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First evidence of retrospective findings of microplastics in harbour porpoises (*Phocoena phocoena*) from German Waters

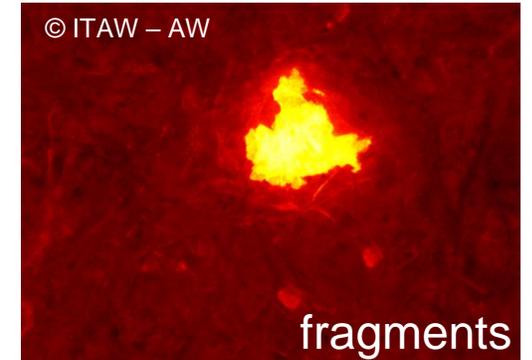
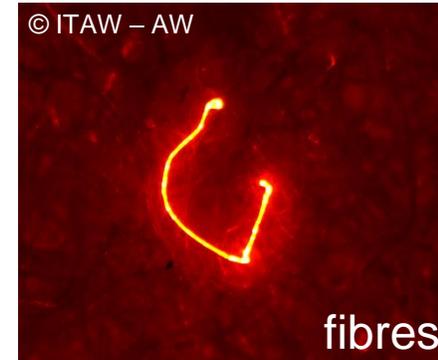
C. Philipp, B. Unger, S. Ehlers,
J. Koop, U. Siebert



Introduction

Microplastics (MPs)

- <5 mm
- fibres & fragments
- **primary MPs**
 - extra synthesised & manufactured for different industries
- **secondary MPs**
 - larger plastic items break down to small pieces (e.g. UV light, physical forces)



Current Knowledge in Microplastic Occurrence in Marine Mammals

- **North Sea**

- Netherlands:
 - harbour porpoises, >1 mm
 - harbour seals, > 300 µm
- Great Britain: var. of species, > 35 µm

