Supplement of Atmos. Chem. Phys., 18, 7041–7056, 2018
https://doi.org/10.5194/acp-18-7041-2018-supplement

Atmospheric Chemistry and Physics
Open Access

Supplement of

Aerosol composition and the contribution of SOA formation over Mediterranean forests

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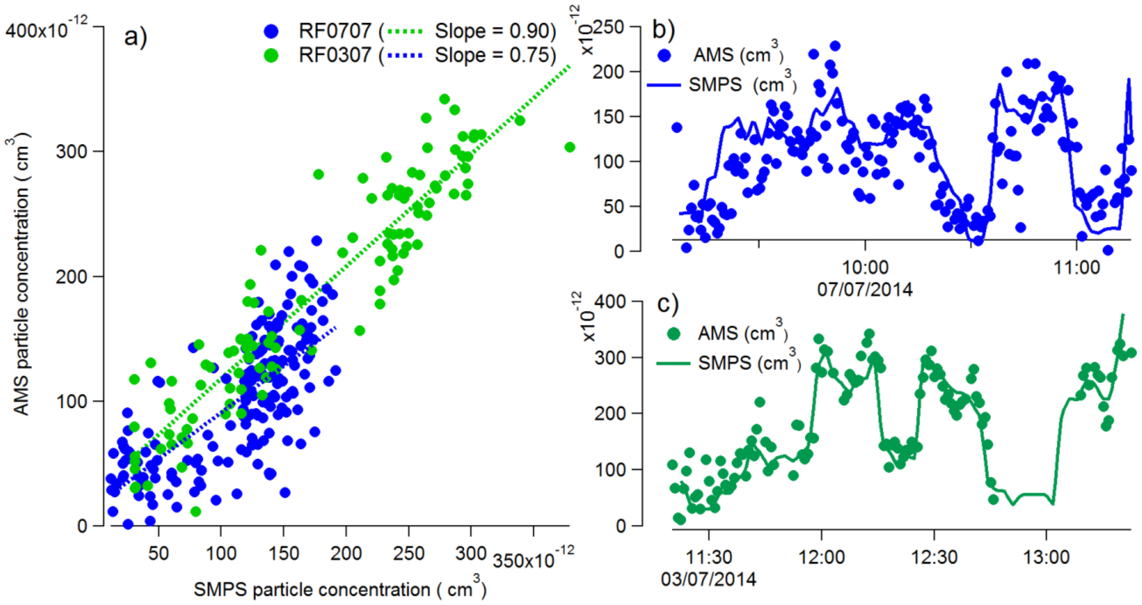

Figure S1: a) Comparison of particle volume concentrations measured by the AMS and the SMPS for the two flights RF20 03/07 and RF23 07/07; b) time series for RF23 07/07; c) time series for RF20 03/07.

