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# AFOS-ERA VERIFICATION OF GUIDANCE AND LOCAL AVIATION/PUBLIC WEATHER FORECASTS--NO. 8 (APRIL 1987-SEPTEMBER 1987)

Valery J. Dagostaro, Gary M. Carter, and J. Paul Dallavalle

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## 1. INTRODUCTION

This is the eighth in the 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 warm season months of April 1987 through September 1987 for probability of precipitation (POP), surface wind, cloud amount, ceiling height, visibility, and maximum/minimum (max/min) temperature. 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and guidance forecasts for the aviation weather elements (ceiling height, visibility, and wind speed and direction) are no longer valid at the same time. Consequently, the same observation can not be used to verify both the local and guidance forecasts and comparisons of the two sets are not meaningful. In addition, since the local aviation forecasts and observations were not available for the new FT times for a full season, only statistics for the guidance will be presented for those elements. Verification summaries are provided for both the 0000 and 1200 GMT forecast cycles. The scores are those recommended in the NWS National Verification Plan (National Weather Service, 1982).

All of the forecasts (both local and guidance) and most of the 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 aviation element surface observations, which are valid at the same time as the guidance, were collected from hourly observations archived by TDL. The national AFOS-era verification data processing system is described in detail by Dagostaro (1985). The local collection system is described by Ruth and Alex (1987), 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 cloud amount and 42-h significant wind forecasts were manually entered by the forecasters at the WSFO's. The local 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 by 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 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 new AFOS-era verification system in late 1983 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 warm season with statistics based on the pre-AFOS verification system (e.g., Maglaras et al., 1984).

## 2. PROBABILITY OF PRECIPITATION

MOS PoP forecasts were produced by the warm season prediction equations described in Technical Procedures Bulletin No. 299 (National Weather Service, 1981a). 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. The LFM model schedule makes this necessary, 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 will 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 have reason to believe it is incorrect, the number of times local forecasters deviated from the guidance by at least 20% and the Brier score when such deviations occurred were tabulated.

Tables 2.2 and 2.7 present the 1987 warm 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. SURFACE WIND

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

Since the local and guidance forecasts are no longer valid for the same time, verification of a matched sample is not possible. Although we computed statistics for the local forecasts issued at the new FT times for a portion of the warm season, those results will not be presented here. In verifying the 12-, 18-, and 24-h guidance from both 0000 and 1200 GMT, we continued to use the same method of verification as in previous seasons. First, for those cases in which the MOS wind speed forecasts were $\geq$10 kt, the mean absolute error (MAE) and the mean algebraic error of the speed forecasts were computed. Cases where the observed wind was calm were then eliminated from this sample and the MAE of direction was computed.[1] Second, for all cases where the MOS forecasts were available, skill score,[1] percent correct, bias by category,[2] and the threat score[3] 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 3.1. 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 91 (92) stations used in the verification for the 0000 (1200) GMT cycle are listed in Table 2.1.

The results for all 91 (92) stations combined for the 0000 (1200) GMT cycle are presented in Table 3.2 (Table 3.7). Tables 3.3-3.6 and 3.8-3.11 show scores for the NWS Eastern, Southern, Central, and Western Regions, for 0000 and 1200 GMT, respectively.

In addition, 42-h forecasts of winds $\geq$23 knots were collected as part of the AFOS-era verification system. The local forecasts were manually entered by forecasters at the WSFO's. However, for the warm season, the sample of 42-h forecasts was insufficient to provide a meaningful comparative verification.

## 4. CLOUD AMOUNT

During the 1987 warm season, the objective cloud amount forecasts were produced by the prediction equations described in Technical Procedures Bulletin No. 303 (National Weather Service, 1981b). These regionalized 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 4.1. 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 is described in Technical Procedures Bulletin No. 303.

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

[2] In the discussion of 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.

[3] 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.

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. 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 1984 warm 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 being taken do not record total opaque sky cover as part of the observation; in fact, thin clouds are included as part of the total sky cover. 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 4.2 and 4.7 for the 0000 and 1200 GMT cycle forecasts, respectively. Tables 4.3-4.6 and Tables 4.8-4.11 show scores for the NWS Eastern, Southern, Central, and Western Regions, for the 0000 and 1200 GMT cycles, respectively.

## 5. CEILING AND VISIBILITY

During the 1987 warm season, the ceiling and visibility guidance was produced by the prediction equations described in Technical Procedures Bulletin No. 303 (National Weather Service, 1981b). 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 for the guidance only for 91 (92) of the 94 stations listed in Table 2.1 for the 0000 (1200) GMT cycle. Persistence based on an observation taken at 0900 (2100) GMT for the 0000 (1200) GMT forecast cycle was used as a standard of comparison. The objective forecasts were verified for 12-, 18-, and 24-h projections after 0000 and 1200 GMT.

We constructed forecast-observed contingency tables for the four categories of ceiling and visibility given in Table 5.1. These categories were used for computing several different scores: bias by category, percent correct, skill score, and log score.[4] We have summarized the results in Tables 5.2-5.5. It should be noted 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 are usually 10-, 16-, and 22-h forecasts.

## 6. MAXIMUM/MINIMUM TEMPERATURE

Throughout the 1987 warm season, the max/min temperature guidance was generated by the prediction equations described in Technical Procedures Bulletin

[4]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.

No. 356 (National Weather Service, 1985). These equations forecast daytime max and nighttime min temperatures.

During the warm season, daytime is defined as 8 a.m. to 7 p.m. Local Standard Time (LST), while nighttime extends from 7 p.m. to 8 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 spring season is defined as March-May; the summer, as June-August; and the fall, as September-November. 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 available 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 which were verified by using observations that approximate the daytime high or nighttime low. In 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 reported max/min observation adequately represents the daytime or nighttime 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 the 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 verifying observations 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[5] of min temperatures ≤32°F, and false alarm ratio[6] for min temperatures ≤32°F were computed for 93 stations in the conterminous United States (Table 2.1). At 0000 (1200) GMT, the local 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 min temperature forecasts are valid for nighttime periods ending approximately 36 (24) and 60 (48) hours after 0000 (1200) GMT. However, it should be noted 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.

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[5]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.

[6]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.

For all stations combined, the results for 0000 and 1200 GMT are shown in Tables 6.1 and 6.6, respectively. Similarly, Tables 6.2-6.5 give the 0000 GMT cycle verification scores for the Eastern, Southern, Central, and Western Regions, respectively. Tables 6.7-6.10 show analogous scores by NWS region for the 1200 GMT cycle.

