IASC 2021

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.

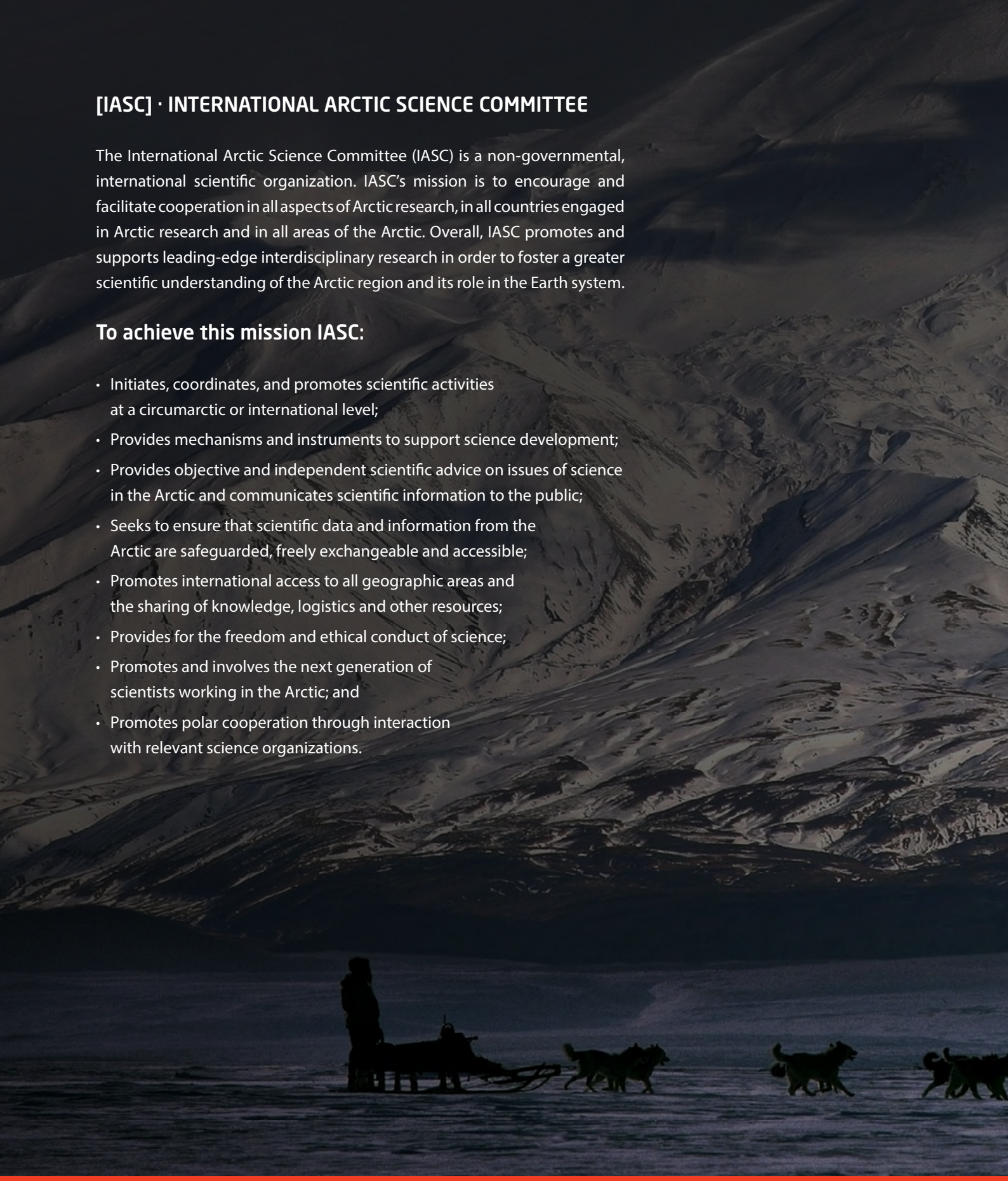

PHOTO: RANE WILLERSLEV
Kamchatka

IASC 2021

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INTERNATIONAL ARCTIC SCIENCE COMMITTEE

[IMPRINT]

International Arctic Science Committee

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COVER PHOTO: LAWRENCE HISLOP (http://www.grida.no)
Dog sledding is a mode of transport and a tradition dating back as far as the 10th Century in Greenland.
Sled dog teams are usually made up of between 12-15 strong dogs.

[CONTENTS]

[PREFACE]

In years to come, people will remember 2020 as a disturbing outlier. We have lost many good people to the COVID-19 global pandemic and the personal and financial tolls have been devastating. While vaccines are being distributed and administered, we must acknowledge recovery to pre-pandemic life is a distant vision. This terrible disease interrupted field research, teaching, travel, conferences, interactions with our colleagues, and every other aspect of a scientist's life. And yet, the scientific community, including the IASC delegates, working groups, and committees remained productive. As demonstrated throughout this Bulletin, our community is driven to advance scientific understanding. Although it has been difficult or impossible to visit field sites, collaborations with Arctic communities have continued despite the pandemic with local experts continuing the collection of data in the field, continuing to advance the understanding of the Arctic. The organization of scientific cruises has been hampered or extremely challenged, but despite the difficulties it has not fully stopped. Collaborative discussions with colleagues and students continued unabated through virtual forums. Laboratory analyses were performed with social distancing and appropriate personal protective equipment. Data analyses were completed and journal publications were written in our homes while our families competed for bandwidth. We have adjusted, adapted, and redirected our energies to continue our work. We realize that much was lost in this terrible year, but we also acknowledge, we will not stop. We will work, we will learn, and we will emerge stronger, with greater understanding, better tools, and even greater capacity. Our duty and our passion is to make our societies more informed and better prepared to address the challenges before us.

During the 2020 Arctic Science Summit Week, the President of IASSA, the President of UArctic, and I, as president of IASC, agreed we should examine the consequences of this pandemic on Arctic research. With

PHOTO: JOSEPHINE Z. RAPP
Sea ice in Fram Strait during June 2016. Searching for a suitable ice floe to land the helicopter and take some ice cores
Location: Fram Strait, Northern Greenland Sea.

the help of several colleagues, we wrote a paper on how to make Arctic research more resilient during this pandemic and into the future (see abstract on facing page). Our recommendations include better community engagement, improved infrastructure, and greater reliance upon local experts. Arctic science must rely on local partnerships based on equity, trust, and respect. While, this pandemic had a harsh impact to the Arctic research community, we must grow and learn from these experiences and make our communities and our scientific enterprise more resilient to this and future disruptions.

In spite of monumental obstacles, IASC and the Arctic research community accomplished much over the past year. The 2020 Arctic Science Summit Week was among the very first major conference events to be completely on-line, with little warning or time to prepare, and yet was praised by all as being efficient, effective, and important. The 2021 ASSW will likewise be convened virtually, and is promising to be the pre-eminent Arctic conference of the year with over 700 abstracts submitted. The 2020 Arctic Observing Summit advanced a roadmap to sustained observing networks. The concept of the MOSAiC Arctic cruise began as an IASC initiative and evolved into an incredible international collaborative program involving hundreds of researchers from 20 different countries. Their objective to advance understanding of the interactions of atmospheric and oceanic processes in driving climate dynamics yielded critically important data that will improve our modelling capabilities for decades to come.

IASC promoted substantive efforts to equitably engage Indigenous peoples and Indigenous knowledge in Arctic research by implementing many of the recommendations proposed by the IASC Action Group on Indigenous Involvement, including creating a new annual IASC Fellowship for early career Indigenous researchers, promoting the inclusion of Indigenous representatives in our Working Groups & Council, and supporting participation costs of Indigenous participants at IASC events. IASC also issued a formal Statement On Tackling Racism & Systemic Bias including against black and other under-represented minorities both in the Arctic region and around the world. Black Lives Matter. Indigenous Lives Matter. IASC looks forward to working with the Arctic science community to eradicate racism and systemic biases in our community and to build a more diverse and inclusive Arctic research community.

In our 31st year, IASC remains relevant and effective in fostering and executing international collaborations in Arctic research. IASC stands as an important organization because our members, our working groups, and our teams are committed to advancing Arctic science through collaborations, to sharing understanding, and to attacking those grand Arctic challenges that must be approached through international partnerships.

Dr. Larry Hinzman | IASC President

PHOTO: Courtesy Dr. Larry Hinzman

Building resilient Arctic science amid the COVID-19 pandemic

Petrov, A.N., Hinzman, L.D., Kullerud, L. et al. Building resilient Arctic science amid the COVID-19 pandemic. Nat Commun 11, 6278 (2020). https://doi.org/10.1038/s41467-020-19923-2

Arctic research faces unprecedented disruptions due to COVID-19. This 'pause' gives an opportunity to reflect on the current state and the future of Arctic science and move towards a more resilient, thus equitable, coordinated, safe and locally-embedded Arctic research enterprise. Arctic science has been greatly affected by COVID-19. This comment looks forward to how Arctic science could be conducted in the future.

The Arctic has been at the centre of recent climate-driven changes influencing global climate dynamics, regional weather, and international commerce. Now, the scientific community finds Arctic research capabilities severely limited by travel bans and our own trepidation of becoming vectors transmitting COVID-19. Arctic communities have justifiably asked that travel to their areas be curtailed. The consequences of the prolonged gap in field research will resonate for decades across scientific disciplines, through policy decisions, and into economic investments.

COVID-19 is not just an immediate danger for the Arctic. It will have lasting effects on communities as the current health, food security, and economic issues become exacerbated. Remote Arctic villages are poised to experience significant economic losses (including the earnings from hosting science operations), endure reduction of transportation accessibility, and may also face the loss of key knowledge holders—including elders—and thus the loss of culture, heritage, and tradition.

This article, co-written by Indigenous natural and social science experts, represents a synthesis of perspectives from the International Arctic Science Committee (IASC), the International Arctic Social Sciences Association (IASSA), and the University of the Arctic (UArctic) to help guide the science community's response to the COVID-19 pandemic in the Arctic. We argue that although Arctic research has been disrupted, this pause is giving us a unique opportunity to reflect on the current state and the future of Arctic science and work on building a more resilient, equitable, coordinated, safe, and locally embedded Arctic research enterprise.

Read the full article:
https://doi.org/10.1038/s41467-020-19923-2

PHOTO: MARIA SCHEEL
Curious Corvus corax approaching during field hike along the Zackenberg river.

PHOTO: FEDERICA SCARPA
Akureyri (Iceland), where the IASC Secretariat is located, in a windy day.

1. IASC INTERNAL DEVELOPMENT

» 1 IASC INTERNAL DEVELOPMENT

PHOTO: SUSAN CHRISTIANEN
Glaciers

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 23 member countries. IASC member organizations are national science organizations that cover all fields of Arctic research.

COUNTRY	MEMBER ORGANIZATION	IASC COUNCIL MEMBER
Austria	Austrian Polar Research Institute (APRI)	Wolfgang Schöner
Canada	Polar Knowledge Canada	Wayne Pollard
China	Chinese Arctic and Antarctic Administration	Huigen Yang
Czech Republic	Centre for Polar Ecology	Josef Elster
Denmark	Danish Agency for Science and Higher Education	Lise Lotte Sørensen
Finland	Council of Finnish Academies	Paula Kankaanpää, Vice-President
France	National Center for Scientific Research (CNRS)	Jérôme Chappellaz
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)	M. Ravichandran
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)	Yeadong Kim
The Netherlands	Dutch Research Council (NWO)	Dick van der Kroef
Norway	Research Council of Norway	Ingvild Marthinsen
Poland	Polish Academy of Sciences, Committee on Polar Research	Michał Łuszczuk
Portugal	Portuguese Foundation for Science and Technology	João Canario
Russian Federation	Russian Academy of Sciences	Vladimir Pavlenko, Vice-President
Spain	Spanish Polar Committee (CPE)	Antonio Quesada
Sweden	Swedish Research Council	Ulf Jonsell
Switzerland	Swiss Committee on Polar and High Altitude Research	Martin Schneebeli
United Kingdom	Natural Environment Research Council (NERC)	Henry Burgess, Vice-President
USA	Polar Research Board	Matthew Druckenmiller

TABLE: An overview of the IASC countries, organizations, and Council members. For contact information, please visit https://iasc.info/iasc/organization/council/council-members

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.

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:

Larry Hinzman, President

Henry Burgess, Vice-President

Hiroyuki Enomoto, Vice-President

Paula Kankaanpää, Vice-President

Vladimir Pavlenko, Vice-President

Gerlis Fugmann, IASC Executive Secretary

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.

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Yulia Zaika, ISIRA Secretary, Kola Science Center of the Russian Academy of Sciences
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Dr. Gerlis Fugmann New IASC Executive Secretary

Dr. Gerlis Fugmann is IASC´s new Executive Secretary as of August 2020. She held the position of Executive Director of the Association of Polar Early Career Scientists (APECS) from October 2013 until July 2020 based at the Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research (AWI) in Germany, and before at the UiT The Arctic University of Norway in Norway.

Through her career, she has worked with researchers, international organizations, and many other stakeholders in the Polar regions, helping to shape and manage large projects, events and meetings. Among others, she has coordinated APECS involvement in several projects of the EU Polar Cluster (ARICE, APPLICATE, INTERACT and Nunataryuk). She completed her PhD in 2011 in Geography at the Justus Liebig University Giessen (Germany) and afterwards worked as a postdoctoral researcher at the International Centre for Northern Governance and Development at the University of Saskatchewan in Canada. Her research focused on projects in the Canadian North as well as Northern Scandinavia, and addressing questions of economic development, entrepreneurship, tourism, resource development and Northern participation in innovation and the knowledge economy.

PHOTO: Courtesy of Dr. Gerlis Fugmann

Iceland Extends Support for the IASC Secretariat in Akureyri, Iceland for a Further 5 Years

IASC and Rannís, the Icelandic Centre for Research, are excited to announce that Iceland has extended support for the IASC Secretariat to be located in Akureyri, Iceland for a further 5 years. This secures the work of the IASC Secretariat through the end of 2026.

