Addressing the chemical composition of secondary organic aerosol in the rural/ urban Paris area

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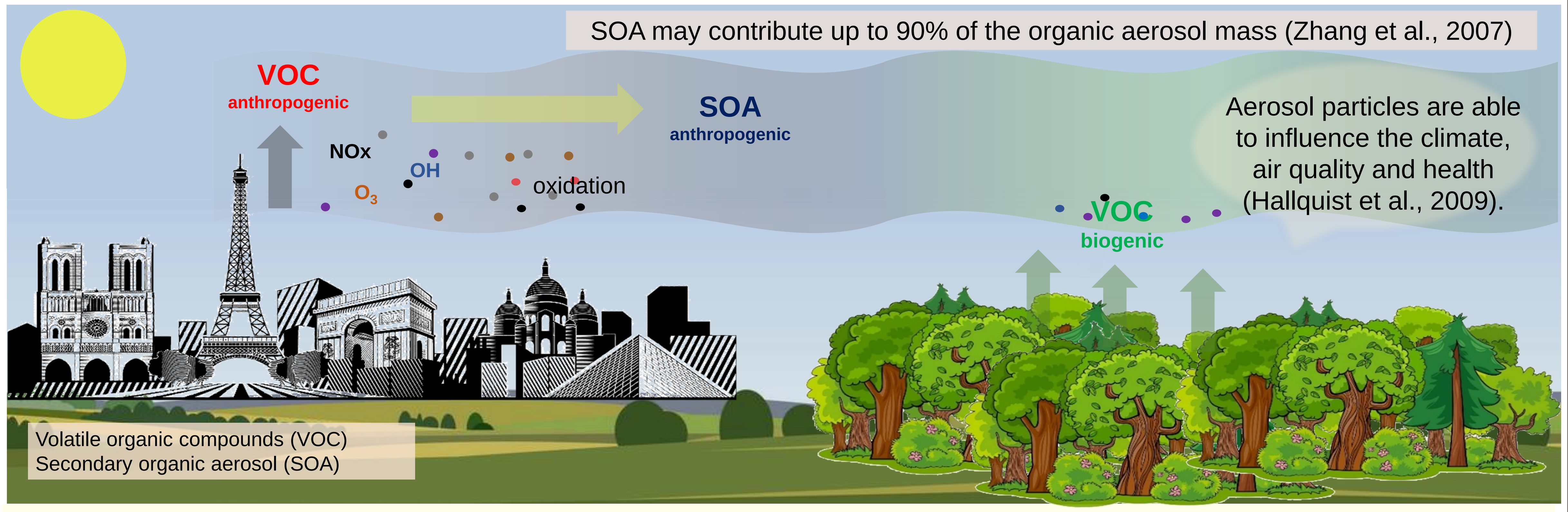
1. INTRODUCTION: Secondary Organic Aerosol formation and importance

