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CoCliCo

Coastal Climate Core Services

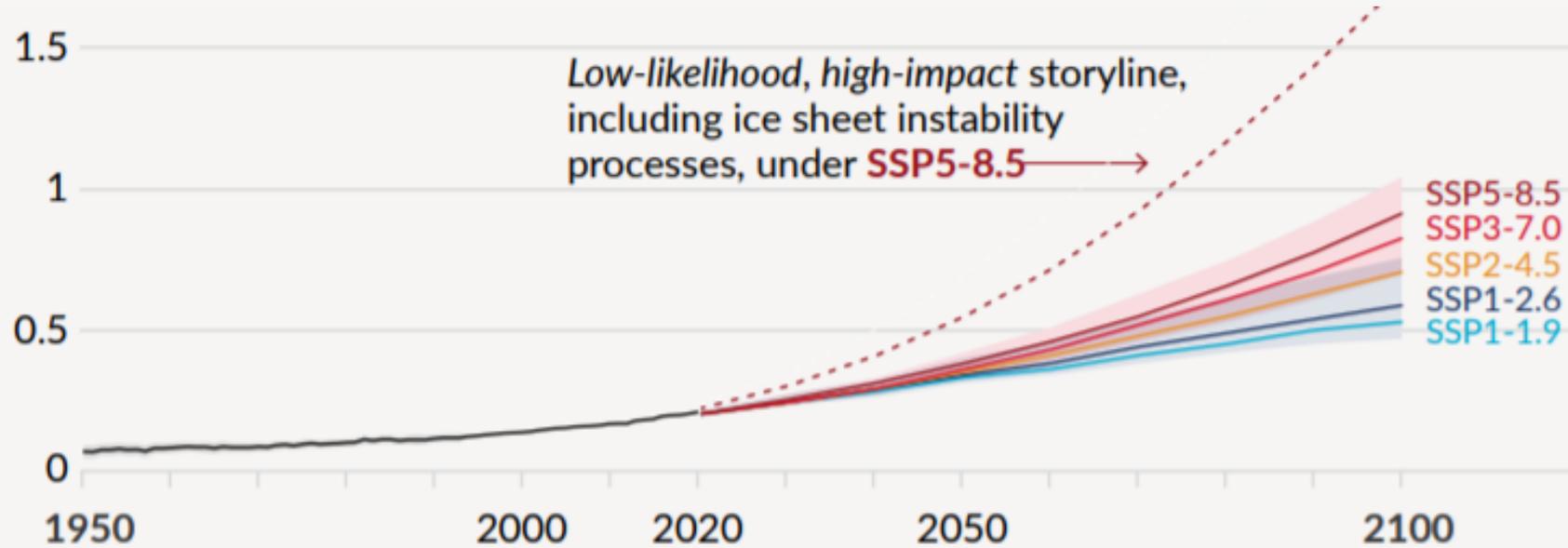
Summary of science advances

Gonéri Le Cozannet (BRGM) with the ExCom and the CoCliCo Team

Validation workshop – 4th and 5th March 2025



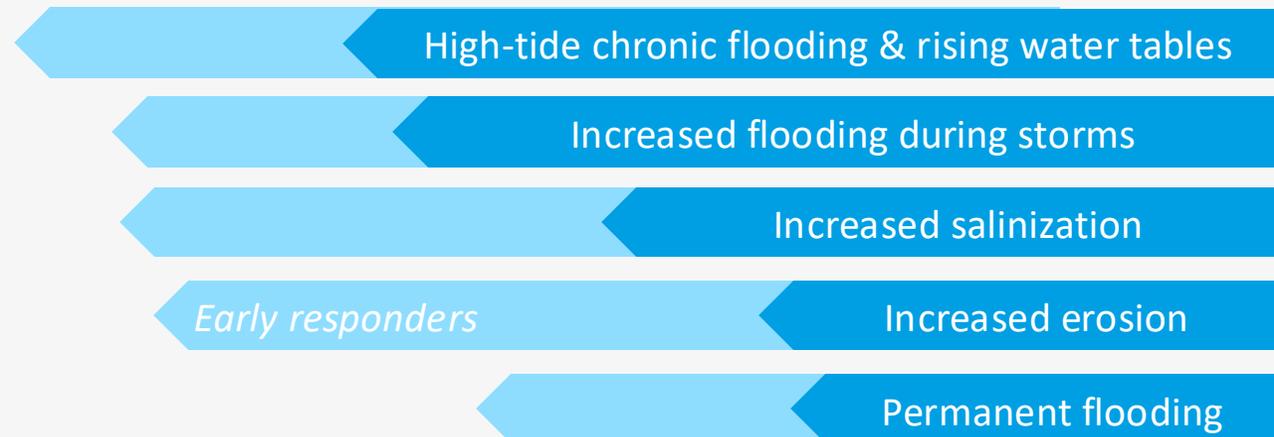
Sea-level rise risks are about to emerge from natural variability



Natural variability dominates



Stylized times of emergence



Risks = Hazards x Vulnerability of Exposed Assets



Exposed people and buildings

Hazard: e.g. probability to exceed specific water levels or flow velocities



2 exposed buildings,
not equally vulnerable

Climate services for coastal adaptation to sea-level rise

A climate service is distinct from climate information.

