

EDERA: Early warning Demonstration of pan-European rainfall-induced impact forecasts

VESPRA workshop, Madrid, 23 Mar 2023

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Project summary

Early warning Demonstration of pan-European rainfall-induced impact forecasts (UCPM-2022-PP)

- **Duration:** 01 Feb 2023 - 31 Jan 2025 (24 months)

- **Budget:** 1,173,954.78€ (grant: 997,861.55€)

- **Website:** www.edera-project.eu

- **Partners:**

Universitat Politècnica de Catalunya (ES)

European Centre for Medium-range Weather Forecasts (INT)

Finnish Meteorological Institute (FI)

Environment and Water Agency of Andalusia (ES)

Directorate-General for Civil Protection and Emergencies (ES)

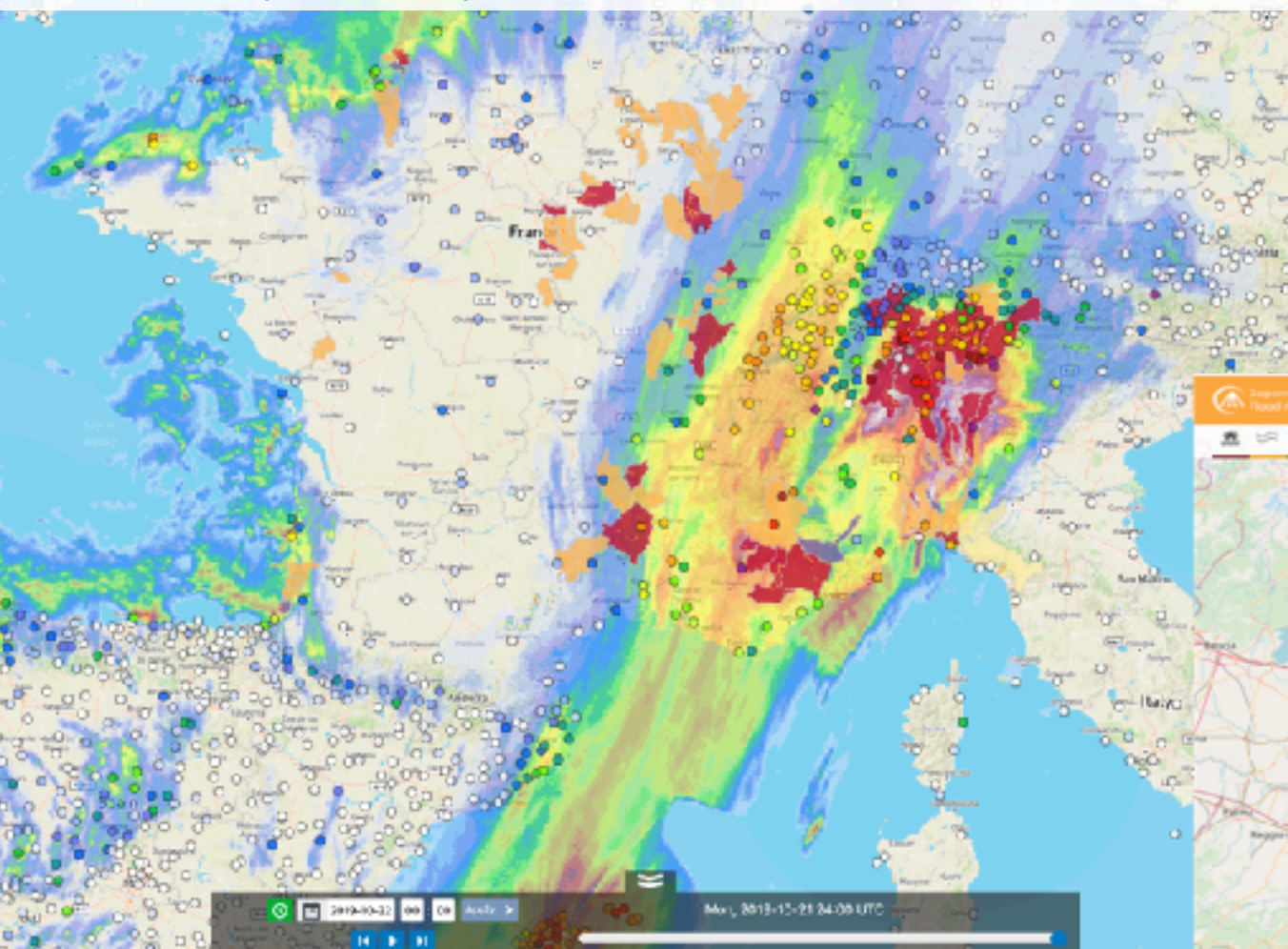
National Authority of Emergency and Civil Protection (PT)

Main objective

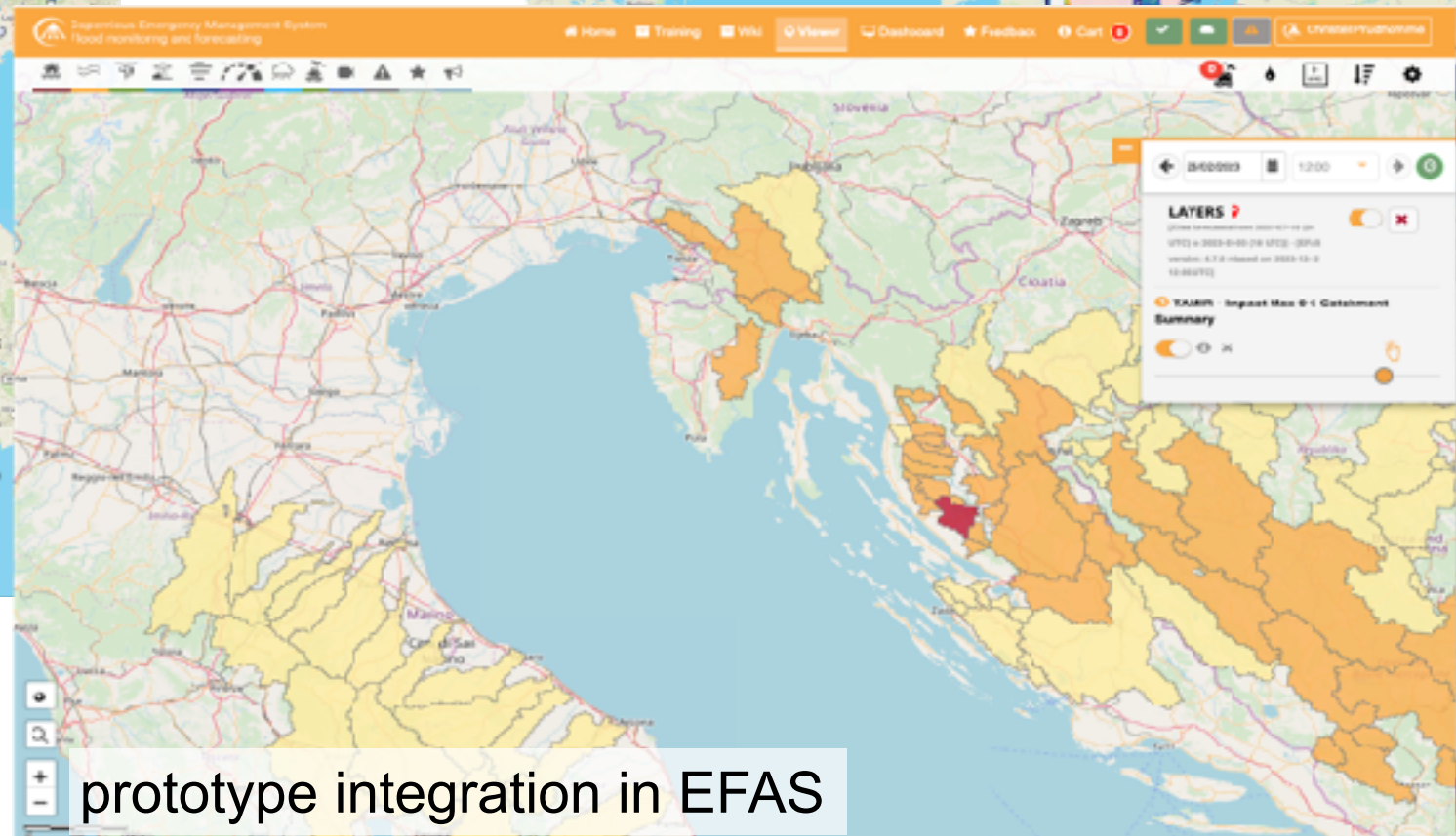
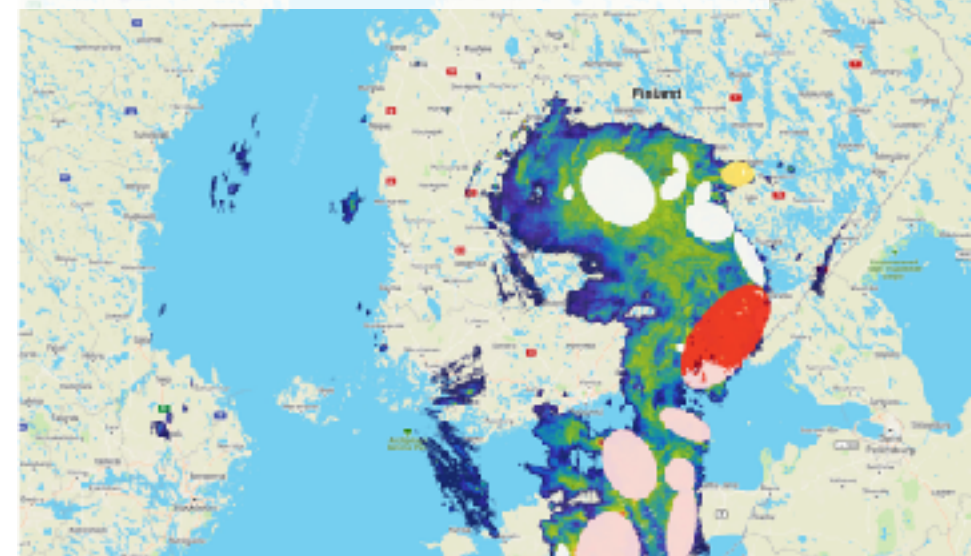
Integrating TAMIR products into the operational EWSs of national, regional and local CPAs, fostering sharing information and cooperation of CPAs during cross-border events and coordination between CPAs.

