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Supplement of

Vertical and horizontal variability of PM_{10} source contributions in Barcelona during SAPUSS

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Table S1: Average concentration of PM_{10} analysed species at each site (RS, UB, TM and TC).

	RS	UB	TM	TC
PM_{10} (μgm^{-3})	30.7	25.9	24.8	21.8
OC (μgm^{-3})	3.7	2.5	2.5	2.2
EC (μgm^{-3})	1.4	0.9	0.7	0.5
C_{total} (μgm^{-3})	5.8	3.4	3.1	2.7
EC+OM (μgm^{-3})	7.6	5.2	4.9	5.2
$CO_3^{=}$ (μgm^{-3})	1.1	0.9	0.7	0.6
SiO_2 (μgm^{-3})	1.9	1.3	1.5	1.3
Al_2O_3 (μgm^{-3})	0.6	0. 5	0.5	0.4
Ca (μgm^{-3})	0.7	0.6	0.5	0.4
Fe (μgm^{-3})	0.6	0.4	0.3	0.2
K (μgm^{-3})	0.3	0.2	0.2	0.2
Mg (μgm^{-3})	0.2	0.2	0.2	0.1
Na (μgm^{-3})	1.1	0.9	1.2	0.7
SO_4^{2-} (μgm^{-3})	2.8	2.8	2.7	2.3
NO_3^{-} (μgm^{-3})	2.6	2.2	2.4	1.6
Cl (μgm^{-3})	1.3	1.0	1.2	0.8
NH_4^{+} (μgm^{-3})	0.9	0.7	0.7	0.5
Li (ngm^{-3})	0.2	0.3	0.2	0.2
Be (ngm^{-3})	<0.1	<0.1	<0.1	<0.1
Sc (ngm^{-3})	0.1	<0.1	<0.1	<0.1
Ti (ngm^{-3})	20.1	19.9	15.4	13.8
V (ngm^{-3})	6.4	5.9	6.8	4.9
Cr (ngm^{-3})	6.7	4.6	1.9	1.0
Mn (ngm^{-3})	9.3	9.4	6.8	5.3
Co (ngm^{-3})	0.2	0.2	0.2	0.1
Ni (ngm^{-3})	4.8	5.2	2.9	2.5
Cu (ngm^{-3})	23.9	15.9	8.3	5.3
Zn (ngm^{-3})	41.1	61.9	27.9	23.8
Ga (ngm^{-3})	0.1	0.1	<0.1	0.1
Ge (ngm^{-3})	0.2	0.2	<0.1	<0.1
As (ngm^{-3})	0.4	0.4	0.3	0.3
Se (ngm^{-3})	0.5	0.5	0.5	0.4
Rb (ngm^{-3})	0.5	0.5	0.4	0.4
Sr (ngm^{-3})	2.9	2.3	2.2	1.5
Y (ngm^{-3})	0.5	0.3	<0.1	<0.1
Zr (ngm^{-3})	5.8	2.7	5.1	5.3
Nb (ngm^{-3})	<0.1	0.1	<0.1	<0.1
Mo (ngm^{-3})	6.1	4.8	3.8	<0.1
Cd (ngm^{-3})	0.1	0.1	0.1	0.1
Sn (ngm^{-3})	5.8	4.6	2.1	2.9
Sb (ngm^{-3})	2.5	1.8	1.3	0.8
Cs (ngm^{-3})	<0.1	<0.1	<0.1	<0.1
Ba (ngm^{-3})	10.9	13.0	5.6	4.1
La (ngm^{-3})	0.3	0.2	0.2	0.2
Ce (ngm^{-3})	0.7	0.5	0.4	0.4
Pr (ngm^{-3})	<0.1	<0.1	<0.1	<0.1
Nd (ngm^{-3})	0.2	0.2	<0.1	<0.1

