

Microplastic Aerosol Contamination in Porto (Portugal)

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SUPPLEMENTARY INFORMATION

Table S1. Recovery rate data for polymers from the filtration sampling procedure analyzed by optical microscopy.

Polymer	Polymer morphology	Fraction (μm)	Status	Quantity, (num)		
				1st	2d	3d
PP	particulate	>125	add	30	30	30
			recovered	18	26	24
add			30	30	30	
recovered			27	21	21	
ABS			add	30	30	30
			recovered	21	19	28
PES	fibrous	>63	add	302	464	225
			recovered	73	65	37
		63-12	add	95	110	50
			recovered	50	28	13

Table S2. Data from all analyzed air samples for MPs and fibers by optical microscopy.

n°	Sample	Size-fraction, µm	Fibers	MPs						
				Red	Blue	Green	Yellow	Orange	Purple	Rose
1.	Control 1/1	>125	6	0	1	0	0	0	0	0
		125-63	8	2	0	0	0	0	0	0
		63-25	3	0	1	0	0	0	0	0
		25-12	6	7	5	0	1	0	0	0
		12-1.2	6	4	0	0	0	0	0	0
2.	Control 1/2	>125	18	1	0	0	1	0	0	0
		125-63	17	1	0	0	0	0	0	0
		63-25	35	3	2	0	2	0	0	0
		25-12	2	2	0	0	0	0	0	0
		12-1.2	15	6	2	0	0	0	0	0
3.	Control 1/3	>125	84	4	5	1	0	0	0	0
		125-63	66	2	2	0	0	0	0	0
		63-25	38	2	2	0	0	0	0	0
		25-12	16	3	0	0	0	0	0	0
		12-1.2	0	5	1	0	0	0	0	0
4.	29.09.22	>125	53	12	34	0	2	0	0	0
		125-63	31	15	50	2	1	0	0	0
		63-25	27	26	30	0	0	0	0	0
		25-12	80	17	9	0	0	0	0	0
		12-1.2	40	11	4	0	0	0	0	1
5.	26.10.22	>125	20*	20	7	0	1	0	0	1
		125-63		22	8	1	1	0	0	0
		63-25		21	9	1	1	0	0	0
		25-12	52	46	18	2	1	0	0	0
		12-1.2	63	25	9	0	2	0	0	0
6.	09.11.22	>125	11	5	1	0	0	0	0	0
		125-63	8	4	0	0	0	0	0	0
		63-25	5	4	4	0	1	0	0	0
		25-12	7	5	3	0	1	0	0	0
		12-1.2	32	5	1	0	1	0	0	3
7.	23.11.22	>125	9	6	9	0	2	0	0	0
		125-63	7	6	7	0	1	0	0	0
		63-25	11	5	5	1	0	0	0	0
		25-12	11	10	12	0	1	0	0	0
		12-1.2	23	10	3	0	2	0	0	0
8.	07.12.22	>125	3	4	0	0	1	0	0	0
		125-63	4	3	5	1	0	0	0	0
		63-25	2	3	3	0	0	0	0	0
		25-12	1	5	2	1	0	0	0	0
		12-1.2	13	4	1	0	0	0	0	0
9.	21.12.22	>125	2	3	4	3	2	0	0	0
		125-63	1	2	4	0	3	0	0	0
		63-25	0	1	2	0	0	0	0	0
		25-12	5	0	2	2	1	0	0	0
		12-1.2	64	22	6	0	0	0	0	0
10.	04.01.23	>125	3	7	4	1	1	0	0	0
		125-63	0	3	2	2	1	0	0	1
		63-25	2	2	3	1	0	0	0	0
		25-12	3	5	1	1	0	0	0	0
		12-1.2	58	15	2	0	0	0	0	0

