

EASTERN REGION TECHNICAL ATTACHMENT

No. 74-1-28

January 28, 1974

EVALUATION of MOS SUMMER TEMPERATURE
FORECASTS for CHARLESTON, WV

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Maximum and minimum temperature forecasts based on model output statistics (MOS) became operationally available in August 1973 (1). In this study forecasts for Charleston, WV, generated from the summer equations in use from August 8, through October 16, 1973, are evaluated. Table 1 presents the temperature forecast mean algebraic errors (forecast minus observed) independent of cloud cover. The results are shown both for each month and for all months combined. Separate results are presented for each of three forecast periods generated from 0000Z initial PE Model output (5 a.m. forecast) and from 1200Z initial PE Model output (5 p.m. forecast). The results show that for each period, both the minimum and maximum temperature forecasts had a cold bias with the minimum temperature forecast having a greater bias than the maximum temperature forecast.

The effects of cloud cover were determined by first stratifying the data into two cloud cover groups, clear to scattered and broken to overcast. The cloud cover for each case was determined by examination of the hourly observations for 6 hours ending at about the usual time of maximum (2000Z) or minimum (1200Z) temperature. Cirrus clouds were not considered in determining the cloud cover. For each cloud cover group, the number of cases in which the forecasts were too low, too high, and correct, were determined. The results are shown in Table 2. Examining these results we find for minimum temperature that for each of the three forecast periods, when there were clear to scattered cloud conditions, $\bigcirc - \bigcirc$, the forecasts were too warm more often than too cold. This is in marked contrast to results obtained for broken to overcast cloud conditions, $\oplus - \oplus$, where minimum temperature forecasts were too cold in an overwhelming majority of the cases. For each of the three forecast periods, the ratio of forecasts too low to forecasts too high, for minimum temperature, range from 10 to 1 in the first forecast period, to 6 to 1 in the third forecast period. Now turning our attention to maximum temperature forecasts, we find that the forecasts were too low more often than too high for both cloud cover groups. We also note, however, that the ratio of forecasts too low to forecasts too high for maximum temperature is significantly greater for clear to scattered conditions than for broken to overcast conditions.

From the results presented, it is concluded that the 1973 summer MOS temperature forecasts, both maximum and minimum, for Charleston, WV, had a cold bias and did not adequately account for the effects of cloud cover. This bias was particularly noticeable for minimum temperature forecasts under broken to overcast cloud conditions, and for maximum temperature forecasts under clear to scattered cloud conditions. An exception to the overall bias of forecasting too low a temperature occurs for minimum temperatures with clear to scattered clouds. For these cases, the forecast for each period is more often too high, indicating the equations' failure to account for the radiation that can occur when there is little or no cloud cover at night.

REFERENCES

- (1) "Maximum/Minimum Temperature Forecasts Based on Model Output Statistics--No. 1," *Technical Procedures Bulletin No. 94*, July 20, 1973.

SCIENTIFIC SERVICES DIVISION, ERH
January 28, 1974

Attachments: Tables 1 and 2

TABLE 1. MOS temperature forecast mean algebraic errors ($^{\circ}\text{F}$) for Charleston, WV, August 8 - October 16, 1973.

Period	5 AM FORECAST			5 PM FORECAST		
	Max Temp Period 1	Min Temp Period 2	Max Temp Period 3	Min Temp Period 1	Max Temp Period 2	Min Temp Period 3
Aug 8-31	- 0.58	- 2.29	- 0.63	- 2.63	- 1.63	- 3.54
Sep 1-30	- 2.27	- 1.73	- 2.40	- 1.60	- 2.63	- 1.97
Oct 1-16	- 0.62	- 1.56	+ 0.56	- 1.07	+ 0.07	- 1.27
Aug 8 - Oct 16	- 1.31	- 1.88	- 1.11	- 1.84	- 1.69	- 2.36

NOTE: Period 1, 2, and 3 are roughly 24, 36, and 48 - hour forecasts, respectively.

TABLE 2. Number of MOS temperature forecasts as a function of cloud cover that were too low, too high, and correct. Data are for Charleston, WV, August 8 - October 16, 1973.

Cloud Cover	5 AM Forecast						5 PM FORECAST					
	Max Temp Period 1		Min Temp Period 2		Max Temp Period 3		Min Temp Period 1		Max Temp Period 2		Min Temp Period 3	
	○-○	⊕-⊕	○-○	⊕-⊕	○-○	⊕-⊕	○-○	⊕-⊕	○-○	⊕-⊕	○-○	⊕-⊕
Fcsts too Low	22	21	8	35	22	21	11	32	23	24	11	34
Fcsts too High	8	15	20	4	9	15	17	3	7	12	12	6
Fcsts Correct	2	2	2	1	1	2	1	5	1	2	5	1

NOTE: Period 1, 2, and 3 are roughly 24, 36, and 48 - hour forecasts, respectively.