SUMMARIES

THE POLAR INITIATIVE

2ND EDITION

POLAR SYMPOSIUM

FROM ARCTIC TO ANTARCTIC

The Cold is Getting Hot

22 | 23 FEBRUARY 2024 • MONACO

www.thepolarinitiative.org

KEY MESSAGES OF THE EVENT

Recognize environmental challenges in the polar regions: Sea level rise, permafrost thaw, extreme weather events, and ice-free seas were identified as primary challenges for the polar regions.

Understand the global impact of polar changes: The ongoing changes in the polar regions directly affect among others water security, food security, and public health. It's therefore crucial to acknowledge both the local and global impacts of these polar challenges.

Foster a holistic understanding of polar regions: There is a need to promote interdisciplinary research approaches to develop a holistic understanding of the polar regions and their interconnectedness with the Earth system. This involves studying the complex interactions between various environmental factors and ecosystems in the polar regions.

Involve Indigenous knowledge and local perspectives: Incorporating Indigenous knowledge and addressing local interests and needs are essential for devising effective mitigation and adaptation strategies in the polar regions. Indigenous communities have valuable insights and practices that contribute to sustainable solutions.

Take global action for mitigation: Mitigating the effects of polar changes primarily requires global and collective action to reduce greenhouse gas emissions.

Invest in capacity building: Empowering early career researchers is a key priority in building the scientific capacity of tomorrow.

Facilitate international collaboration: Fostering ongoing and developing international collaboration to improve polar science initiatives is key to the success of polar science.

Engage International Organizations as Mediators: Non-governmental organizations, including funding agencies and coordinating bodies play a central role in facilitating collaboration among stakeholders, rightsholders, and researchers to advance polar science initiatives.

Secure long-term funding for polar research: Advocating long-term planning and funding is essential to ensure the continuity and stability of ongoing activities aimed at understanding and addressing polar challenges.

Promote sustainable research practices: Research expeditions must prioritize the development and adoption of technology and methodologies that minimize their environmental footprint, such as remote sensing.

Communicate science effectively: Developing and implementing effective communication strategies is necessary to raise awareness of the significance of polar research and its implications to a broader audience, including policymakers, stakeholders, and the general public.

TABLE OF CONTENT

EXECUTIVE SUMMARY

The Polar Initiative organized the second edition of its biannual international Polar Symposium in Monaco from 22-23 February 2024. The symposium brought together more than 150 distinguished scientists, representatives of non-governmental organizations, Indigenous knowledge holders, and policymakers to discuss the challenges facing polar regions and their broad implications for the global system.

The symposium was co-organized by the Prince Albert II of Monaco Foundation, the Scientific Committee on Antarctic Research and the International Arctic Science Committee, in collaboration with the Oceanographic Institute of Monaco - Prince Albert I of Monaco Foundation, the Monaco Scientific Center, the European Polar Board, the World Economic Forum, with the contribution of the Association of Polar Early Career Scientists. The event received financial support from the Albédo Foundation for the Cryosphere.

In addition to keynotes and panel discussions, the participants engaged in workshops, highlighting key priorities in polar research and policy, while suggesting avenues for future action.

The Symposium discussed long-term collaborations in the polar regions and adaptation and mitigation strategies in response to emerging challenges.

Participants reflected on how to establish the most efficient and resource effective international collaborations, how to secure equal participation for all stakeholders, including Indigenous peoples and local communities and how to prioritize science to fill the most urgent knowledge gaps. On the second day, participants discussed the global importance of the poles and suggested avenues for future strategies and actions to address the scientific and political challenges associate with the polar regions.

WELCOME ADDRESS

HSH PRINCE ALBERT II OF MONACO

Mr. Henry Burgess, President of the International Arctic Science Committee, Professor Dr. Jefferson Cardia Simões, Vice President of the Scientific Committee on Antarctic Research, Chairman of the Arctic Circle, dear President Grímsson, dear friend, Mr. Chairman of the UArctic dear Frederik Paulsen, Your Excellencies, Distinguished guests, Ladies and Gentlemen, dear friends of both polar regions,

Thank you for coming to the Principality of Monaco for this second edition of the Polar Symposium.

Thank you for your commitment to the polar regions and your support for this initiative which was launched two years ago.

My Government and my Foundation, from its inception, included the Polar regions in its areas of action because of their precursor status, especially as far as climate change is concerned. Therefore, we have initiated and supported a large number of projects over the years.

To address the particularly alarming situation in the Polar regions, the initiative that brings us together today focuses on a primary goal: to foster unprecedented dialogue between Arctic and Antarctic experts.

It aims to catalyse the broadest possible exchange. By pooling disciplines, expertise, and skill sets. By incorporating the contributions of Indigenous peoples and local communities, so important yet so often overlooked.
By promoting cooperation, partnerships, and co-funding. And by fostering collaboration, still too rare, between experts on both Polar regions.

This is what we achieved in 2022 at our first Symposium. Hopefully, it is what we will achieve again today and tomorrow. And indeed, this is what we have endeavoured to do here in Monaco for many years, where our commitment to promote the Polar regions is a widely shared value.

As many of you know, this stems back to my great-great-grandfather, Prince Albert I, the scholar and navigator, and lover of science in all disciplines, who conducted several scientific expeditions to the Arctic a hundred and fifty years ago.

His example has prompted many of our actions, and the commitment of various institutions, including the Oceanographic Institute where our meeting is being hosted today, the Monaco Scientific Center, and my Foundation. All of them have helped to make Monaco a resolute activist for the conservation of the Poles.

These efforts, this history, and this commitment provide us with a clear vision today of the situation of the Poles. An alarming situation in many respects, and one of which our contemporaries are sadly not sufficiently aware. Because while we have become familiar with images of crumbling glaciers and polar bears wandering across snow-less terrain, we are less capable of gauging the direct and indirect consequences of these changes on the overall balance of our planet.

We cannot see what these tragedies mean for all of us in the medium and even short term. We find it hard to grasp the extent to which these regions concern all of us.

That is why it is so important to focus our attention on them, as we are doing here again at this symposium. And above all, that is why it is important to take action, and in order to do this, to gain a better understanding of the various solutions that are offered to us, how effective they are, how feasible they are, and what their limitations are.
The first thing we need to do therefore is to develop science.

Faced with such complex and poorly understood phenomena, our primary duty, as it is always when the goal is to protect the Planet, should be to improve our knowledge. To promote an accurate understanding of the mechanisms at work, their causes, and their consequences. Without this, action will not only be ineffective: it will quite simply be impossible.

That is why we have among us today a significant number of eminent scientists, whom I wish to acknowledge. I would like to thank them for being here, but most importantly thank them for their action, determination, and perseverance. In the current context of distrust with regard to the truth, and the calling into question of different skills, we must reaffirm our support for them.

This should include additional support and resources for work that is of interest to all of us. In this respect, the supremacy given to science in Antarctica provides a model for the set of values that should be ours. Science should take precedence over everything, particularly in these unknown and fragile regions. It should be given first place in our set of requirements because it comes first when implementing our actions.

This is the philosophy behind the Antarctic Treaty and the reason why it is so important. Its philosophy is based on science of course, but also on peace and above all utmost priority to knowledge and protection over exploitation. These critically endangered areas need to be protected more than ever before.

At a time when the number of threats is ever-increasing, we need to ensure that the application of the protocol of Madrid is perpetuated and not questioned after 2048 – in other words, very quickly, given the length of time spent on international negotiations…

We also need to extend its principles as widely as possible. In the Polar seas which are currently under threat, as we did with the marine protected area in the Ross Sea, the establishment of which was a huge success. And as we are trying to do for three other priority areas in Antarctica: the Antarctic Peninsula, the Weddell Sea, and East Antarctica. Of course, the current international context complicates these projects, but we must continue our efforts because we know that the long-term objectives will eventually pay off!

The same efforts must also be made in the Arctic, where we must establish other marine protected areas, but we would have preferred to sancturize the entire region.

And we also need to encourage our partners – States of course, but also NGOs and private businesses – to contribute to this much-needed sanctuarisation movement.

An increasing number are getting involved and implementing initiatives that deserve to be commended.

I am thinking of the ban on commercial fishing in the Arctic, to tackle the resources exploitation opportunities that could be offered by the ice melt in the region.

I am also thinking of the determination of the International Maritime Organisation to phase out heavy fuel in the Arctic, and the decision by some oil companies to abandon temporarily certain offshore oil wells.

These measures should be commended. However, the shortcomings and difficulties they have encountered also demonstrate that we need to intensify this movement and scale up our ambition. The gap is too wide between the severity and urgency of the situation, and the timidity of the measures taken. The risks placed on the Polar regions on a daily basis by human activities are too significant for us to content ourselves with these interim solutions. Especially as other dangers, other challenges loom in the distance.

I just mentioned the political challenges around the Arctic, against a backdrop of growing international tension between the neighbouring countries, even paralysis, for example of the Arctic Council. I also mentioned the uncertainties hovering over the future of the Antarctic Treaty. However, we must have in mind other challenges, such as the increasingly substantial prospects offered by the exploitation of deep-sea mineral, oil, and gas resources.

And I might also mention the development of new activities, such as Antarctic krill fishing, and certain types of tourism, which place additional pressure on ecosystems that are already weakened by the effects from climate change.

Faced with these threats, it is important that coordinated and ambitious action be implemented. We need to implement as widely as possible the only measures we know are effective, which consist of marking out targeted exclusion zones, adapted to the current threats and likely to have a real impact in terms of protection and regeneration.

We need to do this together, by pooling our expertise, by using up-to-date knowledge, and by listening to the needs and different skills of the Indigenous populations, of the Arctic. More than ever before, they need to be fully involved in these discussions, decisions and processes.

This is what we will be focusing on over the next two days, which for all these reasons will, I believe, be particularly invaluable.

I would therefore like to thank you once again for agreeing to attend, and I would also like to thank everyone who made this event possible: the teams from the Scientific Committee on Antarctic Research, the International Arctic Science Committee, as well as from the Oceanographic Institute, the Prince Albert I of Monaco Foundation, and my Foundation as well.

Thank you everyone. Here's to a successful meeting!

WELCOME REMARKS

HENRY BURGESS

President, International Arctic Science Committee

In his opening speech, Henry Burgess expressed gratitude to H.S.H. Prince Albert II of Monaco for his interest in the polar regions as well as for his support to the polar research community through various initiatives and notably via the Prince Albert II of Monaco Foundation and its collaborations.

He emphasized the importance of collaborative efforts pointing out the need for joint Antarctic-Arctic science meetings and citing this conference as a prime example. Burgess also emphasized that outcomes of this conference constitute important inputs to ongoing long-term polar science planning such as the International Conference on Arctic Research Planning (ICARP).

Henry Burgess highlighted challenges arising from loss of data as well as the impact on research collaborations, both current and potential, and on personal friendships, arising from the Russia-Ukraine situation.

Yet he expressed hope for the future, citing the restart of the Arctic Council work as an example. Accordingly, he stated that where there is hope, there exists a corresponding responsibility to act, citing the collected and international work towards the 5th International Polar Year as a good example of a hope-driven action.

In his final words, Henry Burgess stressed that the need for courageous and respectful leadership across all polar-related areas is more critical than ever. Such leadership should have the courage to take bold and long-term decisions and to ensure that underrepresented groups, such as Indigenous and local communities in the Arctic, are empowered to participate.
In this context Henry Burgess reminded participants of the commitment of IASC to pursue its mission of encouraging and facilitating cooperation in all aspects of Arctic research.

WELCOME REMARKS

PROF. JEFFERSON CARDIA SIMÕES

Vice President for Finance, Scientific Committee on Antarctic Research

Professor Simões emphasized the pressing necessity for enhanced international collaboration, particularly considering the escalating complexity of changes observed in and around Antarctica.

As examples, he pointed to the rapid warming and acidification of the Southern Ocean, which are destabilizing food webs, and highlighted the significant threat this warming posed, to the stability of Antarctic ice shelves, greatly increasing the risk from rising sea levels globally. Furthermore, drawing upon his Brazilian perspective, he highlighted the parallels between the Brazilian state of Amazonas and the polar regions, stressing their significant roles in the global climate system. He emphasized that the ongoing changes in Antarctica have direct implications for our daily lives, pointing out that evidence from the past decade suggests that alterations in polar regions are already causing changes to temperate and tropical regions.

Professor Simões expressed his firm belief that "science diplomacy is one of the polar community's noblest roles" and should be fully leveraged to address the challenges ahead. He also emphasized the necessity for multidisciplinary and international cooperation initiatives between polar regions to achieve this goal.

Concluding his remarks, he reminded the audience of SCAR's pivotal role in Antarctic research. Established in 1958, the Scientific Committee on Antarctic Research stands as a pioneer in science diplomacy by building on the importance of international collaboration. He also reiterated SCAR's commitment to partnering with other polar organizations to ensure the success of the upcoming 5th International Polar Year in 2032/33.

