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AFOS-ERA VERIFICATION OF GUIDANCE AND LOCAL AVIATION/PUBLIC WEATHER FORECASTS--NO. 9 (OCTOBER 1987-MARCH 1988)

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1. INTRODUCTION

This is the ninth in a series of Techniques Development Laboratory (TDL) office notes which compare the performance of TDL's automated guidance with National Weather Service (NWS) local forecasts made at Weather Service Forecast Offices (WSFO's). Verification statistics are presented for the cool season months of October 1987 through March 1988 for probability of precipitation (PoP), precipitation type, snow amount, surface wind, cloud amount, ceiling height, visibility, and maximum/minimum (max/min) temperature. Verification summaries are provided for both forecast cycles, 0000 and 1200 GMT. The scores are those recommended in the NWS National Verification Plan (National Weather Service, 1982a).

Due to a change in the issuance time of the NWS official terminal forecasts (FT's), the local and guidance forecasts for the aviation weather elements (ceiling height, visibility, and wind speed and direction) no longer match. Moreover, the observations saved locally now correspond only to the valid time of the local forecasts. The issuance time of the local forecasts is based on local time rather than the forecast cycle. Although the actual time varies with time zone and changes from standard to daylight time, for simplicity, we will refer to the FT issuance times as if they occur at the same time for all stations. We verified the local forecasts associated with the FT issuance times of approximately 0900 and 1800 GMT. Persistence forecasts corresponding to the local forecasts are also now based on the local time. Since the valid time of the automated guidance has not changed, it is no longer possible to perform a comparative verification for the aviation weather elements.

For the aviation elements, the local forecasts, along with their corresponding persistence and verifying observations were collected locally at the WSFO's, transmitted via the Automation of Field Operations and Services (AFOS) system to the National Meteorological Center, and archived centrally by TDL. The automated guidance for these elements was also collected locally and transmitted to NMC. The persistence and verifying observations corresponding to the guidance were taken from hourly reports archived centrally by TDL. For the remaining weather elements, including the 42-h significant wind, all of the forecasts (both local and guidance) and the verifying observations were collected locally at the WSFO's and transmitted to NMC. The local collection system is described by Ruth and Alex (1987). The national AFOS-era verification data processing system is described in detail by Dagostaro (1985), while guidelines for the public/aviation forecast verification program are given in National Weather Service (1983).

The local PoP and max/min forecasts used for verification were official public weather forecasts obtained from the Coded City Forecast (FPUS4) bulletin. The local forecasts for the aviation weather elements were obtained from the FT's. In contrast, the local cloud amount, precipitation type, snow

amount, and 42-h significant wind forecasts were manually entered by the forecasters at the WSFO's. These subjective forecasts may or may not be based on the objective guidance. Also, surface observations as late as 2 hours before the first valid forecast time may have been used in preparation of the local forecasts.

The automated guidance was based on forecast equations developed through application of the Model Output Statistics (MOS) technique (Glahn and Lowry, 1972). In particular, these prediction equations were derived by using archived surface observations and forecast fields from the Limited-area Fine Mesh (LFM) model (Gerrity, 1977; Newell and Deaven, 1981). The surface observations used as predictors in these equations were taken at least 9 hours before the first verification valid time.

As noted in the sections which follow for each of the various weather elements, implementation of the AFOS-era verification system has introduced significant changes from past verifications in regard to the characteristics of the local forecasts and the verifying observations. For example, the local and guidance max/min temperature forecasts are verified by using max/min temperatures observed during approximately 12-h periods instead of 24-h (calendar day) periods. Also, the cloud amount observations are given in terms of total sky cover rather than opaque sky cover. Hence, we do not think it is meaningful to compare results for the 1987-88 cool season with statistics based on the pre-AFOS verification system (e.g., Carter et al., 1983).

In addition, due to the change in the issuance time of the FT's, direct comparison of the local statistics with those for the guidance is no longer possible for the aviation weather elements. Direct comparison of results for the local aviation elements for the 1987-88 cool season with statistics for previous cool seasons is also no longer possible.

2. PROBABILITY OF PRECIPITATION

MOS PoP forecasts were produced by the cool season prediction equations described in Technical Procedures Bulletin No. 289 (National Weather Service, 1980). This guidance was available for the first, second, and third periods, which correspond to 12-24, 24-36, and 36-48 hours, respectively, after 0000 and 1200 GMT. The predictors for the equation development were forecast fields from the LFM model and weather elements observed at the forecast site at 0300 or 1500 GMT. However, in day-to-day operations, surface observations at 0200 or 1400 GMT (or even 0100 or 1300 GMT) were used as input to the prediction equations nearly all the time. The LFM model schedule makes this possible, and the guidance is available earlier than if the 0300 and 1500 GMT observations were used.

The forecasts were verified by computing Brier scores (Brier, 1950) for 93 of the 94 stations listed in Table 2.1. Note that we used the standard NWS Brier score for PoP which is one-half the original score defined by Brier. Brier scores vary from one station to the next and from one year to the next because of changes in the relative frequency of precipitation. Therefore, we also computed the percent improvement over climate, that is, the percent improvement of Brier scores obtained from the local or guidance forecasts over analogous Brier scores produced by climatic forecasts. Climatic forecasts are defined as relative frequencies of precipitation by month and by station determined from a

15-yr sample (Jorgensen, 1967). Because local forecasters should be encouraged to depart from the guidance if they think it is incorrect, the number of times local forecasters deviated from the guidance by at least 20% were tabulated and the Brier score when such deviations occurred was computed.

Tables 2.2 and 2.7 present the 1987-88 cool season results for all 93 stations combined for the 0000 and 1200 GMT cycle forecasts, respectively. Tables 2.3-2.6 and Tables 2.8-2.11 show scores for the NWS Eastern, Southern, Central, and Western Regions, for the 0000 and 1200 GMT cycles, respectively.

3. PRECIPITATION TYPE

The objective conditional probability of precipitation type (PoPT) forecast system described in Technical Procedures Bulletin No. 319 (National Weather Service, 1982c) and Bocchieri and Maglaras (1983) provides categorical forecasts for three categories: freezing (freezing rain or drizzle), frozen (snow or ice pellets), and liquid (rain or drizzle). Precipitation in the form of mixed snow and ice pellets is included in the frozen category; any mixed precipitation type which includes freezing rain or drizzle is included in the freezing category; all other mixed precipitation types are included in the liquid category. In this report, the freezing, frozen, and liquid categories will be referred to as freezing rain, snow, and rain, respectively.

For verification purposes, local categorical forecasts of precipitation type are given for the 18-, 30-, and 42-h projections from 0000 and 1200 GMT. Note that this is a conditional forecast, that is, it's a forecast of the type of precipitation if precipitation actually occurs. Therefore, a precipitation type forecast is always recorded. Similarly, the PoPT guidance is available whether or not precipitation occurs.

Table 3.1 lists the 86 stations used for the precipitation type verification. The verification sample included only those cases in which precipitation actually occurred within ± 1 hour of the forecast valid time. If a combination of precipitation types occurred during the 2-h period, the verifying observation was considered as freezing if freezing precipitation was observed at any time, or frozen if frozen (but not freezing) precipitation occurred. Note that an observation of mixed frozen and liquid precipitation types was included in the frozen category, while the guidance forecasted the liquid category if mixed frozen and liquid precipitation was expected. Also, since we were concerned that some forecasters may not have put much effort into making the conditional forecasts when they considered precipitation to be unlikely, we used cases only when the local PoP was $\geq$30%. The PoP forecasts were valid for 12-h periods centered on the 18-, 30-, and 42-h projections from both 0000 and 1200 GMT.

Based on the three precipitation type categories, forecast-observed contingency tables were constructed. Bias by category,[1] probability of detection

[1] In the discussion of precipitation type, snow amount, surface wind, cloud amount, ceiling height, and visibility, bias by category refers to the number of forecasts of a particular category (event) divided by the number of observations of that category. A value of 1.0 denotes unbiased forecasts for a particular category.

(POD),[2] false alarm ratio (FAR),[3] skill score,[4] and percent correct were calculated from contingency tables of precipitation type. Tables 3.2 and 3.3 show the verification results for 0000 and 1200 GMT, respectively. The number of freezing rain cases is small, and conclusions for that category must be made with caution.

4. SNOW AMOUNT

The objective probability of snow amount forecast system described in Technical Procedures Bulletin No. 318 (National Weather Service, 1982b) and by Bocchieri (1983) provides categorical forecasts for four categories of snow amount: <2, 2 or 3, 4 or 5, and ≥6 inches. In particular, prediction equations based on LFM model forecasts are used to produce conditional probabilities of snow amount for the three categories of ≥2, ≥4, and ≥6 inches. These conditional probabilities are converted to unconditional probability forecasts through the use of the MOS PoP and PoPT forecasts. The unconditional probability forecasts are converted to categorical forecasts through the use of the threshold technique described in Technical Procedures Bulletin No. 318.

Verification scores were computed for both local and guidance forecasts for 82 of the 86 stations listed in Table 3.1. The local and guidance forecasts were verified for the 12-24 h period from both 0000 and 1200 GMT, since the guidance was provided only for this projection.

We constructed forecast-observed contingency tables for four categories of snow amount. These tables were used for computing several different scores: bias by category, percent correct, skill score, threat score,[5] POD, and FAR. The percent correct and skill score were calculated from all four categories. The bias by category, threat score, POD and FAR were calculated separately for the three cumulative categories of ≥2, ≥4, and ≥6 inches. Table 4.1 shows comparative verification scores for the snow amount forecasts for both cycles.

5. SURFACE WIND

The objective surface wind forecasts were generated by the cool season, LFM-based equations described in Technical Procedures Bulletin No. 347 (National Weather Service, 1984). Prior to the 1983-84 cool season, the surface wind prediction equations were rederived to account for the latest available LFM data. The objective surface wind forecast is defined in the same way as the

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[2]The POD is the ratio of the number of times a particular category was correctly forecast to the total number of observations of that category.

[3]The FAR is the ratio of the number of times a particular category was incorrectly forecast to the total number of forecasts of that category.

[4]The skill score used throughout this report is the Heidke skill score (Panofsky and Brier, 1965).

[5]Threat score = H/(F+O-H), where H is the number of correct forecasts of a category, and F and O are the number of forecasts and observations of that category, respectively.

observed wind, namely, the 1-min average wind direction and speed for a specific time. All objective forecasts of wind speed were adjusted by an "inflation" technique (Klein et al., 1959) involving the multiple correlation coefficient and the mean value of wind speed for each station and forecast valid time.

We verified both the local and guidance forecasts for three projections; however, due to the change in issuance time of the FT's, the projections no longer match. The guidance forecasts are valid at 12-, 18-, and 24-h projections from both the 0000 and 1200 GMT cycles, while the local forecasts correspond to approximately 3-, 9-, and 15-h projections from the FT issuance times of approximately 0900 and 1800 GMT.

Although the MOS and local forecasts were verified separately, we used the same method of verification as in previous seasons. First, for those cases in which the wind speed forecasts were $\geq$10 kt, the mean absolute error and the mean algebraic error (forecast minus observed wind speed) of the forecasts were computed. Cases where the observed wind was calm were then eliminated from this sample and the MAE of direction was computed. Second, for all cases where the forecasts were available, the skill score, percent correct, bias by category, and threat score were computed from contingency tables of wind speed. The definitions of the categories used in the contingency tables for wind speed and direction are given in Table 5.1. The threat score used here was calculated by combining events of the upper two categories (winds $\geq$28 kt). In addition, for all cases in which the wind speed forecasts were at least 10 kt, the skill score for the wind direction forecasts was computed from contingency tables. The 92 stations used in the verification are listed in Table 2.1.

For the guidance forecasts, the results for all 92 stations combined for the 0000 and 1200 GMT cycles are presented in Tables 5.2 and 5.7, respectively. Tables 5.3-5.6 and 5.8-5.11 show guidance scores for the NWS Eastern, Southern, Central, and Western Regions for 0000 and 1200 GMT, respectively. For the local forecasts, Table 5.12 (5.17) shows the results for all 91 (92) stations combined for the FT issuance time of approximately 0900 (1800) GMT. Similar local forecast results for the NWS Eastern, Southern, Central, and Western Regions are presented in Tables 5.13-5.16 and 5.18-5.21, respectively, for the two issuance times.

In addition, 42-h forecasts of winds $\geq$23 kt were collected as part of the AFOS-era verification system. Note that the change in FT issuance time did not affect these forecasts; hence, a comparative verification of the local and guidance forecasts was possible. Both the local and guidance forecasts correspond to the 42-h projection from both the 0000 and 1200 GMT cycles. Since these forecasts specify the occurrence (or non-occurrence) of an operationally significant wind, they were verified against the highest observed sustained wind within $\pm$3 hours surrounding the forecast valid time. For purposes of comparison, and analogous to the development of the MOS prediction equations, another set of scores was calculated by using the 1-min average wind observed at the exact forecast valid time. The results for all 92 stations combined are given in Tables 5.22 and 5.23 for the 0000 and 1200 GMT cycles, respectively.

