



Peace Airshed Zone Association

Ambient Air Monitoring Network Summary

Ambient Air Quality Monitoring Program

Monthly Report

November 2021

December 31, 2021

Alberta Environment and Parks

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

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

Please find enclosed the PAZA Ambient Air Quality Monitoring Network Report for the month of November 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 (started at beginning of the month of November 2021), 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 November 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 was one reading above the AAAQG (1hr PM_{2.5}), results are summarized below:

There was one, 1hr PM_{2.5} readings above 80 µg/m³ (AAAQG) as follows:

Reference Number	Pollutant	Station	Date	From MST	To MST	Hour avg µg/m ³	WS km/h	WD degrees
385212	PM _{2.5}	Henry Pirker	02-Nov-21	21:00	22:00	124.3	1.0	41.2

Operational times less than 90 percent:

Dunes station monitoring began at start of month, valid data was <75% for SO₂ and TRS but based on monitored time operations were >90%.

Air Incidents

None were reported

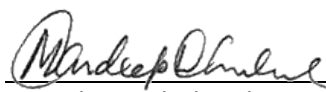
Deviations from Authorized Monitoring Methods

None to report.

Passive Monitoring

- 45 Stations throughout the PAZA zone
 - Passive sample analyses were performed by Bureau Veritas Laboratories
 - New passive at Girouxville 7 was added
- There were 14 duplicates sampled in the month of November
 - Six SO₂ duplicates located at Shaftesbury, Hythe, Wembley, Deer Mountain, Duvernay 1, Jayar Plant; RPD ranging from 0% to 98% (1 fail, Duvernay 1)
 - One O₃ duplicate at Crooked Creek; RPD at 18%
 - Five NO₂ duplicates at Bear Lake, Puskwaskau, Sylvester, Kinuso, Jayar Bone Yard; RPD ranging from 3% to 31% (no fails)
 - Two H₂S duplicates, Duvernay 1, Jayar 7-8 or 8-8 Pad; RPD ranging from 0% to 2% (no fails)
- 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.

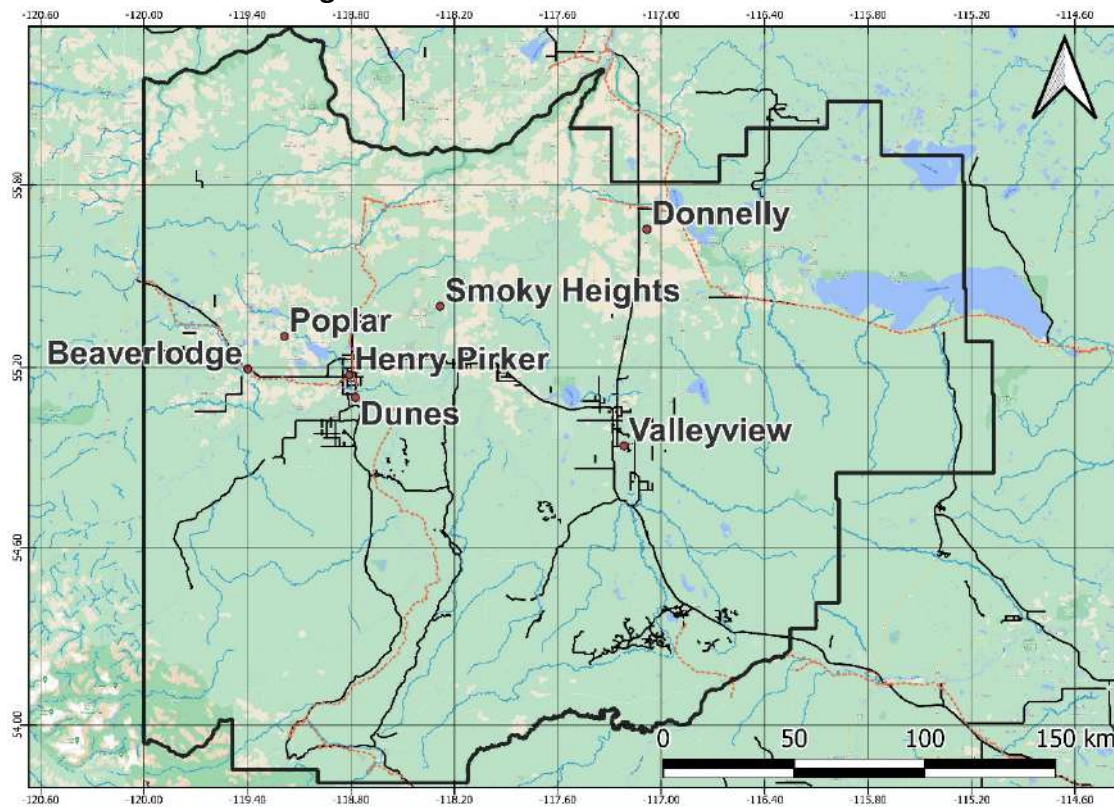


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Program Manager

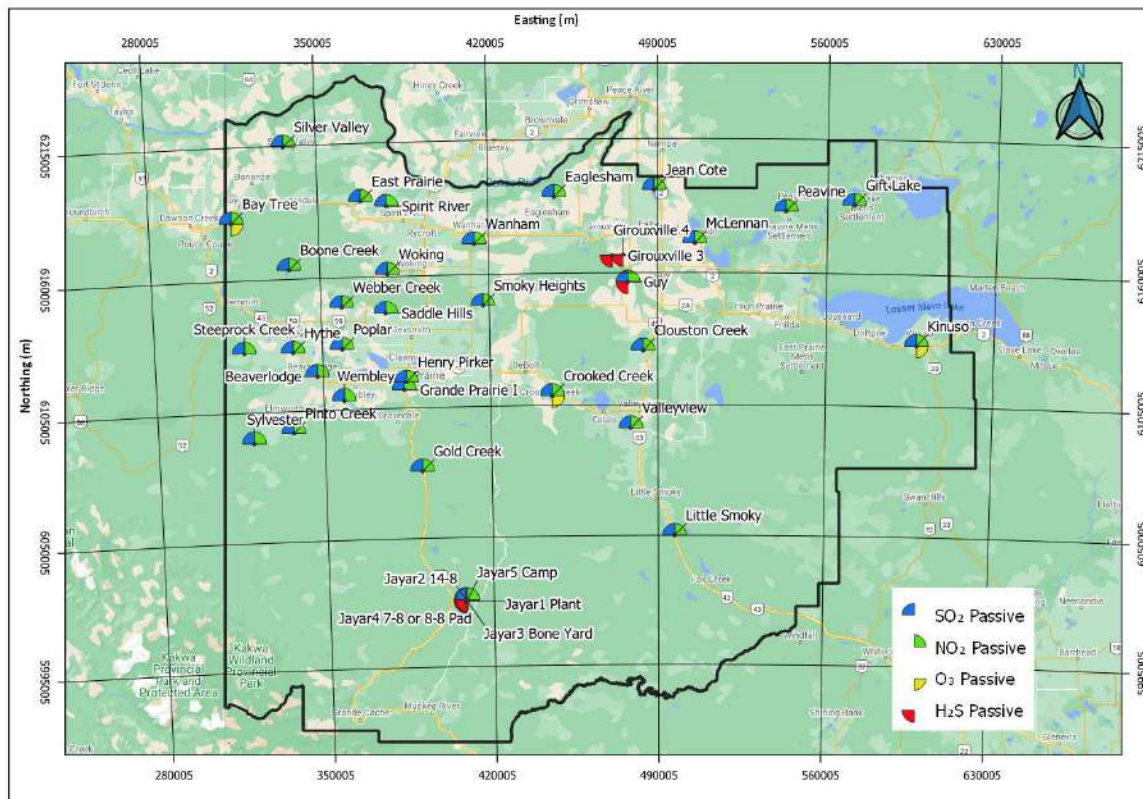
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PAZA Continuous Monitoring Station Locations



PAZA Passive Monitoring Station Locations



1 November 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 - November 2021 Beaverlodge Station Report

Parameter	November				Max	1-hour		Max	24-hour		Exceedance				Calibration
	Average	Minimum	Valid	Operational		Objective	Max Day and Time		Objective	Max Day	1hr	8hr	24hr	30d	Date
NO (ppb)	1.2	0.0	95.1%	100.0%	36.3	-	Nov-03 10:00	6.9	-	Nov-10	-	-	-	-	Nov 02, 2021
NO ₂ (ppb)	5.8	0.3	95.1%	100.0%	26.9	159	Nov-24 19:00	13.9	-	Nov-24	0	-	-	-	Nov 02, 2021
NO _x (ppb)	7.0	0.3	95.1%	100.0%	52.1	-	Nov-03 10:00	18.2	-	Nov-24	-	-	-	-	Nov 02, 2021
O ₃ (ppb)	23.7	0.8	95.3%	100.0%	42.8	76	Nov-26 11:00	38.3	-	Nov-26	0	-	-	-	Nov 02, 2021
PM _{2.5} (µg/m³)	4.5	0.0	99.6%	100.0%	24.0	80	Nov-10 02:00	11.5	29	Nov-24	0	-	0	-	Nov 03, 2021
SO ₂ (ppb)	0.6	0.0	95.4%	100.0%	9.9	172	Nov-20 22:00	2.0	48	Nov-20	0	-	0	0	Nov 03, 2021
	Average	Minimum	Valid	Operational	Maximum	Note: Valid hours must be greater than 75% Operational hours must be greater than 90%									
Temp (°C)	-2.1	-16.2	100.0%	100.0%	10.3										
RH (%)	74.7	38.1	100.0%	100.0%	100.0										
WS (km/hr)	9.8	0.1	100.0%	100.0%	61.0										
WD (deg)	247	0.5	100.0%	100.0%	358.9	Average Wind Direction		247	WSW						

Update Summary:

Parameter	Make	Model	Equipment summary
NO/NO ₂ /NO _x	Thermo	42i	No Operational issues noted
O ₃	Thermo	49IQ	No Operational issues noted
PM _{2.5}	Sharp	5030	No Operational issues noted
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 - November 2021 Dunes Station Report

Parameter	November				1-hour			24-hour			Exceedance				Calibration	
	Average	Minimum	Valid	Operational	Max	Objective	Max Day and Time	Max	Objective	Max Day	1hr	8hr	24hr	30d	Date	
PM _{2.5} (µg/m³)	4.0	0.0	77.7%	96.7%	20.8	80	Nov-28 04:00	9.2	29	Nov-24	0	-	0	-	Nov-06-2021	
SO ₂ (ppb)	0.3	0.0	74.2%	96.4%	7.0	172	Nov-16 14:00	0.9	48	Nov-16	0	-	0	0	Nov-06-2021	
TRS (ppb)	0.3	0.0	68.8%	90.6%	5.4	-	Nov-18 04:00	0.8	-	Nov-18	-	-	-	-	Nov-06-2021	
	Average	Minimum	Valid	Operational	Maximum	Note: Valid hours must be greater than 75% Operational hours must be greater than 90%										
Temp (°C)	-4.1	-19.3	75.2%	96.5%	9.6											
RH (%)	77.1	34.0	75.2%	96.5%	97.5											
WS (km/hr)	3.5	0.1	77.5%	96.5%	13.6											
WD (deg)	254	0.8	77.5%	96.5%	359.7	Average Wind Direction			254	WSW						

Update Summary:

Parameter	Make	Model	Equipment summary
PM _{2.5}	Thermo	TEOM AB	Not-in-service (Nov 1-6, 133hrs); Power issue data removed Nov12-13, 23hrs
SO ₂	TECO	43i	Not-in-service (Nov 1-6, 133hrs); Span failure, 2hrs maint.; Power issue, data removed Nov 12-13, 24hrs
TRS	TECO	43C	Not-in-service (Nov 1-6, 133hrs); Power issue data removed Nov12-13, 23hrs; Span fail, 44hrs removed
Met Equip	Gil/RMYoung	MetPak/RMY86004	Not-in-service (Nov 1-6, 133hrs); Power issue data removed Nov 12-13, 23hrs; 2hrs excessive drift Nov 16

1.3 Grande Prairie - Henry Pirker Air Monitoring Station

PAZA - November 2021 Henry Pirker Station Report

Parameter	November				Operational	1-hour			8-hour / 24-hour			Exceedance				Calibration Date
	Average	Minimum	Valid			Max	Objective	Max Day and Time	Max	Objective	Max Day	1hr	8hr	24hr	30d	
NO (ppb)	8.8	0.0	85.9%	100.0%	112.3	-		Nov-01 10:00	39.4	-	Nov-03	-	-	-	-	Nov 15, 2021
NO ₂ (ppb)	13.5	1.4	85.9%	100.0%	41.7	159		Nov-27 06:00	21.7	-	Nov-24	0	-	-	-	Nov 15, 2021
NO _x (ppb)	22.5	1.5	85.9%	100.0%	136.3	-		Nov-01 10:00	60.9	-	Nov-03	-	-	-	-	Nov 15, 2021
O ₃ (ppb)	15.9	0.3	95.3%	100.0%	44.9	76		Dec-01 00:00	34.6	-	Nov-26	0	-	-	-	Nov 16, 2021
PM _{2.5} (µg/m ³)	6.0	0.4	98.9%	99.3%	124.3	80		Nov-02 22:00	16.6	29	Nov-02	1	-	0	-	Nov 12, 2021
SO ₂ (ppb)	0.4	0.0	95.1%	100.0%	15.7	172		Nov-19 19:00	2.0	48	Nov-19	0	-	0	0	Nov 15, 2021
H ₂ S (ppb)	0.3	0.0	95.3%	100.0%	1.6	10		Nov-03 22:00	0.7	3	Nov-17	0	-	0	-	Nov 12, 2021
CH ₄ (ppm)	2.2	2.0	95.3%	100.0%	4.2	-		Nov-18 10:00	2.6	-	Nov-17	-	-	-	-	Nov 01, 2021
THC (ppm)	2.2	2.0	95.3%	100.0%	4.2	-		Nov-18 10:00	2.6	-	Nov-17	-	-	-	-	Nov 01, 2021
NMHC (ppm)	0.0	0.0	95.3%	100.0%	0.1	-		Nov-11 08:00	0.0	-	Nov-02	-	-	-	-	Nov 01, 2021
CO (ppm)	0.3	0.1	95.3%	100.0%	1.0	13		Nov-03 20:00	0.5	5	Nov-17	0	0	-	-	Nov 01, 2021
	Average	Minimum	Valid	Operational	Maximum											
Temp (°C)	-2.5	-19.0	100.0%	100.0%	10.7	Note: Valid hours must be greater than 75% Operational hours must be greater than 90%										
RH (%)	70.6	36.4	100.0%	100.0%	89.3											
SR (W/m ²)	27.1	0.0	100.0%	100.0%	270.0											
WS (km/hr)	6.2	0.1	100.0%	100.0%	36.6											
WD (deg)	245	0.8	100.0%	100.0%	359.6											
										Average Wind Direction		245	WSW			

Update Summary:

Parameter	Make	Model	Equipment summary
NO/NO ₂ /NO _x	Thermo	42IQ	Removal of NO _x analyzer for 49IQ then 49i put back in service 75hrs of calibrations
O ₃	TECO	49I	No Operational issues noted
PM _{2.5}	Sharp	5030	Maintenance with PM _{2.5} cable replacement resulted in 5hrs removed; 1hr reading above AAAQG on Nov 02
SO ₂	TEI	43I-TLE	No Operational issues noted
H ₂ S	TEI	450i	No Operational issues noted
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 - November 2021 Smoky Heights Station Report

Parameter	November				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/m ³)	4.6	0.0	99.6%	100.0%	39.1	80		Nov-09 23:00	17.1	29	Nov-04	0	-	0	-	Nov 17, 2021
SO ₂ (ppb)	0.5	0.0	95.3%	100.0%	5.5	172		Nov-13 18:00	1.0	48	Nov-10	0	-	0	0	Nov 17, 2021
TRS (ppb)	0.2	0.0	94.9%	100.0%	0.8	-		Nov-24 13:00	0.3	-	Nov-24	-	-	-	-	Nov 17, 2021
	Average	Minimum	Valid	Operational	Maximum											
Temp (°C)	-3.3	-17.4	100.0%	100.0%	8.6	Note: Valid hours must be greater than 75% Operational hours must be greater than 90%										
WS (km/hr)	11.3	0.1	100.0%	100.0%	46.6											
WD (deg)	238	0.4	100.0%	100.0%	360.0											
										Average Wind Direction		238	WNW			

Update Summary:

Parameter	Make	Model	Equipment summary
PM _{2.5}	Sharp	5030	No Operational issues noted
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 - November 2021 Valleyview Station Report

Parameter	November			Operational	Max	1-hour		24-hour		Max Day	Exceedance				Calibration Date
	Average	Minimum	Valid			Objective	Max Day and Time	Max	Objective		1hr	8hr	24hr	30d	
SO ₂ (ppb)	0.2	0.0	95.1%	99.9%	22.1	172	Nov-11 14:00	1.9	48	Nov-11	0	-	0	0	Nov 22, 2021
H ₂ S (ppb)	0.1	0.0	95.0%	99.9%	0.3	10	Nov-04 01:00	0.1	3	Nov-29	0	-	0	-	Nov 22, 2021
	Average	Minimum	Valid	Operational	Maximum										
Temp (°C)	-2.4	-17.9	100.0%	100.0%	13.8	Note: Valid hours must be greater than 75% Operational hours must be greater than 90%									
RH (%)	80.9	26.6	100.0%	100.0%	100.2										
WS (km/hr)	3.9	0.1	100.0%	100.0%	17.0										
WD (deg)	194	0.6	100.0%	100.0%	359.4										
Average Wind Direction									194	NW					

Update Summary:

Parameter	Make	Model	Equipment summary
SO ₂	TEI	43i-APSCB	No Operational issues noted; 1hr of data removed Nov 10 due to negative drift
H ₂ S	TEI	450i-APHAA	No Operational issues noted; 1hr of data removed Nov 10 due to negative drift
Met Equip	RMYoung	RMY86004	No Operational issues noted during the month

1.6 Donnelly Air Monitoring Station

PAZA - November 2021 Donnelly Station Report

Parameter	November			Operational	Max	1-hour		24-hour		Max Day	Exceedance				Calibration Date
	Average	Minimum	Valid			Objective	Max Day and Time	Max	Objective		1hr	8hr	24hr	30d	
SO ₂ (ppb)	0.2	0.0	95.1%	99.7%	3.4	48	Nov-02 16:00	0.9	48	Nov-02	0	-	0	0	Nov 25, 2021
H ₂ S (ppb)	0.1	0.0	95.0%	99.7%	0.6	10	Nov-04 20:00	0.2	3	Nov-08	0	-	0	-	Nov 25, 2021
	Average	Minimum	Valid	Operational	Maximum										
Temp (°C)	-1.8	-19.9	99.7%	99.7%	12.3	Note: Valid hours must be greater than 75% Operational hours must be greater than 90%									
WS (km/hr)	12.2	0.1	99.7%	99.7%	39.9										
WD (deg)	206	0.9	99.7%	99.7%	359.1										
Average Wind Direction									206	SSW					

Update Summary:

Parameter	Make	Model	Equipment summary
SO ₂	Teco	43i	Communication data acquisition loss of 2 hours (Nov 04)
H ₂ S	Thermo	45C	Communication data acquisition loss of 2 hours (Nov 04)
Met Equip	RMYoung	5103	Communication data acquisition loss of 2 hours (Nov 04)

1.7 Poplar Air Monitoring Station

PAZA - November 2021 Poplar Station Report

Parameter	November			Operational	Max	1-hour		24-hour		Max Day	Exceedance				Calibration Date
	Average	Minimum	Valid			Objective	Max Day and Time	Max	Objective		1hr	8hr	24hr	30d	
NO (ppb)	1.9	0.0	95.0%	100.0%	33.9	-	Nov-10 12:00	8.0	-	Nov-17	-	-	-	-	Nov 08, 2021
NO ₂ (ppb)	7.0	0.3	95.0%	100.0%	38.3	159	Nov-17 17:00	16.5	-	Nov-24	0	-	-	-	Nov 08, 2021
NO _x (ppb)	9.0	0.4	95.0%	100.0%	72.3	-	Nov-17 17:00	24.2	-	Nov-17	-	-	-	-	Nov 08, 2021
O ₃ (ppb)	22.1	0.2	95.3%	100.0%	44.1	76	Dec-01 00:00	39.4	-	Nov-26	0	-	-	-	Nov 08, 2021
PM _{2.5} (µg/m³)	2.5	0.0	99.6%	100.0%	18.1	80	Nov-04 23:00	6.6	29	Nov-04	0	-	0	-	Nov 09, 2021
SO ₂ (ppb)	1.0	0.0	95.1%	100.0%	26.0	172	Nov-12 16:00	3.0	48	Nov-03	0	-	0	0	Nov 08, 2021
TRS (ppb)	0.4	0.0	95.3%	100.0%	2.3	-	Nov-30 04:00	0.8	-	Nov-10	-	-	-	-	Nov 09, 2021
CH ₄ (ppm)	2.2	1.9	95.3%	100.0%	3.0	-	Nov-11 05:00	2.5	-	Nov-10	-	-	-	-	Nov 09, 2021
THC (ppm)	2.2	1.9	95.3%	100.0%	3.3	-	Nov-11 05:00	2.5	-	Nov-10	-	-	-	-	Nov 09, 2021
NMHC (ppm)	0.0	0.0	95.3%	100.0%	0.3	-	Nov-10 02:00	0.0	-	Nov-17	-	-	-	-	Nov 09, 2021
	Average	Minimum	Valid	Operational	Maximum										
Temp (°C)	-3.2	-19.5	100.0%	100.0%	10.7	Note: Valid hours must be greater than 75% Operational hours must be greater than 90%									
WS (km/hr)	11.6	0.1	100.0%	100.0%	53.5										
WD (deg)	265	2.4	100.0%	100.0%	358.6										
Average Wind Direction									265	W					

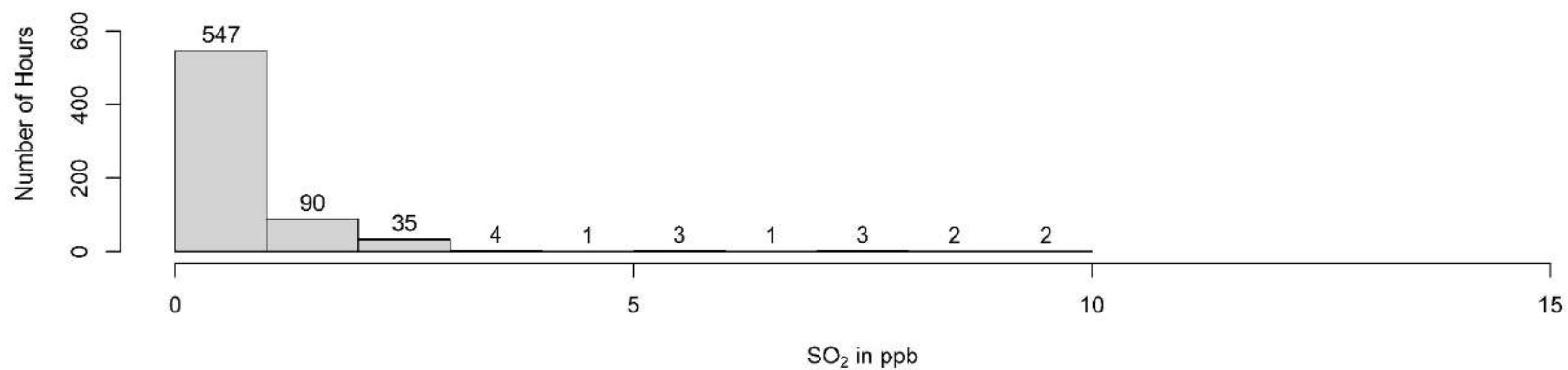
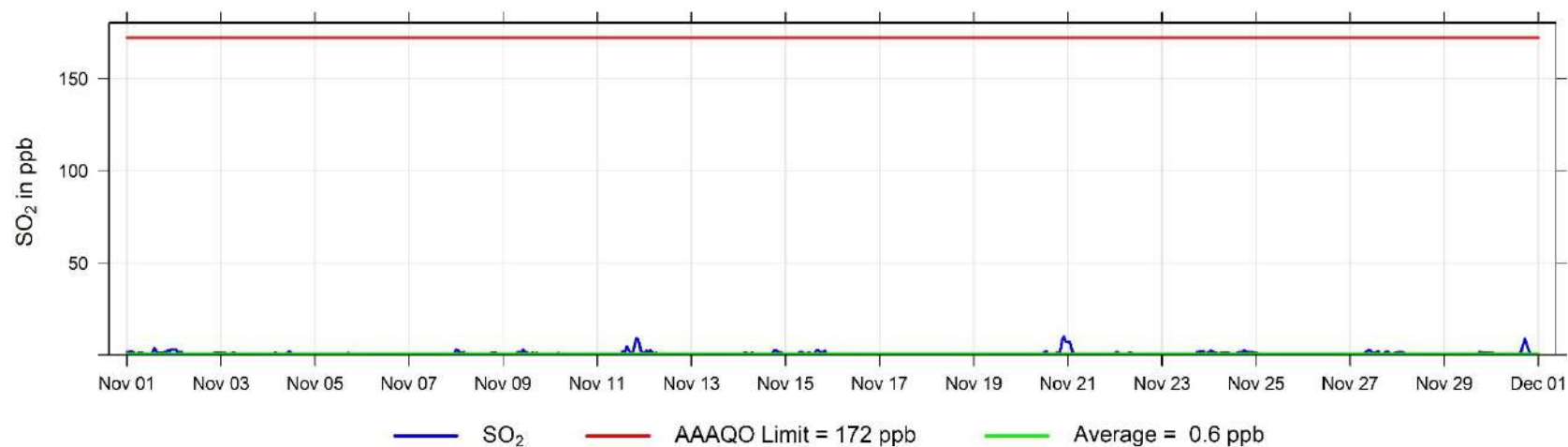
Update Summary:

Parameter	Make	Model	Equipment summary
NO/NO ₂ /NO _x	TEI	42i	No Operational issues noted; replaced nitrogen tank
O ₃	TEI	49i	No Operational issues noted
PM _{2.5}	Thermo	TEOM AB	No Operational issues noted
SO ₂	TEI	43i	No Operational issues noted
TRS	TEI	43i	No Operational issues noted
THC/CH ₄ /NMHC	TEI	55i-A3PHAA	No Operational issues noted
Met Equip	MetOne	50.5	No Operational issues noted

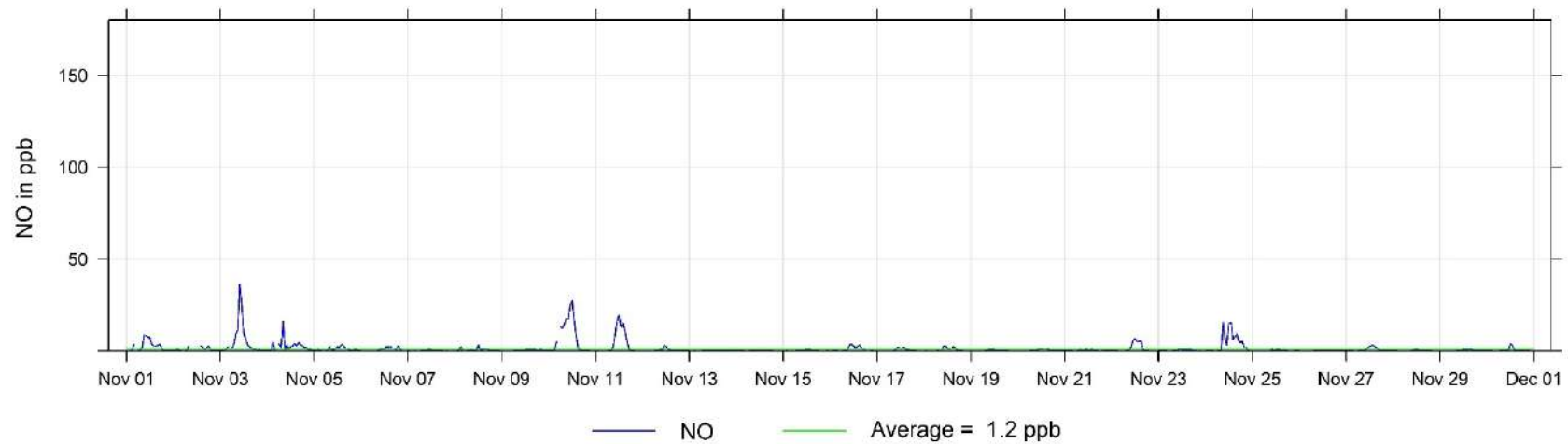
2 Beaverlodge Charts

The following pages include the charts and histograms for Beaverlodge Station

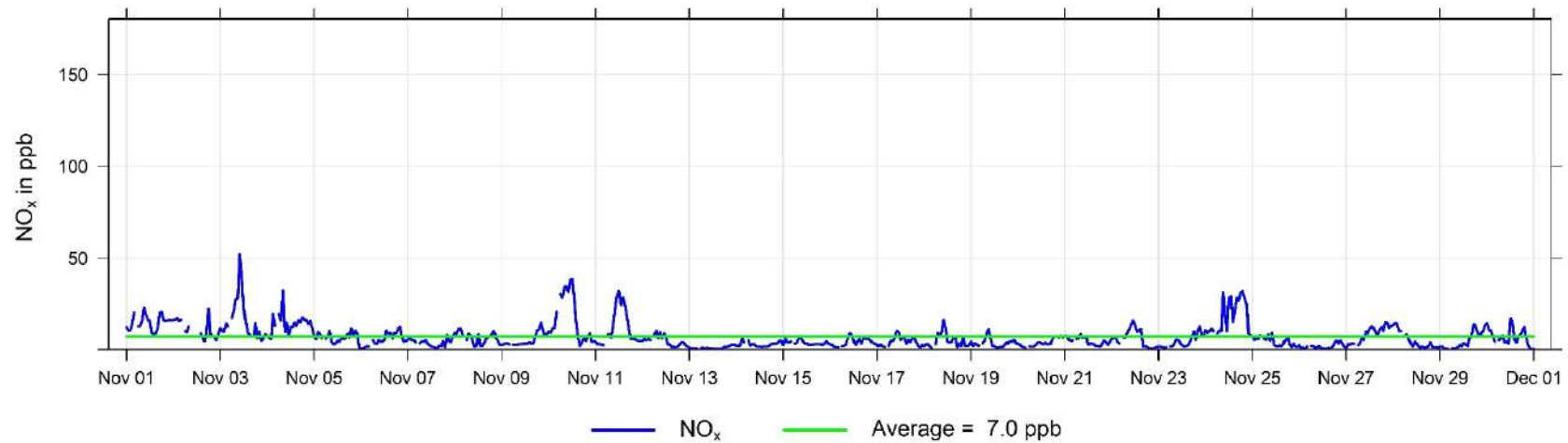
November Hourly Concentration Readings of SO₂ (in ppb) at Beaverlodge



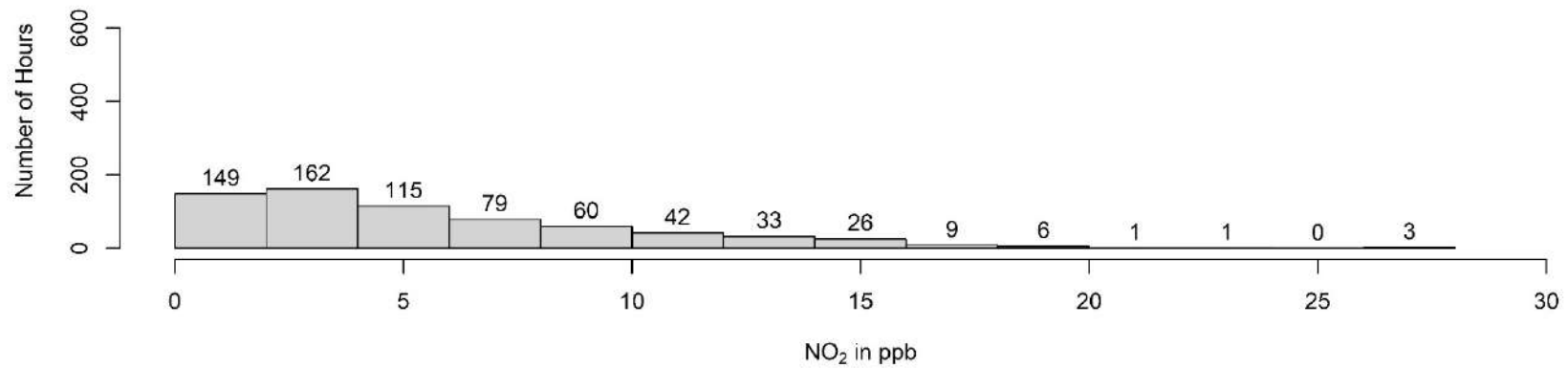
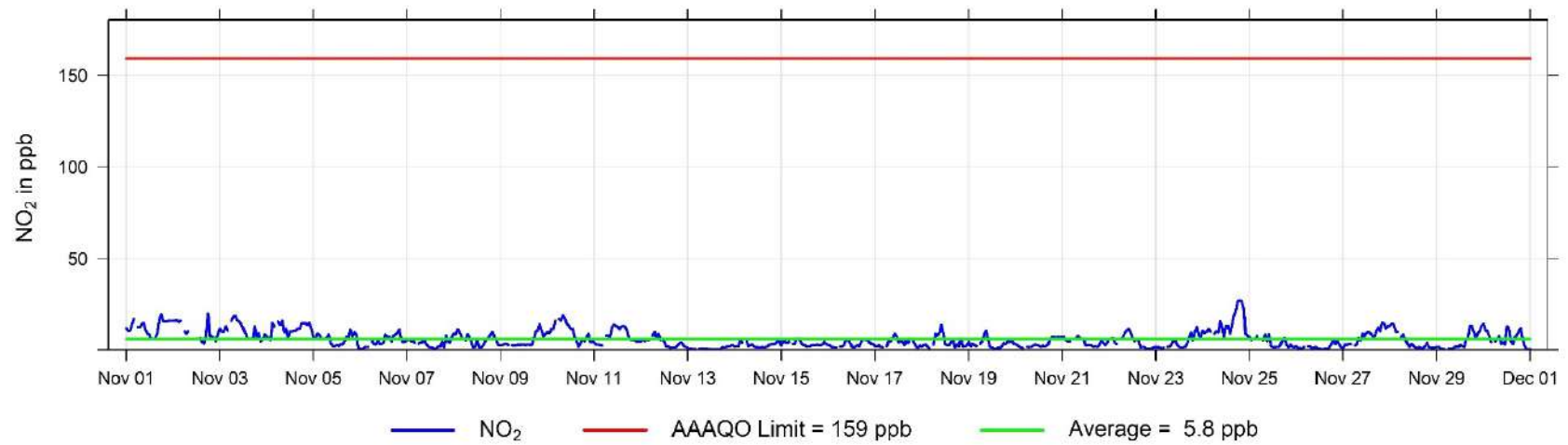
November Hourly Concentration Readings of NO (in ppb) at Beaverlodge



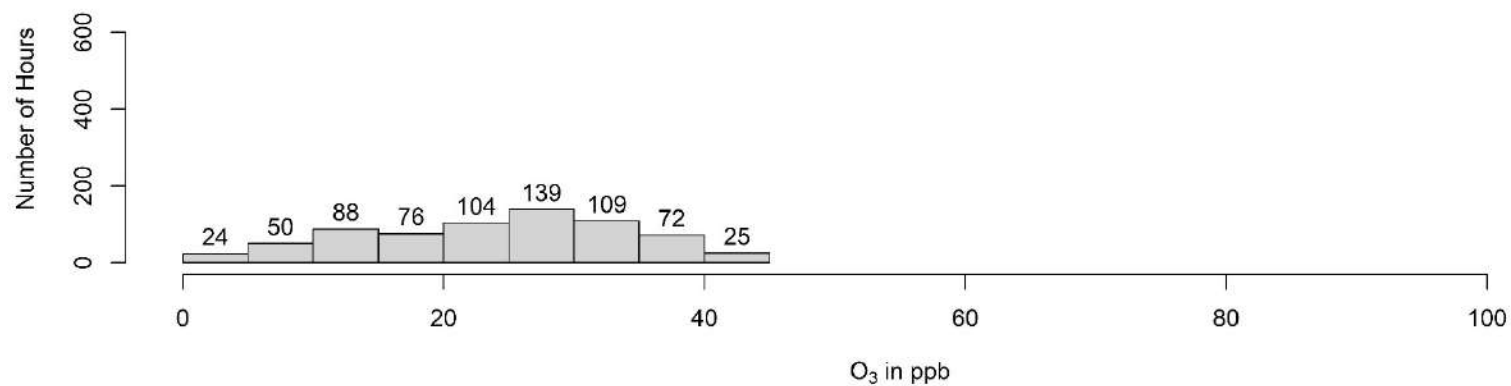
November Hourly Concentration Readings of NO_x (in ppb) at Beaverlodge



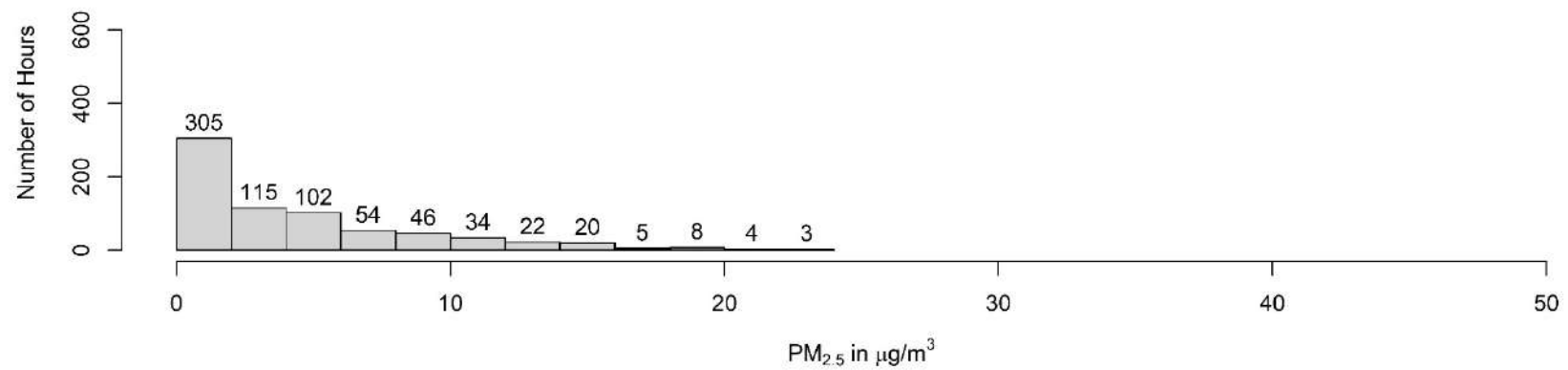
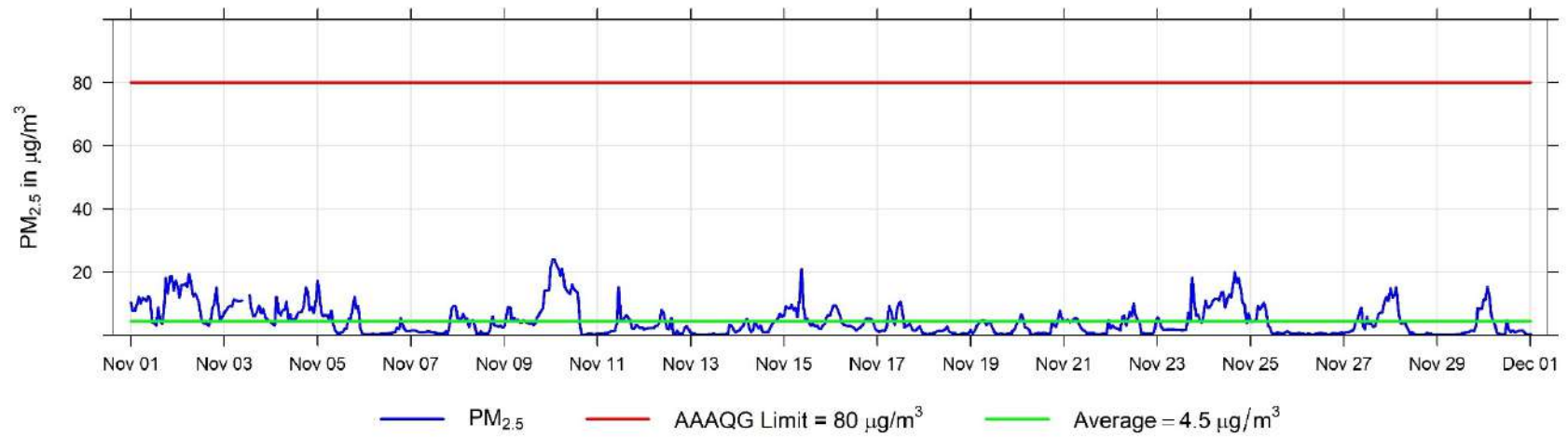
November Hourly Concentration Readings of NO₂ (in ppb) at Beaverlodge



