SAMPLING METHODOLOGY OPTIMIZATION FOR LARGE MICROPLASTIC (1-5mm)

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INTRODUCTION

There is a growing concern in the scientific community as well as among the public about microplastic pollution. It has become a major threat for the environment, affecting kilometers of coast around the world. To investigate this pollution, standardization is being forced on biological, chemical, and physical analytical methods. This is necessary to obtain comparable temporal and regional data sets; otherwise, strong inferences and conclusions cannot be made. In relation to beach sampling, the standardized methodology outlined in the manual, *Guidance on Monitoring of Marine Litter in European Seas*, is currently being used to collect microplastics in the Canary Island Archipelago. From that starting point, we have made modifications and improvements in order to minimize the time spent sampling and the use of human resources, both in field and in the laboratory.

METHODOLOGY

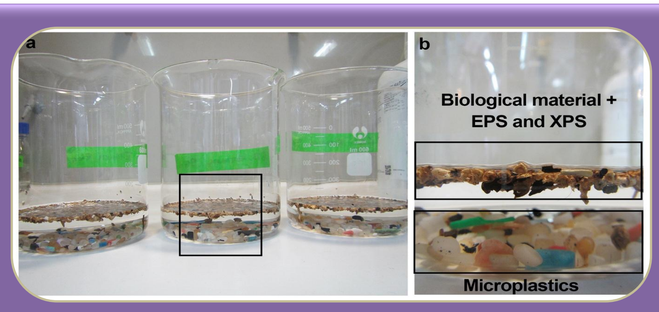
Sampling the beach, place a 50x50 cm quadrant at the high tide line.

Collect 1L if the first 'cm' of sand with a metallic spoon, weigh the sample and put it in a 1mm mesh bag.

Clean bag in sea water, to eliminate the sand, and to retain only with microplastics and organic material. Store bags until sample treatment in the laboratory.

At the laboratory

Dry the sample. Pour contents of the bag into a beaker. Add ethanol (96%) until reaching a volume of 100mL.



The previous step promote density separation of microplastics and biological material as shown in the images above.

Filter microplastics remaining at the bottom through a 50µm mesh net and dry for 24h at 60ºC. Finally, separate the 1-5 and 5-25mm fractions with a 5mm mesh sieve. Weigh both fractions.

IMAGE ANALYSIS:

Image Acquisition

- ✓ High resolution scanner
- ✓ High resolution images

Minimum of 4800x6900 pixels

Automatic classification results

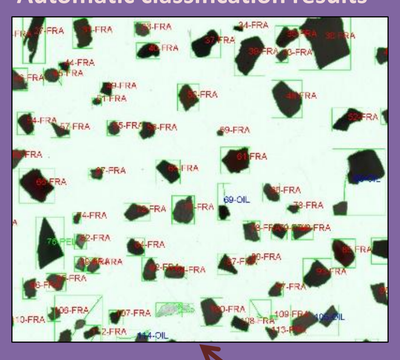
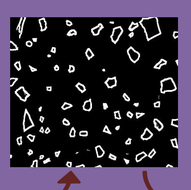


Image Segmentation



Color and Shape Features Extraction

Particles Classification

Experimental setup: 4 images containing 342 pellets (PEL), 227 fragments (FRAG), 174 tar particles (OIL) and 101 line particles (fibers).

Obtaining **accuracy of 96.46%** with the Random Forest classifier, in addition to providing geometric statistics for each detected class:

	Classified as			
	Pellet	**Fragment**	**Tar**	**Fiber**
Pellet	340	2	0	0
Fragment	12	203	12	0
Tar	0	3	171	0
Fiber	0	1	0	100

Can obtain area and perimeter of each particle detected in the image. This greatly improves the particle descriptive process.

ADVANTAGES

- ✓ Reduction in the time spent on sampling in the field and laboratory work
- ✓ Greatly improved the separation of microplastics from organic matter
- ✓ Facilitates counting, separating, identifying and describing (obtaining geometric data) microplastics

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