RI-URBANS

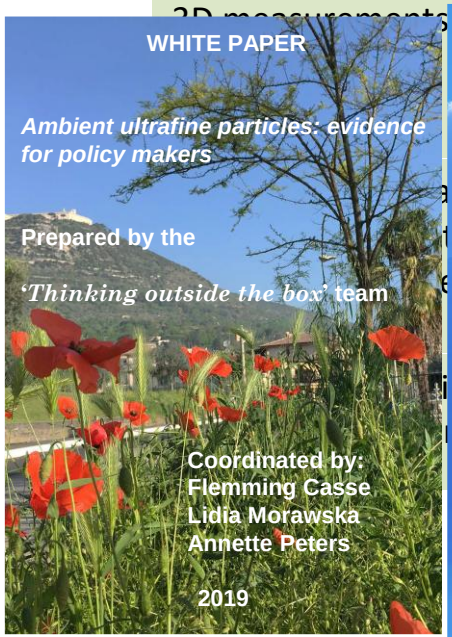
Research Infrastructures Services Reinforcing Air Quality Monitoring Capacities in European Urban & Industrial AreaS

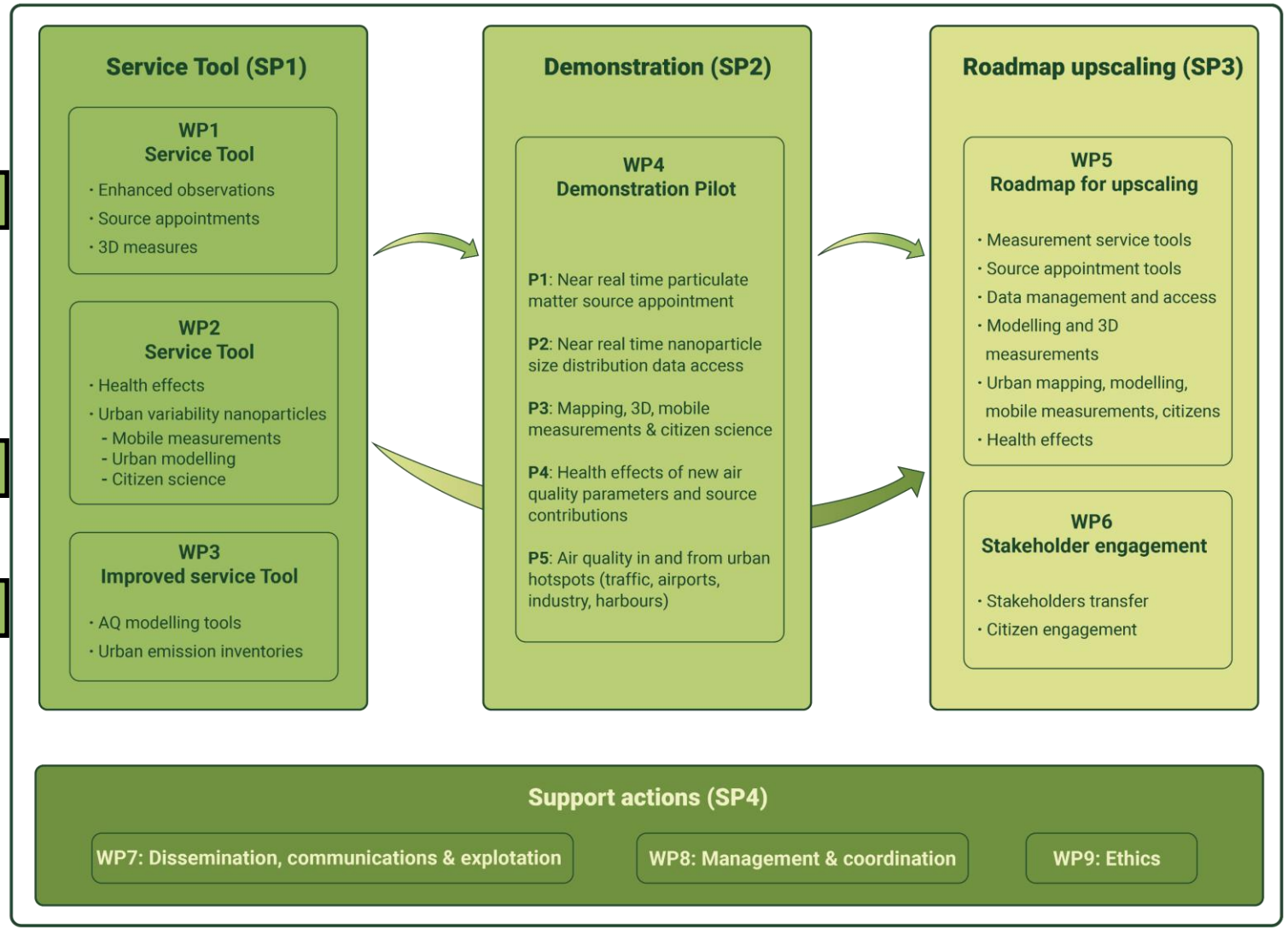
Xavier Querol & Tuukka Petäjä

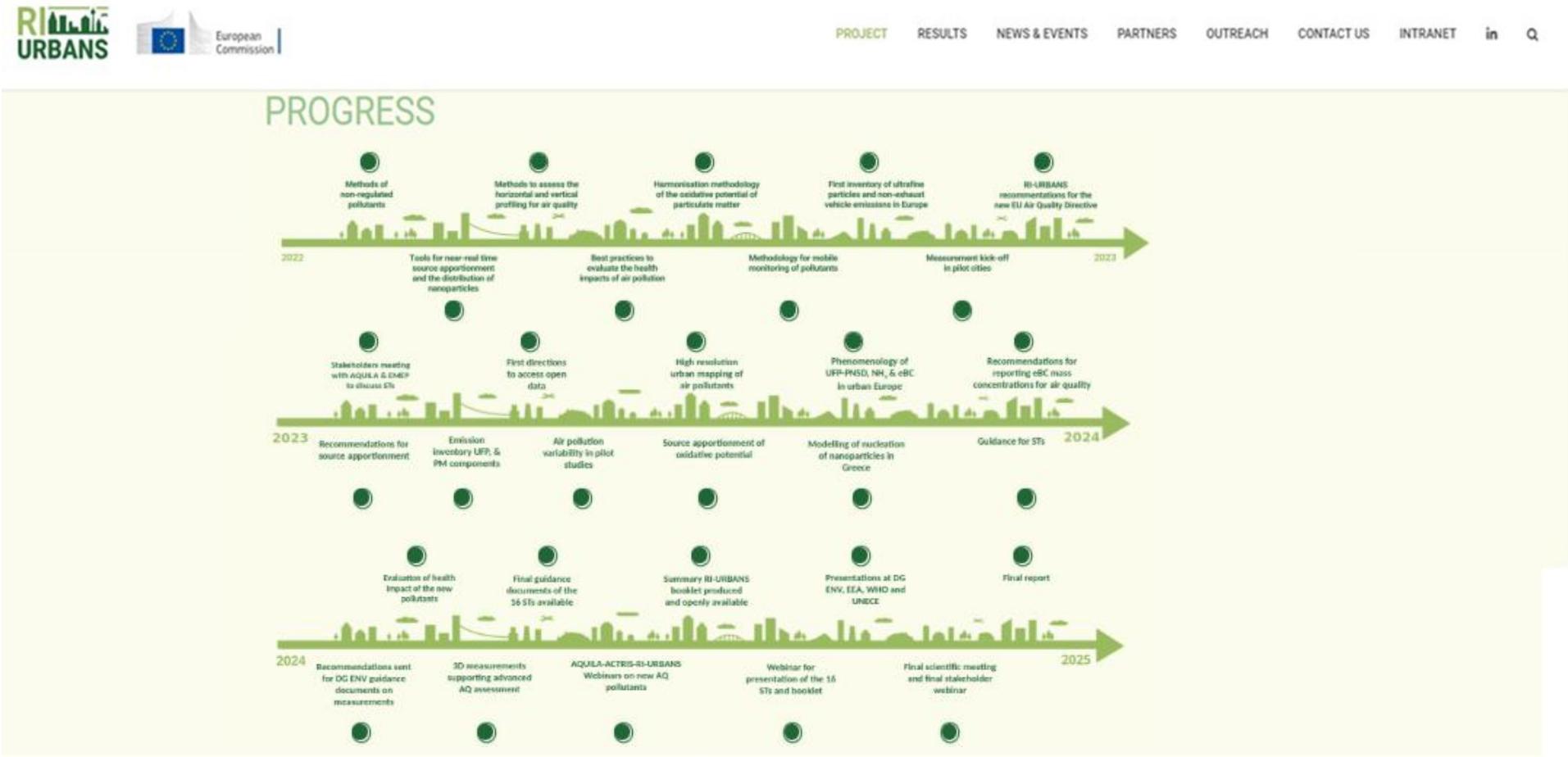
PEEX webinar, 14th April 2026

RI-URBANS' concept and service tools

UFP-PNSD
BC
Offline PM speciation
Online PM speciation
Source apportionment
NH_3
VOCs







UFP, BC, OP, PM chemistry, VOCs, NH_3, source apportionment mapping, 3D measurements recommended for supersites in 2021 to DG ENV

Recommendations sent to the drafts of the new AQD, with ACTRIS

Guidance documents elaborated & openly available, webinars for AQMN experts along 2024 & 2025

HIGHLY CITED IN THE REPORT ON MEASUREMENTS FROM DG-ENV

The advanced air quality variables and RI-URBANS's ST

Article 10 & Annex VII

Table 1 - Pollutants to be measured at supersites at urban [background] locations

Pollutant	Type of measurement
PM_{10}, $PM_{2.5}$, UFP, BC	Fixed measurements
NO_2, O_3	Fixed measurements
SO_2, CO	Fixed or indicative measurements
Size distribution of UFP	Fixed or indicative measurements
Benzo(a)pyrene, other polycyclic aromatic hydrocarbons (PAH) as relevant (1)	Fixed or indicative measurements
Total deposition (2) of benzo(a)pyrene, and other polycyclic aromatic hydrocarbons (PAH) as relevant	Fixed or indicative measurements