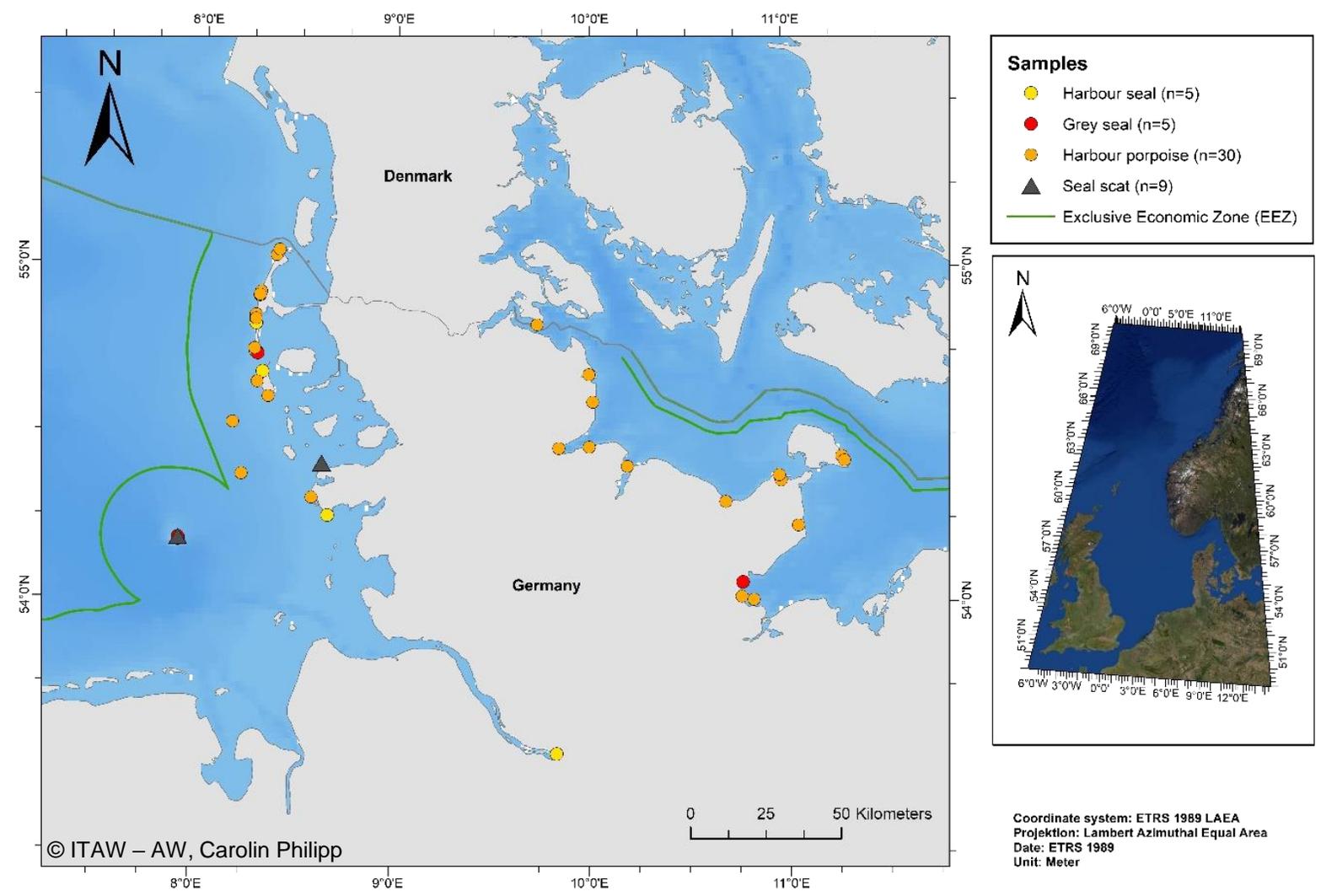
- **Baltic Sea**

- no study investigates microplastic occurrence in marine mammals

- **first time:** investigation gastrointestinal tract (GIT) samples of marine mammals **from German waters** (North Sea and Baltic Sea)
- since marine mammals are highly mobile, **results could be compared** with other studies from the North Sea (North Atlantic Area)
- links between **microplastic exposure & health status** are scarce

[Bravo Rebolledo et al. 2013; Hernandez-Milian et al. 2019; van Franeker et al. 2018; Nelms et al. 2019]

Survey Area



Sample Collection

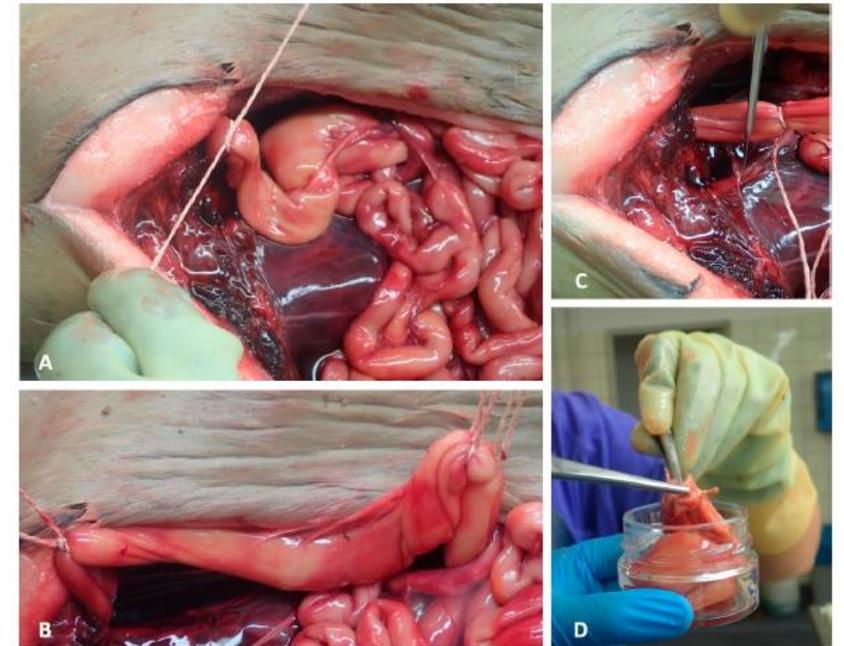
Article

Handle with Care—Microplastic Particles in Intestine Samples of Seals from German Waters

Carolin Philipp¹, Bianca Unger¹, Elke K. Fischer², Joseph G. Schnitzler¹ and Ursula Siebert^{1,*}



- **Samples:** collected since 2014
 - **intestinal** samples (incl. faeces) of all three species
 - during regularly conducted necropsies
 - stored in glass jars at -20°C



