

Supplementary materials for

The abundance, characteristics and diversity of microplastics in the South China Sea: Observation around three remote islands

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The details of surface MP abundance calculation and correction

The abundance can be converted into data per unit volume of water filtered. According to the report provided by Michida et al. (2019), net immersion depths during 15-min trawling varied from 50% to 87% of the height of the net mouth. Therefore, an average immersion depth of 0.27 m was applied for data estimation.

$$N_{\text{tow,v}} = \frac{N_{\text{tow}}}{0.27 \text{ m}}$$

where N_{tow} is the observed surface plastic concentration (items/km²), $N_{\text{tow,v}}$ is the observed surface plastic amount per unit volume of water filtered (items/m³).

The Kukulka model (Kukulka et al., 2012) is a one-dimensional column model based on in situ observations of vertically distributed buoyant plastic debris within the surface boundary layer (-3 m - 0 m) due to wind-driven mixing. Reisser et al. (2015) modified this exponential decay model with depth profile observations (-5 m - 0 m) of plastics and found a good correlation at Beaufort

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number between 1 and 4. But the largest decrease presented in the upper two meters with Beaufort number below 3. So this model could be applied in this study. The corrected surface plastic concentration N could be expressed as follows,

$$N \approx N_{\text{tow}} / \left(1 - \exp\left(\frac{-d * w_b}{1.5 * u_{*w} * k * H_s}\right) \right)$$

where d is the net's immersion depth (here $d = 0.27$ m), w_b is plastic's median rise velocity (0.0053 m/s as given by Reisser et al., 2015), $k = 0.4$ is the von Karman constant, and u_{*w} is water friction velocity, which could be calculated by Pugh (1987),

$$u_{*w} = 0.0012 \times W_{10}$$

where W_{10} (m/s) is the wind speed at 10 m above the sea surface. H_s is significant wave height. $H_s = 0.1$ m, 0.2 m or 0.6 m (typical wave heights experienced at Beaufort numbers of 1, 2, and 3, respectively). As the Beaufort scale gives an interval for the wind speeds, when the wave height cannot be described by Beaufort scale, the Beaufort number with the closest corresponding wind speed was adopted. For example, the Beaufort number with a wind speed of 3.5 m/s should be 3 (the corresponding wind speed ranges from 3.60 m/s to 5.14 m/s). This modified model was based on the observations of plastics with median size of 1.5 mm, lightly larger than the median in this study (Fig. 1); since the vertical mixing process was size-selective and smaller plastics were found to be more likely to sink into the lower water column (Reisser et al., 2015; Poulain et al., 2019), this model might slightly underestimate the actual number of MPs.

Introduction to CORA v1.0



Briefly, the ocean model used was a parallel version of the Princeton Ocean Model with a generalized coordinate system (POMgcs). Both wave-induced and tide-induced mixings were considered in this model. NCEP (National Centers for Environmental Prediction) Reanalysis was

employed as the atmospheric forcing. For the ocean data reanalysis, a three-dimensional variational analysis scheme designed within the multi-grid framework were implemented. Oceanic observations assimilated include in-situ temperature/salinity profiles, sea surface height anomalies from altimeters, and sea surface temperature from Reynolds SST dataset. The stimulated surface current (2.5-m layer) during 1958-2018 was shown visually on the NMDIS website (Fig. S3).

Table S1 Geographic locations (centers of trawling areas) of sampling stations.

Site	Longitude	Latitude
Meiji Reef		
1	115.50	9.91
2	115.51	9.94
3	115.55	9.93
4	115.57	9.89
5	115.54	9.88
6	115.52	9.88
Chigua Reef		
7	114.28	9.70
8	114.27	9.73
Huayang Reef		
9	112.86	8.86
10	112.82	8.86

Table S2 The species, number, average body length and weight of collected organisms.

Scientific name	Photos	Number of captured individuals	Average body length (mm)	Average body weight (g)	Gastrointestinal tracts or soft tissues weight	Feeding habits
<i>Trochus niloticus</i>		3	*(114±13)×(116±7)×(4±1)	484.20±57.70	113.84±19.89	Sea bed.
<i>Sargocentron caudimaculatum</i>		1	161	79.63	2.55	In both demersal and shallow water, feeding on benthic shrimps, crabs, crustaceans, etc

*Priacanthus
macracanthus*



1

190

97.02

3.77

Demersal, feeding
on crustaceans
and small fish

Myripristis murdjan



7

153±12

72.07±14.55

2.89±0.68

Demersal (adult),
feeding on small
fish or polychaete

Cephalopholis argus



6

200±12

124.15±23.62

3.14±0.19

In shallow water,
feeding on small
fish or crustaceans
occasionally

Scarus festivus



1

235

209.41

16.58**

Demersal,
herbivorous

* Cone height (mm) × Cone bottom diameter (mm) × Shell thickness (mm)

** Due to the rupture of swim bladder, all indistinguishable parts are included to prevent possible loss.

Table S3 Some typical plastics, rubber, cotton and rayon could be identified by μ -Raman or ATR-FTIR with commercial library and self-created library references.

