

Learning from EFAS to develop European Flash Flood Hazard Identification Capacities



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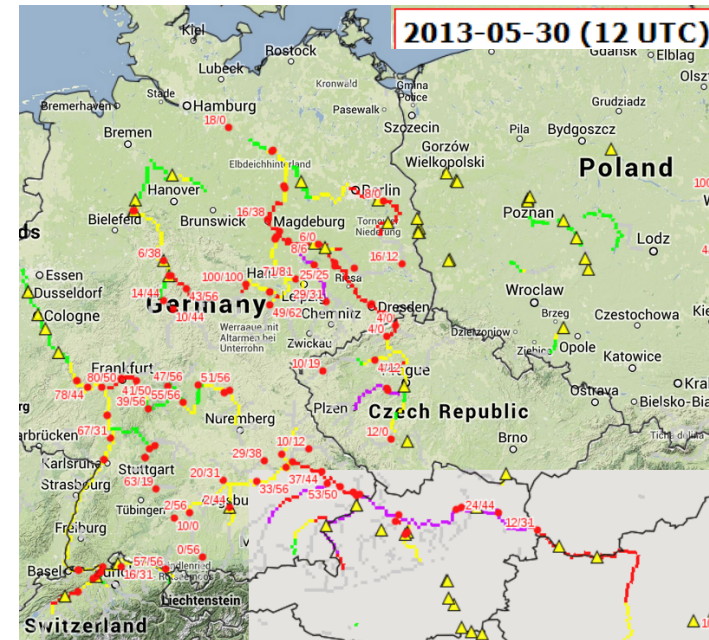
<http://floods.jrc.ec.europa.eu>

European Flood Awareness System

Main Objectives

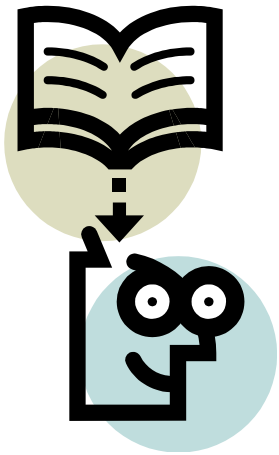
1. Inform European Civil Protection before and during floods through harmonized information across Europe
2. Provide additional information for national hydrological services (medium range, multiple NWP including EPS, catchment based information)

Now operational under GMES-IO Emergency Management Service (Regulation (EU) No 911/2010)



European
Civil Protection

Learning from EFAS for flash floods

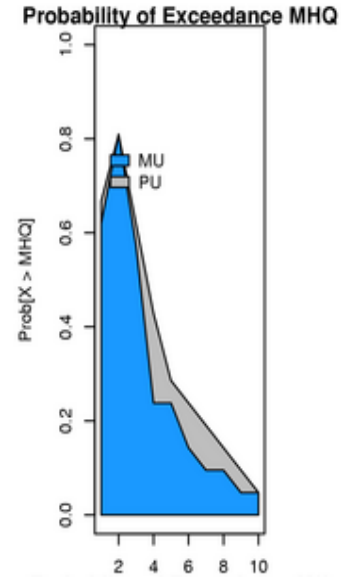
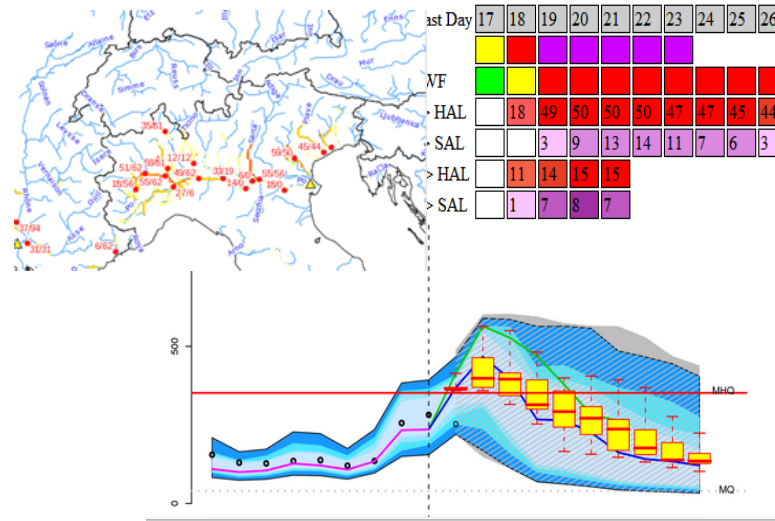
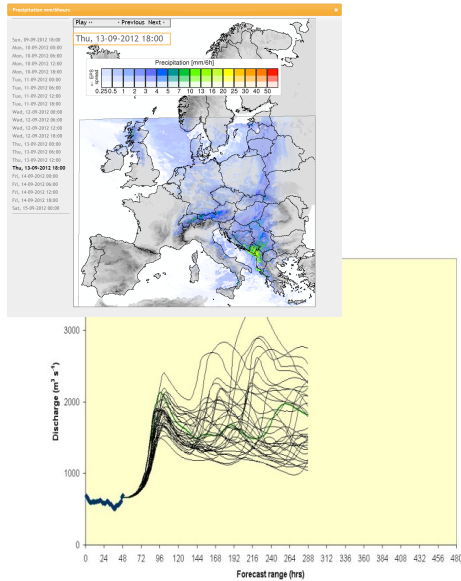


