



Improving a continental hydrological model by enhancing its hydrological representation and implementing at 1km spatial resolution

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The Australian Water Resources Assessment Landscape (AWRA-L) model is a continental hydrological model developed by the Commonwealth Scientific and Industrial Research Organization (CSIRO) and Bureau of Meteorology (BoM) of Australia which is essential in providing consistent and reliable water resources assessments and accounts across continental Australia. The operational version of the AWRA-L model provides estimates of landscape runoff, evapotranspiration, soil moisture, and groundwater recharge/storage at a spatial resolution of 5km grids. Each 5km grid is assumed to have two hydrological response units (HRUs) – shallow-rooted vegetation and deep-rooted vegetation. To improve the landscape dynamics within the model, CSIRO and BoM increased the number of HRUs from two to five by representing the hydrological processes of the following: irrigated agricultural areas, perennial large water bodies, and impervious areas. The spatial resolution of the model was also increased to 1km grids to improve its applicability for management purposes in local areas.

In this presentation, a summary of the results of the improved model using the Murrumbidgee River as a test basin will be discussed. Overall, the results suggest that the incorporation of the extra HRUs enabled the explicit representation of hydrological processes in irrigated areas, large water bodies, and impervious areas. Particularly, significant improvement was seen in the comparison of the simulated soil moisture with the observed. With the implementation of the model at a finer 1km spatial resolution, the improved model can now provide more realistic estimates of the water balance which are more suitable for use in catchment and local scale applications.

To implement the improved model in other catchments within Australia as well as for the entire continent, numerous spatial data inputs to the model must be prepared. To ensure the reliability and consistency of the spatial data layers, the most recent and best available data were used to derive and regenerate the AWRA-L spatial input layers for the Australian continent. The 48 input spatial layers to the improved 5 HRU AWRA-L model have been updated and made available both at 5km and 1km spatial grids. The climatological inputs from 1970-2012 have also been prepared to match with the spatial grids of the AWRA-L model. The updated spatial layers will be shown in this presentation. The updated input spatial layers are essential for implementing the improved

AWRA-L model at any catchment within continental Australia. Local catchments with a high fraction of irrigated agricultural areas, impervious areas, or large water bodies will benefit the most from these updates. While the spatial layers were prepared for use in the AWRA-L model, they may also be useful for the development of large-scale hydrological models as well as to the hydrological community, in general.