



IP **2**

Agenda Item: 4.3.5

Person Responsible: E Charpentier

**XXXIV SCAR Delegates Meeting
Kuala Lumpur, Malaysia, 29-30 August 2016**

Partnerships between the WMO (including WCRP) and SCAR

Executive Summary

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Important Issues or Factors:

The paper provides a non-exhaustive summary of current WMO and WCRP activities of most relevance to SCAR, indicating where current as well as potential synergies and partnerships exist.

Recommendations/Actions and Justification:

Delegates are asked to note the information, noting in particular current partnerships (e.g. with ISMASS, Southern Ocean Panel, AntON, YOPP) as well as future potential collaborations (e.g. with Antarctic Treaty papers, the Global Cryosphere Watch, Polar Regional Climate Centres, Polar CORDEX).

Partnerships between the WMO (including WCRP) and SCAR

The World Meteorological Organization¹ (WMO) is a specialized agency of the United Nations and includes 191 Member States and Territories. It is the UN system's authoritative voice on the state and behaviour of the Earth's atmosphere, its interaction with the oceans, the climate it produces and the resulting distribution of water resources.

Polar and high mountain regions are one of the strategic priorities of the WMO for 2016-2019. This focuses on improvement of operational meteorological and hydrological monitoring, prediction and services in polar, high mountain regions and beyond by: (a) operationalizing the Global Cryosphere Watch (GCW); (b) better understanding the implications of changes in these regions on the global weather and climate patterns; and (c) advancing the polar prediction under the Global Integrated Polar Prediction System (GIPPS). WMO is also invited as an Expert to the Antarctic Treaty Consultative Meetings.

Climate Services in the Antarctic Region

WMO facilitates advances in observations, understanding and prediction in pursuit of better and new services. Its polar activities² focus upon improved situational awareness of the state of the cryosphere through, inter alia, the *Global Cryosphere Watch*³ (see below). WMO aims 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* and the *Polar and High Mountain Regional Climate Centres*. As part of this, WMO is coordinating a *Year of Polar Prediction*⁴ (See below).

WMO also has a *Polar Space Task Group*⁵ made up of members of the space agencies since satellites have a unique capability to observe the otherwise data-sparse Polar Regions, and contribute to development of integrated applications and services using remotely-sensed and *in situ* observations.

WMO issues regularly an Annual Statement⁶ on the Status of Global Climate with a section on the cryosphere including among other issues the provision of information on monitoring Antarctic sea ice and sea surface temperatures in the Southern Ocean.

A Scoping Workshop to discuss Polar Regional Climate Centres (PRCC) was held in November 17-19, 2015. The workshop showed a clear indication of interest and requirements in establishing an Arctic PRCC, as well as outlining the need for an Antarctic equivalent. WMO would be happy to involve SCAR in later discussions around the formation of an Antarctic PRCC.

Observations in the Antarctic Region

CryoNet

The development of the Global Cryosphere Watch (GCW) has made substantial progress in the last few years. In particular, the concept of CryoNet, the core observing component of the GCW, has been refined during the pre-operational testing, candidate sites and stations identified, and the procedure for acceptance of new stations into CryoNet, including minimum requirements and selection criteria defined. A GCW data portal is now being implemented and a guide and manual for best practices is under development. The Executive Director of SCAR is a member of the GCW Steering Group and thus is helping to direct further development of GCW from the point of view of SCAR and its strategies.

¹ <http://www.wmo.int>

² Further details can be found at https://www.wmo.int/pages/prog/www/polar/index_en.html

