UNIVERSITY of WISCONSIN
UWMILWAUKEE

Department of
Mathematical Sciences

Master's Thesis Defense
Russell Danielson
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UW-Milwaukee

Wednesday
April 26
EMS Building
Room W434
12:00pm

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Downstream Predictability of the Path and Survival of Severe Wind Producing MCSs using RUC Analysis Data

A method for predicting the track of mesoscale convective systems (MCSs) is developed, based upon meteorological parameters in the path of the systems. Rapid Update Cycle model analysis from the years 2007 through 2011 were used to gather meteorological data for 94 MCS events. An artificial neural network model was developed to predict whether the MCS will track to the "Right", "Left", or stay on its current path. The most important parameters to predict the track of an MCS in this model are precipitable water, most unstable CAPE, 700hPa temperature, surface-500hPa mean wind, low-level equivalent potential temperature difference, and 700-500hPa lapse rate. The model produced a threat score of 0.30 and a Heidke skill score of 0.16 which demonstrates relatively small skill but compares favorably to similar warm season forecasts. Sensitivity analysis revealed that surface-500hPa mean wind was the most influential meteorological parameter for forecasting the track of MCSs, with smaller (higher) values giving a greater chance for MCSs to track in the "Middle" and "Right" ("Left"). This relationship may help forecasters improve decision support services and issuances of convective watches. Future work may be able to develop a model with better skill through the use of a higher resolution model or through stratifying MCS cases into subsets of similar environments.

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