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Dear Topical Editor Travis A. O'Brien,

Thank you for your comment on the manuscript. Our response to your one remaining minor concern is noted below. Changes to the document are highlighted in blue.

Best regards,
Ivette on behalf of the authors

The one remaining minor concern is associated with the most recent reviewer's final comment: "How are the MMI values so different at 21 UTC in CLIPSAT and 75EnBEC?" The additional text and figure (provided in your response) does help explain what a reader should be looking for in the figures, but I still am having difficulty seeing how the 75EnBEC experiment "produces more isolated objects which do not match with observed objects," such that it has a penalized MMI value. From my visual assessment, it appears that there are just as many non-matching, isolated cells with reflectivity greater than 35 dBZ in CLIPSAT as there are in 75EnBEC. Can you and your co-authors come up with a way to visualize the differences in the two simulations such that it is obvious that CLIPSAT should have a substantially higher MMI? Perhaps there is some way to highlight the convective regions in both simulations that detract from the MMI score?

We thank the editor for the opportunity to revisit this issue. We recognize that indeed it is not very easy to see in Figure 16d how many more isolated objects were predicted in the 75EnBEC experiment that did not match with the observed objects. In an attempt to better show the differences between the experiments CLIPSAT and 75EnBEC at 21 UTC (2 h forecast), Figure 1 presents the index of the objects identified using MODE for the forecast and observed reflectivity values larger than 35 dBZ in both experiments. A total of 4 objects were identified in the observed field while 7 forecast objects were identified in CLIPSAT and 10 forecast objects in 75EnBEC. Object number 1 is not shown in the figure since it falls far from the interest area but its statistics are shown in Table 1. Table 1 shows the maximum of the total interest for the observed (MIO) and forecast (MIF) objects for both experiments. Overall, in Figure 1 it can be noted that in both experiments there were matched (colored red indices) and unmatched (colored royal blue indices) objects, with forecast objects 9 and 10 in 75EnBEC (Figure 1b) and 5 and 7 in CLIPSAT (Figure 1c) being unmatched over northeastern Oklahoma, southeastern Kansas, and southwestern Missouri. This means that both experiments overforecast the reflectivity values of the convection over that area. As a result, total interest values from these unmatched objects penalized the MMI (F+O) values of both experiments as can be noted in Table 1, where 0.4233 and 0.29 are the MFI of forecast objects 9 and 10 in 75EnBEC, respectively, and 0.5355 and 0.3057 are the MFI of forecast objects 5 and 7 in CLIPSAT, respectively. Yet, in 75EnBEC forecast object number 2 was also identified, which did not match any of the observed objects and resulted in the lowest MFI in this experiment with a value of 0.2339. Nevertheless, the best MIF and MIO value of 0.9532 is found in 75EnBEC for the observed object number 2 matching forecast object 5. A similar MIF and MIO value of 0.9472 was obtained for forecast object number 3 in CLIPSAT. It is worth noting that observed object 3 is best matched by forecast object number 6 in CLIPSAT with an MIF of 0.9075 while its best match in 75EnBEC is with forecast object number 8 with an MIF of 0.7429. The identified forecast object number 3 in 75EnBEC also penalized the MMI (F+O) with an MIF of 0.3103. Finally, the median of all MIF and MIO of each experiment indicates that, overall, the CLIPSAT experiment performs better than 75EnBEC at this forecast hour.

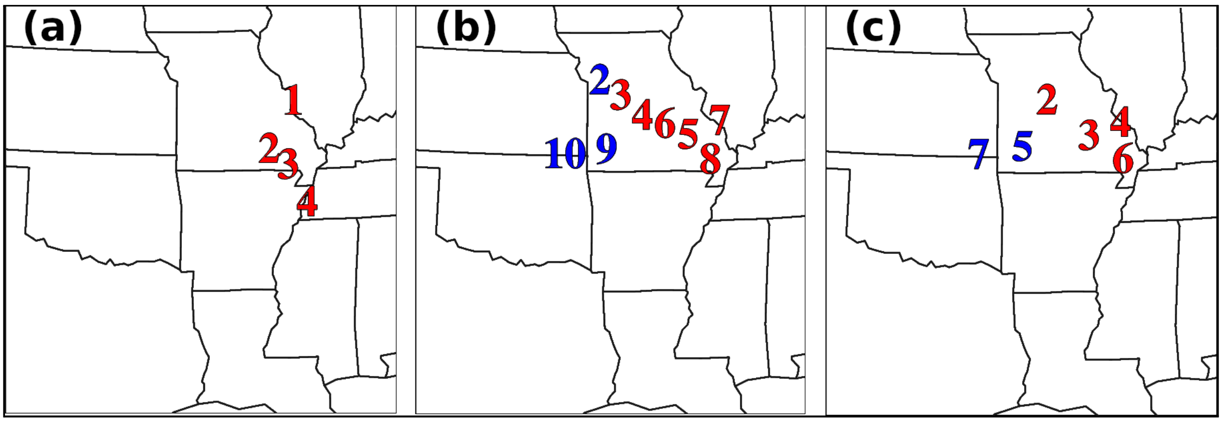

Figure 1. Index of the objects identified by MODE for the observed reflectivity (a) and 2 h forecast of composite reflectivity in experiments 75EnBEC (b) and CLIPSAT (c) for values larger than 35 dBZ. The colored red indices indicate matched objects between the forecast and observation and colored royal indices represent the unmatched objects.

Table 1. Maximum of the total interest derived from the comparison between an object in one field (observed or forecast) with all objects in the other field (observed or forecast).

