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

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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].

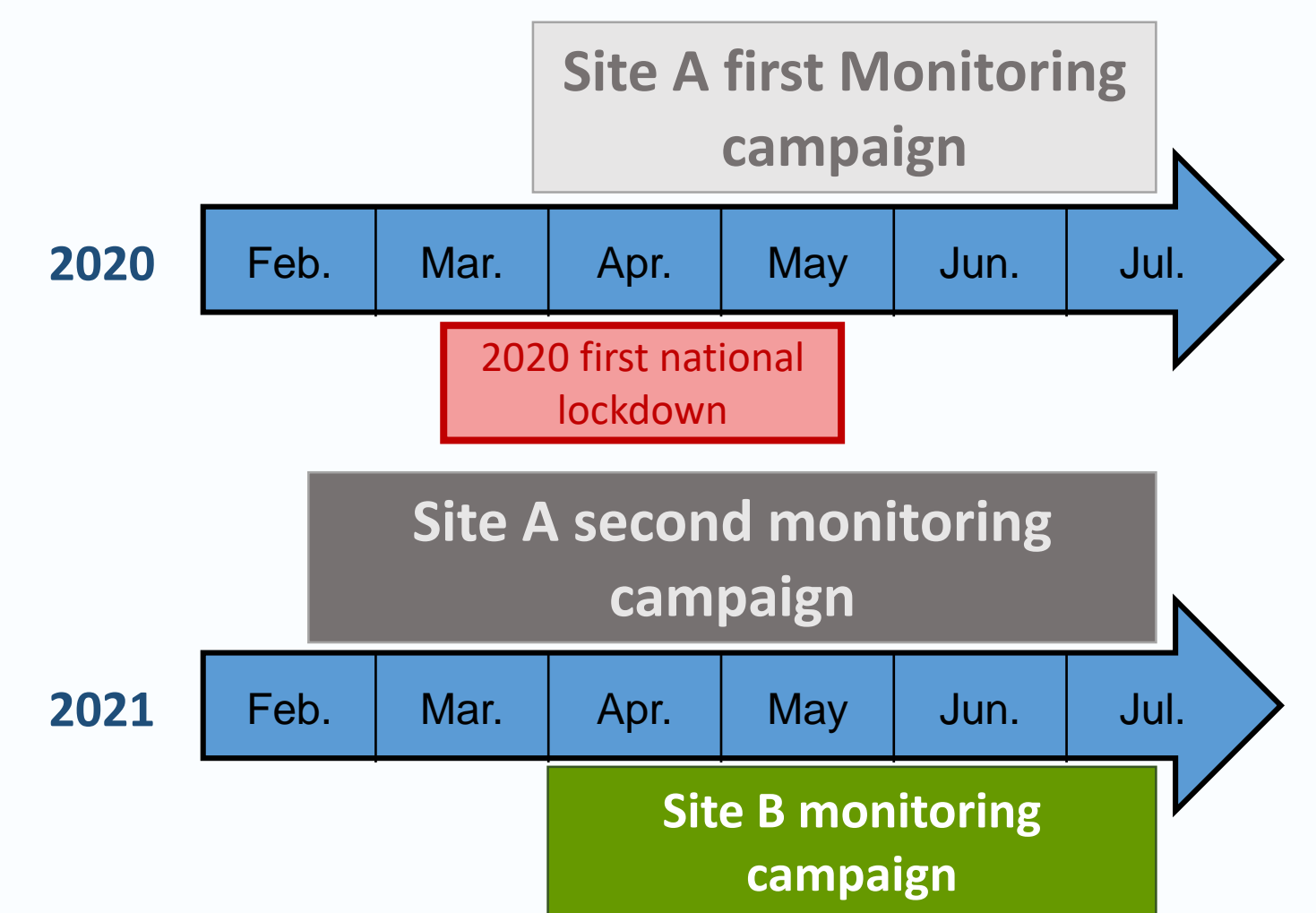
Objectives

