Microplastic Pollution in Ny-Ålesund, Svalbard

Yubo Li

November 22th, 2023

Content

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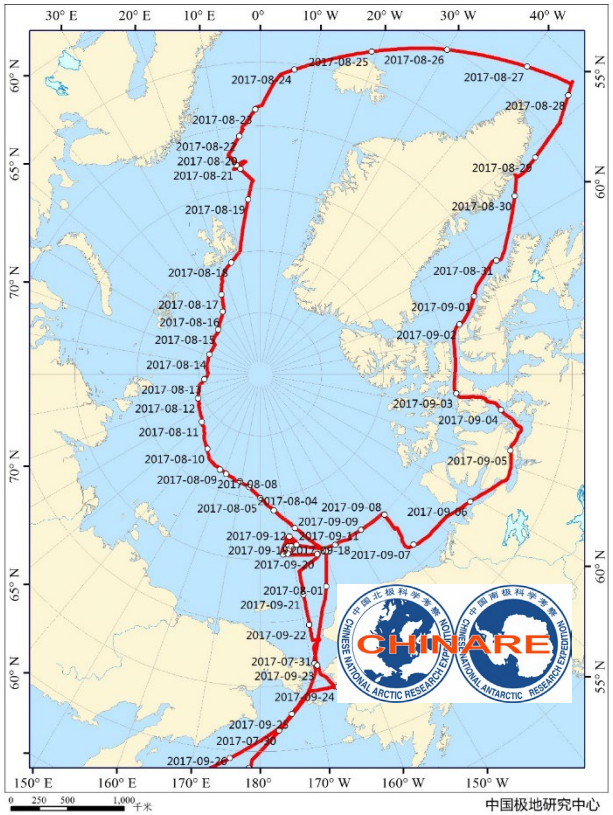
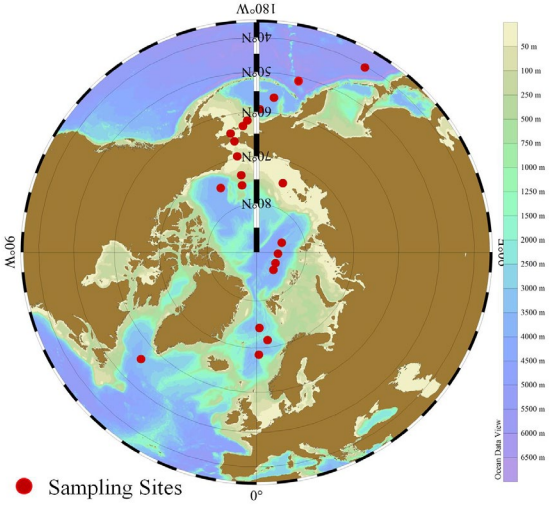
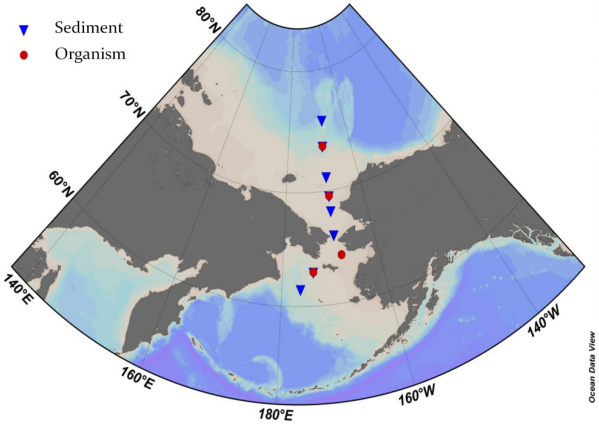
1 Research Background

