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Supplement of

Detection of Saharan dust and biomass burning events using near-real-time intensive aerosol optical properties in the north-western Mediterranean

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Table S1. List of acronyms

Acronym	Definition
AA	Atlantic advections
AAE_{bb}	Fossil fuel absorption Ångström exponent
AAE_{ff}	Biomass burning absorption Ångström exponent
BB	Biomass burning
BBOA	Biomass burning organic aerosol
BC	Equivalent black carbon
BC_{ff}	Equivalent black carbon from fossil fuel source
BC_{bb}	Equivalent black carbon from biomass burning source
FF	Fossil fuel
g	Asymmetry parameter
HOA	Hydrocarbon-like organic aerosol
MSA	Montsec
MSY	Montseny
OM	Organic matter
OM_{bb}	Organic matter from biomass burning source
OM_{ff}	Organic matter from fossil fuel source
PBL	Planetary boundary layer
REG	Regional atmospheric episodes
SAE	Scattering Ångström exponent
SDE	Saharan dust event
SOA	Secondary organic aerosol
SSA	Single scattering albedo
SSAAE	Single scattering albedo Ångström exponent
WMB	Western Mediterranean Basin

Table S2. Statistics from the hourly averages of the considered aerosol parameters for the period under study at MSY (above) and MSA (below) sites.

MSY	λ	Counts	Mean	SD	Median	Min	Max	Skewness	Percentiles				
									5	25	50	75	95
σ_{sp}	635	28443	30.05	27.67	23.53	-0.50	596.55	3.12	3.01	11.64	23.53	40.06	79.46
	525	28522	38.41	34.03	30.26	-0.50	539.71	2.52	4.27	14.98	30.26	51.72	100.42
	450	28540	47.26	41.29	37.35	-0.49	513.67	2.36	5.14	18.29	37.35	64.34	122.67
σ_{bsp}	635	25894	4.21	3.38	3.63	-0.50	60.56	2.12	0.26	1.77	3.63	5.87	10.06
	525	25974	4.67	3.76	4.01	-0.50	107.08	2.82	0.40	1.99	4.01	6.47	11.14
	450	25951	5.46	4.23	4.70	-0.50	58.86	2.08	0.57	2.40	4.70	7.51	12.86
g	635	23963	0.54	0.10	0.54	-0.97	0.97	-3.34	0.40	0.50	0.54	0.59	0.67
	525	24503	0.59	0.06	0.59	-0.46	0.90	-1.39	0.49	0.56	0.59	0.62	0.68
	450	25038	0.60	0.07	0.61	-0.94	0.88	-2.30	0.49	0.58	0.61	0.64	0.68
σ_{ap}	470	21580	7.66	6.50	6.04	-0.25	94.05	2.48	1.06	3.12	6.04	10.35	19.37
	880	21567	3.51	2.99	2.73	-0.21	31.43	2.10	0.44	1.37	2.73	4.81	9.02
SAE	450-635	27959	1.38	0.79	1.42	-2.45	5.98	0.14	0.06	1.01	1.42	1.76	2.48
AAE	370-950	21390	1.30	0.30	1.27	-1.86	5.84	0.69	0.91	1.14	1.27	1.44	1.75
SSA	470	13585	0.83	0.07	0.84	0.12	0.98	-1.69	0.70	0.80	0.84	0.88	0.91
	880	13575	0.80	0.12	0.83	0.05	1.00	-1.71	0.57	0.75	0.83	0.89	0.95
PM_{10}	-	35354	16.23	11.08	14.15	0.15	236.51	2.24	3.49	8.14	14.15	22.01	35.22

