



IASC 2022

BULLETIN

[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.

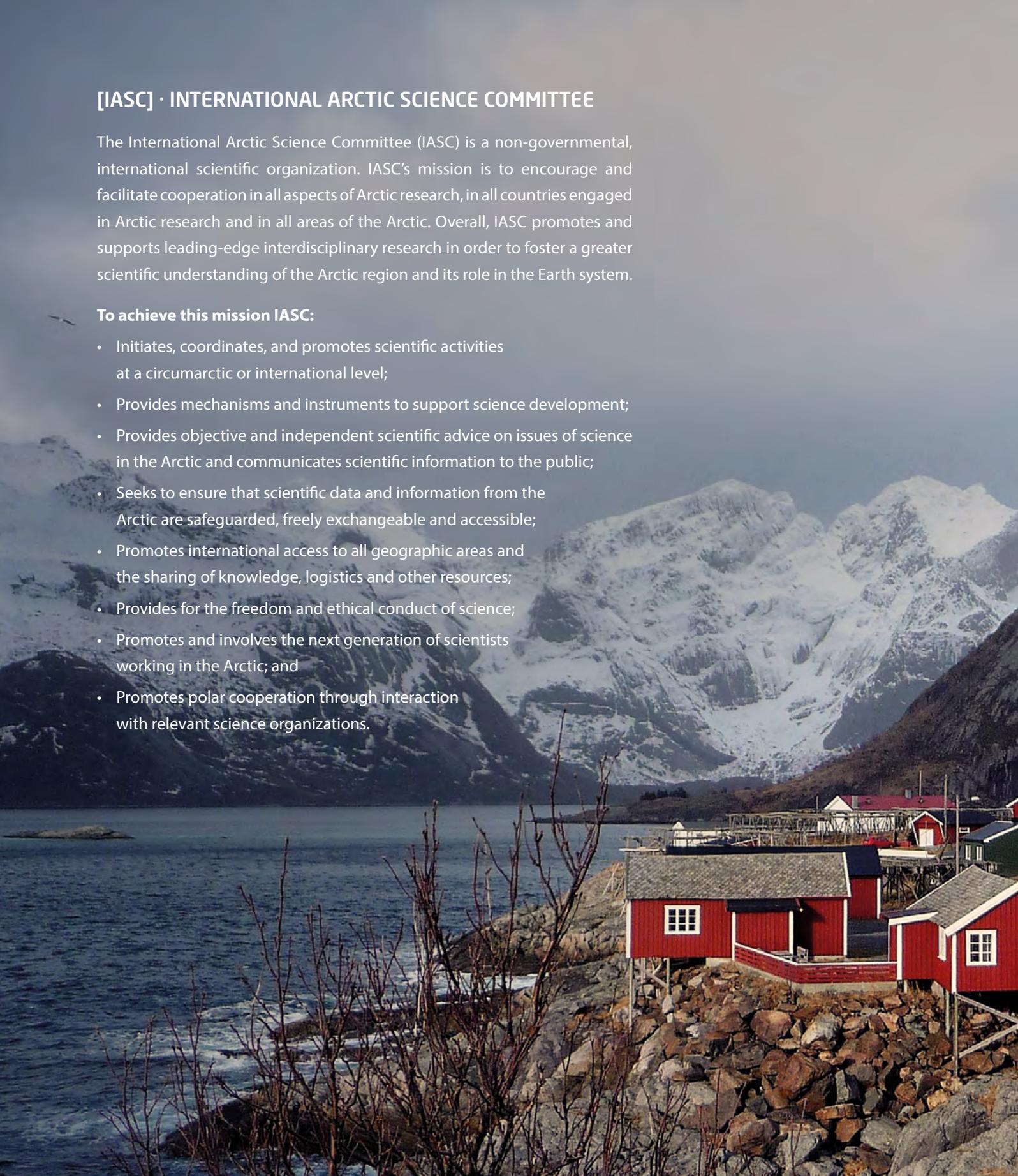


PHOTO: ANNA LENA BERCHT

View of Hamnøy, a small fishing village in the Lofoten archipelago
Location: Hamnøy, Lofoten Islands in the Norwegian Arctic, 2015



IASC 2022

BULLETIN

[IMPRINT]

International Arctic Science Committee

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Editors: Federica Scarpa and Gerlis Fugmann

Production and Layout: www.redpear.de

ISBN 978-9935-25-125-1

COVERPHOTO: IGOR KOZLOV

[CONTENTS]

Preface	6	3. ICARP IV - Fourth International Conference for Arctic Research Planning.....	57
1. IASC Internal Development	9	The Need, Vision and Goals of ICARP IV	58
IASC Organization	10	Scientific Foci	59
IASC Council	12	Community-wide Engagement in ICARP IV	59
IASC Executive Committee	12	Organizational Structure	60
Secretariat	13	Host for ICARP IV	61
ISIRA / ИСІРА	14	4. Arctic Science Summit Week 2021	63
IASC Medal 2022	16	Upcoming ASSWs	65
2. IASC Working Groups.....	19	5. Data and Observations	67
2021 State of Arctic Science Report	20	Sustaining Arctic Observing Networks (SAON)	68
IASC Cross-Cutting Activities	23	Arctic Data Committee (ADC)	70
Completed	23	6. Capacity Building	73
IASC Cross-Cutting Activities	28	IASC Fellowship Program	74
Atmosphere Working Group (AWG)	36	Dr. Stanislav (Stas) Ksenofontov is the new IASC Fellowship Coordinator	76
Cryosphere Working Group (CWG)	40	Fellows'Voices	78
Marine Working Group (MWG)	44		
Social and Human Working Group (SHWG)	48		
Terrestrial Working Group (TWG)	52		

[PREFACE]

As we approach the end of a second year of the global COVID pandemic, we grieve the lives lost and the turmoil our countries have endured. We regret the opportunities missed or postponed. I am particularly saddened to think of our students and early career researchers who have not experienced the energy and excitement of meeting fellow researchers in conferences, scientific cruises, or in field campaigns. However, I am also inspired to witness the enthusiasm and adaptability of the scientific community. Our virtual meetings continue to be very productive and there are certainly tangible benefits of working with the assets we have available. IASC's second publication on the "State of Arctic Science" demonstrates the Arctic research community remains vital and active, conducting re-analyses and syntheses. Analyses of available data and publication of new findings continues without falter. The translation of information to knowledge and observations to understanding continues unabated.

As is reported in this Bulletin, much was accomplished this year. Our colleagues in Portugal organized an important and successful 2021 Arctic Science Summit Week (ASSW) with over 1400 participants from 37 countries. I am also grateful to our Norwegian friends for their efforts in convening ASSW in March 2022. We are looking forward to ASSW 2023 in Vienna, Austria, ASSW 2024 in the United Kingdom, and ASSW 2025 in

Boulder CO, USA. The ASSW remains a critical meeting event where many organizations converge to take advantage of the confluence of researchers, program managers and policy makers. We have much new information to share, many new ideas to promote, many new projects that will require international collaborations to implement. Together, we can advance these ideas into accomplishments.

The IASC Fellowship Program was established in 2014 to engage early career researchers in the work of the Atmosphere, Cryosphere, Marine, Social & Human, and Terrestrial Working Groups. Each year, one Fellow per WG is chosen from approximately 100 applicants. In addition, one Indigenous Fellow is selected each year to collaborate with the WG best aligned with their interests. In 2022, we were able to expand this program through partnerships with the Arctic Council's Sustainable Development Working Group (SDWG), the International Association for Arctic Social Sciences (IASSA) and Sustaining Arctic Observing Networks (SAON) to offer two additional fellowships. In addition, we are pleased to announce support from the Prince Albert II of Monaco Foundation will provide funds to further increase the number of fellows we can support in future years. Our Fellows are important contributors to the success of IASC, bringing energy, ideas, and tools to the challenges we address. In return, our Fellows are given opportunities to accept leadership roles and

PHOTO: VASILEVICH IGOR / AARI
Svalbard, Isfjord. Different species of birds fly together.



work with the top scientists in their respective fields. We are fortunate to have Dr. Stanislav (Stas) Ksenofontov as the new IASC Fellowship Coordinator and also express our deep gratitude to Dr. Alevtina Evgrafova for her insightful and enthusiastic leadership of the Fellowship Program.

We are very excited about future IASC activities. Our Carbon Footprint Action Team is striving to help IASC learn how we can continue to thrive as an international scientific organization while we reduce our own contributions to the increasing concentrations of greenhouse gases in the atmosphere. We have started planning for the Fourth International Conference on Arctic Research Planning (ICARP IV), which will be convened with ASSW 2025 in Boulder. This important event helps our research community identify the most urgent research needs and enables many Arctic organizations to collaborate in addressing those challenges. IASC has demonstrated that we can make the most progress and achieve the greatest accomplishments when we work together, sharing our understanding, our data, our platforms and our resources. The results of ICARP IV will be used to craft the next decadal strategic plan for IASC.

As my term of IASC President comes to an end, I offer my sincere thanks to the IASC working groups, our action teams, our standing committees, our council,



our executive committee and the staff and volunteers of our distributed secretariat. Through collaborations and coordination, by sharing ideas, posing problems, and suggesting solutions, our collective contributions have advanced Arctic science and made the world a better place. There remains much work to do. But, watching the international partnerships and collaborations of the IASC community gives me great optimism that the challenges we face, while substantial, are not insurmountable.

PHOTO: UAF PHOTO BY JR ANCHETA
Dr. Larry Hinzman, IASC President

PHOTO: MICHAEL FRITZ (ALFRED WEGENER INSTITUTE, POTSDAM, GERMANY)
Twins united onboard the CCGS Amundsen. Project: PeCaBeau (Permafrost Carbon on the
Beaufort Shelf), Canadian Beaufort Sea



1. IASC INTERNAL DEVELOPMENT

1 IASC Internal Development

IASC Organization

The International Arctic Science Committee (IASC) is a non-governmental organization that encourages and facilitates cooperation in all aspects of Arctic research, in all countries engaged in Arctic research, and in all areas of the Arctic region. To fulfill its mission, IASC promotes and supports leading-edge interdisciplinary research

in order to foster a greater scientific understanding of the Arctic region and its role in the Earth system. IASC was established in 1990 and began operations in 1991. It currently comprises 23 member countries. IASC member organizations are national science organizations that cover all fields of Arctic research.



PHOTO: SUSAN CHRISTIANEN

A challenging glacier rescue mission of a superjeep that got stuck on the glacier. There was an icelcold storm and the conditions were challenging. Our team succeeded and we celebrated the victory afterwards. Langjökull glacier, Iceland.

