

There are large gaps in the knowledge of the fate and distribution of plastics once the plastic has entered the ocean. This is in part due to the vastness of the ocean, the probable uneven distribution of plastics and the challenges in accurately estimating the concentration of plastics. Here we report on a campaign that involved sampling for micro-plastics from two yachts racing around the world in the Volvo Ocean Race. The race started in Alicante in October 2017 and ended in den Hague in June 2018, providing a unique snap-shot of micro-plastic distribution along the race track. The project is a cooperation between the science project, the Volvo Ocean Race and the sponsors of the instrumentation, - the Volvo Cars Group. Samples for microplastics were sampled on 3 different mesh-size SS filters while the boats open the through-hull fittings to run the water maker, allowing for integrated samples over that time- period. The filters were brought to the lab in Kiel and analyzed in a flow-through system with a Raman spectrophotometer.

We found micro plastics in almost all samples along the race track, with the highest concentrations on the south European coast and Mediterranean, as well as in the South China Sea. On several other locations we found higher than average microplastic concentrations that seems to be tied to major ocean currents, suggesting a remote source. Here we will report on experience with the sampling and analytical instrumentation, report on the distribution of the microplastic along the race track and provide some initial ideas on the source of the plastic using numerical modelling. We will also report on the utility of racing yachts as platforms for oceanographic measurements, including micro plastics.

Keywords: microplastic worldwide distribution mixed, layer

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Microplastics at the first 200 meters of the water column in the Atlantic Ocean

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The presence of microplastic at open ocean is a well documented fact. But they have been determined basically in the first 5 meters of the water column or near the seabed. The buoyant microplastics more abundant are of polyethylene (PE) and polypropylene (PP) composition, with a density significantly lower than seawater density. But there are other kind of plastics, as nylon of fishing nets or fibers which have a density similar to seawater and due to their size, shape and composition, can appear hundreds of meters below seawater surface. Taking into account that

fishing nets represent a high percentage of marine pollution (Lebreton 2018), the possibility to find these small fragments on the water column increase.

Based on this idea, they took place there specific sampling of microplastics at the European Station for Time-Series in the ocean (ESTOC). This station is placed at open ocean at 100 km to the North to the Canary Islands, on the subtropical gyre of the North Atlantic ocean. Sixty liters of seawater were filtered by sample with a net of 100 μm pore size. It was sampling at 0, 50, 100 and 150 meters depth at three different scientific cruises between April 2017 and March 2018. At all sampling done it was observed the microplastic presence at every depths. Microplastics found were basically small fragments of fishing net, lines, paint chips and fibers. This preliminary study supposes that can exist an undetermined small size plastic amount with neutral buoyancy which are not being taken into account at prediction models, underestimating the plastic tons existing at marine environment.

Keywords: deep water, ESTOC, under the surface, POPs

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Floating microplastics in the Western Mediterranean Sea and their export by marine aggregates

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Pollution by large-sized plastics and microplastic debris is widespread in all Earth environments, also threatening marine ecosystems worldwide. The view of the Mediterranean Sea as one of the most impacted regions in the world by plastic litter has been recently confirmed. However, coastal regions in the Western Mediterranean Sea have been omitted in large-scale surveys in quantifying microplastics and little is known about their dispersal patterns and potential inputs. Furthermore, the discovery of microplastic incorporation into marine aggregates underlines the need to quantify and characterize aggregated microplastics in the marine environment. Whereas the deep-sea has been suggested as a major sink for microplastic debris, the pathways for microplastics to reach such remote environment remain poorly assessed. In this study we determine the abundance, chemical composition, color and size parameters of free floating loose and naturally aggregated microplastics from samples taken in the Western Mediterranean Sea offshore Spain, from the Gulf of Lions to the Alboran Sea. We report microplastic abundances of 0.100 ± 0.048