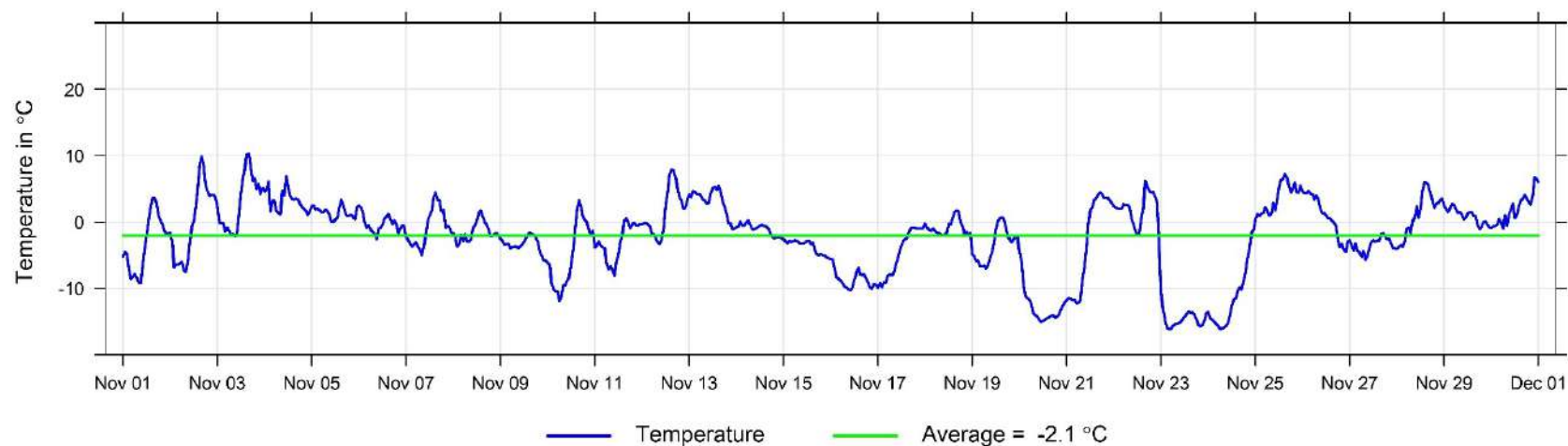
November Hourly Concentration Readings of O₃ (in ppb) at Beaverlodge



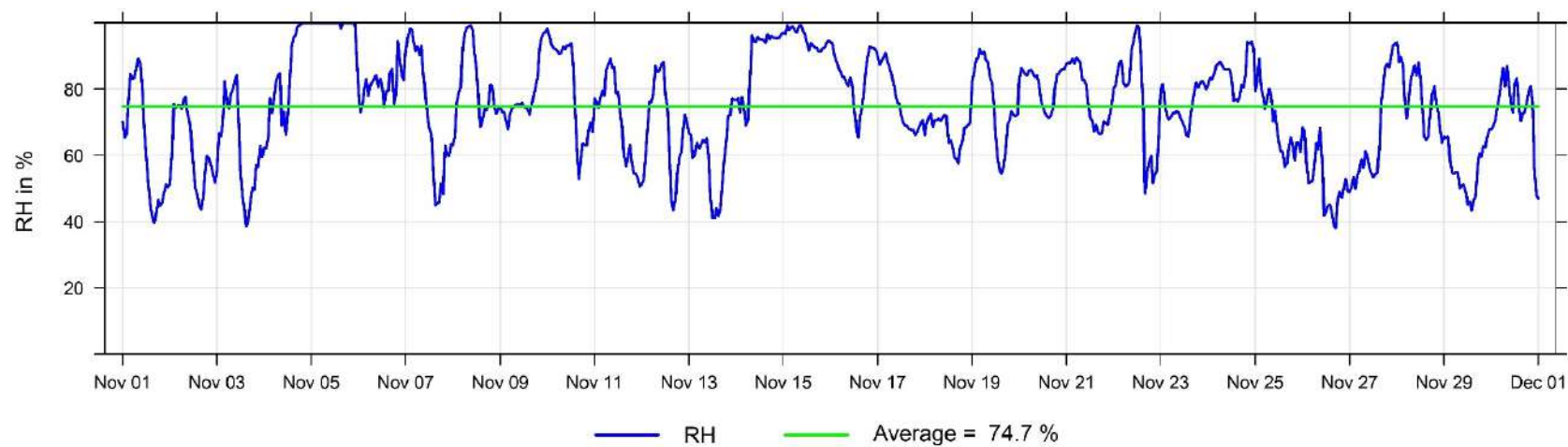
November Hourly Concentration Readings of PM_{2.5} in $\mu\text{g}/\text{m}^3$ at Beaverlodge



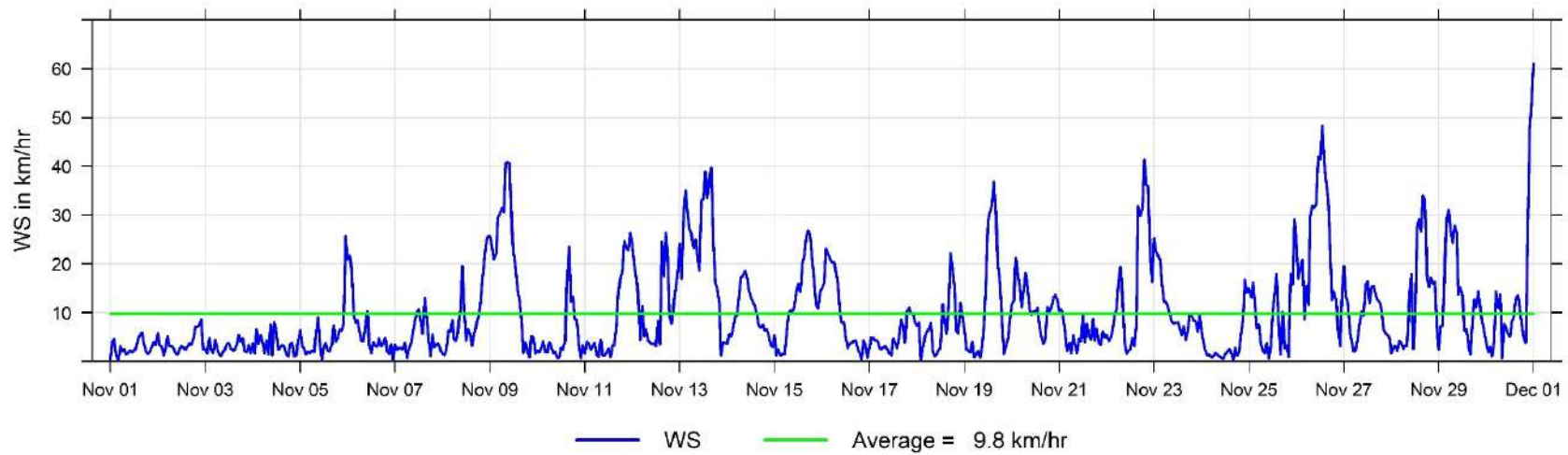
November Hourly Temperature Readings (in °C) at Beaverlodge



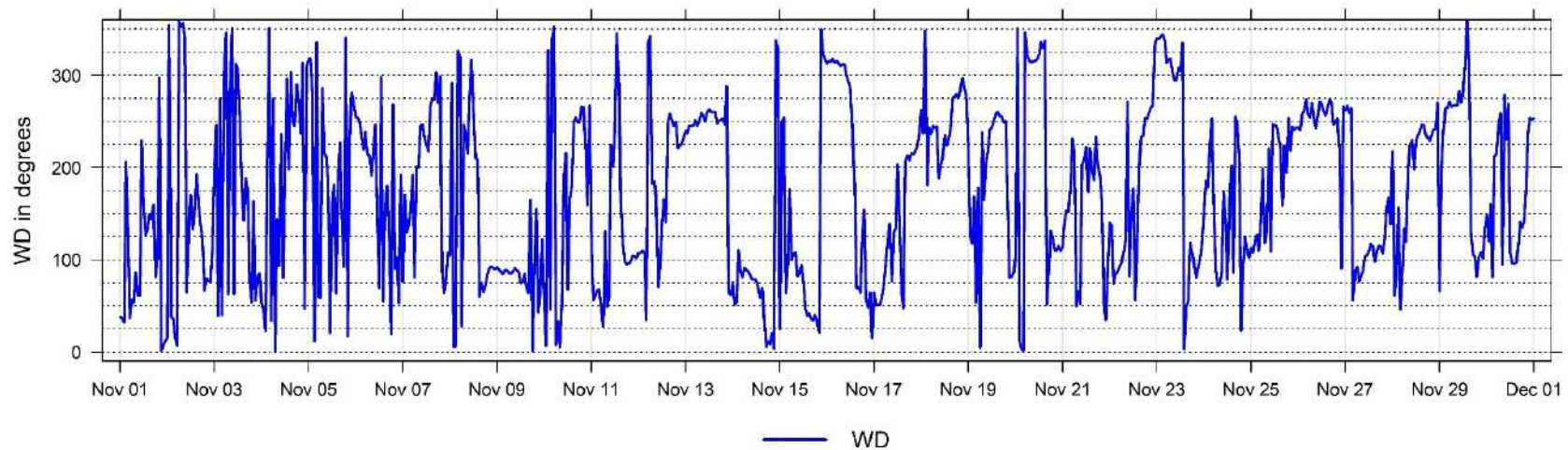
November Hourly Readings of Relative Humidity (in %) at Beaverlodge



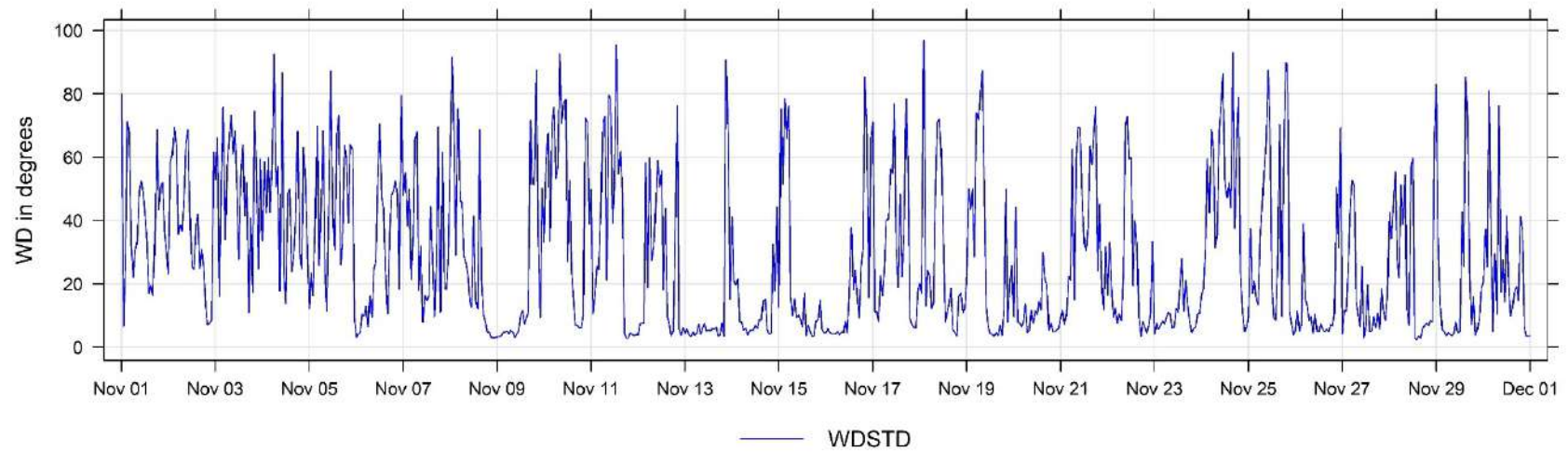
November Hourly Readings of Wind Speed (in km/hr) at Beaverlodge

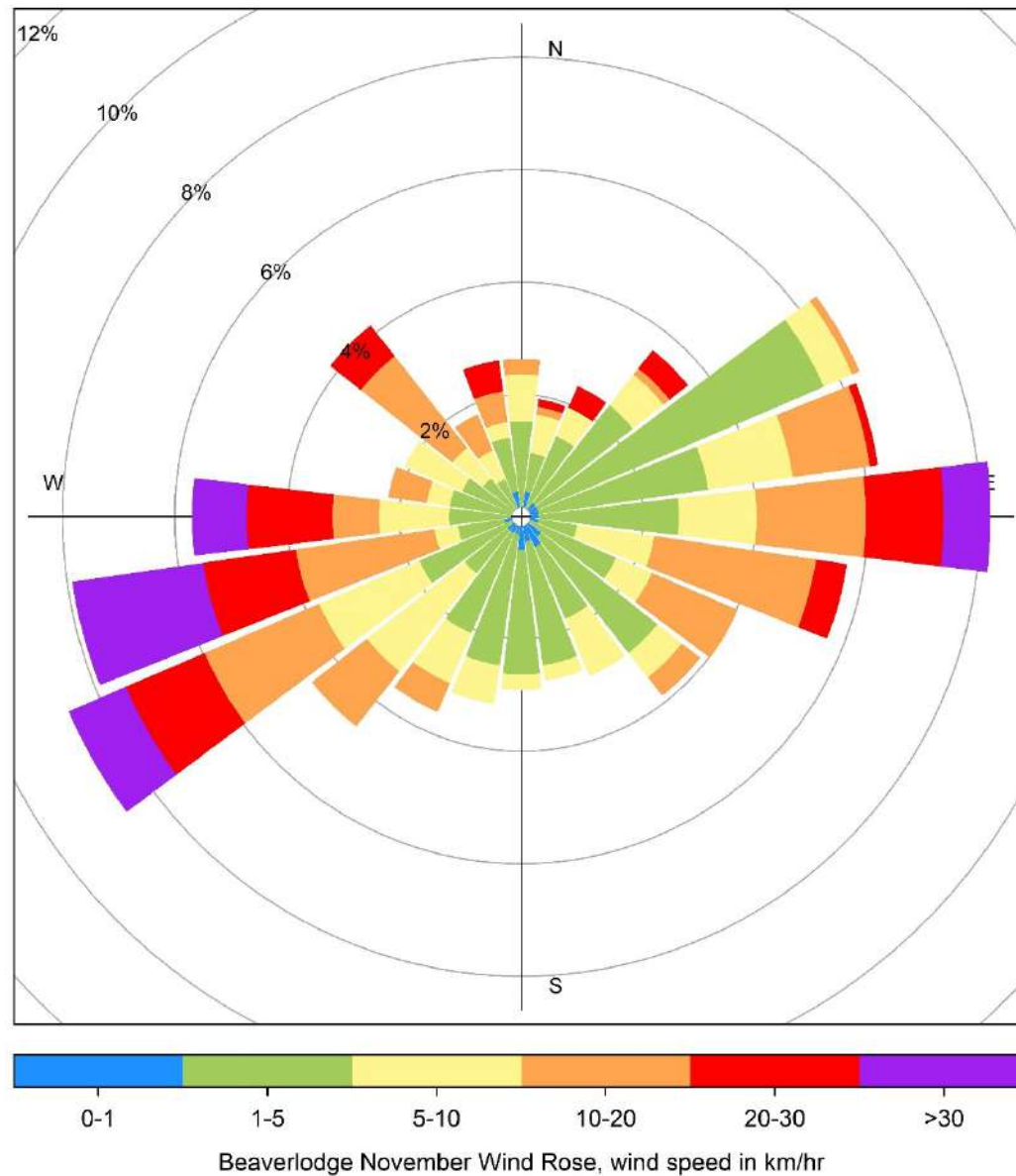


November Hourly Readings of Wind Direction (in degrees) at Beaverlodge



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

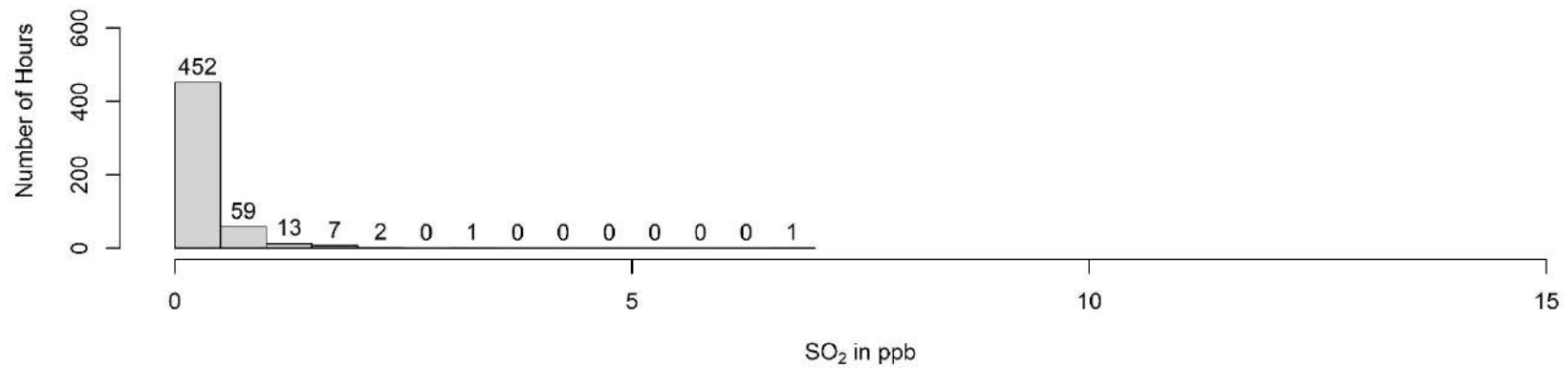
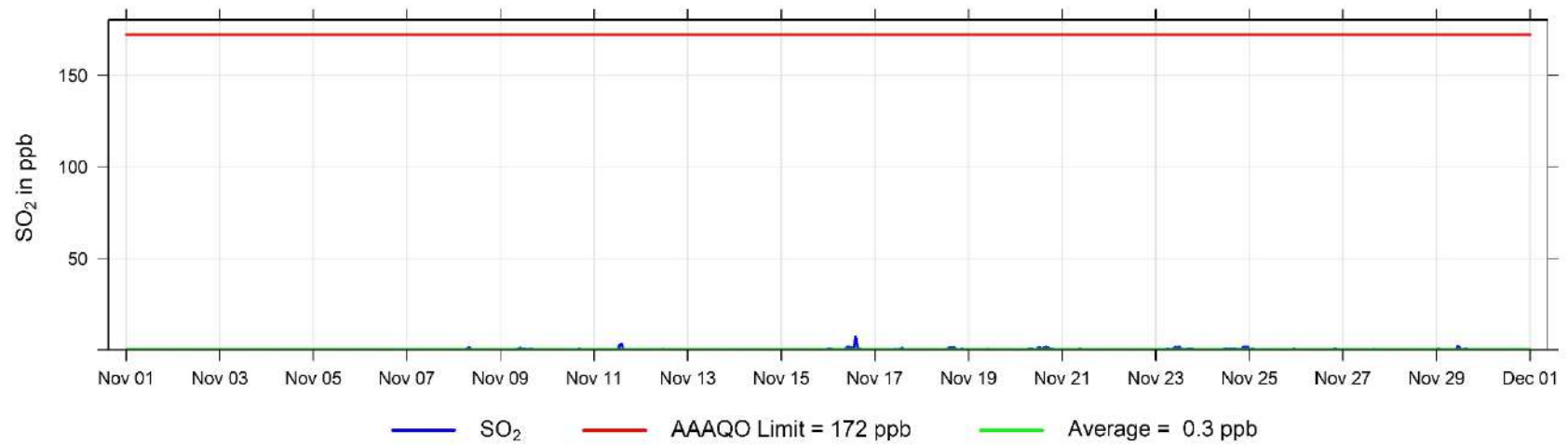




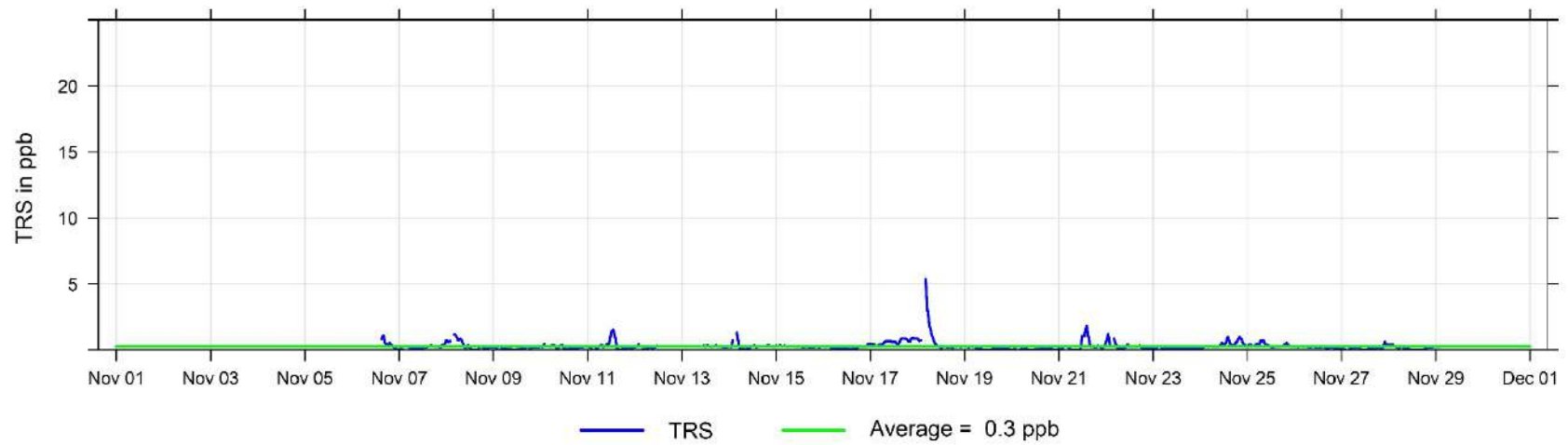
3 Dunes Charts

The following pages include the charts and histograms for Dunes Station

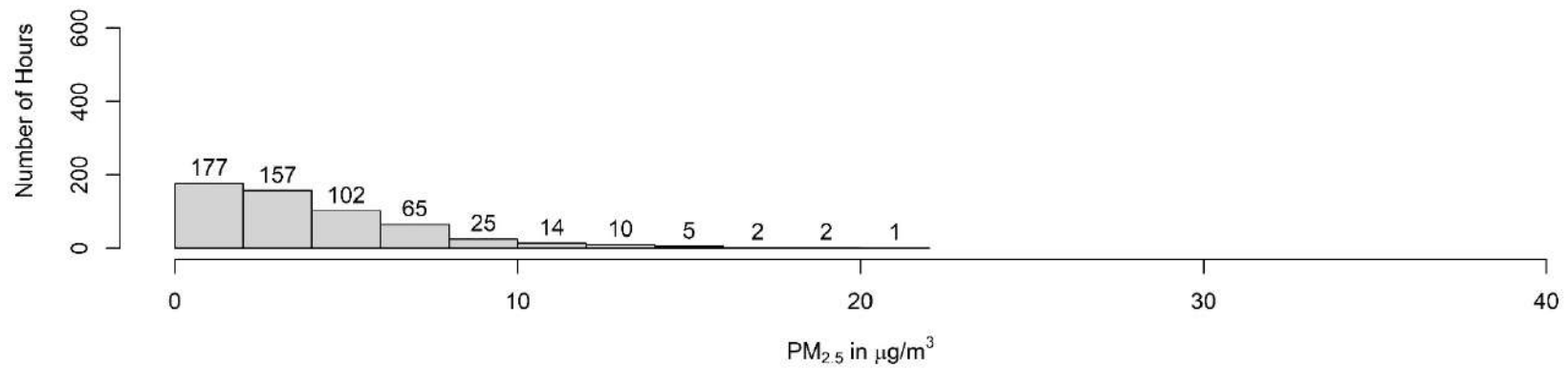
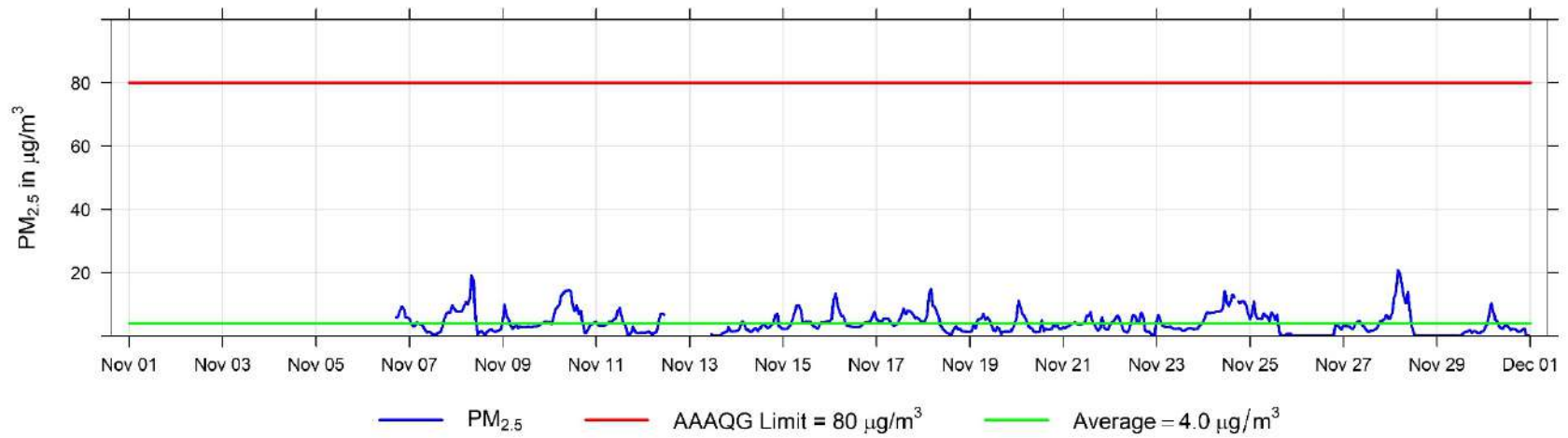
November Hourly Concentration Readings of SO₂ (in ppb) at Dunes



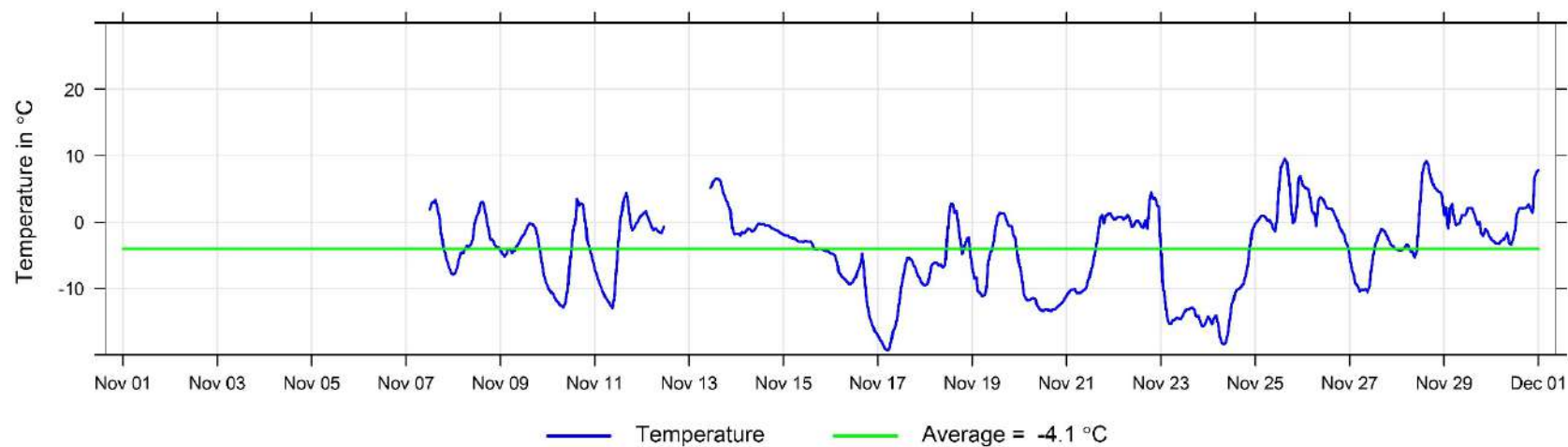
November Hourly Concentration Readings of TRS (in ppb) at Dunes



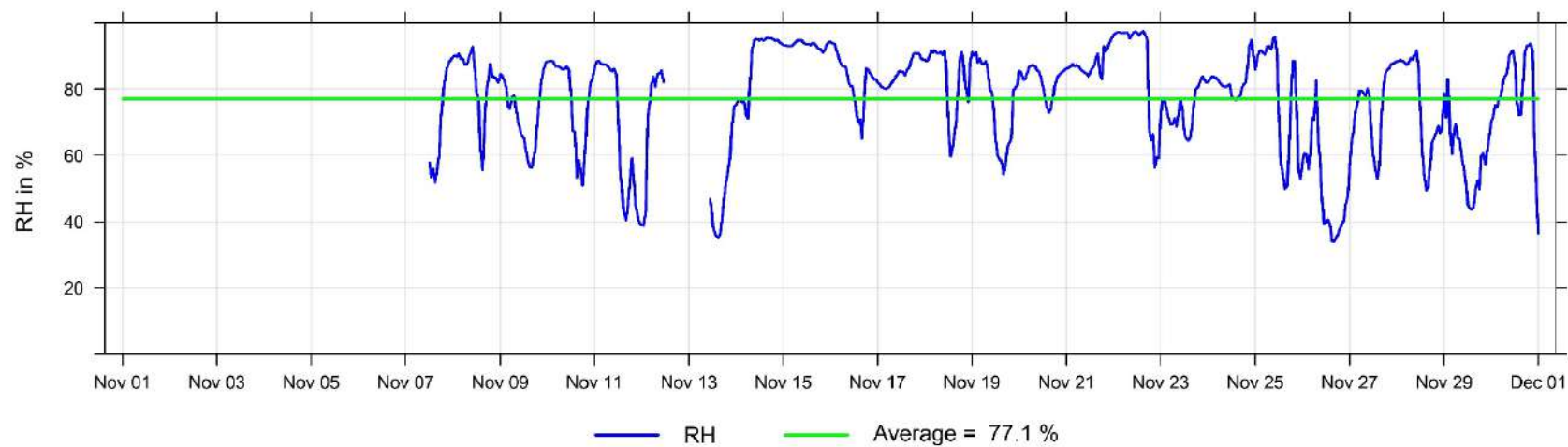
November Hourly Concentration Readings of PM_{2.5} in $\mu\text{g}/\text{m}^3$ at Dunes



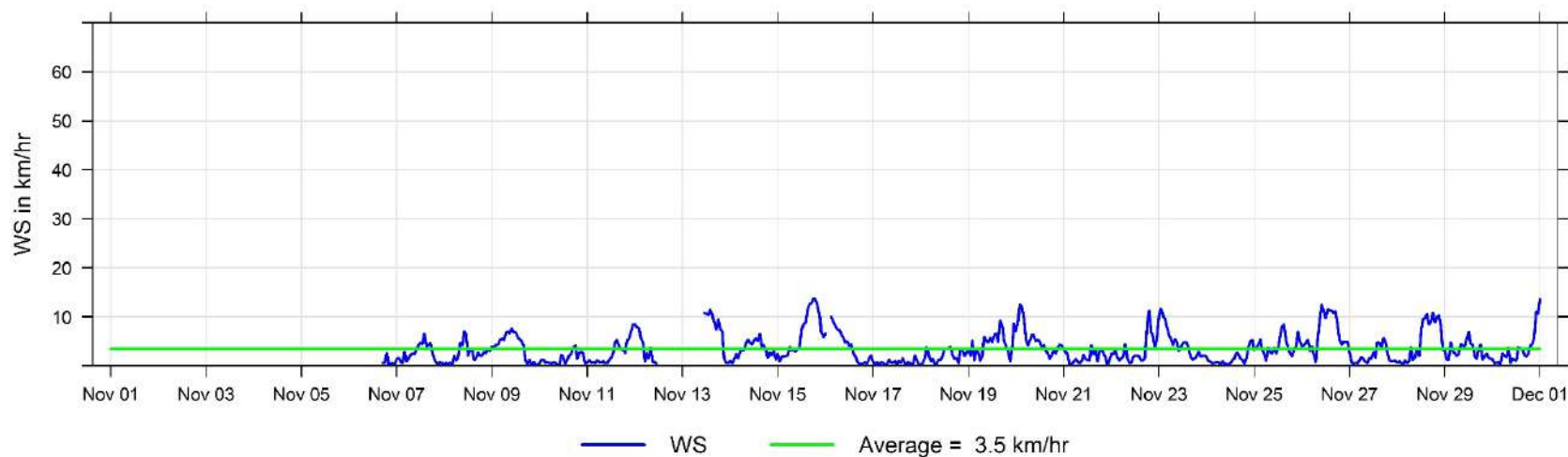
November Hourly Temperature Readings (in °C) at Dunes



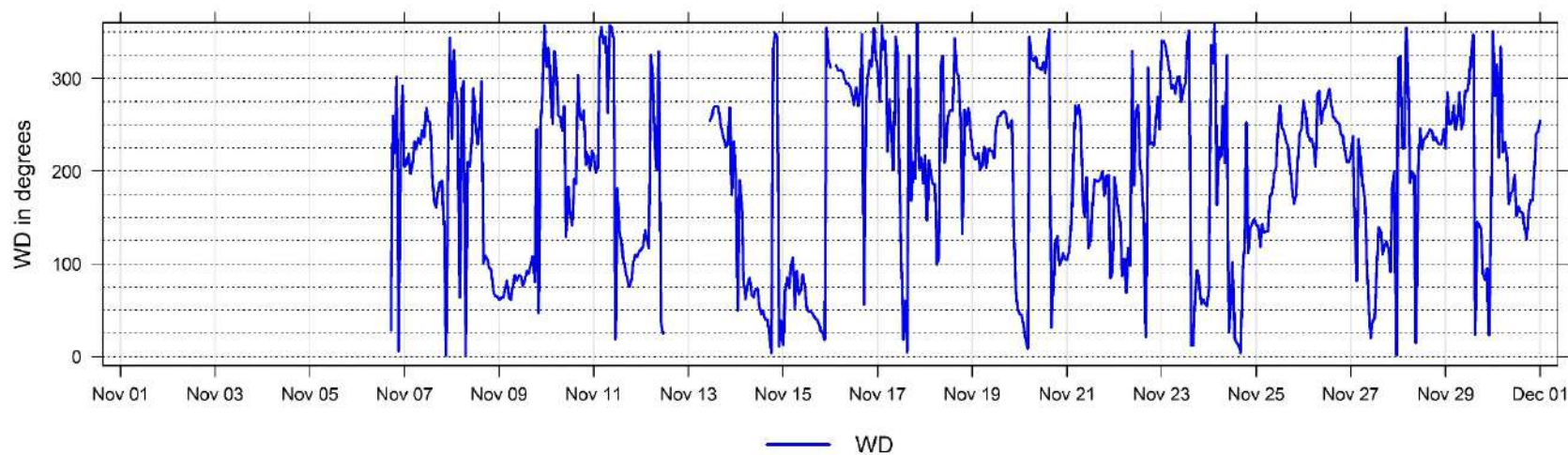
November Hourly Readings of Relative Humidity (in %) at Dunes



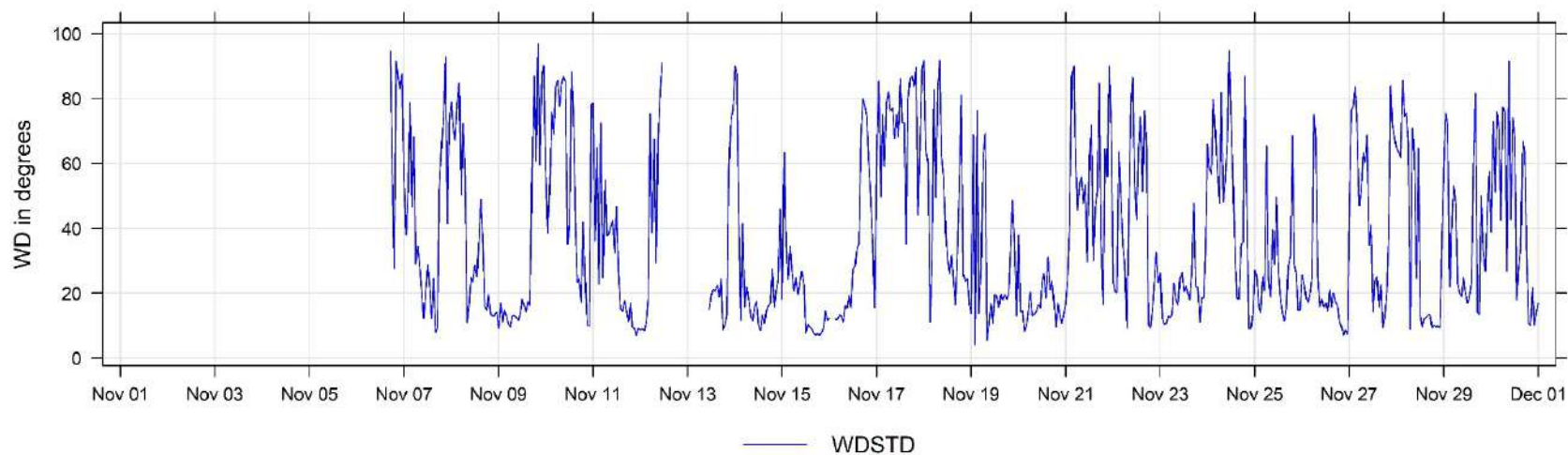
November Hourly Readings of Wind Speed (in km/hr) at Dunes

