Navigating the New Arctic Community Office

2023

Regional Projects Report

Greenland

University of Colorado Boulder · ALASKA PACIFIC UNIVERSITY · UAF UNIVERSITY OF ALASKA FAIRBANKS · NSF

NASA Earth Observatory image by Joshua Stevens, using Landsat data from the U.S. Geological Survey and topographic data from NASA/METI/AIST/Japan Space Systems, and the U.S./Japan ASTER Science Team.

Message from NNA-CO

The Arctic is warming at a rapid rate, several times faster than the rest of the world. Co-production of knowledge between research partners and Indigenous Peoples of the Arctic is key to address complex societal challenges. Bordering both the Arctic and North Atlantic Oceans is Greenland, the world's largest island, which hosts the Greenland Ice Sheet and a population of ~57,000 people. The Greenland Ice Sheet has been steadily shrinking each year since the late 1990's, driving regional and global impacts for Greenlanders and communities around the world. The projects identified in this report represent a great step towards more collaborative research and impactful science.

This report provides a brief introduction to projects funded through the Navigating the New Arctic (NNA) initiative that have past or ongoing research activities in Greenland.

Navigating the New Arctic (NNA) is one of the U.S. National Science Foundation's (NSF) "10 Big Ideas" for advancing critical and cutting-edge research for society. NNA projects address challenges in the rapidly changing Arctic using convergence research. The NNA initiative aims to empower new research partnerships from local to international scales, diversify the next generation of Arctic researchers, enhance efforts in formal and informal education, and support co-production of knowledge with Indigenous Peoples.
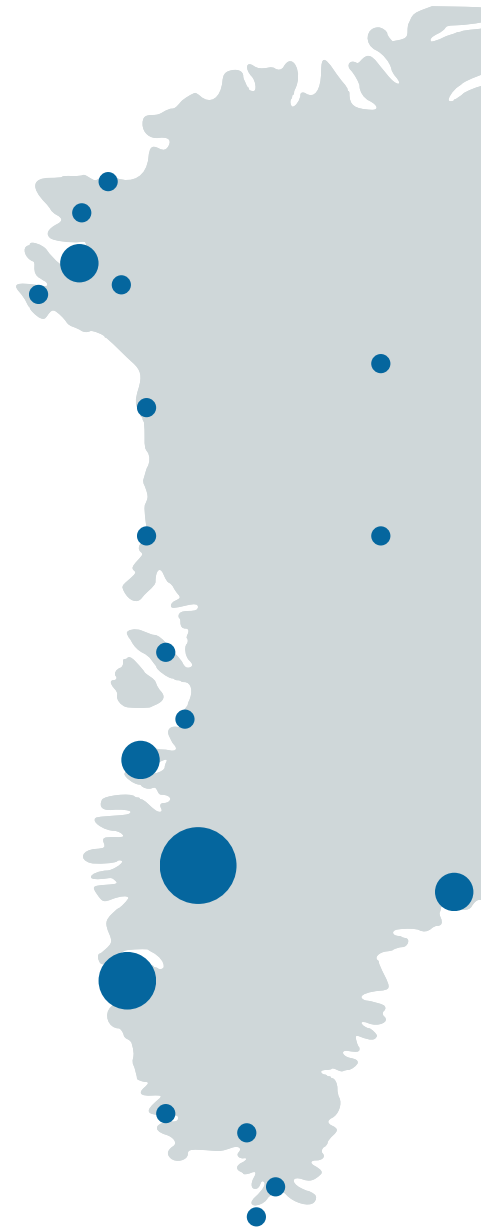
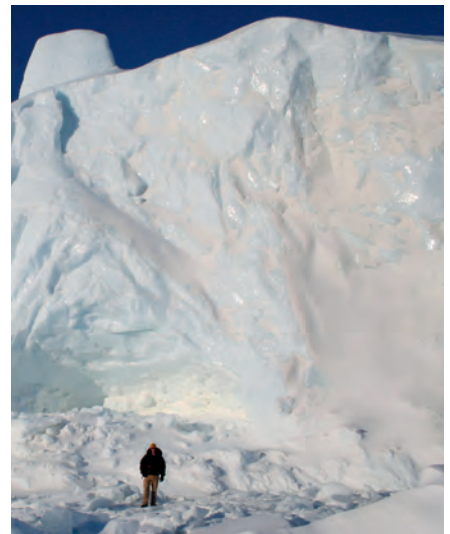*To learn more about NNA-CO and view all NNA projects visit https://nna-co.org/*
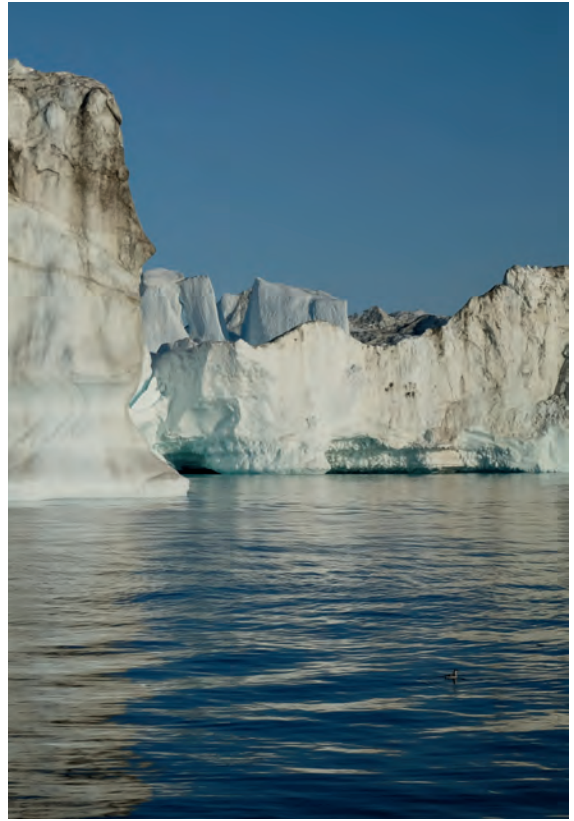

NNA-CO Regional Projects Report: Greenland

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Active Project

Completed Project

Scan or click this code for a more detailed map of project locations

Photos courtesy of the National Snow and Ice Data Center

Global Changes, Local Impacts: Study of Glacial Fjords, Ecosystems and Communities in Greenland

This project seeks to understand how global environmental and social changes affect – and are affected by – Greenland fjords, which are characterized by dynamic, interacting, physical, biogeochemical, ecological, and social systems.

