

Annual Summary Report

Coastal hazard assessment in Kugluktuk and Grise Fiord (Aujuittuq), Nunavut.

This project aims to study and monitor changes in coastal environments within and around the communities of Kugluktuk and Grise Fiord, including coastal erosion, permafrost thaw and flood ing. This project has two specific objectives: 1) to gain new knowledge of the coastal erosion processes and permafrost degradation and 2) to provide learning and training opportunities for community members. Our fieldwork activities were conducted between July 7–22 and September 23–30 in Kugluktuk, and between August 2–September 5, 2023. In Grise Fiord, our field campaign was abruptly interrupted, where a colleague lost her life during a tragic accident in mid-August, after which our field activities were cancelled.

Research team in 2023:

- David Didier (Université du Québec à Rimouski)
- Stéphanie Coulombe (Polar Knowledge Canada)
- Samuel Binette (Université du Québec à Rimouski)
- Charles Jourdain-Bonneau (Université du Québec à Rimouski)
- Samuel Laroche (Université du Québec à Rimouski)
- Émile Bujold (Université du Québec à Rimouski)
- Jérémy Baudry (Université du Québec à Rimouski)
- Béatrice Noël (Université du Québec à Rimouski)
- Charlotte Stancu (Université du Québec à Rimouski)
- Terry Noah (Asuittuq Adventures)
- Richard Akana (Kugluktuk HTO)
- Liam Mulgrew (Kugluktuk HTO)

Field activities in 2023

Our research and monitoring activities were similar to those of the previous field campaigns (2021 and 2022).

- We conducted drone surveys over the study areas in July, August and October to detect shoreline changes between years.
- We retrieved photos from time-lapse cameras deployed in 2021 along the shores. Last summer, we also installed three additional cameras at two different locations along the Coppermine River, and one location near the beach west of Kugluktuk. These cameras allow identifying specific processes that drive erosion along the Coppermine River and the coast.
- We deployed several instruments in the water to measure water levels and waves during the open-water season. These instruments were all recovered at the end of September before sea ice freeze-up.

- We collected soil temperature data from monitoring stations installed between 2017 and 2021 to monitor permafrost. In 2023, three additional stations were installed in Kugluktuk.

Summary of key research findings

Using drone surveys, recent satellite imagery and historical air photos, we were able to measure shoreline changes between 1952 and 2023. In Kugluktuk, our analysis shows that that shoreline change rates are variable along the coast, with an average regional shoreline change rate of -0.2 m/yr. Over the past two years, our more detailed spatial and temporal analysis reveals an increase in erosion rates with a maximum of 3.14 m/yr (2021-22) and 2.04 m/yr (2022-23). We plan to continue the monitoring work in 2024. In Grise Fiord, we found that inland beach migration reached 14 m over one year.

Community meetings and project outputs

In July, we met with Marissa Mercurio (Economic Development Officer) at the hamlet of Kugluktuk and Amanda Dumond (HTO) to share updates about the project and preliminary results about the erosion near the community and on 'graveyard island'. For Kugluktuk, the first phase of the project has ended in 2023 and a final report was submitted to the hamlet of Kugluktuk and CIRNAC. In April 2024, we will return to the community to present key research findings in-person to local organizations (hamlet, HTO, GN's Department of Community and Government Services) and community members (open community night). Our team has submitted two abstracts to present this project at the next International Conference on Permafrost, which will be held in Whitehorse (June 2024).