- 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

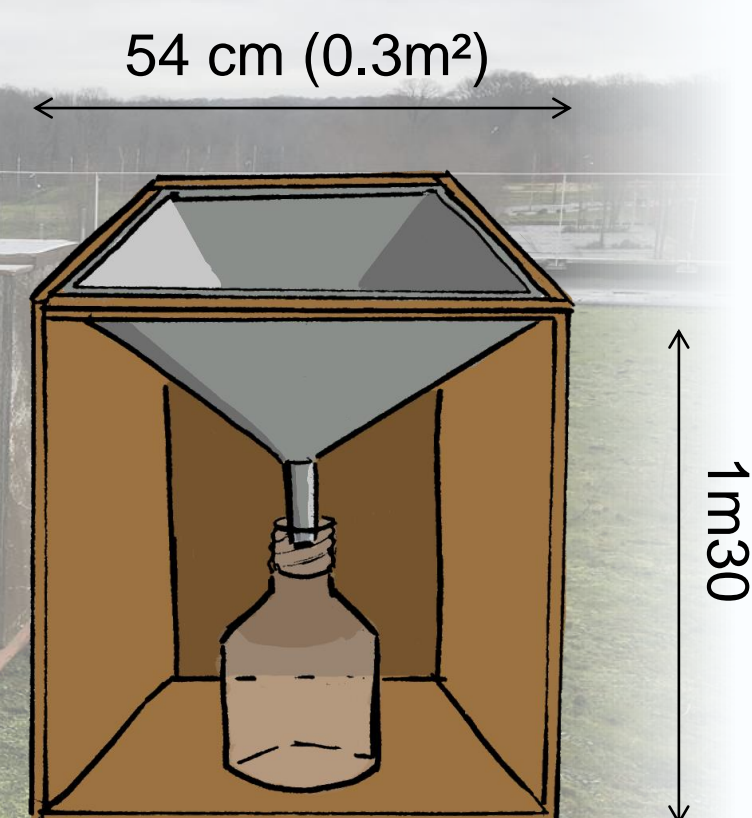


In total:
15 samples in 2020 campaign, suburban site (site A)
21 samples in 2021 campaign, suburban site (site A)
8 samples in agricultural site (site B)

