



Coastal & Riverine Flood Hazard in Finland in the European Context

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River floods

Finland's area: 338,000 km²
6% of study area

Rivers: 29665 km with
catchments > 100 km²
6% of study area



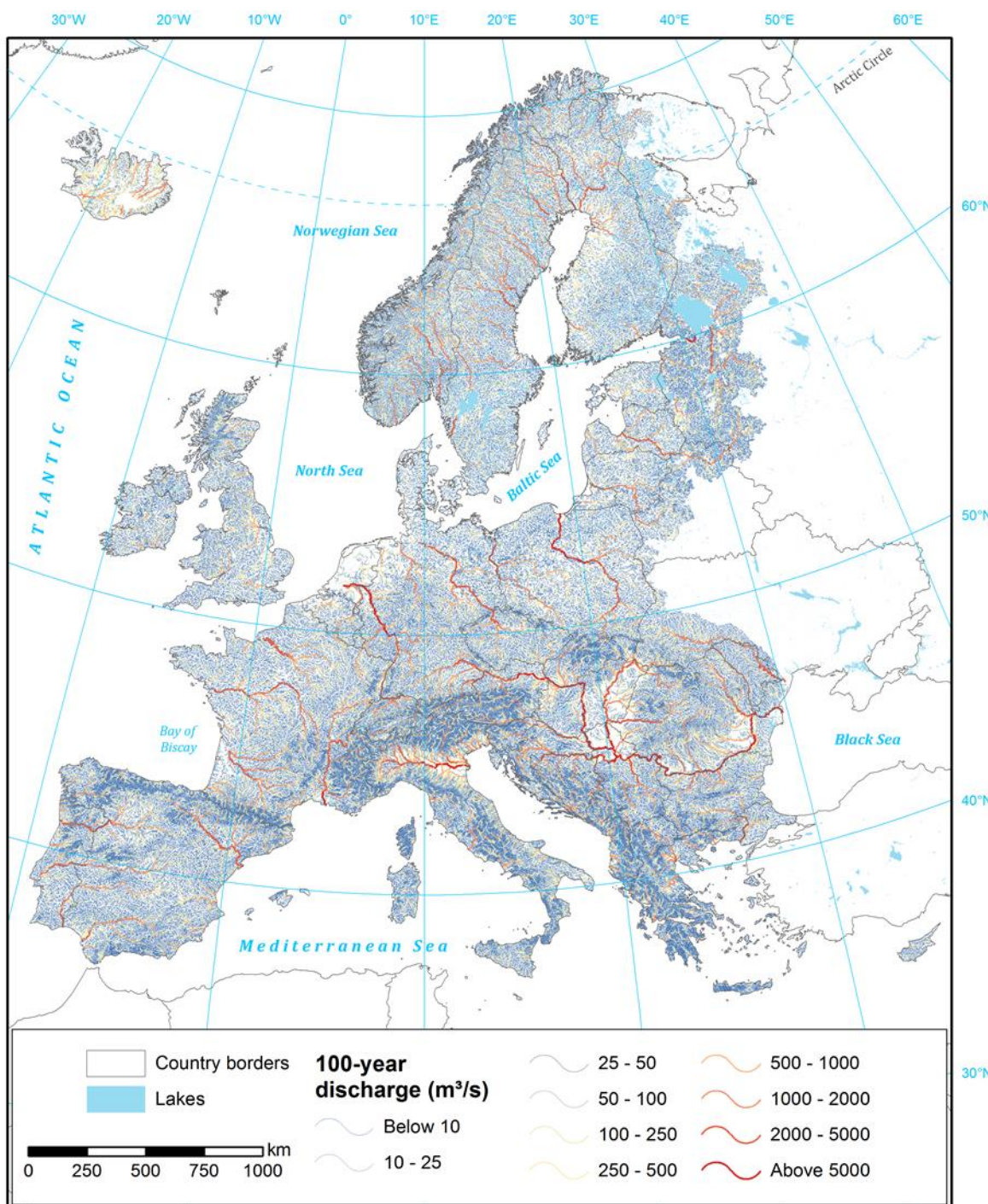
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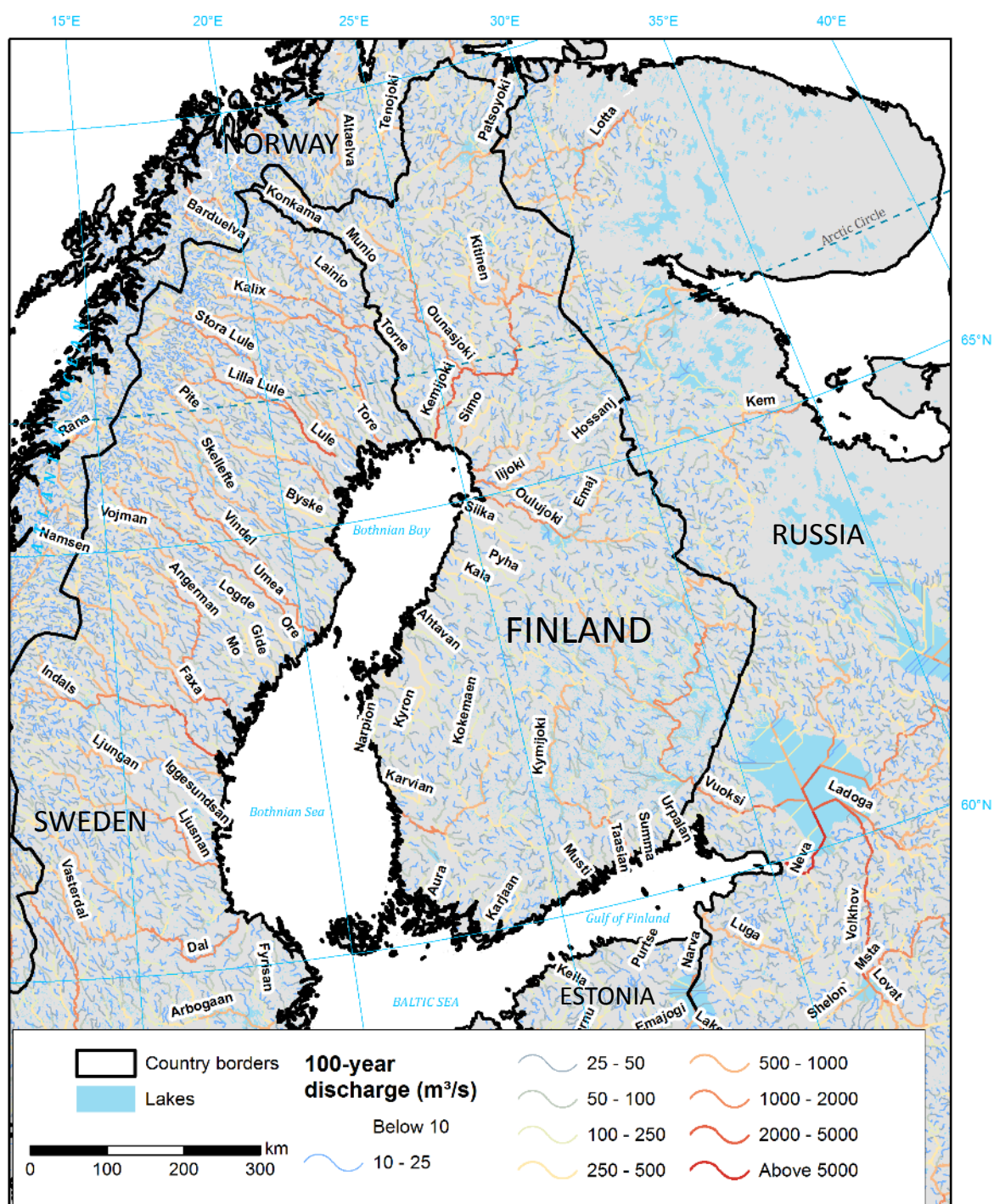
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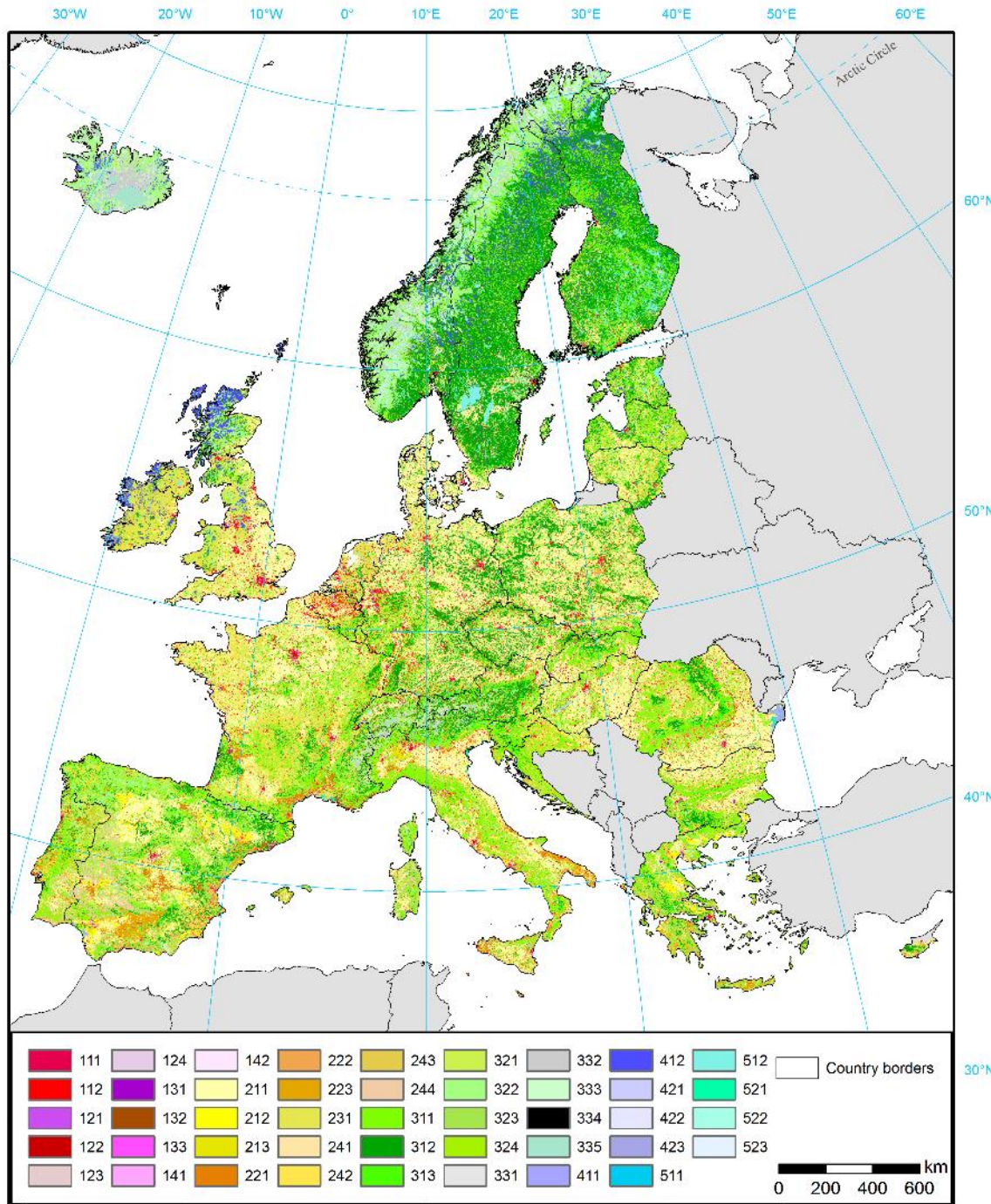