³ <http://globalcryospherewatch.org>

⁴ <http://www.polarprediction.net/yopp.html>

⁵ http://www.wmo.int/pages/prog/sat/pstg_en.php

⁶ http://www.wmo.int/pages/prog/wcp/wcdmp/CA_2.php

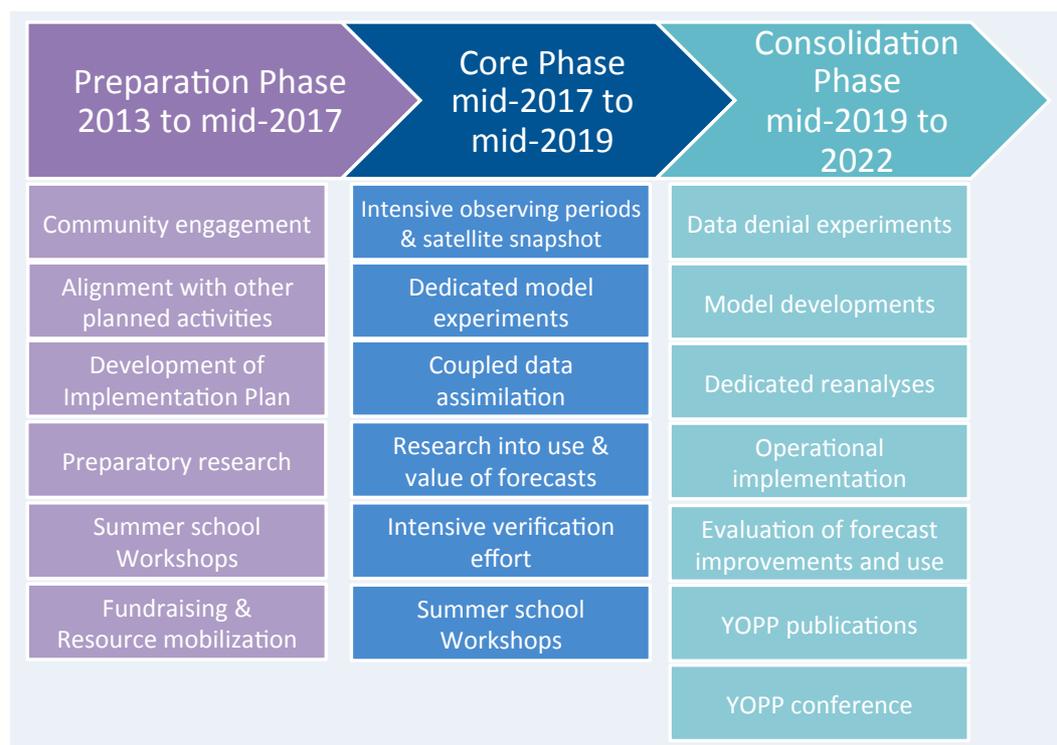
WMO Antarctic Observing Network (AntON)

SCAR is contributing to AntON, the WMO integrated observing network for the Antarctic region, comprising operational surface and upper air stations. It includes all Global Climate Observing System Surface Network (GSN), Upper-Air Network (GUAN) and Global Atmosphere Watch (GAW) Stations reporting from the Antarctic Region. There are currently 155 AntON stations on the Antarctic continent, plus 19 AntON stations in the sub-Antarctic region. How to include additional platforms in AntON e.g. aircraft, drifting buoys or Automatic Weather Stations (AWS) on board voluntary ships are currently being discussed.

WMO will seek to expand observational networks and improve telecommunications related to the AntON.

The Year of Polar Prediction (YOPP)

Realising that significant knowledge gaps in terms of observational coverage and process understanding exist, WMO has initiated major efforts to address the lagging environmental forecasting capabilities at the poles, focussing on hourly-to-seasonal [Polar Prediction Project (PPP)] and on seasonal-to-centennial [Polar Climate Predictability Initiative (PCPI)] time scales. A key element of these activities is the Year of Polar Prediction (YOPP). YOPP will explore largely uncharted territory in the area of polar forecast verification; contribute to our understanding of the value of improved polar prediction capabilities; and help to educate the next generation of scientists. YOPP will be carried out in three phases: a Preparation Phase from 2013 to mid-2017, a Core Phase from mid-2017 to mid-2019, and a Consolidation Phase from mid-2019 to 2022 (see figure, below). For further information see <http://www.polarprediction.net>.



Climate Research in the Antarctic Region

WMO climate research in the Antarctic region is primarily carried out through its co-sponsored (with ICSU and IOC) World Climate Research Programme (WCRP⁷). The two overarching objectives of

⁷ <http://wcrp-climate.org>

WCRP are: (1) to determine the predictability of climate; and (2) to determine the effect of human activities on climate.

Like SCAR, WCRP does not fund the science directly, but provides resources to hold meetings and workshops on specific high-priority research topics related to the climate system. The below represents a non-exhaustive selection of Antarctic climate-related research activities carried out by WCRP, usually under the umbrella of its Climate and Cryosphere (CliC⁸) core project:

Ice Sheet Mass Balance and Sea Level

Co-sponsored with SCAR and the International Arctic Science Committee, the *Ice Sheet Mass Balance and Sea Level project*⁹ aims to promote research on the estimation of the mass balance of ice sheets and its contribution to sea level, to facilitate the coordination among the different international efforts focused on this field of research and to contribute to the diffusion, to society and policy makers, of the current scientific knowledge and the main achievements in this field of science.

