

## WESTERN REGION TECHNICAL ATTACHMENT NO. 88-07 March 1, 1988

### THE INFLUENCE OF RECENT CHANGES IN THE NESTED GRID MODEL ON THE PERFECT PROG POP GUIDANCE

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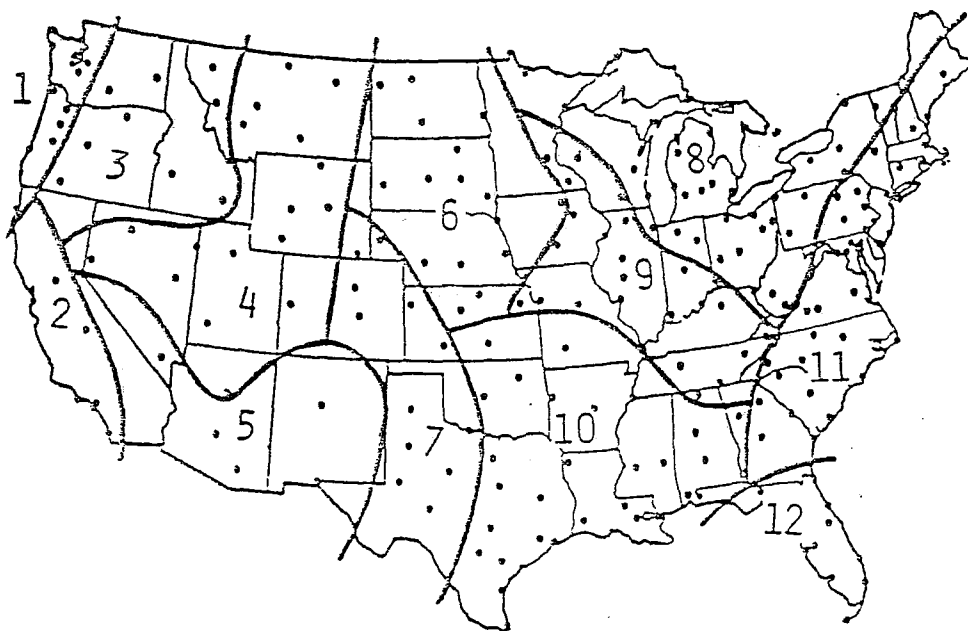
The Nested Grid Model (NGM) has exhibited a cold and wet bias that increases with forecast projection since the implementation of an improved physics package in July 1986. The magnitude of this problem varies geographically, with the greatest tendency for bias found in the mountainous west. On October 22, 1987, a hemispheric statistical correction was implemented in the NGM to adjust the mean bias of the potential temperature to zero at each model level in the vertical. This correction does not take into account specific geographical variations in the magnitude of the bias.

It was expected that the correction in the thermal bias would also correct some of the NGM's wet bias in the relative humidity forecasts. Relative humidity is a major predictor for the perfect prog PoP guidance. If the NGM humidity forecasts become more accurate, then the PoP guidance off the NGM should improve. For this reason, we have studied the effects of this model change on the perfect prog PoP guidance.

PoP forecasts for October 22, 1987 through January 31, 1988 (the period after the NGM temperature correction was implemented) were compared to the results for last cool season, October 1986 through March 1987. The improvement over climate in the NWS Brier Score was calculated. The MOS PoP's off the Limited-area Fine Mesh (LFM) model were included in this comparison. We compared the LFM-based and NGM-based PoP forecasts for the 12 regions shown in Attachment 1 in order to determine geographic variations in the results. The same 204 stations were used for both seasons but the sample for 1987-1988 was smaller.

The results for the nation (Attachment 2) show that, overall, the model change has been beneficial to perfect prog PoP guidance. Last cool season, the perfect prog PoP forecasts were up to 10% worse than MOS PoP's. This year, the perfect prog PoP's were about the same as or better than MOS except for the 60-hour projection. The mean PoP forecasts (these are shown in parentheses for each projection) indicate that perfect prog PoP's are still too high, but now they are somewhat closer to the observed relative frequency of precipitation for the nation (21%).

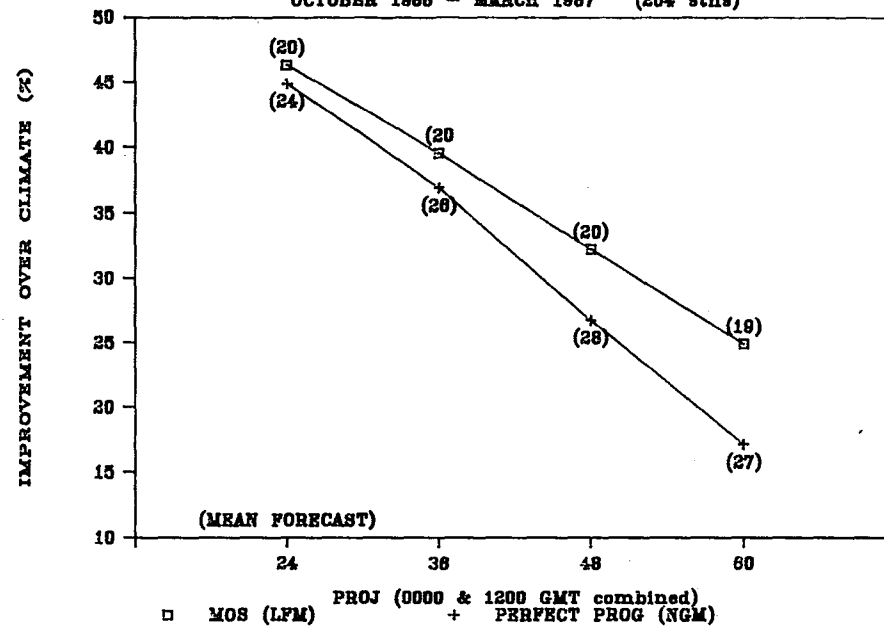
The results for each region are shown separately in Attachments 3-14. Many of these comparisons are quite different than those for the national average and may be strongly related to the prevailing weather patterns during the two seasons. In addition, in some dry areas the sample is relatively small. The areas where perfect prog is as good as or better than MOS are found in the eastern half of the country (regions 7-12). Also, in the comparisons between MOS and perfect prog, the perfect prog PoP's have shown an improvement over last year in all the regions except 1 and 3. We plan to do further studies to analyze the geographical variations of other NGM output variables and their impact on the perfect prog guidance.



The 12 regions used for the development of cool season perfect prog PoP and cloud equations.