KEYNOTE REMARKS

H.E. ÓLAFUR RAGNAR GRÍMSSON

Chairman, Arctic Circle

In his address, H.E. Ólafur Ragnar Grímsson acknowledged the challenge and occasional difficulties associated with explaining the complexities of climate change.

Recognizing the importance of ensuring that decision-makers and the general public grasp the severity of the issue, he emphasized his frequent use of melting ice as a pedagogical tool. H.E. Grímsson asserted that because «everyone understands ice,» this approach not only facilitates comprehension but also allows for the inclusion of the «Third pole,» namely the Tibetan Plateau, with its vast array of glaciers, when illustrating the consequences of climate change and ice melt. He also underscored the crucial role of melting ice in addressing current climate challenges globally, citing extreme weather event patterns as an example consequence.

H.E. Ólafur Ragnar Grímsson pointed to what he regarded as positive signs in the work against climate change. He emphasised that he has seen clearer and more personal engagement from head of states and top politicians. Another example he provided was the growing importance of melting ice and the cryosphere in the international discourse on climate change, referencing events like the One Planet Polar Summit hosted by France, the Polar symposium and the importance of the Arctic Circle Forum.

In conclusion, he emphasized the urgent need to act, stressing that «we are running out of time» to protect polar and ice-covered regions.

KEYNOTE REMARKS

PROF. DR. FREDERIK PAULSEN

Founding Member, Albédo Foundation for the Cryosphere & Chair, UArctic

In his remarks, Prof. Dr. Paulsen emphasized the critical need for resources, particularly financial resources, to advance research on the polar regions and the cryosphere.

Building upon this necessity, he introduced the establishment of the Albedo Foundation, aimed at providing financial assistance and coordinating research programs on the cryosphere at the national and international levels, with an initial focus on French-speaking projects.

Prof. Dr. Paulsen also expressed the foundation's intention to extend support to research efforts in Germany and the UK in the near future. He articulated the Albedo foundation's ambition to guide corporations in allocating funds effectively and to attract significant private financial contributions for research purposes.

FELLOWSHIP AWARDS

From left to right: Archana Dayal, *IASC-PA2F Fellow* · Hanna Yevchun, *SCAR-PA2F Fellow* Dieter Tetzner, *SCAR-PA2F Fellow* · Henry Burgess, President of IASC · Jefferson Cardia Simões, Vice-President of SCAR · H.S.H Prince Albert II of Monaco · Elena Adasheva-Klein, *IASC-PA2F Fellow* · Beatriz Recinos, *IASC-PA2F Fellow* · Eda Ayaydin, *IASC-PA2F Fellow.*

The Polar Symposium 2024 was the opportunity to honor and hear from the emerging generation of polar researchers. Since its establishment, the Polar Initiative and the Prince Albert II of Monaco Foundation have prioritized capacity building and support for early career researchers, notably through partnerships with SCAR and IASC. At this year's event, two SCAR-PA2F fellows and four IASC-PA2F fellows received awards from H.S.H. Prince Albert II of Monaco. These talented early career researchers are actively involved in cutting-edge scientific activities contributing to our understanding of the Arctic and Antarctic.

COLLABORATIONS & PARTNERSHIPS

International collaborations and partnerships between different polar organizations have a long and successful tradition. This history, crucial for enhancing our understanding of the polar regions and facilitating the dissemination of research results, was significantly reinforced at the symposium with the signing of three memorandums of understanding.

Dr Renuka Badhe, Executive Secretary of the European Polar Board, and Olivier Wenden, Vice President & CEO of the Prince Albert II of Monaco Foundation, formalized their collaboration to further develop their strategic partnership, in addition to being co-organisers of the Polar Symposium.

COLLABORATIONS & PARTNERSHIPS

The Oceanographic Institute and the Alfred Wegener Institute forged a strategic alliance during the symposium. The partnership underscores a dedicated commitment to scientific cooperation and public engagement in the realm of polar, marine, and coastal conservation. This agreement commits to a united, collaborative effort over the next five years to advance research, protection, and public awareness initiatives crucial for the preservation of polar biodiversity.

The Alfred Wegener Institute further solidified its collaborative efforts by signing a Partnership Agreement with the Monaco Scientific Center, formalizing their ongoing cooperation in studying polar and marine environments and the impacts of environmental changes on them. These collaborative projects cover various disciplines, including terrestrial and marine ecology, geophysics, glaciology, and conservation biology, with results and tools essential to the preservation of these environments.

KICK-OFF

To kick off the event, three participants were invited to reflect on the global significance of the polar regions and explore the personal implications from their unique perspectives. VICTORIA HERRMANN shed light on perspectives from the Arctic region, JILDA ALICIA CACCAVO offered valuable reflections from Antarctica, and ELLE MERETE OMMA provided unique insights from the Indigenous viewpoint.

ELLE MERETE OMMA
Head of EU Unit,
Saami Council

Elle Merete Omma began by emphasizing the Saami people's perspective on their relationship with nature. In her speech, she stated that the role of humans is to maintain harmony within an ecosystem rather than exerting dominance over them. Elle Merete Omma then highlighted the relevance of Indigenous knowledge in sustainability planning, suggesting that it frequently offers valuable solutions. She referred to the term wilderness that is often used by the global community when describing the Arctic. However, for Elle Merete Omma, the Arctic is more than just wilderness; it is the homeland of people living there, providing them with the means to sustain themselves. She lamented the frequent exclusion of Indigenous voices from decision-making processes, "we often find ourselves outside of the decision rooms" she said. At the end, Elle Merete Omma expressed hope that gatherings like the Polar Symposium could serve as catalysts for shifting this dynamic.

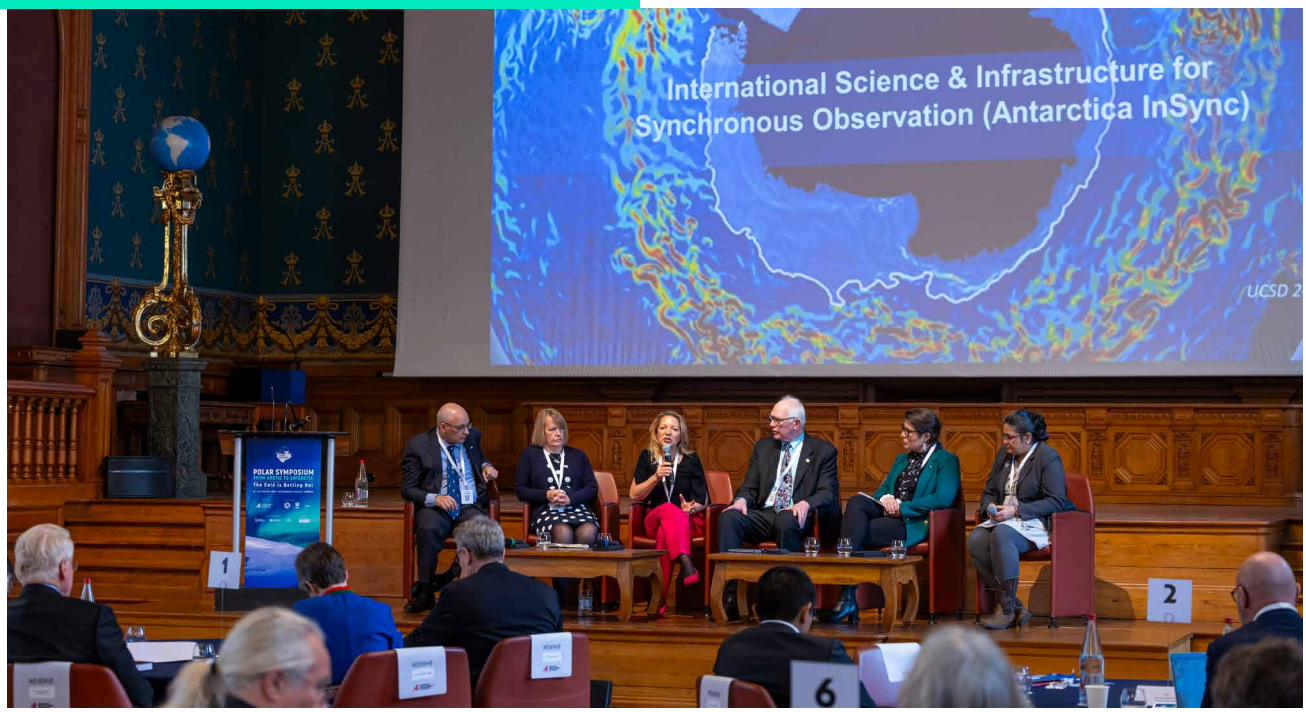
VICTORIA HERRMANN
Fellow of the Re. Generation programme of the Prince Albert II of Monaco Foundation & Senior Fellow, The Arctic Institute & National Geographic Explorer

Beginning her address, Victoria Herrmann invited us to «Please close your eyes and think of a place that matters the most to you». She then directed our focus to the polar regions emphasizing their significance to the place we initially envisioned, underscoring the global importance of the polar regions and their interconnectedness with our personal landscapes. "We are deeply connected to the poles" she argued. Human activities regardless of their location on the globe can significantly impact the polar regions, particularly those driving climate change. «What happens in Arctic does not stay in the Arctic", she continued. Emphasising that melting ice and consequent sea level rise have far-reaching consequences beyond the polar regions. Victoria Herrmann concluded her speech by assigning the audience a task: upon returning home, each of us was encouraged to share with five people something we had learned about the polar regions during the symposium.

JILDA ALICIA CACCAVO
Research Associate, Insti tute Pierre-Simon Laplace

Jilda Alicia Caccavo started by declaring to the audience that she had not yet visited either of the poles! However, she emphasized that visiting the poles is not necessary to feel a connection to the poles, as she did, especially through her research on Antarctic species. Caccavo continued by referring to her research on the impacts of climate change on populations, both marine and terrestrial, within the Southern Ocean. In both her research and her speech, she emphasized the necessity for species to adapt to the complex and diverse set of drivers associated with climate change. She argued that at least three research approaches are essential: Baseline studies, climate change impact studies and modelling the future impact on ecosystems. She concluded with aspirations for the «ecosystem» of science, stressing the need for financial resources, especially to ensure that the potential of early career researchers is not overlooked.

PANEL 1



Long-term Collaborations in the Polar Regions: Upcoming initiatives for the next decade

The panel discussion featured five experts representing key actors in the field of polar science. They were invited to reflect and provide insights on the collective work to plan and implement polar science. The moderator began by stating that there is a very active polar research community with many long-term initiatives underway. Along with the recognition of the importance of polar science, this calls for a continued international collaborative endeavour. The panel highlighted a series of aspects for the successfully international collaborations.

RENUKA BADHE
Executive Secretary,
European Polar Board
(moderator)

SPEAKERS

- **SARA OLSVIG** I International Chair of the Inuit Circumpolar Council
- **LARRY HINZMAN** I Executive Director, Interagency Arctic Research Policy Committee & Assistant Director of Polar Sciences, White House Office of Science and Technology Policy
- **ANTJE BOETIUS** I Director, Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research
- **JANE FRANCIS** I Director, British Antarctic Survey
- **JEFFERSON CARDIA SIMÕES** I Vice President for Finance, Scientific Committee on Antarctic Research

PANEL 1

The inclusion of Indigenous knowledge

Polar research and science are closely connected to power structures and sovereignty and are influenced by political developments. After clearly distinguishing the difference between "local communities" and "Indigenous peoples", it is crucial to make Indigenous participation on equal terms one of the cornerstones of planning and implementation of polar research. The inclusion of Indigenous knowledge must also be considered.

Addressing urgent knowledge gaps

The last 40 years have seen remarkable developments in polar research, not only in results and new technologies, but also in its scale. More and more research is now taking place at international level. One successful initiative for increased international collaboration in the Arctic was the creation of IASC (International Arctic Science Committee) in 1990. It was then decided that the science community should come together every ten years to discuss research gaps and how to improve collaboration.
This process is called ICARP - The International Conference on Arctic Research Planning. In 2025, the ICARP IV will be held in Boulder, Colorado, US. By bringing together Arctic researchers, Indigenous peoples, policymakers, residents, and stakeholders from around the world, ICARP IV considers knowledge gaps, Arctic research priorities and needs for the next decade and explores solutions.
Outcomes of this process will feed into the planning for the International Polar Year (IPY) 2032/33 where polar research for both poles is addressed. In parallel, SCAR (The Scientific Committee on Antarctic Research) is ramping up its efforts to feed into the collective process leading to the Fifth International Polar Year, and as part of this is co-organizing a science conference with IASC in 2030.

The 5th International Polar Year

The 5th IPY will be a large collaborative polar science initiative. It will foster vital cooperation among countries, disciplines, programmes, and knowledge systems to produce urgently needed actionable information to support evidence-based challenges. It will build directly on the legacy of the 4th IPY (2007-08), which drew together evidence from thousands of polar scientists and others emphasizing that what happens at the poles has global impacts.