n°	Sample	Size-fraction, µm	Fibers	MPs						
				Red	Blue	Green	Yellow	Orange	Purple	Rose
11.	18.01.23	>125	3	5	2	1	3	0	0	0
		125-63	1	2	5	0	0	0	0	0
		63-25	0	5	5	1	2	0	0	0
		25-12	0	0	1	0	0	0	0	0
		12-1,2	54	17	5	0	1	0	0	0
12.	Control 2/1	>125 µm	8	0	1	0	1	1	0	0
		125-63 µm	8	2	2	1	0	2	0	0
		63-25 µm	10	0	0	0	2	1	0	0
		25-12 µm	19	3	1	0	2	2	0	0
		12-1,2 µm	1	5	1	0	0	2	0	0
13.	Control 2/2	>125 µm	9	0	0	1	0	1	0	0
		125-63 µm	7	1	1	0	1	1	0	0
		63-25 µm	8	2	1	0	1	2	0	0
		25-12 µm	7	9	5	0	1	3	0	0
		12-1,2 µm	6	4	0	0	0	2	0	0
14.	Control 2/3	>125 µm	11	0	1	0	0	1	0	0
		125-63 µm	17	0	0	0	1	2	0	0
		63-25 µm	7	1	1	0	0	0	0	0
		25-12 µm	3	2	2	0	1	2	0	0
		12-1,2 µm	17	6	2	0	0	1	0	0
15.	01.02.23**	>125 µm	-	-	-	-	-	-	0	0
		125-63 µm	-	-	-	-	-	-	0	0
		63-25 µm	-	-	-	-	-	-	0	0
		25-12 µm	21	26	10	2	19	34	0	0
		12-1,2 µm	3	8	3	0	4	3	0	0
16.	15.02.23**	>125 µm	-	-	-	-	-	-	0	0
		125-63 µm	-	-	-	-	-	-	0	0
		63-25 µm	-	-	-	-	-	-	0	0
		25-12 µm	36	23	9	3	19	29	0	0
		12-1,2 µm	4	2	2	0	2	5	0	0
17.	01.03.23	>125 µm	8	3	2	0	6	5	0	1
		125-63 µm	14	2	1	0	2	5	0	0
		63-25 µm	7	1	5	0	1	3	0	0
		25-12 µm	33	22	10	1	23	30	0	0
		12-1,2 µm	16	10	24	0	14	12	0	0
18.	15.03.23	>125 µm	3	0	4	1	0	0	0	0
		125-63 µm	11	0	0	0	4	4	0	0
		63-25 µm	17	0	2	0	0	5	0	0
		25-12 µm	11	9	4	1	2	8	0	0
		12-1,2 µm	2	4	4	0	6	4	0	0
19.	26.04.23	>125 µm	74	20	11	1	41	43	0	0
		125-63 µm	23	12	4	1	28	35	0	0
		63-25 µm	56	59	44	2	63	71	0	0
		25-12 µm	58	36	20	3	50	57	0	1
		12-1,2 µm	30	6	30	0	18	24	0	2
20.	10.05.23	>125 µm	59	2	11	0	10	17	0	0
		125-63 µm	49	9	4	0	8	15	0	0
		63-25 µm	95	11	5	0	12	18	0	0
		25-12 µm	128	95	34	8	27	81	0	1
		12-1,2 µm	16	4	20	2	8	14	0	0
21.	24.05.23	>125 µm	41	11	3	1	8	13	0	0

n°	Sample	Size-fraction, µm	Fibers	MPs						
				Red	Blue	Green	Yellow	Orange	Purple	Rose
		125-63 µm	36	16	2	1	5	15	0	0
		63-25 µm	35	32	6	1	21	26	0	0
		25-12 µm	92	59	25	8	29	40	0	0
		12-1,2 µm	18	2	4	2	16	12	0	0
22.	07.06.23	>125 µm	20	0	5	0	5	7	0	0
		125-63 µm	35	1	5	0	3	4	0	0
		63-25 µm	37	12	5	0	8	11	0	0
		25-12 µm	16	26	4	7	12	17	0	0
		12-1,2 µm	24	12	16	0	10	18	0	0
23.	21.06.23	>125 µm	36	2	6	0	4	7	0	0
		125-63 µm	19	6	0	0	3	4	0	0
		63-25 µm	24	12	7	1	8	13	0	0
		25-12 µm	26	32	12	7	17	24	0	1
		12-1,2 µm	22	12	12	2	6	20	0	2
24.	05.07.23	>125 µm	23	6	7	0	4	12	0	0
		125-63 µm	31	13	4	0	6	10	0	0
		63-25 µm	14	30	3	1	9	31	0	0
		25-12 µm	17	23	12	1	10	15	0	1
		12-1,2 µm	4	6	20	0	14	22	0	0
25.	Control 3/1	>125	19	0	2	6	1	12	0	0
		125-63	53	0	2	0	1	3	0	0
		63-25	35	0	3	0	3	3	0	0
		25-12	84	0	18	0	10	20	0	0
		12-1.2	8	0	11	0	0	0	0	1
26.	Control 3/2	>125	77	0	13	0	7	3	0	0
		125-63	61	0	5	0	0	1	0	1
		63-25	87	0	4	0	1	2	0	0
		25-12	17	0	8	0	2	4	0	0
		12-1.2	1	0	0	0	0	0	0	0
27.	Control 3/3	>125	45	2	6	1	0	0	0	0
		125-63	65	2	2	0	0	0	0	0
		63-25	42	0	8	0	0	0	0	0
		25-12	18	0	2	0	10	1	0	0
		12-1.2	2	0	0	0	0	0	0	0
28.	05.12.23	>125	33	0	0	1	2	0	0	0
		125-63	18	0	2	0	5	3	0	0
		63-25	21	0	1	0	6	3	0	0
		25-12	18	1	7	4	64	28	0	2
		12-1.2	19	0	1	0	2	0	0	2
29.	19.12.23	>125	72	0	4	1	33	4	0	1
		125-63	60	0	3	0	42	0	0	0
		63-25	23	0	4	0	11	3	0	1
		25-12	35	3	30	5	37	8	0	3
		12-1.2	26	0	6	0	3	0	0	0
30.	23.01.24	>125	33	1	4	0	5	0	0	0
		125-63	22	0	1	0	6	0	0	0
		63-25	39	1	9	0	2	1	0	1
		25-12	55	6	41	5	60	10	4	2
		12-1.2	38	0	8	0	0	0	0	0
31.	06.02.24	>125	14	0	0	0	0	0	0	0
		125-63	10	0	1	0	0	0	0	0