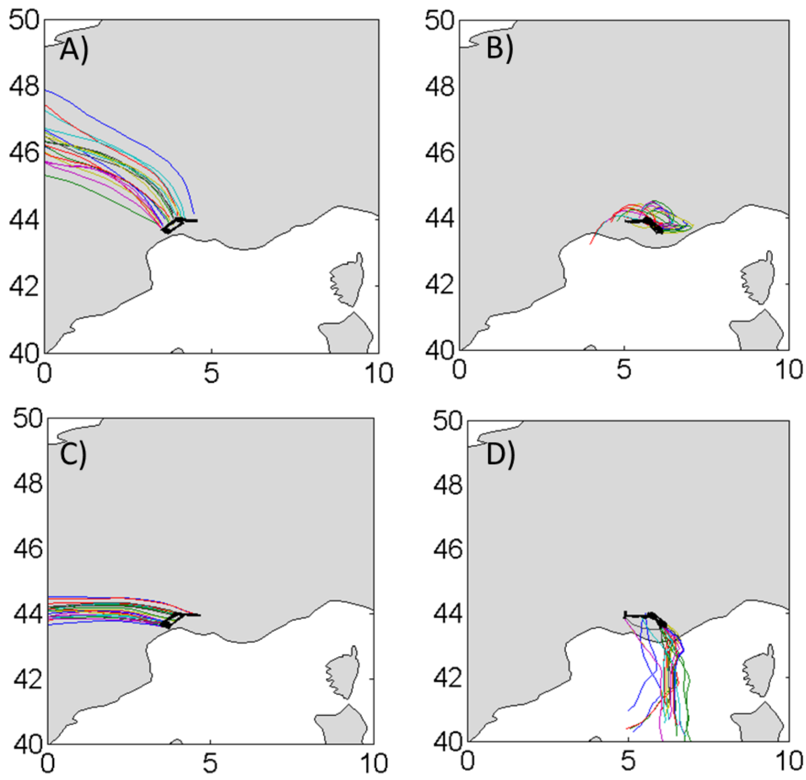

Figure S2. 24-hour back trajectories calculated using HYSPLIT along the flight track for research flight a) RF15 30/06. b) RF20 03/07. c) RF21 05/07. d) RF23 07/07.

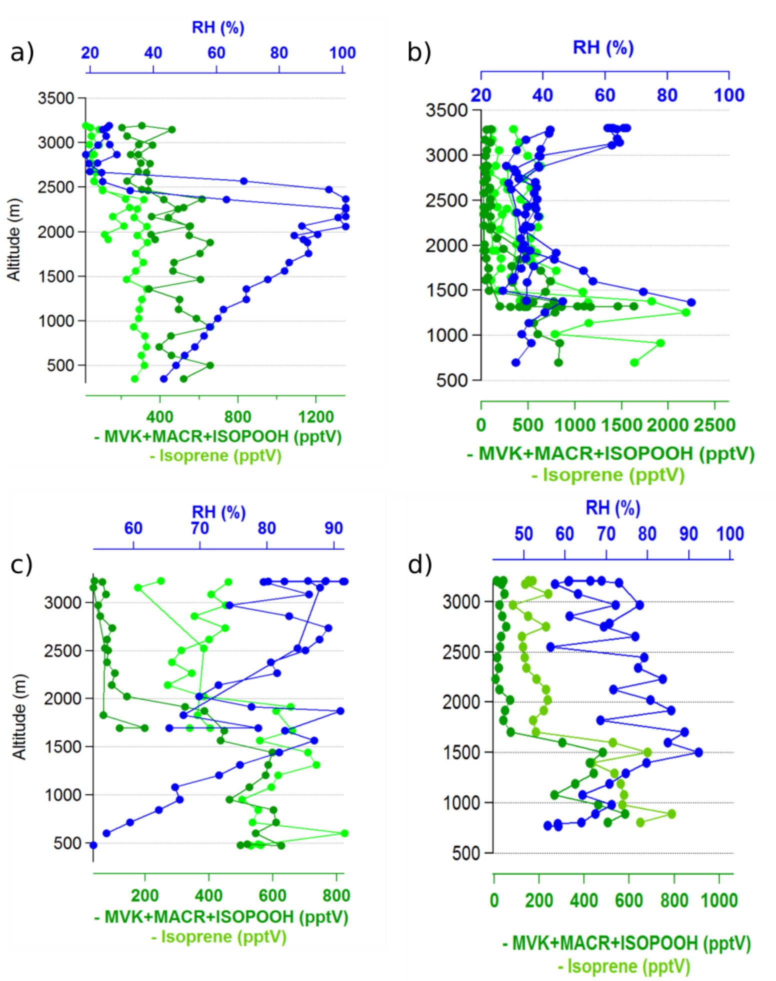

Figure S3. Vertical profiles o RH,. isoprene and its oxidation products (MVK+MACR+ISOPOOH) for: a) RF15, b) RF20, c) RF21, d) RF23.

