iC3 // Centre for ice, Cryosphere, Carbon and Climate

Annual report 2025

iC3 Report Series, Volume 02 (2026)

Norwegian Centre of Excellence
UiT The Arctic University of Norway
Norwegian Polar Institute
NORCE

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Photo: Sebastein Moreau

Words from the Directors

As we enter our third year as a Research Council of Norway Centre of Excellence, iC3 stands at a pivotal moment in its development. We have grown into a dynamic and collaborative hub for polar cryospheric research, with a clear mandate to pursue ambitious, high-impact science.

Our early career researchers remain central to our strategic vision. Their expertise, curiosity, and drive energize our Centre and cultivate a spirit of innovation. Through fieldwork, laboratory research, modelling, and active science communication, they continue to play a vital role in shaping iC3's future. A key milestone this year was the Annual iC3 Field School, *Ice to Ocean Biogeochemical Cycling in a Changing Arctic*, which was successfully delivered for the second time and formally approved as a UiT course - an important investment in sustainable Arctic training for the next generation.

Scientific progress across iC3 has advanced with purpose and direction. Integrated observations and modelling are now generating new perspectives on ice-sheet processes, carbon cycling, and polar ecosystems. Strengthening collaborative links across research units has been a strategic priority, and we are seeing the benefits: emerging initiatives spanning the full ice-to-ocean continuum, bi-polar missions and interdisciplinary projects demonstrate the Centre's capacity to deliver knowledge that is both cutting-edge and societally relevant.

Innovation and research infrastructure are critical enablers of our mission. The PolarMAGIC lab, now fully operational, provides iC3 with dedicated microbiology and biogeochemistry capabilities, reinforcing our internal laboratory strengths. The upcoming PlasmaLab will expand our analytical reach, particularly in trace elemental and isotopic measurements. Together with in situ sensor development, research infrastructure and field technologies, these strategic investments position iC3 to lead in polar scientific observations, experiments, and modelling.

Looking ahead, our priorities are to consolidate the foundations established in our early years, deepen collaboration across the Centre, and strengthen our role as an international leader in polar ice–carbon–climate research. With a dedicated team, an expanding research capacity, and strong partnerships, we feel well-positioned to accelerate our scientific impact and contribute meaningfully to the global understanding of how a rapidly changing polar cryosphere is affecting life on Earth.

We extend our sincere gratitude to the entire iC3 community, our partners, and host institution for their steadfast support and constant enthusiasm. Together, we look forward to another year of collaboration, innovation, and scientific excellence.

iC3 Director
Jemma Wadham

Assistant Director
Monica Winsborrow

Contents

Unless otherwise stated this report was written by Jemma Wadham, Monica Winsborrow, Terri Souster, Neelu Singh and Freya Sykes.

Cover Photo: Joost van Genuchten

Design: Graphical Services at UiT The Arctic University of Norway

About iC3

Photo: Sebastian Moreau

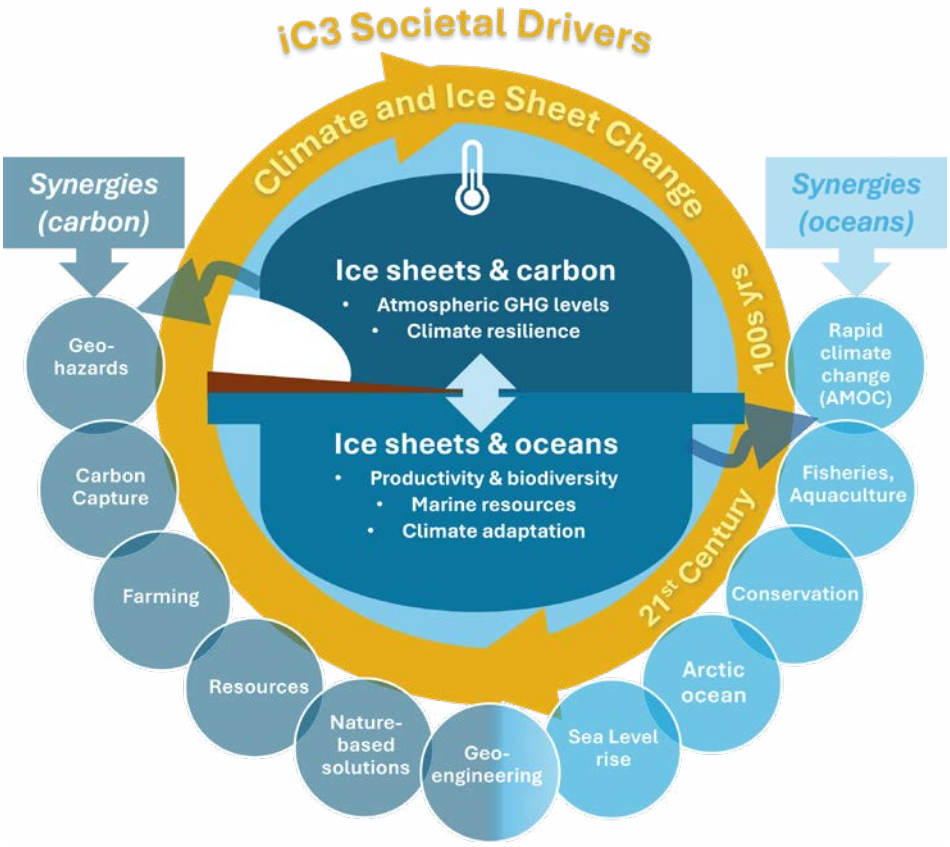
iC3 Vision and objectives

Vision

iC3 produces ground-breaking insights into how links between ice sheets, carbon cycles and ocean ecosystems impact life on Earth.

Societal drivers

To highlight the societal relevance of our vision, iC3 has developed a Societal Drivers concept plan. This identifies links between core scientific topics within the Centre and societally relevant issues, along with emerging topics (outer circles) with potential societal impact.



Photos: Freya Sykes


RU5
RU1
RU3
RU4
Gas reserves
Oil reserves
Coal reserves

Illlustration: Frida Cnossen

Centre organisation

iC3 is a partnership between UiT The Arctic University of Norway (UiT), the Norwegian Polar Institute (NPI) and NORCE. It is hosted by the Department of Geosciences at UiT, where both directors hold positions.

iC3 studies the full spectrum of ice sheet-carbon-climate feedbacks, over an ice-to-ocean domain, in the Arctic and Antarctic. Our activity is organised around five interdisciplinary Research Units (RU1-5) and two cross-cutting Impact Themes (iT1-2):

RU1: How much carbon exists beneath ice sheets and how vulnerable is it to release?
RU2: How are methane, nutrient and organic carbon exported from ice sheets?
RU3: How do ice sheet changes impact marine carbon cycles and ecosystems?
RU4: How did past changes in ice sheets affect the global carbon cycle and marine eco-systems?
RU5: What is the sensitivity of Earth's carbon cycle to shrinking ice sheets?

iT1: Innovation and Technology
iT2: Training the next generation

Who we are

iC3 currently hosts 57 members, of whom 27 are early career researchers (ECRs: PhD and post-doctoral fellows). Across the Centre 43% of the team are women, whilst among the ECRs this rises to 48%.

iC3 Leadership

Jemma Wadham
Director

Monica Winsborrow
Assistant Director/IT2 Lead

Terri Souster
Project Manager

iC3 Support Staff

Freya Sykes
iC3 Project Coordinator

Neelu Singh
Directors Support

Til Bruckner
Communications Advisor (50%)

Fabio Sarti
Data Manager

Rory Burford
Polar Magic Lab Engineer

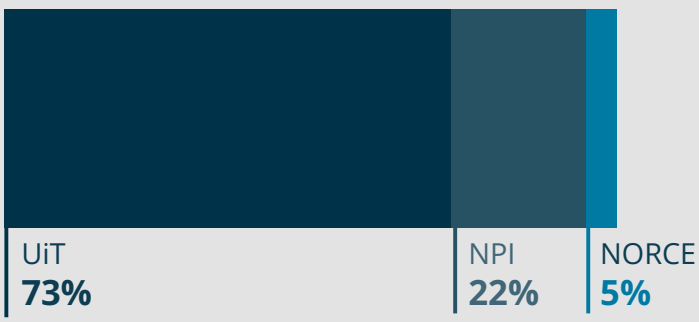
Mariana Esteves
i2B Project manager

Charlie Compton-Jones
Plasma Lab Engineer

iC3 Centre funding

iC3 received 155m NOK from the Research Council of Norway through its Centres of Excellence scheme. This is matched by significant in-kind support from the partners (>180m NOK), which includes in-kind PhD students, a full-time technician to manage iC3´s new Polar MAGIC laboratory and field infrastructure support. Distribution of Research Council of Norway funds amount the iC3 Partnership is shown below.

Funding plan



iC3 Scientific Staff


Sandra Arndt


Philipp Assmy


Stefan Bünz


Pedro Duarte


Mohamed Ezat


Tore Hattermann


Jon Hawkings


Alun Hubbard


Elisabeth Isaksson


Jana Jágerská


Dimitri Kalenitchenko


Jochen Knies


Jack Kohler


Guillaume Lamarche-Gagnon


Petra Langebroek


Fanny Monteiro


Sebastien Moreau


Henry Patton


Michele Petrini


Andreia Plaza Faverola


Anders Schomacker


Jemma Wadham


Monica Winsborrow

iC3 Postdoctoral Researchers


Polina Beskrovnaya


Ben Boyes


Fanny Cusset


Peter Giertzuch


Onur Karakus


Gabrielle Kleber


Aurelia Labarre


Griselda A. Ortiz


Laura Rassmusen


Philip Pika


Ragnar Seton


Akash Trivedi


Jan Viljanen


Adele Westgård


Roman Zakoldev

iC3 PhD Candidates


Emeric Babut de Mares


Lisa Marie Delpech


Lucie Goraguer


Frank Jakobsen


Megan Lens


Leonard Magerl


Silje Waaler Pedersen


Ricarda Runte


Luke Simmons


Colin Sinclair


Freya Sykes


Joost Van Genuchten

iC3 international

iC3 has a wide network of national and international collaborators (see figure), and we are continuously working to deepen and expand these connections. Stimulating and enabling international collaboration is a key ambition of iC3 and the launch of our Global Scholars Programme in 2026 will further support this.

MSCA postdoctoral researchers

iC3 has successfully used the European Marie Skłodowska-Curie Actions (MSCA) funding scheme to attract top talent to Tromsø. In 2025, three MSCA postdoctoral researchers successfully secured funding, joining three funded in 2024.

Benjamin Boyes
Will uncover the glacial history of Siberia and assess its impact on past sea-level change and carbon cycling.

Inda Brinkmann
Will develop a novel geochemical proxy using benthic foraminifera, to reconstruct past glacial melt in Arctic environments.

Eva Doting
Will study proglacial lake impacts on the export of organic carbon and nutrients to downstream ecosystems.

To attract strong candidates, iC3 continued to actively promote fellowship opportunities on its website and social media channels. Candidates were supported through a dedicated funding support programme that helps early career researchers to develop winning MSCA proposals. Nine iC3-hosted researchers applied in 2025 and are currently waiting for a funding decision.

iC3 activities

Photo: Tim Kalvelage

Highlights of 2025

7 iC3 science board meetings

Photo: Peter-Lasse Giertzuch

The Research Council of Norway visited iC3 in May

Photo: The Research Council of Norway

iC3 hosted award-winning journalist Tim Kalvelage for 2 months

(ERC Frontiers Residency-funded)

Photo: Tim Kalvelage

January

Funding of the PlasmaLab

Led by RU4 Assistant Lead Mohamed Ezat, and hiring of lab engineer Charlie Compton-Jones

Photo: Charlie Compton-Jones

iC3 science day was hosted for the first time, and included a visit from the SAC

Photo: Emeric Babut du Marès

iC3's Director Jemma Wadham joined Lars Monsen to discuss all things glaciers for Norwegian national TV

Photo: Till Brückner

First iC3 affiliated PhD, Adele Westgård

Successfully defended, supervised by RU4 Assistant Lead Mohamed Ezat

Photo: Peter-Lasse Giertzuch

8 Science seminars, 7 Career development seminars, 3 workshops on iC3 Science Themes

Photo: Emeric Babut du Marès

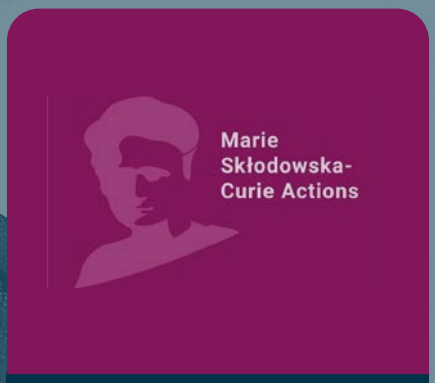
Second iC3 Field School

On “Ice to Ocean biogeochemical cycling in a changing Arctic” run with 4 MSc and 4 PhD students

Photo: Megan Lenss

December

iC3 Data management plan published on Septentrio



3 iC3-hosted Marie Skłodowska-Curie Actions (MSCA)

Postdoctoral fellowships funded and 9 candidates submitted

iC3 held 4 social events across the year

Photo: Terri Souster

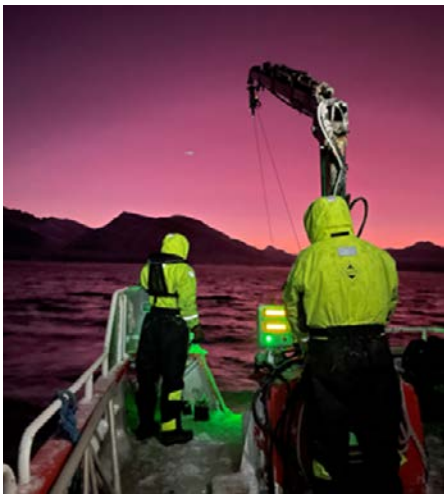
Major iC3 science missions

Svalbard

Svalbard continues to represent a key focus for iC3 science missions across its ice-to-ocean domain.