Arsenic, cadmium, lead, and nickel	Fixed or indicative measurements
Total deposition (2) of arsenic, cadmium, lead, nickel and mercury	Fixed or indicative measurements
Benzene	Fixed or indicative measurements
Chemical composition of $PM_{2.5}$ in accordance with Section 1 of Annex VII	Fixed or indicative measurements

Table 2 - Pollutants to be measured at supersites at rural background locations

Pollutant	Type of measurement
PM_{10}, $PM_{2.5}$, UFP, BC	Fixed measurements
NO_2, O_3 and ammonia (NH_3)	Fixed measurements
SO_2, CO	Fixed or indicative measurements
Total deposition of benzo(a)pyrene and other polycyclic aromatic hydrocarbons (PAH) as relevant	Fixed or indicative measurements
Total deposition of arsenic, cadmium, lead, nickel and mercury	Fixed or indicative measurements
Benzo(a)pyrene, other polycyclic aromatic hydrocarbons (PAH) as relevant (1)	Fixed or indicative measurements
Arsenic, cadmium, lead, and nickel	Fixed or indicative measurements
Chemical composition of $PM_{2.5}$ in accordance with Section 1 of Annex VII	Fixed or indicative measurements
Total gaseous mercury	Fixed or indicative measurements

(1) benzo(a)pyrene and the other polycyclic aromatic hydrocarbons referred to in Article 9(8)

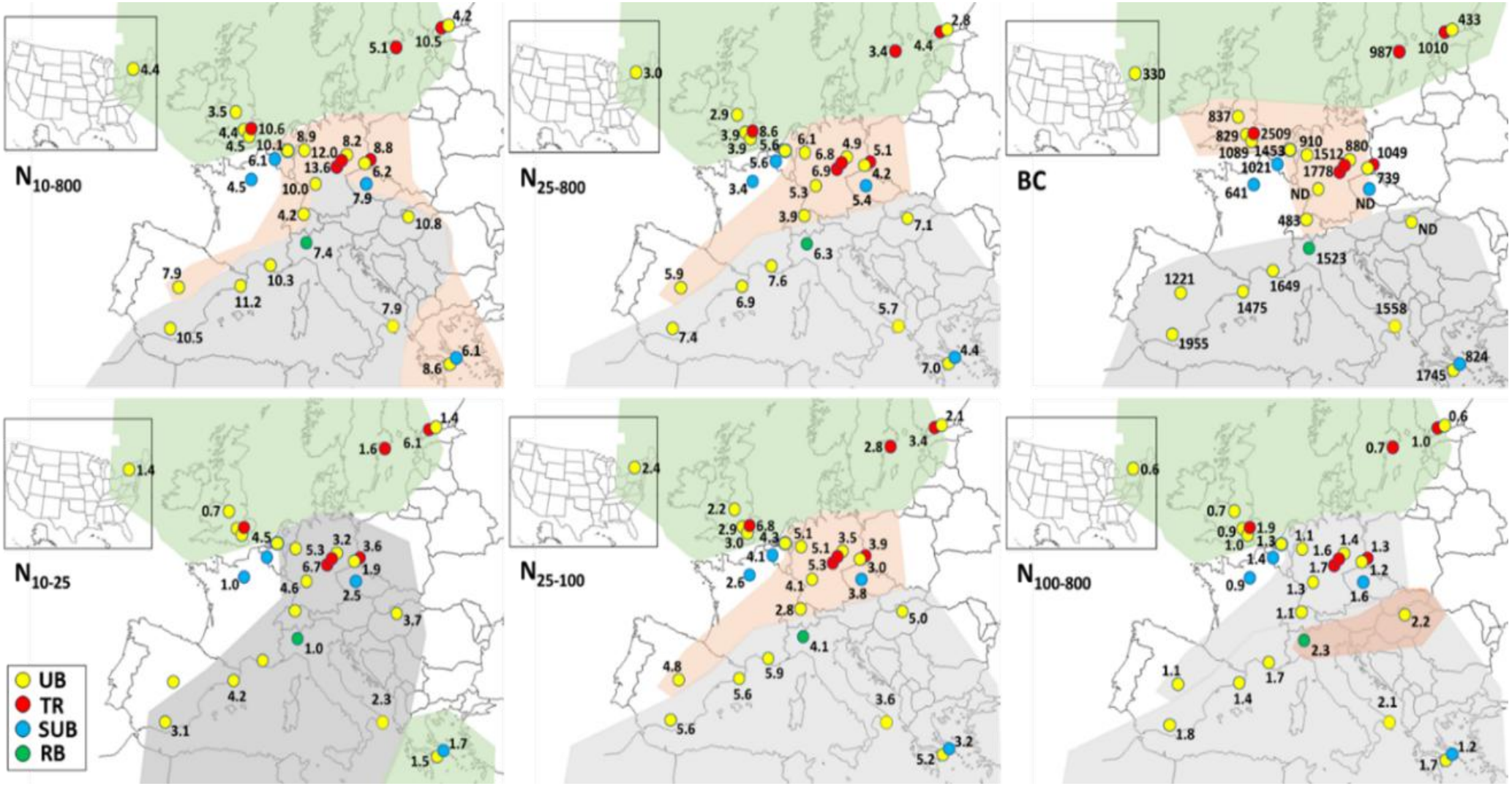
Table 3 - Pollutants recommended to be measured at supersites at urban and rural locations if not covered by the requirements of Tables 1 and 2