6. CLOUD AMOUNT

Prior to February 24, 1988, the objective cloud amount forecasts were produced by the prediction equations described in Technical Procedures Bulletin No. 303 (National Weather Service, 1981). For the remainder of the cool season, the forecasts were produced by the prediction equations described in Technical Procedures Bulletin No. 378 (National Weather Service, 1988). In both cases, the forecast equations used LFM model output and either 0100 or 0200 (1300 or 1400) GMT surface observations to produce probability forecasts of the four categories of cloud amount shown in Table 6.1. We converted the probability estimates to "best category" forecasts by an algorithm that produced good bias characteristics (bias of approximately 1.0 for each category) on the developmental sample. The algorithm used to obtain the best category for the new prediction equations is described in Technical Procedures Bulletin No. 378.

We compared the local forecasts with a matched sample of guidance forecasts for the 94 stations listed in Table 2.1 for the 12-, 18-, and 24-h projections from 0000 and 1200 GMT. The surface observations used for verification were converted to the cloud amount categories given in Table 6.1. Four-category (clear, scattered, broken, and overcast), forecast-observed contingency tables were prepared from the local and objective categorical predictions. Using these tables, we computed the percent correct, skill score, and bias by category. Prior to the 1983-84 cool season, opaque sky cover amounts from surface observations were used in determining the observed categories. However, the hourly surface reports from which the verifying observations are now taken do not record total opaque sky cover as part of the observation; hence, thin clouds are also included. For example, a report of overcast with eight tenths opaque and two tenths thin, which previously was put into the broken category, now is categorized as overcast. The result of this change is to decrease (increase) the number of observations of the broken (overcast) category compared to previous verifications. This change has greatly affected the overall bias by category statistics for both the guidance and local forecasts.

The results for all stations combined are shown in Tables 6.2 and 6.7 for the 0000 and 1200 GMT cycle forecasts, respectively. Tables 6.3-6.6 and Tables 6.8-6.11 show scores for the NWS Eastern, Southern, Central, and Western Regions, for the 0000 and 1200 GMT cycles, respectively.

7. CEILING AND VISIBILITY

During the 1987-88 cool season, the ceiling and visibility guidance was produced by the prediction equations described in Technical Procedures Bulletin No. 303 (National Weather Service, 1981). Operationally, the guidance was based primarily on LFM model output and either 0100 or 0200 (1300 or 1400) GMT surface observations.

Verification scores were computed separately for the local and guidance forecasts. A comparative verification of local and persistence forecasts was performed for 91 (92) of the 94 stations listed in Table 2.1 for the FT issuance time of approximately 0900 (1800) GMT. The local forecasts and verifying observations correspond to approximately 3-, 6-, 9-, and 15-h projections from the beginning of the scheduled FT valid period. Persistence is also based on the local time, and the projections are from the beginning of the scheduled FT valid period.

A comparative verification of guidance and persistence forecasts was performed for the same 91 (92) stations for the 0000 (1200) GMT cycle. Here, persistence for the 0000 (1200) GMT forecast cycle was based on an observation taken at the subsequent 0900 (2100) GMT. The objective and persistence forecasts were verified for the 12-, 18-, and 24-h projections from both cycles. Note that the persistence forecasts for the 12-, 18-, and 24-h projections are actually 3-, 9-, and 15-h forecasts, respectively, from the latest available surface observation, and in this sense, the guidance forecasts are usually 10-, 16-, and 22-h forecasts.

We constructed forecast-observed contingency tables for the four categories of ceiling and visibility given in Table 7.1. These categories were used for computing several different scores: bias by category, percent correct, skill score, and log score.[6] Table 7.2 (7.3) shows the MOS ceiling height verification results for all 91 (92) stations combined for the 0000 (1200) GMT cycle. Table 7.4 (7.5) presents the local ceiling height scores for the same 91 (92) stations except for the FT issuance time of approximately 0900 (1800) GMT. Visibility scores are given for all stations combined for the MOS forecasts in Tables 7.6 and 7.7 for the 0000 and 1200 GMT cycles, respectively. Similarly, results for the local forecasts are given in Tables 7.8 and 7.9 for the FT issuance times of approximately 0900 and 1800 GMT, respectively.

8. MAXIMUM/MINIMUM TEMPERATURE

Throughout the 1987-88 cool season, the max/min temperature guidance was generated by the prediction equations described in Technical Procedures Bulletin No. 356 (National Weather Service, 1985b). These equations forecast daytime max and nighttime min temperatures. During the cool season, daytime is defined as 9 a.m. to 7 p.m. Local Standard Time (LST), while nighttime extends from 7 p.m. to 9 a.m. LST. The guidance equations were developed by stratifying archived LFM model forecasts, station observations, and the first two harmonics of the day of the year into seasons of 3-mo duration (Erickson and Dallavalle, 1986). The fall season is defined as September-November; the winter, as December-February; and the spring, as March-May. During the 0000 GMT cycle, the MOS max/min guidance is valid for periods corresponding to today's max, tonight's min, tomorrow's max, and tomorrow night's min. Similarly, for the 1200 GMT forecast cycle, guidance is produced for tonight's min, tomorrow's max, tomorrow night's min, and the day after tomorrow's max. Station observations at 0000 GMT (1200 GMT) are used as possible predictors only in the first period forecast of today's max (tonight's min). The valid periods of the guidance closely approximate those of the local forecaster who makes predictions of today's high, tonight's low, and so forth.

In this publication, we present results for both guidance and local forecasts that were verified by using observations approximating the daytime high or nighttime low. For the local AFOS-era verification software (Ruth and Alex, 1987), daytime is defined as 7 a.m to 7 p.m. LST and nighttime as 7 p.m. to 8 a.m LST. The local program scans the synoptic and hourly reports to determine if the max/min observation adequately represents the daytime or nighttime

[6]The log score is proportional to the absolute value of $\log_{10} f_i - \log_{10} O_i$, where f_i is the forecast category for each case and O_i is the observed category for each case. The result is averaged over all cases and scaled by multiplying by 50.

period. If this observation is satisfactory, it is kept. If, however, the reported value is not representative of the day or night period, then an algorithm is used to deduce an appropriate value from available synoptic and hourly temperature observations. The local forecaster is also provided the option of replacing the estimated observation with the exact nighttime low or daytime high. It's important to note, then, that the verification observations used in this report correspond reasonably well to the local and guidance forecast periods.

We verified the local and MOS max/min temperature forecasts for both the 0000 and 1200 GMT cycles. The mean algebraic error (forecast minus observed temperature), mean absolute error, percent of absolute errors >10°F, probability of detection[7] of min temperatures ≤32°F, and false alarm ratio[8] for min temperatures ≤32°F were computed for 93 stations in the conterminous United States (see Table 2.1). At 0000 (1200) GMT, the local and guidance max temperature forecasts are valid for daytime periods ending approximately 24 (36) and 48 (60) hours after 0000 (1200) GMT. Similarly, at 0000 (1200) GMT, the local and guidance min temperature forecasts are valid for nighttime periods ending about 36 (24) and 60 (48) hours after 0000 (1200) GMT. Note that the local forecasters occasionally may not have put much effort into making the 60-h min forecasts from 0000 GMT, especially during severe weather events.

For all stations combined, the results for 0000 and 1200 GMT are shown in Tables 8.1 and 8.6, respectively. Similarly, Tables 8.2-8.5 give the 0000 GMT verification scores for the Eastern, Southern, Central, and Western Regions, respectively. Tables 8.7-8.10 show scores by NWS region for the 1200 GMT cycle.

9. SUMMARY

Highlights of the 1987-88 cool season verification results, summarized by general type of weather element, are:

- Probability of Precipitation - The PoP verification involved 93 stations and forecast projections of 12-24, 24-36, and 36-48 hours from 0000 and 1200 GMT. The NWS Brier scores for all stations and both forecast cycles combined show that the local forecasts were 9.4% better than the guidance for the first period, 7.3% better for the second period, and 7.1% better for the third period. These overall average improvements over guidance are better than those for the previous cool season (Dagostaro et al., 1987). Depending on the projection and cycle, the local forecasters deviated by 20% or more from the guidance about 13% of the time. For these cases, the NWS Brier scores for all stations and both forecast cycles combined indicate that the local forecasts were 22.8% better than the guidance for the first period, 19.0% better for the second period, and 17.8% better for the third period. Finally, the percent improvement over

[7] Here, the probability of detection is defined to be the fraction of time the min temperature was correctly forecast to be ≤32°F when the previous day's min was ≥40°F.

[8] Here, the false alarm ratio is defined to be the fraction of forecasts of ≤32°F that failed to verify when the previous day's min was ≥40°F.

climate scores for all three periods and both forecast cycles indicate that the local and guidance scores were worse than those for the previous cool season.

- Precipitation Type - Local and guidance forecasts for 86 stations and projections of 18, 30, and 42 hours from 0000 and 1200 GMT comprised the comparative verification. Only those cases for which the local PoP was $\geq$30% were verified, and surface observations within $\pm$1 hour of the forecast valid time were used. Based on three-category (freezing rain, snow, rain) contingency tables, the scores for all stations combined for all three projections and both cycles indicate that the local and guidance forecasts performed at about the same level of accuracy. Overall, the scores for all three categories were generally about the same as those for the previous cool season, except for the POD and FAR for the snow category. Both of these scores show an improvement in local and MOS forecasts of frozen precipitation over those for the previous cool season in conjunction with an increase in the number of events for this category.

- Snow Amount - The snow amount verification involved 82 stations for the 12-24 h period from 0000 and 1200 GMT. In terms of skill score, threat score, POD, and FAR, the local forecasts were generally as good as or better than the guidance for all three categories for both cycles. In terms of bias by category, neither the local forecasts nor the guidance was clearly better. The scores for both the local forecasts and the guidance were generally worse than those for the previous cool season for the $\geq$4 and $\geq$6 inch categories.

- Surface Wind - Statistics were computed for local and guidance forecasts of surface wind speed and direction. Local forecasts for 91 (92) stations for projections of around 3, 9, and 15 hours from the FT issuance times of approximately 0900 and 1800 GMT were verified. These results are not directly comparable to those for previous seasons. Guidance forecasts for the same 91 (92) stations for projections of 12, 18, and 24 hours from 0000 and 1200 GMT were verified. The results for the guidance are similar to those for the previous cool season. During the past four cool seasons, the MOS guidance underforecast the number of winds $\geq$18 kt. This appears to be directly related to the change in the LFM's surface stress profile which was implemented in January 1985 (National Weather Service, 1985a).

  The 42-h significant wind verification involved the comparison of local and guidance forecasts of winds $\geq$23 kt for 92 stations for the 42-h projection from 0000 and 1200 GMT. In terms of bias by category, the guidance was considerably better than the local forecasts when the verifying observation was the 1-min average. The bias of the local forecasts was still high, but much less so, when the verifying observation was the $\pm$3-h maximum speed. The accuracy and skill measures reflect the respective biases of the MOS and local forecasts. For a rare event such as this, underforecasting the event (bias <1.0) usually leads to a higher percent correct with lower skill and threat scores.

- Cloud Amount - The verification for cloud amount involved the comparison of local and guidance forecasts for 94 stations for projections of 12, 18, and 24 hours from 0000 and 1200 GMT. The skill scores and percent correct for all stations combined indicate both the 0000 and 1200 GMT cycle local forecasts were better than the corresponding guidance for the 12-h projection, while the guidance was better than the local forecasts for the 18- and 24-h projections. In terms of bias by category, the guidance was better than the local forecasts for the clear, scattered, and broken categories. The local forecasts were generally better than the guidance for the overcast category. Overall, the results were similar to those for the previous cool season, except that the tendency for both the guidance and local forecasters to overforecast the scattered category appears to have increased.

- Ceiling and Visibility - Both the local and guidance forecasts were verified against their corresponding persistence forecasts. For the local forecasts, a comparative verification was performed for the 91 (92) stations for projections of around 3, 6, 9, and 15 hours from the FT issuance times of approximately 0900 and 1800 GMT. For both forecast cycles combined, the log scores, percent correct, and skill scores for both ceiling and visibility show that persistence was generally as good as or better than the locals for the 3-h projection, while the locals were better for the 6-, 9-, and 15-h projections. In terms of bias by category, the locals almost always underforecast the ceiling height $\leq$900 ft and the visibility $\leq$2 3/4 mi. These results are not directly comparable to those for previous seasons.