Sm (ngm^{-3})	0.1	0.1	<0.1	<0.1
Eu (ngm^{-3})	<0.1	<0.1	<0.1	<0.1
Gd (ngm^{-3})	0.1	0.1	<0.1	<0.1
Tb (ngm^{-3})	<0.1	<0.1	<0.1	<0.1
Dy (ngm^{-3})	0.1	0.1	<0.1	<0.1
Ho (ngm^{-3})	<0.1	<0.1	<0.1	<0.1
Er (ngm^{-3})	<0.1	<0.1	<0.1	<0.1
Tm (ngm^{-3})	<0.1	<0.1	<0.1	<0.1
Yb (ngm^{-3})	<0.1	<0.1	<0.1	<0.1
Lu (ngm^{-3})	<0.1	<0.1	<0.1	<0.1
Hf (ngm^{-3})	0.1	0.1	<0.1	<0.1
Ta (ngm^{-3})	<0.1	<0.1	<0.1	<0.1
W (ngm^{-3})	0.1	0.1	0.1	<0.1
Tl (ngm^{-3})	<0.1	<0.1	<0.1	<0.1
Pb (ngm^{-3})	6.6	6.8	4.9	5.1
Bi (ngm^{-3})	0.3	0.3	0.2	0.1
Th (ngm^{-3})	0.1	0.1	0.1	0.1
U (ngm^{-3})	0.1	0.1	<0.1	0.1

Table S2: Explained variation for each element and each factor. In bold are the species that most contribute to each factor.

	Exhaust &wear	Road dust	Mineral	Aged marine	Heavy oil	Industrial	Sulphate	Nitrate	
	F1	F2	F3	F4	F5	F6	F7	F8	Residuals
PM_{10}	0.16	0.10	0.16	0.15	0.02	0.05	0.13	0.15	0.08
SiO_2CO_3	0.02	**0.43**	**0.33**	0.00	0.01	0.00	0.00	0.05	0.16
Al_2O_3	0.00	**0.35**	**0.42**	0.00	0.00	0.00	0.00	0.02	0.20
Ca	0.22	**0.37**	0.07	0.06	0.07	0.00	0.00	0.06	0.15
K	0.09	0.11	0.18	0.10	0.00	0.10	0.08	0.13	0.23
Na	0.01	0.01	0.08	**0.75**	0.09	0.00	0.03	0.00	0.04
Mg	0.00	0.13	0.20	**0.48**	0.06	0.03	0.00	0.03	0.07
Fe	**0.41**	**0.24**	0.19	0.00	0.00	0.06	0.01	0.00	0.09
SO_4^{2-}	0.04	0.01	0.17	**0.22**	0.08	0.00	**0.39**	0.00	0.08
Mn	0.16	0.16	0.10	0.03	0.05	**0.31**	0.00	0.06	0.13
Ti	0.07	**0.29**	**0.45**	0.03	0.03	0.01	0.00	0.00	0.12
V	0.01	0.03	0.04	0.00	**0.71**	0.06	0.00	0.11	0.04
Cr	**0.46**	0.10	0.03	0.02	0.00	0.07	0.01	0.00	0.30
Ni	0.18	0.03	0.00	0.03	**0.45**	0.03	0.04	0.00	0.24
Cu	**0.67**	**0.19**	0.00	0.00	0.00	0.04	0.00	0.00	0.10
Zn	0.14	0.07	0.00	0.00	0.01	**0.44**	0.09	0.03	0.24
As	0.19	0.05	0.06	0.07	0.02	**0.15**	0.21	0.08	0.17
Ga	0.03	0.21	**0.34**	0.00	0.00	0.13	0.07	0.08	0.13
Rb	0.03	**0.26**	**0.36**	0.04	0.03	0.05	0.12	0.03	0.09
Sr	0.13	**0.23**	0.17	0.18	0.06	0.03	0.00	0.06	0.14
Cd	0.13	0.04	0.12	0.00	0.00	**0.19**	0.20	0.10	0.22
Sn	**0.39**	0.07	0.00	0.00	0.00	0.08	0.16	0.00	0.30
Sb	**0.53**	**0.23**	0.00	0.00	0.01	0.01	0.09	0.03	0.11
Pb	0.00	0.08	0.03	0.05	0.00	**0.50**	0.27	0.00	0.08
Li	0.00	**0.30**	**0.26**	0.11	0.08	0.04	0.09	0.01	0.11
Se	0.10	0.01	**0.22**	0.14	0.04	0.03	0.19	0.12	0.15
La	0.13	0.13	**0.27**	0.06	0.12	0.06	0.00	0.05	0.19
Ba	0.26	0.09	0.15	0.00	0.00	0.05	0.00	0.11	0.34
NO_3^-	0.00	0.00	0.00	0.00	0.01	0.00	0.00	**0.97**	0.02
Cl	0.04	0.01	0.07	**0.52**	0.00	0.04	0.00	0.06	0.25
NH_4^+	0.00	0.01	0.00	0.00	0.00	0.03	**0.73**	0.10	0.13
EC	**0.68**	0.07	0.12	0.00	0.02	0.00	0.03	0.00	0.09
OC	0.33	0.07	0.06	0.04	0.00	0.09	0.10	0.11	0.19

