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# Assessing weather and climate risks with CLIMADA

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Improving the resilience of our societies in the face of volatile weather and climate change is an urgent priority today and will increase in importance in the decades to come. The climate of the past is by no means sufficient a basis for decisions going forward any more. Never in history a society has known so much about the processes that shape its future and obtained a wealth of forward-looking weather and climate information – yet pre-emptive (and precautionary) action is not taking place as widespread as is it could be. While measures exist to adapt to an ever-changing environment, decision makers on all levels need the facts to identify the most cost-effective instruments, they need to know the potential weather and climate-related damages over the coming decades, to identify measures to mitigate these risks – and to decide whether the benefits will outweigh the costs. The Economics of Climate Adaptation methodology implemented in CLIMADA provides decision makers with a fact base to answer these questions in a systematic way.

Starting from a comprehensive mapping of hazards, exposed assets and people and their specific vulnerability, CLIMADA computes the necessary metrics to assess risk and to quantify socio-economic impact. CLIMADA supports multi-hazard calculations and provides an event-based probabilistic approach that is globally consistent for a wide range of resolutions, suitable for whole-country to detailed local studies. Moreover, it implements state-of-the-art probabilistic risk modelling techniques (Monte Carlo simulations building on ensembles and weather generators) to integrate different economic development and climate impact scenarios, allowing to assess portfolios of adaptation measures by quantifying the damage aversion potential and cost-benefit ratio for each measure. The software design is modular and object-oriented, offering a simple collaborative framework and a parallelization strategy which allows for scalable computations on clusters. In this work we present the decision support tool and estimate and contextualize the damage of hurricane Irma in the Caribbean in 2017. Most of the affected islands are non-sovereign countries and do also rely on overseas support in case disaster strikes. The risk assessment performed for this region, based on remotely available data available shortly before or hours after landfall of Irma, proves to be close to reported damage and hence demonstrates a method to provide readily available impact estimates and associated uncertainties in real time.