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Leveraging insurance for resilience: Perspectives from the insurance industry on responsibilities for ex-ante disaster risk reduction investments and measures

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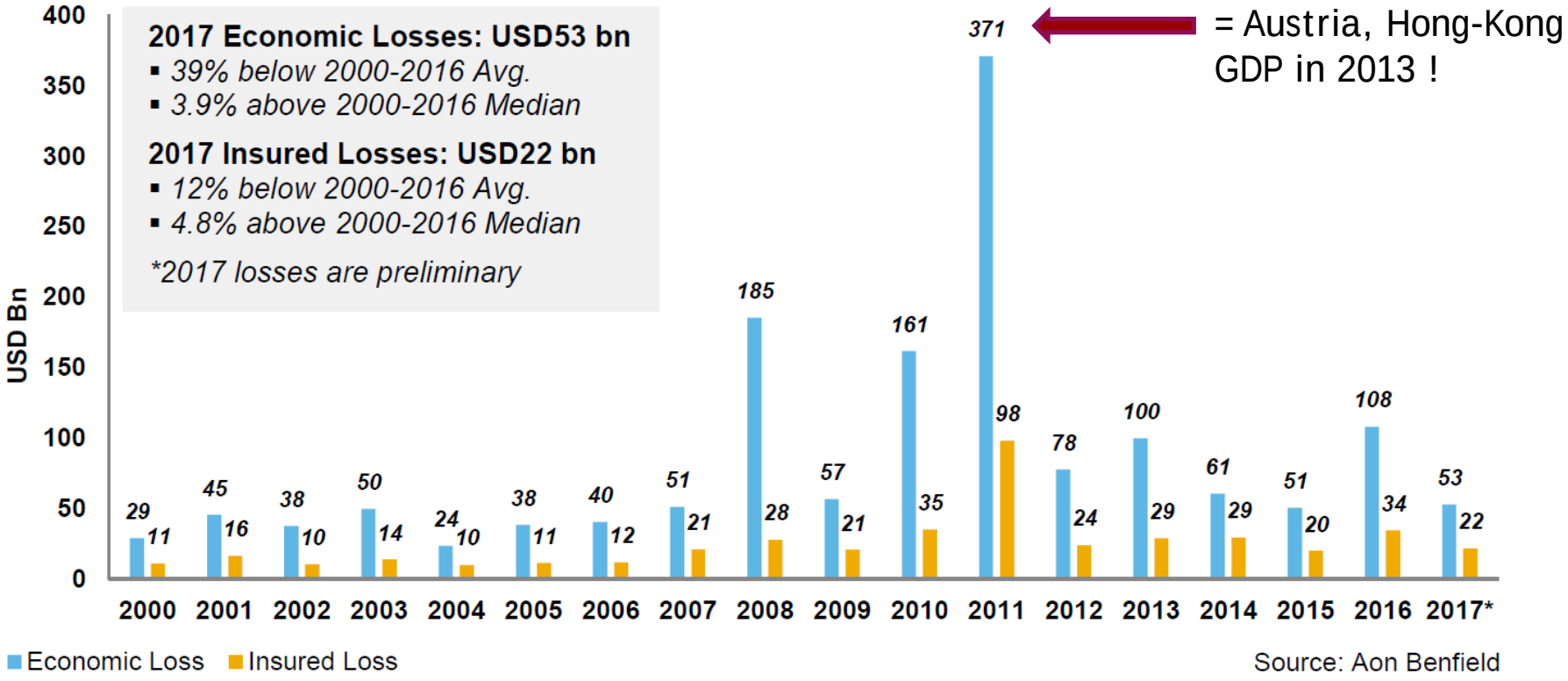
World Water Week