Throughout 2025, iC3 and affiliated projects have carried out multiple marine and terrestrial field campaigns, offering our team opportunities to collect novel datasets to help us address how changing glaciers are impacting carbon cycling and marine ecosystems. Here we select three Svalbard science mission highlights from iC3 participation in the International Kongsfjorden Year, the iC3-affiliated project GlaciGas, and the PhD-led field campaign BeNTHEC.

Photo: Ceslav Czyz & Allison Bailey



International Kongsfjorden Year

In 2024–2025, iC3 scientists and students participated in a collaborative, year-round research campaign on Svalbard known as the International Kongsfjorden Year (IKY). The campaign was initiated under the international Kongsfjorden System Flagship, a network of researchers studying the marine ecosystem of Kongsfjorden, which includes several iC3 scientists.

The IKY campaign was motivated by the need to better understand how the extreme seasonality of the Arctic light cycle influences marine ecosystem functioning and its sensitivity to climate change and pollutant drivers. To address this, Flagship participants developed new projects and coordinated field activities to expand monitoring and experimental efforts across an entire annual cycle. By working collaboratively, researchers achieved coverage across all seasons and multiple trophic levels.

Ny-Ålesund Research Station, situated on the shores of Kongsfjorden, provided a unique platform for this effort. Year-round vessel access, laboratory infrastructure, winter flight connections, and a long-standing international research community enable continuous, place-based ecosystem studies rarely possible elsewhere in the Arctic.

The largest IKY contribution came from the German YESSS project, which maintained rotating research teams in Ny-Ålesund for a full year. The project conducted weekly sampling at a mid-fjord pelagic station (Kb3) and at an intertidal site, examining seasonal sensitivities of polar cod, sea urchins, kelp, and phytoplankton to warming. Complementary initiatives—including the Norwegian Polar Institute's seasonal transects, UiT's OpKROP transects, and India's CTD surveys—expanded the spatial scope of observations. Additional insights were provided by seven Arctic Field Grant projects, including four led by iC3 students and researchers (Ricarda Runte, Lucie Goraguer, Marianna Pinzone, and Fanny Cusset), as well as by the SIOS-funded ExFOBB mooring array, which included a profiling mooring capturing previously under-observed surface dynamics.

Together, IKY generated the highest-resolution, year-round dataset ever collected in Kongsfjorden. The next phase of the initiative will focus on data synthesis and the production of both Flagship-led and project-specific publications, with the goal of identifying critical monitoring periods and advancing understanding of seasonal ecosystem functioning in a rapidly changing Arctic.

Written by Allison Bailey (NPI), Philipp Assmy

Photo: Gabrielle Kleber

GlasiGas

Dr. Gabrielle Kleber (iC3 postdoctoral researcher) has led GlaciGas field campaigns to study terrestrial and marine methane emissions from Svalbard glacier catchments.

During spring, Dr. Kleber and her team conducted ground-penetrating radar on several glaciers to reveal linkages between the thermal structure of glaciers and the amount of methane transported by their melt rivers. Their findings, which are currently in review at Nature Communications, show that the geology and the extent of temperate ice control the amount of methane flushed by subglacial melt rivers. In addition, Dr. Kleber led campaigns during spring and summer to investigate subsea methane seeps in front of a tidewater glacier on Svalbard. Building on her team's research at the site last year, which found year-round methane supersaturation in the fjord waters, they used multibeam and single-beam mapping to identify subsea seep sites. They found several seeps with active bubbling in areas where the glacier had retreated within the last decade and used an ROV to collect bubble samples. Using chamber measurements and an eddy covariance tower that they've erected at the site, the team can quantify methane emissions from this glacier-fjord system.

Written by Gabrielle Kleber

Photo: Aurélie Labarre

South Spitsbergen

In July 2025 a field campaign was carried out in Billefjorden and south Spitsbergen as part of the POLARIN Transnational Access project BeNTHEC. The goal of the sampling was to investigate the transport of glacial sediments and accompanying changes in nutrient composition from the ice edge to the ocean. We sampled glacier forefields of land terminating glaciers experiencing different levels of retreat: Werenskioldbreen, Naanbreen, Bratteggbreen and Svenbreen, as well as the surface fjord waters around glacial inputs, such as Austre Torellbreen and Hansbreen.

Written by Ricarda Runte

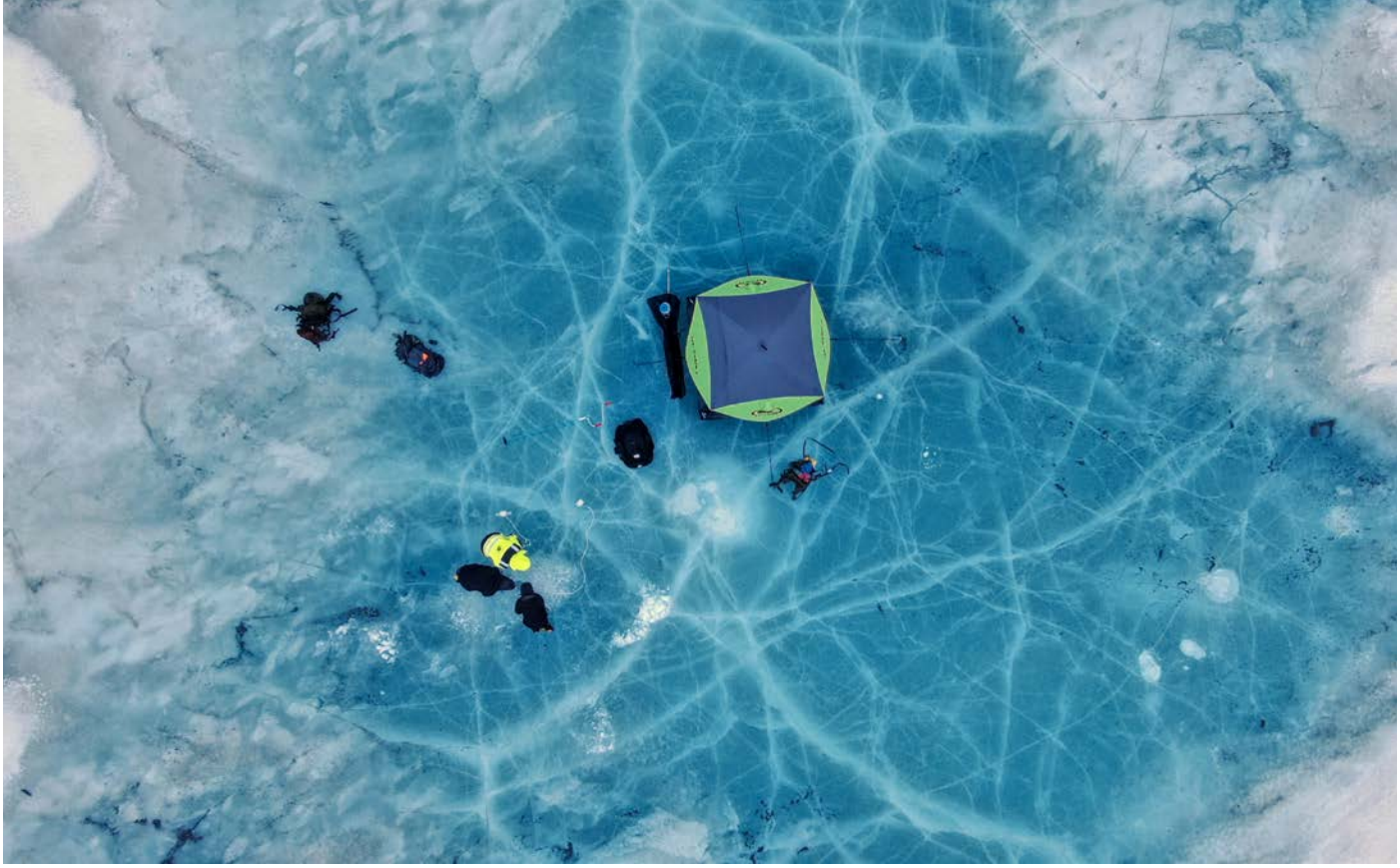


Photo: Joost van Genuchten

Greenland

iC3 led multiple terrestrial campaigns in southwest and east Greenland with collaborators from across the globe. Sampling in proglacial terrain across the winter to summer seasons gives iC3 a unique insight into the ice and carbon dynamics in these marginal regions.

Methane emissions from glacier influenced lakes – Southwest Greenland

Deglaciation is driving the expansion of proglacial terrains and the formation of an increasing number of proglacial lakes worldwide, particularly in Greenland. These newly deglaciated environments are now recognized as potential sources of methane, a potent greenhouse gas. However, due to limited data, these sources remain underrepresented in global methane budgets. Research indicates that some of these systems may emit higher-than-expected levels of methane, potentially influenced by glacier-related factors such as meltwater connectivity and interactions with the subglacial environment.

In April 2025, a team of five researchers, led by Guillaume Lamarche-Gagnon (RU2 lead), conducted an expedition to the ice-marginal terrain of Southwest Greenland (Kangerlussuaq). As part of the iC3 team, we were joined by Marie Bulínová (UiT), Arthur Fouillé (Charles University Prague), and Laura Brosius (University of Alaska Fairbanks), whose expertise further enriched the research efforts.

The campaign resulted in an extensive array of samples, which will be used to unravel methane dynamics across 12 proglacial lake systems. By studying lakes disconnected from the ice sheet, alongside those hydrologically linked to meltwater streams, the researchers aim to gain valuable insights into methane emissions across these diverse lake types and evolving terrain.

Written by Joost van Genuchten

Photo: Joost van Genuchten

PROMETHEUS – Southeast Greenland

The PROMETHEUS project (EU POLARIN Grant), coordinated by Joost van Genuchten (PhD candidate at iC3), investigates the role of glacial processes in driving methane emissions within proglacial environments. Building on earlier field campaigns in Southwest Greenland, the project has expanded to include two additional proglacial regions in East Greenland, thereby providing broader spatial coverage of the processes under investigation.

In August 2025, a dedicated team of iC3 researchers conducted a field campaign at the proglacial terrain of the Mittivakkat Glacier. This expedition represents the first of a two-part effort focused on East Greenlandic proglacial lakes, carried out in collaboration with Gabrielle Kleber (postdoctoral research fellow at iC3) and Guillaume Lamarche-Gagnon (RU2 lead). During this campaign, six proglacial lakes were surveyed and sampled using a combination of sediment coring, water sampling, and gas collection techniques.

The research aims to improve understanding of how proglacial landscapes develop as glaciers continue to retreat, a process that is particularly pronounced in peripheral ice caps. By integrating geomorphological and biogeochemical observations, the team seeks to identify patterns of proglacial evolution, methane production, and the influence of lake dynamics on downstream environments.

Written by Joost van Genuchten

iC3 at the poles

iC3 has been active at both poles across 2025. Firstly, several researchers participated in the annual Southern Ocean transect of the Antarctic resupply vessel from South Africa to Dronning Maud Land, led by NPI , to study marine ecosystems and biogeochemical cycling. Secondly, the North Pole cruise of the iC3-affiliated project i2B successfully made it to 90°N as part of their campaign to retrieve sediment records to provide evidence of cryosphere-carbon feedbacks during periods of past ice sheet change.

Photos: Sebastian Moreau

Transekt tokt 2025

In January 2025, the Transekttokt 2025 (TT2025) cruise focussed on servicing the Troll Observing Network Multidisciplinary Ocean Moored Observatory (TONe-MOMO) and continuing the time series of monitoring stations. This included conductivity-temperature-depth (CTD) profiles and water sampling stations across the sea ice zone of the Kong Haakon VII Sea in the Southern Ocean, a region where NPI researchers have been conducting observations since January 2021.