		75EnBEC			CLIPSAT		
	Obj #	MIO	MIF	MIO+MIF	MIO	MIF	MIO+MIF
	1	0.85	0.3378	0.85	0.811	0.3378	0.811
	2	0.9532	0.2339	0.9532	0.9472	0.4124	0.9472
	3	0.7429	0.3103	0.7429	0.9075	0.9472	0.9075
	4	0.504	0.5128	0.504	0.4682	0.811	0.4682
	5		0.9532	0.3378		0.5355	0.85925
	6		0.5678	0.2339		0.9075	0.3378
	7		0.8204	0.3103		0.3057	0.4124
	8		0.7429	0.5128			0.9472
	9		0.4233	0.9532			0.811
	10		0.29	0.5678			0.5355
				0.8204			0.9075
				0.7429			0.3057
				0.4233			
				0.29			
MMIO		0.79645			0.85925		
MMIF			0.46805			0.5355	

MMI (F+O)				**0.5403**			**0.811**

As the editor suggested, Figure 16 in the manuscript was updated including a blue circle in panel (a) and a red circle in panel (d) highlighting the area of forecast objects 2 and 3 that detract from the MMI score. Lines 549-550 and 553-555 were also modified. More information on how MODE works in MET can be found at https://met.readthedocs.io/en/main_v10.1/Users_Guide/mode.html#mode-output and it is recommended to refer to Davis et al. (2009) (https://doi.org/10.1175/2009WAF2222241.1) for more information on the MMI metric.

Lines 549-550: "Both experiments overforecast the reflectivity values larger than 35 dBZ over that area, though."

Lines 553-555: "Overall, more spurious convection over northwestern Missouri is shown in 75EnBEC which led to the lower MMI (F+O) at this forecast hour (see the blue and red circles over this area in Fig. 16a and d, highlighting improvement and degradation, respectively, for each experiment)"

Figure 16:

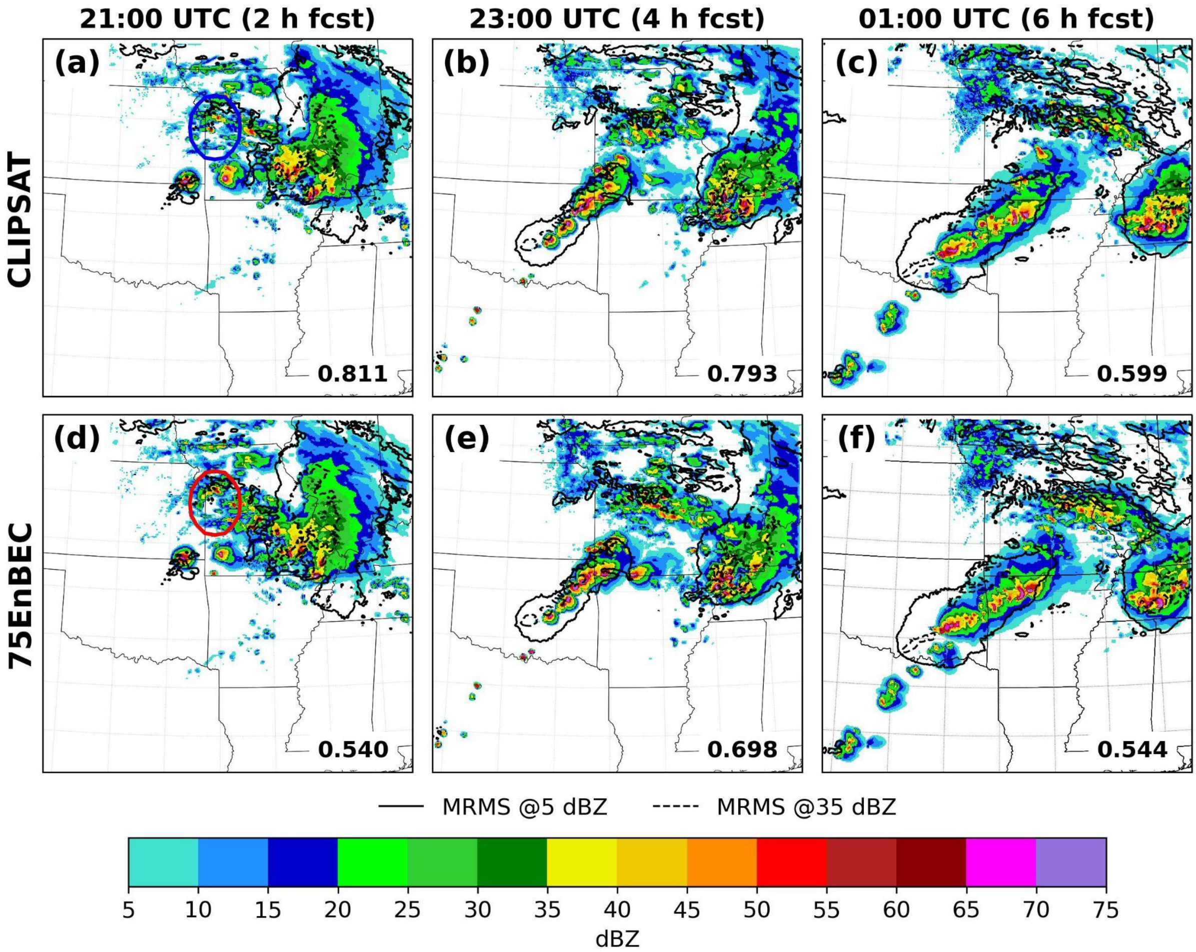

Figure 16. As in Fig. 7, but for experiments CLIPSAT (a, b, and c) and 75EnBEC (d, e, and f). The red (blue) circle in panel d (a), respectively, indicates forecast convection that penalized (improved) the MMI (F+O) value in experiment 75EnBEC (CLIPSAT) at 2 h forecast.