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Can conceptual hydrological models be used under changing conditions?

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Hydrological models are used both for short term forecasting and for prediction of long-term behavior. Predictions under stationary conditions can be performed both with physically based and reasonable conceptual models. However if circumstances are changing – for example land use or climate – there is reasonable doubt if conceptual models can capture the right signal. On the other hand, physically based models due to their complexity and data demand are often performing worse than conceptual ones under stationary conditions. Therefore, the decision, which model, to use for prediction is not easy. In this contribution, we investigate the performance of the models SHETRAN and HBV for three different prediction problems (i) floods (ii) water balances (iii) low flows. Two types of experiments are carried out – the comparison of results for observed changes and artificial changes generated by a weather generator. Model results show that conceptual models require careful parametrization to provide reasonable predictions.