The three TONe-MOMO moorings continuously measure ocean dynamics and were recovered and redeployed successfully, involving various sensors placed throughout the water column. As the moorings are located in a region of frequent iceberg passages, the upper 200 m of the mooring structure are mounted with an innovative weak-link technology, such that sensors can be placed close to the icebergs-infested surface waters following a high-risk, high-gain strategy. A first two-year-long time series of upper ocean (60 m) CTD and Chlorophyll-a time series was successfully recovered in this region, and altimeters for sea ice thickness were also deployed, to our knowledge for the first time so far south in the Southern Ocean Sea ice zone. These moorings also collect biological and biogeochemical samples using two deep-sea sediment traps that collect sinking material at 500 m depth. Very few data exist from the crucial sea ice zone of the Southern Ocean, yet initial results indicate significant deep carbon export.

From the fixed CTD stations, researchers also collected a range of biological (e.g. phytoplankton, particulate organic carbon and biogenic silica) and biogeochemical (e.g., inorganic carbon and nutrient) samples throughout the water column along the receding sea ice edge following a north-south gradient. During the cruise, a pronounced and well-defined sea ice edge bloom was observed, along with striking numbers of baleen whales (including several observed blue whales) feeding actively on krill swarms just north of the sea ice pack.

Additional activities during the expedition included conducting micro-structure profiles to assess heat, meltwater and nutrients turbulent fluxes throughout the water column. The results from these observations are currently being analysed as part of a PhD project in collaboration with the University of Tasmania, Australia (UTAS). Daily marine mammal and seabird observations were also carried out from the ship's bridge, as well as an opportunistic sea ice station. This activity continues the recently established long-term monitoring of sea ice physical, biogeochemical and biological dynamics in the Kong Haakon VII Sea.

Written by Sebastian Moreau, Tore Hattermann

Photo: Peter-Lasse Giertzuch

Photo: Tim Kalvelage

i2B North Pole cruise

The i2B Arctic Ocean Expedition 2025 set sail from Longyearbyen on 16 August 2025 to retrieve climate archives from past warm climates in the Arctic. The main goal of this expedition was to retrieve sediment records from interglacials with little or no glacial ice on Greenland and Eurasia, to provide evidence of cryosphere-carbon feedbacks during ice sheet change. We used a giant piston corer with a barrel up to 25 m during the expedition to recover cores longer than 10 m, and even up to 22 m, from the Fram Strait, the Yermak Plateau, the Eurasian continental margin and the Lomonosov Ridge. With the exception of the ACEX drilling expedition in 2004, such recovery has not been achieved by any coring campaign in the Arctic. We also visited the northeast Greenland Shelf and Morris Jesup Rise in the hope of recovering possibly Pliocene sediments, the warmest climate state in the Arctic Ocean during the past 5 million years.

We also recovered data from the contemporary Arctic Ocean on water chemistry, sediment pore water geochemistry relating to carbon and nutrient remineralization, planktic and benthic communities and sea ice communities using a CTD, multi-net and plankton nets, and multicorer equipment. Specifically, samples were collected for micropalaeontology, environmental and sedimentary DNA, and organic and inorganic geochemistry. In total, we collected >8000 samples for analyses, recovered >340 m of sediments, and collected acoustic data for reconstructing past ice sheet dynamics and mapping natural leakage of methane over more than 5700 km.

Written by Jochen Knies

Numerical modelling

Modelling work continues to build on and complement observational studies to expand our understanding of dynamic ice-carbon-ocean interactions. Cross-disciplinary collaboration between modellers and field scientists at the centre facilitates ground-breaking research across the different iC3 themes.

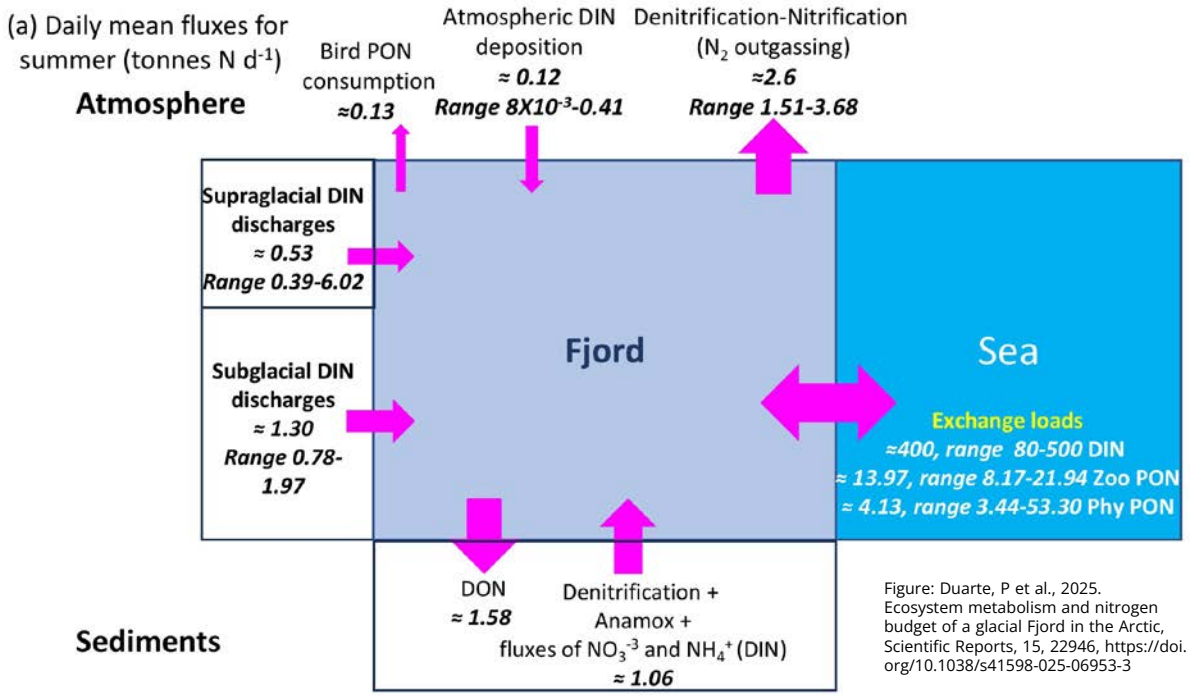
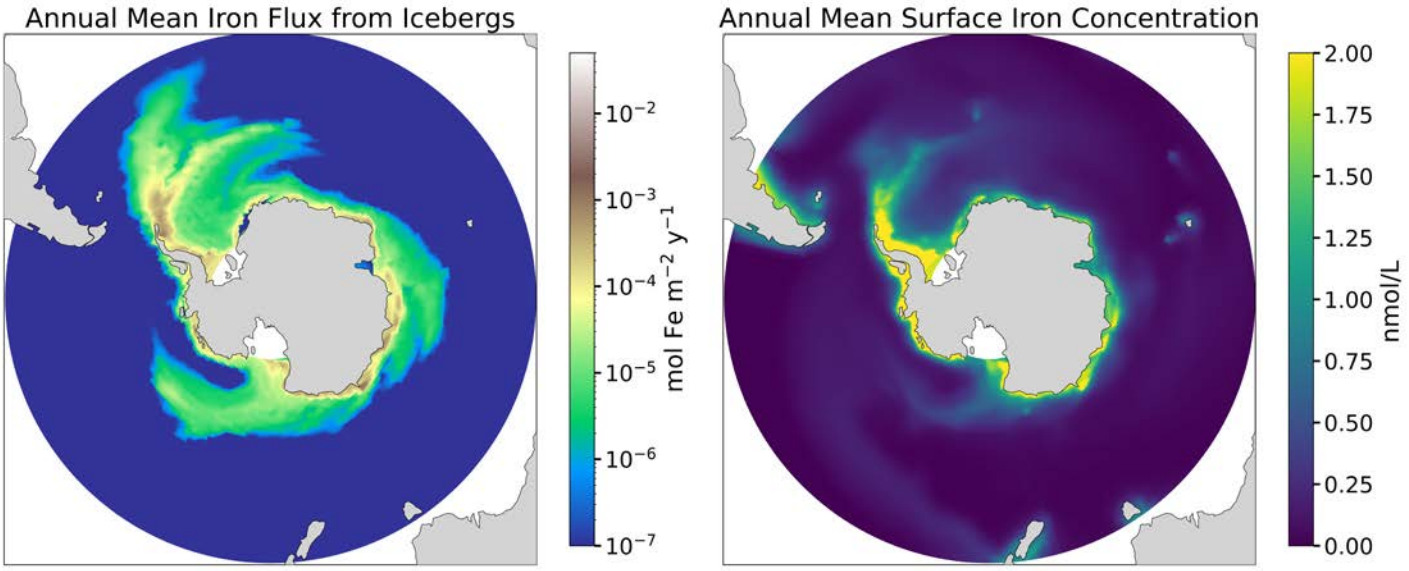


Figure: Duarte, P et al., 2025. Ecosystem metabolism and nitrogen budget of a glacial Fjord in the Arctic, Scientific Reports, 15, 22946, https://doi.org/10.1038/s41598-025-06953-3

Ecosystem metabolism and nitrogen budget of a glacial Fjord in the Arctic

Arctic fjords are undergoing rapid changes as a result of climate warming. These changes affect ecosystem functioning and key ecosystem services, including the removal of atmospheric carbon dioxide. In this study, published in Scientific Reports, we applied a novel approach that combines monitoring data with modelling to estimate net ecosystem metabolism (NEM), an indicator of ecosystem functioning that quantifies the balance of carbon and nitrogen removal through biogeochemical processes. This approach provides a relatively low-cost framework for monitoring fjord ecosystems and for assessing the impacts of warming and glacier retreat on ecosystem functioning and associated biological–climate feedbacks, particularly through the uptake and release of carbon dioxide. Applying this method to Kongsfjorden, Svalbard, we show that the fjord currently acts as a net sink of carbon and nitrogen.

Written by Pedro Duarte



Figures: Onur Karakus

Modelling the biogeochemical impact of nutrient inputs from icebergs and meltwater discharge in the Southern Ocean using NEMO–PISCES

To study the impact of iceberg-derived iron input on the Southern Ocean ecosystem and carbon cycle, this iC3 project employs the global ocean biogeochemical model NEMO–PISCES. This numerical model simulates physical, biological, and chemical processes in the ocean, including ocean circulation, lower trophic-level ecosystems, and nutrient and carbon cycling.

The Southern Ocean is one of the largest high-nutrient and low-chlorophyll regions of the global ocean. A key reason for this is strong iron limitation: although macronutrients are abundant, phytoplankton growth is constrained by the low availability of iron, an essential micronutrient. This makes it crucial to investigate external iron sources to the Southern Ocean, such as atmospheric dust, sediment inputs, meltwater discharge, and icebergs.

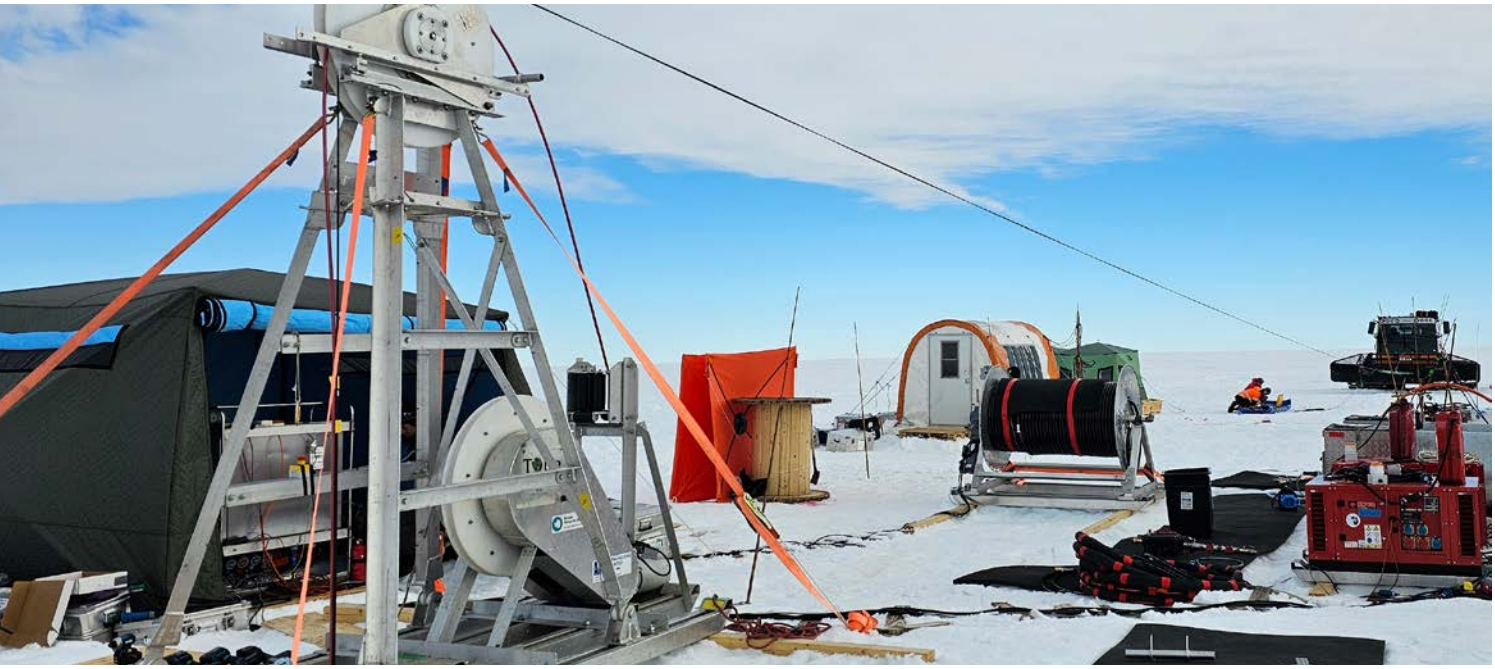
Over the past decade, the potential impact of iron inputs on net primary production and the biological carbon pump has been widely studied. However, their effects on plankton ecosystem structure and on different plankton functional types remain poorly resolved. In this project, we aim to deepen our understanding of how additional iron inputs from icebergs and meltwater discharge affect Southern Ocean diatoms, and subsequently their grazers and the biological carbon pump.

