Supplementary Information of

Long-term PM trends in southern Finland from three different measurement techniques

Ylivinkka et al.

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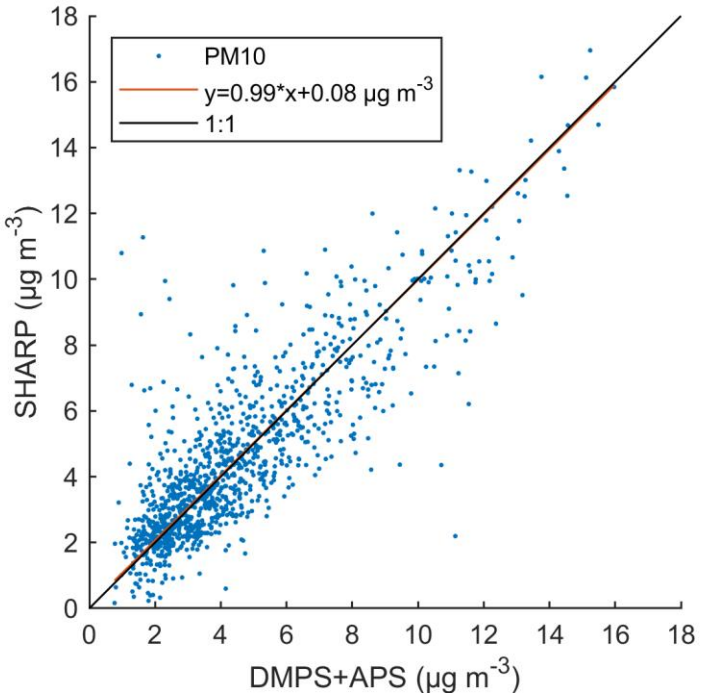


Figure S1: Correlation between PM_{10} from SHARP and DMPS+APS derived mass measurements.