Type	Acronym	Specific Density (g/cm ³)*	Identifiable or not		Typical sources
			μ -Raman	ATR-FTIR**	
Plastics					
Polypropylene	PP	0.85-0.92	x	x	Folders, food packaging, laboratory equipment, nets, etc.
Polyethylene	PE	LDPE	x	x	Food wrap film, grocery bags, nets, etc.
		HDPE			0.89-0.93
Polyamide (nylon)	PA	1.02-1.15	x	x	Textile, automotive appliances, carpets, sportswear, nets, etc.
Polystyrene	PS/EPS	0.01-1.07	x	x	House building, floats, bait boxes, foam cups, takeout/takeaway food container, packaging, etc.
Polycarbonate	PC	1.20-1.22	x	x	Construction materials, medical equipment, automotive components, etc.
Polyvinyl chloride	PVC	1.35-1.41	x	x	Pipes, floors, window frames, etc.
Polyethylene terephthalate	PET	1.38-1.41	x	x	Plastic beverage bottles and packaging, etc.
Polytetrafluoroethylene (Teflon)	PTFE	2.10-2.30	x	x	Industrial coating, kitchen utensils, etc.
Polyacrylonitrile	PAN	1.12	x	x	Textile.
Acrylonitrile/butadiene/styrene resin	ABS	1.01-1.08	x	x	Pipe systems, automotive components, medical devices, musical instruments, etc.
Cellulose acetate butyrate	CAB	-	-	x	Scratch resistant film or as a surface protection layer in laminate film structures, oil field natural gas transmission pipeline, etc.
Polyethersulfone resin	PES	1.37	-	x	Electric appliance, automobile, medical treatment,

					coating, etc.
Poly(butyl methacrylate)	PBMA	1.05	x	x	Transparent glass substitute, optical fiber, etc.
Polymethyl methacrylate (acrylic)	PMMA	1.09-1.20	x	x	Transparent glass substitute, medical technologies and implants, etc.
Polyvinylidene chloride	PVDC	1.65-1.78	x	-	Cooked food packaging
Acrylonitrile-styrene copolymer	SAN	-	-	x	Packaging, kitchenware, houseware, housings, casings and covers, etc.
Polyurethane	PUR	1.20-1.26	-	x	Mattresses and insulation panels
No plastics***					
Alkyd resin	-	-	-	x	Coating
Poly(acrylic acid)	PAA	-	-	x	Coating
Liquid silicone rubber	LSR	-	x	-	Trademarks, products, nipples, medical supplies, etc.
Rubber	-	-	-	x	Tyre, pipes, electrical appliance
Rayon	-	-	-	x	Textile
Cotton	-	-	-	x	Textile

* Obtained from the book chapter by Rodríguez-Seijo and Pereira (2017), technical report by Gago et al. (2018) or Chemical Retrieval on the Web (2019).

** ATR-FTIR was applied as a supplement to μ -Raman; so if the spectra from two equipments provide different answers, the result from μ -Raman were selected as the final result. The logical sequence of adopting evidence in spectral interpretation is shown in Fig. S5.

*** According to the recommendations of Hartmann et al. (2019), some of debris without plastic composition could be viewed as plastic debris as well, such as synthetic/vulcanized natural rubber, silicone, and regenerated cellulose. In this study, there is an additional 1.2% of the suspected items (0.3 mm - 5 mm) in the Neuston samples (8 items) were identified as rubber and alkyd resin, while 3% of the suspected items (one item) in the biological sample was LSR.

Table S4 The size ranges and average densities of floating microplastics reported in previous studies and this study.

Region	Size range mm	Mean density (Items/km ²)	Author
Seagrass Sea	2.5 - 5	3537	Carpenter et al.(1972)
Subtropical North Pacific Ocean	1 - 5	34,000 (max)	Wong et al. (1974)
Bering Sea	>0.5	100±600	Day et al. (1990)
Subarctic Water		12,800±22,300	
Transitional Water		57,900±72,800	
Subtropical Water		61,000±74,000	
Japan Sea and nearshore Japan Water		74,700±73,800	
North Pacific central gyre	0.355 - 4.76	309,506	Moore et al. (2001)
Kuroshio Current area	1 - 5	131,323	Yamashita et al. (2007)
Mediterranean Sea	0.3 - 5	116,000	Collignon et al. (2012)
Caribbean Sea	>0.335	1414±112	Law et al. (2010)
Gulf of Maine		1534±200	
29° to 31°N of the North Atlantic Subtropical Gyre		20,328±2324	
Northeast Pacific Ocean	0.333 - 5	448,000 (summer, median); 21,000 (fall, median)	Goldstein et al. (2013)
South Pacific subtropical gyre	0.5 - 4.76	21,802.5	Eriksen et al. (2013b)
Waters around Australia	0.4 - 82.6	4256.4 ^a	Reisser et al. (2013)
World's oceans	0.335 - 4.75	53716.13	Eriksen et al. (2014)
East Asian seas	0.35 - 5	1,720,000	Isobe et al. (2015)
Arctic polar waters	<5	28,000	Lusher et al. (2015)
Arabian Gulf	0.3 - 5	43,800 - 1,460,000	Abayomi et al. (2017)
Southern Ocean	0.35 - 5	211,000	Isobe et al. (2017)
Tokyo Bay, Japan	0.315 - 5	2,400,000 - 3,200,000 ^b	Matsuguma et al. (2017)
Great Pacific Garbage Patch	0.5 - 5	678,000	Lebreton et al. (2018)
Hiroshima Bay, Japan	0.35 - 5	30,000 - 240,000	Sagawa et al. (2018)
Northwestern Adriatic Sea	0.33 - 5	1,200,000	Vianello et al. (2018)
Kingston Harbour, Jamaica	0.335 - 5	359,593.41	Rose and Webber (2019)
Northwestern Pacific	0.333 - 5	10,000	Pan et al. (2019)
Xiamen Bay and the Jiulong Estuary	0.5 - 5	36,455	Chen et al. (2019)
Mid-West Pacific Ocean	0.333 - 5	34,039	Wang et al. (2020)
Southern SCS	0.333 - 5	300,000±410,000 (uncorrected)	This study

a ~75% with a size smaller than 5 mm.

b Only the abundance of polyethylene and polypropylene has been reported.