## 7. SUMMARY

Highlights of the 1987 warm 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 4.0% better than the guidance for the first period, 1.9% better for the second period, and 1.7% better for the third period. Depending on the projection and cycle, the local forecasters deviated by 20% or more from the guidance about 11% of the time. In those cases, the NWS Brier scores for all stations and both forecast cycles combined show that the local forecasters were 10.7% better than the guidance for the first period, 5.5% better for the second period, and 6.3% better for the third period. The percent improvement over climate scores for all three periods and both forecast cycles combined indicate that the local forecasts were better than those for the previous warm season, (Dagostaro et al., 1986) but the guidance was slightly worse.

- Surface Wind - The local wind speed and direction forecasts were not available for a full season, so statistics were computed for the guidance forecasts only. The MOS wind speed and direction forecasts were verified for 91 (92) stations for projections of 12, 18, and 24 hours from 0000 (1200) GMT. Since a comparative verification of local and guidance forecasts was not possible, only conclusions of a general nature can be drawn from the results. The mean absolute error and skill score for all stations, projections, and both forecast cycles combined show that the MOS wind direction forecasts were generally worse than for the previous warm season. The skill score, threat score, mean algebraic error, and bias by category for all stations, projections, and both cycles combined show that the wind speed forecasts were worse than those for the previous warm season; however, in terms of percent correct the wind speed forecasts were better than last year's results. The mean absolute error for all stations, projections, and both cycles combined remained about the same as last year's results.

- Cloud Amount - The verification for cloud amount involved 94 stations and forecasts for projections of 12, 18, and 24 hours from 0000 and 1200 GMT. The skill scores and percents 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 (clear, scattered, broken, and overcast), the results varied by category, cycle, and forecast projection, but usually, the guidance was better than the local

forecasts except for the prediction of scattered. In terms of skill score and percent correct, the results indicate that both types of forecasts were better than those for the previous warm season, while the bias by category remained about the same as last year's results.

- Ceiling and Visibility - The verification involved the comparison of MOS guidance and persistence for 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, the log scores, percents correct, and skill scores show that persistence was more accurate than the guidance forecasts for the 12-h projection for both ceiling and visibility. The guidance was always better than persistence for the 18- and 24-h projections from 0000 GMT, while persistence was usually better for the 1200 GMT cycle. The bias by category scores varied greatly from projection to projection and cycle to cycle indicating no clear trends. A comparative verification of local and guidance forecasts was not possible, so these results were not compared to those for the previous warm season.

- 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 0.2°F and 0.1°F, respectively, more accurate than those for the MOS guidance. For all stations combined, the local forecasters were almost always 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 warm season verification, the local forecasts improved in terms of mean absolute error for all stations and projections combined. In fact, the mean absolute error is the lowest recorded for the warm season since 1966 (Carter and Polger, 1986). Most of the improvement occurred in the min forecasts. In terms of the percentage of errors >10°F, both the local forecasts and the guidance improved over that of the previous warm season.

## 8. ACKNOWLEDGMENTS

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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. TCC was not available during the 0000 GMT cycle for surface wind, ceiling height, and visibility. ELP was not available for surface wind, ceiling height, and visibility during the 1200 GMT cycle.

| | | | |
|---|---|---|---|
| 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 guidance 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 | 0.1038 | | 29.5 | | 0.2163 | | |
| (1st period) | LOCAL | 0.1002 | 3.5 | 31.9 | 16313 | 0.1969 | 9.0 | 2025 |
| 24-36 | MOS | 0.1096 | | 23.3 | | 0.2079 | | |
| (2nd period) | LOCAL | 0.1069 | 2.4 | 25.2 | 16063 | 0.1952 | 6.1 | 1607 |
| 36-48 | MOS | 0.1189 | | 19.1 | | 0.2169 | | |
| (3rd period) | LOCAL | 0.1172 | 1.4 | 20.2 | 16207 | 0.2057 | 5.1 | 1588 |

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 | 0.1151 | | 36.8 | | 0.1948 | | |
| (1st period) | LOCAL | 0.1129 | 1.9 | 38.0 | 4197 | 0.1892 | 2.9 | 673 |
| 24-36 | MOS | 0.1198 | | 31.2 | | 0.2010 | | |
| (2nd period) | LOCAL | 0.1180 | 1.5 | 32.3 | 4160 | 0.1952 | 2.9 | 506 |
| 36-48 | MOS | 0.1340 | | 26.4 | | 0.2055 | | |
| (3rd period) | LOCAL | 0.1354 | -1.0 | 25.6 | 4171 | 0.2107 | -2.5 | 498 |

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 | 0.1176 | | 21.7 | | 0.2227 | | |
| (1st period) | LOCAL | 0.1136 | 3.4 | 24.4 | 4269 | 0.1984 | 10.9 | 616 |
| 24-36 | MOS | 0.1109 | | 13.7 | | 0.2009 | | |
| (2nd period) | LOCAL | 0.1082 | 2.4 | 15.8 | 4102 | 0.1893 | 5.8 | 435 |
| 36-48 | MOS | 0.1292 | | 13.7 | | 0.2232 | | |
| (3rd period) | LOCAL | 0.1275 | 1.4 | 14.9 | 4245 | 0.2094 | 6.2 | 532 |

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 | MOS | 0.1059 | | 30.5 | | 0.2249 | | |
| (1st period) | LOCAL | 0.1026 | 3.1 | 32.7 | 4912 | 0.2043 | 9.2 | 589 |
| 24-36 | MOS | 0.1254 | | 23.1 | | 0.2062 | | |
| (2nd period) | LOCAL | 0.1228 | 2.1 | 24.7 | 4886 | 0.1984 | 3.8 | 514 |
| 36-48 | MOS | 0.1250 | | 17.9 | | 0.2198 | | |
| (3rd period) | LOCAL | 0.1223 | 2.1 | 19.6 | 4881 | 0.2073 | 5.7 | 426 |

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 | MOS | 0.0638 | | 24.1 | | 0.2533 | | |
| (1st period) | LOCAL | 0.0585 | 8.3 | 30.4 | 2935 | 0.1962 | 22.5 | 147 |
| 24-36 | MOS | 0.0666 | | 21.2 | | 0.2569 | | |
| (2nd period) | LOCAL | 0.0625 | 6.1 | 26.1 | 2915 | 0.2011 | 21.7 | 152 |
| 36-48 | MOS | 0.0720 | | 13.8 | | 0.2248 | | |
| (3rd period) | LOCAL | 0.0677 | 5.9 | 18.9 | 2910 | 0.1666 | 25.9 | 132 |

