SUPPLEMENTARY INFORMATION

Formation and chemical evolution of SOA in two different environments: A dual chamber study

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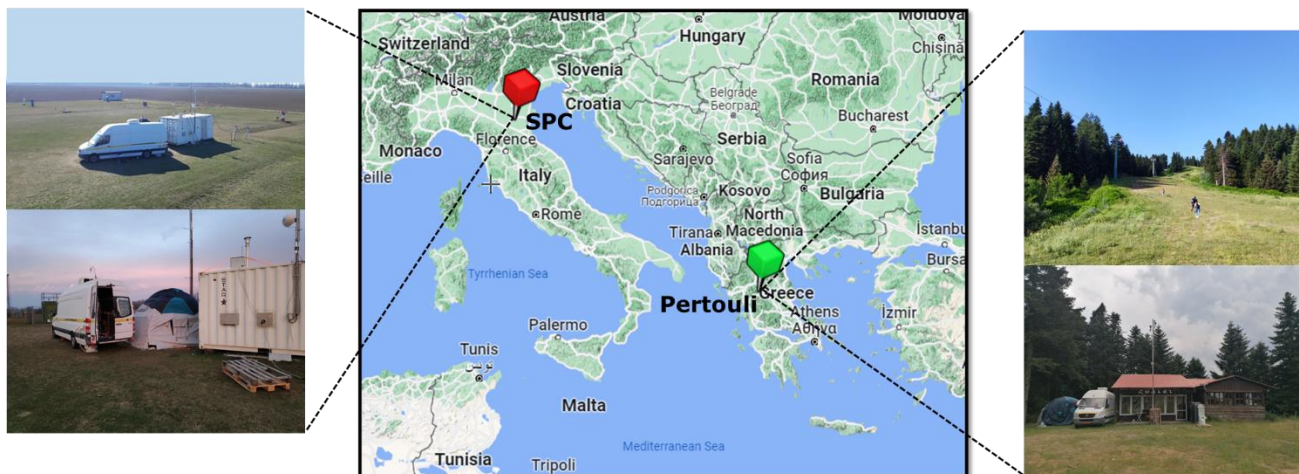
Figure S1: The sites where the two field campaigns took place. The site in San Pietro Capofiume (SPC), northern Italy is shown on the left, while the site in Pertouli where the SPRUCE-22 campaign took place is shown on the right (map from Map Data ©2024 GeoBasis-DE/BKG (©2009), Google).
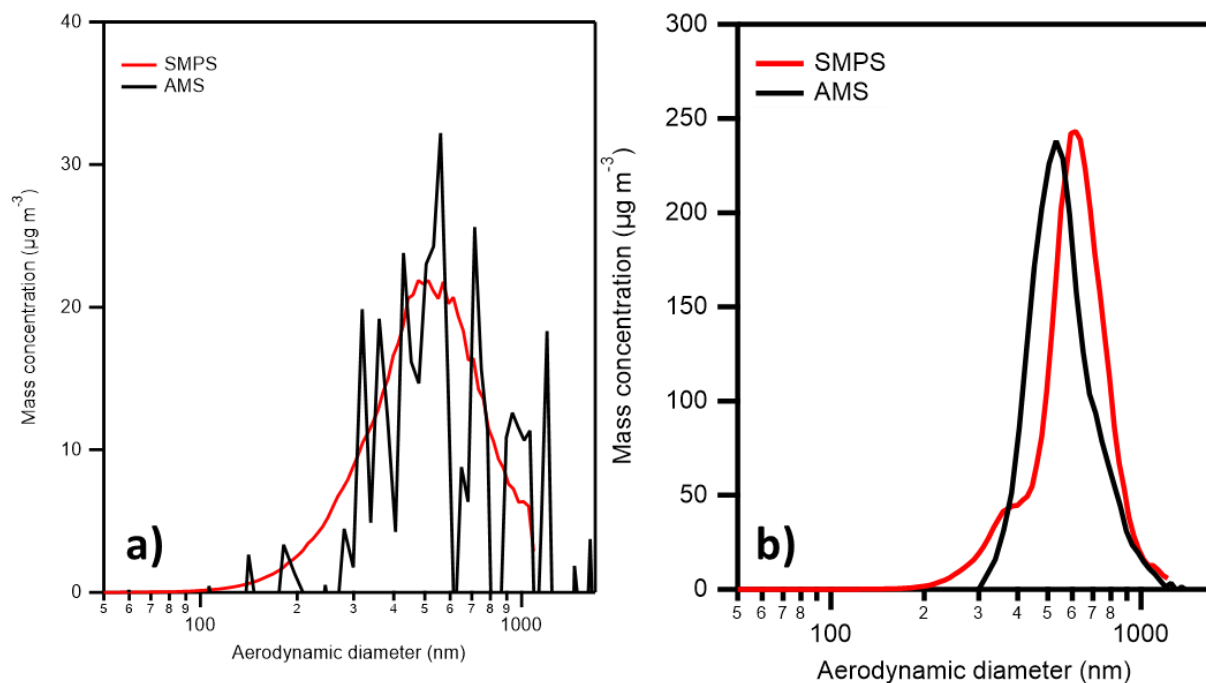
Figure S2: Example of CE corrected mass size distributions of PM_1 measured by the AMS and the SMPS for a) the characterization period and b) the SOA formation period during Exp. 7 in Po Valley.
