Western Region Technical Attachment
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HOW COULD THE NGM MOS POPs BE 90 OR 100% WHEN THE NGM QPF APPARENTLY CALLED FOR NO PRECIPITATION?

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During this past December, two separate cases came to our attention where the above mentioned disparity occurred at DCA. We examined each case individually and concluded that the problem was the same in both cases.

Fig. 1 displays the FWC and FRHT output from the NGM initialized on December 3, 1990, 0000 UTC. Note that the NGM MOS for DCA called for a 90% PoP for the 12-h period ending 0000 UTC on December 4, while the NGM itself forecast no precipitation to fall during that time. Fig. 2 paints a similar picture for the NGM run initialized on December 17, 1200 UTC. In this case, the PoP for DCA for the 12-h period ending 1200 UTC on December 18 was 100% with no precipitation forecast through the 42-h projection.

Here's the problem. Both the graphical output depicting forecast precipitation amount and the FRHT message that the forecaster sees are obtained from the NGM "C" grid. However, the MOS forecast program is constrained to use precipitation forecasts that are interpolated to the coarser LFM grid. Thus, even though the same model is used, there can be subtle, but important, geographical differences in the placement of forecast precipitation boundaries due to the method of interpolation. In fact, precipitation displayed on the LFM grid tends to have a greater areal extent and lesser maxima than that displayed on the "C" grid. It turns out that these differences were responsible for the observed disparities.

For a clearer picture of what happened, refer to Figs. 3 and 4. Here, the NGM forecasts of the 12-h precipitation amount ending 24 hours after initialization for the December 3 and December 17 cases, respectively, are graphically displayed. Note that these precipitation amount forecasts were important predictors in the NGM MOS equations that produced the PoP forecasts in question. In the top portion of Figs. 3 and 4, the NGM precipitation amount forecasts on the "C" grid are shown, while the same forecasts interpolated to the LFM grid are shown at the bottom. Note that in each case, the precipitation boundary was forecast to lie north of DCA on the "C" grid, while the precipitation forecasts interpolated to the LFM grid and then to DCA indicate that DCA would have precipitation. We verified that this was true for each case by retrieving the actual forecast precipitation values used to produce the NGM MOS PoP forecasts. In both cases, the NGM forecast values were measurable and contributed towards the high PoP. For academic purposes, we'll mention that measurable precipitation verified in both cases.

While, on one hand, using NGM data from the relatively coarse LFM grid has the benefit of smoothing the NGM forecast data to some degree, there is also the potential that this type of situation will "pop up" from time to time. Certainly, it is disturbing to have seen it twice in such a short time span. While we have no particular evidence, we wonder whether any of the recent changes to the NGM played a role in how the precipitation boundaries were placed. In any event, we just wanted to bring our findings to your attention.

```
NMCFWCDCA
FOUS14 KWBC 030524
DCA  ESC
POP/MX-MN                90/ 50          90/ 49          90/ 50  30/ 37
WIND   0310   0414   1112   1113   1514   1712   1810   3112
CLDS 0118/4 0019/4 1009/4 0009/4 0009/4 0019/4 0028/4 0226/4
```

```
NMCFRHT62
FOUE62 KWBC 030000
OUTPUT FROM NGM 00Z DEC 03 90
TTPTTR1R2R3 VVVLI PSDDFF HHT1T3T5
DCA//426450 -0312 290210 40110300
06000556070 -1012 300519 40060402
12000718292 00411 300917 40030403
18000658795 01410 271317 52090402
24000749299 01705 211526 56130703
30004889499 00903 171828 59151105
36024919099 05003 131829 60151006
42064959999 07599 111920 60171106
48045819197 03203 132717 56130705
```

Figure 1. FWC and FRHT output from NGM initialized 0000 UTC on 12/3/90.

```
NMCFWCDCA
FOUS14 KWBC 171625
DCA  ESC
POP/MN-MX                100/ 41         30/ 65          70/ 51  50/ 58
WIND   1205   1608   1710   1810   1913   1913   2113   2114
CLDS 0136/4 0119/4 0009/4 0109/4 0236/4 0325/4 0227/4 0118/4
```

```
NMCFRHT62
FOUE62 KWBC 171200
OUTPUT FROM NGM 12Z DEC 17 90
TTPTTR1R2R3 VVVLI PSDDFF HHT1T3T5
DCA//824751 -0614 230108 47010202
06000605472 -0714 220801 50050303
12002598176 00109 191816 54070506
18000719494 01602 142021 59070907
24000068591 01102 092125 63111308
30000787096-02303 062122 66171309
36000665892 00405 032130 67191110
42000787199 02303 022129 67171111
48003737955 -2301 042330 62191208
```

