Supplementary Material

Distribution and Controlling Factors of Microplastics in Surface Sediments of Typical Deep-Sea Geomorphological Units in the Northern South China Sea

Xiaodong Zhang[1], Zhifei Liu[1,*], Yulong Zhao[1], Pengfei Ma[1], Christophe Colin[2], Andrew Tien-Shun Lin[3]

[1] State Key Laboratory of Marine Geology, Tongji University, Shanghai 200092, China
[2] GEOPS, CNRS, Université Paris-Saclay, Orsay 91405, France
[3] Department of Earth Sciences, National Central University, Taoyuan 32001, Taiwan
* Corresponding author. E-mail address: lzhifei@tongji.edu.cn

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Table S1. Type, characteristic, and recovery rate of the microplastic spikes for laboratory analysis

Microplastic type	Shape	Particle size (mm)	Density ($g \cdot cm^{-3}$)	Number of spikes	Number of recovered spikes	Recovery rate (%)
PVC	fragment	1.00–2.00	~1.38	20	20	100.0±0.0
				20	20	
				20	20	
PS	bead	0.90–1.00	~0.62	20	19	98.3±2.9
				20	20	
				20	20	
PE	bead	0.25–0.30	~1.05	20	19	98.3±2.9
				20	20	
				20	20	

Table S2. Type, abundance, and particle size of microplastics in the typical deep-sea geomorphological units of the northern South China Sea

	MD18-3558	**MD18-3572**	**FC3-1**	**MD18-3562**	**SD-A3-1**	**MD18-3564**	**SW-B-4**
Geomorphological units	Gaoping canyon levee	Penghu canyon levee	Formosa canyon channel	Gaoping canyon levee	Sediment drift on lower slope	Gaoping canyon sandbar	Sand dune on upper slope
Mean grain size ($\times10^{-3}$ mm)	12.27	12.64	14.42	18.57	25.27	70.07	349.78
Total abundance ($p\cdot kg^{-1}$)	39	198	408	38	174	402	694
Number of type (n)	1	3	4	2	1	5	4
PC+PVC ($p\cdot kg^{-1}$)	0	0	45	0	174	247	347
PE+PP ($p\cdot kg^{-1}$)	0	132	227	19	0	62	217
PES ($p\cdot kg^{-1}$)	39	0	136	19	0	31	87
Mean value ($p\cdot kg^{-1}$)	13	44	136	13	58	113	217
Fragment ($p\cdot kg^{-1}$)	0	132	227	0	174	340	564
Fiber ($p\cdot kg^{-1}$)	39	0	181	38	0	31	130
Bead ($p\cdot kg^{-1}$)	0	66	0	0	0	31	0
Mean value ($p\cdot kg^{-1}$)	13	66	136	13	58	134	231
Mean fragment size (mm)		0.65	1.16		1.26	0.48	0.55
Mean fiber size (mm)	0.31		1.05	0.59		0.76	3.42
Mean bead size (mm)		0.09				0.09	
Mean particle size (mm)*	0.31	0.47	1.11	0.59	1.26	0.48	1.09

*The mean particle size is the averaged size of all microplastic particles (fragments, fibers, and beads) in each sample.

