

系集模式颱風風速預報之技術發展

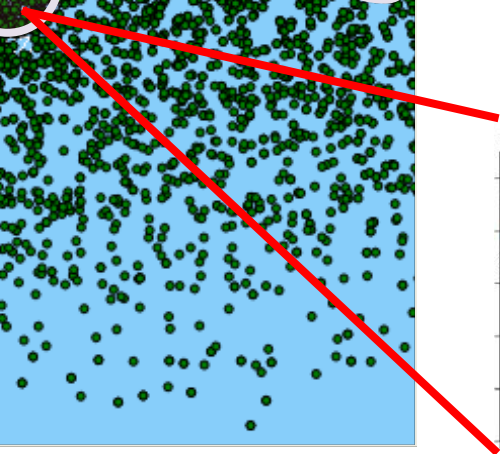
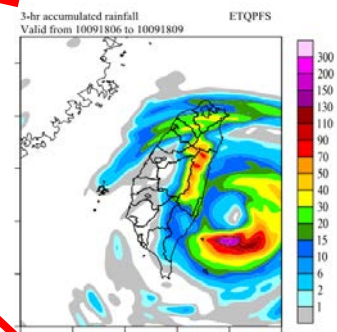
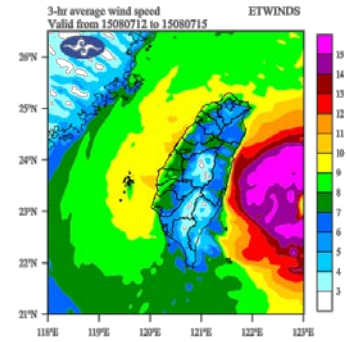
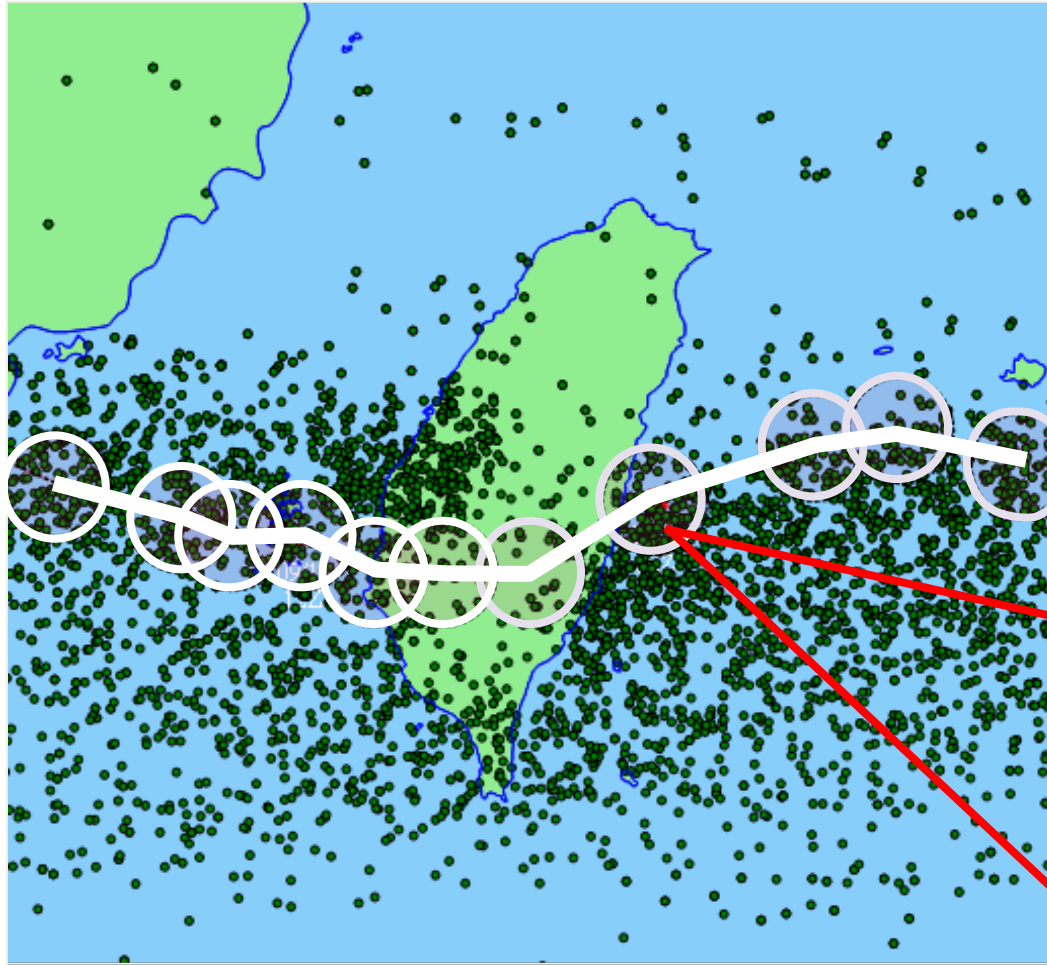
曾千祐 洪景山
中央氣象局氣象資訊中心

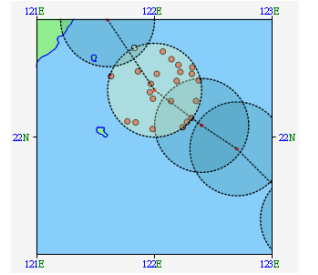
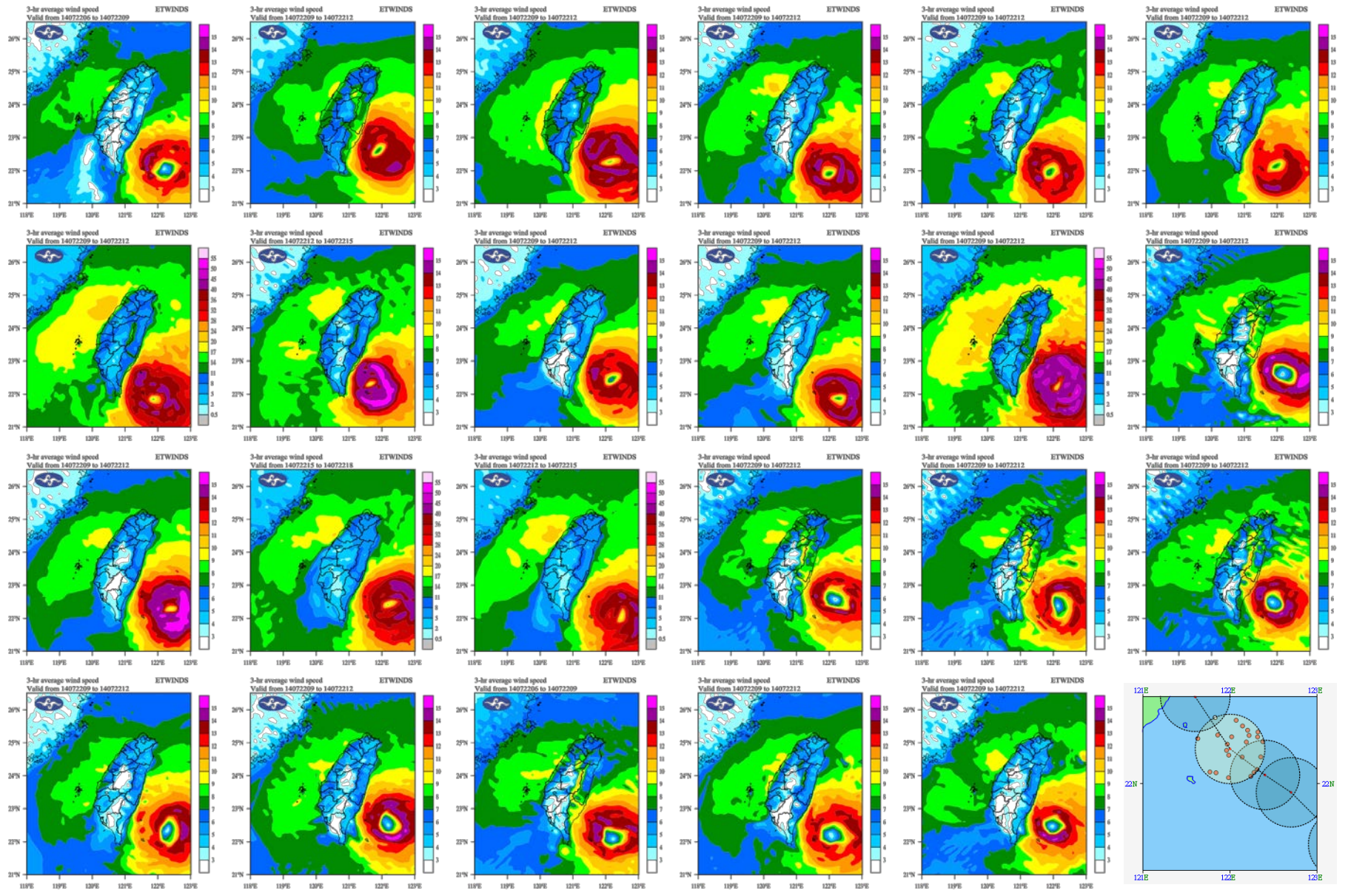
2015/09/15