Table 2.7. Comparative verification of MOS guidance 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 | 0.1032 | | 28.0 | | 0.2191 | | |
| (1st period) | LOCAL | 0.0985 | 4.6 | 31.3 | 15985 | 0.1919 | 12.4 | 2054 |
| 24-36 | MOS | 0.1105 | | 24.5 | | 0.2093 | | |
| (2nd period) | LOCAL | 0.1090 | 1.4 | 25.6 | 16136 | 0.1990 | 4.9 | 1696 |
| 36-48 | MOS | 0.1154 | | 18.8 | | 0.2162 | | |
| (3rd period) | LOCAL | 0.1131 | 2.0 | 20.4 | 15891 | 0.2001 | 7.4 | 1518 |

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 (1st period) | MOS | 0.1101 | | 37.0 | | 0.1731 | | |
| | LOCAL | 0.1089 | 1.1 | 37.7 | 4138 | 0.1706 | 1.5 | 623 |
| 24-36 (2nd period) | MOS | 0.1228 | | 32.2 | | 0.1865 | | |
| | LOCAL | 0.1237 | -0.7 | 31.7 | 4148 | 0.1951 | -4.6 | 526 |
| 36-48 (3rd period) | MOS | 0.1308 | | 23.9 | | 0.2202 | | |
| | LOCAL | 0.1282 | 2.0 | 25.4 | 4115 | 0.2056 | 6.6 | 472 |

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 (1st period) | MOS | 0.1060 | | 18.0 | | 0.2241 | | |
| | LOCAL | 0.1008 | 4.9 | 22.1 | 4100 | 0.1942 | 13.3 | 559 |
| 24-36 (2nd period) | MOS | 0.1231 | | 17.6 | | 0.2297 | | |
| | LOCAL | 0.1189 | 3.4 | 20.4 | 4247 | 0.1974 | 14.1 | 571 |
| 36-48 (3rd period) | MOS | 0.1159 | | 10.7 | | 0.2044 | | |
| | LOCAL | 0.1136 | 2.0 | 12.5 | 4077 | 0.1880 | 8.0 | 430 |

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 (1st period) | MOS | 0.1186 | | 27.3 | | 0.2441 | | |
| | LOCAL | 0.1113 | 6.2 | 31.8 | 4853 | 0.2070 | 15.2 | 693 |
| 24-36 (2nd period) | MOS | 0.1133 | | 25.1 | | 0.2039 | | |
| | LOCAL | 0.1130 | 0.3 | 25.3 | 4848 | 0.2079 | -2.0 | 467 |
| 36-48 (3rd period) | MOS | 0.1282 | | 20.3 | | 0.2264 | | |
| | LOCAL | 0.1259 | 1.8 | 21.8 | 4822 | 0.2135 | 5.7 | 471 |

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 (1st period) | MOS | 0.0635 | | 25.5 | | 0.2664 | | |
| | LOCAL | 0.0589 | 7.3 | 31.0 | 2894 | 0.2008 | 24.6 | 179 |
| 24-36 (2nd period) | MOS | 0.0694 | | 17.4 | | 0.2310 | | |
| | LOCAL | 0.0665 | 4.2 | 20.9 | 2893 | 0.1909 | 17.3 | 132 |
| 36-48 (3rd period) | MOS | 0.0712 | | 16.2 | | 0.2048 | | |
| | LOCAL | 0.0692 | 2.8 | 18.5 | 2877 | 0.1746 | 14.7 | 145 |

Table 3.1. 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 3.2. Verification of MOS surface wind guidance for 91 stations, 0000 GMT cycle.

| Fcst Proj (h) | Type of Fcst. | Direction | | | Speed | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Contingency Table | | | | | | | | |
| | | | | | | | | | | | Bias by Category | | | | | |
| | | 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 | 0.518 | 1856 | 3.4 | 1.8 | 1877 | 0.329 | 94.1 | 0.00 | 1.01<br>14526 | 0.85<br>632 | 0.73<br>113 | 0.41<br>22 | 0.00<br>7 | *<br>0 |
| 18 | MOS | 27 | 0.440 | 4677 | 2.9 | 0.4 | 4688 | 0.344 | 82.8 | 0.00 | 1.08<br>12503 | 0.66<br>2282 | 0.59<br>410 | 0.65<br>57 | 0.10<br>10 | 0.00<br>1 |
| 24 | MOS | 31 | 0.423 | 3855 | 3.3 | 0.8 | 3878 | 0.308 | 84.3 | 0.06 | 1.07<br>12845 | 0.66<br>1827 | 0.60<br>415 | 0.35<br>77 | 0.17<br>12 | 0.00<br>5 |

* This category was neither forecast nor observed.

Table 3.3. Same as Table 3.2 except for 24 stations in the Eastern Region.

| Fcst Proj (h) | Type of Fcst. | Direction | | | Speed | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Contingency Table | | | | | | | | |
| | | | | | | | | | | | Bias by Category | | | | | |
| | | 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 | 0.493 | 489 | 3.1 | 1.1 | 492 | 0.322 | 93.2 | 0.00 | 1.02<br>3740 | 0.72<br>206 | 0.54<br>35 | 1.00<br>2 | 0.00<br>2 | *<br>0 |
| 18 | MOS | 29 | 0.369 | 1304 | 2.7 | 0.4 | 1306 | 0.306 | 82.1 | 0.00 | 1.09<br>3233 | 0.59<br>647 | 0.58<br>77 | 0.73<br>11 | 0.00<br>1 | *<br>0 |
| 24 | MOS | 32 | 0.375 | 544 | 3.1 | 1.1 | 548 | 0.214 | 91.3 | 0.00 | 1.04<br>3639 | 0.50<br>272 | 0.53<br>30 | 0.20<br>5 | *<br>0 | *<br>0 |

* This category was neither forecast nor observed.

Table 3.4. Same as Table 3.2 except for 21 stations in the Southern Region.

| Fcst Proj (h) | Type of Fcst. | Direction | | | Speed | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Contingency Table | | | | | | | | |
| | | | | | | | | | | | Bias by Category | | | | | |
| | | 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 | 0.491 | 318 | 3.6 | 2.1 | 322 | 0.311 | 96.4 | 0.00 | 1.00<br>3636 | 1.11<br>76 | 0.76<br>17 | 0.40<br>5 | 0.00<br>2 | *<br>0 |
| 18 | MOS | 28 | 0.440 | 1009 | 2.9 | 1.1 | 1012 | 0.363 | 86.7 | 0.00 | 1.03<br>3252 | 0.83<br>399 | 0.75<br>69 | 0.30<br>10 | 0.00<br>1 | *<br>0 |
| 24 | MOS | 28 | 0.432 | 848 | 3.0 | 1.4 | 853 | 0.314 | 88.1 | 0.00 | 1.03<br>3311 | 0.82<br>327 | 0.59<br>63 | 0.00<br>6 | 0.00<br>1 | *<br>0 |

* This category was neither forecast nor observed.

