

Regional Microplastic Research Progress and Collaboration

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Plastics Debris in Our Environment



Source: www.pinterest.com/



Source: <https://www.haikudeck.com>



Source: www.eurolenta.com/



Source: www.texasenvironment.org

WWF-Indonesia @WWF_ID · Nov 20, 2018
Sobat, seekor Paus Sperma (*Physeter macrocephalus*) terdampar di Pulau Kapota, Wakatobi dlm kondisi sdh membusuk (18/11). Kondisi paus saat ditemukan tdk baik & bagian tubuhnya sdh tdk lengkap. Pihak berwenang tdk bisa melakukan nekropsi u/ mengetahui penyebab kematian paus tsb.

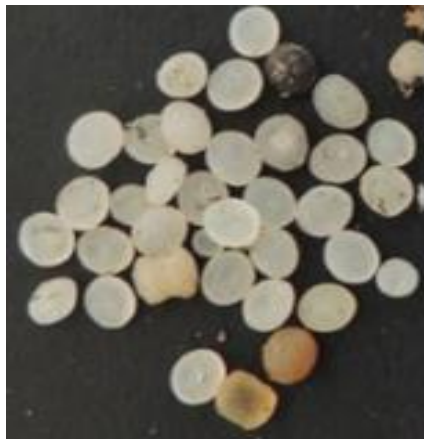


2018.11.19, a dead sperm whale at Indonesis Kapota Island , 6 kg of plastics in its stomach, 115 plastic cups, 25 plastic bags, 4 plastic bottles, 2 slippers and some plastic ropes

Definition of Microplastics

Definition: Plastic fragments or particles (less than 5mm)

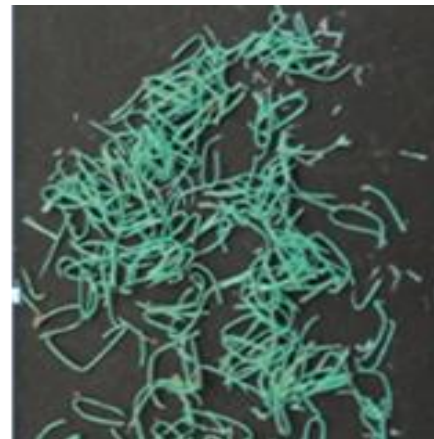
- Various shapes
- Component complexity
- Uneven size



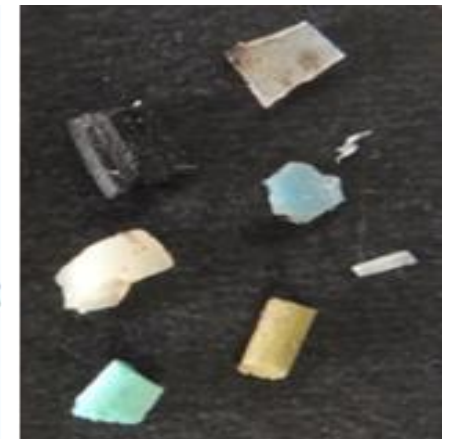
Pellet



Foam



Fiber



Fragme

Characteristics of microplastics in marine environment

- ◆ Large surface area, persistent, extensive, fluidity
hydrophobic
- ◆ Enrich pollutants (POPs, microorganism and Heavy metals, etc)
- ◆ Depositing into the deep sea



Sources of Marine Microplastics

Primary source : Plastic particles from daily chemical products.

