Supplementary Materials:

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Mon	Tue	Wed	Thu	Fri	Sat	Sun
15 Feb	16 **CAMPAIGN STARTS WD1**	17	18	19 **WE1**	20	21
22 **WD2** Sahara sand wind episode[1]	23	24	25 Pollution episode[2]	26 **WE2** Pollution episode[2] Rain (afternoon)	27 Sunny	28
1 Mar **WD3** Sahara sand wind episode (weak)[1]	2	3	4 Pollution episode[2] Rain (afternoon)	5 **WE3**	6	7
8 **WD4**	9 Rain (evening)	10	11 Rain (afternoon-night) Strong wind episode[3]	12 **WE4 (8)** Strong wind episode[3]	13 Rain (noon) Strong wind episode[3]	14 Strong wind episode[3]
15 **CAMPAIGN FINISHES**						

WD WE

Note: all working days (WD) and weekend (WE) definition are matched with the sampling period.

[1]https://actualite.lachainemeteo.com/actualite-meteo/2021-03-01/nouvelle-remontee-de-sable-du-sahara-sur-la-france-58539 [15] ; [2]http://www.atmo-grandest.eu/e http://www.atmo-grandest.eu/episodes-de-pollutionpisodes-de-pollution [16]; [3]https://www.francebleu.fr/infos/meteo/l-alsace-toujours-en-vigilance-jaune-vent-violence-1615556378 [17]

Figure S1. Sampling campaign calendar.

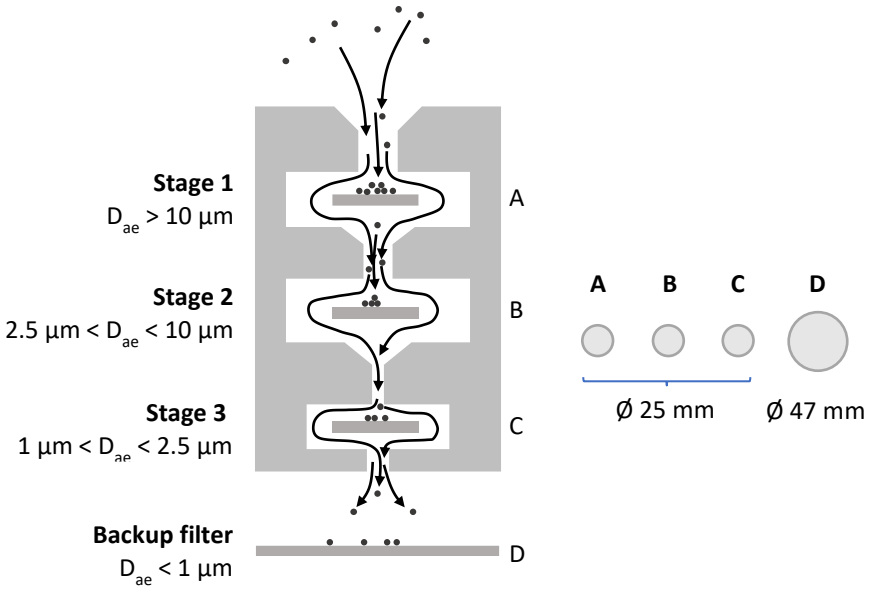


Figure S2. Scheme of three-stage cascade impactor DEKATI PM-10 and filters used.

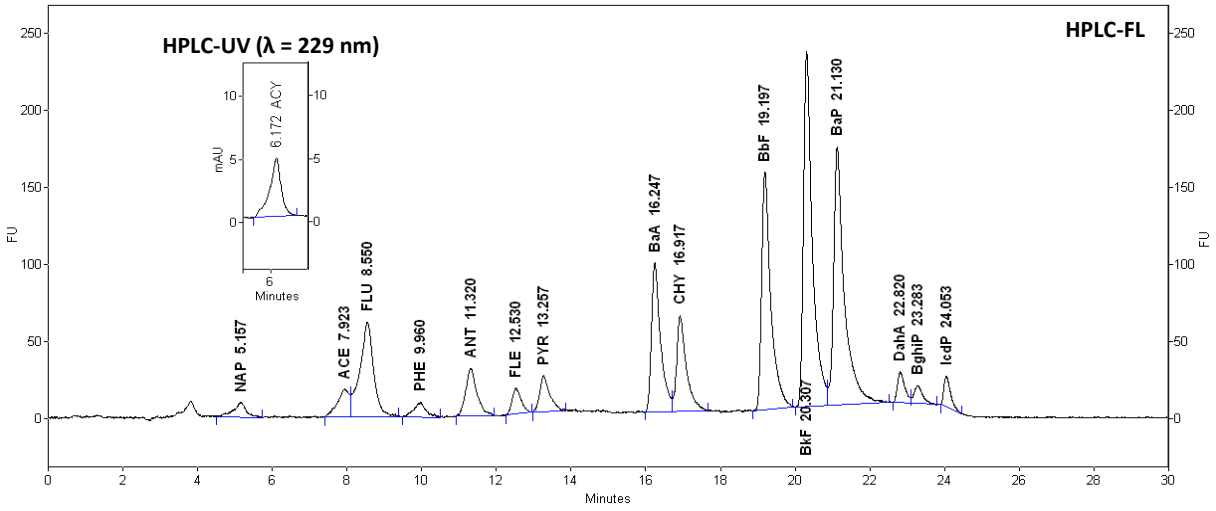
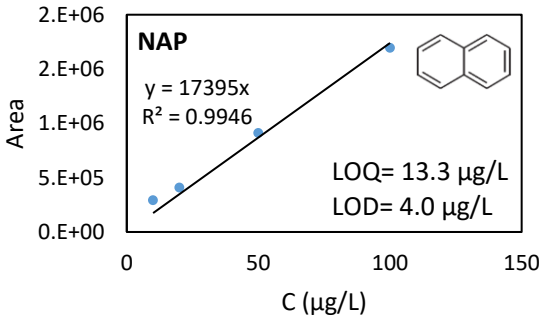
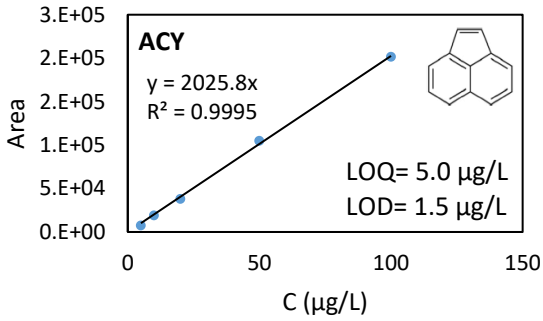
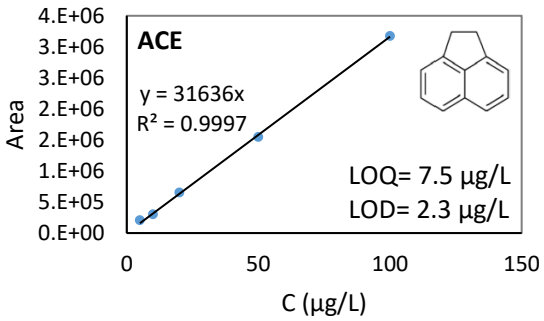
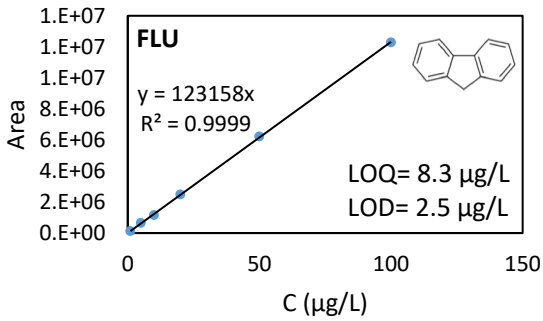


