Clean Air Status and Trends Network
Quarterly Data Summary for Fourth Quarter 2022 (October through December)

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Introduction

This quarterly report summarizes the Clean Air Status and Trends Network (CASTNET) data collected during fourth quarter 2022. Trends in pollutants measured at eastern and western reference sites are shown. Results from the quality assurance/quality control (QA/QC) program are presented for fourth quarter data and include completeness and precision of filter concentrations and hourly O_3 concentrations. This report also analyzes data for continuous, trace-level NO_y from the six of eight sites that were operational during fourth quarter and continuous SO_2 concentrations from three sites. Other QC statistics are given in the CASTNET Fourth Quarter 2022 Quality Assurance Report with 2022 Annual Summary (Wood, 2023).

Figure 1. Fourth Highest Daily Maximum 8-hour Average O_3 Concentrations (ppb) through Fourth Quarter 2022

Figure 1 shows fourth highest daily maximum 8-hour average (DM8A) O_3 concentrations measured through fourth quarter 2022. Four western sites and one eastern site exceeded the 0.070 parts per million (ppm) National Ambient Air Quality Standard for O_3. The concentration of 83 ppb measured at CAV436 in southeastern New Mexico was produced by emissions from oil and gas exploration, drilling, processing, and storage in the Permian Basin. Vehicular emissions from truck traffic on U.S. Route 285 also contributed (Sive, 2023).

Trends

Trend analyses were performed based on filter pack pollutant concentrations measured in micrograms per cubic meter ($\mu g/m^3$) of air at the 34 eastern and 16 western reference sites during fourth quarter. Trends in quarterly mean filter pack and O_3 concentrations are shown using box plots in Figures 2 through 13.

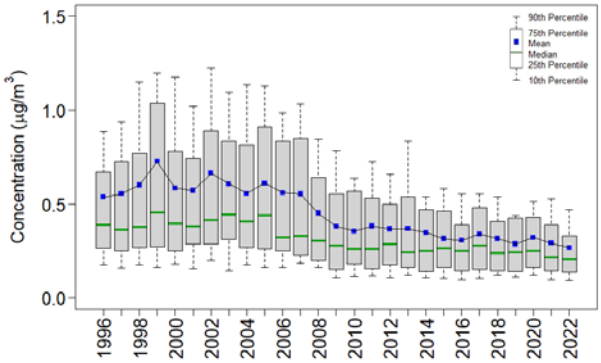
Fourth Quarter Concentrations

Quarterly mean SO_4^{2-}, HNO_3, and K^+ concentrations decreased at eastern sites in 2022, and NO_3^-, NH_4^+, total NO_3^-, SO_2, Cl^-, Ca^{2+}, Mg^{2+}, and Na^+ concentrations increased. Quarterly mean HNO_3, total NO_3^-, Cl^-, Ca^{2+}, K^+, Mg^{2+}, and Na^+ concentrations decreased at western sites in 2022 while SO_2, SO_4^{2-}, NO_3^-, and NH_4^+, increased.

Quarterly O_3 concentrations were analyzed using box plots constructed by averaging all valid hourly O_3 concentrations within fourth quarter 2022 by site and then averaging those averages for all eastern and western reference sites (Figure 13). The figure shows a slight overall increase in quarterly mean O_3 concentrations at eastern sites. Mean O_3 concentrations at western sites decreased in fourth quarter 2022. Quarterly mean concentrations were higher at the western reference sites than at the eastern sites.

