ARISTOTLE-eENSHP

A global expert support to the EU Emergency Response Coordination Centre (ERCC)

EDERA Final Workshop
22 January 2025

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Aristotle overview

- Aristotle-eENHSP *"enhanced European Natural Hazard Scientific Partnership"*
- Project started in 2016, phase 4 from 2024 - 2028
- 24 institutions across Europe, including four international organizations (ECMWF, CSEM, EUCENTRE, GEM)
- Provide guidance on **6 interrelated natural hazards** to the EU Emergency Response Coordination Centre (ERCC)
  - **Forecastable hazards**: *severe weather, flooding, wildfires*
  - **Non-forecastable hazards**: *earthquakes, tsunami, volcanoes*
- Guidance used by ERCC to coordinate preparatory and response actions in and outside Europe to global natural disasters - part of UCPM mandate

Images courtesy of Aristotle SMT

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Reporting of natural hazards

Routine Multi-Hazard <u>Monitoring Report</u>

- Every Mon/Wed/Fri
- Each hazard report events where impacts are possible
- Deliver report to ERCC by 15:00 CEST/CEST
- Discussion with ERCC at 16:00 CEST/CEST


ARISTOTLE-ENHSP
MULTI-HAZARD IMPACT ORIENTED BRIEF

HEADLINES

SUMMARY

Single/Multi-Hazard <u>Emergency Report</u>

- Triggered proactively or reactively
- Report provided to ERCC within 3 hours of request
- Details the natural hazard(s) and the potential and reported impacts

29 Activations
(10/2020 – 09/2021)

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Flood Service Provision

- Operated as a partnership between **ECMWF**, **SMHI**, **CIMA** and **SHMU** alternating weekly

- **Monday-Friday 09:00 to 17:00 CET/CEST**
- **Saturday-Sunday 09:00 to 15:00 CET/CEST**

- **3 Monitoring reports a week** (Mon – Wed – Fri) + **Emergency reporting** (upon request)
- All reporting are **impact-based**

- **Pan-European coverage**, including all UCPM Participating States and (partially) neighbourhood countries + **Global coverage**

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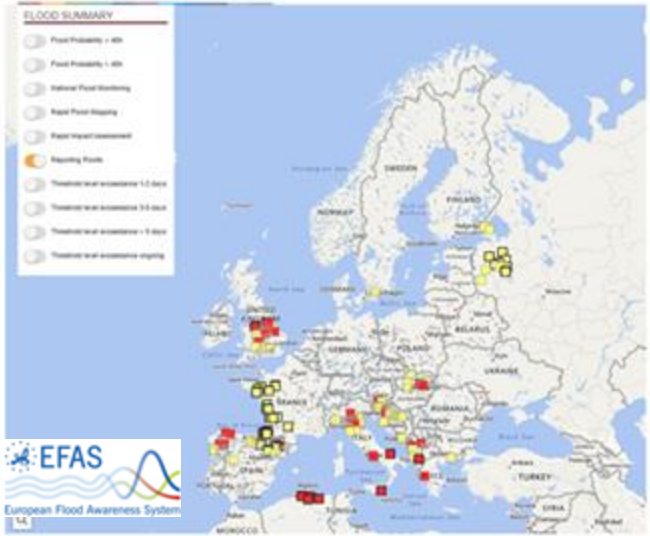
Flood forecast systems

Pan-European Domain

Rivers with upstream area >= 500 km^2

European Flood Awareness System (EFAS)

- European forecasts
- 1.4 km, 6 hourly time steps
- Restricted access to EFAS partners for first 30 days

