



ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE

THE FINNISH METEOROLOGICAL INSTITUTE'S ACTION PLAN FOR FINLAND'S CHAIRMANSHIP OF THE ARCTIC COUNCIL 2017-2019



BACKGROUND AND OBJECTIVES

THE FINNISH METEOROLOGICAL INSTITUTE'S FOCUS AREAS, SPECIFIC OBJECTIVES AND MEASURES

During its 2017–2019 Chairmanship of the Arctic Council, Finland has four priorities: environmental protection, meteorological cooperation, communication solutions and education.

Intensified meteorological and oceanographic cooperation improves general security, serves international maritime and air traffic, and produces information for Arctic climate research.

1. Monitoring the Arctic region

During its Chairmanship of the Arctic Council, Finland will propose that the Arctic Council includes both meteorological and oceanographic observations as one of the scopes in its working groups.

Responsible person:

Mikko Strahlendorff.

Objective: Provide a synopsis of the results (the shortcomings and needs of Arctic observation activities as well as the added value of intensified observations) from currently ongoing activities and bring this up for discussion within the Arctic Monitoring and Assessment Programme (AMAP). The main sources of information are the Sus-

taining Arctic Observing Networks (SAON), the EU's Horizon 2020 programme's integrated Arctic observation system (INTAROS) and the WMO's Year of Polar Prediction (YOPP).

Measures: These are to be discussed with the working group: How can AMAP enhance the inclusion of Arctic monitoring in AMAP's and the Arctic Council's work in general?

Timetable:

Spring–summer 2017: discussions with AMAP.

Autumn 2017 to spring 2019: preparation and communication of the synopsis

Spring 2019: assignment of the synopsis to AMAP and the next host of the Arctic Council (Iceland).





2. Active participation in research projects

Active participation in research projects will strengthen weather, ice, snow, marine and climate research and related services in the Arctic region and its neighbouring areas.

Responsible party: the Finnish Meteorological Institute (FMI).

These projects include: INTAROS, developing the most comprehensive and standardised observation system for Arctic regions. A total of 49 organisations from 20 European, North American and Asian countries are taking part in the project.

FMI will lead a work package for the utilisation of existing observations. The International Arctic Systems for Observing the Atmosphere (IASOA)

programme coordinates the activities of observatories located in the Arctic region. FMI will lead research of the regional processes related to, for example, the large-scale weather situation in the Cape of the North, as well as the movement of heat, humidity and clouds from lower latitudes to the Arctic and vice versa. The Pan-Eurasian Experiment (PEEX) researches climate change, air quality and the environment on the Eurasian continent, including its Arctic regions and the Northern Arctic Ocean.

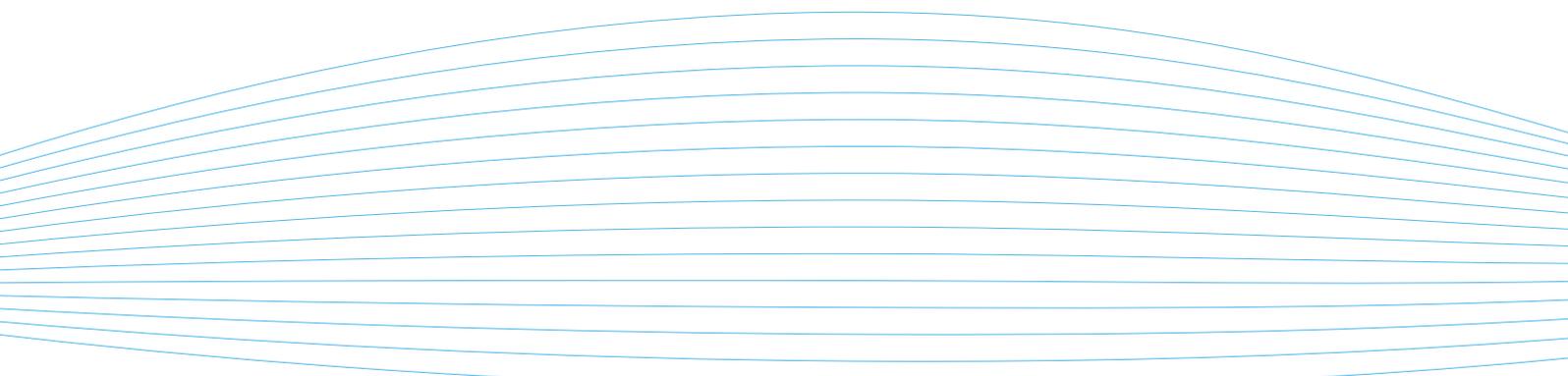
One of the activities in the WMO's Climate Variability and Predictability programme was the study of the impacts of recent Arctic changes to weather in the middle latitudes.

