UNITED KINGDOM AND GREENLAND ARCTIC RESEARCH BURSARIES SCHEME 2024–25

Project Summaries

Photo: Joseph Marlow

Arctic Office
NATURAL ENVIRONMENT RESEARCH COUNCIL

UK Science & Technology Network

UK Government

Greenland Research Council

BACKGROUND

This publication shares details of new work from UK-based research teams working with Greenland-based researchers, funded by the UK Government from 2024–25.

Researchers in the UK and Greenland are well-placed to develop important new science partnerships that address pressing research questions. These partnerships can support the development of skill- and knowledge-based networks to strengthen both communities; foster the creation of positive, respectful and empowering partnerships; and create lasting research connections.

During 2023–24 and 2024–25, the UK Government has supported two schemes to support new UK-Greenland Partnerships. Delivered by the UK Arctic Office and the UK Science and Technology Network (formerly Science and Innovation Network) in collaboration with the Greenland Research Council and the Arctic Hub, the scheme has enabled funding of 25 projects across a broad range of disciplines that have carried out research across Greenland over the two years. A summary of the projects for 2024 –25 is included in this booklet.

The outcomes of the bursaries programme continue to support and further develop lasting research and collaboration links between UK-based and Greenland-based researchers; to provide opportunities for UK-based researchers to work with new partners in Greenland; and develop ideas for future international projects.

Further information about the work of the NERC Arctic Office can be found here: www.arctic.ac.uk

Photo: Kathryn Adamson

Project Summaries:

PI Name	PI Institution	Project Title
Prof Jan Hiddink	Bangor University	Assessing the impact of bottom trawling on Greenland's seabed ecosystems
Dr Isabelle Gapp	University of Aberdeen	Voices on Ice: Teaching the visual and material culture of the Greenland Ice Sheet
Dr Dan Allen	Liverpool Hope University	SafeHarbour Greenland: Safely reducing the number of children in Out-of-Home care
Dr Nicholas Dulake	Sheffield Hallam University	Adapting, repairing and creating scientific equipment in Greenland using 3D printing
Dr Stephanie Ordonez Sanchez	University of Strathclyde	Powering the Arctic with Greenland's Green Hydrogen (PAGGhy)
Prof John Schofield	University of York	Homelessness in a changing climate: Co-creating resilience through heritage and tourism in Nuuk (Greenland)
Dr Stephen Brough	University of Liverpool	A flagship glacier-fjord monitoring programme in Nuup Kangerlua: Continuation
Dr Laurence De Clippele	University of Glasgow	Unlocking deep-sea biodiversity data from Greenland's submarine wall ecosystems
Dr Joseph Marlow	Scottish Association for Marine Science	Assessing the potential impacts of climate change and glacial retreat on fjord wall biodiversity and biomass using ROV surveys and automated 3D image analysis
Prof Paul Mann	Northumbria University	Urgently moniToring the Impact of road deveLopment on alr pollution SuscEptibility (UTILISE)
Dr Mihai Cimpoiasu	British Geological Survey	PILLAR: Permafrost thaw Induced LandsLides in Arctic Regions
Dr Kathryn Adamson	Manchester Metropolitan University	Seasons of Change

Assessing the impact of bottom trawling on Greenland's seabed ecosystems

Principal Investigator:
Prof Jan Geert Hiddink,
Bangor University

Email: j.hiddink@bangor.ac.uk

UK and Greenland-based Co-Investigator/Team members:
Nadescha Zwerschke, Greenland Institute of Natural Resources
nazw@natur.gl

Research location:
Deskbased in Nuuk and Bangor

Project overview:

Bottom-trawl fishing occurs worldwide and provides about a quarter of global seafood landings. It is a controversial practice because the heavy nets and dredges that are used to catch species such as cod, plaice and shrimps also disturb the seabed and impact the invertebrates that live there. The strength of these effects varies between different bottom trawl gears and for different seabed types. Greenland has a large bottom trawl fishery that is targeting Greenland halibut, cod and shrimps, but the regional scale impact of this fishing activity on the seabed is mostly unassessed. This project aims to work towards a cohesive coherent assessment of the trawling impacts in Greenland waters by setting up new collaborations and providing training. Hiddink has developed methods for assessing seabed impacts that have been adopted by the Marine Stewardship Council and ICES working groups.

Project highlights:

- We have identified, collated, organised and analysed the datasets needed to run the first full assessment of bottom trawling impacts on seabed ecosystems for West and East Greenland.

Next steps:

We will publish a paper on this work, to be submitted in 2025.

