

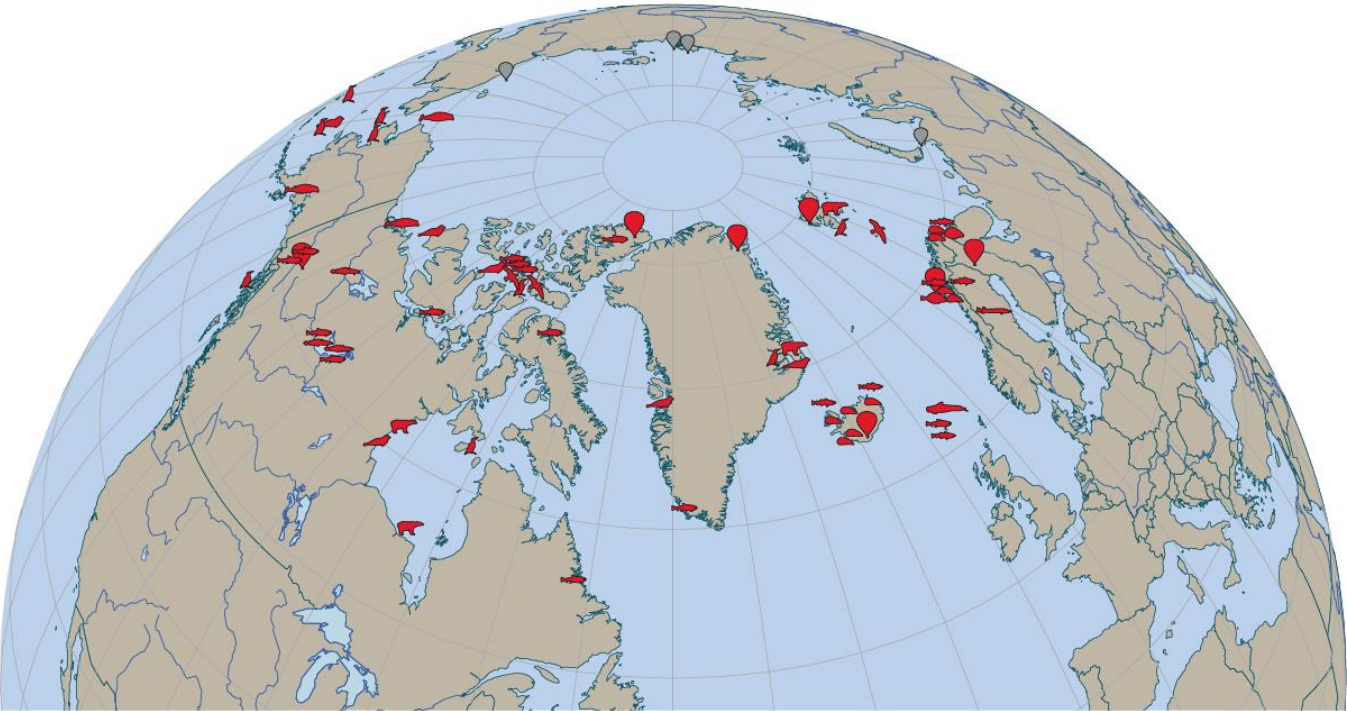
# SCREENING FOR CHEMICALS OF EMERGING ARCTIC CONCERN

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Co-chair of the AMAP POP Expert Group  
Member of the AMAP Litter and Microplastic Expert Group

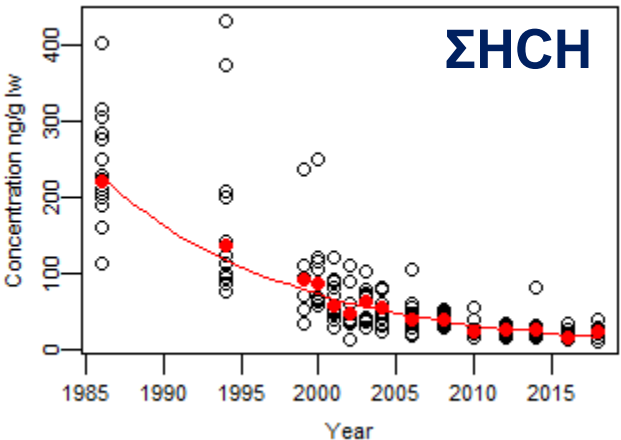
# AMAP long-term monitoring of Persistent Organic Pollutants (POPs)

