National Marine Environmental Monitoring Center, SOA

Marine Debris (micro- & macro-) Monitoring and Research in China

Juying Wang, Weiwei Zhang, Jingli Mu

Brussels, Belgium June 02, 2017

Contents

Marine debris is present in all marine habitats, from densely populated regions to remote points far from human activities.

Global Governance

- Rio +20 Declaration
- Honolulu Commitment & Strategy:
  - To reduce waste in order to halt and reverse the occurence of marine debris.
- MARPOL Convention (Annex V)
  - The International Convention for the Prevention of Pollution from Ships (MARPOL) prohibits disposal of all waste including plastics (fish nets) from vessels, although there is an exception for foodwaste.
- London Convention:
  - Regulates dumping of wastes at sea on a global basis, with the exception of wastes generated by the normal operations of ships, which instead are subject to MARPOL
- **UNCLOS, Basel Convention** on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal
- **UNEP: Global Partnership of Marine Litter (GPML)**
- **SDG 14**

EU Marine Strategy Framework Directive

- Came into force in 2008, Aimed at achieving a good ecological status of marine water in 2020

1. Biological diversity
2. Non-indigenous species introduced by human activities
3. Pressure by fisheries
4. Productivity of marine food web
5. Eutrophication
6. Sea floor integritity
7. Hydrographic alterations
8. Contaminant concentrations in water and sediment
9. Contaminant concentrations in seafood for human consumption
10. **Marine litter**
11. Introduction of energy (thermal energy, EMF and light) and noise

http://ec.europa.eu/environment/marine/eu-coast-and-marine-policy/marine-strategy-framework-directive/index_en.htm

National Policy Framework in China

- **Environmental Protection Law of the People's Republic of China**
- **Marine Environmental Protection Law of the People's Republic of China**
- Law of the People's Republic of China on Prevention and Control of **Water Pollution**
- Law of the People's Republic of China on Prevention and Control of Environmental Pollution by Solid Wastes
- Regulations Concerning the Prevention and Cure of Pollution Damage of Marine Environment by Pollutants from Land
- Regulations Concerning the Management of Marine Dumping
- Regulations Concerning the Prevention and Cure of Pollution Damage of Marine Environment by Seashore Construction Project
- Regulations on Prevention of Environment Pollution by Marine Oil Exploitation and Development
- Regulations Concerning the Prevention of Pollution of Sea Areas by Vessels
- Regulations on Prevention of Environment Pollution by Ship Scraping
- ……

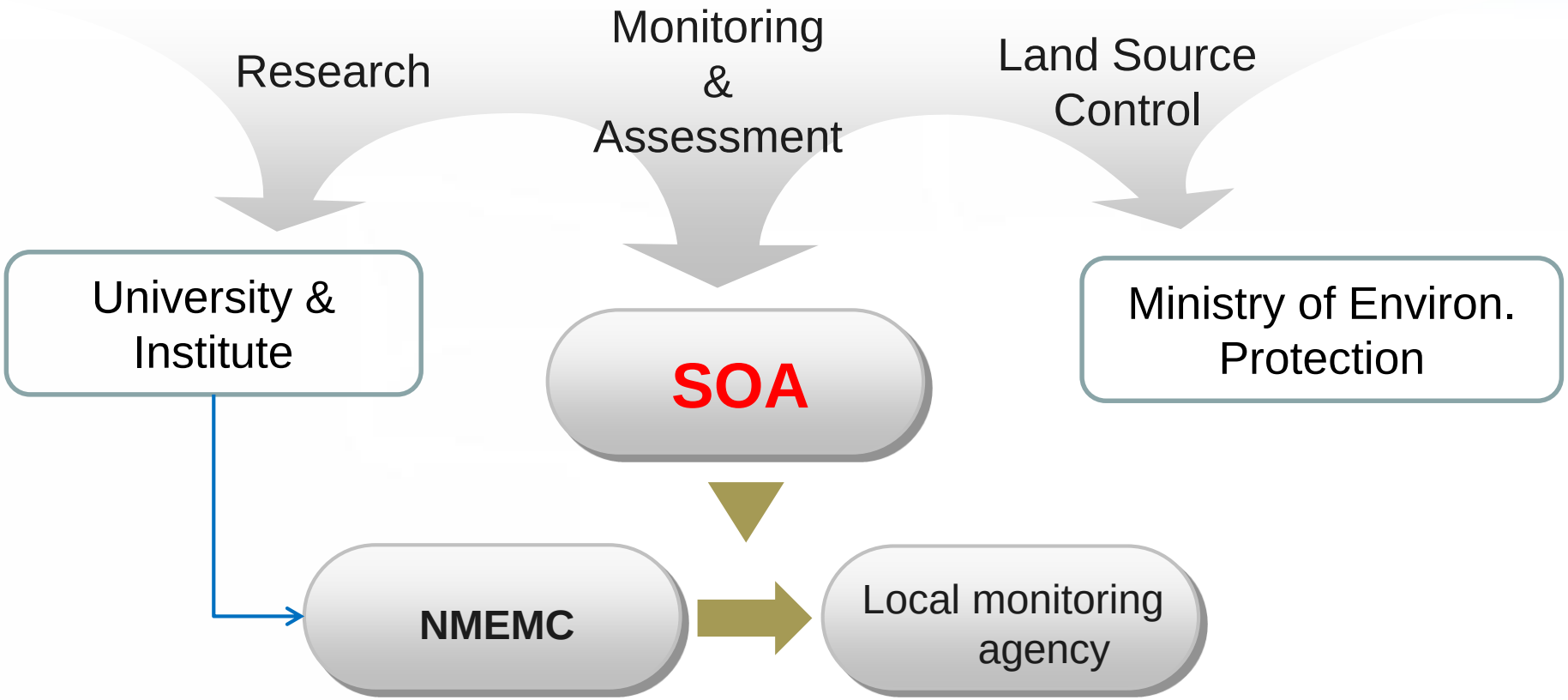
To strictly manage solid wastes, control marine debris input from both the land and sea based activities

Recent National Action Plan

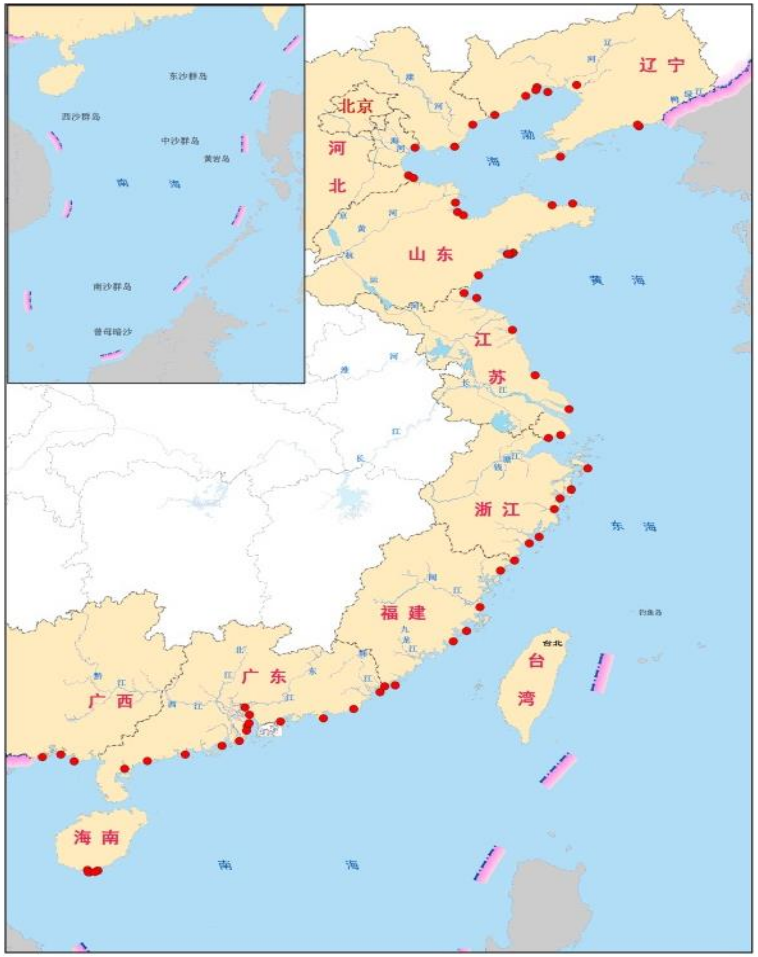
- **Integrated Reform Plan for Promoting Ecological Progress;**
- Water Pollution Prevention and Control Action Plan;
- Air Pollution Prevention and Control Action Plan;
- Soil Pollution Prevention and Control Action Plan;

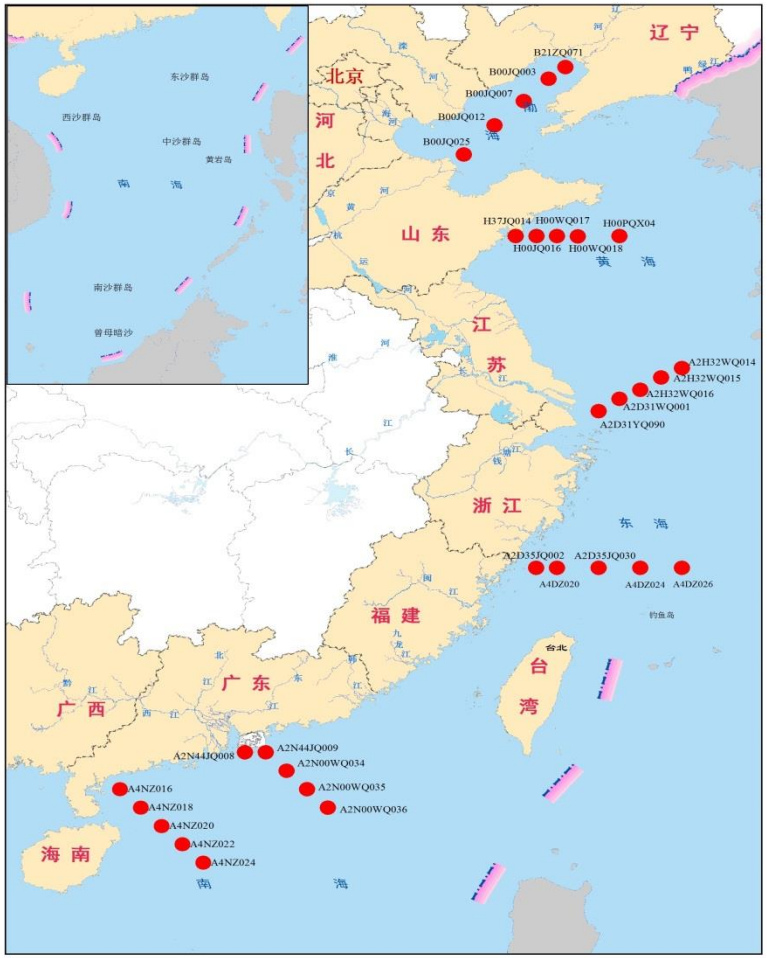
- Coast Pollution Prevention and Control Plan
- Plan on Prevention and Control of Pollution from Ship and Ports (2015-2020)
- ……

Marine debris Institutional Arrangements



2. SOA's Marine Debris Monitoring Program





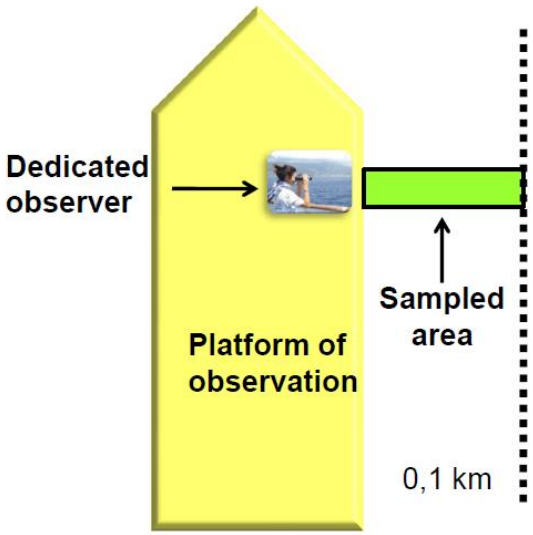
2017

- Macro-debris: being commenced since 2007.
- Micro-debris: being commenced since 2016

Macro-Debris Monitoring Program

▸ Main focus areas

- *Coastal recreational waters*
- *Harbors and ports*
- *Mariculture zones*
- *Marine protection areas*



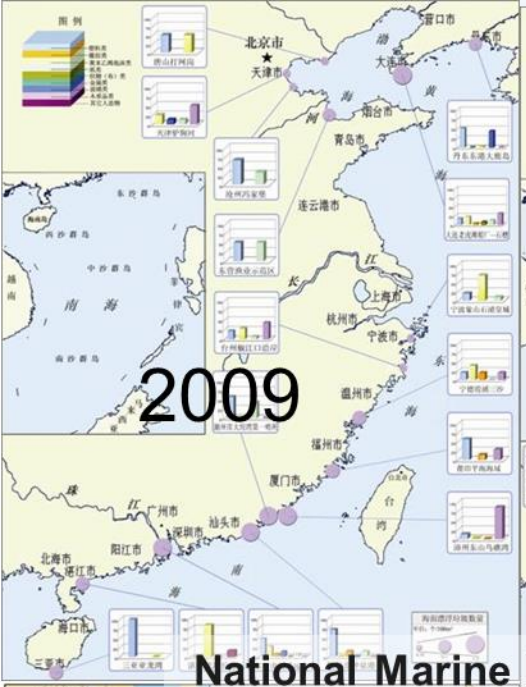
▸ Frequency

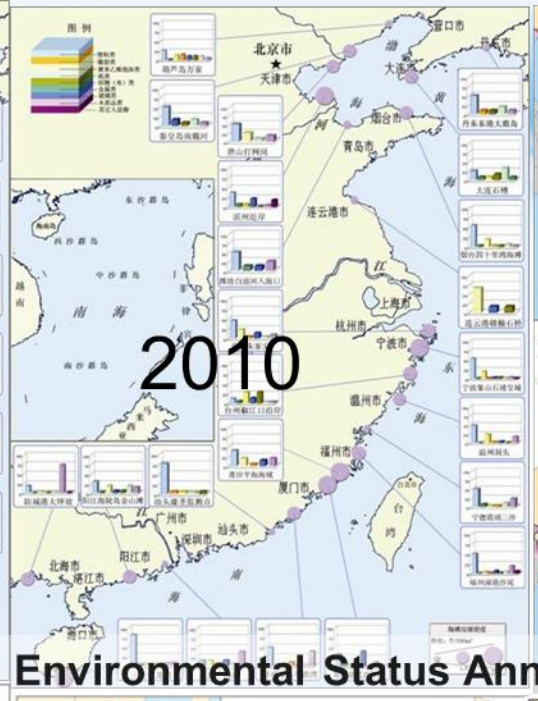
- *Once/year , in wet season*

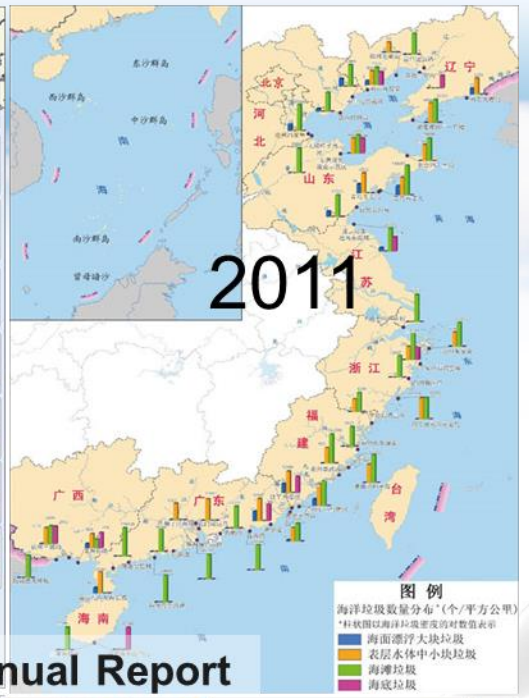
▸ Monitoring items

	Observing Methods
Beach Debris	Sighting survey
Floating Debris	Sighting/Trawling survey
Benthic Debris	Diving survey/Trawling survey