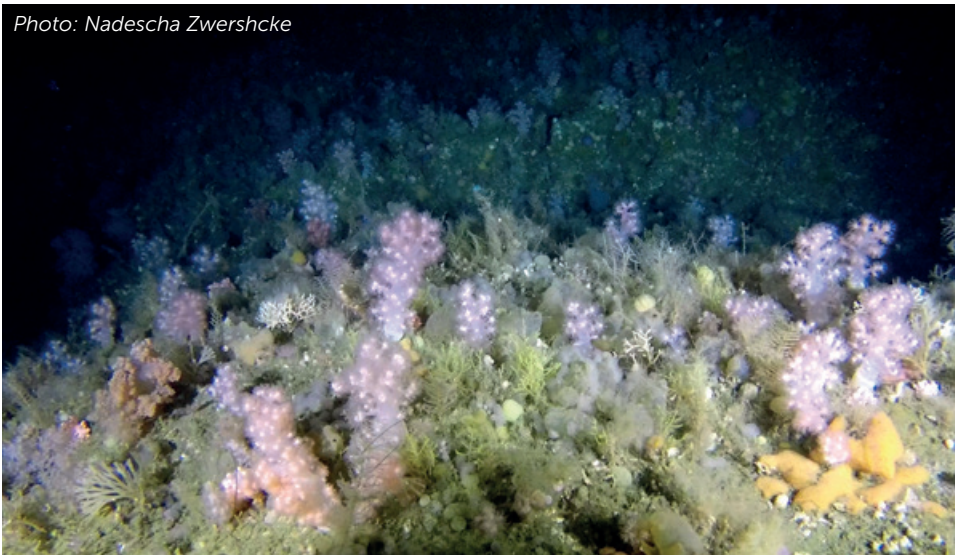


Photo: Nadescha Zwershcke

Voices on Ice: Teaching the visual and material culture of the Greenland Ice Sheet

Principal Investigator:
Dr Isabelle Gapp,
University of Aberdeen

Email: isabelle.gapp@abdn.ac.uk

UK and Greenland-based Co-Investigator/Team members:
Penelope How, Geological Survey of Denmark and Greenland (GEUS), project partner

Research location: Nuuk, Greenland

Project overview:

Voices on Ice: Teaching the Visual and Material Culture of the Greenland Ice Sheet addresses the need for multi-disciplinary and collaborative pedagogy within and beyond Scottish, Greenlandic (Kalaallit), and North American institutions. In collaboration with the Geological Survey of Denmark and Greenland (GEUS), this project builds upon the 2023-24 Scottish Government Arctic Connections Fund project *Teaching Arctic Environments* to develop and co-create online and open-access visually-orientated teaching resources centred on Greenland. With a focus on the Greenland Ice Sheet (GrIS) and local cultural heritage institutions in Nuuk, this project will develop a series of digital teaching modules that foreground Indigenous and non-Indigenous perspectives, heritage, and visual and material culture to address the growing need and demand for accessible and critical environmental humanities pedagogy of the circumpolar Arctic.

Project highlights:

- In October 2024, Isabelle visited Nuuk for two weeks as part of the *Voices on Ice project*. This was her first time in Greenland, despite having been researching the art history of Greenland's glaciers for several years. She was based at the Greenland Natural Resources Institute, with a desk in the shared GEUS office. As part of this visit, Isabelle and Penny spent time at the Nuuk Art Museum, for which they received a tour of the collections from curator Ujammiugaq Engell. This visit has directly influenced a co-authored essay for the *Voices on Ice series*. The other project highlight was a boat tour of Nuuk fjord, which was a formative experience for Isabelle who learned a lot from experiencing sea ice first hand with a glaciologist.
- By the end of the project, we will have around nine essays and audio/visual recordings incoming that will form part of a series, *Voices on Ice*, as part of the Teaching Arctic Environments project.

Next steps:

We have been colleagues and collaborators for a long time, and so are keen to continue to build on this professional relationship through other funding avenues. The overarching Teaching Arctic Environments project will continue, and our hope is to continue to expand this through grants and relationship-building with colleagues and institutions in Nuuk and throughout Greenland.

Publications:

In Spring-Summer 2025, we will be publishing a series of open-access essays and audio-visual recordings on the *Teaching Arctic Environments* website (an overarching project led by Isabelle Gapp). This will be part of a dedicated series on Greenland and will be available in both English and Kalaallisut.

Safeharbour Greenland: Safely reducing the number of Greenlandic children living in 'Out-of-Home' care

Principal Investigator:
Dr Dan Allen, Principal Social Work Lecturer, Liverpool Hope University

Email: allend@hope.ac.uk

UK and Greenland-based Co-Investigator/Team members:
Associate Professor Bonnie Jensen, head of Children & Adolescent Research Environment, Ilisimatusarfik (University of Greenland), academic partner and project convener

International partners:
Tina Dam, UNICEF

Research location: Nuuk

Project overview:

In Greenland, children are placed in 'Out-of-Home' care, a living arrangement for children and young people who are unable to live with their family, at more than four times the rate of comparable Nordic countries. This situation is placing significant emotional pressure on children and considerable economic strain on the child welfare system. While some research has explored the causes of overrepresentation, far less attention has been paid to strategies to reduce the number of children living in 'Out-of-Home' care safely. This lack of attention has resulted in weak theory-informed approaches to support children in their homes and facilitate family reunification.

Safeharbour Greenland seeks to address this gap. In line with Greenland's National Research Strategy 2022–2030, it fosters and supports a community of practice that explores ways of safeguarding children and reducing their involvement in 'Out-of-Home' care. In collaboration with care-experienced adults and child welfare professionals in Nuuk, the project draws on Indigenous knowledge to strengthen Greenland's child welfare services. The project also offers transferable insights for supporting other marginalised groups, such as Romani and Traveller communities in the UK, highlighting the value of culturally sensitive, community-driven solutions.

Project highlights:

- Transformative Approach to Social Change: Safeharbour Greenland, aligned to the Greenlandic National Research Strategy (2022–2030), provides a work plan, that unites a Special Interest Group (SIG) of stakeholders, including care-experienced adults and families, to reform child welfare. The initiative is rooted in social pedagogy, Indigenous knowledge, and evidence-based research.
- Child and Family Rights: Over four years, Safeharbour Greenland will target three themes: children's rights, family rights, and the development of Child Welfare Services. It will prioritise Early Help interventions, preventive measures to keep children safe at home, and family reunification while protecting children's rights.
- Impact Goals: Safeharbour Greenland aims to reduce the number of children living in 'Out-of-Home' Care, improve support for at-risk children, and ease economic strain on the child welfare sector. Success will be measured against specific, measurable outcomes aligned with the programme Theory of Change.

