IASC 2024

BULLETIN

INTERNATIONAL ARCTIC SCIENCE COMMITTEE

[IASC] · INTERNATIONAL ARCTIC SCIENCE COMMITTEE

The International Arctic Science Committee (IASC) is a non-governmental, international scientific organization. IASC's mission is to encourage and facilitate cooperation in all aspects of Arctic research, in all countries engaged in Arctic research and in all areas of the Arctic. Overall, IASC promotes and supports leading-edge interdisciplinary research in order to foster a greater scientific understanding of the Arctic region and its role in the Earth system.

To achieve this mission IASC:

- Initiates, coordinates, and promotes scientific activities at a circumarctic or international level;
- Provides mechanisms and instruments to support science development;
- Provides objective and independent scientific advice on issues of science in the Arctic and communicates scientific information to the public;
- Seeks to ensure that scientific data and information from the Arctic are safeguarded, freely exchangeable and accessible;
- Promotes international access to all geographic areas and the sharing of knowledge, logistics and other resources;
- Provides for the freedom and ethical conduct of science;
- Promotes and involves the next generation of scientists working in the Arctic; and
- Promotes polar cooperation through interaction with relevant science organizations.

PHOTO: LIONEL FAVRE, technician and field assistant from EERL an EPFL's lab.
Sunrise in Pallas Lapland with reindeers during the fieldwork in PaCE

IASC 2024
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INTERNATIONAL ARCTIC SCIENCE COMMITTEE

[IMPRINT]

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COVER PHOTO: LIONEL FAVRE, technician and field assistant from EERL an EPFL's lab.
One of the huge icebergs in the fjord of Narsaq. The boat of the 13m mast Atlas Vessel for scale, a Swiss boat that came to Greenland to follow the activity of the GreenFjord project.

[CONTENTS]

Preface 6

1. IASC Internal Development 11

IASC Organization 12

IASC Council 13

IASC Executive Committee 14

Secretariat 14

International Science Initiative in the Russian Arctic (ISIRA) 16

IASC Medal 2024 18

IASC Award for Service 2024 19

2. IASC Working Groups 23

2023 State of Arctic Science Report 24

IASC Cross-Cutting Activities 27

Atmosphere Working Group (AWG) 44

Cryosphere Working Group (CWG) 52

Marine Working Group (MWG) 56

Social and Human Working Group (SHWG) .. 64

Terrestrial Working Group (TWG) 70

3. ICARP IV - Fourth International Conference for Arctic Research Planning 79

Community-Wide Engagement 81

Research Priority Teams 82

ICARP IV International Steering Committee 85

4. IPY – International Polar Year 2032-33 87

Why an International Polar Year in 2032-33? 89

A crucial new phase in a 150-year-old process 90

Co-creating societal impacts and benefits .. 92

Moving forward together 92

5. Arctic Science Summit Week 2023 95

Upcoming ASSWs 97

6. Data and Observations 99

Sustaining Arctic Observing Networks (SAON) 100

Arctic Data Committee (ADC) 102

7. Capacity Building 105

IASC Fellowship Program 106

Fellows' Voices 109

[Preface]

IASC is a non-governmental, international scientific organisation, operating among its 24 member countries. It works on a consensus basis to encourage and facilitate international cooperation in all aspects of Arctic research, across all countries engaged in Arctic research, and in all areas of the Arctic region.

Since its establishment in 1990, IASC has brought together many thousands of researchers to share knowledge, exchange skills, build new partnerships, and explore new ways of understanding the Arctic and its impact on global systems.

The events of recent years have posed significant challenges to the way that IASC works and to international Arctic collaboration as a whole. Thankfully the backlogs created by Covid-19 have now largely eased in many places. Yet the geopolitical situation that has arisen due to Russia's actions in Ukraine continues to create major problems for research and cooperation in the Arctic.

Despite these major issues, the principles of scientific freedom; of research independence; and of peaceful international cooperation remain absolutely vital for the researchers, Indigenous Peoples and many others who are working together to understand and respond to ongoing pressing climate, environmental, resource, and social changes across the Arctic.

I remain grateful to the members of the IASC Executive Committee, the Council, and the wider community for their continuing patience, support, and encouragement as we turn those principles and our IASC values into practical action in the face of the challenge. It was very good to see the re-endorsement of IASC's fundamental aims and value within the updated IASC Strategic Plan that was agreed at the Council meeting during the Arctic Science Summit Week (ASSW) in Vienna in 2023.

Thank you to the generous hosts of the meeting in Vienna and everyone who participated in a fantastic week of science, business and community meetings and much more.

As the Bulletin is published we will be about to begin our ASSW2024 meeting - including the Arctic Observing Summit - in Edinburgh (Scotland, United Kingdom). We look forward to the following year in Boulder (United States) and then in Aarhus (Denmark) in 2026. Our ASSW meetings are a crucial opportunity for the diverse Arctic research community – researchers, programme managers, Indigenous Peoples, decision-makers, funders – to gather together to share and test new ideas, develop new projects, and build promising partnerships.

The past year has seen the publication of the fourth edition of IASC's State of Arctic Science Report. Through this document we are building up a strong picture of the strengths and gaps in Arctic science. It shows that despite the profound problems of the last four years this community remains vital, active, and engaged. The Report will be an important contribution to both the ICARP IV process and the 5th International Polar Year.

This year is the tenth anniversary of the IASC's Fellowship program. Since 2014, the annual Fellowships Programme has offered practical support and opportunities to 78 researchers to engage in IASC's work and to develop their skills and networks. IASC is extremely fortunate to have an active community of early career researchers. On the occasion of the 10th anniversary, IASC has been able to support ten Fellowships, working in partnership with the Prince Albert II of Monaco Foundation. Congratulations to all the successful Fellows and best wishes for the year ahead.

PHOTO: IASC President Henry Burgess, Photo Courtesy Henry Burgess

The IASC Medal for 2023 was awarded to Prof. Paul Wassmann (UiT, the Arctic University of Norway). Paul was honoured for his skill, dedication and passion in creating pan-Arctic and inter-disciplinary perspectives. Thank you to Paul for delivering a fascinating and inspiring Medal Lecture in Vienna last year.

It is a great pleasure to say that this year the IASC Medal has been awarded to Prof. James Overland (Pacific Marine Environmental Laboratory, NOAA) for outstanding long-lasting achievements to improve interdisciplinary knowledge, particularly on the linkages between changes in the Arctic and the weather in mid-latitudes. As well as for ensuring that this information becomes widely available through his ability to present complex information in an accessible way and his central role in the formation of the IASC Atmosphere Working Group. I look forward to welcoming James to deliver his Medal Lecture in Edinburgh.

Acting on the advice of the Medal Committee, the Executive Committee also have great pleasure in recognising Prof. Klaus Dethloff, Prof. Markus Rex and Dr Matthew Shupe with a joint IASC Award for Service. Their outstanding achievement in planning and delivering the unique international Arctic Ocean programme MOSAiC has made a fundamental change in the collective understanding of the Arctic, especially during the polar night. The largest and most ambitious such programme ever undertaken, MOSAiC has been an immense force for the power and value of international collaboration to address the biggest questions in Arctic science.

Many congratulations to James, Matthew, Markus and Klaus on their awards, and to everyone who was nominated. Nominations for the 2024 IASC Medal are now open, and I encourage the whole IASC community to submit nominations on behalf of the many Arctic researchers, across the full range of scientific disciplines and many diverse backgrounds, who you would like to be considered for the IASC Medal.

The coming ASSW in Edinburgh will see the new IASC Standing Committee on Indigenous Involvement meet for the first time. Open for nominations from all IASC Members and the Arctic Council Permanent Participants this new group will have an important role to play in ensuring that IASC hears from, responds to and involves those with direct knowledge and experience of Indigenous knowledge systems. I look forward to working closely with the Standing Committee in the years ahead to advance IASC's aims and objectives.

The past year has seen an enormous amount of progress with the Fourth International Conference on Arctic Research Planning (ICARP IV). This decadal event helps the research community identify the most urgent research needs, as well as enabling Arctic organisations to work together in addressing those challenges and to influence national and international funders. The engagement and consultation phase is now well underway, including a dedicated survey. Over 170 researchers and knowledge holders have joined the seven Research Priority Teams who will be holding their first community meetings during the ASSW in Edinburgh. Intensive work this year will culminate in the ICARP IV conference during the ASSW in Boulder in 2025. The success and relevance of the whole process rest on effective community engagement, so please do visit ***https://icarp.iasc.info*** on how to get involved.

Finally, good progress has been made this year on the development of planning for the 5th International Polar Year (IPY) 2032-33. An initial Concept Note was published in October 2023, setting out the overall aims and expectations, together with a timeline. Detailed preparations with IPY partners, including the Scientific Committee on Antarctic Research, UN bodies such as the WMO, the International Science Council, University of the Arctic, APECS, IASSA and many more will intensify in the coming year. The 5th IPY will be only the second since IASC came into being, but I am confident that we are track to make a very significant contribution to the leadership of this vitally important initiative.

Thank you to the Executive Committee, the Secretariat team in Akureyri and the dispersed Secretariat, including the Working Group Secretaries, and many others in the Council and Working Groups who have worked so effectively and enthusiastically to advance IASC's aims and objectives over the last year. This Bulletin shows how much has been achieved together. Genuinely international and ambitious scientific cooperation has never been more important. With your continued support the organisation is in a good place to meet the challenges and opportunities ahead.

New partners and collaborators are always welcome and I look forward to meeting you – in-person or online – at the IASC events soon in Edinburgh and in Boulder for ASSW2025 next year.

Henry Burgess President, IASC

PHOTO: MARIASILVIA GIAMBERINI, Consiglio Nazionale delle Ricerche (CNR).
Towards the Arctic.

PHOTO: LIONEL FAVRE, technician and field assistant from EERL an EPFL's lab.
Spending some time in Iceland after a two-day delayed plane on our
way to Greenland for the GreenFjord 2023 fieldwork.

1. IASC INTERNAL DEVELOPMENT

1. IASC Internal Development

IASC Organization

The International Arctic Science Committee (IASC) is a non-governmental organization that encourages and facilitates cooperation in all aspects of Arctic research, in all countries engaged in Arctic research, and in all areas of the Arctic region. To fulfill its mission, IASC promotes and supports leading-edge interdisciplinary research in order to foster a greater scientific understanding of the Arctic region and its role in the Earth system. IASC was established in 1990 and began operations in 1991. It currently comprises 24 member countries. IASC member organizations are national science organizations that cover all fields of Arctic research.

PHOTO: IASC Council Members attending ASSW2023 in Vienna, Austria in person

COUNTRY	MEMBER ORGANIZATION	IASC COUNCIL MEMBER
Austria	Austrian Polar Research Institute (APRI)	Wolfgang Schöner
Belgium	Belgian National Committee on Antarctic Research (BNCAR)	Philippe Huybrechts
Canada	Polar Knowledge Canada	David Hik
China	Chinese Arctic and Antarctic Administration	Huigen Yang
Czech Republic	Centre for Polar Ecology	Josef Elster
Denmark	Agency for Science, Technology, and Innovation	Lise Lotte Sørensen
Finland	Council of Finnish Academies	Paula Kankaanpää, Vice-President
France	National Center for Scientific Research (CNRS)	Jérôme Fort
Germany	German Research Foundation	Günther Heinemann
Iceland	The Icelandic Centre for Research (RANNÍS)	Egill Thor Nielsson
India	National Centre for Polar and Ocean Research (NCPOR)	Thamban Meloth
Italy	National Research Council of Italy (CNR)	Carlo Barbante
Japan	Science Council of Japan, National Institute of Polar Research (NiPR)	Hiroyuki Enomoto, Vice-President
Republic of Korea	Korea National Committee on Polar Research (KOPRI)	Hyoung Chul Shin
The Netherlands	Dutch Research Council	Daan Blok
Norway	Research Council of Norway	Jon L. Fuglestad
Poland	Polish Academy of Sciences, Committee on Polar Research	Monika Kędra
Portugal	Portuguese Foundation for Science and Technology	João Canario, Vice-President
Russian Federation	Russian Academy of Sciences	Vladimir Pavlenko
Spain	Spanish Polar Committee (CPE)	Antonio Quesada
Sweden	Swedish Research Council	Ulf Jonsell
Switzerland	Swiss Committee on Polar and High Altitude Research	Gabriela Schaepman-Strub
United Kingdom	Natural Environment Research Council (NERC)	Henry Burgess, President
USA	Polar Research Board	Matthew Druckenmiller, Vice-President

IASC Council

The IASC Council is comprised of representatives from national scientific organizations from all IASC member countries. The IASC Council typically meets once a year during Arctic Science Summit Week (ASSW). Council members provide input regarding a wide range of scientific and technical topics and provide access to a large number of scientists and administrators through their national committees.

The IASC Council is responsible for:

- Developing policies and guidelines for cooperative Arctic research;
- Establishing Working Groups and Action Groups that address and act on timely topics in Arctic science;
- Recommending, in cooperation with the Working Groups, implementation plans for IASC programs and activities;
- Making decisions regarding the participation of national scientific organizations from non-Arctic countries; and,
- Organizing Arctic science conferences.

TABLE
An overview of the IASC countries, organizations, and Council members updated to 18 February 2024.
For contact information, please visit
https://iasc.info/about/organisation/council

IASC Executive Committee

The IASC Executive Committee operates as a board of directors and manages IASC's activities between Council meetings. The Executive Committee consists of five elected officials: the President, four Vice-Presidents, and the Executive Secretary (ex officio).

The current IASC Executive Committee members are:

Henry Burgess, President

João Canario, Vice-President

Matthew Druckenmiller, Vice-President

Hiroyuki Enomoto, Vice-President

Paula Kankaanpää, Vice-President

Gerlis Fugmann, IASC Executive Secretary (ex officio)

Secretariat

The IASC Secretariat is responsible for the daily operations of IASC including:

- Communicating with Council members;
- Implementing the decisions of the IASC Council and Executive Committee;
- Communicating with other organizations including the Arctic Council and its subsidiary bodies and the International Science Council (ISC);
- Providing support for the IASC Working Groups and Action Groups;
- Publishing the IASC Bulletin and IASC communication materials as required;
- Maintaining the IASC website, preparing the IASC newsletter, and facilitating outreach; and,
- Administering IASC finances.

The central IASC Secretariat is supplemented by the dispersed Secretariat, drawing support from individuals and institutions in a range of IASC members countries, especially addressing the support for the growing number of activities undertaken by the IASC Working Groups and early career researcher development.

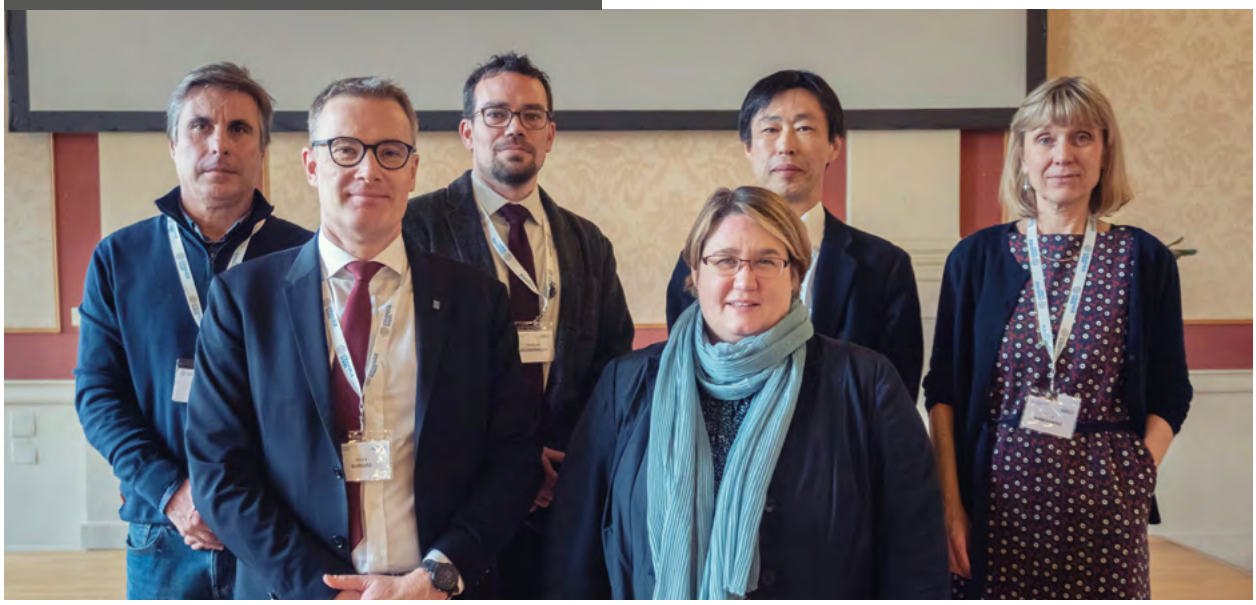

PHOTO: IASC Executive Committee Members attending ASSW2023 in Vienna, Austria

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Laura Ghigliotti
Marine Working Group Secretary until ASSW2024, National Research Council of Italy, Italy
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Anna Varfolomeeva
Social & Human Working Group Secretary, University of Helsinki, Finland (maternity leave until 03/'23)
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Clay Prater
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Yulia Zaika
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PHOTOS: courtesy of the Secretaries

International Science Initiative in the Russian Arctic (ISIRA)

The International Science Initiative in the Russian Arctic (ISIRA) is a Russian and international cooperative initiative to assist Arctic science and sustainable development in the Russian Arctic.

ISIRA´s objectives include:

- Initiating planning of multinational research programs that address specific key scientific problems in the Russian Arctic;
- Providing a forum for linking on-going or planned bilateral projects;
- Facilitating improved scientific access to the Russian Arctic;
- Advising on funding and implementation of projects.

The Activities include:

- Reporting on international science activities and initiatives in the Russian Arctic;
- Providing up-to-date information on policies, regulations and logistics within the Russian Arctic;
- Supporting Russian and international early career scientists.

Deliverables are:

- Comprehensive national inventories of past, ongoing and planned international and bilateral science projects and initiatives in the Russian Arctic;
- Reports of annual ISIRA meetings, including presentations of IASC supported early career scientists;
- Information on scientific access to the Russian Arctic.

Members of ISIRA

Chair, Arkady Tyshkov | Russia

Annett Bartsch | Austria

Hanna Lappalainen | Finland

Juha Pekka Lunkka | Finland

Heidemarie Kassens | Germany

Yoshihiro Iijima | Japan

Louise Kiel Jensen | Norway

Tadeusz Pastusiak | Poland

Boris Morgunov | Russia

Sergey Priamikov | Russia

Vladimir Kotlyakov | Russia

Anna-Maria Perttu | Sweden

Gabriela Schaepman-Strub | Switzerland

Gareth Rees | United Kingdom

Vladimir Romanovsky | United States (incoming member)

Lee Cooper | United States (outgoing member)

Yulia Zaika | Russia

More information:
https://iasc.info/our-work/isira

Международная научная инициатива в Российской Арктике (ИСИРА)

Международная научная инициатива в Российской Арктике (ISIRA / ИСИРА) — это совместная российская и международная инициатива с целью содействия научному сотрудничеству и устойчивому развитию в российской Арктике.

Цели ISIRA включают:

- Инициирование и планирование международных исследовательских программ для решения ключевых задач в российской Арктике;
- Создание форума для обеспечения взаимодействия по текущим или планируемым двусторонним проектам;
- Содействие улучшению доступа научных групп к исследованию российской Арктики;
- Консультирование по вопросам финансирования и организации проектных исследований.

Деятельность включает в себя:

- Освещение международной научной деятельности и инициатив в Российской Арктике;
- Предоставление актуальной информации о политике, правилах и логистике в Российской Арктике;
- Поддержка российских и международных ученых, начинающих карьеру.

Результатами являются:

- Полный национальный перечень прошлых, текущих и планируемых международных и двусторонних научных проектов и инициатив в Российской Арктике;
- Отчеты о ежегодных встречах ISIRA, включая презентации молодых ученых, получивших поддержку IASC;
- Информация о доступе ученых в российскую Арктику.

Члены группы ISIRA

Председатель, Аркадий Тишков | Россия

Аннет Бартш | Австрия

Ханна Лаппалайнен | Финляндия

Юха Пекка Лункка | Финляндия

Хайдемари Кассенс | Германия

Йошихиро Иидзима | Япония

Луиза Киль Йенсен | Норвегия

Тадеуш Пастусяк | Польша

Борис Моргунов | Россия

Сергей Прямиков | Россия

Владимир Котляков | Россия

Анна-Мария Пертту | Швеция

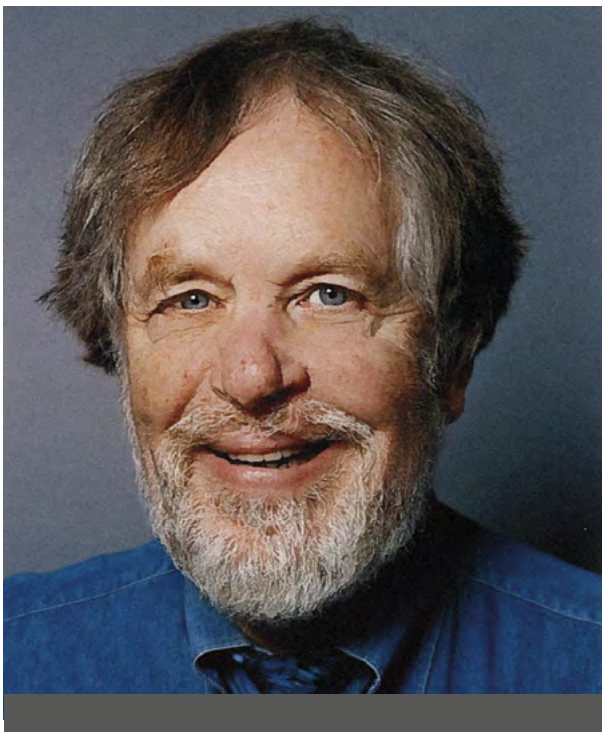
Габриэла Шаепман-Штруб | Швейцария

Гарет Рис | Великобритания

Владимир Романовский | Соединенные Штаты (входящий член)

Ли Купер | Соединенные Штаты (уходящий член)

Более подробная информация:
https://iasc.info/our-work/isira



IASC Medal 2024 Awarded to Dr. James Overland

The International Arctic Science Committee (IASC) awards the 2024 IASC Medal to Dr. James Overland (Pacific Marine Environmental Laboratory, National Oceanic and Atmospheric Administration, USA), for outstanding long-lasting achievements to improve interdisciplinary knowledge, particularly on the linkages between changes in the Arctic and the weather in mid-latitudes. As well as ensuring this information becomes widely available through his ability to present complex information in an accessible way and his critical role in the formation of the IASC Atmosphere Working Group.

Dr. Overland has been an active and world-leading contributor to Arctic research for more than 50 years. His early contributions in the 1970s and 1980s emphasized climate and sea ice variability in the Pacific sector of the Arctic. In the 1990s these contributions broadened to encompass impacts on Arctic marine ecosystems, including marine mammals. During the last decades, he has addressed pan-Arctic climate variations and trends and placed Arctic climate change into a global context with new knowledge on the Arctic Amplification and the Arctic-midlatitude linkages. Through his work on linkages, he has opened the eyes of politicians and the general public around the world to understand that what happens in the Arctic not only impact the Arctic system and its people, but that it has a huge impact on the rest of the world as well.

In addition to being an outstanding scientist, Dr. Overland has also provided outstanding service to the international community for many decades. He has been a lead author in both regional (e.g. SWIPA 2017) and global climate change assessment reports (e.g. IPCC AR5). He organized the IASC Atmospheric Working Group and served as a chair for six years. He also contributed to the initiation of MOSAiC, together with M. Tjernström (Sweden) and K. Dethloff (Germany), laying out the importance of multi-seasonal observations.

Through his excellent communication skills, he has brought scientific knowledge to broad audiences. His long-term dedication to the Arctic community and exceptional scientific work have provided significant inputs and will continue to contribute to understanding the Arctic in a global context through the legacy of his work.

Dr. Overland will deliver his **IASC Medal Lecture** with the title **"Climate Science: From the First International Polar Year to the Urgency of Arctic Extremes"** at the Arctic Science Summit Week (ASSW) 2024 in Edinburgh (Scotland, UK) and online on **26 March 2024** as part of the ASSW 2024 Science Day from **09:30 - 10:00 GMT / UK time**.

IASC would like to thank the 2024 IASC Medal Committee for their services: Margareta Johansson (Chair) (CWG), Sergi Pla-Rabes (TWG), Muyin Wang (AWG), Mark Inall (MWG and Alison Perrin (SHWG, IASC Fellow).

PHOTO: Dr. James Overland, photo courtesy of Dr. James Overland

IASC Award for Service 2024 – Prof. Dr. Markus Rex, Dr. Matthew Shupe and Prof. Dr. Klaus Dethloff

The Executive Committee of the International Arctic Science Committee (IASC) is delighted to present **Prof. Dr. Markus Rex**, **Dr. Matthew Shupe** and **Prof. Dr. Klaus Dethloff** with its **Award for Service** for outstanding achievements in planning and executing the unique international Arctic Ocean program Multidisciplinary drifting Observatory for the Study of Arctic Climate (MOSAiC) which is fundamental for our understanding of the Arctic and which will serve the international community with new data that was not previously possible to access.

Involving several hundred researchers from 20 nations, MOSAiC was the largest and most ambitious Arctic expedition ever undertaken. The mission and success of MOSAiC would not have been possible without the vision, leadership, and decade-long committed work of these three individuals. MOSAiC's goal was to undertake the first full annual cycle of in-situ observations of properties, processes, and interactions between coupled aspects of the Arctic system. The expedition was centered on the comprehensively equipped Polarstern research icebreaker as the primary measurement platform, which drifted 3,400 km between September 2019 and October 2020. This expedition allowed an unprecedented comprehensive dataset to be obtained, providing the first observational constraint on many aspects of the coupled Arctic system, particularly during winter. These data will allow the international science community to address real grand challenges in our ability to predict and respond to the threat of climate change, both in the Arctic and more widely. As of October 2023, more than 90 scientific papers have been published as a result of the expedition and more are in the pipeline. The successful execution and completion of MOSAiC has produced an immense force for Arctic science globally. The expected legacy of the expedition will continue to grow over time.

The achievements of the three awardees in ensuring the realization and success of the MOSAiC programme, developed under the umbrella of IASC, are unparalleled in their contributions to Arctic science, international cooperation, and community leadership.

PHOTOS:
- left: Prof. Dr. Markus Rex (photo courtesy, Prof. Dr. Markus Rex)
- middle: Dr. Matthew Shupe (photo courtesy, Dr. Matthew Shupe)
- right: Dr. Klaus Dethloff (photo courtesy, Dr. Klaus Dethloff)

The three awardees will deliver their **IASC Award Lecture** with the title **"The MOSAiC transpolar drift in the Arctic climate puzzle"** at the Arctic Science Summit Week (ASSW) 2024 in Edinburgh (Scotland, UK) and online on **26 March 2024** as part of the ASSW 2024 Science Day from **10:00 - 10:30 GMT / UK time**.