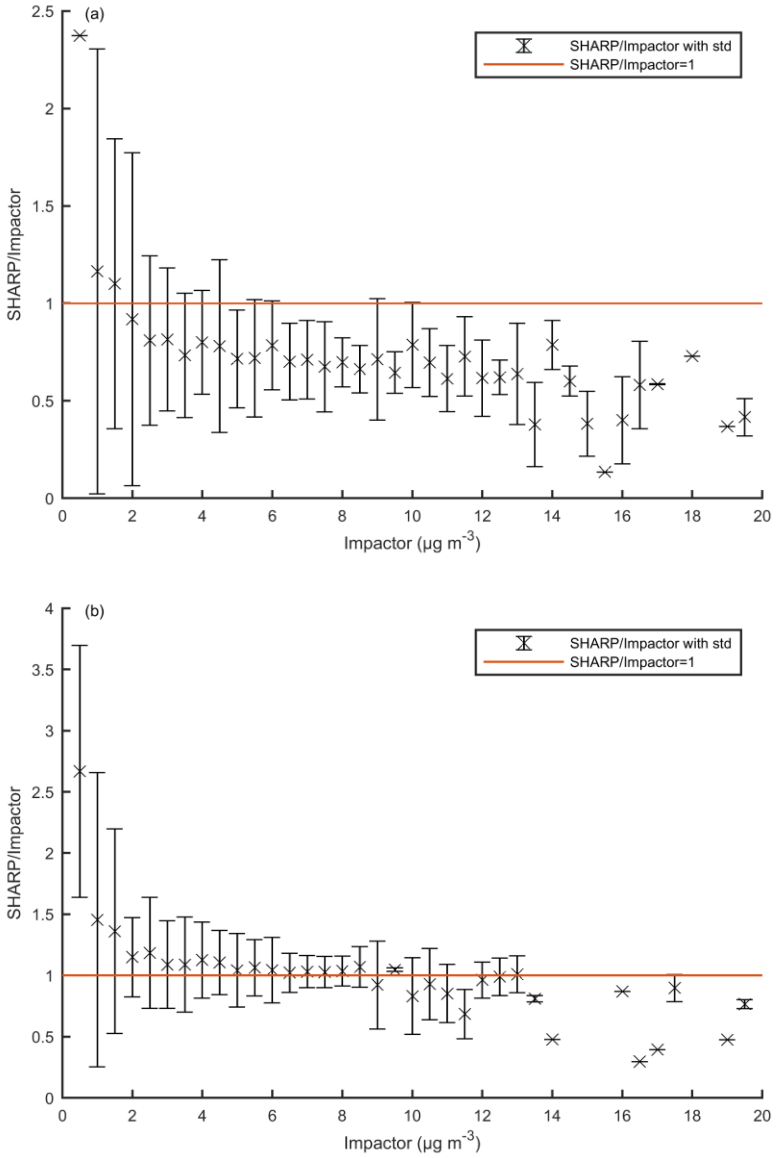
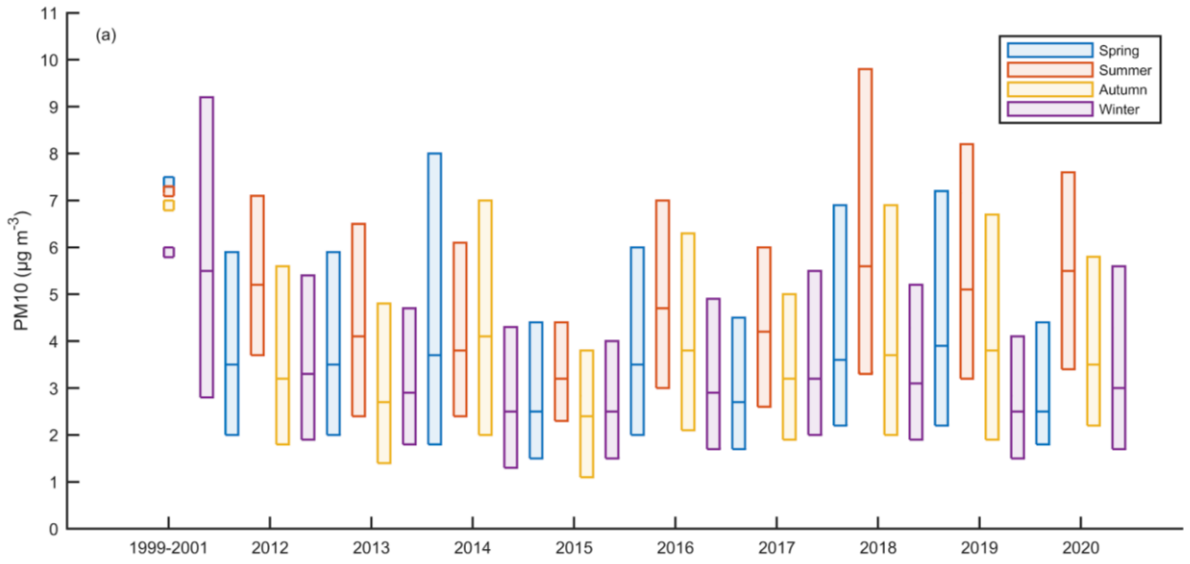
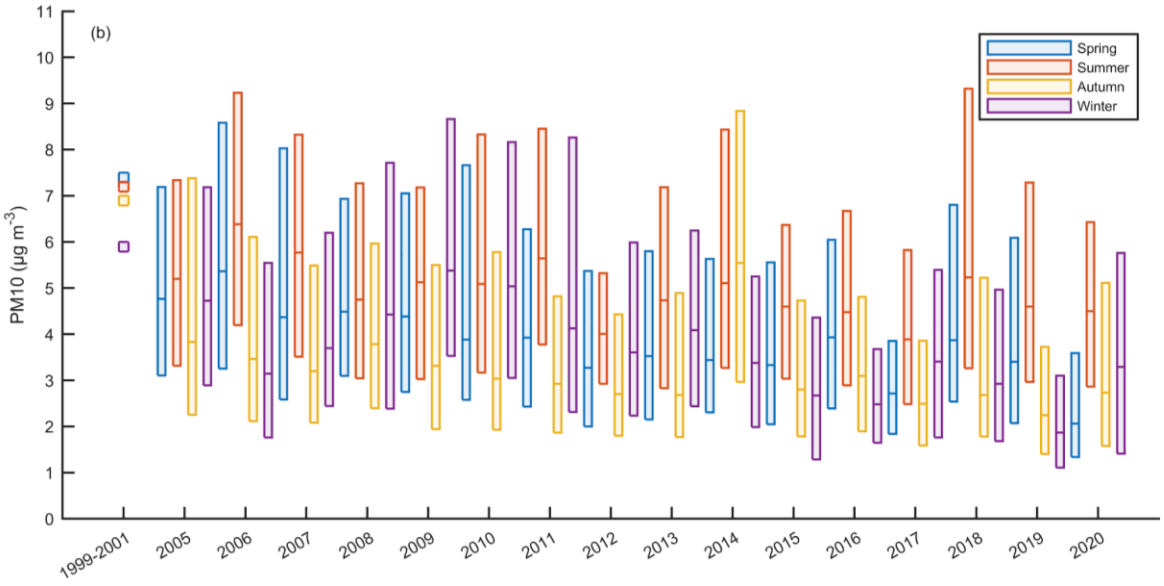
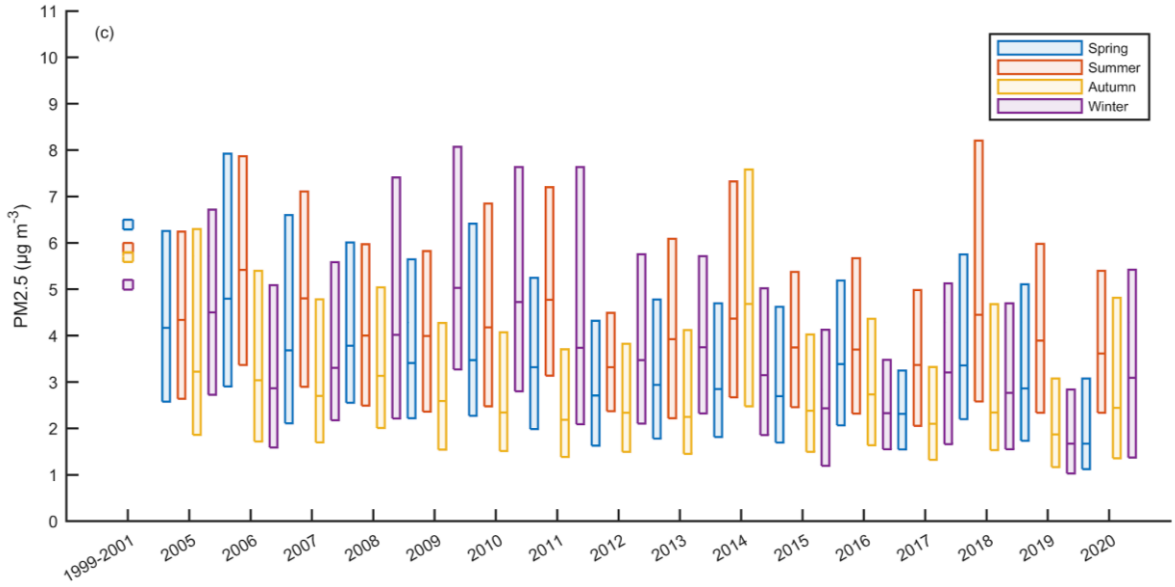


Figure S2: SHARP–impactor ratio as a function of PM_{10} mass concentration from impactor. (a) SHARP heating set to 45 °C and (b) SHARP heating set to 35 °C.