Figure 2. Trends in Fourth Quarter Mean HNO_3 Concentrations

Western Reference Sites



Eastern Reference Sites

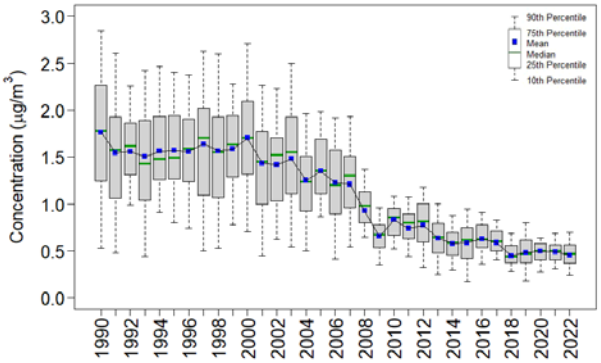


Figure 3. Trends in Fourth Quarter Mean NO_3^- Concentrations

Western Reference Sites Eastern Reference Sites

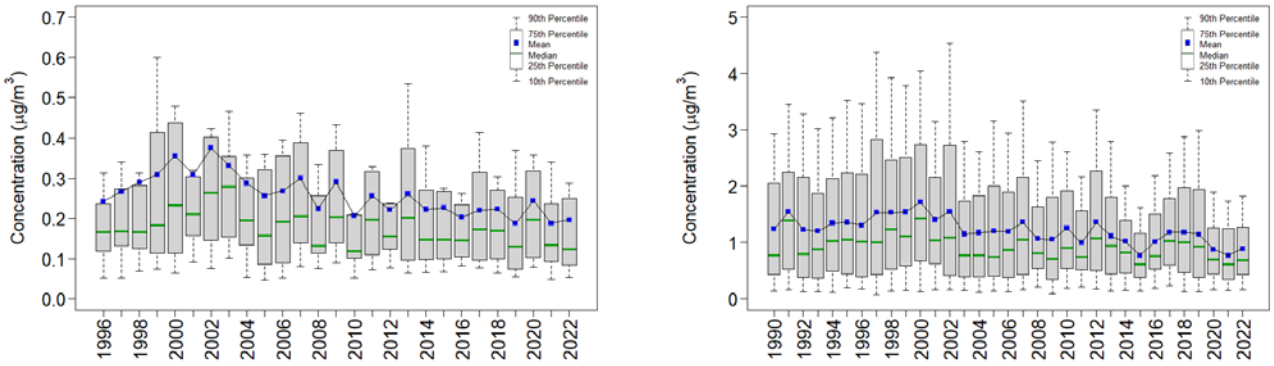


Figure 4. Trends in Fourth Quarter Mean NH_4^+ Concentrations

Western Reference Sites Eastern Reference Sites

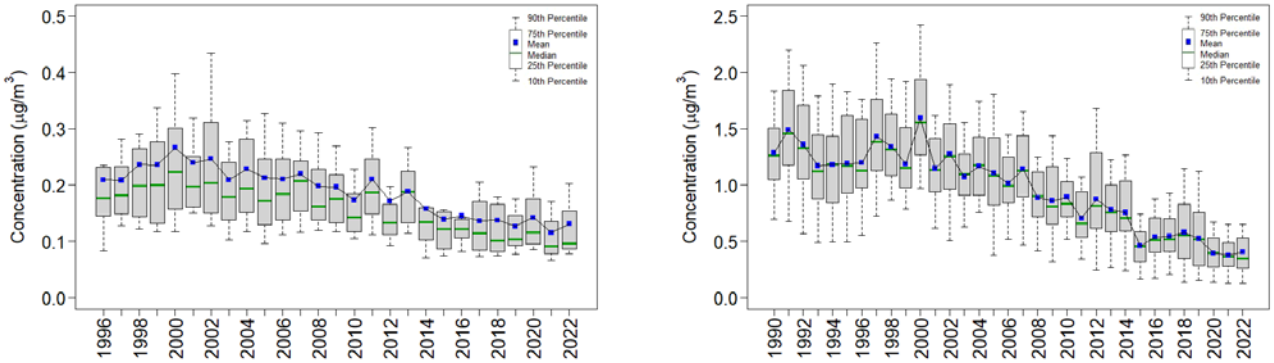


Figure 5. Trends in Fourth Quarter Mean Total NO_3^- Concentrations

Western Reference Sites Eastern Reference Sites

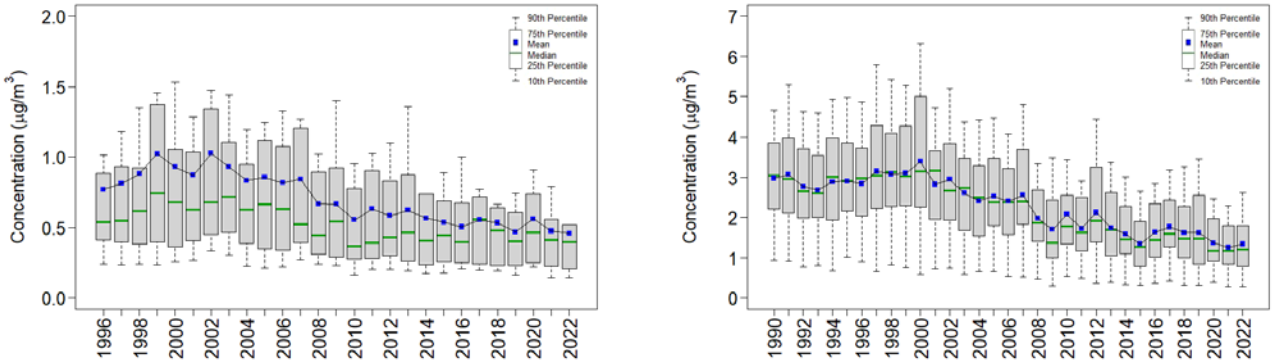


Figure 6. Trends in Fourth Quarter Mean SO_2 Concentrations

Western Reference Sites Eastern Reference Sites

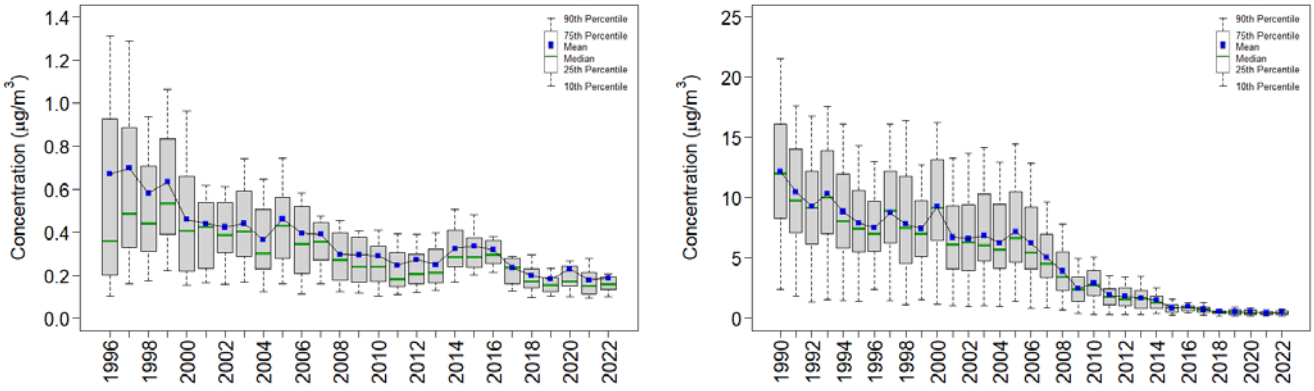


Figure 7. Trends in Fourth Quarter Mean SO_4^{2-} Concentrations

Western Reference Sites Eastern Reference Sites

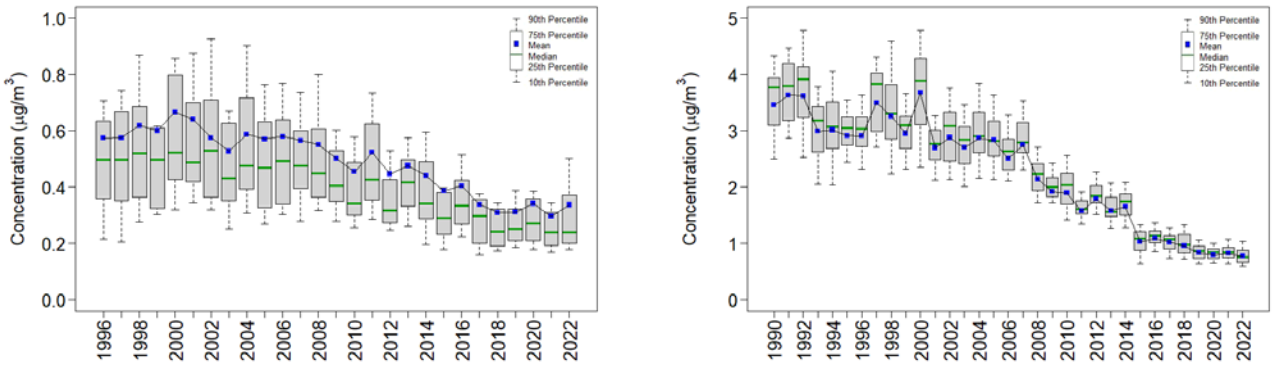


Figure 8. Trends in Fourth Quarter Mean Cl^- Concentrations

Western Reference Sites Eastern Reference Sites

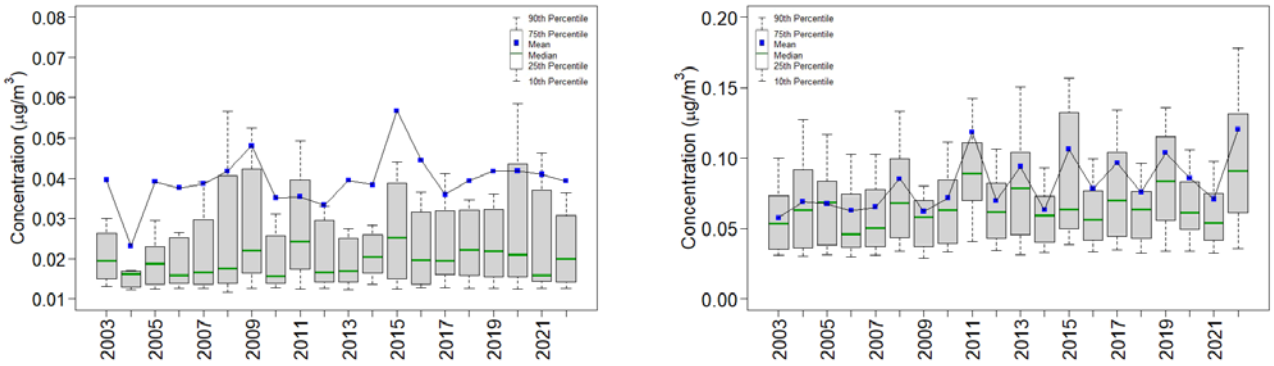
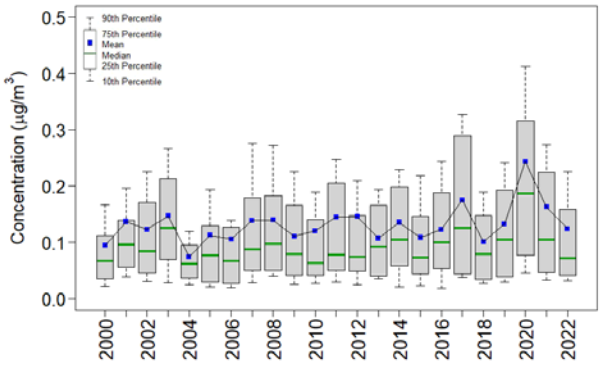


Figure 9. Trends in Fourth Quarter Mean Ca^{2+} Concentrations

Western Reference Sites



Eastern Reference Sites

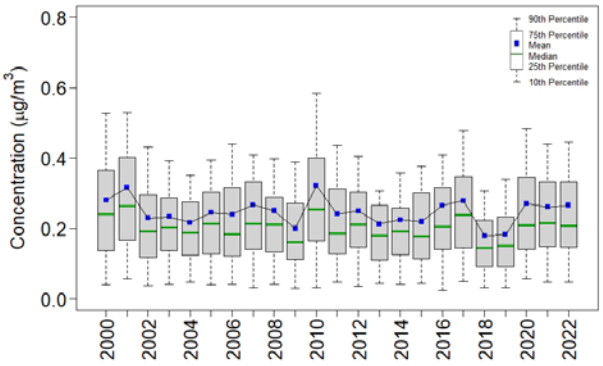
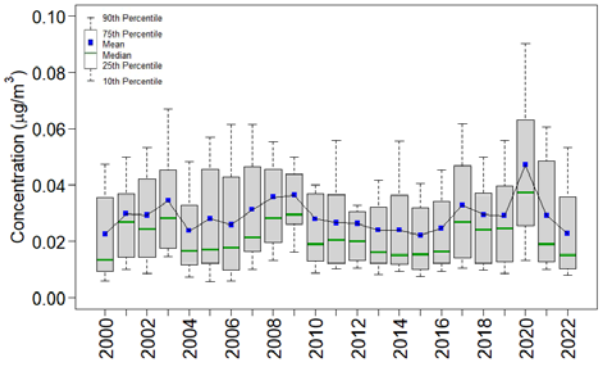


Figure 10. Trends in Fourth Quarter Mean K^{+} Concentrations

Western Reference Sites



Eastern Reference Sites

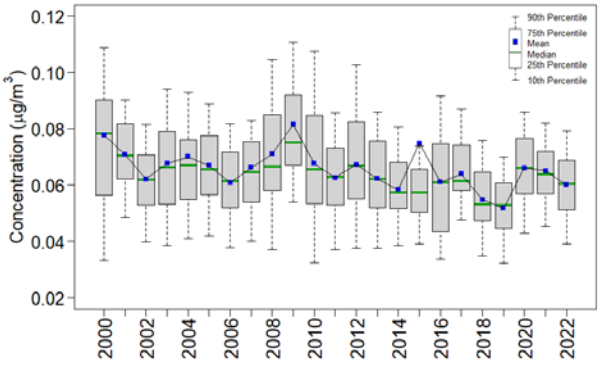
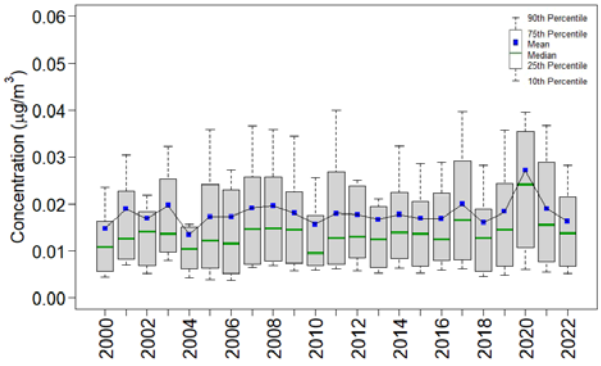


Figure 11. Trends in Fourth Quarter Mean Mg^{2+} Concentrations

Western Reference Sites



Eastern Reference Sites

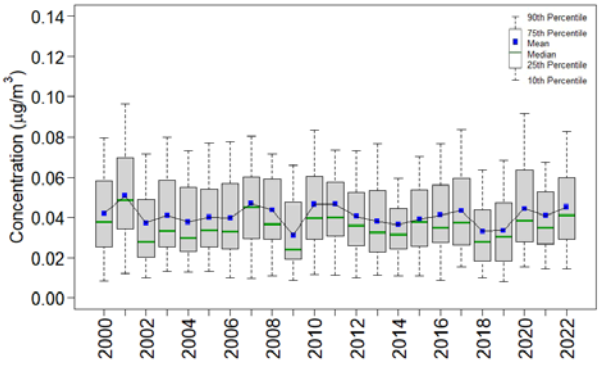


Figure 12. Trends in Fourth Quarter Mean Na^+ Concentrations

Western Reference Sites Eastern Reference Sites

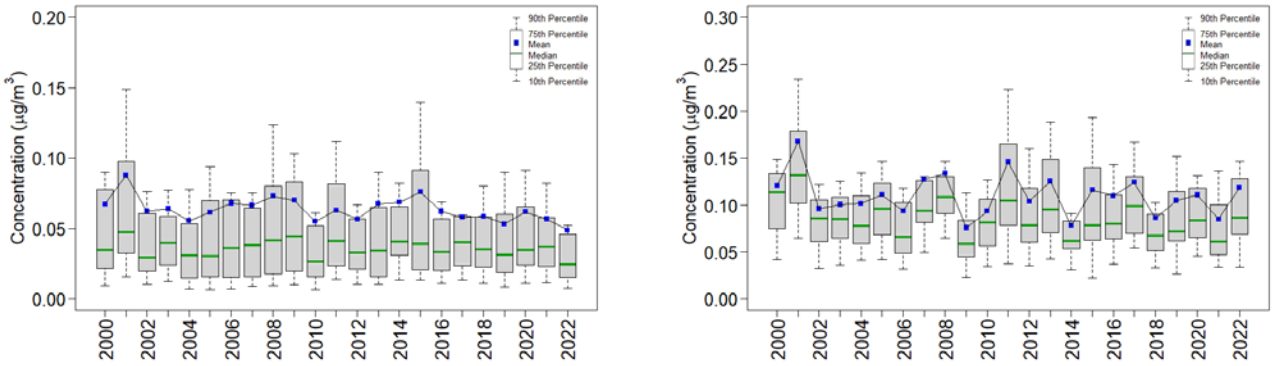
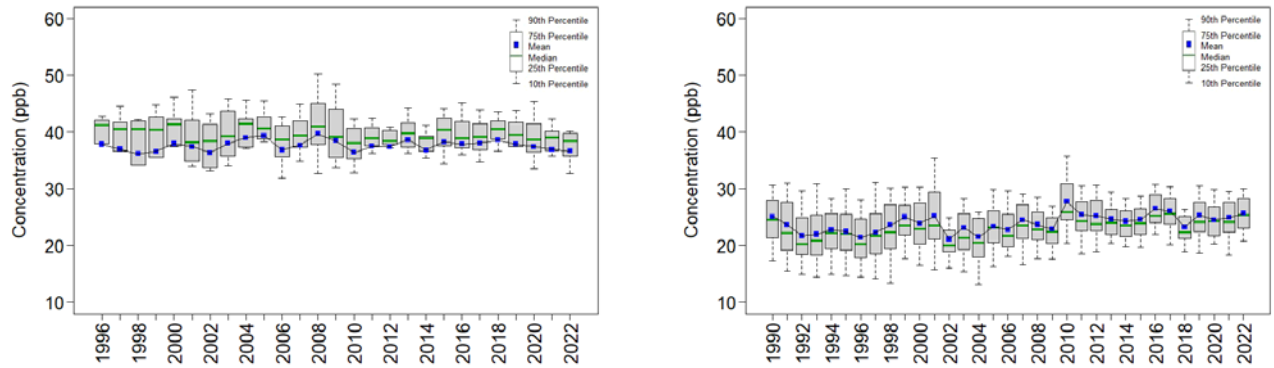


Figure 13. Trends in Fourth Quarter Mean O_3 Concentrations

Western Reference Sites Eastern Reference Sites



Changes in 3-year Average Fourth Quarter Concentrations

As shown in Table 1 and Table 2, three-year averages of quarterly mean concentrations of total NO_3^-, NH_4^+, SO_2, and SO_4^{2-} were reduced over the period 1990–1992 through 2020–2022 for eastern reference sites and from 1996–1998 through 2020–2022 for western reference sites. Potassium levels declined at eastern sites from 2004–2006 through 2020–2022 while Ca^{2+}, Mg^{2+}, Na^+, and Cl^- values increased. At western sites, Na^+ levels decreased while Cl^- and base cation concentrations increased. Ozone concentrations increased at eastern sites and showed no change at western reference sites.

