Global flood inundation forecasting combining GloFAS and flood hazard maps: A case study of the 2017 Brahmaputra floods

Hydrological Services for Business

8th May 2018

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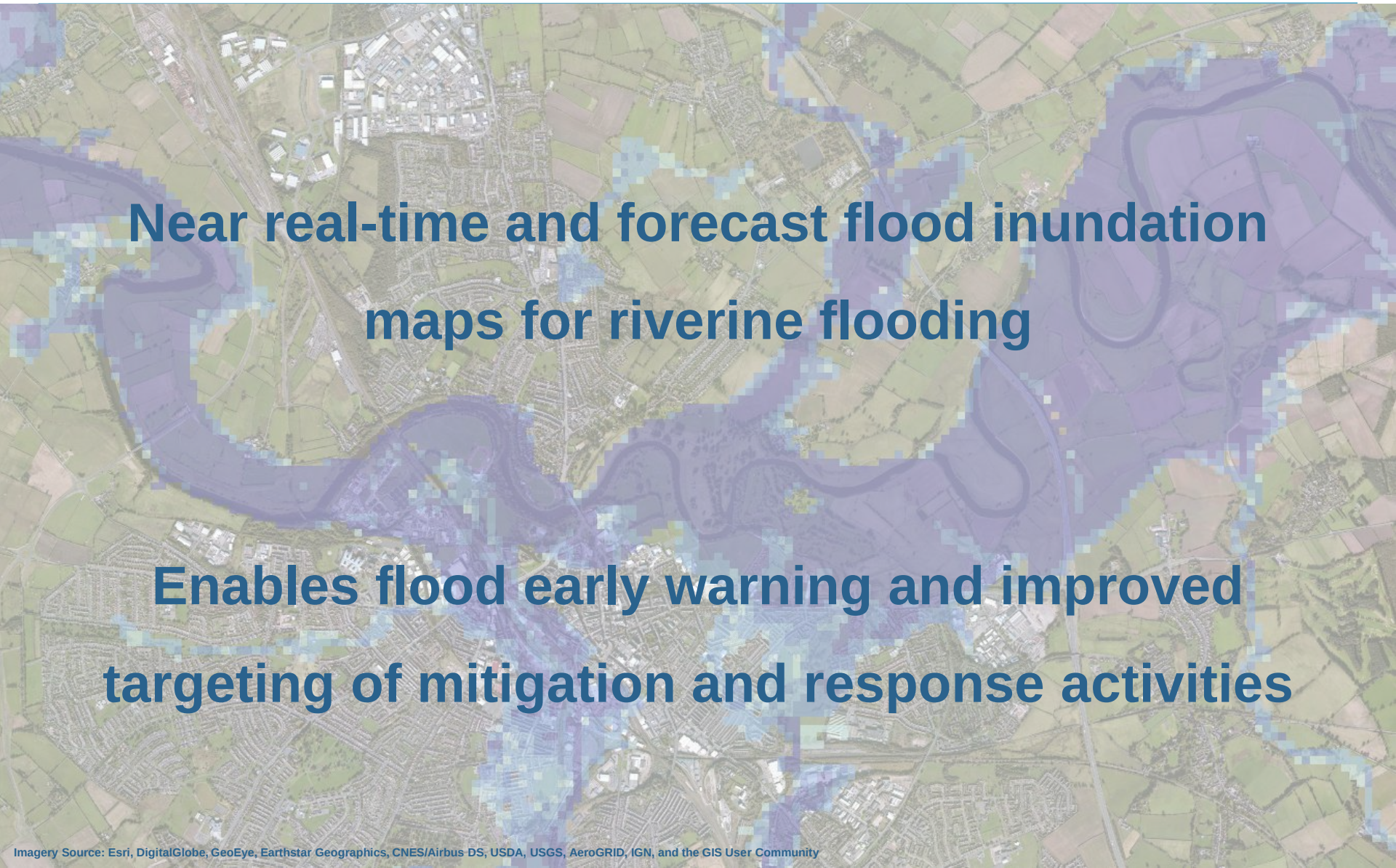
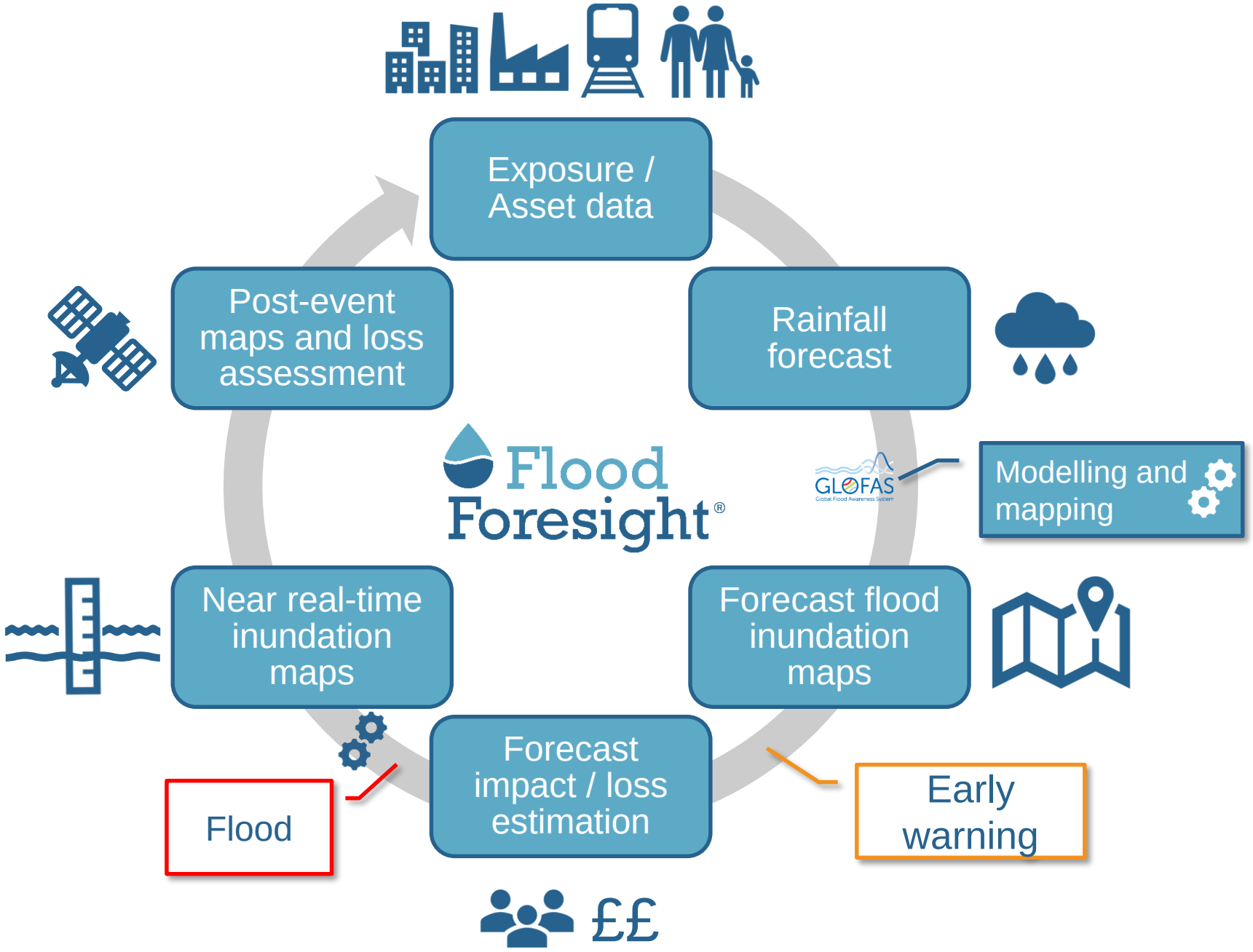
Charles Allatson, Sally Dempsey, Elizabeth Wood