1 Research Background

China’s MP Research in the Polar Regions







Surface water: 21 sites

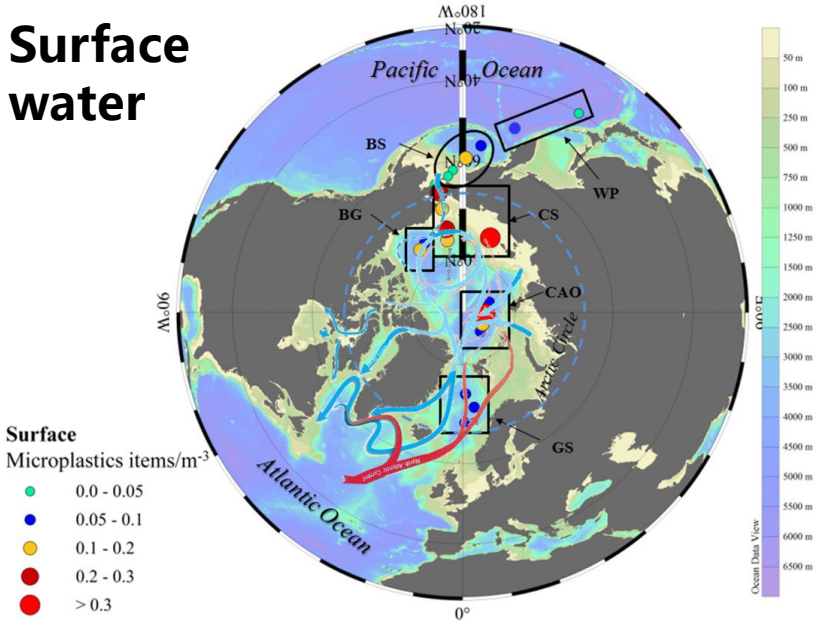
Sediment: 8 sites

Benthic organisms: 4 sites

Cruise of China’s Eighth Arctic Expedition

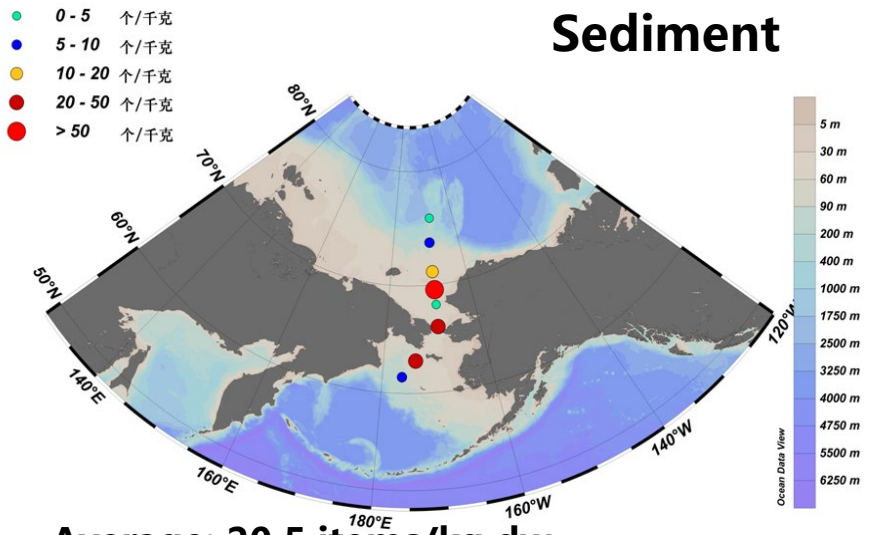
1 Research Background

Surface water



- Highest: 0.31 Items/m^3
- Fibers > 87%
- PET (Polyethylene terephthalate)>76%

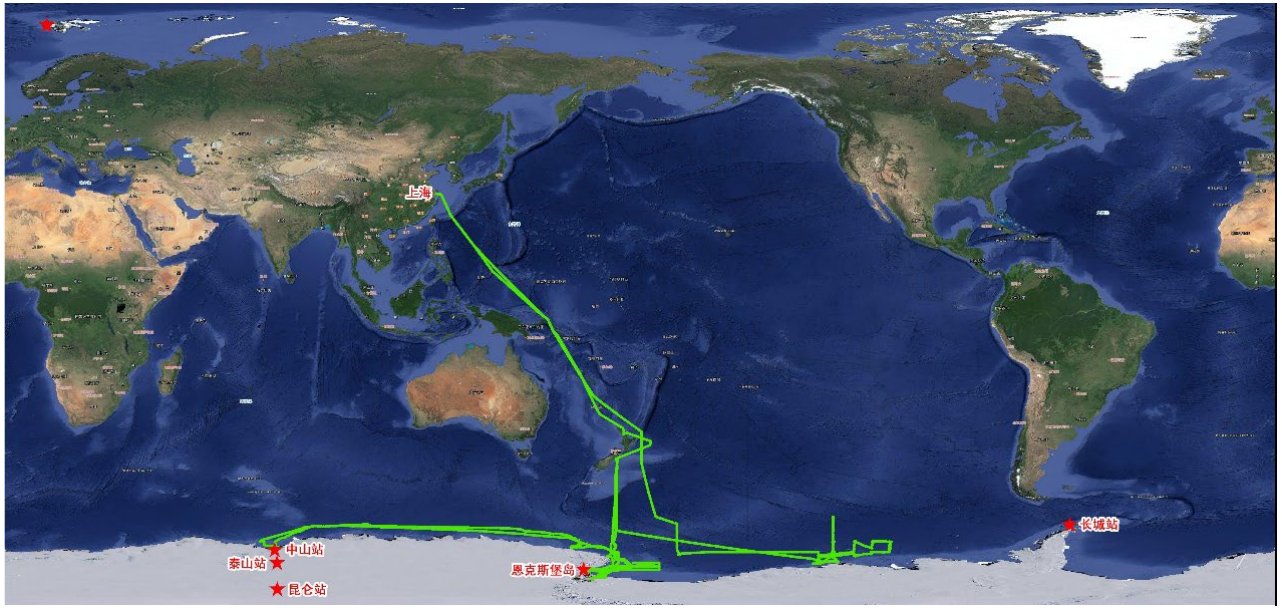
Sediment

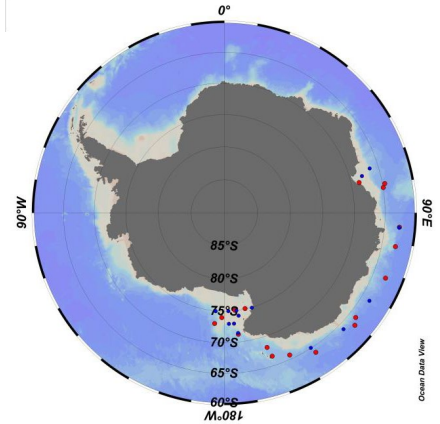


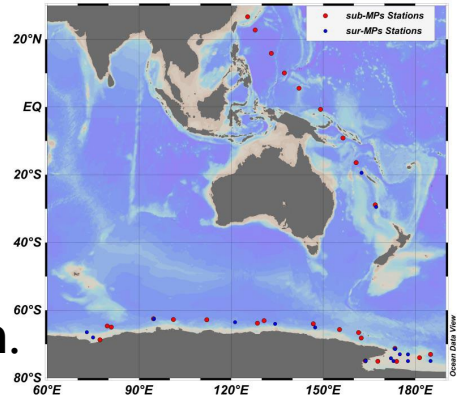
- Average: 20.5 items/kg dw
- Highest: 68.8 items/kg dw
- Fibers > 75%
- PP:56%
- PET:22%
- Cellophane:22%

1 Research Background

Cruise of China’s Antarctica Expedition







Microplastics investigations were mainly conducted in the **Ross Sea**, the **Davis Sea-Prydz Bay** and the **Amundsen Sea**. During the voyage, **14** MP samples were collected from **surface seawater** and **20** from the **subsurface**.