Table 1. Eastern Reference Sites: 3-Year Mean Values (ppb or µg/m_3)

Parameter	O_3 (ppb)	Total NO_3^-	NH_4^+	SO_2	SO_4^{2-}	Ca^{2+}	K^+	Mg^{2+}	Na^+	Cl^-
1990–1992	24	2.9	1.4	10.6	3.6					
2004–2006						0.23	0.07	0.04	0.10	0.07
2020–2022	25	1.3	0.4	0.5	0.8	0.27	0.06	0.04	0.10	0.09
Percent Change	7	-55	-72	-96	-78	14	-3	11	3	39

Note: Ozone concentrations are given as ppb. Concentrations for all other parameters are in µg/m^3.

Table 2. Western Reference Sites: 3-Year Mean Values (ppb or µg/m_3)

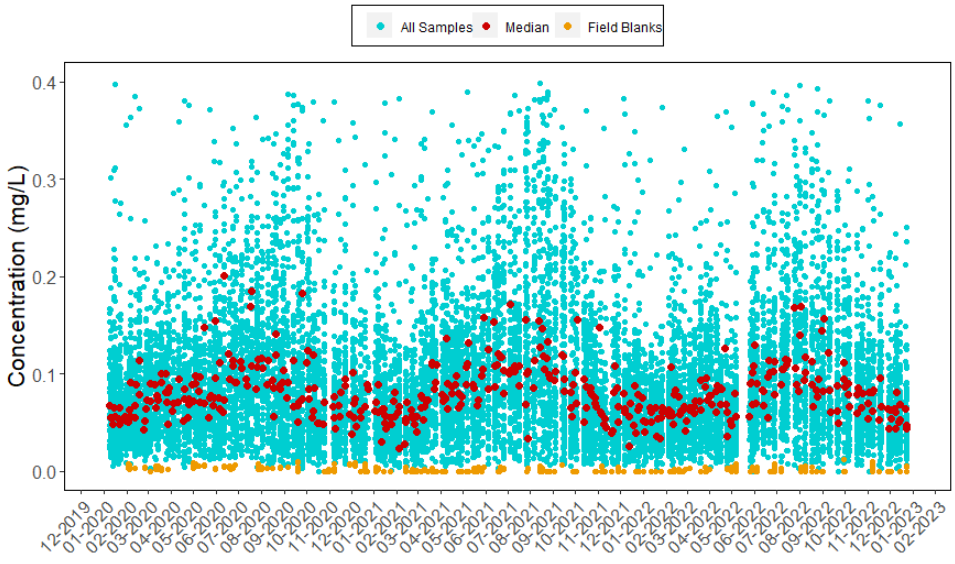
Parameter	O_3 (ppb)	Total NO_3^-	NH_4^+	SO_2	SO_4^{2-}	Ca^{2+}	K^+	Mg^{2+}	Na^+	Cl^-
1990–1992	38	0.8	0.2	0.7	0.6					
2004–2006						0.10	0.03	0.02	0.06	0.03
2020–2022	38	0.5	0.1	0.2	0.3	0.18	0.03	0.02	0.06	0.04
Percent Change	0	-39	-41	-70	-45	81	28	30	-9	22

Note: Ozone concentrations are given as ppb. Concentrations for all other parameters are in µg/m^3.

Time Series of Laboratory Analysis Parameters for All Sites

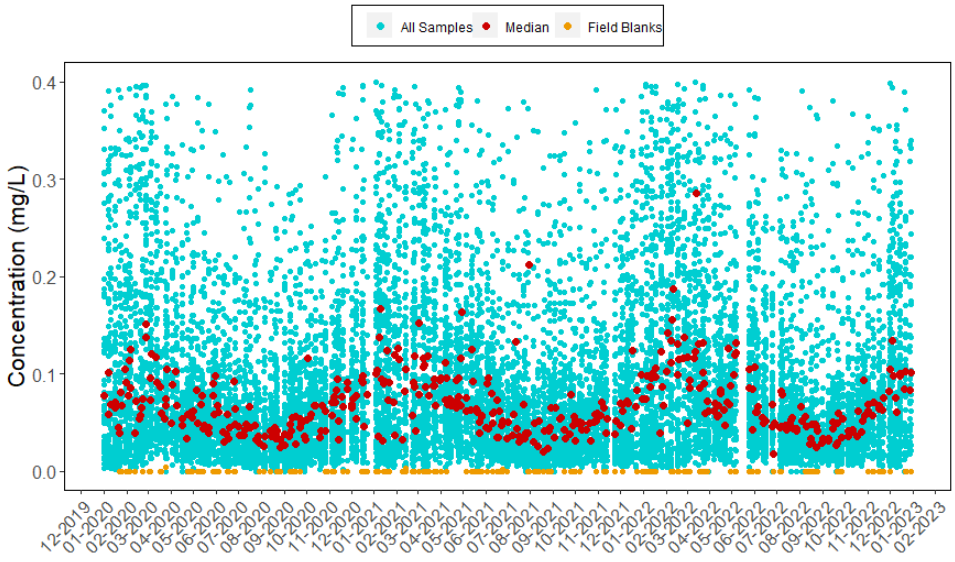
Figures 14 through 23 give time series of laboratory-analyzed concentrations of field samples and field blanks in milligrams per liter (mg/L) of 11 parameters from first quarter 2020 through fourth quarter 2022. These figures provide indications of potential issues with concentration measurements relative to detection and reporting limits.

Figure 14. Concentrations of NO_3^- (as N) from Nylon Filters



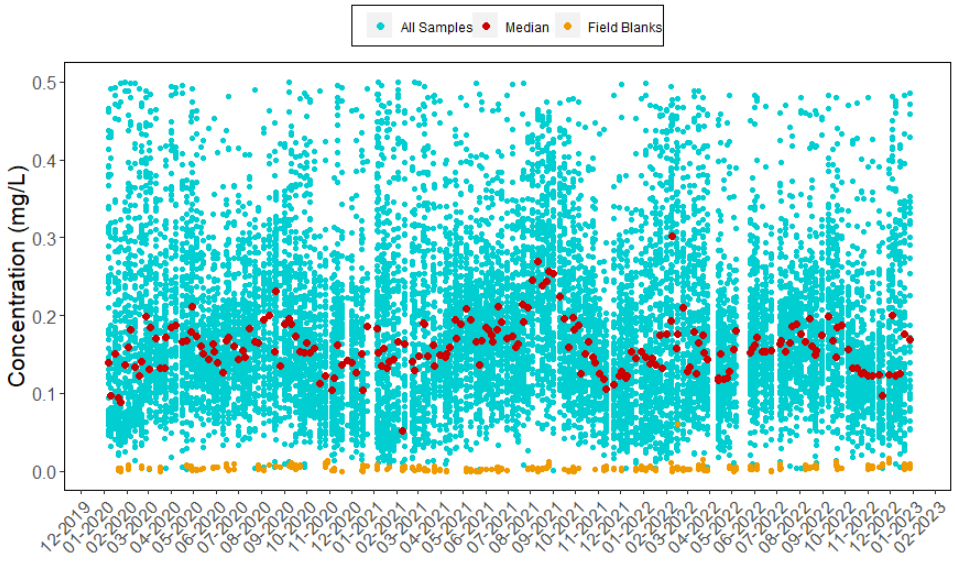
Note: Nominal reporting limit is 0.008 mg/L.

Figure 15. Concentrations of NO_3^- (as N) from Teflon Filters



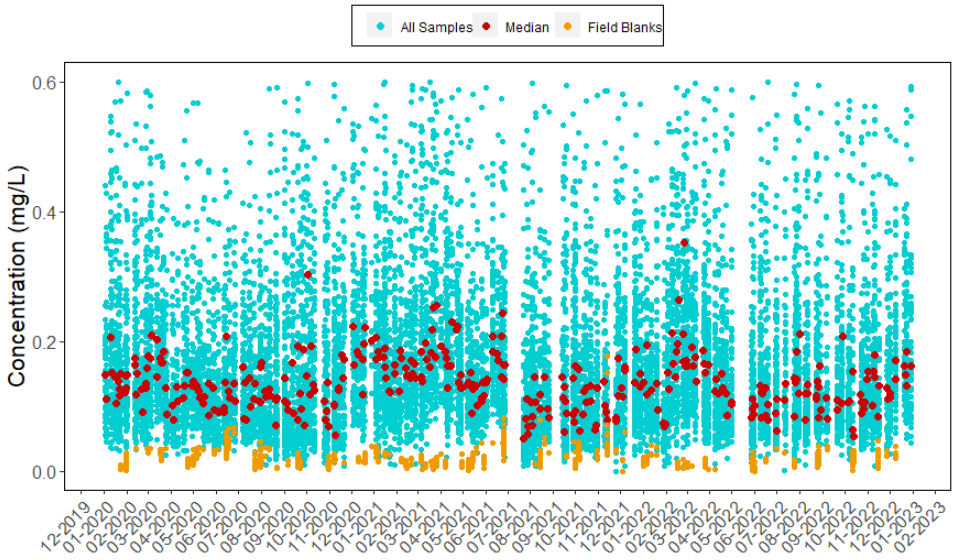
Note: Nominal reporting limit is 0.008 mg/L.

Figure 16. Concentrations of NH_4^+ (as N) from Teflon Filters



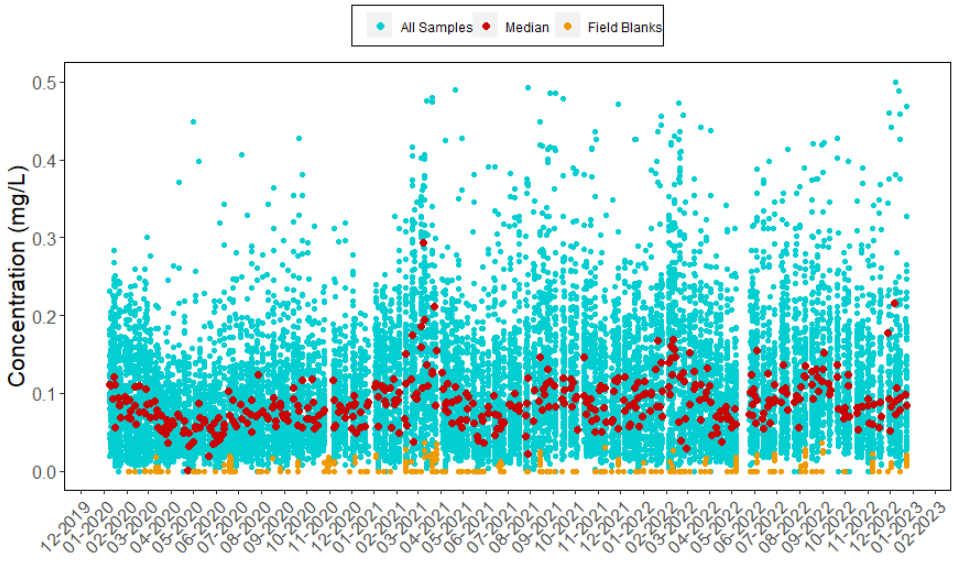
Note: Nominal reporting limit is 0.020 mg/L.

