



## **On nonstationarity, hydrologic modelling, and the role data assimilation can play**

Sahani Pathiraja (2), Lucy Marshall (1), Hamid Moradkhani (3), and Ashish Sharma (1)

(1) University of New South Wales, School of Civil and Environmental Engineering, Sydney, NSW, Australia (a.sharma@unsw.edu.au), (2) University of Potsdam, Germany, (3) University of Alabama, USA

Hydrological modelling is often constrained by the need to assume a model form, and limited in catchments where responses change with time. Such catchments include those undergoing deforestation or reforestation, impacted by bushfire and recovering with time, or where explicit mechanisms for change are not obvious. There is a need to develop alternatives for dynamic hydrologic models without making substantial structural assumptions that may be difficult to justify.

Here a data assimilation based approach for dynamic hydrologic modeling is presented. It attempts to ascertain when the model needs to be dynamic, what is the dynamic change needed to be built into the model, and how this dynamic model could be used for prediction and forecasting. The approach is formulated without making significant assumptions about the nonstationarity the model needs to exhibit. An overview of the approach, its limitations and some recently published applications (below) are presented.

### References

Insights on the impact of systematic model errors on data assimilation performance in changing catchments, AWR, 2018.

Time-varying parameter models for catchments with land use change: The importance of model structure, HESS, 22(5), 2903-2919, doi:10.5194/hess-22-2903-2018.

Data Driven Model Uncertainty Estimation in Hydrologic Data Assimilation, WRR, 2018.