The R/V Tarajoq in Johann Pedersen fjord. Photo by Alex Rivest.

Interdisciplinary observational campaigns and model analyses are focused on linking past, present and future drivers of change in two large fjord systems in Greenland, while assessing their commonalities and/or heterogeneity. Information will be disseminated to US and Greenlandic governments, communities, and regional stakeholders to develop adaptive strategies to sustain fjord systems in a changing Arctic.

HIGHLIGHTS

- **Improve understanding of the physical and biological processes that sustain ecosystems in glacial fjords**

- **Improve understanding of external drivers that impact glacial fjord systems, and the influence of fjord systems on Arctic environmental and social change**

- **Generate information that can help develop adaptive strategies and sustainable practices in a changing Arctic**

- **Train undergraduates, graduate students, and a postgraduate fellow**

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Location of Focus	Nuuk, Greenland Tasiilaq and Sermilik Fjord, SE Greenland Qanaaq and Kangerlussuaq Fjord (Inglefield Fjord), NW Greenland
Project PIs	Mark Carey, University of Oregon (carey@uoregon.edu) Helene Seroussi, Dartmouth College (helene.l.seroussi@dartmouth.edu) Lorenzo Ciannelli, Oregon State University (lorenzo.ciannelli@oregonstate.edu) Christopher Little, Atmos.and Env.Research, Inc. (clittle@aer.com) Patricia Matrai, Bigelow Lab for Ocean Sciences (pmatrai@bigelow.org) Fiammetta Straneo, UC San Diego (fstraneo@ucsd.edu)
Project Start Date	January 2022
Link to Project	https://nna-co.org/research/projects/global-changes-local-impacts-study-glacial-fjords-ecosystems-and-communities

Research Activities

Specific research activities include: i) research cruises to two fjords in Greenland to obtain physical, biological, and chemical oceanographic measurements; ii) deployment of ocean moorings to measure the variability of these systems; iii) collection of zooplankton, fish eggs and larvae for characterizing local assemblages, trophic interactions, and factors affecting the productivity of fish stocks in the region; iv) remote sensing and regional-scale modeling to assess physical and biogeochemical changes in the fjords; v) analysis of climate and ice sheet models to provide context for observations, and to assess past and future changes in fjord systems; vi) co-development of educational resources with local communities; and vii) collection and analysis of local societal histories through archival and on-site research with Greenlandic partners.

Collaborators

- Jamie Holte, **Scripps Institution of Oceanography**

- Donald Slater, **University of Edinburgh**

- Caroline Bouchard, Lorenz Meire and Karl Zinglersen, **Greenland Institute of Natural Resources (GINR)**

Below: Selected elements of the Sermilik fjord system, SE Greenland. Photo by Aurora Roth, UC San Diego. Right: The village of Tilerilaaq, inside Sermilik fjord. Photo by Alex Rivest.
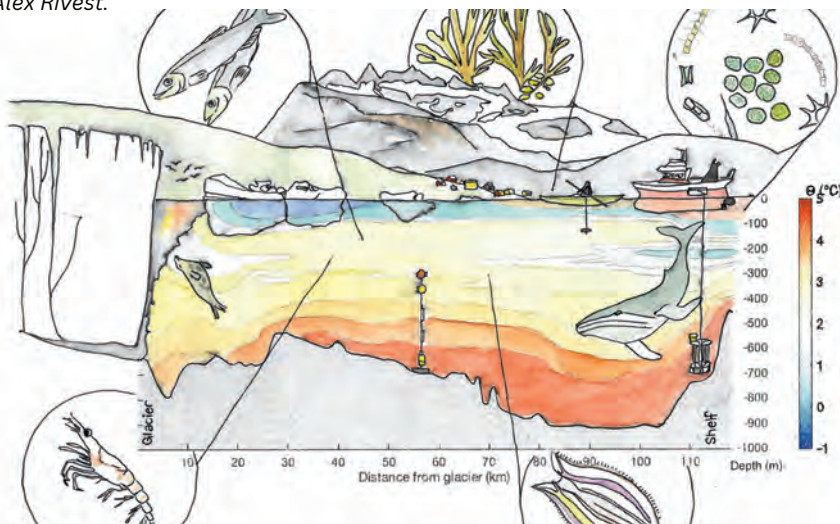
Innovations in Energy Technologies in Arctic Fishing Communities (Qulleq)

This project discovers sustainable technological innovations and identifies an achievable and affordable pathway to the future for small communities in Northern Greenland in a changing Arctic.

Qaanaaq, Greenland. Photo by Mary Albert

Initiated by an invitation from local fishers in Qaanaaq, Greenland, this project represents stakeholder-driven science with knowledge co-generation between community members and academics.

HIGHLIGHTS

- **Create stakeholder-driven science and knowledge co-generation between community members and academics**

- **Identify affordable pathways for technology implementation that embraces the cultural heritage and strengthens the local energy self-reliance of the people of Greenland**

- **Provide hands-on activities in Greenland schools to learn about renewable energy systems and build self-confidence for students to pursue technology-oriented careers**

Location of Focus	Qaanaaq, Greenland Siorapaluk, Greenland Qeqertat, Greenland
Project PI	Mary Albert, Dartmouth College (mary.r.albert@dartmouth.edu)
Project Start Date	April 2020
Link to Project	https://sites.dartmouth.edu/qulleq/

Research Activities

Research by faculty, graduate and undergraduate students in this project will produce mission-relevant insights and prototypes and will enable identification of robust and resilient adaptation strategies.

