

How can past storms help us prepare tomorrow's coastlines ?

Archives, maps, narratives and historical measurements preserve the memory of weather-marine hazards that have sometimes been forgotten. By combining geohistory, AI, statistics and modeling, AMERAA transforms these traces into usable data to improve the understanding of extreme events.

Objective : to better anticipate coastal risks and help territories adapt.

Context

XVIIIth c.-1970 → 2050-2100
French coastlines of the English Channel-North Sea
Focus : Normand pilot sites (demonstrator)

- Historical hazards **poorly studied** along this coastline, with fragmented documentary heritage (fig. 1)
- Exposed critical stakes** : ports, military and industrial complexes (e.g. Cherbourg, Le Havre), 4 of 5 french coastal nuclear power plants
- Stakes for 2050** : population growth of +4,1% to +23,5% along these coastlines (INSEE, 2022)
- Climate change** context (IPCC, 2023)

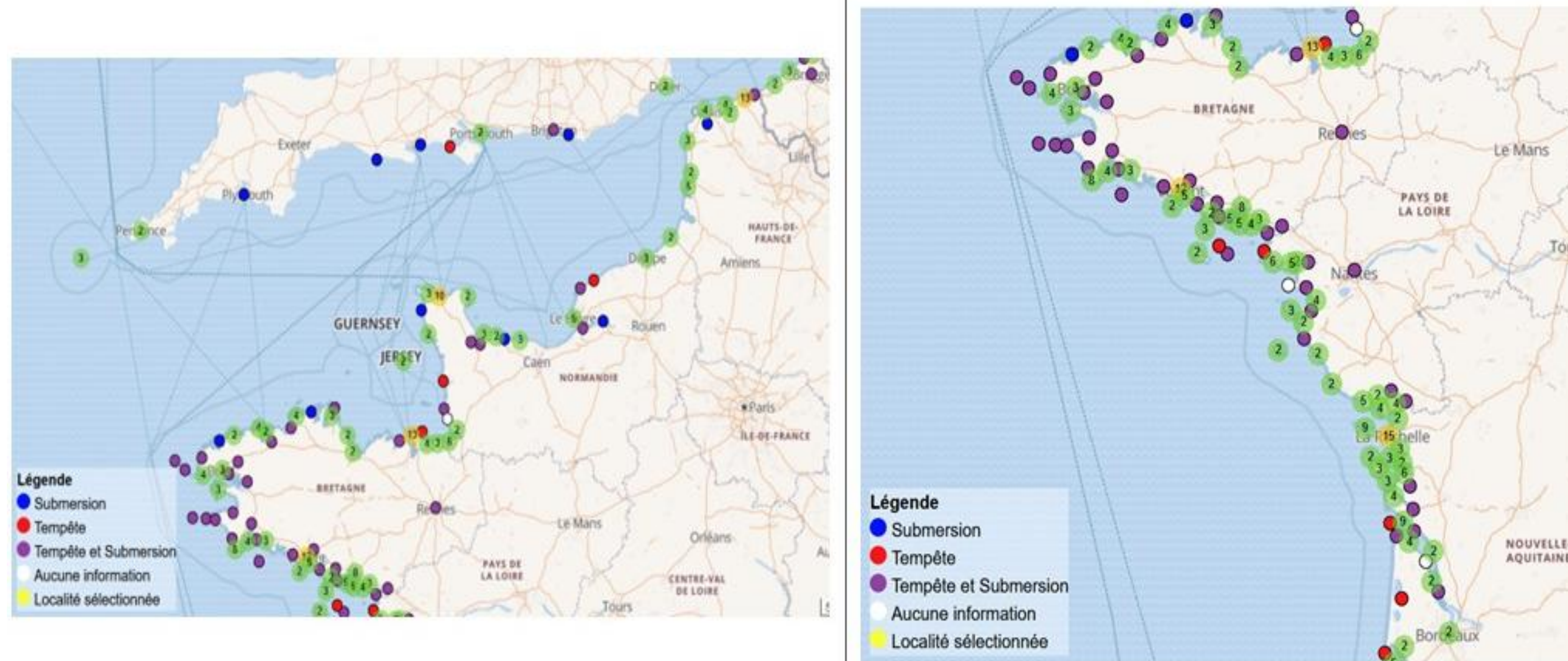


Fig. 1 : Maps extracted from BDD / WebSIG « Tempêtes et Submersions Historiques (TSH) » (<https://bddtsh.asnr.fr>)

The 4 questions addressed by AMERAA

SC1

How can **heterogeneous historical information** be **structured into traceable datasets** ?

