

# **Particulate pollution in Korhogo and Abidjan (Cote d'Ivoire) during the dry season.**

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**Table S1.** Description of different measurements sites in Korhogo (Cote d'Ivoire)

<b>ID site</b>	<b>Site location area</b>	<b>Nearby roads</b>	<b>Distant roads</b>	<b>Comments</b>
<b>K<sub>1</sub></b>	Peleforo Gon Coulibaly University (UPGC)	unpaved	paved	Located at Péléforo Gon Coulibaly University and the main long-term measurement site of the PASMU project in Korhogo.
<b>K<sub>2</sub></b>	Sadio Koné Pharmacy	paved	paved	Second PASMU measurement site in Korhogo, and located near bus stations.
<b>K<sub>3</sub></b>	Air France area	unpaved	unpaved	Household using wood and charcoal for cooking.
<b>K<sub>4</sub></b>	Parish St John Baptist	unpaved	paved	Urban area with little road traffic nearby.
<b>K<sub>5</sub></b>	Petit Paris area	unpaved	unpaved	A district without an asphalt road, with low- and middle-income populations.
<b>K<sub>6</sub></b>	Kassrimé area	unpaved	unpaved	Popular district with high motorcycle traffic.
<b>K<sub>7</sub></b>	Calao School - Mount Korhogo	unpaved	paved	Household in an unpaved area.
<b>K<sub>8</sub></b>	Haoussabougou – Nassara pharmacy	unpaved	unpaved	Area with high population density using wood and charcoal for cooking.
<b>K<sub>9</sub></b>	Korhogo Modern School	unpaved	paved	Surrounded by a residential area near unpaved roads.
<b>K<sub>10</sub></b>	Korhogo City Hall	paved	paved	Downtown, city centre's Administrative complex.
<b>K<sub>11</sub></b>	Soba pharmacy	paved	paved	Building located near a high traffic road.
<b>K<sub>12</sub></b>	New residential area	unpaved	paved	Newly built and less populated area.
<b>K<sub>13</sub></b>	Sakanoko School	unpaved	unpaved	Measurement site located in house where wood and charcoal are used near a school.
<b><u>K<sub>14</sub></u></b>	Great Mosque pharmacy	paved	paved	Located downtown in urban area where wood and charcoal are used.

**Table S2.** Site ID, name and GPS position of Korhogo's measurement sites

<b>Site ID</b>	<b>Site name</b>	<b>Latitude</b>	<b>Longitude</b>
K <sub>1</sub>	Peleforo Gon Coulibaly University (UPGC)	9.42697	-5.62977
K <sub>2</sub>	Sadio Koné Pharmacy	9.45750	-5.62946
K <sub>3</sub>	Air France area	9.45040	-5.62809
K <sub>4</sub>	Parish St John Baptist	9.45195	-5.63018
K <sub>5</sub>	Petit Paris area	9.46370	-5.61541
K <sub>6</sub>	Kassrimé area	9.44483	-5.59954
K <sub>7</sub>	Calao School - Mount Korhogo	9.46015	-5.65025
K <sub>8</sub>	Haoussabougou – Nassara pharmacy	9.47339	-5.63659
K <sub>9</sub>	Korhogo Modern School	9.45506	-5.64384
K <sub>10</sub>	Korhogo City Hall	9.45223	-5.63306
K <sub>11</sub>	Soba pharmacy	9.45320	-5.61906
K <sub>12</sub>	New residential area	9.43620	-5.62130
K <sub>13</sub>	Sakanoko School	9.45613	-5.65895
K <sub>14</sub>	Great Mosque pharmacy	9.46072	-5.63787

**Table S3.** Geometric mean, average deviation, minimum and maximum of PM<sub>10</sub> concentrations on Korhogo site's

<b>Site</b>	<b>Geometric Mean</b>	<b>Average Deviation</b>	<b>Minimum</b>	<b>Maximum</b>
K <sub>1</sub>	89.6	57.2	11	589
K <sub>2</sub>	198.1	166.1	41	2875
K <sub>3</sub>	129.6	74	45	875
K <sub>4</sub>	78.6	47.1	33	1311
K <sub>5</sub>	102.5	67.2	30	873
K <sub>6</sub>	138.7	110.5	36	976
K <sub>7</sub>	147.2	97.8	32	1638
K <sub>8</sub>	90.8	50.8	25	629
K <sub>9</sub>	89.4	56.4	34	781
K <sub>10</sub>	85.8	67	32	2916
K <sub>11</sub>	176	179.2	35	1577
K <sub>12</sub>	96.8	78	32	853
K <sub>13</sub>	101.3	152.4	13	1374
K <sub>14</sub>	165.4	195.4	19	1120

