季節尺度降水預報系統之建置與驗證

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摘　　要

本研究運用中央氣象局一步法模式之氣候預報資料，經由 2 種降尺度方式(距離比重法、相關係數法)與 6 種時間組合(第 1-10 天、第 11-20 天、第 21-30 天、第 1-15 天、第 16-30 天、第 1-30 天)，共計 12 種預報方式中，選擇預報能力最佳 2 種方式組成優選預報組合，取其平均值進行預報。本研究以 1982-2011 年為訓練期，2012-2018 年為驗證期，以每年 5 月為初始時間進行預報，逐月執行到隔年 4 月。對全台 15 測站，包含 10 平地測站(台北、新竹、台中、嘉義、台南、高雄、恆春、宜蘭、花蓮、台東)、2 山區測站(日月潭、阿里山)、3 水庫集水區(石門、德基、曾文)，進行未來 1 季降雨總量之降尺度預報。主要研究成果如下所述:

- 在全台 15 測站之優選預報組合中，相關係數法入選個案數明顯高於距離比重法。在時間組合中，以訓練期具有顯著程度相關係數之測站數為評比標準，第 1-30 天組合(或稱 ensemble 組合)於多數月份具有最多測站數。
- 訓練期之預報降雨值與觀測降雨值之相關係數顯示，除了 8-10 月為初始時間之預報能力偏低，其餘月份均具有適宜預報能力。
- 驗證期之誤差特性顯示，預報枯水期之 RMSE 值低於預報豐水期之 RMSE 值。其中 9 月-1 月為初始時間所預報之 RMSE 值較低。
- 綜合訓練期相關係數與驗證期 RMSE 之分析結果，可歸納 11 月-1 月為初始時間之整體預報能力應是全年之中最佳，反映中央氣象局一步法模式於枯水期之優質預報能力。

關鍵字：降雨、季節預報

A downscaling system for seasonal rainfall prediction and validation

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Abstract

This study employs one-tier prediction data from the Central Weather Bureau (CWB) to develop a downscaling system for seasonal rainfall prediction. The approaches include two downscaling methods (distance-weighting method, correlation-weighting method) and six temporal combinations (day 1-10, day 11-20, day 21-30, day 1-15, day 16-30, day 1-30). The best 2 predictions are averaged to correlate with the observations by compute their correlation coefficient and regression. The period 1982-2011 is used for training, while the period 2012-2018 is used for validation. Seasonal rainfall for the next three months is predicted for 10 plain stations, 2 mountainous stations, and 3 reservoir regions. The downscaling prediction system is conducted with the initial time of May of the first year to April of the next year. The major results of this study are following:

- The correlation-weighting method performs better than the distance-weighting method, while the day 1-30 combination has better prediction skill than other temporal combinations.
- As indicated by correlation coefficients in the training period, seasonal rainfall prediction with initial time of August-October has lower skills, while the other months have relative good prediction skills.
- As indicated by RMSE in the validation period, predictions with initial time of September-January have the lower RMSEs than other months.
- By summarizing results of correlation and RMSE analyses, seasonal rainfall predictions with initial time of November-January have the best skills in the entire year. This indicates that the CWB one-tier prediction system has sufficient capability in performing seasonal rainfall prediction.

Keywords: Rainfall, Seasonal prediction