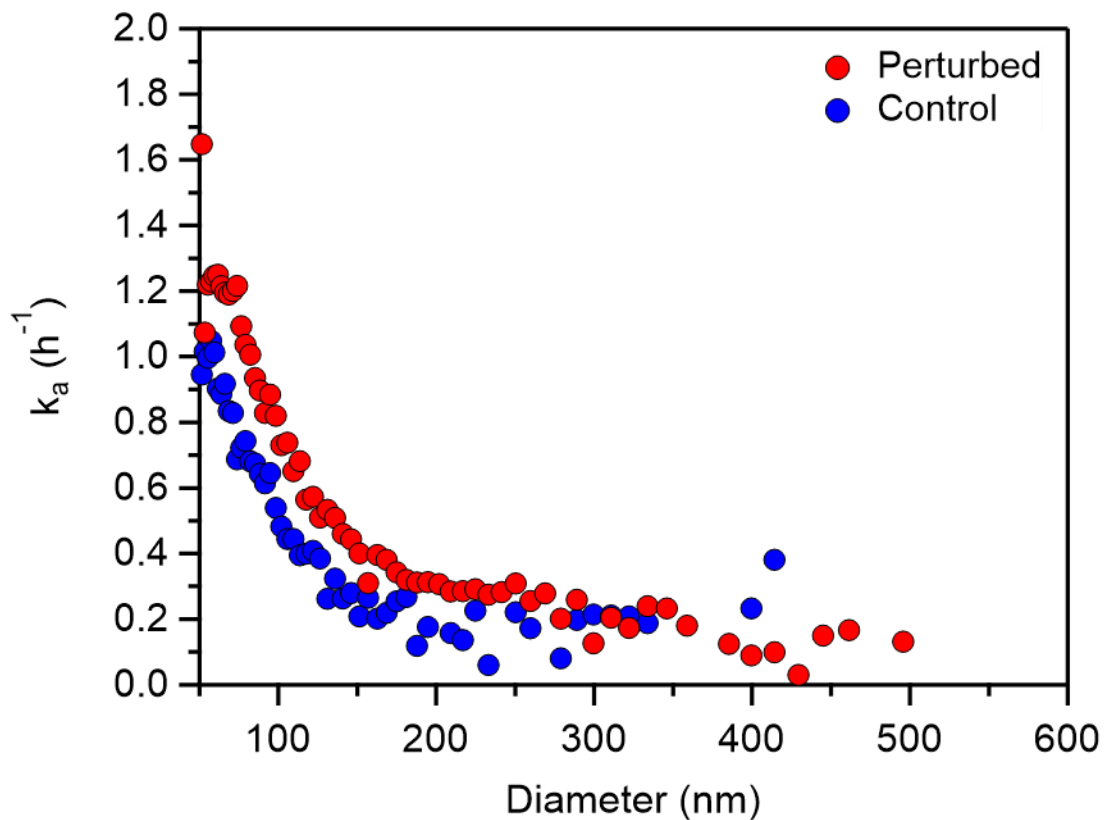
Figure S3: Size dependent wall-loss rate constant measured during Exp. 3 (5-3-2022).
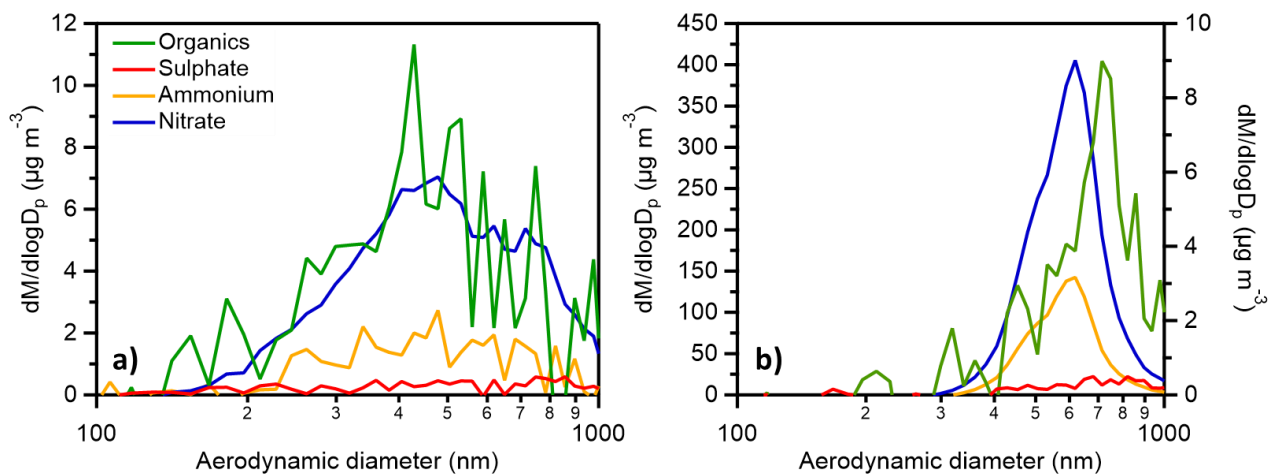
Figure S4: Mass size distributions of the various compounds measured by the AMS for a) the characterization period and b) the SOA formation period during a typical experiment.