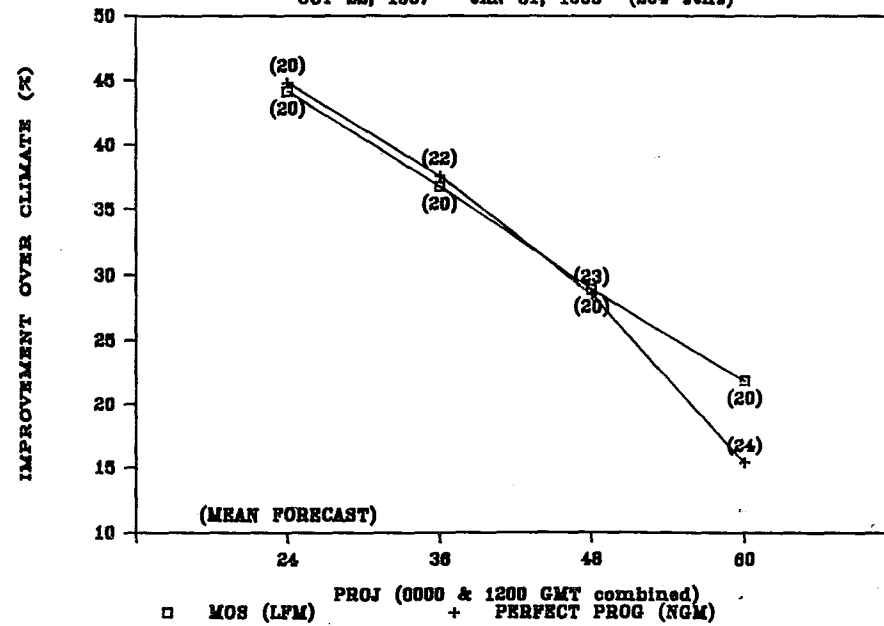
### NATIONAL PoP COMPARISON

OCTOBER 1986 - MARCH 1987 (204 stns)



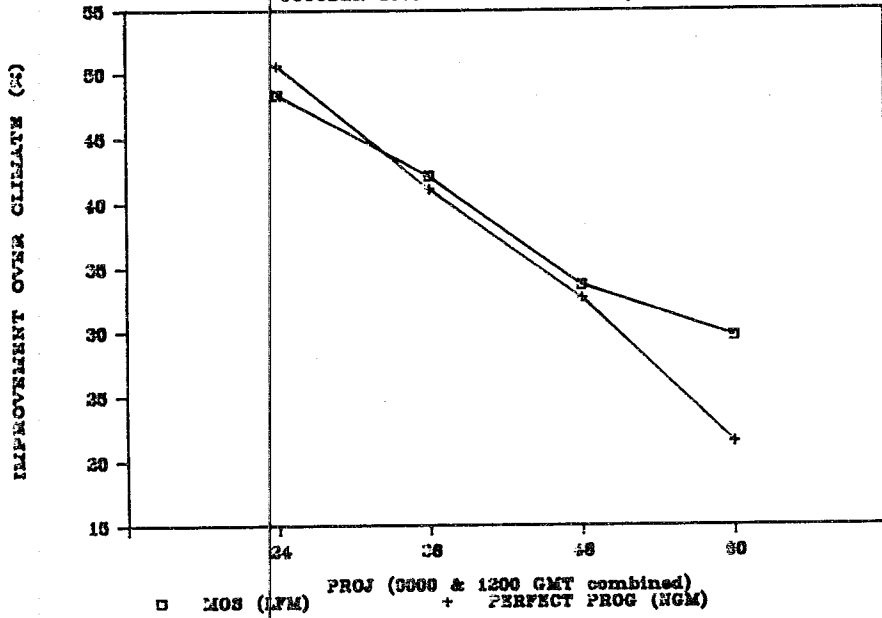
### NATIONAL PoP COMPARISON

OCT 22, 1987 - JAN 31, 1988 (204 stns)



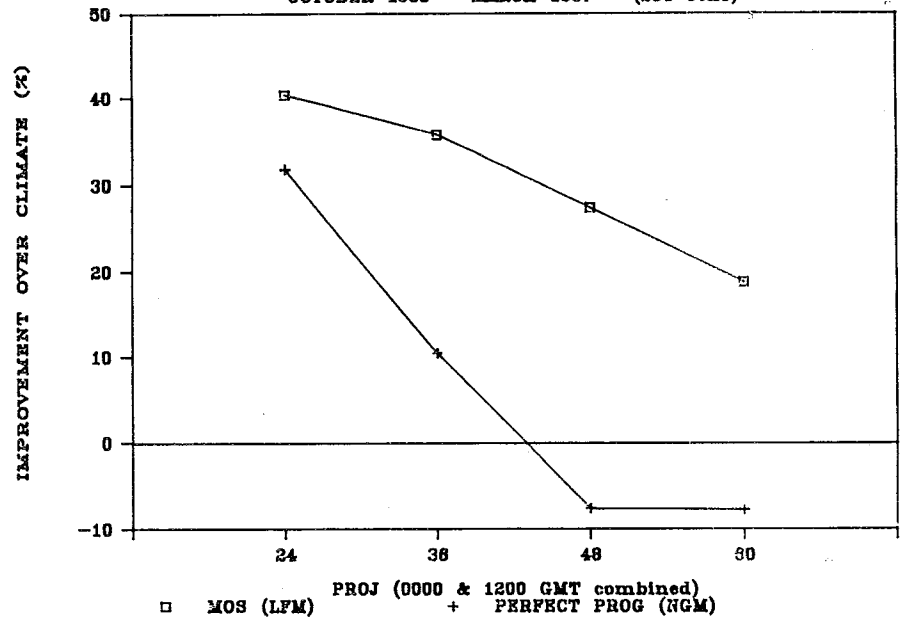
### REGION 1 PoP COMPARISON

OCTOBER 1986 - MARCH 1987 (304 stns)