  For the guidance, the verification involved the comparison of MOS forecasts and persistence for the same 91 (92) stations for projections of 12, 18, and 24 hours from 0000 (1200) GMT. These are actually 3-, 9-, and 15-h forecasts from the latest available surface observations for persistence, and in this sense, they are usually 10-, 16-, and 22-h forecasts for the guidance. For both forecast cycles combined, the log scores, percent correct, and skill scores for ceiling show that persistence was better than the guidance for the 12-h projection, while the guidance was generally better for the 18- and 24-h projections. The bias by category results varied from projection to projection and cycle to cycle. For visibility, the log score, percent correct, and skill score for both cycles combined show that persistence was clearly better than the guidance for the 12-h projection. In terms of bias by category, the guidance was generally as good as or better than persistence for all cycles and projections. In terms of log score and percent correct, the results for ceiling and visibility were better than those for the 1986-87 cool season, but worse in terms of skill score.

- Maximum/Minimum Temperature - Objective and local forecasts were verified for 93 stations for both the 0000 and 1200 GMT cycles. At 0000 (1200) GMT, the local maximum temperature forecasts were valid for daytime periods ending approximately 24 (36) and 48 (60) hours after 0000 or 1200 GMT, while the minimum temperature forecasts were valid for nighttime periods ending approximately 36 (24) and 60 (48) hours after initial model time. The valid periods of the

guidance closely approximate those of the local forecasts. As verifying observations, max or min temperatures for daytime or nighttime intervals were used.

For all stations and projections combined, we found the mean absolute errors of the local max and min temperature forecasts were 0.3°F and 0.2°F, respectively, more accurate than those for the MOS guidance. In every region and for all projections, the local forecasters were able to improve over the MOS guidance, both in terms of mean absolute error and the percentage of errors >10°F. Compared to the 1986-87 cool season verifications, the MOS guidance was 0.2°F worse in terms of mean absolute error for all stations and projections combined, while the local forecasts were 0.1°F worse overall than those for the previous cool season.

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Table 2.1. Ninety-four stations used for comparative verification of MOS guidance and local probability of precipitation, surface wind, cloud amount, ceiling height, visibility, and max/min temperature forecasts. Please note that LAX was not included in the PoP and max/min temperature verifications, and LBB and ELP were not included in the surface wind, ceiling height, and visibility verifications. TCC was not available during the 0000 GMT cycle for the local surface wind, ceiling height, and visibility.

DCA	Washington, D.C.	ORF	Norfolk, Virginia
PWM	Portland, Maine	CON	Concord, New Hampshire
BOS	Boston, Massachusetts	PVD	Providence, Rhode Island
ALB	Albany, New York	BTV	Burlington, Vermont
BUF	Buffalo, New York	SYR	Syracuse, New York
LGA	New York (LaGuardia), New York	EWR	Newark, New Jersey
RDU	Raleigh-Durham, North Carolina	CLT	Charlotte, North Carolina
CLE	Cleveland, Ohio	CMH	Columbus, Ohio
PHL	Philadelphia, Pennsylvania	AVP	Scranton, Pennsylvania
PIT	Pittsburgh, Pennsylvania	ERI	Erie, Pennsylvania
CAE	Columbia, South Carolina	CHS	Charleston, South Carolina
CRW	Charleston, West Virginia	BKW	Beckley, West Virginia
BHM	Birmingham, Alabama	MOB	Mobile, Alabama
LIT	Little Rock, Arkansas	FSM	Fort Smith, Arkansas
MIA	Miami, Florida	TPA	Tampa, Florida
ATL	Atlanta, Georgia	SAV	Savannah, Georgia
MSY	New Orleans, Louisiana	SHV	Shreveport, Louisiana
JAN	Jackson, Mississippi	MEI	Meridian, Mississippi
ABQ	Albuquerque, New Mexico	TCC	Tucumcari, New Mexico
OKC	Oklahoma City, Oklahoma	TUL	Tulsa, Oklahoma
MEM	Memphis, Tennessee	BNA	Nashville, Tennessee
DFW	Dallas-Ft. Worth, Texas	ABI	Abilene, Texas
LBB	Lubbock, Texas	ELP	El Paso, Texas
SAT	San Antonio, Texas	IAH	Houston, Texas
DEN	Denver, Colorado	GJT	Grand Junction, Colorado
ORD	Chicago (O'Hare), Illinois	SPI	Springfield, Illinois
IND	Indianapolis, Indiana	SBN	South Bend, Indiana
DSM	Des Moines, Iowa	ALO	Waterloo, Iowa
TOP	Topeka, Kansas	ICT	Wichita, Kansas
SDF	Louisville, Kentucky	LEX	Lexington, Kentucky
DTW	Detroit, Michigan	GRR	Grand Rapids, Michigan
MSP	Minneapolis, Minnesota	DLH	Duluth, Minnesota
STL	St. Louis, Missouri	MCI	Kansas City, Missouri
OMA	Omaha, Nebraska	LBF	North Platte, Nebraska
BIS	Bismarck, North Dakota	FAR	Fargo, North Dakota
FSD	Sioux Falls, South Dakota	RAP	Rapid City, South Dakota
MKE	Milwaukee, Wisconsin	MSN	Madison, Wisconsin
CYS	Cheyenne, Wyoming	CPR	Casper, Wyoming
PHX	Phoenix, Arizona	TUS	Tucson, Arizona
LAX	Los Angeles, California	SAN	San Diego, California
SFO	San Francisco, California	FAT	Fresno, California
BOI	Boise, Idaho	PIH	Pocatello, Idaho
GTF	Great Falls, Montana	HLN	Helena, Montana
RNO	Reno, Nevada	LAS	Las Vegas, Nevada
PDX	Portland, Oregon	MFR	Medford, Oregon
SLC	Salt Lake City, Utah	CDC	Cedar City, Utah
SEA	Seattle-Tacoma, Washington	GEG	Spokane, Washington

Table 2.2. Comparative verification of MOS and local PoP forecasts for 93 stations, 0000 GMT cycle.

Forecast Projection (h)	Type of Forecast	Brier Score	% Imp. Over Guid.	% Imp. Over Clim.	No. of Cases	Changes GE 20% to Guidance: Brier Score	Changes GE 20% to Guidance: % Imp. Over Guid.	Changes GE 20% to Guidance: No. of Changes
12-24	MOS	0.0828		43.8		0.2248		
(1st period)	LOCAL	0.0754	9.0	48.8	15522	0.1765	21.5	1908
24-36	MOS	0.0991		35.0		0.2357		
(2nd period)	LOCAL	0.0919	7.2	39.7	15394	0.1915	18.7	1941
36-48	MOS	0.1081		27.0		0.2359		
(3rd period)	LOCAL	0.0996	7.8	32.7	15498	0.1885	20.1	2206

Table 2.3. Same as Table 2.2 except for 24 stations in the Eastern Region.

Forecast Projection (h)	Type of Forecast	Brier Score	% Imp. Over Guid.	% Imp. Over Clim.	No. of Cases	Changes GE 20% to Guidance: Brier Score	Changes GE 20% to Guidance: % Imp. Over Guid.	Changes GE 20% to Guidance: No. of Changes
12-24	MOS	0.0952		46.7		0.1955		
(1st period)	LOCAL	0.0892	6.3	50.1	3950	0.1672	14.5	622
24-36	MOS	0.1142		37.9		0.2246		
(2nd period)	LOCAL	0.1046	8.5	43.1	3954	0.1675	25.4	594
36-48	MOS	0.1274		30.6		0.2235		
(3rd period)	LOCAL	0.1185	7.0	35.4	3944	0.1797	19.6	677

Table 2.4. Same as Table 2.2 except for 24 stations in the Southern Region.

Forecast Projection (h)	Type of Forecast	Brier Score	% Imp. Over Guid.	% Imp. Over Clim.	No. of Cases	Changes GE 20% to Guidance: Brier Score	Changes GE 20% to Guidance: % Imp. Over Guid.	Changes GE 20% to Guidance: No. of Changes
12-24	MOS	0.0679		47.9		0.2189		
(1st period)	LOCAL	0.0624	8.1	52.1	4109	0.1789	18.3	488
24-36	MOS	0.0817		37.6		0.2155		
(2nd period)	LOCAL	0.0766	6.2	41.5	3977	0.1908	11.4	530
36-48	MOS	0.0914		29.7		0.2035		
(3rd period)	LOCAL	0.0839	8.2	35.5	4107	0.1698	16.5	636

Table 2.5. Same as Table 2.2 except for 28 stations in the Central Region.

Forecast Projection (h)	Type of Forecast	Brier Score	% Imp. Over Guid.	% Imp. Over Clim.	No. of Cases	Changes GE 20% to Guidance: Brier Score	Changes GE 20% to Guidance: % Imp. Over Guid.	Changes GE 20% to Guidance: No. of Changes
12-24 (1st period)	MOS	0.0881		40.1		0.2457		
	LOCAL	0.0787	10.7	46.5	4572	0.1823	25.8	537
24-36 (2nd period)	MOS	0.1069		31.9		0.2518		
	LOCAL	0.0993	7.0	36.7	4570	0.2046	18.8	571
36-48 (3rd period)	MOS	0.1141		21.8		0.2679		
	LOCAL	0.1042	8.6	28.5	4561	0.2112	21.2	635

Table 2.6. Same as Table 2.2 except for 17 stations in the Western Region.

Forecast Projection (h)	Type of Forecast	Brier Score	% Imp. Over Guid.	% Imp. Over Clim.	No. of Cases	Changes GE 20% to Guidance: Brier Score	Changes GE 20% to Guidance: % Imp. Over Guid.	Changes GE 20% to Guidance: No. of Changes
12-24 (1st period)	MOS	0.0789		39.0		0.2626		
	LOCAL	0.0698	11.5	46.0	2891	0.1821	30.6	261
24-36 (2nd period)	MOS	0.0899		31.9		0.2685		
	LOCAL	0.0838	6.8	36.5	2893	0.2206	17.8	246
36-48 (3rd period)	MOS	0.0960		25.8		0.2692		
	LOCAL	0.0891	7.2	31.2	2886	0.2017	25.1	258

Table 2.7. Comparative verification of MOS and local PoP forecasts for 93 stations, 1200 GMT cycle.

Forecast Projection (h)	Type of Forecast	Brier Score	% Imp. Over Guid.	% Imp. Over Clim.	No. of Cases	Changes GE 20% to Guidance: Brier Score	Changes GE 20% to Guidance: % Imp. Over Guid.	Changes GE 20% to Guidance: No. of Changes
12-24	MOS	0.0866		42.8		0.2234		
(1st period)	LOCAL	0.0781	9.9	48.4	15057	0.1696	24.1	1892
24-36	MOS	0.0962		35.0		0.2272		
(2nd period)	LOCAL	0.0892	7.3	39.7	15154	0.1834	19.3	2018
36-48	MOS	0.1113		27.3		0.2186		
(3rd period)	LOCAL	0.1042	6.4	32.0	15033	0.1840	15.8	2152

Table 2.8. Same as Table 2.7 except for 24 stations in the Eastern Region.

Forecast Projection (h)	Type of Forecast	Brier Score	% Imp. Over Guid.	% Imp. Over Clim.	No. of Cases	Changes GE 20% to Guidance: Brier Score	Changes GE 20% to Guidance: % Imp. Over Guid.	Changes GE 20% to Guidance: No. of Changes
12-24	MOS	0.0972		46.1		0.1818		
(1st period)	LOCAL	0.0919	5.4	49.0	3848	0.1582	13.0	579
24-36	MOS	0.1093		39.6		0.2071		
(2nd period)	LOCAL	0.1024	6.2	43.3	3835	0.1736	16.2	627
36-48	MOS	0.1318		28.3		0.2155		
(3rd period)	LOCAL	0.1225	7.1	33.4	3838	0.1783	17.3	702

Table 2.9. Same as Table 2.7 except for 24 stations in the Southern Region.

Forecast Projection (h)	Type of Forecast	Brier Score	% Imp. Over Guid.	% Imp. Over Clim.	No. of Cases	Changes GE 20% to Guidance: Brier Score	Changes GE 20% to Guidance: % Imp. Over Guid.	Changes GE 20% to Guidance: No. of Changes
12-24	MOS	0.0740		43.5		0.2161		
(1st period)	LOCAL	0.0648	12.5	50.6	3854	0.1579	26.9	504
24-36	MOS	0.0809		37.6		0.2094		
(2nd period)	LOCAL	0.0741	8.4	42.9	3982	0.1678	19.9	554
36-48	MOS	0.0940		28.4		0.1950		
(3rd period)	LOCAL	0.0876	6.9	33.4	3854	0.1692	13.2	621

Table 2.10. Same as Table 2.7 except for 28 stations in the Central Region.

Forecast Projection (h)	Type of Forecast	Brier Score	% Imp. Over Guid.	% Imp. Over Clim.	No. of Cases	Changes GE 20% to Guidance: Brier Score	Changes GE 20% to Guidance: % Imp. Over Guid.	Changes GE 20% to Guidance: No. of Changes
12-24	MOS	0.0937		40.4		0.2588		
(1st period)	LOCAL	0.0817	12.8	48.1	4496	0.1780	31.2	576
24-36	MOS	0.1045		29.2		0.2562		
(2nd period)	LOCAL	0.0963	7.8	34.7	4484	0.2038	20.5	571
36-48	MOS	0.1184		25.8		0.2430		
(3rd period)	LOCAL	0.1100	7.1	31.1	4485	0.1978	18.6	579

Table 2.11. Same as Table 2.7 except for 17 stations in the Western Region.

