

Supplementary information for

**Ambient PM<sub>2.5</sub>, soot, black carbon and organic carbon levels in Kimberley, South Africa**

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Supplementary Table 1: PM<sub>2.5</sub>, BC, OC and soot levels on 46 sampling days during 25 March 2021 and 25 January 2022 in Kimberley, South Africa: By weekday and weekends.

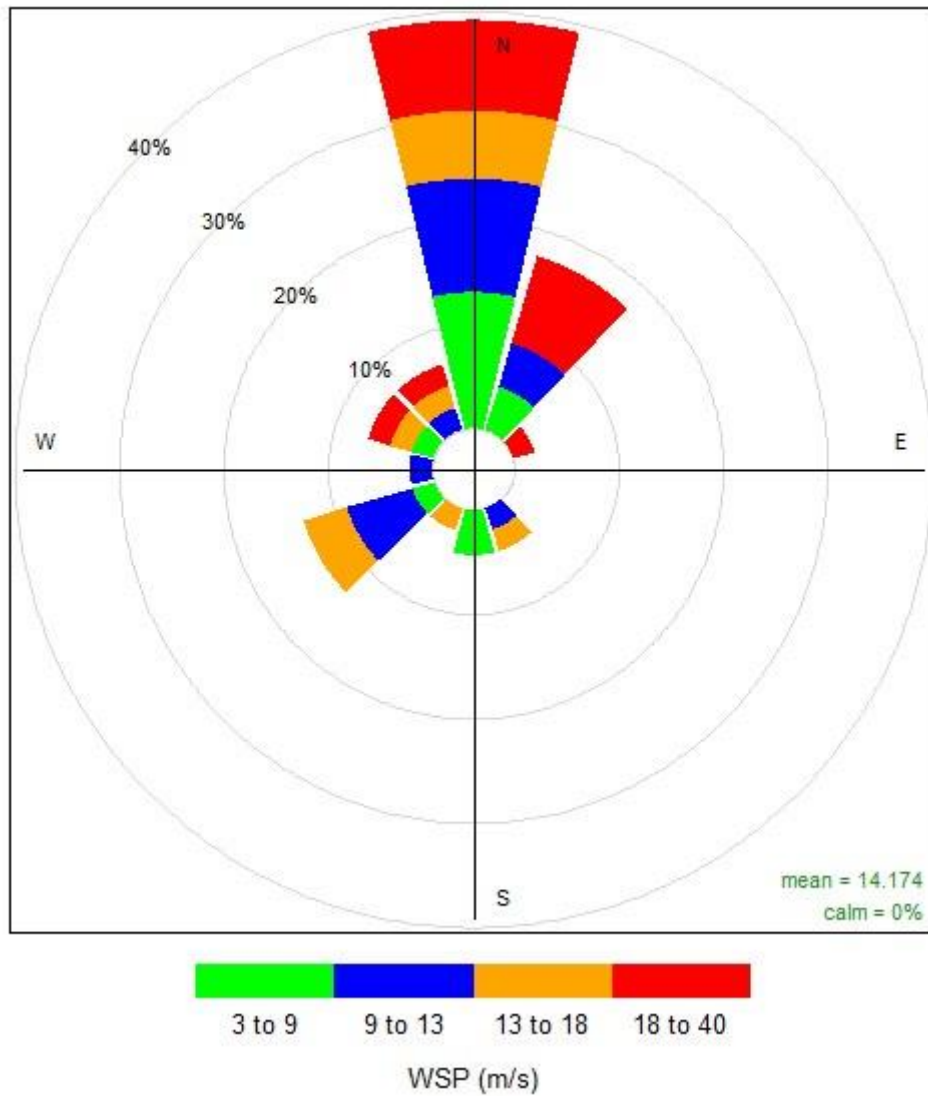
<b>Variable</b>	<b>Mean</b>	<b>Median</b>	<b>Std Dev</b>	<b>Min</b>	<b>Max</b>
<b>Weekday (34 samples)</b>					
<b>PM<sub>2.5</sub></b>	6.5	5.9	4.4	0.7	25.4
<b>Soot</b>	0.47	0.56	0.30	0.00	3.01
<b>BC</b>	0.58	0.49	0.26	0.27	1.56
<b>OC</b>	0.44	0.32	0.27	0.12	1.28
<b>Weekends (12 samples)</b>					
<b>PM<sub>2.5</sub></b>	5.6	2.9	5.8	1.0	11.1
<b>Soot</b>	0.45	0.28	0.42	0.12	0.95
<b>BC</b>	0.53	0.47	0.20	0.29	1.07
<b>OC</b>	0.39	0.33	0.22	0.17	1.01