Philipp et al. 2020

Sample Collection

 sustainability 

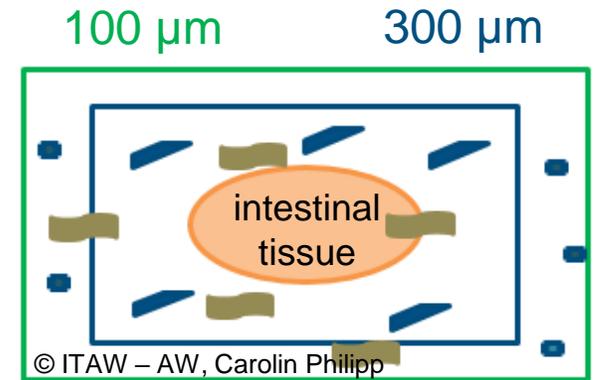
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focussing on MPs ≥ 100 µm

- **Samples:** collected since 2014
 - **intestinal** samples (incl. faeces) of all three species
 - during regularly conducted necropsies
 - stored in glass jars at -20°C
- **Purification:**
 - samples are sewed into a double-layer washing bags
 - washing machine (enzyme detergents were added)
 - hard parts + intestinal tissue
 - rinsed into a glass beaker with saturated NaCl solution (density separation)
 - filtered onto cellulose filters



focussing on MPs $\geq 100 \mu\text{m}$

- How to identify microplastic particles?
 - Identification: Nile Red staining + Fluorescence microscopy
 - Polymer identification: μFTIR spectroscopy





Microplastic Burden

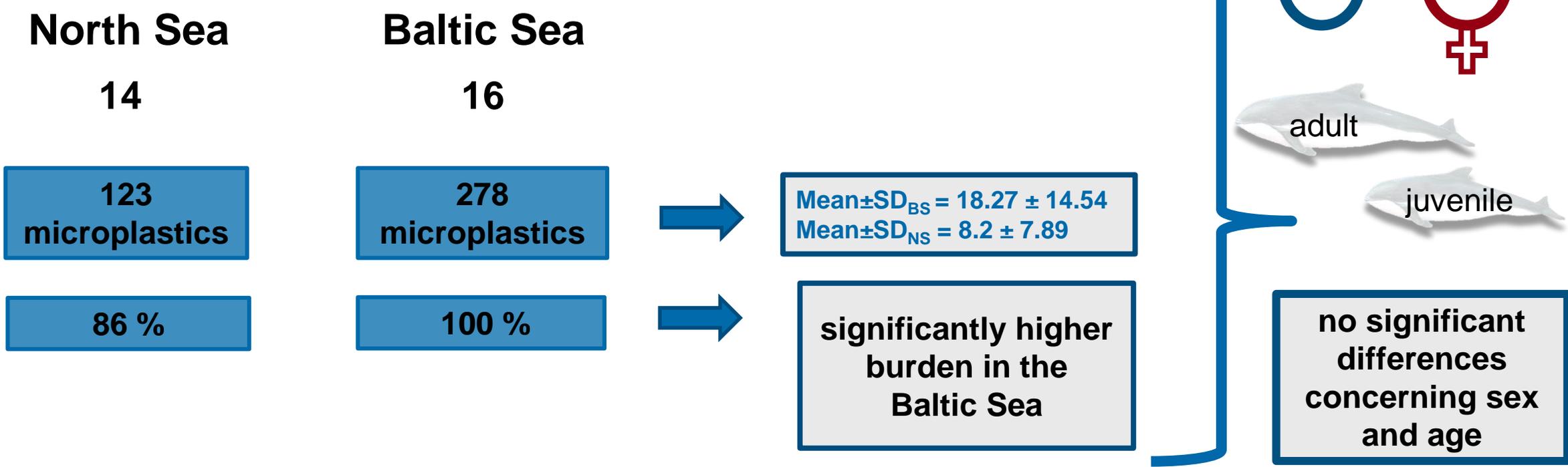
frontiers
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First Evidence of Retrospective Findings of Microplastics in Harbour Porpoises (*Phocoena phocoena*) From German Waters

Carolin Philipp¹, Bianca Unger¹, Sonja M. Ehlers^{2,3}, Jochen H. E. Koop^{2,3} and Ursula Siebert^{1*}