**Table S4.** Geometric mean, average deviation, minimum and maximum of PM<sub>2.5</sub> concentrations on Korhogo site's

<b>Site</b>	<b>Geometric Mean</b>	<b>Average Deviation</b>	<b>Minimum</b>	<b>Maximum</b>
K <sub>1</sub>	57.7	43.7	16.8	265.7
K <sub>2</sub>	202.2	202.8	57.1	819.7
K <sub>3</sub>	63.5	49.1	31.4	237.9
K <sub>4</sub>	83.5	60.1	38.2	322.4
K <sub>5</sub>	114.8	101.5	39.1	502.4
K <sub>6</sub>	110.1	73.9	46.2	427.7
K <sub>7</sub>	98.1	88.1	18.3	471.4
K <sub>8</sub>	60	38.7	16.3	237.1
K <sub>9</sub>	109.2	69.8	44.1	370.7
K <sub>10</sub>	91	57.2	39.4	281.6
K <sub>11</sub>	170.7	155.7	26	695.6
K <sub>12</sub>	66.2	60.7	22	349.2
K <sub>13</sub>	184.9	172.1	25.1	686.6
K <sub>14</sub>	300	288.6	27.5	1006.7

**Table S5.** Description of different measurements sites in Abidjan (Cote d'Ivoire)

<b>ID site</b>	<b>Site location area</b>	<b>Nearby roads</b>	<b>Distant roads</b>	<b>Comments</b>
<b>A<sub>1</sub></b>	COCODY: Felix Houphouet-Boigny University (UFHB)	paved	paved	Located at Felix Houphouet-Boigny University, main measuring point of the PASMU project where long-term measuring equipment is installed. Surrounding traffic is significant.
<b>A<sub>2</sub></b>	LE PLATEAU: District Hotel	paved	paved	Country's main administrative centre, with a high level of road traffic, measurements site in Autonomous District of Abidjan, where the 2nd PASMU site is located in Abidjan.
<b>A<sub>3</sub></b>	TREICHVILLE: Nanan Yamoussou	unpaved	paved	Close to site 3 of the PASMU project, this site is located in a low-income residential area where wood and charcoal are heavily used for cooking and near the port area.
<b>A<sub>4</sub></b>	ABOBO: Anador	unpaved	unpaved	This site is located in a district composed of 2 to 5-levels buildings, where middle-class populations live; road traffic is mainly composed of personal vehicles with a few public transport lines.
<b>A<sub>5</sub></b>	YOPOUGON: Banco 2	unpaved	unpaved	Popular neighborhood without paved roads and using wood and charcoal
<b>A<sub>6</sub></b>	BINGERVILLE: Scientific pole of UFHB	paved	paved	University site mainly under the influence of road traffic with some middle-income residences in the surrounding area
<b>A<sub>7</sub></b>	ABOBO: Anokoi Kouté	unpaved	paved	Low-income residential site with lots of public transit and old vehicles, close to a waste transit site.
<b>A<sub>8</sub></b>	KOUMASSI: In'Challah	unpaved	paved	Housing area, with populations using all types of fuel and located near the lagoon.
<b>A<sub>9</sub></b>	ABOBO: Cultural Center	paved	paved	Downtown of the most densely populated municipality in the country, and nearby residential area.