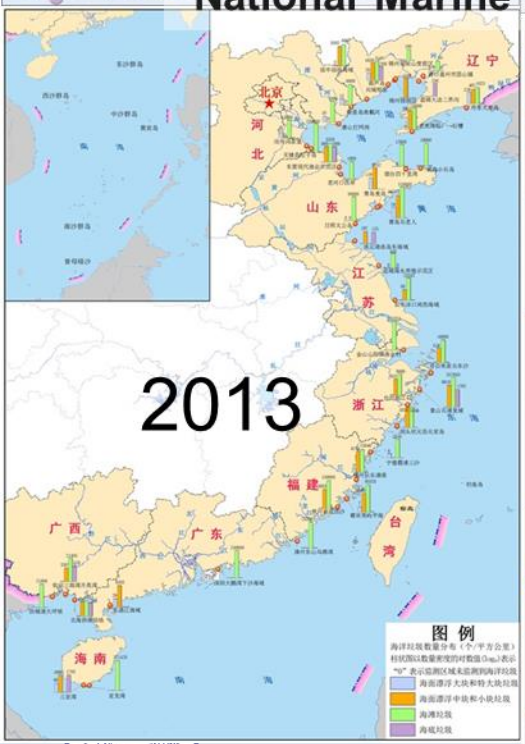
Distribution of marine debris

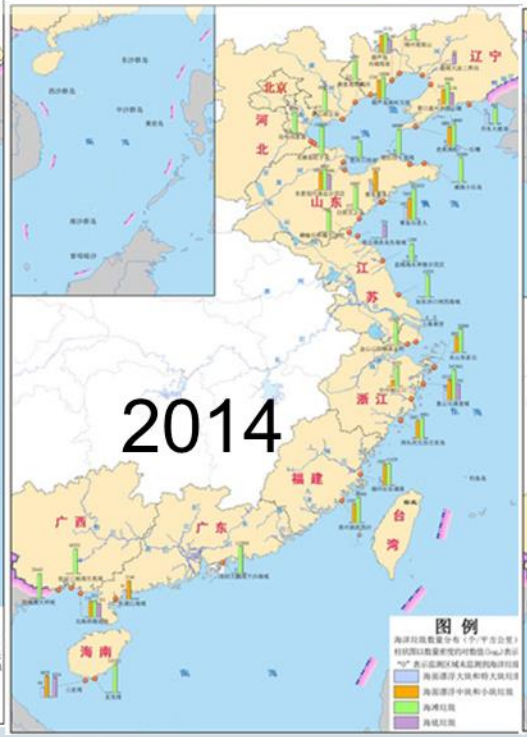


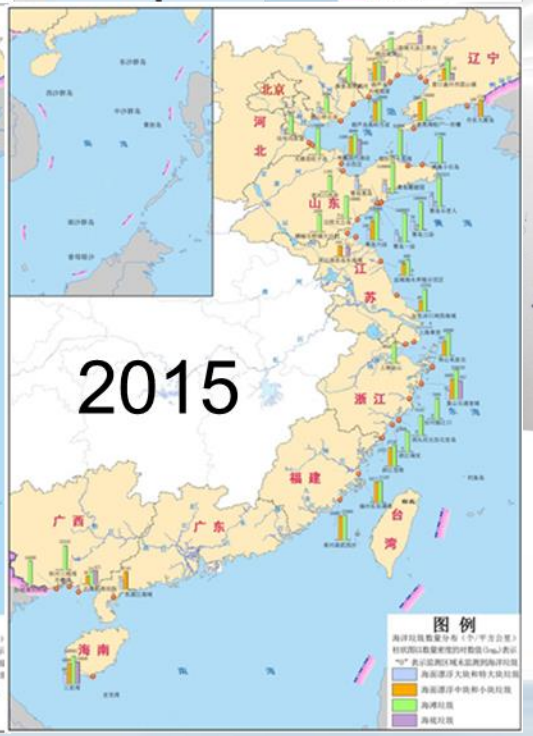




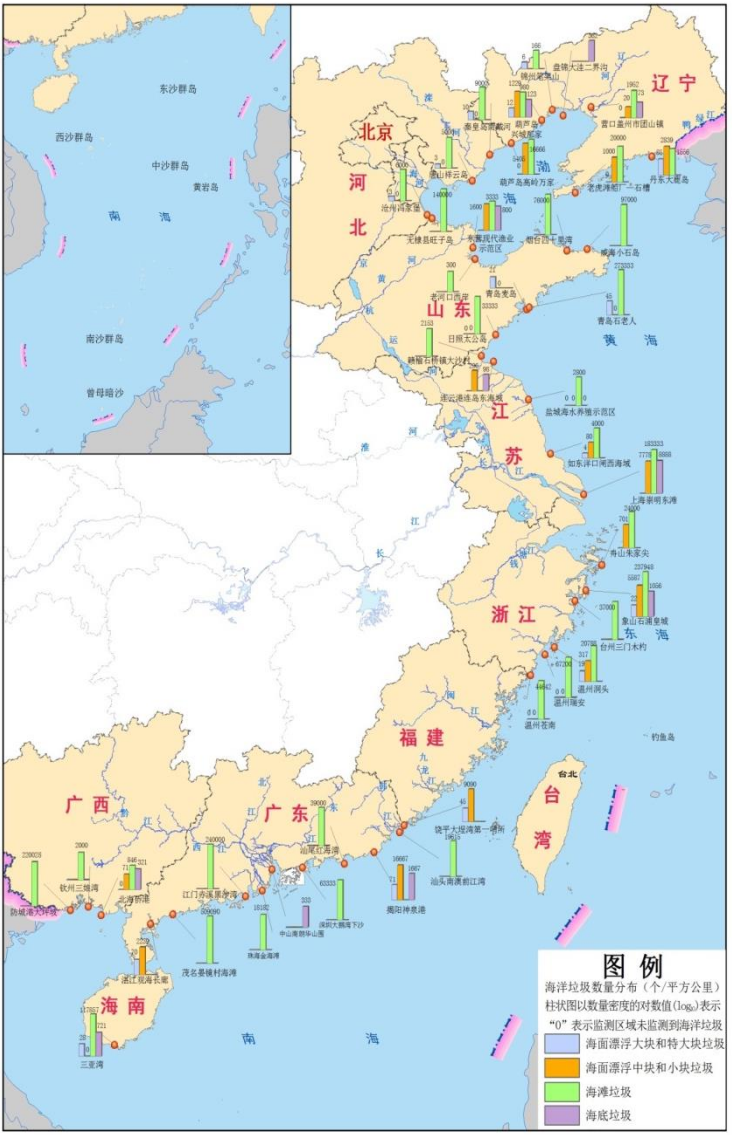
National Marine Environmental Status Annual Report

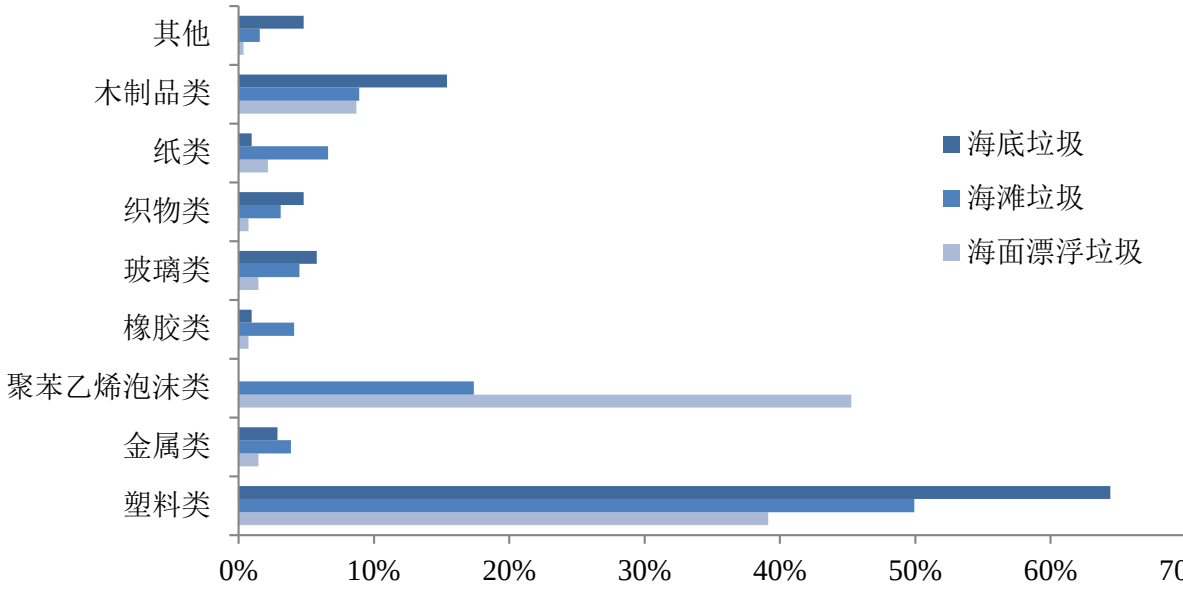






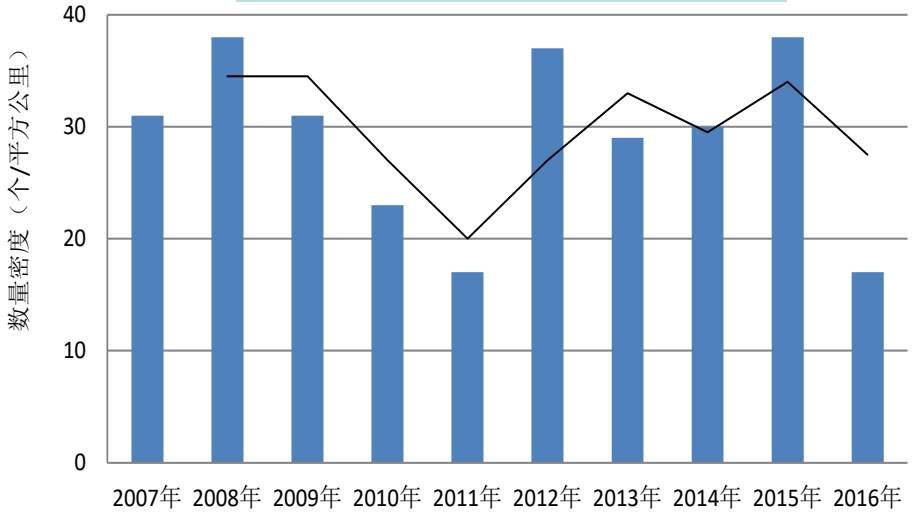
Macro-Debris In 2016



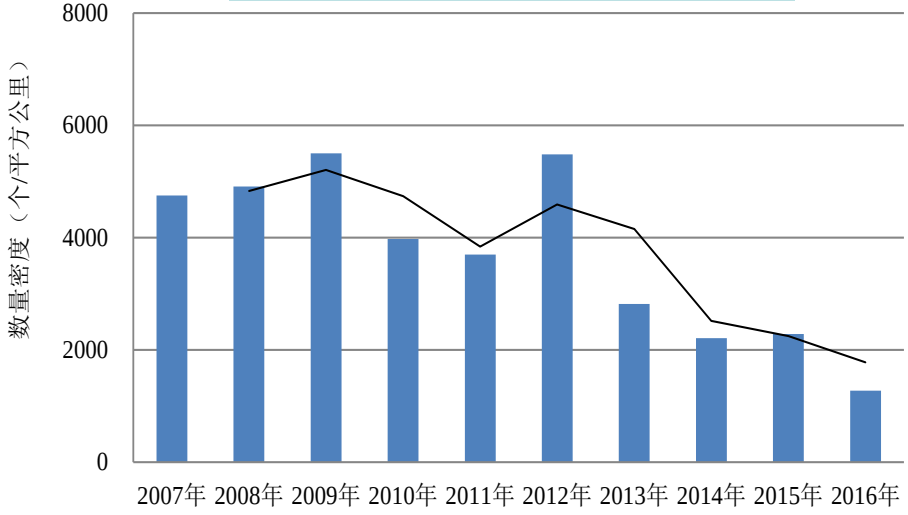


- Floating: 2 284 items/km^2, 62 kg /km^2;
- Beach: 69 203 items/km^2 , 1 105 kg /km^2;
- Seafloor: 1 325 items/km^2, 34 kg/km^2;

