





# Abundance and distribution of microplastics in water and sediments of the river Elbe, Germany

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### Goal of this study

- quantify microplastic abundance in water and sediments along the German part of the River Elbe (11 sampling sites)
- better understand sinks and transport mechanism of microplastics



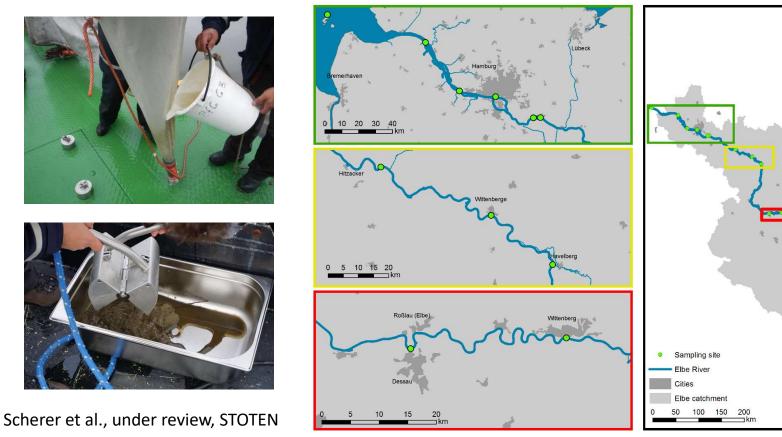






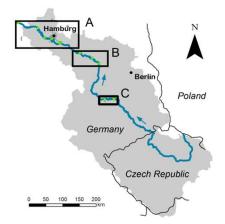
#### Methods

- Sediments: density separation (zinc chloride, Munich Plastic Sediment Separator) followed by organic digestion (10:1 mixture of 30 % H<sub>2</sub>O<sub>2</sub> and 10 % H<sub>2</sub>SO<sub>4</sub>, 5 d, 55°C)
- Water samples (150 μm net): organic digestion (KOH and H<sub>2</sub>O<sub>2</sub>) and density separation (potassium formate)
- Analysis with FTIR (particles >500  $\mu$ m) and pyrolysis GC-MC (entire filters)

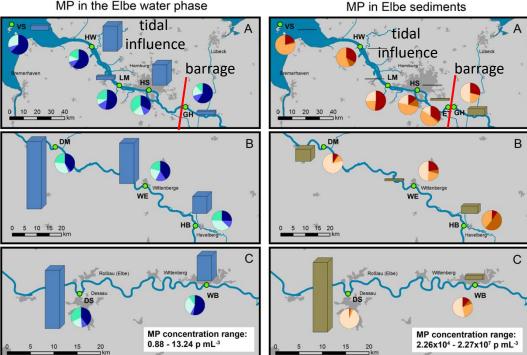




## **Results**



MP in the Elbe water phase



Cities

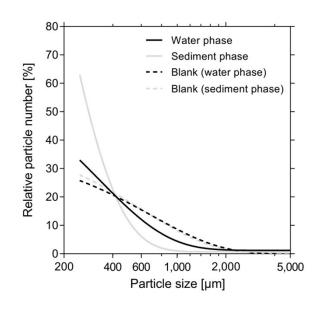
Particle abundance (MP m-3

15 x 10

- 10 x 1

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- more microplastics in sediments •  $(2.26 \times 10^{4} - 2.27 \times 10^{7} \text{ p/m}^{3})$  than in the water phase (0.88-13.24 p/m<sup>3</sup>)
- lower abundance in the tidal influenced • area (ET to VS)
- size: increase exponentially with • decreasing particle size
- Dessau (DS): 93 % spheres probably • from industry in the environs

Scherer et al., under review, STOTEN



Results





**Pyrolysis GC-MS** 

(sediments 125-5000 µm) Water phase 60 **PE** (47.5 %) PP PS Unknown PE а (45.0 %) (2.5 %) (5.0 %) PP 50 PS MP concentration [g m<sup>-3</sup>] 40 < 0 % 20 % 40 % 60 % 80 % 100 % 30-20 تے Г ٦ ABS/PA/PET/PMMA Unknown PE PP PS PVC (29.3 %) 10 (34.4 %) (12.5 %) (18.5 %) (3.4 %) (2 %) Sediment phase 0-NO DS HO NE ON GH ET HS IN 5 44 Lower Elbe Outer Middle Elbe Elbe fibre foil particles fragment sphere

#### FTIR, all particles >500 μm

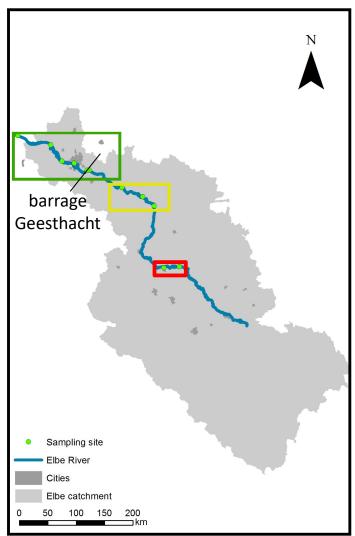
Scherer et al., under review, STOTEN



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## **Discussion and conclusion**



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- abundance of microplastics is site dependent
- in general: lower abundance in the tidal influenced area and downstream a barrage
- more microplastics in sediments than in water
- Higher microplastic abundance in more densely populated areas and close to industry (Dessau 93% spheres)
- Polymers esp. Polyethylene (PE), Polypropylene (PP) and Polystyrene (PS)
- higher diversity of polymers in sediments