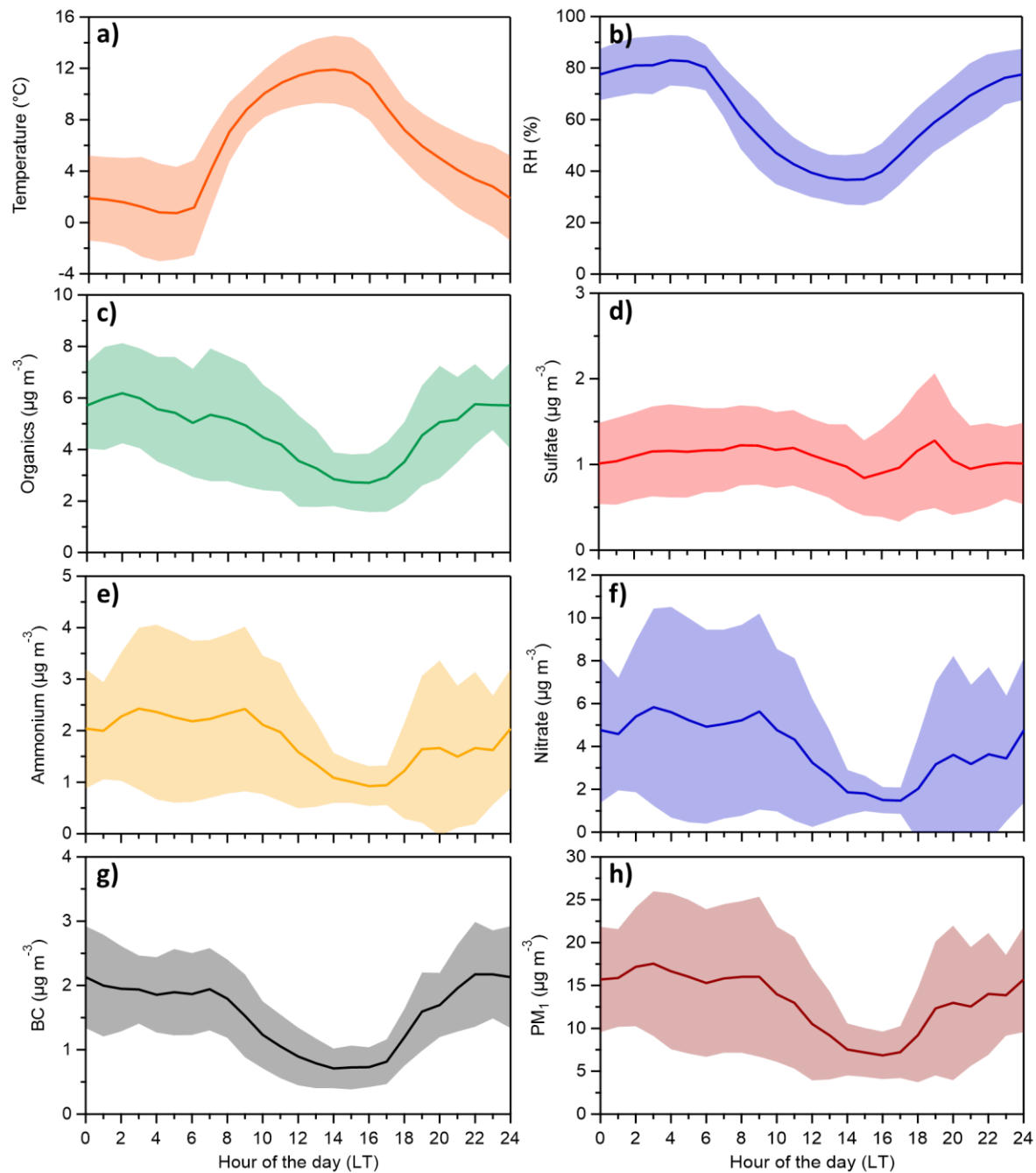
Figure S5: Diurnal profiles of the ambient a) temperature, b) relative humidity, c) organics, d) sulfate, e) ammonium, f) nitrate, g) black carbon and h) the PM_1 concentrations measured by the AMS during the chamber experiments period (2-17 March 2022) in Po Valley. The shaded areas correspond to one standard deviation.
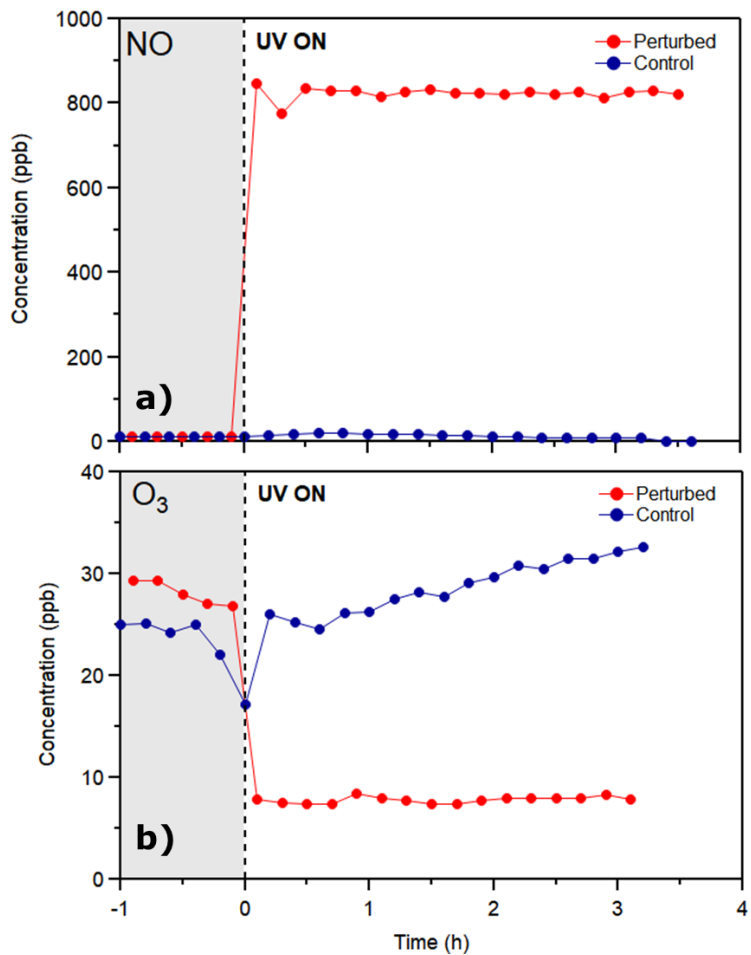
Figure S6: Concentration of a) NO and b) O₃ in the perturbed and the control chamber during the experiment of 10-3-2022.