Example: HCH isomers (insecticide), banned in 2009

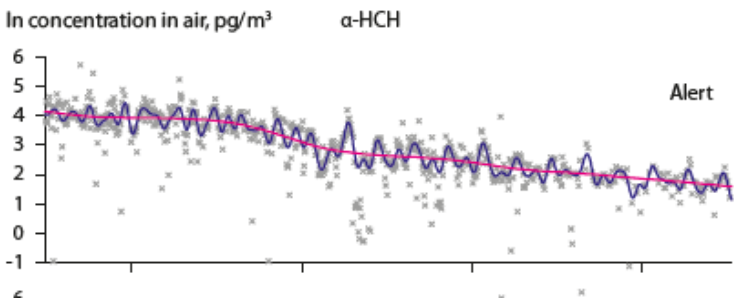


- |   |                         |                              |                                |  |
|---|-------------------------|------------------------------|--------------------------------|--|
| <b>Air</b>                                      | <b>Freshwater fish</b>  | <b>Marine fish/shellfish</b> | <b>Marine mammals</b>          | <b>Seabirds</b>  |
| Active air monitoring                           | Arctic char, Lake trout | Blue mussel                  | Ringed seal, Northern fur seal | Thick-billed murre/Black guillemot, Common murre       |
| Active air monitoring (time series unavailable) | Burbot                  | European plaice              | Beluga                         | Black-legged kittiwake, Northern fulmar, Glaucous gull |
|   | Pike                    | Atlantic cod                 | Polar bear                     |  |
|   |                         |                              | Killer whale                   |  |

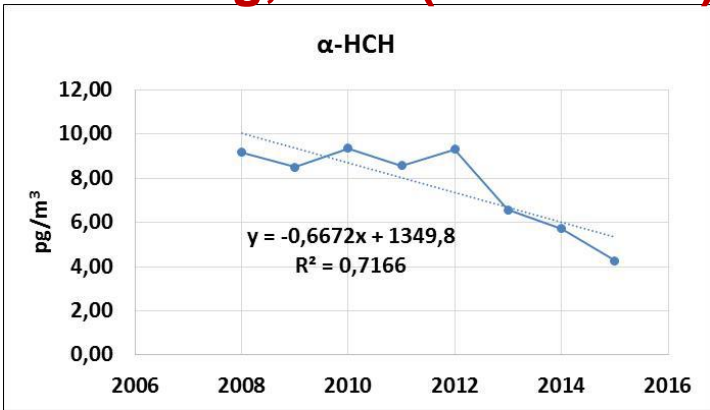
## Juvenile ringed seals, East Greenland