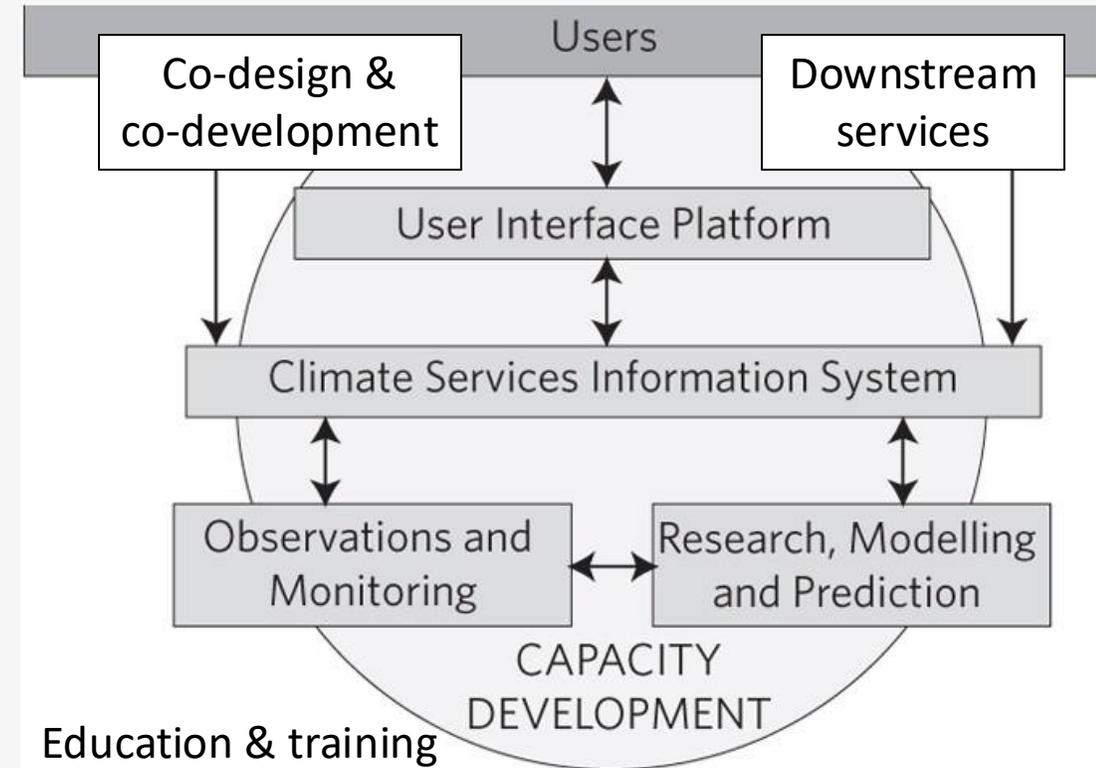
A climate service is decision centric.

Climate services development is progressing

Yet, decision-oriented climate services and platforms to support these policies are still in their early development.

Barriers well identified, incl.:

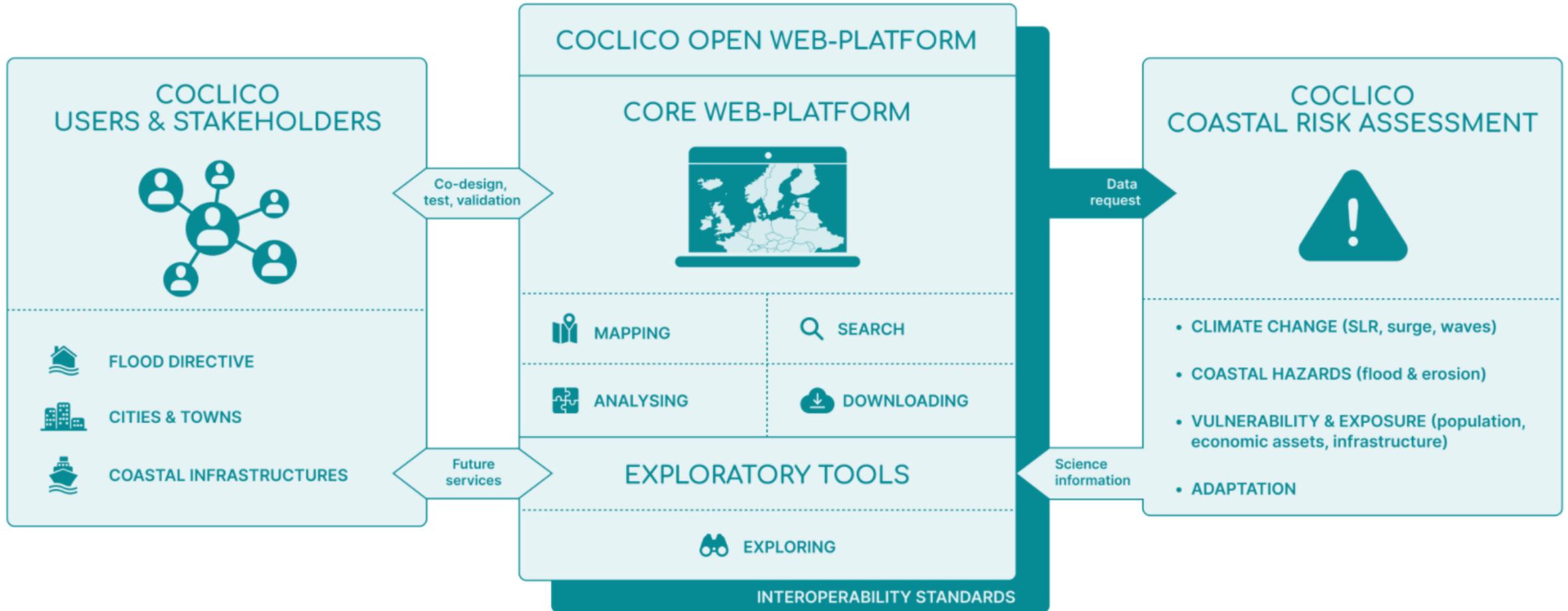
- lack of perceived usefulness
- lack of expertise to use the information
- mismatches between needs and type of information made available
- insufficient engagement with users
- business models unclear



CoCliCo's objectives and concept

Objective: improve decision-making on coastal risk management and adaptation, by establishing an integrated core service dedicated to coastal adaptation to sea-level rise.

