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## Assessing the riverine flood forecast skill of GloFAS and Google Flood Hub with impact data and river flow observations to support early actions in Mali

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Riverine floods are among the most destructive and frequent natural hazards in Mali. To mitigate their impacts, the Mali Red Cross has implemented an anticipatory action mechanism that activates early responses when predefined triggers are met. Currently, the Early Action Protocol (EAP) relies on real-time water level observations from the National Directorate of Hydraulics (DNH) of Mali. Triggers are activated when upstream water levels exceed thresholds, which are extrapolated downstream along the river network using estimated propagation times as the lead time. The current EAP's trigger model lacks meteorological inputs, limiting skilful lead times to less than four days. Recent advancements in global operational flood forecasting systems present opportunities to enhance Mali's EAP by leveraging increasingly skilful medium-range weather forecasts as inputs of both physically-based models, as in the Copernicus Emergency Management Service's Global Flood Awareness System (GloFAS), and artificial intelligence-based models, like in Google Flood Hub. Incorporating forecasts from these models in Mali's EAP could improve flood anticipation. This study evaluates the performance of the latest version of GloFAS (version 4) and Google Flood Hub alongside Mali's current trigger model for the Niger and Senegal river basins in Mali. We evaluated hindcasted triggers aggregated to administrative units, using river flow observations and flood impact data, sourced from OCHA, EMDAT, DesInventar, DRPC Mali, DGPC Mali, CatNat, Relief, and a text-mining algorithm applied to newspaper articles. Model performance was assessed using Probability of Detection (POD) and False Alarm Ratio (FAR) for different lead times and discharge return period thresholds. GloFAS and Google Flood Hub demonstrated similar skill in frequently flooded regions, suggesting that lead times can be extended beyond the four-day window. However, performance assessments are limited by the quality of impact data. This study highlights the potential and challenges of enhancing flood forecasting and anticipatory action in Mali. In the future, incorporating flood extent mapping may improve forecast value by pinpointing affected communities, and impact databases can be

improved using satellite imagery, enhancing forecast assessments for early actions.