SC2

Under what conditions can these **reconstructed hazards** be **integrated into modelling, statistics and risk management** ?

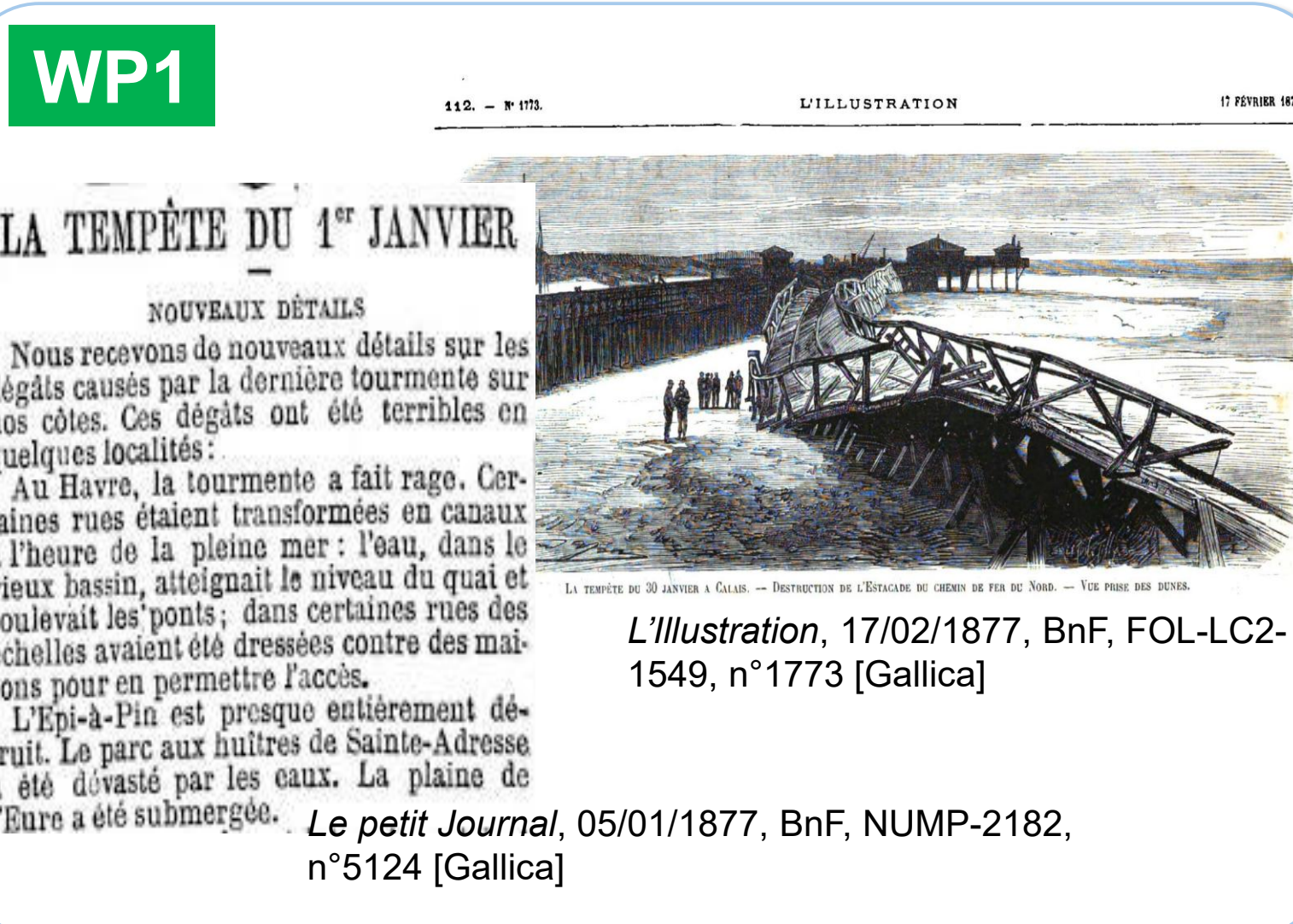
