# 2019-2021年侵(近)臺颱風路徑之分析：WRF及MSM

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## 摘　要

颱風生成後，在往臺灣移動的過程中，常易因大氣駛流場的影響，使得路徑有所變化，進而改變颱風影響臺灣及附近海域的時間與地點；有鑑於此，未來72小時內影響臺灣的颱風路徑，成為預報作業中心關注的預警項目之一。本研究運用海軍大氣海洋局所建置天氣研究暨預報系統(WRF)及中尺度波譜模式(MSM)，相互比對上述兩種數值模式的預報路徑，期能透過時間及空間上的差異，診斷模式的預報特性，以提供後續模式精進之參考，及提升數值模式的可預報度。

本研究針對2019-2021年共5個侵(近)臺颱風個案，分析颱風中心登陸或最接近臺灣的72小時以內的預報路徑。經比對實際觀測結果，顯示模式預報的直行路徑多為南北向修正、轉彎路徑多為東西向修正；其次，預報路徑誤差平均值顯示WRF在00時較小，然而MSM則在24-48小時表現較佳。綜合而言，MSM結果可作為颱風登陸前1-2天的路徑預報依據，但其誤差會因移動方向而有所差異。

關鍵字：颱風、路徑、WRF、MSM、可預報度

# Analysis of Tropical Cyclone Tracks Affecting Taiwan during 2019-2021: WRF vs. MSM

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## Abstract

After a tropical cyclone (TC) is formed, its track could be unpredictable on the way toward Taiwan due to the influence of the atmosphere's steering flow. In addition, it would change TC's impacting Iperiod and location on Taiwan and the vicinity. Thus, the TC tracks affecting Taiwan within 72 hours become one of the most concerned early warnings. In this study, the forecasting routes from the numerical models, WRF and MSM, developed by Naval Meteorological and Oceanographic Office are used to compare their difference. With the temporal and spatial differences, the forecasting characteristics of the models can be diagnosed. The comparison is then able to serve as a guide for improving the model's performance and promoting its predictability.

A total of five TCs that hit (or are nearby) Taiwan between 2019 and 2021 are examined. Their tracks forecasted by the models are used to analyze by selected period within 72 hours with the closest or equivalent TC center in Taiwan. Comparing the in-situ observation, it reveals a north-south adjustment for forward-straight routes by the model forecast, and east-west adjustment for the recurving routes. Additionally, the averaged error is lower for WRF on 00-hr forecasting track, but MSM outcome can be better performance for its 24- to 48-hr forecast. In summary, the MSM can provide forecasting reference for one to two-day before TC landfall on Taiwan; however, its error can vary depending on the moving direction.

Keywords: tropical cyclone, track, WRF, MSM, predictability