





# NIVA & HURTIGRUTEN PARTNERSHIP

## BRINGING LIGHT TO THE GAPS IN PLASTIC MARINE LITTER KNOWLEDGE

**VERENA MERALDI, TUDOR MORGAN, BERT VAN BAVEL**





# SINGLE USE PLASTIC BAN





# HYBRID SHIPS





# BEACH CLEAN-UPS

Association of  
Arctic Expedition Cruise  
Operators

**AECO**





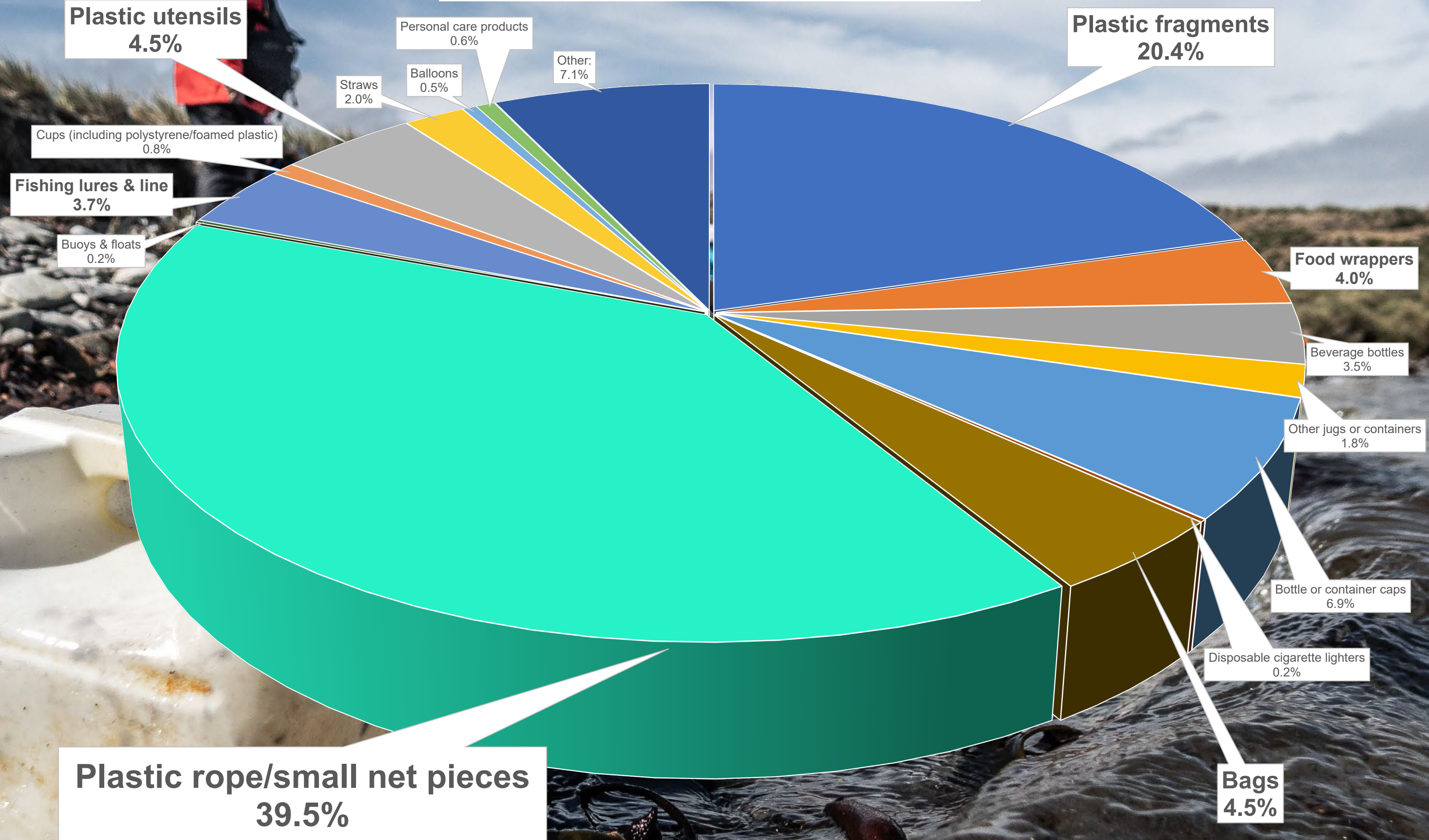
# CITIZEN SCIENCE





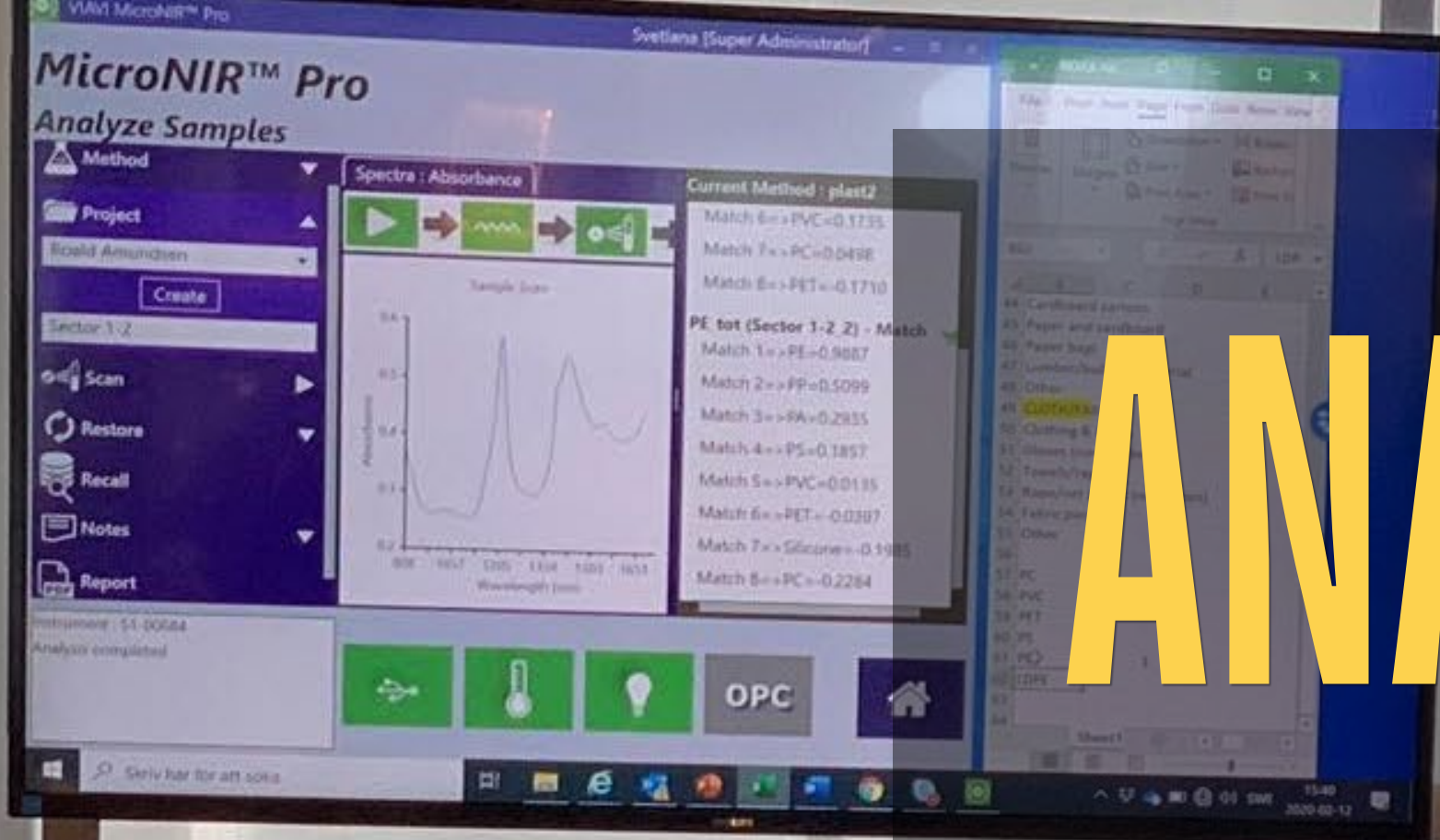
# CARCAS ISLAND, FALKLANDS BEACH CLEANING