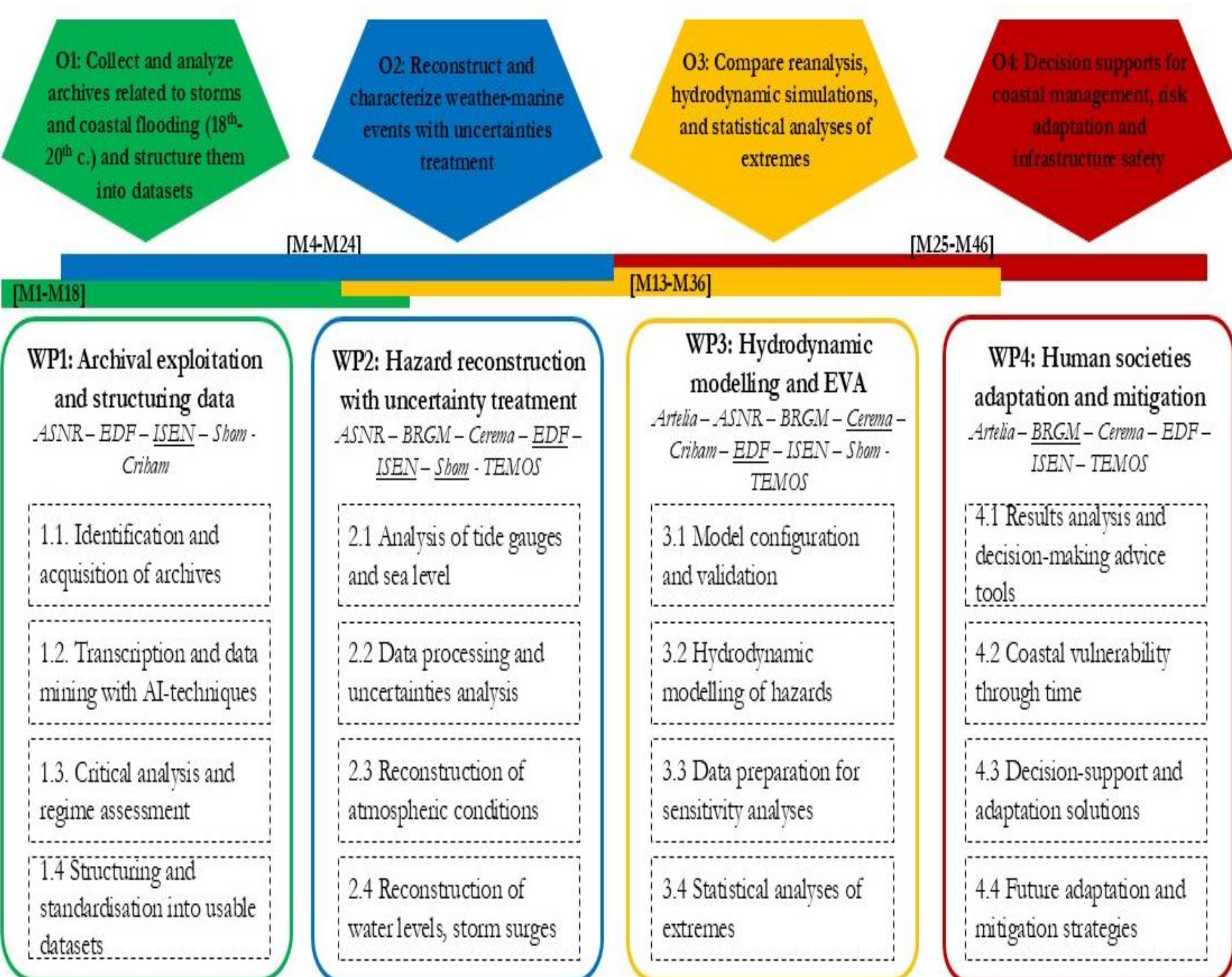
SC3

Does **temporal depth** — which carries non-stationarities and heterogeneities — **improve ou degrade the robustness of simulation and return periods** ?