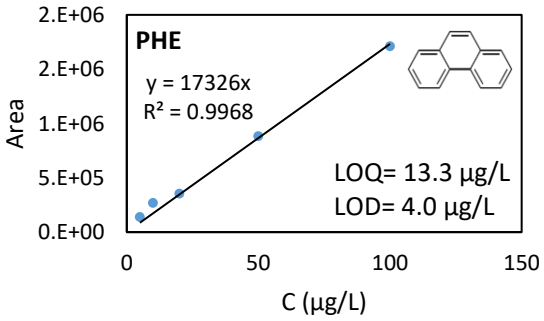
Figure S3. Chromatogram of 16 US EPA PAHs with concentration of 50 μg/L in ACN 100%.

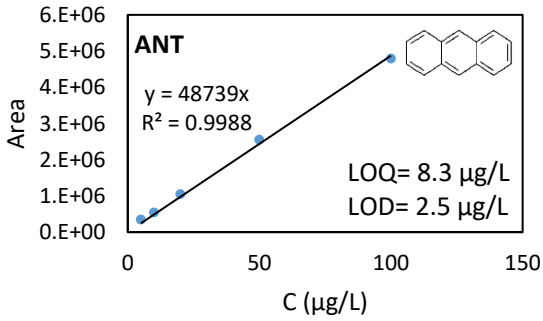

NAP
y = 17395x
R² = 0.9946
LOQ= 13.3 µg/L
LOD= 4.0 µg/L
Area
C (µg/L)
2.E+06
2.E+06
1.E+06
5.E+05
0.E+00
0
50
100
150

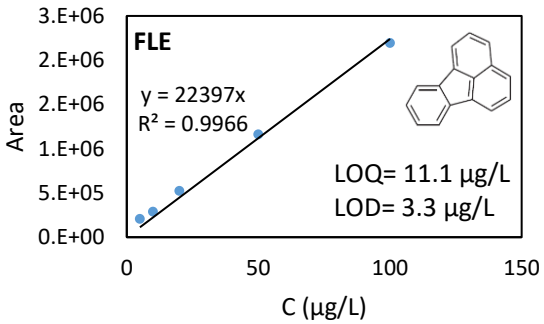

ACY
y = 2025.8x
R² = 0.9995
LOQ= 5.0 µg/L
LOD= 1.5 µg/L
Area
C (µg/L)
3.E+05
2.E+05
2.E+05
1.E+05
5.E+04
0.E+00
0
50
100
150

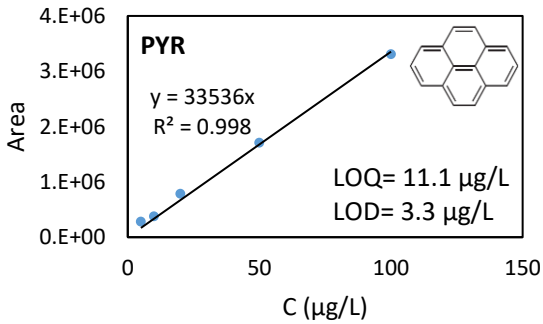

ACE
y = 31636x
R² = 0.9997
LOQ= 7.5 µg/L
LOD= 2.3 µg/L
Area
C (µg/L)
4.E+06
3.E+06
3.E+06
2.E+06
2.E+06
1.E+06
5.E+05
0.E+00
0
50
100
150


FLU
y = 123158x
R² = 0.9999
LOQ= 8.3 µg/L
LOD= 2.5 µg/L
Area
C (µg/L)
1.E+07
1.E+07
1.E+07
8.E+06
6.E+06
4.E+06
2.E+06
0.E+00
0
50
100
150


PHE
y = 17326x
R² = 0.9968
LOQ= 13.3 µg/L
LOD= 4.0 µg/L
Area
C (µg/L)
2.E+06
2.E+06
1.E+06
5.E+05
0.E+00
0
50
100
150


ANT
y = 48739x
R² = 0.9988
LOQ= 8.3 µg/L
LOD= 2.5 µg/L
Area
C (µg/L)
6.E+06
5.E+06
4.E+06
3.E+06
2.E+06
1.E+06
0.E+00
0
50
100
150


FLE
y = 22397x
R² = 0.9966
LOQ= 11.1 µg/L
LOD= 3.3 µg/L
Area
C (µg/L)
3.E+06
2.E+06
2.E+06
1.E+06
5.E+05
0.E+00
0
50
100
150


PYR
y = 33536x
R² = 0.998
LOQ= 11.1 µg/L
LOD= 3.3 µg/L
Area
C (µg/L)
4.E+06
3.E+06
2.E+06
1.E+06
0.E+00
0
50
100
150