InSync (International Science and Infrastructure for Synchronous Observation) shows the opportunities of coordinated international collaboration. InSync is a programme for synchronous scientific observations in Antarctica and the Southern Ocean to allow for a circumpolar assessment of the connections between ice, ocean, climate, environment, and life. It includes data on human pressures and potential solutions such as marine protection. The implementation and analysis phase will cover the period from 2027 to 2030 with joint field campaigns for land, sea, and air.

PANEL 1

Antarctica plays a crucial role in the status of the global earth system. As an example, 50% of the global ocean heat uptake takes place in the Southern Ocean. Thanks to a specific sampling scheme, nations will, at the same time, collect data, throughout the whole year, including winter which brings certain challenges.
This initiative will, for the first time, result in a holistic baseline picture of the environmental situation for Antarctica. This largest international research mission for Antarctica also has the ambition to ensure cost-effective research and the lowest carbon footprint possible.

Past successes to learn from

The success of Arctic Council was recognized by participants, who highlighted that despite the present strained geopolitical situation especially due to the Russia-Ukraine war, it is still active and productive, although at a slower pace. Consensus on certain environmental protection measures has been reached. The Arctic Council also fulfils the objective of inclusion of Indigenous peoples. The Arctic Council is a success that constantly needs the collective responsibility to protect and nurture.

The development of data and information sharing has been rapid and successful, within the scientific community but also towards the general public, which now has access to specific tools to follow expeditions. With the emergence of new technologies (AI, machine learning, etc), efforts on international agreements for open data and data sharing must continue.

It is noted that satellite and remote sensing have absolutely revolutionized polar science, allowing for example live monitoring of environmental changes. Close connection between space and polar research is needed to improve our knowledge. As this is still a recent idea, it will require effort in making financial partners understand this need and what it means in terms of long-term planning and funding.

KEY TAKEAWAYS FROM THE PANEL

- **Ensuring Indigenous community engagement:** Prioritizing equal participation of Indigenous communities is imperative in polar research planning and implementation.
- **Advocating for collaborative long-term planning:** International collaboration and sustained planning are indispensable for pinpointing urgent knowledge gaps in polar research.
- **Highlighting InSync's significance:** InSync -International Science and Infrastructure for Synchronous Observation- emerges as a pivotal upcoming international research mission for Antarctica.
- **Promoting the 5th International Polar Year:** The upcoming 5th International Polar Year, slated for 2032/33, stands as a beacon for fostering crucial cooperation among nations, disciplines, and programs to yield urgently needed actionable information about the polar regions.

WORKSHOP 1

How Can Long-Term Initiatives Collaboratively Shape the Next Decade? Connecting, Relating, and Defining Common Priorities for Polar Research and Policy

Co-organizer EUROPEAN POLAR BOARD

TOPIC 1: SCIENCE PRIORITIES FOR THE LONG-TERM INITIATIVES

The major challenges of the coming decades

At the start of the workshop, the experts highlighted the main challenges to be met over the next decade. Among them is the need to promote a global understanding of the polar regions and their interconnection with the wider Earth system. This involves accurately simulating the complex links between the ocean, atmosphere, and cryosphere, while rigorously monitoring their evolution in the context of climate change and the repercussions on ecosystems and human societies.

Indeed, the Earth system is evolving at an unprecedented rate, requiring international collaboration to effectively address the significant scientific and societal challenges that lie ahead. Consequently, one of the main outcomes of the discussion was to advocate that funding bodies actively promote and prioritise initiatives that encourage international collaboration. International initiatives, such as The Polar Initiative, can play the role of facilitator between the various rightsholders, stakeholders and researchers to support and encourage the development of these international scientific collaborations.

WORKSHOP 1

In addition to international scientific cooperation, a major issue raised was the maintenance and building of research capacity in the future. It was noted that a strategic opportunity would be to provide increased support for early career scientists through long-term funding and permanent positions. The discussion also focused on emerging technologies and the challenge to build the capacity of the workforce and secure funding to develop these innovations. In polar research, these technologies include for example tools to improve our understanding of the polar regions, while reducing the carbon footprint associated with fieldwork.

The last challenge that was mentioned was the homogenisation of data coverage, which is often limited to each country's priorities and is guided by long-standing research traditions and practices. These practices can become an obstacle when it comes to monitoring technological developments and developing a holistic understanding of the polar regions. It was therefore recommended that international collaborative initiatives should encourage the development of open and synchronised data management. During the table discussions, the experts identified several scientific priorities for long-term polar initiatives.

Observations and monitoring

The first scientific priority to emerge from the discussion was the need for long-term observation and monitoring programmes. Satellite monitoring programmes should prioritize filling existing data gaps at both poles, while ensuring sustainability through the deployment of long-lasting instruments. Among the priority research areas, the sustained advancement of radar altimetry for precise ice elevation measurements and the ongoing documentation of topographic changes within ice sheets, were highlighted. Discussions also focused on the gaps that need to be filled in terms of observation and monitoring.

Regarding the need for innovations, there was a notable focus on improving satellite connectivity and data transmission capabilities to manage large volumes of data efficiently, along with the need to develop autonomous vehicles and instruments for real-time data transmission. Emphasis was placed on the importance of reducing the cost and carbon footprint associated with scientific monitoring fieldwork.

Gaps were identified in terms of data collection methodology and emphasis was placed on the need for a universal, understandable, and framed methodology, in particular as a number of data are collected by private citizens and the general public or financed by blended funds, including private sector and philanthropy. The discussion explored the ethical implications of allowing the tourist industry to conduct scientific activities in polar regions, weighing the advantages of filling data gaps and reducing the carbon footprint against the ecological disturbances to an already fragile ecosystem. It underscored the need for targeted studies to assess the impact and propose regulations.

RAPPORTEURS

DIETER TETZNER

ARCHANA DAYAL

BEATRIZ RECINOS

FACILITATORS: **DENEB KARENTZ, MATTHEW DRUCKENMILLER, CAMILLA BREKKE**

WORKSHOP 1

Modelling

The development of scientific models has been identified as another scientific priority for the next decade of polar science. Arguments in favor of developing these models were put forward during the discussions. The models provide a detailed understanding of the evolution of Earth systems and their tipping points. They can also determine whether a system is approaching a tipping point or if observed changes are within its natural variability.
However, the development of these tools faces specific trends and challenges such as securing long term for model development, validation, testing and documentation of code and existing tools. In addition, it is essential to ensure that current cutting-edge models can be adapted to work with emerging hardware technologies.

One approach that has been discussed is to develop new models using supervised deep learning algorithms e.g., data-driven neural network, where the problem lends itself to this type of application. A key conclusion was that the use of artificial intelligence and machine learning methods should be considered to improve the simulation and modeling of earth systems.
Given the rapid emergence of these technologies, which can be challenging for scientists without backgrounds in computer science or applied mathematics to comprehend, there is a pressing need to foster more interdisciplinary collaborations. It was also stressed that we need to rethink the way disciplines - such as geography, glaciology, ecology, and oceanography - are taught in order to adapt effectively to these changes.

Collaborations

The working groups address specific aspects of the need for collaboration as a scientific priority. The experts recommended developing broader international collaborations with current observation networks and future long-term field campaigns at both poles, with the aim of ensuring the sustainability of current and future observation networks. This includes regulated cooperation with the private tourism sector.

Emphasis was placed on promoting interdisciplinary collaboration and supporting research initiatives addressing multidisciplinary problems, as well as facilitating platforms for sharing research through journals or publishers. One suggested approach involved offering incentives, such as high-impact interdisciplinary journals, prizes, and funding awards. The experts called for interdisciplinary collaboration between social, political, and natural scientists to develop research initiatives that address societal challenges. These types of collaboration would also require greater involvement of Indigenous communities and Indigenous experts in science initiatives, policy development and planning related to the Arctic and Antarctic.

It has been stressed that it is of the utmost importance to increase the participation of Indigenous peoples in research on an equal footing. The working group, made up of international and Indigenous experts, pointed out that the key to achieving this is to recognise the expertise of Indigenous and local communities and involve them in the decision-making process, notably around new scientific priorities, and policies. Additionally, it was recommended that funding organisations assess the feasibility of requiring the full participation of Indigenous and local communities in projects and provide them with the means to respond and engage in collaborative research.

A further gap that was discussed is the recent and current geopolitical landscape in which engagement with Russia and Russian polar researchers is at a minimum. While Russia is a key player in ensuring long-term monitoring of the Arctic system, there is a clear necessity for establishing an ethical and sustainable framework for interactions with Russia and the polar research conducted in the region.

Co-designed research projects, bringing a wide range of stakeholders could be an effective way of validating the integrated research approach, while providing a framework for communicating and implementing research findings. Stakeholders identified as potential co-designers of research projects include insurance companies, the financial sector, politicians, communities, entrepreneurs, and philanthropists.

WORKSHOP 1

Communication

Communication, particularly between the research community and a non-expert public, is a crucial scientific priority identified by the working group. Among other benefits, effective communication improves the likelihood of research findings being translated into policy action and influencing changes in behaviour at the policy level, industrial practices, and public perceptions.

Unfortunately, scientists are often not trained in communication skills and, in most cases, active engagement in scientific communication is considered an academic merit. There is a pressing need for reforms within the academic system. Training and recognition of proper scientific communication, along with fostering greater openness to funding research projects aimed at public outreach, are crucial steps towards enhancing the effectiveness of science communication.
The current conventional message about the situation in the polar regions needs to be conveyed in a more impactful and innovative ways, adapted to the target audience.

The need to increase the presence of the polar scientific community at international meetings and events, such as meetings of the Conference of the Parties, was highlighted.

Setting science priorities

The discussion on scientific priorities finally focused on the different ways of setting these priorities. While each country has its own mechanisms for setting scientific priorities for polar research funded by public funds, international initiatives aimed at identifying and formulating research priorities for the polar regions will become increasingly important. Such initiatives will lay the groundwork for collaborative and synchronized research efforts, while also facilitating the engagement of all relevant rightsholders and stakeholders on the international stage. The Fourth International Conference on Arctic Research Planning (ICARP IV) and the ongoing planning for the 5th International Polar Year 2032-33 are excellent examples of international collaborative research planning which can feed into each nation's respective process for determining polar science priorities.

WORKSHOP 1

TOPIC 2: ENSURING EQUITABLE PARTICIPATIONS FOR ALL STAKEHOLDERS

Introductory discussion: The challenges

The working table brought together international and Indigenous experts to discuss the need and means to ensure equitable participation of all rightsholders and stakeholders in polar science.
It was emphasized that the interpretation of "equitable participation" differs across various groups. In the Arctic, there is a focus on Indigenous peoples' rights and involvement, whereas in Antarctica, the emphasis shifts towards Inclusion, Diversity, and Equity (IDE) within a broader context, implying diverse perspectives based on gender, nationality, and other criteria.

Furthermore, the discussion delved into the distinction between the terms "stakeholders" and "rightsholders". Indigenous peoples are rightsholders, while stakeholders refer to entities such as entrepreneurs, business actors, scientists, and local citizens. These distinctions in terms and definitions are crucial to ensure that all the groups around the table have the same understanding of the terminology used.
The challenge of language highlighted in the group, taking the example that in the Arctic not all communities are English-speaking, and the academic terminology is often used exclusively by academics. For instance, the term "environment" has a different meaning to different people. According to the Indigenous concept, 'environment' refers to the land and sea used for livelihood. It is essential to ensure equitable participation, including with regard to terminology and definitions, when conducting research in the Arctic.

A key point raised when discussing the challenges of equitable participation is that Indigenous communities can be overwhelmed by invitations and requests for research projects. This lack of coordination frequently burdens Indigenous communities with excessive workloads. Emphasis was placed on developing new co-producing approaches between the scientists and Indigenous communities that is not just project-specific, but evolves over the long term.

Identifying key polar actors: who else should be present at the table?

The group identified several potential contributors who could probably contribute to the discussion on equitable participation in polar research.

RAPPORTEURS

ELENA ADASHEVA-KLEIN

HUGO GUÍMARO

FACILITATORS: **BRIDGET LAROCQUE, MALGORZATA SMIESZEK**

WORKSHOP 1

For instance, the working group identified industries, including the food, healthcare, and communication technology sectors that would bring valuable perspectives to the table. Multinational businesses and financial institutions are often absent from polar conferences, which could then limit the results of the conference. Political representatives also often seen as absent from polar discussions, which is concerning given the global importance of polar regions and their considerable influence on society.

A key point raised was the importance of funders initiating conversations with Indigenous communities early on, ensuring their inclusion in all stage of research and decision-making.

Which tools do we need to facilitate integrated and equitable participation?

The discussions then shifted towards solutions, and experts discussed the different tools needs to facilitate equitable participations.

Following the challenges raised in the introduction, the group pointed out that equity is often defined top-down by organisations. Therefore, to ensure «meaningful participation» and empower Indigenous peoples in decision-making, it is necessary to prioritize language equity and implementation of a code of conduct. Ultimately, these solutions will encourage collaboration and avoid misunderstandings.

The experts addressed the responsibility of funders when involving Indigenous peoples from the earliest stages of the research process, particularly when formulating research questions, determining the conditions for the participation of Indigenous peoples and evaluating proposals, and proposed that funds be made available for the engagement of Indigenous and local communities.