Deliverable: an open source web-platform informing users on present-day & future coastal risks.

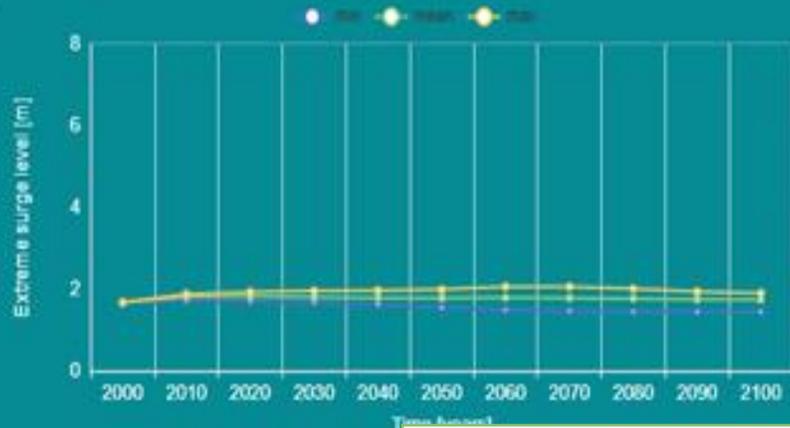


Target resolution: 25m to 100m, allowing for zooms up to 1m where available (e.g., France)

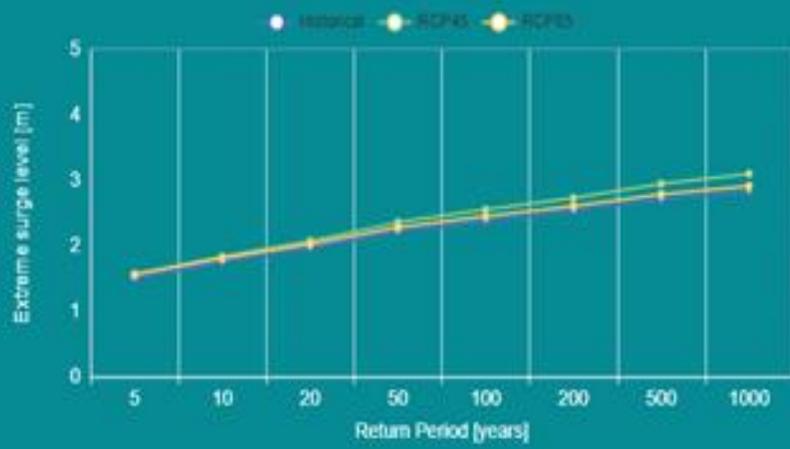
Main focus: Europe (EU28 + UK), extended to the Europe Region as defined by the IPCC



Data set: eesl
Location id: 2053



Data set: ssl
Location id: 2053



Deltares presentation on the platform

All datasets

- Extreme sea levels
 - Select variable: eewl
 - scenarios: RCP45
 - rp: 200
- Extreme surge level
- Floodmaps
- Cost & benefit adaptation
- Shoreline change
- Coastal flood risk
- Wave energy flux



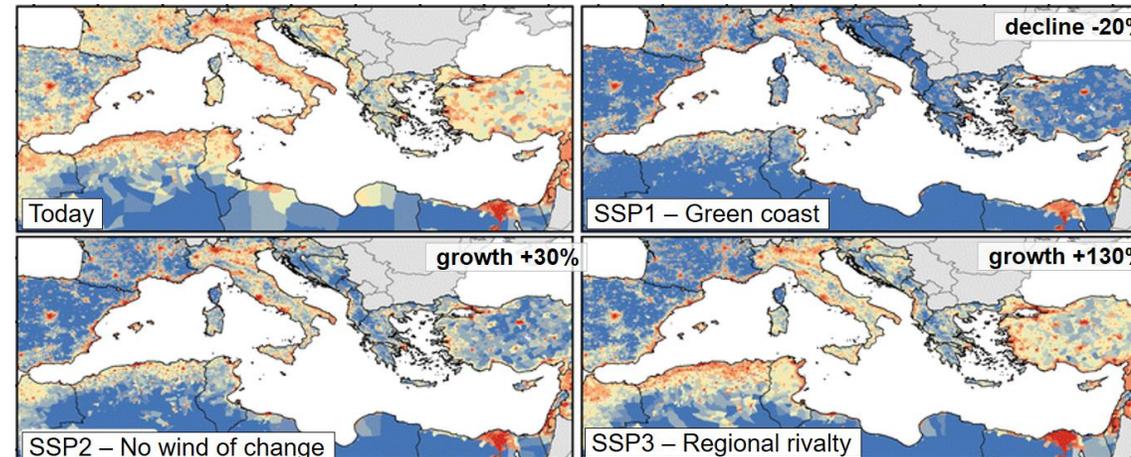
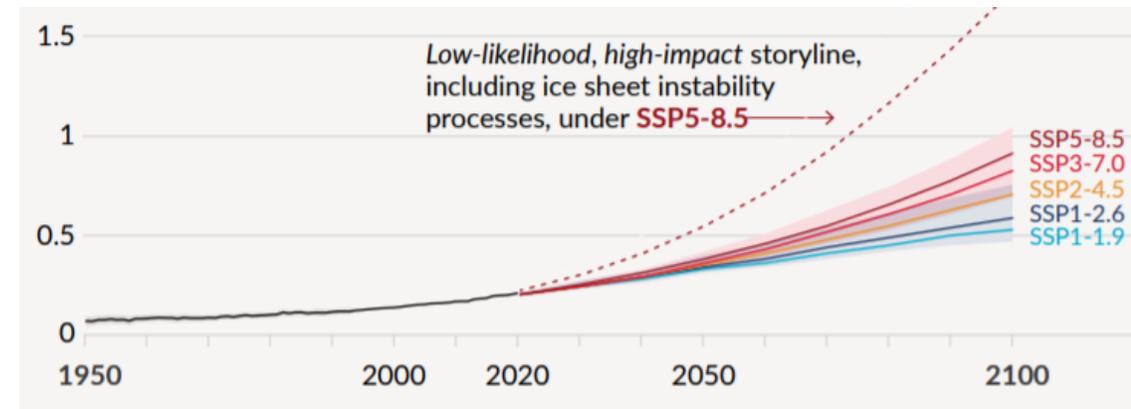
Integrated scenarios

