Metric optimisation for analogue forecasting by simulated annealing

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It is well known that weather patterns tend to recur from time to time. This property of the atmosphere is used by analogue forecasting techniques. They have a long history in weather forecasting and there are many applications predicting hydrological variables at the local scale for different lead times. The basic idea of the technique is to identify past weather situations which are similar (analogue) to the predicted one and to take the local conditions of the analogues as forecast. But the forecast performance of the analogue method depends on user-defined criteria like the choice of the distance function and the size of the predictor domain. In this study we propose a new methodology of optimising both criteria by minimising the forecast error with simulated annealing. The performance of the methodology is demonstrated for the probability forecast of daily areal precipitation. It is compared with a traditional analogue forecasting algorithm, which is used operational as an element of a hydrological forecasting system. The study is performed for several meso-scale catchments located in the Rhine basin in Germany. The methodology is validated by a jack-knife method in a perfect prognosis framework for a period of 48 years (1958-2005). The predictor variables are derived from the NCEP/NCAR reanalysis data set. The Brier skill score and the economic value are determined to evaluate the forecast skill and value of the technique. In this presentation we will present the concept of the optimisation algorithm and the outcome of the comparison. It will be also demonstrated how a decision maker should apply a probability forecast to maximise the economic benefit from it.