	ppb
Passive Summary for August 2021 (PAZA)				
Mean	0.3	29.6	3.2	0.2
Standard Deviation	0.2	1.5	3.3	0.1
Minimum	0.0	28.7	0.6	0.2
Maximum	Deer Mountain (#48)	Bay Tree (#2)	Peavine (#44)	Jayar3 Bone Yard (#59)
	Duvernay 4 (#D4)	Kinuso (#47)	Grande Prairie I (#27)	Girouxville 4 (#G4)
Continuous and Passive Monitoring Comparison				
PAZA Beaverlodge Station	0.5	26.1	41.3	-
Beaverlodge Passive (#16)	0.5	-	4.4	-
PAZA Henry Pirker Station	0.6	18.3	47.0	0.4
Henry Pirker passive (#49)	0.6	-	13.8	-

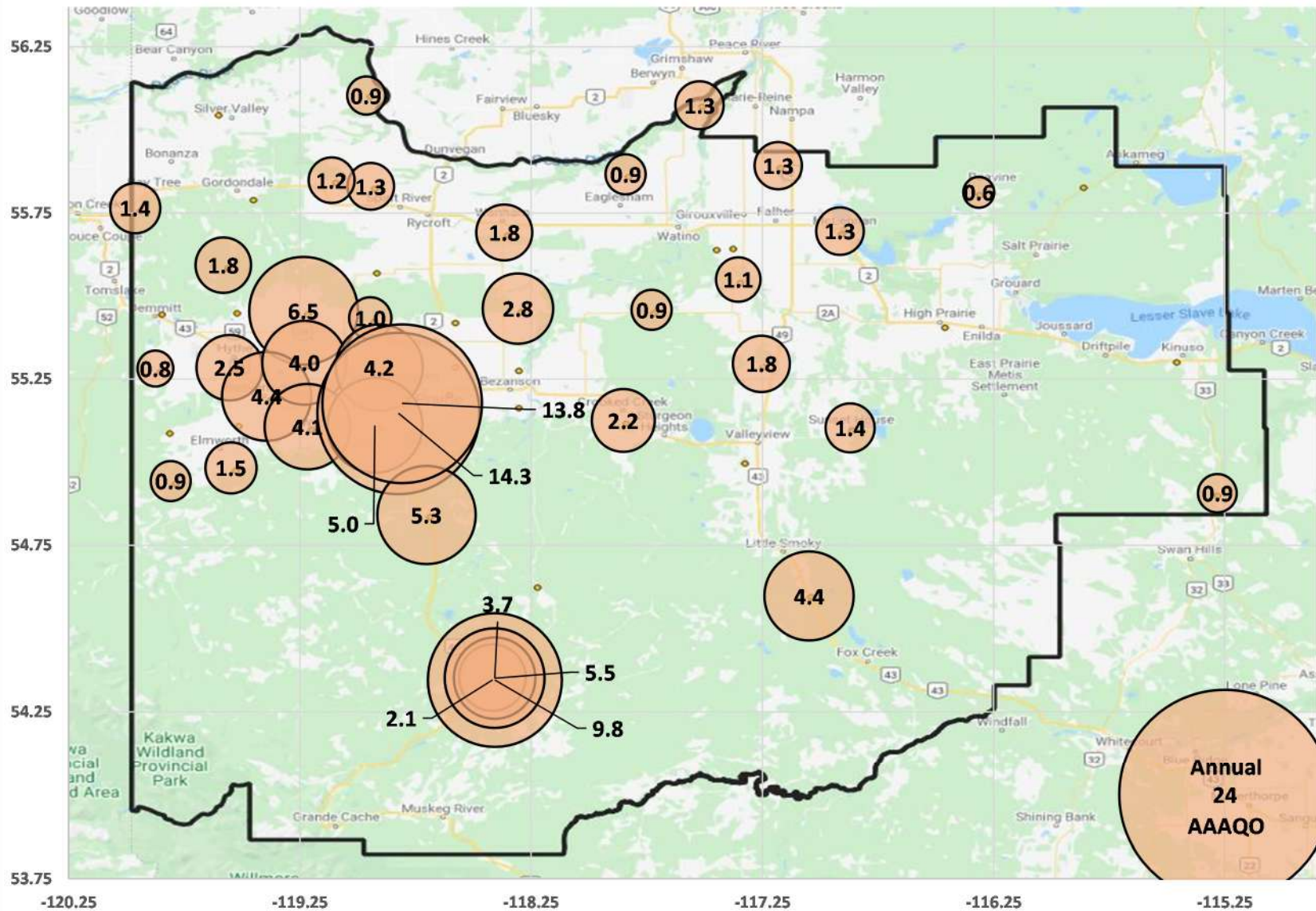




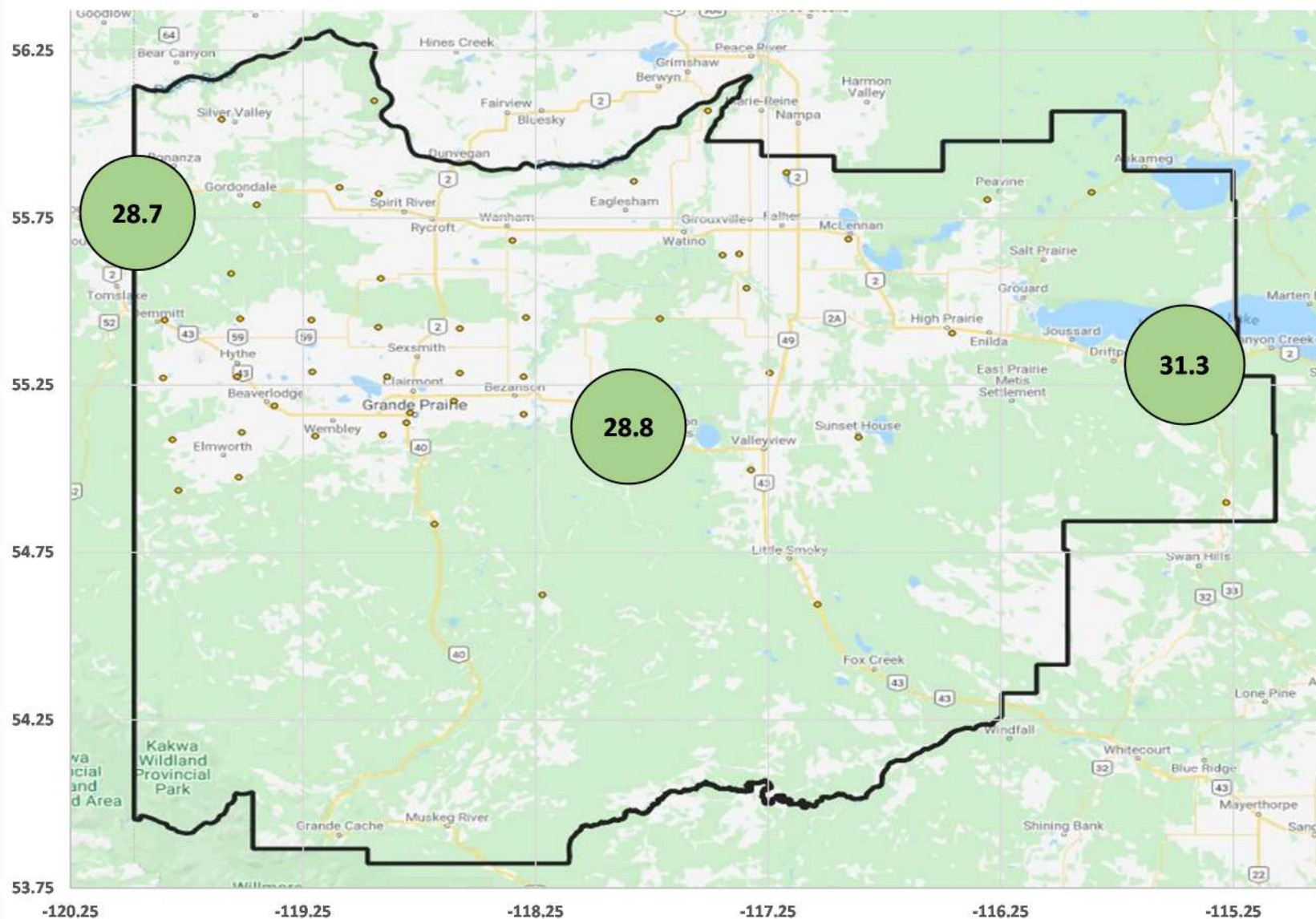
SO₂ Monthly Average (units in ppb)