Photos: Dan Allen

Next steps:

The PI continues to work with Associate Professor Bonnie Jensen and the Greenlandic government to explore further research funding opportunities. As a beneficiary of the UK/Greenland Arctic Science Bursary Scheme 2024–25, I have learned that Safeharbour Greenland requires a long-term, respectful approach to create meaningful and sustainable impact. I have also learned that short-term research risks undermining trust in a context where colonial legacies have fostered scepticism of Westernised child protection practices. For these reasons, ongoing collaboration is required to address systemic issues, amplify local voices, and ground efforts in Indigenous knowledge to ensure cultural relevance and strengthen Greenlandic traditions. By fostering trust, building local capacities, and promoting culturally informed frameworks, I hope that Safeharbour Greenland will go on to support policies and practices that empower communities and deliver lasting, positive outcomes for all.

Publications:

A research paper is currently being prepared for submission to the British Journal of Social Work, and a project report is available via Liverpool Hope University https://hira.hope.ac.uk/id/eprint/4374/.

Adapting, repairing, and creating scientific equipment in Greenland using 3D printing.

Principal Investigator: Dr Nicholas Dulake, Sheffield Hallam University

Email: n.dulake@shu.ac.uk

UK and Greenland-based Co-Investigator/Team members:
David Blockley,
Greenland Institute of Natural Resources(GINR)

Lise Autogena,
Sheffield Hallam University

Søren Post, GINR

Aili Lage Labansen, GINR

Else Ostermann, GINR

Thomas Juul-Pedersen, GINR

Sandra R. Maier, GINR

Tobias Reiner Vonnahme, GINR

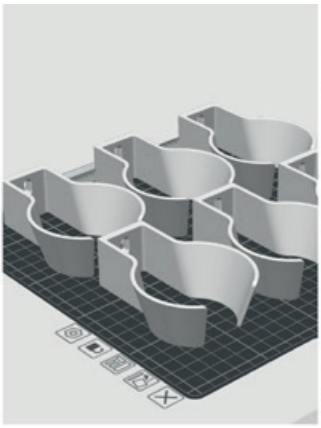
Research location:
Nuuk, Greenland and Sheffield, UK

Project overview:

The Project aims to revolutionise scientific workflows in Greenland by integrating 3D printing and design. In this region, where ecological studies are vital yet challenged by equipment malfunctions due to harsh conditions and logistical complexities, 3D printing could offer a transformative solution if combined with context-informed design and provides a game-changing opportunity in exploiting the technology by achieving functionality, optimising geometries, ensuring structural integrity and shaping aesthetics.

The core objective is to empower scientists by providing autonomy to adapt, repair and create customised solutions for scientific research tools. Whilst collaborating with the Greenland Institute of Natural Resources (GINR), the specific areas that benefited from 3D printing included custom sample collectors, camera setups, benthos settlement studies, educational models, and other equipment suitable for Greenland's demanding environment. Through three case studies centred on adaptation, repair, and creation, the project aimed to demonstrate the practical advantages of integrating 3D printing into scientific research. By fostering innovation, efficiency, and adaptability,

Example of adaption, original design


3d design and print layout


Manufactured and deployed

this initiative project addresses the unique challenges faced by Greenland's scientific community, offering tailored solutions through the convergence of 3D printing, design expertise, and scientific inquiry.

Project highlights:

Design and Innovation at GINR: A Collaborative Approach

During the initial visit to the Greenland Institute of Natural Resources (GINR), within the first two days in Nuuk, over ten newly designed and manufactured items were developed in collaboration with GINR staff. These innovations aligned with the overarching themes of adaptation, repair, and creation.

A selection of the developed designs is categorised as follows:

- Adaptation: Drip bottle holder, air pump clip, bird fishing rod
- Repair: Niskin bottle cap, seawater filter holder
- Creation: 3D-scanned and printed fish replicas, sample holders

The complexity and diversity of these designs varied, however, the rapid development and successful implementation of solutions within such a short timeframe were significant achievements. These designs enhance workflow efficiency, improve process repeatability, and provide financial benefits by enabling the production of custom 3D-printed components at a significantly reduced cost while also introducing added functionality. The success of this initial trip has laid a strong foundation for further development within the project.

Following this first visit, a selection of projects was further refined and developed through ongoing collaboration between Sheffield and Nuuk. This approach has proven highly effective in generating new designs, particularly for remotely


Photo: Nicholas Dulake

operated underwater vehicle (ROV) instrument mounts. The ideation phase took place in Nuuk, followed by design development in Sheffield, and within days, the components were manufactured and deployed back in Nuuk—demonstrating an efficient, iterative process of innovation.

On the return visit in March 2025, I will conclude the collaborative work, and I will document the journey, outlining key developments and identifying opportunities for future exploration in this field.

Next steps:

The initial success of the project has established a strong foundation for further development. I aim to explore opportunities to scale up the project by incorporating additional partners identified over the past year. A key focus of my second visit in March 2025 will be expanding the necessary network to support the development of a funding bid.