Figure 2. FWC and FRHT output from NGM initialized 1200 UTC on 12/17/90

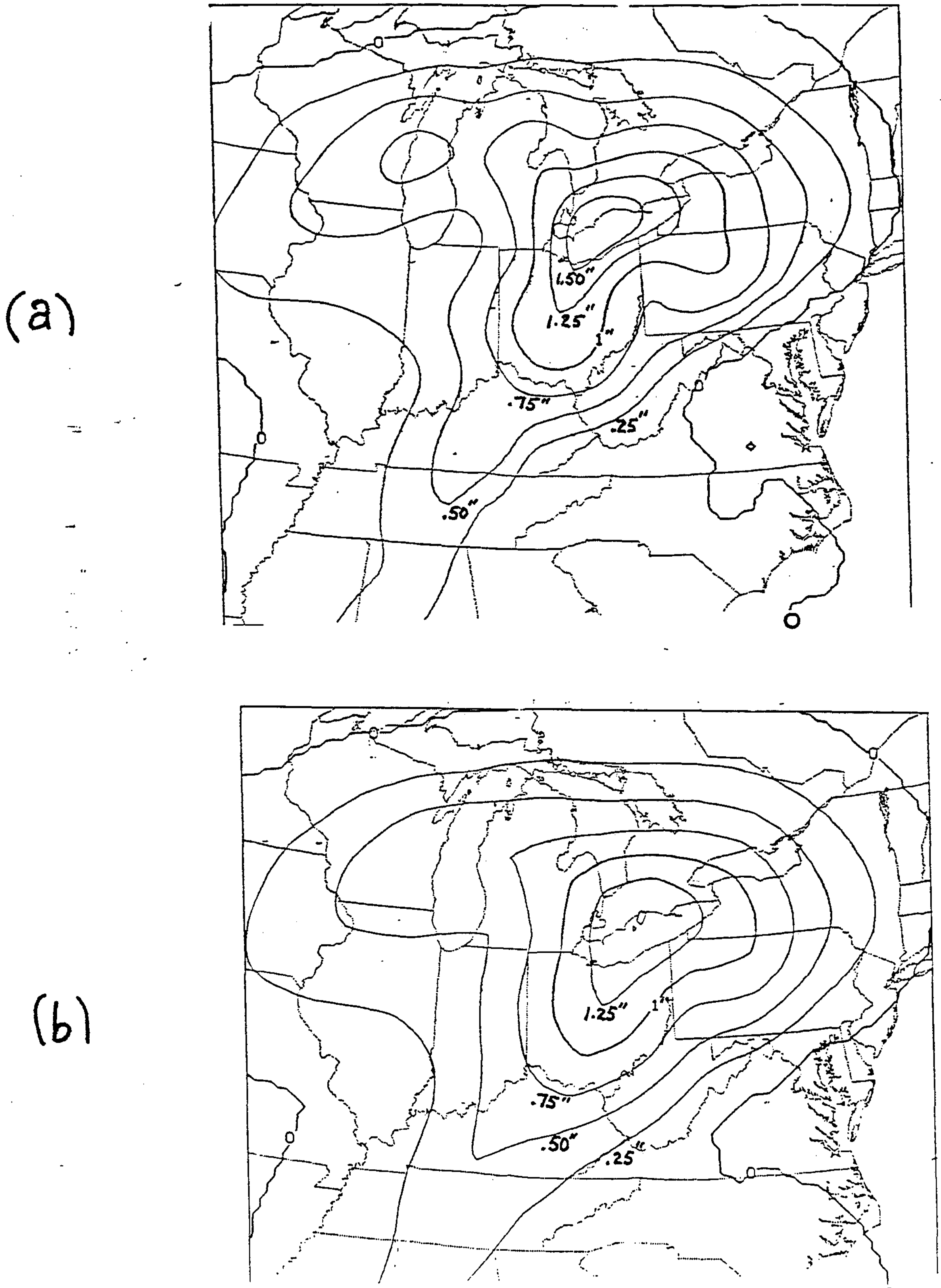

Figure 3. Forecasts of precipitation amount valid for the 12-h period ending 0000 UTC, 12/4/90 from the NGM initialized 0000 UTC, 12/3/90. The forecasts are shown as they appear on the NGM "C" grid (a) and after interpolation to the LFM grid (b).