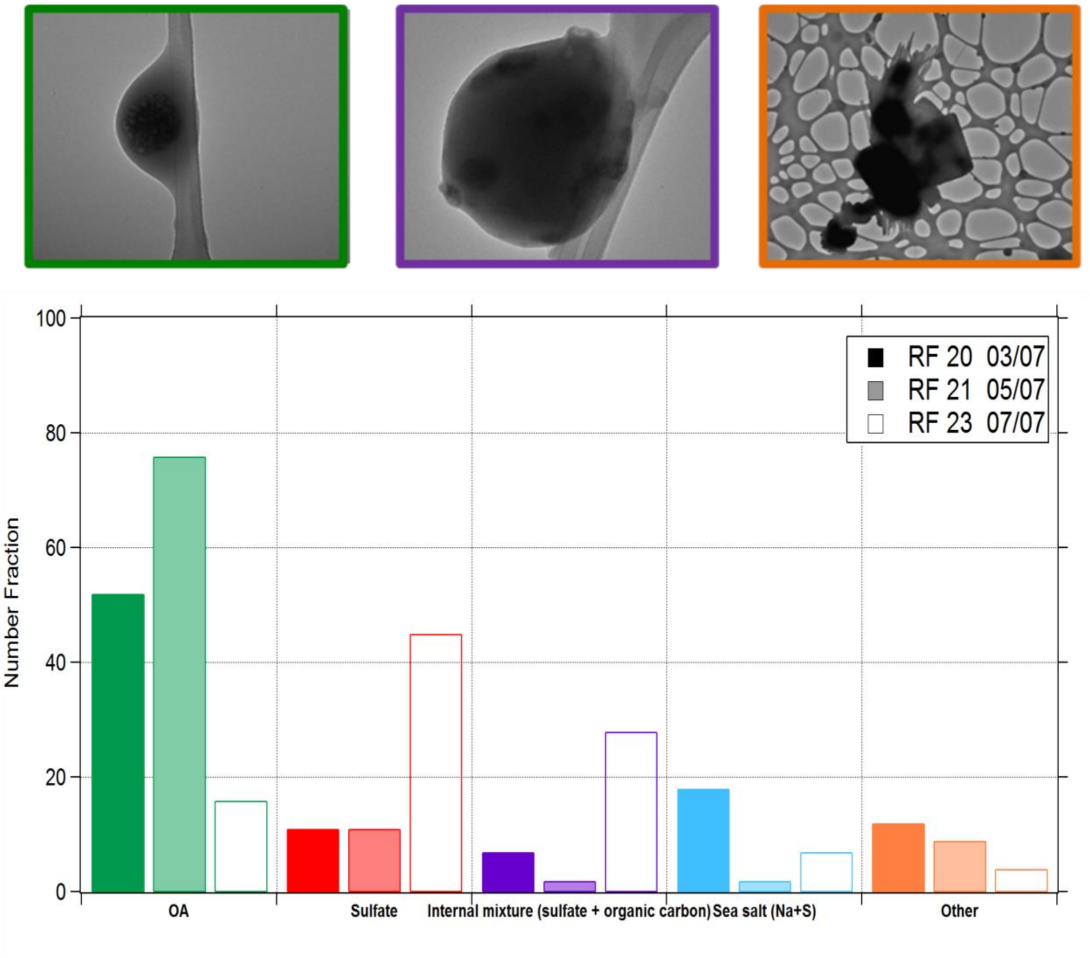

Figure S4. top) Some examples of TEM images of aerosol particles collected during the biogenic flights. Bottom) the fraction contribution of different species for the different flights (sample number > 230)