Related to this, the WCRP Grand Challenge¹⁰ on *Regional Sea-Level Change and Coastal Impacts* focuses on all components of global to local sea level changes and will consider the necessary analyses on global and regional climate change data and simulations, extreme events and potential impacts, including the evaluation of sea level rise impacts for coastal zones.

The Southern Ocean and Sea Ice

Co-sponsored by two WCRP core projects and SCAR, the CLIVAR¹¹/CliC/SCAR *Southern Ocean Implementation Panel*, serves as a forum for the discussion and communication of scientific advances in the understanding of climate variability and change in the Southern Ocean. WCRP (through CLIVAR and CliC) also officially endorses the SCAR/SCOR *Southern Ocean Observing System*¹² and co-sponsors the SCAR/CliC *Antarctic Sea Ice Processes & Climate Expert Group*.

Permafrost

WCRP carries out a range of Antarctic-related activities focussed on permafrost, for example the CliC/IPA¹³ *Permafrost Research Priorities: A Roadmap for the Future*¹⁴

Model Intercomparisons and downscaling experiments

CliC leads several *Model Intercomparison Projects* that are essential to the Intergovernmental Panel on Climate Change (IPCC) process, for example the *Ice Sheet Model Intercomparison for (ISMIP6)*¹⁵ brings together a consortium of international ice sheet models and coupled ice sheet-climate models to fully explore the sea level rise contribution from the Greenland and Antarctic ice sheet. Other Model Intercomparisons focus on snow, soil moisture, marine ice sheet, glaciers and sea ice in order to improve specific areas of future climate models.

*Polar-CORDEX*¹⁶ (Coordinated Regional Downscaling Experiment - Arctic and Antarctic Domains) aims to produce an improved generation of regional climate change projections for input into impact and adaptation studies. Discussions are being held between the AntClim21 leadership and Antarctic CORDEX to explore linkages and synergies.

Polar Climate Predictability

The *Polar Climate Predictability Initiative*¹⁷ (PCPI) aims to improve the understanding of the predictability of polar climate. The PCPI has a focus on the polar regions and their role in the global

⁸ <http://www.climate-cryosphere.org>

⁹ <http://www.climate-cryosphere.org/activities/groups/ismass>

¹⁰ The WCRP Grand Challenges represent major areas of scientific research, modelling, analysis and observations for WCRP in the ensuing decade. See <http://www.wcrp-climate.org/grand-challenges>

¹¹ CLIVAR = Climate and Ocean: Variability, Predictability and Change core project of WCRP (<http://www.clivar.org>)

¹² <http://www.soos.aq>

¹³ International Permafrost Association (<http://ipa.arcticportal.org>)

¹⁴ <http://www.climate-cryosphere.org/activities/targeted/permafrost-research-priorities>

¹⁵ <http://www.climate-cryosphere.org/activities/targeted/ismip6>

¹⁶ <http://www.climate-cryosphere.org/activities/targeted/polar-cordex>

¹⁷ <http://www.climate-cryosphere.org/wcrp/pcpi>

climate system, and aims to improve predictability of the climate system on all time scales by improving our understanding of the underlying physical mechanisms and their representation in climate models. Along with the *Polar Prediction Project*¹⁸ (which looks at timescales from hours to seasonal) the PCPI forms part of the WMO Global Integrated Polar Prediction System.

Melting Ice and Global Consequences

WCRP also has a Grand Challenge⁹ on *Melting Ice and Global Consequences*¹⁹, which has the overall aim to consolidate historical observations from a range of sources, and focus effort on better representing the shrinking cryosphere in climate models used to make quantitative projections that underpin the IPCC Assessment Reports.

Engagement with the Antarctic Treaty Consultative Meeting (ATCM)

In the XXXIX ATCM, WMO presented six papers: (i) The Antarctic Observing Network (AntON); (ii) The Year of Polar Prediction (YOPP) 2017-2019; (iii) WMO Antarctic Climate related activities; (iv) The Polar Challenge; (v) Polar Regional Climate Centres; and (vi) a WMO Annual update. The papers have been targeted to ATCM priorities and highlight areas where further engagement would be mutually beneficial (e.g. improvement to the AntON as per Resolution 41 (Cg-17)).

WMO (and WCRP) are committed to a positive, mutually beneficial engagement with SCAR in the Antarctic and Southern Ocean region and are keen to explore further cooperation. For further details please contact Etienne Charpentier (Chief, Observing Systems Division of WMO - echarpentier@wmo.int) or contact Mike Sparrow (WCRP Senior Scientific Officer - msparrow@wmo.int).

¹⁸ <http://polarprediction.net>

¹⁹ <http://www.wcrp-climate.org/index.php/gc-cryosphere>