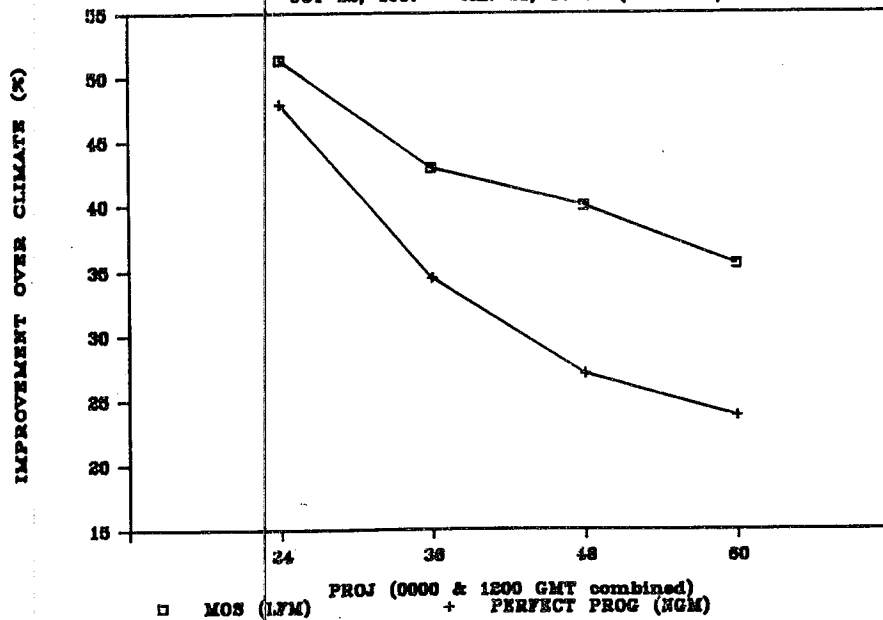
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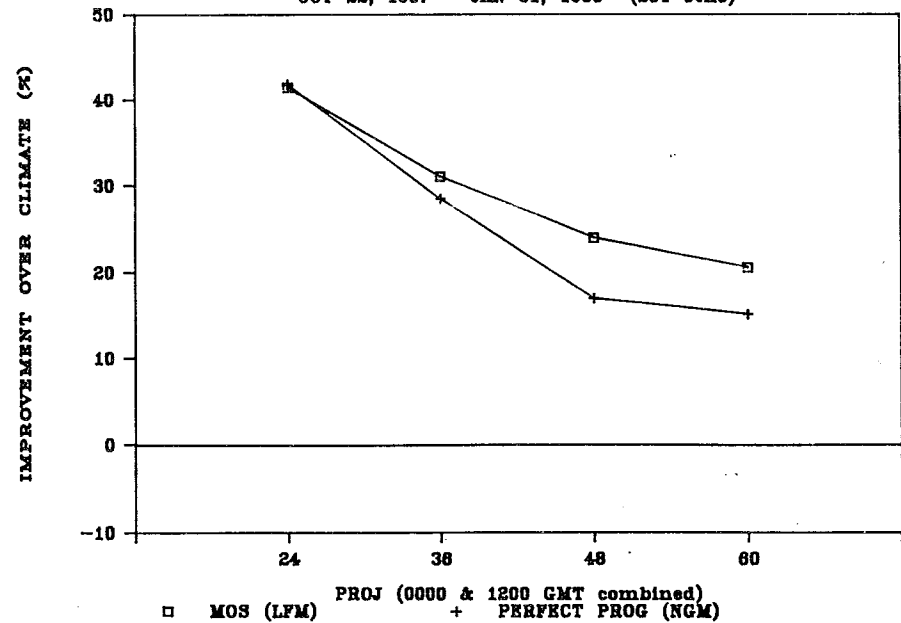
### REGION 1 PoP COMPARISON