緣起

- 颱風臨臺期間，臺灣的風速分布和颱風的位置有密切關係。為提供預報及防災單位在颱風臨臺期間臺灣的風速預報指引，建立以系集模式颱風定量降水（ETQPF）架構為基礎之系集模式颱風風速預報技術（Ensemble model based Typhoon Wind Speed Forecast，ETWind）。

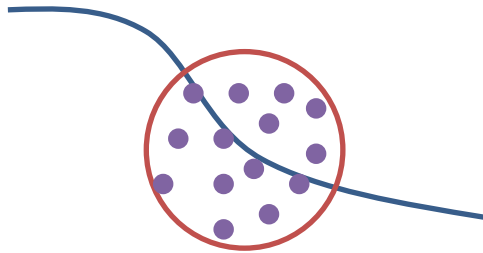
ETQPF 架構簡介



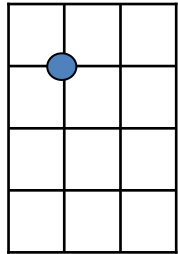


風速合成方法

3-hr composite

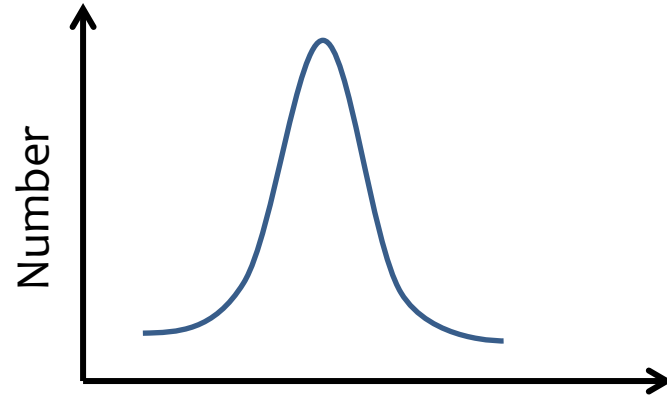


n=100



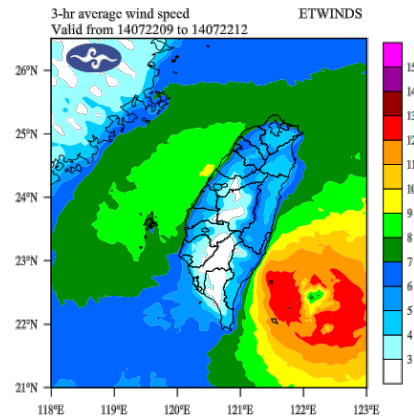
X 100

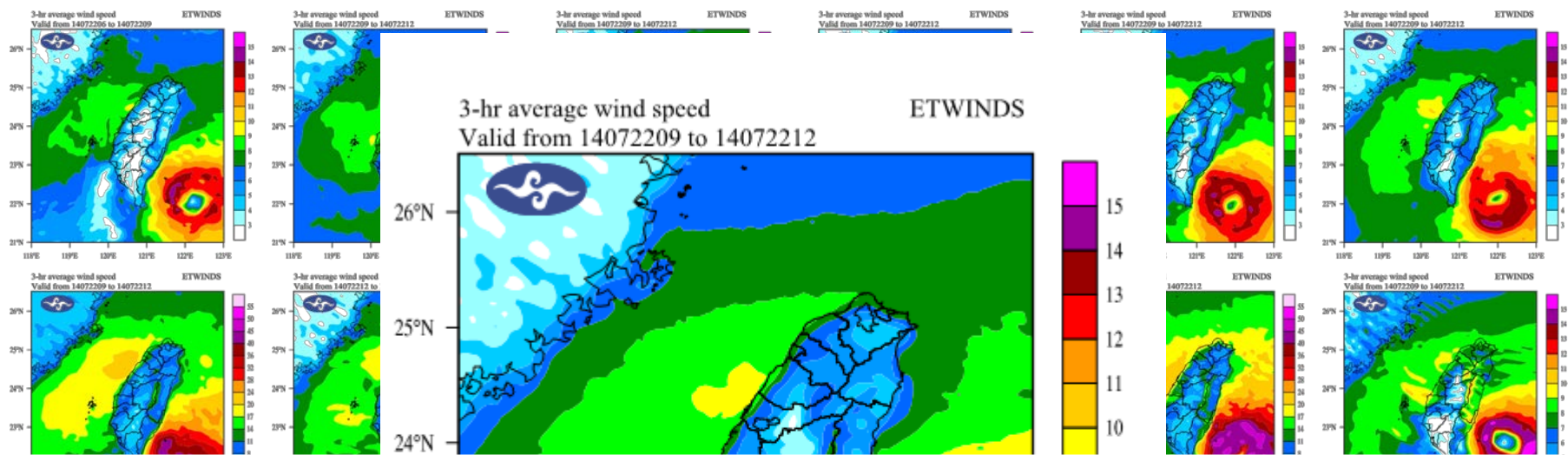
Max wind speed in 3-hr



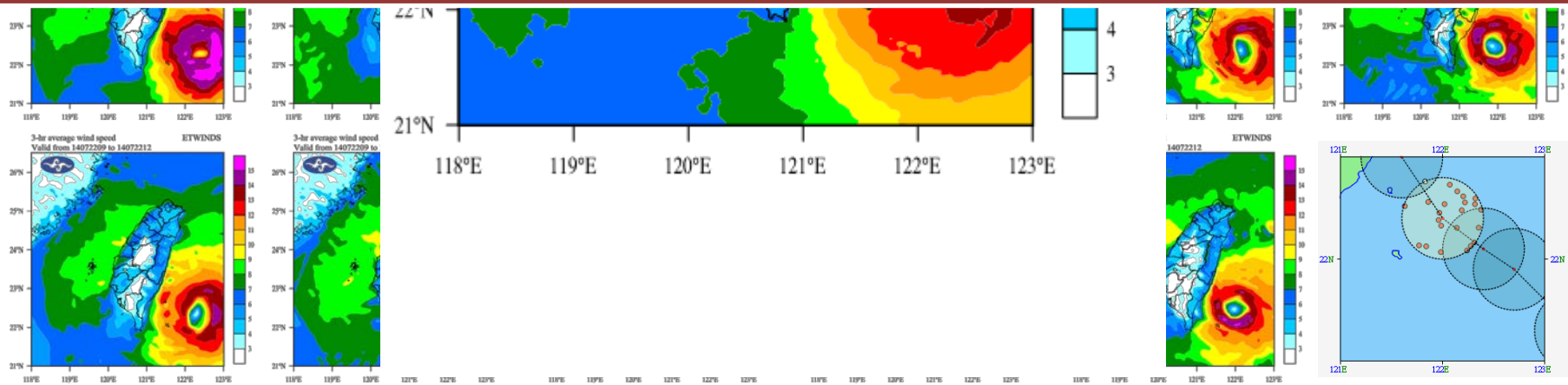
PDF of the wind speed forecast for all the screened ensemble cases at a grid point.

The median, third quartile, maximum or any percentile in this PDF distribution could be retrieved to represent the 3-hr composite wind speed.