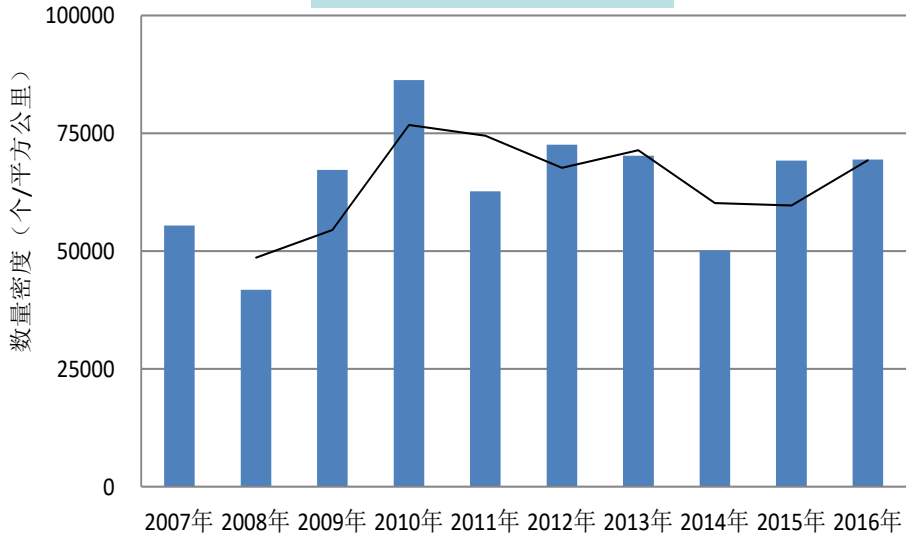
Mega Floating Debris



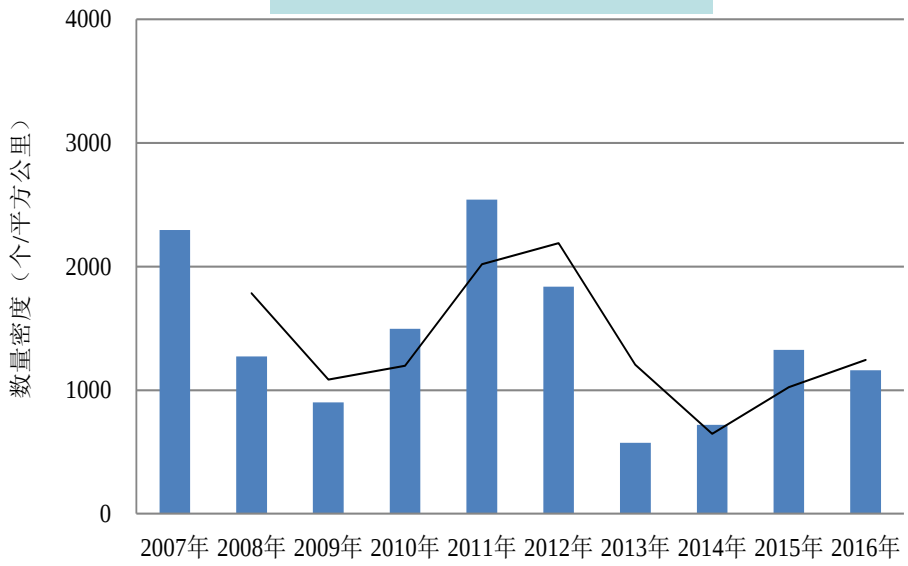
Macro Floating Debris



Beach Debris

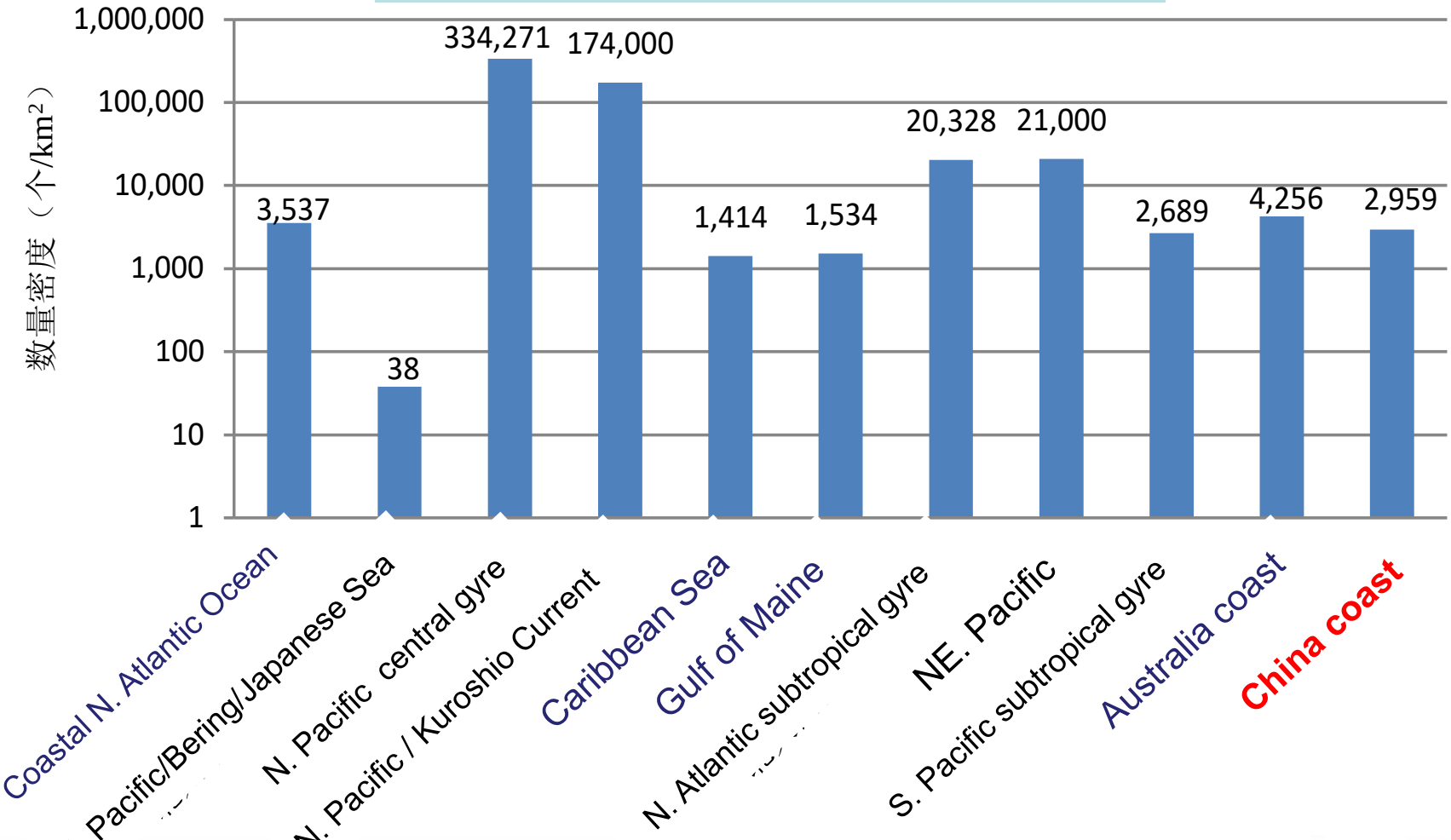


Sea Floor Debris



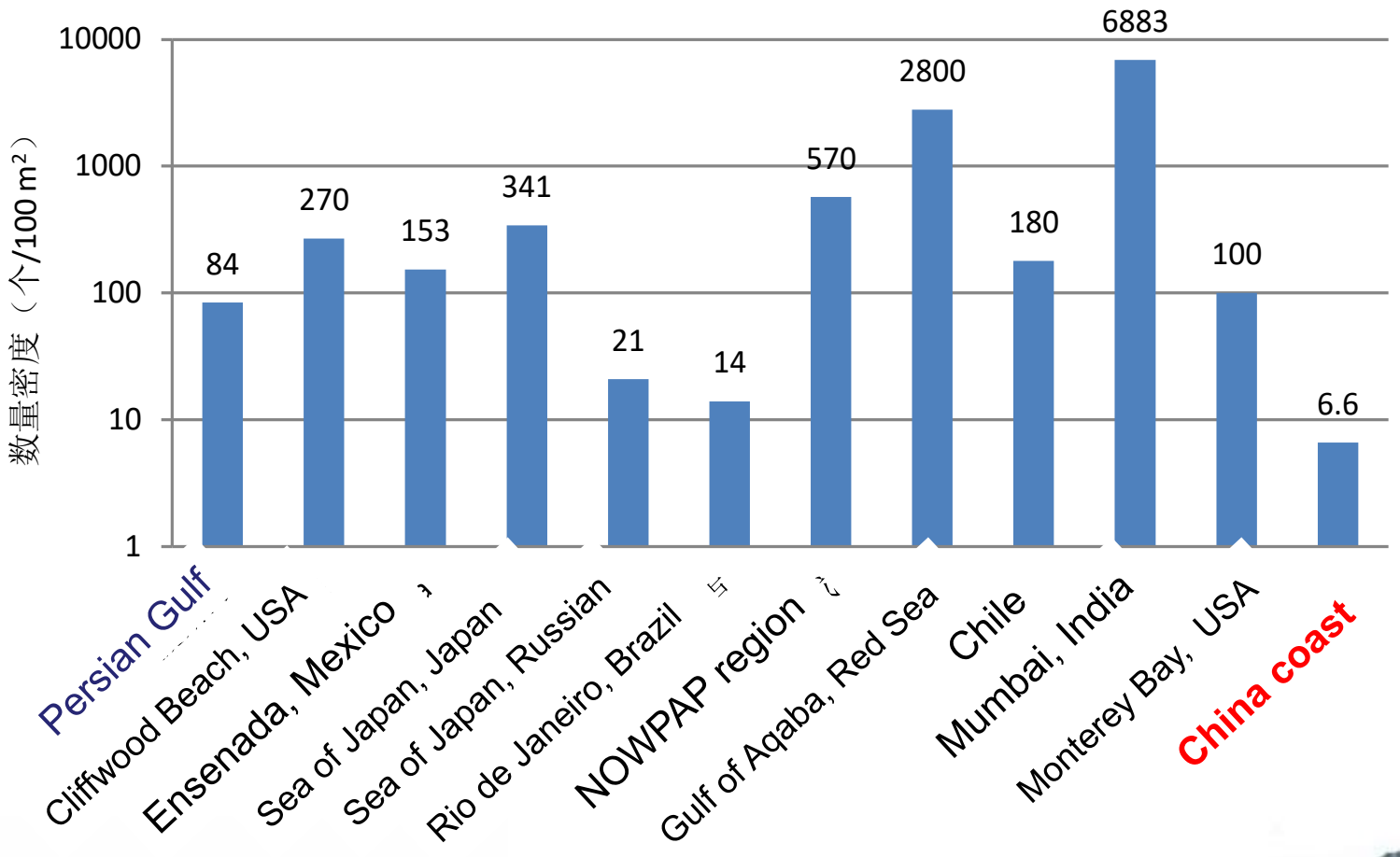
Debris Abundance from 2007 to 2016 in China

Floating Debris (items/km^2)

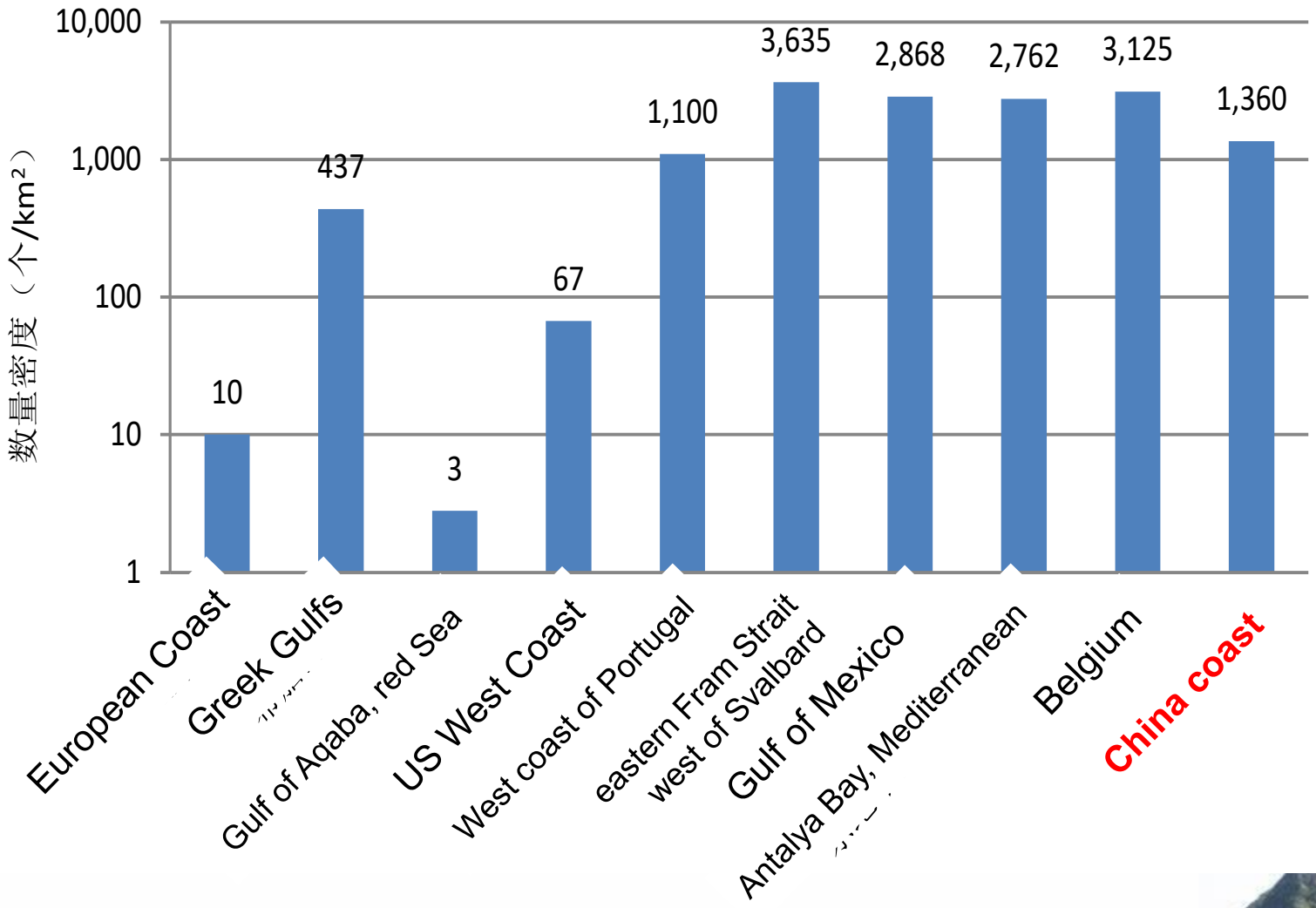


data of WOA I was cited

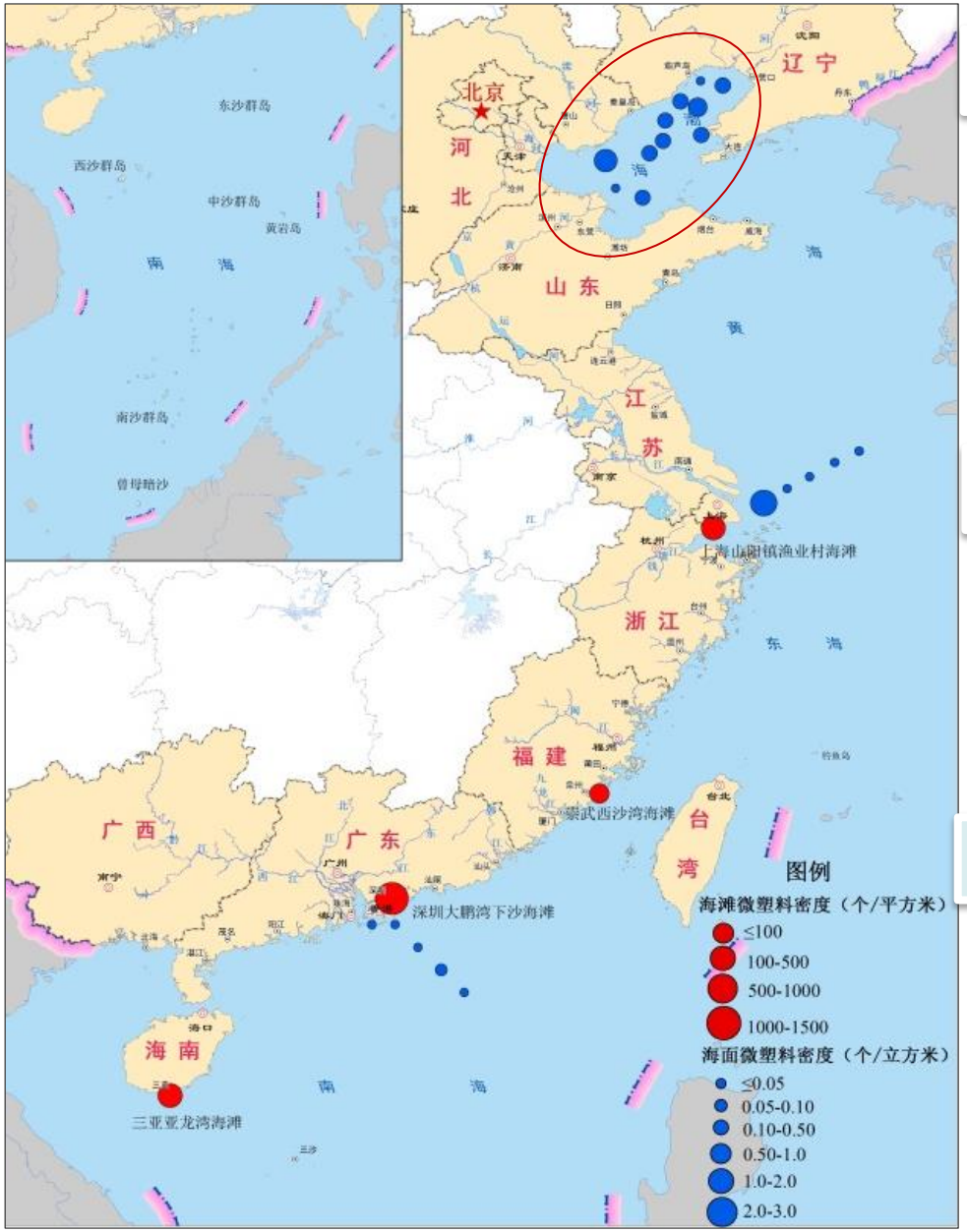
Beach Debris (items/100 m^2)



Benthic Debris (items/km^2)



SOA's Marine Micro-Debris Monitoring Program



MPs distribution in 2016

MPs in surface waters

Density: 0.29 (0.001-2.35) particles/m^3

Component: PE, PP and PS;

Color: white, blue;

Shape: line, film, fragment, foam

MPs on beaches

Density: 100 - 1208 particles/m^2

Component: PE, PP, PS, PET, PVC.

Shape: fragment, film, fiber.