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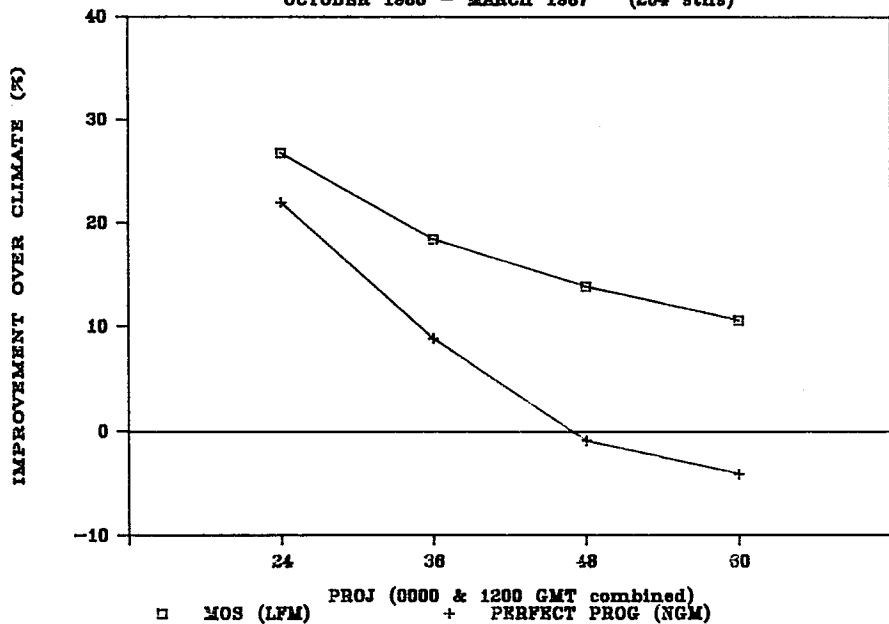
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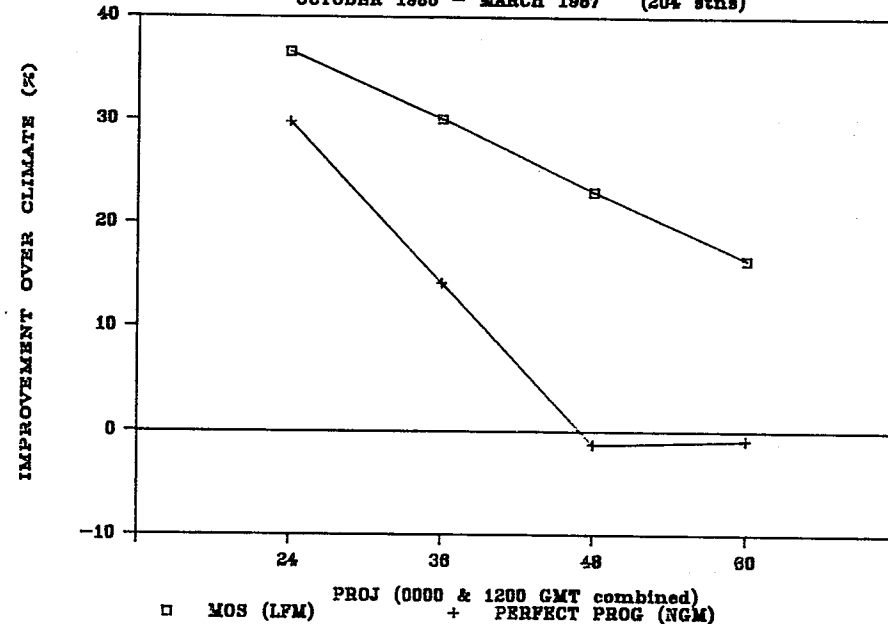
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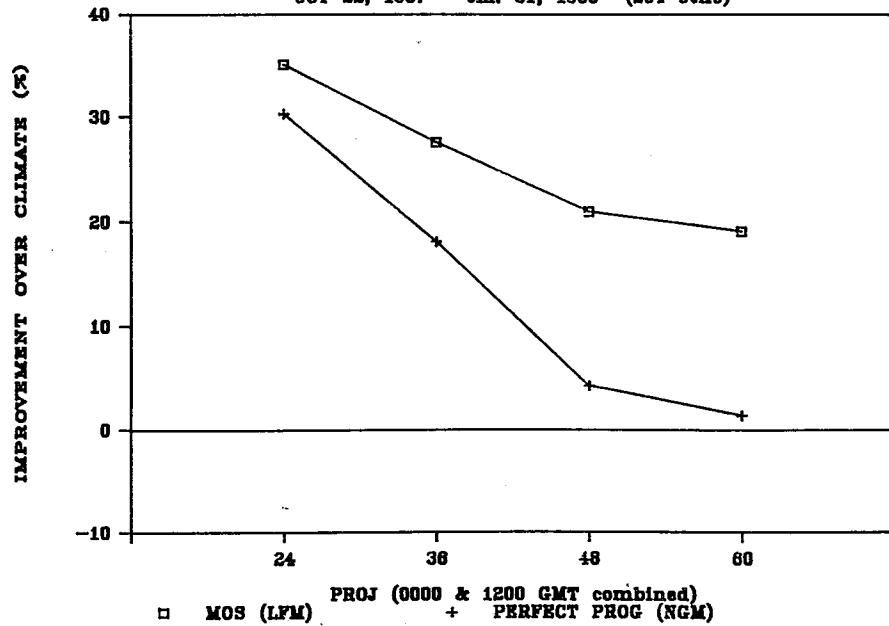
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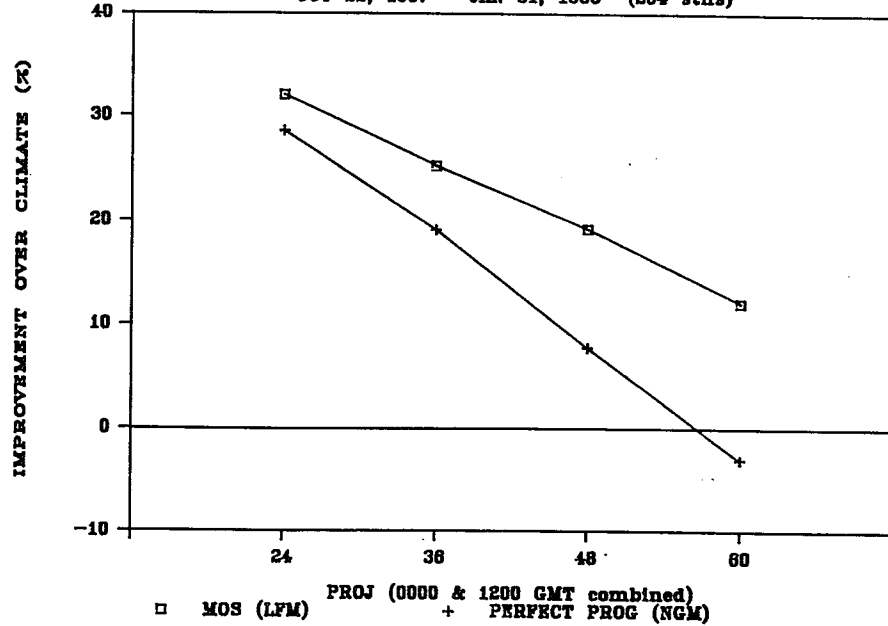
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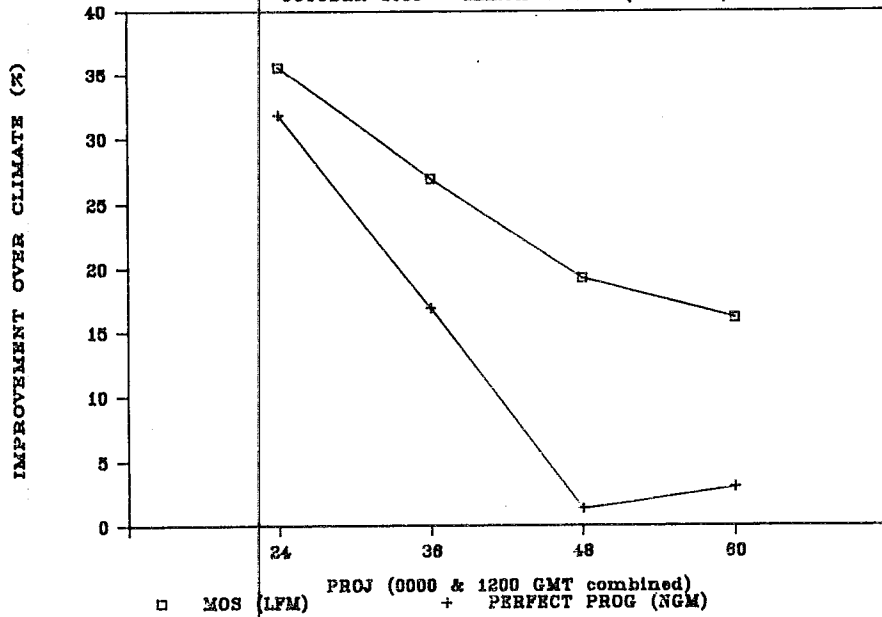
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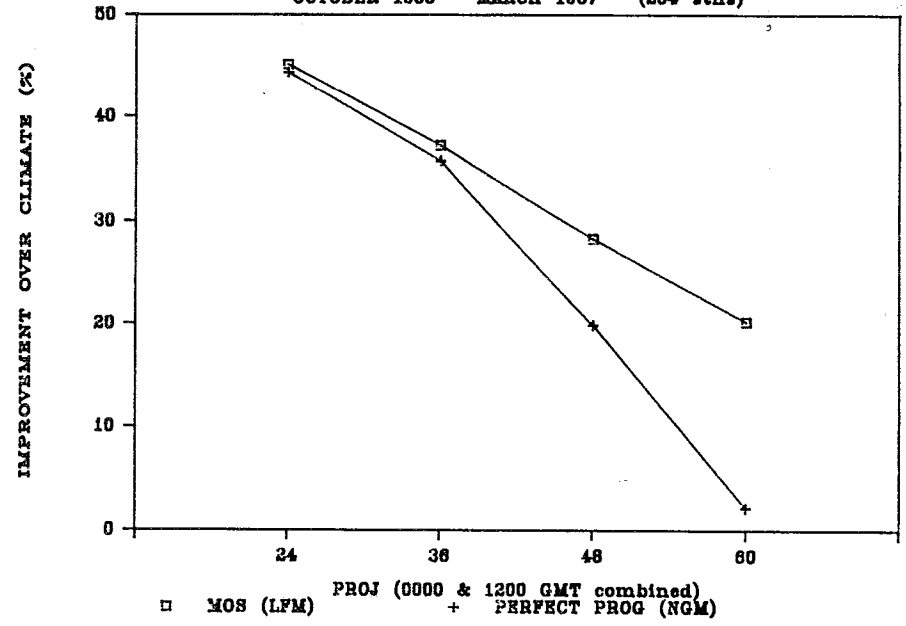
REGION 5 PoP COMPARISON