In Antarctica, where countries commit to certain common rules under the treaty, the lack of a policing mechanism of equity raises issues. There are inequities existing both between countries as well as within national programs. To address this, high-level statements and a code of conduct could be proposed, building on expectations set by organizations like SCAR regarding equality, diversity and inclusion.

With regard to education, the experts called for promoting interactions between Indigenous and non-Indigenous youth, particularly for early career scientists and before the launch of research projects. Additionally, it was recognized that researchers in natural sciences sometimes engage in Arctic research without a thorough understanding of the region's history, emphasizing the responsibility of universities to address this gap. The Polar Resource Book, produced under the last International Polar Year, was cited as an example of an effective educational resource. Ongoing efforts are underway to update and expand this initiative for the upcoming IPY.

Educational initiatives should also target the general public and businesses to highlight the potential consequences of the environmental changes in the polar regions, as well as engage with politicians, emphasizing the direct impact of polar events on their districts and voters, leveraging pressure from constituents to drive action.

The working group stressed that the research communities and Indigenous communities hold differing values regarding their contributions to polar science. While the first one prioritizes new knowledge, Indigenous communities emphasize the importance of knowledge for survival. This discrepancy extends to the allocation of funds, where there is currently more financial support for research than implementation, which is often carried out by Indigenous and local communities.

WORKSHOP 1

TOPIC 3: FUNDINGS AND INFRASTRUCTURE LOGISTICS

Funding

The working group was invited to discuss the need for funding in planning long-term polar initiatives. A key takeaway from the discussion highlighted the crucial role of long-term funding in the success of polar research. Notably, it increases the potential for delivering high quality research results that can make a significant contribution to understanding the complexity of the polar regions. Long-term funding is particularly necessary for sustained monitoring and measurement programmes and field studies. Moreover, long term financial support facilitates structured capacity-building initiatives by recruiting and securing positions for early career scientists.

Experts emphasized the growing significance of multilateral alliances and governmental collaborations in polar research. For example, platforms such as the Belmont Forum, where funding agencies can pool their financial resources, offer the possibility of submitting multi-year proposals. Nonetheless, the persistent funding shortage means that setting setting priorities for polar science is essential.

Current international collaborative processes for science prioritization, like ICARP, play an important role in establishing science plans that achieve consensus within the global scientific community.

Private funders and philanthropy are set to play a significant role in research funding in the polar regions. An essential aspect for securing successful funding lies in fostering a clear understanding between the funder and researcher regarding their respective roles and expectations prior to the initiation of any research endeavour. This clarity is particularly crucial concerning how the funded project will be communicated and the establishment of principles governing open data policies.

There was discussion about the growing interest of the tourism sector in financing or supporting scientific initiatives. The intersection of tourism in supporting polar science presents both opportunities and challenges that were considered during the workshop. Direct financing of scientific projects by the tourism sector raised concerns and ethical questions within the group, especially regarding environmental responsibility, regulation and certification and funding mechanisms.

RAPPORTEURS

JOSÉ QUEIRÓS

HANNA YEVCHUN

FACILITATORS: **ANTJE BOETIUS, JANE FRANCIS**

WORKSHOP 1

Infrastructure

The discussion then shifted towards the need for infrastructures to carry out polar research. It was pointed out that much polar science depends on infrastructure such as vessels, aircrafts, stations, satellites, which is costly and requires logistical resources. In addition, infrastructure and logistics face the challenge of reducing their carbon and environmental footprint. A key mechanism highlighted for optimising the use of resources when using the necessary infrastructure is the need for international collaboration and resource sharing, a long-standing tradition in polar science, requiring constant innovative development. Increased collaboration between national programmes was identified as one of the most important advances for the international polar science community.

Experts underscored the potential for innovative approaches when considering the use of privately owned infrastructures. Sectors such as tourism, fisheries, and shipping are examples of commercial activities that the science community could leverage to explore new possibilities for polar research. To be successful such collaborations must build on mutual trust and clear understanding of the distinct roles and responsibilities of each party involved.

The next Internal Polar Year: an opportunity to further develop international collaboration.

The International Polar Year (IPY) presents unique opportunities to develop the collaborative processes on the international stage, especially regarding inclusiveness and participation.

In term of inclusiveness, the IPY must not only to include relevant contributors and regions but also emerging scientific disciplines, such as robotics and machine learning. Additionally, Early Career Researchers (ECRs) could significantly contribute to enhancing scientific capacity for the future.

The IPY provides an opportunity to include different sources of funding, both private and philanthropic, that have not yet been engaged in polar research.

WORKSHOP 1

TOPIC 4: SCIENCE-POLICY CONSIDERATIONS, LED BY THE INTERNATIONAL CRYOSPHERE CLIMATE INITIATIVE (ICCI)

The relation between science and policy

The workshop brought together interdisciplinary groups of experts with an interest in the Arctic and Antarctic, from different career stages and backgrounds, for fruitful discussions on the relations between science and policy.

The initial discussion identified the challenges of engaging policymakers effectively and making cryosphere science relevant to policymakers.
Indigenous organizations often face barriers in direct engagement with states. At international events, representation remains a persistent issue, despite the improvements and inclusion of Indigenous knowledge.

The difficulty of distilling complex issues into a concise, straightforward message was also highlighted. At the international level, there is often ambiguity regarding the integration of scientific knowledge into negotiation rooms and delegations. While evidence-based decision-making is standard in many international bodies focused on the cryosphere, scientific evidence alone may not always suffice to ensure policy agreements in practice.

In addition, where scientific evidence is lacking, precautionary decisions must sometimes be made. Experts stressed the importance of engaging with individual politicians and civil service, while advocating for broadening discussions to include a larger audience. Engaging with relevant stakeholders, including the public, NGOs, students, and others, is essential to effectively address polar issues. Central to this effort is the coordination and delivery of a clear and consistent message to these relevant stakeholders, applicable at both national and international levels.

Another crucial point addressed in the workshop centred around advising policy - and decision-makers on addressing emerging phenomena. For instance, in 2023, a record minimum level of sea ice in Antarctica was observed, though the scientific community has yet to reach a consensus on its underlying drivers and determining whether this phenomenon is directly linked to climate change may require further investigation. However, given the significant media and political attention it has garnered, effectively managing this situation becomes crucial for the scientific community. This example reinforces the importance of precautionary approaches to decision making.

RAPPORTEURS

EDA AYADIN

GWENAËLLE GREMION

FACILITATORS: **JAMES KIRKHAM, LYDIE LESCARMONTIER**

WORKSHOP 1

Moreover, the role of media and their selection of relevant or credible topics often shape the dynamics surrounding policy development. Notably, certain media outlets prioritize sensationalism, which poses both a challenge and opportunity for the scientific community. Ideally information should be thoroughly checked by both scientists and journalists, in which case media can foster trust between science and the general public. This is particularly crucial for disseminating information of high public interest through mainstream media, for instance concerning the effect of climate change on the cryosphere.

Recommendations for effective communication

The working groups concluded that communication is the most obvious tool in this field. To effectively communicate with policymakers, the following recommendations emerged:
It is necessary to recognize that definitions may vary among individuals and that it is essential to tailor the message accordingly. As the opportunity to communicate with policymakers may arise unexpectedly, it is needed to be prepared to deliver an effective message, concise, understandable and directly pertinent to the topic at hand.

A key solution while raising awareness on polar issues is to illustrate the relevance of polar regions to society using local examples, making the message more relatable on a personal level. Finally, it was recommended to practice communication to enhance clarity and effectiveness.

KEY TAKEAWAYS FROM THE WORKSHOP

- **Recognizing the need for holistic understanding:** There is a clear need to develop a holistic understanding of the polar regions and their connection with the rest of the broader Earth system.
- **Emphasizing long-term satellite monitoring:** The continued development of new satellite monitoring programs is essential for gaining insights into long-term trends in the polar regions.
- **Leveraging models for insight:** Utilizing models can provide detailed insights into the evolution of the Earth system and identify critical tipping points.
- **Enhancing Indigenous involvement:** Increasing the involvement of Indigenous communities in research on equal terms is of utmost importance.
- **Communication as a key factor:** Effective communication, particularly from the research community to broader society, is crucial for success.
- **Importance of long-term funding:** Long-term funding is indispensable for the success of polar research endeavours.
- **Potential of private funders and philanthropy:** Funding from private funders and philanthropic organizations have the potential to significantly contribute to advancing polar research.
- **Addressing infrastructure and logistics challenges:** There is a need to reduce the carbon and environmental footprint of the infrastructure and logistics required for polar research.
- **Empowering early career researchers:** Inclusivity of Early Career Researchers (ECRs) could serve as a catalyst in building science capacity for the future.
- **Bridging cryosphere science and policy:** Engaging policymakers effectively and making cryosphere science relevant to them through effective communication remains a critical challenge.

DANCE PERFORMANCE

The first day of the symposium concluded with a dance performance by Korhonen Miili-Reetta.

Miili-Reeta is studying dance and different techniques such as ballet, jazz, street dance and folk dance at the Santasport Vocational Institute. She is set to graduate as a professional dancer by the end of the year. She has performed a piece entitled "Snow On The Boneyard" which is about dancing on the grave of negative things and experiences of the past, letting go and finally finding joy in being alive.

UArctic

PANEL 2

Impact of human activities on polar biodiversity, societies and economies: The need for Indigenous knowledge and robust scientific data to underpin policy and understand the polar crisis as a global crisis

The panel initiated the discussion by emphasizing the global significance of the polar regions and the changes occurring therein. These changes are predominantly driven by human activities, such as burning of fossil fuels. The moderator highlighted the that changes in the poles have the potential to drastically impact the rest of the globe, leading to consequences like sea level rise and alterations of large-scale patterns of sea currents.

HELEN MILLMAN
World Economic Forum
Hoffmann Fellow for the Poles,
University of Exeter
(moderator)

SPEAKERS

- **ELLE MERETE OMMA** | Head of EU Unit, Saami Council
- **SNORRI SIGURÐSSON** | Head of Division of Nature Protection, Iceland Institute of Natural History
- **CASSANDRA BROOKS** | Assistant Professor, Department of Environmental Studies & Faculty Fellow, Institute of Arctic and Alpine Research, University of Colorado Boulder
- **VICKI LEE WALLGREN** | Director, WWF Global Arctic Programme
- **MADS QVIST FREDERIKSEN** | Executive Director, Arctic Economic Council
- **BIRGIT NJÅSTAD** | Antarctica Program leader, Norwegian Polar Institute

PANEL 2

Science based policy-making

The panel began by citing an example where science has contributed to the development of international policies, namely the Central Arctic Ocean Fisheries agreement which entered into force in 2021. The Agreement aims to prevent commercial fishing by the ten signatory states of the high seas Arctic Ocean for a duration of 16 years. It stands as an example of what can be achieved when there is a multilateral willingness to agree on a matter of mutual interest. The moderator then invited the speakers to reflect on how to ensure that the best available science is used as the basis of precautionary management. The Antarctic Treaty system was presented as one example where science is used as the cornerstone of all policy efforts within the treaty framework. It also illustrates how a scientific committee, such as SCAR, can provide robust scientific advice to inform policy making under such a treaty.

The discussion also emphasized how the lack of scientific knowledge often translates into an inability to make effective policy decisions. Such obstacles can unnecessarily become stumbling blocks to the necessary management of the polar regions, implying that a major challenge is to identify the tools to remove these stumbling blocks.

The panel raised the question of who determines what constitutes the most reliable science and for whose benefit it serves. The necessity to democratise knowledge within polar science, which implies an increased openness to Indigenous knowledge, was mentioned. Recently, the Saami Council asked the Saami community, recognised as knowledge holders, to contribute to the publication of a report on climate change and Indigenous knowledge is increasingly integrated into the various working groups of the Arctic Council.

Examples of success through collaborations

The panel highlighted key successful collaborative initiatives in polar science in recent years. The Arctic Hub secretariat was mentioned as a successful collaboration between a local community and researchers from Greenland. The Arctic Hub «builds bridges between people, institutions, and countries interested and involved in the research conducted in Greenland». Their role is to offer services, material, and equipment that researchers need, making their journeys easier and boosting the activity of local businesses.

Another success story goes back to 2016, when The Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) came together after fourteen years of work and was able to jointly declare the protection of the Ross Sea. This success story of the Ross Sea Marine Protected Area (MPA) is an example of international collaboration between science, policymaking, and politics. From the start, the Prince Albert II of Monaco Foundation actively supported the process leading to the Ross Sea MPA becoming the largest marine protected area in the world. Once again, the discussion highlighted the two distinct governance systems governing the respective polar regions as successful models built on collaboration.

The Antarctic Treaty, signed in 1959 by the countries whose scientists were active in and around Antarctica, underlines the close link that exists in the polar regions between science, policy, and politics. This treaty commits the Parties to the comprehensive protection of the Antarctic environment, making the governance of this territory unique. Nowhere else in the world is an area governed by such strict, internationally agreed environmental protection rules.