The project will identify, design, test and demonstrate innovative energy technology systems designed for polar conditions, and will identify pathways for implementation that embraces the cultural heritage and strengthens local energy self-reliance of the people of Greenland.

There will be field seasons based in Qaanaaq from 2022 to 2025. Short trips to neighboring settlements Siorapaluk and Qeqertat will be made in some years. In each year 6-8 team members will participate in two 2-week trips.

Collaborators

- Toku Oshima, **Qaanaaq - Greenland**

- Chris Polashenski, Weiyang Li, **Dartmouth College**

Below: Dogsledding near Qaanaaq. Right: Toku Oshima fishing for halibut. Photos by Chris Polashenski.

Predicting Coastal Responses to a Changing Greenland Ice Sheet

The goal of this project (The Greenland Rising Project) is to bring together a convergent team focusing for the first time on the natural, social, and built environment of Arctic communities proximal to a changing ice sheet using new mapping, state of the art models, and local understanding of the coastal environment.

Greenland Research Vessel "Sanna". Photo by Dave Porter, LDEO

The joint US-Greenlandic investigator team has identified four key local communities with different infrastructure that are likely to experience differential future coastal environments. Together these new predictions of sea level change and mapping of seafloor habitats can improve the capacity of local communities to respond to change.

HIGHLIGHTS

- **Uses state of the art technologies to map shallow water environment and habitats that will be most significantly impacted by changing sea level**

- **Develop better models of sea level change combining ice and ocean change with solid earth response**

- **Improve the capacity of Greenland communities to respond to changing ice in the Arctic and around the globe**

|	
Location of Focus	Aasiaat, Greenland Kullorsuaq, Greenland Nuuk, Greenland Tasiilaq, Greenland Kangerlussuaq, Greenland
Project PI	Kirsty Tinto, Columbia University (tinto@ldeo.columbia.edu)
Project Start Date	September 2019
Link to Project	https://pgg.ldeo.columbia.edu/projects/greenland-rising

Research Activities

The team will use state of the art technologies to map shallow water environment and habitats, develop data-informed models and projections of how sea level has responded to changing ice in the past, present and future. The team will partner with communities in both collecting the data to improve the sea level models and the baseline bathymetric mapping to identify hot spots for future change where new infrastructure, fisheries, and other marine use will be susceptible to change.

Field work will be conducted from 2021 - 2023 with researchers working in Nuuk, Aasiaat, Tasiilaq, and Kullorsuaq. In each year of the project, a field team of 3- 8 will be conducting vessel-based research in each community. There will be outreach and engagement with local residents in each community as part of the project as well.

Collaborators

- Jacqueline Austermann, Robin Bell, Casey Brayton, Jonathan Kingslake, Lauren Lewright, Andrew Lloyd, Frank O. Nitsche, Guy Paxman, David Porter, Margie Turrin, **Lamont-Doherty Earth Observatory (LDEO), Columbia Univerisity**

- Karl Brix Zinglersen, David Blockley, Uiloq Kleist, Diana Krawczyk, Aqqaluk Sorensen, **Greenland Institute of Natural Resources (GINR)**

Photos by Erin Towns (PolarTREC 2022), Courtesy of ARCUS
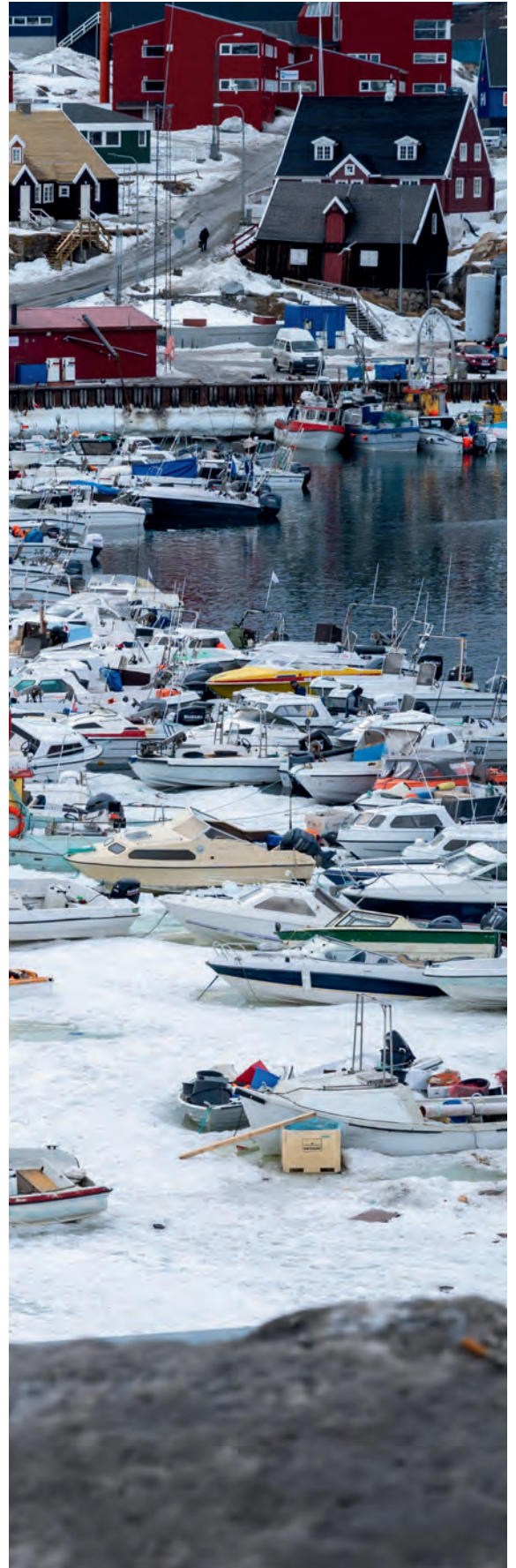
Closing the Water Vapor Exchange Budget Between the Ice Sheets and Free Atmosphere

This project utilizes Uncrewed Aerial Systems (UAS), commonly referred to as drones, for measuring near-surface temperature and humidity and collecting atmospheric water vapor samples to constrain vapor flux on the Greenland Ice Sheet. Captured samples also enable investigation of isotopic composition of water vapor in the polar environment.

