Supplementary Information

Changing optical properties of Black Carbon and Brown Carbon aerosols during long-range transport from the Indo-Gangetic Plain to the equatorial Indian Ocean

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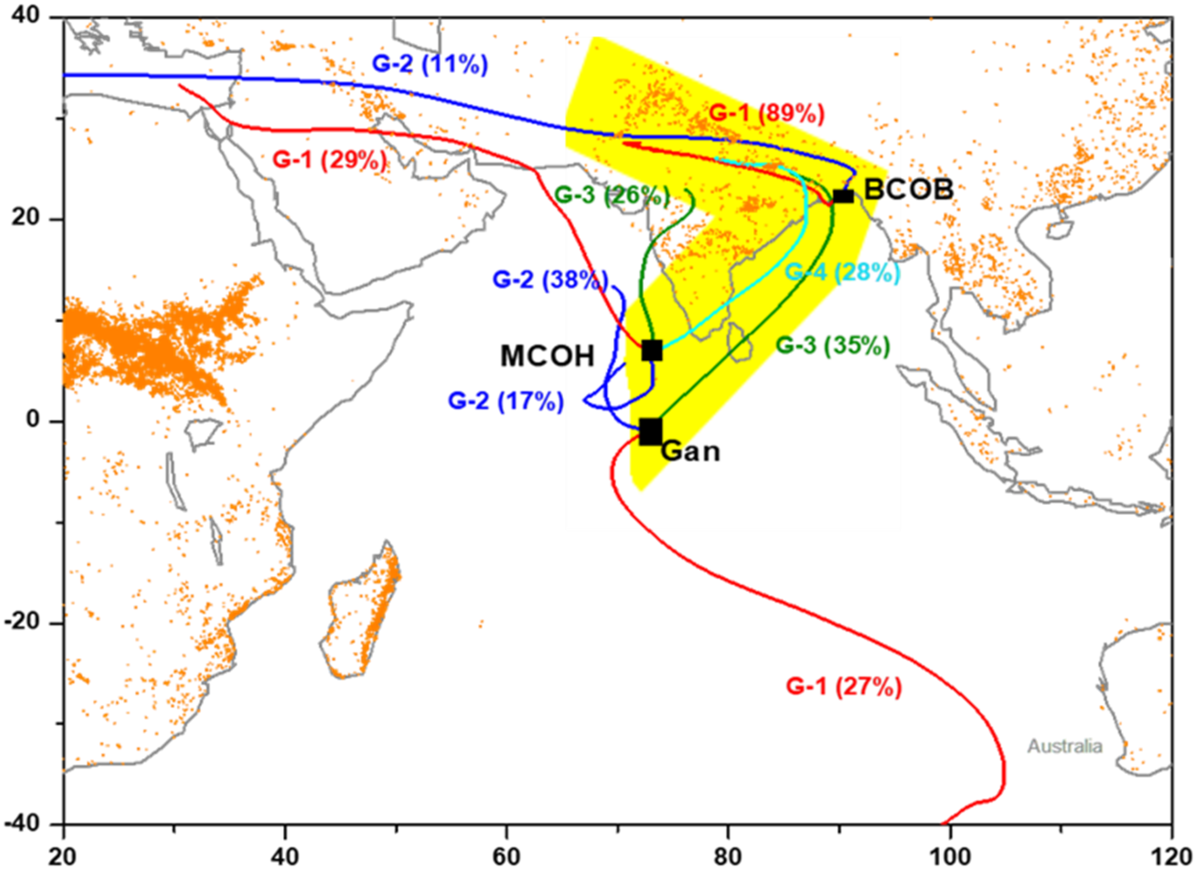

Figure S1: The 10-day air mass back trajectory cluster means ending at Bhola Climate Observatory-Bangladesh (BCOB), Maldives Climate Observatory at Hanimaadhoo (MCOH), and Maldives Climate Observatory at Gan (MCOG), at 50 m above mean sea level with MODIS/Aaua active fires from December 2017 to March 2018. G- represents the group number and percentage in brackets and gives information on percentages of trajectories in the group.