TAMIR products

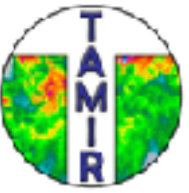
Real-time pan-European flash flood impact forecasts (0-120 h).



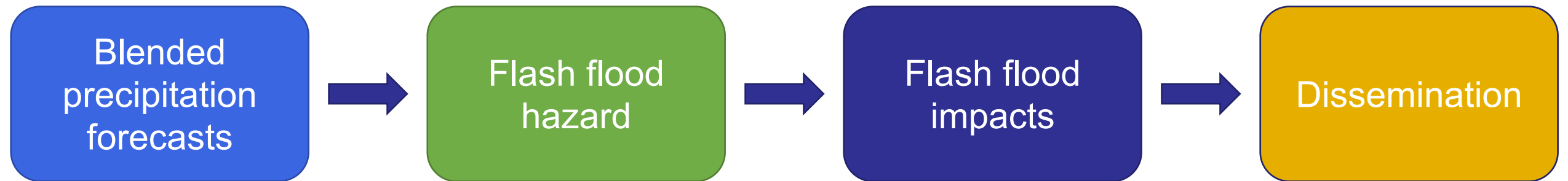
convective impact nowcasts



Flash flood forecasting system in TAMIR



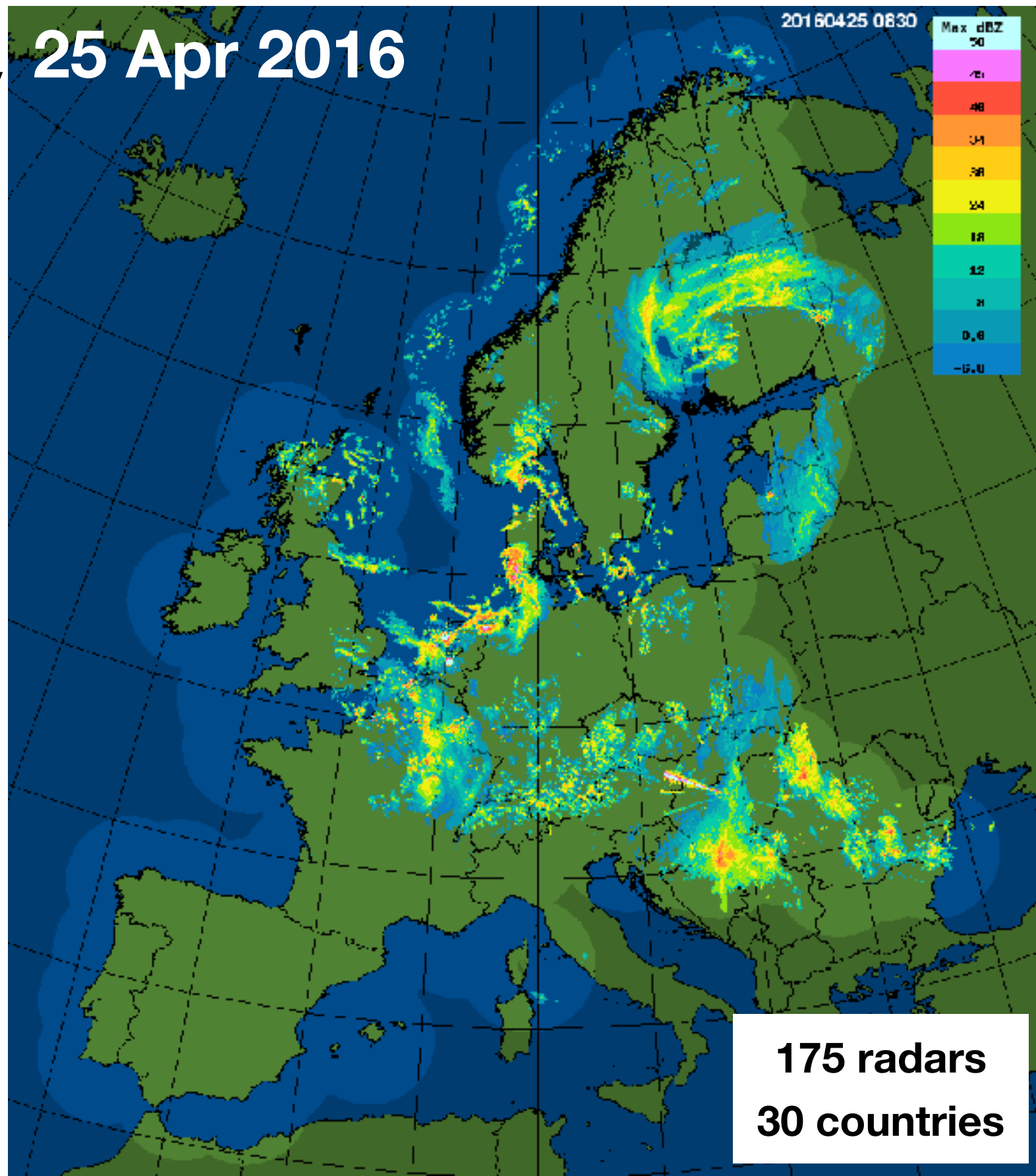
- Forecasts hourly over the 1 - km river network for the first 6 hours, and every 6 hours afterwards up to next 5 days
- Updated once per hour



