U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE
NATIONAL METEOROLOGICAL CENTER

OFFICE NOTE 283

# PRECIPITATION VERIFICATION

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JANUARY 1984

# PRECIPITATION VERIFICATION

## 1983

## Introduction

Basic Weather Branch keeps a continuous record of precipitation threat scores, no precipitation threat scores and bias. These scores are used to evaluate the effectiveness of the 1-2 day operational meteorologist and the ...dance in precipitation related situations.

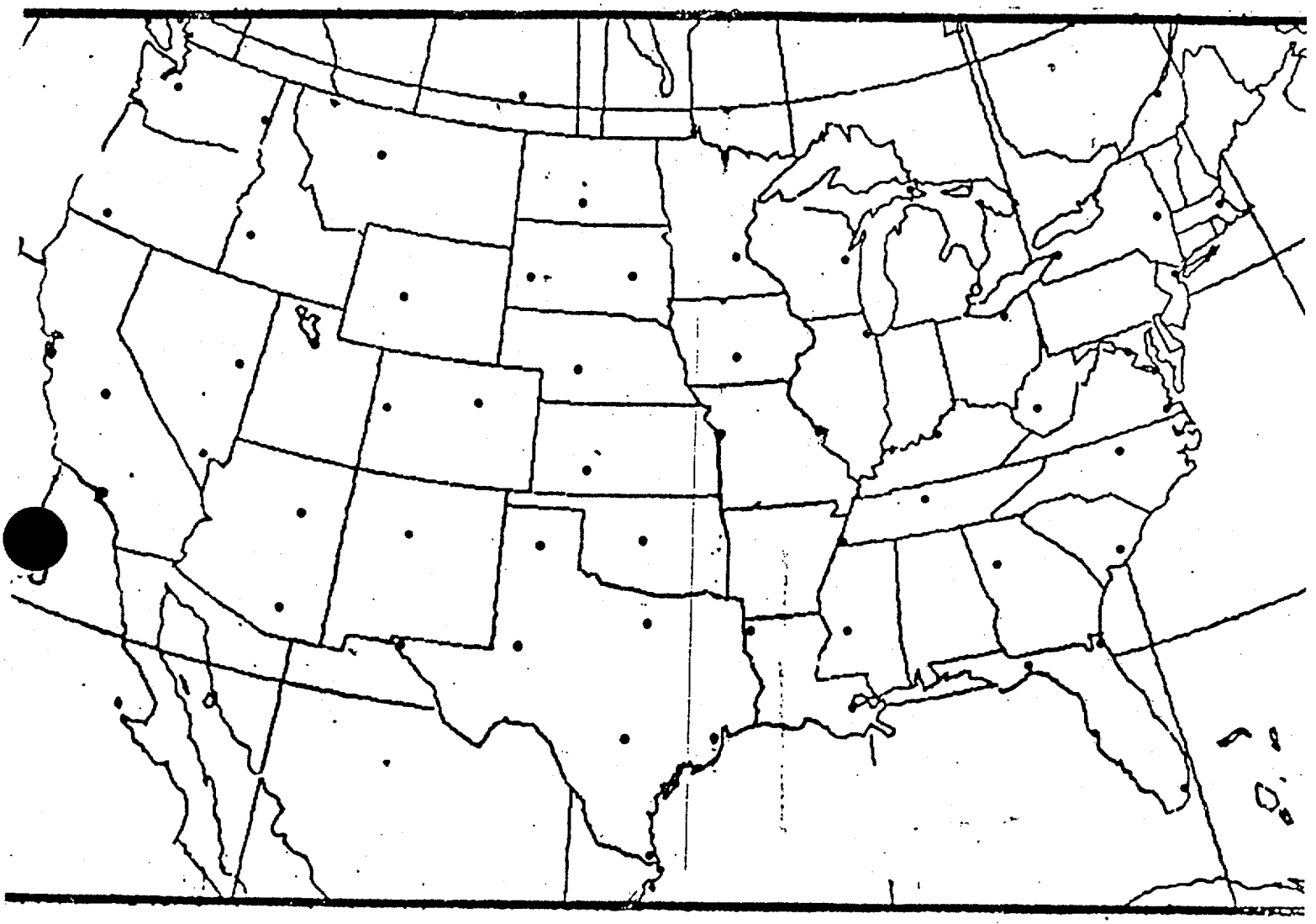
The verification of precipitation forecasts for 36-12 and 24-12 hours, over a 60 station network Figure #1 for the Limited Area Fine Mesh (LFM), Basic Weather Branch 1-2 day forecasts and PoPs (model output statistics (MOS) from the LFM), are presented in the following tables.