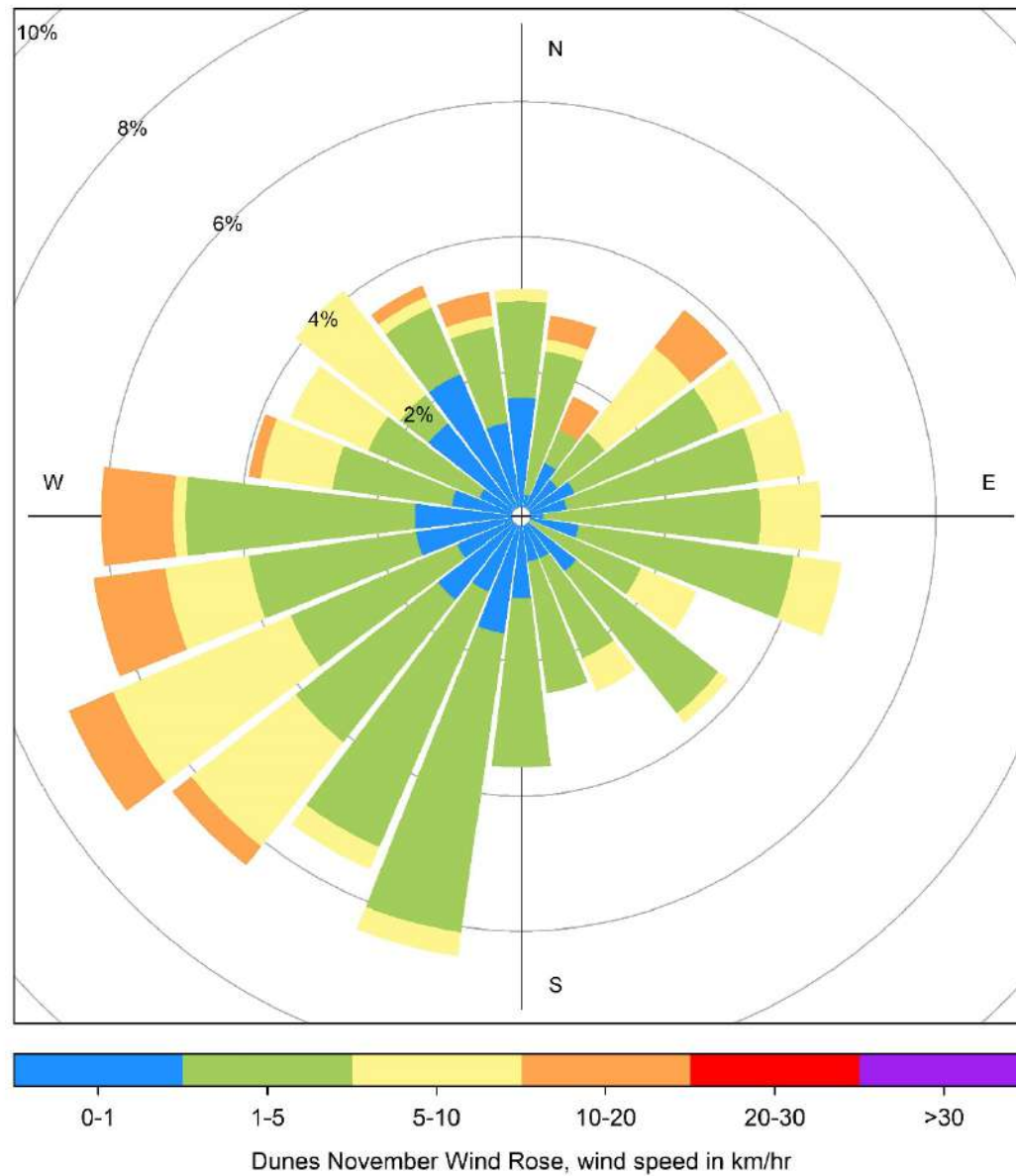


November Hourly Readings of Wind Direction (in degrees) at Dunes



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

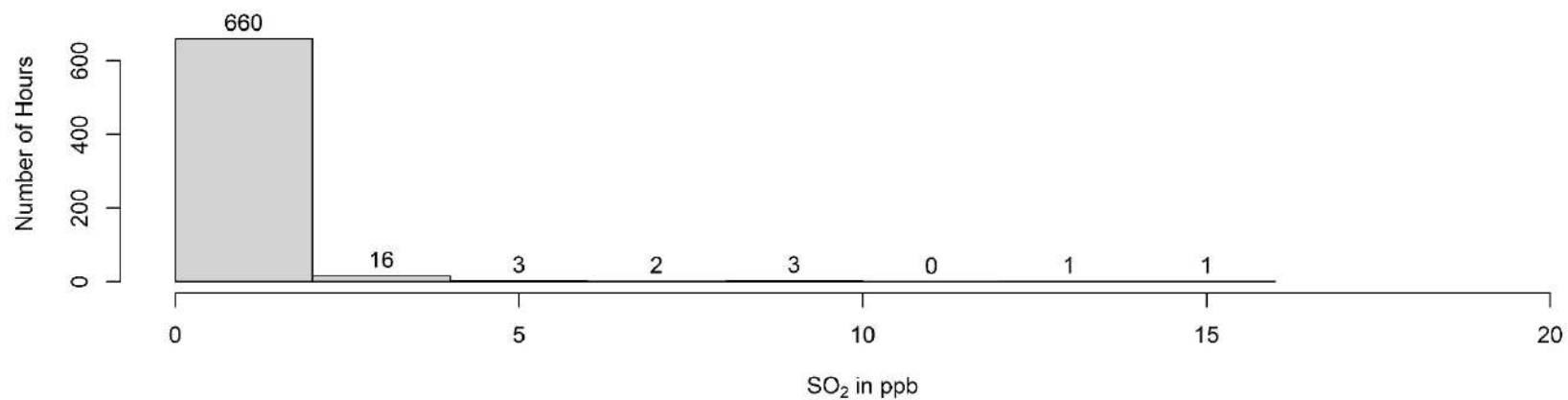
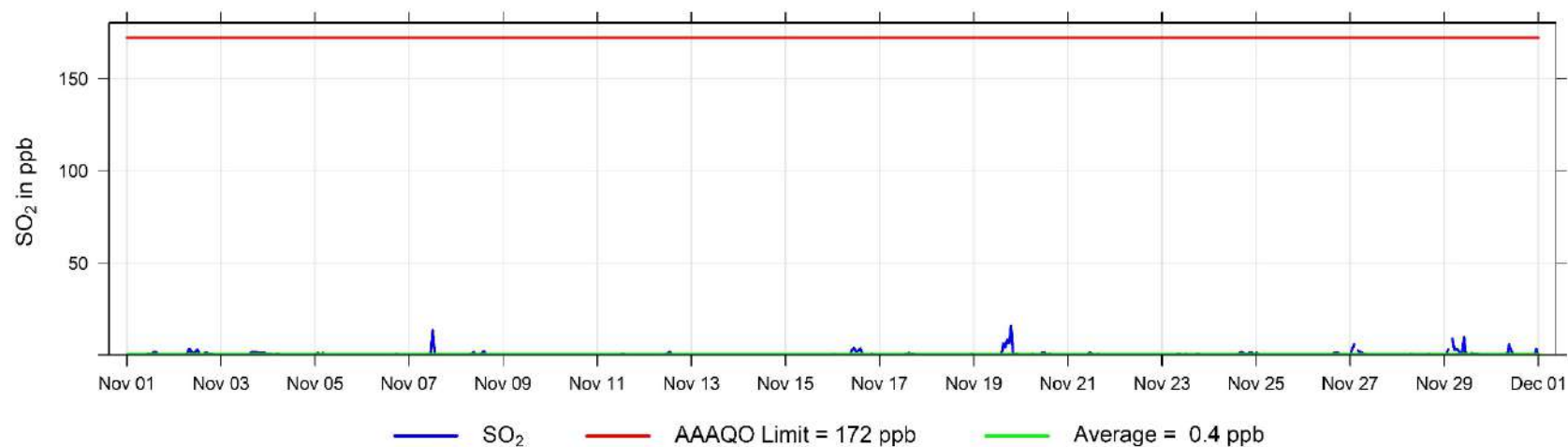




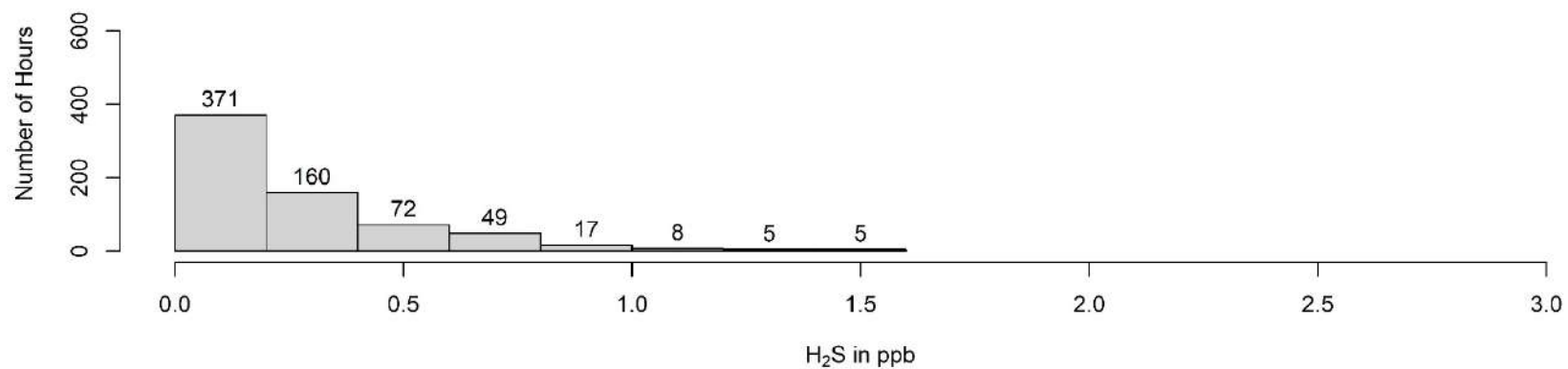
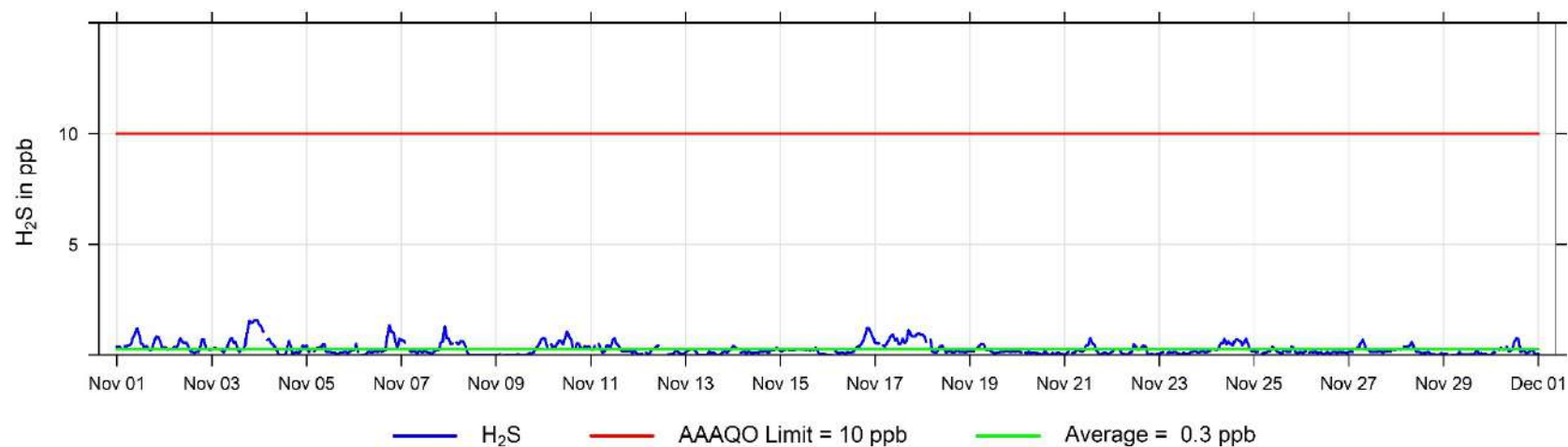
4 Grande Prairie - Henry Pirker Charts

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

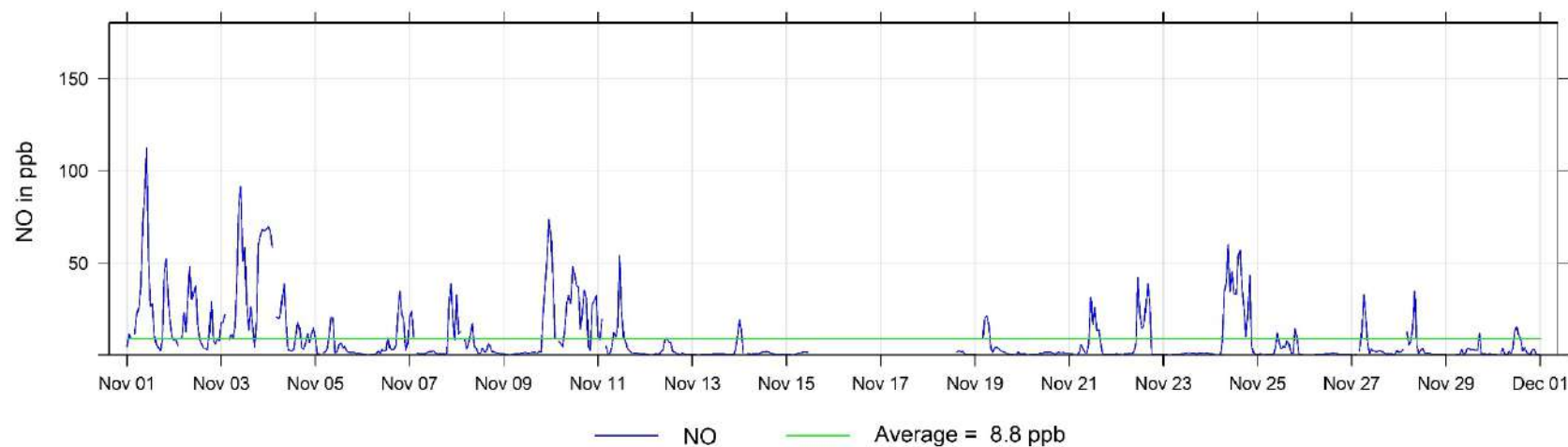
November Hourly Concentration Readings of SO₂ (in ppb) at Henry Pirker



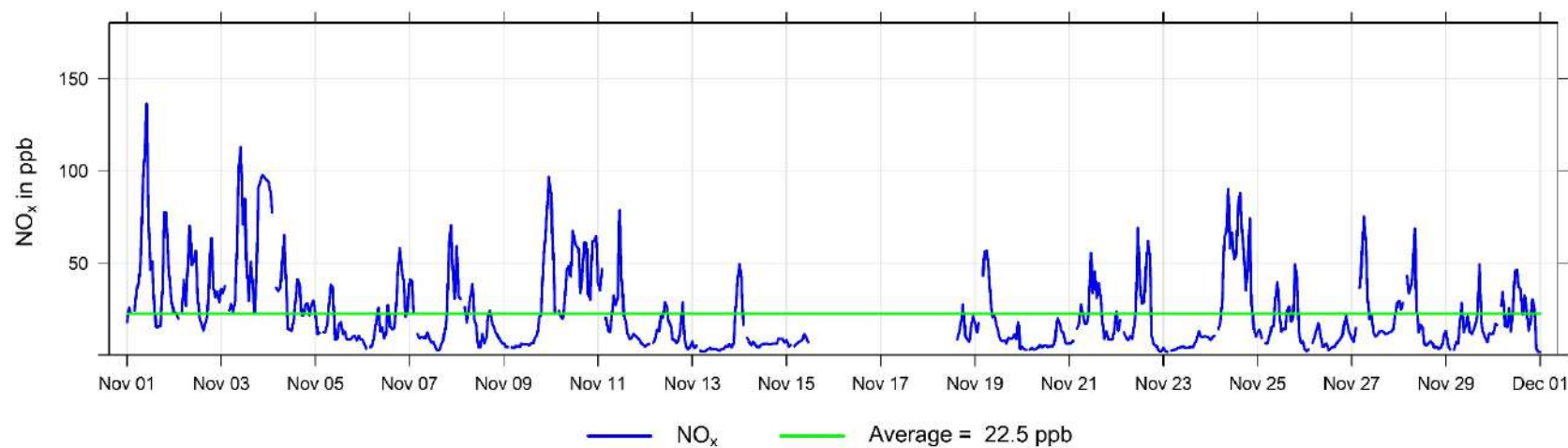
November Hourly Concentration Readings of H₂S (in ppb) at Henry Pirker



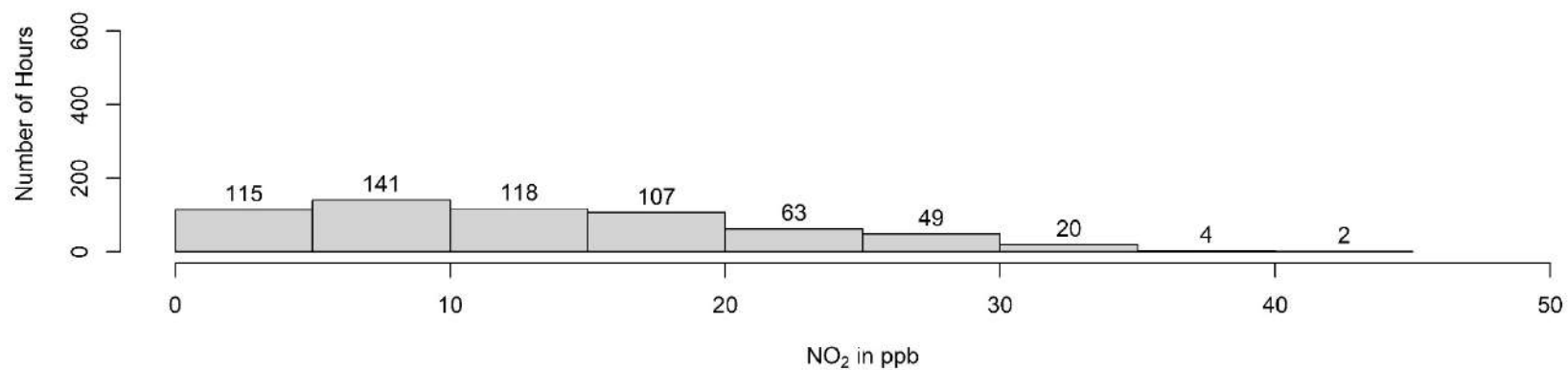
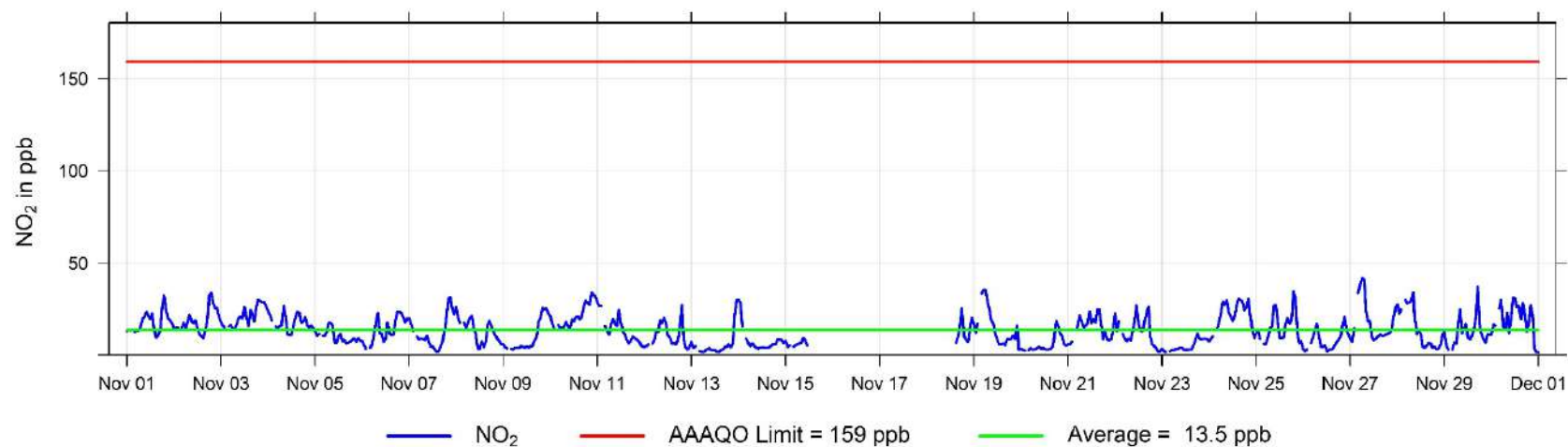
November Hourly Concentration Readings of NO (in ppb) at Henry Pirker



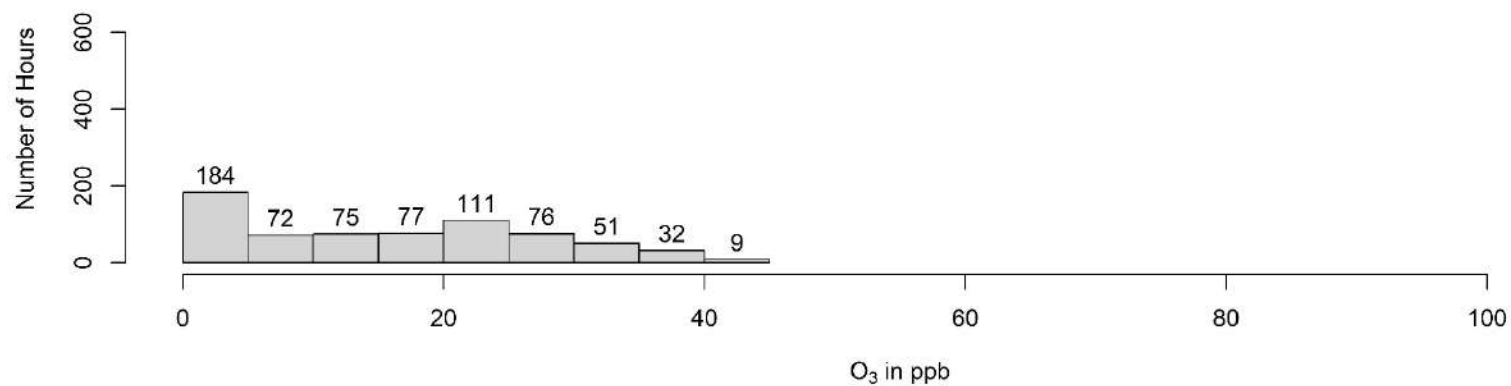
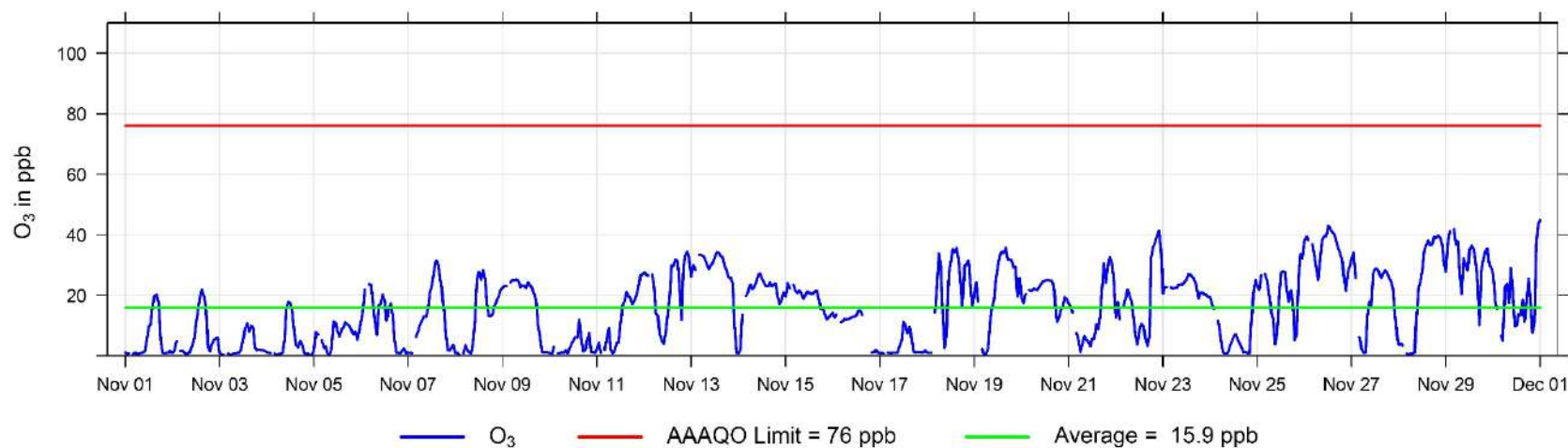
November Hourly Concentration Readings of NO_x (in ppb) at Henry Pirker



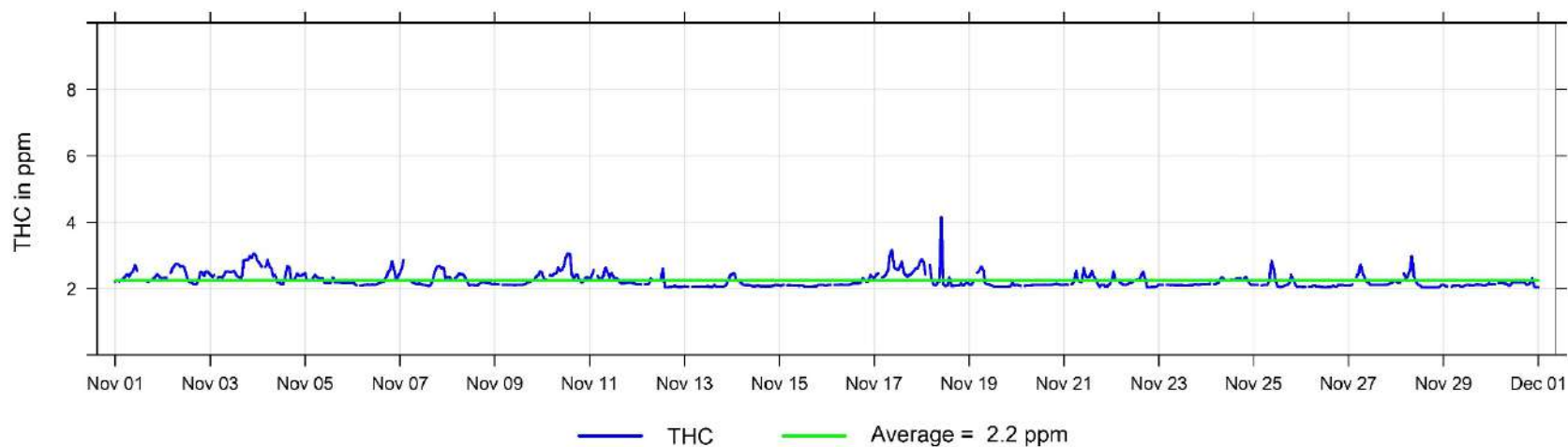
November Hourly Concentration Readings of NO₂ (in ppb) at Henry Pirker



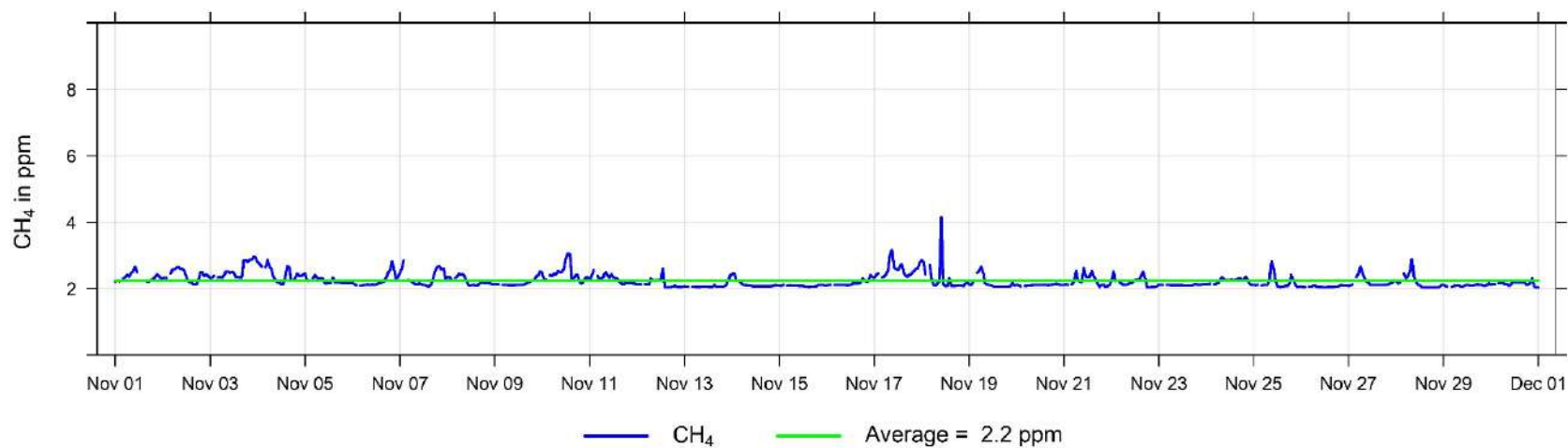
November Hourly Concentration Readings of O₃ (in ppb) at Henry Pirker



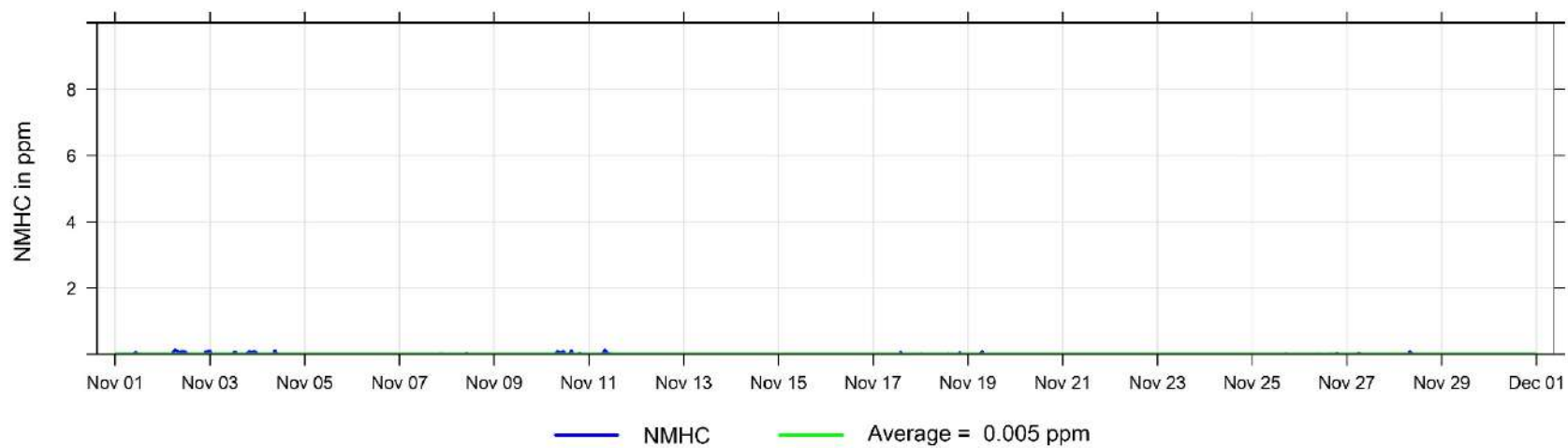
November Hourly Concentration Readings of THC (in ppm) at Henry Pirker



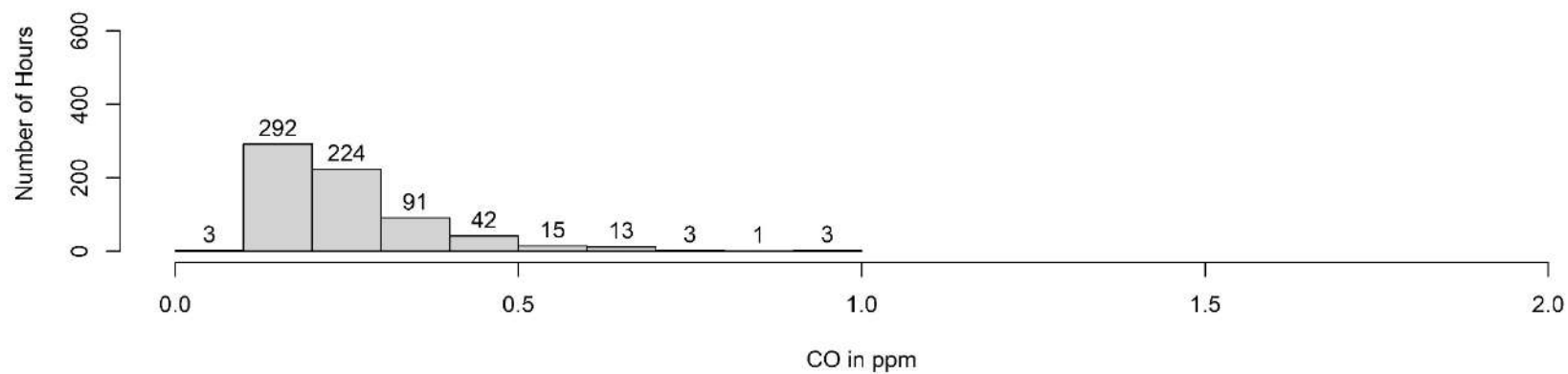
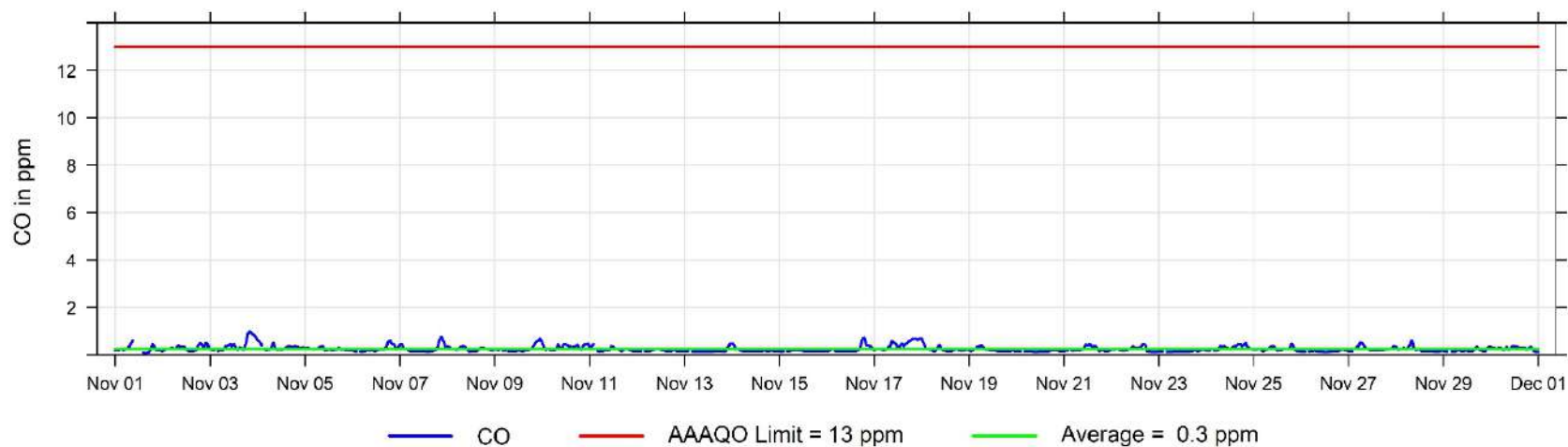
November Hourly Concentration Readings of CH₄ (in ppm) at Henry Pirker



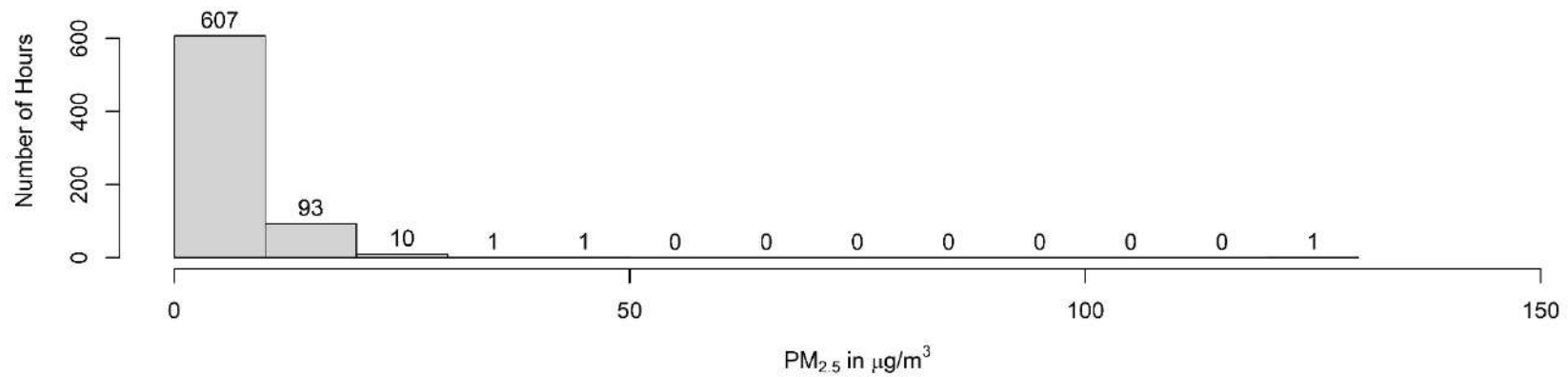
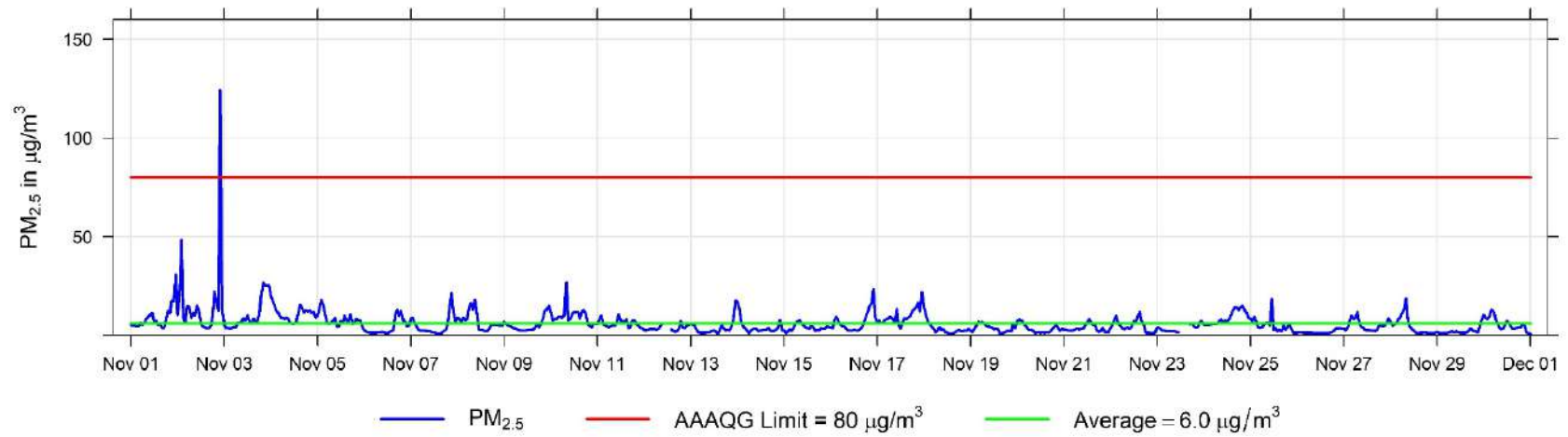
November Hourly Concentration Readings of NMHC (in ppm) at Henry Pirker



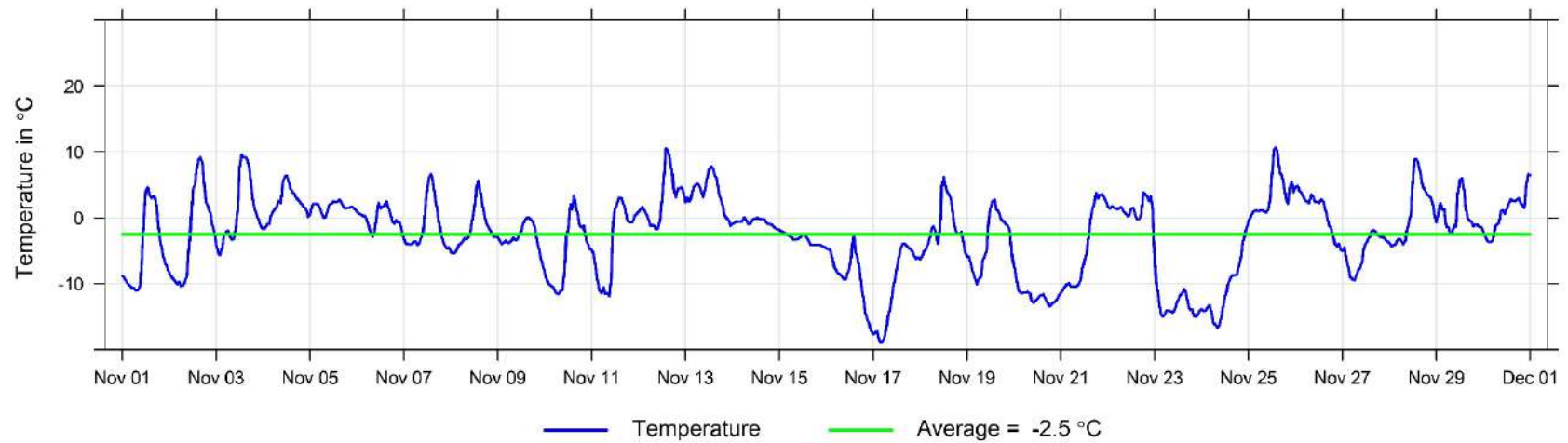
November Hourly Concentration Readings of CO (in ppm) at Henry Pirker