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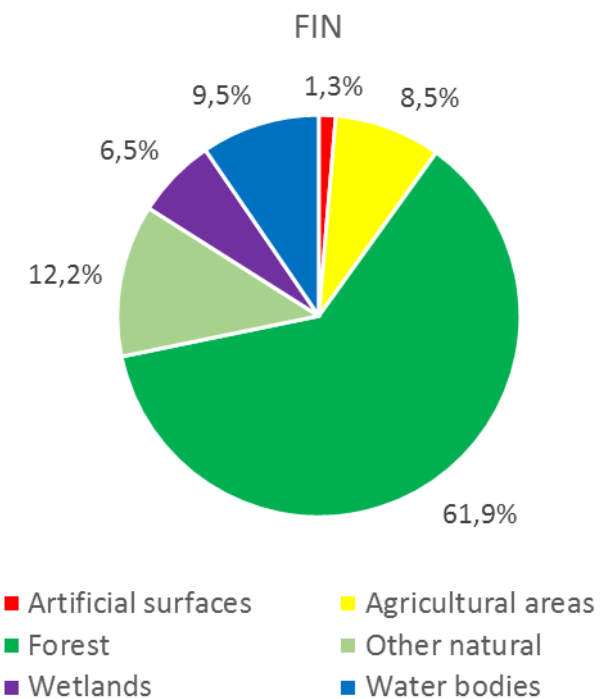
River floods

- EM-DAT disaster database recorded 567 floods in Europe since 1970...
- ... and only 1 in Finland
- Dartmouth Flood Observatory also recorded 1 event in Finland since 1985.
- Lapland flood in Ivato and Kittila cities, on 25-31 May 2005.
- Flood was caused by snowmelt and rainfall.
- No casualties, but 400 people had to be evacuated and caused €4.7 million damages
- Spring floods are typical events, but generally cause limited damages
- 2004 - €900,000, 2007 – €20 million, 2012 - €10 million, 2013 - €5 million
- Historically, the worst flood occurred in 1899 (€50 million damages in today's money), considered a 1-in-250 year flood.
- PFRA: approx. 48,000 people at risk of a 1-in-1000 year flood (0.9% of national population), including 20,000 in Pori and 10,000 in Rovaniemi





