



AWRA-G: A continental scale groundwater component linked to a land surface water balance model

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The Australian Water Resources Assessment (AWRA) system is a combination of models, data sources and analysis techniques that together will describe the water balance of Australia's landscapes, rivers and groundwater systems. It is a grid based water balance model that has lumped representation of the water balance of the soil, groundwater and surface water stores for each cell. The purpose of AWRA is to operationally provide up to date, credible, comprehensive, and accurate information about the history, present state and future trajectory of the water balance across Australia with sufficient spatial and temporal detail and enable water resources management for undertaking annual water resource assessments and national water accounts.

AWRA is developed to link three major components: a landscape water balance model (AWRA-L), a river routing model (AWRA-R), and a groundwater component model (AWRA-G). These three component models combined are expected to be able to model the fluxes and stores of water throughout the landscape. The groundwater component (AWRA-G) addresses an improved representation of groundwater in the AWRA system to describe basic aquifer dynamics and groundwater-surface water processes. While most continental scale land surface models do not have the capacity to allow water to flow between cells and thus ignore this element of the water balance, AWRA-G does account for lateral flows. In general, AWRA-G provides estimates of groundwater fluxes that are not incorporated into either AWRA-L and its modifications to in-cell soil and groundwater processes, or AWRA-R. The processes integrated into AWRA-G thus are lateral groundwater flow between cells in regional and intermediate groundwater flow systems, groundwater discharge to the ocean, groundwater extraction and infiltration, river losses to groundwater, recharge from overbank flooding, and interactions between deep confined systems and surficial groundwater systems.

Basis of AWRA-G is a good knowledge of aquifer properties (e.g. water table, transmissivity, etc.) on a continental scale. Since information is sparse at the current stage, these properties have to be derived from known sources like digital elevation maps (DEM), geologic maps, and general maps of groundwater flow systems using simplifying assumptions. As a first step such simplified input data are used as the currently best available basis for testing and implementation of AWRA-G. Both, the derivation of simplified aquifer properties and the implementation of AWRA-G are discussed here. Simulations are exemplified on a larger catchment (Loddon) and the whole of Australia to show the general behaviour of water redistribution due to groundwater processes on a large scale.