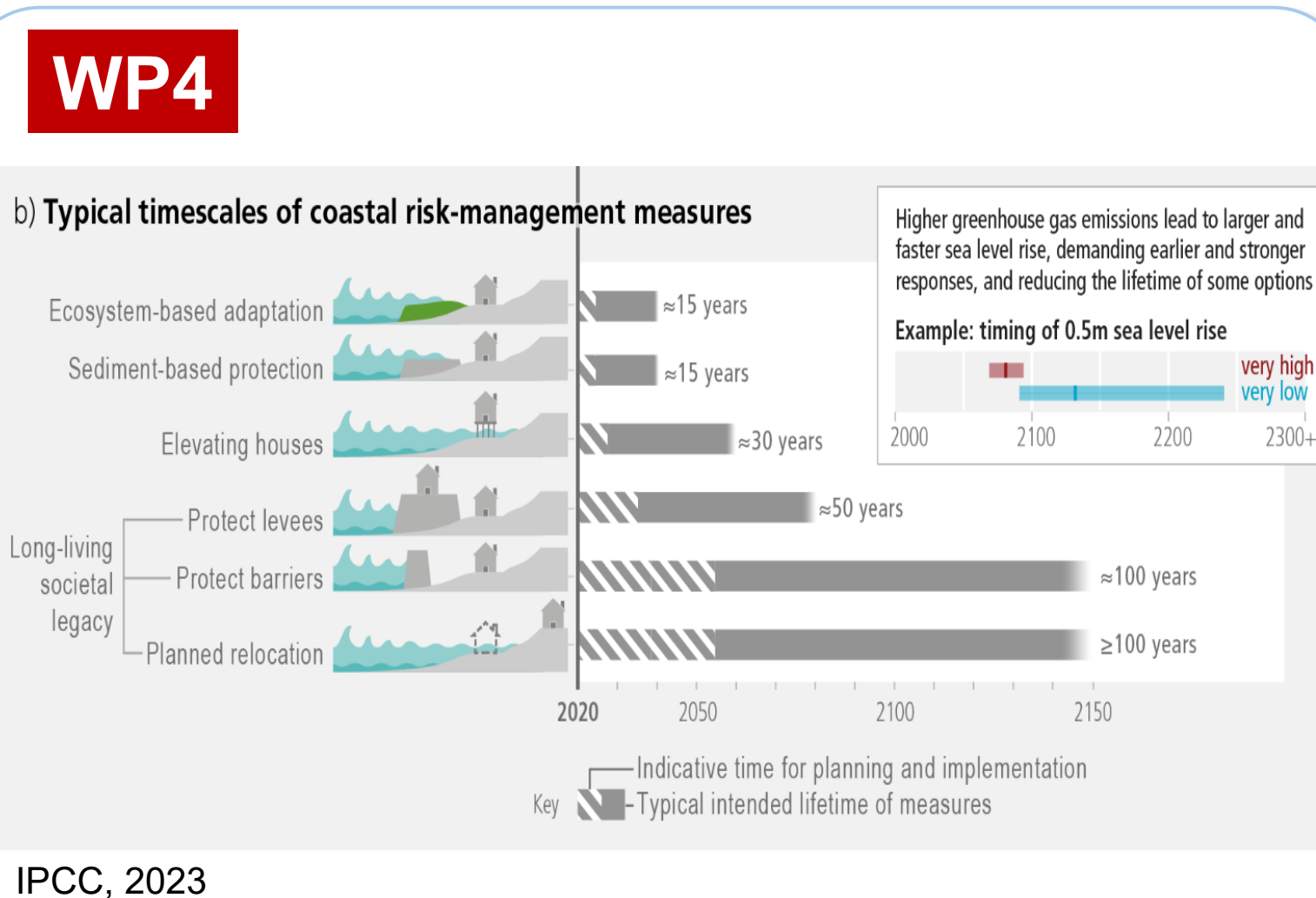
SC4

How can these results be translated into **operational tools for decision-makers and coastal managers** ?