Forecast Projection (h)	Type of Forecast	Brier Score	% Imp. Over Guid.	% Imp. Over Clim.	No. of Cases	Changes GE 20% to Guidance: Brier Score	Changes GE 20% to Guidance: % Imp. Over Guid.	Changes GE 20% to Guidance: No. of Changes
12-24	MOS	0.0784		39.9		0.2547		
(1st period)	LOCAL	0.0717	8.5	45.0	2859	0.2021	20.7	233
24-36	MOS	0.0872		33.0		0.2497		
(2nd period)	LOCAL	0.0812	6.9	37.6	2853	0.1954	21.7	266
36-48	MOS	0.0959		26.7		0.2298		
(3rd period)	LOCAL	0.0928	3.2	29.0	2856	0.2051	10.8	250

Table 3.1. Eighty-six stations used for comparative verification of MOS guidance and local precipitation type forecasts. These same stations, except for MFR, PDX, SDF, and TCC were also used for snow amount verification.

DCA	Washington, D.C.	ORF	Norfolk, Virginia
PWM	Portland, Maine	CON	Concord, New Hampshire
BOS	Boston, Massachusetts	PVD	Providence, Rhode Island
ALB	Albany, New York	BTV	Burlington, Vermont
BUF	Buffalo, New York	SYR	Syracuse, New York
LGA	New York (LaGuardia), New York	EWR	Newark, New Jersey
RDU	Raleigh-Durham, North Carolina	CLT	Charlotte, North Carolina
CLE	Cleveland, Ohio	CMH	Columbus, Ohio
PHL	Philadelphia, Pennsylvania	AVP	Scranton, Pennsylvania
PIT	Pittsburgh, Pennsylvania	ERI	Erie, Pennsylvania
CAE	Columbia, South Carolina	CHS	Charleston, South Carolina
CRW	Charleston, West Virginia	BKW	Beckley, West Virginia
BHM	Birmingham, Alabama	MOB	Mobile, Alabama
LIT	Little Rock, Arkansas	FSM	Fort Smith, Arkansas
ATL	Atlanta, Georgia	SAV	Savannah, Georgia
MSY	New Orleans, Louisiana	SHV	Shreveport, Louisiana
JAN	Jackson, Mississippi	MEI	Meridian, Mississippi
ABQ	Albuquerque, New Mexico	TCC	Tucumcari, New Mexico
OKC	Oklahoma City, Oklahoma	TUL	Tulsa, Oklahoma
MEM	Memphis, Tennessee	BNA	Nashville, Tennessee
DFW	Dallas-Ft. Worth, Texas	ABI	Abilene, Texas
LBB	Lubbock, Texas	ELP	El Paso, Texas
SAT	San Antonio, Texas	IAH	Houston, Texas
DEN	Denver, Colorado	GJT	Grand Junction, Colorado
ORD	Chicago (O'Hare), Illinois	SPI	Springfield, Illinois
IND	Indianapolis, Indiana	SBN	South Bend, Indiana
DSM	Des Moines, Iowa	ALO	Waterloo, Iowa
TOP	Topeka, Kansas	ICT	Wichita, Kansas
SDF	Louisville, Kentucky	LEX	Lexington, Kentucky
DTW	Detroit, Michigan	GRR	Grand Rapids, Michigan
MSP	Minneapolis, Minnesota	DLH	Duluth, Minnesota
STL	St. Louis, Missouri	MCI	Kansas City, Missouri
OMA	Omaha, Nebraska	LBF	North Platte, Nebraska
BIS	Bismarck, North Dakota	FAR	Fargo, North Dakota
FSD	Sioux Falls, South Dakota	RAP	Rapid City, South Dakota
MKE	Milwaukee, Wisconsin	MSN	Madison, Wisconsin
CYS	Cheyenne, Wyoming	CPR	Casper, Wyoming
BOI	Boise, Idaho	PIH	Pocatello, Idaho
GTF	Great Falls, Montana	HLN	Helena, Montana
RNO	Reno, Nevada	LAS	Las Vegas, Nevada
PDX	Portland, Oregon	MFR	Medford, Oregon
SLC	Salt Lake City, Utah	CDC	Cedar City, Utah
SEA	Seattle-Tacoma, Washington	GEG	Spokane, Washington

Table 3.2. Comparative verification of MOS and local forecasts of PoPT for 86 stations for the 0000 GMT cycle. Only cases where the local PoP was ≥30% were included. Data for TCC were not available for the 30-h projection.

Projection (h)	Region Number of Stations	Type of Forecast	Bias ZR	Bias S	Bias R	Percent Correct	Skill Score	POD ZR	POD S	FAR ZR	FAR S
18	Eastern 24	MOS	0.36	0.96	1.07	88.9	0.782	0.07	0.87	0.80	0.08
		LOCAL	0.71	0.93	1.07	89.8	0.803	0.21	0.87	0.70	0.07
		No. Obs.	14	334	361						
	Southern 22	MOS	1.14	0.81	1.02	91.9	0.656	0.57	0.62	0.50	0.23
		LOCAL	1.07	0.70	1.03	91.7	0.628	0.57	0.57	0.47	0.19
		No. Obs.	14	37	321						
	Central 28	MOS	1.64	0.98	1.00	91.8	0.840	0.36	0.93	0.78	0.05
		LOCAL	1.00	0.95	1.06	90.4	0.813	0.27	0.89	0.73	0.06
		No. Obs.	11	323	248						
	Western 12	MOS	*	0.93	1.04	87.6	0.744	*	0.82	1.00	0.12
		LOCAL	*	0.82	1.12	85.5	0.696	*	0.74	1.00	0.10
		No. Obs.	0	101	141						
	All Stations	MOS	1.03	0.96	1.03	90.2	0.806	0.33	0.88	0.68	0.08
		LOCAL	0.95	0.91	1.07	89.8	0.798	0.36	0.85	0.62	0.07
		No. Obs.	39	795	1071						
30	Eastern 24	MOS	0.62	0.98	1.04	89.0	0.787	0.19	0.89	0.69	0.09
		LOCAL	0.29	1.07	0.98	88.2	0.771	0.05	0.92	0.83	0.14
		No. Obs.	21	330	393						
	Southern 21	MOS	1.73	0.75	1.00	93.5	0.670	0.55	0.64	0.68	0.14
		LOCAL	1.00	0.82	1.02	93.0	0.614	0.36	0.61	0.64	0.26
		No. Obs.	11	28	332						
	Central 28	MOS	1.22	1.00	0.98	87.1	0.755	0.17	0.91	0.86	0.09
		LOCAL	0.56	0.98	1.06	85.3	0.718	0.06	0.86	0.90	0.12
		No. Obs.	18	308	247						
	Western 12	MOS	2.00	0.97	1.01	95.1	0.891	1.00	0.92	0.50	0.05
		LOCAL	0.00	1.12	0.94	92.3	0.836	0.00	0.95	1.00	0.15
		No. Obs.	1	76	145						
	All Stations	MOS	1.10	0.98	1.01	90.0	0.803	0.27	0.89	0.75	0.09
		LOCAL	0.53	1.03	1.00	88.7	0.776	0.12	0.89	0.78	0.14
		No. Obs.	51	742	1117						
42	Eastern 24	MOS	1.33	1.04	0.95	88.5	0.778	0.42	0.91	0.69	0.12
		LOCAL	0.67	1.00	1.01	88.6	0.778	0.33	0.89	0.50	0.11
		No. Obs.	12	330	343						
	Southern 22	MOS	1.67	0.57	1.03	90.2	0.532	0.33	0.43	0.80	0.24
		LOCAL	0.89	0.49	1.06	92.1	0.579	0.56	0.43	0.38	0.11
		No. Obs.	9	37	310						
	Central 28	MOS	2.60	0.98	0.96	88.8	0.789	0.40	0.91	0.85	0.07
		LOCAL	0.40	0.95	1.08	88.8	0.782	0.00	0.88	1.00	0.07
		No. Obs.	10	284	251						
	Western 12	MOS	**	0.82	1.12	84.6	0.680	**	0.73	1.00	0.11
		LOCAL	*	0.87	1.09	88.2	0.756	*	0.80	1.00	0.09
		No. Obs.	0	93	128						
	All Stations	MOS	1.90	0.96	1.00	88.4	0.773	0.39	0.87	0.80	0.10
		LOCAL	0.68	0.94	1.06	89.3	0.785	0.29	0.85	0.57	0.09
		No. Obs.	31	744	1032						

* This category was forecast once but was not observed.
** This category was forecast twice but was not observed.

Table 3.3. Same as Table 3.2 except for the 1200 GMT cycle. Data for TCC were not available for the 18- and 42-h projections. Data for LAS were not available for the 42-h projection.

Projection (h)	Region Number of Stations	Type of Forecast	Bias ZR	Bias S	Bias R	Percent Correct	Skill Score	POD ZR	POD S	FAR ZR	FAR S
18	Eastern 24	MOS	0.62	0.98	1.04	90.8	0.822	0.19	0.91	0.69	0.07
		LOCAL	0.29	1.04	1.01	91.1	0.827	0.10	0.94	0.67	0.10
		No. Obs.	21	318	377						
	Southern 21	MOS	1.63	0.97	0.99	94.6	0.743	0.63	0.79	0.62	0.19
		LOCAL	1.38	0.55	1.04	93.0	0.600	0.75	0.42	0.45	0.22
		No. Obs.	8	33	328						
	Central 28	MOS	1.56	0.91	1.08	86.4	0.741	0.25	0.85	0.84	0.07
		LOCAL	0.88	0.95	1.07	88.2	0.771	0.25	0.88	0.71	0.07
		No. Obs.	16	343	250						
	Western 12	MOS	1.00	1.01	0.99	94.1	0.878	1.00	0.93	0.00	0.08
		LOCAL	2.00	1.04	0.97	91.0	0.814	0.00	0.91	1.00	0.13
		No. Obs.	1	85	136						
	All Stations	MOS	1.13	0.95	1.03	90.5	0.813	0.30	0.88	0.73	0.08
		LOCAL	0.72	0.98	1.03	90.5	0.812	0.26	0.89	0.64	0.09
		No. Obs.	46	779	1091						
30	Eastern 24	MOS	1.31	1.06	0.94	87.0	0.751	0.23	0.91	0.82	0.14
		LOCAL	1.08	1.02	0.98	87.9	0.766	0.38	0.89	0.64	0.12
		No. Obs.	13	323	349						
	Southern 22	MOS	1.70	0.90	0.99	90.5	0.621	0.40	0.67	0.76	0.26
		LOCAL	0.60	0.62	1.06	91.9	0.598	0.50	0.49	0.17	0.21
		No. Obs.	10	39	310						
	Central 28	MOS	2.60	0.95	0.99	88.7	0.786	0.40	0.90	0.85	0.05
		LOCAL	1.50	0.95	1.04	87.3	0.755	0.10	0.87	0.93	0.08
		No. Obs.	10	306	251						
	Western 12	MOS	**	0.89	1.07	88.3	0.763	**	0.82	1.00	0.08
		LOCAL	*	0.86	1.10	89.2	0.778	*	0.81	1.00	0.06
		No. Obs.	0	102	129						
	All Stations	MOS	1.88	0.99	0.98	88.4	0.774	0.33	0.88	0.82	0.11
		LOCAL	1.09	0.95	1.03	88.7	0.775	0.33	0.85	0.69	0.10
		No. Obs.	33	770	1039						
42	Eastern 24	MOS	1.25	0.99	1.00	86.9	0.750	0.15	0.87	0.88	0.12
		LOCAL	0.40	1.07	0.97	86.7	0.743	0.00	0.91	1.00	0.15
		No. Obs.	20	299	373						
	Southern 21	MOS	2.00	0.92	0.97	90.6	0.551	0.50	0.52	0.75	0.43
		LOCAL	0.60	0.68	1.04	91.5	0.465	0.40	0.32	0.33	0.53
		No. Obs.	10	25	304						
	Central 28	MOS	2.17	0.96	0.96	85.4	0.732	0.33	0.88	0.85	0.09
		LOCAL	0.67	0.97	1.06	85.5	0.725	0.17	0.86	0.75	0.11
		No. Obs.	18	290	259						
	Western 11	MOS	0.00	0.96	1.03	93.8	0.865	0.00	0.90	1.00	0.06
		LOCAL	0.00	1.07	0.97	89.1	0.770	0.00	0.89	1.00	0.17
		No. Obs.	1	70	122						
	All Stations	MOS	1.71	0.97	0.99	87.8	0.763	0.29	0.86	0.83	0.11
		LOCAL	0.53	1.01	1.01	87.5	0.749	0.14	0.86	0.73	0.15
		No. Obs.	49	684	1058						

* This category was forecast once but was not observed.
** This category was forecast twice but was not observed.

