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Controls on the spatial distribution and temporal variations of PAH in the sediments of the Parisian sewerage system



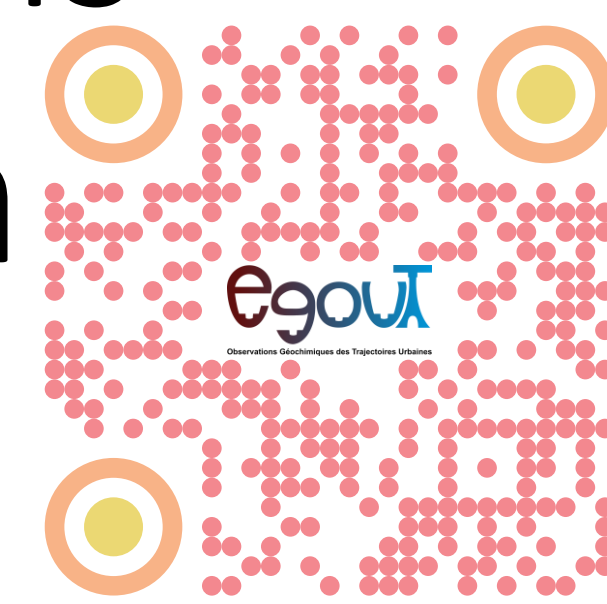
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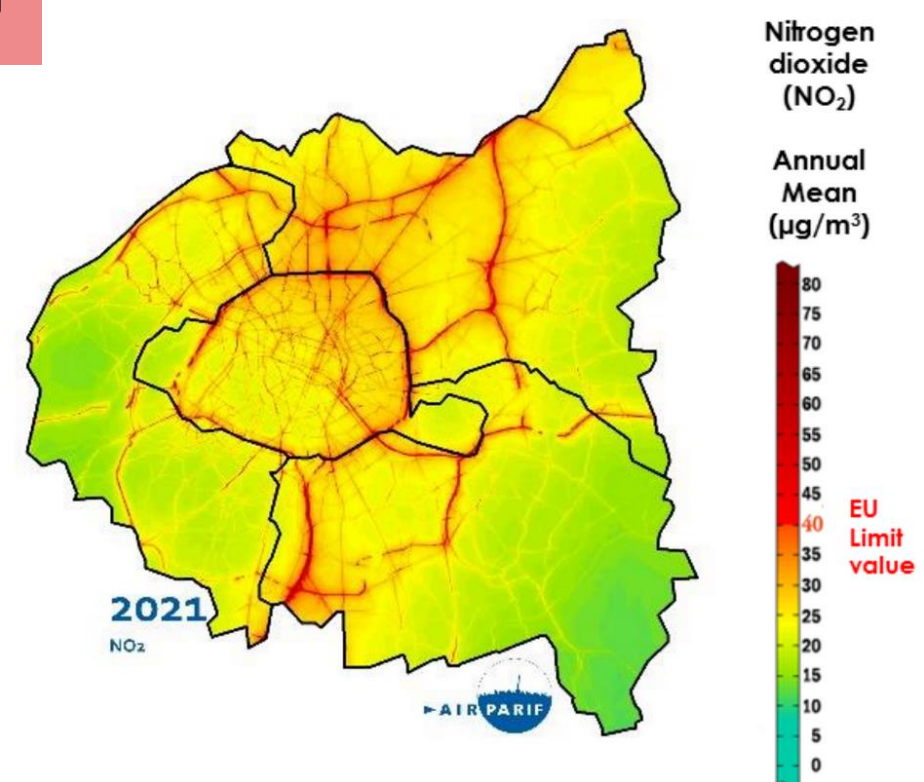
³ Laboratoire Dynamiques sociales et recomposition des espaces (LADYSS), UMR 7533, Université Paris Nanterre, France

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INTRODUCTION

- Heterogeneities of urban environments -> difference in exposure to pollution -> health issues



- City management through public policy: low emission zone
- EGOUT project: sediment and water in sewers provide information on surface dynamics (Jacob et al., 2020)

Working hypothesis:

- The diversity and the changes of urban contexts are expressed in the spatio-temporal distribution of tracers archived in sewer sediments

Questions:

- What determines the spatial and temporal distributions of PAH ?
- Can regulatory data be used for scientific purposes ?