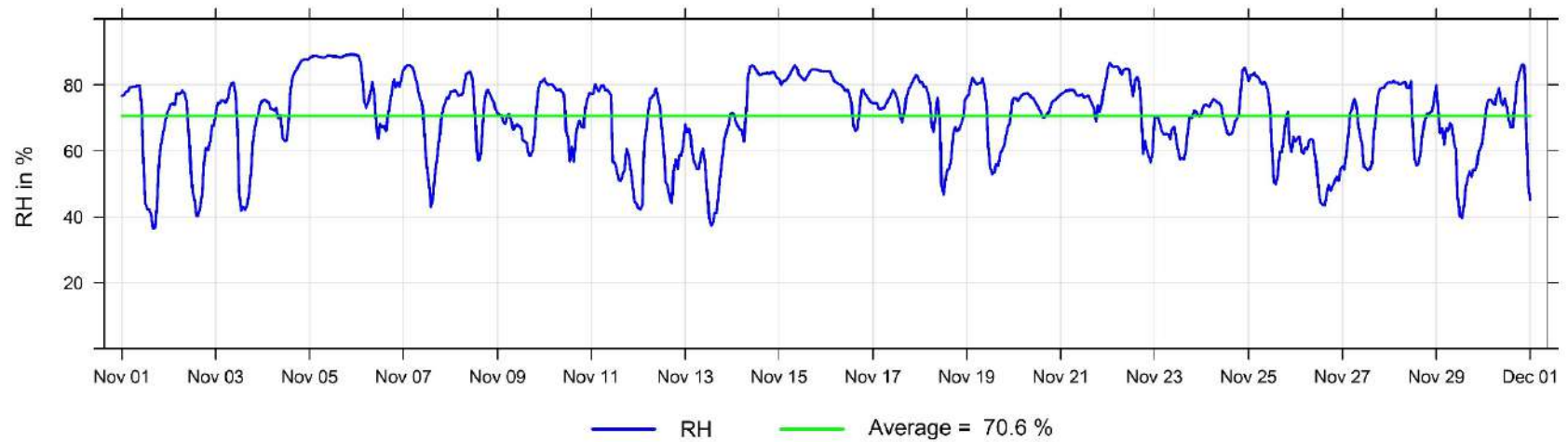
November Hourly Concentration Readings of PM_{2.5} in $\mu\text{g}/\text{m}^3$ at Henry Pirker



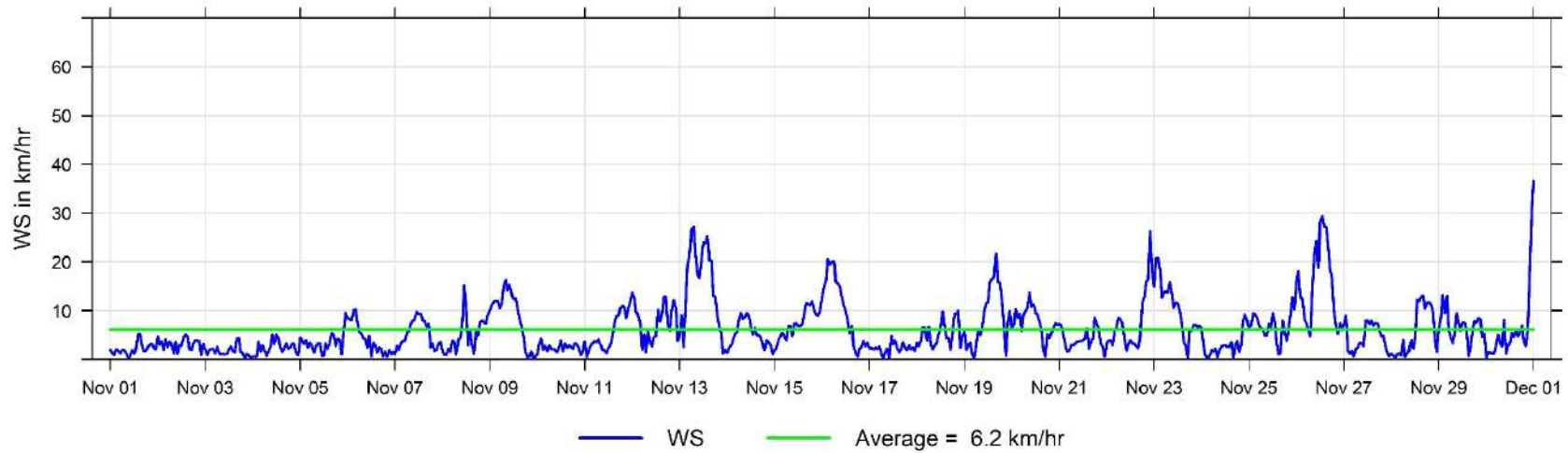
November Hourly Temperature Readings (in °C) at Henry Pirker



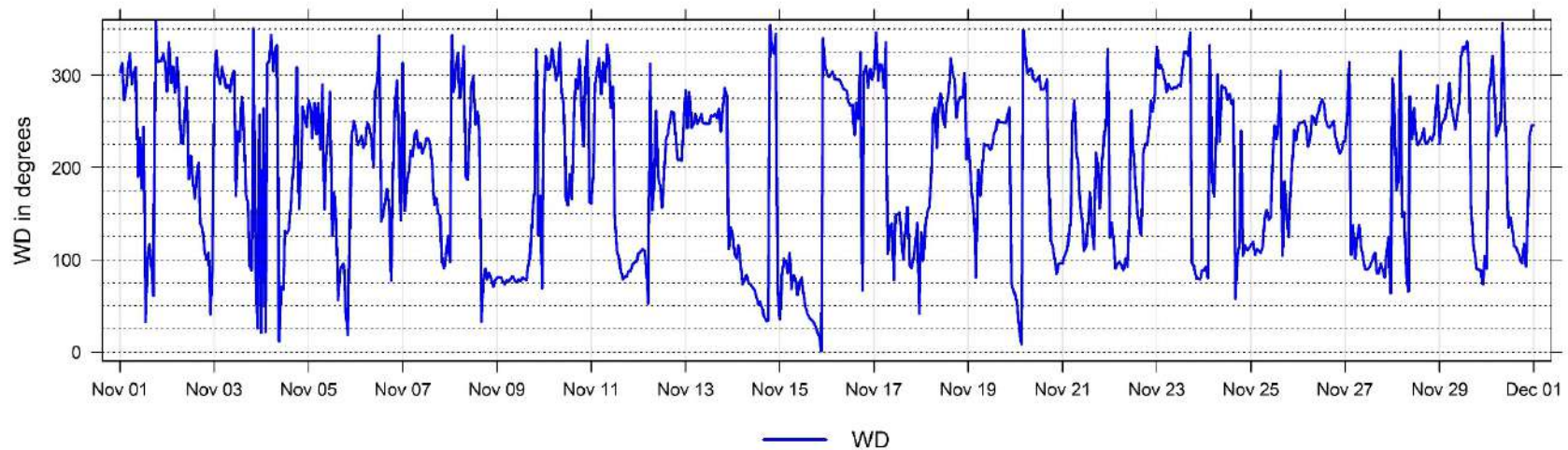
November Hourly Readings of Relative Humidity (in %) at Henry Pirker



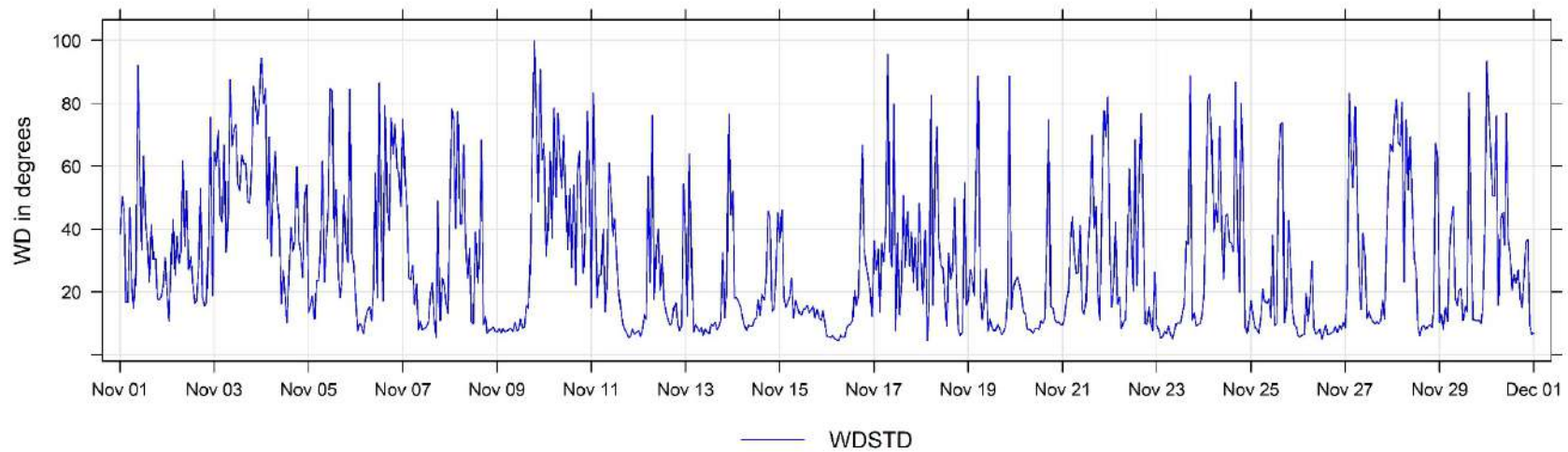
November Hourly Readings of Wind Speed (in km/hr) at Henry Pirker

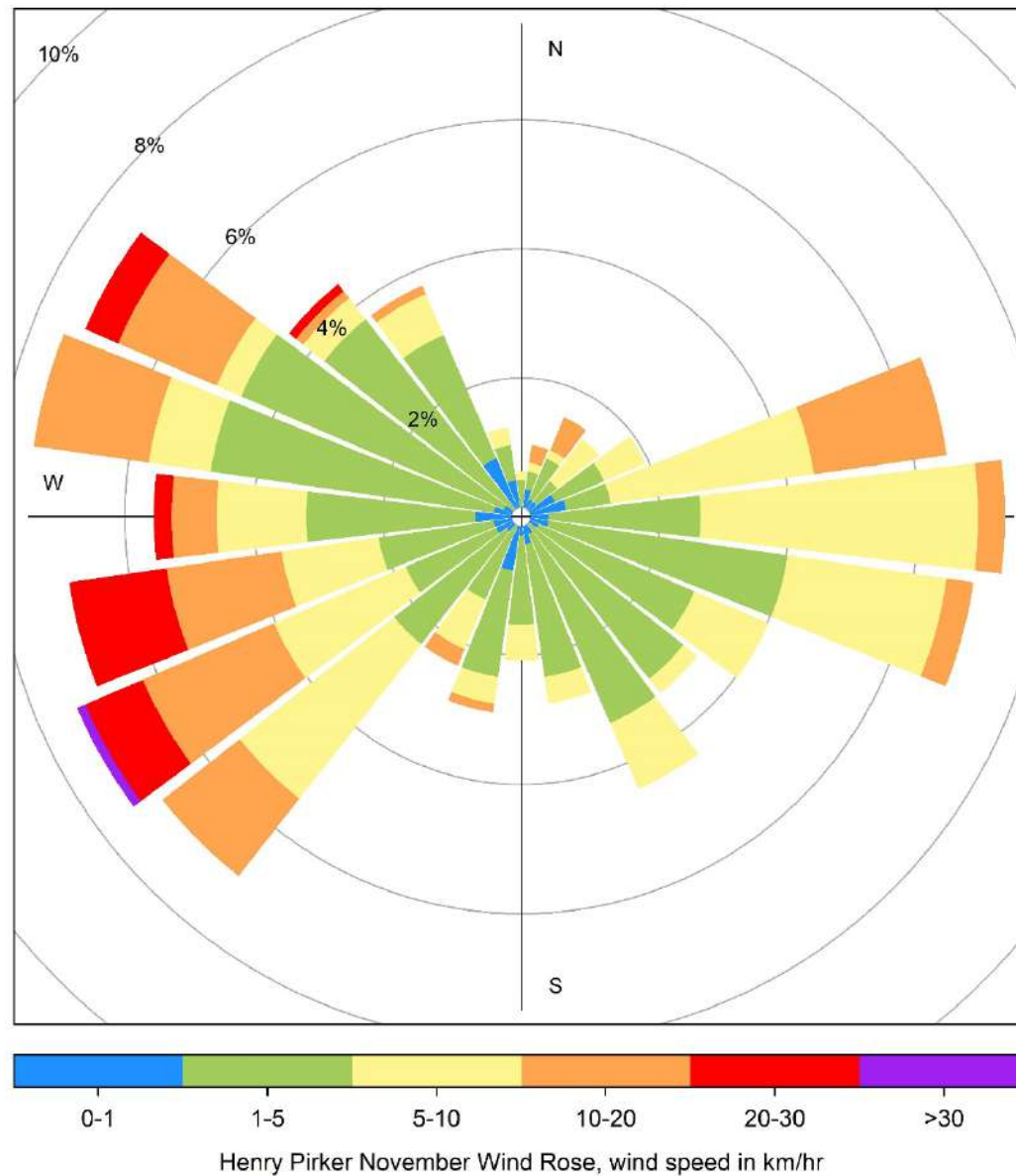


November Hourly Readings of Wind Direction (in degrees) at Henry Pirker



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

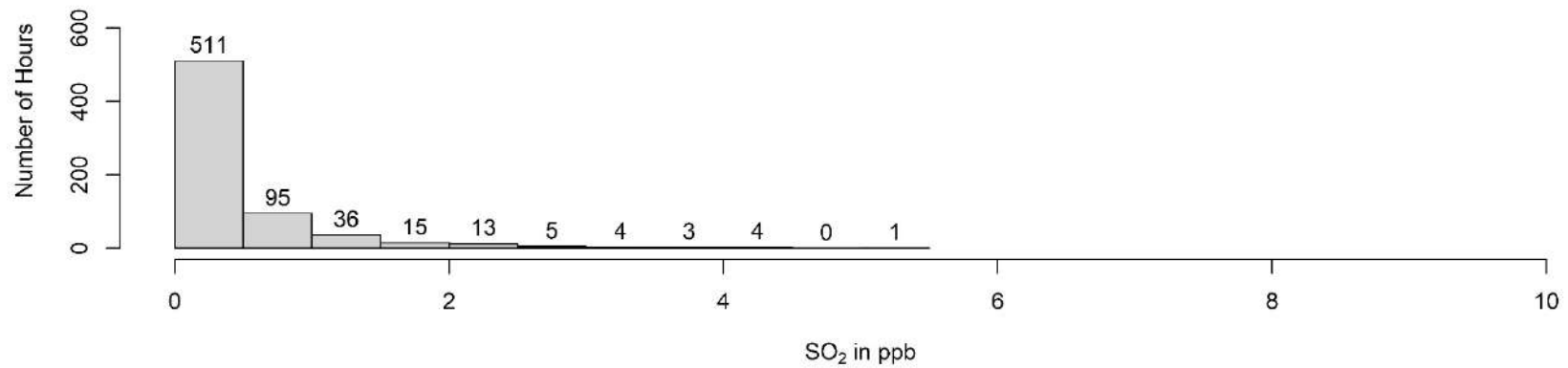
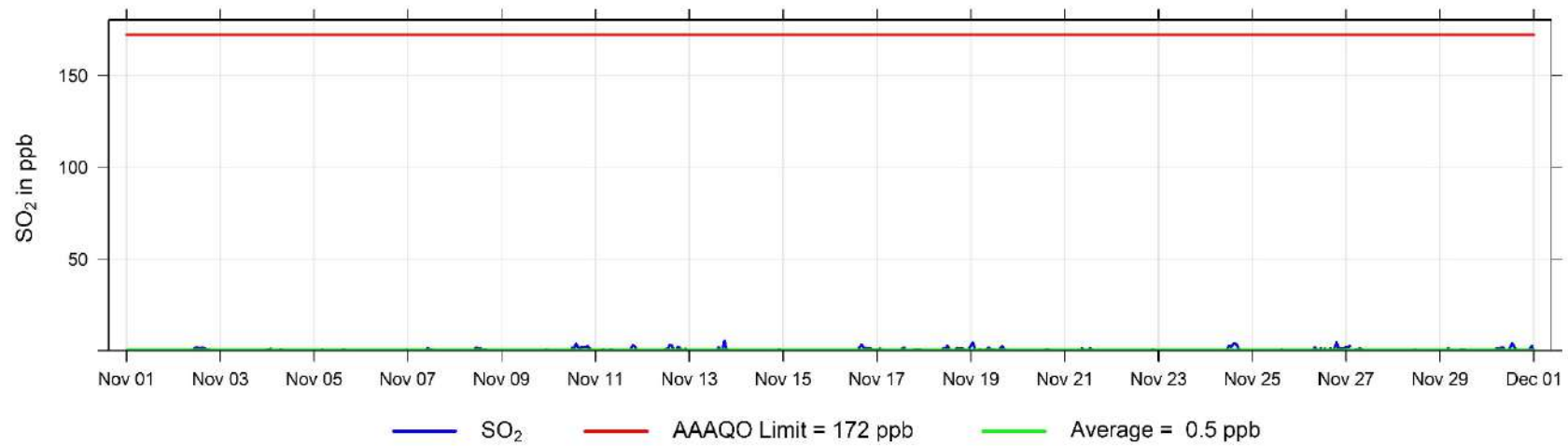




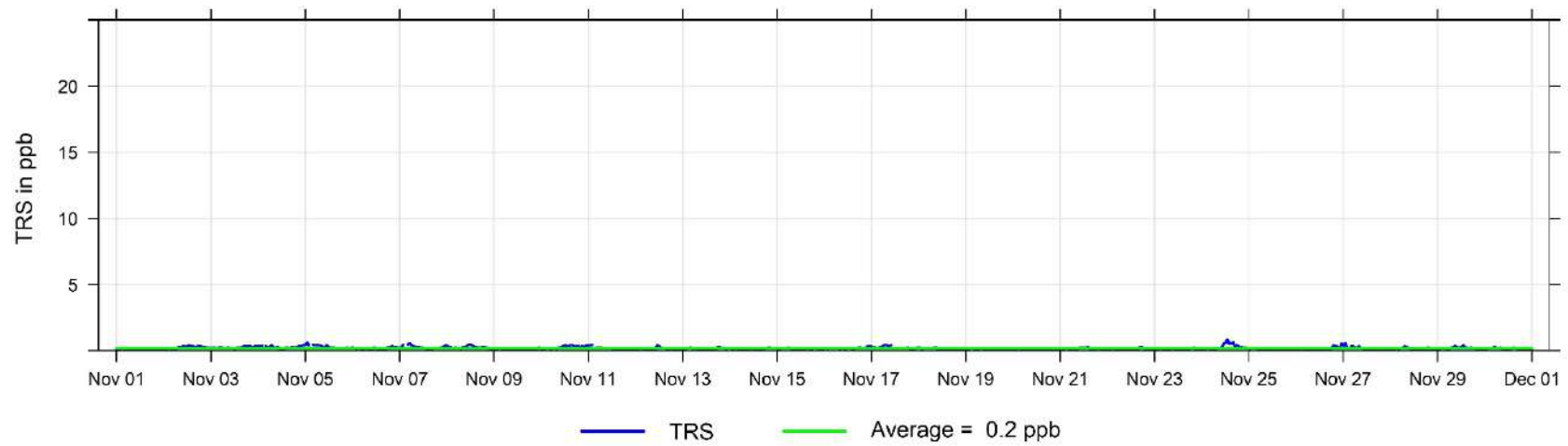
5 Smoky Heights Charts

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

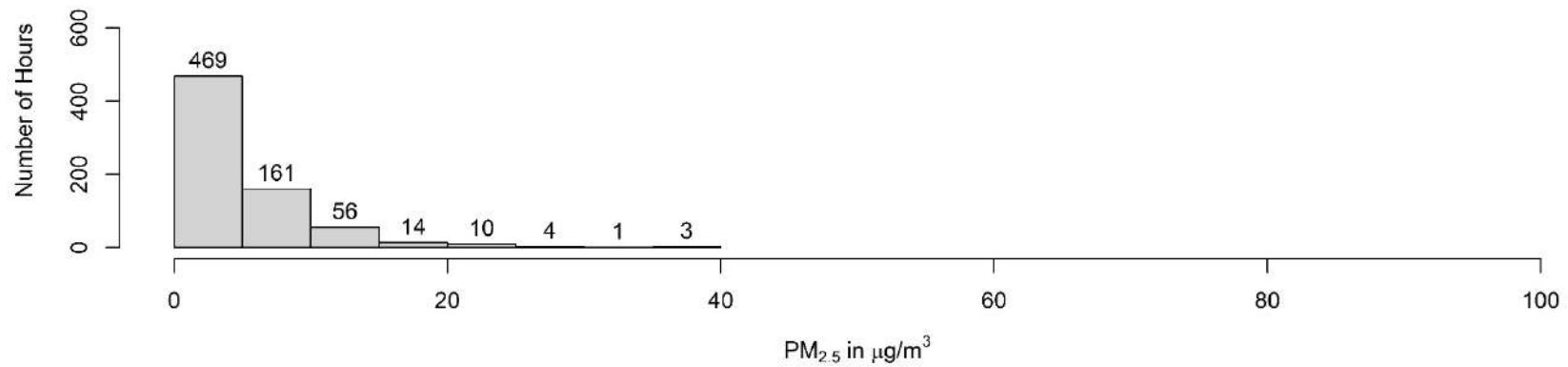
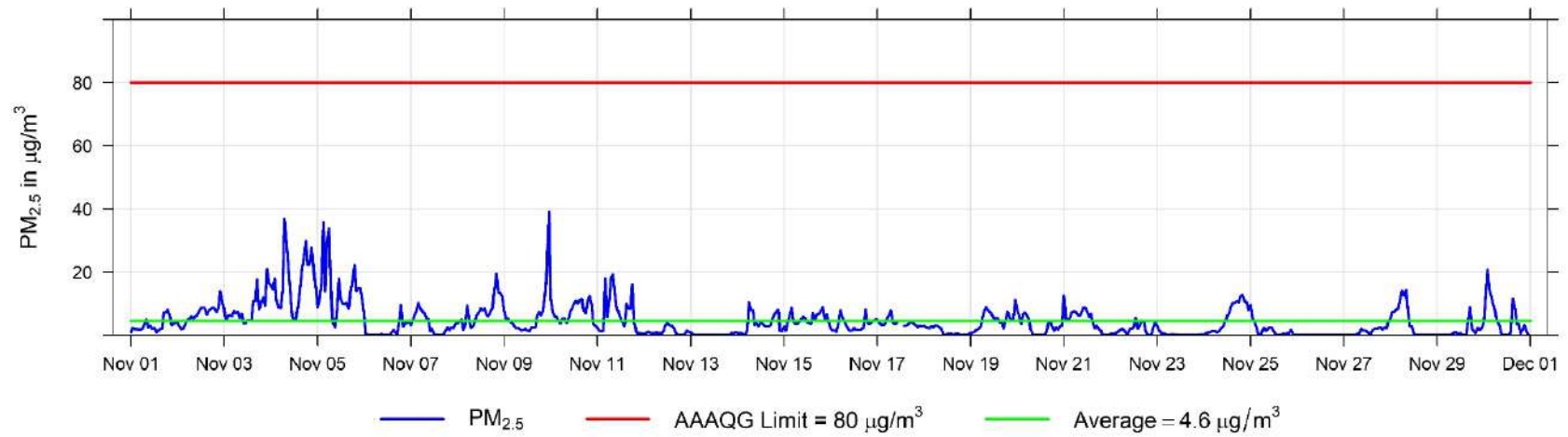
November Hourly Concentration Readings of SO₂ (in ppb) at Smoky Heights



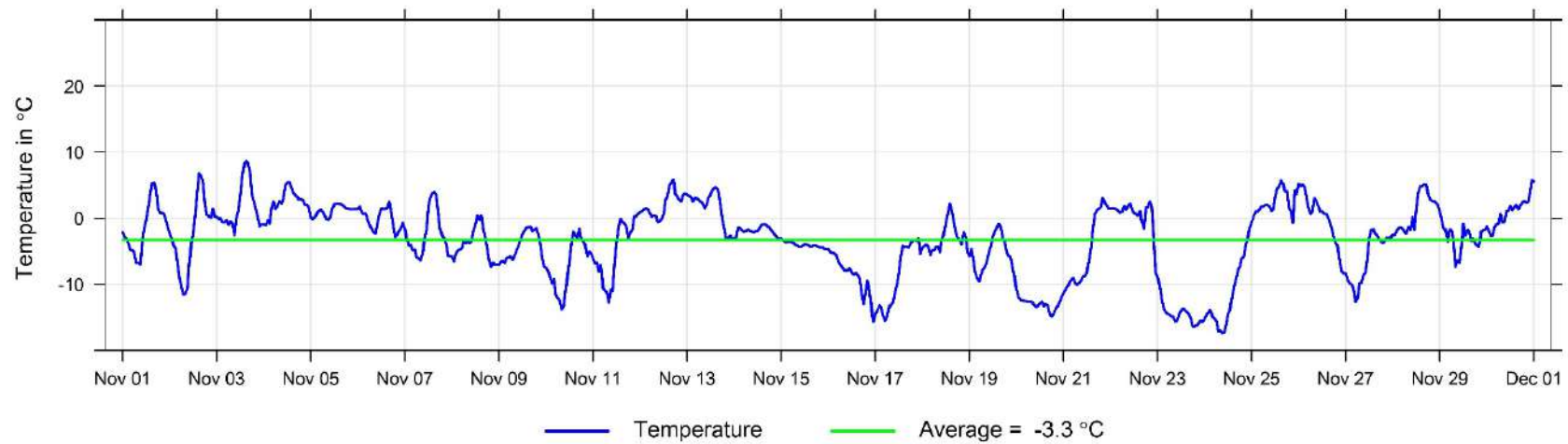
November Hourly Concentration Readings of TRS (in ppb) at Smoky Heights



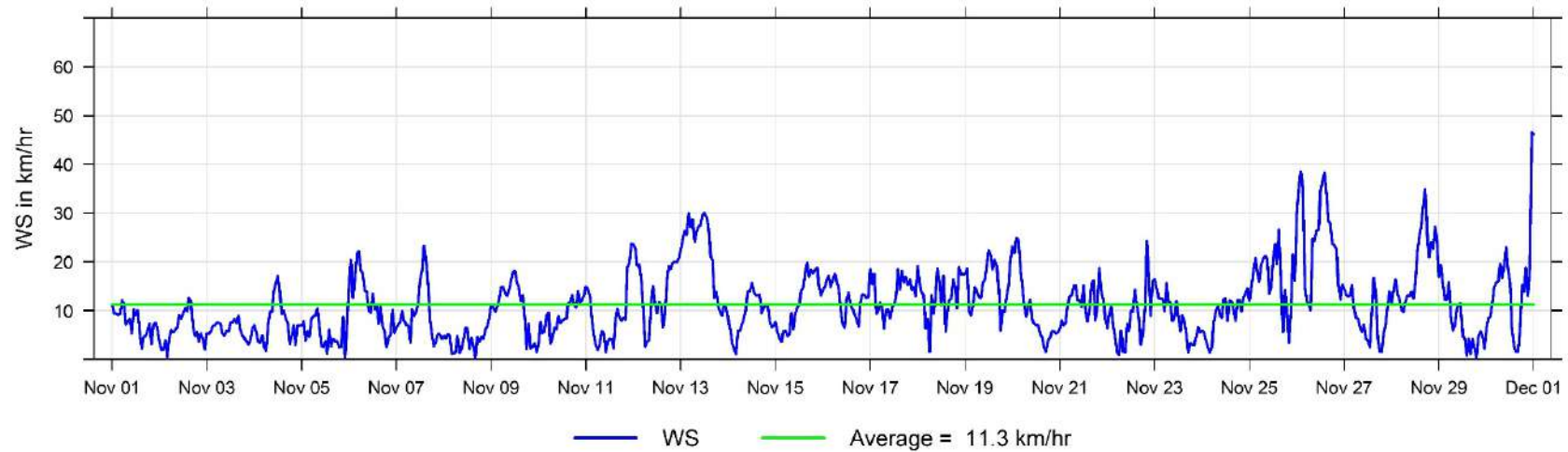
November Hourly Concentration Readings of PM_{2.5} in $\mu\text{g}/\text{m}^3$ at Smoky Heights



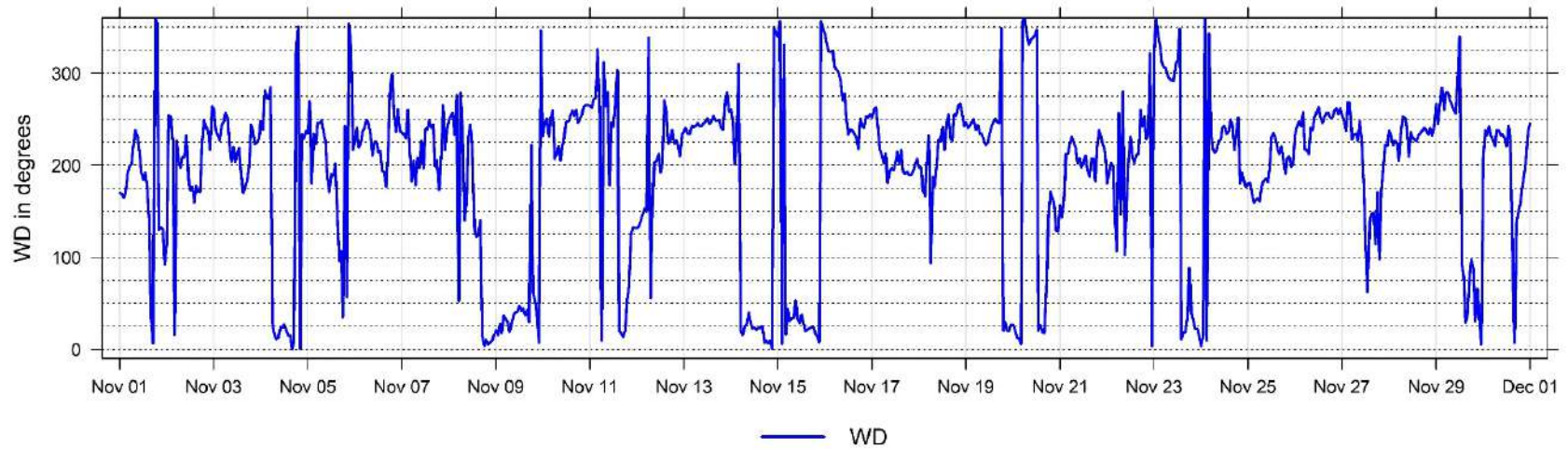
November Hourly Temperature Readings (in °C) at Smoky Heights



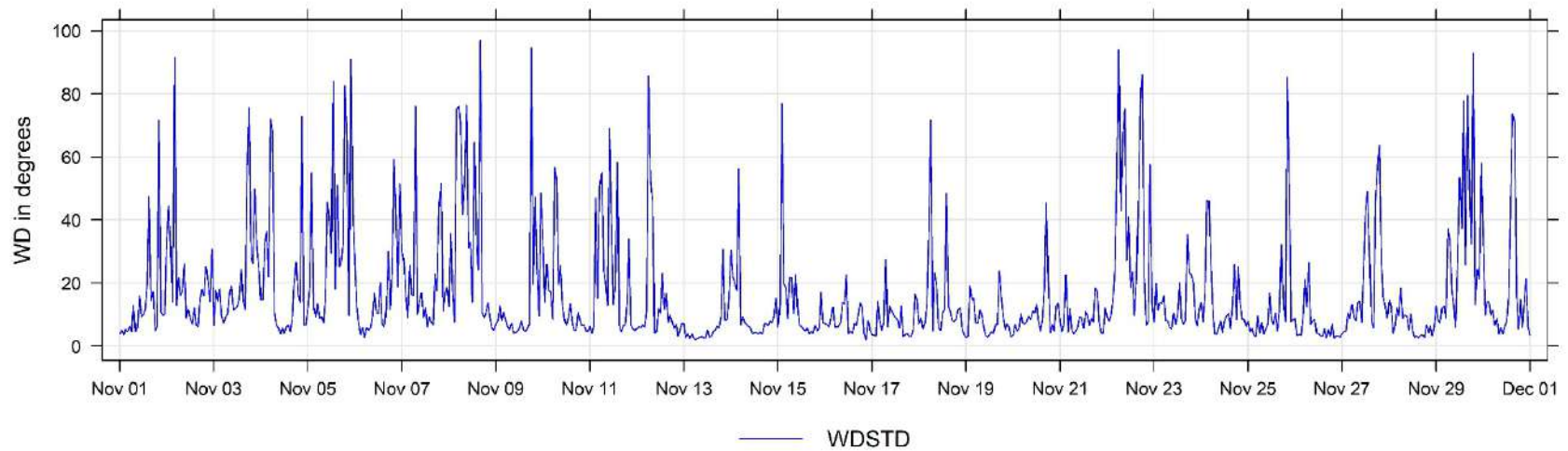
November Hourly Readings of Wind Speed (in km/hr) at Smoky Heights

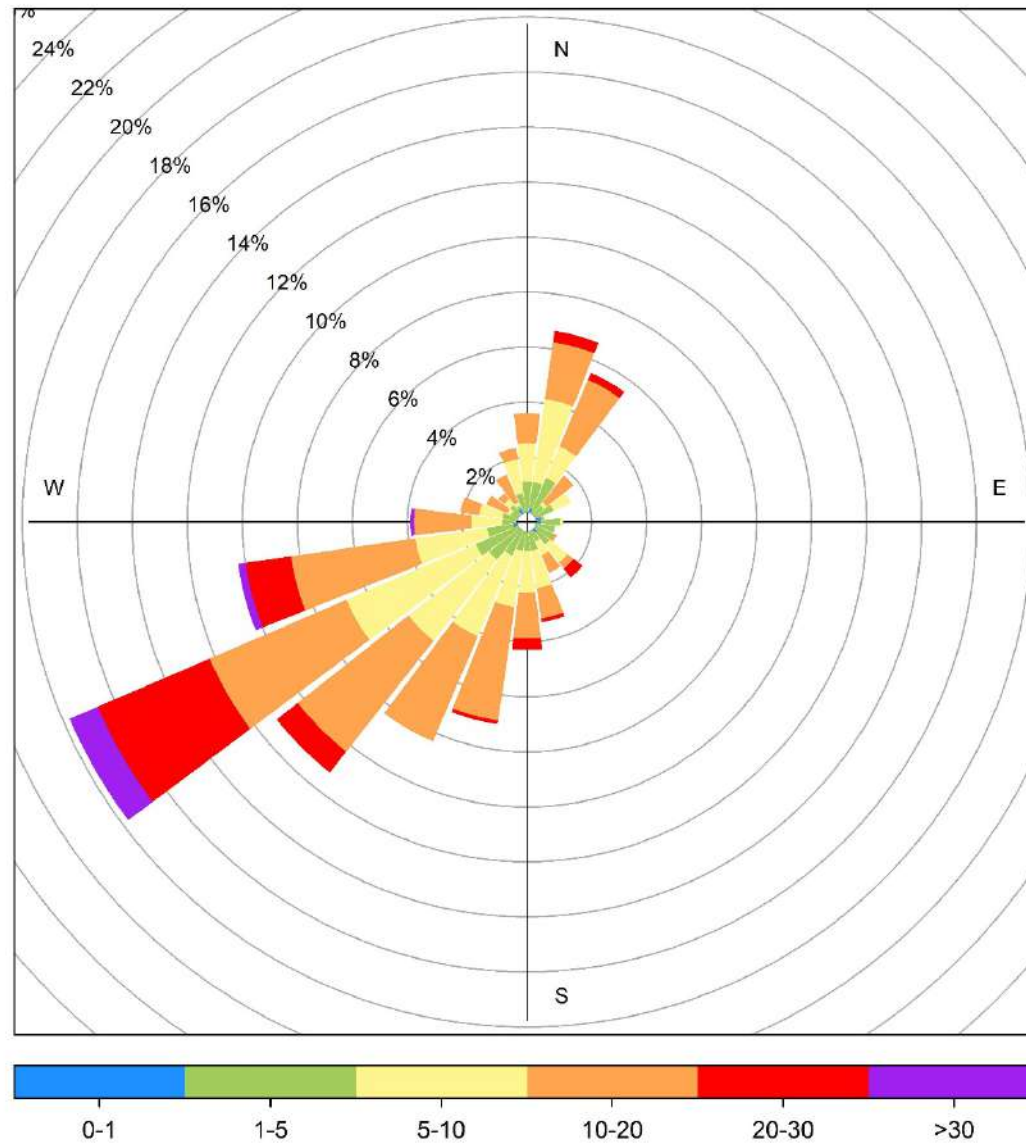


November Hourly Readings of Wind Direction (in degrees) at Smoky Heights



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



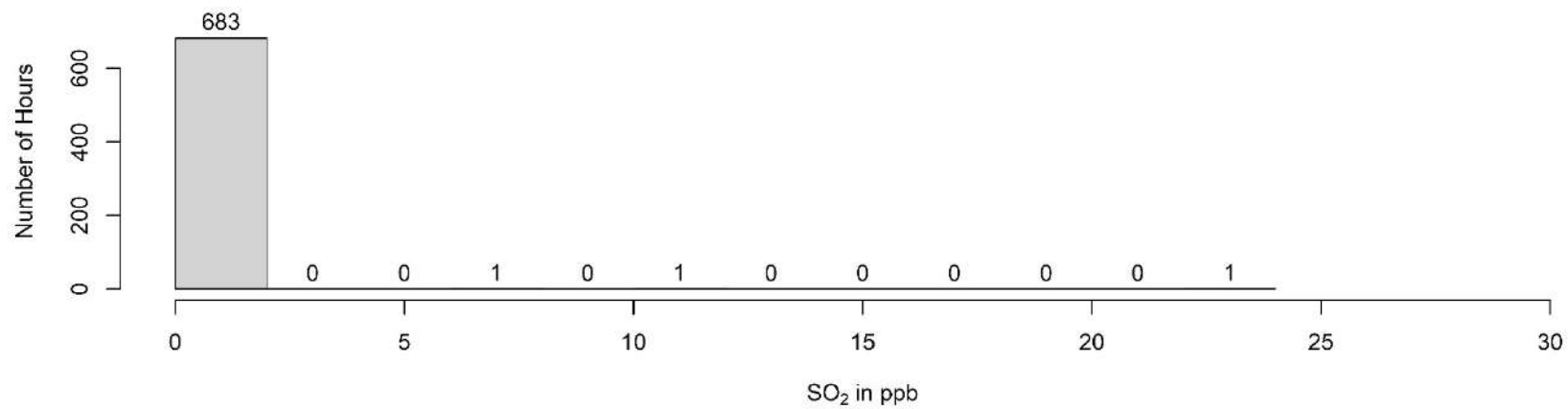
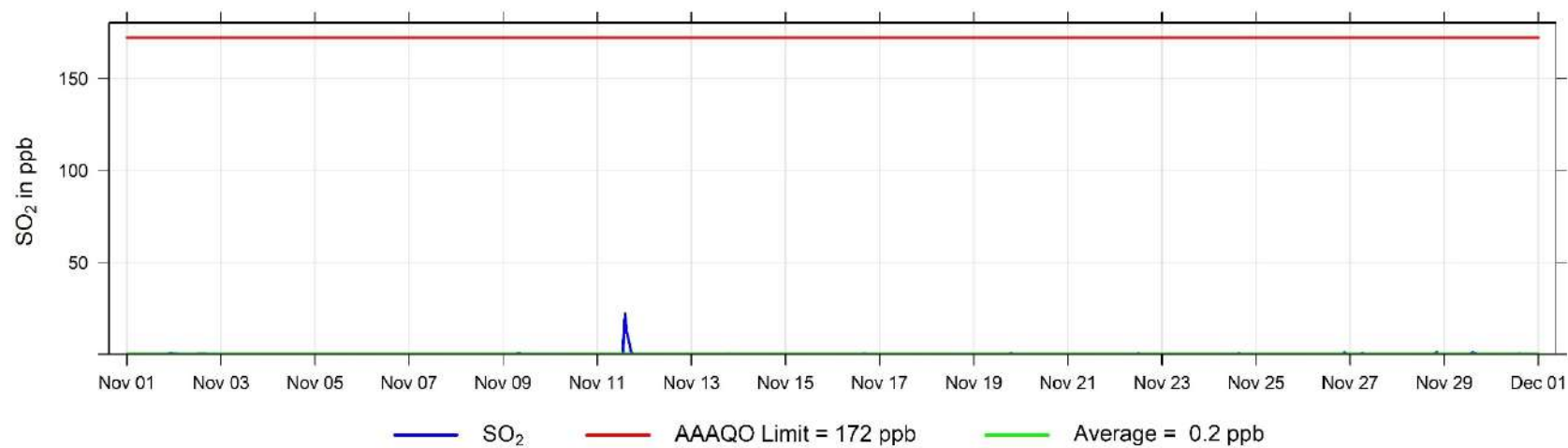


