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Atmospheric Chemistry and Physics Discussions

Supplement of

Long-term real-time chemical characterization of submicron aerosols at Montsec (Southern Pyrenees, 1570 m a.s.l.)

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Supplementary Material

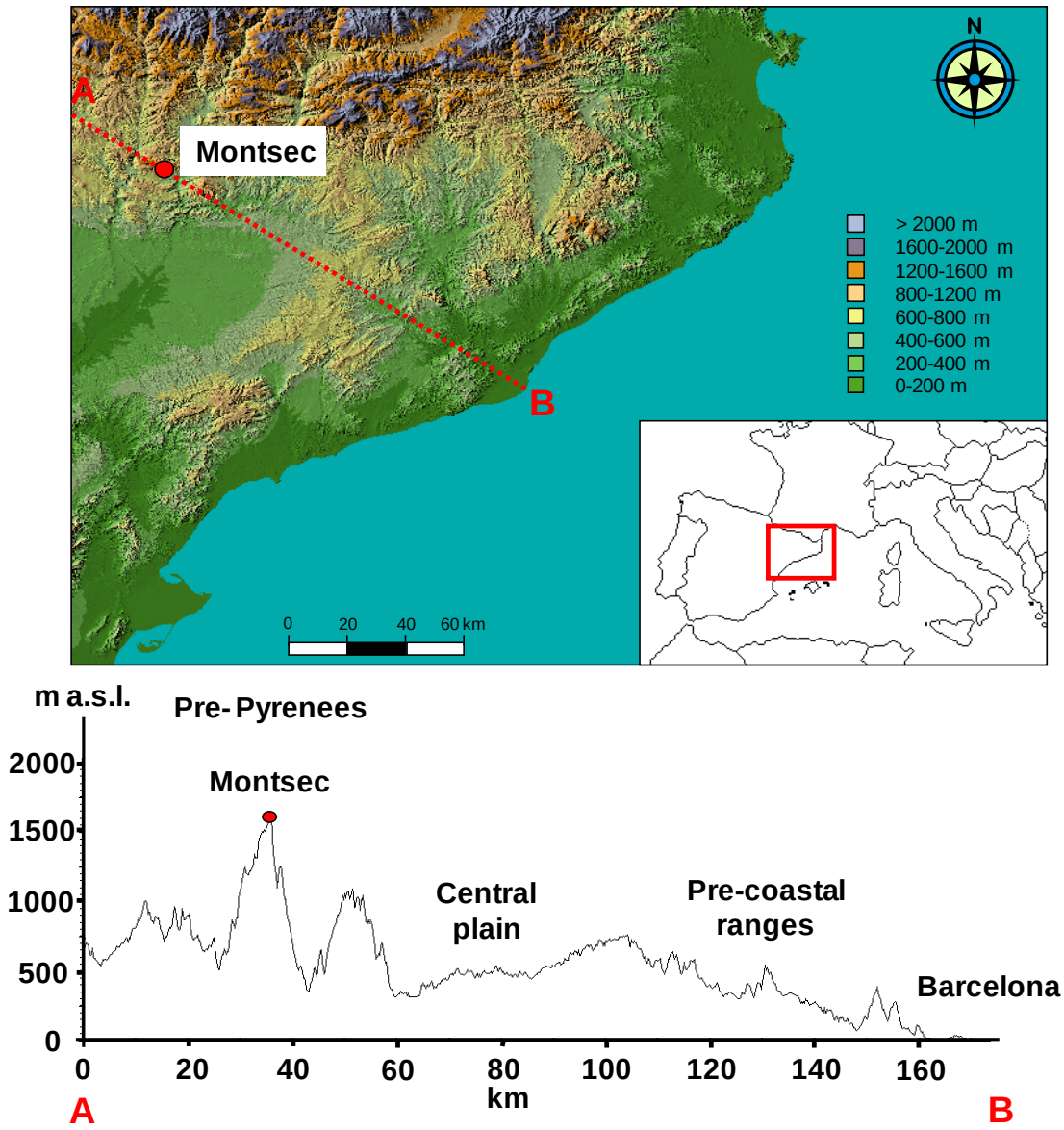

Fig.S1 Top: location of the Montsec sampling site. Bottom: topography of Montsec area following the red line.