(a)
Spring
Summer
Autumn
Winter
PM10 (μg m-3)
0
1
2
3
4
5
6
7
8
9
10
11
1999-2001
2012
2013
2014
2015
2016
2017
2018
2019
2020


(b)
Spring
Summer
Autumn
Winter
PM10 (μg m-3)
0
1
2
3
4
5
6
7
8
9
10
11
1999-2001
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020


(c)
Spring
Summer
Autumn
Winter
PM2.5 (μg m-3)
0
1
2
3
4
5
6
7
8
9
10
11
1999-2001
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020

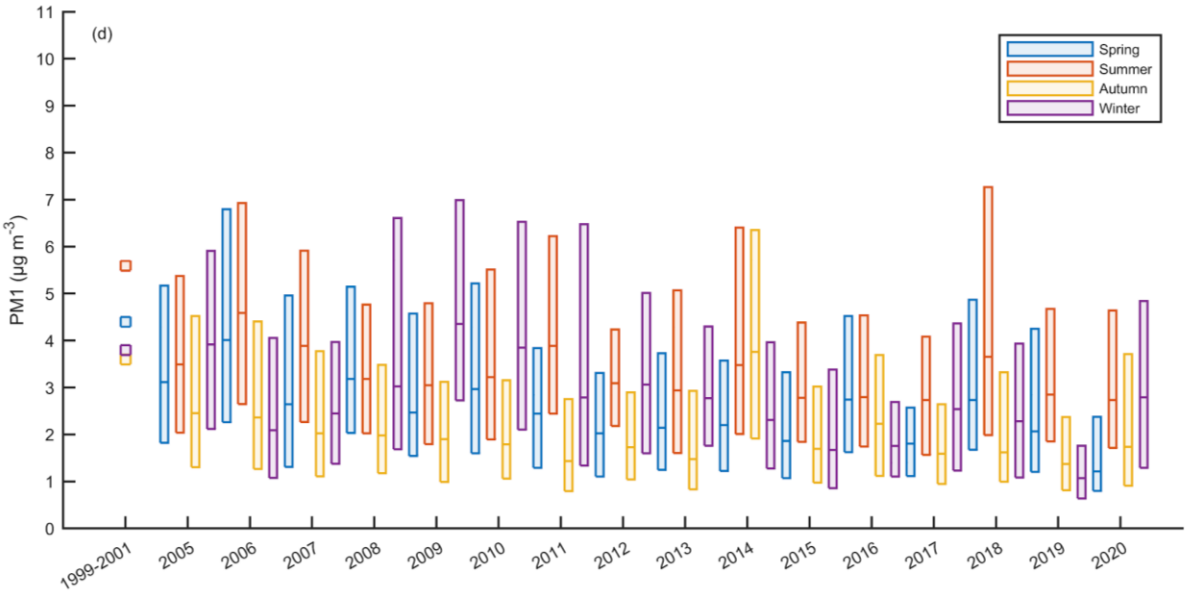
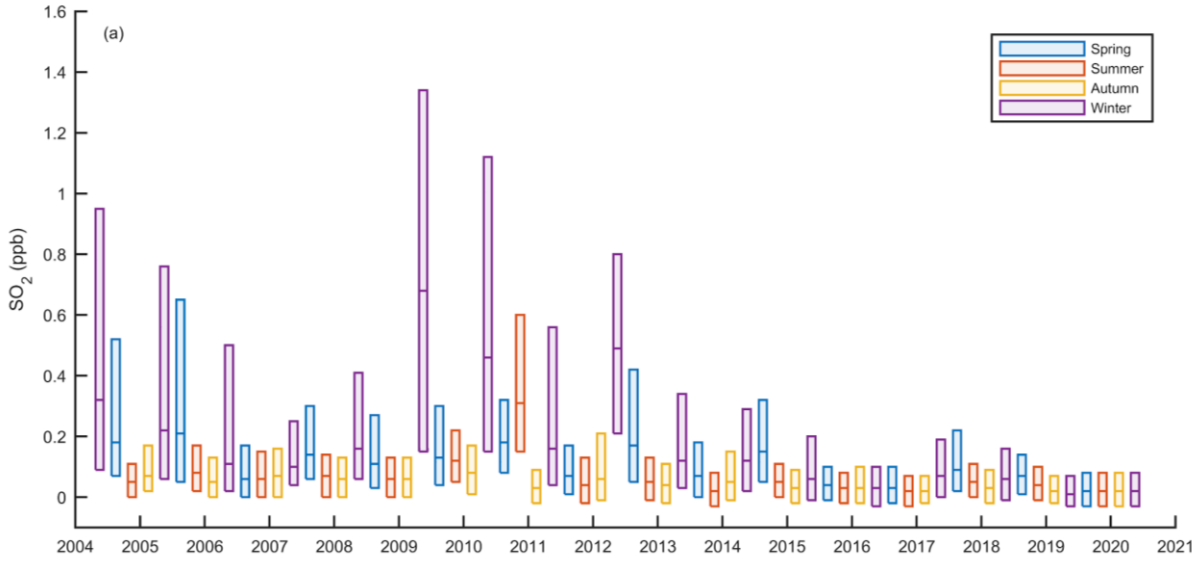


Figure S3: Seasonal median PM_{10}, $PM_{2.5}$ and PM_1 concentrations and their 25 and 75 quartile ranges measured with (a) SHARP (only PM_{10}) and (b-d) DMPS+APS.