Smoky Heights November Wind Rose, wind speed in km/hr

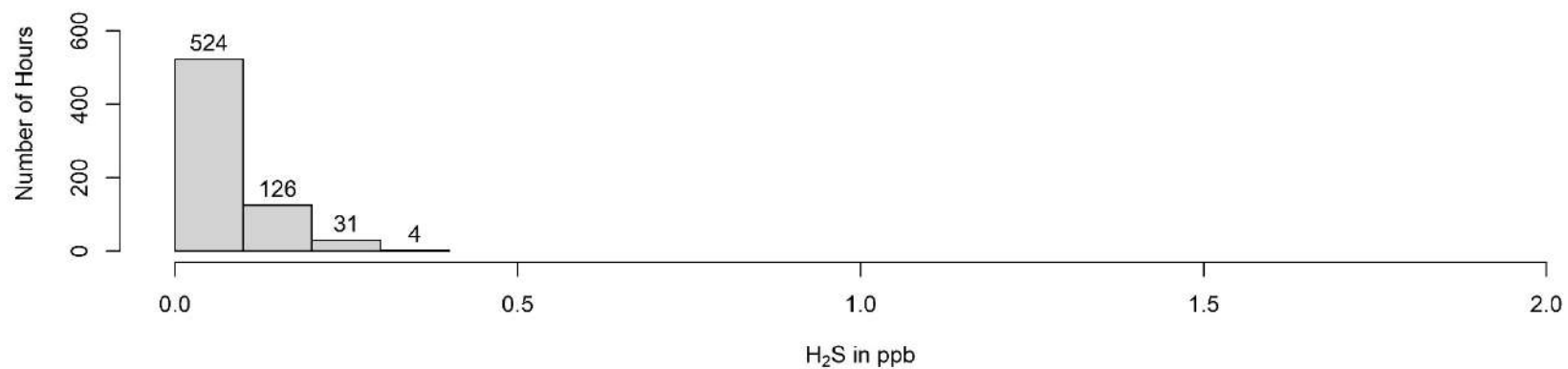
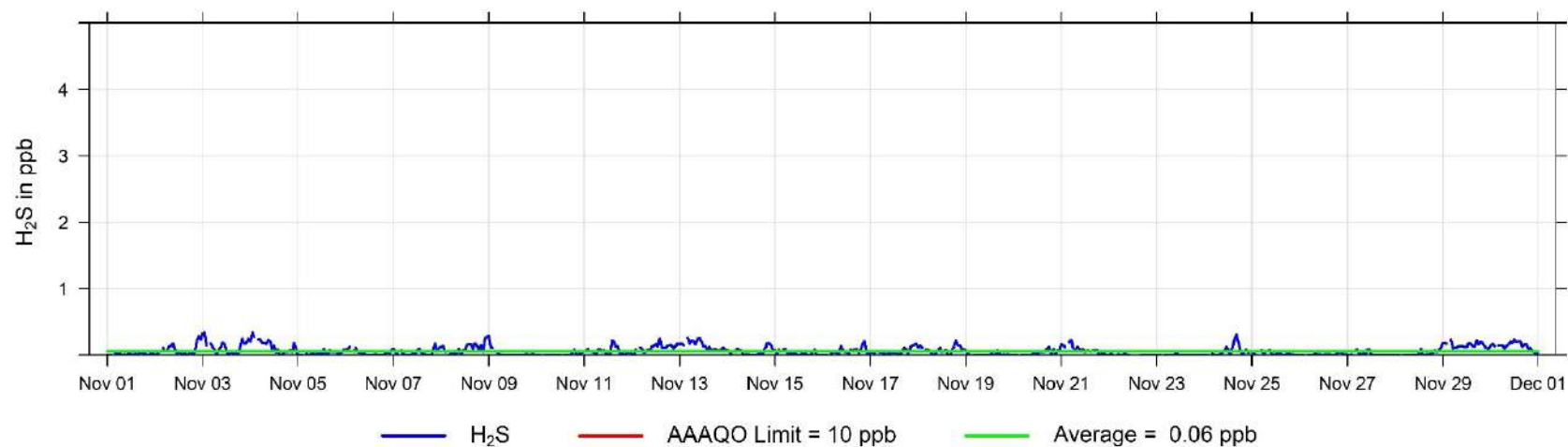
6 Valleyview Charts

The following pages include the charts and histograms for Valleyview Station

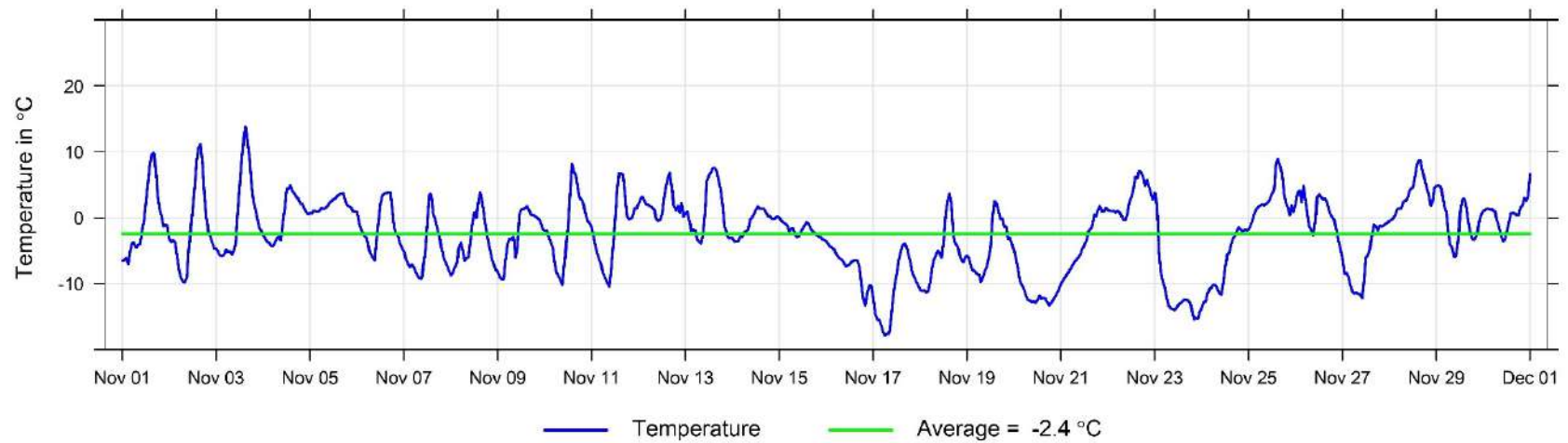
November Hourly Concentration Readings of SO₂ (in ppb) at Valleyview



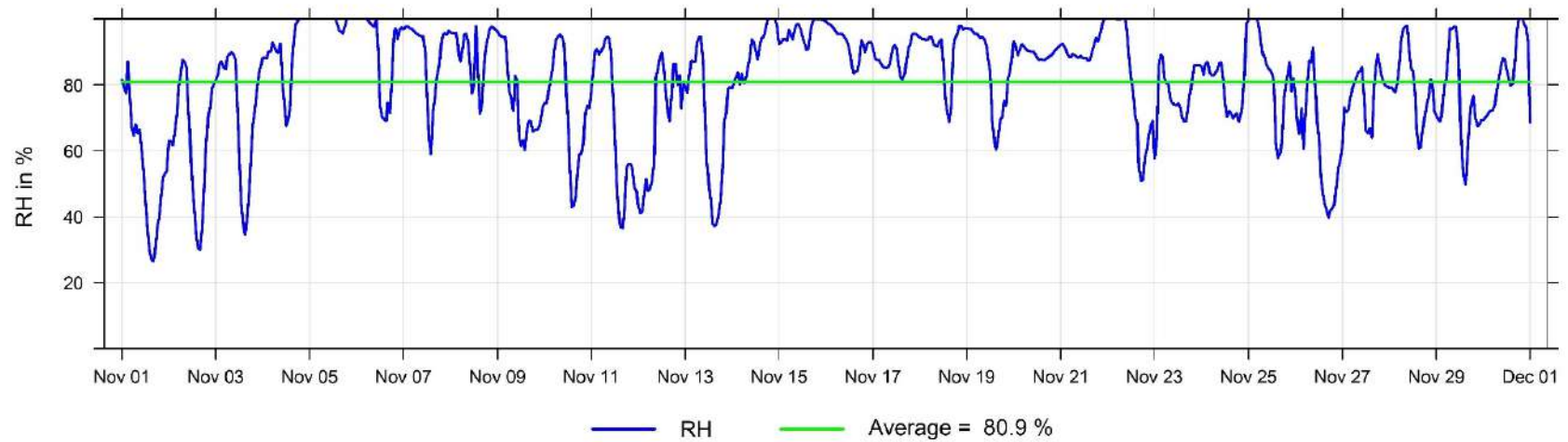
November Hourly Concentration Readings of H₂S (in ppb) at Valleyview



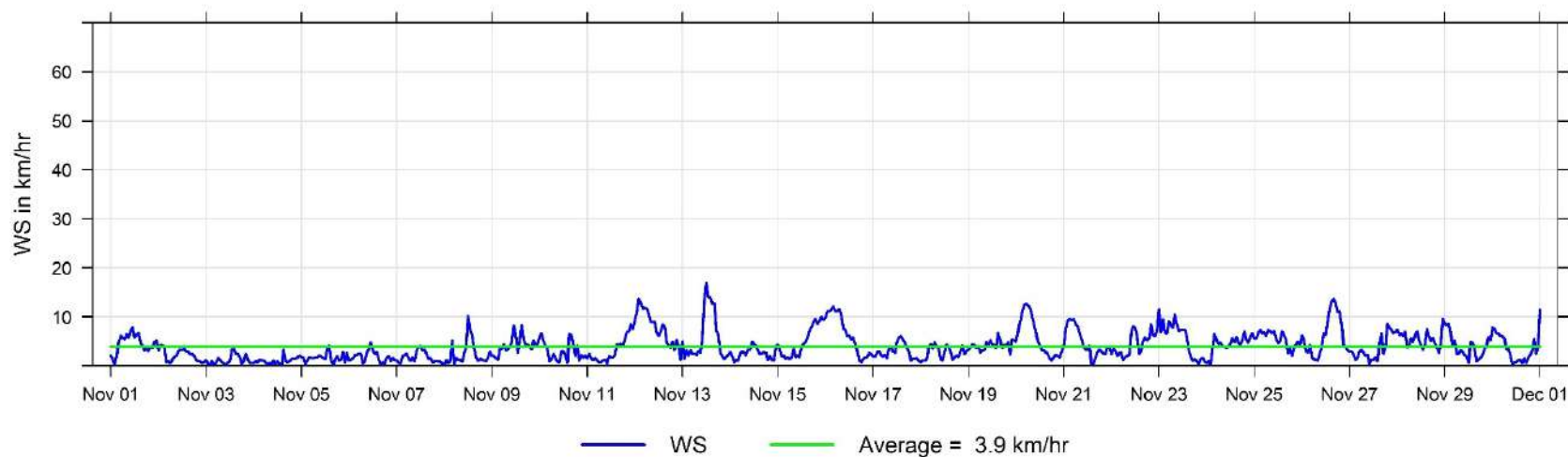
November Hourly Temperature Readings (in °C) at Valleyview



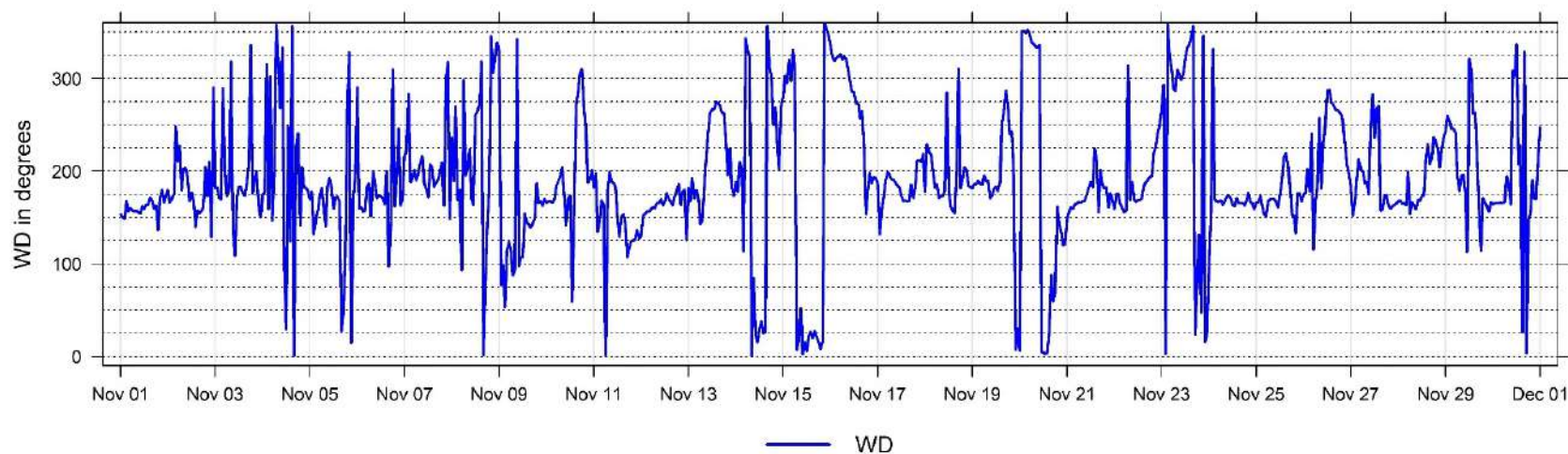
November Hourly Readings of Relative Humidity (in %) at Valleyview



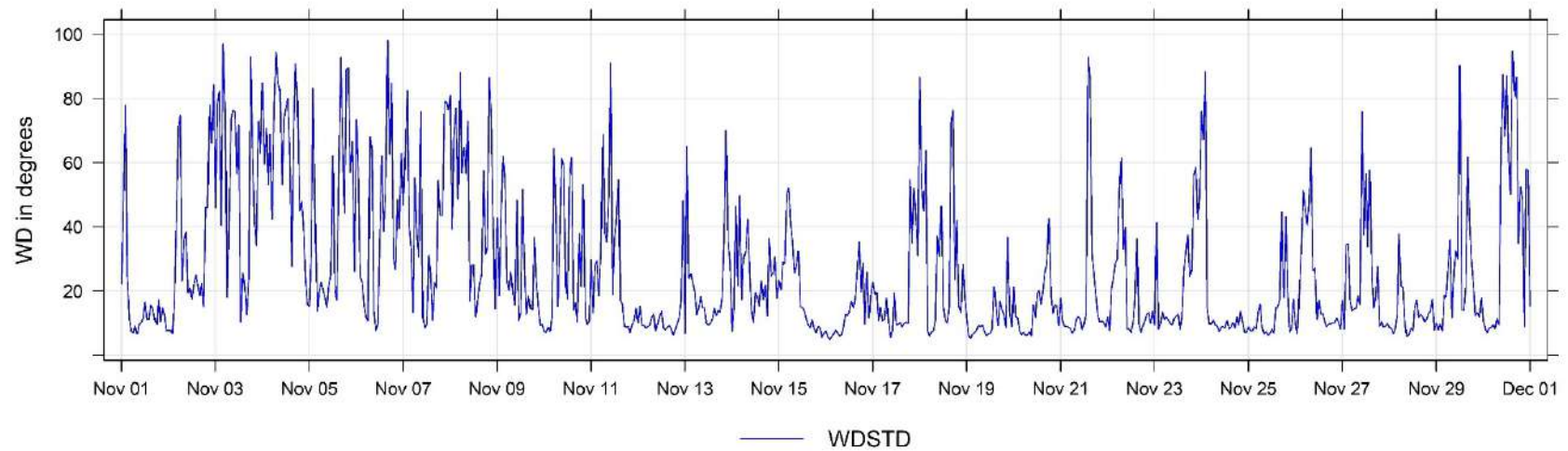
November Hourly Readings of Wind Speed (in km/hr) at Valleyview

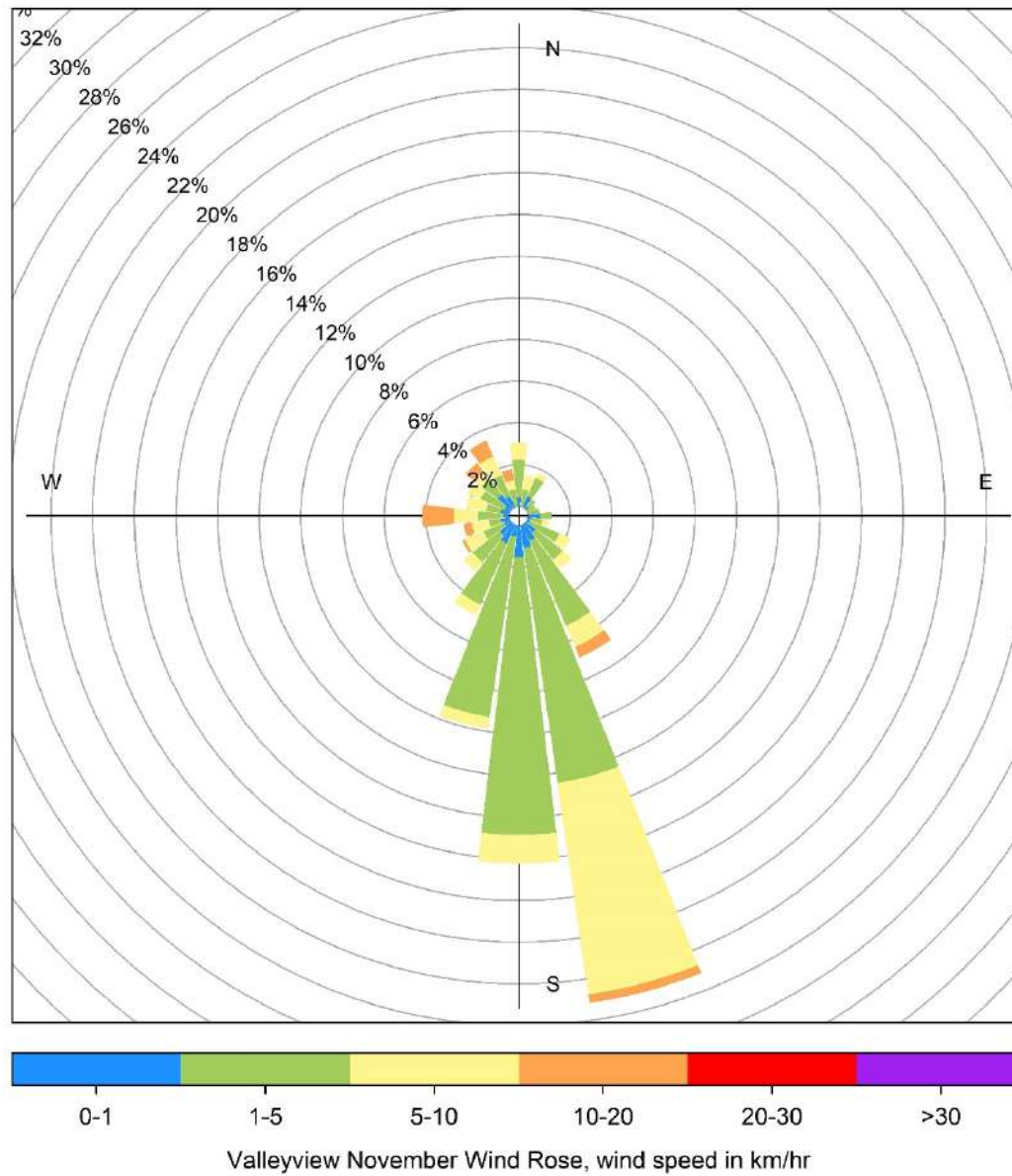


November Hourly Readings of Wind Direction (in degrees) at Valleyview



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

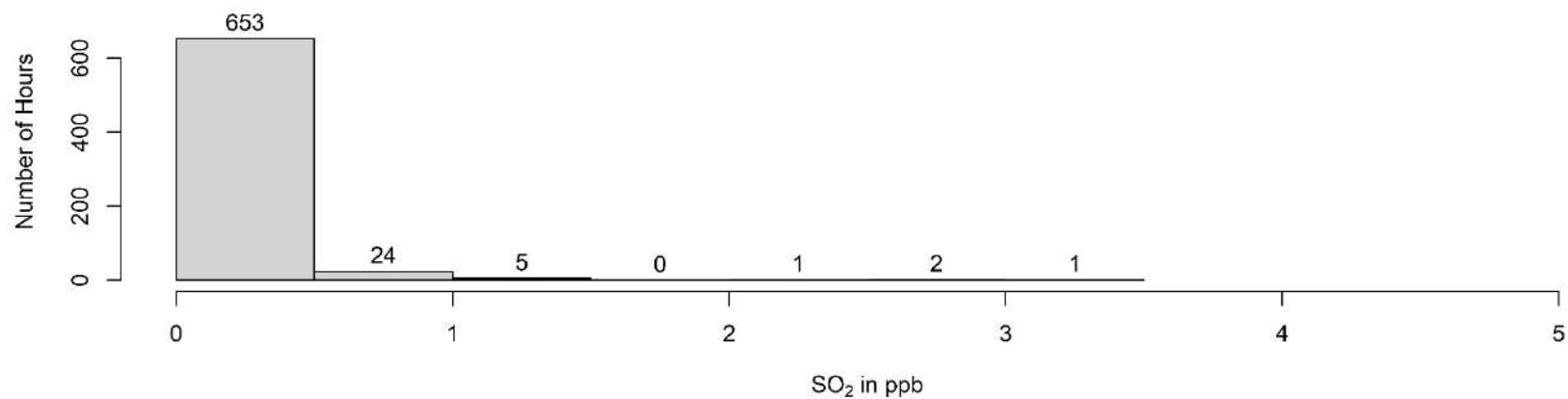
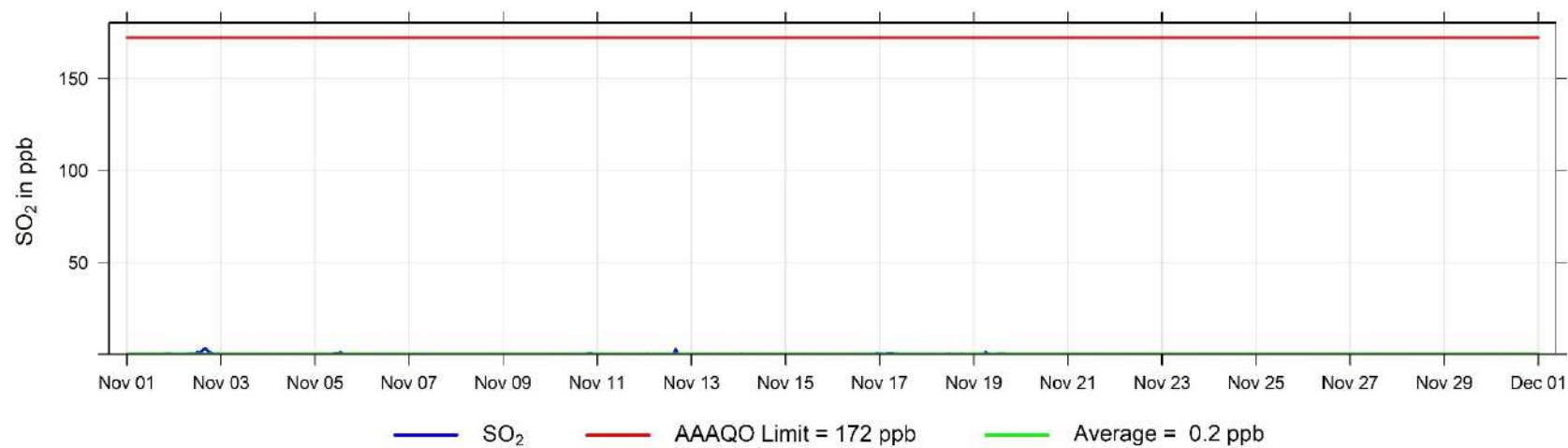




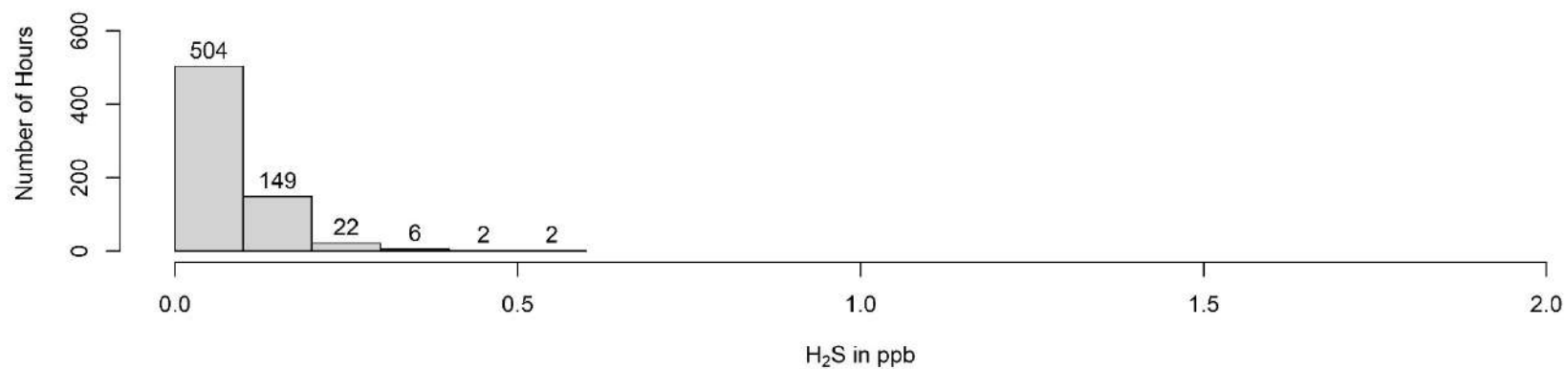
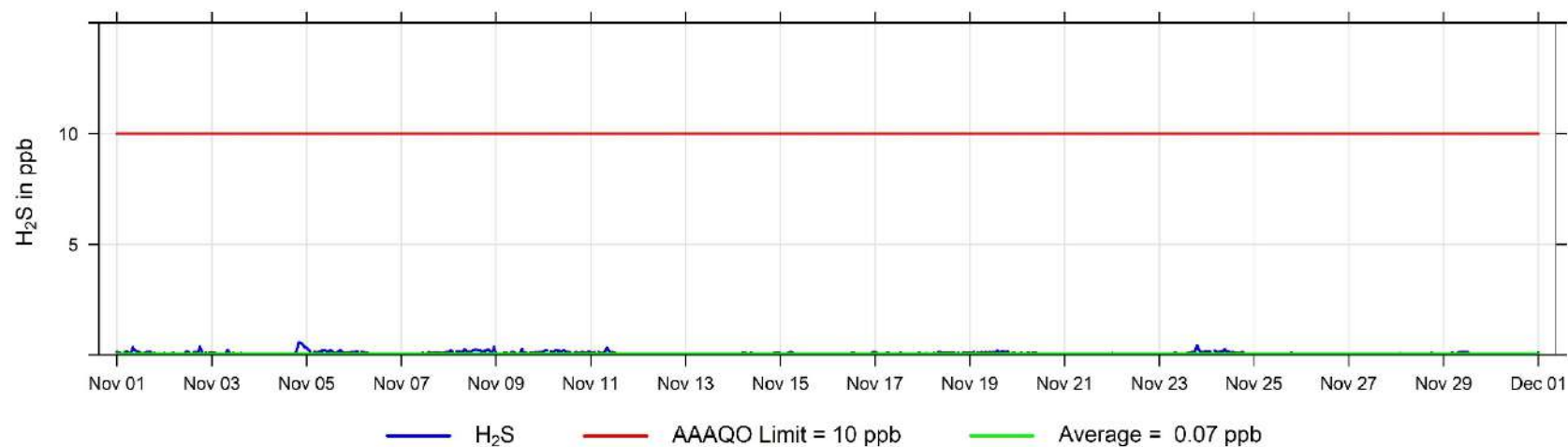
7 Donnelly Charts

The following pages include the charts and histograms for Donnelly Station

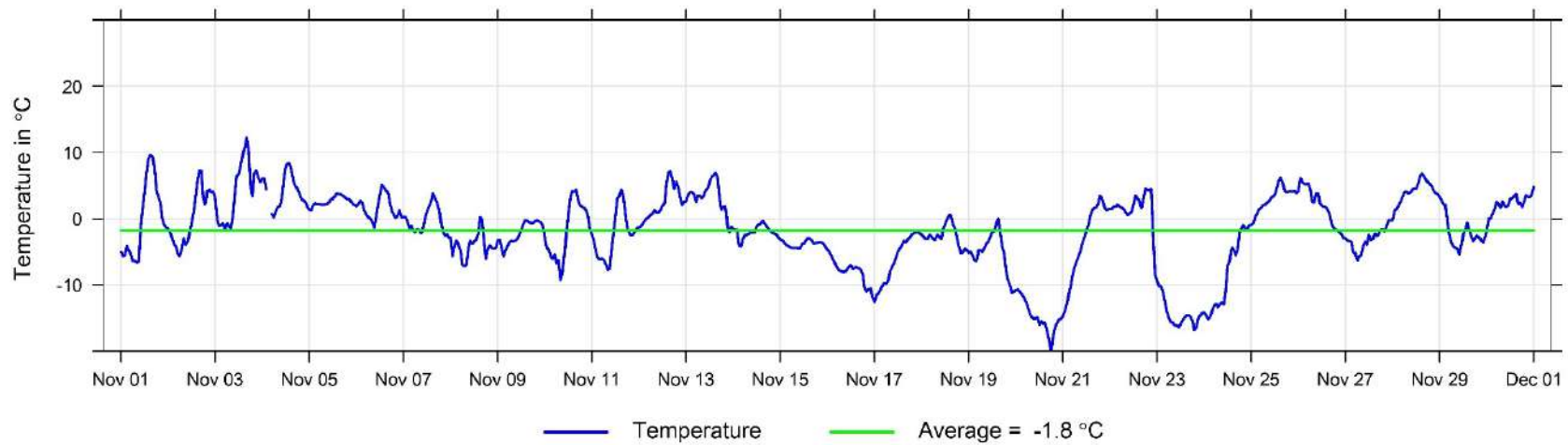
November Hourly Concentration Readings of SO₂ (in ppb) at Donnelly



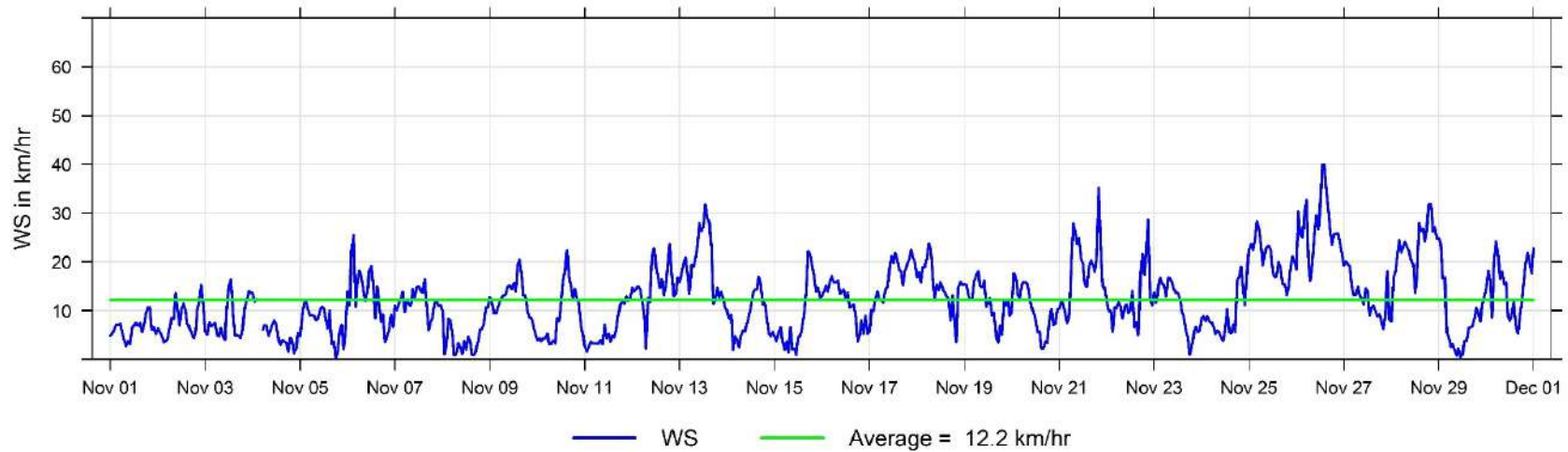
November Hourly Concentration Readings of H₂S (in ppb) at Donnelly



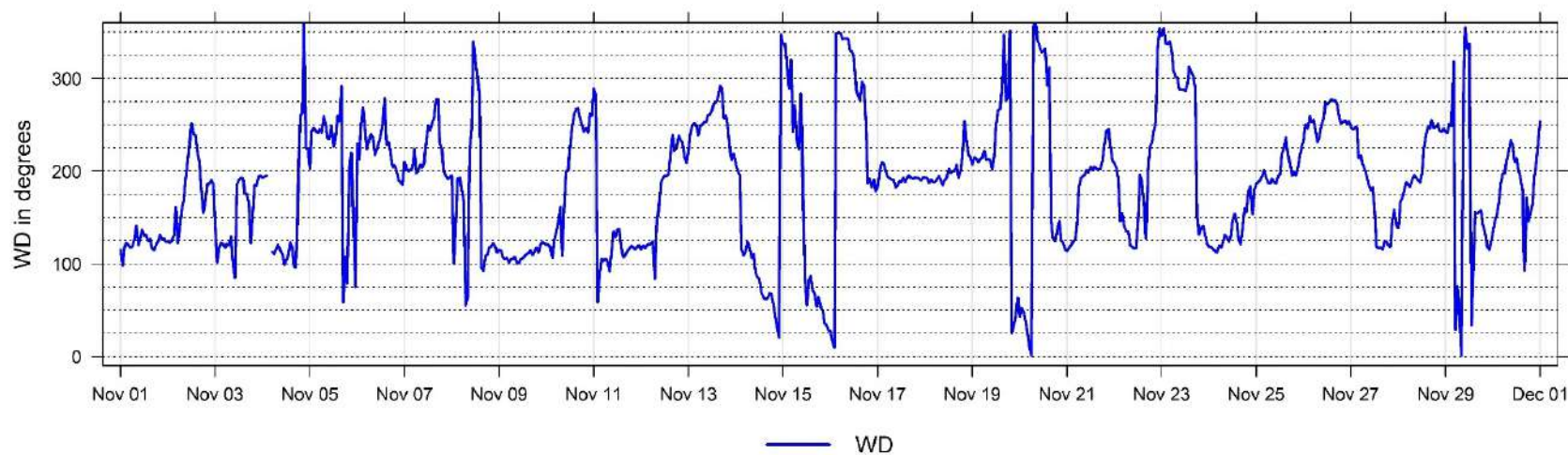
November Hourly Temperature Readings (in °C) at Donnelly



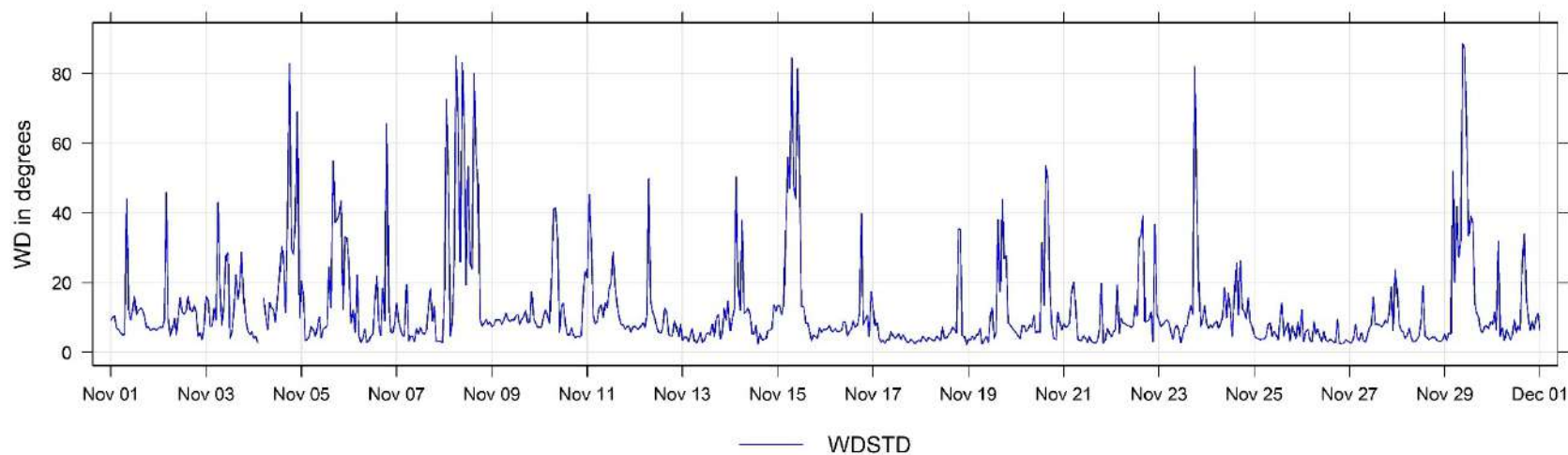
November Hourly Readings of Wind Speed (in km/hr) at Donnelly