Powering the Arctic with Greenland's green hydrogen

Principal Investigator:
Dr Stephanie Ordonez Sanchez,
Department of Mechanical and Aerospace Engineering,
University of Strathclyde

Email: s.ordonez@strath.ac.uk

UK and Greenland-based Co-Investigator/Team members:
Dr A Riccardi provided content for the online seminars and shared her knowledge regarding the capabilities of earth observations to monitor terrestrial ecosystems and greenhouse gas concentrations. In particular, she showcased the work she has supervised related to mining in Greenland and contributed a proposal submitted in November 2024.

Mr Johnstone was the conduit between this project and the insights from the REMIROCaN project in Artic Canada, part of the CINUK programme. He delivered a seminar based on his expertise related to demand-side management and control in buildings and implementing hybrid energy systems to decarbonise buildings, e.g. wind and solar PV. He will also provide his expertise during the workshop and grant writing stages.

International partners:
Dr Javier L. Arnaut is an Associate Professor at the University of Greenland (Ilisimatusarfik) in Nuuk.

Research location: Mostly UK but a research visit was done in August 2024 to Nuuk, Greenland

Project overview:

Greenland is pioneering sustainable energy, currently generating 70% of its power from renewables, primarily hydropower. The country aims to achieve 100% renewable energy by 2030, positioning itself as a potential power-to-hydrogen producer and energy exporter. This initiative could reduce global reliance on petrochemicals and decrease carbon emissions, especially benefiting remote Arctic regions. The project draws inspiration from the REMIROCaN initiative at the University of Strathclyde, which focuses on integrating renewable sources in Nunavut to reduce diesel dependence. While Greenland's challenges differ, its natural resources make it well-suited for hydrogen production and export, leveraging Arctic conditions for efficient hydrogen transport.

The collaboration between UK and Greenland teams aimed to foster knowledge exchange and innovative methods between UK and Greenland teams, enhancing sustainable energy conversion and integrating satellite monitoring with scientific and local knowledge to drive sustainable projects in small communities.

Photo: Javier Arnaut

Therefore, the objectives of the project included the assessment of renewable energy impact on Greenland's sustainability, explore hydrogen applications as energy storage and compare Greenland's current energy infrastructure with potential alternatives.

Project highlights:

- Arctic Academy Participation:
  Dr Ordonez and Riccardi contributed to the ARCADE program, focusing on Arctic sustainability and Greenland's green transition. They engaged in panel discussions and collaborations with colleagues from Arctic University of Norway, University of Iceland, and the students involved in the summer school.
- Green Hydrogen Research:
  A study evaluated the economic feasibility of hydrogen transportation in Greenland, comparing compressed gas via pipelines and liquefied hydrogen via maritime routes. The research found pipelines more cost-effective for shorter distances (<1,500 km) and higher demand, while shipping suited longer distances and larger volumes. A case study showed pipeline transport costs at 1.3 USD/kg versus 2.7 USD/kg for shipping from Paamuit to Nuuk at 40 t/d capacity. This work was published at the *Journal of Ocean Engineering and Technology*.
- Grant proposal submitted:
  The team prepared a stage 1 proposal for the ARIA's Forecasting Tipping Points Programme, unfortunately this was not invited for stage 2.

Next steps:

We are writing a proposal to continue working with our collaborator Dr Arnaut and the University of Greenland. We have also spread the collaboration with the Business School at the University of Strathclyde.

Photo: Stephanie Ordonez-Sanchez

Publications:

We have recently published the following article:

1. Dukku H., Riccardi A., Johnstone, C., Arnaut J & Ordonez-Sanchez, S. (2025). Techno-economic analysis of green hydrogen transportation using pipeline and shipping in Greenland. Journal of Ocean Engineering and Technology. DOI: https://doi.org/10.26748/KSOE.2024.088

And we presented the work at the Asian Wave and Tidak Energy Conference in Busan 2024:

1. Bolivar-Carbonell, M, Arnaut, J., Johnstone, C, **Ordonez-Sanchez, S**. (2024) Assessing the Feasibility of Tidal Energy to Power Remote Communities in Greenland Using FES2014. Abstract accepted to be presented at the Asian Wave and Tidal Energy Conference (AWTEC 2024), Busan, October 2024.
2. Dukku H. and **Ordonez-Sanchez S**. (2024) Investigating the Production of Green Hydrogen in Greenland using Offshore Wind Turbines. Abstract accepted to be presented at the Asian Wave and Tidal Energy Conference (AWTEC 2024), Busan, October 2024.

Homelessness in a changing climate: Co-creating resilience through heritage and tourism in Nuuk (Greenland)

Principal Investigator:
Prof John Schofield,
Archaeology, University of York

Email: john.schofield@york.ac.uk

UK and Greenland-based Co-Investigator/Team members:
Kenny Lieske, Good Organisation (Social Ventures) CIC, York.

Dr Steven Arnfjord, Ilisimatusarfiks (University of Greenland), Centre for Arctic Welfare.

As a research team, based at Ilisimatusarfik, we will work closely with Kofoeds Skole in Nuuk, a social institution that aims to help vulnerable people by providing education, counselling and practical assistance. The School's mission is to empower people to take control of their lives and improve their social and economic prospects.