PHOTO: ALEKSANDRA OSIKA
A calving front of Hansbreen, Hornsund. Photo taken for the PhD project "History of glaciation of southern Spitsbergen in the Holocene" The aim of the fieldwork was geomorphological mapping of glacier forelands and collecting material for geochronological analysis.

PHOTO: ANTONELLO PROVENZALE, Consiglio Nazionale delle Ricerche (CNR).
Measuring summer CO_2 fluxes in the Svalbard tundra

2. IASC WORKING GROUPS

2. IASC Working Groups

Encouraging and supporting international science-led programs

IASC is engaged in all fields of Arctic research. Its main scientific working bodies consist of five Working Groups (WGs): Atmosphere, Cryosphere, Marine, Social & Human, and Terrestrial. The primary function of the WGs is to encourage and support science-led international programs by offering opportunities for planning and coordination, and by facilitating communication and access to facilities. Each WG is composed of up to two scientists from each IASC member country, appointed by the national adhering bodies.

All five IASC WGs are guided by scientific Work Plans which concisely articulate, with scientifically-driven high-level specifics not programmatic detail, how they will achieve IASC's vision over the coming years. These plans are meant to help Arctic scientists get involved in IASC activities, and it is expected that they will evolve in the coming years as the WGs continue with their work. These scientific foci are included in the WG sections which follow, and the full plans are on the IASC website (iasc.info).

The WG members are experts in their field that have an international reputation and are from different scientific disciplines so that the full range of Arctic research is represented within the WGs. Though the WGs are somewhat disciplinary, they also address crosscutting science questions by initiating activities that involve at least two WGs.

To this end, WGs are required to work together to use at least 40% of their funds in collaboration with paired funds from at least one other WG. In particular, IASC encourages projects that bridge the social and natural/physical sciences. IASC hopes that this will lead to closer cooperation, coordination, and teamwork across Arctic science disciplines.

More info: ***https://iasc.info/our-work/working-groups***

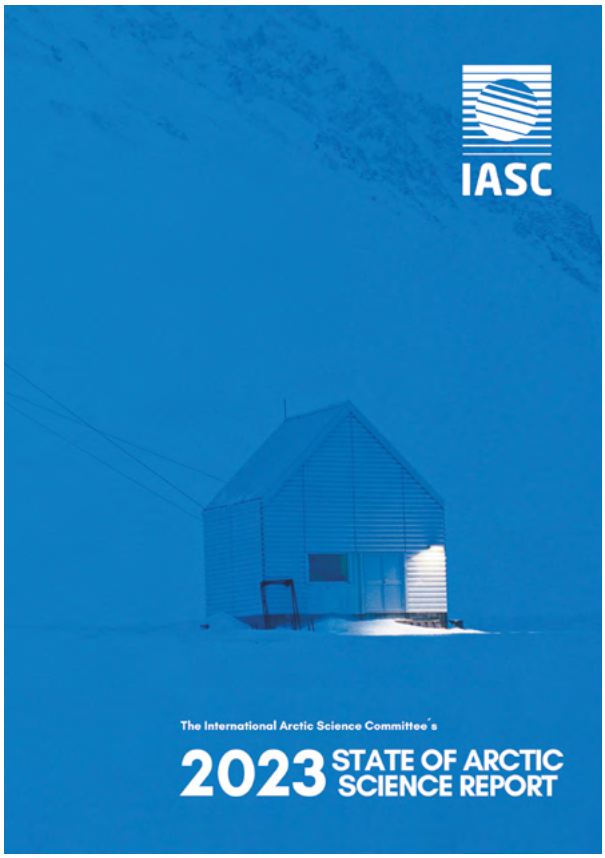
2023 State of Arctic Science Report

The IASC State of Arctic Science Report 2023 presents a cohesive synthesis of Arctic research activities and priorities with a large range of input and contributions touching upon all aspects of Arctic research. It is aimed at Arctic science agencies, managers, and users, including a wide range of decision-makers and policy-makers, to help all Arctic science stakeholders and rights- holders stay up to date on Arctic research

Published since 2020 by the International Arctic Science Committee (IASC), the report is updated by the members of several IASC or IASC-affiliated committees including the IASC Working Groups (Atmosphere, Cryosphere, Marine, Social and Human, Terrestrial); the International Science Initiative in the Russian Arctic (ISIRA); the Arctic Data Committee (ADC), and the Sustaining Arctic Observing Network (SAON).

The IASC State of Arctic Science Report series contributes an important resource to the Fourth International Conference on Arctic Research Planning (ICARP IV) process for the period of 2022 – 2026. Therefore, a wider range of contributors from the ICARP IV International Steering Committee also update the report during the ICARP IV Engagement Phase in 2023 and 2024. The content of the report is compiled by the researchers themselves and thus is not exhaustive. There are many other NGOs, IGOs, institutions, non-profits, Indigenous Peoples' organisations, private and public companies, and others around the world working in the Arctic knowledge space that are currently not participating in the preparation of this report.

IASC was founded in 1990 at a time of great geopolitical uncertainty, but also of hope, as a non-governmental, international scientific organisation, operating among its now 24 member countries. It works on a consensual basis to encourage and facilitate international cooperation in all aspects of Arctic research, across all countries engaged in Arctic research, and in all areas of the Arctic region. IASC is a connector – connecting scientists and other knowledge holders across international, disciplinary, and cultural boundaries and connecting those who do research with those who apply the outcomes of research to inform solutions to Arctic challenges. While the challenges for Arctic research due to the Covid-19 pandemic in the last three years have now largely eased, the geopolitical situation that has arisen as a result of Russia's actions in Ukraine continues to create further



short-term and also long-lasting uncertainties for research in the Arctic. The situation is seriously affecting international scientific collaborations and the ability of the international scientific community to carry out research and observations across vitally important areas of the Arctic.

The impacts on scientific collaboration, data exchange and publications, conferences and events, travel and fieldwork, maintenance of experiments and long- term monitoring stations, exchange programs and secondments, funding decisions and international research expeditions are profound. The consequences are felt by national and international researchers of all career stages, however some of the greatest impacts are experienced by the Indigenous Peoples of the Arctic, many of whose lands, waterways, relations, hunting and gathering grounds, and communities span national boundaries.

The work of the Arctic Council, to which IASC is an observer, restarted with limited collaboration in June 2022,

PHOTO: SAS Report, Cover photo by Teugsu Shin

when seven Arctic nation states resumed limited continuation of projects and cooperation without Russian participation, based on the work plan that all eight Arctic nation states had approved in 2021, while the Russian Federation continued to implement its chairmanship program domestically. 4 In May 2023, during the 13th Arctic Council Meeting, Norway took over the Arctic Council Chairship for the period of 2023 to 2025, with a focus on promoting stability and constructive cooperation in the Arctic. In late August 2023, a consensus was reached by the Arctic States, in consultation with the Permanent Participants, on guidelines to resume the work of the Arctic Council at the Working Group level using written procedures. It is expected that work in the Council will further resume, albeit on a limited scale, when more details about the Norwegian Chairship activities are published. Research in the Arctic relies on international collaboration, access, and continuous monitoring and data sharing among all regions of the Arctic to understand and to effectively respond to the climate crisis and other challenges in the Arctic.

The principles of scientific freedom, research independence, and peaceful international cooperation are vital for researchers, Indigenous Peoples, and many others who are working together to understand and respond to the ongoing pressing climate, environmental, resource and social changes and challenges across the Arctic. Due to these rapid changes in the Arctic, there are intricate links to near-term and long- term stewardship, security, and human-rights concerns of many nations involved in Arctic research, Indigenous Peoples, and the broader global community. Those involved in Arctic research must continually adjust to the new challenging realities in forming partnerships and in creating meaningful international Arctic science collaboration. In looking for ways to continue to work effectively in the future, the annual IASC State of Arctic Science Report is a crucial tool for IASC to identify and prioritise common areas of interest. It will also assist in monitoring the practical effects of the new realities on Arctic research and collaboration over the coming years.

Email *info@iasc.info* and find out more about IASC at *iasc.info*.

The 2023 State of Arctic Science Report and previous years reports available at:

https://iasc.info/about/publications-documents/state-of-arctic-science

IASC Cross-Cutting Activities

Recent Activities

For updated information, please check the IASC website: iasc.info

Atmospheric rivers and the onset of sea-ice melt (ARTofMELT)

When: 11 - 13 October 2022
Where: Stockholm, Sweden
IASC Working Group: AWG, CWG, MWG

What happens as the surface of the Arctic sea ice begins to melt? What are the most important processes at play? And is the timing of the melt tied in with intrusions of warm and moist air from the mid-latitudes? Those are some of the questions that will be addressed by the ARTofMELT (Atmospheric rivers and the onset of Arctic melt) expedition on the Swedish research icebreaker Oden in spring, departing from Longyearbyen on 7 May and returning on 15 June, 2023. With support from IASC, ARTofMELT held a workshop at Stockholm University 11-13 October, 2022, attended by about ~40 participants in person with a handful on line. The workshop started with a half-day open science symposium in collaboration with the Bolin Centre of Climate Research (BCCR), then went through all the suggested work packages, suggested science targets and logistical needs, and ended with breakout groups laying the foundation for the logistical planning. The workshop was a great success, and was in addition to IASC also supported by the International Meteorological Institute (IMI), the BCCR and the Swedish Polar Research Secretariat (SPRS). IASC travel funding made it possible to invite 5 Early Career Scientists, three from the US, one from UK and one from Germany, that will now participate in the expedition.

Understanding and being able to correctly model the onset of the melt is important for forecasting on scales from months and seasons to decades. ARTofMELT is intending to provide observations to facilitate the understanding that will be the scientific underpinning for improved climate and weather-forecast models. Two things are unusual with ARTofMELT; the timing and the navigation strategy. Icebreaker expeditions into the Arctic Ocean most often happens in late summer or early autumn, simply because there is less sea ice and the ice is also easier to break. As a consequence, there is much more observations of the fall transition than of its spring counterpart. But with the target to study the annual spring transition, from a frozen to a melting Arctic, it follows one has to be there when this happens – in spring! Atmospheric river is a nick-name for filaments of warm and often moist air entering into the Arctic from farther south, and are driven by weather systems. Limited extent and the sporadic nature make it more or less luck to observe one with an expedition that is either stationary or follows a preplanned route. Therefore, we instead plan to use so-called ensemble weather forecasts at a lead times of 5-7 days, to give us information on where and when atmospheric rivers are expected. Then we will simply move the Oden to the indicated position and wait. Rather than relying on one single forecast, ensemble forecasting summarize output from a large number of similar weather forecasts, all with slightly different initial conditions sampling observation and model uncertainty.

Highlights:

- This strategy also means that deploying instruments on the ice must be in a mobile fashion, so that instruments that can be quickly retrieved, and most observations will be carried out from onboard or from airborne sensors.

- We intend to take observations in a column extending from the upper ocean, through the ice and up through the atmosphere, with an emphasis on the lowest kilometer, using both in-situ and remote sensing instruments.
- The focus for these observations will be on the processes responsible for energy fluxes between the three systems.

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Glacier - atmosphere interactions in a warming and wetting Arctic

When: 26-28 January 2023
Where: Obergurgl, Austria
IASC Working Group: AWG, CWG

In late January scientists with an interest in glaciers and climate gathered in a beautiful winter setting in Obergurgl, Austria. The IASC Network on Arctic Glaciology meeting included a cross-cutting activity on "Glacier – atmosphere interactions in a warming and wetting Arctic" together with a general workshop on the dynamics and mass budget of Arctic glaciers. The full meeting comprised 2,5 days of scientific presentations, discussion sessions, an open forum discussion and a poster session, and was attended by 45 participants from 14 countries, of which 23 were early-career scientists. A total of 29 talks were given, also livestreamed via Zoom, and 11 posters were presented. Thanks to funding from IASC we could provide travel support for 12 early career researchers and two keynotes!

The general workshop included stimulating sessions on glacier mass balance, glaciers dynamics, glacier hydrology and glacier calving and frontal ablation. The cross-cutting activity consisted of two oral presentation sessions, followed by a cross-cutting discussion session. A poster session covered both the cross-cutting and general workshop theme. Two keynote lectures were given on the resilience of Greenland firn to climate warming (Brice Noël) and North-Atlantic cooling and the impact on Icelandic glacier mass balance (Gudfinna Adalgeirsdottir). Other presentations in the cross-cutting theme among others discussed turbulent heat and moisture fluxes over a glacier surface (Maurice van Tiggelen, Maiken Kristiansen Revheim), the Greenland Cli-

PHOTO: ERIKA BRUMMELL - IASC NAG Group Photo, 2023

mate Network (Andreas Ahlstrøm, Jason Box), and the history of climate change work in Greenland (Jakob Abermann). Other studies looked into climate impacts on glaciers in Norway (Liss Andreassen) and the Canadian Arctic (Danielle Hallé). The cross-cutting discussion focused on how we can improve collaboration between modellers and observers and between glaciologists and meteorologists. Discussion points e.g. included 1) how we can improve the representation of glaciers and ice sheets in regional climate models and earth system models, 2) changes in large-scale circulation patterns and the impact on glacier mass balance, 3) rain-on-snow events and the impact on snow, firn and runoff, 4) remote sensing and in-situ observations of precipitation and snowfall on Arctic glaciers.

Scientific highlights:

- North Atlantic cooling is responsible for mitigation of Icelandic glacier mass loss until the mid-21st century. On the Greenland Ice Sheet refreezing of melt water is a significant buffer against mass loss in a warming climate, which however will peak around 2100. [Brice Noël, Gudfinna Adalgeirsdottir]
- The combination of recent remote sensing data and historical meteorological, ablation and snow line observations facilitate the analysis of long-term climate impacts on Greenland's mass balance [Jakob Abermann, Jason Box]
- Whereas extreme melt summers lead to the formation of thick ice layers in Greenland's accumulation area, significantly altering runoff, a contrasting reduction in ice layers is found in the Canadian Arctic [Horst Machguth, Nicole Clerx, Danielle Hallé]

Project Lead

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AGORA (A collaborative Arctic research community assessment of interactions between global change drivers, societies and subsystems through space and time)

When: ASSW2023, February 2023
Where: Vienna, Austria
IASC Working Group: AWG CWG, SHWG, TWG

The Agora workshop (a collaborative Arctic research community assessment of interactions between global change drivers, societies and subsystems through space and time) creates the arena to bring together researchers from different disciplines (from social sciences to data analysis), indigenous people, and people that have an interest in the consequences of GC in the Arctic system (e.g. think-tank attendees). Unfortunately, the Agora workshop did not get any policymaker participants, although one attendee was a policy expert. However, Agora supported 6 ECRs, and a Yup'ik (Alaska) to be part of Agora. In addition, it was attended by ~30 participants, which enabled a vibrant discussion of science, environmentalism, and how to enact change across scales.

Our workshop started with presentations from participants to showcase the diversity of research approaches and expertise in the room (Goal 1 - Integrating scientific research across disciplines). Next, we formed a group circle to begin discussing approaches to interdisciplinary research approaches. After hearing some good advice from experienced researchers, we had two suggestions from the audience that shaped the rest of our workshop. First, was the idea of "community" which was proposed by our indigenous ECR (Aisha), who provided a powerful testimony of what climate change looks like first-hand in her village. Although we had already been around the

room and introduced ourselves using "traditional" titles and affiliations, Aisha asked us to identify further how we got to our current positions, which is more in line with introductions among indigenous peoples (i.e., who are your people; what do you do?).

Next, we had another participant who challenged the proposed framework of our workshop, stating quite rightly that our approach was business as usual and didn't account for or enable the rapid progress and research-community integration needed to bring about timely change in the Arctic. While taking a direction other than our original intent, we ultimately accomplished goal #2 of our workshop, which was to identify multidisciplinary perspectives for Arctic research focused on both enacting change in our local, regional, and global communities, with the idea that even small changes can lead to "social tipping-points," or rapid changes in public perception that may lead to sweeping changes in the way that we respond to the threat of global climate change.

Our workshop did less than expected to forward our overall goal, that is, increasing the spatio-temporal scope of Arctic environmental understanding through the use of historical and paleoenvironmental perspectives. This was partly because most participants were not historians or palaeoenvironmental scientists. Work on the third goal of our workshop, to compose a synthesis article on this subject will continue to proceed following the conference, but given the feedback of workshop participants following our meeting, it is clear that our workshop was an unqualified success with respect to the overall purpose of AGORA, which is to serve as a "community meeting place" where people from the IASC community come together to discuss ideas about how to work together to address Arctic change. Below is feedback from conference participants showcasing these results, but overall, most participants agreed that this was one of the more enjoyable and unique experiences they have had in a scientific workshop and wished for more open conversations like this to take place at future meetings.

This workshop encouraged further work towards making concrete steps, no matter how small, towards spreading the word about the rapid environmental changes currently underway in the Arctic and promoting the immediacy in which changes are needed both by scientists and the public to address this great challenge

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Co-creating Arctic Research together with Indigenous Rightsholders – Workshop at ASSW2023

When: ASSW2023, February 2023
Where: Vienna, Austria
IASC Working Group: AWG MWG, SHWG, TWG

What is "decolonial research methodology"? How can Arctic research meet societal needs and how can science step out of the ivory tower and legitimise its activities in the Arctic, which is also the homeland of Indigenous people? These are the foundational questions that are currently discussed in Arctic research under the keyword "co-creation of knowledge". This has become increasingly a prominent concept within the Arctic research community across all disciplines and within the different IASC working groups. However, it is not always clear what this collaborative process of creating knowledge through research partnerships with Indigenous rights holders and other societal stakeholders exactly means. Even more so, it is often obscure how to

implement this approach into actual research practice, especially (but not only) in natural sciences, which do not necessarily and not always understand themselves as sciences in which the engagement with local and Indigenous people in the field sites is part of their methodological approach to create added value. Exactly this practical side of the topic was discussed during the 3-days ASSW workshop, co-funded by IASC.

One of the recommendations of ICARP III was to improve the process of co-creation of knowledge, which describes a collaborative and transdisciplinary form of knowledge generation about, from and for the Arctic. It is an approach that aims to empower, and ensures that all participants benefit equally from the knowledge produced. Unlike traditional research approaches, co-creation seeks to design research in a way that uses genuine collaboration between different knowledge systems. By leveraging the strengths of Indigenous and non-Indigenous ways of knowing, the co-creation of knowledge can help to create more holistic and inclusive research outcomes that benefit all involved (see also Hermann et al. 2023).

This workshop, organised by the 'CO-CREATE initiative' discussed intensely how to develop meaningful and longer-term involvement platforms for Indigenous early career researchers and Indigenous communities and people as partners in international research communities. The aim was to develop recommendations for co-creating research projects with a focus on fully fledged participation of Indigenous rights holders, Indigenous communities and individual Indigenous partners. We exchanged ideas, discussed problems, shared good practices, promoted co-create methodologies and brainstormed on how to influence funding agencies. This happened in one public workshop day and two days of a closed workshop with around 30 participants.

We developed 3 key outputs:

- We have formed a writing group that uses the input of these workshops and other important documents produced by the CO-CREATE initiative (like the roadmap to decolonial Arctic research [Hermann et al, 2023]) for developing concrete recommendations for the ICARP IV process and the next IPY and in general, to feed very actively into ICARP process by generating a roadmap and accompany this document with a short statements (timeline: till december 2024)
- Create a toolbox/resource box on existing research / co-creation protocols and guidelines, collect videos already existing on the topic, podcasts, etc.. This will become useful piece of information for people hesitant and insecure how to start co-creation with Indigenous communities.
- Educational intervention. How to get established, powerful researchers to talk and think about these things? Provide tools to get new perspectives, self-reflection (reflect on your own positionality)

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Race and systemic bias-cross-cutting workshop 2023

When: ASSW2023, February 2023
Where: Vienna. Austria
Working Groups: AWG, CWG, MWG, SHWG, TWG

In 2020, the IASC Council released a statement on Race and Systemic Bias in Arctic Sciences. They noted that:

"Arctic science still suffers from systemic biases that marginalize and exclude people who are Black, Indigenous, or from other under-represented minorities both in the Arctic region and around the world. Racism takes many forms – from the overt to the subtle or unconscious. Systemic racism can and does silence people, devalue their contributions, and exclude them from Arctic science. Changes to remove systemic racism and bias will require work on all levels, from the individual to the institutional." In order to build on this statement, a group of IASC fellows made a request to hold a workshop to tackle this issue further. Originally planned to be held in 2021 but delayed due to the ongoing travel issues related to the COVID-19 pandemic, the workshop was held at the beginning of ASSW 2022. The day was planned by Sammie Buzzard (IASC Cryosphere Fellow 2020) in collaboration with Polar Impact and Inclusion in Northern Research. The workshop began with two Polar Impact members sharing their personal experiences of working in polar research. Kimberly Aiken (University of Tasmania) joined us virtually to share both her PhD research, which focuses on the intersection of race (racial diversity) and gender in expeditioner recruitment in the Australian Antarctic workforce, and her personal experiences. Caleb Walcott (University of Buffalo) then shared some of Polar Impact's ongoing activities, and invited those present to join and support them. The second session was led by Jamie Bell (Inclusion in Northern Research) who joined us live from the Canadian Arctic. Despite to it being a national holiday in Canada, Jamie was able to share a variety of projects and reflections from their grassroots initiative via a series of videos which led to interesting discussion. The final session of the workshop was dedicated to discussion around routes that IASC, and the Arctic research community in general, could take to make our community a more inclusive space. Ideas included:

1. **Establishment of an EDI (Equity, Diversity and Inclusion) action group**
   This workshop was only the first step for IASC, and a dedicated group of people is needed to continue this work with support and membership of the council.
2. **Funding structure and opportunities**
   While we appreciate the need to progress the interests of countries that fund IASC, this can be prohibitive in terms of increasing diversity. We recommend as a priority to open IASC fellowships beyond membership countries.
3. **Activities and collaboration**
   The planning of explicit sessions solely for EDI during the ASSW program will promote and allow attendance. Conference delegates should not have to choose between science sessions or business meetings, and timetabling sessions at the 'edges' of the conference program also makes attendance more difficult.
4. **Fieldwork access and partnership:**
   IASC are in the ideal position to provide leadership and resources for access to fieldwork.
5. **Education:**
   IASC should lead on encouraging universities and scientific organisations to educate students and employees about discrimination issues (e.g. workshops) and their impact on day-to-day work.
   A detailed version of these recommendations was presented to the IASC council during their May 2023 meeting.
   Sammie would like to thank Polar Impact and Inclusion in Northen Research, without whom we would not have had a workshop and numerous IASC fellows and community members for feedback in the application and planning stages. IASC funding made it possible for Polar Impact to participate and for three early career researchers to attend the workshop and subsequent ASSW activities

Project Lead

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Towards Sustainable Infrastructure: Environmental, Technological, and Societal Impacts of Development in the Arctic

When: ASSW2023, February 2023
Where: Vienna. Austria
Working Groups: CWG, SHWG, TWG

The IASC community workshop "Towards Sustainable Infrastructure: Environmental, Technological, and Societal Impacts of Development in the Arctic" held at ASSW 2023 in Vienna and online, became one of the key events in the long history of the interdisciplinary research network RATIC ("Rapid Arctic Transitions due to Infrastructure and Climate").

The workshop, convened by Olga Povoroznyuk (University of Vienna) and Howard Epstein (University of Virginia) kicked off with a poster session and a networking luncheon attended by RATIC members and friends, where early career scholars presented their recent research in the Arctic. Two following scientific sessions opened with an introduction by the conveners on the background and goals of the workshop and featured multiple project presentations by social and natural scientists and architects on a variety of infrastructure-related topics. The scientific part of the workshop was rounded up by Sandy Starkweather's presentation of the 4th International Conference on Arctic Research Planning (ICARP IV) and Skip Walker's talk about the past and the future of RATIC in connection to the ICARP process and beyond. The workshop finished with a lively open discussion on the next steps in interdisciplinary research on Arctic infrastructure and the role and format of the RATIC.

All in all, over seventy in person and twenty online participants from sixteen countries, including Arctic residents, Indigenous peoples, early career and advanced stage scholars, artists, research funding and policy agencies, attended the workshop. They contributed to the truly interdisciplinary and international debates about social, environmental, technological and other aspects of Arctic infrastructure in the context of permafrost thaw, resource extraction and urban and industrial development.

The main takeaways from the workshop can be summarized as follows:

- Infrastructure should remain one of the central topics of interdisciplinary Arctic research, especially in the context of environmental changes and technological solutions for increased sustainability and communities' well-being
- Such research should rely on even stronger involvement of Indigenous and local stakeholders, and participation of architects and artists, as well as industrial players and development agencies
- RATIC's revisited mission and format, seen in the broader context of the ICARP process, will be formulated in a position paper and discussed at the next workshop planned for the ASSW 2025 in Boulder, Colorado.

More information about the workshop, including the agenda, presentation slides and recording of the event, is available at the RATIC's website:
https://www.geobotany.org/ratic/workshop2023.php

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Gordon Research Conference and Seminar for Polar Marine Science 2023

When: March 5 - 10, 2023
Where: Ventura, CA, USA
IASC Working Group: CWG, MWG

During 5-10 March 2023, the 13th Gordon Research Conference on Polar Marine Science (GRC) was held in Ventura, CA, USA. The GRC is a bi-annual international conference providing a key forum for the Arctic and Antarctic research communities to discuss marine research of international polar priority. The 2023 Gordon Research Conference (GRC) focused on "Integrating Ocean Physics and Biogeochemistry to Assess Polar Ecosystem Sensitivity to Rapid Change". The program was composed of an international collection of world-leading, gender-diverse scientists at various career levels that are actively engaged in research on polar marine systems, both in the Arctic and the Southern Ocean. The GRC comprised 9 discussion sessions covering various topics including polar ocean and sea ice physcis, marine food webs, effects of multiple stressors on pelagic and benthic biota, as well as climate change impacts on Arctic communities (see: *https://www.grc.org/polar-marine-science-conference/2023/*). The GRC provided a forum to present and discuss new data, cutting-edge ideas and multidisciplinary approaches with experts from different fields of polar sciences, and participants from both the Arctic and Antarctic marine research communities. The GRC conference was attended by 115 registered participants, most of them (54%) being early career scientists (ECS).

The 2023 GRC was preceded by the Gordon Research Seminar (GRS, 52 participants), a dedicated 2-day ECS-organized and ECS-chaired forum, and comprising mentorship activities as well as scientific sessions aimed at

PHOTO: IVO FABIO BECK, PhD student at the Extreme Environments Laboratory at EPFL, Switzerland. Light is coming back. The RV Polarstern moored on an ice flow at the end of Leg 2 of the MOSAiC expedition. Location: Central Arctic Ocean, 88º06'N 30º24'E

facilitating ECS peer-to-peer interaction. The full GRS program is available at: *https://www.grc.org/polar-marine-science-grs-conference/2023/*.

As one of the first larger international polar marine science conferences after the pandemic, the GRC/GRS provided a wonderful opportunity for the community to meet, exchange novel ideas and develop new collaborations. The GRC and GRS formats facilitated informal exchanges during joint meals and afternoon breaks in the program, that participants used for social activities such as beach walks and sport activities. For many attendees, it was their first participation in a Polar Marine Science GRC/GRS, and many expressed an interest to attend the next meeting planned to be held in Italy in March 2025.