NAIAD side-event

Thursday August 31

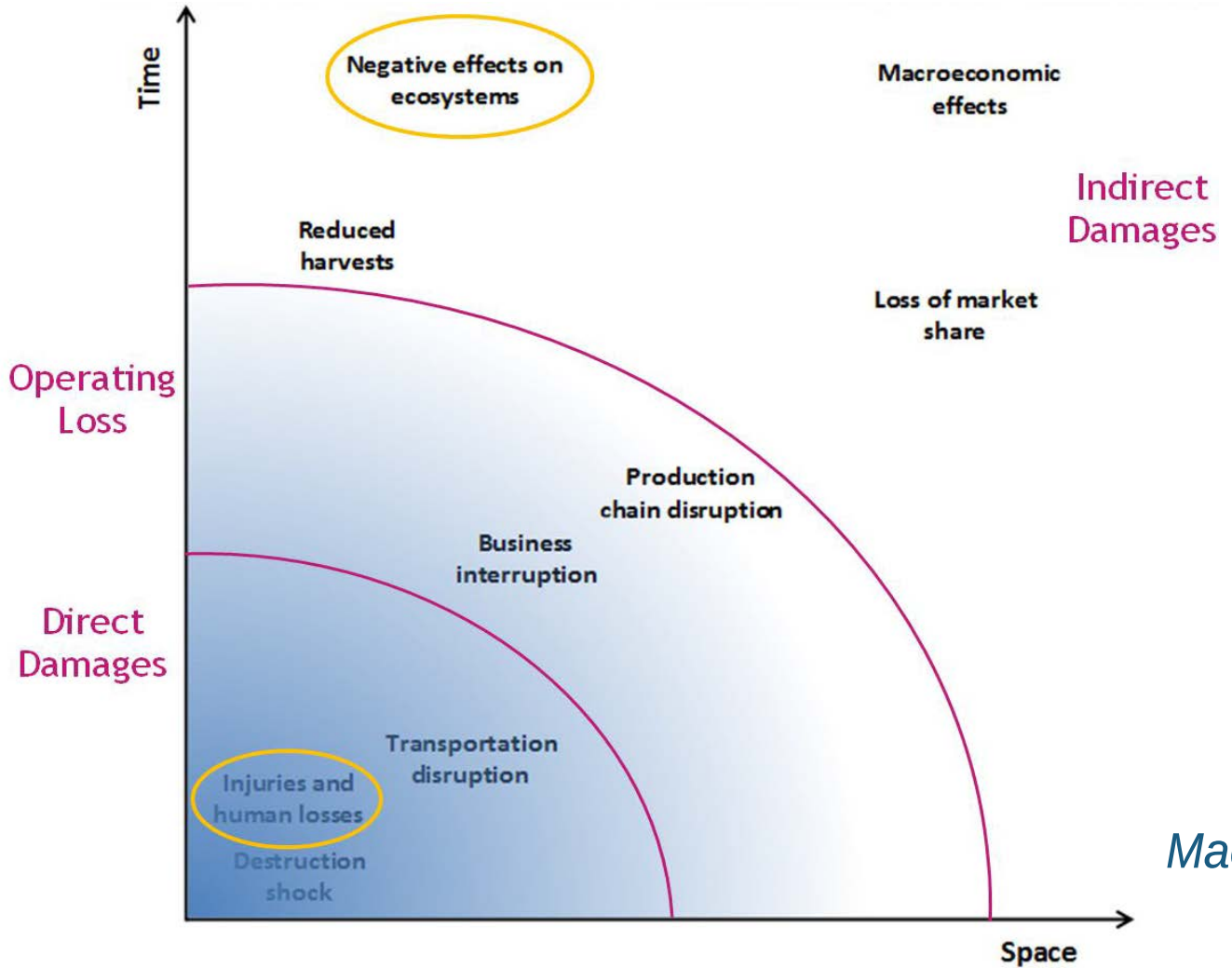
Natural Disaster losses in the world



- Hurricane Harvey not included in 2017
- Insurance still does not cover the majority of losses (average 30%)
- Reducing the gap must be an objective for the insurers

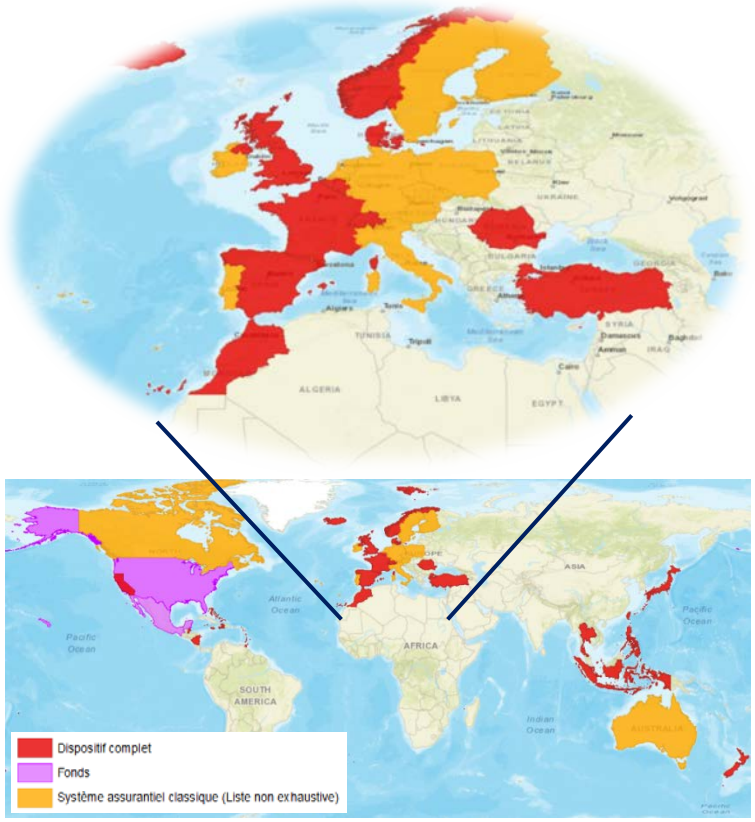
All the damages are not covered by insurance

- Why such a gap between economic and insured losses ?