Flood Foresight



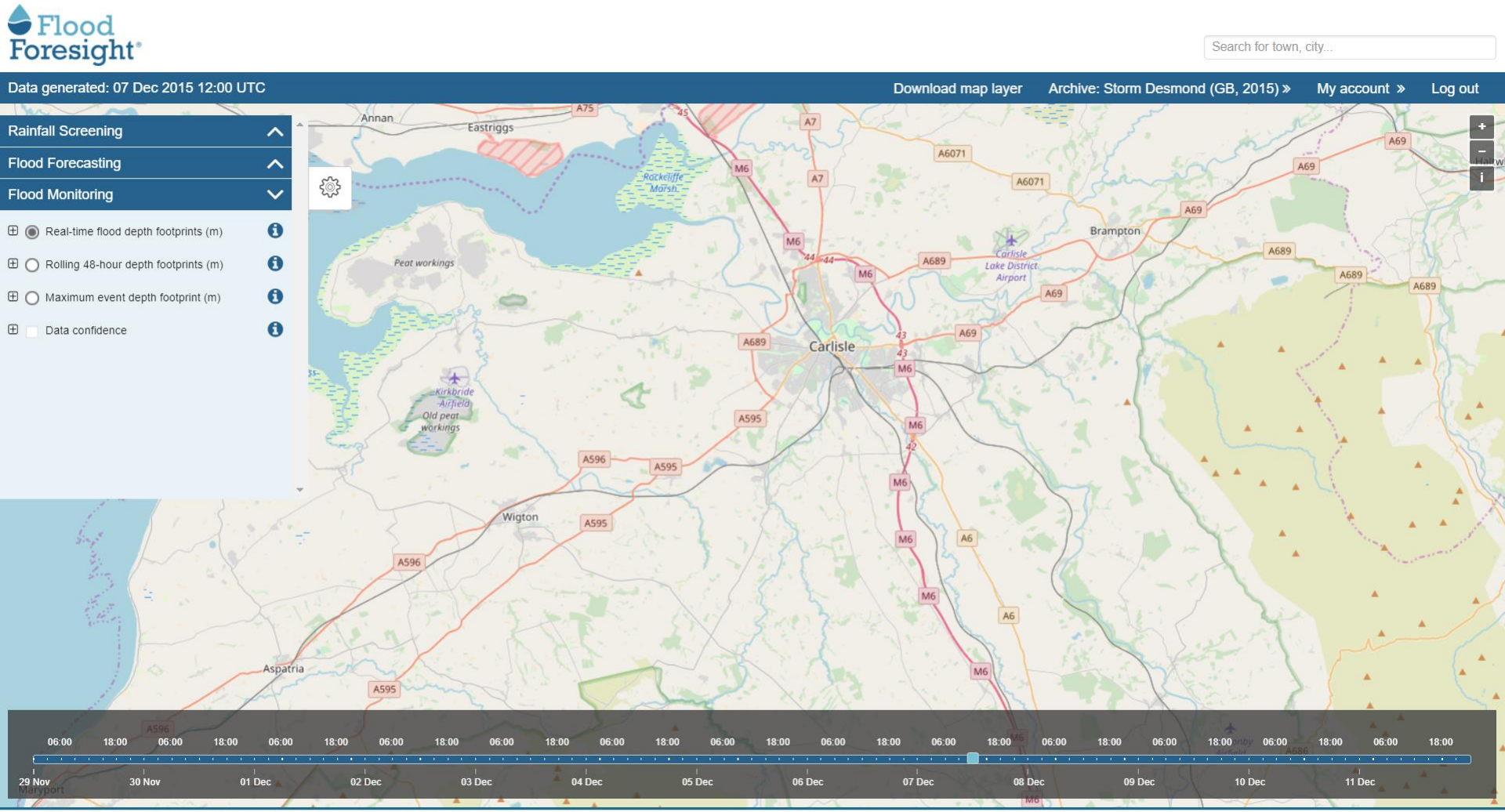
Near real-time and forecast flood inundation maps for riverine flooding

