Development and assessment of the probabilistic storm surge forecast system in Taiwan: Case Study of Typhoon Maria in 2018

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From the forecast and the analyzed typhoon tracks in Taiwan, it is found that if the forecast track errors are greater than 100 km, roughly a quarter of the length of Taiwan, significant variability of storm surge elevation can be seen.

In order to consider the uncertainty of the atmospheric forecast, this study aims to develop the probabilistic storm surge forecast system. The coastal storm surge model applied in this study is COMCOT-SS (COrnell Multi-Grid COupled Tsunami Model –Storm Surge), which is the kernel of the operating deterministic storm surge forecast system in CWB, Taiwan. It solves nonlinear shallow water equations in the nested-grid scheme. Two ensemble methods are adopted in this study, one is Deterministic Track Error Distribution Method, D-TED Method. The other one is the Ensemble Track Analysis Method, ETA Method. D-TED Method is generated from the deterministic forecast, while the ETA Method obtains typhoon tracks and parameters from the CWB WEPS (CWB WRF Ensemble Prediction System).

From the case study of typhoon Maria in 2018, it shows that as the typhoon approaching Taiwan, the coverage of the tracks from ETA Method would be more convergence comparing to the tracks from D-TED Method, and it provides a more concentrated surge elevation distribution.

Keywords: storm surge, ensemble forecast, COMCOT-SS