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AFOS-ERA VERIFICATION OF GUIDANCE AND LOCAL AVIATION/PUBLIC WEATHER FORECASTS--NO. 19 (OCTOBER 1992 - MARCH 1993)

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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). In order to streamline production of the documents and to encourage their use, the format was changed significantly a number of issues ago. Most text has been eliminated, and descriptive information about the verification data is presented in tabular form. In addition, the format includes a section for special items of interest or changes that occurred during the verification season. For more specific information about the forecasts, observations, and verification procedure for each weather element, see Dagostaro and Dallavalle (1991).

Verification statistics are presented here for the cool season months of October 1992 through March 1993 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. The definitions of the official local max/min temperature forecasts and verifying observations, in turn, differ from those of the guidance.

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 Limited-area Fine-mesh Model (LFM) (Gerrity 1977; Newell and Deaven 1981) and the Nested Grid Model (NGM) (Hoke et al. 1989). 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 Table 5.1 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. Comparative verification results for the 42-h significant wind speed are presented for the Alaska Region in Tables 7.25 and 7.26. For ceiling height and visibility, objective and local forecast verification scores are shown only for the conterminous U.S. stations combined and for the Alaska Region. Tables 8.1 - 8.4 contain the objective ceiling height forecast results for the conterminous U.S. and the Alaska Region, while Tables 8.5 - 8.8 contain ceiling height scores for the local forecasts. Analogously, Tables 9.1 - 9.8 show guidance and local visibility forecast verification scores for the conterminous U.S. stations and the Alaskan stations.

2. SUMMARY (OCTOBER 1992 - MARCH 1993)

During the 1992-93 cool season, five AEV stations, namely, Oklahoma City, OK; Tulsa, OK; Amarillo, TX; Wichita, KS; and Topeka, KS, were commissioned as ASOS sites. Oklahoma City and Tulsa were commissioned on October 1, 1992; Amarillo and Wichita on November 1, 1992; and Topeka on December 1, 1992. Since we had reservations about using ASOS observations collected by the local software for some weather elements, we carefully checked the ASOS observations and eliminated some of them from the central data archive. For example, we set to missing the observed precipitation amount, cloud amount, and snow amount data for each ASOS site after it was commissioned. For the remaining weather elements, including precipitation type, we kept all observed data collected by the local software unless the data failed existing gross error checks in the local and central quality control processes.

The NGM-based precipitation type guidance was added to the NGM MOS forecast bulletin beginning 1200 UTC November 18, 1992 (Erickson et al. 1993, Dallavalle et al. 1992). Similarly, the NGM-based MOS ceiling height guidance was added beginning 1200 UTC January 27, 1993 (Miller 1994, Dallavalle et al. 1992). Although NGM-based guidance was not the "official" guidance collected by the local verification software during the cool season, local forecasts may have been influenced by the new guidance.

A record-setting storm that occurred in mid-March affected a large area of the conterminous U.S., particularly in the Southern and Eastern Regions. Strong winds associated with the storm necessitated a temporary adjustment of the gross error checks in the central quality control process. For the 42-h significant wind speed, we determined that some suspicious local and MOS forecasts were actually legitimate values. Therefore, we kept local and MOS wind speeds that differed by up to 38 kt for a few forecast cycles in March. We usually set to missing the local and MOS forecasts that differ by more than 30 kt.

During this cool season, we found an error in the local software that collects the verifying observation for the 42-h significant wind for stations in the conterminous U.S. Because of this error, the projection of the verifying observation collected by the local software does not always match the valid time of the local and MOS forecasts. The local and MOS wind speed forecasts are valid for a specific time, namely, 42 hours after 0000 or 1200 UTC. Two types of verifying observations are collected by the local software: the verifying observation at a specific hour and the highest sustained wind in a 6-h window surrounding the verifying hour. Unlike the forecasts, however, the projection of the verifying observation collected by the local software is based on the FT issuance time which varies with time zone and changes from standard to daylight savings time. Likewise, the beginning and ending times of the 6-h window vary, since the window is always centered on the verifying hour. The mismatch of the forecast valid time and the verifying observation began in late June 1987. Since that time, some 42-h significant wind verification results (not included in the office notes) for individual stations were correct, but we recommend that the overall results for the conterminous U.S. presented in the office notes be disregarded. For this reason, results for the 1992-93 cool season 42-h significant wind verification were not included in this office note for the conterminous U.S. For the Alaska Region, the forecast valid time and the projection of the verifying observation are correctly based on 0000 and 1200 UTC. Similarly, the 6-h window surrounding the verifying hour is correctly centered on the verifying hour. Therefore, verification results presented in previous office notes were correct for the Alaska Region and the 1992-93 cool season results are included in this office note.

