U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE
OFFICE OF SYSTEMS DEVELOPMENT
TECHNIQUES DEVELOPMENT LABORATORY

TDL OFFICE NOTE 95-2

AFOS-ERA VERIFICATION OF GUIDANCE AND LOCAL AVIATION/PUBLIC WEATHER FORECASTS--NO. 21 (OCTOBER 1993 - MARCH 1994)

Valery J. Dagostaro, J. Paul Dallavalle,
Mahalia D. Miller, and Virgil C. Southall

November 1995

AFOS-ERA VERIFICATION OF GUIDANCE AND LOCAL AVIATION/PUBLIC WEATHER FORECASTS--NO. 21 (OCTOBER 1993 - MARCH 1994)

Valery J. Dagostaro, J. Paul Dallavalle,
Mahalia D. Miller, and Virgil C. Southall

1. INTRODUCTION

This office note continues the series of Techniques Development Laboratory (TDL) office notes which present verification results for TDL's automated guidance and National Weather Service (NWS) local forecasts made at Weather Service Forecast Offices (WSFO's). Verification statistics are presented here for the cool season months of October 1993 through March 1994 for maximum/minimum (max/min) temperature, probability of precipitation (PoP), precipitation type, snow amount, cloud amount, surface wind, ceiling height, and visibility. Specific details about the local and objective forecasts and the verifying observations are summarized in Table 1.1. It's important to consider this information when interpreting the verification scores. For example, the objective max/min temperature forecast system is based on calendar day observations for Alaska, but on daytime/nighttime periods for the conterminous U.S. For Alaska, the definitions of the official local max/min temperature forecasts and verifying observations, in turn, differ from those of the guidance. Dagostaro and Dallavalle (1991) provide more specific information about the forecasts, observations, and verification procedure for each weather element.

For this season, the objective guidance was based on forecast equations developed by use of the Model Output Statistics (MOS) technique (Glahn and Lowry 1972) and applied to forecast fields from the Nested Grid Model (NGM) (Hoke et al. 1989) and the Limited-area Fine-mesh Model (LFM) (Gerrity 1977; Newell and Deaven 1981). Additional information about the objective guidance prediction equations is available from the references listed in Table 1.2. Details regarding the local data collection in the conterminous U.S. and Alaska are described briefly in Dagostaro and Dallavalle (1991). For additional information about the local data collection process, see Ruth and Alex (1987). The central data collection and data processing system is described in Dagostaro (1985).

Verification statistics are provided for the 101 stations in the conterminous U.S. and Alaska listed in Table 1.3. The scores are those recommended in the NWS National Verification Plan (National Weather Service 1982). Definitions of the categories used for verification are given in Table 1.4. For the aviation weather elements, we verified the local forecasts associated with the FT issuance times of approximately 0900 and 1800 UTC. Objective guidance for the aviation weather elements, as well as all local and guidance forecasts for the public weather elements, were verified for the 0000 and 1200 UTC forecast cycles. Because verification data or forecast projections for Alaska differ from those of the conterminous U.S., data for the six Alaskan stations were verified separately from those of the conterminous U.S.

For most weather elements, verification results are presented for all stations in the conterminous U.S. combined, followed by results for each of the four NWS regions in the conterminous U.S. and for the Alaska Region. Max/min temperature and PoP scores are presented in Tables 2.1 - 2.12 and 3.1 - 3.12, respectively.

Verification results for precipitation type are shown in Tables 4.1 and 4.2 for stations in the conterminous U.S. only. Similarly, the snow amount verification results shown in Tables 5.1 and 5.2 are for the conterminous U.S. only. Tables 6.1 - 6.12 show cloud amount verification scores for the conterminous U.S. stations and the Alaskan stations. For wind speed and direction, objective guidance verification results are presented in Tables 7.1 - 7.12, while the analogous local scores are given in Tables 7.13 - 7.24. Verification results for the 42-h significant wind speed are presented for the Alaska Region only in Tables 7.25 and 7.26. For ceiling height, Tables 8.1 - 8.4 contain the objective forecast results for the conterminous U.S. stations combined and for the Alaska Region, while Tables 8.5 - 8.8 contain ceiling height scores for the local forecasts. Tables 9.1 - 9.8 show objective and local visibility forecast results for the conterminous U.S. stations combined and for the Alaska Region.

2. SUMMARY (OCTOBER 1993 - MARCH 1994)

During the 1993-94 cool season, NGM-based MOS was the official objective guidance for stations in the conterminous U.S., and LFM-based MOS was the only objective guidance available for stations in Alaska. Please note that for some weather elements, forecast definitions for LFM and NGM MOS differ slightly. For stations in the conterminous U.S., LFM MOS forecasts of max/min temperature and PoP were still available to forecasters in an abbreviated version of the LFM MOS forecast product (i.e., the FPC). We included centrally-archived LFM MOS in the comparative verifications of max/min temperature and PoP for the conterminous U.S.

Beginning in July 1993, NGM MOS ceiling height and visibility forecasts were provided for the 15-h projection from model cycle time for stations in the conterminous U.S. (Dallavalle et al. 1992.) However, because ceiling height and visibility forecasts for the 15-h projection were not available in the previous LFM-based MOS system, the local data collection software in use for most of the cool season did not collect the new 15-h NGM MOS forecasts. Once an updated version of the software was installed at forecast offices, data for the 15-h projection were collected. As a consequence, the number of cases verified for the 15-h projection is much less than the number verified for the 12-, 18-, and 24-h projections.

Note that the NGM MOS snow amount forecast system for the conterminous U.S. generated categorical forecasts equal to "1" for the first time, but the local data collection software in use for most of the cool season did not recognize these values as legitimate forecasts. Thus, until a newer version of the software was installed at a given forecast office, MOS forecasts equal to "1" were flagged as erroneous. We eliminated from the data sample all cases that were flagged as erroneous except those cases where a forecaster manually filled in the correct value of 1. In addition, we found an error in the operational software that created the NGM MOS forecast message (i.e., the FWC). Specifically, category 4 snow amount forecasts (4 to less than 6 in.) were erroneously set equal to category 1 (trace to less than 2 in.) in the FWC; thus, NGM MOS forecasts of category 4 never appeared in the FWC during the cool season. We treated these category 4 forecasts as if they were forecasts of category 1 when computing AEV snow amount scores because the erroneous forecasts were disseminated and may have influenced the local forecasts. However, in order to assess the true skill of the NGM MOS snow amount forecast system, we also verified the correct centrally-archived MOS forecasts. This second comparative verification

of local and NGM MOS forecasts eliminated the two problems affecting the MOS snow amount guidance. Both sets of verification results are presented here.

On November 1, 1993, Syracuse, New York, was commissioned as an ASOS site, and on March 1, 1994, Phoenix, Arizona, was commissioned. Because the ASOS cloud amount observations are incomplete, we set to missing the observed cloud amount data for those stations after they were commissioned. Observed cloud amount data were also set to missing for the AEV ASOS sites listed in Table 1.3 that were commissioned prior to the 1993-94 cool season. Because snow amount observations were unavailable for ASOS sites, snow amount forecasts were no longer verified after a station was commissioned.

The 1993-94 cool season marked the first cool season in which updated climatic normal temperatures were used in the max/min temperature verification. Beginning with the 1993 warm season, the climatic normals were based on temperatures for the 1961-90 period. Prior to the 1993 warm season, the climatic normals were based on the 1951-80 period.

For stations in the conterminous U.S., the local data collection software used during much of the cool season contained an error in which missing local forecasts or observations for all variables were set equal to 15 instead of a coded value used by other parts of the local data collection software. During the cool season, a corrected version of the local data collection software was installed at forecast offices. However, because all forecast offices did not install the software at the same time, and because we couldn't determine when a station switched to the corrected software, we eliminated from the data archive all local forecasts and observations equal to 15 for the October 1993 - February 1994 period. Undoubtedly, legitimate values equal to 15 were eliminated from the data sample. For the MOS guidance, locally-collected data were compared to TDL's centrally-archived values, and only data that differed were eliminated from the AEV data archive.

Dagostaro and Dallavalle (1993) documented a problem that affected the verifications of the 42-h significant wind for stations in the conterminous U.S. Thus, the 42-h wind verification results for the conterminous U.S. are not included for the 1993-94 cool season. For the Alaska Region, however, the verification results are correct and are included here.

In June 1995, we discovered that the MOS PoP forecasts collected by Alaska Region's data collation software were valid for a different 12-h period than the local PoP forecasts and the 12-h precipitation amount observations. In fact, since the 1988-89 cool season, the local PoP forecasts and the LFM MOS forecasts verified for Alaska have been mismatched, that is, the LFM MOS PoPs have been valid 12 hours prior to the valid time of the local forecasts. The observations, however, matched the valid time of the local forecasts. Please disregard the MOS PoP verification results for Alaska presented in all previous office notes. *Local* PoP verification results presented here and in previous office notes are correct. For this cool season, we computed a subset of the usual PoP verification scores for the local PoP forecasts and the centrally-archived LFM MOS forecasts whose valid periods matched those of the local forecasts and verifying observations. The comparative verification results are presented here.

In general, care must be used when interpreting verification results for rare events, for example, the lower categories of ceiling height or visibility.

3. REFERENCES

Dagostaro, V. J., 1985: The national AFOS-era verification data processing system. TDL Office Note 85-9, National Weather Service, NOAA, U.S. Department of Commerce, 47 pp.

_____, and J. P. Dallavalle, 1991: AFOS-era verification of guidance and local aviation/public weather forecasts--No. 11 (October 1988 - March 1989). TDL Office Note 91-2, National Weather Service, NOAA, U.S. Department of Commerce, 64 pp.

_____, and _____, 1993: AFOS-era verification of guidance and local aviation/public weather forecasts--No. 19 (October 1992 - March 1993). TDL Office Note 93-4, National Weather Service, NOAA, U.S. Department of Commerce, 52 pp.

Dallavalle, J. P., J. S. Jensenius, Jr., and S. A. Gilbert, 1992: NGM-based MOS guidance - the FOUS14/FWC message. NWS Technical Procedures Bulletin No. 408, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, 16 pp.

Gerrity, J. P., Jr., 1977: The LFM model--1976: A documentation. NOAA Technical Memorandum NWS NMC-60, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, 68 pp.

Glahn, H. R., and D. A. Lowry, 1972: The use of Model Output Statistics (MOS) in objective weather forecasting. J. Appl. Meteor., 11, 1203-1211.

Hoke, J. E., N. A. Phillips, G. J. DiMego, J. J. Tuccillo, and J. G. Sela, 1989: The regional analysis and forecast system of the National Meteorological Center. Wea. Forecasting, 4, 323-334.

National Weather Service, 1982: National Verification Plan. National Oceanic and Atmospheric Administration, U.S. Department of Commerce, 81 pp.

Newell, J. E., and D. G. Deaven, 1981: The LFM-II model--1980. NOAA Technical Memorandum NWS NMC-66, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, 20 pp.

Ruth, D. P., and C. L. Alex, 1987: AFOS-era forecast verification. NOAA Techniques Development Laboratory Computer Program NWS TDL CP 87-2, National Weather Service, NOAA, U.S. Department of Commerce, 50 pp.

Table 1.1. Forecasts and observations in the NWS verification data.

Weather Element	Type of Data	Data Source[1]	Projections From Forecast Cycle	Forecast Cycle (UTC)	Comments
Max temp	LFM MOS	FXX	24, 48 36, 60	0000 1200	Daytime max temperature forecast for the conterminous U.S.; calendar day max temperature forecast for Alaska.
	NGM MOS	FWC	24, 48 36, 60	0000 1200	Daytime max temperature forecast for the conterminous U.S.; no guidance for Alaska.
	Local Fcst	FP	24, 48 36, 60	0000 1200	Daytime max temperature for all stations. In the conterminous U.S., actual daytime period depends on time zone and differs slightly from the LFM MOS definition of daytime. For Alaska, forecasts are valid for 12-h periods ending at 30 (42) and 54 (66) hours after 0000 (1200) UTC.
	Obs	SAO			Corresponds closely to the local and NGM MOS definitions of the max for all stations.
Min temp	LFM MOS	FXX	36, 60 24, 48	0000 1200	Nighttime min temperature forecast for the conterminous U.S.; calendar day min temperature forecast for Alaska.
	NGM MOS	FWC	36, 60 24, 48	0000 1200	Nighttime min temperature forecast for the conterminous U.S.; no guidance for Alaska.
	Local Fcst	FP	36, 60 24, 48	0000 1200	Nighttime min temperature for all stations. In the conterminous U.S., actual nighttime period depends on time zone and differs slightly from the LFM MOS definition of nighttime. For Alaska, forecasts are valid for 12-h periods ending at 30 (42) and 54 (66) hours after 1200 (0000) UTC.
	Obs	SAO			Corresponds closely to the local and NGM MOS definitions of the min for all stations.
PoP	LFM MOS	FXX	24, 36, 48	0000, 1200	For the conterminous U.S., forecasts are for 12-h periods ending at the indicated projections. For Alaska, the 12-h periods actually end at 30, 42, and 54 hours from the forecast cycle.
	NGM MOS	FWC	24, 36, 48	0000, 1200	For the conterminous U.S., forecasts are for 12-h periods ending at the indicated projections. There is no NGM-based PoP guidance for Alaska.
	Local Fcst	FP	24, 36, 48	0000, 1200	Same as the guidance.
	Obs	SAO			Precipitation amount for 12-h periods that match those of the local forecasts.

