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## Assessing Typhoon Risk Using Multi-model Ensemble Forecasts for Disaster Risk Reduction

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Understanding high impact land-affecting tropical cyclones (TCs) is of crucial importance due to its potential to cause high socioeconomic damages and losses to many coastal areas. However, due to the rarity of extreme severe TCs and the lack of persistent long-term meteorological observations, it is difficult to construct a robust risk assessment of high impact TCs based solely on historical records. This poses a problem from the disaster risk reduction (DDR) perspective, e.g. for the development of financial instruments, as the estimate of occurrence probabilities above damage relevant thresholds remains highly uncertain. In this study, we present an overview and first results of our current project – INtegrated threshold development for PArametric Insurance Solutions (INPAIS), which demonstrates a way forward to improve expected occurrence probabilities of those events for the Western North Pacific (WNP).

We introduce a new approach to construct a TC event set for the WNP based on multi-model ensemble global forecasts – the THORPEX Interactive Grand Global Ensemble (TIGGE) dataset in combination with an impact-based tracking algorithm for Typhoons. This event set contains physically consistent events, which were forecasted but not necessarily realised in the observed past. With respect to the physical characteristics of these forecasted, but not realised events, they are not distinguishable from real TC events. This approach will allow to analyse data equivalent to more than 10,000 years.

In addition to the TC-related wind information, the TC-related precipitation, which is physically consistent with the associated TC, can also be obtained. This provides an opportunity to analyse the compound TC risk (wind and precipitation) using physically consistent data for the WNP. We further demonstrate how this information can be used to improve existing financial instrument for DRR, e.g. parametric insurance solution which is offered by many re-insurance companies, such that resilience and post-disaster recovery speed of society can be improved.