選用哪種百分位數最為合適？

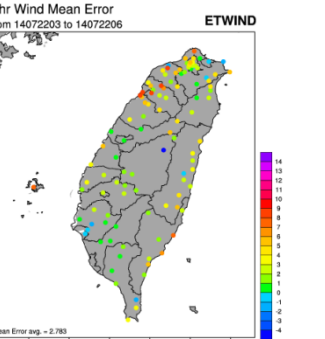
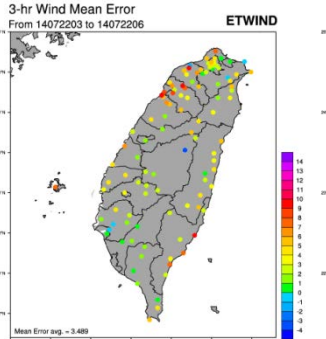
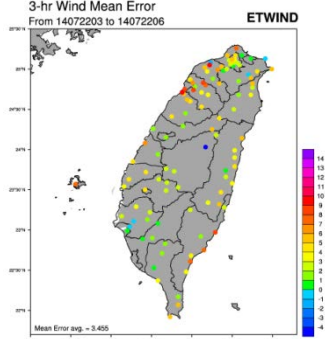
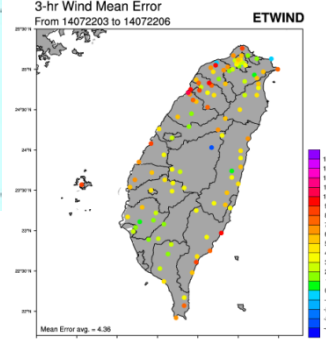
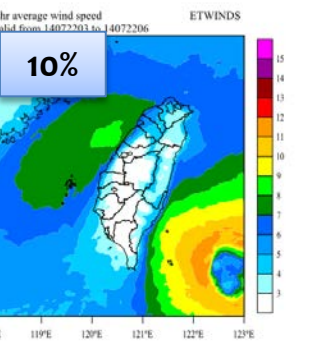
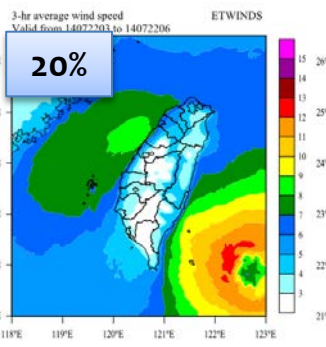
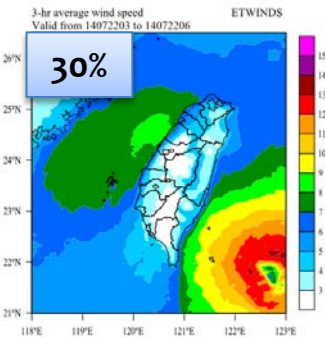
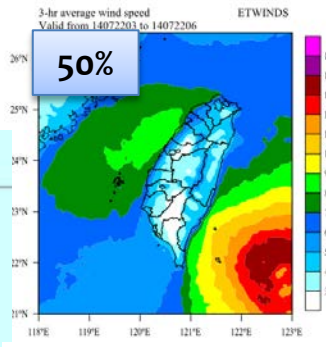
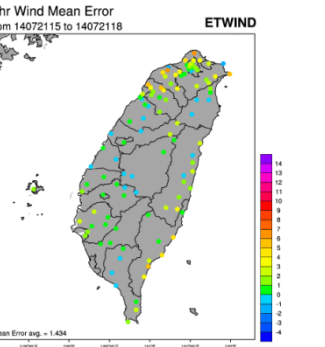
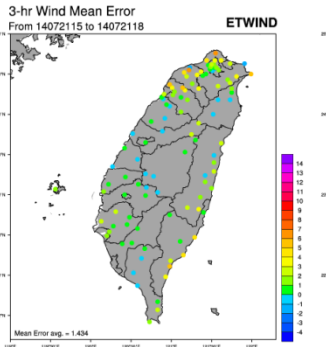
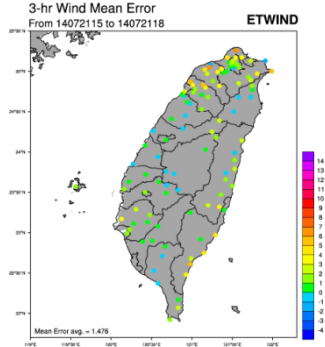
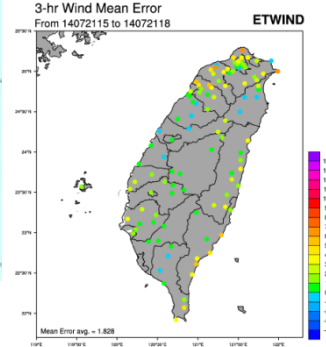
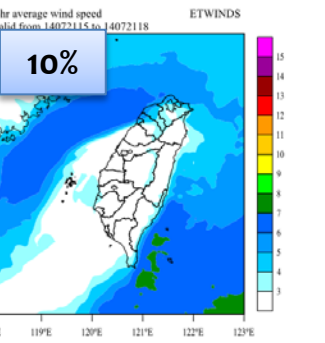
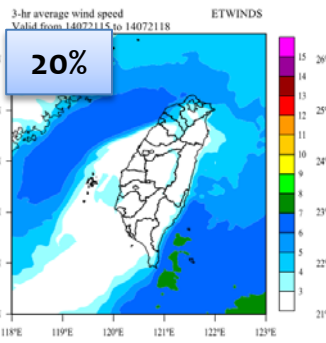
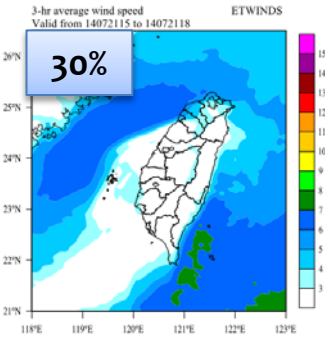
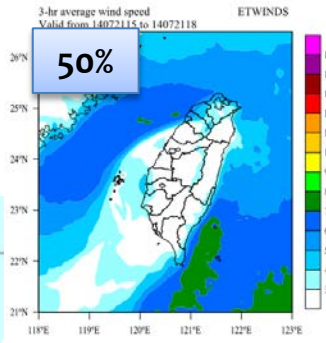