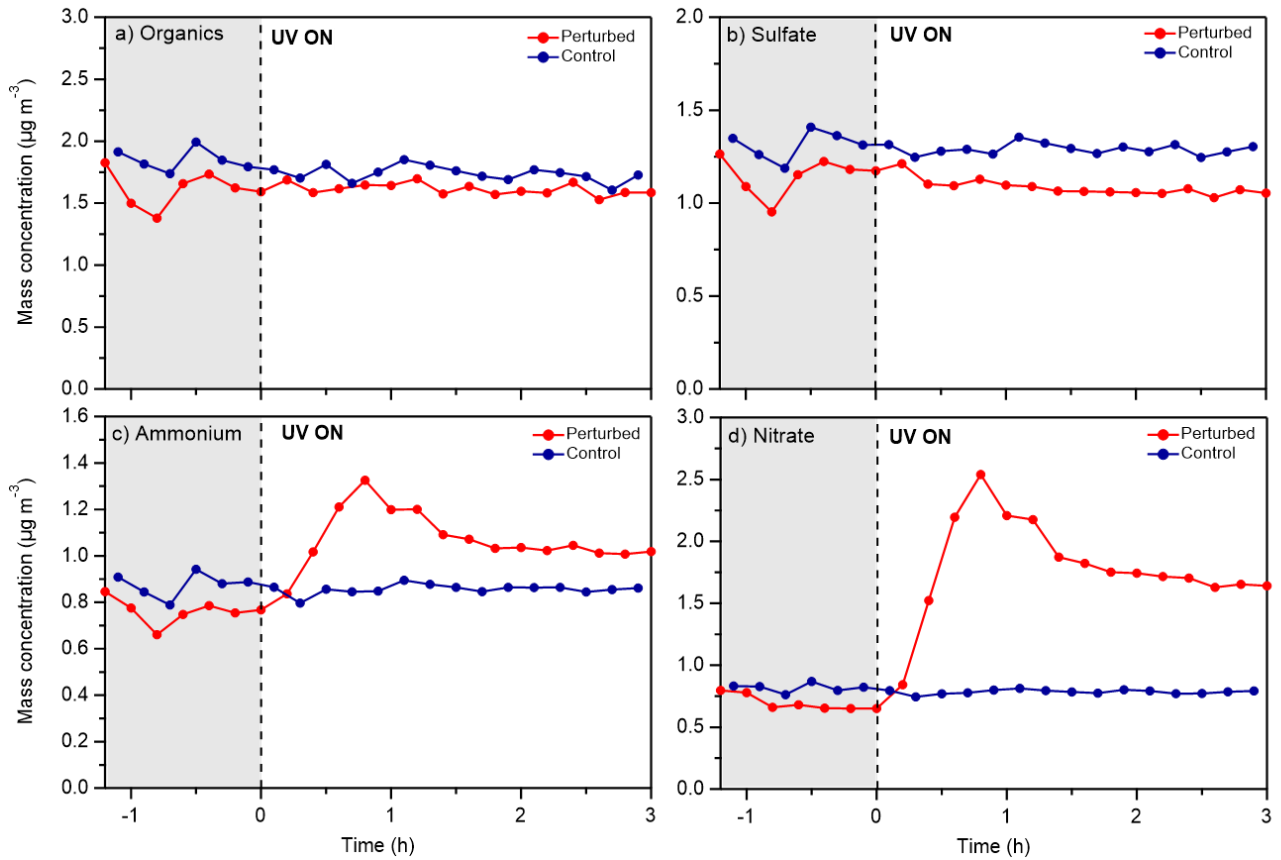
Figure S7: Wall-loss (perturbed: $k_{ac}=0.24$ h^{-1}, control: $k_{ac}=0.2$ h^{-1}) and CE corrected mass concentrations of a) organics, b) sulfate, c) ammonium and d) nitrate in the perturbed and the control chambers during the Exp. 2 (7/3/2022).
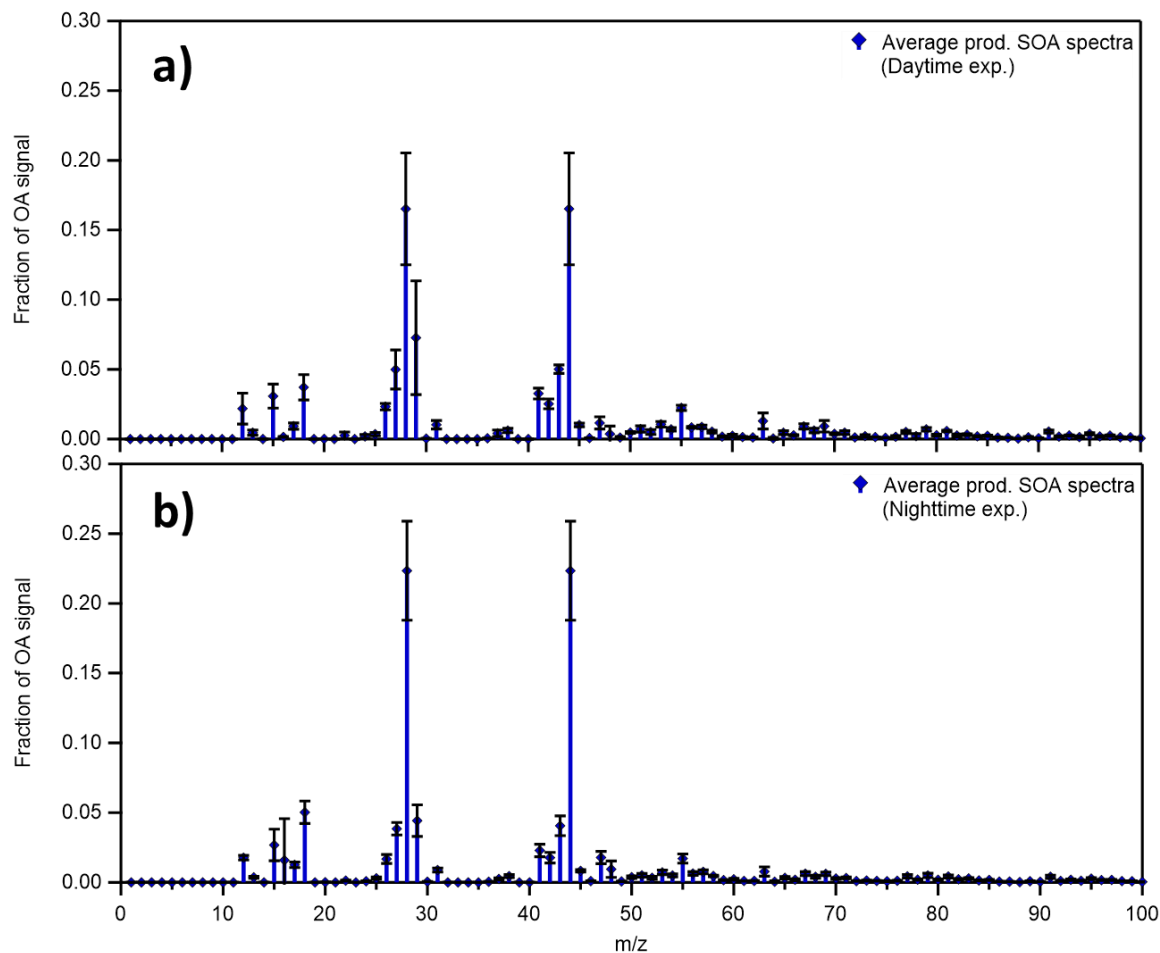
Figure S8: Average mass spectra of the produced SOA during the a) daytime and b) nighttime experiments in the Po Valley. The error bars represent