Parameter space

- Time horizons: 2010, 2030, 2050, 2100, (2150)
- Return periods: annual, centennial, black swan (1:1000) events

Scenario space

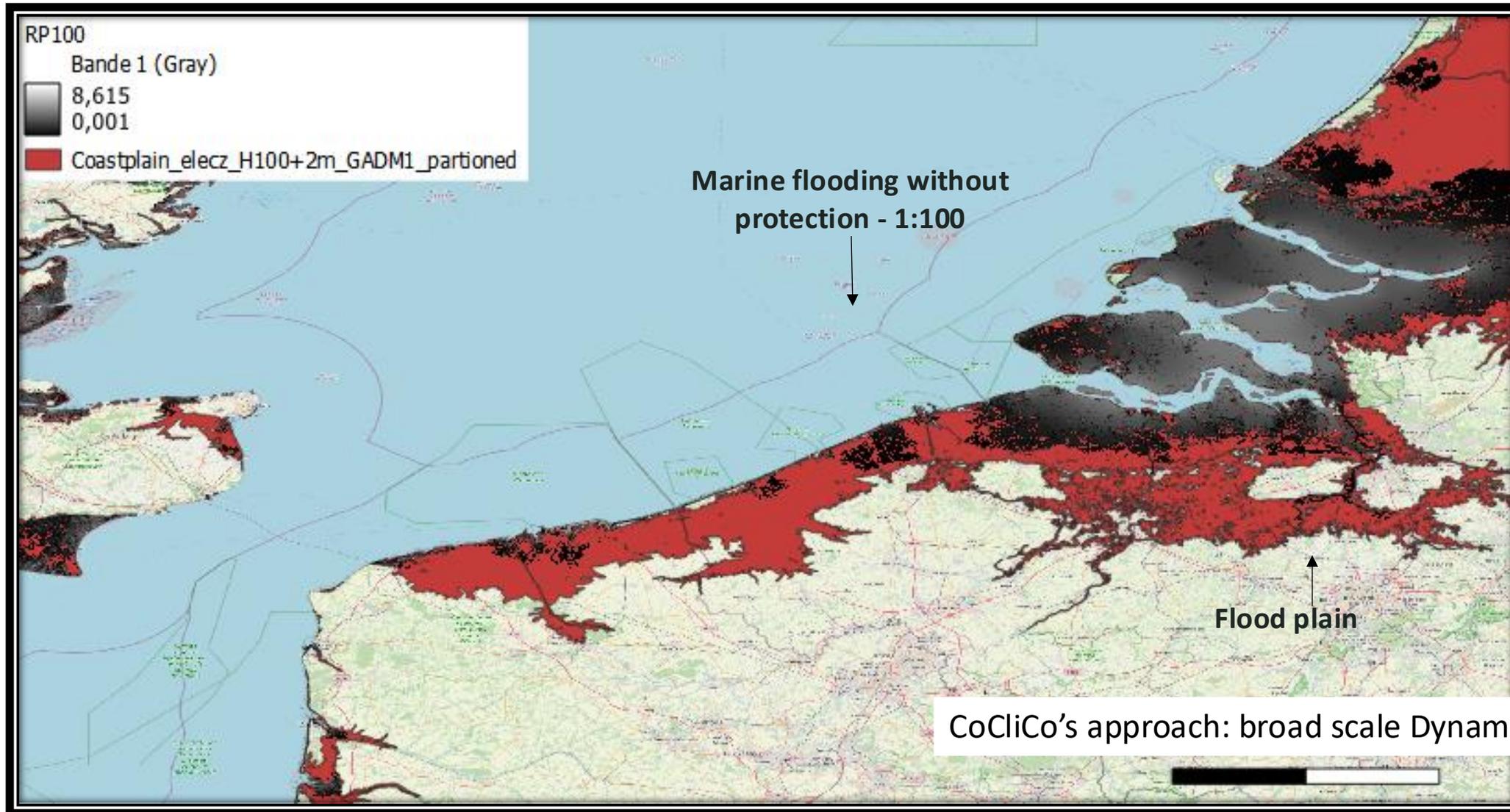
- Climate change and linked socio-economic scenarios: SSP1-2.6; SSP2-4.5; SSP5-8.5; SSP5-8.5 and high-end SLR
- Adaptation options: relocation or protection based on costs benefit analysis



