



Verification of EFAS flood hazard maps

EFAS annual meeting 2022

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28 September 2022



Outline

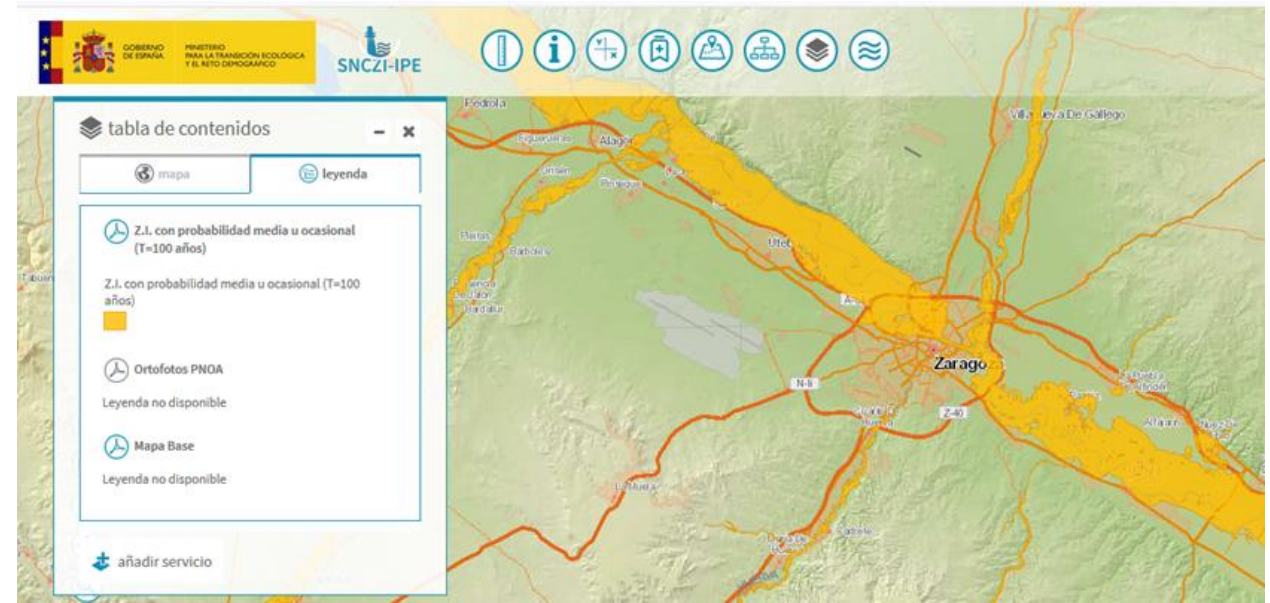
- Why flood hazard maps in EFAS?
- How EFAS flood maps are now
- Skill of EFAS flood maps
 - Continental- vs national-scale maps
- Can we use national flood maps in EFAS?
- Conclusions



Emergency
Management

Why continental flood hazard (FH) maps?

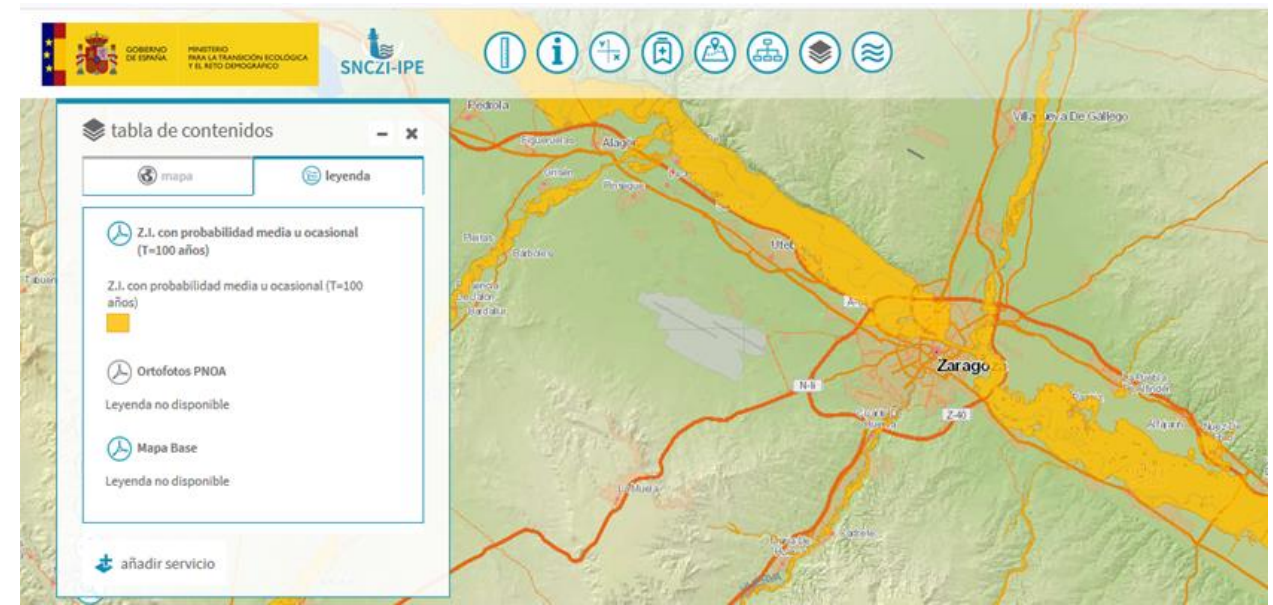
- The EU Floods Directive requires all Member States to develop flood hazard maps, **but...**





Why continental river flood hazard (FH) maps?

- The EU Floods Directive requires all Member States to develop flood hazard maps, **but...**
- National FH maps can be (very) different depending on the area
- Limited information (models? Data?) and limited accessibility
- Non-EU countries might not have national FH maps



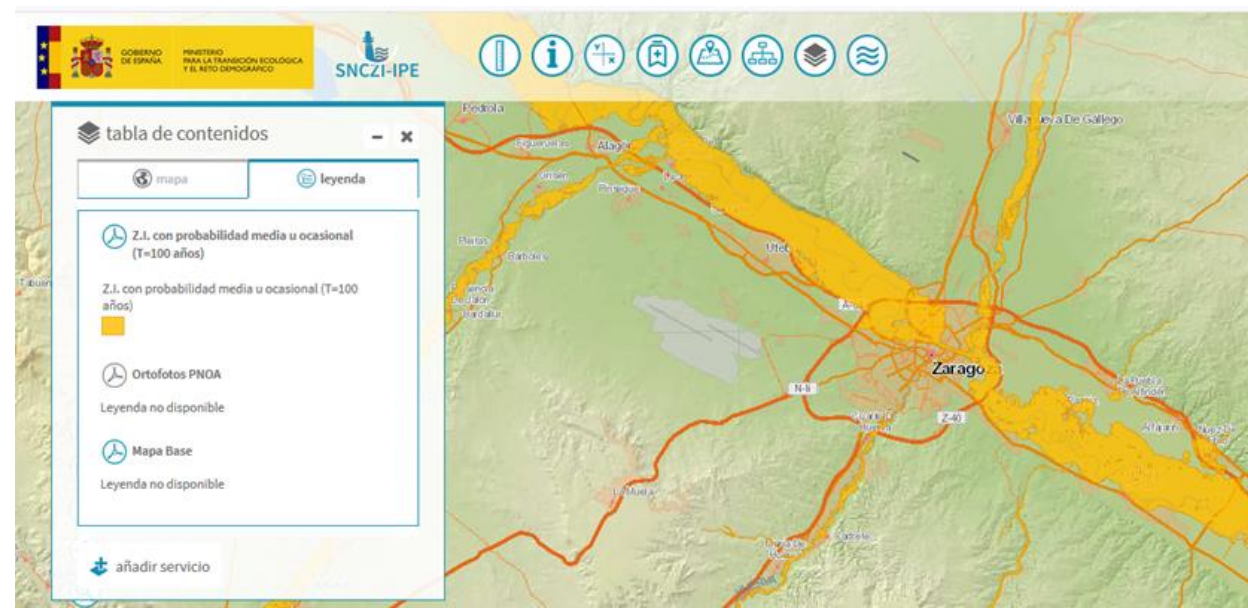


Emergency
Management

Why continental flood hazard (FH) maps?

