Microplastic pollution in the Beibu Gulf- the Northern of the South China Sea

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Introduction

Microplastic (0.3-5mm) characteristics and distributions in the coastal and off coastal zones of the Beibu Gulf were firstly investigated. The aims of this study were to: (1) determine the microplastic abundance, size, color and polymer composition in the Beibu Gulf; (2) analyze the distribution patterns of microplastic in the Beibu Gulf; (3) provide preliminary data for further study of the fate of microplastics in the Beibu Gulf and the transportation to the open water, i.e., the South China Sea.

Materials and methods

The study area and sampling station distribution are showed in Figure 1.Seawater samples were collected using a Manta trawl. Surface sediment (> 5cm) was collected using a Van Veen sediment collector (sampling area 0.1 m^2).

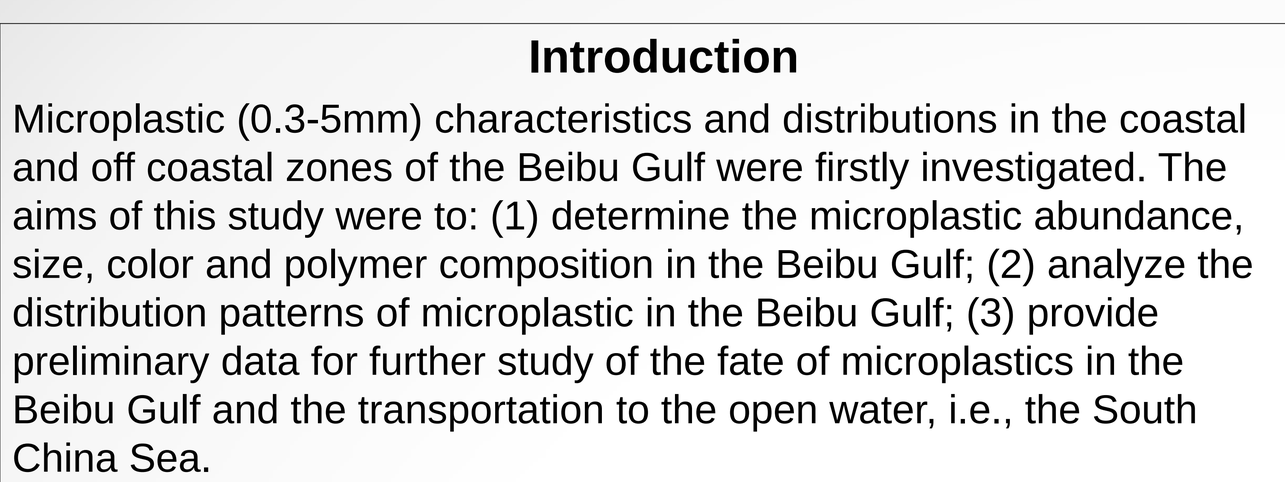

Figure 1 Location of Beibu Gulf and sampling station distribution

Results and discussion

1 Abundance of microplastics

The mean abundance of microplastics in all seawater was 0.67 ± 1.09 items/m^3, while 0.78 ± 1.20 items/m^3 and 0.26 ± 0.32 items/m^3 in seawater from L and B stations, respectively.

The mean abundance of microplastics in sediment was 13.87 ± 9.9 items/kg d.w., while 15.00 ± 10.74 items/kg d.w. and 12.21 ± 8.07 items/kg d.w. in sediment from L and B stations, respectively.

2 Microplastic characteristics

In seawater the fragments contributed the most as 92.38%, and polystyrene (PS) was the dominant polymer (53.23%). In sediment, the most abundant microplastics were fibre (82.93%) and rayon (RY, 39.54%)..