Microplastic Burden: Identified Polymers in the Baltic Sea (μ FTIR)

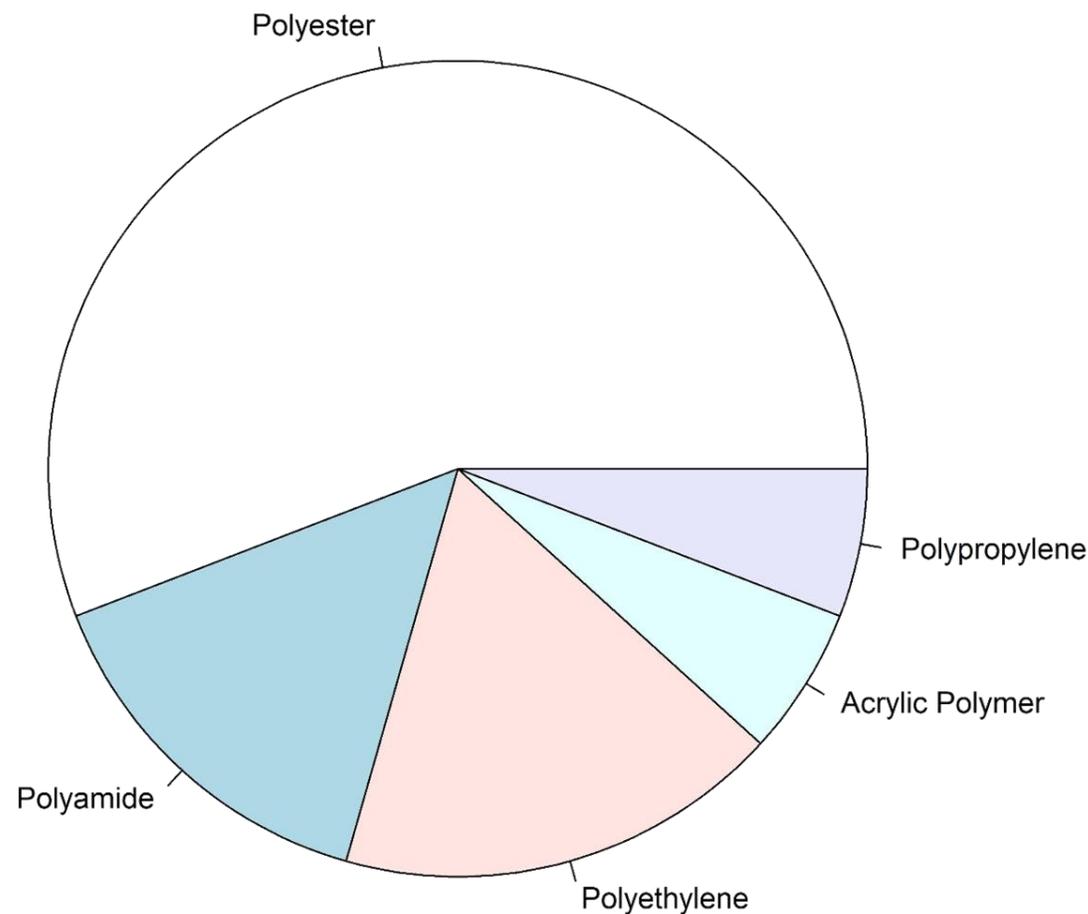
- **Baltic Sea: subset of 34 particles were identified**

Potential sources:

Polyester & Polyamide: lost fibres of washed cloths

Polyethylene & Polypropylene: packaging material

PEST, PE, PA & PP: fishing gear





Conclusions

- **harbour porpoises** of the North Sea & **Baltic Sea** are **exposed to microplastic**
 - a significant higher burden was identified in individuals from the Baltic Sea
 - studies investigating demersal & pelagic fish species coincide with our results
- **no differences between ages & sexes**
 - no accumulation over the lifespan
 - egestion of microplastics is clearly determined
- **first evidence:**
 - **a good nutritional status** is likely joined with a **high quantity of microplastics**
 - healthy individuals feed continuously → **high rate of ingestion/egestion**
 - the **favoured prey / feeding strategy** might play a role

**needs to be
continued in
future studies**

Thank you for your interest and your attention!



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Sonja Ehlers

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Seal Rangers of Schleswig-Holstein for collecting carcasses



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