Table S5 The average densities of microplastics in soft tissue or gastrointestinal tract of organisms reported in previous studies and this study.

Region	Sources	Organisms		Microplastics				Reference
		Species	Habitat*	Main shape	Main composition	items/g (wet weight)	items/individual	
Brittany,	Farmed	<i>M. edulis</i>	I	NA**	NA	0.36±0.07	NA	Van Cauwenberghe and Janssen, 2014
France		<i>C. gigas</i>	I	NA	NA	0.47±0.16	NA	
Belgium	Market***	<i>M. edulis</i>	I	Fiber	NA	0.35	NA	De Witte et al., 2014
	Wild	<i>M. edulis</i>	I	Fiber	NA	0.26; 0.51	NA	Vandermeersch et al., 2015
Tagus Estuary, Portugal	Wild	<i>M. galloprovincialis</i>	I	NA	NA	0.34±0.33; 0.08±0.09	NA	
Po Estuary, Italy	Wild	<i>M. galloprovincialis</i>	I	NA	NA	0.05±0.11; 0.16±0.11	NA	
Fangar Bay, Spain	Wild	<i>M. galloprovincialis</i>	I	NA	NA	0.15±0.33; 0.11±0.12	NA	
Baie de Saint Brieux, France	Market	<i>M. edulis</i>	I	NA	NA	0.06±0.13	NA	
Goro, Italy	Market	<i>M. galloprovincialis</i>	I	NA	NA	0.25±0.26	NA	
Løgstør Bredning, Limfjorden, Denmark	Market	<i>M. edulis</i>	I	NA	NA	0	NA	
Amposta, Ebro delta,	Market	<i>M. galloprovincialis</i>	I	NA	NA	0.04±0.09	NA	

Spain								
Inshot,	Market	<i>M. edulis</i>	I	NA	NA	0.32±0.22	NA	
Netherlands								
Shanghai,	Market	<i>Sc. subcrenata</i>	II	Fiber	PE, PET, PA (Data	10.4	45	Li et al., 2015
China		<i>T. granosa</i>	III	Fiber	by species were	4.1	5	
		<i>M.</i>	I	Fiber	not available)	2.3	4	
		<i>galloprovincialis</i>						
		<i>P. yessoensis</i>	II	Fiber		2.2	57	
		<i>A. plicatula</i>	I	Pellet		5.9	11	
		<i>Si. constricta</i>	III	Fiber		2.0	14	
		<i>R. philippinarum</i>	II	Fiber		2.6	6	
		<i>Me. lusoria</i>	II	Fiber		4.2	9	
		<i>C. sinensis</i>	II	Fiber		4.0	5	
China's coast	Wild	<i>M. edulis</i>	I	Fiber	NA	2.7	4.6	Li et al., 2016
	Farmed					1.6	3.3	
Shanghai,	Market	<i>H. intermedius</i>	Pelagic,	Fiber,	NA	3.4±2.4	3.7±2.2	Jabeen et al., 2017
China			planktivorous	fragment				
		<i>L. haematocheila</i>	Pelagic,	Fiber	NA	0.6±0.05	3.3±0.3	
			omnivorous					
		<i>C. ectenes</i>	Pelagic,	Fiber	NA	11.5±6.1	4.0±1.8	
			planktivorous					
		<i>L. japonicus</i>	Pelagic,	Fiber	NA	0.5±0.1	2.1±0.3	
			carnivorous					
		<i>S. sihama</i>	Pelagic,	Fiber	NA	5.7±2.9	2.8±1.5	
			carnivorous					
		<i>L. crocea</i>	Benthopelagic,	Fragment	NA	1.3±1.5	4.6±3.4	

	carnivorous					
<i>P. anomala</i>	Benthopelagic, carnivorous	Fiber	NA	0.5±0.2	1.1±0.3	
<i>P. cinereus</i>	Benthopelagic, carnivorous	Fiber	NA	0.5±0.2	3.0±0.8	
<i>H. nehereus</i>	Benthopelagic, carnivorous	Fiber	NA	1.9±0.1	3.8±2.0	
<i>M. cephalus</i>	Demersal, omnivorous	Fiber	NA	0.5±0.2	3.7±1.0	
<i>M. cinereus</i>	Demersal, carnivorous	Fiber	NA	0.4±0.2	2.4±0.6	
<i>T. jarbua</i>	Demersal, omnivore	Fiber	NA	0.9±0.3	3.0±0.7	
<i>S. marmoratus</i>	Demersal, carnivorous	Fiber	NA	3.3±1.2	4.2±1.3	
<i>P. bindus</i>	Demersal, carnivorous	Fiber	NA	10.1±4.9	4.1±2.1	
<i>C. abbreviatus</i>	Demersal, carnivorous	Fiber	NA	9.4±5.1	6.9±2.4	
<i>T. septentrionalis</i>	Demersal, carnivorous	Fiber	NA	4.0±1.7	7.2±2.8	
<i>O. marmorata</i>	Demersal, carnivorous	Fiber	NA	1.3±1.1	4.2±2.4	
<i>S. ommaturus</i>	Demersal, carnivorous	Fiber	NA	12.6±9.5	5.3±2.9	
<i>C. lucidus</i>	Demersal,	Fiber	NA	17.2±9.7	6.2±2.4	