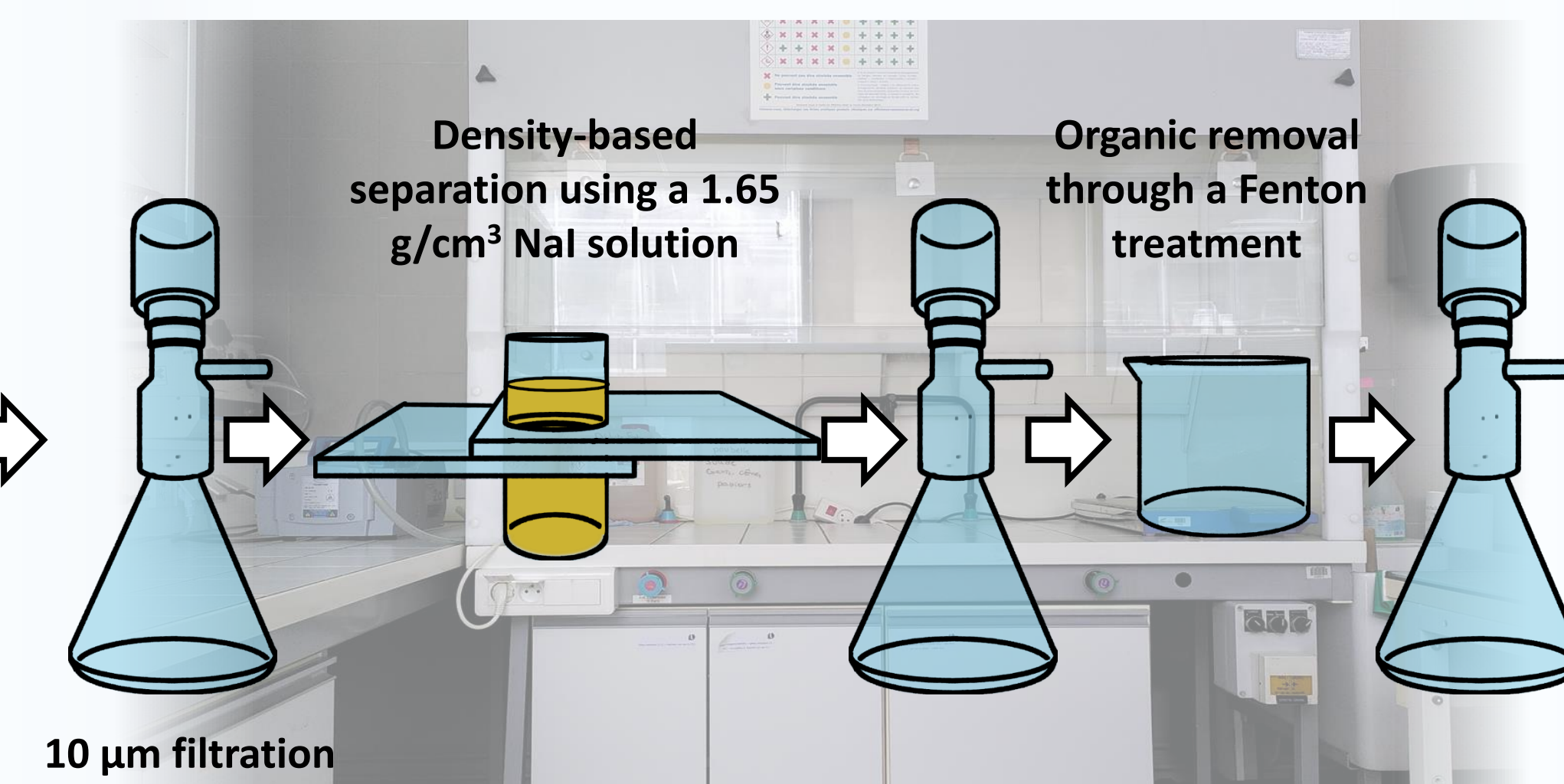


Sampling

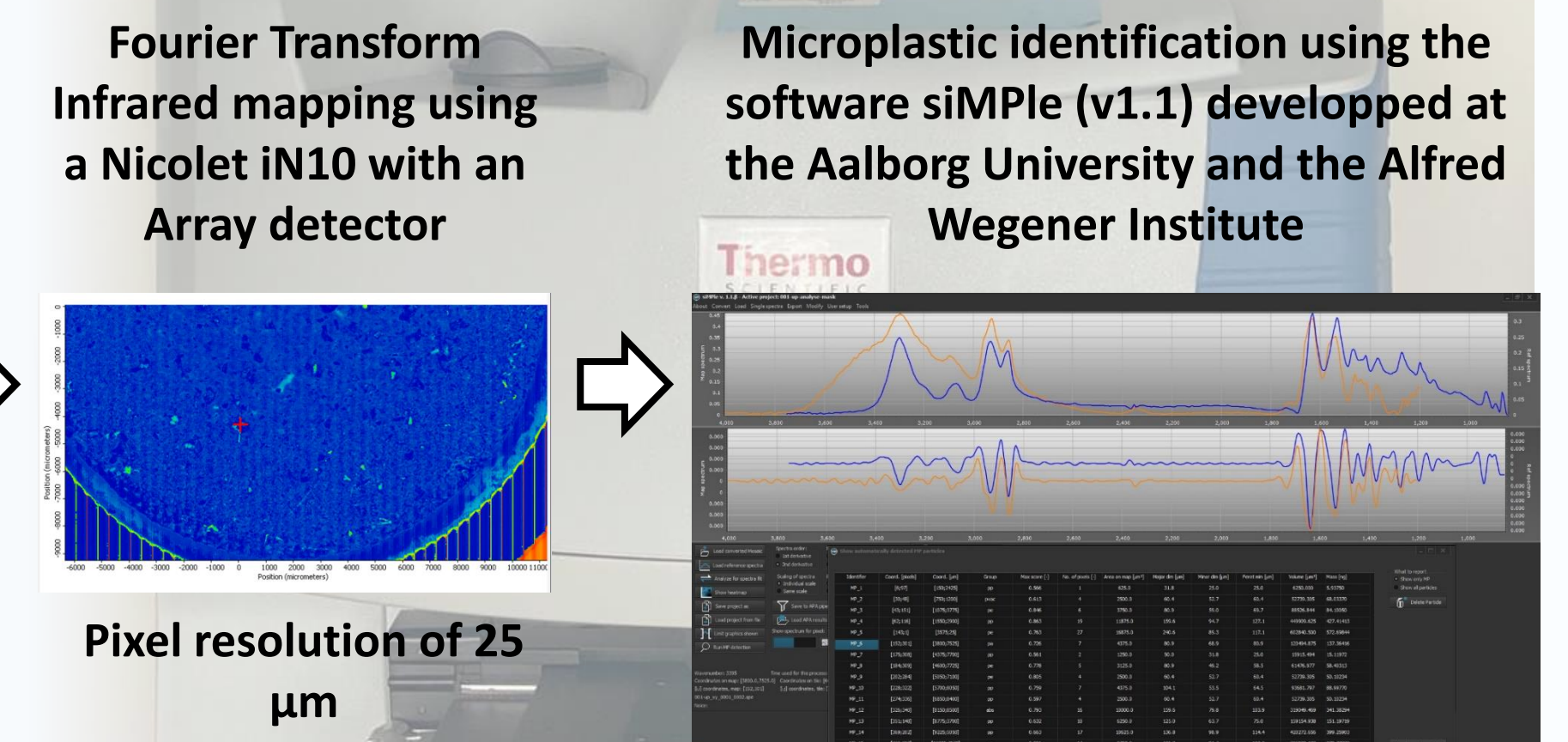
- Passive sampling using a metallic funnel
- Rinsing with filtered water and ethanol
- New samples collected every 4 to 15 days depending on dry spells and rain events



