

ABSTRACT

The U.S. Air Force's 45th Weather Squadron (45WS) seeks to improve their forecasts of lightning cessation at the Kennedy Space Center (KSC) and Cape Canaveral Air Force Station (CCAFS) in Florida. The 45WS currently keeps lightning advisories active longer than necessary to ensure the safety of personnel and facilities. This paper describes the use of lightning and dual-polarimetric radar data to develop lightning cessation guidance for east central Florida.

Eighty non-severe thunderstorm cells in central Florida during the 2012 warm season (April-July) were analyzed using dual-polarimetric radar data from the WSR-88D network. Total lightning data for the storms were obtained by combining data from the Lightning Detection and Ranging network at CCAFS and the National Lightning Detection Network. Storms were tracked using the Warning Decision Support System – Integrated Information software (WDSS-II). The tracking produced time series of radar-derived and lightning parameters. Trends in conventional reflectivity (Z_H), as well as various dual-polarimetric parameters at three temperatures crucial to storm electrification (i.e., 0°C , -10°C , -20°C), were analyzed for a random subset of storms in Florida near the end of their lightning activity. This subset, comprising our dependent storm sample, was used to develop numerous potential cessation algorithms. The algorithms developed from the dependent sample were tested on the independent sample of Florida storms (the remaining portion of the 80 storms). WDSS-II again was used extensively.

Results reveal that the best performing cessation algorithm in Florida utilizes $Z_H > 35$ dBZ and the presence of graupel (PID = 12 or 13 from WDSS-II) at -10°C . One waits 10 or 15 min after these thresholds are no longer met before ending an advisory. This study shows the importance and utility of using graupel to improve lightning cessation guidance for storms near KSC/CCAFS. However, the results are tentative, and the procedure must be tested on more storms and in different geographic regions throughout the United States.