Mao et al., CCR, 2016

Diffusion rates depend on country and compensation schemes



Scheme	Type	State guarantee	Public private partnership	Perils
Spain Consorcio de Compensacion de Seguros	Public institution	Yes	Yes	Natural disasters (floods, earthquake, tsunami, volcano), terrorism
UK Flood Re	National Pool	No	Yes	Flood
California California Earthquake Authority	State reinsurance	No	Yes	Earthquake
Caraibean (16 pays) The Caribbean Catastrophe Risk Insurance Facility	Regional Pool	No	Yes	Earthquake, hurricane
Taiwan Taiwan Residential Earthquake Insurance Fund	Public fund	Yes	Yes	Earthquake and its consequences (flood, tsunami)

But for every country…

- There is no alternative to public intervention in case of major natural disaster
  - Direct funding to cover non-insured losses
  - Or indirectly via private/public scheme

- To reduce the gap between total and insured damages :
  - Affordable prices are related to high diffusion rates in the exposed areas
  - The perimeter of insured damage must include new risks
  - A large scale of natural disaster must be covered

What do we learn when studying Natural Disaster compensation shemes ?

- Natural disasters are a tricky subject for insurers for the following reasons :

  - The lack of historical data makes it difficult to find the “good price” by taking into account an exhaustive view of the exposure

  - For climatic disasters, the unsteady state of climate (climate change, El Nino, North Atlantic Oscillation, …) add unsolvable difficulties to the exposure and pricing models

  - For geological disasters (like earthquakes), the rarity of events increases the modeling challenge

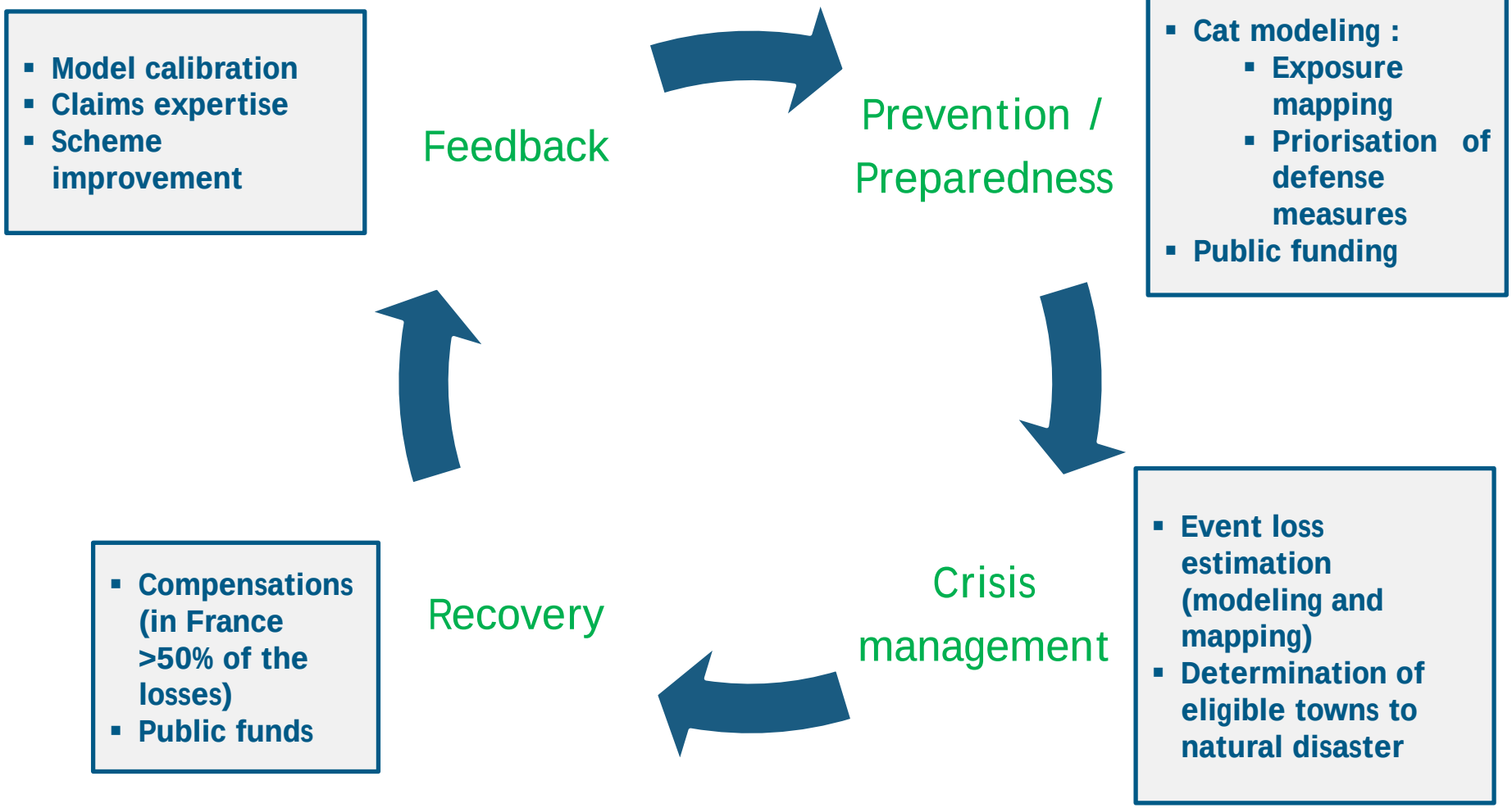
How to deal with the old constructions in exposed areas ?