Table 3.5. Same as Table 3.2 except for 28 stations in the Central Region.

| Fcst Proj (h) | Type of Fcst. | Direction | | | Speed | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Contingency Table | | | | | | | | |
| | | | | | | | | | | | Bias by Category | | | | | |
| | | 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 | 21 | 0.558 | 665 | 3.1 | 1.5 | 667 | 0.322 | 92.8 | 0.00 | 1.02<br>4451 | 0.69<br>262 | 1.03<br>35 | 0.44<br>9 | 0.00<br>3 | *<br>0 |
| 18 | MOS | 22 | 0.498 | 1763 | 2.9 | -0.3 | 1768 | 0.328 | 77.1 | 0.00 | 1.15<br>3523 | 0.61<br>979 | 0.49<br>204 | 0.38<br>26 | 0.00<br>7 | 0.00<br>1 |
| 24 | MOS | 29 | 0.424 | 1300 | 3.1 | 0.0 | 1306 | 0.280 | 81.8 | 0.10 | 1.12<br>3811 | 0.52<br>715 | 0.34<br>154 | 0.09<br>22 | 0.14<br>7 | 0.00<br>3 |

* This category was neither forecast nor observed.

Table 3.6. Same as Table 3.2 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 |
| 12 | MOS | 29 | 0.436 | 384 | 4.0 | 2.7 | 396 | 0.360 | 94.3 | 0.00 | 0.99<br>2699 | 1.41<br>88 | 0.58<br>26 | 0.17<br>6 | *<br>0 | *<br>0 |
| 18 | MOS | 35 | 0.327 | 601 | 3.5 | 1.4 | 602 | 0.396 | 88.4 | 0.00 | 1.02<br>2495 | 0.80<br>257 | 0.73<br>60 | 1.60<br>10 | 1.00<br>1 | *<br>0 |
| 24 | MOS | 33 | 0.334 | 1163 | 3.7 | 0.9 | 1171 | 0.321 | 73.8 | 0.00 | 1.06<br>2084 | 0.84<br>513 | 0.85<br>168 | 0.55<br>44 | 0.25<br>4 | 0.00<br>2 |

* This category was neither forecast nor observed.

Table 3.7. Verification of MOS surface wind guidance for 92 stations, 1200 GMT cycle.

| Fcst Proj (h) | Type of Fcst. | Direction | | | Speed | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Contingency Table | | | | | | | | |
| | | | | | | | | | | | Bias by Category | | | | | |
| | | 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 | 28 | 0.462 | 4076 | 3.0 | 0.8 | 4094 | 0.342 | 84.6 | 0.11 | 1.06<br>12745 | 0.72<br>1827 | 0.62<br>417 | 0.38<br>76 | 0.15<br>13 | 0.00<br>5 |
| 18 | MOS | 26 | 0.475 | 1742 | 3.6 | 1.8 | 1773 | 0.277 | 93.3 | 0.00 | 1.02<br>13958 | 0.68<br>730 | 0.52<br>122 | 0.00<br>18 | 0.00<br>4 | *<br>0 |
| 24 | MOS | 25 | 0.488 | 1498 | 3.7 | 1.7 | 1521 | 0.263 | 94.2 | 0.00 | 1.02<br>14365 | 0.65<br>627 | 0.39<br>107 | 0.35<br>23 | 0.00<br>7 | *<br>0 |

* This category was neither forecast nor observed.

Table 3.8. Same as Table 3.7 except for 24 stations in the Eastern Region.

| Fcst Proj (h) | Type of Fcst. | Direction | | | Speed | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Contingency Table | | | | | | | | |
| | | | | | | | | | | | Bias by Category | | | | | |
| | | 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 | 30 | 0.400 | 643 | 3.0 | 1.3 | 646 | 0.285 | 91.5 | 0.00 | 1.03<br>3599 | 0.61<br>272 | 0.61<br>31 | 0.00<br>3 | *<br>0 | *<br>0 |
| 18 | MOS | 24 | 0.481 | 268 | 3.3 | 1.2 | 272 | 0.245 | 95.5 | 0.00 | 1.02<br>3731 | 0.45<br>148 | 0.46<br>13 | 0.00<br>3 | *<br>0 | *<br>0 |
| 24 | MOS | 26 | 0.459 | 400 | 3.3 | 1.0 | 404 | 0.287 | 93.5 | 0.00 | 1.03<br>3682 | 0.54<br>204 | 0.41<br>34 | 2.00<br>2 | 0.00<br>2 | *<br>0 |

* This category was neither forecast nor observed.

Table 3.9. Same as Table 3.7 except for 22 stations in the Southern Region.

| Fcst Proj (h) | Type of Fcst. | Direction | | | Speed | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Contingency Table | | | | | | | |
| | | | | | | | | | | | Bias by Category | | | | |
| | | 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 | 27 | 0.451 | 846 | 2.9 | 1.3 | 850 | 0.317 | 88.1 | 0.00 | 1.03<br>3300 | 0.84<br>321 | 0.60<br>63 | 0.14<br>7 | 0.00<br>1 | *<br>0 |
| 18 | MOS | 23 | 0.403 | 401 | 3.8 | 2.5 | 409 | 0.327 | 94.6 | 0.00 | 0.99<br>3364 | 1.35<br>103 | 0.64<br>28 | 0.00<br>3 | *<br>0 | *<br>0 |
| 24 | MOS | 27 | 0.379 | 316 | 4.0 | 2.6 | 323 | 0.266 | 96.0 | 0.00 | 1.00<br>3605 | 1.33<br>78 | 0.36<br>14 | 0.00<br>5 | 0.00<br>2 | *<br>0 |

* This category was neither forecast nor observed.

