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Evaluation of Low-Cost Sensors for Ambient $PM_{2.5}$ Monitoring – Supplementary Material

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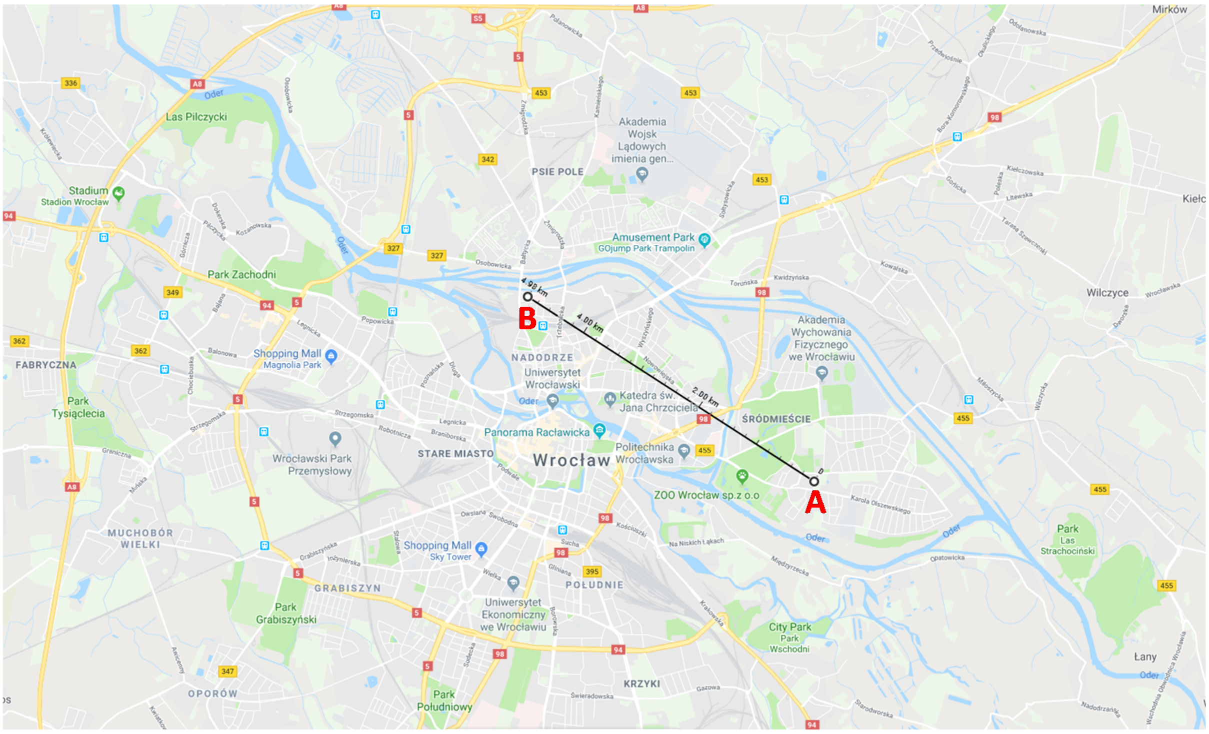

Figure S1: Location of measurement stations: A – Meteorological Observatory of Department of Climatology and Atmosphere Protection of University of Wrocław (Kosiby Street: 51°06'18.6" N; 17°05'21.4" E) equipped with TEOM analyser; B – Urban background station of Voivodeship Inspection for Environmental Protection (Wybrzeże Conrada-Korzeniowskiego: 51º07'45.9"N; 17º01'45.4"E) equipped with BAM analyser. The distance between points A and B is 4.98 km.

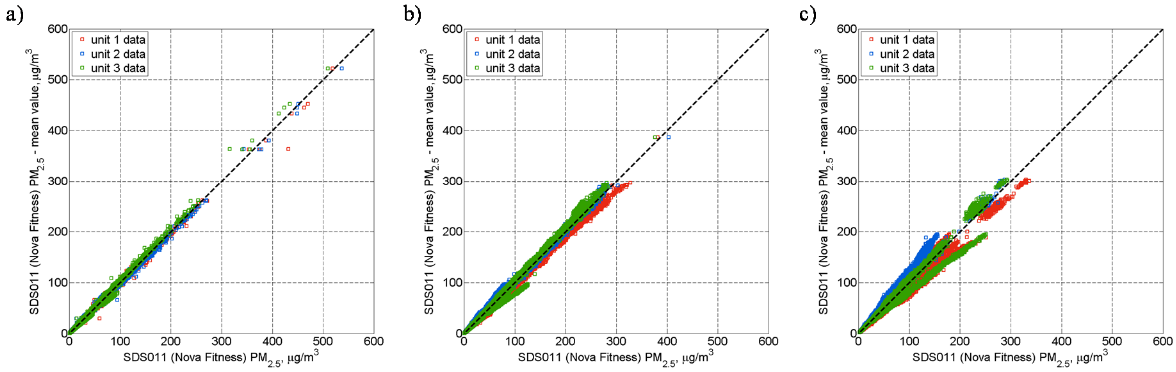

Figure S2: Scatterplots of SDS011 units outputs versus the mean values of the 1-minute averaged data for: a) RH ≤ 80% (113 396 data points), b) 80% < RH ≤ 90% (91 836 data points), c) RH > 90% (25 979 data points). Dashed lines denote the ideal relationship.