Highlights:

1) The Gordon Research Conference on Polar Marine Science 2023 provided a forum to discuss leading-edge interdisciplinary and international research to better understand polar regions.

2) The biennial conference helped capacity and community building, and strengthened international research collaborations between Arctic and Antarctic researchers.

3) The associated Gordon Research Seminar provided a unique training opportunity by allowing early career scientists to closely interact and network with their international peers and mentors across several disciplines.

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IGS International Symposium on Sea Ice Across Temporal and Spatial Scales, June 2023, Bremerhaven, Germany

When: 4 – 9 June 2023
Where: Bremerhaven, Germany
IASC Working Group: AWG, CWG, MWG

Experts discuss rapidly changing Arctic and Antarctic sea ice. Between June 4 and 9, 2023, almost 300 scientists from all around the world and from all career stages gathered in Bremerhaven, Germany, to discuss causes and consequences of the rapidly changing Arctic and Antarctic sea ice cover. This international sea ice symposium takes place every 4 to 5 years and was organized by the International Glaciological Society (IGS). As suggested by the theme of the symposium of "Sea Ice across Temporal and Spatial Scales" plenary keynote talks, thematic sessions, and presentations covered every physical and biological aspect of sea ice, from the microscale to the macroscale, and from diurnal to decadal changes. Of much interest are the long-term shrinkage of Arctic and the recent drops of Antarctic sea ice. These challenge our process and system understanding and our predictive capabilities and call for highly interdisciplinary research. Symposium participants learned about new observational advances and new modeling approaches, including field campaigns and satellite missions, and results from the IASC supported MOSAiC project. The symposium had an exciting social program with icebreaker reception, excursions, and a barbeque on the beach of the Weser river, providing great opportunities for meeting old and new friends and extending one's network. The weather was brilliant the whole week. We are grateful for the sponsorship by the Cryosphere, Atmosphere, and Marine Working Groups of IASC who provided substantial travel support for 18 Early Career Scientists (ECS). ECS also received awards for the best oral and poster presentations, and were celebrated during the symposium banquet.

More information can be found on the symposium website at:

https://igs2023.awi.de/

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4th International PalaeoArc Conference and NORDQUA Excursion 2023

When: 27 August – 2 September 2023
Where: Akureyri, Iceland
IASC Working Group: CWG, MWG

The Nordic World has strong ties and a long history of Arctic Quaternary and climate science. The Nordic Union for Quaternary Research (NORDQUA – est. 1974) and PalaeoArc (along with its predecessor networks; PONAM 1989-94; QUEEN; 1996-02; APEX 2004-12; Past Gateways 2012-18) are clear evidence of this legacy. PalaeoArc is an international research network (2019-2025) with scientific aims that parallel the overall goal of IASC to enhance knowledge and understanding of the Arctic, and provide advisory data and results to the international society.

PalaeoArc strives to understand climatically induced environmental changes in the Arctic from the Quaternary to present, following four themes focusing on the dynamics of 1) Arctic ice sheets, ice shelves and glaciers, 2) high latitude oceans and sea ice, 3) the terrestrial environment and landscape evolution, and the 4) climat-

ic response to, and interaction between, these parts of the Arctic system. Annual international conferences are organized in different countries (2019 Poznán, Poland; 2021 Pisa, Italy; 2022 Rovaniemi, Finland; 2023 Akureyri, Iceland), gathering young and senior researchers working on diverse topics in Arctic science from marine, terrestrial and cryosphere perspectives. NORDQUA is the Nordic Union for Quaternary Research with the goal of encouraging interdisciplinary cooperation and networking among Quaternary scientists in the Nordic countries through joint field excursions and symposia.

For the first time in history, the Nordic Quaternary Community gathered in North Iceland for The 4th International PalaeoArc Conference and the 2023 NORDQUA Excursion. The gathering attracted >60 researchers and academics (from students and earlier careers to senior scientists and Prof. emeriti) from all Nordic nations as well as the United Kingdom, Spain, Poland, Germany, Singapore, the US and Canada. The conference brought together scientists from different countries and career stages, and from different disciplines in Arctic science. This includes marine and terrestrial researchers, working either with field data or on numerical modelling approaches. The glue that merges all is the quest for knowledge of past environmental processes and change in the Arctic; given this is the key to understanding the present and future of the Arctic.

Between two full days of stimulating scientific presentations (oral and poster) a Mid-Conference Field Excursion was taken to Iceland's best kept Quaternary secret – The Tjörnes beds. In Iceland's finest autumn weather, participants could marvel at the classic site which exhibits the North Atlantic´s fossiliferous transition from Pliocene warmth to Pleistocene glaciations, and the onset of the Quaternary geological period. The sequence records the migration of Pacific species into the Atlantic following the opening of the Bering Strait oceanic gateway. Furthermore, the sequence transitions into alternating beds of (glacial) diamictite with volcaniclastic sediments and basaltic lava flows. The Pleistocene sequence is believed to include 14 (glacial) tillites with the oldest roughly 2,5 Ma. The conference was closed with a panel discussion on knowledge gaps, urgent research topics, and the future of PalaeoArc. IASC Summary Report: PalaeoArc – NORDQUA 2023

Following the PalaeoArc Conference, the 2023 NORDQUA Excursion showcased Northern Icelands glacial, sea level, climatic and volcanic history through regional day trips. Trip 1: The alpine glacial landscapes and slope instabilities of the Tröllaskagi Peninsula. Trip 2: Signatures of deglaciation dynamics, ice-lakes and their tephrochronological age control in Fnjóskadalur. And Trip 3: Geomorphological fingerprints of fast-flowing ice streams within the Iceland Ice Sheet in Bárðardalur. A total of 39 people participated in the excursion, making it the largest NORDQUA excursion at least since 1987 and possibly since the foundation of the union.

The gathering was a success and provides a marker point in the history until the following NORDQUA Gathering at the Nordic Geological Winter Meeting (Gothenburg, Sweden Jan. 2024) and the planned 5th and 6th International PalaeoArc Meetings (Stockholm, Sweden May 2024 and Tromsö, Norway 2025).

Subsidy for Early Career Researchers provided by IASC allowed for a more financially accessible gathering In Akureyri, North Iceland.

Scientific highlights

- Over 60 interdisciplinary researchers gather to present and discuss past and present environmental changes in the Arctic based on terrestrial and marine records.
- Panel discussion of knowledge gaps and approaches to fill them in.
- Invitations to conference attendees to submit scientific contributions to the PalaeoArc special issue in the Boreas journal with a deadline of 1st September 2024. Publication anticipated 2025.

Interdisciplinary Polar Studies (IPS-2022) Modular Meeting: Arctic Amplification-Glaciers-Environment

When: 30 August – 4 September 2023
Where: Longyearbyen, Svalbard
IASC Working Group: AWG, CWG, MWG

Interdisciplinary Polar Studies (IPS-2023) Modular Meeting: Arctic Amplification-Glaciers-Environment consists of a two days scientific conference at UNIS in Longyearbyen and field workshops within Isfjorden and Hornsund Fjord areas.

The event gathered over 60 polar scientists from Canada, the Czech Republic, Denmark, Great Britain, Spain, India, Italy, Norway, Poland, Romania, Sri Lanka, Switzerland and the USA. It was one of the meetings to spark creative thinking on interdisciplinary studies and a grasp of the warming Arctic.

The IPS-2023 conference was organized by the Centre for Polar Studies, University of Silesia in Katowice, in co-operation with the Institute of Geophysics and Institute of Oceanology, Polish Academy of Sciences, Svalbard Integrated Arctic Earth Observing System (SIOS), The University Centre in Svalbard (UNIS), International Arctic Science Committee (IASC), Association of Polar Early Career Scientists (APECS), Polish Polar Consortium and Committee on Polar Research, Polish Academy of Sciences.

The primary motivation and goal of the IPS-2023 were (1) to strengthen a holistic approach to studies and a better understanding of environmental changes due to the accelerated warming of the Arctic and (2) to prepare the new generation of scientists for creative involvement in the 5th International Polar Year 2032/2033 by active participation in the IASC ICARP IV (2025) process and the ongoing Ocean Decade (2021-2030) programme.

The scientific sessions provided novel advantageous insights into the dynamically changing Arctic.

[1] session **"Amplification of Arctic warming"** revealed the interconnected nature of the Arctic system. The discussions underscored the cascading effects of temperature anomalies, ocean heat content variations, and sea ice dynamics on the Arctic environment. Key insights included the potential impacts of changing Arctic Ocean loops, the role of meltwater in carbon dioxide uptake, and the diverse ecological consequences of climate change, from noise pollution affecting marine mammals to the thriving invasive alga Vaucheria aff. compacta. The presented findings emphasized the urgency of further research to understand and address the multifaceted challenges arising from climate change in the Arctic.

[2] session **"Shrinking glaciers and thawing permafrost"** provided insights into the profound impacts of global warming on Svalbard's environmental dynamics. The session highlighted the intricate relationships between glacier melt, atmosphere circulation, and marine ecosystems, emphasizing the urgent need for understanding and addressing climate-induced changes. The discussions underscored the challenges in modeling glacier behavior, the importance of recognizing biogeochemical processes, and the advanced environmental transformations in the High Arctic, calling for continued research to enhance our cognition of Earth's systems in the face of ongoing climate change.

[3] session **"Looking into the future – The IPY 2032-2033 challenge"** highlighted the vulnerability of marine-terminating glaciers to climate change, emphasizing the need for international collaboration to advance our understanding of these critical components for increasing sea level rise. The session also addressed environmental concerns, such as heavy metal contamination from melting glaciers, emphasizing the importance of monitoring programs in Svalbard to comprehend the interplay between atmospheric impurities and climate-induced changes. Furthermore, the discussions underscored the significance of understanding the po-

lar environment for space science and the urgency of implementing long-term adaptation plans to mitigate risks posed to Arctic communities by ongoing climate warming.

The panel discussions "Ignite session of discussions on the ICARP IV priority themes" allowed us to draw the following key takeaways:

- The collaborative prioritization of Arctic research themes with engagement across disciplines and the inclusion of traditional knowledge;
- The need for interdisciplinary collaboration, secure satellite observation networks, and community involvement to address knowledge gaps and navigate political challenges;
- The increasing interdisciplinarity in Arctic research with a focus on feedback mechanisms within the Arctic system, open data principles, and the emerging concept of "digital twins."

The audience posed queries ranging from the challenges faced by young researchers to the justification of the environmental footprint of polar research. Scientists acknowledged these challenges, emphasized the importance of international collaboration, and outlined initiatives to minimize environmental impact. The role of young researchers in addressing environmental issues and the significance of citizen science in polar research were underscored.

The field workshops during IPS-2023 explored Svalbard's diverse environments, offering participants firsthand experiences at key scientific sites. Visits to the Polish Polar Station in Hornsund and Isfjorden, the Hansbreen glacier, and the Petuniabukta Polar Station facilitated insights into glaciological changes, oceanological monitoring, and cultural heritage. The alternative workshops in Billefjorden and Adventdalen enriched the understanding of central Spitsbergen's landscapes and glaciers, highlighting the importance of on-site experiences in enhancing scientific knowledge and fostering interdisciplinary discussions.

Climate change, particularly in the Arctic, is driving significant environmental changes. These changes impact various aspects of the region, including glaciers, marine ecosystems, atmospheric impurities, hydrology and biodiversity. The conference findings emphasise the complexity of these interactions and highlight the importance of interdisciplinary research, international collaboration, and long-term adaptation planning to address the challenges posed by ongoing climate warming in the Arctic.

IPS-2023 showed the enthusiasm of young researchers in adopting a multifaceted and holistic approach to studying the rapidly changing Arctic environment and their eagerness to engage in the ICARP IV process and contribute to shaping the 5th IPY program!

Project Leads

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Arctic PASSION-APECS Sharing Circle for early career scientists and Arctic Youth

When: 2 – 6 October 2023
Where: Sevettijärvi and Inari, Finland
IASC Working Group: SHWG, TWG

Early career professionals and Arctic youth are the bridge builders for future Arctic collaboration. The APECS & Arctic PASSION Sharing Circle initiated a close dialogue among the next generation of Arctic stakeholders and research leaders.

Early career professionals and Arctic youth are the bridge builders for future Arctic collaboration. The APECS & Arctic PASSION Sharing Circle initiated a close dialogue among the next generation of Arctic stakeholders and research leaders. Growing up in a world of global challenges, Arctic youth and early career professionals have the power to create positive change for the future. The Arctic benefits from a close dialogue between Arctic youth, young professionals and early career researchers working and living in the Arctic. The Association of Polar Early Career Sciences (APECS) and the EU project Arctic PASSION fostered this dialogue by inviting eighteen participants from 9 countries to a Sharing Circle in Sevettijärvi and Inari, Northern Finland, from 2-6 October 2023.

The EU project Arctic PASSION is working with a diverse group of Arctic rights holders and stakeholders towards co-creating a coherent, integrated Arctic Observing System, based on intercultural collaborations and equality of different knowledge systems. The Association of Polar Early Career Scientists (APECS) is offering education and training activities in the frame of Arctic PASSION by addressing the young generation. With the support of IASC funds, we organised an event to create a deeper understanding of the Arctic and its people, the intercultural and transdisciplinary complexity of the Arctic, and the value of sharing experiences and knowledge in collaborations. The Finnish NGO Snowchange Cooperative, partner in Arctic PASSION, built an essential part of the Sharing Circle by sharing their knowledge and experiences about the local Skolt Sámi culture and indigenous-led and co-managed environmental restoration projects of the region. The Sharing Circle was hosted at the Sanila's Reindeer Farm, a Sámi family-run accommodation that shone with hospitality and warm-hearted souls.

"The Sharing Circle was a unique combination of outdoor excursions to Snowchange rewilding and restoration sites, balanced with indoor discussions and presentations in the kota hut, a circular-shaped wooden grillhouse at the reindeer farm. This structure meant that the conversations we had in the cabin were contextualised and expanded by our daily outdoor activities. For example, the participant Élise Brown-Dussault gave an insightful presentation on reindeer habitats and lichen on the same day that we went to a Snowchange rewilding site and were shown different types of lichen. The visits and activities highlighted not only the topics we discussed but gave us the opportunity to understand why these topics and conversations are so vital to have. The Sharing Circle was exactly that, a collaborative and shared environment to circulate and debate incredibly important issues.", reported the master student in Governance and Entrepreneurship in Northern Indigenous Areas, Jessica Hall, one of the participants of the Sharing Circle.

Being in Sápmi, homeland of the Sámi, while learning about intercultural and transdisciplinary collaborations and meeting different Skolt Sámi community members as well as the local school that teaches Skolt Sámi traditions are just some highlights of the Sharing Circle. Discussing how collaborations can work best and at the same time hearing about great best-practise examples from Snowchange, made important topics tangible. Another highlight was the group that was gathered in this remote region; they were bonding from the beginning and created a supportive and appreciative atmosphere, providing a good basis for discussions. The lively discussion rounds to various relevant topics and a lot of exchange among the group were an integral part of the Sharing Circle. They brought various expertises and perspectives onto the table and everyone was very motivated to contribute and learn from each other. Creating these spaces for young people and seeing that this event has the potential to honestly address and discuss potentially sensitive issues, was a great success of this format. "A truly fantastic part of our experience was participant involvement in the shared learning. In addition to lively discussions, many participants were invited to present their work and/or research to the Sharing Circle. This was a brilliant part of the schedule as the following conversations were so diverse and we covered an incredible number of topics in our five-day trip.", Jessica added.

Learnings and experiences from the Sharing Circle will help participants to build a frame for working towards

equitable and genuine collaborations and a sustainable Arctic future. Spending a week together in a remote location, gathering an international group with different perspectives and knowledge backgrounds but having their common ground in being engaged in the Arctic, has made a special meeting for everybody that very likely lasts more than these few days. "We all left this experience feeling inspired, determined, and reminded that we are all working and researching necessary topics. To be surrounded by inspirational people, such as our hosts, Snowchange, the Skolt Sámi activists, as well as the participants, was a week that cannot be compared to anything else I have experienced", Jessica concluded.

After the Sharing Circle, the 18 participants of the Sharing Circle have become Arctic PASSION Ambassadors and develop their own outreach projects to distribute learnings of the event to a wider audience. Further information about the project will be publish here: ***https://arcticpassion.eu/sharingcircle/***

Highlights:

1. Participants learned a lot about the Samí, co-management, and collaborations which they will integrate into their own fields of engagements
2. A close dialogue and personal connection of early career professionals and Arctic youth across the Arctic are valuable and much needed to create positive change for the Arctic.
3. Participants felt that the Arctic PASSION Sharing Circle this was highly relevant and created a safe space to talk about sensitive topics

Project Leads

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Arctic Permafrost Atlas – High-level Exhibition for European decision-makers

When: 20 October 2023
Where: Reykjavík, Iceland
IASC Working Group: CWG, SHWG, TWG

The European Union funded Horizon 2020 "NUNATARYUK"- project, led by the Alfred Wegener Institute (AWI), has carried out a comprehensive six-year investigation into the rapidly changing permafrost regions in the northern hemisphere. The project aimed to answer pressing questions about the role of permafrost thaw in the global climate system, and the consequences for ecosystems, the economy, and the people living in these regions. The culmination of this ambitious endeavour is the "Arctic Permafrost Atlas," a ground-breaking publication launched during the Arctic Circle Assembly on October 20, 2023. The term "Nunataryuk", drawn from the Inuit language Inuvialuktun, means "between land and sea". It signifies the Arctic coastal zone, where a majority of the northern population resides. Those who live and work in this region must contend with the many dimensions of permafrost. The frozen ground shapes the land as well as the coast and the seabed. Rising global temperatures have left their mark, with permafrost thaw causing changes in landscapes, shoreline erosion, altered ecosystems, damaged infrastructure, and impacting the lives and livelihoods of Arctic residents.

To address the many challenges and uncertainties around permafrost thaw, the "Nunataryuk" project, which started in November 2017, brought together over 150 scientists from 26 partner institutions across 14 countries. The project blended on-site permafrost research and stakeholder input with modeling and socio-economic analyses. Based on new data from the project as well as existing data sources outside of the consortium, GRID-Arendal, a Norwegian-based envi-

ronmental communications center, created the atlas that offers a comprehensive view of existing permafrost on land and beneath the sea. In collaboration with the International Arctic Science Committee, the launch was accompanied by an exhibition called "Permafrost Matters" at the Harpa conference centre for the duration of the Arctic Circle Assembly. The exhibition offered a glimpse into the changing world of permafrost, drawing from the stories, maps, and graphics presented in the Arctic Permafrost Atlas.

A PDF version of the book and the exhibition panels are now available online at ***https://www.grida.no/publications/998*** with a print version of the atlas to follow. The atlas and the exhibit can be found online at ***https://url.grida.no/3S0go5k***

The exhibit is supposed to be a travelling exhibit both a printed version and a digital version were made (apt for a wide screen). This was already used once at the Cryosphere Pavilion during UNFCCC COP28 in Dubai now in December: both printed posters decorated the Pavilion and the screen displayed the full exhibit at times. An application to bring the exhibit to Arctic Frontiers in Tromsø was unfortunately not possible but two possible venues in May are identified. The Arctic Permafrost Atlas is a key output of the international research project NUNATARYUK, funded by the European Union's Horizon 2020 research and innovation programme (grant agreement No. 773421). This exhibition is proudly presented with funding from the International Arctic Science Committee (IASC).

The goals of the exhibition were to:

- Learn more about permafrost and climate warming and the importance of studying all aspects of permafrost to protecting Europe's and the
- Arctic´s ecosystems, communities, and infrastructure as well as learn about the impacts of and solutions to permafrost thaw
- Learn more about how scientists are working to understand permafrost thaw
- Come away with a sense of urgency regarding, understanding permafrost thaw, its impacts, and adaptation solutions that are needed
- Understand the project and its approaches - Inspire the visitors

Project Lead

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PHOTO: JULIA ASPLUND, Stockholm University

This picture was taken during the ARTofMELT 2023 expedition onboard the Swedish icebreaker Oden. It took place in May/June, in the pack ice between Svalbard and Greenland, at latitudes between 79-81 degrees North. The focus of the expedition was to study the onset of sea ice melt in the Arctic winter/summer transition, to understand the underlying processes and how they are changing with the warming climate. Because we stayed relatively close to the ice edge, we had a ship record of 31 polar bear visits during the campaign.

Atmosphere Working Group (AWG)

The scientific scope of the Atmosphere Working Group (AWG) includes research towards understanding and prediction of rapid Arctic change, especially around interactions between the atmosphere, ocean, and cryosphere, the role of the atmosphere in Arctic socio-economic development, rapid Arctic climate change, and extreme weather and Arctic predictability. Other key priorities are Arctic-lower latitude coupling, liquid (rain) and solid precipitation (snow), reconstruction of past Arctic climates, and improving our knowledge of aerosol-cloud interactions in the Arctic. The geographic scope of the AWG is the Arctic but will also include the Arctic's responses to global change processes and impacts of Arctic changes on the general atmospheric circulation.

Scientific Foci

The AWG has identified five core science topics associated with the above priorities:

- Arctic energy Budget, clouds, and surface fluxes
- Arctic air Pollution
- Atmosphere coupling within the Arctic system
- Arctic weather extremes
- Role of the Arctic in the global climate system

Work to support an advanced understanding of the topics and priority areas discussed above are grouped under the three thematic pillars of the AWG, which include:

- The atmosphere in the coupled Arctic system
- Arctic climate, weather, and predictability
- Arctic pollution, socio-economic and environmental change

Work conducted under these pillars will be planned and tracked through a living "implementation plan". Activities and actions included in the implementation plan are required to be international in nature, involving multiple IASC nations, and should constitute significant efforts in the international Arctic atmospheric science community.

More Info:

iasc.info/working-groups/atmosphere

Membership[1]

	NAME	COUNTRY	EXPERTISE
Chair	**Gijs de Boer**	USA	Arctic clouds; Autonomous Observing; Aerosol-cloud interactions
Vice-Chair	**Guðrún Nína Petersen**	Iceland	Arctic weather; Extreme weather; Numerical weather prediction
Vice-Chair	**Jennie Thomas**	France	Arctic atmospheric chemistry, cryosphere-atmosphere interactions, regional and process modeling
Past Chair	**Stephen Arnold**	UK	Arctic trace gases and aerosols; Atmospheric chemistry; Tropospheric ozone
Member	**Michael Mayer**	Austria	climate diagnostics; water and energy cycle; long-range forecasts
Member	**Ramiro Checa-Garcia**	Austria	Radiative forcing; Aerosols and Atmospheric chemistry; Climate modelling
Member	**François Massonnet**	Belgium	Arctic sea ice; Prediction and Predictability; Climate model evaluation and forecast verification
Member	**Xavier Fettweis**	Belgium	regional climate modelling; surface mass balance; general circulation changes
Member	**James Drummond**	Canada	Remote sounding; Ozone and air quality; Climate change

TABLE
[1]Membership as of 18 February 2024. For updated information and contact information for each Working Group Member please visit :
https://iasc.info/working-groups/atmosphere/members

Member	**G.W.K. (Kent) Moore**	Canada	High-latitude air-sea-ice interactions; Polar meteorology; Paleoclimatology
Member	**DING Minghu**	China	Mass balance; Air-sea/ice interaction; Measurement technique
Member	**DING Zhuoming**	China	Atmospheric boundary layer; Polar lows; Numerical weather rediction
Member	**Kamil Laska**	Czech Republic	Solar radiation modelling; Boundary layer processes; Glacier-climate interactions
Member	**Henrik Skov**	Denmark	Arctic troposphere; Interaction of pollutants and climate; Phate of anthropogenic pollutants in the Arctic troposphere
Member	**Mikko Sipila**	Finland	Secondary aerosol formation; Nucleation; Gas phase chemistry
Member	**Jean-Christophe Raut**	France	Arctic aerosols; Aerosol-cloud interactions; Numerical modelling
Member	**Astrid Lampert**	Germany	Atmospheric boundary layer; Airborne meteorology; In situ measurements
Member	**Annette Rinke**	Germany	Arctic climate modeling; Arctic atmospheric processes; Surface-atmosphere interactions
Member	**Rohit Srivastava**	India	Atmospheric aerosols; Black carbon; Climate modeling
Member	**Sourav Chatterjee**	India	Large-scale atmospheric circulation; Pole-tropics teleconnections; Air-sea-ice interactions
Member	**Stefano Decesari**	Italy	Atmospheric chemistry; Aerosol-climate interactions; Biogenic & anthropogenic organic aerosols
Member	**Yutaka Tobo**	Japan	Atmospheric aerosols; Aerosol-cloud interactions; Ice nucleation
Member	**Masakazu Yoshimori**	Japan	Global climate modeling, Large-scale circulation, Air-sea-ice interactions
Member	**Ki-Tae Park**	Republic of Korea	Trace gases, Aerosols, Air-sea interactions
Member	**Sang-Jong Park**	Republic of Korea	Polar meteorology; Atmospheric boundary layer; Surface-atmosphere interactions
Member	**Laurens Ganzeveld**	The Netherlands	Atmospheric chemistry-climate interactions; Surface exchange processes; Modelling
Member	**Maria Sand**	Norway	Climate modeling; Black carbon aerosols; Aerosol-radiation interactions
Member	**Malte Müller**	Norway	Arctic weather, High-latitude atmosphere-surface interactions, Numerical modelling
Member	**Ewa Lupikasza**	Poland	Climate change; Atmospheric circulation; Synoptic climatology
Member	**Marek Kejna**	Poland	Climate change; topoclimatic diversity of glaciated areas; Radiation balance of polar areas; influence of atmospheric circulation on the climatic conditions
Member	**Daniele Bortoli**	Portugal	Atmospheric physics; Active and passive remote sensing; Spectroscopy
Member	**Alexander Makshtas**	Russia	Sea ice and permafrost - atmosphere interaction processes; Arctic climate
Member	**Boris Vladimirovich Kozelov**	Russia	Geliogeophysical impact to Arctic atmosphere; Climate and micro-climate in Arctic region
Member	**Ana Cabrerizo**	Spain	Persistent organic pollutants; Environmental chemistry; Temporal trends
Member	**Carlos Toledano**	Spain	Atmospheric aerosols; Remote sensing; Radiometry
Member	**Thomas Kuhn**	Sweden	In-situ measurements of Arctic clouds; Snowfall; Ice fog
Member	**Iris Thurnherr**	Switzerland	Weather systems; atmospheric dynamics
Member	**Jo Browse**	UK	Aerosols; Clouds; Modelling
Member	**Muyin Wang**	USA	Arctic climate dynamics; Model-data synthesis; Sea-ice prediction

FELLOWS

2021	**Hélène Angot**	France	Trace gases, atmospheric chemistry, surface-atmosphere exchange
2022	**Thomas Webb**	United Kingdom	Coastal Climate, Boundary-Layer Meteorology, Climate Modelling
2023	**Rémy Lapere**	France	Chemistry-transport modeling, Aerosols, Air pollution
2024	**Patrik Winiger**	Switzerland	Arctic and high-altitude aerosols, atmospheric chemistry, analytical chemistry

AWG Secretary

	Sonja Murto	Sweden	Arctic weather extremes, Warm-air intrusions, large-scale atmospheric circulation

Recent Activities

For updated information, please check the IASC website: iasc.info

CliC/CLIVAR Northern Oceans Region Panel CMIP6 Bootcamp

When: 11. - 21. October 2022
Where: Søminestationen, Denmark

In many ways, the NORP bootcamp on Arctic Processes in CMIP6 was about making connections. Connections between different processes and components of the climate system; connections between different types of data – in-situ observations, climate models, satellite remote sensing, ice and ship based measurements; connections between people and connections between computers.