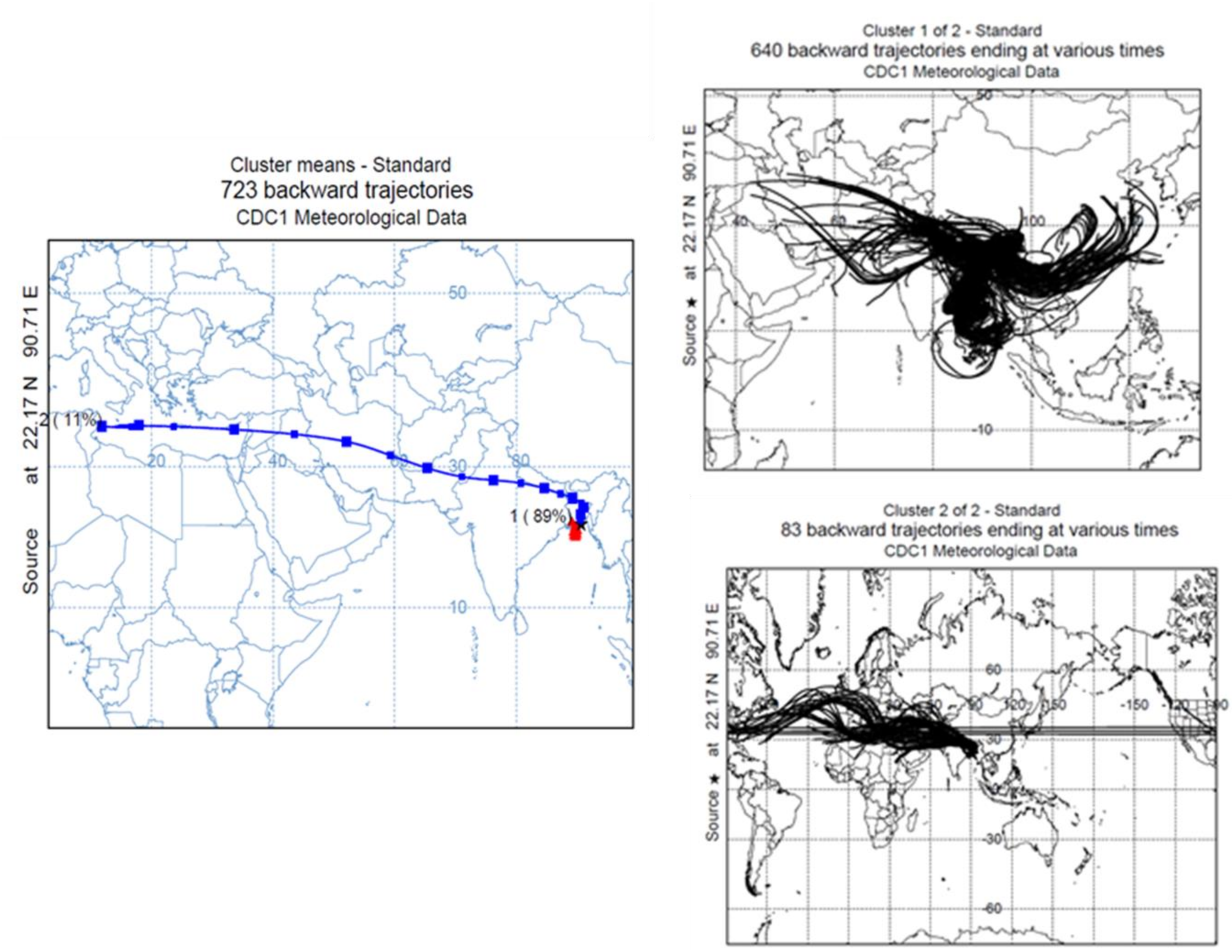

Figure S2: Ten-day air mass back-trajectories (AMBTs) were generated for Bhola Climate Observatory-Bangladesh (BCOB) at an arrival height of 50 m, computed for every three h using NOAA Hybrid Single-Particle Lagrangian Integrated Trajectory Model (HYSPLIT) version 4.