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A <sub>10</sub>	YOPOUGON: GESCO	unpaved	unpaved	Measurement site located in peripheral district of the bus station of the largest country in the municipality, with low-income populations.
A <sub>11</sub>	COCODY: Riviera 3	paved	paved	Residential area, with mainly personal vehicles and almost no public transport lines.
A <sub>12</sub>	ABOBO: AboboBaoulé	unpaved	unpaved	Near a communal taxi station, where low- and middle-income people live.
A <sub>13</sub>	YOPOUGON: Abobodoumé	unpaved	unpaved	Site on the edge of a lagoon and near a main road traffic.
A <sub>14</sub>	COCODY: CIAD	unpaved	paved	Located near an elementary school in a low-income and middle-income neighborhood.
A <sub>15</sub>	YOPOUGON: Niangon	unpaved	paved	Near major circular roads with middle-class populations.
A <sub>16</sub>	ABOBO: N'Dotré	unpaved	unpaved	Located north of Abidjan, close to an exit road from the city, with populations mainly using wood and charcoal.
A <sub>17</sub>	YOPOUGON: 16th arrondissement police station	unpaved	unpaved	Low- and middle-income population and close to a busy road.
A <sub>18</sub>	PORT-BOUET: VridiCité CIE1	paved	paved	Medium-income residential area located in the country's largest industrial area.
A <sub>19</sub>	PORT-BOUET: Petit Bassam	paved	paved	Residential area, located near a main road and the industrial zone.
A <sub>20</sub>	COCODY: Djibi	unpaved	paved	Residential area with buildings under construction and inhabited by high-income and middle-income populations.

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**Table S6.** ID, name and GPS position of Abidjan's measurement sites

<b>Site ID</b>	<b>Site name</b>	<b>Municipality</b>	<b>Latitude</b>	<b>Longitude</b>
A <sub>1</sub>	COCODY: Felix Houphouet-Boigny University (UFHB)	Cocody	5.34655	-3.98999
A <sub>2</sub>	LE PLATEAU: District Hotel	Le Plateau	5.32104	-4.01986
A <sub>3</sub>	TREICHVILLE: NananYamousso	Treichville	5.30771	-4.00745
A <sub>4</sub>	ABOBO: Anador	Abobo	5.40445	-4.01112
A <sub>5</sub>	YOPOUGON: Banco 2	Yopougon	5.35176	-4.08027
A <sub>6</sub>	BINGERVILLE: Scientific pole of UFHB	Bingerville	5.35867	-3.90199
A <sub>7</sub>	ABOBO: Anokoi Kouté	Abobo	5.43838	-4.04317
A <sub>8</sub>	KOUMASSI: In'Challah	Koumassi	5.29670	-3.96009
A <sub>9</sub>	ABOBO: Cultural Center	Abobo	5.42015	-4.01352
A <sub>10</sub>	YOPOUGON: GESCO	Yopougon	5.3643	-4.10519
A <sub>11</sub>	COCODY: Riviera 3	Cocody	5.3494	-3.95803
A <sub>12</sub>	ABOBO: AboboBaoulé	Abobo	5.41821	-3.99708
A <sub>13</sub>	YOPOUGON: Abobodoumé	Yopougon	5.31028	-4.0375
A <sub>14</sub>	COCODY: CIAD	Cocody	5.32786	-3.94588
A <sub>15</sub>	YOPOUGON: Niangon	Yopou'(gon	5.3272	-4.10596
A <sub>16</sub>	ABOBO: N'Dotré	Abobo	5.44327	-4.07435
A <sub>17</sub>	YOPOUGON: 16th arrondissement police station	Yopougon	5.33681	-4.07230
A <sub>18</sub>	PORT-BOUET: VridiCité CIE1	Port-Bouët	5.25651	-3.98675
A <sub>19</sub>	PORT-BOUET: Petit Bassam	Port-Bouët	5.25905	-3.97743
A <sub>20</sub>	COCODY: Djibi	Cocody	5.38238	-3.97849