COUNTRY	MEMBER ORGANIZATION	IASC COUNCIL MEMBER	WEBSITE
Austria	Austrian Polar Research Institute (APRI)	Wolfgang Schöner	www.polarresearch.at
Canada	Polar Knowledge Canada	Wayne Pollard	www.canada.ca/en/polar-knowledge.html
China	Chinese Arctic and Antarctic Administration	Huigen Yang	http://www.chinare.gov.cn/
Czech Republic	Centre for Polar Ecology	Josef Elster	www.prf.jcu.cz/en/cpe
Denmark	Danish Agency for Science, Technology, and Innovation	Lise Lotte Sørensen	http://fist.dk
Finland	Council of Finnish Academies	Paula Kankaanpää, Vice-President	www.academies.fi
France	National Center for Scientific Research (CNRS)	Jérôme Chappellaz	www.cnrs.fr
Germany	German Research Foundation	Günther Heinemann	www.dfg.de
Iceland	The Icelandic Centre for Research (RANNÍS)	Egill Thor Nielsson	www.rannis.is
India	National Centre for Polar and Ocean Research (NCPOR)	M. Ravichandran	https://ncpor.res.in/
Italy	National Research Council of Italy (CNR)	Carlo Barbante	www.cnr.it
Japan	Science Council of Japan, National Institute of Polar Research (NiPR)	Hiroyuki Enomoto, Vice-President	www.nipr.ac.jp
Republic of Korea	Korea National Committee on Polar Research (KOPRI)	Sung-Ho Kang	https://kopri.re.kr/eng/
The Netherlands	Dutch Research Council	Dick van der Kroef	www.nwo.nl/en
Norway	Research Council of Norway	Ingerid Fossum	www.forskningsradet.no
Poland	Polish Academy of Sciences, Committee on Polar Research	Michał Łuszczuk	https://kbp.pan.pl
Portugal	Portuguese Foundation for Science and Technology	João Canario	www.fct.pt
Russian Federation	Russian Academy of Sciences	Vladimir Pavlenko, Vice-President	www.ras.ru
Spain	Spanish Polar Committee (CPE)	Antonio Quesada	www.ciencia.gob.es
Sweden	Swedish Research Council	Ulf Jonsell	www.vr.se
Switzerland	Swiss Committee on Polar and High Altitude Research	Gabriela Schaepman-Strub	www.polar-research.ch
United Kingdom	Natural Environment Research Council (NERC)	Henry Burgess, Vice-President	www.nerc.ukri.org
USA	Polar Research Board	Matthew Druckenmiller	https://www.nationalacademies.org/prb/polar-research-board

TABLE:
An overview of the IASC countries, organizations, and Council members. For contact information, please visit

<https://iasc.info/about/organisation/council>

IASC Council

IASC Executive Committee

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.

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



PHOTO: IASC SECRETARIAT
IASC Council (online) meeting during ASSW2021.

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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Laura Ghigliotti, Marine Working Group Secretary,

National Research Council of Italy, Italy

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Anna Varfolomeeva, Social & Human Working Group

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Stanislav (Stas) Ksenofontov, IASC Fellowship

Coordinator, ARCTICenter, University of Northern

Iowa, USA

Contact: sksesta@gmail.com

Yulia Zaika, ISIRA Secretary, Kola Science Center of
the Russian Academy of Sciences

Contact: yulia.valerievna.zaika@gmail.com

ISIRA / ИСІРА

The year of 2021 has brought new activities and new members to the ISIRA Group. Currently, the group consists of 16 members including the chair and the secretary, and national delegates from 11 countries – Russia, Austria, Finland, Germany, Japan, Norway, Poland, Sweden, Switzerland, United Kingdom and the United States.

The regular annual meeting of the group took place during the ASSW2021 with both open and closed sessions where national delegates presented the national research activities and initiatives on the bilateral and international basis and had discussed and made decisions regarding the overall administrative tasks of the group. 2021 was the first year when ISIRA is taking part in the annual cross-cutting call of IASC to financially support the projects and activities related to the Russian Arctic and which includes the scientists involved in such endeavours. In total 7 projects have been supported at different funding levels.

After the very intense summer period of the active field works, the group has organized the intermediate online meeting in October 2021 to check the updates, discuss the following activities and draft the work plan 2022-2024 for the group. The idea of inclusion of early-career researchers to the group to assist the national delegates was proposed and will be actively discussed and implemented in 2022 together with the IASC Secretariat.

One of the important missions of ISIRA includes the assistance to the decision-making process and keeping in mind the current Russian Chairmanship in the Arctic Council, it was decided to publicize the ISIRA history and activities to make them more visible. Some national delegates made their contribution to the article which was published within the well-known in Arctic research and policy-makers community of Russia the “Arctic Herald” journal, which has been disseminated at the latest meeting of Arctic Council SAO in Salekhard, Russia, in December 2021.

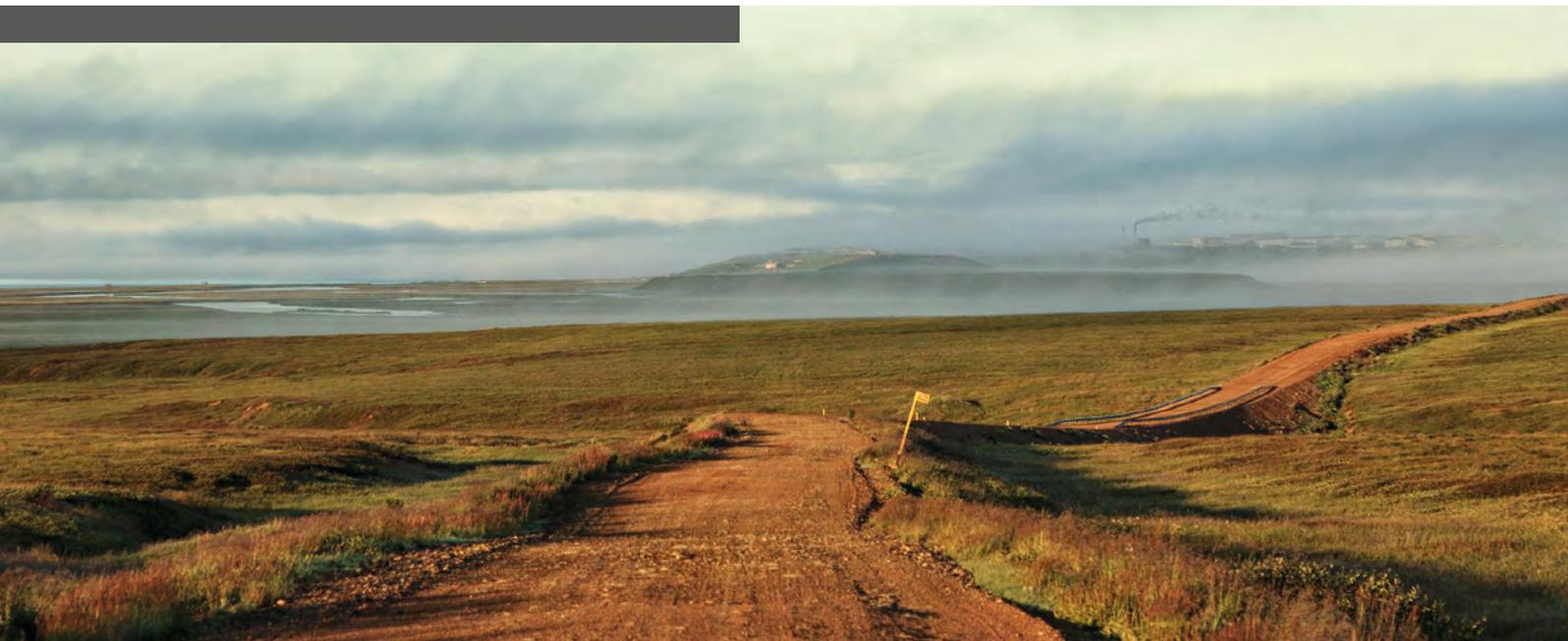


PHOTO: GENNADY ZELENSKY
Road to Lorino, Chukotka Autonomous region (Russia)

2021 год принес новые мероприятия и новых членов в группу ISIRA. В настоящее время группа состоит из 16 членов, включая председателя и секретаря, а также национальных делегатов из 11 стран - России, Австрии, Финляндии, Германии, Японии, Норвегии, Польши, Швеции, Швейцарии, Великобритании и США.

Очередное ежегодное заседание группы состоялось во время Недели арктического научного саммита 2021 с открытой и закрытой сессиями, на которых национальные делегаты представили национальные исследовательские мероприятия и инициативы на двусторонней и международной основе, а также обсудили и приняли решения относительно общих административных задач группы. 2021 год стал первым годом, когда ISIRA принимала участие в ежегодном заявочном конкурсе IASC, чтобы финансово поддержать проекты и мероприятия, связанные с российской Арктикой. Всего было поддержано 7 проектов с различным финансированием.

ISIRA | Members — Члены | ИСИРА

Chair Arkady Tishkov | Russia

Annett Bartsch | Austria

Hanna Lappalainen | Finland

Juha Pekka Lunkka | Finland

Heidemarie Kassens | Germany

Yoshihiro Iijima | Japan

Louise Kiel Jensen | Norway

Tadeusz Pastusiak | Poland

Boris Morgunov | Russia

После очень интенсивного летнего периода активных полевых работ группа организовала промежуточную онлайн-встречу в октябре 2021 года для обсуждения новостей, следующих мероприятий и составления плана работы группы на 2022-2024 годы. Была предложена идея о включении в состав группы молодых исследователей для помощи национальным делегатам, эта инициатива будет активно обсуждаться и реализовываться в 2022 году совместно с Секретариатом МАНК.

Одна из важных миссий ISIRA включает в себя содействие процессу принятия решений, и, учитывая нынешнее председательство России в Арктическом Совете, было решено популяризировать историю и деятельность группы. Некоторые национальные делегаты внесли свой вклад в статью, которая была опубликована в известном в арктическом сообществе ученых и политиков России журнале „Арктические Ведомости“, распространенном на заседании старших должностных лиц Арктического совета в Салехарде, Россия, в декабре 2021 года.

Sergey Priamikov | Russia

Vladimir Kotlyakov | Russia

Anna-Maria Perttu | Sweden

Gabriela Schaepman-Strub | Switzerland

Gareth Rees | United Kingdom

Lee Cooper | United States

Yulia Zaika | Russia

More information:

<https://iasc.info/our-work/isira>

IASC Medal 2022



The International Arctic Science Committee (IASC) awards the 2022 IASC Medal to Professor Dalee Sambo Dorough, University of Alaska Anchorage and Chair of the Inuit Circumpolar Council, for outstanding achievements in advocacy for the rights of Indigenous peoples, her service to a wide range of arctic communities, including the Arctic Council, and her influence as a legal scholar.

Dr. Dalee Sambo Dorough was selected for her scientific expertise and advancement of the rights of Indigenous peoples and for her exceptional contributions in advancing research on public international law, international organizations, and human rights. She has worked as a scholar, as an advisor to international organizations, and, since 2018, as leader of the Inuit

Circumpolar Council (ICC), which represents approximately 180,000 Inuit from Canada, Greenland, Russia and the United States on the Arctic Council.

A distinguishing career feature is her sustained record of working practically to implement the results of her research. Years of legal studies and policy research by Dr Dorough have contributed to key changes in how the rights of Indigenous peoples are viewed worldwide. Her contribution to the development of the UN Declaration on the Rights of Indigenous People (UNDRIP) and its subsequent implementation exemplifies her global influence and her impact on Indigenous people across the planet, and her own cultural affiliations and arctic scholarship credentials have brought the Indigenous peoples of the Arctic into greater global focus. Dr Dorough has given numerous presentations on law and policy affecting the Arctic to international and national fora; her publications span peer-reviewed articles and book chapters, edited volumes, and high-impact reports directed towards a range of national and international bodies. They include the Routledge Handbook of Indigenous Peoples in the Arctic, published in 2021, which she co-edited, and major contributions to landmark policy-relevant publications, such as the Arctic Human Development Report and International Law Association studies on the rights of Indigenous Peoples.

Dr Dorough's exceptional work has provided—and will continue to provide—outstanding guidance for gaining greater equality and recognizing diversity across arctic communities. It stands as an inspiration for several generations of Indigenous and non-Indigenous scholars and leaders in the social sciences and beyond.

