Global analysis of the uncertainties prevailing in global-scale assessment of coastal flood damage & adaptation costs under 21st century sea-level rise

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What are the most important uncertainties to be reduced in the cascade?

Adapted from Wilby & Dessai, 2010
Coastal flood damage and adaptation costs under 21st century sea-level rise

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Study case

The cascade of uncertainty

Future society
GHG emissions
Climate model
Regional scenario
Impact model
Local impacts

Costs

Uncertainties

5 SSP
3 RCP
Choice in GCMs (4 of CMPI5)

Subsidence (in delta regions Y/N)
Land-ice scenarios (low-med-high)

Damage function DF (2)

Database of Extremes (DINA-COAST or GTSR)
Asset-to-GDP ratio (2)

The envelope of uncertainty

2,880 combinations of scenarios!
COST: dike raising + maintenance

Using a tree-based Machine Learning approach
EAD (billion US$)

EAD: expected annual damage

Using a tree-based Machine Learning approach
Summary

- Decreasing role over time of extremes
- Increasing role of SSP and of RCP after 2030 and 2080 for the damage and adaptation costs respectively.
- This means: “mitigation of climate change helps to reduce uncertainty of adaptation costs, and being able to identify SSP reduces the uncertainty on the expected damages”.

Further work

- Update with new SLR projections (SROCC 2019)
- Integrate additional uncertainties
  - DEM (Kulp & Strauss, 2019)
  - GEV fitting (Wahl et al., 2017)