This work benefits from collaborations with colleagues from the University of Liverpool, Sorbonne University, and UiT, and builds on technical and theoretical expertise developed in recent years in Southern Ocean biogeochemical modelling.

Written by Onur Karakus

Innovation and technology (iT1)

Photo: Tore Hattermann



Innovation and Technology Development in Polar Cryospheric Sciences

In 2025, iT-1 worked toward translating earlier technology assessments into a coherent analytical foundation to support future development of an innovation and technology roadmap for iC3.

Rather than finalizing a roadmap, the focus was on preparing a synthesis that can underpin strategic discussions with iC3 leadership. This work integrates feedback from across the community, including results from a technology questionnaire, and identifies shared priorities for cryospheric research infrastructure. Key themes include the need for interoperable and resilient observing systems, expanded use of autonomous platforms, and improved data integration across disciplines and environments.

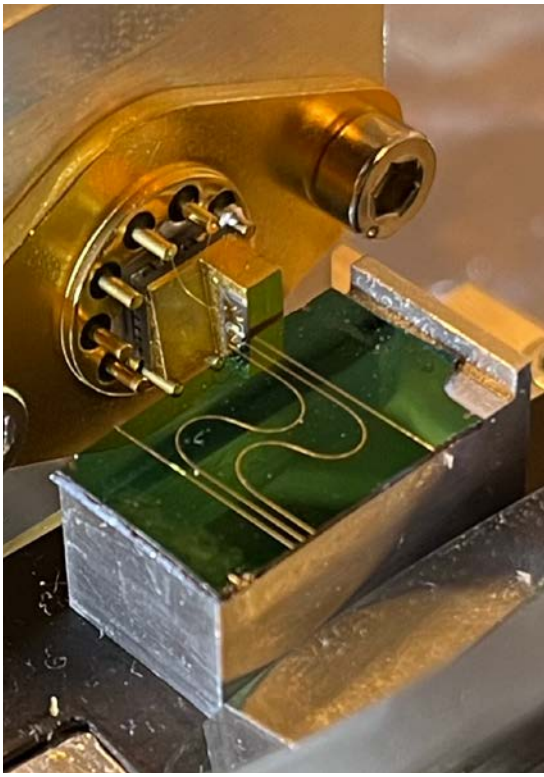
These strategic priorities are exemplified by major advances in Antarctic observing systems led by NPI. During the 2024/25 Antarctic field season, the Troll Observing Network Fimbulisen Ice Shelf Observatory (FONe-FIO) was completed and delivered its first year of high-resolution under-ice temperature, velocity, and melt-rate data. Central ice-shelf moorings were prepared for fully autonomous operation over the coming years, and additional radar installations expanded observations of grounding-zone and subglacial processes. Looking ahead, a pilot access call has been announced within the TONe infrastructure for the 2026/27 season, introducing a new long-range, instrumented drone capability operating from Troll Research Station. Unlike conventional drones, these platforms can carry substantial scientific payloads over large distances, enabling novel surveys of ice-shelf morphology, grounding zones, and subglacial pathways, and opening new possibilities for Antarctic field science.

Written by Stefan Bünz, Tore Hattermann

From silicon chips to trace-gas sensor prototypes

In recent years, the photonic sensing group at UiT has advanced a new class of on-chip optical sensors capable of detecting and analysing trace gases through laser absorption spectroscopy, with unprecedented sensitivity and specificity.

Photos: Jana Jágerská



By guiding mid-infrared light through in-house developed and fabricated, application specific integrated waveguides, these miniature devices enable light–matter interactions that capture the unique spectroscopic fingerprints of individual gas molecules. From these signatures, we can accurately determine gas species and quantify their concentrations down to the low parts-per-billion (ppb) range, performance levels that until recently required bulky laboratory instrumentation.

Key achievements on a 1 × 1 cm chip include:

- Detection of CO_2 with limits down to 20 ppb
- Detection of CH_4 down to 200 ppb
- Measurement of $\delta^{13}C$ isotope ratios in CO_2 with a precision of 0.2‰

The waveguide design awarded individual group members the premier national photonics prize (Tycho Jæger's prize) and the subsequent sensing breakthroughs led to the award of both ERC Proof-of-Concept and RCN Proof-of-Concept grants, accelerating our path toward prototype development and commercial deployment. The photonic sensing group's infrastructure has been extended with microsystems technology focused integration lab, geared towards further development and fast iterations of integrated sensors. This extends the groups capabilities to now integrate all components of future sensing platforms rather than relying on off-the-shelf parts.

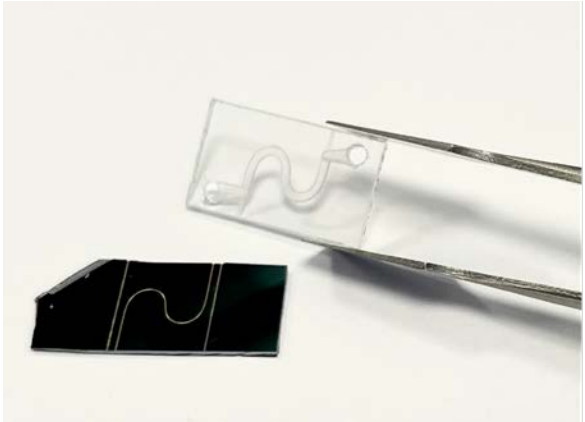
Several technological milestones were reached in 2025:

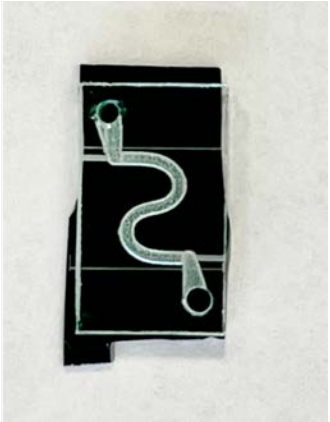
- Direct laser–chip coupling: We successfully demonstrated that a mid-IR diode laser such as an ICL or QCL can be coupled directly into our sensor chips, without any intermediate optics, while maintaining the same signal-to-noise ratio (Figure 1). This achievement removes a major barrier to full miniaturization and significantly simplifies future device integration.
- Ultralow-volume microfluidic cell: A custom glass microfluidic chamber, fully compatible with the chip sensor, has been fabricated (Figure 2). With a volume of only a few microlitres, it represents the smallest sample cell reported to date for laser-absorption spectrometry. This advancement opens entirely new possibilities for environmental monitoring and biotechnological applications, including real-time studies of microbial and cellular metabolism planned together with Alex T. Tveit within iC3 in 2026.

Together, these developments move our platform from fundamental nanophotonics toward deployable sensing technologies, strengthening iC3's contribution to high-impact innovation in climate and environmental science.

Written by Jana Jágerská, Ragnar Seton

Others involved in the research: Marek Vlk, Martin Feiler, Roman Zakoldaev, Jan Viljanen

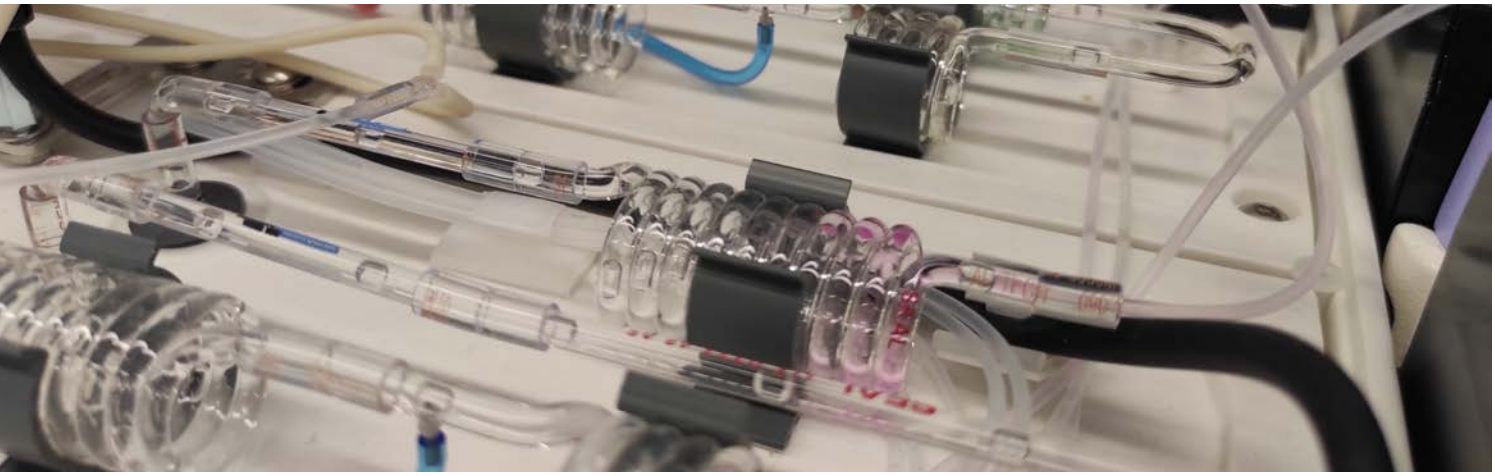




Laboratory infrastructure

The laboratory infrastructure at iC3 has continued to expand through 2025. PolarMAGIC is now fully operational, and iC3 researchers were successful in obtaining funding for the geochemical research facility PlasmaLab.

Photo: Rory Burford



PolarMAGIC

2025 was a year of method development for the Polar Laboratory for Microbes and Geochemistry in Icy Climes (Polar MAGIC). Whereas 2024 was characterised by setting up and testing several fundamental analytical methods, the bulk of our work this year was more experimental in nature.

On the chemical side, iC3 doctoral candidates Leo Magerl and Colin Sinclair established protocols for extracting ammonium ions from glacial sediment; Colin then went on to test a similar method for the extraction of phosphate. Fellow iC3 PhD student Joost van Genuchten conducted our first measurements of dissolved organic carbon and total nitrogen in porewater from Greenland? Lake? sediment cores. Meanwhile, we have continued to measure nutrients in environmental water samples for internal research projects, the iC3 Field School and external collaborators.

In terms of microbiology, the main development has been the first DNA extractions using Polar MAGIC facilities. Aurélie Labarre (iC3 MSCA fellow), Kara Sampsell (iC3 visiting doctoral researcher) and Polina Beskrovnaya (iC3 postdoctoral researcher) have extracted genetic material from a range of environmental samples, which were sent for sequencing externally. Polina has also laid the groundwork for culturing rare cryophilic cells under anaerobic conditions, which will hopefully start in early 2026.

Otherwise, the lab has been a base for a wide variety of fieldwork, providing researchers with facilities for cleaning and packing boxes for expeditions in Scandinavia, Svalbard and Greenland. Training researchers and analysing the 2025 samples will comprise a large part of the lab's work next year, alongside expanding our procedures for analytical and microbiological methods.

Written by Rory Burford

Photo: Freya Sykes

PlasmaLab for Ice, Ocean, and (Palaeo) climate

The PlasmaLab for Ice, Ocean, and (Palaeo)climate is a recently-funded geochemical research facility at the UiT Department of Geosciences, linked to iC3 and the ERC-funded Into the Blue (i2B) project..

The PlasmaLab will be a hub for high-resolution isotope and trace element analysis for a broad array of research areas (including palaeoclimatology, oceanography, glaciology, mineralogy, archaeology, and potentially clinical medicine), powered by a suite of state-of-the-art mass spectrometers. Within the core research themes of iC3, the PlasmaLab will advance our understanding of the pathways of nutrients, toxins and carbon from ice to ocean, and help assess their interactions with climate and ecosystems.

The facility is currently in its design phase and is planned to be commissioned by 2027, followed by instrument installation and testing. The PlasmaLab is expected to open its doors to a user community in 2028.