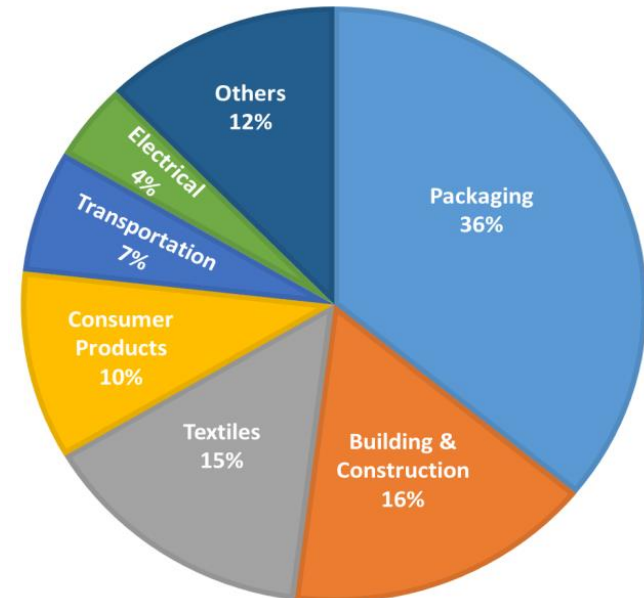
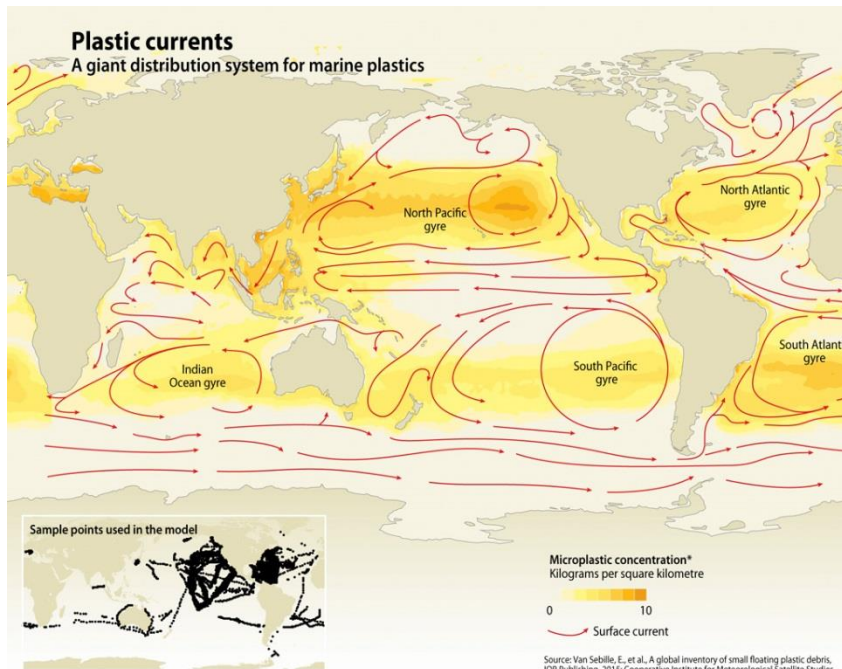
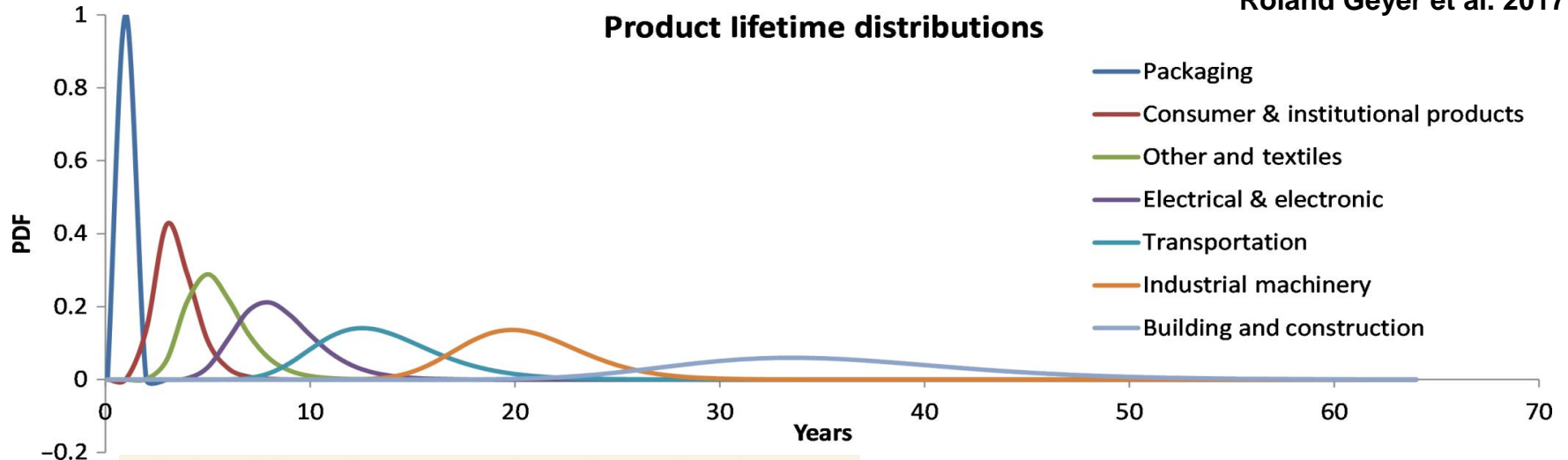


Secondary source : Break down of large pieces of plastics coming from land, shipping, aquaculture, and tourism

