Andrew Berrington (Reviewer #3)

In terms of the percentage of MCS-related tornadoes rated EF2-EF5 in Figure 7 and particularly for violent tornadoes, it has been shown in a number of studies that linear convective systems are not responsible for the vast majority of these events (Trapp et al. 2005, Smith et al. 2012). To observe a 40% fraction of violent tornadoes from MCSs suggests that the separation/delineation/classification between supercells and MCSs needs to be adjusted in this work. In the paragraph mentioning 4/27/2011, where the correct supercellular classification of the afternoon activity by Knupp et al. 2014 is mentioned, a stricter criteria is imposed by the authors that subsequently removes the EF5s from the MCS climatology. Stricter criteria and further quality control, perhaps further involving low-level reflectivity, should be applied to separate tornado cases that are clearly the result of supercells and those with MCSs. While embedded supercells within MCSs can indeed produce very strong tornadoes (e.g. the morning QLCS of 4/27/2011, 2/29/2012 in Harrisburg IL, and 4/13/2020 in Estill SC), the occurrence of these is very infrequent compared to more discrete supercells producing tornadoes of this intensity. While the definition of 'MCS' may include larger complexes including individual supercell storms such as the Feb 2008 case mentioned by the authors – especially using upper level reflectivity or satellite proxies where "connection" of elements may occur – it should be clear that discrete or semi-discrete supercells are a separate storm mode and thus these tornadoes should be classified separately.

References:

Smith, B. T., R. L. Thompson, J. S. Grams, C. Broyles, and H. E. Brooks, 2012: Convective modes for significant severe thunderstorms in the contiguous United States. Part I: Storm classification and climatology. Wea. Forecasting, 27, 1114–1135, https://doi.org/10.1175/WAF-D-11-00115.1.

Trapp, R. J., S. A. Tessendorf, E. S. Godfrey, and H. E. Brooks, 2005: Tornadoes from squall lines and bow echoes. Part I: Climatological distribution. Wea. Forecasting, 20, 23–34, https://doi.org/10.1175/WAF-835.1.

We thank the reviewer for the suggestion.

For the discrete supercells, our algorithm excluded them, and this has been clarified now at Section 2.3, 'In this way, all the irrelevant radar echo objects (including supercells, cellular and multicellular systems) are excluded from this study.'

For the supercell embedded in the MCSs, our automated algorithm identified that a considerable fraction of EF4 and 5 tornadoes (25 out of 63) were MCS-related. By manual examination of the 25 MCS-related tornadoes with severity of EF4 and 5, it is observed that their respective low-level radar reflectivity field exhibits distinct supercell structures embedded in the MCSs, these supercell structures, however, were not evident in the composite radar reflectivity data. As a result, these particular records were excluded from the statistics in our analysis.

Although the EF4/5 tornado-producing supercells embedded in MCSs were detected in the automated algorithm employed in this study, such condition was rare for tornadoes at EF3 and lower intensity based on our sampling results (the complete manual screening of all tornado events is apparently infeasible). This reinforces the robustness of the observed increasing trend in MCS's fractional contribution to tornadoes with increasing severity.

Figures 7, S6 and S7, as well as the related discussion have been modified accordingly to exclude the association of EF4/5 tornadoes with MCSs.