- Address the right science questions
- From research to operations
- Management an operational flood forecasting system on European scale

? Addressing the right (science) questions

How can the system contribute to making *better* decisions at different levels (scientists, forecaster, decision maker, policy maker)

EFAS science questions



Added value?

- EU
- Longer leadtime
- EPS, multi-model

Expert information?

- Visualisation EPS
- Post-processing
- Harmonised views
- Skill scores

Decision support ?

- Interpretation
- Alert protocols

Respect existing warning mechanisms!

From **research** to operational flood forecasting on EU scale

- Secure funding & customer
- Multi-disciplinary teams
- scalable pre-operational capacity (IT, staff)
- Develop networks & partnerships
 - Main users
 - Regular meetings for feedback
 - Established feedback mechanism
- **Strike a balance between state of the art & operational versions**
- Development in view of changing data policies and legal aspects when going from research to operations

Managing an operational flood forecasting system on European scale

- Mandate & role within the existing warning mechanisms
- Customer
- Secured, continuous funding

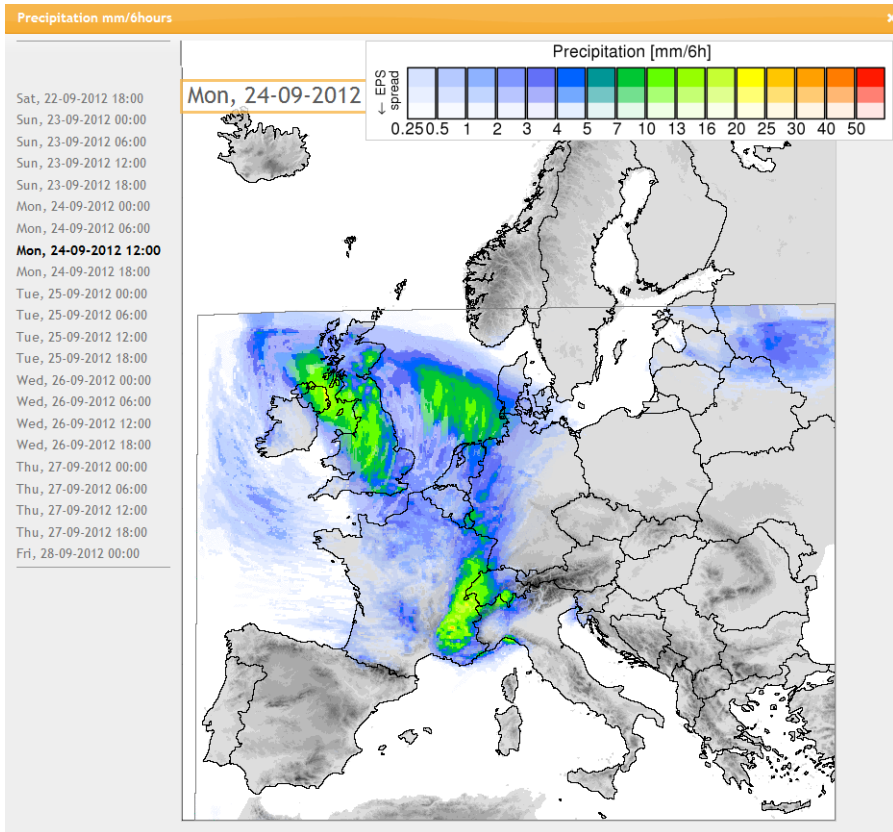
- Multi-disciplinary, multi-lingual teams
- Operational capacity (IT, staff) & business continuity plan