PHOTO: BILL HESS.
Dr. Dalee Sambo Dorough

The other shortlisted candidates for the 2021 IASC Medal were:

- **Robert W. Corell**, for outstanding achievements in the pursuit of Arctic science across past political divides, the promotion of diversity in research through mentoring, and leadership that has brought science and public policy together and was critical to the formation of IASC.
- **John England**, for outstanding achievements in pioneering Quaternary studies across Arctic Canada, excellent mentorship of generations of researchers, tireless efforts to support Indigenous communities and scholars, and advocacy of conservation in the Arctic.
- **Matthew D. Shupe**, for outstanding achievements in interdisciplinary scholarship and his critical role on steering the unique international Arctic Ocean program MOSAiC to success.

Dr. Dalee Sambo Dorough is planned to deliver her IASC Medal lecture as part of ASSW2022. Be sure to sign up for the IASC email list to receive the latest information and to register for the ASSW 2022.

IASC would like to thank the 2022 IASC Medal Committee for their service: Mary Edwards (TWG) (Chair), J. Otto Habeck (SHWG), Yuji Kodama, Monika Kędra (MWG) and Greta Wells (CWG, Fellow).

PHOTO: MICHAEL SNYDER
Into the Dark



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.

2021 State of Arctic Science Report

The IASC 2021 State of Arctic Science Report updates the first IASC State of Arctic Science Report from 2020 and presents a cohesive synthesis of international Arctic research activities and priorities, as gathered from the Arctic research community itself. Updates to the report have been provided by the members of the of the IASC scientific Working Groups (Atmosphere, Cryosphere, Marine, Social & Human, Terrestrial), the IASC Council and Executive Committee, the



International Science Initiative of the Russian Arctic (ISIRA), the former IASC Action Group on Indigenous Involvement, the Arctic Data Committee (ADC) and the Sustaining Arctic Observing Network (SAON)

The State of Arctic Science 2021 is expected to provide benefits by identifying priorities, linkages, and gaps in the current work of the international Arctic research community. For example:

- Arctic research must be truly interdisciplinary, and indeed convergent, in order to meet both Arctic and global challenges.
- The Arctic research community must improve on its efforts to respect and implement the priorities, voices, and contributions of Indigenous Peoples and other Arctic residents.
- International and interdisciplinary cooperation are absolutely critical to studying Arctic systems and should be encouraged and expanded.
- Arctic data sharing, discoverability, access, and re-use continue to be difficult challenges, but

improvements in these areas will be crucial for future success.

- Current levels of Arctic monitoring and research are insufficient to meet these challenges, despite the hard work and investments of both Arctic and non-Arctic countries.

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 (ICARP) process (e.g., ICARP-III's "Integrating Arctic Research - A Roadmap for the Future"). 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. Initial planning has started for the fourth ICARP in 2025, and the IASC State of Arctic Science report series will provide an important resource for its planning process.

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. This report 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.

PHOTO:
Cover of the 2021 State of Arctic Science Report

The State of Arctic Science 2021 remains an initial effort to describe the status of the scientific endeavor at high northern latitudes. Building on a foundation of ICARPIII, IASC has compiled this report out of broad, bottom-up contributions from the IASC scientific community. Arctic change is accelerating, and Arctic science is vast, and so this report attempts to summarize - but just barely scratches the surface of - the tapestry that is Arctic research.

This report adds value and is a useful contribution for researchers, policymakers, and all research stakeholders by setting out the state of Arctic science. While this report is static, Arctic research is vibrant and evolving. Therefore, IASC will update this report on an annual basis in the future.

Full Report available at:

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



PHOTO: TUYARA GARVILYEVA

From June 2021, the taiga forests in the Sakha Republic (Yakutia) were hit by wildfires, following record-breaking heat and drought. We see miles of burnt forest along the road during fieldworks (e-ASIA project „Climate change Resilience of Indigenous Socio Ecological systems - RISE“)

IASC Cross-Cutting Activities

Completed

Polar Archaeology Network (PAN) / Regional messenger, global message: the role of tangible cultural heritage in times of turbulence

When: 21 March 2021

Where: ASSW2021 Online

Working Groups: SHWG, TWG

Highlights:

- An overarching theme centered on collaborative indigenous community involvement and the co-production of knowledge with local indigenous. Not only was this a constructive discussion point later, but presenters demonstrated that integral to the polar research is the involvement of circumpolar peoples: to de-colonize research, improve data resolution, and benefits of reciprocal exchange of information about tangible heritage.
- The possibilities for interdisciplinary research due to the digital documentation revolution were also a common thread in many talks such as logistical issues to access the Arctic, and now with Corona virus pandemic. An increase in digital approaches to data acquisition not only has allowed for more archaeological sites to be located but increased global, interdisciplinary collaboration.

- Climate crisis-related impacts in polar archaeology were highlighted as tangible heritage archives are increasingly threatened, whether it is due to rising sea levels and coastal erosion, shorter seasons and loss of preservation, or the endangered indigenous lifeways that allow for ethnoarchaeological research or knowledge coproduction.

The Polar Archaeology session entitled “The Object: Regional Messenger, Global Message” was a fruitful sharing of various archaeological investigations that are currently ongoing or were previously successful in circumpolar regions. Participants were asked to present an archaeological ‘object’ that embodied interdisciplinary research and an indispensable polar aspect. During the session, not only were material objects such as bone tools and carvings from the high Arctic and faunal remains from hunter-foragers in Greenland presented but entire archaeological structures, such as a 19th century cruciform house in Tuktoyaktuk, Nunavut, Canada as well as a Nunalleq (Yup’ik house) in the Yup’ik Culture Area or Southwest Alaska. Ongoing investigations into the importance of marine species in the North Atlantic and completed work demonstrating the value of the digital data revolution in Arctic contexts were presented as well.

Finally, the spectrum of ‘objects’ presented was a highlight in and of itself, demonstrating value of archaeological sciences and tangible cultural heritage as a central interdisciplinary polar research agenda.

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2nd International Conference on 'Processes and Palaeo-environmental changes in the Arctic: from past to present – PalaeoArc2021'

When: 24-28 May 2021

Where: Online/ Pisa (Italy)

Working Groups: CWG, MWG, TWG

Highlights:

As the PalaeoArc network aims to further understand past and present environmental changes and processes in the Arctic, the conference developed around the 4 main themes of the PalaeoArc programme:

- 1) Dynamics of the terrestrial environment and landscape evolution;
- 2) Dynamics of Arctic ice sheets, ice shelves and glaciers;
- 3) Dynamics of high latitude oceans and sea ice;
- 4) Climatic response to, and interaction between, the different parts of the Arctic system

The 2nd International Conference on 'Processes and Palaeo-environmental changes in the Arctic: from past to present – PalaeoArc2021' was organised by the University of Pisa, Earth Sciences Department, Italy, on May, 24-28, 2021.

The main conference was preceded by two workshops dedicated to them and, although the events were completely online, we were able to let the students actively interact during the workshops. Indeed, during the first workshop, focused on the application of SEM to Earth Sciences, we were able to live streaming images of the instrument and of the software while analysing some samples. Similarly, during the activity dedicated to the taxonomy of the foraminifera genera *Islandiella* and *Cassidulina*, students had the chance to discuss the taxonomy of the specimens they are studying, by sharing photos during the workshop.

The discussions that followed-up the different presentations were animated and were not limited by the virtual nature of the conference. Indeed, the Zoom account made available by IASC was provided with a live chat, always open for participants to debate. Also the decision to create a channel dedicated to the Conference on the platform "Mighty Networks", where to upload the posters, making all the participants able to comment, revealed to be appropriate.

Overall, the Conference was scientifically very stimulating, as it can be inferred by the abstracts collected in the PalaeoArc 2021 Abstract Book (many abstracts will be developed into papers, that will be collected in a PalaeoArc 2021 Special Issue of Arctic, Antarctic and Alpine Research).

More information:

<http://www.palaeoarc.no/>

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RATIC meets T-MOSAIC: Sharing Best Practices in Research on Infrastructures in the Arctic (Part 1)

When: 21 March 2021

Where: ASSW2021 Online

Working Groups: CWG, SHWG, TWG

Highlights:

- **Methods:** Mixed approaches that combine qualitative and quantitative methods play an increasing role in research on infrastructure. Even within one discipline, such as remote sensing, combining several approaches (e.g. gradient boosting machines and deep learning) may yield more success, with value added from incorporating datasets from other disciplines.
- **Codevelopment:** Start with a research question that is driven by local needs and priorities; Co-deter-

mine sensor/survey locations based on community-specific challenges and needs.

- Sharing back: Disseminate results in a popular format (e.g. illustrated brochures in local and regional languages, multi-media archives); Follow CARE Principles for Indigenous Data Governance (www.gida-global.org/care).
- Developing best practices: Study your work as you go (e.g. participant observation of team meetings and community workshops; interviews with collaborators and stakeholders).

At the ASSW 2021 RATiC Meets T-MOSaIC community meeting on 21 March, nine speakers shared insights from their research related to Arctic infrastructure. The three-hour online meeting included presentations from physical and social science researchers and engineers working across the Arctic. Topics included: Active layer monitoring for infrastructure management; combining remote sensing methods to map the extent of infrastructure; multi-disciplinary approaches to understanding permafrost-related changes in natural and built environments; geotemperature modeling to identify geocryological hazards; participatory mapping of informal roads; and community perspectives on issues related to infrastructure development and sustainability. The meeting agenda and presentation slides are on the RATiC website at www.geobotany.uaf.edu/ratic/workshop2021.php.

As part of their presentations, speakers were asked to address how they were working with Arctic communities, government or industry; how they planned to „share back“ their data and findings with Arctic communities and other stakeholders; and best practices or lessons learned that could be transferable to other projects. Among the takeaways shared: The meeting was organized by the T-MOSaIC Arctic Infrastructure Action Group. This online meeting will be followed by an in-person workshop in Tromsø at ASSW 2022.

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The 3rd International Conference on „Polar Climate and Environmental Change in the Last Millenium“ - Polar Climate 2020

When: 30 August - 1 September 2021

Where: Toruń (Poland) and Hybrid

Working Groups: CWG, TWG

Highlights

- The need to increase the interdisciplinarity of research in polar areas by inviting researchers from other fields of science to collaborate,
- in the face of significant global changes, observed especially strongly in the Arctic, it was found that research in the polar regions should be intensified even more,
- there are still a number of debatable issues in the field of polar issues,
- climate change in polar ecosystems is also causing various environmental threats.

The aim of the conference was to present the current state of knowledge on climate and environmental changes in the polar regions in the last millennium. The hitherto achievements of science in the field of historical climatology of polar regions were presented on the basis of meteorological, historical, dendrochronological, palaeolimnological, geophysical, geomorphological and other observations and measurements. The detailed topics of the conference included: sources of palaeoclimatic information, research methods of climate change in historical times, climate of polar regions in the last 1000 years and its variability, causes and effects of climate change in historical times, scenarios of climate change in polar regions in the 21st century.

44 scientists from Poland and around the world (including Belgium, Finland, Iceland, Canada, Germany,

Norway, Switzerland, Peru, Russia, USA and Great Britain) participated in the conference. The conference was held in a hybrid mode. 50% of participants took part in it by contact, the rest remotely via the MS Teams platform.

