



Ministry of
Education
and Culture



Bundesministerium
für Bildung
und Forschung

Themes of the second Arctic Science Ministerial meeting

Information note to invited Governments of 20 December 2017

Introduction

The rapid changes happening in the Arctic – mostly triggered by global warming caused by far-flung greenhouse gas emissions - are primarily impacting its fragile ecosystem and have deep impacts on the people living there. On a broader scale, Arctic changes are influencing global changes such as those on the climate system and on sea levels. Understanding the consequences of these changes and their connection to global environmental, economic, societal and governance factors requires improved knowledge of local, regional and global processes. Arctic research and observation are therefore essential for monitoring and predicting the evolution of these changes and its impacts on regional to global scales.

There is a sense of urgency among decision-makers and awareness in the public opinion regarding the global importance of changes taking place in the Arctic. These challenges demand for coordinated and carefully planned collective efforts, as no country can work in isolation in this difficult environment, under harsh working conditions.

The first Arctic Science Ministerial was unanimously considered a success and proved to be key in the advancement of sustainable research and observation programmes. It highlighted, *inter alia*, the fact that the Arctic is still underrepresented in our global observing efforts and capabilities, and many opportunities exist to enhance our global data gathering efforts, also through growing community-based observing. The joint statement signed at the first Arctic Science Ministerial recognises that international collaboration and the inclusion of Arctic Indigenous peoples' representatives in science are essential to advancing research in the Arctic.

The second Arctic Science Ministerial (ASM2) aims to promote the results of the deliverables presented at the first Arctic Science Ministerial and to further enable the capability to respond to major societal challenges in the Arctic. It also aims to foster further scientific cooperation among a wide number of countries and representatives of indigenous peoples.

The second Arctic Science Ministerial will focus on three themes where an improved and better-coordinated international scientific cooperation effort can provide clear opportunities to advance the understanding of and the ability to respond to the impact of rapid Arctic changes.

The organisers of ASM2 agreed on the following themes:

1. Strengthening, Integrating and Sustaining Arctic Observations, Facilitating Access to Arctic Data, and Sharing Arctic Research Infrastructure
2. Understanding Regional and Global Dynamics of Arctic Change
3. Assessing Vulnerability and Building Resilience of Arctic Environments and Societies

Theme 1. Strengthening, Integrating and Sustaining Arctic Observations, Facilitating Access to Arctic Data, and Sharing Arctic Research Infrastructure

The Arctic is a complex system, and it remains a challenge to monitor and forecast changes – even more so due to its vastness, low population density, and extreme conditions.

Arctic research is thus difficult and expensive, and it requires the availability of costly research infrastructures to observe, monitor and understand the rapid changes taking place in the Arctic. Cooperation among Countries and research institutions is therefore mutually beneficial for the partnering entities.

Existing national and international observing and research efforts are not yet fully able to meet the demand for comprehensive and integrated information on the Arctic. There is a need to enhance coordination and collaboration on Arctic observations from indigenous observers to high-tech autonomous systems.

Costs can be reduced not only by sharing research infrastructure and observing systems, but also by making data freely and openly available in a timely manner.

An ideal observing system has a high level of complexity, as it should serve global requirements (such as on climate change), as well as other needs at different scale, responding to interests at regional, national or local level.

The demonstration of the benefits and of the value of an integrated Arctic observing system is essential to justify the required long-term investments. Significant advances from the first Arctic Science Ministerial have happened in this field.

Theme 2. Understanding Regional and Global Dynamics of Arctic Change

Recent years show a continual decline of summer sea ice extents, and also an increase in surface mass balance loss in Greenland's ice sheet. When warming temperatures gradually melt ice over time, solar energy is absorbed at the exposed surfaces and temperatures rise. Delayed ice growth in fall and earlier ice melt in spring expose dark ocean waters for a longer period in summer and create a positive feedback of ice melt. This begins a cycle of warming and melting in the ocean and on land, also with effects on permafrost leading to potential further increase in greenhouse gas emissions. All these changes - and their dynamics - affect ocean and atmospheric circulation, thereby impacting the global climate. Even a small increase in temperature can trigger greater warming over time, making the Arctic the most sensitive area to climate change on Earth.

The full impacts of a warming Arctic, and those of deep ecosystem changes (both on land and the ocean), have not yet been fully assessed and quantified. Arctic changes are revealing to the world which developments may occur elsewhere as climate continues to change. Understanding and responding to this challenge requires joint efforts of the global community.

Theme 3. Assessing Vulnerability and Building Resilience of Arctic Environments and Societies

Communities and ecosystems around the Arctic are already experiencing the impacts of global change. Not all changes are perceived to have negative effects, because a warmer Arctic may also present opportunities in terms of resource exploitation, transport routes, tourism and regional growth. It is however increasingly clear that environmental, ecological and social changes are happening faster than ever, affecting ecosystems and people's livelihoods. People's lives are also changing, in particular for indigenous and non-indigenous Arctic residents regarding new livelihoods, new technologies, increasing global connections, and new forms of Arctic governance.

Science will contribute to identifying and minimizing the risks, reducing exposure, improving resilience and adaptation, and form a vital basis for decision-making. Understanding how these changes interact with one another, and what they mean for people and ecosystems alike, requires for holistic and trans-disciplinary approaches that look at human and natural dynamics together.