AR6 WG1 SPM; Reiman et al., 2017

- **User benefit: a comprehensive and consistent set of scenarios to help prepare for diverse potential futures**

Existing broad scale tools to assess future impacts of sea-level rise

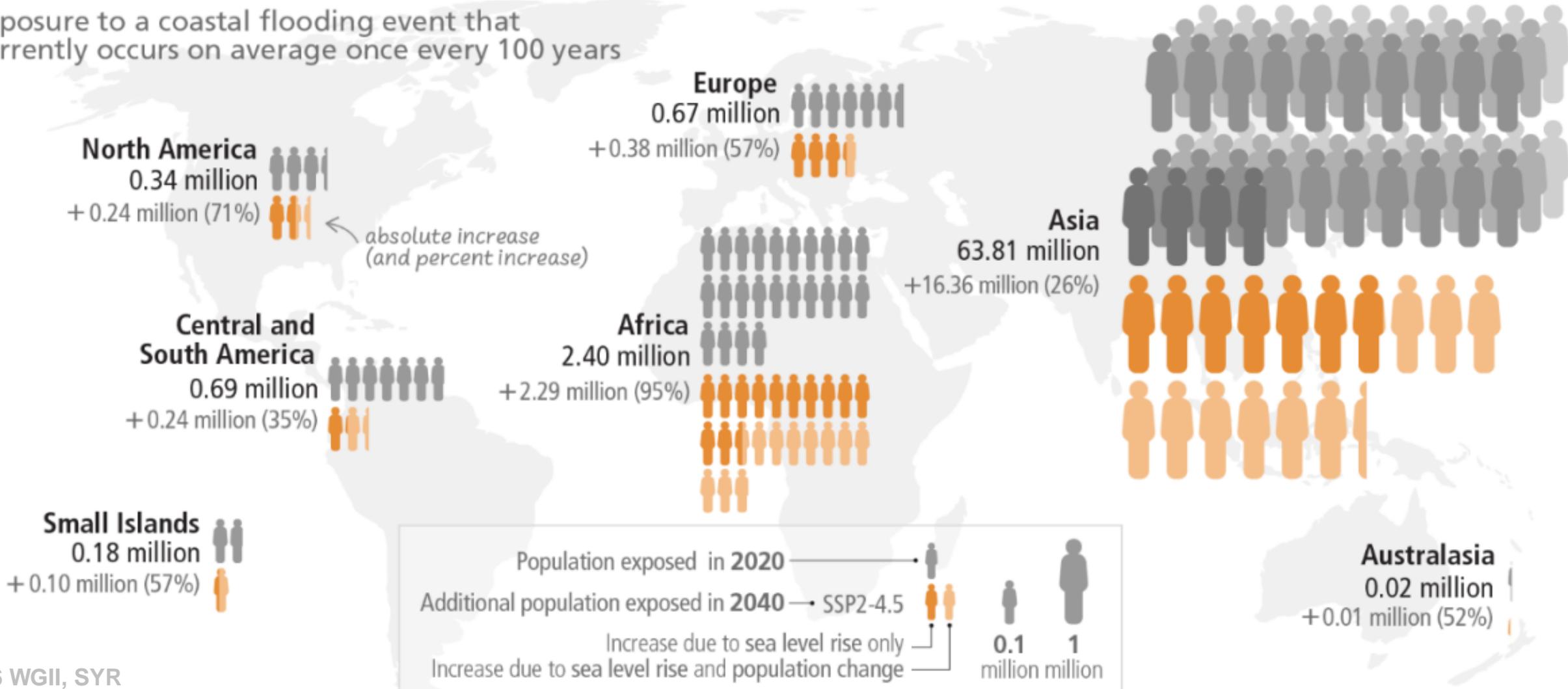


People exposed to coastal flooding in 2020 and 2040 (IPCC AR6 SYR)

- Costs in Europe ~x10 by 2050 without additional adaptation (IPCC AR6 WGII Ch13)
- People exposed ~+400,000 to 500,000 persons by 2050

Preliminary results - CoCliCo confirms these orders of magnitude

Exposure to a coastal flooding event that currently occurs on average once every 100 years