92% of the Seine watershed in Paris and suburbs is built !
How to deal with a Seine flood if this economic population is not insured
Flood barriers are efficient below 100yrs return period
=> Risk transfer between upstream and downstream

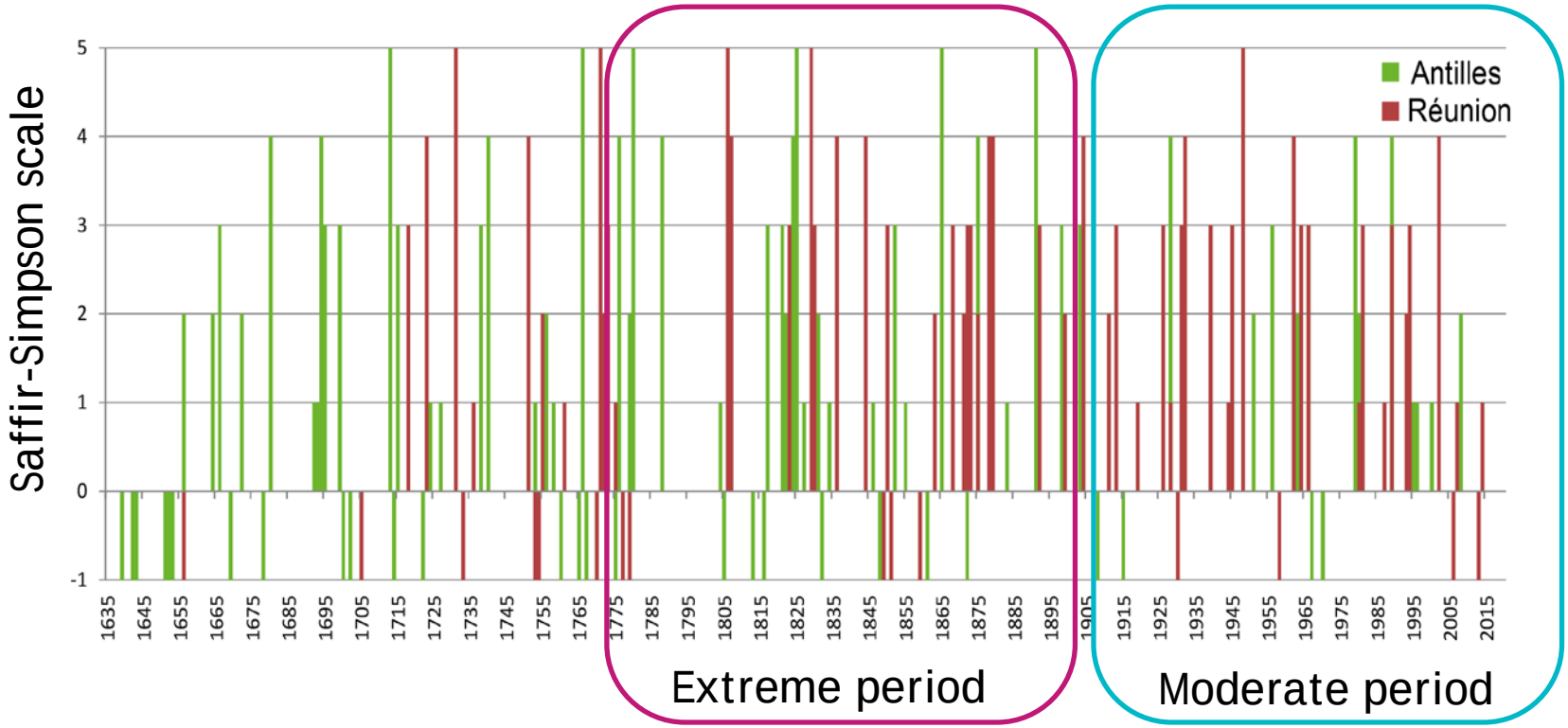
How can insurance play a role in mitigation measures ?

- Crichton (2008) suggests six ways of how insurance could lead to physical flood risk reduction:
  - Assistance with identifying areas at risk;
  - Catastrophe modeling;
  - Economic incentives to discourage construction in the floodplain;
  - Collection of data on the costs of flood damage to feed into benefit cost appraisals for flood management schemes;
  - Promotion of resilient reinstatement techniques after a flood loss;
  - Promotion of temporary defense solutions.