Plastic Litter Carcas Island Zone 1





# ANALYSIS WITH GUESTS

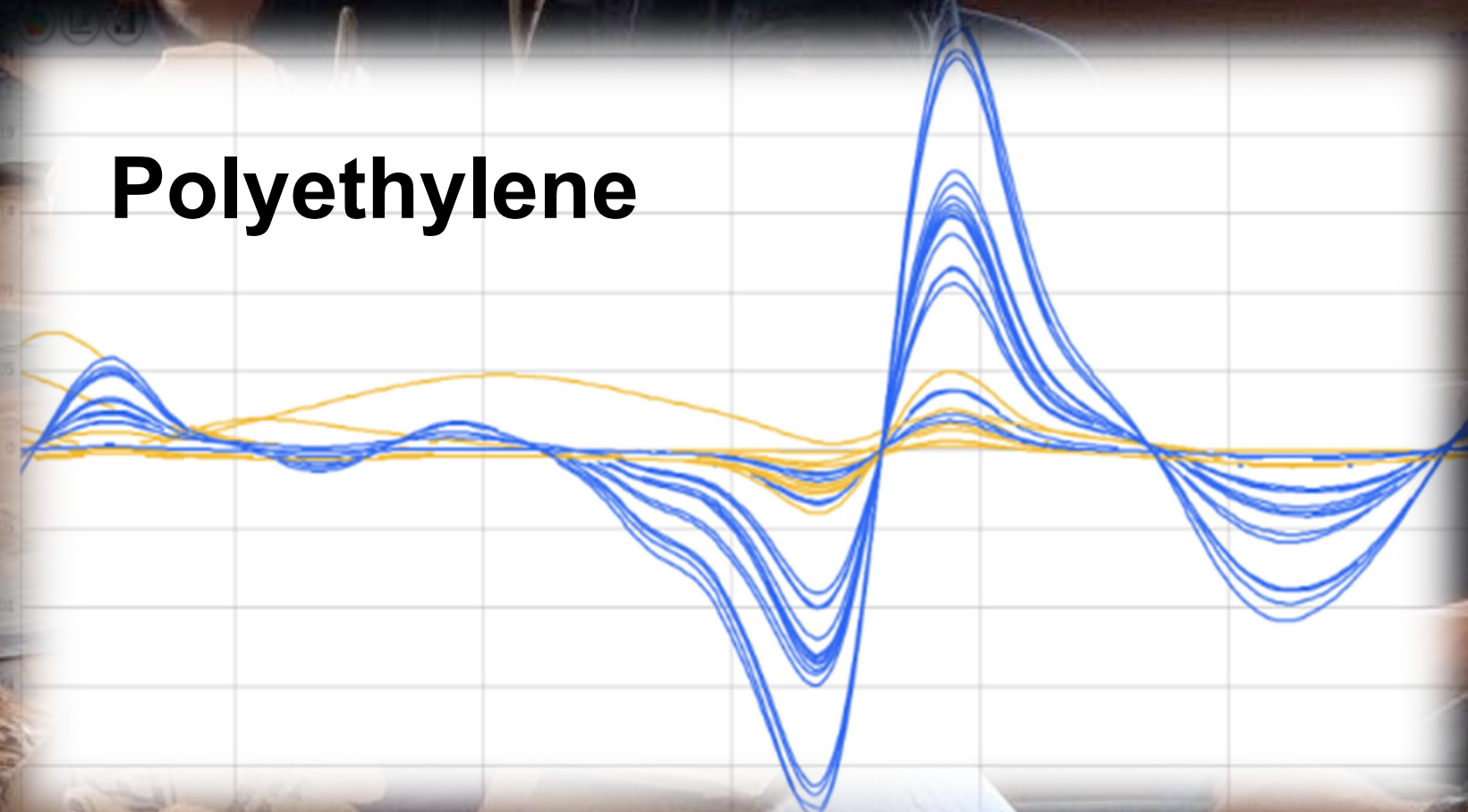




# SMART PHONE NIR SCANNERS



Polyethylene





# A MODERN RESEARCH PLATFORM

## **Modul 6. Console for Ocean Literacy**

Touch screens displaying observational data and ocean related "key stories"

## **Modul x: Towed/hull-mounted observations**

Towed plankton collector (CPR) profiling sensors (XBT), acoustic current meters (ADCP). Ofte 3dje part



## **Modul 7: Metrological and atmospheric observations**

Metrological variables of wind direction and strength

## **Modul 8: Advanced above water observations**

Light sensors, sea surface skin temperature, downwardfacing sensors for Ocean Colour

## **Modul 5. Laboratory**

Ranging from proper labs, small lab benches, to citizen science labs. Used for advanced sensors (Flowcytometry, Nutrients)