CORINE Land Cover 2012

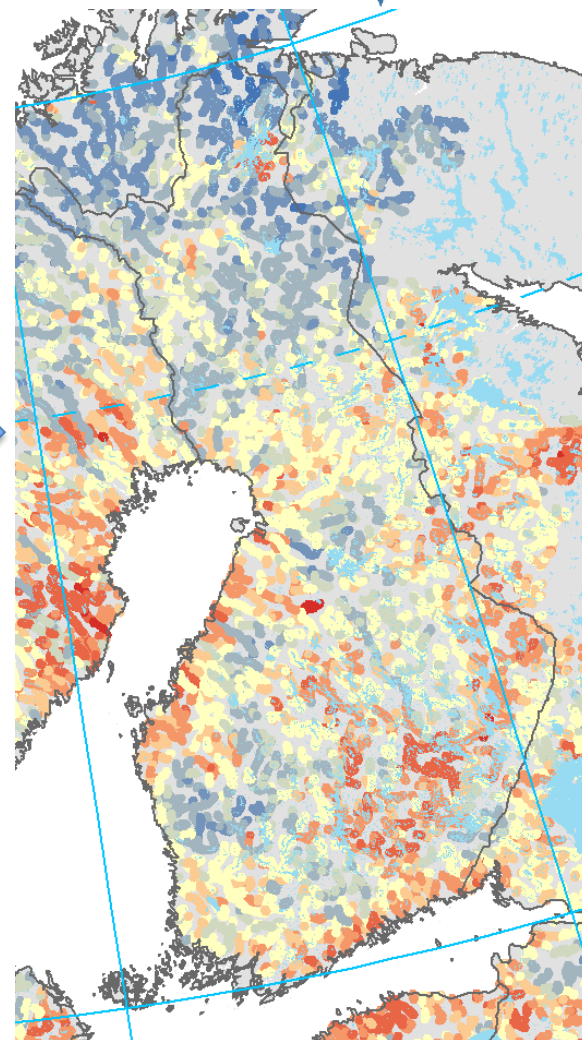
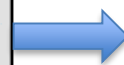
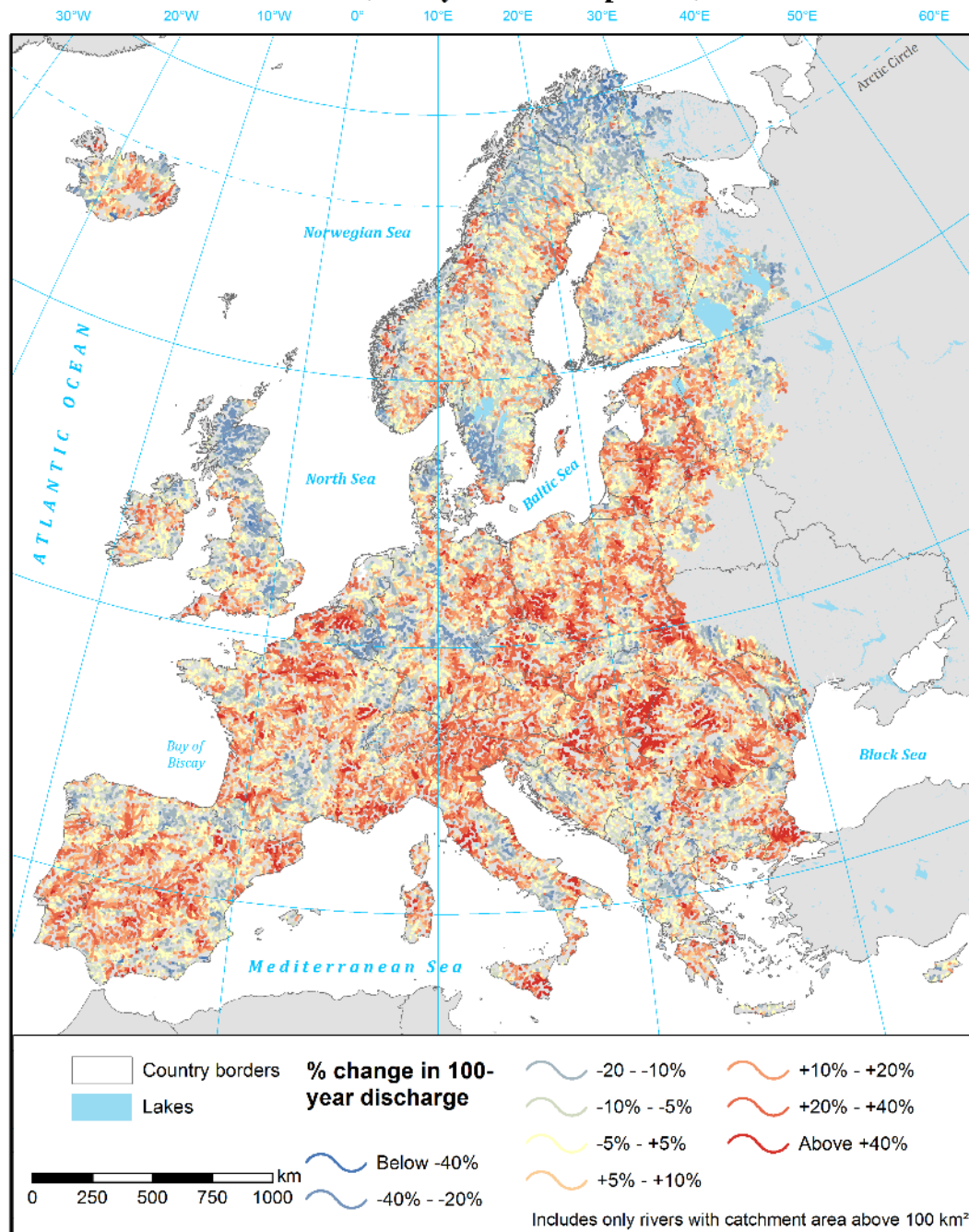


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ESTIMATED CHANGE IN EXTREME DAILY RIVER DISCHARGE 2071-2100 to 1971-2000, 100-year return period, RCP 4.5 scenario

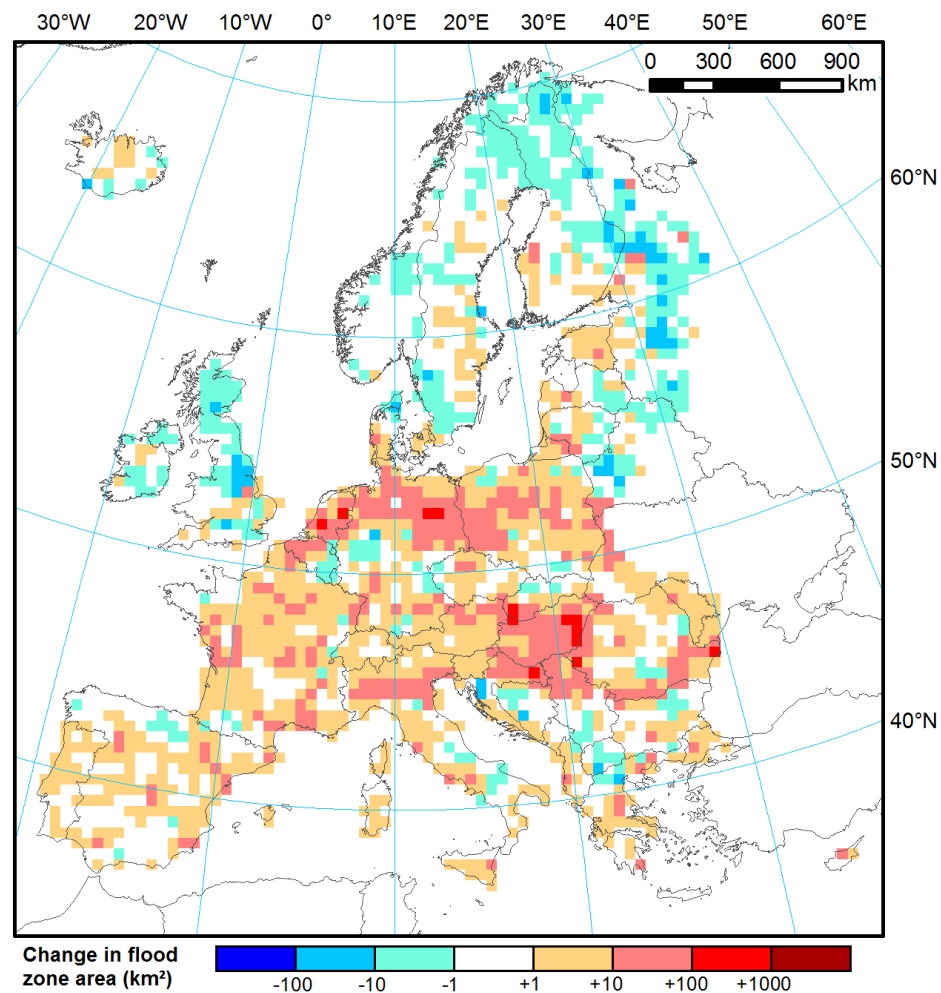
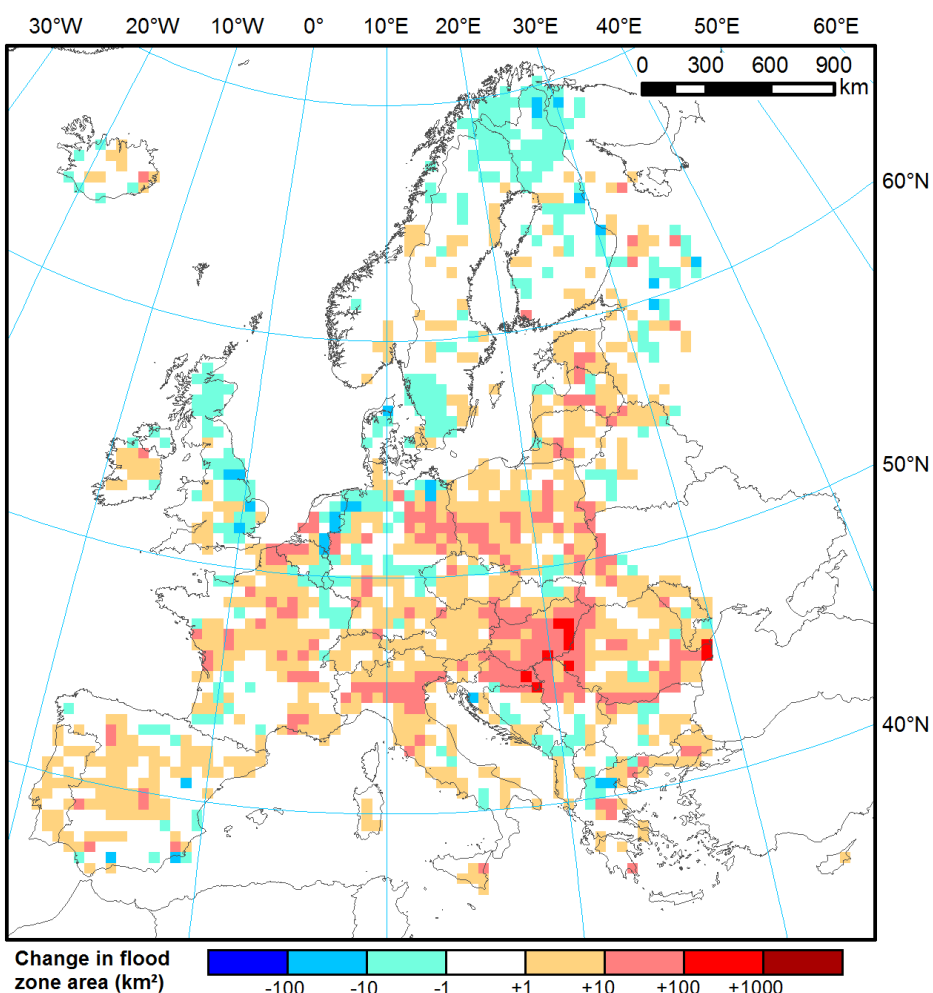


