



Model adequacy metrics for flow predictions in ungauged basins

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Flow predictions in ungauged basins (PUBs) remains an elusive challenge in hydrological sciences and engineering, even with the advances achieved during the “PUB decade”. Meeting this challenge is made difficult by the uncertainty in the “regionalization” model used to transpose hydrological data (e.g., flow indices) from gauged to ungauged basins, and by the uncertainty in the hydrological model used to predict streamflow in the ungauged basin. In this work we advance on the modelling challenges in the PUBs problem by proposing two statistical metrics, DistanceTest and InfoTest, to assess the adequacy of a model before estimating its parameters. We report an empirical case study based on 92 catchments in northern Spain. We demonstrate that the model adequacy tests can be treated a prerequisite for a model (hydrological or regionalization), before the model can be considered capable of meaningful and high quality flow time series predictions in ungauged catchments. The tests can also help identify the main sources of predictive error. In our case study, the tests indicate that the hydrological model is the main source of uncertainty in comparison to the regionalization model, and hence that priority should be given to the improvement of the hydrological model.