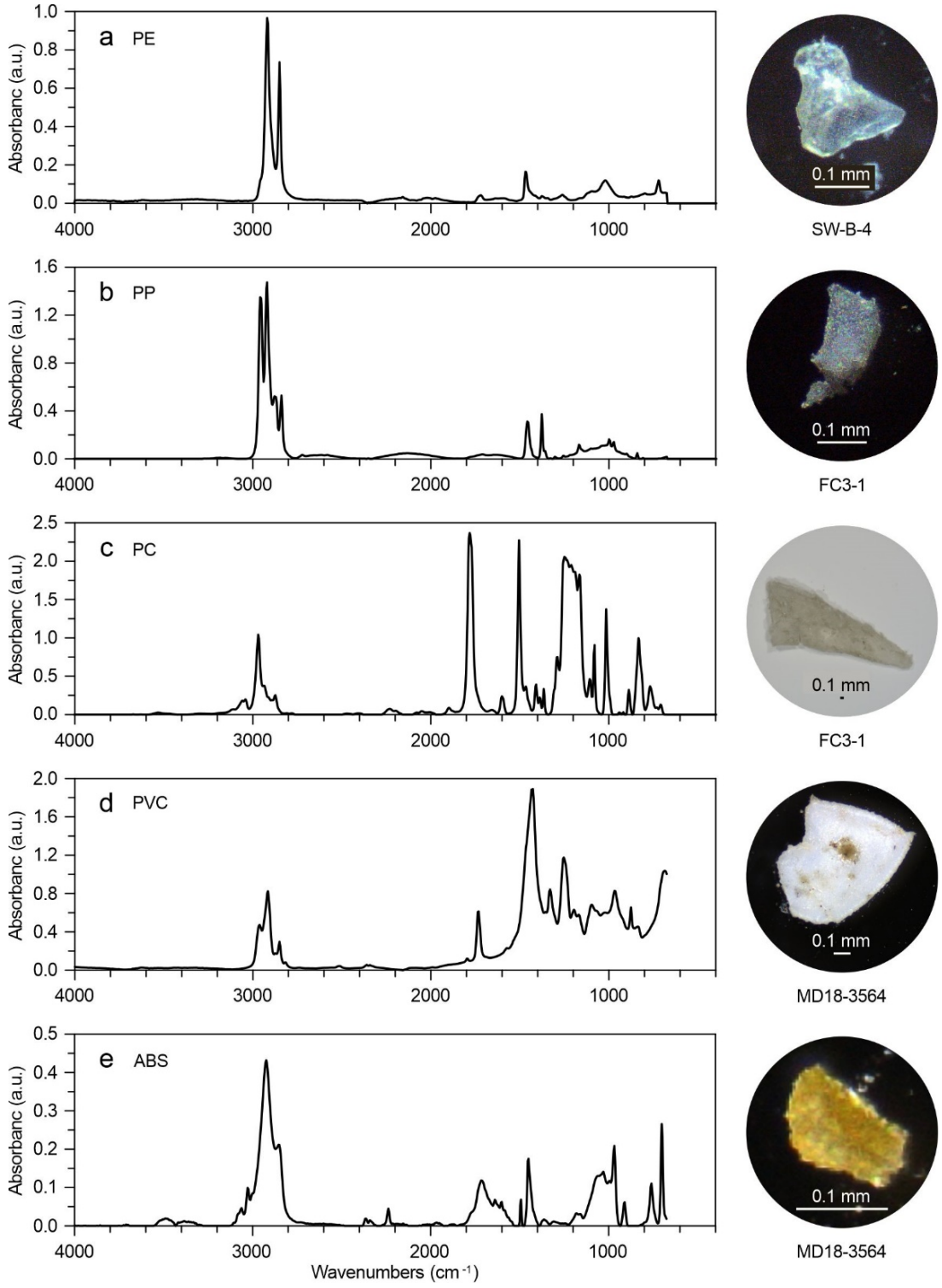


Figure S1. FTIR spectra and photographs of typical microplastic fragments in surface sediments of the northern South China Sea.

(a) PE in sample SW-B-4. (b) PP and (c) PC in sample FC3-1. (d) PVC and (e) ABS in sample MD18-3564.