Table 1.1. Continued.

Weather Element	Type of Data	Data Source[1]	Projections From Forecast Cycle	Forecast Cycle (UTC)	Comments
Precipitation type[2]	LFM MOS	FXX	18, 30, 42	0000, 1200	For Alaska, guidance is for frozen and unfrozen precipitation (freezing is considered unfrozen) but is not verified. Guidance for the conterminous U.S. is no longer available.
	NGM MOS	FWC	18, 30, 42	0000, 1200	For the conterminous U.S., forecasts are valid at specific hours corresponding to the indicated projections. Guidance is for freezing, frozen, and liquid precipitation (mixed frozen and liquid is considered liquid). There is no guidance for Alaska.
	Local Fcst	MEF	18, 30, 42	0000, 1200	Forecasts of freezing, frozen, and liquid precipitation (mixed frozen and liquid is considered frozen) for all stations. Forecasts are valid at specific hours corresponding to the indicated projections.
	Obs	SAO			Obs are collected at the verifying time and $\pm$ 1 hour of the verifying time.
Snow amount[2]	LFM MOS	FXX	24	0000, 1200	For Alaska, appropriate guidance is not available. Guidance for the conterminous U.S. is no longer available.
	NGM MOS	FWC	24	0000, 1200	For the conterminous U.S., categorical forecasts of snow amount for the 12-h period ending at the indicated projection; no comparable guidance for Alaska.
	Local Fcst	MEF	24	0000, 1200	Snow amount forecast in inches for the 12-h period ending at the indicated projection.
	Obs	SSM			12-h snow amount.
Cloud amount	LFM MOS	FXX	12, 18, 24	0000, 1200	Categorical forecasts of opaque sky cover for Alaska; guidance no longer available for the conterminous U.S.
	NGM MOS	FWC	12, 18, 24	0000, 1200	Categorical forecasts of opaque sky cover for the conterminous U.S.; no guidance for Alaska.
	Local Fcst	MEF	12, 18, 24	0000, 1200	Categorical forecasts of sky cover.
	Obs	SAO			Observed total sky cover (includes thin clouds) at the verifying hour.
Wind speed	LFM MOS	FXX	12, 18, 24, 42	0000, 1200	For Alaska, forecasts are valid at specific hours after 0000 or 1200 UTC. Guidance is no longer available for the conterminous U.S.
	NGM MOS	FWC	12, 18, 24, 42	0000, 1200	For the conterminous U.S., forecasts are valid at the indicated hours after 0000 or 1200 UTC; no guidance for Alaska.
	Local Fcst	FT	3, 9, 15	0900, 1800	Aviation terminal forecasts are valid for variable time periods. Forecasts valid for the "projections" at left are verified. Approximate FT issuance times, at left, depend on time zone where station is located.
		MEF	42	0000, 1200	A yes/no forecast of $\geq$ 22 kt wind speed valid at the specific hour after 0000 or 1200 UTC.
	Obs	SAO			Observed values collected at the stations for the specific hour and $\pm$ 3 hours (highest sustained wind) correspond to the valid times of the local aviation terminal forecasts. Observed values corresponding to the 42-h significant wind should be based on 0000 or 1200 UTC, but are erroneously based on the FT issuance time for the conterminous U.S. Verifying obs corresponding to the guidance are from TDL hourly archives.

Table 1.1. Continued.

Weather Element	Type of Data	Data Source[1]	Projections From Forecast Cycle	Forecast Cycle (UTC)	Comments
Wind direction	LFM MOS	FXX	12, 18, 24	0000, 1200	For Alaska, forecasts are valid at specific hours after 0000 or 1200 UTC. Guidance is no longer available for the conterminous U.S.
	NGM MOS	FWC	12, 18, 24	0000, 1200	For the conterminous U.S., forecasts are valid at the indicated hours after 0000 or 1200 UTC; no guidance for Alaska.
	Local Fcst	FT	3, 9, 15	0900, 1800	Same as for local aviation terminal forecasts of wind speed.
	Obs	SAO			Observed values collected at the stations for the specific hour correspond to the valid time of the local forecasts. Verifying obs corresponding to the guidance are from TDL hourly archives.
Ceiling height	LFM MOS	FXX	12, 18, 24	0000, 1200	Categorical value. Definitions of categories match the official definitions of LIFR and IFR, but differ slightly from the official definitions of MVFR and VFR. Guidance is no longer available for the conterminous U.S.
	NGM MOS	FWC	12, 15, 18, 24	0000, 1200	Categorical value. Definitions of categories match the official definitions of LIFR, IFR, MVFR, and VFR; no guidance for Alaska.
	Local Fcst	FT	3, 6, 9, 15	0900, 1800	Forecasts are converted to categorical values. See wind speed for FT valid times and issuance times.
	Persis	SAO			Persistence observations used for comparison with the local forecasts are collected at the stations and are the latest hourly obs available at the scheduled FT release time. Since March 1987, persistence obs used for comparison with the MOS guidance are from hourly obs taken at 0900 (2100) UTC for the 0000 (1200) UTC cycle. These latter obs are collected at TDL.
	Obs	SAO			Observations taken at specific hours. Obs corresponding to the valid times of the local forecasts are collected at the stations. Verifying obs that correspond to the valid times of the MOS guidance are from hourly obs collected at TDL.
Visibility	LFM MOS	FXX	12, 18, 24	0000, 1200	See ceiling height.
	NGM MOS	FWC	12, 15, 18, 24	0000, 1200	See ceiling height.
	Local Fcst	FT	3, 6, 9, 15	0900, 1800	See ceiling height.
	Persis	SAO			See ceiling height.
	Obs	SAO			See ceiling height.

[1]Data sources are as follows:
- FXX - FPC bulletin contains LFM-based MOS guidance for max/min temperature and PoP for stations in the conterminous U.S.; guidance for Alaska is obtained from the FMAK1 and FMAK2 bulletins for all weather elements
- FWC - FWC bulletin contains NGM-based MOS guidance for all weather elements for stations in the conterminous U.S. only; there is no NGM-based guidance for Alaska at this time
- FP - Coded city forecast (FPUS4) bulletin containing official local public weather element forecasts in the conterminous U.S.; data in Alaska are obtained from the FPAK4 bulletin
- FT - Aviation terminal forecast containing official local forecasts for aviation weather elements
- MEF - Manually entered forecast product containing official local forecasts of some weather elements
- SAO - Surface airways observation containing verifying observations corresponding to local and MOS forecasts for most weather elements
- SSM - Surface synoptic report containing verifying observations of snow amount

[2]Precipitation type and snow amount forecasts are not verified for the warm season months of April through September.

Table 1.2. National Weather Service Technical Procedures Bulletins (TPB's) containing information about MOS guidance.

Geographical Area	Subject	Forecast Model	TPB No.
Conterminous U.S.	max/min temperature	LFM	356
		NGM	387
	PoP	LFM	386
		NGM	409
	precipitation type	NGM	421
	snow amount	NGM	420
	cloud amount	NGM	387
	surface wind	NGM	399
	ceiling height	NGM	414
	visibility	NGM	408
Alaska	max/min temperature	LFM	329
	PoP	LFM	329
	cloud amount	LFM	329
	surface wind	LFM	329
	ceiling height	LFM	338
	visibility	LFM	338

Table 1.3. Ninety-five stations in the conterminous U.S. and six stations in Alaska used for verification of MOS guidance and local forecasts of max/min temperature, probability of precipitation, precipitation type, snow amount, cloud amount, 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[1]	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
AMA[1]	Amarillo, Texas		
LIT	Little Rock, Arkansas	FSM	Fort Smith, Arkansas
MIA[2]	Miami, Florida	TPA[2]	Tampa, Florida
ATL	Atlanta, Georgia	SAV	Savannah, Georgia
MSY	New Orleans, Louisiana	SHV	Shreveport, Louisiana
JAN[1]	Jackson, Mississippi	MEI	Meridian, Mississippi
ABQ	Albuquerque, New Mexico	TCC[4]	Tucumcari, New Mexico
OKC[1]	Oklahoma City, Oklahoma	TUL[1]	Tulsa, Oklahoma
MEM	Memphis, Tennessee	BNA	Nashville, Tennessee
DFW	Dallas-Ft. Worth, Texas	ABI	Abilene, Texas
LBB[5]	Lubbock, Texas	ELP[5]	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[1]	Topeka, Kansas	ICT[1]	Wichita, Kansas
SDF[3]	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[1,2]	Phoenix, Arizona	TUS[2]	Tucson, Arizona
LAX[6]	Los Angeles, California	SAN[2]	San Diego, California
SFO[2]	San Francisco, California	FAT[2]	Fresno, California
BOI	Boise, Idaho	PIH	Pocatello, Idaho
GTF	Great Falls, Montana	BIL	Billings, 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
ANC[2]	Anchorage, Alaska	BET[2]	Bethel, Alaska
FAI[2]	Fairbanks, Alaska	OME[2]	Nome, Alaska
JNU[2,7]	Juneau, Alaska	YAK[2]	Yakutat, Alaska

[1]Precipitation type and cloud amount observations were not used, and snow amount observations were not available after the station was commissioned as an ASOS site.
[2]This station was not included in the precipitation type and snow amount verifications.
[3]SDF had no data for the snow amount verification.
[4]TCC had no data for the max/min temperature, PoP, and snow amount verifications. Data also were not available for the local ceiling height, visibility, and surface wind verifications for the FT release time of approximately 0900 UTC, the MOS surface wind verification for the 1200 UTC cycle, and the MOS ceiling height and visibility verifications for the 0000 and 1200 UTC cycles.
[5]LBB and ELP were not included in the local ceiling height, visibility, and surface wind verifications.
[6]LAX was not included in the max/min temperature, PoP, precipitation type, and snow amount verifications.
[7]JNU had no data for the PoP verification.

Table 1.4. Definitions of categories used for verification.

Category	Precipitation Type	Snow Amount* (in)	Cloud Amount	Wind Speed (kt)	Wind Direction (degrees)	Ceiling Height (ft)	Visibility (mi)
1	ZL, ZR, any combination of precipitation types that includes ZL or ZR	<2	CLR, -SCT, -BKN, -OVC, -X	≤12	340-20	≤400	<1
2	IC, IP, IPW, S, SG, SP, SW, any combination of frozen and liquid	2-3	SCT	13-17	30-60	500-900	1-2 3/4
3	L, R, RW	4-5	BKN	18-22	70-110	1000-3000	3-5
4		≥6	OVC, X	23-27	120-150	≥3100	>5
5				28-32	160-200		
6				≥33	210-240		
7					250-290		
8					300-330		

*Scores based on cumulative snow amount categories of ≥ 2, ≥ 4, and ≥ 6 inches are noted in the verification tables.

