The Recommendations of SCAR on Climate Action in the Antarctic: The Finnish Perspective

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***Working Paper submitted by Finland***

# *Summary*

This working paper provides Finland’s perspectives on the recommendations of The Scientific Committee on Antarctic Research (SCAR), identified in the report Antarctic Climate Change and Environment (ACCE). The working paper encourages:

* constant cooperation and exchange of information between the UNFCCC and the ATCM as well as between IPCC and SCAR;
* enhanced scientific cooperation between both polar regions in terms of making scientific advances and advising policymakers;
* assessment of the carbon footprints of scientific operations in the Antarctic and the designing of low-emission research programmes;
* an operative and holistic approach to be taken. International collaboration and coordination are important in reducing the emissions and other environmental impacts of research programmes;
* Antarctic Treaty Parties to increase their climate action by revisiting their Nationally Determined Contributions (NDCs) under the Paris Agreement.

# *Background*

The Antarctic Ice Sheet (AIS) is changing rapidly and is projected to contribute substantially to global mean sea level rise. The consequences of sea level rise and melting ice (sea, land, and shelves) around Antarctica’s coastline will present significant risks to society and nature. The Southern Ocean itself is also undergoing changes and these changes will continue, especially under higher emissions scenarios. Major impacts on the cryosphere, marine ecosystems, and their constituent species, and consequently on the ecosystem services they deliver, including on systems and services outside the Antarctic region, are expected. Significant changes are anticipated in areas particularly vulnerable to ice sheet instability and collapse once thresholds are reached.

Changes to the Southern Ocean and its ecosystems will present growing management difficulties, logistics challenges, and research requirements that will require special attention within the Antarctic Treaty System. The Scientific Committee on Antarctic Research (SCAR) offered in its report Antarctic Climate Change and the Environment (ACCE) recommendations for addressing these challenges. The recommendations focus on three themes: outreach and communication, research needs and coordination, and actions and policy proposals.

# *Recommendations*

## 1. Outreach and communication

According to the IPCC, NDCs announced prior to COP26 lead to a median global warming of 2.8°C by 2100. We are not collectively on track to reach the Paris Agreement’s long-term temperature goal “*holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels*”. For polar regions, including Antarctica, exceeding the 1.5-level will lead to a loss in several cryospheric elements, including the Antarctic ice sheet, and subsequent sea-level rise. The elevated sea levels have negative consequences for societies and ecosystems in all coastal regions. Sea levels will remain elevated for thousands of years.

Science shows that the Antarctic climate change has major global consequences and therefore only global collective climate action can mitigate the impacts. Therefore, the UNFCCC is a key forum to engage with. Both the ATCM and the UNFCCC need to base their decisions on the most recent scientific information. Such information is compiled and conveyed by the IPCC and, specifically in the Antarctic context, by the Scientific Committee on Antarctic Research (SCAR). We encourage constant cooperation and exchange of information between the UNFCCC and the ATCM, for example by keeping up to date on the most recent scientific findings on the consequences of climate change to the Antarctic and informing each other on relevant activities and processes in this context. We also encourage cooperation between the scientific communities (SCAR and IPCC) to ensure the flow of the most recent information, for example via the engagement of experts for both processes, coordinated timelines, etc.

# 2. Research needs and coordination

As an Arctic country, Finland emphasizes the importance of research in both polar regions, especially with regard to climate change. It is important to use all existing scientific knowledge as efficiently as possible to look for synergies. SCAR and its Arctic sister IASC (International Arctic Science Committee) have strengthened cooperation in terms of making scientific advances and advising policymakers. Finland welcomes this development and supports cooperation in projects of common interest such as the International Polar Year.

