Predicting large-scale convective storm initiation events

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Large-scale convective storms are responsible for much of the warm-season rainfall over the Great Plains of the United States. These larger convective systems often have their origins over the high plains and subsequently propagate across the central United States as coherent features with lifetimes often exceeding 6 hours. Accurately predicting the timing and location of formation and subsequent evolution of these storms is critical to the public for advanced warning of accompanying hazards (e.g., flash flooding, lighting, hail, winds) as well as several sectors of the economy including agriculture, transportation, construction, and recreation. Improvements in data assimilation techniques, observational networks and the use of sophisticated high-resolution NWP models has allowed for significant advancements in the ability to predict convective storms; however, due to the myriad of uncertainties that remain in models, observational inadequacies, and the limited predictability of convective storms, forecasting the exact time and location of the formation of such storms is not possible. A probabilistic large-scale CI product is being developed for air traffic management in the United States to aid in strategic planning of flight route structures across the United States each day. This new product combines object-based detection algorithms, high resolution model ensembles, and statistical techniques to produce a rapidly-updating probabilistic CI product spanning the entire United States. The large-scale CI detection algorithm has been used to evaluate the performance of the NOAA/GSD High Resolution Rapid Refresh (HRRR) model during the summers (JJA) of 2010 and 2011. It has been found that the HRRR detects roughly 60% of the large-scale CI events to within a distance error of 250 km or less. The performance of the HRRR at predicting large-scale CI has also been found to be a function of time of day, environmental conditions and location. Changes in the HRRR between 2010 and 2011, resulted in significant changes in its performance. Preliminary results of the large-scale CI product will also be described.