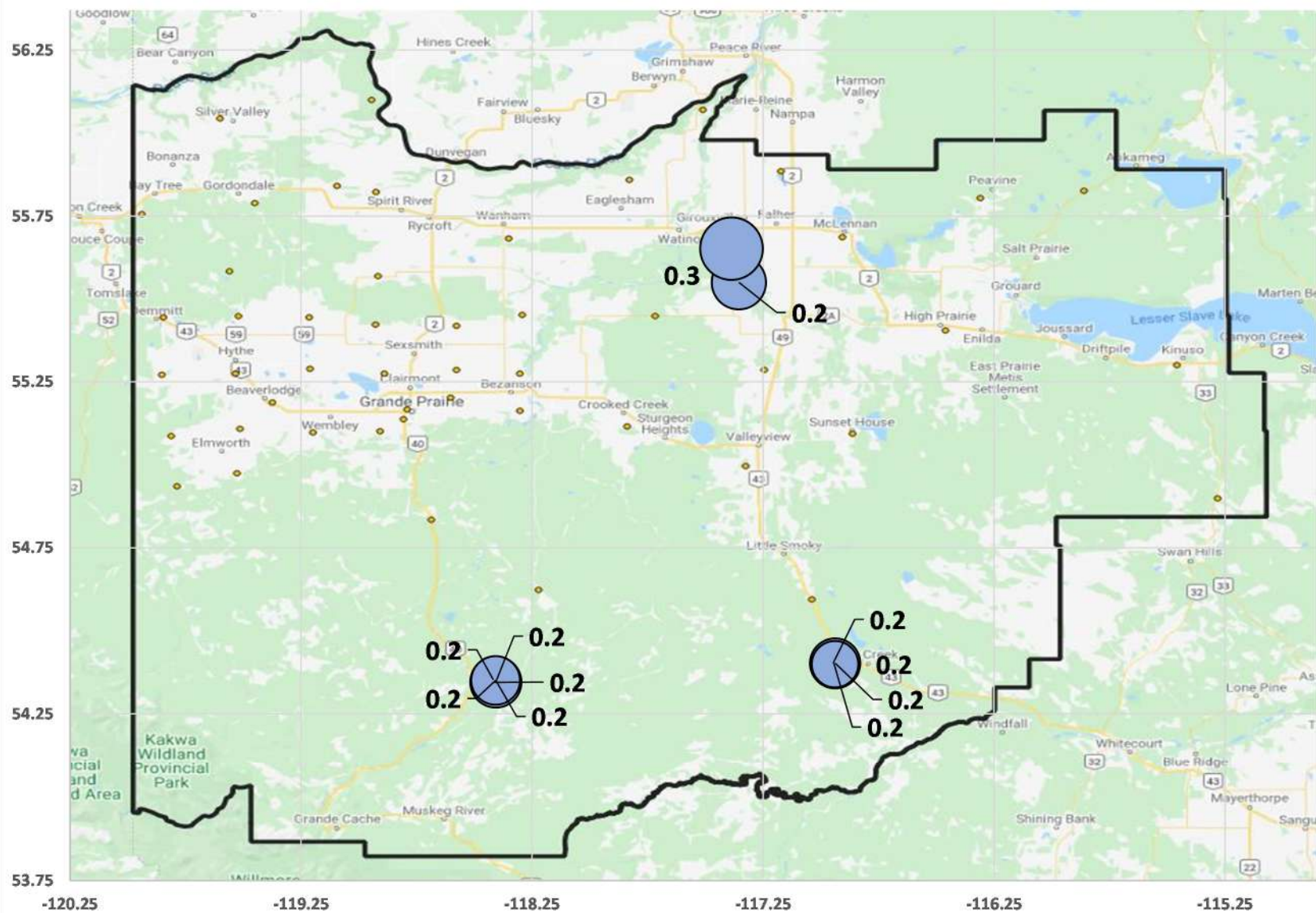
NO₂ Monthly Average (units in ppb)



O₃ Monthly Average (units in ppb)



H₂S Monthly Average (units in ppb)



End of Report



Peace Airshed Zone Association

Ambient Air Monitoring Report

December 2021