Pollutant	Type of measurement
Size distribution of UFP	Fixed or indicative measurements
Particulate matter oxidative potential	Fixed or indicative measurements
Total deposition of benzo(a)pyrene and other polycyclic aromatic hydrocarbons (PAH) as relevant	Indicative measurements
Ammonia (NH3)	Fixed or indicative measurements
Levoglucosan to be measured as part of the chemical composition of PM2.5	Fixed or indicative measurements
Total gaseous mercury	Fixed or indicative measurements
Particulate and gaseous divalent mercury	Fixed or indicative measurements
Nitric acid	Fixed or indicative measurements

The 16 RI-URBANS' ST & the booklet

https://riurbans.eu/project/#service-tools

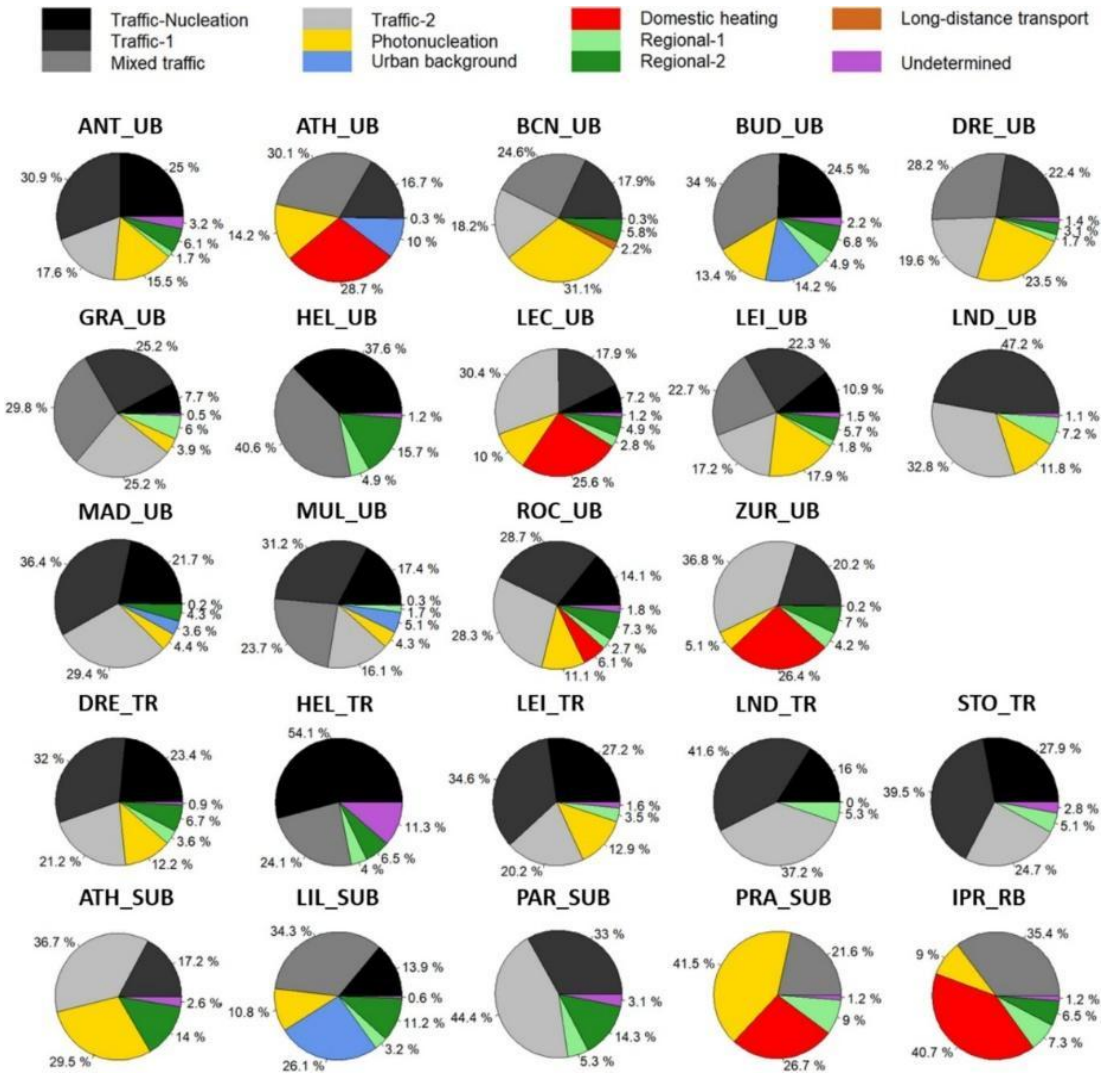
Ultrafine particles and PNSD in urban Europe ST1



