Quantifying and Characterising Organic Carbon in Newly-developed Soils Following Glacier Retreat in Northern Latitudes

Akhmetkaliyeva, Saule¹, Sparkes, R. ¹, Clarke, L. ¹, Dean, A.P. ¹, & Cook, S².
¹Manchester Metropolitan University, ²University of Dundee

Background
- Glacial organic carbon (GOC) held within glacier ice, subglacial sediments, and proglacial sediments and soils.
- 21st century warming will result in global glacier retreat with the potential to expose and release GOC.
- Newly-exposed nutrient rich glacial landscapes may develop soils and ecosystems.

Study sites
- Öræfajökull icecap, Iceland (2018 & 2019)
- Tarfala valley, Sweden (2018)
- Zackenberg valley, Greenland (2019)

Methods
- Soil samples → Total Carbon → Decarbonation → Total Organic Carbon
- Soil samples → Biomarker extraction → LC/MS → Soil BHPs & R'soil

Findings
- Direct glacial output of organic carbon is low
- Organic Carbon develops in soils
- Higher bacterial presence in moraine and bank soils
- Soils develop over time after being exposed

Conclusions
- Build-up of new terrestrial OC stores
- Erosion of OC by glacial meltwater
- Future retreat might increase terrestrial OC productivity and carbon export

Research Question
- Interested in understanding the main source of OC in soils exposed after glacier retreat and soil development along downstream transects from the glacier front.