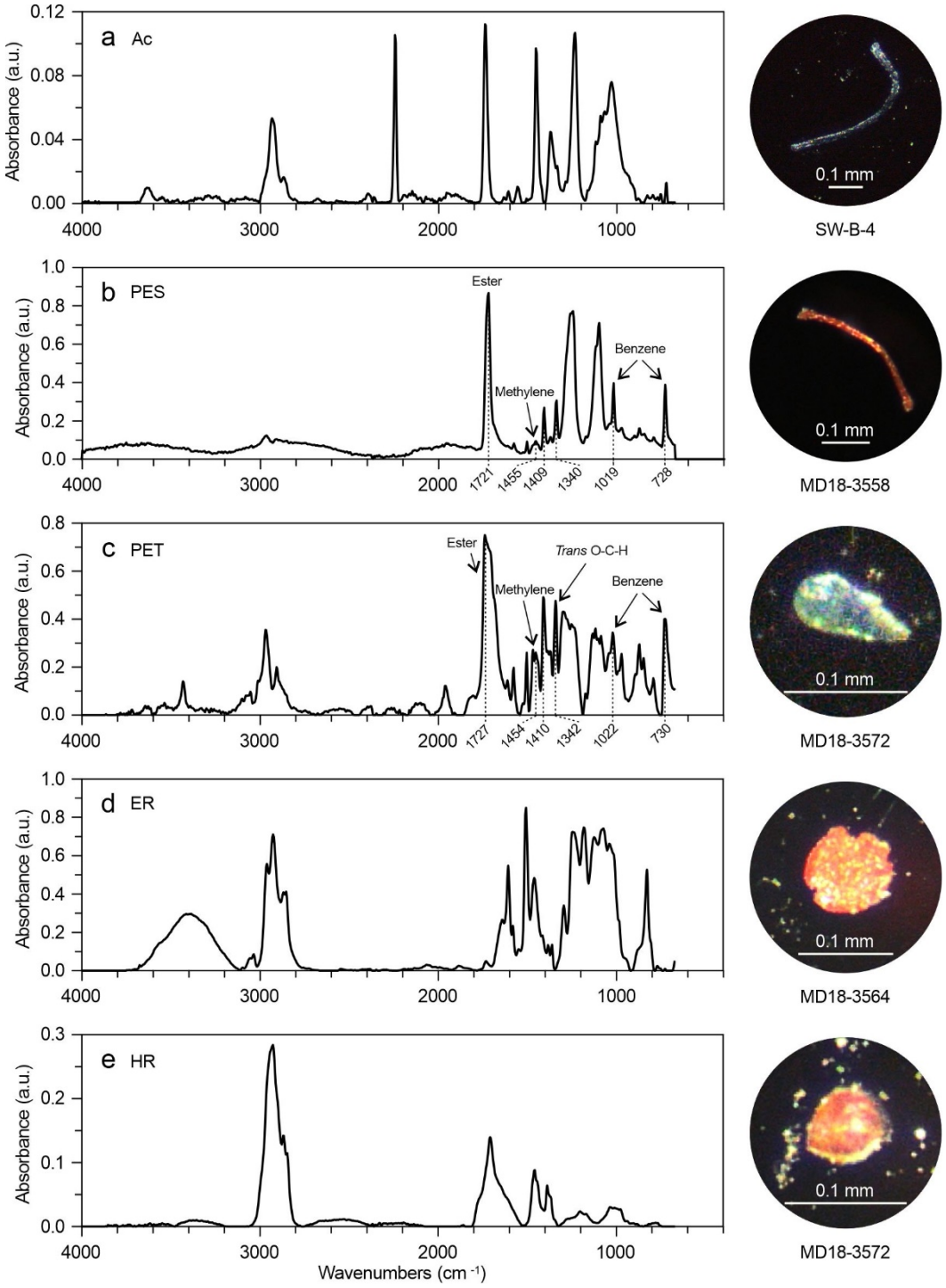
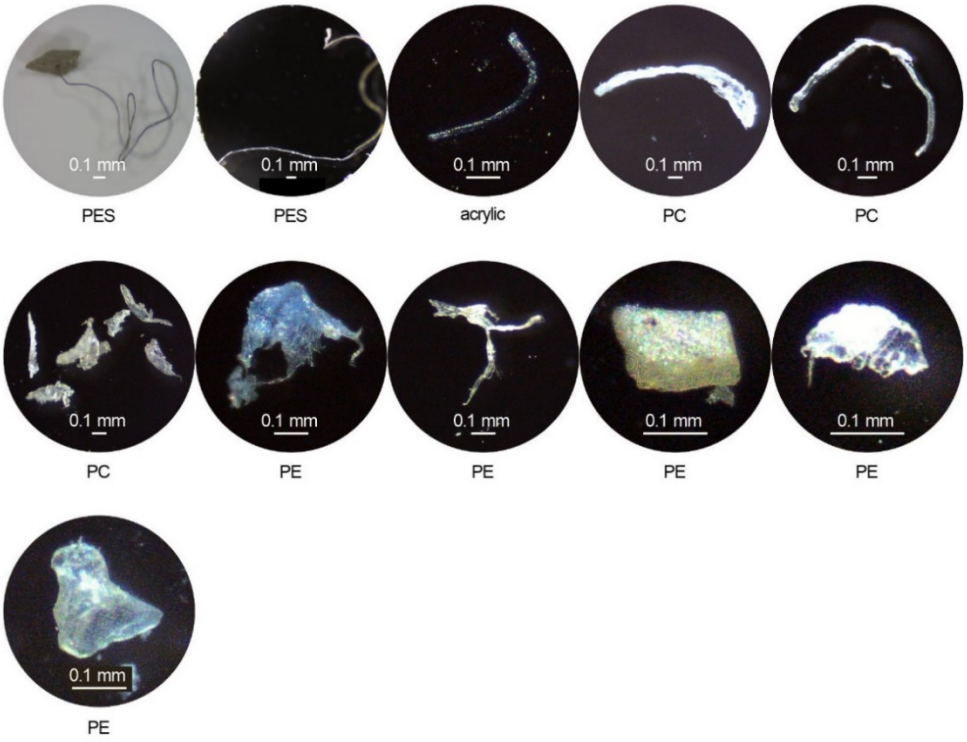