Table 3.10. Same as Table 3.7 except for 28 stations in the Central region.

| Fcst Proj (h) | Type of Fcst. | Direction | | | Speed | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Contingency Table | | | | | | | | |
| | | | | | | | | | | | Bias by Category | | | | | |
| | | 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 | 27 | 0.468 | 1415 | 2.9 | 0.2 | 1421 | 0.319 | 81.5 | 0.09 | 1.10<br>3781 | 0.63<br>722 | 0.48<br>155 | 0.26<br>23 | 0.13<br>8 | 0.00<br>3 |
| 18 | MOS | 28 | 0.455 | 626 | 3.3 | 1.3 | 633 | 0.287 | 91.7 | 0.00 | 1.04<br>4297 | 0.53<br>319 | 0.44<br>50 | 0.00<br>8 | 0.00<br>2 | *<br>0 |
| 24 | MOS | 21 | 0.534 | 488 | 3.3 | 1.2 | 489 | 0.232 | 93.0 | 0.00 | 1.04<br>4412 | 0.48<br>257 | 0.50<br>32 | 0.40<br>10 | 0.00<br>3 | *<br>0 |

* This category was neither forecast nor observed.

Table 3.11. Same as Table 3.7 except for 18 stations in the Western region.

| Fcst Proj (h) | Type of Fcst. | Direction | | | Speed | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Contingency Table | | | | | | | | |
| | | | | | | | | | | | Bias by Category | | | | | |
| | | 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 | 28 | 0.385 | 1172 | 3.3 | 0.7 | 1177 | 0.361 | 75.6 | 0.17 | 1.07<br>2065 | 0.83<br>512 | 0.76<br>168 | 0.51<br>43 | 0.25<br>4 | 0.00<br>2 |
| 18 | MOS | 27 | 0.462 | 447 | 3.9 | 2.1 | 459 | 0.236 | 91.1 | 0.00 | 1.02<br>2566 | 0.79<br>160 | 0.58<br>31 | 0.00<br>4 | 0.00<br>2 | *<br>0 |
| 24 | MOS | 28 | 0.479 | 294 | 4.3 | 2.5 | 305 | 0.284 | 95.0 | 0.00 | 1.02<br>2666 | 0.82<br>88 | 0.26<br>27 | 0.00<br>6 | *<br>0 | *<br>0 |

* This category was neither forecast nor observed.

Table 4.1. Definitions of the cloud amount categories used for the local forecasts and observations. The MOS guidance was based on these same categories for opaque amounts only.

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

Table 4.2. 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 | 0.70 | 1.67 | 1.36 | 0.80 | 52.0 | 0.350 |
| | LOCAL | 0.77 | 1.33 | 1.56 | 0.84 | 61.0 | 0.468 |
| | No. Obs. | 6700 | 3221 | 2017 | 4307 | | |
| 18 | MOS | 0.71 | 1.37 | 1.20 | 0.73 | 53.4 | 0.369 |
| | LOCAL | 0.61 | 1.30 | 1.64 | 0.61 | 49.7 | 0.325 |
| | No. Obs. | 4930 | 4864 | 2890 | 3573 | | |
| 24 | MOS | 0.78 | 1.39 | 1.21 | 0.70 | 49.5 | 0.318 |
| | LOCAL | 0.65 | 1.28 | 1.78 | 0.59 | 45.1 | 0.270 |
| | No. Obs. | 5222 | 4508 | 2714 | 3799 | | |

Table 4.3. Same as Table 4.2 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 | 0.59 | 1.56 | 1.67 | 0.88 | 51.1 | 0.338 |
| | LOCAL | 0.66 | 1.45 | 1.86 | 0.82 | 55.3 | 0.398 |
| | No. Obs. | 1348 | 749 | 490 | 1583 | | |
| 18 | MOS | 0.41 | 1.34 | 1.34 | 0.80 | 51.4 | 0.331 |
| | LOCAL | 0.48 | 1.22 | 1.66 | 0.69 | 48.1 | 0.296 |
| | No. Obs. | 742 | 1289 | 800 | 1344 | | |
| 24 | MOS | 0.56 | 1.57 | 1.34 | 0.85 | 48.0 | 0.305 |
| | LOCAL | 0.49 | 1.43 | 1.93 | 0.75 | 43.6 | 0.258 |
| | No. Obs. | 1224 | 948 | 611 | 1385 | | |

Table 4.4. Same as Table 4.2 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 | 0.61 | 1.81 | 1.23 | 0.69 | 48.2 | 0.302 |
| | LOCAL | 0.68 | 1.43 | 1.46 | 0.80 | 57.0 | 0.419 |
| | No. Obs. | 1757 | 999 | 662 | 867 | | |
| 18 | MOS | 0.67 | 1.30 | 1.12 | 0.62 | 52.9 | 0.334 |
| | LOCAL | 0.50 | 1.25 | 1.46 | 0.45 | 46.8 | 0.248 |
| | No. Obs. | 1026 | 1573 | 1025 | 662 | | |
| 24 | MOS | 0.72 | 1.35 | 1.13 | 0.61 | 46.7 | 0.262 |
| | LOCAL | 0.60 | 1.22 | 1.70 | 0.39 | 42.2 | 0.207 |
| | No. Obs. | 1131 | 1460 | 887 | 810 | | |

Table 4.5. Same as Table 4.2 except for 28 stations in the Central Region.

| Projection (h) | Type of Forecast | Bias by Category 1 | 2 | 3 | 4 | Percent Correct | Skill Score |
|---|---|---|---|---|---|---|---|
| | MOS | 0.66 | 1.77 | 1.36 | 0.80 | 51.4 | 0.344 |
| 12 | LOCAL | 0.82 | 1.30 | 1.44 | 0.86 | 62.7 | 0.485 |
| | No. Obs. | 2019 | 957 | 581 | 1264 | | |
| | MOS | 0.70 | 1.46 | 1.17 | 0.76 | 52.8 | 0.361 |
| 18 | LOCAL | 0.55 | 1.44 | 1.76 | 0.61 | 48.9 | 0.320 |
| | No. Obs. | 1622 | 1352 | 758 | 1084 | | |
| | MOS | 0.79 | 1.42 | 1.19 | 0.67 | 50.7 | 0.332 |
| 24 | LOCAL | 0.61 | 1.29 | 1.90 | 0.58 | 44.1 | 0.259 |
| | No. Obs. | 1592 | 1337 | 771 | 1114 | | |

Table 4.6. Same as Table 4.2 except for 18 stations in the Western Region.