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



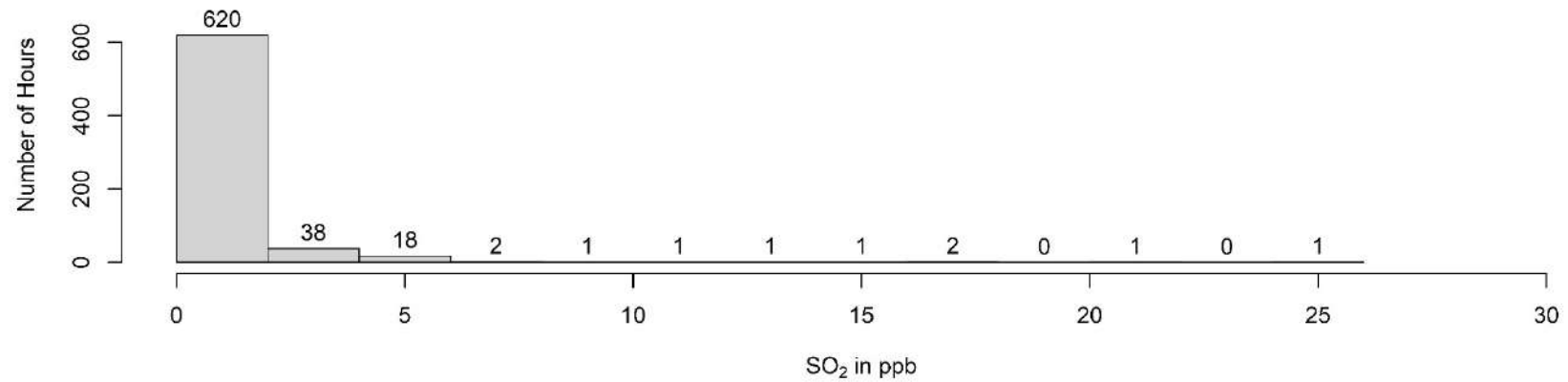
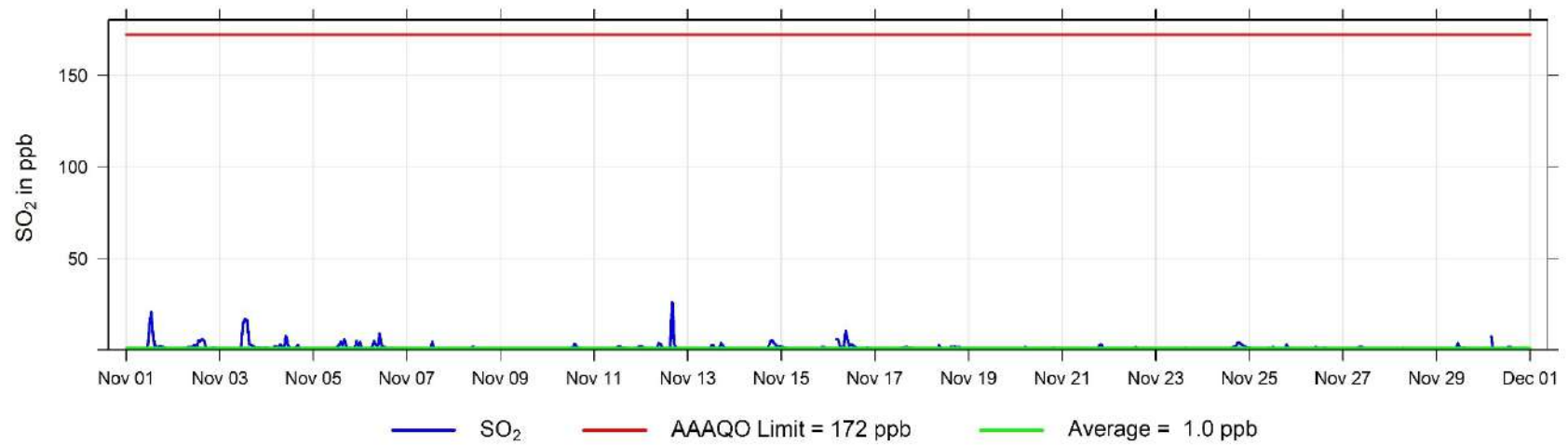
November Hourly Readings of Wind Direction Standard Deviation (in degrees) at Donnelly



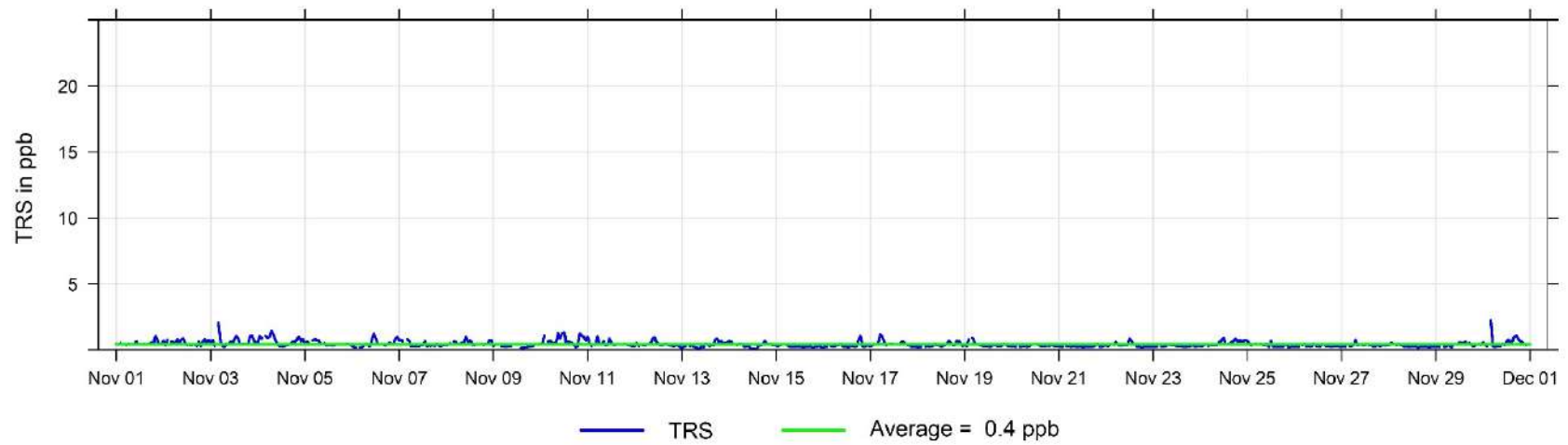
8 Poplar (Portable) Charts

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

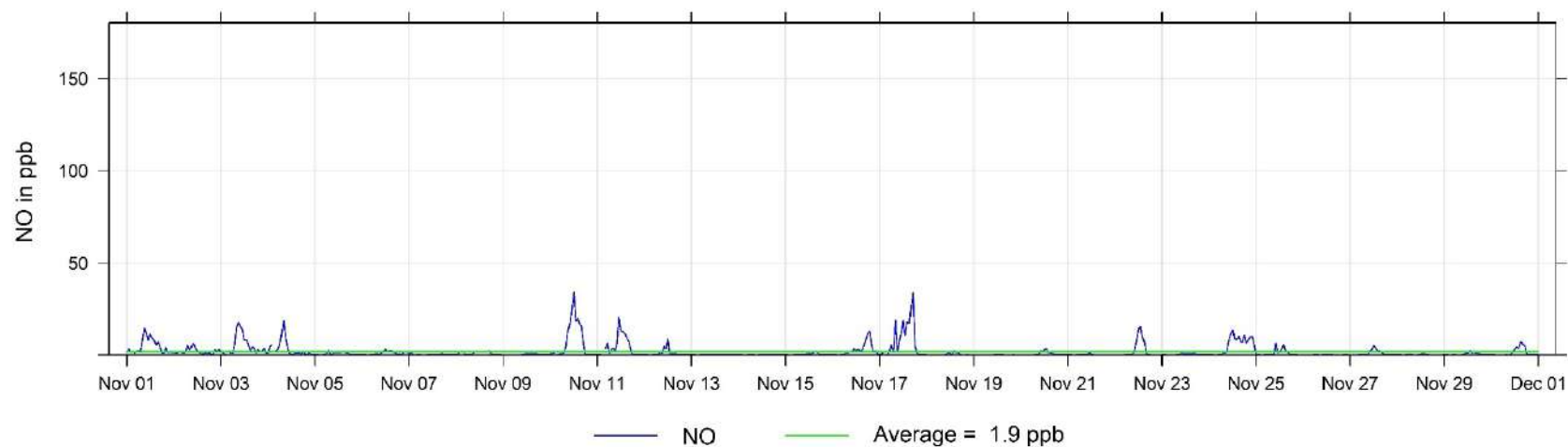
November Hourly Concentration Readings of SO₂ (in ppb) at Poplar



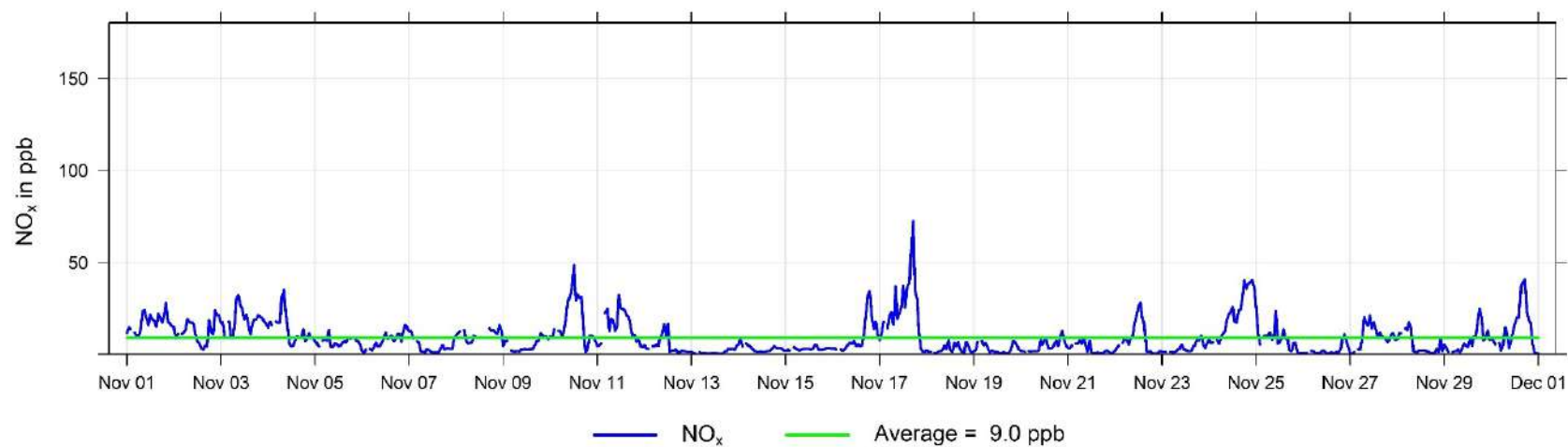
November Hourly Concentration Readings of TRS (in ppb) at Poplar



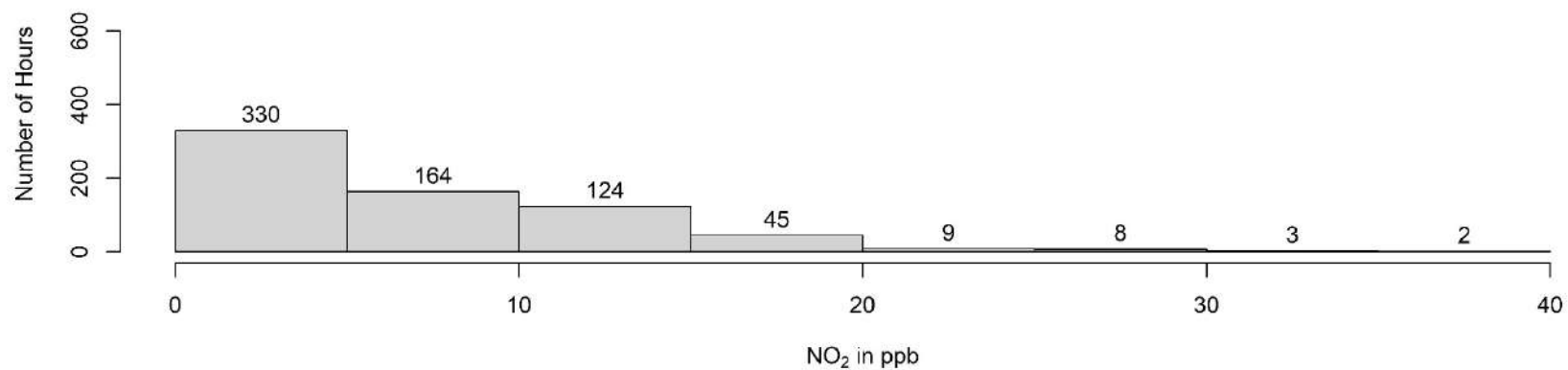
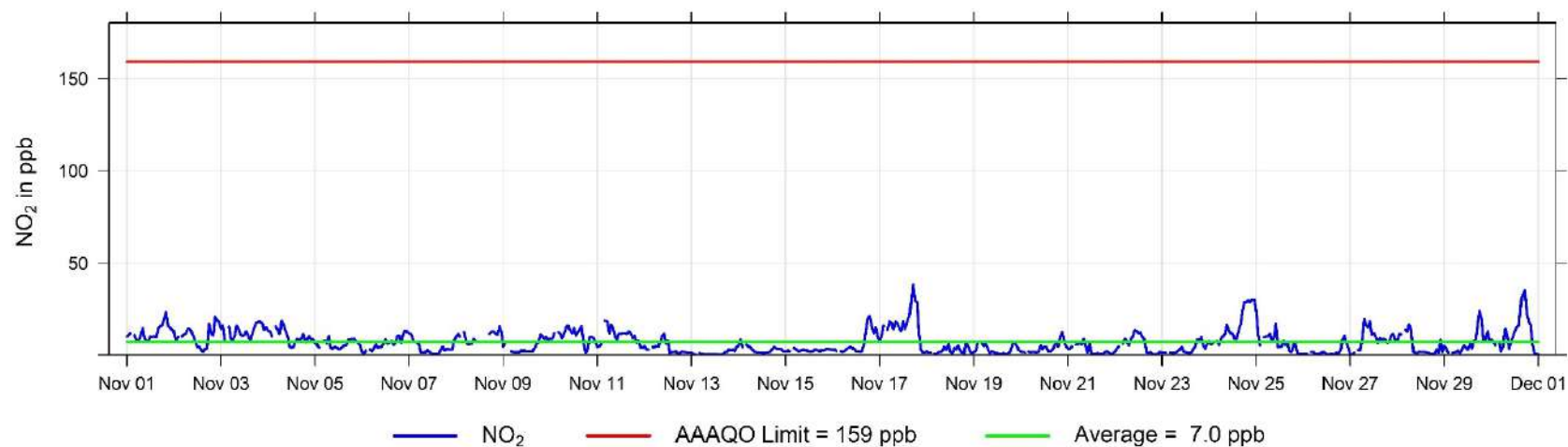
November Hourly Concentration Readings of NO (in ppb) at Poplar



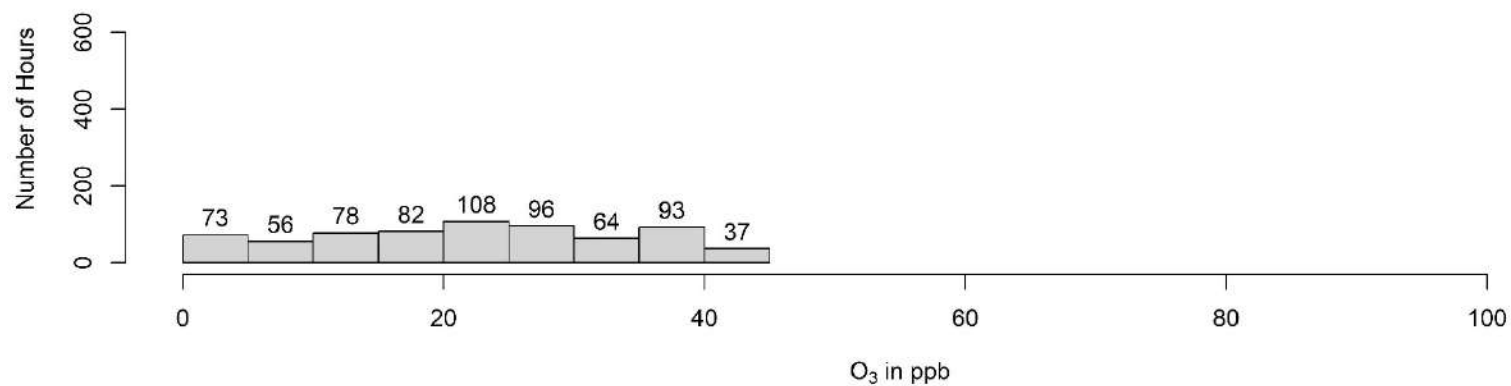
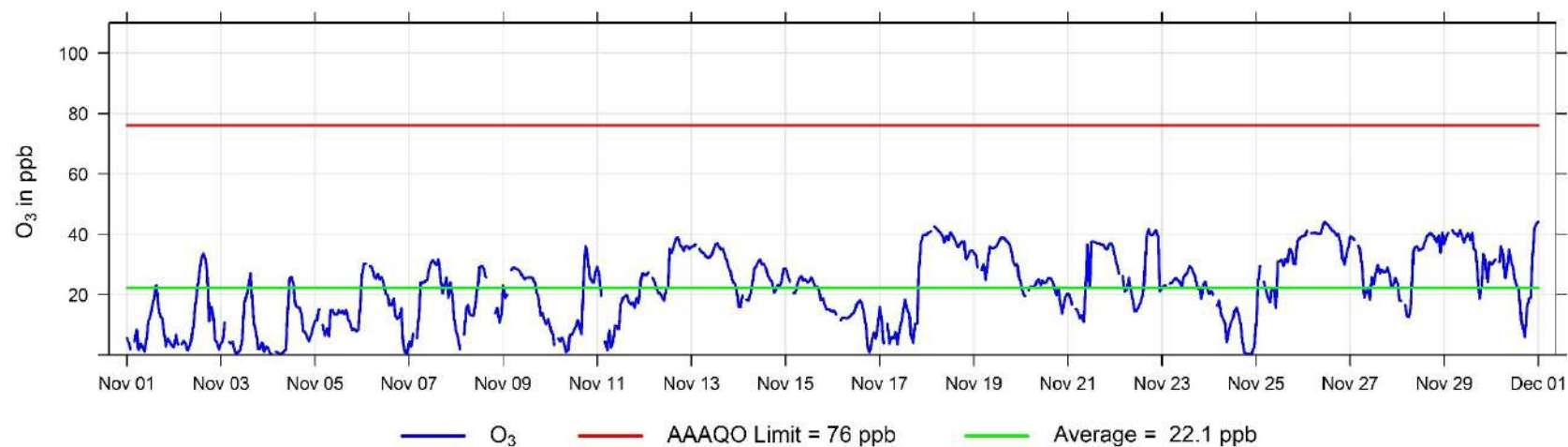
November Hourly Concentration Readings of NO_x (in ppb) at Poplar



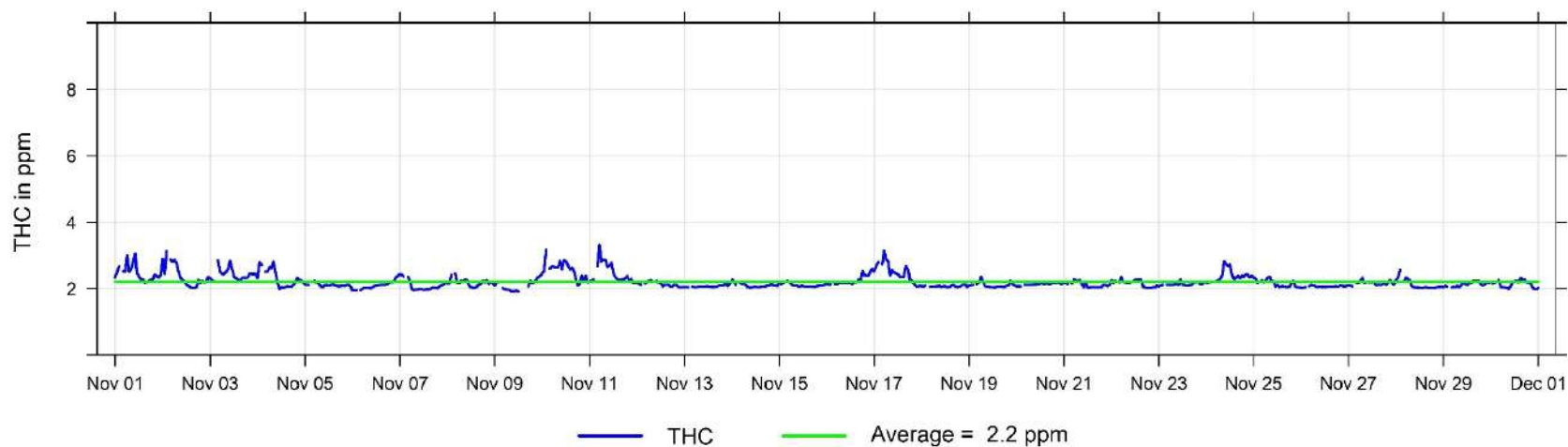
November Hourly Concentration Readings of NO₂ (in ppb) at Poplar



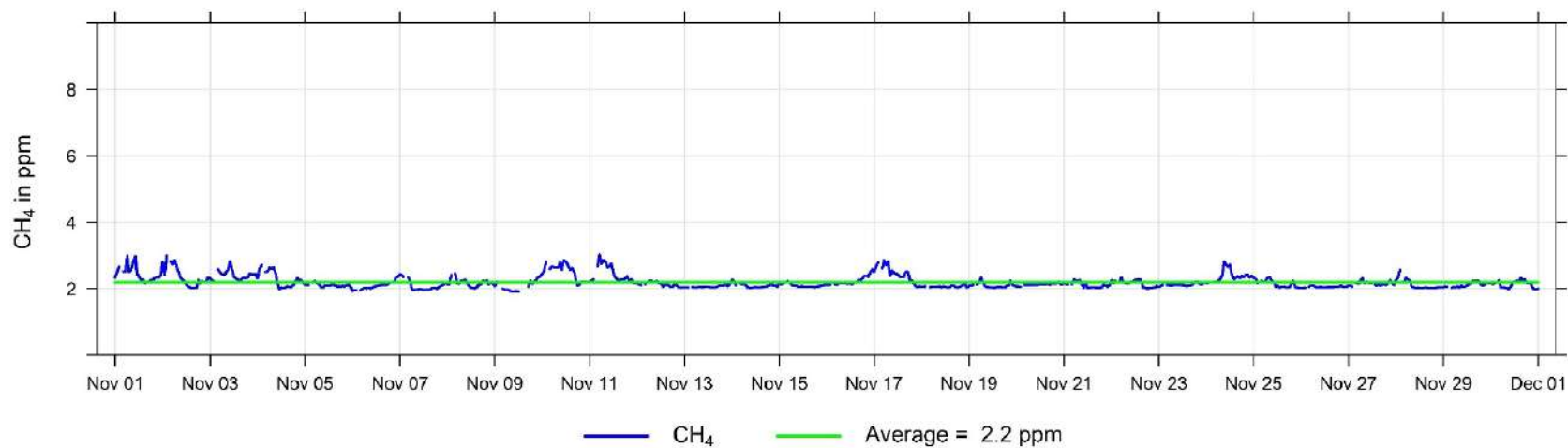
November Hourly Concentration Readings of O₃ (in ppb) at Poplar



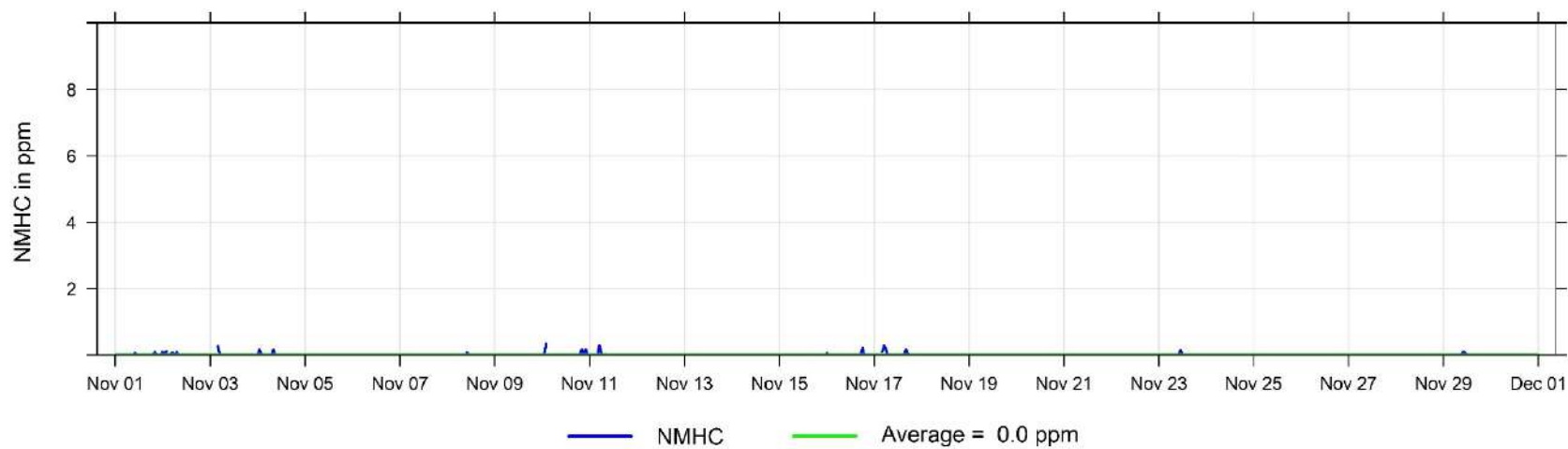
November Hourly Concentration Readings of THC (in ppm) at Poplar



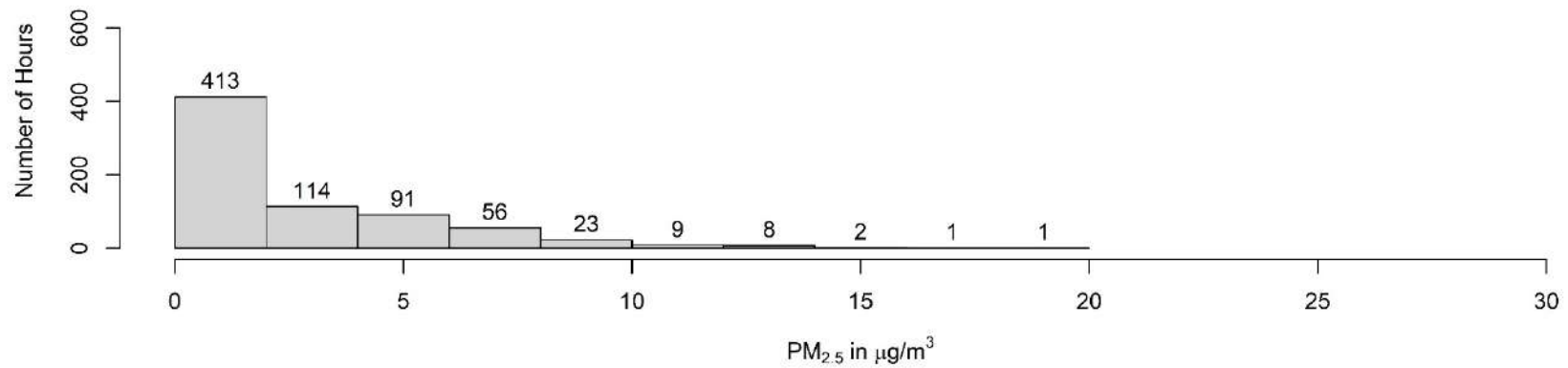
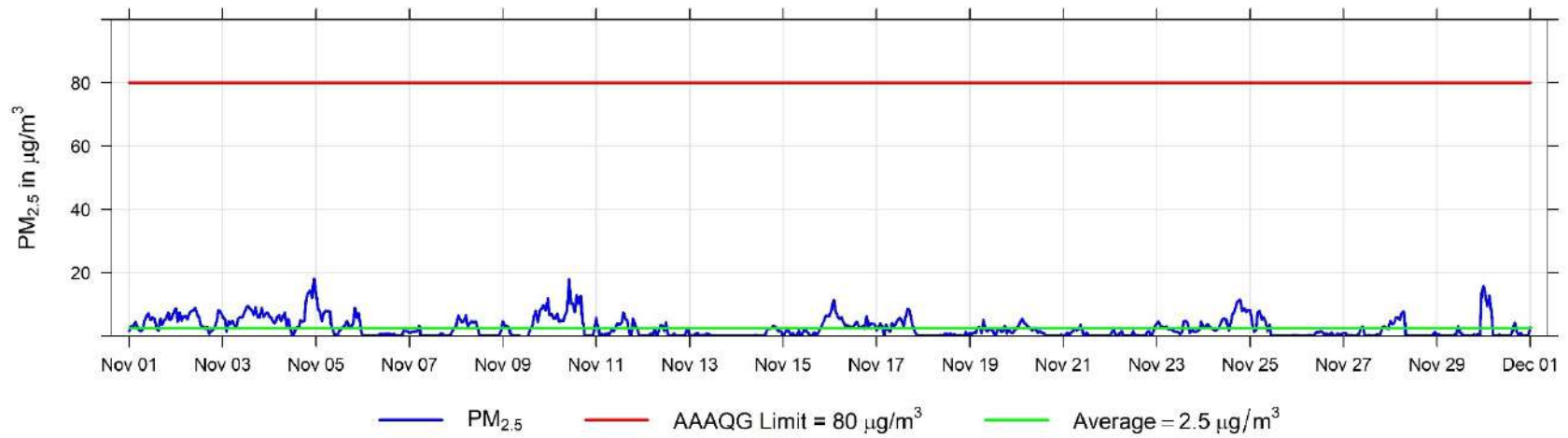
November Hourly Concentration Readings of CH₄ (in ppm) at Poplar



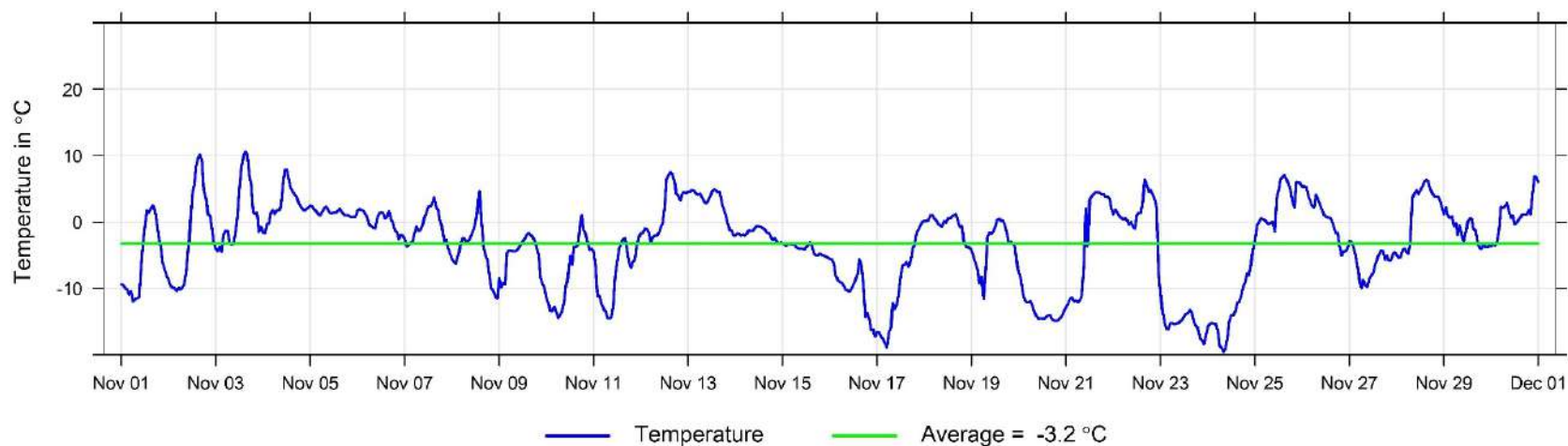
November Hourly Concentration Readings of NMHC (in ppm) at Poplar



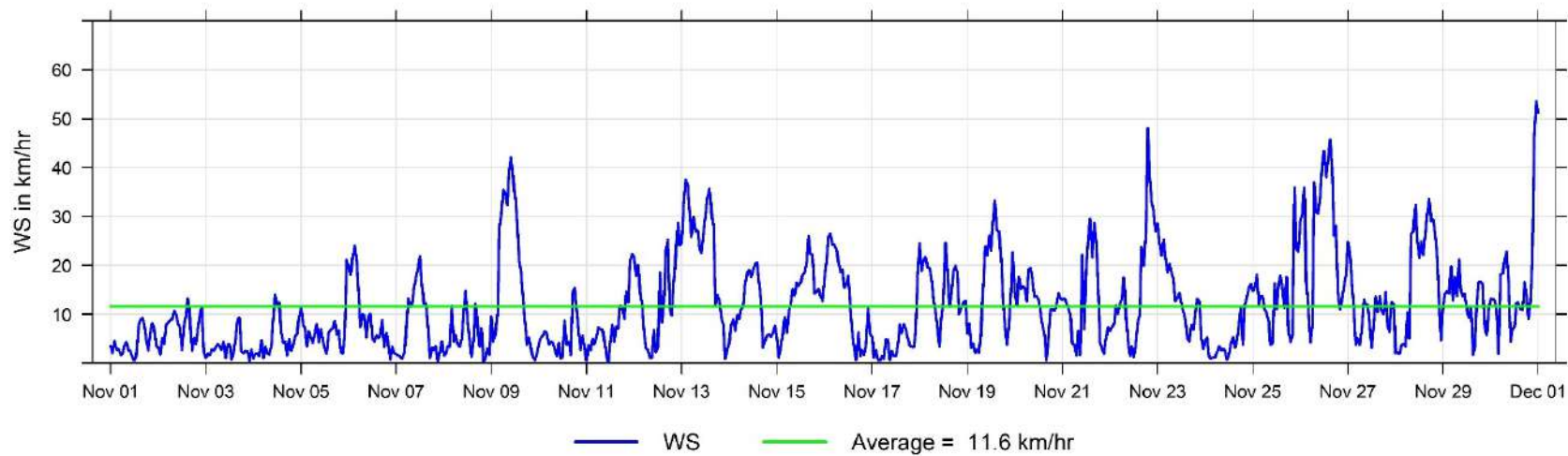
November Hourly Concentration Readings of PM_{2.5} in $\mu\text{g}/\text{m}^3$ at Poplar



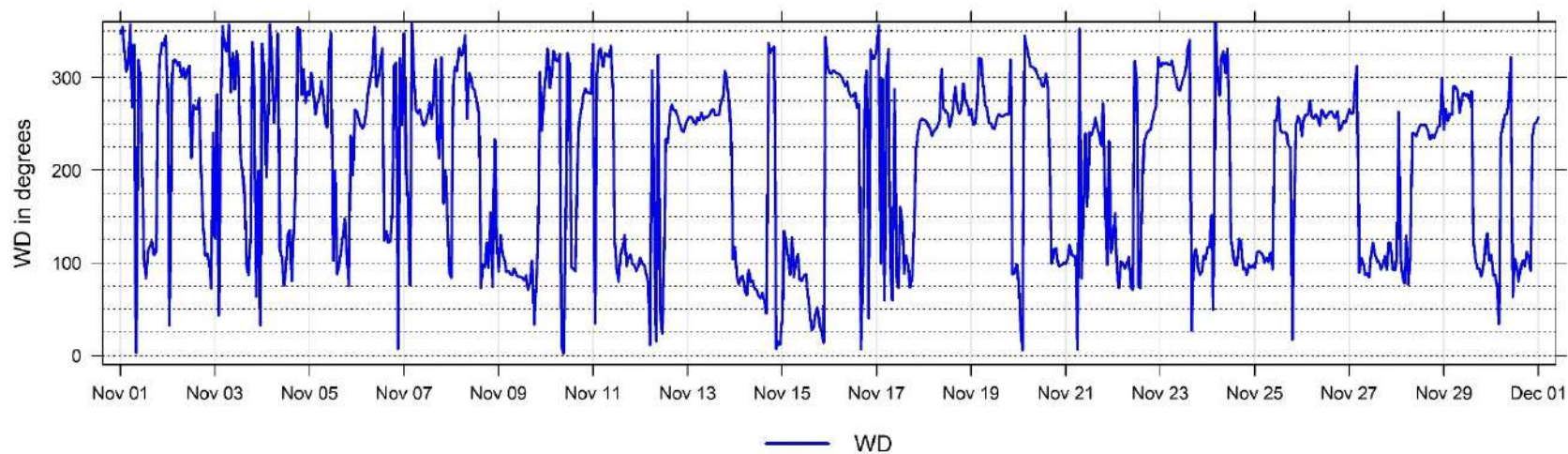
November Hourly Temperature Readings (in °C) at Poplar



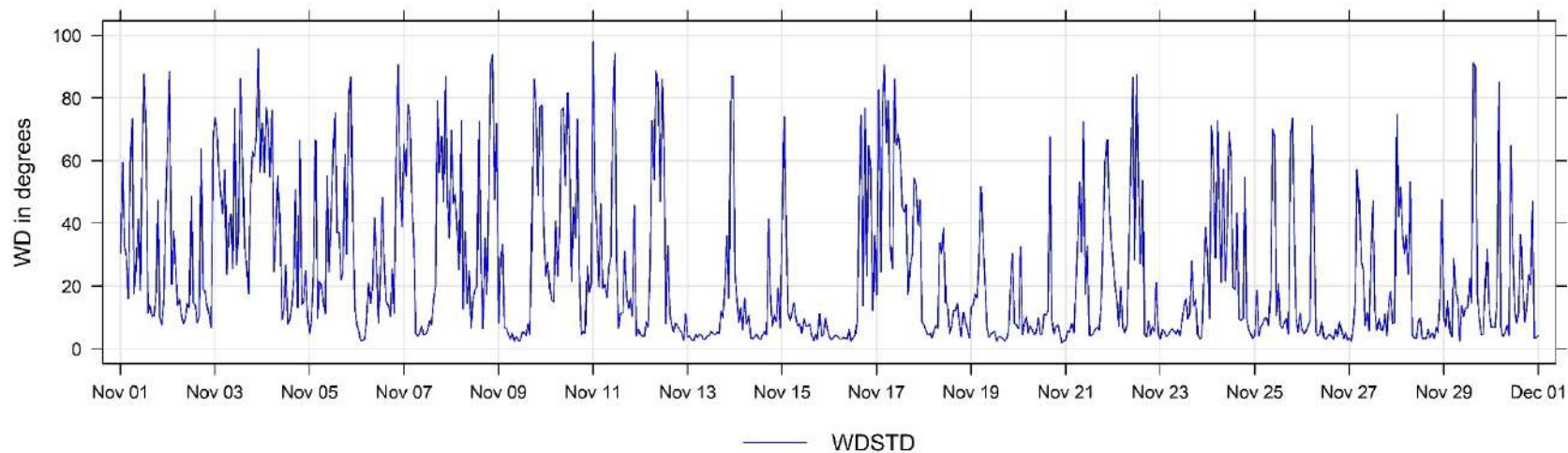
November Hourly Readings of Wind Speed (in km/hr) at Poplar