Table 2.1. Comparative verification of local, NGM MOS, and LFM MOS max/min temperature forecasts for 93 stations in the conterminous U.S., 0000 UTC 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	LOCAL		-0.2	2.9	1.2	--	--	87.0
	NGM MOS	15896	-0.2	3.3	2.1	--	--	83.8
	LFM MOS		-0.5	3.5	2.9	--	--	81.4
Tonight's Min	LOCAL		-0.2	3.5	2.9	0.68	0.26	80.5
	NGM MOS	15613	0.0	3.9	4.5	0.66	0.28	76.0
	LFM MOS		-0.6	3.9	3.6	0.64	0.30	76.7
Tomorrow's Max	LOCAL		-0.6	3.9	4.2	--	--	77.5
	NGM MOS	15871	-0.3	4.1	5.4	--	--	74.3
	LFM MOS		-0.9	4.4	6.3	--	--	72.1
Tomorrow Night's Min	LOCAL		-0.5	4.5	6.7	0.53	0.33	68.6
	NGM MOS	15544	-0.1	4.7	7.7	0.55	0.36	65.5
	LFM MOS		-0.5	4.8	8.5	0.51	0.36	64.7

Table 2.2. Same as Table 2.1 except for the 1200 UTC 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	LOCAL		-0.4	3.2	1.7	0.68	0.23	84.2
	NGM MOS	15512	0.1	3.5	2.7	0.63	0.22	80.8
	LFM MOS		-0.6	3.7	3.0	0.65	0.28	79.3
Tomorrow's Max	LOCAL		-0.5	3.5	2.8	--	--	81.4
	NGM MOS	15731	0.0	3.8	4.0	--	--	77.8
	LFM MOS		-0.7	4.2	5.9	--	--	73.8
Tomorrow Night's Min	LOCAL		-0.3	4.0	4.7	0.66	0.30	74.9
	NGM MOS	15445	0.1	4.3	6.2	0.65	0.30	70.9
	LFM MOS		-0.8	4.5	6.8	0.63	0.36	69.1
Day After Tomorrow's Max	LOCAL		-0.6	4.4	6.9	--	--	70.7
	NGM MOS	15717	0.0	4.7	8.0	--	--	66.9
	LFM MOS		-1.0	5.0	9.6	--	--	64.4

Table 2.3. Comparative verification of local, NGM MOS, and LFM MOS max/min temperature forecasts for 24 stations in the Eastern Region, 0000 UTC 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	LOCAL	4157	-0.2	2.9	1.1	--	--	86.7
	NGM MOS		-0.2	3.4	2.0	--	--	82.6
	LFM MOS		-0.2	3.5	2.6	--	--	81.0
Tonight's Min	LOCAL	4070	-0.2	3.5	2.3	0.72	0.26	81.0
	NGM MOS		0.3	3.9	3.9	0.72	0.28	76.2
	LFM MOS		-0.5	3.7	2.4	0.66	0.23	79.3
Tomorrow's Max	LOCAL	4150	-0.5	3.7	3.7	--	--	78.1
	NGM MOS		-0.2	3.9	4.0	--	--	76.4
	LFM MOS		-0.9	4.2	4.9	--	--	73.3
Tomorrow Night's Min	LOCAL	4043	-0.5	4.4	5.9	0.60	0.29	69.6
	NGM MOS		0.1	4.7	6.4	0.62	0.31	66.9
	LFM MOS		-1.0	4.6	7.4	0.64	0.33	66.6

Table 2.4. Same as Table 2.3 except for the 1200 UTC 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	LOCAL	4044	-0.5	3.1	1.4	0.68	0.27	84.8
	NGM MOS		0.2	3.4	2.1	0.68	0.23	81.7
	LFM MOS		-0.3	3.5	1.9	0.70	0.23	81.6
Tomorrow's Max	LOCAL	4109	-0.4	3.5	2.4	--	--	81.4
	NGM MOS		0.0	3.7	3.4	--	--	78.8
	LFM MOS		-0.4	4.0	4.5	--	--	75.5
Tomorrow Night's Min	LOCAL	4027	-0.1	3.9	3.9	0.67	0.22	76.3
	NGM MOS		0.4	4.2	5.2	0.69	0.22	72.6
	LFM MOS		-0.7	4.3	5.2	0.67	0.35	72.3
Day After Tomorrow's Max	LOCAL	4109	-0.5	4.2	5.8	--	--	72.6
	NGM MOS		0.1	4.4	6.3	--	--	70.5
	LFM MOS		-1.0	4.7	7.4	--	--	67.3

Table 2.5. Comparative verification of local, NGM MOS, and LFM MOS max/min temperature forecasts for 24 stations in the Southern Region, 0000 UTC 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	LOCAL	4085	-0.1	3.0	1.4	--	--	84.7
	NGM MOS		-0.4	3.1	1.8	--	--	83.3
	LFM MOS		-0.4	3.5	3.7	--	--	78.5
Tonight's Min	LOCAL	4041	-0.3	3.3	2.0	0.68	0.26	82.4
	NGM MOS		-0.4	3.5	2.6	0.61	0.24	80.2
	LFM MOS		-0.2	3.8	3.2	0.59	0.34	77.9
Tomorrow's Max	LOCAL	4074	-0.6	3.9	4.4	--	--	74.4
	NGM MOS		-0.5	4.1	5.1	--	--	71.8
	LFM MOS		-1.1	4.4	7.4	--	--	67.5
Tomorrow Night's Min	LOCAL	4024	-0.7	4.3	5.4	0.49	0.31	70.6
	NGM MOS		-0.3	4.5	5.9	0.45	0.35	68.6
	LFM MOS		-0.2	4.7	8.2	0.48	0.37	64.8

Table 2.6. Same as Table 2.5 except for the 1200 UTC 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	LOCAL	4022	-0.4	3.0	1.6	0.69	0.18	85.4
	NGM MOS		-0.1	3.3	1.7	0.56	0.18	83.0
	LFM MOS		-0.3	3.6	2.5	0.60	0.29	79.6
Tomorrow's Max	LOCAL	4055	-0.4	3.6	3.0	--	--	78.2
	NGM MOS		-0.2	3.8	3.4	--	--	76.1
	LFM MOS		-0.9	4.4	6.9	--	--	68.1
Tomorrow Night's Min	LOCAL	4007	-0.4	3.8	3.6	0.61	0.35	77.3
	NGM MOS		-0.1	3.9	4.4	0.55	0.31	74.6
	LFM MOS		-0.7	4.4	6.8	0.58	0.39	69.2
Day After Tomorrow's Max	LOCAL	4040	-0.5	4.5	7.3	--	--	66.3
	NGM MOS		0.0	4.7	7.9	--	--	63.0
	LFM MOS		-1.4	5.1	10.8	--	--	57.8

Table 2.7. Comparative verification of local, NGM MOS, and LFM MOS max/min temperature forecasts for 28 stations in the Central Region, 0000 UTC 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	LOCAL	4813	-0.3	3.0	1.3	--	--	89.6
	NGM MOS		-0.1	3.4	2.2	--	--	86.9
	LFM MOS		-0.5	3.6	2.9	--	--	85.1
Tonight's Min	LOCAL	4716	-0.3	3.8	4.4	0.69	0.28	80.9
	NGM MOS		0.0	4.3	6.8	0.71	0.30	75.6
	LFM MOS		-1.2	4.3	5.5	0.70	0.30	76.6
Tomorrow's Max	LOCAL	4811	-0.7	4.2	5.2	--	--	80.2
	NGM MOS		-0.1	4.5	6.8	--	--	77.5
	LFM MOS		-0.8	4.6	7.0	--	--	76.9
Tomorrow Night's Min	LOCAL	4702	-0.5	5.0	9.6	0.57	0.37	68.3
	NGM MOS		-0.1	5.2	11.4	0.60	0.41	65.1
	LFM MOS		-0.5	5.3	11.4	0.48	0.38	65.2

Table 2.8. Same as Table 2.7 except for the 1200 UTC 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	LOCAL	4688	-0.4	3.4	2.3	0.74	0.22	84.7
	NGM MOS		0.2	3.9	4.5	0.70	0.27	80.1
	LFM MOS		-1.1	4.1	4.7	0.68	0.32	79.2
Tomorrow's Max	LOCAL	4765	-0.6	3.7	3.4	--	--	84.4
	NGM MOS		0.0	4.0	4.6	--	--	81.9
	LFM MOS		-0.9	4.4	6.3	--	--	78.6
Tomorrow Night's Min	LOCAL	4672	-0.4	4.5	7.0	0.72	0.32	74.2
	NGM MOS		0.2	4.8	9.5	0.73	0.33	69.6
	LFM MOS		-1.1	5.0	9.7	0.67	0.34	68.3
Day After Tomorrow's Max	LOCAL	4769	-0.6	4.9	9.0	--	--	72.8
	NGM MOS		0.3	5.2	10.5	--	--	69.2
	LFM MOS		-0.6	5.3	11.6	--	--	68.8

Table 2.9. Comparative verification of local, NGM MOS, and LFM MOS max/min temperature forecasts for 17 stations in the Western Region, 0000 UTC 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	LOCAL	2841	-0.2	2.8	0.8	--	--	83.7
	NGM MOS		-0.2	3.2	2.7	--	--	77.8
	LFM MOS		-0.8	3.3	2.3	--	--	76.4
Tonight's Min	LOCAL	2786	0.0	3.2	2.3	0.55	0.25	74.2
	NGM MOS		0.0	3.6	4.1	0.53	0.36	68.0
	LFM MOS		-0.4	3.6	3.0	0.55	0.33	69.4
Tomorrow's Max	LOCAL	2836	-0.6	3.5	3.0	--	--	73.4
	NGM MOS		-0.3	4.0	5.3	--	--	64.4
	LFM MOS		-0.9	4.1	5.8	--	--	63.7
Tomorrow Night's Min	LOCAL	2775	-0.4	3.9	4.6	0.37	0.43	63.0
	NGM MOS		-0.2	4.2	5.9	0.46	0.40	57.3
	LFM MOS		-0.1	4.2	5.9	0.33	0.37	58.8

Table 2.10. Same as Table 2.9 except for the 1200 UTC 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	LOCAL	2758	-0.2	2.9	1.5	0.48	0.22	78.9
	NGM MOS		0.2	3.1	2.1	0.46	0.14	76.0
	LFM MOS		-0.8	3.3	2.5	0.56	0.29	73.8
Tomorrow's Max	LOCAL	2802	-0.5	3.2	2.0	--	--	77.8
	NGM MOS		0.0	3.8	4.8	--	--	66.1
	LFM MOS		-0.8	4.0	5.6	--	--	65.7
Tomorrow Night's Min	LOCAL	2739	-0.4	3.6	3.2	0.58	0.27	68.9
	NGM MOS		-0.1	3.9	4.5	0.60	0.37	63.2
	LFM MOS		-0.6	3.9	4.1	0.53	0.36	64.1
Day After Tomorrow's Max	LOCAL	2799	-0.9	3.8	4.5	--	--	68.3
	NGM MOS		-0.6	4.3	6.5	--	--	59.6
	LFM MOS		-0.8	4.5	7.6	--	--	56.9

Table 2.11. Comparative verification of local and LFM MOS max/min temperature forecasts for 6 stations in the Alaska Region, 0000 UTC 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	LOCAL	1058	0.7	3.6	4.4	--	--	79.0
	LFM MOS		1.8	3.9	6.0	--	--	75.2
Tonight's Min	LOCAL	1051	-0.4	4.9	10.0	0.46	0.40	76.9
	LFM MOS		-1.4	5.3	12.4	0.69	0.36	74.5
Tomorrow's Max	LOCAL	1057	0.7	4.4	9.3	--	--	68.3
	LFM MOS		2.1	4.7	10.3	--	--	62.6
Tomorrow Night's Min	LOCAL	1057	-0.6	6.0	16.2	0.00	1.00	67.1
	LFM MOS		-1.8	6.0	15.4	0.42	0.58	68.7

Table 2.12. Same as Table 2.11 except for the 1200 UTC 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	LOCAL	1058	-1.1	4.2	6.0	0.58	0.30	82.3
	LFM MOS		-2.0	4.9	9.0	0.50	0.25	78.3
Tomorrow's Max	LOCAL	1064	0.5	4.1	8.5	--	--	71.9
	LFM MOS		1.6	4.4	8.6	--	--	67.2
Tomorrow Night's Min	LOCAL	1058	-0.9	5.5	13.1	0.45	0.38	71.2
	LFM MOS		-1.7	6.1	16.9	0.55	0.57	67.4
Day After Tomorrow's Max	LOCAL	1064	0.3	5.0	11.8	--	--	60.3
	LFM MOS		1.7	5.1	12.4	--	--	55.3

Table 3.1. Comparative verification of local, NGM MOS, and LFM MOS PoP forecasts for 93 stations in the conterminous U.S., 0000 UTC cycle.

Forecast Projection (h)	Type of Forecast	Brier Score	Local % Imp. Over Guid.	% Imp. Over Clim.	No. of Cases	Changes GE 20% to Guidance		
						Guid. Brier Score	Local % Imprv.	No. of Changes
12-24	LOCAL	0.0766		50.6				
(1st period)	NGM MOS	0.0797	4.0	48.6	15988	0.2075	9.0	1995
	LFM MOS	0.0850	9.9	45.2		0.2172	19.4	2725
24-36	LOCAL	0.0872		43.9				
(2nd period)	NGM MOS	0.0889	1.9	42.9	15962	0.2066	2.6	1775
	LFM MOS	0.0940	7.3	39.5		0.2166	15.5	2981
36-48	LOCAL	0.0961		37.5				
(3rd period)	NGM MOS	0.0979	1.8	36.4	15959	0.2080	5.3	1719
	LFM MOS	0.1030	6.7	33.1		0.2189	13.9	3143

Table 3.2. Same as Table 3.1 except for the 1200 UTC cycle.

