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EARLY VS. FINAL MOS TEMPERATURE FORECASTS AT PORTLAND

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During December 1976, it was felt that the early MOS temperature forecasts were more accurate than the final temperature forecasts in predicting first period maximum and minimum temperatures. A close examination of the early and final temperature forecasts showed this to be true.

First period temperature forecasts for Portland and Caribou, Maine and Concord, New Hampshire were verified with observed values. The only cases used were those for which both early and final forecasts were available. The early forecasts improved upon the final forecasts by an average of 1.1 degrees F or by 18.2% (Table 1).

Continuing into January 1977, similar results were found until the study was terminated on the tenth. The average improvement of the early forecasts over the final forecasts was 0.7 degrees F or 12.5% (Table 2).

Combining December's data with that of the first ten days of January resulted in an improvement of 1.0 degrees F or 16.8% (Table 3).

It was also suspected that the early temperature forecasts were more accurate in cases involving strong warming or cooling processes, such as the advection of warm or cold air. To show this, the average interdiurnal changes in maximum and minimum temperatures were determined for Portland using thirty years of data (excluding the years involved in the study). Portland was the only station used because it was the only one for which data was readily available.

The average change (interdiurnal change) in consecutive daily maximums was 6 degrees in December and 7 degrees in January. The average interdiurnal change in mimimums was 7 degrees in December and 8 degrees in January.

To determine if there was a relationship between strong warming and cooling and improvement of early over final temperature forecasts, cases when the observed interdiurnal change exceeded the climatological interdiurnal change by $< 4^{o}F$, $\geq 4^{o}F$, and $\geq 8^{o}F$ were compared to the average errors in the early and final temperature forecasts (Table 4).

In cases where the interdiurnal change was near normal ($<4^{\circ}F$) or less than normal, the final temperature forecasts were, as one might expect, better than the early temperature forecasts.

However, in cases where the interdiurnal change exceeded normal by >4°F, the early temperature forecasts were 2.5°F or about 34% better than the final forecasts. Furthermore, in cases where the interdiurnal change substantially exceeded normal, ≥8°F, even greater improvements of early over final temperature forecasts were found.

Therefore, improvement of early temperature forecasts over final temperature forecasts can occur during periods of strong warming or cooling. In those cases when strong warming or cooling is anticipated, forecasters may wish to give more weight to the early temperature guidance when developing public service forecasts.

It should be mentioned that whereas this study has found evidence of improvement for early over final temperature forecasts under certain conditions in the Portland area, this may or may not be the case in other areas.

EDITOR'S NOTE: Scientific Services Division has also been collecting data that deals with similar subject matter. A report will be prepared after the end of the cold weather season.

Mean interdiurnal temperature variability for most major cities in the United States may be found in Weather Bureau Technical Paper No. 56 which should be available in most station libraries.

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Attachment: Tables 1 - 4

		EARLY	FINAL
PORTLAND	Total Error	237°F	284°F
	# Forecasts	48	48
	Average Error	4.9	5.9
CARIBOU	Total Error	244	290
	# Forecasts	50	50
	Average Error	4.9	5.8
CONCORD	Total Error	236	302
	# Forecasts	50	50
	Average Error	4.7	6.0
ALL THREE	Total Error	717	876
	# Forecasts	148	148
	Average Error	4.8	5.9

Table 1. Comparison of early and final MOS temperature forecasts for December 1976. Average improvement of early temperature forecast over final temperature forecast is 1.1 degrees or 18.2%.

		EARLY	FINAL
PORTLAND	Total Error	92°F	85°F
	# Forecasts	17	17
	Average Error	5.4	5.0
CARIBOU	Total Error	59	81
	# Forecasts	17	17
	Average Error	3.5	4.8
CONCORD	Total Error	94	114
	# Forecasts	17	17
	Average Error	5.5	6.7
ALL THREE	Total Error	245	280
	# Forecasts	51	51
	Average Error	4.8	5.5

Table 2. Comparison of early and final MOS temperature forecasts for January 1-10, 1977. Average improvement of early temperature forecast over final temperature forecast is 0.7 degree or 12.5%.

		EARLY	FINAL
PORTLAND	Total Error	329°F	369°F
	# Forecasts	65	65
	Average Error	5.1	5.7
CARIBOU	Total Error	303	371
	# Forecasts	67	67
	Average Error	4.5	5.5
CONCORD	Total Error	330	416
	# Forecasts	67	67
	Average Error	4.9	6.2
ALL THREE	Total Error	962	1156
	# Forecasts	199	199
	Average Error	4.8	5.8

Table 3. Comparison of early and final MOS temperature forecasts for December 1976 and January 1-10, 1977. Average improvement of early temperature forecast over final temperature forecast is 1.0 degrees or 16.8%.

DEGREES F EXCEEDING AVERAGE INTERDIURNAL CHANGE	EARLY		FINAL		% Improvement (Early Over Final)
	Total Error °F / # Cases	Mean Absolute Error °F	Total Error °F / # Cases	Mean Absolute Error °F	
<4	139/27	5.2	78/27	2.9	-90
≥4	115/24	4.8	174/24	7.3	+34
≥8	75/14	5.4	117/14	8.4	+36

Table 4. Comparison of early and final MOS temperature forecasts at Portland for December 1976 and January 1-10, 1977, with the number of degrees exceeding average interdiurnal change.