

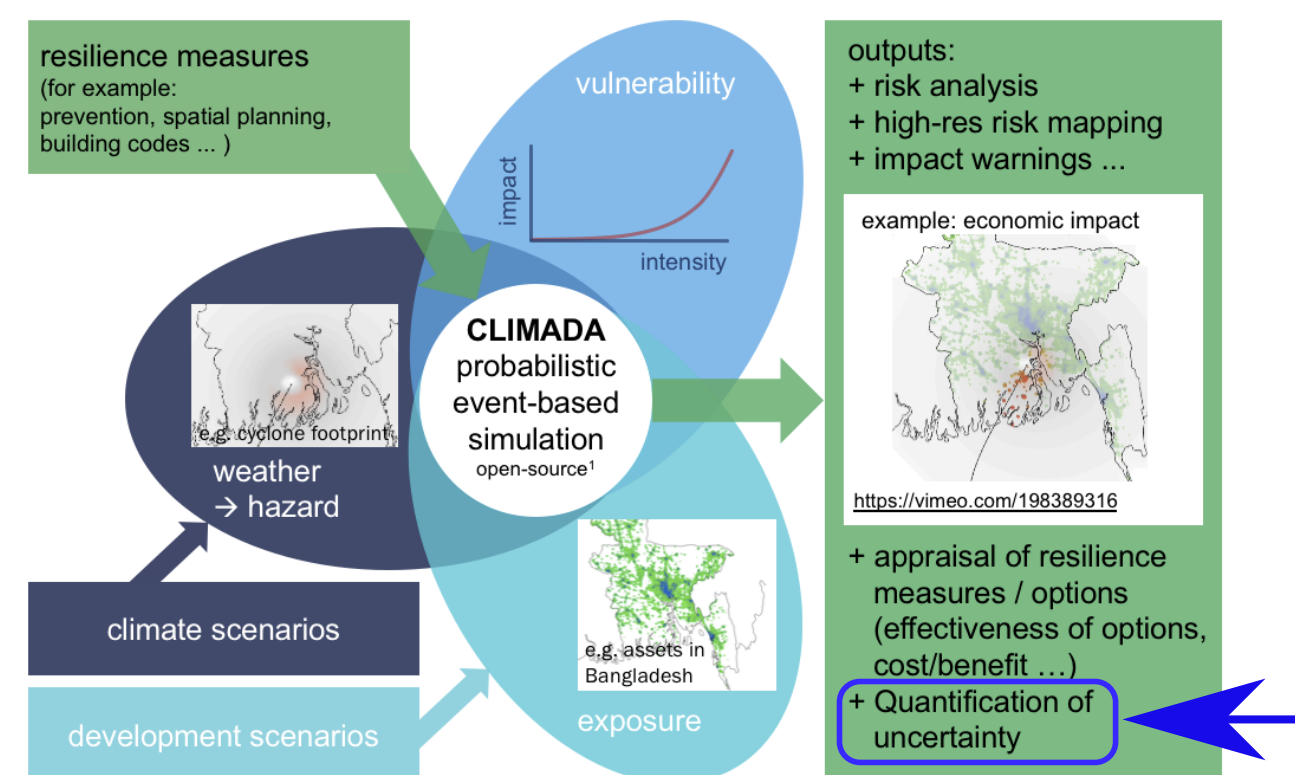
Uncertainty and sensitivity analysis for natural risk and adaptation appraisal modeling with CLIMADA

