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## Improved unit hydrograph characterisation of the daily flow regime (including low flows) for the River Teifi, Wales: towards better rainfall-streamflow models for regionalisation

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**Abstract.** An established rainfall-streamflow modelling methodology employing a six-parameter unit hydrograph-based rainfall-runoff model structure is developed further to give an improved model-fit to daily flows for the River Teifi at Glan Teifi. It is shown that a previous model of this type for the Teifi, which (a) accounted for 85% of the variance in observed streamflow, (b) incorporated a pure time delay of one day and (c) was calibrated using a trade-off between two model-fit statistics (as recommended in the original methodology), systematically over-estimates low flows. Using that model as a starting point the combined application of a non-integer pure time delay and further adjustment of a temperature modulation parameter in the loss module, using the flow duration curve as an additional model-fit criterion, gives a much improved model-fit to low flows, while leaving the already good model-fit to higher flows essentially unchanged. The further adjustment of the temperature modulation loss module parameter in this way is much more effective at improving model-fit to low flows than the introduction of the non-integer pure time delay. The new model for the Teifi accounts for 88% of the variance in observed streamflow and performs well over the 5 percentile to 95 percentile range of flows. Issues concerning the utility and efficacy of the new model selection procedure are discussed in the context of hydrological studies, including regionalisation.

**Keywords:** unit hydrographs, rainfall-runoff modelling, low flows, regionalisation.

[Final Revised Paper](#) (PDF, 700 KB)

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