MICROTROPHIC PROJECT

MICROPLASTIC INCORPORATION IN MARINE FOOD WEBS

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ABSTRACT

Small pieces of plastic are accumulating in the oceans. Because they are smaller than 5 mm they are called microplastics. They are produced by many different processes of degradation and fragmentation, and can be found washed up on every beach of the world ocean. Recently their size is getting smaller and their abundance increasing. A recent evaluation finds five trillion particles weighing 268,940 tons floating at sea. However, these values are 10 orders of magnitude lower than the total plastic debris dumped into the sea since 1970. Thus, a significant portion of plastic waste has disappeared and one likely cause is ingestion by marine zooplankton and subsequent transfer up the marine food web. There, they pose a biohazard because microplastics absorb persistent organic pollutants (POP's), including polychlorinated biphenyls (PCB's) that, via marine fisheries, get transferred to people. Once in people's bodies, these POPs can penetrate cells, chemically interact with important biomolecules, and disrupt the endocrine system. Because of this danger, it is imperative to estimate microplastic ingestion and egestion rates in zooplankton. Here at the University of Las Palmas on Gran Canaria in the MICROTROPHIC Project, we are determining microplastic abundance and temporal variability. In laboratory cultures of zooplankton, we are determining the ingestion and egestion rates of microplastics. In mesocosm experiments we are investigating microplastic transfer through the food chain and we are studying the relationship between the ingestion of microplastics contaminated with PCBs and the concentration of PCB's in animal tissues.

STUDY AREA

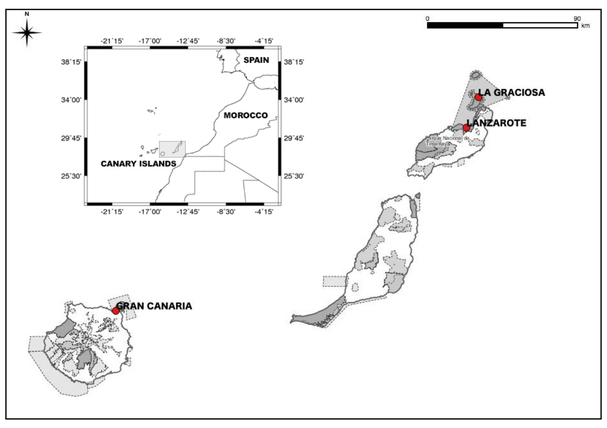


Figure 1. Sampling sites in the Canary Current. Las Canteras Beach in Gran Canaria Island; Famara Beach in Lanzarote Island and Lambra Beach in La Graciosa Island.