A remote-controlled UAS with multiple air-capture chambers and environmental sensors collects data over the ice sheet. Over 105 vertical profiling flights were flown in summer of 2022, collecting water vapor samples, analyzed on site after the flights. The rich data set drives validation studies with models.

HIGHLIGHTS

- **Successful profiling of lower atmosphere with over 105 flights in summer of 2022**

- **Provided the first detailed and high-resolution airborne measurements of water vapor isotopes in the critical atmospheric boundary layer just above the Greenland Ice Sheet.**

- **The data can be used to improve satellite algorithms, general circulation models and meteorological understanding of the atmosphere in general.**

Location of Focus	EGRIP, Greenland Kangerlussuaq, Greenland
Project PI	Bruce Vaughn, University of Colorado Boulder (bruce.vaughn@colorado.edu)
Project Start Date	July 2018
Link to Project	https://nna-co.org/research/projects/closing-water-vapor-exchange-budget-between-ice-sheets-and-free-atmosphere

Research Activities

Through the use of drones, this project lays the groundwork for advancements in the understanding of water vapor exchange in the free troposphere, the planetary boundary layer, and the near-surface ice and snow of the Greenland Ice Sheet.

This project combines concurrent measurements of snow at the ice sheet surface and atmospheric water vapor measurements up to 500 meters in altitude. Researchers travel to EGRIP, Greenland between the months of May through August. They are trained in flying the drones and analyzing the isotopes of the samples in their onsite lab. Resulting profiles reveal differences between models (MAR, ERA5) and data obtained with the UAS. Additional samples and data are collected continuously from a small meteorological tower.

Collaborators

- Kevin Rozmiarek, Tyle Jones, Valerie Morris, Chloe Brashear, Hayley Bennett, Brad Markle, Sylvia Michel, Reid Clark, John Ortega, **Institute of Arctic and Alpine Research (INSTAAR), University of Colorado Boulder**
- Jack Elston, Josh Fomm, Danny Troke, Maciej Stachura, **BlackSwift Technologies**
- Hans-Christian Steen-Larsen, Laura Dietrich, Michael Town, **University of Bergen**
- Plotting code by Aslak Grinsted, MAR model runs by Xavier Fettweis, advising by Irina Overeem, support by EGRIP community at large

Photos by Ole Zeising, Alfred-Wegener Institute

Systems Approaches to Understanding and Navigating the New Arctic (SAUNNA)

The Systems Approaches to Understanding and Navigating the New Arctic (SAUNNA) National Research Traineeship (NRT) is a graduate student education program based at the University of Maine, USA. The program trains graduate students in the interdisciplinary field of Arctic system sciences.

Every year, SAUNNA participants spend several weeks in South Greenland. The program trains students to use multiple perspectives, types of knowledge, and scientific expertise to learn about and address the challenges of socio-environmental changes in the Arctic.

Photos by SAUNNA, https://umaine.edu/arcticnrt

HIGHLIGHTS

- **Train a new generation of leaders to advance understanding of Arctic changes and their local and global effects**

- **Conduct solutions-driven research focused on socio-environmental systems and their dynamics**

- **Inform future Arctic policy and effectively communicate results geared to different audiences**

Location of Focus	Greenland
Project PI	Jasmine Saros, University of Maine (jasmine.saros@maine.edu)
Project Start Date	September 2020
Link to Project	umaine.edu/arcticnrt

Research Activities

This project anticipates training 57 Master and PhD students, including 20 funded trainees from Ecology, Earth Sciences, Anthropology, Economics, and Marine Science.

The core training elements of this project include:

- An annual retreat
- a suite of new and existing coursework
- A collaborative interdisciplinary research project
- Arctic field experience
- An internship with a partner organization

The NSF Research Traineeship (NRT) Program is designed to encourage the development and implementation of bold, new potentially transformative models for STEM graduate education training. The program is dedicated to effective training of STEM graduate students in high priority interdisciplinary or convergent research areas through comprehensive traineeship models that are innovative, evidence-based, and aligned with changing workforce and research needs.

Photos by Jasmine Saros

Co-production of Shorefast Ice Knowledge in Uummannaq Bay

The goal of this project is to understand the impacts of environmental change and how they matter to individuals, communities, and institutions in the Arctic by co-producing salient, timely, and credible knowledge about shorefast ice in the Uummannaq region of West Greenland.

Photo by Sarah Cooley

The project will co-produce shorefast ice knowledge by leveraging large satellite remote sensing datasets, community-based monitoring and local and Indigenous knowledge.
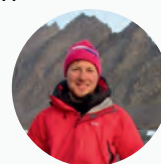
HIGHLIGHTS

- **First comprehensive multidisciplinary assessment of shorefast ice in Greenland**

- **Enhance the ability of residents and institutions to make informed and embedded choices concerning natural resource governance and management**

- **Improve institutional knowledge of environmental change in the Arctic and prediction of its associated impacts**

Location of Focus	Uummannaq, Greenland
Project PI	Jonathan Ryan, University of Oregon (jryan4@uoregon.edu)
Project Start Date	August 2018
Link to Project	https://nna-co.org/research/projects/co-production-shorefast-ice-knowledge-uummannaq-bay-greenland

Research Activities

Shorefast ice (also known as landfast ice) is sea-ice that is attached to the coastline. Since it does not drift with the winds and currents, shorefast ice forms an important habitat for wildlife and a platform for human subsistence food production and transport in the Arctic.