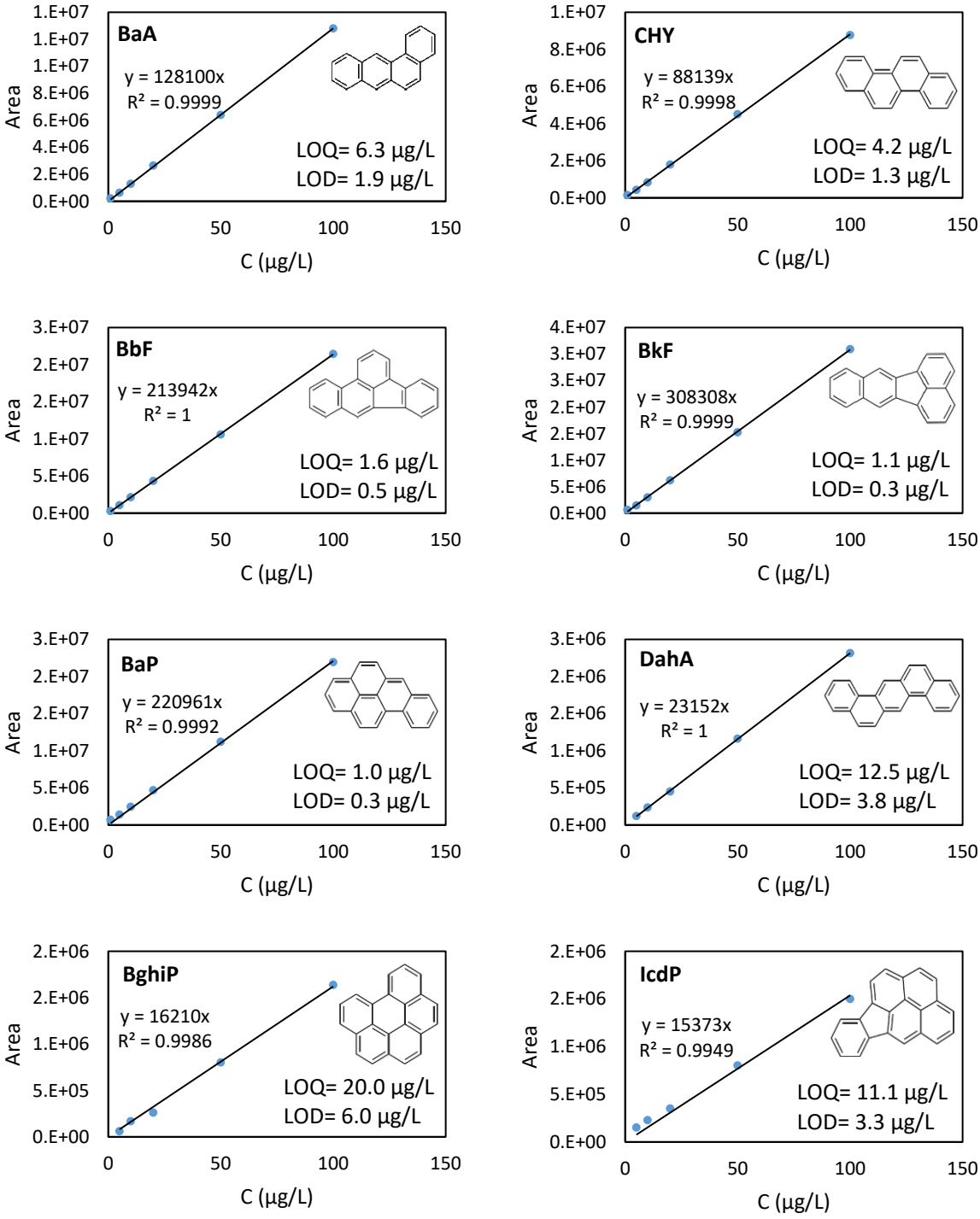
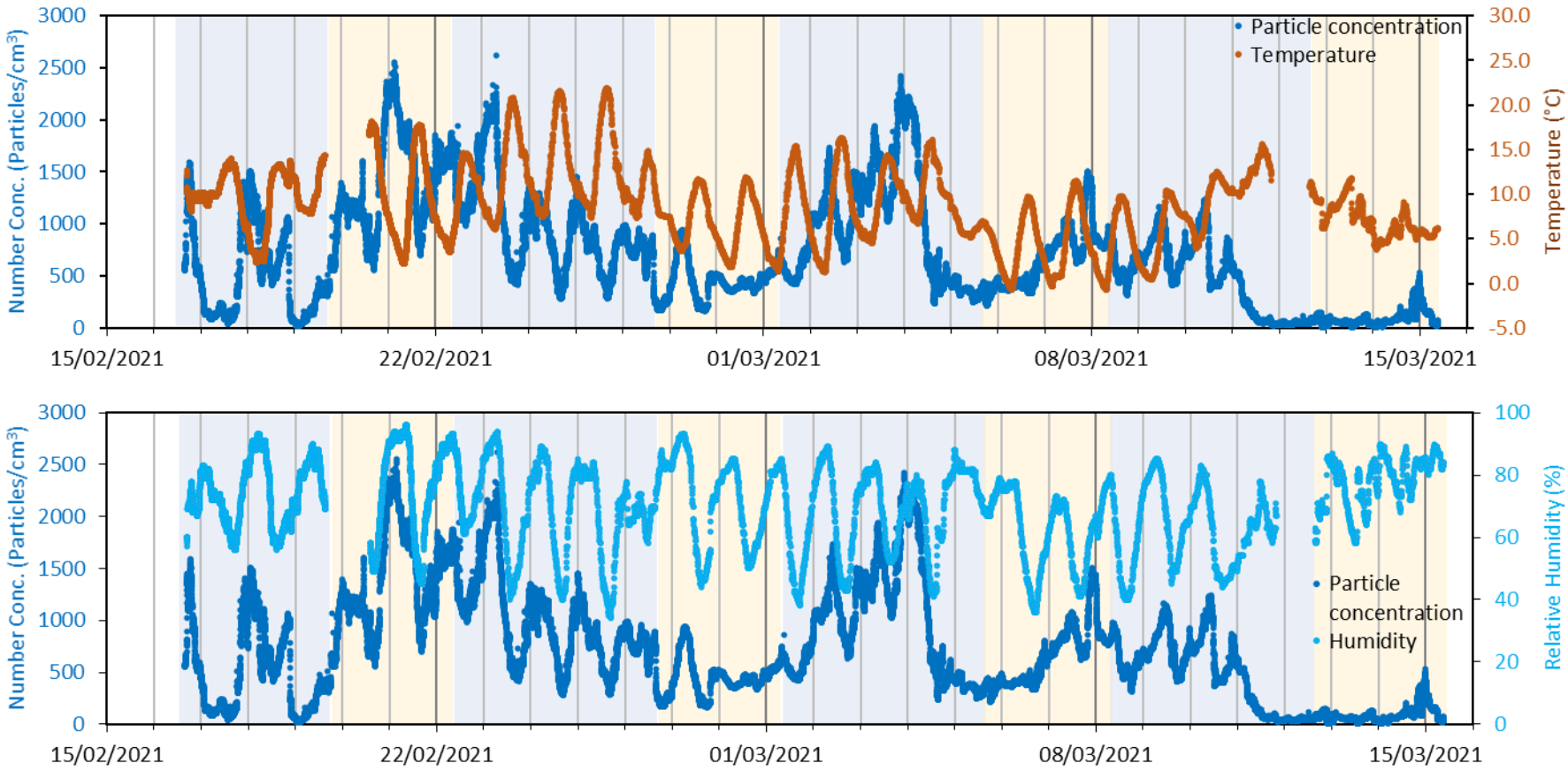


Figure S4. Calibration curves for PAH analysis in the range 10–100 µg L^{-1} for NAP; 5–100 µg L^{-1} for ACY, ACE, PHE, ANT, FLE, PYR, DahA, BghiP and IcdP; 1–100 µg L^{-1} for FLU, BaA, CHY, BbF, BkF and BaP.