Research location: Nuuk

Project overview:

This project will explore the potential of community-led tourism to develop a financially self-sustaining model of support which is authentically co-created with people experiencing homelessness in Nuuk (Greenland). Building on his experience with people affected by homelessness in the UK, and Arnfjord's work with Indigenous people impacted by homelessness in Greenland, the applicant will work with Ilisimatusarfik's (University of Greenland) Centre for Arctic Welfare and Kofoeds Skole, to co-create opportunities for homeless people in Nuuk to: 1) build resilience within the context of a changing climate; 2) promote Indigenous history, heritage and knowledge; and 3) enhance the voice and representation of homeless Inuit by adapting a successful model developed by the Good Organisation in York, UK. This project aligns with at least three visions/goals within the Greenland National Research Strategy, 2022-2030: 1.4 (increased use of indigenous and local knowledge); 2.1 (finding solutions to future challenges); and 4.2 (international research cooperation). The project also resonates with Pillar 1 of the IASC Strategic Plan, to 'address societally relevant questions that are inherently interdisciplinary', and an overarching research priority of ICARP III ('improved understanding of the vulnerability and resilience of Arctic environments and societies').

Project highlights:

- The creation of a new research collaboration involving partners in York (UK) and Nuuk (Greenland), both of which are cities with a disproportionately high level of tourism relative to their permanent population, accompanied by a growing sense of disconnect between visitors and local residents, and with increased levels of homelessness.
- A new and distinctive tourism offer for those visiting Nuuk, and one that benefits its economically-marginalised residents. A peer-reviewed publication describing our scoping project, as a proof of concept, including the voices of those closest to the issues we seek to address, as co-authors (the costs for the writing time required for this paper are not covered by this application, although work will begin during the study period).

- A peer-reviewed publication describing our scoping project, as a proof of concept, including the voices of those closest to the issues we seek to address, as co-authors (the costs for the writing time required for this paper are not covered by this application, although work will begin during the study period).

Next steps:

We view this as a feasibility study, to develop a proof of concept. If successful, we aim to seek further funding to extend the project, either to as wider geographic area, or as a more substantive Nuuk-based study into homelessness in a changing climate.

Photos: Steven Arnfjord

A flagship glacier-fjord monitoring programme in Nuup Kangerlua: Continuation

Principal Investigator:
Dr Stephen Brough,
University of Liverpool

Email: Stephen.brough@liverpool.ac.uk

UK and Greenland-based Co-Investigator/Team members:
Prof James Lea,
University of Liverpool

Mr George White,
University of Liverpool

Dr Penelope How,
Geological Survey of Denmark and Greenland (GEUS, Nuuk Office)

Dr Alexandra Messerli,
ASIAQ Greenland Survey

Research location:
Nuup Kangerlua (Nuuk Fjord)

Project overview

The broad aim of this project is to lay the foundations for a flagship fjord-ice-climate monitoring programme by installing and maintaining instruments in the field that will provide long-term climatic, fjord environment and glaciological datasets. We are aiming to install operational weather, glacier, fjord and iceberg monitoring instruments, with the capability to process the data collected in near-real time. To achieve this, we are looking to deploy a state-of-the-art operational weather station and time-lapse camera to monitor ice and fjord dynamics and their climate controls, respectively. Importantly, these instruments will be installed on the fjord shoreline at a location within easy hiking distance from Kapisillit, opening the opportunity for co-creation of research and environmental understanding with Greenlandic and international students, researchers and the wider public.

Project highlights:

Successful deployment of a state-of-the-art operational weather station which has been operational since October 2023, with near-real-time data transmission and processing. We are currently exploring the potential for installation of a time-lapse camera with near-real-time data transmission.

Next steps:

We want to establish a network of individuals that would allow exploration of how data collected from the project can be most effectively used for public outreach activities, potential business applications and long-term research collaboration within Greenland, especially beyond the members of the project team.

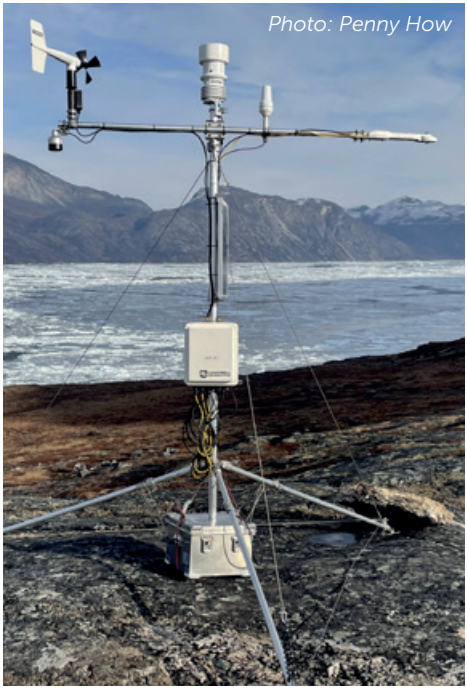


Photo: Penny How

Unlocking deep-sea biodiversity data from Greenland's submarine wall ecosystems

Principal Investigator:
Dr Laurence De Clippele,
University of Glasgow

Email:
Laurence.declippele@glasgow.ac.uk

UK and Greenland-based Co-Investigator/Team members:
Dr Sandra Maier,
Greenland Institute of Natural Resources

Dr Veerle Huvenne,
National Oceanography Centre

Dr Michelle Taylor, University of Essex

International partners: Greenland Institute of Natural Resources

Research location: Greenland

Project overview:

The workshop contributed to the development of a new network of AI-trained researchers, fostered new long-term and equitable Greenland- and UK-based partnerships, and will provide efficiently generated biodiversity datasets that can be used to conserve and restore benthic ecosystems, which is important in light of the pressing climate and anthropogenically driven changes. While the focus of the workshop was on image data collected from three deep-sea benthic habitats, this workshop received interest from researchers working on birds, fish, algae and terrestrial ecosystems. A total of ten Greenlandic researchers joined the workshop, and four UK early career researchers and one technician participated in the workshop to gain skills in developing AI models with the interactive machine learning tool, RootPainter. A combination of lectures, tutorials and mini projects and networking events allowed the participants to expand their network and increase their understanding of deep-sea habitats in Greenland. As part of the mini projects, participants trained a *Drifa* sp. (soft coral) and *Madrepora* sp. (hard coral) model. They compared different training approaches, which increased the speed of training and accuracy of the model. More information about the workshop schedule can be found here: https://laurencedeclippele.com/ai-image-analysis-workshop-unlocking-deep-sea-biodiversity-data-from-greenlands-submarine-wall-ecosystems/

Project highlights:

- AI workshop was organised in Nuuk, Greenland 3-7 February 2025 at the Greenland Institute of Natural Resources
- Different model training approaches were compared, with adjustments improving the speed at which a higher accuracy was achieved
- A draft proposal for future work between the UK-Greenland was prepared

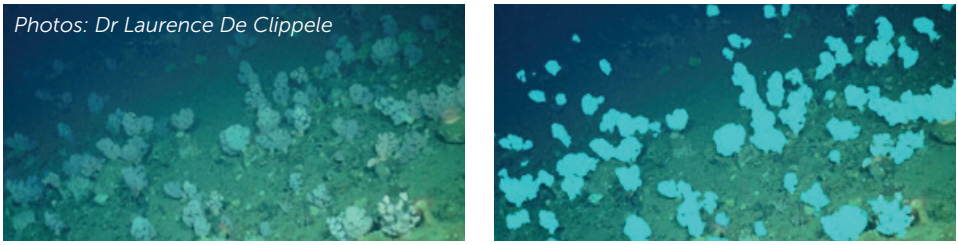


Image of Drifa sp. soft corals on the left (ERC/ICYLAB/UBRISTOL/HENDRY/NERC) and on the right the result from the RootPainter model developed by the AI Workshop Mini Project team members: Emmeline Broad, Alexandra Midkiff and Maja Nagler.

Assessing the potential impacts of climate change and glacial retreat on fjord wall biodiversity and biomass using ROV surveys and automated 3D image analysis

Principal Investigator:
Dr Joseph Marlow,
Scottish Association for Marine Science

Email: Joseph.Marlow@sams.ac.uk

UK and Greenland-based Co-Investigator/Team members:
John Halpin,
Scottish Association for Marine Science

Nadescha Zwerschke,
Greenland Climate Research Centre (part of Greenland Institute of Natural Resources- GINR)

Research location: Sermilik and Ammassalik Fjords, Eastern Greenland

Project overview:

The original aim of the project was to conduct ROV surveys of fjord wall benthos to assess how these vary under differing fjord glacial regimes. However, we suffered a critical ROV fault early into our field work and had to change project at the last minute.

Instead, we focused on intertidal algae. Greenland's vast macroalgal habitats are potentially significant sources for blue carbon export and eventual sequestration in deeper offshore regions. Previous research indicates that subtidal algae are likely to sink within fjord and buoyant intertidal algae are more important for offshore transport. However, very little is known about how glacial regimes affect the abundance of intertidal algae in the fjords.

We assessed intertidal algal biomass across twelve sites in Sermilik (marine-terminating glacier) and Ammassalik Fjords (land-terminating glacier), spanning from the fjord mouth to terminus. Drone surveys were used in conjunction with a machine-learning workflow to assess algal spatial coverage, while quadrat surveys were used to calibrate the drone data to *in situ* algal biomass. Early results indicate significant differences between the two fjords, with considerably larger intertidal algal biomass in Ammassalik than Sermilik fjord. This has implications for across Greenland, as glaciers retreat and transition from marine to land terminating.

Project highlights:

- Our principal achievement was quickly switching focus after suffering a substantial equipment failure in a short and remote field trip. While we were disappointed we couldn't do the ROV based research we had planned for, the work we achieved and the data we collected was high quality and we expect the resultant publication to be high impact.
- A real highlight of the field work was being based in the small village of Tiilerilaaq and working with local guides and boat skippers for two weeks. This was a truly unique experience that not only made the whole trip much more enjoyable but really allowed us to work much more flexibly and efficiently than if we'd been operating from a large ship or expedition.

Next steps:

Not at the moment, but if funds became available we would like to go back to East Greenland to complete the work we originally set out to do.

Publications:

We hope to publish this study later this year.

We have published an adjacent paper (see below) with our Greenland partners on the potential for machine-learning to monitor blue-carbon in Greenlandic waters. https://tos.org/oceanography/article/the-potential-of-low-tech-tools-and-artificial-intelligence-for-monitoring-blue-carbon-in-greenlands-deep-sea

Photos: Joseph Marlow

Urgently moniToring the Impact of road deveLopment on aIr pollution SuscEptibility (UTILISE)

Principal Investigator:
Prof Paul Mann, Northumbria University

Email: paul.mann@northumbria.ac.uk

UK and Greenland-based Co-Investigator/Team members:
Louise Mercer, Northumbria University

Prof Michael Lim, Northumbria University

Prof Joanna Bullard, Loughborough

Alex Hall, a PhD student, Loughborough

Marco Marcer, Arctic DTU, Greenland

Thomas Ingeman-Nielsen, Arctic DTU & DTU, Greenland & Denmark

We have also developed partnerships with representatives of the Qeqqata Kommunia municipality, UNESCO chairs, Sisimiut Museum and Arctic Circle Trail Business (local tour operator) in Greenland.