EFAS needs continental scale maps for:

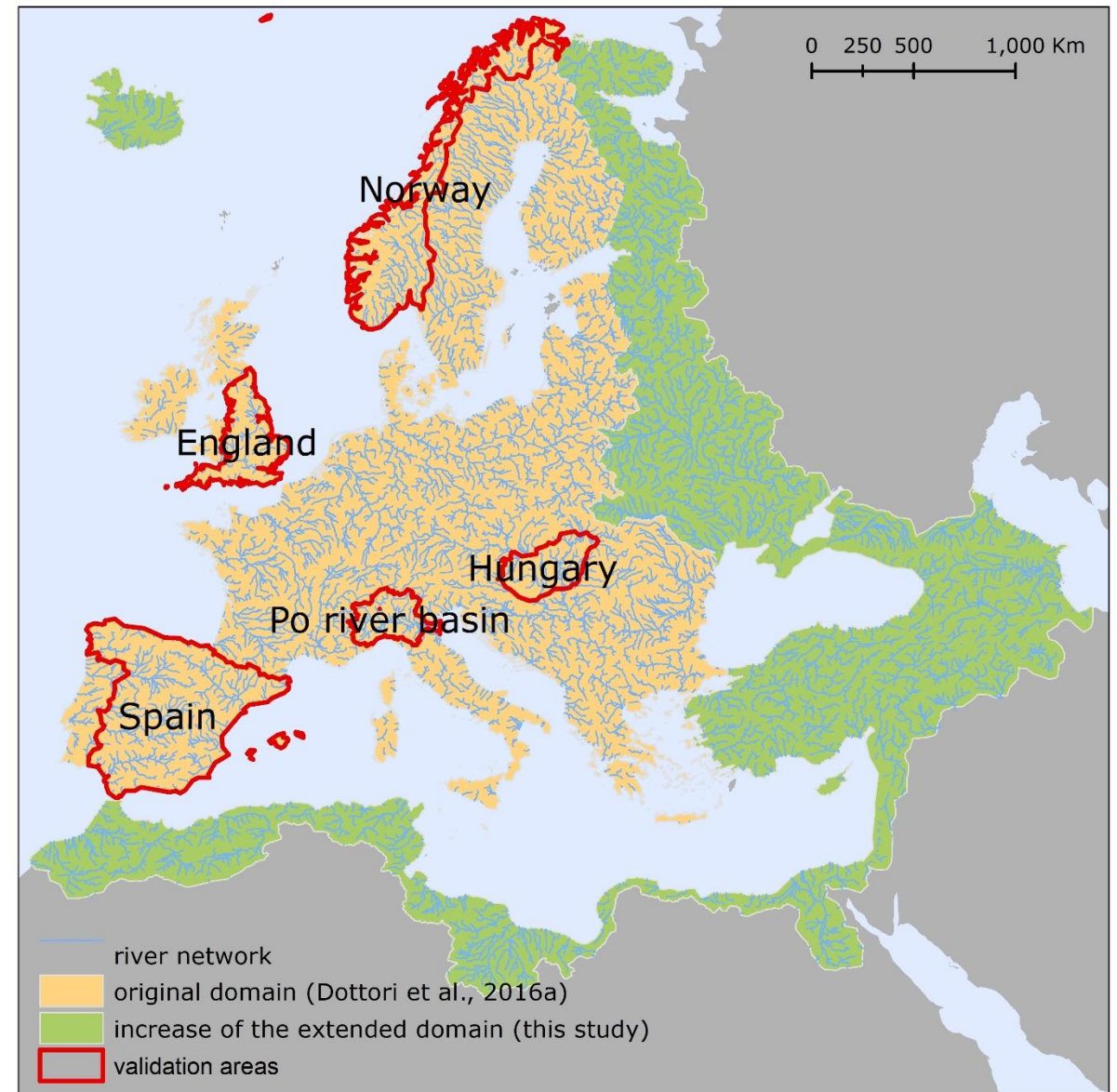
- impact-based river flood forecasts
- Continental-scale analysis of flood risk (e.g. impacts of climate change)





The EFAS river flood hazard maps

- Europe + Mediterranean (full EFAS extent)
- Based on EFAS climatology
- All rivers with drainage basin $>500\text{km}^2$
- Flood extent and water depth at 100m resolution
- Six flood scenarios (1-in-10 to 1-in-500 years)
- For more details:
<https://essd.copernicus.org/articles/14/1549/2022/>