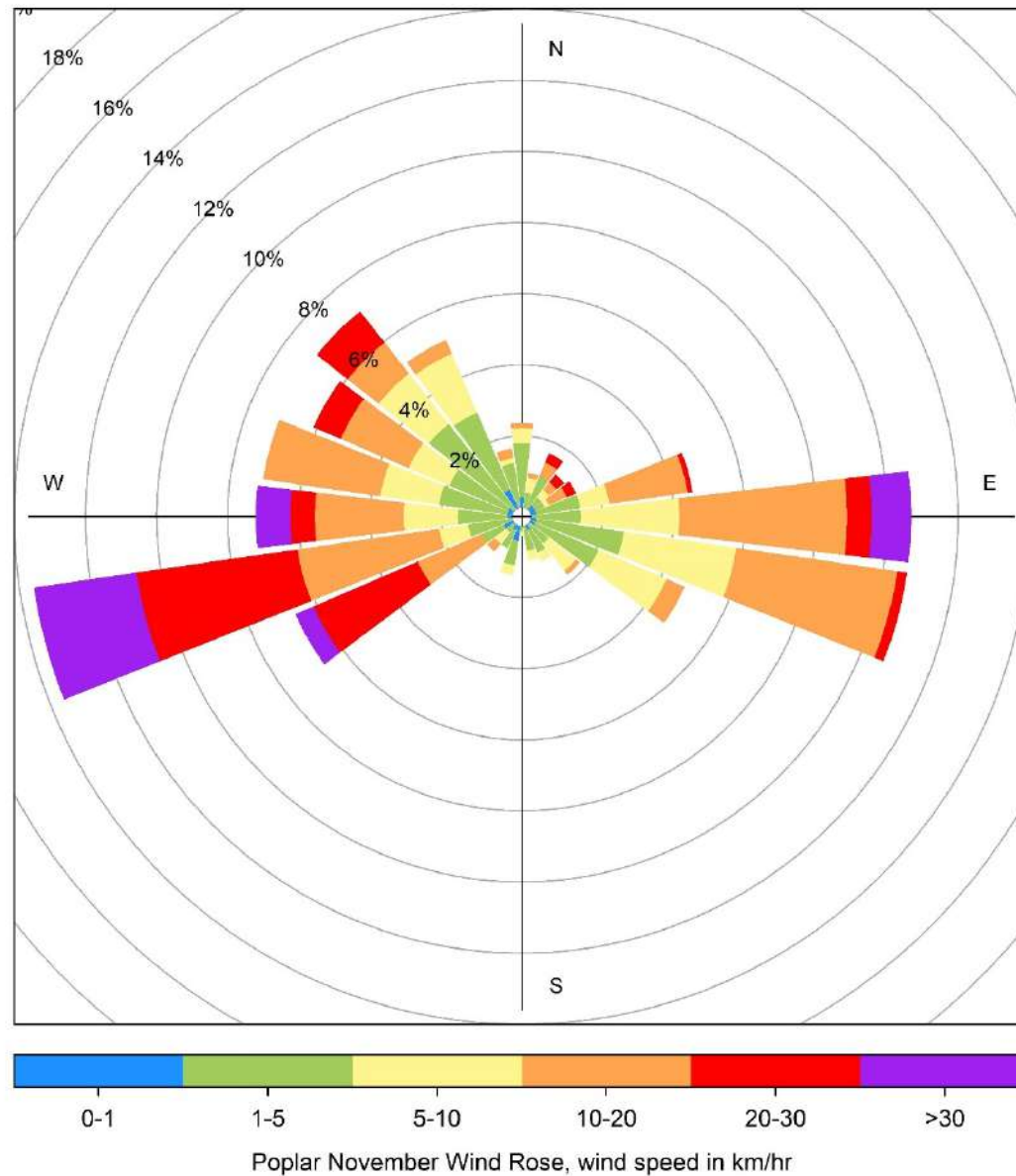


November Hourly Readings of Wind Direction (in degrees) at Poplar

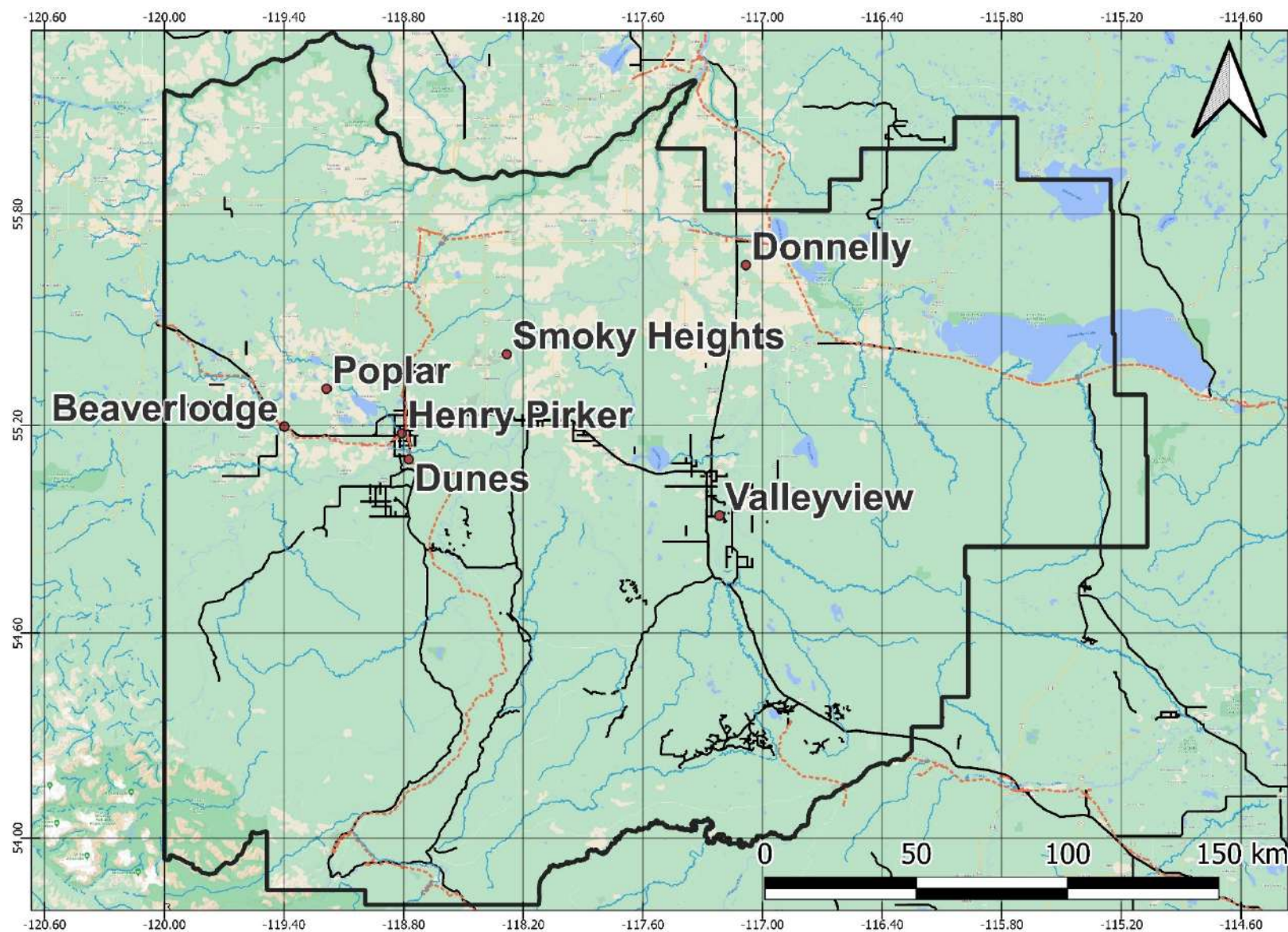


November Hourly Readings of Wind Direction Standard Deviation (in degrees) at Poplar

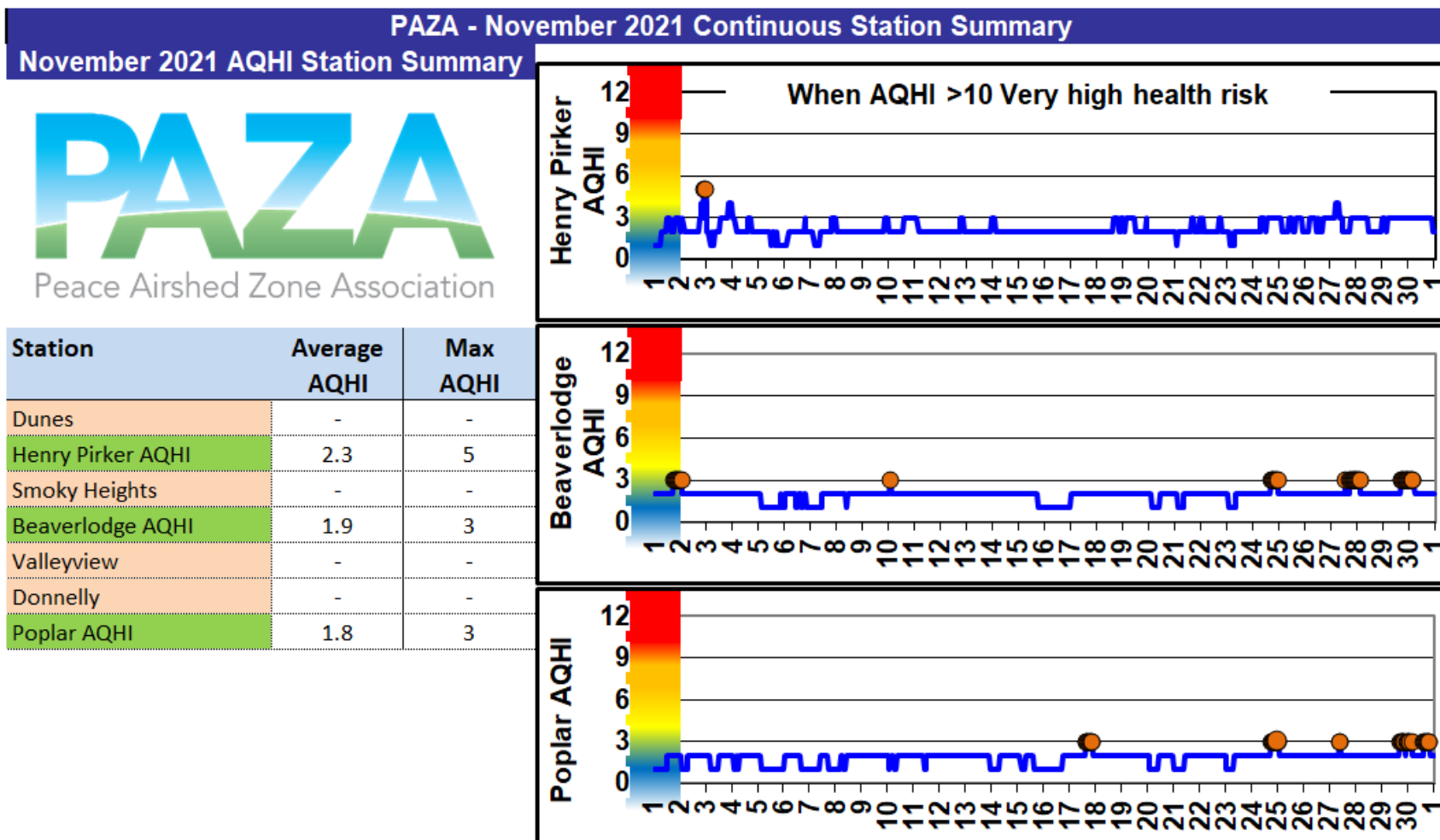




9 Concentration Summaries and Roses for PAZA

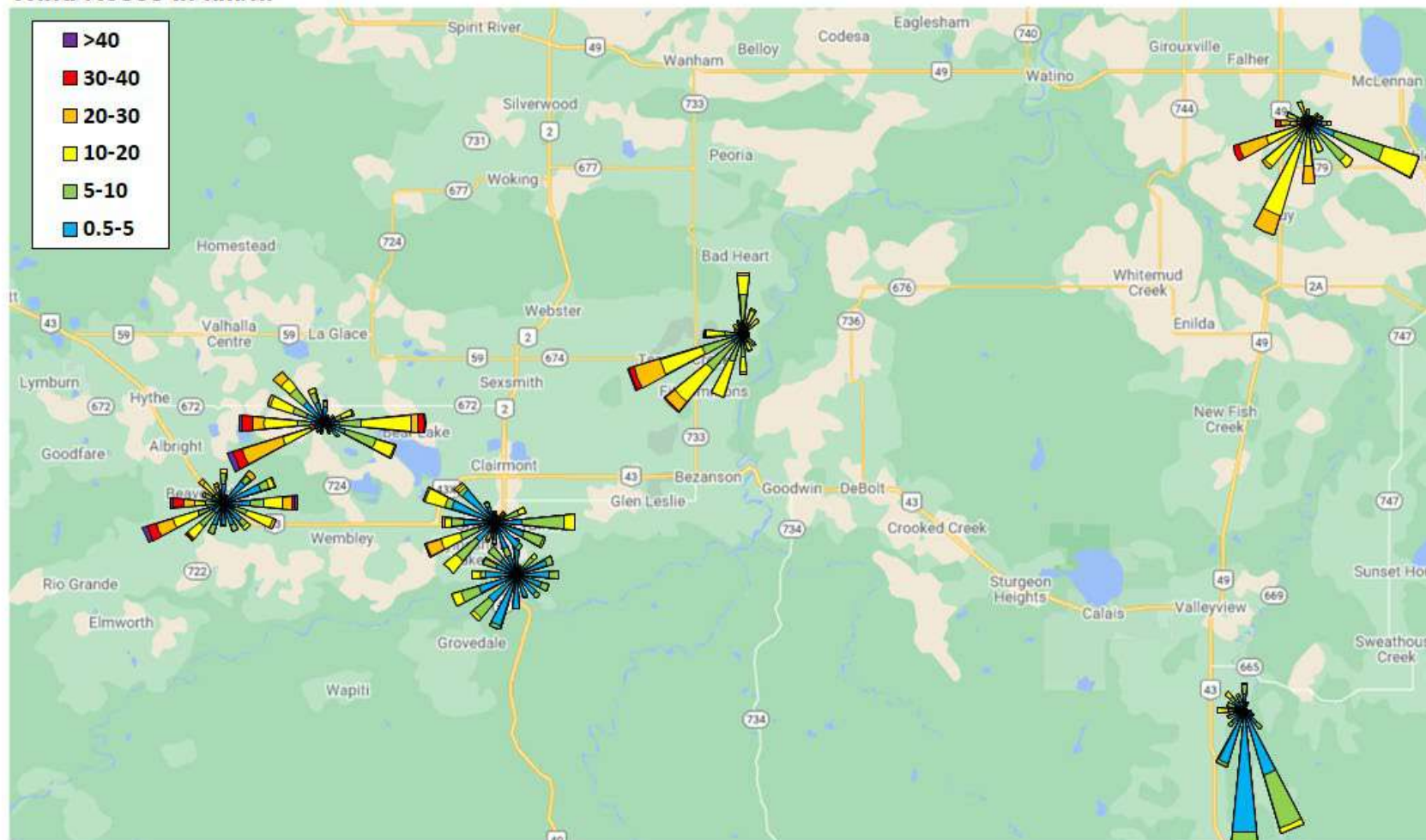


9.1 Air Quality Health Index (AQHI) Plots



9.2 Wind Roses

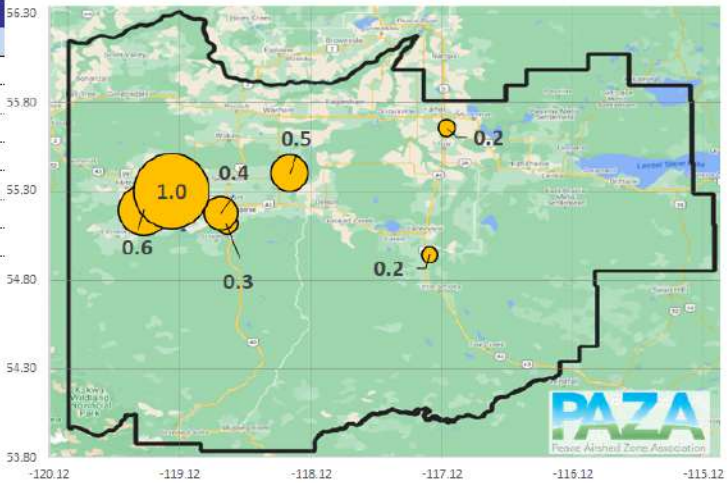
Wind Roses in km/hr



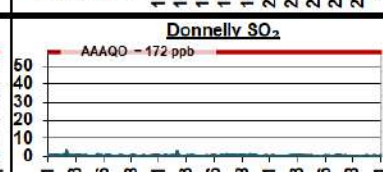
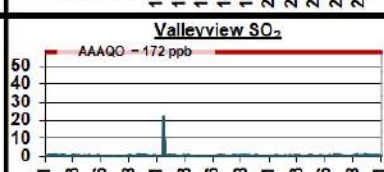
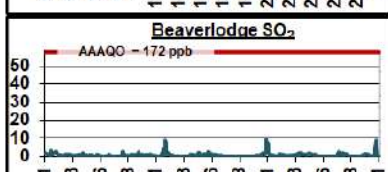
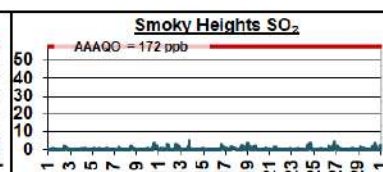
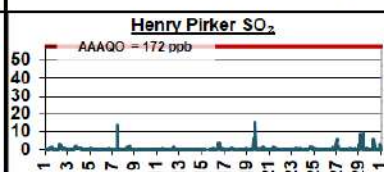
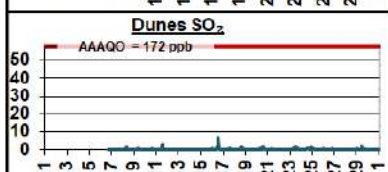
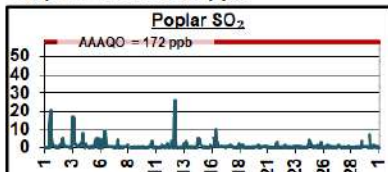
9.3 Sulphur Dioxide (SO₂) Plots

November 2021 SO₂ Station Summary

Station	Avg (ppb)	Max (ppb)
Dunes SO ₂	0.3	7.0
Henry Pirkner SO ₂	0.4	15.7
Smoky Heights SO ₂	0.5	5.5
Beaverlodge SO ₂	0.6	9.9
Valleyview SO ₂	0.2	22.1
Donnelly SO ₂	0.2	3.4
Poplar SO ₂	1.0	26.0



Sulphur Dioxide in ppb



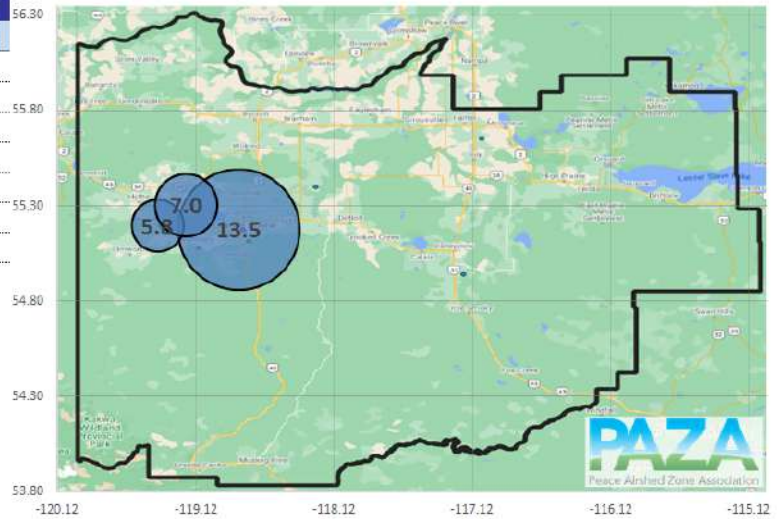
SO₂ Roses in ppb



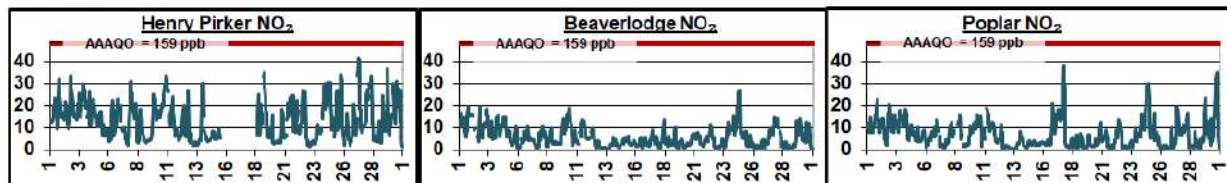
9.4 Nitrogen Dioxide (NO₂) Plots

November 2021 NO₂ Station Summary

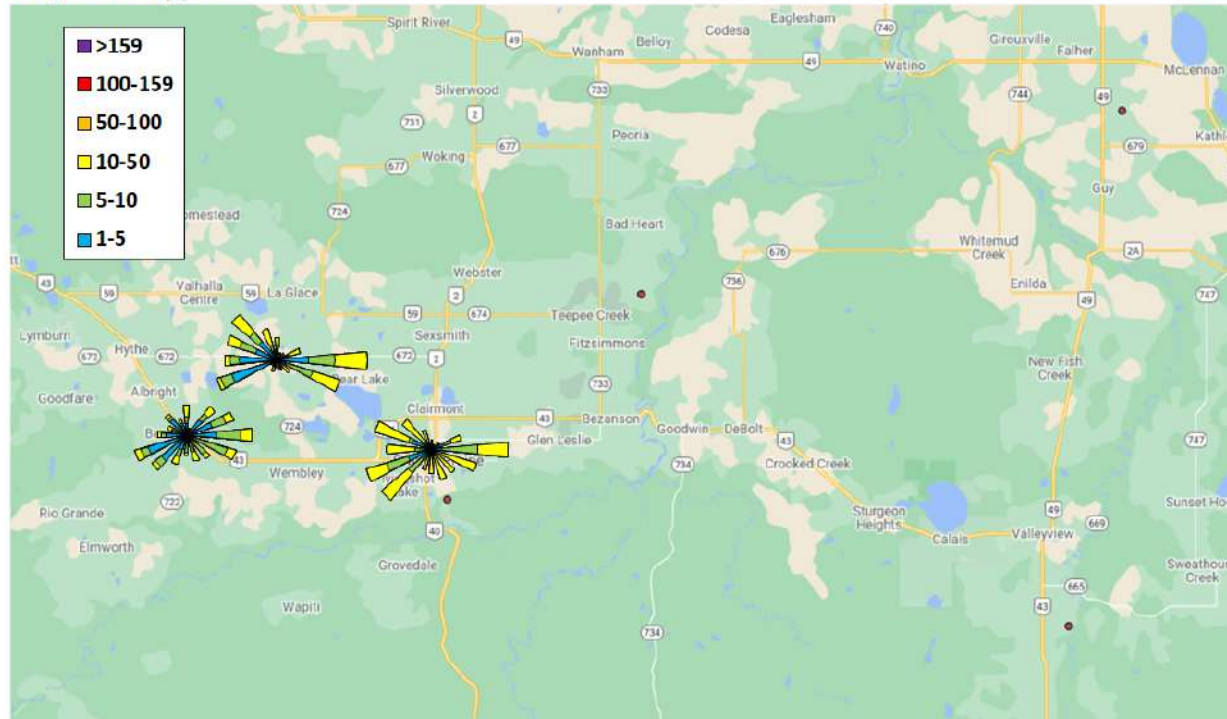
Station	Avg (ppb)	Max (ppb)
Dunes NO ₂	-	-
Henry Pirkler NO ₂	13.5	41.7
Smoky Heights NO ₂	-	-
Beaverlodge NO ₂	5.8	26.9
Valleyview NO ₂	-	-
Donnelly NO ₂	-	-
Poplar NO ₂	7.0	38.3



Nitrogen Dioxide in ppb

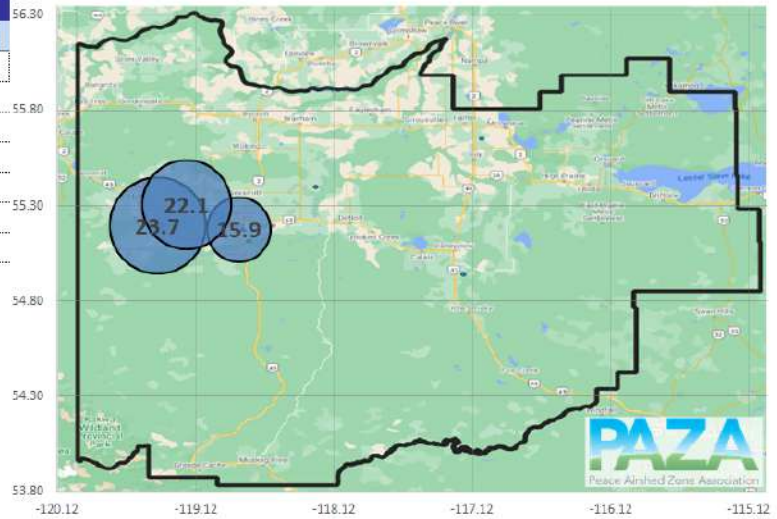


NO₂ Roses in ppb

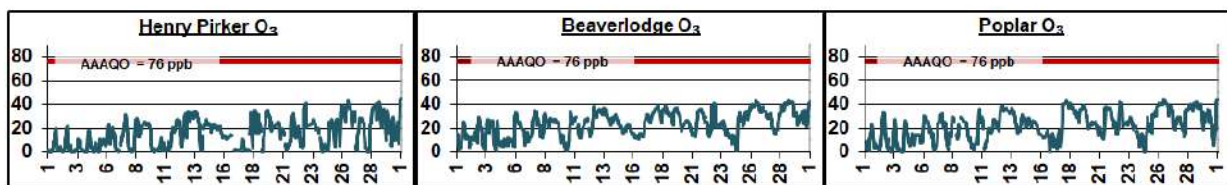


9.5 Ozone (O₃) Plots

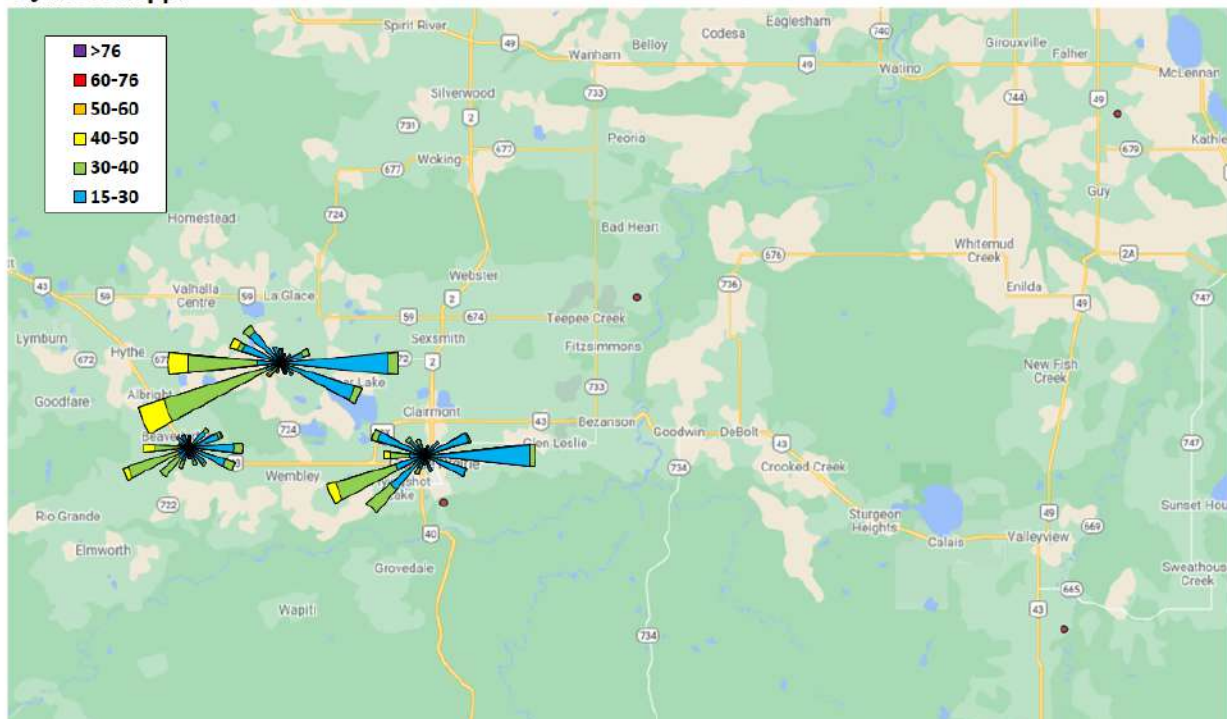
November 2021 O ₃ Station Summary		
Station	Avg (ppb)	Max (ppb)
Dunes O ₃	-	-
Henry Pirkler O ₃	15.9	44.9
Smoky Heights O ₃	-	-
Beaverlodge O ₃	23.7	42.8
Valleyview O ₃	-	-
Donnelly O ₃	-	-
Poplar O ₃	22.1	44.1



Ozone in ppb



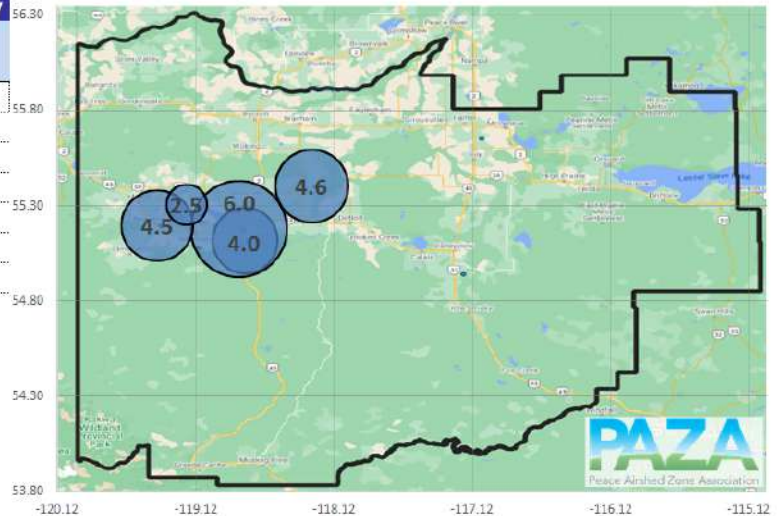
O₃ Roses in ppb



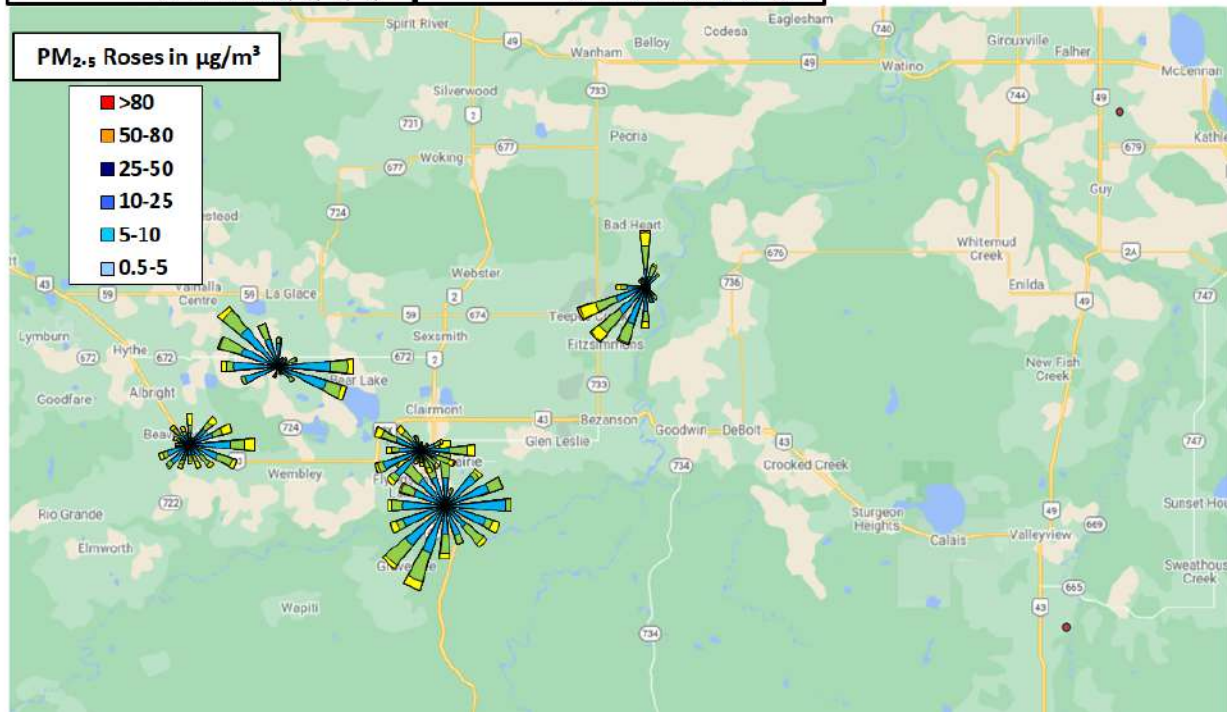
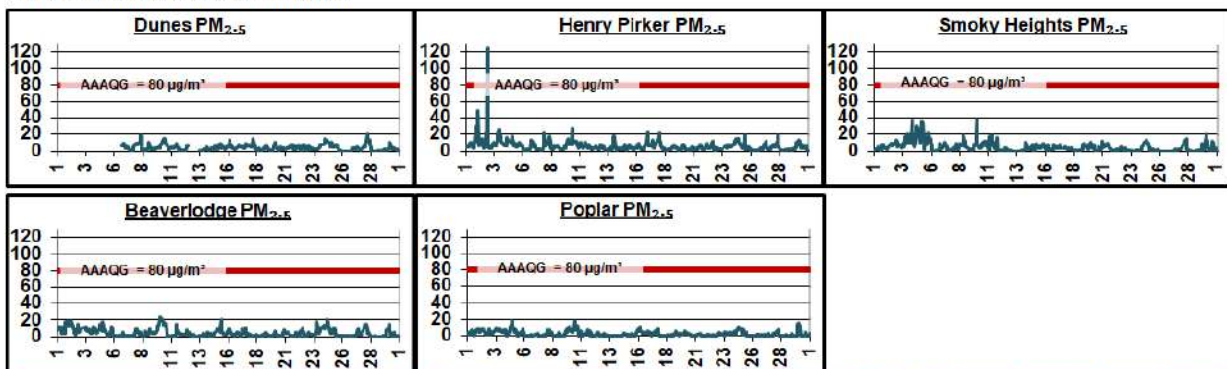
9.6 Fine Particulate Matter (PM_{2.5}) Plots

November 2021 PM_{2.5} Station Summary

Station	Avg µg/m ³	Max µg/m ³
Dunes PM _{2.5}	4.0	20.8
Henry Pirkler PM _{2.5}	6.0	124.3
Smoky Heights PM _{2.5}	4.6	39.1
Beaverlodge PM _{2.5}	4.5	24.0
Valleyview PM _{2.5}	-	-
Donnelly PM _{2.5}	-	-
Poplar PM _{2.5}	2.5	18.1



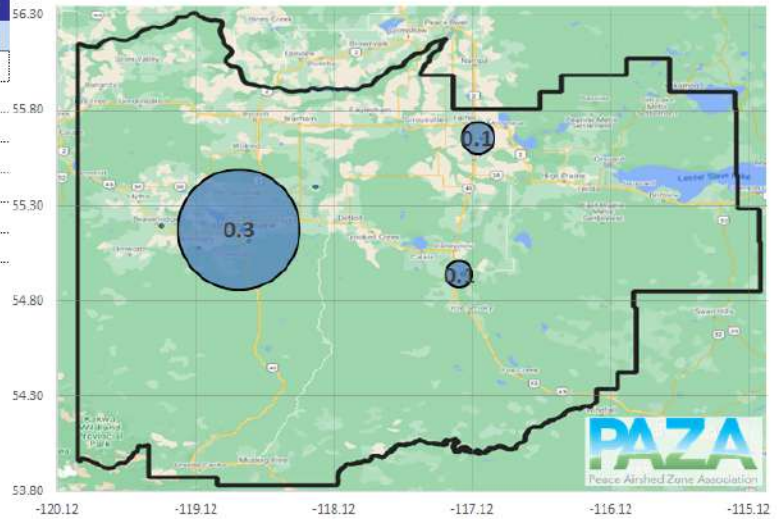
Fine Particulate Matter in µg/m³



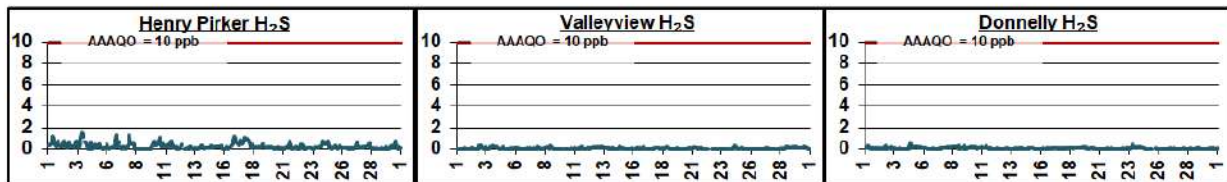
9.7 Hydrogen Sulphide (H₂S) Plots

November 2021 H₂S Station Summary

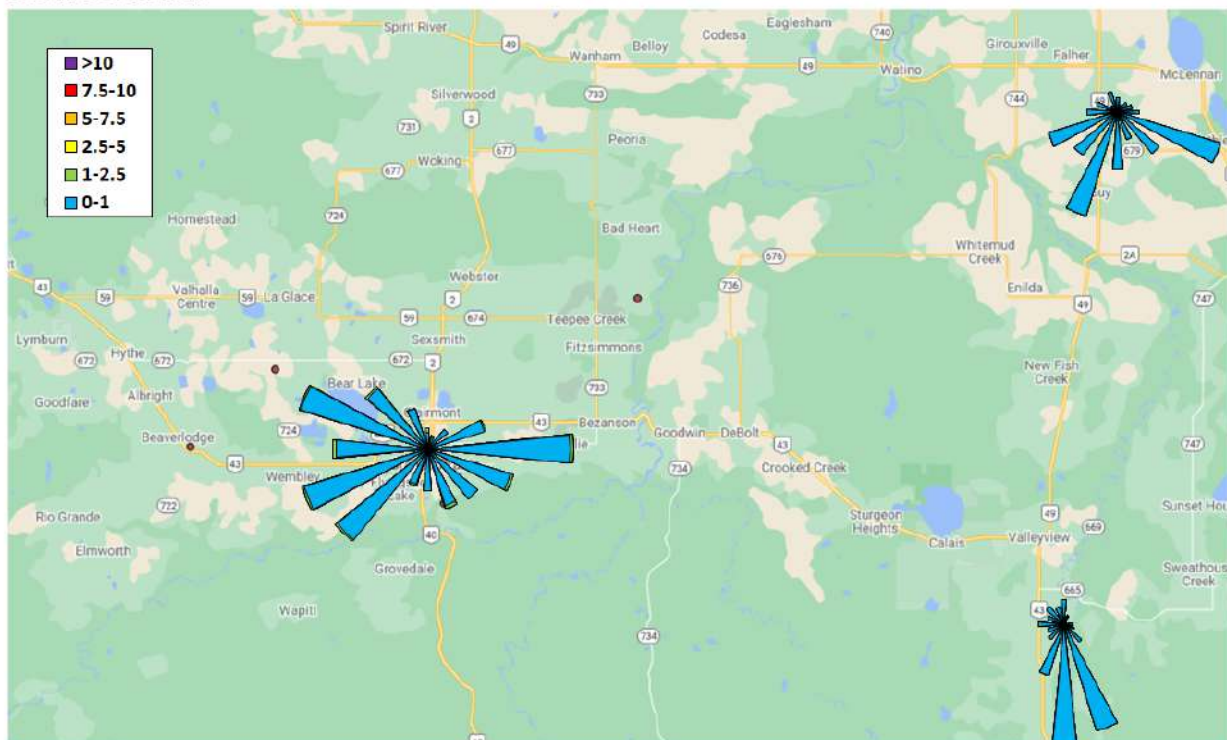
Station	Avg (ppb)	Max (ppb)
Dunes H ₂ S	-	-
Henry Pirkler H ₂ S	0.3	1.6
Smoky Heights H ₂ S	-	-
Beaverlodge H ₂ S	-	-
Valleyview H ₂ S	0.1	0.3
Donnelly H ₂ S	0.1	0.6
Poplar H ₂ S	-	-