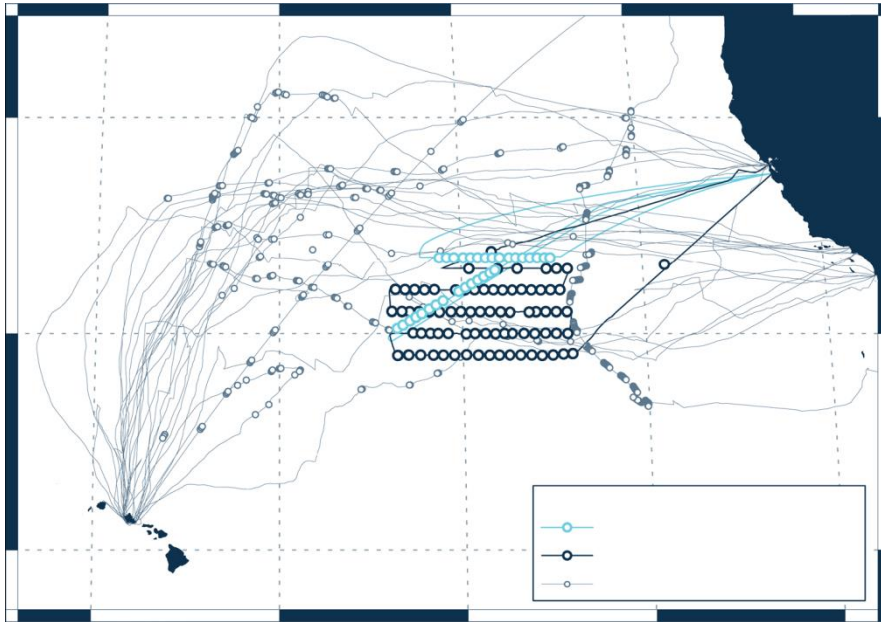


Lifetime of Plastic Products

Roland Geyer et al. 2017



Great Pacific Garbage Patch

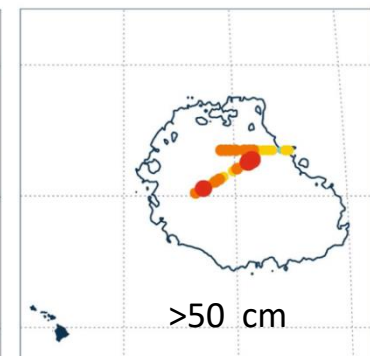
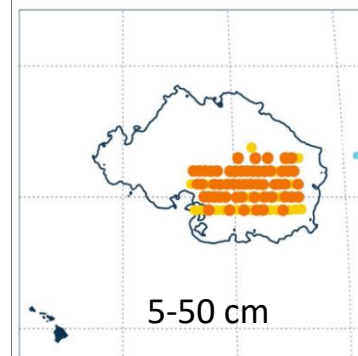
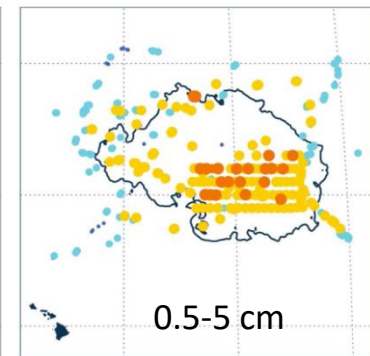
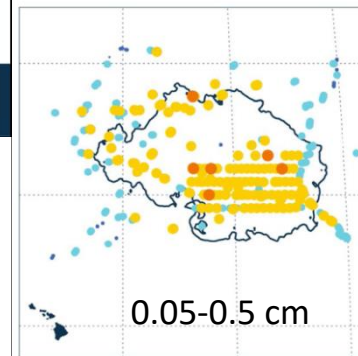
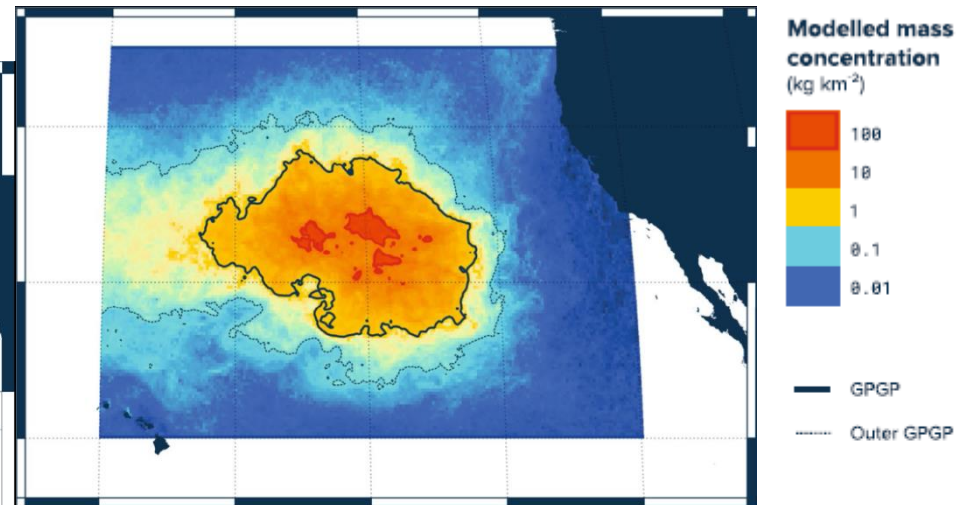


- 18 vessels
- 2 flights

The Great Pacific Garbage Patch (GPGP), predicted at least 79 (45–129) M tons of ocean plastic /1.6 million km², 4-6 times higher than reported
 >3/4 GPGP mass was larger than 5 cm and at least 46% was fishing nets.

Microplastics accounted for 8% of the total mass but 94% of the estimated 1.8 (1.1–3.6) trillion pieces floating in the area.

Lebreton, et al., 2018



Current Research Fileds

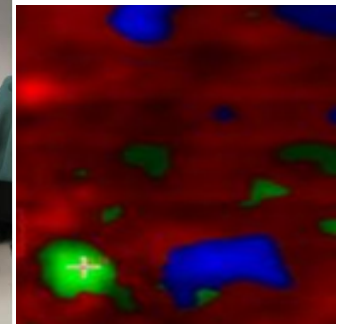
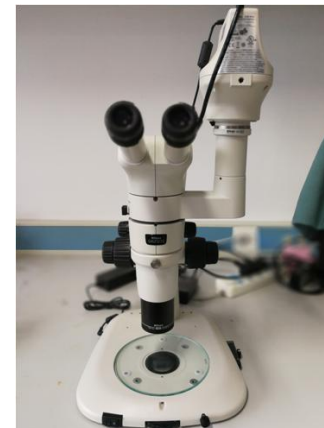
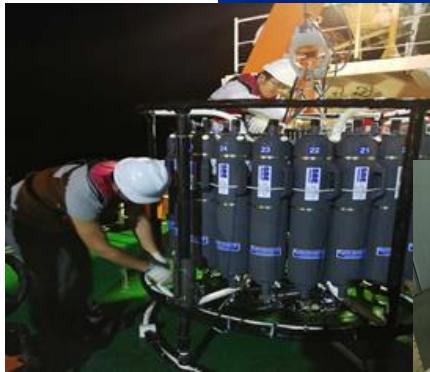
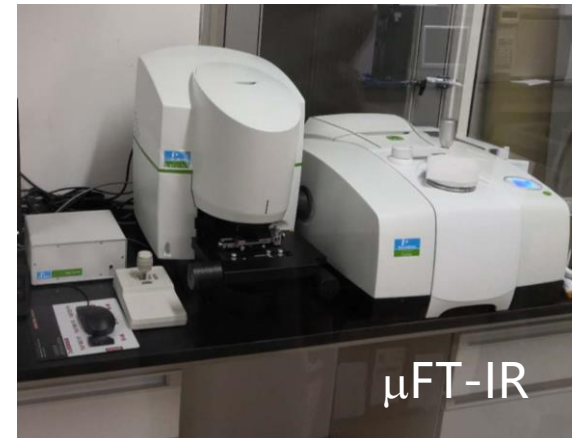
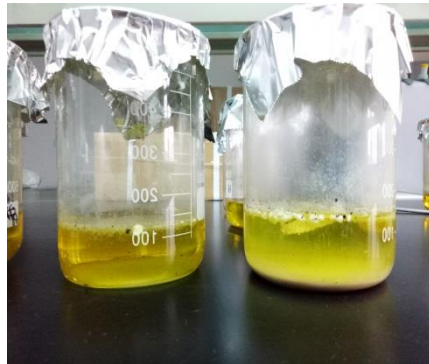
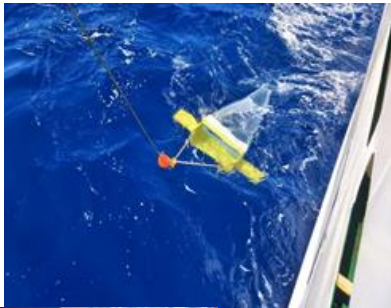
- ◆ **Establishment of standardized method for separation and analysis of microplastics;**
- ◆ **Temporal and spatial distribution of microplastics in various medium (offshore, lakes, rivers, sediments, organisms);**
- ◆ **Ecotoxic effects of microplastics;**
- ◆ **Marine microplastics pollution, Ecological risk Assessment system and Standards;**
- ◆ **Formulate policies and regulations to control and reduce pollution of microplastics, etc.**

