



Are seasonal forecasts useful to improve operational decisions for water supply in the UK?

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Improved skill of seasonal predictions for the North Atlantic circulation and Northern Europe are motivating an increasing effort towards developing seasonal hydrological forecasting systems, such as the Copernicus Climate Change Service (C3S). Among other purposes, such forecasting systems are expected to deliver better-informed water management decisions. Using a pumped-storage reservoir system in the UK as a pilot application, we investigate the potential for using seasonal weather forecasts to simultaneously increase supply reliability and reduce pumping costs. To this end, we develop a Real-Time Optimisation System (RTOS) that uses C3S seasonal weather forecasts to generate hydrological forecasts, and combine them with a reservoir simulation model and an evolutionary optimisation algorithm, to generate release and pumping decisions.

We evaluate the performances of the RTOS over historical periods and compare it to several benchmarks, including a simplified operation scheme that mimic the current operational procedures, and a RTOS that uses Ensemble Streamflow Predictions (ESP) in place of C3S seasonal forecasts. We also attempt at linking the improvement of system performances to the characteristic of hydrological conditions and forecasts properties. Ultimately, we aim at addressing key questions such as ‘To what extent improving forecast skill translates into an increase of the forecast value for water supply decisions?’ and ‘Does accounting for forecast uncertainty in optimization improve decisions?’.