Enables flood early warning and improved targeting of mitigation and response activities


Exposure / Asset data
Rainfall forecast
Modelling and mapping
Forecast flood inundation maps
Early warning
Forecast impact / loss estimation
££
Flood
Near real-time inundation maps
Post-event maps and loss assessment
Flood Foresight®
GLOFAS
Global Flood Awareness System

Mapping the full lifecycle of floods

Flood Foresight®



Demonstration

How it works

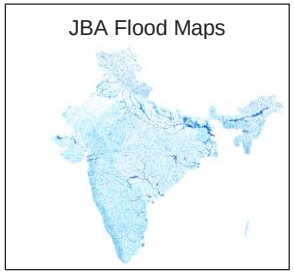
Flood Foresight®

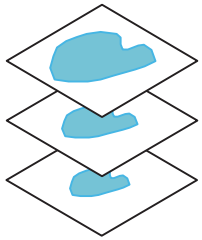
Static, pre-computed

Dynamic, operational

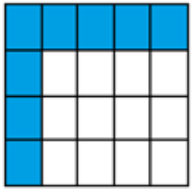
Flood Mapping

Generalised 2D hydraulic modelling with national coverage



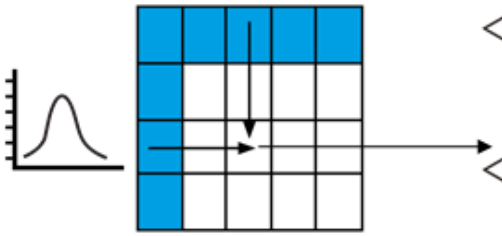


Library of mapping model outputs



Database of AEP to outline flood depth lookups

1. Real-time (gauged) or forecast (modelled) in-channel levels or flows



2. Lookup between in-river conditions and impact mapping

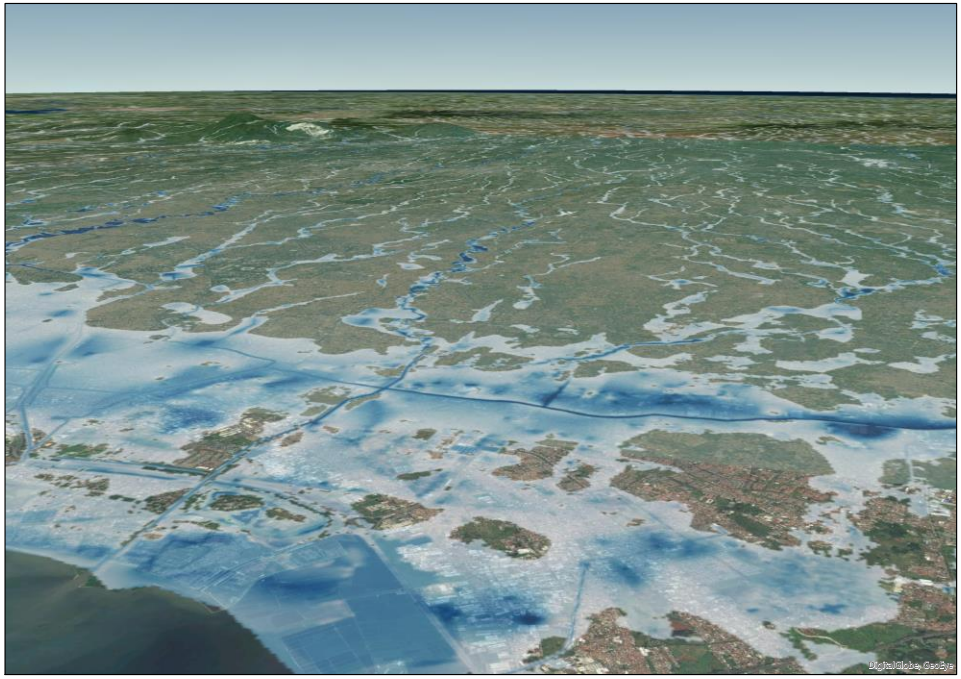
3. Select flood outline with closest match to forecast conditions

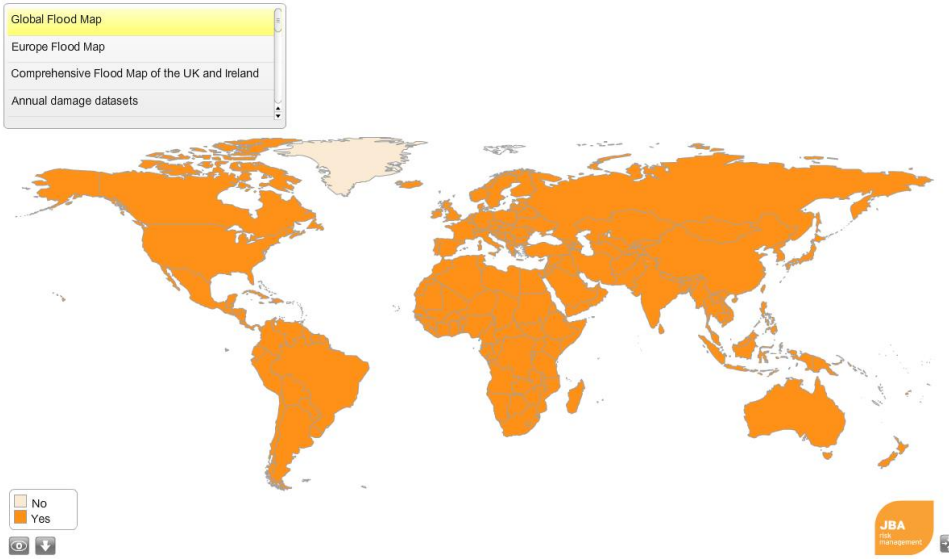
4. Intersect with flood receptors to derive impacts information