Written by Charlie Compton-Jones, Matteus Lindgren, Mohamed M. Ezat

Training the next generation (iT2)

ECR researchers continue to be a fundamental part of the dynamic and vibrant research community at iC3. We have continued our commitment to providing a supportive and engaging environment for these researchers throughout 2025, to provide them with the best start to their scientific career.

Empowering Early Career Researchers (ECRs): A Pillar of iC3's Success

ECRs make up approximately 50% of the iC3 team, underscoring their critical role in shaping our success and legacy.

ECRs are actively engaged in the scientific and strategic work of iC3 through representation on our Science Board, participation in workshops, seminars, and meetings, and regular dialogue sessions with iC3 leadership.

Our commitment to fostering a supportive and stimulating environment has been pivotal in both supporting ongoing research by ECRs and enabling competitive research proposals. The latter has been achieved through a combination of group activities, such as seminars, and personalised support via proposal forums and review panels.

Our dedicated MSCA Fellowship Support Programme continues to attract exceptional talent to iC3. In 2025, three MSCA fellowships were awarded, and a further nine applications are currently under review. Beyond scientific support, we place equal emphasis on career and personal development, facilitated through our seminar series and a one-on-one mentoring scheme tailored for postdoctoral researchers and other researchers. We are also proud to support ECR-led initiatives, including training sessions on data visualisation and presentation workshops to prepare for conference participation.

A highlight of the year was the successful second edition of the iC3 Field School, "Ice-to-Ocean Biogeochemical Cycling in a Changing Arctic." This programme brought together PhD and MSc students from UiT and our international collaborators, fostering interdisciplinary learning and collaboration.

By investing in the growth and integration of ECRs, we ensure that iC3 remains a dynamic, inclusive, and forward-thinking research community.

Written by Monica Winsborrow

Photo: Terri Souster

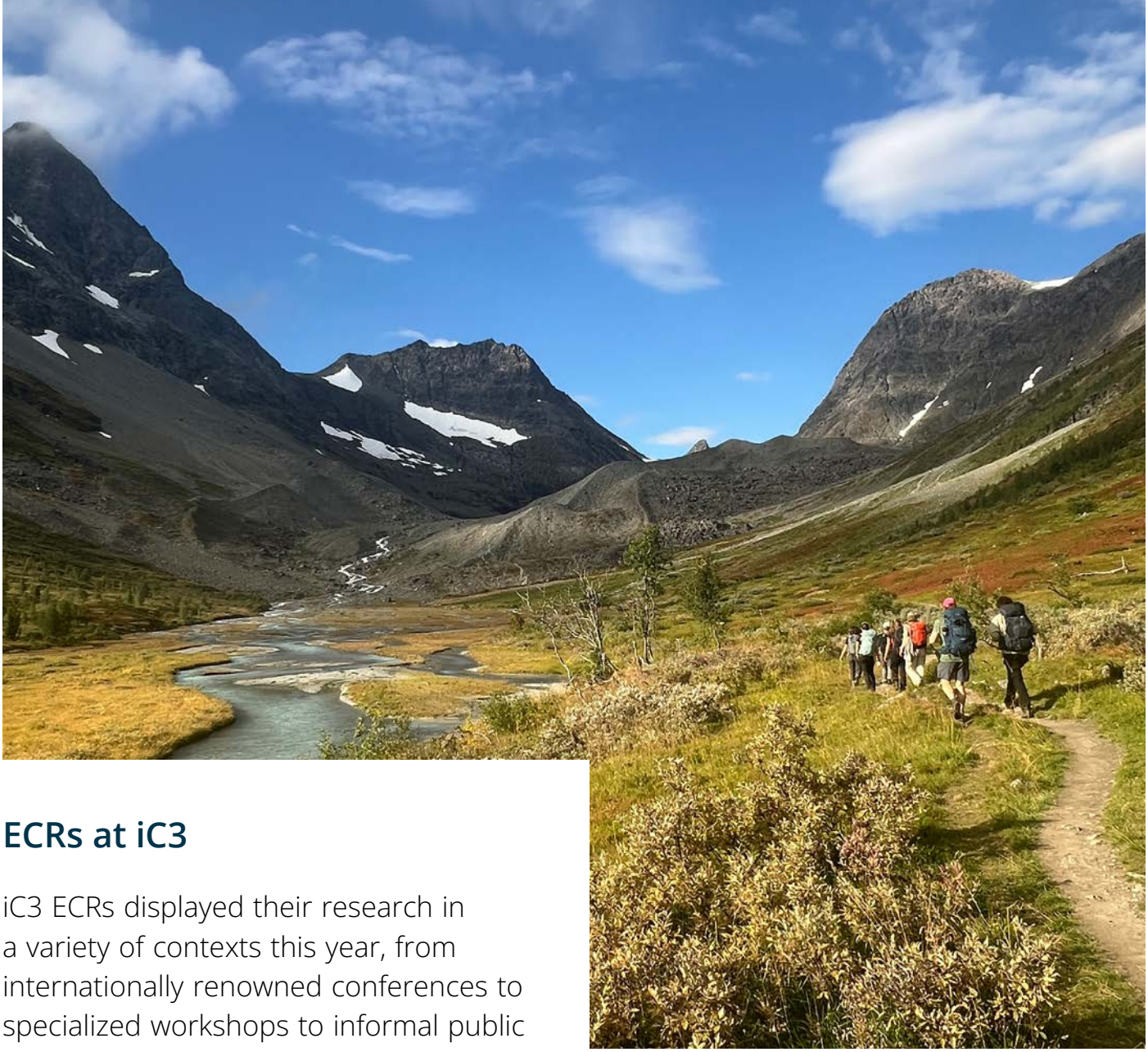


Photo: Megan Lenss

ECRs at iC3

iC3 ECRs displayed their research in a variety of contexts this year, from internationally renowned conferences to specialized workshops to informal public outreach events.

In total they presented at 11 scientific conferences across five different countries. Additionally, February's GReAT PhD Day held at UiT's Department of Geosciences and May's iC3 Science Day gave iC3 ECRs the opportunity to present a poster or give a talk to their colleagues and peers, as well as obtain feedback on their research. ECRs also participated in iC3 workshops on topics including data visualisation, ice sheets and carbon, and ecosystems.

Special mentions:
– Adele Westgård became the first iC3-affiliated PhD to successfully defend her thesis and thereafter joined the i2B project as a postdoctoral researcher.

– Gabby Kleber won the award for best poster at the Svalbard Science Conference in Oslo.– At the aforementioned GReAT PhD Day, iC3 PhDs Leo Magerl and Emeric Marie Babut du Marès won the prize for best presentation and best poster, respectively.

– ECRs continued to serve on the iC3 Science Board and had the opportunity to share their experiences with the Scientific Advisory Committee when they visited Tromsø in May.

Written by Colin Sinclair

iC3 Field School 2025

Eight students from UiT, University Grenoble Alpes, and Sorbonne University set off to the Lyngen Alps in September for the second annual iC3 Field School.

The four MSc and four PhD students learned techniques in biological and biogeochemical sampling in both glacial and marine environments. Data from the field school were written up to 6000-word reports by the students and showed a late summer phytoplankton bloom mostly unimpacted by glacial discharge. This data helps uncover the impact of glacial discharge on fjord productivity and allows iC3 to contribute to local understanding of glacial processes and change. This was the second year of sunny weather and peak autumn colors in the Lyngen Alps for our field school, and we cross our fingers for another round of sunshine and engaged students in 2026!

Written by Megan Lenss

SAC visit and science day

Photo: Emeric Babut du Marès

On 27 May, iC3 members gathered at the Tromsø Sailing Club to celebrate iC3 Science Day in the presence of three members of the Scientific Advisory Committee (SAC): Julia Slingo, Marianne Kroglund and Ben Poulter.

Around 40 researchers from iC3 attended the day during which senior and ECR members introduced their research to the SAC.

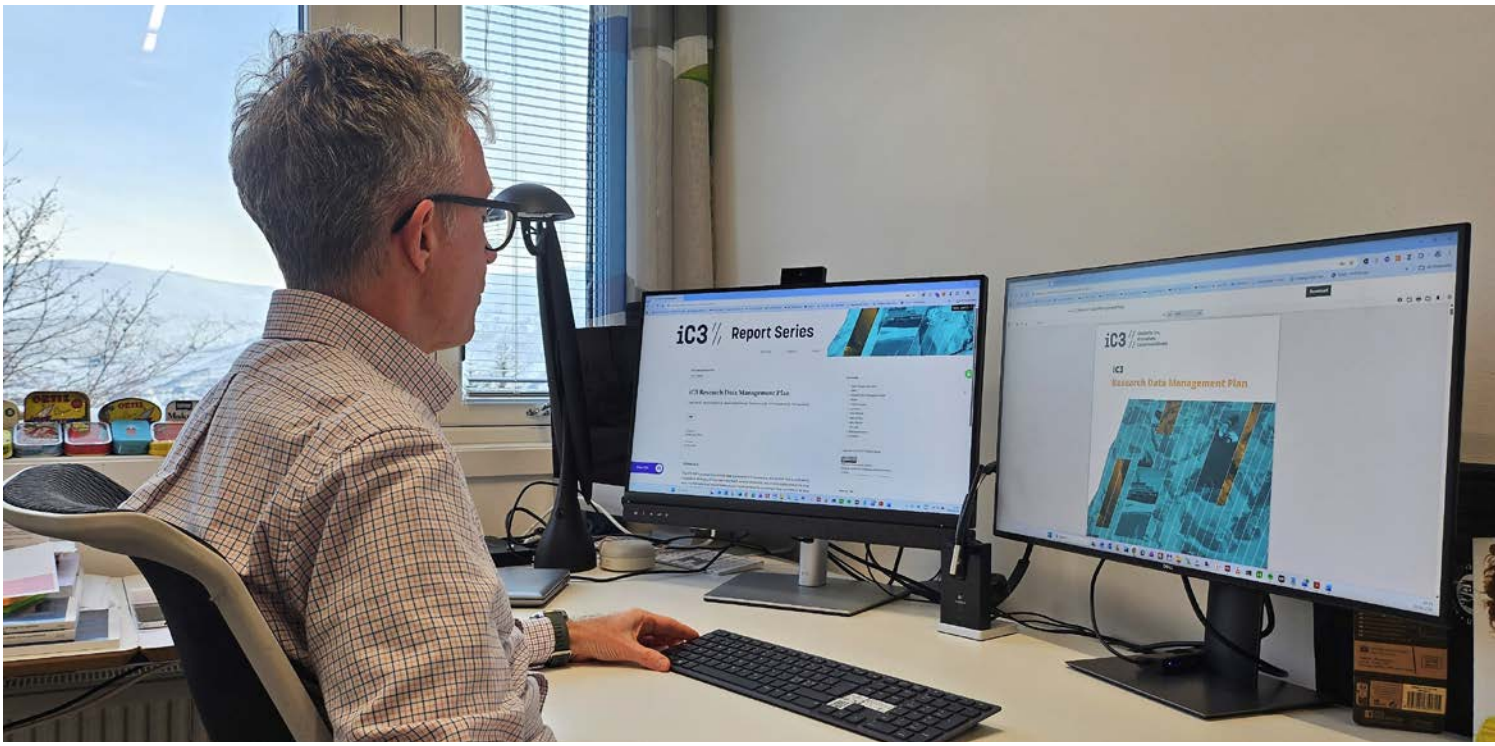
The day's presentations covered all aspects of iC3. During the morning session, chaired by postdoc Aurelié Labarre, relevant researchers addressed questions focusing on palaeo-ice sheets and carbon (RU4), present-day nutrients and carbon from ice sheets (RU2), and ice sheet and carbon modelling (RU5). In the afternoon, Peter-Lasse Giertzuch chaired a session where the focus shifted to ice sheets and marine ecosystems in the past (RU4), the present (RU3) and within the modelling framework (RU5).

In-between the sessions, iC3 researchers enjoyed a hot-dog lunch with a view of the harbour and then rounded off the day socialising over ice-cream!

Written by Emeric Babut du Marès

Data management

Photo: Freya Sykes



In the past year (2025), significant progress has been made in advancing data management and computational support within iC3.

Two key achievements stand out:

1. Development of a comprehensive data inventory: A shared data inventory has been established, cataloguing all datasets collected and processed by iC3 and affiliated researchers. This inventory ensures that data is systematically organized, easily accessible, and well-documented, fostering collaboration and enabling efficient data reuse across projects. This initiative represents a critical step toward enhancing data transparency and maximizing the impact of iC3's research outputs.
2. High-performance computing (HPC) infrastructure access: High-performance computing resources provided by Sigma2 AS (Norway's national e-infrastructure for computational science), have been made available to two research groups within iC3. This infrastructure has significantly enhanced the capacity for complex data analysis and modelling, enabling researchers to tackle computationally intensive tasks more efficiently. By leveraging Sigma2's cutting-edge computational tools, iC3 continues to support innovative research and accelerate scientific discovery.