p>0.05, no significant difference between median levels on weekday and weekend days

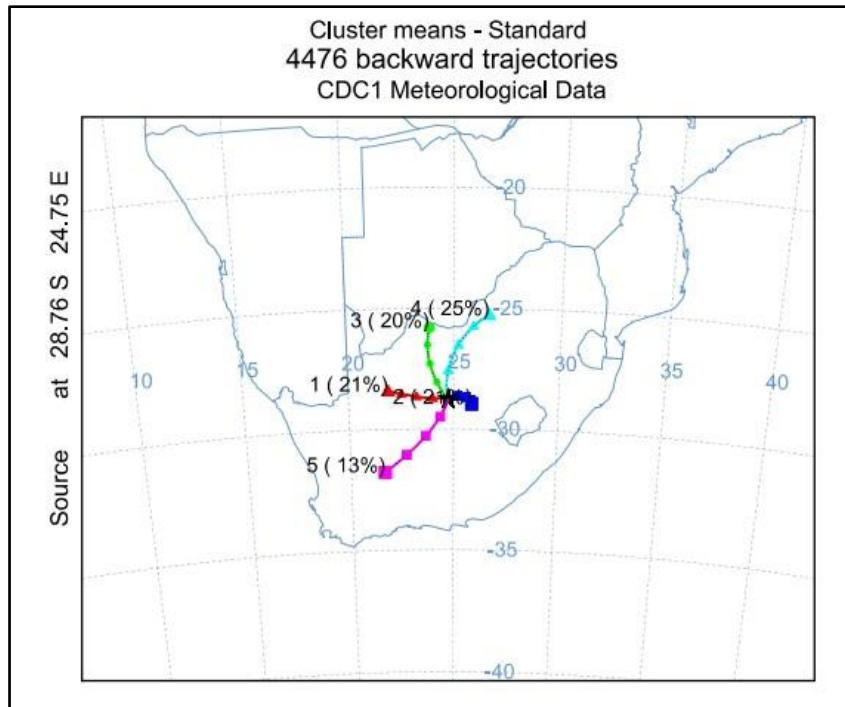
Supplementary Table 2: PM<sub>2.5</sub>, BC, OC and soot levels on 46 sampling days during 25 March 2021 and 25 January 2022 in Kimberley, South Africa: By day of the week.

