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Hydrology and Earth System Sciences
Discussions

Interactive comment on "The skill of seasonal ensemble low flow forecasts for four different hydrological models" *by* M. C. Demirel et al.

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This paper compares the performance of two conceptual hydrological models and two data-driven models based on Artificial Neural Networks (ANNs) applied to 90-day low flow forecasting for the Moselle River. Three of the models, including conceptual models HBV and GR4J and the data-driven model ANN-Ensemble (ANN-E), use forecasted meteorological inputs in the form of the ensemble seasonal meteorological forecasts. The fourth model (ANN-Indicator) is data-driven and provides forecasts based on historical observations of precipitation, potential evapotranspiration, groundwater and discharge. The effect of seasonal meteorological forecasts on the skill of low flow forecasts has been assessed for varying lead times. The paper is interesting and it shows

that both conceptual and data-driven models can be successfully used for long-term low flow predictions. From the practitioner's point of view it would be useful if the authors presented a table with minimum and maximum prediction errors from the ensemble for each model for both examined time-periods (years 2002 and 2003).

The authors have set themselves a difficult task in comparing the models with different input variables and different basic assumptions. Unfortunately, the comparison does not come out sufficiently clearly. It would help if the authors did not include the ANN-I model in their comparison. It uses different inputs and obscures the message the authors want to put across.

Specific comments

Lines 225-229: The authors distinguish between daily P and PET data and historical Q as an input. "The first model, i.e. ANN-E, requires daily P, PET and historical Q as input. Historical Q from the previous day is used to update the model states (Table 3). This is a one day memory which also exists in the conceptual models, i.e. GR4J and HBV (Figure 1). The ANN-E is assumed to be comparable with the conceptual models with similar model structures. The second model, ANN-I, uses historical Q to update initial model conditions and three low flow indicators, i.e. P, PET and G, as model input."

Does this mean: observed flow Q up to the date when the forecast is issued?

Line 459 Case 5: zero P and ensemble PET forecasts as input for the other three models (GR4J, HBV and ANN-E). – the figure should be shown for completeness of the discussion.

Line 477: "The decrease in false alarm rates after a lead time of 20 days shows the importance of initial condition uncertainty for short lead time forecasts. For longer lead times the error is better handled by the models."

It is not clear to me how the initial conditions can affect the false alarm rate. It rather seems that the "correct negatives" are increasing in number and may be this particular

indicator is not working properly for forecasts longer than 20 days? Please explain that statement in more detail.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 5377, 2014.