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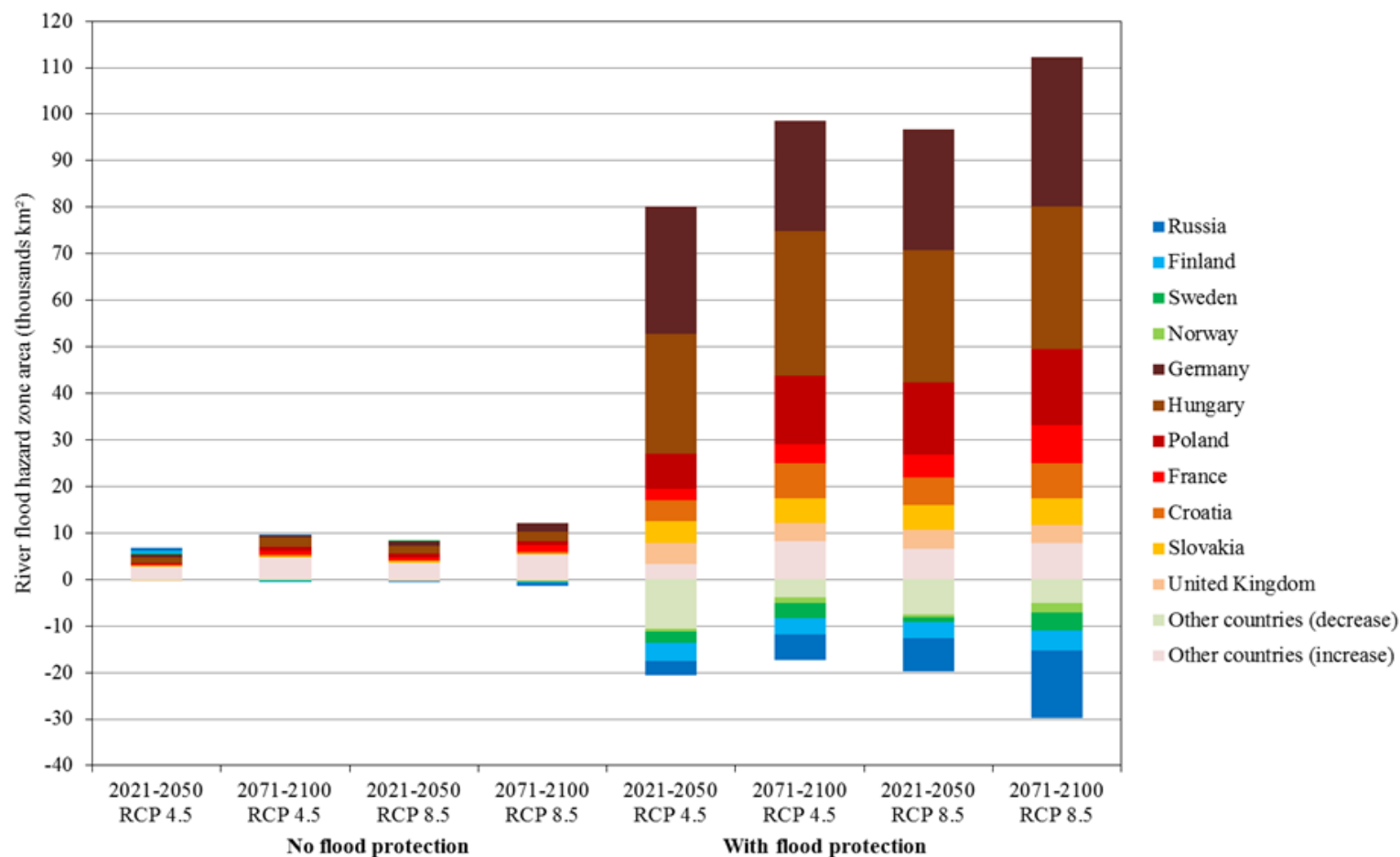


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Change in 100-year flood zone area, 2071-2100 to 1971-2000, RCP 4.5 and 8.5



Contributions of selected countries to overall changes in 100-year flood zone area in Europe by scenario.

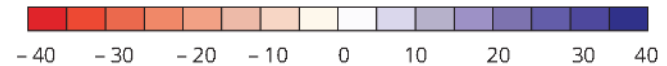


2080 vs. 1990



Projected change in the magnitude of river floods with a return period of 100 years

Percentage



© European Union 2016 Source: Joint Research Centre

Projections by the European
Commission's Joint Research
Centre



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Coastal floods

Coastline: approx. 14,000 km
6% of study area



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Coastal floods

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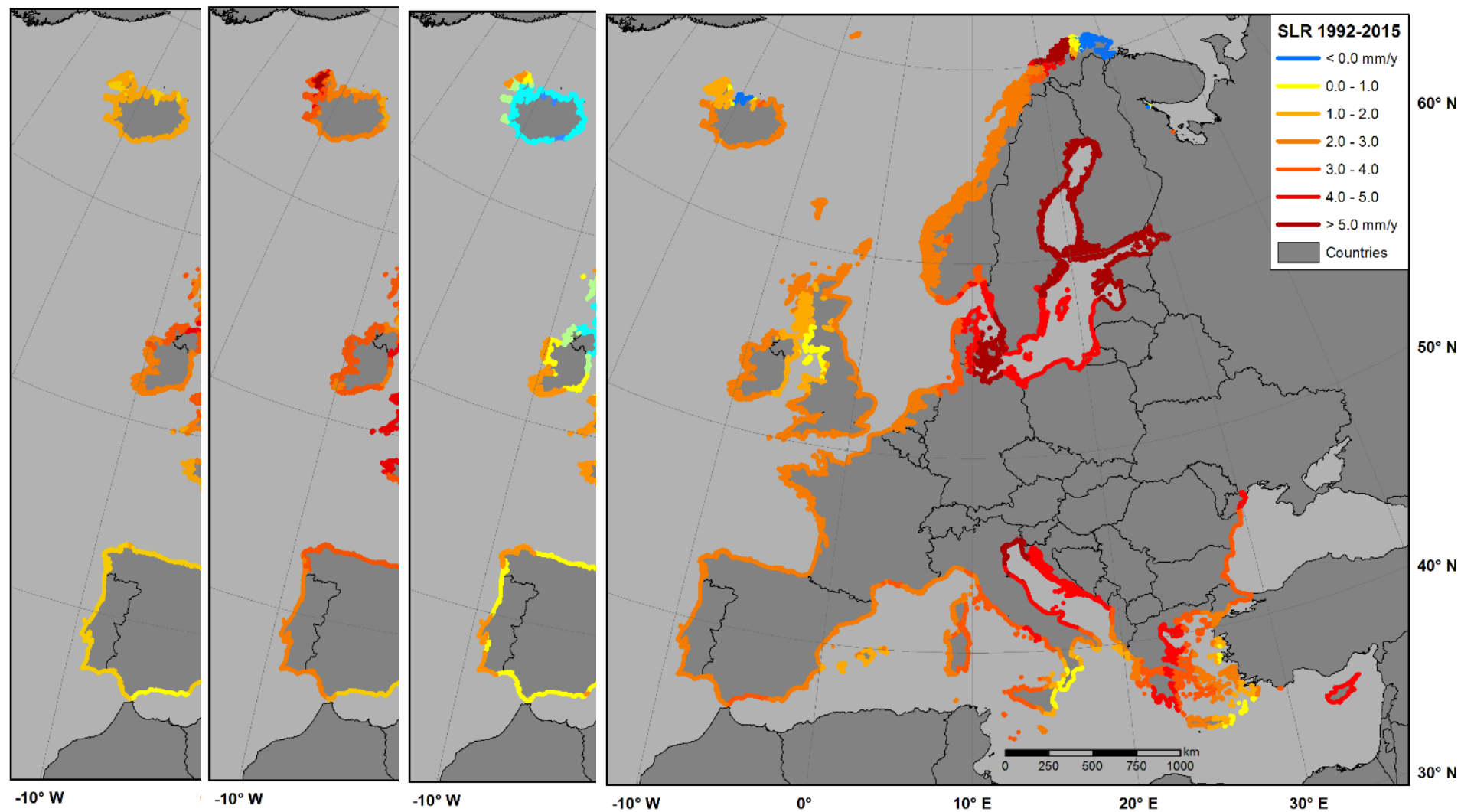


