

大臺北地區午後雷雨之極短期預報

Very Short-Term Forecast of Afternoon Thunderstorm in Taipei Metropolitan Area

修榮光¹ 鍾吉俊¹ 江祖恩¹ 周仲島^{1,2}

¹國立臺灣大學氣候天氣災害研究中心

²國立臺灣大學大氣科學系

¹Center for Weather Climate and Disaster Research, National Taiwan University

²Department of Atmospheric Sciences, National Taiwan University

摘要

林品芳等 (2011) 分析 2005 至 2008 年 5 至 9 月弱綜觀天氣系統，統計歸納內淡水、台北、基隆三個地面測站，在大台北地區發生午後雷雨前的四個氣象要素：水氣壓、相對溼度、風速、風向逐時變化特徵。臺大天氣團隊依據此研究成果，設計作業用午後雷雨檢查表，協助判斷大臺北地區暖季發生午後雷雨的機率。本研究統計 2014 至 2023 年每日作業紀錄之午後雷雨檢查表，挑選弱綜觀天氣個案，其測站當日逐時最高項數若達 8 項以上，則預報當日有午後雷雨發生機會，並將此結果與實際雙北地區有否發生午後雷雨進行校驗。結果顯示 10 年來總預兆得分為 0.602、總誤報度率為 0.368、總準確率為 0.927。

在 2020 年反聖嬰轉聖嬰年期間，太平洋高壓發展旺盛，午後雷雨檢查表漏報個案特別多；歷年 POD(Probability of Detection)皆為 90%以上，2020 年 POD 為 74.1%。初步分析原因是淡水河海風進入臺北盆地時間延後導致臺北站水氣量上升時間也延後，直至 13 時後才有利雷雨發生。今(2024)年亦為反聖嬰轉聖嬰年，500 百帕太平洋高壓距平於七月中上旬較 2020 年夏季更高，初步分析發現有類似 2020 年的情形發生，海風進入臺北盆地的時間變晚。臺灣沿岸海溫增高，與陸地氣溫差異相對變小，海風強度變弱。海風進入盆地後仍有利午後雷雨發生，只是發生的時間偏晚，位置也有差異。本研究嘗試分析在聖嬰轉反聖嬰年，在太平洋高壓勢力較強情況下，海風環流進入臺北盆地與其它年不同的特徵，以及初始對流胞發生位置的差異。

關鍵字：聖嬰反聖嬰、太平洋高壓、海風環流、午後雷雨

Corresponding author: Ben Jong-Dao Jou (周仲島), jouben@ntu.edu.tw

Abstract

Lin et al. (2011) summarized the feature of surface station when thunderstorm occurred in Taipei Metropolitan Area under weak synoptic-scale weather systems during May to Sep. from 2005 to 2008: The ranges of water vapor pressure, relative humidity, wind speed, and wind direction of Tamsui, Taipei, and Keelung station from 0800 to 1300 LST. Based on this study, an operational afternoon thunderstorm checklist of ground observation stations was developed. Daily operational records of the afternoon thunderstorm checklist from 2014 to 2023 were reviewed under weak synoptic-scale weather systems. There were totally 12 items of ground observation stations, and if there are more than 8 item correspond to the range, it was considered 'yes' for possible afternoon thunderstorms occurring. Verification was conducted to check whether afternoon thunderstorms occurred in Taipei Metropolitan Area. The verification performance over the past 10 years : TS was 0.602, FAR was 0.368, and POD was 0.927.

During the period of the " El Niño swing to La Niña " year 2020, the Pacific High was stronger, leading to a significant increase cases of missing by the afternoon thunderstorm checklist. In average POD(Probability of Detection) were higher than 90%, in spite of POD in 2020 was only 74.1%. A preliminary analysis indicated that the delay in the onset of the sea breeze of Tamsui River and the rise in moisture at the Taipei station occurred after 13:00. This year (2024) is also a " El Niño swing to La Niña " year, with the Pacific High at 500 hPa being stronger in the early to middle July compared to the summer of 2020. Preliminary analysis suggests a similar situation to 2020: a delay in the sea breeze entering the Taipei Basin, increased sea surface temperatures, while land temperatures remain high, afternoon thunderstorms can still occur after the sea breeze come in Taipei basin in the afternoon. Hence, the study tries to analyze and summarize the distinctive characteristics of the sea breeze circulation entering the Taipei Basin and the location different of convection initiation under the stronger influence of the Pacific High during the " El Niño swing to La Niña " year compared to other years.

Keywords: El Niño and La Niña, Pacific High, sea breeze circulation, afternoon thunderstorm