In Figure #2 TsP, TsNP and bias statistics are listed for January through December 1983; as well as new TsP records for the month, and new all time TsP records. Monthly and all time records are not listed for the PoPs but one can easily make comparisons from Figure #2.

Figure #3 is a graph of monthly TsP for 1983. The results are self explanatory. The operational forecaster still has an edge over the LFM model and the PoPs. How much of an edge can be observed by looking at the shaded area. Here the 36-12 hour 1-2 day forecast is approximately equivalent to the LFM 24-12 hour giving the 1-2 day forecaster a twelve hour edge. The 24-12 hour 1-2 day TsP verification continues its scoring leadership over the LFM as it has since the inception of the 24 hour LFM in October 1971. And, if one looks at the comparison on Figure #2 between the TsP, TsNp and bias, the improvement over the LFM and the PoPs at both 36-12 hours and 24-12 hours has become even more significant. Looking at Figures #4 and #5 which is a comparison between the LFM and 1-2 day TsP and bias since inception, it is apparent that in the beginning the 1-2 day forecasters were maximizing threat score by over forecasting, but since 1981 the LFM has taken over that dubious honor. "83" was better with lower bias than "82" but the 1-2 day forecasters improved their bias an equal amount. In summary, a better TsP and a better bias means much more in terms of improved guidance.

The PoPs were not graphed except in Figure #3 and summarized in Figure #2, but the totals indicate skill in the wetter months and little skill in the drier months. However, one look at the TsNP, in comparison with the other statistics for the same month, shows the PoPs skill for the stations "picked" even in the drier months. We can see at a glance the PoPs are not maximizing threat score.

In conclusion, the 1-2 day forecasters in Basic Weather Branch had a banner year with eleven out of twenty-four monthly records broken. In addition, two of those records were all-time records.