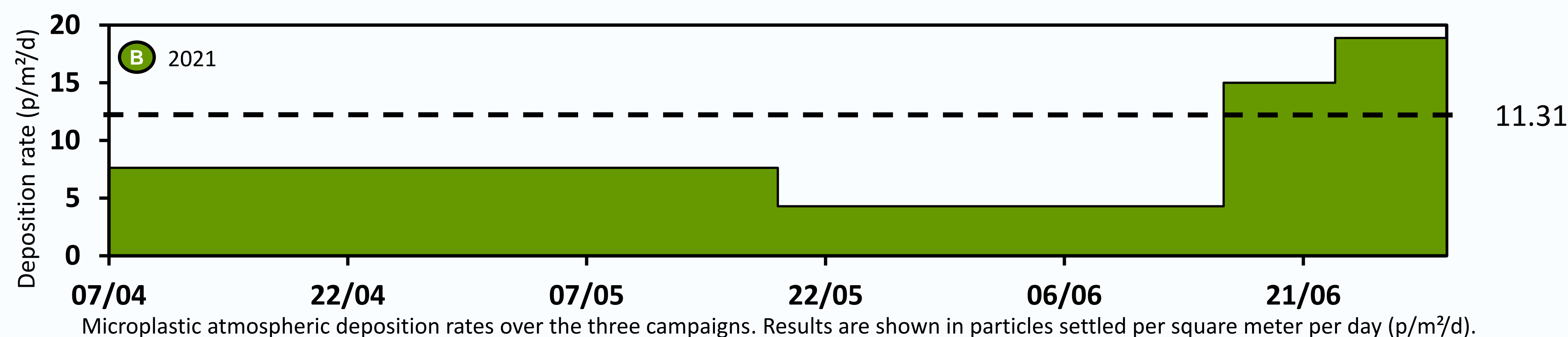
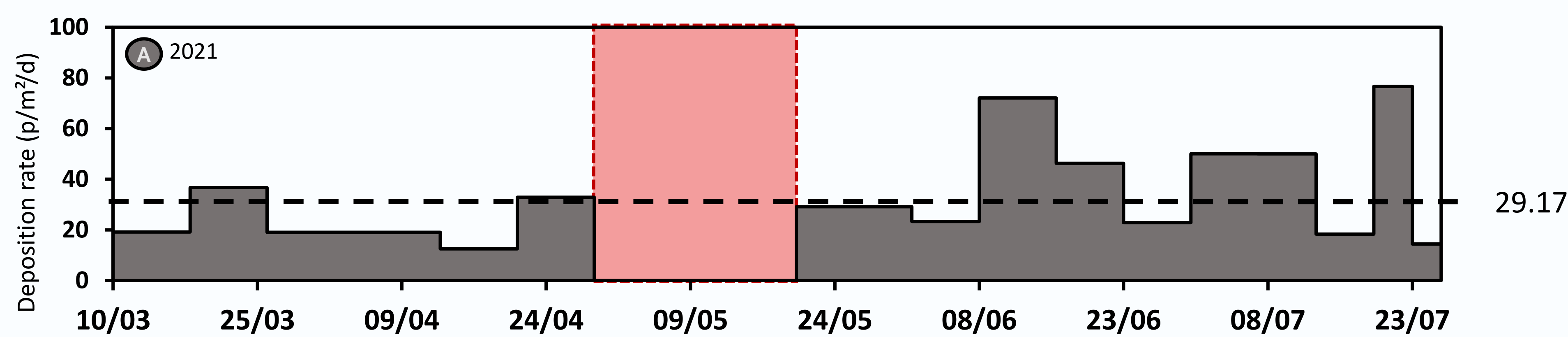
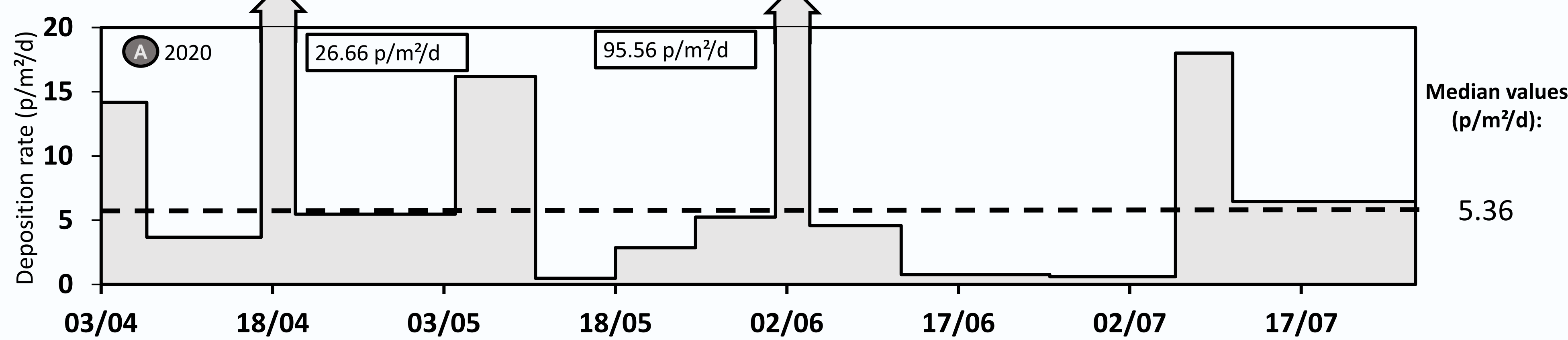
Treatment



