Microplastics (MPs, < 5 mm) have been identified as emerging topic of global concern. Therefore the detection of MP pollution has also been included in the European Marine Strategy Framework Directive (MSRL, descriptor 10.1.3) [1]. Although monitoring of MP pollution is demanded there are still knowledge gaps on how much MPs are out there, because the required analytics are challenging and no standard operating procedure (SOP) does exist so far. Environmental samples i.e. surface water samples contain next to MPs a high amount of natural organic material. The extraction of these MPs from the environmental matrix is crucial to enable a solid identification especially of small of MPs (11-500 µm) with state-of-the-art methods like micro Fourier transform infrared (µFTIR) spectroscopy.

In the framework of JPI Oceans BASEMAN project several innovative approaches were developed and processes optimized to gain insight into the extent of MP pollution in North Sea surface waters.

A first evaluation of seven samples from the North Sea showed an omnipresence of MPs in surface waters with concentrations ranging from 4 to 233 particles m⁻³, with rubber (41.8 %), PE (15.8 %) and acrylics/PUR/varnish (13.3 %) as most dominant polymer types and a clear prevalence of small MPs <100 µm (97.9 %).

[Image: Diagram showing steps of microplastics sampling and extraction, detection, and analysis.]

**Successful application of a highly efficient enzymatic-oxidative purification in newly developed MP reactors to approach challenging and elaborate preparation of samples**

**Prevention of overloaded filters via FlowCam measurements**

**Cutting-edge analysis with µFTIR spectroscopy and an automated analysis to produce valid data on polymer composition, abundance and size distribution with an identification down to a size limit of 11 µm**

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