

Project information

Keywords

Emerging contaminants, freshwater ecosystems, long-range transport, modeling

Project title

Atmospheric inputs of organic contaminants of emerging concern to the Arctic and possible implications for ecosystem exposures

Year

2017

Project leader

Ingjerd S. Krogseth (NILU)

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

Takvatn (~69°N,19°E) in Troms county, in addition to air samples at 45 locations all across Norway.

Participants

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Flagship

Hazardous Substances

Funding Source

Fram Centre flagship for Hazardous Substances

Summary of Results

The initial year of this project has focused on (i) extraction and preparation of air samples, (ii) fieldwork and sample collection in Takvannet, and (iii) publication of the bioaccumulation model which will later be adapted and applied to Takvannet.

- (i) A master student (NMBU/NILU) is going to use results from selected air samples collected under the NEM-project for her master thesis. Thanks to funding from this flagship project, she could be hired during summer 2017 to extract and prepare more of the collected air samples. This frees funds from the RCN-projects to cover analysis costs for more chemicals of emerging concern (CECs) in these samples, maximizing the output from a unique and valuable sample set, and providing concentrations in air to be used in this project. Analysis of these samples will be carried out in 2018.
- (ii) Fieldwork in Takvannet was carried out in both June and October 2017. In June, three passive water samplers were deployed in the lake. In October, these water samplers were retrieved. In addition, surface sediment was collected from three sites (same locations as where the water samplers had been deployed), three samples of zooplankton were obtained, and samples of benthos (molluscs and *Gammarus lacustris*) and sticklebacks (*Gasterosteus aculeatus*) were collected. Five specimens of brown trout (*Salmo trutta*) and five specimens of Arctic char (*Salvelinus alpinus*) were kindly provided by the University of Tromsø that carried out fieldwork in Takvannet at the same time. These fish were dissected on-site to obtain samples of muscle and liver. Analysis of Takvannet samples for CECs and auxiliary data (e.g. total organic carbon content, lipid content, stable isotopes) will be carried out in 2018.
- (iii) This project has helped finalize a scientific publication describing model development, parameterization, evaluation, and application of the benthopelagic bioaccumulation model that will later be adapted and applied to Takvannet. Model parameterization for Takvannet will be carried out in 2018.

Master and PhD-students involved in the project

Helene Lunder Halvorsen, PhD-student (UiO/NILU)

Lovise Skogeng Pedersen, master student (NMBU/NILU)

For the Management

As the project is only in its first year, no results have been finalized yet.

The scientific publication published this year is expected to be of high relevance for national and international agencies involved in the regulation of chemicals, as there is currently an ongoing process within the EU proposing to restrict the use of certain volatile methyl siloxanes.

Published Results/Planned Publications

Krogseth, I.S.; Undeman, E.U.; Evenset, A.; Christensen, G.N.; Whelan, M.J.; Breivik, K.; Warner, N.A. Elucidating the behavior of cyclic volatile methylsiloxanes in a subarctic freshwater food web: A modeled and measured approach. *Environmental Science and Technology*. DOI: 10.1021/acs.est.7b03083

A similar scientific publication for Takvannet in a high-ranked scientific journal is planned for 2019.

Communicated Results

Krogseth, I.S. Models and measurements in concert – Overall approach, future plans and a UFO adventure. Guest lecture in the course “AT-324/824: Techniques for the detection of organo-chemical pollutants in the Arctic environment”, University Centre in Svalbard, January 26th 2017, Barentsburg, Norway.

Solbakken, C.F. Searching for environmental contaminants using UFOs. FRAM forum 2017: pp 34-37; <https://issuu.com/framcentre/docs/framforum-2017-innmat-web>

Solbakken, C.F. På ufojakt etter miljøgifter i Norge. NILU Årsrapport 2016: pp 12-13; https://issuu.com/nilu-luftforskning/docs/aarsrapport_2016_norsk

Krogseth, I.S.; Undeman, E.; Evenset, A.; Christensen, G.N.; Whelan, M.J.; Breivik, K.; Evenset, A.; Warner, N.A. Factors affecting bioaccumulation of cyclic volatile methyl siloxanes in a subarctic benthopelagic food web. SETAC Europe 27th Annual Meeting, 7. - 11. May 2017, Brussels, Belgium.

Krogseth, I.S.; Undeman, E.; Evenset, A.; Christensen, G.N.; Whelan, M.J.; Breivik, K.; Evenset, A.; Warner, N.A. Factors affecting bioaccumulation of cyclic volatile methyl siloxanes in a subarctic benthopelagic food web. 16th International Conference on Chemistry and the Environment, 18. - 22. June 2017, Oslo, Norway.

Solbakken, C.F. Sminkegift sprer seg fra kloakken til fisken i Storvannet. *Forskning.no*, October 24, 2017; <https://forskning.no/2017/10/siloksan-funnet-i-fisk-i-storvannet/produsert-og-finansiert-av/nilu-norsk-institutt-luftforskning>

Solbakken, C.F. Sminkegift sprer seg fra kloakken til fisken i Storvannet. *Framsenteret.no*, October 26, 2017; <http://www.framsenteret.no/sminkegift-sprer-seg-fra-kloakken-til-fisken-i-storvannet.6047841-146437.html#.WfnDYaJqv9E>

Solbakken, C.F. Modeller og miljøgifter. *nilu.no*, October 24, 2017; <https://www.nilu.no/Nyhetsarkiv/tabid/74/NewsId/867/Modeller-og-miljogifter.aspx>

Bruland, W. Hudkrem og balsam kan forgifte fisk. *Nrk.no*, November 2nd 2017, <https://www.nrk.no/finnmark/hudkrem-og-balsam-kan-forgifte-fisk-1.13757971>.

Interdisciplinary Cooperation

This project could not have been carried out without the close cooperation between the biology, ecology and freshwater ecosystem competence at Akvaplan-niva and the atmospheric transport, chemistry and modeling competence at NILU. These disciplines complement each other and are both vital to increase the understanding of atmospheric inputs of organic contaminants of emerging concern to the Arctic and possible implications for freshwater ecosystem exposures. In this context, the models serve as very useful frameworks to integrate and organize the existing knowledge from the two disciplines, and to aid address the research questions in the project with a holistic and interdisciplinary approach.

Budget in accordance to results

The activities carried out in 2017 and summarized above could not have been carried out without funding from the Fram Centre. As the project is ongoing, results are expected in 2018-2019 provided continuation of funding for this project.

Could results from the project be subject for any commercial utilization

No

Conclusions

As the project is only in its first year and no results have been finalized, no conclusions can be made yet.