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Coastal trends



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Coastal floods

- EM-DAT disaster database has no recorded coastal floods in Finland.
- January 2005 storm surge in Gulf of Finland... I leave to Julie to describe 😊
- PFRA: approx. 28,000 people at risk of a 1-in-1000 year flood (0.5% of national population), including 25,000 in the Helsinki agglomeration.

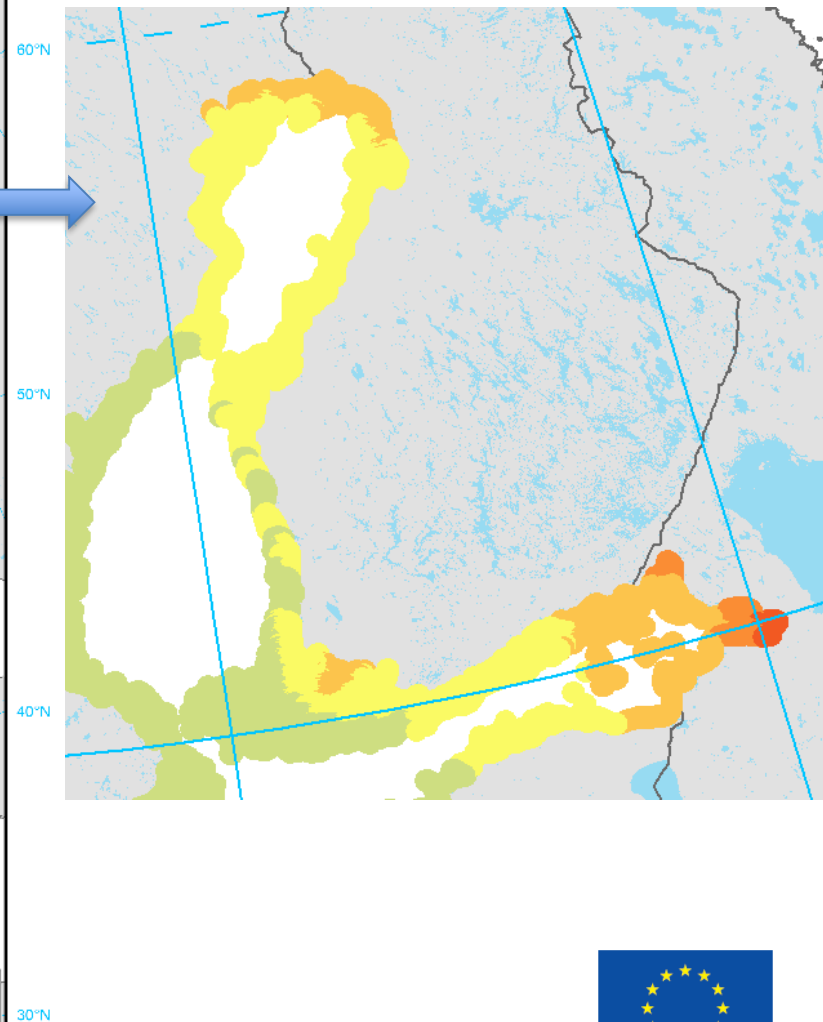
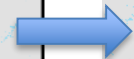
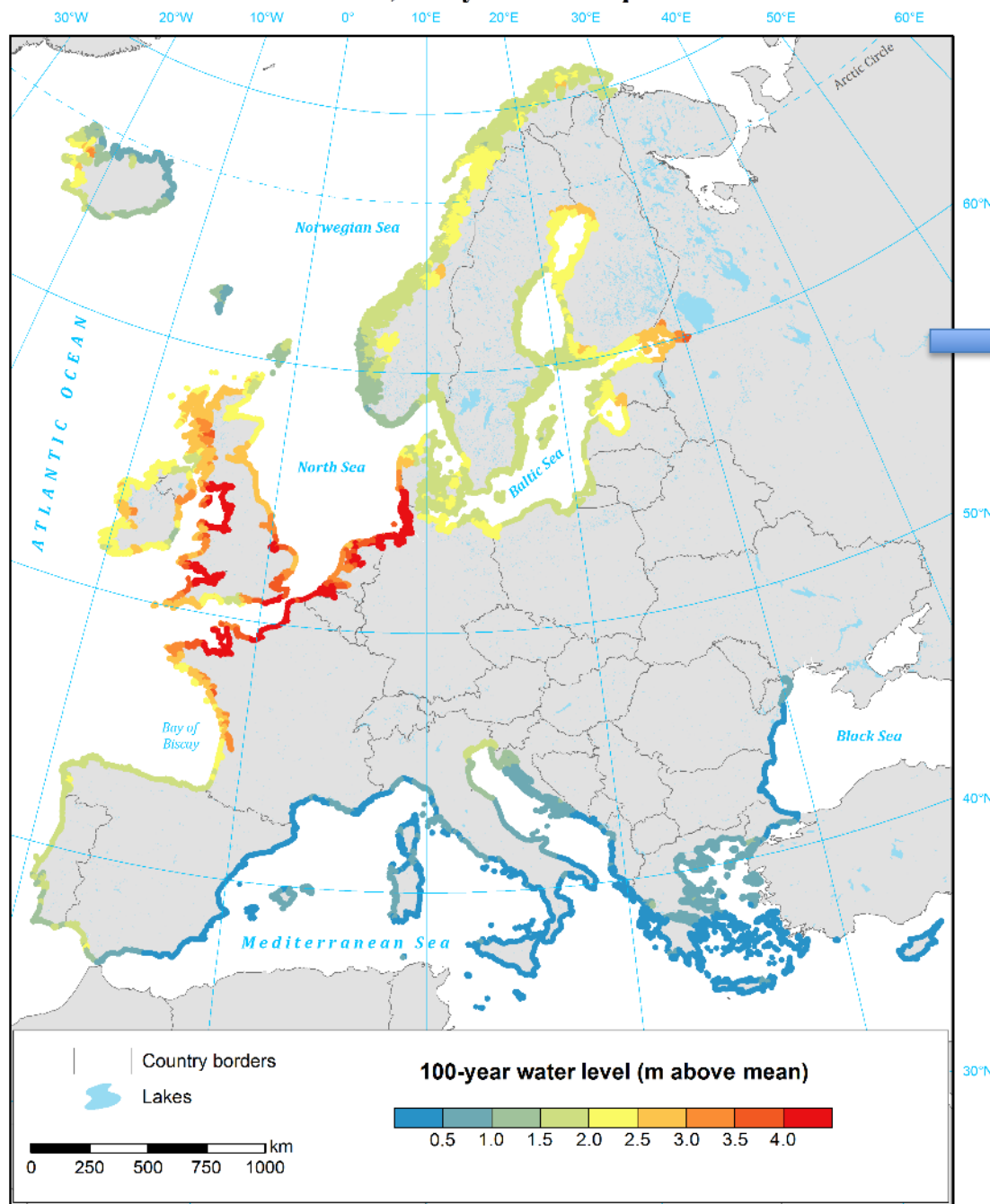