		<i>B. japonicus</i>	carnivorous Demersal,	Fiber	NA	8.1±5.2	4.6±2.8	
		<i>C. planus</i>	carnivorous Benthic,	Fiber	NA	3.6±1.8	4.8±2.3	
Texas Gulf Coast, United States	Wild	<i>M. americanus</i>	carnivorous Coast; demersal;	Fiber (Data by species	-	0.27	0.57	Peters et al., 2017
		<i>M. undulates</i>	carnivorous/ saprophagous Coast; demersal;	were not available)		0.67	0.87	
		<i>C. faber</i>	Coast; 3-35 m; feeding on benthic invertebrates and plankton			0.48	1.38	
		<i>C. arenarius</i>	Coast; demersal; carnivorous			0.42	0.79	
		<i>L. rhomboids</i>	Coast; demersal; omnivorous			0.80	0.96	
		<i>O. chrysoptera</i>	Coast; demersal; carnivorous			0.49	0.54	
Norwegian coast	Wild	<i>Mytilus spp.</i>	I	Fiber	PET, PAN	1.85±3.74	1.84±2.06	Lusher et al., 2017
Eastern coast of Thailand	Wild	<i>B. amphitrite</i>	I	Rod shaped and	Polyamide, PET (Data by species	0.23±0.10 to 0.43±0.33	NA	Thushari et al., 2017
		<i>S. forskalii</i>	I	fragmented fibers	were not available)	0.37±0.03 to 0.57±0.22	NA	

Swedish coast	Wild	<i>S. trutta</i>	Pelagic-neritic; carnivorous	-	PE	NA	NA	Karlsson et al., 2017
North Sea		<i>M. edulis</i>	I	Fiber	NA	37	NA	
Clyde estuary, UK	Wild	<i>M. edulis</i>	I	Fiber	Polyamide	1.05±0.66 to 4.44±3.03	NA	Courtene-Jones et al., 2017
UK's coast	Wild	<i>M. edulis</i>	I	Fiber	PET, PP, PE	1.6	2.5	Li et al., 2018
	Farmed			Fiber		0.8	5.8	
	Market			Fiber		0.9 (live); 1.36 (processed)	5.8 (live); 3.6 (processed)	
Northern Ionian Sea	Wild	<i>M. galloprovincialis</i>	I	Fragment	PE, PP	NA	0.8±0.2	Digka et al., 2018
	Farmed	<i>M. galloprovincialis</i>	I	Fragment	PE, PP	NA	0.9±0.2	
	Wild	<i>S. pilchardus</i>	Coast; 0-200 m; planktivorous	Fragment	PE, PP	NA	0.8±0.2	
	Wild	<i>P. erithrinus</i>	Demersal; omnivorous	Fragment	PE, PP	NA	0.8±0.2	
	Wild	<i>M. barbatus</i>	Demersal; carnivorous	Fragment	PE, PP	NA	0.5±0.2	
Saudi Arabian Red Sea coast	Wild	<i>A. gahhm</i>	Demersal	Fiber	PP, PE (Data by species were not available)	0.00	0.10	Baalkhuyur et al., 2018
		<i>E. areolatus</i>	Seagrass	(Data by species were not available)		0.02	0.20	
		<i>P. multidens</i>	Demersal	species were not available)		0.04	0.20	
		<i>L. kasmira</i>	Coral reef			0.04	0.17	
		<i>L. microdon</i>	Coral reef			0.03	0.20	
		<i>G. grandoculis</i>	Coral reef			0.02	0.20	
		<i>E. chlorostigma</i>	Seagrass			0.06	0.33	

		<i>P. eriomma</i>	Demersal			0.15	0.60	
		<i>E. radiatus</i>	Demersal			0.02	0.14	
		<i>L. carnolabrum</i>	Demersal			0.07	0.29	
		<i>P. gaterinus</i>	Demersal			0.05	0.33	
		<i>E. epistictus</i>	Demersal			0.02	0.20	
		<i>A. sexfasciatus</i>	Coral reef			0.15	0.20	
		<i>C. austriacus</i>	Coral reef			0.09	0.10	
		<i>N. sammara</i>	Coral reef			0.13	0.20	
		<i>T. rueppellii</i>	Coral reef			0.06	0.08	
		<i>B. pterotum</i>	Mesopelagic			0.04	0.10	
		<i>M. mucronatus</i>	Mesopelagic			0.04	0.10	
French	Wild	<i>M. edulis</i>	I	Fragment	PE, PP	0.23±0.20	0.60±0.56	Phuong et al., 2018a
Atlantic		<i>C. gigas</i>	I	Fragment	PE, PP	0.18±0.16	2.10±1.71	
coasts	Wild	<i>M. edulis</i>	I	Fragment	PE, PP	0.23±0.09	0.7	Phuong et al., 2018b
Persian Gulf,	Wild	<i>C. cingulata</i>	III	Fiber	PE, PET, nylon	1.5	3.7	Naji et al., 2018
Iran		<i>T. mutabilis</i>	III	Film	(Data by species	2.3	19.5	
		<i>A. umbonella</i>	III	Fiber	were not	20	6.9	
		<i>A. purpuratus</i>	II	Fiber	available)	12.7	7.1	
		<i>P. radiata</i>	I	Fiber		0.1	3.9	
Sea area	Wild	<i>Mytilus spp.</i>	I	Fiber	PET, Poly	3±0.9	3.2±0.52	Catarino et al., 2018
around		<i>M. modiolus</i>	II	Fiber	(ether-urethane)	0.086±0.031	3.5±1.29	
Scotland					(Data by species			
					were not			
					available)			
South Korea	Market	<i>C. gigas</i>	I	Fragment	PE, PP, PS	0.07±0.06	0.77±0.74	Cho et al., 2019
		<i>M. edulis</i>	I	Fragment	PE, PP, PS	0.12±0.11	0.68±0.64	