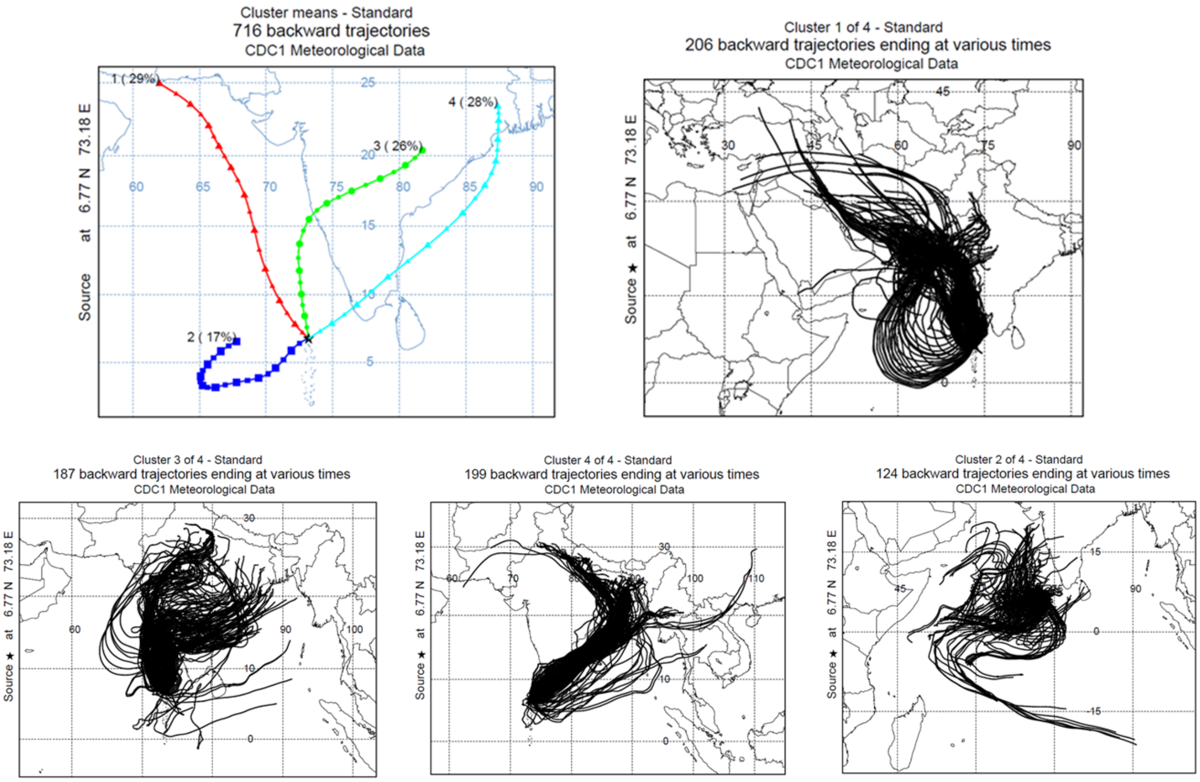

Figure S3: Ten-day air mass back-trajectories (AMBTs) were generated for Maldives Climate Observatory-Hanimaadhoo (MCOH) at an arrival height of 50 m, computed for every three hours using NOAA HYSPLIT model version 4. The AMBTs were clustered into four regions: Western Indian margin, Southern India, IGP, and the Arabian Sea.