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

3. REFERENCES

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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 definition 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 definition 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 18, 30, and 42 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	Forecasts are valid at specific hours corresponding to the indicated projections. Guidance for the conterminous U.S. is for freezing, frozen, and liquid precipitation (mixed frozen and liquid is considered liquid). For Alaska, guidance is for frozen and unfrozen precipitation (freezing is considered unfrozen) but is not verified.
	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 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.
	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	Valid at specific hours after 0000 or 1200 UTC.
	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	Valid at specific hours after 0000 or 1200 UTC.
	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.
	NGM MOS	FWC	12, 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.
	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 all weather elements for stations in the conterminous U.S.; guidance for Alaska is obtained from the FMAK1 and FMAK2 bulletins
FWC - FWC bulletin contains NGM-based MOS guidance for max/min temperature, PoP, precipitation type, cloud amount, ceiling height, and surface wind 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	LFM	319
	snow amount	LFM	318
	cloud amount	LFM	378
		NGM	387
	surface wind	LFM	347
		NGM	399
	ceiling height	LFM	303
		NGM	414
	visibility	LFM	303
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	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	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[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[3]	Portland, Oregon	MFR[3]	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]	Juneau, Alaska	YAK[2]	Yakutat, Alaska

[1]Precipitation amount 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]This station was not included in 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.

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	1000-2900	3-6
4		≥6	OVC, X	23-27	120-150	≥3000	>6
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, LFM MOS, and NGM 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	16197	0.1	2.9	1.4	--	--	84.8
	LFM MOS		0.0	3.4	2.8	--	--	79.3
	NGM MOS		0.6	3.3	3.0	--	--	79.5
Tonight's Min	LOCAL	16155	-0.6	3.5	2.5	0.64	0.36	79.7
	LFM MOS		-0.9	3.9	3.9	0.66	0.39	74.9
	NGM MOS		-0.2	3.9	4.4	0.65	0.35	73.6
Tomorrow's Max	LOCAL	16177	-0.1	3.8	4.3	--	--	74.2
	LFM MOS		0.1	4.3	6.6	--	--	68.1
	NGM MOS		0.9	4.3	6.5	--	--	66.7
Tomorrow Night's Min	LOCAL	16147	-0.9	4.5	6.7	0.54	0.45	66.5
	LFM MOS		-0.8	4.8	8.4	0.57	0.47	61.8
	NGM MOS		-0.3	4.7	7.6	0.57	0.44	63.4

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	16124	-0.7	3.1	1.3	0.65	0.28	83.9
	LFM MOS		-0.9	3.6	2.8	0.63	0.34	78.7
	NGM MOS		-0.1	3.5	2.5	0.59	0.31	79.6
Tomorrow's Max	LOCAL	16129	0.0	3.5	3.1	--	--	78.7
	LFM MOS		0.2	4.1	5.7	--	--	69.9
	NGM MOS		1.2	4.0	5.5	--	--	70.6
Tomorrow Night's Min	LOCAL	16093	-0.7	3.9	3.9	0.63	0.37	74.6
	LFM MOS		-0.9	4.4	6.1	0.61	0.46	68.5
	NGM MOS		-0.1	4.2	5.5	0.60	0.41	69.8
Day After Tomorrow's Max	LOCAL	16120	-0.1	4.4	6.6	--	--	66.8
	LFM MOS		0.1	4.8	8.9	--	--	60.8
	NGM MOS		1.2	4.8	9.5	--	--	59.0

