Implementation of ACCE Imperatives: A COMNAP perspective

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Introduction

This Working Paper aims to inform discussions and provide advice on how to achieve implementation of imperatives.

Antarctic Messages

The ACCE Decadal Synopsis says, “The messages informed by research in the Antarctic are clear. It is urgent that states meet, and exceed, the greenhouse gas emissions reduction targets of the Paris Climate Agreement to maintain the Antarctic and Southern Ocean in a state close to that known for the past 200 years.”[[1]](#footnote-1)

This identifies the Antarctic as, “both a site where knowledge about climate change is produced, and the most important source of melting”[[2]](#footnote-2).

This is not a new dichotomy, but one that has only recently been appreciated.

Within the ATS, we understand well “the Antarctic as a site for knowledge production” with scientific investigation being an ATS foundation. We can therefore, easily, negotiate and create policy in support of Antarctic science, including environmental protection provisions. Through COMNAP, we interpret that policy into practical guidance for implementation by National Antarctic Programmes.

We are, however, not so adept at negotiating, creating and communicating policy that recognises the Antarctic as the most important “...conduit through which emissions become consequences…a site where the consequences of emissions are revealed…”[[3]](#footnote-3) This is a recent emerging conceptualisation that requires engagement with those traditionally “outside” the ATS.

Knowledge production: ACCE Decadal Synopsis Research Recommendations (SCAR ATCM XLIV WP31rev.1) & Policy Recommendations (SCAR ATCM XLIV WP30rev.1)

Reducing uncertainties

National Antarctic Programmes’ Antarctic research strategies (Appendix 1) reflect that they understand the recommended research imperatives. Continued funding of, and support for, this critical research remains important. Long-term monitoring networks, some established over 60 years ago, continue across the Antarctic and provide data to reduce uncertainties. However, due to the brief research season and the large study area, we may never have a comprehensive understanding of all aspects of the Antarctic region even through remote sensing. For example, winter data is lacking.

Integrated research approaches

One of SCAR’s two key messages to the COMNAP Science Facilitation Expert Group was “develop large-scale integrated research approaches across National Antarctic Programmes” (SCAR presentation to COMNAP AGM XXXIV, 15 June 2022; see also CEP XXIV Report (2022) para 31).

We take this to mean internationally collaborative, transdisciplinary research and note that there is no shortage of such collaboration in the Antarctic; it is the hallmark of the ATS. Through COMNAP and by way of bi-lateral and multi-lateral agreements, National Antarctic Programmes facilitate, develop and deliver large-scale integrated research projects (Appendix 2), share operations and logistics, exchange innovations and best practice that enables Antarctic research.

Research from Antarctica provisioned the IPCC Reports and will continue to fill our gaps in knowledge. The ATCM has articulated its support to National Antarctic Programmes in their ongoing efforts to undertake research about climate change (ATCM Resolution 8 (2021) *Antarctica in a Changing Climate*).

Even with continuing or increasing delivery of internationally collaborative research in Antarctica, we cannot change the fact that global emissions are a driver of a changing Antarctica. We can ensure, however, Antarctic data informs global policy and decision-making, and work together to distribute understanding to inform all countries’ adaptation strategies, not just those within the ATS. Many places in the world that will be especially vulnerable to climate change are not Antarctic Treaty countries.[[4]](#footnote-4)

Convey research outcomes

SCAR encouraged Parties to communicate the urgency of meeting and exceeding the Paris Climate Agreement’s Nationally Determined Contributions and convey the outcomes of our research. This can be a focus of our collective efforts.

The Parties play a key leadership role in this communication through other international fora within which all Parties participate. National Antarctic Programmes have a role to play too. Often charged with development, and delivery, of their country’s key Antarctic messages through their education and outreach programmes, through policy briefs to their Ministries, through art and community engagement, and through a range of social media to name only a few (see COMNAP ATCM XXXVIII IP009 rev1 *Workshop on Education and Outreach - Making an Impact: National Antarctic Program Activities which Facilitate Education and Outreach*). These already established communications’ pathways can be strengthened and utilised to deliver key Antarctic messages. International collaboration in regards to communication and outreach is just as important as the role international collaboration plays in science projects. The COMNAP Education, Outreach & Training Expert Group provides a forum for such collaborations. We can all work together to develop the key messages.