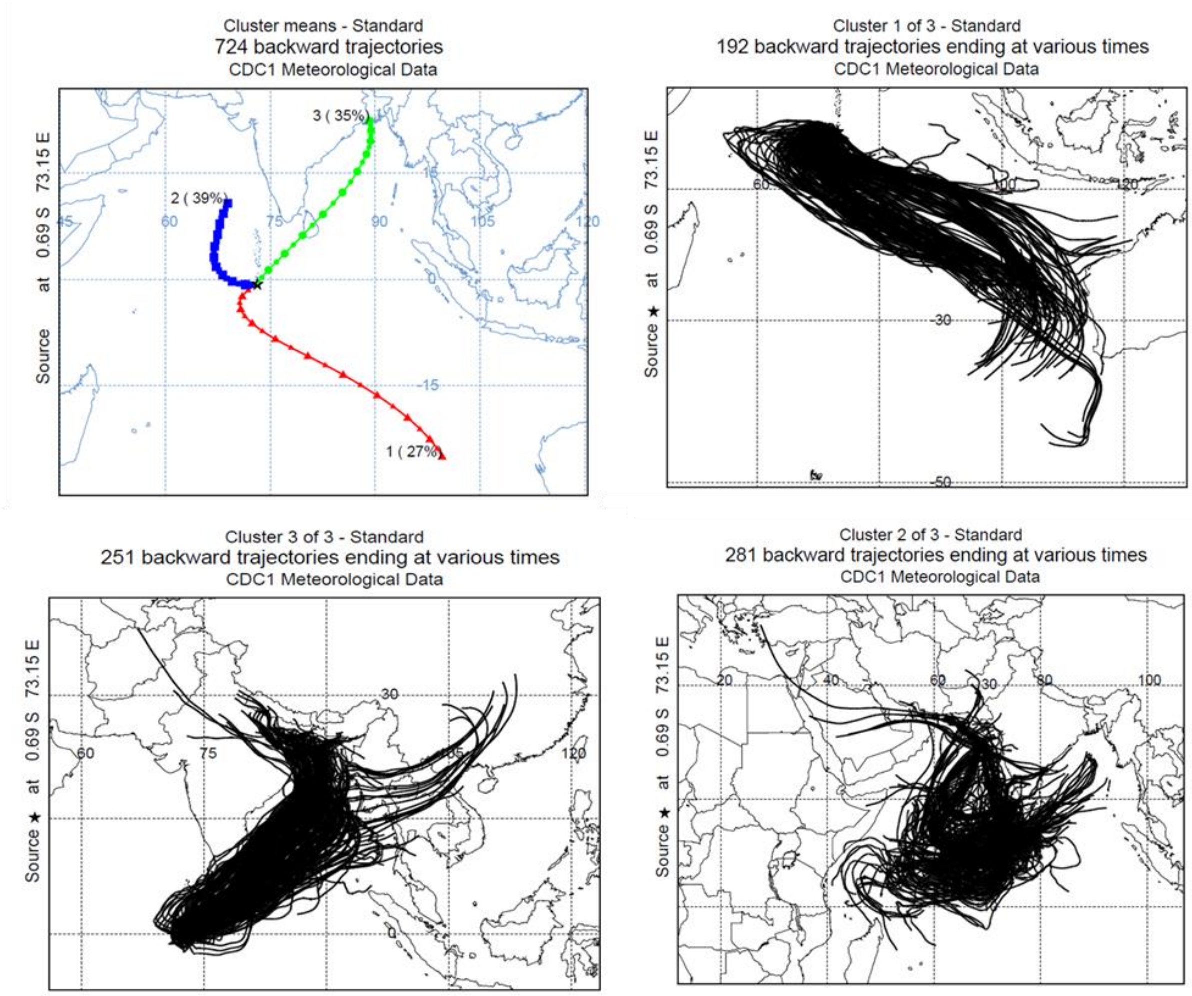

Figure S4: Ten-day air mass back-trajectories (AMBTs) were generated for Maldives Climate Observatory-Gan (MCOG) at an arrival height of 50 m, computed for every three h using NOAA HYSPLIT model version 4. The AMBTs were clustered into four regions: Arabian Sea, IGP, and Indian Ocean.