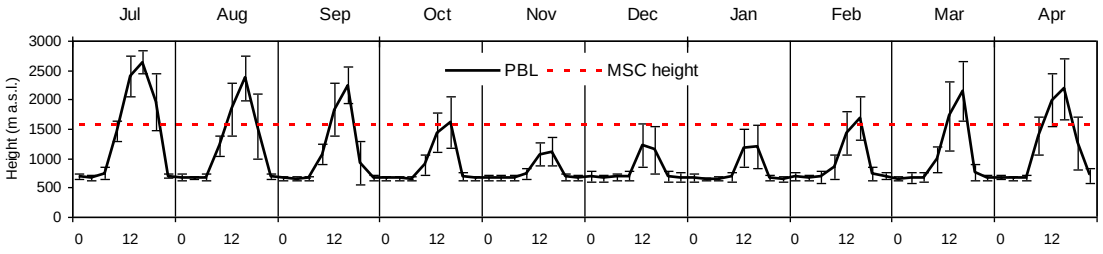

Fig.S2 Diurnal variation of the boundary layer height (computed with HYSPLIT model) averaged for each month during the study period at Montsec.

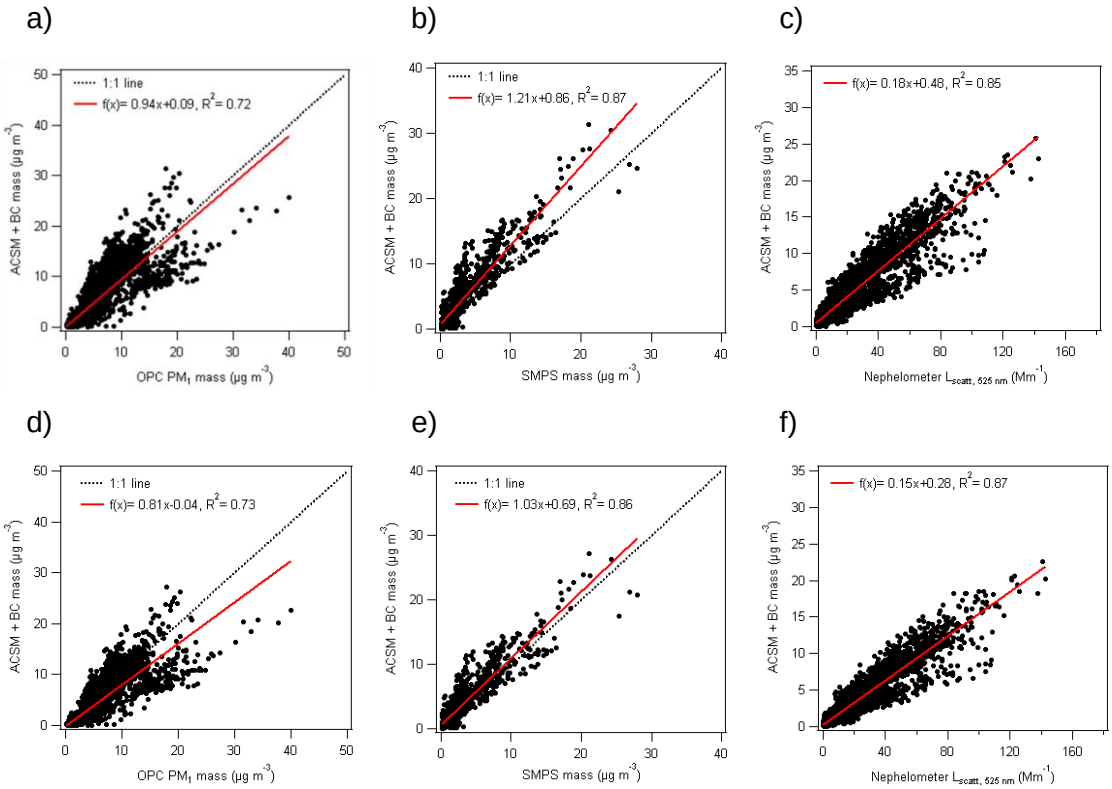

Fig.S3 Top: Scatter plots of ACSM plus BC mass versus PM_1 from (a) OPC and (b) SMPS (winter campaign), and versus light scattering at 525 nm from (c) nephelometer. Bottom: Scatter plots of ACSM plus BC mass after dividing OA by 1.54 versus PM_1 from (d) OPC and (e) SMPS (winter campaign), and versus light scattering at 525 nm from (f) nephelometer. Data points correspond to hourly values and equation and red line correspond to linear regression fits.

