Non technical project description

ICAAP – Increase Carbon Accumulation in Arctic Peatlands

Principal Investigator: Prof. Angela Gallego Sala, University of Exeter, UK.
In collaboration with researchers from Université du Québec à Montréal

Research Objectives

We aim to better understand the carbon dynamics of Arctic peatlands. Currently, there is a lot of uncertainty as to whether under present and future warming these habitats will expand and/or absorb more carbon from the atmosphere, or the reverse.

Research questions

- Have Arctic peatlands increased carbon accumulation and/or expanded laterally in response to warming past climates in the last several hundreds of years and over the satellite period?
- Will future climate change result in an increase of the Arctic peatland carbon store as a result of increases in accumulation and extent?
- How do our datasets compare to a land surface model that incorporates dynamic peatlands?

Field work schedule overview

Field work, including the peat core sampling and drone data collection, was carried out in 2019 in Svalbard (July) and in Lapland (August) in Europe. Field work in Canada was due to take place in 2020, but was delayed due to the pandemic. Thanks to a funded extension, we are still able to try to get field data from the Canada sites this year (2022) as a last chance to complete the dataset. We aim to visit the Pond Inlet area in July (18th to 26th) to sample 4 sites located not far from Pond Inlet (but not in the Sirmilik National Park boundary).

Methods for field work

We will collect soil samples at four sites for the Pond Inlet field work. A central core from each site will be used to estimate changes in peat accumulation rates. Bulk density, carbon and nitrogen analyses will be measured in 1cm depth increments. Full chronologies will be determined using carbon-14 dates, and 210Pb analyses. These will be used to derive estimates of peat accumulation rates over the past millennium and the last 150 years. Transects from mineral ground to shallow peat at the edges of sites will also be sampled to determine age and accumulation rates in order to consider rates and dating of lateral spread.

In tandem with peat coring, we will fly a micro-drone to map the peat sites and characterise the microtopography and vegetation characteristics from the centre to edges of the peat bogs. This light micro-drone is less than 250g total take-off weight, so does not require registration or a pilot certificate.

Methods remote sensing and modelling

Alongside field work, we are also carrying out analysis of changes in productivity and extent in the Arctic peatlands sites over the last 35 years using satellite data. We will finally compare all our datasets to land surface models to find whether they capture the dynamics we have measured.

Impacts of the research

No detrimental impacts are envisaged in the field work. We will ensure however to not disturb any wildlife whilst accessing the field sites, and to be conscientious when flying the drone.

Data storage and management

All datasets (peat core and remote sensing data) will be made available on public repositories for use by the scientific community. This will be done to coincide with publication of our findings.

Are Nunavut residents involved in the research?

No Nunavut residents are currently involved.

How research results will be shared in Nunavut?

The research will be published in Open Access journals, meaning that any results (and datasets) from the work will be freely available to anyone who would like to read it, including Nunavut residents.

As part of our project we are preparing a MOOC (Massive Open Online Course) in English entitled “Arctic Ecosystem and Climate Change” concerned with the shrinking Arctic environment in response to future warming, and particularly with peatlands ecosystems and carbon storage. We are also willing to provide a presentation of our work to the public in Pond Inlet during the field work dates if that is of interest.