We called this event a bootcamp, to emphasise the short but intense nature of it, but you could also call it a summer school, or perhaps more appropriately a hackathon as the idea was not just provide additional education, but also to extract additional value out of the CMIP6 global climate modelling dataset for the Arctic. The idea came even before the CMIP6 archive was filling up as we became more aware of just what a challenge the coupled model intercomparison project (CMIP) is starting to pose to climate researchers. The petabytes of data produced by around 40 international modelling centres, completing many and varied different climate experiments, along with the core DECK experiments, represent data gold. However, extracting that gold to improve our understanding of the Earth system requires a lot of work and careful thought. Here the application of big data tools can also really help. The bootcamp programme therefore also aimed to help users learn about big data processing that can hopefully be applied in multiple contexts. We chose to use, pangeo, which is perhaps best described as a community developing open tools and infrastructure for big data geoscience research, gathered together in a single platform.

The topic of Arctic processes in the CMIP6 was chosen by the Northern Oceans Regional Panel, who all participated in different aspects of organising the bootcmap. However, this format was very successful and could easily be applied to other themes and/or geographic locations.

The efficient data processing aspect of the bootcamp was greatly helped by the participation of Tina Odaka (in person) and Anne Fouilloux (online) of IFREMER. Tina's presence at the bootcamp was actually essential and a large part of the success of the bootcamp projects is down to her help in tutoring through the tools, uploading the missing datasets needed and helping out with ad hoc requests. In addition, Anne and Tina provided free access to the European Open Science Cloud, via their Foss4G project, which meant that processing and the big data aspects of the bootcamp could all be done using cloud computing. This made the processing of data considerably more efficient and has hopefully helped to raise the profile of open science solutions like pangeo.io and the EOSC as well as helping ECRs and mentors alike to increase the efficiency of using large datasets in the future.

The daily programme varied a bit but included a slot for student presentations on their own research field, one or two lectures from senior scientists (some of these were delivered online, some from mentors present at the bootcamp) and a large piece of free working time on the bootcamp technical projects. In the first week we had technical lectures and practicals on using pangeo and different techniques for data processing, as well as some lectures giving a grounding in different elements in the Arctic climate system, including, ocean, atmosphere, sea ice, ice sheets and glacier and climate modelling, including the use of large ensembles. Other topics included Arctic links to mid-latitude climate and the use of remote sensing data.

The main aim of the bootcamp was to work on technical projects in small groups, with the assistance of senior scientists who acted as mentors to the groups. Given family

and travel obligations, most mentors only attended in person for part of the bootcamp with some also being partly or wholly online. This meant that some groups had 2 different mentors at different times, or had part online mentoring and part in-person.

Given the short but intense nature of the event we found that most groups managed a lot of very detailed technical work, but follow-up afterwards was necessary to turn this into publications and/or presentations. The role of the mentors here has been important to keep the momentum going, as after a sprint of this nature, many of the bootcamp participants were quite tired and then returned to their own research projects. The experience and organisation of a senior scientist is helpful here in keeping the group together and focused on the end goal, though it should be noted not all groups have needed this.

The ECRs at the bootcamp were selected by NORP members from applicants to cover a range of different disciplines, career stages and countries. This included MSc students, PhDs and postdoctoral scientists covering subjects ranging from global climate modelling, to in-situ field observations, to satellite remote sensing. In this way, we found that different participants had different skills and could support each other in learning and applying new knowledge. We received rather few applications from the global south, but we prioritised these (as long as the applicant was studying something relevant) and also strove for a good gender balance. Thanks to funding from CLIVAR, administered by the WMO, we were able to offer travel funds to all students who requested them. This was the largest expense in the project, but we considered it important to mix students from many places who may not otherwise have the opportunity to meet. All of our mentors came from European institutions. This was largely to reduce the travel budget, and carbon footprint of the bootcamp as much as possible but we were able to host online lectures from scientists in North America.

More info: *iasc.info*

Scientific Highlights

1. Open science tools like pangeo are very suitable for processing big datasets using cloud computing solutions like the European Open Science Cloud. Arctic science and climate science in general will benefit from more cross-collaboration with the open science/big data community
2. CMIP& models have a large number of biases that make it challenging to be confident about some impacts of climate change in the Arctic. We highlight some necessary improvements aimed at CMIP7
3. A brief intense focused work sprint is a useful method for solving difficult problems in climate science. The format allowed early career researchers to build networks, get experience presenting their work and to promote international collaboration with each other and with more senior mentors

Project Lead

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Air Pollution in the Arctic: Climate, Environment, and Societies (4th PACES Open Science Meeting)

When: 6 – 8 June 2023
Where: Helsinki, Finland

The "air Pollution in the Arctic: Climate, Environment and Societies" (PACES, *https://pacesproject.org/*) initiative aims to foster new research on the origins and fate of Arctic air pollution, how it impacts the climate, human health, and ecosystems. PACES also focuses on the feedback mechanisms between anthropogenic pollution

and natural processes, the associated climate responses, and the impacts on society, including sustainable solutions, adaptation, and economic consequences.

PACES coordinates international research efforts on these topics in collaboration with existing and planned activities and motivates trans-disciplinary research related to Arctic air pollution and its impacts. Around 40 scientists with interests in Arctic air pollution gathered in Helsinki, Finland, for the 5th PACES Open Science Meeting in June 2023, where recent research highlights and ongoing and planned activities within PACES and more broadly were discussed in-depth. Funding from both IASC and IGAC

PHOTO: MARIASILVIA GIAMBERINI, Consiglio Nazionale delle Ricerche (CNR) - Launch of the AWIPEV weather balloon, Ny Ålesud, Svalbar

supported the attendance of 6 early career scientists. Scientific session themes included the global linkages between long-range transport, wildfires, and Arctic air pollution; the human and ecosystem health impacts of local Arctic air pollution, with a focus on the recent Alaskan Layered Pollution and Chemical Analysis (ALPACA) campaign; and the chemical and physical properties of Arctic aerosols.

More than 20 scientific presentations were given across these topics, with additional group discussion around plans for the future directions of PACES as well as a panel discussion between experienced and early career scientists about potential career paths in academia.

Discussion about the future directions of PACES was implemented using the World Café format (*https://theworldcafe.com/key-concepts-resources/world-cafe-method/*). The World Café is a simple yet effective method for conducting collaborative dialogue. Small groups of 4-5 participants were randomly selected for each question/topic of discussion. These questions included:

1. **Which major scientific issues need to be addressed in the coming 10-15 years (benefiting from / enabled by international collaboration)?**
   Major threads of discussion centred around how the Arctic will respond to ice free conditions, including the natural baseline, anthropogenic activities (e.g., resource extraction and increased marine ship traffic), geoengineering solutions, and geopolitical issues involving claims to the newly accessible sea floor.
2. **What observational activities and advances are needed to improve scientific knowledge and reduce model uncertainties?**
   Discussions were focused on identifying which model uncertainties are the most pertinent and how experimentalists can address them, aerosol/gas removal processes, micrometeorological measurements (e.g. boundary layer height estimation), cloud formation processes, development of high temporal/spatial resolution emissions inventories including satellite detection of small-scale wildfires emissions, and measurement of currently missing or derived variables (i.e., aerosol/cloud droplet pH, speciated VOC emissions). Additionally, little is known regarding the nitrogen budget in the arctic.
3. **What will be the key scientific and technical advances / challenges that should inform the development of an IPY 2032-33 activity?**
   Key topics discussed include the state of Arctic sea ice during summer, improving the current detection limits of analytical instrumentation, choice of observing platform (increased use of drones and balloons for vertical measurements), interactions with local communities for citizen science, and improved geopolitical relations between Arctic nations.
4. **Which policy-relevant science questions should PACES focus on addressing in the next 10-15 years?**
   The final question focused on addressing the following issues: impact of fire management policies, impact of air pollution on indigenous communities and ecosystems, impact of model uncertainty on assessment of climate risk, how climate hazards impact infrastructure (both in the mid-latitudes and in the Arctic), how to sustainably develop the Arctic, and the impact of changing Arctic population dynamics including climate refugees.

The panel discussion between experienced and early career scientists explored personal topics such as work-life balance, useful things to know before starting in academia, and which compromises are needed to fulfil one's goals. Challenges faced by female scientists were discussed in depth, a key example is the necessity for females to work harder to achieve funding or to have their work respected than their male colleagues. It was clear that inequalities (including gender, race and disabilities) are still apparent in the atmospheric science community despite improvements in recent decades, and an emphasis was made on the importance of addressing and

improving diversity within the community moving forwards. Another aspect explored by the panel discussion focused on the logistical side of procuring research funds including various funding agencies, getting appropriate feedback, the mental health side of dealing with proposal rejection, and the advantages of being on an evaluation panel. The overall message from the experienced to early career researchers was to be honest with yourself, stay curious and keep asking questions.

Some specific scientific highlights from the meeting included:

- Interesting new insights into health impacts related to wildfires and discussions of proposed future wildfire modelling projects.
- High latitude BC emissions from ice core data inversion. Dr Sabine Eckhardt delivered a presentation on work from her recent paper, 'Revised historical Northern Hemisphere black carbon emissions based on inverse modeling of ice core records' in Nature Communications. The revised emission inventory, which provides BC emissions during the period 1850-2000, is particularly sensitive to emissions in the Arctic region, as it was the source of the majority of the ice cores.
- Updates on the ALPACA fieldwork campaign. Five ALPACA related presentations were delivered on topics ranging from aerosol sources and composition to measurements of indoor air pollution caused by pellet stoves,which provided valuable insight into some of the latest observation and analysis techniques being used in high-latitude local air pollution science.

Project Lead

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The Influence of the Lower Stratospheric Polar Vortex on Cold Air Outbreaks Under Climate Warming

When: 11-13 September 2023
Where: Lincoln, UK

The IASC/CliC workshop on "The influence of the lower stratospheric polar vortex on cold air outbreaks under climate warming" was held at the University of Lincoln, Lincoln, UK, on 11-13 September 2023 .Even now with warmer winter average midlatitude temperatures, there are still major winter cold events affecting the lives and economics of millions of people in eastern North American and Asia and Europe.

The connection between Arctic change and midlatitude weather events is a scientific challenge as events appear local, intermittent, and do not occur every year. This has led to ongoing controversy in the atmospheric community. We hypothesize that movement of the lower stratospheric polar vortex to over the North American or Eurasia continents provides a mechanism for enhancing regional cold air outbreaks. This small (19-person) workshop, including a diverse range of participants from research institutes in the UK, Finland, Germany, USA, China, Korea and Japan, involved focused presentation from established subject experts and promising Early Career Scientists as well as intensive discussion to advance the understanding of this meteorological connection.

Presentations were on the following topics: Overview of polar vortex studies; The twisted and tortured path of Arctic influence on mid latitude extreme weather; The polar vortex response to sea-ice loss and its state dependence; Greenland Blocking as a conduit of stratosphere-troposphere coupling and Stratospheric Polar Vortex (SPV) impacts; Factors influencing predictability of Northern European cold spells; Drivers of extreme

cold events in Europe; Arctic-east Asia teleconnection via troposphere and stratosphere; North American extreme winter weather and the polar vortex; Extreme cold events in North America and Eurasia in November-December 2022: a potential vorticity gradient perspective; Tropical role in the Arctic-midlatitude linkage; The potential vorticity theory of atmospheric blocking in the nonlinear multi-scale interaction model: an application to the Arctic-midlatitude linkage; A new approach to identifying stratospheric polar vortex configurations and connections; Stratosphere-troposphere oscillation and its contribution to cold air outbreaks; The varied surface impacts associated with sudden stratospheric warming in observations and CMIP6; Internal variability increased Arctic amplification during 1980-2022; Investigating pathways connecting tropospheric precursors to stratospheric extreme events; The impact of sea-ice concentration and sea-surface temperature boundary forcing in different experimental settings with ECHAM6 on the polar stratosphere.

During break-out discussions the following themes were identified as key priorities for further research in this area:

1. Improving weather/climate predictions: improving our ability to predict and understand Arctic-Midlatitude linkages in global climate and Numerical Weather Prediction models for more accurate extreme weather, seasonal to sub-seasonal (S2S) and climate projections.
2. Stratosphere-troposphere coupling: developing a comprehensive framework for stratosphere-troposphere coupling events beyond just Sudden Stratospheric Warming (SSW), including asymmetric structures of the SPV, the role of large-scale circulation, and more detailed spatio-temporal analysis of SPV.
3. Impact on extreme weather: investigating the influence of stratospheric forcing and blocking on extreme weather events, such as temperature and precipitation extremes and identifying precursors in the troposphere.
4. Climate change and Linkages: Examining the impact of climate change on Arctic Amplification and Arctic-Midlatitude linkages, particularly in relation to the Quasi-Biennial Oscillation (QBO) and other tropical drivers, and the changing jet stream. Detection and attribution studies of Arctic influence, using AI methods.
5. Model improvements: addressing challenges in numerical models, including their ability to capture Arctic-Midlatitude linkages, blocking, SPV interactions with the jet stream, and the need for better representation of Arctic Amplification (AA) in simulations while considering the trade-offs between significance and ensemble size.
6. Clarify terminology (e.g. weak SPV & prolonged structure of SPV, locations of SPV centre).
7. Cross-timescale interaction.
8. Nonlinearity: assumption of linearity in many current analyses - more non-linear tests are needed.

The workshop organisers are currently working on a review/synthesis paper(s) for a high-profile peer-reviewed journal. The accompanying photos show University of Lincoln Minerva Building (inside and outside the meeting room), in the Georgian Town Hall ball room and in front of the Norman castle at Newark-on-Trent, Nottinghamshire, UK - a day excursion to Edward Hanna's home town near Lincoln. The workshop was deemed by participants to have been highly successful and enjoyable. We thank the co-sponsors: IASC, WCRP CliC and the University of Lincoln.

Project Lead

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Upcoming Activities

For updated information, please check the IASC website: **iasc.info**

Cryosphere Working Group (CWG)

The Cryosphere Working Group (CWG) supports and promotes all scientific or engineering research related to the Arctic and subarctic cryosphere, including glaciers, sea ice, snow, permafrost, seasonally frozen ground, and lake and river ice. It encompasses cryospheric interactions with the atmosphere, ocean, biosphere, and terrestrial systems in the past, present and future, and the cryosphere's role in climate and human society.

Scientific Foci

- Improve knowledge of the past, current, and future state of the Arctic cryosphere across wide-ranging spatial and temporal scales using innovative methods including in-situ observations, remotely sensed measurements, models, citizen science, and participatory research.
- Advance understanding of melt and thaw processes, ice and snow dynamics, and complex cryospheric interactions with atmosphere, terrestrial, ocean, and biological systems.
- Quantify and project cryospheric change and the frequency and intensity of extreme cryospheric events such as: heavy snowfalls, icing, avalanches and rockfalls, glacial lake outburst floods, glacier surges, abrupt permafrost thaw, permafrost coastal erosion, events resulting from sea ice dynamics, intrusion of warm air masses from outside the Arctic, and seasonal climate anomalies.
- Improve understanding of interactions between the cryosphere and human society, especially impacts of cryospheric change on humans, anthropogenic impacts on the cryosphere, and the contribution of local and indigenous communities to cryospheric knowledge.

Cross-cutting Approach

Achieving the CWG scientific foci requires interdisciplinary research and collaboration with other working groups and local communities, where applicable. Our approach emphasizes open and collaborative science; ethical, sustainable, and responsible science practices; diversity, equity, and inclusion; and using cryospheric knowledge to support society.

More Info:

iasc.info/working-groups/cryosphere

Membership[2]

	NAME	COUNTRY	EXPERTISE
Chair	**Shawn Marshall**	Canada	Glacier and ice sheet modelling; Cryosphere-climate processes; Glacier mass balance
Vice-Chair	**Marie Šabacká**	Czech Republic	Glacier ecology
Vice-Chair	**LEI Ruibo**	China	Sea-ice physics; Climate change; Technology for sea-ice observations
Member	**Helena Bergstedt**	Austria	Permafrost, Landscape dynamics, Remote Sensing
Member	**Jakob Abermann**	Austria	Mountain glaciers, ice-climate interaction, Greenland mass balance
Member	**Hugues Goosse**	Belgium	Sea Ice, feedbacks, climate modelling
Member	**François Fripiat**	Belgium	Oceanography, Glaciology and Paleoclimatology
Member	**XIAO Cunde**	China	Cryospheric research
Member	**Nanna Karlsson**	Denmark	Glaciology; Ice-penetrating radar; Ice-flow modelling; Mass balance
Member	**Kirsty Langley**	Denmark	Sea ice

TABLE
[2]Membership as of 18 February 2024. For updated information and contact information for each Working Group Member please visit :
https://iasc.info/working-groups/cryosphere/members

Member	**Arttu Polojärvi**	Finland	Ice mechanics; Numerical modeling; Deformed sea ice
Member	**Letizia Tedesco**	Finland	Marine biogeochemical modelling; sea-ice physical-biogeochemical processes, climate change
Member	**Hans-Werner Jacobi**	France	Snow physics and chemistry; Snow-atmosphere interactions; Climate
Member	**Anne Morgenstern**	Germany	Permafrost; Geomorphology; Remote Sensing
Member	**Gunnar Spreen**	Germany	Sea ice; Remote sensing; Ocean-sea ice-atmosphere interactions
Member	**Þorsteinn Þorsteinsson**	Iceland	Glaciology; Ice drilling; Climate history
Member	**Hrafnhildur Hannesdóttir**	Iceland	Glaciology, remote sensing, terminus measurements
Member	**Parmanand Sharma**	India	Glaciology; Mass and energy balance; Glacier hydrology; Snow and ice chemistry
Member	**AL. Ramanathan**	India	Glaciology; Biogeochemistry; Hydrology
Member	**Andrea Spolaor**	Italy	Paleoclimate; Snow chemistry; Air-snow exchange
Member	**Masahiro Minowa**	Japan	Calving, Glacier dynamics, Glacier mass balance
Member	**Nozomu Takeuchi**	Japan	Glacier-ecology; Microbiology; Glaciology
Member	**Jung-Hyun Kim**	Republic of Korea	Satellite remote sensing (Ocean Color, Sea-Ice); UAV
Member	**Yeongcheol Han**	Republic of Korea	Geochemistry; Isotopes
Member	**Richard Bintanja**	The Netherlands	Arctic climate change; Climate variability; Arctic hydrological cycle; Climate modelling
Member	**Geir Moholdt**	Norway	Glaciology; Remote Sensing; Mass balance
Member	**Thomas Vikhamar Schuler**	Norway	Arctic glacier mass balance & hydrology; Subglacial processes; Modeling cryosphere: snow, glaciers and permafrost
Member	**Dariusz Ignatiuk**	Poland	Arctic glacier mass balance and hydrology, Glaciology, Energy mass balance
Member	**Ireneusz Sobota**	Poland	Cryospheric changes; Mass balance; Snow; Permafrost
Member	**Gonçalo Vieira**	Portugal	Permafrost; Remote sensing; Geomorphology
Member	**Dmitry Drozdov**	Russia	Permafrost: Mapping, Thermal state, Active layer, Remote sensing; Arctic Coastal Dynamics; Arctic landscapes
Member	**Sergei Verkulich**	Russia	Glaciers and permafrost; Antarctic and Arctic Quaternary sediments; Terrestrial records
Member	**Carolina Gabarro**	Spain	Remote sensing; Sea-ice extension; Sea-ice thickness
Member	**Jaime Otero**	Spain	Glaciers; Numerical Models; Calving
Member	**Margareta Johansson**	Sweden	Permafrost; Snow; Vegetation
Member	**Amy Macfarlane**	Switzerland	snow microstructure, sea ice and energy transfer
Member	**Andreas Vieli**	Switzerland	Calving, glacier and ice sheet dynamics, ice-ocean interaction
Member	**Kelly Hogan**	United Kingdom	Palaeoglaciology, glacial landforms, marine sedimentary records
Member	**Richard Essery**	United Kingdom	Snow modelling; Seasonal snow cover; Snow hydrology
Member	**Melinda Webster**	USA	
Member	**Robert Hawley**	USA	Glaciers, ice sheets, snow and firn; Mass balance; Remote sensing

	FELLOWS		
2021	**Greta Wells**	USA	Glacial outburst floods; glacier environmental change; geomorphology
2022	**Wai Yin Cheung**	Canada	Glaciology, Photogrammetry, Cross-culture studies
2023	**Armina Soleymani**	Canada	Sea ice, Satellite image processing, Remote sensing
2024	**Robbie Mallett**	Norway	Snow, sea ice, radar, altimetry
2024	**Beatriz Recinos-Rivas**	United Kingdom	Ice-ocean interactions, numerical modelling, sea level rise

	CWG Secretary		
	Rosalie McKay	Norway	Marine biogeochemistry, sea ice, community production

Recent Activities

For updated information, including dates, please check the IASC website: **iasc.info**

Upcoming Activities

For information on CWG upcoming activities, please check the IASC website: **iasc.info**

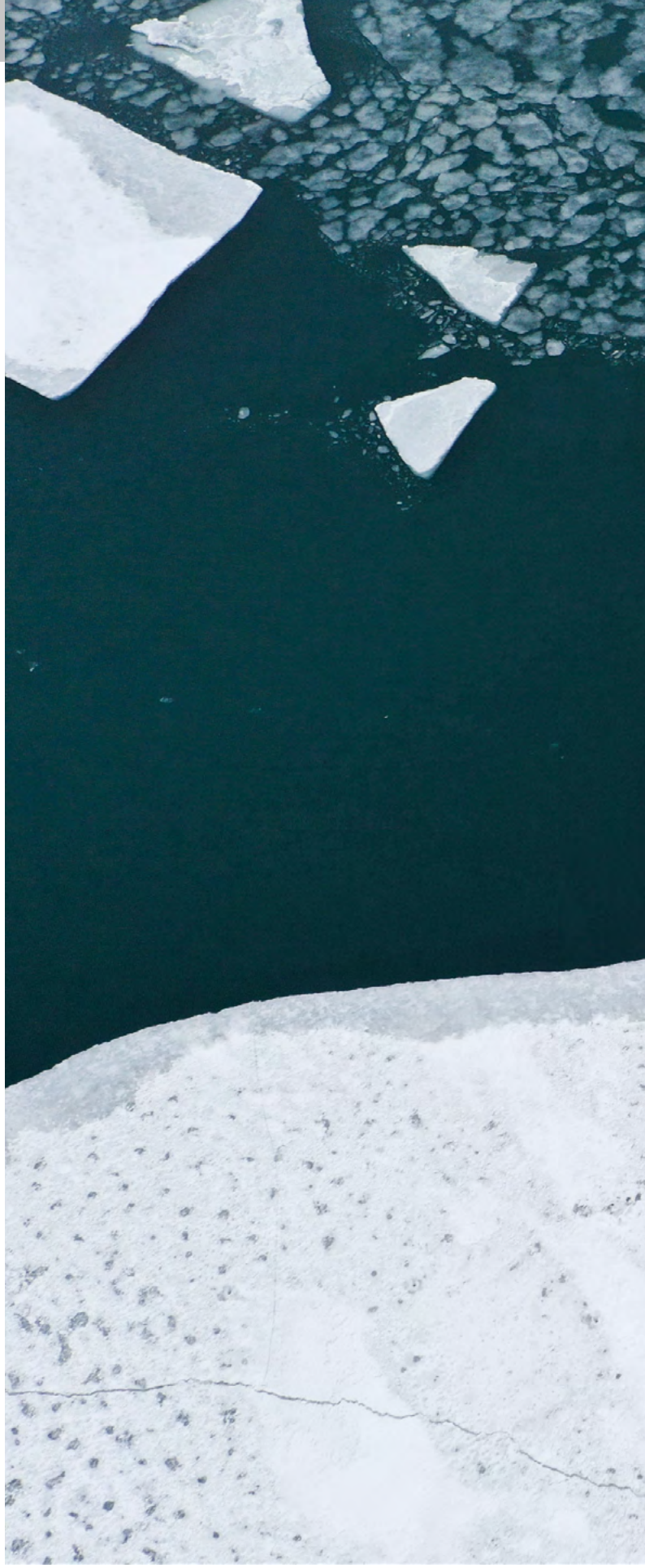

PHOTO: TRINE LISE SVIGGUM HELGERUD, NORWEGIAN POLAR INSTITUTE.
Sea ice researchers from the Norwegian Polar Institute have been monitoring the sea ice in the Kongsfjorden close to Ny-Ålesund Research Station on Svalbard every April since 2003! This year the time series is 20 years – and results show that the sea ice cover has become thinner, and the sea ice season has become shorter.

Marine Working Group

The IASC Marine Working Group (MWG) facilitates international coordination of research in the Arctic marine environment and supports cross-cutting objectives. Annual face-to-face meetings and online communication are used throughout the year, including interaction and collaboration with terrestrial, cryospheric, atmospheric, and social scientists as appropriate. An important goal is to support early career scientists and involve them in international research coordinated by IASC member countries, including an expanded role for IASC Fellows in MWG tasks. Starting in 2023, a network of IASC Alumni Fellows will support IASC and Working Group activities and their current Fellows, and maintain an active network of early to mid-career researchers and collaborators (IASC Fox).

The scientific scope of the MWG includes but it is not limited to any marine natural science or engineering research related to the Arctic Ocean and Subarctic Seas. A strategic planning process has been undertaken to guide research and monitoring priorities aligned with international science planning goals such as those identified by the ICARP process and the UN DOS Arctic Action Plan. The identified research priorities are practical areas for international cooperation consistent with the pillars of IASC and the science programmes of its 24 member countries. Five themes have been identified addressing major unknowns that remain to be resolved in order to contribute to an integrated and predictive understanding of the Arctic System and its interactions with the overall Earth System.

These themes, in no specific order of importance are:

- Marine Life,
- Sea Ice and Stratification,
- Disturbances,
- Biogeochemical Cycles, and
- Connectivity and Borealization.