EXTREME WATER LEVELS ALONG EUROPEAN COASTS

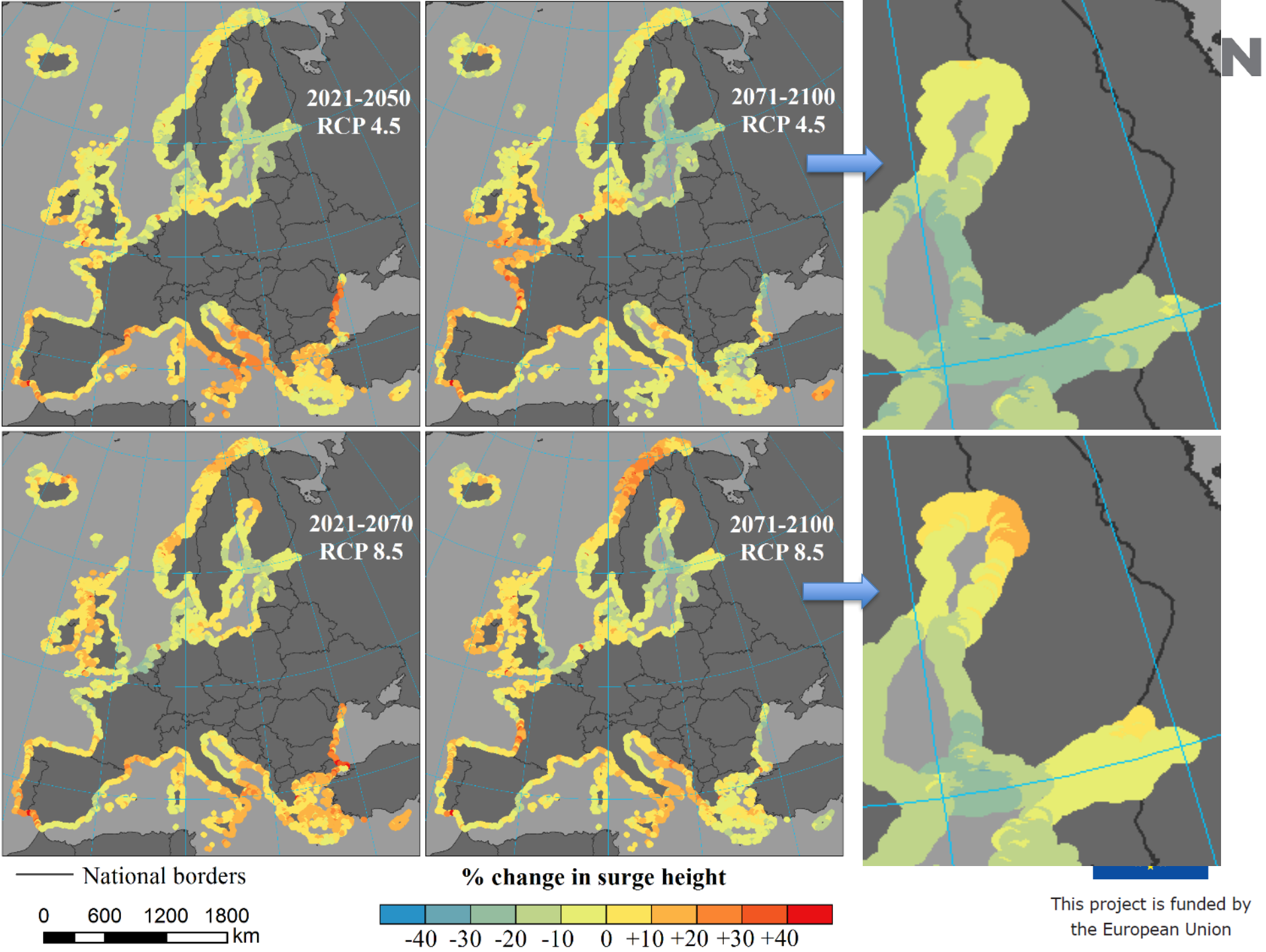
1971-2000, 100-year return period

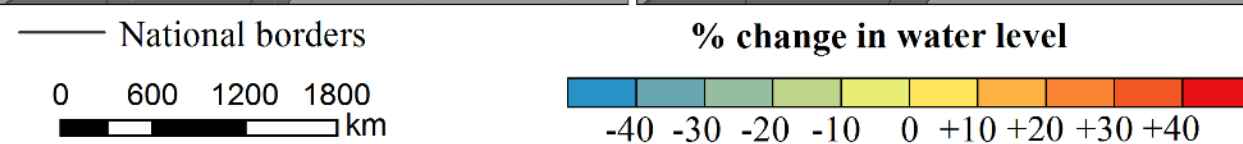
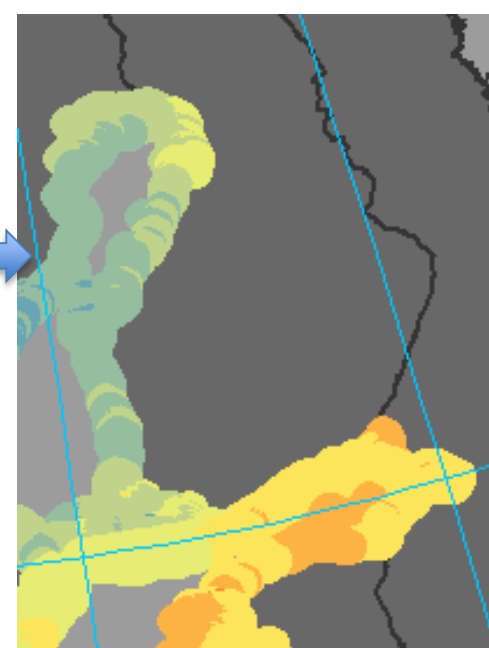
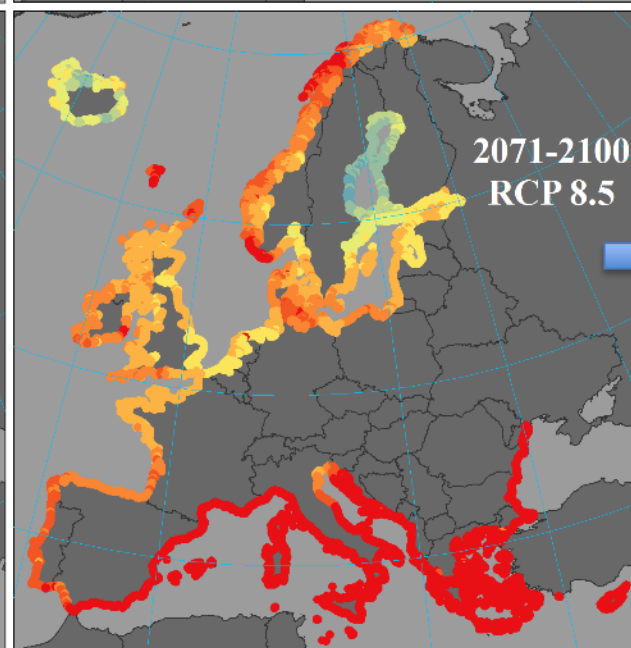
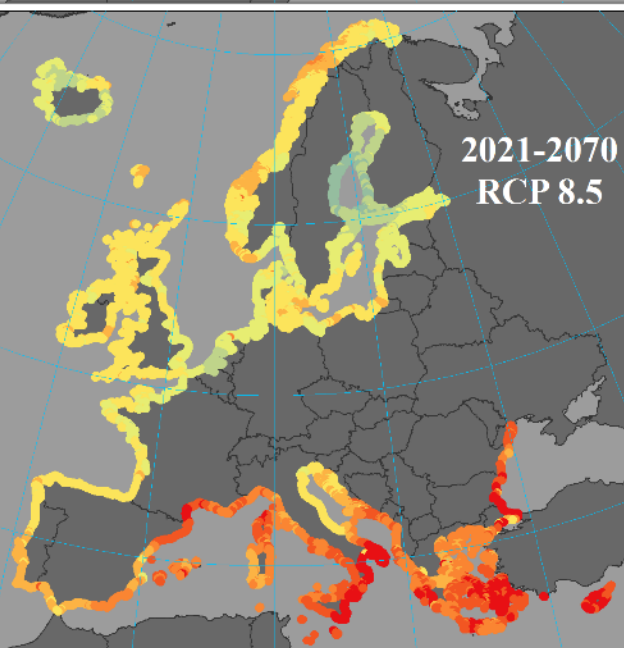
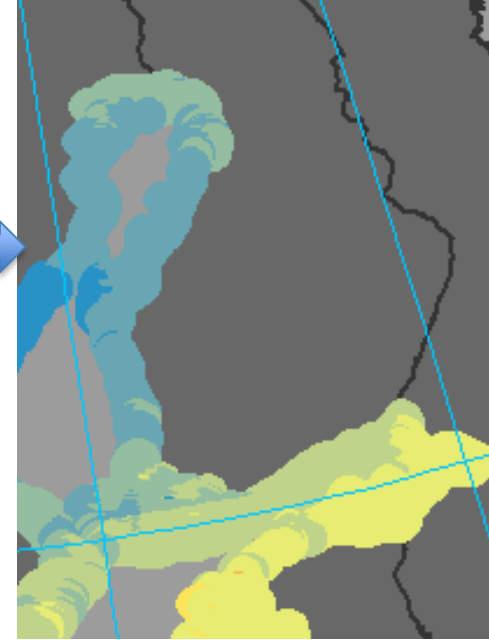