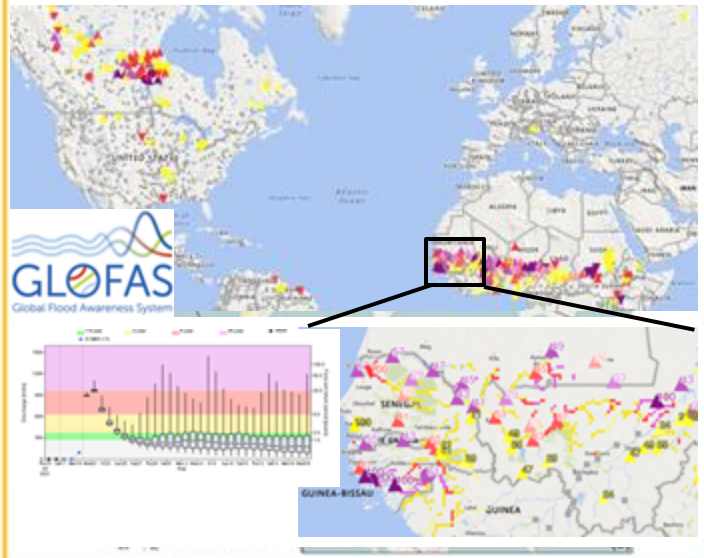


Global Domain

Rivers with upstream area >= 2000 km^2

Global Flood Awareness System (GloFAS)

- Global forecasts
- 5 km, 24 hourly time steps
- Open access



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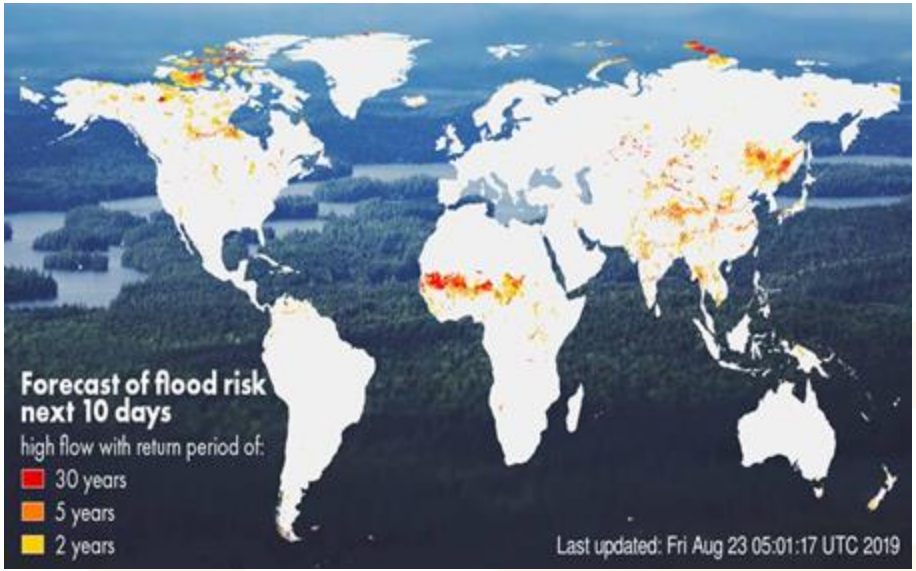
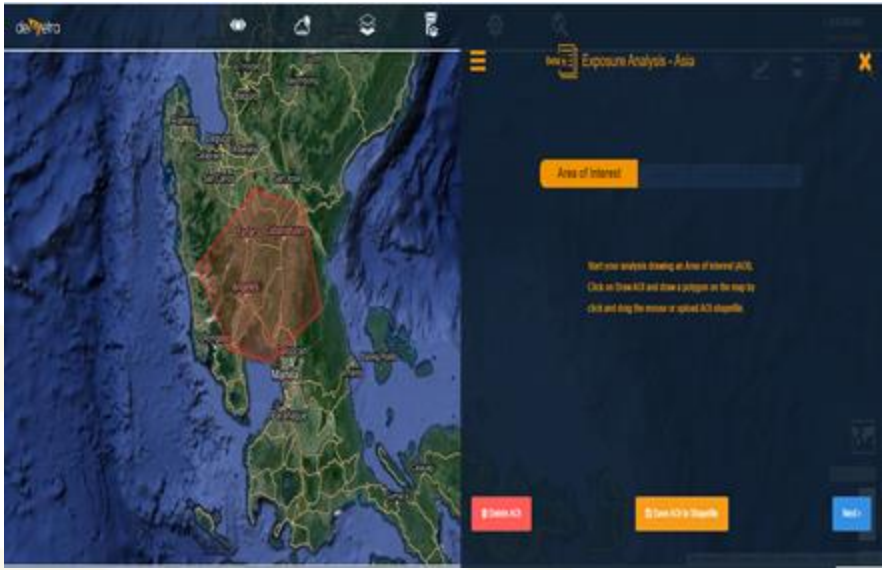
Additional systems

