World Meteorological Organization
Weather · Climate · Water

ARCTIC DRIVES NEW ERA IN CLIMATE AND WEATHER SERVICES

The Arctic is changing. Melting sea ice, thawing permafrost and a greening tundra are some of the consequences of Arctic temperatures that have been higher in the past few decades than at any other time over the past 2000 years. Unanticipated alterations in weather patterns and ocean currents are driving changes both on land and in the oceans.

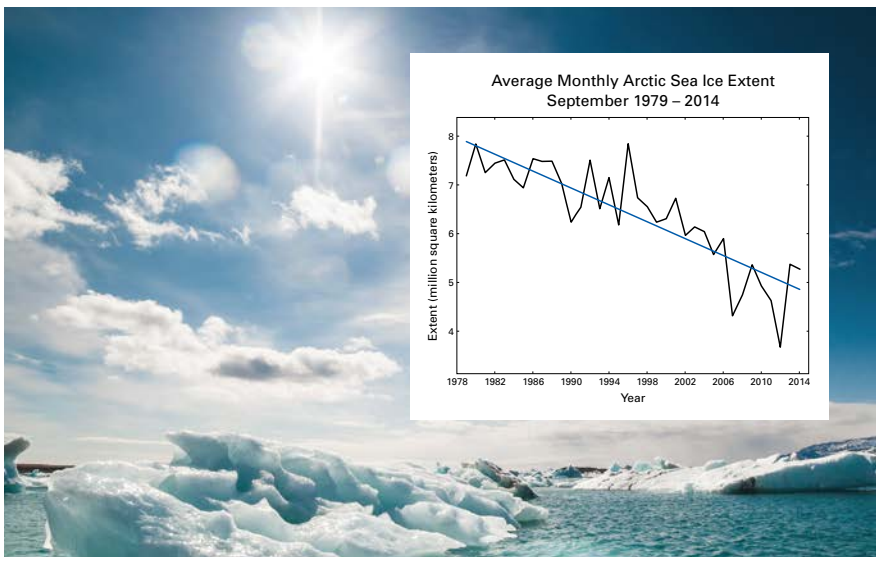
The extent and duration of snow cover have decreased across the Arctic, especially in spring and summer seasons. Temperatures in the permafrost have already risen by 2 to 3°C, causing damage to infrastructure and releasing greenhouse gases such as methane into the atmosphere. The thawing of permafrost and melting of glaciers in the Arctic impact local water resources, while losses of ice, particularly from the huge Greenland Ice Sheet, increase global sea level and alter the fresh water input to the North Atlantic Ocean.

These changes are projected to amplify, with Arctic-wide temperature increases of up to 7°C predicted by the end of the century if modest efforts are made to curtail greenhouse gas emissions and up to 13°C for "business as usual" emissions scenarios. Associated impacts will be many and varied, affecting everything from Arctic ecosystems; the physical, social and economic well-being of indigenous peoples; and the sustainable development of the region.

At the same time, the Arctic is attracting ever more human activity. The exploitation of natural resources – fisheries, minerals, oil and gas – has become more commercially feasible, while the tourism sector is targeting the Arctic as a new frontier. Trans-Arctic shipping has also expanded, and it is plausible that within the next few decades a journey through the Arctic will be a common occurrence.

Changing Sea Ice and Extremes

Transport options for tourism, industry and indigenous populations are strongly dependent on the sea-ice distribution. The last few years have seen a drastic reduction in sea-ice extent, with the Arctic Ocean predicted to become ice-free in summer within this century – perhaps within a few decades. Predicting the distribution and thickness of sea ice along favoured shipping routes and in and near Arctic harbours is critical for communities and commerce in the Arctic region. It is also crucial to understand impacts – through the ice-albedo effects – on present and future climate of the region and the planet.



Strengthening the scientific capability to accurately predict extremes in the Arctic – such as severe storms, potential associated impacts on human

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life and infrastructure, and changes in ocean or sea-ice conditions from months to decades ahead – is socially and economically urgent. Overwhelming evidence indicates that the frequency and severity of extreme events are changing. The need for improved observational networks and predictive tools in the Arctic is imperative in view of the impacts of climate change in the region.

The Role of the World Meteorological Organization

WMO provides a unique forum for integrating weather, climate and hydrological data, environmental information and weather-climate predictive tools, for example through its Global Cryosphere Watch[1] and other components of the WMO Integrated Global Observing System (WIGOS)[2] as well as its World Climate[3] and Weather[4] Research Programmes (WCRP and WWRP). All these programmes aim to provide weather and climate information at both poles (including the state of sea ice and the polar oceans) on time scales from hours to decades through a Global Integrated Polar Prediction System[5]. As part of this, WMO is coordinating a Year of Polar Prediction[6] starting in 2017, which will include a host of observing, modeling and educational activities.

1 http://globalcryospherewatch.org

2 http://www.wmo.int/pages/prog/www/wigos/

3 http://wcrp-climate.org

4 http://www.wmo.int/wwrp

5 http://polarprediction.net

6 http://www.polarprediction.net/yopp.html

The Arctic needs observational and monitoring networks on land, in the oceans and in the atmosphere as well as integrated hazard early warning systems, emergency response capabilities, and skilled daily, seasonal and long-term forecasting services developed and tailored to its extreme conditions. Building blocks and prototypes for these networks and services exist within the WMO community and the Arctic nations have taken the lead in contributing to many of these activities. However both the observational network and research activities in the region are under resourced and in need of investment. Such much-needed funding can come from a variety of sources such as governments, foundations and the private sector.

The Arctic has great economic potential and is an important driver of global climate. The haunting beauty of the polar landscape attracts people from around the world. WMO is committed to providing weather and climate information and services – and to supporting the research required – to ensure the protection of lives and livelihoods as well as the sustainable development of the region.

Highlights:

1. Partnerships to research

WCRP and the Prince Albert II of Monaco Foundation, together with other cosponsors, are also promoting a Polar Challenge[7] to stimulate technological innovation towards a future cost-effective, autonomous and scalable observing network for sea-ice covered regions.

2. From Prediction to Services

The Global Cryosphere Watch (GCW) is establishing a sustained, global, robust, end-to-end cryosphere observing and monitoring system, including developing a core standardized network of surface observations called “CryoNet”.

7 http://www.wcrp-climate.org/polarchallenge

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