Management Implications

National Antarctic Programmes facilitate the science that has provided the evidence of a changing Antarctica. They have also been first-hand witnesses to a changing Antarctic for over a decade. They work together, through COMNAP to share their expertise to respond to changes, to interpret guidance as determined by the ATCM or the CEP into practical implementation, and address management, operations, logistics, science and science support challenges using planning processes that include risk assessment and contingency planning. The National Antarctic Programme Managers know well of the management implications (see COMNAP ATCM XXV (2012) IP004 *Management Implications of a Changing Antarctica*.)

Operating in the Antarctic has always meant addressing the usual challenges polar operations present. Now, Programmes are facing new challenges, cross Antarctic and regionally, that are related to unpredictability of weather, higher than average temperatures, unpredictable sea ice and melting ice. Uncertainty, or unpredictability, disrupts plans, invokes contingency plans and can result in research campaign impacts.

We are already addressing complications related to:

* (In)ability to carry out aircraft operations on sea ice
* (In)ability to traverse land ice, sea ice and/or ice shelves
* Changeable and unusually high winds causing grounding of aircraft or stopping land traverse
* Vessel movement impediments
* (In)ability to deploy science teams to the areas that are experiencing the most rapid change
* Changes in precipitation creating new research season dynamics & durations
* Unusual temperature extremes and storms causing unexpected impacts and delays to science support, operations, delivery of cargo/fuel
* (In)stability and/or vulnerability of facility infrastructure. Infrastructure impacts already identified include:
  + Structural instability of station footings due to permafrost changes
  + Repositioning of entire stations due to ice shelf changes
  + Reengineering of logistics platforms (including docks and runways)
  + Waste management, including sites of past waste disposal
  + Drinking water supply and sewage treatment/disposal
* Growth of moss and lichens areas, some beyond the boundaries of the current Protected Areas that were established to protect that biodiversity.

Address new challenges

Infrastructure vulnerability

With much of our Antarctic science support infrastructure being in coastal areas, Programmes are looking to understand how sea level changes (see COMNAP/SCAR IP to this ATCM) and sea ice conditions will affect critical Antarctic infrastructure. Many Programmes are doing vulnerability assessments as part of their modernisation projects. Through the COMNAP Environmental Protection Expert Group, we have begun discussion and exchange of information on vulnerability. Outcomes will inform future Antarctic infrastructure investment and long-term maintenance to allow for uninterrupted delivery of science. Tools that we already have at our disposal, such as EIA, monitoring and maintenance, will continue to be essential to mitigate effects.

Showing leadership in decarbonisation

In regards to Antarctic stations, “despite improvements in the last two decades, the predominant source of electricity and heat generation comes from fossil fuels, mainly Antarctic diesel.”[[5]](#footnote-5) These systems provide year-round, dependable energy that is critical to safety of human life in the Antarctic. National Antarctic Programmes recognise the benefits, including environmental and cost saving, of migrating over to renewable energy sources. Domestic policies are driving shifts to renewables.

Progress is being made. Which, coupled with implementation of energy efficiency practices & new technologies, is reducing the relatively low-level of carbon emissions from National Antarctic Programmes’ activity. COMNAP continues its work on this topic and has adopted the COMNAP Ambitions Framework (2021). The Framework aims to increase efficiency and reduce emissions and waste. Decarbonising Antarctic operations and science support as far as possible is a symbolic gesture and shows leadership without compromising safety of human life in Antarctica and impacting science.

Parties have a key role to play with their commitment to keep Antarctic fossil fuels in the ground as per the Environmental Protocol mineral prohibition.