MATERIAL AND METHODS

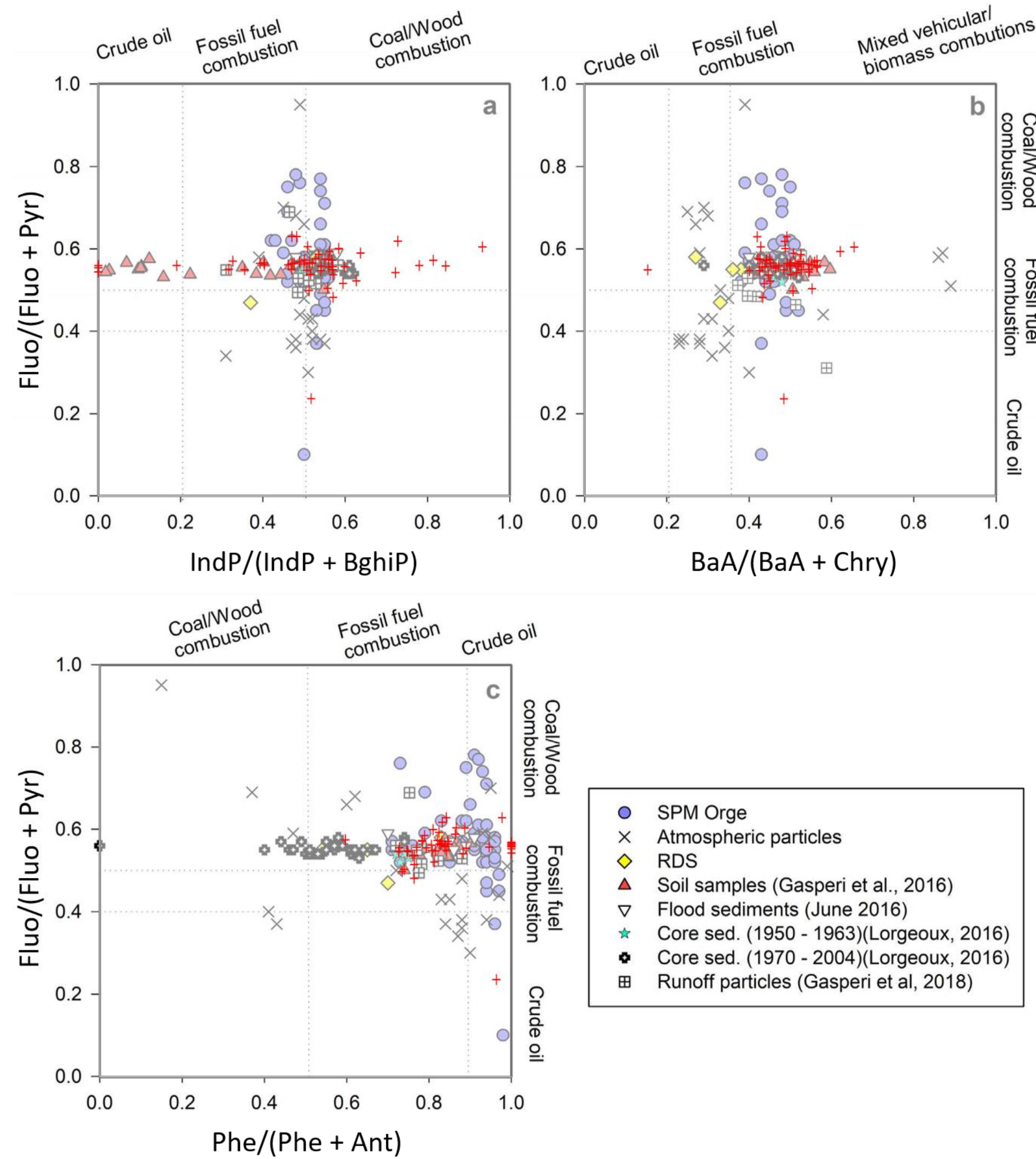
- Regulatory results on silt traps sediments -> available since 2000: grain size, organic matter, 16 PAH... (624 samples)
- GIS approach: sewershed (159)