## Air monitoring, Alert (Canada)

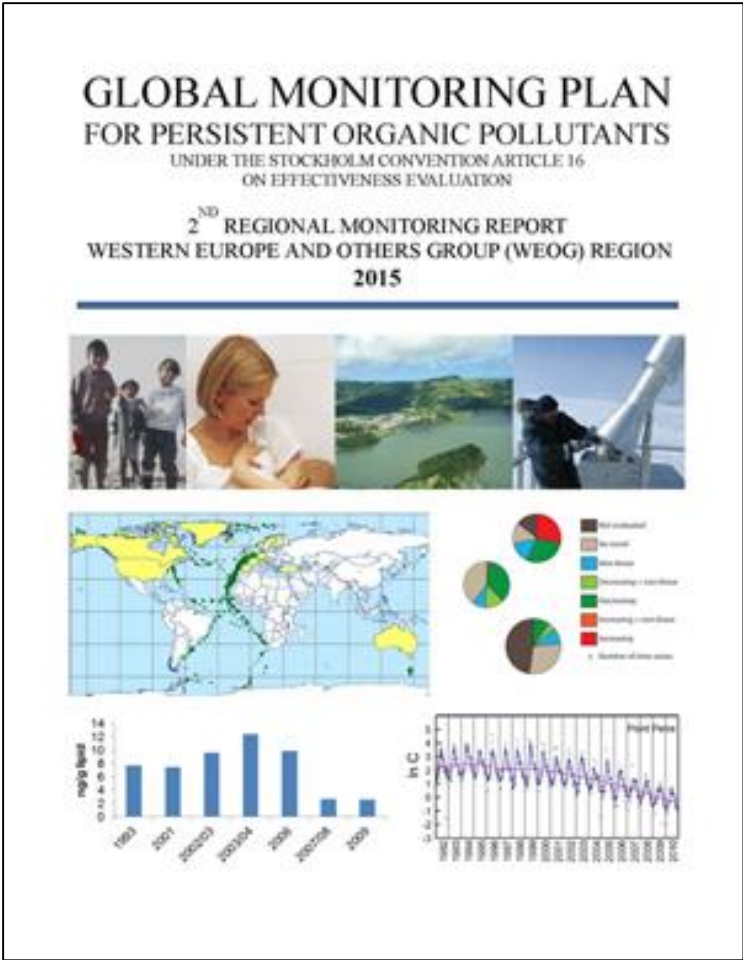
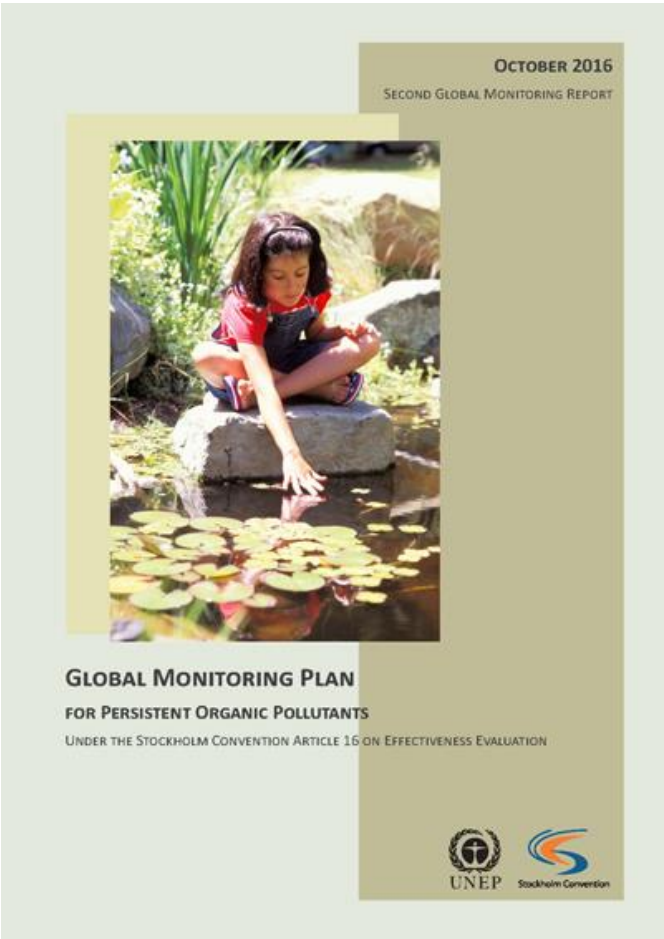
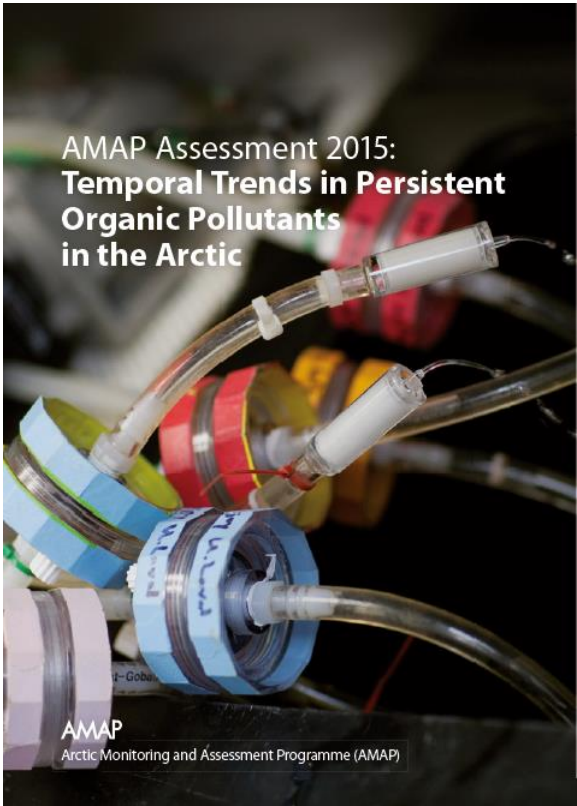