Table 4.1. Comparative verification of MOS and local snow amount forecasts for 82 stations for the 12-24 h projection.

Cycle (GMT)	Type of Forecast	Bias ≥2	Bias ≥4	Bias ≥6	Percent Correct	Skill Score	Threat Score ≥2	Threat Score ≥4	Threat Score ≥6	POD ≥2	POD ≥4	POD ≥6	FAR ≥2	FAR ≥4	FAR ≥6
0000	MOS	1.15	1.51	1.08	97.9	0.295	0.268	0.220	0.163	0.45	0.45	0.29	0.60	0.70	0.73
	LOCAL	1.22	1.43	1.29	98.2	0.412	0.362	0.252	0.222	0.59	0.49	0.42	0.52	0.66	0.68
	No. Obs.	183	53	24											
1200	MOS	1.23	1.45	1.22	97.7	0.335	0.299	0.216	0.133	0.51	0.44	0.26	0.58	0.70	0.79
	LOCAL	1.28	1.11	0.91	97.7	0.344	0.301	0.236	0.158	0.53	0.40	0.26	0.59	0.64	0.71
	No. Obs.	195	62	23											

Table 5.1. Definition of the categories used for MOS guidance, local forecasts, and surface observations of wind direction and speed.

Category	Direction (degrees)	Speed (kt)
1	340-20	$\leq$ 12
2	30-60	13-17
3	70-110	18-22
4	120-150	23-27
5	160-200	28-32
6	210-240	$\geq$ 33
7	250-290	---
8	300-330	---

Table 5.2 Verification of MOS surface wind guidance for 92 stations, 0000 GMT cycle.

		Direction			Speed											
								Contingency Table								
											Bias by Category					
Fcst Proj (h)	Type of Fcst.	Mean Abs. Error (deg)	Skill Score	No. of Cases	Mean Abs. Error (kt)	Mean Alg. Error (kt)	No. of Cases	Skill Score	Percent Fcst. Correct	Threat Score (>27 kt)	1 No. Obs	2 No. Obs	3 No. Obs	4 No. Obs	5 No. Obs	6 No. Obs
12	MOS	22	0.522	3629	3.3	1.1	3659	0.390	86.5	0.18	1.02 12545	0.87 1462	0.80 340	0.71 92	0.44 18	0.75 4
18	MOS	24	0.491	6324	3.3	0.4	6359	0.376	74.5	0.11	1.07 10616	0.84 2982	0.73 916	0.80 209	0.74 43	0.33 12
24	MOS	26	0.482	4557	3.5	0.9	4579	0.344	81.7	0.06	1.04 12049	0.85 1913	0.77 494	0.63 122	0.48 29	0.57 7

Table 5.3. Same as Table 5.2 except for 24 stations in the Eastern Region.

		Direction			Speed											
								Contingency Table								
											Bias by Category					
Fcst Proj (h)	Type of Fcst.	Mean Abs. Error (deg)	Skill Score	No. of Cases	Mean Abs. Error (kt)	Mean Alg. Error (kt)	No. of Cases	Skill Score	Percent Fcst. Correct	Threat Score (>27 kt)	1 No. Obs	2 No. Obs	3 No. Obs	4 No. Obs	5 No. Obs	6 No. Obs
12	MOS	22	0.495	939	3.0	0.9	942	0.404	87.6	0.00	1.04 3225	0.73 409	0.84 69	0.54 13	0.00 2	* 0
18	MOS	22	0.446	1822	2.9	0.4	1829	0.389	74.4	0.00	1.05 2683	0.94 833	0.67 212	0.77 31	0.25 8	* 0
24	MOS	22	0.491	1052	3.2	0.9	1058	0.332	84.3	0.00	1.04 3168	0.80 429	0.69 102	0.42 19	0.67 3	* 0

* This category was neither forecast nor observed.

Table 5.4. Same as Table 5.2 except for 22 stations in the Southern Region.

		Direction			Speed											
								Contingency Table								
											Bias by Category					
Fcst Proj (h)	Type of Fcst.	Mean Abs. Error (deg)	Skill Score	No. of Cases	Mean Abs. Error (kt)	Mean Alg. Error (kt)	No. of Cases	Skill Score	Percent Fcst. Correct	Threat Score (>27 kt)	1 No. Obs	2 No. Obs	3 No. Obs	4 No. Obs	5 No. Obs	6 No. Obs
12	MOS	24	0.460	800	3.3	1.8	808	0.331	88.8	0.50	0.99 3132	1.07 248	1.00 46	1.67 6	0.00 2	** 0
18	MOS	26	0.463	1559	3.3	1.0	1564	0.324	74.2	0.14	1.04 2706	0.82 722	1.03 161	1.15 27	*** 0	0.00 2
24	MOS	27	0.465	1034	3.5	1.7	1041	0.311	84.5	0.00	0.99 3146	1.07 350	1.08 74	0.55 11	0.25 4	0.00 1

** This category was forecast once but was not observed.
*** This category was forecast six times but was not observed.

Table 5.5. Same as Table 5.2 except for 28 stations in the Central Region.

Fcst Proj (h)	Type of Fcst.	Direction: Mean Abs. Error (deg)	Direction: Skill Score	Direction: No. of Cases	Speed: Mean Abs. Error (kt)	Speed: Mean Alg. Error (kt)	Speed: No. of Cases	Contingency Table: Skill Score	Contingency Table: Percent Fcst. Correct	Contingency Table: Threat Score (>27 kt)	Bias by Category: 1 No. Obs	2 No. Obs	3 No. Obs	4 No. Obs	5 No. Obs	6 No. Obs
12	MOS	19	0.561	1439	3.2	0.5	1446	0.404	81.3	0.21	1.05 3472	0.85 640	0.75 168	0.69 58	0.80 10	0.67 3
18	MOS	21	0.537	2279	3.4	-0.5	2286	0.371	67.8	0.12	1.18 2649	0.76 1165	0.68 424	0.68 122	0.59 27	0.30 10
24	MOS	23	0.514	1536	3.5	0.1	1536	0.366	77.8	0.03	1.09 3297	0.74 779	0.69 190	0.74 65	0.57 14	0.80 5

Table 5.6 Same as Table 5.2 except for 18 stations in the Western Region.

Fcst Proj (h)	Type of Fcst.	Direction: Mean Abs. Error (deg)	Direction: Skill Score	Direction: No. of Cases	Speed: Mean Abs. Error (kt)	Speed: Mean Alg. Error (kt)	Speed: No. of Cases	Contingency Table: Skill Score	Contingency Table: Percent Fcst. Correct	Contingency Table: Threat Score (>27 kt)	Bias by Category: 1 No. Obs	2 No. Obs	3 No. Obs	4 No. Obs	5 No. Obs	6 No. Obs
12	MOS	30	0.458	451	4.3	2.0	463	0.344	90.4	0.00	1.01 2716	1.02 165	0.75 57	0.53 15	0.00 4	0.00 1
18	MOS	36	0.416	664	4.5	1.6	680	0.348	85.0	0.13	1.03 2578	0.89 262	0.60 119	1.00 29	1.00 8	** 0
24	MOS	34	0.392	935	4.0	1.4	944	0.330	80.9	0.20	1.03 2438	0.94 355	0.76 128	0.56 27	0.38 8	0.00 1

** This category was forecast once but was not observed.

Table 5.7. Verification of MOS surface wind guidance for 92 stations, 1200 GMT cycle.

		Direction			Speed											
								Contingency Table								
											Bias by Category					
Fcst Proj (h)	Type of Fcst.	Mean Abs. Error (deg)	Skill Score	No. of Cases	Mean Abs. Error (kt)	Mean Alg. Error (kt)	No. of Cases	Skill Score	Percent Fcst. Correct	Threat Score (>27 kt)	1 No. Obs	2 No. Obs	3 No. Obs	4 No. Obs	5 No. Obs	6 No. Obs
12	MOS	24	0.510	4554	3.3	0.8	4576	0.382	82.4	0.11	1.04 11790	0.88 1892	0.72 508	0.65 127	0.37 30	0.43 7
18	MOS	24	0.494	3524	3.5	1.3	3554	0.350	85.6	0.03	1.02 12601	0.89 1463	0.78 355	0.68 82	0.87 15	0.20 5
24	MOS	26	0.481	3291	3.7	1.3	3324	0.352	85.9	0.07	1.03 12248	0.84 1406	0.85 337	0.63 92	0.56 16	0.50 4

Table 5.8. Same as Table 5.7 except for 24 stations in the Eastern Region.

		Direction			Speed											
								Contingency Table								
											Bias by Category					
Fcst Proj (h)	Type of Fcst.	Mean Abs. Error (deg)	Skill Score	No. of Cases	Mean Abs. Error (kt)	Mean Alg. Error (kt)	No. of Cases	Skill Score	Percent Fcst. Correct	Threat Score (>27 kt)	1 No. Obs	2 No. Obs	3 No. Obs	4 No. Obs	5 No. Obs	6 No. Obs
12	MOS	20	0.533	992	2.9	0.6	995	0.392	85.6	0.00	1.05 3080	0.76 424	0.71 106	0.47 19	0.00 3	* 0
18	MOS	22	0.464	888	3.1	0.9	892	0.369	86.7	0.00	1.04 3225	0.79 384	0.65 96	0.38 16	2.00 1	0.00 1
24	MOS	24	0.452	842	3.4	1.0	845	0.362	86.3	0.00	1.04 3118	0.76 392	0.88 75	0.44 16	0.50 2	* 0

* This category was neither forecast nor observed.

Table 5.9. Same as Table 5.10 except for 22 stations in the Southern Region.

		Direction			Speed											
								Contingency Table								
											Bias by Category					
Fcst Proj (h)	Type of Fcst.	Mean Abs. Error (deg)	Skill Score	No. of Cases	Mean Abs. Error (kt)	Mean Alg. Error (kt)	No. of Cases	Skill Score	Percent Fcst. Correct	Threat Score (>27 kt)	1 No. Obs	2 No. Obs	3 No. Obs	4 No. Obs	5 No. Obs	6 No. Obs
12	MOS	26	0.471	993	3.4	1.5	999	0.318	84.5	0.00	0.99 3059	1.11 348	0.78 73	1.00 13	0.00 3	0.00 1
18	MOS	26	0.477	821	3.8	2.4	835	0.308	86.7	0.00	0.99 3061	1.05 277	1.23 56	2.80 5	0.50 4	** 0
24	MOS	29	0.440	755	3.7	2.5	766	0.319	88.2	0.33	0.98 3041	1.18 231	1.56 41	1.20 5	1.00 2	* 0

* This category was neither forecast nor observed.
** This category was forecast once but was not observed.

Table 5.10. Same as Table 5.7 except for 28 stations in the Central Region.

Fcst Proj (h)	Type of Fcst.	Direction: Mean Abs. Error (deg)	Direction: Skill Score	Direction: No. of Cases	Speed: Mean Abs. Error (kt)	Speed: Mean Alg. Error (kt)	Speed: No. of Cases	Contingency Table: Skill Score	Contingency Table: Percent Fcst. Correct	Contingency Table: Threat Score (>27 kt)	Bias by Category: 1 No. Obs	2 No. Obs	3 No. Obs	4 No. Obs	5 No. Obs	6 No. Obs
12	MOS	20	0.558	1668	3.2	0.1	1671	0.413	78.7	0.15	1.07 3240	0.80 768	0.80 196	0.62 68	0.47 15	0.60 5
18	MOS	22	0.518	1333	3.3	0.6	1338	0.369	81.9	0.06	1.04 3594	0.88 601	0.74 142	0.59 41	0.75 8	0.00 3
24	MOS	23	0.504	1260	3.6	0.4	1262	0.350	80.6	0.06	1.07 3418	0.75 618	0.68 162	0.71 55	0.75 8	0.67 3

Table 5.11. Same as Table 5.7 except for 18 stations in the Western Region.

Fcst Proj (h)	Type of Fcst.	Direction: Mean Abs. Error (deg)	Direction: Skill Score	Direction: No. of Cases	Speed: Mean Abs. Error (kt)	Speed: Mean Alg. Error (kt)	Speed: No. of Cases	Contingency Table: Skill Score	Contingency Table: Percent Fcst. Correct	Contingency Table: Threat Score (>27 kt)	Bias by Category: 1 No. Obs	2 No. Obs	3 No. Obs	4 No. Obs	5 No. Obs	6 No. Obs
12	MOS	32	0.399	901	3.8	1.3	911	0.353	81.3	0.08	1.03 2411	0.99 352	0.60 133	0.70 27	0.44 9	0.00 1
18	MOS	33	0.407	482	4.5	1.9	489	0.295	88.7	0.00	1.02 2721	0.89 201	0.66 61	0.60 20	1.50 2	0.00 1
24	MOS	36	0.420	434	4.8	2.2	451	0.346	90.6	0.00	1.02 2671	0.88 165	0.78 59	0.38 16	0.00 4	0.00 1

Table 5.12. Verification of local surface wind forecasts for 91 stations for the FT issuance time of approximately 0900 GMT.

