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Modelling interannual variability in a tropical cyclone hazard model

Shirin Ermis¹ and Ralf Toumi^{1,2}

¹Imperial College London, Physics, United Kingdom of Great Britain – England, Scotland, Wales

²Grantham Institute for Climate Change and the Environment, United Kingdom of Great Britain – England, Scotland, Wales

Tropical cyclones (TCs) are some of the most dangerous natural hazards that human civilisation is exposed to. Effective adaptation for coastal regions requires reliable forecasts of risks for the season. Natural Hazard models such as the Synthetic Tropical cyclOne genRation Model (STORM) developed by Bloemendaal et al. (2020) are a common choice to assess risks without the expense of running a full forecast model. STORM has so far only been compared to observations on a basin-wide scale. However, for useful risk assessments in coastal regions, the model is also required to be skilful on much smaller spatial scales. We examine landfall statistics in some key areas such as the Gulf of Mexico. Numerous indices for TC genesis have been developed over the past decades that aim to derive genesis locations from meteorological variables. None of the currently operational indices however is capable of realistically modelling interannual variability in genesis numbers and locations. Here, we compare the purely statistical Poisson interannual variability to that observed. Using Poisson regression between observations and driving environmental variables such as relative sea surface temperatures and wind shear, we then produce a new index for genesis location that has better predictive skill on interannual time scales.