Figure 17. Concentrations of SO_2 from K_2CO_3-impregnated Cellulose Filters



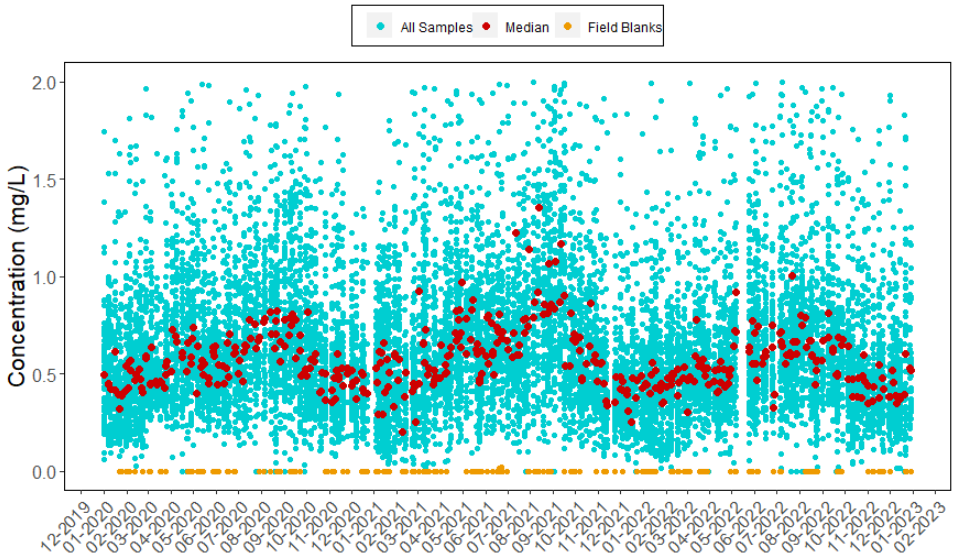
Note: Nominal reporting limit is 0.040 mg/L.

Figure 18. Concentrations of SO_4^{2-} from Nylon Filters



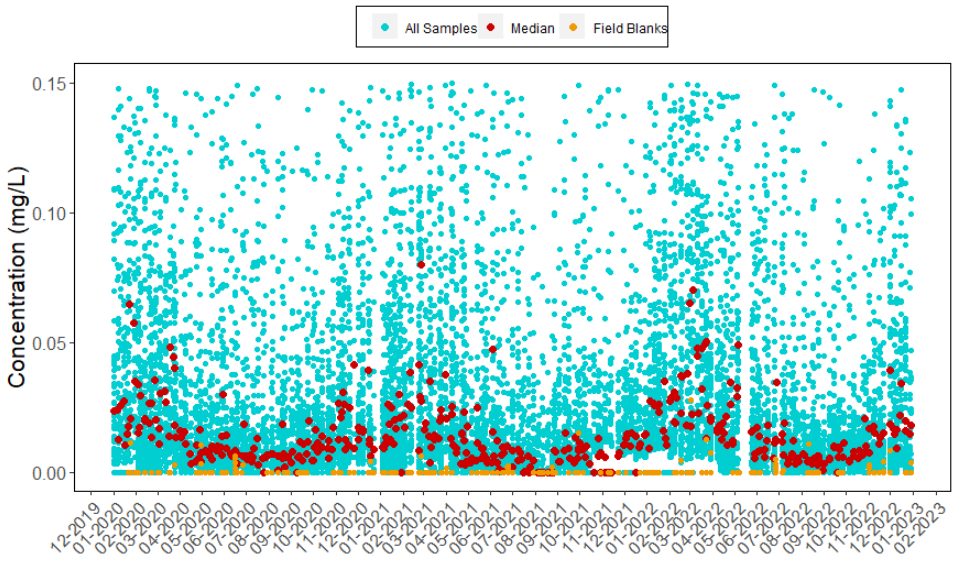
Note: Nominal reporting limit is 0.040 mg/L.

Figure 19. Concentrations of SO_4^{2-} from Teflon Filters



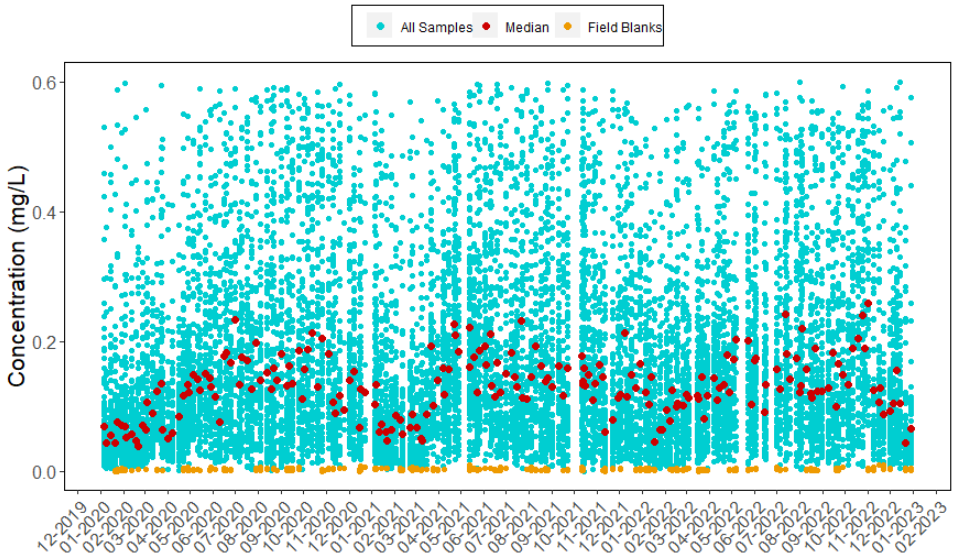
Note: Nominal reporting limit is 0.040 mg/L.

Figure 20. Concentrations of Cl^- from Teflon Filters



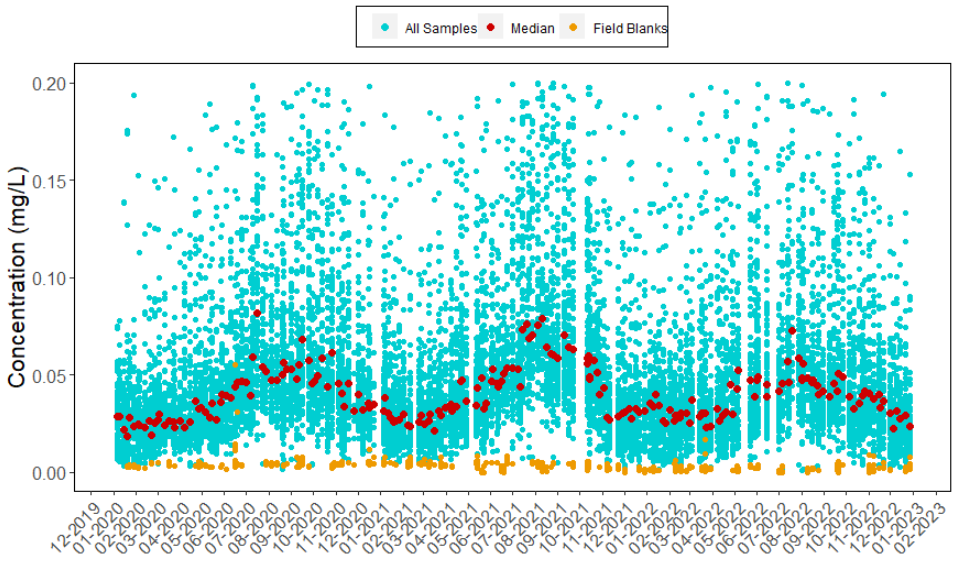
Note: Nominal reporting limit is 0.020 mg/L.

Figure 21. Concentrations of Ca^{2+} from Teflon Filters



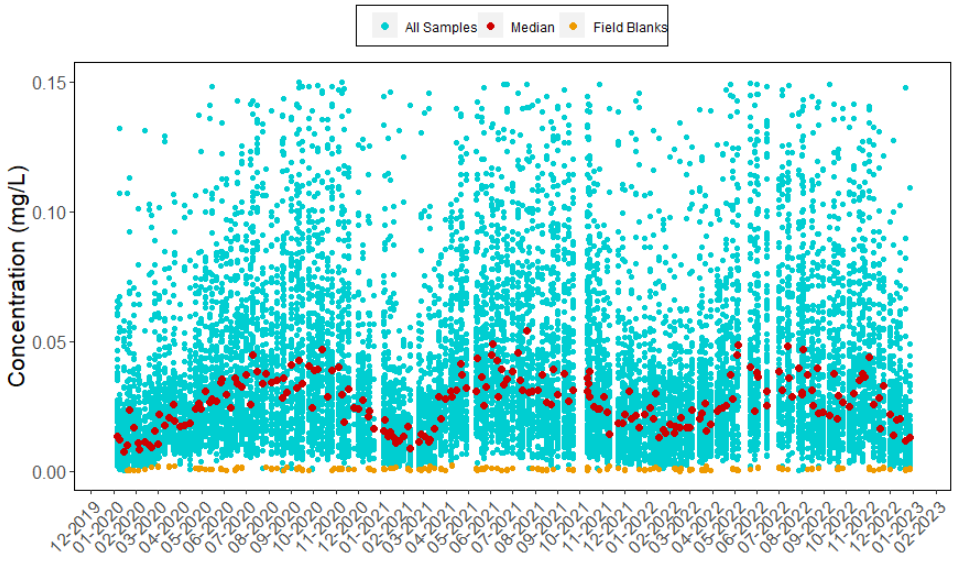
Note: Nominal reporting limit is 0.006 mg/L.

Figure 22. Concentrations of K^+ from Teflon Filters



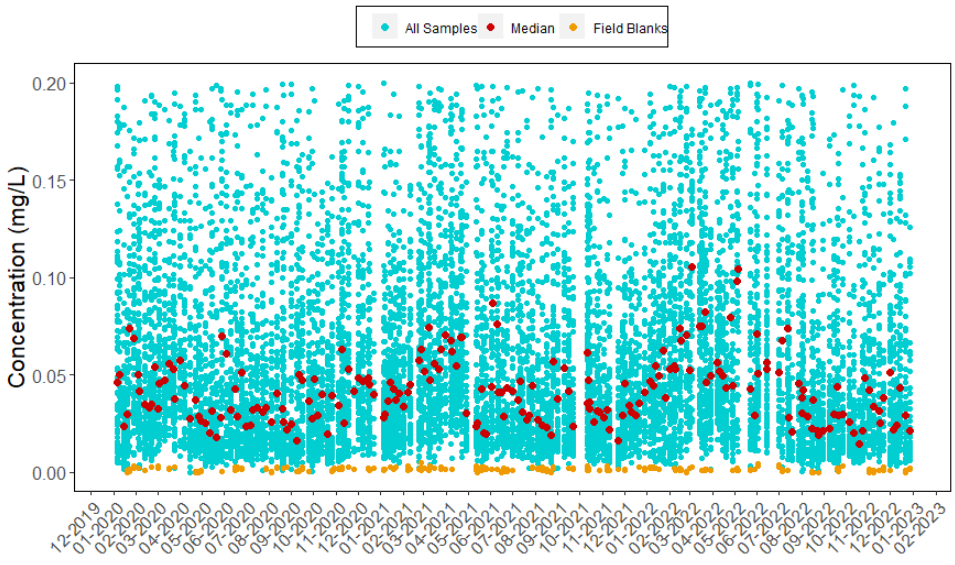
Note: Nominal reporting limit is 0.006 mg/L.

Figure 23. Concentrations of Mg^{2+} from Teflon Filters



Note: Nominal reporting limit is 0.003 mg/L.

Figure 24. Concentrations of Na^+ from Teflon Filters



Note: Nominal reporting limit is 0.005 mg/L.

Time Series of Concentration Differences from Co-located Sites

Figures 25 and 26 show times series of concentration differences between the two sets of co-located sites.