Number Conc. (Particles/cm³)
3000
2500
2000
1500
1000
500
0
Particle concentration
Temperature
30.0
25.0
20.0
15.0
10.0
5.0
0.0
-5.0
Temperature (°C)
15/02/2021
22/02/2021
01/03/2021
08/03/2021
15/03/2021
Number Conc. (Particles/cm³)
3000
2500
2000
1500
1000
500
0
Particle concentration
Humidity
100
80
60
40
20
0
Relative Humidity (%)
15/02/2021
22/02/2021
01/03/2021
08/03/2021
15/03/2021

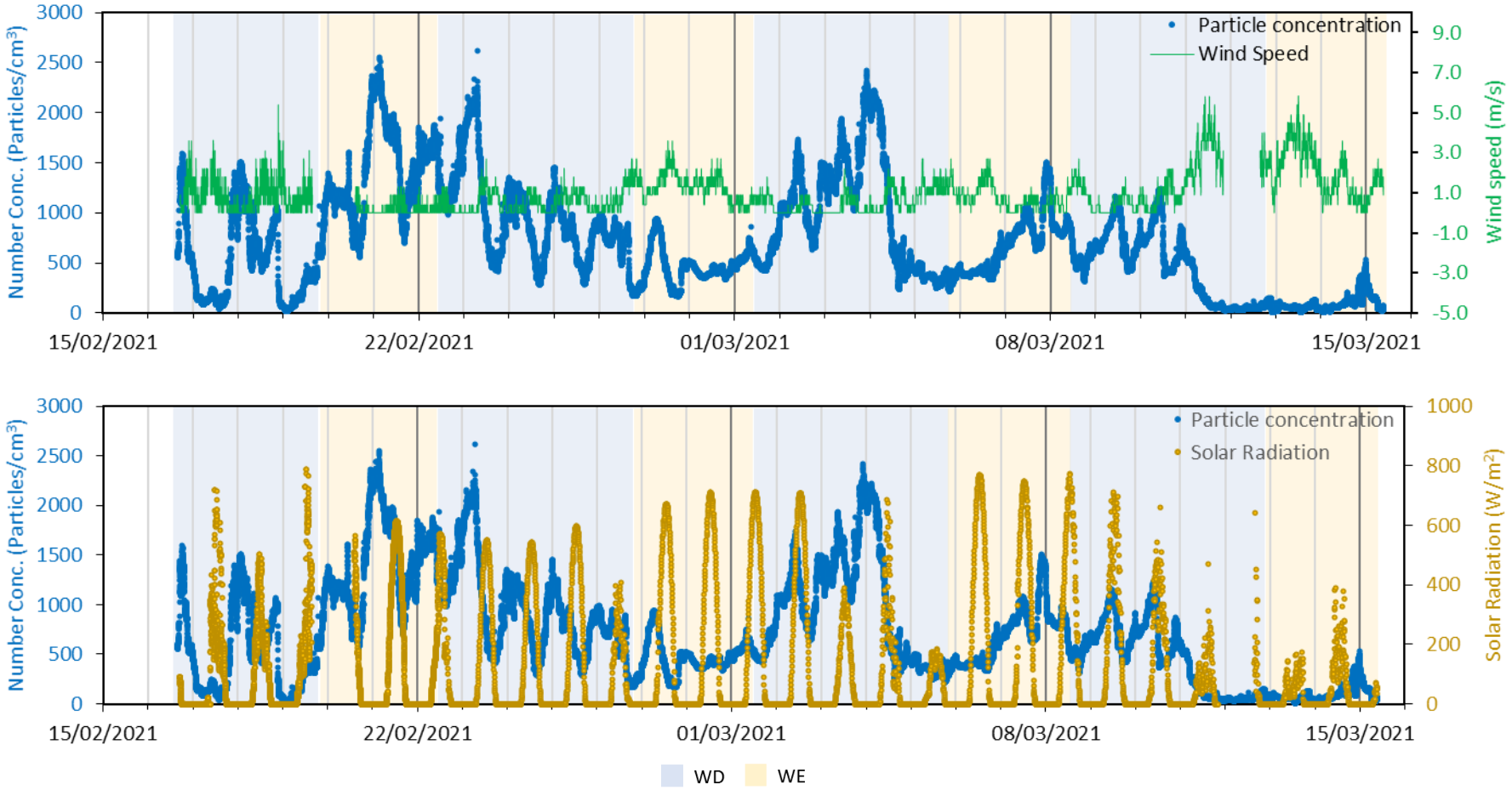
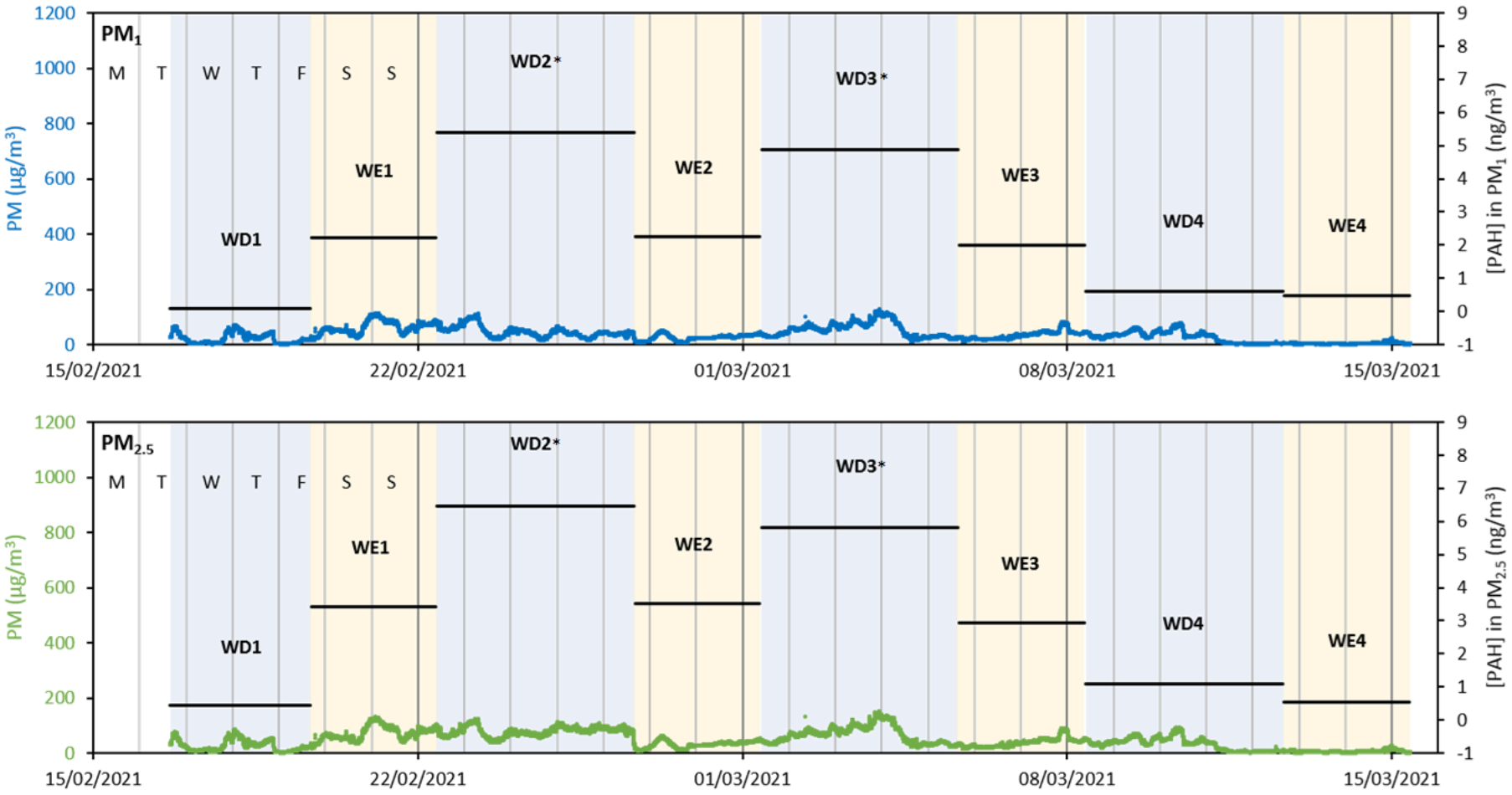


Figure S5. Variation of particle number concentration and different weather parameters (temperature, relative humidity, wind speed and solar radiation) during the experimental campaign. (* used to indicate the sampling periods when the pollution episodes occurred.).