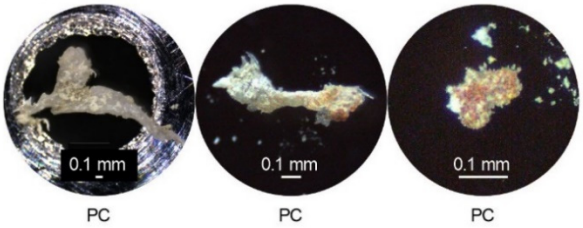
Figure S2. FTIR spectra and photographs of typical microplastic fibers and beads in surface sediments of the northern South China Sea.

(a) Ac in sample SW-B-4. (b) PES in sample MD18-3558. PES (polyester fiber) appeared as a fiber and contained the ester group (band at 1727 cm^{-1}), *gauche* methylene (band at 1455 cm^{-1}), and benzene ring (bands at 1049, 1019, and 728 cm^{-1}). (c) PET in sample MD18-3572. PET (polyethylene terephthalate resin) appeared as a bead and had a typical *trans* conformer of the O-C-H bond (band at 1342 cm^{-1}). (d) ER in sample MD18-3564. (e) HR in sample MD18-3572.

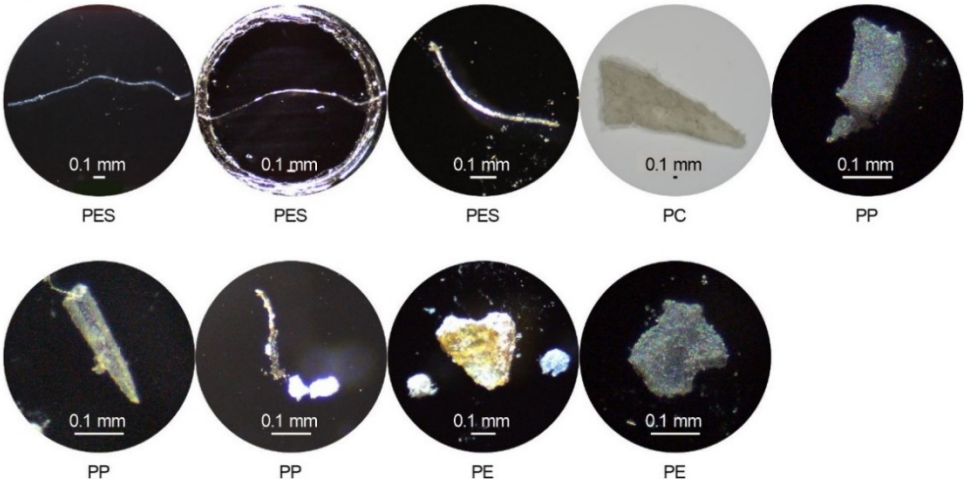
SW-B-4



SD-A3-1



FC3-1



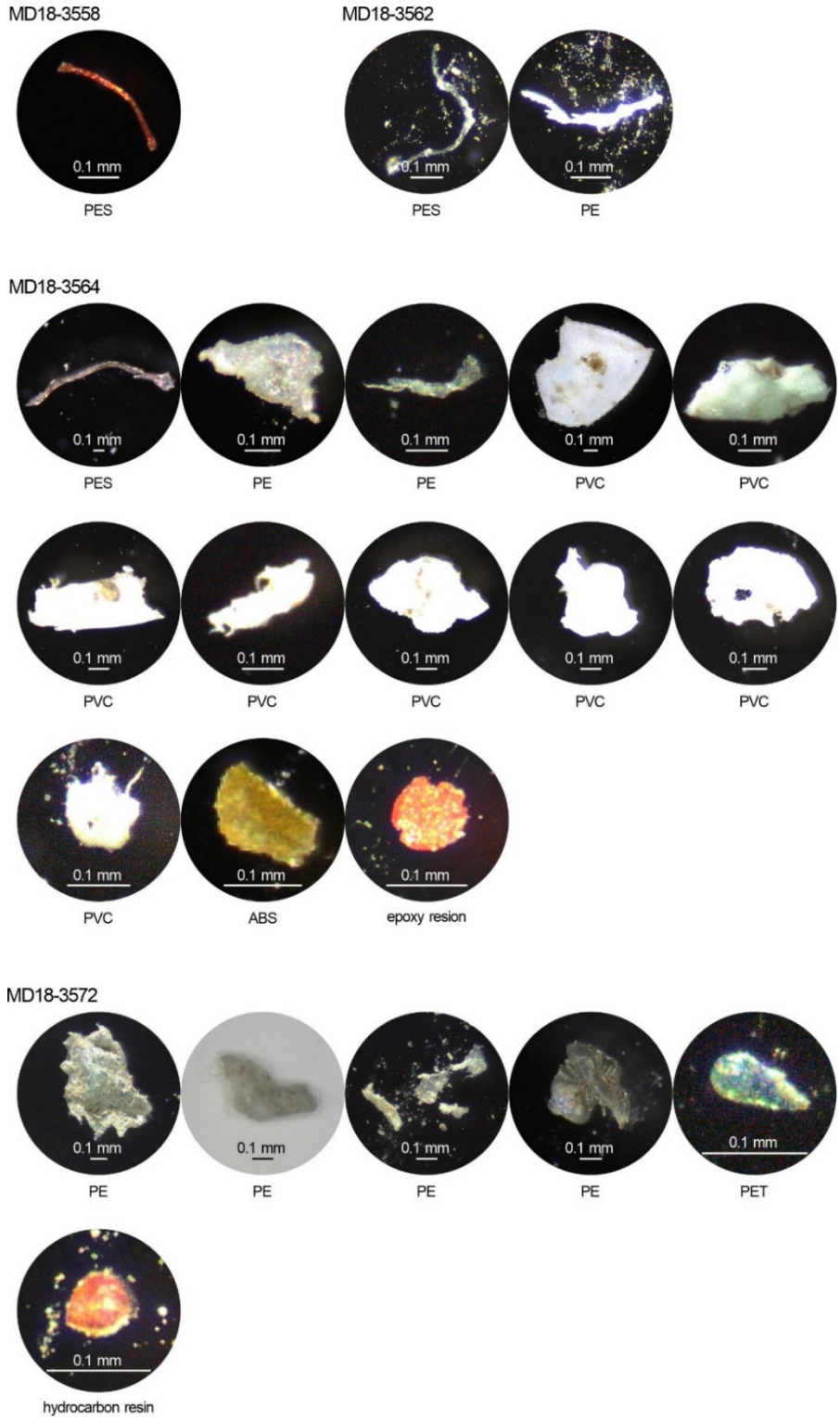


Figure S3. Photographs of all microplastics in surface sediments of the northern South China Sea.
The fourth panel (PC) of sample FC3-1 contains the largest fragment (diameter 4.61 mm). The first panel (PES) of sample SW-B-4 contains the longest microfiber (length 5.36 mm). The sixth panel (hydrocarbon resin) of sample MD18-3572 contains the smallest bead (diameter 0.07 mm). The sixth panel (PC) of sample SW-B-4 contains six pieces of small fragments. The third panel (PE) of sample MD18-3572 contains one piece of fragment.