Figure 25. Time Series of Filter Concentration Differences between MCK131 and MCK231, KY

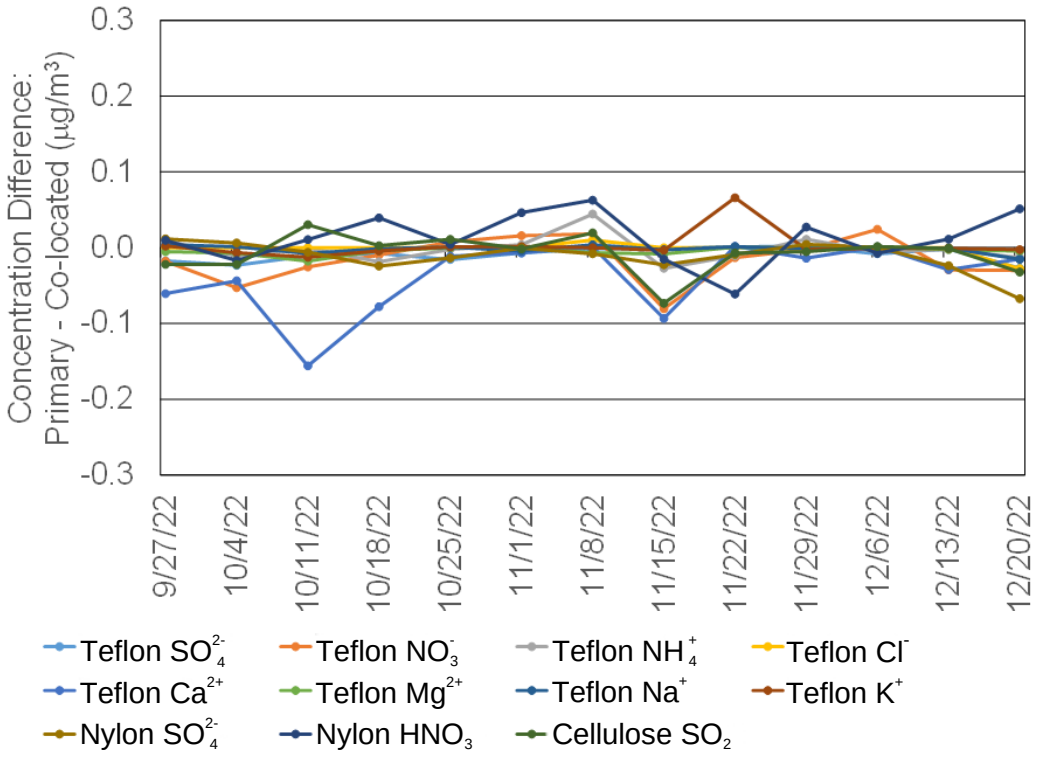
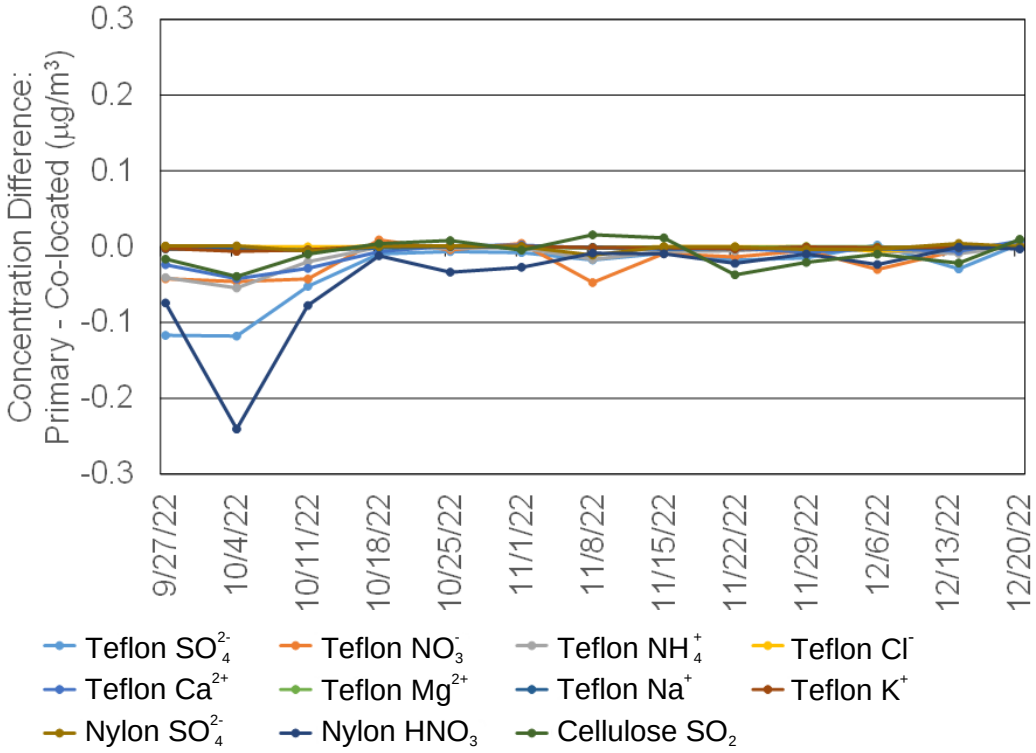


Figure 26. Time Series of Filter Concentration Differences between ROM406 and ROM206, CO



Precision of Filter Pack Concentrations

Table 3 shows mean absolute relative percent differences (MARPD) for concentrations measured at MCK131/231 and ROM406/206 during fourth quarter 2022. The MARPD values met the 20 percent criterion.

Table 3. Precision (MARPD) for Co-located Filter Pack Data during Fourth Quarter 2022

	Total NO_3^-	HNO_3	NO_3^-	NH_4^+	SO_2	SO_4^{2-}	Ca^{2+}	Mg^{2+}	Na^+	K^+	Cl^-
MCK131/231, KY											
$\overline{X}$ ($\mu g/m^3$)	1.56	0.68	0.92	0.48	0.50	0.84	0.36	0.04	0.07	0.07	0.06
$\overline{Y}$ ($\mu g/m^3$)	1.59	0.67	0.93	0.48	0.51	0.85	0.39	0.05	0.07	0.06	0.06
MAD	0.04	0.03	0.03	0.01	0.02	0.01	0.04	0.00	0.00	0.01	0.00
MARPD	2.55	4.38	3.16	2.96	3.78	1.30	8.17	8.92	4.61	9.28	2.07
ROM406/206, CO											
$\overline{X}$ ($\mu g/m^3$)	0.34	0.21	0.13	0.12	0.17	0.26	0.05	0.01	0.01	0.01	0.02
$\overline{Y}$ ($\mu g/m^3$)	0.41	0.26	0.16	0.14	0.18	0.29	0.06	0.01	0.02	0.01	0.02
MAD	0.07	0.05	0.02	0.01	0.02	0.03	0.01	0.00	0.00	0.00	0.00
MARPD	14.27	13.94	16.71	9.30	10.83	9.87	17.93	14.36	17.00	16.82	4.33

Completeness for Filter Pack Concentrations

Table 4 shows CASTNET sites with less than 90 percent completeness for weekly filter pack concentrations. Comments are included to provide information on why these sites experienced low data completeness.

Table 4. Sites with less than 90 Percent Data Completeness for Filter Concentrations for Fourth Quarter 2022 (1 of 2)

Site ID	Teflon SO_4^{2-}	Teflon NO_3^-	Teflon NH_4^+	Teflon Minor Cations	Teflon Cl^-	Nylon HNO_3	Nylon SO_4^{2-}	Cellulose SO_2	Comment
ALH157, IL	69.2	69.2	69.2	69.2	69.2	69.2	69.2	69.2	Site was decommissioned 12/6/22.
ANA115, MI	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Site was mothballed due to EPA's FY2022 budget.
ASH135, ME	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Site was mothballed due to EPA's FY2022 budget.
BWR139, MD	76.9	76.9	76.9	76.9	76.9	76.9	76.9	76.9	There were two 2-week samples during the quarter. Another sample was invalidated because of a hole in the Teflon filter.
CDR119, WV	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Site was mothballed due to EPA's FY2022 budget.
CDZ171, KY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Site was mothballed due to EPA's FY2022 budget.
DCP114, OH	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Site was mothballed due to EPA's FY2022 budget.
EGB181, ON	61.5	61.5	61.5	61.5	61.5	61.5	61.5	61.5	Communication issues occurred. Data were missing from 11/6/22 to 12/5/22.
HWF187, NY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Site was mothballed due to EPA's FY2022 budget.
LAV410, CA	84.6	84.6	84.6	84.6	84.6	84.6	84.6	84.6	A power failure affected two samples.
MKG113, PA	53.8	53.8	53.8	53.8	53.8	53.8	53.8	53.8	The mass flow controller malfunctioned in mid-October, and its replacement malfunctioned in late November. Six samples were affected.

Table 4. Sites with less than 90 Percent Data Completeness for Filter Concentrations for Fourth Quarter 2022 (2 of 2)

Site ID	Teflon SO_4^{2-}	Teflon NO_3^-	Teflon NH_4^+	Teflon Minor Cations	Teflon Cl^-	Nylon HNO_3	Nylon SO_4^{2-}	Cellulose SO_2	Comment
PED108, VA	84.6	84.6	84.6	84.6	84.6	84.6	84.6	84.6	One sample was invalidated for insufficient flow volume. Another was affected by power outage.
PNF126, NC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Site was mothballed due to EPA's FY2022 budget.
PSU106, PA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Site was mothballed due to EPA's FY2022 budget.
UND002, VT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Site was mothballed due to EPA's FY2022 budget.
UVL124, MI	69.2	69.2	69.2	69.2	69.2	69.2	69.2	69.2	The mass flow controller malfunctioned in early October and was replaced on 11/1/2022. Four samples were invalidated.
VOY413, MN	84.6	84.6	84.6	84.6	84.6	84.6	84.6	84.6	A flow system leak affected two samples.
VPI120, VA	84.6	84.6	84.6	84.6	84.6	84.6	84.6	84.6	There was one 2-week sample. Another was invalidated due to power failure.
WST109, NH	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Site was mothballed due to EPA's FY2022 budget.

Precision of Ozone Concentrations

Time series of co-located hourly O_3 concentration differences for fourth quarter 2022 are provided in Figures 27 and 28 for MCK131/231 and ROM406/206, respectively. The figures indicate no consistent bias between the co-located analyzers at these site locations.

