



## **Utilising climate research to inform the insurance industry: Can we use dynamically simulated storms for risk assessment?**

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Risk assessment, in the form of catastrophe modelling, is used by the insurance industry to estimate potential loss from hazardous events, such as tropical cyclones (TCs). Probability distributions of potential loss are generated using available information about the location, severity and frequency of the hazard in question, coupled with information about the vulnerability of insured assets. Hazard information for climate-related events is typically derived from limited observational data. TC data, for example, are only available for approximately the last 50 years, beyond which the data becomes less and less consistent and reliable. Basing statistics on a limited period of historical data neglects the non-stationary nature of the climate system and its influence on TC activity, and hence does not necessarily capture the full array of possible storm scenarios. This is particularly true when considering the influence of natural climate variability operating on longer time scales, such as multi-decadal variability, which are known to have an impact on TCs.

High resolution dynamical climate modelling, has the potential to provide highly relevant information to the risk assessment process. Simulating extreme events in a global climate context is increasingly possible with improved general circulation model (GCM) resolution, physics, and simulation length; this has the potential to improve understanding of the impact of natural variability on climate-related hazards. Although catastrophe models already utilise output from numerical models, closer integration between stochastic event modelling approach undertaken in industry and dynamical modelling undertaken in academia has the potential to further improve risk assessment.

We propose a new approach to the creation of a TC event set, for use in the catastrophe modelling process, based on both available observational data (IBTrACS) and a database of dynamically simulated TCs, extracted from over 200 years of current climate data, simulated using a high resolution, global, ocean-atmosphere GCM. As an initial proof of concept exercise we initially concentrate on the West Pacific region, taking into account storms affecting Japan, China and South-East Asia. A bias corrected (necessary due to the impact of resolution on simulated storm intensities) version of the storm database is statistically sampled and perturbed to produce thousands of synthetic storms. This is a typical catastrophe modelling approach, however the resultant stochastic event-set will be take into account the influence of the naturally varying global climate system.

This project reveals the advantage of having a cross-disciplinary approach made possible through the platform of the Willis Research Network, bringing together climate modellers, statisticians, geovisualisation experts and risk modellers. The challenge of developing a much stronger partnership between the industry and academia, with more openness and a flow of expertise and relevant information, is beneficial to both the industry and the science.