Microplastic Identification

Sampling

Sample Pre-treatment

Sample Analysis



Our Research Work



XIANGYANGHONG 01



XIANGYANGHONG 18

WORK LIST

Microplastics in surface seawater and water column

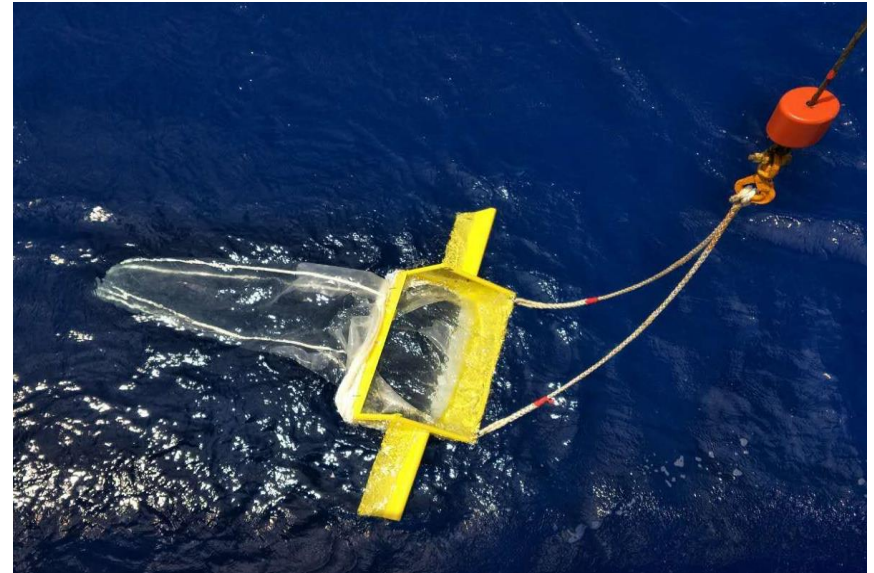
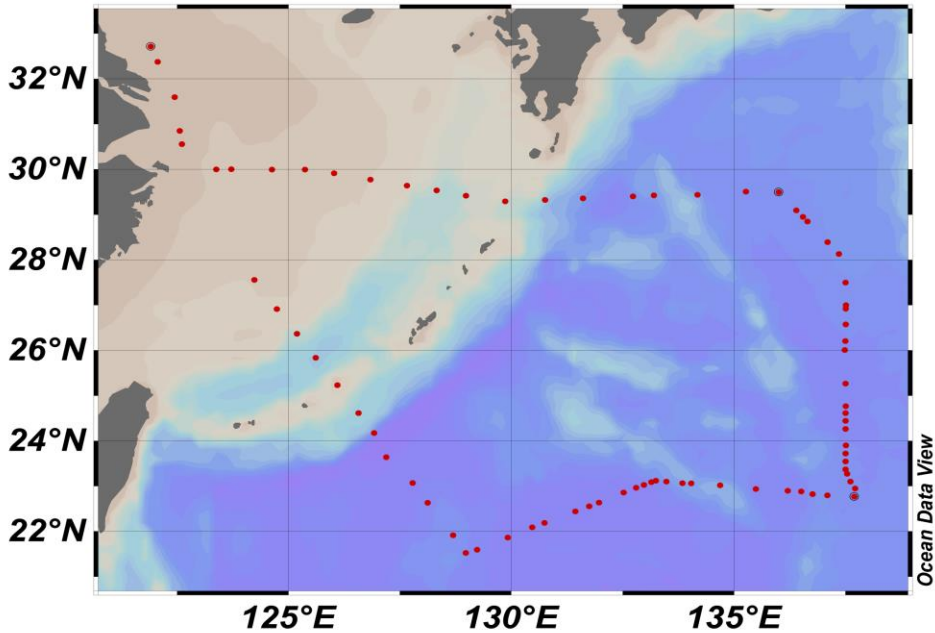
Microplastics in marine organisms