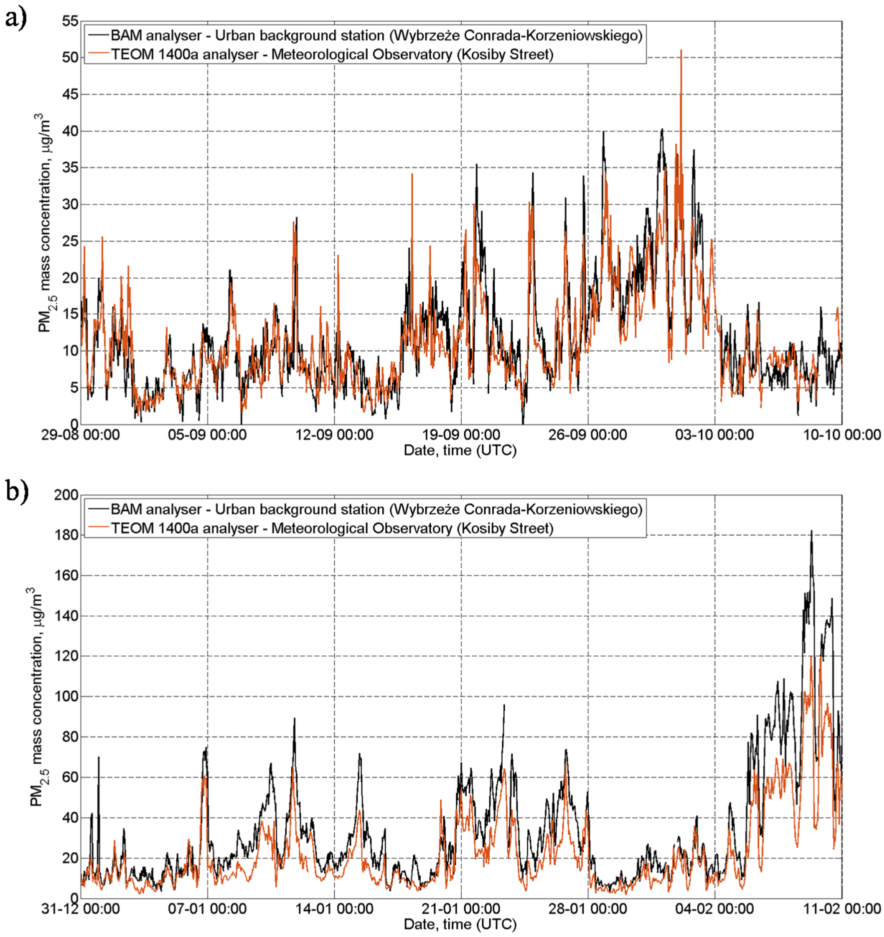

Figure S3: Examples of 1-hour averaged data from governmental urban background station (BAM analyser) and from meteorological observatory of University of Wrocław (TEOM 1400a analyser) for:
a) non-heating period, b) heating period.

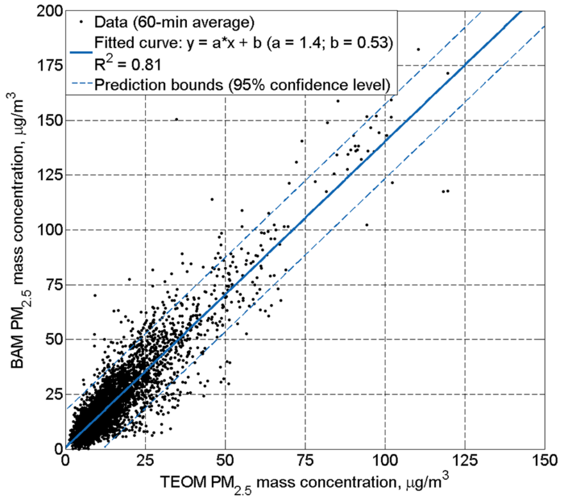

Figure S4: Relationship between BAM analyser from governmental urban background station (Wybrzeże Conrada-Korzeniowskiego) and TEOM 1400a analyser from meteorological observatory of University of Wrocław (Kosiby Street).