## **Modul 0: FerryBox system**

Clean seawater intake, pipes, pumps, computer, electronics, network

## **Modul 1: FerryBox standard sensors**

Inlet temperature, Salinity, temperature, Oxygen

## **Modul 2: FerryBox optical sensors**

Chlorophyll a, cDOM, turbidity, Phycocyanin

## **Modul 3. FerryBox carbon sensors**

pCO<sub>2</sub>, pH, Alkalinity,

## **Modul 4: FerryBox advanced samplers**

Water sampler, microplastics, contaminants, sample filter collector

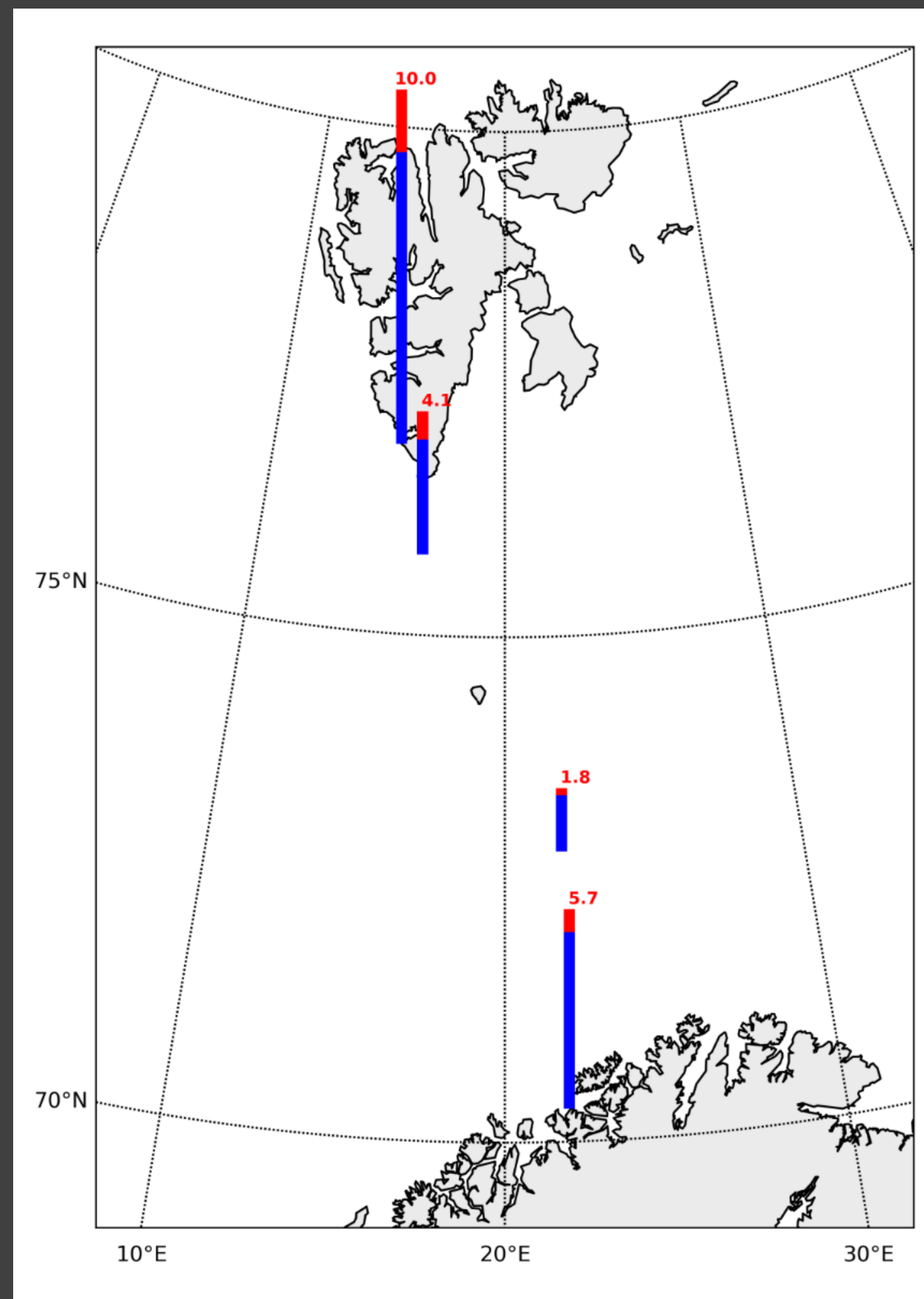


# MICROPLASTIC SAMPLER

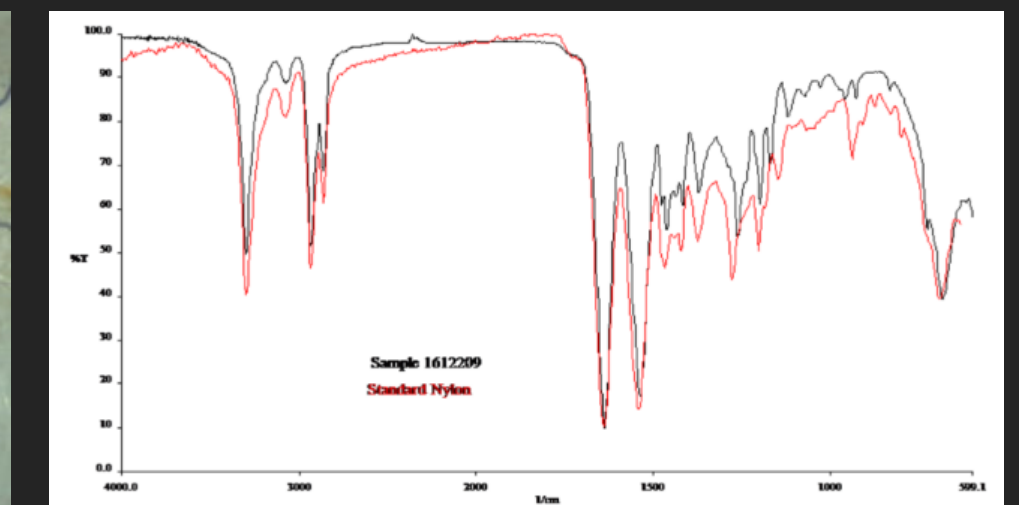
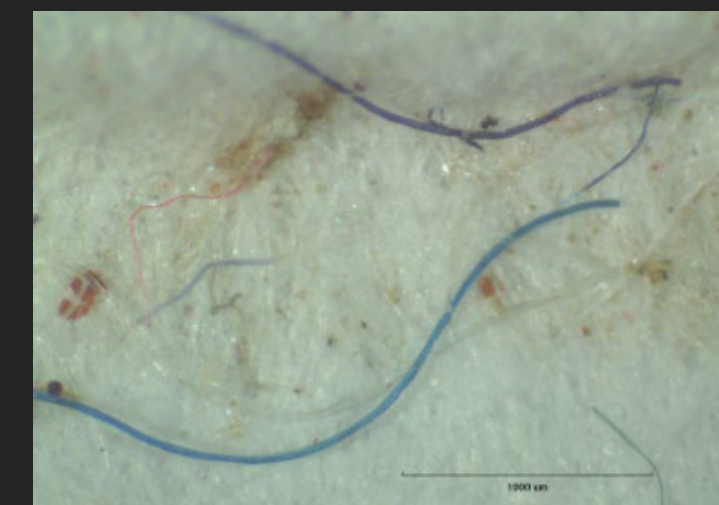




