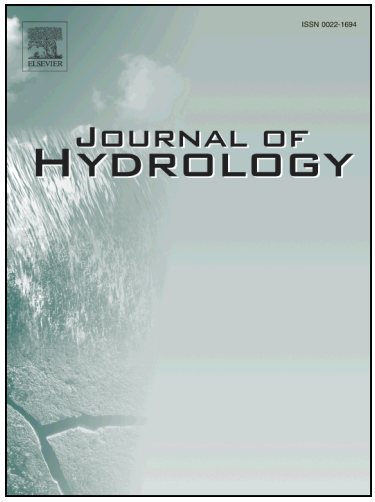

Research papers

Hydrologic model calibration using remotely sensed soil moisture and discharge measurements: the impact on predictions at gauged and ungauged locations

Yuan Li, Stefania Grimaldi, Valentijn R.N. Pauwels, Jeffrey P. Walker

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Hydrologic model calibration using remotely sensed soil moisture and discharge measurements: the impact on predictions at gauged and ungauged locations

Yuan Li [*], Stefania Grimaldi, Valentijn R. N. Pauwels, Jeffrey P. Walker

Department of Civil Engineering, Monash University, Clayton, Victoria 3800, Australia

[*] Corresponding author: yuan.li2@monash.edu

Abstract

The skill of hydrologic models, such as those used in operational flood prediction, is currently restricted by the availability of flow gauges and by the quality of the streamflow data used for calibration. The increased availability of remote sensing products provides the opportunity to further improve the model forecasting skill. A joint calibration scheme using streamflow measurements and remote sensing derived soil moisture values was examined and compared with a streamflow only calibration scheme. The efficacy of the two calibration schemes was tested in three modelling setups: 1) a lumped model; 2) a semi-distributed model with only the outlet gauge available for calibration; and 3) a semi-distributed model with multiple gauges available for calibration. The joint calibration scheme was found to slightly degrade the streamflow prediction at gauged sites during the calibration period compared with streamflow only calibration, but improvement was found at the same gauged sites during the independent validation period. A more consistent and statistically significant improvement was achieved at gauged sites not used in the calibration, due to the spatial information introduced by the remotely sensed soil moisture data. It was also found that the impact of using soil moisture for calibration tended to be stronger at the upstream and tributary sub-catchments than at the downstream sub-catchments.