Advancing Flash Flood Forecasting Capabilities in West Africa with Machine Learning and Satellite Observations

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RUTGERS

January 31, 2024

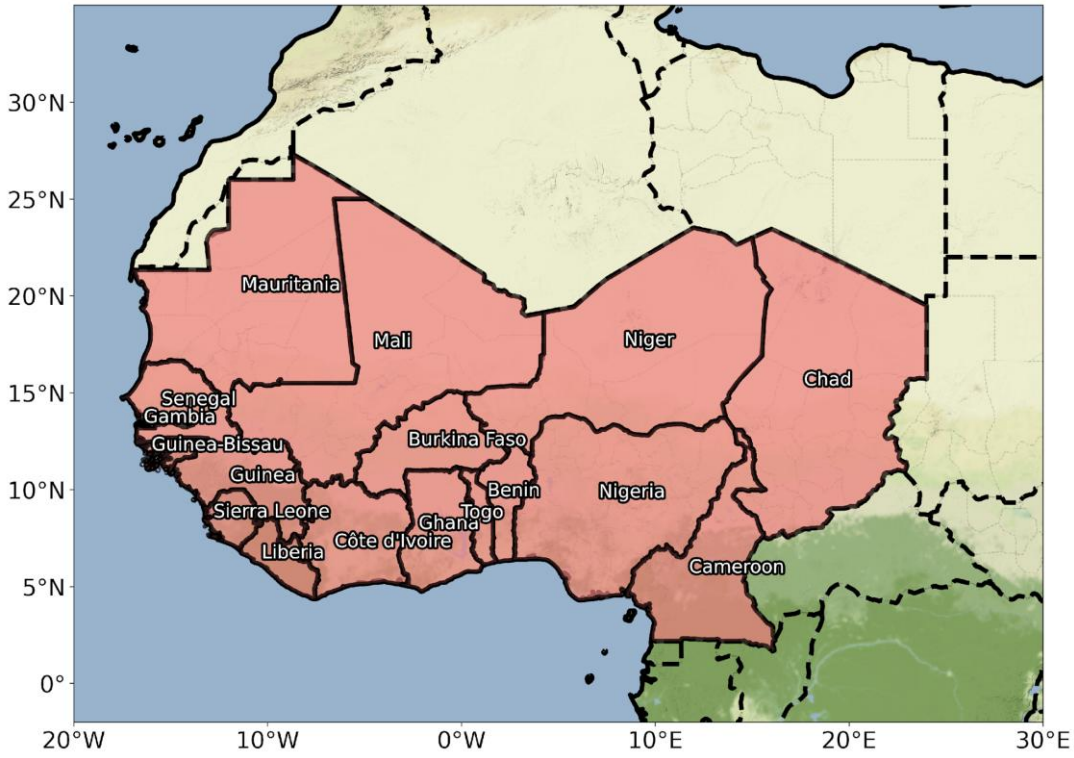
Motivation

OCHA

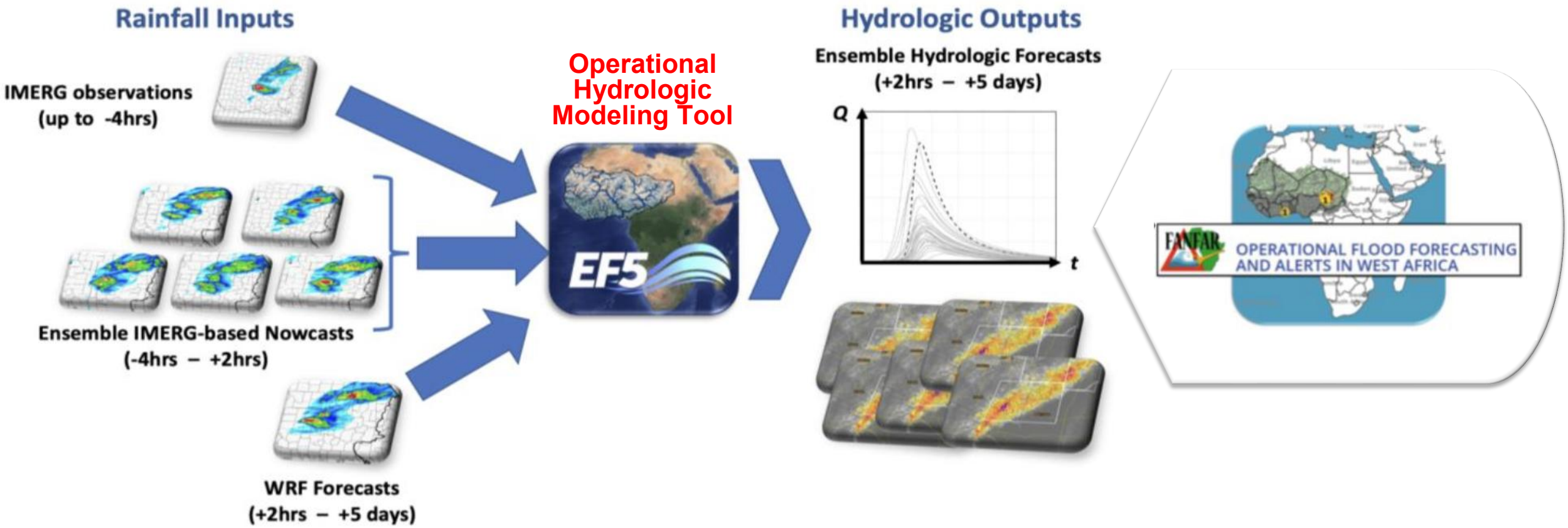
	FROM 05 JULY. TO 04 SEP.	OVERALL IN 2023
People Killed	70	836
People Injured	43	303
People Displaced	12K	173K
People Affected	190K	692K
Houses Destroyed/Damaged	16K	57K
Destroyed crops	3K	4K

Objective

Develop a flash flood nowcasting/forecasting system to **advance the institutional capacity** of the West Africa countries to mitigate flash flood risk.