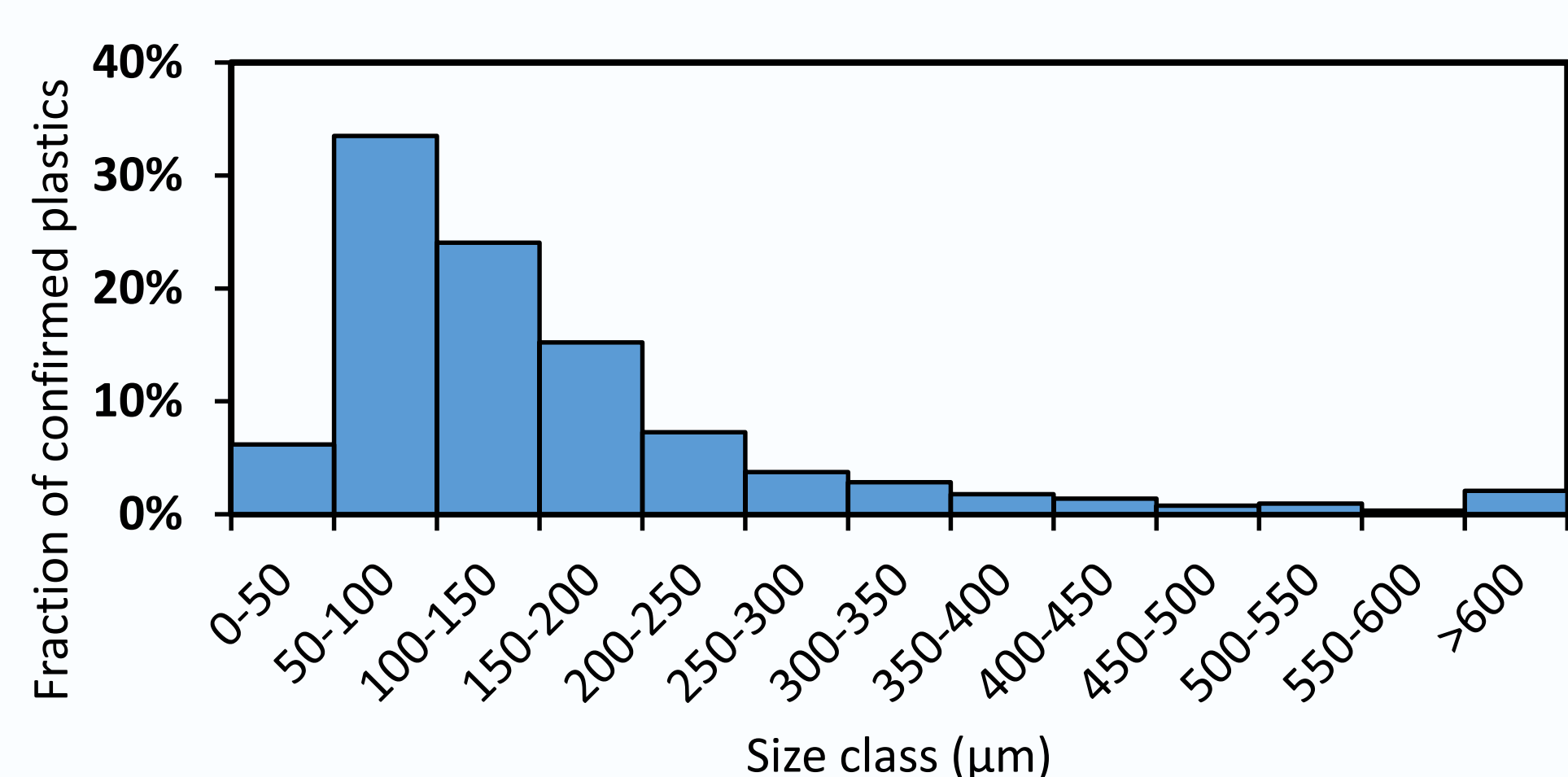
FTIR mapping analysis



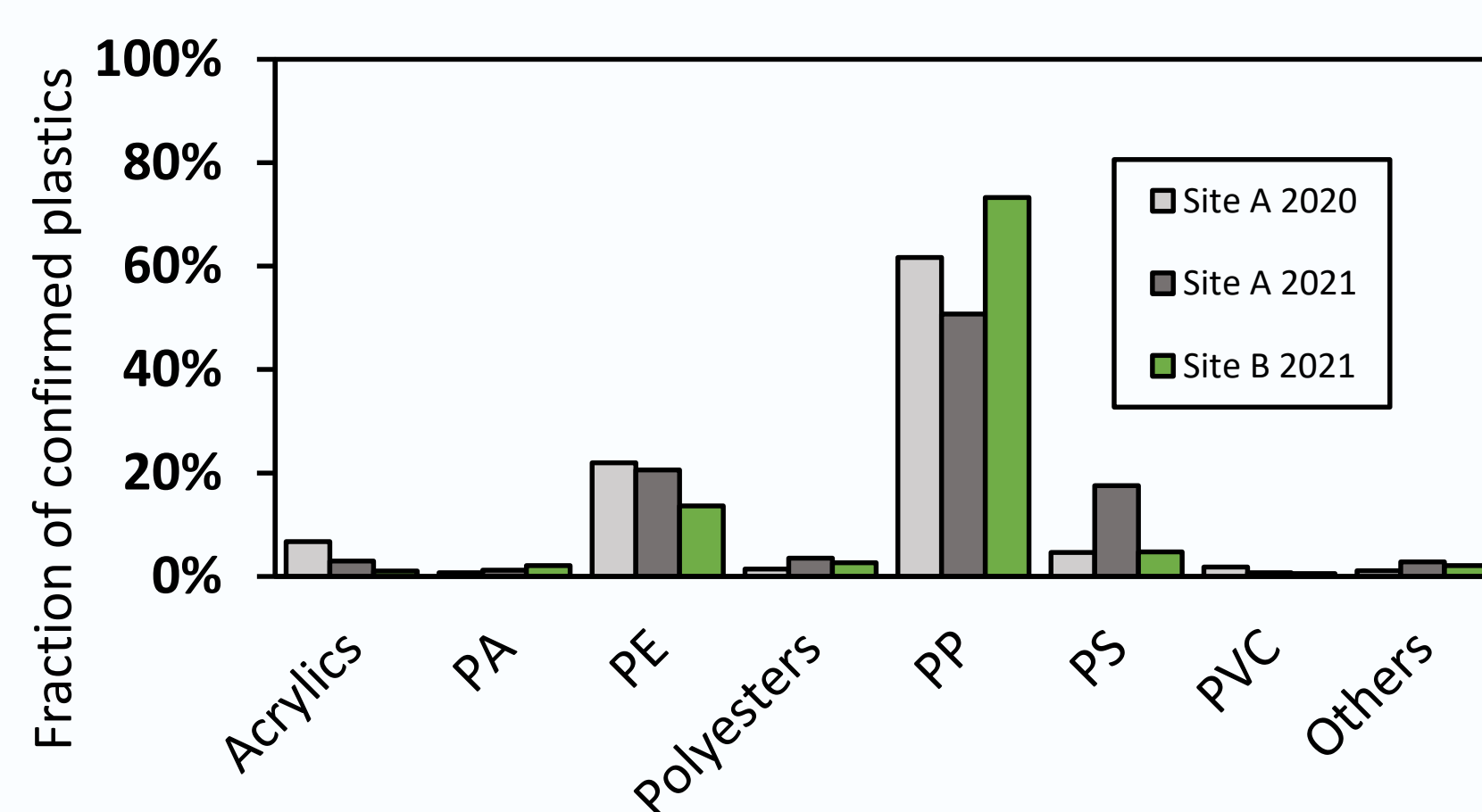
Preliminary results



Microplastic atmospheric deposition rates over the three campaigns. Results are shown in particles settled per square meter per day (p/m²/d).



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.

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- 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.