Observations from high-resolution optical satellite sensors will be supplemented with knowledge gathered from residents. A community-based monitoring program will be initiated using small multi-rotor UAVs to document key shorefast ice processes (e.g. formation and break-up) as they happen. The quantitative and qualitative shorefast ice knowledge generated by these two activities will be used to understand how the shorefast ice has changed and how these changes matter to communities in the Uummannaq region.

Collaborators

- Sarah Cooley, **University of Oregon**

- Brigt Dale, Siri Veland, **Nordland Research Institute**

- Parnuna Egede Dahl, Laurence Smith, Amanda Lynch, **Brown University**

Photos by Johnny Ryan

Facilitating Increased Engagement between the Research Communities of Greenland and the U.S.

As the need for research in Greenland intensifies along with the rate of Arctic change, the U.S. and Greenland research communities seek new and stronger bilateral collaborations that leverage resources and expertise held by researchers, stakeholders, and community members.

Photo by Lars Demant-Poort

At the "Facilitating Engagement" workshop leading Arctic researchers from the U.S. and Greenland will discuss and develop guidelines and frameworks for cooperative work, including knowledge co-production, community engagement, Indigenous perspectives, and student training and education.

HIGHLIGHTS

- **Creating an international and diverse network of Indigenous and non-Indigenous scientists**

- **Increase community engagement and student education**

- **Provide recommendations about Greenlandic research priorities and needs**

Location of Focus	Nuuk, Greenland
Project PI	Lauren Culler, Dartmouth College (lauren.e.culler@dartmouth.edu)
Project Start Date	July 2018
Link to Project	https://sites.google.com/dartmouth.edu/nuukworkshop/home

Research Activities

A two-day workshop was held 27-28 August 2018 at Pinngortitaleriffik (Greenland Institute of Natural Resources, GINR), in Nuuk, Greenland, where participants from the U.S. and Greenland research communities explored possibilities for strengthening U.S.-Greenland collaborations. Participants set priorities for future work and funding related to:

- Research & Co-Production of Research,
- Public Outreach,
- and Education & Student Training.

A workshop report, available in English and Kalaallisut on the project website, captured many thoughtful, creative, and enthusiastic recommendations for improving the way that U.S. and Greenland researchers collaborate on important Arctic projects.

Collaborators

- Ross Virginia, Co-PI, **Dartmouth College**

- Josephine Nymand, **Greenland Research Council and Greenland Institute of Natural Resources (GINR)**

- Sten Lund, **Government of Greenland**

Photos by Anne Schoeffler (PolarTREC 2022), Courtesy of ARCUS
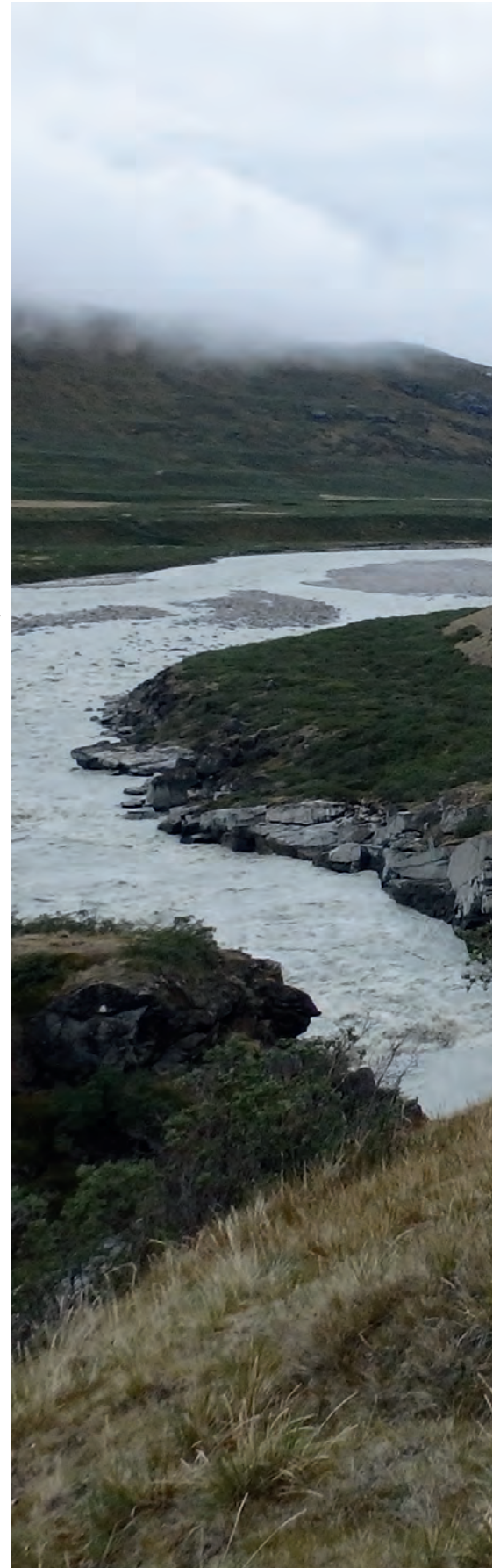
GRISO: Accelerating Discoveries at Greenland's Marine Margins via International Collaboration

The Accelerating Research through International Network-to-Network Collaborations (AccelNet) project facilitates rapid and effective collaboration-building and foster discovery about the Greenland ice sheet, the ocean, the marine ecosystems and their interactions.

The Greenland Ice Sheet Ocean Science Network (GRISONET) addresses current knowledge gaps and community-identified needs by establishing international and interdisciplinary collaborations to assess, plan for, and accelerate ice-ocean-ecosystem research.