- Maintain networks & partnerships
 - Regular meetings for feedback
 - Established feedback mechanism
 - Science and policy advisory group
 - *Natural hazards partnership, Global Floods Working Group, HEPEX*

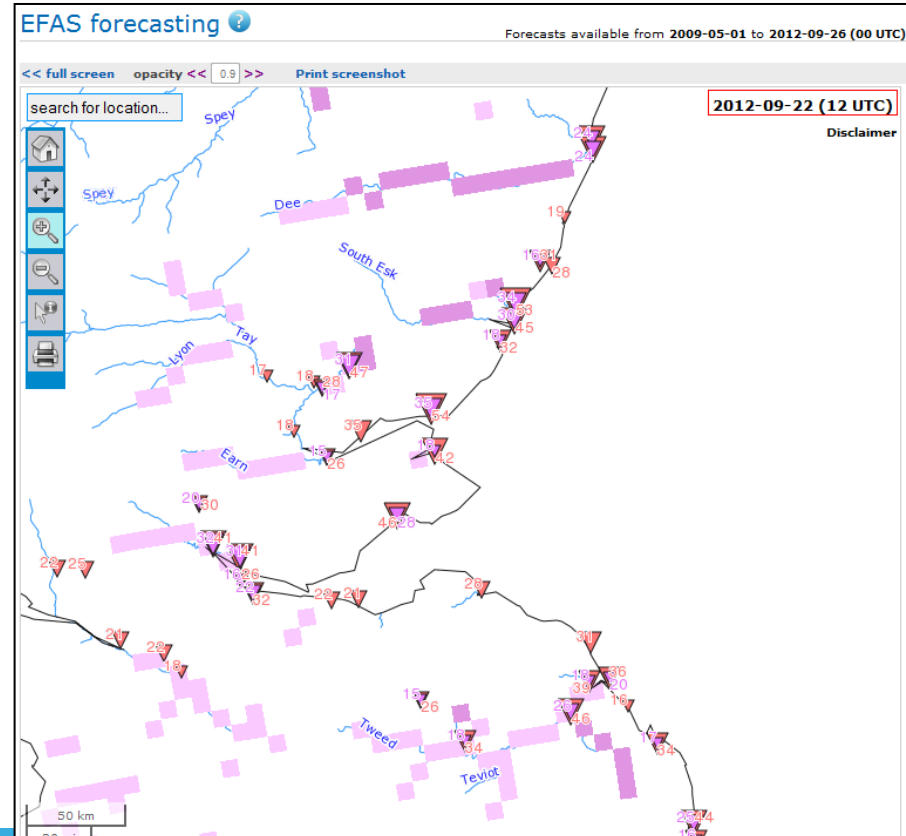
- **Ensure underpinning research and development**
- Fully transparent contract management, procurements,

