

I CONVEGNO ISTITUTO DI SCIENZE POLARI

Fate of persistent organic pollutants in arctic permafrost environments

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POPs in permafrost environments: determine the changes in levels and interpretation of trends

To achieve the main global objective to upscaling the data projections, two specific goals have been identified.

- 1) Modelling within sampled areas, **simulating processes** to better understand how different local conditions affect **permafrost induced contaminant pulses**, especially by comparing field and modelling results.
- 2) Test the sensitivity of the model for the best upscaling on a regional scale.

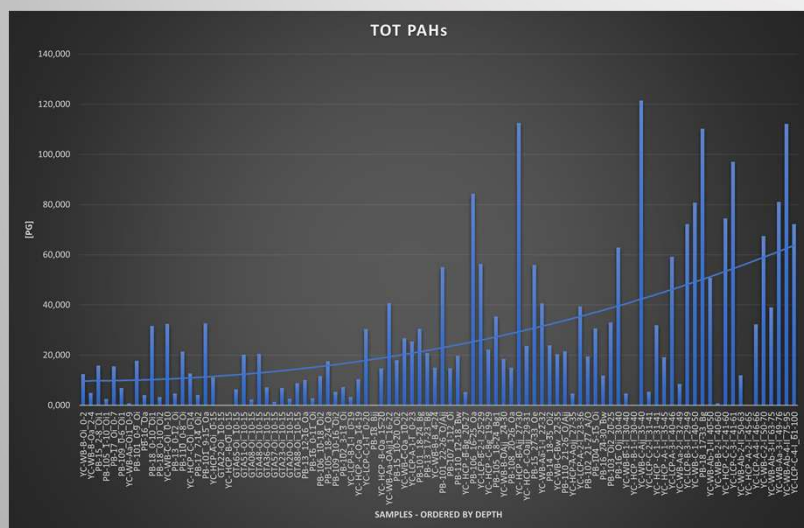
Field work campaigns

chosen considering the age of the permafrost condition, the glacial history, the environmental variables, and the global distribution:

- **2 coastal catchments along Beaufort Sea**, Ptarmigan Bay (summer 2018) and Komakuk Beach (summer 2019);
- 1 area in the **permafrost peatlands in Fennoscandia** (expected in summer 2022);
- 1 potential area in **Svalbard** (TBD).



Chemical analysis on soils and permafrost cores

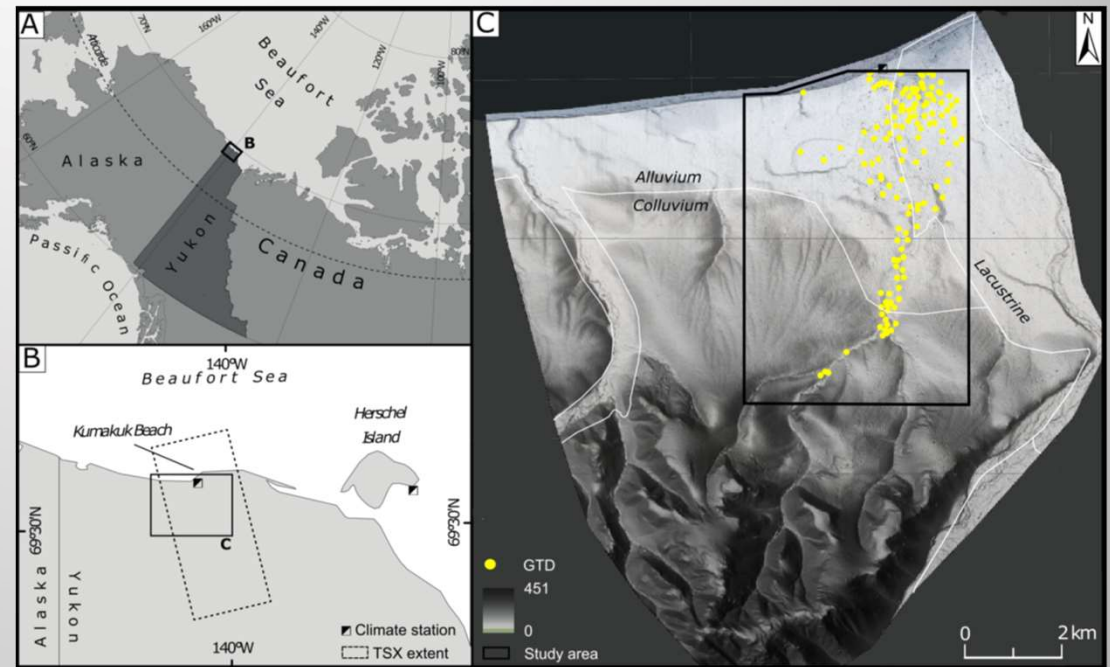


An analytical method for the quantification of
PAHs, PCBs and HCB
has been validated for soil and permafrost
sediments analysis.

It was performed using Accelerated Solvent Extraction (Thermo Scientific Dionex ASE 350) and Gas Chromatography - Triple Quadrupole Mass Spectrometry (Trace 1310 GC coupled with TSQ9000 TQMS, Thermo Scientific) at CNR-ISP Venice, Italy.

Inputs and ground truth

- **soil properties** (classification, SOC, N, selected contaminants, soil texture)
- **physical parameters** combined with remote sensing products (landforms, land cover, hydrology)
- complementation with digitization of **extensive legacy datasets**
- major atmospheric transport and variation



A. Overview of North Canada. B. Beaufort Coast Area, with TerraSAR-X extent and climate stations. C. Komakuk Beach Study Area with the ground truth points (GTD). ArcticDem ©.

Work in progress

The research will undertake a series of investigations to create fundamental datasets and process understanding to **quantify thawing permafrost and its impact on storage and vulnerability of contaminants.**

The workflow will include sampling and characterizing representative permafrost catchments, including their **thaw-vulnerability and thaw-impacts** on lateral fluxes.

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