

## ***Interactive comment on “Characterizing severe weather potential in synoptically weakly forced thunderstorm environments” by Paul W. Miller and Thomas L. Mote***

### **Anonymous Referee #2**

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In this manuscript the challenge to characterize the severe weather potential in synoptically weakly forced convective environments is tackled. Various convective variables and indices are computed using proxy-soundings of hourly model analyses representing the environment. As observational data base for benign convection the authors' own dataset of radar reflectivities is blended with 'subjective' severe weather reports from Storm Data. The odds ratio is used to measure the conditional likelihood. In essence, the authors find the surprising result (their own wording) that only two convective parameters based on temperatures at two pressure levels (850 and 500 hPa) are able to differentiate between severe and nonsevere convection during such difficult to forecast weather regimes. It is suggested that prominent, heavily moisture-weighted

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parameters and indices broadly used in severe storm forecasting suffer from inaccuracies in the RAP analysis data.

The manuscript is well written and merits publication given that the comments below are taken into account.

#### Major Points:

1) My main criticism is the use of the RAP analyses providing proxy-soundings to calculate convective variables and indices. Subtle model inaccuracies (or errors) can impede the accurate calculation of convective parameters. The key question is the suitability of the RAP system with  $\Delta x=13\text{km}$  using presumably a convective parameterisation scheme for deep convection for such calculations. I suggest to use proxy-soundings from the convection permitting model HRRR analyses (at least for a subset) and confront your results with those. This extension would considerably broaden the relevance of the manuscript.

2) (line 117ff) More detail is needed describing the data assimilation of RAP. What data is how assimilated in RAP? Any radar reflectivities?

3) (line 128ff) Is the proxy-sounding representative for a storm environment if there is no storm in the model analysis? What happens if there is a shift in space or/and time between observation and model?

#### Minor Points:

1) (line 59) The term signal-to-noise ratio is awkward in this respect. Is there any reference? Is model error a noise source, too?

2) (line 95) Although a brief explanation of the indices used in this study are given in the appendix, key 'tools' should be explained in the main text. What is SWEAT?

3) (line 108) More detail is needed on the authors' own dataset of radar reflectivities for benign convection that is still under review at the time of this review.

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