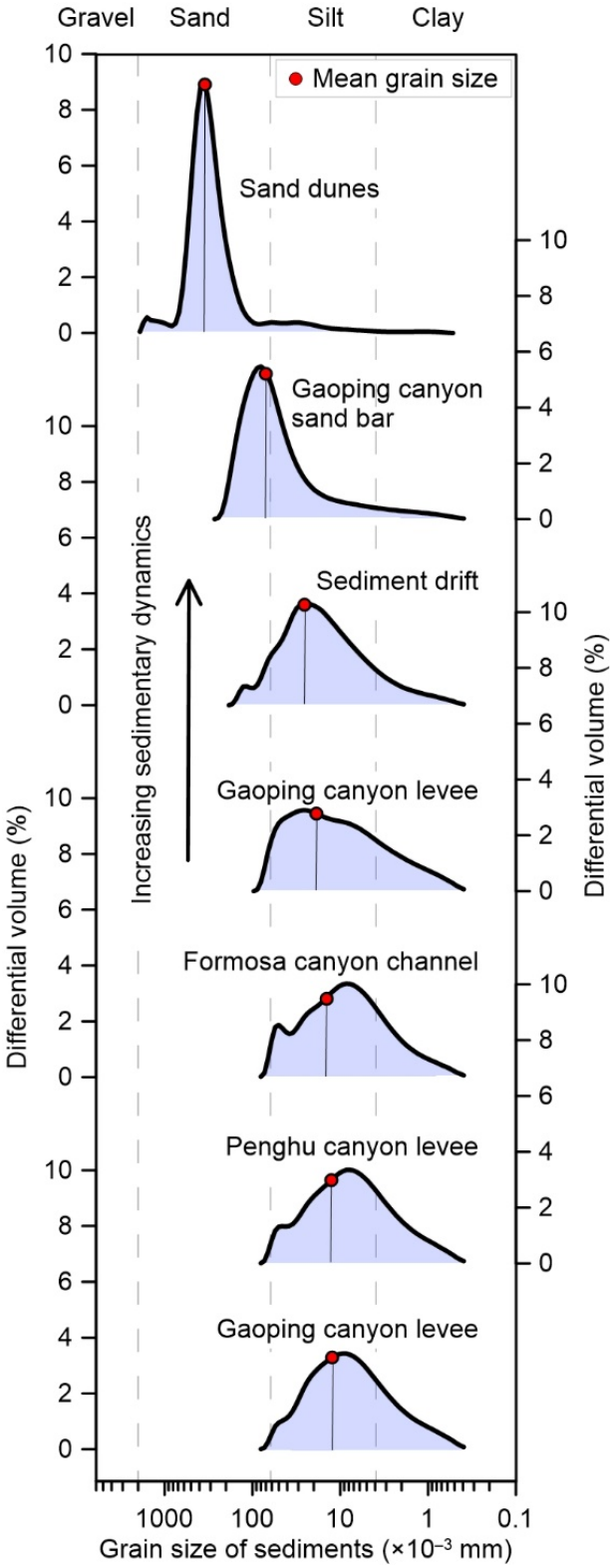


Figure S4. Grain-size frequency distribution of detrital fractions in surface sediments from typical deep-sea geomorphological units in the northern South China Sea.