		<i>T. philippinarum</i>	II	Fragment	PE, PP, PET	0.34±0.31	1.15±0.74	
		<i>P. yessoensis</i>	II	Fragment	PE, PP, PET	0.08±0.08	1.21±0.71	
Maowei Sea, China	Market	<i>A. latus</i>	Pelagic	Fiber, film	PET (Data by	2.3±1.3	4.1±2.0	Zhu et al., 2019
		<i>C. affinis</i>	Pelagic	(Data by	species were not	1.5±0.6	3.8±0.6	
		<i>K. punctatus</i>	Pelagic	species were	available)	0.7±0.4	2.0±0.2	
		<i>Pachycormus</i>	Pelagic	not		0.2±0.3	3.0±1.3	
		<i>P. fluviatilis</i>	Pelagic	available)		0.9±0.7	5.3±1.4	
		<i>S. sihama</i>	Pelagic			4.3±1.3	1.7±0.5	
		<i>C. giurinus</i>	Demersal			14.6±2.3	4.6±1.3	
		<i>Oreochromis spp.</i>	Demersal			1.9±0.5	8.5±1.8	
		<i>Platycephalus</i>	Demersal			3.5±0.7	10.0±1.6	
		<i>S. argus</i>	Demersal			1.3±0.4	14.0±2.7	
		<i>S. macrocephalus</i>	Demersal			1.8±0.6	2.0±0.7	
		<i>T. theraps</i>	Demersal			9.6±1.9	5.7±1.8	
		<i>C. hongkongensis</i>	I			0.8±0.2	4.7±0.3	
Xiamen, China	Market	<i>A. latus</i>	Demersal; prey on benthos	Fiber	PET, PAN, PS	1.26±0.34	4.71±1.24	Fang et al., 2019
		<i>K. punctatus</i>	Coast; 5-15 m; plankton-eating	Fiber	PET, PAN	0.49±0.11	2.39±0.59	
		<i>P. viridis</i>	II	Fiber	PET, PAN	0.28±0.07	1.56±0.33	
		<i>M. meretrix</i>	II	Fiber	PET, PAN	0.30±0.10	1.26±0.39	
Fuzhou, Xiamen		<i>A. latus</i>	Demersal; prey on benthos	Fiber	PET, PAN	0.65±0.36	2.29±1.13	
		<i>K. punctatus</i>	Coast; 5-15 m; plankton-eating	Fiber	PS, PET, PAN	0.60±0.14	1.69±0.39	
		<i>M. edulis</i>	I	Fiber	PET, PAN	0.12±0.04	1.44±0.39	

Nanxun Reef, Southern SCS	Wild	<i>M. meretrix</i>	II	Fiber	PAN, PS, PET	0.11±0.02	0.59±0.21	Nie et al., 2019
		<i>C. urodeta</i>	Coast; 1-60 m; carnivorous	Fiber	-	0.04 - 0.39	1 - 8	
		<i>M. vidua</i>	Benthopelagic, omnivorous	Pellet, fiber	-	0 - 0.10	0 - 14	
		<i>B. undulatus</i>	Coast; 2-50 m; prey on benthos, omnivorous	Pellet, fiber	-	0 - 0.16	0 - 10	
		<i>B. capistratus</i>	Benthopelagic, omnivorous	Fiber	-	0.01 - 0.06	1 - 6	
		<i>O. niger</i>	Coast; 5-40 m; omnivorous	Fiber	-	0.01 - 0.04	1 - 2	
		<i>P. fuscus</i>	Coast; 30-50 m; carnivorous	Fiber	-	0.09	2	
		<i>A. pyroferus</i>	Coast; 4-60 m; herbivorous	Fiber	-	0 - 0.10	0 - 4	
		<i>A. japonicus</i>	Coast; 1-20 m; omnivorous	Fiber	-	0.04 - 0.12	1 - 6	
		<i>N. brevirostris</i>	Benthopelagic, feeding on zooplankton	Fiber	-	0.03	6	
		<i>A. lineatus</i>	Benthopelagic, omnivorous	Film	-	0.01	1	
<i>D. kuhlii</i>	Benthos, feeding on benthos, carnivorous	Pellet	-	0	6			

		<i>M. japonica</i>	Pelagic; 1 - 250 m; carnivorous	Fiber	-	0.02	1	
Agulhas Bank, South Africa	Wild	<i>T. capensis</i>	Pelagic-neritic; omnivorous	Fiber (Data by species were not available)	-	0.21±0.06	3.9±1.0	Sparks and Immelman, 2020
		<i>M. capensis</i>	Bathydemersal; carnivorous			0.25±0.03	4.2±0.6	
		<i>M. paradoxus</i>	Bathydemersal; omnivorous			0.15±0.04	3.8±0.7	
		<i>E. whiteheadi</i>	Pelagic-neritic; feeding on zooplankton			0.05±0.01	3.3±0.5	
		<i>S. japonicus</i>	Pelagic-neritic; omnivorous			0.28±0.05	4.6±0.8	
		<i>C. capensis</i>	Demersal; omnivorous			0.25±0.04	3.4±0.4	
		<i>A. argyrozona</i>	Benthopelagic; omnivorous			0.03±0.01	2.8±0.7	
SCS	Wild	Pelagic and benthic species (mean)		Fiber, fragment	PET, PA	0.18 ± 0.06	0.39 ± 0.12	Chen et al., 2021
Indian Ocean	Wild	Pelagic species (mean)		Fiber	PET, PA	0.70 ± 0.16	1.00 ± 0.16	
Southern SCS	Wild	<i>T. niloticus</i>	II	Fiber	PET, PP	0.05±0.05	5.67±5.51	This study
		<i>M. murdjan</i>	Demersal, carnivorous	Fiber	PP	0.30±0.45	0.71±0.95	
		<i>C. argus</i>	Demersal, carnivorous	Fiber, fragment, film	PP, PE	0.16±0.18	0.50±0.55	

* The living habits of molluscs were classified into three types. Type I: Subtidal and intertidal beds on hard substrates; Type II: Sandy, muddy or muddy-gravel bottoms below the mid-tide level; Type III: Muddy, sandy-muddy or muddy-gravel beaches between the mid-tide level and low-tide level. Please note that this classification is very rough. If the habits were not described in the corresponding studies, the information were obtained from FishBase (https://www.fishbase.in/manual/English/FishBaseThe_Species_Table.htm) or Animal Diversity Web (<https://animaldiversity.org/>). Both living habits and feeding habits were described here.