# MICROPLASTIC IN THE ARCTIC

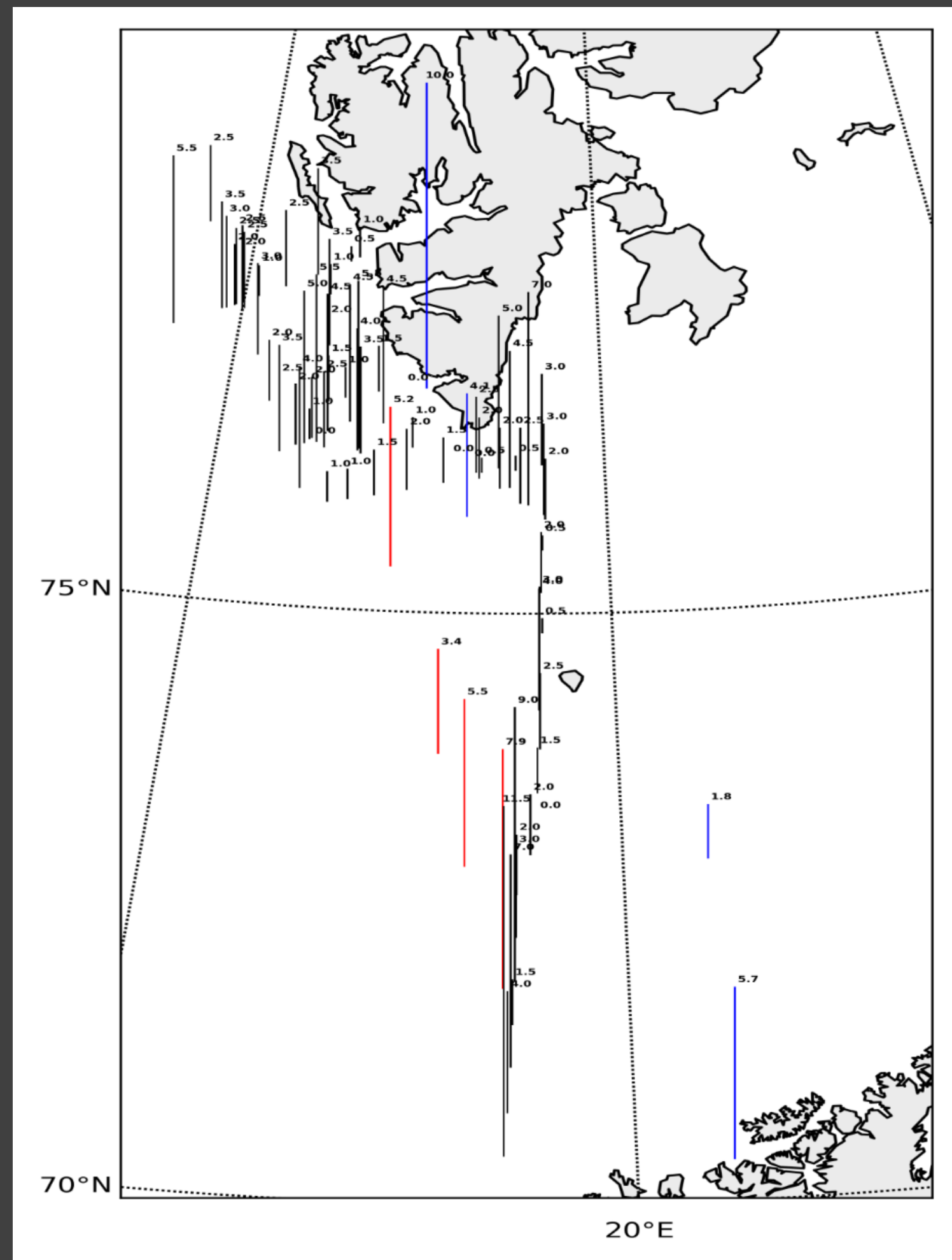


5.4 → **Total number of plastic, 5.4 n/m<sup>3</sup>**  
→ **Fragments 0.9 n/m<sup>3</sup>**  
→ **Fibers 4.5 n/m<sup>3</sup>**