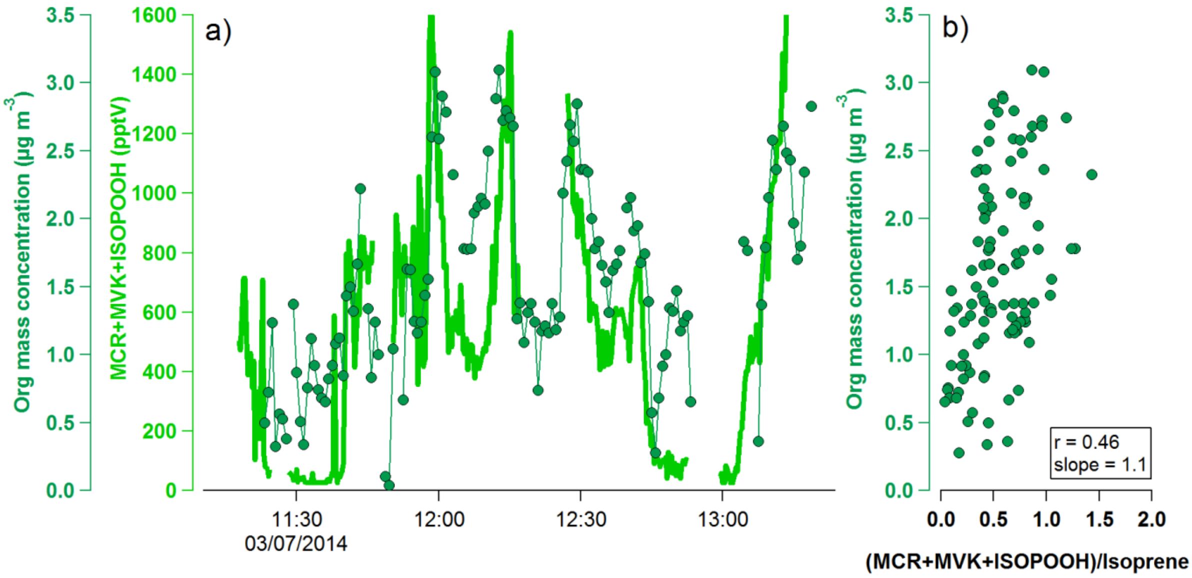

Figure S5. Comparison of total organic matter (µg m^{-3}) measured by the C-ToF-AMS with a) the oxidation products of isoprene. as a function of time. and b) against the ratio of the oxidation products of isoprene and isoprene.

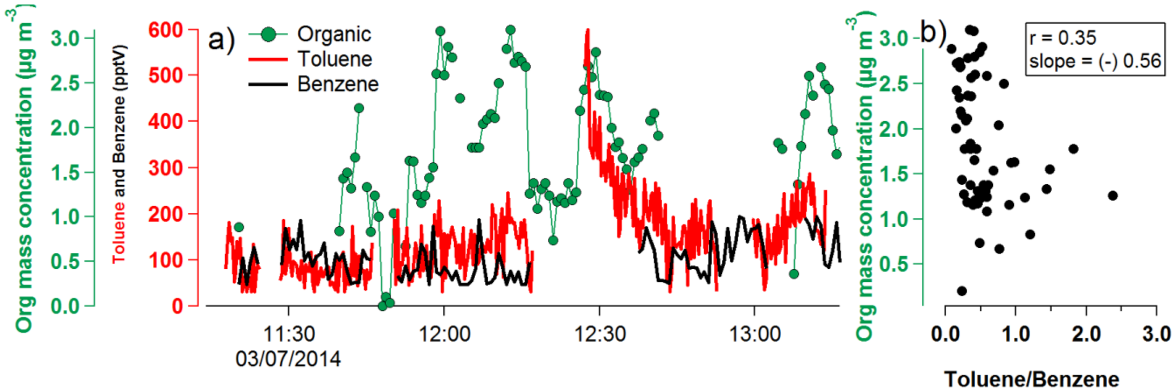

Figure S6. Comparison of total organic matter (µg m^{-3}) measured by the C-ToF-AMS with a) Toluene and Benzene concentrations. as a function of time. and b) against the ratio of the Toluene/Benzene.