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2 Sampling & Analysis Method

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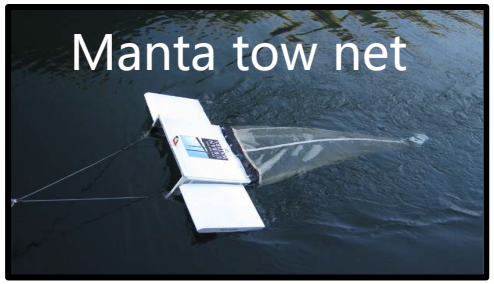
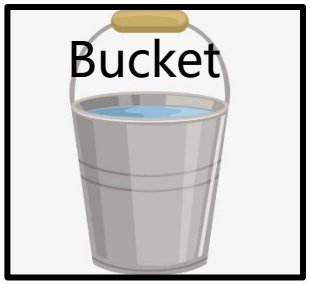
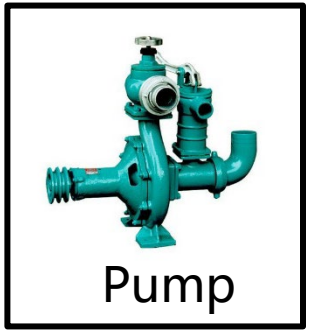
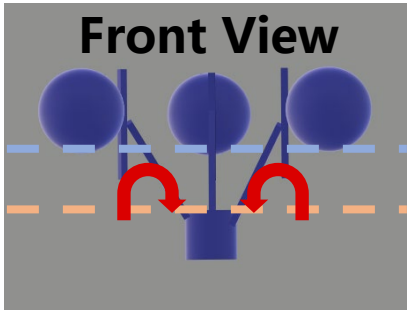
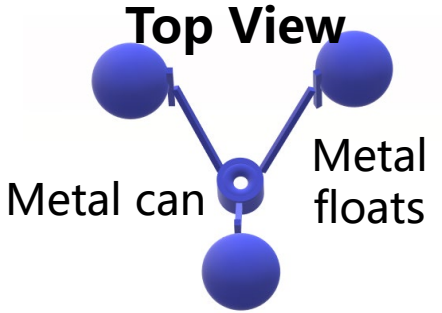










PROBLEMS:

(1) Plastic materials may influence the result;
(2) Many environments don’ t have tow conditions;
(3) Sample volume of the bucket is low, 1-10 L.

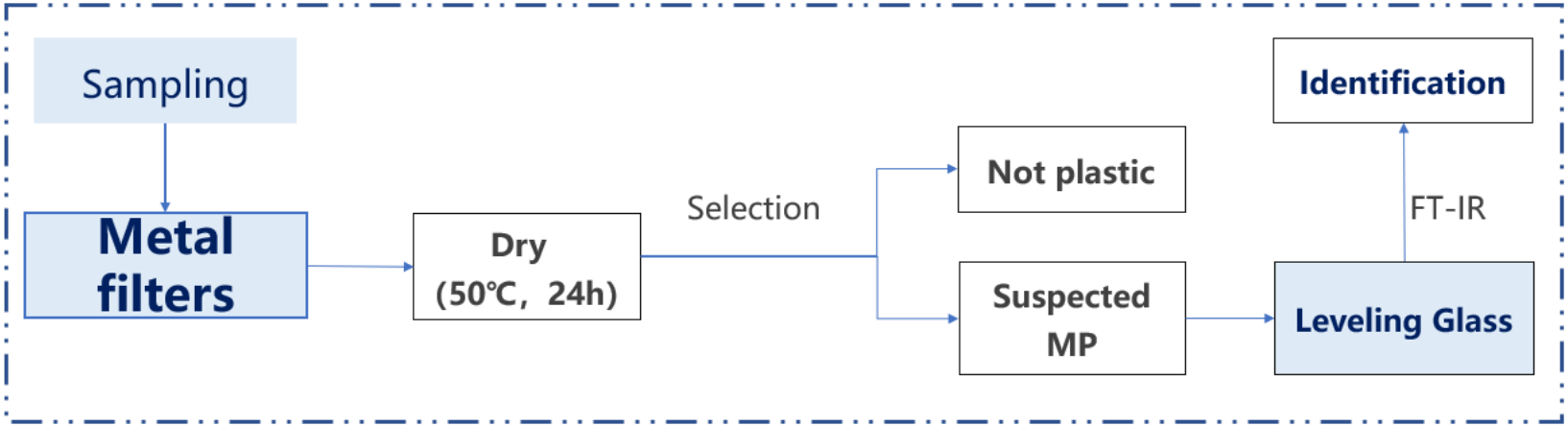
IMPROVEMENTS:

(1) The sampler is made of **metal**;
(2) Can be sampled in **various environments**;
(3) Sample volume can reach **100 L — 1 m³**.