Trechera et al., 2023, ENV INT, https://doi.org/10.1016/j.envint.2023.107744

Source apportionment of ultrafine particles and PNSD

ST11

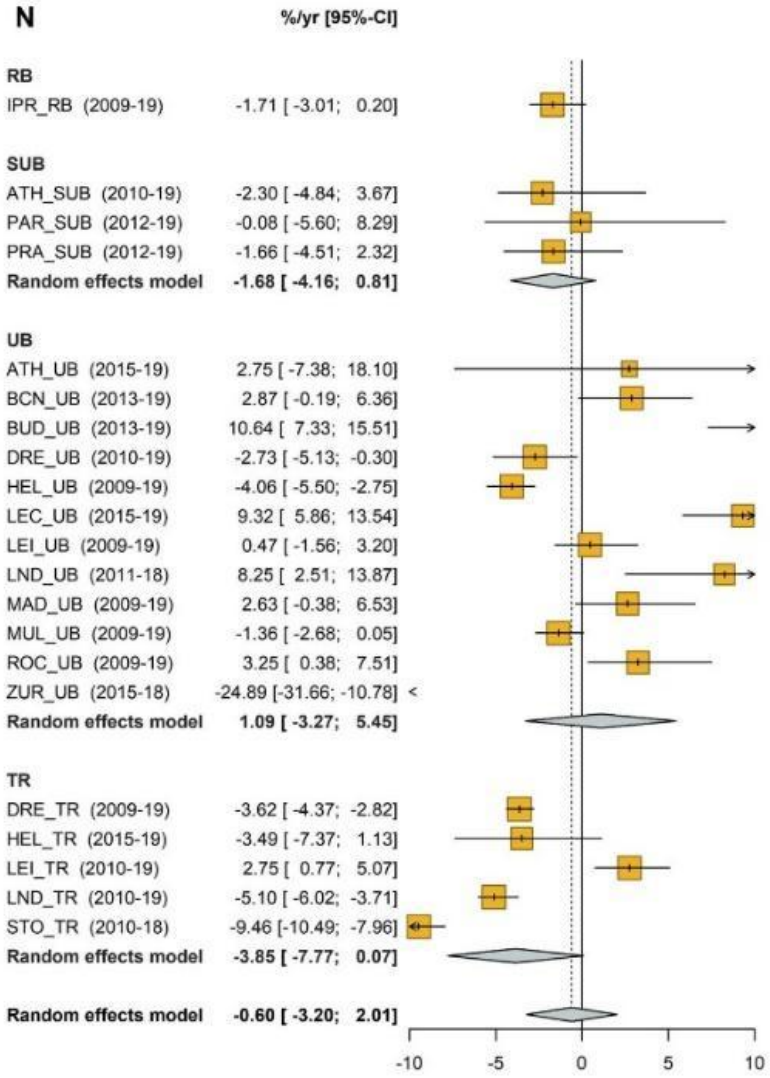


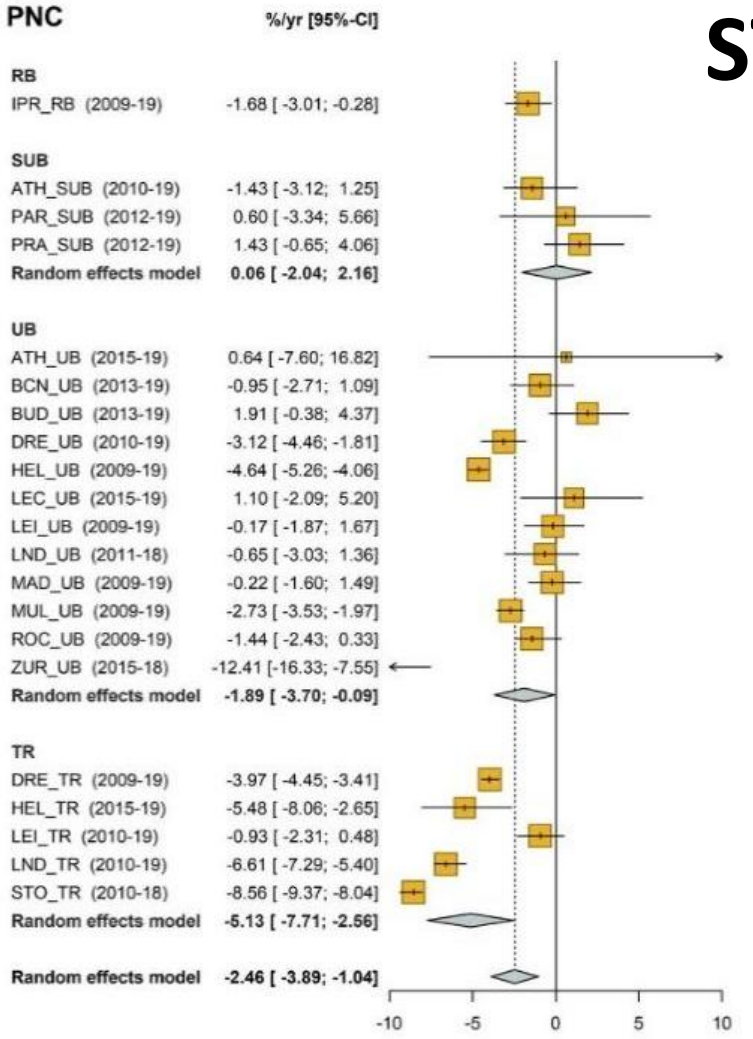
Garcia-Marlès et al., 2024a, ENV INT
https://doi.org/10.1016/j.envint.2024.109149

The trends of ultrafine particles and PNSD in urban Europe

Garcia-Marlès et al., 2024b, ENV INT, https://doi.org/10.1016/j.envint.2024.108510

