

Pathologies of hydrological models used in changing climatic conditions: a review

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Abstract Characterizing the impact of climate change on hydrology is not as simple as feeding a previously calibrated hydrological model with future climate scenarios. Nevertheless, hydrological modelling is often considered as a small contributor to the overall uncertainty in climate change impact studies. Running a model under conditions that can be significantly different from those used for calibration raises questions relative to the actual extrapolation capacity of the model. As hydrological models (as complex as they may be) are always a simplification of reality, they can never fully integrate all aspects of the rainfall–runoff relationship. Consequently, we prefer to consider them as patients that can certainly be in good health in average conditions, but may also be affected with pathologies when exposed to unusual conditions (namely conditions they have not been properly trained or structured for). Focusing on the robustness issues linked with non-stationary climatic conditions, this paper reviews some of the typical pathologies rainfall–runoff models can suffer from when asked to predict discharges under climate conditions different from the calibration ones.

Key words hydrological model; climate change; model calibration; parameter stability