The Arctic also has its own intergovernmental body, namely the Arctic Council which fosters cooperation in the region. It is comprised of 8 Arctic states as members and 6 Permanent Participants representing the Indigenous peoples of the Arctic.

PANEL 2

Conflicts of goals

The discussion ended by highlighting a set of challenging conflicts of goals in the polar regions, some of which are successfully managed in the respective northern and southern governance systems. In the Arctic, Indigenous peoples and local communities often have distinct and valid priorities that may differ from those of visiting scientists and businesses from other parts of the world. A current example of conflict in the Arctic lies in its potential as a source of rare earth metals crucial to the green transition.

However, increased mining activity in the Arctic poses a risk to the environment, bringing these two objectives into conflict. In Antarctica, challenges arise from the diverse goals of stakeholders. Every year around 100000 tourists visit Antarctica, which on the one hand enhances global understanding of the environmental challenges facing Antarctica, but on the other hand can pose a threat to this pristine environment.

One sentence

Key concluding remarks from the panel included the need for the world to see Antarctica as its home and to understand the changes occurring there. The importance of science, policy and public interaction was highlighted, as was the need to be ready to act in the event of the political window opening in the future.

It was then noted that international meetings play a crucial role in bringing policymakers together and fostering diverse opinions. In this regard, emphasis was placed on the significance of collaboration, highlighting that it should not be taken for granted.

The following question was raised: «Are you ready to change your mentality to save the planet?" and the final takeaway highlighted the importance of helping people to identify and implement solutions.

KEY TAKEAWAYS FROM THE PANEL

- **Global importance of the polar regions:** Emphasis was placed on the importance of understanding changes in the polar regions induced by human activities, such as the use of fossil fuels, and their potential impacts on a global scale.
- **Democratisation of knowledge:** The importance of democratising knowledge in the field of polar sciences, including the integration of Indigenous knowledge, was particularly emphasised in order to guarantee more complete and reliable information for political decisions.
- **Successful collaborations:** The presentation of effective governance systems for the respective polar regions and collaborative polar science initiatives, such as the Arctic Hub Secretariat and the establishment of the Ross Sea Marine Protected Area, demonstrates the effectiveness of international collaboration in science, policy development and politics.
- **Conflict of goals:** Conflicting objectives in the polar regions were highlighted as a major challenge. Examples of tourism activities offering both opportunities for awareness raising, and challenges related to environmental impact were mentioned.

WORKSHOP 2

How can we make sure that the impacts of global climate change on the polar regions are factored into global strategies for climate change mitigation and adaptation?

Co-organizer WORLD ECONOMIC FORUM

INTRODUCTORY REMARKS BY GAIL WHITEMAN

Professor, University of Exeter Business School & Founder, Arctic Basecamp

Professor Whiteman set the stage for the workshop by delivering a presentation on the global risks associated to the polar crisis. Through her work, she is engaged in communicating these risks, based on science, to business leaders.

She began by highlighting the evolving perspective of business leaders regarding their approaches to climate change and sustainability over the past decade. According to a recent survey, 87% of business leaders regard sustainability and ESG (Environmental, Social and Governance) factors as crucial for their organisations. In addition, 82 % of CEOs said they have implemented policies aimed at achieving net-zero emissions.

Gail Whiteman emphasized the importance of understanding the attitudes and actions of large corporations for several reasons, particularly because they and their value chain partners contribute to greenhouse gas emissions detrimental to the poles. Her message to business leaders is that changes in the polar regions will inevitably impact their commercial activities.

WORKSHOP 2

Furthermore, she discussed the presentations and statistics shown at each World Economic Forum meeting, revealing a collective acknowledgment by businesses of the risks associated with global warming and biodiversity loss. She recognized that leaders are currently distracted by urgent and acute issues, such as tense geopolitical situation, which therefore limits their knowledge on polar changes and associated impact. Professor Whiteman then pointed out that of the 16 global tipping points, nine are located in the poles. This information raises the interest of the participants from the business world to learn more about the poles. The objective was to show that polar risks are indeed global risks and hence concern global businesses.

Concluding her presentation, Professor Whiteman demonstrated a new AI-supported online platform capable of displaying the real-time risks associated with extreme weather conditions worldwide. The increase in extreme weather is a symptom on large-scale changes in climate and Earth system dynamics, urging businesses to integrate this knowledge into their long-term planning for success.

TOPIC 1: INFRASTRUCTURE AND TRANSPORTATION

As part of the workshop, experts were invited to reflect on effective strategies and solutions for infrastructure and transport in the polar regions to meet the challenge of the impacts of global climate change.

The three different groups that worked on this topic addressed it from slightly different perspectives, leading to a comprehensive coverage of the topic. Climate change is undeniably affecting infrastructure in polar regions. But it was pointed out that considering climate change in isolation, as an independent variable, is overly simplistic, as it intertwines with political, economic, and environmental factors.

It was also importantly noted that there is already a significant lack of infrastructure in these areas and that factors such as remoteness and low population density contribute to cost challenges. Nonetheless, investments in infrastructure should be viewed as a prudent long-term strategy.

The speed of change makes it difficult and extremely costly to plan for adaptation of societies to the new realities. Participants highlighted that adaptation efforts must take account of cultural specificities and be developed with Indigenous populations.

RAPPORTEURS

ALICE GUZZI

LINA MADAJ

BEATRIZ RECINOS

FACILITATORS: **HUGO GUÍMARO, VIKTORIJA STARYCH-SAMUOLIENE, EOGHAN GRIFFIN**

WORKSHOP 2

Indigenous knowledge will therefore play an important role in developing relevant and resource-efficient adaptation measures.
Increased tourism has intensified pressure on infrastructure development, while the use of existing infrastructure, such as ports and roads, can compete negatively with the needs of local communities. In addition, threats to Arctic infrastructure could have global impacts. For example, damage to the Svalbard satellite station or to pipelines caused by thawing permafrost could affect global satellite and energy systems.

The solutions discussed included facilitating constructive dialogues between entities such as shipping and fishing industries, agricultural and food industries, insurance and transport sectors, private tourism, technological and satellite companies, and Indigenous and local communities. Organizations like IASC, SCAR, and the Polar Initiative were called to assess their possible role as facilitators for dialogues between these sectors.

Sea level rise, permafrost thaw, extreme weather events and ice-free sea were identified as primary challenges for the polar regions. These challenges were discussed in more detail and suggestions were made for possible solutions that could reduce risks.

- **Sea level rise**

As sea levels rise, coastal erosion threatens infrastructure, habitats, and communities, particularly in low-lying coastal areas, often resulting in the displacement of populations.
Specific adaptation measures to be implemented to protect coastal infrastructure and transportation networks in polar regions from the impacts of sea-level rise and coastal erosion were suggested and discussed by the experts:

Local climate projections: They pose a significant challenge due to variability and dependence on multiple physical factors but were proposed as solutions for local adaptation planning.

Global attention: Sea level rise demands global attention and concerted efforts for effective mitigation and adaptation strategies. The main challenge highlighted by the working group was to achieve consensus and sustained commitment from diverse stakeholders, nations, and international organizations.

Reducing emissions: Reducing emissions of greenhouse gases was considered crucial for mitigating sea level rise and its associated impacts. This requires coordinated action on the global scale, overcoming political, economic, and technological barriers.

Adapt, mitigate, transform: The experts pleaded for a multifaceted approach that involves adaptation, mitigation, and transformation of socio-economic systems to address sea level rise. Solutions would involve innovative policies, investments in resilient infrastructure, and behavioural changes at individual and societal levels.

Preparation: Proactive measures such as coastal defences, land-use planning, early warning systems, and community resilience-building initiatives were proposed to prepare for sea level rise. However, inadequate resources, limited access to technology, and socio-economic disparities pose significant challenges, particularly in vulnerable regions and developing countries.

Learning from affected regions: Learning from regions already affected by sea level rise is essential for informing adaptive strategies, sharing best practices, and building resilience. Overcoming language barriers, cultural differences, power dynamics, and ensuring equitable access to information and resources remain major challenges.

Future-proof infrastructure: Building infrastructure that can withstand future sea level rise and extreme weather events is essential for ensuring long-term resilience and sustainability. The solutions put forward during the conversations were nature-based solutions and innovative technologies. However, they present technical, financial, and regulatory challenges and requires integrating diverse expertise, considering uncertain future scenarios, and balancing short-term costs with long-term benefits.

WORKSHOP 2

- **Permafrost thaw**

The thawing of permafrost directly impacts infrastructure, leading to damage to roads, buildings, and pipelines. The groups discussed solutions and strategies to mitigate these impacts, monitor permafrost and reduce carbon emissions.

The following responses were proposed:
Remote sensing for permafrost monitoring: Remote sensing, including high-resolution satellite imagery and LiDAR technology, were proposed as tools to facilitate permafrost monitoring and provide valuable data for assessing environmental impacts.

Pollution monitoring and management: Permafrost thaw releases pollutants stored in frozen soil layers, posing risks to human health and ecosystems. Remote sensing tools able to detect and monitor pollutant dispersion, were also proposed to implement effective pollution management strategies.

International cooperation and long-term projects: Collaborative efforts between countries are essential for addressing permafrost thaw. Recommendations included the development of long-term research projects to facilitate understanding, adaptation, and mitigation strategies.

Safeguarding cultural remains: Permafrost thaw exposes cultural remains to decay and erosion, necessitating preservation efforts. Solutions including remote sensing technology were presented to assist in identifying, assessing, and protecting cultural heritage sites.

- **Increased frequency and intensity of extreme weather events**

These events present significant risks to human lives, infrastructure, and economies, leading to socioeconomic vulnerability, especially among communities with limited resources and in remote areas.
The groups discussed how to enhance resilience to extreme weather events in polar regions through infrastructure upgrades, community-based disaster risk reduction initiatives, international collaboration, and integrating community-based approaches into decision-making processes.

WORKSHOP 2

The following responses were proposed:
Prediction: Improved forecasting models and early warning systems are crucial for mitigating the impacts of extreme weather events. Experts called for more investment in predictive technologies to help communities prepare and respond effectively.

Management of areas: Effective management of forest fires and other natural disasters requires coordinated efforts and resources. It is therefore essential to develop tools and training to mitigate risks and protect communities.

Disaster reaction: Developing comprehensive disaster response plans is critical for minimizing casualties and property damage during extreme weather events. Effective coordination between government agencies, NGOs and local communities was seen as a key element of the response.

Engaging engineers and architects: Collaboration between engineers, architects, and policymakers is essential for designing resilient infrastructure and buildings capable of withstanding extreme weather events. One solution presented was the integration of climate resilience into urban planning.

Space community collaboration: The space community can play a vital role in enhancing understanding of extreme weather events. Satellite technology and remote sensing were proposed as tools to provide valuable data for monitoring weather models and forecasting future events.

- **Sea ice free Arctic/Antarctic**

With the Arctic experiencing longer periods of ice-free conditions and Antarctica experiencing less ice, what infrastructure investments are needed to support increased maritime traffic and commercial activities in polar regions.

The following aspects were discussed:
Search and rescue: Enhancing search and rescue capabilities in remote polar regions become imperative to respond to emergencies promptly. Ship accidents in polar regions could have considerable environmental and economic impacts.

Insurance mechanisms: It is necessary to implement robust insurance mechanisms tailored to the unique challenges of operating in ice-free Arctic/Antarctic regions. Insurance frameworks should incentivize adherence to safety and environmental standards, promoting responsible behaviour.

Communication systems: Developing resilient and adaptable communication networks is crucial to facilitate efficient coordination among vessels and emergency responders, even in regions where geopolitical tensions exist.

Improved navigation technologies: Enhanced navigation technologies play a crucial role in ensuring safety and efficiency in shipping routes through ice-free Arctic waters. Some advancements include high-resolution satellite imagery, real-time ice mapping technologies and stringent safety standards for vessels operating in polar waters.

International cooperation: The need to foster international cooperation and collaboration to address common challenges and promote responsible maritime governance was highlighted. In the Arctic, this includes strengthening the role of the Arctic Council as a forum for dialogue and cooperation.

The workshop emphasized the critical need for effective strategies in polar regions to deal with climate change impacts. Experts highlighted the intertwined nature of climate change with political, economic, and environmental factors. They stressed long-term investments in infrastructure and adaptation efforts, considering cultural specificities, especially with Indigenous populations. Challenges such as sea-level rise, permafrost thaw, extreme weather events, and ice-free Arctic/Antarctic regions were discussed, underscoring the necessity for global attention, collaborative efforts, and resilient infrastructure.

WORKSHOP 2

TOPIC 2: LOCAL COMMUNITIES, HUMAN ACTIVITIES, AND TOURISM

Experts were invited to reflect on effective strategies and solutions to address the impacts of global climate change regarding challenges impacting local communities and human activities in the polar regions.

Changes that are challenging

Damage to the polar system poses multifaceted challenges for human activities and polar communities. The increasing variability and unpredictability of weather events, ranging from storms to wildfires, and the impact of thawing permafrost on existing infrastructures are disrupting ways of life in the Arctic and affecting research activities and tourism in Antarctica.

