

Arctic Frontiers 2017 Call for Papers

White space – blue future

The ocean carries vast resources, many of which are undeveloped and undiscovered. There are still many poorly known places on the Arctic map, and we know more about the surface of moon than the oceans. As the climate gets warmer, new areas of ocean in the Arctic are becoming accessible. This has resulted in an increased attention from scientists, businesses and states. Arctic Frontiers 2017 will discuss the gaps in our knowledge about the Arctic oceans and the role these will play in the future.

The key questions to be asked are: What do we know about the processes taking place under the ice and the impact of the polar night on Arctic ecosystems? Changes occur in the Arctic ecosystems, how much of it is natural? As the arctic productivity alters, new species establish, existing species change their geographical extent, creating opportunities for new fishing grounds., How do these processes alter the dynamics of fisheries? With new areas becoming accessible, how do we assess, manage and mitigate risk? How can technology be a driver for arctic business development? With new areas to operate in, how do people connect?

The 2017 Arctic Frontiers Science section will address four main themes:

- Part I: Bridging physical and biological processes
- Part II: Pushing back the Frontiers: New approaches, new technologies, and new insights
- Part III: Future Fisheries
- Part IV: Managing risks in policymaking and the law

This call for papers addresses only the science section that takes place from 25 January to 27 January 2017.

On behalf of the Scientific Program Committees, we have great pleasure in inviting you to submit one or more online abstracts, for oral or poster presentation, to any of the four parts. We ask you to do so in accordance with the instructions provided on the Call for Papers page at www.arcticfrontiers.com. All abstracts will be reviewed by members of the three scientific committees for rating of abstract quality and presentation content.

Call for Papers closes on 20 September 2016.

Part I: Bridging physical and biological processes

The gateways, inflow-shelves, gateways and shelf-break regions of the Arctic Ocean, are in a state of transition. Major changes in the physical environment cause responses on biogeochemical- and ecosystem levels. Altered hydrography and sea ice conditions and changed timing of seasonal changes already influence productivity patterns and pathways, ecosystem structure and function, and biogeochemical cycling.

To project future Arctic productivity and ecosystems responses, we need to understand how physical conditions evolve, the relation to biogeochemical cycling, biological communities, and their interactions. Our understanding is limited by lack of sufficient insight into microbial and lower trophic food webs, their impact on and response from higher trophic levels, and by the relatively sparse observational datasets. Arctic Ocean gateways link the Arctic to lower latitudes, and thus represent key sites to study responses to current changes and how advection impact Arctic Ocean food webs.

This session aims to synthesize knowledge to facilitate synergy from recent investigations. This will increase our understanding of how climate change impact present and future productivity, fate of production, seasonality and communities in the Arctic marine gateway regions including the ecosystem service they provide.

The Arctic Frontiers 2017 session on Bridging Physical and Biological Processes aims to integrate these important aspects of Arctic marine systems by inviting abstracts on the following themes:

- Physical processes in the Arctic Ocean and their impact on hydrography, biology and biogeochemistry
- Feedback processes, including ecosystem processes affecting the physical system
- Productivity and the fate of primary production
- Biogeochemical, biological and ecosystem responses in a changing Arctic
- Observations, experimental- and modeling studies on Arctic inflow- and shelf break oceanography, ice cover, productivity and ecosystems
- Lower trophic level communities and interactions
- Coupling between sub-Arctic and higher latitude oceans and marine systems
- Sea Ice Ecology and coupling to pelagic and benthic systems
- Productivity regimes and impact in the new Arctic Ocean

Scientific committee:

Prof. **Marit Reigstad**; UiT The Arctic University of Norway

Prof. Aud Larsen; UniResearch, Norway

Dr. Christian Wexels Riser; Research Council of Norway

Dr. Monika Kedra; Institute of Oceanology Polish Academy of Sciences

Dr. Christine Michel; Fisheries and Oceans Canada

Prof. Lars Henrik Smedsrud University of Bergen, Norway

Christine Dybwad (UiT, Norway) secretary

The session is organized by the research projects CarbonBridge (NFR), MicroPolar (NFR) and Arctic in Rapid Transition (IASC), but is open to all relevant contributions.

Part II: Pushing back the Frontiers: New approaches, new technologies, and new insights

For decades, the majority of Arctic marine research was performed from spring to autumn, and limited to field stations and areas accessible by ship. Results from these studies have been used to develop the paradigms used to understand Arctic marine ecosystems operate. In recent years, however, it has become clear that the Arctic is highly heterogeneous and findings from one area may not be applicable to other areas. Further, processes taking place under the ice, or at times without sunlight, times from which little data exist, may profoundly shape how ecosystem functioning. All this has led to many paradigms being challenged or refined in ways that change how we view the Arctic in this period of climatic change.