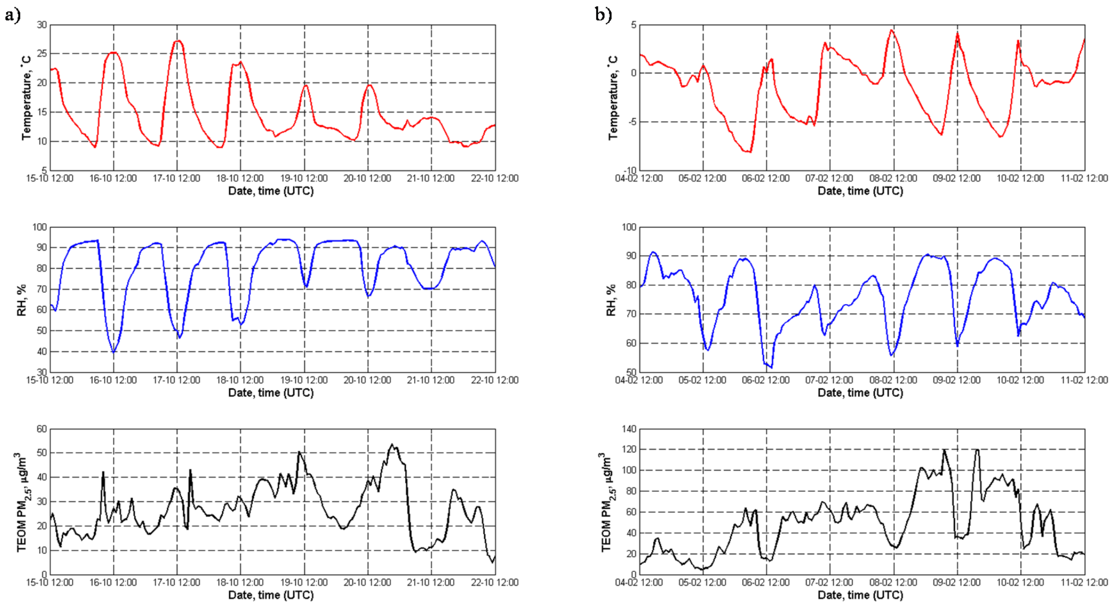

Figure S5: Examples of diurnal variation of temperature, relative humidity and $PM_{2.5}$ concentration: a) at the beginning of the heating period, b) in the middle of the heating period.

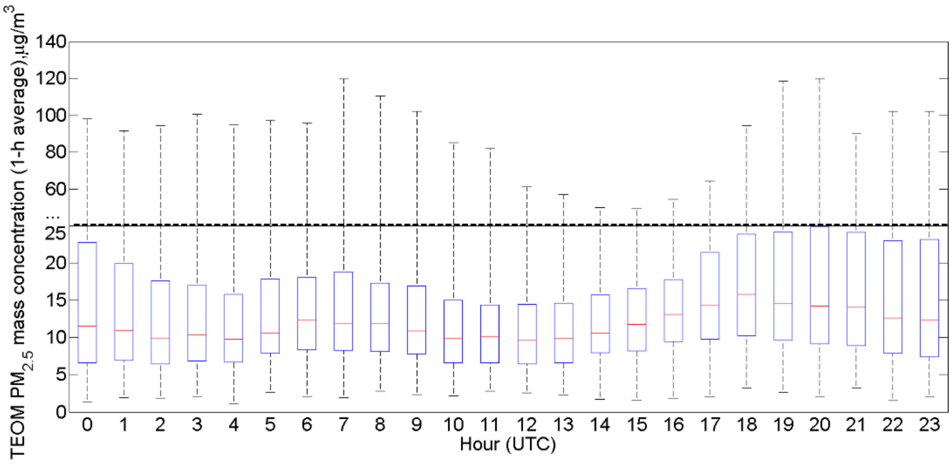

Figure S6: Box plot of daily distribution of TEOM $PM_{2.5}$ concentrations during measuring campaign. Distribution based on 1-hour averages. The central red mark indicates the median; the bottom and top edges of the box indicate the 25th and 75th percentiles, respectively; the whiskers extend to the most extreme data points. Dashed line denotes the break on Y-axis.

