Vertical distribution of microplastics in marine sediments

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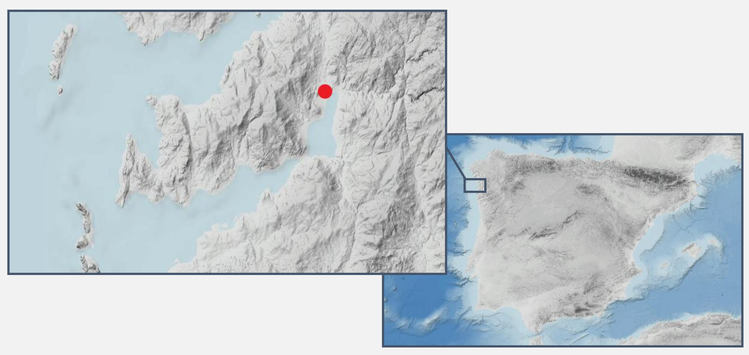
ABSTRACT

Microplastics (MPs) have been frequently detected in samples from marine environment, however the vertical distribution of microplastics in the marine sediment is a less understood topic[1].

In this work, we obtained the distribution of MPs from a intertidal sediment core of 50 cm. This distribution can give a view of the evolution of MPs concentrations over time as markers of the Anthropocene.

SAMPLING

Intertidal core sample was taken at the Ría de Vigo employing a PVC tubing. Core sample was maintained frozen until analysis.



MAIN RESULTS

Sixteen sub samples were analyzed and 96 MPs were identified with an average of 127.8 MP/kg of wet sediment.

Fibers were the most common type of MP accounting for almost half of the identified particles.

MP size (Feret diameter or length for fibers and filaments) ranged between 164 and 17300 μm with a clear distribution towards sizes under 5 mm and a median of 1835 μm.

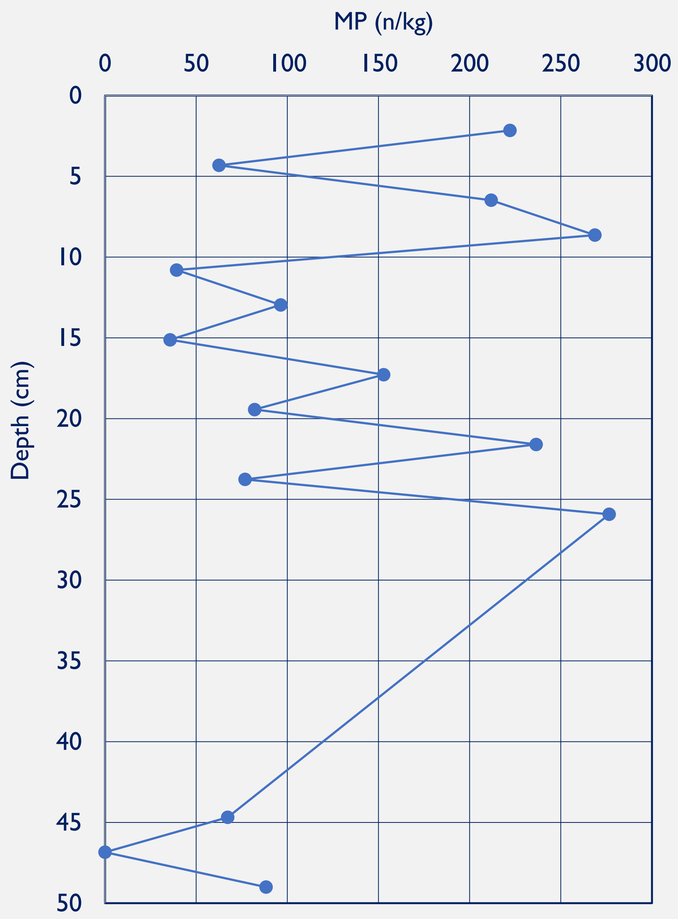
The most common color was transparent (43,5 %) followed by blue (17%), black (15%) and brown (4%).

VERTICAL DISTRIBUTION

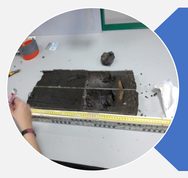
A negative, but not statistically significant trend, was observed between MP number and depth. Although significant negative trends have been frequently obtained[1] this is not always the case, and even positive correlations have been found[2].

Increments of MPs in deeper sediments can be linked to changes in MPs input, sedimentation rates, natural or anthropogenic disturbance of sediments or extreme environmental episodes[3].

No significant correlation was found between size or type of the MPs and depth.



ANALYSIS



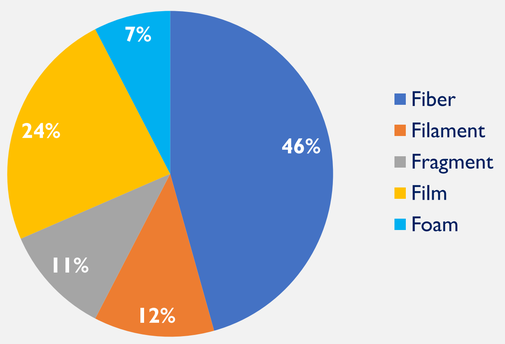
The core sample was divided in 2.5 cm sections tanking a 50 g subsample at each division.

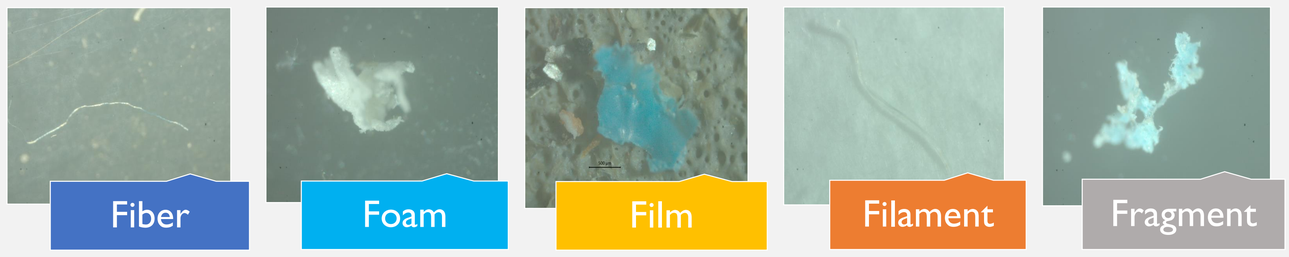
Procedural and lab environment blanks were obtained.

Organic matter digestion with 100 mL H_2O_2 20% and flotation in satured NaCl for 1.5 hours twice.

Vacuum filtration of supernatant through glass fiber filter.

Microplastic identification with stereo microscope and ImageJ processing.





Previous studies in the area have shown a considerable variability of microplastics in the sediments along Ría de Vigo[4]. This variability has been suggested to be originated by multiple and variable anthropogenic sources in the area.

This local variability can alter the expected decrease of microplastics with depth as result of the anthropocene.

CONCLUSIONS

- General trends of plastic size distribution and type, being fibers the most common, are in agreement with previous studies in the area [4].
- No clear dependence was observed between number, size or type of microplastics and sediment depth.
- The irregular distribution of MPs with depth is attributed to highly variable sources and sediment disturbances.

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