

Project title: Building on unstable ground: developing effective solutions for infrastructure on permafrost

Ref: OP2410

Keywords: Permafrost, climate change, subsiding infrastructure, environmental monitoring

One Planet Research Theme:

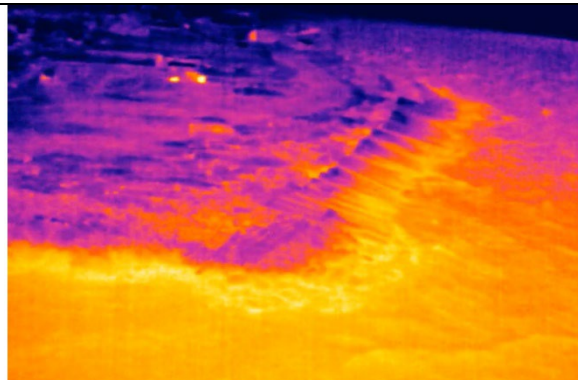
Climate & Climate Change ☒ | Earth System Processes ☒ | Anthropocene ☒ | Environmental Informatics ☒

Lead Supervisor: Professor Mike Lim, Northumbria University

<https://www.cinuk.org/projects/nuna/>

Key Research Gaps and Questions:

- How have historic landuse changes in coastal arctic communities impacted the rate and nature of permafrost degradation?
- How effective are new ground condition monitoring approaches in different arctic coastal environments?
- How can environmental datasets inform decisions on where and how to build resilient infrastructure?



A thermal image of warm storm waters (orange) overtopping coastal defences and degrading frozen ground areas.

Project Description:

Arctic coastal communities are experiencing some of the most extreme environmental changes on Earth, warming up to four times faster than elsewhere. Warmer conditions are thawing frozen material within the ground (permafrost) and leading to subsidence that affects infrastructure and transport routes. Storm events are also causing more variable and extreme erosion rates and potentially releasing materials and contaminants that can affect waterways and habitats.

This research will investigate the patterns and processes of ground change, permafrost degradation and erosion quantities across a range of communities in the Inuvialuit Settlement Region. You will learn to operate autonomous sensors (e.g. drones and new environmental loggers) and processing techniques and work with arctic permafrost experts from Natural Resources Canada (the Canadian Government) during a placement at the Bedford Institute of Oceanography (Canada's leading marine institute) Dartmouth, Nova Scotia. Using a combination of remote sensing and geophysical investigations of the surface and subsurface this research will identify evolving processes and emerging hazards and seek to quantify process interactions with infrastructure. You will look at how sites have evolved spatially and over time and provide new insights into the interactions between environmental processes, human agency, and permafrost responses.

Prerequisites: The project would suit a student with a background in fields such as Geosciences, Remote Sensing, Environmental Science, Civil Engineering or Geophysics. Experience of Masters-level research and publication in a relevant field and is desirable but not essential. For more information, please contact Prof Mike Lim (michael.lim@northumbria.ac.uk).