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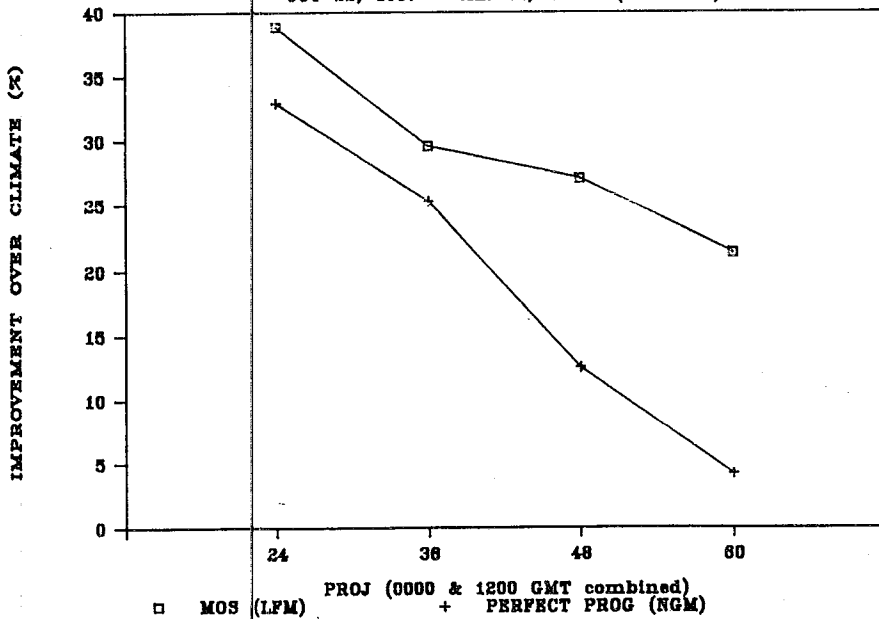
REGION 6 PoP COMPARISON

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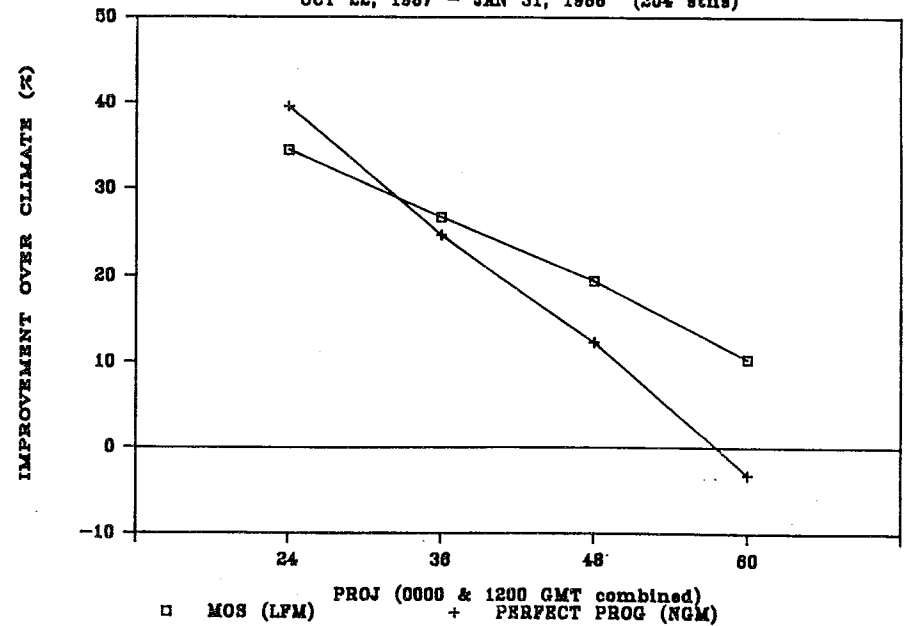
REGION 5 PoP COMPARISON