More Info:

https://iasc.info/working-groups/marine

Membership[3]

	NAME	COUNTRY	EXPERTISE
Chair	**Heidi Kassens**	Germany	Marine Geology; Interdisciplinary polar research projects; Cooperation with Russia
Vice-Chair	**Karen Frey**	USA	Land-ocean linkages; Sea ice; Biogeochemistry
Vice-Chair	**Takashi Kikuchi**	Japan	Physical oceanography; Polar oceanography; Polar climate
Member	**Petra Heinz**	Austria	Marine ecology; Microbenthos biology; (Paleo-)ecosystems
Member	**Thierry Fichefet**	Belgium	sea ice-ocean interactions, polar climate, modelling
Member	**Bruno Delille**	Belgium	
Member	**Christine Michel**	Canada	Role of sea ice in Arctic marine ecosystems; Pelagic and benthic Arctic food webs
Member	**LIU Yanguang**	China	Marine geology
Member	**LI Tao**	China	Oceanography
Member	**Oleg Ditrich**	Czech Republic	Parasitology; Zoology; Polar ecology
Member	**Henrieka Detlef**	Denmark	Paleoceanography, Sea ice, Geochemistry
Member	**Dewan Ahsan**	Denmark	Management, Marine Resource Management, Green Transition
Member	**Jukka Tuhkuri**	Finland	Ice mechanics

TABLE
[3]Membership as of 18 February 2024. For updated information and contact information for each Working Group Member please visit :
https://iasc.info/working-groups/marine/members

Member	**Hermanni Kaartokallio**	Finland	Sea ice ecology; Microbial ecology in cold marine environments
Member	**Vincent Le Fouest**	France	ocean-sea ice-biogeochemical modeling, coastal oceanography, land-to-sea interface
Member	**Marie-Noëlle Houssais**	France	Physical oceanography; Ocean-sea ice processes; Large-scale and mesoscale ocean variability
Member	**Torsten Kanzow**	Germany	Observational physical oceanography; Long-term time series observations
Member	**Anna Heiða Ólafsdóttir**	Iceland	Geographical distribution, migration, life history traits, and stock assessment of small pelagic fish in the northeast Atlantic
Member	**Arnab Mukherjee**	India	Ocean sea-ice coupled modelling, Physical oceanography, Climate dynamics
Member	**Manish Tiwari**	India	Paleoclimatology, Paleoceanography, Isotope Geochemistry
Member	**Tommaso Tesi**	Italy	Paleoclimatology; Geochemistry; Oceanography
Member	**Michiyo Yamamoto-Kawai**	Japan	Chemical oceanography; Freshwater/carbon/nutrients; Climate change
Member	**Eun Jin Yang**	Republic of Korea	Polar marine ecology; Microzooplankton biology
Member	**Jinyoung Jung**	Republic of Korea	
Member	**Martine van den Heuvel**	The Netherlands	Polar marine biology; Ecotoxicology; Rapid assessment of non-indigenous species using eDNA
Member	**Arild Sundfjord**	Norway	Ocean – sea ice interaction; Regional & sub-mesoscale ocean modelling; Vertical mixing
Member	**Grace Shephard**	Norway	Geology and Geophysics; Plate Tectonics; Deep Earth and surface interactions
Member	**Agata Zaborska**	Poland	
Member	**Agnieszka Beszczynska-Möller**	Poland	observational physical oceanography, ocean climate, ocean-ice interactions, autonomous observations
Member	**Catarina Magalhães**	Portugal	Polar Microbial Ecology; Nitrogen Biogeochemistry; Marine Microbiome standards
Member	**Sergey Pisarev**	Russia	Meso-scale oceanographic processes; Shot-period variations of ocean climate in the Arctic Ocean
Member	**Antonio Tovar**	Spain	Biogeochemical cycles of trace metals in the ocean; Marine environmental pollution; Global change
Member	**Manuel D'Allosto**	Spain	Atmospheric science; Marine aerosols and air quality in coastal areas
Member	**Adam Ulfsbo**	Sweden	Chemical oceanography, marine chemistry, carbonate chemistry
Member	**Samuel Jaccard**	Switzerland	biogeochemistry, carbon cycle, paleoceanography
Member	**Andrew Brierley**	United Kingdom	Marine ecology; Scientific echosounding; Zooplankton ecology, predator-prey interactions
Member	**Mark Inall**	United Kingdom	Marine terminating glaciers; sub-glacial discharge plumes; fjordic mixing and exchange processes
Member	**Lauren Juranek**	USA	Biogeochemistry, isotopic tracers, dissolved gases

	FELLOWS		
2021	**Neelu Singh**	Norway	Microplastics, Persistent Organic Pollutants, Svalbard
2022	**Henrieka Detlef**	Denmark	Paleoceanography, Sea Ice, Geochemistry
2023	**Lisa Winberg von Friesen**	Denmark	Marine/sea ice biogeochemistry, nitrogen fixation, microbial ecology
2024	**Daniela Walch**	Canada	Aquatic Remote Sensing, Biogeochemistry

	MWG Secretary		
	Laura Ghigliotti	Italy	National Research Council of Italy, Italy

Recent Activities

For updated information please check the IASC website: **iasc.info**

Towards a Strategic Research Plan for Arctic Marine Research Aligned with the UNDOS Arctic Action Plan

When: 15-17th November 2022
Where: Copenhagen, Denmark

Ten members of the IASC Marine Working Group (MWG), including three early career researchers (ECR), and the IASC Secretariat met at the Technical University of Denmark (DTU) in Copenhagen for a 3-day workshop (Nov 15-17, 2022) to draft and develop a strategic research plan for Arctic marine research that can guide the MWG in the coming years. Over the three days, discussions took place about how to develop such a plan and how to align it with other ongoing initiatives including the UN Decade of Ocean Science (UNDOS) Arctic Action Plan, the IASC Strategic Plan, and the ICARP IV process. The first day was spent brainstorming what this kind of plan would entail. Through that brainstorming process, five research themes were identified and questions of interest associated with these priorities were posed and articulated by a short informative description. The second day was spent cooperatively writing the short descriptions, an introduction, and the connections to the UNDOS Arctic Action Plan. Additional goals were identified through implementation strategies such as promoting increased ECR and Indigenous scholar engagement and better coordination of international cooperation. The final day of the workshop, the draft of a document entitled "A Strategic Plan for the Marine Working Group of the International Arctic Science Committee (IASC): Priorities to support implementation of the UNDOS Arctic Action Plan and transdisciplinary research cooperation in the Arctic" was shared with representatives from the Intergovernmental Oceanographic Commission (IOC) of UNESCO, the International Council for the Exploration of the Sea (ICES), the Danish Centre for Marine Research, and the Arctic Monitoring and Assessment Programme (AMAP). Suggestions from these discussions were incorporated into the draft and a copy of the document will be shared with the rest of the MWG at the upcoming working group meeting on 5 December 2022, for review and comment.

Project Lead

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Arctic and Subarctic Ocean Fluxes (ASOF) Workshop 2023

When: 10 – 12 May 2023
Where: Las Palmas de Gran Canaria, Spain

Arctic-Subarctic Ocean Fluxes (ASOF) is an international program on the oceanography of the Arctic and Subarctic seas and their role in climate. ASOF focusses on ocean fluxes of mass, heat, freshwater, and ice in the Arctic and Subarctic oceans.

The key objectives of ASOF are to perform an Arctic/Subarctic synthesis of mass, heat & freshwater fluxes, create a forum where scientists and programs studying Arctic/Subarctic Ocean ecosystems and biology can interact, assist testing of ocean circulation and biophysical models of the Arctic and Subarctic.

ASOF organizes yearly workshops for 30-50 participants. These workshops have had a great impact on the international of Arctic and Subarctic oceanography community in terms of collaborations, publications, development of

research proposals, programs and cruise planning. ASOF has supporting synthesis activities (*https://asof.awi.de/outputs/*) such as a book, several reports and newsletters that help to put research in a context, built a community and give visibility to Early Career Scientists work.

ASOF workshops have become great spots for Early Career Scientists to connect with senior scientists in the field. Apart from allowing some administrative worktime for an assistant from the Alfred Wegener Institute for Polar and Marine Research (Germany), ASOF is not receiving any funding for organizing its yearly workshops. However, ASOF is strongly committed with the new generation of polar scientists, and to support several Early Career Scientists for their travel, each year ASOF applies for support to international programs. For 2023 the IASC the Marine Working Group has help us by supporting 5 ECS.

The ASOF workshop 2023 was took place on 10-12 May 2023, hosted by María Dolores Pérez Hernández at the IOCAG - Instituto de Oceanografía y Cambio Global - Universidad de las Palmas de Gran Canaria. The main topics of the ASOF 2023 workshop were to discuss recent progress in research projects and studies related to better understanding the Arctic/Subarctic Oceans, discuss and plan Arctic/Subarctic syntheses of mass, heat & freshwater fluxes, and their dynamics, coordinate and plan future studies of the coupled dynamics of the Arctic and Subarctic oceans, including the physical system and its connection with the marine biogeochemical system and the ecosystem, contribute to the engagement phase of the Fourth International Conference on Arctic Research Planning (ICARP IV) process and to coordinate the connection of the three Arctic DBOs (the well-established Pacific DBO, the establishment of a Davis Strait/Baffin Bay DBO and the Atlantic-Arctic DBO in development as part of the Arctic PASSION project).

Locally the ASOF workshop 2023 had a great impact, it gave the Ph.D. candidates the opportunity of presenting their work to the Arctic international scientific community and to interact and network with them in a familiar place. The meeting also benefited the students from the Master in Oceanography and from the Marine Science Degree to participate in an international workshop for free and see in firsthand how scientists discuss their results and future projects with the community. Four of these students also got offered an opportunity to join a cruise on the Arctic next summer.

In total there were a total of 74 communications, 61 in oral and in 13 poster form. We had a total of 119 (69 in person and 48 online) participants of which 69 (36 females-33 males) were in person attendees, 48 (22 females -26 males) online participants, and 15 (9 females – 6 males) were students from either the Master in Oceanography or the Marine Science Degree from the University of Las Palmas de Gran Canaria.

Scientific highlights:

- The ASOF 2023 provided with an update on the most recent relevant research results on the topics of the workshops for all in-person and online participants. Also, the workshop presented the most recent developments and plannings regarding projects, project proposals and cruise planning.
- For the ECS this meeting was a mid-size forum ideal to train their skills for disseminating their results and to build an international and interdisciplinary network for their future. Furthermore, in-person connections of ECS with senior scientists, enhances their chances for new positions in their career, and a more efficient recruitment of new personnel on the senior scientist's side.
- The long-term result of the workshop is a strong contribution to a better coordinated and better-connected research on the oceanography of the Arctic and subarctic This holds on a scientific and planning level as well as on a personal level regarding connections between scientists and teams globally who work on the meeting.

Project Lead

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Enabling Early Career Scientist and/or Indigenous Participation in Internationally Cross-Platformed Research Cruises 2023

When: August-October 2023
Where: Arctic Ocean

The IASC Marine Working Group (MWG) provided funding to facilitate and support the participation of an early career scientist on a research cruise operated by an international partner in 2022, and again in 2023. The project´s primary goal is to increase the participation of early career scientists and/or Indigenous knowledge holders on ships conducting oceanographic research in the Arctic on a cross-platform, international basis (platforms that would allow the participation of one country's scientist(s) on another's country's vessel). The object of this program in general is to improve international cooperation and coordination, data sharing, complement observations, and collaboration across international boundaries. This project supported travel to join the ship; shipboard costs are expected to be borne by the host country.

With funding received by the IASC Marine Working Group and the support of the Japan Agency for Marine Science and Technology (JAMSTEC), and especially Dr. Takashi Kikuchi of JAMSTEC, Eva Silva Lopes of the Universidade do Porto (Portugal) was selected to join the expedition. Lopes was previously accepted by JAMSTEC as part of a team of international early-career scientists who had applied to participate on the 2023 RV Mirai research cruise to the Arctic. During her time onboard of Mirai, Ms. Lopes undertook studies on microbial biogeochemistry and the microbial biome. She has presented a poster at the XV Portuguese Conference of Polar Sciences describing her experience and more formal scientific results will be forthcoming. Ms. Lopes provided a description of her work aboard the ship, which follows.

With the temperature increase of the Pacific and Atlantic Oceans, nutrient redistribution will be affected. This will also include distributional shifts in several Arctic and sub-Arctic species, including the microbiome. Microbes play pivotal roles within the marine food web, contributing significantly to key biogeochemical cycles that sustain water column primary productivity. Understanding climate change's impact on prokaryotic (bacteria and archaea) and protist members of microbial communities is crucial. This understanding should include their diversity, spatial distribution, and interactions. Analysing the change in the redistribution of plankton microbial communities and their functions within the changing Arctic Ocean is crucial since they form a web of highly diverse species and functions that quickly react to change, dictating shifts on ocean primary production and consequently on ecosystem sustainability. In my PhD project, I aim to investigate the Arctic Ocean prokaryotic and unicellular eukaryotic communities from a community dynamics and ecological perspective by understanding how planktonic prokaryotic and unicellular eukaryotic communities interact with each other.

Throughout the campaign, the Arctic Ocean prokaryotic and unicellular eukaryotic communities will be analysed from an ecological standpoint. Firstly, we'll uncover the crucial links (taxonomic and functional) between these communities. Secondly, we will study how environmental variations in Pacific and Arctic water masses impact the interaction dynamics among planktonic prokaryotes and unicellular eukaryotes. During the Mirai expedition, I collected seawater samples in multiple stations at different depths for microplankton analysis. The chosen area of this campaign was the Pacific Arctic Region, starting in Dutch Harbor (Alaska, USA), crossing areas such as the Bering Strait, Chukchi Shelf, Canada Basin, Barrow Canyon, and the East Siberian Sea. The samples were collected using 12 L Niskin bottles on a CTD/Rosette multi-sampler, between the 7th and 30th of September 2023. CTD and routine samples, at several depths, were taken of

PHOTO: TRINE LISE SVIGGUM HELGERUD, Norwegian Polar Institute.
RV Kronprins Haakon at the annual Fram Strait Cruise in the fast ice east of Greenland at 79N. Ice bergs in the horizon is a sign that we are close to Greenland. September 2023.

the following parameters: 18O isotopes, pH, dissolved inorganic carbon, salinity, nutrients, and chlorophyll-a. For my DNA samples, the chosen depths were the deep chlorophyll maximum and the bottom depth sampled at each station. After the seawater samples collection, samples were filtered through a Sterivex® filter with a 0.22 µM pore size and stored at –80°C until further genomic and metagenomic analysis. These samples were collected to observe the dynamics of the microbial communities across the water column in the Arctic Ocean. Additionally, across the Chukchi Sea, opportunistic sampling occurred. Sediment samples were collected from a multiple core sampler, Ashura, and interstitial water was filtered through a Sterivex® filter with a 0.22 µM pore size and stored at –80°C, until further analysis. These samples were collected to compare the microbial community differences between the sediments and water, with a special focus on diatoms. A total of 144 seawater samples were collected during this campaign. Due to the progressive intensification of the Pacific and Arctic water connectivity, and considering heat transport, it is predicted that community functions will change. With this in mind, onboard the R/V Mirai, a microcosm experience was performed, where the Pacification phenomenon was reproduced. The aim was to mix surface waters, collected at 100m, with bottom waters, collected at 300m, and analyse which interactions between the communities change during 48 hours of incubation (Figure 2). The dynamic Barrow Canyon area was selected for this study. Water collected at 100m was classified as "Remnant Winter Water" and water collected at 300m was classified as "Atlantic Water". The output of these microcosm experiments will allow us to observe how these communities change their interactions in these changing environments and especially will allow us to see if the communities on the different sides of the Arctic Ocean have or do not have the same behaviour.

Previous studies have not gathered enough spatial and temporal information about the movement and change over time of tiny life in the North Pacific and Arctic areas because there is not much biological data from these remote regions. Indeed, long-term data sets from these regions are available for physical variables like temperature and salinity, which limits modeling approaches to predict the response of biological communities to climate change. Opportunities like the Mirai campaign help to bridge this knowledge gap in the Arctic Ocean by promoting study and understanding of prokaryotic and unicellular eukaryotic planktonic communities. A fundamental question is which community functions will change due to the progressive intensification of the Pacific and Arctic water connectivity, as heat transport accelerates. It is essential to fill this knowledge gap by undertaking observations to understand how the increase of the Pacific heat inflow to the Arctic will promote shifts in Arctic plankton microbiome diversity and functions. This is crucial because there are some dramatic changes, in particular the retreating ice edge and increased heat influx of North Pacific water, happening in this crucial transition area but the impact of these changing trends on microplankton is poorly studied.

Scientific highlights:

- Project successfully increased international participation in US-led (2022) and Japanese-led research cruises (2023) by German (2022) and Portuguese graduate students (2023).
- Focus of the scientific effort supported in both years has been on microbial biogeochemistry and genomics
- The impacts of climate warming in the Arctic are key motivating factors.

Project Lead

Lee Cooper
(University of Maryland Center for Environmental Science, USA)
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Marine Working Group Strategy Meeting - Marine Life

When: 11-12 December 2023
Where: Vienna (Austria)

During the ASSW 2023, the IASC Marine Working Group (MWG) adopted a new Strategic Plan to guide research and monitoring priorities aligned with international science planning goals. This Strategic Plan defined five overarching themes: Marine Life, Disturbances, Connectivity and Borealization, Sea ice and Stratification, and Biogeochemical Cycling.

Six members of the MWG, including two early career researchers (ECR), met at the Department of Palaeontology (University of Vienna) in Vienna for a 2-day workshop (Dec 11-12, 2023) to expand on the MWG new Strategic Plan and, specifically, to define research priorities on the overarching high-level theme „marine life". Over the two days, discussion revolved around how to shape research priorities on the theme aligned with international initiatives such as the ICARP IV process, UN Decade of Ocean Science, Biodiversity Beyond National Jurisdiction Agreement, Convention on Biological Diversity, and the Central Arctic Ocean Fisheries Agreement. The first day was spent brainstorming around the main drivers of change in the marine Arctic, how they may affect marine life, which are the knowledge gaps, and urgent needs. Building on the ideas and elements emerged during the first day, the second day was spent discussing about research priorities related to each of the ecosystem components highlighted in the Strategy Plan: primary producers, sympagic, pelagic, and benthic communities, high trophic level species. A draft document was cooperatively written and shared with the rest of the MWG for review and comments. The document will be finalized before the ASSW 2024 for approval during the MWG Business meeting.

Highlights:

- To find answers on how and where the net primary production will change in future marine arctic systems, especially shifts in bloom timing and duration, sea ice cover and hydrography, habitat formation, nutrient input, the bentho-pelagic-sympagic coupling and ocean acidification have to be in the focus of upcoming
- To better understand how changes in sympagic, pelagic or benthic community structures impact biodiversity and the food web, investigations on species composition at all trophic levels, on distribution and behavior, on species responses to changing conditions, on the effect of sea-ice loss on (key) species, on improvements of biomass estimations, as well as further taxonomic descriptions are urgently necessary.
- To improve our knowledge on how higher trophic level species abundance and distribution will change in the near future, more data and analysis are necessary on the effects of climate-induced modifications, borealization and impacts of human activities on these species, their distribution, foraging, breeding behavior, resilience, and predators.

Project Lead

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Upcoming Activities

For information on MWG upcoming activities, please check the IASC website: **iasc.info**

Social and Human Working Group (SHWG)

The scientific scope of the Social and Human Sciences Working Group (SHWG) shall include all aspects of social sciences and humanities research in the Arctic, as well as their connections with other IASC Working Groups. The actual work of the Social & Human Sciences WG is determined by a dynamic list of scientific focus areas.

The geographic scope of the Social and Human Sciences Working Group shall be the Arctic as defined in the map accompanying the Arctic Human Development Report (AHDR). The geographic scope can be extended south where it is appropriate for an understanding of Arctic social and human processes.

Scientific Foci

Disciplinary foci for the Social & Human Working Group are:

- **Arctic residents and change:** The Arctic is at the center at various vectors of change, from climate and environmental change to economic and cultural globalization. Arctic residents - whether members of Indigenous communities, long-time settlers or recent immigrants – have long dealt with such change, as active participants in attempts to mitigate them and/or adapt to them, sometimes successfully, sometimes not. Responses to change vary by locale, as well as along axes of age, ethnicity and gender. Through this focus, we seek to contribute to understanding the past and present role of humans in the Arctic environment, including to forecast future states and situations.
- **Histories, perceptions and representations of the Arctic:** Research within the humanities and social sciences examines historical memories and material remains of Arctic communities, to understand how exploration, exploitation and interventions have influenced natural resource use, local economies, traditional knowledge, health, political systems, gender relations, settlements, cultural heritages, languages, and identities. Through various disciplinary and analytical perspectives on cultural contacts, conflicts and collaborations, on scientific practices and specific modes of constructing knowledge, and on varied representations of the Arctic, we can better understand present-day contexts of local communities and peoples, and better explain the relation between historical memories/ material archives and current perceptions, with a goal of addressing issues of participation, representation, human rights and social justice, social and economic development, education and public outreach.
- **Securities, governance and law:** The Arctic is a peaceful and stable region, not overtly plagued by conflicts. The region has become ever more globalized. Critical topics include 1) how to effect a shift from high (geo) political stability to peaceful change, and make security less mystified and controlled by a nation-state's security-political elite; 2) how to accelerate mitigation and fulfill the Paris Agreement (COP-21); and 3) how to establish the Arctic as a resilient area and structure.
- **Natural resource(s)/ use/ exploitation and development:** past, present, future
- **Human health and well-being**

Cross-cutting scientific foci for the Social & Human Working Group are:

- Human health, well-being and ecosystem change
- Long-term impacts, vulnerability and resilience in Arctic social-ecological systems
- Competing forms of resource use in a changing environment
- Perception and representation of Arctic science

More Info:

iasc.info/working-groups/social-human

PHOTO: LIONEL FAVRE, technician and field assistant from EERL an EPFL's lab.
Drone view of the village of Narsaq in south Greenland. The base camp village for the Greenfjord project. This village is between two fjords, one with glacier (where the icebergs come from) and another without a glacier. It's the ideal place to respond to the GreenFjord main question to better understand climate change

Membership[4]

	NAME	COUNTRY	EXPERTISE
Chair	**Catherine Chambers**	Iceland	Coastal communities; Fisheries and aquaculture governance; Fishermen's knowledge
Vice-Chair	**Barbora Halašková**	Czech Republic	Arctic geopolitics and security; International relations; Foreign policy
Vice-Chair	**Ingrid A Medby**	United Kingdom	Arctic Identity; Political Geography; Critical Geopolitics
Past-Chair	**Susan Chatwood**	Canada	Health systems; Population health; Community engagement
Member	**Alexandra Meyer**	Austria	Anthropology, Climate change, Svalbard
Member	**Olga Povoroznyuk**	Austria	Anthropology of infrastructure; social and environmental transformations; indigenous and local communities of the Arctic and Siberia
Member	**Frédéric Laugrand**	Belgium	Anthropology, hunting and Inuit knowledge systems, mobility, history, religion, Canada
Member	**Nathalie Pattyn**	Belgium	
Member	**David Natcher**	Canada	Environmental livelihoods; Culture and economy; Maintenance of local food systems
Member	**SU Ping**	China	Global Governance; International Political Sociology; International Organization
Member	**DENG Beixi**	China	Polar Geopolitics & Security; Polar Policy; Arctic Shipping
Member	**Zdenka Sokolíčková**	Czech Republic	Svalbard, Climate/environmental change, Globalisation
Member	**Carina Ren**	Denmark	Tourism development and entrepreneurship; Cultural innovation, co-creation, and capacity building; Collaborative research methods
Member	**Brooks Kaiser**	Denmark	Arctic economic development; Bioeconomy; Marine resource governance
Member	**Mervi Heikkinen**	Finland	Women's and gender studies; Intersectionality; Ethics; Higher education
Member	**Florian Stammler**	Finland	Indigenous and local livelihoods, development impact assessments, Arctic Eurasia
Member	**Claire Alix**	France	Archaeology, Ethnoarchaeology; Alaska, Bering Strait, Western Canadian Arctic; Inuit history and technology
Member	**Virginie Vaté**	France	Anthropology of religion; Shamanism and Christianity; Conversion; Chukotka and Alaska
Member	**Nina Doering**	Germany	Co-production, transdisciplinarity, ethics, participation
Member	**Peter-Tobias Stoll**	Germany	
Member	**Swati Nagar**	India	Science outreach; Polar outreach
Member	**Fujio Omishi**	Japan	History of international relations in the Arctic, Polar Geopolitics, Arctic Policy
Member	**Hiroki Takakura**	Japan	Siberian anthropology; Northeast Asian indigenous history; arctic pastoralism
Member	**Seung Woo Han**	Republic of Korea	Polar policy; Polar sociology; International law
Member	**Hyunkyo Seo**	Republic of Korea	Polar policy
Member	**Annette Scheepstra**	The Netherlands	Transdisciplinary; Stakeholder engagement
Member	**Britt Kramvig**	Norway	Indigenous peoples ontologies, politics, and art; Creativity, tourism, and innovation in Arctic and Indigenous communities
Member	**Maiken Bjørkan**	Norway	Coastal communities; Co-production of knowledge; Fisheries and aquaculture governance
Member	**Agnieszka Skorupa**	Poland	Psychology; Human behavior in extreme situations; Group and individual adaptation to Polar region
Member	**Monika Szkarłat**	Poland	
Member	**Sandra Maria Rodrigues Balão**	Portugal	Geopolitics & (Geo)Strategy; Security & Securitization Diplomacy
Member	**Andrei Golovnev**	Russia	Social psychology in the Arctic; Circumpolar states; Policy of scientific researches

TABLE
[4]Membership as of 18 February 2024. For updated information and contact information for each Working Group Member please visit :
https://iasc.info/our-work/working-groups/social-human

Member	**Andrey Podoplekin**	Russia	Social psychology in the Arctic, Circumpolar states, Policy and programs of scientific researches
Member	**Ana Maria Manero Salvador**	Spain	International Law of the Sea, International Environmental Law, Indigenous Peoples' Human Rights
Member	**Ragnhild Nilsson**	Sweden	Indigenous politics; Indigenous representation and self-determination
Member	**Laine Chanteloup**	Switzerland	
Member	**James D. Ford**	United Kingdom	Climate/environmental change, Indigenous and local communities, climate adaptation
Member	**Victoria Herrmann**	USA	climate change, community adaptation, cultural heritage, storytelling
Member	**Lawrence Hamilton**	USA	Sociology; Demography; Survey research
	FELLOWS		
2021	**Wayne Clark**	Canada	Inuit research methodology, Inuit health education. cultural safety
2022	**Seira Duncan**	Finland	Anthropology, Indigeneity, Eurasia
2022	**Daria Burnasheva**	Russia	Arctic, Indigeneity, Gender, Identity, Social and cultural dimensions of climate change
2023	**Alison Perrin**	Canada	Science policy; climate change adaptation; human-environment relationships
2023	**Naja Carina Steenholdt**	Denmark	Quality of life, living conditions, Greenland
2023	**Eda Ayaydin**	France	Arctic geopolitics, indigenous politics, sovereignty, governance
2024	**Charlotte Gehrke**	Norway	Environmental policy, science communication, science diplomacy
2024	**Anita Lafferty**	Canada	Indigenous pedagogy, decolonization, land-based
2024	**Elena Adasheva-Klein**	USA	Human-environment relations, environmental anthropology, environmental humanities
	SHWG Secretary		
	Anna Varfolomeeva	Finland	Indigeneity / Extractive Industries / Sustainability

Recent Activities

For updated information, please check the IASC website: **iasc.info**

Justice in and for the Arctic Workshop

When: October 2022
Where: Reykjavík, Iceland

The Justice in and for the Arctic working group met twice, first conjunction with the Arctic Circle Assembly in Reyjkavik, Iceland in October 2022 and second in Vienna, Austria during the Arctic Sciences Summit Week in February 2023. The purpose of the workshops was to formalise and expand a growing research network and to develop the terms of reference for a working group and setting the agenda for justice research in and for the Arctic.