In addition, climate change exacerbates socio-economic factors in different local contexts. For example, the collapse of the fishing industry is due to warming oceans and overfishing, which is amplified by climate change. Concrete consequences include changes in mobility with regards to both local and global transportation infrastructures, changes in human connectivity at local and global scales, and changes in food security driven by shifting food supply sources and food storage technologies.

These interconnected impacts underscore the complex and far-reaching consequences of polar system damage on human societies. Even though there are no local communities in Antarctica, it was stressed that mitigating climate change in Antarctica will protect societies around the world.

Changes in the Antarctic will have global repercussions. A few examples have been highlighted, including sea level rise caused by melting ice, leading to the risk of coastal cities being submerged; the failure of thermohaline circulation due to the warming and cooling of the Southern Ocean, creating unstable weather conditions around the world; and changes in Southern Ocean productivity and the nutrient cycle, affecting the productivity of the northern oceans. In addition, climate change in Antarctica and the Southern Ocean will have local impacts on activities, ecosystems, and heritage. For example, changes in westerly wind patterns can affect the sea-ice coverage that can preclude the ships to reach to supply the research stations.

In the Arctic, shorter winter periods for transporting essential supplies are having an impact on businesses and lifestyles. The consequences extend to infrastructure malfunctions, including challenges in food storage, housing, and oil and gas transportation.

RAPPORTEURS

ELENA ADASHEVA-KLEIN

EDA AYADIN

JOSÉ QUEIRÓS

FACILITATORS: MADS QVIST FREDERIKSEN, ELLE MERETE OMMA, BIRGIT NJÅSTAD

WORKSHOP 2

The loss of sea ice and permafrost thaw have far-reaching effects on various human activities in both the Arctic and globally. The securitization of the Arctic was highlighted by participants as a new concerning challenge and barrier for Indigenous peoples, local people, and researchers. Before the Russia-Ukraine war, security was broadened and extended from its concept of hard security to various areas such as energy security, food security and climate security. Since then, there is a tendency to favour hard security in funded projects in the social sciences. The question rightly raised was then: who decides on scientific priorities?

Tourism in the polar regions

The increase in polar tourism due to the loss of sea ice has significant economic and cultural implications for Indigenous and local Arctic communities, while also affecting the research infrastructure in Antarctica.

In the Arctic, both the surge in tourism and permafrost thaw alters mobility patterns, leading to the collapse of traditional ice roads while introducing new forms of mobility through increased air flights connecting remote locations with major cities. Tourism, as we know, comes with environmental consequences, and income from tourism does not always contribute to local communities, such as in the case of Greenland. The increase in tourism also raises questions about the production of tourist goods. The Saami Council provides a good example by creating trademarks for their cultural products, supporting local artists.

Mentioning the media, it was raised that journalists do not always manage to portray what is really happening in the polar regions, from physical to societal aspects. This constitutes a problem when it comes to raising awareness about needed changes in the polar regions.

During the discussion, tourism in Antarctica was seen as lacking optimal regulation. For example, at the Antarctic Treaty Conference, the issue of increasing numbers of ships and visitors was raised but did not receive sufficient attention. The question of the need to implement precautions or pricing mechanisms to regulate tourism in the polar regions was highlighted. One of the comments was that limiting tourism via cost of travel is probably not enough, and that global regulations for this issue are needed.

Possible mitigation strategies

Addressing the impacts of polar system damage requires a nuanced approach to mitigation and adaptation. Recognizing the diversity of contexts and capacities on the ground is crucial, emphasizing that a one-size-fits-all strategy is inadequate. Moreover, understanding local interests and needs is essential in devising effective mitigation and adaptation measures.

The participants identified the need for educational programs tailored to empower Indigenous communities. Additionally, strategic investments in infrastructure, both in Arctic and Antarctic facilities, play a pivotal role. Transitioning to renewable energy sources like solar and wind to replace diesel usage in remote communities were highlighted as strategies to enhance their resilience to the impacts of polar system damage.

The groups then discussed possible strategies for mitigating the impacts of climate change and human activities in the Antarctic. One of these is the possibility for CCAMLR (Commission for the Conservation of Antarctic Marine Living Resources) to establish temporary protection in specific marine areas giving the ecosystem time to recover. Permanent Marine Protected Areas were suggested as a potential mitigation measure that could be applied, alongside stricter regulations aimed at reducing tourism footprint.

A set of approaches was proposed in order to mitigate some of challenges of research activities impacting the polar regions. An increased use of remote sensing and autonomous vehicles could be effective in reducing footprints. In addition, more collaboration and sharing of physical resources such as ships and stations is needed, as well as an increase in open science and open data to limit the need for field research.

WORKSHOP 2

TOPIC 3: HUMAN HEALTH, FOOD, AND WATER SECURITY

On this topic, experts were invited to reflect on effective adaptation and mitigation strategies regarding human health, food, and water security. Undoubtedly, all three are influenced by the impacts of global climate change, spanning from extreme weather events and sea level rise to the salinization of groundwater, permafrost thaw leading to the release of pollutants and viruses, loss of sea ice, damage to polar ecosystems, and forced migration of populations.

Changes in the polar regions

The experts discussed the various changes taking place in the polar regions.
Discussions addressed the loss of ecosystem integrity and biodiversity, which has an impact on food production and food chains in other regions of the planet, as well as the impact of ocean acidification, a critical threat to numerous organisms with implications for the capacity of the ocean to absorb CO2. Acidification also has an impact on human health, as it affects food security and nutrient cycling, which are directly linked to resilient and productive ecosystems for people living in the Arctic.

Participants also highlighted the link between sea level rise and water security. Rising sea level can lead to groundwater intrusion which reduces the availability of freshwater availability, while we are also faced with reduced water availability later in the summer. In the Arctic, glaciers and snow are disappearing, and watersheds are drying up, leading to health problems and reduced water and food security.

Melting permafrost has been highlighted as a potential risk for dissemination of pathogens posing a direct threat to people's health. Thawing permafrost can also lead to the leakage of metals from human activities (mining) into the water and the release of greenhouse gases.

A specific question was raised concerning the risks for local communities in the Arctic. Fish and meat from the Arctic are often not consumed by the local communities, and the profits from exports often do not accrue to the Indigenous peoples. This raises the question of whether the fishing industry is really contributing to food security in the Arctic, or whether its activities are being carried out on behalf of economically well-established countries.

RAPPORTEURS

ARCHANA DAYAL

DIETER TETZNER

HANNA YEVCHUN

FACILITATORS: **BRIDGET LAROCQUE, VICTORIA HERRMANN, CÉLINE LE BOHEC**

WORKSHOP 2

Effective strategies

Participants proposed effective strategies for mitigating and adapting to these changes. The main means of mitigation highlighted was the reduction of greenhouse gas emissions at global level. The experts emphasised the need for the global mindset to shift away from rampant materialism. They stressed the importance of learning from Indigenous peoples, who have learned to live in harmony with nature and prioritise values such as clean air, food, and environmental stewardship.

The discussion also highlighted the importance of intercultural learning. Among other things, media stories play a crucial role in communicating the skills and knowledge possessed by Indigenous communities, who have learned to survive in difficult circumstances and build a cohesive and sustainable community. These human values need to be communicated to policymakers.

In addition to communicating Indigenous knowledge, the groups stressed the need for better scientific communication, in order to increase public confidence in scientists, warning about global climate change. The importance of connectivity between businesses, politicians and the general public was highlighted. Effective communication linking changes in the polar regions to concrete events, such as the impact of ice loss on sea level rise, is essential to foster understanding and action. Actionable measures were proposed, such as the need to develop strategies for early warning systems for events that directly affect human health, food security and water security.

KEY TAKEAWAYS FROM THE WORKSHOP

- **Identifying primary challenges:** Sea level rise, permafrost thaw, extreme weather events, and ice-free sea were recognized as the foremost challenges facing polar regions, directly impacting water security, food security, and health.
- **Pronounced risks to arctic infrastructure:** The Arctic regions face significant risks and vulnerabilities to infrastructure, necessitating robust adaptation measures.
- **Global solutions for mitigation:** Mitigation efforts primarily hinge on global-scale actions, particularly in reducing greenhouse emissions.
- **Communication strategies:** Developing effective communication strategies to convey polar research to non-experts was emphasized.
- **Understanding complex consequences:** The workshop highlighted the complex and far-reaching consequences of polar system damage on human societies. Loss of ecosystem integrity and biodiversity in polar regions has far-reaching impacts on food production and chains worldwide.
- **Importance of Indigenous knowledge:** Understanding local interests and needs and leveraging Indigenous knowledge are crucial in formulating effective mitigation and adaptation measures.
- **Environmental impacts of tourism:** Tourism in polar regions was acknowledged to have environmental consequences and income from tourism may not directly benefit local communities.
- **Global implications of Antarctic changes:** The impacts of changes in Antarctica extend globally, necessitating attention and action.
- **Shift in global mindsets:** A global shift away from materialism towards reprioritizing values was deemed necessary.
- **Role of Marine Protected Areas:** Marine Protected Areas were identified as a potential key mitigation measure warranting implementation.

JAZZ CONCERT

To close the two-day Polar Symposium, a jazz concert was given by a group called «The Arctic Market».

The Arctic Market is a project by the Academy of Music in Tromsø. The band writes and plays original compositions that take inspiration from the Norwegian scenery. The band consists of Roger Amundsen (guitar), Marie Bottheim (saxophone), Lars Folmer Jahren (piano) and Torkil Vollstad Giæver (drums). Together they expressed their interpretation of the Arctic.

A CONVERSATION WITH

JÉRÔME CHAPPELLAZ | Full Professor Ecole Polytechnique Fédérale de Lausanne Swiss Polar Institute
ANTJE BOETIUS | Director, Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research

The Polar Symposium organized a moderated conversation between Professors Chappellaz and Boetius, focusing on the outcome of the One Planet - Polar Summit that was held in Paris in November 2023.

The summit had gathered researchers and scientists from over fourty glacial and polar nations to discuss findings and observations with experts from the IPCC (Intergovernmental Panel on Climate Change) and the IPBES (Intergovernmental Platform on Biodiversity and Ecosystem Services), as well as with leaders of international institutions, NGOs, representatives of Indigenous peoples and local communities, private sector stakeholders in these regions, and political leaders from Arctic, Antarctic, and glacial nations.

As co-organizers of the summit, Jérôme Chappellaz and Antje Boetius were invited to share their ideas on the future of the cryosphere, drawing on their takeaways from the Summit.

They started by pointing out that the cryosphere is currently losing mass at an unpredictable rate, with implications for various aspects of the Earth system, including sea-level rise, potential changes to large-scale ocean currents and precipitation patterns.

The importance of a balanced cryosphere for human habitation was highlighted, with around 2 billion people dependent on water from high-altitude cryospheric regions.

A CONVERSATION WITH

The conversation then shifted to defining the main challenges, including driver of cryospheric loss, such as dependence on fossil fuels. Nations and governments are generally slow to address this important challenge and to advocate transitioning away from fossil fuel dependency.

They noted that there is a need to develop the potential of relevant knowledge about the cryosphere held by Indigenous populations and those who depend on a balanced cryosphere.

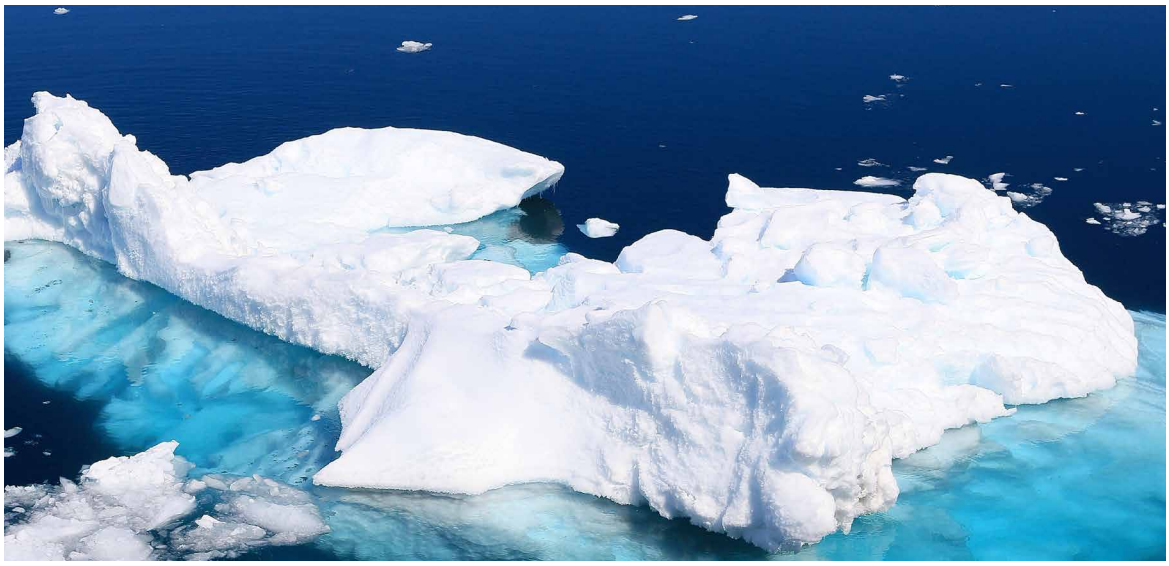
One of the key conclusions highlighted the lack of a robust and comprehensive reporting system for the global cryosphere accessible to the scientific community and the policymakers. It was suggested that a framework, like those established by the United Nations for climate and biodiversity, be developed to fill this gap.