World wide HYPE (WW-HYPE)



Dewetra



+ information from web pages of hydrological services and/or civil protection organisations

Deciding whether to Report an Event

The following criteria must be met to report the event:

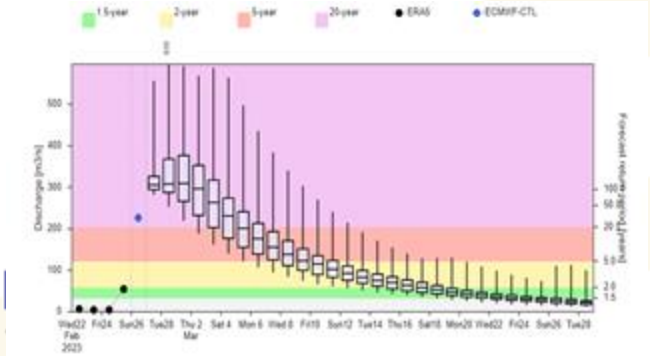
1. hydrological models must predict at least the **5-year return period will be exceeded**

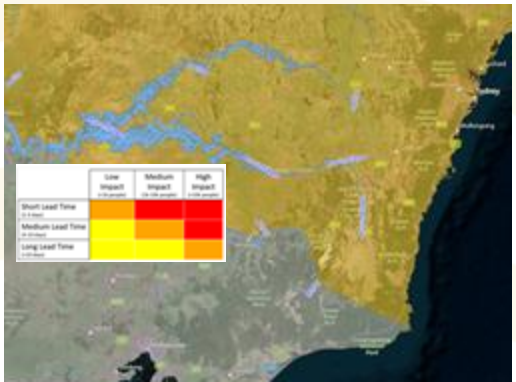
2. The exceedances must occur **within the next 3 days**

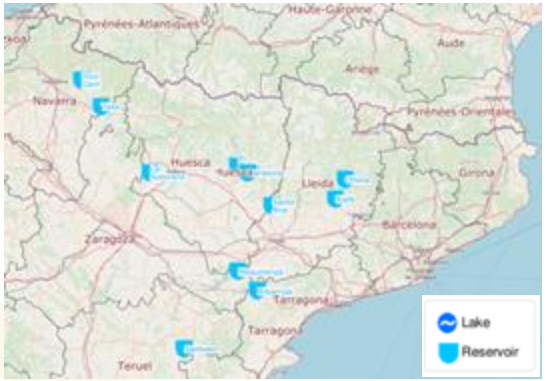
3. The locations should also be **highlighted by the flood impact products**