Microplastics database

Microplastics and other pollutants

International co-operation

Microplastics in Western Pacific



FIO/Global Voyage

中国首次环球海洋综合科学考察航次——航段示意图



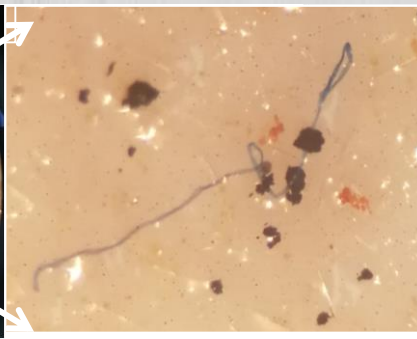
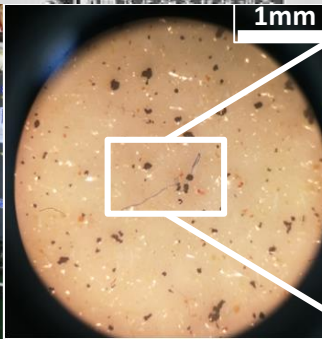
Sampling:

Water samples – hundreds

Horizontal: Sailing surface water and Trawling samples; vertical: CTD

Sediments – a few

Organic samples – a few



Microplastics Database

**Information
(7S-D)**

Samples-unique number

Sample type

Sampling time

Sampling method

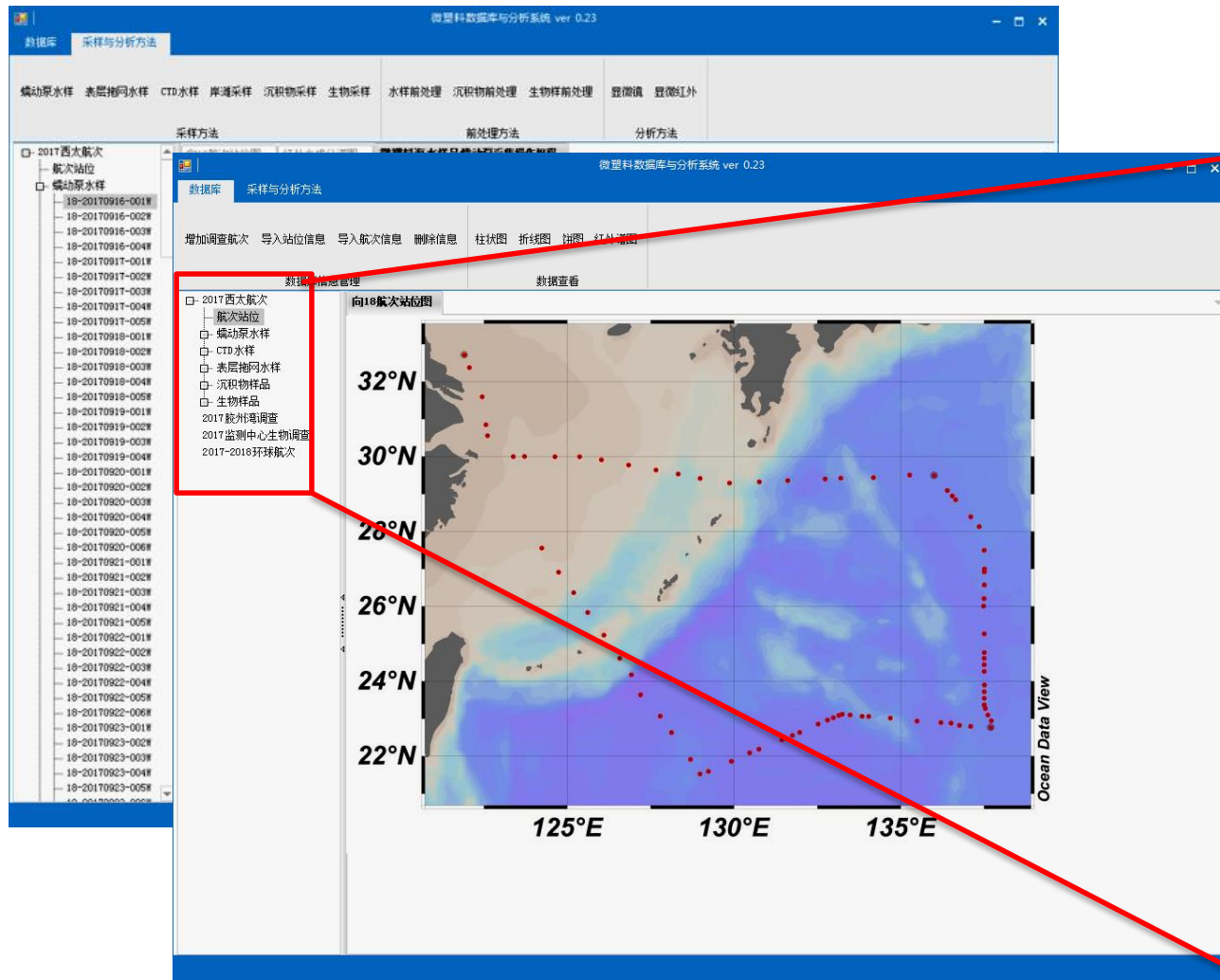
Survey area

(latitude and longitude)

