The Developmental Testbed Center

2007 13-km Dynamic Core Test Report Addendum

Jamie Wolff

June 30, 2010

1. Introduction

Recently, the DTC has worked to streamline the end-to-end testing and evaluation system and in the process the scripts used to perform the precipitation analysis and plotting were rewritten. Due to this rewrite, the confidence intervals for the 24-h precipitation accumulation statistics were slightly altered. The analysis has been reexamined and detailed in this addendum. The overall result for the individual configurations and their tendencies to overpredict at lower thresholds and underpredict at higher thresholds did not change significantly. However, there are several SS pair-wise differences that are now evident for bias. The favored configuration was dependent on the threshold and season, with no consistently better performer.

2. Results addendum

Section 4a: Precipitation accumulated in 24 h

Since the RFC precipitation analysis used for verification is only published at 12 UTC, for the forecast cycles initialized at 12 UTC, verification is available for the 24- and 48-h lead times, while for the forecast cycles initialized at 00 UTC, verification is available for the 36- and 60-h lead times. The 24-h and 60-h results will be presented in this report.

The biases for the ARW and NMM for the 24-h lead time are shown in Fig. 4a for several thresholds. For the annual aggregation, overprediction is noted for both cores at the 0.01- and 0.10-in thresholds and underprediction occurs for the NMM core at the 0.50- and 0.75-in thresholds. For the other thresholds, the results are not conclusive regarding over or under-prediction. The CIs are noticeably larger for the higher thresholds, reflecting large variability and a smaller sample size.

When the seasonal distribution is examined, statistically significant (SS) bias results are present for additional thresholds (Table 3). For both cores, summer and spring have SS overprediction at the lower thresholds, while summer also displays a marked underprediction at the intermediate thresholds. Winter also has SS overprediction at the lower thresholds, but for the ARW core only, while fall has SS underprediction at high thresholds.

Table 3. *Forecasts of 24-h accumulated precipitation for the 24-h lead time for both dynamical cores classified as under or overprediction at all time periods and thresholds. Only SS results are presented.*

Threshold (in)	**Time period**	**Prediction**	**Core**
0.01	Annual	Over	Both
	Summer	Over	Both
	Spring	Over	Both
	Winter	Over	ARW

0.10	Annual	Over	Both
	Summer	Over	Both
	Spring	Over	Both
	Winter	Over	ARW
0.50	Annual	Under	NMM
	Summer	Under	Both
0.75	Annual	Under	NMM
	Summer	Under	Both
1.00	Summer	Under	Both
1.50	Fall	Under	NMM
2.0	Fall	Under	Both

At the 60-h lead time (Fig. 4b), the annual aggregation shows overprediction at the 0.01- and 0.10-in thresholds, and the results are inconclusive for higher thresholds. There is not a pronounced change in bias magnitude between the 24- and 60-h forecasts, however, the CIs are wider than at 24 h, indicating more variability in the sample. The seasonal decomposition is presented in Table 4. The differences among the seasons are more pronounced at the 60-h lead time, with fall generally displaying the lowest values of mean biases at all thresholds and the highest number of SS underprediction at thresholds above 0.50-in, especially for the NMM core. Winter has the highest mean biases at the mid thresholds with the ARW core exhibiting SS overprediction, while summer and spring have the highest mean biases and SS overprediction at the lower thresholds for both cores.

Table 4. *Same as Table 3, but for the 60-h lead time.*

Threshold (in)	**Time period**	**Prediction**	**Core**
0.01	Annual	Over	Both
	Summer	Over	Both
	Spring	Over	Both
	Winter	Over	Both
0.10	Annual	Over	Both
	Summer	Over	Both
	Spring	Over	Both
	Winter	Over	Both
0.25	Spring	Over	Both
	Winter	Over	ARW
0.50	Summer	Under	ARW
	Winter	Over	ARW
0.75	Fall	Under	NMM
1.00	Fall	Under	Both
2.0	Fall	Under	NMM

For both lead times (Fig 5), at the lowest thresholds for the annual and winter aggregations, the NMM core is favored when there are SS pair-wise differences, while most SS pair-wise differences during the summer favor the ARW core. For the 24-h lead time in the 0.5- to 1.5-in threshold range the SS pair-wise differences generally favor the ARW core. Overall, there are less SS pair-wise bias differences for the longer lead time.

