

Project information

Project title

POPs adsorbing to Marine plastic litter in the Arctic marine environment acting as a new vector of exposure; expanding PLASTOX to the North (PLASTOX-NORTH)

Year

2018

Project leader

Dorte Herzke

Geographical localization of the research project in decimal degrees (max 5 per project, ex. 70,662°N and 23,707°E)

Tromsø: 69°39'07"N 018°57'12"E; Ny Ålesund, Svalbard: 78°55'0"N, 11°56'0"E

Participants

Project leader(s)/institutions: Dorte Herzke (NILU)

Project participants/institutions: Andy Booth (SINTEF), Geir W. Gabrielsen (NPI), Jørn Hansen (UiT), Linda Hanssen (NILU)

Administrative responsible for lead institution: Eva Beate Andresen, (NILU)

Flagship

Hazardous Substances

Funding Source

FRAM, NFR

Summary of Results

We carried out the deployment of virgin and post-use plastic particles at Ny Ålesund, Svalbard during two campaigns; summer and winter 2017/8 for a period of 6 months each. Five timepoints per campaign were sampled. All samples were transferred to the NILU lab at the FRAM centre and prepared according to established methods to analyse for PBDEs, HCB and PCBs. All samples were measured using the Orbitrap GC-HRMS for ultratrace sensitivity. The establishment of adsorption kinetics is under way. Additionally we investigated the change of the polymeric composition (weathering) over time using FTIR measurements. Also measurements with electronmicroscope at the University of Tromsø was carried out, to investigate the change of surface characteristics over time under Arctic conditions.

To assess the real environmental contribution of marine plastic litter to the POP load in the Arctic a selection of beach litter collected at Longyearbyen was also investigated. The developed kinetics will potentially enable us to estimate how much time the respective plastic waste has spend in the marine environment.

Master and PhD-students involved in the project

master student: Unni Mette Nordang at the University of Tromsø supervised by Jørn Hansen (UiT), Linda Hanssen (NILU)

Tittel: Microplastic as a vector of Persistent organic pollutants in the Arctic Environment

For the Management

Pollutants and microplastic are closely interlinked, and we are able to measure a broad range of pollutants in microplastic samples.

The ubiquitous presence of microplastic in the marin environment will also cause an ubiquitous distribution of pollutants. Microplastic act as a vector of a broad range of pollutants, some of which are normally not prone to Long-Range-transport to the Arctic and fragile parts of the marin ecosystem.

Published Results/Planned Publications

Presented by D. Herzke:

- SETAC poster at SETAC Rome, May 2018

- Oral presentation at Micro 2018; Lanzarote, Spain, November 2018

- Oral presentation at Arctic Frontiers, Tromsø, February 2019
- Chair at Special science session at SETAC Europe in Helsinki, May 2019
- Chair at Special Science Session, DIOXIN, Kyoto, August, 2019

Communicated Results

- Arctic conditions cause a different absorption behaviour than observed in temperate regions
- Adsorbed POP load is considerably lower in Arctic regions compared to temperate regions

Interdisciplinary Cooperation

-

Budget in accordance to results

yes

Could results from the project be subject for any commercial utilization

No

Conclusions

- Arctic conditions cause a different absorption behaviour than observed in temperate regions
- Adsorbed POP load is considerably lower in Arctic regions compared to temperate regions
- The produced data will give us a much improved understanding about the amounts of POPs carried to the Arctic via marine plastic
- We will improve our understanding about the adsorption kinetics of POPs under Arctic conditions