| Projection (h) | Type of Forecast | Bias by Category 1 | 2 | 3 | 4 | Percent Correct | Skill Score |
|---|---|---|---|---|---|---|---|
| | MOS | 0.95 | 1.35 | 1.18 | 0.74 | 59.8 | 0.382 |
| 12 | LOCAL | 0.93 | 1.03 | 1.51 | 0.92 | 72.2 | 0.576 |
| | No. Obs. | 1576 | 516 | 284 | 593 | | |
| | MOS | 0.90 | 1.44 | 1.16 | 0.62 | 58.0 | 0.365 |
| 18 | LOCAL | 0.82 | 1.32 | 1.86 | 0.59 | 57.1 | 0.371 |
| | No. Obs. | 1540 | 650 | 307 | 483 | | |
| | MOS | 1.02 | 1.18 | 1.22 | 0.48 | 53.8 | 0.335 |
| 24 | LOCAL | 0.91 | 1.19 | 1.50 | 0.49 | 52.9 | 0.335 |
| | No. Obs. | 1275 | 763 | 445 | 490 | | |

Table 4.7. 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 | 0.88 | 1.32 | 1.20 | 0.64 | 51.3 | 0.341 |
| | LOCAL | 0.81 | 1.13 | 1.48 | 0.76 | 56.4 | 0.416 |
| | No. Obs. | 5175 | 4497 | 2685 | 3749 | | |
| 18 | MOS | 0.87 | 1.59 | 1.09 | 0.83 | 55.8 | 0.351 |
| | LOCAL | 0.66 | 1.77 | 2.10 | 0.71 | 49.9 | 0.309 |
| | No. Obs. | 8005 | 2570 | 1614 | 3740 | | |
| 24 | MOS | 0.82 | 1.57 | 1.14 | 0.79 | 52.0 | 0.339 |
| | LOCAL | 0.74 | 1.51 | 1.70 | 0.70 | 48.0 | 0.297 |
| | No. Obs. | 6636 | 3173 | 2009 | 4270 | | |

Table 4.8. Same as Table 4.7 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 | 0.66 | 1.48 | 1.45 | 0.77 | 50.0 | 0.334 |
| | LOCAL | 0.66 | 1.25 | 1.71 | 0.82 | 54.8 | 0.399 |
| | No. Obs. | 1209 | 934 | 603 | 1341 | | |
| 18 | MOS | 0.78 | 1.68 | 1.34 | 0.92 | 53.8 | 0.348 |
| | LOCAL | 0.61 | 1.89 | 2.31 | 0.77 | 50.4 | 0.332 |
| | No. Obs. | 1725 | 540 | 395 | 1422 | | |
| 24 | MOS | 0.64 | 1.57 | 1.41 | 0.91 | 50.4 | 0.323 |
| | LOCAL | 0.65 | 1.47 | 2.02 | 0.76 | 46.9 | 0.290 |
| | No. Obs. | 1331 | 718 | 488 | 1542 | | |

Table 4.9. Same as Table 4.7 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 | 0.98 | 1.22 | 1.03 | 0.59 | 49.5 | 0.302 |
| | LOCAL | 0.77 | 1.14 | 1.39 | 0.64 | 56.5 | 0.405 |
| | No. Obs. | 1126 | 1455 | 879 | 798 | | |
| 18 | MOS | 0.84 | 1.73 | 0.86 | 0.78 | 54.1 | 0.315 |
| | LOCAL | 0.57 | 1.84 | 2.03 | 0.64 | 44.8 | 0.241 |
| | No. Obs. | 2174 | 780 | 503 | 635 | | |
| 24 | MOS | 0.73 | 1.75 | 0.98 | 0.69 | 48.4 | 0.295 |
| | LOCAL | 0.64 | 1.62 | 1.62 | 0.53 | 43.2 | 0.237 |
| | No. Obs. | 1736 | 992 | 660 | 866 | | |

Table 4.10. Same as Table 4.7 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 | 0.91 | 1.29 | 1.17 | 0.67 | 52.1 | 0.349 |
| | LOCAL | 0.78 | 1.11 | 1.49 | 0.85 | 55.1 | 0.398 |
| | No. Obs. | 1559 | 1331 | 750 | 1099 | | |
| 18 | MOS | 0.91 | 1.62 | 1.10 | 0.78 | 56.6 | 0.349 |
| | LOCAL | 0.66 | 1.95 | 2.16 | 0.71 | 49.2 | 0.295 |
| | No. Obs. | 2458 | 702 | 441 | 1139 | | |
| 24 | MOS | 0.81 | 1.66 | 1.19 | 0.72 | 51.2 | 0.327 |
| | LOCAL | 0.76 | 1.57 | 1.62 | 0.67 | 47.6 | 0.287 |
| | No. Obs. | 1997 | 935 | 568 | 1242 | | |

Table 4.11. Same as Table 4.7 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 | 0.97 | 1.35 | 1.22 | 0.35 | 54.4 | 0.348 |
| | LOCAL | 1.03 | 1.03 | 1.33 | 0.60 | 60.7 | 0.439 |
| | No. Obs. | 1281 | 777 | 453 | 511 | | |
| 18 | MOS | 0.98 | 1.24 | 1.11 | 0.77 | 59.4 | 0.358 |
| | LOCAL | 0.86 | 1.32 | 1.86 | 0.67 | 57.1 | 0.353 |
| | No. Obs. | 1648 | 548 | 275 | 544 | | |
| 24 | MOS | 1.07 | 1.08 | 0.96 | 0.78 | 60.6 | 0.378 |
| | LOCAL | 0.88 | 1.26 | 1.50 | 0.84 | 56.8 | 0.357 |
| | No. Obs. | 1572 | 528 | 293 | 620 | | |

Table 5.1. Definitions of the categories used for verification of persistence and guidance forecasts of ceiling height and visibility.

| Category | Ceiling (ft) | Visibility (mi) |
|---|---|---|
| 1 | $\leq$400 | <1 |
| 2 | 500-900 | 1-2 3/4 |
| 3 | 1000-2900 | 3-6 |
| 4 | $\geq$3000 | >6 |

Table 5.2. 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 | 1.07 | 0.81 | 0.91 | 1.01 | 2.197 | 83.4 | 0.370 |
| | PERSISTENCE | 0.86 | 0.72 | 0.89 | 1.03 | 1.390 | 88.9 | 0.560 |
| | No. Obs. | 500 | 651 | 1113 | 12592 | | | |
| 18 | MOS | 0.78 | 0.72 | 0.98 | 1.01 | 1.069 | 86.8 | 0.403 |
| | PERSISTENCE | 5.02 | 1.59 | 0.65 | 1.00 | 1.760 | 84.6 | 0.332 |
| | No. Obs. | 85 | 290 | 1509 | 12819 | | | |
| 24 | MOS | 0.90 | 0.54 | 1.03 | 1.01 | 0.798 | 92.1 | 0.349 |
| | PERSISTENCE | 3.75 | 2.26 | 1.50 | 0.93 | 1.820 | 85.7 | 0.221 |
| | No. Obs. | 114 | 207 | 652 | 13545 | | | |