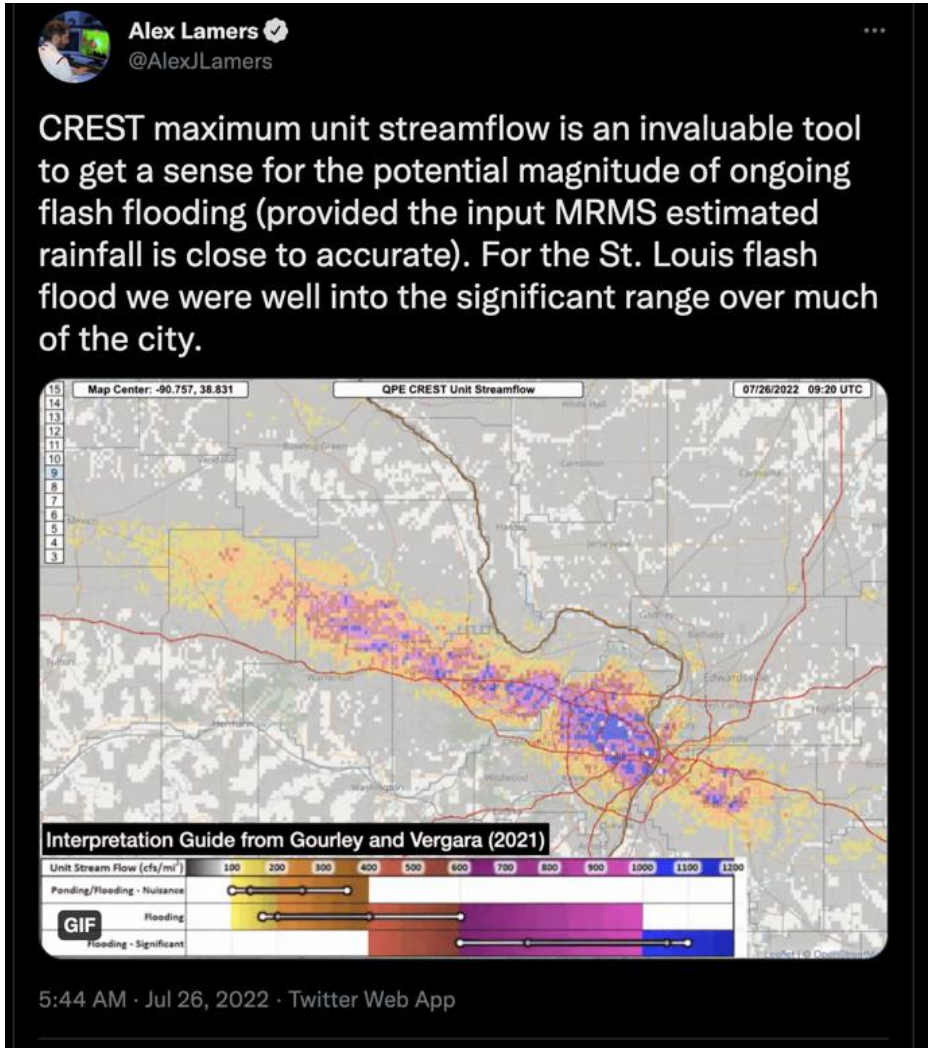


Methodology



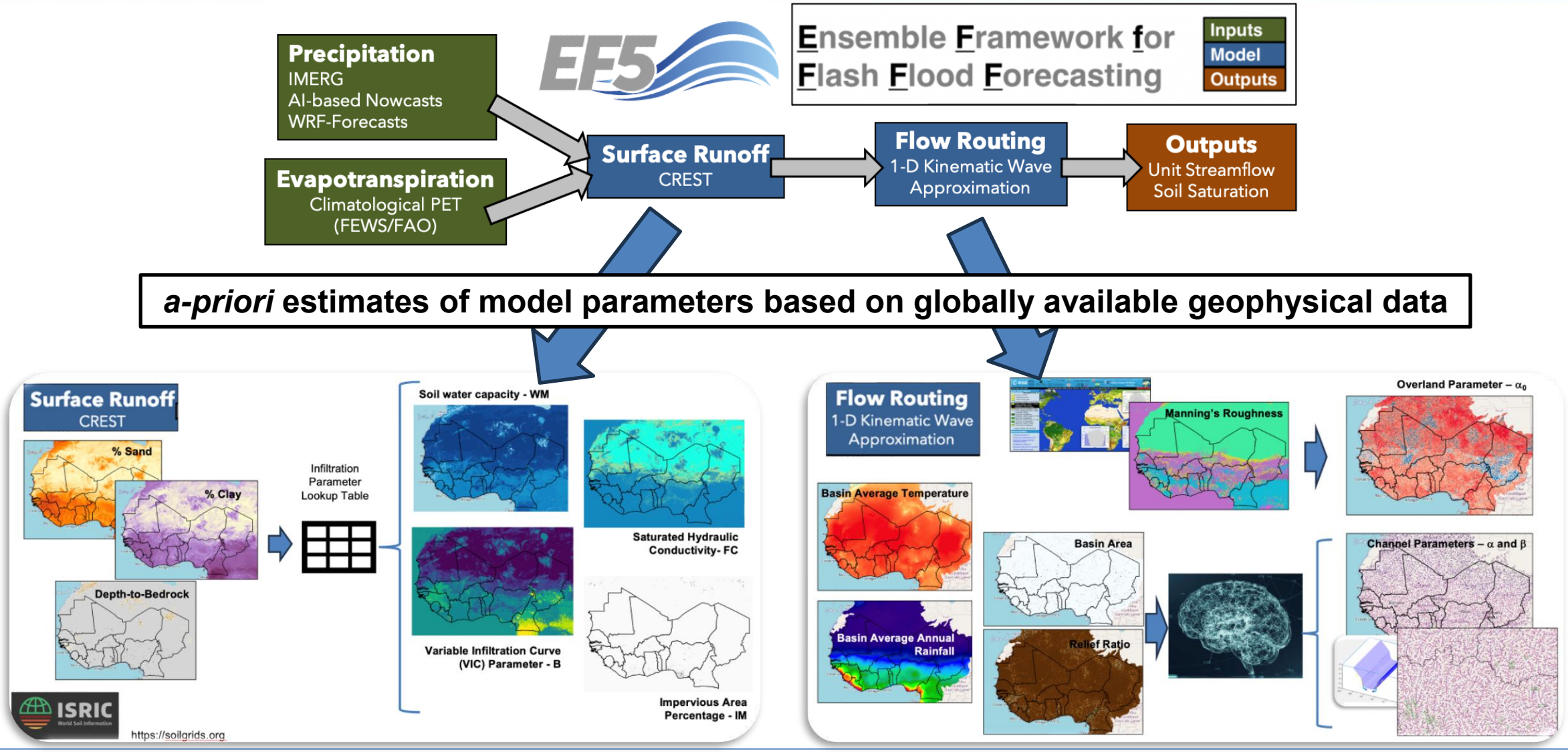
Distributed hydrological modeling for flash flood prediction