實驗設計

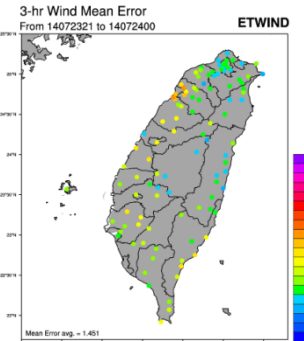
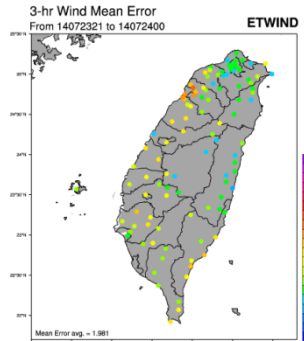
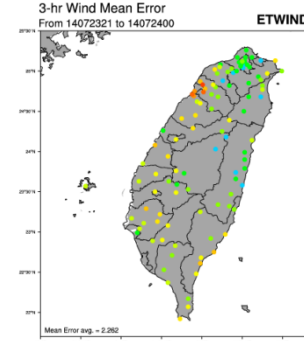
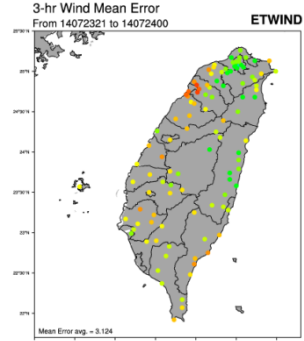
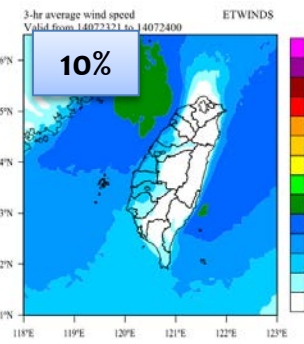
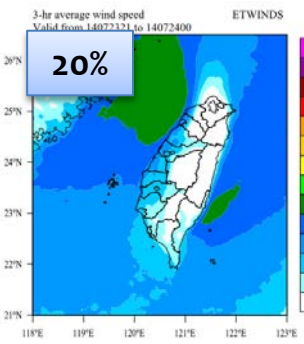
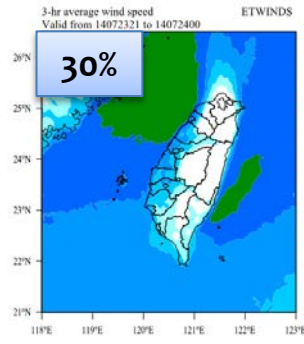
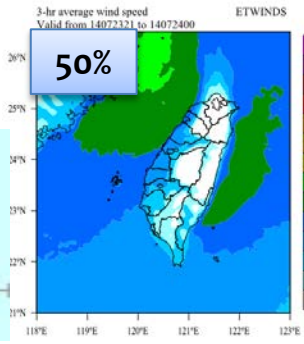
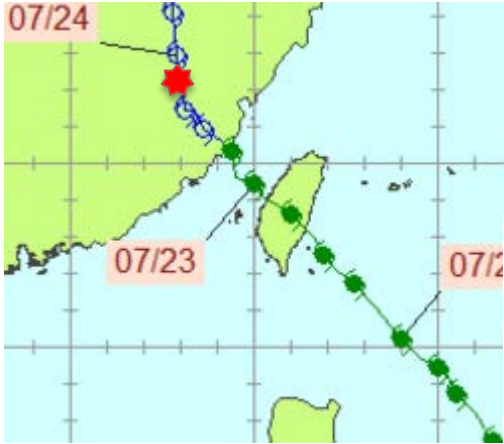
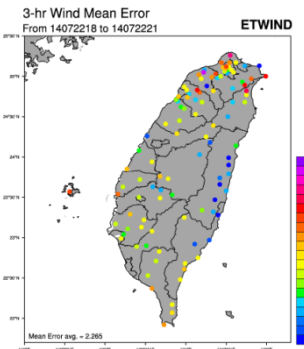
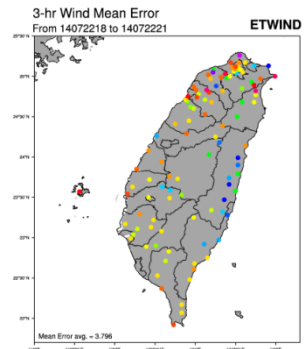
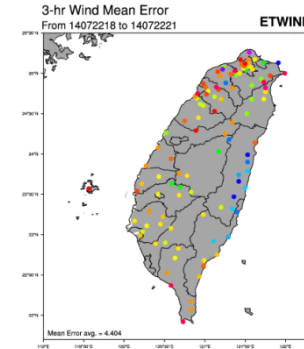
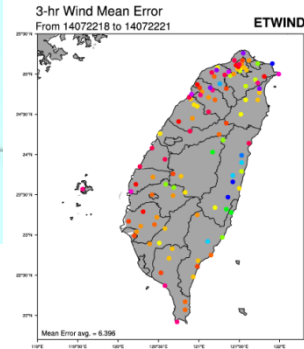
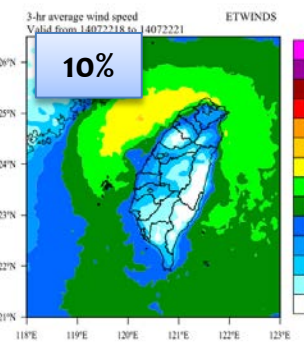
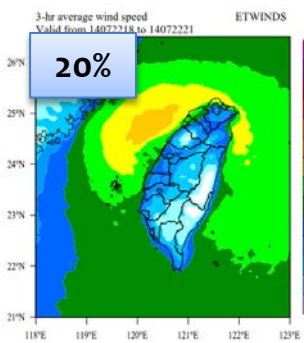
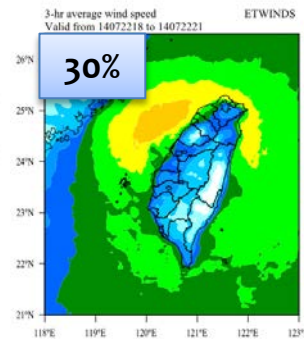
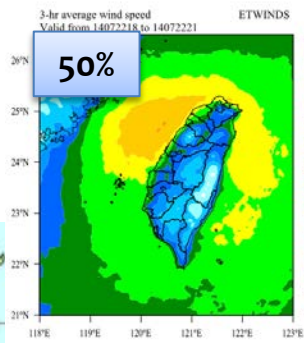
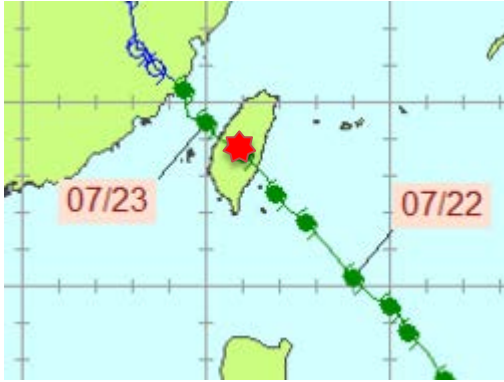
- 個案選擇：
 - 2013蘇力颱風
 - 2014麥德姆颱風
 - 2014鳳凰颱風（輕度）
 - 2015紅霞颱風
 - 2015蓮花颱風（輕度）
 - 2015蘇迪勒颱風
- 百分位數選擇：50%、30%、20%、10%
- 合成產品區間：3小時
- 採用最佳路徑做為篩選路徑，以去除路徑誤差的因素。
- 校驗對象：
 - 局屬測站及自動站，取3小時內最大平均風速做為校驗基準。
 - 取最靠近測站的網格點進行校驗。

實驗結果與討論

2014 麥德姆



2014 麥德姆

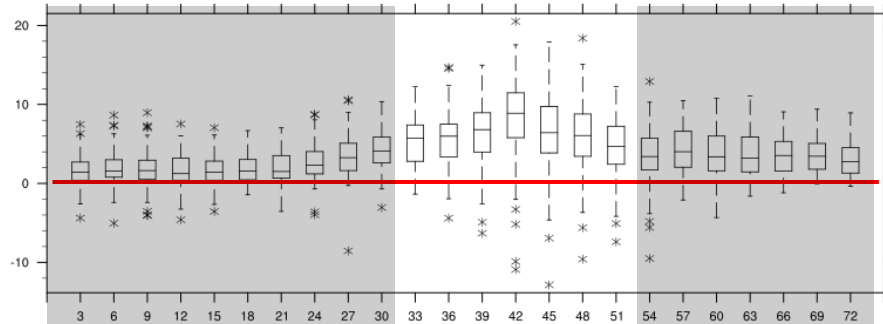


2014 麥德姆

50%

MATMO_50 14072100

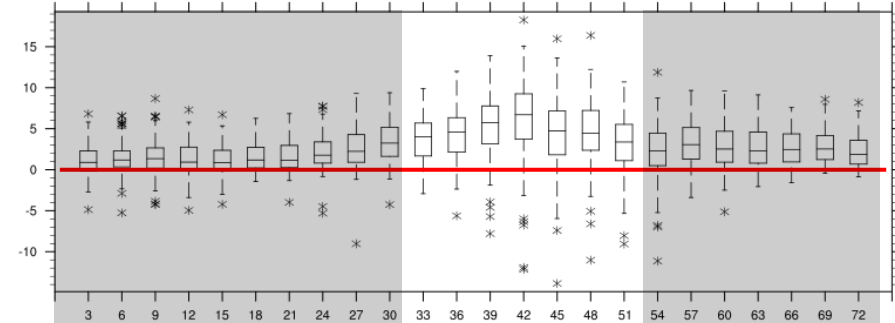
Mean Error



30%

MATMO_30 14072100

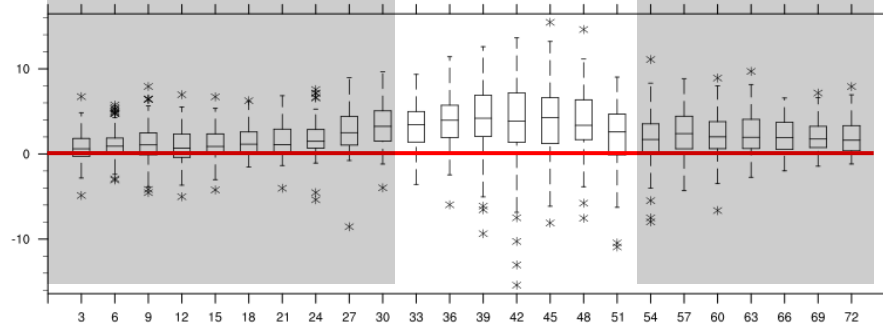
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20%

