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Assessing the seasonal forecast performance of hydrological extremes over Europe

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The attention given to hydro-climate services is continuously increasing due to the scientific improvements of hydrological models and numerical weather forecasts. However, there is still an urgent need to highlight the predictability of hydrological droughts and floods in order to meet the growing demand on hydrological forecast information from socio-economic sectors, such as energy production and agricultural irrigation. In this study, we evaluated the seasonal hydrological reforecasts generated by the E-HYPE hydrological model forced with predictions from the fifth-generation seasonal forecasting system of the European Centre for Medium-Range Weather Forecasts (ECMWF SEAS5), covering the period 1993-2015. The forecast skill was benchmarked to the simulated streamflow climatology by calculating the Brier Skill Scores for both high and low streamflow for each initialization month and lead time. Results show that both hydrological droughts and flooding over Europe are generally well predicted, with spatial and temporal variability depending on the initialization month and lead time. The results are of high importance since geographical areas and times are identified where the seasonal hydrological forecasts provide an added-value for flooding and droughts, and consequently contribute to decision-making in water resources management.