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Relationship between convective systems and the production and maintenance of associated cold pools

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There is a clear importance of understanding the roles of representing convective cold pools, and properly representing those processes in multi-scale meteorological models. In particular, the strong coupling between vertical velocities and surface-based outflows is not well represented in convective parametrization schemes. The main goal of this work is to understand the relationships between the morphological properties of convective systems and the production and maintenance of cold pools. For this, we take advantage of the vast amount of observations available from the Midlatitude Continental Convective Clouds Experiment (MC3E). In particular, this analysis is centered around deep convective systems and associated cold pools that took place on May 23, 2011. The size and strength of cold pool are characterized by Oklahoma Mesonet observations, and data from the NEXt-generation RADar (NEXRAD) and the Department of Energy-Atmospheric Radiation Measurement (DOE-ARM) and National Aerospace and Space Administration (NASA) radar networks are mainly used to study the resulting convective development and intensity. MC3E observations are also used to characterize the kinematic structures of the observed convective systems (updraft and downdraft properties) using traditional multi-Doppler retrievals as well as 3-D variational approaches. Finally, the potential impact of the characteristics of the spatial and temporal distributions of hydrometeor types on the properties of the associated cold pool will also be explored using dual-polarization radar retrievals.