**Table S7.** Geometric mean, average deviation, minimum and maximum of PM<sub>10</sub> concentrations on Abidjan site's

<b>Site</b>	<b>Geometric Mean</b>	<b>Average Deviation</b>	<b>Minimum</b>	<b>Maximum</b>
A <sub>1</sub>	22.5	7.7	10	115
A <sub>2</sub>	14.1	6.9	4	484
A <sub>3</sub>	27.8	8.2	14	461
A <sub>4</sub>	25.2	8.2	8	208
A <sub>5</sub>	29.2	9.3	14	179
A <sub>6</sub>	21.6	4.6	12	60
A <sub>7</sub>	59.4	36.4	18	644
A <sub>8</sub>	35.8	17.5	11	425
A <sub>9</sub>	35.7	22.1	14	314
A <sub>10</sub>	24.1	10	7	220
A <sub>11</sub>	16.6	4.1	7	86
A <sub>12</sub>	26.5	9.3	12	299
A <sub>13</sub>	19.2	9.6	7	365
A <sub>14</sub>	21.6	17	3	552
A <sub>15</sub>	18.8	5.8	8	110
A <sub>16</sub>	22.3	21.4	6	284
A <sub>17</sub>	17.4	5.4	6	114
A <sub>18</sub>	46.4	42.3	8	871
A <sub>19</sub>	19.9	8.2	6	303
A <sub>20</sub>	44.7	15.2	22	486

**Table S8.** Geometric mean, average deviation, minimum and maximum of PM<sub>2.5</sub> concentrations on Abidjan site's

Site	Geometric Mean	Average Deviation	Minimum	Maximum
A <sub>1</sub>	9.4	3.7	5	50
A <sub>2</sub>	7.1	2.7	3	86
A <sub>3</sub>	15.9	5.4	9	214
A <sub>4</sub>	9.5	3.7	5	92
A <sub>5</sub>	8.8	2.7	4	121
A <sub>6</sub>	15.5	4.8	9	50
A <sub>7</sub>	32.4	31.6	9	587
A <sub>8</sub>	13.2	5.9	6	282
A <sub>9</sub>	26.2	18.5	9	310
A <sub>10</sub>	10.5	4.6	4	113
A <sub>11</sub>	13	3.8	8	93
A <sub>12</sub>	20.9	9.4	8	308
A <sub>13</sub>	15	8.6	5	396
A <sub>14</sub>	6.8	4.1	2	105
A <sub>15</sub>	12.5	3.9	7	54
A <sub>16</sub>	14.1	6.9	4	219
A <sub>17</sub>	10.5	3.4	5	129
A <sub>18</sub>	13.3	6.3	6	479
A <sub>19</sub>	7	2.8	3	40
A <sub>20</sub>	26	6.2	17	107

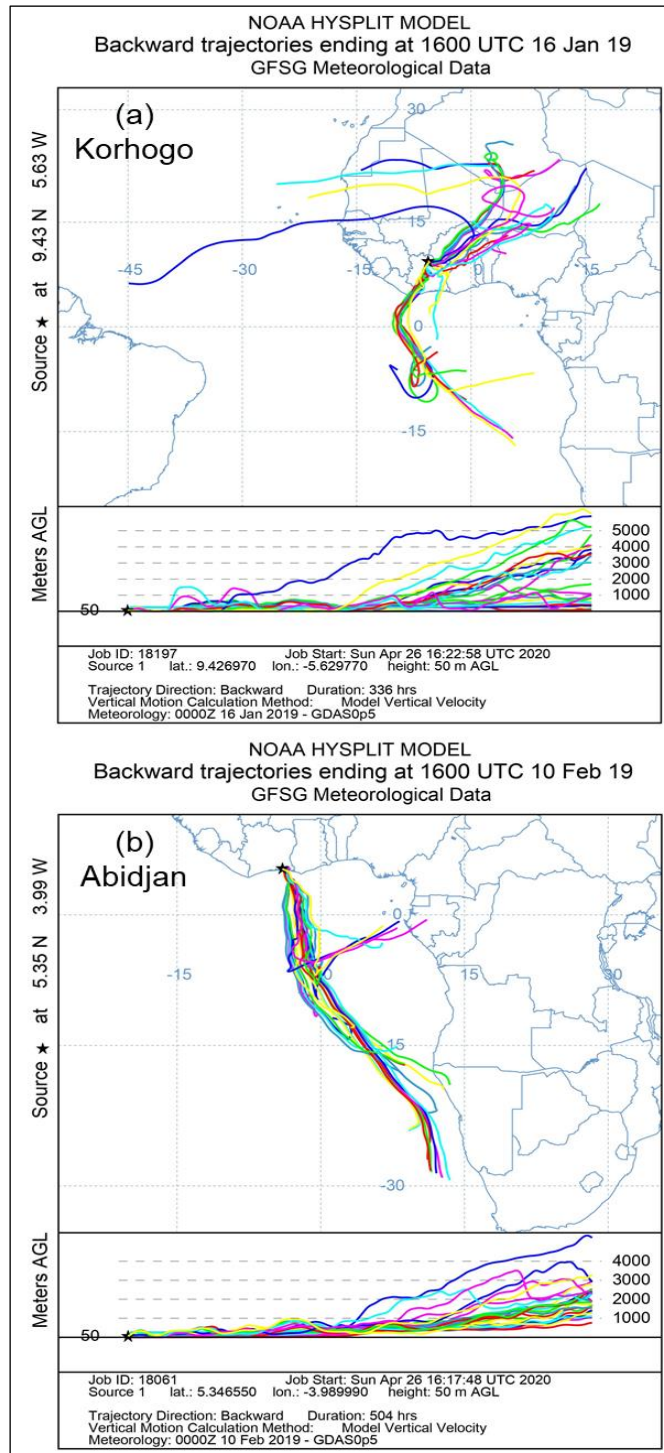
**Table S9.** Review of PM<sub>10</sub> and PM<sub>2.5</sub> concentrations obtained from other studies in Africa