# MICROPLASTIC IN THE ARCTIC



## Total number of plastic, n/m<sup>3</sup>

**Tromsø-Svalbard**  
**Tromsø-Svalbard**

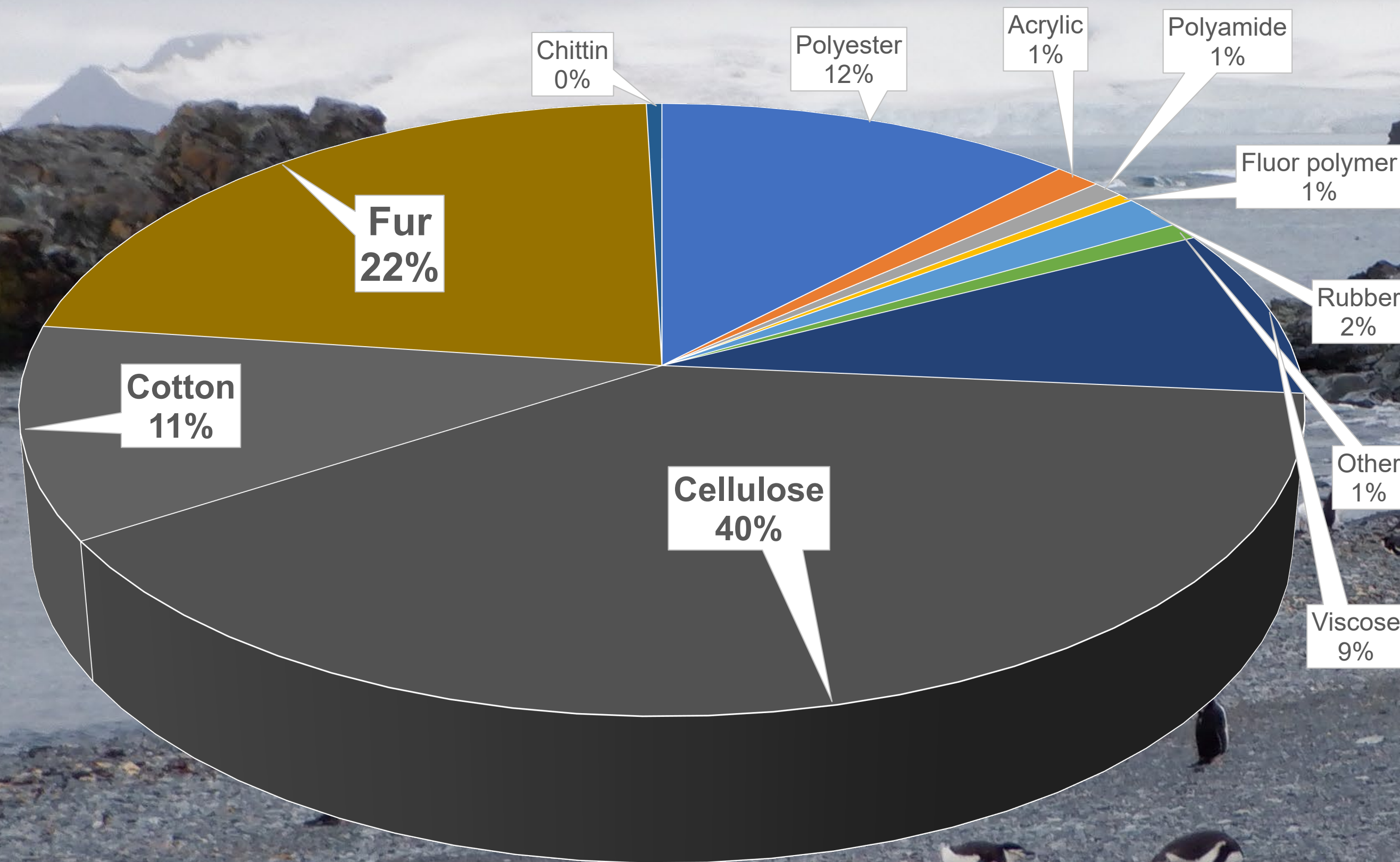
- av 5.4, min 1.8, max 10.0  
- av 5.5, min 3.4, max 7.9