EFAS – with a flash flood component

Rainfall from a meteorological point of view



Rainfall from a hydrological point of view



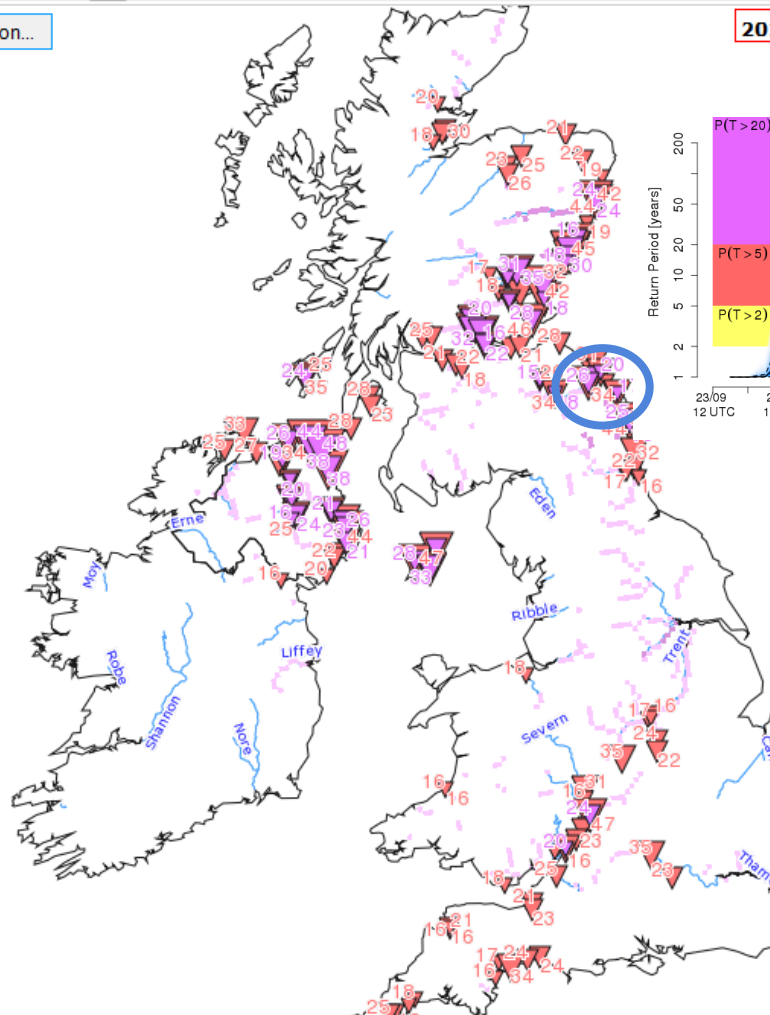
Probabilistic rainfall fields

EFAS forecasting 

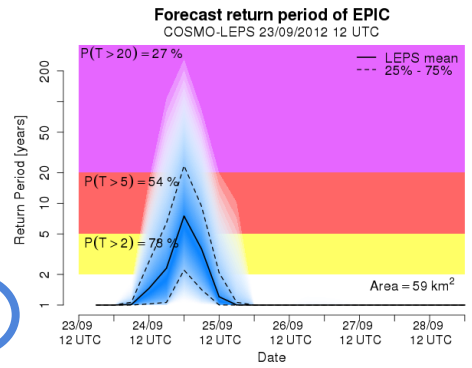
Forecasts available from 2009-05-01 to 2012-09-26 (00 UTC)

<< full screen opacity << 0.9 >> Print screenshot

search for location...



2012-09-22 (12 UTC)