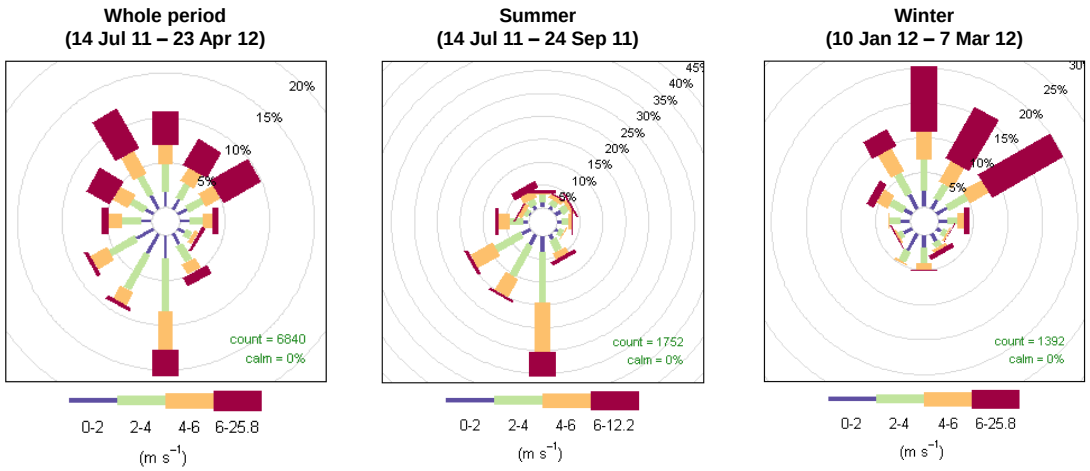

Fig.S4 Wind rose frequency at Montsec during the study.