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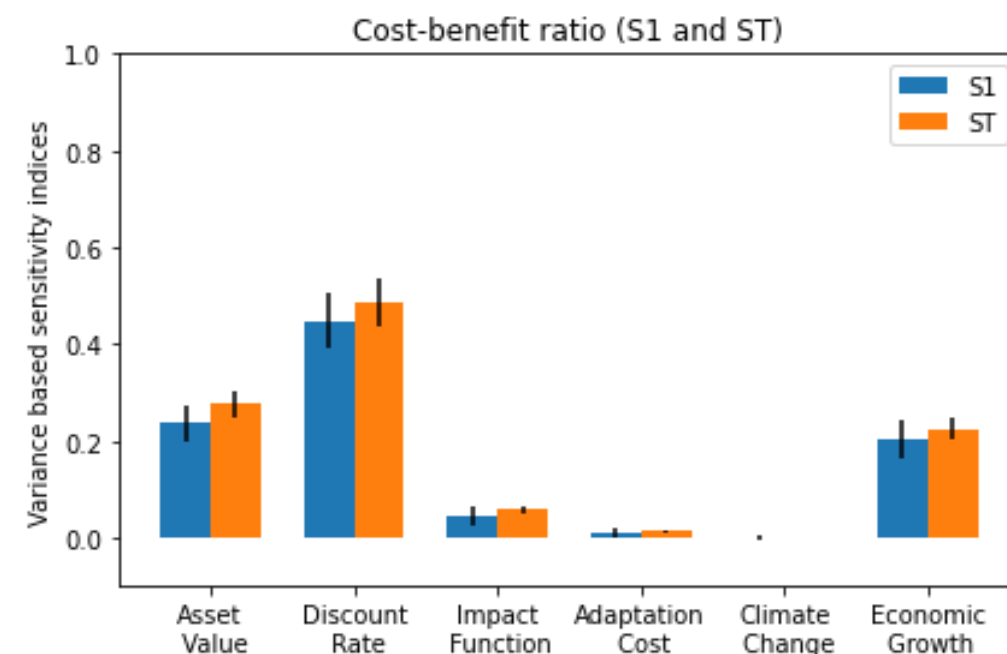
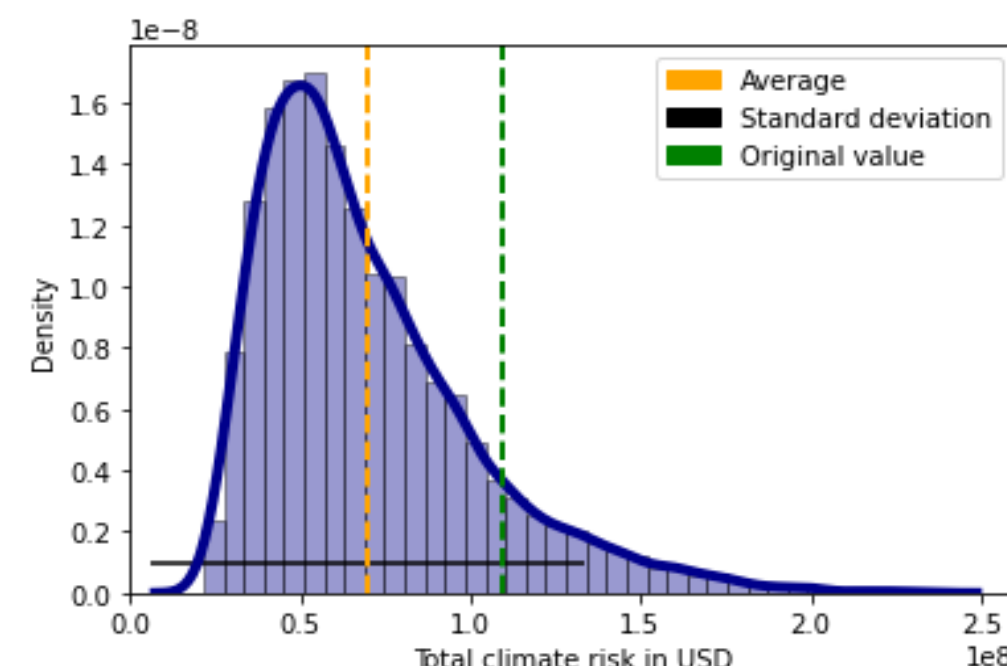
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New module in CLIMADA (a global weather and climate risk assessment platform)^{1,2}:

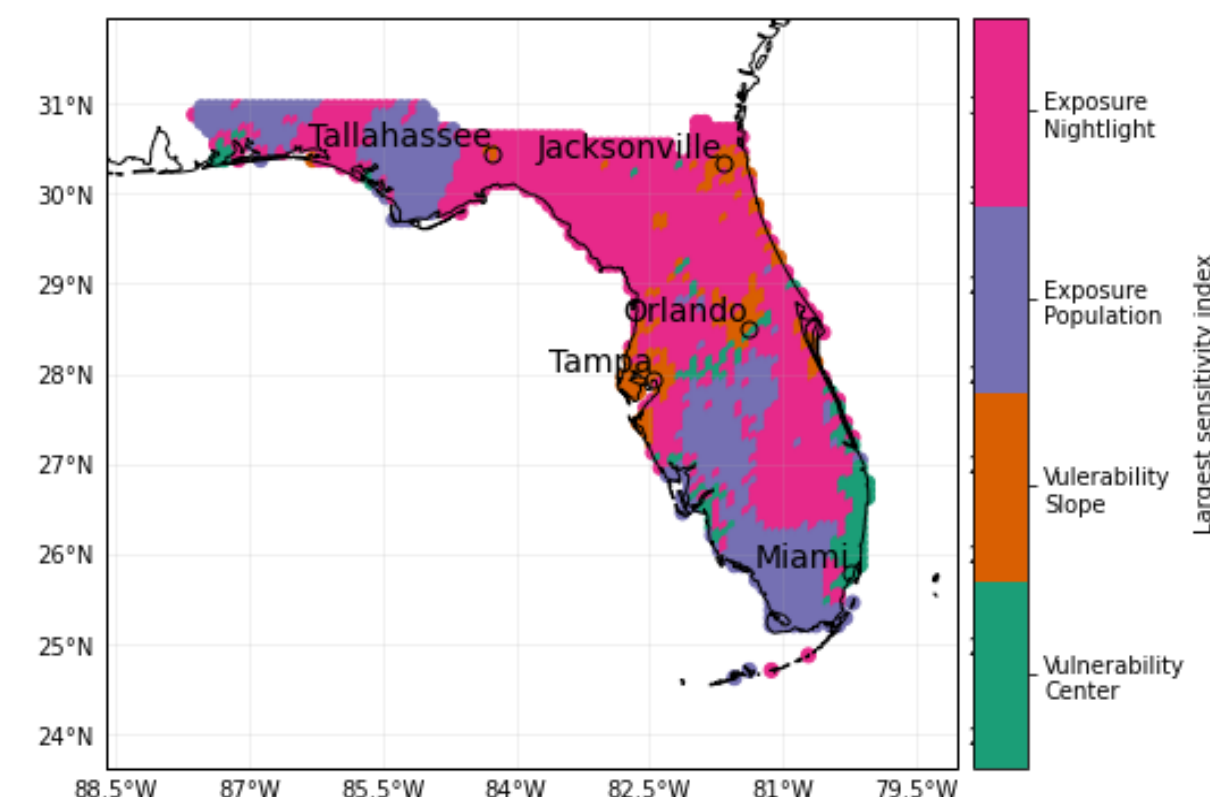
- Uncertainty on any input parameter (exposure, hazard, vulnerability, measures, discount rate, climate scenario, development path,...)
- Any probability density distribution from Scipy.
- Global uncertainty and sensitivity analysis:
 - > impact metrics (average annual impact, probability exceedance curves, impact maps, ...)
 - > option appraisal (cost benefit ratios, impact future,...)
- Based on SALib³



Uncertainty and sensitivity analysis is an essential part of risk modelling and is crucial for a proper interpretation of the data⁴.



Provides important insights
Eg. Tropical Cyclone damage uncertainty in Florida is, in urban areas, most sensitive to the vulnerability, and in non-urban areas to the asset distribution.



Caution

- needs estimates of ranges and distributions of inputs!
- sensitivity says nothing about direct causality

Future development

- robustness to random noise test
- coupling to UQlab for surrogate models

1. Aznar-Siguan, G. and Bresch, D. N.: CLIMADA v1: a global weather and climate risk assessment platform, 12, 3085–3097, 2019.

2. Bresch, D. N. and Aznar-Siguan, G.: CLIMADA v1.4.1: Towards a globally consistent adaptation options appraisal tool, 1–20, 2020.

3. Herman, J. and Usher, W. (2017) SALib: An open-source Python library for sensitivity analysis. Journal of Open

4. Saltelli, A., et al.: Why so many published sensitivity analyses are false: A systematic review of sensitivity analysis practices, Environmental Modelling & Software, 114, 29–39,, 2019.