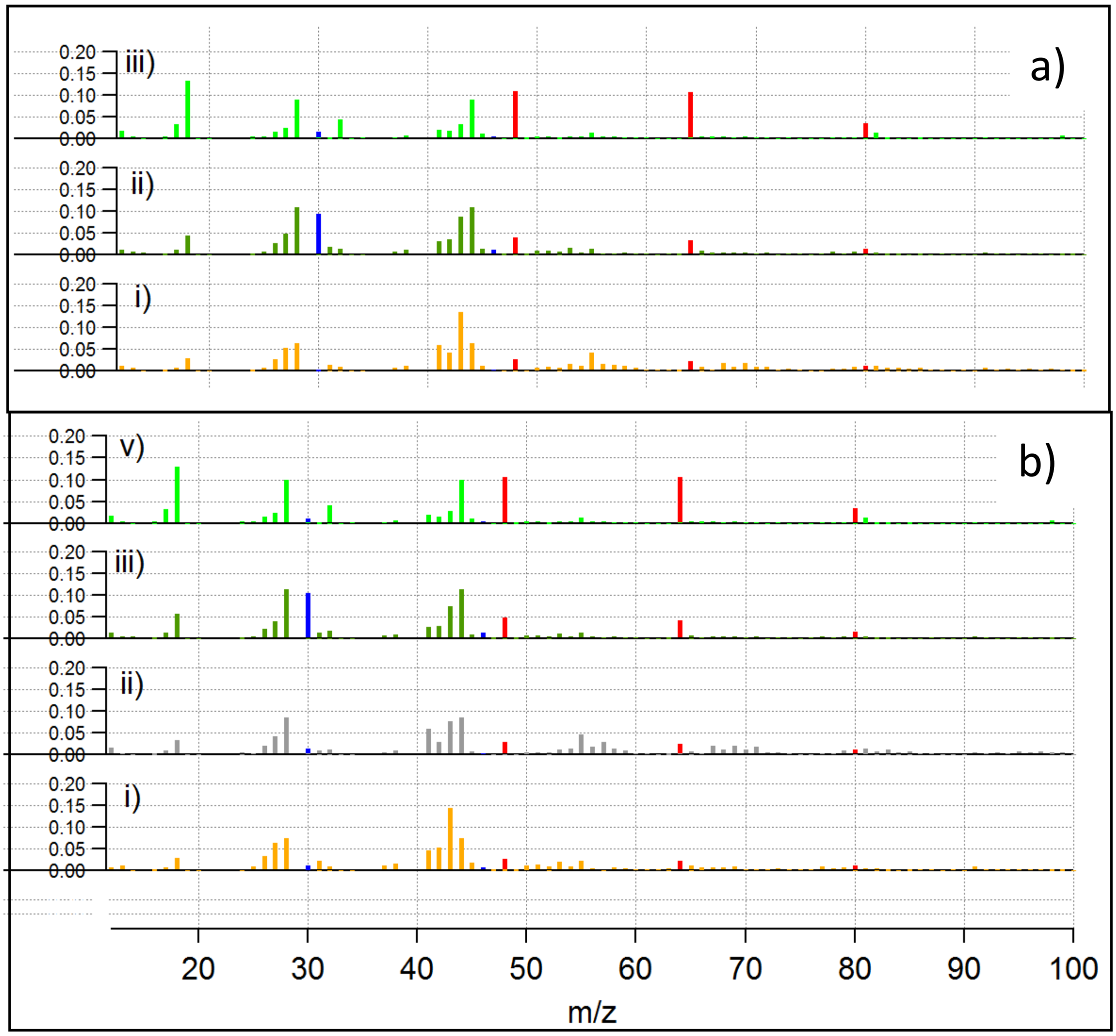

Figure S7: PMF solutions for a) three and b) four factors, i) ii) iii) represent the different identified factors.

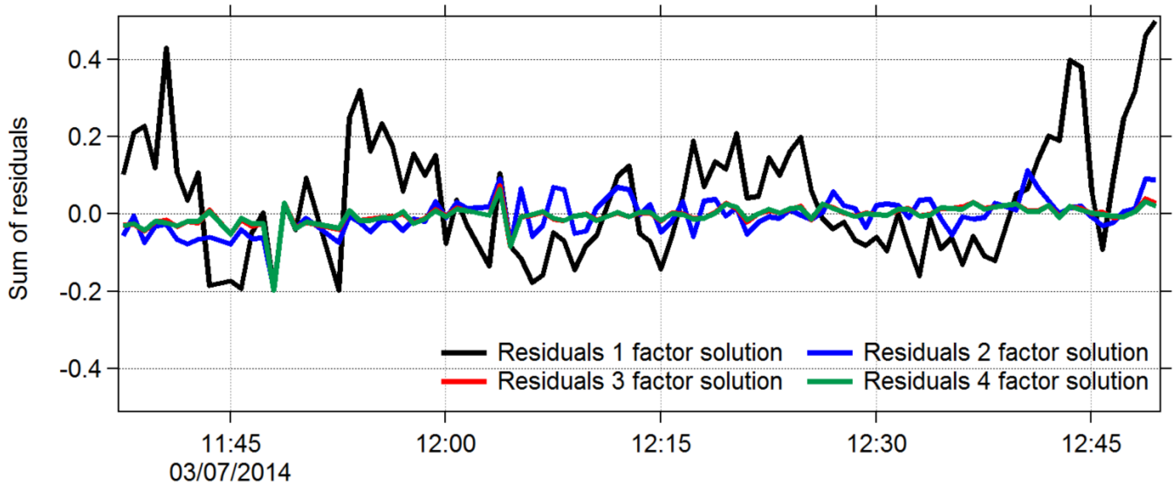

Figure S8. Residual analysis for RF20 for one to four factors.