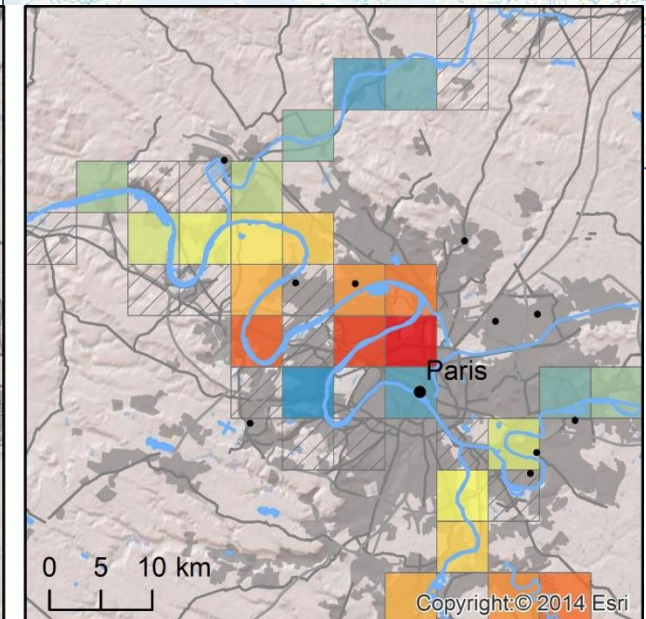
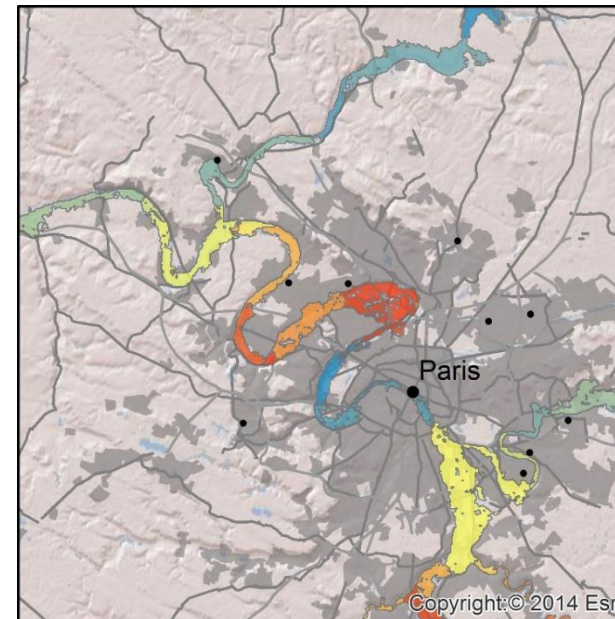
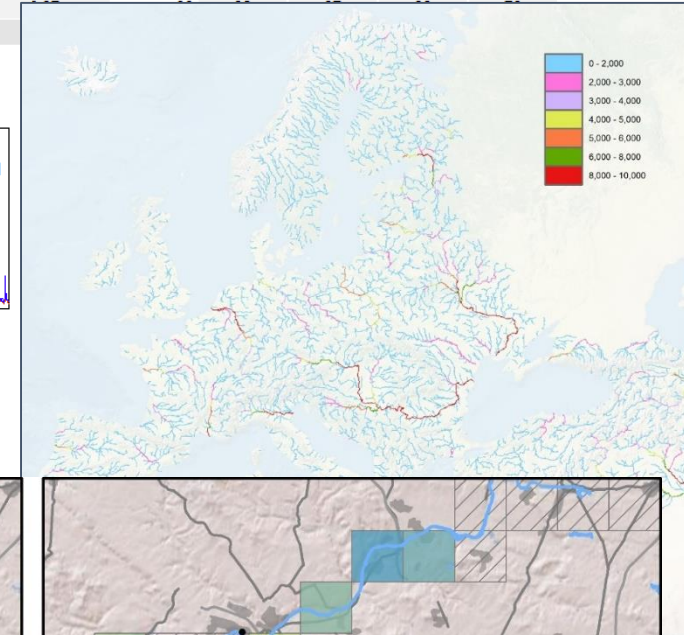
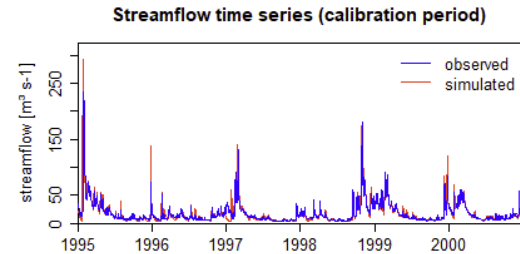




Procedure

- We use long-term (~30 years) river flow simulations done with the **LISFLOOD** model
- We identify the **magnitude of extreme flood scenarios** along the river network (extreme value analysis)
- We simulate flooding processes with 2D hydraulic models to produce a **catalogue of local flood maps**

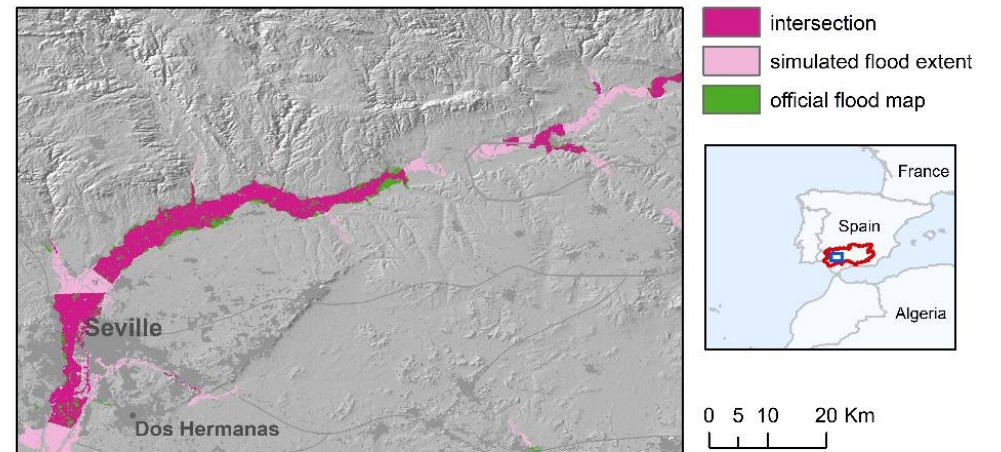
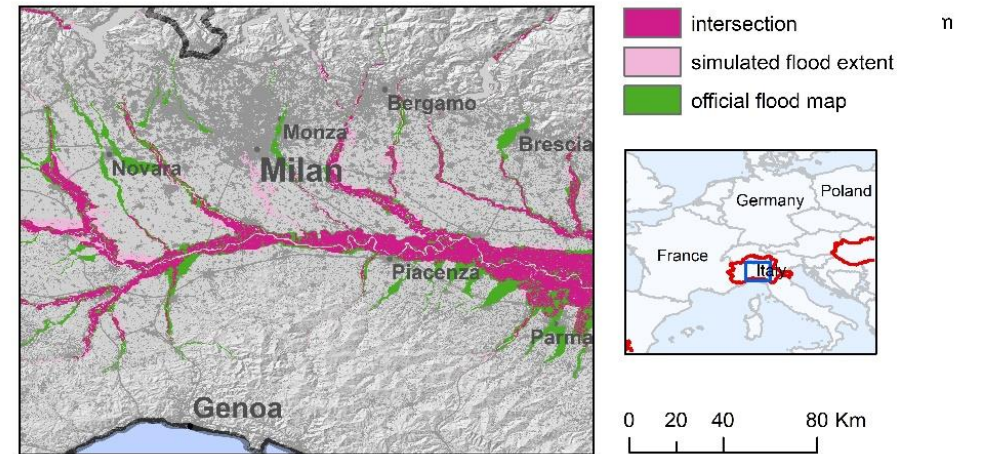
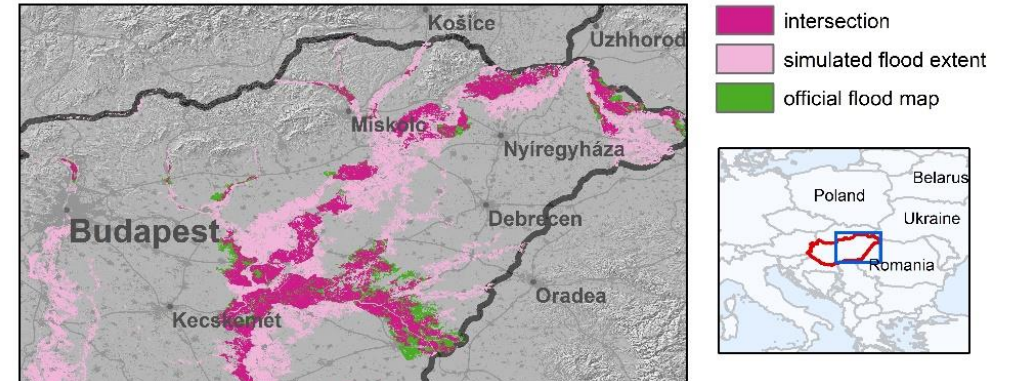
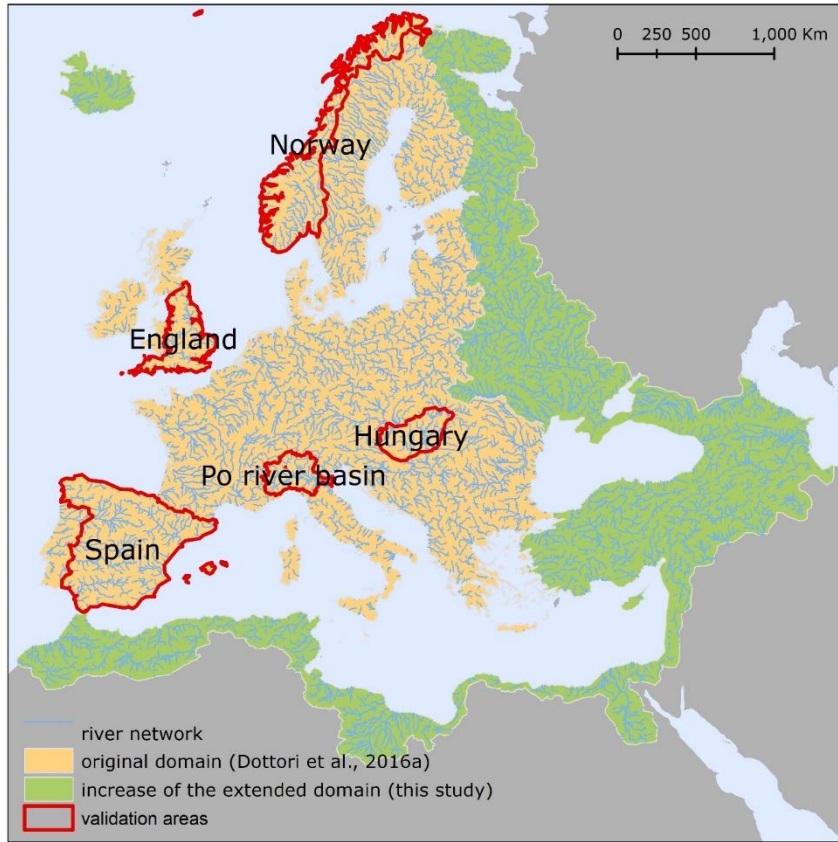
station information		skill scores		discharge statistics [m ³ /s]					
ID	C709	calibration	validation	Qobs cal.	Qsim cal.	Qobs val.	Qsim val.		
station	Wolfsmueenster	start	1/1/1995	1/1/1990	min	3	3	3	
river	Frankische Saale	end	12/31/2000	12/31/1994	q25	7	7	6	4
basin	Rhine	KGE	0.86	0.85	mean	18	18	16	14
lat	50.09	NSE	0.73	0.75	q95	51	53	50	49
lon	9.74	r	0.86						
ups	2425	PBIAS %	3						