More information:

<https://polarclimate2020.umk.pl>

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The Svalbard-MOSAIc workshop on snow, sea-ice and aerosol interactions in the Arctic

When: 8-9 November 2021

Where: Online

Working Groups: AWG, CWG

Highlights:

Take-home messages focused around how to improve collaborations between groups, projects and researchers on a long-term, pan-Arctic basis. Conclusions included:

- Sharing information between different research groups, disciplines and topics is incredibly important in understanding the interactions between different systems in the Arctic.
- It is important for researchers to be aware of different projects taking place in the Arctic and datasets/potential collaborations that may be available. Ways to do this could include building an online system to log current Arctic research, or ensuring that topic-based workshops open to researchers on different projects take place and are well advertised.
- The best way to share information and expertise can vary depending on the topic of study. For example, when studying the deposition of aerosols onto snow, large-scale sampling in a single location, with

extended analysis and characterisation, can be extremely beneficial in increasing understanding. When researching marine biogenic aerosols, it was generally felt that bringing together information and data from different parts of the Arctic would be more valuable.

As Arctic warming increases, it is becoming increasingly important to understand the complex interactions between sea ice, surface water, snow cover and atmospheric aerosols. During the 2019/2020 period, extensive measurements took place in the Arctic, including the large-scale MOSAIc campaign and measurements on Svalbard, with the aim of understanding these processes as well as others. The Svalbard-MOSAIc workshop brought together researchers with diverse expertise and from different projects across the Arctic, in order to foster collaborations and networking in the topic of snow, sea-ice and aerosol interactions. The workshop was based around small-group discussions, each with a specific topic focus. The three key topics discussed included the deposition of aerosol onto snow and sea ice, the production of marine biogenic aerosols and the impact of aerosols on the radiation budget. Sixty-two attendees from 22 different groups attended the workshop, with 76% participating in focus group discussions.

Global ecological and economic connections in Arctic and sub-Arctic crab markets

When: 9 and 16 December 2021

Where: Online

Working Groups: SHWG, ISIRA

Highlights:

An interdisciplinary pan-Arctic connectivity study on the crab fisheries can provide important answers to both ecological and economic concerns in the crab fisheries.

The global markets for crab increase the need for interdisciplinary and international cooperation and access to both ecological and economic data, particularly in the important domains of Russia as market supplier and China as developing market intermediary and end-buyer. Product diversification in crab markets is driving wide-ranging changes including management goals, onshore infrastructure, and tourism opportunities.

Members of the network met virtually after sharing videos to discuss two key evolving ecological economic topics. First, what are the impacts to coastal communities, infrastructure, and investment from market segmentation, certification, and diversification in the industry? Second, how can we use interdisciplinary tools to understand instabilities in supply from changes in ecosystem and economic productivity driven by climate, fishing, and other interdisciplinary concerns?

A great deal of information sharing across geographic and disciplinary domains resulted in focus on a number of important gaps at the global scale. The first of these is the need for a pan-Arctic connectivity study. This study would simultaneously trace the ecological

and economic boundaries for both ecosystems and markets, and the extent to which changes in ecological conditions, including temperatures, acidification, and recruitment interact with market changes including shifts in demand due to e.g. prices, income, or product quality and shifts in supply from ecological or technological changes. The second of these addresses the mechanics behind the success of any such study. That is, as global connections grow through both increased and diversified trade and ecosystem shifts, the supply chains for the crabs are becoming more complex. China's role as importer as well as re-exporter is rapidly evolving. There is greater need for increased accessibility to Russian and Chinese databases to understand these shifts in the global context. A third consensus item is the need for greater interdisciplinary understanding of ghost fishing and its impacts to both other fisheries and to marine species' well-being.

More info:

<https://iasc.info>

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Upcoming Cross-Cutting Activities

Funded in 2021

Indigenous-led Wildlife and Protected Area Management

Working Groups: MWG, SHWG, ISIRA

The Arctic is a hotbed for emerging local, national, and international conservation efforts, and researchers, managers, and communities alike will benefit from improved partnerships in conservation planning, research, management, policy, and governance. This project proposes a two-day in-person workshop entitled “Facilitating Indigenous-led Wildlife, Protected Area Management, and Conservation,” in Nuuk, Greenland and will convene Indigenous scholars, Indigenous managers, and research allies in productive discussions leading to best practices for working towards conservation in partnership with Indigenous communities. Discussions of equity in research and planning among researchers, managers, and Indigenous community members improves the assessment and setting of conservation targets and goals, as well as the attainment of these goals. Clear guidance on how to engage in knowledge co-production in conservation research and planning should come primarily from Indigenous scholars, managers, and community members, however, such guidance is lacking in many regions of the circumpolar north. This workshop will culminate in a manuscript to be submitted to the 2020 IASC-funded special issue on Indigenous Methodologies, provide summary reports to Greenlandic government ministries and organizations, and publish shorter articles at international organizations and fora potentially including WWF, CAFF, Arctic Council, and the Indigenous Peoples Secretariat.

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Scientists and Educators Co-developing Education Outreach and Communication tools for The Polar Resource Book

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

Now almost a decade old, Polar Science and Global Change: An International Resource for Education and Outreach, known by its many users as The Polar Resource Book, is due for an update. The polar regions are changing rapidly, particularly the Arctic, and there have been many new developments in polar sciences, education and outreach since the book was originally published following IPY.

Polar Educators International, APECS, SCAR, and IASC are collaborating to produce the updated, open-access online resource with the same goals as the original, for a new cohort of polar scientists, educators, and learners.

PEI and the IASC Working Groups (WGs) will guide a diverse group of polar educators and early career polar scientists to co-develop education outreach activities and science communication skills linked to each of the five WG science focuses for PRB2, to engage a global audience with current Arctic research and the challenges that Arctic communities face.

New and updated tools and resources will be uploaded to the PEI PRB2 webpages for wider feedback, refined and presented at PEI 2022 Hofn, Iceland and ASSW2022.

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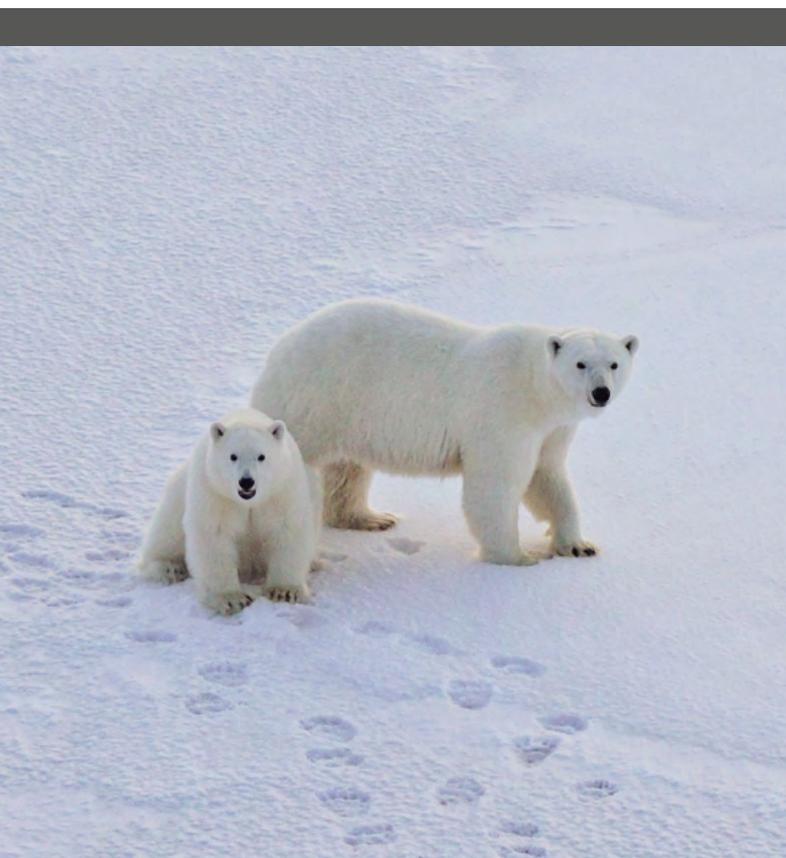
Race and Systemic Bias Crosscutting Workshop

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

Arctic science suffers from systemic biases that marginalize and exclude people who are Black, Indigenous, or from other under-represented minorities both in the Arctic region and around the world. During this workshop we will hear from speakers who have been impacted by these issues, and are working to eliminate them. Through breakout discussions we will provide actionable recommendations for IASC and the Arctic Sciences community to continue to tackle these issues. This proposal aims to work across working groups, as this issue affects all areas of Arctic Science.

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Karthaus Summerschool on Ice Sheets and Glaciers in the Climate System

Working Group: AWG, CWG

The Karthaus Summerschool on Ice Sheets and Glaciers in the Climate System is a 10-day international course that will take place in the South Tirolian town Karthaus 25 May - 3 June 2022. It has place for 36 students and provides them with a thorough introduction into the dynamics of glaciers and ice sheets with a focus on ice-climate interactions. The course is intended for early stage PhD candidates that work in glaciology-related climate projects from all over the world. Although the course is anchored in continuum-mechanics and numerical modelling, it also provides lectures on ice-atmosphere interaction, climate of ice sheets and glaciers, glacier hydrology, ice-ocean interactions, geomorphology, and geodynamics. An important part of the course is networking and community building, for participants and teachers.

More information can be found on:

<https://www.projects.science.uu.nl/iceclimate/karthaus/>

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International MOSAiC Science Conference

Working Group: AWG, CWG, MWG

The Multidisciplinary Drifting Observatory for the Study of Arctic Climate (MOSAIC) was the largest Arctic expedition in our times and took place from September 2019 until October 2020. After years of planning under the umbrella of IASC and more than 80

PHOTO: TATIANA MATVEEVA, INSTITUTE OF GEOGRAPHY RAS

Two polar bears - mom and her baby - didn't want to go away from our RV Akademik Fedorov for several days and it stopped our field work. Arctic Ocean - it's their home, we are just a guests there. October, 2019. Central Arctic (approx. north of the Laptev Sea).

institutions from 20 nations involved, the expedition was a big success and scientists collected terabytes of data and thousands of samples during the year of expedition. Now, one year after the expedition ended, MOSAiC is organizing a big meeting to present and discuss the scientific results.

The meeting addresses the whole MOSAiC community including early career scientists and offers the chance to present preliminary experimental and modelling results and to enhance the interaction and interlinkages between the different disciplines of the coupled Arctic climate system. Supporting this, the meeting offers platforms to develop future analyses and publication strategies, support and foster connections to other groups and disciplines and to identify and develop joint projects. The meeting will advertise the unique data sets and attract the big modelling centres. In such a way the “International MOSAiC Science Conference/Workshop” will function as big step towards the improvement of the sea ice and weather forecast and regional and global climate models. To address the scope of the meeting, a concept was developed that combines aspects of a conference and a workshop. Therefore, we will have parallel sessions following the character of a conference with oral and poster presentations. For those sessions, abstracts could be submitted. Furthermore, it is planned to have breakout sessions that allow detailed discussions. Some of the breakout sessions will be defined before the meeting, but others will develop spontaneously to respond to topics that will come up during the meeting. To allow a lively and agile meeting, we have flexible time slots in the agenda to enable small meetings and discussion rounds.