## Air monitoring, VRS (Greenland)



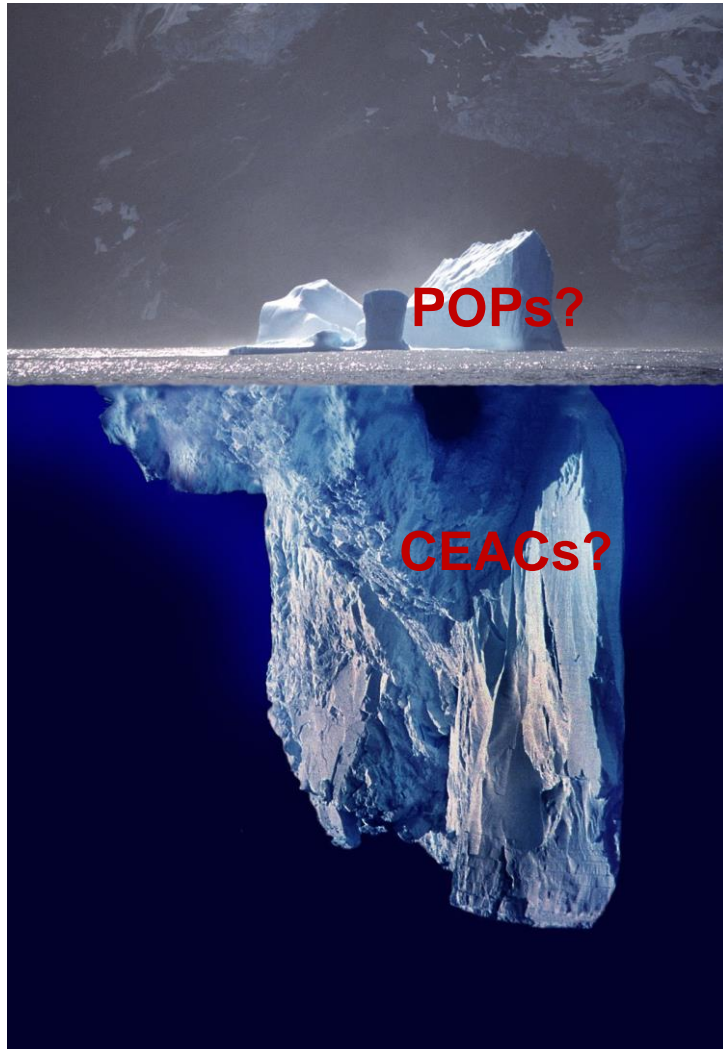
# Circumpolar AMAP assessments and links to the Stockholm Convention

