

## Microplastic extraction method development and distribution analyses of North-Atlantic deep-sea sediment samples

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Microplastics (MPs), defined as plastic particles smaller than 5 mm, can be released into the environment either directly, e.g., via cosmetics or indirectly, e.g., via the fragmentation of larger litter items. Microplastics pollution reaching the ocean and seas has been a cause for concern due to the negative effects for organisms and ecosystems. The transport of MPs from coastal and terrestrial origins into the deep ocean is complex and driven by a convergence of factors, with the most important being bottom currents<sup>(1)</sup>. Although the scientific community has broadly investigated MPs distribution in the last decade<sup>(2,3)</sup>, the occurrence, distribution and accumulation rates of MPs in deep-sea sediments have remained largely understudied, mostly due to the inaccessibility of deep-sea areas and the complexity of MPs sampling<sup>(4,5)</sup>.

The objectives of this study are twofold; first we aim to develop a method for MPs extraction from deep-sea sediments, and second to investigate their distribution and occurrence. For this purpose, sediment samples collected from both oceanic (Atlantic Ocean) and North Sea environments will be analysed. The North Sea samples will be subject to both a sedimentological study (grain size analyses), as well as to a standardized extraction, observation, and characterization of MPs<sup>(6)</sup>. The same workflow will be adjusted as required and applied to the Atlantic Ocean samples, taken during the RV Belgica Cruise 2023/12, offshore Ireland, by subsampling boxcores for MP analyses. These deeper oceanic samples most likely will have a smaller grain size distribution, which may be a challenge for making an accurate density separation of MPs and sediments. For the observation of MPs after sample processing, we will use a well-standardized workflow, using Red Green Blue (RGB) data extracted from photos of Nile red- fluorescently stained MPs for the detection and classification of MPs<sup>(6)</sup>. This inventive workflow integrates the benefits of high-throughput screening with the benefits of automation<sup>(6)</sup>. We will consider method development, as finetuning may need to be made to optimize this method of microplastic extraction from deep-sea sediments. Once samples are processed, we will assess the concentration of MPs recorded from deep sea sediments. Therefore, we will be able to establish whether a difference in MPs occurrence or distribution occurs among the different sampled deep-water sedimentary environments from the Atlantic Oceans, such as sediment drifts and channel systems. Our data contributes to better understand the dynamics of MPs transport in deep sea environments, and the potential exposure of organisms to these particles. To do this effectively it is crucial to keep optimizing existing extraction methods and evaluate to which extend they can be applied.

### References

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### Keywords

Microplastics; Deep-sea Sediments; Extraction Methods; Distribution and Accumulation