This session will highlight the insights gained from recent research that has:

- **Studied ecosystems during the polar night.** The Polar night can no longer be viewed as a time when most of the Arctic ecosystem is dormant, but how newly discovered processes affect ecosystem functioning is largely still unknown.
- **Investigated poorly known locations in the Arctic.** The under-ice community of the central Arctic can be far more productive than previously thought. Blooms within and under the ice can nourish pelagic and benthic food webs, but how these blooms are generated and sustained, and how they may change in a warmer Arctic is still under investigation.
- **Deployed technology and models to obtain a broader view of the Arctic.** Robotics and mooring networks make virtually all areas of the Arctic accessible at appropriate observational scales. And complex ecosystem models are the only method to link field and laboratory studies to view systems at regional and pan-Arctic scales.
- **Combined disciplines in unique ways to obtain a more integrated picture of Arctic ecosystems.** Creative approaches bring us closer than ever to identifying mechanisms behind the patterns we observe. Behavioral, physiological, and molecular studies provide insight into community dynamics and processes. And disciplines such as glaciology, geology, and atmospheric chemistry allow a more integrated view of ecosystem processes and trajectories of change.

We welcome abstracts from studies where frontiers have been crossed through such new approaches to test current paradigms, develop new conceptual models, and fill in the 'white spaces' on our maps of Arctic ecosystems.

Scientific committee:

Prof. Paul E. Renaud; Akvaplan-niva, and University Centre in Svalbard

Prof. Antje Boetius; Alfred-Wegener-Institute for Polar and Marine Research, Germany

Dr. Finlo Cottier; Scottish Association for Marine Science, and UiT The Arctic University of Norway

Prof. Torkel Gissel Nielsen; Technical University of Denmark, and Greenland Climate Research Centre

Prof. Jan Marcin Węsławski; Institute of Oceanology Polish Academy of Sciences

Part III: Future Fisheries

The future Arctic is expected to be warmer and less icy, opening possibilities for existing species to change their geographical extent and for new species to establish. This also creates opportunities for new fishing grounds to be harvested. International markets stimulate exploitation of resources that can be consumed very far from their Arctic origin or for species at low trophic levels that have not been exploited previously. In parallel, populations of large marine mammals are anticipated to increase, as a result of international conservation measures, with indirect impacts on fisheries dynamics. These changes are anticipated to lead to major reconfiguration of the arctic ecosystems, exploitation patterns and conservation priorities. This theme session will address this general theme through three specific sub-sessions, each provided with one invited key-note speaker.

Sub session 1 – Future harvestable resources: which, where and how much?

There is noticeable evidence that numerous marine species are already moving northward as a result of ocean warming. Species displacement is partly controlled by temperature but other factors such as bottom habitat types, light regime, seasonal ice cover, density dependent habitat selection and interspecific interactions can modulate or even counter the effects of warming. For this reason, anticipating the future distribution and abundance of harvestable resources in the Arctic and sub-Arctic remains challenging. In addition to species exploited by traditional fisheries, new resources at low trophic levels or with market opportunities in regions far from the Arctic are emerging. This session will address the specific issue of the mechanisms controlling the distribution of traditional harvestable resources, the emergence of new potential resources and how the availability of these resources may change in the future.

Sub session 2 – Fisheries adaptation: reaction or anticipation?

The abundance and composition of harvestable resources within an ecosystem are naturally fluctuating. Fisheries management and regulations, such as harvest control rules, can ensure some degree of stability and predictability for the fishing industry in the short term. On the other hand, large amplitude variations in resource abundance, geographical distribution and species composition over longer periods of time are rarely explicitly considered in management plans. Paralleled to these changes, technological developments create opportunities for more efficient exploitation of valuable living marine resources or for the exploitation of new ones. This session will address the specific issue of how fisheries prepare for anticipated future changes in resource availability. How do managers and fishers adapt to changes in resource availability as they happen and what is their capacity to anticipate such changes over longer periods of time?

Sub session 3 – Top predators: growing numbers, growing pressure or resources?

The community of Arctic top predators will see drastic changes in the future, due to climate and related changes, with synergist or antagonist effects. Some

populations, especially ice-dependant species, might be declining or retreating, while other species may be blooming and new species appear. In parallel, conservation efforts favour in increase of some marine mammal and bird populations. The dynamic of the Arctic food chain will change, as a result of different predation pressures, but also different exploitation pressures. Predicting the potential increase/decrease in top predator populations and their geographical redistribution is essential in predicting changes in ecosystem services and the possible new balance between provisioning (food resources through fishing, sealing and whaling) and cultural (recreation, artistic inspiration, education) services. A new dynamic may also emerge in the competition for the territorial use of the ocean, in particular in coastal areas.

This session will address anticipated increase/decrease in marine mammals and birds populations and their impact on fisheries through predation pressure, fisheries/conservation balance (by-catch and responsible fishing) and fisheries/tourism interests. Is there a place for sustainable exploitation and balanced fishing?