EF5 Ensemble Framework for Flash Flood Forecasting



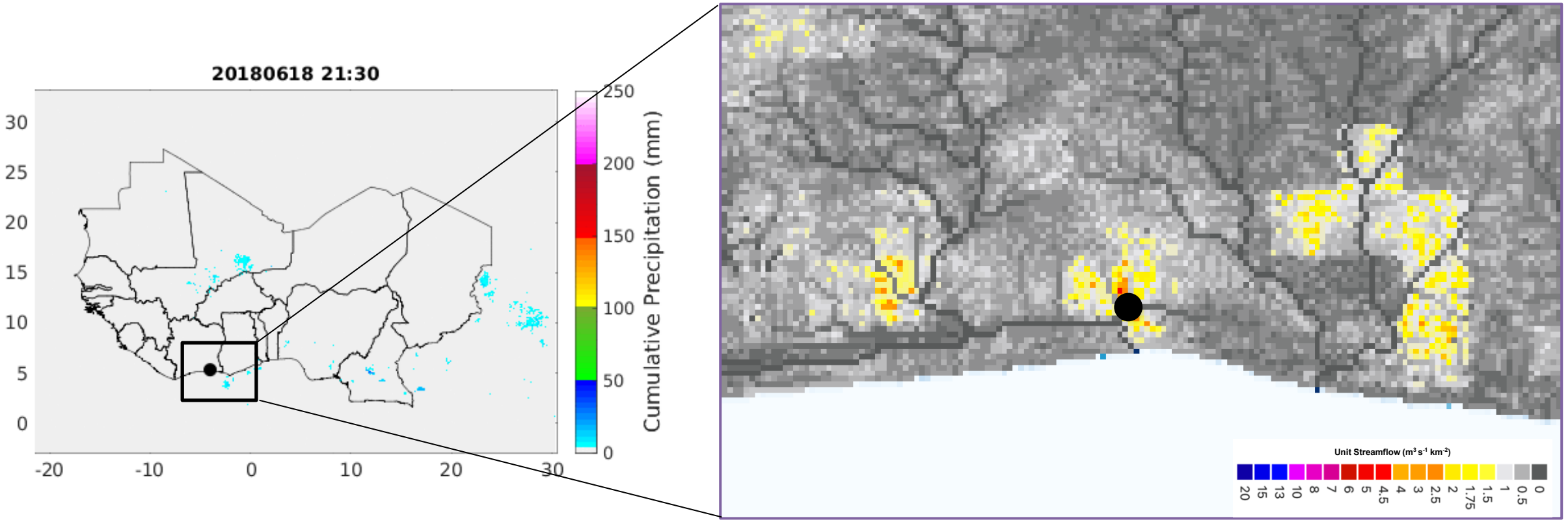
Flamig, Z.L., Vergara, H. and Gourley, J.J., 2020. The Ensemble Framework For Flash Flood Forecasting (EF5) v1.2: Description and Case Study. *Geoscientific Model Development Discussions*, 13, 4943–4958, https://doi.org/10.5194/gmd-13-4943-2020, 2020.

