WMO Annual Report

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An Information Paper submitted by WMO

The World Meteorological Organization[[1]](#footnote-1) (WMO) is a specialized agency of the United Nations and includes 193 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.

WMO covers a range of activities of relevance to the Antarctic Treaty System, including *Antarctic Science* via the World Climate Research Programme[[2]](#footnote-2) and World Weather Research Programme, *Antarctic Observations and Infrastructure*, for example via the Global Cryosphere Watch; and *Antarctic Services* via, for example, the Antarctic Regional Climate Centre network.

Antarctic Science activities of the World Climate and World Weather Research Programmes

Through the World Climate Research Programme2 (WCRP), WMO carries out several research and modelling activities in which the climate of the Antarctic region is a key aspect. Its activities are often conducted in partnership with other organisations, such as SCAR.

*WCRP’s Climate and Cryosphere Core Project (CliC)*

WCRP’s CliC project, with an international office hosted by the Bjerknes Centre in Norway, focusses on the cryosphere component of the climate system. CliC is a connector and integrator of cryosphere research worldwide, coordinating research and modelling activities (often in partnership with SCAR) on ice sheet mass balance and sea level, ice shelves and alpine glaciers, sea ice, and permafrost. With a vision of cultivating future leaders in cryospheric research, CliC has also established a new fellowship and grant program, particularly aimed at early career scientists[[3]](#footnote-3). See accompanying IP for further details.

WCRP also coordinates several modelling activities of relevance to Treaty Parties, including Antarctic CORDEX[[4]](#footnote-4) (the Coordinated Regional Downscaling Experiment, with an office at the Swedish Meteorological and Hydrological Institute), and CMIP (the Coupled Model Intercomparison Project, with a new project office hosted by the European Space Agency in the UK) that generates the scenario runs that are integral to the Intergovernmental Panel on Climate Change (IPCC)[[5]](#footnote-5) assessment reports.

*Antarctic CORDEX*

The CORDEX vision is to advance and coordinate the science and application of regional climate downscaling through global partnerships. Detailed projections of how the Antarctic climate may evolve over the twenty-first century in response to anthropogenic forcing are urgently required by many users, in particular by the glaciological and biological communities in order to produce improved projections of mass balance and biological processes. A detailed paper (IP119) on Antarctic CORDEX was submitted to CEP XX (Beijing, 2017). Recently, Mottram et al. (2021)[[6]](#footnote-6) compared the performance of five different regional climate models, available through the Antarctic CORDEX project, in simulating the present-day near-surface climate and surface mass balance (SMB) of Antarctica. This study showed that all models simulate Antarctic climate well when compared with daily observed temperature and pressure. The largest spatial differences between model SMB estimates are in West Antarctica, the Antarctic Peninsula, and around the Transantarctic Mountains. A new paper on this paper will be submitted to the next ATCM.

*Antarctica 2300 Projections*

The Ice Sheet Model Intercomparison for CMIP6 (ISMIP6) is the primary effort of CMIP6 focusing on ice sheets. It was designed to provide processed-based projections of ice sheets contribution to sea level rise over the 21st century, and assess uncertainties associated with these projections as well as their origins. However, improved ice sheet projections beyond the 21st century are also necessary, as instability mechanisms have the potential to rapidly destabilize ice sheets and several regions may reach tipping points, potentially leading to much larger sea level contributions. Building on the success of ISMIP6, a new effort targeting projections of the Antarctic ice sheet until 2300 has being launched. This effort is open to the international community and we invite all modelers interested to participate, regardless of their previous involvement in ISMIP6[[7]](#footnote-7). A full paper on this topic will be submitted to the next ATCM.

*The WCRP Academy*

WCRP has developed five new Lighthouse activities[[8]](#footnote-8) that are designed to be ambitious and transdisciplinary so that they can rapidly advance some of the new science and technologies, and institutional frameworks, that are needed to manage climate risk and meet society’s urgent need for robust and actionable climate information more effectively.

The WCRP Academy[[9]](#footnote-9)aims to determine the requirements for climate research training and education and build enabling mechanisms. One mechanism being planned is an online marketplace for climate science training, which will connect training providers and those who seek training. The Academy will also identify training gaps and advocate for those needs to be met and will work with partner organizations around the world to ensure that climate science training and education are meeting the needs of society. See accompanying IP for further details.

*The Southern Ocean Action Plan*

Coordinated by SCAR, a Southern Ocean Task Force was set up to develop a Southern Ocean Action Plan as part of the UN Ocean Decade. The plan itself was developed by several partners, including WCRP and IAATO. Through the publication of this Action Plan, the Southern Ocean Task Force aims to mobilise the Southern Ocean community and inspire all stakeholders to seek engagement and leverage opportunities to deliver innovative solutions that maintain and foster the unique conditions of the Southern Ocean. This framework provides an initial roadmap to strengthen links between science, industry and policy, as well as to encourage internationally collaborative activities in order to address existing gaps in our knowledge and data coverage. The [Southern Ocean Action Plan](https://www.oceandecade.org/regional-ocean-decade-ecosystem/) will, as part of the UN Ocean Decade, deliver in achieving the UN Agenda 2030 and its Sustainable Development Goals in a polar context. See accompanying IP for further details.