Hydrogen Sulphide in ppb

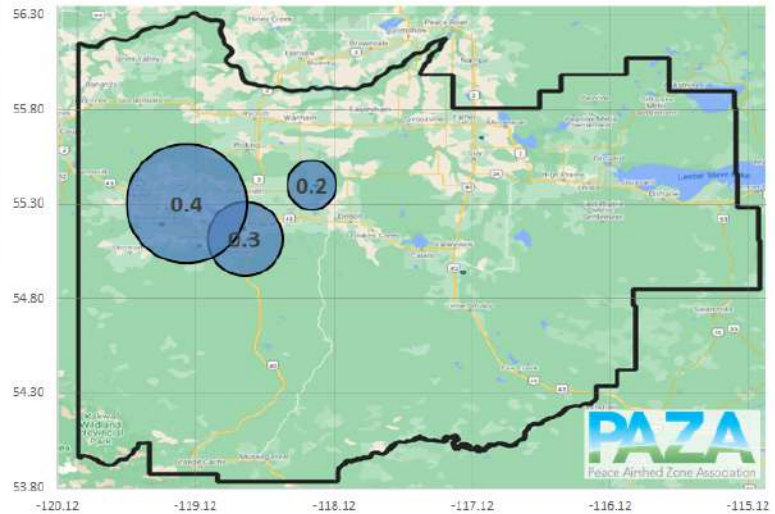


H₂S Roses in ppb

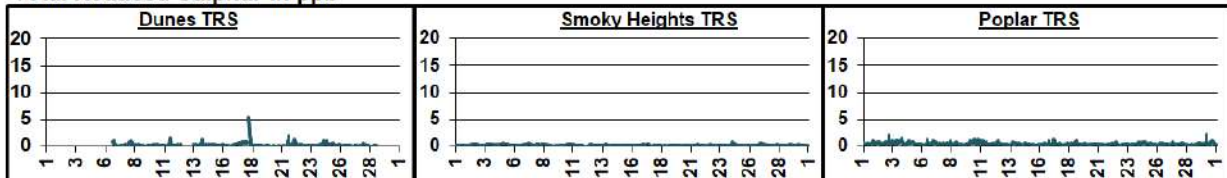


9.8 Total Reduced Sulphur (TRS) Plots

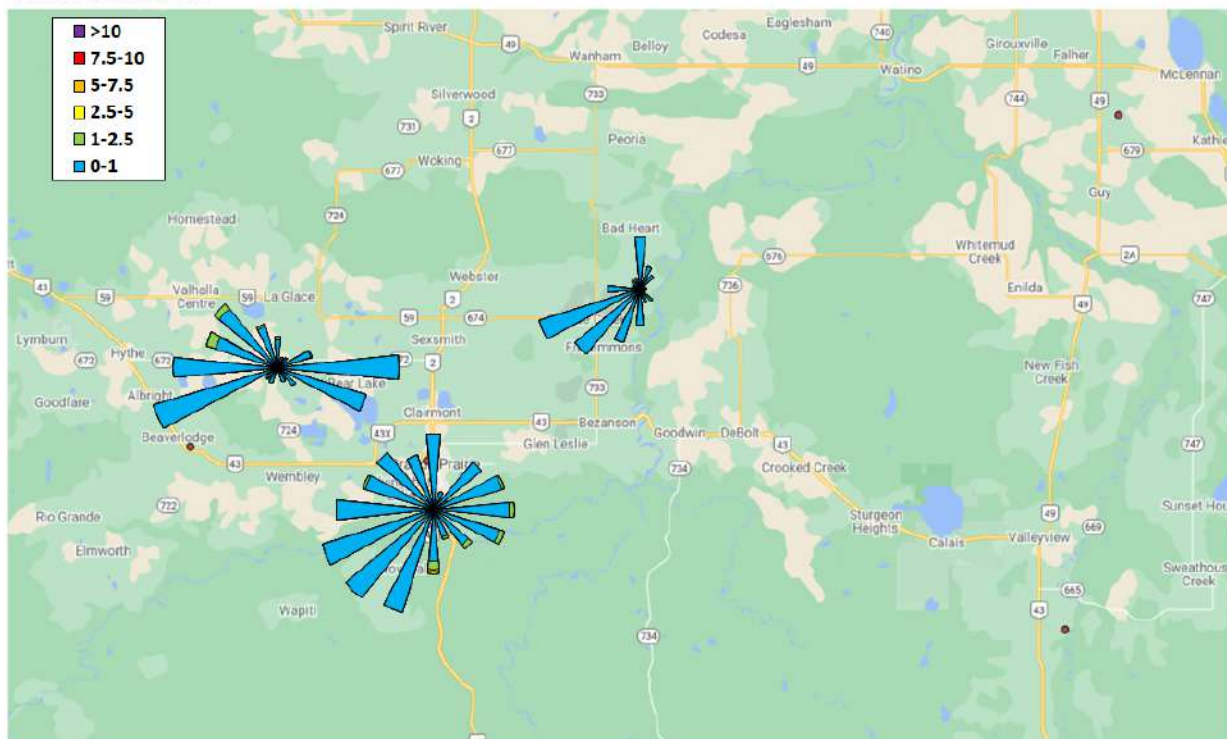
November 2021 TRS Station Summary		
Station	Avg (ppb)	Max (ppb)
Dunes TRS	0.3	5.4
Henry Pirkar TRS	-	-
Smoky Heights TRS	0.2	0.8
Beaverlodge TRS	-	-
Valleyview TRS	-	-
Donnelly TRS	-	-
Poplar TRS	0.4	2.3



Total Reduced Sulphur in ppb



TRS Roses in ppb

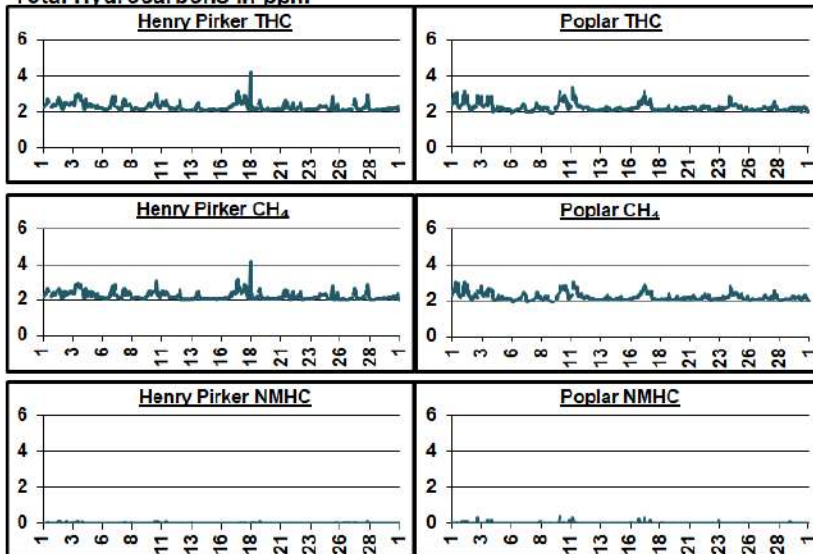


9.9 Total Hydrocarbon (THC) Plots

November 2021 THC Station Summary

Station	Total Hydrocarbons		Methane		Non-Methane HCs	
	Avg (ppm)	Max (ppm)	Avg (ppm)	Max (ppm)	Avg (ppm)	Max (ppm)
Dunes THC	-	-	-	-	-	-
Henry Pirker THC	2.2	4.2	2.2	4.2	0.0	0.1
Smoky Heights THC	-	-	-	-	-	-
Beaverlodge THC	-	-	-	-	-	-
Valleyview THC	-	-	-	-	-	-
Donnelly THC	-	-	-	-	-	-
Poplar THC	2.2	3.3	2.2	3.0	0.0	0.3

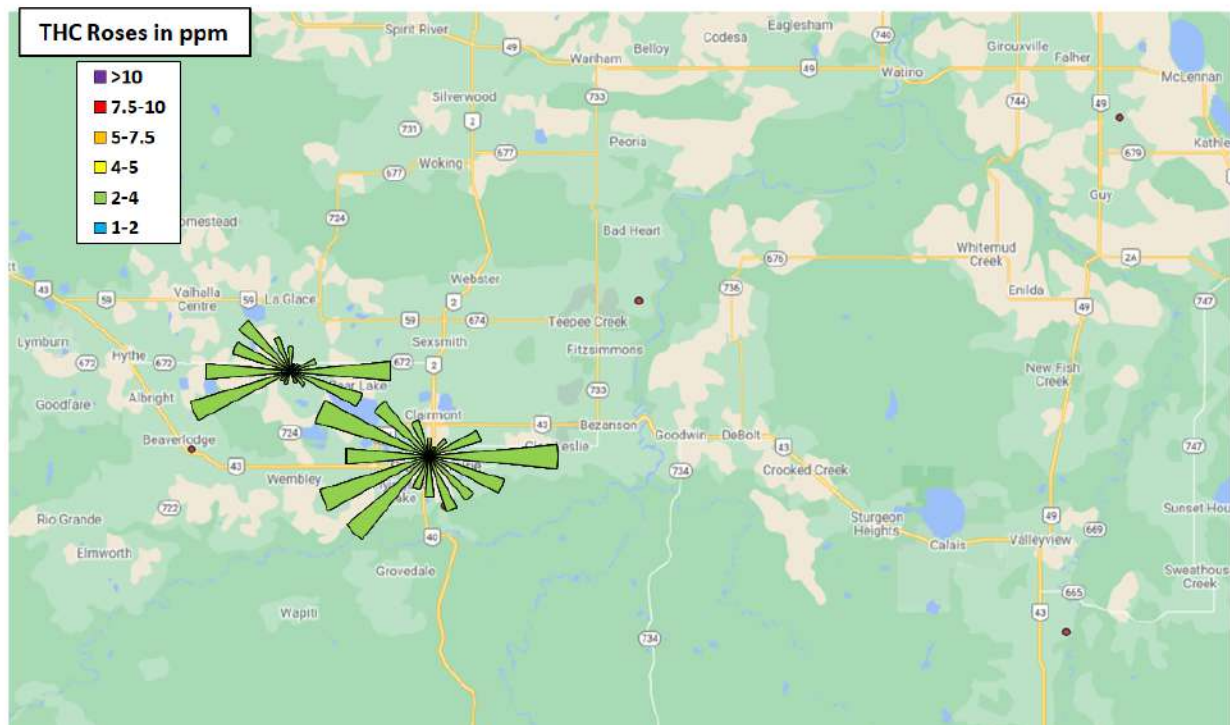
Total Hydrocarbons in ppm



Total Hydrocarbons (THC)

Methane (CH₄)

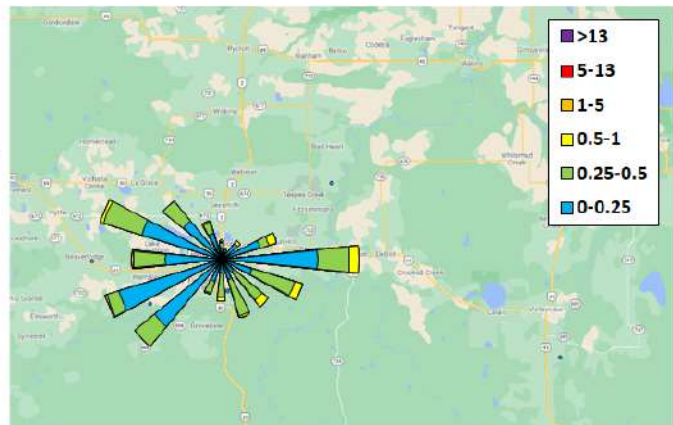
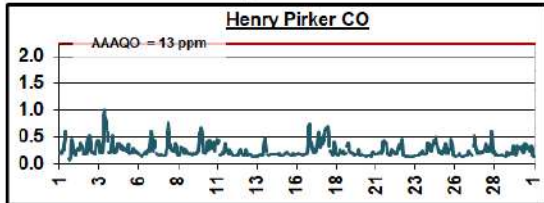
Non-Methane Hydrocarbons (NMHC)



9.10 Carbon Monoxide (CO) Plots

November 2021 CO Station Summary		
Station	Avg (ppm)	Max (ppm)
Henry Pirkler CO	0.26	1.00

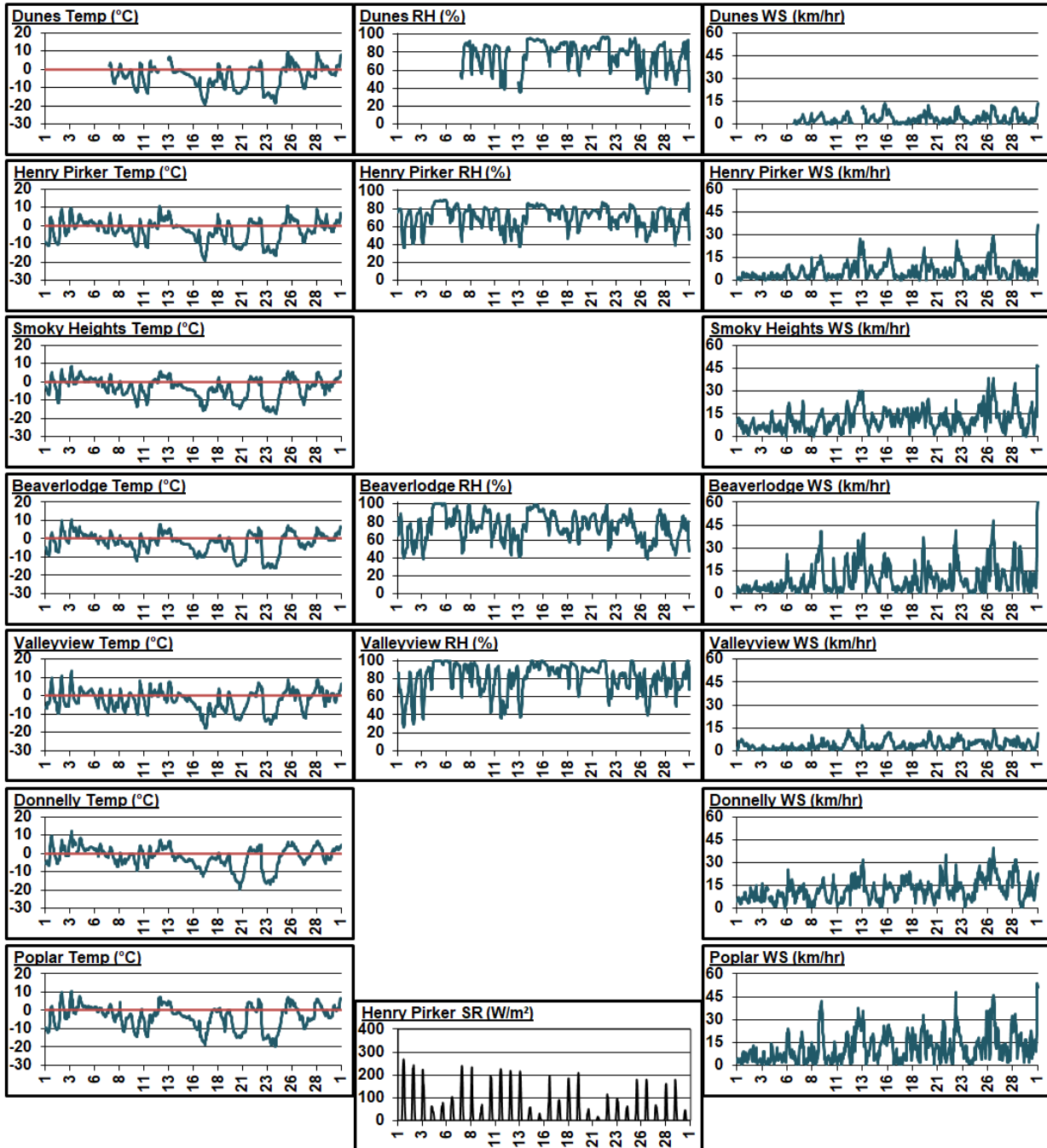
Carbon Monoxide in ppm



9.11 Meteorology Summary

November 2021 Meterological Summary						
Station	Temp (°C)	RH (%)	SR (W/m ²)	WS (km/hr)	WD (deg)	WD
Dunes	-4.1	77.1	-	3.5	254	WSW
Henry Pirker	-2.5	70.6	27.1	6.2	245	WSW
Smoky Heights	-3.3	-	-	11.3	238	WSW
Beaverlodge	-2.1	74.7	-	9.8	247	WSW
Valleyview	-2.4	80.9	-	3.9	194	SSW
Donnelly	-1.8	-	-	12.2	206	SSW
Poplar	-3.2	-	-	11.6	265	W

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



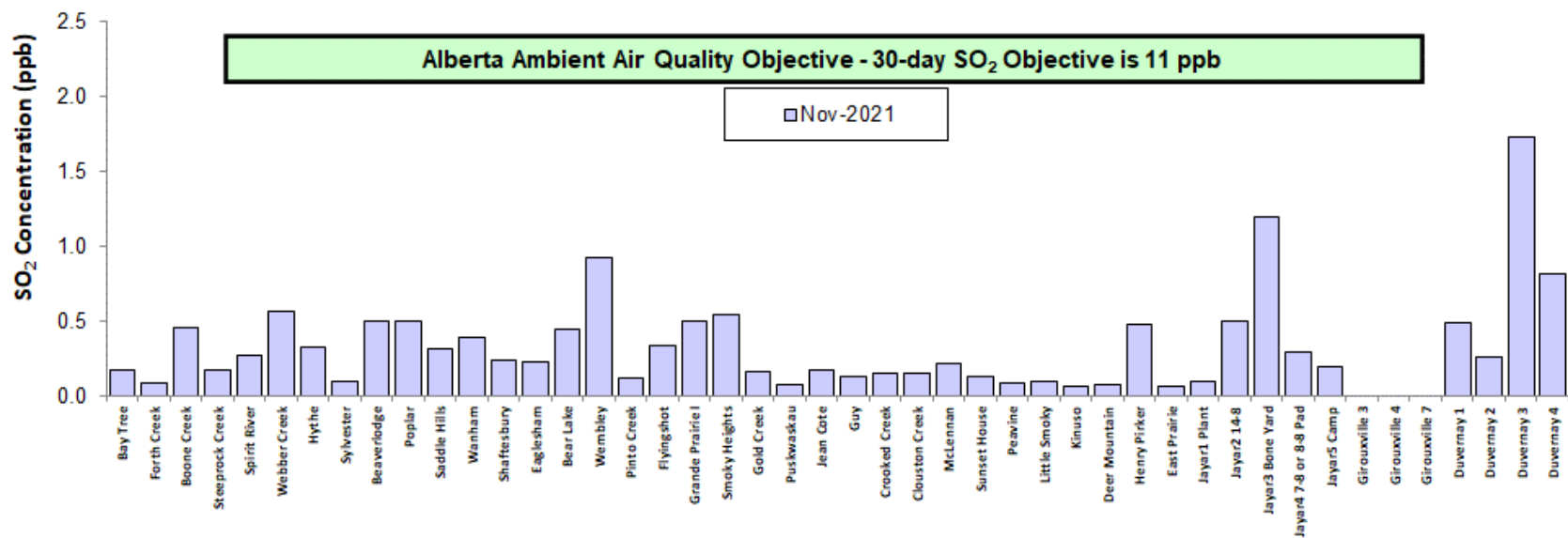
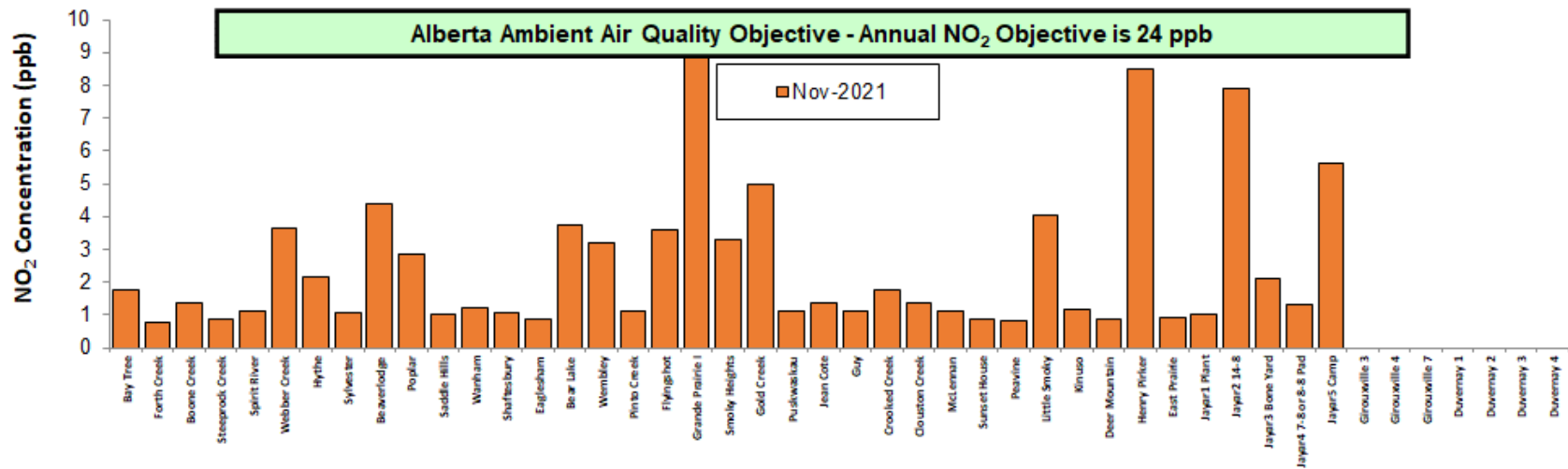
10 Passive Monitoring Data

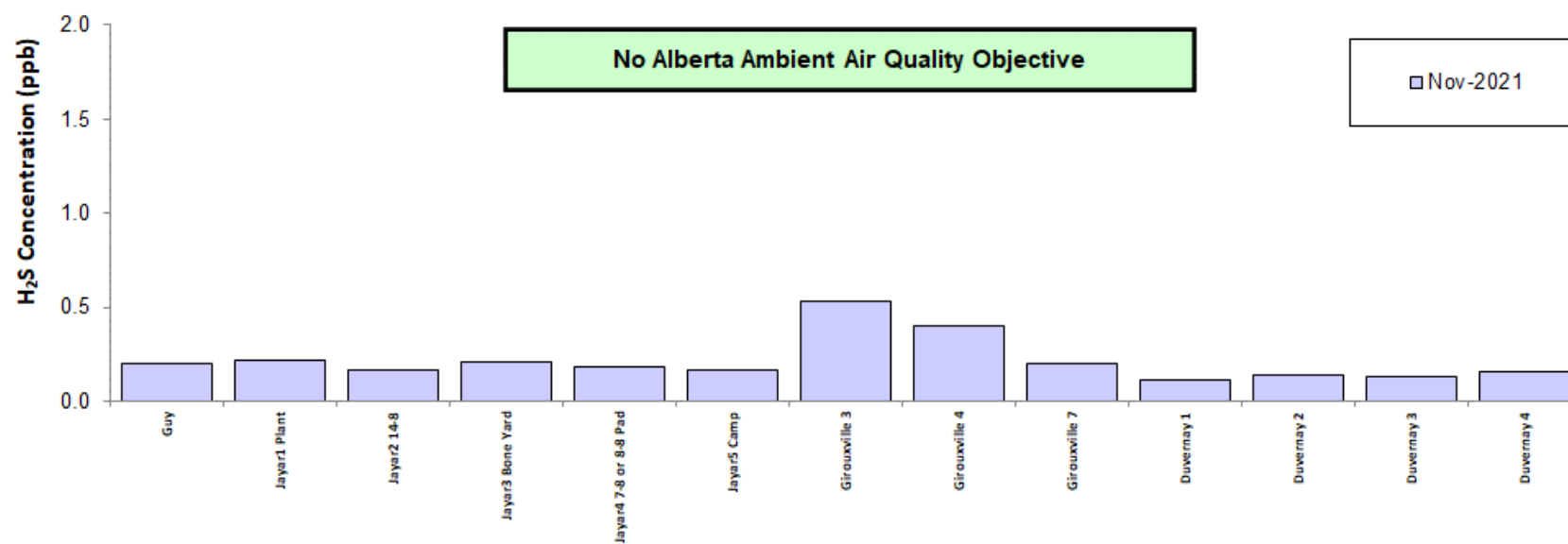
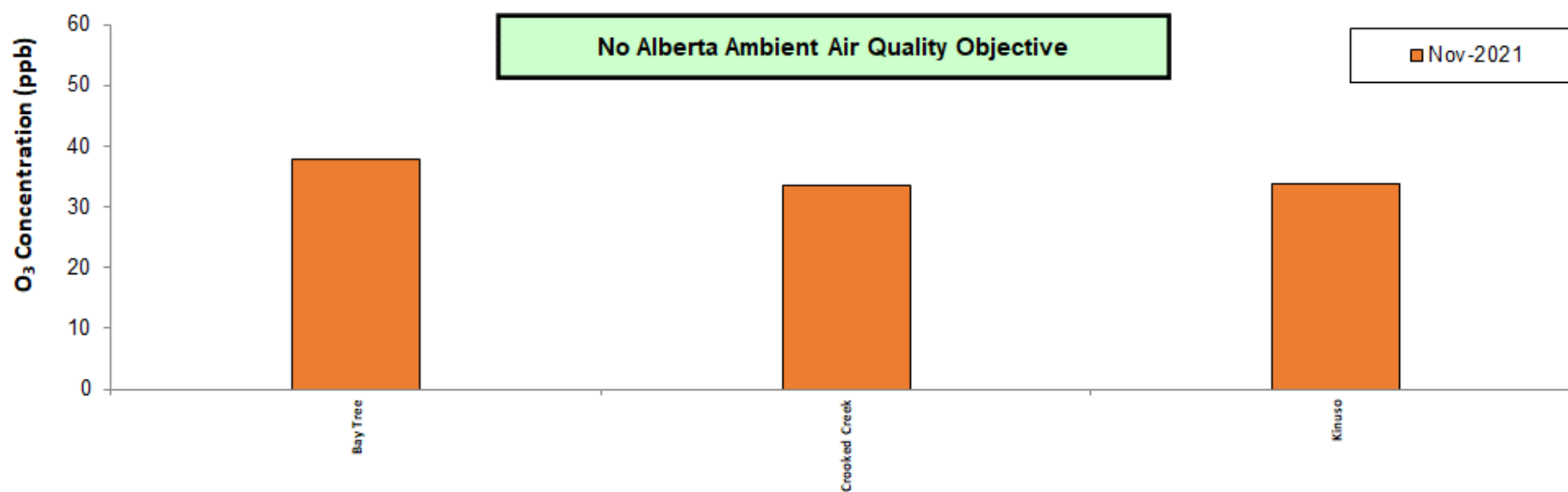
Peace Airshed Zone Association - PAZA Passive Stations for November 2021

Station Number	Station Name	SO2 ppb	O3 ppb	NO2 ppb	H2S ppb	LSD
Duplicates						
12a	Hythe	0.3				
12b	Hythe	0.3				
14a	Sylvester			1.1		
14b	Sylvester			1.0		
20a	Shaftesbury	0.3				
20b	Shaftesbury	0.2				
23a	Bear Lake			4.3		
23b	Bear Lake			3.2		
24a	Wembley	0.9				
24b	Wembley	1.0				
34a	Puskwaskau			1.1		
34b	Puskwaskau			1.1		
37a	Crooked Creek		36.7			
37b	Crooked Creek		30.4			
47a	Kinuso			1.0		
47b	Kinuso			1.3		
48a	Deer Mountain	0.1				
48b	Deer Mountain	0.1				
D1a	Duvernay 1	0.7			0.1	
D1b	Duvernay 1	0.3			0.1	
J1a	Plant	0.1				
J1b	Plant	0.1				
J3a	Bone Yard			2.3		
J3b	Bone Yard			1.9		
J4a	7-8 or 8-8 Pad				0.2	
J4b	7-8 or 8-8 Pad				0.2	
2	Bay Tree	0.2	37.8	1.7	-	13-16-078-13 W6M
3	Forth Creek	0.1	-	0.8	-	04-13-082-07 W6M
5	Boone Creek	0.5	-	1.4	-	01-23-076-11 W6M
7	Steeprock Creek	0.2	-	0.9	-	09-35-072-13 W6M
9	Spirit River	0.3	-	1.1	-	08-12-079-07 W6M
11	Webber Creek	0.6	-	3.6	-	09-36-074-09 W6M
12	Hythe	0.3	-	2.2	-	14-36-072-11 W6M
14	Sylvester	0.1	-	1.1	-	08-06-069-12 W6M
16	Beaverlodge	0.5	-	4.4	-	15-36-071-10 W6M
17	Poplar	0.5	-	2.8	-	13-06-073-08 W6M
18	Saddle Hills	0.3	-	1.0	-	04-25-074-07 W6M
19	Wanham	0.4	-	1.2	-	16-22-077-03 W6M
20	Shaftesbury	0.2	-	1.1	-	04-03-082-23 W5M
21	Eaglesham	0.2	-	0.9	-	16-21-079-25 W5M
23	Bear Lake	0.4	-	3.8	-	15-31-072-06 W6M
24	Wembley	0.9	-	3.2	-	12-31-070-08 W6M
25	Pinto Creek	0.1	-	1.1	-	04-24-069-11 W6M
26	Flyingshot	0.3	-	3.6	-	15-36-070-07 W6M
27	Grande Prairie I	0.5	-	9.7	-	08-15-071-06 W6M
29	Smoky Heights	0.5	-	3.3	-	04-06-075-02 W6M
32	Gold Creek	0.2	-	5.0	-	06-33-067-05 W6M
34	Puskwaskau	0.1	-	1.1	-	15-35-074-25 W5M
35	Jean Cote	0.2	-	1.4	-	12-35-079-21 W5M
36	Guy	0.1	-	1.1	0.2	03-04-076-22 W5M
37	Crooked Creek	0.2	33.5	1.8	-	16-01-071-26 W5M
39	Clouston Creek	0.1	-	1.4	-	12-01-073-22 W5M
40	McLennan	0.2	-	1.1	-	03-29-077-19 W5M
42	Sunset House	0.1	-	0.9	-	05-32-070-19 W5M
44	Peavine	0.1	-	0.8	-	03-05-079-15 W5M
46	Little Smoky	0.1	-	4.0	-	12-01-065-21 W5M
47	Kinuso	0.1	33.8	1.2	-	12-10-073-10 W5M
48	Deer Mountain	0.1	-	0.9	-	15-22-068-09 W5M
49	Henry Pirker	0.5	-	8.5	-	17-26-071-06 W6M
50	East Prairie	0.1	-	0.9	-	11-13-079-08 W6M
57	Jayar1 Plant	0.1	-	1.0	0.2	06-08-062-03 W6M
58	Jayar2 14-8	0.5	-	7.9	0.2	07-08-062-03 W6M
59	Jayar3 Bone Yard	1.2	-	2.1	0.2	14-08-062-03 W6M
60	Jayar4 7-8 or 8-8 Pad	0.3	-	1.3	0.2	10-08-062-03 W6M
61	Jayar5 Camp	0.2	-	5.6	0.2	11-08-062-03 W6M
G3	Girouxville 3	-	-	-	0.5	14-02-077-23 W5M
G4	Girouxville 4	-	-	-	0.4	04-08-077-22 W5M
G7	Girouxville 7	-	-	-	0.2	-
D1	Duvernay 1	0.5	-	-	0.1	04-33-062-20 W5M
D2	Duvernay 2	0.3	-	-	0.1	04-33-062-20 W5M
D3	Duvernay 3	1.7	-	-	0.1	04-33-062-20 W5M
D4	Duvernay 4	0.8	-	-	0.2	04-33-062-20 W5M

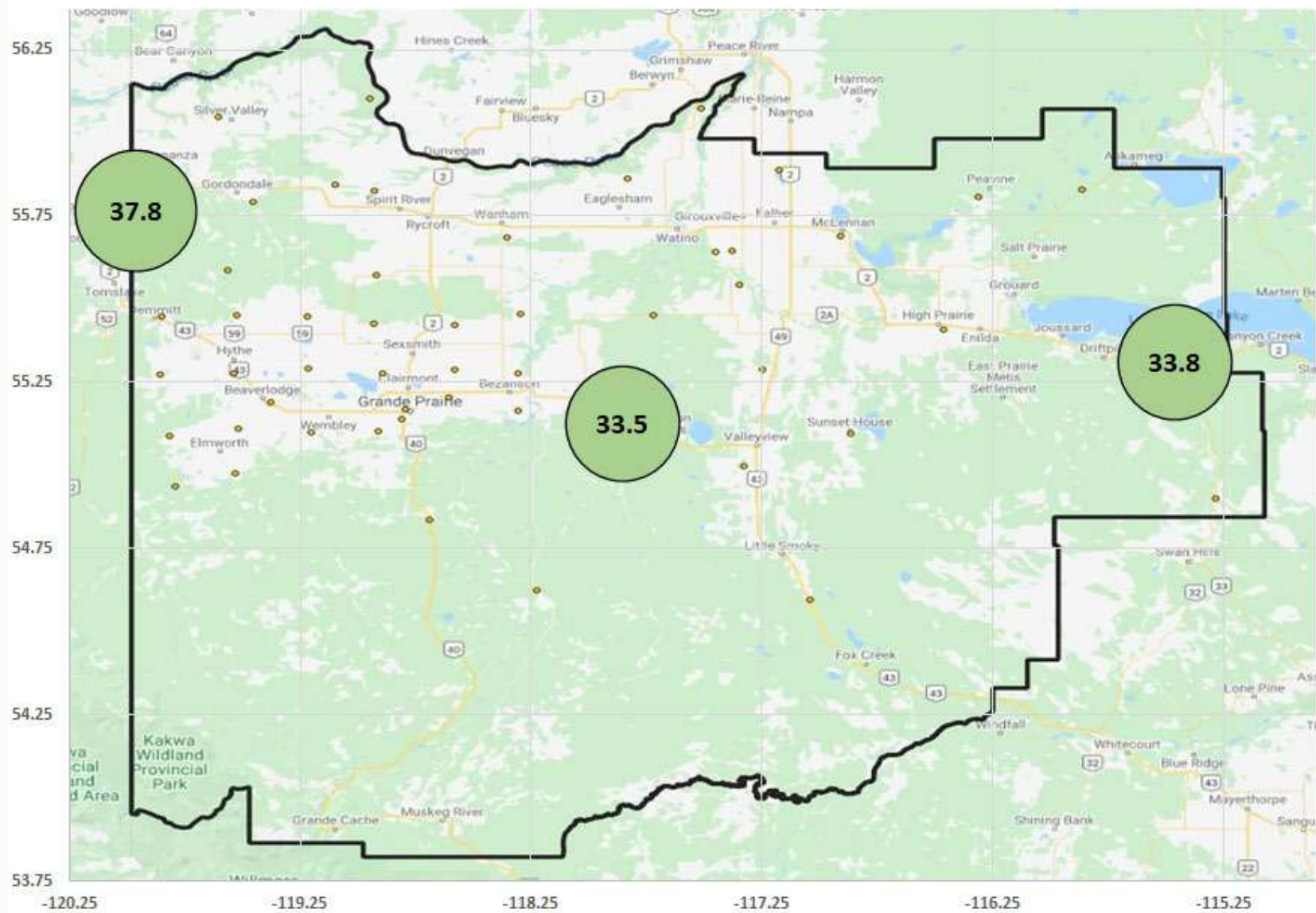
Passive Summary for November 2021

Stats	Sulphur Dioxide SO ₂	Ozone O ₃	Nitrogen Dioxide NO ₂	Hydrogen Sulphide H ₂ S
	ppb	ppb	ppb	ppb
Passive Summary for August 2021 (PAZA)				
Mean	0.3	35.1	2.5	0.2
Standard Deviation	0.3	2.4	2.2	0.1
Minimum	0.1	33.5	0.8	0.1
Maximum	East Prairie (#50)	Crooked Creek (#37)	Forth Creek (#3)	Duvernay 1 (#D1)
	1.7	37.8	9.7	0.5
	Duvernay 3 (#D3)	Bay Tree (#2)	Grande Prairie 1 (#27)	Girouxville 3 (#G3)
Continuous and Passive Monitoring Comparison				
PAZA Beaverlodge Station	0.6	23.7	26.9	-
Beaverlodge Passive (#16)	0.5	-	4.4	-
PAZA Henry Pirker Station	0.4	15.9	41.7	0.3
Henry Pirker passive (#49)	0.5	-	8.5	-

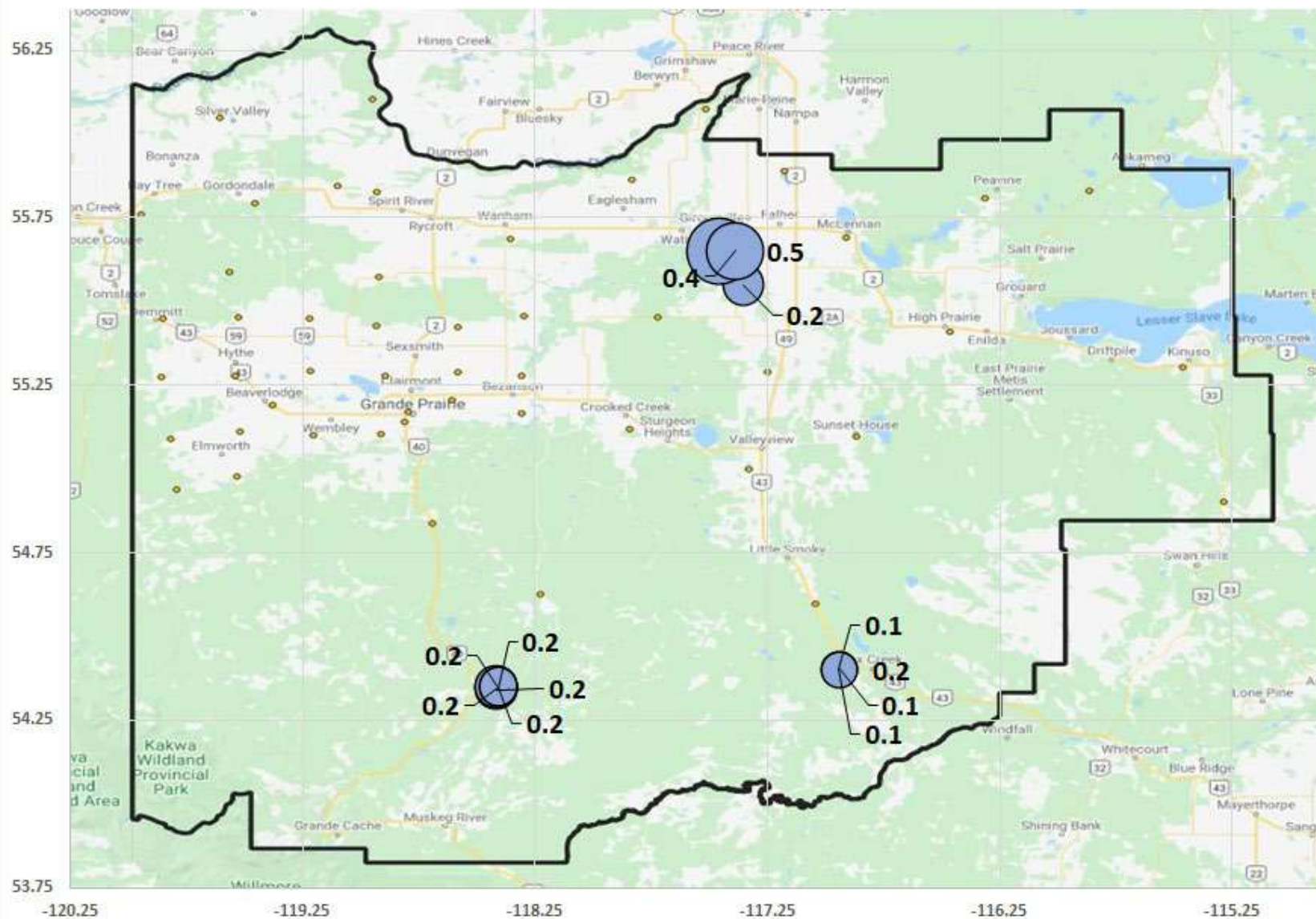




O₃ Monthly Average (units in ppb)



H₂S Monthly Average (units in ppb)



End of Report



Peace Airshed Zone Association

Ambient Air Monitoring Report

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