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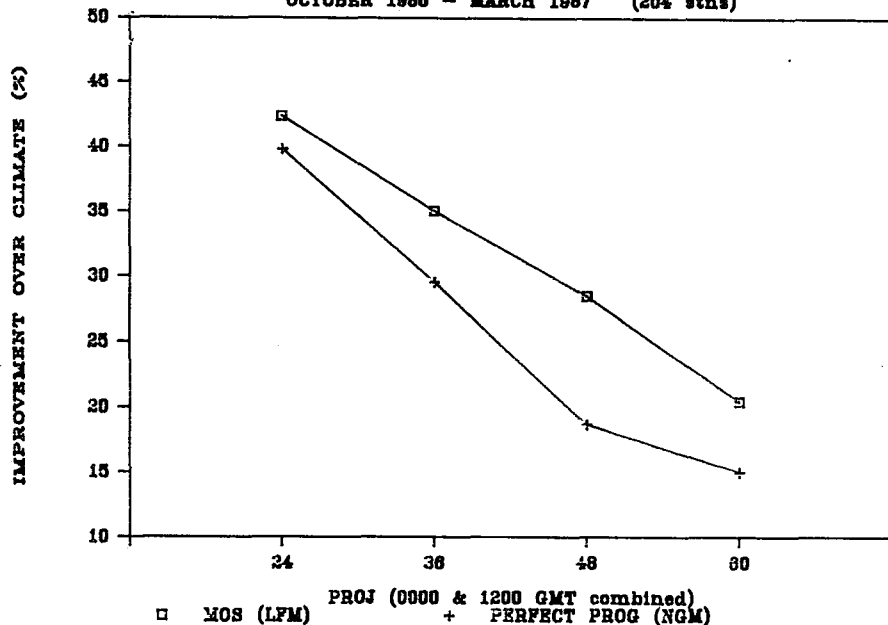
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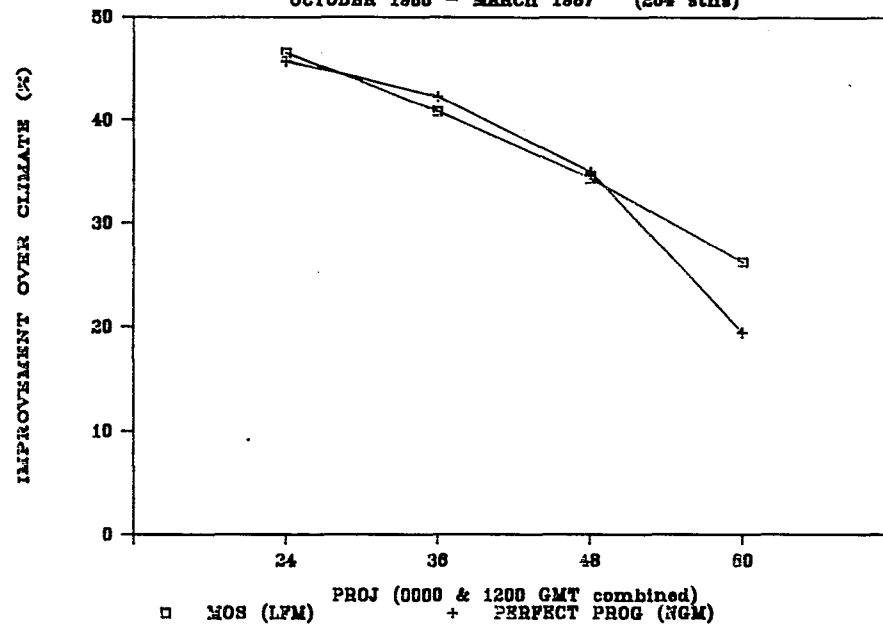
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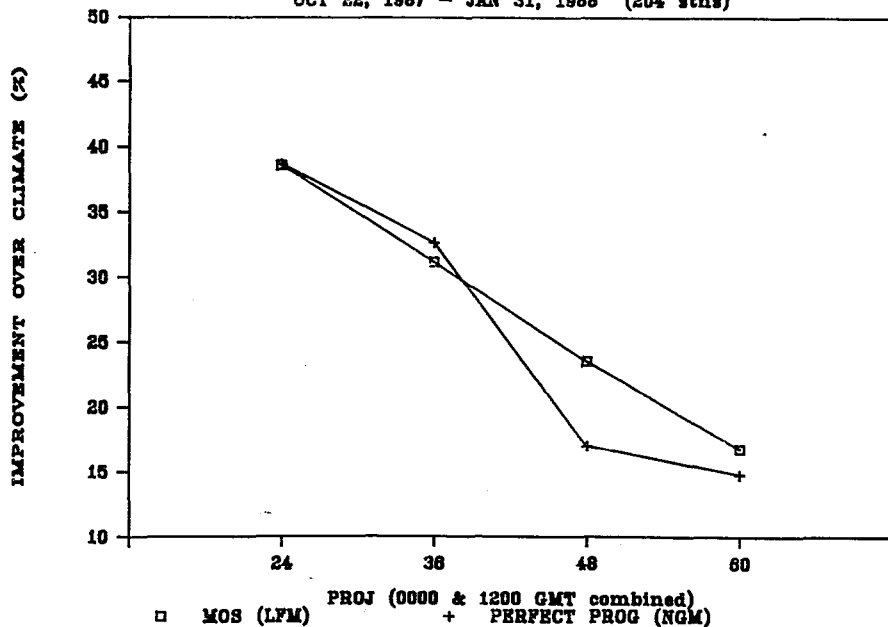
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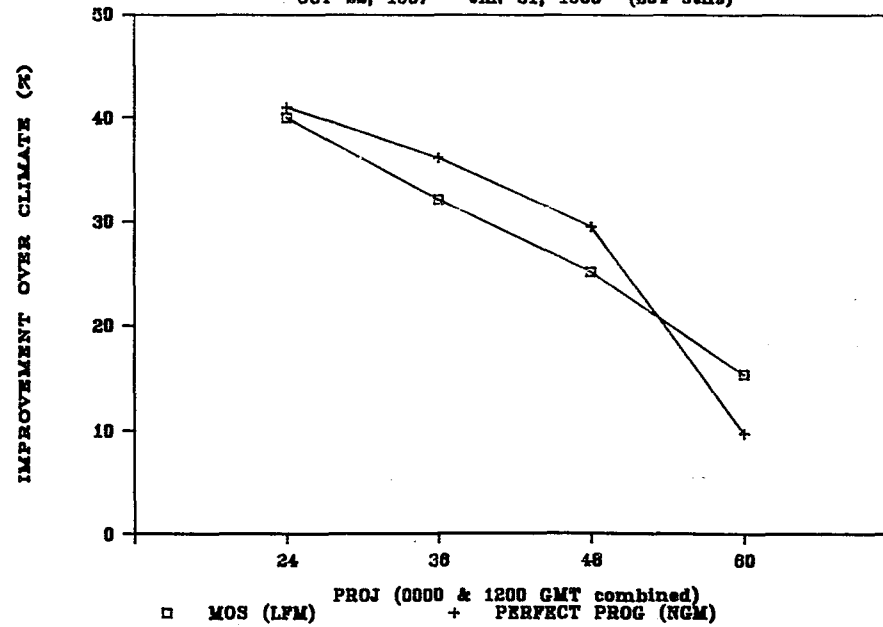
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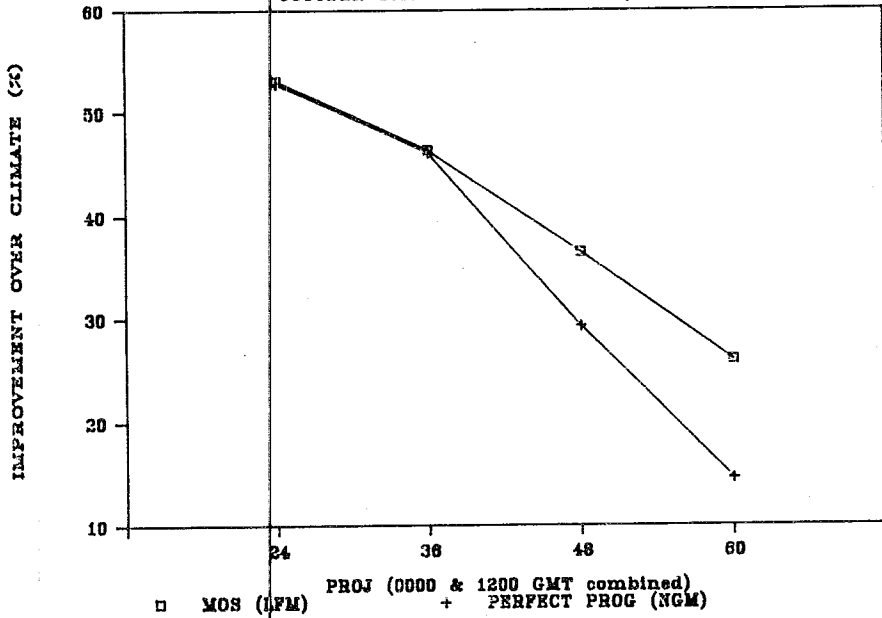
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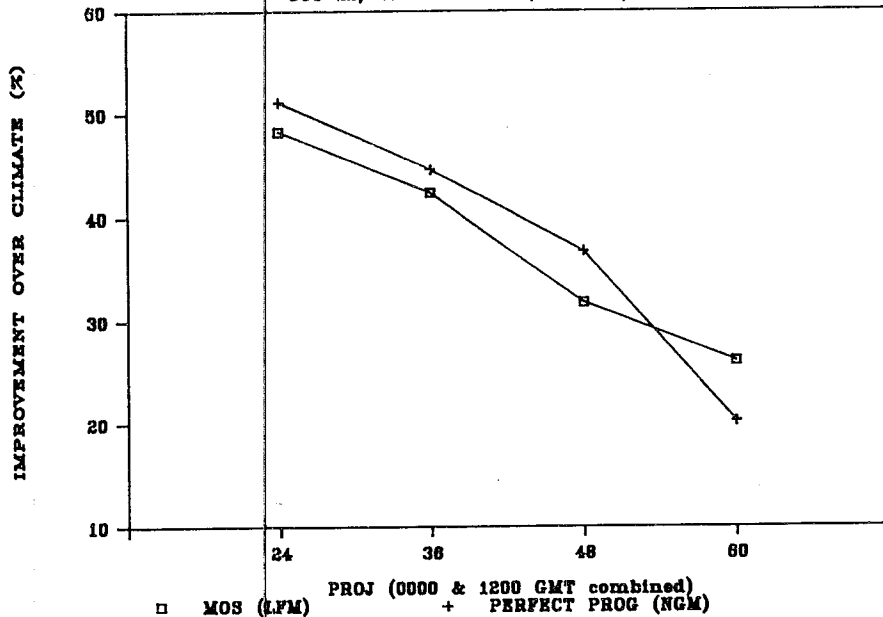
REGION 9 PoP COMPARISON