Validation of modelled maps

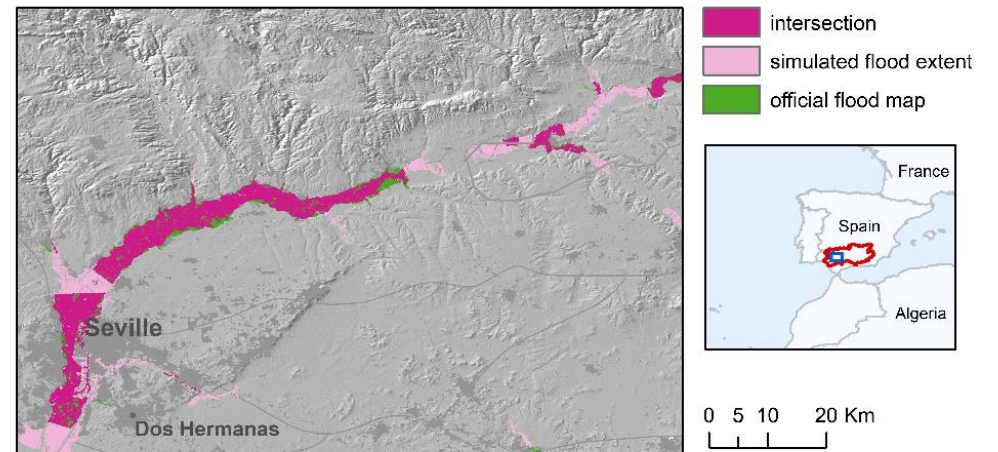
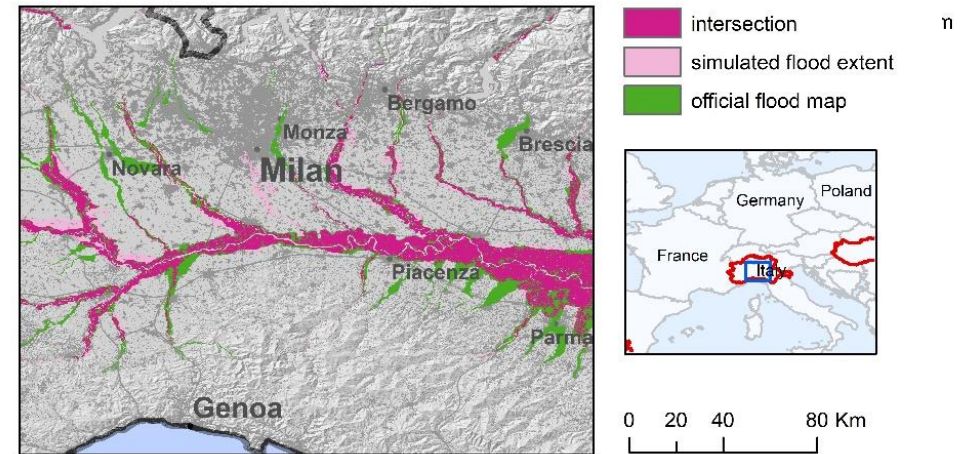
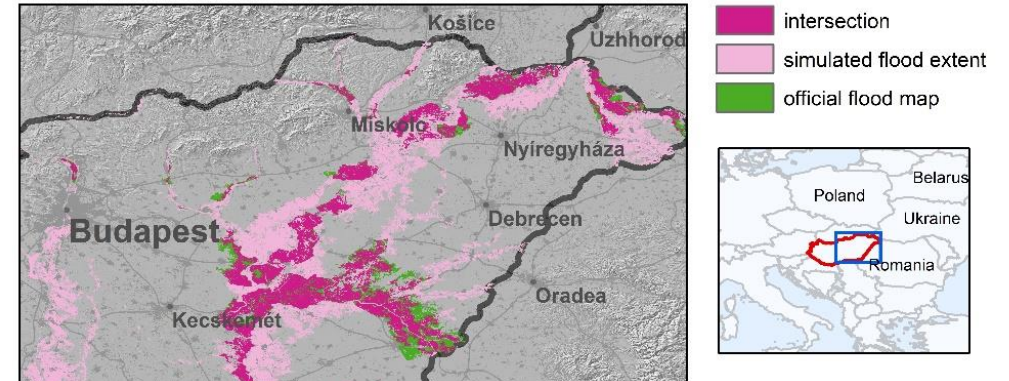
➤ Comparison against official hazard maps (those publicly available as geodatasets....)