Table 5.3. Same as Table 5.2 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 | 1.22 | 0.65 | 1.05 | 1.00 | 0.814 | 92.1 | 0.362 |
| | PERSISTENCE | 0.73 | 0.98 | 1.47 | 0.98 | 0.550 | 93.3 | 0.528 |
| | No. Obs. | 109 | 209 | 644 | 13553 | | | |
| 18 | MOS | 1.37 | 0.75 | 1.06 | 1.00 | 1.495 | 88.5 | 0.368 |
| | PERSISTENCE | 0.31 | 0.58 | 1.20 | 1.01 | 1.158 | 89.0 | 0.345 |
| | No. Obs. | 264 | 344 | 782 | 13146 | | | |
| 24 | MOS | 1.78 | 0.80 | 0.95 | 0.98 | 2.853 | 81.3 | 0.343 |
| | PERSISTENCE | 0.16 | 0.31 | 0.87 | 1.08 | 2.079 | 83.2 | 0.230 |
| | No. Obs. | 498 | 658 | 1106 | 12561 | | | |

Table 5.4. Same as Table 5.2 except for visibility, 0000 GMT cycle.

| Projection (h) | Type of Forecast | Bias by Category 1 | 2 | 3 | 4 | Log Score | Percent Correct | Skill Score |
|---|---|---|---|---|---|---|---|---|
| 12 | MOS | 1.19 | 1.16 | 1.02 | 0.98 | 2.697 | 73.1 | 0.383 |
| | PERSISTENCE | 0.61 | 0.46 | 0.77 | 1.11 | 1.749 | 80.8 | 0.483 |
| | No. Obs. | 371 | 928 | 2663 | 11002 | | | |
| 18 | MOS | 0.75 | 0.74 | 1.30 | 0.97 | 1.163 | 84.5 | 0.359 |
| | PERSISTENCE | 7.06 | 1.61 | 1.31 | 0.94 | 1.726 | 81.4 | 0.304 |
| | No. Obs. | 32 | 266 | 1558 | 13057 | | | |
| 24 | MOS | 0.64 | 0.78 | 1.40 | 0.97 | 1.106 | 85.6 | 0.365 |
| | PERSISTENCE | 4.87 | 1.60 | 1.51 | 0.92 | 1.790 | 81.0 | 0.267 |
| | No. Obs. | 47 | 267 | 1347 | 13243 | | | |

Table 5.5. Same as Table 5.2 except for visibility 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 | 2.15 | 1.08 | 1.12 | 0.98 | 1.140 | 86.7 | 0.377 |
| | PERSISTENCE | 0.79 | 0.95 | 1.02 | 1.00 | 0.646 | 92.0 | 0.600 |
| | No. Obs. | 47 | 260 | 1337 | 13222 | | | |
| 18 | MOS | 2.64 | 1.35 | 1.04 | 0.97 | 1.670 | 83.2 | 0.355 |
| | PERSISTENCE | 0.33 | 0.76 | 0.87 | 1.03 | 1.145 | 86.8 | 0.406 |
| | No. Obs. | 108 | 317 | 1561 | 12640 | | | |
| 24 | MOS | 2.39 | 1.37 | 1.07 | 0.90 | 3.413 | 70.5 | 0.371 |
| | PERSISTENCE | 0.10 | 0.27 | 0.52 | 1.21 | 2.523 | 75.2 | 0.243 |
| | No. Obs. | 373 | 926 | 2630 | 10991 | | | |

Table 6.1. Verification of MOS guidance 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) |
|---|---|---|---|---|---|---|---|
| Today's | MOS | | -0.1 | 2.8 | 1.8 | -- | -- |
| Max | LOCAL | 16118 | 0.0 | 2.6 | 1.4 | -- | -- |
| Tonight's | MOS | | 0.1 | 2.7 | 0.6 | 0.27 | 0.35 |
| Min | LOCAL | 16042 | 0.1 | 2.6 | 0.6 | 0.27 | 0.39 |
| Tomorrow's | MOS | | 0.0 | 3.5 | 3.9 | -- | -- |
| Max | LOCAL | 16071 | 0.0 | 3.4 | 3.4 | -- | -- |
| Tomorrow | MOS | | 0.1 | 3.3 | 1.9 | 0.11 | 0.71 |
| Night's Min | LOCAL | 16010 | -0.1 | 3.2 | 2.0 | 0.14 | 0.62 |

Table 6.2. Same as Table 6.1 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) |
|---|---|---|---|---|---|---|---|
| Today's Max | MOS | | 0.0 | 3.1 | 2.3 | -- | -- |
| | LOCAL | 4198 | 0.0 | 2.9 | 1.9 | -- | -- |
| Tonight's Min | MOS | | 0.1 | 2.7 | 0.5 | 0.29 | 0.50 |
| | LOCAL | 4156 | 0.0 | 2.7 | 0.6 | 0.21 | 0.50 |
| Tomorrow's Max | MOS | | 0.0 | 3.6 | 4.6 | -- | -- |
| | LOCAL | 4192 | -0.2 | 3.6 | 3.9 | -- | -- |
| Tomorrow Night's Min | MOS | | -0.4 | 3.3 | 1.5 | 0.29 | 0.69 |
| | LOCAL | 4153 | -0.5 | 3.3 | 1.6 | 0.21 | 0.73 |



Table 6.3. Same as Table 6.1 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) |
|---|---|---|---|---|---|---|---|
| Today's Max | MOS | | -0.1 | 2.3 | 0.8 | -- | -- |
| | LOCAL | 4106 | 0.1 | 2.1 | 0.6 | -- | -- |
| Tonight's Min | MOS | | 0.6 | 2.4 | 0.6 | 0.50 | 0.50 |
| | LOCAL | 4127 | 0.3 | 2.3 | 0.5 | 0.50 | 0.50 |
| Tomorrow's Max | MOS | | 0.2 | 2.9 | 2.2 | -- | -- |
| | LOCAL | 4099 | 0.2 | 2.8 | 1.9 | -- | -- |
| Tomorrow Night's Min | MOS | | 0.7 | 2.6 | 1.2 | * | ** |
| | LOCAL | 4121 | 0.4 | 2.6 | 1.3 | * | ** |

* No events of ≤32°F were observed.
** No forecasts of ≤32°F were made.