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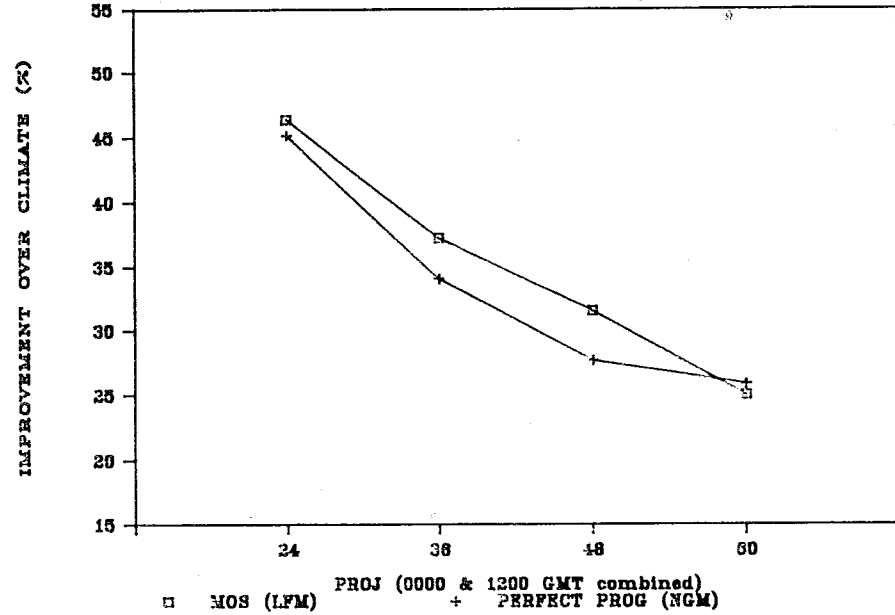
REGION 9 PoP COMPARISON

OCT 22, 1987 - JAN 31, 1988 (204 stns)



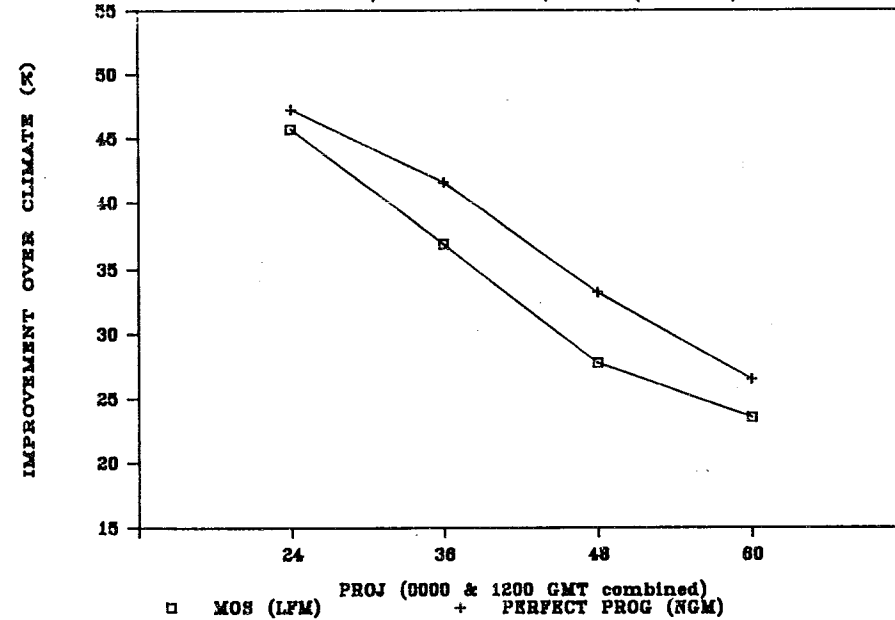
REGION 10 PoP COMPARISON

OCTOBER 1986 - MARCH 1987 (204 stns)



