

Cold Pool Trains in the Colorado Plains

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Cold pools, or evaporatively cooled regions of air that spread at the surface as density currents, can have impacts on weather in the High Plains. For example, they can influence storm organization, intensity, and lifetime. They can initiate new storms through interactions with the environment and collisions with other cold pools. Multiple cold pools can propagate through the same location, without colliding, on the same day, which we refer to as a cold pool train. The goal of this study is to assess the variability of cold pool trains and examine their processes.

In May-June 2022, the first BioAerosol and Convective Storms (BACS-I) campaign was conducted at the Central Plains Experimental Range (CPER) in Northern Colorado. During BACS-I cold pool trains were observed more than 50% of the days where any cold pool was observed during the intensive operating periods. To examine the variability of the cold pool trains observed during BACS-I, data from a meteorological surface station are analyzed. Further, idealized cold pool trains, motivated by a multi-squall line cold pool train observed during BACS-I, are simulated to explore the dynamics of cold pool trains. The simulations show that as a result of the stable stratification by the passage of the first cold pool, the second cold pool in the train propagates faster than the first despite having the same initial properties of the first cold pool. It is also found that the second cold pool in the train propagates faster as the time between the cold pool passages decreases. Analysis of the variability of cold pool trains observed during BACS-I and cold pool train dynamics will be presented.