City, Country	Site characteristic	Samplings period	PM <sub>2.5</sub> ( $\mu\text{g}\cdot\text{m}^{-3}$ )	PM <sub>10</sub> ( $\mu\text{g}\cdot\text{m}^{-3}$ )	Reference
Abidjan, Cote d'Ivoire	Traffic	Feb-2015 to Mar-2016	32 (w)	-	Djossou, (2018)
	Urban (WB)		28 (w)	-	
	Urban (DF)		145 (w)	-	
Cotonou, Benin	Traffic	Mar-2016	32 (w)	-	
	Urban (in Fann)		75.1 (2w)	-	
Dakar, Senegal	Urban (in Faidherbe)	Jul. to Sep- 2009	105.4 (2w)	-	(Dieme <i>et al.</i> , 2012)
	Traffic		-	328.1 (d)	
	Industrial		-	319.7 (d)	
	Residential		-	257.4 (d)	
Bamako, Mali	Urban	Sep. to Oct- 2012 and Jul- 2013	43 (d)	210 (d)	Garrison <i>et al.</i> , (2014)
Ouagadougou, Burkina Faso	Urban	Nov. to Dec- 2017	86 (d)	-	Boman <i>et al.</i> , (2009)
Accra, Ghana	Traffic	Jun. to Jul- 2006	27.4 (d)	71.8 (d)	Arku <i>et al.</i> , (2008)
Bafoussam, Cameroun	Urban		67(d)	105 (d)	
Bamenda, Cameroun	Urban	Jan. to Mar- 2012	132(d)	141 (d)	Antonel and Chowdhury (2014)
Yaoundé, Cameroun	Urban		49(d)	65 (d)	
Libreville, Gabon	Urban	Jun. to Jul- 2015	35.8 (d)	-	Ngo <i>et al.</i> , (2019)
Port-Gentil,	Urban		60.9 (d)	-	

Gabon					
Kigali, Rwanda	Traffic Urban	Apr. to Jun- 2017	185 (d) 81.4 (d)	214 (d) 98.7 (d)	Kalisa <i>et al.</i> , (2019)
Nairobi, Kenya	Traffic Urban	Feb. to Mar- 2017	36.6 (d) 24.8 (d)	93.7 (d) 53 (d)	Pope <i>et al.</i> , (2018)
Nairobi, Kenya	Roadway Urban (Background)	February 2016	414 (d) 20 (d)	- -	Van Vliet and Kinney (2007)
Nairobi, Kenya	Traffic	July 2009	98.1 (di)	-	Kinney <i>et al.</i> , (2011)
Nairobi, Kenya	Urban	Feb. to Apr- 2003	-	239 (di)	Odhiambo <i>et al.</i> , (2010)
Nairobi, Kenya	Urban (in Korogocho) Urban (in Viwandani)	Feb. to Oct- 2013	166 67	- -	Egondi <i>et al.</i> , (2016)
Kampala, Uganda	Commercial area Industrial area Residential unpaved road Residential Office Paved	Jun. to July, 2014	129.4 (d) 156 (d) 152.6 (d) 88.33 (d)	- - - -	Kirenga <i>et al.</i> , (2015)
Sfax, Tunisia	Industrial	Nov. to Dec- 2013	-	4.07 – 88.51 (d)	Bahloul <i>et al.</i> , (2015)
Cairo, Egypt	Urban	2001 to 2002	85 (d)	170 (d)	Zakey <i>et al.</i> , (2007)
Shobra, Egypt	Industrial	May to Oct- 2010	61 – 216 (d)	154 – 360 (d)	Lowenthal <i>et al.</i> , (2014)
Tiaret, Algeria	Traffic	May. to Aug- 2016	20.87 (d)	37.11 (d)	Safa and Bouacha, (2018)