PM1
M T W T F S S
WD1
WE1
WD2*
WE2
WD3*
WE3
WD4
WE4
PM (µg/m³)
[PAH] in PM1 (ng/m³)
15/02/2021
22/02/2021
01/03/2021
08/03/2021
15/03/2021
PM2.5
M T W T F S S
WD1
WE1
WD2*
WE2
WD3*
WE3
WD4
WE4
PM (µg/m³)
[PAH] in PM2.5 (ng/m³)
15/02/2021
22/02/2021
01/03/2021
08/03/2021
15/03/2021

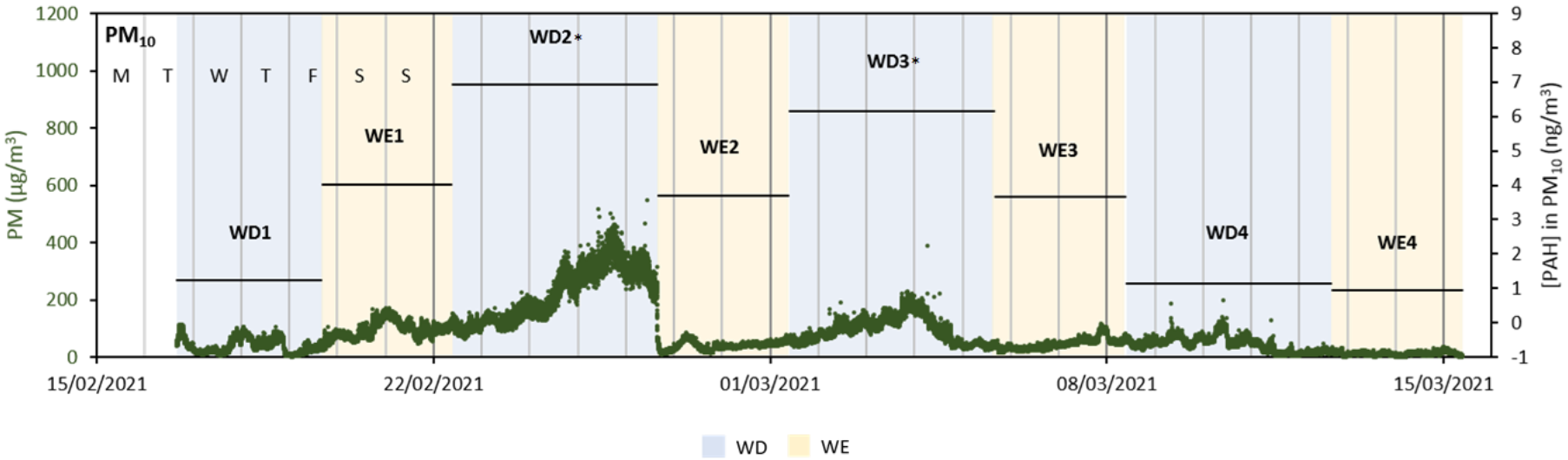
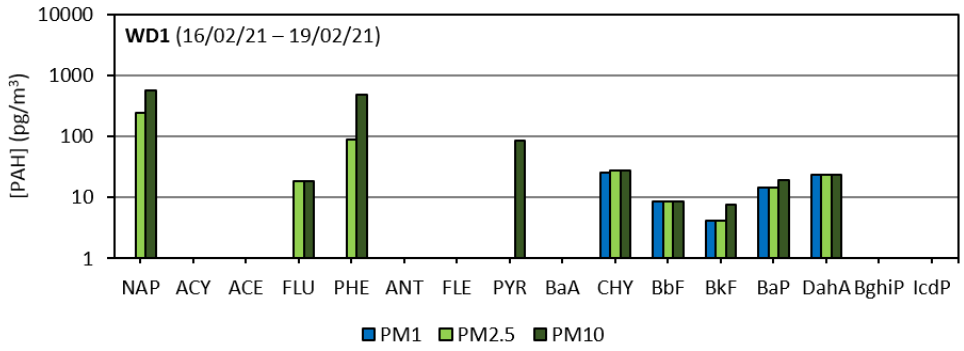
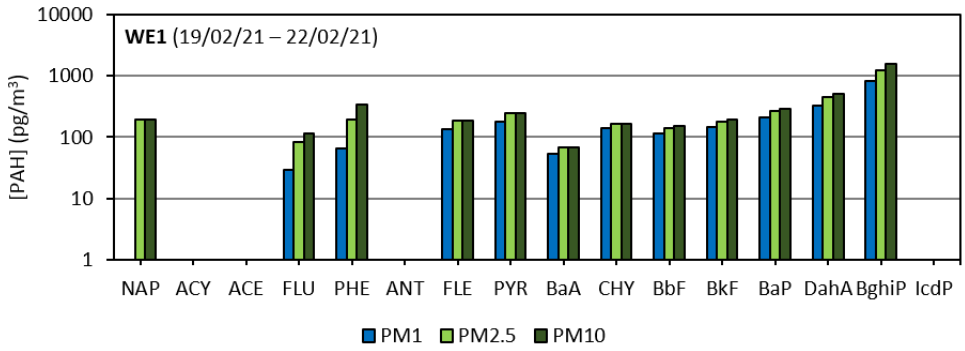
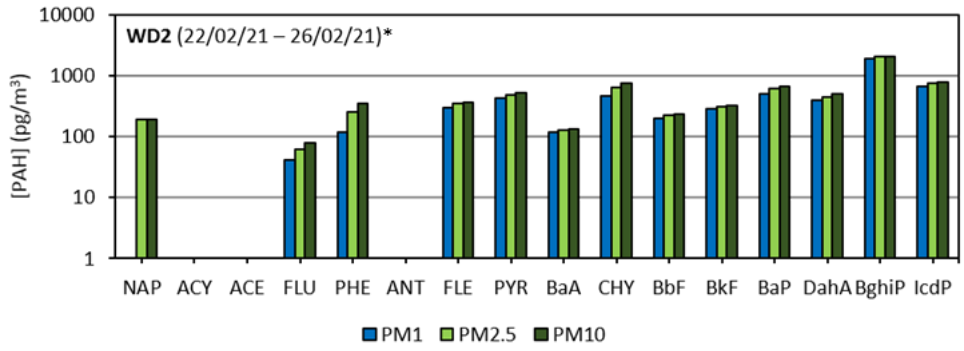
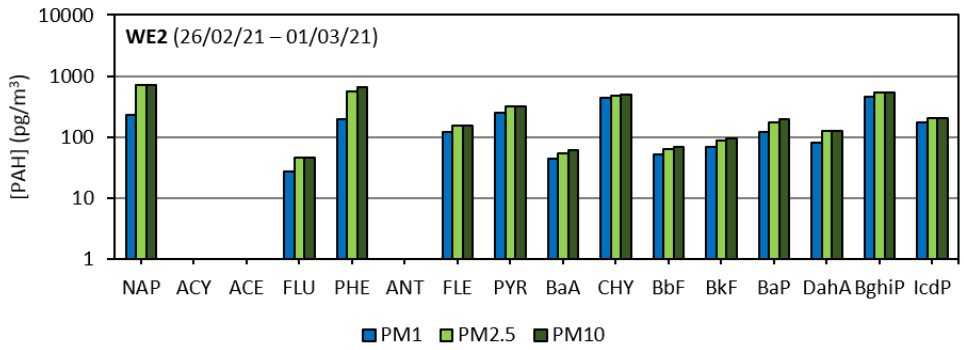


