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# Environments supporting warm season nocturnal convection initiation during the Plains Elevated Convection at Night experiment

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Incorrect forecasts of the specific timing and location of the initiation of deep moist convection in operational models is a major factor limiting the predictability of severe weather and quantitative precipitation forecasting. Past field experiments, such as the International $H_2O$ Project, expanded our fundamental understanding of surface-based convection initiation (CI) during daytime. However, nocturnal convection is believed to be composed primarily of air located above the boundary layer, which becomes increasingly statically stable after sunset. Therefore, it is likely that the processes triggering CI at night are fundamentally different from those during the day. The Plains Elevated Convection at Night (PECAN) field experiment recently observed several aspects of nocturnal convection occurring on the U.S. central plains. Primary goals of the project include gaining a better scientific understanding of the processes associated with elevated CI and upscale growth of storms to mesoscale convective systems that occur in the presence of a nocturnal stable boundary layer and low-level jets. Ground-based radars, research aircraft, surface instruments, radiosondes, and vertical profilers collected observations in several such events between 1 June 2015 – 15 July 2015.

This study examines preliminary proximity sounding, vertical profiler, radar, and surface observations from several CI events during the project, assessing the mesoscale distributions of CAPE, CIN, stability and boundary layer profiles before and after CI, and the location of CI relative to radar-observed gravity waves and convergence boundaries. Comparisons of the nocturnal CI environments with forecast model output used to guide PECAN operations on those days will illustrate possible model shortcomings. These comparisons will be used to motivate preliminary high-resolution modeling experiments that assimilate conventional and PECAN observations using the ensemble Kalman filter to improve model initial conditions and simulations of CI. The ensemble analyses will be used for a detailed examination of processes priming the environment for and triggering nocturnal CI.