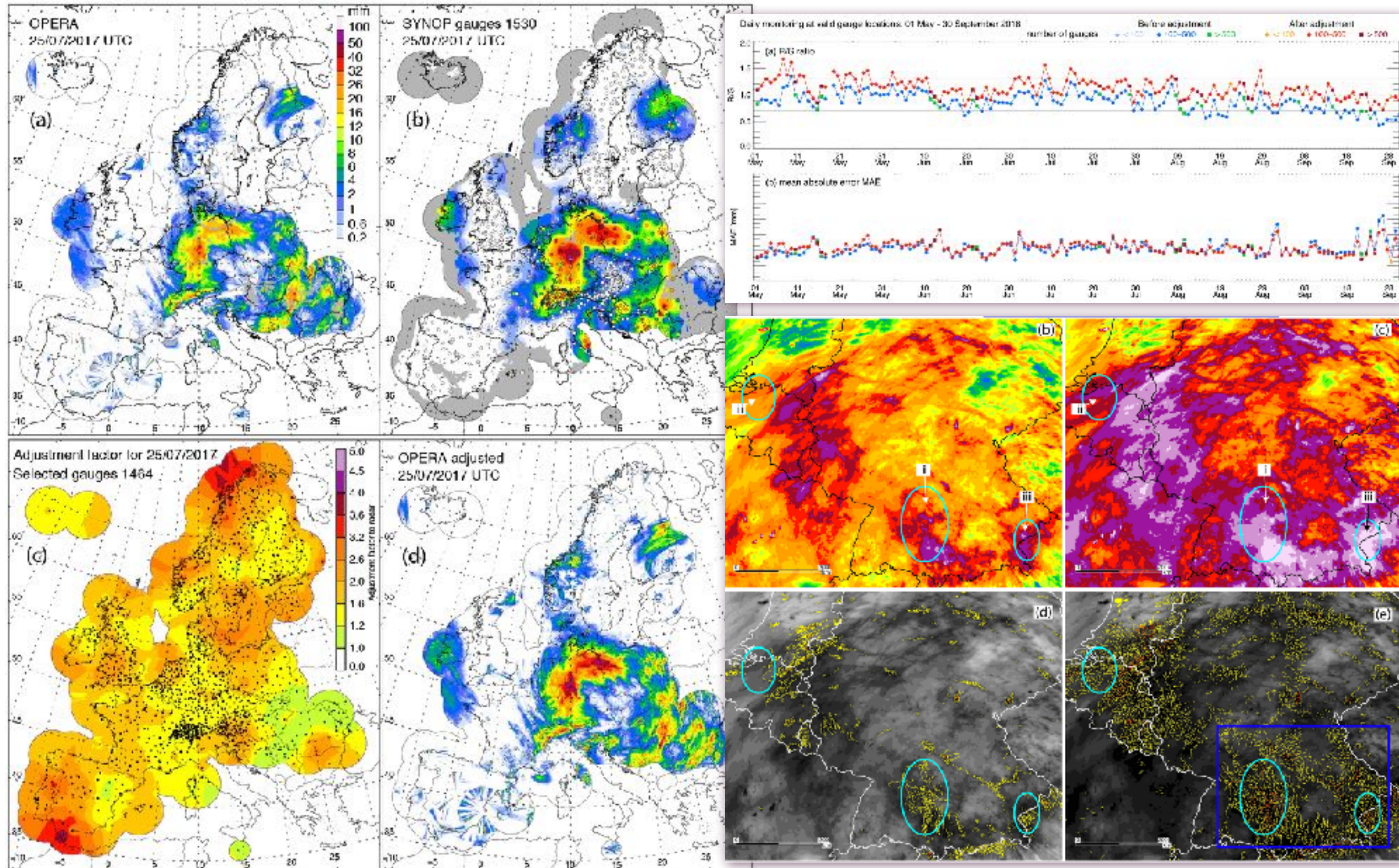
- Created by seamless blending of the probabilistic radar-based nowcasting and Numerical Weather Prediction forecasts.
- The blending technique is applied for the first 6 hours.
- Precipitation forecasts are accumulated on a 1km channel network.
- Accumulated values are compared to thresholds derived from radar and model climatology.
- Flash flood hazard forecasts are combined with exposure information to highlight areas at risk of high impacts.
- The products are distributed as showcase tools through EFAS since Oct 2022

OPERA radar mosaics

- Precipitation observations over Europe @2 km and every 15 minutes.
- Operationally produced since mid 2011.
- Available $< t+15$ min.
- Delivered products:
 - + Rainfall intensity
 - + dBZmax
 - + Hourly accumulation

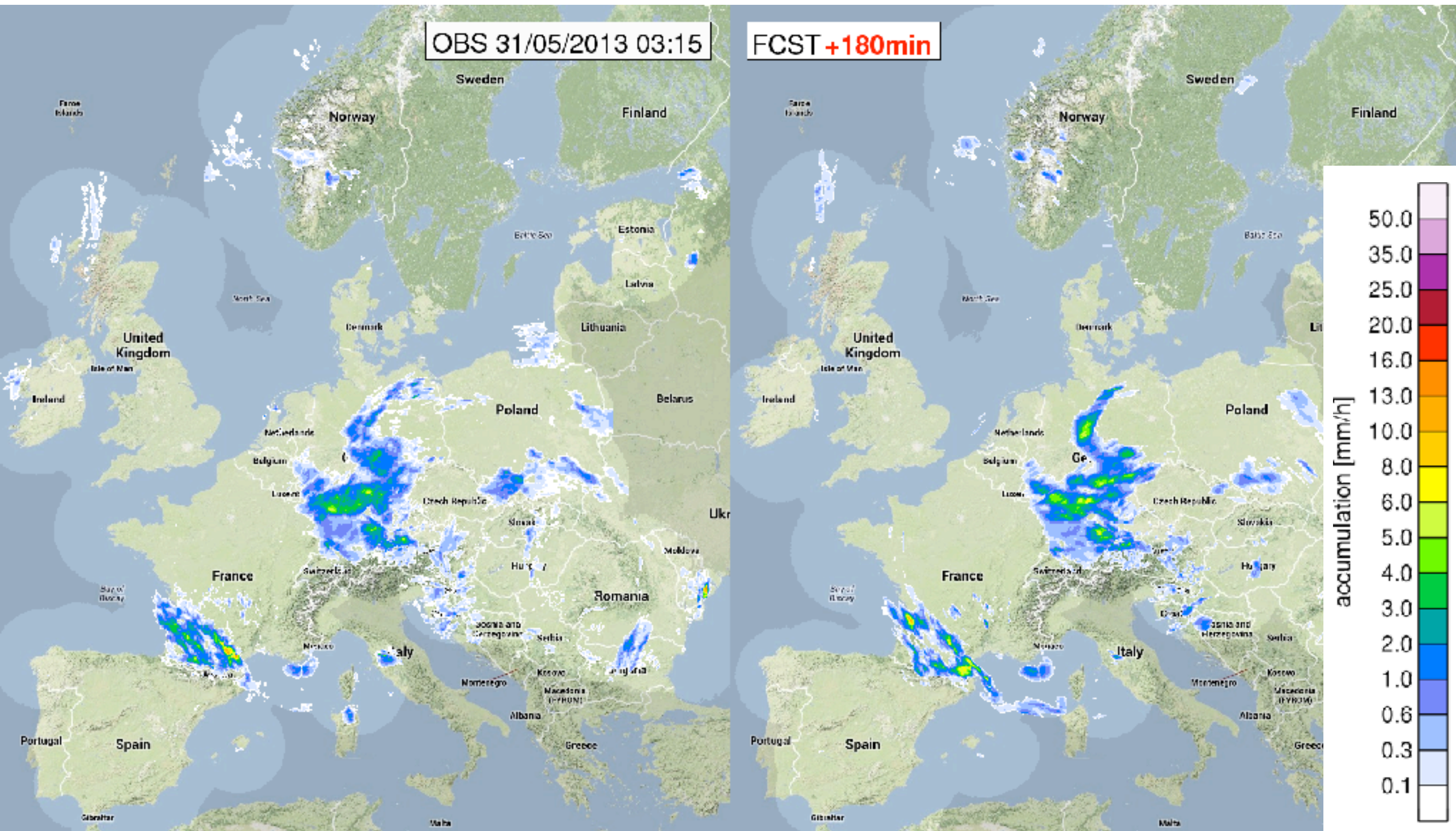


European-wide QPE



Park, S., Berenguer, M., Sempere-Torres, D., 2019: Long-term analysis of gauge-adjusted radar rainfall accumulations at European scale. *Journal of Hydrology*, 573, 768-777.