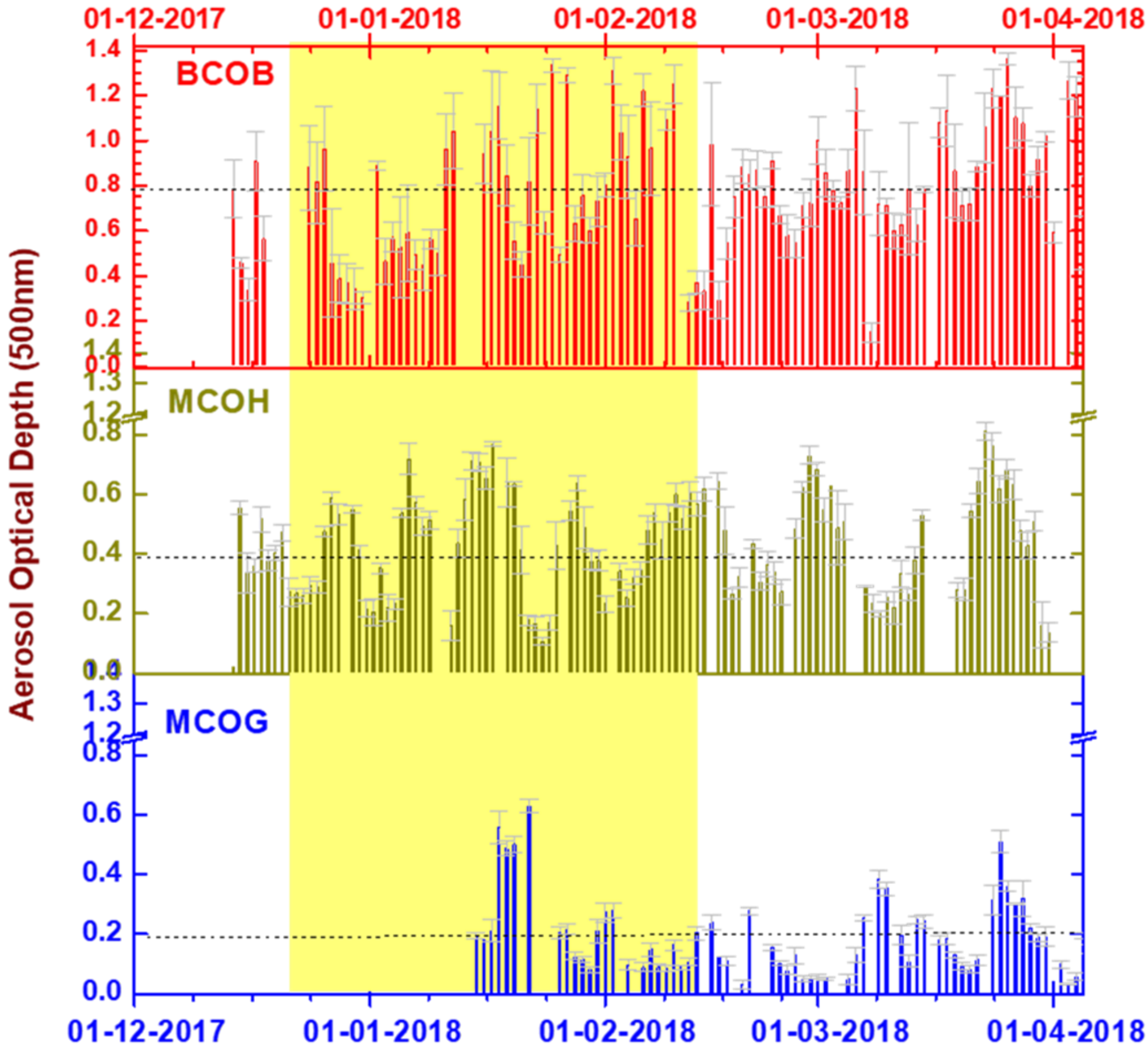

Figure S5. Daily average aerosol optical depth (AOD) measured over Bhola Climate Observatory-Bangladesh (BCOB), Maldives Climate Observatory-Hanimaadhoo (MCOH), and Maldives Climate Observatory-Gan (MCOG) from December 2017 to April 2018. The vertical yellow field indicates the period dominated by air mass transport through the high-pollution source region Indo-Gangetic Plain (IGP).