Public reinsurance
Example of CCR's role in the Natural Disaster scheme



Example of importance of historical data: The Reunion Island and French Antilles hurricanes

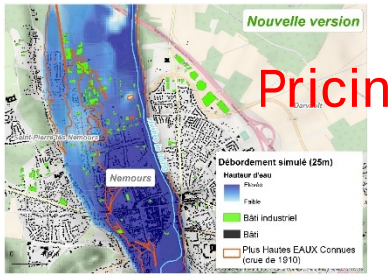


- CCR study *(Desarthe et al., CCR, 2014)*
- Use of historical data to build a hurricane chronology
- Improvement of hurricane exposure studies

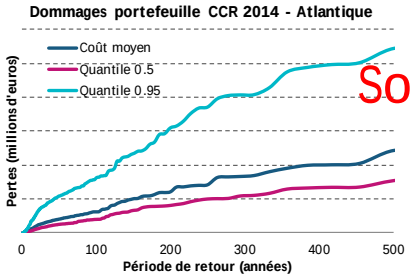
Developing catastrophe models to improve risk knowledge in CCR

Anthropic risks	Hydrologic risks	Geologic risks	Meteorological risks
Terrorism Nuclear Dam brakes	Floods Stormsurge Tsunamis	Earthquakes Drought	Cyclones Storms Agricultural

Post-event losses modeling
Historical event reconstruction (simulations as-if)
Stochastic modelisation



Pricing



Solv. II

Exposure

Importance of scientific partnerships between economic stakeholders and science

- To improve prevention efficiency, (re)insurers and scientists have to work together !

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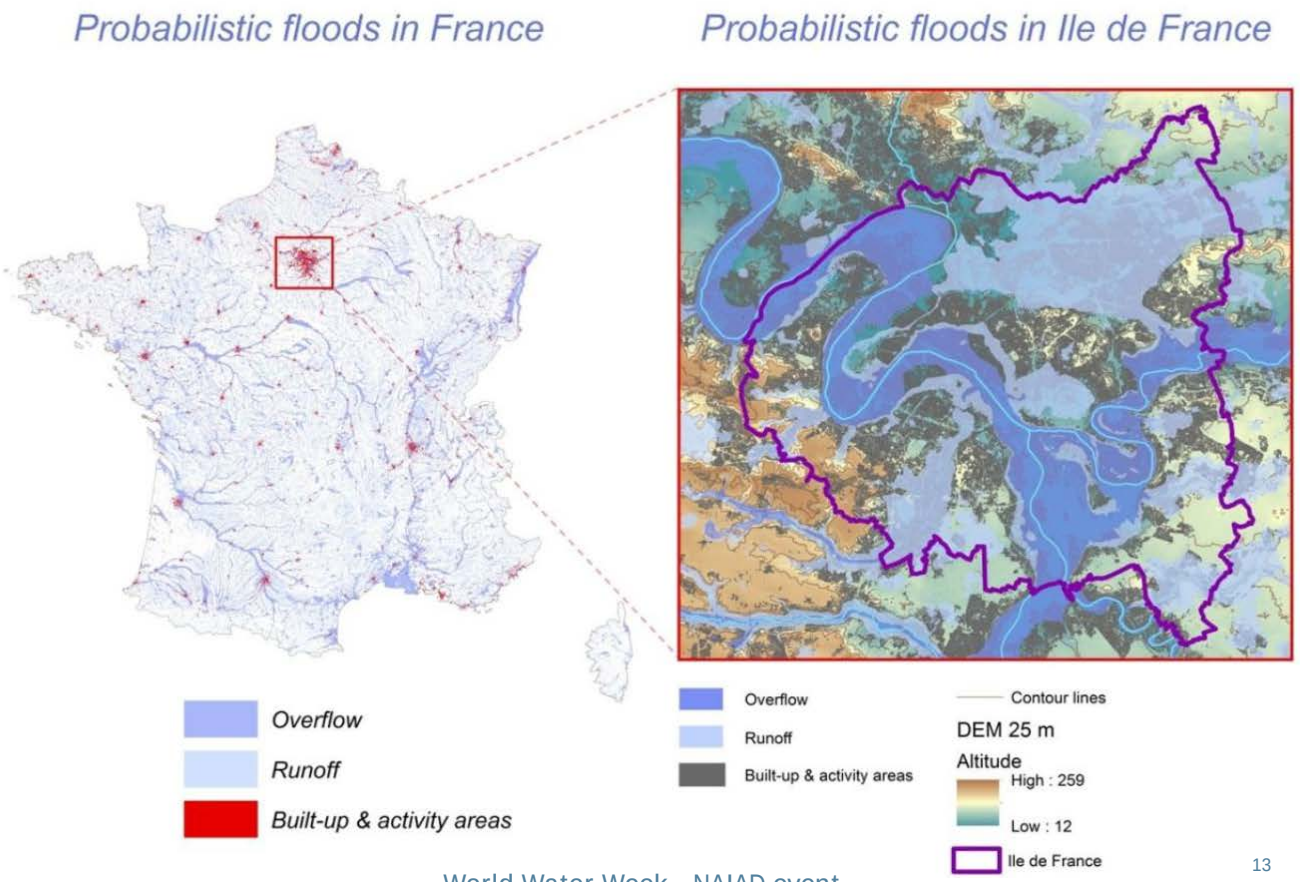
Stochastic modeling: global exposure mapping

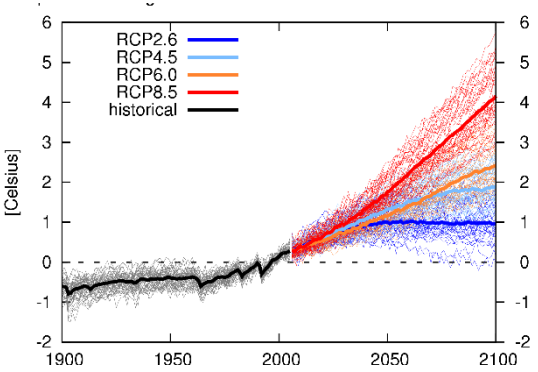
- The first step to priorize defense measures is to know with precision the exposed areas