Biosecurity protocols

COMNAP and SCAR have long been working together on understanding unintentional introduction of non-native species (NNS) and advising the CEP on the topic. The usual biosecurity practices may not be sufficient to prevent a NNS introduction becoming invasive if coupled with changing climate conditions. There will be variations inter- and intra-regionally. The ACCE recommendation to implement strengthened biosecurity protocols for all pathways requires review of COMNAP, SCAR and CEP guidance in the context of expected milder conditions, especially in the Antarctic Peninsula, but also in the marine environment. Biosecurity protocols at ports of departure vary. The traditional Antarctic air and sea gateways have a key role to play in implementing strengthened biosecurity protocols, including those as mandated by the IMO. The National Antarctic Programmes, IAATO Members, and fishery-related entities all have roles to play, as do Parties, especially those with bi-polar operations.

Recommendations to the ATCM, the CEP and for the joint session:

As a community who holds dear the values of Antarctica, we recognise the critical need to communicate externally the urgency, coupled with why it matters to humanity, to ensure we all work together to maintain the Antarctic Treaty Area in a state close to that known for the past 200 years. We advise:

1. Parties to continue to support National Antarctic Programmes to engage in research that is internationally collaborative, fills gaps in knowledge and reduces uncertainty in regards to a changing Antarctic region. This includes support for long-term monitoring efforts that often require long-term sustainable investment;
2. The ATCM and the CEP to jointly develop key messages for the global community in regards to a changing Antarctica based on best available research, that those changes are globally significant, what impacts those changes will have to global society and how we can stop or mitigate changes through our global actions;
3. Parties to work with their National Antarctic Programmes, and through COMNAP and SCAR, and other ATS organisations, to deliver and promote those key messages through the range of education, outreach and communications fora and through a range of media including art and social media;
4. Continuing support to couple global communications with local management policies that enable ongoing and long-term efforts to facilitate Antarctic research, while continuing to assess our impact on the Antarctic Treaty area of direct human activities there;
5. Through COMNAP, continue work to assist National Antarctic Programmes to assess risk of change in climate to Antarctic infrastructures, to impacts to operations, logistics and science delivery and support;
6. Parties to continue to support National Antarctic Programme efforts to decarbonise or reduce fossil fuel use, safely, as part of their Antarctic activities in line with domestic policies and through sharing of best practice through COMNAP;
7. The need to review CEP guidance and advice in regards to existing biosecurity practices (Non-Native Species Manual), especially to adapt current “response protocols” to better respond to marine NNS introduction in a changing ocean (Biofouling and Ballast Water Management), and update accordingly. Such a review might also consider the emerging issue of microorganisms and virus introductions. Parties who develop biosecurity protocols at air and sea gateways have a key role to play as well as does guidance and conventions of the IMO;
8. Parties to (re)assess which sites of their past activities are most likely to be affected by a changing climate and to prioritise their clean-up efforts based on their (re)assessment. This should be coupled with a review of CEP guidance and advice in regards to clean-up of sites of past activity (Clean-Up Manual) especially considering areas that may be affected by changing environmental conditions near those sites of past activity.

Appendix 1: List of National Antarctic Programmes’ research priorities/strategies with links to the information.



Appendix 2: Just a few of many examples of National Antarctic Programmes’ large-scale integrated research projects and those they participate within or support.

**Beyond EPICA** (<https://www.beyondepica.eu/en/about/participants/>)  
ISP-CNR & ENEA, Italy  
AWI, Germany   
UKRI-BAS, UK

IPEV & CNRS, France

UU, Netherlands

NPI, Norway

SU, Sweden

UCPH, Denmark

ULB, Belgium

**DEEPICE** (<https://deepice.cnrs.fr/>)

The goal of DEEPICE project is to build a training program benefiting from the momentum created by the Beyond EPICA project .An innovative training network for a new generation of 15 early-stage researchers in instrumentation, ice core analysis, statistic tools, glaciological and climatic modelling. Ten research organisations and Universities as well as 11 partner organisations from 11 different countries.