International partners: Clay Prater is a Postdoctoral Research Associate at the University of Arkansas

Research location:
Kangerlussuaq and Sisimiut, Greenland

Photos: Louise Mercer

Project overview:

Climate-driven landscape change and ongoing infrastructure development are leading to air pollution concerns across the Arctic, including Kalaallit Nunaat (Greenland). Air quality can be impacted by changing natural or manmade sources of dust and has been identified as of concern to Qeqqata Kommunia municipality. New road infrastructure between Sisimiut and Kangerlussuaq is being developed, with potential to change local air quality. Concerns have been raised regarding the environmental effects of road development on a UNESCO World Heritage Site/ culturally significant wildlife harvesting sites, and associated health impacts on residents. To address local concerns and facilitate future sustainable development of the area, an environmental monitoring network is required to assess current and future changes in air quality. UTILISE deployed and tested low-cost and emerging technologies through a new community-based monitoring (CBM) program that will feed into the further development of a locally driven observing network along the new road. Initial findings will be presented during outreach meetings in Sisimiut and provide an opportunity for local residents and researchers to co-develop priorities and protocols for future CBM. Our approach will help aid understanding of impacts of dust on human health and inform sustainable development planning.

Project highlights:

- We had a successful first visit to Kangerlussuaq and Sisimiut in September 2024. We had very constructive meetings and developed partnerships with representatives of the Qeqqata Kommunia municipality,

UNESCO chairs, Sisimiut Museum and Arctic Circle Trail Business. We deployed 4 low cost sensors and cameras at sites which will be retrieved during our Spring 2025 trip, where we will have follow up co-interpretation meetings.

- Results and learnings from our approach will feed directly into the ICARPIV research planning process and Arctic Science Summit Week (Colorado, March, 2025).
- This project is directly helping to support 2 Early Career Researchers (ECRs) who are current Fellows of the International Arctic Science Committee (IASC) and further ECRs we are working with on wider funding proposals which directly build from the research and relationships developed as a result of the UTILISE project.

Next steps:

At present we are planning our upcoming outreach meetings in Sisimiut for Spring 2025. We are working directly in collaboration with Arctic DTU Sisimiut, the Arctic Circle Trail Business, Sisimiut Museum and Qeqqata municipality so are coordinating our visit with their respective schedules. Outreach meetings held in Sisimiut will help to address urgent knowledge gaps by bringing researchers and local residents, municipality officials, businesses and researchers from DTU

Sisimiut together to develop an air quality monitoring network along a new ATV trail developed between Kangerlussuaq and Sisimiut. Dust surrounding Kangerlussuaq has been heavily studied, but dust remains understudied in Sisimiut especially in relation to the impacts of road development and shipping on air pollution. Initial results from low-cost air quality monitors will be co-interpretated during these meetings. Engaging further with local rights- and stake- holders will continue to build trusting relationships and co-create priority areas and protocols for future environmental community-based monitoring of the impact of changing air quality. Outreach meetings held at the Sisimiut Museum will set the foundation (partnerships, protocols, equipment) for future collaborations that address air pollution concerns in Greenland arising from natural and manmade sources. We are actively planning means to support continued partnership development to support long-term collaborations. We have submitted three other funding proposals to support further visits planned for 2025 that build from this project, including further equipment and travel funds. We plan to attend the Nuuk Science meeting to disseminate results from this project with research organisations, rights and stakeholders in Greenland and discuss the further development of an integrated observing network across the ATV Trail.

PILLAR: Permafrost thaw Induced LandsLides in Arctic Regions

Principal Investigator:
Dr Mihai O. Cimpoiasu,
British Geological Survey

Email: mcim@bgs.ac.uk

UK and Greenland-based Co-Investigator/Team members:
Steffen Ringsø Nielsen,
Denmark Technical University,
Sisimiut, Greenland

Anton Abrahamsen,
Denmark Technical University,
Sisimiut, Greenland

Thomas Ingerman-Nielsen,
Denmark, Technical University,
Denmark

International partners: Denmark Technical University, Sisimiut, Greenland

Research locations:
Sisimiut, Greenland and Kangerlussuaq area, Greenland

Project overview:

Mudslides and permafrost detachments are an escalating natural hazard in the Arctic regions, driven by rising temperatures and increased precipitation. Particularly in Greenland, they endanger human settlements, infrastructure as well as natural habitats. Geophysical methods such as electrical resistivity tomography provide images of the subsurface, which allow characterisation of the permafrost layer and determination of thickness and depth. Time-lapse measurements enable the capture of subsurface processes related to degrading permafrost. We propose the installation of a semi-permanent geoelectrical monitoring array on an active mudslide in the vicinity of Kangerlussuaq, Greenland. This will provide a continuous record of time-lapse images, allowing us to relate slope movements to moisture-driven subsurface processes. As UK partners, we will contribute to the collaborative project by providing geoelectrical monitoring technology and know-how, experience of operating geoelectrical observatories in Arctic environments, and interpretation support. The Greenlandic partner will undertake the fieldwork and be responsible for data collection, curation, and interpretation.