4. Multiple or major rivers within an administrative region must be affected

5. The river location should **not be significantly impacted by upstream reservoirs**

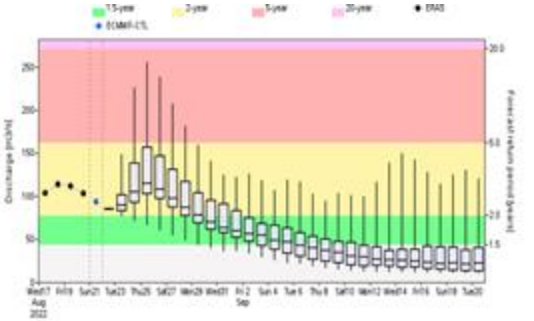


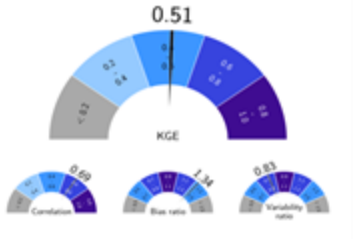


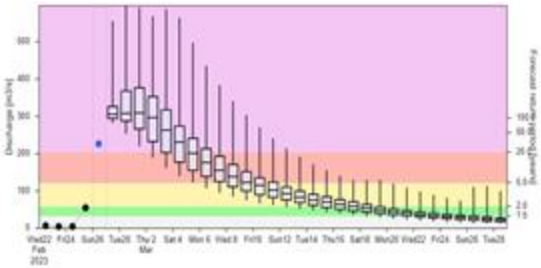


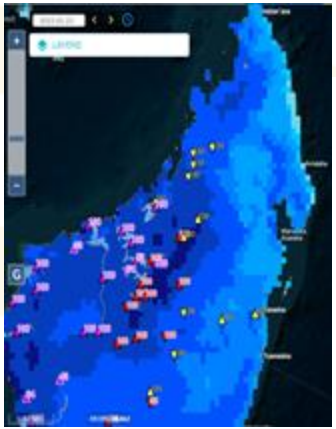
Additional Considerations

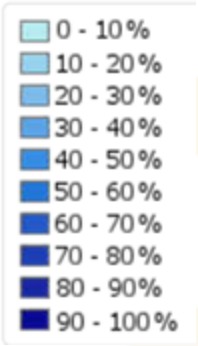
- **Forecast probability** of exceeding the 5/20 year return period threshold
- **Skill of the model**
  - Is it calibrated?
  - Is the river regulated?
- **Skill of the meteorological forecast**
  - Are there uncertainties e.g. in landfall location of tropical cyclone?
- **Target areas**
  - Flood extent w/respect to country size + Coping capacities

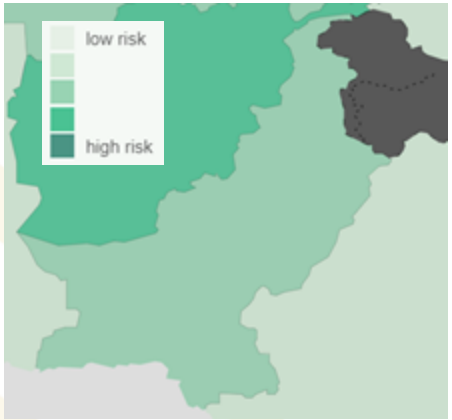












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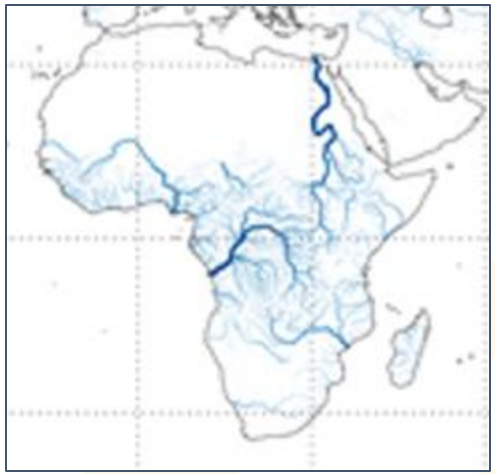
Flood service limitations

1. Guidance restricted to
   - ≥ 500 km^2 in Europe
   - ≥ 2000 km^2 globally



2. Flash flooding – broader areas where riverine flash flooding is possible

3. no Urban flooding

4. Other types of flooding not captured by the service: Coastal, Dam break, Ice jam, Jökulhlaup, Glacier outburst

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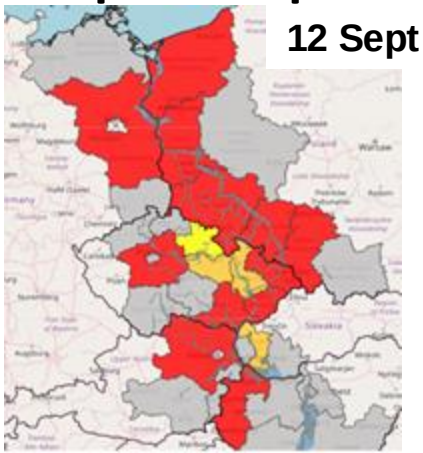
Floods in Central Europe September 2024

EFAS forecasts 00 UTC run

Rapid impact assessment

Rapid Flood Mapping



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Floods in Central Europe September 2024