Iceland funds the full-time Executive Secretary, a part-time Executive Officer, and a part-time Communications Manager, in addition to an operating budget for the Secretariat. Hosting by Rannís also provides essential infrastructure, financial, and staff support resources. Funding comes from the Icelandic Ministry of Education, Science, and Culture.

Akureyri is an ideal home for IASC. Being located in northern Iceland allows IASC to better cooperate with the many Arctic scientists and Arctic science organizations located in Akureyri, including the Icelandic Arctic Cooperation Network, the CAFF and PAME working groups of the Arctic Council, the Stefansson Arctic Institute, the University of Akureyri, and many more.

PHOTO: FEDERICA SCARPA
View from the IASC Secretariat in Akureyri.

ISIRA / ИСИРА

For the ISIRA group, the highlight of the end of 2020 was an online meeting to discuss further steps and action points, and welcome new members of the group. The group currently comprises of 16 representatives from 10 IASC countries which gives a truly international input to the work of the group. During the meeting, the group considered among others the enlargement of its membership by inviting the IASC Council members to appoint their national representative to the group; the development of its own ISIRA fellowship mechanism to engage more early career researchers; and the allocations from the ISIRA budget to support conference participation and science projects from Russian and international researchers who are engaged in the study of the Russian Arctic.

At its next meeting during the ASSW2021, ISIRA aims to finalize its Terms of Reference (ToRs) and templates for endorsement letters which will foster the further processes within group. For the open part of the meeting, the group plans to have an extensive discussion devoted to the role of the group within the Russian Chairmanship in the Arctic Council, and further activities to ensure the implementation of the group's main goals: 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.

Further plans for 2021, include finalizing the ISIRA working plan and restructure its webpage with a more user-friendly navigation and useful information. The ISIRA meeting at ASSW2020 has shown that a rethinking of the science foci and priorities of the group is in need. Thus, the group's agenda for 2021 will be mostly devoted to qualitative investigation and discussion on the gaps and research priorities currently existing in the field of the Arctic research both within the Russian Arctic and internationally, and how ISIRA can advise and support the ongoing processes.

Конец 2020 года для группы ISIRA был отмечен онлайн встречей, посвященной обсуждению дальнейших планов, а также приветствием новых членов группы. В настоящее время в состав группы входят 16 представителей 10 стран-участниц МАНК, что вносит поистине международный вклад в работу группы. Во время встречи в ноябре 2020 г. группа рассмотрела вопрос о расширении своего членства, посредством предложения членам Совета МАНК назначить своего национального представителя в группу и рассмотреть возможность разработки собственного механизма стипендий для привлечения большего числа молодых ученых к работе группы, включая финансирование из бюджета ISIRA участия в конференции и поддержку научных проектов российских и международных исследователей, занимающихся изучением российской Арктики.

В ходе встречи на ASSW2021 группа намерена завершить работу над своими регулятивными документами и официальным письмом о поддержке (проектной и прочей деятельности), что будет способствовать развитию дальнейших процессов в группе. В рамках открытой части встречи группа планирует провести обширную дискуссию, посвященную своей роли во время российского председательства в Арктическом Совете, а также дальнейшей деятельности по обеспечению основных целей

группы: планирование многонациональных исследовательских программ, направленных на решение конкретных ключевых научных проблем в российской Арктике; обеспечение объединенной платформы для коммуникации текущих или планируемых двусторонних проектов; содействие улучшению научного доступа в российскую Арктику; консультирование по вопросам финансирования и реализации проектов.

Что касается планов на 2021 год, ISIRA рассматривает возможность доработки рабочего плана и реструктуризации веб-страницы с более удобной для пользователя навигацией и полезной информацией. Совещание группы на ASSW2020 показало, что необходимо переосмыслить научные приоритеты работы. Так, повестка дня группы на 2021 г. будет в основном посвящена качественным исследованиям и обсуждению пробелов и исследовательских приоритетов, существующих в настоящее время в области арктических исследований как в российской Арктике, так и на международном уровне, а также роли ISIRA в этих процессах.

ISIRA | Members — Члены | ИСИРА

Chair **Arkady Tishkov**, Russia

Annett Bartsch, Austria

TBA, Canada

Juha Pekka Lunkka, Finland

Hanna Lappalainen, Finland

Heidi Kassens, Germany

Yoshihiro Iijima, Japan

Lisa Bjørnsdatter Helgason, Norway

Tadeusz Pastusiak, Poland

Vladimir Kotlyakov, Russia

Sergey Priamikov, Russia

Boris Morgunov, Russia

Magnus Augner, Sweden

Anna-Maria Perttu, Sweden

Gabriela Schaepman-Strub, Switzerland

Gareth Rees, UK

Lee Cooper, USA

Yulia Zaika, ISIRA Secretary

Gerlis Fugmann, IASC Executive Secretary

More information:
https://iasc.info/isira

IASC Medal 2021

IASC awards the 2021 IASC Medal to **Atsumu Ohmura** Ph.D., Professor Emeritus at ETH Zurich (Switzerland), for outstanding achievements in understanding complex climate and glacier relationships, global energy budgets, and thermal energy flow in the Arctic; and for excellence in program building, international collaborations, and mentorship in the cryospheric sciences.

Dr. Ohmura has had an enormously influential career in the Arctic sciences, spanning 50 years. His research has encompassed processes over both land and ocean, including the energy and water balance of tundra regions, the energy balance and climate across the Greenland ice sheet, and global radiation budgets, with methodologies ranging from in situ observations, to more theoretical approaches, to the application of climate models. Some of his main accomplishments are contributions to our current understanding of microclimates in the Arctic, including radiative fluxes in polar and alpine regions. In particular, he was one of the first scientists to study and monitor the interaction of solar radiation with snow and ice surfaces. Dr. Ohmura's work has had broad reach throughout the global climate sciences community as well, where his discovery and contributions to the theory of global dimming, the missing absorption, and global brightening have given great insight and altered our understanding of shortwave and

PHOTO: Courtesy of Prof. Dr. Atsumu Ohmura.

longwave energy fluxes in the global energy balance. Dr. Ohmura has exceptional accomplishments in building observational programs and international collaborations. He initiated the Global Energy Balance Archive (GEBA) in 1986 (and is still operational today) to archive monthly mean instrumental measurements of radiation and other energy fluxes for a wide range of users. His pioneering work in the characterization of radiative processes additionally led to the Baseline Surface Radiation Program, part of the World Climate Research Program (WCRPBSRN), through which over 60 BSRN stations are currently submitting their radiometry data to the World Radiation Monitoring Center. Both the GEBA and WCRP-BSRN would not have been established without Dr. Ohmura's vision and determination for high-quality radiation and energy balance measurements. Dr. Ohmura has also greatly contributed to international organizations and research cooperation, including serving as a Swiss national delegate to IASC from 1992–2000 (during which he helped to assemble the first IASC working group for Arctic Glaciology). Dr. Ohmura has additionally served important roles within the International Glaciological Society (President, 2005– 2008), International Commission on Polar Meteorology, and the Radiation Panel of WCRP Global Energy and Water Cycle Experiment (GEWEX). He has coordinated numerous joint cryospheric science projects with institutes in the US, Canada, Russia, and Denmark. Lastly, we recognize Dr. Ohmura's outstanding contributions to mentorship in the cryospheric sciences. He has supervised more than 200 junior scientists from around the world, including 47 Ph.D. students, 147 M.Sc. students, and 25 postdoctoral fellows. Many of these mentees are now professors at distinguished institutions distributed across the globe, taking leading roles themselves in domestic and international research projects, and furthering the boundaries of knowledge of a variety of fields, including the mass balance of the Greenland ice sheet, variability of ice sheets during glacial/interglacial periods, global glacier fluctuations, and satellite remote sensing of polar cryospheric change.

The other shortlisted candidates for the 2021 IASC Medal were:

- **Robert Corell**, for outstanding achievements in understanding the interface between Arctic science and public policy; and for the promotion of Arctic research through mentorship and leadership
- **Peter Wadhams**, for outstanding achievements in understanding sea ice, ocean, and climate interactions and feedbacks; and for significant and sustained international collaborations in polar environmental research
- **Donald A. (Skip) Walker**, for outstanding achievements in understanding Arctic geobotany, landscape dynamics, and biological conservation; and for contributions to understanding Arctic vegetation through novel mapping techniques

IASC would like to thank this year's Medal Committee for their service: Karen Frey (MWG) (Chair), J. Otto Habeck (SHWG), Mary Edwards (TWG), Yuji Kodama, Enooyaq Sudlovenick (MWG, Fellow).

PHOTO: GINA JOZEF
DataHawk2 taking flight during leg 3 of the MOSAiC Expedition - the DataHawk2
is a fixed wing drone that measures meteorological variables in
the lower atmosphere - Pictured is Andreas Preusser

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.

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 which bridge the social and natural/physical sciences. IASC hopes that this will lead to closer cooperation, coordination, and teamwork across Arctic science disciplines.

2020 State of Arctic Science Report

The State of Arctic Science 2020 aims to be a cohesive synthesis of international Arctic research activities and priorities, as gathered from the Arctic research community itself. Arctic science is moving faster than ever, and so this report is aimed at Arctic science agencies, Arctic science managers, and Arctic science users including a wide range of decisionmakers and policymakers, to help all Arctic science stakeholders stay up to date on Arctic research.

IASC, the International Arctic Science Committee, was founded in 1990 with a mission of encouraging and facilitating cooperation in all aspects of Arctic research, in all countries engaged in Arctic research, and in all areas of the Arctic region. IASC is a

connector – connecting scientists across international, disciplinary, and cultural boundaries and connecting with those who do research with those who seek the outcomes of that research. One way in which IASC does this is by providing a collective voice to the international Arctic research community. Decadally, this is addressed through the International Conference on Arctic Research Planning process (e.g., ICARP-III's "Integrating Arctic Research - A Roadmap for the Future;" **https://icarp.iasc.info/**). However, with rising temperatures, geopolitical interests, the initiation of the Arctic Science Ministerial meetings, and an increasingly active landscape of international Arctic (science) organizations, Arctic science is moving faster than ever. IASC is grounded in our community of scientists and aims to provide a consensus voice – by reaching out to their national communities, connecting internationally, and reporting out.

The State of Arctic Science 2020 presents a synthesis of a breadth of input, but it is not exhaustive, as input came only through the IASC Working Groups. Indeed, there are many other NGOs, IGOs, institutions, non-profits, Indigenous Peoples' Organizations, companies, countries, and more working in the Arctic knowledge space. Nevertheless, this report comes from scientists themselves. Each of the 23 countries represented in IASC's scientific Working Groups (Atmosphere, Cryosphere, Marine, Social & Human, Terrestrial; **https://iasc.info/working-groups**) was asked to submit a summary detailing the research priorities and activities in their country. This corpus of content was compiled by each Working Group's leadership. These were condensed into this report here, then reviewed by the IASC Executive Committee and Council with an eye towards interdisciplinary connections. For national and/or disciplinary breakdowns, please contact IASC Working Group members directly (contact information is available at **https://iasc.info**). Following an internal recommendation, this report, IASC's 2020 State of Arctic Science Report is aimed at Arctic science agencies, Arctic science managers, and Arctic science users including a wide range of decisionmakers and policymakers – e.g., national research councils and scientific foundations, Arctic ministers and ambassadors, international science bodies, and more. It will also be delivered to the organizers of the 3rd Arctic Science Ministerial. It is exciting to be able to learn from the insights of the Arctic science community, so please read on and also join IASC in thanking the community for their time and input.

Full Report available at:
https://iasc.info/images/media/print/SAS2020_web.pdf

The MOSAiC Expedition achieved its goal: one year drifting with ice

*The **M**ultidisciplinary drifting **O**bservatory for the **S**tudy of **A**rcti**c** **C**limate (MOSAiC) is the first year-round expedition into the central Arctic exploring the coupled Arctic climate system. The project with a total budget exceeding € 150 Million has been designed by an international consortium of leading polar research institutions, under the umbrella of the International Arctic Science Committee (IASC) and led by the Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research (AWI), Arctic and Antarctic Research Institute (AARI) and the University of Colorado, Cooperative Institute for Research in Environmental Sciences (CIRES).*

After more than a year in the Central Arctic on 12 October, the research icebreaker Polarstern returned to her homeport in Bremerhaven. Accompanied by a 'welcome committee' of ships that came to greet, the ship entered the North Lock with the morning high tide, at ca. 9:00 am. At port, Expedition Leader Markus Rex, Captain Thomas Wunderlich and the entire team from the final leg of the expedition were welcomed by e.g. Federal Minister of Research Anja Karliczek and the Director of the Alfred Wegener Institute, Antje Boetius. The event marked the end of a record-breaking expedition: never before had an icebreaker been near the North Pole in winter, and never before could international researchers comprehensively gather such urgently needed climate data in the region of the world hardest hit by climate change. Drifting with the ice, they endured the extreme cold, Arctic storms, a constantly changing floe – and the challenges posed by the coronavirus pandemic.

On 20 September 2019 Polarstern departed from the Norwegian port of Tromsø, bound for the Central Arctic, the epicentre of climate change. Once there, the ship allowed itself to become trapped in the ice, and began a one-year-long drift across the North Pole, completely at the mercy of natural forces – the route and speed were solely determined by the ice drift, powered by wind and currents. Over the five legs of

PHOTO: GINA JOZEF
Droneville II, operaton site of the DataHawk2 during the second half of leg 3 of the MOSAiC Expedition, with Polarstern in the background

the expedition, a total of 442 researchers, Polarstern crewmembers, young investigators, teachers and members of the press took part. Seven ships, several aircrafts and more than 80 institutions from 20 countries were involved. The researchers, who hailed from 37 countries, had a common goal: to investigate complex interactions in the climate system between the atmosphere, ice and ocean, as well as life in the Central Arctic, so as to better represent them in climate models. Now they have returned home with a wealth of impressions from the rapidly transforming Arctic, and with an unparalleled treasure trove of data, which an entire generation of climate researchers will focus on analysing.

