

9h55-10h40, Project results WEATHER-MIC: (i) General introduction (Annika Jahnke); (ii) The influence of weathering on the sinking behavior of microplastic (Erik Toorman); (iii) Characterization and effect testing of leachates liberated during UV light-induced weathering of polymers (Christoph Rummel) and (iv) Ecological relevance of microplastic effect testing with a focus on weathering (Zandra Gerdes).

WEATHER-MIC – How microplastic weathering changes its transport, fate and toxicity in the marine environment

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Studies on plastic debris including microplastic in the aquatic environment are increasing. However, it is still common to use pristine particles, which are of limited relevance since plastic debris is weathered quickly when exposed to various environmental factors. The overall aim of the JPI Oceans-funded project WEATHER-MIC was to assess the impacts that weathering has on the transport, fate and effects of plastic debris and the related leachates, i.e., the chemicals being liberated during weathering.

There is a range of environmental factors influencing the weathering of plastic material and leaching of chemicals, including UV radiation, physical stress due to wave action near- and onshore, and microbial degradation. Their relative importance depends on site-specific factors and the polymer. As additives are not chemically bound in the polymers, they are expected to leach relatively fast. Microbial colonization and biofilm formation on the polymer surface has several implications: Besides shielding the particle from UV light, the polymer's density is altered, resulting in changes in buoyancy and sedimentation rate. Furthermore, biofilms add an additional sorptive phase to the plastic fragments, which can slow down the sorption of chemicals and leaching from the polymer. Furthermore, the fragmentation of large plastic debris leads to formation of smaller, irregularly shaped particles with relatively large contributions of biofilm per particle mass. These particles can be ingested by marine consumers and hence potentially affect organism fitness as well as facilitate transfer in food webs.

In this overview, we present WEATHER-MIC results, with a focus on three main topics: (i) The influence of weathering on the sinking behavior of microplastic; (ii) Characterization and effect testing of leachates liberated during weathering of polymers induced by UV exposure; (iii) Ecological relevance of microplastic effect testing with a focus on weathering. Additional important aspects, such as advanced particle characterization, will also be addressed.

10h40-11h, Coffee Break.