# Propagating Nocturnal Convection within a 7-Day WRF-Model Simulation

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An explicit (convection-permitting) version of WRF is used to simulate a one-week episode (3-10 July 2003) of rainfall coherence that began several days prior to the end of the Bow-Echo and MCV Experiment (BAMEX) field phase. Eastward propagating rainfall events that exhibit temporal scales greater than 12 h and 1000 km, respectively, were common in both the simulations and observations during this period. In this presentation we focus on the nocturnal phase of deep convection of organized deep convection, which represents the major portion of the lifecycle of individual events of rainfall coherence during this one-week period.

Five separate heavy precipitation episodes occurred in both the observations and the simulation for which convection initiated during the late afternoon or early evening over the western Great Plains of the United States (~102-98W), matured over the central Plains (~96-92W) overnight, and weakened near sunrise the following morning over the Midwest (~90-86W), occasionally regenerating farther east during the next afternoon. This is evident in the time-frequency diagram for the one-week period that forms the background of Fig. 1.

Both the simulated mesoconvective structure and the structure of the larger-scale environment have been composited relative to the leading edge of the five linearly oriented mesoscale convective systems (which are the primary constituents of the coherent precipitation episodes) during their separate initation, mature, and weakening stages. The composites indicate that the initial convection is rooted in the planetary boundary layer, but becomes based above the stable boundary layer at night within a frontogenetic lower-tropospheric region over the central Plains, where deep moisture is confined to a narrow latitudinal corridor (Fig. 1). The strong lower-tropospheric frontal zone supplies both the necessary vertical shear and CAPE to support intense, linearly-oriented propagating convection through the night. The convection remains elevated during the early morning, but weakens as it moves eastward toward less favorable environmental conditions.

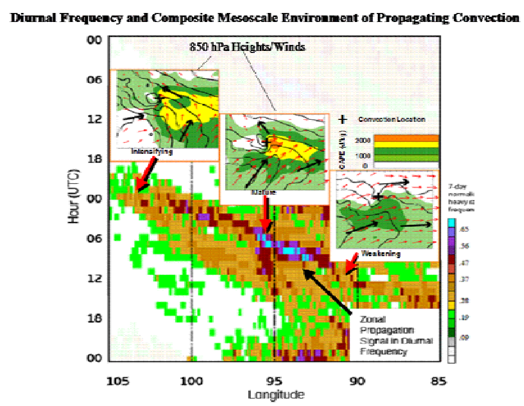


Figure 1. Below: Longitude vs. frequency diagram of fractional occurrence of latitudinally averaged (33-48N) precipitation exceeding 0.1 mm/h. Above Insets: Composite diagrams of 850-hPa winds (vectors) and temperature (contours) with maximum CAPE (color fill) for the different stages of propagating convection occurring in the different geographical regions. Bold arrows indicates emphasize the deformation characteristics of the flow, and + symbol indicates the position of the leading of convection relative to which the composites were created.