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Labcom Hydr.IA: a joint Company-Academic laboratory to develop new flood forecasting services. Case Study on the Nîmes Flash-Floods (Southeastern France)

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Labcom Hydr.IA: a joint Company-Academic laboratory to develop new flood forecasting services

Case Study on the Nîmes Flash-Floods (Southeaster France)

Flash-Floods in the city of Nîmes

- Mediterranean climate:
 - High intensity precipitation: e.g. in 1988 (1), > 420 mm in 8 hours
 - High precipitation heterogeneities
- Flood events with response times of less than 1/2 hour
- Damages: e.g. In 1988 (1) 1 billion euros worth of damages, 45,000 victims and 9 casualties
- Small catchments (< 30 km²) with karst terrains
- City crossed by urban rivers (2)

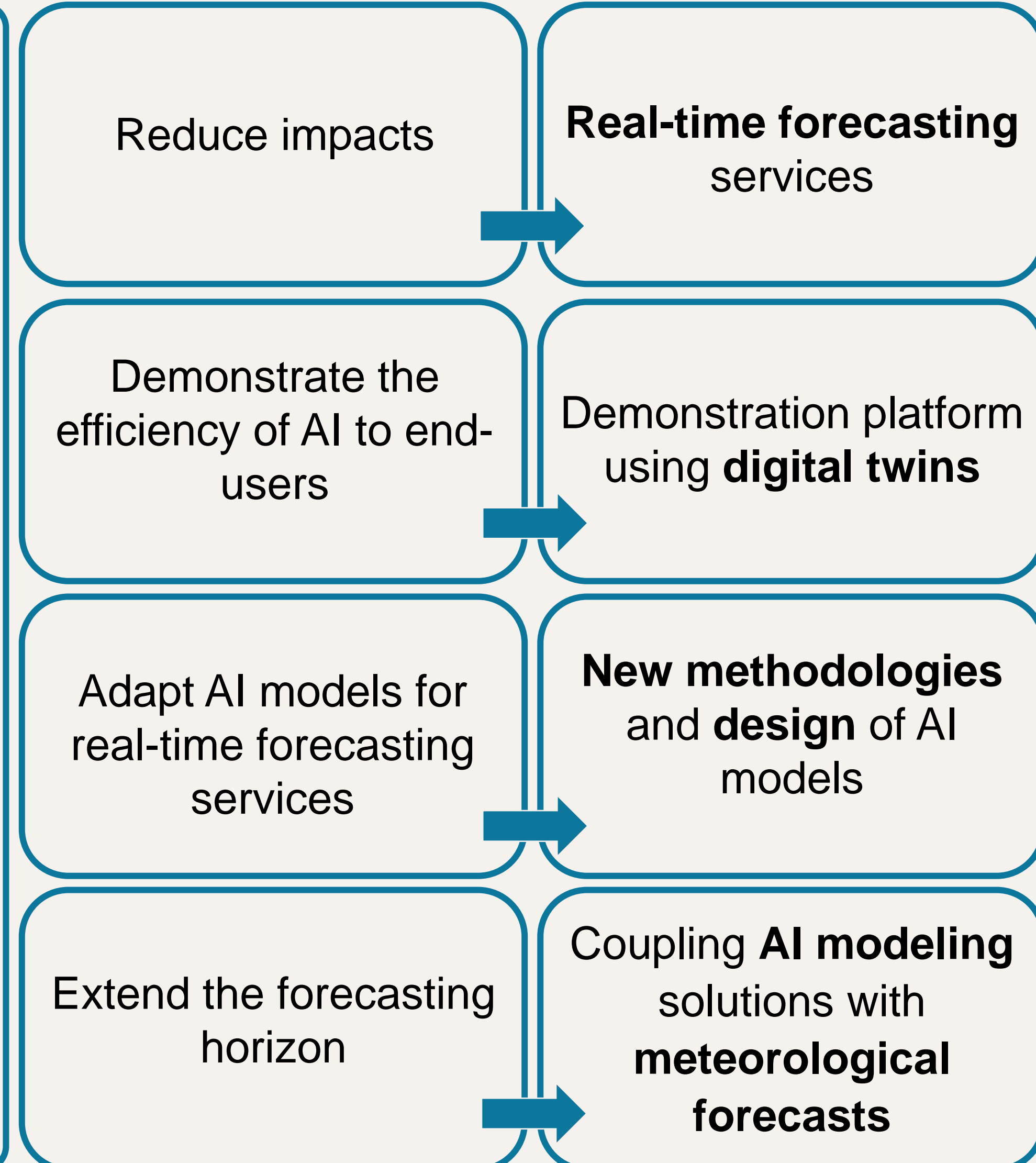


Despite the growing development of AI-related solutions in many complex fields, and the demonstration of their relevance to several hydro(geo)logical issues, there is a **deficit in the transfer of these technologies to end-users.**