Coupling a large scale climatic model with high resolution impact models

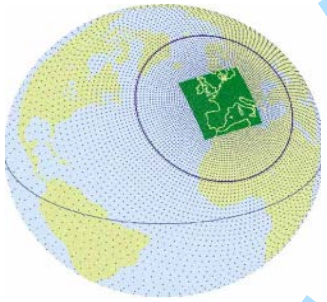
GIEC

Climatic scenario
4.5 and 8.5

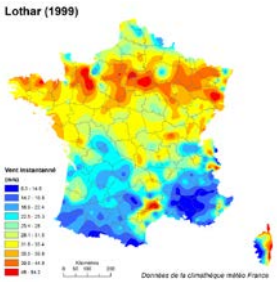


Météo France

« **ARPEGE-Climat** »



Wind



Storm model

CCR

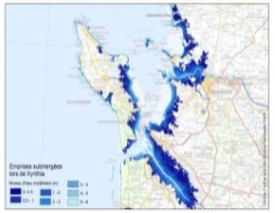
Rainfall

Flood model

Humidity
Soil

Drought model

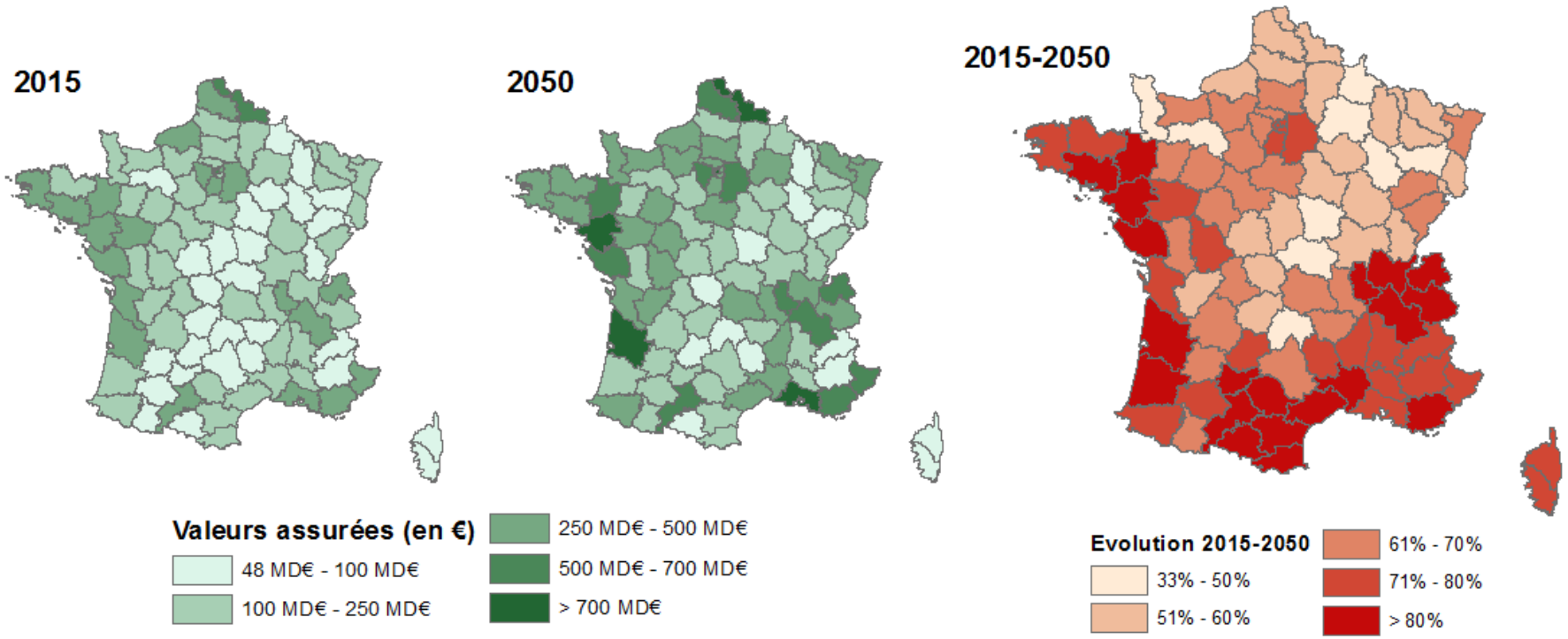
Wind
Pressure



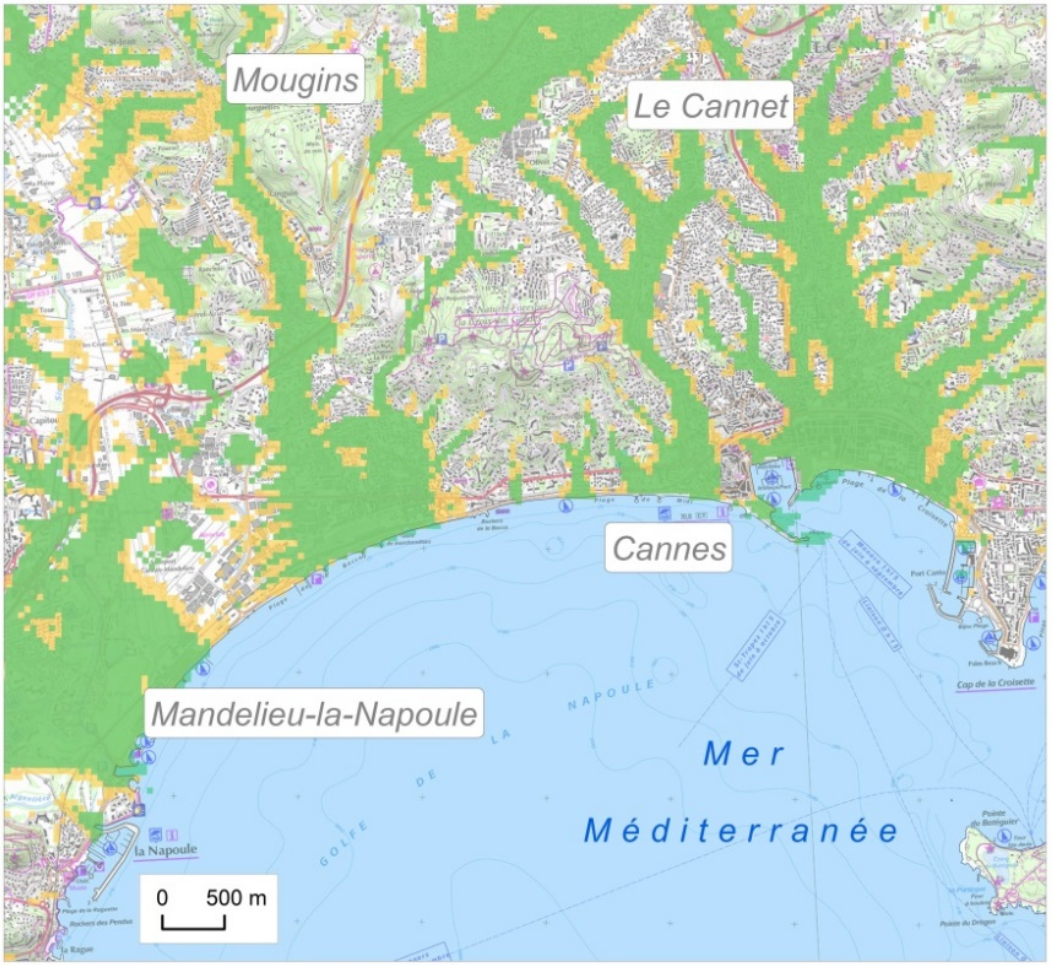
Storm surge model