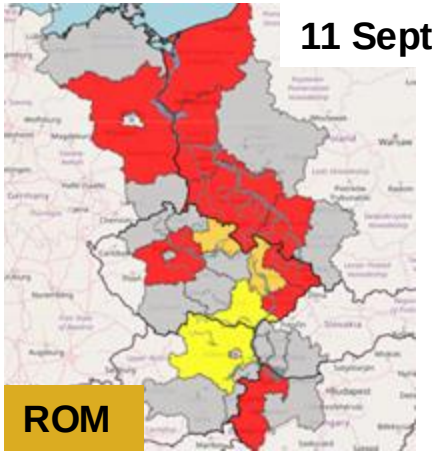
EFAS
00 UTC run

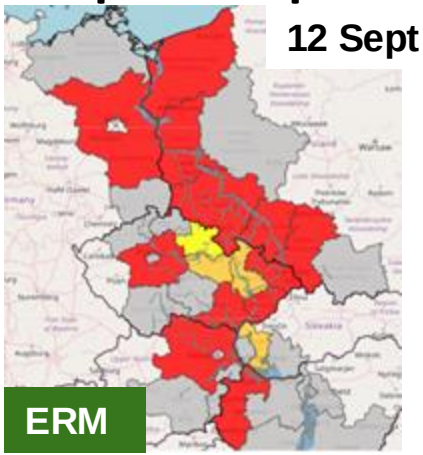
Rapid impact assessment

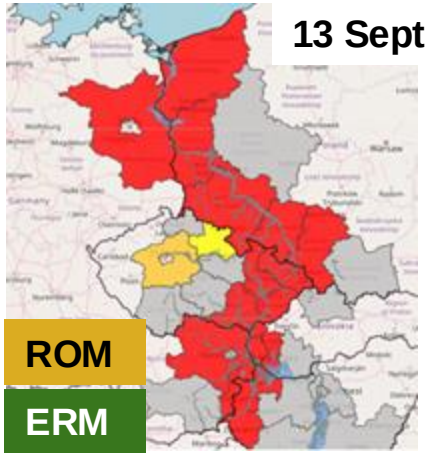
Rapid Flood Mapping

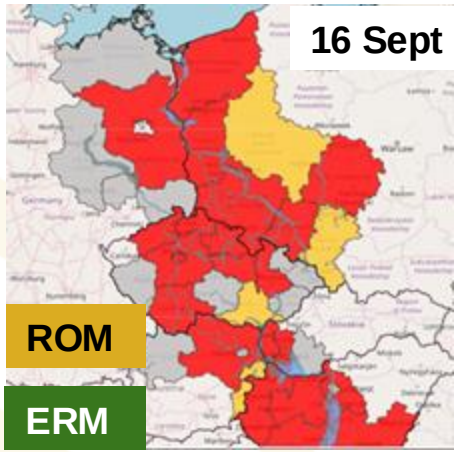
ROM
Monitoring report

ERM
Emergency report









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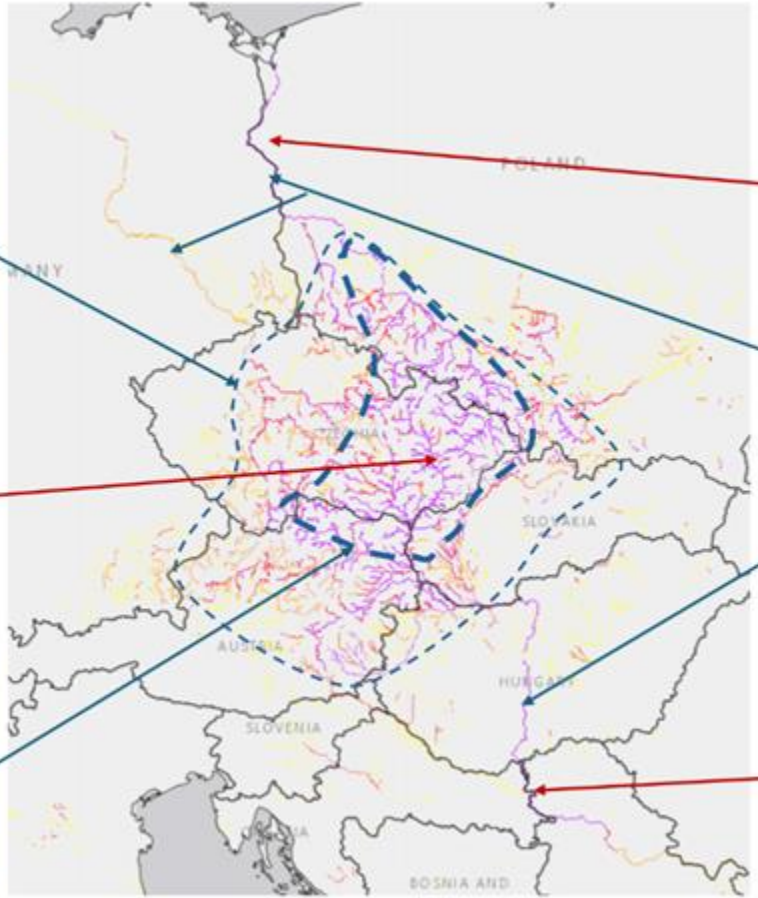
Emergency report Friday 13 September 2024