Figure S6. Temporal distribution of PM values and PAH concentration in PM fractions (PM_1, $PM_{2.5}$ and PM_{10}). (* used to indicate the sampling periods when the pollution episodes occurred.)


WD1 (16/02/21 – 19/02/21)
[PAH] (pg/m³)
10000
1000
100
10
1
NAP ACY ACE FLU PHE ANT FLE PYR BaA CHY BbF BkF BaP DahA BghiP IcdP
PM1 PM2.5 PM10


WE1 (19/02/21 – 22/02/21)
[PAH] (pg/m³)
10000
1000
100
10
1
NAP ACY ACE FLU PHE ANT FLE PYR BaA CHY BbF BkF BaP DahA BghiP IcdP
PM1 PM2.5 PM10


WD2 (22/02/21 – 26/02/21)*
[PAH] (pg/m³)
10000
1000
100
10
1
NAP ACY ACE FLU PHE ANT FLE PYR BaA CHY BbF BkF BaP DahA BghiP IcdP
PM1 PM2.5 PM10


WE2 (26/02/21 – 01/03/21)
[PAH] (pg/m³)
10000
1000
100
10
1
NAP ACY ACE FLU PHE ANT FLE PYR BaA CHY BbF BkF BaP DahA BghiP IcdP
PM1 PM2.5 PM10

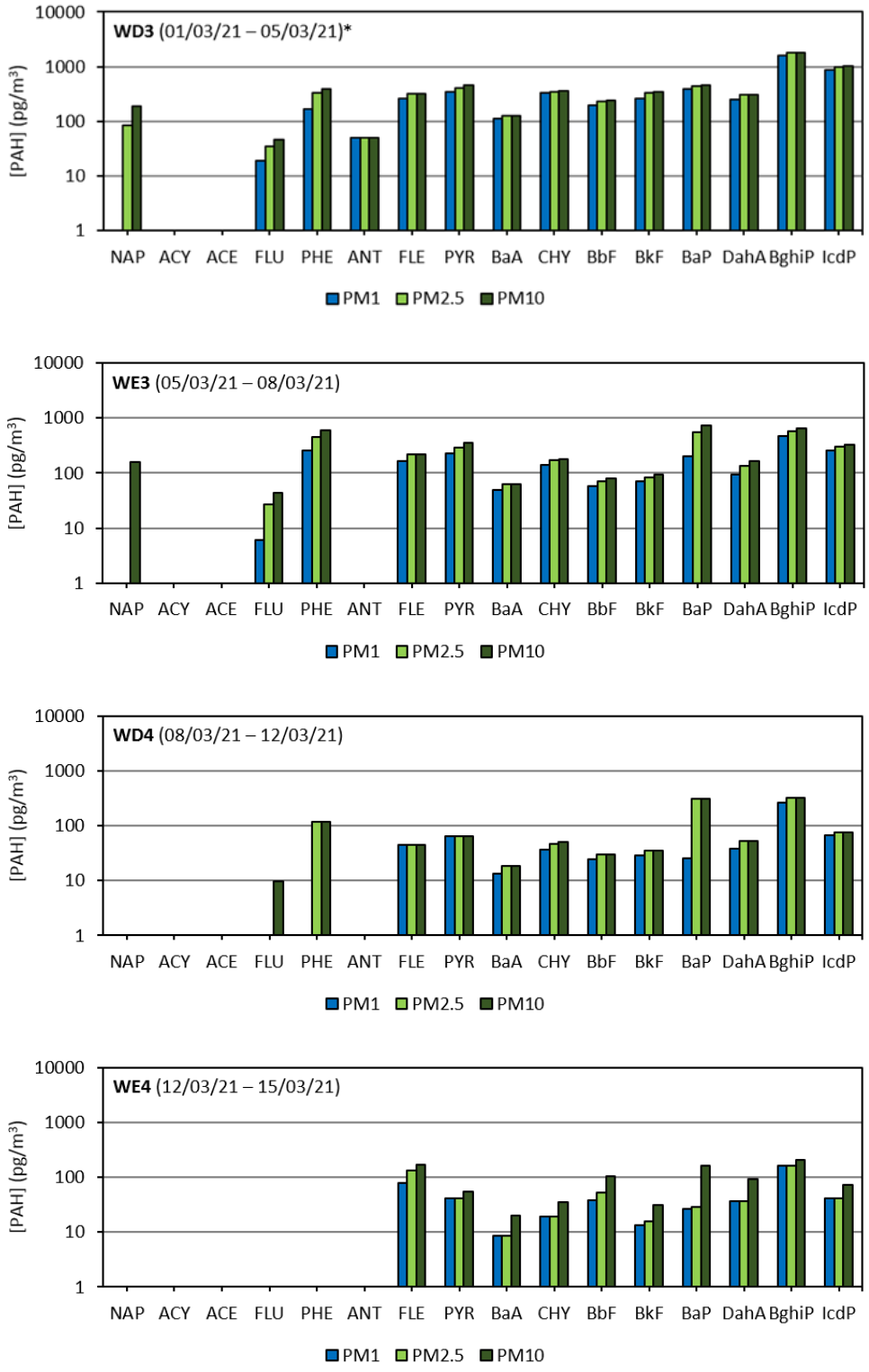
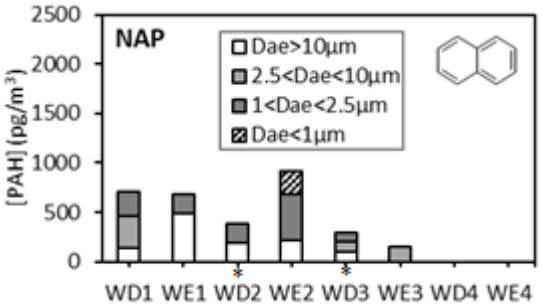
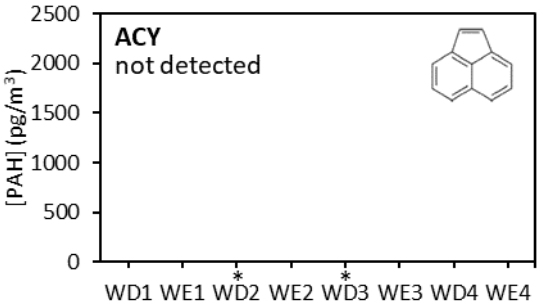
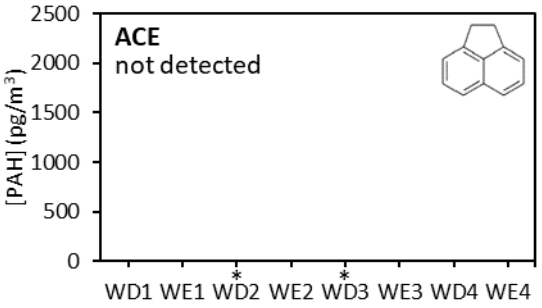
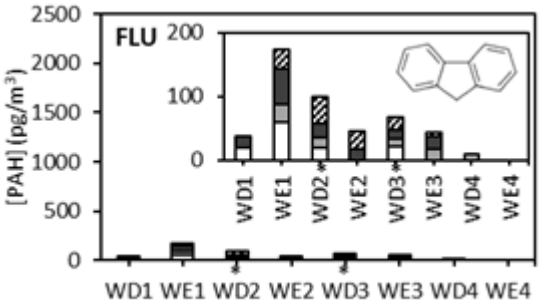