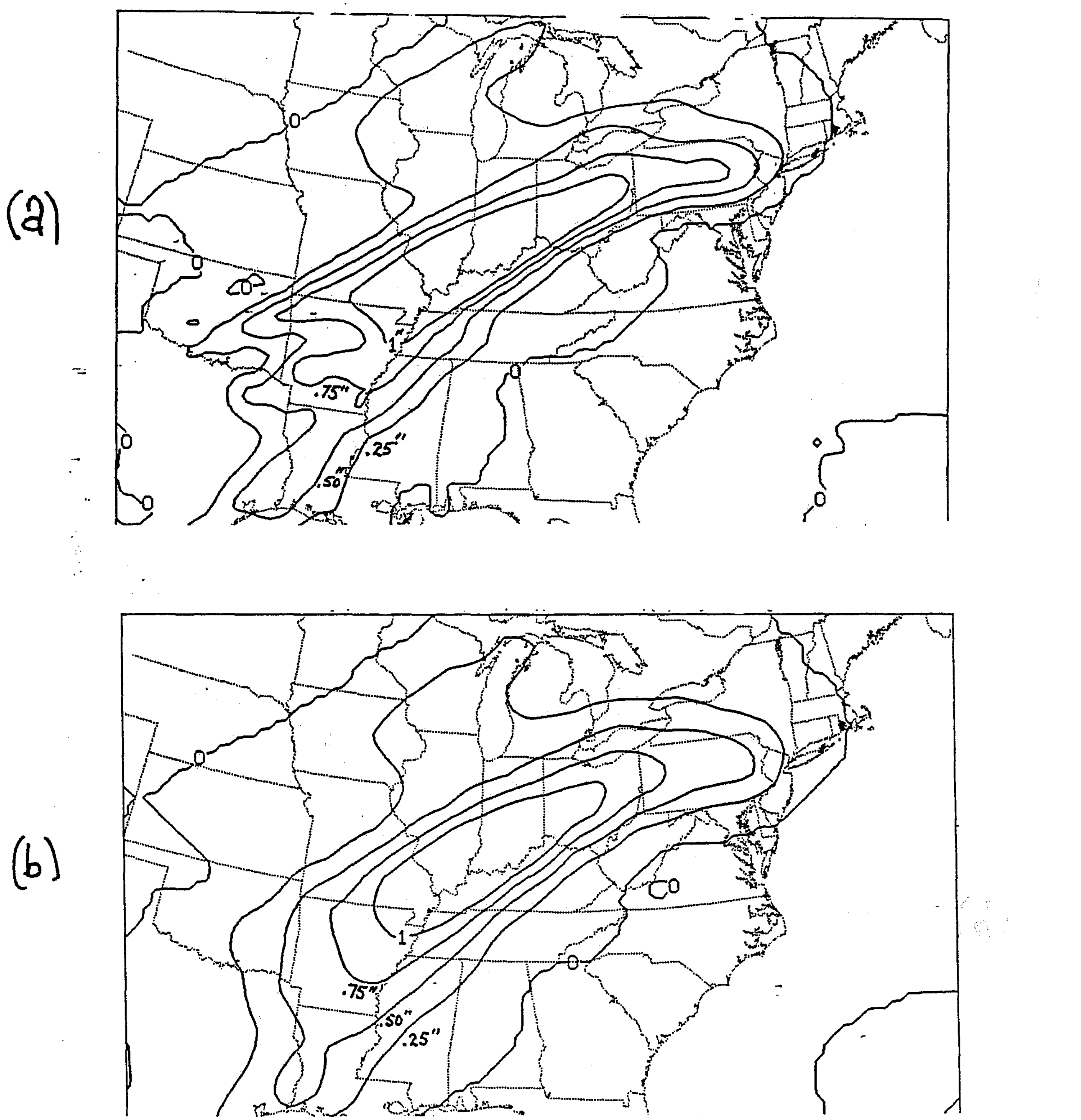

Figure 4. Forecasts of precipitation amount valid for the 12-h period ending 1200 UTC 12/18/90 from the NGM initialized 1200 UTC 12/17/90. The forecasts are shown as they appear on the NGM "C" grid (a) and after interpolation to the LFM grid (b).