Table 5. *SS pair-wise differences of bias for the 24-h lead time, where the favored core is highlighted.*

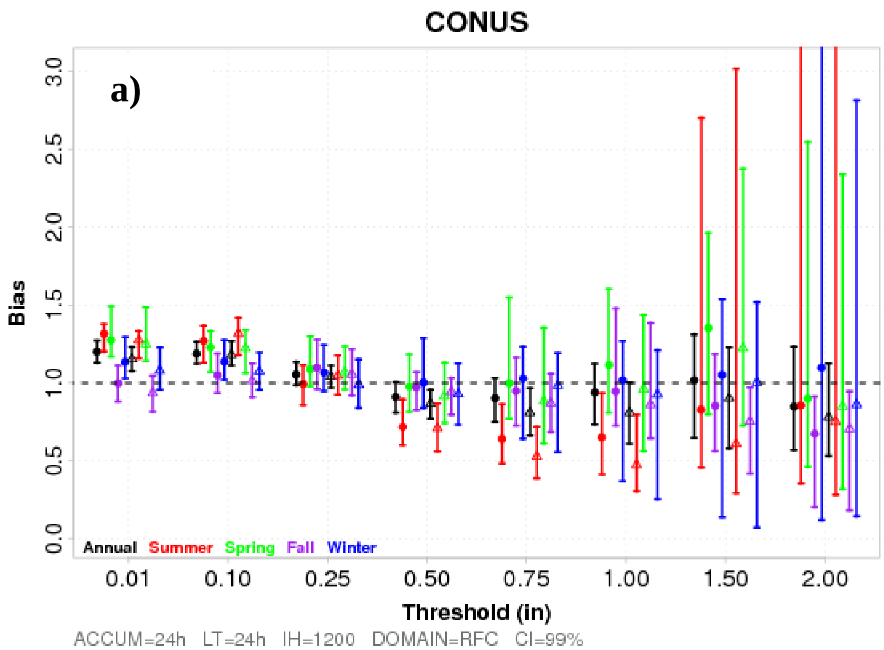
Threshold (in)	Time period	Core
0.01	Annual	NMM
	Summer	NMM
	Fall	ARW
	Winter	NMM
0.10	Summer	ARW
	Winter	NMM
0.25	Summer	ARW
	Fall	NMM
	Winter	NMM
0.50	Annual	ARW
	Winter	ARW
0.75	Annual	ARW
	Summer	ARW
1.0	Annual	ARW
	Summer	ARW
	Winter	ARW
	Spring	NMM
1.5	Annual	ARW
	Summer	ARW

Table 6. *Same as Table 5, but for the 60-h lead time.*

Threshold (in)	Time period	Core
0.01	Annual	NMM
	Fall	NMM
	Winter	NMM
0.10	Summer	ARW
	Winter	NMM
0.25	Summer	ARW
	Winter	NMM

The ETS for the 24–h lead time (Fig. 6a) displays its maximum values for the lowest thresholds and is smaller for higher thresholds. The seasonal breakdown indicates that summer has the lowest scores for all thresholds. The 60-h results (Fig. 6b) indicate a loss of skill with lead time, especially for the summer season. Fall and winter have the highest aggregated forecast skill at all thresholds at both lead times.

The ETS differences between ARW and NMM are shown in Fig. 7. The differences are very small and are not SS for any threshold at the 24-h lead time. Two SS pair-wise differences are noted at the 60-h lead time, both favoring the ARW core during fall at the 0.75- and 1.0-in thresholds.



