



HAL
open science

Microplastics in total atmospheric fallout: Monitoring in suburban and agricultural sites

Max Beaurepaire, Rachid Dris, Bruno Tassin, Johnny Gasperi

► To cite this version:

Max Beaurepaire, Rachid Dris, Bruno Tassin, Johnny Gasperi. Microplastics in total atmospheric fallout: Monitoring in suburban and agricultural sites. SETAC Europe 32nd Annual Meeting 2022, May 2022, Copenhagen, Denmark. hal-03675715

HAL Id: hal-03675715

<https://enpc.hal.science/hal-03675715>

Submitted on 23 May 2022

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Max Beaurepaire¹, Rachid Dris¹, Bruno Tassin¹ and Johnny Gasperi²

¹LEESU, Ecole des Ponts, Univ Paris Est Creteil, Marne-la-Vallee, France

²LEE, Universite Gustave Eiffel, Nantes, France

E-mail contact: max.beaurepaire@enpc.fr, rachid.dris@u-pec.fr

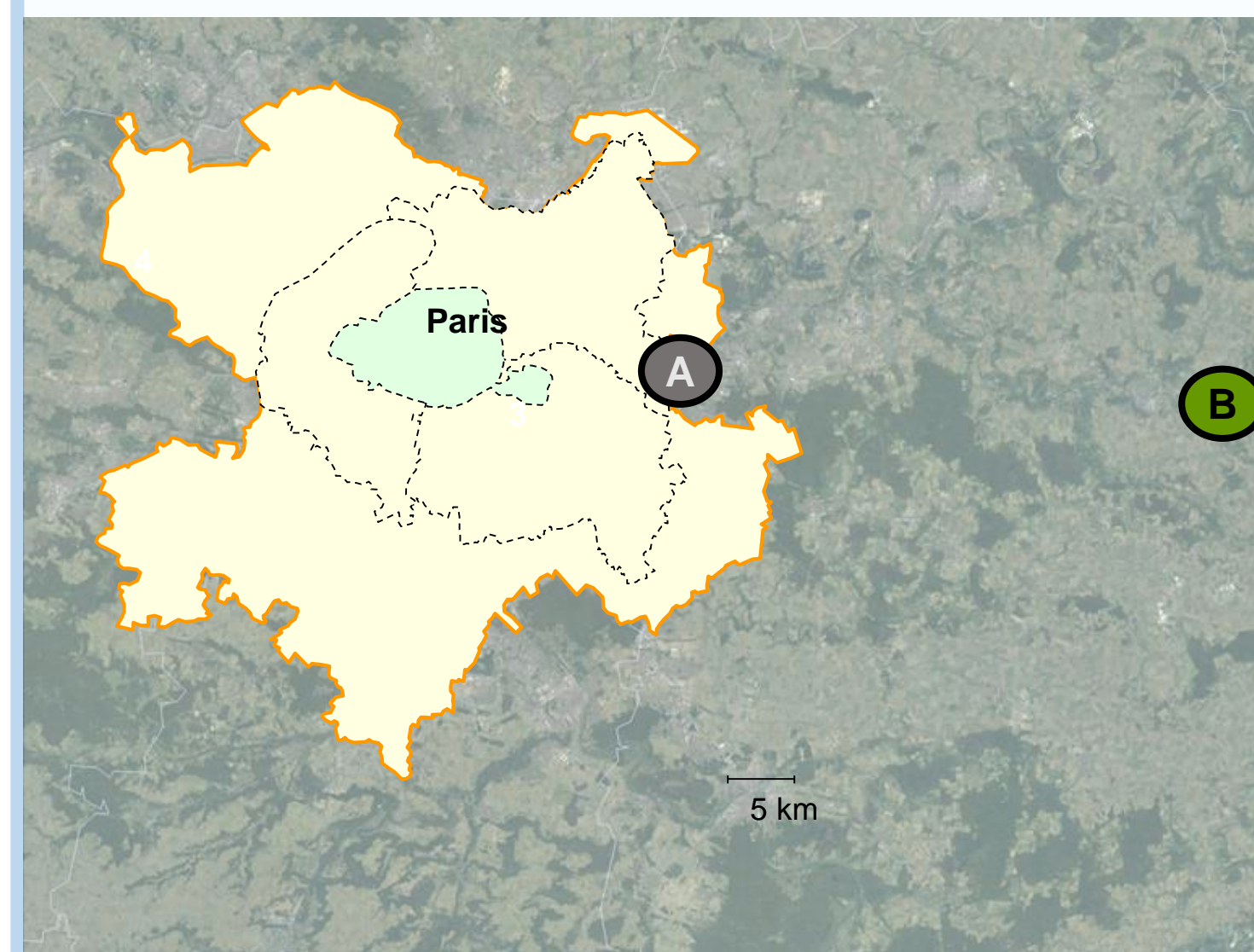
Context

- Microplastic pollution is the source of an increasing scientific interest since 2004 [1].
- Microplastics were first described in the atmospheric compartment in 2015 by Dris *et al.* [2].
- Human activity and rain events are suspected to affect atmospheric microplastic concentrations and depositions. However, no clear result was obtained on the subject [3].

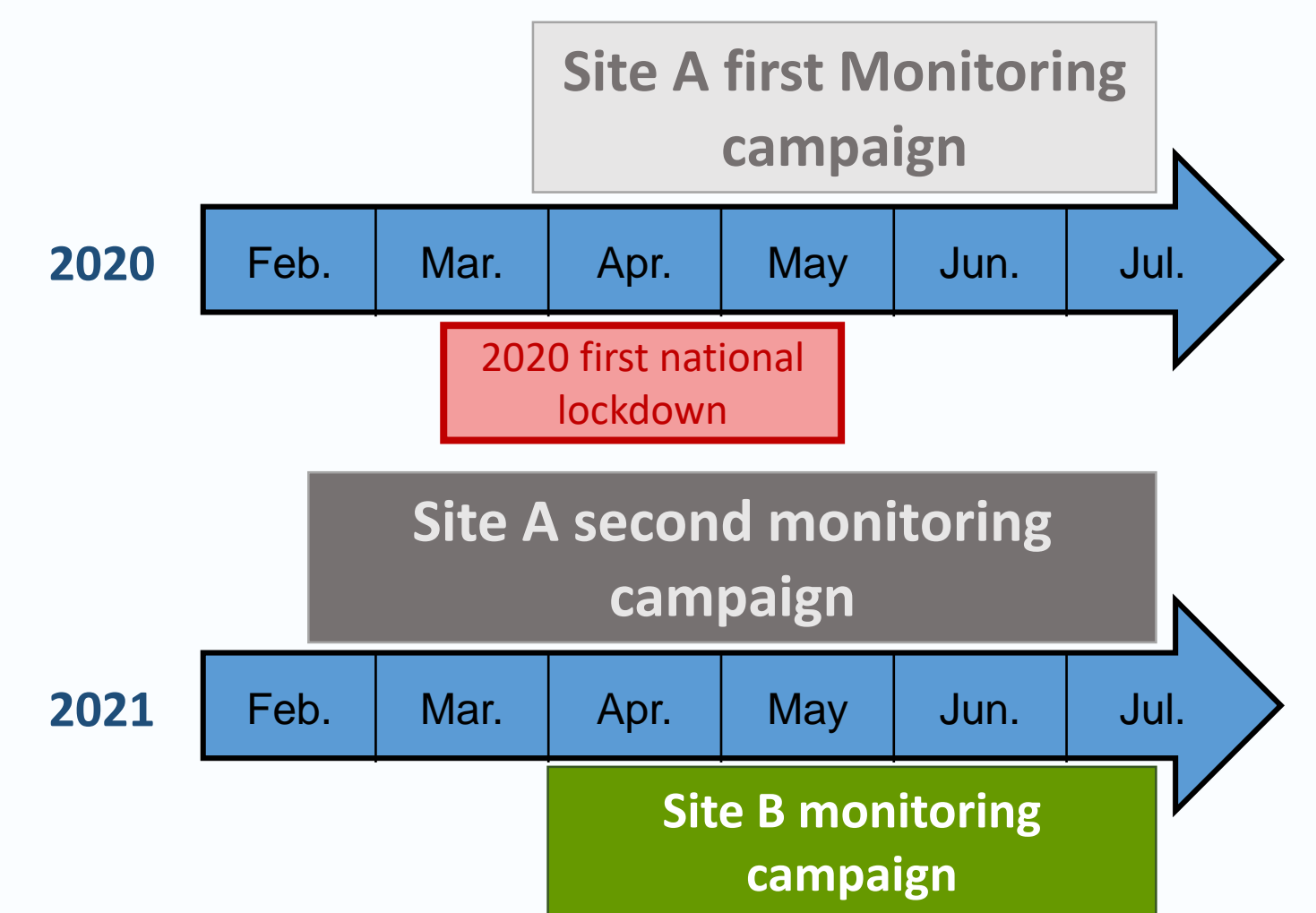
Objectives

- Compare microplastic deposition in two different sites
- Assess the effect of 2020 lockdown on microplastic deposition in a single suburban site.
- Assess the effect of precipitation events on atmospheric deposition.