Forecast Projection (h)	Type of Forecast	Brier Score	Local % Imp. Over Guid.	% Imp. Over Clim.	No. of Cases	Changes GE 20% to Guidance		
						Guid. Brier Score	Local % Imprv.	No. of Changes
12-24	LOCAL	0.0786		50.1				
(1st period)	NGM MOS	0.0813	3.3	48.4	15828	0.2103	8.6	2035
	LFM MOS	0.0864	9.1	45.1		0.2197	18.0	2827
24-36	LOCAL	0.0890		42.9				
(2nd period)	NGM MOS	0.0906	1.8	41.8	15844	0.2096	4.4	1737
	LFM MOS	0.0969	8.2	37.8		0.2198	16.7	3096
36-48	LOCAL	0.0991		36.5				
(3rd period)	NGM MOS	0.0996	0.4	36.3	15811	0.2040	-2.8	1713
	LFM MOS	0.1062	6.6	32.0		0.2147	12.9	3290

Table 3.3. Comparative verification of local, NGM MOS, and LFM MOS PoP forecasts for 24 stations in the Eastern Region, 0000 UTC cycle.

Forecast Projection (h)	Type of Forecast	Brier Score	Local % Imp. Over Guid.	% Imp. Over Clim.	No. of Cases	Changes GE 20% to Guidance		
						Guid. Brier Score	Local % Imprv.	No. of Changes
12-24 (1st period)	LOCAL	0.0913		54.1				
	NGM MOS	0.0924	1.1	53.6	4180	0.2100	2.7	652
	LFM MOS	0.0993	8.0	50.2		0.2192	13.5	908
24-36 (2nd period)	LOCAL	0.0986		50.2				
	NGM MOS	0.1004	1.8	49.3	4178	0.2018	-0.8	592
	LFM MOS	0.1081	8.8	45.4		0.2092	18.4	1006
36-48 (3rd period)	LOCAL	0.1125		43.6				
	NGM MOS	0.1140	1.2	42.9	4172	0.2100	4.8	584
	LFM MOS	0.1182	4.8	40.8		0.2169	9.2	1136

Table 3.4. Same as Table 3.3 except for the 1200 UTC cycle.

Forecast Projection (h)	Type of Forecast	Brier Score	Local % Imp. Over Guid.	% Imp. Over Clim.	No. of Cases	Changes GE 20% to Guidance		
						Guid. Brier Score	Local % Imprv.	No. of Changes
12-24 (1st period)	LOCAL	0.0878		56.1				
	NGM MOS	0.0905	3.0	54.7	4140	0.2051	6.6	634
	LFM MOS	0.0976	10.1	51.2		0.2114	17.9	963
24-36 (2nd period)	LOCAL	0.1038		47.8				
	NGM MOS	0.1032	-0.6	48.1	4140	0.1971	-2.9	565
	LFM MOS	0.1109	6.4	44.3		0.2074	11.2	1080
36-48 (3rd period)	LOCAL	0.1114		43.5				
	NGM MOS	0.1109	-0.4	43.7	4137	0.1990	-8.3	616
	LFM MOS	0.1236	9.9	37.3		0.2204	16.3	1172

Table 3.5. Comparative verification of local, NGM MOS, and LFM MOS PoP forecasts for 24 stations in the Southern Region, 0000 UTC cycle.

Forecast Projection (h)	Type of Forecast	Brier Score	Local % Imp. Over Guid.	% Imp. Over Clim.	No. of Cases	Changes GE 20% to Guidance: Guid. Brier Score	Changes GE 20% to Guidance: Local % Imprv.	Changes GE 20% to Guidance: No. of Changes
12-24	LOCAL	0.0673		48.2				
(1st period)	NGM MOS	0.0705	4.6	45.7	4089	0.1933	10.5	499
	LFM MOS	0.0750	10.4	42.2		0.2115	23.1	576
24-36	LOCAL	0.0749		42.7				
(2nd period)	NGM MOS	0.0768	2.5	41.3	4079	0.2030	7.9	410
	LFM MOS	0.0819	8.5	37.4		0.2113	18.0	670
36-48	LOCAL	0.0848		33.8				
(3rd period)	NGM MOS	0.0868	2.3	32.2	4078	0.2113	7.4	404
	LFM MOS	0.0899	5.7	29.9		0.1971	10.8	721

Table 3.6. Same as Table 3.5 except for the 1200 UTC cycle.

Forecast Projection (h)	Type of Forecast	Brier Score	Local % Imp. Over Guid.	% Imp. Over Clim.	No. of Cases	Changes GE 20% to Guidance: Guid. Brier Score	Changes GE 20% to Guidance: Local % Imprv.	Changes GE 20% to Guidance: No. of Changes
12-24	LOCAL	0.0669		49.8				
(1st period)	NGM MOS	0.0693	3.6	47.9	4056	0.1979	7.9	505
	LFM MOS	0.0755	11.4	43.3		0.2224	22.6	624
24-48	LOCAL	0.0797		38.9				
(2nd period)	NGM MOS	0.0810	1.5	38.0	4060	0.1973	3.7	438
	LFM MOS	0.0849	6.1	34.9		0.1952	15.8	657
48-36	LOCAL	0.0870		34.3				
(3rd period)	NGM MOS	0.0874	0.5	34.0	4045	0.1968	-1.7	392
	LFM MOS	0.0935	6.9	29.4		0.1982	15.7	751

Table 3.7. Comparative verification of local, NGM MOS, and LFM MOS PoP forecasts for 28 stations in the Central Region, 0000 UTC cycle.

Forecast Projection (h)	Type of Forecast	Brier Score	Local % Imp. Over Guid.	% Imp. Over Clim.	No. of Cases	Changes GE 20% to Guidance: Guid. Brier Score	Changes GE 20% to Guidance: Local % Imprv.	Changes GE 20% to Guidance: No. of Changes
12-24 (1st period)	LOCAL	0.0769		50.1				
	NGM MOS	0.0790	2.6	48.7	4875	0.1974	5.8	562
	LFM MOS	0.0863	10.8	44.0		0.2189	22.5	871
24-36 (2nd period)	LOCAL	0.0923		40.4				
	NGM MOS	0.0935	1.2	39.7	4870	0.2111	1.8	505
	LFM MOS	0.0980	5.8	36.7		0.2260	10.7	959
36-48 (3rd period)	LOCAL	0.0998		34.4				
	NGM MOS	0.1002	0.3	34.1	4867	0.1998	-4.9	462
	LFM MOS	0.1073	6.9	29.5		0.2355	16.2	908

Table 3.8. Same as Table 3.7 except for the 1200 UTC cycle.

Forecast Projection (h)	Type of Forecast	Brier Score	Local % Imp. Over Guid.	% Imp. Over Clim.	No. of Cases	Changes GE 20% to Guidance: Guid. Brier Score	Changes GE 20% to Guidance: Local % Imprv.	Changes GE 20% to Guidance: No. of Changes
12-24 (1st period)	LOCAL	0.0835		46.8				
	NGM MOS	0.0841	0.7	46.4	4832	0.2059	2.9	597
	LFM MOS	0.0918	9.0	41.6		0.2263	16.9	897
24-36 (2nd period)	LOCAL	0.0897		42.5				
	NGM MOS	0.0920	2.4	41.0	4837	0.2197	7.0	479
	LFM MOS	0.1031	12.9	33.9		0.2487	23.9	1022
36-48 (3rd period)	LOCAL	0.1058		32.3				
	NGM MOS	0.1053	-0.5	32.7	4832	0.2083	-2.7	490
	LFM MOS	0.1114	5.0	28.8		0.2197	9.2	1014

Table 3.9. Comparative verification of local, NGM MOS, and LFM MOS PoP forecasts for 17 stations in the Western Region, 0000 UTC cycle.

Forecast Projection (h)	Type of Forecast	Brier Score	Local % Imp. Over Guid.	% Imp. Over Clim.	No. of Cases	Changes GE 20% to Guidance: Guid. Brier Score	Changes GE 20% to Guidance: Local % Imprv.	Changes GE 20% to Guidance: No. of Changes
12-24	LOCAL	0.0678		47.0				
(1st period)	NGM MOS	0.0757	10.5	40.7	2844	0.2472	24.6	282
	LFM MOS	0.0763	11.2	40.3		0.2174	21.1	370
24-36	LOCAL	0.0793		38.7				
(2nd period)	NGM MOS	0.0813	2.4	37.2	2835	0.2140	3.5	268
	LFM MOS	0.0840	5.6	35.1		0.2222	16.3	346
36-48	LOCAL	0.0819		35.5				
(3rd period)	NGM MOS	0.0863	5.1	32.0	2842	0.2131	19.5	269
	LFM MOS	0.0920	11.0	27.5		0.2264	26.6	378

Table 3.10. Same as Table 3.9 except for the 1200 UTC cycle.

Forecast Projection (h)	Type of Forecast	Brier Score	Local % Imp. Over Guid.	% Imp. Over Clim.	No. of Cases	Changes GE 20% to Guidance: Guid. Brier Score	Changes GE 20% to Guidance: Local % Imprv.	Changes GE 20% to Guidance: No. of Changes
12-24	LOCAL	0.0734		43.8				
(1st period)	NGM MOS	0.0800	8.3	38.8	2800	0.2511	22.2	299
	LFM MOS	0.0767	4.3	41.3		0.2206	13.2	343
24-36	LOCAL	0.0793		38.1				
(2nd period)	NGM MOS	0.0837	5.3	34.6	2807	0.2398	14.0	255
	LFM MOS	0.0832	4.6	35.1		0.2201	10.3	337
36-48	LOCAL	0.0871		32.9				
(3rd period)	NGM MOS	0.0906	3.8	30.2	2797	0.2217	9.0	215
	LFM MOS	0.0898	2.9	30.9		0.2167	6.9	353

Table 3.11. Comparative verification of local and centrally archived LFM MOS PoP forecasts for 5 stations in the Alaska Region, 0000 UTC cycle.

Forecast Projection (h)	Type of Forecast	Brier Score	Local % Imp. Over Guid.	% Imp. Over Clim.	No. of Cases	Changes GE 20% to Guidance: Guid. Brier Score	Changes GE 20% to Guidance: Local % Imprv.	Changes GE 20% to Guidance: No. of Changes
18-30 (1st period)	LOCAL	0.143		*				
	LFM MOS	0.142	-0.6	*	861	**	**	**
30-42 (2nd period)	LOCAL	0.131		*				
	LFM MOS	0.144	9.2	*	864	**	**	**
42-54 (3rd period)	LOCAL	0.158		*				
	LFM MOS	0.152	-4.4	*	860	**	**	**

Table 3.12. Same as Table 3.11 except for the 1200 UTC cycle.

Forecast Projection (h)	Type of Forecast	Brier Score	Local % Imp. Over Guid.	% Imp. Over Clim.	No. of Cases	Changes GE 20% to Guidance: Guid. Brier Score	Changes GE 20% to Guidance: Local % Imprv.	Changes GE 20% to Guidance: No. of Changes
18-30 (1st period)	LOCAL	0.125		*				
	LFM MOS	0.137	8.7	*	862	**	**	**
30-42 (2nd period)	LOCAL	0.144		*				
	LFM MOS	0.147	2.2	*	862	**	**	**
42-54 (3rd period)	LOCAL	0.154		*				
	LFM MOS	0.153	-0.7	*	862	**	**	**

* Percent improvement over climate scores were not available.
** This score was not computed.

Table 4.1. Comparative verification of local and NGM MOS PoPT forecasts for 87 stations in the conterminous U.S. for the 0000 UTC cycle. Only cases where the local PoP was ≥ 30% were included.

