



## Flood forecast skill for Early Action: Results and Learnings from the development of the Early-Action Protocol for Floods in Uganda

**Andrea Ficchi**<sup>1</sup>, Hannah Cloke<sup>1,2,3</sup>, Linda Speight<sup>1</sup>, Douglas Mulangwa<sup>4,5</sup>, Irene Amuron<sup>6</sup>, Emmanuel Ntale<sup>7</sup>, and Liz Stephens<sup>1,6</sup>

<sup>1</sup>University of Reading, Department of Geography and Environmental Science, Reading, United Kingdom of Great Britain – England, Scotland, Wales (a.ficchi@reading.ac.uk)

<sup>2</sup>Department of Meteorology, University of Reading, Reading RG6 6BB, UK

<sup>3</sup>Department of Earth Sciences, Uppsala University, Uppsala, Sweden

<sup>4</sup>Directorate of Water Resources Management, Ministry of Water and Environment, Uganda

<sup>5</sup>Department of Civil Engineering, Makerere University, Kampala, Uganda

<sup>6</sup>Red Cross Red Crescent Climate Centre, The Hague, Netherlands

<sup>7</sup>Uganda Red Cross Society, Kampala, Uganda

Global flood forecasting systems are helpful in complementing local resources and in-country data to support humanitarians and trigger early action before an impactful flood occurs. Freely available global flood forecast information from the European Commission's Global Flood Awareness System (GloFAS, a Copernicus EMS service) is being used by the Uganda Red Cross Society (URCS) alongside in-country knowledge to develop appropriate triggers for early actions for flood preparedness, within the Forecast-based Financing (FbF) initiative. To scale up the first FbF pilot to a national level, in 2020 URCS collaborated with several partners including the Red Cross Red Crescent Climate Centre (RCCC), the Uganda's Ministry of Water and Environment, through the Directorate of Water Resources Management (DWRM), the Uganda National Meteorological Authority (UNMA), the 510 Global team and the University of Reading, through the UK-supported project Forecasts for Anticipatory Humanitarian Action (FATHUM). The new Early Action Protocol (EAP) for floods, submitted to the IFRC's validation committee in September 2020, is now under review.

One of the aims of an EAP is to set the triggers for early action, based on forecast skill information, alongside providing a local risk analysis, and describing the early actions, operational procedures, and responsibilities. Working alongside our partners and practitioners in Uganda, we developed a methodology to tailor flood forecast skill analysis to EAP development, that could be potentially useful for humanitarians in other Countries and forecasters engaging with them. The key aim of the analysis is to identify skilful lead times and appropriate triggers for early action based on available operational forecasts, considering action parameters, such as an Action Lifetime of 30 days, and focusing on relevant flood thresholds and skill scores. We analysed the skill of probabilistic flood forecasts from the operational GloFAS (v2.1) system across Uganda against river flow observations and reanalysis data. One of the challenges was to combine operational needs

with statistical robustness requirements, using relevant flood thresholds for action. Here we present the results from the analysis carried out for Uganda and the verification workflow, that we plan to make openly available to all practitioners and scientists working on the implementation of forecast-based actions.