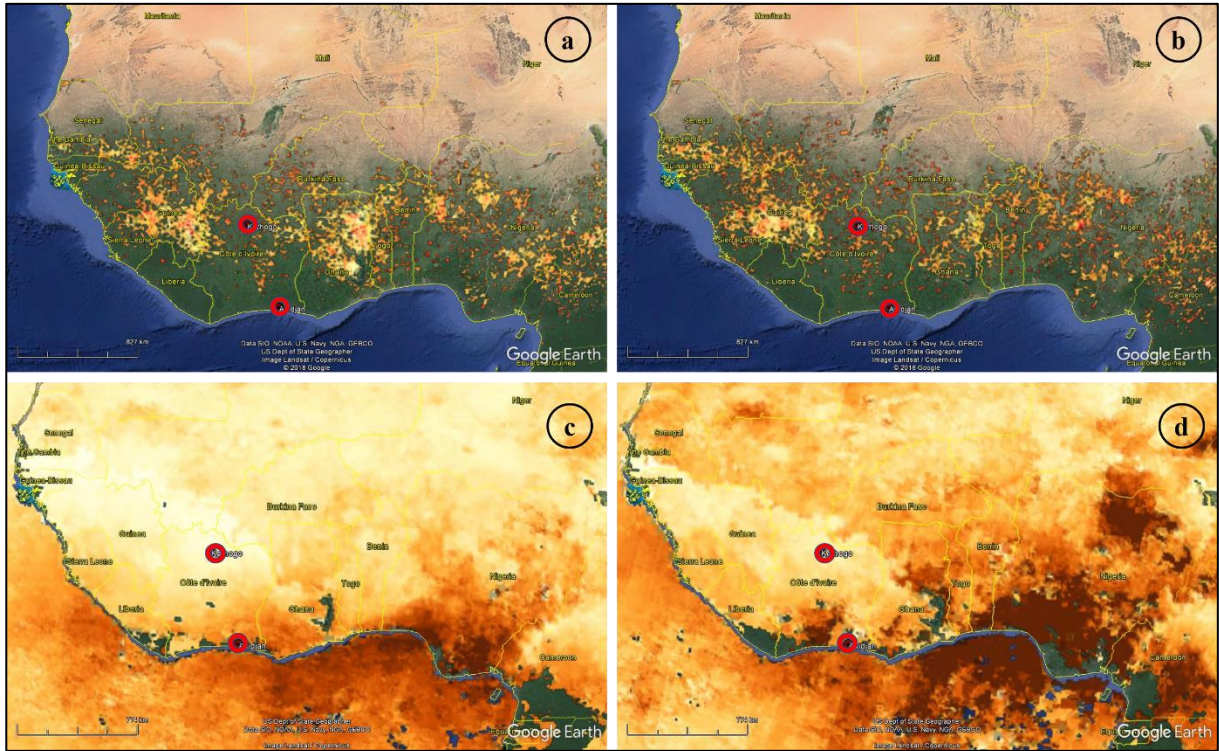
Constantine, Algeria	Traffic	Mar to Nov- 2011	57.83 (d)	122.63 (d)	Terrouche <i>et al.</i> , (2016)
Kenitra, Morocco	Urban	Feb-2007 to Feb 2008	50.73 (d)	110.42 (d)	Tahri <i>et al.</i> , (2013)
Bethlehem, South Africa	Urban	Jul-2001	65 (d)	-	Worobiec <i>et al.</i> , (2011)
Addis Ababa, Ethiopia	Urban	Feb. to Jul- 2008	80 (d)	-	Gebre <i>et al.</i> , (2010)
Dar es Salaam, Tanzania	Traffic (dry season)	Apr. to May 2005	26 (di)	76 (di)	Mkoma <i>et al.</i> , (2010)
	Traffic (wet season)	Apr. to May 2005	19 (di)	52 (di)	

