MMM SEMINAR SERIES

Impact of Low-level Jets and Gravity Waves on Heavy Rainfall over Southern China

Dr. Yu Du, Sun Yat-sen University

In this talk, I will present the impact of low-level jets and gravity waves on heavy rainfall over southern China through observations, numerical simulations and theoretical studies.

Heavy rainfall occurred at both the inland frontal zone and coastal warm sector in southern China during 10–11 May 2014. The frontal rainfall is closely related to the synoptic-system-related low-level jet (SLLJ), while the warm-sector rainfall is associated with the boundary layer jet (BLJ). The nighttime BLJ over the northern South China Sea strengthens the convergence at ~950 hPa near the coast where the BLJ's northern terminus reaches the coastal terrain. Meanwhile, the SLLJ to the south of the inland cold front provides divergence at ~700 hPa near the SLLJ's entrance region. Such low-level convergence and mid-level divergence collectively produce strong mesoscale lifting for convection initiation at the coast.

Banded convective activity occurred near the south coast of China on 30 January 2018. The convection-allowing simulations capture reasonably well the observed characteristics of this event. The convective bands are closely related to an episode of mesoscale gravity waves. The environment provides a wave duct for these gravity waves, with a thick low-level stable layer below 850 hPa capped by a low-stability reflecting layer with a critical level. The strength and depth of the low-level stable layer determine the intrinsic phase speed and wavelength of the ducted gravity waves. Strong interactions of convection and gravity waves also exist, in which the ducted gravity waves can trigger and modulate convection, while latent heating from convection enhances the waves.

The characteristics and mechanisms of diurnal rainfall and winds near the south coast of China are also explored. The diurnal cycle of rainfall has onshore and offshore propagation modes near the coast. The diurnally periodic winds also show a similar propagation feature. It was found that a simple 2D linear land–sea breeze model with a background wind can well capture the two propagation modes, which are associated with inertia–gravity waves.

***Friday, 25 January 2019, 11:00 a.m.**

***Please note special day and time**

Refreshments 10:45a.m.

NCAR-Foothills Laboratory, 3450 Mitchell Lane, FL2-1022, Large Auditorium

This seminar will be webcast live at:
http://ucarconnect.ucar.edu/live

Recorded seminar link can be viewed here:
https://www.mmm.ucar.edu/events/seminars


MMM SEMINAR SERIES
Mesoscale & Microscale Meteorology
M M M
LABORATORY