HIGHLIGHTS

- **Create and support working groups to address next-step needs for research connecting ice, ocean, ecosystem, and people**

- **Train the next generation of Greenland-focused researchers for collaborative discovery**

- **Foster international connections and knowledge**

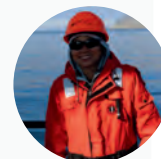| Location of Focus	Greenland
Project PIs	An Nguyen, University of Texas Austin (atnguyen@oden.utexas.edu) David Sutherland, University of Oregon (dsuth@uoregon.edu) Twila Moon, University of Colorado Boulder (twila.moon@colorado.edu) Fiammetta Straneo, UC San Diego (fstraneo@ucsd.edu)
Project Start Date	October 2020
Link to Project	https://griso.ucsd.edu/

Research Activities

The GRISONET supports the next phase of the Greenland Ice Sheet Ocean (GRISO) Science Network. The network of networks engages oceanographers, glaciologists, marine ecosystem and fisheries experts, climate scientists, and others to collaborate on scientific knowledge about connected systems at Greenland coastal margins. This will also improve projections of future Greenland changes and of their impacts on global societies.

GRISO objectives include improving representation of ice/ocean exchanges in models, supporting a collaborative network of international researchers who engage together to chart new science, encouraging community planning for a Greenland Integrated Ocean Observing System (GrIOOS), and preparing the next generation of Greenland and Arctic-focused researchers for more interdisciplinary systems science and leadership. Activities leverage resources from different networks within the US (e.g., US Arctic Observing Network, Interagency Arctic Research Policy Committee), international programs (e.g., International Ice Patrol, Ice Sheet Modeling Intercomparison Project, International Arctic Science Committee), and facilities from European, Canadian and Japanese partners. Through working groups, international workshops, yearly summer schools for early career scientists, and professional training, GRISO is helping to shape a future of interdisciplinary science collaboration.

Photos by GRISO Team https://griso.ucsd.edu/
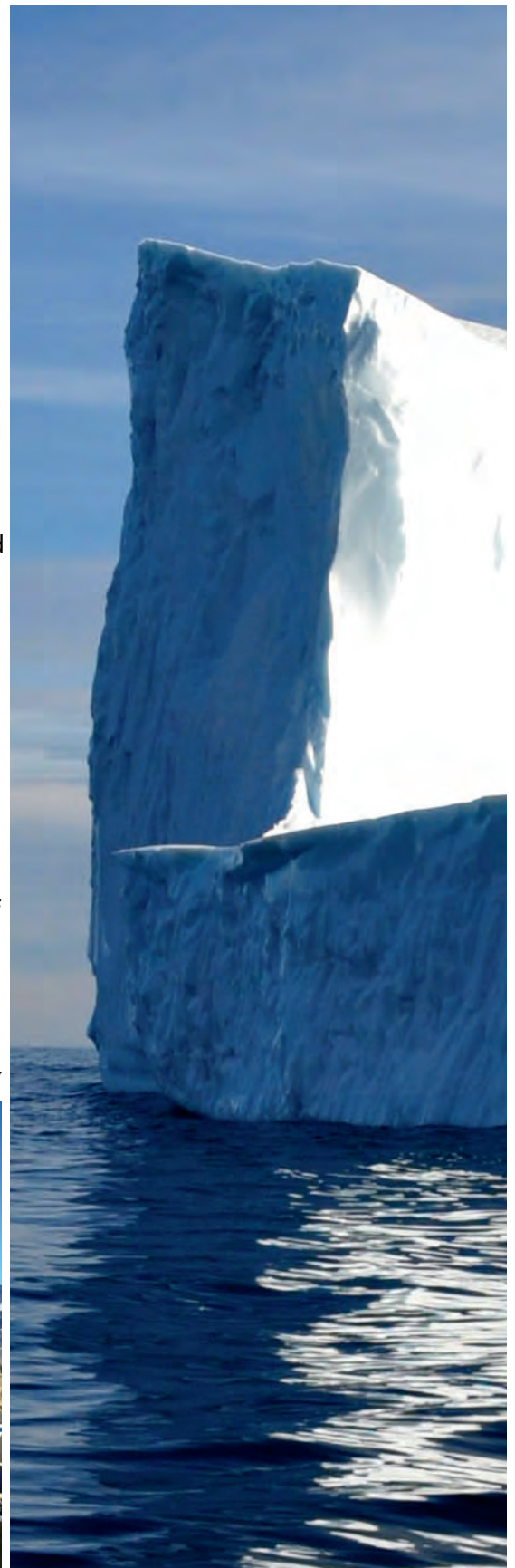
The Integrated Characterization of Energy, Clouds, Atmospheric State, and Precipitation at Summit, Aerosol-Cloud Experiment (ICECAPS-ACE)

ICECAPS-ACE will provide a better understanding of aerosol-cloud interactions over the Greenland Ice Sheet (GrIS).

This project provides insight into the role that advective aerosol sources play in cloud and precipitation processes. The continuation of the ICECAPS field campaign will create a valuable 10-year dataset that documents changes from year-to-year from this unique location in Greenland.