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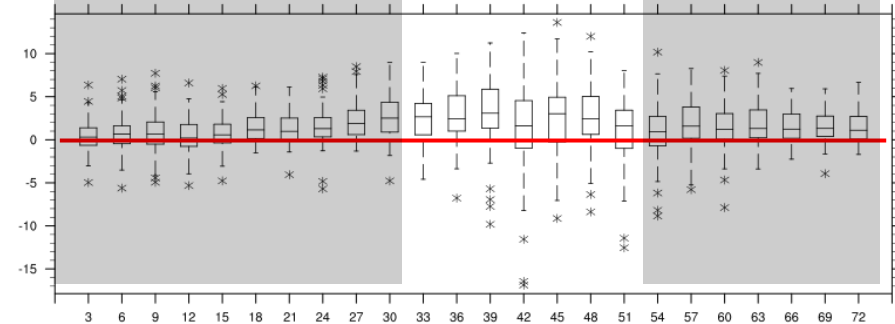
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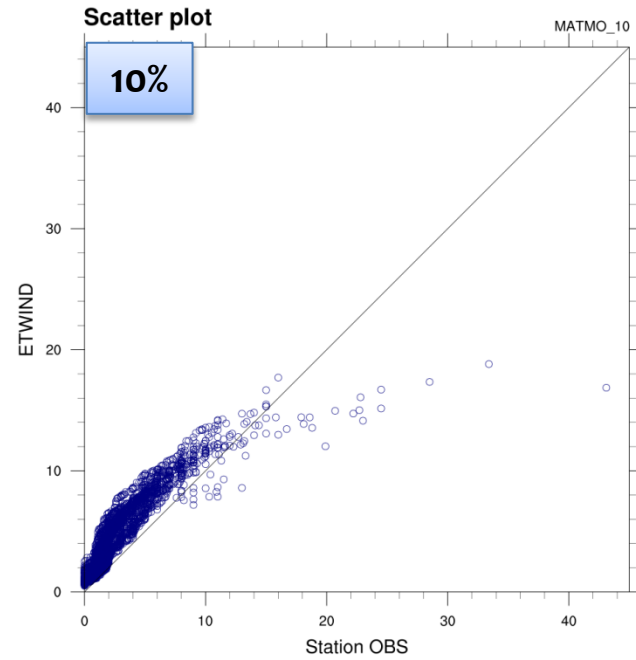
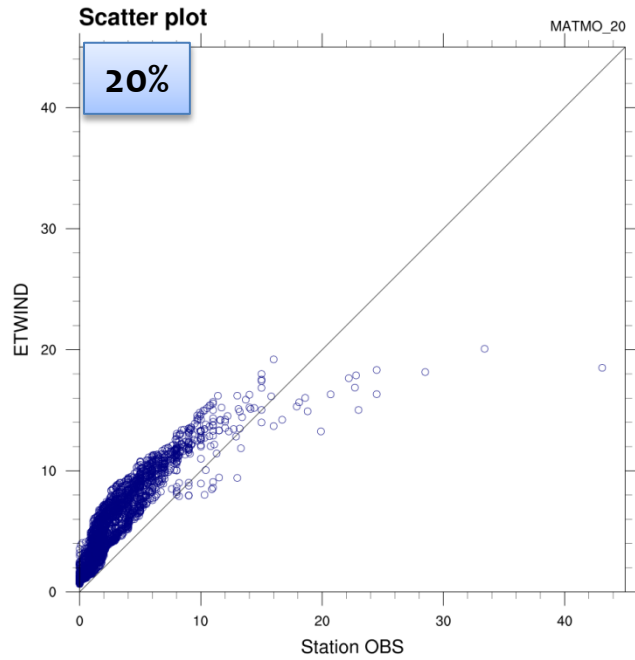
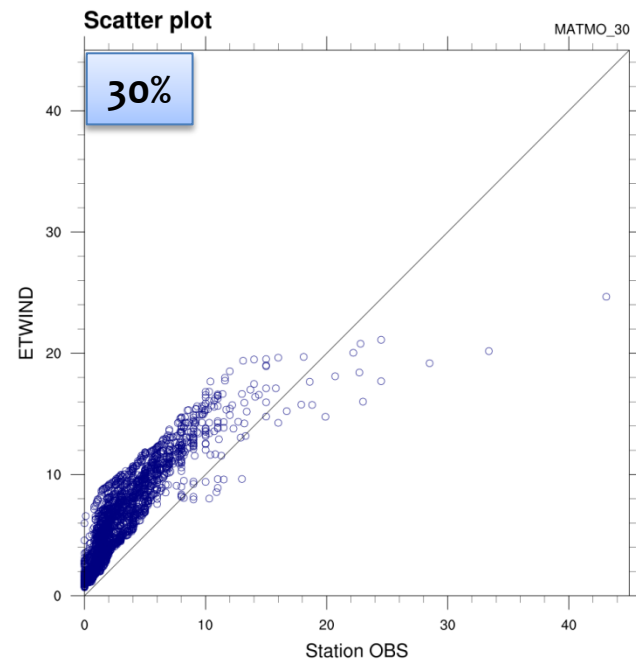
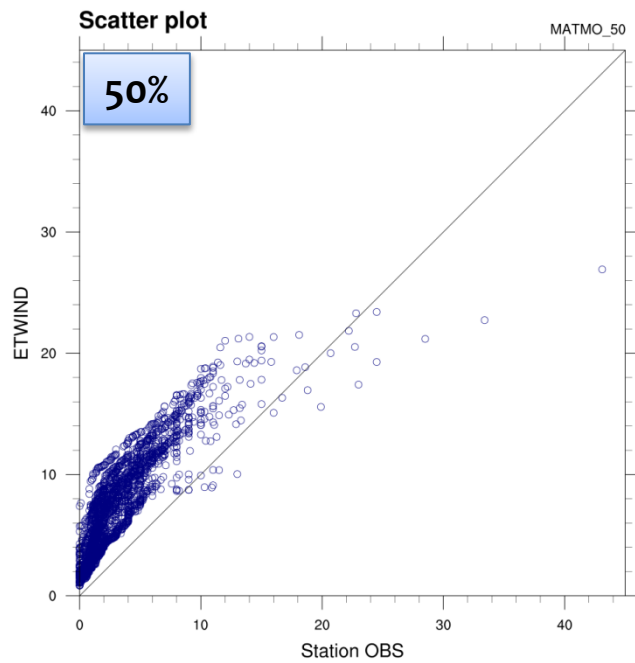


10%

MATMO_10 14072100

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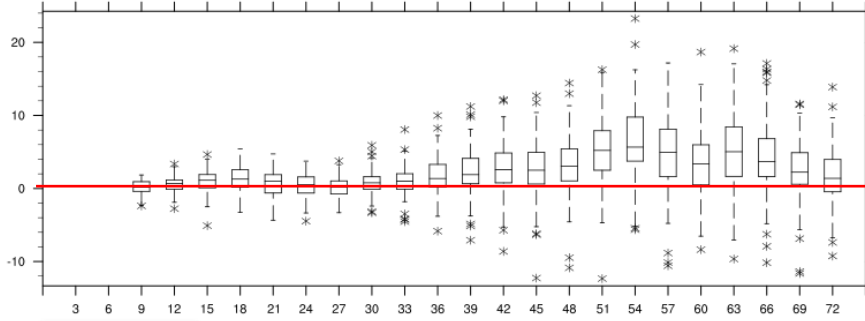




蘇力

SOULIK_10 13071012

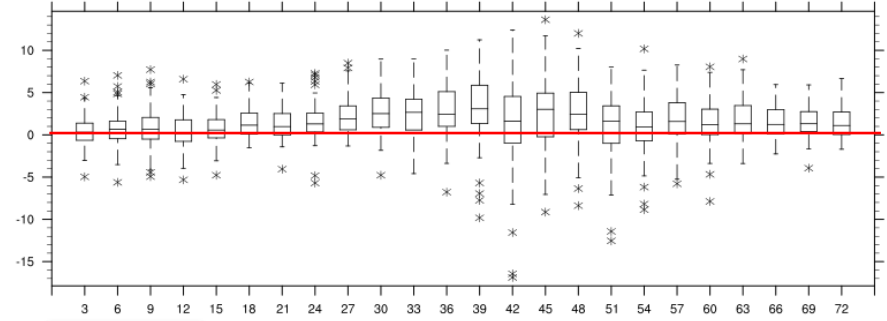
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麥德姆

