利用四維變分雷達資料同化系統分析宜蘭冬季強降水：
2021年11月26日個案研究

Analyzing the heavy winter rainfall case on 26 November 2021 using a 4DVar radar data assimilation system

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摘　　要

　　本研究使用IBM_VDRAS與宜蘭實驗觀測來分析於2021年11月26日發生的強降水個案，從中可辨認四個階段，起初降水沿雪山山脈發展，逐漸演變為對流從內陸及中央山脈北支肇始向平原移動，接著整體系統向東移動後進入消散期。透過不同觀測資料驗證了同化模擬結果，並進一步調查影響降雨的要素，包括低層東北風增強、強勁的中層西南風、陡峭的雪山山脈與中央山脈北支等。其中，局地高壓扮演影響降雨分布的重要角色。總結來說，此研究透過IBM_VDRAS分析動力、熱力與微物理場，完整描述宜蘭冬季強降雨的演變與特徵。

關鍵字：宜蘭強降水實驗、四維變分雷達資料同化

Abstract

This study analyzes a heavy rainfall event in Yilan, Taiwan on November 26, 2021, using IBM_VDRAS and observations from Yilan Experiment for Severe Rainfall. It identifies four stages of precipitation, starting along the Snow Mountain Range, then initiating from inland and the Northern Central Mountain Range, and moving eastward before dissipating. The research validates simulation results against various data sources and investigates key features affecting the rainfall. Factors influencing the event include increasing low-level northeasterly winds, strong mid-level southwesterly winds, the steep terrain of the Snow Mountain Range and the Northern Central Mountain Range. Local high-pressure systems also play a crucial role in determining precipitation hotspots. The study utilizes kinematic, thermodynamic, and microphysical fields from IBM_VDRAS to describe the evolution and characteristics of this winter heavy rainfall event in Yilan.

Key words: YESR, IBM_VDRAS, heavy precipitation