		Direction			Speed											
								Contingency Table								
											Bias by Category					
Fcst Proj (h)	Type of Fcst.	Mean Abs. Error (deg)	Skill Score	No. of Cases	Mean Abs. Error (kt)	Mean Alg. Error (kt)	No. of Cases	Skill Score	Percent Fcst. Correct	Threat Score (>27 kt)	1 No. Obs	2 No. Obs	3 No. Obs	4 No. Obs	5 No. Obs	6 No. Obs
3	LOCAL	22	0.537	6191	3.5	2.0	6297	0.430	85.5	0.16	0.98 13311	1.25 1543	1.07 366	0.36 107	0.42 19	0.43 7
9	LOCAL	31	0.414	9752	3.4	1.2	9856	0.360	71.5	0.13	1.00 10844	1.14 3181	0.72 974	0.40 231	0.50 52	0.12 17
15	LOCAL	35	0.365	8659	4.2	2.8	8812	0.289	75.1	0.04	0.91 12629	1.53 2014	1.16 513	0.64 118	0.52 23	0.33 9

Table 5.13. Same as Table 5.12 except for 24 stations in the Eastern Region.

Fcst Proj (h)	Type of Fcst.	Direction: Mean Abs. Error (deg)	Direction: Skill Score	Direction: No. of Cases	Speed: Mean Abs. Error (kt)	Speed: Mean Alg. Error (kt)	Speed: No. of Cases	Contingency Table: Skill Score	Contingency Table: Percent Fcst. Correct	Contingency Table: Threat Score (>27 kt)	Bias by Category: 1 No. Obs	2 No. Obs	3 No. Obs	4 No. Obs	5 No. Obs	6 No. Obs
3	LOCAL	22	0.509	1850	3.4	2.3	1880	0.400	84.6	0.00	0.97 3474	1.18 444	1.21 81	0.53 15	0.50 2	* 0
9	LOCAL	28	0.407	2800	3.2	1.1	2817	0.313	69.6	0.00	1.02 2801	1.06 919	0.68 232	0.44 34	0.56 9	* 0
15	LOCAL	33	0.361	2278	4.2	3.0	2333	0.294	76.7	0.00	0.91 3360	1.57 493	1.16 120	0.59 22	0.33 3	* 0

* This category was neither forecast nor observed.

Table 5.14. Same as Table 5.12 except for 21 stations in the Southern Region.

Fcst Proj (h)	Type of Fcst.	Direction: Mean Abs. Error (deg)	Direction: Skill Score	Direction: No. of Cases	Speed: Mean Abs. Error (kt)	Speed: Mean Alg. Error (kt)	Speed: No. of Cases	Contingency Table: Skill Score	Contingency Table: Percent Fcst. Correct	Contingency Table: Threat Score (>27 kt)	Bias by Category: 1 No. Obs	2 No. Obs	3 No. Obs	4 No. Obs	5 No. Obs	6 No. Obs
3	LOCAL	22	0.538	1289	3.3	2.2	1310	0.388	89.0	0.00	0.98 3321	1.34 263	0.88 48	0.11 9	** 0	* 0
9	LOCAL	30	0.416	2378	3.1	1.2	2390	0.312	72.8	0.17	1.02 2696	1.10 738	0.50 166	0.07 29	0.25 4	0.00 2
15	LOCAL	34	0.357	2016	4.1	3.1	2051	0.226	77.3	0.00	0.90 3163	1.83 380	0.97 75	0.08 12	0.00 2	0.00 1

* This category was neither forecast nor observed.
** This category was forecast once but was not observed.

Table 5.15. Same as Table 5.12 except for 28 stations in the Central Region.

		Direction			Speed											
								Contingency Table								
											Bias by Category					
Fcst Proj (h)	Type of Fcst.	Mean Abs. Error (deg)	Skill Score	No. of Cases	Mean Abs. Error (kt)	Mean Alg. Error (kt)	No. of Cases	Skill Score	Percent Fcst. Correct	Threat Score (>27 kt)	1 No. Obs	2 No. Obs	3 No. Obs	4 No. Obs	5 No. Obs	6 No. Obs
3	LOCAL	20	0.552	2353	3.4	1.5	2375	0.439	79.9	0.25	0.96 3678	1.26 668	1.13 176	0.29 66	0.38 13	0.75 4
9	LOCAL	28	0.427	3345	3.5	0.7	3372	0.370	64.9	0.13	0.97 2762	1.24 1202	0.79 462	0.44 124	0.50 30	0.08 13
15	LOCAL	33	0.379	3017	4.0	2.3	3045	0.291	68.2	0.04	0.89 3452	1.45 836	1.22 223	0.75 60	0.47 15	0.40 5

Table 5.16. Same as Table 5.12 except for 18 stations in the Western Region.

		Direction			Speed											
								Contingency Table								
											Bias by Category					
Fcst Proj (h)	Type of Fcst.	Mean Abs. Error (deg)	Skill Score	No. of Cases	Mean Abs. Error (kt)	Mean Alg. Error (kt)	No. of Cases	Skill Score	Percent Fcst. Correct	Threat Score (>27 kt)	1 No. Obs	2 No. Obs	3 No. Obs	4 No. Obs	5 No. Obs	6 No. Obs
3	LOCAL	29	0.495	699	4.3	2.2	732	0.446	91.1	0.00	0.99 2838	1.29 168	0.85 61	0.59 17	0.25 4	0.00 3
9	LOCAL	45	0.341	1229	4.4	2.4	1277	0.365	82.2	0.21	1.00 2585	1.14 322	0.88 114	0.45 44	0.56 9	0.50 2
15	LOCAL	44	0.301	1348	4.6	3.1	1383	0.301	80.8	0.10	0.96 2654	1.31 305	1.19 95	0.71 24	1.33 3	0.33 3

Table 5.17. Verification of local surface wind forecasts for 92 stations for the FT issuance time of approximately 1800 GMT.

		Direction			Speed											
								Contingency Table								
											Bias by Category					
Fcst Proj (h)	Type of Fcst.	Mean Abs. Error (deg)	Skill Score	No. of Cases	Mean Abs. Error (kt)	Mean Alg. Error (kt)	No. of Cases	Skill Score	Percent Fcst. Correct	Threat Score (>27 kt)	1 No. Obs	2 No. Obs	3 No. Obs	4 No. Obs	5 No. Obs	6 No. Obs
3	LOCAL	26	0.474	10258	3.1	1.2	10318	0.406	72.4	0.17	0.97 10670	1.17 3276	0.84 997	0.54 232	0.79 47	0.12 17
9	LOCAL	33	0.399	6793	4.1	2.5	6961	0.313	80.8	0.11	0.97 13021	1.32 1692	0.93 405	0.40 94	0.64 25	0.80 5
15	LOCAL	35	0.360	5967	4.3	2.6	6170	0.299	82.4	0.06	0.98 13091	1.27 1527	0.87 378	0.25 84	0.80 15	0.50 4

Table 5.18. Same as Table 5.17 except for 24 stations in the Eastern Region.

Fcst Proj (h)	Type of Fcst.	Direction: Mean Abs. Error (deg)	Direction: Skill Score	Direction: No. of Cases	Speed: Mean Abs. Error (kt)	Speed: Mean Alg. Error (kt)	Speed: No. of Cases	Contingency Table: Skill Score	Contingency Table: Percent Fcst. Correct	Contingency Table: Threat Score (>27 kt)	Bias by Category: 1 No. Obs	2 No. Obs	3 No. Obs	4 No. Obs	5 No. Obs	6 No. Obs
3	LOCAL	24	0.461	2824	3.1	1.4	2836	0.361	71.7	0.10	0.96 2819	1.18 855	0.87 203	0.43 37	0.25 8	0.00 1
9	LOCAL	32	0.354	1943	4.0	2.5	1998	0.310	80.1	0.13	0.97 3312	1.23 486	0.97 100	0.42 19	0.75 4	**** 0
15	LOCAL	35	0.302	1747	4.2	2.8	1809	0.309	82.1	0.00	0.96 3411	1.31 412	1.04 89	0.22 18	***** 0	1.00 1

**** This category was forecast twice but was not observed.
***** This category was forecast three times but was not observed.

Table 5.19. Same as Table 5.17 except for 22 stations in the Southern Region.

Fcst Proj (h)	Type of Fcst.	Direction: Mean Abs. Error (deg)	Direction: Skill Score	Direction: No. of Cases	Speed: Mean Abs. Error (kt)	Speed: Mean Alg. Error (kt)	Speed: No. of Cases	Contingency Table: Skill Score	Contingency Table: Percent Fcst. Correct	Contingency Table: Threat Score (>27 kt)	Bias by Category: 1 No. Obs	2 No. Obs	3 No. Obs	4 No. Obs	5 No. Obs	6 No. Obs
3	LOCAL	27	0.448	2637	3.0	1.4	2655	0.361	72.9	0.10	0.97 2738	1.19 780	0.87 163	0.22 36	0.50 6	0.00 2
9	LOCAL	33	0.429	1526	4.0	2.7	1569	0.282	84.0	0.33	0.97 3317	1.48 318	0.52 75	0.42 12	1.00 2	* 0
15	LOCAL	36	0.355	1253	4.2	2.8	1300	0.251	86.0	0.00	0.98 3230	1.37 268	0.46 54	0.22 9	1.00 2	* 0

* This category was neither forecast nor observed.

Table 5.20. Same as Table 5.17 except for 28 stations in the Central Region.

Fcst Proj (h)	Type of Fcst.	Direction: Mean Abs. Error (deg)	Direction: Skill Score	Direction: No. of Cases	Speed: Mean Abs. Error (kt)	Speed: Mean Alg. Error (kt)	Speed: No. of Cases	Contingency Table: Skill Score	Contingency Table: Percent Fcst. Correct	Contingency Table: Threat Score (>27 kt)	Bias by Category: 1 No. Obs	2 No. Obs	3 No. Obs	4 No. Obs	5 No. Obs	6 No. Obs
3	LOCAL	23	0.513	3423	2.9	0.7	3433	0.423	67.0	0.20	0.95 2654	1.21 1244	0.82 488	0.69 108	1.08 25	0.17 12
9	LOCAL	30	0.417	2478	4.0	2.2	2519	0.308	74.4	0.12	0.94 3616	1.32 680	1.18 171	0.30 53	0.71 14	0.67 3
15	LOCAL	33	0.386	2283	4.1	2.2	2330	0.294	75.7	0.11	0.97 3658	1.23 650	1.03 171	0.26 42	0.60 10	0.33 3

Table 5.21. Same as Table 5.17 except for 18 stations in the Western Region.

Fcst Proj (h)	Type of Fcst.	Direction: Mean Abs. Error (deg)	Direction: Skill Score	Direction: No. of Cases	Speed: Mean Abs. Error (kt)	Speed: Mean Alg. Error (kt)	Speed: No. of Cases	Contingency Table: Skill Score	Contingency Table: Percent Fcst. Correct	Contingency Table: Threat Score (>27 kt)	Bias by Category: 1 No. Obs	2 No. Obs	3 No. Obs	4 No. Obs	5 No. Obs	6 No. Obs
3	LOCAL	34	0.419	1374	3.6	1.4	1394	0.409	80.9	0.15	1.02 2459	1.03 397	0.80 143	0.55 51	0.63 8	0.00 2
9	LOCAL	41	0.326	846	4.7	2.9	875	0.307	87.5	0.00	0.99 2776	1.28 208	0.69 59	0.90 10	0.20 5	0.00 2
15	LOCAL	42	0.331	684	5.2	3.2	731	0.285	88.2	0.00	1.00 2792	1.16 197	0.52 64	0.27 15	0.33 3	* 0

* This category was neither forecast nor observed.

Table 5.22. Comparative verification of MOS and local 42-h surface wind speed forecasts for 92 stations, 0000 GMT cycle.

Type of Verifying Observation	Type of Forecast	Bias by Category ≤22 kt	Bias by Category >22 kt	Skill Score	Percent Forecast Correct	Threat Score 22 kt
1-min Avg	MOS	1.01	0.64	0.212	97.8	0.13
	LOCAL	0.95	3.62	0.148	93.4	0.09
	No. Obs.	14899	263			
±3-h Max	MOS	1.04	0.25	0.191	95.5	0.11
	LOCAL	0.98	1.39	0.260	92.4	0.18
	No. Obs.	14467	686			

Table 5.23. Same as Table 5.22 except for the 1200 GMT cycle.

Type of Verifying Observation	Type of Forecast	Bias by Category ≤22 kt	Bias by Category >22 kt	Skill Score	Percent Forecast Correct	Threat Score 22 kt
1-min Avg	MOS	1.00	0.47	0.138	99.0	0.08
	LOCAL	0.96	5.53	0.087	95.5	0.05
	No. Obs.	14769	115			
±3-h Max	MOS	1.02	0.14	0.101	97.4	0.06
	LOCAL	0.98	1.68	0.196	94.7	0.12
	No. Obs.	14494	377			

Table 6.1. Definitions of the total cloud amount categories used for the local forecasts and observations. The MOS guidance was defined for these same categories, but for opaque amounts only.