n°	Sample	Size-fraction, µm	Fibers	MPs						
				Red	Blue	Green	Yellow	Orange	Purple	Rose
		63-25	28	0	8	0	9	1	1	0
		25-12	92	2	26	4	44	3	4	4
		12-1.2	43	0	5	1	2	0	1	0
		>125	29	0	7	2	13	4	0	0
32.	20.02.24	125-63	38	0	1	0	20	0	0	0
		63-25	24	0	5	2	78	21	0	0
		25-12	38	1	7	3	63	19	0	0
		12-1.2	34	0	7	0	3	0	0	4
		>125	80	1	14	0	2	0	0	0
33.	05.03.24	125-63	71	0	30	0	19	0	0	0
		63-25	73	0	2	0	5	0	0	0
		25-12	38	0	26	3	120	0	1	2
		12-1.2	22	0	5	0	0	0	0	4
		>125	80	1	14	0	2	0	0	0

* The value is a sum of three fractions. ** Don't exist data for fractions. >125 µm;
125-63 µm and 63-25 µm.

Table S3. Independent variables*: numbers of microplastics (5mm-1.2µm) in the samples and variables calculated from meteo data for PCA analyses for each sampling period.

Nº	Data	MPs/day/m2 tot	Wind, max, m/s	Wind, avr, m/s	Wind max max, m/s	Wind avr max, m/s	Precip. total, mm	Precip. occur, nº	Temper. avr max, °C	Temper. avr min, °C	Temper. avr avr, °C	Temper max, °C	Temper. min, °C	Humid avr max, %	Humid avr min, %	Humid avr avr, %	Humid max, %	Humid min, %
1	29.sep.22	218	6.03	1.75	12.73	7.32	78.01	14.00	23.57	17.52	19.99	32.57	12.88	91.61	67.31	82.38	96.76	34.07
2	26.oct.22	204	7.27	1.78	14.83	7.73	96.91	27.00	21.96	14.78	17.93	29.09	12.23	92.99	68.60	83.56	96.68	35.57
3	09.nov.22	35	5.05	1.66	12.73	8.01	150.84	18.00	19.80	13.48	16.23	25.25	8.59	94.61	70.54	86.40	96.05	54.81
4	23.nov.22	130	7.79	2.49	13.93	8.99	256.91	20.00	18.25	13.16	15.50	23.76	9.87	95.16	73.89	87.73	97.41	52.80
5	07.dec.22	26	5.35	1.69	12.58	7.16	66.27	11.00	16.21	9.70	12.24	19.13	6.56	90.17	67.30	81.72	96.83	87.09
6	21.dec.22	83	8.63	2.54	16.93	10.10	170.54	24.00	16.57	12.06	14.34	18.32	7.38	94.15	78.36	87.57	97.02	94.94
7	04.jan.23	67	8.08	2.85	15.65	9.74	239.80	17.00	16.44	11.81	13.88	18.83	5.38	95.47	78.33	89.15	97.19	96.59
8	18.jan.23	85	8.87	2.34	16.10	9.38	158.40	15.00	15.26	9.37	12.02	18.26	5.58	92.04	69.67	83.73	96.61	85.61
9	01.feb.23	205	5.12	1.69	11.68	8.19	15.92	5.00	14.29	5.84	9.57	17.20	3.05	85.65	53.64	72.20	95.74	85.99
10	15.feb.23	171	6.10	2.43	12.43	8.37	0.20	1.00	17.82	9.11	12.75	21.00	6.53	67.34	40.11	55.42	76.89	48.21
11	01.mar.23	349	4.28	1.33	8.75	6.37	5.77	4.00	16.87	8.24	12.03	23.03	2.96	81.13	49.18	66.58	90.84	78.06
12	15.mar.23	74	8.02	2.26	13.78	8.03	52.93	17.00	15.83	10.11	12.76	19.38	4.20	91.91	68.20	83.01	97.16	95.45
13	26.apr.23	1484	4.83	1.69	10.33	7.74	40.20	9.00	20.16	12.84	16.22	29.81	8.41	88.19	60.01	75.22	96.32	85.47
14	10.may.23	879	4.78	1.43	9.87	7.14	10.35	6.00	22.32	13.91	18.09	29.57	0.00	91.66	61.92	79.96	95.79	74.93
15	24.may.23	747	7.22	2.63	12.80	9.86	0.60	1.00	23.88	14.90	19.07	28.13	11.57	73.52	40.30	56.86	90.01	59.38
16	07.jun.23	361	5.08	1.25	11.83	7.16	18.90	7.00	22.14	16.41	18.77	28.00	15.54	92.41	67.88	81.56	95.68	88.36
17	21.jun.23	434	4.95	1.67	12.50	7.92	43.38	10.00	23.15	17.34	19.86	28.74	15.55	92.87	69.77	84.18	96.04	83.14
18	05.jul.23	524	4.01	1.30	10.55	7.11	0.00	0.00	27.06	17.51	21.63	31.89	15.86	89.31	57.01	75.94	94.04	67.91
19	05.dec.23	201	6.13	1.50	13.63	7.52	65.27	13.00	16.25	9.54	12.57	19.85	6.19	90.90	66.64	81.17	100.00	93.77
20	19.dec.23	322	5.90	2.19	11.83	8.04	107.26	15.00	15.66	9.64	12.25	18.99	2.28	88.21	67.79	80.91	97.25	90.03
21	23.jan.24	260	7.25	2.36	14.83	8.95	104.67	19.00	15.18	10.29	12.53	19.60	6.07	92.60	71.74	84.75	97.66	96.89
22	06.feb.24	177	4.11	1.25	8.83	5.25	0.00	0.00	20.31	11.13	14.55	24.10	9.44	87.85	59.38	76.75	92.89	82.19
23	20.feb.24	454	8.23	2.01	17.00	9.26	95.32	23.00	18.08	11.75	14.60	24.92	8.54	93.22	67.99	84.52	96.99	84.45
24	05.mar.24	399	9.69	2.68	15.50	11.14	109.05	26.00	15.06	9.07	11.98	20.95	6.71	91.98	63.93	81.08	96.32	80.14