HIGHLIGHTS

- **Expanded instrument suite to include an Aerosol-Cloud Experiment (ACE)**

- **Provide a comprehensive suite of observational data as part of the Year of Polar Prediction (YOPP) that can be used for the assessment of numerical models**

- **Provide more accurate models of weather and climate over Greenland**

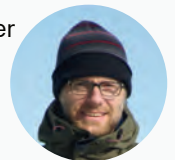|	
Location of Focus	Summit, Greenland Kangerlussuaq, Greenland
Project PIs	Ralf Bennartz, Vanderbilt University (bennartz@me.com) Matthew Shupe, University of Colorado Boulder (matthew.shupe@colorado.edu) Von Walden, Washington State University (v.walden@wsu.edu)
Project Start Date	August 2018
Link to Project	https://icecaps.ssec.wisc.edu/ https://psl.noaa.gov/arctic/observatories/summit/

Research Activities

ICECAPS-ACE provides a better understanding of aerosol-cloud interactions over the Greenland Ice Sheet. Summit Station is a unique location to study such interactions because there are no significant local sources of cloud-active aerosols. ICECAPS-ACE will provide a comprehensive suite of observations as part of the Year of Polar Prediction (YOPP) that can be used for the assessment of numerical models. It will also overlap with field activities of the Multidisciplinary drifting Observatory for the Study of Arctic Climate (MOSAiC) project, which offers an unprecedented focus by the operational modeling community on the Arctic system. The continuation of the ICECAPS field campaign will create a valuable 10-year dataset that documents changes from year-to-year from this unique location in Greenland.

Collaborators

- Dave Turner, Christopher Cox, Sara Morris, **National Oceanic and Atmospheric Association (NOAA)**

- Ryan Neely III, **University of Leeds**

- Michael Gallagher, **University of Colorado**

Photos by Mattthew Shupe

The Greenland Hazards Project

This project is carefully mapping how Greenland is changing in response to ice thinning and is exploring the developing risk of landslides and other hazards. Researchers are examining and modeling high energy events such as rockslides and avalanches to ascertain their potential tsunami threats to communities around the country.

Photo by Mike Willis

The research integrates local observations made by Greenlandic people in their communities with data collected through advanced remote sensing to learn how hazards evolve over time. The collaboration between US and Greenlandic scientists and Greenlandic residents will be critical to ensure that the research addresses community needs.

HIGHLIGHTS

- **First Greenland-wide analysis of unstable land and how hazards affect infrastructure and society**

- **Prototype a monitoring system that could provide warning of approaching large waves**

- **Create understandable and easily accessible information that can inform decision-making and policy**

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Location of Focus	Kangerlussuaq, Greenland Nuuk, Greenland
Project PI	Michael Willis, Virginia Tech (mikewillis@vt.edu)
Project Start Date	January 2022
Link to Project	https://cires.colorado.edu/esoc/content/greenland-hazards-project

Research Activities

The project team hypothesizes that the known distribution of recorded landslides is controlled by rock type, slope and aspect and then by proximity to retreating glaciers, changing permafrost, temperatures and precipitation. Satellite radar, optical imagery and topographic differencing are being used to investigate geophysical changes and how they alter hazards on regional scales. On local scales, drone surveys are examining permafrost changes and rock instabilities on seasonal to sub-daily timescales. Machine learning and modeling are being applied at all scales to identify patterns of change.

In addition, a qualitative study is advancing our understanding of the communication processes through which scientific and Greenlandic communities give meaning to environmental changes and hazards through diverse ways of knowing and multiple forms of expertise. The project data are useful to a wide range of disciplines, with work relevant to solid earth geophysics, glaciology, oceanography, natural hazards, and the field of communication.

Collaborators

- Kristy Tiampo, **University of Colorado Boulder**

Photos by National Snow and Ice Data Center
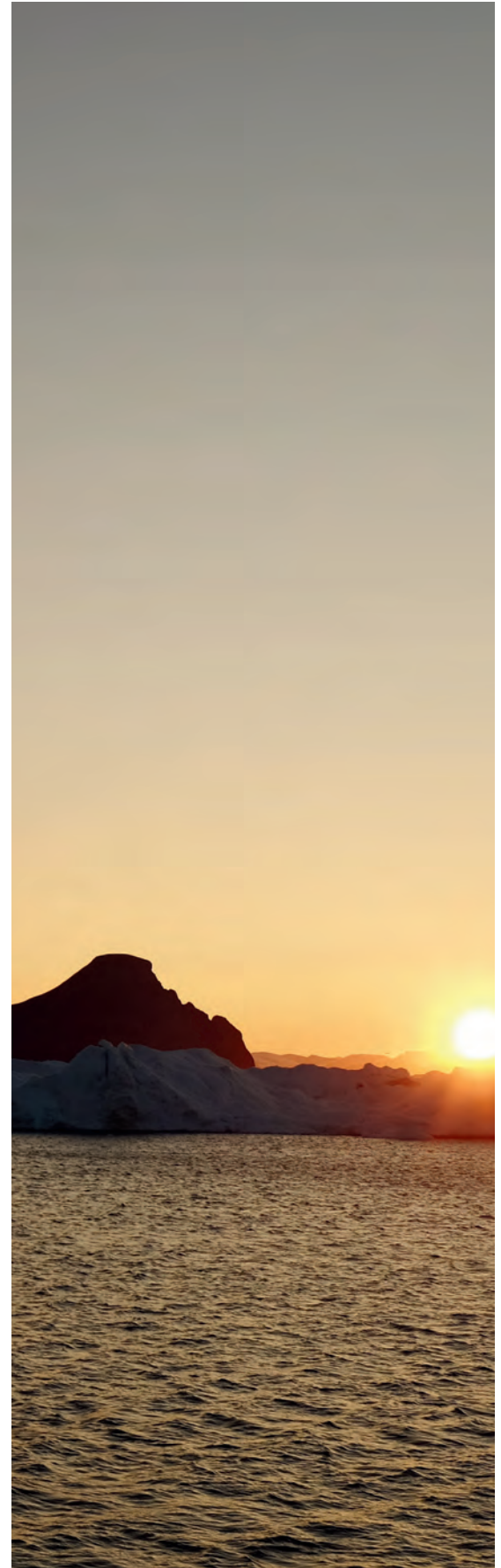
Sustainable Transitions through Arctic Redevelopment (STAR)

This project lays the groundwork for understanding the futures for diverse industrial sites across the Arctic, focusing on cooperation with local communities to understand and vision sustainable development goals for the Arctic.

