

ATS 641

Mesoscale Meteorology

Lab Exercise 4

March 26, 2025
(Due Friday, April 18, 2025)

Analysis of a severe weather event; and numerical modeling of convective storms

Part 1: On 14-16 March 2025, there was an outbreak of severe weather in the central and eastern US, including numerous tornadoes and widespread wind damage (Fig. 1).

For this question, please conduct a brief but thorough case study of this severe weather event. Frame your analysis on the “ingredients-based methodology” for severe and tornadic convection, why the severe weather occurred in the locations it did, and ideally why the different hazards occurred where they did (i.e., why were tornadoes favored in some locations, and wind in others). You can focus on one of the two days, or provide a broader discussion of the full two-day period. Feel free to use any available information. At a minimum, include one or more synoptic maps, thermodynamic soundings, and hodographs, from either observations or model-based analyses. Use supporting evidence for your claims as much as possible, i.e., don’t simply say “SPC predicted there would be severe weather...”. It may be helpful to consult Dave Schultz’s paper “How to Research and Write Effective Case Studies in Meteorology,” which is linked in the “Articles” section of the class website, when putting together your case study. A length of ~ 3 pages with 3-5 figures is good to aim for; please don’t make it excessively long: focus on your key findings.

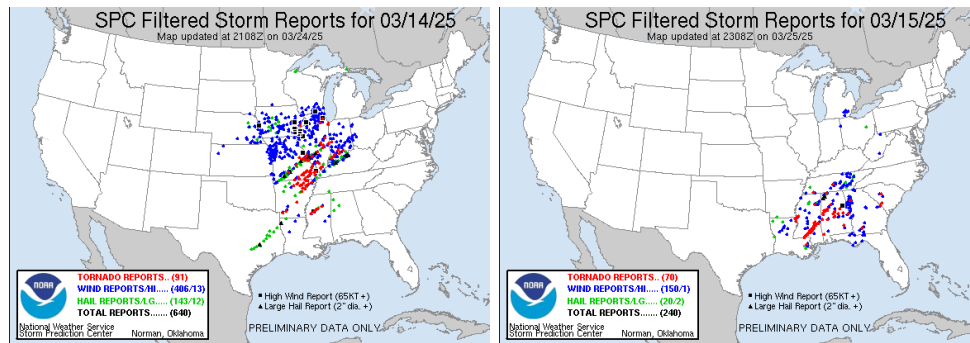


Figure 1: Storm reports from 14–15 and 15–16 March 2025. Obtained from the SPC.

Part 2: Part 2 involves the numerical simulation of convective storms, with instructions found at https://russ-schumacher.github.io/ats641_spring2025/lab4.html