The EU's Horizon 2020 programme's Marie-Curie project, LAWNIE, studies the aforementioned topic with the key focus being on the Arctic's

impact on the northern parts of the Eurasian continent.

TWASE, a project financed by the Academy of Finland, focuses on Arctic weather and sea services, which can be used to support the region's sustainable economic development and infrastructures. The project creates scenarios related to the climate and socio-economic development in the Arctic, develops modelling of the atmosphere and sea ice, and refines the model products to correspond with user needs.

The FMI is participating in ISOBAR, a Norwegian-led project that studies the lower layers of the Arctic atmosphere by utilising new observation methods such as drones.



3. Active participation in the World Meteorological Organization's (WMO's) initiatives

The Arctic Regional Climate Centre (Arctic RCC) and the YOPP campaign (2017–2019).

Responsible persons:

Johanna Ekman (Arctic RCC) and Timo Vihma (YOPP).

Measures: Promoting the realisation of the Arctic RCC demonstration phase (2017–2019).

Timetable: The demonstration will begin in 2017 and come to a close by the end of 2019.

Measures: Participation in the YOPP campaign's intensive observing periods. With radio sounding carried out more frequently than usual at Arctic observation stations, such as the one in Sodankylä. Atmosphere model testing will be used to analyse how great an advantage additional observations can provide for weather forecasting.

Participation in the meteorological research campaign in Fram strait. The installation of buoys on the Arctic sea ice for the measurement of snow and ice temperature and thickness. The TWASE project will assess the economic significance of weather and ice services.

Timetable:

June 2017: measurement campaign in Fram strait.

February–March 2018: intensive radio sounding campaign.

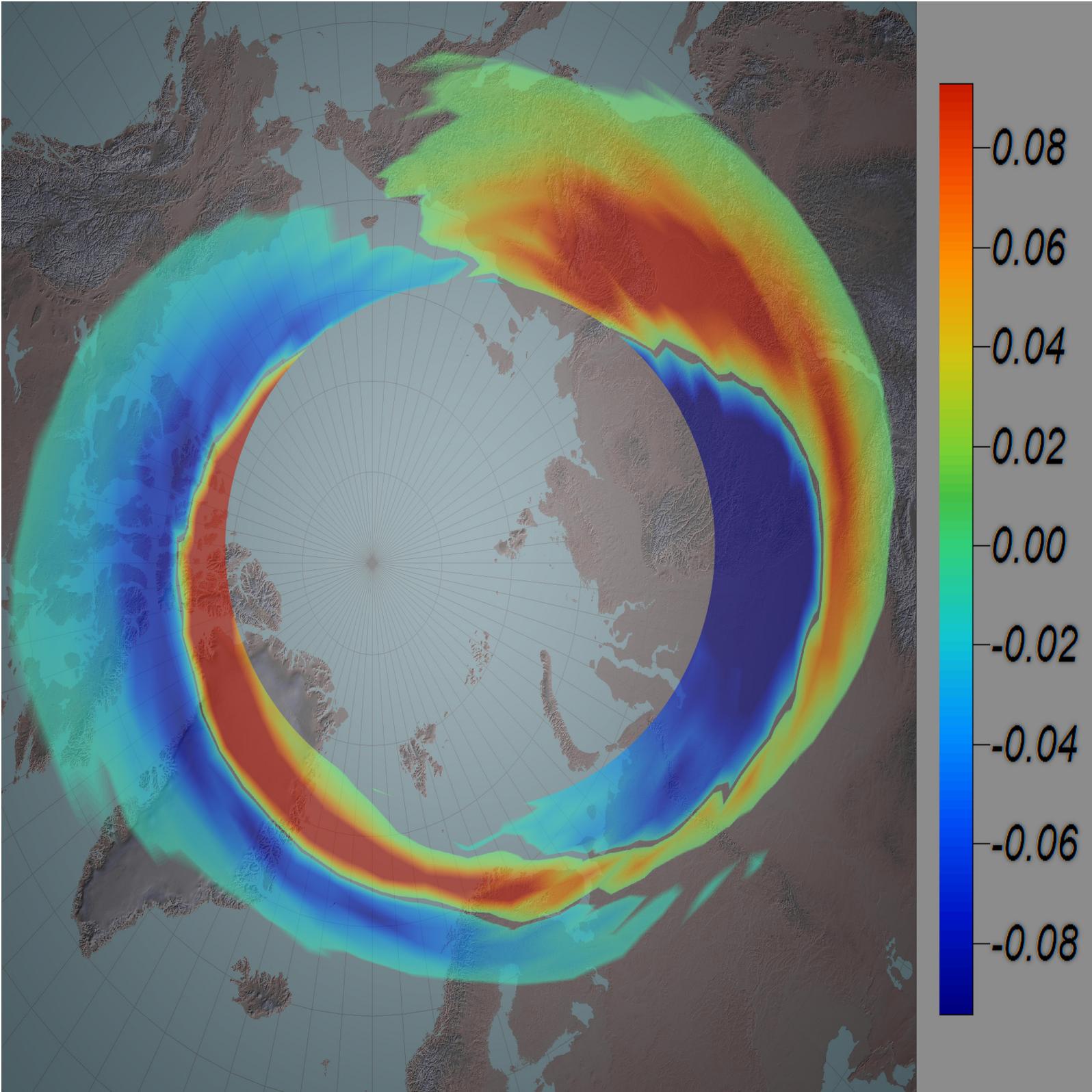
July–August 2018: intensive radio sounding campaign.