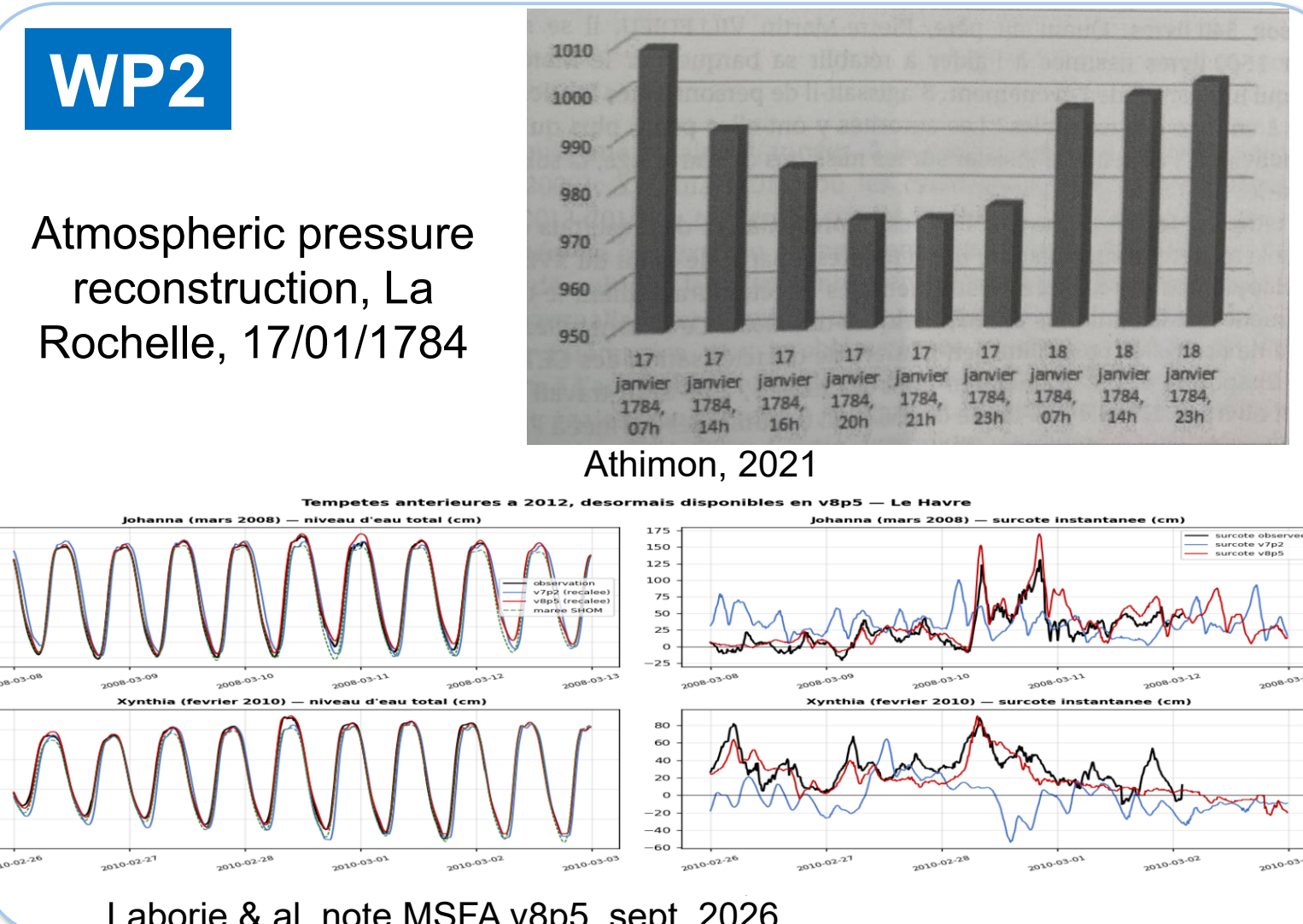
What AMERAA will produce – project organisation