Evolution of vulnerability in 2050

- The evolution of the financial exposure is strongly correlated with :
  - The number of individual and professional risks
  - The insured values per risk



Map the exposure for current and future climate



Flood hazard maps
50-yrs return period

2016

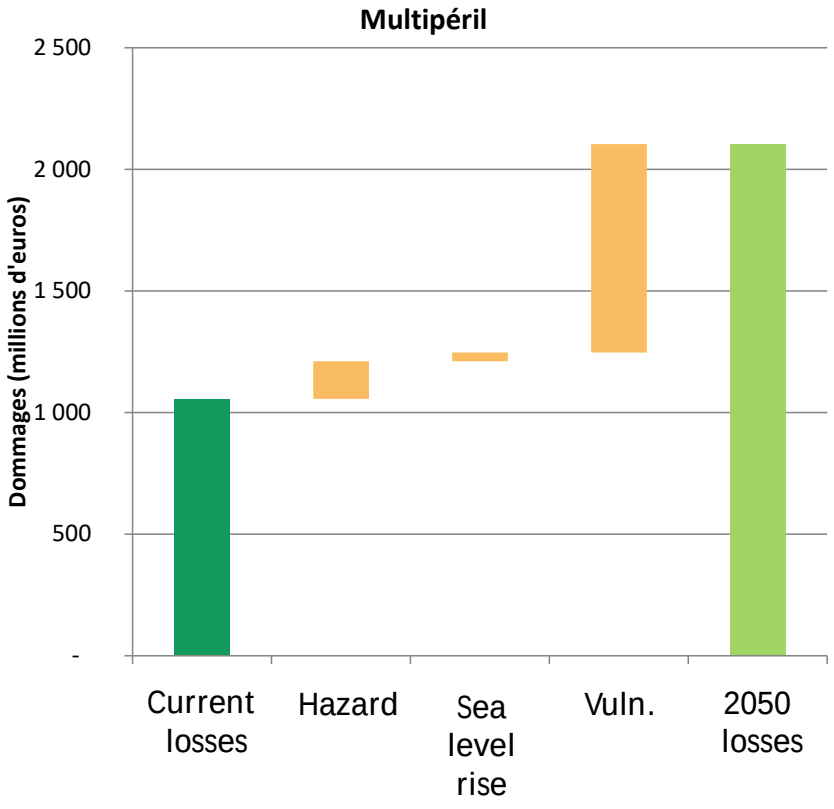
2050

Source : Scan 25 IGN

Estimate the losses for 2018 and for the future

The damage for flood, drought and storm surge would rise by 100% between 2015 and 2050

