

WEATHER-MIC



How microplastic weathering changes its transport, fate and toxicity in the marine environment

DURATION

15/12/2015 - 15/03/2019

BUDGET

200 000 EUR

PROJECT DESCRIPTION

WEATHER-MIC is one of four approved projects following the 2014 JPI-Oceans Pilot Call on ecological effects of microplastics. Five partners from four European countries form the consortium. The project runs from 2016 to 2018 and is funded through the national funding partners Project Management Juelich (ptj, Germany), the Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (FORMAS, Sweden), The Research Council of Norway (RCN, Norway) and the Belgian Federal Science Policy Office (BELSPO, Belgium).

WEATHER- MIC will:

- Use artificial weathering in lab experiments combined with non-target chemical analysis and particle imaging to “fingerprint” weathered plastic particles
- Investigate how weathering processes of MPs influence their vertical distribution, trophic transfer and toxicity (by affecting size distribution, surface morphology, density, aggregation-flocculation behaviour and microbial biofilm communities)
- Investigate if the 3D spatial distribution from lab-scale column tests can be extrapolated to field data from the Stockholm Archipelago and Oslo Harbour (using sediment transport models parameterized for MPs)
- Assess toxic effects of weathered MPs by:
 - toxicity tests using OECD guidelines adapted for ecotoxicological testing of MP particles
 - changes in biofilm communities
 - cell-based bioassays with MP leachates to identify modes-of-action and to quantify toxicity
- Develop new tools to incorporate MP weathering into risk assessment of marine MP pollution.

The project brings together a wide diversity of disciplines: environmental sciences (IFZ, ACES & NGI: a wide range of aspects), analytical environmental chemistry (ACES), material sciences (IKTS), geotechnical sciences (NGI), hydraulic engineering (KUL) and sedimentology (NGI & KUL). Most of the researchers had never before applied their expertise and technologies to microplastics; this allows the generation of an interesting fresh and innovative approach.

This project is unique in many aspects. The modelling tool, developed by KU Leuven, will enable managers and policy makers to better understand how and where microplastic will end up in the marine environment, from the water surface to the sea bed. The techniques applied by the partners will provide new experimental methods to assess the weathering processes and the related ecotoxicological risks. Together, the entire project approach will enable stakeholders to make better environmental risk assessment of microplastic particles in the aquatic environment.

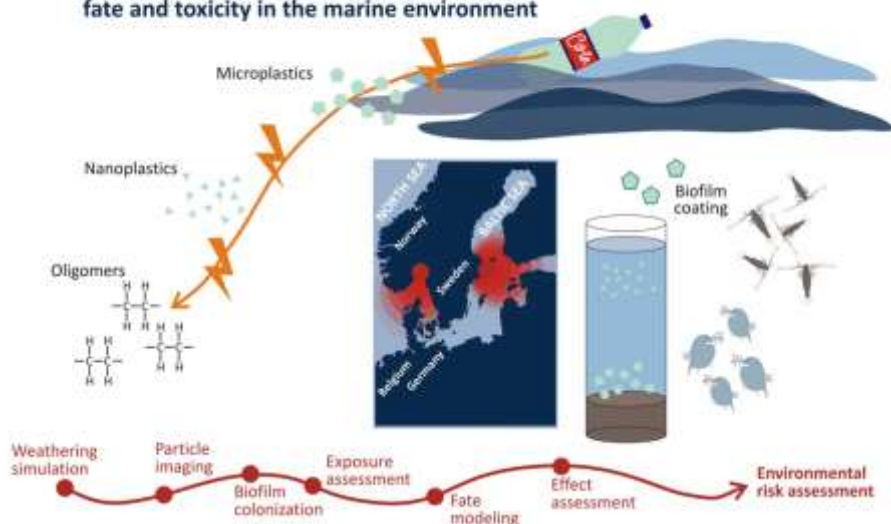
WEATHER-MIC

The project deliverables consist of new guidelines for the application of different technologies to describe and quantify weathering of plastic particles, assessment of their ecotoxicological effects, and models to predict the fate of MP particles in the marine environment.

The results will be published in reports, conference proceedings and journal papers. The modelling tool is developed in the open source software TELEMAC (which will be made available through the website www.openTELEMAC.org). An educational website will be set up as well.

WEATHER-MIC

How microplastic weathering changes its transport, fate and toxicity in the marine environment



CONTACT INFORMATION

Coordinator

Annika JANKE

Helmholtz-Zentrum für Umweltforschung GmbH - UFZ

annika.jahnke@ufz.de

Partners

Hans-Peter ARP

Norwegian Geotechnical Institute (NGI)

hans.peter.arp@ngi.no

Annegret POTTHOFF

Fraunhofer Institute for Ceramic Technologies and Systems (IKTS)

annegret.potthoff@ikts.fraunhofer.de

Matthew MACLEOD

Stockholm University, Department of Environmental Science and Analytical Chemistry (ACES)

matthew.macleod@aces.su.se

Erik TOORMAN

Katholieke Universiteit Leuven (KU Leuven)

Dept. of Civil Engineering, Hydraulics Division

erik.toorman@kuleuven.be

LINKS

Project website:

<http://www.jpi-oceans.eu/weather-mic/about>

ResearchGate:

<https://www.researchgate.net/project/WEATHER-MIC-To-assess-how-weathering-processes-influence-the-transport-fate-and-toxicity-of-microplastics-MPs-and-their-leachates-in-the-marine-environment-http-jpi-oceans.eu-weather-mic-aims-and-o?scrollto=1&esc=profileProjectCards&sg=7LvHdK2rnpF0cL8XINJ-nu7Ggza3VQV9-S9V5BRppS5WS-527r23osBT3GM8JOh0to0jM--wKaM9HLEyRN4yNoCbdMMRgXYFHTqcmphnuWs>