Geophysical Research Abstracts
Vol. 19, EGU2017-5414, 2017
EGU General Assembly 2017

Does a more skilful meteorological input lead to a more skilful flood forecast at seasonal timescales?

Jessica Neumann (1), Louise Arnal (1,2), Linus Magnusson (2), Hannah Cloke (1,3)

(1) Department of Geography and Environmental Science, University of Reading, Reading, United Kingdom (j.l.neumann@reading.ac.uk), (2) European Centre for Medium-Range Weather Forecasts (ECMWF), Reading, United Kingdom, (3) Department of Meteorology, University of Reading, Reading, United Kingdom

Seasonal river flow forecasts are important for many aspects of the water sector including flood forecasting, water supply, hydropower generation and navigation. In addition to short term predictions, seasonal forecasts have the potential to realise higher benefits through more optimal and consistent decisions. Their operational use however, remains a challenge due to uncertainties posed by the initial hydrologic conditions (e.g. soil moisture, groundwater levels) and seasonal climate forcings (mainly forecasts of precipitation and temperature), leading to a decrease in skill with increasing lead times.

Here we present a stakeholder-led case study for the Thames catchment (UK), currently being undertaken as part of the H2020 IMPREX project. The winter of 2013-14 was the wettest on record in the UK; driven by 12 major Atlantic depressions, the Thames catchment was subject to compound (concurrent) flooding from fluvial and groundwater sources. Focusing on the 2013-14 floods, this study aims to see whether increased skill in meteorological input translates through to more accurate forecasting of compound flood events at seasonal timescales in the Thames catchment.

An earlier analysis of the ECMWF System 4 (S4) seasonal meteorological forecasts revealed that it did not skilfully forecast the extreme event of winter 2013-14. This motivated the implementation of an atmospheric experiment by the ECMWF to force the S4 to more accurately represent the low-pressure weather conditions prevailing in winter 2013-14 [1]. Here, we used both the standard and the “improved” S4 seasonal meteorological forecasts to force the EFAS (European Flood Awareness System) LISFLOOD hydrological model. Both hydrological forecasts were started on the 1st of November 2013 and run for 4 months of lead time to capture the peak of the 2013-14 flood event. Comparing the seasonal hydrological forecasts produced with both meteorological forcing data will enable us to assess how the improved meteorology translates into skill in the hydrological forecast for this extreme compound event.

As primary stakeholders involved in the study, the Environment Agency and Flood Forecasting Centre are responsible for managing flood risk in the UK. For them, the detection of a potential flood signal weeks or months in advance could be of great value in terms of operational practice, decision-making and early warning.

[1] Rodwell, M.J., Ferranti, L., Magnusson, L., Weisheimer, A., Rabier, F. & Richardson, D. (2015) Diagnosis of northern hemispheric regime behaviour during winter 2013/14. ECMWF Technical Memoranda 769.