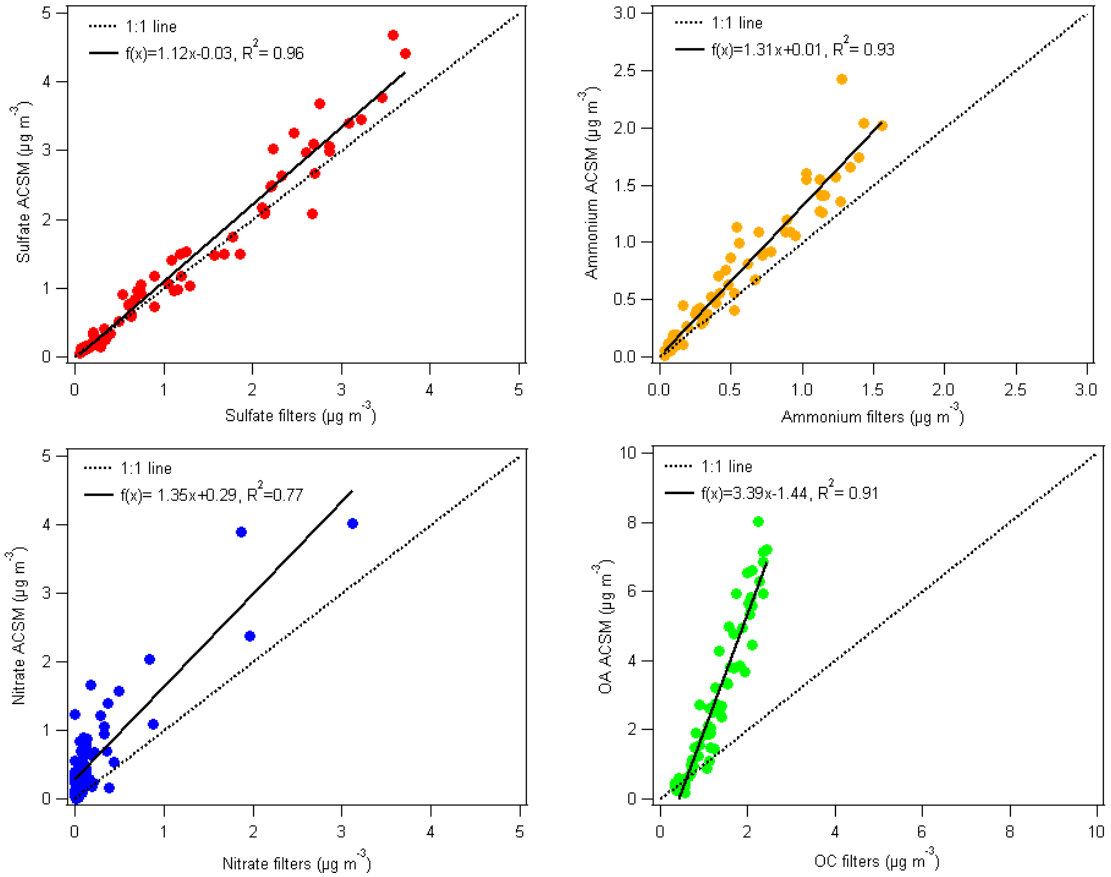

Fig.S5 Scatter plots of chemical species concentrations measured by the ACSM versus those measured off-line in 24-h PM_1 filter samples.