60 STATION NETWORK

Fig #1

Fig # 2

1983

Precipitation Verification

| Mo | 36-12hrs LFM TsP | LFM Bias | LFM TsNP | 36-12hrs BWB TsP | BWB Bias | BWB TsNP | 36-12hrs POPS TsP | POPS Bias | POPS TsNP | 24-12hrs LFM TsP | LFM Bias | LFM TsNP | 24-12hrs BWB TsP | BWB Bias | BWB TsNP | 24-12hrs POPS TsP | POPS Bias | POPS TsNP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jan | 39.1 | 1.40 | 77.6 | 40.4 | 1.22 | 80.0 | 39.4 | .72 | 84.8 | 43.7 | 1.33 | 80,6 | 49.7 | 1.20 | 84.0 | 49.2 | .85 | 85.9 |
| Feb | 40.1 | 1.47 | 74.3 | 45.2 | 1.13 | 80.6 | 37.9 | .67 | 82.6 | 44.5 | 1.34 | 78.3 | 51.1 | 1,10 | 83.5 | 48,6 | .80 | 85.2 |
| Mar | 45.1 | 1.49 | 68.2 | *49.9 | 1.17 | 76.9 | 43.6 | .81 | 78.5 | *49.9 | 1.43 | 72.0 | *54.8 | 1.18 | 79.4 | 52,2 | .91 | 81.2 |
| Apr* | 43.0 | 1.52 | 72.9 | *47.3 | 1 25 | 78.2 | 43.9 | .90 | 81.2 | *50.2 | 1.41 | 77 7 | *54.0 | 1.25 | 81.5 | 52.5 | .99 | 83.1 |
| May* | 41.2 | 1.46 | 74.8 | *45.1 | 1.23 | 79.5 | 37.2 | .78 | 81 4 | *45.5 | 1.41 | 78.0 | *49.3 | 1.24 | 81,3 | 44.7 | .82 | 83.9 |
| June | 33.8 | 1.64 | 74.2 | 35.8 | 1.28 | 78.9 | 27.7 | .58 | 83.9 | 35.5 | 1.61 | 75.4 | *40.1 | 1.29 | 80.6 | 31.5 | .65 | 82.9 |
| July | 26.0 | 1.65 | 78.8 | 28.3 | 1.34 | 82.3 | 14.0 | .32 | 87.1 | 26.7 | 1.59 | 79.2 | 32.2 | 1.47 | 82.6 | 19.2 | .36 | 87.5 |
| Aug | 26 2 | 1.72 | 74 8 | 30.7 | 1.36 | 80.2 | 16.3 | .37 | 85.9 | 26.2 | 1 82 | 74.7 | 31.5 | 1.41 | 80.1 | 20.1 | .44 | 85.8 |
| Sept | 32.2 | 1.60 | 75.7 | 39.2 | 1.14 | 83.1 | 28.8 | .46 | 85.8 | 38.1 | 1.53 | 78.9 | 43.8 | 1.18 | 84.4 | 33.2 | .54 | 86.2 |
| Oct | 37.4 | 1.38 | 79.5 | 40.3 | 1.16 | 82.6 | 29.2 | .53 | 85.1 | 40.8 | 1.32 | 81.3 | 47.6 | 1.20 | 85.0 | 38.3 | .62 | 86.6 |
| NOv** | 46.1 | 1.45 | 72,1 | **50.6 | 1.19 | 78.2 | 47.7 | .74 | 81.6 | **51 6 | 1.38 | 76.4 | **57.9 | 1.16 | 82.1 | 54.9 | .82 | 83.8 |
| Dec | *42.6 | 1.46 | 68.6 | *48.5 | 1.14 | 76.6 | 43.3 | 76 | 79.2 | 47.1 | 1.34 | 73 5 | *56.8 | 1.12 | 81.2 | 52.6 | .81 | 82.3 |
| Yearly ave | 37.7 | 1.52 | 74.3 | 41.6 | 1.21 | 79.8 | 34.1 | .64 | 83.1 | 41.7 | 1.46 | 77 2 | 47.7 | 1,23 | 82.1 | 41.5 | ,72 | 84 5 |

$$TsP = \frac{H}{F+O-H}$$

$$Bias = \frac{F}{O}$$

$$TsNP = \frac{*N-(F+O-H)}{*N-H}$$

"For POPS" F = a forecast of 45% probability or greater of .01/12 hr period that verifies in the 60 station network