Even when, due to the coronavirus pandemic, virtually every other expedition around the globe was cancelled, thanks to the broad support of the international scientific community and to the tireless efforts of the entire team, MOSAiC was able to continue. In the early summer, Polarstern had to briefly leave her floe and several autonomous stations for a personnel transfer. Four weeks later, a new team commenced fieldwork on the ice, continuing their efforts right up to the last day, when the floe (as predicted) reached the ice edge to the east of Greenland, began breaking up under the influence of the waves, and completed its typical lifecycle. To explore the last piece of the puzzle in the sea ice's annual cycle – the formation of new ice at summer's end – the expedition then headed farther north, crossed the North Pole, and moored to a second floe in its vicinity.

As such, despite all obstacles, the MOSAiC expedition achieved its goal: to monitor the epicentre of climate change more precisely than ever before, and over the span of an entire year – and by doing so, to take a crucial step forward in our understanding of the Earth's climate system and how it is changing. The total cost of the expedition was ca. 150 million euros, with roughly two-thirds being contributed by Germany.

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IASC Planned Activities in 2020/2021

The current COVID-19 pandemic has deeply affected many aspects of our lives, including these concerning research, meetings and science dissemination. In-person meetings and workshops are not allowed or sensibly limited in the vast majority of IASC countries and worldwide. Fieldwork in small and remote Arctic communities is also strongly discouraged, following the recommendations of several Arctic organizations.

As consequence, several IASC-funded activities that were scheduled to take place either at ASSW2020, or during the remaining year 2020 (and partially also 2021), had to be cancelled, postponed or re-arranged into online activities. IASC has implemented an extremely flexible approach, in order to properly deal with the uncertainty of our current times by allowing activities and funding allocated during ASSW2020 to stretch over a longer span of time, and encouraging the organizers of IASC-funded events to arrange (part of) their activities as online events to ensure IASC activities can continue to happen despite the current restrictions in the pandemic. A list of suggestions has been provided to organizers on how to use IASC funds to support attendance in online activities (e.g. covering online registration fees).

Following the necessary adjustments, the 2021 IASC Bulletin will not report on completed activities. Instead, it will provide information on the postponed activities from 2020 that will take place during 2021. Please, keep in mind that it is an evolving situation, and the latest updates, including dates and places for upcoming IASC-funded activities are available on the IASC Website:

iasc.info

Upcoming Cross-Cutting Initiatives

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

CoAST: Coastal Arctic Science Teams

Working Groups: AWG, CWG, MWG, SHWG, TWG

The CoAST Project has three complementary aims:

1. Improve scientific understanding of Arctic coastal environments.
2. Facilitate interdisciplinary and cross-cutting research that draws from the diverse perspectives of the Arctic research community.
3. Encourage collaboration between disciplines and career stage The activity includes: participant recruitment & project matching, project development, a workshop structured around he themes that emerge as popular areas of interest from the participant matching phase and open to the Arctic Science community in order to further encourage collaboration, and a follow up.

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Polar Archaeology Community Meeting

Working Groups: SHWG, TWG

We welcome the participation from people who are involved in the study and care of the polar historic environment, employed or voluntary, regardless of academic background or location. During the meeting, you will among other things have a chance to get acquainted with the Chair of the Polar Archaeology Network (PAN), Dr. Frigga Kruse, and members of the PAN Board. We hope to encourage a lively exchange on broad overarching topics such as ethical and professional standards and guidelines, international working practices, advocacy for archaeology to influence policy and decision makers, special interest groups (e.g. finds, geophysics, information management, and more), career paths and professional development, training events and e-learning, networking and cooperation, and future events. Our goal is the cultivation of shared visions and productive relationships in the polar historic environment. We are therefore particularly looking forward to participants from the Social and Human Working Group.

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The Object: Regional Witness, Global Message

Working Groups: SHWG, TWG

In this session, archaeological science and tangible cultural heritage take centre stage in the interdisciplinary polar research agenda. Archaeology has a long tradition of being a thematic and methodological "interdiscipline". Our daily bread is the study of continuous human adaptation to age-old environmental and social change. We invite papers and e-posters from across the range of heritage professionals and other stakeholders for a show and tell: Introduce the one archaeological object (alternatively one structure, site, or landscape) that to you embodies an indispensable polar aspect and bears witness to recent changes, and deliver its global message that would otherwise not be heard. Preference will be given to contributions that demonstrate a direct link to the conference call. We strongly encourage traditional and Indigenous participation and perspectives.

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RATIC meets T-MOSAiC: Sharing Best Practices in Research on Infrastructures in the Arctic

Working Groups: CWG, SHWG, TWG

The Rapid Arctic Transitions due to Infrastructure and Climate (RATIC) initiative has been providing a forum for scientists to share knowledge across disciplines since 2014 on topics related to Arctic infrastructure and climate change. In 2019, the RATIC initiative became the T-MOSAiC Arctic Infrastructure Action Group. The RATIC/T-MOSAiC workshop at ASSW 2021 will be a two-hour online meeting for participants to share progress and insights on RATIC-related research from around the Arctic. The meeting is open to all and we encourage attendance by physical and social science researchers, including APECS members, Indigenous scholars, and representatives of Arctic communities and industry involved in research and adaptation projects. This will be followed by an in-person workshop in Tromsø at ASSW 2022 where we will continue to collaborate on activities prioritized at past RATIC workshops including 1) a framework for Arctic infrastructure mapping and monitoring, 2) strategies and best practices for codesign and codevelopment of research with industry and Arctic communities, and 3) observations from the recent MOSAIC Expedition that may improve our understanding of how polar sea ice, ocean and atmospheric changes are impacting Arctic coastal and near-coastal communities and infrastructure.

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Indigenous Methodologies in Collaborative Arctic Science

Working Groups: AWG, CWG, MWG, SHWG, TWG

This is a special session at ASSW2021 in Lisbon on Indigenous methodologies in the environmental and social sciences, in which presentations will discuss methodologies by Indigenous scholars, knowledge holders, Indigenous organizations, and allies involved in research with Indigenous communities across the circumpolar Arctic. The session will conclude with a panel discussion on Indigenous methodologies in the co-production of knowledge on Arctic environmental change, and the discussion and contributions will culminate in a white paper to be shared with the IASC community.

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BEPSII Sea Ice School

Working Groups: AWG, CWG, MWG, SHWG

Theory, sampling methods, data analysis and modelling of sea-ice biogeochemistry will be the core of the school. Sea ice and snow, and their physical and optical properties, together with gas fluxes, land-sea ice-ocean interactions, and engagement with local communities will be also fundamental topics of the school. The school has the following major objectives:

- Teaching ECSs the main characteristics and complexities of seaice, and in particular of sea-ice biogeochemistry,
- Increasing awareness of the unique characteristics of sea ice and of its rapid changes,
- Communicating and cooperating with local communities

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16th ICRSS

Working Groups: AWG, CWG, SHWG, TWG

The theme of the 16th ICRSS is Convergence at the Poles–Addressing urgent research questions and management needs through remote sensing in the Arctic and Antarctic. As a hallmark of the ICRSS series, the symposium will not feature parallel sessions but will use a single-session format to allow maximum exposure to the broad themes of Polar Remote Sensing to all participants, which in the past has resulted in fruitful discussions across disciplines as well as new collaborations and networks. Both oral and poster presentations will be solicited.

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More information: ICRSS Website
https://www.awi.de/en/science/geosciences/permafrost-research/conferences/icrss.html

PaleoArc

Working Groups: CWG, MWG,TWG

The 2nd International Conference on 'Processes and Palaeo-environmental changes in the Arctic: from past to present – PalaeoArc2021' will be organised by the University of Pisa, Earth Sciences Department, Italy, on May, 25-28, 2021. We welcome contributions on the overall theme of the network research programme PalaeoArc that aims to understand past and present environmental changes and processes in the Arctic. In particular, we invite oral and poster contributions on four themes divided in four thematic days:

- 25 May 2021: Role and dynamics of Arctic ice sheetsand ice caps
- 26 May 2021: Role and dynamics of high latitude ocean and sea ice

- 27 May 2021: Role and dynamics of terrestrial environment and landscape evolution
- 28 May 2021: Climate response to, and interaction between, different parts of the Arctic System.

With the University of Pisa as our backdrop, we will invite a number of guests to participate in person (where permissible) to PaleoArc congress at Le Benedettine congressual centre, (University of Pisa) and welcome other speakers from around the world on our digital conference platform. We will start each day at 14:00 CET and finish at 18:15 CET with a combination of live talks and discussions and potentially pre-recorded content relevant to the daily themes.

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More information:
http://www.palaeoarc.no/

High-latitude Fires, Arctic Climate, Environment, and health (HiFACE)

Working Groups: AWG, SHWG, TWG

The workshop focuses on high latitude vegetation fires and their linkages to environmental change and societal impacts in the Arctic. The workshop will be arranged under PACES, with co-sponsorship from a recently-funded 2M Euro Belmont Forum project "Arctic Community Resilience to Boreal Environmental change: Assessing Risks from fire and disease (ACRoBEAR)" and from the Norwegian Research Council. The aims of the workshop will be to share current state-of-the-art understanding on landscape fire impacts on high latitude climate, ecosystems and air quality, and to explore inter-disciplinary linkages that could help drive forward new research on this topic.

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Glacier - Atmosphere Interactions (NAG)

Working Groups: AWG, CWG

The IASC Network on Arctic Glaciology(NAG) will be in form of presentation and discussion sessions. Themes of the conference will be: Atmospheric circulation patterns and the impact on the Arctic land-ice mass budget, precipitation and snowfall in the Arctic– observations & modelling, coupling of glaciers and atmosphere in general circulation models(GCMs), regional climate models (RCMs) and earth system models (ESMs).

Contacts:
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GRC Polar Marine Science

Working Groups: MWG, SHWG

The 2021 Gordon Research Conference on Polar Marine Science entitled "Integrating Ocean Physics and Biogeochemistry to Assess Polar Ecosystem Sensitivity to Rapid Change" is currently scheduled to be held at the Four Points Sheraton / Holiday Inn Express, Ventura, CA, USA (https://www.grc.org/polar-marine-science-conference/2021/). The program is composed of an international collection of world-leading, gender-diverse scientists at various career levels that are engaged in research on polar marine sciences, both in the Arctic and the Southern Ocean.

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More information: GRC webpage
https://www.grc.org/polar-marine-science-conference/2021/

Polar Climate 2020

Working Groups: CWG, TWG

The purpose of the planned conference is to present the current state of knowledge about climate and environmental changes in polar areas over the last millennium. The detailed subject matter of the conference includes: sources of paleoclimatic information; research methods for climate change in historical times; the climate of the polar regions in the last1000 years and its variability; the causes and effects of climate change in historical times; scenarios of climate change in areas in the 21st century.

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More information:
https://polarclimate2020.umk.pl

Trace Gas Action Workshop

Working Groups: AWG, CWG, TWG

The background for the workshop is a tremendous development in analysers and supporting platforms (UAVs,floats etc) in use for measuring trace gas exchanges between elements of the cryosphere (incl. permafrost), terrestrial, freshwater and marine ecosystems and the atmosphere. The workshop will be a venue for discussing and planning a practical hands-on display and in situ campaign with the proposed workshop informed by discussions about new ways of conducting ecosystem-atmosphere trace gas flux measurements.

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Synoptic Arctic Survey

Working Groups: AWG, CWG, MWG

Synoptic Arctic Survey is a bottom-up, researcher driven, initiative aiming at collecting empirical data in the Arctic ocean that cannot be done in any other way than through cruises! The goal is to generate a comprehensive dataset that allow for a complete characterisation of Arctic hydrography and circulation, carbon uptake and ocean acidification, tracer distribution and pollution, and organismal and ecosystem functioning and productivity.

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More information:
https://synopticarcticsurvey.w.uib.no/

YOPP Workshop

Working Groups: AWG, CWG, MWG

The workshop is jointly organized between the Polar Prediction Project and its International Coordination Office (ICO) and NOAA/CIRES. The main theme of the workshop is to bring together Observatory and Model specialists within the framework of YOPPsiteMIP. The intercomparison concept is based on developing a well-defined file format and compatible semantics applicable across models and observations: Merged Model Data Files (MMDFs) and Merged Observatory DataFiles (MODFs).

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MOSAiC/NASCENT Svalbard WSs

Working Groups: AWG, CWG

The aim of this workshop is to bring together researchers from intensive campaigns that took place in Svalbard during the 2019-2020 period and those involved in

the MOSAiC campaign. The workshop will focus on the topic of snow/sea-ice-aerosol interactions. A full understanding of these processes requires an interdisciplinary approach and can be enhanced by taking into account data from different locations across the Arctic. With this in mind, this workshop aims to provide a forum for researchers to work together on this topic with those from different fields and different campaigns. The first workshop will likely take place virtually during June 2021, with a potential follow-up in spring 2022. It is open to experimentalists and modellers.

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Nunataryuk / T-MOSAiC Summer School

Working Groups: CWG, SHWG, TWG

The Nunataryuk-T-MOSAiC-APECS Field School on "Arctic Coastal Adaptation-Capacity building and knowledge exchange across borders" aims to connect ECRs from different scientific disciplines with international scientific experts as well as local experts and stakeholders from Arctic Nordic coastal communities to share state-of-the-art and Traditional Knowledge and best practices for adaptation strategies in the Arctic coastal areas to respond to permafrost thaw.

