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Climate services for water resources – the Australian experience

Louise Wilson[1], Chantal Donnelly[2], Pandora Hope[1], Elisabeth Vogel[1], Wendy Sharples[1], Justin Peter[1], Sri Srikanthan[1], Ulrike Bende-Michl[3], Margot Turner[1], Vjeko Matic[1], Julien Lerat[3], Robert Pipunic[1], Andrew Frost[4], Ashkan Shokri[1], Alison Oke[1], and Jannatun Nahar[3]

[1]Bureau of Meteorology, Melbourne, Victoria, Australia (louise.wilson@bom.gov.au)

[2]Bureau of Meteorology, Brisbane, Queensland, Australia

[3]Bureau of Meteorology, Canberra, Australian Capital Territory, Australia

[4]Bureau of Meteorology, Sydney, New South Wales, Australia

Climate change is already impacting on Australian water resources with step changes in rainfall regimes, changes in catchment functioning and drier, hotter conditions creating major challenges for water resource management. Water resources in most parts of the country are influenced by high interannual variability. Thus Australia's operational water management, as well as water policy and infrastructure development decisions require high resolution information that realistically defines this variability both for the past, at seasonal scales, and into the future.

In Australia, water information accounting for climate change that is available to planners and resource managers, exists for limited geographical regions such as single catchments, urban regions or states. It is typically sourced from multiple regional downscaling efforts and using different methods to interpret this data for hydrological impacts. These regional downscaling and hydrological impact data collections are either not application-ready or tailored for specific purposes only, which poses additional barriers to their use across the water and other sectors. The needs of the water sector in managing this resource over vast river basins which cross jurisdictional boundaries, such as the Murray Darling Basin, have provided a challenge for providers of climate projection information and climate services. Consistent, agreed upon approaches across impacts at the national scale are yet to be developed. However, an accessible and consistent set of climate projections for water will help ensure that climate change risks are properly factored into decision-making in the water sector.

The Australian Bureau of Meteorology is developing a seamless national landscape water service, combining historical data on water availability with forecast products, as well as hydrological impact projections. This system uses a consistent methodology based upon the Australian Water resources Assessment (AWRA-L) hydrological model across all time scales. Once delivered, these new products will contribute towards comparable water services for the water, agricultural, energy, and other sectors, providing data across timescales. From a user's perspective the service will facilitate understanding of both past and future variability across multiple timescales of interest including the associated impacts of a changing climate. Providing a seamless service will improve operational decision making by putting short- and medium-term forecasts in the context

of the past and future climate variability. Operational decision making can therefore be better integrated with longer-term strategic decision making on climate change.

For services to meet user needs they must be designed in consultation with these users. An extensive user centred design (UCD) process underpins the scope and nature of the new service. Insights will be shared from the UCD outcomes including user-defined data requirements of past and future variability. Users clearly expressed needs for guidance material and information about skill, confidence and uncertainty to accompany and contextualise climate information which is a major focus of this seamless water service. To engage users and ensure useful outputs, co-design principles are being employed as part of the confidence and uncertainty assessment process to be undertaken as part of the hydrological projections service, which will underpin development of guidance to assist users navigate multiple datasets.