Difficulty for **research** to be directly confronted with **real operational conditions**

Limited confidence users have in solutions that are often perceived as opaque, and whose **operational implementation is rare**

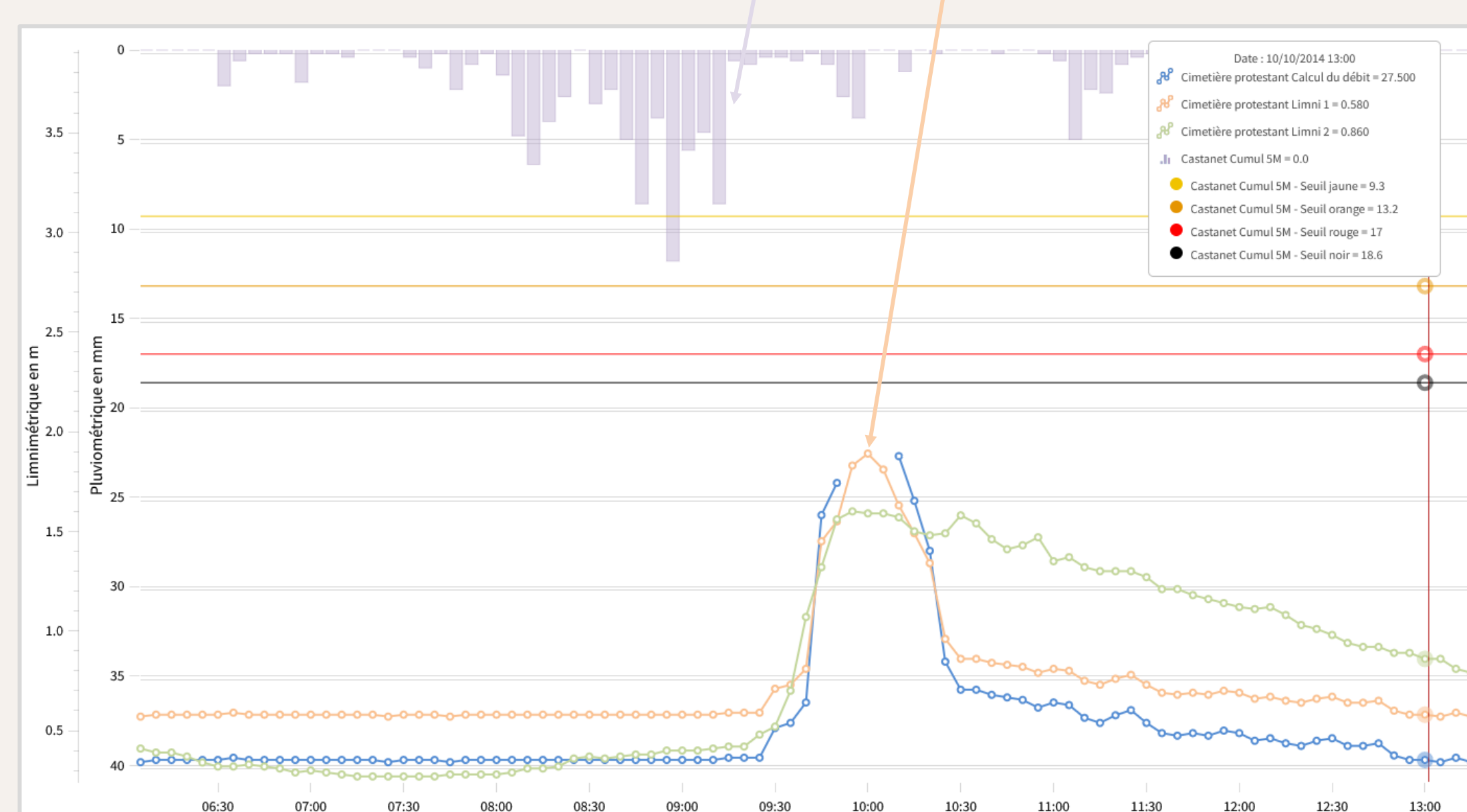
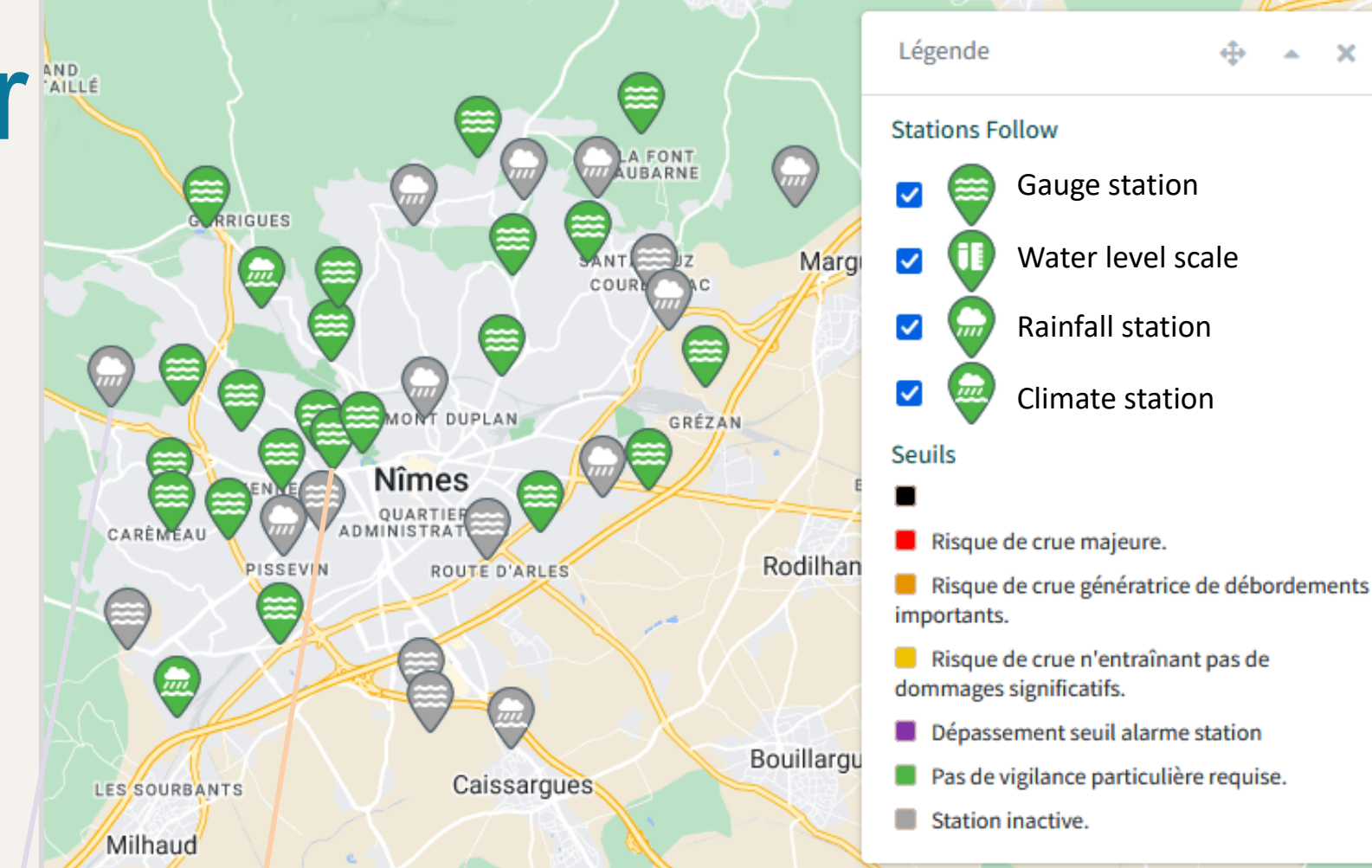
Challenges and solutions