Contacts:
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Integrated EA of the Northern Bering and Chukchi seas

Working Groups: MWG, SHWG

Indigenous and science knowledge holders will attend an ecosystem assessment workshop, which results will contribute over a longer period an Indigenous knowledge perspective of the northern Bering and Chukchi seas. Currently, with support from PICES and ICES, an interdisciplinary and international working group (WG), including Arctic peoples and Indigenous Knowledge holders is being convened to conduct an Integrated Ecosystem Assessment of the Northern Bering Sea-Chukchi Sea (NBS-CS). The goal of this networked international cooperation will be to develop over a three-year period an inventory of existing information, an ecosystem description including both Indigenous and academically generated scientific knowledge, and an integrated assessment of status and trends.

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Gender in Polar Research

Working Groups: CWG, MWG, SHWG, TWG

Recent years have seen an upsurge in gender-related approaches to research in the Arctic and life-ways in northern communities. These efforts have contributed to questioning and complementing earlier characterisations of Arctic exploration as a heroic (and predominantly male) domain. Scrutinising widespread tenets about the "traditional" or "exotic" quality of gender roles in indigenous communities, these efforts have also brought forth more nuanced understandings of gender relations in different parts of the circumpolar North. The organisers invite representatives of gender-related initiatives to review and discuss: (i) What have been the main achievements thus far? (ii) What are the next steps to be taken? (iii) How can we develop communication channels and formats that foster scientific and public outreach? Ideas for enhancing outreach may comprise: a PhD/MA school on Gender in the Arctic; other educational programs; podcasts; vlogs etc. Everyone is invited to become a co-organiser of such media and educational activities.

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Atmosphere Working Group (AWG)

Scientific Foci:

- Cloud, Water Vapor, Aerosols, Fluxes
- Arctic Air Pollution
- Coupled Arctic Climate System
- Arctic Weather Extremes
- Linkages: Role of the Arctic in the Global Climate System

The scientific scope of the AWG includes research towards understanding and predicting the Arctic climate system, its change, and impacts of this change. Priorities include Arctic air pollution, which influences Arctic climate and feedbacks through trace gas and aerosol forcing, is harmful to Arctic communities and ecosystems. Other key priorities are atmosphere-ice and atmosphere-ocean coupling, Arctic paleoclimates, Arctic energy budget, and aerosol-cloud interactions in the Arctic.

These topics have been put under the three pillars of:

1) MOSAiC (Multidisciplinary drifting Observatory for the Study of Arctic Climate)
2) PACES (air Pollution in the Arctic: Climate, Environment and Societies)
3) YOPP/PPP (Year of Polar Prediction / Polar Prediction Project)

Two of the main pillars of the AWG, MOSAiC and PACES, are firmly rooted in the AWG. 2020 saw the conclusion of the MOSAiC Arctic drift experiment, which is the largest and probably most ambitious Arctic cruise campaign ever undertaken. This unique project was conceived bottom-up from the AWG. The AWG has engaged with PPP's YOPP activities, and supported exchange among the science projects that are endorsed by YOPP. The AWG is now actively exploring connections between the 3 main AWG pillars to facilitate new understanding of the Arctic atmosphere within the coupled Arctic system.

More information:
iasc.info/working-groups/atmosphere

Membership[1]

NAME	COUNTRY	EXPERTISE
Chair Stephen Arnold	UK	Arctic trace gases and aerosols; Atmospheric chemistry; Tropospheric ozone
Vice-Chair Annette Rinke	Germany	Arctic climate modeling; Arctic atmospheric processes; Surface-atmosphere interactions
Vice-Chair G.W.K. (Kent) Moore	Canada	High-latitude air-sea-ice interactions; Polar meteorology; Paleoclimatology
Leopold Haimberger	Austria	Climate; Energy and water budgets; Surface and upper air instrumental records
Harald Rieder	Austria	Atmospheric chemistry; Chemistry-climate connections; Polar ozone
James Drummond	Canada	Remote sounding; Ozone and air quality; Climate change
Ding Minghu	China	Mass balance; Air-sea/ice interaction; Measurement technique

[1] Membership as of 4 February 2021. Please visit
https://iasc.info/working-groups/atmosphere/members
for updated information and contact information for each Working Group Member.

NAME	COUNTRY	EXPERTISE
DING Zhuoming	China	Atmospheric boundary layer; Polar lows; Numerical weather rediction
Kamil Laska	Czech Republic	Solar radiation modelling; Boundary layer processes; Glacier-climate interactions
Jacob Klenø Nøjgaard	Denmark	Arctic aerosol; Mass spectrometry; Source apportionment
Jens Hesselbjerg	Denmark	Coupled Arctic climate system; Climate change; Climate prediction
Kalevi Mursula	Finland	Space climate; Heliospheric and magnetospheric physics; Solar climate effects at high latitudes
Tiina Nygård	Finland	Atmospheric thermodynamics; Moisture/clouds; Numerical modelling
Olivier Jourdan	France	Clouds; Microphysics; Airborne measurements
Astrid Lampert	Germany	Atmospheric boundary layer; Airborne meteorology; In situ measurements
Guðrún Nína Petersen	Iceland	Arctic weather; Extreme weather; Numerical weather prediction
Rohit Srivastava	India	Atmospheric aerosols; Black carbon; Climate modeling
Sourav Chatterjee	India	Large-scale atmospheric circulation; Pole-tropics teleconnections; Air-sea-ice interactions
Stefano Decesari	Italy	Atmospheric chemistry; Aerosol-climate interactions; Biogenic & anthropogenic organic aerosols
Jun Inoue	Japan	Arctic climate change; Air-sea-ice interactions; Arctic weather
Yutaka Tobo	Japan	Atmospheric aerosols; Aerosol-cloud interactions; Ice nucleation
Ki-Tae Park	Republic of Korea	Trace gases, Aerosols, Air-sea interactions
Sang-Jong Park	Republic of Korea	Polar meteorology; Atmospheric boundary layer; Surface-atmosphere interactions
Laurens Ganzeveld	The Netherlands	Atmospheric chemistry-climate interactions; Surface exchange processes; Modelling
Thomas Spengler	Norway	Atmosphere dynamics; Mesoscale meteorology; Air-sea-ice interactions
Maria Sand	Norway	Climate modeling; Black carbon aerosols; Aerosol-radiation interactions
Ewa Łupikasza	Poland	Climate change; Atmospheric circulation; Synoptic climatology
Andrzej Araźny	Poland	Polar climate; Bioclimatology; Biometeorology; Climate change
Daniele Bortoli	Portugal	Atmospheric physics; Active and passive remote sensing; Spectroscopy
Alexander P. Makshtas	Russian Federation	Sea ice and permafrost - atmosphere interaction processes; Arctic climate
Boris Vladimirovich Kozelov	Russian Federation	Geliogeophysical impact to Arctic atmosphere; Climate and micro-climate in Arctic region
Ana Cabrerizo	Spain	Persistent organic pollutants; Environmental chemistry; Temporal trends
Carlos Toledano	Spain	Atmospheric aerosols; Remote sensing; Radiometry
Thomas Kuhn	Sweden	In-situ measurements of Arctic clouds; Snowfall; Ice fog
Julia Schmale	Switzerland	Aerosol chemistry and microphysics; Cloud condensation nuclei; In-situ observations
Jo Browse	UK	Aerosols; Clouds; Modelling
Muyin Wang	USA	Arctic climate dynamics; Model-data synthesis; Sea-ice prediction
Gijs de Boer	USA	Arctic clouds; Autonomous Observing; Aerosol-cloud interactions

Fellows:

Sophie Haslett	Sweden	Arctic aerosols and trace gases; Mass spectrometry; Atmospheric chemistry
Avneet Singh	Norway	Data assimilation; Climate prediction; Complex planetary systems
Hélène Angot	Switzerland	Trace gases, atmospheric chemistry, surface-atmosphere exchange

Secretary Gillian Young	United Kingdom	University of Leeds, Contact: G.Young1@leeds.ac.uk

Upcoming Activities

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

ALPACA

This 2nd ALaskan Pollution and Chemical Analysis ALPACA workshop will be a forum for bringing together the latest research on Arctic air pollution, for sharing the latest activities pursued by UAF and collaborating institutions on both atmospheric and social science aspects, for the 2021 campaign planning and discussion about possible synergies between ALPACA and other parallel initiatives in other Arctic regions

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More information: ALPACA Website
https://alpaca.community.uaf.edu/

Polar Low Workshop

The workshop focuses on polar lows and mesocyclones in both hemispheres, but contributions to other mesoscale weather phenomena such as katabatic winds, tipjets, boundary layer fronts, cold air outbreaks, and weather extremes in polar regions are also welcome. This includes experimental, climatological, theoretical, modelling, and remote sensing studies. The main format will consist of science presentations as well as a poster session. Several early career scientists as well as solicited speakers have already confirmed their participation. The workshop will also feature extended discussion sessions for the community to formulate the state-of-the-art knowledge as well as future research directions.

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Arctic Climate and Weather Extremes

The proposed workshop will bring together international experts from atmospheric sciences, meteorology, ocean, and sea ice. It will systematically examine detection and attribution of Arctic extreme events in the context of interactions among climate system components within the Arctic and between the Arctic and Earth System. The workshop will also identify where knowledge gaps exist. Further, the recently conducted international field campaigns YOPP and MOSAiC from 2018-2020provideunique opportunities to systematically observe the coupled Arctic climate system in the new, rapidly changing state. Integrations between observational data analysis, theoretical study, and model simulations in the workshop will help identify model discrepancies for improving model physics and, in turn, enhance our ability to model and predict extreme event.

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PHOTO: ALEXANDER PEUKER

The image was taken during a measurement campaign 2018 in Ny-Ålesund at the airport. It shows the UAV ALADINA of TU Braunschweig performing last system checks prior to takeoff. ALADINA is used to measure several atmospheric parameters, especially aerosols and particles ranging from a few nanometers up to several micrometers.

Cryosphere Working Group (CWG)

Scientific Foci:

- Atmosphere-glacier-ocean interactions
- Cutting barriers in snow knowledge
- Causes, impacts and prediction of extreme cryospheric events

The CWG's research interests span all elements of the cryosphere - the frozen regions of our planet - including sea ice, mountain glaciers, ice caps, icebergs, the Greenland ice sheet, snow cover, permafrost and seasonally frozen ground, and lake and river-ice. The CWG helps promote activities that enhance our understanding of these cryospheric components of the Arctic/sub-Arctic and their interaction with the Earth's climate system.

While the CWG is interested in all elements of the cryosphere, our activities we have structured across three main themes:

- Atmosphere-glacier-ocean interactions: implications on the pan-Arctic glacier mass budget, which explores the link between the response of glaciers to climate change and both atmospheric changes and ocean circulation, with focus on the dynamics and mass budget of Arctic glaciers and their impact on global sea-level and regional freshwater runoff.
- Cutting barriers in snow knowledge, in which the impact of snow on glacier and ice-sheet mass balance and sea-ice variability is explored. Through this theme we seek to promote an improved common knowledge of snow-related processes by bringing together snow-interested scientists working within the various IASC working groups.
- Causes, impacts and prediction of extreme cryospheric events, which aims to gain understanding on a wide variety of phenomena, including intense storms/cyclonic activity, severe warm periods, droughts, rapid iceberg calving events, anomalous ice-sheet surface melt, avalanches, and heavy rain-on-snow events, many of which are becoming more frequently observed in the Arctic.

More information:
iasc.info/working-groups/cryosphere

Membership[2]

NAME	COUNTRY	EXPERTISE
Chair Guðfinna Th. Aðalgeirsdóttir	Iceland	Climate - glaciers/ice sheets interaction; Evolution of Icelandic glaciers and the Greenland ice sheet
Vice Chair Jari Haapala	Finland	Sea-ice physics; Numerical modeling; Climate variablity and change
Vice Chair Martin Schneebeli	Switzerland	Snow and snow tomography; Stratigraphy; Snow instruments
Annett Bartsch	Austria	Permafrost; Snow; Remote sensing
Wolfgang Schöner	Austria	Glacier mass balance; Surface energy balance; Snow climatology
Shawn Marshall	Canada	Glacier and ice sheet modelling; Cryosphere-climate processes; Glacier mass balance
LEI Ruibo	China	Sea-ice physics; Climate change; Technology for sea-ice observations
XIAO Cunde	China	Cryospheric research

[2] Membership as of 16 February 2021. Please visit
https://iasc.info/working-groups/cryosphere/members
for updated information and contact information for each Working Group Member.

