Public Abstract
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Title: Analysis of Heavy-Rain-Producing Elevated Thunderstorms in the Mo-Ks-Ok Region of the United States

Presented is an environmental analysis of conditions which favor the development of thunderstorms which produce heavy rainfall above a stable boundary layer near the surface. These storms are known to cause flash flooding, and flash flooding causes more deaths than any other weather phenomena. This study uses cases which observed over two inches of rainfall in five different National Weather Service county warning areas (CWAs): Kansas City, Topeka, Wichita, Tulsa, and Springfield. These regions encompass the area previous research has shown gets the most elevated thunderstorm events in the United States. For this study, heavy rainfall cases in each CWA were collected and the observed environmental conditions were averaged to create a composite (average) environment for the development of these storms in that CWA. This means five composites were created (one for each CWA), then additional composites were created for six and 12 hours prior to the heaviest rainfall, in order to aid in forecasting ahead of the event. It was found that upward forcing is maximized right at the time of the event over the site where heavy rainfall is observed, as moisture convergence occurs along the nose of the developing low-level jet in an already very moist environment. Steep cooling with height allows the layer forced upward to continue to rise as the air temperature remains warmer than its environment. The location of an upper-level jet streak to the northeast of the event location places a region of enhanced divergence aloft over the area where vertical ascent is maximized, assisting the generation of significant vertical motions right over the heavy-rainfall location.