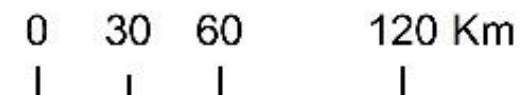
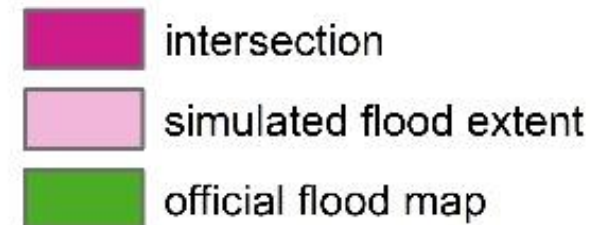
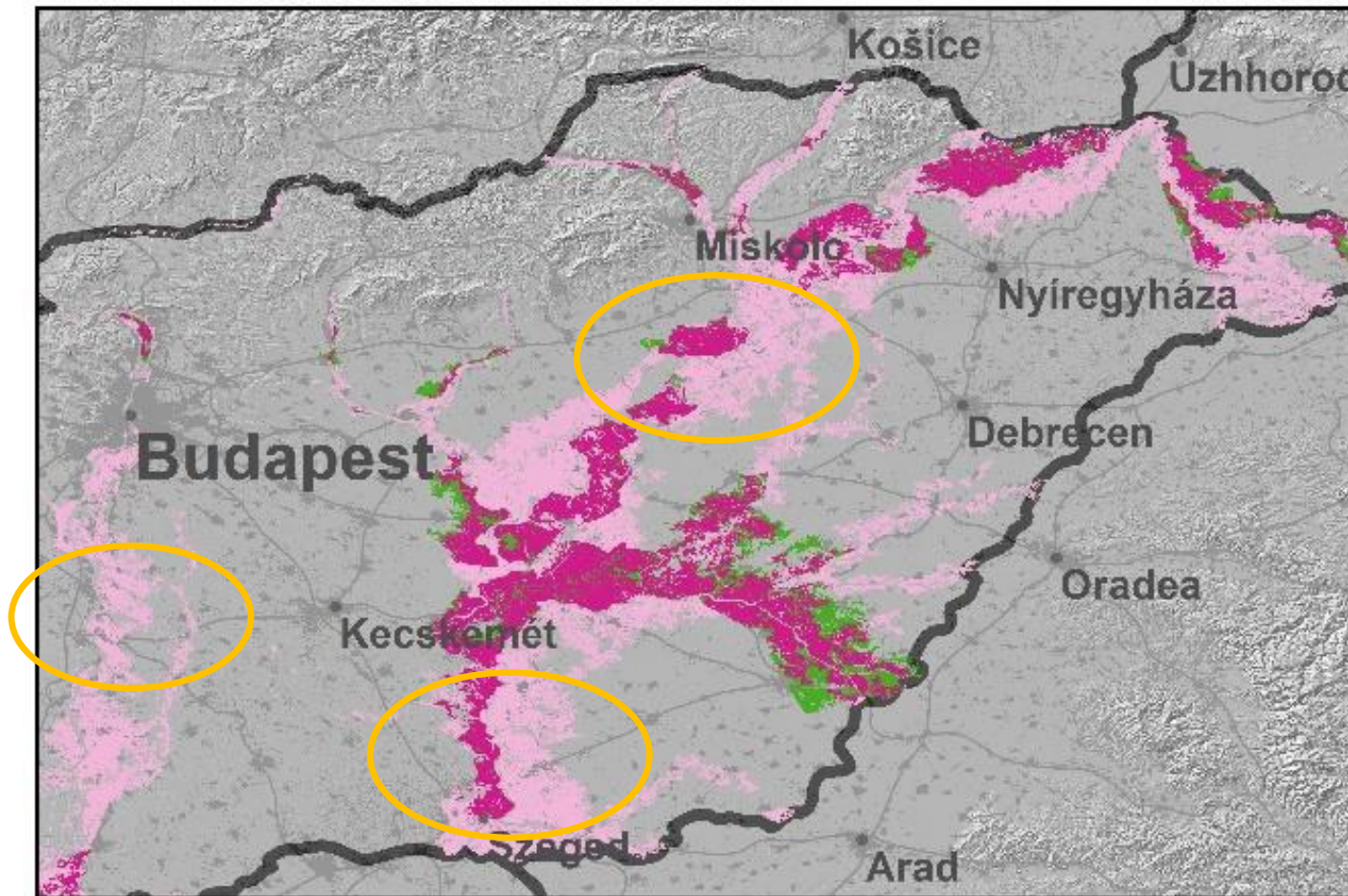
Validation of modelled maps

- On average, 2/3 of reference flood-prone areas are correctly identified ...
- ... yet modelled maps generally overestimate flood-prone areas
- Low skill especially for flood scenarios with high/medium probability