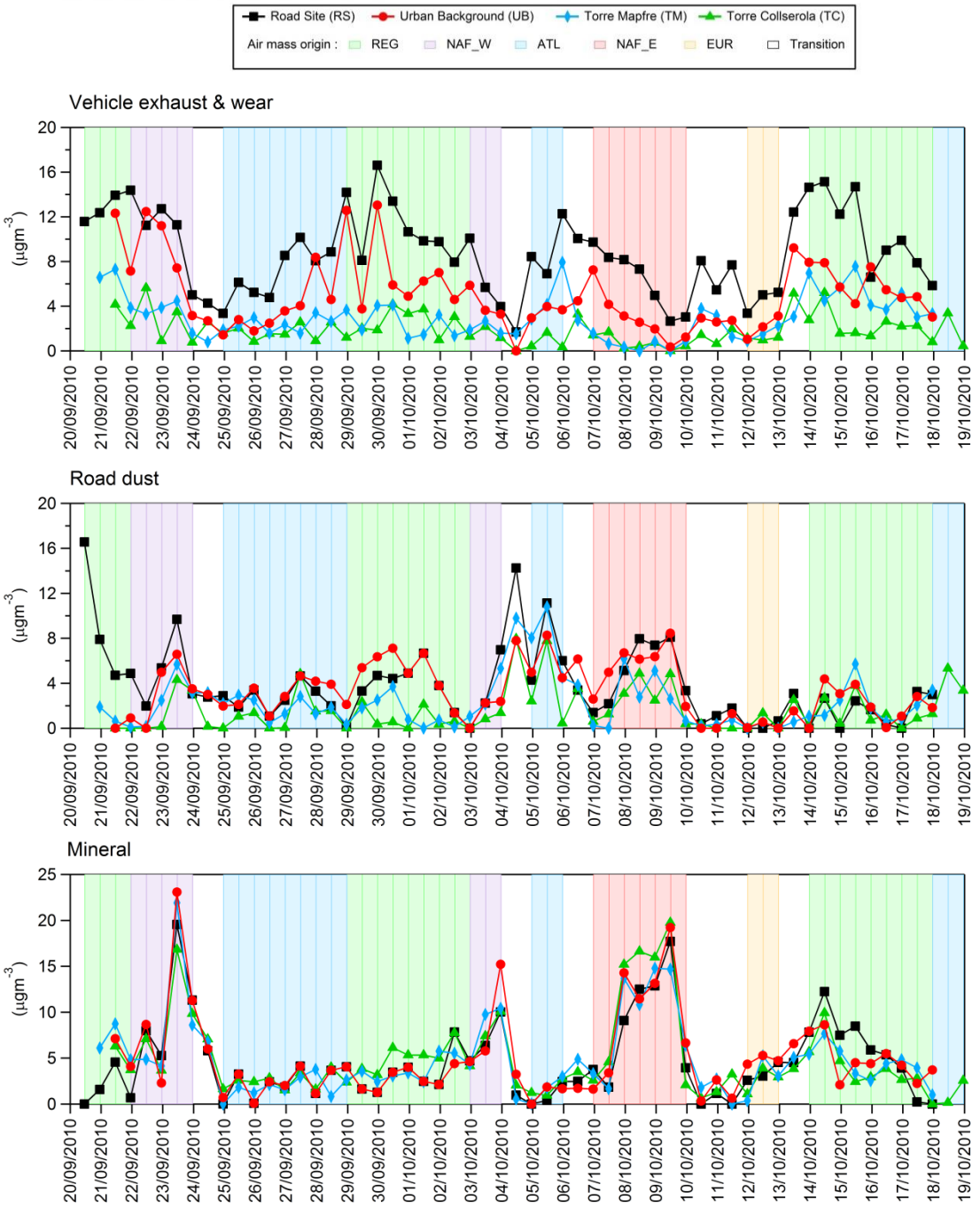


Figure S1: Temporal variation of the 8 PMF factors (vehicle exhaust and wear, road dust, mineral, marine, heavy oil, industrial, sulphate and nitrate) and the calculated contributions of Saharan dust, background mineral dust and anthropogenic marine sulphate during the study period.