The Finnish research activities in the Antarctic are internationally highly interactive. Finnish scientists have been involved in several international projects around the continent. The joint Antarctic scientific programme in the Argentinean station Marambio serves as an example of scientific success stories generated by cooperative and coordinated research. The programme started in 1988 with its weekly ozone soundings providing one of the first observations of ozone loss above the Antarctic. Since then, collaboration has expanded to topics of atmospheric composition and climate change and resulted in new scientific insight. Antarctic research requires well-coordinated international efforts in in-situ observations, in analyses of existing and new data, and in experiments applying a range of models (process models, operational weather and sea ice models, and coupled climate models).

The Finnish researchers have identified specific future science questions regarding Antarctic research and global climate change. They include, inter alia:

* Questions related to the ice sheet and the sea-level rise: How will the mass balance of the Antarctic ice sheet and ice shelves evolve under changes in precipitation, surface and basal melt, as well as iceberg calving? How stable are the ice shelves and the West Antarctic ice sheet, and what are the consequences of major collapses of ice shelves? What is the sensitivity of the Antarctic ice sheet and its contribution to past and future sea level and climate change? Is there a way to mitigate sea level rise from West Antarctica? Can geoengineering prevent rapid ice sheet collapse?
* Questions related to meteorology, oceanography, and sea ice: How do small-scale processes (which need to be parameterized in climate models) related to clouds, radiative transfer, snow, and sea ice thermodynamics, as well as turbulent mixing and waves in the atmosphere and ocean, interact with each other and with large-scale dynamics of the atmosphere and ocean? How are the Antarctic atmosphere and the Southern Ocean affected by forcing from mid- and lower latitudes, and how will changes in the Antarctic affect weather and climate in southern mid-latitudes?
* Questions related to climate forcing parameters, atmospheric composition, and atmosphere-cryosphere-ocean interactions: How strong sink of atmospheric carbon dioxide is the Southern Ocean and how is the strength of the sink connected to the biological activity in the sea? Is the Southern Ocean a source or a sink for aerosol particles? What is the spatial distribution of different atmospheric compounds in Antarctica and what are their major sources?
* Biodiversity-related questions: What are the consequences of climate change to Antarctic habitat and biodiversity?
* Questions related to human activities in the Antarctic: What is the effect of climate change on the operations of ships in the Antarctic waters?

In the Finnish Antarctic expeditions, climate change is at the forefront not only of research but also of the planning of operations and logistics and implementation of actions. Emissions and other environmental impacts from moving, living, eating, using water, and waste management are assessed. The results contribute to the planning of environmentally more friendly and safe activities. Increasingly using solar and wind energy at the research station Aboa has also been explored.

Finland recommends an operative and holistic approach to be taken in operations. International collaboration and coordination can reduce the environmental impact of operations, as demonstrated by the environmental savings emanating from Finnish automated year-round measuring. Expeditions stay at the research station only during Antarctic summers, and for the rest of the year, measurements are taken with automated measuring devices, maintained by collaborators in the field. For instance, Finnish scientists installed a cosmic ray detector in a Physics shelter at the Italian-French Concordia Station in 2015. Instruments were maintained by Italian collaborators, and the data were analysed in Finland.

# 3. Actions and policy proposals

The changes happening in the Antarctic have significant global impacts and therefore the climate actions in the Antarctic context need to essentially be taken at a global level. The multiple changes, driven by climate change, are a consequence of global GHG emissions. Therefore, the mitigation of global GHG emissions determines the success or failure to reach the long-term temperature goals of the Paris Agreement, and further what the future of the Antarctic looks like. Based on this evidence, it is clear that all countries collectively need to increase ambition in mitigation. Only deep, rapid, and sustained GHG emissions reductions would limit further sea level rise acceleration and projected long-term sea level rise commitment. The GHG emission reductions need to take place immediately, or at the latest in 2025. We call on all Parties to revisit their NDCs and increase the ambition of their climate action to reach alignment with the Paris Agreement.

Cooperation in National Antarctic Programs can contribute to a smaller carbon footprint and enhanced capacities for research on climate change. Parties are also encouraged to develop plans for low-emission research programmes.