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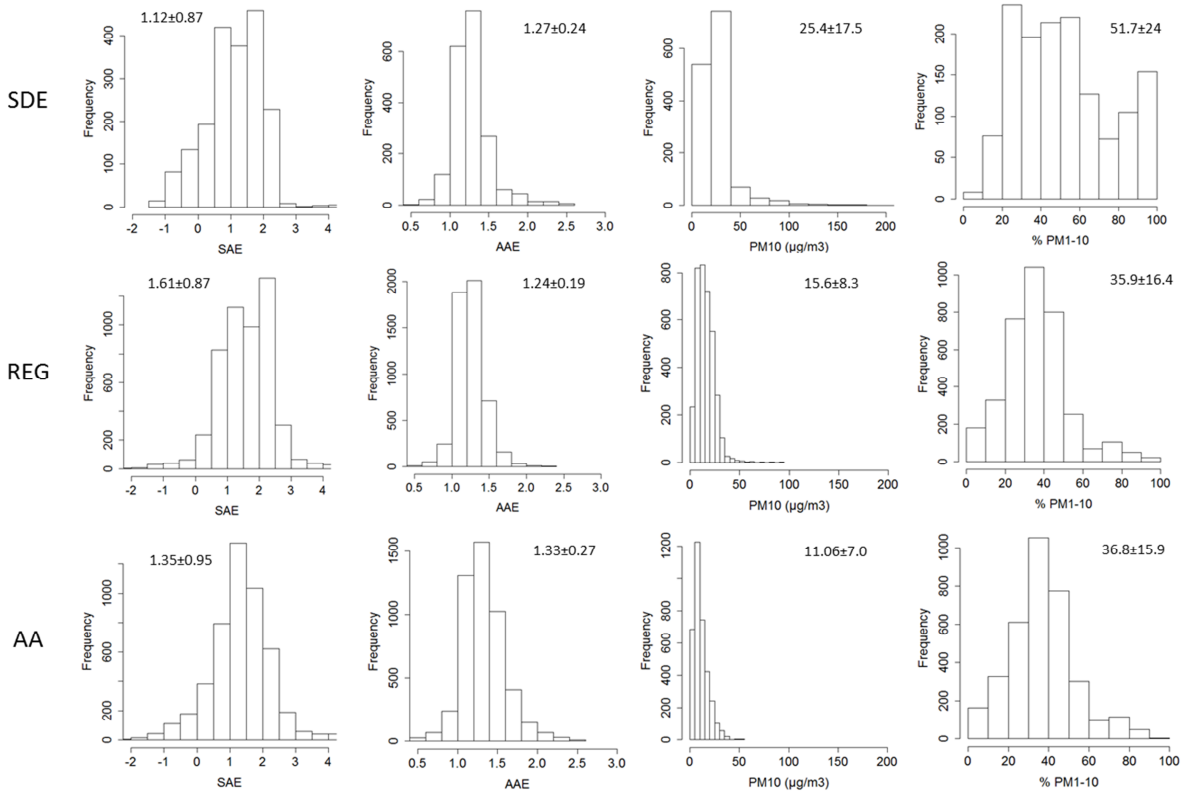
MSA	λ	Counts	Mean	SD	Median	Min	Max	Skewness	Percentiles				
									5	25	50	75	95
σ_{sp}	635	21708	16.73	19.28	9.37	-0.50	307.33	2.05	0.22	2.77	9.37	25.19	54.79
	525	21790	22.12	25.09	12.44	-0.50	277.46	1.85	0.40	3.54	12.44	33.46	71.78
	450	21792	28.11	31.50	16.06	-0.50	376.38	1.80	0.59	4.53	16.06	42.70	91.38
σ_{bsp}	635	21728	2.29	2.51	1.38	-0.50	30.59	1.52	-0.13	0.35	1.38	3.68	7.14
	525	21757	2.69	2.91	1.60	-0.50	36.04	1.45	-0.09	0.41	1.60	4.30	8.36
	450	21542	3.19	3.43	1.94	-0.50	42.44	1.42	-0.10	0.46	1.94	5.16	9.82
g	635	18287	0.52	0.17	0.54	-1.00	0.94	-3.10	0.25	0.48	0.54	0.60	0.71
	525	18657	0.57	0.14	0.59	-1.00	0.94	-3.53	0.35	0.54	0.59	0.63	0.73
	450	18644	0.60	0.14	0.62	-1.00	0.94	-3.63	0.38	0.57	0.62	0.66	0.77
σ_{ap}	470	9913	3.57	3.95	2.03	-0.24	70.52	2.53	0.13	0.65	2.03	5.64	10.50
	880	9915	1.59	1.71	0.89	-0.16	23.03	1.79	0.06	0.29	0.89	2.57	4.81
SAE	450-635	20189	1.58	0.83	1.64	-1.95	6.00	-0.04	0.08	1.24	1.64	1.95	2.82
AAE	370-950	9625	1.36	0.27	1.32	-0.90	4.80	2.02	1.05	1.21	1.32	1.47	1.76
SSA	470	7146	0.85	0.08	0.87	0.21	1.00	-2.16	0.69	0.82	0.87	0.90	0.93
	880	7134	0.82	0.13	0.85	0.04	1.00	-2.29	0.57	0.79	0.85	0.89	0.95
PM_{10}	-	18782	11.32	9.93	8.46	0.10	153.62	2.60	1.36	4.84	8.46	15.54	29.51

a)