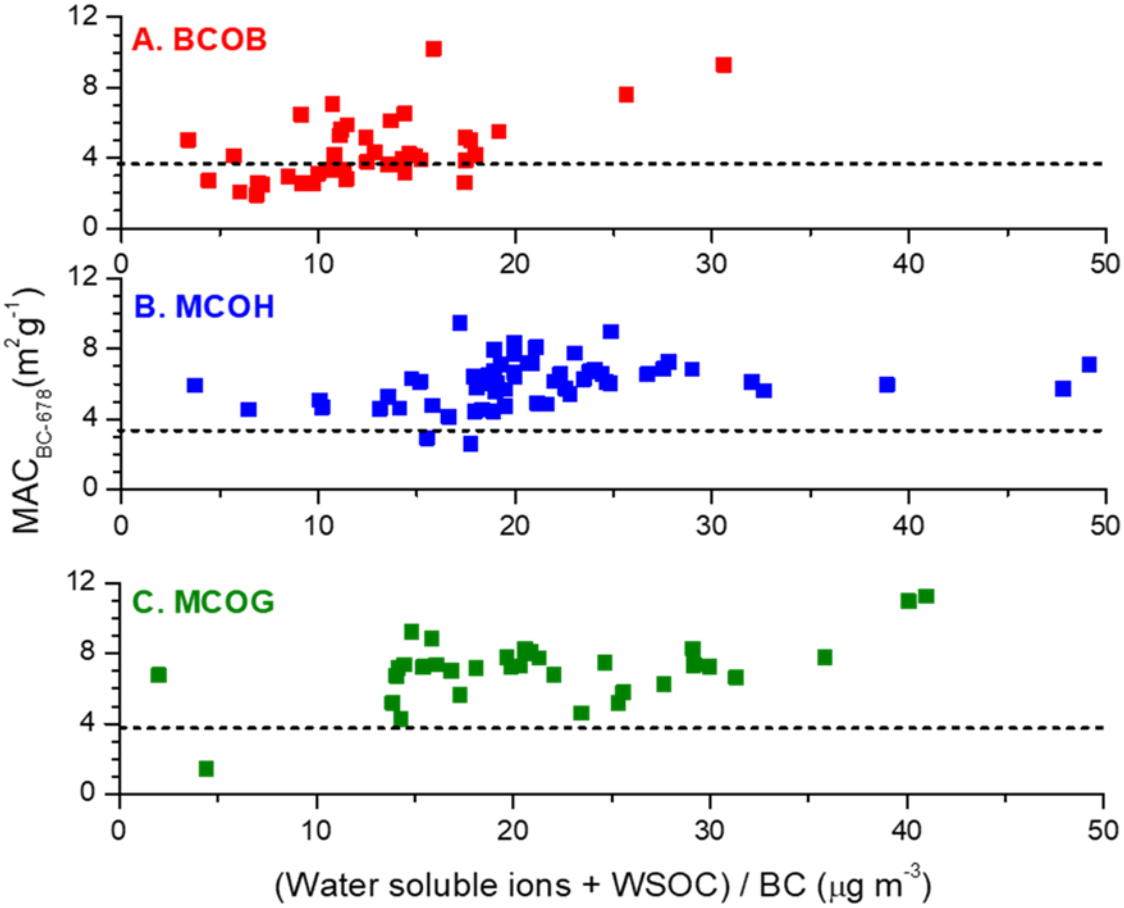

Figure S6: The ratio of black carbon (BC) MAC to [(water-soluble ions + WSOC) / BC] measured at Bhola Climate Observatory-Bangladesh (BCOB), Maldives Climate Observatory-Hanimaadhoo (MCOH), and Maldives Climate Observatory-Gan (MCOG) from December 2017 to April 2018. The horizontal black dotted lines indicate the average MAC (3.5 $m^2 g^{-1}$) measured at the BCOB period when air mass transport dominated through the high-pollution source region Indo-Gangetic Plain (IGP).

Table S1. Matrix of correlation coefficients (r) for the components measured at BCOB station. Correlations coefficients higher than 0.7 are highlighted in bold.