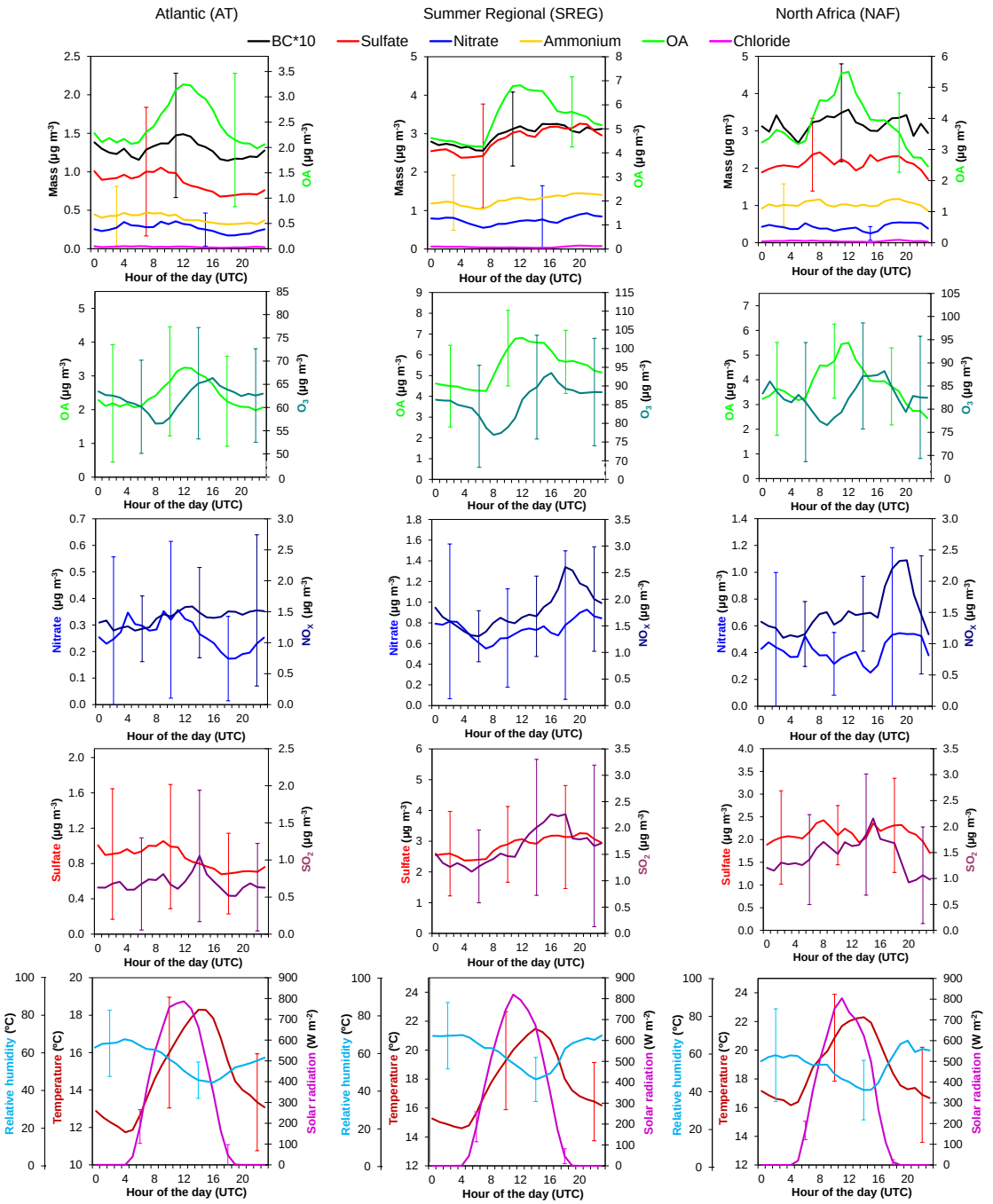

Fig.S6 Diurnal cycles of PM_1 chemical species (black carbon (BC), sulfate, nitrate, ammonium, chloride and OA), gaseous pollutants (ozone (O_3), nitrogen oxides (NO_x), and sulfur dioxide (SO_2)), and meteorological parameters (relative humidity, temperature and solar radiation) averaged as a function of meteorological episode for the summer period (14 Jul 11 – 24 Sep 11). Variation bars indicate ± standard deviation.

