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A numerical study of back-building process in a quasistationary rainband with extreme rainfall over northern Taiwan during 11–12 June 2012

Abstract

This study investigates the back-building process by using a cloud-resolving model over northern Taiwan during 11–12 June 2012. Although the system formed in a low-level convergence zone, the cold pool mechanism was ineffective for new cell triggering. Also, the authors find out why new cells preferentially initiate 15–30 km upstream of the mature cell.

CReSS model results reproduced the back-building cycle well, revealing that the process was governed by thermodynamic effects, based on a detailed pressure perturbation analysis. During initiation, the old convective cell preconditions the upstream environment, including enhancing warming near the surface and creating additional cooling at mid-levels. This results in a strong upward decrease in buoyancy in the low atmosphere and then generates an upward perturbation pressure gradient force (PGF). New convection cells are thus generated. Once the new cell has gained sufficient strength, the old cell's downdraft separates the new cell, keeping the system's quasistationary nature. In conclusion, the back-building process can be explained by buoyancy pressure forcing, even in the weak cold pool conditions.

Keyword

Back-Building (BB) Process

References

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