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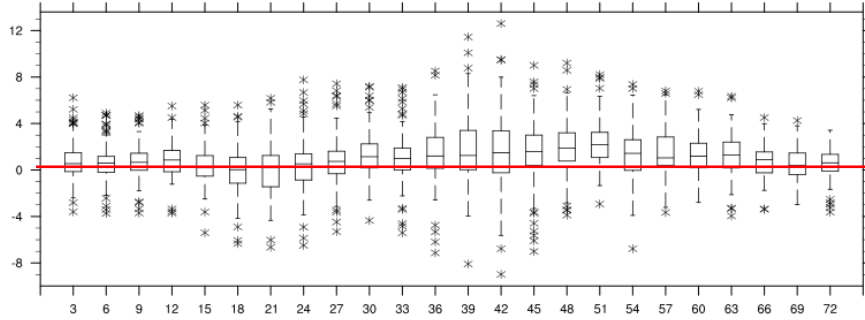
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鳳凰

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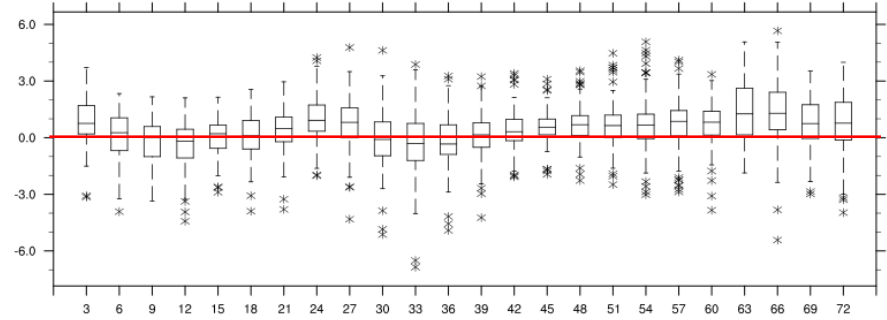
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紅霞

NOUL_10 15050900

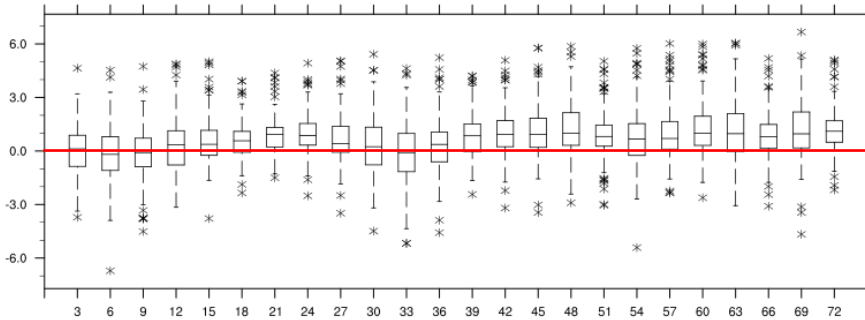
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蓮花

LINFA_10 15070600

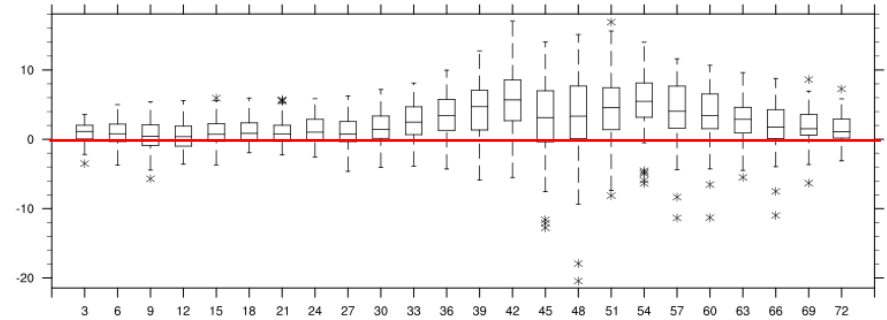
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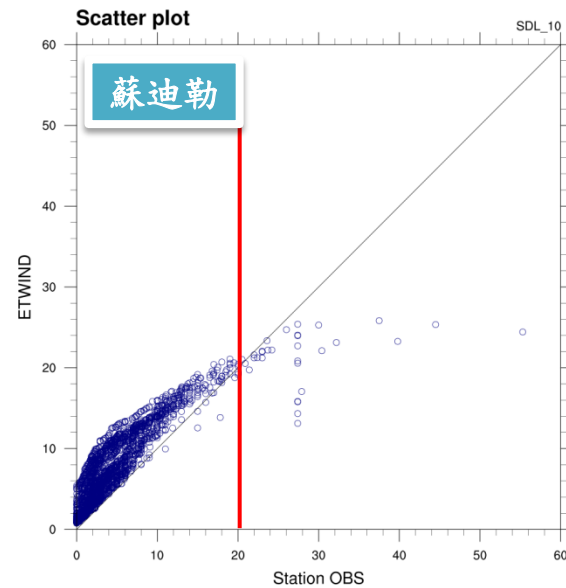
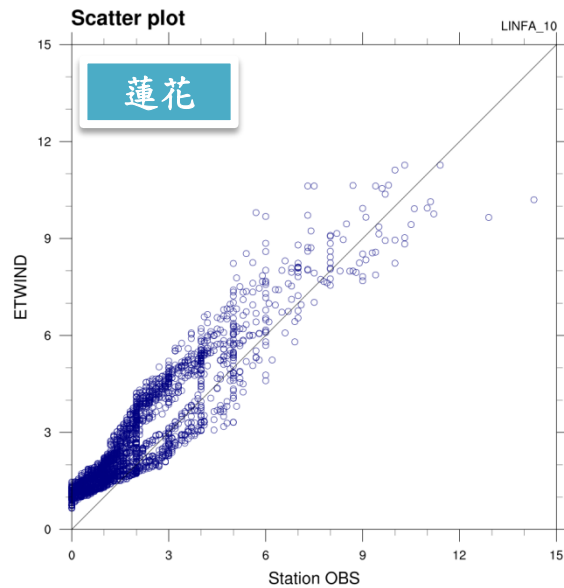
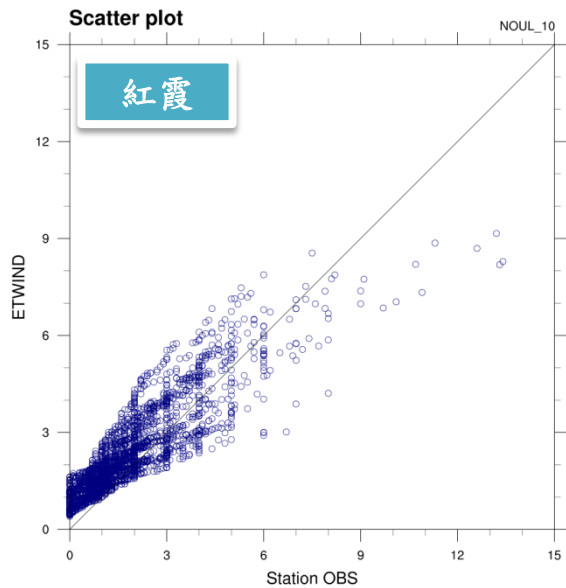
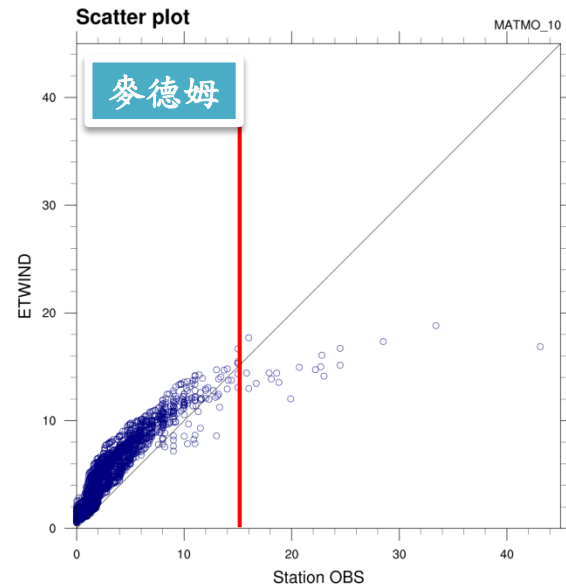
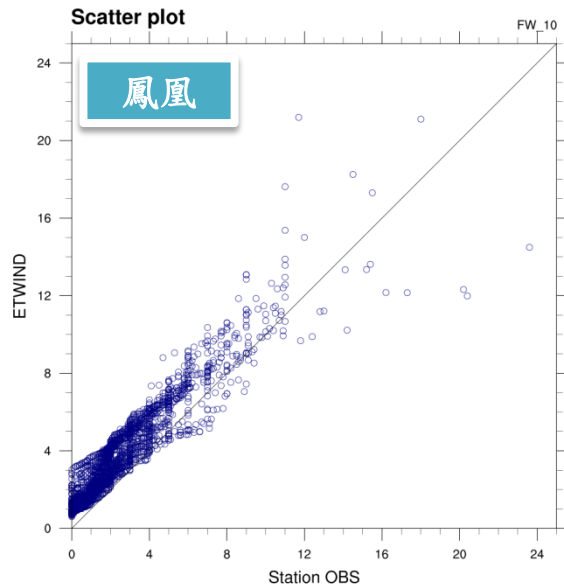
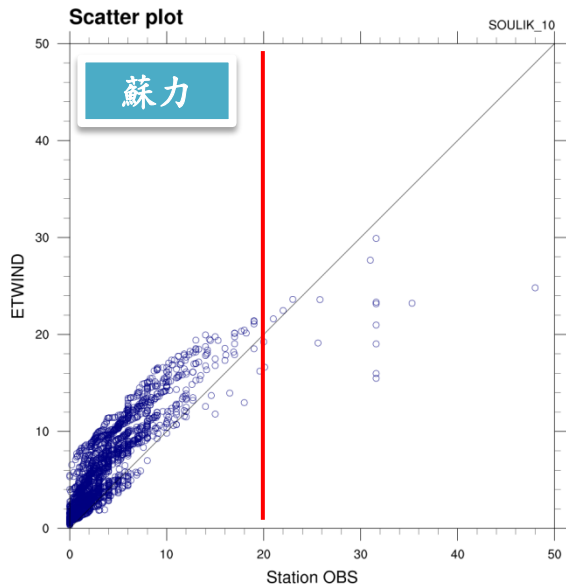