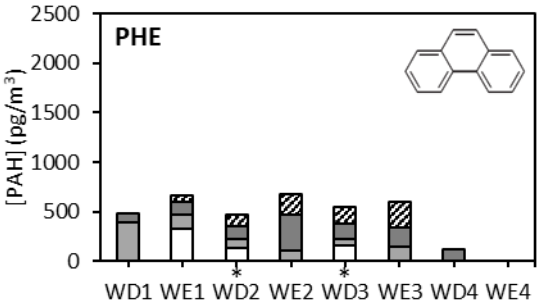
Figure S7. Individual PAH concentration in PM fractions (PM_1, $PM_{2.5}$ and PM_{10}) for the different sampling periods. (* used to indicate the sampling periods when the pollution episodes occurred.).

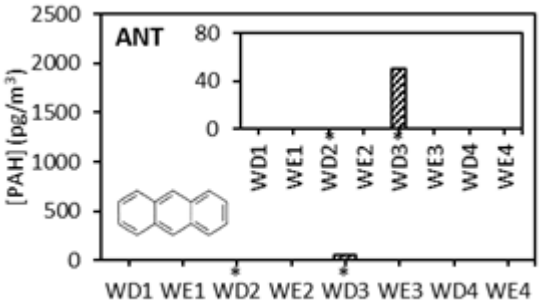

NAP
Dae>10µm
2.5<Dae<10µm
1<Dae<2.5µm
Dae<1µm
[PAH] (pg/m³)
2500
2000
1500
1000
500
0
WD1 WE1 WD2 WE2 WD3 WE3 WD4 WE4

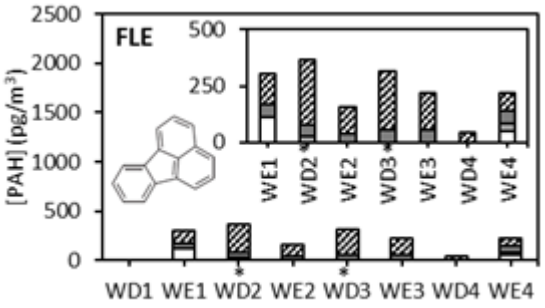

ACY
not detected
[PAH] (pg/m³)
2500
2000
1500
1000
500
0
WD1 WE1 WD2 WE2 WD3 WE3 WD4 WE4

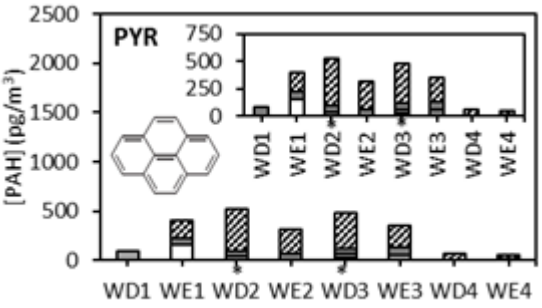

ACE
not detected
[PAH] (pg/m³)
2500
2000
1500
1000
500
0
WD1 WE1 WD2 WE2 WD3 WE3 WD4 WE4

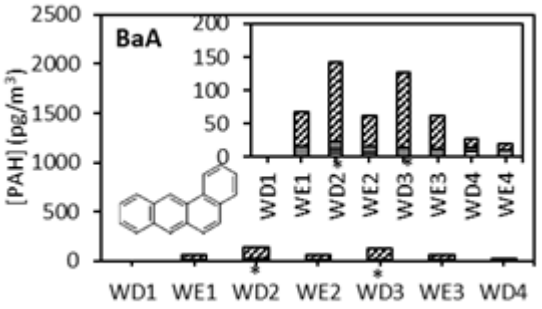

FLU
200
100
0
WD1 WE1 WD2 WE2 WD3 WE3 WD4 WE4
[PAH] (pg/m³)
2500
2000
1500
1000
500
0
WD1 WE1 WD2 WE2 WD3 WE3 WD4 WE4

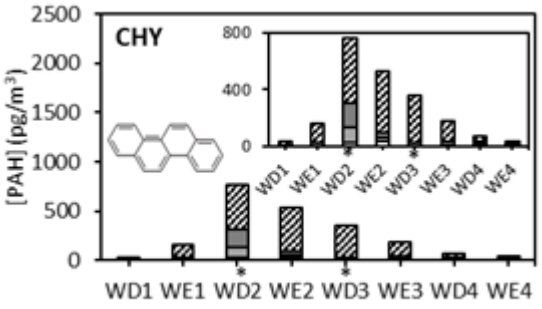

PHE
[PAH] (pg/m³)
2500
2000
1500
1000
500
0
WD1 WE1 WD2 WE2 WD3 WE3 WD4 WE4


ANT
80
40
0
WD1 WE1 WD2 WE2 WD3 WE3 WD4 WE4
[PAH] (pg/m³)
2500
2000
1500
1000
500
0
WD1 WE1 WD2 WE2 WD3 WE3 WD4 WE4


FLE
500
250
0
WE1 WD2 WE2 WD3 WE3 WD4 WE4
[PAH] (pg/m³)
2500
2000
1500
1000
500
0
WD1 WE1 WD2 WE2 WD3 WE3 WD4 WE4


PYR
750
500
250
0
WD1 WE1 WD2 WE2 WD3 WE3 WD4 WE4
[PAH] (pg/m³)
2500
2000
1500
1000
500
0
WD1 WE1 WD2 WE2 WD3 WE3 WD4 WE4


