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Weathering the STORM: Challenges and opportunities in tropical cyclone risk research

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Tropical cyclones (TCs), also referred to as hurricanes or typhoons, are amongst the deadliest and costliest natural hazards, affecting people, economies, and the environment in coastal areas around the globe when they make landfall. TCs are projected to become more intense in a warming climate, enhancing the risks associated with their wind speeds, precipitation and storm surges. It is therefore crucial to minimize future loss of life and by performing accurate TC risk assessments for coastal areas. Calculating TC risk at a global scale, however, has proven to be difficult, given the limited temporal and spatial information on landfalling TCs around much of the global coastline, and how this is going to change under climate change.

To overcome these limitations, we developed a novel approach to calculate TC risk under present and future climate conditions using the Synthetic Tropical cyclOne geneRation Model (STORM). STORM is a fully statistical model that can take any input dataset and statistically resamples this to an equivalent of 10,000 years of TC activity under the same climate condition. The resulting publicly available STORM dataset contains of enough TC activity in any coastal region of interest to adequately calculate TC probabilities and risk from. Furthermore, the STORM algorithm has been expanded with a future-climate module, enabling globally consistent local-scale assessments of (changes in) TC risk. This presentation will discuss the challenges and opportunities in using such synthetic datasets, particularly in the light of improving our understanding of TC risk.