

The One Ocean Expedition can give us better understanding of levels and transport routes of microplastics in the ocean

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INTRODUCTION

Under the framework of United Nations Decade of Ocean Science for Sustainable Development, the tall ship Statsraad Lehmkuhl has started a 20-month circumnavigation, the “One Ocean Expedition” in August 2021 with the ambition to “create attention and share knowledge about the crucial role of the ocean for a sustainable development in a global perspective” (<https://oneoceanexpedition.com>). On board the ship, students carry out scientific work according to research protocols designed by contributing scientists. The global oceanographic currents are important global transport routes of microplastics (MP) that links the population-dense areas to low inhabited areas such as the Arctic and the Antarctic regions. We want to get data on MP distribution across different regions along the sailing route of the One Ocean Expedition, and test if we find different levels at coastal sites compared with offshore stations. We also want to use observations combined with ocean modeling to better understand sources and fate.

MATERIALS AND METHODS

Seawater is collected from the vessel’s intake and approx. 300 L per replicate are filtered by an ad hoc Compact Large Volume MPs sampling device recently developed. Samples are treated by a combined multienzymes and strong oxidative procedure prior to be analyzed by μ -FTIR imaging.



Figure 1. R/V Statsraad Lehmkuhl



Figure 2. Map of the R/V Statsraad Lehmkuhl Route from Arendal (Norway) to Las Palmas (Spain)

CONCLUSIONS

Preliminary results show the occurrence of coast based hot spots. Disentangling the contribution of MP from this array of water masses is important to understand the flow dynamics of MP within the major oceanographic currents, and quantification of MP from as many sources as possible is needed to allow models to assess the overall transport at global levels.

RESULTS

Within the first part of the cruise from Arendal (Norway) to Lanzarote (Spain) the total number of MPS varied from 0,3 to 4 MPS m⁻³. Polyethylene, Polypropylene, Polyamide, Polyester, Polyurethane, Polyethylene Terephthalate, Polystyrene and rubber were the most recurring polymers in the investigated samples.

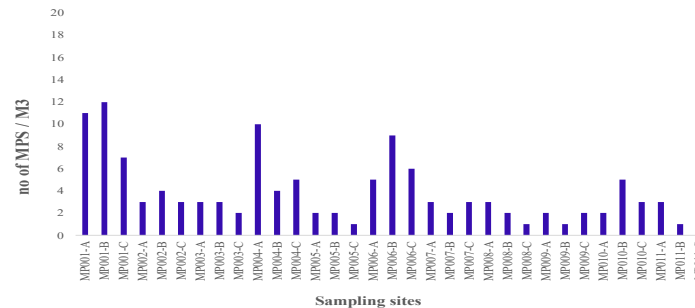


Figure 3. Levels of MPs in the investigated water samples collected from Arendal (Norway) to Las Palmas (Spain)

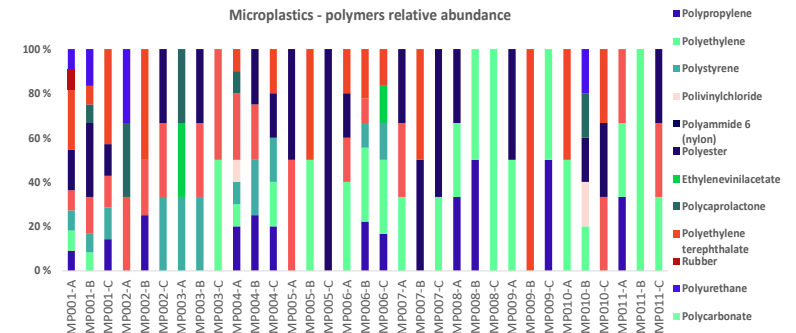


Figure 4. Polymers relative abundance in the investigated samples