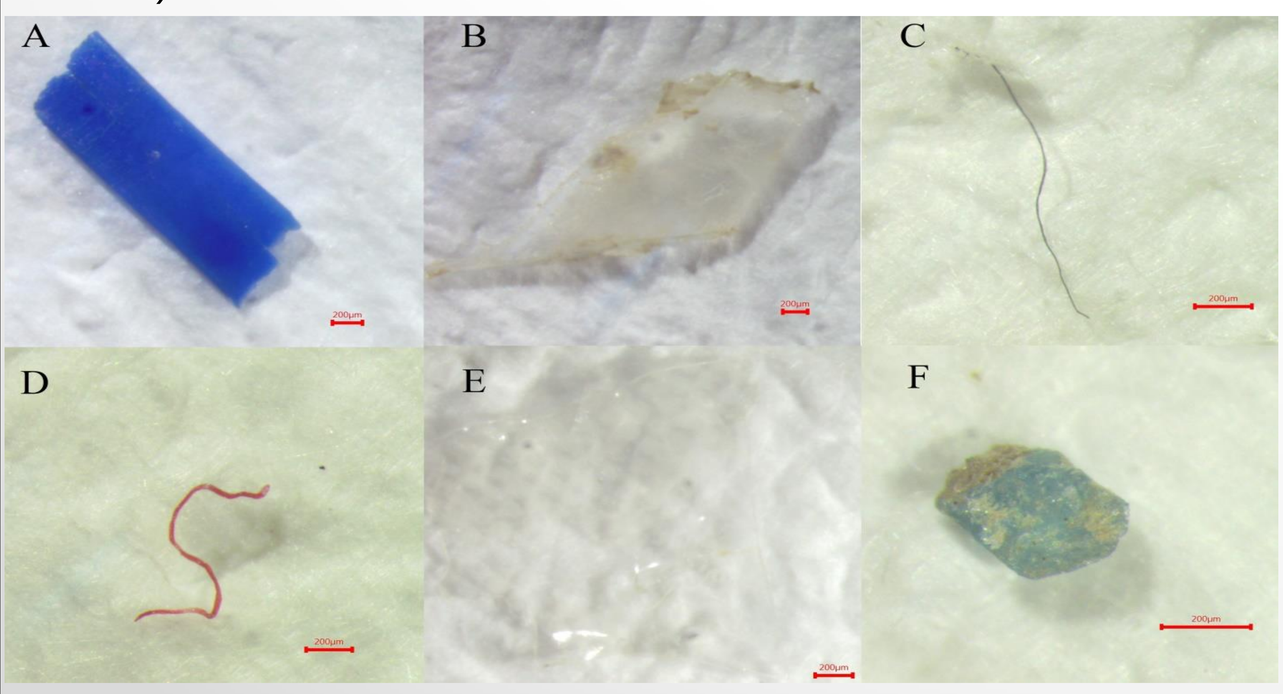

Figure 2 Selected microplastic shapes inspected by SteREO microscope: Fragment (A-B), Fibre (C-D), Film (E) and Pellet (F)

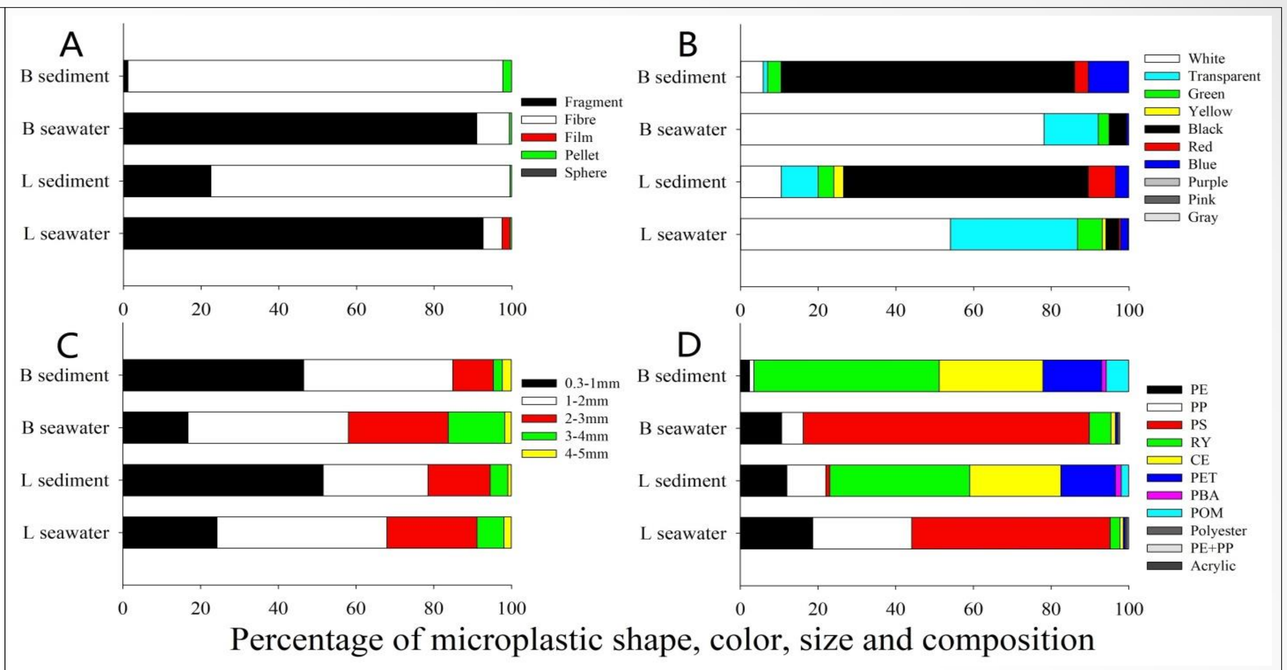

Figure 3 Microplastic characteristics observed from the seawater and sediment sampled in the Beibu Gulf, the northern of SCS: Shape (A), Color (B), Size (C) and Composition (D)

3 Distribution of microplastics

The abundances of microplastics in coastal area were found to be greater than those in off coastal area, indicating that the important contribution of human activities.