one standard deviation. The θ angle between the daytime experiments ranged from 5.2° to 15.5° and between the nighttime experiments from 2.4° to 19°.
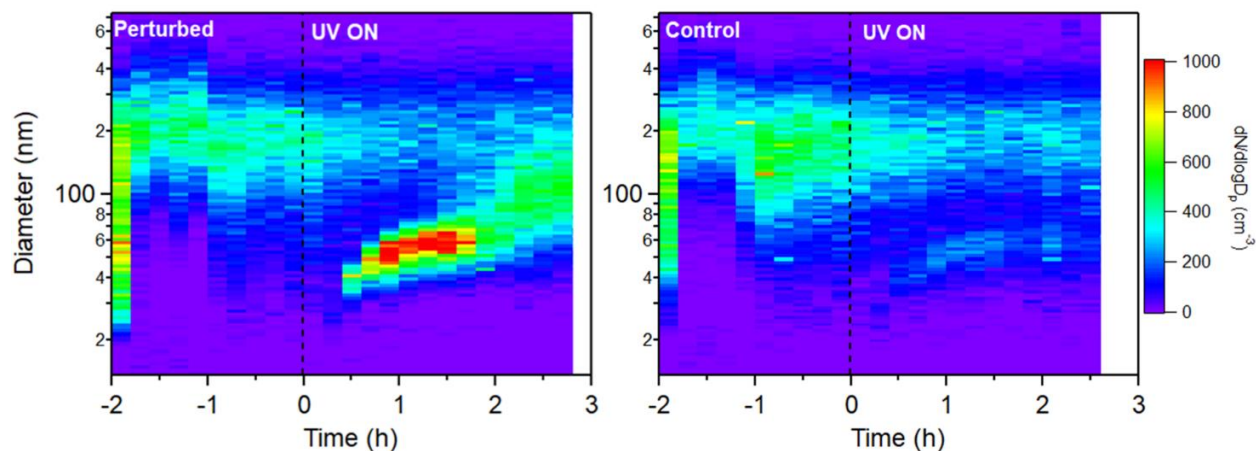
Figure S9: Particle number size distributions in the perturbed and the control chamber during the Exp. 3 (5/3/2022).
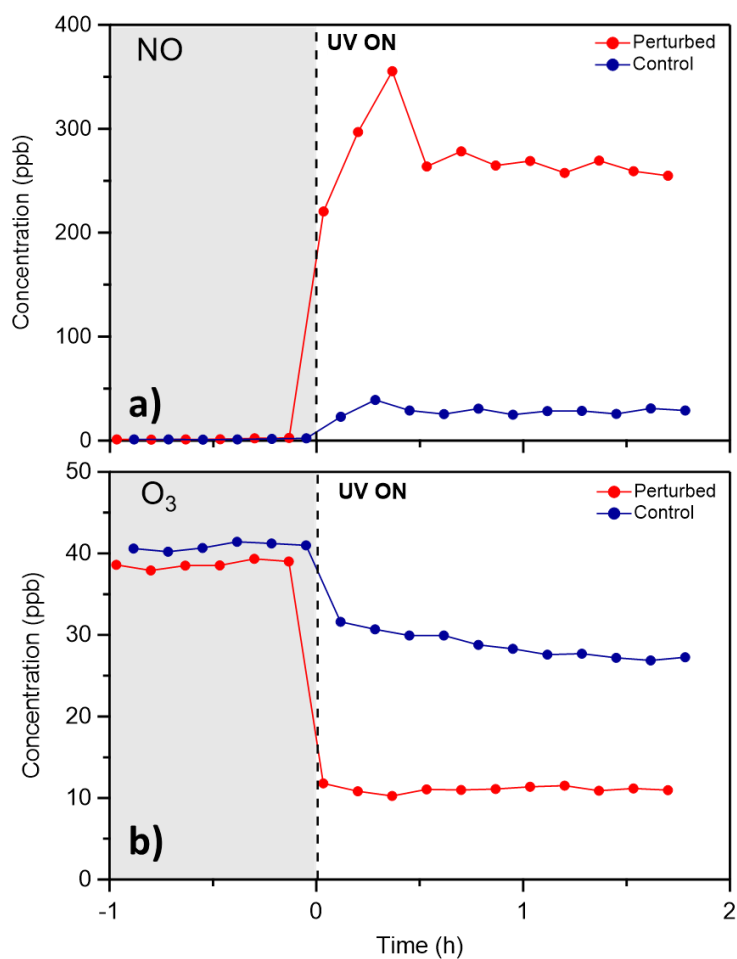
Figure S10: Concentration of a) NO and b) O_3 in the perturbed and the control chamber during the experiment of 10-7-2022.