These achievements underscore iC3's commitment to fostering a robust data management framework and providing the necessary tools to support high-quality research. Moving forward, we aim to further expand the data inventory and extend HPC access to additional research groups, ensuring that iC3 remains at the forefront of data-driven science.

Written by Fabio Sarti

Photo: Till Brückner

Communications

During the first full year of operations, iC3's communications aimed to promote the centre as a key player in global polar research, attract strong PhD and postdoctoral researchers, and make external researchers aware of opportunities for collaboration.

iC3 secured a FRONTIERS science journalism fellow for the second time in a row. Reporter Tim Kalvelage embedded with iC3 researchers for several weeks in early 2025 to learn more about the microbiome of glaciers and subglacial environments. As part of his fellowship, he joined a research cruise to the North Pole and delivered a photography workshop to early career researchers.

iC3 director Jemma Wadham teamed up with Norwegian outdoor legend Lars Monsen to bring the magic of glaciers to a national television audience. Over the course of five days, accompanied by a film crew from Norwegian public broadcaster NRK, Lars and Jemma hiked through Seiland National Park and explored how the local glacier affects wildlife in lakes, streams and fjords. The expedition will be broadcast to a national audience in 2026.

The iC3 communications team continued to grow the centre's social media presence. A steady stream of blogs about new publications, fieldwork stories by early career researchers and interviews with scientists now reach over 13,000 followers on LinkedIn. This has already generated considerable interest from external researchers keen to collaborate with iC3 or join the centre. Proactive outreach to the media has resulted in multiple stories about iC3's work being published.

Written by Till Brückner


emissioni di gas climalteranti

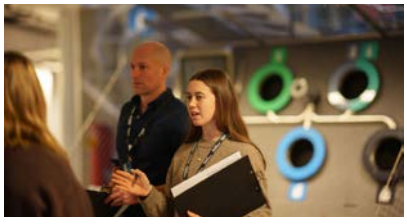
di Jacopo Pasotti

23 febbraio 2025

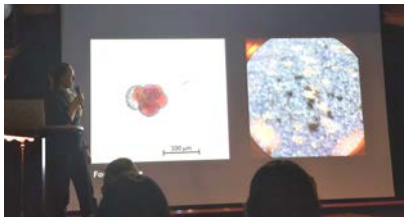
Article referencing iC3 research published by visiting journalist Jacopo Pasotti in Italy's leading financial daily *Il Sole 24 Ore*

Work on Kongsfjorden lead by iC3 researchers was featured by Norwegian national broadcaster NRK

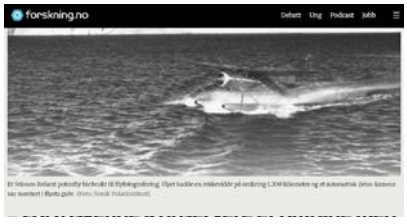
Multiple features of iC3 researchers and their science in the Barents Observer and High North News



iC3 Fullbright Scholar Jamie Hollander participated in the competition jury for Arctic Frontiers Science for Schools



iC3 PhD Adele Westgård gave a popular science talk on foraminifera at Arctic Frontiers Science on Tap



iC3 researchers made regular contributions to the Norwegian online popular science journals forskersonen.no and forskning.no

Facsimile & Photos: Il Sole 24 Ore, NRK, The Barents Observer, Alexandru Mitu, Freya Sykes & forskning.no

Appendices

Photo: EGU blogs

List of staff

Name	Organisation	Position
Jemma Wadham	UiT	Director
Monica Winsborrow	UiT	Assistant Director/IT2 Lead
Terri Souster	UiT	Project Manager
Till Brückner	UiT	Communications Advisor (50%)
Neelu Singh	UiT	Directors Coordinator
Freya Sykes	UiT	Project Coordinator (50%)/PhD Candidate (50%)
Mariana Esteves	UiT	i2B Project Manager
Charlie Compton-Jones	UiT	Plasma Lab Engineer
Fabio Sarti	UiT	Database Manager (50%)
Rory Burford	UiT	Polar Magic Lab Engineer
Alun Hubbard	UiT	Professor
Henry Patton	UiT	Researcher
Guillaume Lamarche-Gagnon	UiT	RU2 Lead
Jon Hawkings	UiT/University of Pennslyvania, USA	RU2 Assistant Lead
Philipp Assmy	NPI	RU3 Lead
Sebastien Moreau	NPI	RU3 Assistant Lead
Jochen Knies	UiT/NGU	RU4 Lead
Andreia Plaza-Faverola	UiT	RU4 Assistant Lead
Mohamed Ezat	UiT	RU4 Assistant Lead
Fanny Monteiro	UiT/University of Bristol, UK	RU5 Lead
Pedro Duarte	NPI	RU5 Assistant Lead
Petra Langebroek	UiT/NORCE	RU5 Assistant Lead
Stefan Bünz	UiT	IT1 Lead
Tore Hattermann	NPI	IT1 Assistant Lead
Anders Schomacker	UiT	IT2 Assistant Lead
Matthias Forwick	UiT	Head of IG
Elisabeth Isaksson	NPI	Researcher
Jack Kohler	NPI	Reseacher
Dimitri Kalenitchenko	UiT/La Rochelle Université, France	Researcher
Jana Jágerská	UiT	Professor
Sandra Arndt	UiT/Universite Libre de Bruxelles, Belgium	Professor
Michele Petrini	NORCE	iC3 Researcher
Peter-Lasse Giertzuch	UiT	Postdoctoral Fellow

Name	Organisation	Position
Sarah Tingey	UiT	Postdoctoral Fellow
Fanny Cusset	NPI	Postdoctoral Fellow
Gabrielle Kleber	UiT	Postdoctoral Fellow
Aurélie Labarre	NPI	Postdoctoral Fellow
Jan Viljanen	UiT	Postdoctoral Fellow
Ragnar Seton	UiT	Postdoctoral Fellow
Roman Zakoldaev	UiT	Postdoctoral Fellow
Akash Trivedi	UiT	Postdoctoral Fellow
Philip Pika	UiT/Universite Libre de Bruxelles, Belgium	Postdoctoral Fellow
Jay Pillai	NPI	Postdoctoral Fellow
Griselda Anglada-Ortiz	UiT	Postdoctoral Fellow
Adele Westgård	UiT	Postdoctoral Fellow
Benjamin Boyes	UiT	Postdoctoral Fellow
Joost van Genuchten	UiT	PhD Candidate
Ricarda Runte	UiT	PhD Candidate
Luke Simmons	UiT	PhD Candidate
Emeric Babut de Marès	UiT	PhD Candidate
Megan Lenss	UiT/NPI	PhD Candidate
Lucie Goraguer	UiT/NPI	PhD Candidate
Colin Sinclair	UiT	PhD Candidate
Leonard Magerl	UiT	PhD Candidate
Silje Waaler	UiT	PhD Candidate
Lisa-Marie Delpech	La Rochelle Université, France	PhD Candidate
Frank Jakobsen	UiT/NGU	PhD Candidate

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ten Hietbrink, S., et al., 2025 & **Patton, H., Knies, J.** *Deglaciation drove seawater infiltration and slowed submarine groundwater discharge*. Nature Geoscience, (2025), 18, pp. 779–786, DOI: 10.1038/s41561-025-01750-z

Tingey, S., et al., 2025 & **Wadham, J., Hawkings, J., Mun, Y., Lamarche-Gagnon, G.** *The potential for glacial flour to impact soil fertility, crop yield and nutrition in mountain regions*. iScience, (2025), 28 (1, 111476), pp. 20, DOI: 10.1016/j.isci.2024.111476

van Crimpen, F. C. J., et al., 2025 & **van Genuchten, J.** *Shallow coastal zones are key mediators in Arctic land-ocean carbon fluxes*. Communications Earth & Environment, (2025), 6 (909), pp. 1–12, DOI: 10.1038/s43247-025-02846-5

Xu, X., et al., 2025 & **Hatterman, T.** *Robustness and Mechanisms of the Atmospheric Response Over the Southern Ocean to Idealized Freshwater Input Around Antarctica*. Geophysical Research Letters, (2025), 52 (10, e2024GL113), pp. 1–13, DOI: 10.1029/2024GL113734

Zeising, O., et al., 2025 & **Hatterman, T.** *Enhanced basal melting in winter and spring: seasonal ice–ocean interactions at the Ekström Ice Shelf, East Antarctica*. The Cryosphere, (2025), 19, pp. 2837–2854, DOI: 10.5194/tc-19-2837-2025

Photo: Tim Kalvelage

Presentations 2025

Anglada-Ortiz, G., 2025**.** Oral presentation. *Nannofossils from sediment cores. Use of coccoliths as biostratigraphic tools and paleoenvironmental indicators*. iC3 Science Day 2025. 2025–05–27. Tromsø, Norway

Anglada-Ortiz, G., et al., 2025 & **Knies, J., Ezat, M.** Poster. *Planktic calcifiers: from living assemblages to proxies in the Arctic Ocean*. PalaeoArc 2025. 2025–06–02 – 2025–06–05. Tromsø, Norway

Assmy, P., et al., 2025 & **Magerl, L., Tingey, S., Wadham, J., Waaler, S.** Oral presentation. *Extensive summer blooms in fjords of West Spitsbergen triggered by run-off from land*. Svalbard Science Conference 2025. 2025–10–28 – 2025–10–29. Oslo, Norway

Assmy, P. & **Moreau, S.**, 2025**.** Oral presentation. *Present ice sheets and marine ecosystems*. iC3 Science Day 2025. 2025–05–27. Tromsø, Norway

Babut du Marès, E., et al., 2025 & **Wadham, J., Langebroek, P., Patton, H., Arndt, S.** Poster. *Constraining the Gas Hydrates Stability Zone beneath the Antarctic Ice Sheet from 40 Ma to the year 3000*. Great: Geoscience Research Academy Of Tromsø 2025. 2025–02–28. Tromsø, Norway

Babut du Marès, E., et al., 2025 & **Wadham, J., Langebroek, P., Patton, H., Arndt, S.** Oral presentation. *Constraining the Methane Gas Hydrates Stability Zone beneath the Antarctic Ice Sheet from 40 Ma to the year 3000*. BE-Polar Conference 2025. 2025–09–11. Brussels, Belgium

Babut du Marès, E., et al., 2025 & **Wadham, J., Langebroek, P., Patton, H., Arndt, S.** Oral presentation. *Mapping the methane gas hydrates stability zone beneath the Antarctic Ice Sheet from 40 Ma to the year 3000*. GIMS16 The Gas in Marine Sediments (GIMS) conference. 2025–10–20 – 2025–10–24. Southampton, United Kingdom

Cusset, F., et al., 2025 & **Tingey, S., Waaler, S., Assmy, P., Wadham, J.** Oral presentation. *Glacier releases of heavy metals in Kongsfjorden: What are the ecosystem impacts?* Arctic Frontiers 2025. 2025–01–27 – 2025–01–30. Tromsø, Norway

Duarte, P., et al., 2025 & **Arndt, S., Monteiro, F., Karakus, O., Wadham, J.** Oral presentation. *Modelling overview for marine ecosystems*. iC3 Science Day 2025. 2025–05–27. Tromsø, Norway

Duarte, P., et al., 2025 & **Assmy, P**. Oral presentation. *Fjord Net Ecosystem Metabolism*. Arctos Days. 2025–02–10 – 2025–02–12. Tromsø, Norway

Goraguer, L., 2025**.** Oral presentation. *Deep export in the Sea Ice Zone of the Southern Ocean (Kong Haakon VII, eastern Weddel Gyre), in relation to phytoplankton composition, ocean and sea-ice dynamics during 2019-2020*. Great: Geoscience Research Academy Of Tromsø 2025. 2025–02–28. Tromsø, Norway

Goraguer, L., et al., 2025 & **Assmy, P.** Poster. *Phytoplankton seasonality and community composition in relation to glacier proximity and Atlantic Water inflow over an annual cycle in Kongsfjorden (2024-2025)*. Svalbard Science Conference 2025. 2025–10–28 – 2025–10–29. Oslo, Norway

Hodson, A., et al., 2025 & **Magerl, L.** Oral presentation. *Changes in Svalbard's nitrogen cycle: seasonal to multi-decadal perspectives based upon studies of riverine biogeochemistry*. Svalbard Science Conference 2025. 2025–10–28 – 2025–10–29. Oslo, Norway

Jouet, O., et al., 2025 & **Hattermann, T.** Oral presentation. *Impact of additional freshwater around Antarctica on the Southern Ocean carbon cycle : an inter-model comparison*. EGU General Assembly 2025. 2025–04–27 – 2025–05–02. Vienna, Austria

Karakus, O., et al., 2025 & **Monteiro, F., Wadham, J.** Oral presentation. *Title: Southern Ocean Ice and Phytoplankton: Modelling Antarctic Ice, Nutrients and Diatoms*. iC3 Science Day 2025. 2025–05–27. Tromsø, Norway

