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TEMPERATURE FORECAST PERFORMANCE COMPARISON
--THREE-HOURLY TEMPERATURE FORECASTS VS. MAX/MIN
TEMPERATURE FORECASTS IN EARLY FOUS 12 OUTPUT

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Calendar day max/min and 3-hourly temperature forecasts have been produced by the MOS technique and available to the field, in the Early FOUS 12 message, since mid-1978. Although the 3-hourly and max/min temperature equations are derived simultaneously to insure some degree of consistency, consistency is not guaranteed, and there are occasional instances in which the 3-hourly forecasts would suggest a lower minimum, or a higher maximum, temperature than the max/min forecasts. In order to look at the relative performance of each set of forecasts, a study was conducted for Cincinnati during March 1979. The lowest and highest 3-hourly temperature forecasts in a calendar day and the max/min temperature forecasts were compared to the observed calendar day max/min temperatures.

In general, from consideration of mean absolute error (MAE), the results in Table 1 suggest that the 3-hourly temperature forecasts do a better job of forecasting min temperatures, and the max/min temperature forecasts are better at forecasting max temperatures. Both forecast products tend to underforecast the max temperatures and overforecast the minimum temperatures, and this is demonstrated in the forecast bias tabulation. In a gross sense, this could be explained by the fact that the average temperature for March 1979 was 4.9°F above normal at Cincinnati. Since several years of development data are input to the MOS technique, MOS forecasts tend to perform best during periods of "normal" weather. In fact, an abnormally warm March 1979 may explain the better performance of the 3-hourly temperatures in forecasting min temperatures. Three-hourly temperatures are instantaneous forecasts and may miss the lowest temperature that could be forecast during the period. This could be an advantage when observed temperatures are abnormally warm.

There are no great surprises in the error distribution tabulation. The product with the lowest MAE also has the fewest extreme errors. For example, 3-hourly forecasts of tonight's low (00Z and 12Z data combined) had errors $>10^{\circ}\text{F}$ only 5% of the time as opposed to 16% for the min temperature forecasts.

Editor's Note: These results should not be universally applied; however, this type of study would be very worthwhile at any WSFO.

Reference

Sadowski, A. F., 1978: Automated Maximum/Minimum and 3-Hourly Surface Temperature Guidance. NWS Technical Procedures Bulletin No. 238, NOAA, U. S. Department of Commerce, Washington, D.C., 14 pp.

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TABLE 1

Comparison of MOS (Early F0US 12) 3-Hourly Temperature Forecasts vs. Calendar Day Max/Min Temperature Forecasts

Date: March 1979
 Station: Cincinnati, OH

Forecast Bias

Initial Data Time	High Today			Low Tonight			High Tomorrow			Tomorrow Night		
	3 Hourly	Max	Min	3 Hourly	Max	Min	3 Hourly	Max	Min	3 Hourly	Max	Min
00Z	8	1	22	11	3	17	20	5	6	25	0	6
12Z							18	3	9	25	0	6
	Over Forecast	Correct	Under Forecast	Over Forecast	Correct	Under Forecast	Over Forecast	Correct	Under Forecast	Over Forecast	Correct	Under Forecast

Error Distribution

00Z	15	7	4	5	12	13	4	2	13	11	5	2	5	10	8	8	9	5	7	10	14	5	5	7	
12Z									19	7	3	1	9	9	11	2	11	7	3	9	11	9	6	5	16
	<3°	>3° <7°	>6° <10°	>10°	<3°	>3° <7°	>6° <10°	>10°	<3°	>3° <7°	>6° <10°	>10°	<3°	>3° <7°	>6° <10°	>10°	<3°	>3° <7°	>6° <10°	>10°	<3°	>3° <7°	>6° <10°	>10°	

Mean Absolute Error

00Z	5.2	4.5	4.1	6.9	7.7	5.6	5.8	4.3	7.0
12Z			3.5	5.6	6.1	5.8	4.3	7.0	

NOTE: ONLY 30 FORECASTS IN 12Z THREE HOURLY FORECASTS ALL OTHERS 31.