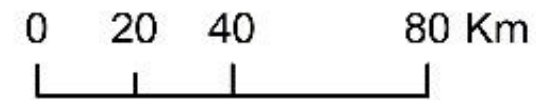
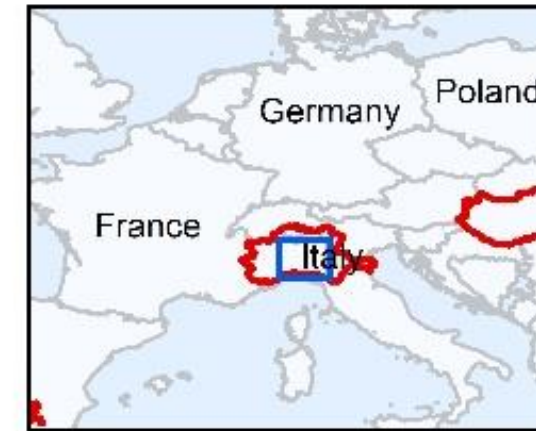
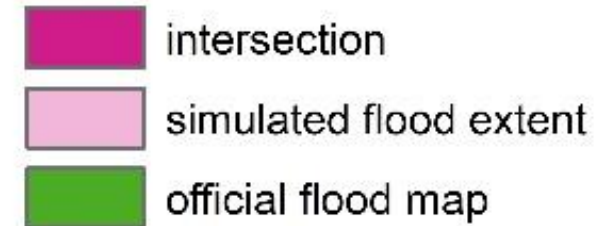
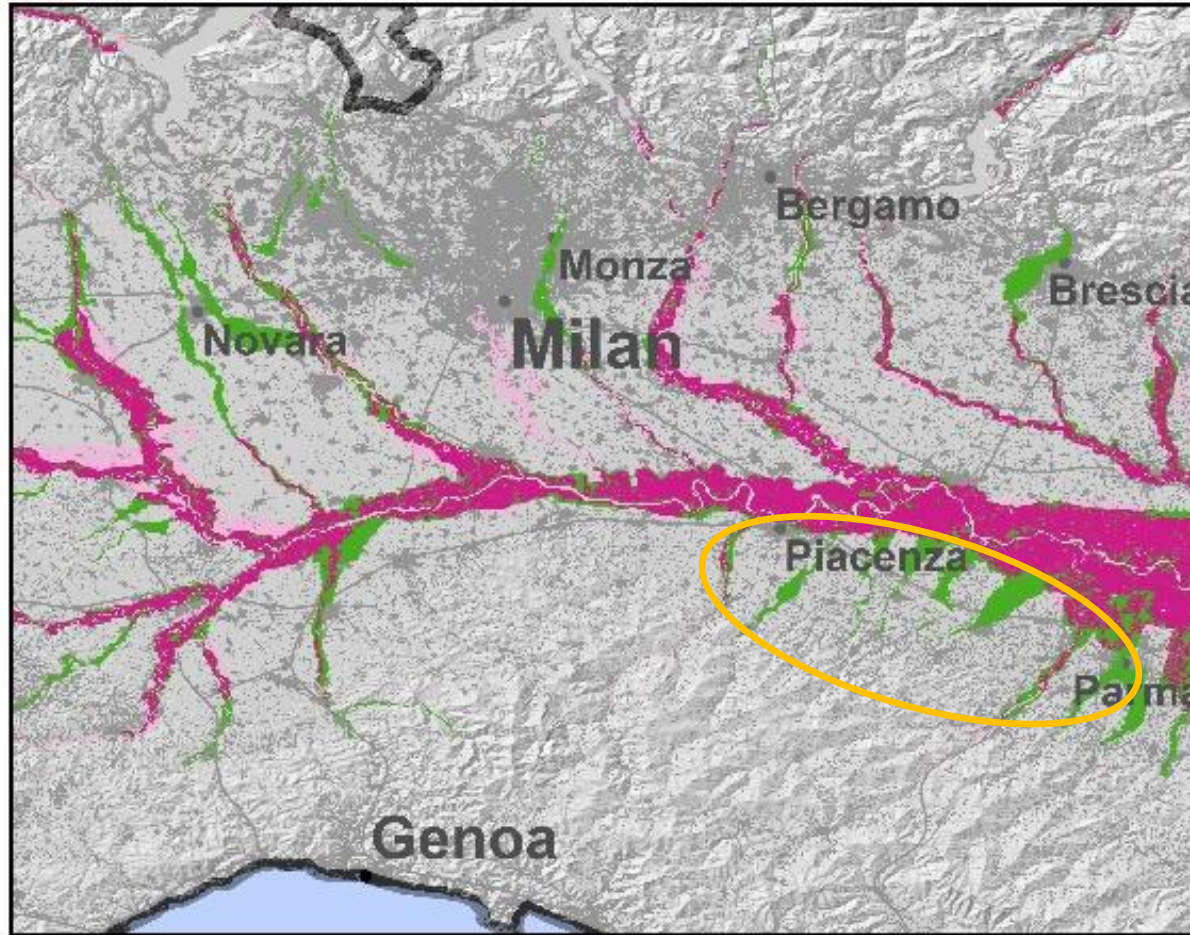
Validation of modelled maps – Hungary (100y)



- Overestimations caused by data limitations (flood defences, topography, river channels)



Validation of modelled maps – Po River (500y)

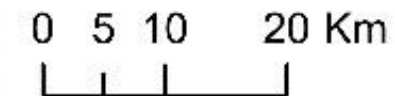
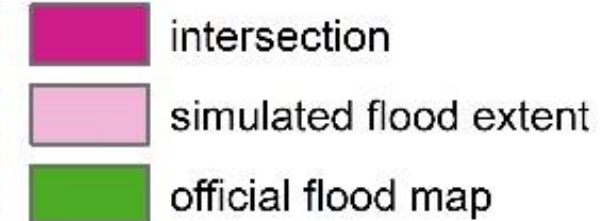
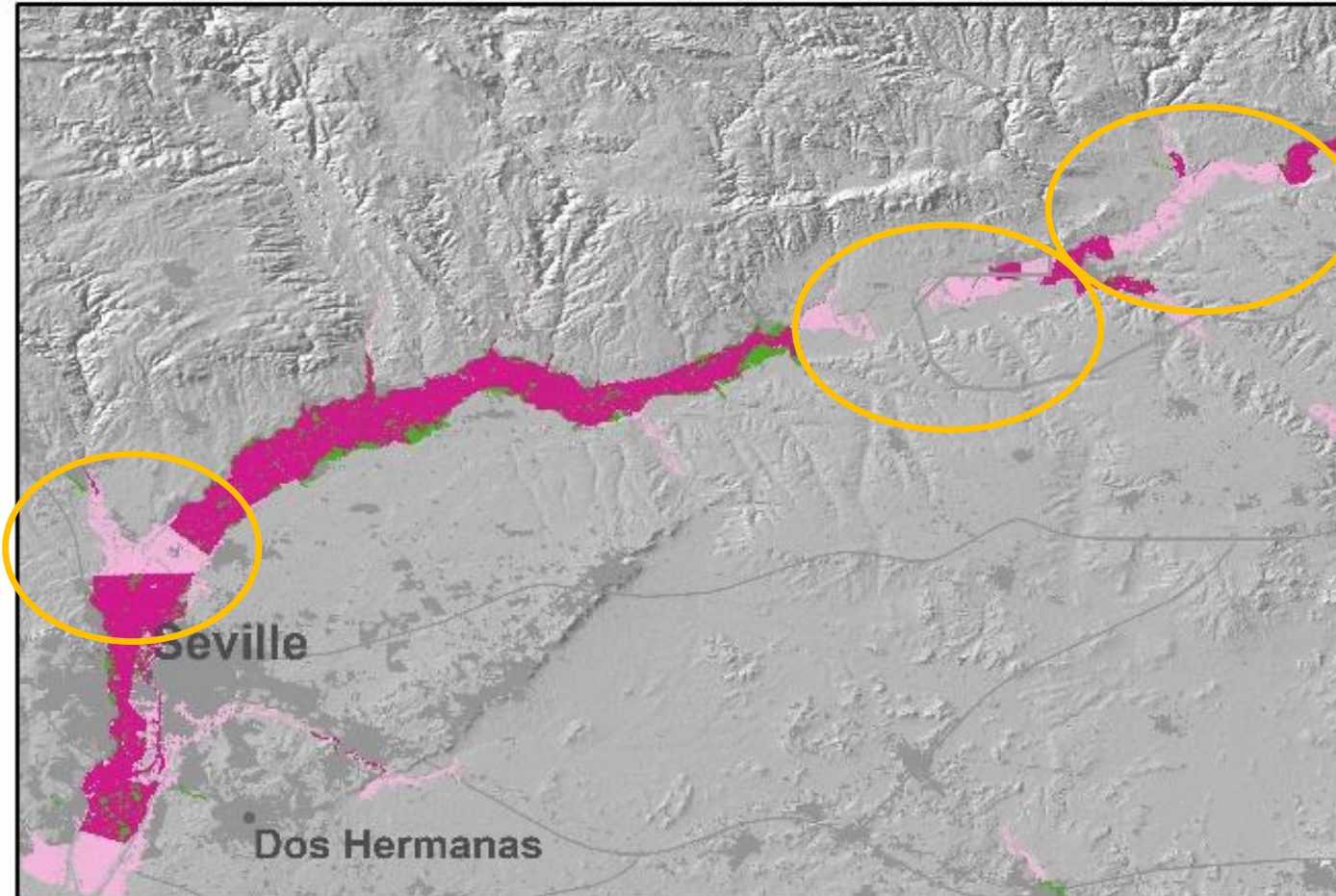