Kleber, G., et al., 2025 & **Magerl, L., Kalenitchenko, D.** Oral presentation. *Field studies of glacial methane seeps on Svalbard*. Great: Geoscience Research Academy Of Tromsø 2025. 2025–02–28. Tromsø, Norway

Kleber, G., et al., 2025 & **Magerl, L., Waaler, S.** Poster. *Assessing the roles of geology and glacier thermal regime on subglacial methane release*. Svalbard Science Conference 2025. 2025–10–28 – 2025–10–29. Oslo, Norway

Kleber, G. E., et al., 2025 & **Magerl, L.** Invited speaker. *Methane emissions driven by glacier retreat*. Blått Kompass Ocean Conference. 04.06.2025. Tromsø, Norway

Labarre, A. & **Moreau, S.**, 2025**.** Oral presentation. *CRYOsphere-Ocean: Effect on the MIcrobial Communities in the Southern Ocean*. Arctos Days. 2025–02–10 – 2025–05–12. Tromsø, Norway

Lamarche-Gagnon, G., 2025**.** Oral presentation. *Carbon fluxes and stores around present-day ice sheets*. iC3 Science Day 2025. 2025–05–27. Tromsø, Norway

Lenss, M., et al., 2025 & **Moreau, S., Hattermann, T., Goraguer, L., Assmy, P.** Oral presentation. *Sea ice as a driver of primary production in the King Haakon VII Sea*. Great: Geoscience Research Academy Of Tromsø 2025. 2025–02–28. Tromsø, Norway

Lenss, M., et al., 2025 & **Moreau, S., Hattermann, T., Goraguer, L., Assmy, P.** Oral presentation. *Sea ice as a driver of primary production in the King Haakon VII Sea*. Gordon Research Seminar. 2025–03–09 – 2025–03–14. Lucca, Italy

Magerl, L., et al., 2025 & **Kleber, G., Tingey, S., Wadham, J.** Poster. *Shale weathering drives flux of geogenic nitrogen from a glaciated catchment: Fagerstadalen, Svalbard*. Svalbard Science Conference 2025. 2025–10–28 – 2025–10–29. Oslo, Norway

Magerl, L., et al., 2025 & **Kleber, G., Hodson, A., Tingey, S., Wadham, J.** Oral presentation. *Precipitation mobilizes geogenic nitrogen from a glaciated catchment: Fagerstadalen, Svalbard*. iC3 Science Day 2025. 2025–05–27. Tromsø, Norway

Moreau, S., et al., 2025 & **Lenss, M., Assmy, P., Goraguer, L., Hattermann, T., Labarre, A.** Oral presentation. *Phytoplankton blooms and biological carbon and silica export in the Sea Ice Zone of the Southern Ocean*. Arctos Days. 2025–02–10 – 2025–02–12. Tromsø, Norway

Muilwijk, M., et al., 2025 & **Hattermann, T.** Poster. *Uncertainty in Future Southern Ocean Warming and Antarctic Ice Shelf Melting Due to Meltwater-Driven Climate Feedbacks*. EGU General Assembly 2025. 2025–04–27 – 2025–05–02. Vienna, Austria

Patton, H., et al., 2025 & **Knies, J., Andreassen, K., Winsborrow, M., Hubbard, A.** Poster. *Quaternary landscape development of the Eurasian Arctic*. PalaeoArc 2025. 2025–06–02 – 2025–06–05. Tromsø, Norway

Patton, H., et al., 2025 & **Knies, J., Andreassen, K., Winsborrow, M., Hubbard, A.** Poster. *Quaternary landscape development of the Eurasian Arctic*. iC3 Science Day 2025. 2025–05–27. Tromsø, Norway

Waaler, S., et al., 2025 & **Wadham, J., Assmy, P.** Poster. *MCSA ICEBIO - Center for glacial biome doctoral network*. Great: Geoscience Research Academy Of Tromsø 2025. 2025–02–28. Tromsø, Norway

Petrini, M., et al., 2025 & **Langebroek, P.** Poster. *Coupling the polar ice sheets to the Norwegian Earth System Model: advances and challenges*. EGU General Assembly 2025. 2025–04–27 – 2025–05–02. Vienna, Austria

Pinzone, M., et al., 2025 & **Cusset, F., Assmy, P., Goraguer, L., Tingey, S., Waaler, S., Wadham, J.** Oral presentation. *Tracing mercury sources in the Arctic marine ecosystem of Kongsfjorden, Svalbard*. Svalbard Science Conference 2025. 2025–10–28 – 2025–10–29. Oslo, Norway

Plaza-Faverola, A., et al., 2025 & **Winsborrow, M., Patton, H., Giertzuch, P.-L., Jakobsen, F., Trivedi, A., Bünz, S., Ezat, M., Knies, J.** Oral presentation. *Palaeo ice-sheets and carbon*. iC3 Science Day 2025. 2025–05–27. Tromsø, Norway

Sen, A., et al., 2025 & **Patton, H., Knies, J.** Oral presentation. *Diverse and self-sustaining benthos of an Arctic oil seep*. 17th Deep Sea Biology Symposium (17DSBS). 2025–01–12 – 2025–01–17. Hong Kong

Seton, R., et al., 2025 & **Jágerská, J., Viljanen, J.** Oral presentation. *In-situ stable carbon isotope measurements with laser ablation and on-chip laser absorption spectroscopy*. EGU General Assembly 2025. 2025–04–27 – 2025–05–02. Vienna, Austria

Simmons, L., et al., 2025 & **Ezat, M., Knies, J.** Oral presentation. *A correlation of organic carbon burial and regional climate variability: a tale from the last century in Sermilik fjord, Southeast Greenland*. iC3 Science Day 2025. 2025–05–27. Tromsø, Norway

Simmons, L., et al., 2025 & **Ezat, M., Knies, J.** Poster. *A correlation of organic carbon burial and regional climate variability: a tale from the last century in Sermilik fjord, Southeast Greenland*. iC3 Science Day 2025. 2025–05–27. Tromsø, Norway

Simmons, L., et al., 2025 & **Ezat, M., Knies, J.** Poster. *A correlation of organic carbon burial and regional climate variability: a tale from the last century in Sermilik fjord, Southeast Greenland*. Fjord Workshop 2025. Fjords in a changing climate. 2025–06–02 – 2025–06–05. Bergen, Norway

Simmons, L., et al., 2025 & **Ezat, M., Knies, J.** Poster. *Correlating organic carbon burial with regional climate variability: the past two centuries tale from Sermilik fjord, Southeast Greenland*. Great: Geoscience Research Academy Of Tromsø 2025. 2025–02–28. Tromsø, Norway

Simmons, L., et al., 2025**.** Poster. *Transferability of Image Evaluation Software for AI Uncertainty Estimation into a Teaching and Learning Tool*. iEarth GeoLearning Forum. 11.11.2025 – 12.11.2025. Bergen, Norway

Stibal, M., et al., 2025 & **Hubbard, A., Lamarche-Gagnon, G, Hawkings, J., Arndt, S.** Oral presentation. *Quantifying the Potential of the Greenland Ice Sheet to Produce and Release CH4 into the Atmosphere*. Goldschmidt 2025 Conference. 2025.07.06 – 2025.07.11. Prague, Czech Republic

Sykes, F., 2025. Oral presentation. *Updating proxy calibrations for high latitude palaeoclimate reconstructions*. iC3 Science Day 2025. 2025–05–27. Tromsø, Norway

ten Hietbrink, S., et al., 2025 & **Knies, J.** Oral presentation. *Constraining offshore groundwater flow and porewater freshening mechanisms in Svalbard fjords*. Svalbard Science Conference

2025. 2025–10–28 – 2025–10–29. Oslo, Norway

Tingey, S., et al., 2025 & **Wadham, J., Hawkings, J., Lamarche-Gagnon, G., Magerl, L., Assmy, P., Bailey, A., Cusset, F., Kleber, G., Waaler, S., Rasmussen, L.** Oral presentation. *More than just water: How glaciers shape biogeochemistry from soil to sea*. iC3 Science Day 2025. 2025–05–27. Tromsø, Norway

Tingey, S., et al., 2025 & **Wadham, J., Magerl, L., Assmy, P., Bailey, A., Cusset, F., Hawkings, J., Kleber, G., Kohler, J., Lamarche-Gagnon, G., Mun, Y., Rasmussen, L., Waaler, S.** Oral presentation. *Metal and mercury mobilization from Arctic glaciers*. Arctic Frontiers 2025. 2025–01–27 – 2025–01–30. Tromsø, Norway

Tingey, S., et al., 2025 & **Wadham, J., Magerl, L., Assmy, P., Bailey, A., Lamarche-Gagnon, G., Kleber, G., Kohler, J., Rasmussen, L., Waaler, S.** Poster. *Mercury mobilisation by glaciers of Mainland Norway and Svalbard from ice to oceans*. Fjord Workshop 2025. Fjords in a changing climate. 2025–06–02 – 2025–06–06. Bergen, Norway

Trivedi, A., et al., 2025 & **Bunz, S.** Poster. *Natural Methane Seepage and Fluid Migration Pathways in the Tampen Slide: Insights from Structural and Seismic Analysis*. Methane emissions in the North Sea Symposium. 13.11.2025 – 14.11.2025. Utrecht, Netherlands

van Genuchten, J., et al., 2025 & **Lamarche-Gagnon, G.** Oral presentation. *Recollection of the Proglacial Field Campaign in Kangerlussuaq, Southwest Greenland, 2025*. iC3 Science Day 2025. 2025–05–27. Tromsø, Norway

van Genuchten, J., et al., 2025 & **Lamarche-Gagnon, G., Schomacker, A., Hawkings, J.** Poster. *Investigating Carbon, Nutrient and Methane Dynamics in Proglacial Lakes: Study Design and Objectives for the Southwestern Greenland Campaign*. Great: Geoscience Research Academy Of Tromsø 2025. 2025–02–28. Tromsø, Norway

Westgård, A., et al., 2025 & **Ezat, M., Sykes, F.** Oral presentation. *Reducing inaccuracies in polar palaeotemperature reconstructions using planktic foraminifera*. Great: Geoscience Research Academy Of Tromsø 2025. 2025–02–28. Tromsø, Norway

Winsborrow, M., 2025 Invited speaker. *Centre for ice, Cryosphere, Carbon and Climate (iC3): Closing large-scale uncertainty in Polar ice sheet impacts on the global carbon cycle*. Norwegian Geological Society lunch seminar. 2025–05–14. Virtual

Winsborrow, M., 2025**.** Invited speaker. *Changing ice sheets and their role in the carbon cycle*. Seminar at the Department of Geography, The University of Manchester. 2025–03–26. Manchester, United Kingdom

Winsborrow, M., 2025**.** Invited speaker. *iC3: Centre for ice, Cryosphere, Carbon and Climate*. Presentation for Administration at Faculty for Science and Technology. 2025–02–26. Tromsø, Norway

Winsborrow, M., et al,. 2025. Invited speaker*. Imprints and dynamics of ice streams on glaciated continental margins*. International Glaciological Society Symposium on Ice Streams and Outlet Glaciers. 2025-07-20 – 2025-07-25. Durham, UK.