The purpose of the Justice in the Arctic Working Group (JAWG) is to promote research in and on the Arctic using theories of justice and to collaborate on research activities (i.e. publications, research proposals) related to the Arctic Justice agenda. In particular, the group will work towards framing a critical research agenda for justice in and for the Arctic.

Rules of participation:

1. Membership of the group is open to all IASSA members and where possible, all participants should also be members of IASSA.
2. Members should commit to regular participation in working group events and collaboration
3. Members should commit to disseminating and promoting the work and outcomes of the group and its members' work related to justice in and for the Arctic through available communication channels (i.e. social media or institutional profiles)
4. Members should commit to respectful dialogue and relationships in group interactions and encourage a growth mindset.
5. Members should seek to support junior colleagues when in their capacity to do so.

Proposed Goals of the Working Group:

1. To outline an agenda for Justice in and for the Arctic.
2. To contribute to social science research on the Arctic using theories of justice through scholarly publications.
3. To expand the Zotero-based JUSTNORTH Justice Database
4. To promote the significance of justice in political decision-making and economic development of the Arctic.
5. To share the work and aims of the group through conference panels, media engagements and other science communication opportunities.

Researchers wishing to join the group should send an inquiry via our website at *www.arcticjustice.com*

Project Lead

Corine Wood-Donnelly

(Nord Universitet)

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Online Representations of the Arctic Region

When: October 2023

Where: Reykjavík, Iceland

The project was started in Spring 2023. Access to a database we created to amass Twitter posts about the Arctic region was granted to researchers, joining the project. This data allowed researchers, especially Gabriella Gricius and Isabelle Caron, to refine their theoretical frameworks and explore the dataset to generate analytical insights.

A session was proposed in May 2023 for the Arctic Circle Assembly, scheduled to take place in October 2023. The proposal was accepted and the session was held on October 21 2023. Four panelists participated: Mathieu Landriault (École nationale d'administration publique), Jean-François Savard (École nationale d'administration publique), Isabelle Caron (Dalhousie University) and Gabriella Gricius (Colorado State University).

The presentation by Isabelle Caron provided a theoretical framework to understand the motivations behind individuals spreading disinformation. While deep-seated and secondary beliefs provide an impetus to be active online, access to social, economic and political resources provide tools for users to disseminate false information.

Jean-François Savard analysed if the prevalence of disinformation about Indigenous languages. He found that prevalence was low on X, with most users promoting these languages and events related to this issue. A handful of users accounted for most of the messages post-

ed and users were active reacting and replying to other users: this observation pointed to a dynamic and active community sharing information with one another. He warned however that he only studied one platform and that prevalence is likely higher if other platforms are concerned, especially Facebook.

Gabriella Gricius for her part studied how Arctic insecurity was defined on X. Using a dictionary related to insecurity, she was able to track the prevalence and nature of Arctic threats or risks described by X users since January 2020. She concluded that the Arctic insecurity discussion on X was one driven by environmental fears/threats more than by any other concerns (military for example). More messages were typically posted when environmental fears or threats would arise, mostly related to climate change: heat waves in the Arctic for example caused increased attention. Climate activists were particularly active on X and talked about the Arctic as part of their overall campaign to fight global warming.

As a result of this session, two papers will be finalized by the researchers and be added to two special issues in peer-reviewed publications. The first special issue will be published in Polar Geography, with articles to be submitted by December 2023. The other one will be published in The Northern Review and the article will be submitted by January 2024.

Scientific highlights:

- The spread of disinformation is both motivated by deep-rooted beliefs and access to resources (both material and social);
- Disinformation is relatively low about Indigenous languages, while most of the coverage on social media is positive on this topic;
- Attention devoted to the Arctic region on X (formerly Twitter) does not follow salient events in the real world such as Arctic council meetings and climate change reports/summits. Intense coverage is mostly driven by climate activists referring to the Arctic to defend their cause.

Project Lead

Mathieu Landriault

(École nationale d'administration publique, Canada)

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Upcoming Activities

For updated information on SHWG activities, please check the IASC website: **iasc.info**

Terrestrial Working Group (TWG)

The scientific scope of the Terrestrial Working Group (TWG) shall include any scientific research on Arctic terrestrial and freshwater environments, landscapes and biota, and their responses to, and interactions with, other components of the Earth system. The remit encompasses the dynamics of the Arctic system; past, present and future.

Geographically, the main area of interest of the IASC Terrestrial Working Group encompasses lands and fresh water within the area north of the latitudinal treeline with Arctic climate and Arctic vegetation. Several adjacent areas are included where highly relevant for certain disciplines and projects (a) boreal oceanic tundra (e.g. the Aleutian Islands, North Atlantic islands), (b) alpine tundra that is continuous with the Arctic tundra (e.g. the central highlands of Iceland, the Scandes Mountains, the Polar Urals), (c) the forest tundra, and (d) drainage basins to the south that connect with freshwater and marine areas of the Arctic.

Scientific Foci

- Improving knowledge at multiple spatial scales of the current state of Arctic terrestrial geosystems and ecosystems
- Determining the net effect of the terrestrial and freshwater environmental and biosphere's processes that amplify or moderate climate warming
- Developing unifying concepts, fundamental theories and computer models of the interactions among species, interactions between species and their environment, and the biology of life in extreme environments
- Estimating past changes in arctic geo- and biodiversity, measuring current change and predicting future changes
- Developing high spatial resolution models of terrestrial geosystem and ecosystem change, and other tools that can be used by arctic stakeholders for adaptation strategies and sustainable management of natural resources and ecosystem services
- Determining the role of connectivity in the functioning of arctic terrestrial systems, including connections within the arctic and the global system

Cross-cutting

Understanding the major issues within the wide disciplinary and geographical scope of the Terrestrial Working Group requires interaction with other Working Groups. The initial priority activities developed by the Terrestrial Working Group would benefit form interactions with all the Working Groups

PHOTO: ALEXANDER FOGAL, Wilfrid Laurier University
For historic purposes, as well as many ongoing projects, measuring stream flow is a critical component. Pictured is Malcolm Brockett, measuring stream flow at set points along the cross section of the stream, and Jackson Seto holding the measuring tape.

Membership[5]

	NAME	COUNTRY	EXPERTISE
Chair	**João Canário**	Portugal	Biogeochemistry; Permafrost; Trace-elements
Vice-Chair	**YANG Xiaofan**	China	Subsurface hydrology; Alpine hydrology; Computational hydrology
Vice-Chair	**Michelle Mack**	USA	Plant and ecosystem ecology; Disturbance ecology; Nitrogen cycling
Past-Chair	**Ulrike Herzschuh**	Germany	Ecosystem change on decadal to glacial time-scales; Ancient DNA and pollen analysis
Member	**Annett Bartsch**	Austria	permafrost, snow, remote sensing
Member	**Leopold Füreder**	Austria	Freshwater Ecology; Biodiversity Structure and Function; Food Webs
Member	**Elie Verleyen**	Belgium	microbial (paleo)ecology, lakes, soils
Member	**Sophie Opfergelt**	Belgium	permafrost, organo-mineral interactions, biogeochemistry
Member	**Philip Marsh**	Canada	Hydrology; Snow; Permafrost; Hydrologic-Terrestrial System Interactions
Member	**Emily Jenkins**	Canada	Wildlife; Parasites; Vectors
Member	**LI Guangwei**	China	Tectono-geomorphology; Low temperature thermochronology; Structural geology
Member	**Milos Bartak**	Czech Republic	Extremophile polar microorganisms and plants
Member	**Josef Elster**	Czech Republic	Microbial ecology; Stress ecophysiology of cyanobacteria and microalgae
Member	**Thomas Friborg**	Denmark	Climatic feedbacks; Carbon budgets; Terrestrial ecosystems
Member	**Simon Bahrndorff**	Denmark	Thermal adaptation, host-microbiota interactions, climate change in terrestrial ecosystems
Member	**Kari Saikkonen**	Finland	Climate chage, biodiversity and species interactions
Member	**Miska Luoto**	Finland	Data mining; Remote sensing; Biogeography
Member	**Christelle Marlin**	France	
Member	**Emilie Gauthier**	France	Past ecosystems; Interactions between societies and environment; Pollen analysis
Member	**Nikola Koglin**	Germany	Petrology; Geochemistry; Geochronology
Member	**Bjarni Kristófer Kristjánsson**	Iceland	Evolutionary Ecology, Limnology, Fish
Member	**Archana Singh**	India	Aquatic chemistry
Member	**Santonu Goswami**	India	Permafrost
Member	**Mariasilvia Giamberini**	Italy	
Member	**Tetsuya Hiyama**	Japan	Hydrology; Climate Change; Hydrologic-Terrestrial System Interactions
Member	**Masaki Uchida**	Japan	Microbial ecology; Ecosystem ecology
Member	**Ji Young Jung**	Republic of Korea	Biogeochemistry; Soil carbon dynamics; Tundra ecosystems
Member	**Mincheol Kim**	Republic of Korea	Ecology; Microbiology
Member	**Rolf Anker Ims**	Norway	Biodiversity; Tundra ecosystems; Climate change impacts
Member	**Kristine Bakke Westergaard**	Norway	Arctic vascular plant biosystematics, conservation genetics, alien species
Member	**Piotr Owczarek**	Poland	Dendrogeomorphology; Modern slope and glaciofluvial processes; Climate - landscape interaction
Member	**Zbigniew Zwoliński**	Poland	Geomorphology; Geodiversity; Geoinformation
Member	**Alexander Makarov**	Russia	Carbon cycle
Member	**Olga L'vovna Makarova**	Russia	Tundra invertebrates; Mites; Insects; Earthworms; Taxonomy; Community structure
Member	**Sergi Pla-Rabes**	Spain	Paleoecology; Remote ecosystems; Biodiversity; Biogeochemistry
Member	**Hans Linderholm**	Sweden	Arctic climate change; Paleoclimate; Glacier variability
Member	**Christian Rixen**	Switzerland	Arctic and alpine plant ecology; Biodiversity and ecosystem functioning
Member	**Jakob Assmann**	Switzerland	Tundra Plants, Spatial Ecology, Remote Sensing

TABLE
[5]Membership as of 18 February 2024. For updated information and contact information for each Working Group Member please visit :
https://iasc.info/our-work/working-groups/terrestrial

Member	**Robert Baxter**	UK	Cryosphere-biosphere interactions; carbon cycling; soil-plant atmosphere interactions
Member	**Mary Edwards**	UK	Vegetation ecology and palaeoecology; Quaternary biogeography; Long-term climate history
Member	**Craig Tweedie**	USA	
	FELLOWS		
2021	**Ivan Alekseev**	Russia	permafrost soils; organic matter; environmental contamination
2022	**Kabir Rasouli**	Canada	Cold Regions Hydrology, Landcover Change, Snow, Mountain Hydrometeorology
2023	**Megan Wilcots**	USA	Terrestrial ecosystem ecology, carbon cycling, nitrogen cycling
2023	**Archana Dayal**	United Kingdom	Glacial ecosystem, Biogeochemistry, Microbial ecology
2024	**Louise Mercer**	United Kingdom	Community-based monitoring, Arctic environmental monitoring, co-development
2024	**Kathleen Orndahl**	USA	Satellite remote sensing; herbivore-vegetation interactions; vegetation change
	TWG Secretary		
	Clay Prater	USA	Elemental ecology; Cross-system nutrient flux; Limnology

Recent Activities

For updated information, please check the IASC website: **iasc.info**

Towards an Arctic Critical Zone Observation Network (ACZON)

When: October 2022
Where: Pisa, Italy

Following a series of online meetings, we organized the first ACZON workshop at the CNR Headquarters in Pisa, Italy, on 11 and 12 January 2023, to explore the possibility of an Arctic network of Critical Zone observatories. The workshop was in hybrid format (in-person and online). Afterwards, a general workshop on "The Arctic Critical Zone under threat: processes, fluxes and challenges" was organized at IASC ASSW 2023, on Tuesday 21 February.

Based on these questions/topics, we then started to identify what are the variables that are needed to provide a quantitative characterization of the Arctic CZ and its changes.

The list of variables to be measured was quite extensive, making it difficult to be effectively monitored at several sites. One next goal is to reduce such number of necessary variables, and the choice will also depend on what specific question will be tackled (e.g., hydrology versus carbon cycle, versus geomorphology, etc.).

In the framework of carbon flux studies, it emerged the need for a standardization of the flux measurements using accumulation chambers, something that e.g. the European ICOS ERIC has already done for measurements using Eddy Covariance techniques. Along these lines,

contacts will be established with other researchers using accumulation chambers.

Another topic of relevance is the need for a comparison between the different modelling approaches (e.g. for carbon and water fluxes), and the build-up of a repository where such models can be stored and hopefully used in a open-access way. Ideally, it would be optimal to build a Virtual Research Environment, e.g. in the spirit of the European LifeWatch ERIC, where models, data and data analysis methods can be combined by any researchers who is interested.

The discussion then addressed the future initiatives related to ACZON. These are:

1. Organize a second workshop online to further discuss the possibilities of a network of Arctic CZ Observatories (by summer 2023).
2. Identify existing models of the ACZ, which could be possibly upscaled at pan-Arctic level for inclusion in regional climate models (by fall 2023).
3. Write a common perspective paper on the minimal set of variables to be measured for a network of Arctic CZOs (in fall/winter 2023).
4. Work on estimating the drivers of wildfires in the pan-boreal/pan-Arctic region, start from literature search, contact with other TWG and IASC projects. Open to anybody who is interested.

In addition, part of the ACZON community will meet again at the 2023 IASC ASSW meeting, at the workshop "The Arctic Critical Zone under threat: processes, fluxes and challenges", to be held on Tuesday, 21 February 2023.

Project Lead

Antonello Provenzale
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Herbivory Network meeting at the Canadian High Arctic Research Station

When: 13 – 16 June 2023
Where: Cambridge Bay, Nunavut, Canada

The Herbivory Network 2023 meeting took place in Cambridge Bay, June 13-16, 2023. The aim of the meeting was to advance and discuss ongoing projects and start new collaborations that will contribute to a better understanding of the effects of herbivores on arctic ecosystems. The meeting included an open public lecture and a short field visit. Eleven researchers from five Arctic countries participated in person in the meeting, and online access was provided to other participants to some of the discussion sessions. The meeting was hosted at the Canadian High Arctic Research Station (CHARS), a leading research facility run by Polar Knowledge Canada (POLAR) in the community of Cambridge Bay, Nunavut.

During this Herbivory Network meeting a strong emphasis was placed on presentations by participants on their current research projects. As well, a field session included the demonstration of an observational protocol for data collection. We also had a brainstorming session on the potential contribution of Herbivory Network researchers to the ICARP IV process and an open public lecture attended by community members in Cambridge Bay.

Highlights

- After 10 years of contributing to circumpolar research on herbivory, since our first meeting at ASSW 2014 in Helsinki, the Herbivory Network continues to advance knowledge about the functioning of terrestrial Arctic ecosystems.
- The Herbivory Network 2023 meeting was organized at the Canadian High Arctic Research Station (CHARS) in Cambridge Bay, Nunavut, June 13-16, 2023, and was

attended by eleven researchers from five Arctic countries and in different career stages.

- One of the legacies of the meeting will be a contribution to the ICARP IV process in the form of a horizon scanning exercise that will identify the top priorities for arctic herbivory research in the coming decade.
- A public lecture by Dr. Esther Lévesque from UQTR organized as part of the meeting welcomed community members from Cambridge Bay and presented research that had been co-developed with communities in the Canadian Arctic, focused on the ecology and harvest of berries.

Background about Herbivory Network

The Herbivory Network (HN) is a collaborative research initiative (http://herbivory.lbhi.is). Since its establishment in 2014, the HN has worked towards addressing the role of herbivory in Arctic and alpine ecosystems and developing new approaches to harmonise research efforts. The goal of HN is to foster collaborations within and across disciplines, facilitate multi-site comparisons, and work towards understanding the complexity and variability of responses of tundra ecosystems to herbivory.

Funding and support

Funding to organize the meeting was provided by the Terrestrial Working Group of IASC, supporting especially the participation of early career scientists. Transnational Access from INTERACT allowed researchers to participate in the meeting to demonstrate the implementation of the field protocol that will be used by researchers at their own field sites. Polar Knowledge Canada provided in-kind support, including accommodation, access to meeting facilities and logistics support. The Herbivory Network is a UArctic Thematic Network. Many of the discussions held during the meeting contribute to the TUNDRAsalad project (grant nr. 217754), funded by the Icelandic Research Fund.

Project Lead

Isabel C Barrio

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Co-creating research agendas: toward a holistic, community-led terrestrial-monitoring transect in SW Greenland

When: November 2023
Where: Sisimiut, Kangerlussuak and Nuuk, Greenland

Development in the Arctic proceeds at a rapid pace with infrastructure investments promising new services and economic benefits for local communities. These developments, however, may also pose novel environmental and social tradeoffs, as they often cannot be accomplished without disturbing pristine areas of tundra, local wildlife and habitat, and human-wildlife relationships. This tension is also felt within the Arctic science community, as new research infrastructure is often necessary to gain a better understanding of the complex and rapid changes currently underway. As international Arctic researchers, it is our responsibility to understand these dynamics in the regions where we plan to work through early engagement with local stakeholders and by establishing meaningful working relationships to ensure that our research is informed by and is in service to priorities of local communities.

With this goal in mind, the Terrestrial Working Group of IASC recently funded the project "Co-creating research agendas: toward a holistic, community-led terrestrial monitoring transect in SW Greenland," which took place during the 2023 Greenland Science Week (Sisimiut, Sarfanguit, Kangerlussuaq, and Nuuk; Greenland) November 3rd-10th 2023. The purpose of this scoping initiative was to assess the potential interest of the residents, community leaders, businesses, and the scientific community in developing a holistic community-led terrestrial monitoring network in SW Greenland. This project was inspired by the recent efforts by the Qeqqata Kommunia municipality to establish the Arctic Circle ATV Trail connecting the international research

hub of Greenland, Kangerlussuaq, to the second largest city in the country, Sisimiut. Project participants joined a diverse cavalcade of international and Greenlandic researchers, tourism operators, and governmental officials and engaged in a series of traveling public workshops and seminars related to science, culture, infrastructure, and tourism organized by the municipality, Arctic DTU, and the Sisimiut Museum.

The trip began with the start of the Greenland Science Week in Sisimiut and consisted of tours of the research infrastructure of the Technical College of Greenland and Arctic DTU and a public panel discussion on "Science, Infrastructure, and Tourism". Here, we learned about the role of scientists in aiding local development efforts including the recent establishment of permanent permafrost bore hole and weather monitoring stations across the trail by Arctic DTU researcher Thomas Ingeman-Nielson and upcoming terrestrial wildlife monitoring projects planned by the Greenland Institute of Natural Resources. Most importantly we received word from the municipality that the trail will officially open in September 2024, so be sure to make your travel plans now! Day two was full of more public interactions beginning with a tourism and science workshop where we met with tour operators to discuss their plans for the region and ways of working together to develop mutually beneficial relationships. This discussion was followed by the community world heritage and science festivals where we heard about the latest developments of the Aasivissuit-Nipisat UNESCO World Heritige Site located in the region and participated in a diverse series of lectures from Greenlandic and international researchers where Clay Prater and Vendy Hazukova gave a presentation to introduce our initiative. The presentation was followed by Q&A session with the scientific and local community.

Day three of the trip we left Sisimiut harbor and traveled by boat up the fjord to the village of Sarfannguit. Here, we were invited to present our initiative to the community members, heard their concerns about the effects of the road on local wildlife, and discussed our shared observations and questions regarding the recent environmental changes in the region. We also toured the town and were treated to an exhibit of historical photos of the village presented by the Sisimiut Museum in the afternoon. Days 4-5 saw us heading to Kangerlussuaq where we toured the local research infrastructure, including the start of the new trail, and visited the Kangerlussuaq Museum where we sat down with local citizens and hunters to discuss the trail and upcoming plans for the World Heritage Site. Before leaving, we hosted a second community event at the sciencesupport@mit.gl">Kangerlussuaq International Science Station where we talked about local wildlife concerns and discussed the importance of engaging the local youth and getting them involved with the field research efforts around the town.

To wrap up our trip, we headed to Nuuk for a few more days of science at the Greenland Science Conference. Under the theme of "Making Science Matter," we were treated to an opening speech by the Prime Minister of Greenland and the International Chair of the Inuit Circumpolar Council about the importance of conducting research that benefits the Greenlandic people, as outlined in Greenland's National Research Strategy published earlier this year. The following keynotes, panel discussions, and scientific presentations allowed us to take in the wide array of research being conducted in Greenland. On the last day of the conference, we hosted an open community meeting where we presented preliminary insights gained from our trip. Afterwards, we had an open discussion with Greenlandic scientists about the importance of working with the Greenland Institute and the Greenland Ecosystem Monitoring Network to ensure that our efforts our not duplicated and that data are collected using standardized methods so that they can feed into the ever-growing knowledge base generated by the Greenlandic Science Community.

We received sufficient interest in developing a monitoring network along the new transect that we are confident in moving forward with continued support from our local, regional, and national partners. We thank all

of those who planned and organized the Nuuk Science Week and are particularly grateful to Laust Løgstrop, Steffen Ringsø Nielsen, and Dorthe Katrine Olsen for hosting open community meetings along with Panninguaq Fleischer Lyberth, Christian Jerimiassen, and Ingvar Knudsen for serving as interpreters and enabling us to talk to directly with local communities. Most importantly, we are very grateful to the people of Sisimiut, Sarfannguit, and Kangerlussuaq for sitting down with us to discuss your concerns, interests, and insights into infrastructure developments and environmental changes in the region.

Highlights:

- Discussing observations of environmental change with Sarfannguit residents
- Learning about the cultural and scientific history of the region from members of the Sisimuit Museum
- Discussing future work with the Qeqqata Kommunia, local tourism groups, and members of the Greenlandic science community

Project Lead

Clay Prater

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Upcoming Activities

For updated information on TWG activities, please check the IASC website: **iasc.info**

PHOTO: LIONEL FAVRE, technician and field assistant from EERL an EPFL's lab.
Northern lights above the village of Narsaq. The main village for the studies of the GreenFjord project..

3. ICARP IV - Fourth International Conference for Arctic Research Planning

3. ICARP IV - Fourth International Conference for Arctic Research Planning

In the lead up to its 35th anniversary in 2025, the International Arctic Science Committee (IASC) is coordinating a multi-year planning process for the Fourth International Conference on Arctic Research Planning (ICARP IV) lasting from 2022 until 2026. The ICARP IV process is a community-wide undertaking that engages Arctic researchers, policy makers, residents, and stakeholders from around the world to discuss the state of Arctic science, the place the Arctic occupies in global affairs and systems, to:

- consider the most urgent knowledge gaps and Arctic research priorities and needs for the next decade, and
- explore avenues to address these research needs.

The ICARP IV process will culminate at the ICARP IV Summit / Arctic Science Summit Week (ASSW) 2025 to be convened in Boulder Colorado, USA from 21 – 28 March 2025, hosted by a consortium of US institutions, including the University of Colorado Boulder, University of Northern Iowa, University of Alaska Fairbanks, and Alaska Pacific University.

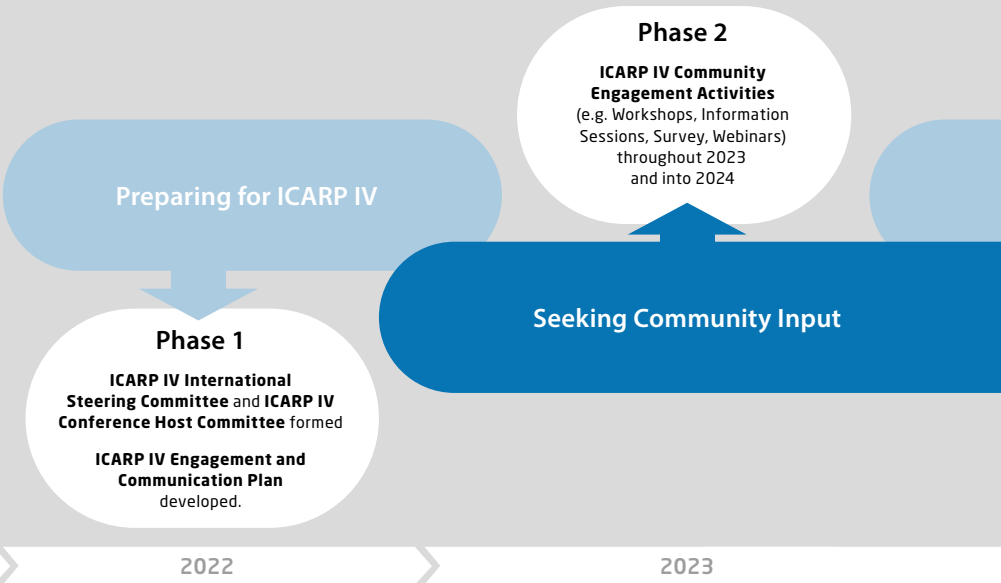
ICARP V will contribute to developing the Arctic research plans for the International Polar Year 2032-33.

ICARP IV
INTERNATIONAL CONFERENCE ON ARCTIC RESEARCH PLANNING

Fourth International Conference on Arctic Research Planning (ICARP IV) Process (2022 – 2026)

Arctic Research Planning for the next Decade

info@iasc.info
icarp.iasc.info



Community-Wide Engagement

The ICARP IV process focuses on seeking community input throughout 2023 and 2024 with a diverse set of engagement activities (in-person and online). Individuals, groups, networks, institutions and organisations are encouraged to organise projects and events focused on Arctic research planning for the next decade as part of this ICARP IV engagement process and report their results for them to be included in the development of the ICARP IV outcomes.

One of the main goals for this engagement process is to be truly inclusive, diverse, and engaging. This bottom-up engagement process will ensure that the scientific goals for the next decade are firmly grounded on the advice and needs of Arctic scientists and science organisations, Indigenous people and other Arctic residents, stakeholders, and rights-holders. The community-input provided will complement and advise the work of the ICARP IV International Steering Committee and the ICARP IV Research Priority Teams.

All upcoming activities will be posted in the Event calendar on the ICARP website (*https://icarp.iasc.info/engagement/events*). IASC also encourages organisations that want to participate in the ICARP IV process as partner to contact the IASC Secretariat at info@iasc.info. More information on ICARP IV partners are available on the website (*https://icarp.iasc.info/about/partners*) .

How can you contribute to the ICARP IV process?

Individuals, groups, networks, institutions and organisations are encouraged to organise projects and events as part of the ICARP IV engagement process and seek endorsement for their activity from the ICARP IV International Steering Committee.