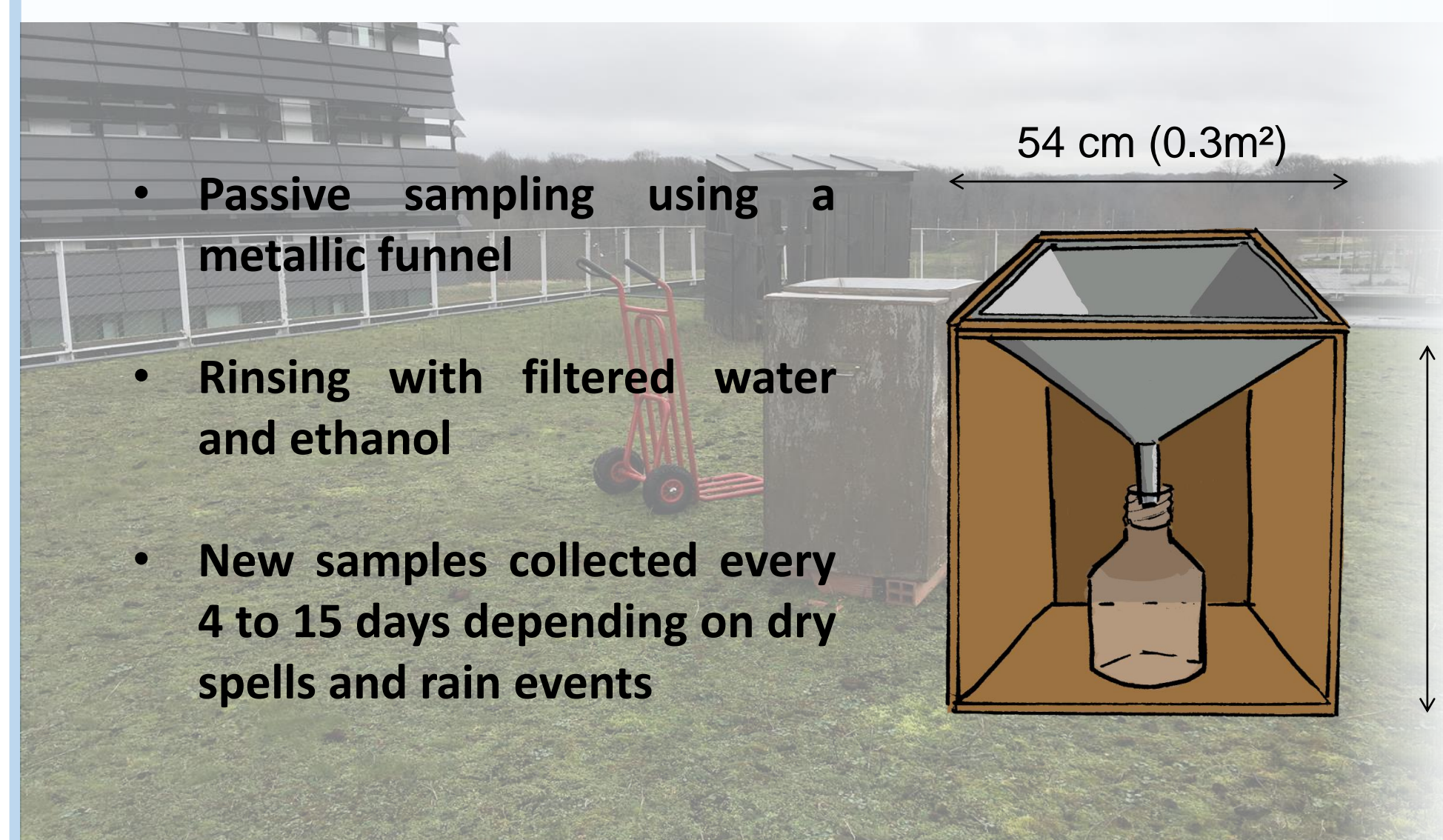
Sampling sites and campaigns



In total:
15 samples in 2020 campaign, suburban site (site A)
21 samples in 2021 campaign, suburban site (site A)
8 samples in agricultural site (site B)