BaA
200
150
100
50
0
WD1 WE1 WD2 WE2 WD3 WE3 WD4 WE4
[PAH] (pg/m³)
2500
2000
1500
1000
500
0
WD1 WE1 WD2 WE2 WD3 WE3 WD4


CHY
800
400
0
WD1 WE1 WD2 WE2 WD3 WE3 WD4 WE4
[PAH] (pg/m³)
2500
2000
1500
1000
500
0
WD1 WE1 WD2 WE2 WD3 WE3 WD4 WE4

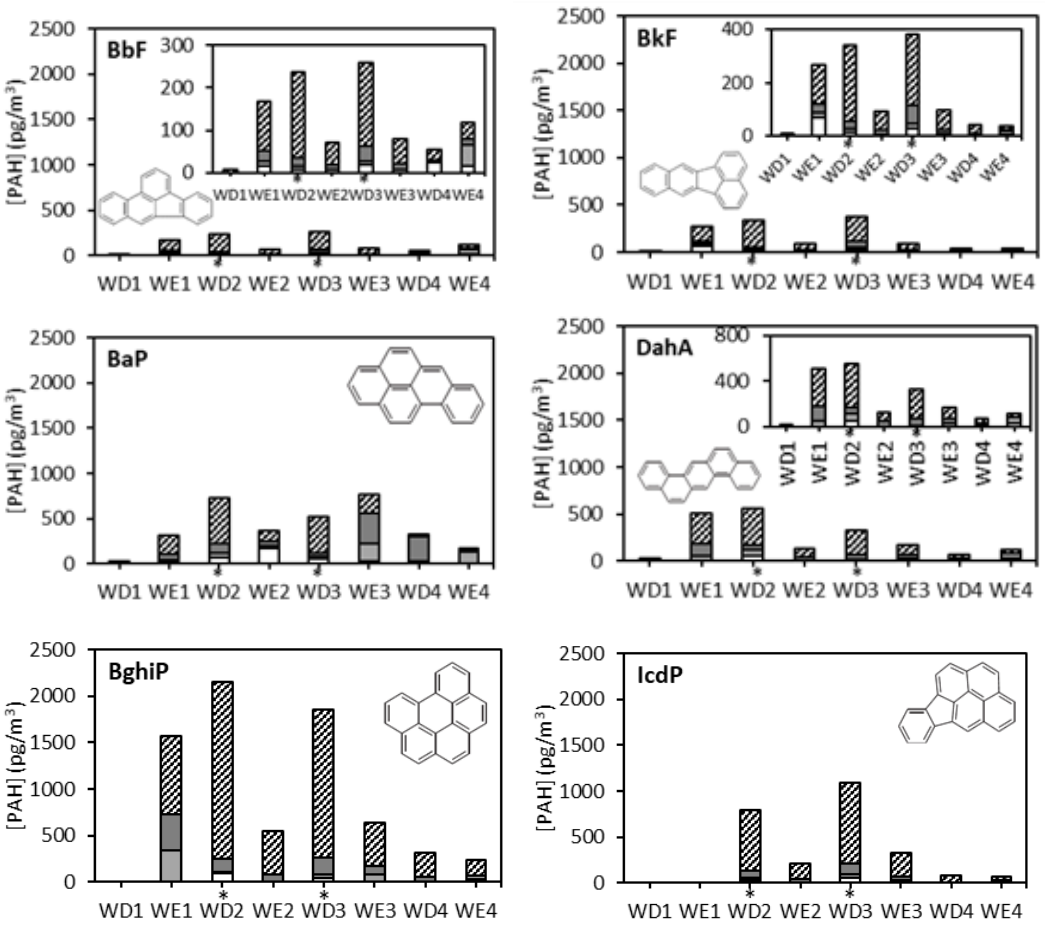


Figure S8. Temporal distribution of individual PAH concentration corresponding to collection plates (D_{ae} > 10 μm, 10 μm > D_{ae} > 2.5 μm, and 2.5 μm > D_{ae} > 1 μm). (* used to indicate the sampling periods when the pollution episodes occurred.)

Table S1. Normalized PAH in each PM fraction.

Period	PAH/PM ratio (ng/μg)		
	PAH in PM1/PM1 a	PAH in PM2.5/PM2.5 a	PAH in PM10/PM10 a
WD1	0.01 (7%)	0.05 (41%)	0.07 (52%)
WE1	0.06 (33%)	0.06 (32%)	0.06 (35%)
WD2*	0.21 (50%)	0.13 (30%)	0.09 (20%)
WE2	0.20 (37%)	0.20 (37%)	0.14(26%)
WD3*	0.13 (39%)	0.12 (36%)	0.09 (25%)
WE3	0.48 (43%)	0.32 (29%)	0.31 (28%)
WD4	0.08 (28%)	0.11 (40%)	0.09 (32%)
WE4	0.10 (52%)	0.05 (25%)	0.04 (22%)

values in brackets indicate the percentage of each fraction

* indicates the sampling period when the pollution episodes occurred.

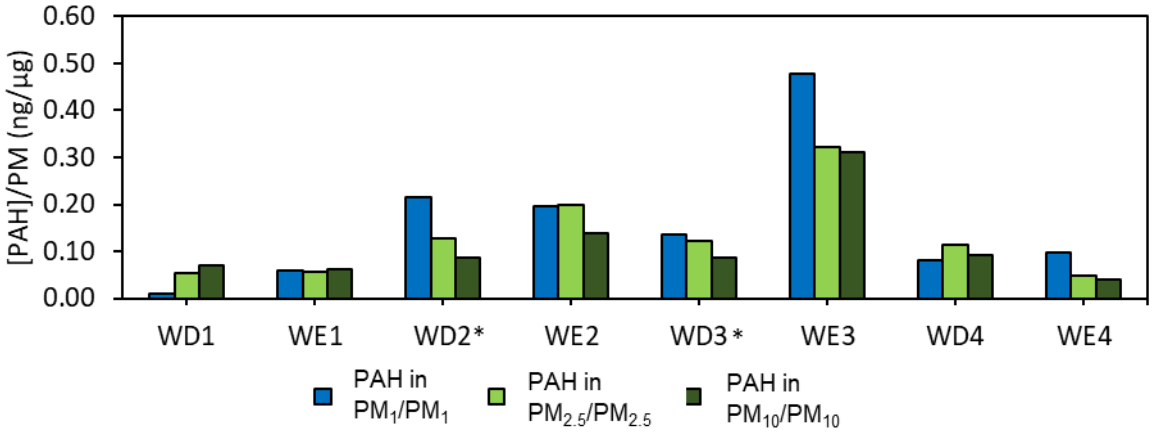


Figure S9. Normalized PAH concentration in each PM fraction. (* used to indicate the sampling periods when the pollution episodes occurred.)

Table S2. BaP_{eq} values.

Period	BaP_{eq} (pg/m^3)[a]
WD1	56.1
WE1	900.5
WD2*	1462.5
WE2	551.2
WD3*	1056.5
WE3	995.2
WD4	424.3
WE4	312.0

Values in red surpass the BaP target value established by the EU.

* indicates the sampling period when the pollution episodes occurred.