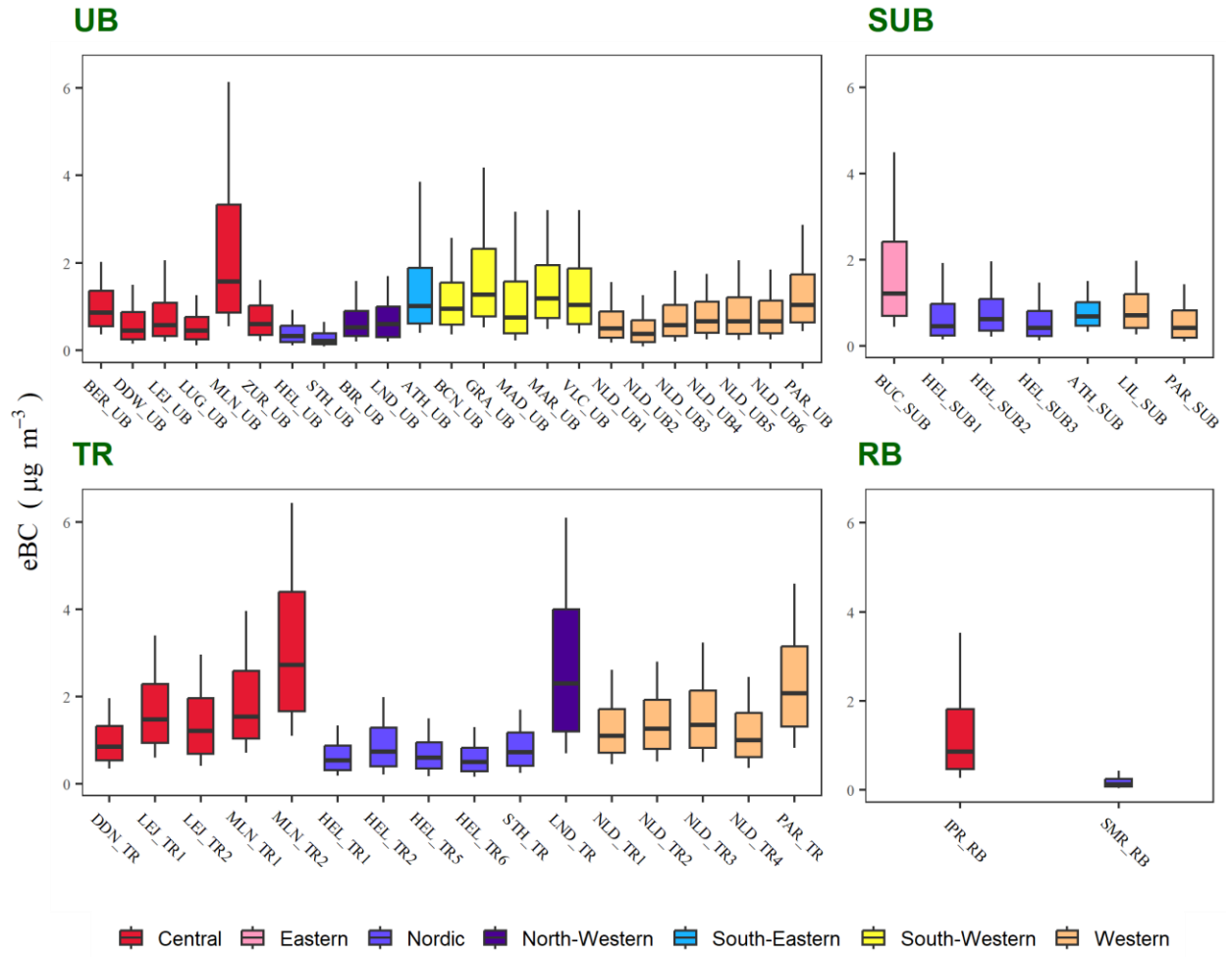
ST1 &11

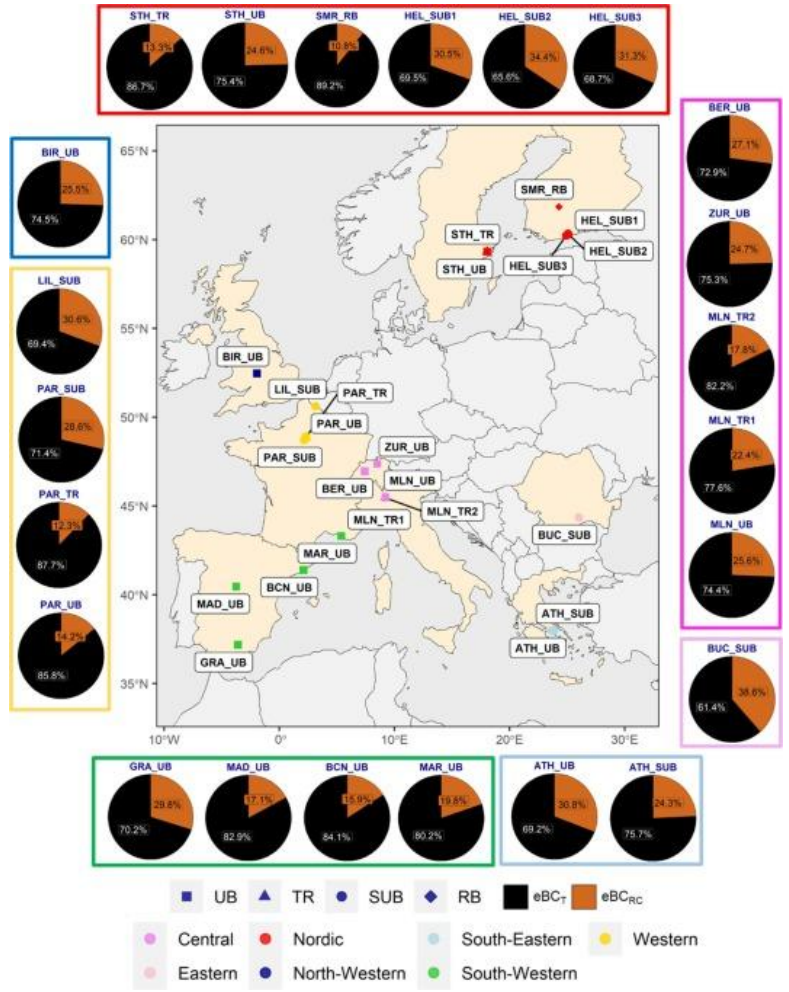




Black carbon in Urban Europe

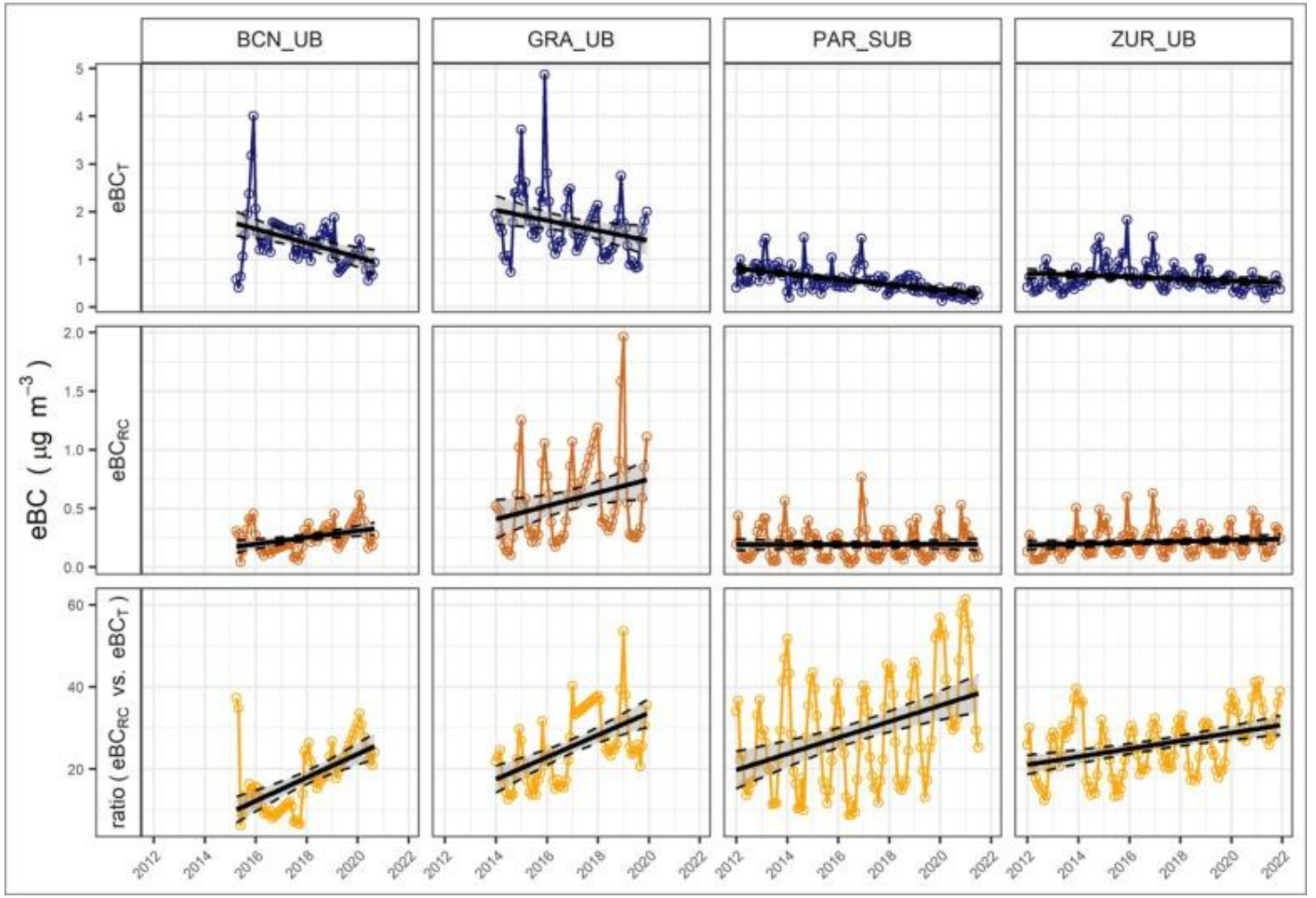
ST2 & 11





Savadkoohi M., 2023. Environment International https://doi.org/10.1016/j.envint.2023.108081

