



## **Communication of uncertainty in hydrological predictions: a user-driven example web service for Europe**

Matt Fry (1), Katie Smith (1), Justin Sheffield (2), Glenn Watts (3), Eric Wood (4), Jon Cooper (5), Christel Prudhomme (1,6,7), and Gwyn Rees (1)

(1) Centre for Ecology & Hydrology, Wallingford, Oxfordshire, United Kingdom, (2) Southampton University, Southampton, Hampshire, United Kingdom, (3) Environment Agency, Bristol, United Kingdom, (4) Princeton University, New Jersey, United States of America, (5) Centre for Ecology & Hydrology, Lancaster, Lancashire, United Kingdom, (6) Department of Geography, Loughborough University, Leicestershire, United Kingdom, (7) European Centre for Medium Range Weather Forecasts (ECMWF), Reading, Berkshire, United Kingdom

Water is fundamental to society as it impacts on all facets of life, the economy and the environment. But whilst it creates opportunities for growth and life, it can also cause serious damages to society and infrastructure through extreme hydro-meteorological events such as floods or droughts. Anticipation of future water availability and extreme event risks would both help optimise growth and limit damage through better preparedness and planning, hence providing huge societal benefits.

Recent scientific research advances make it now possible to provide hydrological outlooks at monthly to seasonal lead time, and future projections up to the end of the century accounting for climatic changes. However, high uncertainty remains in the predictions, which varies depending on location, time of the year, prediction range and hydrological variable. It is essential that this uncertainty is fully understood by decision makers so they can account for it in their planning. Hence, the challenge is to find ways to communicate such uncertainty for a range of stakeholders with different technical background and environmental science knowledge.

The project EDgE (End-to end Demonstrator for improved decision making in the water sector for Europe) funded by the Copernicus programme (C3S) is a proof-of-concept project that develops a unique service to support decision making for the water sector at monthly to seasonal and to multi-decadal lead times. It is a mutual effort of co-production between hydrologists and environmental modellers, computer scientists and stakeholders representative of key decision makers in Europe for the water sector.

This talk will present the iterative co-production process of a web service that serves the need of the user community. Through a series of Focus Group meetings in Spain, Norway and the UK, options for visualising the hydrological predictions and associated uncertainties are presented and discussed first as mock-up dash boards, off-line tools and pre-operational services. Feedbacks received from the users are listed and prioritised for the next-generation of development to take place. In addition, sprint-review webinars are also organised to insure the developed services address the users' demands correctly. The tools are formally tested through a set of case studies representative of decision making in contrasting water sectors, including hydro-power in snow-dominated regions, public water supply in heavily regulated countries, and river basin management in an arid environments with multiple users. In addition to the visualisation, a key component of the project is the provision of user guidance. This helps the user understand the challenges of dealing with uncertainty and interpretation of the results, provides contextual background information, describes the service's functionality, and showcases examples of good practice.