JBA Flood Hazard Maps

Flood Foresight®

- 30m resolution undefended river flood and surface water hazard maps
- Indicative flood extent and depths for 6 return periods:
  - 20-year
  - 50-year
  - 100-year
  - 200-year
  - 500-year
  - 1,500-year





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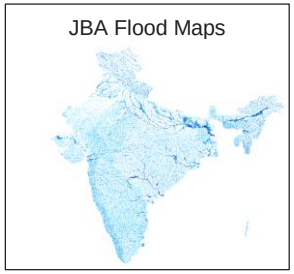

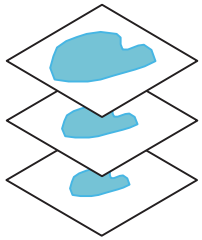

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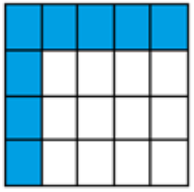

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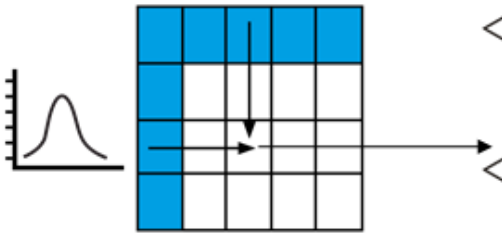

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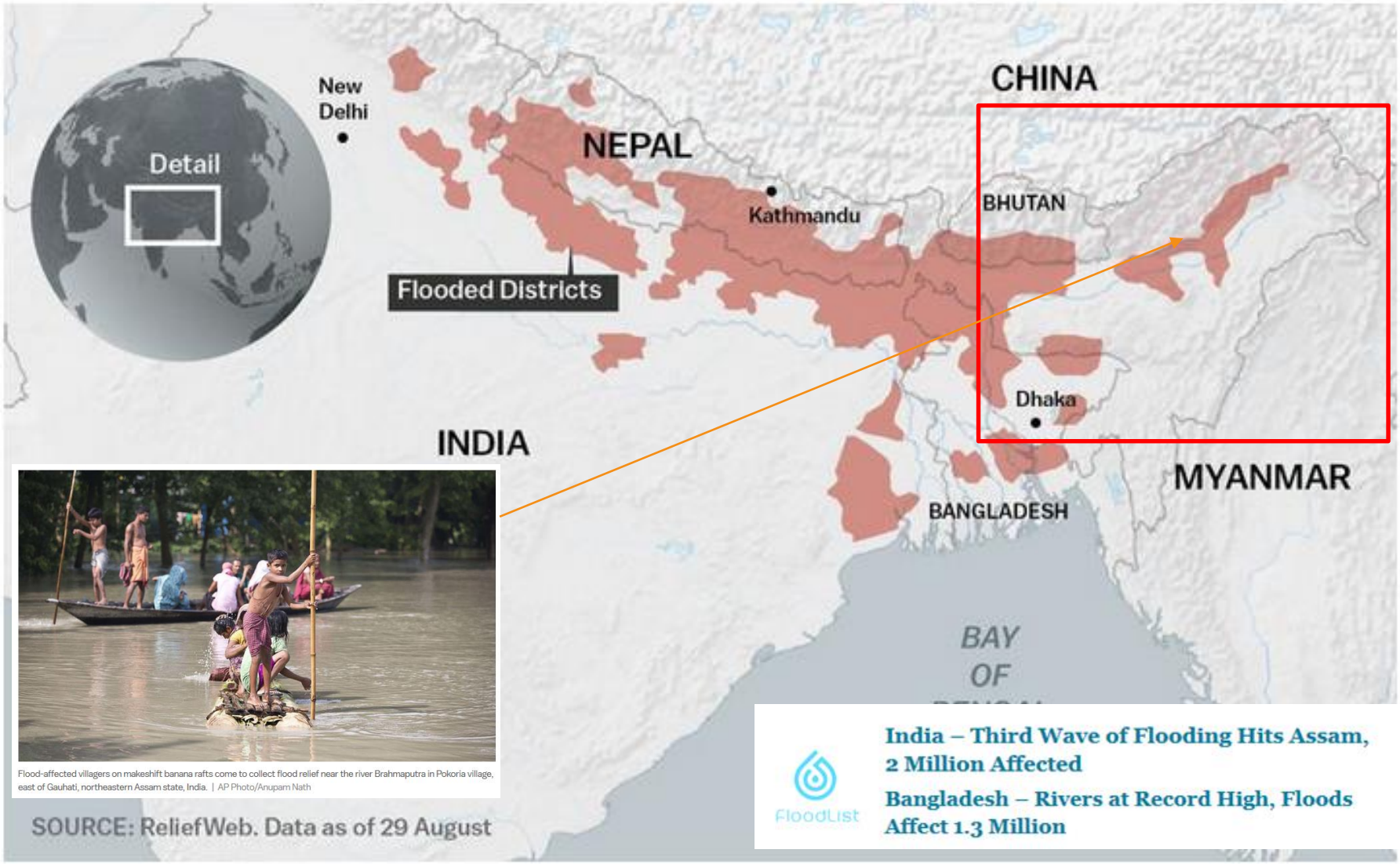
Brahmaputra pilot