NAME	COUNTRY	EXPERTISE
Marie Sabacka	Czech Republic	Glacier ecology
Nanna Karlsson	Denmark	Glaciology; Ice-penetrating radar; Ice-flow modelling; Mass balance
Rasmus Tonboe	Denmark	Sea ice
Arttu Polojärvi	Finland	Ice mechanics
Hans-Werner Jacobi	France	Snow physics and chemistry; Snow-atmosphere interactions; Climate
Hugues Lantuit	Germany	Permafrost; Geomorphology and remote sensing; Coastal science
Gunnar Spreen	Germany	Sea ice; Remote sensing; Ocean-sea ice-atmosphere interactions
Þorsteinn Þorsteinsson	Iceland	Glaciology; Ice drilling; Climate history
Thamban Meloth	India	Ice core research; Glaciology; Snow biogeochemistry
Ramanathan Ramanathan	India	Glaciology; Biogeochemistry; Hydrology
Andrea Spolaor	Italy	Paleoclimate; Snow chemistry; Air-snow exchange
Nozomu Takeuchi	Japan	Glacier-ecology; Microbiology; Glaciology
Teruo Aoki	Japan	Optical properties of snow; Atmospheric radiation; Greenland Ice Sheet
Hyun-cheol Kim	Republic of Korea	Remote sensing; Sea ice
Jung-Ho Kang	Republic of Korea	Environmental monitoring; Glaciology; Snow and ice chemistry
Richard Bintanja	The Netherlands	Arctic climate change; Climate variability; Arctic hydrological cycle; Climate modelling
Geir Moholdt	Norway	Glaciology; Remote Sensing; Mass balance
Thomas Vikhamar Schuler	Norway	Arctic glacier mass balance & hydrology; Subglacial processes; Modeling cryosphere: snow, glaciers and permafrost
Mariusz Grabiec	Poland	Mass balance; Geometry changes; Thickness and internal structure of Arctic glaciers
Ireneusz Sobota	Poland	Cryospheric changes; Mass balance; Snow; Permafrost
Gonçalo Vieira	Portugal	Permafrost; Remote sensing; Geomorphology
Dmitry Drozdov	Russian Federation	Permafrost: Mapping, Thermal state, Active layer, Remote sensing; Arctic Coastal Dynamics; Arctic landscapes
Sergei Verkulich	Russian Federation	Glaciers and permafrost; Antarctic and Arctic Quaternary sediments; Terrestrial records
Carolina Gabarro	Spain	Remote sensing; Sea-ice extension; Sea-ice thickness
Jaime Otero	Spain	Glaciers; Numerical Models; Calving
Veijo Pohjola	Sweden	Glaciology; Climatology; Natural hazards
Gwendolyn Leysinger Vieli	Switzerland	Glacier and Ice-sheet Dynamics, Internal Ice-layer (isochrone) Structures, Ice-flow Modelling
Poul Christoffersen	UK	Glacial hydrology; Ice-ocean interactions; Basal processes

Fellows:

Barbara Barzycka	Poland	Remote sensing; Glacier facies; Drone mapping
Sammie Buzzard	USA	Glaciology; Ice shelves; Sea ice
Greta Wells	USA	Glacial outburst floods; glacier environmental change; geomorphology

Secretary Michael Wood USA NASA Jet Propulsion Laboratory

Upcoming Activities

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

Glaciology Summer School

The International Summer School in Glaciology will be held in McCarthy in central Alaska. We will accept 28 students from around the world and invite three guest lecturers from elsewhere in the US in addition to five instructors from the glaciology lab at the University of Alaska Fairbanks. The course will consist of a combination of lectures, computational exercises, student projects, glacier excursions, and student poster presentations and a mini-conference where the students present their project results. Topics focus on glaciology with a strong regional focus on Arctic glaciers and the Greenland ice sheet. Since glacier changes are driven by processes at the glacier-atmosphere and the glacier-ocean interfaces, topics include cross-cutting themes like ice-ocean interactions and processes at the ice surface-atmosphere interface and their modeling.

Contact:
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Cryosphere 2022

This activity supports the participation of Early Career Researchers in a symposium in Reykjavík, where the dialogue on changes in the Arctic cryosphere will be continued. The symposium, Cryosphere 2022, will be held on the occasion of the 100th Anniversary of the Icelandic Meteorological Office. Sessions will be held on topics related to all components of the cryosphere and their changes due to global warming, including adaptation and mitigation strategies and the coordination of studies on the decline in snow and ice cover and associated hydrological changes.

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More information: Cryosphere 2022 website **https://www.cryosphere2022.is/**

PHOTO: KAMILLA OLIEVER

Icebergs in the morning mist. Rays of Sun struggling to penetrate the thick grey bulk of water droplets, vapour and air, while the shapes are emerging, displaying a range of lighting and shades. Tiilerilaaq, East Greenland.

Marine Working Group (MWG)

Scientific Foci:

- Predicting and understanding rapid changes to the ocean system
- Understanding biological and ecosystem processes in the Arctic and sub-Arctic seas
- Understanding sea-ice structure dynamics and the Arctic system
- Understanding geochemical processes in the Arctic and sub-Arctic seas
- Climate and geological history of the Arctic basin

The IASC Marine Working Group (MWG) facilitates international coordination of research in the Arctic marine environment and supports cross-cutting objectives through face-to-face annual meetings. Frequent electronic communication is used throughout the remainder of the year, including exchange and collaboration with terrestrial, cryospheric, atmospheric and social scientists where appropriate. The MWG also seeks to encourage and facilitate two-way communication between working group members from each member state of IASC and their national science constituencies. Another important goal is to provide support for early career scientists and include their involvement in international research coordinated by IASC member countries, including expanding roles for IASC Fellows in MWG tasks.

Specific work goals that are integrated into the MWG Work Plan include project coordination and support for prominent initiatives that include: renewal of the Arctic in Rapid Transition network that has provided a mechanism for the early career science community to become engaged in international Arctic research; implementation of the Multidisciplinary drifting Observatory for the study of Arctic Climate (MOSAiC); contribution to the Workshop on Arctic Glaciology and Proglacial Marine Ecosystem; and expansion of the Distributed Biological Observatory on a pan-Arctic basis. Strengthening international cooperation with Russian scientists remains a key goal, including support for IASC's Russian Arctic (ISIRA) activities that are seeking to improve conditions for marine research within Russia's Exclusive Economic Zone. Finally, identifying new mechanisms to involve the MWG in Arctic Council observer activities and meetings are critical to connecting research with governmental affairs at the international level.

More information:
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 Takashi Kikuchi	Japan	Physical oceanography; Polar oceanography; Polar climate
Vice-Chair Karen Frey	USA	Land-ocean linkages; Sea ice; Biogeochemistry
Gerhard Herndl	Austria	Limnology; Microbial oceanography of Polar seas
Renate Degen	Austria	Marine ecology; Benthic ecosystems; Functional traits
John Fyfe	Canada	Global and regional climate variability; Role of the poles in the global system
Christine Michel	Canada	Role of sea ice in Arctic marine ecosystems; Pelagic and benthic Arctic food webs
LIU Yanguang	China	Marine geology
LI Tao	China	Oceanography

[3] Membership as of 16 February 2021. Please visit
https://iasc.info/working-groups/marine/members
for updated information and contact information for each Working Group Member.

NAME	COUNTRY	EXPERTISE
Oleg Ditrich	Czech Republic	Parasitology; Zoology; Polar ecology
Colin Stedmon	Denmark	Chemical oceanography; Environmental spectroscopy; Dissolved organic matter biogeochemistry
Marit-Solveig Seidenkrantz	Denmark	Climate system science; Palaeoclimate; Palaeoceanography; Palaeontology; Marine geology
Jaakko Heinonen	Finland	Arctic marine technology; Offshore structures; Offshore wind energy
Hermanni Kaartokallio	Finland	Sea ice ecology; Microbial ecology in cold marine environments
Laurent Chauvaud	France	Coastal ecology; Marine biology; Sclerochemistry
Marie-Noëlle Houssais	France	Physical oceanography; Ocean-sea ice processes; Large-scale and mesoscale ocean variability
Torsten Kanzow	Germany	Observational physical oceanography; Long-term time series observations
Anna Heiða Ólafsdóttir	Iceland	Geographical distribution, migration, life history traits, and stock assessment of small pelagic fish in the northeast Atlantic
M. Ravichandran	India	Ocean observations; Modelling
Rahul Mohan	India	Marine geology; Palaeoclimate
Tommaso Tesi	Italy	Paleoclimatology; Geochemistry; Oceanography
Michiyo Yamamoto-Kawai	Japan	Chemical oceanography; Freshwater/carbon/nutrients; Climate change
Eun Jin Yang	Republic of Korea	Polar marine ecology; Microzooplankton biology
Jinyoung Jung	Republic of Korea	Chemical oceanography; Biogeochemistry
Martine van den Heuvel	The Netherlands	Polar marine biology; Ecotoxicology; Rapid assessment of non-indigenous species using eDNA
Randi Ingvaldsen	Norway	Physical/Polar oceanography; Climate variability; Climate impacts on species and ecosystem
Arild Sundfjord	Norway	Ocean – sea ice interaction; Regional & sub-mesoscale ocean modelling; Vertical mixing
Monika Kędra	Poland	Biological oceanography; Food webs; Carbon cycling
Waldemar Walczowski	Poland	Physical oceanography; Hydrology; Ocean and glacier interaction
Teresa Cabrita	Portugal	Marine pollution; Trace element biogeochemistry; Phytoplankton ecotoxicology
Sergey Pisarev	Russian Federation	Meso-scale oceanographic processes; Shot-period variations of ocean climate in the Arctic Ocean
Antonio Tovar	Spain	Biogeochemical cycles of trace metals in the ocean; Marine environmental pollution; Global change
Manuel D'Allosto	Spain	Atmospheric science; Marine aerosols and air quality in coastal areas
Pauline Snoeijs Leijonmalm	Sweden	Sea-ice ecology; Microbiology; Fish ecology; Food-web ecology
Andrew Brierley	UK	Marine ecology; Scientific echosounding; Zooplankton ecology, predator-prey interactions
Finlo Cottier	UK	Ice – Ocean processes; Coupled biological-physical interactions; Fjordic systems; Autonomous technologies
Lee Cooper	USA	Marine biogeochemistry, including stable and radioactive isotopes

Fellows:

Maria Paulsen	Denmark	Microbial foodwebs; Terrestrial runoff; Bacterial activity
Amanda Burson	UK	Phytoplankton ecology; Nutrients & stoichiometry; Fjords & coasts
Enooyaq Sudlovenick	Canada	Marine mammals; Pathology; Inuit Qaujimajatuqangit
Sascha Schiøtt	Greenland	Arctic marine ecosystems; Foodwebs; Glacial runoff
Neelu Singh	Norway	Phytoplankton ecology; Nutrients & stoichiometry; Fjords & coasts
Victoria Buschman	Greenland and USA	Conservation, Biology

Secretary Laura Ghigliotti	Italy	National Research Council of Italy

Upcoming Activities

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

Role of Freshwater in Polar Ocean Climate Change and Global Linkages

This activity will fund a workshop on the "Role of Freshwater in Polar Ocean Climate Change and Global Linkages".

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ISPA - International Symposium on Plastic in the Arctic

The International Symposium on Plastics in the Arctic and sub-Arctic Region was planned to be held in Reykjavik from 21 to 23 April 2020. It is now an online event 2-4 and 8-9 March 2021. It is hosted by the Government of Iceland in collaboration with the Nordic Council of Ministers, during the Chairmanship of Iceland in the Arctic Council. The Symposium is also sponsored by the International Council for the Exploration of the Sea (ICES), the United Nations Environment Program (UNEP), the OSPAR Commission, the PAME working group (Arctic Council), the Intergovernmental Oceanographic Commission of UNESCO (IOC), the Marine and Freshwater Research Institute of Iceland, UArctic, NordMar, the Harvard Kennedy School and IASC. The aim of this Symposium is to share scientific knowledge, discuss methodological issues, and offer advice and information for decision makers. IASC will support the participation to the Symposium of early-career and/or indigenous & local resident.

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Françoise Amélineau | francoise.amelineau@gmail.com

More information: International Symposium on Plastics in the Arctic and sub-Arctic Region website
http://www.arcticplastics2020.is/

The Capelin: The Canary in the Arctic Environment

Capelin is a short-lived, cold water, pelagic species that occurs in numerous discrete populations throughout the circumpolar Arctic region. This workshop will focus on the capelin stocks in the following Sub-Arctic regions (i) Barents Sea (ii)waters around Iceland–East Greenland–Jan Mayen (iii) the Newfoundland–Labrador Shelf (iv) Gulf of Alaska and Bering Sea. In the recent years, a decline in the capelin population, and a shift in the spatial distribution at all life stages has been observed in all Sub-Arctic systems. Thus, the overarching goal of this proposed activity is to revise and expand our knowledge base on the capelin biology, ecology, and roles in the Arctic and Sub-Arctic ecosystems, by establishing an international network of experts involved in capelin research in the region.

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PHOTO: FIEKE RADER
Rocky view from Blomstrandbreen. Ny-Ålesund, Svalbard.

Social and Human Working Group (SHWG)

Scientific Foci:

- Arctic residents and change**
- Histories, perceptions and representations of the Arctic**
- Securities, governance, and law**
- Natural resource(s)/ use/ exploitation and development: past, present, future
- Human health and well-being

Cross-Cutting Foci:

- 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

The scientific scope of the SHWG includes all aspects of social sciences, humanities and health research in the Arctic, as well as their connections with other IASC Working Groups. A wide range of topics is therefore of interest to the SHWG, including human health and well-being; livelihoods and land use; geopolitics and peace in the Arctic; vulnerability and resilience in changing social-ecological systems; and perspectives of gender in Indigenous communities. As demonstrated by the supported activities in 2018/19, SWHG members address these topics in various ways: by going into depth on core concepts, by bringing a global perspective to the Arctic, and by working closely with local stake-, rights- and knowledge holders.

Finally, SHWG places high value on supporting early career development. All workshops awarded travel grants for early-career researchers and three of the activities (SHWG supported cross-cutting activities included) were directly involved with capacity building.

More information:
iasc.info/working-groups/social-human

Membership[4]

NAME	COUNTRY	EXPERTISE
Chair Andrey Petrov	USA	Arctic regional/economic development; Sustainability; Urbanization
Vice-Chair Halvor Dannevig	Norway	Climate change adaptation; Environmental governance; Co-production of knowledge
Vice-Chair Susan Chatwood	Canada	Health systems; Population health; Community engagement
Gertrude Saxinger	Austria	Anthropology; Indigenous communities; Extractive industries; Labour mobility (FIFO); Infrastructure
Peter Schweitzer	Austria	Infrastructure studies; Anthropology of climate change; Indigenous political movements
David Natcher	Canada	Environmental livelihoods; Culture and economy; Maintenance of local food systems
DENG Beixi	China	Polar Geopolitics & Security; Polar Policy; Arctic Shipping
Su Ping	China	Global Governance; International Political Sociology; International Organization
Barbora Halašková	Czech Republic	Arctic geopolitics and security; International relations; Foreign policy
Zdena Sokolíčková	Czech Republic	Svalbard, Climate/environmental change, Globalisation

[4] Membership as of 16 February 2021. Please visit **https://iasc.info/working-groups/social-human/members** for updated information and contact information for each Working Group Member.