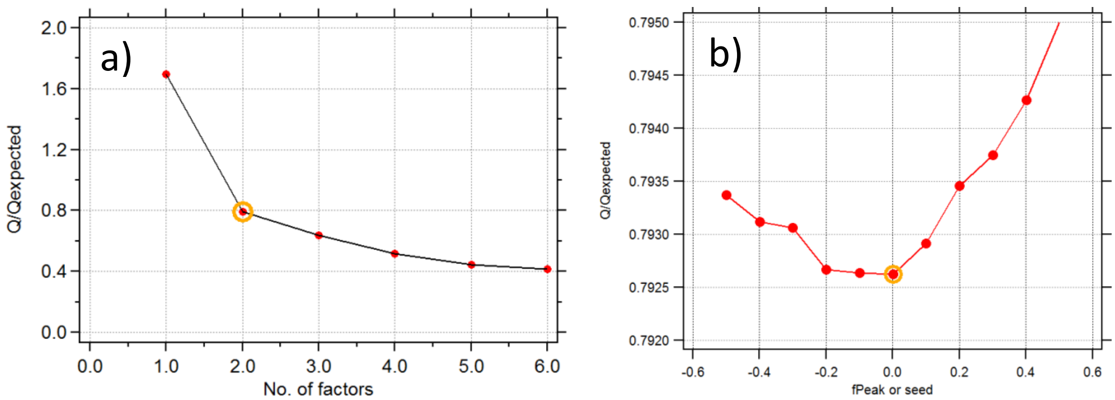

Figure S9 a) Q/Qexp for PMF factor solutions, b) fpeak analysis for a two factor solution.

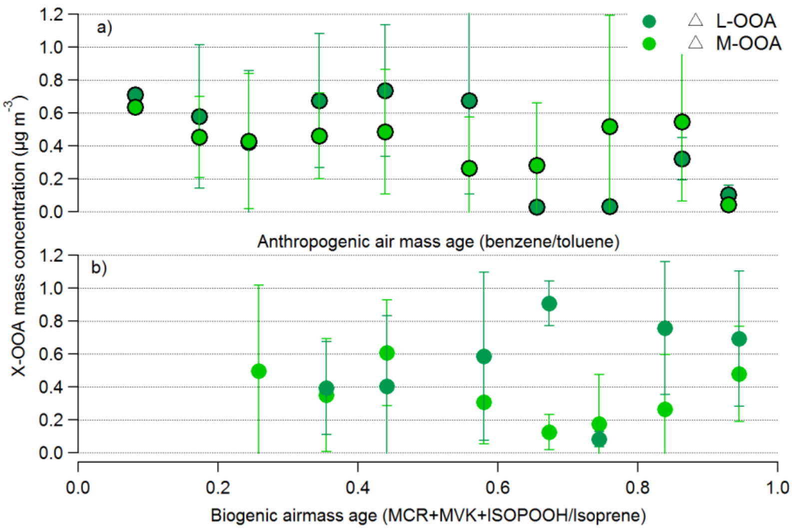

Figure S10 Variations of these two PMF factors with the relative air mass age calculated using either a) anthropogenic VOC to calculate air mass age and b) using the ratio of

MACR+MVK+ISOPOOH/Isoprene to calculate the relative air mass . Δ-LOOA and Δ-MOOA represent organic concentrations above the determined background.

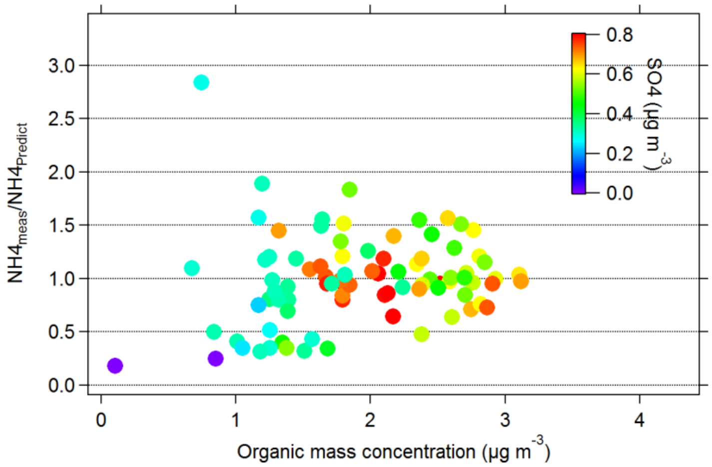

Figure S11. NH_4 measured to NH_4 predicted plotted against organic aerosol during flight RF20. The points are coloured by SO_4 concentrations.