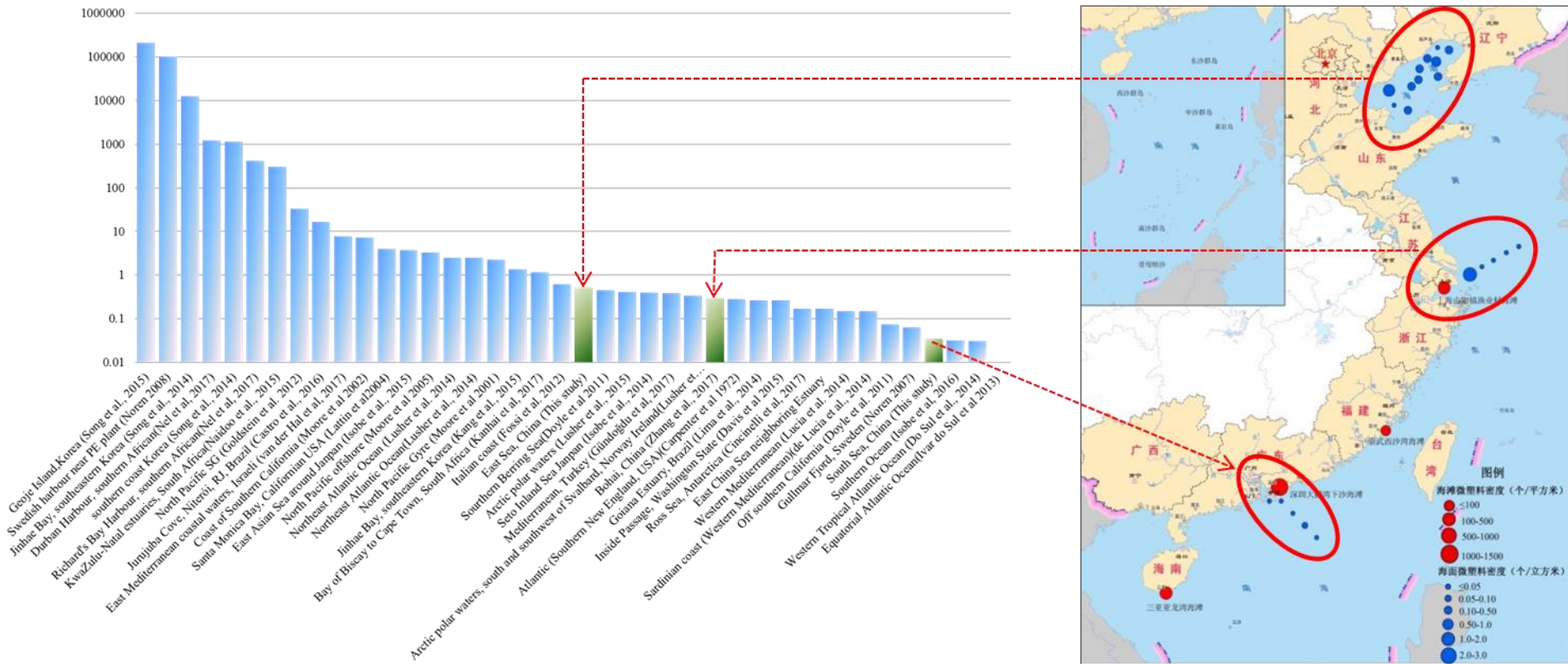
Spectrogram (μ FT-IR)

Sustainable upgrading

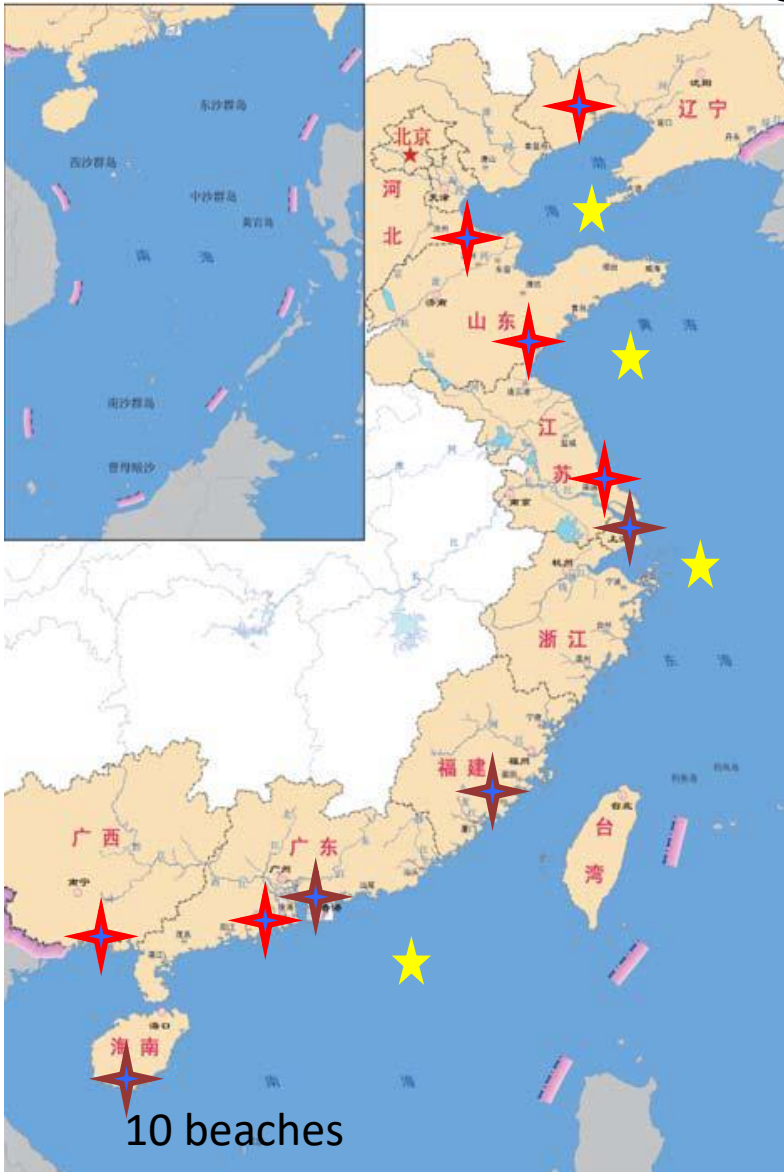
Distribution



Regional: Surface Water Microplastics Abundance (n/m³)