SDE
REG
AA
1.12±0.87
1.27±0.24
25.4±17.5
51.7±24
1.61±0.87
1.24±0.19
15.6±8.3
35.9±16.4
1.35±0.95
1.33±0.27
11.06±7.0
36.8±15.9
Frequency
SAE
AAE
PM10 (µg/m3)
% PM1-10

b)

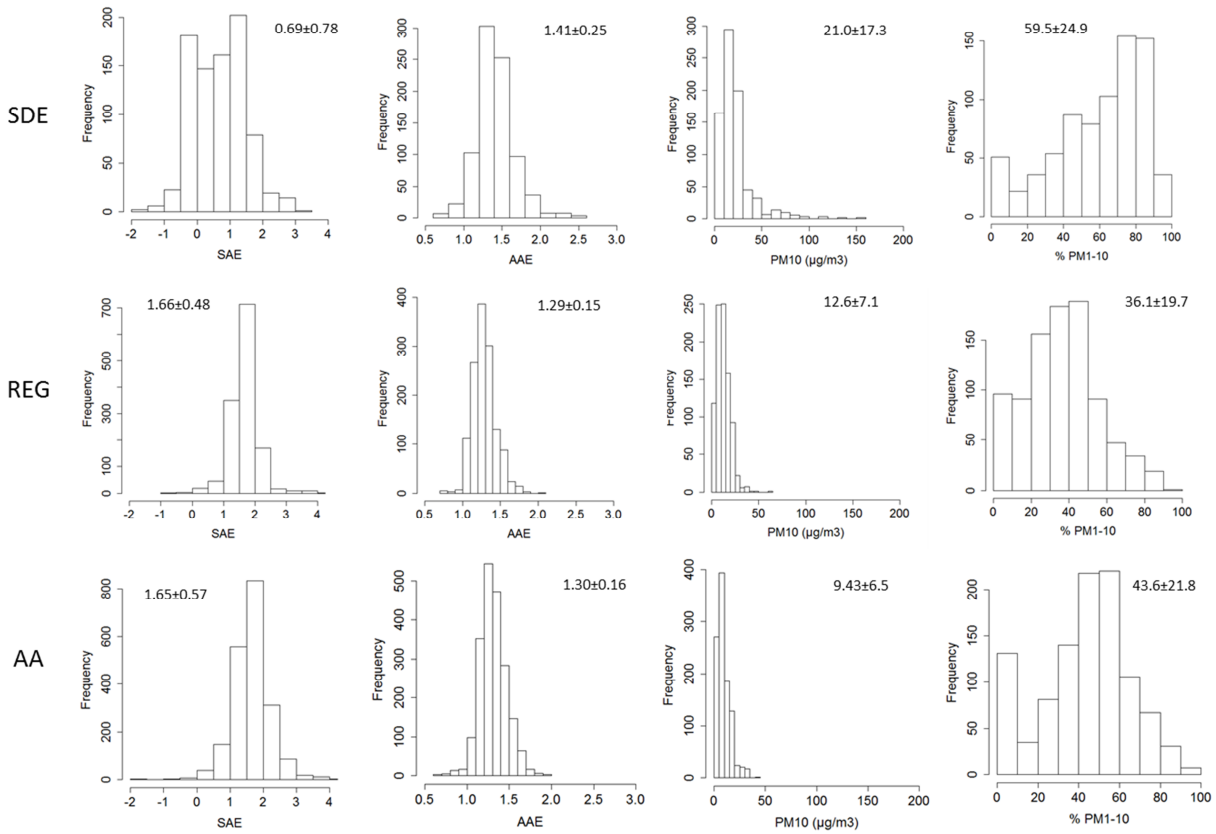

SDE
REG
AA
0.69±0.78
1.41±0.25
21.0±17.3
59.5±24.9
1.66±0.48
1.29±0.15
12.6±7.1
36.1±19.7
1.65±0.57
1.30±0.16
9.43±6.5
43.6±21.8
Frequency
SAE
AAE
PM10 (µg/m3)
% PM1-10

Figure S1. Frequency distribution, average and standard deviation of SAE, AAE, PM_{10} and $\%PM_{1-10}$ in PM_{10} parameters for the three atmospheric scenarios (SDE, REG, AA) displayed in the Ångström matrix at (a) MSY and (b) MSA.

