

Who are you chatting with?

Katharina Müller

What project am I working in?

Behaviour and transport of Microplastic
in disturbed and undisturbed soils – a
project within the CRC 1357
„Microplastics“

Where am I based?

Working Group Ecosystem Research,
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Cologne



Microplastic input in to alluvial meadows of the Rhine river in Cologne, Germany

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Introduction

- Rivers as major pathways for microplastic (MP) [1].
- The Rhine among biggest river system in north-eastern Europe.
- Aim: analyse transport pathways and sedimentation of MP into the alluvial meadows of the Rhine.

Methods

Sampling:

- Sites: north outside of the city and south inside of the city
- Three transects per site (increasing elevation and distance to river)
- Mixture samples per transect for depths 0–5 cm and 5–20 cm.

Sample preparation:

- Separation of coarse and fine fraction via sieving; visual MP sorting for coarse fraction
- Separation of inorganic matter: density separation using ZnCl₂ for fine fraction [2] (<500 µm)
- Separation of organic matter via enzymatic purification [3]

Analysis:

- Coarse fraction: Attenuated total reflection- Infrared Spectroscopy (ATR-IR)
- Fine fraction: Micro - Fourier transform infrared (FTIR) spectroscopy



Primary Microplastic beads found in meadows of Rhine river in Cologne.



Northern sample site "Merkenich-Langel":



Southern sample site "Poller Wiesen":



Challenges

- Sample preparation process very time consuming – amount of samples thus limited
- After enzymatic purification coal remained in samples: further separation undertaken using CaCl₂

Preliminary Results

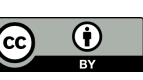
- Variety of polymer types found in samples: PP, PE, PS, PET, ABS, PMMA, PVC, PC, PA, POM, PBT
- Primary MP beads found especially in northern site "Merkenich-Langel"
- Variety of particle shapes found in samples: beads, fibres, fragments, "pixels" (unidentified shape)

Outlook

- Quantitative results from spectroscopy will be included
- New questions arise: why is the concentration of primary MP beads especially high in the northern sample site?

Acknowledgments

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References

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- [2] J. N. Müller, M. G. J. Löder, and C. Laforsch. "Finding Microplastics in Soils: A Review of Analytical Methods". In: *Environmental science & technology* 54.4 (2020), pp. 2078–2090. DOI: 10.1021/acs.est.9b04618.
- [3] M. G. J. Löder, H. K. Imhof, M. Ladehoff, L. A. Löschel, C. Lorenz, S. Mintenig, S. Piehl, S. Primpke, I. Schrank, C. Laforsch, and G. Gerdts. "Enzymatic Purification of Microplastics in Environmental Samples". In: *Environmental science & technology* 51.24 (2017), pp. 14283–14292. DOI: 10.1021/acs.est.7b03065.