

國立中央大學大氣物理研究所書報討論

Date: 2025/11/07

Location: S1-713

Speaker: Yu-Ya Lo

Advisor: Prof. Pay-Liam Lin

Prof. Wei-Yu Chang

Detection and characterization of the melting layer based on polarimetric radar scans

Abstract

This study presents a algorithm for detecting the melting layer (ML) in polarimetric radar Range Height Indicator (RHI) scans, and applies it to characterize the ML across four datasets collected by X-band polarimetric radars in different climatic and topographic regions. The algorithm identifies the ML boundaries by combining vertical gradients of reflectivity at horizontal polarization (Z_H) and copolar correlation coefficient (ρ_{hv}), with a refined detection of the ML top based on Z_H alone. The algorithm is then used to analyze the polarimetric and geometric signatures of the ML. Results show that the ML thickness is remarkably consistent among datasets, with a mean of 300–330 m. Polarimetric signatures such as ρ_{hv} exhibit similar behavior across regions, while differences in Z_H mainly reflect varying precipitation intensity. Correlation analyses demonstrate that ML thickness is linked to bright-band strength, hydrometeor concentration, riming intensity, and vertical velocity. The study shows that ML characteristics are consistent across diverse climatic regions, supporting their use in future precipitation estimation.

Keywords:

Melting Layer 、 Polarimetric Radar 、 Stratiform

Reference:

Wolfensberger, D., Scipion, D. and Berne, A. (2016), Detection and characterization of the melting layer based on polarimetric radar scans. Q.J.R. Meteorol. Soc., 142: 108-124. <https://doi.org/10.1002/qj.2672>