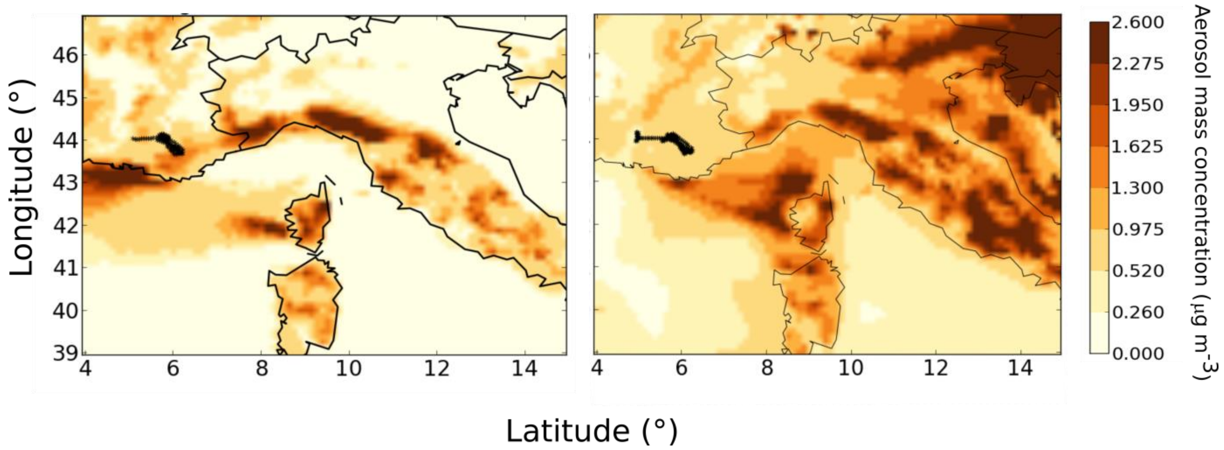

Figure S12. Average surface concentrations (in μg m^{-3}) of submicron organic matter (OA_1) simulated during the a) RF20 03/07. and b) RF23 07/07 flights. The flight path is shown with bold black lines.

PMF details

Table S1. R Correlation values for 2 to 4 factor solutions at fpeak values of 0

	2 factors		3 factors			4 factors			
Time series	LOOA	MOOA	LOOA	MOOA	MOOA2	LOOA	LOOA2	MOOA	MOOA2
Isoprene	0.51	0.14	0.49	0.36	0.03	0.45	0.38	0.29	0.00
MCR+MVK+ISOPOOH	0.64	0.00	0.57	0.40	-0.16	0.64	0.35	0.28	-0.19
MCR/Isoprene	0.21	-0.03	0.17	0.14	-0.10	0.28	0.04	0.07	-0.11
Benzene	-0.04	0.00	-0.07	0.00	0.01	-0.02	-0.09	0.01	0.02
Toluene	0.27	0.16	0.19	0.28	0.09	0.28	0.09	0.24	0.07
Monoterpenes	0.29	0.60	0.22	0.46	0.55	0.30	0.14	0.47	0.52
f82	0.44	0.42	0.51	0.35	0.32	0.35	0.47	0.32	0.28
f91	0.52	0.35	0.54	0.49	0.21	0.55	0.52	0.41	0.18
CO	0.34	0.40	0.19	0.49	0.30	0.37	0.06	0.48	0.26
NO3	0.28	0.51	0.18	0.51	0.42	0.20	0.24	0.55	0.36
NOX	0.50	0.62	0.31	0.70	0.48	0.54	0.12	0.67	0.43
O3/CO	-0.18	-0.13	-0.12	-0.20	-0.08	-0.21	-0.03	-0.18	-0.07
BC	0.61	0.57	0.43	0.73	0.41	0.57	0.26	0.70	0.35

Table S2. Background and study area concentrations measured for the main species during RF20

	Background	**Valley area**
Organic (μg m^{-3})	1.05 ±0.39	2.80±0.52
MOOA	0.41±0.23	1.12±0.30
LOOA	0.27±0.22	1.39±0.21
Sulphate(μg m^{-3})	0.04±0.02	0.15±0.04
Nitrate(μg m^{-3})	0.33±0.06	0.69±0.14
Ammonia(μg m^{-3})	0.11±0.11	0.50±0.13
Isoprene (pptV)	1544±696	962±540
MACR+MVK (pptV)	661±239	901±358
Toluene (pptV)	84±34	131±27
Benzene (pptV)	83±28	75±37
Monoterpenes (pptV)	201±20	234±34