MPs in shellfish: 0.26 particle/g (WW)

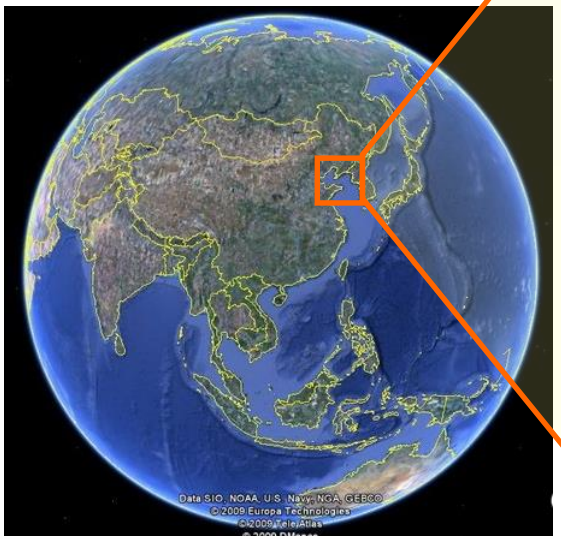
Sinonovacula constricta:0.16 particle/g

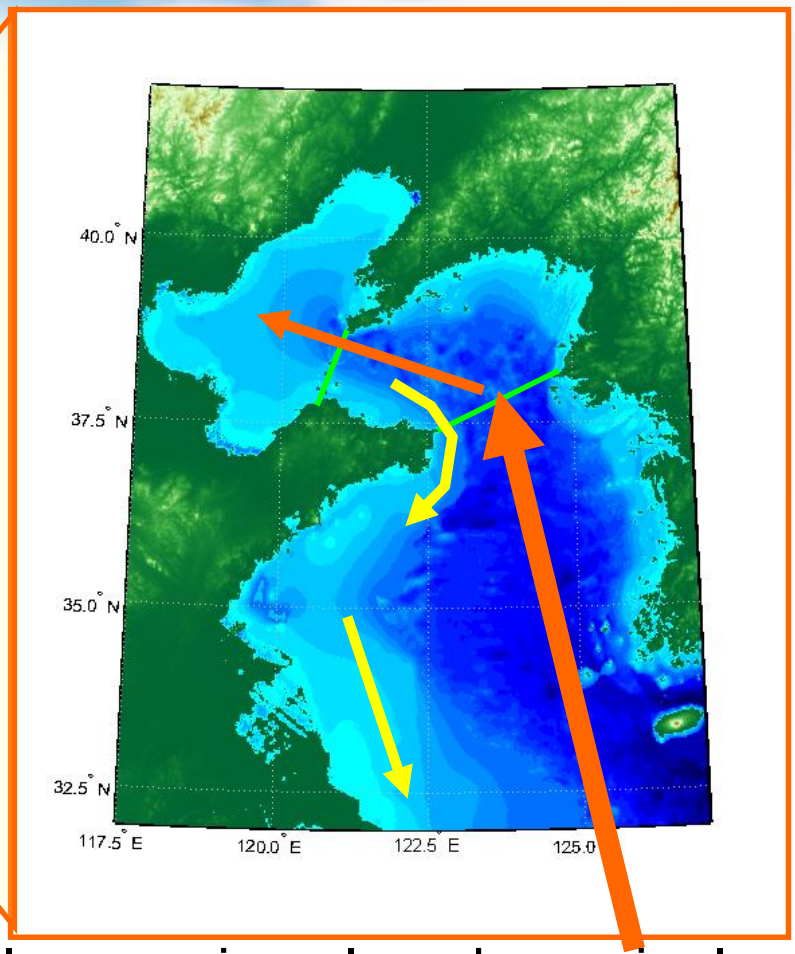
Ruditapes philippinarum:0.49 particle/g

Perna viridis:0.12 particle/g

Bohai Sea

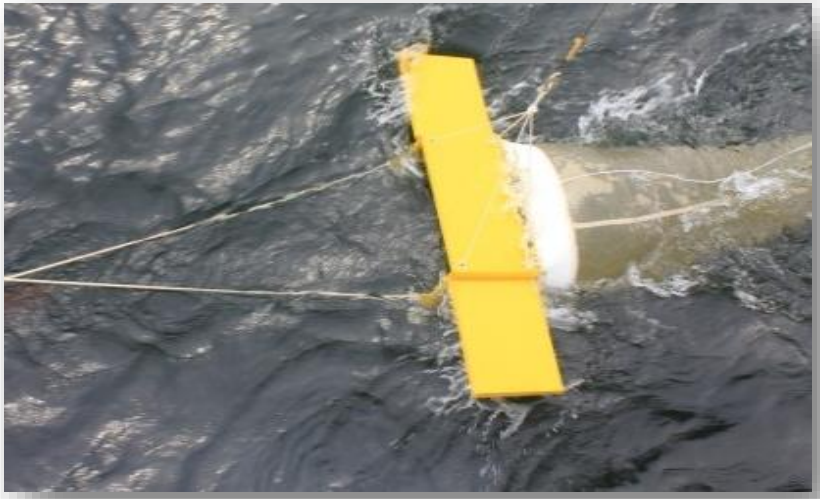
Low water exchange capacity



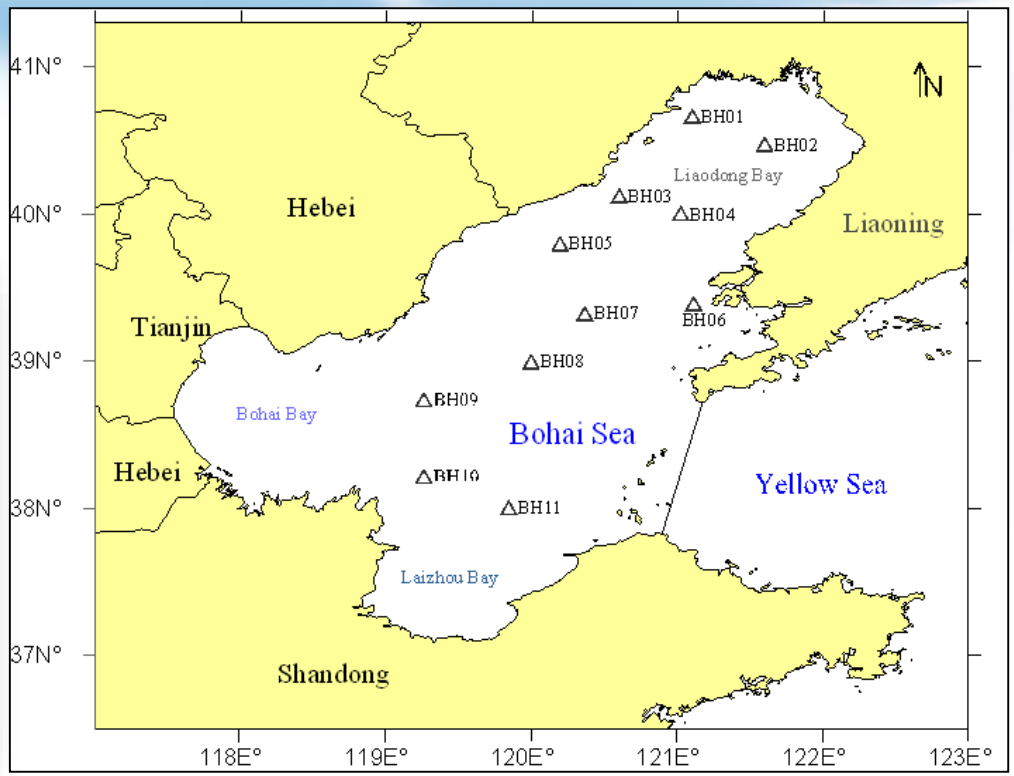


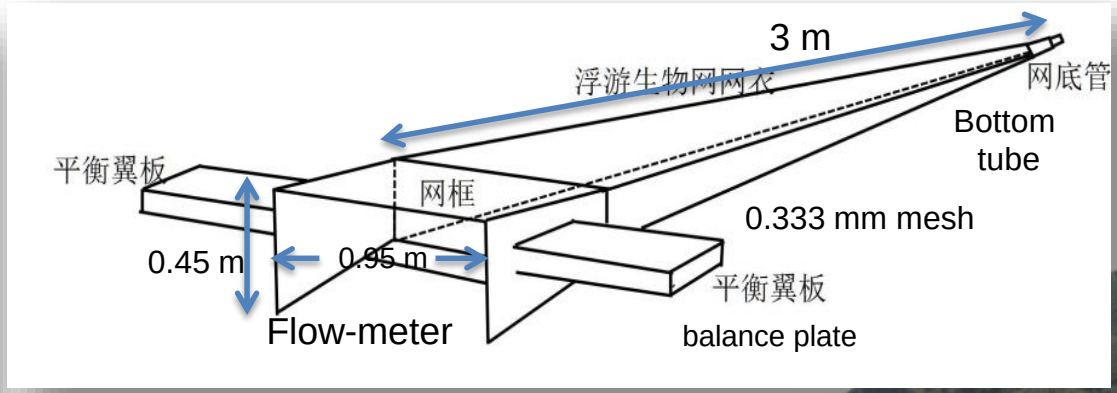
The Bohai Sea (BHS) is a shallow semi-enclosed marginal sea of the NW Pacific, with an area of about 77×10^3 km^2, average depth of 18m, and coastal line length of nearly 3800 km (Sun, 2006).

Floating MPs samples were collected at 11 stations during August 17 to 22, 2016.

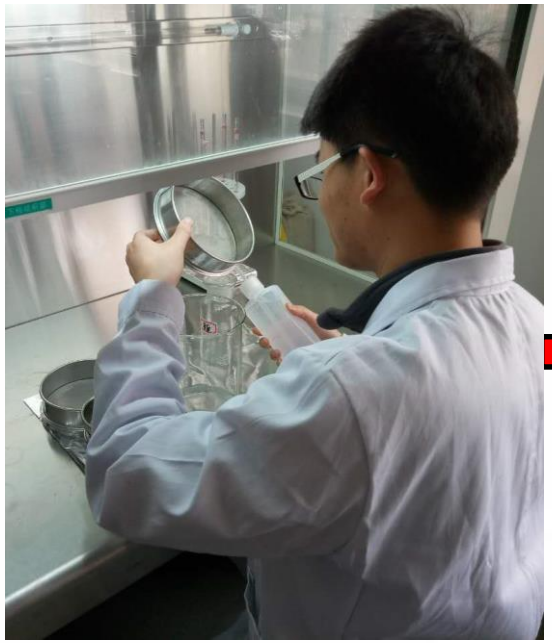


15 minutes at ～1.5-2.0 knots





Laboratory Analysis of MPs



Wet sieve

Pour the sample through stacked 5.0 mm and 0.3 mm stainless steel mesh sieves..

Wet peroxide oxidation

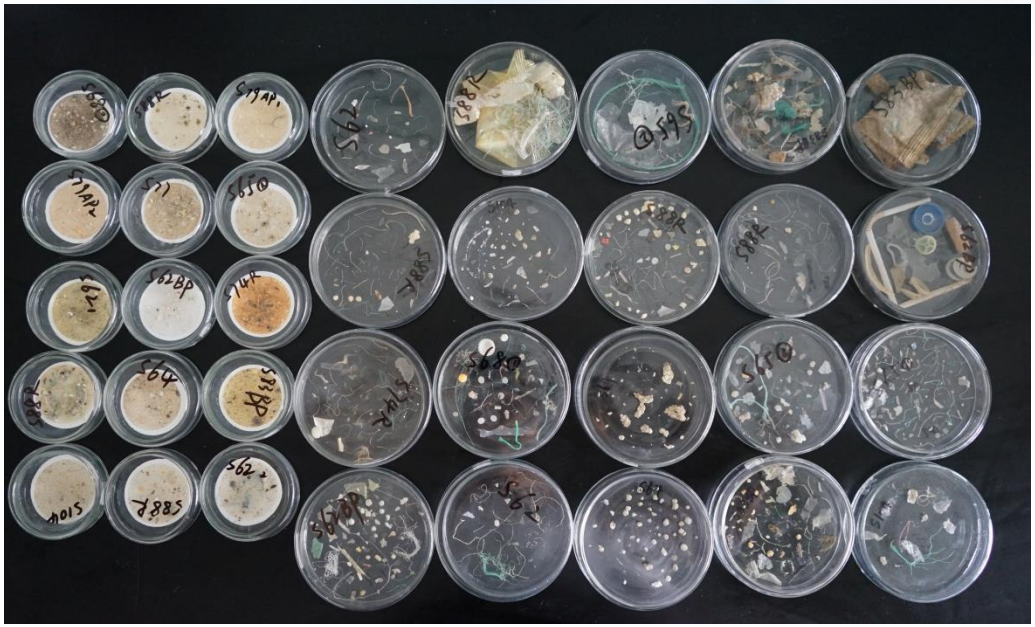
Add aqueous 0.05 M Fe(II) + 20 mL of 30% H_2O_2. Heat at 75℃ for 30 min to removal natural organic.

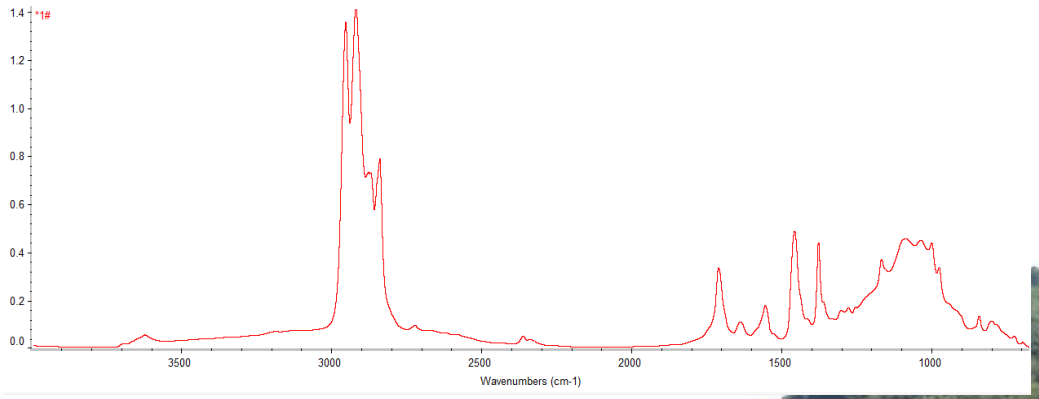
Filtering

Solid float on surface of the mixed solution were filtrated with glass fiber filter (0.7μm).