** NA means not available.

*** The original sources of samples obtained from markets usually could not be identified.

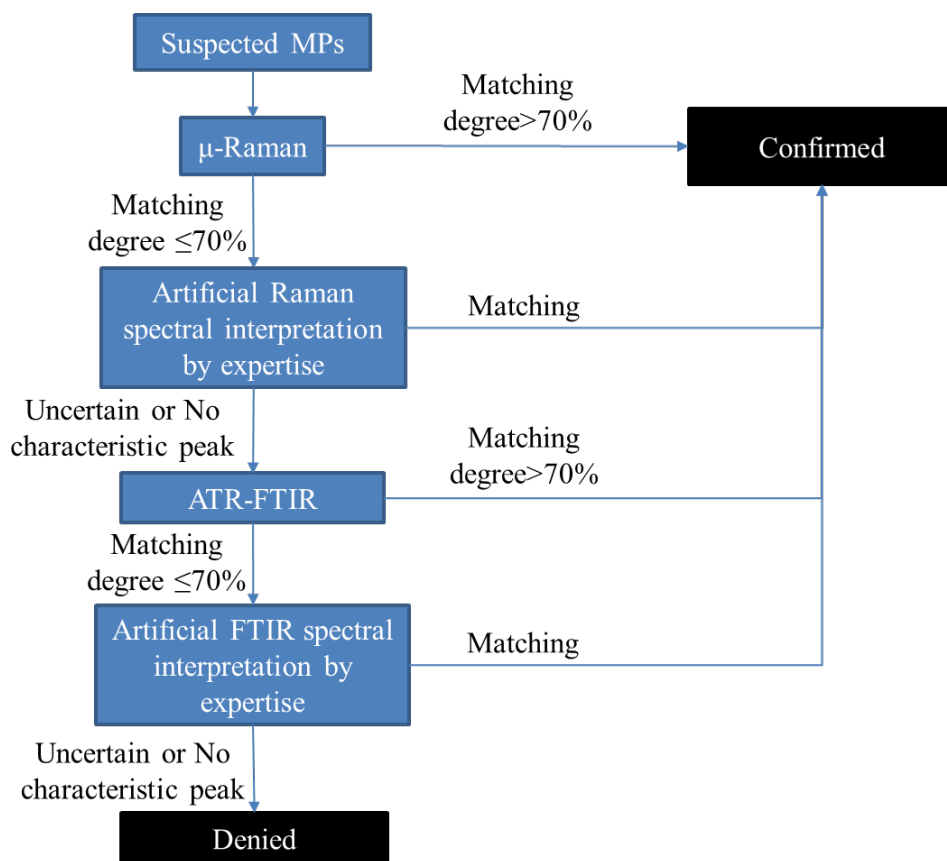


Fig. S1 The logical sequence of adopting evidence in spectral interpretation.