Projection (h)	Region Number of Stations	Type of Forecast	Bias			Percent Correct	Skill Score	POD		FAR	
			ZR	S	R			ZR	S	ZR	S
18	Eastern 24	LOCAL	0.91	0.96	1.04	89.5	0.799	0.42	0.87	0.53	0.09
		NGM MOS	1.18	0.91	1.06	88.4	0.780	0.36	0.85	0.69	0.07
		No. Obs.	33	404	502						
	Southern 23	LOCAL	1.00	0.43	1.05	93.6	0.599	0.78	0.37	0.22	0.15
		NGM MOS	1.22	0.63	1.03	96.4	0.797	1.00	0.60	0.18	0.05
		No. Obs.	9	30	321						
	Central 28	LOCAL	1.20	0.95	1.08	89.8	0.789	0.60	0.90	0.50	0.05
		NGM MOS	0.83	1.02	0.99	88.8	0.759	0.30	0.94	0.64	0.08
		No. Obs.	30	482	212						
	Western 12	LOCAL	0.50	0.89	1.07	93.0	0.848	0.50	0.85	0.00	0.04
		NGM MOS	0.00	0.97	1.03	91.9	0.826	0.00	0.88	*	0.09
		No. Obs.	2	100	169						
	All Stations	LOCAL	1.03	0.93	1.06	90.6	0.822	0.54	0.87	0.47	0.07
		NGM MOS	1.01	0.96	1.03	90.2	0.814	0.41	0.89	0.60	0.07
		No. Obs.	74	1016	1204						
30	Eastern 24	LOCAL	0.65	1.06	1.00	84.3	0.715	0.34	0.88	0.48	0.17
		NGM MOS	1.04	0.95	1.04	85.4	0.741	0.49	0.84	0.54	0.11
		No. Obs.	68	408	471						
	Southern 23	LOCAL	1.10	1.20	0.98	91.6	0.534	0.50	0.55	0.55	0.54
		NGM MOS	0.70	1.15	1.00	94.9	0.695	0.40	0.85	0.43	0.26
		No. Obs.	10	20	302						
	Central 28	LOCAL	0.39	1.09	0.93	88.0	0.756	0.18	0.95	0.53	0.12
		NGM MOS	0.97	1.02	0.97	88.8	0.781	0.37	0.93	0.62	0.09
		No. Obs.	38	459	264						
	Western 12	LOCAL	0.50	1.15	0.92	88.4	0.762	0.50	0.92	0.00	0.20
		NGM MOS	0.00	0.97	1.03	90.4	0.793	0.00	0.86	*	0.11
		No. Obs.	2	95	162						
	All Stations	LOCAL	0.60	1.09	0.97	87.0	0.759	0.31	0.91	0.49	0.16
		NGM MOS	0.97	0.99	1.01	88.5	0.787	0.43	0.88	0.56	0.11
		No. Obs.	118	982	1199						
42	Eastern 24	LOCAL	0.91	0.96	1.04	85.9	0.734	0.26	0.85	0.72	0.12
		NGM MOS	1.43	0.90	1.06	86.5	0.750	0.34	0.83	0.76	0.08
		No. Obs.	35	420	480						
	Southern 23	LOCAL	0.29	0.73	1.04	93.1	0.544	0.14	0.50	0.50	0.32
		NGM MOS	1.71	0.69	1.01	94.3	0.675	0.86	0.58	0.50	0.17
		No. Obs.	7	26	302						
	Central 28	LOCAL	0.57	1.08	0.90	84.5	0.672	0.20	0.93	0.65	0.14
		NGM MOS	0.70	1.04	0.97	86.7	0.724	0.20	0.93	0.71	0.11
		No. Obs.	30	414	209						
	Western 12	LOCAL	0.00	0.92	1.05	91.1	0.804	0.00	0.84	*	0.09
		NGM MOS	1.00	0.94	1.04	94.2	0.873	0.00	0.89	1.00	0.05
		No. Obs.	1	93	163						
	All Stations	LOCAL	0.70	1.00	1.02	87.2	0.755	0.22	0.87	0.69	0.13
		NGM MOS	1.15	0.96	1.03	88.7	0.786	0.33	0.87	0.71	0.09
		No. Obs.	73	953	1154						

* This category was observed but was not forecast.

Table 4.2. Same as Table 4.1 except for the 1200 UTC cycle.

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	LOCAL	0.60	1.05	1.01	87.0	0.761	0.33	0.89	0.45	0.15
		NGM MOS	1.03	0.94	1.05	87.2	0.768	0.52	0.85	0.49	0.10
		No. Obs.	67	418	511						
	Southern 23	LOCAL	1.00	0.88	1.01	93.5	0.629	0.50	0.64	0.50	0.27
		NGM MOS	0.70	1.00	1.01	96.6	0.806	0.50	0.88	0.29	0.12
		No. Obs.	10	25	321						
	Central 28	LOCAL	0.80	1.00	1.03	88.5	0.776	0.40	0.91	0.50	0.09
		NGM MOS	0.80	1.00	1.03	89.1	0.789	0.38	0.92	0.53	0.07
		No. Obs.	40	455	267						
	Western 12	LOCAL	0.00	1.02	0.99	94.4	0.879	0.00	0.93	*	0.09
		NGM MOS	0.00	0.93	1.04	92.4	0.832	0.00	0.86	*	0.07
		No. Obs.	1	88	162						
	All Stations	LOCAL	0.69	1.02	1.01	89.2	0.798	0.36	0.90	0.48	0.12
		NGM MOS	0.92	0.97	1.03	89.8	0.809	0.47	0.88	0.49	0.08
		No. Obs.	118	986	1261						
30	Eastern 24	LOCAL	1.06	0.92	1.06	88.3	0.779	0.53	0.85	0.50	0.08
		NGM MOS	1.28	0.90	1.06	87.5	0.764	0.42	0.84	0.67	0.07
		No. Obs.	36	401	495						
	Southern 23	LOCAL	0.30	0.53	1.07	92.3	0.512	0.20	0.40	0.33	0.25
		NGM MOS	1.00	0.70	1.03	94.9	0.725	0.80	0.60	0.20	0.14
		No. Obs.	10	30	311						
	Central 28	LOCAL	0.57	1.01	1.05	86.3	0.714	0.26	0.91	0.55	0.10
		NGM MOS	0.74	1.00	1.04	87.5	0.740	0.26	0.92	0.65	0.08
		No. Obs.	35	459	215						
	Western 12	LOCAL	1.00	0.91	1.05	88.4	0.751	0.00	0.80	1.00	0.12
		NGM MOS	0.00	0.92	1.06	93.8	0.867	0.00	0.88	*	0.04
		No. Obs.	2	102	171						
	All Stations	LOCAL	0.76	0.95	1.06	88.3	0.777	0.36	0.86	0.52	0.09
		NGM MOS	0.99	0.94	1.05	89.4	0.799	0.39	0.87	0.61	0.07
		No. Obs.	83	992	1192						
42	Eastern 24	LOCAL	0.57	1.06	1.01	83.4	0.698	0.26	0.86	0.55	0.18
		NGM MOS	0.97	0.94	1.06	83.9	0.712	0.46	0.81	0.53	0.13
		No. Obs.	70	404	476						
	Southern 23	LOCAL	0.50	0.88	1.02	92.5	0.560	0.38	0.56	0.25	0.36
		NGM MOS	0.63	1.00	1.01	94.7	0.706	0.50	0.76	0.20	0.24
		No. Obs.	8	25	287						
	Central 28	LOCAL	0.57	1.07	0.95	85.2	0.709	0.19	0.93	0.67	0.13
		NGM MOS	0.92	1.03	0.96	87.6	0.761	0.38	0.93	0.59	0.10
		No. Obs.	37	418	262						
	Western 12	LOCAL	0.00	1.11	0.95	84.4	0.669	0.00	0.83	*	0.25
		NGM MOS	0.00	0.90	1.06	90.3	0.785	0.00	0.82	*	0.09
		No. Obs.	1	84	152						
	All Stations	LOCAL	0.56	1.06	0.99	85.4	0.726	0.24	0.88	0.57	0.17
		NGM MOS	0.92	0.98	1.03	87.3	0.765	0.43	0.86	0.53	0.12
		No. Obs.	116	931	1177						

* This category was observed but was not forecast.

Table 5.1. Comparative verification of local and NGM MOS snow amount forecasts from the AEV data archive for 79 stations in the conterminous U.S. for the 12-24 h projection.

Cycle (UTC)	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
	LOCAL	1.24	1.17	0.95	97.6	0.406	0.383	0.257	0.156	0.62	0.44	0.26	0.50	0.62	0.72
0000	NGM MOS	0.84	0.42	0.89	97.9	0.384	0.321	0.237	0.241	0.45	0.27	0.37	0.47	0.35	0.59
	No. Obs.	232	81	38											
	LOCAL	1.31	1.28	0.96	97.4	0.364	0.315	0.189	0.214	0.55	0.36	0.35	0.58	0.72	0.64
1200	NGM MOS	0.95	0.54	1.42	97.7	0.338	0.289	0.191	0.105	0.44	0.25	0.23	0.54	0.54	0.84
	No. Obs.	226	69	26											

Table 5.2. Same as Table 5.1 except NGM MOS is the correct centrally-archived snow amount guidance.

Cycle (UTC)	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
	LOCAL	1.21	1.09	0.88	97.3	0.404	0.371	0.239	0.145	0.60	0.40	0.24	0.51	0.63	0.73
0000	NGM MOS	0.92	0.96	0.83	97.7	0.409	0.365	0.277	0.222	0.51	0.42	0.33	0.44	0.56	0.60
	No. Obs.	274	92	42											
	LOCAL	1.39	1.27	1.03	97.1	0.349	0.303	0.204	0.204	0.56	0.38	0.34	0.60	0.70	0.67
1200	NGM MOS	1.04	1.06	1.28	97.6	0.363	0.327	0.238	0.100	0.50	0.40	0.21	0.52	0.63	0.84
	No. Obs.	250	78	29											

Table 6.1. Comparative verification of local and NGM MOS forecasts of four categories of cloud amount (clear, scattered, broken, and overcast) for 89 stations in the conterminous U.S., 0000 UTC cycle.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Percent Correct	Skill Score
12	LOCAL	0.72	1.44	1.75	0.92	66.8	0.531
	NGM MOS	0.79	1.57	1.28	0.93	60.7	0.439
	No. Obs.	5348	1938	1495	6209		
18	LOCAL	0.52	1.65	2.24	0.77	50.8	0.346
	NGM MOS	0.58	1.80	1.53	0.87	53.5	0.368
	No. Obs.	4988	2326	1826	5939		
24	LOCAL	0.53	1.80	2.14	0.77	48.5	0.314
	NGM MOS	0.63	1.81	1.46	0.88	53.7	0.366
	No. Obs.	5169	2229	1742	5852		

Table 6.2. Same as Table 6.1 except for the 1200 UTC cycle.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Percent Correct	Skill Score
12	LOCAL	0.70	1.43	1.77	0.87	61.4	0.470
	NGM MOS	0.71	1.66	1.32	0.91	57.4	0.411
	No. Obs.	5169	2232	1754	5891		
18	LOCAL	0.58	1.91	2.42	0.86	54.5	0.375
	NGM MOS	0.78	1.75	1.25	0.95	60.5	0.428
	No. Obs.	6053	1660	1334	5991		
24	LOCAL	0.57	1.73	2.08	0.88	52.2	0.343
	NGM MOS	0.73	1.62	1.38	0.95	57.2	0.391
	No. Obs.	5324	1925	1523	6248		

Table 6.3. Comparative verification of local and NGM MOS forecasts of four categories of cloud amount (clear, scattered, broken, and overcast) for 24 stations in the Eastern Region, 0000 UTC cycle.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Percent Correct	Skill Score
12	LOCAL	0.66	1.41	1.71	0.92	63.4	0.470
	NGM MOS	0.72	1.52	1.24	0.96	61.7	0.437
	No. Obs.	1121	570	418	1953		
18	LOCAL	0.45	1.45	2.38	0.81	53.2	0.357
	NGM MOS	0.51	1.64	1.60	0.90	56.0	0.380
	No. Obs.	1074	660	465	1860		
24	LOCAL	0.50	1.86	2.40	0.83	52.6	0.339
	NGM MOS	0.66	1.75	1.50	0.93	59.3	0.408
	No. Obs.	1255	498	379	1930		

Table 6.4. Same as Table 6.3 except for the 1200 UTC cycle.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Percent Correct	Skill Score
12	LOCAL	0.61	1.49	2.15	0.90	61.3	0.446
	NGM MOS	0.76	1.61	1.28	0.94	62.5	0.447
	No. Obs.	1256	499	386	1943		
18	LOCAL	0.56	1.82	2.32	0.89	57.4	0.390
	NGM MOS	0.76	1.74	1.06	1.01	63.3	0.444
	No. Obs.	1379	394	370	1942		
24	LOCAL	0.64	1.40	1.90	0.89	56.0	0.370
	NGM MOS	0.67	1.46	1.35	0.98	58.5	0.390
	No. Obs.	1117	572	432	1957		

Table 6.5. Comparative verification of local and NGM MOS forecasts of four categories of cloud amount (clear, scattered, broken, and overcast) for 21 stations in the Southern Region, 0000 UTC cycle.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Percent Correct	Skill Score
12	LOCAL	0.71	1.61	1.81	0.86	66.3	0.534
	NGM MOS	0.83	1.53	1.23	0.92	63.2	0.478
	No. Obs.	1332	457	345	1259		
18	LOCAL	0.58	1.81	1.77	0.67	49.2	0.334
	NGM MOS	0.69	1.74	1.14	0.88	56.4	0.413
	No. Obs.	1194	582	536	1174		
24	LOCAL	0.56	1.81	1.88	0.70	45.6	0.286
	NGM MOS	0.68	1.73	1.30	0.85	53.1	0.368
	No. Obs.	1252	593	452	1097		