Category	Cloud Amount
1	CLR, -SCT, -BKN, -OVC, -X
2	SCT
3	BKN
4	OVC, X

Table 6.2. Comparative verification of MOS guidance and local forecasts of four categories of cloud amount (clear, scattered, broken, and overcast) for 94 stations, 0000 GMT cycle.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Percent Correct	Skill Score
12	MOS	0.98	1.19	1.43	0.85	61.7	0.441
	LOCAL	0.80	1.41	1.62	0.93	69.6	0.566
	No. Obs.	6343	1892	1451	5833		
18	MOS	0.92	1.27	1.62	0.75	56.0	0.393
	LOCAL	0.60	1.67	2.12	0.74	52.1	0.364
	No. Obs.	5756	2448	1853	5558		
24	MOS	0.99	1.23	1.48	0.75	56.4	0.390
	LOCAL	0.62	1.69	2.13	0.74	48.9	0.319
	No. Obs.	6007	2506	1720	5379		

Table 6.3. Same as Table 6.2 except for 24 stations in the Eastern Region.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Percent Correct	Skill Score
12	MOS	0.84	1.11	1.54	0.93	58.1	0.408
	LOCAL	0.78	1.18	1.65	0.91	64.4	0.499
	No. Obs.	1189	604	460	1676		
18	MOS	0.80	1.12	1.63	0.85	54.6	0.381
	LOCAL	0.53	1.46	1.89	0.78	52.0	0.357
	No. Obs.	1058	691	595	1569		
24	MOS	0.88	1.18	1.54	0.90	57.5	0.401
	LOCAL	0.58	1.57	2.25	0.81	50.0	0.326
	No. Obs.	1337	579	426	1571		

Table 6.4. Same as Table 6.2 except for 24 stations in the Southern Region.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Percent Correct	Skill Score
12	MOS	0.98	1.20	1.22	0.90	66.5	0.496
	LOCAL	0.78	1.62	1.55	0.94	70.6	0.577
	No. Obs.	1835	438	367	1362		
18	MOS	0.96	1.17	1.32	0.84	61.2	0.450
	LOCAL	0.64	1.88	1.86	0.72	52.8	0.370
	No. Obs.	1731	611	521	1265		
24	MOS	1.02	1.12	1.23	0.80	60.6	0.430
	LOCAL	0.62	1.87	1.90	0.74	49.0	0.318
	No. Obs.	1811	662	470	1194		

Table 6.5. Same as Table 6.2 except for 28 stations in the Central Region.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Percent Correct	Skill Score
12	MOS	1.02	1.29	1.53	0.79	60.0	0.411
	LOCAL	0.75	1.62	1.69	0.94	69.7	0.564
	No. Obs.	1865	525	362	1805		
18	MOS	0.93	1.49	1.75	0.67	52.6	0.347
	LOCAL	0.46	1.88	2.49	0.77	49.2	0.329
	No. Obs.	1651	699	457	1745		
24	MOS	1.02	1.46	1.55	0.66	53.2	0.350
	LOCAL	0.49	1.91	2.37	0.76	47.0	0.298
	No. Obs.	1629	696	458	1760		

Table 6.6. Same as Table 6.2 except for 18 stations in the Western Region.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Percent Correct	Skill Score
12	MOS	1.05	1.16	1.41	0.77	62.6	0.427
	LOCAL	0.89	1.22	1.60	0.94	74.9	0.626
	No. Obs.	1454	325	262	990		
18	MOS	0.96	1.32	1.96	0.63	55.8	0.373
	LOCAL	0.78	1.40	2.49	0.68	55.7	0.391
	No. Obs.	1316	447	280	979		
24	MOS	1.04	1.12	1.63	0.59	54.0	0.357
	LOCAL	0.84	1.31	1.99	0.59	50.0	0.322
	No. Obs.	1230	569	366	854		

Table 6.7. Comparative verification of MOS guidance and local forecasts of four categories of cloud amount (clear, scattered, broken, and overcast) for 94 stations, 1200 GMT cycle.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Percent Correct	Skill Score
12	MOS	1.02	1.18	1.44	0.76	58.4	0.416
	LOCAL	0.79	1.26	1.66	0.90	63.1	0.490
	No. Obs.	5890	2423	1686	5269		
18	MOS	1.07	1.15	1.23	0.81	63.7	0.444
	LOCAL	0.67	1.83	2.30	0.87	56.5	0.391
	No. Obs.	6964	1594	1285	5298		
24	MOS	1.08	1.11	1.25	0.82	60.8	0.420
	LOCAL	0.65	1.78	2.23	0.83	52.2	0.343
	No. Obs.	6201	1836	1394	5728		

Table 6.8. Same as Table 6.7 except for 24 stations in the Eastern Region.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Percent Correct	Skill Score
12	MOS	0.89	1.20	1.57	0.87	58.6	0.418
	LOCAL	0.74	1.26	1.87	0.89	61.2	0.462
	No. Obs.	1298	569	409	1529		
18	MOS	1.00	1.11	1.61	0.86	62.0	0.432
	LOCAL	0.64	1.73	2.54	0.86	56.8	0.391
	No. Obs.	1480	381	308	1641		
24	MOS	0.96	1.12	1.38	0.88	57.0	0.390
	LOCAL	0.71	1.31	1.95	0.83	52.1	0.338
	No. Obs.	1139	592	441	1642		

Table 6.9. Same as Table 6.7 except for 24 stations in the Southern Region.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Percent Correct	Skill Score
12	MOS	1.05	1.07	1.21	0.79	62.4	0.454
	LOCAL	0.79	1.38	1.47	0.92	65.2	0.515
	No. Obs.	1752	636	464	1160		
18	MOS	1.06	1.19	0.88	0.88	68.7	0.497
	LOCAL	0.68	2.27	1.89	0.89	58.7	0.413
	No. Obs.	1992	350	365	1153		
24	MOS	1.04	1.03	1.04	0.93	65.4	0.471
	LOCAL	0.63	2.15	2.11	0.82	53.6	0.363
	No. Obs.	1768	429	354	1326		

Table 6.10. Same as Table 6.7 except for 28 stations in the Central Region.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Percent Correct	Skill Score
12	MOS	1.04	1.32	1.49	0.71	57.1	0.398
	LOCAL	0.75	1.28	1.75	0.93	63.6	0.492
	No. Obs.	1615	672	452	1735		
18	MOS	1.13	1.21	1.22	0.74	61.6	0.414
	LOCAL	0.61	1.85	2.63	0.88	54.0	0.362
	No. Obs.	1966	494	338	1690		
24	MOS	1.15	1.24	1.17	0.74	60.1	0.398
	LOCAL	0.56	2.10	2.69	0.82	49.2	0.305
	No. Obs.	1850	506	338	1788		

Table 6.11. Same as Table 6.7 except for 18 stations in the Western Region.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Percent Correct	Skill Score
12	MOS	1.06	1.12	1.51	0.61	54.9	0.366
	LOCAL	0.92	1.10	1.55	0.83	62.1	0.472
	No. Obs.	1225	546	361	845		
18	MOS	1.08	1.09	1.27	0.71	62.5	0.410
	LOCAL	0.77	1.47	2.16	0.82	57.0	0.383
	No. Obs.	1526	369	274	814		
24	MOS	1.12	1.00	1.41	0.71	60.9	0.390
	LOCAL	0.74	1.64	2.26	0.84	55.1	0.361
	No. Obs.	1444	309	261	972		

Table 7.1. Definitions of the categories used for verification of persistence, local, and guidance forecasts of ceiling height and visibility.

Category	Ceiling (ft)	Visibility (mi)
1	≤400	<1
2	500-900	1-2 3/4
3	1000-2900	3-6
4	≥3000	>6

Table 7.2. Comparative verification of MOS and persistence ceiling height forecasts for 91 stations, 0000 GMT cycle.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Log Score	Percent Correct	Skill Score
12	MOS	1.37	0.85	0.97	0.99	2.905	77.3	0.391
	PERSISTENCE	0.85	0.96	0.97	1.02	1.658	85.6	0.598
	No. Obs.	646	702	1733	11045			
18	MOS	1.26	0.86	1.00	1.00	2.355	78.3	0.406
	PERSISTENCE	1.42	0.99	0.82	1.02	2.644	77.0	0.355
	No. Obs.	387	684	2048	11184			
24	MOS	1.23	0.80	0.97	1.01	1.892	82.8	0.395
	PERSISTENCE	1.75	1.20	1.12	0.96	2.870	75.9	0.243
	No. Obs.	303	533	1462	11642			

Table 7.3. Same as Table 7.2 except for 92 stations, 1200 GMT cycle.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Log Score	Percent Correct	Skill Score
12	MOS	1.18	0.79	0.98	1.01	1.785	83.5	0.423
	PERSISTENCE	0.89	1.05	1.18	0.98	1.178	87.5	0.590
	No. Obs.	300	535	1438	11475			
18	MOS	1.61	0.77	0.92	1.00	2.385	80.4	0.387
	PERSISTENCE	0.63	0.96	1.14	1.00	2.145	79.9	0.367
	No. Obs.	436	606	1538	11504			
24	MOS	1.74	0.81	0.91	0.98	3.249	75.8	0.368
	PERSISTENCE	0.44	0.84	1.03	1.04	3.096	74.2	0.263
	No. Obs.	628	696	1673	10610			

Table 7.4. Comparative verification of local and persistence ceiling height forecasts for 91 stations for the FT issuance time of approximately 0900 GMT.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Log Score	Percent Correct	Skill Score
3	LOCAL	0.80	0.88	1.04	1.01	1.791	84.3	0.566
	PERSISTENCE	0.84	0.92	0.98	1.02	1.650	85.7	0.602
	No. Obs.	734	763	1859	12000			
6	LOCAL	0.55	0.70	1.06	1.04	2.166	80.6	0.460
	PERSISTENCE	0.95	0.87	0.90	1.03	2.336	79.9	0.448
	No. Obs.	646	805	2005	11851			
9	LOCAL	0.41	0.63	0.97	1.04	1.819	81.3	0.429
	PERSISTENCE	1.71	0.98	0.84	1.01	2.571	77.4	0.358
	No. Obs.	359	713	2152	12087			
15	LOCAL	0.31	0.68	1.21	1.01	1.685	82.8	0.394
	PERSISTENCE	1.82	1.25	1.11	0.95	2.893	76.0	0.249
	No. Obs.	337	556	1629	12786			

Table 7.5. Same as Table 7.4 except for 92 stations for the FT issuance time of approximately 1800 GMT.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Log Score	Percent Correct	Skill Score
3	LOCAL	0.65	0.79	1.11	1.00	1.262	86.1	0.550
	PERSISTENCE	1.27	1.17	1.15	0.96	1.336	86.1	0.582
	No. Obs.	280	606	1860	12458			
6	LOCAL	0.42	0.87	1.23	0.99	1.480	84.5	0.471
	PERSISTENCE	1.05	1.27	1.33	0.95	1.826	81.9	0.439
	No. Obs.	337	554	1611	12691			
9	LOCAL	0.44	0.97	1.22	0.99	1.747	82.6	0.432
	PERSISTENCE	0.88	1.22	1.30	0.95	2.181	79.2	0.369
	No. Obs.	402	581	1636	12561			
15	LOCAL	0.56	1.03	1.25	0.98	2.451	77.9	0.381
	PERSISTENCE	0.58	1.01	1.20	0.99	2.930	74.5	0.278
	No. Obs.	612	696	1768	11964			

Table 7.6. Comparative verification of MOS and persistence visibility forecasts for 91 stations, 0000 GMT cycle.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Log Score	Percent Correct	Skill Score
12	MOS	1.48	1.05	1.10	0.97	2.763	76.5	0.320
	PERSISTENCE	0.77	0.89	0.86	1.03	1.468	85.9	0.539
	No. Obs.	408	659	1617	11593			
18	MOS	1.22	0.96	1.16	0.98	2.114	80.5	0.319
	PERSISTENCE	1.25	0.83	1.11	0.99	2.338	79.2	0.252
	No. Obs.	257	701	1268	12226			
24	MOS	0.90	0.99	1.11	0.99	1.637	84.1	0.324
	PERSISTENCE	1.59	1.16	1.24	0.96	2.388	79.0	0.177
	No. Obs.	192	498	1119	12487			