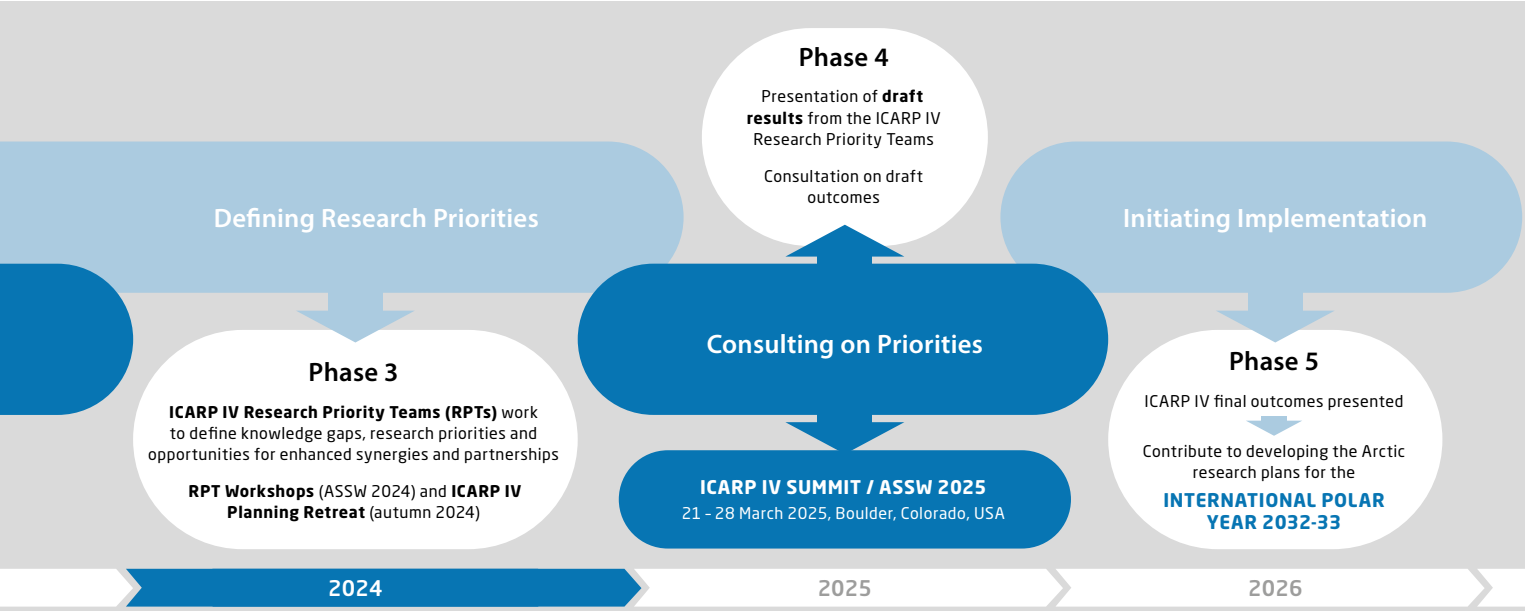
More info at:
https://icarp.iasc.info/engagement

You can further contribute to the ICARP IV process by submitting any website links, articles, reports, results from your recent projects, or other relevant resources that could inform the ICARP IV process and assist the ICARP IV Research Priority Teams in their work.

Please visit:
https://icarp.iasc.info/engagement/submit-resources

You can participate in the ICARP IV Survey to provide input on research priorities for the next decade (2025 - 2035). Take the survey and distribute it among your network.

Please visit:
https://icarp.iasc.info/ engagement/icarp-iv-survey



Research Priority Teams

The ICARP IV International Steering Committee convenes seven Research Priority Teams (RPTs) between 2024 and 2025 that will work with with the input provided through the ICARP IV Community Engagement process to:

- define the knowledge gaps and research priorities for the next decade for their topic area based on the input collected, and
- Identify and suggest opportunities to enhance synergies that might exist across existing research plans, or where there is potential for formalising new alliances and collaborative partnerships.

The preliminary results of the Research Priority Teams work will be presented at the ICARP IV Summit / ASSW 2025 in Boulder, Colorado, USA (21 – 28 March 2025), followed by a community-wide public consultation phase, with the aim to finalise the outcomes of the Research Priority Teams work by the end of 2025. The results will then contribute to the final report of the ICARP IV process published in 2026.

The following seven ICARP IV Research Priority Teams have been set up by the ICARP IV International Steering Committee Meeting. To ground the process in the outcomes of the last ICARP III, the topic areas include the ICARP III themes (from the final ICARP III report) plus additional relevant themes. Each RPT will also consider several cross-cutting themes in their work, including but not limited to co-production of knowledge.

Research Priority Team 1:
The Role of the Arctic in the Global System

The team will address research priorities and their implementation regarding topics such as: the needs for further scientific understanding of the role of the Arctic in the global climate system (past, present, and future); extreme events; permafrost thaw and SLCF; temporal and spatial distribution of precipitation (spatio-temporal aggregation); teleconnection patterns; impacts of rapid changing Arctic on extreme events locally and remotely; and global consequences (including concerning human / social aspects).

Chairs:

Hanne Hvidtfeldt Christiansen
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Research Priority Team 2:
Observing, Reconstructing, and Predicting Future Climate Dynamics and Ecosystem Responses

The team will address research priorities and their implementation regarding topics such as: Arctic observing needs (including prioritisation and planning tools for selecting observables and the engagement of indigenous peoples and stakeholders in these processes); climate system and transformations; predicting future climate dynamics; and the need for, and nature of, sustained observations and monitoring systems including spatio-temporal comparable monitoring of abiotic and biotic factors (e.g. atmosphere - vegetation - soil). In addition, the potential of paleobiology and paleoclimatology as a basis for conservation practices and evidence-based modelling will be assessed.

Chairs:

Margaret Rudolf
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Jeff Welker
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Research Priority Team 3:
Understanding the Vulnerability and Resilience of Arctic Environments and Societies and Supporting Sustainable Development

The team will address research priorities and their implementation regarding topics such as: sustainable and equitable Arctic economy; adaptive management and nature-based solutions (actions/adaptations/measures); healthy Arctic and healthy peoples (multi-stressor effects, contaminants and climate interactions, One Health); energy systems; sustainable energy production; green transition and green energy; reliability; resilience; food systems; sustainable production; resilience; water systems and drinking water; sanitary health; infrastructure and migration.

Chairs:

Jackie Dawson
(ArcticNet and University of Ottawa, Canada)
jackie.dawson@uottawa.ca

Heather Sauyaq Jean Gordon
(Sauyaq Solutions, LLC, USA)
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Research Priority Team 4:
Scientific cooperation and diplomacy

The team will address research priorities and their implementation regarding topics such as: effective international pan-Arctic cooperation in joint-funding and delivery of Arctic research outcomes; connecting and coordinating national and international funding agencies; utilising the role, contribution and value of Arctic science at times of high geopolitical tension; pathways to effective research cooperation; research exchange programs; and collaborative observing amid geopolitical constraints.

Chairs:

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Tom Barry
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Research Priority Team 5:
Co-Production and Indigenous-led methodologies

The team will address research priorities and their implementation regarding topics such as: co-production of knowledge; empowerment; capacity sharing; creating space and opportunities for Indigenous institutions / scholars to lead research and develop collaborations; Indigenous leadership; bringing education, science, and Indigenous knowledge together; producers and users of knowledge; and Indigenising Arctic research.

Chairs:

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Anita Lafferty
(University of Alberta, Canada)
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Norma Shorty
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Research Priority Team 6:
Preparing present and future generations through Education, Outreach, Communication, Capacity Building, and Networking

The team will address how Arctic research planning and traditional knowledge are preparing present and future

generations living in the Arctic and beyond to build community resilience and sustainability. Topics include: connecting Arctic issues, research priorities and their implementation; effective outreach, science communication and capacity building between research teams, local communities, decision-makers and the wider public; engaging young people, local communities, decision-makers and others in research planning; training a new generation of Arctic researchers, equipped to lead and be engaged in Arctic research at all levels; the role of EOC working at the interface of academic science and Indigenous traditional and local knowledge helping to combine and harmoniously integrate these different knowledge systems; measuring impact - effective planning and evaluation; equality, diversity, access and inclusion in EOC.

Chairs:

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Inga Beck
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Research Priority Team 7:
Technology, Infrastructure, Logistics, and Services

The team will address research priorities and their implementation regarding topics such as: Arctic infrastructure needs; engineering; new and emerging technologies (e.g. AI and machine learning), the potential for further automation and remote operation in research; the requirements and opportunities presented by new large-scale research equipment and monitoring systems; the potential for step-changes in the sharing of national infrastructure and the creation of new international platforms.

Chairs:

Dariusz Ignatiuk
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PHOTO: JILL DE VISSCHER
Picture of the surroundings of the Ny-Ålesund research town (Svalbard) with view on the Prins Heinrichøya island. The picture was taken during a sampling campaign during which we took samples within the CLIMARCTIC project. This project is aimed at studying the effects of climate change on the diversity and genetic functional attributes (nutrient and carbon cycling) of High Arctic microbiomes in soils, wetlands and lakes.

ICARP IV International Steering Committee

The ICARP IV International Steering Committee (ISC) consists of appointees from all ICARP IV partner organisations and is tasked to oversee and coordinate the ICARP IV process from 2022 to 2026, identify and develop an overall process goal, theme and agenda, sub-theme research questions, and mechanisms for action and implementation of the ICARP IV outcomes.

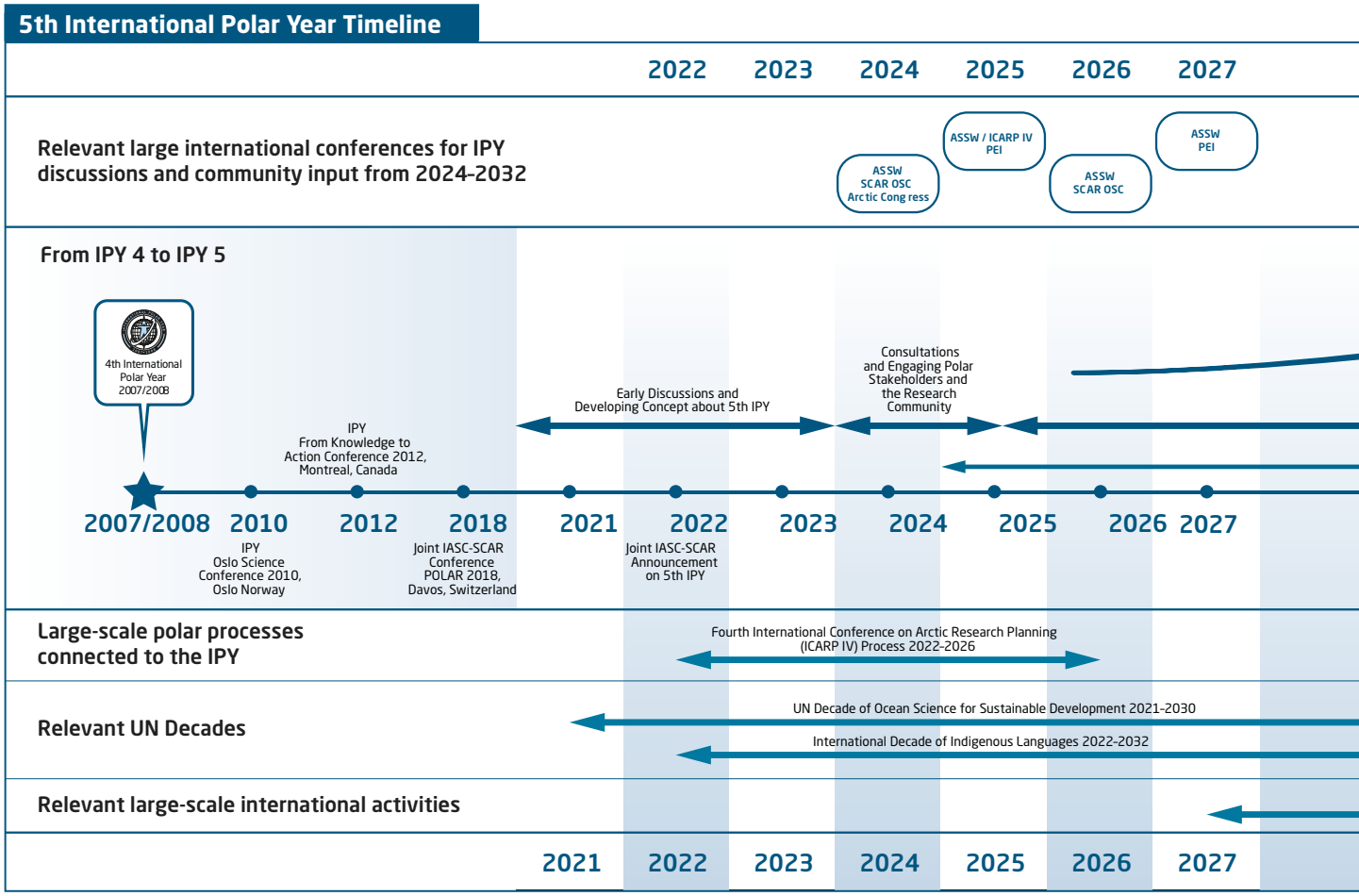
CHAIR	**Henry Burgess**, International Arctic Science Committee (IASC) - IASC President
Member	**Sourav Chatterjee**, International Arctic Science Committee (IASC) - Atmosphere Working Group
Member	**Margareta Johansson**, International Arctic Science Committee (IASC) - Cryosphere Working Group
Member	**Henrieka Detlef,** International Arctic Science Committee (IASC) - Marine Working Group
Member	**Catherine Chambers**, International Arctic Science Committee (IASC) - Social and Human Working Group
Member	**Hans Linderholm**, International Arctic Science Committee (IASC) - Terrestrial Working Group
Member	**Yulia Zaika**, International Arctic Science Committee (IASC) - International Science Initiative in the Russian Arctic (ISIRA)
Member	**Matthew Druckenmiller**, International Arctic Science Committee (IASC) - ICARP IV / ASSW 2025 host
Member	**Gerlis Fugmann**, International Arctic Science Committee (IASC) - IASC Secretariat
Member	**David Hik**, International Arctic Science Committee (IASC) - Past ICARP III Chair
Member	**Lauren Divine**, Aleut International Association (AIA)
Member	**Rolf Rødven**, Arctic Monitoring and Assessment Programme (AMAP)
Member	**Chantelle Verhey**, Arctic Data Committee (ADC)
Member	**Hyoung Chul Shin**, Asian Forum for Polar Science (AFOPS)
Member	**Harmony Wayner**, Association of Polar Early Career Scientists (APECS)
Member	**Svein Mathiesen**, Association of World Reindeer Herders (AWRH)
Member	**Amy Lauren Lovecraft**, Climate and Cryosphere (CliC)
Member	**Courtney Price**, Conservation of Arctic Flora and Fauna (CAFF)
Member	**Renuka Badhe**, European Polar Board (EPB)
Member	**Jennifer Mercer**, Forum of Arctic Research Operators (FARO)
Member	**Tatiana Degai**, International Arctic Social Sciences Association (IASSA
Member	**Richard Essery**, International Association of Cryospheric Sciences (IACS)
Member	**Eirini Glyki**, International Council for the Exploration of the Sea (ICES)
Member	**Goncalo Vieira**, International Permafrost Association (IPA)
Member	**Melody Burkins**, International Science Council (ISC)
Member	**Maribeth Murray**, International Study of Arctic Change (ISAC)
Member	**John Crump**, Inuit Circumpolar Council Canada (ICC Canada)
Member	**Radovan Krejci**, Ny-Ålesund Science Managers Committee (NySMAC)
Member	**Maria Pia Casarini**, Polar Educators International (PEI)
Member	**Elle Merete Omma**, Saami Council
Member	**Seong-Joong Kim**, Scientific Committee on Antarctic Research (SCAR)
Member	**Emmanuel Boucher-Fassett,** Sustainable Development Working Group (SDWG)
Member	**Sandy Starkweather**, Sustaining Arctic Observing Network (SAON)
Member	**Heikki Lihavainen**, Svalbard Integrated Arctic Earth Observing System (SIOS)
Member	**Dag Avango**, The Arctic Five
Member	**Kirsi Latola**, University of the Arctic (UArctic)
Alternate	**Sarah Strand**, Association of Polar Early Career Scientists (APECS)
Alternate	**Paula Kankaanpää**, International Arctic Science Committee (IASC)
Alternate	**Muyin Wang**, International Arctic Science Committee (IASC) - Atmosphere Working Group
Alternate	**Heidemarie Kassens**, International Arctic Science Committee (IASC) - Marine Working Group
Alternate	**Andrey Petrov**, International Arctic Science Committee (IASC) - ICARP IV / ASSW 2025 host
Alternate	**Kári Fannar Lárusson**, Conservation of Arctic Flora and Fauna (CAFF)
Alternate	**Katy Smith**, Forum of Arctic Research Operators (FARO)
Alternate	**Inga Beck**, Polar Educators International (PEI)

More info: *https://icarp.iasc.info*

PHOTO: MARIASILVIA GIAMBERINI, Consiglio Nazionale delle Ricerche (CNR).
Sampling CO2 winter emissions, Svalbard

4. IPY – INTERNATIONAL POLAR YEAR 2032-33

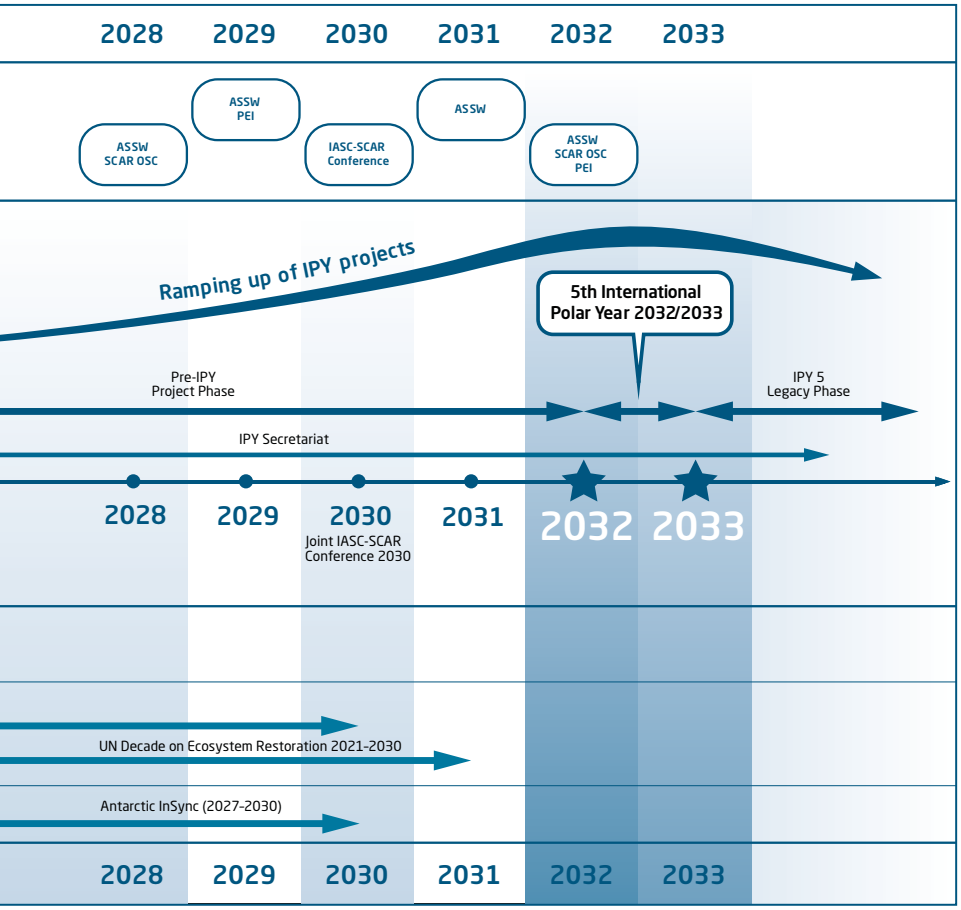
4. IPY – INTERNATIONAL POLAR YEAR 2032-33



Why an International Polar Year in 2032-33?

This is a critical decade for people and the planet. Extreme weather, rising temperatures, rising sea levels, and devastating events such as droughts, floods, wildfires, marine warming, ocean acidification, and record lows in sea ice extent are becoming ever more prevalent, affecting ecosystems, economies, and human wellbeing around the world. Many changes are taking shape faster than previously predicted, and as the IPCC 6th Assessment Report made clear, many of the most serious consequences are linked to unprecedented changes in the Arctic and Antarctic. The urgency of understanding the consequences of such rapid change in the polar regions for global climate, biodiversity and human societies is now clear and has never been greater.

A 5th International Polar Year (IPY) will provide a vital opportunity to close outstanding major knowledge gaps through targeted attention and globally-coordinated action enabling polar researchers, knowledge holders, rights holders and stakeholders to achieve major breakthroughs in the knowledge required to protect the global environment, develop effective national and local strategies to mitigate and adapt to environmental changes, and accelerate progress towards achieving the UN Sustainable Development Goals.



A crucial new phase in a 150-year-old process

The 5th IPY (2032-33) will bring the longstanding tradition of organising regular IPYs to an era of unprecedented need for large-scale coordinated research on polar and global changes.

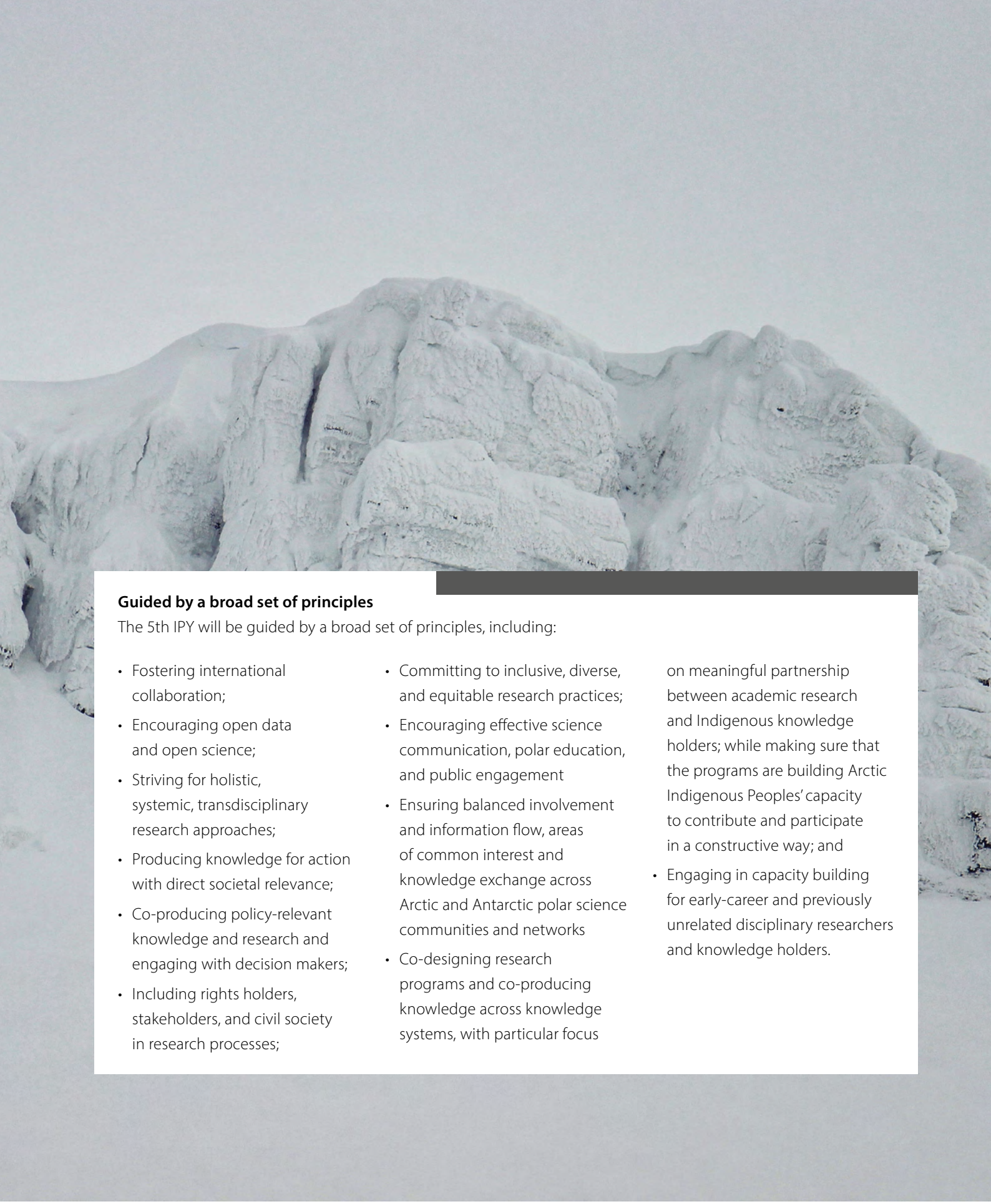
It will build on four groundbreaking IPYs between 1883 and 2008, which together form a 150-year-long chain of credible scientific evidence regarding changes to the cryosphere, oceans, atmosphere, landscapes and people living in the polar regions. The rate of change, especially in the polar regions, has been increasing rapidly over the last few decades. At the same time, the majority of the global climate tipping point elements are at the poles. By 2032 or even before we may be crossing tipping points in the Earth's System that will cause irreversible environmental changes in the polar regions and around the globe, with dramatic consequences for all life on Earth. Consequently, a shorter (25-year) interval for coordination of a 5th IPY is essential. The 5th IPY will foster vital cooperation among countries, disciplines, programmes, and knowledge systems to produce urgently needed actionable information to support evidence-based z challenges. It will build directly on the legacy of the 4th IPY (2007-08), which drew together evidence from thousands of polar scientists and others emphasising that what happens at the poles has global impacts. It also generated an impetus in polar science communication, education, and public engagement.

The 5th IPY will:

- Allow researchers and knowledge holders to capitalise on the outcomes of previous IPYs by expanding integrated and coordinated observations of accelerating changes,
- and long-term monitoring required to understand current conditions and inform predictions of future states;
- Provide a comprehensive assessment of the operation and evolution of polar ecosystems enabling a more holistic understanding of the Earth's interconnected systems and climate
- change trajectory, as well as supporting practical global and local adaptation solutions.
- Build on the methodological, technological, and epistemological advancements of the 4th IPY, including major shifts toward working across knowledge systems;
- Achieve a step-change in transdisciplinary polar research through meaningful integration of natural sciences, social sciences, humanities research, and Indigenous knowledge systems.

The urgency of undertaking the 5th IPY in 2032-33 is underscored by recent international developments and commitments, from the 2023 Helsinki Declaration on Climate Change and

Antarctica adopted by the Antarctic Treaty Consultative Meeting, and the 4th International Conference on Arctic Research Planning Process (ICARP IV), to the UN Decades of Ocean Science, Ecosystem Restoration, and Indigenous Languages. The 5th IPY will leverage these and other initiatives, which together highlight the need for greater international coordination to provide the credible scientific evidence needed for effective decision-making on urgent local to global issues.