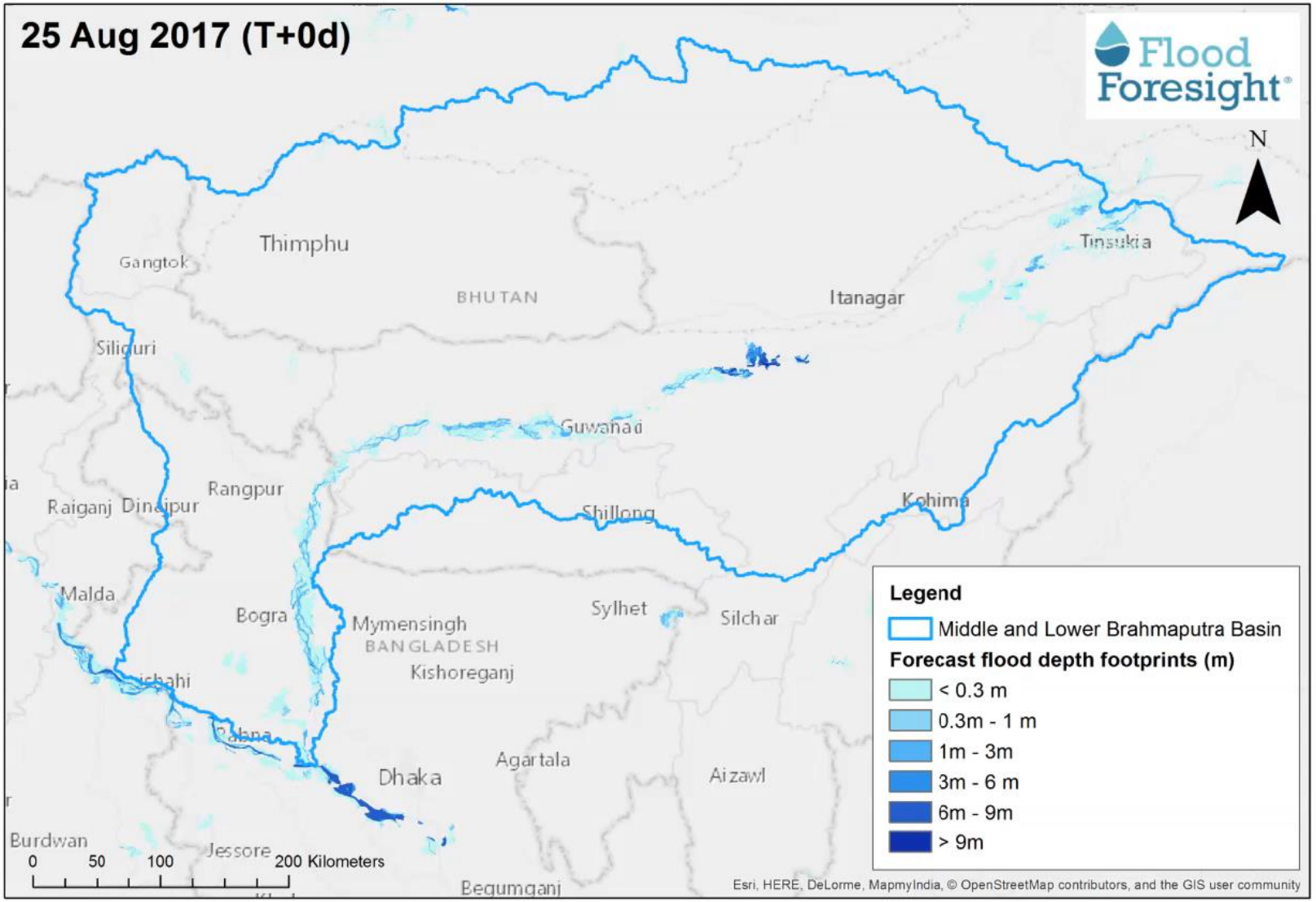
August 2017

Brahmaputra Pilot Project

Flood Foresight®



Results – flood peak animation

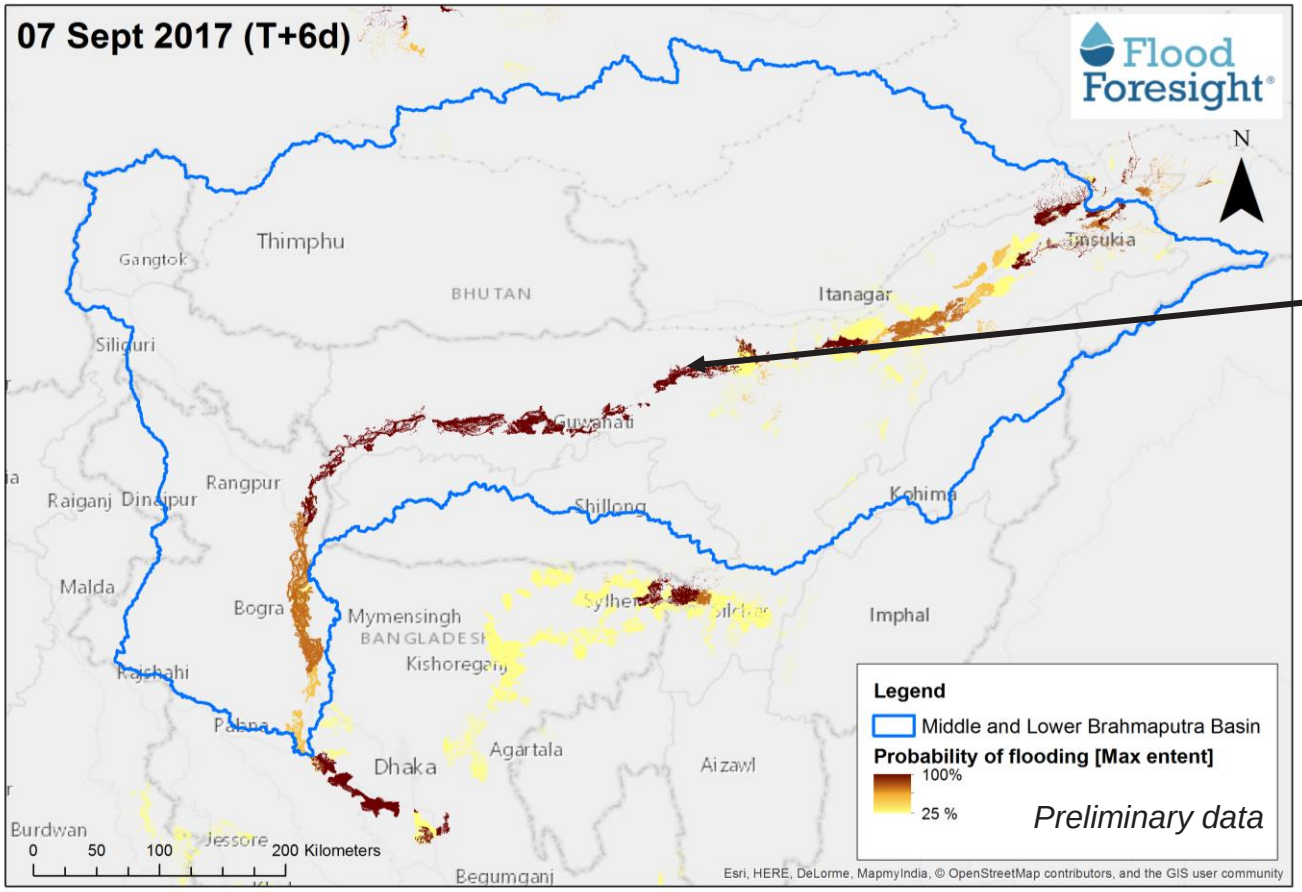


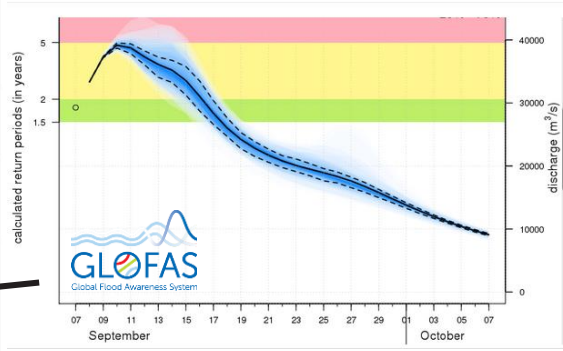