Regional: Beach and Sediment Study in China



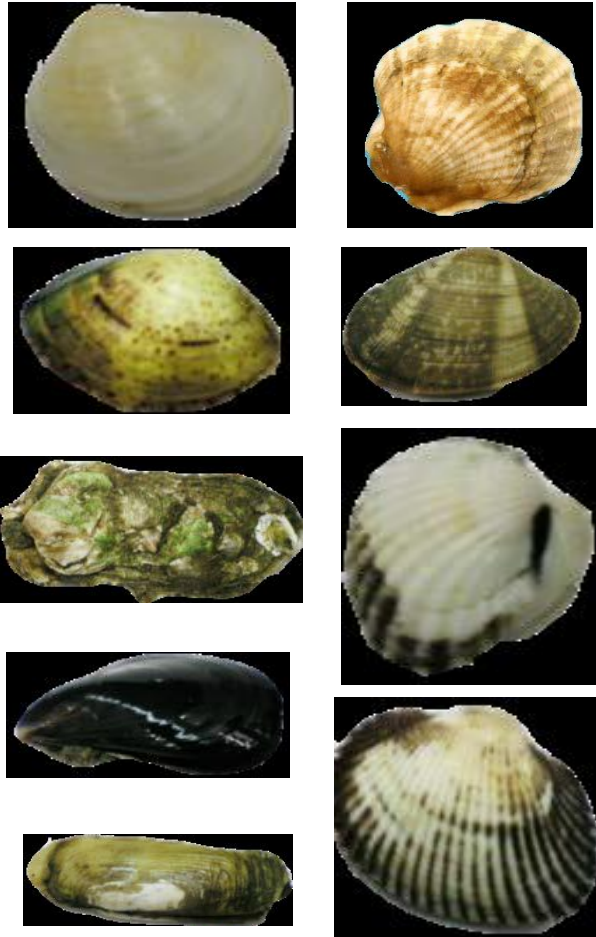
2016
中国海洋环境状况公报



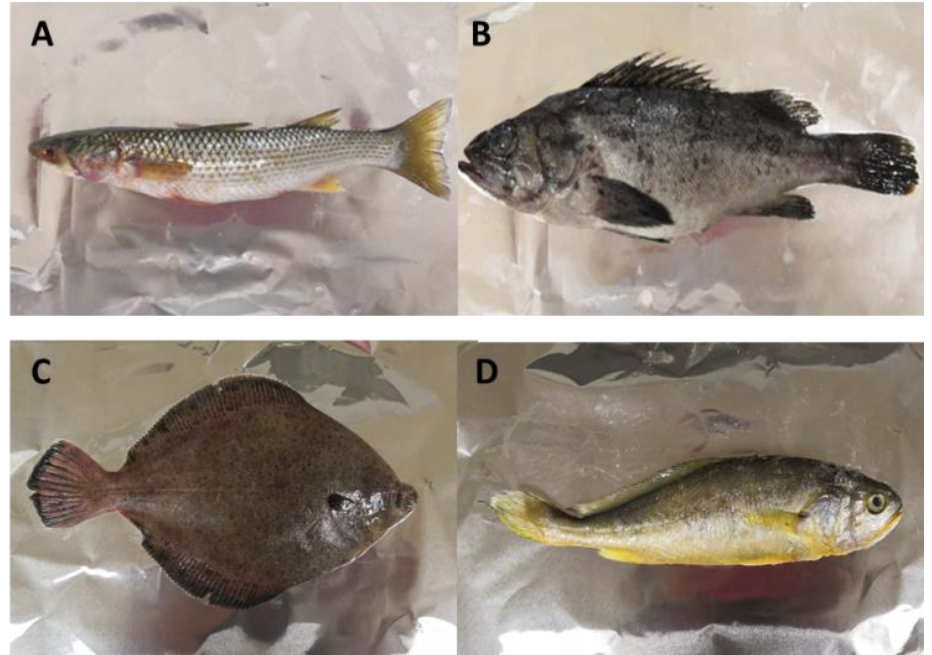
2017年
中国海洋环境状况公报



Regional: Marine Organisms Study in China



(Li et al 2015. EP)



(Ding, et al., 2018, Anal. Methods)

Zoolankton

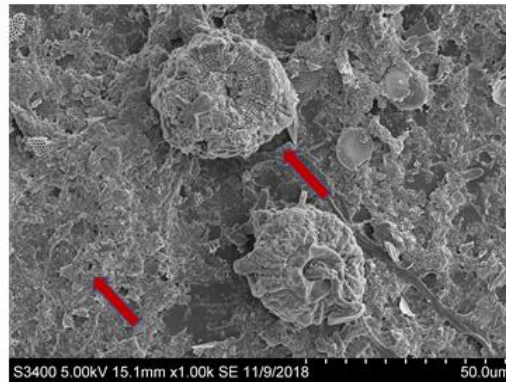
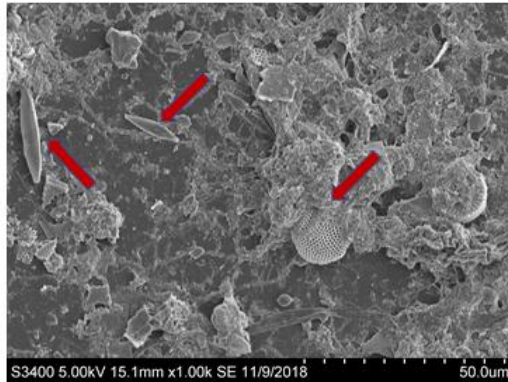
Mussel as bioindicator

