2023 | DYNAMICS OF SINKING MICROPLASTICS

FKt230802 | #MicroplasticDynamics

- Panama
- 2 - 7 August 2023
- Dr. Laura Simon Sánchez, Aalborg University
- Ship Track

AALBORG UNIVERSITY

North Atlantic Microplastic Centre

NATIONAL GEOGRAPHIC

- **5** science days
- **.03** terabytes of data collected
- **~55,000** liters of seawater filtered
- **907** sq km mapped
- **16** CTD & rosette casts

Expedition objectives:

- Investigate the vertical distribution of microplastics in the water column, focusing on particles as small as 10μm, comparable in size to a droplet of rain.
- Explore the processes that govern the sinking rate of microplastics to the seafloor.
- Compare two different approaches for collecting microplastics in the water column of the Ocean, including a new piece of technology called the AAU-UFO, which is capable of 300-, 10-, and even 1-μm filtration of large volumes of water samples; AAU-UFO stands for Aalborg University Universal Filtering Object.

Evidence suggests that microplastics are ubiquitous in the Ocean — tiny particles of plastic are found throughout the water column. While larger particles, easily visible to the human eye, are commonly seen on the Ocean's surface, much smaller particles are in the water column or accumulate in seafloor sediments. These tiny particles are often only seen when water samples or collected sediments are viewed using a microscope.

There is a distinct disparity in the composition of floating microplastics compared to those in the sediment layer. These differences suggest that composition and particle size may influence how microplastics are transported to the deeper marine environment. Understanding of how microplastics move in the marine environment is limited, primarily due to a scarcity of in *situ* measurements. The major obstacle to collecting such measurements of microplastics is an issue of scale — getting large enough water samples and small enough filtration resolution.

The main objective of this research expedition in the Gulf of Panama was to investigate the vertical distribution of microplastics along the water column and to explore the processes governing how these pollutants sink to the seafloor. Conducting the research in the Gulf of Panama allowed the science team to collect samples in an understudied area of the Pacific Ocean, where nearly 6% of the global marine trade occurs.

Led by Dr. Laura Simon Sánchez, this expedition's research contributions were critical to advancing in situ data collection by successfully using a novel piece of equipment called an AAU-UFO, built explicitly for studying microplastics, combined with the McLane large water pump. These measurements were compared against water samples collected by the ship's Niskin bottles from matching depths.

Ultimately, researchers are building an essential picture of microplastic type and concentration across ocean depths and proximity to land. The novel data on the spatial distribution of sub-surface microplastics along the ship traffic area will help inform local authorities on the levels of microplastic pollution in the region, as well as the role of marine traffic as a potential source for some of these pollutants.

Resulting highlights include:

- Collected microplastic samples off the coast of Panama, an important region for global marine trade and the second largest producer of plastic waste in Latin America.
- Documented the occurrence and distribution of small microplastics (< 300 μm — the length of a dust mite), providing new insight into how these pollutants are transported to the seafloor.
- Successfully conducted a comparison study of two different sampling methodologies, one using R/V *Falkor (too)'s* CTD and rosette and a new technology, an AAU-UFO and a McLane large water pump, to identify the most effective and accurate technique for sampling microplastics in the Ocean.

Permit to conduct research in Panama's waters: 170-23