Trends and source contributions of black carbon in Europe

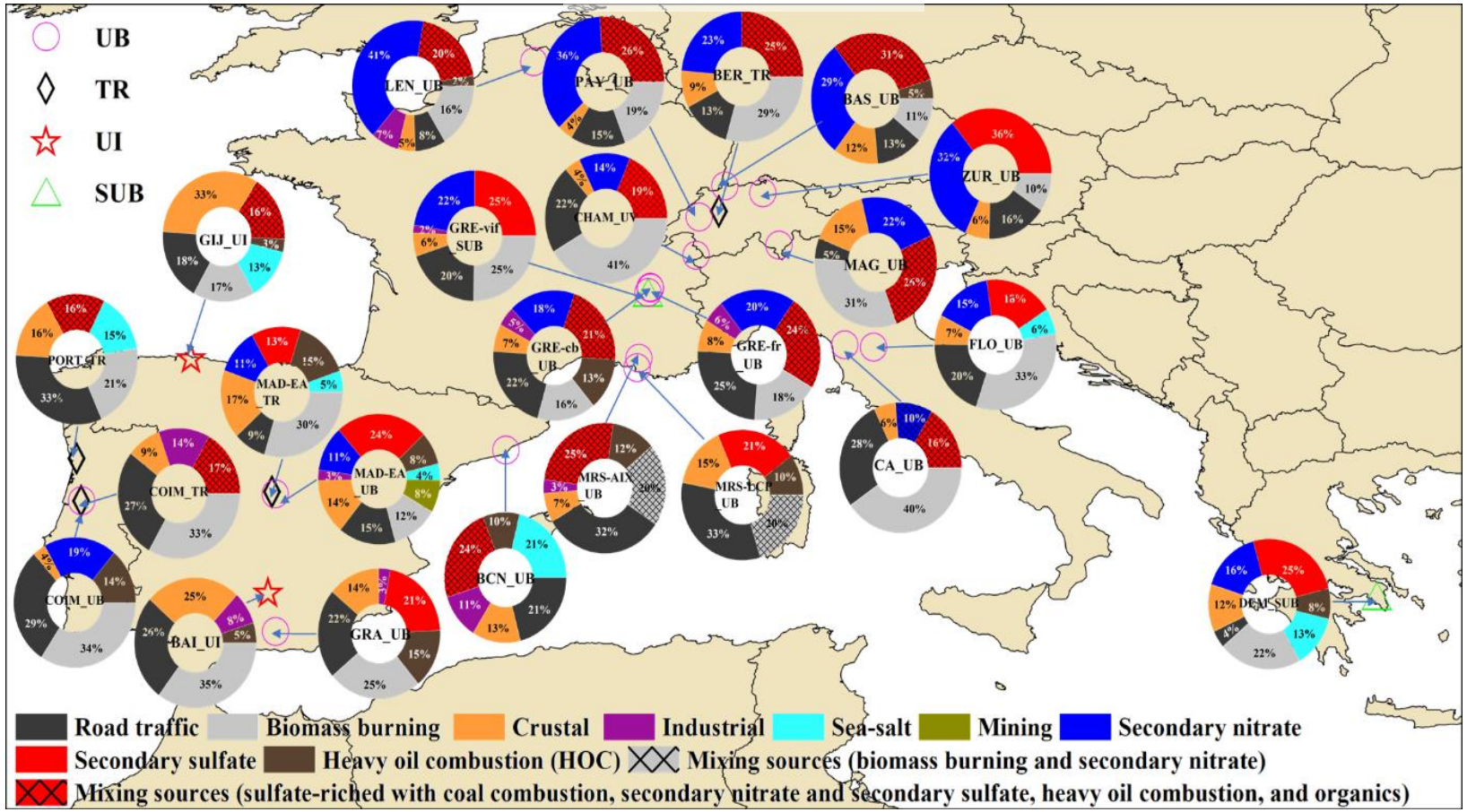


ST2 & 11

Savadkoohi M., 2023. Environment International https://doi.org/10.1016/j.envint.2023.108081

