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Shallow- and deep-convection characteristics in the greater Houston, Texas, area using cell tracking methodology

Abstract

Convection plays an important role in the climate system by transporting heat, moisture, and momentum, all of which are heavily influenced by cloud development. The lifecycle of convective cells, from initiation to maturity and dissipation, is shaped by complex interactions between kinematic, thermodynamic, microphysical, and radiative processes that vary across time and space. However, observations from weather radars allow for more comprehensive research on the characteristics of convective clouds.

In this paper, the authors analyze radar data to study the changes in characteristics and diurnal cycles of three types of convective cells over the greater Houston area: shallow convection, modest deep convection, and vigorous deep convection. In addition to using radar data, they employ a multi-cell identification and tracking (MCIT) algorithm to analyze convective activity during the warm-season months (June to September) over four years (2018–2021). The analysis showed clear diurnal cycles in cell initiation (CI) consistent with the sea breeze circulation and showed diurnal, as well as notable changes in cell evolution parameters throughout their normalized lifetimes. These findings provide valuable information regarding the evolution of convective features.

Keyword

Cell tracking

Reference

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