* New TsP records for the month

** New all-time TsP records

(*N) number of reports over 60 station network for 12 hr period

ex. there are 62(12hr)reporting periods in a 31 day month 62X60= 3720 for *N

Fig # 3

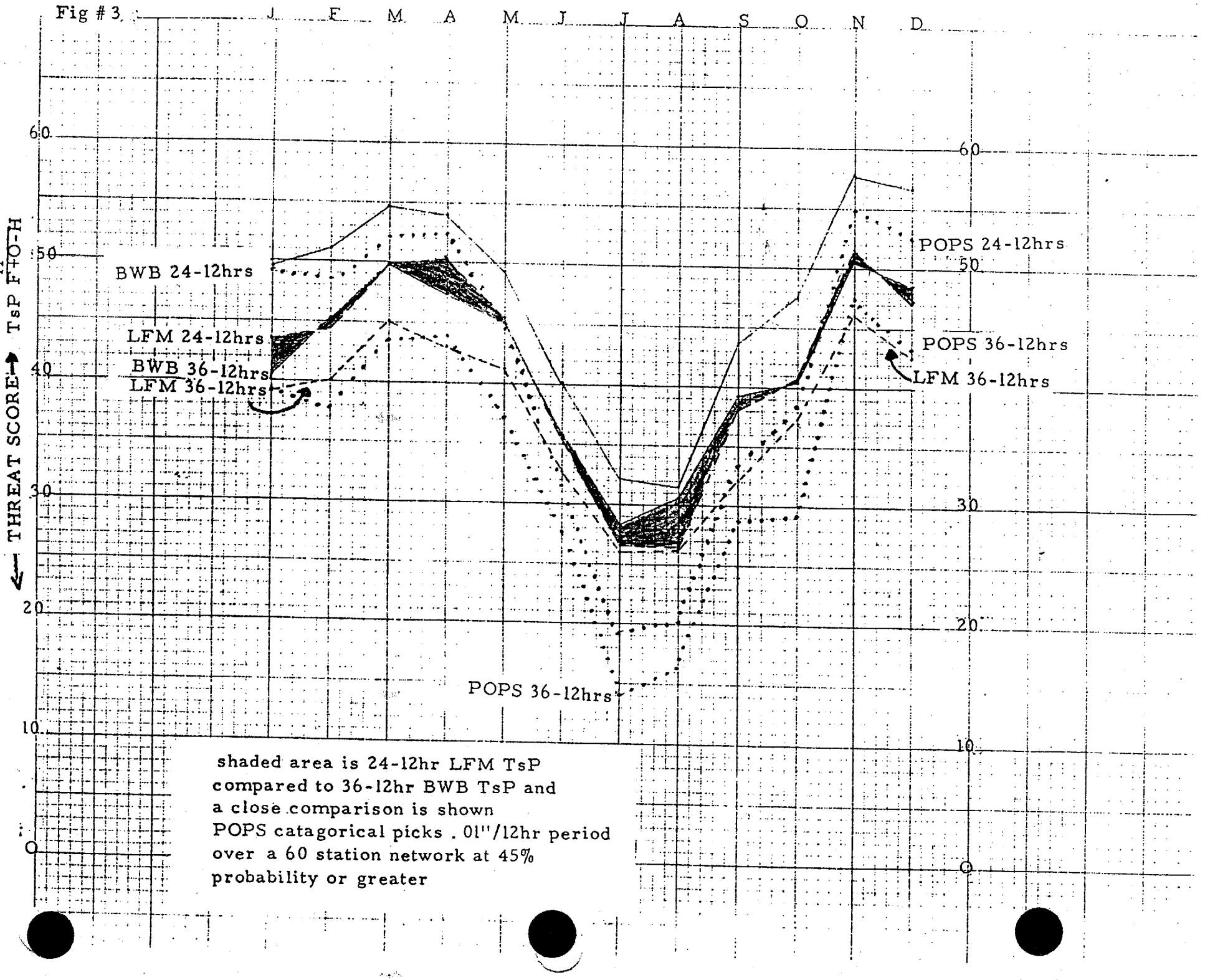

J F M A M J J A S O N D
60
50
40
30
20
10
0
THREAT SCORE → TsP F+O-H
BWB 24-12hrs
LFM 24-12hrs
BWB 36-12hrs
LFM 36-12hrs
POPS 24-12hrs
POPS 36-12hrs
LFM 36-12hrs
POPS 36-12hrs
shaded area is 24-12hr LFM TsP compared to 36-12hr BWB TsP and a close comparison is shown
POPS catagorical picks . 01"/12hr period over a 60 station network at 45% probability or greater