CoCliCo's results on adaptation

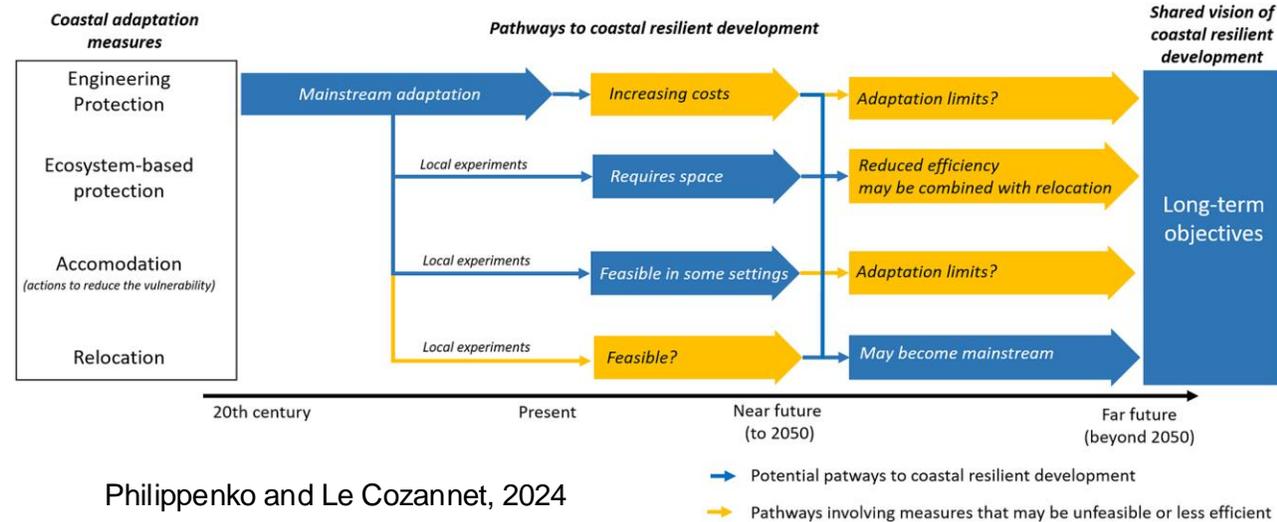
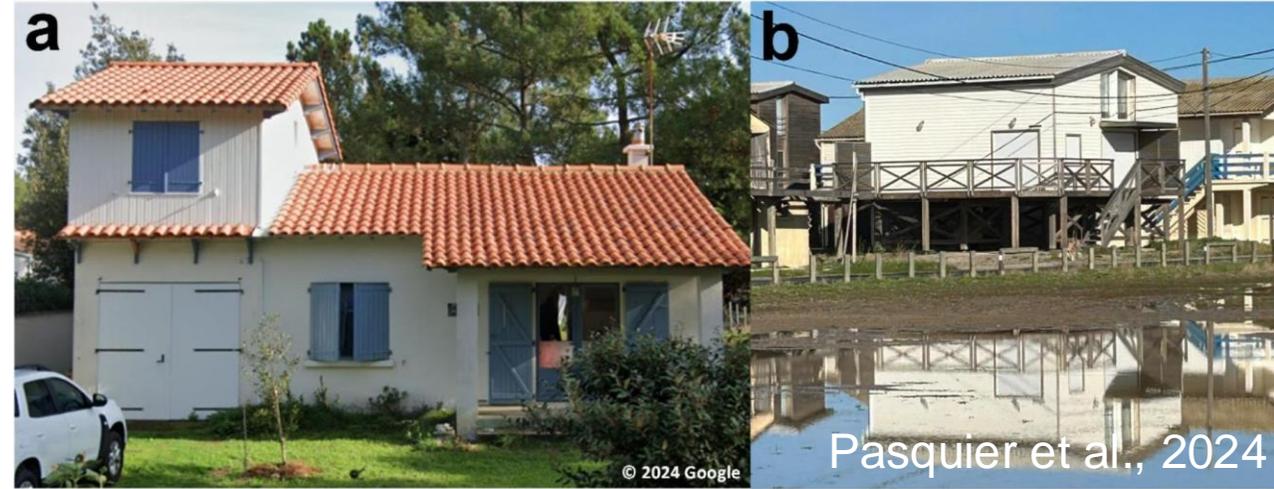
Empirical feedback on adaptation options

- e.g., Pasquier et al., 2024: accommodation
- e.g. Sayers et al., forth. Relocation

Adaptation options and their effectiveness over the 20th and 21st century

- e.g. Wolff et al. 2024: setback zones
- e.g. Lincke et al., 2024: drivers of coastal flood exposure and risks in the 20th and 21st centuries
- e.g. Völtz et al., forth: most likely adaptation option based on cost benefit assessments

Also: Reiman et al. – social vulnerability map; Lobeto et al. – coastal modeling; Philippenko and Le Cozannet – coastal resilient development...