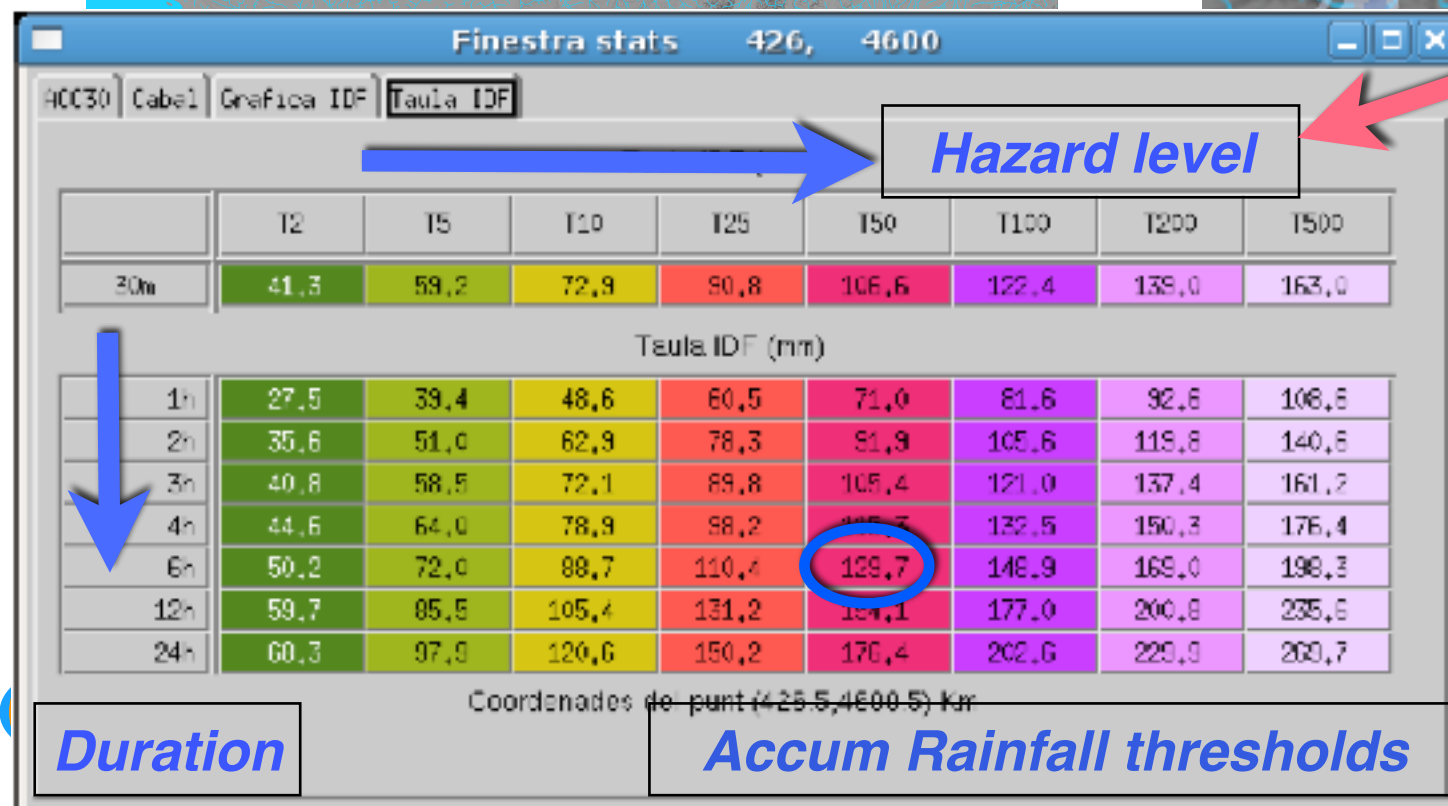
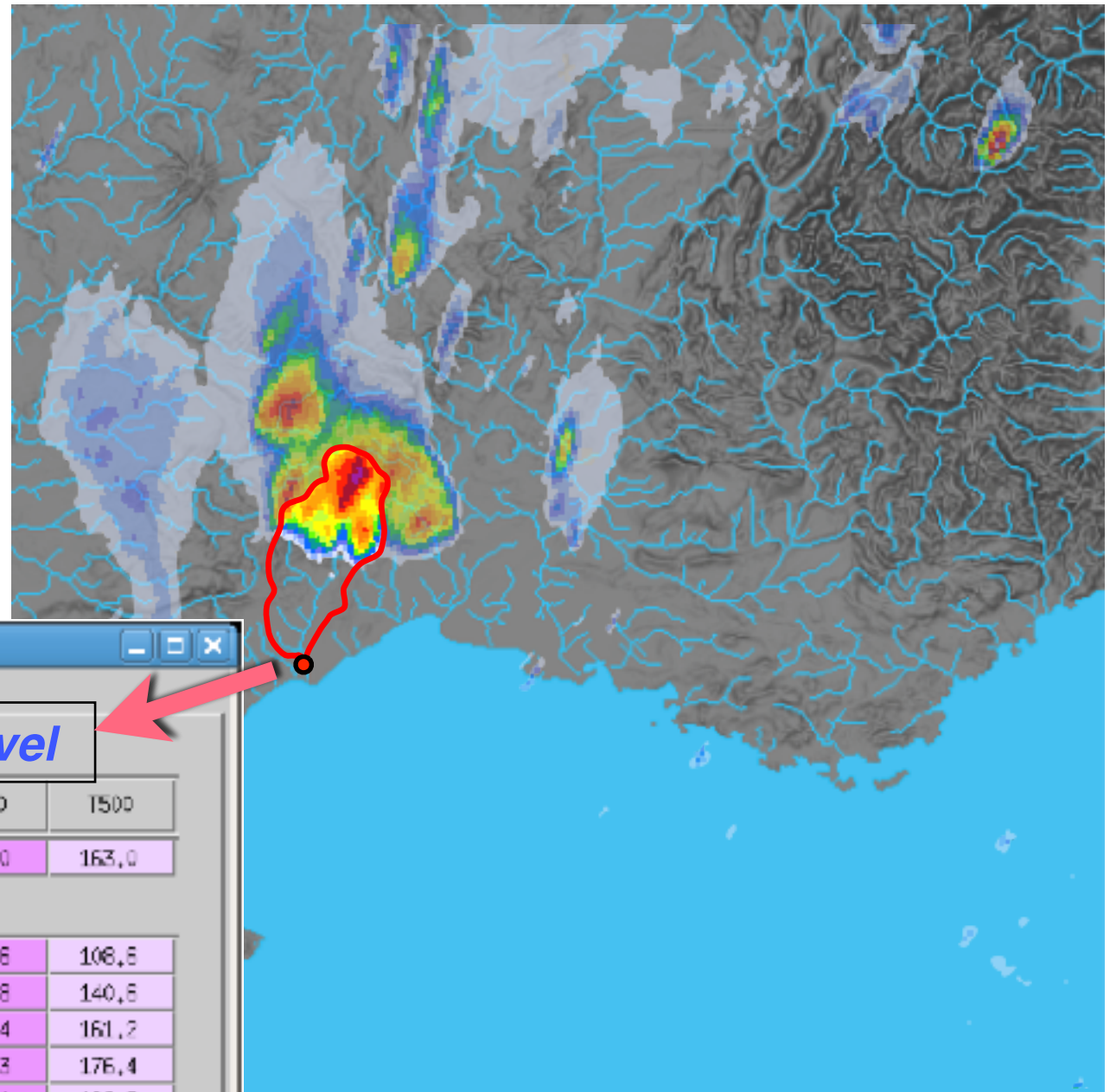
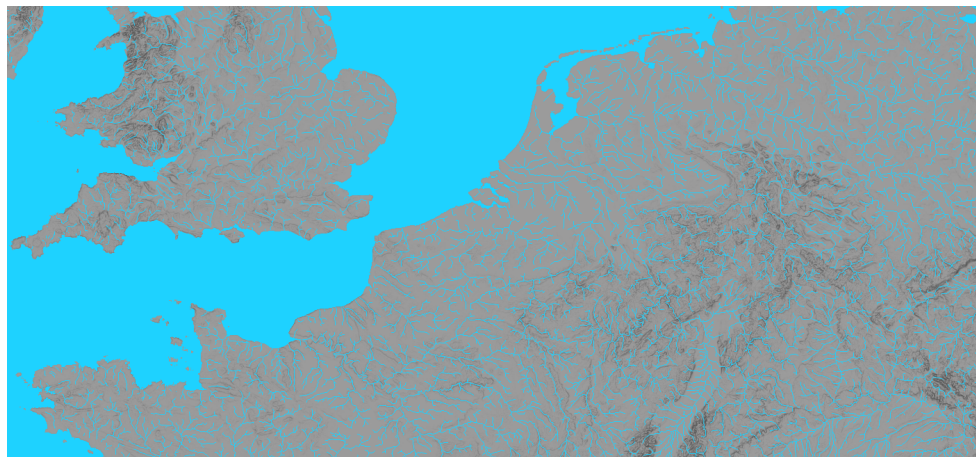
Forecasted rainfall accumulations



ERICHA flash flood hazard indicator

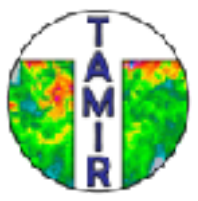
Based on observations & nowcasts of **basin-aggregated rainfall** at each point of the drainage network.