Guided by a broad set of principles

The 5th IPY will be guided by a broad set of principles, including:

- Fostering international collaboration;
- Encouraging open data and open science;
- Striving for holistic, systemic, transdisciplinary research approaches;
- Producing knowledge for action with direct societal relevance;
- Co-producing policy-relevant knowledge and research and engaging with decision makers;
- Including rights holders, stakeholders, and civil society in research processes;
- Committing to inclusive, diverse, and equitable research practices;
- Encouraging effective science communication, polar education, and public engagement
- Ensuring balanced involvement and information flow, areas of common interest and knowledge exchange across Arctic and Antarctic polar science communities and networks
- Co-designing research programs and co-producing knowledge across knowledge systems, with particular focus on meaningful partnership between academic research and Indigenous knowledge holders; while making sure that the programs are building Arctic Indigenous Peoples' capacity to contribute and participate in a constructive way; and
- Engaging in capacity building for early-career and previously unrelated disciplinary researchers and knowledge holders.

PHOTO: IGOR VASILEVICH
Snow frost on the top of the mountain. Photo taken during the project: Hydrological observations (mass balance) over Gronfjorden basin, Svalbard.

Co-creating societal impacts and benefits

The 5th IPY has at its core a commitment to meaningfully involve and benefit a wide range of stake- and rightsholder groups, including scientists, decision makers, local communities, educators, youth, global publics, industry, and especially Indigenous Peoples in the Arctic. Among its key impacts will be the generation of new knowledge with direct societal and policy relevance, to inform decision-making for communities in the polar regions and around the globe.

IPY projects will create and strengthen meaningful partnerships between scientists, academic institutions, educators, Indigenous Peoples, polar stakeholders, and relevant organisations through co-design of research projects and co-production of knowledge. A focus on capacity-building will advance polar research as an inclusive, diverse, and equitable undertaking through engagement with under-represented groups, youth engagement and support to early career researchers and polar educators. Extensive education and outreach activities will raise public awareness of the global importance of the polar regions, helping to garner support for knowledge-based solutions and for polar research itself. The IPY will strengthen international coordination and collaboration between all nations, toward a common purpose for the greater good, enabling the global polar research community to achieve together what no single nation can achieve alone.

Moving forward together

The 5th IPY is envisioned as a highly coordinated international, multi-year activity with three distinct phases: a preparatory planning phase (2021-25); a project phase (2026-33) including the IPY itself (2032-33); and a legacy phase (2033+).

1. The preparatory planning phase began in 2021 via conceptual discussions among several polar research organisations and Arctic Indigenous Peoples organisations, fostering meaningful engagement and coordination between all participants who will be vital to the success of this IPY. From 2023-25, a period of broad consultations will be carried out to understand the needs of the relevant stakeholders, refine planning documents and to co-develop timelines, priorities, and ambitions.
2. The IPY project phase will start around 2026 with a gradual ramping-up of IPY projects and a clear two-year peak of intensive polar fieldwork and analysis activities during the 5th IPY itself in 2032-33. Two years are needed for the IPY in order to study both poles and conduct relevant field seasons. The project phase will overlap with key polar research events including a joint IASC-SCAR Conference and APECS World Summit in 2030, and will engage closely with related regional and global efforts such as the Fourth International Conference on Arctic Research Planning process (ICARP IV), the Antarctic InSync initiative, and relevant UN Decades.
3. A legacy phase beyond 2033 will fully exploit the data collected during the 5th IPY. This will involve analysis and synthesis activities, with a focus on knowledge transfer, reporting, and establishment of supporting frameworks for legacy outcome

More information

https://iasc.info/cooperations/international-polar-year-2032-33

For more information and to provide feedback please contact the Secretariats of the International Arctic Science Committee (IASC) (**info@iasc.info**) and the Scientific Committee on Antarctic Research (SCAR) (**info@scar.org**).

PHOTO: ALEKSANDRA OSIKA

A calving event at Hansbreen, Hornsund Photo taken for the PhD project "History of glaciation of southern Spitsbergen in the Holocene" The aim of the fieldwork was geomorphological mapping of glacier forelands and collecting material for geochronological analysis.

5. Arctic Science Summit Week 2023

5. Arctic Science Summit Week 2023

The **Arctic Science Summit Week (ASSW) 2023** was organized from **17 - 24 February 2023** in Vienna, Austria, by the International Arctic Science Committee (IASC) and hosted by the Austrian Polar Research Institute (APRI) at the University of Vienna.

The ASSW 2023 Science Symposium was titled "The Arctic in the Anthropocene". Never before has the Arctic experienced such a high pressure by human impact either by local environmental disturbances or by global climate change leading to long-term changes and massive challenges to the resistance and resilience of polar ecological systems and Arctic societies. "The Arctic in the Anthropocene" was a quite appropriate theme to focus on the increasing pressure of high latitudes. Several sessions offered space to shed light on short- and long-term changes, respectively, on human, terrestrial, aquatic or aerial systems. Despite the focus on the Arctic, contributions on the Antarctic, aiming at fostering networking and advances on research on both poles, were accepted and appreciated.

The ASSW 2023 included the following elements:

1. Business and Community Meetings: This included 52 meetings/workshops/lectures from IASC and other Arctic research organizations, projects, and initiatives spread across all eight conference days.
2. Science Conference "The Arctic in the Anthropocene" with 42 scientific sessions including keynote lectures (offered in hybrid mode), opening and closing ceremonies, panel discussion, IASC medal lecture and a poster session. In-person participants came from 26 countries and all continents, including scientists, Indigenous leaders and know- ledge holders, artists, business and non-profit organizations and representatives from governments.

The total number of actual participants was 877 from 36 countries, with 585 in-person participants from 31 different countries, and 292 online participants from 31 different countries.

More information:

assw.info

Upcoming ASSWs

ASSW 2024

ASSW 2024 will be held in Edinburgh, United Kingdom, from 21 - 29 March 2024, and there is an exciting programme of business, community and science meetings (21-26 March); an Arctic Science Day with the theme "Arctic Coasts" in the fabulous Dynamic Earth science centre (26 March); and three days for the important Arctic Observing Summit 2024 (27-29 March)

ASSW 2025

ASSW 2025 will be held in Boulder, Colorado, US from 21 - 28 March 2025. Following an invitation from the U.S. Polar Research Board at the National Academies the IASC Council voted to approve Boulder, Colorado (USA) as the host of ICARP IV conference, to be held concurrently with Arctic Science Summit Week (ASSW) 2025 from 21 - 28 March 2025. The Conference Host Committee is committed to providing an outstanding venue for sharing scientific achievements, advancing collaboration, and planning for the future of Arctic research.

PHOTO: WAI YIN CHEUNG

PHOTO: TRINE LISE SVIGGUM HELGERUD, Norwegian Polar Institute
During our annual cruise in Fram Strait with RV Kronprins Haakon, scientists from Norwegian Polar Institute and CIRFA at UiT collect sea ice data and samples of the fast ice east of Greenland at 79N. The sampling is also used for validating radar images from ESA Earth Observation. September 2023.

6. Data and Observations

6. Data and Observations

Sustaining Arctic Observing Network (SAON)

Background

The Sustaining Arctic Observing Network (SAON) is a joint initiative of the Arctic Council and the International Arctic Science Committee (IASC) that was established through the Arctic Council Nuuk Declaration 2011 with the aim to strengthen multi-national engagement in and coordination of pan-Arctic observing.

In SAON's Strategy and Implementation Plan[5] the need for a Roadmap for Arctic Observing and Data Systems (ROADS[6]) was identified. This marks a transition in SAON's focus from community-building and partnership development towards a more active vision for the systematic design and implementation of the Arctic Observing System.

SAON ROADS Process

The lack of a consistent and holistic mechanism to assess observing system priorities and link independently funded efforts across the Arctic is a shortcoming that has hindered adaptation strategies and hampered funding responses for an improved observing system. SAON ROADS proposes to address this shortcoming by generating a systems-level view of observing requirements and implementation strategies, across SAON's partners. It is recognized that a critical success factor for ROADS is the equitable inclusion of Arctic Indigenous Peoples in the design and development process. The ROADS process will build on the societal benefit-based approach of the International Arctic Observing Assessment Framework[7].

Activities in 2023

As a response to the European Commission call for Supporting the implementation of GEOSS in the Arctic in collaboration with Copernicus, the Arctic PASSION programme has been established. Through the AMAP Secretariat, the SAON Secretariat is engaged in several work packages and is responsible for several deliverables in Arctic PASSION. In one of the work packages, Expert Pan-

[5] https://www.arcticobserving.org/strategy
[6] https://journalhosting.ucalgary.ca/index.php/arctic/article/view/74330
[7] https://www.arcticobserving.org/images/pdf/misc/STPI-SAON-International-Arctic-Observations-Framework-Report-2017.pdf
[8] https://roadsadvisorypanel.org/expert-panel

PHOTOGRAPHER: MALCOLM BROCKETT, Wilfrid Laurier University

Location: Little Bear Lake, Trail Valley Creek, NWT. This is one of the study lakes from my master's project as melt time is starting. There is a thin layer of water (about 10cm) sitting on top of the ice around the edges of the lake, and the lake ice is beginning to candle. Pictured is Alexander Fogal walking onto the lake ice to inspect it.

els have been established to develop observation and data requirements for a series of so-called Shared Arctic Variables (SAVs) and the framework necessary to document these. Within ArcticPASSION this work is related to permafrost and wildfire. In collaboration with Canadian partners an Expert Panel on sea ice has been established, and in collaboration with USA partners, work is ongoing to define harmful algal blooms and salmon and food security as SAVs[8].

SAON is engaged in the planning of the Arctic Observing Summit (AOS) in 2024. For this AOS, four working groups have been established to develop recommendations for the design, implementation, coordination and sustained operation of an international network of Arctic observing systems: 1) Local to Global Observing, 2) Data Sharing, 3) System Implementation/SAON ROADS, and 4) Observing System Benefits.

SAON finally plans to be engaged in the ICARP IV process.

SAON and the Arctic Council

The Arctic Council and its subsidiary bodies have been in a pause situation since February 2022. This includes SAON, and its Board and Committees have had no formal meetings since February 2022. Through external partnerships, it has been possible to progress especially the ROADS process, as described above. There is uncertainty when SAON can formally resume activities, but the Secretariat continues to operate at a minimum level.

For more information, see:

https://www.arcticobserving.org/

Arctic Data Committee (ADC)

ADC is a joint initiative of IASC and the Sustaining Arctic Observing Networks (SAON). One of SAON's guiding principles is to "promote ethically free and open access to ethically-collected data". Over the years a number of workshops (e.g. the Polar Data Planning and Polar Data Architecture Workshop) and conferences (Polar Data Forum) addressing the structured approach to polar and Arctic data management have been arranged. These workshops and conferences have to a large degree focused on exchange of discovery information between data centres and integration of such in data portals. Since 2019, regular hackathons have been arranged through the Polar to Global Online Interoperability and Data Sharing Hackathons (*https://p2g-data.org/*). These hackathons are used to liaise between the working groups related to ADC and the wider polar data management community.

The Arctic Council and its subsidiary bodies have been in a pause situation since February 2022. This includes SAON, and also the ADC as one of SAON's Committees, joint with IASC. A process to change the leadership of the ADC has started, and Leasi Vanessa Raymond (Convene North, Alaska, USA) and Chantelle Verhey (WDS-ITO, Canada) are now ADC chairs elect. Outgoing chairs are Peter Pulsifer, Marten Tacoma and Sten Tronstad, and they have all served as passionate leaders of the ADC for several years.

In spite of the pause, and through external partnerships, it has been possible to progress certain activities through other communities:

- The Arctic Data Ecosystem mapping is an activity establishing a map of the Arctic data management. The intention is to establish an overview of data reposi-

tories being active as well as how they relate to each other, including technologies used to integrate services/holdings. The preliminary data in this mapping activity was collected during workshops, and the data is currently subject to cleaning as well as feeding this information into a web based service allowing visual representation of the connections. In 2024 owners of the information will be requested to update and add additional information. The mentioned web based service is currently under revision1

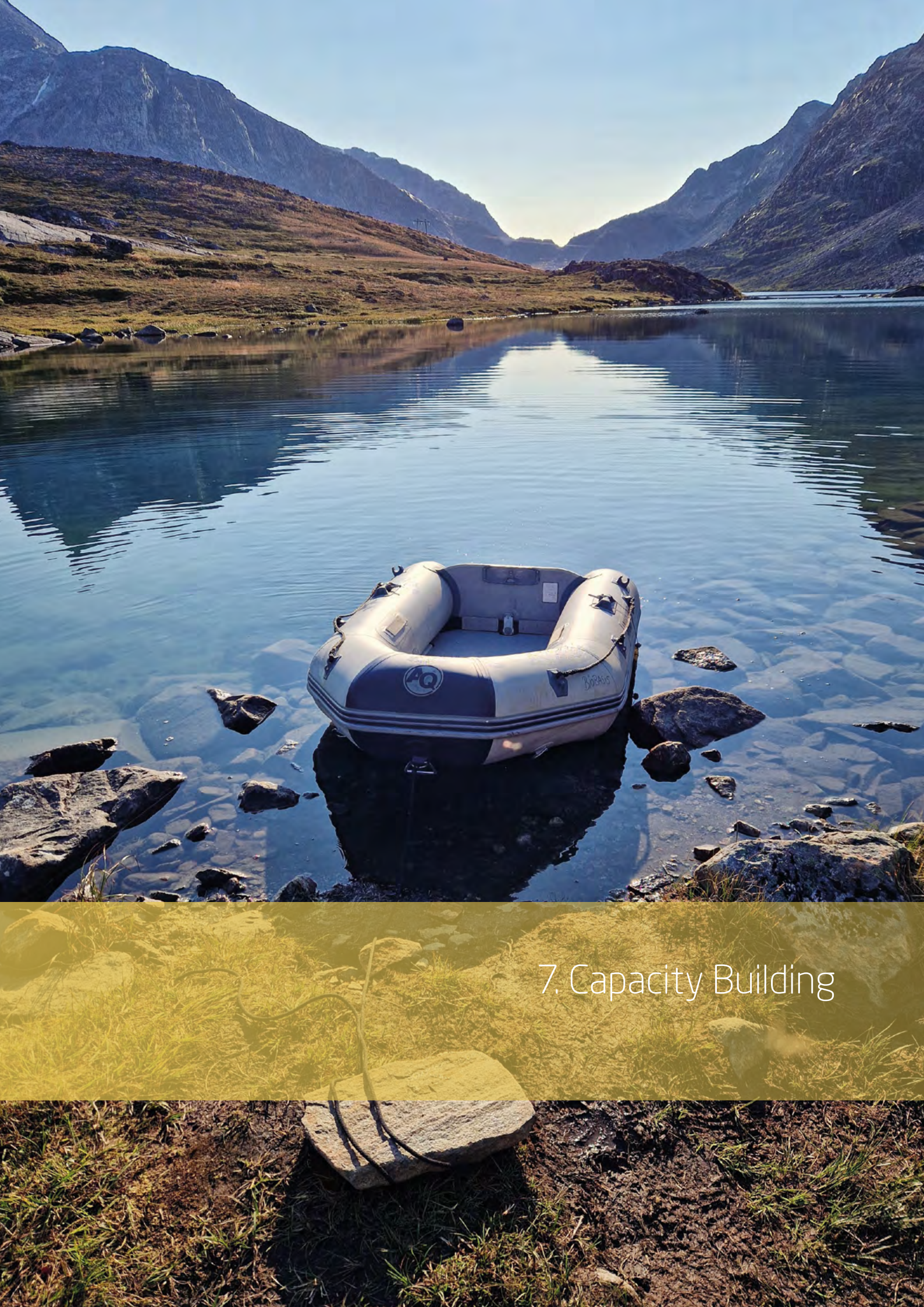
- Arctic PASSION is actively supporting Arctic data management efforts through the SAON Data Portal2. The facility is documented in the ArcticPASSION publication Website with data information, description of available and emerging web services and user client to find data regardless their location and regular updates on datasets that have been FAIRified3
- The POLDER Working Group is working towards a unified search for all polar data through recommendations for a common set of metadata elements relevant across Arctic sciences. The group has continued to support the Polar Data Search (frmrly: Polar Federated Search)4.
- The ADC-IARPC-SCADM Vocabularies and Semantics Working Group is focusing on how semantic technologies and resources can support distributed data management efforts. The focus is on raising the awareness of technologies and resources among data repositories and data providers as well as actually implementing and using resources in operational systems.
- In collaboration with partners, mainly SCADM and SOOS, the Polar Data Forum V was arranged in the autumn 20235. The focus was on improving large-scale data exchange and interoperability – between organizations and at the international level.
- The Polar Observing Assets Working Group (POAwg) is a working group under the Committee on Observations and Networks (CON). It facilitates the discovery and interoperability of structured information about research & monitoring assets at high latitudes: sites, mobile platforms, projects, campaigns, and initiatives. The WG has recently released the Registry of Polar Observing Networks (RoPON)6, which is a web facility that organizes information about systems and organizations that coordinate or track observing activities and infrastructures in the polar regions.
- Through Arctic PASSION, the AMAP Secretariat has recently published the report Synthesis reports on the status of the Arctic Data System7, which is based on the work of the ADC and the PDF.

Onwards

- Many of the activities described above will continue in 2024. In addition, the preparations for the Arctic Observing Summit in 2024 are ongoing, and the data working group in AOS has a strong engagement from ADC members. The themes for the data working group will be 1) Indigenous Data Sovereignty, 2) Shared Arctic Variables (SAVs), and 3) Data Interoperability beyond discovery metadata.

PHOTO: MARIE FROST ARNDAL

Picture represent field work done by the Greenland Ecosystem Monitoring programme (GEM). The GEM programme is one of the most comprehensive monitoring programmes for climate and ecosystems in the Arctic, and has 3 main sites for monitoring in Greenland – of which Kobbefjord is one of them.



7. Capacity Building

7. Capacity Building

IASC Fellowship Program

IASC recognizes that the next generation of Arctic researchers are faced with emerging scientific and societal challenges due to the growing impacts of Arctic and global climate change. IASC therefore believes that it is of great importance to foster, promote, and involve early career researchers (ECRs) working in the Arctic by:

- Striving to represent ECRs within IASC;
- Providing support, endorsement, and dissemination of information on activities, projects and requests for participation;
- Supporting travel grants to ECRs for participation in Arctic conferences.

Using these instruments, IASC aims to promote ECRs within the organization by providing career development activities such as planning international and interdisciplinary research activities and programs, organizing scientific workshops, and developing professional networks.

Every year since 2014, the IASC Fellowship Program has provided at least five excellent Arctic ECRs (incl. graduate students, postdocs and junior research group leaders) with the opportunity to get engaged in the IASC Working Groups. Starting in 2020, an additional Indigenous Fellowship was added to the IASC Fellowship Program. The appointment of Indigenous Fellows comes at the recommendation of the Action Group on Indigenous Involvement. The Indigenous Fellow can choose whichever IASC Working Group is most of interest and relevant to them

This year it is 10th anniversary of the Fellowship Program! On the occasion of the 10th anniversary of the IASC Fellowship program, ten successful early career researchers were identified for all available fellowships in 2024. APECS very kindly coordinated the application and review process; recommendations from APECS based on the peer review process were delivered for final selection to the IASC Working Group Chairs and the SAON Leadership. The reviewers were impressed by the excellent quality of the applications.

As of 2024, a total of 78 ECRs have participated in the IASC Fellowship Program. Fellows have the opportunity to participate as WG members for three years and are provided with funding to attend two consecutive ASSW meetings during their initial fellowship year. This unique opportunity allows ECRs to become active members of their WGs, hence, to develop research collaborations and professional networks with senior researchers from various disciplines. Five Fellows for each WG have been

selected in 2024 and they are Patrik Winiger, Robbie Mallet, Daniela Walch, Charlotte Gehrke and Louise Mercer . Anita Lafferty has been announced as an Indigenous Fellow in 2024 and has joined the SHWG. In 2024, IASC also offered special joint Fellowships in cooperation with other partners. The Fellowship Program together with the Polar Initiative of the Prince Albert II of Monaco Foundation (PA2F) provided three fellowships to Beatriz Recinos-Rivas, Elena Adasheva-Klein, and Kathleen Orndahl . The Fellowship Program together with SAON-ROADS provides one Fellowship to Izuchukwu O Ezukanma. Congratulations to all 10 IASC Fellows!

Fellows will be introduced during the IASC Council meeting at the ASSW2024 in Edinburgh, Scotland, United Kingdom.

The previous years' Fellows were actively involved in both the WG and Council meetings as well as in the ASSW science symposium, where Fellows co-convened scientific sessions, presented scientific results and participated in panel discussions.

One of the former fellows Amanda Burson created a group for alumni fellows who want to keep contacts with IASC and still get involved in WGs activities. Please contact Amanda if you're interested!

IASC is excited to witness the contributions of all our current and past Fellows brought to the IASC's scientific activities and Arctic research as a whole. IASC would like to acknowledge all that have supported the idea of the IASC Fellowship Program and outstanding ECRs, who have functioned as Fellows. Now in its tenth year, the benefits of the IASC Fellowship Program are clearly evident for the Fellows, IASC, and Arctic research.

Dr. Stanislav Ksenofontov,
IASC Fellows Coordinator

PHOTO: ANNA LENA BRECHT, Postdoctoral Researcher, Department of Geography, University of Kiel
Kindergarten children, dressed up as little coastal fishers, traditionally welcome and celebrate the annual arrival of the Northeast Arctic cod (Gadus morhua), which starts migrating into the Vestfjord every January. Location: Svolvær, Lofoten Islands in the Norwegian Arctic, 2015

IASC Fellows 2024

Patrik Winiger | Atmosphere WG
Arctic and high-altitude aerosols, atmospheric chemistry, analytical chemistry

Robbie Mallett | Cryosphere WG
Ice-ocean interactions, numerical modeling, sea level rise

Daniela Walch | Marine WG
Aquatic remote sensing, biogeochemistry

Charlotte Gehrke | Social and Human WG
Environmental policy, science communication, science diplomacy

Anita Lafferty | Social and Human WG - Indigenous Fellow
Indigenous pedagogy, decolonization, land-based

Louise Mercer | Terrestrial WG
Community-based monitoring, Arctic environmental monitoring, co-development

IASC - Prince Albert II of Monaco Foundation Fellows 2024

Beatriz Recinos-Rivas | Marine WG
Ice-ocean interactions, numerical modeling, sea level rise

Elena Adasheva-Klein | Social and Human WG
Human-environment relations, environmental anthropology, environmental humanities

Kathleen Orndahl | Terrestrial WG
Satellite remote sensing; herbivore-vegetation interactions; vegetation change

IASC - Roads Fellows 2024

Izuchukwu O Ezukanma
Tundra, weathering, Greenland

IASC Fellows 2023

Rémy Lapere | Atmosphere WG
Chemistry-transport modeling, Aerosols, Air pollution

Armina Soleymani | Cryosphere WG
Sea ice, Satellite image processing, Remote sensing

Lisa Winberg von Friesen | Marine WG
Marine/sea ice biogeochemistry, Nitrogen fixation, Microbial ecology

Alison Perrin | Social and Human WG
Science policy; Climate change adaptation; Human-environment relationships

Naja Carina Steenholdt | Social and Human WG - Indigenous Fellow
Quality of life, Living conditions, Greenland

Megan Wilcots | Terrestrial WG
Terrestrial ecosystem ecology, Carbon cycling, Nitrogen cycling

IASC - Prince Albert II of Monaco Foundation Fellows 2023

Eda Ayaydin
Social and Human WG
Arctic geopolitics, Indigenous politics, Sovereignty, Governance.

Archana Dayal
Terrestrial WG
Glacial ecosystem, Biogeochemistry, Microbial ecology

Fellows' Voices

Being an IASC fellow is an unparalleled way of meeting passionate scientists. Not only do you get the opportunity to exchange with the top scientists from your discipline, you also get to collaborate with fellows from other fields who are young, inspiring people. As an IASC fellow at the 2023 ASSW, I feel that I expanded my work horizons more in these few days than during my entire career before. But being a fellow is more than networking. Actively participating in your working group means you contribute to shaping the way forward in Arctic science.

Rémy Lapere
2023 Atmosphere Working Group Fellow
Chemistry-transport modeling, Aerosols, Air pollution
Contact: *remy.lapere@univ-grenoble-alpes.fr*

I actively participated in IASC FOX (Fellows' Ongoing X-change) meetings, not only attending sessions but also engaging in discussions with both current and alumni IASC fellows. Additionally, I shared my ongoing research with the International Conference on Arctic Research Planning (ICARP), resulting in my nomination for contribution in Topic Area 1: The Role of the Arctic in the Global System. Currently, I am eagerly awaiting updates regarding my role and the specific details of how I will initiate my contributions to this team

Armina Soleymani
2023 Cryosphere Working Group Fellow
Sea ice, Satellite image processing, Remote sensing
Contact: *armina.soleymani@uwaterloo.ca*

The IASC Fellowship has been an excellent opportunity to meet and collaborate with colleagues from the international Arctic science community. The Social and Human Working Group brings together a diverse group of experts and it's a privilege to be a part of this group. I had the opportunity to network with these leaders at the ASSW in Vienna where I also met a wonderful group of supportive colleagues in the IASC fellowship community. Through IASC, I have had opportunities to expand my skillset by developing and reviewing proposals, adjudicating awards, and participating in workshops and meetings. Through this fellowship I have found ways to contribute to the international community, including the ICARP IV process and ICARP IV Research Priority Teams. This fellowship is an experience that I am very grateful for and which will hopefully seed long term connections and collaborations.

Alison Perrin
2023 Human & Social Working Group Fellow
Climate Change Adaptation, Science Policy,
Human-Environment Relationships
Contact: *aperrin@yukonu.ca*

The IASC fellowship has opened many doors and filled in several gaps in my knowledge of coordination of the Arctic science community. It is inspiring to see the amount of engaged researchers coming together and thinking ahead – this is how I think we build strong networks and useful research. Participating in ASSW 2023 widened my network and sparked several new ideas, as well as getting me involved in different initiatives. I look forward to continuing to be involved with IASC in the coming years, with for example building up ideas for ICARP IV and the International Polar Year.

Lisa Winberg von Friesen
2023 Marine Working Group Fellow
Marine/sea ice biogeochemistry, Nitrogen fixation,
Microbial ecology
Contact: *lisa.vonfriesen@bio.ku.dk*

My experience with IASC has been immensely enriching for both my professional and personal growth. Attending ASSW 2023 was a pivotal moment, leading to my involvement in the local and scientific organizing committees for ASSW 2024. Additionally, participating in a cross-cutting proposal with the Cryosphere group enhanced my understanding of collaborative grant writing and partnerships in science. The upcoming Polar Symposium in Monaco in February 2024, with its workshops and plenary sessions, promises further learning opportunities. Hence, I am excited to continue strengthening the collaboration between FPA2 and IASC and contributing to innumerable opportunities in the future.

Archana Dayal
2023 Terrestrial Working Group Fellow
Glacial ecosystem, Biogeochemistry, Microbial ecology
Contact: ***ard33@aber.ac.uk***

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