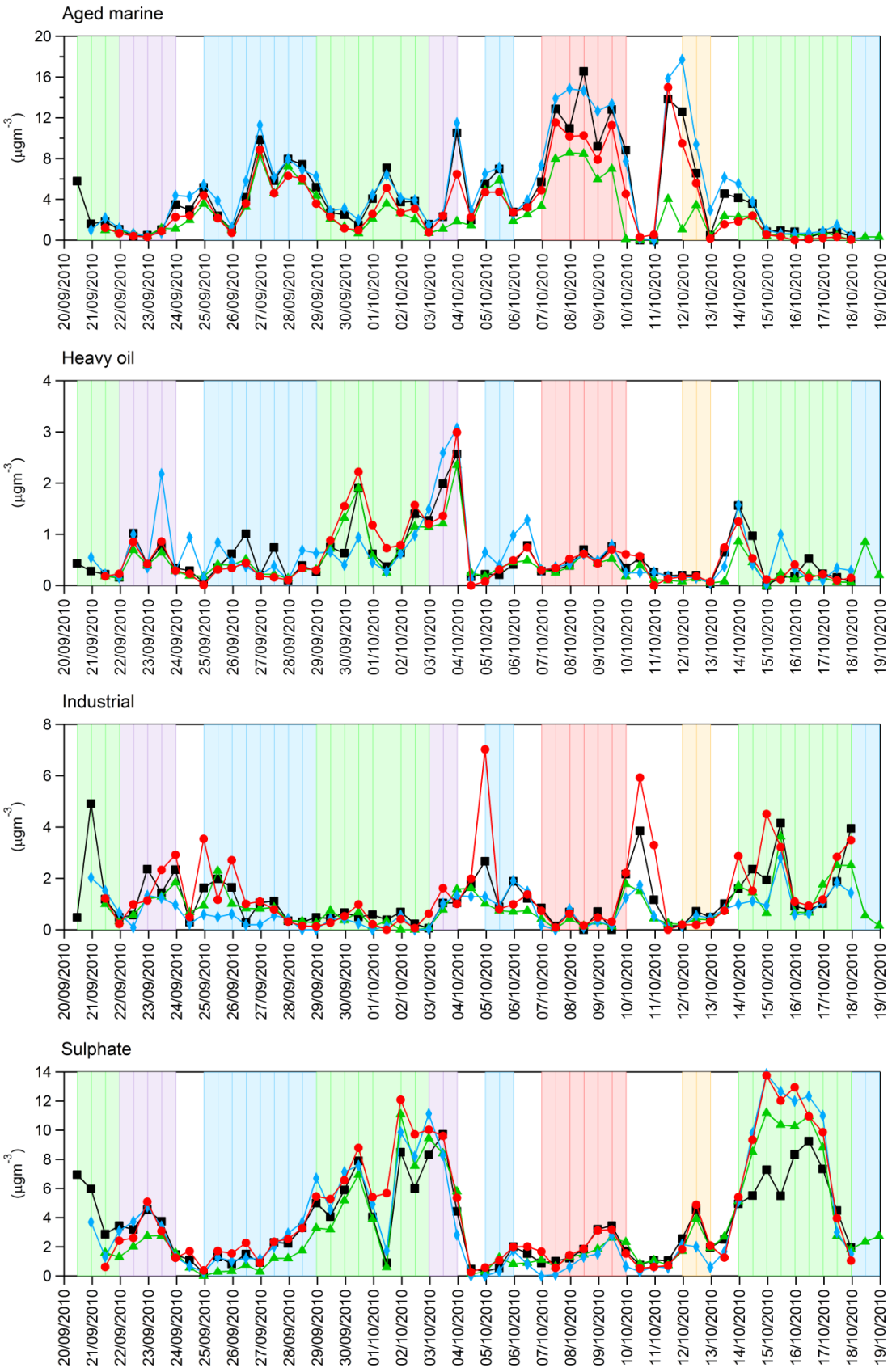


Figure S1 (cont.)