**denotes a priority within the scientific foci

NAME	COUNTRY	EXPERTISE
Carina Ren	Denmark	Tourism development and entrepreneurship; Cultural innovation, co-creation, and capacity building; Collaborative research methods
Brooks Kaiser	Denmark	Arctic economic development; Bioeconomy; Marine resource governance
Lassi Heininen	Finland	International relations, geopolitics and security; Environmental politics; Northern Europe and Russia
Mervi Heikkinen	Finland	Women's and gender studies; Intersectionality; Ethics; Higher education
Béatrice Collignon	France	Inuit geographic knowledge; Geographies of the Inuit; Inuit culture and contemporary societies
Virginie Vaté	France	Anthropology of religion; Shamanism and Christianity; Conversion; Chukotka and Alaska
J. Otto Habeck	Germany	Gender and social distinction; Segregation, marginality and mobility; Indigenous land use and permafrost
Alexander Proelss	Germany	International law; International law of the Sea; International environmental law
Catherine Chambers	Iceland	Coastal communities; Fisheries and aquaculture governance; Fishermen's knowledge
Swati Nagar	India	Polar science outreach
Akiho Shibata	Japan	International law; Polar law and policy
Nobuhiro Kishigami	Japan	Cultural Anthropology; Subsistence activities; Food sharing; Indigenous whaling
Seung Woo Han	Republic of Korea	Polar policy; Polar sociology; International law
Hyunkyo Seo	Republic of Korea	Polar policy
Britt Kramvig	Norway	Indigenous peoples ontologies, politics, and art; Creativity, tourism, and innovation in Arctic and indigenous communities
Maiken Bjørkan	Norway	Coastal communities; Co-production of knowledge; Fisheries and aquaculture governance
Michał Łuszczuk	Poland	Interational relations; Diplomacy; Security
Agnieszka Skorupa	Poland	Psychology; Human behaviour in extreme situations; Group and individual adaptation to Polar region
Sandra Maria Rodrigues Balão	Portugal	
Andrei Golovnev	Russian Federation	Anthropology, ethnography and ethnohistory; Arctic nomads, migration and movement
Andrey Podoplekin	Russian Federation	Social psychology in the Arctic; Circumpolar states; Policy of scientific researches
Elena Conde	Spain	Arctic; Law of the Sea; Legal regime of marine scientific research
Ragnhild Nilsson	Sweden	Indigenous politics; Indigenous representation and self-determination
Peter Jordan	The Netherlands	Circumpolar Archaeology; History and Anthropology
Annette Scheepstra	The Netherlands	Transdisciplinary; Stakeholder engagement
Ingrid A Medby	UK	Arctic Identity; Political Geography; Critical Geopolitics
Klaus Dodds	UK	Geopolitics; Security; Diplomacy
Lawrence Hamilton	USA	Sociology; Demography; Survey research

Fellows:

Megan Sheremata	Canada	Inuit knowledge; Environmental change; Eastern Hudson Bay
Pauline Pic	Canada	Geopolitics; Security; Arctic governance
Wayne Clark	Canada	Inuit research methodology, Inuit health education, cultural safety

Secretary Anna Varfolomeeva | Finland | University of Helsinki, Contact: anna.varfolomeeva@helsinki.fi

Upcoming Activities

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

Arctic Futures Revisited

This activity involves the running of a conference session at the ASSW 2021, supporting the participation of in particular ECR and Indigenous presenters in order to facilitate broader involvement and participation in discussions. Following the conference organisers combining this and a related session on the Arctic in a post-pandemic world, the activity will be the primary focus of the first of two connected sections. In brief, the session invites reflections from on how notions of pasts, presents, and futures structure their research: How are current issues informed by past understandings; and how are projections of the future altered by the immediate present? Specifically, the session will address how the current pandemic as well as the climate crisis could be informed by past experiences and provide guidance for the ways in which we conceptualise Arctic futures.

Contact:
Ingrid A. Medby | imedby@brookes.ac.uk

Co-Creating Arctic Research together with Indigenous Rightsholders

In the workshop, experiences of the development of co-creating research projects are being discussed, with a special focus on the Indigenous perspectives. What are their experiences in the co-creation process of the development of research projects? How can this process being improved and who needs to be involved in this (Indigenous communities and organisations, research organisations, funding agencies etc.)? How can we achieve a paradigm shift, e.g., towards developing a new way how the science community together with funders could be partners with the Indigenous communities in order to support these communities in developing their own research needs?

Contact:
Annette Scheepstra | a.j.m.scheepstra@rug.nl
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Converging Science, Art & Indigenous Knowledge Systems

The ASSW workshop will gather representatives of natural sciences, social sciences, humanities, local and Indigenous communities. We set up the following objectives to frame our discussions and further activities:

- To explore creative possibilities of art, science, local and Indigenous knowledge to understand interdependencies and interrelations within Arctic social-ecological systems.
- To examine drivers of infrastructure change in the Arctic social-ecological systems as a case-study for possible future collaboration.
- To discuss collaborative scientific and artistic practices based on analysis of case-studies at the fringe of these cultural approaches.
- To define the most effective ways to represent co-created understandings of Arctic sustainability for the wider audience.

Contact:
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Olga Zaslavskaya | zaslavsk@gmail.com

PHOTO: WITEK KASZKIN (Polish Polar Station)
Reindeers

Terrestrial Working Group (TWG)

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

The TWG fosters and supports a broad spectrum of activities, reflecting the geo-, bio-, and social diversity associated with the Arctic terrestrial and freshwater realms. Recent highlights include the launch of 'T-MOSAiC' (the Terrestrial Multidisciplinary distributed Observatories for the Study of Arctic Climate; https://www.t-mosaic.com/) as a circumpolar, land-based program that will complement the IASC-supported ocean-atmosphere program, MOSAiC

More information:
iasc.info/working-groups/terrestrial

Membership[5]

NAME	COUNTRY	EXPERTISE
Chair Josef Elster	Czech Republic	Microbial ecology; Stress ecophysiology of cyanobacteria and microalgae
Vice-Chair Vladimir Romanovsky	USA	Permafrost; Geographic areas: Beringia (Alaska and NE Siberia), Norway and Svalbard
Vice-Chair Ulrike Herzschuh	Germany	Ecosystem change on decadal to glacial time-scales; Ancient DNA and pollen analysis
Andreas Richter	Austria	Microbial ecology; Terrestrial ecosystem ecology; Belowground plant-microbe interactions
Birgit Sattler	Austria	Microbial ecology; High altitude and polar limnology; Aerobiology
Philip Marsh	Canada	Hydrology; Snow; Permafrost; Hydrologic-Terrestrial System Interactions
Emily Jenkins	Canada	Wildlife; Parasites; Vectors
YANG Xiaofan	China	Subsurface hydrology; Alpine hydrology; Computational hydrology
LI Guangwei	China	Tectono-geomorphology; Low temperature thermochronology; Structural geology

[5] Membership as 16 February 2021. Please visit
https://iasc.info/working-groups/terrestrial/members
for updated information and contact information for each Working Group Member.

NAME	COUNTRY	EXPERTISE
Torben R. Christensen	Denmark	Biogeochemistry; Carbon cycling; Terrestrial ecosystem functioning
Thomas Friborg	Denmark	Climatic feedbacks; Carbon budgets; Terrestrial ecosystems
Otso Suominen	Finland	Animal ecology; Ecological interactions; Herbivory; Biodiversity
Miska Luoto	Finland	Data mining; Remote sensing; Biogeography
Emilie Gauthier	France	Past ecosystems; Interactions between societies and environment; Pollen analysis
Christelle Marlin	France	
Nikola Koglin	Germany	Petrology; Geochemistry; Geochronology
Jón S. Ólafsson	Iceland	Freshwater Ecology; Ecosystem Processes; Subarctic freshwater ecosystems
Archana Singh	India	Aquatic chemistry
Santonu Goswami	India	Permafrost
Antonello Provenzale	Italy	Geosphere-biosphere interactions; Climate change impacts; Terrestrial ecosystems
Tetsuya Hiyama	Japan	Hydrology; Climate Change; Hydrologic-Terrestrial System Interactions
Masaki Uchida	Japan	Microbial ecology; Ecosystem ecology
Tae-Yoon Park	Republic of Korea	Palaeontology; Evolutionary Biology; Polar Geology
Ji Young Jung	Republic of Korea	Biogeochemistry; Soil carbon dynamics; Tundra ecosystems
Rien Aerts	The Netherlands	Global Change effects on polar ecosystem functioning; Biodiversity; Biogeochemistry
Rolf Anker Ims	Norway	Biodiversity; Tundra ecosystems; Climate change impacts
Pernille Bronken Eidesen	Norway	Arctic botany; Phylogeography; Spatial & temporal variation of biodiversity
Piotr Owczarek	Poland	Dendrogeomorphology; Modern slope and glaciofluvial processes; Climate - landscape interaction
Zbigniew Zwoliński	Poland	Geomorphology; Geodiversity; Geoinformation
João Canário	Portugal	Biogeochemistry; Permafrost; Trace-elements
Alexander Makarov	Russian Federation	Carbon cycle
Olga L'vovna Makarova	Russian Federation	Tundra invertebrates; Mites; Insects; Earthworms; Taxonomy; Community structure
Sergi Pla-Rabes	Spain	Paleoecology; Remote ecosystems; Biodiversity; Biogeochemistry
Hans Linderholm	Sweden	Arctic climate change; Paleoclimate; Glacier variability
Gabriela Schaepman-Strub	Switzerland	Biodiversity; Ecosystem functioning; Energy budget; Remote sensing
Christian Rixen	Switzerland	Arctic and alpine plant ecology; Biodiversity and ecosystem functioning
Robert Baxter	UK	Cryosphere-biosphere interactions; carbon cycling; soil-plant atmosphere interactions
Mary Edwards	UK	Vegetation ecology and palaeoecology; Quaternary biogeography; Long-term climate history
Michelle Mack	USA	Plant and ecosystem ecology; Disturbance ecology; Nitrogen cycling

Fellows:

Clay Prater	UK	Elemental ecology; Cross-system nutrient flux; Limnology
Matthias Fuchs	Germany	Arctic deltas; Permafrost; Carbon
Ivan Alekseev	Russian Federation	Permafrost soils; organic matter; environmental contamination

Secretary Clay Prater USA Oklahoma State University, Contact: prater.clay@gmail.com

Upcoming Activities

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

Arctic Underground II

The Arctic Underground Network brings together an interdisciplinary team of biologists and ecologists to synthesize what is known about root traits and rhizosphere processes in cold ecosystems - tundra, boreal forest, and peatlands. At ASSW2021 we will hold our second workshop in conjunction with a contributed research session during the ASSW Science Meeting. Our efforts focus on four thematic activities:

1. Synthesize mechanisms by examining the effects of soil warming experiments on root and rhizosphere processes. This will address belowground responses to climate warming at multiple spatial scales utilizing molecular to circumarctic analyses.

2. Explore linkages between leaf and root traits for extrapolation and scaling of ecological processes in cold ecosystems. This will inform unifying concepts that can be used for scaling and modeling ecosystem processes.

3. Add cold soil roots and their symbionts to a "worldwide root economic spectrum," filling in a data gap in global plant traits databases and model parameters.

4. Integrate traditional ecological knowledge (TEK) of plants and belowground properties into our understanding of Arctic ecosystem change and educate scientists on indigenous perspectives.

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AVA2020

This activity is coordinating the development of the Arctic Vegetation Archive, an circumpolar database of plot-based vascular plant, moss, and lichen species abundance, and related environmental data. While coordination is ongoing based on smaller online meetings, an in-person international workshop attended by vegetation scientists and database experts from all the circumpolar countries is planned for 2022. The workshop will aim at the discussion and coordination of major objectives, including:

- Follow-up on the Russian component (AVA-RU),
- Development of the North America component,
- Database management, and
- Applications of the existing components of the AVA.