Variable	Mean	Median	Std Dev	Min	Max
<b>Monday (7 samples)</b>					
PM <sub>2.5</sub>	6.0	3.8	5.7	1.2	16.4
Soot	0.37	0.21	0.35	0.10	1.03
BC	0.60	0.47	0.34	0.27	1.26
OC	0.44	0.28	0.37	0.14	1.21
<b>Tuesday (7 samples)</b>					
PM <sub>2.5</sub>	7.0	3.9	9.0	0.7	25.4
Soot	0.41	0.38	0.44	0.00	1.30
BC	0.59	0.49	0.18	0.43	0.95
OC	0.46	0.33	0.22	0.26	0.86
<b>Wednesday (8 samples)</b>					
PM <sub>2.5</sub>	6.8	4.2	7.1	1.3	21.5
Soot	0.67	0.22	1.01	0.00	3.01
BC	0.64	0.50	0.40	0.28	1.56
OC	0.48	0.30	0.38	0.12	1.28
<b>Thursday (5 samples)</b>					
PM <sub>2.5</sub>	5.4	3.6	3.5	2.9	11.2
Soot	0.45	0.49	0.25	0.18	0.81
BC	0.60	0.61	0.14	0.46	0.76
OC	0.45	0.44	0.14	0.31	0.63
<b>Friday (6 samples)</b>					
PM <sub>2.5</sub>	6.2	5.8	2.7	3.1	11.1
Soot	0.49	0.46	0.27	0.12	0.95
BC	0.57	0.50	0.25	0.42	1.07
OC	0.44	0.35	0.28	0.26	1.01
<b>Saturday (6 samples)</b>					
PM <sub>2.5</sub>	5.1	5.8	3.2	1.0	8.7
Soot	0.41	0.31	0.31	0.14	0.86
BC	0.48	0.45	0.15	0.29	0.73
OC	0.34	0.31	0.14	0.17	0.56
<b>Sunday (7 samples)</b>					
PM <sub>2.5</sub>	6.8	6.4	3.3	1.4	11.2
Soot	0.41	0.30	0.36	0.09	1.18
BC	0.49	0.46	0.14	0.34	0.74
OC	0.37	0.34	0.15	0.18	0.66

p>0.05, no significant difference between median levels on different days of the week



Supplementary Figure 1: Wind direction and windspeed observed during the study period 25 March 2021 to 25 January 2022 in Kimberley, South Africa.



Supplementary Figure 2: Five geographical origins of air masses identified in the 24-hour backward trajectory model runs on all days during the study period March 2021 to January 2022 in Kimberley, South Africa. North West (NW) is indicated by the blue line, North (N) indicated by the green line, East (E) indicated by the blue line, South West (SW) indicated by the pink line and West (W) indicated by the red line.

Supplementary Table 3: PM<sub>2.5</sub>, BC, OC and soot levels on 46 sampling days during 25 March 2021 and 25 January 2022 in Kimberley, South Africa: By geographical origin of air masses (24-hour backward trajectories).

Variable	Mean	Median	Std Dev	Min	Max
<b>Cluster 1 (11 sampling days)</b>					
PM <sub>2.5</sub>	4.8	4.2	3.3	1.2	13.1
Soot	0.34	0.30	0.25	0.09	0.85
BC	0.47	0.44	0.12	0.34	0.72
OC	0.32	0.29	0.11	0.18	0.54
<b>Cluster 2 (8 sampling days)</b>					
PM <sub>2.5</sub>	7.1	4.9	5.0	2.5	16.4
Soot	0.39	0.35	0.26	0.06	0.86
BC	0.66	0.61	0.22	0.41	1.07
OC	0.53	0.45	0.27	0.27	1.01
<b>Cluster 3 (9 sampling days)</b>					
PM <sub>2.5</sub>	3.2	1.5	2.9	0.7	9.7
Soot	0.32	0.11	0.42	0.00	1.18
BC	0.50	0.49	0.14	0.28	0.74
OC	0.37	0.32	0.18	0.12	0.66
<b>Cluster 4 (13 sampling days)</b>					
PM <sub>2.5</sub>	8.9	6.4	7.2	1.2	25.4
Soot	0.65	0.43	0.77	0.12	3.01
BC	0.59	0.46	0.34	0.27	1.56
OC	0.43	0.31	0.32	0.14	1.28
<b>Cluster 5 (5 sampling days)</b>					
PM <sub>2.5</sub>	6.9	6.3	4.4	1.0	11.3
Soot	0.65	0.71	0.37	0.18	1.03
BC	0.72	0.61	0.32	0.47	1.26
OC	0.58	0.44	0.36	0.31	1.21

Units: PM<sub>2.5</sub>, BC and OC ( $\mu\text{g}/\text{m}^3$ ) and soot ( $\text{m}^{-1} \times 10^{-5}$ )

$p > 0.05$ , no significant difference between median levels by geographic origin of air masses

Supplementary Table 4: PM<sub>2.5</sub>, BC, OC and soot levels on 46 sampling days during 25 March 2021 and 25 January 2022 in Kimberley, South Africa: By wind direction.