Winsborrow, M. & **Langebroek, P.**, 2025 Invited speaker. *iC3 - NORCE seminar*. Seminar at NORCE in Tromsø. 2025–03–11. Tromsø, Norway

Seminars and workshops

Proposal development

Linda Solstrand Darlberg
EU funding opportunites
5.9.25

Gabby Kleber
Proposal forum
12.3.25

Øyvind Foss
Proposal forum
8.9.25

Jenny Arthur
Proposal forum
22.4.25

Career development

Marko Lukic
Alin research
12.9.25

Lisa Grosfield AWI
Science communication
11.3.25

Fanny Montiero
Using AI in research (Icebreaker)
17.3.25

Maria Kvalevåg and Mario Acquarone
Arctic Monitoring Assessment Program (AMAP)
26.8.25

Kathleen (UiT Library)
Where to publish my research
3.3.25

Jack Landy
High impact publications
6.9.25

Science

Ben Boyes
A new retreat pattern of the last Fennoscandian Ice Sheet?
14.11.25

Archana Dayal
Methane and microbes Foxfonna glacier Svalbard
12.5.25

Laura Rassmusen
The PULSE project: quantify the impact of Arctic glacier forefield exposure on soil N cycling and export to coastal marine environments
1.9.25

Amy Mcfarlane
Snow processes on sea ice specialising in optical, thermal, and radiative transfer modelling
30.4.25

Jon Hawkings
Role of glacial meltwater in downstream biogeochemical cycles
10.2.25

Workshops

MSCA
3.6.25

Photography
15.5.25

Ecosystems
19.3.25

Antarctic
22.8.25

Ice Sheet and Carbon storage
5.12.25

Data Illustration
8.5.25

Science Day
27.5.25

ECR Monthly meetings

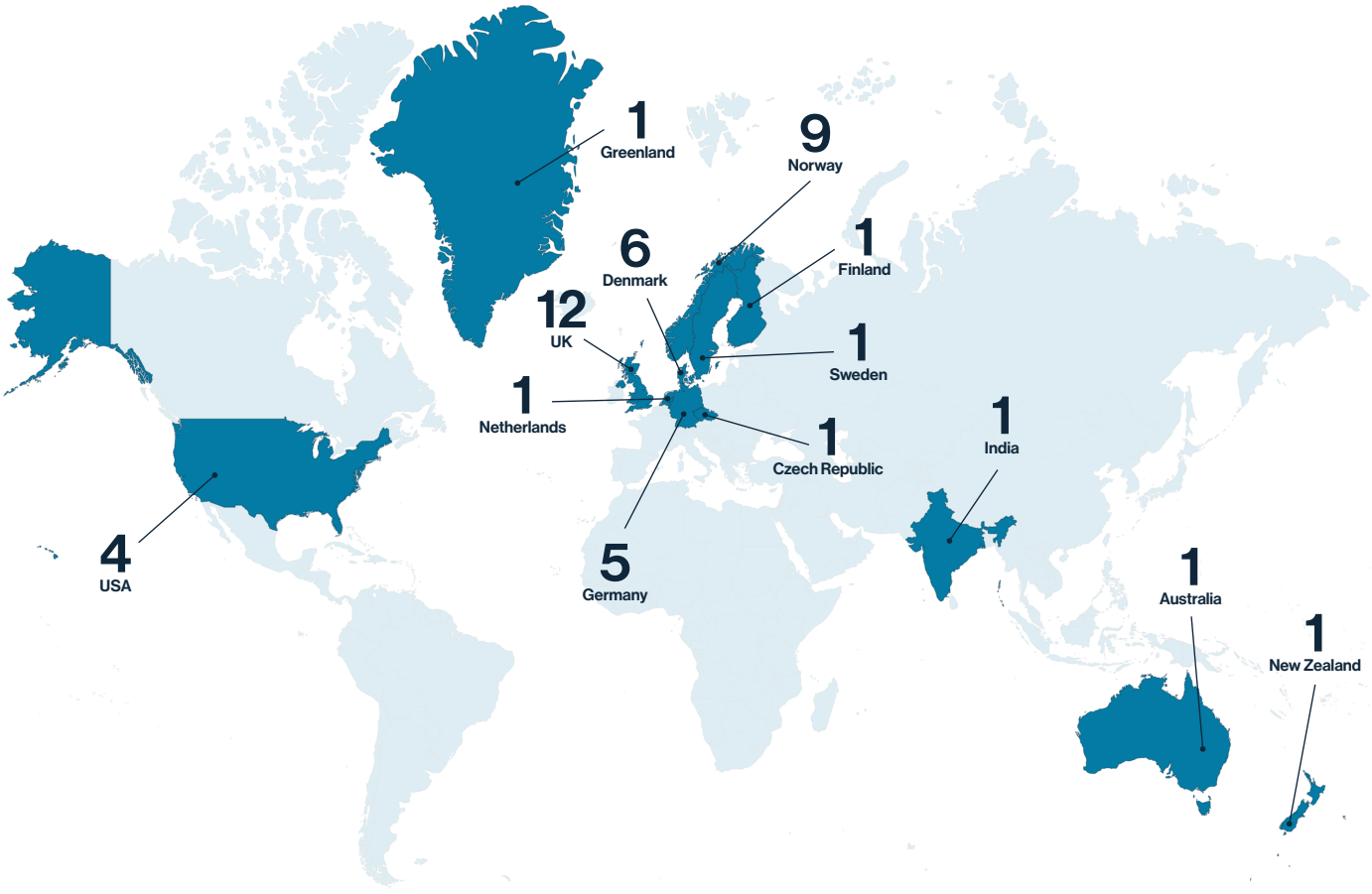
iC3 Affiliated projects

Project	Lead iC3 representative
SEAMSTRESS: Tectonic stress effects on Arctic methane seepage	Andreia Plaza-Faverola
METHANICE: Methanotrophic communities in ice	Dimitri Kalenitchenko
METALLICA: Meltwater release of heavy metals from glacier to ocean in a changing Arctic	Jemma Wadham
ICEBIO Doctoral Network (led by Aarhus Uni.)	Jemma Wadham
ARCLIM: The Arctic Ocean under Warm Climates	Mohamed Ezat
Into the Blue (i2B)	Jochen Knies
The Nansen Legacy	Philipp Assmy
SUDARCO Fram Senter Project	Philipp Assmy
OCEAN:ICE: Ocean-Cryosphere Exchanges in Antarctica: impacts on Climate and the Earth System	Tore Hattermann
NuArctic	Philipp Assmy
iMELT	Tore Hattermann
I-CRYME: Impact of cryosphere melting on Southern Ocean ecosystems and biogeochemical cycles	Sebastein Moreau
HAVOC: safe havens for ice-associated flora and fauna in a seasonally ice-covered Arctic Ocean	Philipp Assmy
FACE-IT: Arctic biodiversity and livelihoods	Pedro Duarte
CRiceS: Climate relevant interactions and feedbacks: the role of sea ice and snow in the polar and global climate system	Pedro Duarte
BREATHE: Bottom sea ice respiration and nutrient exchanges assessed for the Arctic	Philipp Assmy/Pedro Duarte
TONe: Troll Observasjonsnettverk	Tore Hattermann
Arctic Ocean Physics	Tore Hattermann
TiPACCs: Tipping points in Antarctic climate components	Petra Langebroek
GREASE: Greenland Ice Sheet stability and evolution	Petra Langebroek
Marine Ecosystem Response to Rapid Arctic Climate Change - Irish Marine Institute	Mohamed Ezat
WOBEC: designing and applying a biodiversity and ecosystem monitoring framework for the Weddell Sea off Antarctica	Sebastein Moreau
CLIM2Ant (From Climatic Drivers to Antarctic Ice Sheet Response: Improving Accuracy in Sea Level Rise Projections)	Tore Hattermann
GlaciGas project. A research project that will map and measure methane emissions from the basement where there used to be ice.	Andy Hodson
MSCA #1 The impact of Arctic glacier forefield exposure on soil nitrogen cycling and export to coastal marine environments	Laura Rassmusen
MSCA #2 Characterise and quantify the fate of bioavailable nutrients, trace metals and carbon on phyto-plankton productivity and their impact on the biology carbon pump in the Southern Ocean	Aurelie Labarre
MSCA #3 Develop an optical measurement technique to monitor and quantify dissolved iron in glacial meltwaters	Jan Viljanen
MSCA #4 The missing ice sheet in Siberia could explain discrepancies in sea level changes during the Last Glacial Maximum	Benjamin Boyes
MSCA #5 Proglacial lake impacts on downstream export of organic carbon and nutrients	Eva Doting
MSCA #6 Develop an optical measurement technique to monitor and quantify dissolved iron in glacial meltwaters	Inda Brinkman

iC3 collaborators

Name	Country	Organisation
Marek Stibal	Czech Republic	Charles University
Dorthe Dahl-Jensen	Denmark	Niels Bohr Institute; University of Copenhagen
Alexandre Magno Barbosa Anesio	Denmark	Aarhus University
Martyn Tranter	Denmark	Aarhus University
John Robert Hopper	Denmark	GEUS (Geological Survey of Denmark and Greenland)
Tove Nielsen	Denmark	GEUS (Geological Survey of Denmark and Greenland)
Marit-Solveig Seidenkrantz	Denmark	Aarhus University
Risto Makkonen	Finland	NEIC (Nordic E-Infrastructure Collaboration); University of Helsinki
Clara Hoppe	Germany	AWI
Morten H. Iversen	Germany	AWI
Wilken-Jon von Appen	Germany	AWI
Juliane Müller	Germany	AWI
Christian Rodehacke	Germany	AWI
Thomas Juul-Pedersen	Greenland	Greenland Institute of Natural Resources
Sunil Vadakkepuliyambatta	India	NCPOR (National Centre for Polar and Ocean Research)
Pepijn Bakker	Netherlands	Vrije Universiteit Amsterdam
Andrew R Gorman	New Zealand	University of Otago
Karin Andreassen	Norway	UiT
Alexander Tveit	Norway	UiT
Andy Hodson	Norway	UNIS
Amanda Poste	Norway	NINA (Norwegian Institute for Nature Research)
Murat V. Ardelan	Norway	NTNU
Cathrine Lund Myhre	Norway	NILU (The Climate and Environmental Research Institute)
Stephen Matthew Platt	Norway	NILU (The Climate and Environmental Research Institute)
Laura De Steur	Norway	NPI
Paul Dodd	Norway	NPI
Martin Jakobsson	Sweden	Stockholm University
Delphine Lannuzel	Tasmania	University of Tasmania
Mike Bentley	UK	Durham University
Martin Siegert	UK	Imperial College London
Michael Meredith	UK	BAS
Kate Hendry	UK	BAS
Daniel Goldberg	UK	The University of Edinburgh
Claus-Dieter Hillenbrand	UK	BAS
Gavin Foster	UK	University of Southampton

Name	Country	Organisation
Tony Payne	UK	University of Bristol
Keith Makinson	UK	BAS
Keith Nicholls	UK	BAS
Matthew Mowlem	UK	National Oceanography Centre
Alexander Beaton	UK	National Oceanography Centre
John Priscu	USA	Montana State University
Fiamma Straneo	USA	SCRIPPS - UC San Diego
Ed Brook	USA	Oregon State University
William Lipscomb	USA	University Corporation for Atmospheric Research



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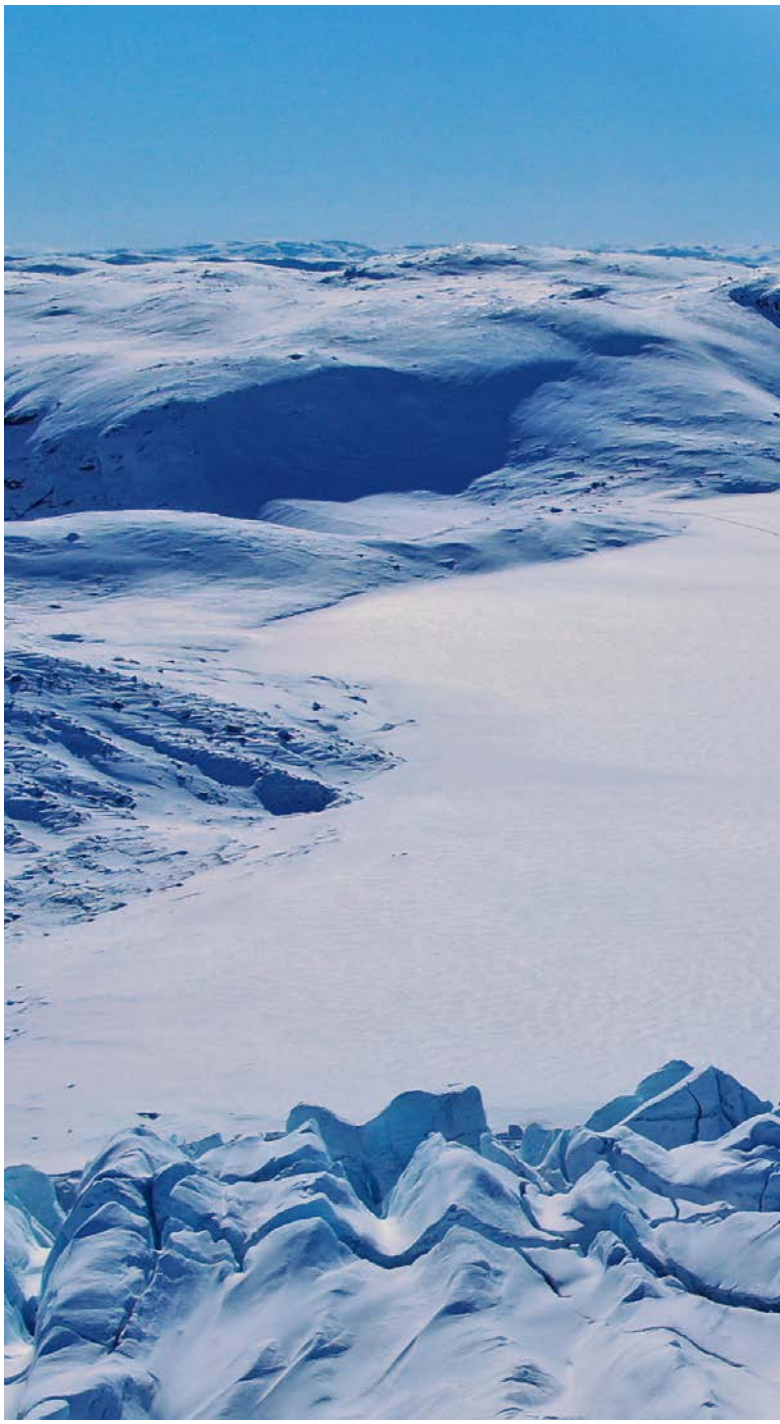

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