*Wind maximum during the days of collecting of each sample (Wind max), Wind average during the days of collecting of each sample (Wind avr), Wind maximum of maximum in each day during the days of collecting of each sample (Wind max max), Wind average of maximum in each day during the days of collecting of each sample (Wind avr max), Precipitation total during the days of collecting of each sample (Precipitation tot), Occurrence number of precipitation during the days of collecting of each sample (Precipitation occur), Temperature average of maximum in each day during the days of collecting of each sample (Temperature avr max), Temperature av-erage of minimum in each day during the days of collecting of each sample (Temperature avr min), Temperature average of average in each day during the days of collecting of each sample (Temperature avr avr), Temperature maximum during the days of collecting of each sample (Temperature max), Temperature minimum during the days of collecting of each sample (Temperature min), Humidity average of maximum in each day during the days of collecting of each sample (Humidity avr max), Humidity average of minimum in each day during the days of collecting of each sample (Humidity avr min), Humidity average of average in each day during the days of collecting of each sample (Humidity avr avr), Humidity maximum during the days of collecting of each sample (Humidity max), Humidity minimum during the days of collecting of each sample (Humidity min).

Table S4. Loading (eigenvectors) of variables in four principal components in PCA analyses.

Variable*	Variable n°	Component 1	Component 2	Component 3	Component 4
MPs/day/m2 tot	1	-0.184684	0.040197	0.032295	0.757356
Wind (max)	2	0.300160	0.009886	0.323346	0.100518
Wind (avr)	3	0.243656	-0.088300	0.409218	0.116881
Wind (max max)	4	0.304961	0.094702	0.269658	-0.004190
Wind (avr max)	5	0.247003	-0.013624	0.397400	0.291008
Precipitation (tot)	6	0.302311	0.150104	0.092214	-0.143892
Precipitation (occur)	7	0.306243	0.177413	0.083722	-0.018198
Temperature (avr max)	8	-0.282494	0.283948	0.134093	0.018826
Temperature (avr min)	9	-0.166186	0.398168	0.146340	0.018939
Temperature (avr avr)	10	-0.218111	0.356705	0.155668	0.059267
Temperature (max)	11	-0.267429	0.298153	0.105397	0.122905
Temperature (min)	12	-0.145313	0.314082	0.191017	-0.159915
Humidity (avr max)	13	0.204203	0.332866	-0.269514	0.037575
Humidity (avr min)	14	0.263212	0.288639	-0.192579	-0.059423
Humidity (avr avr)	15	0.242054	0.307799	-0.236502	-0.052060
Humidity (max)	16	0.189678	0.265275	-0.307911	0.228012
Humidity (min)	17	0.155126	-0.118997	-0.330301	0.438589

*See Table S3.