Illustrating important facts about multi-step ahead forecasting of univariate hydrological time series

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We present a case study using a long time series of monthly streamflow to illustrate important points regarding multi-step ahead forecasting of univariate hydrological processes. We forecast the monthly values of five discrete one-year periods based on the available past monthly values. To produce a faithful image of the underlying phenomena we implement a sufficient number of popular forecasting algorithms and compute an adequate number of metrics on the test sets. The algorithms are applied to the deseasonalized time series, while seasonality is subsequently recovered in the produced forecasts. The ranking of the methods clearly depends on the forecasting attempt and the computed metric, while the forecasting quality can be good or bad.