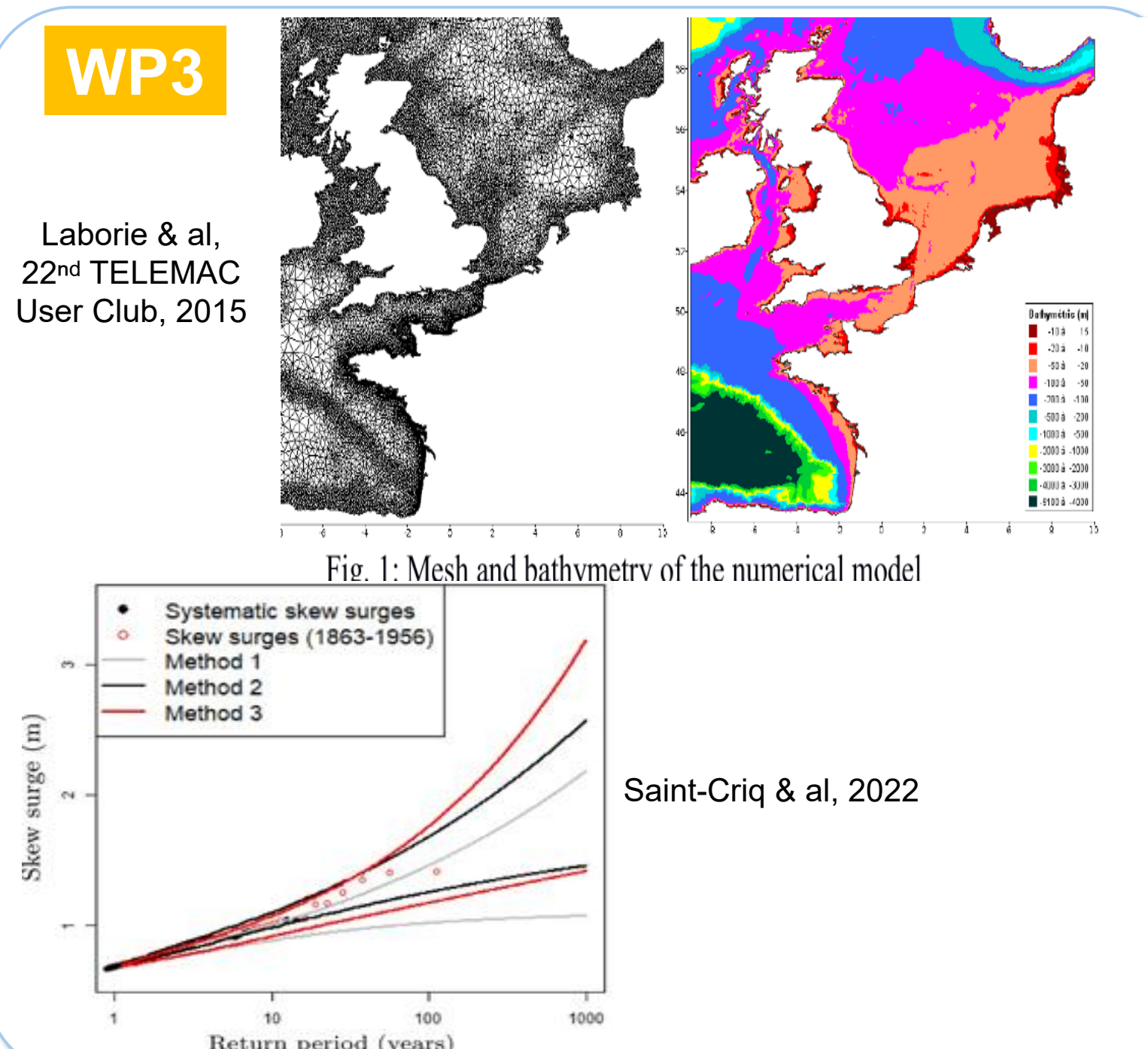
Collection, automatic transcription, and **data structuring** (traceability, qualification, analysis).



Translation of results into **decision-support products** for decision-makers, with **defined conditions of use** for adaptation, planning and infrastructures safety.



Hazards characterisation and **reconstruction**, with **assessed uncertainty components**.



TELEMAC-2D modelling of past hazards, with **multi-decadal framework extended to the multi-centennial scale**, including 2050 and 2100 climate projections.

Development and comparison of **different statistical approaches** integrating **reconstructed or simulated historical data** and explicitly accounting **uncertainties**.

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