A silt trap in sewers network

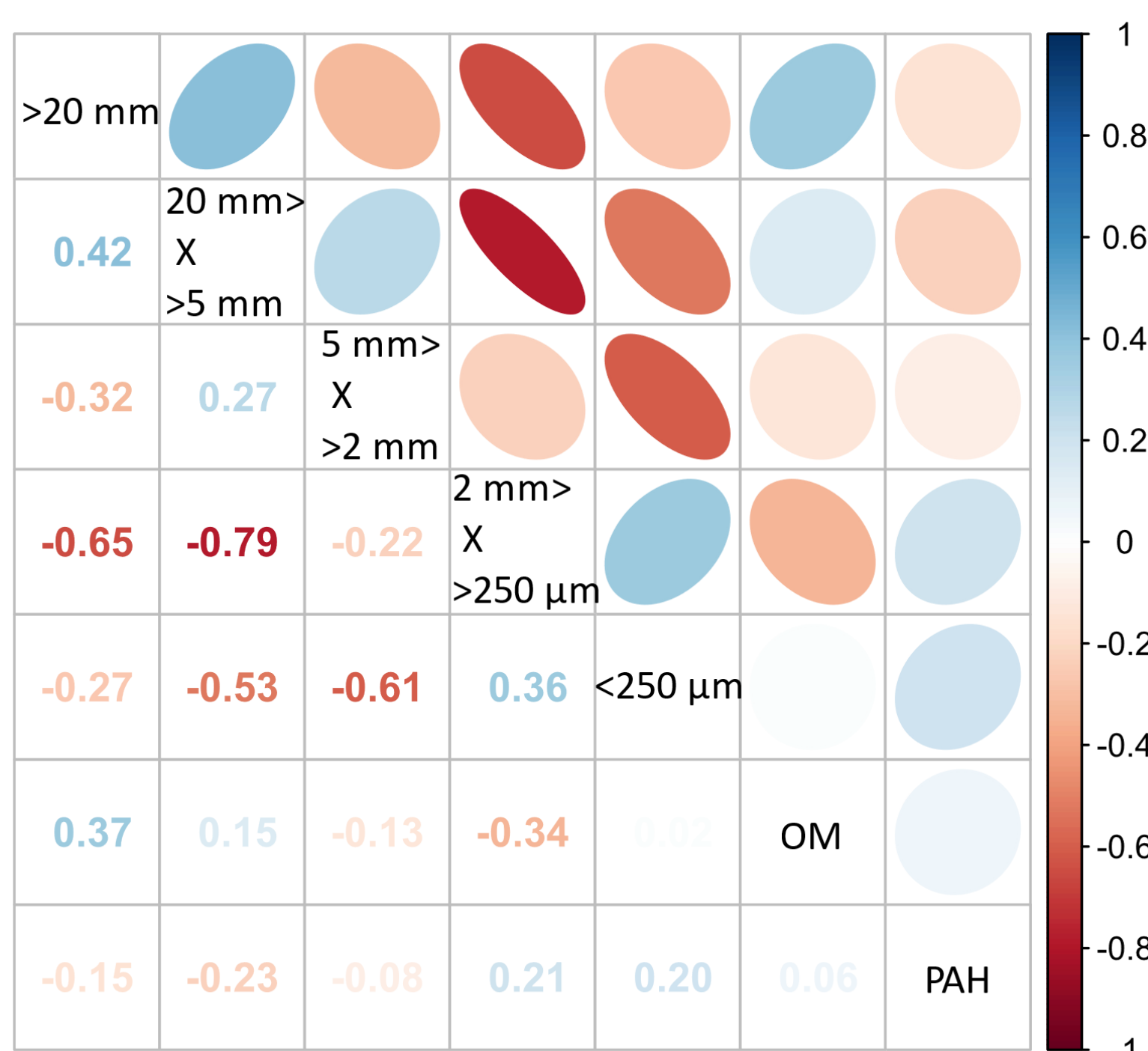
RESULTS

Source of PAH:



