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Enabling a plastic-free microplastic hunt: "Rocket" improves detection of very small particles

Environmental researchers at the Leibniz Institute for Baltic Sea Research Warnemünde (IOW) have developed a novel mobile device for recording microplastics in surface waters. They call it the "Rocket", a design with which depending on the amount of suspended matter in the water up to 60 litres per minute can be sucked through four cartridge filters, and which is particularly advantageous for sampling the fine fraction of the microplastic in the range down to 10 μm . The scientists were specially challenged by the fact that plastic had to be avoided as far as possible. The successful results of the test phase have now been published by them in the international scientific journal "Water".

Microplastics are omnipresent in the environment. Whether in the Arctic ice, the sand of the Sahara or the sediments of the deep sea – environmental researchers find these artificial particles everywhere. Figures on how much of this occurs in the environment, however, are usually based on estimates only. Due to its variable behaviour in the environment, its similarity to natural components and the fact that microplastics are often masked by biofilm growth, it is difficult and time-consuming to record these particles. To make matters worse, in our plastic world the postulate of contamination-free sampling also poses an enormous challenge: whether it is the clothing of the sample taker, the sampling equipment or the sample vessels themselves: any plastic material must be avoided when microplastics are detected.

Robin Lenz and Matthias Labrenz, the authors of the scientific article in "Water", are investigating the main entry pathways for microplastics into the Baltic Sea along a river system, and under which circumstances microplastics already introduced in the course of the river can be removed again. Their "model river" is the Warnow. For the extensive sampling campaigns, they now developed a device, which, in its silvery aluminium box equipped with hoses and levers, looks like the props of a 70s science fiction movie and was therefore nicknamed "The Rocket".

"Rocket" offers many advantages over conventional sampling techniques. Two effects in particular had to be avoided: Conventional techniques, which usually use plankton nets for sampling, are particularly prone to errors in fine microplastics in the micrometer range. Either the mesh size of the nets is too large to catch the very small microplastic fraction, or, in the case of very small mesh sizes, the nets quickly clog. Swirls in the area of the net opening then drive the microplastic out of the net again. This does no longer happen with the parallel cartridge filters in the closed "Rocket" system. All particles larger than 10 μm are collected. Another disadvantage of the net technology was eliminated with the "Rocket", too: The device is constructed almost completely without plastic. Only one type of plastic, the relatively rare PTFE (polytetrafluoroethylene), was used inside the closed system. This means that contamination-free sampling can be assumed for all other plastic polymers.

For further information check the original publication:

Lenz, R.; Labrenz, M.: Small Microplastic Sampling in Water: Development of an Encapsulated Filtration Device. Water 2018, 10, 1055; DOI: 10.3390/w10081055; URL: <https://www.mdpi.com/2073-4441/10/8/1055>.

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Contact the scientific experts:

Robin Lenz | robin.lenz@io-warnemuende.de

PD Dr. Matthias Labrenz | matthias.labrenz@io-warnemuende.de

Working Group Environmental Microbiology, Leibniz Institute for Baltic Sea Research Warnemünde für Ostseeforschung Warnemünde

Press and public relation:

Dr. Barbara Hentzsch | +49 381 5197-102 | barbara.hentzsch@io-warnemuende.de

Dr. Kristin Beck | +49 381 5197-135 | kristin.beck@io-warnemuende.de

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