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Probabilistic nonlinear prediction of river flows

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In the recent past the Nonlinear Prediction (NLP) method, initially developed in the context of nonlinear system dynamics, has been successfully applied to river flow deterministic forecasting. In this work we propose a probabilistic approach to the NLP method, which allows to estimate the full probability distribution of the predicted discharge values, thus providing a useful information to quantify the uncertainty related to the forecast. The ineffective search of the best point prediction is therefore abandoned in favour of the quantification of the forecast process reliability. An ensemble technique is also applied to the choice of the parameter values in order to optimise the prediction and to avoid problems of model calibration. This probabilistic NLP method is applied to a river flow time series, and the obtained results underline the effectiveness and reliability of the proposed approach.