<sup>(a)</sup> **WB**: Waste Burning; <sup>(b)</sup> **DF**: Domestic Fire; **d**: daily; **w**: weekly; **di**: diurnal; "-": not measured



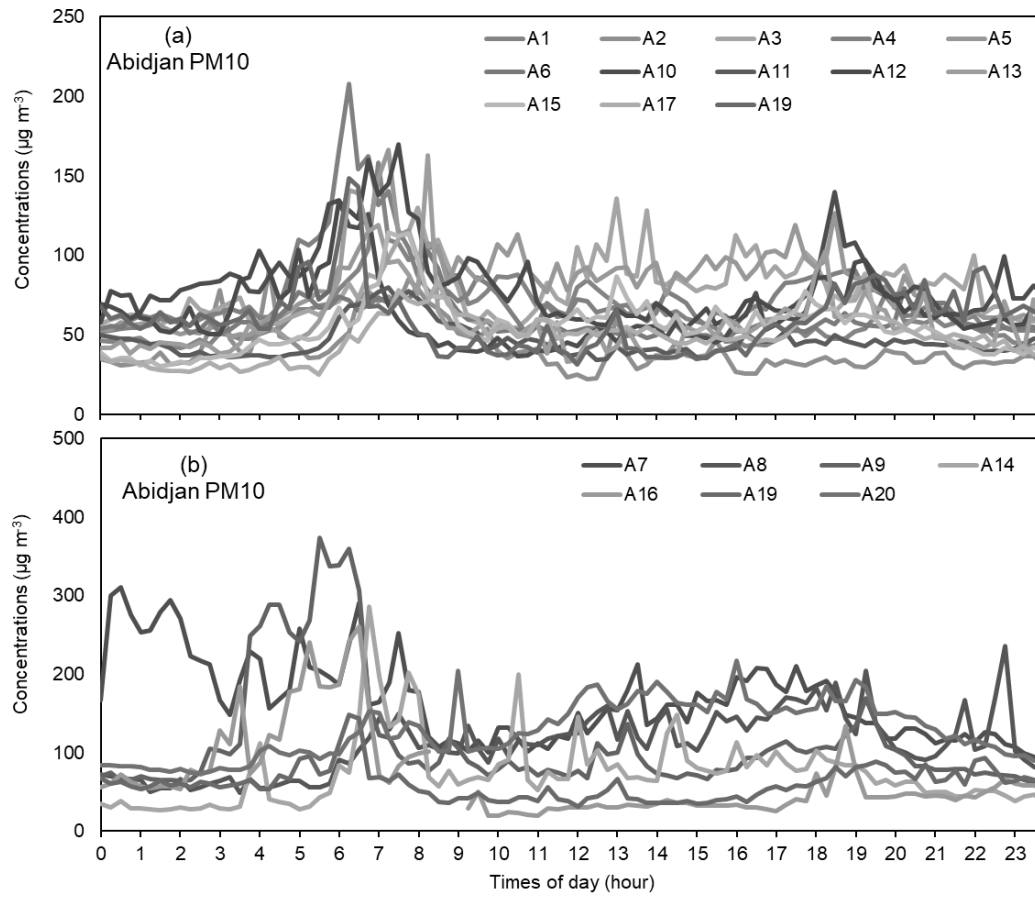
**Fig. S1.** Results of hysplits trajectories in backward of the evaluated periods at 50 m above ground level. covering the respective measurement campaigns of Korhogo (a) and Abidjan (b)

(<https://ready.arl.noaa.gov/hypub-bin/trajtype.pl>)



**Fig. S2.** Images of Actives fires (a and b) and Aerosol Optical Depth (c and d) in January (a and c) and February (b and d) plotted with Google Earth with data from <https://neo.sci.gsfc.nasa.gov>.

Red circles represent the cities of measurement.



**Fig. 3.** Daily averages of PM<sub>10</sub> concentrations in Abidjan.



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