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Investigating evapotranspiration calculations within conceptual hydrological models: an intercomparison among models.

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Hydrological models, ranging from conceptual frameworks to complex physical representations, play a pivotal role in diverse applications including climate change projections and characterising floods and droughts. One crucial aspect of these models is the incorporation of vegetation dynamics, often achieved through links to evapotranspiration and interception. Our study will delve into the critical role of evapotranspiration in the terrestrial water cycle, and how this intricate relationship is simplified across various hydrological models.

Despite the versatility of hydrological models, a common limitation is the static representation of vegetation over time. This limitation becomes particularly significant under climate change, where the consequences of altered vegetation behaviour might not be accurately reflected in the model results. Our research will address this gap by exploring numerous evapotranspiration equations utilised by conceptual rainfall-runoff models, by employing a novel rainfall-runoff model comparison toolbox (MARRMoT), and integrating flux tower measurements into the calibration processes.

By examining how different evapotranspiration equations are utilised across the models and integrating flux tower measurements into the hydrological modelling processes, we seek to improve the models' adaptability to changing environmental conditions. We will do this by interchanging the numerous evapotranspiration equations, whilst keeping all other aspects of the hydrological model constant to explore potential benefits and differences among methods. Further, we will include in-situ measurements by calibrating the model outputted actual-evapotranspiration to flux tower evapotranspiration data, as well as the traditionally calibrated streamflow data.

This research contributes to advancing the accuracy of hydrological predictions and improving the reliability of models in forecasting catchment responses to future climatic shifts.