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Towards uniform metrological processes for the characterization and analysis of microplastics?

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Plastic debris is a widespread pollutant of the marine environment. In the recent years, most research focused on small plastic particles, so-called microplastics “MP” (particle size: 1 µm–5 mm). The assessment of environmental MP pollution requires a multi-step analytical process beginning by a sampling, then a sample preparation to realize a particulate characterization. All the process needs to be adapted to each kind of samples (seawater, sediment, biota). Unfortunately, this analysis is subject to great qualitative and quantitative variabilities due to the absence of a regulatory framework from sample preparation to analysis. Moreover, the acquired data feed the development of numerical models of particle movement in large oceanographic flows regardless of their sizes, shapes and chemical natures. In consequent, the robustness and repeatability of the analyses are essential to validate and refine these models. Work requiring the optimization of preparation and analysis methods or the establishment of uniform metrological processes is becoming essential.

Nevertheless, to estimate uncertainties, it is necessary to establish models that allow working with particles similar to those found in the environment. However, only calibrated plastic microbeads are available on the market, which is far from being representative of current pollution. There is therefore a strong demand for standardized microplastic fragments of various polymers. Different teams are working on this purpose but they all encounter the difficulty of separating small fragments (<100 µm) in the calibrated size range and nanometric particles. This presentation will illustrate the production of MP standard solution and their morphological characterization and quantification by specific tools based on flow imaging. Those standards will be used for the estimation of the uncertainties (Reporting limit, recovery rate…) due to sample preparation and analysis. These uncertainties will be recalculated on real samples and the results will be presented.