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Gertrude Saxinger | Gertrude.Saxinger@polarresearch.at

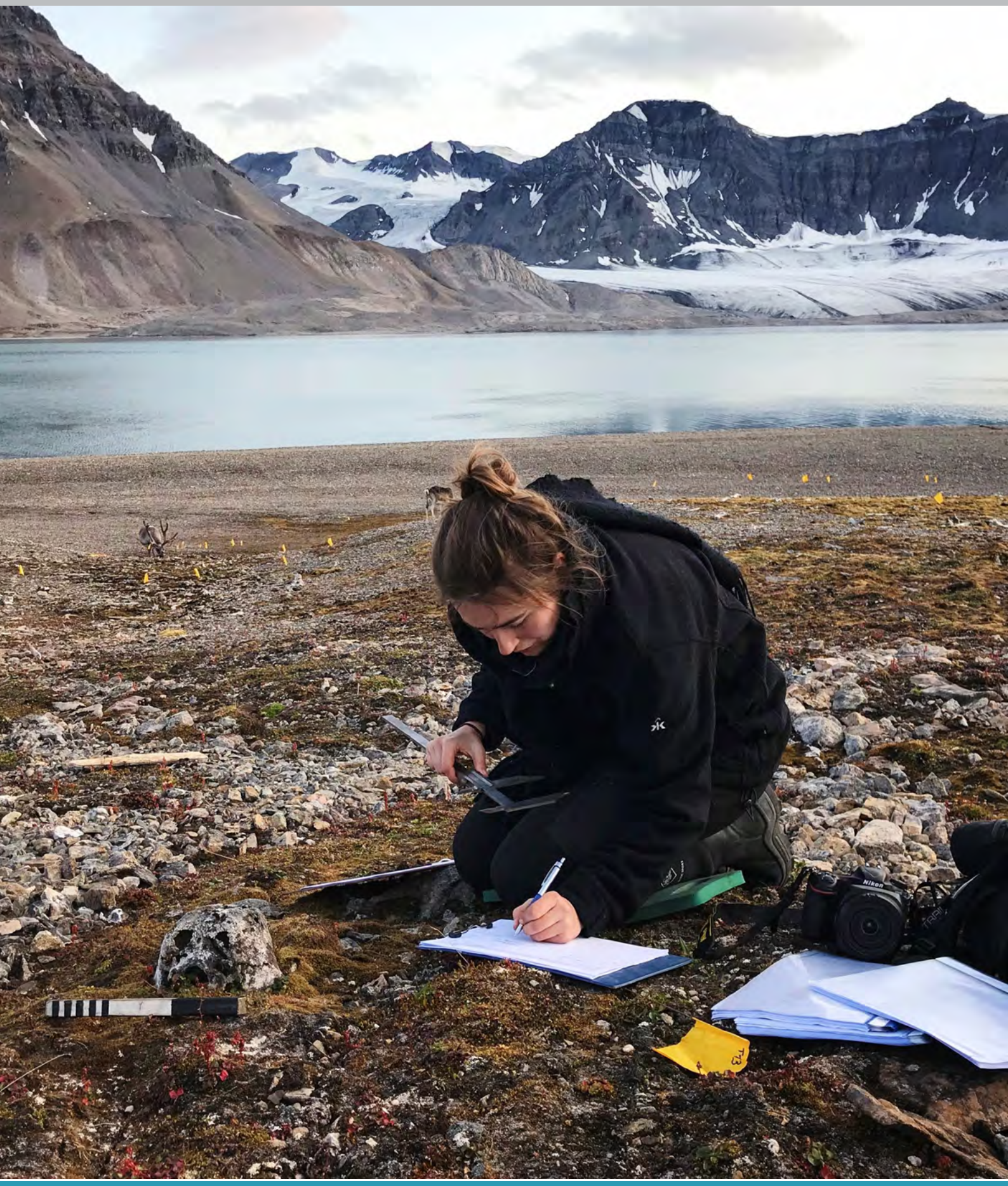

PHOTO: FRIGGA KRUSE

Master student Rosanne van Bodegom is recording the archaeozoological remains of a walrus slaughter site in Svalbard. She wants to find out details about the herd, how they were killed and by whom. Each of the yellow flags in the background marks a walrus skull. The rocky ground is generally barren, but the bones provide nutrients for the vegetation that the Svalbard reindeer are grazing on.The community of polar archaeologists is represented by the Polar Archaeology Network. If interested, please visit our landing page or contact fkruse@ecology.uni-kiel.de

PHOTO: ANDRII GLADII
South view of Eyjafjörður, where Akureyri is located, North Iceland

3. Arctic Science Summit Week 2020

» 3 Arctic Science Summit Week 2020

ASSW2020 was hosted by the Icelandic Centre for Research (Rannís) and the University of Akureyri, and it was originally scheduled as an in-person meeting in Akureyri (Iceland) from 27 March to 2 April 2020.

The first confirmed case of COVID-19 was discovered in Iceland at the end of February 2020. By the beginning of March, authorities started hinting at upcoming restrictions on gatherings and assemblies. Until then, ASSW2020 organizers had been planning an in-person event, with preliminary arrangements to allow for some remote participation. As the circumstances worsened both locally and globally, ASSW2020 was officially moved online on 10 March 2020. The scheduled dates of the event remained unchanged (27 March – 2 April).

ASSW2020 included the following events:

Science for a Sustainable Arctic: a one-day conference focusing on sustainability as well as marine issues in the Arctic, aimed at both scientists and policymakers. Recordings are available on Youtube.
https://youtu.be/FIGkpF8_obY

IASC Business and Community Meetings: a three-day event where IASC leadership and Working Groups annually meet. Any Arctic research organization or team is welcomed and encouraged to schedule meetings and events during these days.

Arctic Observing Summit: a three-day biennial Summit gathering together the Arctic observing community to exchange ideas and develop ways to collaborate, share resources, and improve Arctic observing. Recordings are available on Youtube.
https://youtu.be/jkFDDMB48is

In total, 650 attendees from 28 countries, including scientists, Indigenous leaders and knowledge holders, business and nonprofit organizations and representatives from governments attended ASSW2020.

Two reports have been prepared and shared with the public:

Moving a Conference from Iceland to Zoom: Best Practices and Lessons Learned from Arctic Science Summit Week 2020

ASSW2020 Scientific Summary Report

Upcoming ASSWs

ASSW 2021:

Online / Lisboa, Portugal 19-26 March, 2021

ASSW 2021 was originally supposed to be organized in Lisboa, Portugal on 19-26 March 2021. Due to the ongoing COVID-19 pandemic, it will be a completely virtual conference instead The conference will inlcude science community and business meetings, and a science symposium with the theme, „The Arctic: Regional Changes, Global Impacts."

Website: www.assw2021.pt

ASSW 2022 - including the 6th Arctic Observing Summit:

Tromsø, Norway 26 – 31 March April 2022

ASSW 2022 will be held in Tromsø, Norway from 26 – 31 March 2022. This will include science community and business meetings andthe Arctic Observing Summit 2022.

Website: www.assw.info

ASSW 2023:

Vienna, Austria, 17 - 24 February

ASSW 2023 will be held in Vienna, Austria from 17 – 24 February 2023. Austria has been an IASC member country since 2014, and 2023 is a very special year for polar research in Austria - it is the 150th anniversary of the Austro-Hungarian expedition to Franz Josef Land!

Website: www.assw.info

PHOTO: GREGORY TRAN
AWIPEV Research Station Retrieving data from the AWIPEV permafrost long-term observatory borehole, Bayelva, Kongsfjorden, Svalbard - 2020

4. Data and Observations

» 4 Data and Observations

Sustaining Arctic Observing Networks (SAON)

Vision, Mission and Goals

SAON is a joint initiative of the Arctic Council and IASC. SAON's vision is a connected, collaborative, and comprehensive long-term pan-Arctic Observing System that serves societal needs. The mission of SAON is to facilitate, coordinate, and advocate for coordinated international pan-Arctic observations and mobilize the support needed to sustain them.

The SAON Board has approved a 10-year strategy and implementation plan for SAON in 2018 and adopted the following three goals:

1. Create a roadmap to a well-integrated Arctic Observing System;
2. Promote free and ethically open access to all Arctic observational data; and
3. Ensure sustainability of Arctic observing.

Creating a roadmap to a well-integrated Arctic Observing System.

In its strategy, SAON has identified the need for a Roadmap for Arctic Observing and Data Systems (ROADS) as a way of defining the needed Observing and Data System and to specify how the various partners and players are going to collectively work towards achieving that system. The process 1) must include funding for Indigenous Peoples' equitable partnership and active participation 2) complement and integrate, without duplication, the current planning approaches used by existing efforts (regional to global), and 3 support step-wise development through a flexible, collaborative and evolving structure.

An element in the ROADS process is Shared Arctic Variables (SAVs); these support translation of societal requirements into observing system requirements and coordination of observing implementation strategies.

Free and ethically open access to all Arctic observational data

Ongoing projects of the Arctic Data Committee (ADC) include:

- The Polar Data Forum (PDF) focuses on improving how people and systems can share data in a meaningful way. The goal is to move towards open and connected systems based on a culture of trust and acknowledgement of data production and use. The ADC plans to arrange the next PDF in cooperation with partners in September 2021.

- In 2020, ADC initiated an open series of virtual workshops under the heading Polar to Global Online Interoperability and Data Sharing. At the workshops, three ADC subgroups work under the headings:
  - Federated Search (**https://polder.info**)
  - Vocabularies and Semantics (**https://arcticdc.org/activities/core-projects/vocabularies-and-semantics-wg**)
  - Alignment of Polar Data Policies
    - Recommended Principles

The outcomes of the workshops are found at the ADC web site [6]

Arctic Observing Summit

The Arctic Observing Summit (AOS) is SAON's outreach event. AOS is a high-level, biennial summit that aims to provide community-driven, science-based guidance for the design, implementation, coordination and sustained long-term (decades) operation of an international network of Arctic observing systems. The next AOS has will take in the context of ASSW2022 in Tromsø, Norway.

SAON website, social, media, and newsletter:
https://www.arcticobserving.org

Arctic Observing Summit website:
https://arcticobservingsummit.org/

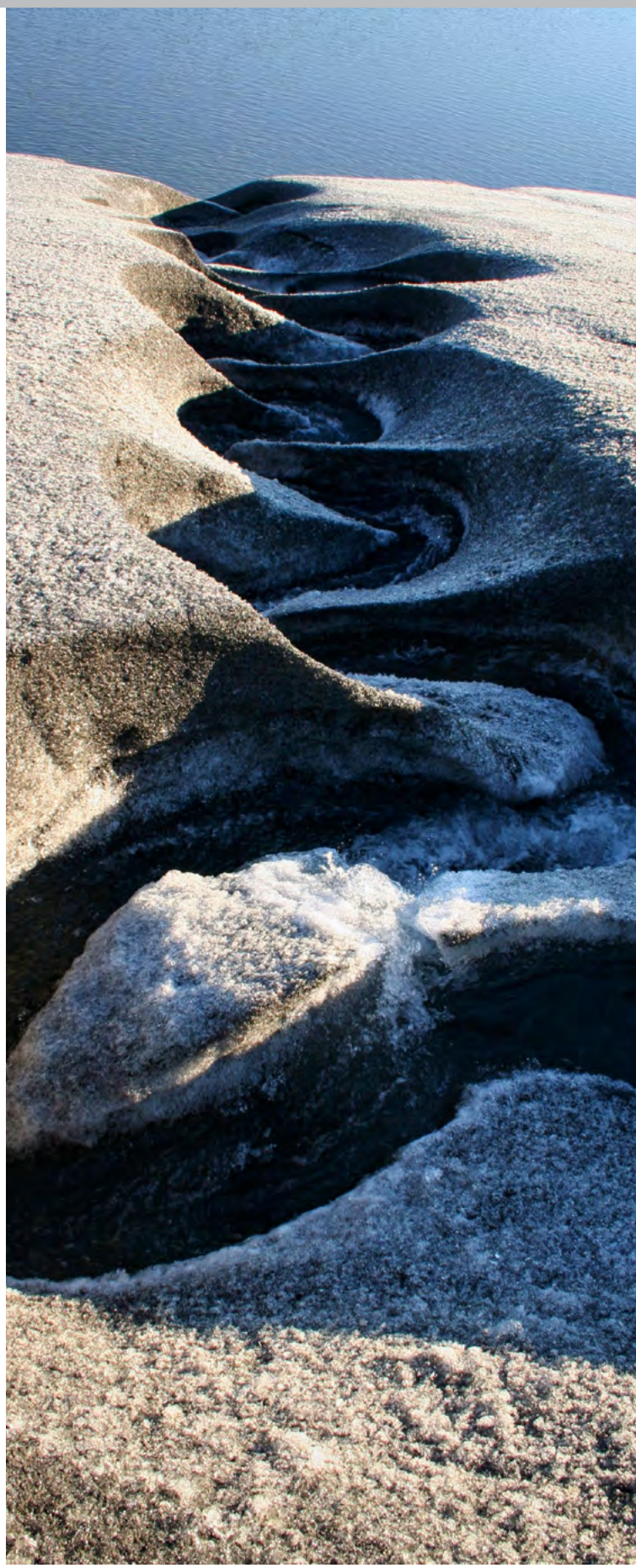

PHOTO: IREK SOBOTA

[6] **https://arcticdc.org/meetings/conference-calls-webinars/polar-to-global-online-interoperability-and-data-sharing-workshop-hackathon**

PHOTO: BORIS RADOSAVLJEVIC

GPS Survey of Retrogressive Thaw Slump Headwall, Herschel Island. Every year, the AWI scientists also record the retreat of the headwall by surveying the upper edge using GPS. This is shown in picture, while a different team of scientists is sampling the massive ice. In the distance (upper right), a flat promontory is visible. This is where the historic whaling settlement on Herschel Island is located, which includes the oldest woodframe structures in the Yukon.

Arctic Data Committee (ADC)

The ADC was formed by IASC and SAON in late 2014. The overarching purpose of the ADC is to promote and facilitate international collaboration towards the goal of free, ethically open, sustained, and timely access to Arctic data through useful, usable, and interoperable systems. Since its formation, the ADC has convened, co-convened, or contributed to a number of activities and events including meetings and implementation workshops in partnership with many other Arctic and polar bodies (e.g., SCAR Standing Committee on Antarctic Data Management, Southern Ocean Observing System, the Global Crysosphere Watch).

In 2019, following conversations at the Polar Data Planning Summit in Boulder, and the Polar Data and Systems and Architecture Workshop in Geneva in 2018, the ADC and other partners co-organized the Third Polar Data Forum (PDF III), hosted by the Finnish Meteorological Institute in Helsinki, 18-22 November.

The Third Polar Data Forum continued a series of productive activities and was followed by the Arctic Observing Summit. To maintain momentum, in June of 2020, the ADC led the initiation of the bi-monthly online Polar to Global Online Interoperability and Data Sharing Workshop/Hackathon (P2G, **https://bit.ly/Polar2GlobalInterop**). In the midst of the COVID-19 pandemic, P2G has been a very productive collaboration. Despite the challenges, we have learned that our globally distributed community can continuing working together between in person meetings. The process has produced a paper entitled "Alignment of Polar Data Policies - Recommended Principles", and is nearing the first draft of a set of specifications for sharing metadata among many tens of polar data catalogues to support "single window" (federated) search. This will dramatically increase the findability of data for the Arctic community.