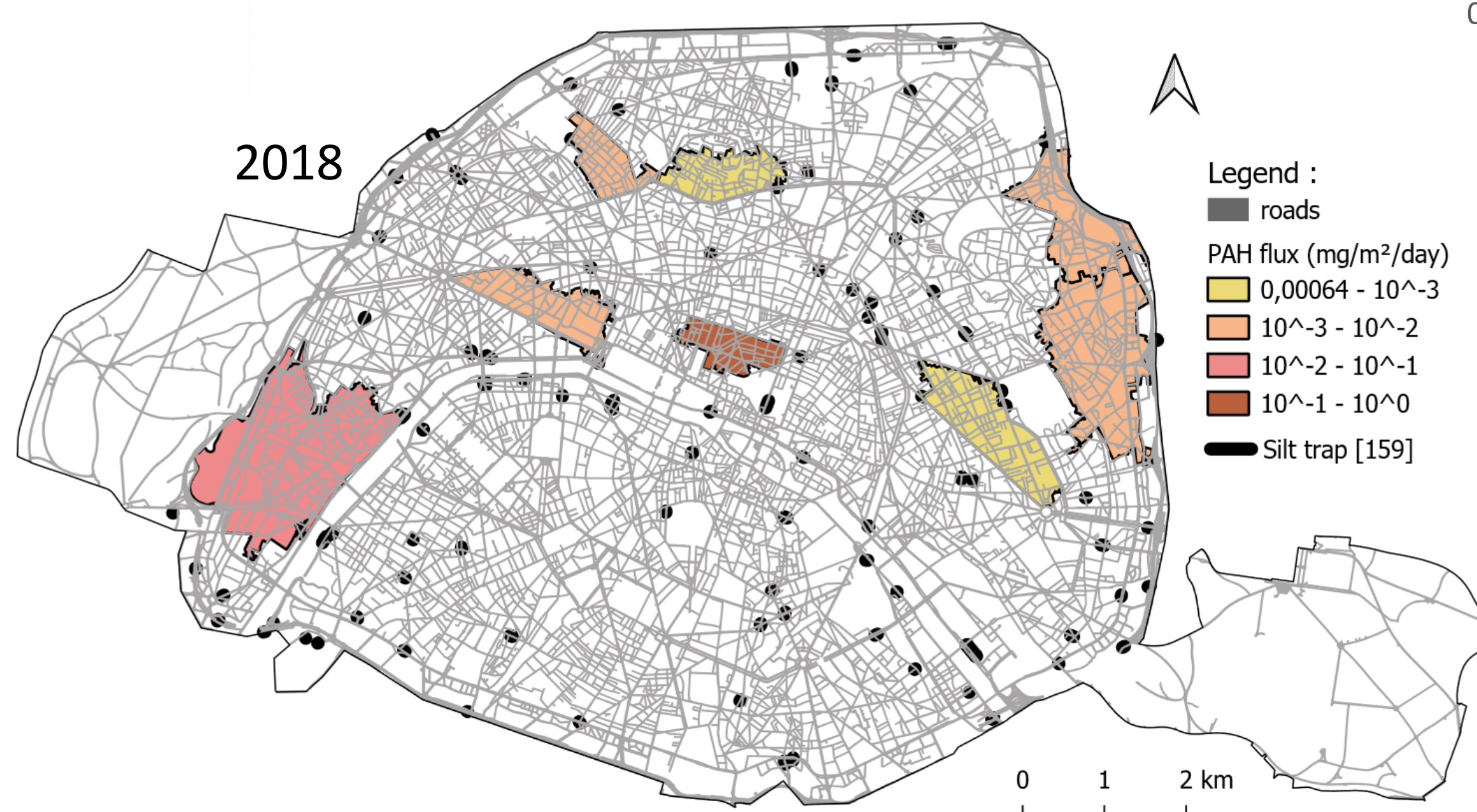
- Possible origins: coal/wood combustion, fossil fuel combustion or mixed vehicular/biomass combustions

Supporting phases (OM, minerals...):