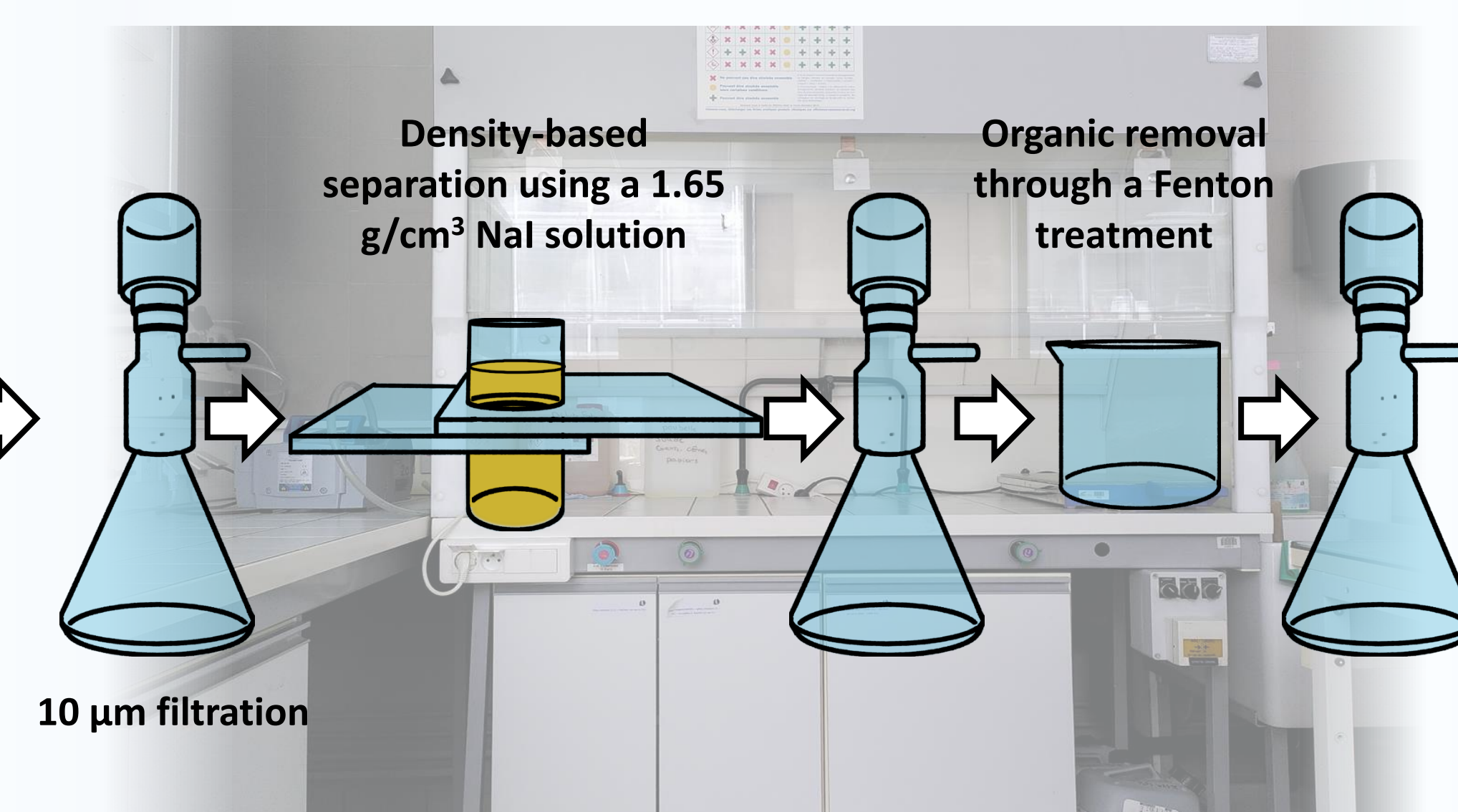


Sampling

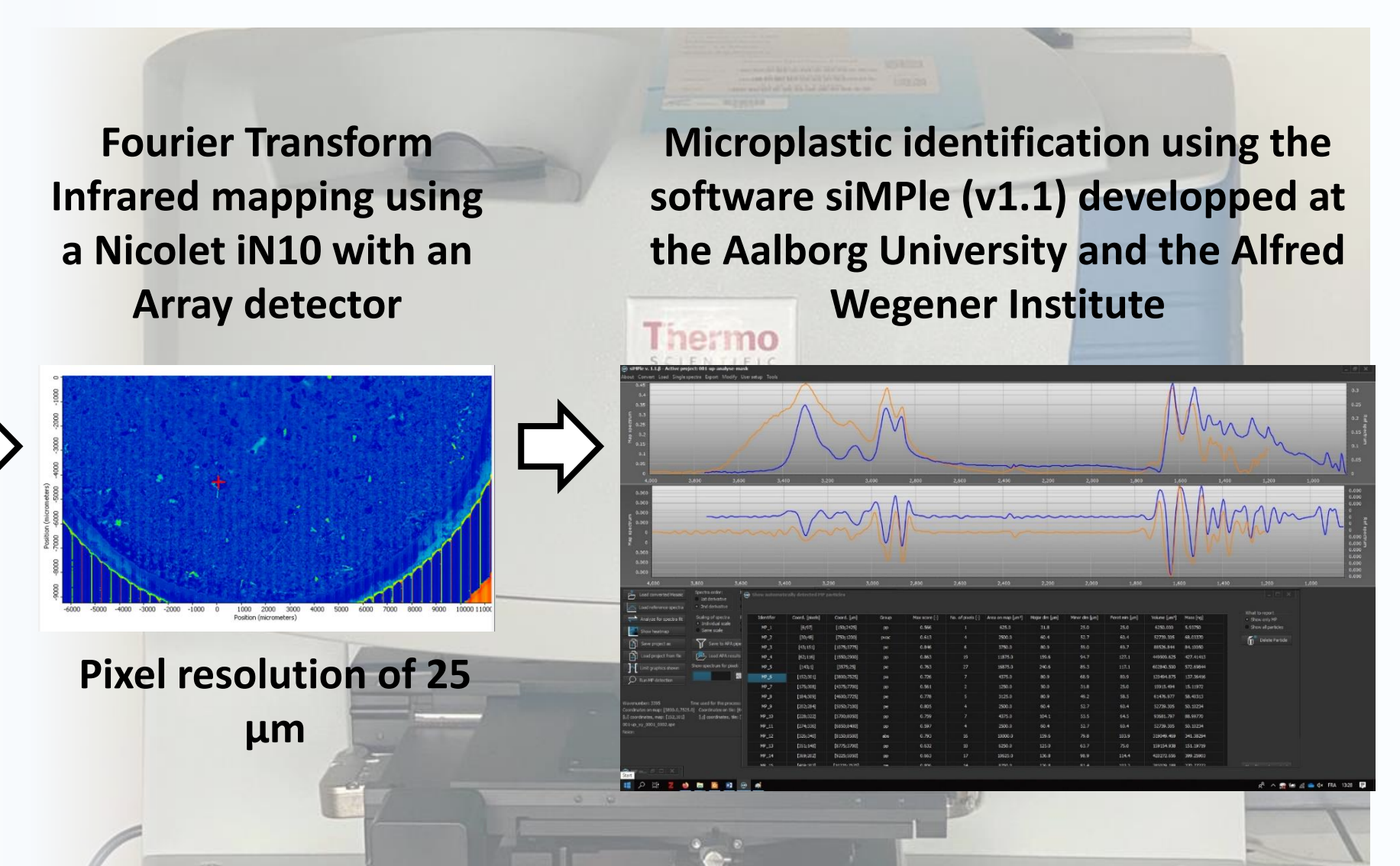


- Passive sampling using a metallic funnel
- Rinsing with filtered water and ethanol
- New samples collected every 4 to 15 days depending on dry spells and rain events