Photos by Thomas Hale

Post-industrial redevelopment themes to be investigated include:

- co-existence of geo/eco-tourism around mineral extraction sites;
- new mineral extraction prospects in old tailings residues;
- diversifying regional economy and minimizing land use impacts; and
- ecological restoration for Indigenous livelihood generation.

HIGHLIGHTS

- **Understand the relationship between Arctic residents in post-mining communities and their natural/cultural landscapes**

- **Expand the definition of resilient infrastructure to include sustainable post-primary use and redevelopment**

- **Strengthen partnerships among the three participating US institutions and international partners in the EU and Greenland**

Location of Focus	Aappaluttoq, Greenland Ivittuut, Greenland
Project PIs	Saleem Ali, University of Delaware (saleem@udel.edu) Thomas Hale, University of Delaware (thale@udel.edu) Bindu Panikkar, University of Vermont (panikkar.bindu@gmail.com) Roman Sidortsov, MIT (rsidorstov@mtu.edu)
Project Start Date	October 2022
Link to Project	https://nna-co.org/research/projects/sustainable-transitions-through-arctic-redevelopment-star

Research Activities

The goal of this collaborative project is to advance our understanding of how sustainable transitions in Arctic communities and markets influence community building and development, democratic policy making, local sovereignty and environmental resilience.

Researchers will conduct participatory mapping, visioning workshops, and structured interviews to develop scenarios for economic redevelopment around the former Ivittuut cryolite mine and future mineral prospects in Southern Greenland.

Through partnership with Hurtigruten science expeditions, there will be an opportunity to travel along the Greenland western coast and gain an understanding of how redevelopment will be perceived by tourists to the region.

Collaborators

- Ana Dyreson, Timothy Scarlett, **Michigan Technological University (MIT)**

- Julie Klinger, Kalim Shah, **University of Delaware**

Photos by Thomas Hale

Developing Community Frameworks for Improving Food Security in Greenland through Fermented Foods

This research promotes Inuit-led, self-sustaining, and collaborative research in Greenland to promote Inuit fermented foods and food safety. Successful completion of these efforts will lead to an understanding of how to conduct Inuit-led, collaborative and ethical research for improved scientific understanding of food security in Arctic communities from an Indigenous perspective.

Fresh ammassaat for sale, Qaqortoq May 2022. Photo by Stephanie Maroney

The goal of this project is to gain an understanding of how to best work with Indigenous knowledge of Southern Greenland fermenters.

These efforts will identify if and how research can be relevant for communities by addressing what communities find important, including food security concerns.

HIGHLIGHTS

- **Support the resurgence of Inuit fermented foods by generating positive, factual outreach based on the values and knowledge of Indigenous fermenters**

- **Develop a foundation of trust between scientists and communities to address food insecurity in Inuit communities**

- **Allow for scientists to get an understanding of the context of Indigenous fermented foods in South Greenland before conducting science**

Location of Focus	Southern Greenland
Project PIs	Maria Marco, UC Davis (mmarco@ucdavis.edu) Jessica Bissett Perea, University of Washington (jbperea@ucdavis.edu)
Project Start Date	December 2021
Link to Project	https://radicalfermentation.ucdavis.edu/

Research Activities

This project engages stakeholders to bring together perspectives from Inuit fermenters and other Greenlandic food authorities, and integrates different forms of knowledge to identify critical research needs in Greenland and the Arctic more broadly. Successful completion of this project will benefit society by developing scientists' understanding of the context of Inuit fermented foods to be able to conduct equitable, collaborative and ethical research.

This research centers on Inuit social networks and practices that sustain knowledge and interest in fermented foods as a means to secure safe inclusion of these culturally significant foods in local food systems.

Collaborators

- Aviaja Lyberth Hauptmann, Co-Investigator, **Ilisimatusarfik University**

- Stephanie Maroney, Co-Investigator, **University of California - Davis**

Top right: Preparing hooded seal blubber for iginneq, Nanortalik. Bottom right: Dried hooded seal meat, Nunarsuaq. Below: Approaching Narsarmijit. Photos by Stephanie Maroney, May 2022.

Resources

The following resources may provide additional relevant information about other ongoing research initiatives and activities in Greenland.

Greenland Research Council

The research council funds research activities and advises the Minister of Science, the Government of Greenland, and international stakeholders on matters relating to research in Greenland.

https://nis.gl/en/

Greenland National Research Strategy

Greenland's National Research Strategy lays out the vision and overarching research goals of Naalakkersuisut for the period 2022-2030. This is the first national strategy for research in Greenland.

https://nis.gl/wp-content/uploads/2023/01/english-book.pdf

Greenland Science Week

Greenland Science Week is a multi-disciplinary Arctic science platform for networking, cooperation & public outreach.

https://www.scienceweek.gl/

ArcticHub

ArcticHub works to build bridges between people, institutions, and countries interested and involved in the research conducted in Greenland.

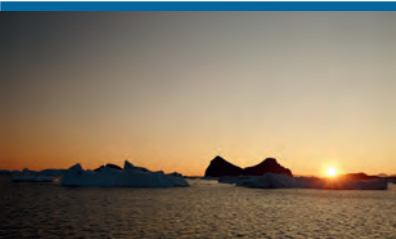*https://arctichub.gl/*

Isaaffik

Isaaffik Arctic Gateway is a user driven web platform supporting research and collaboration. Anyone engaged with Arctic research, education, infrastructure, and logistics may join Isaaffik.

https://isaaffik.org/

Connecting Arctic Priorities (CAP) Portal

The CAP Portal is a searchable collection of reports and documents written by Tribes, Arctic communities, and Indigenous organizations.

https://www.nna-co.org/cap-portal

Photos by National Snow and Ice Data Center (NSIDC)

NNA CO

Russell Glacier, Kangerlussuaq, Greenland