Scientific committee (preliminary):

Dr. Benjamin Planque, Institute of Marine Research, Norway

Prof. Mark Dickey-Collas; International Council for the Exploration of the Sea (ICES), Denmark - tbc

Dr. Mette Skern-Mauritzen; Institute of Marine Research, Norway

General Secretary Geneviève Desportes; North Atlantic Marine Mammal Commission (NAMMCO), Norway

Part IV: Managing risk in policymaking and law

It is difficult to develop sound policies and good laws even when the facts and future developments, including the consequences of alternative actions, are relatively clear. Much more frequently, however, uncertainties abound on factual matters as well as on future trajectories. This is certainly the case for the Arctic Ocean. This part of the Science Program invites papers that examine the methods for assessing risk, the principles for approaching risk, as well as the institutional mechanisms stakeholders can use when seeking to influence risk management in the making of policy and the development of law. Topics may include the following:

- **Assessment:** Risk is a probability for an undesired event, multiplied with the amount of harm caused by the event. However, the assessment of such risks is rather complicated. The tolerance for different risks varies between persons, and the risk aversion may be greater in respect of spectacular incidents than the less spectacular. In policymaking and the law, there is a need for tools to assess risks in a meaningful way, both the singular risks and the total risks of an activity.
- The environmental area has provided fertile ground for developing methods for risk assessment but the scope of interest is much broader. Depending on perspective, the focus may rest on risks to human lives or to human cultures, the risk of being observed and subjected to criminal sanctions, or on various kinds of political risk. Although so far less developed and standardized than in the environmental context, such risks must be identified and managed in the making of policy and law.
- A prominent example is the risk of losing a recognized position, such as a property right or indigenous people's rights. One way to handle it is substitute new, less risk exposed, rights for the threatened rights. For instance, if activities such as oil exploitation pose a risk to the way of life for a group of indigenous peoples, then they could get a share in the activity as a sort of compensation. We invite a discussion on such mechanisms and similar mechanisms, including a discussion on rights that may be threatened by new activities.
- **Principles:** The precautionary principle in environmental law and policy is an example of how to manage uncertainties in respect of possible environmental harm. However, there is a difference between taking some precautions and taking no risks at all. And even under the precautionary principle, threats to the environment must be identified and established with some certainty in order to be taken into account. So how much help is really the precautionary principle? Is a zero emission vision realistic?
- The polluter pays principle represents another approach. The idea is that activity that causes environmental harm should pay for the clean-up and perhaps more, so that the cost of pollution is internalized in the accounts of the activity in order to motivate for preventive measures. But are such remedies effective for this purpose, and why do they differ so much in the Arctic jurisdictions?

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- The no harm principle provides that no state should cause harm on the territory of another state. But how does this work in relation to activities that do not cause harm, but have the potential to do so? One example could be oil exploitation in one sector of the Arctic on conditions that neighboring states do not find safe.
 - **Institutional mechanisms:** A mechanism closely related to liability is insurance. On the one hand, insurance warrants that compensation will be paid when due. This implies that insurance should be mandatory, even to a greater degree than what is the case in the Arctic today. On the other hand, insurance mitigates the exposure for environmental liability, and therefore the effect of the polluter pays principle. This implies that there should be no insurance. How could insurance best be utilized as a risk management tool?
 - A more specific institution is the Arctic Council, with its 20-year history of assessing and responding to a wide range of Arctic risks. How effective is this body in identifying and mitigating risks? Is there room for improving its internal structure or its engagement with other institutions that capable of influencing the making of policies and laws applicable in the Arctic?
 - Related to the Arctic Council is the process of developing stronger agreements on Arctic scientific cooperation. What are the dilemmas and contented issues in this process, and how will the Arctic science agreement influence the basis for risk assessment and mitigation?
 - Area protection is another dynamic area in Arctic risk management, one that also connects to UN-level negotiations on biodiversity protection beyond national jurisdiction.
 - The environmental basis for future fisheries in the Central Arctic Ocean, outside the 200-mile zones of the coastal states, is the subject of another part of the Science Program but also highly relevant for the management of risks to Arctic marine stocks and their associated ecosystems.

In the Arctic, there are many activities and choices that may be risk relevant. In this session, the focus is risk analysis rather than examples of risk relevant activities. However, examples are encouraged.

Scientific committee (preliminary):

Prof. **Erik Røscæg**; University of Oslo, Norway

Prof. **Per Selle**; University of Bergen, Norway

Prof. Olav Schram Stokke; University of Oslo, Norway

Prof. Elena Andreeva Vylegzhanina, Moscow State Institute of International Relations, Russia - tbc

Prof. Aldo Chircop; Dalhousie University, Halifax, Canada - tbc

Prof. Erik Franckx; Vrije University, Brussel, Belgium - tbc

Prof. Arne Huseby; University of Oslo, Norway - tbc