

# 2025年丹娜絲颱風引發臺灣西南地區海水倒灌事件之數 值模擬研究

## Numerical Simulation Study of Coastal Inundation Induced by Typhoon DANAS along Taiwan's Southwest Region in 2025

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### 摘 要

2025年7月，中度颱風丹娜絲以罕見路徑登陸臺灣西南部，在臺南七股等沿岸地區引發嚴重海水倒灌，凸顯了當地暴露於暴潮災害下的脆弱性，以及暴潮預報準確度提升可為當地帶來顯著的貢獻。

潮位觀測資料顯示此次事件呈現與以往暴潮事件不同的特徵，特別是東石潮位站在颱風登陸時出現明顯的「先降後昇」現象，顯示颱風登陸臺灣西南部前後對該站點產生顯著的風剪力效應。作業中之預報模式受限於地形與數值模擬解析度，未能準確捕捉東石站的異常潮位變化特徵，為改善此一情況，本研究利用COMCOT-SURGE多重網格風暴潮預報系統，結合TPXO全球天文潮模式，深入探討此次異常暴潮事件的成因機制。研究中首先呈現本次颱風事件期間模式作業預報之校驗結果，並為提升模式預報準確度探討兩個關鍵精進方向：提升地形解析度以更準確描述沿岸複雜地形對風場與暴潮的影響，以及利用觀測資料與TWRP大氣模式資料最佳化理想風場參數設定，檢視現有模式重現暴潮水位觀測值的能力，探討模式未來應優先著重之改進方向。

關鍵字：COMCOT-SURGE、TWRP、理想風場、丹娜絲颱風、海水倒灌

### Abstract

Typhoon Danas hit southern Taiwan in July 2025, causing severe flooding in coastal areas, including Qigu, Tainan. As a result, local areas were exposed to storm surge disasters and demonstrated the significant contribution that improved storm surge forecasting accuracy could make.

Tide gauge observation revealed that this event characteristics distinct from previous events, especially the "drop-then-rise" phenomenon observed at Dongshi during the landfall of the typhoon. This phenomenon indicated significant wind shear effects on the station during the typhoon's landfall in southwestern Taiwan. The operational forecasting models, limited by topographic and numerical grid resolution, were unable to accurately capture the unusual tide level variations at Dongshi. To address this issue, this study employs the COMCOT-SURGE model coupling with TPXO, to investigate the causal mechanisms behind this anomalous storm surge event. The study first presents the verification results of operational model forecasts during the typhoon and identifies two critical improvement areas: enhancing topographic resolution to better model coastal effects, and optimizing wind field settings based on observed data and TWRP model. This research effectively assesses existing models and establishes priority directions for future model improvements.

Key words : COMCOT-SURGE, TWRP, Idealized Wind Model, Typhoon Danas, Inundation