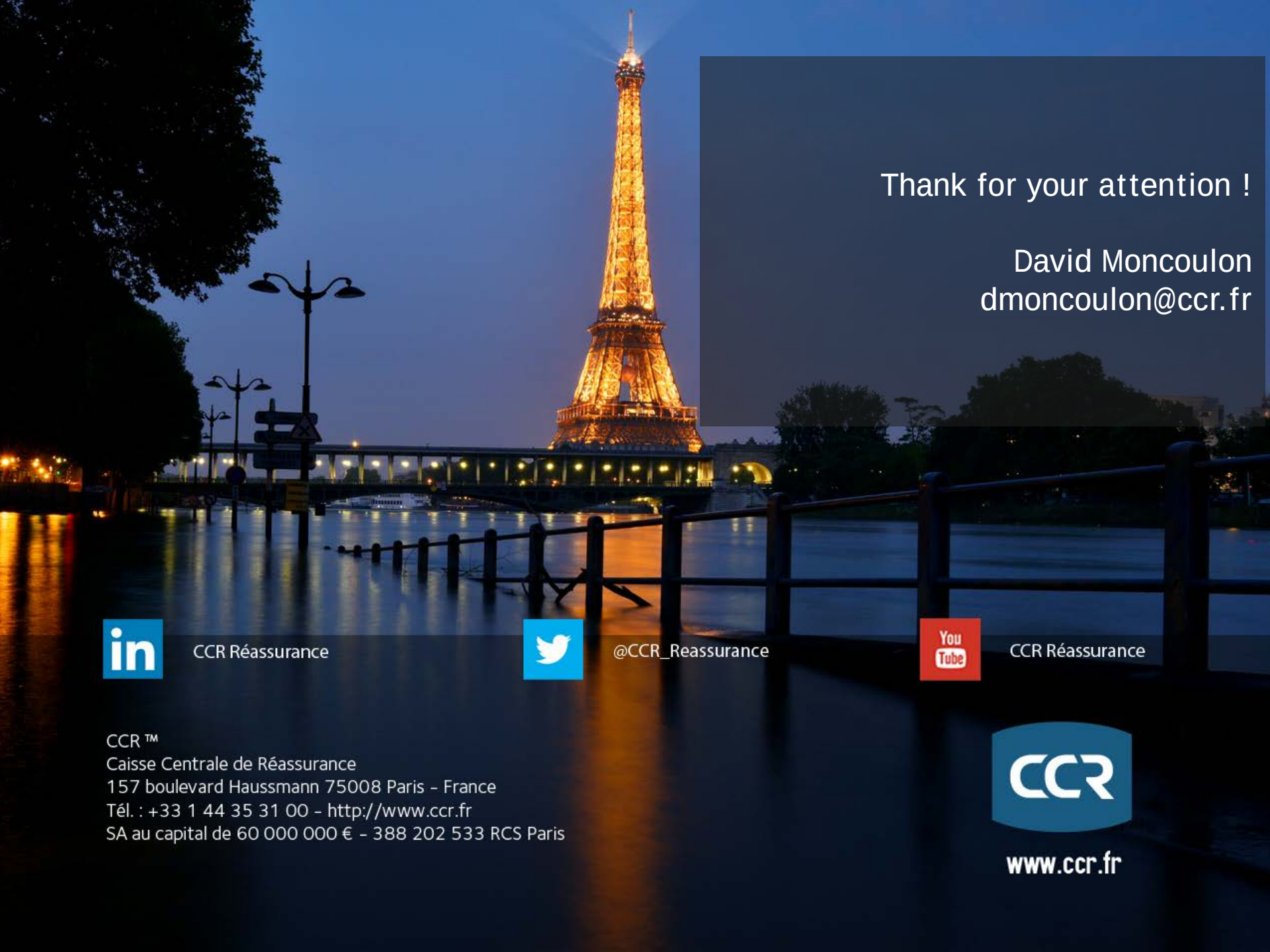
- **Impact of climate change : +20%**
  - Rise of frequency and intensity of flood events
  - Significative impact of sea water level rise
  - More droughts in the South of France
- **Vulnerability : +80%**
  - Insured values
  - Population rise in the coastal areas



Conclusion

- The primary mission of (re)insurers is to enlarge the scope of covered risks and perils
  - To reduce the gap between total damages and insured damages
  - Because financial recovery is not a small part of crisis management

- (Re)insurance has to increase its role in prevention:
  - By working and communicating alongside with scientists on the knowledge of risks
  - By using its modeling capacity to produce cost/benefit analysis for grey or green infrastructures (that's one objective of NAIAD project)
  - By working with public bodies to improve the natural disaster schemes efficiency



Thank for your attention !

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