	OC	**EC**	**WSOC**	**WIOC**	**nss-SO_4**	**NO_3**	**nss-K**	**nss-Ca**	**nss-Mg**	**NH_4**
OC	**1.00**	**0.85**	**0.95**	**0.99**	0.11	**0.80**	**0.85**	-0.36	-0.44	-0.23
EC	**0.85**	**1.00**	**0.79**	**0.85**	-0.05	0.55	**0.79**	-0.46	-0.54	-0.22
WSOC	**0.95**	**0.79**	**1.00**	**0.89**	0.10	**0.76**	**0.78**	-0.41	-0.47	-0.19
WIOC	**0.99**	**0.85**	**0.89**	**1.00**	0.11	**0.78**	**0.85**	-0.32	-0.42	-0.24
nss-SO_4	0.11	-0.05	0.10	0.11	**1.00**	0.40	0.28	0.21	0.09	-0.03
NO_3	**0.80**	0.55	**0.76**	**0.78**	0.40	**1.00**	**0.77**	-0.12	-0.23	-0.28
nss-K	**0.85**	**0.79**	**0.78**	**0.85**	0.28	**0.77**	**1.00**	-0.38	-0.43	-0.27
nss-Ca	-0.36	-0.46	-0.41	-0.32	0.21	-0.12	-0.38	**1.00**	0.53	0.40
nss-Mg	-0.44	-0.54	-0.47	-0.42	0.09	-0.23	-0.43	0.53	**1.00**	0.05
NH_4	-0.23	-0.22	-0.19	-0.24	-0.03	-0.28	-0.27	0.40	0.05	**1.00**

Table S2. Matrix of correlation coefficients (r) for the components in $PM_{2.5}$ measured at MCOH. Correlations coefficients higher than 0.7 are highlighted in bold.

	OC	**EC**	**WSOC**	**WIOC**	**nss-SO_4**	**NO_3**	**nss-K**	**nss-Ca**	**nss-Mg**	**NH_4**
OC	**1.00**	**0.74**	**0.72**	**0.93**	0.60	0.21	0.55	0.33	-0.13	0.60
EC	**0.74**	**1.00**	0.61	0.64	**0.78**	0.40	**0.74**	0.25	0.04	**0.78**
WSOC	**0.72**	0.61	**1.00**	0.60	**0.82**	0.32	**0.77**	0.29	-0.08	**0.83**
WIOC	**0.93**	0.64	0.60	**1.00**	0.48	-0.01	0.46	0.32	-0.04	0.49
nss-SO_4	0.60	**0.78**	**0.82**	0.48	**1.00**	0.38	**0.94**	0.21	0.05	**0.99**
NO_3	0.21	0.40	0.32	-0.01	0.38	**1.00**	0.32	0.12	0.01	0.38
nss-K	0.55	**0.74**	**0.77**	0.46	**0.94**	0.32	**1.00**	0.15	0.08	**0.95**
nss-Ca	0.33	0.25	0.29	0.32	0.21	0.12	0.15	**1.00**	0.23	0.19
nss-Mg	-0.13	0.04	-0.08	-0.04	0.05	0.01	0.08	0.23	**1.00**	0.05
NH_4	0.60	**0.78**	**0.83**	0.49	**0.99**	0.38	**0.95**	0.19	0.05	**1.00**

Table S3. Matrix of correlation coefficients (r) for the components measured at MCOG station. Correlations coefficients higher than 0.7 are highlighted in bold.

	OC	**EC**	**WSOC**	**WIOC**	**nss-SO_4**	**NO_3**	**nss-K**	**nss-Ca**	**nss-Mg**	**NH_4**
OC	1.00	**0.83**	**0.80**	**0.99**	0.55	**0.68**	0.26	0.56	0.39	0.43
EC	**0.83**	**1.00**	**0.67**	**0.83**	**0.79**	0.50	0.10	0.39	0.27	0.63
WSOC	**0.80**	**0.67**	**1.00**	**0.73**	0.50	0.53	0.02	0.44	0.26	0.43
WIOC	**0.99**	**0.83**	**0.73**	**1.00**	0.53	**0.68**	0.30	0.56	0.39	0.41
nss-SO_4	0.55	**0.79**	0.50	0.53	**1.00**	0.30	0.17	0.29	0.22	**0.78**
NO_3	**0.68**	0.50	0.53	**0.68**	0.30	**1.00**	0.24	**0.92**	**0.85**	0.00
nss-K	0.26	0.10	0.02	0.30	0.17	0.24	**1.00**	0.31	0.47	0.24
nss-Ca	0.56	0.39	0.44	0.56	0.29	**0.92**	0.31	**1.00**	0.91	0.04
nss-Mg	0.39	0.27	0.26	0.39	0.22	**0.85**	0.47	0.91	**1.00**	-0.04
NH_4	0.43	0.63	0.43	0.41	**0.78**	0.00	0.24	0.04	-0.04	**1.00**