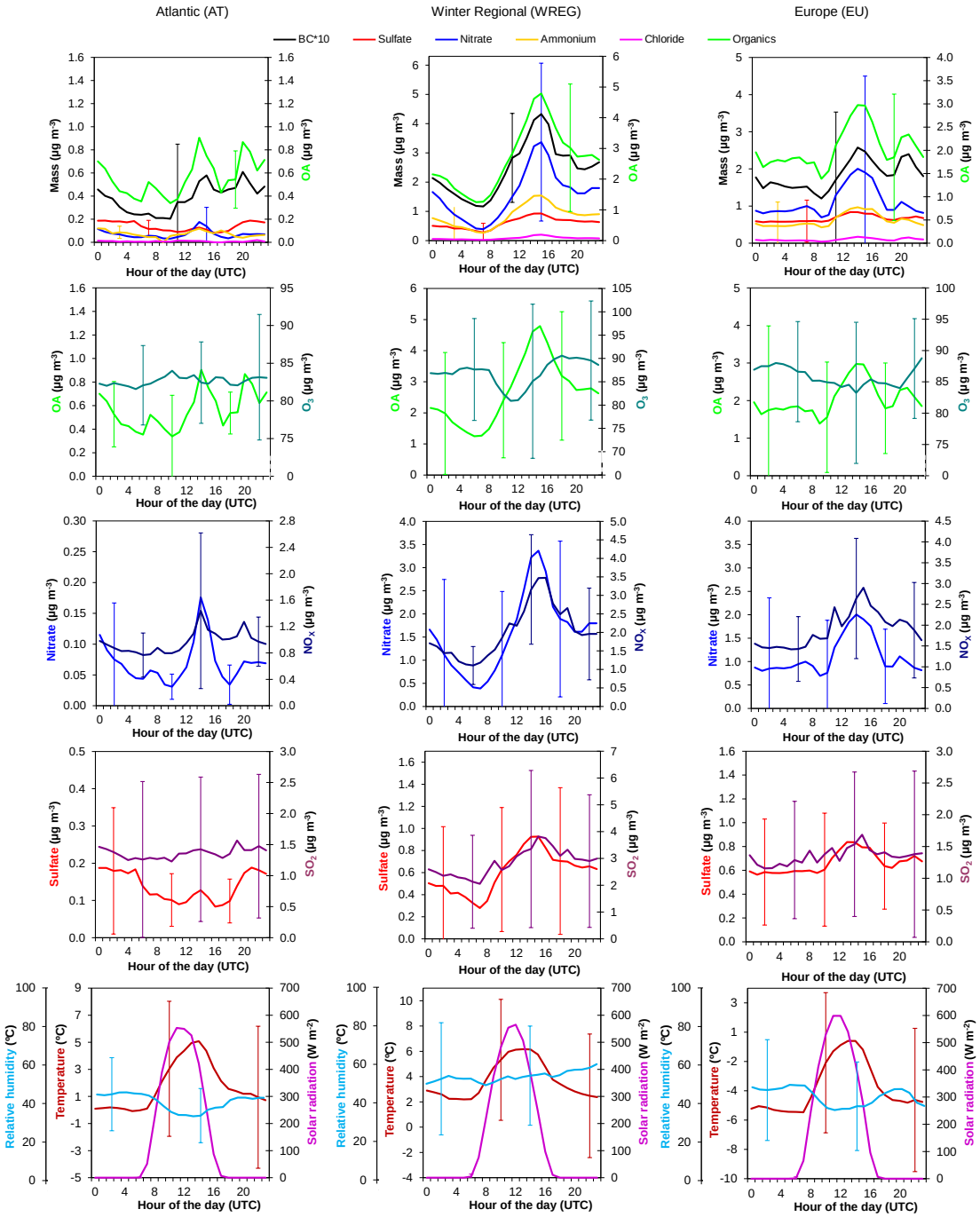

Fig.S7 Diurnal cycles of PM_1 chemical species (black carbon (BC), sulfate, nitrate, ammonium, chloride and OA), gaseous pollutants (ozone (O_3), nitrogen oxides (NO_X), and sulfur dioxide (SO_2)), and meteorological parameters (relative humidity, temperature and solar radiation) averaged as a function of meteorological episode for the winter period (10 Jan 12 – 7 Mar 12). Variation bars indicate ± standard deviation.