Table 6.4. Same as Table 6.1 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) |
|---|---|---|---|---|---|---|---|
| Today's Max | MOS | 4899 | -0.3 | 3.1 | 2.3 | -- | -- |
| | LOCAL | | 0.0 | 2.9 | 1.7 | -- | -- |
| Tonight's Min | MOS | 4875 | -0.1 | 3.0 | 0.7 | 0.24 | 0.00 |
| | LOCAL | | 0.1 | 2.9 | 0.7 | 0.33 | 0.13 |
| Tomorrow's Max | MOS | 4880 | -0.2 | 3.9 | 5.0 | -- | -- |
| | LOCAL | | -0.2 | 3.7 | 4.4 | -- | -- |
| Tomorrow Night's Min | MOS | 4871 | 0.1 | 3.8 | 3.0 | 0.00 | 1.00 |
| | LOCAL | | -0.1 | 3.6 | 3.0 | 0.05 | 0.75 |



Table 6.5. Same as Table 6.1 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) |
|---|---|---|---|---|---|---|---|
| Today's Max | MOS | 2915 | -0.1 | 2.7 | 1.5 | -- | -- |
| | LOCAL | | 0.1 | 2.5 | 1.3 | -- | -- |
| Tonight's Min | MOS | 2884 | -0.3 | 3.0 | 0.8 | 0.24 | 0.29 |
| | LOCAL | | -0.2 | 2.7 | 0.7 | 0.19 | 0.50 |
| Tomorrow's Max | MOS | 2900 | 0.1 | 3.7 | 3.3 | -- | -- |
| | LOCAL | | 0.0 | 3.3 | 3.4 | -- | -- |
| Tomorrow Night's Min | MOS | 2865 | 0.0 | 3.4 | 1.6 | 0.10 | 0.60 |
| | LOCAL | | -0.2 | 3.1 | 1.8 | 0.20 | 0.33 |

Table 6.6. Verification of MOS guidance 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) |
|---|---|---|---|---|---|---|---|
| Tonight's Min | MOS | 15970 | -0.2 | 2.6 | 0.5 | 0.33 | 0.34 |
| | LOCAL | | -0.3 | 2.4 | 0.4 | 0.39 | 0.22 |
| Tomorrow's Max | MOS | 16001 | -0.1 | 3.4 | 3.1 | -- | -- |
| | LOCAL | | -0.2 | 3.1 | 2.4 | -- | -- |
| Tomorrow Night's Min | MOS | 15867 | -0.2 | 3.0 | 1.1 | 0.14 | 0.64 |
| | LOCAL | | -0.3 | 2.9 | 1.1 | 0.17 | 0.50 |
| Day After Tomorrow's Max | MOS | 15884 | -0.3 | 4.0 | 5.6 | -- | -- |
| | LOCAL | | -0.3 | 3.8 | 5.4 | -- | -- |

Table 6.7. Same as Table 6.6 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) |
|---|---|---|---|---|---|---|---|
| Tonight's Min | MOS | 4134 | -0.1 | 2.5 | 0.2 | 0.19 | 0.25 |
| | LOCAL | | -0.3 | 2.5 | 0.4 | 0.25 | 0.00 |
| Tomorrow's Max | MOS | 4169 | 0.0 | 3.5 | 3.8 | -- | -- |
| | LOCAL | | -0.2 | 3.3 | 3.0 | -- | -- |
| Tomorrow Night's Min | MOS | 4112 | -0.5 | 3.0 | 1.0 | 0.13 | 0.83 |
| | LOCAL | | -0.5 | 2.9 | 1.0 | 0.19 | 0.63 |
| Day After Tomorrow's Max | MOS | 4142 | -0.3 | 4.2 | 6.4 | -- | -- |
| | LOCAL | | -0.4 | 4.1 | 6.1 | -- | -- |



Table 6.8. Same as Table 6.6 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) |
|---|---|---|---|---|---|---|---|
| Tonight's Min | MOS | 4125 | 0.2 | 2.2 | 0.3 | 0.60 | 0.67 |
| | LOCAL | | -0.1 | 2.1 | 0.3 | 0.40 | 0.67 |
| Tomorrow's Max | MOS | 4100 | -0.1 | 2.8 | 1.5 | -- | -- |
| | LOCAL | | -0.1 | 2.5 | 1.2 | -- | -- |
| Tomorrow Night's Min | MOS | 4100 | 0.4 | 2.5 | 0.4 | * | 1.00 |
| | LOCAL | | 0.1 | 2.4 | 0.6 | * | 1.00 |
| Day After Tomorrow's Max | MOS | 4074 | -0.1 | 3.2 | 2.3 | -- | -- |
| | LOCAL | | -0.1 | 3.1 | 2.6 | -- | -- |

* No events of ≤32°F were observed.

Table 6.9. Same as Table 6.6 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) |
|---|---|---|---|---|---|---|---|
| Tonight's Min | MOS | | -0.4 | 2.8 | 0.7 | 0.30 | 0.13 |
| | LOCAL | 4843 | -0.3 | 2.7 | 0.5 | 0.43 | 0.09 |
| Tomorrow's Max | MOS | | -0.3 | 3.7 | 4.2 | -- | -- |
| | LOCAL | 4848 | -0.4 | 3.4 | 3.1 | -- | -- |
| Tomorrow Night's Min | MOS | | -0.2 | 3.3 | 1.6 | 0.19 | 0.38 |
| | LOCAL | 4813 | -0.2 | 3.2 | 1.7 | 0.19 | 0.38 |
| Day After Tomorrow's Max | MOS | | -0.4 | 4.4 | 7.9 | -- | -- |
| | LOCAL | 4813 | -0.4 | 4.2 | 7.1 | -- | -- |



Table 6.10. Same as Table 6.6 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) |
|---|---|---|---|---|---|---|---|
| Tonight's Min | MOS | | -0.8 | 2.7 | 0.7 | 0.40 | 0.27 |
| | LOCAL | 2868 | -0.5 | 2.5 | 0.6 | 0.45 | 0.18 |
| Tomorrow's Max | MOS | | -0.1 | 3.4 | 2.6 | -- | -- |
| | LOCAL | 2884 | -0.1 | 3.0 | 2.3 | -- | -- |
| Tomorrow Night's Min | MOS | | -0.6 | 3.2 | 1.4 | 0.10 | 0.33 |
| | LOCAL | 2842 | -0.5 | 2.9 | 1.0 | 0.15 | 0.25 |
| Day After Tomorrow's Max | MOS | | -0.1 | 4.2 | 5.2 | -- | -- |
| | LOCAL | 2855 | -0.2 | 3.9 | 5.3 | -- | -- |