2018–2019: model trials on the benefits of additional observations for weather forecasts.

Summer seasons 2017–2019: the installation of buoys on the Arctic sea ice.

2018–2019: model trials on the benefits of additional observations for weather forecasts.





4. The promotion of space weather observation and research

Responsible person: Kirsti Kauristie.

Objective: The development of services that support navigation and communication in the Arctic region.

Measures: Within the scope of the TomoScand project, the FMI and the University of Oulu Sodankylä Geophysical Observatory have worked in collaboration to build a satellite radio receiver network (financed by the Academy of Finland) in order to measure ionospheric disturbance, as well as a tomography instrument for the utilisation of its observations.

Currently, the TomoScand system has only been used in research projects but during Finland's Chairmanship, a version suited for operational services will be developed. This will require close cooperation with the National Land Survey of Finland's Finnish Geospatial Research Institute, so that the real-time observations from the FinRef GNSS support network reception stations can be integrated seamlessly as the

TomoScand inversion's feed. The operational version of TomoScand will be linked to the 24/7 space weather service maintained by the FMI (<http://ilmatieteenlaitos.fi/avar-uussaa>), As a result the service can be expanded to give information on potential disturbances originating from the ionosphere to radio communications and navigation services in Finland.

The expansion of the TomoScand concept in order for it to support Arctic maritime travel will be tested in collaboration with Oulu-based company KNL Networks in a measurement campaign in which the weather and condition data collected by the Sodankylä National Satellite Data Centre will be set to ships operating in the Arctic region. The campaign will include the testing of data transfer with a KNL-developed wireless communication connection that uses HF radio waves. Information on ionospheric weather derived from the TomoScand observations will be used as support for the KNL's routines for monitoring HF signal strength.

The aforementioned activities are directly related to the Chairmanship's themes that are of special interest to the Ministry of Transport and Communications' administrative branch (communications links and meteorology). Our project demonstrates Finnish expertise in the improvement of the Arctic region's communication links and acts as a natural continuation of the US Chairmanship's similar reports on the use of HF's in Arctic communications. Our campaign promotes data distribution by the Sodankylä National Satellite Data Centre and will be part of the WMO's YOPP project. The results will be disseminated on at a wireless technology seminar that will be held in Oulu during Finland's Chairmanship.

Preliminary timetable:

Spring 2017 to Spring 2018: KNL's campaign for testing wireless communications technology (the IBA project).

Autumn 2017: streamlining of TomoScand to be operational.

2018 onwards: The maintenance of the TomoScand product as part of the FMI's space weather service.

5. Influence the UNESCO Intergovernmental Oceanographic Commission (IOC) to expand its Global Ocean Observing System (GOOS) observations network to cover the Arctic region

Responsible person: Jari Haapala.

Objective: The ICO's GOOS coordinates marine observations in the scope of marine research. The IOC is an organisation similar to the WMO, with the exception that it is not independent but part of UNESCO. GOOS focuses on the real-time observation of seas and sea ice, and the dissemination of data. GOOS is divided into regional programmes, such as BOOS (the Baltic Operational Oceanographic System). GOOS covers almost all of

the globe's oceans and seas, with the exception of the Arctic Ocean, which is a clear shortcoming.

Measures: The IOC and the ArcticRoos group have already discussed the need for a joint Arctic GOOS programme. It is of critical importance to ensure that the United States, Canada and Russia commit to this politically.

An opinion or recommendation by the Arctic Council on this issue would very likely promote the development of an Arctic GOOS programme. The matter must be introduced for discussion in the Protecting Arctic Marine Environment (PAME) Working Group.

