



## **Intercomparison of lumped versus distributed hydrological model on the Upper Lee catchment**

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This paper seeks to investigate the ability of distributed hydrological models to improve model performance as compared to their lumped counterparts. Distributed models, with the capability to incorporate spatially variable inputs-outputs and the potential to simulate runoff at interior catchment points, face the challenging and not always straightforward task of model calibration. This paper compares a lumped and a distributed structure of the Probability Distributed Model, or PDM, using hourly historic data from seven gauged subcatchments (ranging in size from 25 to 1040 km<sup>2</sup>) of the Upper Lee catchment, UK. Regression relationships between known catchment characteristics (land cover, soil type, climate and topography) and parameters of the PDM have been developed using 10 gauged subcatchments and applied to give a priori estimates of the parameters at smaller ungauged subcatchment scales. These a priori estimates are adjusted to the scale using calibration of multiplier. The analysis reveals that a well calibrated distributed PDM can perform at a level comparable to or better than a calibrated lumped one, even when the rainfall input is assumed uniform over the area. Furthermore, the results indicate that a distributed model can outperform a lumped one when spatial variation of rainfall input is considered.