Figure 27. Time Series of the Differences in Co-located O_3 Concentrations for MCK131/231, KY

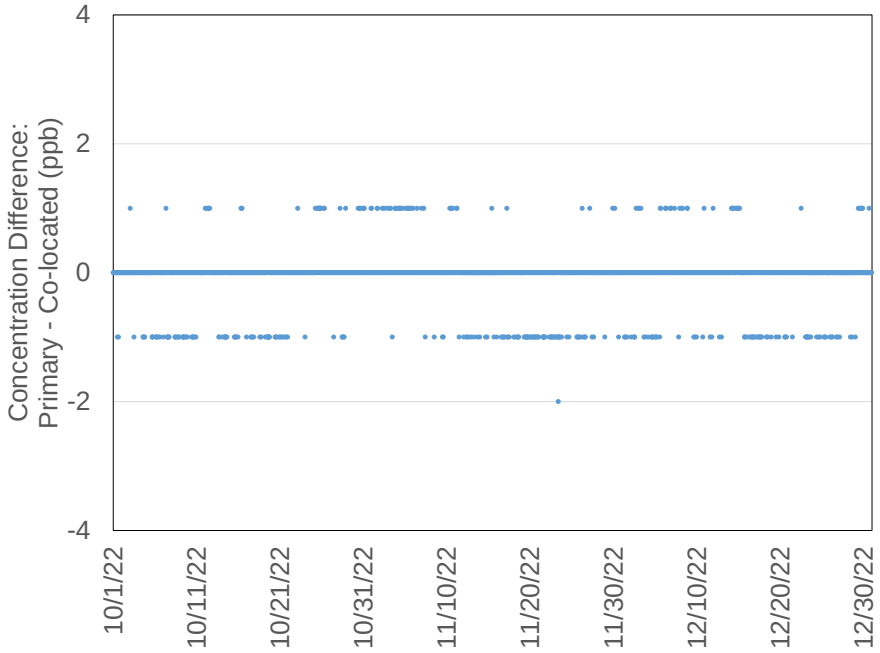


Figure 28. Time Series of the Differences in Co-located O_3 Concentrations for ROM406/206, CO

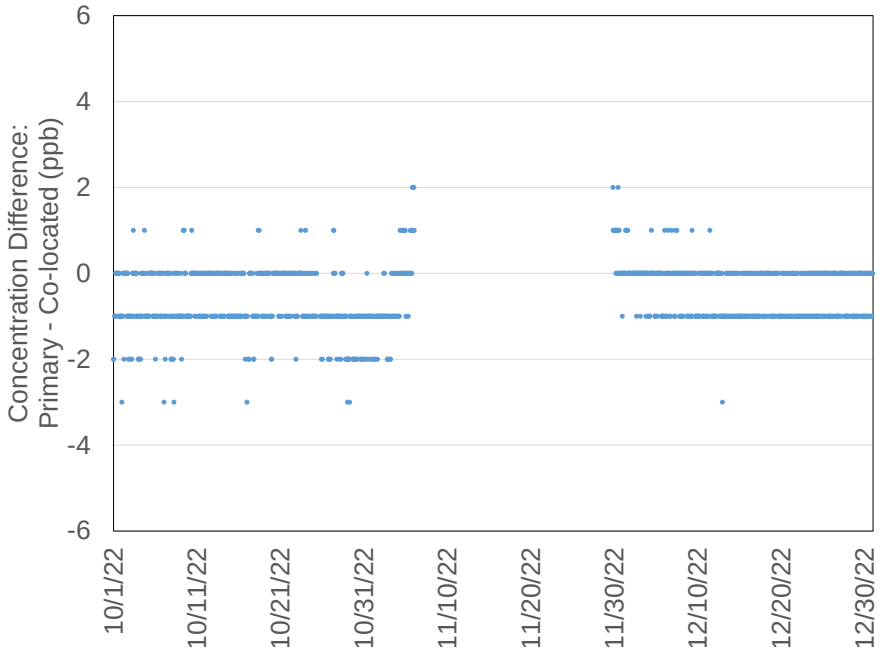


Table 5 gives MARPD data for O_3 data measured at the two co-located sites.

Table 5. Quarterly Precision (MARPD) for Co-located O_3 Concentrations

Site Pair	Quarter	Start Date	MARPD	Records
MCK131/231, KY				
	4	1/1/22	1.1	2046
	1	4/1/22	0.6	2066
	2	7/1/22	0.8	2058
	3	10/1/22	0.6	2098
ROM406/206, CO				
	4	1/1/22	2.0	1970
	1	4/1/22	1.5	1932
	2	7/1/22	1.8	1638
	3	10/1/22	1.5	1531

Completeness for O_3 Concentrations

Calculation of an annual O_3 value requires 75 percent completeness. However, calculation of the 3-year design value used for regulatory purposes requires 90 percent completeness. Table 6 shows CASTNET sites with less than 90 percent completeness for DM8A O_3 concentrations. Comments are provided for these sites.

Table 6. Sites with less than 90 Percent Data Completeness for DM8A Concentrations during Fourth Quarter 2022

Site ID	Percent Completeness	Comments
ASH135, ME	0	Site was mothballed due to EPA's FY2022 budget.
HWF187, NY	0	Site was mothballed due to EPA's FY2022 budget.
WST109, NH	0	Site was mothballed due to EPA's FY2022 budget.
PNF126, NC	0	Site was mothballed due to EPA's FY2022 budget.
CDZ171, KY	0	Site was mothballed due to EPA's FY2022 budget.
DCP114, OH	0	Site was mothballed due to EPA's FY2022 budget.
CDR119, WV	0	Site was mothballed due to EPA's FY2022 budget.
DEN417, AK	71	Ozone data were invalid from 10/20/22 through 11/14/22 due to a failed pump and an issue with the solenoid.
ALH157, IL	72	Site was decommissioned 12/6/22.
ROM206, CO	74	QC failures resulted from malfunctioning analyzer solenoid. Associated data were invalidated. Analyzer was replaced 12/16/22.
ALC188, TX	74	Several sampling system issues had to be addressed following maintenance and replacement of the analyzer in late October. Associated data were invalidated.
LAV410, CA	82	Ozone data were invalid intermittently throughout December due to poor QC checks and noise in the minute data trace.
NPT006, ID	88	QC failures resulted from sampling system issues in late October. Associated data were invalidated.

Table 7 shows CASTNET sites with less than 90 percent completeness for hourly O_3 concentrations. Comments are provided for these sites. The annual average for each of these sites is included for reference.

Table 7. Sites with less than 90 Percent Data Completeness for O_3 Concentrations

Site ID	Q4 2022	Q1 2022–Q4 2022	Comments
ALC188, TX	75	90	Several sampling system issues had to be addressed following maintenance and replacement of the analyzer in late October. Associated data were invalidated.
ASH135, ME	0	56	Site was mothballed due to EPA's FY2022 budget.
CDR119, WV	0	56	Site was mothballed due to EPA's FY2022 budget.
CDZ171, KY	0	60	Site was mothballed due to EPA's FY2022 budget.
DCP114, OH	0	60	Site was mothballed due to EPA's FY2022 budget.
DEN417, AK	71	89	Ozone data were invalid from 10/20/22 through 11/14/22 due to a failed pump and an issue with the solenoid.
HWF187, NY	0	59	Site was mothballed due to EPA's FY2022 budget.
LAV410, CA	86	94	Ozone data were invalid intermittently throughout December due to poor QC checks and noise in the minute data trace.
PNF126, NC	0	60	Site was mothballed due to EPA's FY2022 budget.
ROM206, CO	74	92	QC failures resulted from a malfunctioning analyzer solenoid. Associated data were invalidated. Analyzer was replaced 12/16/22.
WST109, NH	0	60	Site was mothballed due to EPA's FY2022 budget.

Filter Pack Total Nitrate and Continuous Trace-level NO_y Concentrations at CASTNET Sites

Figures 29 through 36 show a comparison of weekly average continuous NO_y measurements with weekly filter pack total NO_3^- concentrations collected at the six of eight sites with NO_y measurements. The NO_y concentrations were consistently higher than the total NO_3^- levels at all sites. The average weekly NO_y levels, the weekly total NO_3^- concentrations, and their ratios for the six sites with available data are shown in Table 8. Ratios of NO_y to total NO_3^- varied from 4.82 at MAC426 to 8.22 at PND165. No data are available from HWF187 and PNF126 for fourth quarter 2022. These sites were mothballed due to EPA's budget constraints.

Table 8. Summary of Total NO_3^- and NO_y Measurements for Fourth Quarter 2022

Site ID	Elevation	Total NO_3^- (ppb)	NO_y (ppb)	Ratio
DUK008, NC	164*	0.71	2.89	5.87
BVL130, IL	213	0.98	4.57	5.44
MAC426, KY	243	0.57	2.55	4.82
HWF187, NY ϕ	497	-	-	-
GRS420, TN	793	0.35	1.76	5.47
PNF126, NC ϕ	1216	-	-	-
PND165, WY	2386	0.08	0.67	8.22
ROM206, CO	2742	0.12	0.82	7.37

Note: * The inlet of the enhanced NO_y monitor is located at the top of the 30-meter tower.
ϕ The site was mothballed in second quarter 2022 due to EPA's FY2022 budget. No measurements were recorded during fourth quarter 2022.