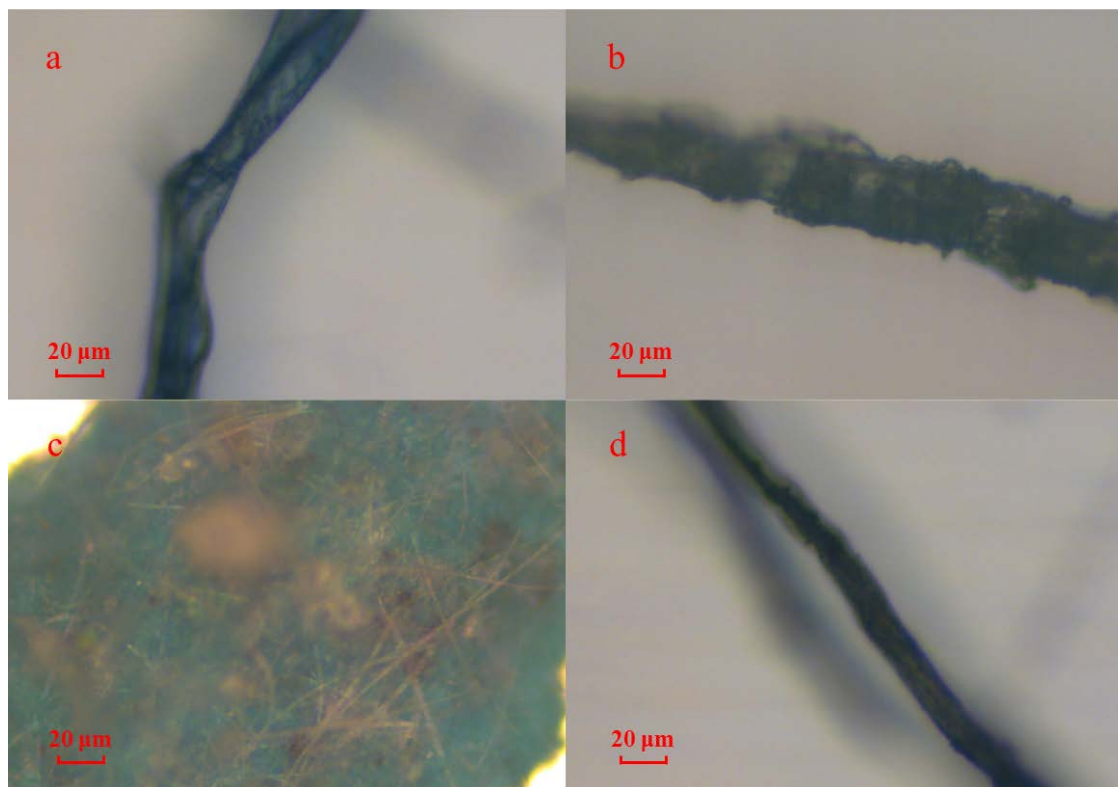
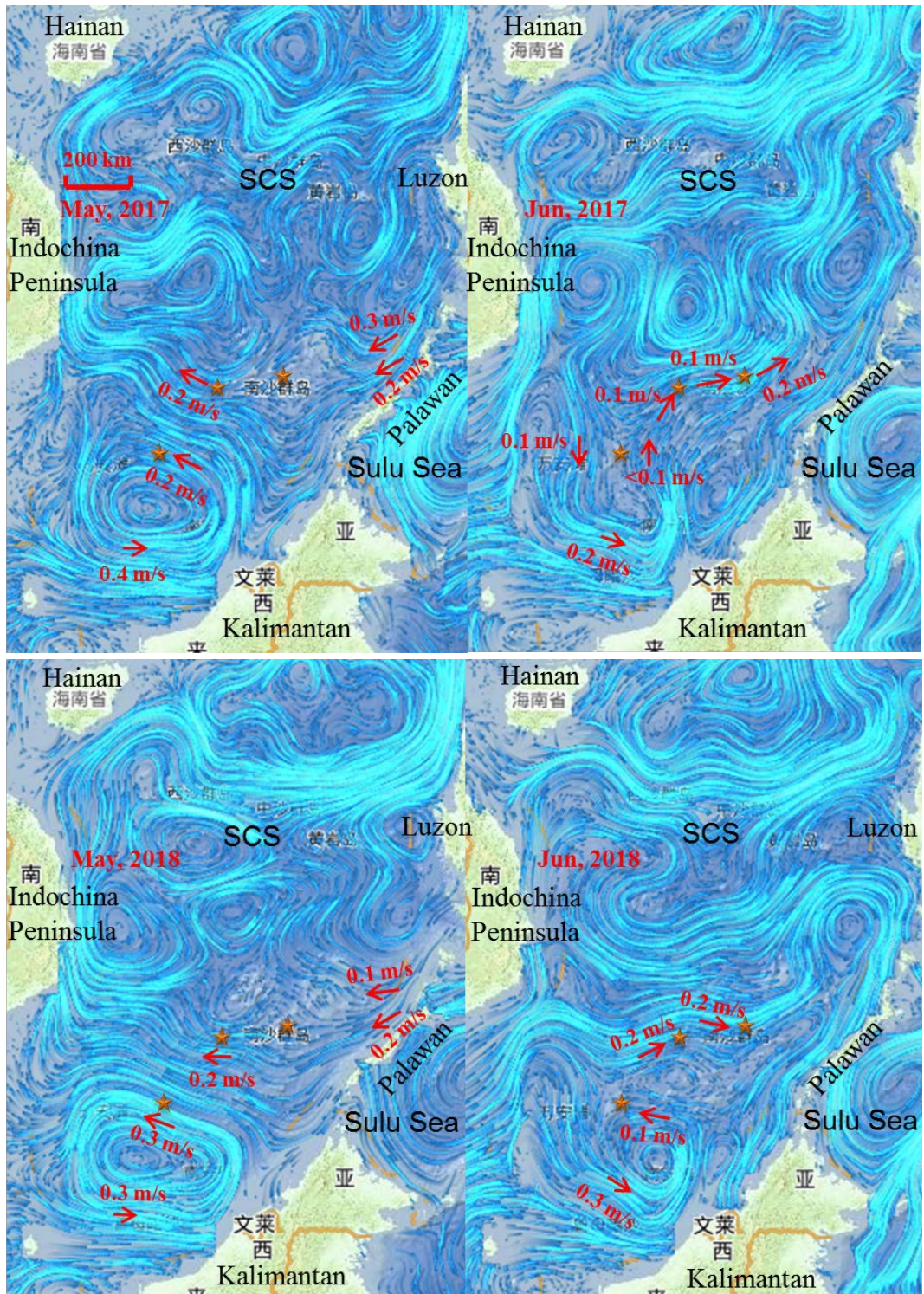


Fig. S2 Suspected MPs in fish flesh (without skin), observed by microscope: (a) Transparent inorganic fiber; (b) Unidentified (no obvious Raman characteristic peak); (c) Blue inorganic sheet; (d) Unidentified (Weak Raman

signal).



