

Subproject: Microbial degradation of oil pollution in Arctic seawater and sea ice

Actual field dates: 15. February – 1. May 2016

Field site: Nuuk fjord: 64.447362, -51.582161

Number of man-days in the field: 12

Summary:

We conducted a 2.5-month field study in Nuuk fjord to study in situ oil weathering and the biodegradation potential of indigenous bacterial communities in ice-covered seawater and sea ice. For this study, we adopted a novel experimental system based on Fluortex mesh nets that can be coated with a 10-20 μm -thin oil film. We placed nets (4.5×9 cm) coated with marine diesel and untreated controls in sea ice and in seawater below the ice. After 31, 51, 63 and 74 days, nets were cored out and the surrounding sea ice was sampled. Over the course of the experiment, the development of a biofilm was observed on the oil-coated nets. To identify bacteria involved in biofilm formation and hydrocarbon degradation, DNA was extracted from the nets, from seawater and from sea ice samples and processed for 16S rRNA gene amplicon sequencing using Illumina technology. In parallel, the degree of oil biodegradation was determined by extracting and analyzing residual hydrocarbons from the nets for a broad selection of aliphatic and polycyclic aromatic hydrocarbons (PAHs) by gas chromatography – mass spectrometry (GC-MS).



Photo 1



Photo 2

Photos:

Photo 1: Credit: Leendert Vergeynst

Caption: Construction of the field experiment: Lorenz Meire drills holes in the ice, in which plastic tubes with oil-coated mesh nets are placed. 32 tubes with a total of 64 oil-coated and 64 untreated nets were placed in the ice.

Photo 2: Credit: Leendert Vergeynst

Caption: Construction of the field experiment: Leendert Vergeynst coats the mesh nets with marine diesel.

Photo 3: Credit: Leendert Vergeynst
Caption: Leendert Vergeynst and Lorenz Meire just cored out a plastic tube with oil-coated mesh nets and are sampling the mesh nets and cutting the ice core in different sections for further analysis in the lab.

Participants:

AU: Leendert Vergeynst, Wieter Boone, Lorenz Meire

GINR: Flemming Heinrich

Acknowledgements:

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Photo 3