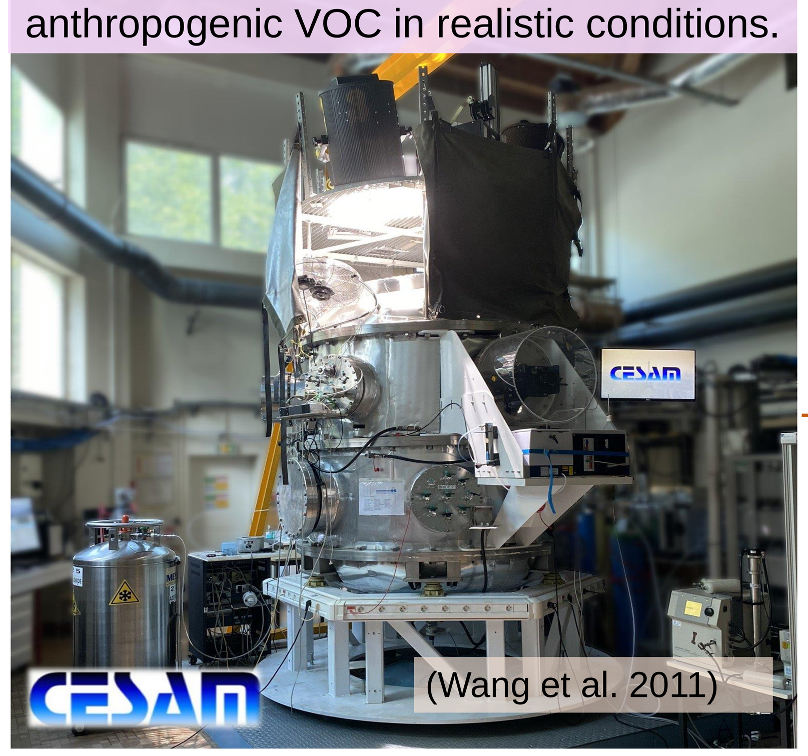


OBJECTIVE: To combine simulation chamber experiments and field measurements in order to identify and quantify the contribution of different anthropogenic VOCs precursors to the SOA formation in the urban and peri-urban area of Paris.

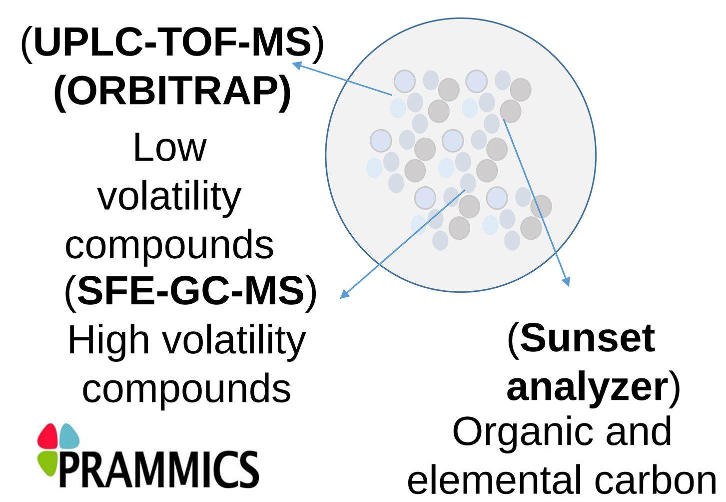
2. APPROACH: Identification and quantification of molecular markers

CHAMBER SIMULATIONS + **FIELD MEASUREMENTS** → **CARBON COMPOSITION AND MOLECULAR SCALE ANALYSIS ON FILTER SAMPLES**

Identify molecular markers for specific anthropogenic VOC in realistic conditions.



Quantify the molecular markers in the real atmosphere.