Figure 29. Comparison of DUK008 Weekly Mean NO_y and Total NO_3^- Concentrations

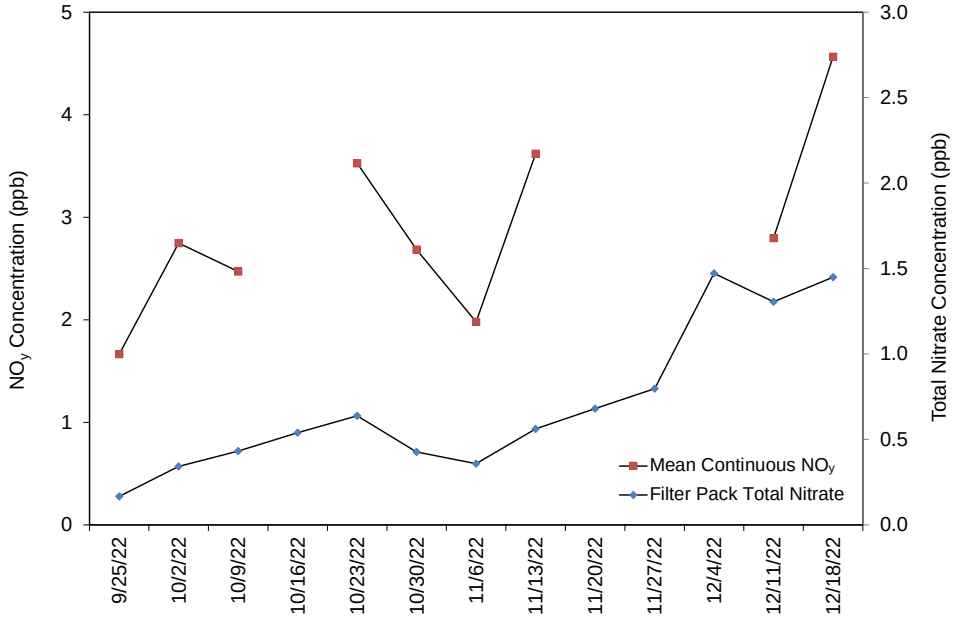


Figure 30. Comparison of BVL130 Weekly Mean NO_y and Total NO_3^- Concentrations

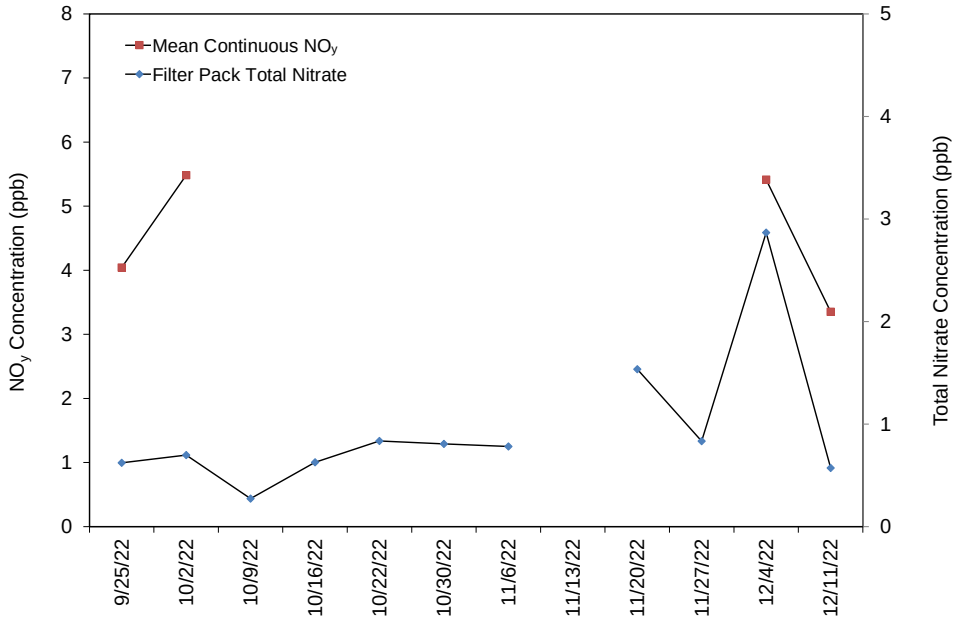


Figure 31. Comparison of MAC426 Weekly Mean NO_y and Total NO_3^- Concentrations

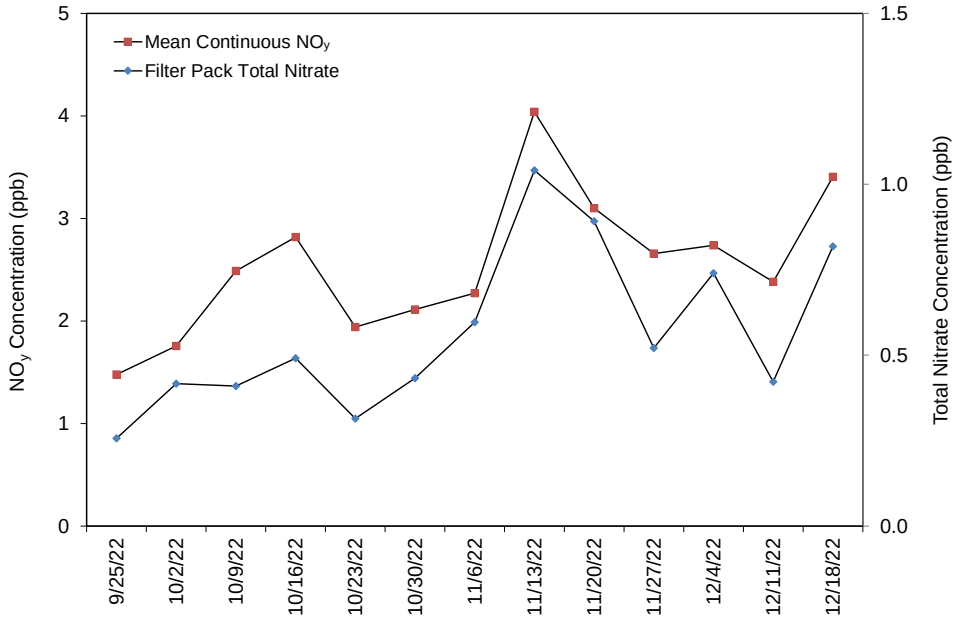


Figure 32. Comparison of HWF187 Weekly Mean NO_y and Total NO_3^- Concentrations

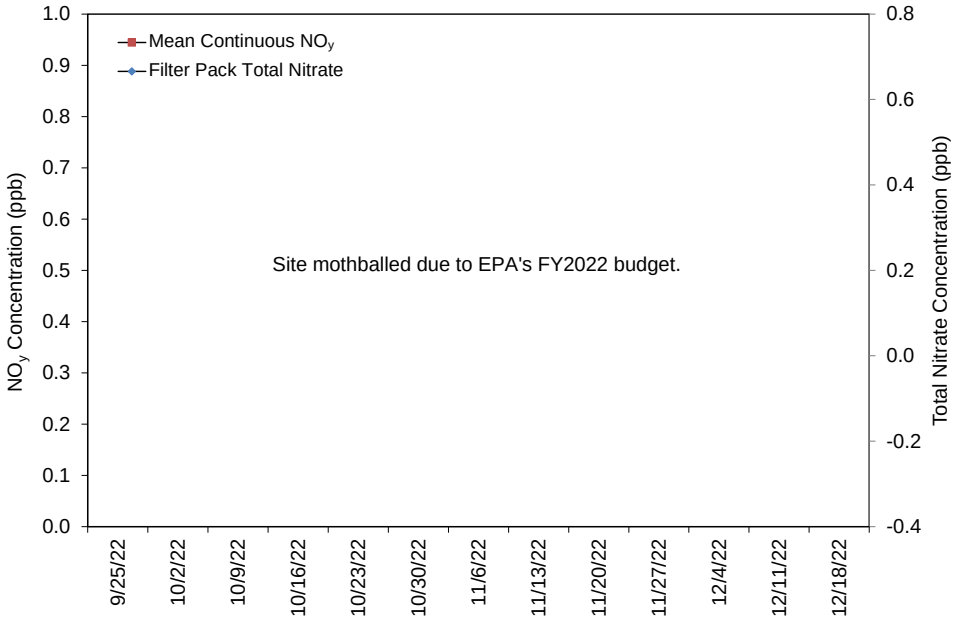


Figure 33. Comparison of GRS420 Weekly Mean NO_y and Total NO_3^- Concentrations

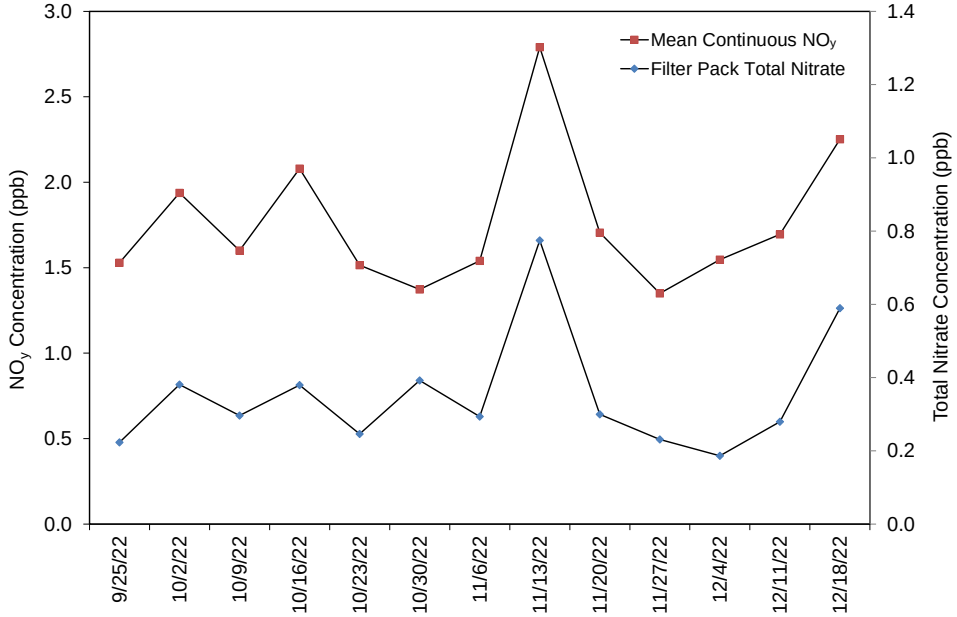


Figure 34. Comparison of PNF126 Weekly Mean NO_y and Total NO_3^- Concentrations

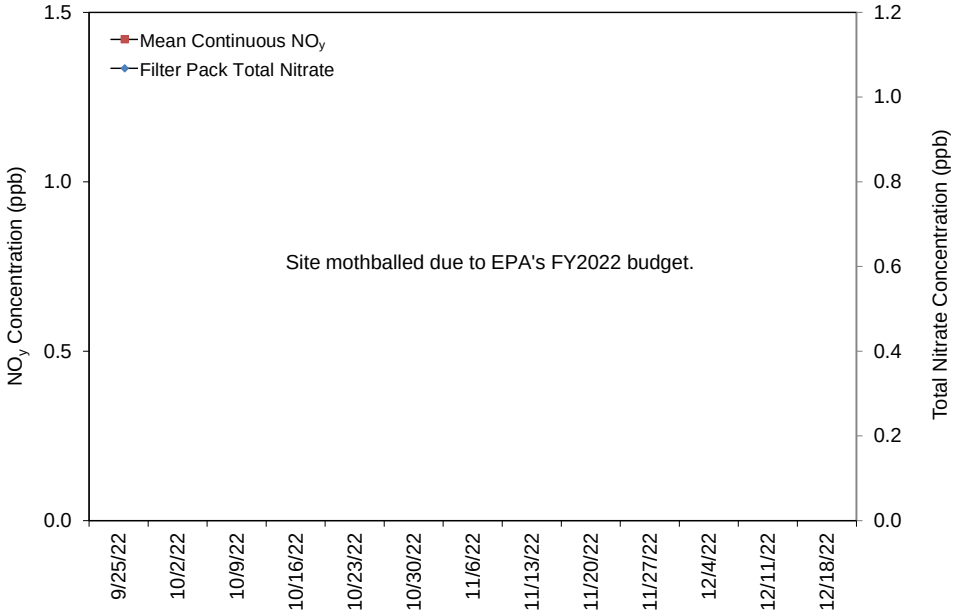


Figure 35. Comparison of PND165 Weekly Mean NO_y and Total NO_3^- Concentrations

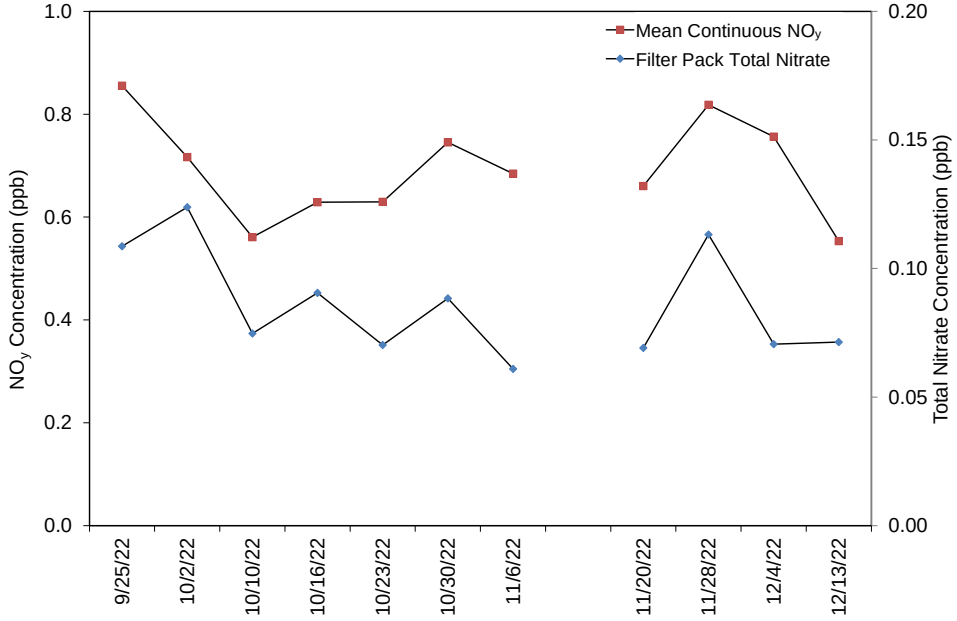
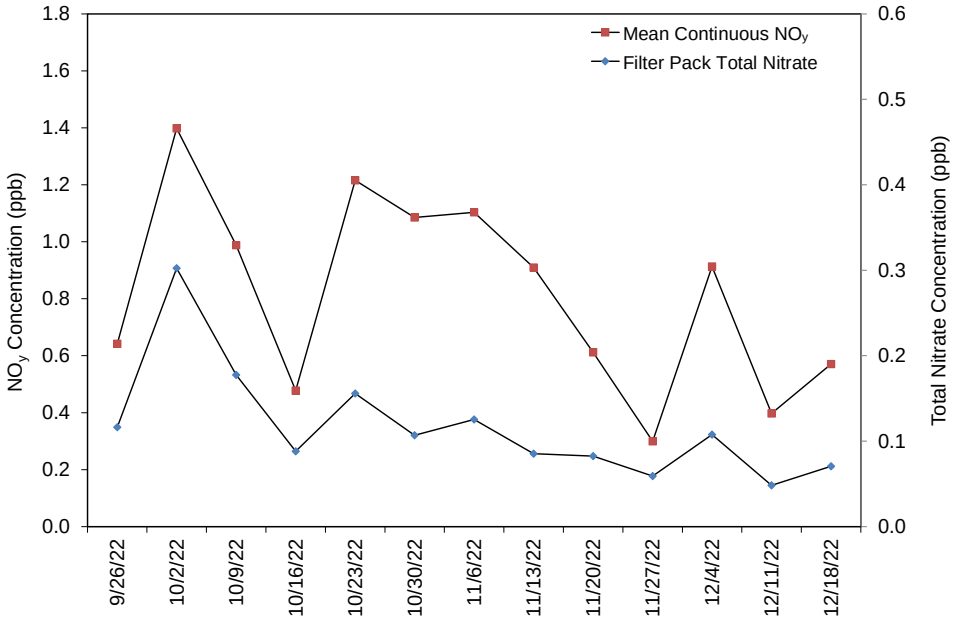