Timetable: Unconfirmed.

6. Improve the status of the Sodankylä National Satellite Data Centre in the Arctic operating environment

Responsible person: Jouni Pulliainen.

Measures: Realisation of a satellite data demonstration in 2017/2018. The demonstration will produce real-time data on ice conditions for a vessel (or vessels) operating in the Arctic region. The same demonstration can also be produced for a vessel operating in the Baltic Sea; for example, in March 2018 in connection with the oil spill exercise organised by the Finnish Environment Institute (SYKE).

Timetable: 2017–2018.





7. Utilisation of satellite observations in the research and monitoring of the Arctic region

Responsible person:

Johanna Tamminen.

Objective: Numerous international polar-orbiting satellites produce a large amount of observation data (for example, on the composition of the atmosphere) also from the Arctic region. However, the satellite observations are typically optimised for middle latitudes and the tropics. By further developing the analysis methods used for satellite data and examining their uncertainties at higher latitudes, the possibilities for the utilisation of satellite data can be significantly improved for the Arctic regions.

Measures: The CARB-ARC project, which is financed by the Academy of Finland, examines the use of satellite observations (e.g. about snow, ice, humidity, methane, carbon dioxide) in studying the carbon cycle in the Arctic regions.

In June 2017, the year's largest greenhouse gas satellite observation conference, the 13th International Workshop on Greenhouse Gas Measurements from Space (iwggms13.fmi.fi), will be held in Helsinki.

As part of ILMApilot – a strategic key project financed by the Academy of Finland that examines the utilisation of satellite observations in monitoring Finland's air quality – the FMI will participate in the validation of satellite data from the Sentinel 5 Precursor satellite, which will be launched in the summer of 2017.

Additionally, the project will develop pilot services for demonstrating the usability of satellite observations. The FMI will examine changes in the ozone layer in the Arctic region, utilising satellite data as part of the project coordinated by the European Space Agency (ESA), the ESA Climate Change Initiative.

Timetable: 2017–2019.

8. Utilise communications methods to promote the FMI's role and reputation as an Arctic actor

Responsible persons:

Nina Kukkurainen and Eija Vallinheimo.

In order to increase the recognition of the FMI's comprehensive Arctic expertise, a communications plan with the theme "We know the Arctic" was drafted. The plan will be implemented during the years 2017 - 2019.

FMI Communications team plans and coordinates different communication activities, especially for the media and the general public, that supports FMI's action plan for Finland's chairmanship.

FMI communicates about Arctic issues through multiple channels and methods.

Timetable: 2017–2019.

9. Organise high standard events for the Chairmanship's Meteorology theme. Meteorological community can collaborate in the development of Arctic region observation, research and services as well as in improving the recognition of the themes among decision-makers

Responsible person:

Joanna Saarinen.

a. Meteorology theme kick-off event at the Arctic Ministerial Conference in Fairbanks, Alaska, May 2017.

Objective: Start Finland's Chairmanship by highlighting the objectives of the Meteorology priority area (including the Connectivity theme) and promoting the possibility to succeed in these through cooperation with other countries.

b. MET18 week in Levi, Kittilä, 19–23 March 2018.

Objective: The Informal Conference of Western European Directors (ICWED) "lunch-to-lunch", 19–20

March 2018; the Arctic Meteorology Summit on the afternoon of 20 March 2018; the WMO EC-PHORS conference, 21–23 March 2018.

Measures and the timetable:

Hosting the ICWED and WMO EC-PHORS (the Executive Council Panel of Experts on Polar and High Mountain Observations, Research and Services) conferences in Finland. The high level Arctic Meteorology Summit is the most important event for the Finnish Chairmanship's Meteorology theme. It combines participants from the week's other meteorology conferences and decision-makers from the Arctic Council's Member States (i.e. SAO representatives from Arctic countries, national and international decision-makers). The preliminary invitations for the Summit will be sent out in early autumn 2017, and a more detailed programme with instructions for signing up will be sent out at the end of 2017.

10. The FMI Arctic Science Networking Workshop 30 August - 1 September 2017 (FMI, Helsinki)

Responsible persons: Joanna Saarinen and Johanna Ekman.

Objective: Facilitate the networking of researchers under the following themes:

- Arctic satellite based services and products including ECV's: snow, sea ice, permafrost, floods, forest fires, water overrun on ice, Day-Night Band (DNB), including use of UAV's
- Operational modeling and application development to meet arctic requirements.
- Observations and monitoring in the Arctic
- WMO Arctic Regional Climate Centre (Arctic RCC)
- Adaptation and resilience to climate change and ocean acidification, including Global Cryosphere Watch (GCV)





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