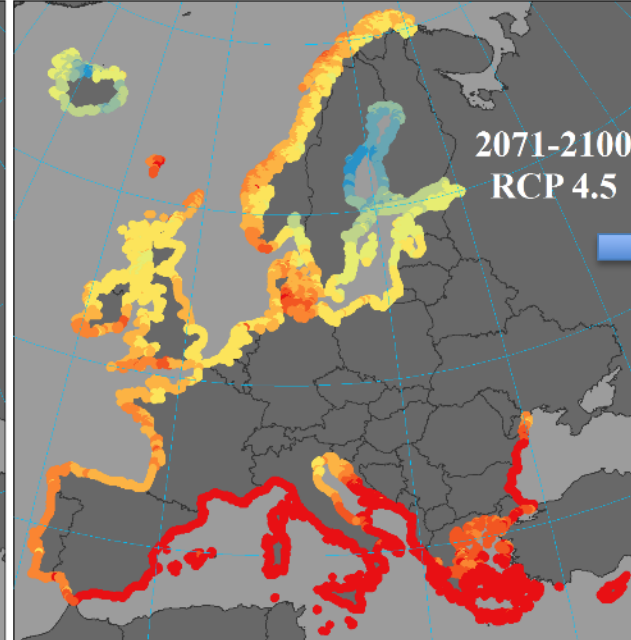
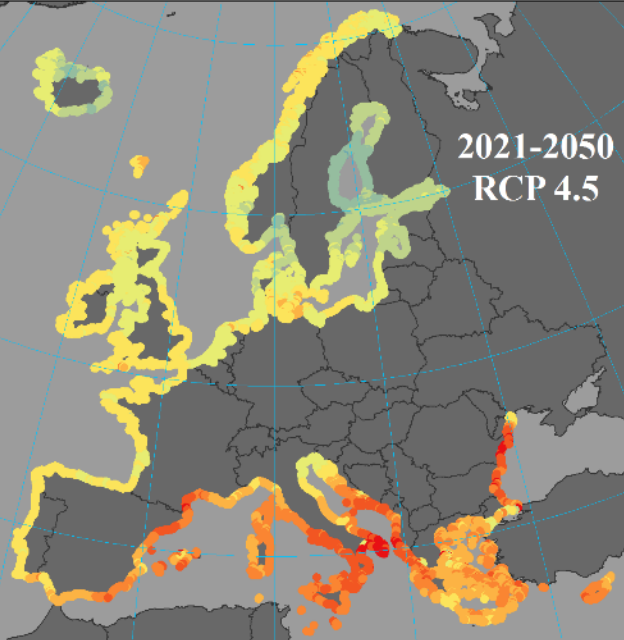


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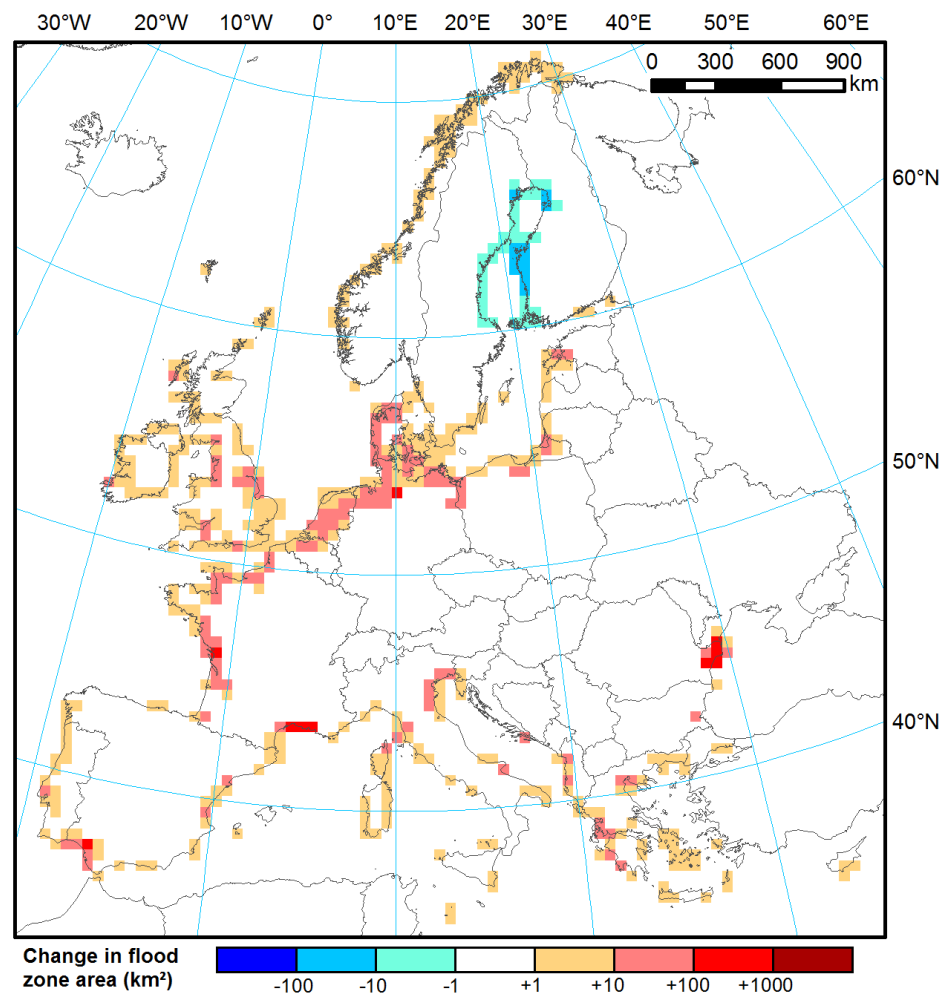
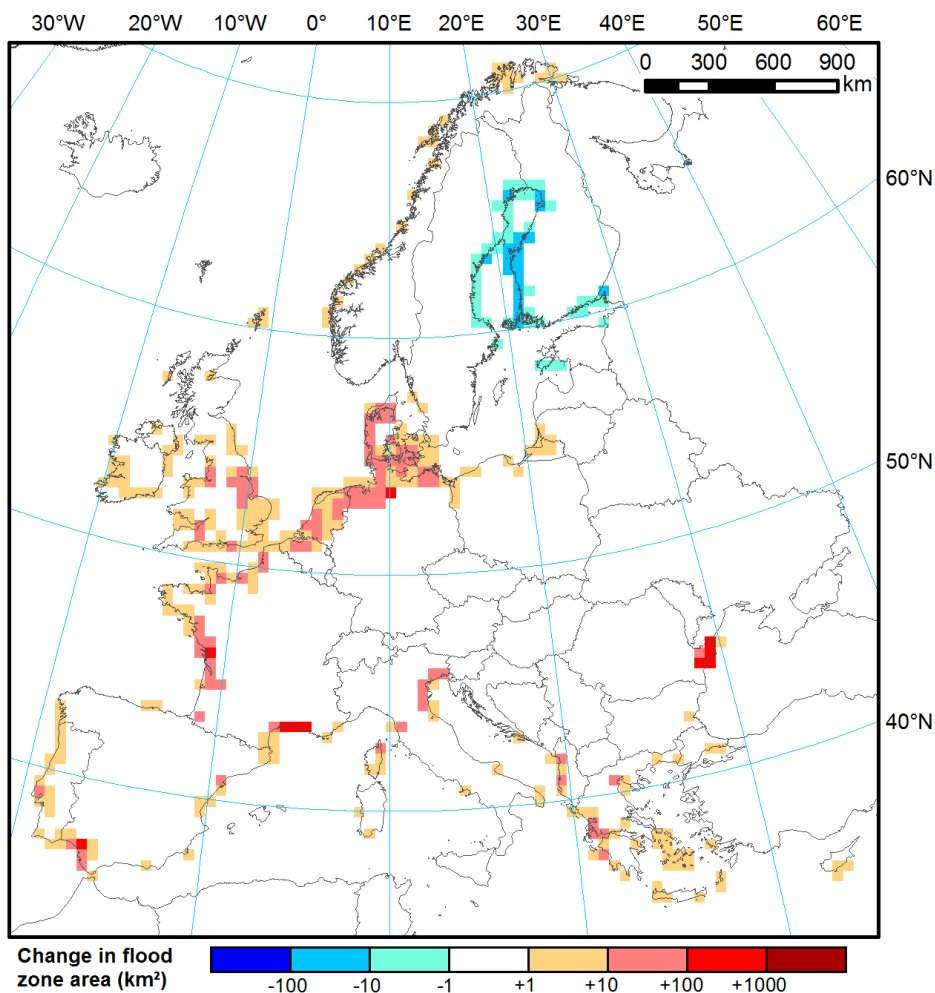
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Change in 100-year flood zone area, 2071-2100 to 1971-2000, RCP 4.5 and 8.5



