



Model structures and parameter sets as hypotheses: analysing hydrological differences within the extended GLUE methodology

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In the light of uncertainty, model structures and parameter sets can be seen as hypotheses of real world processes. The extended Generalised Likelihood Uncertainty Estimation (GLUE) methodology provides a framework for evaluating such multiple hypotheses against observations. In this framework, differences in the hydrological behaviour of elements of the landscape should lead to different model structures and parameter sets being accepted as working hypotheses for these elements – if those hydrological differences dominate over the inherent uncertainties in the observations. In this paper, we analyse hydrological differences between six grassland field-scale lysimeters, which were originally set up as “replicates”, by evaluating multiple model structures, parameter sets and rainfall scenarios against uncertain discharge observations. We show considerable hydrological differences between alleged “replicates”, and demonstrate how their individual behaviour is characterised through different model structures and parameter sets within extended GLUE while accounting for uncertainties throughout the modelling process.