OBJECTIVES

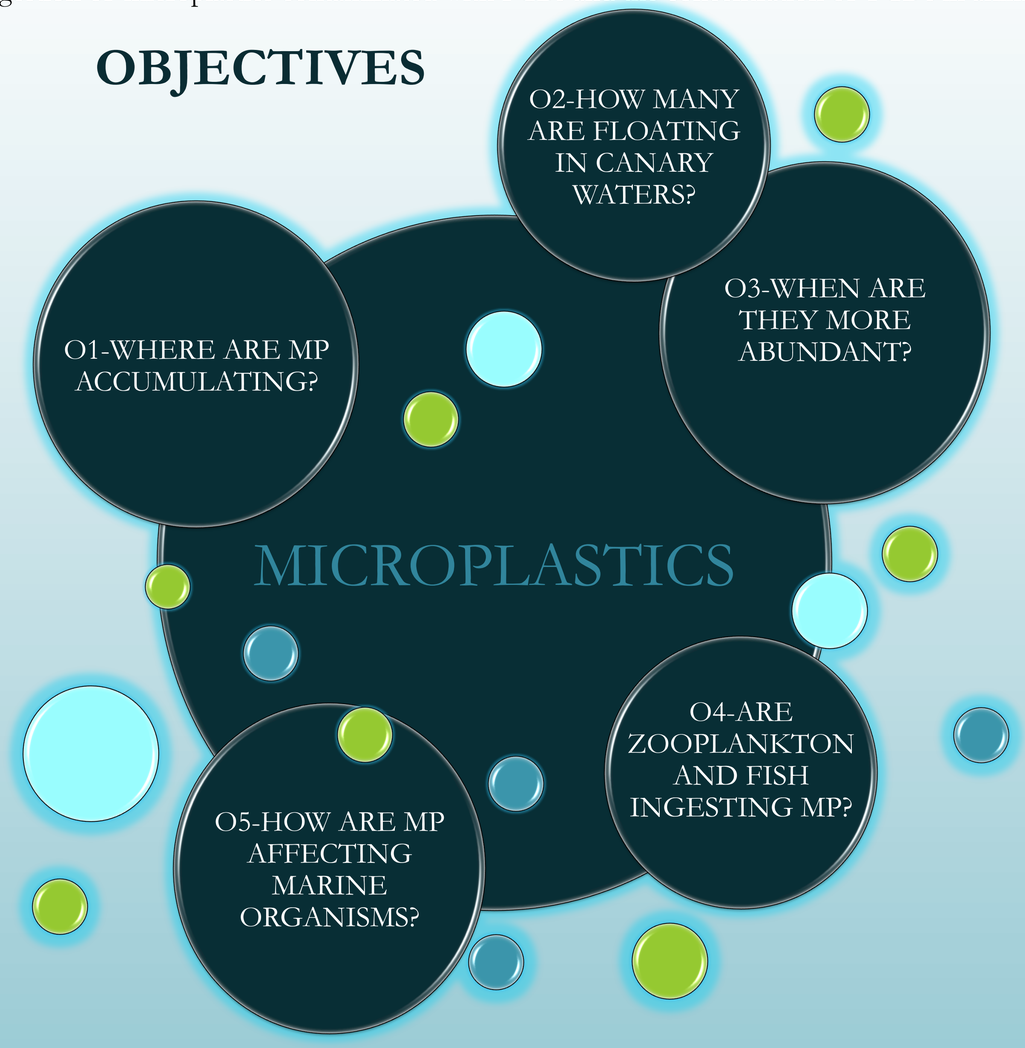


Figure 2. MP pollution in Famara Beach, Lanzarote. October 2015. Photo: Carlos Reyes.

METHODS

MP POLLLUTION EVALUATION IN SEDIMENTS AND SEA SURFACE

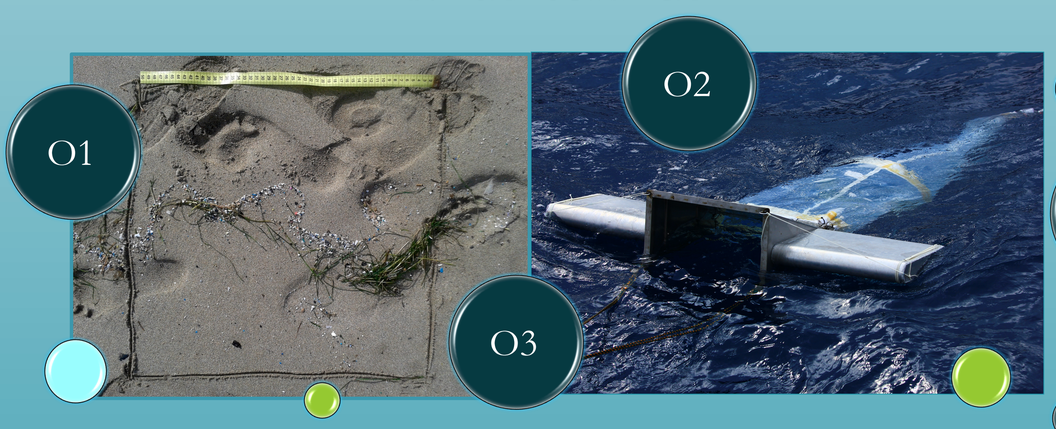


Figure 3. Sampling methods.

Quantify MP abundance in 1L of sediments at 3 study areas (Fig.1) in 50x50 cm square. Sampling twice at month during 1 year.
Quantify MP abundance at sea surface at 3 study areas (Fig.1). Sampling once in autumm, winter, spring and summer.

STUDY MP AND PCBs CONTAMINATION IN MARINE BIOTA

Figure 4. Mysid *Leptomysis lingvura* cultured to study MP ingestion.

Improve and validate a method to quantify microplastic in tissues and stomach contents in animals.
Investigate the presence of microplastic fragments in the tissues and stomach content at different trophic levels: zooplankton, planktivorous fishes and sea turtles in wild.
Study the correlation between microplastic ingestion and the concentration of PCB's on animal tissues.