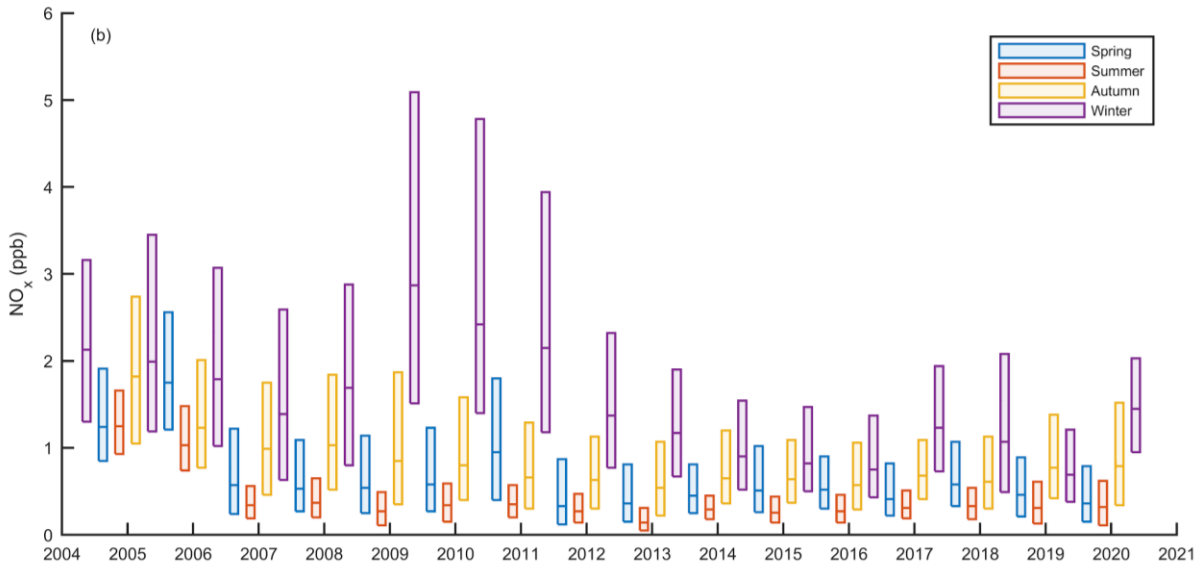
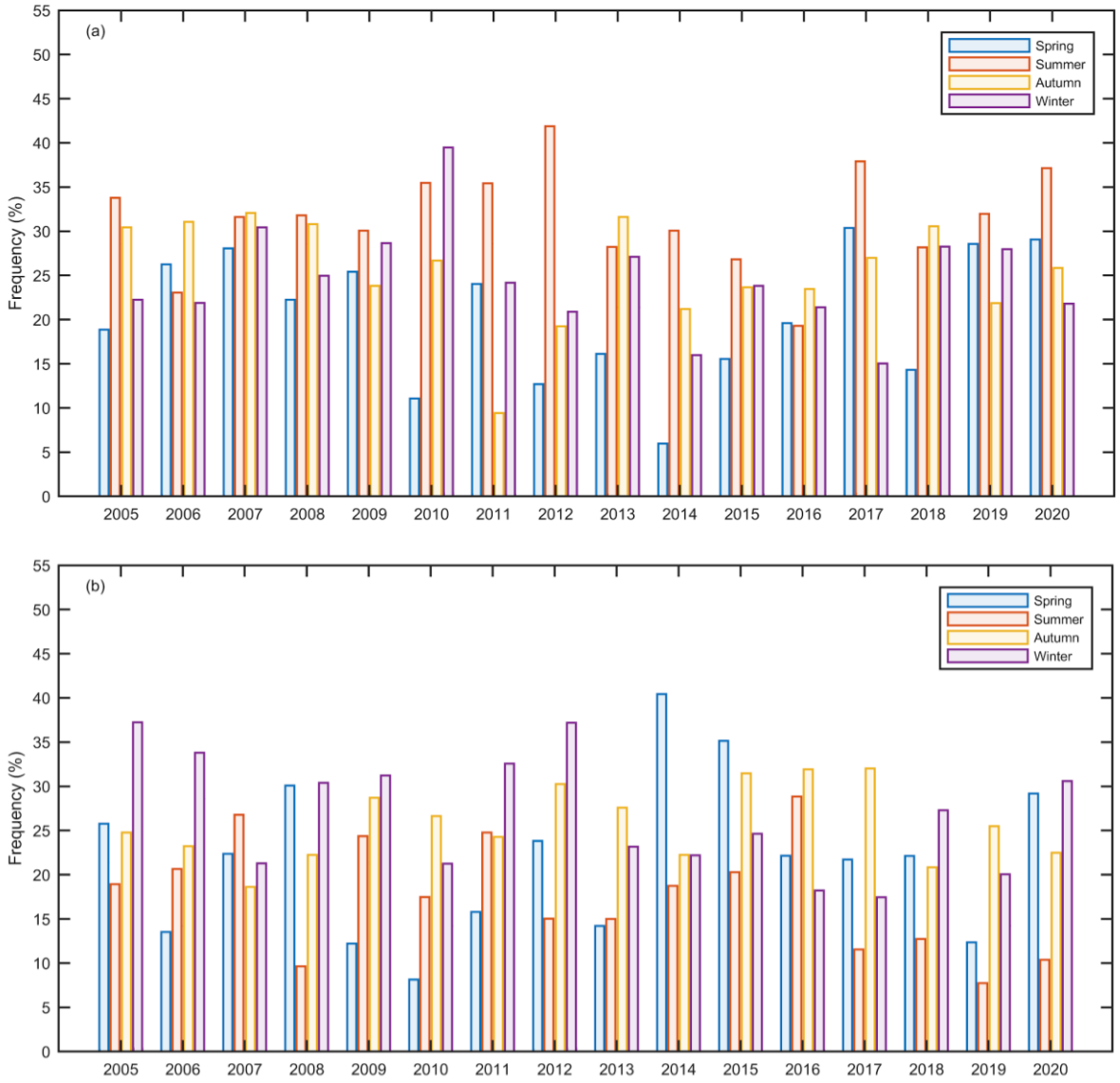


Figure S4: Seasonal median (a) SO_2 and (b) NO_x concentration and their 25 and 75 quartile ranges measured at SMEAR II.