Microscope Exam and FTIR Analysis

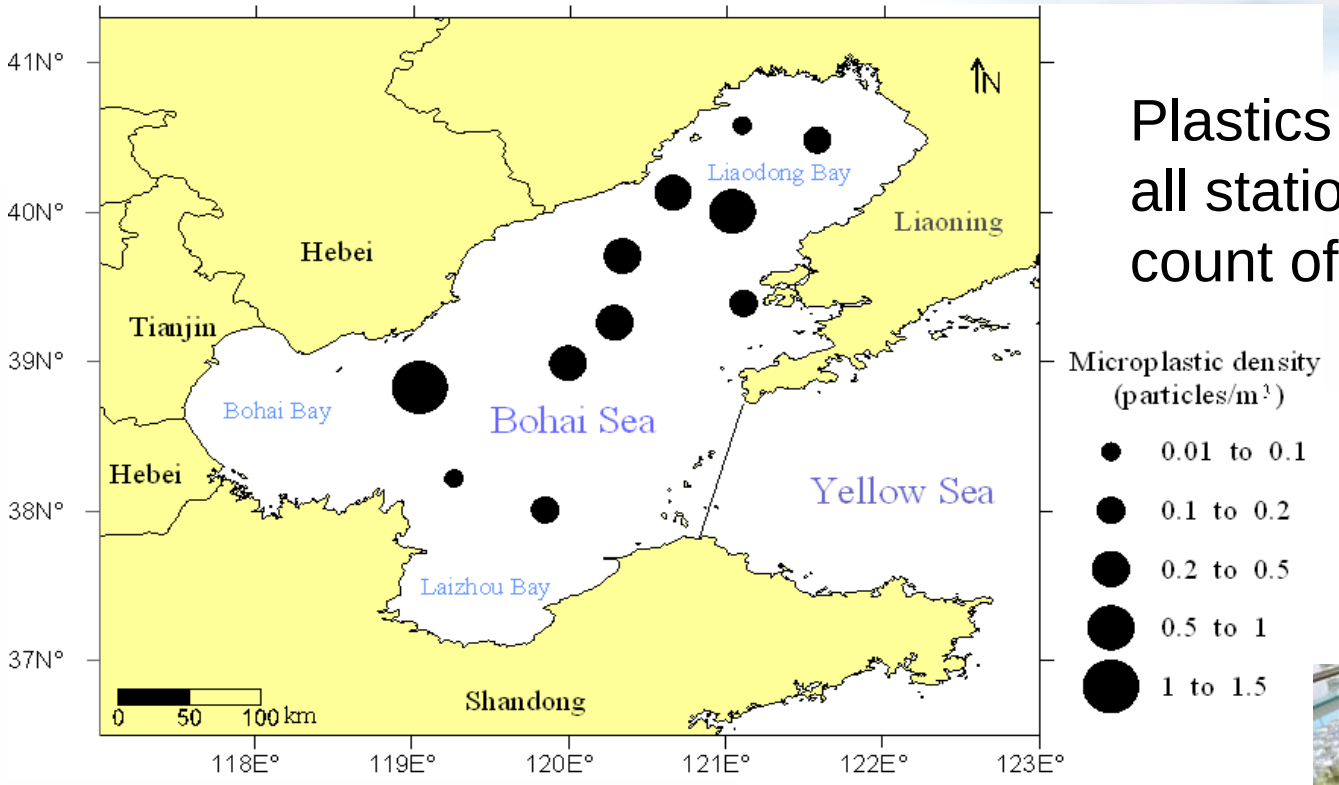
Stereoscopic microscope





Fourier Transform Infrared Spectroscopy

Microplastics abundance



Plastics were collected at all stations, with a total count of 2,925 fragments

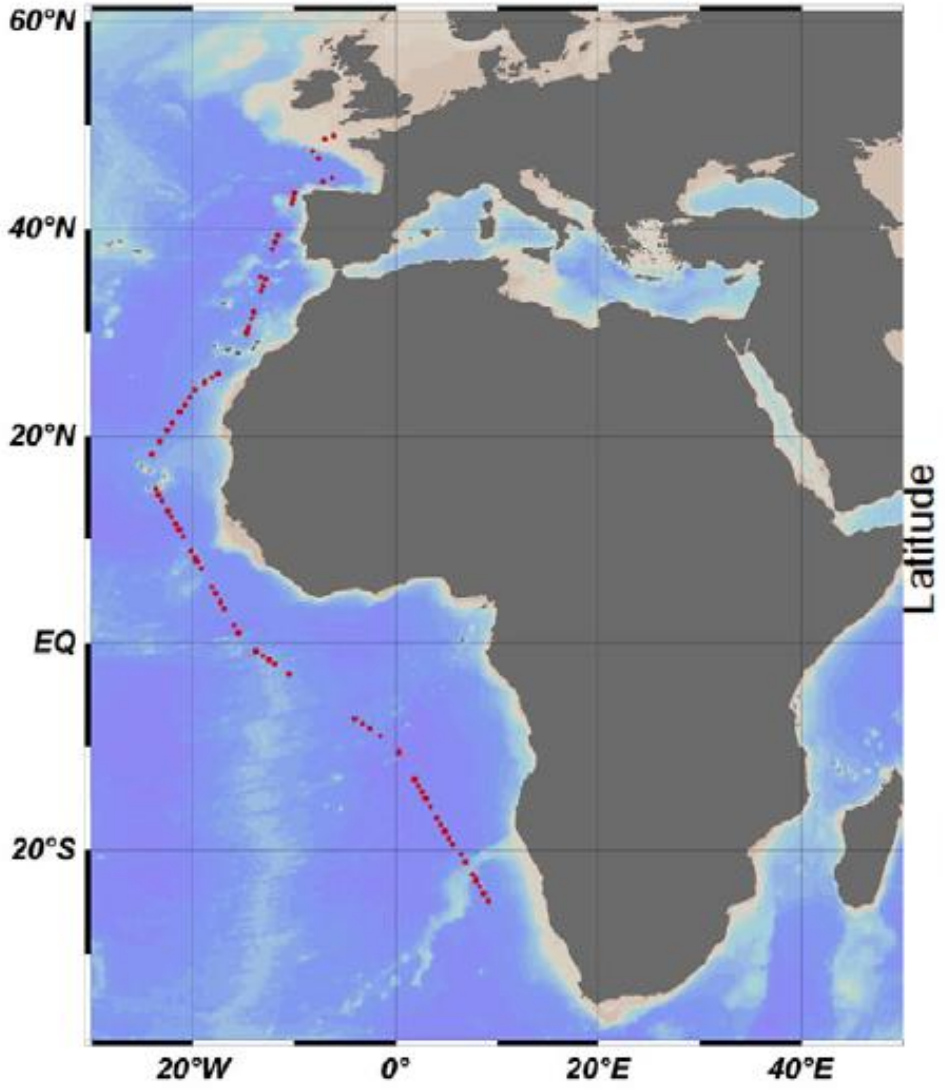
MPs was about 1600, accounted for 55%

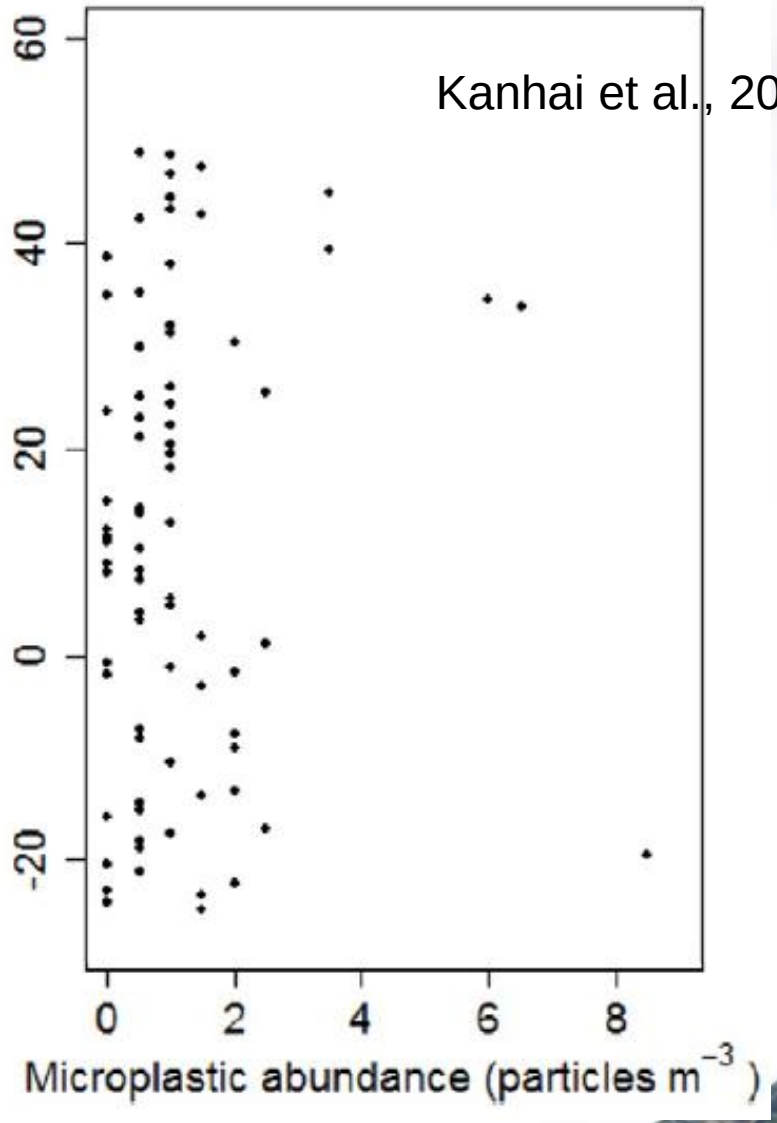
Average abundance of all plastic samples: 0.60 ± 0.71 particle/m^3.

MPs: 0.33 ± 0.36 (ranged 0.01–1.23) particle/m^3

Under review

ranged from 0 to 8.5 particles m^{-3}, average 1.15 ± 1.45 particles m^{-3}





Map of sampling locations and microplastic abundance along the north/south transect in the Atlantic Ocean.

frontiers in Marine Science

ORIGINAL RESEARCH
published: 26 May 2017
doi: 10.3389/fmars.2017.00135

Microplastics Baseline Surveys at the Water Surface and in Sediments of the North-East Atlantic

Thomas Maes[1,2], Myra D. Van der Meulen[3], Lisa I. Devriese[4], Heather A. Leslie[2], Arnaud Huvet[5], Laura Frère[6], Johan Robbens[4] and A. Dick Vethaak[3]*

Maes et al., 2017

Microplastic contamination was determined in sediments of the Southern North Sea and floating at the sea surface of North West Europe. Floating concentrations ranged between 0 and 1.5 microplastic/m^3, whereas microplastic concentrations in sediments ranged between 0 and 3,146 particles/kg dry weight sediment. In sediments, mainly fibers and spheres were found, whereas at the sea surface fragments were dominant. At the sea

Bohai:MPs density ranged 0.01–1.23 particle/m^3.

3. MPs research in China

Environmental Pollution 206 (2015) 597–604

Contents lists available at ScienceDirect

Environmental Pollution

journal homepage: www.elsevier.com/locate/envpol

Microplast

Shiye Zhao**,

State Key Laboratory o

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Microplastic
Estuary
Typhoon
Raman spectroscopy
Pollution

Marine Pollution Bulletin xxx (2014) xxx–xxx

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Environmental Pollution xxx (2016) 1–9

Baseline

Suspended micı
System, China:

Shiye Zhao, Lixin Zh

State Key Laboratory of Estuarine

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Marine debris

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Environmental Pollution

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Microplastic:

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Occurrence of
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Xubiao Yu [a, *], Jin

[a] Faculty of Architectural, Civi
[b] Faculty of Chemical Enginee
[c] The School of Coastal and M

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Marine pollution
Contaminant
Plastic
Chinese coast
Bohai Bay

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Microplastics in musse

Jiana Li [a], Xiaoyun Qu [a], Lei S
Daoji Li [a], Huahong Shi [a, *]

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[b] Division of Marine Chemistry, National Marine

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Science of the Total Environment 550 (2016) 1110–1115

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Science of the Total Environment

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Short Communication

Microscopic anthropogenic litter in terrestrial birds from Shanghai, China: Not only plastics but also natural fibers

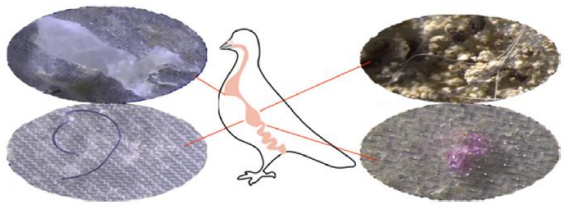
Shiye Zhao, Lixin Zhu, Daoji Li *

State Key Laboratory of Estuarine and Costal Research, East China Normal University, 3663 North Zhongshan Road, Shanghai 200062, China

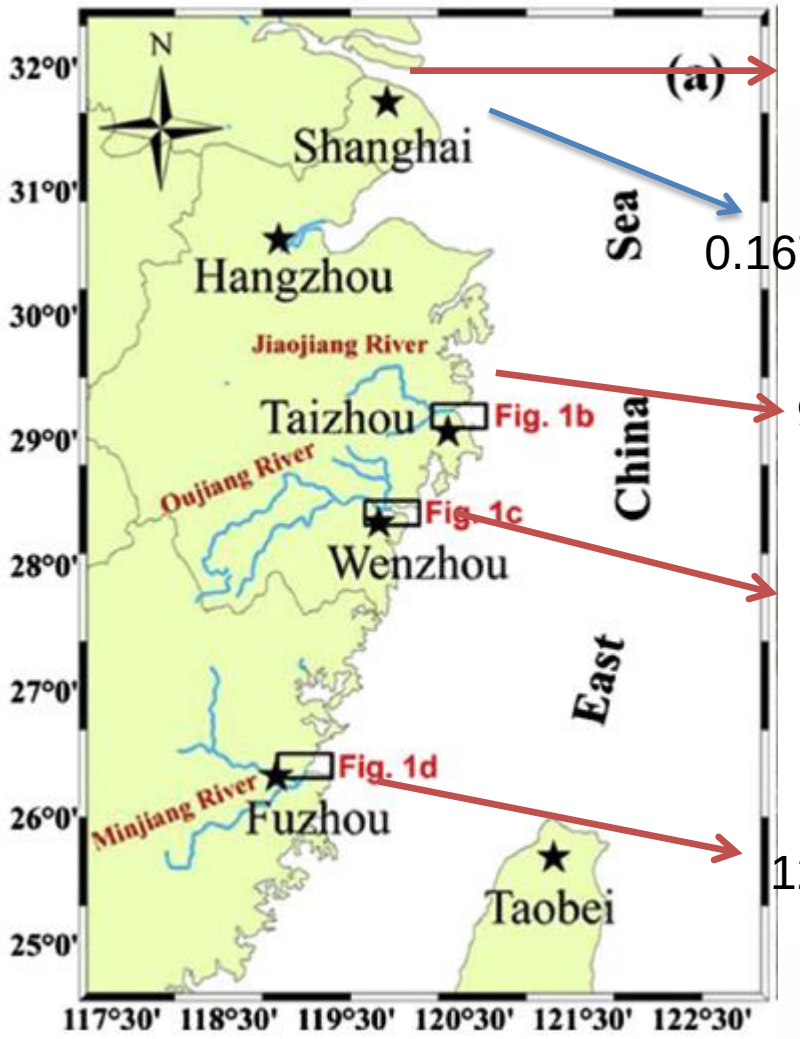
HIGHLIGHTS

- Microscopic litter in the digestive tracts of terrestrial birds is firstly studied.
- Natural fibers (136 items) accounted for 37.4% of the total microscopic litter.
- Two hundred fibers and 28 fragments were classified as microplastic particles.
- Microscopic litter was ubiquitous in the terrestrial ecosystem of the study area.

GRAPHICAL ABSTRACT



MP in Surface Water



MP abundance:
4137.3 ± 2461.5 n/m^3

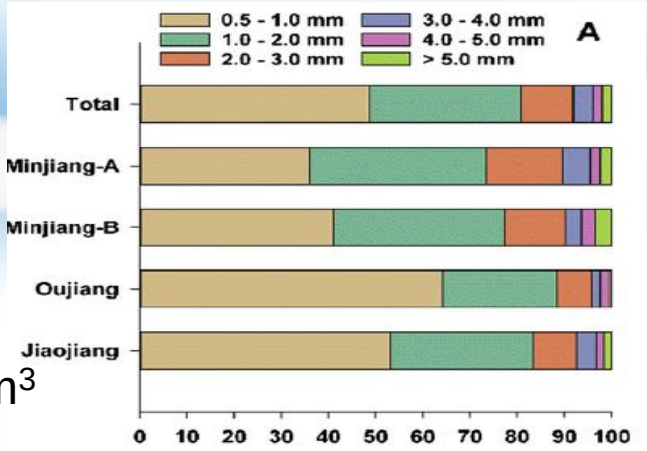
0.167±0.138 n/m^3

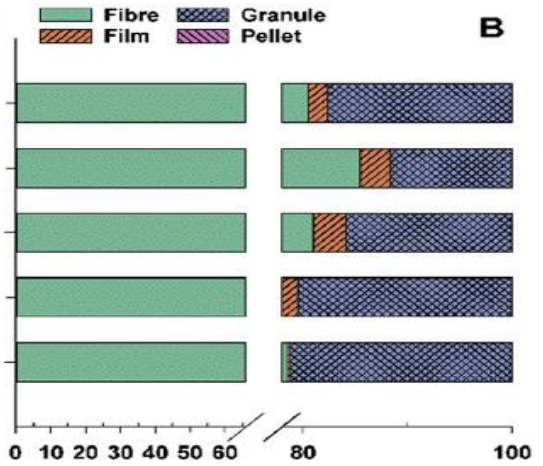
955.6 ± 848.7 n/m^3

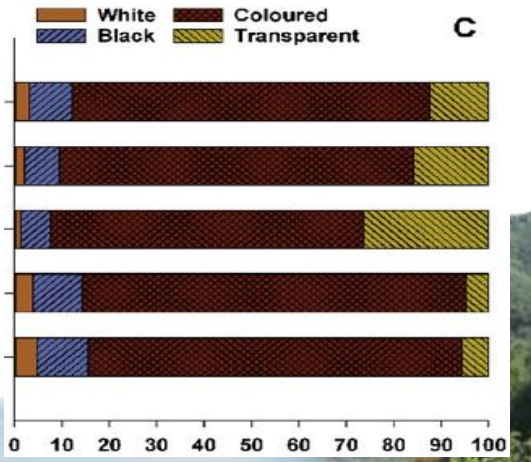
680.0 ± 284.6 nm^3

1245.8 ± 531.5 n/m^3

Zhao et al.,2014; 2015







MPs on Beach

Marine Pollution Bulletin 98 (2015) 274–280

Contents lists available at ScienceDirect

Marine Pollution Bulletin

journal homepage: www.elsevier.com/locate/marpolbul

Baseline

Occurrence of microplastics in the coastal marine environment: First observation on sediment of China

Qiongxuan Qiu [a], Jinping Peng [a,*], Xubiao Yu [b], Fangchaizi Chen [a], Jundong Wang [a], Fenqiang Dong [a]

[a] Faculty of Chemical Engineering and Light Industry, Guangdong University of Technology, Guangzhou 51006, China
[b] The Belle W. Baruch Institute of Coastal Ecology and Forest Science, Clemson University, Georgetown 29440, USA

Table 2
Incidence of microplastics in sediments of China (number of items per 50 g dry sediment).

Sites	Place	No.	Long class	Middle class	Short class	Total
S1	Shapawan	1	45	80	150	275
		2	44	60	112	216
		3	49	58	154	261
		Average	46	66	138.7	250.7
S2	Haikou	1	26	82	153	261
		2	83	212	295	590
		3	61	107	171	339
		Average	56.7	133.7	206.3	396.7
S3	Wanning	1	77	85	148	310
		2	118	134	137	389
		3	165	222	221	608
		Average	120	147	168.7	435.7
S4	Sanya	1	164	175	185	524
		2	39	62	119	220
		3	61	76	150	287
		Average	88	104.3	151.3	343.6
S5	Beihai	1	99	101	138	338
		2	66	56	117	239
		3	93	94	148	335
		Average	86	83.7	134.3	304

Fig. 1. Location of sampling sites.