**International Thwaites Glacier Collaboration** (<https://thwaitesglacier.org/>)

NSF, CIRES & NSIDC, USA

NERC & BAS, UK

KOPRI, Republic of Korea

AWI, Germany

Sweden

**CRiceS C**limate **R**elevant interactions and feedbacks: the key role of sea **ice** and **S**now in the polar and global climate system (<https://www.crices-h2020.eu/home>)

Twenty international research teams, from Europe, Canada, South Africa, and India.   
Includes researchers from: NPI, Norway; BAS, United Kingdom; NCPOR, India; & AWI, Germany.

**MOSAiC** (Multidisciplinary drifting Observatory for the Study of Arctic Climate) (<https://mosaic-expedition.org/>)

Approximately 500 people from twenty countries participated in or contributed to the expedition, including about 300 scientists from different disciplines, who opened their research data and measurements directly on site to interdisciplinary exchange. Leadership was provided by the AWI, Germany, in collaboration with co-lead from CIRES, USA.

**PROTECT** Cryosphere & Sea Level (<https://protect-slr.eu/>)  
A research project with 27 beneficiaries from EU member states, with associated countries and third countries involvement. More than 200 senior and early-career scientists will be actively involved during the four-year course of the project. Coordinated by the Institute for Geoscience and Environmental Research (IGE) of the French National Center for Scientific Research (CNRS).

**HiRISE** (State and fate of Antarctica’s gatekeepers: a HIgh Resolution approach for Ice ShElf instability) (<https://www.nwo.nl/projecten/ocenwgroot2019091>)   
A consortium through NWO, Netherlands, consisting of TUDelft, Institute for Marine and Atmospheric Research Utrecht (IMAU), KNMI & NIOZ, Netherlands, and ULB, Belgium.

**PolarRES** Exploring future polar climates (<https://polarres.eu/about/>)   
PolarRES studies the interactions between the atmosphere, oceans, and sea ice in the Arctic and Antarctic. The team consists of 17 organisations.

**OCEAN:ICE** (Ocean-Cryosphere Exchanges in Antarctica: Impacts on Climate and the Earth System) (<https://ocean-ice.eu/>)   
19 project partners.

**SOOS** (The Southern Ocean Observing System) (<https://www.soos.aq>)   
A coordinating body to enhance and ensure the delivery of data across nations, organisations, programmes and stakeholders, and to provide the infrastructure for organisation of community networks to develop sustained observing systems and syntheses of existing datasets. National representatives from 19 Antarctic Treaty countries and affiliated network that includes many national Antarctic programs and researchers.

**The IceCube Neutrino Observatory Collaboration**   
(<https://icecube.wisc.edu/about-us/overview/>)  
Currently, the collaboration includes more than 350 people from [58 institutions in 14 countries](https://icecube.wisc.edu/collaboration/institutions/). It began in 1999 with the submission of the first IceCube proposal, and many of the original members are still active on the project.

1. SCAR ATCM XLIV (2022) WP 30 rev 1. [↑](#footnote-ref-1)
2. See Roberts, P. (2023) Does the science criterion rest on thin ice?. *The Geographical Journal*, 189, 18–24. https://doi.org/10.1111/geoj.12367. [↑](#footnote-ref-2)
3. Ibid [↑](#footnote-ref-3)
4. Six such places are Haiti, Lagos (Nigeria), United Arab Emirates, Yemen, Manila (Philippines) and Kiribati. As identified in <https://time.com/5687470/cities-countries-most-affected-by-climate-change/>. [↑](#footnote-ref-4)
5. J.J. Lucci, et al. (2022). Renewables in Antarctica: an assessment of progress to decarbonize the energy matrix of research facilities, *Antarctic Science* 34(5), 374–388 (2022). doi:10.1017/S095410202200030X. [↑](#footnote-ref-5)