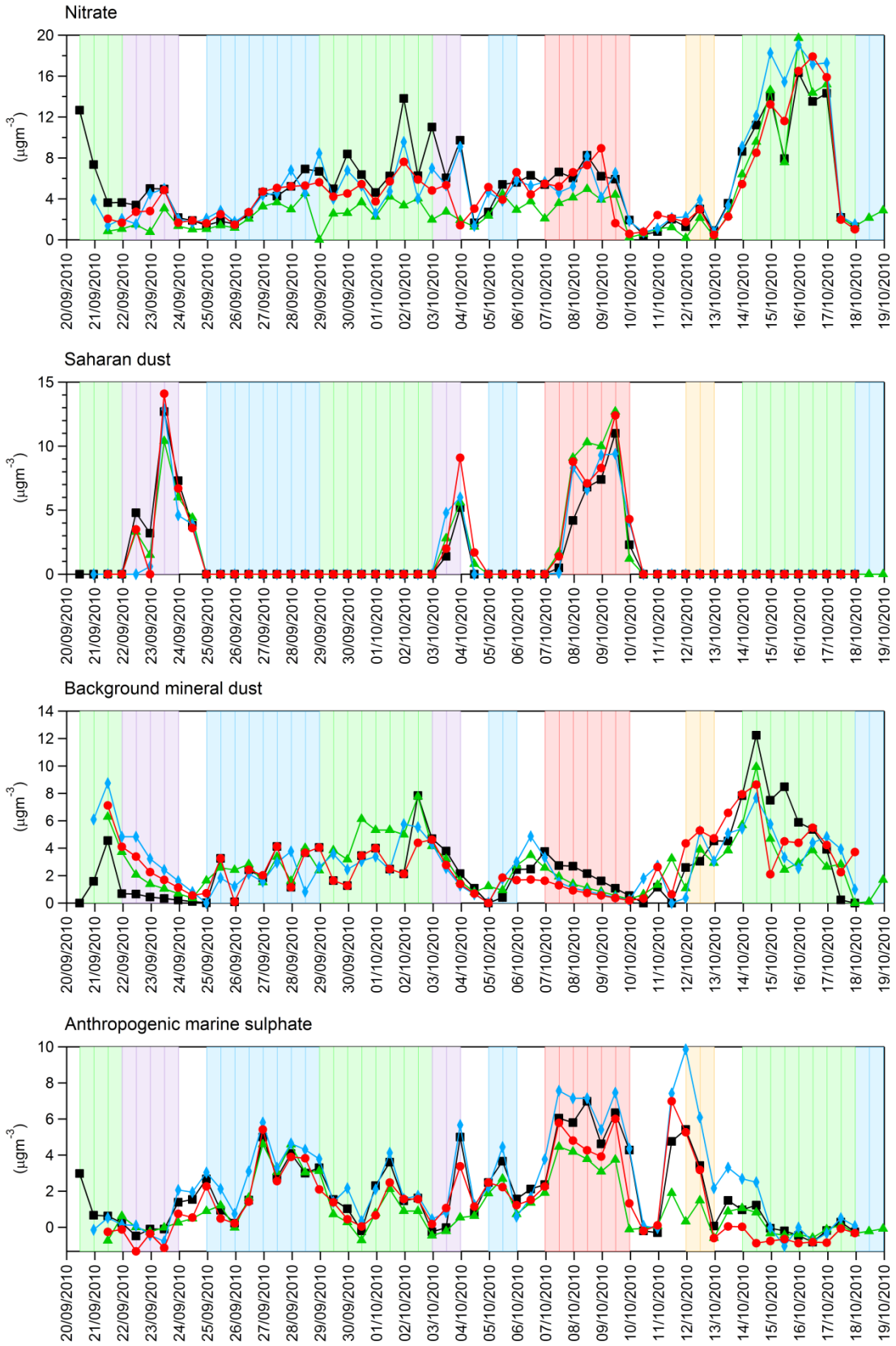
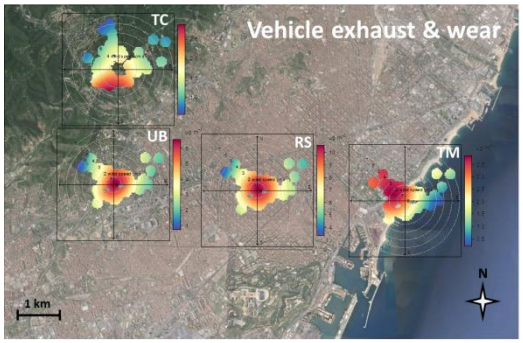
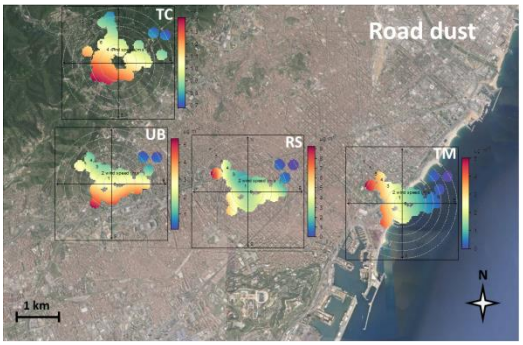
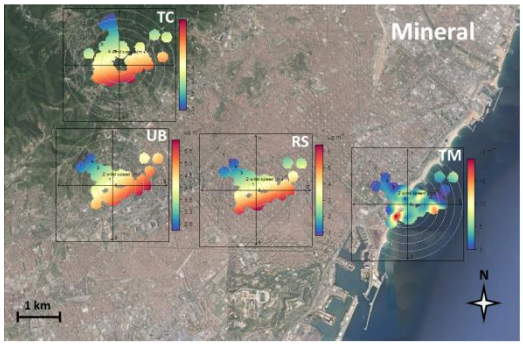