Conclusions

- Finland is relatively safe compared to other European
- Finland is virtually the only country in Europe where coastal and riverine flood hazard is projected to decrease in most of its territory during the course of this century.



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More information:

RAIN D2.5 report: http://rain-project.eu/wp-content/uploads/2016/09/D2.5_REPORT_final.pdf

RAIN datasets: <https://data.4tu.nl/repository/collection:ab70dbf9-ac4f-40a7-9859-9552d38fdccd>

Estimating extreme river discharges in Europe through a Bayesian Network,

<http://dx.doi.org/10.5194/hess-2016-250>

Efficient pan-European river flood hazard modelling through a combination of statistical and physical models, <http://dx.doi.org/10.5194/nhess-2017-4>

Extreme sea levels under present and future climate: a pan-European database,

<http://dx.doi.org/10.1051/e3sconf/20160702001>

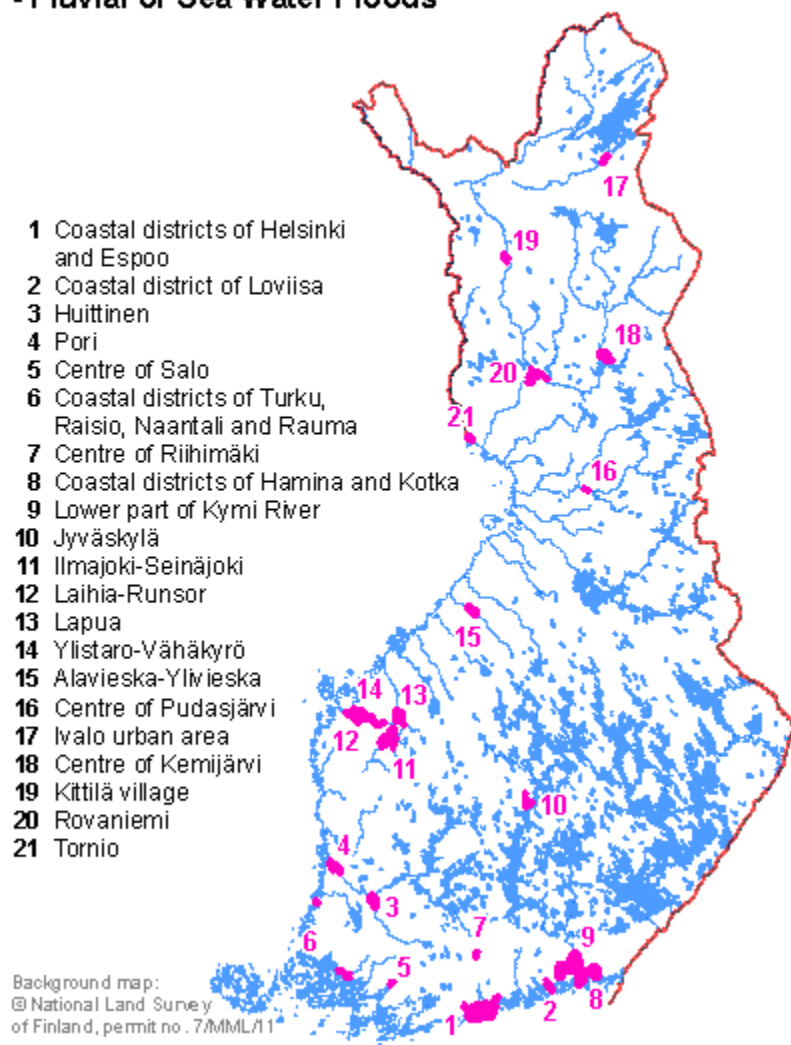


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Slide 11

Areas of Significant Flood Risk 20.12.2011

- Fluvial or Sea Water Floods



Estimated population of the significant flood risk area (extreme flood event, annual likelihood 0,1 %)

ELY Centre	Name of the area	Type of flood	Population
Uusimaa	Coastal districts of Helsinki and Espoo	sea water flood	over 25 000
	Coastal district of Loviisa	sea water flood	ca 500
Southwest Finland	Centre of Salo	fluvial flood	nearly 500
	Coastal districts of Turku, Raisio, Naantali ja Rauma	sea water flood	over 1 500
	Huittinen	fluvial flood	ca 1 200
	Pori	fluvial flood	over 20 000
Häme	Centre of Riihimäki	fluvial flood	ca 2 800
Southeast Finland	Coastal districts of Hamina and Kotka	sea water flood	over 1 000
	Lower part of Kymi River	fluvial flood	500...1 000
Central Finland	Jyväskylä	fluvial flood	ca 1 700
South Ostrobothnia	Ilmajoki-Seinäjoki	fluvial flood	ca 1 300
	Laihia-Runsor	fluvial flood	ca 1 100
	Lapua	fluvial flood	ca 700
	Ylistaro-Vähäkyrö	fluvial flood	ca 700
North Ostrobothnia	Alavieska-Ylivieska	fluvial flood	600...800
	Centre of Pudasjärvi	fluvial flood	500...700
Lapland	Centre of Kemijärvi	fluvial flood	ca 1 500
	Ivalo urban area	fluvial flood	ca 1 000
	Kittilä village	fluvial flood	ca 700
	Rovaniemi	fluvial flood	nearly 10 000
	Tornio	fluvial flood	nearly 3 000

http://www.ymparisto.fi/en-US/Waters/Floods/Flood_risk_management/Flood_risk_management_planning/Preliminary_flood_risk_assessment



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