Figure 36. Comparison of ROM206 Weekly Mean NO_y and Total NO_3^- Concentrations



Filter Pack and Continuous Trace-level Gas Sulfur Dioxide Concentrations

Figures 37 through 39 provide diagrams that compare weekly filter pack SO_2 concentrations with continuous trace-level gas data measured at BVL130, MAC426, and GRS420. The continuously measured trace-level concentrations were higher than filter pack concentrations during the first four weeks of fourth quarter at BVL130 and then were comparable. The filter pack concentrations were higher than continuous concentrations at MAC426. The SO_2 data completeness was insufficient at GRS420.

Figure 37. Comparison of BVL130 Weekly Mean SO_2 Concentrations

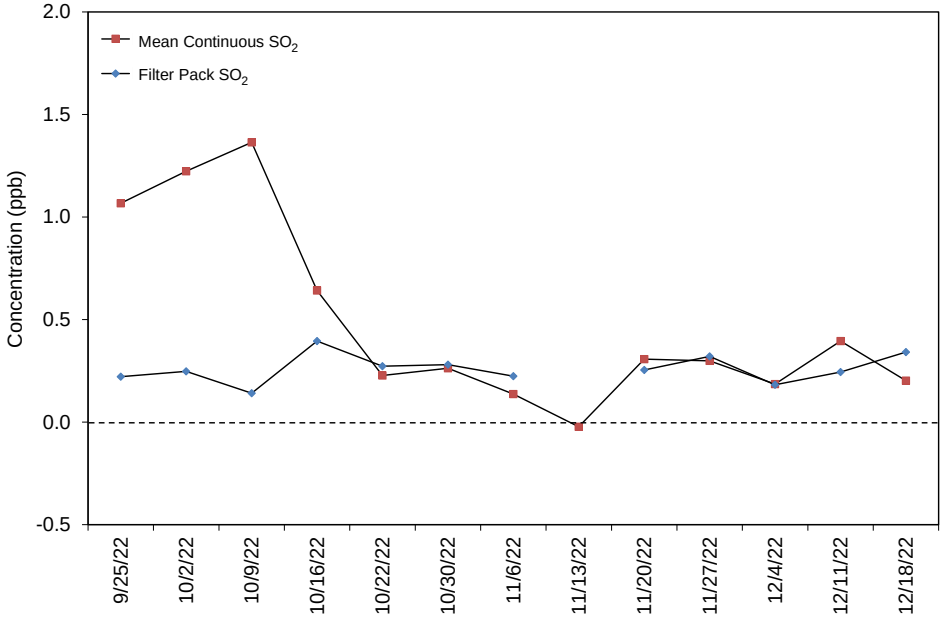


Figure 38. Comparison of MAC426 Weekly Mean SO_2 Concentrations

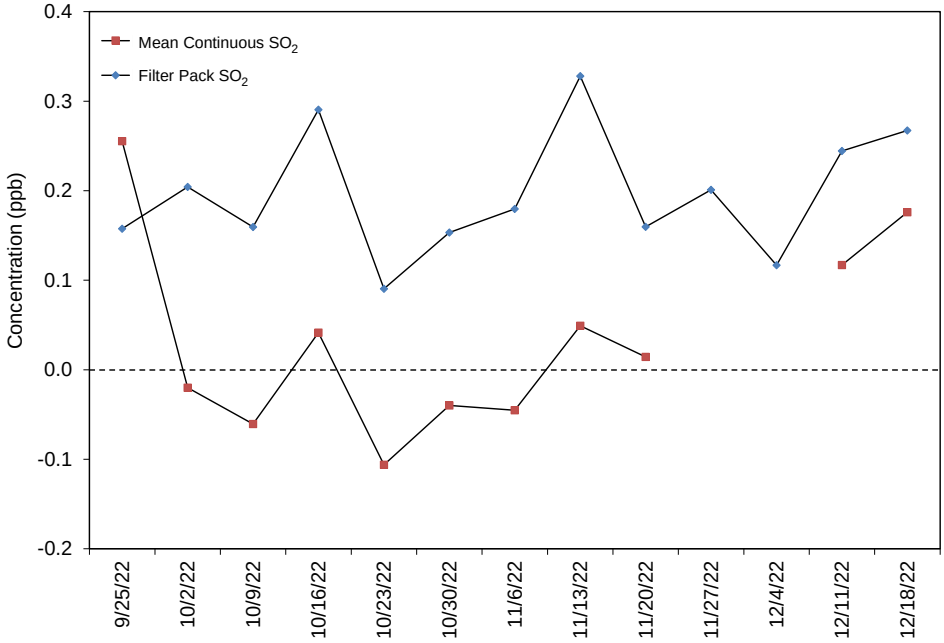
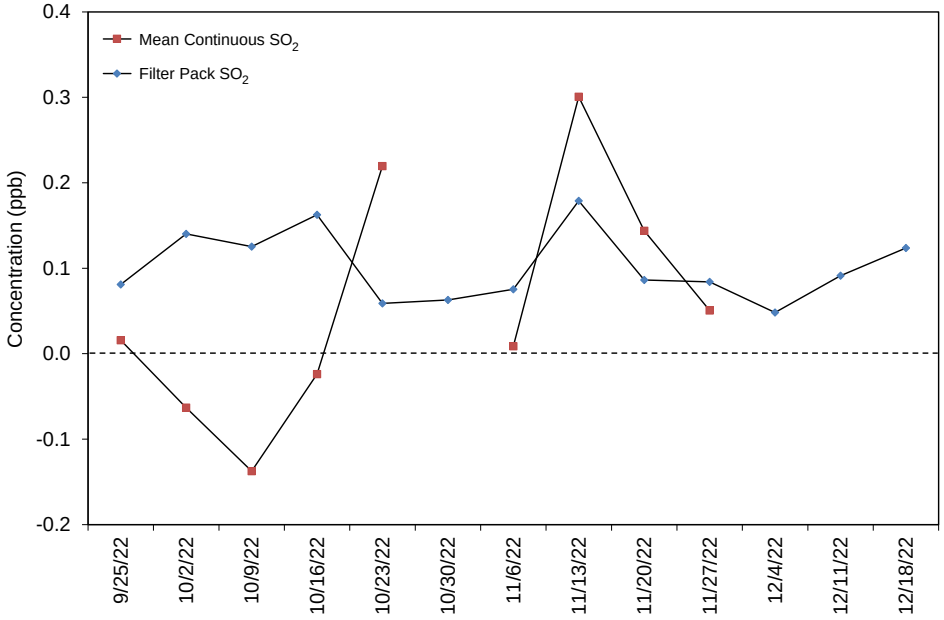


Figure 39. Comparison of GRS420 Weekly Mean SO_2 Concentrations



Completeness for Continuous Trace-level Gas Measurements

Table 9 shows the percent completeness for CASTNET trace-level gas measurements. Comments are provided for sites with less than 90 percent completeness for hourly trace-level gas concentrations during fourth quarter 2022. The average for first quarter 2022 through fourth quarter 2022 for each of the sites is included for reference.

Table 9 Percent Data Completeness for Continuous Trace-level Gas Measurements (1 of 2)

Site ID	Parameter*	Q4 2022	Q1 2022 - Q4 2022	Comments
BVL130, IL	CO	18	43	The CO system was subject to intermittent analyzer stability issues throughout the quarter.
	NO	59	79	QC failures occurred in December. Associated data were invalidated.
	NOY	33	77	The converter and ozone generator malfunctioned beginning in late October. Both were replaced by early December. Associated data were invalidated.
	NOYDIF	33	73	
	SO2_GA	86	88	Data were invalid during several multipoint calibrations.
CHC432, NM	NO	98	98	
	NOX	98	98	
	NOXDIF	98	98	
DUK008, NC	HNO3	43	75	Data were invalidated 11/23/23 to 12/14/23 for high noise levels and 12/23/23 to 12/26/23 for high shelter temperatures. An additional week of data was not collected due to a power failure. HNO3 and NOY Minus were invalidated 10/25/23 and 11/8/23 for suspect values.
	NH3	57	61	
	NO	57	79	
	NO2_TRUE	57	79	
	NOX_TRUE	57	79	
	NOY	57	79	
	NOY_MINUS	43	75	
	NOYDIF	57	79	
	TNX	57	64	
GRS420, TN	CO	93	83	
	NO	94	88	
	NOY	94	88	
	NOYDIF	94	87	
	SO2_GA	62	78	The lamp was failing. Associated data were invalidated.
HWF187, NY	NO	0	33	Site mothballed due to EPA's FY2022 budget.
	NOY	0	32	
	NOYDIF	0	32	

Table 9 Percent Data Completeness for Continuous Trace-level Gas Measurements (2 of 2)

Site ID	Parameter*	Q4 2022	Q1 2022 - Q4 2022	Comments
MAC426, KY	CO	91	94	
	NO	96	97	
	NOY	96	97	
	NOYDIF	96	97	
	SO2_GA	78	92	SO_2 data invalid from 11/26/22 through 12/13/22 because the instrument changed its background and intercept frequently throughout this period.
PND165, WY	NO	93	85	Site mothballed due to EPA's FY2022 budget.
	NOY	91	83	
	NOYDIF	91	83	
PNF126, NC	NO	0	33	Site mothballed due to EPA's FY2022 budget.
	NOY	0	33	
	NOYDIF	0	33	
ROM206, CO	NO	95	95	
	NOY	95	95	
	NOYDIF	95	95	

Note: * See Table 10

The parameters listed in Table 9 are both calculated and measured. Table 10 provides information on how the parameters listed in Table 9 are obtained.

Table 10. CASTNET Trace-level Gas Measurements

Parameter Name	How Obtained	Description of Process
CO	Measured	Gas filter correlation
HNO3	Calculated	NOY minus NOY_MINUS
NH3	Calculated	TNX minus NOY
NO	Measured	Chemiluminescence reaction/no converter used
NO2_TRUE	Calculated	NOX_TRUE minus NO
NOX_TRUE	Measured	Photolytic converter
NOY	Measured	Molybdenum converter at 315° Celsius
NOYDIF	Calculated	NOY minus NO
NOY_MINUS	Measured	Sodium carbonate denuder followed by molybdenum converter at 315° Celsius
NOX	Measured	Molybdenum converter at 325° Celsius
NOXDIF	Calculated	NOX minus NO
SO2_GA	Measured	Ultraviolet fluorescence
TNX	Measured	Platinum/stainless steel converter at 825° Celsius followed by molybdenum converter at 315° Celsius

References

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