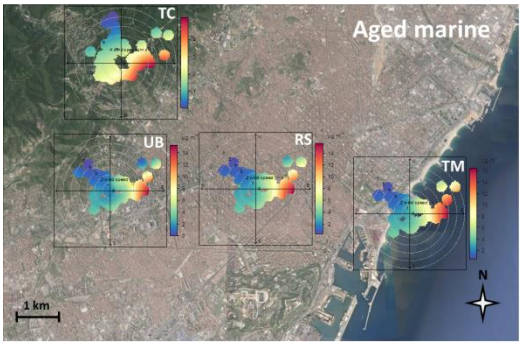
Figure S1 (cont.)

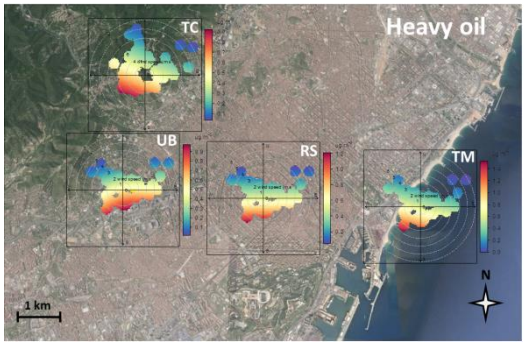
The polar plots were obtained with the OPENAIR package of R. These plots represent the concentration (in our case of certain PMF factors extracted from PM_{10} filters) depending on the wind direction and speed. Note that for the sites located in the city (RS, UB and TM) the wind data used is that measured at the Faculty of Physics as it is representative of the city conditions. The wind components applied to the TC site are those measured at the nearby Fabra Observatory.