(a)
Spring
Summer
Autumn
Winter
Frequency (%)
0
5
10
15
20
25
30
35
40
45
50
55
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020

(b)
Spring
Summer
Autumn
Winter
Frequency (%)
0
5
10
15
20
25
30
35
40
45
50
55
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020

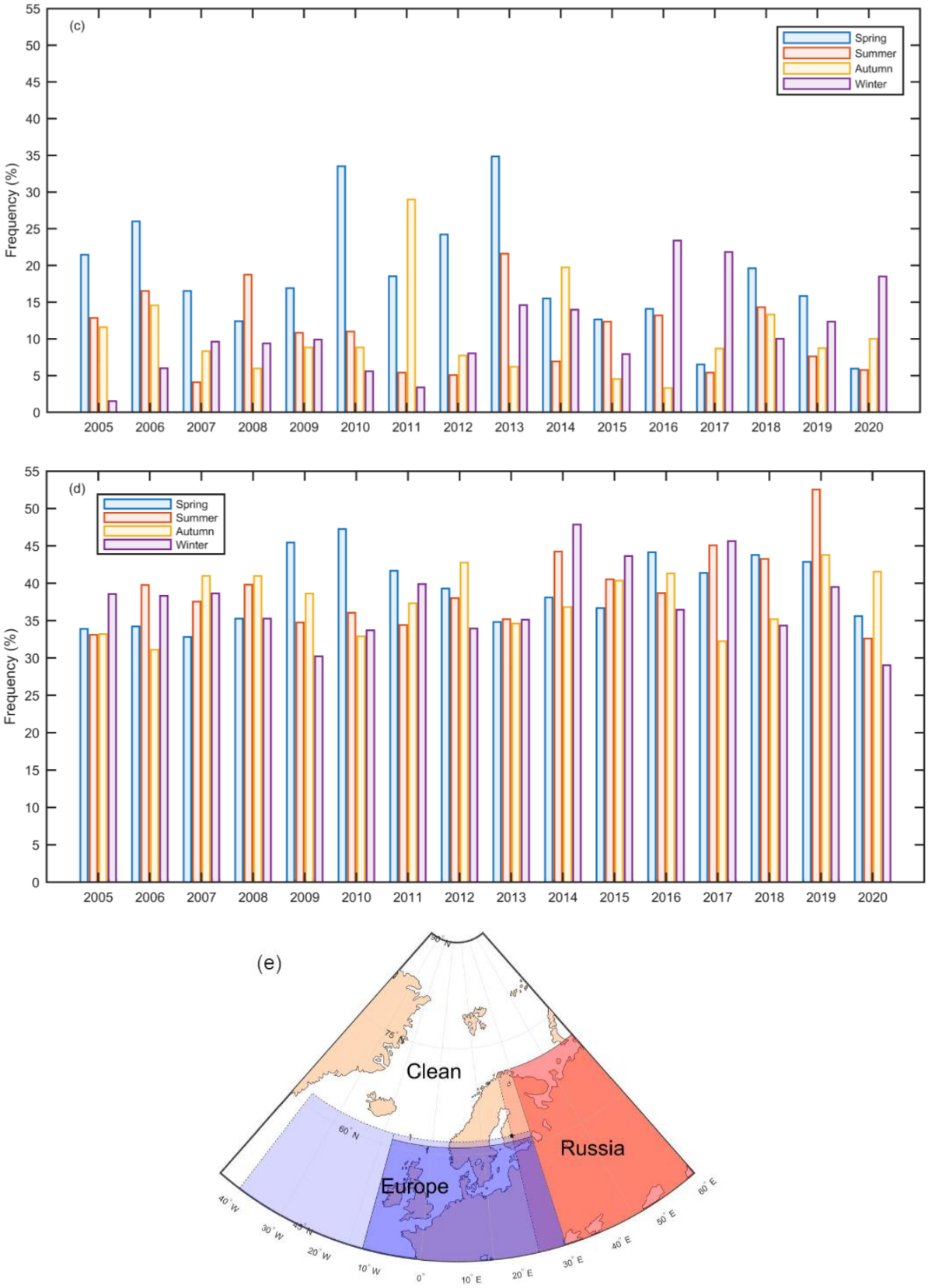


Figure S5: Seasonally divided frequency of different air mass origin sectors. (a) Clean sector, (b) European, (c) Russian, and (d) mixed sectors. (e) Map of different sectors.