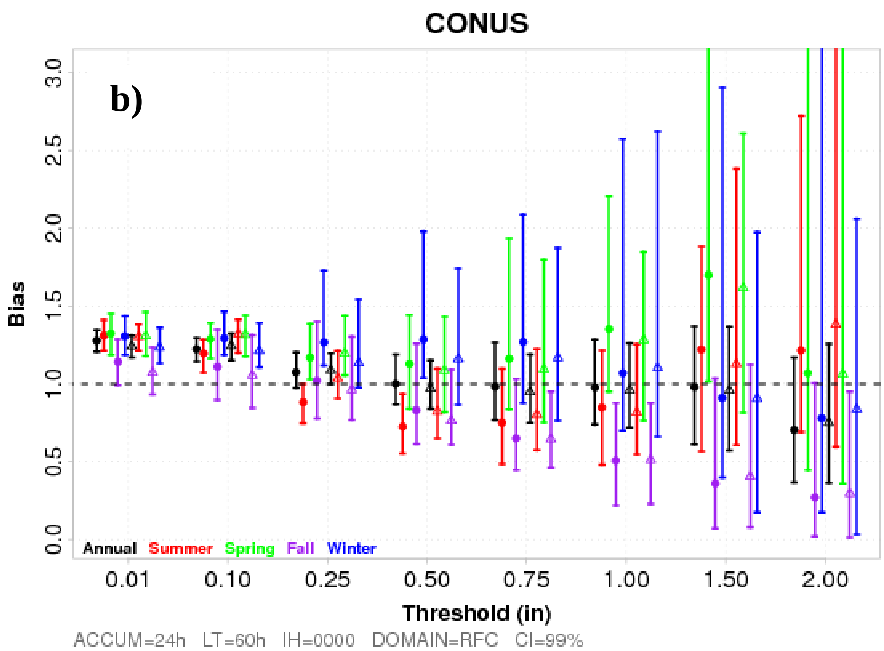


Figure 4. Bias for 24-h accumulated precipitation at the a) 24-h and b) 60-h lead times. ARW/NMM are circles/triangles. Annual mean in black, summer in read, spring in green, fall in purple and winter in blue. Vertical bars represent the 99% CIs.

