

116. ECOTOXICOLOGICAL EFFECTS OF MICROPLASTICS IN MARINE ECOSYSTEMS: INSIGHTS FROM THE EPHEMARE PROJECT

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Estimates on abundance of oceanic plastics are often controversial and typically neglect microplastics (MPs) smaller than 300 μm that are of great biological relevance for marine organisms. The recent Ephemare project, funded by JPI-Oceans, contributed to a significant advancement of the “state-of-the-art” on the most relevant issues concerning the distribution and potential impacts of MPs in the marine environment. The sorption of various contaminants by MPs of different size, shape and polymers was characterized, revealing the influence of such characteristics under short- and long-term accumulation timescales. Even though MPs can act as vectors of pollutants, they do not increase bioavailability of model chemicals to an extent higher than that by natural particulate matter. At the same time, MPs can alter the timescale of exposure, tissue distribution and the sub-cellular compartmentalization of chemicals, potentially resulting in subtle and long-term detrimental biological effects. Mechanisms underlying uptake, transfer and toxicity of MPs remain largely unknown, but targeted experiments on a wide selection of biological models revealed the influence of “size” and “shape” of MPs on these processes. A large selection of biological models, belonging to different trophic levels and life stages confirmed that MPs are ingested by all the species tested, but they did not produce toxic effects in terms of short-term, acute responses. However, MPs induced slight cellular and physiological effects, particularly on immune responses and reproduction, suggesting that these particles may provoke long-term effects under more chronic exposure conditions. Field studies characterized the presence and distribution of MPs in marine food webs from several geographical areas in Europe, confirming the high frequency of ingestion, from zooplankton to top predators, which was observed in most of the species investigated, including those of commercial interest for human consumption.