Other avenues for future improvements in cryospheric research emerged from the summit, including the use of new and innovative technologies that will play a crucial role in the future of polar research.

Remote sensing from space, robotics and autonomous vehicles are all examples that will not only deliver data more efficiently, but also reduce the carbon footprint of field research, a process that young scientists are particularly keen to support. A clear message from the summit was the importance of strengthening links and collaborations between high-altitude and high-latitude research. Research questions in these two areas often overlap and are similar.

Asked about their personal challenges after the summit, the participants expressed a twofold sense of duty. They expressed a responsibility to deliver the conclusions of these scientific deliberations in concise presentations to the Heads of State within a limited timeframe.

They also underlined the ongoing challenge of bringing together the best available scientific data, despite existing gaps in knowledge. Ultimately, participants emphasised the need to adopt participatory approaches and to place science at the forefront of policy formulation.



A CONVERSATION WITH

ROMAIN TROUBLÉ | Executive Director, Tara Ocean Foundation
ANNE-CATHERINE OHLMANN | Director, Ice Memory Foundation

The Polar Symposium facilitated a moderated conversation between two unique polar research initiatives: The Tara Polar Station and the Ice Memory Foundation.

The conversation started by describing the two initiatives, supported by the Prince Albert II of Monaco Foundation, and their goals.
The Tara Polar station is an initiative of the Tara Ocean Foundation. It is a drifting polar scientific station currently under construction.

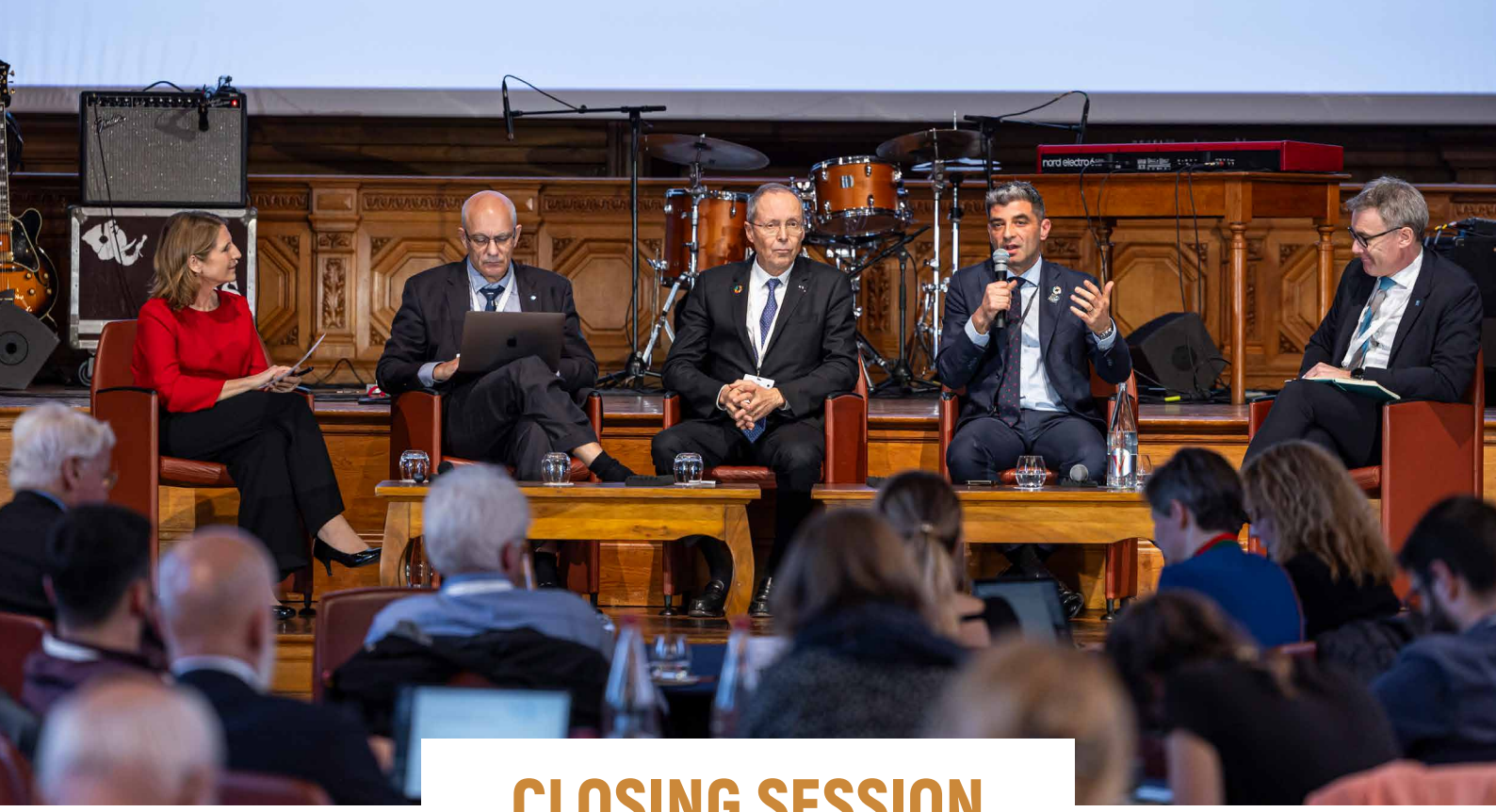
The 26-metre-long boat will be able to accommodate 18 crew members made up of scientists, engineers, navigators, a doctor and a media representative. The aim is to take scientists from all over the world on board for successive drifts from 2026 to 2045. It can operate autonomously for several hundred days in the Arctic and is operational in summer and winter.

In addition to the technical challenges, it is currently difficult to accommodate large numbers of scientists in a confined area of pack ice for long periods. The station aims to meet this challenge and contribute to the development of the necessary knowledge about the Arctic, which forms the basis for political decisions on its management and protection. The project is supported by the French government and a group of private donors, including the Prince Albert II of Monaco Foundation.

The Ice Memory Foundation aims to collect, safeguard and manage ice cores from some glaciers threatened by degradation or disappearance, in order to preserve the information, they contain for decades and centuries to come. The aim is to collect ice cores from 20 glaciers over 20 years. To date, ice cores have been taken from 9 glaciers.

A warehouse for the ice cores is being built in Antartica and scientists will be able to analyse the cores. This is a unique opportunity for future research, especially if some of the glaciers sampled will disappear as a result of global warming.

The results of the analysis will then be integrated into the political decision-making processes that are important for managing the global environment. The project is currently funded 50% by public sources and 50% by philanthropic sources, including the Prince Albert II of Monaco Foundation. Moreover, UNESCO has recognised the importance of the scientific and cultural heritage of glaciers, as well as the relevance of the «Ice Memory» initiative.



CLOSING SESSION

Henry Burgess, President, International Arctic Science Committee
Jefferson Cardia Simões, Vice President for Finance Scientific Committee on Antarctic Research
Olivier Wenden, Vice President & CEO Prince Albert II of Monaco Foundation
Robert Calcagno, CEO, Oceanographic Institute, Prince Albert I of Monaco Foundation

Representatives of the organisers were invited to reflect on the key takeaways from the conference and possible ways forward.

It was emphasised that there is a need for sustained efforts to encourage a change of perception in economic and political fora regarding the importance of the polar regions on a global scale. With the business sector increasingly championing ambitious sustainability and climate change initiatives, there is a unique opportunity to disseminate and integrate polar knowledge into broader discussions on sustainability and climate action, encouraging greater awareness and cooperation across sectors.

This Polar Symposium is one of few meetings which gather actors, rightsholders and stakeholders from both poles, fostering a useful dialogue between Arctic and Antarctic experts.

The main lessons highlighted at the closing session were the importance of the equal inclusion and participation of Indigenous knowledge. The key word for success used at the meeting was collaboration. Ambitious international collaborative actions were advocated as the main way forward. In addition, capacity building in the polar regions, in terms of opportunities for early career researchers through long-term planning, was one of the highlights of the meeting.

Linked to these key messages and as a conclusion the Polar Initiative committed to support polar science and to spread the messages of this Symposium.

ACRONYMS

AI	Artificial Intelligence
CCAMLR	Commission for the Conservation of Antarctic Marine Living Resources
ECRs	Early Career Researchers
ESG	Environmental, Social and Governance factors
EU	European Union
IASC	International Arctic Science Committee
ICARP	International Conference on Arctic Research Planning
ICARP IV	Fourth International Conference on Arctic Research Planning (ICARP IV) Process / 2022 - 2026
ICCI	International Cryosphere Climate Initiative
IDE	Inclusion, Diversity, and Equity
InSync	International Science and Infrastructure for Synchronous Observation
IPBES	Intergovernmental Platform on Biodiversity and Ecosystem Services
IPCC	Intergovernmental Panel on Climate Change
IPY	The International Polar Year. The next one being planned in 2032/33
MPAs	Marine Protected Areas
NGOs	Non-Governmental Organization
PA2F	Prince Albert II of Monaco Foundation
UArctic	University of the Arctic
UNESCO	United Nations Educational, Scientific and Cultural Organization
SCAR	Scientific Committee on Antarctic Research
WWF	World Wildlife Fund

PARTICIPANTS

- **Elena Adasheva-Klein**, Yale University & IASC-PA2F Fellowship Program
- **S.E.M Giulio Alaimo**, Ambassadeur Extraordinaire et Plénipotentiaire d'Italie à Monaco
- **Denis Allemand**, Monaco Scientific Center
- **Roger Amundsen**,The Arctic Market
- **Jamie Anderson**, All Parliamentary Group on Polar Regions at the UK Parliament
- **Eda Ayaydin**, University of London - Institute in Paris IASC-PA2F Fellowship Program
- **Renuka Badhe**, European Polar Board
- **Richard Bellerby**, Norwegian Institute for Water Research (NIVA)
- **Timm A. Bergold**, Consul Honoraire d'Allemagne à Monaco
- **João Bettencourt**, University of Bergen
- **Maria Betti**, Oceanographic Institute - Prince Albert I of Monaco Foundation Dante Alighieri Comitato di Monaco
- **Brigitte Boccone-Pagès**, Conseil National de Monaco
- **Antje Boetius**, Alfred Wegener Institute (AWI)
- **Esther Borgioli**, Prince Albert II of Monaco Foundation
- **Marie Bottheim**, The Arctic Market
- **Camilla Brekke**, Norwegian Polar Institute
- **Cassandra Brooks**, University of Colorado Boulder
- **Essenia Budina**, WWF International
- **Henry Burgess**, International Arctic Science Committee (IASC)
- **Kilian Bus**, Prince Albert II of Monaco Foundation
- **Jilda Caccavo**, Institute Pierre-Simon Laplace
- **Robert Calcagno**, Oceanographic Institute - Prince Albert I of Monaco Foundation
- **Jefferson Cardia Simões**, Scientific Committee on Antarctic Research (SCAR)
- **Patrice Cellario**, Département de l'Intérieur - Gouvernement Princier - Principauté de Monaco
- **Jérôme Chappellaz**, Ecole Polytechnique Fédérale de Lausanne (EPFL) Swiss Polar Institute
- **Jérôme Chartier**, Albédo Foundation for the Cryosphere
- **Miyase Christensen**, Stockholm University
- **Romain Ciarlet**, Prince Albert II of Monaco Foundation
- **Marco Colasanti**, Prince Albert II of Monaco Foundation
- **Florence Colleoni**, Scientific Committee on Antarctic Research (SCAR)
- **Steeve Comeau**, Laboratoire d'Océanographie de Villefranche, LOV Institut de la Mer de Villefranche, IMEV
- **Marjorie Crovetto**, Mairie de Monaco
- **Björn Dahlbäck**, Sustainability professional
- **S.E.M Pierre Dartout**, Ministère d'État - Gouvernement Princier - Principauté de Monaco
- **Archana Dayal**, Aberystwyth University IASC-PA2F Fellowship Program
- **Christian de Marliave**, Edition Paulsen
- **Aurelie Delaissez**, Consulate of United State of America
- **Maurizio Demarte**, Istituto Idrografico della Marina
- **Florence Descroix-Comanducci**, International Atomic Energy Agency (IAEA)
- **S.E.M Jean d'Haussonville**, Ambassade de France à Monaco
- **Matthew Druckenmiller**, International Arctic Science Committee (IASC)
- **Sam Dupont**, University of Gothenburg
- **Markus Dupont**
- **Johanna Durand**, Ice Memory Foundation
- **Olaf Eisen**, Alfred Wegener Institute
- **Hiroyuki Enomoto**, International Arctic Science Committee (IASC)