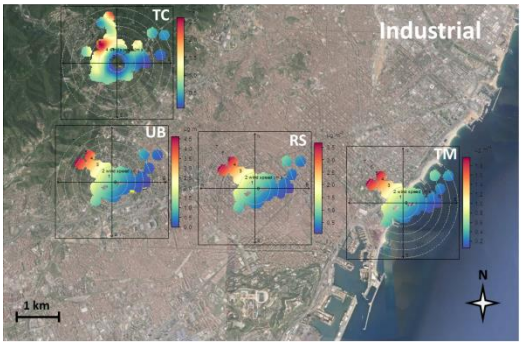


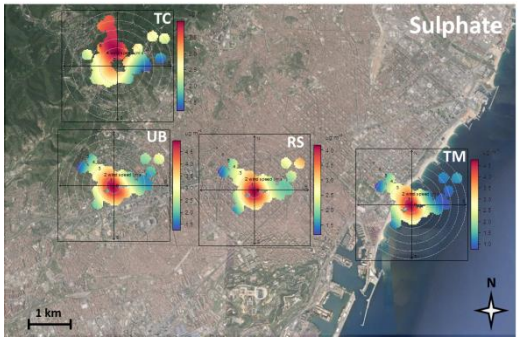


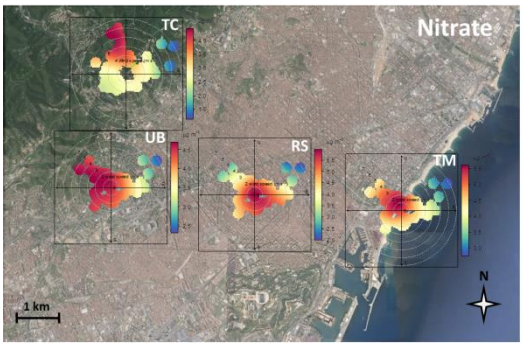












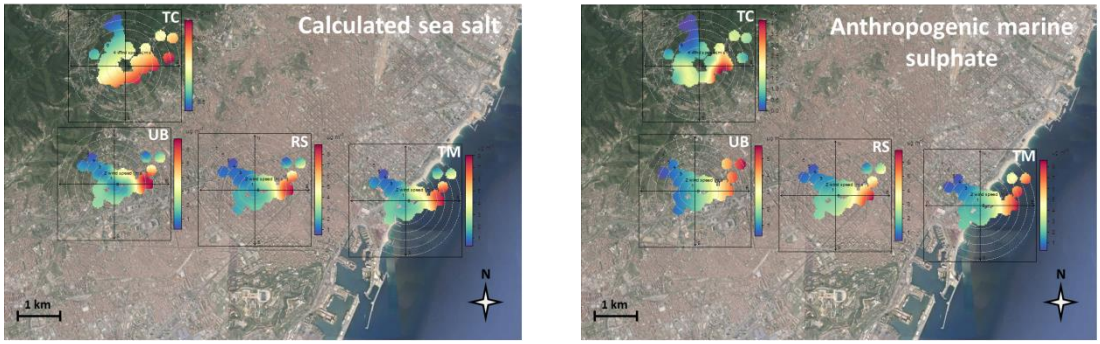


Figure S2: Polar plots representations of the eight PMF factor at each site, calculated sea salt and anthropogenic marine sulphate contributions. Note the different concentration scales.

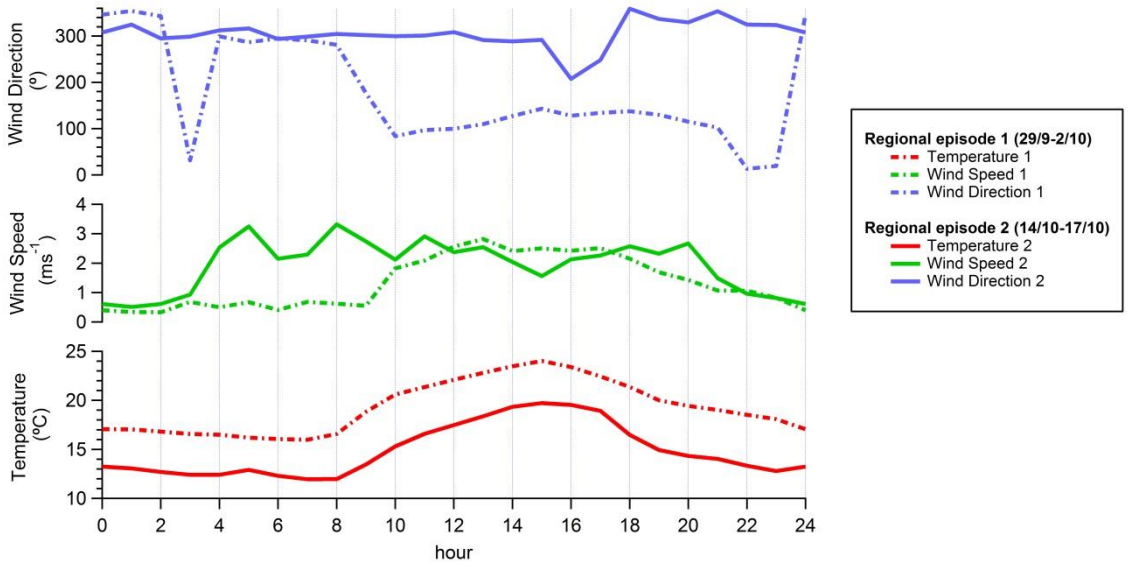


Figure S3: Average diurnal trends of temperature, wind speed and wind direction during two different regional episodes (REG_1: 29/9-2/10 and REG_2: 14/10-17/10).