More information:

<https://mosaic-expedition.org/science-conference/>

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The Contribution of the Reproductive Health and the Quality of the Arctic Environment

Working Groups: SHWG, ISIRA

This project is focused on assessing the contribution of reproductive health (RH) and Arctic environmental quality (EQ) on Well-Being (WB) of Kola Sami. Canadian Index of Well-Being (CIW) will be used in our research since it is considered to be unbiased. Scientists from Humanities, Natural Sciences, Medical-Biological & Statistical Science domains will be involved in assessment of RH, EQ and WB. Environment quality will be assessed based upon detection of man-made pollution in the atmosphere, water and soil. This study will assess adaptability of Sami population to changes in environmental quality and reveal the socio-economic processes in indigenous community, which can significantly affect vulnerability in indigenous groups and lead to irreparable loss of their original ethnic culture. Research results can help in developing methods to improve the standard of living & reproductive health of indigenous in Arctic.

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Changing Arctic rivers' behavior: what is the Inuit perception?

Working Group: CWG, SHWG, TWG

“Changing Arctic rivers' behavior: what is the Inuit perception?” is a 20-minute documentary project showing the impact of climate change on Arctic rivers' behavior from the Inuit communities' perspective. As rivers are central to the Inuit's day-to-day life, they are best placed to observe and understand this natural resource. Hence, this documentary will focus on Inuit's

observations and measurements reflecting climate-related alterations.

This initiative:

Is an opportunity to collaborate with Inuit communities and integrate their knowledge into academic research through collaborative discussions and field observations.

Should be seen as a complement to Flore Sergeant's Ph.D. research which highlights potential relations between changes in Arctic rivers' regime and permafrost thawing process.

Is an original and artistic way to increase awareness of the public to the Inuit communities' perception of climate change and to the challenges related to water resources sustainability.

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ArcticLight Network

Working Group: CWG, MWG, TWG

Light is a key mechanism shaping many aspects of the natural world – from ecosystems to individual behavior and physiology. Phases of continuous light and dark during the annual cycle define high latitude systems and physical characteristics of light differ at high latitude across the year. In Arctic systems, however, we have an incomplete and fragmented understanding of how light structures natural processes, and multiple disciplines investigate how light organizes environmental, ecological, and organismal processes. Our aim is to consolidate the knowledge of the role that light plays in Arctic ecosystems and societies by bringing together researchers and knowledge holders in the ArcticLight Network that have experience with marine, terrestrial, human, and cryospheric systems. This interdisciplinary network

will lead to a foundation from which we can build a better understanding of the role of light in a rapidly changing Arctic and aid in predictions of ecosystem and biodiversity change for the benefit of society.

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Co-creating Arctic Research together with Indigenous Rights holders

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

This workshop will discuss experiences of the development of co-creating research projects, 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 be improved and who needs to be involved in this (Indigenous communities and organisations, research organisations, funding agencies etc.)? Or do we need a paradigm change e.g. develop a 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?

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Beavers and the borealisation of the Arctic: Understanding cascading social and biophysical change

Working Groups: SHWG, TWG

Shifts of boreal species into the Arctic are causing transformative change to ecosystems, the environment, and human societies. This workshop will coordinate activities across arctic research sites of examine the causes and consequences of population and distribution change in two particularly influential mammal species which are currently transforming large areas of arctic and alpine tundra, the north American beaver and the Eurasian beaver. The large-scale collaboration across international sites where beaver research is occurring or planned will allow us to evaluate the magnitude of climate and ecosystem feedbacks from distribution change in this species and examine the social impacts of both the expansion of this species and the cascade of environmental changes it generates. The workshop will be focussed on a) finalising a synthesis of key research questions related to expansion of beavers into the Arctic, b) developing a research agenda and research protocols and approaches to address key ecological and social questions concerning beaver range expansion into the Arctic and c) consulting with Indigenous organisations on research priorities and the best approaches to ensure the research and its outcomes are equitable and inclusive.

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

Working Groups: MWG, ISIRA

This program places early career scientists and/or Indigenous knowledge holders on ships conducting oceanographic research in the Arctic, hosted by the country operating the ship. The host country makes the berth(s) available at no cost, and the funding provided by IASC will support travel to join the ship, and in 2021 at least, costs associated with any required pandemic quarantine. The scientists/Indigenous people participating, with preference given to early career individuals, will have salary provided by their home institution/organization. While this will pose challenges for participation by many Indigenous people, it is also expected that there may be some circumstances where financial support from the host country or other sources could be possible. Participants will be from IASC member countries. Because the challenges associated with travel and pandemic quarantine requirements may be significant, we anticipate that this program in 2021 will support 1-2 guest scientists/Indigenous people, with additional personnel support possible once actual costs are clear. The work plan for the program is to use knowledge of ship platforms and capabilities, planned ship tracks and the chief scientists of the ships to identify specific opportunities that will be satisfactory to both the guest participants and the ship chief scientist.

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Funded in 2020 or earlier

RATIC meets T-MOSAIC: Sharing Best Practices in Research on Infrastructures in the Arctic (part 2)

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 was a three-hour online meeting for participants to share progress and insights on RATIC-related research from around the Arctic. The meeting was open to all and we encouraged 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 - Educating a new generation of sea-ice scientists at times of rapid changes in polar regions

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 International Circumpolar Remote Sensing Symposium (16 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.

More Information: ICRSS Website

<https://www.awi.de/en/science/geosciences/permafrost-research/conferences/icrss.html>

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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 (ACRoBE-AR)” 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)

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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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Integrated Ecosystem Assessment of the Northern Bering Sea – Chukchi Sea (NBS-CS)

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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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 Atmosphere Working Group (AWG) includes research towards understanding and prediction of Arctic change, especially around interactions between the atmosphere, ocean, and cryosphere, the role of the atmosphere in Arctic socio-economic development, rapid Arctic climate change, and extreme weather and Arctic predictability.

Arctic air pollution is among key priorities, which influences Arctic climate through radiative forcing, and is harmful to Arctic communities and ecosystems. Other key priorities are snow, Arctic paleoclimates, and aerosol-cloud interactions in the Arctic. All of these priority areas are cross-disciplinary, and foster cross-cutting activities with other IASC Working Groups.

These topics have been put under the three pillars of:

- 1) Atmosphere in the coupled Arctic system
- 2) Arctic Climate, Weather, and Predictability
- 3) Arctic Pollution, socio-economic and environmental change

2019-20 saw the deployment of the MOSAiC Arctic drift experiment, which is the largest and most ambitious Arctic science cruise undertaken. This unique project was conceived bottom-up from the AWG. The AWG has engaged with PPP's Year of Polar Prediction (YOPP) activities, and supported exchange among the science projects that are endorsed by YOPP. The AWG is actively exploring connections between its 3 main pillars to facilitate new understanding of the Arctic atmosphere within the coupled Arctic system.

More Info:

<https://iasc.info/our-work/working-groups/atmosphere>

Membership¹

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
DING Zhuoming	China	Atmospheric boundary layer; Polar lows; Numerical weather prediction
Kamil Laska	Czech Republic	Solar radiation modelling; Boundary layer processes; Glacier-climate interactions
Jacob Klenn Nøjgaard	Denmark	Arctic aerosol; Mass spectrometry; Source apportionment
Jens Hesselbjerg	Denmark	Coupled Arctic climate system; Climate change; Climate prediction
Mikko Sipilä	Finland	Secondary aerosol formation; Nucleation; Gas phase chemistry
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
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:

Thomas Webb (2022)	UK	Coastal Climate, Boundary-Layer Meteorology, Climate Modelling
Hélène Angot (2021)	Switzerland	Trace gases, atmospheric chemistry, surface-atmosphere exchange
Yvette Gramlich (2020)	Sweden	Arctic aerosols; Cloud particles; Mass spectrometry

Secretary:

Gillian (Young) McCusker	UK	University of Leeds, United Kingdom. Contact: G.Young1@leeds.ac.uk
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TABLE

¹Membership as of 20 February 2022. For updated information and contact information for each Working Group Member please visit:

<https://iasc.info/our-work/working-groups/atmosphere>

Upcoming Activities

Quantifying the Indirect Effect: from Sources to Climate Effects of Natural and Transported aerosol in the Arctic (QuI ESCENT)

The QuI ESCENT Arctic programme identifies the key challenges associated with understanding the role of aerosol-cloud interactions in the changing Arctic climate, providing a cross-disciplinary bridge between aerosols and clouds, physicists and chemists, and observations and models. We provide an international forum for national campaigns to share new knowledge, discuss new findings, and build new collaborations on the Arctic indirect effect.

Our goal is to assess and discuss key questions such as:

- What are the sources of Arctic cloud condensation nuclei and ice nucleating particles, how do they affect clouds and climate, and will they change in future?
- What is the role of anthropogenic (transported and local) pollution versus natural aerosol sources in influencing the microphysics of Arctic low level clouds?
- What is the role of aerosol-cloud-radiation interactions in determining boundary layer mixing and processing/fate of local pollution in the Arctic boundary layer?
- What is the role of the boundary layer structure and associated dynamics in the formation/processing of Arctic clouds (e.g., phase partitioning, cloud microphysics) and their interaction with aerosol particles?

Contact:

Gillian (Young) McCusker | G.Young1@leeds.ac.uk

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

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.

Contacts:

Thomas Spengler | Thomas.Spengler@gfi.uib.no

Sergey Gulev | gul@sail.msk.ru

Polina Verezemskaya | verezem@sail.msk.ru

Natalia Tilinina | tilinina@sail.msk.ru

Arctic Climate and Weather Extremes: Detection, Attribution, and Future Projection

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 2018-2020 provide unique 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.

Contacts:

Xiangdong Zhang | xzhang9@alaska.edu

Annette Rinke | Annette.Rinke@awi.de

G.W.K. Moore | gwk.moore@utoronto.ca

Timo Vihma | Timo.Vihma@fmi.fi

PHOTO: VASILEVICH IGOR / AARI
Svalbard, Barentsburg The view on satellite station in Barentsburg with moon.

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 Info:

<https://iasc.info/our-work/working-groups/cryosphere>

Membership²

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 variability and change
Vice Chair Martin Schneebeli	Switzerland	Snow and snow tomography; Stratigraphy; Snow instruments
Annett Bartsch	Austria	Permafrost; Snow; Remote sensing
Wolfgang Schönner	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

TABLE

²Membership as of 20 February 2022. For updated information and contact information for each Working Group Member please visit

<https://iasc.info/our-work/working-groups/cryosphere/members>

NAME	COUNTRY	EXPERTISE
XIAO Cunde	China	Cryospheric research
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
Porsteinn Porsteinsson	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 Grabcic	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
Richard Essery	UK	Snow modelling; Seasonal snow cover; Snow hydrology
Robert Hawley	USA	Glaciers, ice sheets, snow and firn; Mass balance; Remote sensing
Cathy Wilson	USA	Hydrology; Geomorphology; Permafrost

Fellows:

Wai Yin Cheung (2022)	Canada	Glaciology, Photogrammetry, Cross-culture studies
Greta Wells (2021)	USA	Glacial outburst floods; glacier environmental change; geomorphology
Sammie Buzzard (2020)	USA	Glaciology; Ice shelves; Sea ice

Secretary

Rosalie McKay	Norway	
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Upcoming Activities

International 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:

Regine Hock | rehock@alaska.edu

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

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.

