



## **Seasonal UK Drought Forecasting using Statistical Methods**

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In the UK drought is a recurrent feature of climate with potentially large impacts on public water supply. Water companies' ability to mitigate the impacts of drought by managing diminishing availability depends on forward planning and it would be extremely valuable to improve forecasts of drought on monthly to seasonal time scales.

By focusing on statistical forecasting methods, this research aims to provide techniques that are simpler, faster and computationally cheaper than physically based models. In general, statistical forecasting is done by relating the variable of interest (some hydro-meteorological variable such as rainfall or streamflow, or a drought index) to one or more predictors via some formal dependence. These predictors are generally antecedent values of the response variable or external factors such as teleconnections. A candidate model is Generalised Additive Models for Location, Scale and Shape parameters (GAMLSS). GAMLSS is a very flexible class allowing for more general distribution functions (e.g. highly skewed and/or kurtotic distributions) and the modelling of not just the location parameter but also the scale and shape parameters. Additionally GAMLSS permits the forecasting of an entire distribution, allowing the output to be assessed in probabilistic terms rather than simply the mean and confidence intervals.

Exploratory analysis of the relationship between long-memory processes (e.g. large-scale atmospheric circulation patterns, sea surface temperatures and soil moisture content) and drought should result in the identification of suitable predictors to be included in the forecasting model, and further our understanding of the drivers of UK drought.