Analysis of the 5 July 2015 Nocturnal Convective Initiation Event During the PECAN Field Campaign

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Overview

- The Plains Elevated Convection at Night (PECAN) Project is a collaborative research mission to study nighttime thunderstorms
- The purpose of this project is to study nocturnal convective initiation (NCI), mesoscale convective systems (MCS), and bores
- On 5 July 2015, a bore-driven MCS moved across southeastern South Dakota
- NCI occurred along an east to west surface-based boundary ahead of this MCS
- This boundary is believed to have aided in the initiation of this east to west oriented convection

Key Findings

- NCI occurred along an east to west surface-based boundary ahead of a fast approaching bore-driven mesoscale convective system (MCS)
- Fig. 1. shows the environment where the NCI occurred with a stable boundary layer and an elevated unstable layer

Explanation

- The surface boundary had a 14 m/s wind gust, pressure fluctuation of 0.5 hPa, and 1°C temperature rise
- The boundary destabilized the boundary layer enough to help initiate convection
- The bore was strong with a 23 m/s wind gust and initial pressure rise of 2.5 hPa within the first minute after passage; pressure eventually rose over 5 hPa
- The NCI eventually merged into the bore-driven MCS and continued propagating to the east

Impact

- Research on nocturnal convective processes can be used to improve weather forecasting of impacts from these phenomena
- Further research will be completed to better understand this case

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