Click image to animate

Ensemble-based flood likelihood

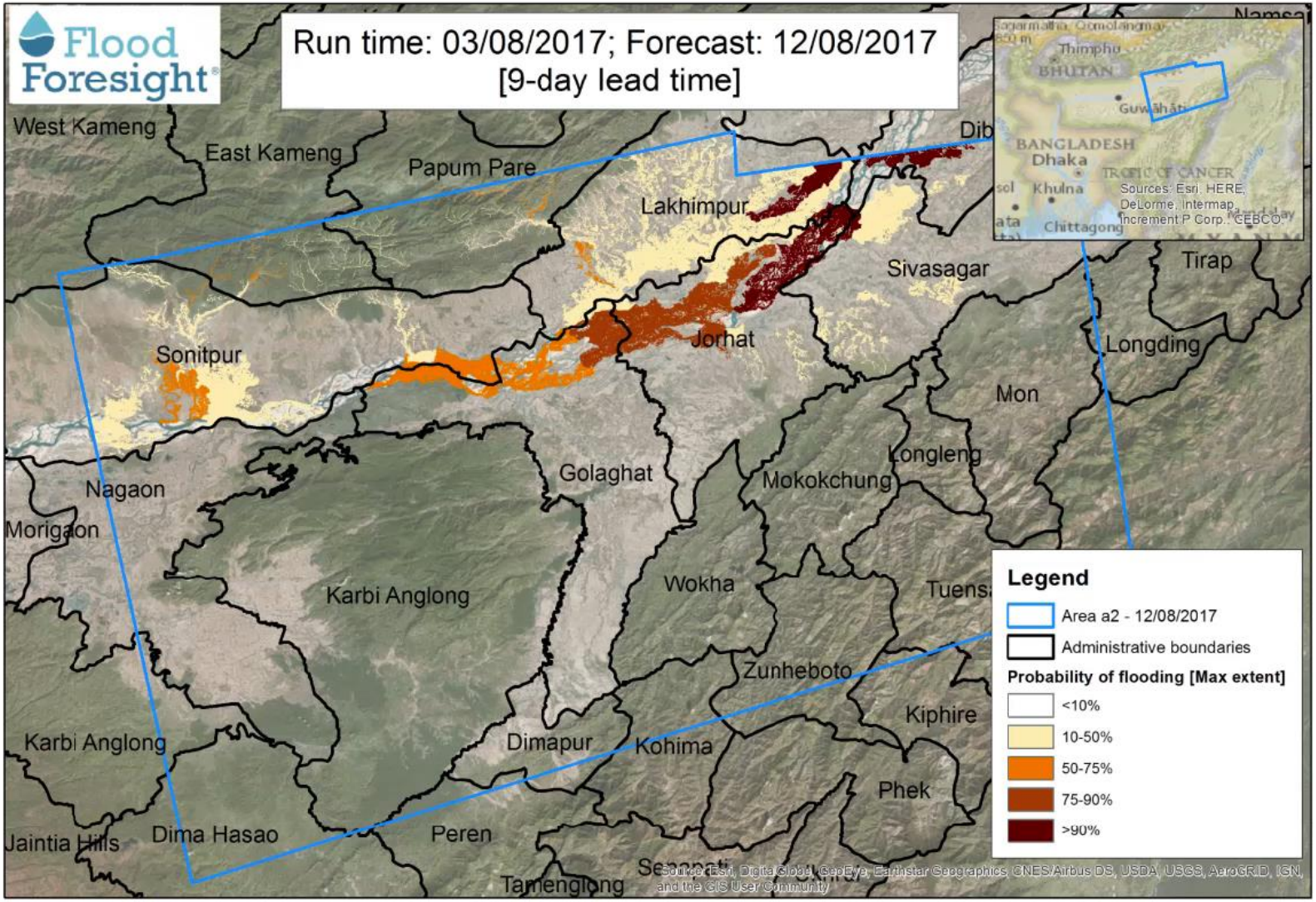
Use of probabilistic footprints to assess the confidence of the forecasts at longer lead-times