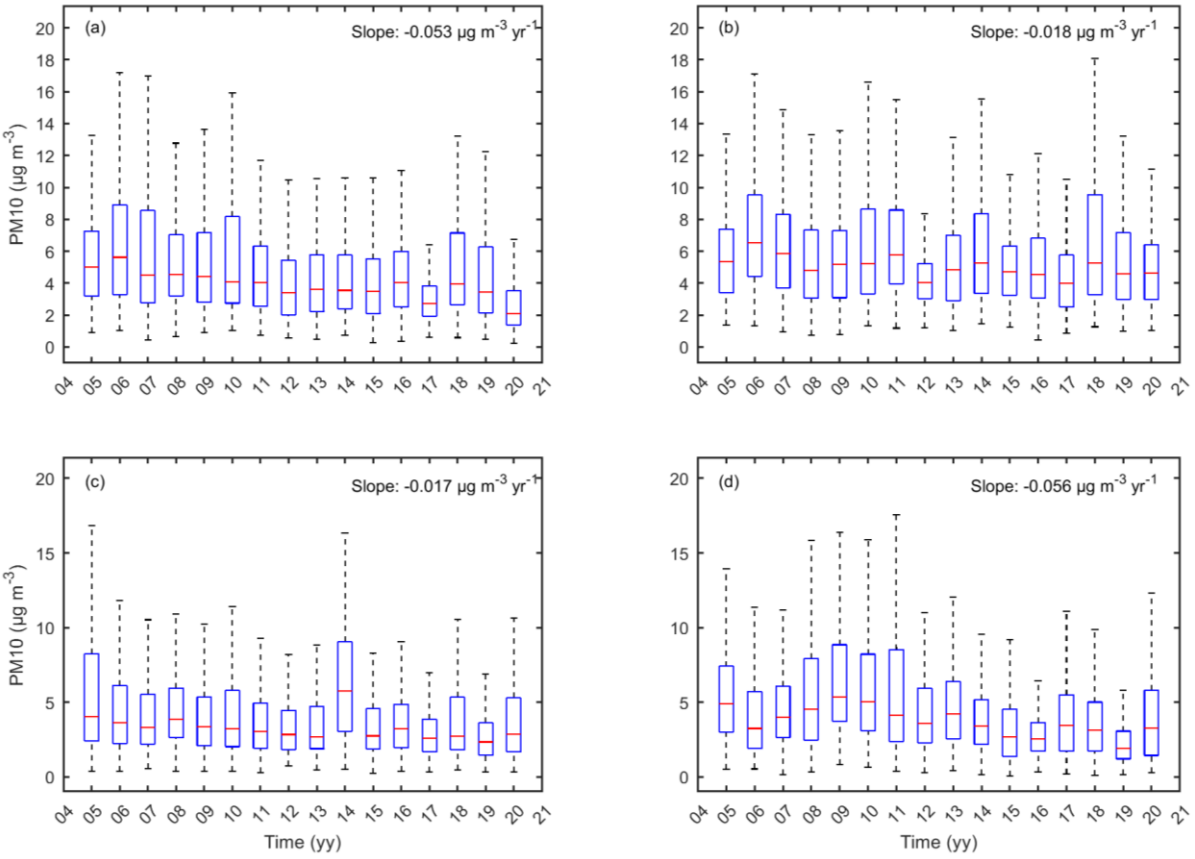


Figure S6: PM_{10} concentration with the impactor method in (a) spring, (b) summer, (c) autumn, and (d) winter. Red horizontal line represents the median, the distance between the box edges shows the interquartile range, and whiskers extend to 1.5 times the interquartile range. Outliers are not shown. Slope represents trend calculated using seasonal Mann-Kendall test. The trends were statistically significant in spring and winter, but not in summer and autumn.

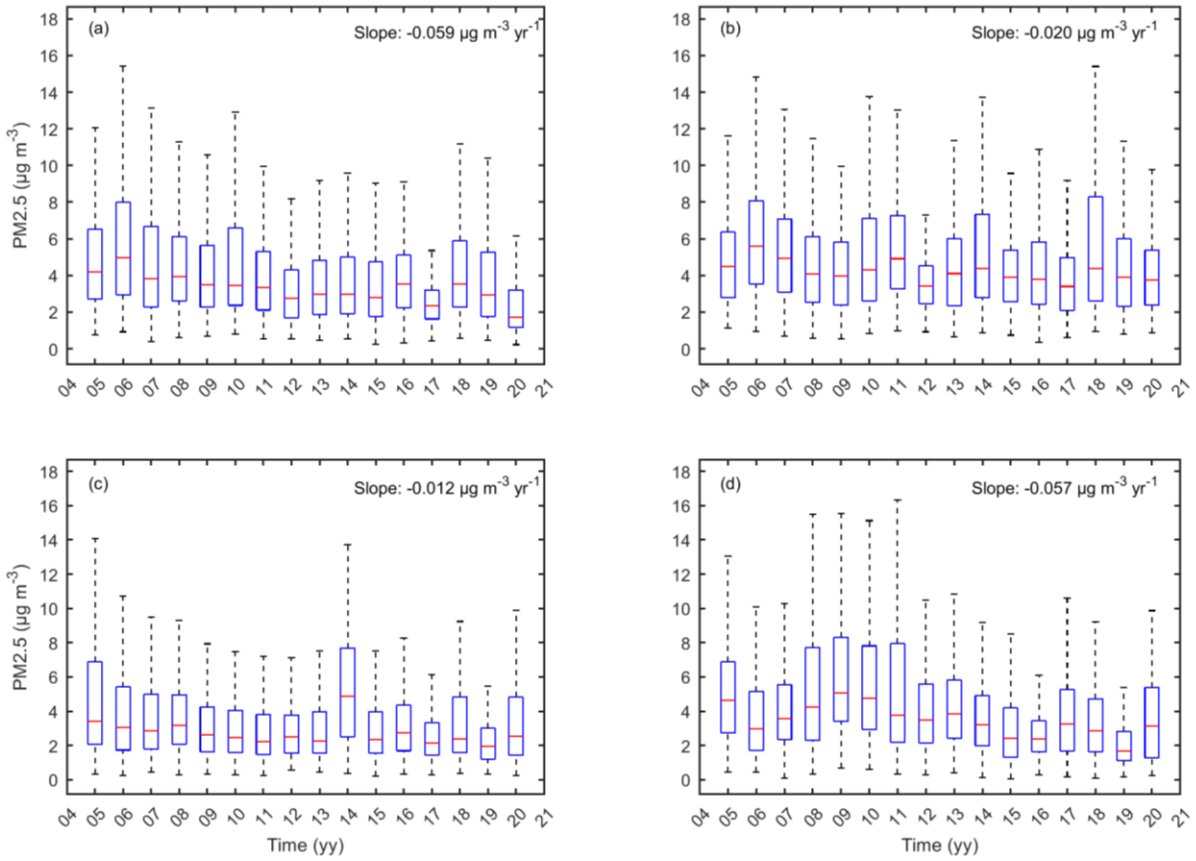


Figure S7: $PM_{2.5}$ concentration with the impactor method in (a) spring, (b) summer, (c) autumn, and (d) winter. Markers as in S5. The trends were statistically significant in spring and winter, but not in summer and autumn.

Table S1: PM trends from 6 h averaged DMPS+APS data in 2005–2020 in µg m^{-3} y^{-1}. All trends are statistically significant in 95 % significance level.