Table 2.3. Comparative verification of local, LFM MOS, and NGM 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	4261	0.0	2.9	1.1	--	--	84.0
	LFM MOS		-0.1	3.4	2.3	--	--	78.7
	NGM MOS		0.0	3.1	2.0	--	--	80.7
Tonight's Min	LOCAL	4240	-0.9	3.4	1.7	0.80	0.31	83.1
	LFM MOS		-1.2	3.7	2.7	0.78	0.36	79.7
	NGM MOS		-0.6	3.6	3.1	0.81	0.32	79.9
Tomorrow's Max	LOCAL	4253	-0.5	3.6	3.3	--	--	75.1
	LFM MOS		-0.6	4.0	5.0	--	--	69.4
	NGM MOS		0.1	3.7	3.5	--	--	73.9
Tomorrow Night's Min	LOCAL	4242	-1.5	4.4	6.3	0.73	0.37	70.7
	LFM MOS		-1.8	4.8	8.0	0.78	0.39	66.5
	NGM MOS		-0.9	4.5	6.8	0.70	0.39	69.5

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	4216	-0.9	3.0	1.0	0.80	0.28	86.3
	LFM MOS		-1.0	3.5	2.1	0.82	0.31	82.4
	NGM MOS		-0.5	3.3	1.6	0.72	0.30	83.6
Tomorrow's Max	LOCAL	4223	-0.3	3.4	2.7	--	--	78.2
	LFM MOS		-0.2	3.8	4.1	--	--	71.9
	NGM MOS		0.4	3.5	3.0	--	--	76.2
Tomorrow Night's Min	LOCAL	4205	-1.2	3.8	3.0	0.79	0.37	78.7
	LFM MOS		-1.6	4.3	5.2	0.79	0.41	73.4
	NGM MOS		-0.5	3.9	4.3	0.75	0.39	76.7
Day After Tomorrow's Max	LOCAL	4224	-0.6	4.1	5.6	--	--	67.8
	LFM MOS		-0.7	4.4	6.3	--	--	64.5
	NGM MOS		0.4	4.2	5.9	--	--	66.5

Table 2.5. Comparative verification of local, LFM MOS, and NGM 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	4173	0.2	3.0	2.0	--	--	81.8
	LFM MOS		-0.1	3.5	3.2	--	--	75.9
	NGM MOS		0.2	3.1	2.4	--	--	80.0
Tonight's Min	LOCAL	4163	-0.4	3.3	1.5	0.56	0.42	79.3
	LFM MOS		-0.5	3.7	2.7	0.58	0.45	74.0
	NGM MOS		-0.4	3.5	2.1	0.57	0.43	76.6
Tomorrow's Max	LOCAL	4172	0.0	4.1	5.8	--	--	67.5
	LFM MOS		-0.1	4.6	8.3	--	--	60.8
	NGM MOS		0.5	4.2	6.3	--	--	63.7
Tomorrow Night's Min	LOCAL	4161	-0.7	4.2	4.8	0.40	0.57	66.0
	LFM MOS		-0.7	4.6	6.9	0.47	0.58	61.0
	NGM MOS		-0.3	4.4	5.2	0.42	0.49	64.6

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	4140	-0.5	2.9	0.6	0.62	0.33	83.6
	LFM MOS		-0.6	3.4	2.2	0.51	0.42	77.4
	NGM MOS		-0.3	3.2	1.1	0.54	0.39	81.4
Tomorrow's Max	LOCAL	4147	0.1	3.6	3.8	--	--	74.2
	LFM MOS		0.0	4.5	7.1	--	--	62.2
	NGM MOS		0.7	3.8	4.4	--	--	71.9
Tomorrow Night's Min	LOCAL	4135	-0.5	3.7	2.8	0.57	0.43	73.8
	LFM MOS		-0.7	4.3	5.2	0.50	0.56	66.2
	NGM MOS		-0.1	3.9	3.2	0.50	0.45	71.8
Day After Tomorrow's Max	LOCAL	4147	-0.1	4.7	8.4	--	--	58.8
	LFM MOS		-0.4	5.1	10.7	--	--	53.3
	NGM MOS		0.8	4.9	9.4	--	--	55.0