2 Sampling & Analysis Method

Transportation

Analysis



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3 MP in Ny-Ålesund

3 MP in Ny-Ålesund

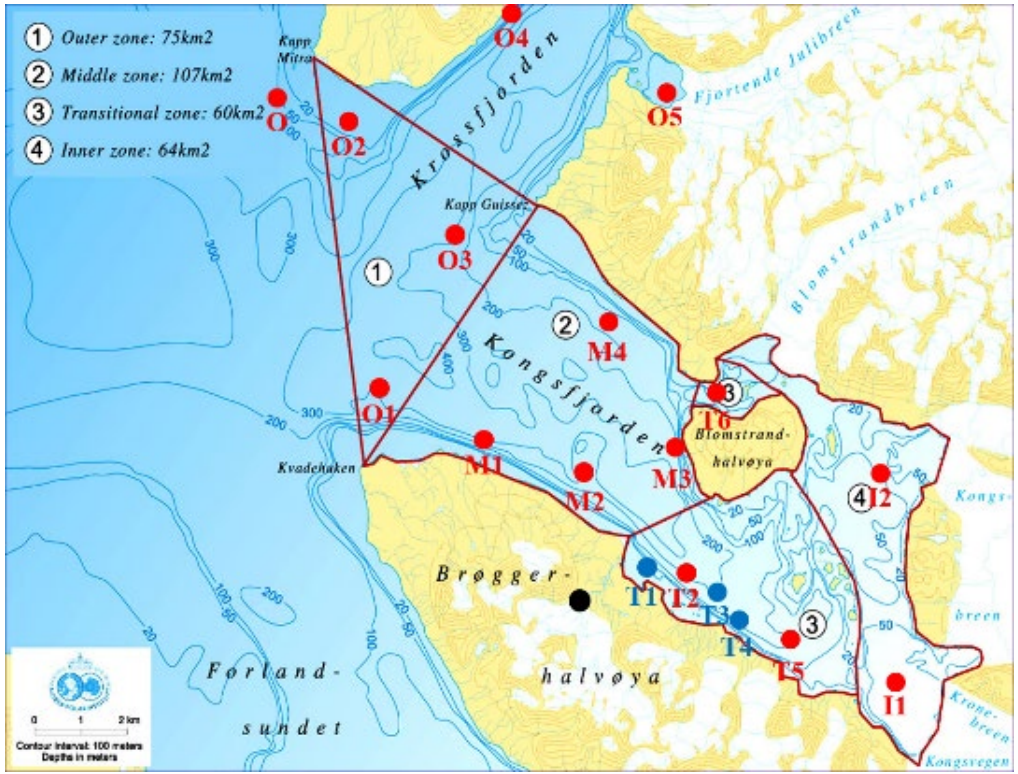
Investigation and Monitoring of Microplastics Pollution in the Fjord of Svalbard Island, Arctic

(Sino-Norway International Cooperation)

June 10-21th, 2019

- To explore the current status of **MP pollution in Ny-Ålesund**, we carried out MP sampling, in-situ continuous extraction and flotation/filtration separation of MP in surface water.