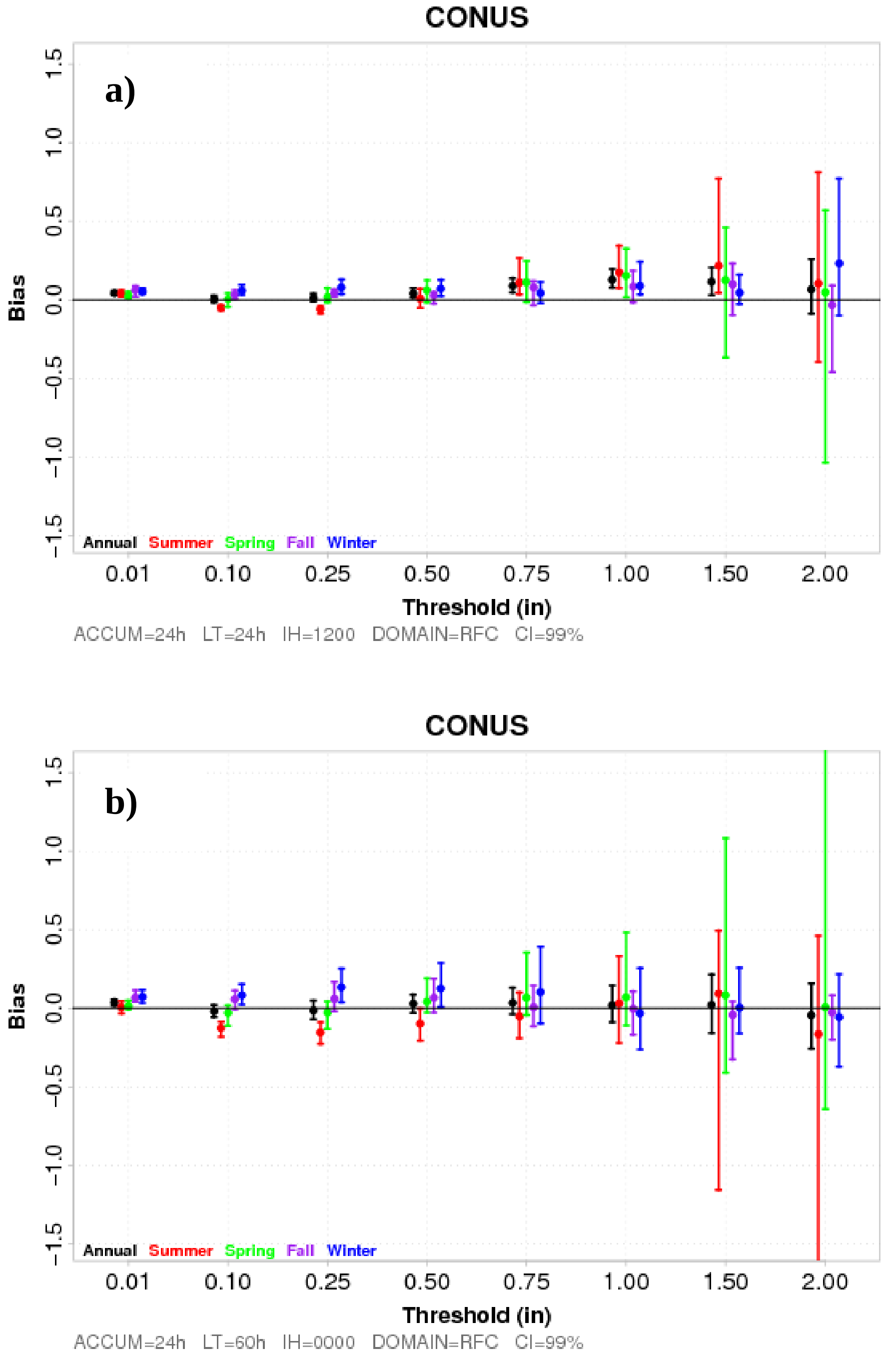


Figure 5. ARW-NMM difference in bias for 24-h accumulated precipitation at the a) 24-h and b) 60-h lead times. Annual mean in black, summer in read, spring in green, fall in purple and winter in blue. Vertical bars represent the 99% CIs.

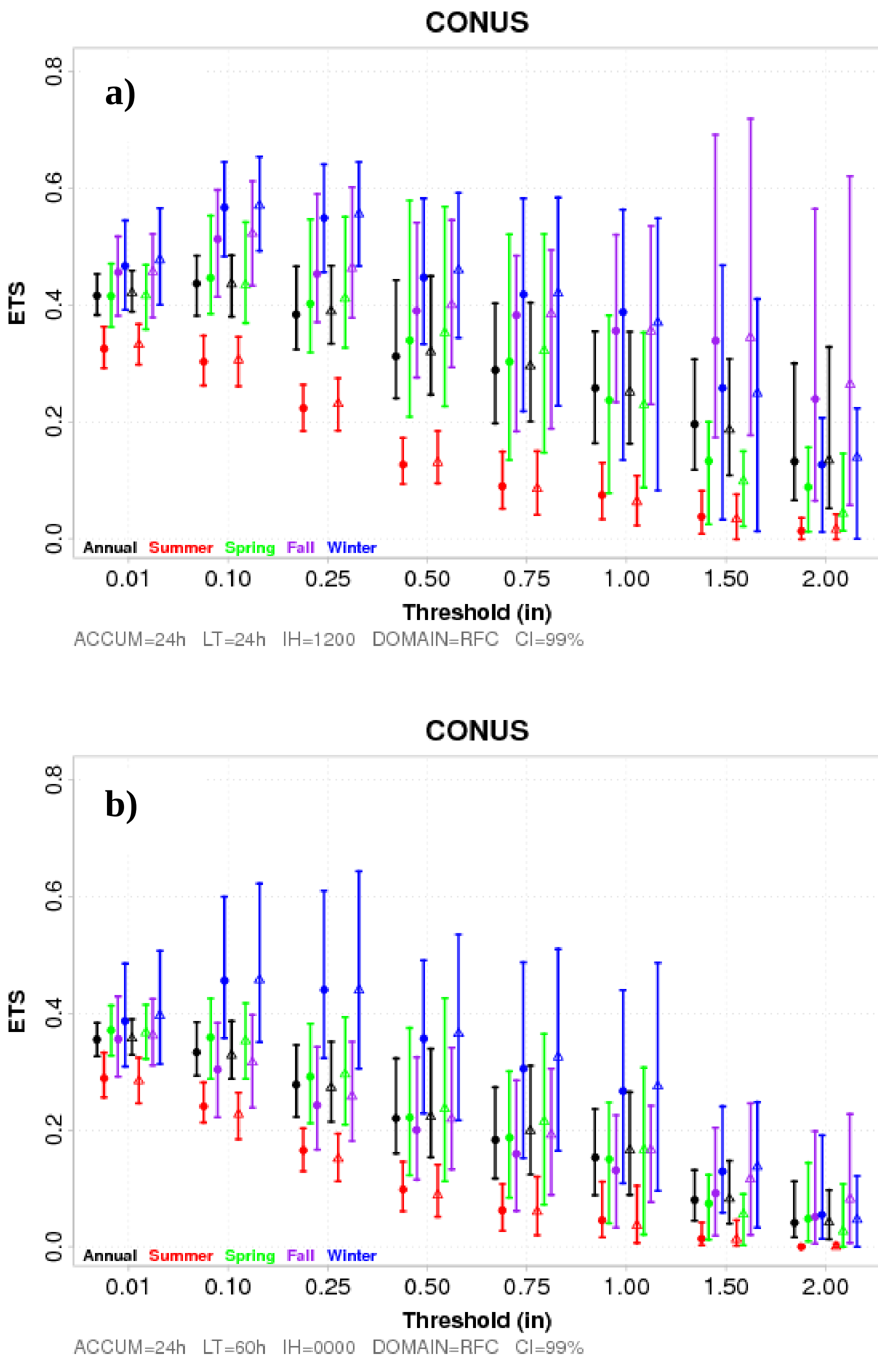


Figure 6. Same as Fig. 4, except for the ETS.