Identifying basins with a risk of flash floods

Top story



Floods hit 300 homes in north England

26 Sep 2012: River defences under pressure in downpours, while fishing village is left covered in sea foam

Most recent

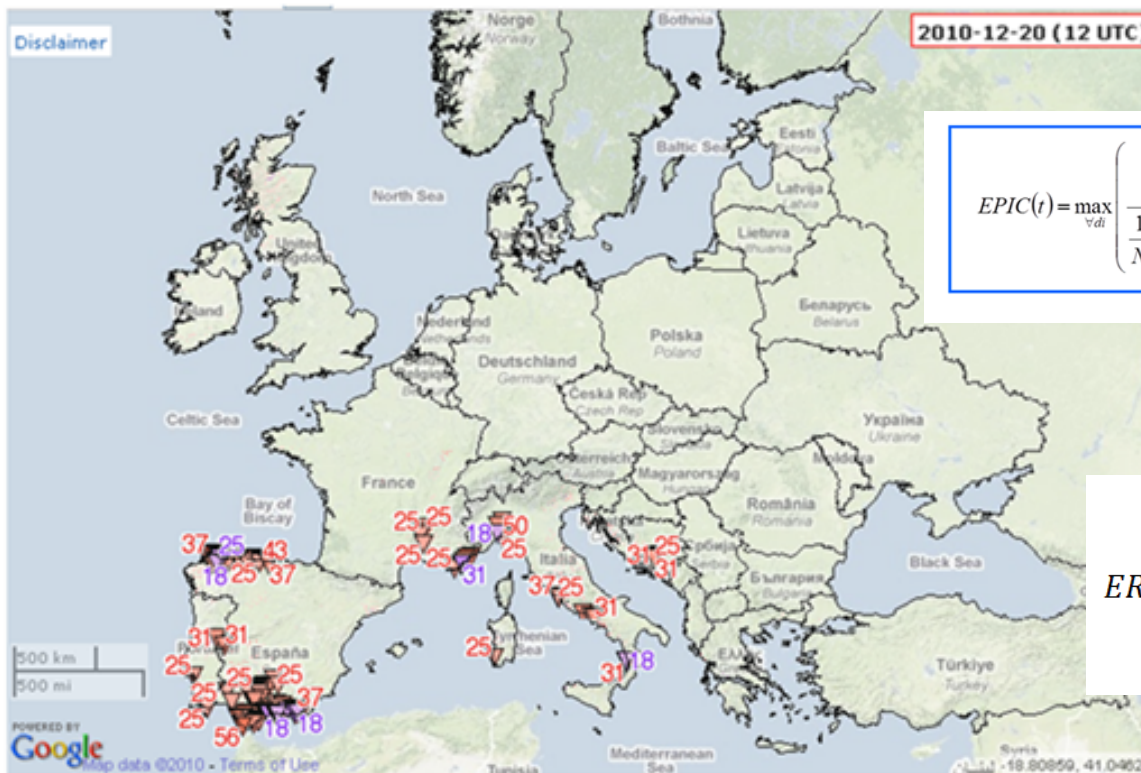


Looters of flooded shop condemned by police

26 Sep 2012: Newcastle upon Tyne cycle shop targeted as swollen rivers cause havoc in northern England

100 km
100 mi

European **P**recipitation Index based on simulated climatology (**EPIC**)

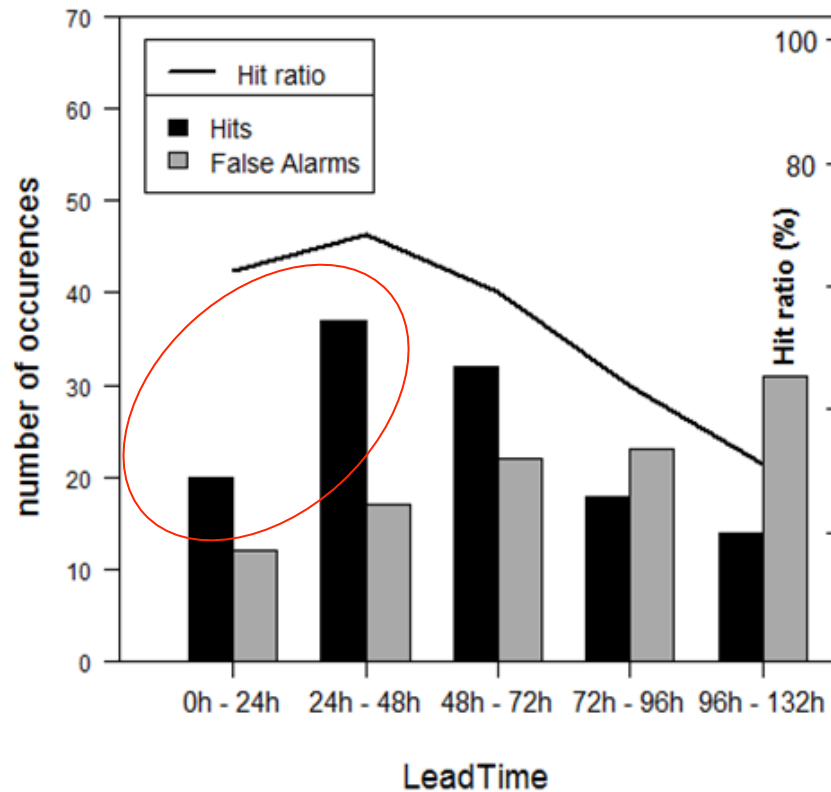


$$EPIC(t) = \max_{\forall di} \left(\frac{UP_{di}(t)}{\frac{1}{N} \sum_{j=1}^N \max(UP_{di})_j} \right) \quad di = \{6, 12, 24 \text{ hours}\}$$

↓
**Include
runoff
(ERIC)**

$$ERIC = \max_{\forall dk} \left(\frac{UR_{dk}}{\frac{1}{M} \sum_{j=1}^M \max(UR_{dk})_j} \right)$$

