

AN ANALYSIS OF THE RELATIONSHIP OF RADAR BEAM HEIGHT AND  
TERRAIN CHARACTERISTICS TO TORNADO WARNING FALSE ALARM  
RATES

An Abstract of  
A Thesis  
Presented to the  
Department of Earth, Atmospheric, and Geographic Information Sciences  
Western Illinois University

In Partial Fulfillment  
of the Requirements for the Degree  
Master of Arts in Geography

By  
Richard Sample II  
December 2020

## ABSTRACT

National Weather Service tornado warnings directly warn the public of impending danger of a tornadic storm. However, there are challenges in predicting, identifying, and disseminating the message of danger. Warnings that are issued without the phenomena occurring, a false alarm, can reduce confidence in future warnings that are issued. Radar is a primary method of detection of potentially tornadic thunderstorms. However, radar detection of thunderstorms far from a radar will not detect meteorological particles near the surface, where a tornado occurs, due to the height of the radar beam. Also, National Weather Service meteorologists use ground truth reports from storm spotters to confirm tornadic potential. However, if storm spotters cannot see storm features due to orographic features or land cover obstructions, this can affect storm spotters' ability to report meaningful storm features for meteorologists to predict future storm phenomena. This research will explore the relationship between false alarm ratios and radar beam height, terrain characteristics, and land cover height.