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Ensemble Sensitivity Analysis of Heavy Rainfall Associated With Three MCSs Coexisting Over Southern China

Abstract

A heavy rainfall event was associated with three coexisting mesoscale convective systems (MCSs) located over Guangxi, Guangdong, and northern Taiwan. Ensemble sensitivity analysis was employed to investigate the key environmental factors controlling rainfall amount and its predictability, including geopotential height, divergence, wind, and moisture. The analysis identifies the dominant variables governing the rainfall characteristics of each MCS.

The analysis indicates that geopotential height is positively correlated with precipitation in MCS-A and MCS-B, whereas this relationship is less evident in MCS-C. The presence of a trough can induce lower geopotential height and stronger low-level convergence within the control region, leading to enhanced precipitation. In addition, the direction and intensity of the low-level jet (LLJ) serve as key factors influencing rainfall, exerting a pronounced impact on the precipitation associated with the three MCS regions. Uncertainties in these key environmental factors may further affect the predictability of the three MCSs, thereby contributing to differences in their forecast accuracy.

Keyword

Ensemble Sensitivity Analysis(ESA)

Mesoscale Convective System(MCS)

Reference.

Shen, Y., Du, Y., Chen, G., 2020. Ensemble sensitivity analysis of heavy rainfall associated with three MCSs coexisting over Southern China. J.Geophys. Res. Atmos. 125, <https://doi.org/10.1029/2019JD031266>