

Arctic Earth System Modelling Workshop

Responding to Grand Challenges in the Pan-Arctic



26–27 November 2019

Reykjavík, Iceland

As a part of the Icelandic chairmanship of the Arctic Council, the Icelandic Meteorological Office will host an exploratory workshop for Earth System Modelling in the Arctic. The workshop will:

- Promote the improvement of forecasting skill of weather, ocean, hydrological and climate models
- Synergize cooperative efforts

The workshop will initiate an exchange and dialogue that will explore, ensure commitment to, and develop recommendations for interoperable observation, prediction and management systems in Polar regions. It will be co-convened by IMO, WMO, ECMWF, YOPP, AMAP, SAON, Global Water Future, UNESCO IOC, UNESCO IHP and IAHS and it will build on existing international initiatives, e.g. Arctic-HYCOS, the Arctic Freshwater Synthesis report and the Year of Polar Prediction Project. The workshop will explore how to maximize the current scientific knowledge regarding the ability of weather and climate models to represent dynamic processes, and further enhance the models through the coupling of ocean-atmosphere-land system, including the hydro- and cryosphere.

The workshop will use the convening role of WMO to synergize its cooperative efforts with its partners in developing socially relevant, urgently needed, accessible, reliable, and timely knowledge and information systems for risk reduction in the Pan-Arctic. It will identify and evaluate scientific, observation and modelling options to address the cascading effects resulting from unprecedented climate change observed in the Arctic. Impacts on the cryosphere, biosphere and hydrosphere will be considered, including water management, community water supply, and production of food and energy.

Pan-Arctic Grand Challenges

In 2017, the Arctic Council, under the leadership of Finland, put meteorology and related hydrological, cryospheric, ocean and climate observations as one of the Council's highest priorities. Under the forthcoming leadership of Iceland, the same themes will be pursued with an increased focus on the oceans. The goal is to provide relevant information and support to enable adaptation and increased resilience of Arctic communities, while building a sustainable platform for cooperation and knowledge sharing.



The Arctic Council will engage the international community to:

- **Address socially relevant user-led and rights-holder-led questions** of how to adapt and how to manage unavoidable changes in the Pan-Arctic cryosphere, ecosystem, hydrology, and the oceans. The goal here is to promote ecosystem conservation, and to provide social benefits and direct sustainable development along climate resilient development pathways.
- **Identify and address critical knowledge gaps** in Pan-Arctic earth systems science, observations, as well as predictive and dissemination capacities.
- **Develop Pan-Arctic earth system prediction systems** to help Arctic communities become more resilient to extreme events, climate change and development pressures, both terrestrial and marine-based.
- **Urge and facilitate the advancement of knowledge** and implementation of forecasting systems and solutions by member states and partners for mutual benefit within a global framework.

WMO is an observer in the Arctic Council. Through WMO's strategic goals, the organisation is well-placed to contribute to the Pan-Arctic Grand Challenges identified by the Arctic Council. At both a global level and at regional scales, WMO is the convening authority coordinating the development and implementation of recommendations for interoperable observation, prediction and information dissemination systems. This remit includes the Polar regions, which are facing rapid changes and increasing frequency of some natural hazards. These hazards heighten the vulnerability of communities, challenge sustainable development and they are projected downstream by hydrological systems to human populations and the oceans. WMO can coordinate the development of early warning systems for long-term forecasts, which will contribute to reducing the effects of unavoidable changes, in addition to mitigating losses from natural hazards. WMO, in its recent reform, has adopted an earth system observation and prediction approach to address socially relevant impacts of atmospheric, hydrological, ocean, and cryospheric change.

Long-Term Goals

To ensure that people living in the Pan-Arctic **receive 'fit for purpose' cryospheric, hydrological, meteorological, ocean, and climate services at levels that recognize the importance of the Arctic as a rapidly changing environment, the following goals will be pursued:**

- **Sustained recognition of the Arctic as a region at risk** relative to weather, water, ocean, cryosphere, and climate processes linked to societal needs. This will be achieved within the scope of the Arctic Council and international organizations operating in the UN system (e.g. WMO, FAO, UNESCO) and others (e.g. IUGG).
- Advance an **Integrated Pan-Arctic Observation and Prediction System** for addressing climate, cryospheric, oceans, and hydrological change, as well as natural-hazard risk reduction.
- **Leverage the knowledge and influence of stakeholders** from affected economic sectors and service providers, for defining mechanisms to develop and disseminate information on disaster risk management and adaptation, with a focus on indigenous peoples and climate hotspots.
- **Build a sustainable, Arctic-focused, international partnership**, with WMO as the facilitator and UNESCO, UNDP, UNEP, UNFCCC as capacity-building partners contributing to the activities of the Arctic Council.

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