	Spring	Summer	Autumn	Winter
PM_{10}	-0.038	-0.012	-0.016	-0.066
$PM_{2.5}$	-0.034	-0.013	-0.009	-0.061
PM_1	-0.027	-0.013	-0.007	-0.042

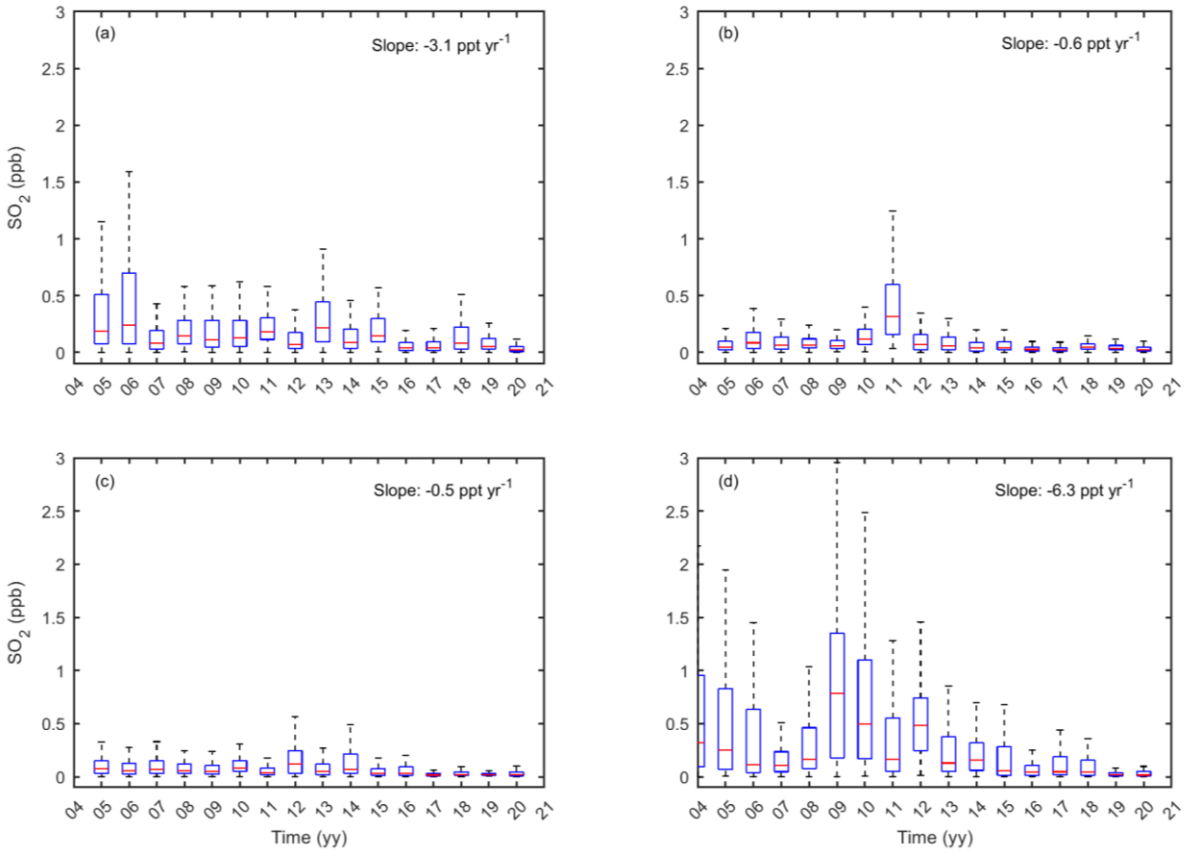


Figure S8: SO_2 concentration in (a) spring, (b) summer, (c) autumn, and (d) winter. Markers as in S5.

