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Hydrologic projections for Australia: understanding future changes to water availability and extremes

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Australia's large natural hydro-climatic variability has already seen many changes, such as declining rainfall in the southern part of the country. Understanding these shifts and associated impacts on water availability is an important issue for Australia, as water supply is dependent on the generation of surface water resources. Sustainable future urban and agriculture developments will depend on best available knowledge about the risks and vulnerabilities of future water availability.

To understand those risks and vulnerabilities and to mitigate the impact of a changing climate, Australia's water policy, management and infrastructure decision making needs detailed high-resolution climate and water information. This includes information on multi-decadal timescales from future projections in the context of past climate variabilities. In Australia, currently, hydrologic change information exists in various forms, ranging from multiple regional downscaling efforts, bias-correction methods and different interpretation methods for hydrologic impact assessment – all limiting a national, consistent impact assessment across multiple spatial and temporal scales. These regional downscaling and hydrological impact data collections are either not application-ready or are tailored for specific purposes only, which poses additional barriers to their use across the water and other sectors.

To overcome these barriers, the Bureau of Meteorology is soon to release a seamless national landscape water service known as the Australian Water Outlook (AWO), combining historical data on water availability with forecast products, as well as hydrological impact projections. This system's core is the Australian Landscape Water Balance model (AWRA-L) modelling hydrologic variables consistently across a large range of spatial and temporal scales. The AWRA-L model is underpinned by substantial scientific development including data assimilation approaches for model calibration as well as model evaluation approaches for past and present time scales. Additionally, consistent downscaling and bias-correction approaches are integrated for the hydrologic projections in the operational framework.

This presentation will share an overview of the soon to be released Australian Water Outlook seamless service with an emphasis on the Hydrologic Projections part: the methodology, the user centred-design, as well as the development of guidance material containing confidence statements and uncertainty assessments to help decision makers in understanding the service. The presentation will also provide an overview of the tactics we applied to ensure the applicability of the new service including demonstration cases developed in partnership with users.