Drainage network (@ 1km)



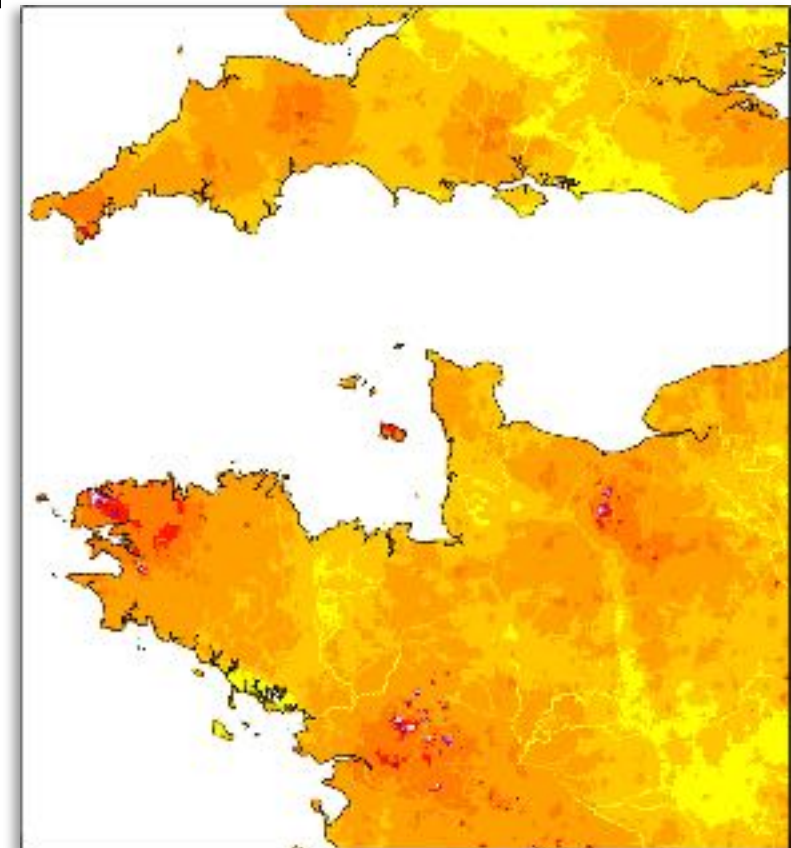
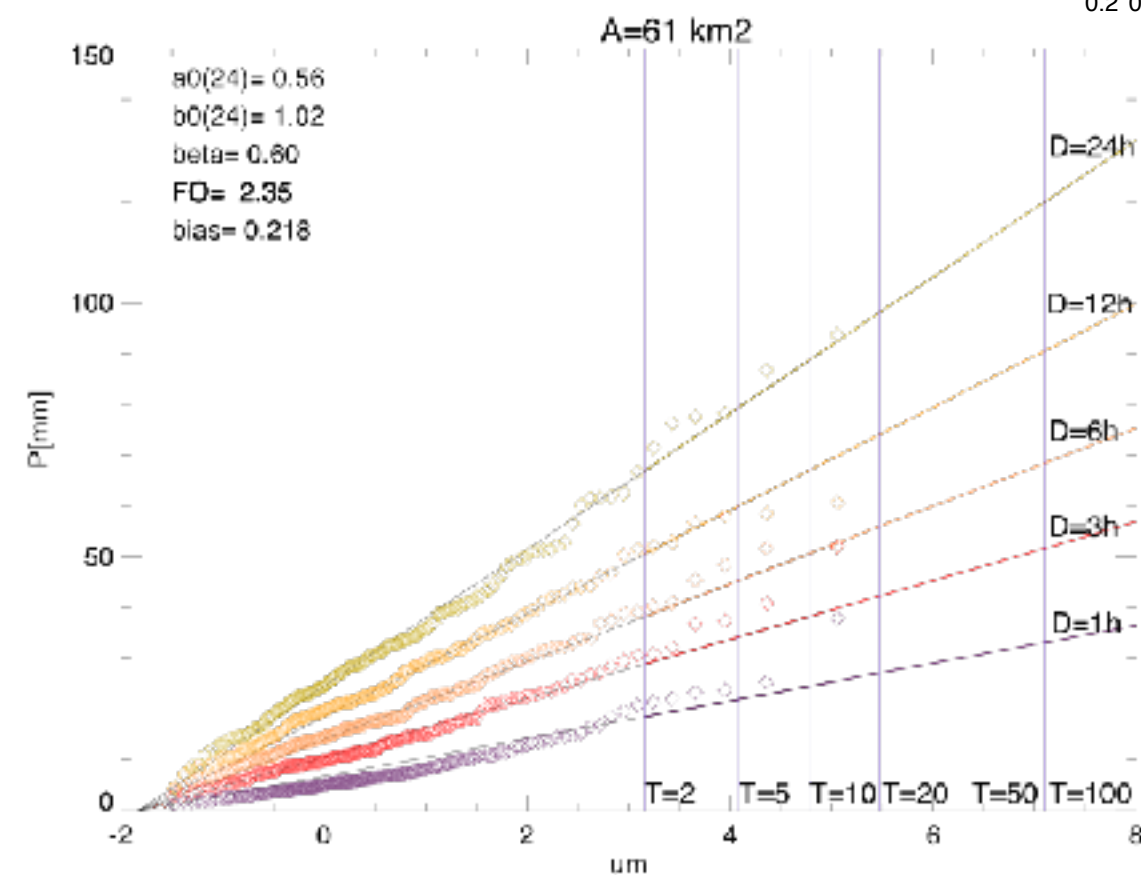
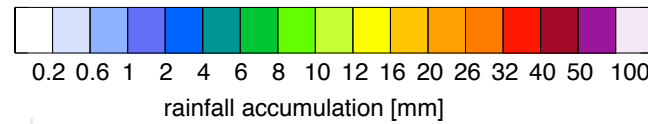
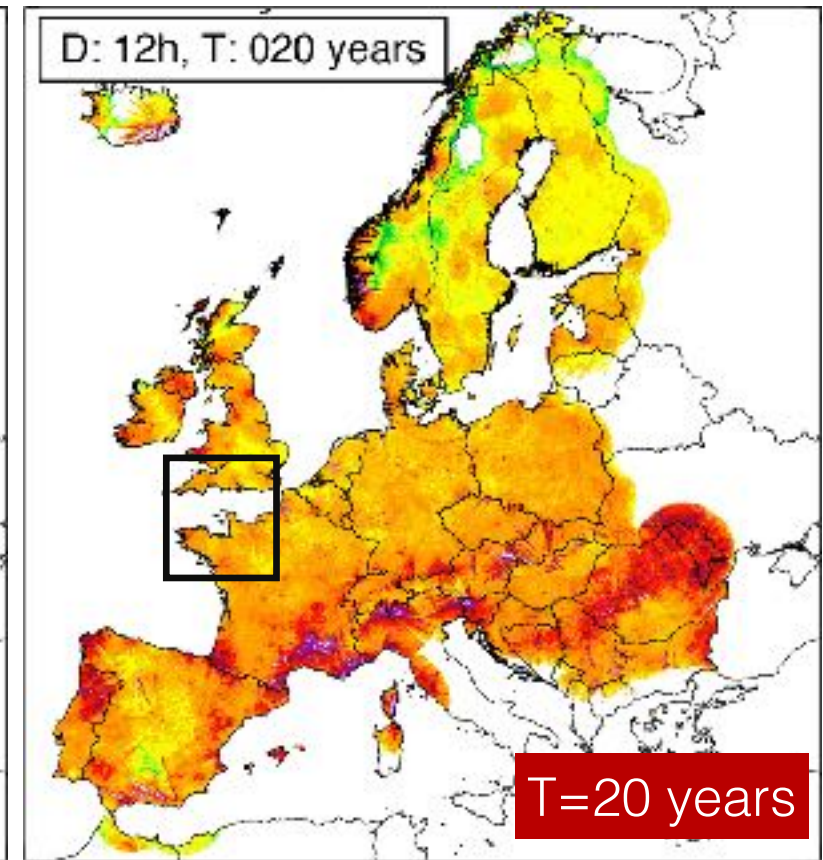
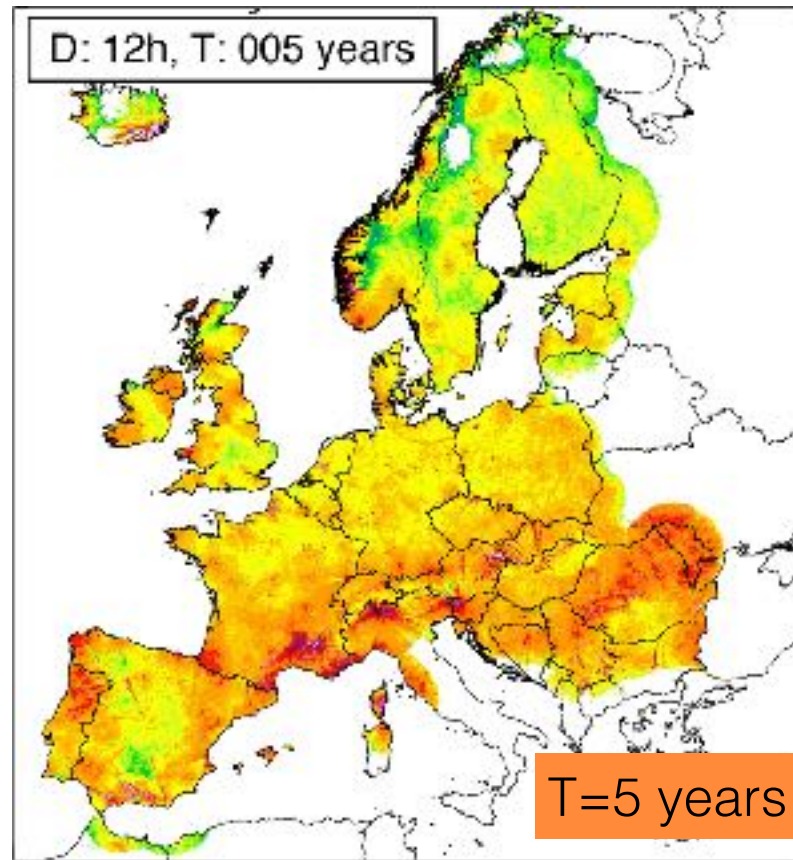
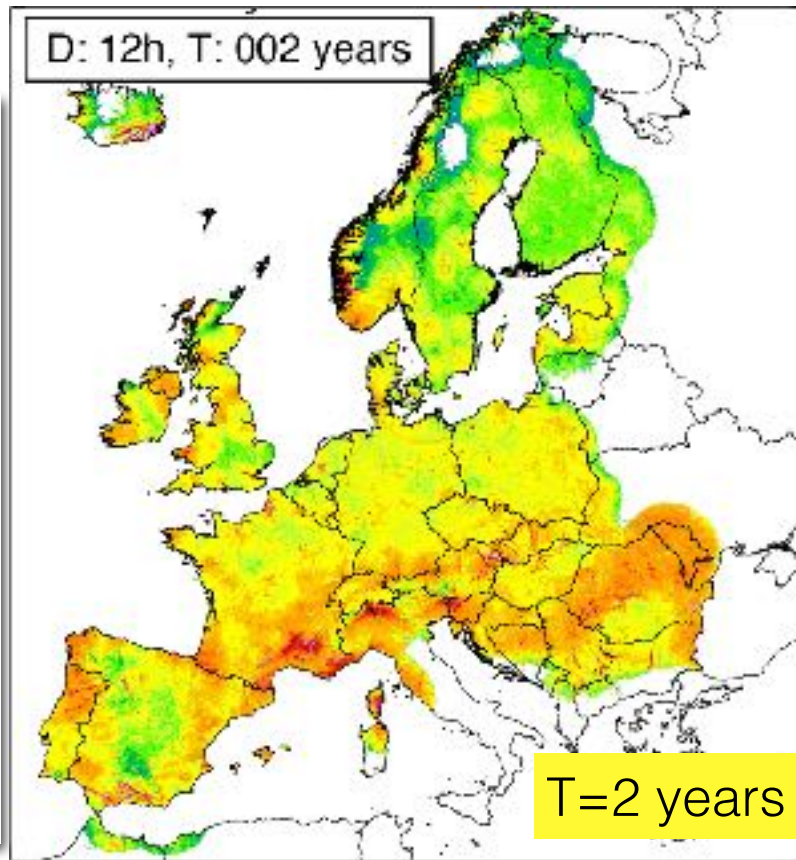
accumulated over the
the basin (1-24 hours)