- Performance improving for lower-probability floods (> 1-in-100-year)



Emerger
Manager

Validation of modelled maps – Spain (100y)

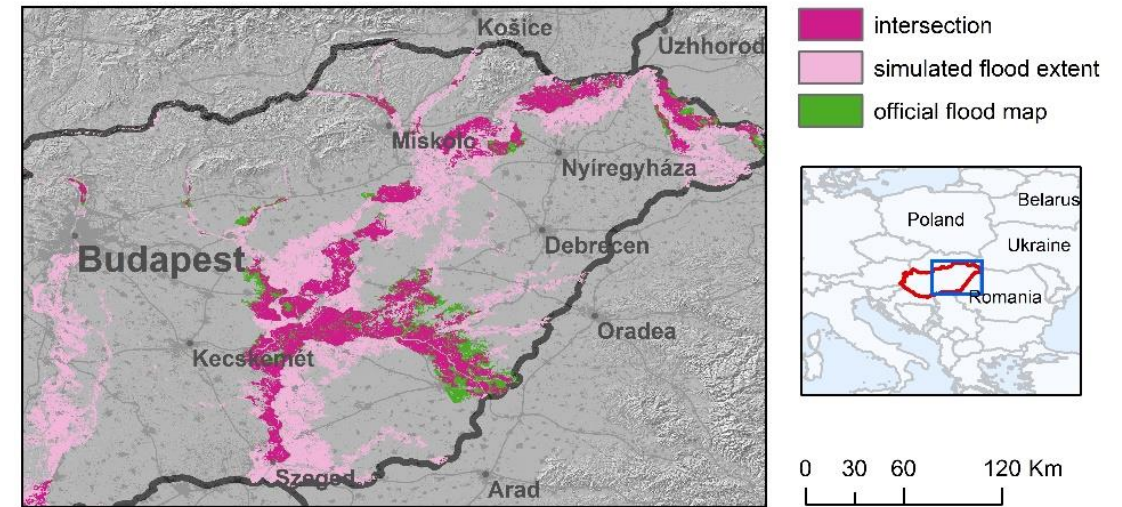


- In some cases, continental maps can complement national and local maps



Conclusions about validation

- EFAS flood hazard maps have important limitations:
 - variable quality compared to national maps
 - not (yet) available for minor river network
 - foreseen improvements (improved DEM, hydro data etc.) can't fix all problems

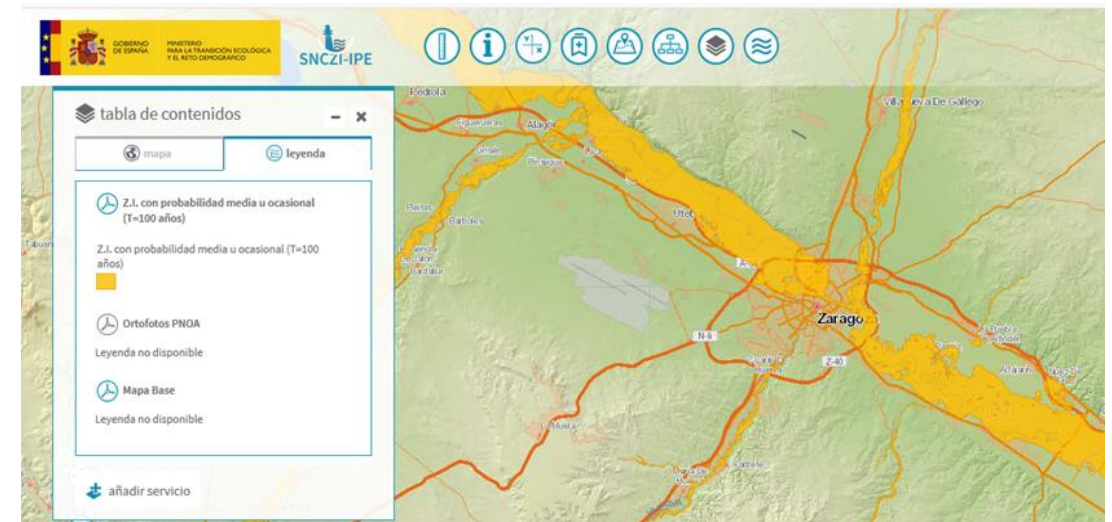
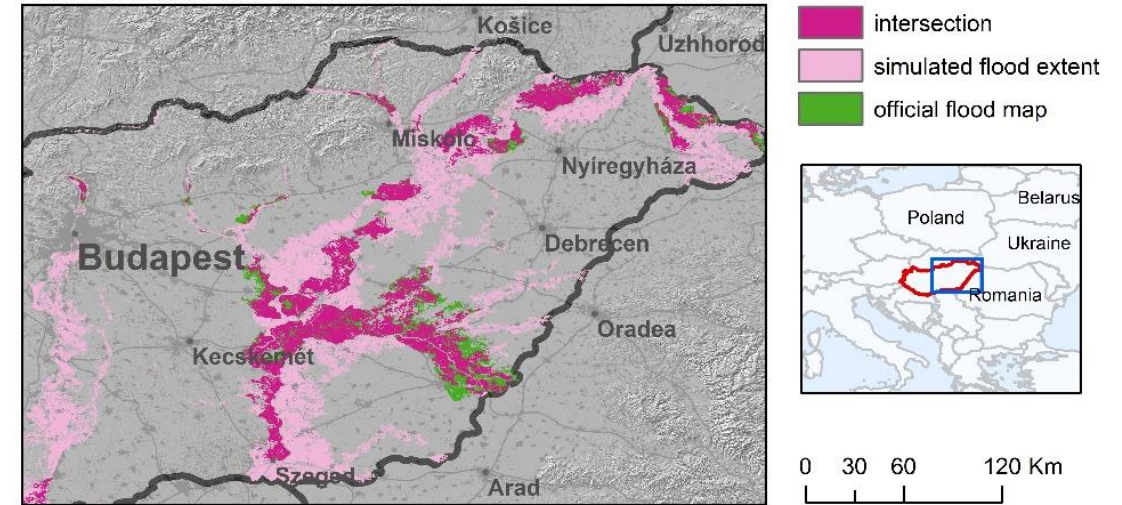




Conclusions about validation

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**Can we replace/complement
JRC flood maps with national
flood hazard (and risk)
maps?**