Contact:

Þorsteinn Þorsteinsson | thor@vedur.is

More information:

Cryosphere 2021 website

<https://www.cryosphere2022.is/>



PHOTO: VASILEVICH IGOR / AARI
Svalbard, Brudebekken valley. Dying glacier

Marine Working Group (MWG)

Scientific Foci:

- Climate change, including impacts on ecosystems (e.g., biodiversity, food webs, biogeochemical cycling, ocean acidification, permafrost thaw, sea ice loss, glacier melting, air temperature rise, seawater warming).
- 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 biogeochemical processes in the Arctic and sub-Arctic seas
- Enhancing and improving access to the paleo record of the Arctic Ocean through scientific drilling

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: the Arctic Ocean Action Plan within the framework of the UN Decade of Ocean Science for Sustainable Development, the Synoptic Arctic Survey initiative and the Distributed Biological Observatory as well as the Russian-German-Swiss project Arctic Century that provide critical data from the Russian Arctic. Strengthening international cooperation with Russian scientists remains a key goal, including support for IASC's International Science Initiative in the Russian Arctic (ISIRA) activities that are seeking to improve conditions for marine research within Russia's Exclusive Economic Zone. Finally, identifying further 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/our-work/working-groups/marine>

Membership³

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

TABLE

³Membership as of 20 February 2022. For updated information and contact information for each Working Group Member please visit

<https://iasc.info/our-work/working-groups/marine/members>

NAME	COUNTRY	EXPERTISE
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
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
Hermann 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
Grace Shephard	Norway	Geology and Geophysics; Plate Tectonics; Deep Earth and surface interactions
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; Short-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 Snoeijls 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:		
Henrieka Detlef (2022)	Denmark	Paleoceanography, Sea Ice, Geochemistry
Neelu Singh (2021)	Norway	Phytoplankton ecology; Nutrients & stoichiometry; Fjords & coasts
Victoria Buschman (2021)	Greenland and USA	Conservation, Biology
Enooyaq Sudlovenick (2020)	Canada	Marine mammals; Pathology; Inuit Qaujimajatuqangit
Secretary		
Laura Ghigliotti	Italy	National Research Council of Italy

Completed activities

International symposium on plastic in the Arctic and sub-Arctic region

When: 2- 4 March and 8-9 March

Where: Online

Highlights:

Among the many issues discussed in the panels, the following aspects were highlighted:

- the importance of international cooperation
- the need for more monitoring programs (with standardized protocols)
- and the sharing of data and techniques (for example online availability of data)

The international symposium on plastic in the Arctic and the sub-Arctic region took place from 2- 4 March and 8-9 March 2021 as an online event and was hosted by the government of Iceland in collaboration with the Nordic Council of Ministers. The conference addressed a variety of topics relevant to the main theme, including sources and transport, waste management, methodologies, and monitoring for macro-, micro-, and nano-plastics, and the toxicological and socioeconomic effects of plastic pollution in the Arctic. IASC funded the participation of nine early-career and/or indigenous scientists.

Daily highlights are available on the Symposium website:

<https://www.arcticplastics2020.is/index.php/en>

Upcoming Activities

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”.

Contact:

Amy Solomon | amy.solomon@noaa.gov

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.

Contact:

Samuel Subbey | samuel.subbey@hi.no

Warsha Singh | warsha.singh@hafogvatn.is

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



PHOTO: JÓN BJÖRGVINSSON, © 2021 SWISS POLAR INSTITUTE, CC BY 4.0.

Organised jointly by the Swiss Polar Institute (SPI), the Arctic and Antarctic Research Institute (AARI), in Russia and the Helmholtz Centre for Ocean Research Kiel (GEOMAR) in Germany, the Arctic Century Expedition is a multidisciplinary expedition that studied rarely accessible and remote areas in the Kara and Laptev Sea.

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 scope of the Social and Human Working Group (SHWG) includes topics that fall in the broad areas of the social sciences, humanities, and health and wellness in the Arctic. The SHWG works to advance international science and the sharing of information as they integrate social and human perspectives into the cross-cutting international efforts through connections with other IASC working groups and partnerships with international organizations.

The SHWG offers opportunities for planning and coordination on a wide range of topics, including human health and well-being; livelihoods and land use; gender; geopolitics and peace in the Arctic; and vulnerability and resilience of the multiple systems in the changing Arctic. SHWG also supports initiatives that promote Indigenous knowledge holder engagement, facilitate multi-stakeholder dialogue on human well-being and sustainability, and explore the principles of justice as linked to the multilayered concerns of sustainable development, global warming, or human security.

The SHWG supported and participated in numerous IASC cross-cutting activities, on topics as varied as artificial intelligence, reproductive health, education, environmental sciences, race and systematic bias, and the co-creation of research with Indigenous rights holders and academic scientists.

SHWG places high value on mentorship and capacity development throughout all the working group initiatives. This is achieved through the support of early-career scientists in funded proposals, engagement of IASC fellows in working group activities, and mentorship in the development and implementation of cross-cutting IASC projects.

More information:

<https://iasc.info/our-work/working-groups/social-human/>

Membership⁴

NAME	COUNTRY	EXPERTISE
Chair Susan Chatwood	Canada	Health systems; Population health; Community engagement
Vice-Chair Chaterine Chambers	Iceland	Coastal communities; Fisheries and aquaculture governance; Fishermen's knowledge
Vice-Chair Barbora Halašková	Czech Republic	Arctic geopolitics and security; International relations; Foreign policy
Gertrude Saxinger	Austria	Anthropology; Indigenous communities; Extractive industries; Labour mobility (FIFO); Infrastructure

TABLE

⁴Membership as of 20 February 2022. For updated information and contact information for each Working Group Member please visit:

<https://iasc.info/our-work/working-groups/social-human/members>

NAME	COUNTRY	EXPERTISE
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
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
Frigga Kruse	Germany	Archaeology; History; Past human-environment interactions
Alexander Proelss	Germany	International law; International law of the Sea; International environmental law
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
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
Ana Maria Manero Salvador	Spain	International Law of the Sea, International Environmental Law, Indigenous Peoples' Human Rights
Ragnhild Nilsson	Sweden	Indigenous politics; Indigenous representation and self-determination
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
Victoria Hermann	USA	

Fellows:

Daria Burnasheva (2022)	Russia	Arctic, Indigeneity, Gender, Identity, Social and cultural dimensions of climate change
Seira Duncan (2022)	Finland	Anthropology, Indigeneity, Eurasia
Wayne Clark (2021)	Canada	Inuit research methodology, Inuit health education, cultural safety
Pauline Pic (2020)	Canada	Geopolitics; Security; Arctic governance

Secretary:

Anna Varfolomeeva	Finland	University of Helsinki, Finland Contact: anna.varfolomeeva@helsinki.fi
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Upcoming Activities

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

Gertrude Saxinger | Gertrude.Saxinger@polarresearch.at

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

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:

Vera Kuklina | kuklina@gwu.edu

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Olga Zaslavskaya | zaslavsk@gmail.com



PHOTO: ANNA LENA BERCHT

Northeast Arctic cod (*Gadus morhua*) drying by cold air and wind. Lofoten Islands in the Norwegian Arctic, 2015

Terrestrial Working Group (TWG)

Scientific Foci:

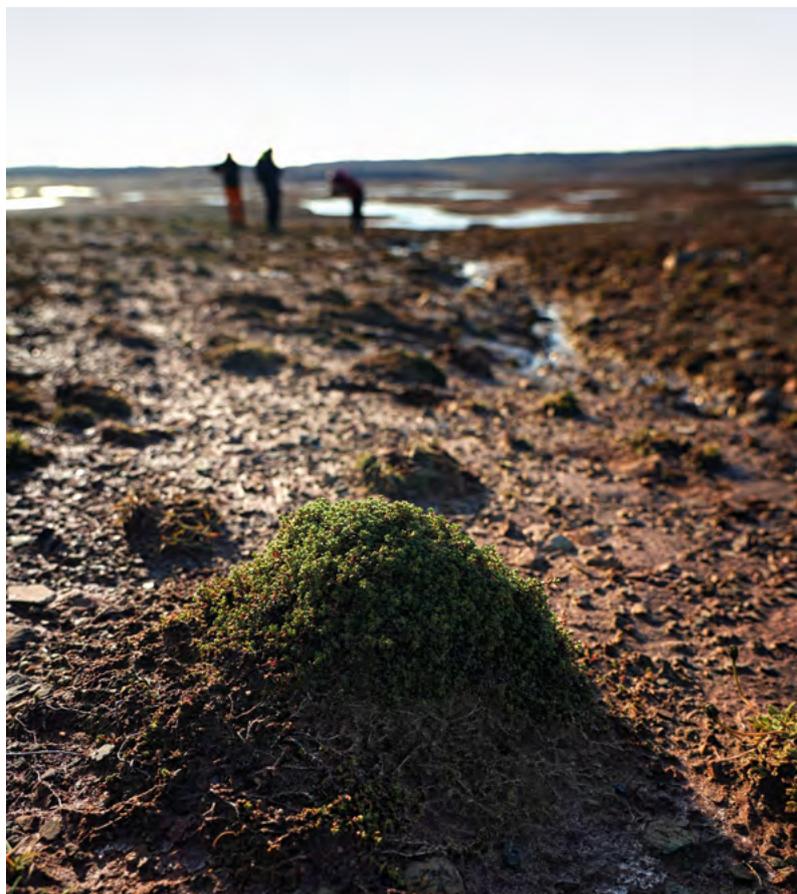
- Improving knowledge at multiple spatial scales of the current state of Arctic terrestrial geosystems and ecosystems
- Determining the net effect of the terrestrial and freshwater environmental and biosphere's processes that amplify or moderate climate warming
- Developing unifying concepts, fundamental 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:

<https://iasc.info/our-work/working-groups/terrestrial>



Membership⁵

NAME	COUNTRY	EXPERTISE
Chair Ulrike Herzschuh	Germany	Ecosystem change on decadal to glacial time-scales; Ancient DNA and pollen analysis
Vice-Chair YANG Xiaofan	China	Subsurface hydrology; Alpine hydrology; Computational hydrology
Vice-Chair João Canário	Portugal	Biogeochemistry; Permafrost; Trace-elements

TABLE

⁵Membership as of 20 February 2022. For updated information and contact information for each Working Group Member please visit

<https://iasc.info/our-work/working-groups/terrestrial/members>

NAME	COUNTRY	EXPERTISE
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
LI Guangwei	China	Tectono-geomorphology; Low temperature thermochronology; Structural geology
Torben R. Christensen	Denmark	Biogeochemistry; Carbon cycling; Terrestrial ecosystem functioning
Thomas Friberg	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
Bjarni Kristófer Kristjánsson	Iceland	Evolutionary Ecology, Limnology, Fish
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
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
Vladimir Romanovsky	USA	Permafrost; Geographic areas: Beringia (Alaska and NE Siberia), Norway and Svalbard

Fellows:

Kabir Rasouli (2022)	Canada	Cold Regions Hydrology, Landcover Change, Snow, Mountain Hydrometeorology
Ivan Alekseev (2021)	Russian Federation	Permafrost soils; organic matter; environmental contamination
Matthias Fuchs (2020)	Germany	Arctic deltas; Permafrost; Carbon

Secretary:

Clay Prater	USA	Oklahoma State University, USA Contact: prater.clay@gmail.com
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PHOTO: JÓN BJÖRGVINSSON, © 2021 SWISS POLAR INSTITUTE, CC BY 4.0.

Only few vascular plant species, such as *Saxifraga oppositifolia* on this picture, grow so far north in the Arctic. Organised jointly by the Swiss Polar Institute (SPI), the Arctic and Antarctic Research Institute (AARI), in Russia and the Helmholtz Centre for Ocean Research Kiel (GEOMAR) in Germany, the Arctic Century Expedition is a multidisciplinary expedition that studied rarely accessible and remote areas in the Kara and Laptev Sea.