Table 2.7. Comparative verification of local, LFM MOS, and NGM 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	4848	0.2	2.9	1.3	--	--	87.9
	LFM MOS		0.1	3.5	3.0	--	--	83.3
	NGM MOS		1.4	3.7	4.5	--	--	80.2
Tonight's Min	LOCAL	4839	-0.7	3.8	4.0	0.63	0.33	78.7
	LFM MOS		-1.2	4.3	5.7	0.69	0.36	74.4
	NGM MOS		0.1	4.4	6.8	0.61	0.30	70.8
Tomorrow's Max	LOCAL	4836	-0.1	4.0	4.5	--	--	78.5
	LFM MOS		0.3	4.4	6.8	--	--	74.0
	NGM MOS		1.6	4.7	8.4	--	--	68.9
Tomorrow Night's Min	LOCAL	4834	-0.9	5.0	9.3	0.56	0.43	64.5
	LFM MOS		-0.8	5.3	10.8	0.54	0.42	61.3
	NGM MOS		-0.2	5.2	11.2	0.66	0.42	59.7

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	4849	-0.8	3.3	2.1	0.63	0.18	83.4
	LFM MOS		-1.0	3.9	3.9	0.63	0.30	78.3
	NGM MOS		0.1	3.9	4.0	0.59	0.21	77.3
Tomorrow's Max	LOCAL	4838	0.0	3.6	3.0	--	--	82.1
	LFM MOS		0.5	4.3	6.3	--	--	74.6
	NGM MOS		1.9	4.4	7.2	--	--	72.0
Tomorrow Night's Min	LOCAL	4835	-0.8	4.3	5.9	0.60	0.30	73.0
	LFM MOS		-1.0	4.8	8.3	0.59	0.42	67.8
	NGM MOS		0.0	4.8	8.5	0.58	0.40	66.1
Day After Tomorrow's Max	LOCAL	4830	0.0	4.6	7.3	--	--	71.3
	LFM MOS		0.5	5.1	10.3	--	--	65.4
	NGM MOS		1.9	5.5	13.2	--	--	59.6

Table 2.9. Comparative verification of local, LFM MOS, and NGM 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	2915	0.2	2.8	1.3	--	--	82.8
	LFM MOS		0.0	3.2	2.8	--	--	75.7
	NGM MOS		0.9	3.2	2.7	--	--	74.9
Tonight's Min	LOCAL	2913	-0.3	3.3	2.6	0.31	0.50	76.1
	LFM MOS		-0.6	3.9	4.5	0.38	0.48	68.2
	NGM MOS		0.2	3.9	5.6	0.44	0.33	63.7
Tomorrow's Max	LOCAL	2916	0.5	3.5	3.1	--	--	72.3
	LFM MOS		1.0	4.1	6.1	--	--	62.2
	NGM MOS		1.6	4.4	8.4	--	--	53.7
Tomorrow Night's Min	LOCAL	2910	-0.2	4.0	5.4	0.30	0.44	63.8
	LFM MOS		0.5	4.5	7.1	0.21	0.65	54.7
	NGM MOS		0.2	4.3	6.5	0.36	0.56	57.8

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	2919	-0.5	3.0	1.6	0.33	0.27	80.8
	LFM MOS		-0.9	3.5	2.9	0.36	0.29	74.3
	NGM MOS		0.3	3.3	3.3	0.24	0.20	74.7
Tomorrow's Max	LOCAL	2921	0.4	3.1	2.6	--	--	77.7
	LFM MOS		0.7	3.7	5.1	--	--	67.0
	NGM MOS		1.9	4.2	8.0	--	--	55.5
Tomorrow Night's Min	LOCAL	2918	-0.3	3.6	3.5	0.32	0.27	71.6
	LFM MOS		-0.2	4.1	5.4	0.38	0.46	63.7
	NGM MOS		0.2	4.1	5.6	0.44	0.42	61.8
Day After Tomorrow's Max	LOCAL	2919	0.4	3.8	4.5	--	--	66.9
	LFM MOS		1.4	4.4	7.5	--	--	55.2
	NGM MOS		1.5	4.5	8.7	--	--	51.7

