Recommendation: Major Revisions

The authors have made numerous changes and improvements to the manuscript. However, there are still questions surrounding their analysis of the convective allowing simulations, particularly the sources of errors. At minimum, their chosen updraft helicity threshold needs better justification, analysis of updraft helicity needs to extend later in the simulations, and the conclusions regarding model error need to be softened or removed. Specific comments are below.

Comments:
The updraft helicity threshold for much of the analysis has been increased from 10 m² s⁻² to 50 m² s⁻², however this value still needs more justification. Your UH threshold value is based on Kain et al 2008, but the grid spacing used in that study was much coarser than your current study. The operational CAM models in the U.S. now use 75 m³ s⁻¹. Clark et al. 2012 used a 100 m² s⁻² value for their 1 km simulations.

The times shown in Fig. 15 and 16 don’t match. In Fig. 16, you analyze the supercell all the way to 16 Z, but the updraft helicity information shown in Fig. 15 only extends to 12:30 Z. How do you know that the storm in your simulations after 12:30 Z is even a supercell? Other than a plot of simulated radar reflectivity, there is no supporting information (plots of UH, overlays of vorticity and vertical velocity to show updraft rotation).

Related to the previous comment, you state that the supercell motion is impacted by the “spurious convection” around 15 Z, but are you sure the simulated storm is even a supercell at that time? From your UH plot in Fig. 15, it looks like the WRF model is producing a supercell between 11 and 1230 Z, but you don’t show what comes after that.

Right now, the analysis of member 30 consists of simulated radar reflectivity snapshots at an hourly interval. A much better way to visualize the track of the storm in member 30 would be to create an updraft helicity swath from, say 11 Z to 17 Z. See Clark et al. (2013) for an example.

Lines 477-479 in revised manuscript:

Note that while the maximum NEP UH values during this time appear to be associated with WRF.14may12utc, they result from the spurious convective activity to the east of the observed supercell and, hence, do not indicate a better forecast skill.

This statement perfectly illustrates the need for choosing the proper UH threshold. If the UH threshold were appropriate for your grid configuration, then you shouldn’t be getting false alarms based on non-supercell convection.

Lines 509-510, revised manuscript: unless you plan on showing a trajectory analysis to back up this claim, then it’s not appropriate to present this as a fact. Several studies have investigated the result of storm interactions and “cutting off the inflow” is only one possible outcome. I refer
you to Hastings and Richardson (2016) for more details on the outcome of supercell-ordinary cell interactions.

Lines 570-576, revised manuscript: As previously mentioned, there’s no supporting evidence that the storm in your simulations is even a supercell at the times when the track deviates from the observed storm.

Lines 640-644, revised manuscript: I’m not convinced these are separate items. It’s possible that interaction with the widespread convection causes the mode to change from supercell to something else, and that’s why you see a deviation in storm motion. You would need to present UH fields later in the simulation.

References:
https://journals.ametsoc.org/doi/abs/10.1175/BAMS-D-11-00040.1
https://journals.ametsoc.org/doi/10.1175/MWR-D-15-0193.1
https://journals.ametsoc.org/doi/full/10.1175/WAF-D-12-00038.1