3 MP in Ny-Ålesund

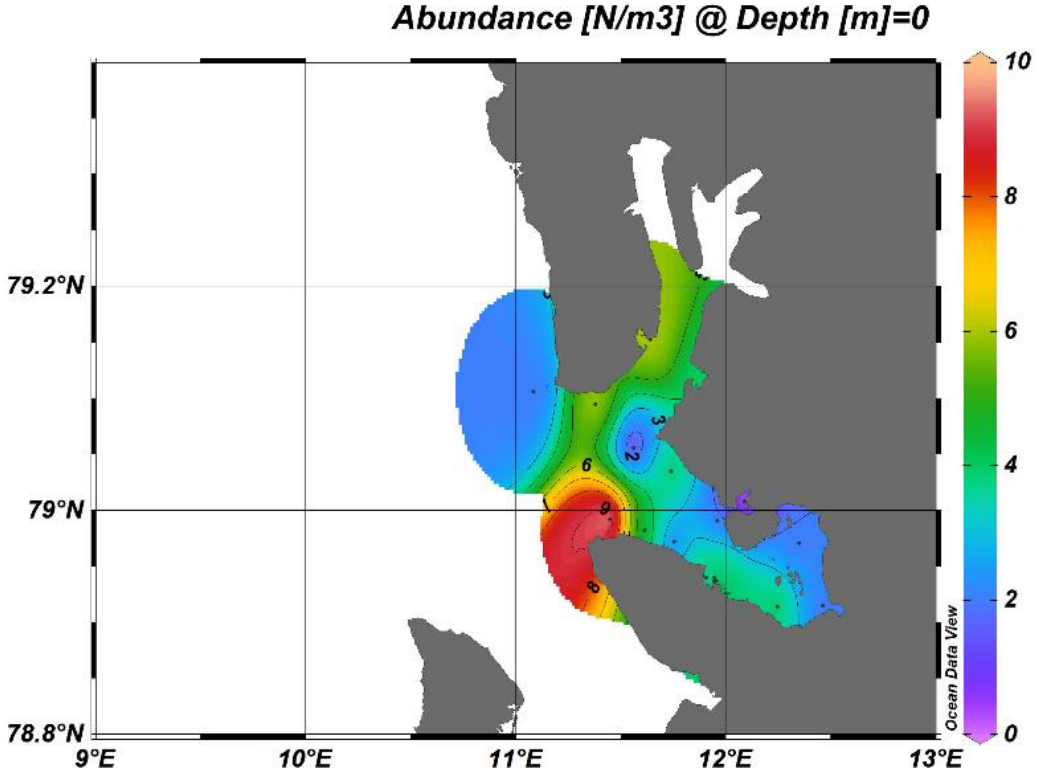


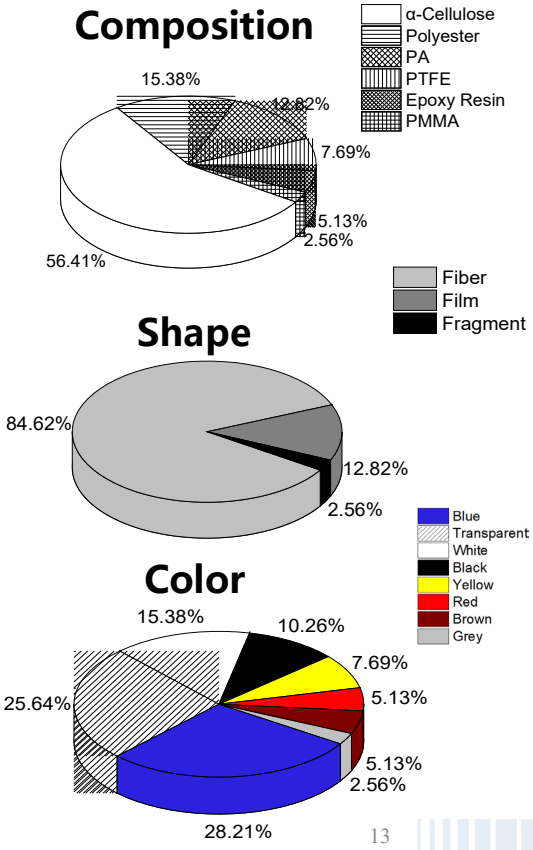
Sampling Area:

- Coastal surface seawater
- Sewage outlet of Ny-Ålesund Research Station
- Surface seawater of the Kongsfjorden conventional station
- Other main glacial meltwater rivers around the Kongsfjorden

3 MP in Ny-Ålesund

The abundance, composition, shape and color characteristics of MP



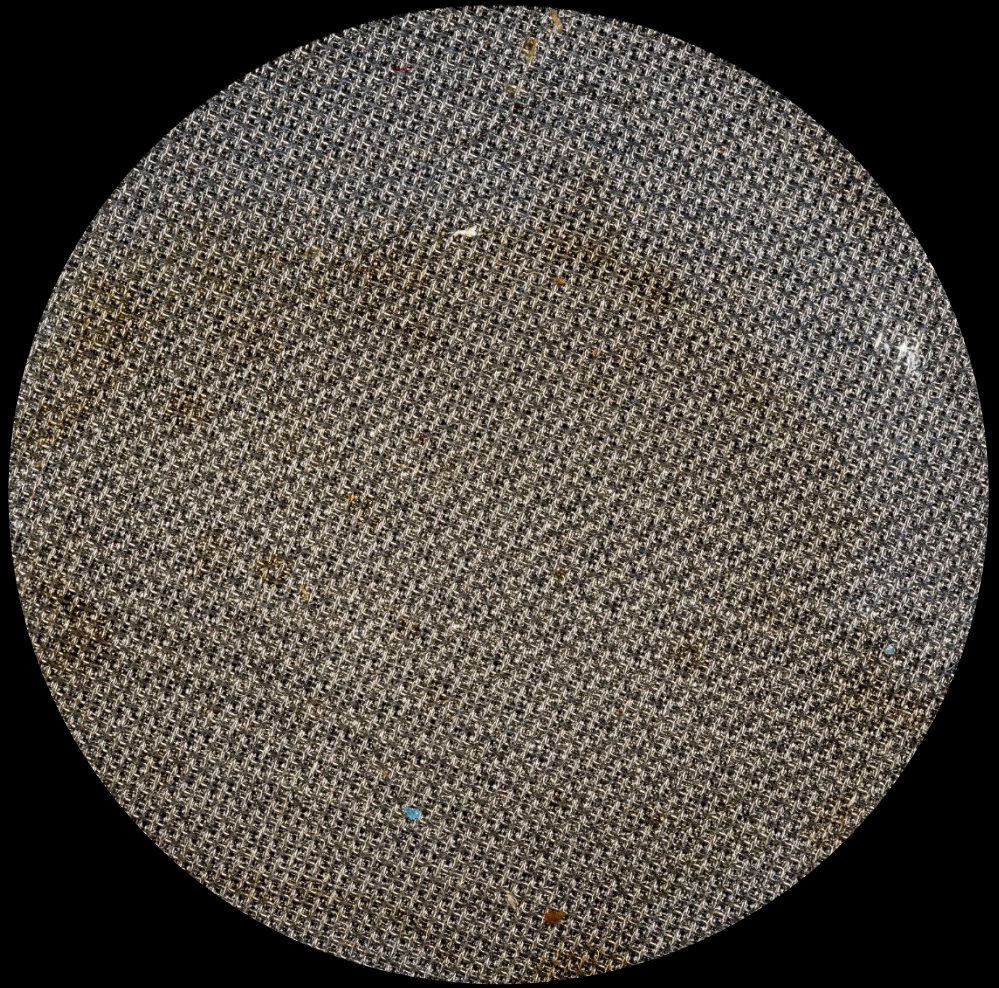


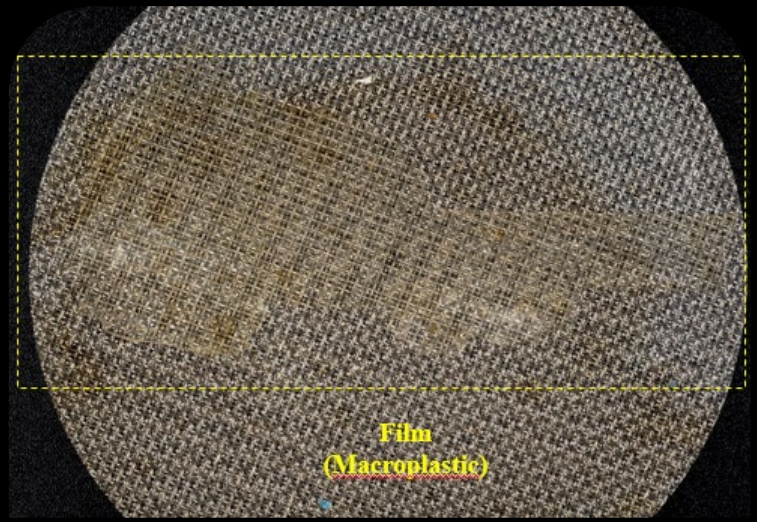
Station 1:

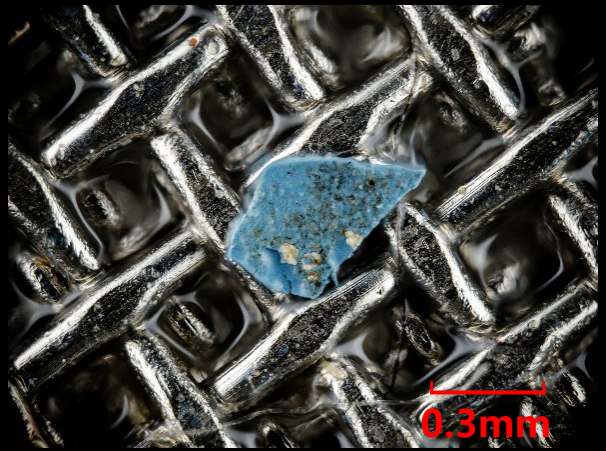
O1

78°58.935 ‘N
11°26.875 ‘E

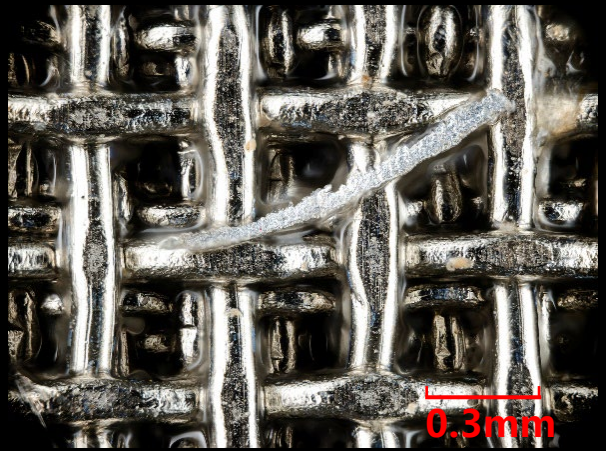
0.900 m^3




Film
(Macroplastic)


0.3mm


0.3mm


0.3mm

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4 MP Hazard

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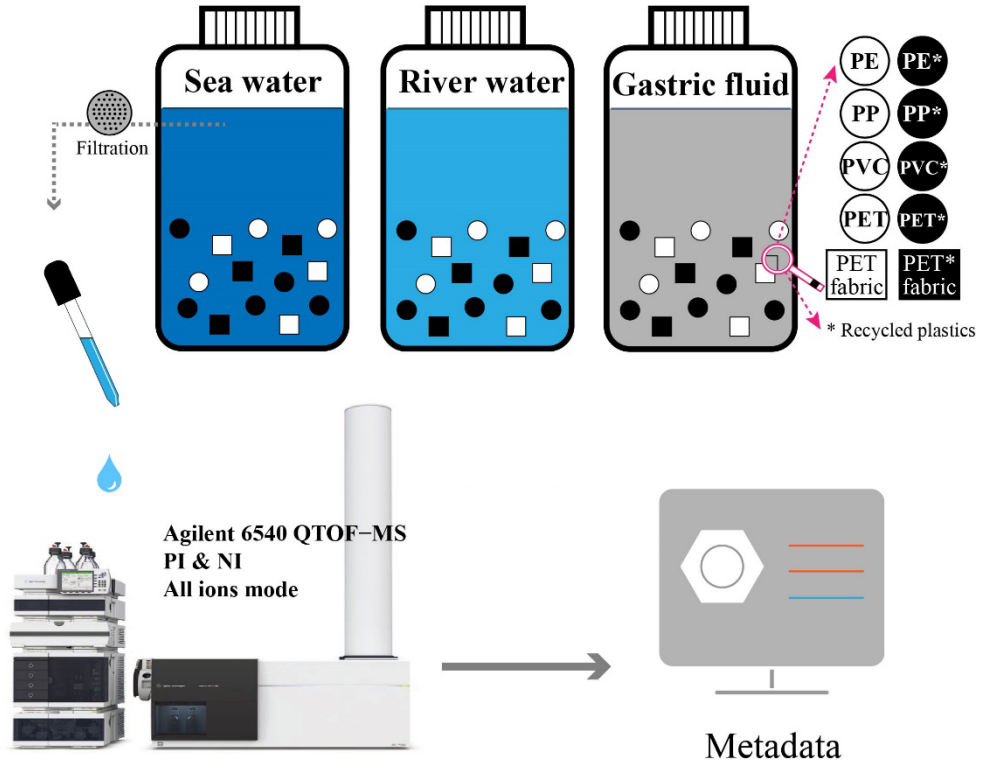


MP Leaching experiment

- **Sea water (pH = 8.2; salinity = 35.5 ‰)**
- River water (pH = 7.4; salinity = 0.0 ‰)
- Gastric fluid (2 g L^{-1} NaCl; 10 g L^{-1} Pepsin; pH = 1.2)