Other Regional Work

- **Flux and Transportation Study**
- **Biotoxicity Study**
- **Modeling**
- **Policy**
- **Non-profit organizations**

Recent China-Southeast Asian Marine Cooperation Forum

The “Plastisphere”



Diverse organisms attached on the biofilm

Deo Florence L. Onda
MSI of Philippines

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plastic is identified as a major pollutant but the recycling campaigns over the years have had too little impact

[Research by the Ocean Conservancy](#) showed that more than half the plastic coming from South and Southeast Asia goes into the ocean because of a lack of developed waste and recycling systems.

<https://star2.com/living/2018/05/15/plastic-waste-pollution/>



Plastic litter in the ocean in Semporna, Malaysia. Image: [Ric Carey / Shutterstock.com](#)



<https://www.shutterstock.com/video/clip-117566201-sandakan-malaysia--23-june-2016-pollution>
Sandakan, Malaysia

Phaik-Eem Lim
University Malaya, Malaysia

Malaysians produce 4,000 metric tons of plastic waste each day. (<https://cleanmalaysia.com/2017/09/04/plastic-bags-banned-sort-kl/>)



Andreas D Patria
CMMA, Indonesia

What's being done?

Conducting Research

- ✓ Macro-, Meso- and Micro-Plastics
- ✓ Different Environmental Matrices
- ✓ Occurrence, Fate and Impact

Policy Brief
endorsing new local
regulation

Citizen Sciences
(Under Graduated Students)

National Agency Action

- ✓ National Plan of Action for Combating Marine Plastic Debris
- ✓ Campaign

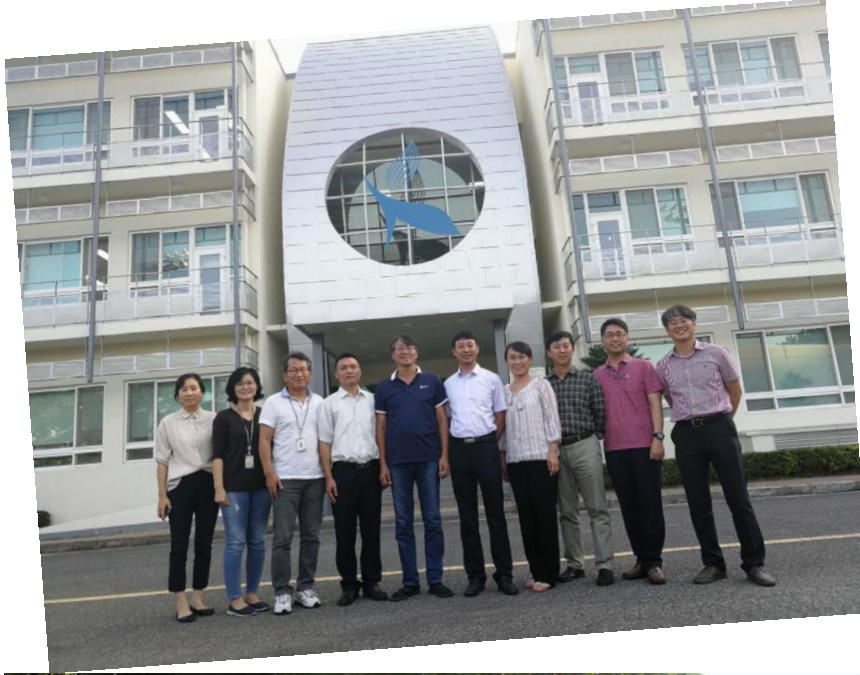
Local Agency Action
DLHK [Pemerov Kepri](#)

Winged Ambassadors
World Clean-up Day
in Riau Island Province

Agung Dhamar Syakti
Raja Ali Haji Maritime University

Transboundary problem, need international collaboration

International co-operation



Future Direction

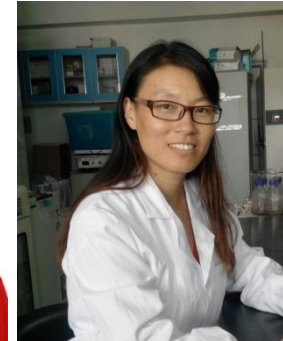
- ❑ Strengthen international cooperation and exchange**
- ❑ Establish standard methods and specifications for investigation of microplastics**
- ❑ Improvement and Optimization of qualitative and quantitative methods for Microplastics**
- ❑ Strengthening the investigation and Research of Open Ocean Microplastics**
- ❑ Intensive study on the mechanism of migration, diffusion and ecological effect of microplastics**

Acknowledgements

FIO Research team

❑ Kuan Wang, Academician, The Taiwan Academy of Sciences, Advisor

❑ Seven senior research scientist from chemistry, biology, physical oceanography



- The Basic Scientific Fund for National Public Research Institutes of China (No. 2016Q02)
- The Research Cooperation and Exchange of Marine Litter and Microplastics (No. QY0518011)
- The Basic Scientific Fund for National Public Research Institutes of China (No. 2017Y03)

Thank You!