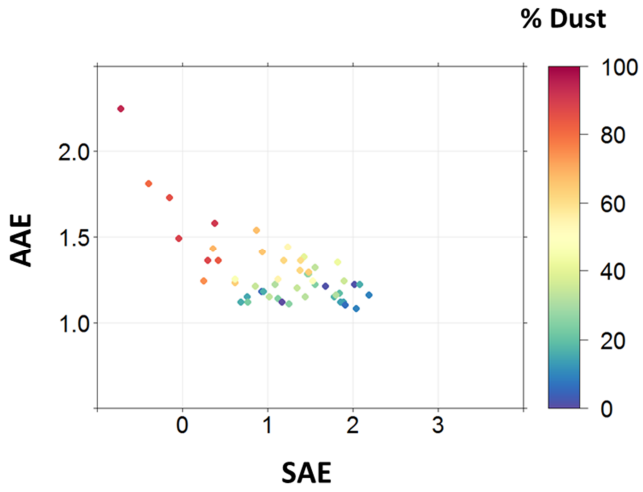


Figure S2. Ångström matrix (AAE vs. SAE weighted by % dust in PM_{10}) during Saharan dust events at MSY (daily base).

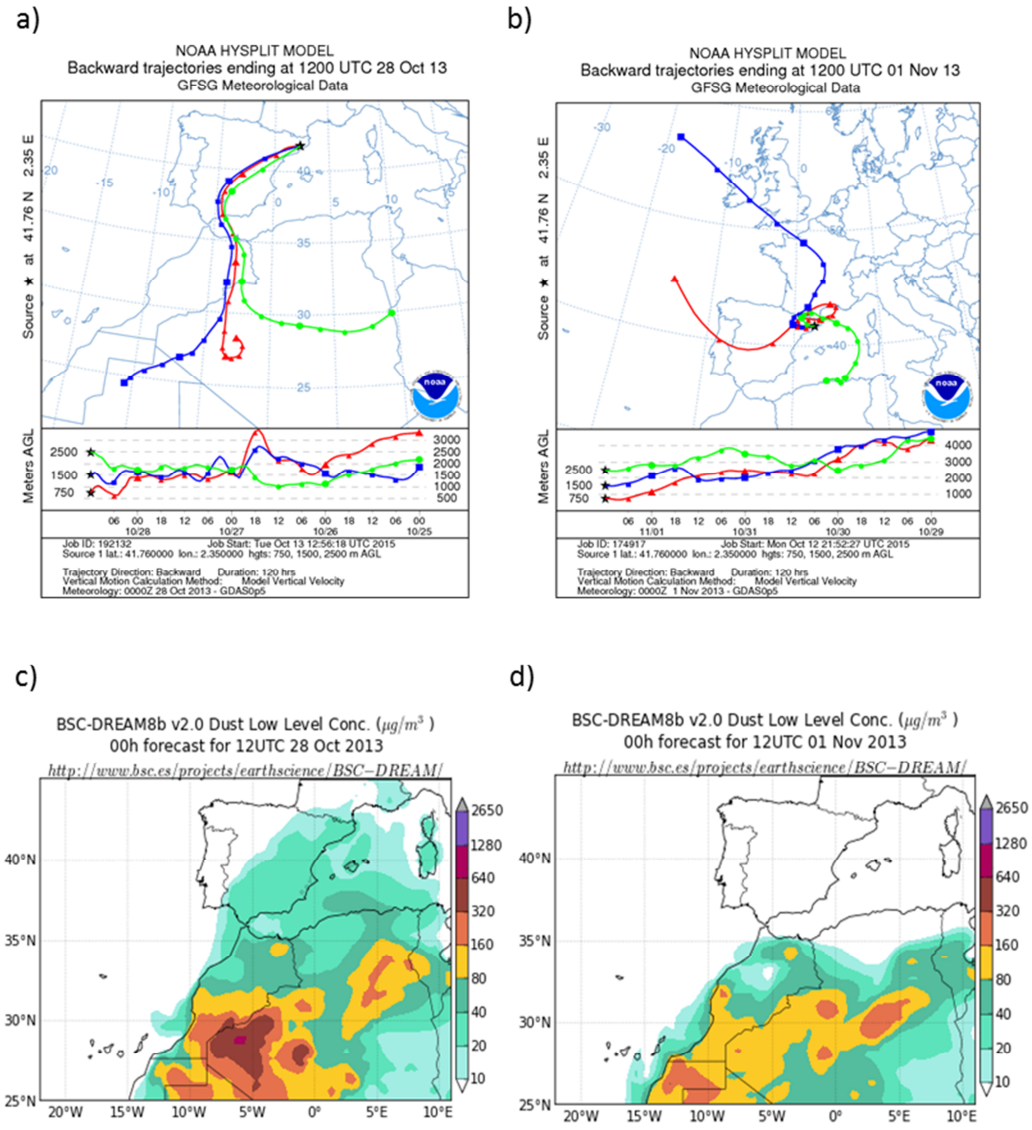


Figure S3. Backward trajectories corresponding to (a) the Saharan dust event (28/10/2013) and (b) the regional episode (01/11/2013) atmospheric scenarios at MSY. Dust surface concentration at MSY from the Dream model