Rotation condition 125 rpm

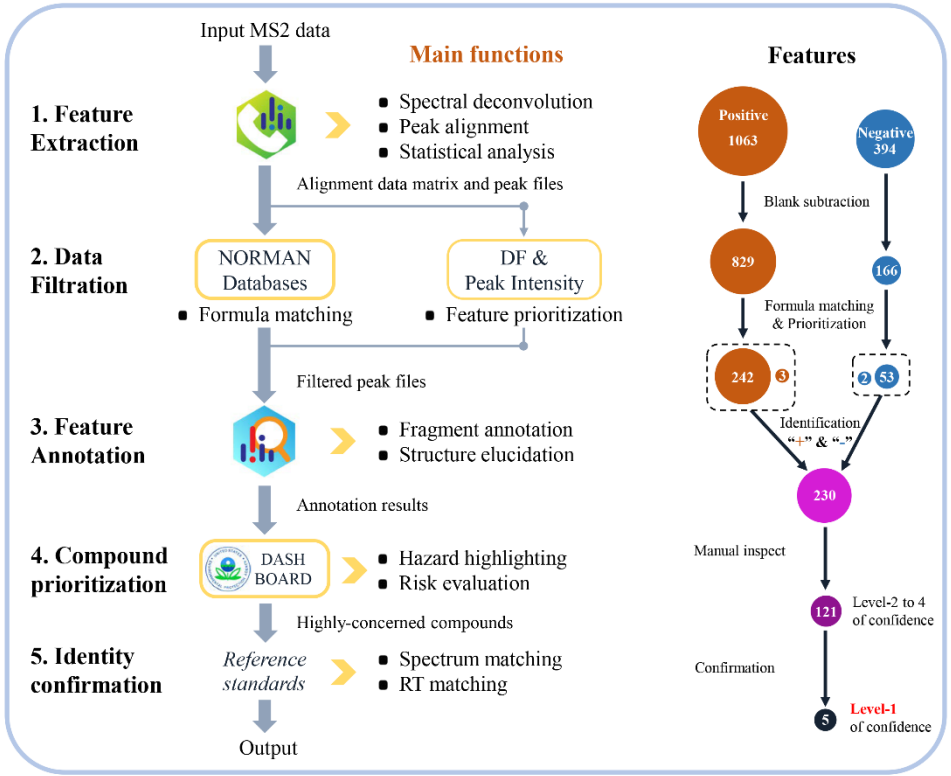
Dark condition, 25 °C, 14 days

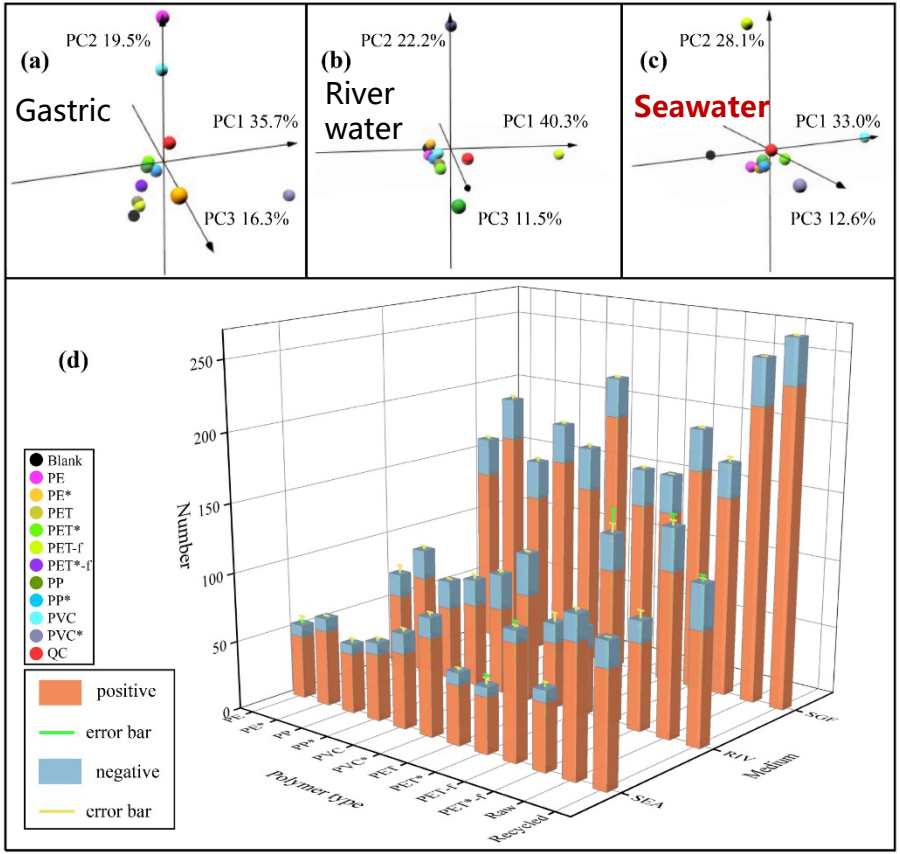
LC-QTOF/MS All-ions Mode

Non-Targeted Analysis (NTA)

- Li, Y.; Lu, Z.; Abrahamsson, D. P.; Song, W.; Yang, C.; Huang, Q.; Wang, J., Non-targeted analysis for organic components of microplastic leachates. Sci Total Environ 2021, 151598.

