

Model-data fusion in the Australian Water Availability Project

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Abstract The Australian Water Availability Project (AWAP) monitors the state and trend of the terrestrial water balance of the Australian continent, using model-data fusion methods (parameter estimation and data assimilation) to combine measurements and model predictions. Here we will discuss the model-data fusion component of the project. We use a down-gradient, batch parameter estimation method (Levenberg-Marquardt) as well as a sequential method (the ensemble Kalman filter) to estimate model parameters with both daily and monthly-mean streamflow measurements, and compare these different approaches. With a daily time-step, the assimilation of monthly mean streamflow measurements in the (sequential) ensemble Kalman filter presents a particular challenge, and we investigate ways to achieve this. We also look at the variation of model parameters spatially, to find the best way to parameterise our model for the entire Australian continent. AWAP involves operational, near-real-time estimation of soil moisture and water fluxes over Australia, and we discuss the implementation of data assimilation into the operational system.