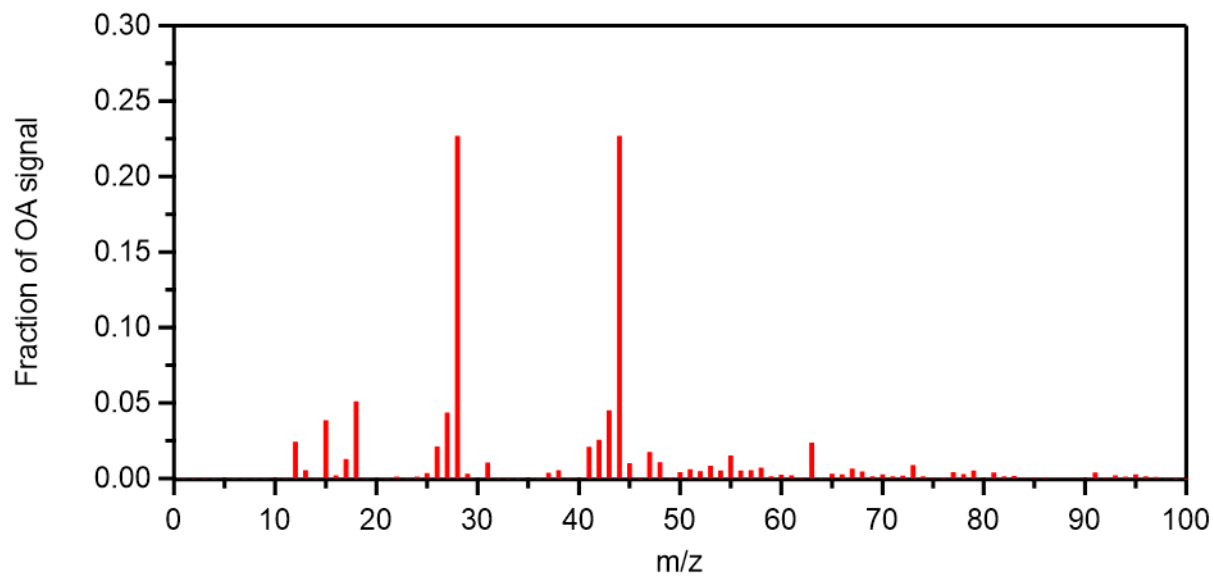
Figure S11: Mass spectrum of the produced SOA during Exp. 1 in Pertouli.
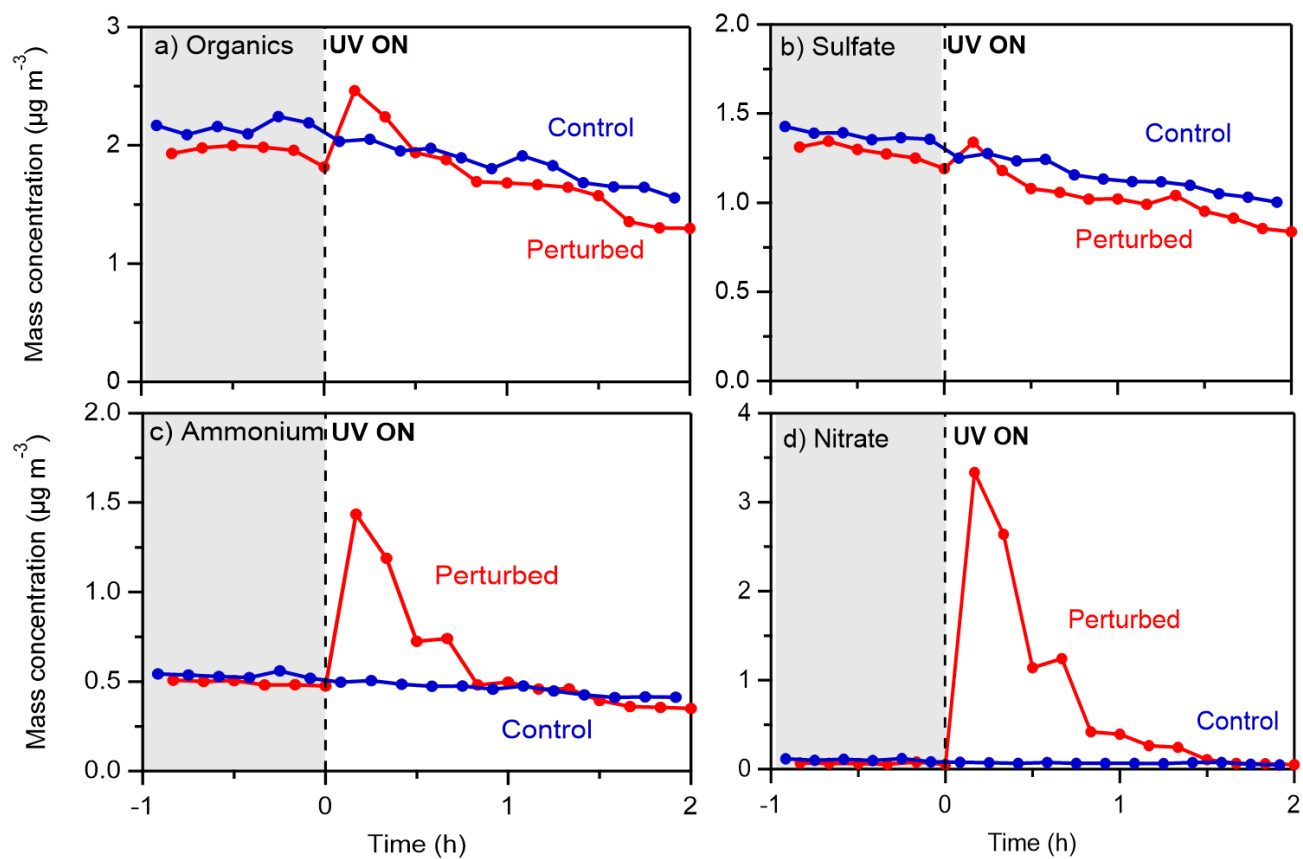
Figure S12: Mass concentrations of a) organics, b) sulfate, c) ammonium and d) nitrate in the perturbed and the control chambers during Exp. 2 (12-7-2022) in Pertouli.