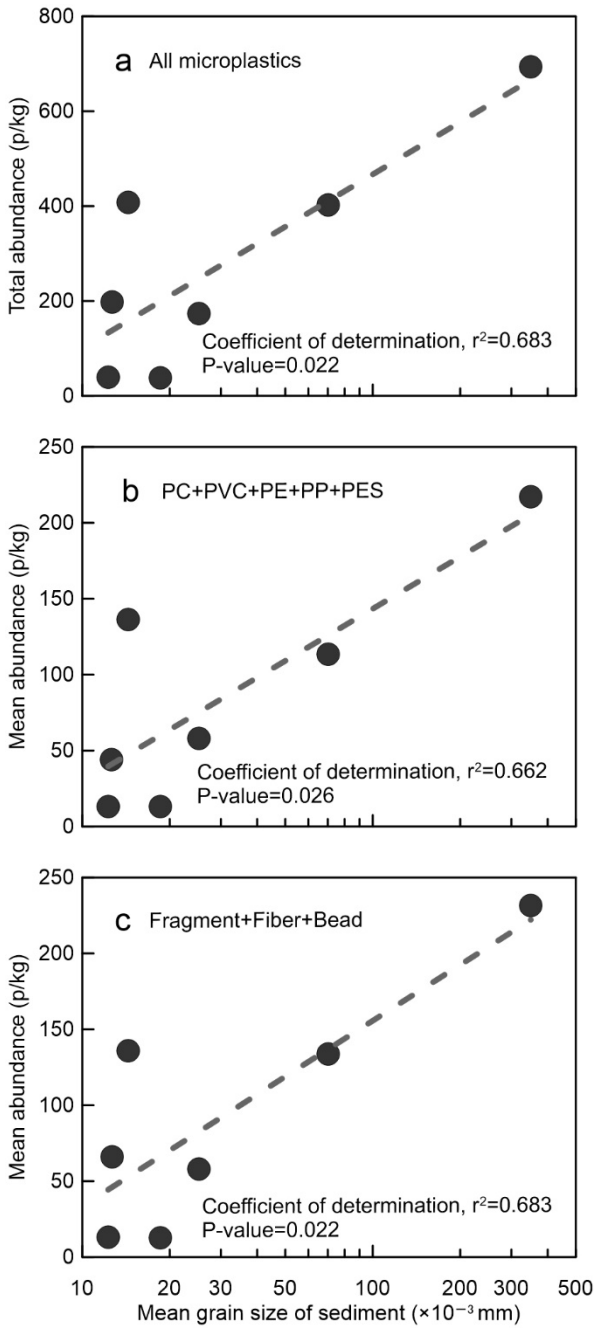


Figure S5. Pearson correlation analyses for the abundance of microplastics with the mean grain size of detrital sediments.

(a) Total abundance of microplastics. (b) Mean abundance of PC, PVC, PE, PP, and PES. (c) Mean abundance of microplastic fragments, fibers, and beads. The horizontal axes (mean grain size of sediments) were transformed to logarithmic formats (Log base 10). The detailed data are shown in Table S2. The dashed regression line shows the linear relationship between two variables (fit equation Y=B*Log(X)+A). Coefficient of determination, r^2, indicates the strength of the linear correlation. P-value indicates the probability of a significant correlation (significance level 0.05). The P-value smaller than 0.05 usually suggests a significant correlation between two variables.