ERICHA flash flood hazard indicator



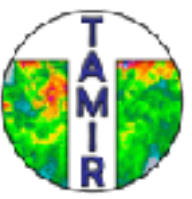
From the available OPERA accumulations

12-h accumulations



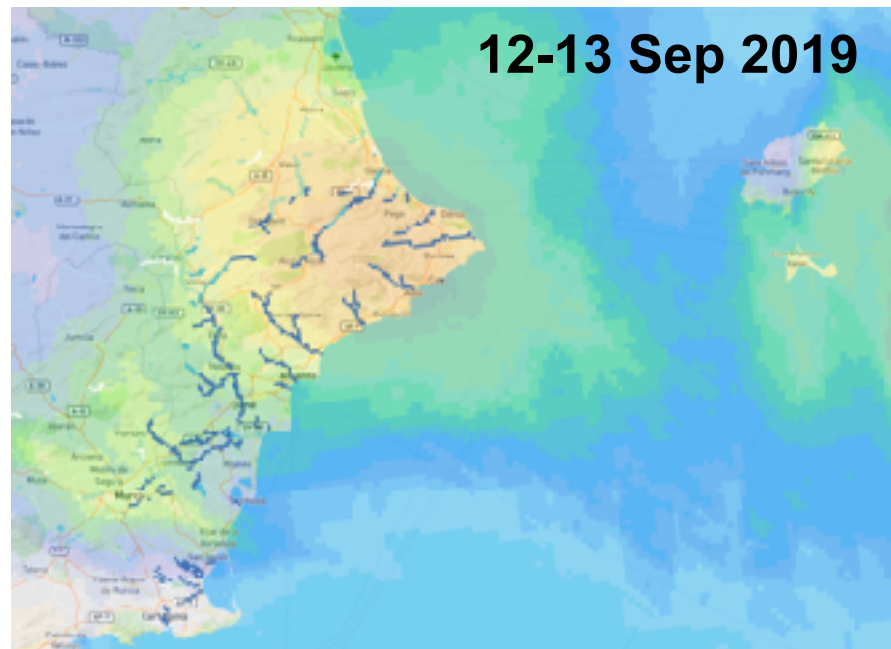
Co-funded by the European Union

From hazard to impacts



The flash flood impact level forecasted for the upcoming 5 days.

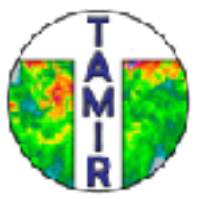
$$\textit{Impact} = \textit{Hazard} * \textit{Exposure}$$