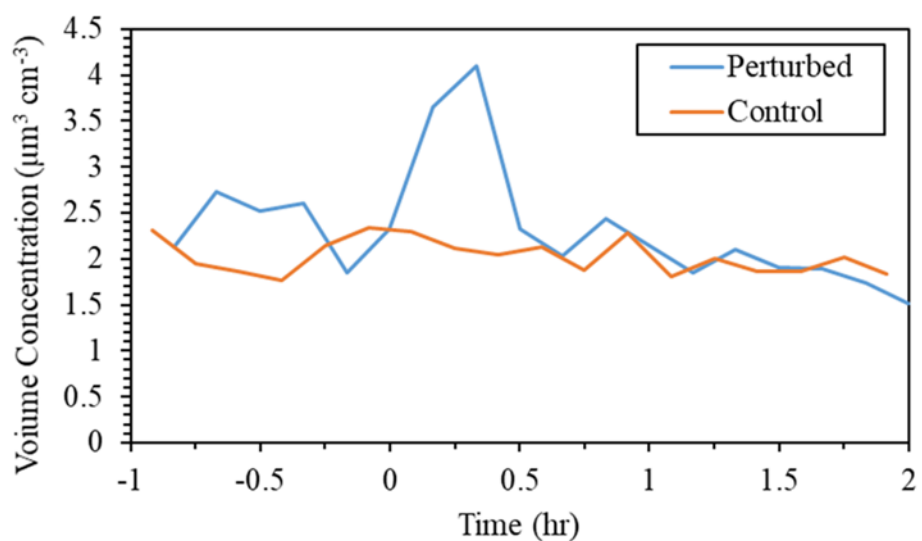
Figure S13: Aerosol volume concentration for the perturbed and control chambers during Exp. 2 (12-7-2022) in Pertouli measured by the SMPS.
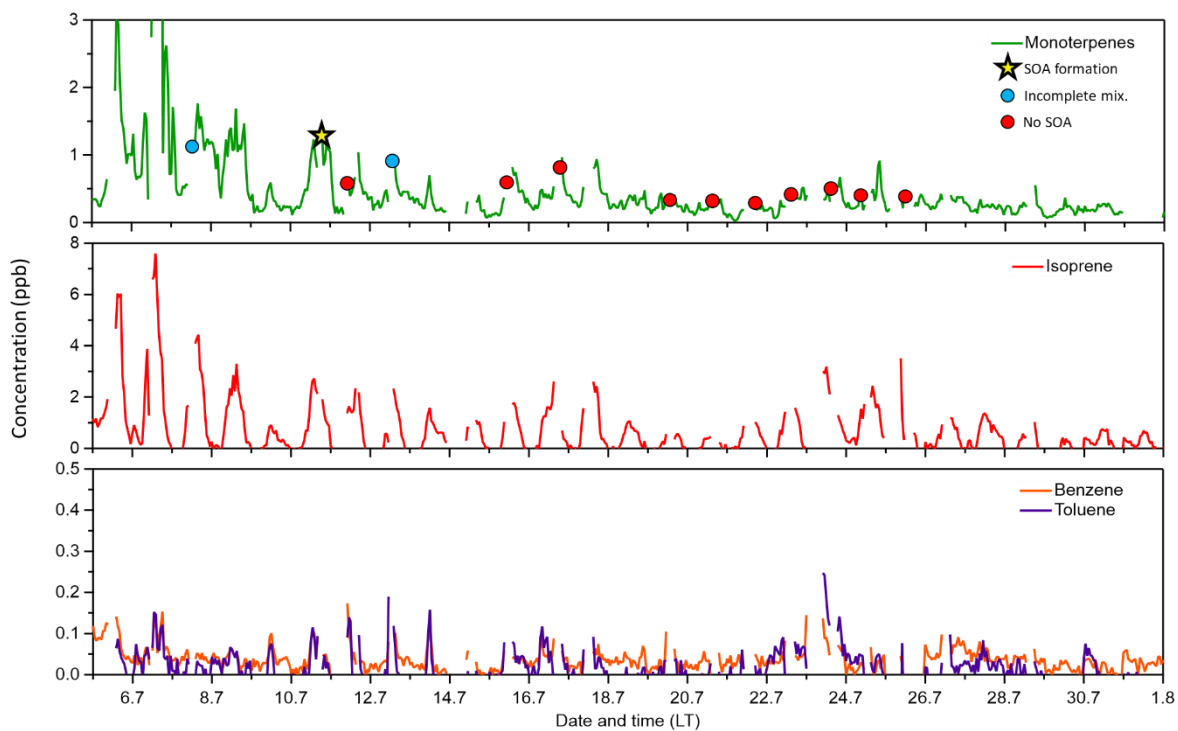
Figure S14: Ambient concentrations of the monoterpenes, isoprene and benzene and toluene during the SPRUCE-22 campaign.