- 1,390,000 people potentially exposed to flooding
- flood defences reduce it to 512,000 people

Flood summary graphic 13 Sep 2024



Main river response from later Friday and over the weekend, peaks generally on Sunday/into Monday

Consistent signal for flows to substantially exceed the 20-year return period on the River Morava, peaking Saturday/Sunday

Area of particular concern for flows exceeding 20-year return periods this weekend and early next week.

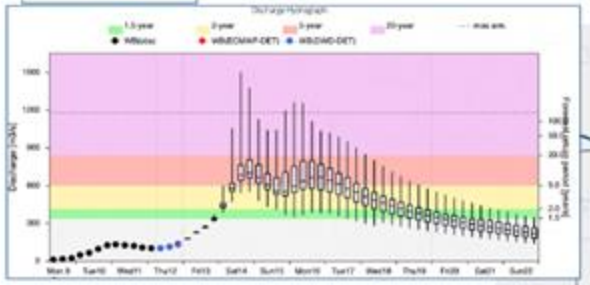
Consistent signal for flows to substantially exceed the 20-year return period along the whole River Oder through into next week.

Slower response through next week on downstream sections of the Rivers Oder, Elbe and Danube.

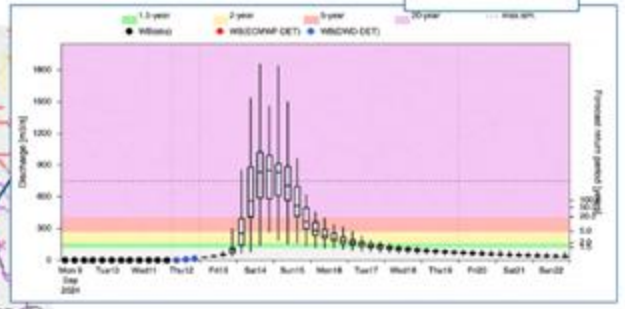
Increased signal for 5-20 year return period flows on the River Danube in Croatia and Serbia

Emergency report Friday 13 September 2024

Elbe



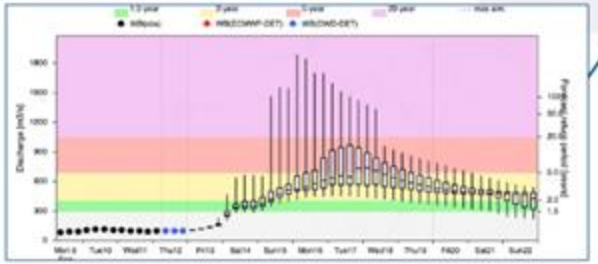
Oder



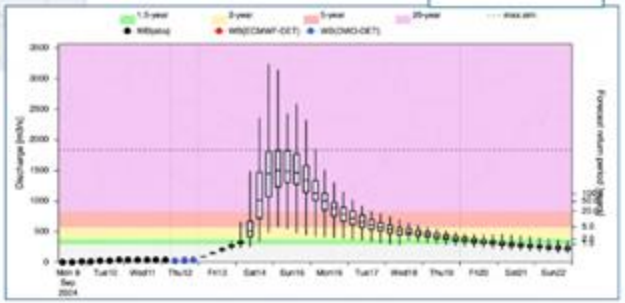
Czechia

Prague

Vltava



Morava



Highest flows currently forecast in eastern/central parts

Floods in Valencia region October 2024

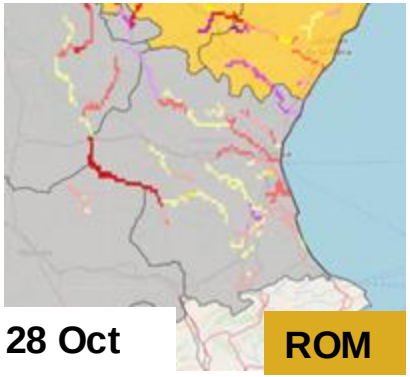
EFAS forecasts
00 UTC run

Rapid impact assessment

Total Flood probability:

