



Mitigating Arctic Challenges with AI (MACAI): Stage 2

Presented to:
NWT Riverbank Erosion Workshop

December 2 , 2025



Project Objectives

- **AI-Powered Permafrost Monitoring**
 - Develop advanced AI tools using different types of satellite imagery to detect and map slumps and erosion with high temporal and spatial resolutions.
- **Field Data Collection for Methane Emission Quantification**
 - Generate a robust field measurement dataset to quantify methane emissions from active permafrost slumps and erosion sites.
- **Scaling Up Across the Arctic**
 - Ensure the scalability capability of the AI-based system across the Arctic and circumpolar regions.

Study Area

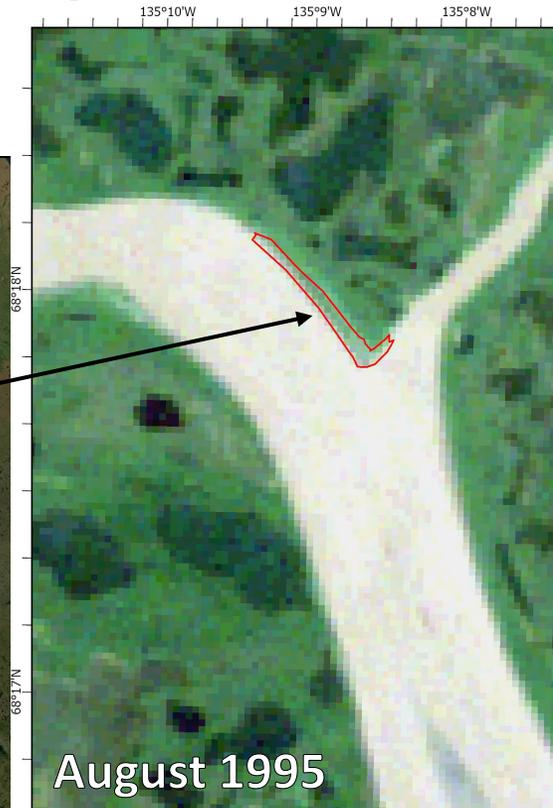
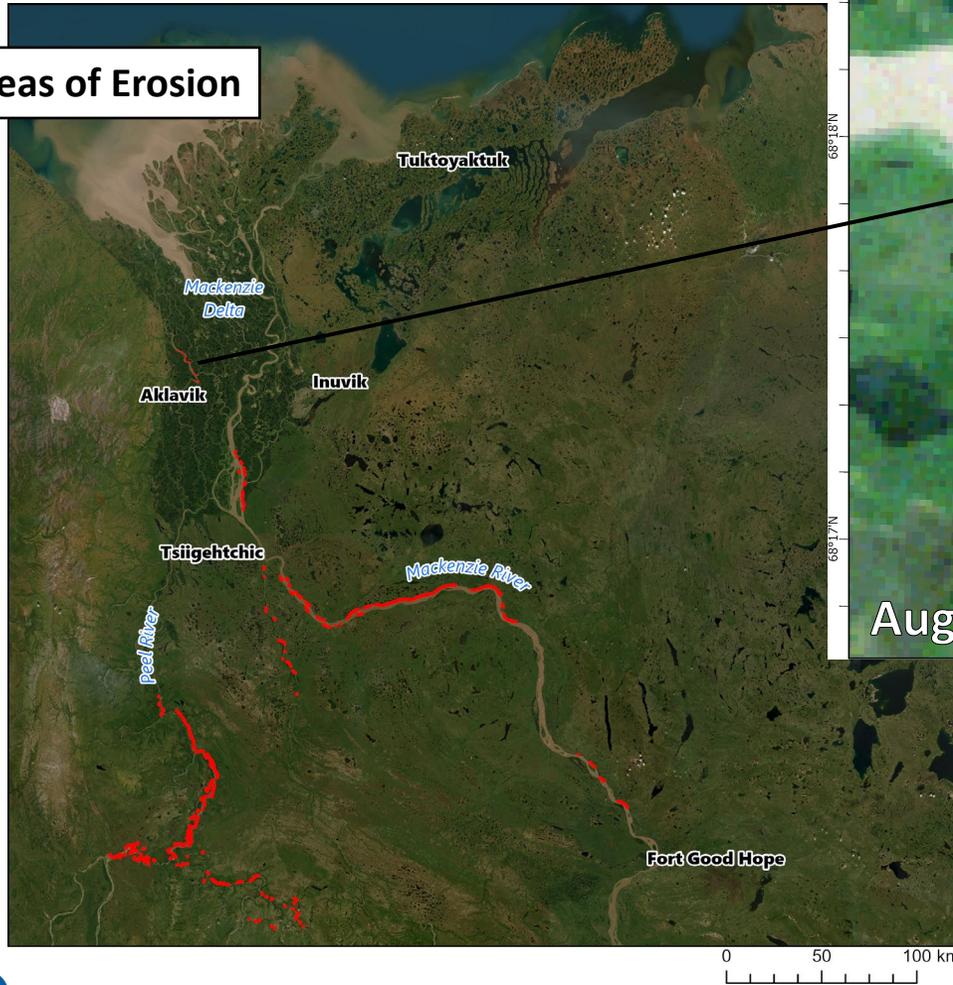
- 500 x 500 km area in NWT.
- Field data collection, AI model development, testing and operationalization will be conducted within this study area.



