Skilful seasonal forecasts of streamflow over Europe?

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While climate-model-based seasonal streamflow forecasting experiments are abundant outside of Europe, they remain limited in this part of the world. This is because, although the skill of seasonal climate forecasts has increased over the past decades, it is still limited in the extra-tropics. Much effort is being made to increase the quality of seasonal streamflow forecasts worldwide. However, as their quality increases, their usability for decision-making lags behind. Translating the quality of a forecast into an added value for decision-making and incorporating new forecasting products into established decision-making chains are not easy tasks.

The European Flood Awareness System (EFAS) is at the forefront of seasonal streamflow forecasting, with one of the first operational pan-European seasonal hydrological forecasting systems. We present a Europe-wide analysis of the skill of the EFAS seasonal streamflow hindcasts (produced using ECMWF's System 4 seasonal climate hindcasts) benchmarked against the Ensemble Streamflow Prediction (ESP) forecasting approach, using a variety of verification scores that cover several forecast attributes (i.e. accuracy, sharpness, reliability and overall performance) (Arnal et al., in review). Overall, the results show that the seasonal climate forecasts improve the predictability over historical meteorological information for pan-European seasonal streamflow forecasting for the first month of lead time only. However, the predictability varies in space and time and is greater in winter and autumn. Parts of Europe additionally display a longer predictability, up to seven months of lead time, for certain target months.

For decision-making, the ability of a seasonal forecasting system to predict above or below normal conditions months ahead is of great value. Our results show that the EFAS seasonal streamflow forecasts are more potentially useful than the ESP for certain seasons and regions, especially in winter for most of Europe.

References

Arnal, L., Cloke, H. L., Stephens, E., Wetterhall, F., Prudhomme, C., Neumann, J., Krzeminski, B., and Pappenberger, F.: Skilful seasonal forecasts of streamflow over Europe?, Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2017-610, in review, 2017.