蘇迪勒

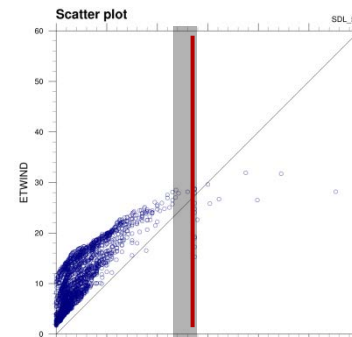
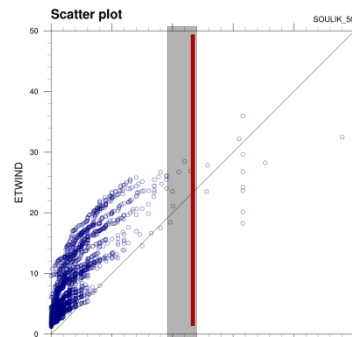
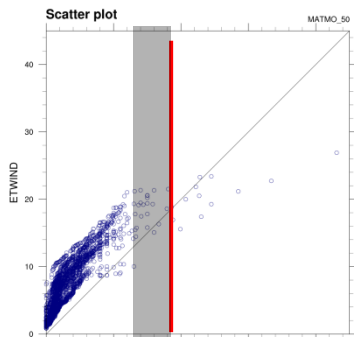
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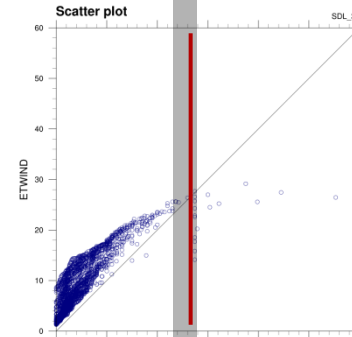
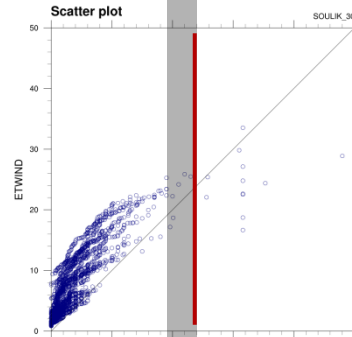
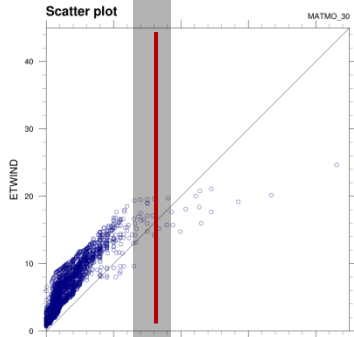




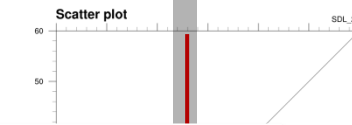
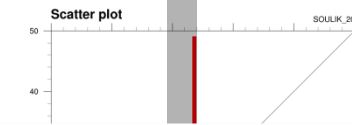
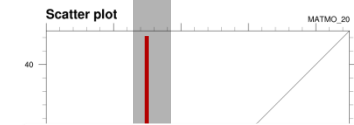
50%



30%

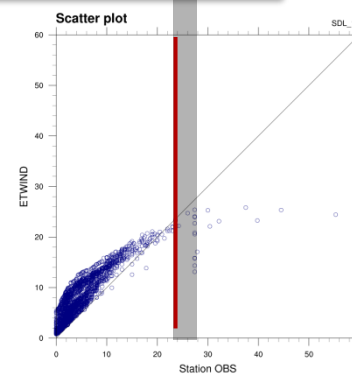
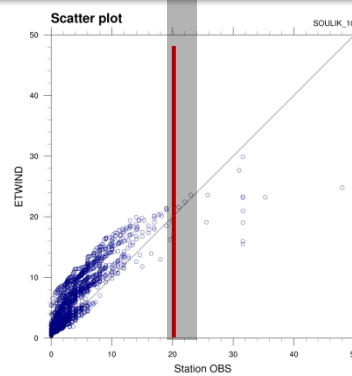
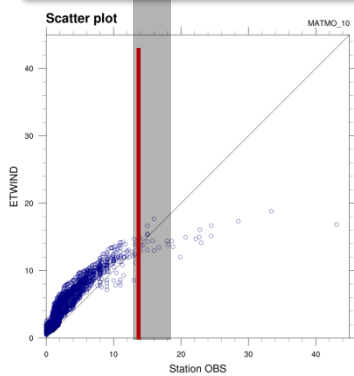