The Fourth Polar Data Forum is being planned for September of 2021 online and in The Hague, Netherlands. All members of the IASC community are encouraged to engage in ADC activities.

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Website: https://arcticdc.org/

PHOTO: GREGORY TRAN
AWIPEV Research Station Water sampling, monitoring of phytoplankton,
Kongsfjorden, Svalbard - 2020.

5. Capacity Building

» 5 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 five excellent Arctic ECRs (incl. graduate students, postdocs and junior research group leaders) with the opportunity to get engaged in the IASC Working Group.

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. IASC has had Indigenous Fellows before, but this new recommendation (and line in the IASC budget) means that there will be at least one offered to an Indigenous ECR every year. The Indigenous Fellow can choose whichever IASC Working Group is most of interest and relevance to them.

As of 2020, a total of 40 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.

In 2020, IASC was also partnering for a second time with the Conservation of Arctic Flora and Fauna (CAFF) Working Group of the Arctic Council to offer the CAFF-IASC Fellowships. These Fellows are paired also connected to the with a CAFF activities, i.e. (the Arctic Migratory Birds Initiative (AMBI) and the Coastal Ecosystem Monitoring Group (CEMG)), funded to participate in the ASSW and these activities' events, and as well as encouraged to contribute towards producing a deliverable scientific deliverables. With

active mentorship, the aim of this the CAFF-AISC Fellowship is to gain experience give early career researchers experience is in bridging the gap between research and decision-making.

2020 Fellows were introduced during the joint WG meeting at the ASSW2020 Online, hosted by Iceland. The previous years' 2019 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.

Despite 2020 being a challenging year due to the COVID-19 Pandemic, the 2020 Fellows still managed to have meaningful participation to online meetings and engagement with the works of the IASC Working Groups. In addition, 2020 Fellows largely contributed to the ASSW2020 Scientific Report, in which they are authored scientific contributors to the thematic session of "Science for a Sustainable Arctic" online conference.

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 eigth year, the benefits of the IASC Fellowship Program are clearly evident for the Fellows, IASC, and Arctic research.

IASC Fellows 2021

HÉLÈNE ANGOT (Switzerland)
Atmosphere WG
Trace gases, atmospheric chemistry, surface-atmosphere exchange
Contact: helene.angot@epfl.ch

VICTORIA QUTUUQ BUSCHMAN (Greenland and USA)
Marine WG - Indigenous
Conservation, Biology
Contact: vbuschmn@uw.edu

GRETA WELLS (USA)
Cryosphere WG
Glacial outburst floods; glacier environmental change; geomorphology
Contact: ghwells@utexas.edu

WAYNE CLARK (Canada)
Social and Human WG
Inuit research methodology, Inuit health education, cultural safety
Contact: waynevoiseyclark@gmail.coma

NEELU SINGH (Norway)
Marine WG
Phytoplankton ecology; Nutrients & stoichiometry; Fjords & coasts
Contact: ghwells@utexas.edu

IVAN ALEKSEEV (Russia)
Terrestrial WG
Permafrost soils; organic matter; environmental contamination
Contact: alekseevivan95@gmail.com

IASC Fellows 2020

YVETTE GRAMLICH
Atmosphere WG
Arctic aerosols; Cloud particles; Mass spectrometry
Contact: yvette.gramlich@aces.su.se

SASCHA SCHIØTT
Marine WG - Indigenous
Arctic marine ecosystems; Foodwebs; Glacial runoff
Contact: sasc@natur.gl

SAMMIE BUZZARD
Cryosphere WG
Glaciology; Ice shelves; Sea ice
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PAULINE PIC
Social and Human WG
Geopolitics; Security; Arctic governance
Contact: pauline.pic.1@ulaval.ca

AMANDA BURSON
Marine WG
Phytoplankton ecology; Nutrients & stoichiometry; Fjords & coasts
Contact: Amanda.Burson@nottingham.ac.uk

MATTHIAS FUCHS
Terrestrial WG
Arctic deltas; Permafrost; Carbon
Contact: matthias.fuchs@awi.de

ENOOYAQ SUDLOVENICK
Marine WG - Indigenous
Marine mammals; Pathology; Inuit Qaujimajatuqangit
Contact: sudlovee@myumanitoba.ca

CAFF-IASC Fellows 2020

SCOTT FLEMMING
Arctic Migratory Bird Initiative
Shorebirds; Plastics; Foraging ecology
Contact: scott.flemming@canada.ca

NICHOLAS HUFFELDT
Coastal Ecosystem Monitoring Group - Circumpolar Biodiversity Monitoring Program
Seabirds; Biological rhythms; Marine ecology
Contact: nph@bios.au.dk

Fellows Voices'

The IASC fellowship has been an exciting experience for me as a PhD student. Through the fellowship I got to partake in the "work behind the scenes": I got involved in shaping the new strategy for the Atmosphere Working Group and got insights into how Arctic research is organized and funded. I am glad I met the other researchers in the WG during this process. I'm thankful for this experience and I am looking forward to potential future collaborations.

Yvette Gramlich
2020 Atmosphere Working Group Fellow
Arctic aerosols; Cloud particles; Mass spectrometry
Contact: yvette.gramlich@aces.su.se

Although 2020 maybe wasn't the best year to start as an IASC fellow (ASSW2020 was actually my first online conference, who would have known it would have been followed by so many?) I've enjoyed the opportunity to get to know the Arctic Sciences community much better. I've been working on cross-cutting proposals with other fellows and a scientific session at ASSW2021 so I'm hoping to continue to build on these relationships, maybe even in person one day!

Sammie Buzzard
2020 Cryosphere Working Group Fellow
Glaciology; Ice shelves; Sea ice
Contact: BuzzardS@cardiff.ac.uk

As an IASC fellow, you get the opportunity to expand not only your network but also scientific scope in Arctic research. Through several discussions with early career researchers and senior scientists alike, I have helped to develope their research ideas but also progressed my own understandings. Importantly, I've used opportunities to discuss not only how my research can become more scientifically relevant, but also how I can better align with the IASC goals of increasing Indigenous people's involvement throughout. The latter part of this has probably been the most tangible addition that being a fellow has provided to my Arctic research.

Amanda Burson
2020 Marine Working Group Fellow
Phytoplankton ecology; Nutrients & stoichiometry; Fjords & coasts
Contact: Amanda.Burson@gmail.com
Twitter: @AmandaMerle1

As an IASC fellow I was able to grow my network, even considering the unprecedented times in wake of the COVID-19 pandemic. I was given the honour of serving as a committee member for the IASC Medal, which recognizes outstanding people in their contributions in Arctic research. Additionally, IASC has introduced me to the European sector of Arctic research, and as a North-American focused early career researcher, this has been very interesting, and I look forward to learning more and maintaining these professional collaborations.

Enooyaq Sudlovenick
2020 Marine Working Group Fellow
Marine mammal health and Inuit Qaujimajtuqangit
Contact: sudlovee@myumanitoba.ca

My fellowship at IASC did not quite have the start that I was anticipating due to the pandemic, but regardless of the Covid-19 situation, my fellowship at IASC has provided me with valuable new contacts and collaborations and given the opportunity to participate in online meetings which has greatly provided me with new collaborations and knowledge.

The Covid-19 situation has undoubtedly reduced the chance to meet new people in person, but I am pleased with the number of online meetings that I have been able to participate in and being able to meet new people without the need for travel. The IASC community has opened for building a greater network and will hopefully continue to do so in the coming years.

Sascha Schiøtt
2020 Marine Working Group Fellow
Arctic marine ecosystems; Foodwebs; Glacial runoff
Contact: sasc@natur.gl

I feel very lucky to have been a fellow this year. Even though 2020 was a 'special' year as I was not able to meet with members of my working group or other fellows in person, this has been an incredible opportunity to network and to understand a little better how Arctic science works. I especially like that it gave me a sense of how interdisciplinary and collaborative Arctic science needs to be. This programme is a great initiative and I hope that emerging projects I am involved in will lead to strong future collaborations.

Pauline Pic
2020 Social and Human Working Group Fellow
Geopolitics, Security, Arctic governance
Contact: pauline.pic.1@ulaval.ca
Twitter: @pilonepic

Being an IASC Fellow is an excellent way for young researchers to learn about different Arctic research topics and to see the bigger Arctic picture. Personally, this experience will certainly help me in the future when shaping own research projects and starting collaborations among different fields. As an IASC Fellow I have the opportunity to learn from and interact with researcher among all fields and backgrounds within the Arctic research domain, which widens my horizon and extends my scientific network.

Matthias Fuchs
2020 Terrestrial Working Group Fellow
Arctic coastal wetlands, Permafrost, Carbon
Contact: matthias.fuchs@awi.de

IASC Indigenous Fellows

Marine Mammal Health is Inuit Health

by Enooyaq Sudlovenick | 2020 Marine Working Group Fellow

Marine mammals across the Arctic, such as the beluga whale, provide as staple food items for many Inuit communities across Inuit Nunaat (Inuit homeland across the northern hemisphere). These very same mammals along with many others are intricately tied with Inuit culture and worldview. In fact, the two are so connected that our Inuit mythology heavily revolves around the sea and the sea goddess Nuliayuq, or anglo Sedna. Nuliayuq is said to have created all marine mammals when she fell off her father's qajaq, and her fingers cut away to release her grasp of the boat. Her fingers became the marine mammals that Inuit across the Arctic continue to harvest for subsistence.

My research is centered on marine mammals across Inuit Nunaat. I am currently in the second year of my PhD at the University of Manitoba, Canada. With my past work on ringed seal health through pathology and Inuit Qaujimajatuqangit, which encompass Inuit values and knowledge of wildlife, in Eastern Nunavut, I am now working on beluga health. Specifically, my thesis is a comparative study examining the Western Hudson Bay and the Eastern Beaufort Sea beluga populations with respect to whale health and the different ways in which Inuit from both regions consume and monitor them.

The unique components of the Inuit beluga harvests and Western scientific inquiry of marine mammals come together to create research programs that provide baseline information on the pathological landscape of the beluga, all the while basing the research goals and training within the communities' grasp. Sampling harvested whales, which are whales selected by hunters for consumption, allows us to obtain samples that would be extremely invasive in live captured whales, or even impossible to access. With these harvested whales we have the opportunity to look for not only the antibodies against viruses and bacteria but the pathogens themselves, which present more reliable results than solely using blood samples. This is great information to have so that we can monitor for any changes in prevalence of diseases, and even new occurrences of disease. These changes in prevalence and occurrence of new diseases are predicted to increase as different species move further north with the warming oceans. Although not all pathogens are capable of cross-species transmission, some of them could be. This makes it all the more important to establish a baseline for pathogen prevalence in marine mammals across the Arctic. In many ways, monitoring marine mammal health can inform us on possible impacts to Inuit health, and Inuit Qaujimajatuqangit can inform Western science on valuable local observations, observed changes in the environmental, and partnerships.

PHOTO: Courtesy of Enooyaq Sudlovenick

As a new fellow in the marine working group, but also as an Inuit fellow inducted through the Action Group on Indigenous Involvement, I hope to engage in many conversations about the many facets of Arctic science. Despite the unique circumstances and limitations of current events brought on by COVID-19, I am grateful for having been selected as a fellow and look forward to meeting many other in the Arctic science realm.

Surveying a fjord system that is difficult to access

by Sascha Schiøt | 2020 Indigenous Fellow IASC Marine Working Group

My research is focusing on the marine ecosystem in Ilulissat Icefjord, Greenland. Ilulissat Icefjord has one of the most productive glaciers regarding icebergs in the Arctic. This makes it an interesting fjord system to study as the marine terminating glacier is assumed to provide good conditions for the marine productivity. At the same time, it is also a challenging fjord system to study, as the main fjord is usually closed off by huge Icebergs much of the year, and the fjords accessibility depends on good snow and sea ice conditions. Traditional surveying methods such as trawl surveys or surveys from research vessels, are impossible to use due to the huge icebergs in the main fjord.

For my PhD project, which is in cooperation with the Greenland Institute of Natural Resources and Arctic Research Centre at Aarhus University, Denmark, I have chosen to use an interdisciplinary approach to be able to explore the marine ecosystem inside the fjord and to uncover some of the characteristics of the fjord's ecosystem. The methods I have chosen are using eDNA, nutrient concentration measurements, oxygen isotope analysis, CTD profiles, stomach samples from different seals and fish caught inside Ilulissat Icefjord as well as using the knowledge of the people that use the fjord system as a fishing and hunting ground.

PHOTO: Courtesy of Sascha Schiøt

Fishermen and hunters in Greenland usually start their fishing/hunting activities early in their lives, which ultimately gives them years of experience and knowledge. For this reason, they hold the knowledge of the effects the changing climate has on living resources, and of the environmental conditions which they have had to adapt to in order to continue their fishing/hunting activities. Their stories also tell of their resilience to climate change, and their ability to adapt to these environmental changes, contradicting the believe of the traditional Inuit way of life being static. Sea ice, for example, plays a crucial role in the traditional fishing and hunting activities. Due to the warming climate, fishing/hunting activities had to adapt to these changes. For many centuries, Ilulissat Icefjord had only been accessible with dogsleds when land-fast sea ice had formed. But today, as the fjord becomes more accessible from the sea, boats are used more and more to fish in the fjord instead. I have worked with local fishermen and hunters in collecting stomachs from different seals and fish to look for indications of the structure of the local food web. So I have also spent many hours looking at stomach content.

The project is broad indeed, requiring an interdisciplinary approach and will ultimately lead to a description of the fjord systems ecosystem. My interdisciplinary approach has required a broad insight into different methods, which requires me to build up a network and collaborate across different scientific disciplines. Being part of the Marine Working Group in IASC will hopefully provide a broader network and open up for greater opportunities.

PHOTO: MIJIN PARK
Arctic puffins in rows on coastal cliffs, Stuphallet, Kongsfjorden, Svalbard

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