Ensemble Characterisation of Precipitation-Uncertainty in the Hydrological Modelling of the Senegal River Basin

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For large catchment areas, and especially in regions where an extensive rain gauge and radar network does not exist, it is possible to estimate rainfall levels by using a combination of satellite and rain gauge inputs. However in order for these estimates to be useful, their uncertainty must be quantified. For use with a hydrological model, not only must the input uncertainty by calculated, its effect upon the model structure and any uncertainty within must also be determined.

This project used an ensemble of rainfall inputs conditionally simulated using a stochastic model conditioned on TAMSAT cold-cloud-durations to drive a Pitman model of the Bakoye catchment, part of the Senegal River Basin. The Pitman model was parameterised to each individual ensemble member using a Shuffled Complex Evolution (SCE) method. Using a dataset comprising of all the ensemble members, the Pitman model was parameterised to produce a parameter set that would be behavioural for any rainfall set produced by TAMSAT within its bounds of uncertainty.

It is proposed that this method could be used together with an ensemble hydrological modelling approach, or a Generalised Likelihood Uncertainty Estimation (GLUE) method, to improve representation of model, parameter and input uncertainty for hydrometeorology applications – a step towards a holistic approach to uncertainty estimation.