STUDIES OF TROPHIC TRANSFER AND EFFECTS ON ZOOPLANKTON PHYSIOLOGY

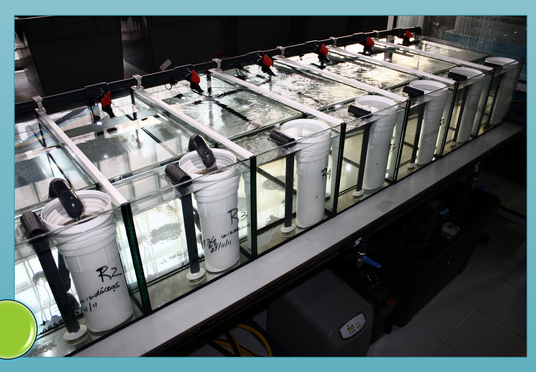
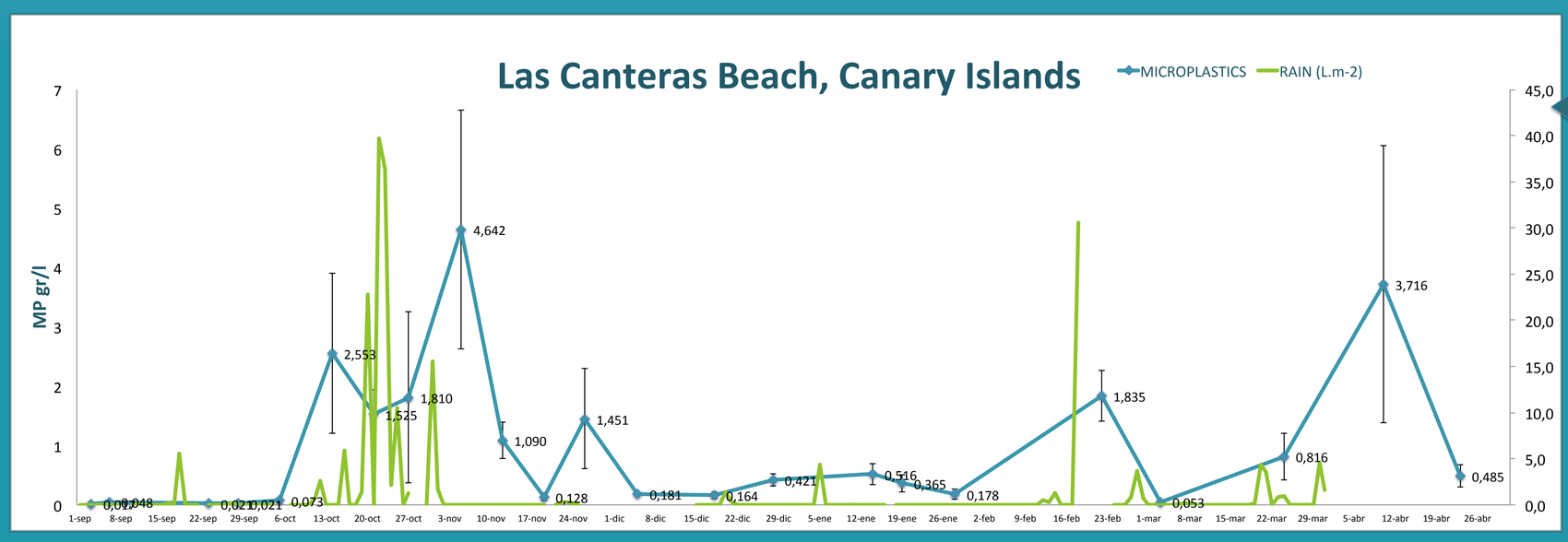


Figure 5. Mysids cultures at EOMAR laboratories.

Determine the ingestion and egestion rate of microplastic in laboratory cultures (zooplankton, planktivorous fishes and sea turtles).
Investigate microplastic transfer through the food chain in mesocosm experiments.
Implement the use of ETS and GDH activity as a tool to detect changes in the physiological state.

PRELIMINARY RESULTS



We found that all sampling areas are highly polluted with MP.

The most polluted areas are exposed to predominant winds and ocean currents.

We determine that peaks in MP densities are correlated with periods of heavy rain.

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Proyecto Microtrofic

Web: https://microtrofic.wordpress.com