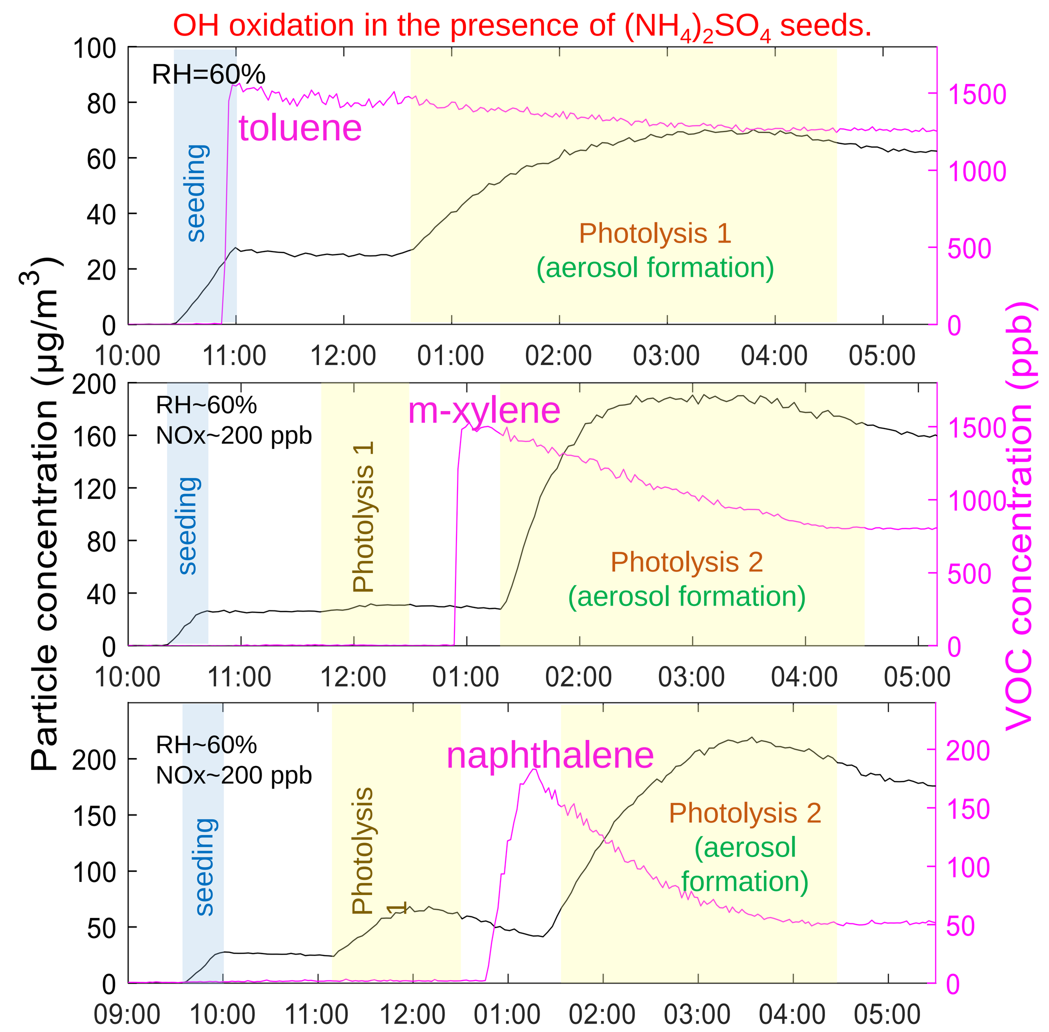


Chamber experiments and field measurements will be combined using the SOA tracer method (Kleindienst et al. 2007).

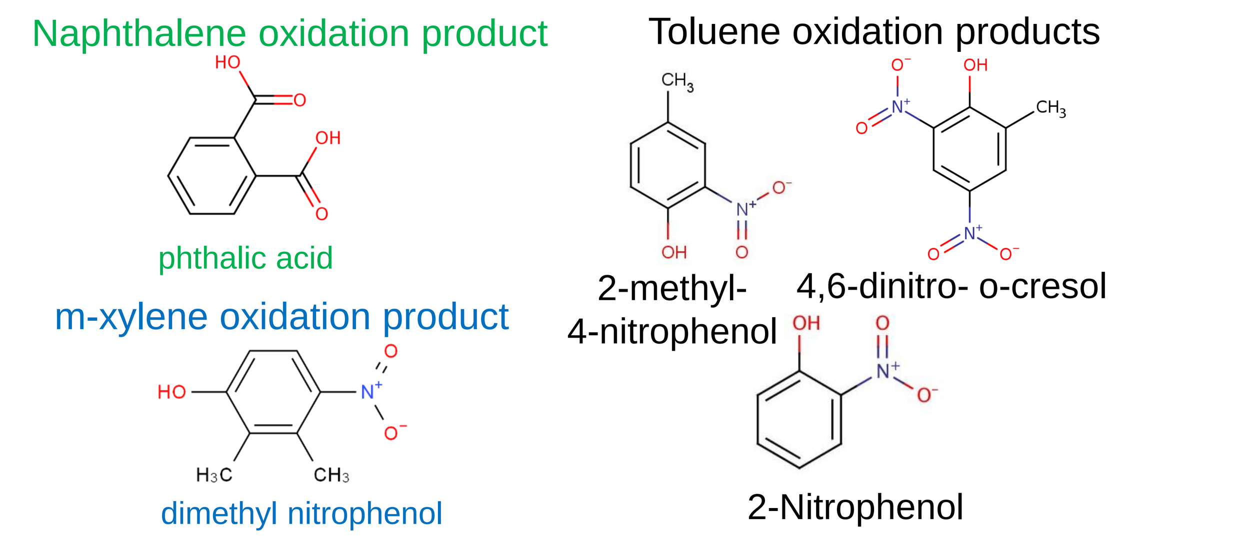
4. TAKE HOME MESSAGE AND FUTURE WORK

- OH oxidation of specific anthropogenic VOCs (toluene, m-xylene, and naphthalene) allowed the identification of molecular markers that will be quantified in the real atmosphere through filters collected in the urban and peri urban area of Paris for low and high periods of aerosol particles emissions.
- Similar OC concentrations were observed on Paris and Rambouillet, while SOC showed higher contribution for Rambouillet. Further studies will allow the determination of the contribution of individual VOCs to the SOC.