Table 6.6. Same as Table 6.5 except for the 1200 UTC cycle.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Percent Correct	Skill Score
12	LOCAL	0.69	1.51	1.63	0.82	59.7	0.460
	NGM MOS	0.74	1.61	1.13	0.91	56.1	0.403
	No. Obs.	1253	593	464	1111		
18	LOCAL	0.54	2.09	2.43	0.85	52.8	0.364
	NGM MOS	0.81	1.68	1.24	0.96	61.0	0.436
	No. Obs.	1577	408	310	1121		
24	LOCAL	0.55	1.94	2.18	0.80	50.6	0.339
	NGM MOS	0.77	1.50	1.35	0.96	59.8	0.433
	No. Obs.	1328	460	354	1271		

Table 6.7. Comparative verification of local and NGM MOS forecasts of four categories of cloud amount (clear, scattered, broken, and overcast) for 26 stations in the Central Region, 0000 UTC cycle.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Percent Correct	Skill Score
12	LOCAL	0.68	1.43	1.93	0.95	65.6	0.510
	NGM MOS	0.74	1.65	1.36	0.95	59.0	0.409
	No. Obs.	1628	569	406	1948		
18	LOCAL	0.38	1.85	2.48	0.80	47.6	0.306
	NGM MOS	0.48	1.96	1.68	0.90	50.2	0.322
	No. Obs.	1533	655	513	1846		
24	LOCAL	0.37	2.08	2.38	0.81	45.5	0.276
	NGM MOS	0.53	1.97	1.54	0.92	52.3	0.341
	No. Obs.	1548	626	486	1887		

Table 6.8. Same as Table 6.7 except for the 1200 UTC cycle.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Percent Correct	Skill Score
12	LOCAL	0.65	1.51	1.83	0.91	60.6	0.453
	NGM MOS	0.63	1.74	1.46	0.94	56.5	0.392
	No. Obs.	1554	634	484	1900		
18	LOCAL	0.51	2.08	2.70	0.86	52.3	0.342
	NGM MOS	0.73	1.80	1.41	0.96	59.6	0.409
	No. Obs.	1769	488	361	1955		
24	LOCAL	0.46	1.91	2.38	0.90	48.6	0.293
	NGM MOS	0.69	1.68	1.48	0.96	55.9	0.367
	No. Obs.	1629	560	411	1965		

Table 6.9. Comparative verification of local and NGM MOS forecasts of four categories of cloud amount (clear, scattered, broken, and overcast) for 18 stations in the Western Region, 0000 UTC cycle.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Percent Correct	Skill Score
12	LOCAL	0.84	1.31	1.50	0.94	73.8	0.624
	NGM MOS	0.88	1.56	1.30	0.86	59.3	0.418
	No. Obs.	1267	342	326	1049		
18	LOCAL	0.71	1.44	2.45	0.72	54.3	0.383
	NGM MOS	0.68	1.86	1.87	0.75	52.0	0.351
	No. Obs.	1187	429	312	1059		
24	LOCAL	0.76	1.40	1.92	0.65	50.7	0.343
	NGM MOS	0.67	1.79	1.50	0.73	48.9	0.320
	No. Obs.	1114	512	425	938		

Table 6.10. Same as Table 6.9 except for the 1200 UTC cycle.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Percent Correct	Skill Score
12	LOCAL	0.87	1.18	1.51	0.83	64.5	0.516
	NGM MOS	0.73	1.68	1.41	0.77	53.4	0.374
	No. Obs.	1106	506	420	937		
18	LOCAL	0.72	1.58	2.19	0.80	56.0	0.392
	NGM MOS	0.85	1.78	1.31	0.81	57.5	0.393
	No. Obs.	1328	370	293	973		
24	LOCAL	0.68	1.70	1.85	0.90	54.4	0.368
	NGM MOS	0.79	1.93	1.33	0.85	54.1	0.355
	No. Obs.	1250	333	326	1055		

Table 6.11. Comparative verification of local and LFM MOS forecasts of four categories of cloud amount (clear, scattered, broken, and overcast) for 6 stations in the Alaska Region, 0000 UTC cycle.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Percent Correct	Skill Score
12	LOCAL	0.73	1.03	1.75	1.02	63.5	0.406
	LFM MOS	0.89	0.79	0.94	1.10	67.6	0.448
	No. Obs.	279	105	85	582		
18	LOCAL	0.74	1.02	1.45	0.99	57.5	0.327
	LFM MOS	0.81	0.64	0.98	1.15	61.7	0.354
	No. Obs.	220	123	135	585		
24	LOCAL	0.65	0.97	1.71	0.98	52.7	0.273
	LFM MOS	0.84	0.66	0.81	1.19	63.0	0.384
	No. Obs.	230	131	137	563		

Table 6.12. Same as Table 6.11 except for the 1200 UTC cycle.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Percent Correct	Skill Score
12	LOCAL	0.84	0.85	1.53	0.97	64.0	0.443
	LFM MOS	0.89	0.74	1.07	1.09	63.1	0.404
	No. Obs.	228	126	137	563		
18	LOCAL	0.59	1.22	2.32	0.96	59.3	0.362
	LFM MOS	0.80	0.93	1.20	1.08	62.6	0.375
	No. Obs.	280	111	85	583		
24	LOCAL	0.56	1.22	2.24	0.98	57.8	0.332
	LFM MOS	0.83	0.70	1.01	1.13	63.8	0.376
	No. Obs.	278	100	88	577		

Table 7.1. Verification of NGM MOS surface wind forecasts for 95 stations in the conterminous U.S., 0000 UTC 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	NGM	21	0.554	4661	3.5	2.2	4697	0.404	85.8	0.28	0.97 14181	1.17 1500	1.38 350	1.53 59	1.67 15	1.00 3
18	NGM	23	0.512	7580	3.4	1.4	7617	0.414	75.0	0.20	0.98 11967	1.02 3023	1.13 960	1.28 194	0.98 58	1.27 11
24	NGM	26	0.478	5748	3.6	1.9	5790	0.373	81.1	0.14	0.98 13387	1.08 2033	1.17 515	0.96 113	2.21 14	1.60 5

Table 7.2. Same as Table 7.1 except for 94 stations for the 1200 UTC 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	NGM	23	0.508	5763	3.4	1.7	5796	0.400	82.0	0.14	0.98 13333	1.06 2040	1.15 518	1.03 111	2.29 14	2.80 5
18	NGM	23	0.518	4745	3.7	2.0	4780	0.393	85.3	0.03	0.98 14002	1.16 1550	1.21 366	0.91 81	2.00 11	5.00 1
24	NGM	24	0.507	4645	3.8	2.2	4687	0.365	85.0	0.24	0.97 14153	1.20 1497	1.20 352	1.41 59	1.13 15	0.33 3

Table 7.3. Verification of NGM MOS surface wind forecasts for 24 stations in the Eastern Region, 0000 UTC 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	NGM	22	0.512	1297	3.5	2.2	1309	0.390	84.7	0.00	0.96 3641	1.21 416	1.53 88	2.33 9	3.00 1	** 0
18	NGM	23	0.501	2091	3.2	1.4	2097	0.423	74.7	0.00	0.97 3028	1.03 850	1.34 230	1.02 42	0.33 6	** 0
24	NGM	23	0.493	1400	3.4	1.5	1408	0.406	83.1	0.00	0.98 3487	1.14 499	1.03 124	0.48 27	2.00 1	* 0

Table 7.4. Same as Table 7.3 except for the 1200 UTC 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	NGM	22	0.497	1434	3.3	1.5	1443	0.410	82.8	0.00	0.97 3481	1.16 502	1.16 125	0.59 27	0.00 1	** 0
18	NGM	22	0.483	1299	3.5	1.8	1310	0.391	84.6	0.00	0.97 3602	1.21 427	1.23 97	0.65 20	0.00 2	0.00 1
24	NGM	24	0.475	1314	3.6	2.1	1325	0.397	85.1	0.00	0.97 3650	1.27 417	1.12 90	1.50 10	0.00 1	** 0

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

Table 7.5. Verification of NGM MOS surface wind forecasts for 25 stations in the Southern Region, 0000 UTC 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	NGM	20	0.571	909	3.2	1.6	915	0.398	89.8	0.25	1.00 3704	1.01 313	0.83 52	1.00 9	0.25 4	** 0
18	NGM	24	0.508	1830	3.1	0.9	1835	0.414	78.1	0.28	1.02 3195	0.97 739	0.86 199	0.88 33	0.83 12	0.00 1
24	NGM	24	0.498	1145	3.3	1.5	1153	0.362	85.4	0.25	1.00 3545	1.03 410	0.74 101	1.15 13	1.00 2	* 0

Table 7.6. Same as Table 7.5 except for 24 stations for the 1200 UTC 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	NGM	22	0.526	1203	3.1	1.3	1206	0.413	86.2	0.13	1.00 3525	1.00 420	0.88 103	0.93 14	3.00 2	* 0
18	NGM	22	0.553	1013	3.4	1.7	1017	0.369	88.2	0.00	1.00 3640	1.01 336	0.93 68	1.11 9	1.00 1	** 0
24	NGM	24	0.482	876	3.5	1.7	882	0.329	89.1	0.50	1.01 3704	0.94 308	0.87 52	0.56 9	0.50 4	** 0

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

Table 7.7. Verification of NGM MOS surface wind forecasts for 28 stations in the Central Region, 0000 UTC 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	NGM	18	0.571	1890	3.6	2.3	1900	0.394	80.6	0.36	0.93 4129	1.27 589	1.63 144	1.41 34	2.50 8	1.00 3
18	NGM	20	0.540	2889	3.5	1.6	2901	0.393	67.7	0.23	0.94 3203	1.06 1158	1.21 414	1.50 92	1.06 31	1.33 9
24	NGM	24	0.489	2167	3.7	2.1	2176	0.364	76.3	0.16	0.95 3885	1.13 750	1.51 183	1.06 50	3.38 8	0.60 5

Table 7.8. Same as Table 7.7 except for the 1200 UTC 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	NGM	21	0.539	2099	3.4	1.9	2107	0.410	78.6	0.18	0.96 3873	1.08 745	1.33 183	1.27 48	2.50 8	2.60 5
18	NGM	20	0.526	1792	3.7	2.2	1804	0.408	81.9	0.04	0.96 4083	1.19 583	1.33 150	0.98 42	2.50 6	* 0
24	NGM	21	0.531	1910	3.9	2.4	1925	0.344	79.0	0.25	0.93 4106	1.31 591	1.52 143	1.29 34	1.63 8	0.33 3

* This category was forecast but was not observed.

Table 7.9. Verification of NGM MOS surface wind forecasts for 18 stations in the Western Region, 0000 UTC 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	NGM	29	0.452	565	3.8	2.4	573	0.429	90.5	0.00	0.99 2707	1.07 182	1.05 66	1.71 7	0.50 2	** 0
18	NGM	37	0.379	770	4.7	2.5	784	0.353	83.1	0.09	1.00 2541	1.00 276	0.94 117	1.44 27	1.33 9	2.00 1
24	NGM	36	0.362	1036	4.1	2.1	1053	0.338	80.4	0.00	1.00 2470	0.96 374	1.15 107	1.17 23	0.00 3	* 0

Table 7.10. Same as Table 7.9 except for the 1200 UTC 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	NGM	32	0.395	1027	3.9	1.8	1040	0.338	80.5	0.00	1.00 2454	0.95 373	1.09 107	1.09 22	2.00 3	** 0
18	NGM	32	0.424	641	4.4	2.6	649	0.363	88.2	0.00	0.98 2677	1.20 204	1.22 51	1.00 10	3.00 2	* 0
24	NGM	32	0.429	545	4.4	2.6	555	0.361	89.3	0.00	0.99 2693	1.10 181	0.87 67	3.17 6	1.00 2	** 0

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

Table 7.11. Verification of LFM MOS surface wind forecasts for 6 stations in the Alaska Region, 0000 UTC 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	LFM	23	0.530	330	4.3	2.3	339	0.375	79.6	0.00	0.97 873	1.23 116	1.04 50	1.11 18	0.50 2	** 0
18	LFM	28	0.418	354	4.8	2.3	358	0.319	77.3	0.10	0.96 874	1.44 103	0.88 57	1.21 19	0.25 8	* 0
24	LFM	32	0.392	414	5.0	2.9	421	0.323	75.7	0.06	0.96 848	1.19 131	1.02 47	1.00 24	2.20 5	2.00 1

Table 7.12. Same as Table 7.11 except for the 1200 UTC 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	LFM	26	0.433	363	4.1	1.8	365	0.347	77.9	0.10	0.99 850	1.09 127	0.92 48	0.92 25	1.00 5	0.00 1
18	LFM	29	0.387	353	4.8	2.6	356	0.342	79.8	0.00	0.97 886	1.27 97	0.93 54	0.95 19	* 0	* 0
24	LFM	32	0.378	347	5.0	3.1	356	0.353	79.4	0.00	0.96 880	1.19 114	1.22 45	0.82 17	3.00 2	* 0

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

Table 7.13. Verification of local surface wind forecasts for 92 stations in the conterminous U.S. for the FT issuance time of approximately 0900 UTC.