Conceptual approach for flood forecasting

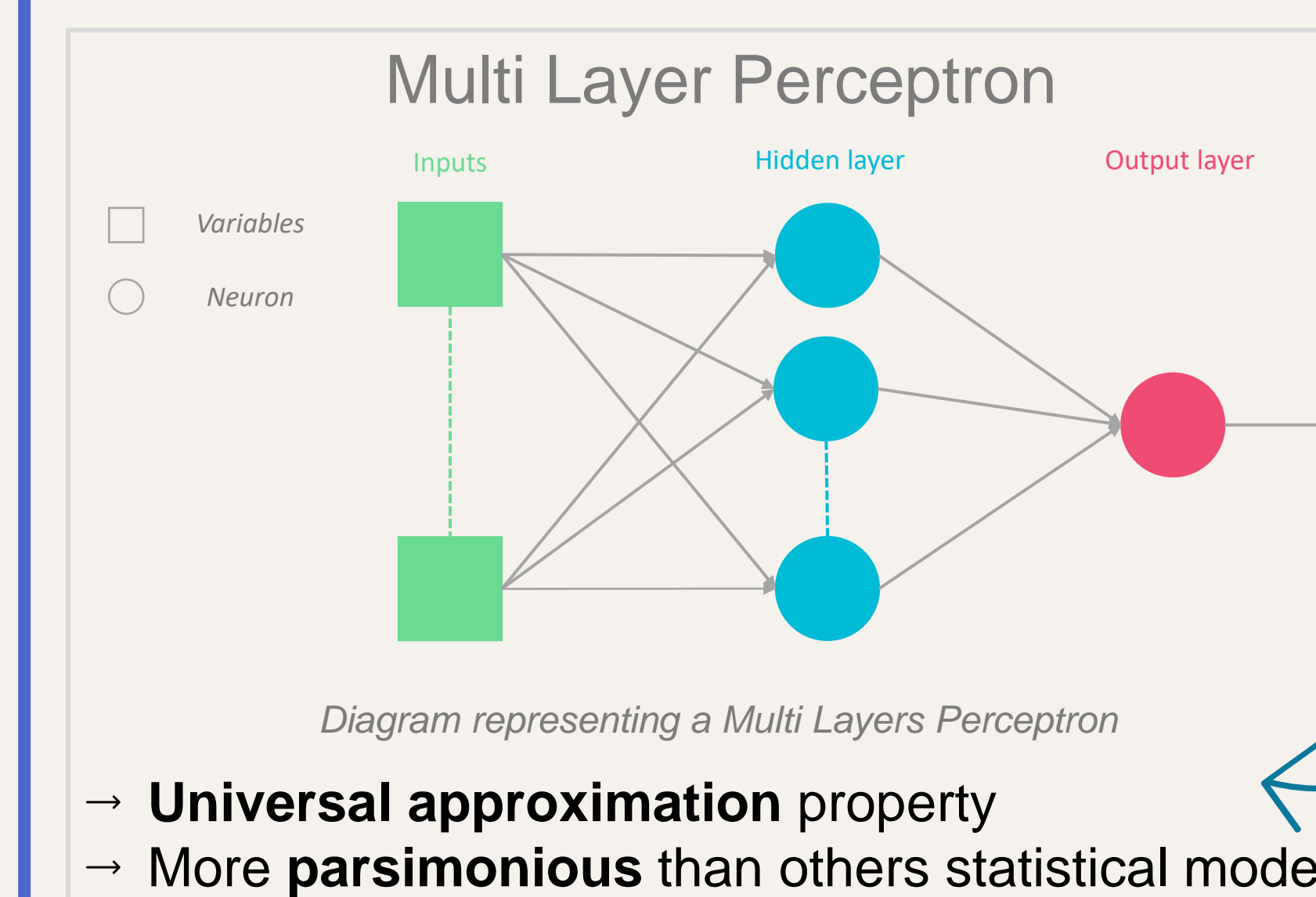
- Physically based model*
- Input data: corrected radar rain (0,25 km², 5 min)
- Rain/water flow models for non-urban areas and urban areas
- Output: **Continuous discharge forecast** at max 1,5 hour lead time

FOLLOW
Hydrological data monitoring solutions



Hydrological monitoring platform for Nîmes City with 5-minutes data transmission.

