



How certain are the process parameterizations in our models?

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Environmental models are abstract simplifications of real systems. As a result, the elements of these models, including system architecture (structure), process parameterization and parameters inherit a high level of approximation and simplification. In a conventional model building exercise the parameter values are the only elements of a model which can vary while the rest of the modeling elements are often fixed a priori and therefore not subjected to change. Once chosen the process parametrization and model structure usually remains the same throughout the modeling process. The only flexibility comes from the changing parameter values, thereby enabling these models to reproduce the desired observation. This part of modeling practice, parameter identification and uncertainty, has attracted a significant attention in the literature during the last years. However what remains unexplored in our point of view is to what extent the process parameterization and system architecture (model structure) can support each other. In other words “Does a specific form of process parameterization emerge for a specific model given its system architecture and data while no or little assumption has been made about the process parameterization itself? In this study we relax the assumption regarding a specific pre-determined form for the process parameterizations of a rainfall/runoff model and examine how varying the complexity of the system architecture can lead to different or possibly contradictory parameterization forms than what would have been decided otherwise. This comparison implicitly and explicitly provides us with an assessment of how uncertain is our perception of model process parameterization in respect to the extent the data can support.