Input datasets for the TAMIR exposure layer

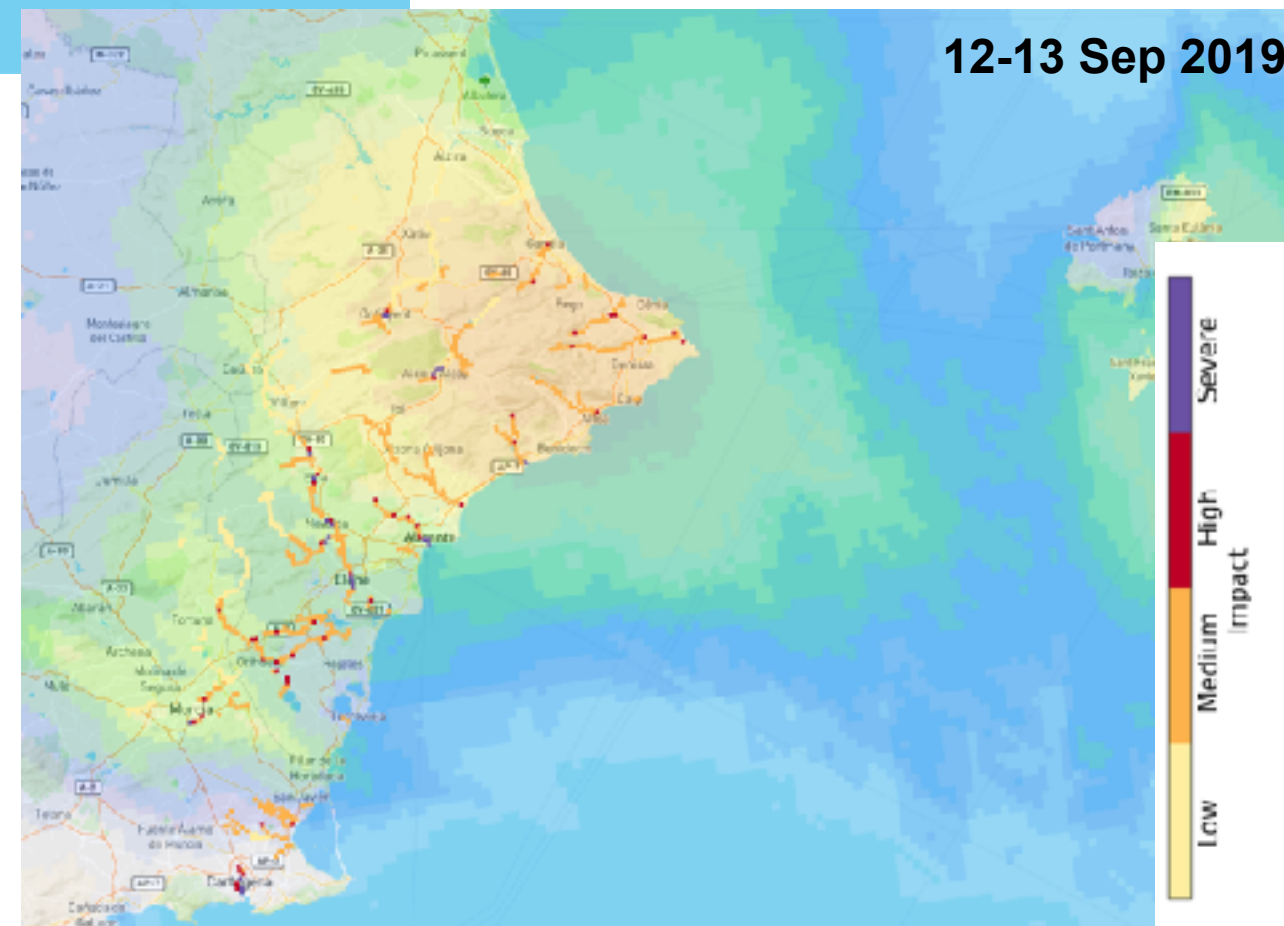
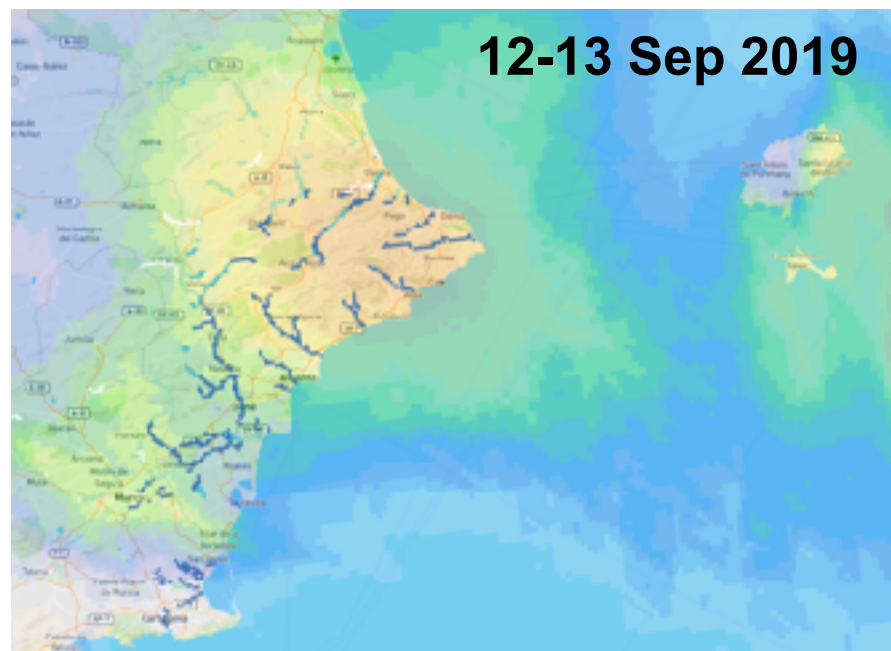
Type	Source (reference)
Population	Global Human Settlement Layer, JRC (Florczyk, et al., 2019)
Health	HARCI-EU (Batista e Silva, et al., 2019)
	JRC health (Dottori, et al., 2017)
Education	HARCI-EU (Batista e Silva, et al., 2019)
	JRC education (Dottori, et al., 2017)
Transport	HARCI-EU (Batista e Silva, et al., 2019)
	JRC airports (Dottori, et al., 2017)
	JRC roads (Dottori, et al., 2017)
Energy	HARCI-EU (Batista e Silva, et al., 2019)
	JRC energy (Dottori, et al., 2017)

From hazard to impacts



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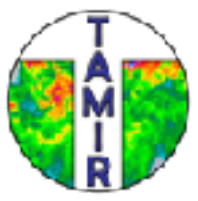
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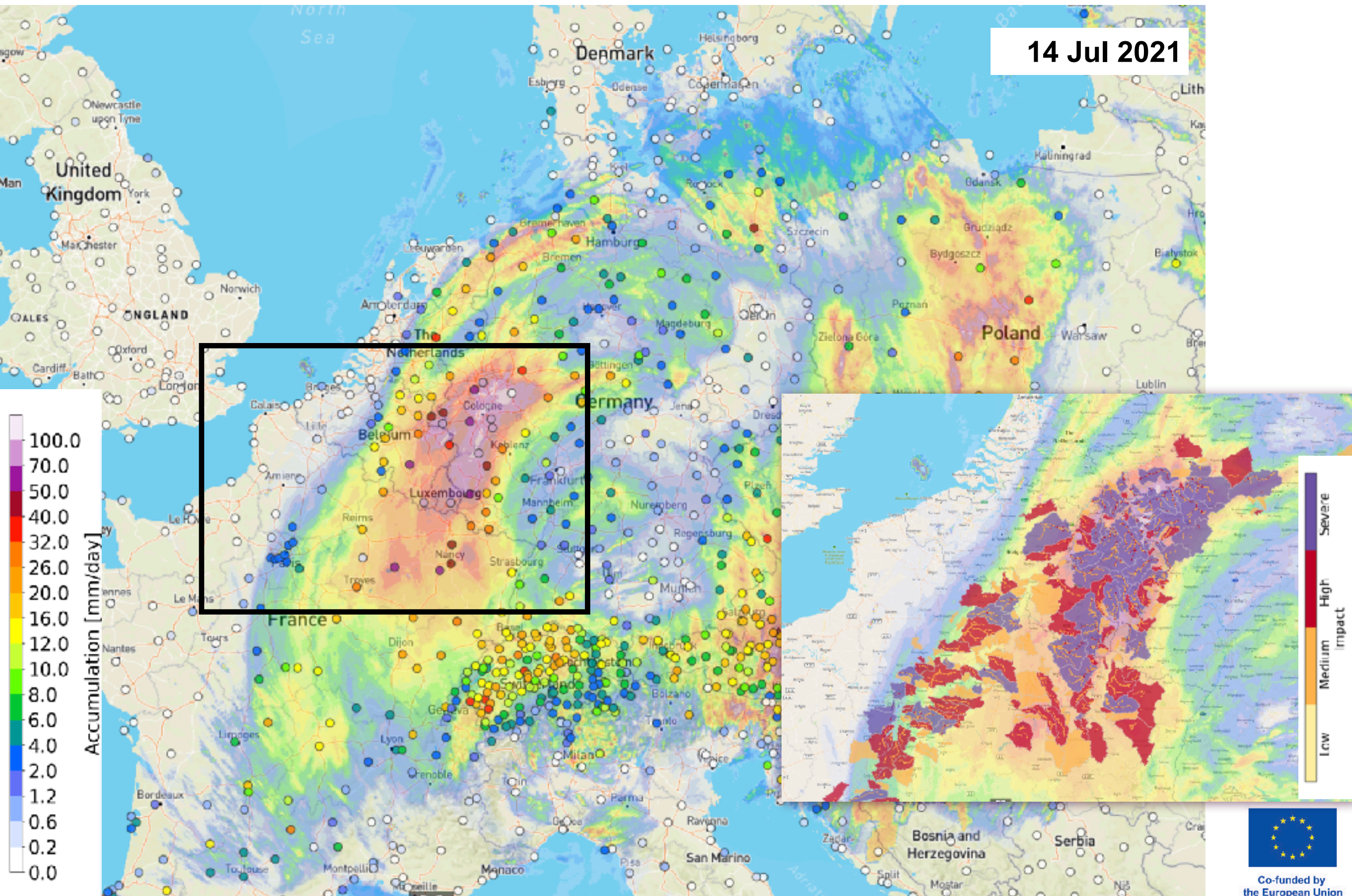
Combined Exposure

	Combined Exposure			
	Low Exposure	Medium Exposure	High Exposure	
High Likelihood				Severe
Medium Likelihood				High
Low Likelihood				Medium
				Low