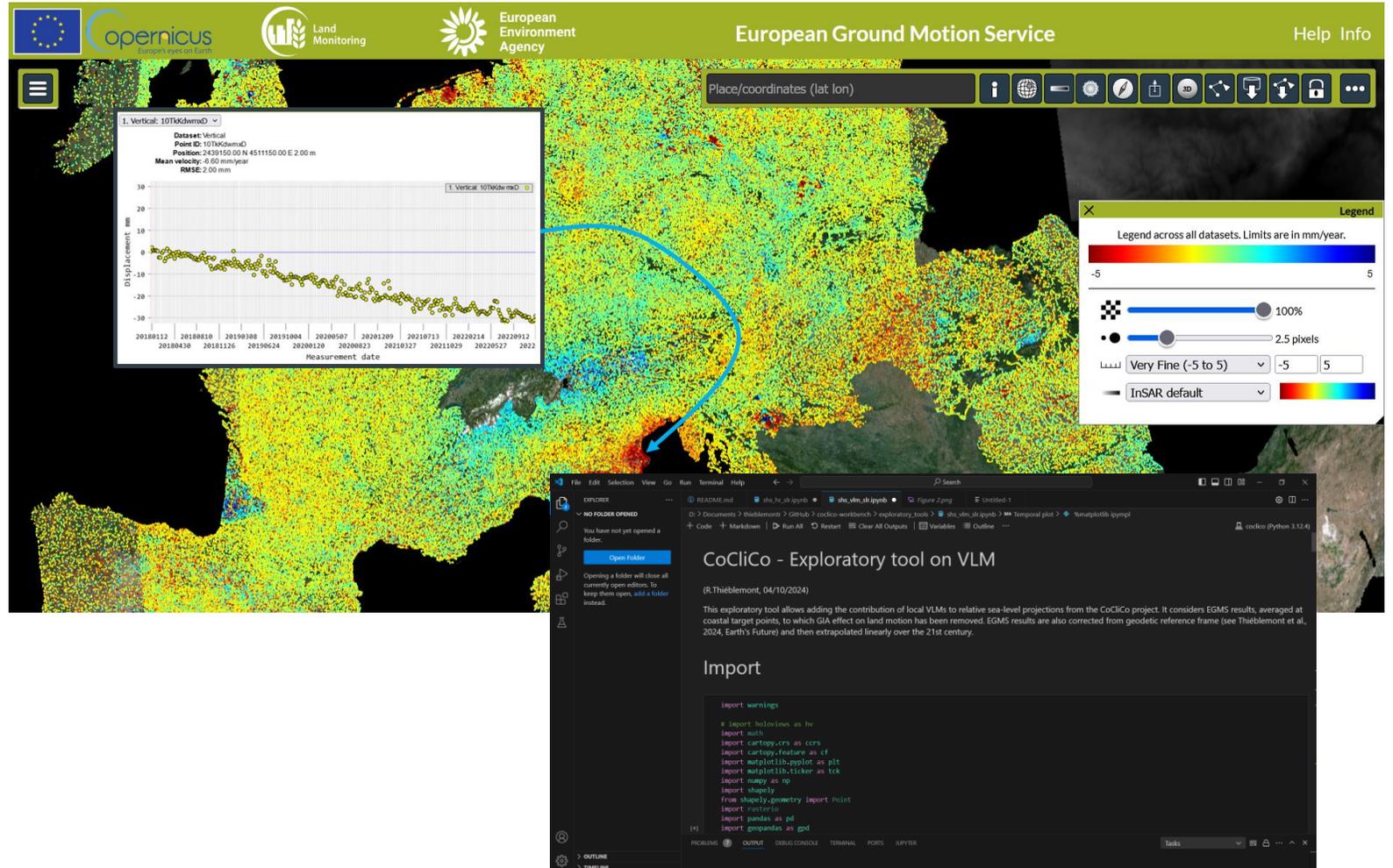


Philippenko and Le Cozannet, 2024

- These papers are used to design user stories

Exploratory tools and future services

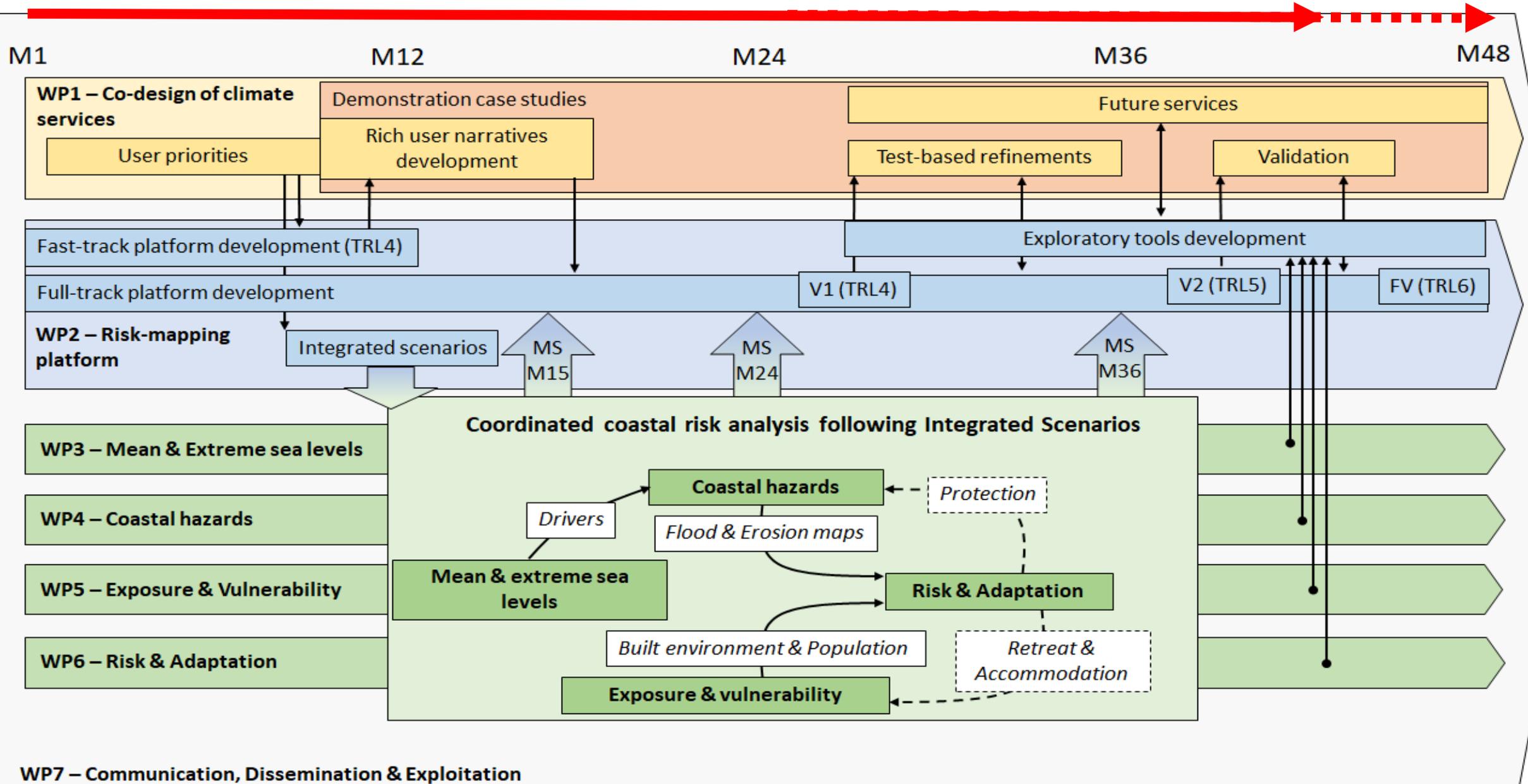
- Sea-level scenarios
- Consideration of subsidence (based on Thiéblemont et al., 2021)
- Relocation and high resolution (based on Sayers et al. forth)