Distributed hydrological modeling for flash flood prediction

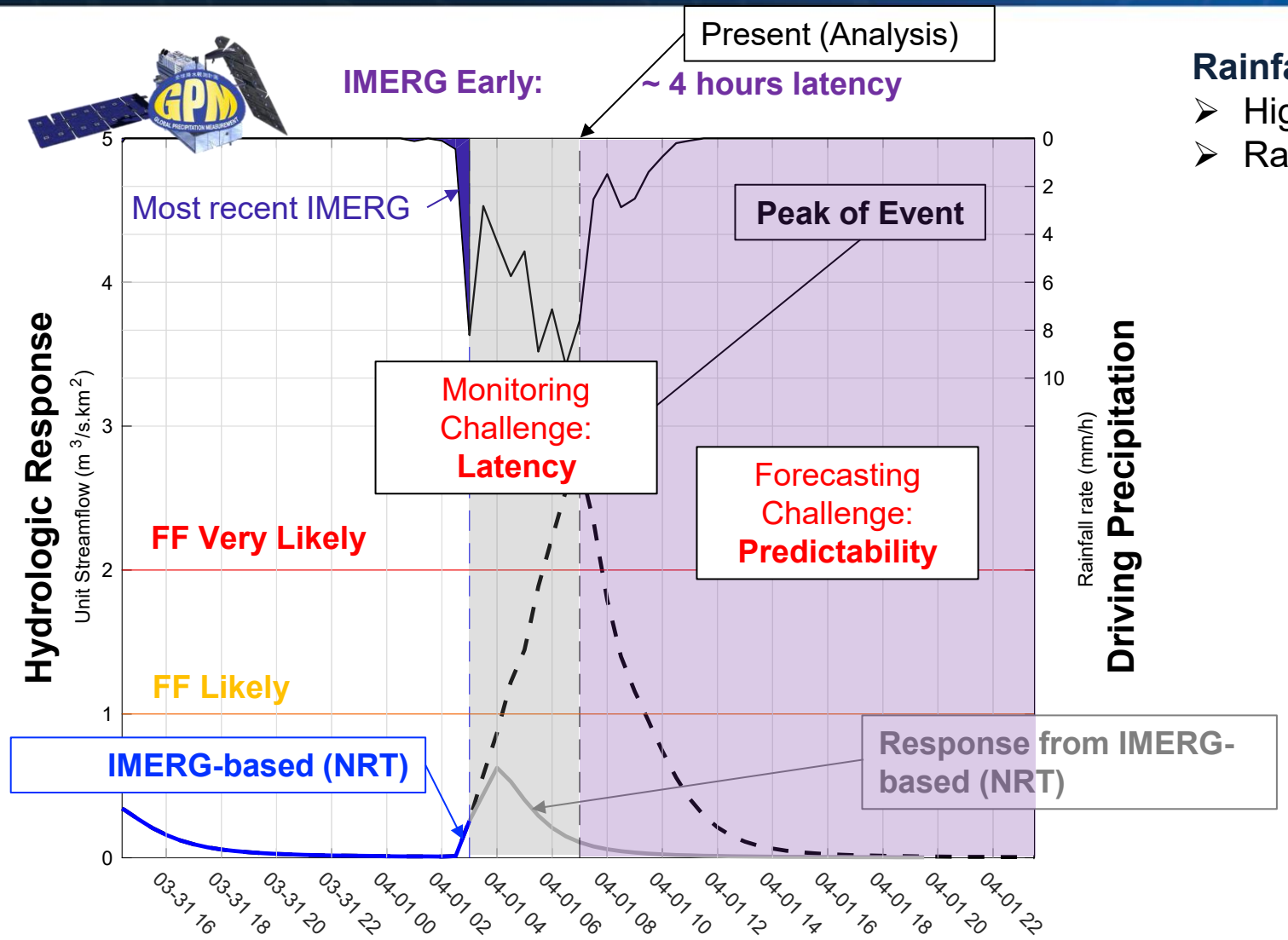


Example – IMERG hindcast

Côte d'Ivoire Flood June 2018



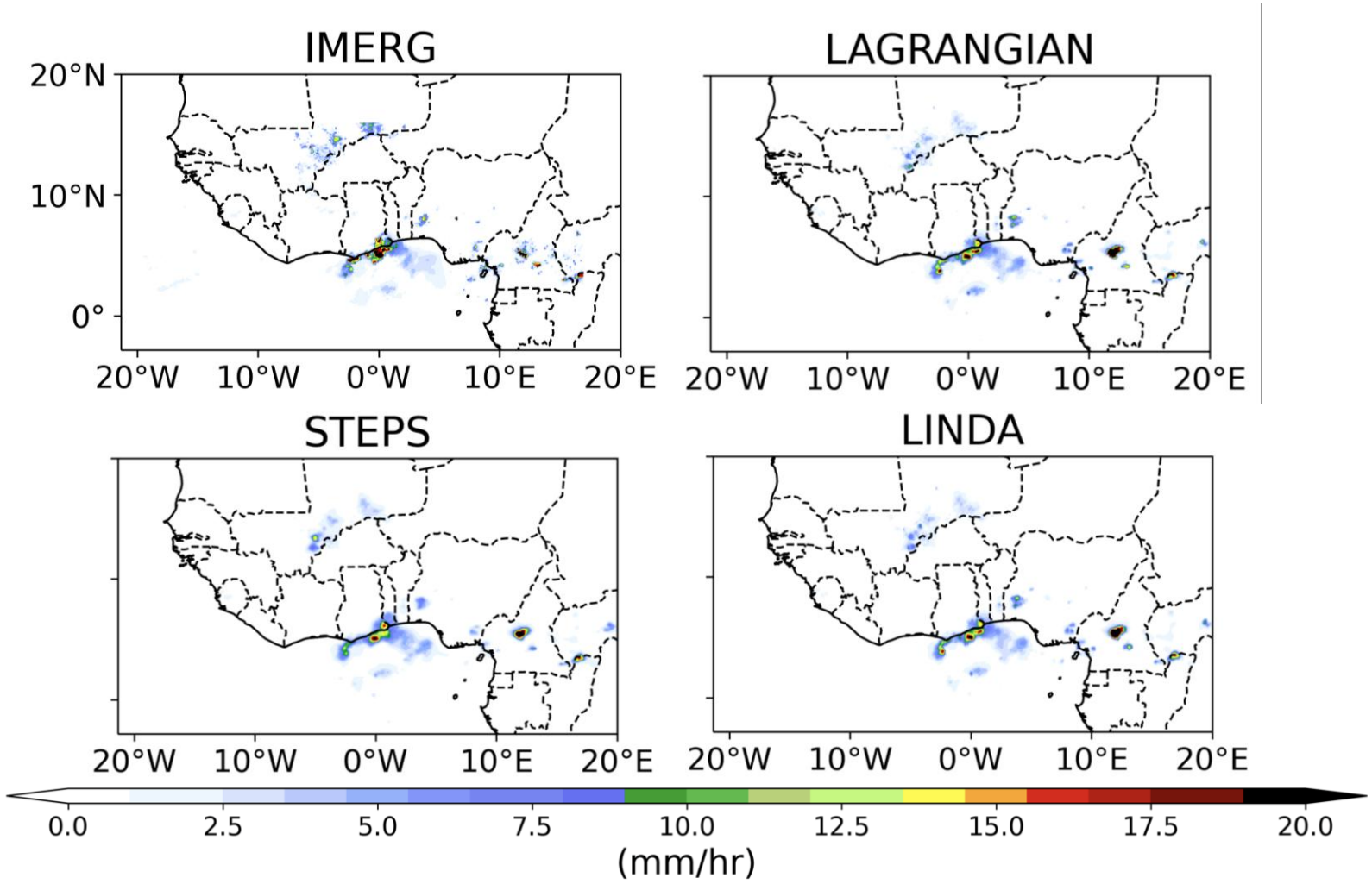
Precipitation – The #1 Challenge



Rainfall-driven short fused hazard

- High rainfall rates
- Rapidly evolving/Small spatial scales

Establishing a baseline for short-term QPFs