**Research Vessel**  
**(Lusher et al.)**  
**Russian Arctic**

- av 2.7, min 0, max 11.5  
- av 1.6, min 0.2, max 3.6



# MICROPLASTIC IN ANTARCTICA 300-2000 $\mu\text{M}$

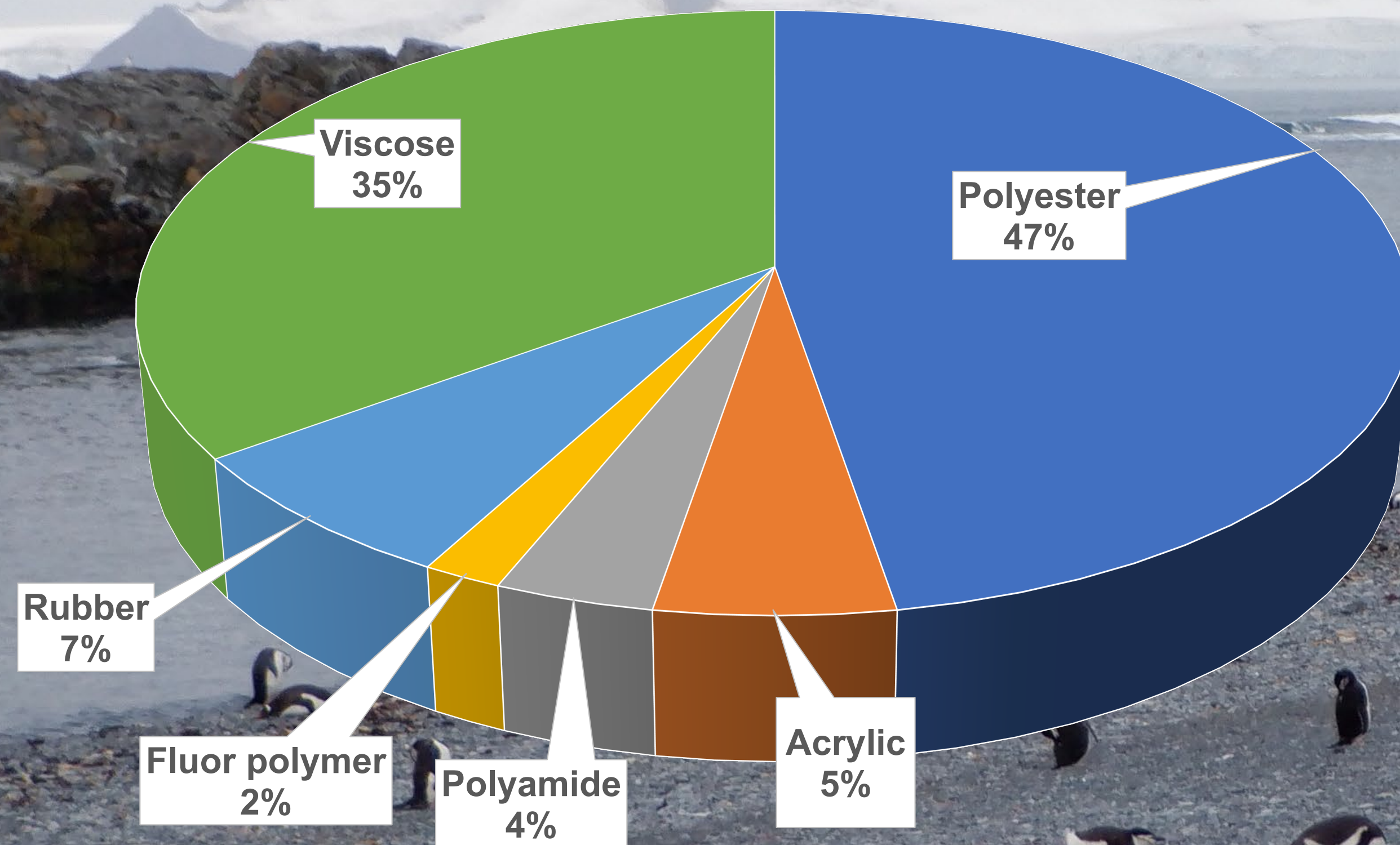


**Most fibers from natural origin**

- Cellulose Based Fibers
- Cotton Fibers
- Biological Fur Fibers



# MICROPLASTIC IN ANTARCTICA



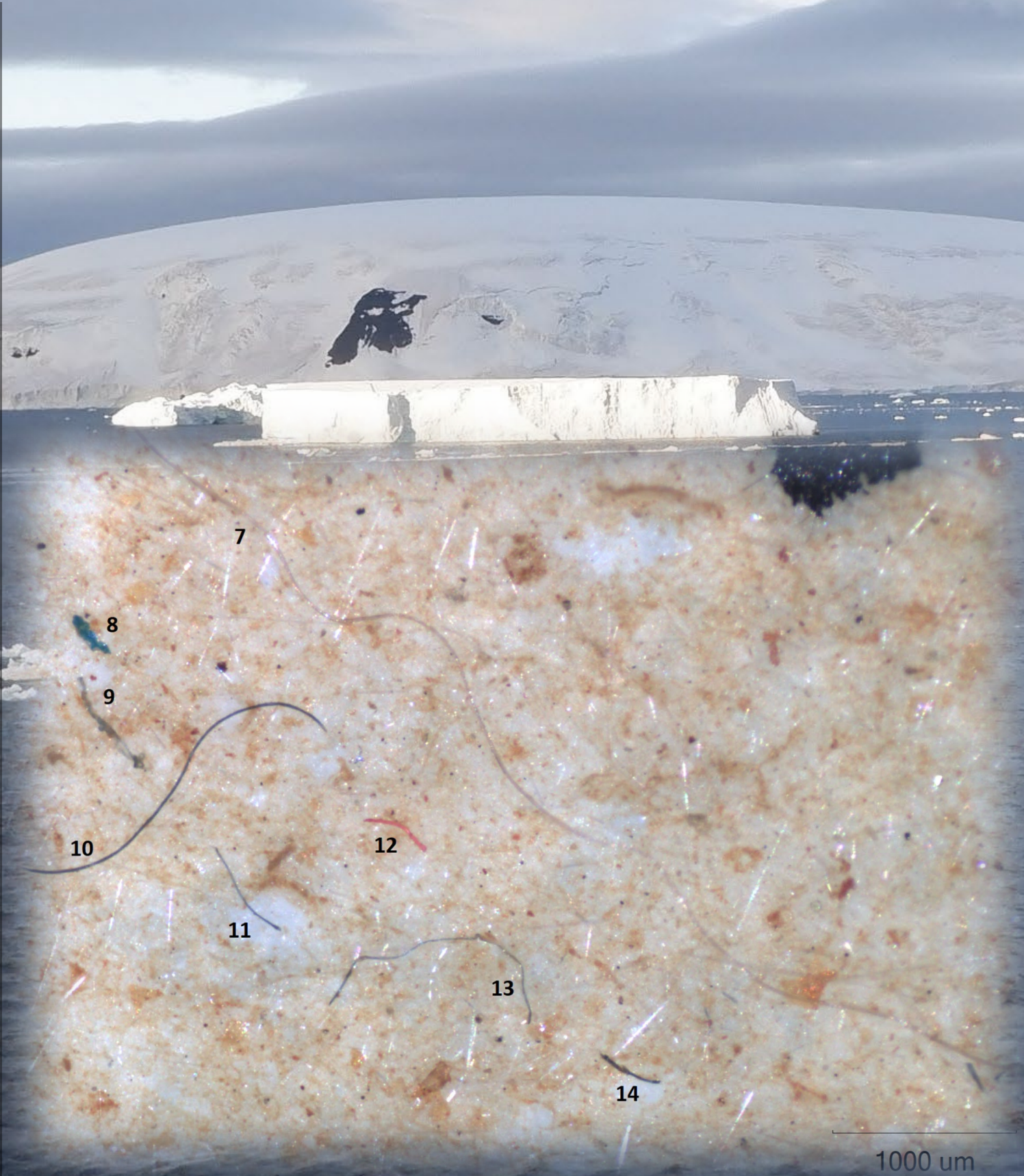
**Plastics**

- Polyester Fibers
- Viscose Fibers
- Rubber particles



# MICROPLASTIC IN ANTARCTICA 300-2000 $\mu\text{M}$

Fibres		
Date	n/m3	
2020-02-08	2.39	
2020-02-07	1.79	
2020-02-06	4.55	
2020-01-11	2.32	
2020-01-06	3.70	
2020-01-01	3.55	
Average	3.05	



Microplastics		
Date	n/m3	
2020-02-08	0.00041	
2020-02-07	0.00041	
2020-02-06	0.00089	
2020-01-11	0.00017	
2020-01-06	0.00077	
2020-01-01	0.00044	
Average	0.00051	