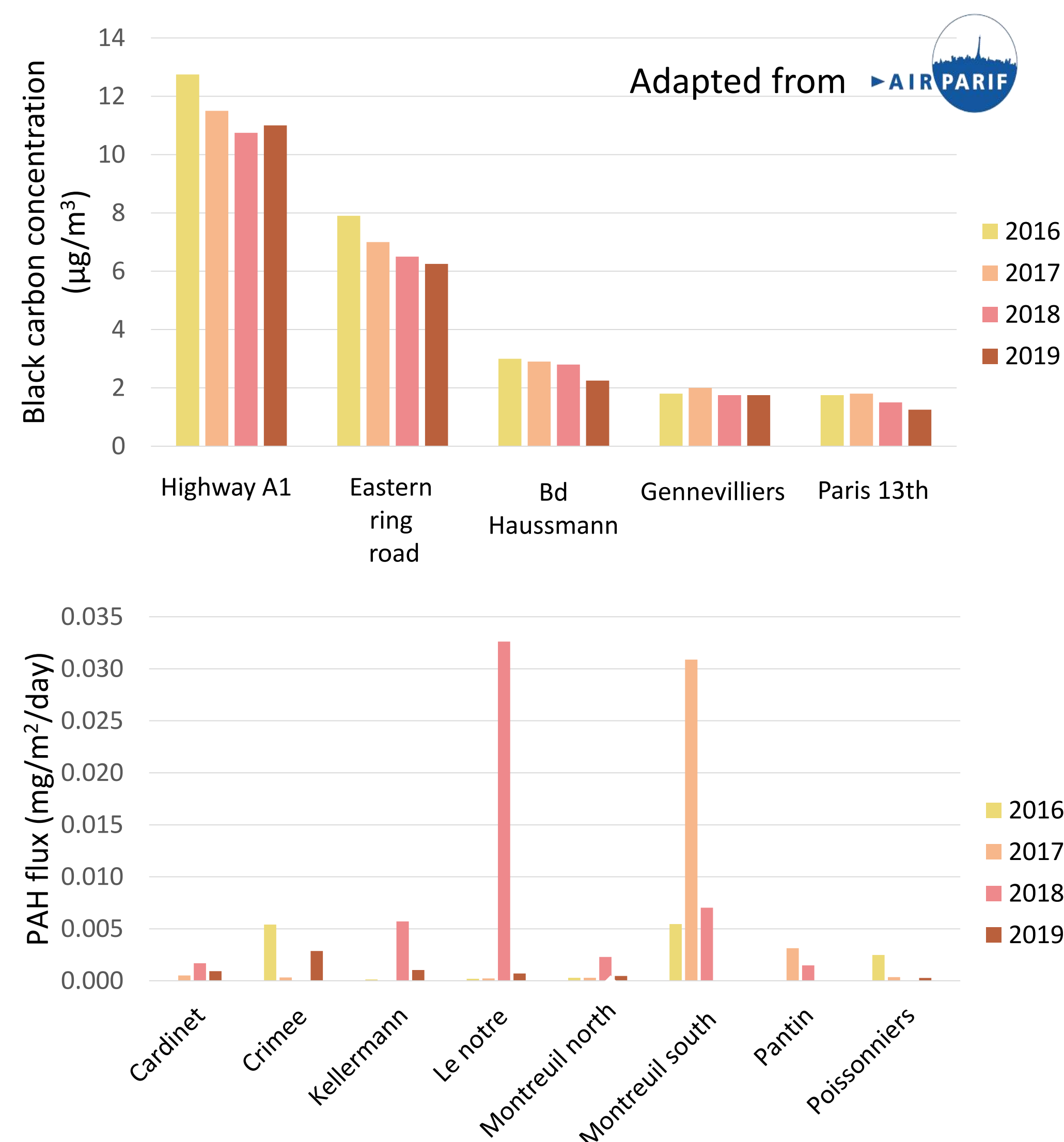


- PAH are not correlated

Spatial distribution:



Temporal evolution:



- Black carbon and PAH (same origin ?) -> not correlated
- Extreme values

- No link between traffic and PAH

CONCLUSIONS AND PERSPECTIVES

- PAH measured in sewage originate from distinct origins
- PAH are not correlated with granulometric, or organic matter (different sources ?)
- The temporal evolution and spatial distribution of PAH are not explained by the distribution of roads or by household heating -> spatio-temporal representativeness issues

- Representativeness of sampling, changes of analytical protocols ?

22 new sediments core will be analyzed

Froger, C., Ayrault, S., Gasperi, J., Caupos, E., Monvoisin, G., Evrard, O., Quantin, C., 2019. Innovative combination of tracing methods to differentiate between legacy and contemporary PAH sources in the atmosphere-soil-river continuum in an urban catchment (Orge River, France). Science of The Total Environment 669, 448–458. <https://doi.org/10.1016/j.scitotenv.2019.03.150>
 Jacob, J., Thibault, A., Simonneau, A., Sabatier, P., Le Milbeau, C., Gautret, P., Ardito, L., Morio, C., 2020. High-resolution sedimentary record of anthropogenic deposits accumulated in a sewer decantation tank. Anthropocene 30, 100238. <https://doi.org/10.1016/j.ancene.2020.100238>