Project highlights:

- Geophysical monitoring equipment, PRIME, arrived in Sisimiut, Greenland

  The PRIME system was bought, assembled and tested in our BGS electronics laboratory in Keyworth, UK. Following a long-haul shipment, all scientific instrumentation has arrived in Sisimiut, Greenland at the DTU campus. Steffen has since successfully reassembled and tested the PRIME system in Greenland to insure functionality.

- First geoelectrical subsurface profiles of an Arctic mudslide

  The PRIME system was reassembled in-situ at one of the mudslide sites in Kangerlussuaq area, Greenland. Using the instrumentation provided and remotely guided by their UK collaborators, in September 2024, the Greenlandic team (Photo 1) was able to collect the first geoelectrical profiles of the active mudslide.

- A permanent installation design for the PRIME system

  Our ultimate goal is to have uninterrupted geoelectrical measurements over the landslide area in order to observe the evolution of the mudslide over time. Subsurface profiles captured at the

Anton Abrahamsen seen here setting up the geophysical survey line along the mudslide.

shoulder seasons will be especially important because it will allow us to track subsurface moisture-driven processes, which are believed to be the cause of land subsidence. By the end of the project, we hope to design a permanent installation for the PRIME instrument at the mudslide site where the first profiles were acquired last September. The UK team has previous knowledge of such remote installations and will remotely guide the Greenlandic team on component specifications, in-situ positioning, scheduling methods and data processing.

Next steps:

We are in continuous contact with DTU, Sisimiut. Over the course of Steffen's PhD project, we will most certainly continue our collaboration.

Seasons of Change

Principal Investigator:
Dr Kathryn Adamson,
Manchester Metropolitan University

Email: k.adamson@mmu.ac.uk

UK and Greenland-based Co-Investigator/Team members:
Prof Kirsten Seestern Christoffersen, University of Copenhagen and Arctic Station

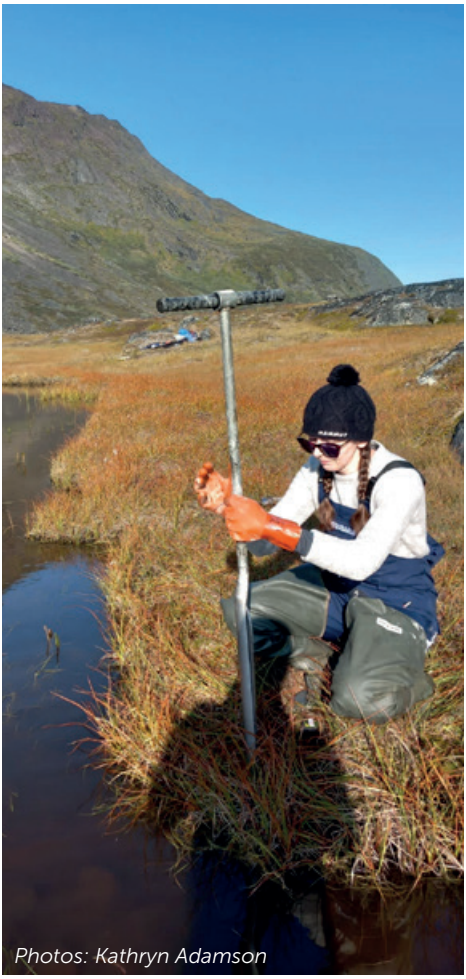
Dr Iestyn Barr, Manchester Metropolitan University

Prof Helen Mort, Manchester Metropolitan University

Research location:
Qeqertarsuaq, Disko Island, West Greenland

Project overview:

Seasons of Change is an interdisciplinary project uniting scientific research with community traditional knowledge to better understand Arctic environmental change. Due to the on-going climate crisis, the Arctic is experiencing major climatic and landscape transformations. Understanding the magnitude of these environmental shifts now and in the past, and the ways that they are experienced by local communities, is vital for managing future resilience. However, few approaches have meaningfully embedded traditional knowledge into (inter)national scientific analysis. 'Seasons of Change' addresses this by working closely with local residents in Qeqertarsuaq and researchers at Arctic Station, West Greenland, to examine recent changes in seasonality and their impacts on the local community and regional landscape. To achieve this, we combine lake-based sedimentary records of seasonal conditions with environmental monitoring records to generate a detailed archive of recent environmental change at the land surface. To support this, we document the ways that changing environmental conditions have been experienced locally by Qeqertarsuaq residents; thus adding valuable detail that simply cannot be captured in the scientific record alone.



Photos: Kathryn Adamson

Project highlights:

- We will develop a new record of glacier behaviour and landscape change at the margins of Lyngmarksbræen ice cap, close to Qeqertarsuaq, Disko Island.
- Community creative writing and science workshops in Qeqertarsuaq are at heart of our project, to celebrate and share ideas about the Arctic environment past, present, and future. These experiences will be used to collate multilingual Arctic community environmental experiences and priorities.
- We will use our combined physical and social science approach to devise a benchmark framework that can be used by other communities and researchers to develop meaningful interdisciplinary dialogues.

Next steps:

We hope to develop Seasons of Change into a larger project, in Greenland and elsewhere in the Arctic, incorporating a larger variety of stakeholders.

NERC Arctic Office

Henry Burgess
Email: Henry.Burgess@bas.ac.uk
Tel: 01223 221426

Nicola Munro
Email: nalm@bas.ac.uk
Tel: 01223 221468

Website: www.arctic.ac.uk
@ukarcticoffice.bsky.social