0 50 100 km

Areas of Erosion for Training the AI

 Areas of Erosion

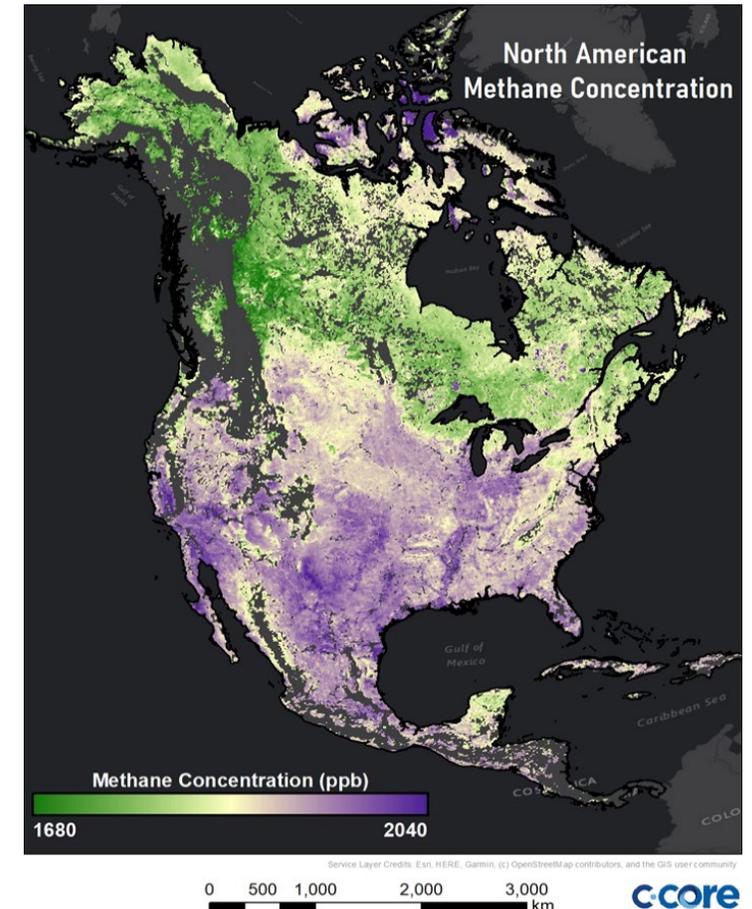
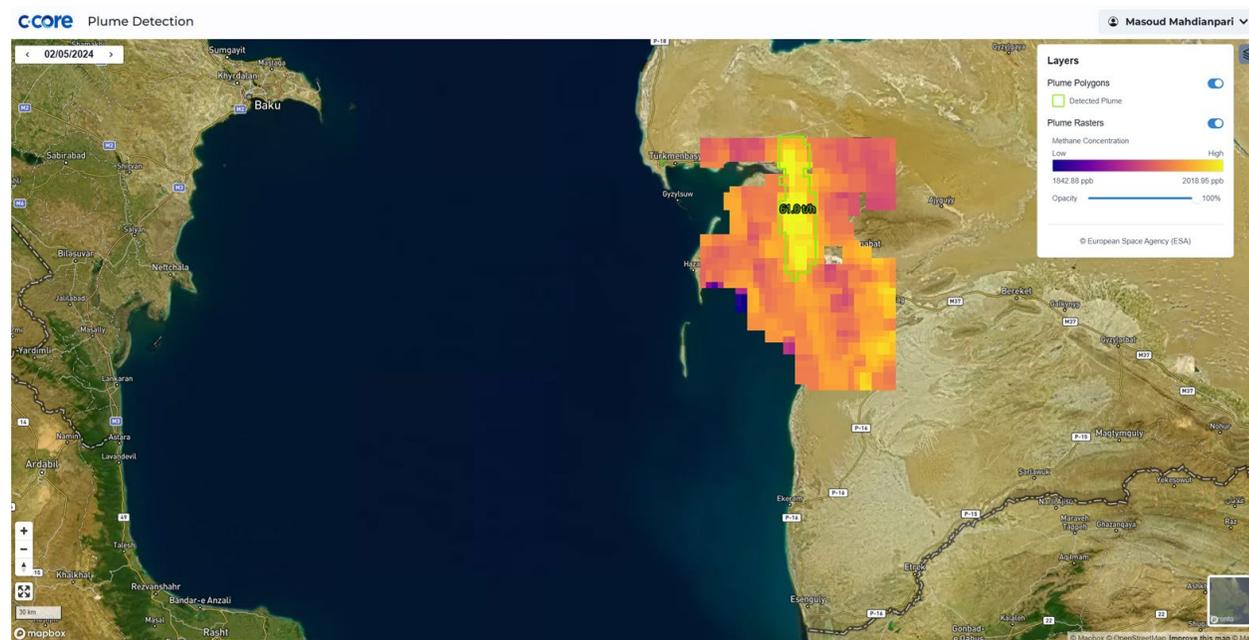


Landsat imagery from 1995 (left) and 2025 (centre) shows an area of riverbank erosion north of Aklavik.

Within the red polygon, the land area in 1995 is water in 2025

Methane Emissions Monitoring

- Sentinel-5P TROPOMI
- 2600 km swath gives global daily coverage
- Measures columns of CH₄, and ...
- Spatial resolution: 7 × 5.5 km²



Questions