

ATS/CIRA Colloquium

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The Impacts of the Cold pool and Gust Front on Convective Storms

March 24, 2008

ATS room 101; Discussion will begin at 3:30pm

Refreshments will be served at 3:00pm in the coffee lounge

The cold pool and associated gust front produced by convective storms are frequently involved in subsequent convective development, whether by strengthening the original convective storm producing the cold pool, or by generating new convection. This development may occur through a number of different processes including the forced lifting of environmental air up and over the progressing gust front, as well as due to boundary collisions between gust fronts of neighboring storms. In addition to enhancing convection, the presence of cold pools may also be destructive to the development of subsequent convective storms through their influence on the thermodynamics, humidity and static stability of the boundary layer. In this talk, the constructive or destructive role of the cold pool and gust front in convective storm development will be explored using numerical simulations of several different convective regimes. Simulations of tropical convection over Florida demonstrate the role of the gust front in temporarily counteracting the influences of aerosol on the production of precipitation. The re-development and strengthening of convective storms downwind of an urban region demonstrates the ability of the cold pool and the gust front to further modify convection enhanced by the presence of an urban air mass. The longevity of a left-moving supercell storm illustrates how the characteristics of the cold pool influence the lifetime of the storm. Simulations of tropical oceanic convection demonstrate that the production of new shallow convection appears to be associated with variations in humidity and static stability associated with the cold pool development. Finally, the results of idealized simulations of the storm development following gust front collisions, is presented. Although each of these scenarios show convective storms forced by very different initial conditions, several generalizations can be made about the role of the cold pool and gust front in the subsequent convective development.