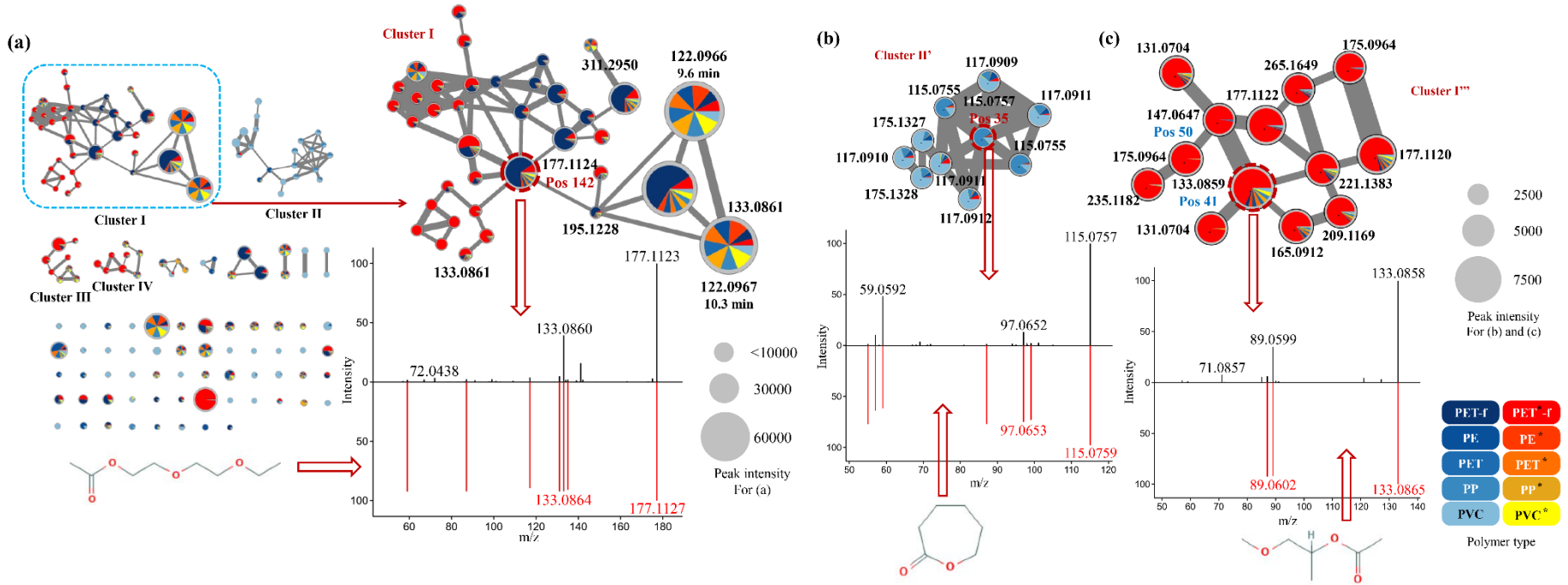
4 MP Hazard





Tentatively Identified Pollutants in MP Leachates by NTA Workflow

4 MP Hazard



Molecular networks (MNs) and clusters of MP leachates for three leaching media.

Number of Molecular Features

- Gastric 111.0 ± 26.7
- River water 98.5 ± 20.3
- Sea water 53.5 ± 4.7

5 Outlook

5 Outlook

Tackling Plastic Pollution Requires Collaborative Efforts

Founded in 1954, the **Shanghai Municipal Engineering Design Institute (for short: SMEDI)** is engaged in planning, engineering design and consultation, EPC, and the whole process service of project management.

Wastewater treatment plants (WWTPs) are **major point sources** of MPs. Wastewater treatment is SMEDI’ s traditional dominant specialty.

The largest waste water treatment plants in Asia

The Shanghai Bailonggang Wastewater Treatment Plant

5 Outlook

Tackling Plastic Pollution Requires Collaborative Efforts

SMEDI has been awarded **13 national prizes for science and technology advancement**, **185 provincial or ministerial prizes** and about **1000 of various prizes in the area of surveying, design, consultation and planning**.

SMEDI has formulated more than **80 national, industrial, group and local standards**, providing strong technical support for national policies

Welcome to scientific cooperation with us!

5 Outlook

Tackling Plastic Pollution Requires Collaborative Efforts

Citizen Science

亿角鲸N.O.C.是由民间于2017年发起的海洋公益保护组织。
旨在促进公民海洋科学， 推广海洋知识并致力于海洋生态资源保护及宣传教育。

N.O.C. started non-government marine protection organization since 2017, aiming to popularize oceanographic education and eventually contribute to the protection of marine ecological resources.

ABOUT N.O.C.

5 Outlook

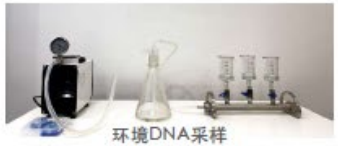
ENTERPRISE 7/10

全船配备

RESEARCH EQUIPMENT

YSI EXO²多参数水质检测仪
EXO² Multiparameter Sonde

微塑料采样
Micro Plastic Sampling



环境DNA采样
eDNA Sampling

SonTek 声学多普勒流速剖面仪
SonTek RiverSurveyor RS5 ADCP

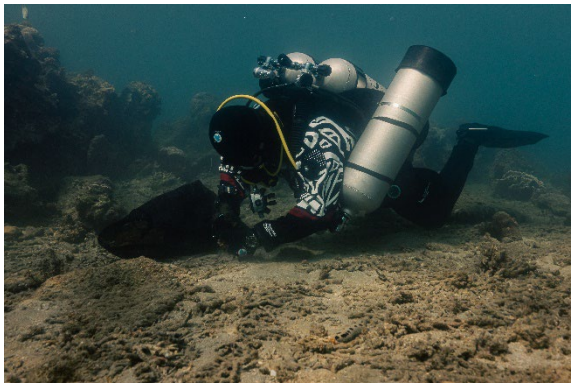
水肺系统

水肺系统

水下推进系统

"TRITION"
HIGHFIELD 6.6米 登陆艇
HIGHFIELD Landing craft

5 Outlook



N.O.C.’s movement on the Ocean Day

- **12-hour non-stop diving for seabed cleaning;**
- **9 cities, 12 beach cleanups by more than 400 volunteers.**

Thank You

liyubo@smedi.com

创造城市未来，追求和谐卓越