Stockholm Convention: 30 POPs, 4 chemicals under review



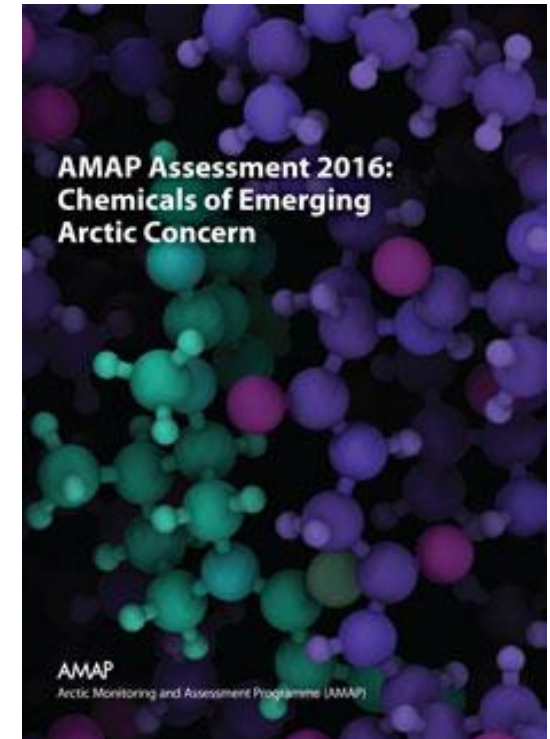


# Are there other chemicals than POPs?

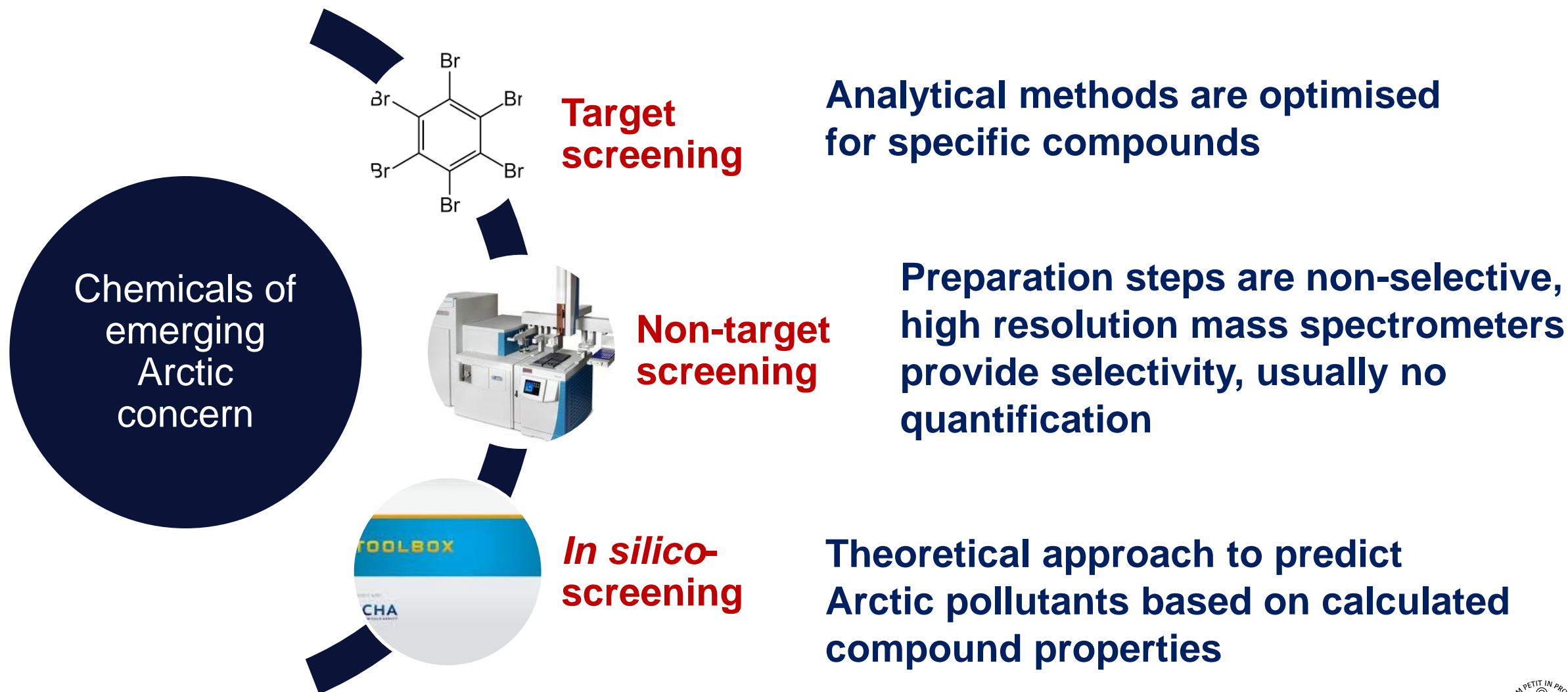


## Chemicals of Emerging Arctic Concern

- Chemicals we have not looked for yet – can there be other POPs?
- Replacements of banned chemicals – might they have similar properties?
- Indicator function of the Arctic re. long-range transport, persistence and bioaccumulation
- Locally used and emitted chemicals without POP characteristics

