



Project acronym: PermaOne

Project title: Permafrost Thaw: Assessing Implications for One Health

Project leader: Alexander Williams, Laboratory of Data Discovery for Health (University of Hong Kong), Hong Kong

Discipline: Life Sciences & Biotech: Other - Life Sciences & Biotech

Station(s): Abisko Scientific Research Station (Sweden)

The project will be carried out at the Abisko Scientific Research Station, and will focus on areas around Storflaket and Stordalen mire. We aim to determine whether permafrost thaw in this region is likely to pose a risk to human, animal and plant health due to climate-induced shifts in microbial and viral communities. We will use metagenomics to characterise the microbes and viruses associated with thaw ponds at different stages of development (e.g. established and newly emerged- as determined by satellite imagery). To understand whether thawing permafrost may contribute to emergent health risks we will track the composition and abundance of pathogens, virulence and antimicrobial resistance genes in a) permafrost adjacent selected thaw ponds, b) transition and active layers c) thaw pond water and d) potential vector organisms (mosquitoes). Critically, this novel cross-sectional approach will help establish if permafrost-associated organisms are being actively released into the environment and colonise candidate vector organisms. Samples will be collected from thaw pond locations (including site-level replicates for 'established' and 'newly emerged' ponds). Coring will take place at the perimeter of each thaw pond, while water (filter samples) and arthropods will be collected directly from ponds. Following collection, samples will be transported to the Abisko Scientific Research Station and frozen at -80°C pending extraction of genetic material. Extractions will be exported for high throughput sequencing and bioinformatic analyses in Hong Kong. Permafrost subsections will also be exported (kept frozen) for controlled thawing experiments.