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		1.5	4.1	6.4	--	--	81.0
	LFM MOS	1010	2.7	4.6	9.8	--	--	76.6
Tonight's Min	LOCAL		1.0	5.4	13.3	0.50	0.00	77.7
	LFM MOS	1003	0.6	5.6	13.8	0.50	0.50	76.2
Tomorrow's Max	LOCAL		1.7	5.1	12.1	--	--	71.2
	LFM MOS	1010	3.1	5.6	13.5	--	--	66.2
Tomorrow Night's Min	LOCAL		1.2	6.6	20.0	0.50	0.00	67.0
	LFM MOS	1012	0.5	6.7	20.9	0.50	0.00	67.2

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		0.0	4.6	8.9	0.50	0.00	84.2
	LFM MOS	1017	-0.5	5.1	10.7	0.50	0.50	81.2
Tomorrow's Max	LOCAL		0.9	4.4	8.0	--	--	78.7
	LFM MOS	1020	2.3	5.0	11.5	--	--	72.7
Tomorrow Night's Min	LOCAL		0.5	5.9	16.8	1.00	0.50	72.8
	LFM MOS	1014	0.2	6.3	18.6	1.00	0.50	70.7
Day After Tomorrow's Max	LOCAL		1.2	5.6	14.2	--	--	63.9
	LFM MOS	1017	2.8	6.2	17.5	--	--	56.6

Table 3.1. Comparative verification of local, LFM MOS, and NGM MOS PoP for 91 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	Changes GE 20% to Guidance: Local % Imprv.	Changes GE 20% to Guidance: No. of Changes
12-24	LOCAL	0.0869		50.6				
(1st period)	LFM MOS	0.0962	9.6	45.4	15503	0.2399	23.2	2186
	NGM MOS	0.0893	2.6	49.3		0.2095	6.3	2477
24-36	LOCAL	0.0967		46.0				
(2nd period)	LFM MOS	0.1049	7.9	41.4	15522	0.2299	19.3	2215
	NGM MOS	0.0980	1.3	45.3		0.2132	4.5	2294
36-48	LOCAL	0.1088		38.6				
(3rd period)	LFM MOS	0.1174	7.3	33.7	15490	0.2341	16.8	2429
	NGM MOS	0.1105	1.5	37.6		0.2136	2.6	2388

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	Changes GE 20% to Guidance: Local % Imprv.	Changes GE 20% to Guidance: No. of Changes
12-24	LOCAL	0.0854		52.4				
(1st period)	LFM MOS	0.0932	8.3	48.1	15480	0.2256	17.2	2230
	NGM MOS	0.0846	-1.0	52.9		0.2030	-1.8	2483
24-36	LOCAL	0.0986		44.5				
(2nd period)	LFM MOS	0.1065	7.5	40.0	15447	0.2260	18.0	2283
	NGM MOS	0.0979	-0.7	44.9		0.2027	-2.2	2326
36-48	LOCAL	0.1114		38.3				
(3rd period)	LFM MOS	0.1197	6.9	33.7	15472	0.2316	16.6	2517
	NGM MOS	0.1106	-0.8	38.8		0.2091	-1.3	2299

Table 3.3. Comparative verification of local, LFM MOS, and NGM MOS PoP 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	Changes GE 20% to Guidance: Local % Imprv.	Changes GE 20% to Guidance: No. of Changes
12-24	LOCAL	0.0958		52.6				
(1st period)	LFM MOS	0.1027	6.8	49.1	4257	0.2229	15.9	723
	NGM MOS	0.0951	-0.7	52.9		0.1995	-1.4	746
24-36	LOCAL	0.1032		50.9				
(2nd period)	LFM MOS	0.1120	7.8	46.7	4266	0.2267	18.6	694
	NGM MOS	0.1034	0.1	50.8		0.2085	2.6	681
36-48	LOCAL	0.1171		42.2				
(3rd period)	LFM MOS	0.1260	7.1	37.8	4254	0.2279	14.6	790
	NGM MOS	0.1166	-0.4	42.5		0.2137	-1.4	722