PM speciation and source contributions in urban Europe

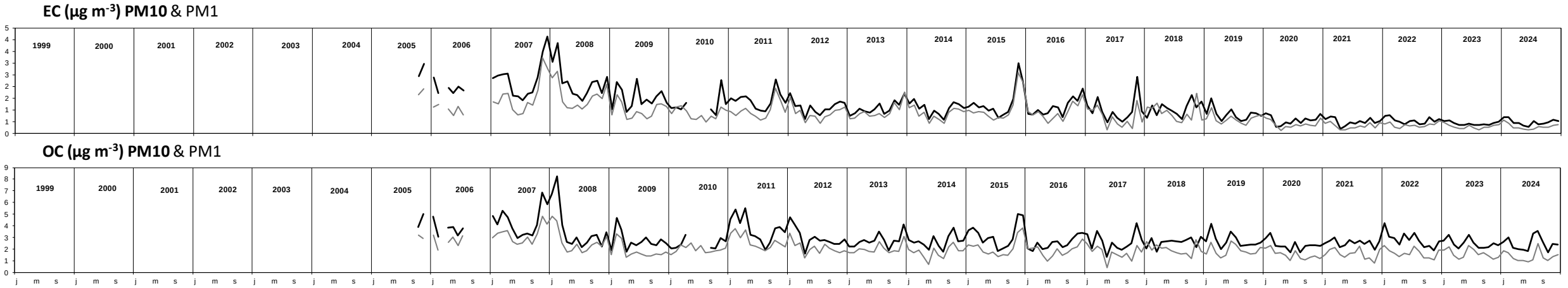
ST3 & 10



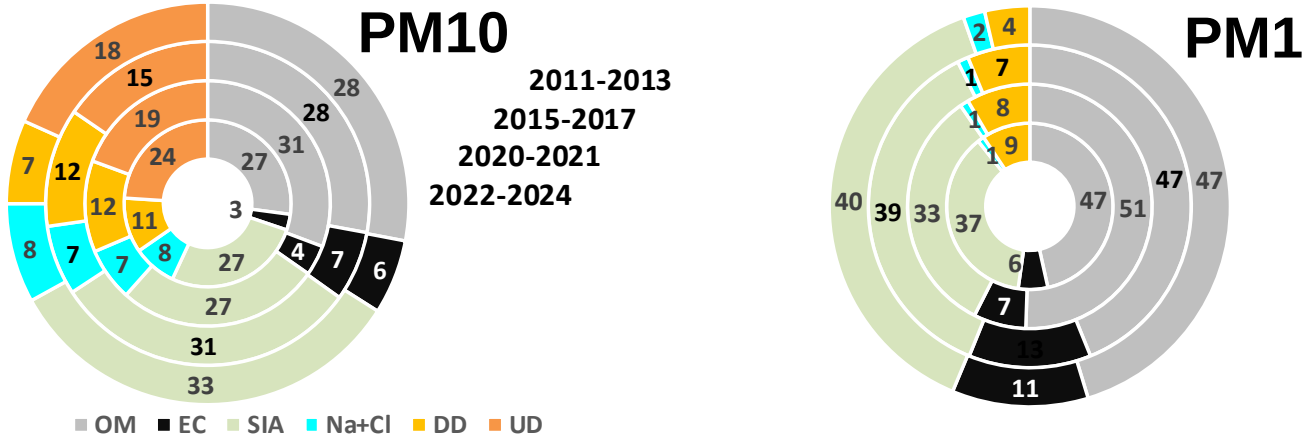
Liu X., npjc, 2025, https://www.nature.com/articles/s41612-025-01097-7

PM speciation and source contributions in urban Europe

BARCELONA PM & PM COMPONENTS 1999-2024



ORGANIC PM POLLUTANTS SHOULD GUIDE ON HOW REDUCE SOA & PM2.5



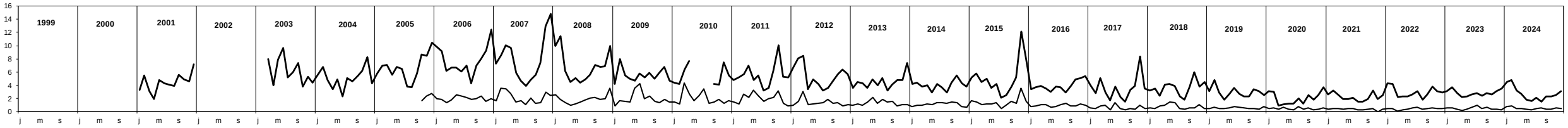
RI-URBANS (101036245) results, PEEX webinar, 14th April 2026, X. Querol & T. Petäjä

PM speciation and source contributions in urban Europe

BARCELONA PM & PM COMPONENTS 1999-2023

Breake and tyre wear and road dust

Sn (ng m^{-3}) PM10 & PM1



PM speciation and source contributions in urban Europe

Common strategies to abate PM in urban environments

- Prevalence of secondary PM (SIA & SOA)

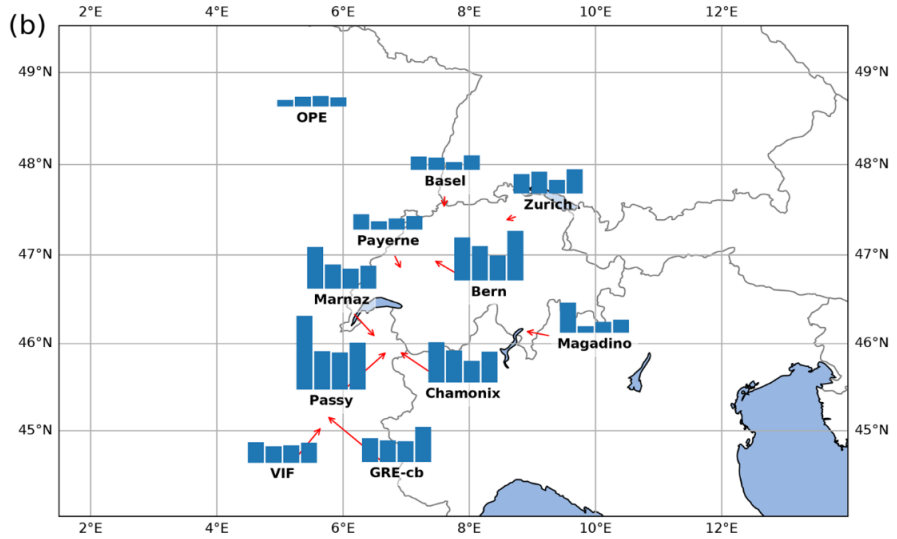
  - Measures at regional and local scales to abate PM precursors (SO_2, NO_X, NH_3 & VOCs)

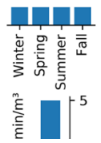
  - Abating O_3 since high O_3 favours SIA & SOA formation