Example cases on TAMIR-platform



14 Jul 2021



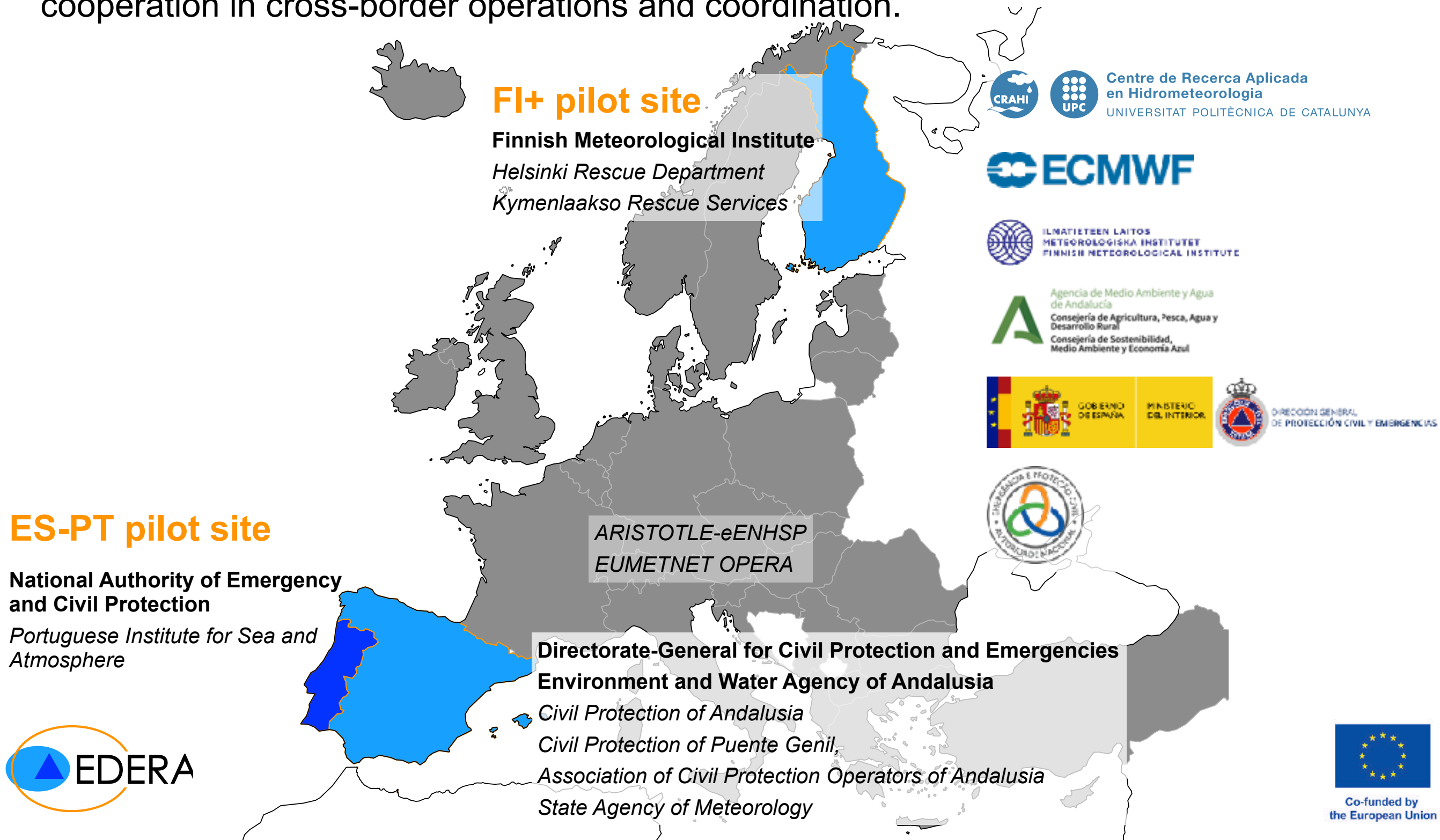
Co-funded by
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EDERA objectives and expected outputs

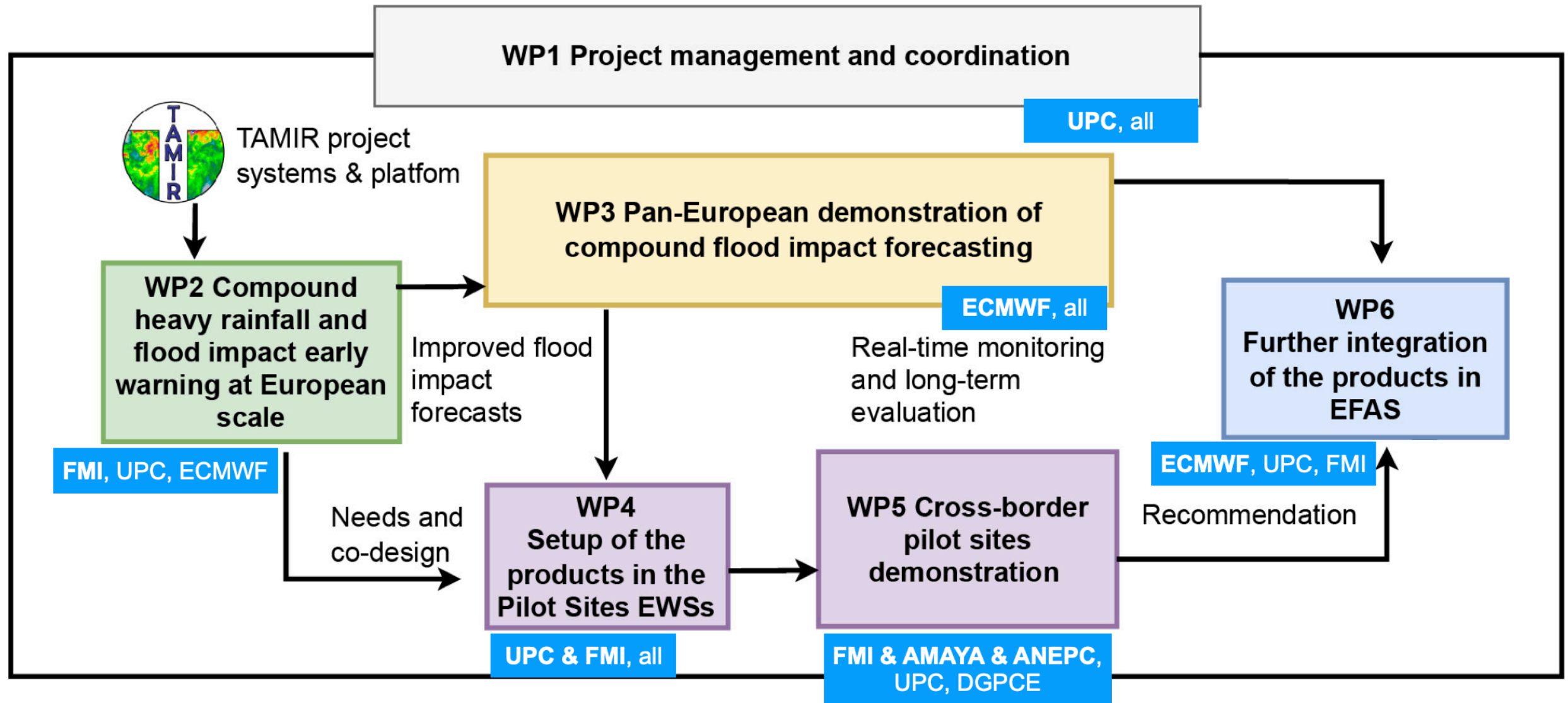
- **Extend the convective hazard and pluvial flood forecasts over Europe.**
- **Increase the adaptability of the flood impact forecasts to the needs of the end users**, applying a strategy to provide compound impact forecasts, and implement configurable user-defined notifications.
 - *Improved products for flood impact forecasting at European scale*
- **Integrate the flood impact forecasts to the EWS platforms of the end users** for improved preparedness and response management during flood events.
- **Demonstrate the added value of seamless flood impact forecasts through a robust evaluation**, at European scale and in **two pilot sites**, with end-users analysing the added value for CPAs cooperation in cross-border operations and coordination.
 - *Demonstration for a period of 15 months*
 - *Recommendations for coordination and cross-border cooperation between CPAs*
- **Develop comprehensive guidance material** delivered through dedicated training workshops and e-learning materials.
- **Integrate the developments within the CEMS-Floods EFAS system.**
 - *Sustainability of the products*

EDERA demonstration

- Integrate the flood impact forecasts to the EWS platforms of the end users with existing datasets.
- Demonstrate the added value of seamless flood impact forecasts for CPAs cooperation in cross-border operations and coordination.



Project organisation



Main events

Mar 2023: 1st EDERA meeting (Sevilla, ES)

Nov 2023: Training activities in the Pilot Sites (Loulé, PT & Helsinki, FI)

Apr 2024: International training (Madrid, ES)

Dec 2024: International workshop (Brussels, BE)

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