*The Year of Polar Prediction final Summit*

The Year of Polar Prediction (YOPP) 2017-2019 of WMO’s World Weather Research Programme’s Polar Prediction Project, galvanised extra observational and modelling efforts in both the Arctic and Antarctic. The final Special Observing Period in the Antarctic has been extended to the end of August 2022, to take advantage of the South African RV Agulhas II presence in the Weddell Sea.

A Year of Polar Prediction (YOPP) Final Summit will take place in Montreal (QC), Canada, Monday, August 29 - September 1 2022. The conference will bring together the polar prediction community, from operational centres and academia, to environment services and polar prediction users and northern communities, to showcase the successes of YOPP and contribute to the legacy of the Polar Prediction Project. For further details see: <https://www.polarprediction.net/> or accompanying IP for further details.

Antarctic Observations and Infrastructure

WMO has adopted new Unified Data Policy that is necessary for the global efforts to monitor, understand and then predict weather and climate, as well as the Global Basic Observing Network (GBON). GBON paves the way for a radical overhaul of the international exchange of observational data, which underpin all weather, climate and water services and products. See accompanying IP for further details.

The increased frequency of extreme temperatures seen in Antarctica recently emphasises the need for systematic observations of demonstrated quality. There are significant challenges to obtaining continuous quality measurements over the ice sheet surface of the Antarctic, e.g., due to the impact of the snow albedo and of the extreme operating conditions. For that reason, WMO is committed to continue bringing together the international community of experts engaged in maintaining observing stations in Antarctica as part of its Global Cryosphere Watch[[10]](#footnote-10), to address specific observations, instrumentation, challenges, e.g., measurements of snow depth, air temperature, fast ice, etc.

Antarctic Services

WMO, with partners, continued with the development of an Antarctic Polar Regional Climate Centre (AntRCC) Network. Progress has been slower than envisioned due to COVID, though the Antarctic RCC Network will build on the lessons learned in the process of establishment of the Arctic RCC Network to produce coherent, and harmonized climate products across the Antarctic domain through a single portal, and establishment of a platform for a dialogue with stakeholders and users. WMO will provide updates in the future and continue to engage Treaty Parties as relevant.

High-level Publications of Interest

WMO produces several Antarctic and climate related science publications. Just to highlight three high-profile publications:

*WMO Statement on the State of the Global Climate*

Each year WMO produces a high-level “Statement on the State of the Global Climate” with key partners, including SCAR. These statements are presented at the Conference of Parties (COP) meetings and other fora and are available in English, Spanish, Russian, French, Chinese and Arabic. Copies of the 2021 provisional report can be downloaded from: <https://library.wmo.int/index.php?lvl=notice_display&id=21982#.YkLj49lBzAM>

*United in Science*

The United in Science report is a multi-organization high-level compilation that presents the very latest scientific data and findings related to climate change, to inform policy and decision-makers. See:

https://public.wmo.int/en/resources/united\_in\_science

Diagrama

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*10 New Insights in Climate Science*

WCRP co-produces the “10 New Insights in Climate Science” with Future Earth and the Earth League. The 2021 edition was launched at COP26 by Patricia Espinosa. The online version can be seen at: https://10insightsclimate.science/.

WMO continues to look forward to a positive, mutually beneficial engagement with Treaty Parties in Antarctic weather and climate observations, services and research. For further queries please contact Mike Sparrow ([msparrow@wmo.int](mailto:msparrow@wmo.int)) in the first instance.

1. www.wmo.int [↑](#footnote-ref-1)
2. Co-sponsored by the International Science Council (ISC) and the Intergovernmental Oceanographic Commission (IOC) of UNESCO [↑](#footnote-ref-2)
3. https://climate-cryosphere.org/2021-clic-fellowships-grants-open-call/ [↑](#footnote-ref-3)
4. https://cordex.org/domains/region-10-antarctica/ [↑](#footnote-ref-4)
5. . https://www.wcrp-climate.org/wgcm-cmip [↑](#footnote-ref-5)
6. What is the surface mass balance of Antarctica? An intercomparison of regional climate model estimates, The Cryosphere, [https://doi.org/10.5194/tc-15-3751-2021.](https://doi.org/10.5194/tc-2019-333) [↑](#footnote-ref-6)
7. <https://www.climate-cryosphere.org/wiki/index.php?title=ISMIP6_wiki_page> or at [ismip6@gmail.com](mailto:ismip6@gmail.com) [↑](#footnote-ref-7)
8. https://www.wcrp-climate.org/lha-overview [↑](#footnote-ref-8)
9. https://www.wcrp-climate.org/academy [↑](#footnote-ref-9)
10. https://globalcryospherewatch.org/ [↑](#footnote-ref-10)