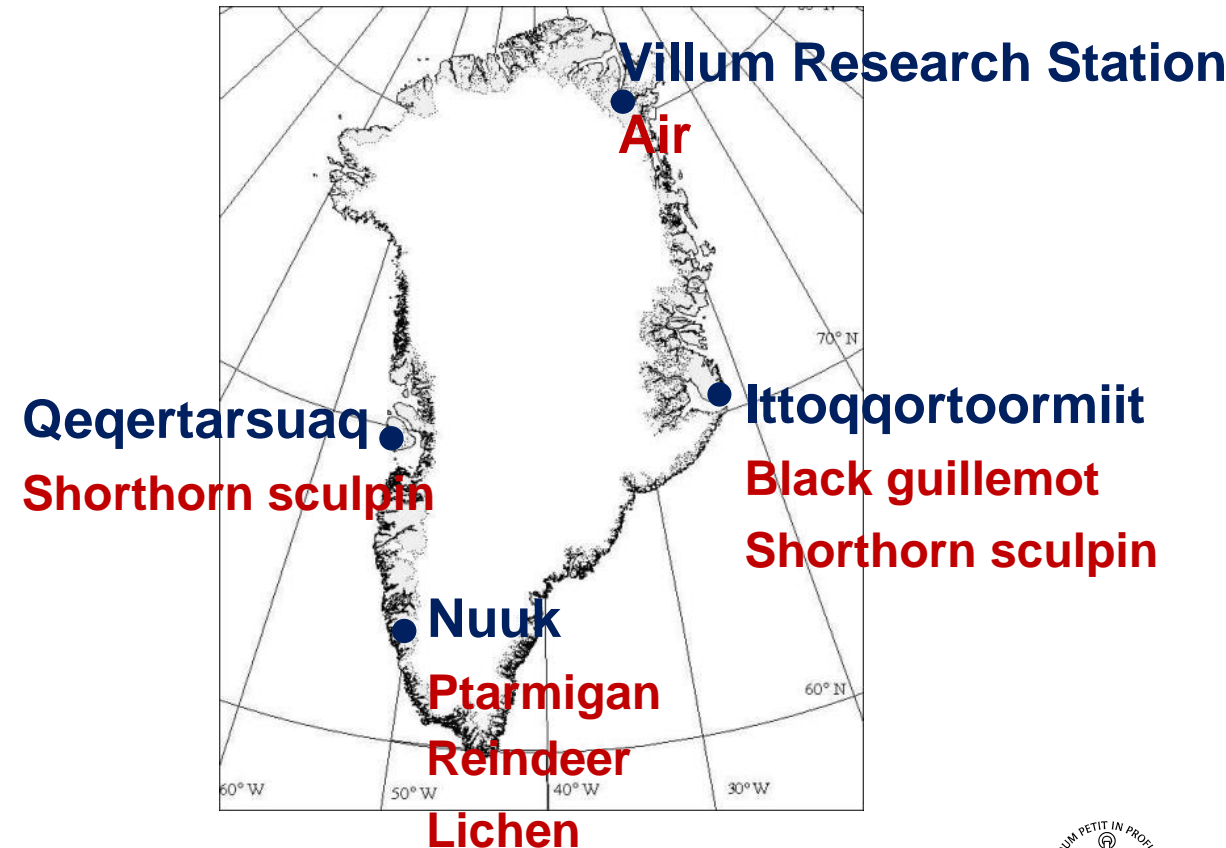
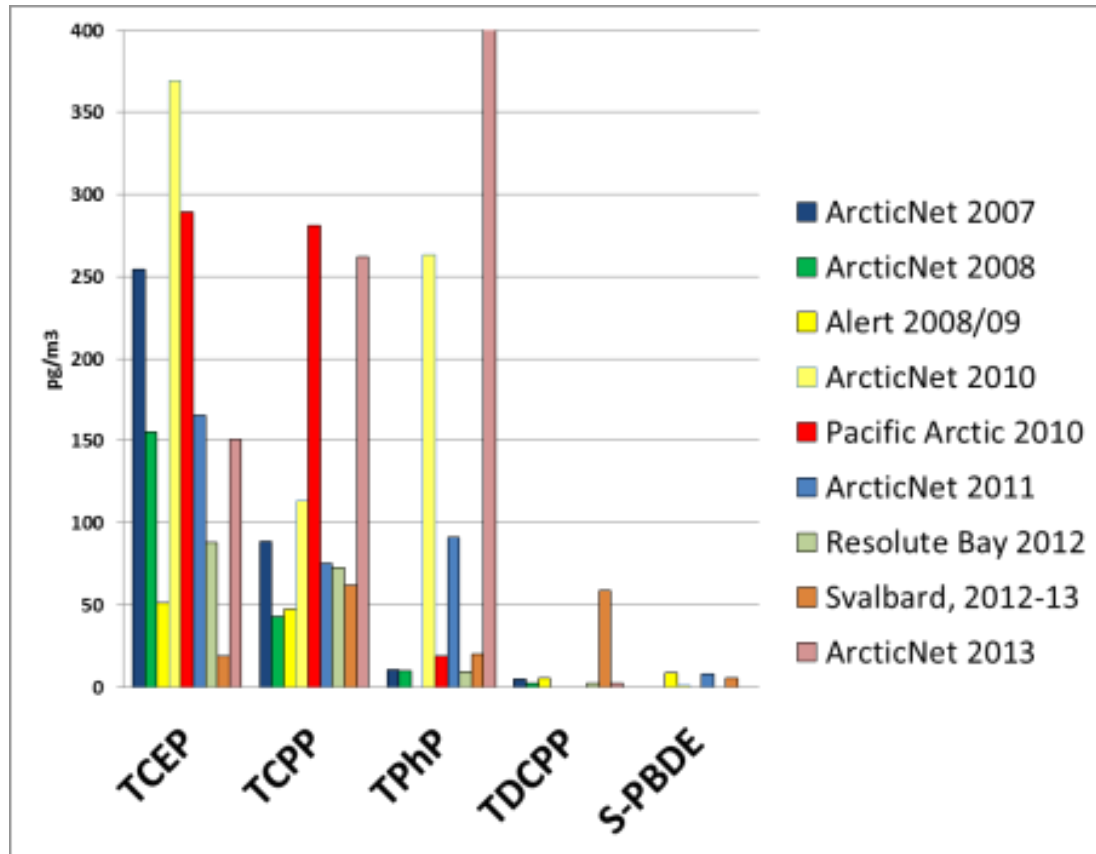
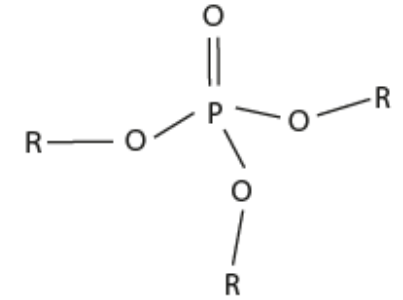


