

國立中央大學大氣物理研究所書報討論

Date : 2023/12/29

Location : S1 713

Speaker : Chi-Chun Su

Advisor : Prof. Wei-Yu Chang

Observations of a Squall Line and Its Near Environment Using High-Frequency Rawinsonde Launches during VORTEX2

Abstract

A squall line event occurred during the Origins of Rotation in Tornadoes Experiment (VORTEX2). Over a span of three hours, nine soundings were released to capture environmental variability as the squall line progressed. From the prestorm sounding observations, the features of the low-level cooling and warming above the boundary could be checked. A sounding, released approximately 5 km ahead of the gust front, revealed a moist absolutely unstable layer (MAUL) occurring within 2 km deep layer of ascent. After analyzing one of soundings released after the gust front had passed but before the precipitation began, it was revealed that the cold pool extended to around 4km in depth with an intensity of approximately 35 ms^{-1}

The final soundings, released in the trailing stratiform region, exhibited the “onion” shaped profile and the uniformly distributed equivalent potential temperature throughout a deep layer, the cold pool was 4.7 km deep in this region. The upshear tilting feature of the soundings’ data is consistent with the intensity of the cold pool being larger than the environmental vertical wind shear. This analysis data will be helpful for the cloud-scale numerical model simulations and the development of the relevant theories in the future.

Keywords

Cold pool

Moist absolutely unstable layer (MAUL)

Reference

Bryan, G. H., and M. D. Parker, 2010: Observations of a Squall Line and Its Near Environment Using High-Frequency Rawinsonde Launches during VORTEX2. *Mon. Wea. Rev.*, **138**, 4076–4097, <https://doi.org/10.1175/2010MWR3359.1>.