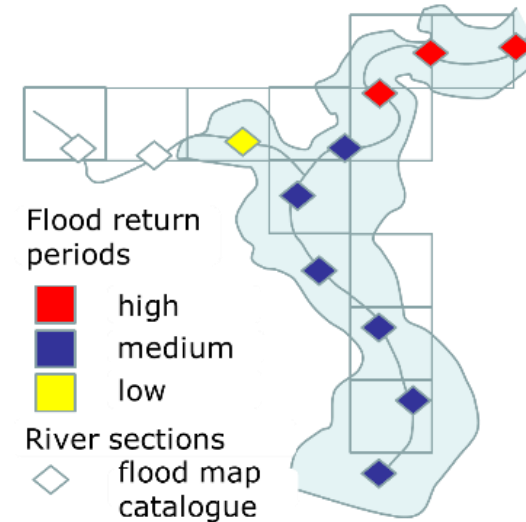
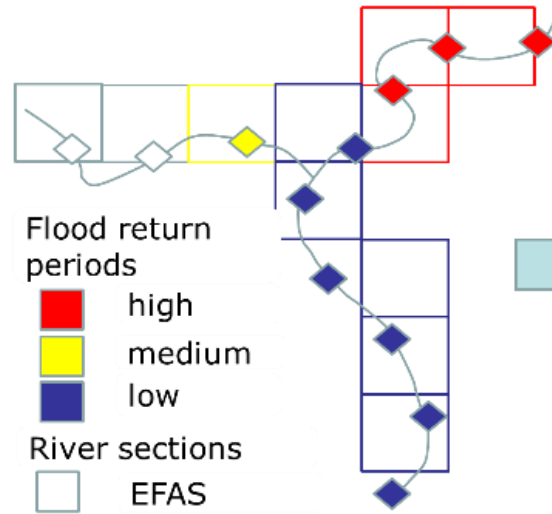


Emergency Management

Impact forecasts and National flood maps

Flow forecast

Identify river reaches potentially affected and local flood magnitude for any event forecasted by EFAS



Rapid flood mapping

Calculate flood-prone areas (using catalogues of flood maps and protection levels) and derive forecast-based inundation maps



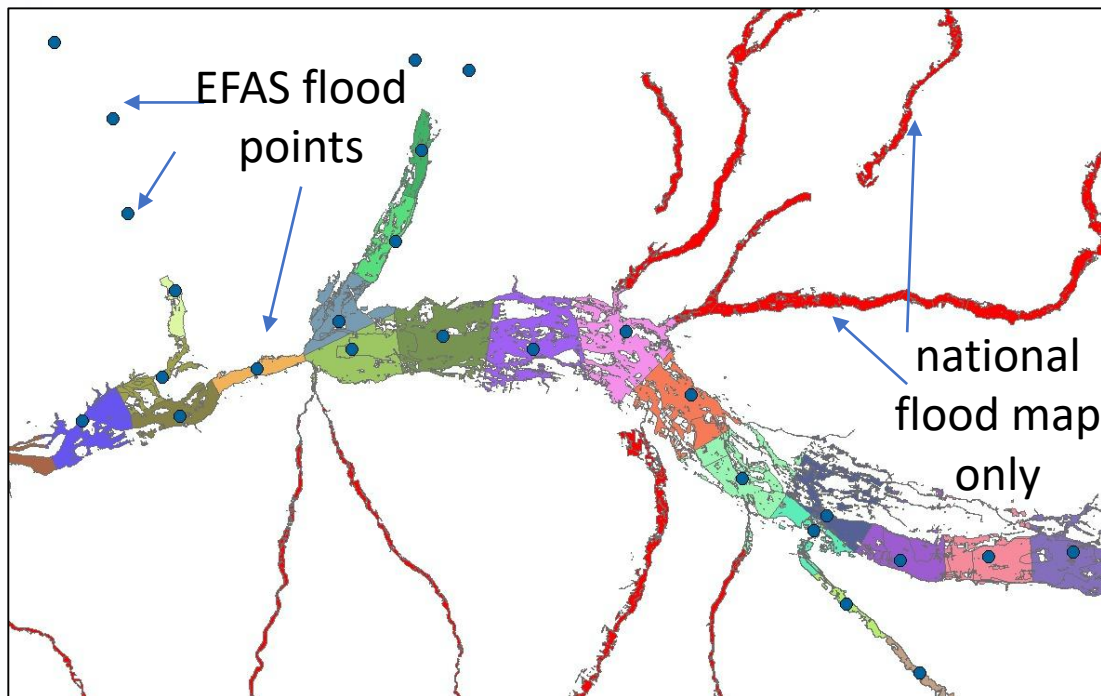
Idea: use national flood hazard maps to derive flood-prone areas



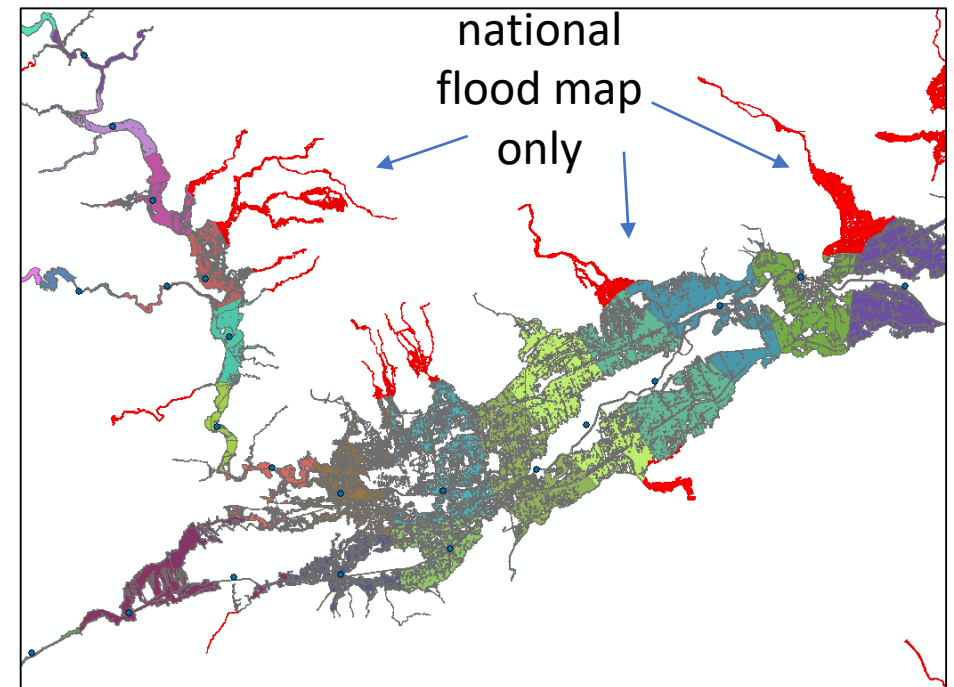
Preliminary tests in Spain

- We used 1-in-100-year official flood extent maps (publicly available)
- Split national maps into local maps linked with EFAS grid points (buffer around each point)
- Flood depth maps also available for further testing

Guadiana River, Spain



Segura River, Spain





Impact forecasts and National flood maps

Pros

- National flood maps have higher resolution and accuracy
- More consistency with national risk assessments under the Floods Directive

Cons

- Limited access to geodata of national maps (only pdfs, only flood extent...)
- Maps available in most countries only for 3 return periods/probabilities
- Limited access to documentation (input data, modelling...)
- Large variability between countries – need to align EFAS and national network



Impact forecasts and National flood maps

Pros

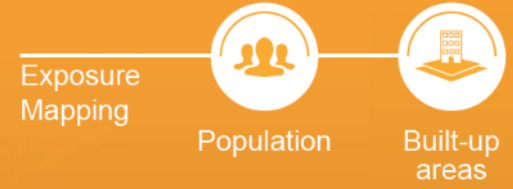
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Using national flood maps is possible... but we need help from local partners!!!



Further information
emergency.copernicus.eu
www.efas.eu

Queries
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