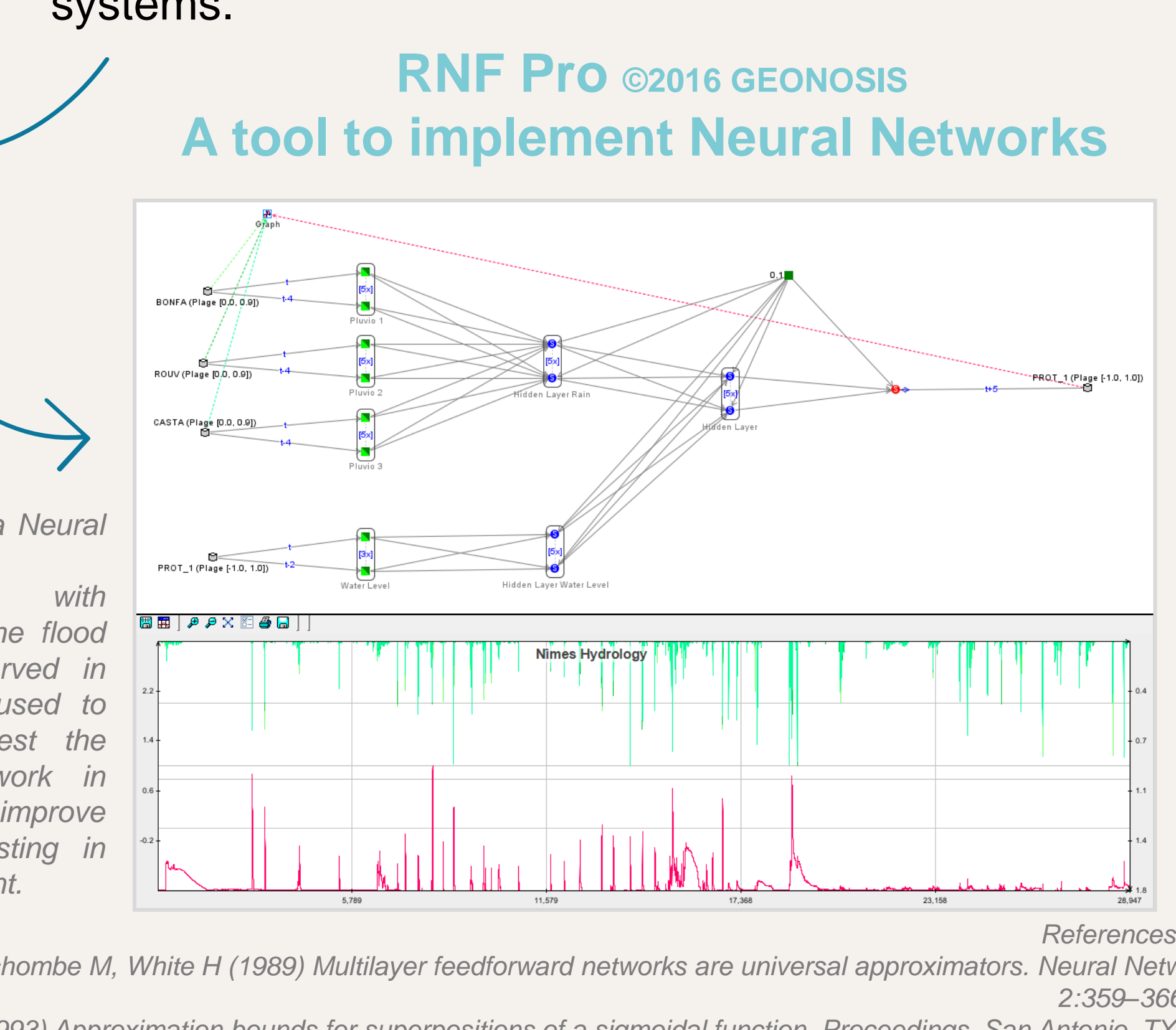
10/10/2014 event's record (observed precipitation, observed and computed discharge)
The observed discharge is from the location shown in picture 2.



- #### Ongoing studies
- “**Digital twins** of complex hydrosystems for flood forecasting using neural network models”
 - “Flood forecasting using artificial intelligence: **increasing the forecast horizon**”
 - “Modeling of hydrosystems by machine learning: **streamline the use of AI** for flood forecasting”

AI for flood forecasting

In hydrology, the studied systems are **dynamic and non-linear.**
Neural Networks are particularly appropriate for representing these complex natural systems.



References:
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