EGU22-9437
https://doi.org/10.5194/egusphere-egu22-9437
EGU General Assembly 2022

The skill of sub-seasonal hydrological prediction over Europe

Francesca Di Giuseppe and **Fredrik Wetterhall**
ECMWF, Reading, United Kingdom of Great Britain – England, Scotland, Wales

The forecast lead time from the medium-range (15 days) to seasonal (up to several months) has the potential to be very useful for decision makers who rely on in hydrometeorological forecasts. Recently many forecasting systems, such as the IFS at ECMWF, are developing into fully integrated earth modeling systems by including the representation of the most relevant coupled processes such as ocean coupling, sea-ice interaction and troposphere-stratosphere feedbacks already at day 1. The immediate consequence of this new approach is that forecasting skills beyond the first two weeks might have increased to provide useful and "actionable" information to the end user. This is not only true for the meteorological output, but also for the many sectoral applications that relies on those atmospheric forcings. This study explores the sub-seasonal to seasonal predictability for a hydrological application over Europe forced by seasonal and sub-seasonal meteorological model output. The model system used was the seamless version of the European Flood Awareness System (EFAS) which combines the 46-day ECMWF Ensemble prediction system (EPS) with the seasonal forecasts (System-4). This provides biweekly forecast updates with a maximum horizon of 7 months. The forecast was evaluated against a water balance run forced with observed meteorological input for a period of 20 years. The results show that the predictability window for river discharge at a number of locations extends to 31 days on average; beyond this limit climatology is as good as or better than dynamical forecast model. However, there are both spatial and and seasonal variations to this limit. Large river basins tends to extend the predictability to up to 45 days and there is a very relevant increase in the predictability up to 60 days for low-flow events. This indicates that a hydrological drought early warning system could provide skillful information of anomalous conditions almost at the season onset.