Fig #4

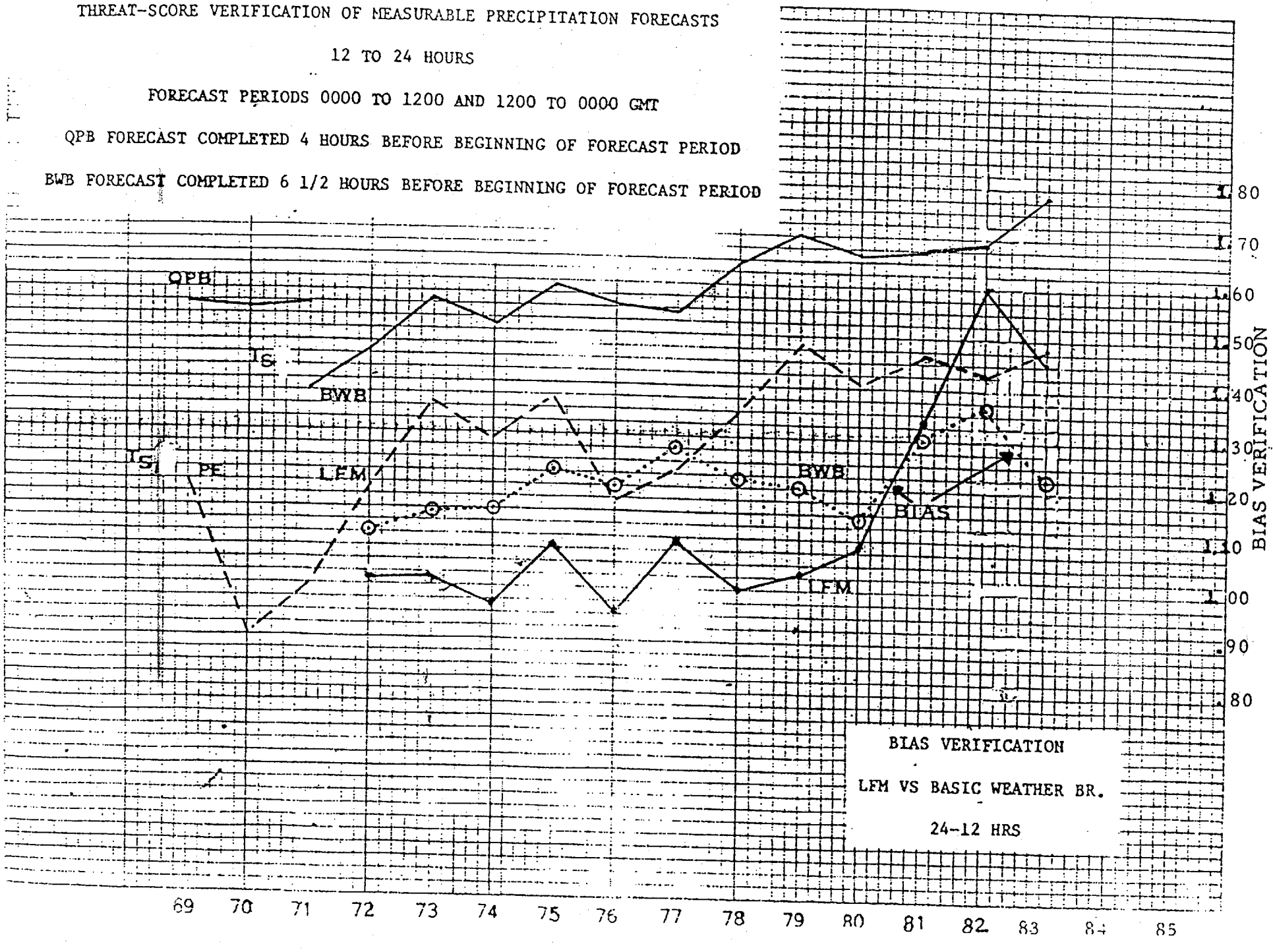
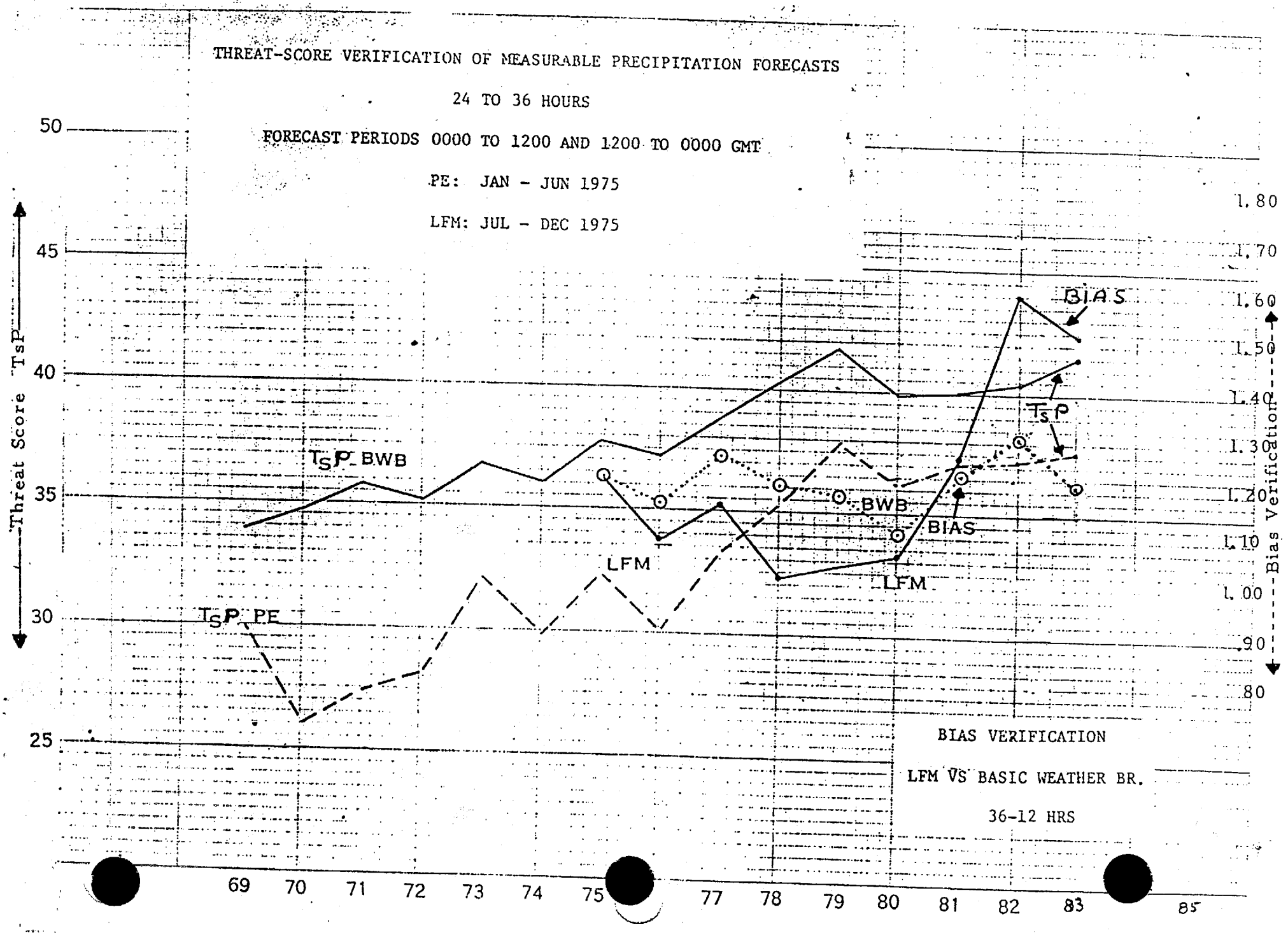