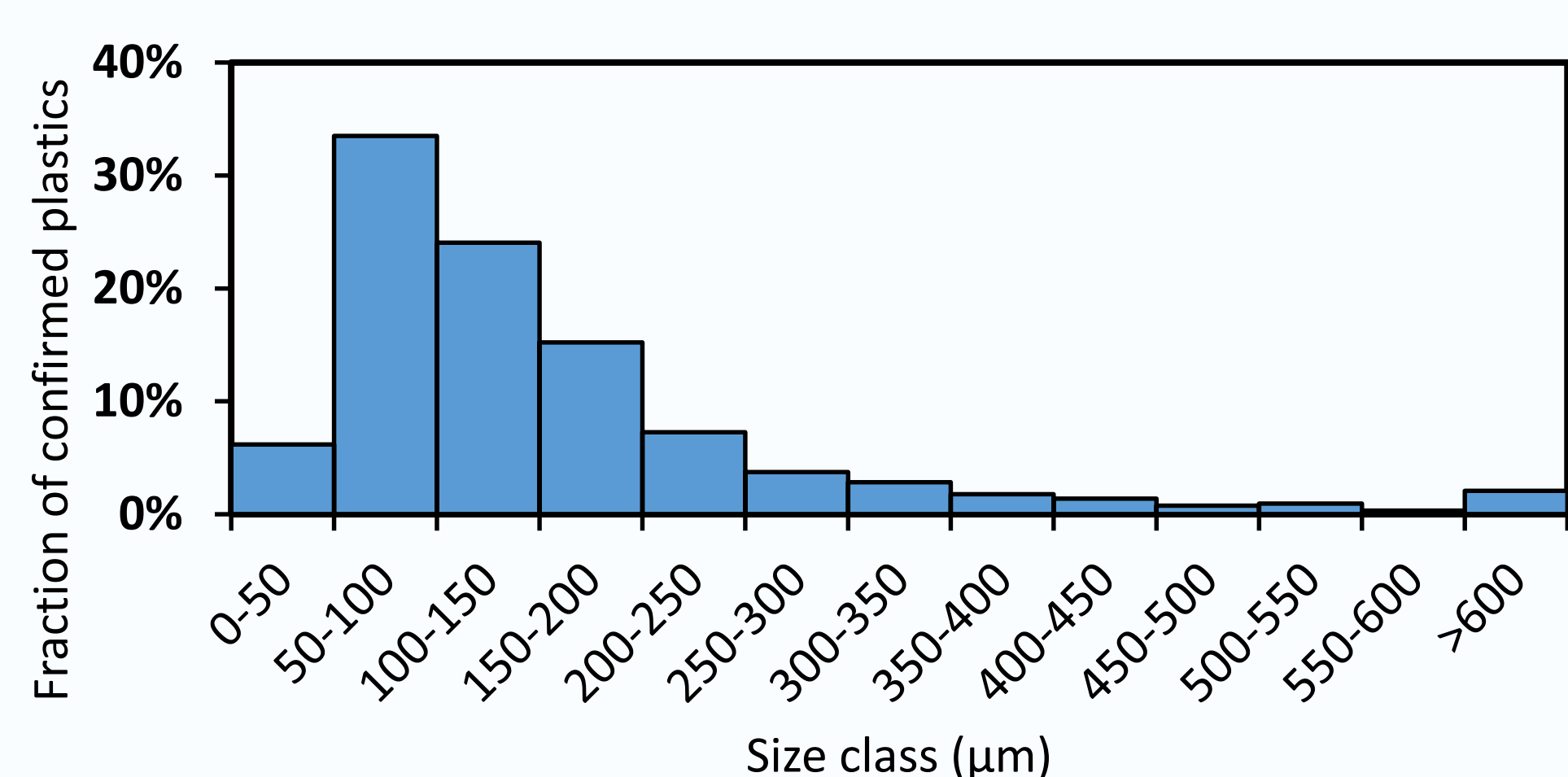