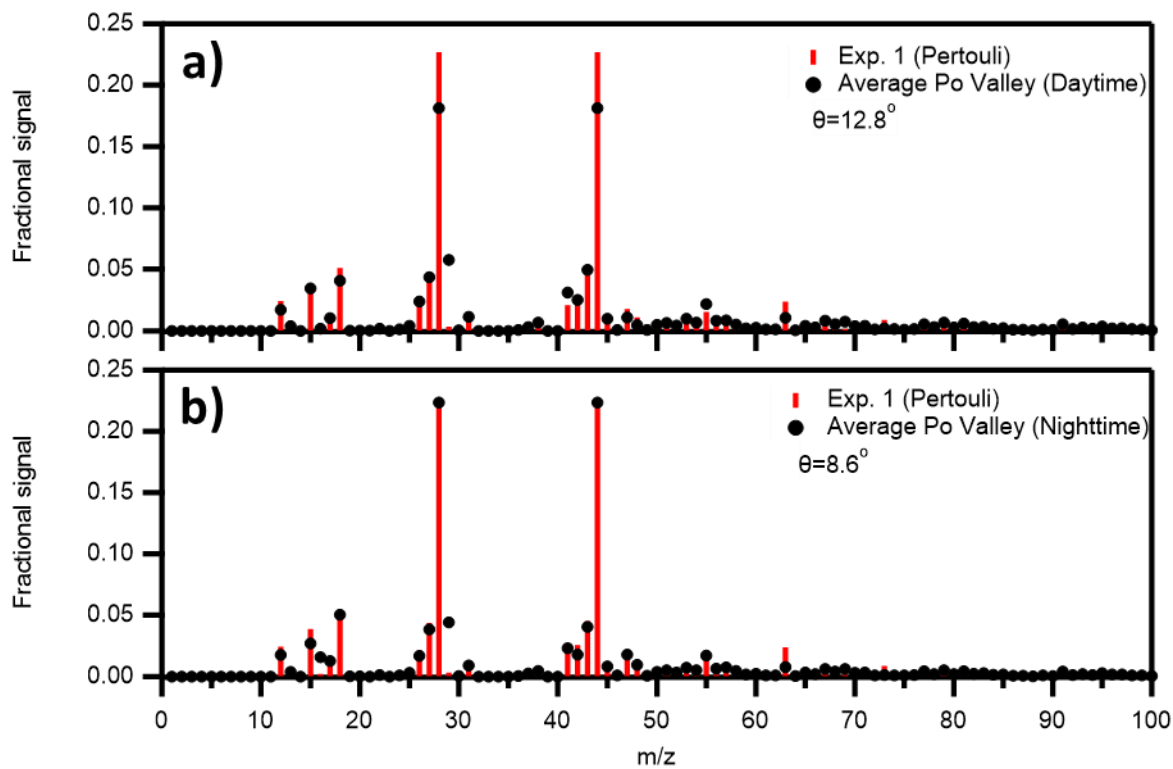
Figure S15: Average fractional signal of the produced SOA during a) Exp. 1 in Pertouli and the daytime (average) experiments in the Po Valley and b) Exp. 1 in Pertouli and the nighttime (average) experiments in the Po Valley.
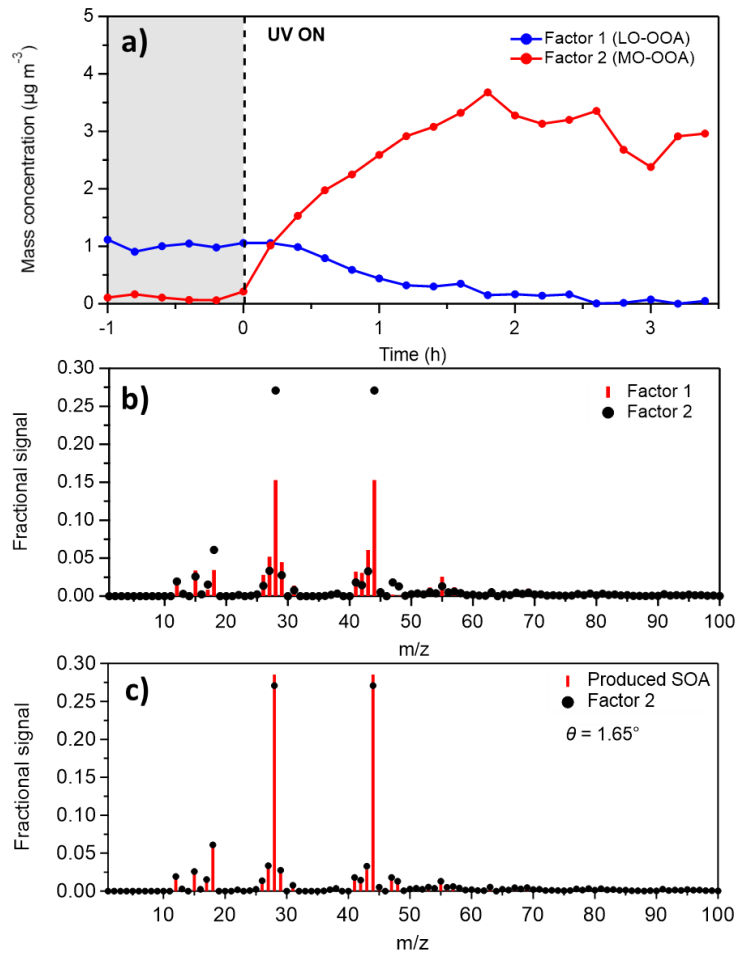
Figure S16: Results from the PMF analysis done for Exp. 1 in the Po Valley, including a) the timeseries of the two different identified factors, b) the comparison of their mass spectra and c) the comparison of the calculated mass spectra of the produced SOA and Factor 2.