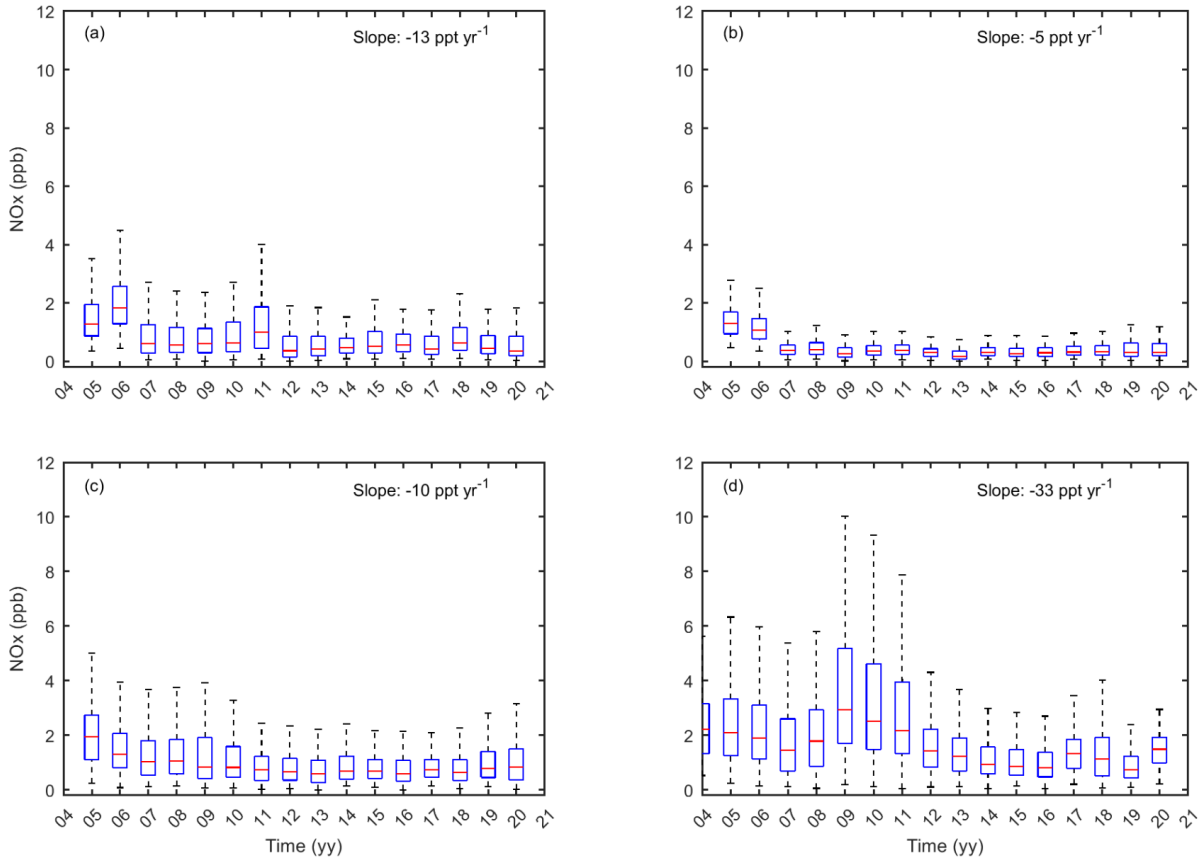


Figure S9: NO_x concentration in (a) spring, (b) summer, (c) autumn, and (d) winter. Markers as in S5.

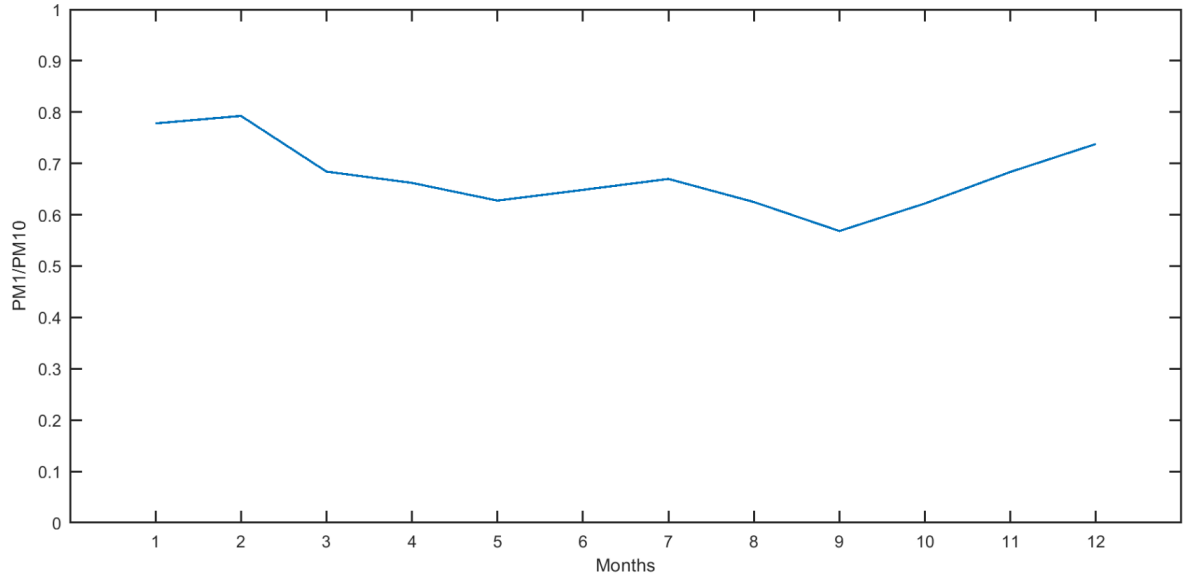


Figure S10: Monthly median PM1 to PM10 ratio using impactor data.

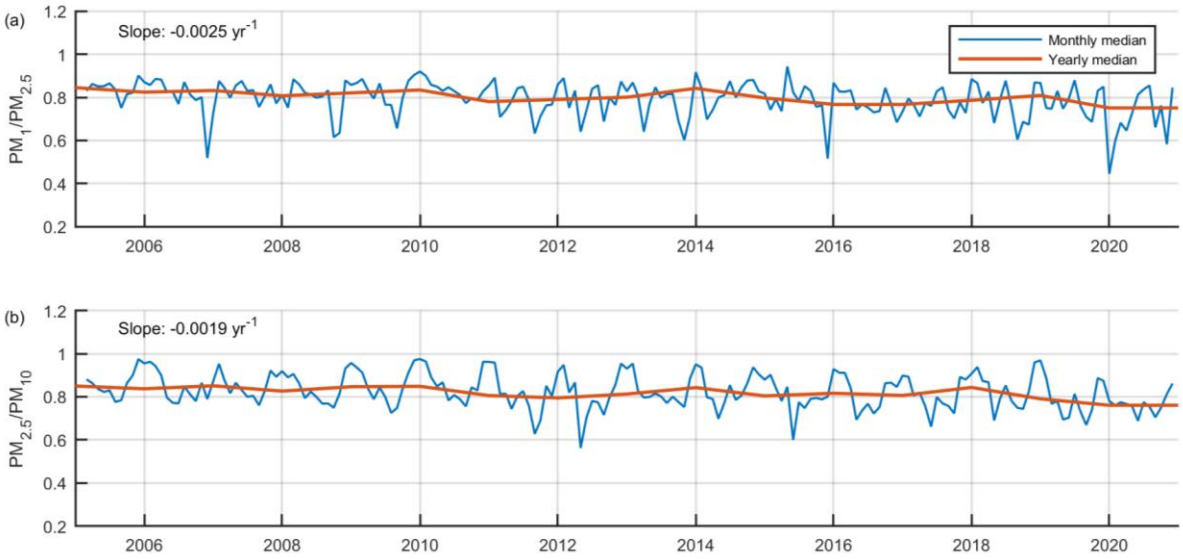


Figure S11: Timeseries of monthly (blue) and yearly (red) median (a) PM_1 to $PM_{2.5}$ and (b) $PM_{2.5}$ to PM_{10} ratios using impactor data. Slope represents trend calculated using Mann-Kendall test.