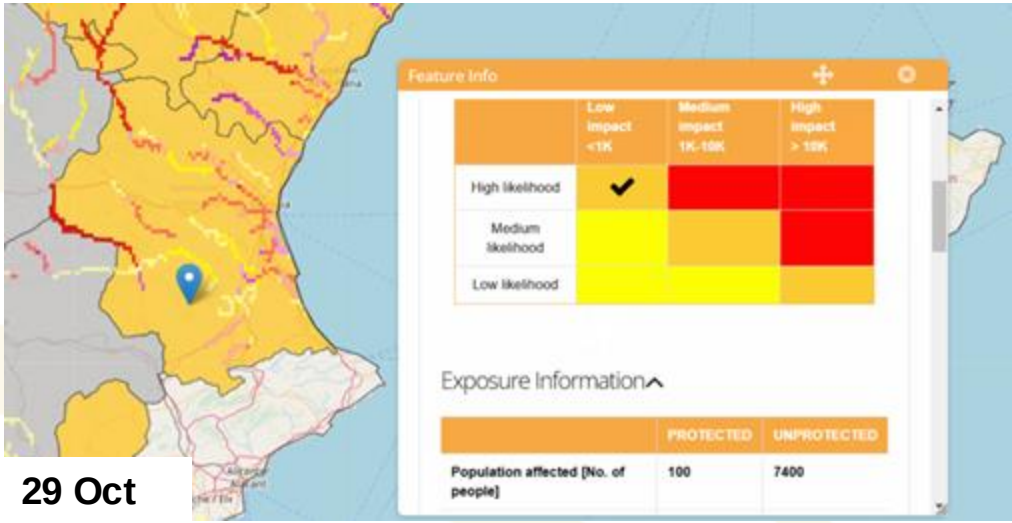
- **> 2-year return period**
- **> 5-year return period**
- **> 20-year return period**

27 Oct



28 Oct

ROM



29 Oct

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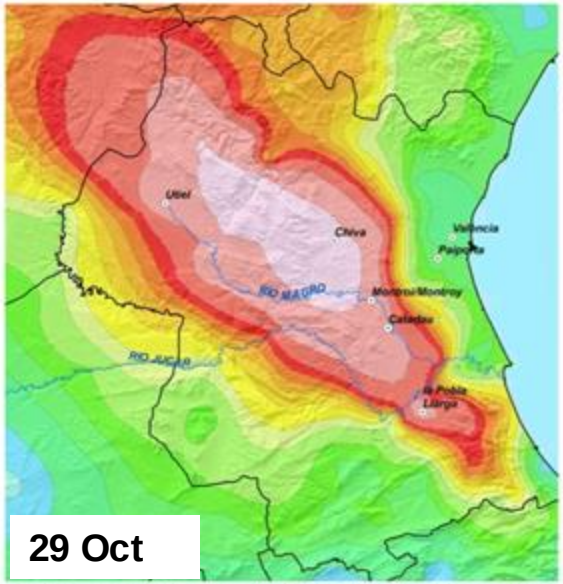
Floods in Valencia