➤ Future services either use the workbench or concepts developed within the project.

We achieved

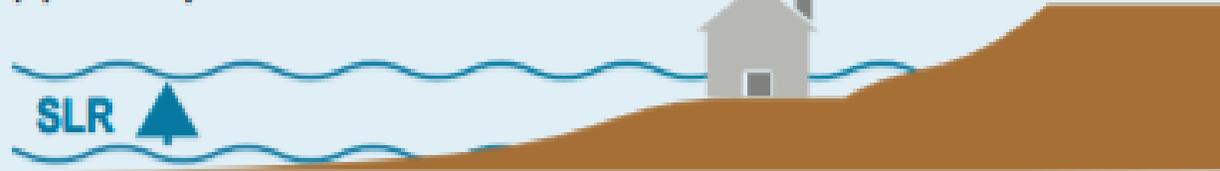
What comes next?



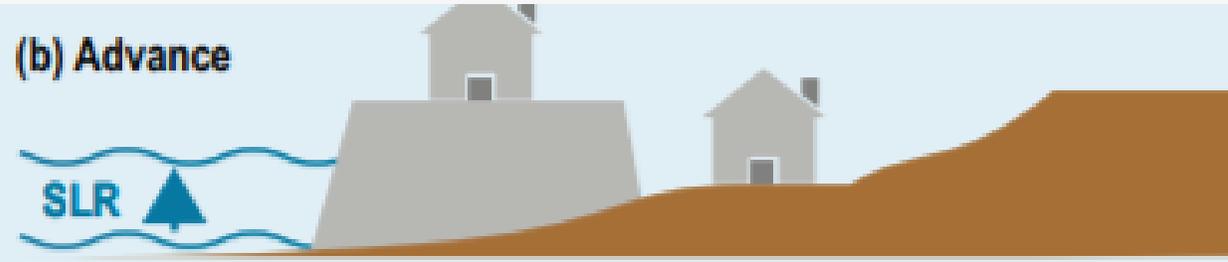
Responses to ongoing sea level rise and land subsidence

Coastal impacts of SLR can be avoided by preventing new development in exposed coastal locations

(a) No response



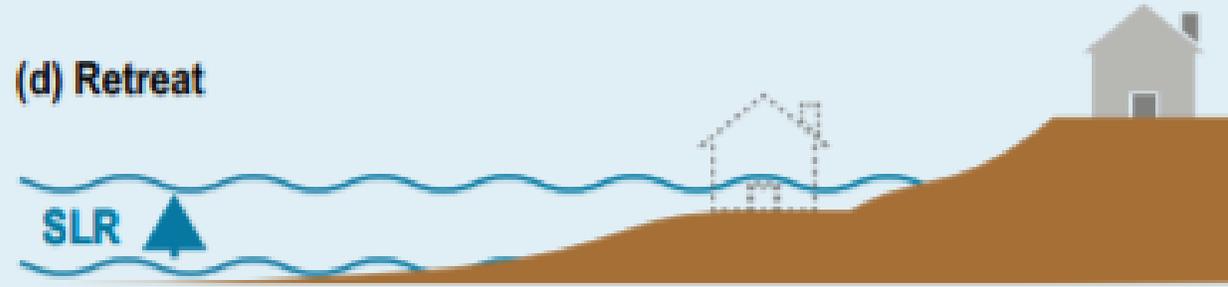
(b) Advance



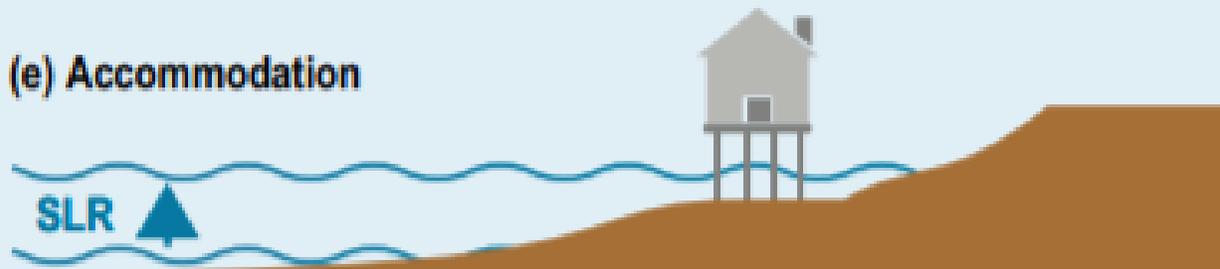
(c) Protection



(d) Retreat



(e) Accommodation



(f) Ecosystem-based adaptation



Adaptation capacity and governance to manage risks from projected SLR typically require decades to implement and institutionalize (high confidence)