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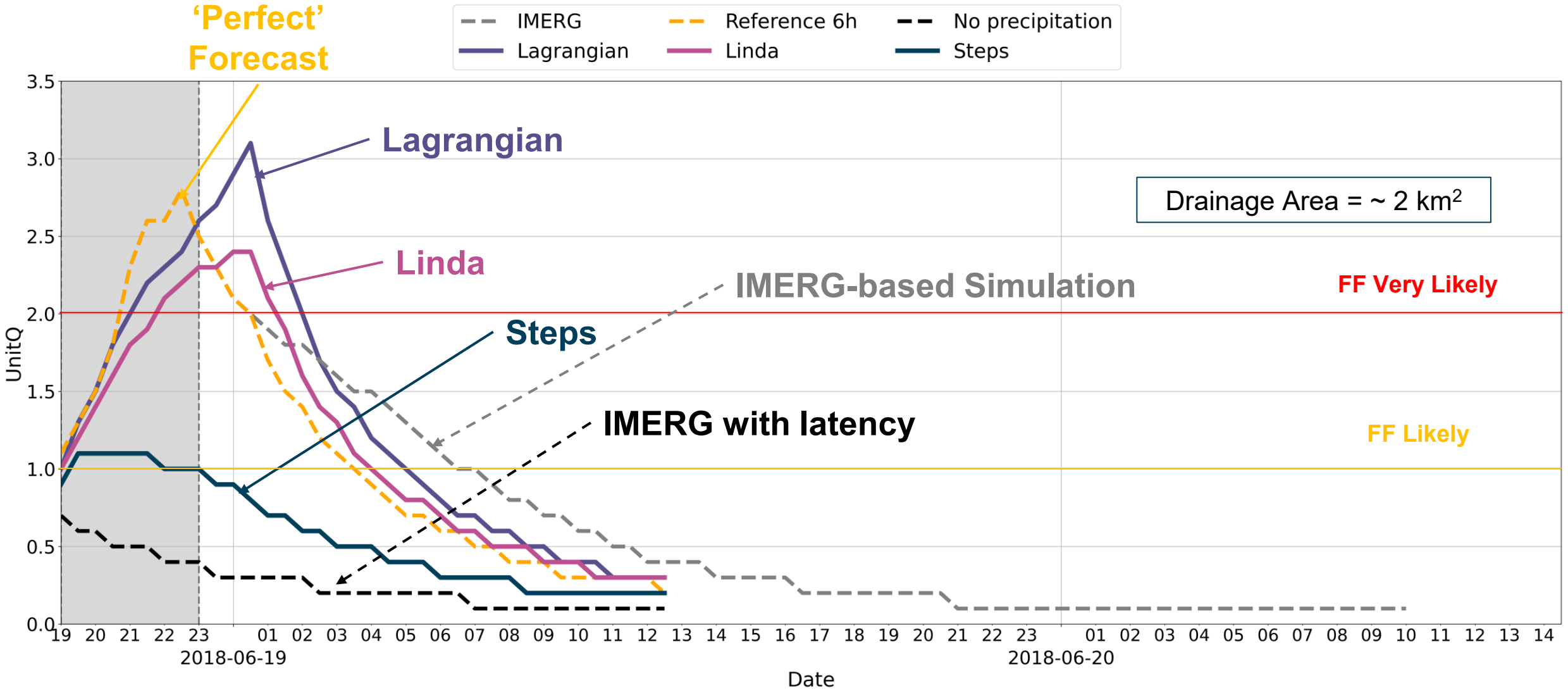
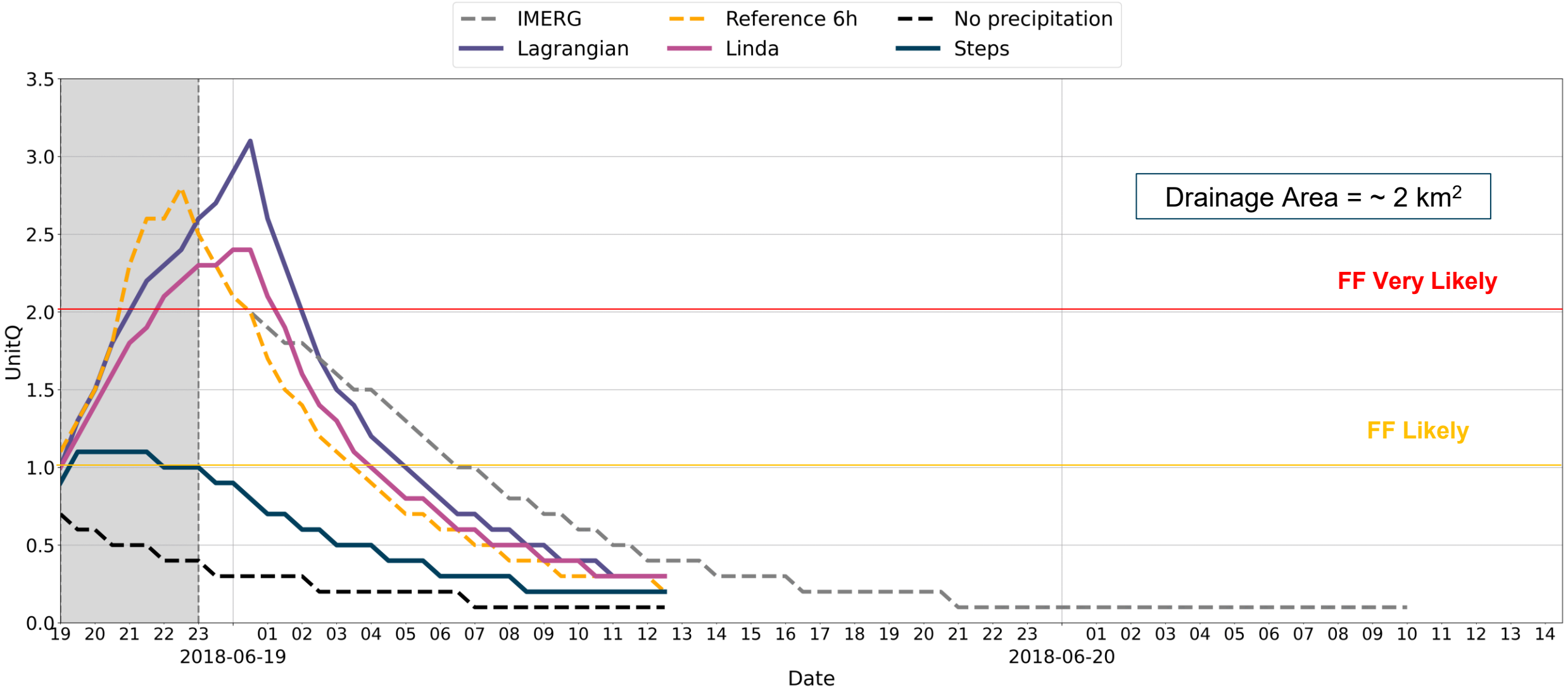
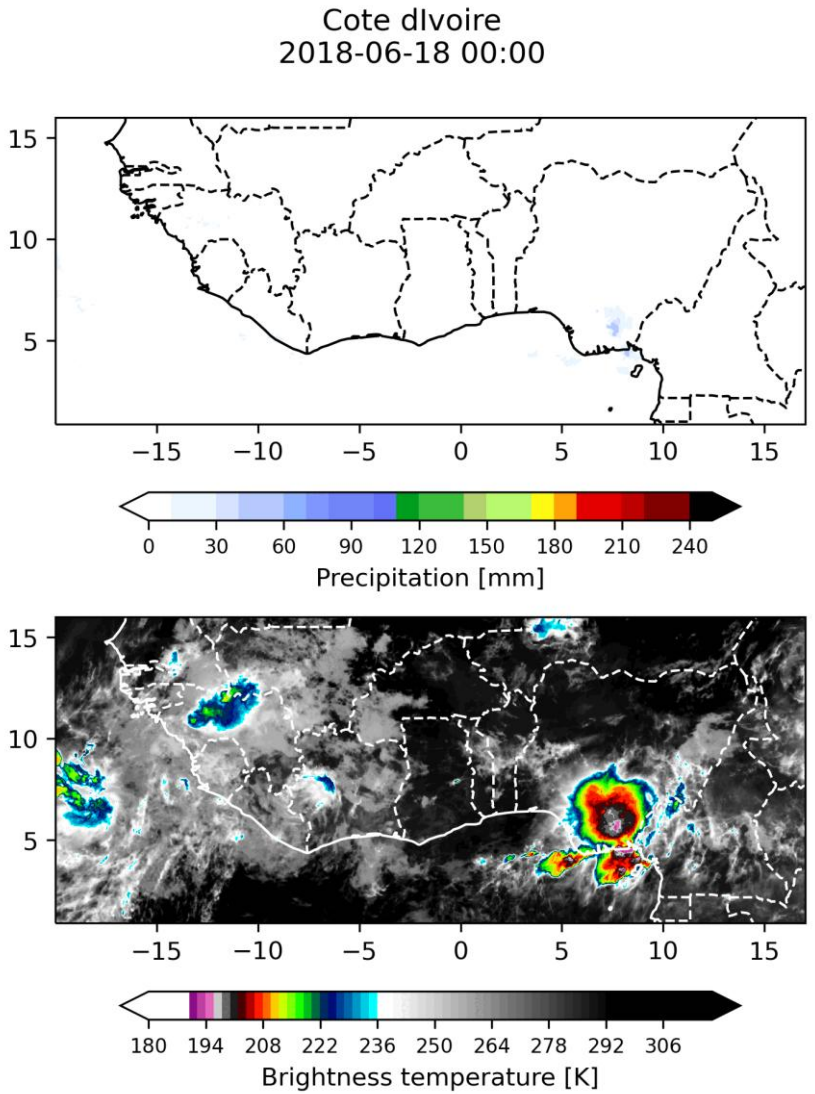


Establishing a baseline for short-term QPFs



Nowcasting: Beyond the baseline



Summary and ongoing efforts

We are developing a flash flood forecasting service based on satellite observations and nowcasting procedures to improve mitigation strategies in data scarce and highly vulnerable region of West Africa.

Ongoing efforts

- Data collection on flash flood events (please reach out!)
- ML nowcasting – integration of IR to reduce latency of observed fields
- Very high-res (90m) EF5 configuration for Ghana
- Capacity building – training material

Thank you for your attention

Project: Machine learning based flash flood forecasting in West Africa with satellite observations

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Satellite Hydrometeorology






Machine Learning



Hydrologic Modeling




Flash Flood Warning

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