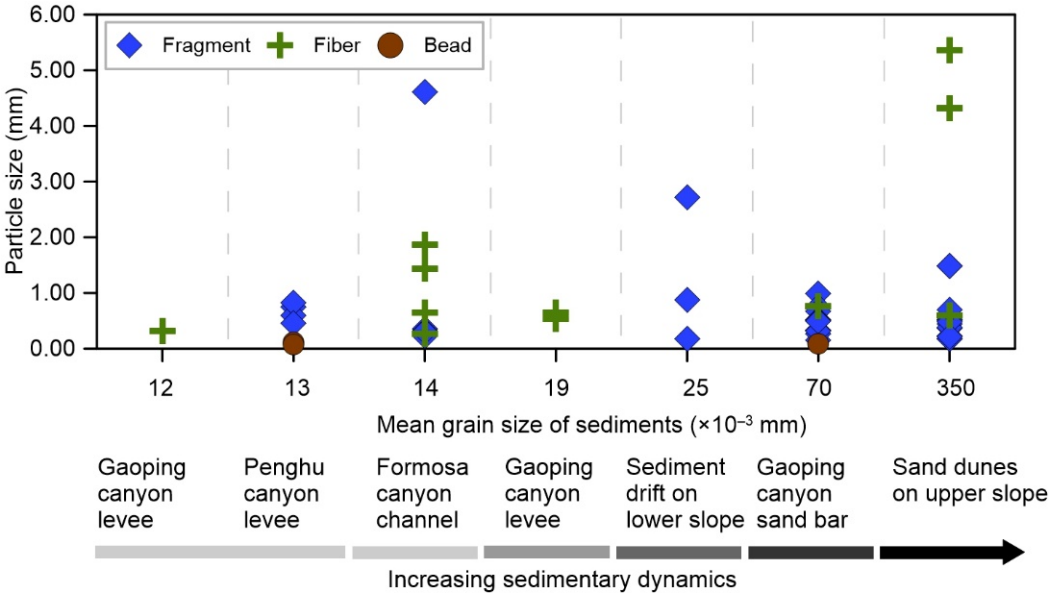


Figure S6. Particle size distribution of microplastic fragments, fibers, and beads.
Deep-sea geomorphological units are arranged along the horizontal axis based on the mean grain size of detrital sediments, representing gradual increasing sedimentary dynamic intensity of the geomorphological units.

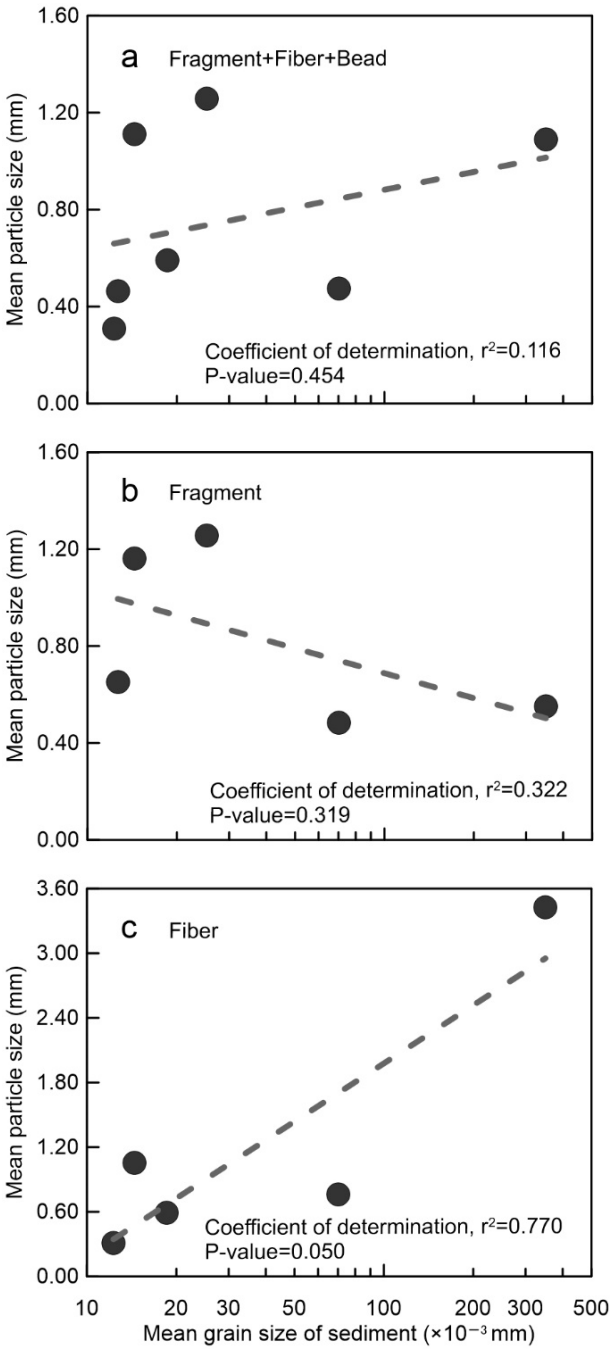


Figure S7. Pearson correlation analyses for the particle size of microplastics with the mean grain size of detrital sediments.

(a) Mean particle size of microplastic fragments, fibers, and beads. (b) Mean particle size of microplastic fragments. (c) Mean particle size of microplastic fibers. The horizontal axes (mean grain size of sediments) were transformed to logarithmic formats (Log base 10). The detailed data are show in Table S2. The dashed regression line shows the linear relationship between two variables (fit equation Y=B*Log(X)+A). Coefficient of determination, r^2, indicates the strength of the linear correlation. P-value indicates the probability of a significant correlation (significance level 0.05). The P-values in plots (≥0.050) suggest insignificant correlations between microplastic particle size and sediment grain size.