One Planet Research Theme:

- Climate & Climate Change ☒
- Earth System Processes ☒
- Anthropocene ☐
- Environmental Informatics ☒

Lead Supervisor: Dr Mike Lim

Key Research Gaps and Questions:

- How sensitive are permafrost coasts to environmental drivers of change?
- What are the wide scale (regional) responses to key events such as thermal changes and storms?
- How are wide scale changes likely to change in the future?

Project Description:

Climatic changes have been particularly pronounced across Arctic coastlines, reducing the sea-ice season and intensifying storm activity. Analyses of the Western Canadian Arctic coastline have revealed substantial increases (up to 200%) in coastal erosion over the last two decades, following a sustained period of relatively consistent retreat since aerial surveys in the 1950s. Accelerated rates of retreat threaten coastal communities, food security and critical infrastructure. The limited studies of permafrost coast erosion have typically been either localised and failure type specific or broad one- to two-dimensional retreat maps at time intervals of annual change at best. We lack understanding of the wide scale volumetric responses and environmental sensitivities of Arctic permafrost coasts and the implications resulting from continued climatic changes.

This PhD research will address critical, longstanding questions over the wide scale sensitivities and impacts of permafrost coast erosion, working closely (including a secondment in Nova Scotia) with leading researchers from the CASE partner Natural Resources Canada (NRCan). The research will benefit from exposure to innovative new approaches for wide scale volumetric monitoring and temperature mapping, geochemical signature analyses linking material sources to sinks and novel modelling approaches to upscale and predict western Arctic permafrost coast change. The depth and reach of the research will be enhanced through access to NRCan’s extensive logistical support, helicopter and boat access, drone surveys, repositories of samples and historic datasets, which will be reanalysed to form a complete picture of long-term trends. Working with NRCan will ensure wider project support, relevance and application through direct co-production and transfer of knowledge to local communities.

Prerequisites:

The project would suit a student with a background in fields such as Geosciences, Geomorphology, Engineering or Physical Geography. Experience of remote sensing, geomatics, geochemistry or modelling is desirable. For more information, please contact Mike Lim (michael.lim@northumbria.ac.uk).