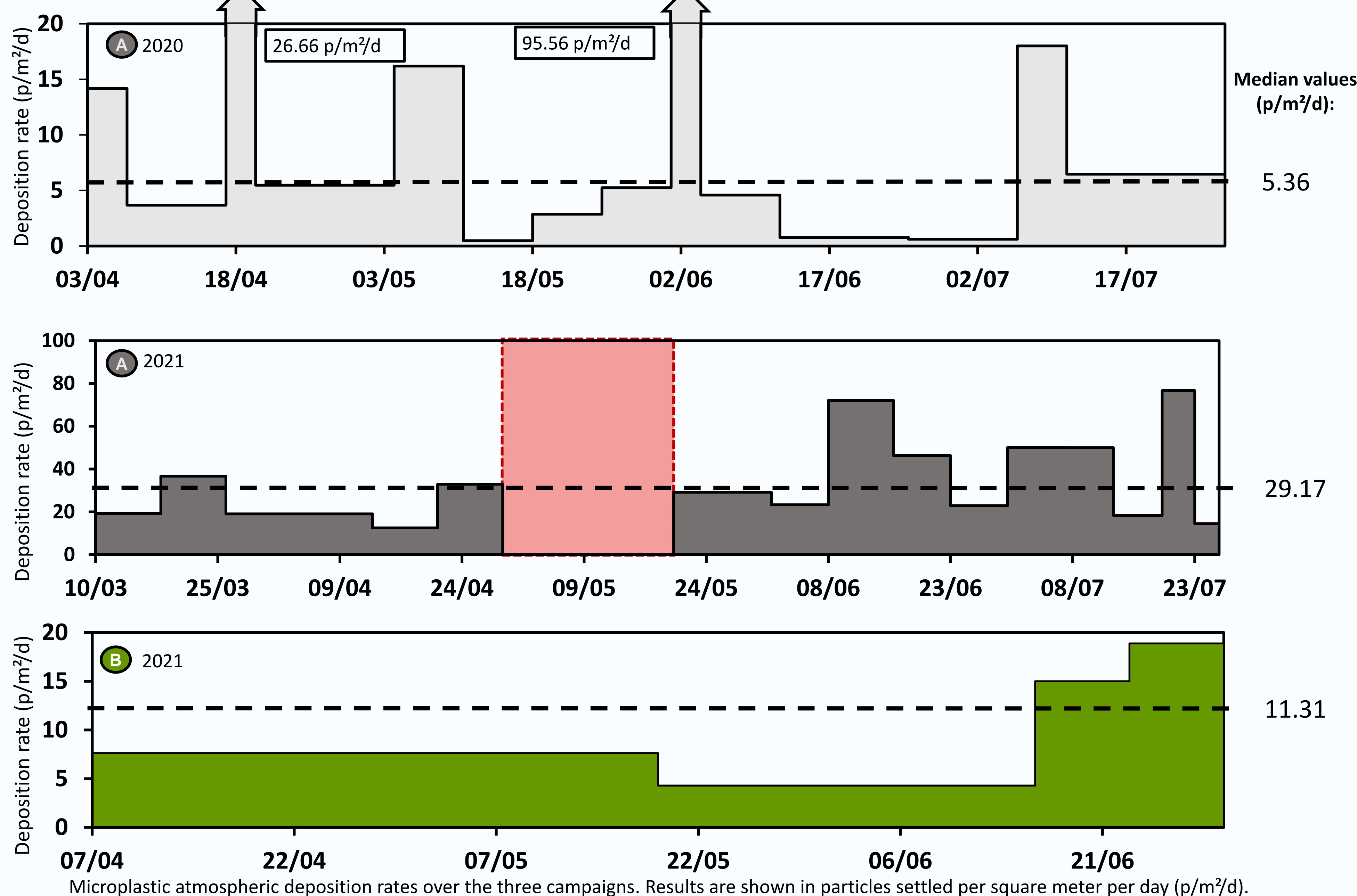
Treatment