20%



高低估的分水嶺約在15~25 m/s之間

10%



鳳凰

蓮花

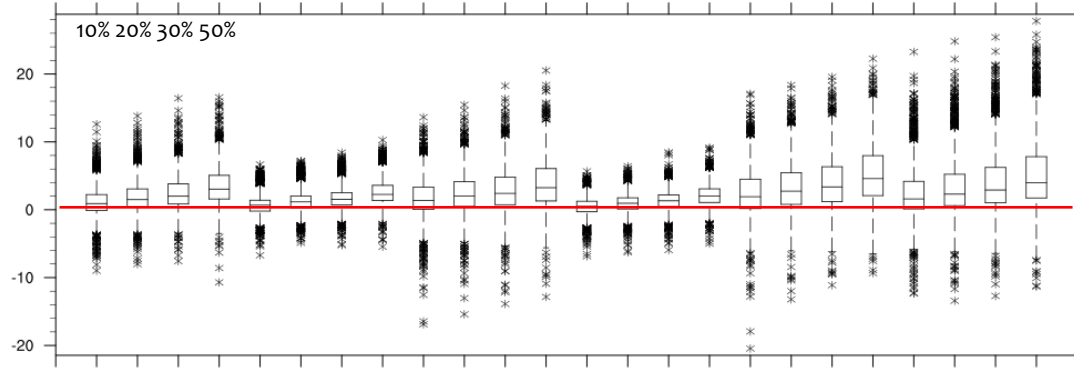
麥德姆

紅霞

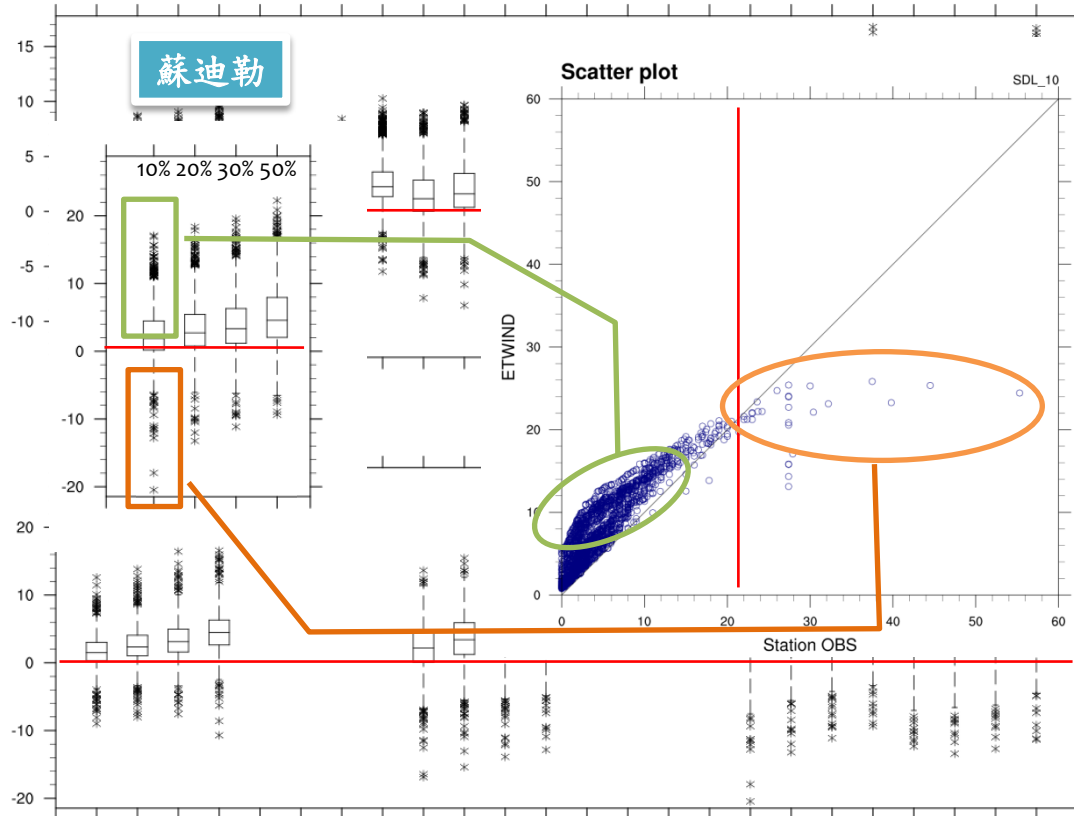
蘇迪勒

蘇力

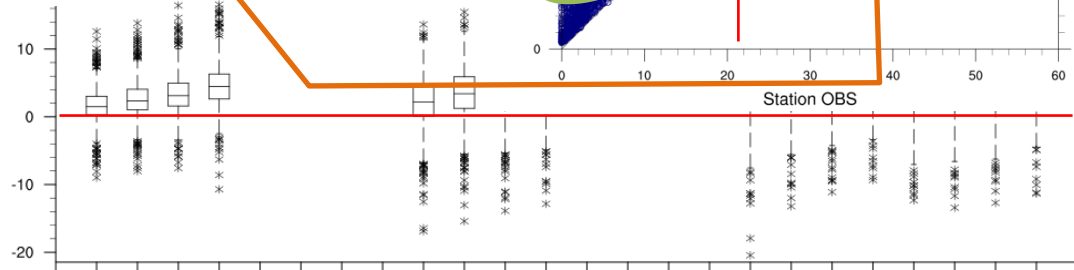
ALL



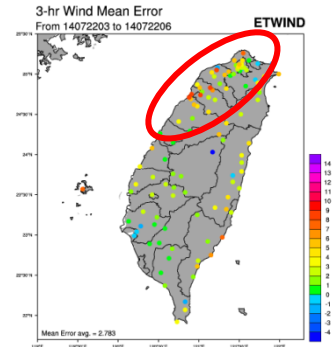
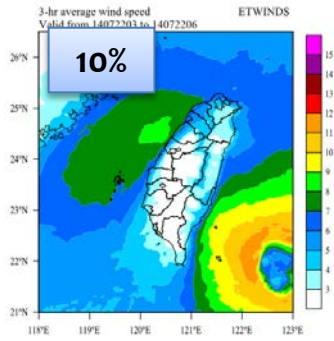
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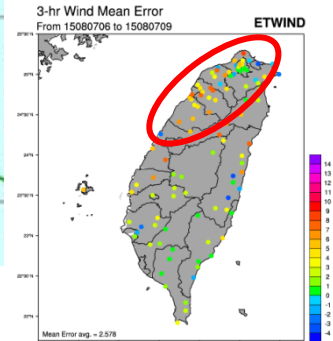
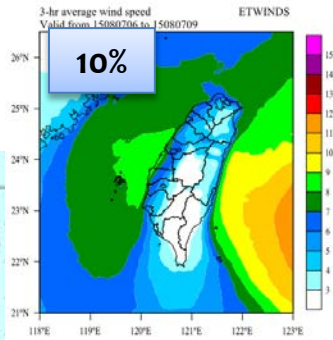
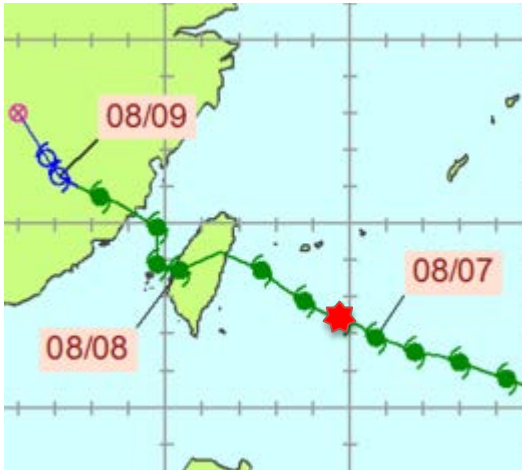
登陸期間



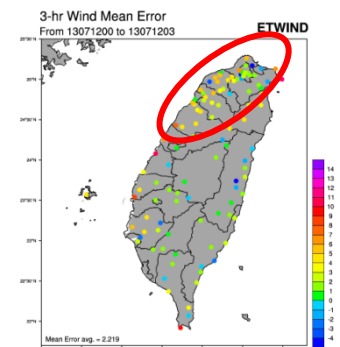
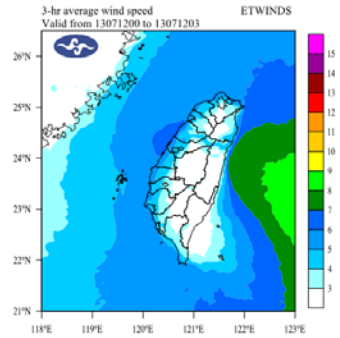
2014 麥德姆



2015 蘇迪勒



2013 蘇力



結論

- 第十百分位數的預報較接近觀測結果，但仍有輕微高估的情形。
 - 模式風速預報有過強的情形。
 - 校驗的依據為測站的十分鐘平均風，ETWind選用第十百分位數的預報產品較適合做平均風的預報指引。
- 統計而言，影響颱風風速預報誤差的因素：
 - 颱風強度愈強，愈易有高估的情形。
 - 登陸期間的風速較未登陸期間容易高估。
- 對於極端風速而言，ETWind則是有低估的傾向，其分水嶺約在15~25 m/s之間，且對不同的百分位數變化不明顯，顯示出模式在預報風速的系統性偏差。
- 颱風位於東部、東南部外海時，北部地區的風速預報容易有高估的情形。