- High mineral matter contribution

  Construction, road and industrial dust should be abated

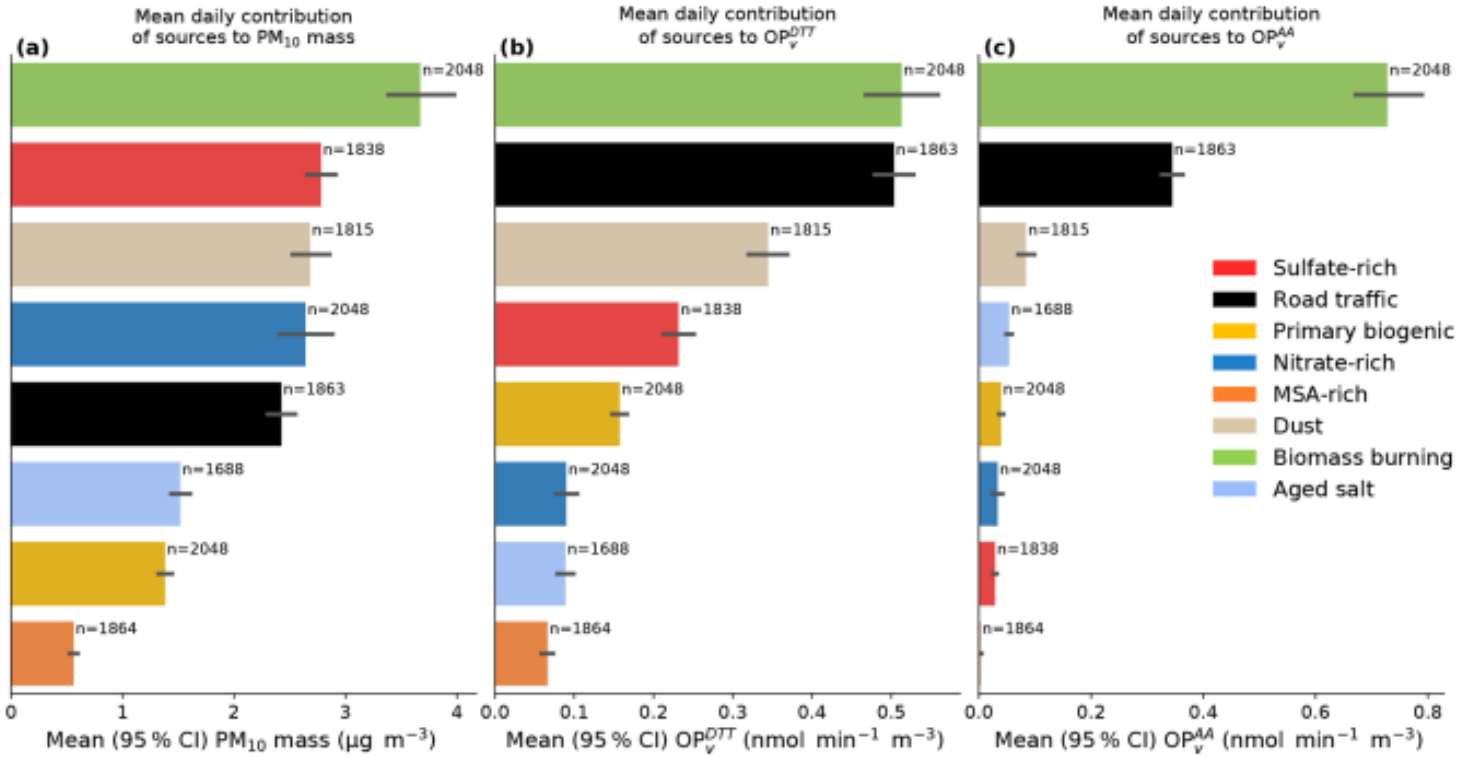
Oxidative potential



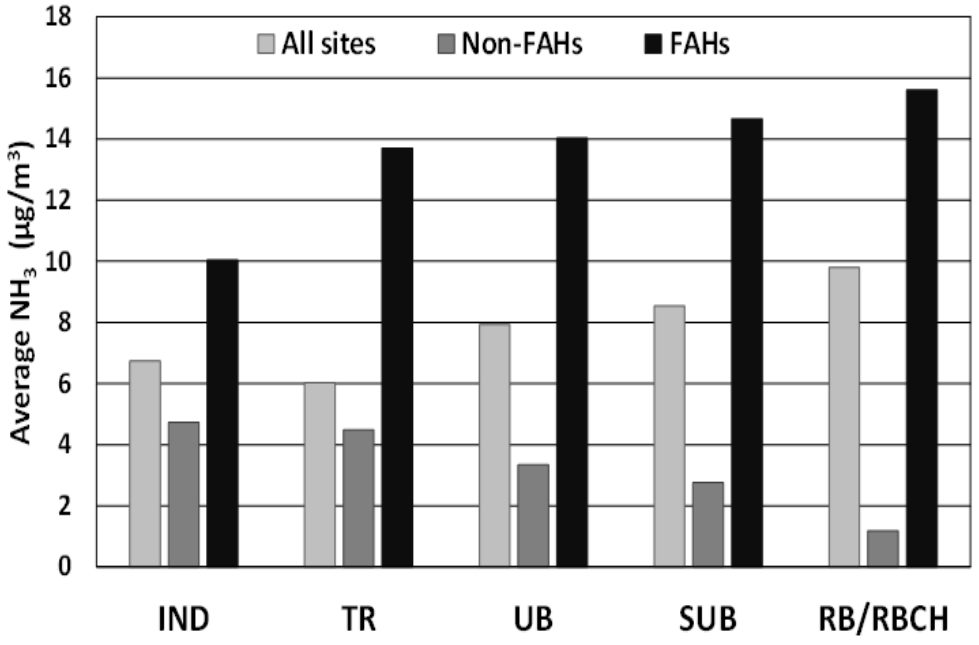


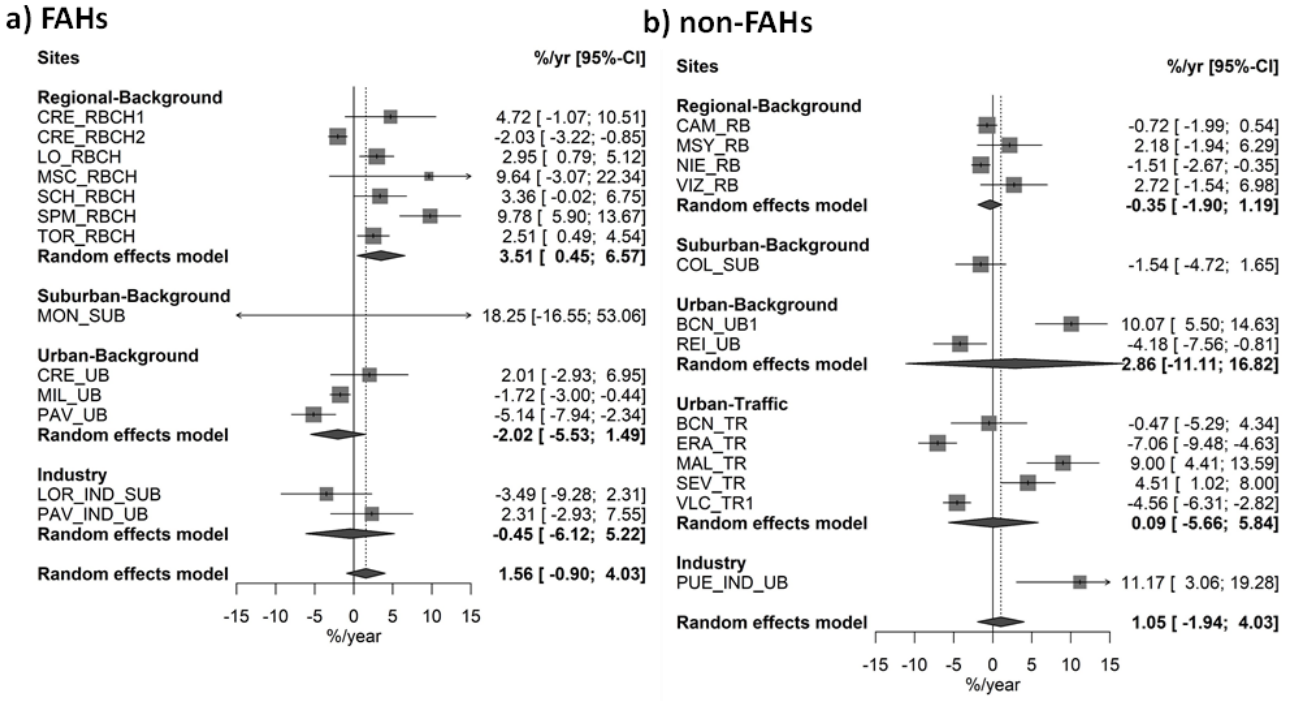
Weber et al., 2021, http://getopstandop.u-ga.fr/

Grange et al., 2022. Atmospheric Chem. Phys. 22, 7029–7050.



Concentrations and trends of NH_3 in Europe





Liu X., 2024. Environment International
https://doi.org/10.1016/j.envint.2024.108519

Acesss to RI-URBANS Progress, open data, STs

https://riurbans.eu/#progress
https://riurbans.eu/results/#open-data
https://riurbans.eu/project/#service-tools
https://riurbans.eu/results/#publications

Thank you very much for your attention!

xavier.querol@idaea.csic.es
tuukka.petaja@helsinki.fi