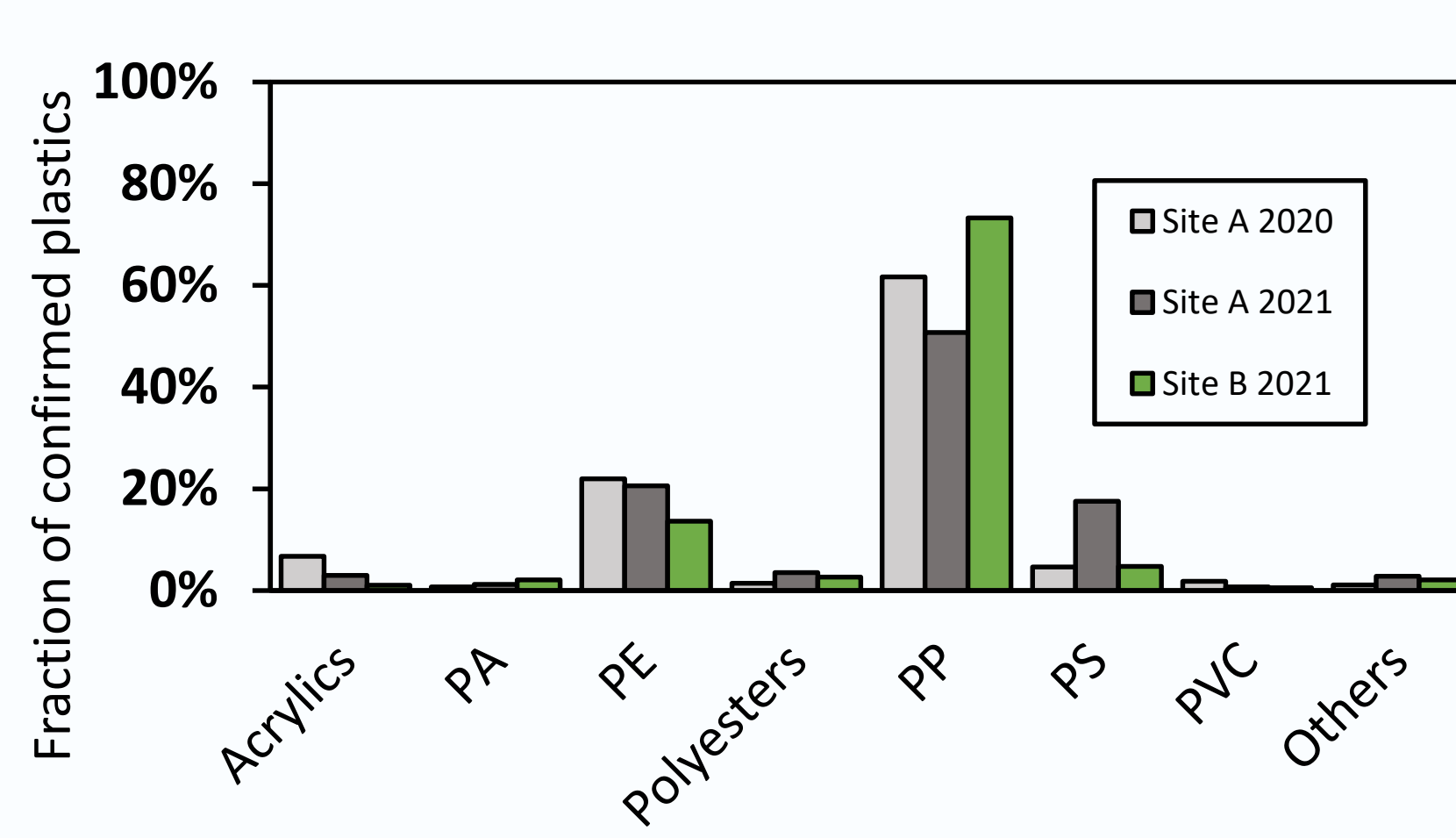
FTIR mapping analysis



Preliminary results



Size repartition chart of all identified particles pooled together. Smaller microplastics appear more frequent, down to a point where analytical methods limit the analysis.



Polymer groups repartition in the three campaigns. The dominant polymer groups always were polypropylene followed by polyethylene and polystyrene groups.

Discussion

- Deposition rates are lower in the agricultural site than in the suburban site.
- The lockdown monitoring campaign in site A shows the lowest microplastic deposition rates (median of 5.36 p/m²/d).
- Important precipitation events seem to be followed by higher deposition rates.

Further steps

- High precision comparison of microplastic deposition rates, precipitation and rain event characteristics.
- Dynamic Atmospheric fallout monitoring during single rain events.
- Comparison with earlier studies on the area.

Acknowledgements

- This work was supported by the OPUR project. The PhD grant of Max Beaurepaire was provided by the ENS de Lyon institution. The FTIR used for data acquisition was provided by the OSU – EFLUVE.
- The authors certify that they have no affiliation with or involvement in any organization or entity with a financial or non-financial interest in the subject matter or materials discussed in this poster.

References

- [1] R. C. Thompson *et al.*, 'Lost at Sea: Where Is All the Plastic?', *Science*, vol. 304, no. 5672, pp. 838–838, May 2004, doi: 10.1126/science.1094559.
- [2] R. Dris, J. Gasperi, V. Rocher, S. Mohamed, and B. Tassin, 'Microplastic contamination in an urban area: A case study in Greater Paris', *Environmental Chemistry*, vol. 12, May 2015, doi: 10.1071/EN14167.
- [3] M. Beaurepaire, R. Dris, J. Gasperi, and B. Tassin, 'Microplastics in the atmospheric compartment: a comprehensive review on methods, results on their occurrence and determining factors', *Current Opinion in Food Science*, vol. 41, pp. 159–168, Oct. 2021, doi: 10.1016/j.cofs.2021.04.010.