THREAT-SCORE VERIFICATION OF MEASURABLE PRECIPITATION FORECASTS
12 TO 24 HOURS
FORECAST PERIODS 0000 TO 1200 AND 1200 TO 0000 GMT
QPB FORECAST COMPLETED 4 HOURS BEFORE BEGINNING OF FORECAST PERIOD
BWB FORECAST COMPLETED 6 1/2 HOURS BEFORE BEGINNING OF FORECAST PERIOD
50
45
40
35
30
25
TsP
QPB
IS
BWB
IS
PE
LFM
BWB
BIAS
LFM
1.80
1.70
1.60
1.50
1.40
1.30
1.20
1.10
1.00
.90
.80
BIAS VERIFICATION
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
BIAS VERIFICATION
LFM VS BASIC WEATHER BR.
24-12 HRS

Fig #5


THREAT-SCORE VERIFICATION OF MEASURABLE PRECIPITATION FORECASTS
24 TO 36 HOURS
FORECAST PERIODS 0000 TO 1200 AND 1200 TO 0000 GMT
PE: JAN - JUN 1975
LFM: JUL - DEC 1975
Threat Score TsP
Bias Verification
50
45
40
35
30
25
1.80
1.70
1.60
1.50
1.40
1.30
1.20
1.10
1.00
.90
.80
BIAS
TsP
TsP BWB
BWB
BIAS
LFM
LFM
TsP PE
BIAS VERIFICATION
LFM VS BASIC WEATHER BR.
36-12 HRS
69
70
71
72
73
74
75
77
78
79
80
81
82
83
85