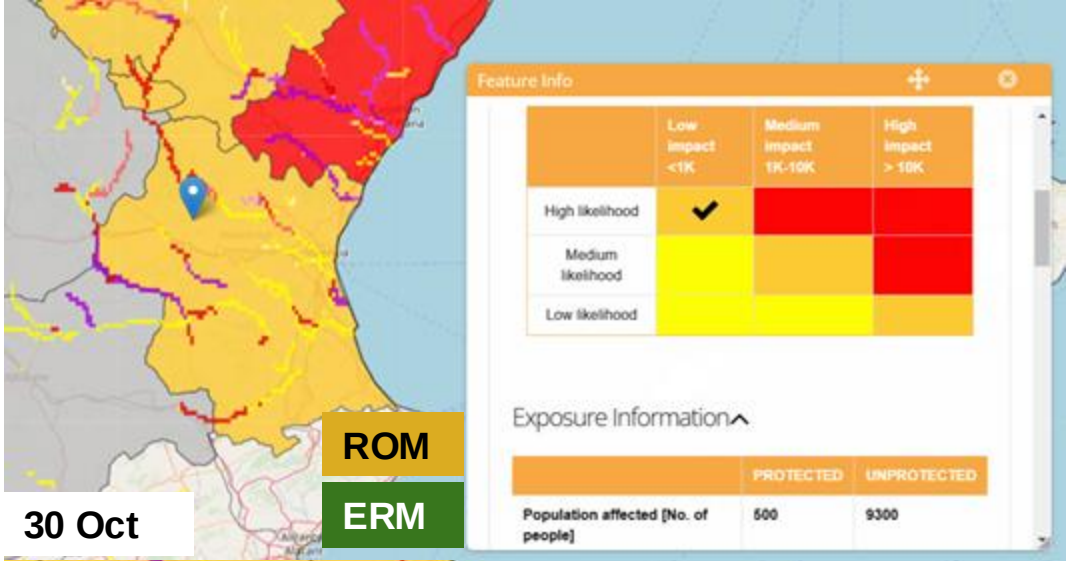
AEMet
Agencia Estatal de Meteorología

Precipitación acumulada
29 de octubre de 2024
(l/m²)

0.0 - 1.0
1.1 - 2.0
2.1 - 5.0
5.1 - 10.0
10.1 - 15.0
15.1 - 20.0
20.1 - 30.0
30.1 - 40.0
40.1 - 60.0
60.1 - 80.0
80.1 - 100.0
100.1 - 125.0
125.1 - 150.0
150.1 - 200.0
200.1 - 300.0
> 300.0

29 Oct

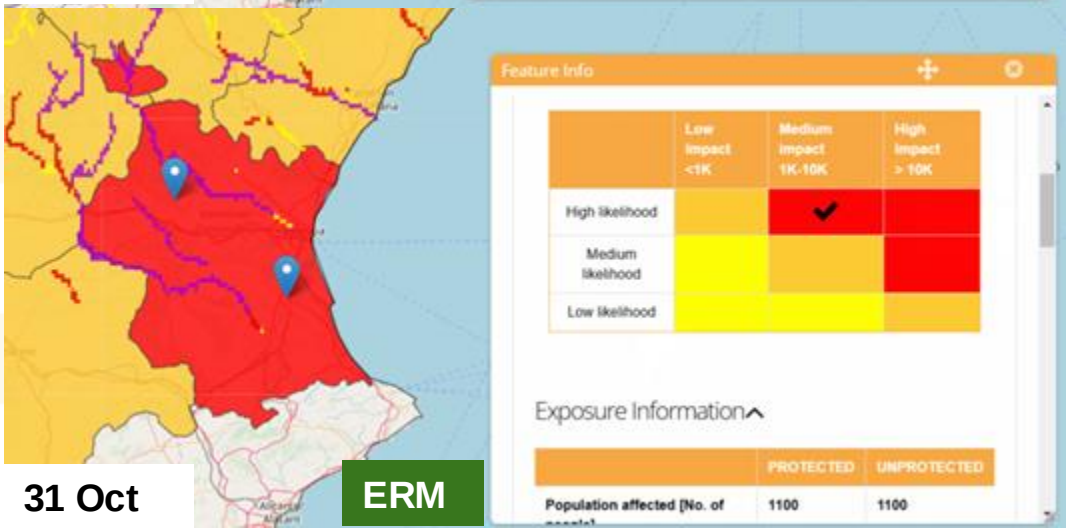
Accumulated precipitation in the Valencian Community, Spain, on 29 October 2024 Image credit: AEMET



ROM

ERM

30 Oct



ERM

31 Oct

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Central Europe September 2024	Valencia October 2024
• regional precipitation, longer lasting	• more local event, shorter
• lower precipitation intensities	• higher precipitation intensities
• whole catchments affected	• highest precipitation totals in downstream part of catchments
• activations ahead the event	• activations after the event
• updated guidance with development of forecasts and the event	• -
• information on flash-flood risk over the upstream part of catchments	• guidance on flash flood risk was missing
• well forecasted impact	• underestimated impact

EDERA outputs

- increasing the capacity to forecast flash floods and their impact
  - testing the feasibility of integration into the workflow of ARISTOTLE flood service
  - testing the quality of products - evaluating for the historical events
- more frequently updated products could help both for our routine monitoring

Thank you.

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