3. FIRST RESULTS: Markers identification and SOC estimation



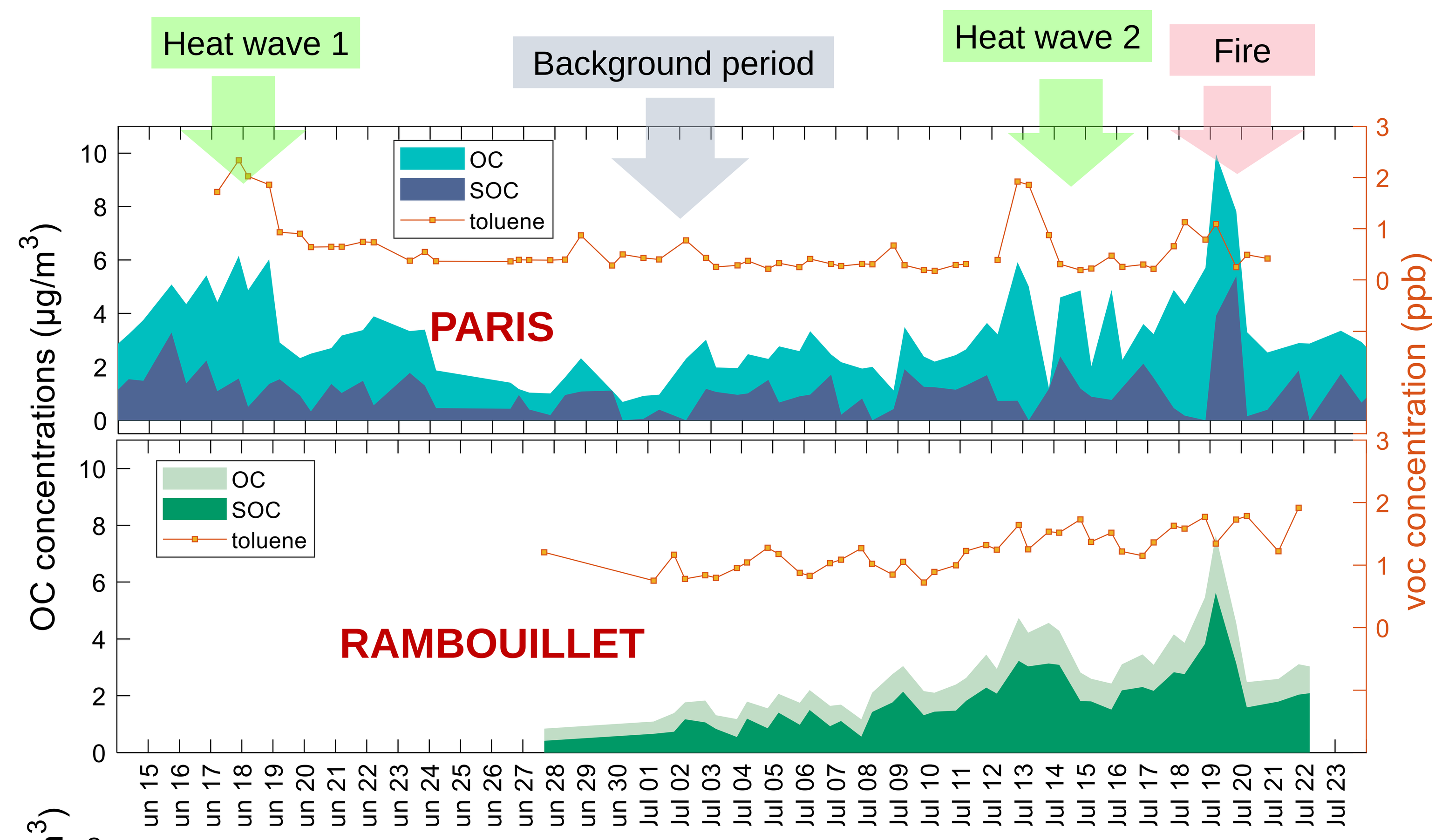
In agreement with (Sato et al. 2007; Ibrahim et al. 2017)