PARTICIPANTS

- **Lars Folmer**, Jahren The Arctic Market
- **Caroline Fontanili**, International Hydrographic Organization (IHO)
- **René Forsberg**, Scientific Committee on Antarctic Research (SCAR)
- **Jane Francis**, British Antarctic Survey
- **Delphine Frappier**, Monaco Scientific Center
- **Jana Friedrich**, International Atomic Energy Agency (IAEA)
- **Gerlis Fugmann**, International Arctic Science Committee (IASC)
- **Rasmus G. Bertelsen**, UiT – Arctic University of Norway
- **Pierre Gilles**, Oceanographic Institute - Prince Albert I of Monaco Foundation
- **Macelloni Giovanni**, Scientific Committee on Antarctic Research (SCAR)
- **Alfredo Giron**, World Economic Forum
- **Léa Glâtre**, Prince Albert II of Monaco Foundation
- **Fred Glesnes**, UiT The Arctic University of Norway
- **Genie Godula**, Master of Ceremony
- **James Gray**, All Parliamentary Group on Polar Regions at the UK Parliament
- **Gwenaëlle Gremion**, Association of Polar Early Career Scientists (APECS)
- **Eoghan Griffin**, Scientific Committee on Antarctic Research (SCAR)
- **H.E Ólafur Ragnar Grímsson**, Arctic Circle
- **Charlène Guillaumot**, Lauréate du prix de thèse de l'institut océanographique Université de Bourgogne
- **Hugo Guímaro**, Association of Polar Early Career Scientists (APECS)
- **Alice Guzzi**, Association of Polar Early Career Scientists (APECS)
- **Guilherme Haguenauer**, Prince Albert II of Monaco Foundation
- **Lina Hansson**, Prince Albert II of Monaco Foundation
- **Victoria Herrmann**, Prince Albert II of Monaco Foundation, Re. Generation Programme
  Arctic Institute, National Geographic
- **Larry Hinzman**, US Interagency Arctic Research Policy Committee (IARPC) White House Office
  of Science and Technology Policy (OSTP)
- **Jessica Huaracayo**, Consulate of United State of America
- **Jean Jaubert**, Prince Albert II of Monaco Foundation
- **Sarah Jones**, Couture International Hydrographic Organization (IHO)
- **Hanna K. Lappaleinen**, University of Helsinki
- **Grete Kaare Hovelsrud**, Nord University Nordland Research Institute
- **Michael Karcher**, Alfred Wegener Institute (AWI)
- **Deneb Karentz**, University of San Francisco
- **James Kirkham**, International Cryosphere Climate Initiative (ICCI)
- **Milli-Reetta Korhonen**, Dancer
- **Sophie Krafft**, Consulate of Sweden in Monaco
- **Lars Kullerud**, Uarctic
- **Bridget Larocque**, Arctic Athabaskan Council
- **Clément Lavigne**, Oceanographic Institute - Prince Albert I of Monaco Foundation
- **Céline Le Bohec**, Centre Scientifique de Monaco
- **Vicki Lee Wallgren**, WWF Global Arctic Programme
- **Lydie Lescarmontier**, International Cryosphere Climate Initiative (ICCI)
- **Camille Lin**, PolarJournal
- **Léa Lippisch**, Prince Albert II of Monaco Foundation
- **Lina Madaj**, Association of Polar Early Career Scientists (APECS)

PARTICIPANTS

- **Nadège Massé**, Prince Albert II of Monaco Foundation
- **Elle Merete Omma**, Saami Council
- **Marc Metian**, International Atomic Energy Agency (IAEA)
- **Helen Millman**, World Economic Forum
- **Arild Molstad**, Author, photojournalist, conservationist, consultant
- **Philippe Mondielli**, Prince Albert II of Monaco Foundation
- **Salomé Mormentyn**, Prince Albert II of Monaco Foundation
- **Birgit Njåstad**, Norwegian Polar Institute
- **Mark Nuttall**, University of Alberta
- **Anne-Catherine Ohlmann**, Ice Memory Foundation
- **Ásdís Ólafsdóttir**, Arctic Circle
- **Sara Olsvig**, Inuit Circumpoar Council
- **Hélène Onoforo Sanaia**, Prince Albert II of Monaco Foundation
- **Olav Orheim**, Prince Albert II of Monaco Foundation
- **Romain Ottavj**, Prince Albert II of Monaco Foundation
- **Prof. Dr. Frederik Paulsen**, Albédo Foundation for the Cryosphere, Uarctic
- **Viljami Pekkala**
- **Emilie Pillon**, Université Paris Nanterre
- **José Queirós**, Association of Polar Early Career Scientists (APECS)
- **Derek Queisser de Stockalper**, Prince Albert II of Monaco Foundation
- **Mads Qvist Frederiksen**, Arctic Economic Council
- **Patrick Rampal**, Monaco Scientific Center
- **Beatriz Recinos**, University of Edinburgh IASC-PA2F Fellowship Program
- **Inge Relph**, Global Choices
- **Hélène Riehl**, Assisante de madame PRATTE Consulat du Canada à Monaco
- **Ricardo Roura**, Antarctic and Southern Ocean Coalition (ASOC)
- **Federica Scarpa**, University of Lapland International Arctic Science Committee (IASC)
- **Snorri Sigurðsson**, Iceland Institute of Natural History
- **Malgorzata (Gosia) Smieszek**, University of Tromsø – The Arctic University of Norway
- **Vanessa Spadetto**, EU-Interact
- **Viktorija Starych-Samuoliene**, Council on Geostrategy
- **Sarah Marie Strand**, APECS International Directorate
- **Dieter Tetzner**, British Antarctic Survey SCAR-PA2F Fellowship Program
- **Paolo Tricotti**, Consulate of Chile in Monaco
- **Romain Troublé**, Tara Océan Foundation
- **Céline Vacquier**, Prince Albert II of Monaco Foundation
- **Laurence Van Zeveren**, Prince Albert II of Monaco Foundation
- **Cyrielle Vaucois**, Prince Albert II of Monaco Foundation
- **Torkil Vollstad Giæver**, The Arctic Market
- **John Weller**, Photographer, writer & filmmaker
- **Olivier Wenden**, Prince Albert II of Monaco Foundation
- **Gail Whiteman**, Arctic Basecamp Foundation, University of Exeter
- **Hanna Yevchun**, National Antarctic Scientific Centre of Ukraine, SCAR-PA2F Fellowship Program

ACKNOWLEDGEMENTS

The partners of the Polar Initiative are grateful to the Albédo Foundation for the Cryosphere and to Prof. Dr. Frederick Paulsen for their support in making this 2nd edition of the Polar Symposium possible.

The Polar Initiative partners wish to deeply thank the co-organizers of the workshops and moderators of the panels, namely the European Polar Board and the World Economic Forum, for their valuable contributions to this event.

Special thanks to the Association of Polar Early Career Scientists for their support in including early career researchers as rapporteurs, as well as the Polar Initiative fellows.

Finally, the Polar Initiative wishes to deeply thank all participants for their meaningful contributions to the conference, with special recognition to the keynote speakers, fireside speakers, panelists, moderator Genie Godula, Polar Symposium conference writer Björn Dahlbäck, and all other individuals who played a role in making the event a success.

Photo credit: © Philippe Fitte/FPA2

CO-ORGANIZERS

PRINCE ALBERT II OF MONACO FOUNDATION

The Prince Albert II of Monaco Foundation is a global non-profit organisation committed to progressing Planetary Health for present and future generations. Founded by HSH Prince Albert II of Monaco in 2006, the Foundation exists to promote a new relationship with nature and the innovations that can impact this change. The Foundation aims to bring humanity together to empower impactful solutions for our planet's biodiversity, climate, ocean and water resources. It works in three main geographical areas : the Mediterranean Basin, the Polar Regions and the Least developed countries.

www.fpa2.org • Tel +377 98 98 44 44
Fondation Prince Albert II de Monaco

THE SCIENTIFIC COMMITTEE ON ANTARCTIC RESEARCH (SCAR)

SCAR is a thematic organisation of the International Science Council (ISC), and was created in 1958. SCAR is charged with initiating, developing and coordinating high quality international scientific research in the Antarctic region (including the Southern Ocean), and on the role of the Antarctic region in the Earth system. SCAR provides objective and independent scientific advice to the Antarctic Treaty Consultative Meetings and other organizations such as the UNFCCC and IPCC on issues of science and conservation affecting the management of Antarctica and the Southern Ocean and on the role of the Antarctic region in the Earth system.

www.scar.org • Tel +44 1223 336550
Scientific Committee on Antarctic Research (SCAR)

THE INTERNATIONAL ARCTIC SCIENCE COMMITTEE (IASC)

IASC is a non-governmental, international scientific organization. IASC is committed to 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. 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.

www.iasc.info • Tel +354 515 5824
International Arctic Science Committee

CO-ORGANIZERS

OCEANOGRAPHIC INSTITUTE, PRINCE ALBERT I OF MONACO FOUNDATION

INSTITUT OCÉANOGRAPHIQUE MONACO

The Oceanographic Institute is committed to increasing awareness of the riches and fragility of the ocean, and to promoting its sustainable management and rational and effective protection. To achieve this, it acts as mediator between scientific and socioeconomic players, the general public, political decision-makers and the private sector. It implements this mission highlighting the exceptional heritage of Prince Albert I and the exemplary commitment of HSH Prince Albert II of Monaco to "Promote knowledge, love and protection of the ocean".

www.oceano.org • Tel +377 93 15 36 00
Institut océanographique, Fondation Albert Ier, Prince de Monaco

THE MONACO SCIENTIFIC CENTER

CENTRE SCIENTIFIQUE DE MONACO

Dedicated to scientific research, fundamental and applied, the work developed by the teams of the Monaco Scientific Center (CSM) are grouped into three departments. The primary concern of researchers in these departments is to study the bases of the functioning of organisms in order to better understand, and therefore better anticipate, the effects of environmental stresses (Physiology of Conservation) or therapeutic treatments (Translational Biology). The proximity of researchers favors rich exchanges that should bring new ideas to the boundaries of disciplines.

www.centrescientifique.mc • Tel +377 97 77 44 00
Centre scientifique de monaco

EUROPEAN POLAR BOARD

EUROPEAN POLAR BOARD

The European Polar Board (EPB) is an independent organisation focused on major strategic priorities in the Arctic and Antarctic. EPB Members include research institutes, logistics operators, funding agencies, scientific academies and government ministries from across Europe. The EPB has a mission to improve European coordination in Arctic and Antarctic research through improved information sharing, optimised infrastructure use and joint initiatives between Members.

www.europeanpolarboard.org
European Polar Board

CO-ORGANIZERS

THE WORLD ECONOMIC FORUM

The World Economic Forum is the International Organization for Public-Private Cooperation. It provides a global, impartial and not-for-profit platform for meaningful connection between stakeholders to establish trust, and build initiatives for cooperation and progress. In a world marked by complex challenges, the World Economic Forum engages political, business, academic, civil society and other leaders of society to shape global, regional and industry agendas. Established in 1971 as a not-for-profit foundation, it is independent, impartial and not tied to any special interests, upholding the highest standards of governance and moral and intellectual integrity.

www.weforum.org
World Economic Forum

SPONSOR

ALBÉDO FOUNDATION FOR THE CRYOSPHERE

Created under the aegis of the CNRS Foundation, the Albédo Foundation for the Cryosphere aims to finance research of French and French-speaking interest on the question of poles and glaciers in a desire to find solutions for their preservation. It also aims to carry out information and educational activities aimed at the general public. It is chaired by Frederik Paulsen.

www.albedocryosphere.fr
Fondation Albédo pour la cryosphère

PARTNER

THE ASSOCIATION OF POLAR EARLY CAREER SCIENTISTS (APECS)

The Association of Polar Early Career Scientists (APECS) is an international and interdisciplinary organization for undergraduate and graduate students, postdoctoral researchers, early career faculty members, early career professionals, educators and others with interests in Polar and Alpine regions and the wider cryosphere.

www.apecs.is
APECS - Association of Polar Early Career Scientists


POLAR INITIATIVE
POLAR SYMPOSIUM
FROM ARCTIC TO ANTARCTIC
The Cold is Getting Hot
22 - 23 FEBRUARY 2024
OCEANOGRAPHIC MUSEUM • MONACO

CONTACTS

Salomé Mormentyn
Coordinator of the Polar Initiative
thepolarinitiative@fpa2.org

Nadège Massé
Press/Media
nmasse@fpa2.org

An initiative by

PRINCE ALBERT II OF MONACO FOUNDATION

In partnership with

SCAR

IASC

OCEANO INSTITUT OCEANOGRAPHIQUE MONACO

Polar symposium partners

CSM CENTRE SCIENTIFIQUE DE MONACO

EUROPEAN POLAR BOARD

WORLD ECONOMIC FORUM

Supported by

FONDATION ALBEDO POUR LA CRYOSPHÈRE

www.thepolarinitiative.org