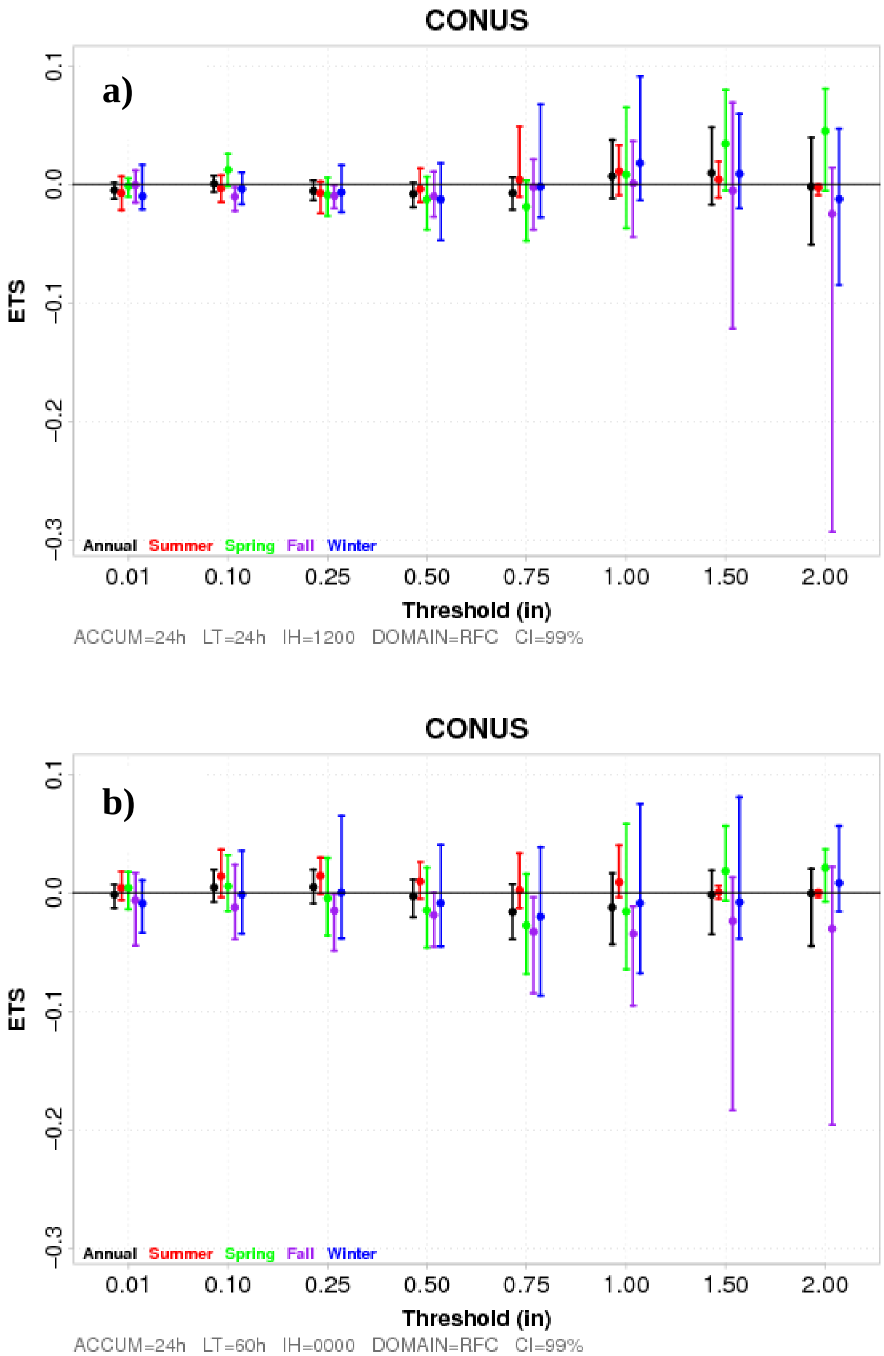


Figure 7. Same as Fig. 5, except for the ETS.