Upcoming Activities

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

Arctic Underground

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. 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 circumpolar 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.

Contact:

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Michelle Mack | michelle.Mack@nau.edu

Arctic Vegetation Archive 2020

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.

Contact:

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Gabriela Schaepman-Strub
gabriela.schaepman@ieu.uzh.ch



PHOTO: SUSAN CHRISTIANEN
Geldingadalur, Iceland. Volcanic eruption. 2021

PHOTO: UNIVERSITY OF COLORADO/GLENN ASAKAWA.
Mountains Flatirons, just outside the University of Colorado Boulder, where ICARP IV will be hosted



3. ICARP IV -
FOURTH INTERNATIONAL CONFERENCE
ON ARCTIC RESEARCH PLANNING

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

The Need, Vision and Goals of ICARP IV

In lead up to its 35th anniversary in 2025, IASC is coordinating a multi-year planning process for the Fourth International Conference on Arctic Research Planning (ICARP) that will engage Arctic researchers, policy makers, residents and stakeholders from around the world to collegially discuss the state of Arctic science, the place the Arctic occupies in global affairs and systems, to consider the most urgent knowledge gaps and research priorities that lie before us and to explore avenues to address these research needs.

The first ICARP was convened in Hanover New Hampshire, USA in 1995, implementing the IASC Founding Articles' call for IASC to host such a conference periodically in order to "review the status of Arctic science, provide scientific and technical advice, and promote cooperation and links with other national and international organizations." Since then, it has been the role of IASC to coordinate this important meeting every decade. ICARP II

was held in Copenhagen in 2005 and developed twelve forward-looking science plans and resulted in several follow-up international projects and programs, mostly within the framework of the International Polar Year 2007-2008. ICARP III was in Toyama Japan in 2015 and provided a framework to further the development of cross-cutting, interdisciplinary and trans-disciplinary initiatives for advancing Arctic research cooperation and applications for Arctic knowledge. The IASC Strategic Plan (2018 – 2023) builds on the key priorities and overarching messages of ICARP III.

For ICARP IV, a process initiating in 2022 will culminate at the ICARP conference to be convened in Boulder Colorado, USA in 2025, hosted by a consortium of US institutions, including the University of Colorado Boulder, University of Northern Iowa, University of Alaska Fairbanks, and Alaska Pacific University. ICARP I, II, and III focused the attention of the world's researchers toward the value of strategic international coordination in accelerating progress in addressing critical challenges. ICARP IV will build upon this concept by striving to achieve consensus and build collaborations among the leading scientific, academic, environmental, Indigenous and political organizations currently concerned with Arctic issues.

The ICARP IV process during 2022 to 2025 must be well planned and coordinated with other ongoing international activities. ICARP IV will identify important research questions and priorities that cut across disciplines and knowledge systems, and that require new and innovative thinking and collaboration. ICARP IV will develop a vision for implementation and science plans for addressing these priorities. An integral aspect of the ICARP IV will be the inclusion of early career scientists (in collaboration with APECS), Indigenous Peoples, and local residents in the development of priorities and science plans to address the key questions.

Community-wide Engagement in ICARP IV

The ICARP IV process must mesh with other ongoing international activities and have broad community support and sponsorship. To ensure this, IASC is engaging our partners in Arctic research to enable a community-wide undertaking. We are continuing to recruit a cadre of leaders from across diverse institutions to guide the planning and facilitate the successful execution of this ambitious conference. This Steering Group will oversee the implementation of the ICARP IV process and provide intellectual and organizational support for the undertaking.

IASC encourages institutions and organisations that want to participate in the ICARP IV process to contact the IASC Secretariat at info@iasc.info.

Scientific Foci

It is the intention of IASC that the focus of ICARP IV be on important research questions that cut across many disciplines and knowledge systems. IASC is committed to recognizing that Traditional Knowledge, Indigenous Knowledge and academic scientific knowledge are co-equal and complementary knowledge systems that all can and should inform the work of IASC and ICARP IV. Research efforts should provide improved understanding and predictive capabilities for the evolution of Arctic systems. Consideration will be given to providing relevant and useful information that peoples in the Arctic and those in more temperate regions need to have in order to adapt and prepare for the changing Arctic and its impact on global systems.

At present, the list of confirmed partners includes:

ADC	Arctic Data Committee
AFoPS	Asian Forum on Polar Science
APECS	Association of Polar Early Career Scientists
AWRH	Association of World Reindeer Herders
CliC	Climate and Cryosphere (CliC) Project of the WMO World Climate Research Programme
CAFF	Conservation of Arctic Flora and Fauna Working Group of the Arctic Council
EPB	European Polar Board
FARO	Forum of Arctic Research Operators
IASSA	International Arctic Social Sciences Association
IACS	International Association of Cryospheric Sciences
ICES	International Council for the Exploration of the Sea
IPA	International Permafrost Association
ISC	International Science Council
ISAC	International Study of Arctic Change
NySMAC	Ny-Ålesund Science Managers Committee
PEI	Polar Educators International
SC	Saami Council
SCAR	Scientific Committee on Antarctic Research
SDWG	Sustainable Development Working Group of the Arctic Council
SAON	Sustaining Arctic Observing Network
UArctic	University of the Arctic



Organizational Structure

Steering Group (SG). The SG consists of appointees from our IASC partners. Members of the Steering Group are well qualified leaders representing a full range of scientific disciplines, knowledge systems, and Arctic regions. The SG includes representation from the Indigenous Peoples of the Arctic as well as a representative from the host country. It is tasked to identify and develop an overall conference goal, theme and agenda, sub-theme research questions, and mechanisms for post conference action and implementation. The SG will report to the IASC Executive Committee and our partner organizations on a regular basis between 2022 to 2025. The SG will have a Secretariat provided by IASC to assist in its function. The SG will collaborate closely with the Conference Host Committee that will be formed in winter/spring 2022.

Research Question Teams (RQTs). One of the early tasks of the SG will be to determine the appropriate

scientific foci for the conference and how pre-conference decisions will guide the conference agenda and science planning activities. Through a multi-year process of broad engagement, the SG will determine not only the foci, but also the research questions to be addressed. As noted above, these questions will be cross-cutting, informed by experts and the most current literature, and will serve as the basis for the formation of Research Question Teams (RQTs). These RQTs will be led by co-chairs of one early career researcher and one senior scientist, with additional support provided by the IASC Working Groups (WG) who will advise as they develop products for the ICARP IV conference. Multidisciplinary teams were assembled to compile justifications for urgent research needs and to recommend research plans during ICARP I and II. ICARP III took a different approach by asking the broader international community to play a more engaged role in identifying critical information gaps. IASC WGs will be called upon to help resolve questions identified during the ICARP IV process. We also anticipate that our partner organizations represented on the SG will also address some of the plan's urgent research questions and priorities in a manner befitting their mission and capabilities.

PHOTO: NICOLAS VALIENTE PARRA / CENTRE FOR BIOGEOCHEMISTRY IN THE ANTHROPOCENE (UNIVERSITY OF OSLO)

Permafrost pond located in the vicinity of Ny-Ålesund (Svalbard). Researchers from University of Oslo are sampling these systems to understand the connection between greenhouse gas emissions and microbial diversity under organic rich conditions in the high Arctic.



Host for ICARP IV

Following an invitation from the U.S. Polar Research Board at the National Academies the IASC Council voted to approve Boulder, Colorado (USA) as the host of ICARP IV in 2025, to be held concurrently with Arctic Science Summit Week (ASSW). The Conference Host Committee is committed to providing an outstanding venue for sharing scientific achievements, advancing collaboration, and planning for the future of Arctic research. The University of Colorado Boulder (UCB) and the city of Boulder are home to an active and long-standing hub for Arctic research, hosting multiple world-renowned organizations, including the Cooperative Institute for Research in Environmental Sciences (CIRES), National Snow and Ice Data Center (NSIDC), Institute for Arctic and Alpine Research (INSTAAR), National Center for Atmospheric Research (NCAR), University Consortium for Atmospheric Research (UCAR), the National Oceanic and Atmospheric Administration (NOAA)'s David Skaggs Research Center, and others. In 2022, UCB will also begin hosting an international office for the Association of Polar Early Career Resear-

chers (APECS) with a fulltime manager to coordinate international activities with the APECS Secretariat. These organizations, together with key partners from across a range the U.S. universities, organizations, and Indigenous and Tribal partners, will provide a deep and diverse source of expertise for hosting a conference that is uniquely tailored to the needs and interests of ICARP participants.

Boulder, scenically located at the foothills of the Rocky Mountains while also approximately 60 km from Denver International Airport, will be an excellent spring meeting location for participants from around the world. However, the Conference Host Committee will also focus on minimizing the carbon footprint of the conference. They will remain responsive to recommendations from IASC, in particular from IASC's Action Group on Carbon Footprint (AGCF) and will consult emerging best practices for developing a hybrid conference structure that will allow for both in-person and virtual participation. Additionally, they plan to explore the use of satellite conference hub locations, which may both minimize long-distance international travel and provide innovative ways for Arctic residents to participate from multiple Arctic satellite locations.

PHOTO: JÓN BJÖRGVINSSON, © 2021 SWISS POLAR INSTITUTE, CC BY 4.0.
The Arctic research vessel Akademik Tryoshnikov anchoring off the Cap Baranov on Bolshvik Island in the Russian Arctic. Organised jointly by the Swiss Polar Institute (SPI), the Arctic and Antarctic Research Institute (AARI), in Russia and the Helmholtz Centre for Ocean Research Kiel (GEOMAR) in Germany, the Arctic Century Expedition is a multidisciplinary expedition that studied rarely accessible and remote areas in the Kara and Laptev Sea.



4. ARCTIC SCIENCE SUMMIT WEEK 2021

4. Arctic Science Summit Week 2021



ASSW2021 was hosted by the Portuguese Foundation for Science and Technology, Ciência Viva, the College of Polar and Extreme Environments of the University of Lisbon and the Air Centre. The meeting was initially scheduled as an in-person meeting in Lisbon from 19 to 26 of March 2021, but due to the COVID-19 pandemic was moved to an online event.

Framed by the overarching theme of the Science Conference “The Arctic: Regional Changes, Global Impacts”, Lisbon invited International experts on the Arctic, Indigenous Peoples, students and other stakeholders to discuss the “New Arctic” and its impacts and interactions with the lower latitudes.

ASSW2021 included the following events:

- IASC Business and Community Meetings from 19 to 23 of March
- Science Conference from 24 to 26 of March

ASSW2021 and the IASC community included 36 business meetings, 82 sciences sessions, 5 keynote lectures and two lectures from IASC medalists 2020 and 2021.

In total, 1413 participants (189 exclusively for the business meetings) from 37 countries and all continents, including scientists, Indigenous leaders and knowledge holders, business and nonprofit organizations and representatives from governments, attended the ASSW2021.

The book of Abstracts was published right after the conference and the 168h of video recordings of sessions can be accessed by all registered attendees at the Brella conference website until March 2022.

The local organizing committee was disappointed for not being able to welcome the IASC community in Lisbon, but hopes to be able to organize a presencial event in the near future and have the opportunity to welcome the Arctic community in Portugal.