Qiu et al., 2015

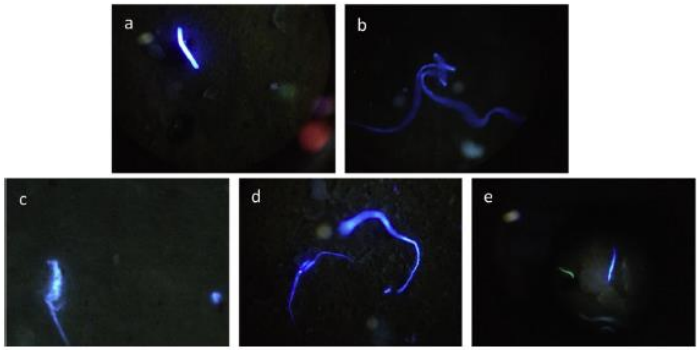
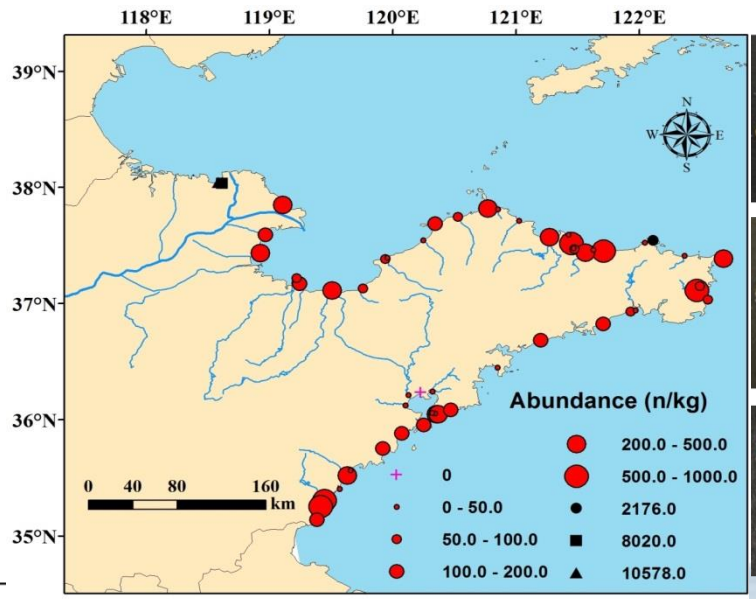


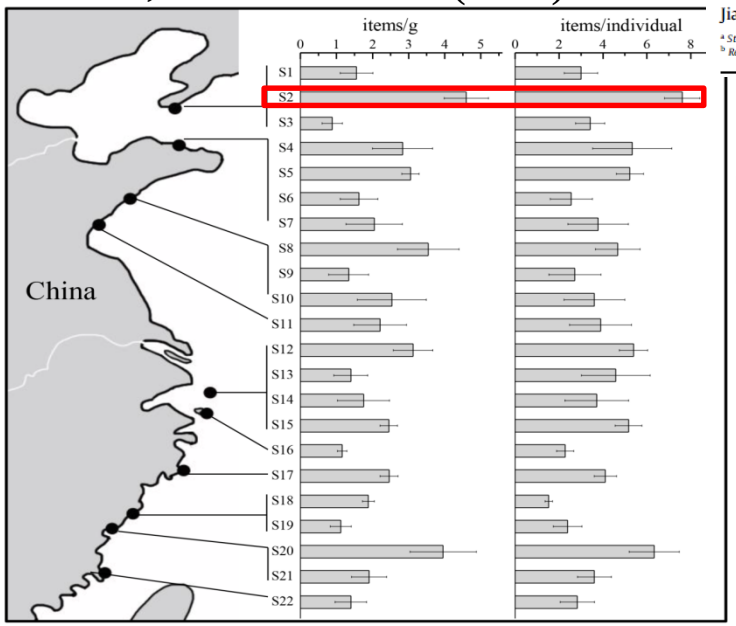
Fig. 5. Images of microplastics by an upright fluorescence microscope from Shapawan (a), Haikou (b), Wanning (c), Sanya (d), and Beihai (e).

Zhang *et al.*, 2016



MP in Shellfish

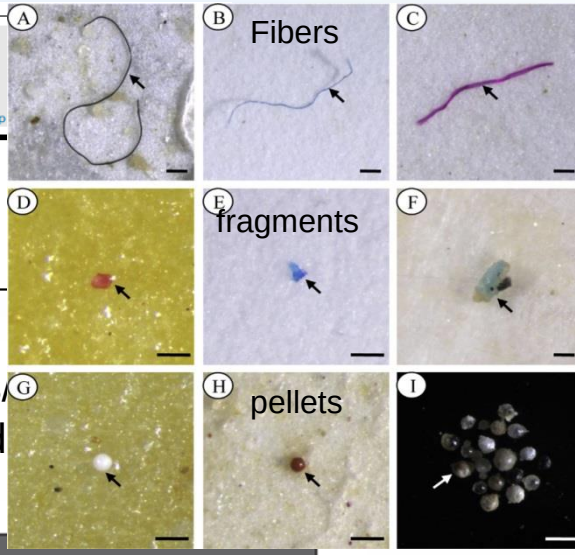
Li et al., *Environ. Pollut.* (2016)



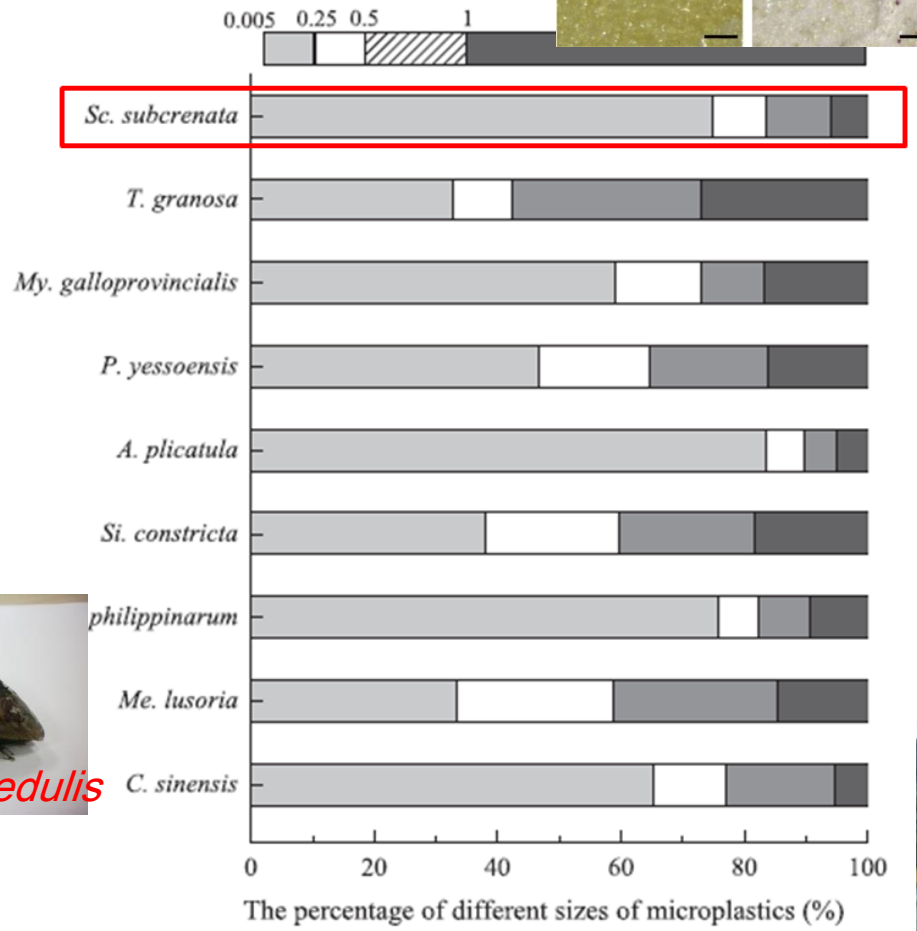
Contents lists available at ScienceDirect
Environmental Pollution
journal homepage: www.elsevier.com/locate/envp

Microplastics in commercial bivalves from China

Jiana Li [a], Dongqi Yang [a], Lan Li [b], Khalida Jabeen [a], Huahong Shi [a,*]
[a] State Key Laboratory of Estuarine and Coastal Research, East China Normal University, Shanghai 200062, China
[b] Research Center for Analysis and Measurement, Donghua University, Shanghai 201620, China



MP Varied 2.1 - 10.5 items/
and 4.3 - 57.2 items/individ



Variation Range:
0.9 - 4.6 items/g;
1.5 - 7.6 items /individual

Average Density:
2.2 items/g;
4.0 items/individual

National Marine Environme

POPs carried on MP

Marine Pollution Bulletin 99 (2015) 28–34

Contents lists available at ScienceDirect

Marine Pollution Bulletin

journal homepage: www.elsevier.com/locate/marpolbul

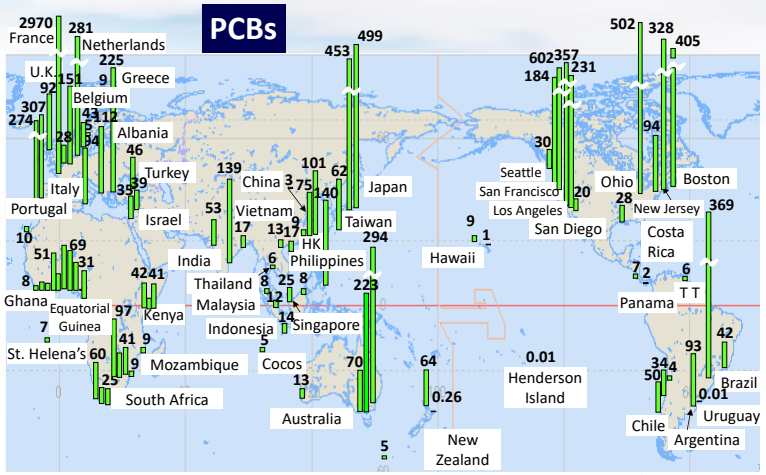
Persistent organic pollutants carried on plastic resin pellets from two beaches in China

Weiwei Zhang[a,b], Xindong Ma[b], Zhifeng Zhang[b], Yan Wang[b], Juying Wang[b], Jing Wang[c], Deyi Ma[d,*]

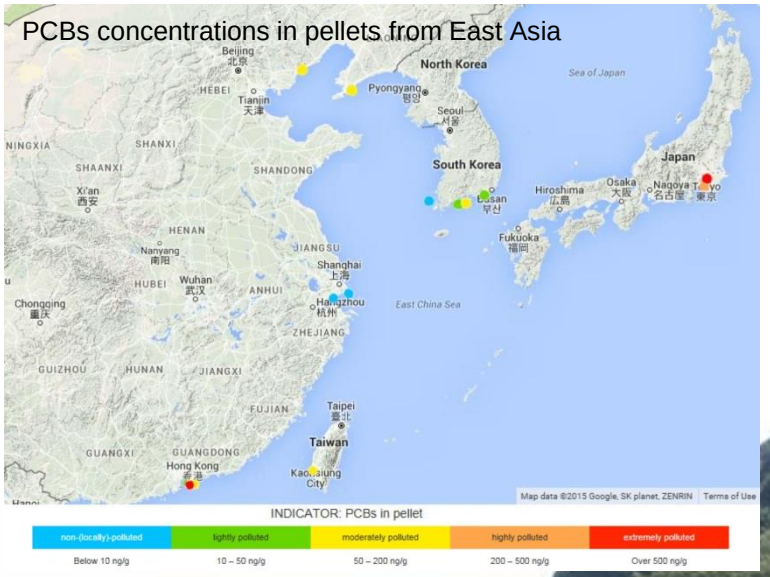
[a] Ocean University of China, Songling Road 238, Qingdao 266100, China
[b] National Marine Environmental Monitoring Center, Linghe Street 42, Dalian 116023, China
[c] China Protection Association of Environment al Industry, Building A-4, Kouzhongbeili, Xicheng District, Beijing 100037, China
[d] First Institute of Oceanography, State Oceanic Administration, China, No. 6, Xianxialing Road, Qingdao 266061, China

The collected pellets were analyzed for PAHs, PCBs, HCHs, DDTs, chlordane, heptachlor, endosulfan, aldrin, dieldrin and endrin.

Microplastic collected from beaches

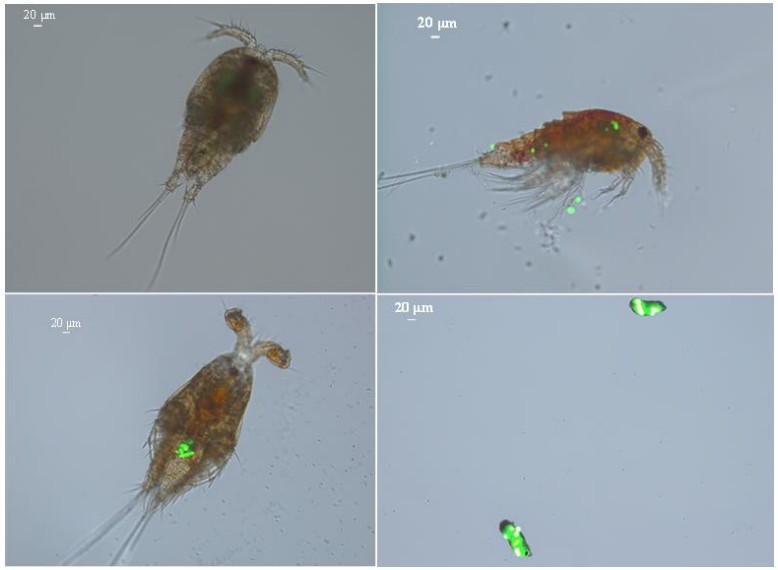


"International Pellet Watch" (Takada, 2015)



Biologicall effects of MPs

MPs Ingestion of microplastics on copepod *Tigriopus japonicus*



Unpublished data

Photographs of accumulation and egestion of fluorescent polystyrene microspheres in marine medaka

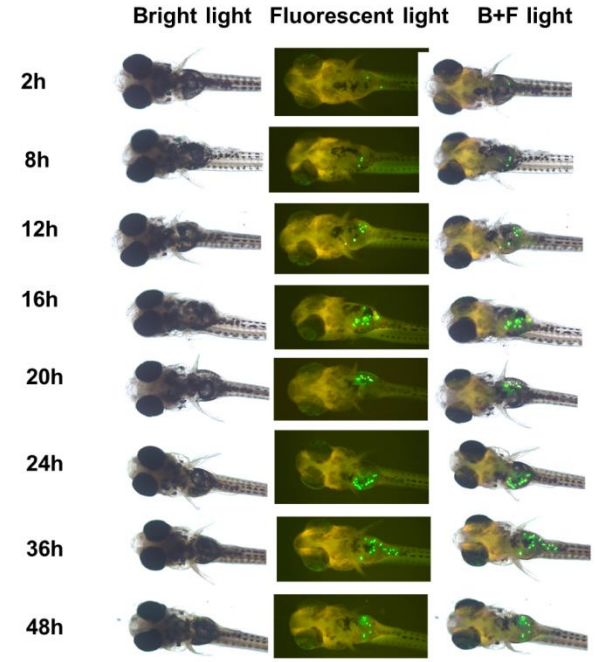
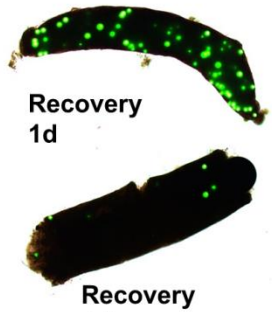


Fig 1. Photographs of accumulation and egestion of fluorescent polystyrene microspheres in marine medaka

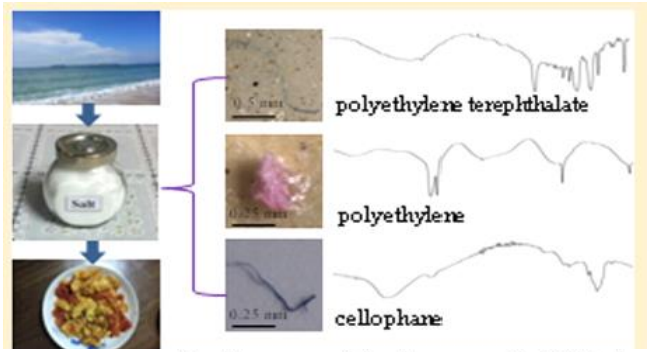


Fluorescent polystyrene microspheres in marine medaka feces

Unpublished data,

MP in Table salt

MPs: 550−681 particles/kg in sea salts;



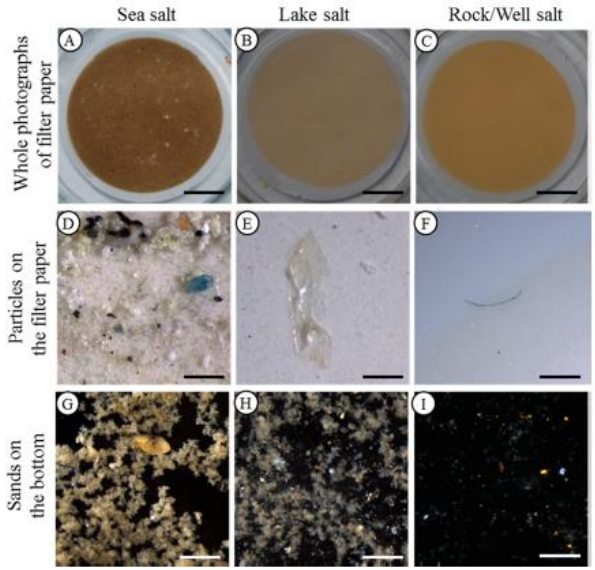


Figure 1. Photographs of the total particles isolated from table salts. A−C, the particles in the salt solution without separation; D−F, the particles in the supernatant of the salt solutions. More particles were observed in sea salts (D) than lake salts (E) and rock/well salts (F); G−I, the particles at the bottom of the bottle after removal of the supernatant. Scale bar = 10 mm (A−C) or 0.2 mm (D−I).