Higher probability (dark colours) shows greater agreement of the ensemble and therefore higher probability of flooding. It is essential to understand uncertainty when used in public alert systems.

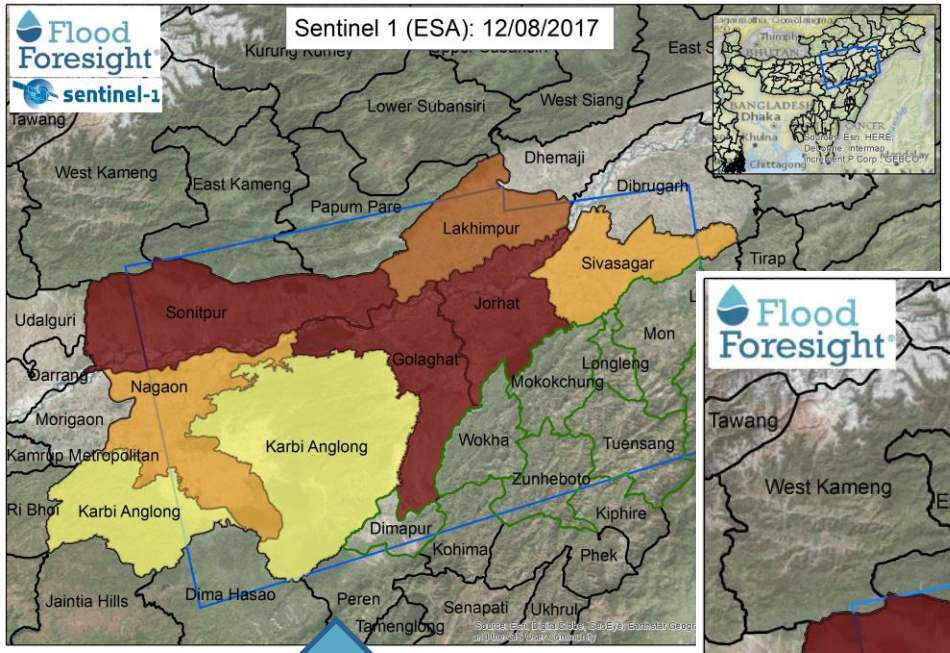


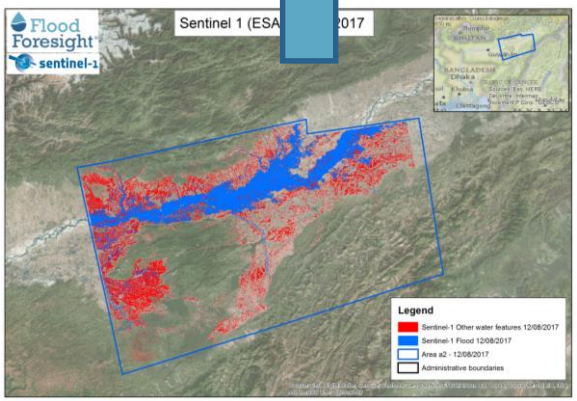


Probabilistic forecasting

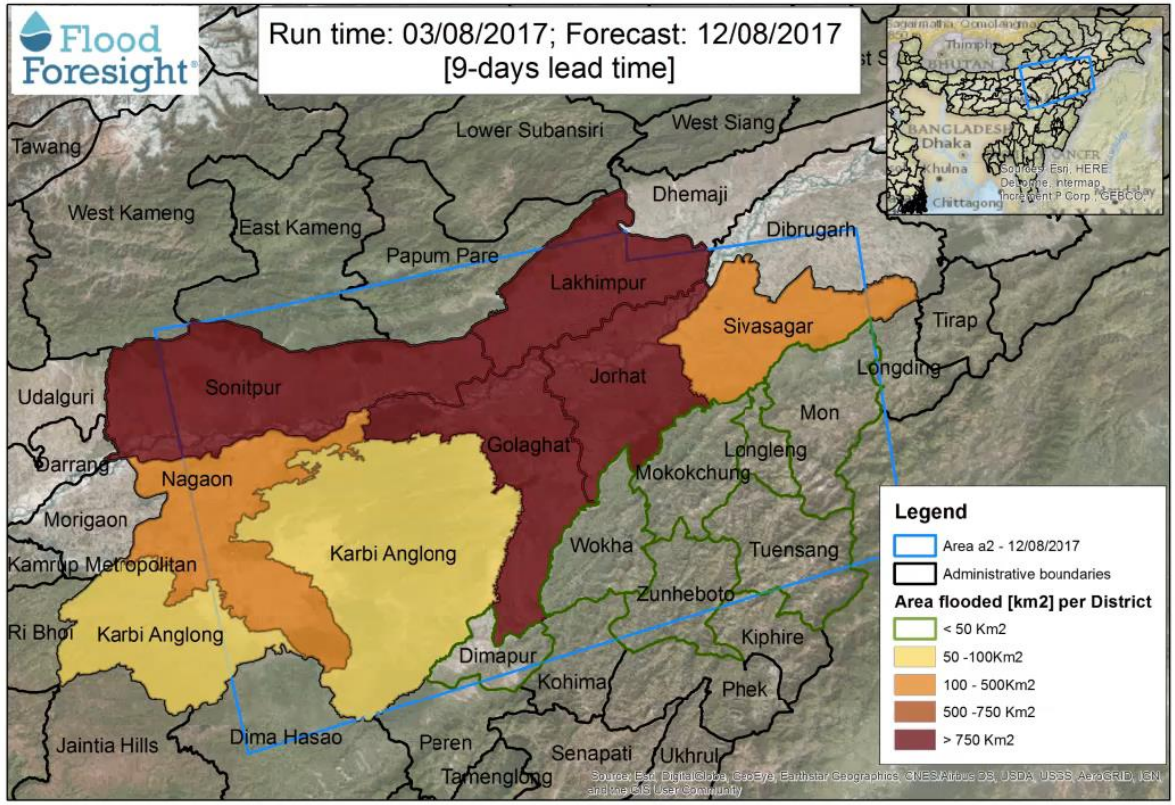


Area flooded per District - Comparison



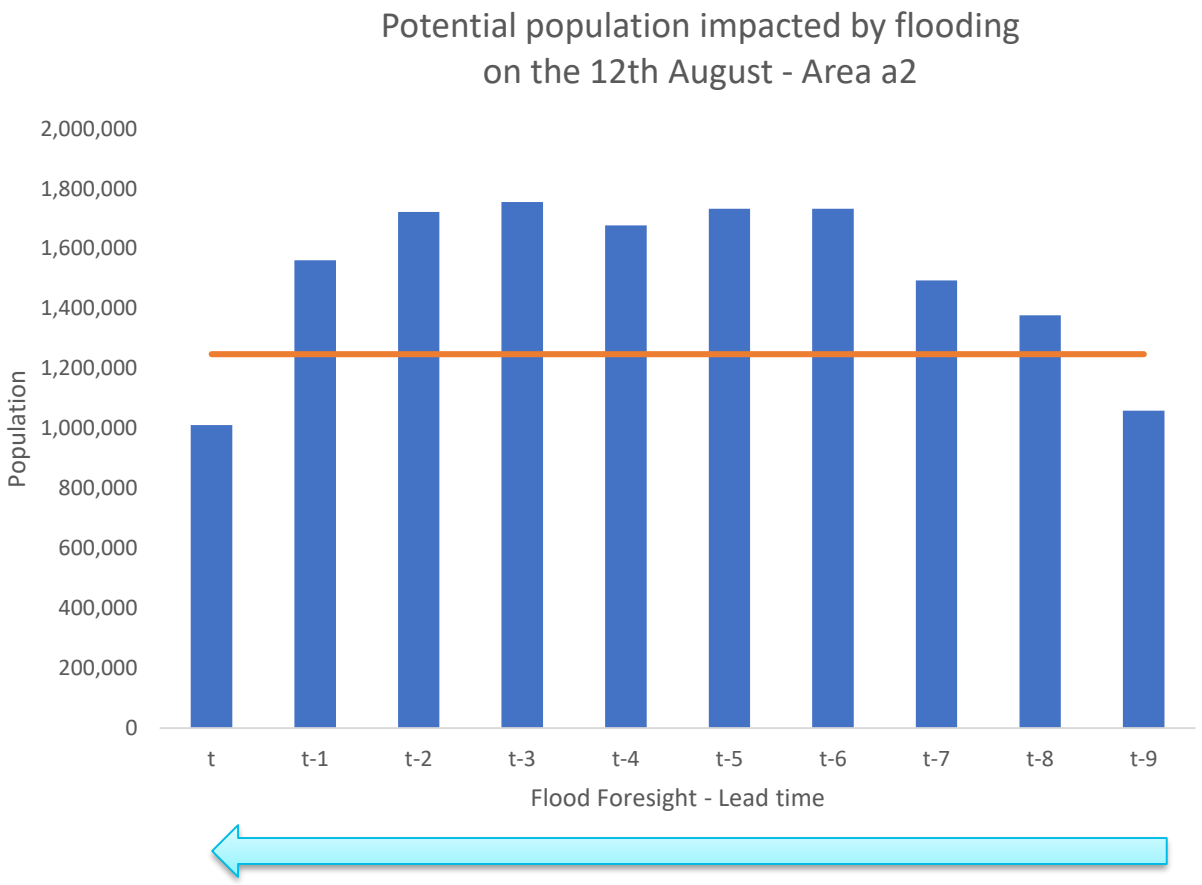


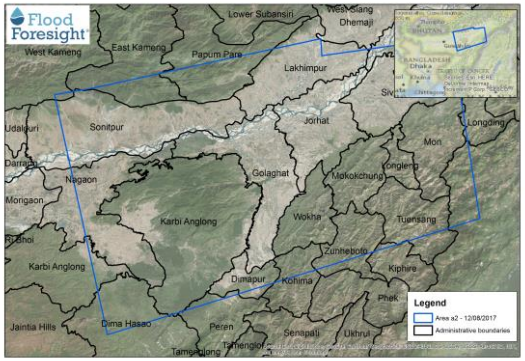
- Most potentially affected districts in the area: Sonitpur, Jorhat, Golaghat and Lakhimpur.



Potential population impacted by flooding- Comparison

Input data: Sentinel 1 vs Flood Foresight





*t=0 no ensemble spread

Summary

GloFAS + Flood Foresight:

- GloFAS allows us to scale Flood Foresight globally
  - Supporting decision-making in several sectors
- Provides consistent methodologies and data for (trans)national flood and impact analysis
- Provides a framework for flood forecasting to make use of the best available data
  - Flood maps, gauge data, forecast data, EO data
- Flexible integration
- Opportunities – data providers and commercial evaluations

Thanks

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