Convective Initiation and Flow Regimes of Severe Storms Across the Central High Plains

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A severe weather climatology encompassing the Goodland, Kansas County Warning Area (GLD CWA) was compiled for the span of 1950-2006. To remain consistent with current warning operations, severe weather was defined in this study as one inch diameter hail, 50 knot wind gusts, and/or tornadoes. Results revealed the months of May, June, and July concurrently contained approximately 76% of the annual severe weather events and likewise served as the peak severe weather months. Events during a ten-year period (1997-2006) within the climatological three-month maximum of severe weather were further examined with respect to convective initiation and storm propagation.

The origin of the initiation of deep moist convection was classified as the first occurrence of a 45 dBZ echo, as resolved in 0.5 degree reflectivity data, within a specific areal domain that fostered the first report of severe weather in the GLD CWA. Approximately 285 severe weather case days occurred during the ten-year study period. Temporal analysis of the events established a strong signal with a clear diurnal preference in regards to the time of convective initiation and resultant severe weather type. The spatial distribution of convective origins, while relatively analogous in most cases, tended to cluster in identifiable geographic locations on or near the Palmer Divide and Cheyenne Ridge (Figure 1).

Upper air soundings from surrounding sites were utilized to investigate the prevailing synoptic-scale flow direction and speed at 500-mb for each event day. A distinct range of wind speed to support severe convection within the study area was discerned as approximately 87% of the cases transpired with flow between 20-40 knots. The database was stratified by 500 mb flow direction into north, northwest, west, southwest and south flow regimes. Analysis revealed preferred locations and periods of flow regimes throughout the progression of months. Overall storm advection was similar with respect to 500 mb flow.

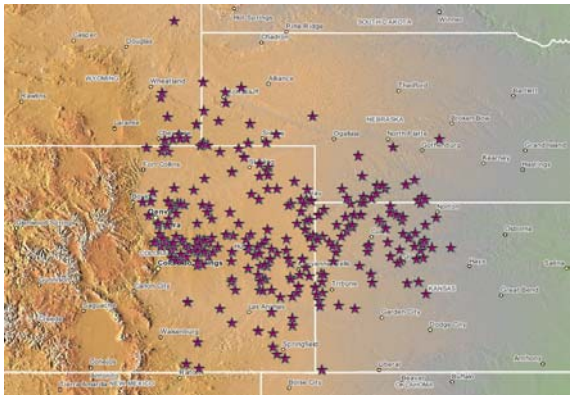

Figure 1. Convective Initiation points (May-July, 1997-2006).