Precursor	SOA/SOC	Tracer	f_{SOA}
Toluene	1,42	2-methyl-4-nitrophenol	0,0010
m-xylene	1,83	Dimethyl nitrophenol	-
naphthalene	1,82	Phthalic acid	0,0057

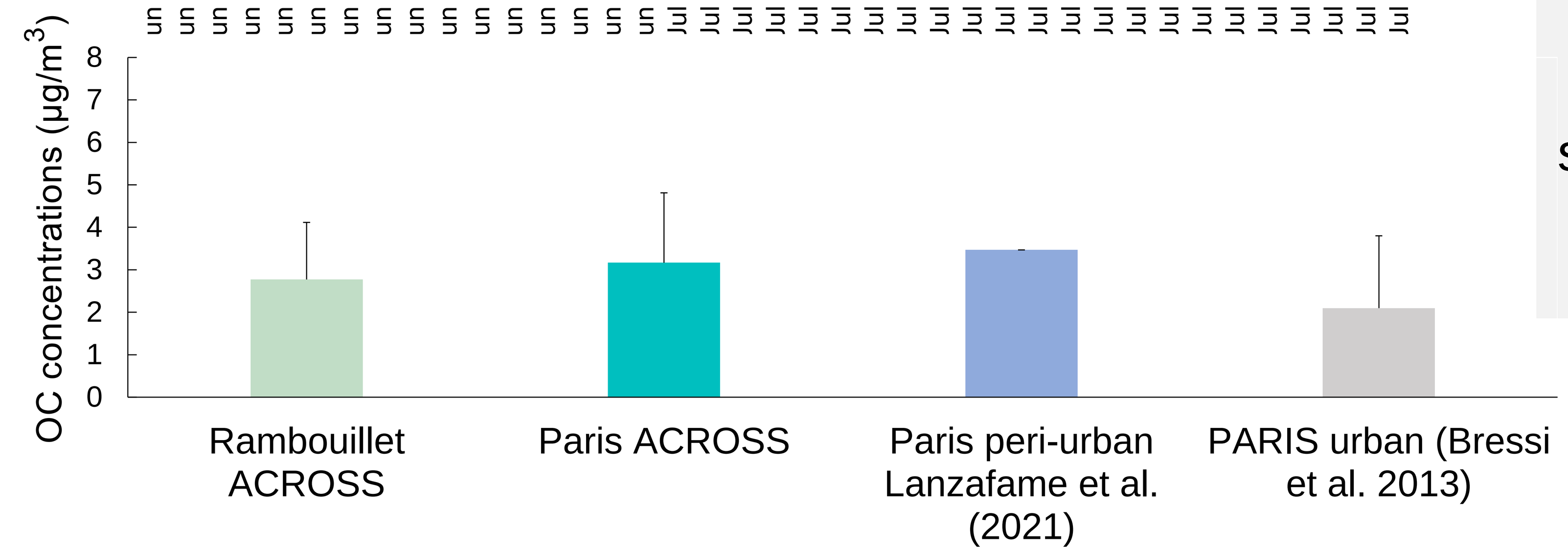
f_{SOA} is the aerosol mass fraction (will be used to estimate the contribution of VOCs to the SOC)

In the presence of seeds, aerosol formation is observed during the OH oxidation of toluene, m-xylene and naphthalene at high relative humidity, with a higher yield of formation observed for naphthalene.



Secondary organic carbon (SOC) concentrations are obtained by EC tracer method (Cabada et al. 2004; Huang et al. 2014) from the OC/EC ratios.

The urban and peri-urban area of Paris show similar OC concentrations for the summer 2022, with a higher SOC contribution in the peri-urban area (Rambouillet)



OC concentrations observed during the summer 2022 in Paris were comparable to those previously reported.

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