Environmental Science & Technology

Article

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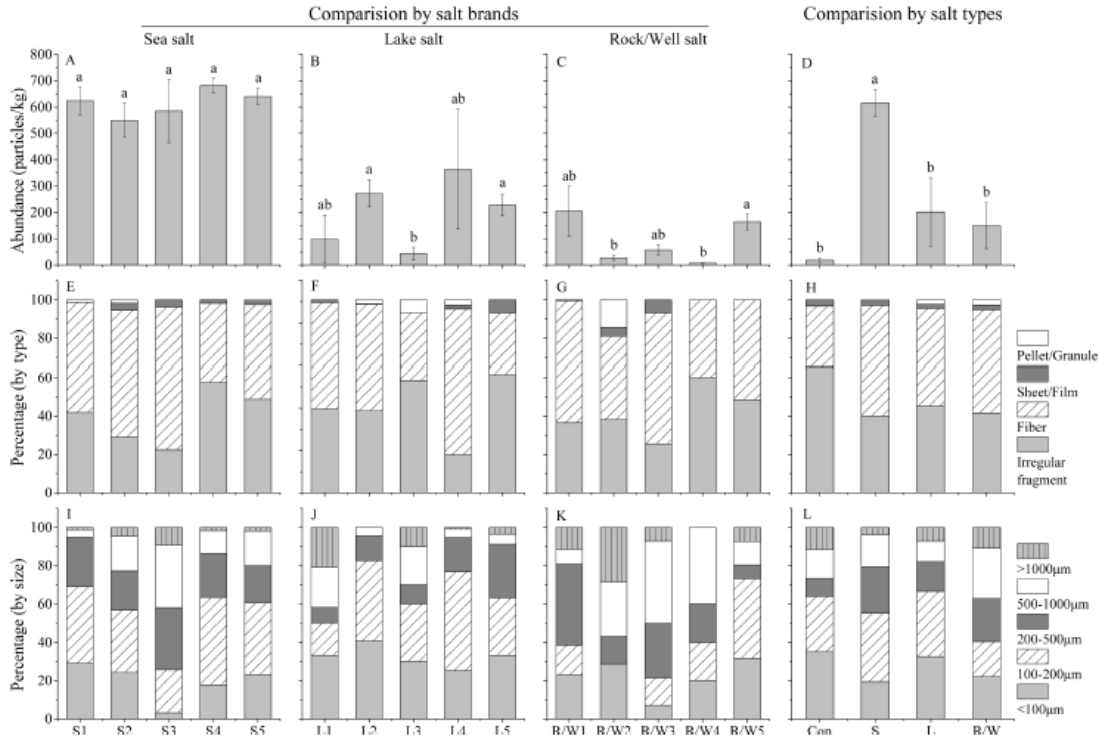
Microplastic Pollution in Table Salts from China

Dongqi Yang,[†] Huahong Shi,[*,†] Lan Li,[‡] Jiana Li,[†] Khalida Jabeen,[†] and Prabhu Kolandhasamy[†]

[†]State Key Laboratory of Estuarine and Coastal Research, East China Normal University, Shanghai 200062, China

[‡]Research Center for Analysis and Measurement, Donghua University, Shanghai 201620, China



The presence of MP in commercial salts from different countries

- Extracted MP-like particles larger than 149 μm from 17 salt brands originating from 8 different countries;
- MP were absent in one brand while others contained between **1 to 10** MPs/Kg of salt.
- Particle size (mean ± SD) was 515 ± 171 μm.
- The low level of anthropogenic particles intake from the salts (maximum **37** particles per individual per annum) warrants negligible health impacts.

149 μm pore size to filter

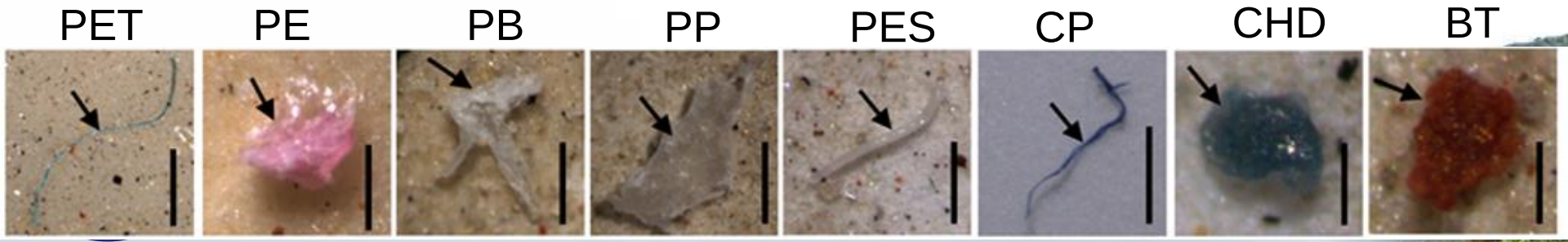
Karami et al., 2017

https://www.nature.com/srep/

MPs in Table Salts from China

Yang et al., 2015

- MPs content was 550−681 particles/kg in sea salts;
- fragments and fibers were the prevalent types of particles compared with pellets and sheets.
- MPs measuring less than 200 μm represented the majority of the particles, accounting for 55% of the total MPs
- most common MPs were polyethylene terephthalate, followed by polyethylene and cellophane in sea salts.
- **5 μm pore size**, 47 mm cellulose nitrate filter paper using a vacuum system.



4. Conclusions

- Governance at local, regional, national, and global scales;
- Rationalization of monitoring
  - ✓ Develop comparable and coherent monitoring standards and baselines, harmonized protocols
  - ✓ Indicators for monitoring
  - ✓ Intercalibrations between regional and overlapping indicators species
  - ✓ New approaches for monitoring: automated

4. Conclusions

- Research priority
  - ✓ Develop model for MD transportation:
    Accumulation areas, source/fate
  - ✓ Rish assessment:
    Better understand the environmental consequences of marco- and micro- MD on wildlife, ecosystem and the food chain.
    Evaluate effects/enable definition of threshold levels.

Thanks for your attention!

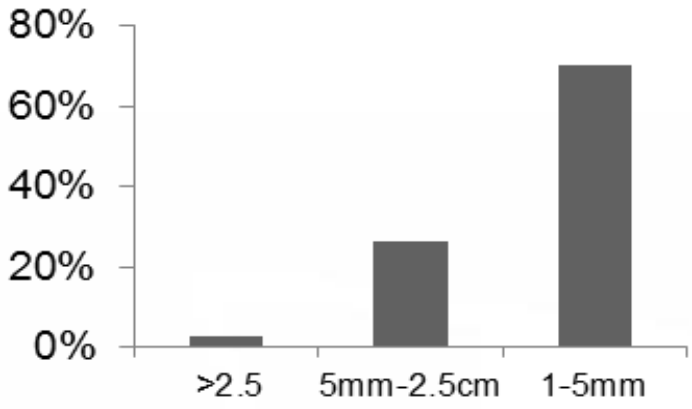
MP in Surface Water

Location	item/m^3	Reference
N. Pacific SG	32.76	Goldstein et al., 2012
N. Pacific G	2.23	Moore et al., 2001
N. Pacific offshore	0.43-2.23	Moore et al., 2005
N. Pacific inshore	5-7.25	Moore et al., 2005
Southern Californian	3.92	Lattin et al., 2004
East Asian Seas	3.7	Isobe et al., 2015
NE Atlantic	2.46	Lusher et al., 2014
N. Atlantic (accumulation area)	1.7	Reisser et al., 2015
Italian Coast	0.62	Fossi et al., 2012
Plymouth, UK	<0.04	Thompson et al., 2004
Seto Inland sea	0.39	Isobe et al., 2014
Bohai Sea	**0.33**	**Our study**
Arctic polar waters	0.34	Lusher et al., 2015
East China Sea	0.167	Zhao et al., 2014
Mediterranean Sea	0.15	De Lucia et al., 2014
N. Pacific	0.12	Goldstein et al., 2012
Southern Oceans	0.099	Isobe et al., 2016

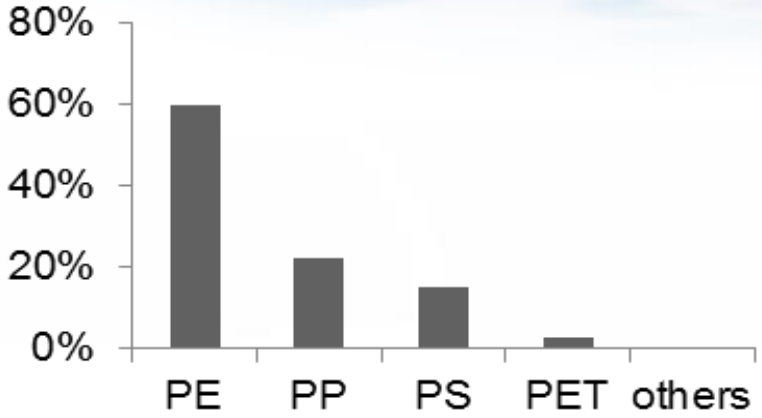
Area	References	Analysis /Concentration
Taihu Lake, China	Su et al., 2016	Plankton net samples: 0.01×10^6 ~ 6.8×10^6 n/km^2 Surface water： 3.4 ~ 25.8 items/L
Three Gorges Dam, China	Zhang et al., 2015	Main stream: 3407.7 $\times10^3$ to 13,617.5 $\times10^3$ n/km^2 Tributary: 192.5 $\times10^3$ to 11,889.7 $\times10^3$ n/km^2
Yangtze Estuary,	Zhao et al., 2014	4137.3 ± 2461.5 n/m^3
Estuaries, China	Zhao et al., 2015	Jiaojiang： 955.6 ± 848.7 n/m^3 Oujiang： 680.0 ± 284.6 n/m^3 Minjiang： 1245.8 ± 531.5 n/m^3

Location	Microplastic abundance (particles per m^3)	Method for surface waters (unless otherwise indicated)	Study
Arctic Ocean			
Svalbard, Norway	0.34 ± 0.31; 0–1.31 (mean, range) 2.68 ± 2.95; 0–11.5 (mean, range)	Manta trawl (333 µm) Underway system (250 µm)[a]	Lusher et al. (2015)[1]
Pacific Ocean			
Southern California, USA	7.25 (mean)	Manta trawl (333 µm)	Moore et al. (2002)
Santa Monica Bay, USA	3.92 (mean)	Manta net (333 µm)	Lattin et al. (2004)
South Californian current	0–3.141	Manta net (505 µm)	Gilfillan et al. (2009)
Southeast Bering Sea	0.004–0.19	Sameoto neuston/manta net (505 µm)	Doyle et al. (2011)
NP Subtropical Gyre	0.425 (median)	Manta net (333 µm)	Goldstein et al. (2012)
North eastern Pacific Ocean	279 ± 178 (mean)	Underway system (62.5–250 µm)a	Desforges et al. (2014)[2]
Geoje Island, South Korea	0.4–54	Manta trawl (330 µm)	Song et al. (2014)
East China Sea	0.167 ± 0.138 (mean)	Neuston net (333 µm)	Zhao et al. (2014)
Southern Sea of Korea	1.92–5.51; 2.3–38.77 (2012) 582–924; 10–375 (2013)	Manta trawl (330 µm) Hand Net (50 µm)	Kang et al. (2015a)
Geoje and Jinhae Bays, Korea	1.92 ± 1.84; 5.51 ± 11.2 (2012) 1.68 ± 0.81; 1.07 ± 0.34 (2013)	Manta Trawl (330 µm)	Kang et al. (2015b)
East Asian Sea	3.7 ± 10.4; 0.03–491 (mean, range)	Neuston net (350 µm)	Isobe et al. (2015)
Indian Ocean			
Southeast South Africa	257.9–1215	WP-2 type net (80 µm)	Nel and Froneman (2015)
Atlantic Ocean			
Bristol Channel, UK	0–100	Lowestoft plankton sampler (270 µm)	Morris & Hamilton (1974)
Offshore Ireland	2.46 ± 2.43; 0–22.5 (mean, range)	Underway system (250 µm)[b]	Lusher et al. (2014)[3]
Western English Channel	0.27	Plankton nets (200, 500 µm)	Cole et al. (2014)
Portuguese coastal waters	0.002–0.036	WP2 (180 µm), Neuston (280 µm), LH Plankton Recorder (335 µm)	Frias et al. (2014)
St. Peter/St. Paul Archipelago, Brazil	0.01	Plankton net (300 µm)	Ivar do Sul et al. (2013)
Western Tropical Atlantic Ocean	0.015–0.04	Manta trawl (300 µm)	Ivar do Sul et al. (2014)
North Atlantic Ocean	13–501	Underway system (10, 300 µm)[b]	Enders et al. (2015)[4]
Atlantic Ocean	1.15 ± 1.45; 0–8.5 (mean, range)	Underway system (250 µm)[b]	Kanhai et al.(2017)[5]
Mediterranean and European Seas			
West Coast, Sweden	167–2400 72–141	Plankton net (80 µm) Zooplankton net (450 µm)	Noren (2007)
West Sardinian Coast	0.15	Manta trawl (500 µm)	de Lucia et al. (2014)
Southwest Finland	0–0.74	Manta trawl (333 µm)	Magnusson (2014)
Baltic Sea	102–104	WP2 net (90 µm mesh)	Gorokhova (2015)

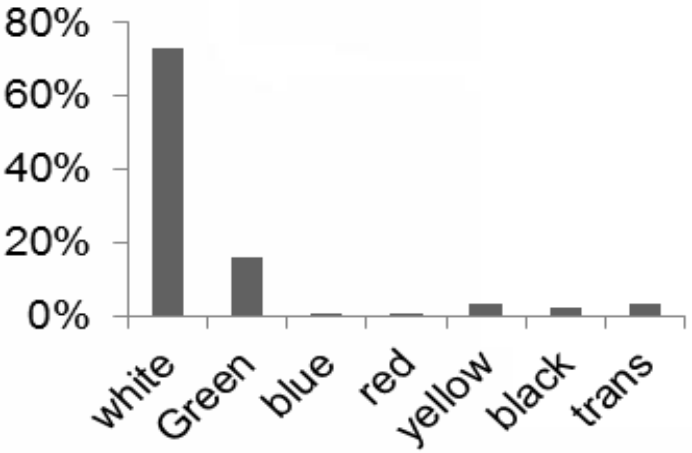
Plastics in the surface waters of Bohai Sea



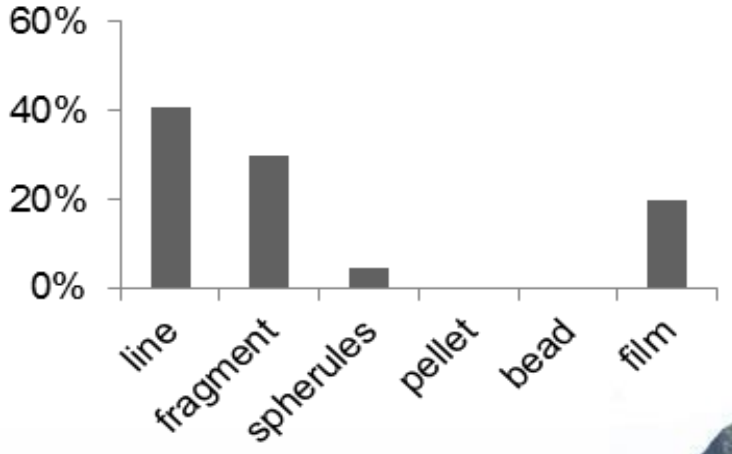
Size



Component



Color



Shape

Under review

Plastics are estimated to make up as much as 95 % of the marine litter found on coastlines, sea surface, and the ocean floor (Galgani et al., 2015.)

