

## **General purpose land-surface data assimilation framework.**

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It remains a crucial challenge to adequately address uncertainty associated with hydrological predictions. The key to solving this challenge is to understand, quantify and reduce uncertainty in a systematic and cohesive manner. Although data assimilation techniques are emerging to tackle hydrological uncertainty, no well-accepted guidelines exist to implement these principles.

A general data assimilation framework is explored using the distributed, integrated hydrological modeling system MIKE SHE, and coupled with an advanced soil-vegetation-atmosphere transfer (SVAT) model that allows direct input from satellite remote-sensing data. The SVAT model inputs of precipitation, radiation and air temperature from the Meteosat Second Generation (MSG) satellite are used, along with leaf area index and albedo products from the Moderate Resolution Imaging Spectroradiometer (MODIS).

The optimal data assimilation algorithm is chosen based on run time, parameter sensitivity analysis and potential improvement in model prediction. The primary data assimilation algorithms investigated are the Kalman Filter (KF), Ensemble-KF, reduced rank square root, extended KF, unscented KF and particle filter.

Our goal is to validate our framework using on-site hydrological measurements in Western-Africa. The African Monsoon Multidisciplinary Analysis (AMMA) is an international project with the aim to improve knowledge and understanding of the West-African monsoon. In particular, the mesoscale convective systems which bring most of the rainfall over this area can be studied in detail as it corresponds also to the scale of many catchments. Using the on-site data, the data assimilation framework will be validated and tweaked to ensure greater confidence in automated remote-sensing based models.

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