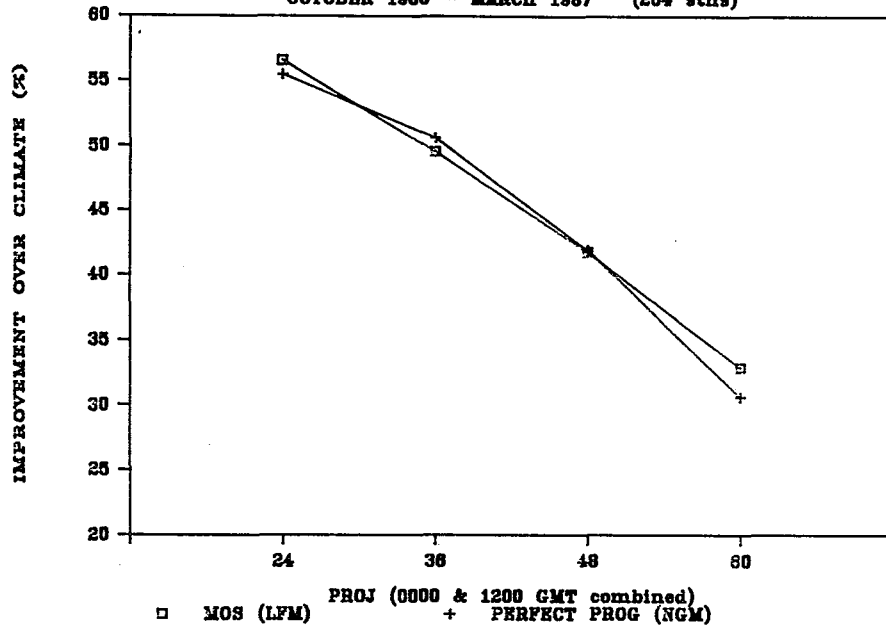
REGION 10 PoP COMPARISON

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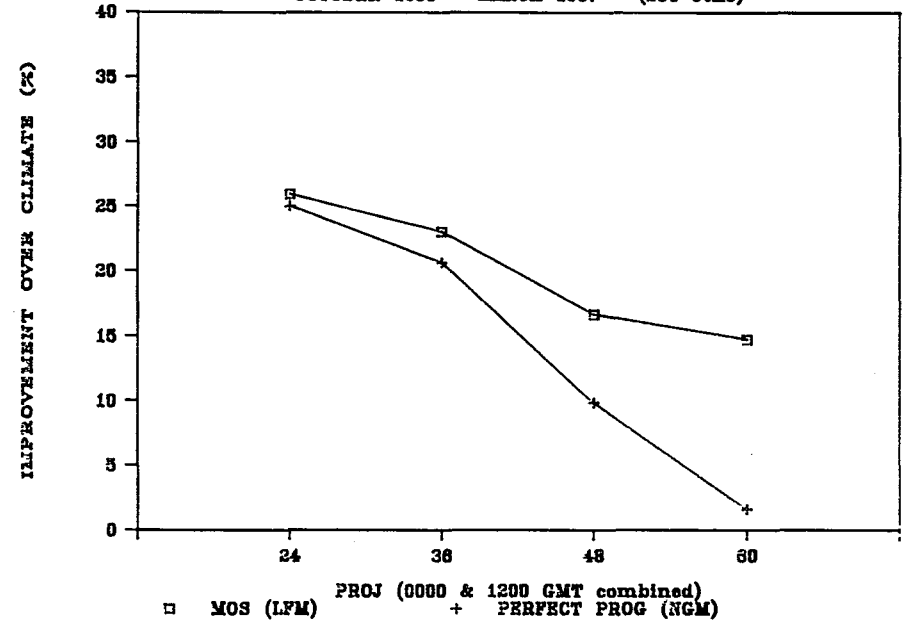
### REGION 11 PoP COMPARISON

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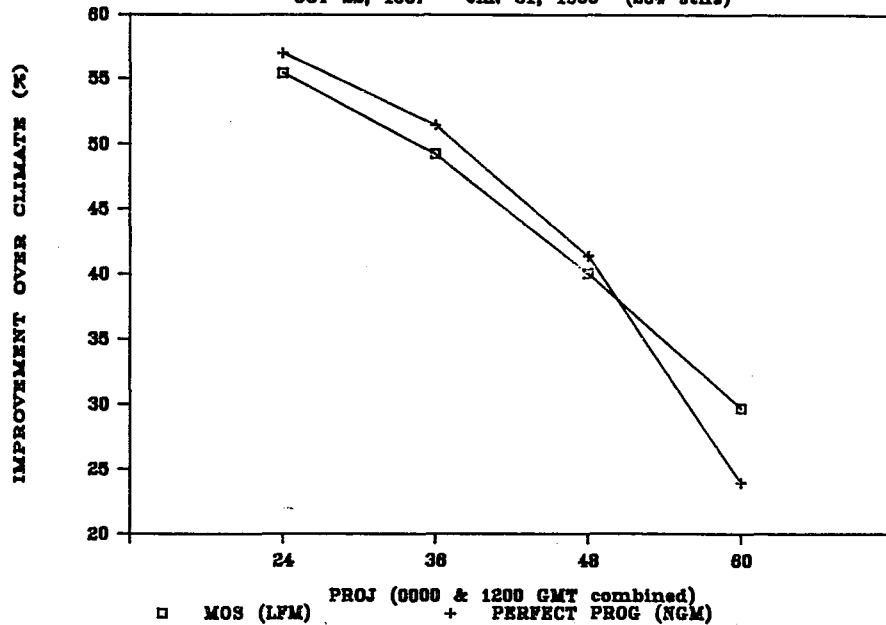
### REGION 12 PoP COMPARISON

OCTOBER 1986 - MARCH 1987 (204 stns)



### REGION 11 PoP COMPARISON

OCT 22, 1987 - JAN 31, 1988 (204 stns)



### REGION 12 PoP COMPARISON

OCT 22, 1987 - JAN 31, 1988 (204 stns)