		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	0.541	6186	3.4	2.1	6261	0.417	86.4	0.11	0.97 14197	1.28 1476	1.00 358	0.60 58	0.86 14	0.33 3
9	LOCAL	30	0.438	9840	3.5	1.4	9924	0.366	73.2	0.09	0.98 11850	1.19 3043	0.77 935	0.42 199	0.48 50	0.43 14
15	LOCAL	34	0.368	9132	4.2	3.0	9331	0.299	76.6	0.02	0.91 13540	1.62 1962	1.17 489	0.53 94	1.69 13	1.00 3

Table 7.14. Same as Table 7.13 except for 93 stations for the FT issuance time of approximately 1800 UTC.

		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	25	0.486	10268	3.1	1.4	10348	0.417	74.8	0.16	0.96 11913	1.20 3088	0.95 901	0.60 213	0.55 55	0.80 5
9	LOCAL	32	0.400	7081	4.1	2.7	7266	0.307	81.9	0.00	0.96 13985	1.46 1590	0.88 396	0.32 74	0.71 17	1.00 1
15	LOCAL	33	0.383	6332	4.2	2.7	6548	0.327	84.0	0.00	0.97 14169	1.42 1448	0.83 364	0.36 70	0.55 11	0.17 6

Table 7.15. Verification of local surface wind forecasts for 24 stations in the Eastern Region for the FT issuance time of approximately 0900 UTC.

		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	0.494	1899	3.4	2.3	1928	0.376	84.1	0.00	0.95 3748	1.39 436	1.01 90	0.78 9	1.00 1	* 0
9	LOCAL	28	0.419	2835	3.4	1.5	2856	0.360	72.3	0.00	0.98 3109	1.16 880	0.81 237	0.46 46	0.57 7	** 0
15	LOCAL	33	0.360	2565	4.2	3.1	2623	0.286	76.2	0.00	0.90 3620	1.69 515	1.18 125	0.41 27	2.00 1	** 0

Table 7.16. Same as Table 7.15 except for the FT issuance time of approximately 1800 UTC.

		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	24	0.477	2787	3.0	1.6	2803	0.407	75.3	0.17	0.94 3239	1.23 805	1.12 191	0.56 45	0.17 6	** 0
9	LOCAL	31	0.390	2084	4.1	2.5	2144	0.296	79.7	0.00	0.96 3637	1.40 489	0.87 124	0.09 22	0.20 5	0.00 1
15	LOCAL	34	0.344	1919	4.2	3.0	1989	0.302	81.4	0.00	0.94 3743	1.53 428	1.10 91	0.58 19	0.00 1	0.00 1

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

Table 7.17. Verification of local surface wind forecasts for 22 stations in the Southern Region for the FT issuance time of approximately 0900 UTC.

		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	0.568	1277	3.3	2.3	1289	0.384	89.5	0.25	0.98 3457	1.25 273	0.83 41	0.67 6	1.50 2	** 0
9	LOCAL	30	0.429	2274	3.3	1.5	2293	0.366	76.8	0.00	0.99 2928	1.17 657	0.55 155	0.39 23	0.14 7	** 0
15	LOCAL	35	0.364	2053	4.2	3.2	2114	0.274	80.6	0.00	0.92 3323	1.78 362	0.67 85	0.60 5	0.00 1	* 0

Table 7.18. Same as Table 7.17 except for 23 stations for the FT issuance time of approximately 1800 UTC.

		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	0.487	2541	3.1	1.6	2564	0.372	75.5	0.08	0.95 2989	1.32 652	0.73 172	0.62 37	0.33 9	0.00 1
9	LOCAL	29	0.423	1509	3.9	2.8	1558	0.267	86.0	**	0.97 3418	1.36 298	0.78 46	0.40 5	** 0	** 0
15	LOCAL	32	0.403	1252	3.9	2.7	1299	0.337	89.0	0.00	0.98 3451	1.35 248	0.62 55	0.00 7	** 0	0.00 1

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

Table 7.19. Verification of local surface wind forecasts for 28 stations in the Central Region for the FT issuance time of approximately 0900 UTC.

		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	19	0.562	2303	3.2	1.8	2327	0.446	83.1	0.10	0.96 4132	1.26 601	1.14 155	0.53 32	0.73 11	0.00 3
9	LOCAL	26	0.479	3417	3.4	1.0	3435	0.348	66.1	0.16	0.94 3229	1.31 1154	0.81 411	0.43 97	0.31 32	0.50 10
15	LOCAL	31	0.382	3178	4.1	2.7	3227	0.306	70.6	0.04	0.85 3895	1.68 779	1.32 195	0.56 52	1.63 8	0.67 3

Table 7.20. Same as Table 7.19 except for the FT issuance time of approximately 1800 UTC.

		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	0.516	3462	2.9	1.0	3481	0.433	70.2	0.22	0.94 3215	1.22 1197	0.95 401	0.63 97	0.54 35	1.33 3
9	LOCAL	30	0.403	2516	4.0	2.5	2563	0.318	77.8	0.00	0.93 4139	1.57 594	0.96 160	0.32 37	0.50 10	* 0
15	LOCAL	30	0.404	2318	4.0	2.3	2371	0.325	79.6	0.00	0.96 4159	1.42 579	0.78 159	0.21 33	0.33 9	0.33 3

* This category was forecast but was not observed.

Table 7.21. Verification of local surface wind forecasts for 18 stations in the Western Region for the FT issuance time of approximately 0900 UTC.

		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	30	0.461	707	3.7	1.8	717	0.416	91.2	**	1.00 2860	1.13 166	0.78 72	0.64 11	** 0	** 0
9	LOCAL	42	0.353	1314	4.3	2.1	1340	0.324	81.3	0.00	1.03 2584	0.91 352	0.83 132	0.33 33	2.25 4	0.25 4
15	LOCAL	41	0.315	1336	4.4	3.1	1367	0.283	81.9	0.00	0.97 2702	1.18 306	1.30 84	0.70 10	2.33 3	** 0

Table 7.22. Same as Table 7.21 except for the FT issuance time of approximately 1800 UTC.

		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	34	0.406	1478	3.5	1.6	1500	0.399	80.6	0.00	1.02 2470	0.91 434	0.99 137	0.56 34	1.40 5	0.00 1
9	LOCAL	43	0.309	972	4.5	3.1	1001	0.304	86.7	0.00	0.98 2791	1.39 209	0.74 66	0.80 10	3.00 2	** 0
15	LOCAL	43	0.285	843	4.8	3.2	889	0.325	88.6	0.00	0.99 2816	1.26 193	0.75 59	0.64 11	3.00 1	0.00 1

** This category was neither forecast nor observed.

Table 7.23. Verification of local surface wind forecasts for 6 stations in the Alaska Region for the FT issuance time of approximately 0900 UTC.

		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	0.559	411	3.2	1.4	419	0.581	87.6	0.00	1.00 868	1.08 106	1.10 49	0.39 18	0.50 2	** 0
9	LOCAL	33	0.385	436	4.3	1.8	443	0.368	80.7	0.13	1.00 873	1.23 100	0.95 57	0.42 19	0.13 8	** 0
15	LOCAL	38	0.310	465	4.7	2.2	479	0.296	76.3	0.14	1.00 845	1.01 133	1.34 47	0.29 24	0.40 5	0.00 1

Table 7.24. Same as Table 7.23 except for the FT issuance time of approximately 1800 UTC.

		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	37	0.351	521	4.4	2.2	535	0.356	78.1	0.10	1.00 848	0.98 130	1.40 48	0.52 25	1.00 5	0.00 1
9	LOCAL	44	0.268	516	5.1	3.3	539	0.292	77.6	0.00	0.95 891	1.38 98	1.19 53	0.75 20	* 0	** 0
15	LOCAL	46	0.291	482	5.6	3.9	518	0.247	76.2	0.00	0.96 874	1.18 107	1.41 44	1.00 17	2.00 2	** 0

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

Table 7.25. Comparative verification of local and LFM MOS 42-h significant wind forecasts for 6 stations in the Alaska Region, 0000 UTC cycle.

Type of Verifying Observation	Type of Forecast	Bias by Category		Skill Score	Percent Forecast Correct	Threat Score ≥22 kt
		< 22 kt	≥ 22 kt			
1-min Avg	LOCAL	0.98	1.70	0.216	93.6	0.14
	LFM MOS	1.00	1.12	0.291	95.4	0.19
	No. Obs.	1018	33			
± 3-h Max	LOCAL	1.02	0.78	0.318	92.1	0.22
	LFM MOS	1.04	0.51	0.336	93.4	0.22
	No. Obs.	969	72			

Table 7.26. Same as Table 7.25 except for the 1200 UTC cycle.

Type of Verifying Observation	Type of Forecast	Bias by Category		Skill Score	Percent Forecast Correct	Threat Score ≥22 kt
		< 22 kt	≥ 22 kt			
1-min Avg	LOCAL	0.98	1.62	0.183	94.3	0.12
	LFM MOS	0.99	1.24	0.222	95.4	0.14
	No. Obs.	1026	29			
± 3-h Max	LOCAL	1.01	0.81	0.228	92.7	0.15
	LFM MOS	1.02	0.62	0.333	94.3	0.22
	No. Obs.	990	58			

Table 8.1. Comparative verification of NGM MOS and persistence ceiling height forecasts for 94 stations in the conterminous U.S. for the 0000 UTC cycle.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Log Score	Percent Correct	Skill Score
12	NGM MOS	0.96	1.22	1.17	0.96	3.054	74.9	0.415
	PERSISTENCE	0.89	0.92	0.97	1.02	1.891	83.6	0.587
	No. Obs.	808	866	2056	11422			
15	NGM MOS	1.15	1.46	1.13	0.93	3.128	72.9	0.368
	PERSISTENCE	1.12	0.95	0.81	1.03	2.741	77.7	0.412
	No. Obs.	73	113	305	1562			
18	NGM MOS	1.50	1.25	1.10	0.94	2.768	74.7	0.402
	PERSISTENCE	1.80	0.97	0.81	1.01	2.981	74.4	0.345
	No. Obs.	398	813	2419	11444			
24	NGM MOS	1.21	1.34	1.15	0.96	2.206	79.2	0.377
	PERSISTENCE	2.08	1.33	1.11	0.94	3.325	73.1	0.224
	No. Obs.	331	571	1697	12049			

Table 8.2. Same as Table 8.1 except for the 1200 UTC cycle.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Log Score	Percent Correct	Skill Score
12	NGM MOS	1.11	1.34	1.21	0.95	2.059	79.8	0.407
	PERSISTENCE	0.82	1.17	1.22	0.97	1.296	86.1	0.578
	No. Obs.	333	586	1719	12137			
15	NGM MOS	1.09	1.47	1.14	0.96	2.297	79.6	0.398
	PERSISTENCE	0.57	1.14	1.15	0.99	1.960	81.4	0.414
	No. Obs.	53	79	228	1654			
18	NGM MOS	1.08	1.35	1.19	0.95	2.720	76.4	0.379
	PERSISTENCE	0.49	1.00	1.14	1.00	2.405	77.8	0.363
	No. Obs.	555	690	1826	11877			
24	NGM MOS	1.10	1.35	1.20	0.93	3.586	71.9	0.360
	PERSISTENCE	0.35	0.81	1.03	1.05	3.349	72.0	0.255
	No. Obs.	779	843	2028	11273			

Table 8.3. Comparative verification of LFM MOS and persistence ceiling height forecasts for 6 stations in the Alaska Region, 0000 UTC cycle.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Log Score	Percent Correct	Skill Score
12	LFM MOS	0.80	1.10	1.74	0.84	3.509	65.6	0.271
	PERSISTENCE	0.97	0.88	1.00	1.01	2.298	79.4	0.481
	No. Obs.	35	50	170	779			
18	LFM MOS	0.65	2.06	1.83	0.76	3.909	61.9	0.262
	PERSISTENCE	0.85	1.25	0.89	1.02	2.942	72.6	0.321
	No. Obs.	40	36	193	771			
24	LFM MOS	0.50	1.58	1.94	0.76	3.375	62.9	0.254
	PERSISTENCE	1.55	1.00	0.92	1.00	3.148	71.2	0.264
	No. Obs.	22	45	182	783			

Table 8.4. Same as Table 8.3 except for the 1200 UTC cycle.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Log Score	Percent Correct	Skill Score
12	LFM MOS	1.39	1.29	1.72	0.81	3.273	66.9	0.310
	PERSISTENCE	1.30	0.93	1.07	0.98	1.871	80.3	0.509
	No. Obs.	23	45	183	790			
18	LFM MOS	1.00	1.50	1.82	0.79	3.740	63.0	0.248
	PERSISTENCE	1.00	0.95	1.10	0.98	2.698	72.1	0.309
	No. Obs.	29	44	180	787			
24	LFM MOS	0.81	1.38	1.99	0.77	4.062	60.7	0.217
	PERSISTENCE	0.81	0.81	1.17	0.98	3.144	71.0	0.284
	No. Obs.	37	48	167	778			

Table 8.5. Comparative verification of local and persistence ceiling height forecasts for 92 stations in the conterminous U.S. for the FT release time of approximately 0900 UTC.