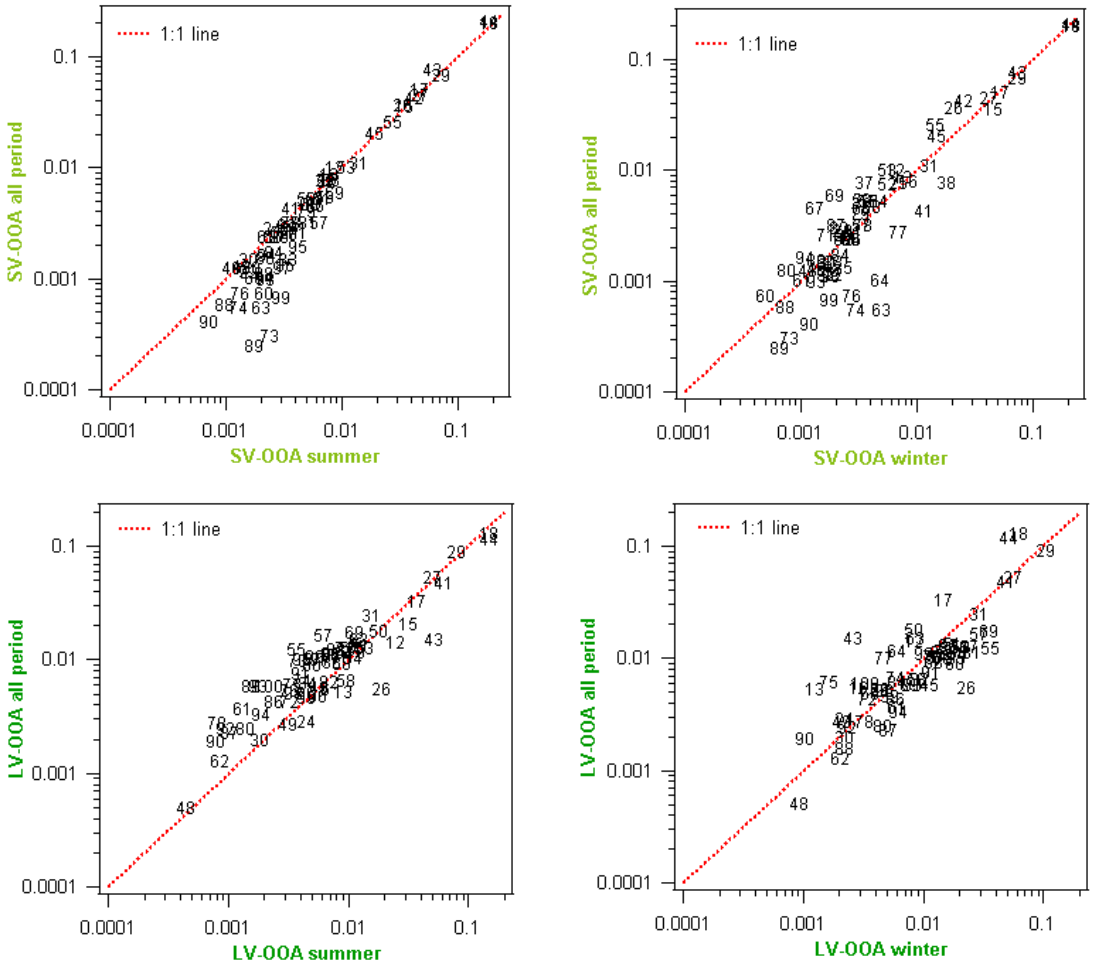

Fig.S8 Scatter plot of organic species (Semi-Volatile Oxygenated Organic Aerosol (SV-OOA) and Low-Volatility Oxygenated Organic Aerosol (LV-OOA)) profiles extracted from the PMF analysis for the entire measurement period versus those for the summer and winter periods. The numerical markers correspond to *m/z* values.

Table S1 Average (25th, 50th, 75th percentiles) concentrations of all chemical components measured at Montsec during the study. Note that the whole period averages include also spring and fall.

	Whole period ($\mu g\ m^{-3}$)	Summer ($\mu g\ m^{-3}$)	Winter ($\mu g\ m^{-3}$)
Period	14 Jul 11 - 23 Apr 12	14 Jul 11 - 24 Sep 11	10 Jan 12 -7 Mar 12
Organics	**2.4** (0.5, 1.4, 3.8)	**4.0** (2.1, 4.0, 5.6)	**1.9** (0.4, 1.0, 2.6)
Sulfate	**1.0** (0.2, 0.5, 1.4)	**1.9** (0.7, 1.6, 2.7)	**0.5** (0.1, 0.3, 0.7)
Nitrate	**0.7** (0.05, 0.2, 0.7)	**0.5** (0.1, 0.3, 0.6)	**1.0** (0.05, 0.2, 1.0)
Ammonium	**0.6** (0.09, 0.3, 0.9)	**0.9** (0.3, 0.8, 1.2)	**0.5** (0.06, 0.2, 0.7)
Chloride	**0.05** (0.01, 0.02, 0.05)	**0.04** (0.01, 0.02, 0.05)	**0.1** (0.004, 0.02, 0.1)
BC	**0.2** (0.04, 0.1, 0.3)	**0.2** (0.1, 0.2, 0.3)	**0.2** (0.03, 0.1, 0.2)
Total	**4.9** (0.9, 2.8, 7.9)	**7.5** (3.4, 7.1, 10.5)	**4.1** (0.8, 1.7, 5.6)

Table S2 Average of meteorological parameters recorded at Montsec during the study. Note that the whole period averages include also spring and fall.

	Whole period	Summer	Winter
Period	14 Jul11 - 23 Apr 12	14 Jul 11 - 24 Sep 11	10 Jan 12 - 7 Mar 12
Tavg (ºC)	7.9	16.6	1.1
Tmax (ºC)	28.8	28.8	13.5
Tmin (ºC)	-13.5	5.5	-13.5
RH (%)	59	58	45
TAP* (mm)	422	51	3
WS** ($m\ s^{-1}$)	0.8	2.0	3.6
WD** (degrees)	347	206	22
P (hPa)	852	853	852
SR ($W\ m^{-2}$)	180	273	152

*Total Accumulated precipitation

**Vector average