corresponding to (c) the Saharan dust event (28/10/2013) and (d) the regional episode (01/11/2013).

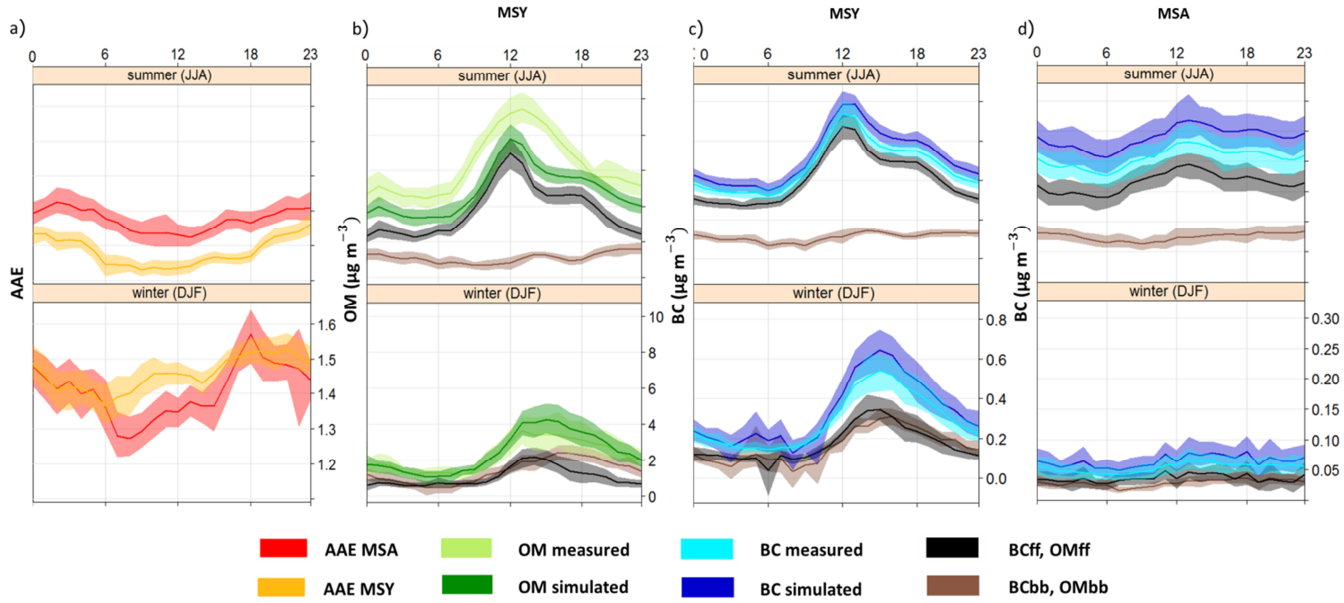


Figure S4. Summer and winter daily cycles of: (a) AAE at MSY and MSA, (b) measured OM and simulated OM as the sum of OMff and OMbb contributions at MSY, measured BC and simulated BC as the sum of BCff and BCbb contributions at (c) MSY and (d) MSA. Averages were calculated from hourly base.