Table 7.7. Same as Table 7.6 except for 92 stations, 1200 GMT cycle.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Log Score	Percent Correct	Skill Score
12	MOS	0.91	0.88	1.01	1.01	1.505	85.5	0.352
	PERSISTENCE	0.98	1.15	0.98	1.00	1.093	89.2	0.533
	No. Obs.	191	498	1072	12299			
18	MOS	1.54	1.02	1.01	0.99	2.004	82.6	0.320
	PERSISTENCE	0.84	1.18	0.86	1.01	1.795	83.5	0.317
	No. Obs.	231	496	1227	12203			
24	MOS	1.79	1.08	1.01	0.97	3.140	75.2	0.288
	PERSISTENCE	0.49	0.90	0.66	1.07	2.783	76.6	0.179
	No. Obs.	392	639	1574	11133			

Table 7.8. Comparative verification of local and persistence visibility forecasts for 91 stations for the FT issuance time of approximately 0900 GMT.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Log Score	Percent Correct	Skill Score
3	LOCAL	0.85	0.73	1.20	0.99	1.744	82.9	0.473
	PERSISTENCE	0.77	0.87	0.87	1.03	1.433	86.3	0.546
	No. Obs.	452	700	1694	12496			
6	LOCAL	0.45	0.42	0.94	1.07	2.131	80.0	0.349
	PERSISTENCE	0.71	0.68	0.84	1.06	2.325	78.8	0.332
	No. Obs.	493	892	1751	12159			
9	LOCAL	0.30	0.41	0.94	1.05	1.461	85.1	0.338
	PERSISTENCE	1.69	0.89	1.12	0.98	2.171	80.4	0.271
	No. Obs.	205	683	1316	13097			
15	LOCAL	0.22	0.46	1.00	1.03	1.364	86.2	0.295
	PERSISTENCE	1.73	1.15	1.32	0.96	2.354	79.5	0.184
	No. Obs.	201	526	1119	13452			

Table 7.9. Same as Table 7.8 except for 92 stations for the FT issuance time of approximately 1800 GMT.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Log Score	Percent Correct	Skill Score
3	LOCAL	0.55	0.55	1.34	1.00	1.079	88.5	0.484
	PERSISTENCE	1.05	1.13	1.21	0.98	1.149	88.5	0.518
	No. Obs.	190	601	1064	13333			
6	LOCAL	0.45	0.56	1.25	1.00	1.209	87.4	0.411
	PERSISTENCE	1.02	1.30	1.17	0.97	1.500	85.5	0.390
	No. Obs.	196	525	1092	13368			
9	LOCAL	0.54	0.73	1.22	1.00	1.383	85.8	0.366
	PERSISTENCE	0.97	1.46	1.09	0.98	1.704	83.8	0.326
	No. Obs.	205	464	1188	13312			
15	LOCAL	0.64	0.87	1.21	0.99	2.092	80.3	0.313
	PERSISTENCE	0.57	1.13	0.88	1.02	2.398	79.1	0.226
	No. Obs.	348	598	1458	12628			

Table 8.1. Verification of MOS and local max/min temperature forecasts for 93 stations, 0000 GMT cycle.

Forecast Projection	Forecast Type	Number of Cases	Mean Algebraic Error (°F)	Mean Absolute Error (°F)	Percent of Absolute Errors >10°F	Probability of Detection (32°F)	False Alarm Ratio (32°F)	Improvement Over Climate
Today's Max	MOS		-0.6	3.3	2.0	--	--	82.2
	LOCAL	15392	-0.3	3.0	1.3	--	--	85.2
Tonight's Min	MOS		-0.9	3.9	3.6	0.65	0.30	77.4
	LOCAL	15244	-0.5	3.7	3.1	0.62	0.28	79.7
Tomorrow's Max	MOS		-1.1	4.3	6.3	--	--	70.5
	LOCAL	15369	-1.0	4.0	5.2	--	--	73.7
Tomorrow Night's Min	MOS		-0.7	5.0	9.4	0.52	0.40	63.3
	LOCAL	15196	-0.7	4.8	8.6	0.51	0.36	65.6

Table 8.2. Same as Table 8.1 except for 24 stations in the Eastern Region.

Forecast Projection	Forecast Type	Number of Cases	Mean Algebraic Error (°F)	Mean Absolute Error (°F)	Percent of Absolute Errors >10°F	Probability of Detection (32°F)	False Alarm Ratio (32°F)	Improvement Over Climate
Today's	MOS		-0.7	3.2	1.5	--	--	83.7
Max	LOCAL	3964	-0.5	3.0	1.0	--	--	86.1
Tonight's	MOS		-1.0	3.7	2.5	0.70	0.29	81.0
Min	LOCAL	3906	-0.7	3.6	2.4	0.67	0.25	82.1
Tomorrow's	MOS		-1.6	4.0	4.5	--	--	74.1
Max	LOCAL	3961	-1.6	3.9	4.1	--	--	76.0
Tomorrow	MOS		-1.8	4.9	8.1	0.66	0.38	67.3
Night's Min	LOCAL	3897	-1.6	4.7	7.6	0.61	0.34	68.4

Table 8.3. Same as Table 8.1 except for 24 stations in the Southern Region.

Forecast Projection	Forecast Type	Number of Cases	Mean Algebraic Error (°F)	Mean Absolute Error (°F)	Percent of Absolute Errors >10°F	Probability of Detection (32°F)	False Alarm Ratio (32°F)	Improvement Over Climate
Today's	MOS		-0.5	3.3	2.6	--	--	80.6
Max	LOCAL	3978	-0.3	3.1	1.5	--	--	83.5
Tonight's	MOS		-0.4	3.7	2.9	0.58	0.38	79.5
Min	LOCAL	3969	-0.1	3.6	2.9	0.58	0.35	80.6
Tomorrow's	MOS		-1.0	4.3	6.8	--	--	68.4
Max	LOCAL	3974	-0.8	4.1	6.1	--	--	70.1
Tomorrow	MOS		0.2	5.0	9.9	0.47	0.43	63.3
Night's Min	LOCAL	3959	-0.1	4.8	9.1	0.47	0.42	65.2

Table 8.4. Same as Table 8.1 except for 28 stations in the Central Region.

Forecast Projection	Forecast Type	Number of Cases	Mean Algebraic Error (°F)	Mean Absolute Error (°F)	Percent of Absolute Errors >10°F	Probability of Detection (32°F)	False Alarm Ratio (32°F)	Improvement Over Climate
Today's Max	MOS		-0.5	3.4	2.2	--	--	85.1
	LOCAL	4567	-0.2	3.1	1.5	--	--	87.6
Tonight's Min	MOS		-1.4	4.3	5.0	0.69	0.26	77.5
	LOCAL	4529	-0.6	4.0	4.1	0.62	0.21	80.4
Tomorrow's Max	MOS		-0.9	4.6	7.7	--	--	73.6
	LOCAL	4559	-1.1	4.3	6.6	--	--	76.5
Tomorrow Night's Min	MOS		-0.8	5.5	11.9	0.45	0.42	64.7
	LOCAL	4520	-0.9	5.2	11.0	0.43	0.32	66.6

Table 8.5. Same as Table 8.1 except for 17 stations in the Western Region.

Forecast Projection	Forecast Type	Number of Cases	Mean Algebraic Error (°F)	Mean Absolute Error (°F)	Percent of Absolute Errors >10°F	Probability of Detection (32°F)	False Alarm Ratio (32°F)	Improvement Over Climate
Today's Max	MOS		-0.9	3.3	1.6	--	--	73.9
	LOCAL	2883	-0.3	2.9	1.2	--	--	79.5
Tonight's Min	MOS		-0.7	3.8	4.0	0.59	0.27	64.2
	LOCAL	2840	-0.4	3.4	2.9	0.59	0.28	70.0
Tomorrow's Max	MOS		-0.8	4.2	6.1	--	--	58.0
	LOCAL	2875	-0.6	3.6	3.3	--	--	67.7
Tomorrow Night's Min	MOS		-0.1	4.4	6.9	0.42	0.37	49.4
	LOCAL	2820	-0.3	4.0	5.6	0.48	0.34	57.0

Table 8.6. Verification of MOS and local max/min temperature forecasts for 93 stations, 1200 GMT cycle.

Forecast Projection	Forecast Type	Number of Cases	Mean Algebraic Error (°F)	Mean Absolute Error (°F)	Percent of Absolute Errors >10°F	Probability of Detection (32°F)	False Alarm Ratio (32°F)	Improvement Over Climate
Tonight's Min	MOS		-1.0	3.6	2.6	0.68	0.27	80.4
	LOCAL	14926	-0.7	3.3	2.0	0.67	0.26	83.5
Tomorrow's Max	MOS		-1.2	4.0	5.2	--	--	73.6
	LOCAL	15030	-0.9	3.6	3.6	--	--	78.6
Tomorrow Night's Min	MOS		-1.2	4.5	6.5	0.65	0.37	70.4
	LOCAL	14874	-0.8	4.2	5.5	0.62	0.34	73.3
Day After Tomorrow's Max	MOS		-1.5	4.8	9.2	--	--	62.6
	LOCAL	15015	-1.3	4.6	8.4	--	--	65.3

Table 8.7. Same as Table 8.6 except for 24 stations in the Eastern Region.

Forecast Projection	Forecast Type	Number of Cases	Mean Algebraic Error (°F)	Mean Absolute Error (°F)	Percent of Absolute Errors >10°F	Probability of Detection (32°F)	False Alarm Ratio (32°F)	Improvement Over Climate
Tonight's Min	MOS		-0.9	3.5	1.8	0.70	0.28	83.0
	LOCAL	3799	-0.8	3.2	1.4	0.74	0.28	85.1
Tomorrow's Max	MOS		-1.2	3.7	3.3	--	--	78.4
	LOCAL	3852	-1.4	3.6	2.9	--	--	80.1
Tomorrow Night's Min	MOS		-1.7	4.4	5.2	0.71	0.39	73.9
	LOCAL	3790	-1.3	4.2	5.1	0.66	0.38	75.8
Day After Tomorrow's Max	MOS		-2.1	4.5	7.0	--	--	68.3
	LOCAL	3854	-2.0	4.4	6.6	--	--	69.5

Table 8.8. Same as Table 8.6 except for 24 stations in the Southern Region.

Forecast Projection	Forecast Type	Number of Cases	Mean Algebraic Error (°F)	Mean Absolute Error (°F)	Percent of Absolute Errors >10°F	Probability of Detection (32°F)	False Alarm Ratio (32°F)	Improvement Over Climate
Tonight's Min	MOS		-0.7	3.5	2.6	0.66	0.35	81.1
	LOCAL	3846	-0.5	3.2	1.7	0.65	0.33	84.1
Tomorrow's Max	MOS		-1.2	4.2	6.2	--	--	69.3
	LOCAL	3852	-0.7	3.7	4.2	--	--	75.9
Tomorrow Night's Min	MOS		-0.7	4.4	6.5	0.59	0.38	71.0
	LOCAL	3840	-0.4	4.2	5.5	0.57	0.34	73.5
Day After Tomorrow's Max	MOS		-1.6	4.9	10.2	--	--	59.0
	LOCAL	3845	-1.1	4.7	9.4	--	--	61.2

Table 8.9. Same as Table 8.6 except for 28 stations in the Central Region.

Forecast Projection	Forecast Type	Number of Cases	Mean Algebraic Error (°F)	Mean Absolute Error (°F)	Percent of Absolute Errors >10°F	Probability of Detection (32°F)	False Alarm Ratio (32°F)	Improvement Over Climate
Tonight's Min	MOS		-1.4	3.9	3.2	0.72	0.20	80.9
	LOCAL	4459	-0.8	3.5	2.4	0.68	0.19	84.5
Tomorrow's Max	MOS		-1.2	4.3	6.3	--	--	76.2
	LOCAL	4481	-0.9	3.9	4.2	--	--	80.8
Tomorrow Night's Min	MOS		-1.5	4.9	8.5	0.69	0.35	70.9
	LOCAL	4446	-1.0	4.5	6.7	0.66	0.29	74.7
Day After Tomorrow's Max	MOS		-1.3	5.3	11.7	--	--	63.9
	LOCAL	4478	-1.4	5.1	11.0	--	--	67.2

Table 8.10. Same as Table 8.6 except for 17 stations in the Western Region.

Forecast Projection	Forecast Type	Number of Cases	Mean Algebraic Error (°F)	Mean Absolute Error (°F)	Percent of Absolute Errors >10°F	Probability of Detection (32°F)	False Alarm Ratio (32°F)	Improvement Over Climate
Tonight's Min	MOS		-1.1	3.4	2.8	0.61	0.20	71.9
	LOCAL	2822	-0.7	3.1	2.3	0.48	0.21	75.2
Tomorrow's Max	MOS		-1.2	3.8	5.0	--	--	63.8
	LOCAL	2845	-0.6	3.2	2.5	--	--	74.5
Tomorrow Night's Min	MOS		-0.5	4.0	5.1	0.54	0.22	59.4
	LOCAL	2798	-0.5	3.7	4.4	0.52	0.30	62.9
Day After Tomorrow's Max	MOS		-0.6	4.4	6.9	--	--	53.5
	LOCAL	2838	-0.6	4.1	5.5	--	--	59.5