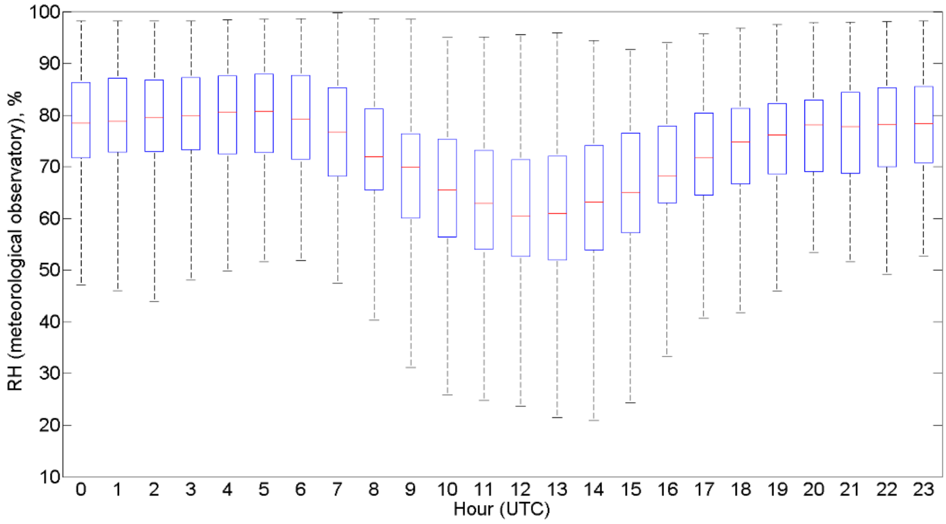

Figure S7: Box plot of daily distribution of relative humidity (RH) values during measuring campaign. Distribution based on 1-hour averages. The central red mark indicates the median; the bottom and top edges of the box indicate the 25th and 75th percentiles, respectively; the whiskers extend to the most extreme data points.

Table S1: Parameters of linear fittings for tested PM sensors and 1-min averages: *a* – slope, *b* – intercept.

Sensor model	SDS011			ZH03A			PMS7003			PMS7003 "AE"			OPC-N2		
Unit	1	2	3	1*	2**	3	1	2	3	1	2	3	1	2	3
a	0.35	0.39	0.38	-	0.34	0.31	0.26	0.27	0.28	0.41	0.42	0.43	0.20	0.19	0.13
b	5.17	4.88	5.06	-	7.48	4.01	3.53	3.49	3.34	1.04	0.94	0.69	8.40	10.17	9.97

*Unit No. 1 was excluded from calculations due to malfunction
**Calculations for Unit No. 2 for the period 21/08/2017 – 24/12/2017, before sensor replacement

Table S2: Parameters of linear fittings for tested PM sensors and 15-min averages: *a* – slope, *b* – intercept.

Sensor model	SDS011			ZH03A			PMS7003			PMS7003 "AE"			OPC-N2		
Unit	1	2	3	1*	2**	3	1	2	3	1	2	3	1	2	3
a	0.35	0.40	0.38	-	0.34	0.32	0.26	0.28	0.29	0.41	0.42	0.43	0.20	0.19	0.13
b	5.11	4.79	4.99	-	7.43	3.63	3.44	3.39	3.23	0.92	0.81	0.55	8.38	10.16	9.96

*Unit No. 1 was excluded from calculations due to malfunction
**Calculations for Unit No. 2 for the period 21/08/2017 – 24/12/2017, before sensor replacement

Table S3: Parameters of linear fittings for tested PM sensors and 1-hour averages: *a* – slope, *b* – intercept.

Sensor model	SDS011			ZH03A			PMS7003			PMS7003 "AE"			OPC-N2		
Unit	1	2	3	1*	2**	3	1	2	3	1	2	3	1	2	3
a	0.35	0.40	0.38	-	0.34	0.33	0.26	0.28	0.29	0.41	0.42	0.43	0.20	0.19	0.13
b	5.07	4.76	4.96	-	7.40	3.28	3.40	3.36	3.19	0.89	0.78	0.52	8.36	10.13	9.93

*Unit No. 1 was excluded from calculations due to malfunction
**Calculations for Unit No. 2 for the period 21/08/2017 – 24/12/2017, before sensor replacement

Table S4: Parameters of linear fittings for tested PM sensors and 24-hour averages: *a* – slope, *b* – intercept.

Sensor model	SDS011			ZH03A			PMS7003			PMS7003 "AE"			OPC-N2		
Unit	1	2	3	1*	2**	3	1	2	3	1	2	3	1	2	3
a	0.36	0.40	0.39	-	0.33	0.35	0.27	0.28	0.29	0.41	0.42	0.43	0.21	0.21	0.15
b	4.76	4.66	4.80	-	7.70	2.54	3.38	3.31	3.08	0.96	0.83	0.53	7.88	9.49	9.04

*Unit No. 1 was excluded from calculations due to malfunction
**Calculations for Unit No. 2 for the period 21/08/2017 – 24/12/2017, before sensor replacement