The abundances of microplastics in off coastal sediment were only slightly lower than that in the coastal sediment, indicating that microplastic is readily to transport and bury in open area sediment.

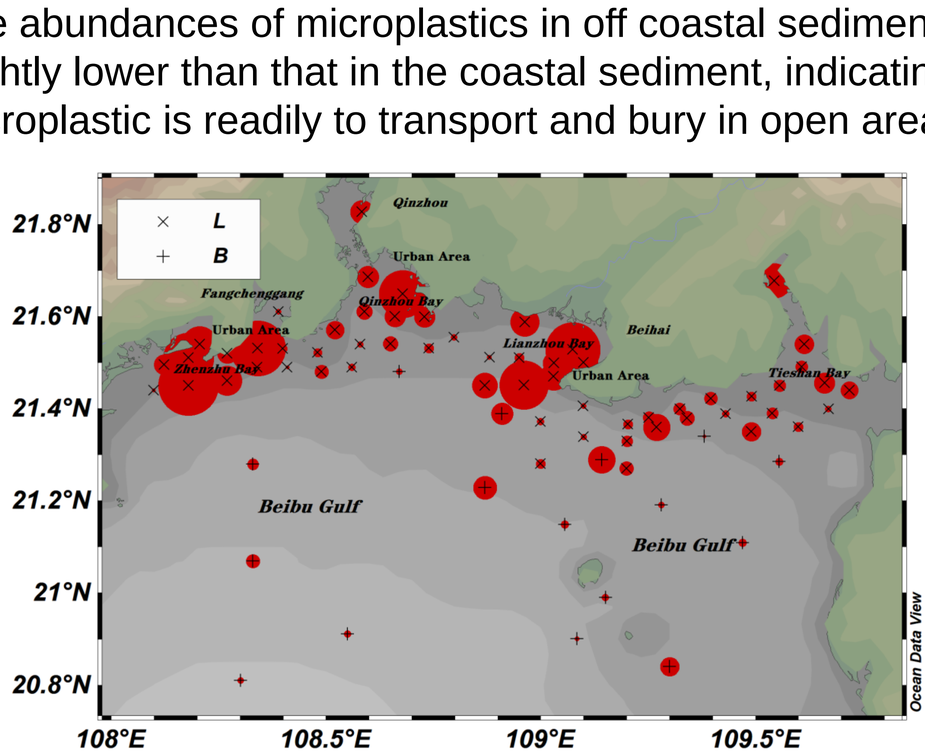

Figure 4 Distributions of microplastics in seawater from L and B stations

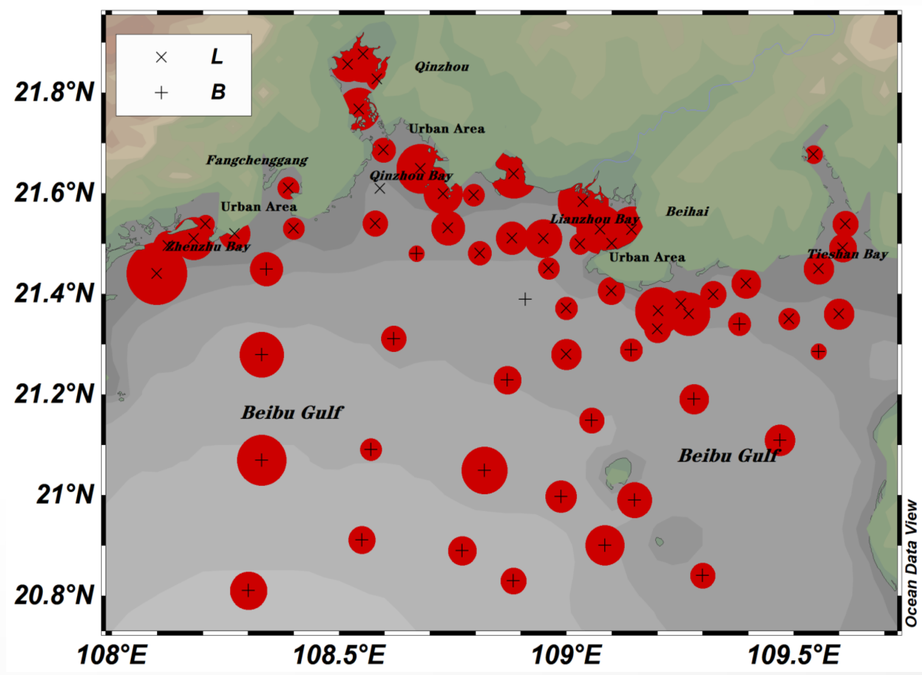

Figure 5 Distributions of microplastics in sediment from L and B stations

Conclusions

The abundances of microplastics in coastal seawater were much greater than that in off coastal seawater, while the abundances were comparable between coastal and off coastal sediments, indicating important contribution of human activities. Large amounts of microplastics can be transported for long distance, then sink down and bury in the sediment.