

臺灣高山冬季固態降水觀測特徵分析與預報方法探究

Winter Solid Precipitation in Taiwan's High Mountains: Observational Characteristics and Forecasting Methods

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摘要

臺灣是多山的島嶼，雖然位處於亞熱帶，每年冬春季高山皆有降雪發生。惟高山天氣及地形複雜，加上觀測資料較為稀少，模式難以精確掌握相關變數，使高山降雪預報有其困難度。本研究以玉山氣象站為代表分析歷史資料，以了解冬季固態降水好發特性，其次聚焦於2024/2025年冬至春季實際固態降水事件，進行預報校驗及分析相關氣象參數之特徵。結果顯示，玉山降雪好發於每年11月至隔年4月間，以1至3月最頻繁且積雪量較多。冷季固態降水型態以雪為主，其次為冰珠、雪粒、霰及凍雨。2024/2025年冬至春季期間，除玉山外，雪山、合歡山、嘉明湖等3000公尺以上地區，以及太平山、梨山、拉拉山、武陵與福壽山農場、司馬庫斯等1500~2000公尺以上地區亦有固態降水發生。比對模式分析場發現，固態降水事件與僅有結冰或降雨事件在結冰高度、水氣層厚度與中層溫度等參數上有所差異；歐洲系集模式之降水類型機率產品在近時效與顯著事件下具參考價值，惟須留意模式取樣海拔與實際地形之差異。上述分析可助提升冷季固態降水預報準確度及研判信心。

關鍵字：臺灣高山、固態降水、降雪預報、系集模式預報降水類型機率

Abstract

Taiwan is a mountainous island in the subtropics, where snowfall can occur at high altitudes during winter and spring. However, complex terrain, limited observations, and model resolution constraints make snowfall forecasting difficult. This study uses Yushan Weather Station to examine historical solid precipitation characteristics and focuses on the 2024/2025 winter-spring season to verify forecasts and analyze related meteorological parameters. Results show snowfall mostly occurs from November to April, especially from January to March, with snow being the most common type, followed by ice pellets, snow grains, graupel, and freezing rain. During 2024/2025, solid precipitation was also reported at altitudes above 3000 meters, such as Mount Syue and Mount Hehuan, and at altitudes of 1500–2000 meters, such as Taipingshan and Wuling Farm. Events were linked to lower freezing levels and deeper moisture layers. ECMWF ensemble forecasts provided useful guidance for near-term and significant events, though terrain mismatch must be considered.

Key words: High mountains areas of Taiwan, solid precipitation, snow forecast, ensemble precipitation-type probability forecast