Marine Litter Cycle

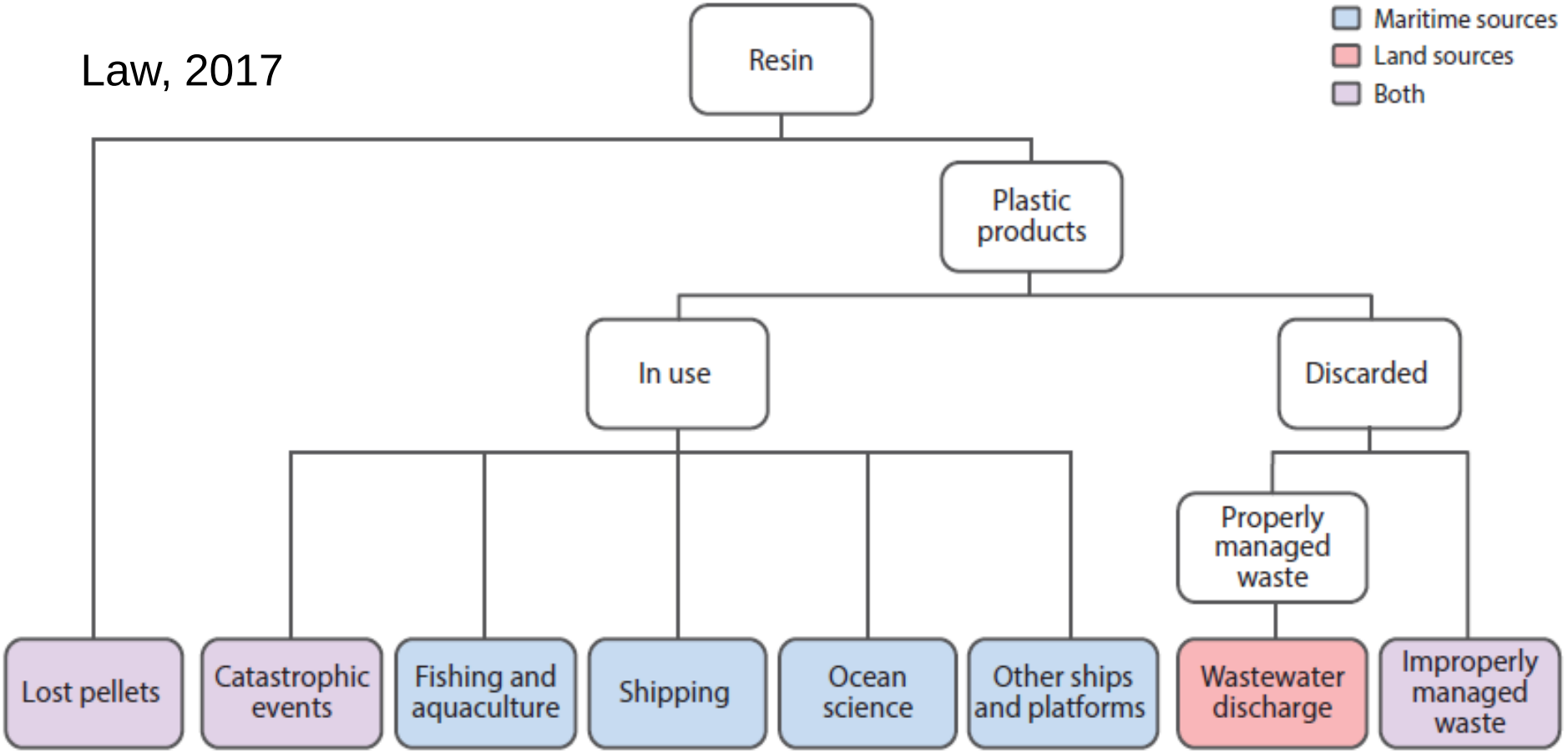
Urban waste

Floating Marine Macro Litter

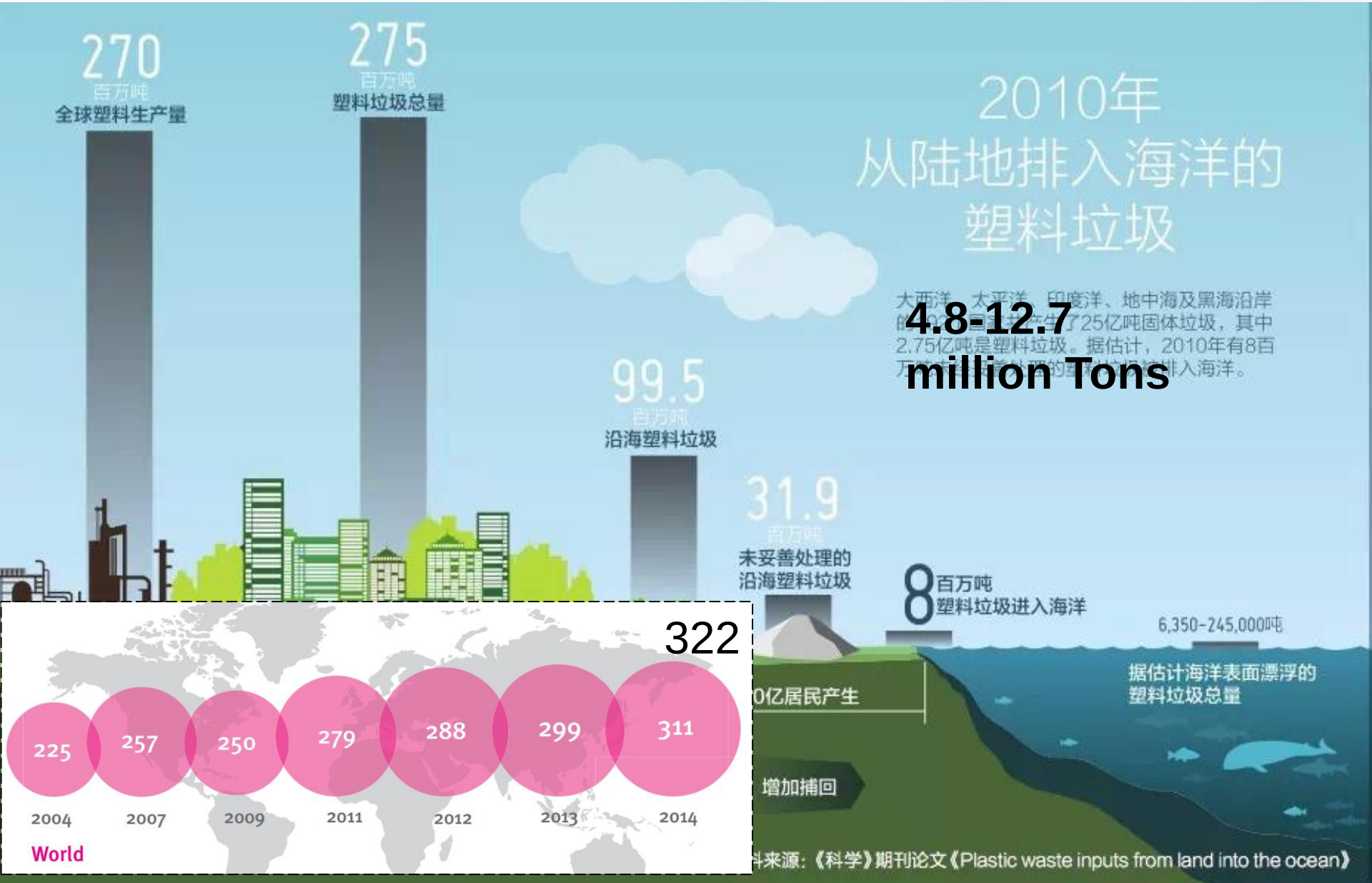
Industrial waste

Flow chart describing inputs of plastics into marine environ.

Law, 2017

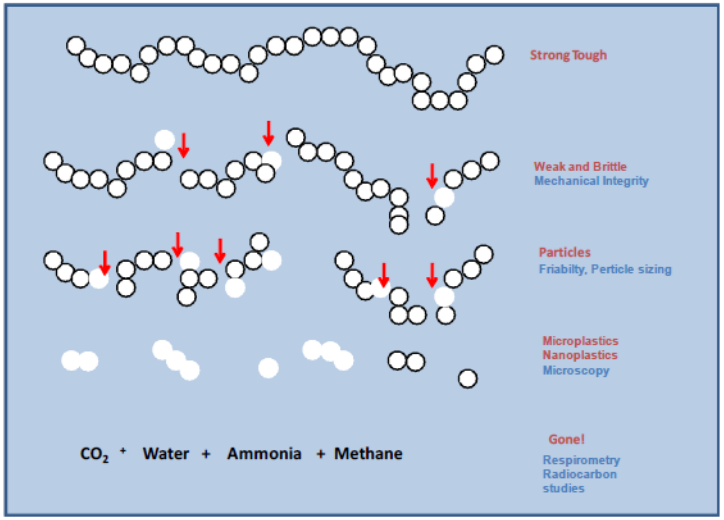


The exact quantity of plastic in the ocean and volumes entering the ocean from waste generated on land is unknown.



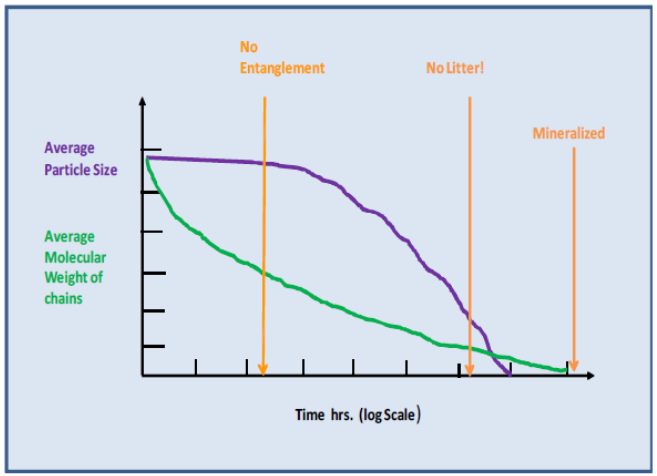
Everything made of plastic that ever enters the ocean will eventually become Micro plastic.

Simple model of polymer degradation

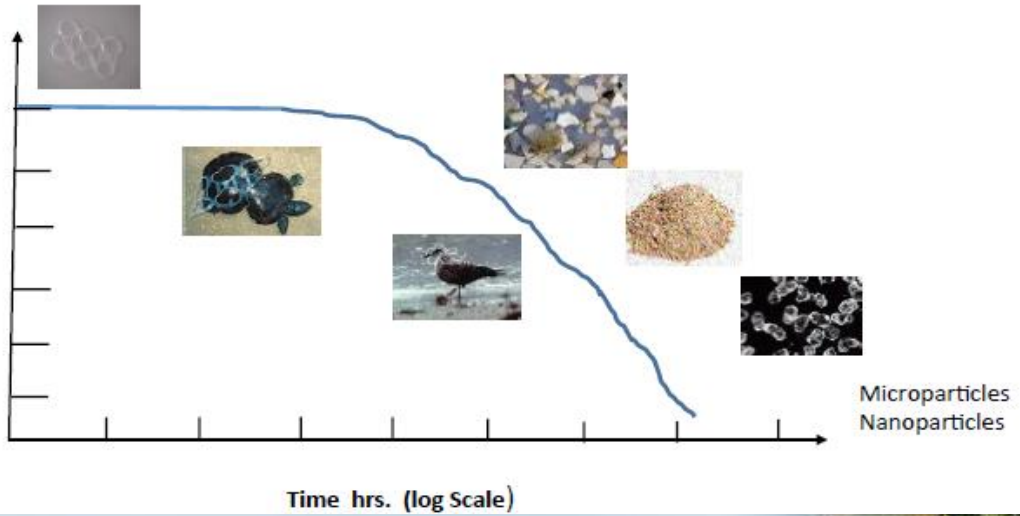


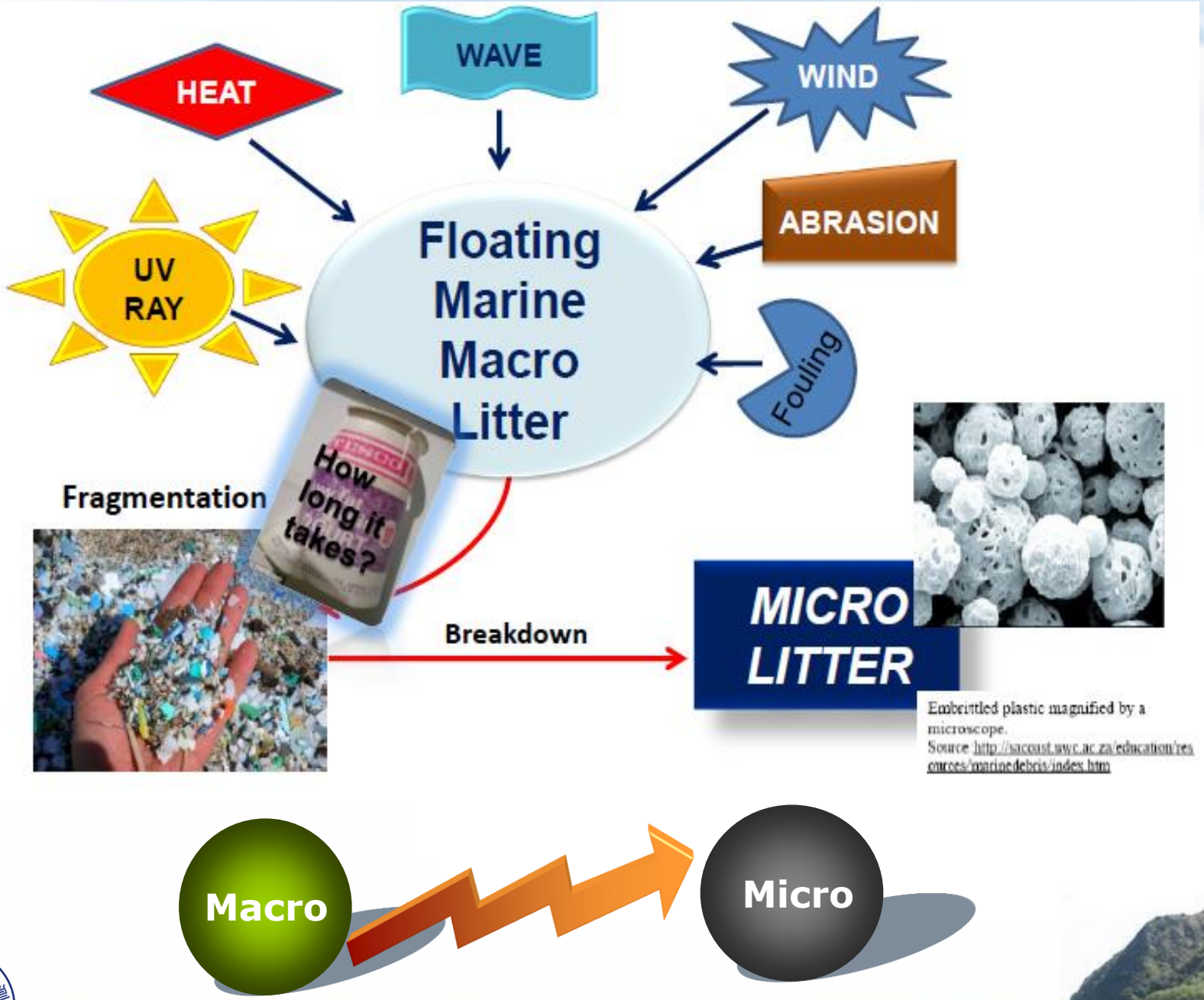
Tony Andrady

Schematic of size vs. effect over time



Weakening and Fragmentation




HEAT
WAVE
WIND
UV RAY
ABRASION
Floating Marine Macro Litter
Fouling
How long it takes?
Fragmentation
Breakdown
MICRO LITTER
Embrittled plastic magnified by a microscope.
Source http://sacoast.uwc.ac.za/education/resources/marinedebris/index.htm
Macro
Micro

Microplastic marine debris

2004，Thompson

E-business


为什么我叫绿色包裹呢?
白色污染的危害
侵占土地
污染空气
污染水源
无胶带纸箱
不产生由胶带缠绕带来的白色污染
更容易被回收再利用
全生物降解快递袋
H_2O
CO_2
H_2O
不再产生白色污染

EU: Regional Convention

- OSPAR – Convention for the Protection of the Marine Environment of the North-East Atlantic:
  - Regional Action Plan in 2014: reduction measures and targets, taking into consideration an ambitious target resulting in a reduction in 2020.
- 7th EAP and other EU Acquis (e.g. Waste, Port Reception Facilities Directive)
- EU/MSFD- Marine Strategy Framework Directive:
  - Properties and quantities of marine litter do not cause harm to the coastal and marine environment.

MSFD is most important legal framework for implementation of measures on Marine Litter.

Response To Marine Debris in China

- Strengthening the management to eliminate the use of plastics products.
  - National: Required to limit the use the plastic bags since Jan. 8, 2008 ;
  - Local - Jilin Province, forbid to produce and sale non-degradable plastics bag and cutlery since Jan. 1st, 2015
- Pushing the recycling and reusing of plastic products.
- Organizing cleaning event to raise awareness.
- Monitoring Marine Debris (Macro- and Micoro-) .