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Toward operational flood forecasting and warning services across West Africa – recent experiences at national and regional scales

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Flooding is a rapidly growing concern in West Africa. In 2020 alone, several hundred people died and 100 000 were displaced by the floods that occurred across the region. The floods damaged houses and crops and washed away livestock, threatening the livelihoods of millions. Niamey, the capital of Niger, experienced a record flood with the highest ever recorded water levels in nearly 100 years. Flooding is also projected to increase with climate change. One component in addressing this challenge – and a concrete way to adapt to the changing climate – is to provide operational forecasting and warning services to enable pre-emptive stakeholder action and thereby minimize damages.

Since 2018, a pre-operational flood forecasting and warning service for West Africa has been co-designed, co-developed, co-adapted, and co-operated within the FANFAR project (https://fanfar.eu/, https://doi.org/10.5194/egusphere-egu2020-7660). This study presents results from two approaches employed to assess the accuracy and utility of the service.

Firstly, representatives from hydrological services, emergency management agencies, river basin organisations, and regional expert centres in 17 countries have contributed to develop and evaluate the service. Specifically, each participating organisation was asked to test the service during the 2019 and 2020 rainy seasons, to record the most critical flood events and the extent to which FANFAR captured the location, timing, magnitude and severity of the floods. The results indicate that both the use and accuracy of the service varies substantially (e.g. from 90% correct in some countries to not even used in others). This people-centred assessment approach also provided an important opportunity to learn about the many events that occur outside of hydrometric monitoring networks, and the way in which agencies communicate flood risk information to multiple audiences for appropriate decision-making.

Secondly, we evaluated FANFAR forecasts against conventional gauge observations at key locations (e.g. Niamey). The effect of different system configurations on forecast performance was assessed (e.g. the benefit of model calibration and assimilation of gauge observations). The results likewise indicate a performance spread, and sometimes ability to capture certain features of a flood but not all. For example, for the record flood in Niamey in 2020, FANFAR managed to

forecast the timing and severity level at the onset of the flood, but not the extent or long duration of the flood.

We finish off by reflecting on some challenges and opportunities for operational, scalable and reliable 24/7 weather and climate services in West Africa, with potential applicability in the global South.