Projection (h)	Type of Forecast	Bias by Category				Log Score	Percent Correct	Skill Score
		1	2	3	4			
03	LOCAL	0.88	1.06	1.06	1.00	1.938	83.5	0.543
	PERSISTENCE	0.93	0.92	0.94	1.02	1.708	85.4	0.582
	No. Obs.	796	783	1657	12186			
06	LOCAL	0.59	0.89	1.06	1.02	2.224	80.2	0.452
	PERSISTENCE	1.08	0.80	0.87	1.03	2.459	79.8	0.434
	No. Obs.	654	864	1867	11966			
09	LOCAL	0.46	0.74	1.04	1.02	1.830	80.7	0.418
	PERSISTENCE	2.15	0.92	0.80	1.01	2.684	77.1	0.334
	No. Obs.	316	734	2084	12223			
15	LOCAL	0.27	0.96	1.50	0.96	1.723	81.8	0.374
	PERSISTENCE	2.28	1.32	1.16	0.94	3.073	75.4	0.208
	No. Obs.	306	533	1490	13098			

Table 8.6. Same as Table 8.5 except for 93 stations for the FT release time of approximately 1800 UTC.

Projection (h)	Type of Forecast	Bias by Category				Log Score	Percent Correct	Skill Score
		1	2	3	4			
03	LOCAL	0.71	1.02	1.12	0.99	1.237	86.1	0.534
	PERSISTENCE	1.30	1.24	1.16	0.96	1.336	85.6	0.544
	No. Obs.	256	609	1710	12881			
06	LOCAL	0.43	1.08	1.40	0.97	1.500	84.3	0.449
	PERSISTENCE	0.97	1.40	1.46	0.93	1.845	81.4	0.393
	No. Obs.	321	536	1413	13077			
09	LOCAL	0.49	1.13	1.46	0.96	1.807	81.5	0.397
	PERSISTENCE	0.84	1.32	1.42	0.94	2.200	78.7	0.327
	No. Obs.	376	568	1473	12899			
15	LOCAL	0.47	1.26	1.49	0.95	2.613	76.5	0.365
	PERSISTENCE	0.46	1.09	1.29	0.99	3.056	73.8	0.249
	No. Obs.	690	698	1637	12185			

Table 8.7. Comparative verification of local and persistence ceiling height forecasts for 6 stations in the Alaska Region for the FT release time of approximately 0900 UTC.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Log Score	Percent Correct	Skill Score
03	LOCAL	0.79	0.60	1.16	1.00	1.917	81.5	0.535
	PERSISTENCE	1.00	0.92	0.99	1.01	2.164	79.9	0.492
	No. Obs.	34	48	170	777			
06	LOCAL	0.56	0.48	1.26	1.00	2.850	73.8	0.374
	PERSISTENCE	0.76	0.83	0.99	1.03	2.949	74.9	0.388
	No. Obs.	45	54	176	767			
09	LOCAL	0.45	0.47	1.34	0.97	2.729	72.8	0.345
	PERSISTENCE	0.92	1.25	0.92	1.01	2.913	72.7	0.324
	No. Obs.	38	36	191	775			
15	LOCAL	0.13	0.25	1.32	0.99	2.300	73.8	0.328
	PERSISTENCE	1.52	1.02	0.94	1.00	3.136	71.1	0.272
	No. Obs.	23	44	186	786			

Table 8.8. Same as Table 8.7 except for the FT release time of approximately 1800 UTC.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Log Score	Percent Correct	Skill Score
03	LOCAL	0.24	0.36	1.23	1.00	2.300	74.3	0.323
	PERSISTENCE	1.29	0.93	1.08	0.98	1.903	79.8	0.492
	No. Obs.	21	45	182	792			
06	LOCAL	0.21	0.43	1.13	1.02	2.429	72.2	0.302
	PERSISTENCE	1.13	1.14	0.94	1.01	2.232	76.8	0.434
	No. Obs.	24	37	210	769			
09	LOCAL	0.22	0.30	1.45	0.97	2.511	71.2	0.279
	PERSISTENCE	1.00	0.91	1.11	0.98	2.674	72.2	0.302
	No. Obs.	27	46	178	794			
15	LOCAL	0.15	0.27	1.53	0.97	2.946	68.6	0.219
	PERSISTENCE	0.79	0.82	1.16	0.99	3.127	70.9	0.273
	No. Obs.	34	49	166	779			

Table 9.1. Comparative verification of NGM MOS and persistence visibility forecasts for 94 stations in the conterminous U.S., 0000 UTC cycle.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Log Score	Percent Correct	Skill Score
12	NGM MOS	1.01	1.13	1.11	0.98	2.510	79.3	0.351
	PERSISTENCE	0.86	0.80	0.89	1.03	1.577	86.1	0.516
	No. Obs.	536	827	1414	13184			
15	NGM MOS	1.23	1.14	1.16	0.96	2.981	76.0	0.334
	PERSISTENCE	0.95	0.67	1.10	1.02	2.688	78.7	0.341
	No. Obs.	66	171	182	1736			
18	NGM MOS	1.22	1.24	1.35	0.96	2.039	82.7	0.349
	PERSISTENCE	1.39	0.82	1.36	0.98	2.456	81.0	0.245
	No. Obs.	330	815	921	13892			
24	NGM MOS	1.35	1.22	1.36	0.96	1.599	85.5	0.353
	PERSISTENCE	2.64	0.96	1.51	0.95	2.557	79.9	0.138
	No. Obs.	173	685	831	14227			

Table 9.2. Same as Table 9.1 except for the 1200 UTC cycle.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Log Score	Percent Correct	Skill Score
12	NGM MOS	1.39	1.21	1.42	0.96	1.507	86.0	0.385
	PERSISTENCE	1.24	1.09	0.98	0.99	1.083	90.0	0.504
	No. Obs.	168	689	838	14186			
15	NGM MOS	0.75	1.24	1.38	0.97	1.856	84.1	0.358
	PERSISTENCE	1.15	1.18	0.83	1.00	2.015	84.3	0.310
	No. Obs.	40	100	120	1853			
18	NGM MOS	1.04	1.38	1.18	0.97	1.941	83.3	0.351
	PERSISTENCE	0.68	1.25	0.72	1.02	1.934	83.8	0.270
	No. Obs.	308	604	1137	13787			
24	NGM MOS	1.00	1.25	1.19	0.96	2.740	77.8	0.325
	PERSISTENCE	0.39	0.91	0.59	1.07	2.845	78.1	0.154
	No. Obs.	529	825	1397	13075			

Table 9.3. Comparative verification of LFM MOS and persistence visibility forecasts for 6 stations in the Alaska Region, 0000 UTC cycle.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Log Score	Percent Correct	Skill Score
12	LFM MOS	0.88	1.11	1.00	1.00	3.105	74.6	0.210
	PERSISTENCE	0.61	1.26	0.86	1.01	2.013	83.7	0.475
	No. Obs.	33	57	101	849			
18	LFM MOS	0.64	0.94	1.70	0.95	3.336	71.8	0.179
	PERSISTENCE	0.75	0.90	1.11	1.01	3.081	75.5	0.214
	No. Obs.	28	81	79	854			
24	LFM MOS	0.66	1.03	1.95	0.95	3.064	75.3	0.194
	PERSISTENCE	0.72	0.99	1.58	0.97	3.272	75.9	0.169
	No. Obs.	29	74	55	878			

Table 9.4. Same as Table 9.3 except for the 1200 UTC cycle.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Log Score	Percent Correct	Skill Score
12	LFM MOS	0.69	0.82	2.54	0.93	2.937	75.7	0.253
	PERSISTENCE	0.93	0.91	1.23	1.00	1.814	86.0	0.502
	No. Obs.	29	76	56	878			
18	LFM MOS	0.63	1.08	1.49	0.95	2.837	74.2	0.185
	PERSISTENCE	1.37	1.15	0.76	1.01	2.552	78.9	0.256
	No. Obs.	19	60	89	871			
24	LFM MOS	0.62	1.05	1.72	0.93	3.551	70.1	0.175
	PERSISTENCE	0.79	1.19	0.68	1.03	3.231	75.2	0.174
	No. Obs.	34	57	99	845			

Table 9.5. Comparative verification of local and persistence visibility forecasts for 92 stations in the conterminous U.S. for the FT release time of approximately 0900 UTC.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Log Score	Percent Correct	Skill Score
03	LOCAL	0.78	0.84	1.18	1.00	1.813	83.5	0.461
	PERSISTENCE	0.85	0.84	0.90	1.03	1.589	86.2	0.525
	No. Obs.	569	805	1430	13297			
06	LOCAL	0.41	0.45	1.10	1.07	2.283	80.5	0.336
	PERSISTENCE	0.82	0.59	0.95	1.05	2.498	79.9	0.340
	No. Obs.	587	1143	1363	12996			
09	LOCAL	0.31	0.46	1.25	1.03	1.542	85.9	0.330
	PERSISTENCE	1.68	0.82	1.38	0.97	2.449	80.8	0.242
	No. Obs.	285	824	938	14038			
15	LOCAL	0.33	0.51	1.31	1.01	1.366	87.1	0.312
	PERSISTENCE	2.43	0.97	1.55	0.95	2.610	79.6	0.140
	No. Obs.	197	696	838	14359			

Table 9.6. Same as Table 9.5 except for 93 stations for the FT release time of approximately 1800 UTC.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Log Score	Percent Correct	Skill Score
03	LOCAL	0.64	0.63	1.46	1.00	1.148	88.9	0.448
	PERSISTENCE	1.26	1.15	1.15	0.98	1.283	88.6	0.475
	No. Obs.	220	722	814	14401			
06	LOCAL	0.54	0.60	1.38	1.00	1.272	87.6	0.370
	PERSISTENCE	1.44	1.18	1.11	0.98	1.649	85.9	0.345
	No. Obs.	192	698	844	14324			
09	LOCAL	0.49	0.79	1.35	0.99	1.399	86.4	0.355
	PERSISTENCE	1.17	1.44	0.94	0.98	1.896	84.0	0.272
	No. Obs.	237	574	992	14250			
15	LOCAL	0.46	0.96	1.40	0.98	2.196	80.5	0.312
	PERSISTENCE	0.57	1.21	0.72	1.03	2.654	79.4	0.187
	No. Obs.	483	682	1297	13592			

Table 9.7. Comparative verification of local and persistence visibility forecasts for 6 stations in the Alaska Region for the FT release time of approximately 1800 UTC.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Log Score	Percent Correct	Skill Score
03	LOCAL	0.68	0.91	0.88	1.03	1.812	84.0	0.452
	PERSISTENCE	0.74	1.19	0.87	1.01	1.957	84.1	0.478
	No. Obs.	31	57	95	847			
06	LOCAL	0.68	0.70	1.07	1.02	2.307	81.2	0.340
	PERSISTENCE	0.79	1.13	0.99	1.00	2.540	79.4	0.316
	No. Obs.	28	61	89	864			
09	LOCAL	0.46	0.44	1.19	1.05	2.612	77.4	0.203
	PERSISTENCE	0.82	0.88	1.11	1.01	3.130	75.4	0.211
	No. Obs.	28	81	79	853			
15	LOCAL	0.18	0.26	1.61	1.05	2.367	80.4	0.176
	PERSISTENCE	0.82	0.97	1.57	0.97	3.248	76.2	0.180
	No. Obs.	28	73	56	882			

Table 9.8. Same as Table 9.7 except for the FT release time of approximately 1800 UTC.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Log Score	Percent Correct	Skill Score
03	LOCAL	0.25	0.28	1.48	1.05	2.175	82.0	0.229
	PERSISTENCE	0.93	0.93	1.21	0.99	1.803	86.3	0.497
	No. Obs.	28	71	56	884			
06	LOCAL	0.30	0.32	1.22	1.06	2.287	80.3	0.206
	PERSISTENCE	1.13	0.90	0.94	1.01	2.249	82.2	0.363
	No. Obs.	23	72	72	871			
09	LOCAL	0.32	0.43	1.06	1.05	2.157	80.2	0.199
	PERSISTENCE	1.37	1.14	0.77	1.01	2.486	79.6	0.261
	No. Obs.	19	58	87	880			
15	LOCAL	0.16	0.46	1.01	1.07	2.656	77.6	0.165
	PERSISTENCE	0.78	1.13	0.72	1.03	3.153	75.6	0.163
	No. Obs.	32	56	94	846			