國立中央大學大氣物理研究所書報討論

Water Vapor Lidar Observation and Data Assimilation for a Moist Low-Level Jet Triggering a Mesoscale Convective System
Abstract

Numerous local heavy precipitation events in Japan associated with Mesoscale convective systems (MCSs), which are triggered by moist low-level jet MLLJ originating from the East China Sea. To clarify the characteristics of the MLLJ ,this study used two Raman Lidars (RLs) which observed the inside and outside of the MLLJ, providing moisture to the MCS with local heavy precipitation on 9 July 2021. The water vapor observations inside of the MLLJ showed large amount of moisture below the convective mixing layer height of 1.6 km.

This study conducted four data assimilation experiments: CNTL that assimilated Japan Meteorological Agency operational observation data and three other experiments that ingested the lidar-derived vertical moisture profiles and the operational observation data. All three experiments assimilating lidar-derived vertical moisture profiles showed intensification and southwestward extension of the convergence zone, resulting in local heavy precipitation. All three experiments ingesting vertical moisture profiles generally produced better 9-h precipitation forecasts than CNTL implying that the assimilation of vertical moisture profiles could improve numerical weather prediction of local heavy precipitation. Furthermore, the experiments assimilating both of the two RL sites' data produced better forecast fields and improved initial conditions than experiments assimilating a single RL site's data.

Keyword
Raman lidar

Reference

Yoshida, Satoru, Tetsu Sakai, Tomohiro Nagai, Yasutaka Ikuta, Teruyuki Kato, Koichi Shiraishi, Ryohei Kato, and Hiromu Seko. 「Water Vapor Lidar Observation and Data Assimilation for a Moist Low-Level Jet Triggering a Mesoscale Convective System」. *Monthly Weather Review* **152**, 1119–37. https://doi.org/10.1175/MWR-D-23-0094.1