
Australia's National Statement on our needs and requirements for Antarctic RCC products and services, as well as on capacities and interest in potential contributions to the Antarctic RCC functions.

WMO Antarctic Regional Climate Centre Scoping Workshop, Bologna, Italy 7th-9th October 2019. Scott Carpentier on behalf of the Australian PR.

1. Australia sees value and can help develop an Antarctic RCC. We suggest the focus of the Centre should be on providing valued downstream services to logistics operators, scientists and intra and inter government agencies.
2. We believe developing an Antarctic RCC is best achieved through international collaboration and partnership.
3. We can currently contribute products and services across most mandatory and Highly Recommended operational activities and functions. More specifically:
 - a. Operational Activities for Climate Monitoring:
 - i. We maintain long-term, quality-controlled surface and upper air records from the 3 Australian continental stations of Casey, Davis, Mawson and Sub Antarctic Macquarie Island.
 - ii. We maintain and monitor a research level sea ice and sea level climatology.
 - b. Operational Data Services to support Climate Monitoring and LRF:
 - i. The Australian Bureau of Meteorology (the Bureau) has a stable, quality-controlled national database and archiving system in place.
 - ii. As well as maintaining its own system, the Bureau has worked with partner countries and funders in the Pacific to develop an open source Climate Data Management System (CDMS) called CliDE. Subject to continued support, the Bureau sees value in continuing this effort.
 - iii. The Bureau does not currently manage data from other countries or regions but has explored the option of supporting back up for other countries.
 - c. Operational Activities for LRFs:
 - i. The Bureau is a GPC and provides LRF operational services for the Australia-Pacific region with our coupled Global model the Australian Climate Community Earth System Simulator (ACCESS-S). ACCESS-S LRF products extend across the Antarctic, but these have not yet been "operationalised" into services for the Antarctic.
 - ii. Australia runs a Decadal Climate Forecasting Project (DCFP). The DCFP is developing multiyear global forecasts, which includes the Antarctic. These would be considered a research product.
 - iii. We have performed downscaling of climate change scenarios for the Australian region and could in theory extend such efforts to the Antarctic.
 - iv. We have a general research agenda focused on understanding extratropical atmospheric modes of variability, outcomes of which would contribute to our understanding of high latitude climate variability.

- d. Training in the use of operational RCC products and services:
 - i. The Bureau has significant experience in the provision of climate services and training (with a focus on the southwest Pacific and east Asia), and it could be possible for it to perform these functions in the Antarctic, subject to resources.
- e. Promote studies of the economic value of climate information:
 - i. There has been research published on the economic value of seasonal prediction in Australia, but not for the Antarctic. We are interested in such studies taking place for the Antarctic.

More details are provided in our survey response.

- 4. To increase the impact and value that an Antarctic RCC can provide to NMHS's and downstream customers, we suggest the RCC expand the range of products and services on offer beyond those that are mandatory and highly recommended. *Desirable RCC products* include:

- a. Oceans and floating Ice
 - i. sea ice (fast and pack) movement, concentration and extent;
 - ii. polynya monitoring
 - iii. Antarctic coastline monitoring (coastal exposure)
 - iv. sea surface height, temperature and sea ice thickness changes
 - v. Ice shelf front monitoring
 - vi. iceberg calving and trajectories
 - vii. Satellite Ocean Colour (biology and primary production)
 - viii. ocean salinity.

- II. Ice Sheet
 - i. Antarctic surface melting
 - ii. Movement and Crevasse monitoring

- III. atmosphere
 - i. tracking of extratropical cyclones and polar lows
 - ii. upper air Temperature, Pressure, humidity, winds, stratospheric ozone
 - iii. clouds
 - iv. radiation

The operationalisation of the above, mostly research based, outputs would require considerable investment and coordination from many nations and Institutions.

- 5. Climate Outlook Forums (COF)
 - a. Australia could be an active participant in an Antarctic COF.
 - i. We conduct extensive operations, science and research in the Antarctic and Southern Ocean, particularly in the East Antarctic Region. We therefore have a significant user community that can assist with developing valued and fit for purpose RCC products and services.

- ii. We produce operational and research grade outputs that lend themselves to RCC functions and products. COF's are seen as a constructive means to customise and enhance the value and impact of our efforts.
- b. Through the COF, we would support the development of customised, systematic and regular reporting to COMNAP, CCAMLR, SCAR, WMO and the ATS.

Potential benefits to Australia from an Ant RCC

- Could provide useful data and information to assist AAD seasonal operational planning and also wider scientific research in the Australian Antarctic Program (AAP).
- Would encourage Australian agencies to participate in developing a consensus statement for Antarctic seasonal outlooks. This could provide a focus for seasonal prediction activities at BoM and CSIRO, which would likely benefit the wider AAP.
- Climate Outlook Forums would help Australian agencies, researchers and users of Antarctic information to improve information exchange and use.
- Could provide a potential end-user for some Australian Antarctic Science projects. For example, data generated for sea ice monitoring projects could be linked to a data portal hosted by the Centre.
- May assist in benchmarking particular national climate modelling activities. For example, particular standards for model setup and boundary conditions could be developed, and code sharing may be made easier. This type of activity would likely provide benefits for research in the AAP.

Comments on data sharing:

- The SCADM community would be interested in identifying the kinds of data services (e.g. RESTful) that the RCC might provide. E.g. ECMWF has their APIs (<https://www.ecmwf.int/en/forecasts/datasets/access-archive-datasets/ecmwf-web-api>). They recognize that the RCC will be collating data (SCADM does the same), but a uniform machine-readable API would be extremely valuable.
- On similar lines, it would be good to think about if/how RCC data and products could be linked to or redistributed – e.g. through the Antarctic Master Directory, and what attribution, provenance and licensing requirements might apply.
- It would be good for the National Polar Data Centres (NPDCs) to learn more about the standards the RCC is considering using for metadata etc. and how the National Polar Data Centres might ensure that they can have the highest level of interoperability with the RCC's data and services (including acting as a data provider *to* the RCC if helpful).

Institutions consulted:

BoM (Harald Richter, Phil Reid, Ian Barnes Keoghan, Greg Stuart, David Jones, Andrew Watkins, Robert Johnson); **AAD** (Andrew Klecociuk, Petra Heil, Ben Galton-Fenzi, Johnathan Kool, Robb Clifton); **CSIRO** (James Risbey, Carly Tozer); **CCAMLR** (David Agnew); **SCADM and the Network of National Polar Data Centres** (Johnathan Kool). **SOOS** (Louise Newman) are also supportive but require more interaction.