Skill analysis of ERIC

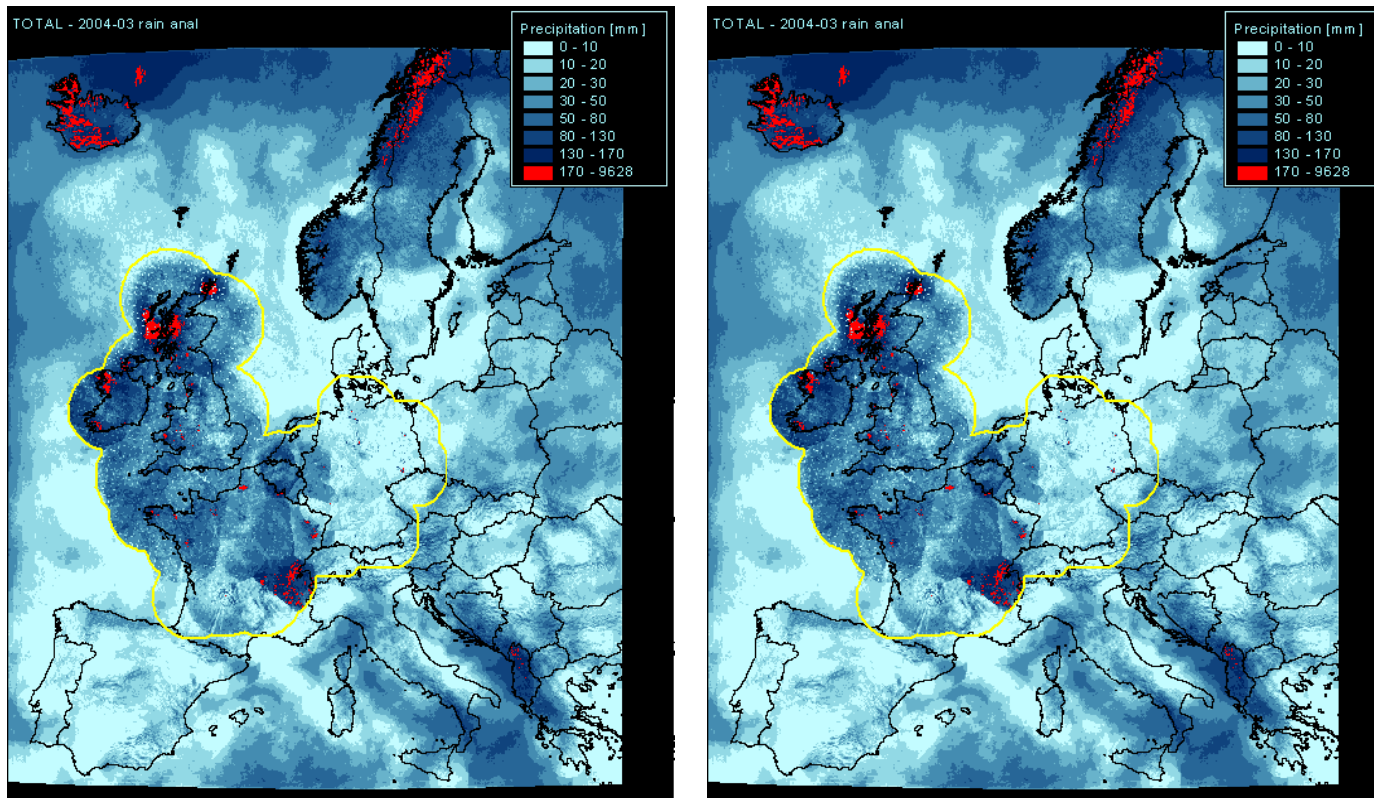


Hits, false alarms and hit ratio depending on lead time and for a minimum probability of exceeding the 20 yrs return period of 35%.

With COSMO-LEPS ensembles the optimum lead time is 24h-72 hours

For the first 24h other inputs would be needed, e.g. EU radar products!

EFAS and testing EU radar composites in 2004...



... we are looking forward to HAREN!

Conclusion

- The European Commission has initiated activities to increase security of the citizens and to reduce socio-economic damage during severe flood events across the entire disaster cycle
- EU policies (Floods Directive) foster trans-national collaborations and management
- *Seamless Early Flood Awareness Systems* on regional, continental (European) scales are promoted for different types of floods including flash floods
- EFAS is operational under GMES-IO EMS umbrella
- EFAS is being expanded towards shorter time scales (flashfloods) and global scale
- EFAS would be a good framework to test European radar data