

# 暴潮預報系統作業用理想風場模式之準確度評估

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## 摘 要

選用理想風場模式作為氣象輸入場之暴潮預報模式相較於採用大氣動力模式者，具備簡潔、效率、彈性及較低計算成本等優點，在預報時效上極具優勢。然而，各界對於潛在的“最佳”理想風場決定方法仍然沒有達成共識，因此也沒有相關的建議或指標。為提升暴潮決定性預報系統的預報準確性，本研究規劃在未來預報作業中，依據颱風的強度變化，選用更符合颱風當下結構之理想風場模式進行颱風暴潮預報。

研究中為瞭解理想風場模式與颱風強度之關係，首先收集ECMWF ERA5之10米風速再分析場中近10年侵台颱風案例作為參考基準，與候選理想風場模式進行比較，探討理想風場模式描述風速時可能之誤差分布情形。初步研究成果中發現，搭配最佳路徑參數計算颱風風速誤差分布時，若選用資料半徑為100公里以上，則使用E11描述風速分布可以得到所有模式中最低之誤差；若選用資料半徑為100公里內，模式表現會依據颱風強度有所變化。以近中心最大風速33公尺/秒為門檻，氣象局作業用理想風場模式最適合描述較強的颱風，而較弱的颱風則可利用W06模式得到最低之風速誤差分布。

後續研究進一步利用候選理想風場模式執行近10年侵台颱風案例之暴潮預報模擬。模擬完成後將收集模擬結果與觀測資料進行比對，使用方均根誤差、偏差量及相關係數等統計參數進行評估及驗證，具體提出颱風在指定侵台情境下，選用何種理想風場模式較有可能得到最低之預報水位誤差，以期精進未來暴潮預報成果。

關鍵字：再分析風場、理想風場、風暴潮預報系統、統計分析

# **Accuracy Evaluation of Idealized Wind Models for Storm Surge Forecasting System**

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## **Abstract**

Storm surge forecasts using idealized wind models as inputs have the advantages of simplicity, efficiency, and flexibility compared to those using atmospheric dynamical inputs. However, there is no consensus on the "best" choice of wind model and therefore no recommendations or indicators exist. The objective of this study is to develop a procedure for selecting the ideal wind model based on typhoon intensity in order to make the numerical winds more consistent with the typhoon structure and thus improve the accuracy of storm surge prediction in future operations.

To understand the relationship between the idealized wind models and the intensity of the typhoons, the ECMWF ERA5 10 m wind speed of the typhoons that hit Taiwan in the past decade was collected and then compared with the candidate idealized wind models to make a discussion of the error distribution between them and the reanalysis winds. The candidates are further used to perform the storm surge forecast simulation of historical warnings to see the error distributions and compare them with the operational wind model. The simulation results are collected and calibrated with observational data, and statistical analysis is performed for evaluation and verification. Finally, this study proposes which ideal wind field model is more likely to achieve the lowest forecast error under the specified typhoon invasion scenario, with the expectation of improving storm surge prediction.

Keywords: ECMWF, idealized wind model, storm surge forecasting system, statistical analysis