Variable	Mean	Median	Std Dev	Min	Max
<b>N (19 sampling days)</b>					
PM <sub>2.5</sub>	5.5	5.0	4.0	0.7	16.4
Soot	0.32	0.21	0.31	0.00	1.18
BC	0.53	0.47	0.18	0.29	1.07
OC	0.39	0.32	0.21	0.17	1.01
<b>NNE (7 sampling days)</b>					
PM <sub>2.5</sub>	9.6	4.9	9.8	1.4	25.4
Soot	0.81	0.31	1.05	0.12	3.01
BC	0.70	0.55	0.43	0.27	1.56
OC	0.54	0.42	0.39	0.14	1.28
<b>NE (1 sampling day)</b>					
PM <sub>2.5</sub>	1.2	1.2	.	1.2	1.2
Soot	0.49	0.49	.	0.49	0.49
BC	0.43	0.43	.	0.43	0.43
OC	0.26	0.26	.	0.26	0.26
<b>ENE (1 sampling day)</b>					
PM <sub>2.5</sub>	3.1	3.1	.	3.1	3.1
Soot	0.51	0.51	.	0.51	0.51
BC	0.46	0.46	.	0.46	0.46
OC	0.31	0.31	.	0.31	0.31
<b>SSE (2 sampling days)</b>					
PM <sub>2.5</sub>	6.2	6.2	7.3	1.0	11.3
Soot	0.87	0.87	0.22	0.71	1.03
BC	1.00	1.00	0.38	0.73	1.26
OC	0.89	0.89	0.45	0.56	1.21
<b>S (2 sampling days)</b>					
PM <sub>2.5</sub>	5.7	5.7	0.7	5.2	6.3
Soot	0.14	0.14	0.06	0.10	0.18
BC	0.44	0.44	0.24	0.28	0.61
OC	0.28	0.28	0.22	0.12	0.44
<b>SSW (1 sampling day)</b>					
PM <sub>2.5</sub>	6.4	6.4	.	6.4	6.4
Soot	0.30	0.30	.	0.30	0.30
BC	0.34	0.34	.	0.34	0.34
OC	0.18	0.18	.	0.18	0.18
<b>SW (5 sampling days)</b>					
PM <sub>2.5</sub>	6.3	5.7	2.8	4.2	11.1
Soot	0.49	0.48	0.30	0.14	0.95
BC	0.48	0.47	0.03	0.43	0.52
OC	0.31	0.31	0.04	0.27	0.38
<b>WSW (1 sampling day)</b>					
PM <sub>2.5</sub>	13.1	13.1	.	13.1	13.1
Soot	0.85	0.85	.	0.85	0.85
BC	0.66	0.66	.	0.66	0.66
OC	0.53	0.53	.	0.53	0.53
<b>W (1 sampling day)</b>					
PM <sub>2.5</sub>	2.5	2.5	.	2.5	2.5
Soot	0.06	0.06	.	0.06	0.06
BC	0.78	0.78	.	0.78	0.78

<b>OC</b>	0.80	0.80	.	0.80	0.80
<b>WNW (2 sampling days)</b>					
<b>PM<sub>2.5</sub></b>	7.6	7.6	6.6	2.9	12.2
<b>Soot</b>	0.44	0.44	0.08	0.38	0.49
<b>BC</b>	0.67	0.67	0.07	0.62	0.72
<b>OC</b>	0.52	0.52	0.04	0.49	0.54
<b>NW (3 sampling days)</b>					
<b>PM<sub>2.5</sub></b>	6.2	6.1	5.0	1.2	11.2
<b>Soot</b>	0.39	0.26	0.37	0.11	0.81
<b>BC</b>	0.56	0.49	0.18	0.42	0.76
<b>OC</b>	0.39	0.31	0.21	0.23	0.63

Units: PM<sub>2.5</sub>, BC and OC ( $\mu\text{g}/\text{m}^3$ ) and soot ( $\text{m}^{-1} \times 10^{-5}$ )

$p > 0.05$ , no significant difference between median levels by wind direction