Upcoming ASSWs



ASSW 2022 -
including the 6th
Arctic Observing
Summit:

Tromsø, Norway
26 – 1 April 2022

ASSW 2022 will be held in Tromsø, Norway from 26 – 1 April 2022. This will include science community and business meetings and the Arctic Observing Summit 2022.



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!

ASSW 2024:
United Kingdom (
date and location TBC)

ASSW 2025:
Boulder, Colorado, United States (date TBC), part of ICARP IV (see Chapter 4)

For updated information, including dates, please check the ASSW website: www.assw.info

PHOTO: JÓN BJÖRGVINSSON, © 2021 SWISS POLAR INSTITUTE, CC BY 4.0.

Thomas Opel, Glaciologist and Manuel Ruben, Geoscientist at the Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung logging temperature and taking ice samples on the University Glacier on October Revolution Island in the Russian Arctic. Organised jointly by the Swiss Polar Institute (SPI), the Arctic and Antarctic Research Institute (AARI), in Russia and the Helmholtz Centre for Ocean Research Kiel (GEOMAR) in Germany, the Arctic Century Expedition is a multidisciplinary expedition that studied rarely accessible and remote areas in the Kara and Laptev Sea.



5. DATA AND OBSERVATIONS

5. Data and Observations

Sustaining Arctic Observing Networks (SAON)



PHOTO: JÓN BJÖRGVINSSON, © 2021 SWISS POLAR INSTITUTE, CC BY 4.0.

Thomas Opel glaciologist loading a KA 32 helicopter on the helicopter deck of research vessel Akademik Tryoshinkov in preparation for a glacier landing on Graham Bell Island in the Russian Arctic. Organised jointly by the Swiss Polar Institute (SPI), the Arctic and Antarctic Research Institute (AARI), in Russia and the Helmholtz Centre for Ocean Research Kiel (GEOMAR) in Germany, the Arctic Century Expedition is a multidisciplinary expedition that studied rarely accessible and remote areas in the Kara and Laptev Sea.

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

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 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>

Arctic Data Committee (ADC)

The Arctic Data Committee (ADC) was formed by IASC and the Sustaining Arctic Observing Networks (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 (SCADM), Southern Ocean Observing System (SOOS), and the WMO Global Cryosphere Watch).

In 2021, following the well attended and successful Third Polar Data Forum (PDF III), hosted by the Finnish Meteorological Institute in Helsinki, 18-22 November, 2019, the ADC co-organized the Fourth Polar Data Forum (PDF IV). With more than 350 registered participants, the Forum was a well-attended online event co-hosted by Royal Belgian Institute of Natural Sciences and the European Polar Board and co-organized by the Southern Ocean Observing System, the SCAR Standing Committee on Antarctic Data Management, the World Data System, the ADC, and other organizations engaged in polar data management (see <https://polar-data-forum.org/>).

In response to the COVID-19 pandemic, in June of 2020, the ADC took a leadership role in convening the bi-monthly Polar to Global Online Interoperability and Data Sharing Workshop/Hackathon, now known as P2G. A number of concrete outcomes are emerging from this series of online meetings including a co-authored report entitled Alignment of Polar Data Policies by ADC (Stein Tronstad), Arctic Spa-

tial Data Infrastructure, SOOS, and SCADM (<https://doi.org/10.5281/zenodo.5734900>), and a soon to be published set of best practices for data discovery using schema.org markup. This work is led by the Polar Data Discovery Enhancement Research (POLDER) working group (<https://polder.info/>).

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Website:

<https://arcticdc.org/>

<https://arcticdc.org/meetings/conference-calls-webinars/polar-to-global-online-interoperability-and-data-sharing-workshop-hackathon>



PHOTO: SUSAN CHRISTIANEN,
Olympus OM-D ambassador Extreme Design Lab + Technology Transfer Office Iceland)
A fleeting herd of reindeer from a nomadic Nenet family in the siberian tundra of
Taymyr peninsula, Russia.



6. CAPACITY BUILDING

6. 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. Daria Burnasheva has been announced as an Indigenous Fellow in 2022 and has joined the SHWG.

As of 2021, a total of 52 ECRs have participated in the IASC Fellowship Program. Fellows have the opportunity to participate as WG members for three years and are provided with funding to attend two consecutive ASSW meetings during their initial fellowship year. This unique opportunity allows ECRs to become active members of their WGs, hence, to develop research collaborations and professional networks with senior

researchers from various disciplines. Five Fellows for each WG have been selected in 2022 and they are Thomas Webb, Wai Yin Cheung, Henrieka Detlef, Seira Duncan, Kabir Raouli. Congratulations!

In 2021, IASC was also offering special joint Fellowships in cooperation with other partners.

The inaugural Sustainable Development Working Group of the Arctic Council (SDWG)- International Arctic Social Sciences Association (IASSA)- IASC Fellowship encourages ECRs to participate in and contribute to the work of the SDWG and IASSA. The Fellowship will enable the recipient to get involved in the process of making research relevant for policy and contribute to policy recommendations. Silja Zimmermann has been announced as the first SDWG-IASSA-IASC Fellow. The inaugural Sustaining Arctic Observing Network (SAON)-IASC Fellowship supports ECRs to get more involved in the work of SAON. SAON holds a unique position in the facilitation of and planning for sustained Arctic observational networks in support of societal benefit and has initiated the Roadmap for Arctic Observing and Data Systems (ROADS) as a planning framework to support its national and organizational partners. The Fellow will engage in the evolving governance of the ROADS Advisory Panel or support alignment and integration across pilot efforts that are beginning to form thematic Expert Panels under ROADS. Chistina Goethel has been selected as a SAON-IASC Fellow in 2022. All IASC 2022 Fellows will be introduced at ASSW2022 in Tromsø, Norway.

2021 Fellows were introduced during the joint WG meeting at the ASSW2021 Online, hosted by Portugal.

Despite 2021 being a challenging year due to the COVID-19 Pandemic, the 2021 Fellows still managed to have meaningful participation in online meetings and engagement with the works of the IASC Working Groups.



PHOTO: STEFAN THIELE
Taking cores.

Dr. Stanislav (Stas) Ksenofontov is the new IASC Fellowship Coordinator



IASC is proud to announce that Dr. Stanislav (Stas) Ksenofontov has joined the IASC team as IASC Fellowship Coordinator (2021). In this role, Stas will be leading the many tasks necessary to support and continue the success of the IASC Fellowship Program. The IASC Fellowship Program provides the opportunity for early career scientists to become involved in leading-edge scientific activities at a circumpolar and international level, to build an international network, and also to develop management skills. The Fellowship Coordinator is responsible for leading recruitment, organization, community-building, and mentorship for the IASC Fellows.

Dr. Stanislav (Stas) Ksenofontov is an IASC fellow (SHWG 2018) and an Indigenous social scientist from the Republic of Sakha, Russia. He earned his Ph.D. on „vulnerability of social-ecological systems of Arctic Sakha in the context of global change“ from the University of Zurich, Switzerland. Besides, Dr. Ksenofontov’s research interests span across sustainability of Indigenous communities, Indigenous Knowledge, Russian megaprojects, and Asian interests in the Arctic. Currently, he is a postdoc scholar at the ARCTICenter, University of Northern Iowa, USA.

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

IASC would also like to take this opportunity to sincerely thank outgoing Fellowship Coordinator Alevtina Evgrafova for her enthusiastic and impactful service in the role. Best wishes on your next endeavors, Alevtina!

PHOTO: DR. STANISLAV (STAS) KSENOFONTOV
Photo courtesy of Dr. Stanislav (Stas) Ksenofontov

IASC Fellows 2022

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<p>Wai Yin Cheung Cryosphere WG Glaciology, Photogrammetry, Cross-culture studies Contact w.cheung@queensu.ca</p>	<p>Daria Burnasheva Social and Human WG - Indigenous Fellow Arctic, Indigeneity, Gender, Identity, Social and cultural dimensions of climate change Contact dv.burnasheva@agiki.ru</p>
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SDWG-IASSA-IASC Fellow

<p>Silja Zimmermann SDWG - IASSA Arctic, Indigeneity, Gender, Identity, Social and cultural dimensions of climate change Contact s.zimmermann@uu.nl</p>
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SAON-IASC Fellow 2021

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IASC Fellows 2021

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<p>Neelu Singh (Norway) Marine WG Microplastics, Persistent Organic Pollutants, Svalbard Contact neelu.singh0387@gmail.com</p>	<p>Ivan Alekseev (Russia) Terrestrial WG Permafrost soils; organic matter; environmental contamination Contact alekseevivan95@gmail.com</p>

Fellows' Voices

The IASC fellowship has been an excellent opportunity to participate directly in the Arctic science community. As a fellow, I have had the chance to contribute to Cryosphere Working Group research agendas, network with both senior and early career scientists, join meetings on U.S. Arctic research activities, and review nomination packets as a member of the IASC Medal Committee. The fellowship has offered a "seat at the table" alongside an impressive cadre of scientists who prioritize a global, interdisciplinary approach to Arctic research, setting a high standard for how to frame current and future projects and expand collaborations.

Greta Wells

2021 Cryosphere Working Group Fellow
Glacial outburst floods; glacier environmental change; geomorphology
Contact | ghwells@utexas.edu

During a period of lockdown last year, one email had given me immense happiness- selected for IASC fellowship (MWG). So far, my journey as an IASC fellow has provided me with the experience of evaluation of funding applications, working with leading scientists, and knowledge of interdisciplinary Arctic research. Recently I have been nominated to work with Polar Educators International (PEI) to update the Polar Resource Book. Because of the travel restrictions caused by COVID-19 I could not meet physically with other fellows and members from IASC working groups. I wish we could see each other soon during Arctic Science Summit Week-2022 after a long wait.

Neelu Singh

2021 Marine Working Group Fellow
Phytoplankton ecology; Nutrients & stoichiometry; Fjords & coasts
Contact | neelu.singh0387@gmail.com

The IASC Fellowship gave me full agency to use the opportunity in a manner that best fit my needs as an Inuk academic whose interests are primarily within Inuit health research. I was given opportunities to present my research studies to an international audience and collaborate with other like-minded scholars who are committed to equity, diversity, and inclusion within circumpolar research communities. I am looking forward to continued participation in IASC activities and as a result, furthering meaningful relationships with Arctic scientists from throughout the world.

Clark Wayne

2021 Human & Social Working Group Indigenous Fellow
Inuit Qaujimaqatugangit, Inuit health data, Inuit research methods
Contact | wclark1@ualberta.ca

IASC Fellowship has already provided me with vast opportunities for dialogue with international colleagues. I am currently involved not only in Terrestrial Working Group discussions, but also in some cross-cutting projects (such as T-MOSAIC), which gave me a unique chance to share my research, ideas with a professional Arctic community and get involved in numerous scientific initiatives. I anticipate to get even more from a Fellowship Program in the coming years and hope to make important contributions for a prosperous development of IASC and Arctic science in general.

Ivan Alexeev

2021 Terrestrial Working Group Fellow
Permafrost soils; organic matter; environmental contamination
Contact | alekseevivan95@gmail.com





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First snow fall announces the end of the growing season on October Revolution Island already on 26th August 2021. Organised jointly by the Swiss Polar Institute (SPI), the Arctic and Antarctic Research Institute (AARI), in Russia and the Helmholtz Centre for Ocean Research Kiel (GEOMAR) in Germany, the Arctic Century Expedition is a multidisciplinary expedition that studied rarely accessible and remote areas in the Kara and Laptev Sea.





IASC Bulletin 2022
ISBN: 978-9935-25-125-1

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