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# Identification of possible structural error in hydrological models

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Hydrological Models are simplifications and theoretical approximations of complex natural phenomena. Hence, they cannot predict perfectly what happen in natural systems. There are several reasons; some of the main reasons are error in the input data, imperfect model structure, insufficient information for parameter identification etc. The identification of structural error in a complex model is very difficult task. This is especially difficult as the final differences between observation and model results are a combined consequence of the above reasons. In this study we aimed to develop a tool to identify possible model structural error in hydrological model by using the concept of the data depth function. The model was calibrated using the ROPE (Bárdossy and Singh 2008) algorithm and the optimal parameter space was obtained. From N optimal parameter sets N discharge series were obtained and boundary of the convex hull from d-dimensional dataset corresponding N discharge series (DB) is taken for further analysis. A d-dimensional dataset corresponding to the observed discharge (DX) is taken and depth of the each elements of observed discharge is calculated with respect to the boundary of the convex hull from N model discharge series. If there are elements in DX whose depths are zero with respect to the convex hull (DB), then those corresponding to d-days trajectories of the observation for which there is no similarity in any of the model parameterization. These elements can give possible indication for model structure errors. The methodology was demonstrated on two models HYMOD and TopNet in Pelorous catchment of New Zealand.

Bárdossy, A. and S. K. Singh (2008). "Robust estimation of hydrological model parameters." Hydrology and Earth System Sciences 12: 1273-1283.