



## **Estimation of tropical cyclone-induced direct economic loss with damage function from an elasticity perspective**

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Tropical cyclones (TCs) are responsible for devastating impact and mass losses. Consequently, it is essential to diagnose all components of risk in order to quantitatively estimate how the TC-induced direct economic losses (DELs) respond to the changes in hazard, exposure and vulnerability. The probability distribution of TC-induced DEL records over the period 2000–2015 for the mainland of China appears to be a negative binomial. This paper quantifies the relationship between TC-induced DELs ( $L$ ), maximum sustained wind (MSW), asset value ( $K$ ) and per capita GDP ( $I$ ) based on the economic concept of elasticity by the generalized linear model. The coefficients on three terms indicate that a doubling in MSW increases the DEL by 303%, a doubling in asset value exposure increases the DEL by 65%, while a doubling in per capita GDP leads to a 53% decrease in DEL. The results can be used for loss assessment of disasters that occur afterwards. The elasticity values suggest that continuing economic growth will take a heavy toll on TC-prone regions assuming no changes in mitigation and adaptation efforts. From another perspective, the results emphasize that human behavior matters to the formation of disasters and disaster risk reduction.