# Screening approaches to identify CEACs



# Example of target screening: Organophosphorous flame retardants

Detected in air, but less evidence of bioaccumulation



# Examples of non-target screening

## Non-target screening – a new approach to identify Arctic pollutants

Collaboration project with members of the AMAP Human Health expert group

Air; Greenland

Biota samples;  
Greenland

Human serum;  
Faroe Islands  
and Greenland

Water samples;  
Greenland

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Identifying further chemicals of emerging arctic concern based on 'in silico' screening of chemical inventories

Derek Muir<sup>a,b,\*</sup>, Xianming Zhang<sup>c</sup>, Cynthia A. de Wit<sup>d</sup>, Katrin Vorkamp<sup>e</sup>, Simon Wilson<sup>f</sup>



ENVIRONMENTAL  
MONITORING

M-1080|2018

## Screening Programme 2017

AMAP Assessment compounds



KATRIN VORKAMP  
SENIOR SCIENTIST



# NORMAN network



**Network of reference laboratories, research centres and related organisations for monitoring of emerging environmental substances**

**6 working groups and 2 cross-working group activities:  
Passive sampling and Non-target screening**

## **Non-target screening:**

- Establishment of databases, e.g. Suspect List Exchange Database, Digital Sample Freezing Platform
- Intercalibration exercises (water, passive samplers, indoor dust, fish,...)
- Steps towards semi-quantitative approaches
- Expansion of the chemical domain
- Development of guidelines

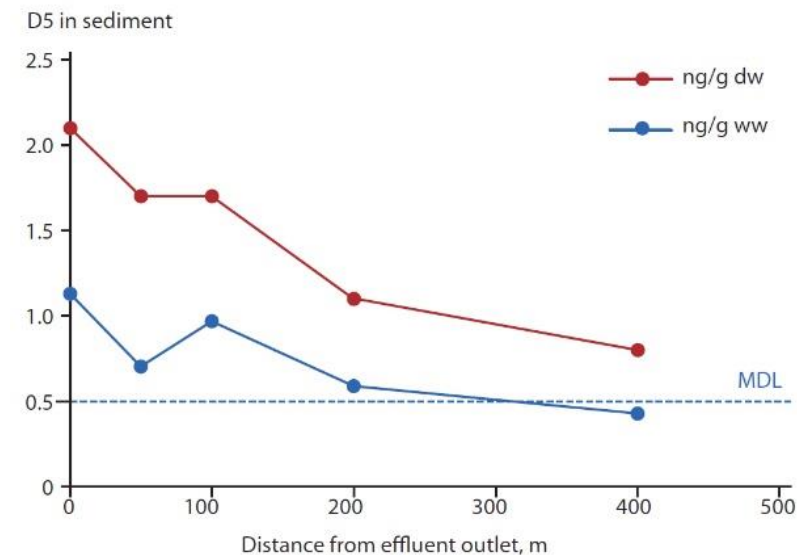
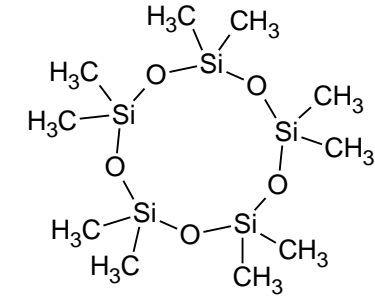


# Long-range transport vs. local sources

Wastewater seems to be a source of contaminants for the local environment.

→ Technical solutions, as part of local waste / wastewater management plans?

- › **Pharmaceuticals and personal care products, siloxanes, phthalates, flame retardants etc.**
- › **"Pseudo-persistent" compounds**
- › **Environmental stability might be enhanced by low temperatures and absence of light in the winter.**



# Monitoring of litter and microplastics

**Litter/Microplastic Expert Group has developed monitoring guidelines**



**Priority 1**  
Immediate trend  
monitoring

Water

Aquatic  
sediments

Beaches/  
shorelines

Seabirds

**Priority 2**  
Initial baseline  
mapping and future  
trend monitoring

Atmospheric  
deposition

Invertebrates

Fish

Compartments to be  
further developed for  
source/surveillance  
and effects monitoring

Seabeds

Ice/Snow

Terrestrial  
soils

Mammals

- Annual monitoring suggested across the Arctic
- Links to Regional Action Plan on Marine Litter in the Arctic (PAME)

# Conclusions

- **Screening approaches in the Arctic can generate data on the long-range transport, persistence and bioaccumulation of CEACs.**
- **Important, but potentially challenging, to distinguish between long-range transport and local emissions.**
- **State-of-the-art approaches combine target screening, non-target screening and in silico screening. Present coverage is limited in terms of compounds, matrices and locations.**
- **An Arctic monitoring programme for litter and microplastic is under construction.**

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