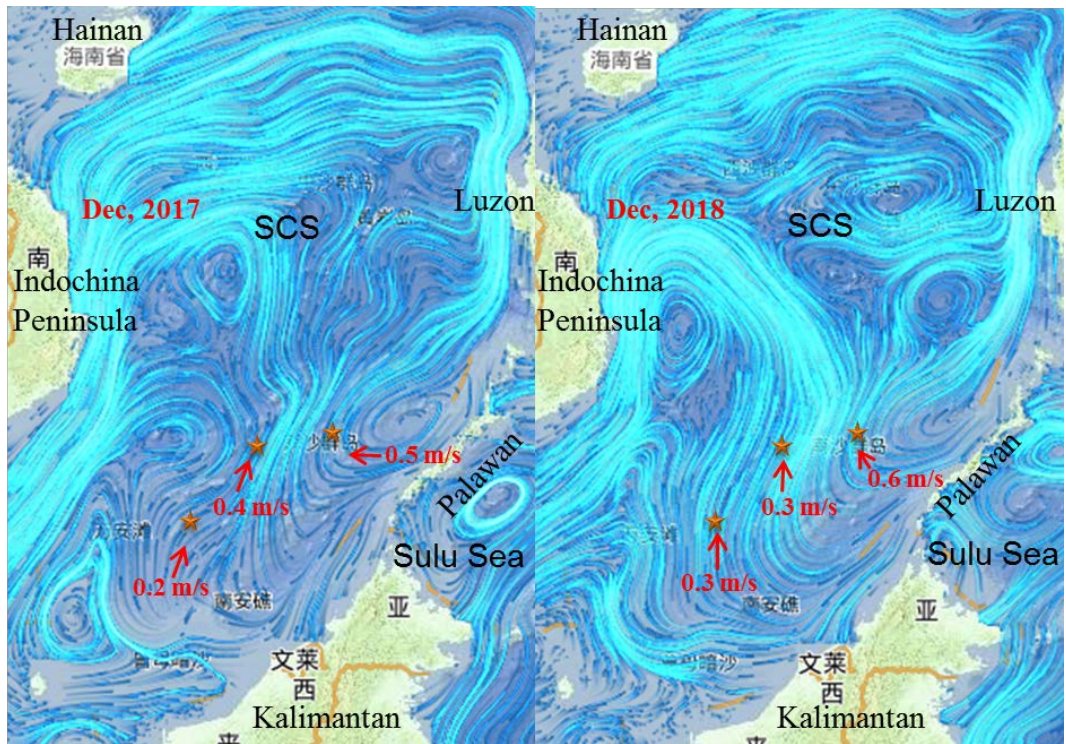
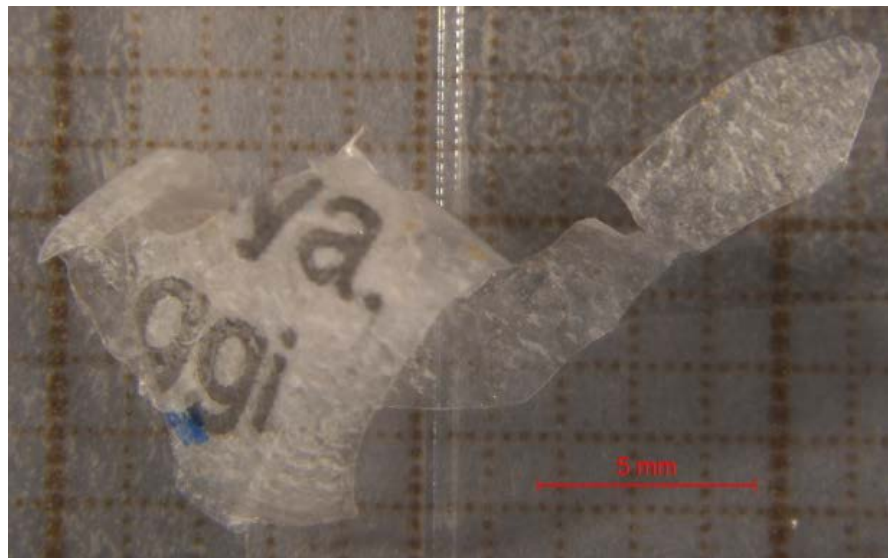


Fig. S3 Snapshots of stimulated surface current (2.5-m level) in the South China Sea in May, June, and December of 2017 and 2018 (Visualized CORA v1.0; <http://mds.nmdis.org.cn/pages/visualization.html>, in Chinese). The locations of three islands are marked with dark orange stars (★). The average velocities at some locations are marked in red on the map.



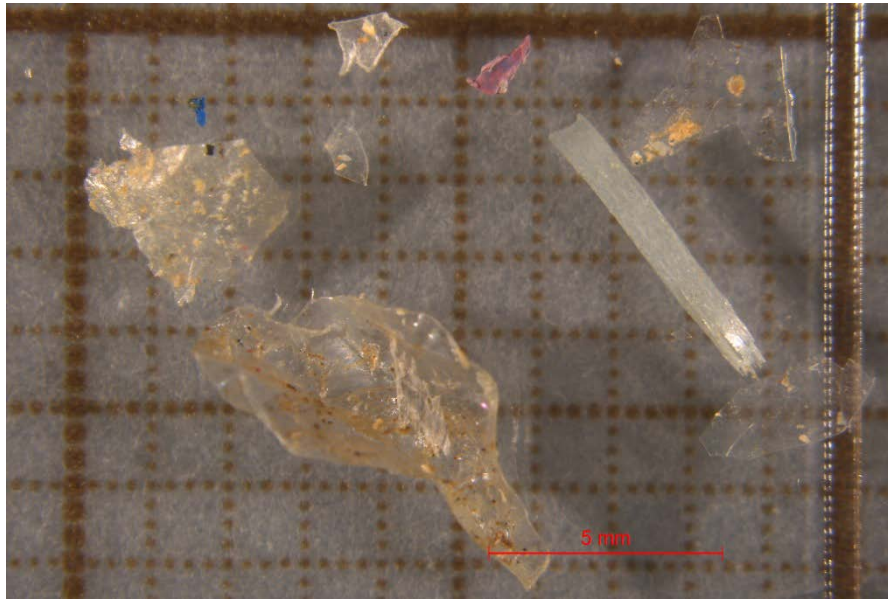


Fig. S4 The photos of a plastic film with Latin text (upper) and several other plastic sheets/films (lower).

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