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	Changes GE 20% to Guidance: Local % Imprv.	Changes GE 20% to Guidance: No. of Changes
12-24	LOCAL	0.0923		56.1				
(1st period)	LFM MOS	0.1014	9.0	51.7	4237	0.2269	18.6	718
	NGM MOS	0.0881	-4.7	58.1		0.1897	-8.7	727
24-36	LOCAL	0.1038		49.0				
(2nd period)	LFM MOS	0.1098	5.5	46.1	4223	0.2121	10.6	700
	NGM MOS	0.1026	-1.2	49.6		0.2061	-3.6	690
36-48	LOCAL	0.1236		41.7				
(3rd period)	LFM MOS	0.1304	5.2	38.5	4235	0.2133	13.0	818
	NGM MOS	0.1239	0.2	41.6		0.2017	1.4	773

Table 3.5. Comparative verification of local, LFM MOS, and NGM MOS PoP for 22 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 (1st period)	LOCAL	0.0791		48.7				
	LFM MOS	0.0891	11.2	42.2	3743	0.2421	28.5	466
	NGM MOS	0.0842	6.0	45.4		0.2161	12.5	565
24-36 (2nd period)	LOCAL	0.0907		40.1				
	LFM MOS	0.0997	9.0	34.2	3746	0.2339	21.5	537
	NGM MOS	0.0922	1.7	39.1		0.2244	4.6	490
36-48 (3rd period)	LOCAL	0.1027		34.1				
	LFM MOS	0.1086	5.4	30.3	3741	0.2357	12.3	561
	NGM MOS	0.1034	0.7	33.7		0.2135	-0.2	462

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 (1st period)	LOCAL	0.0798		47.7				
	LFM MOS	0.0865	7.8	43.3	3720	0.2334	15.7	505
	NGM MOS	0.0796	-0.3	47.9		0.2073	1.3	567
24-36 (2nd period)	LOCAL	0.0941		39.7				
	LFM MOS	0.1026	8.3	34.2	3716	0.2239	21.8	531
	NGM MOS	0.0939	-0.2	39.8		0.2083	-1.9	460
36-48 (3rd period)	LOCAL	0.1020		33.3				
	LFM MOS	0.1095	6.9	28.4	3717	0.2160	13.4	588
	NGM MOS	0.1012	-0.8	33.9		0.2309	-0.1	427

Table 3.7. Comparative verification of local, LFM MOS, and NGM MOS PoP 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	Local % Imprv.	No. of Changes
12-24	LOCAL	0.0861		50.3				
(1st period)	LFM MOS	0.0959	10.3	44.6	4582	0.2536	24.1	623
	NGM MOS	0.0855	-0.6	50.6		0.1980	-0.5	699
24-36	LOCAL	0.0970		46.0				
(2nd period)	LFM MOS	0.1065	8.9	40.7	4590	0.2445	22.9	647
	NGM MOS	0.0960	-1.1	46.5		0.1902	-3.5	678
36-48	LOCAL	0.1083		38.0				
(3rd period)	LFM MOS	0.1172	7.6	32.9	4575	0.2316	18.9	713
	NGM MOS	0.1094	1.0	37.3		0.2024	0.7	729

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	Local % Imprv.	No. of Changes
12-24	LOCAL	0.0841		53.4				
(1st period)	LFM MOS	0.0921	8.7	49.0	4599	0.2238	19.2	660
	NGM MOS	0.0819	-2.7	54.7		0.2031	-8.6	727
24-36	LOCAL	0.0983		43.7				
(2nd period)	LFM MOS	0.1079	8.9	38.2	4585	0.2412	20.6	684
	NGM MOS	0.0937	-4.9	46.3		0.1791	-11.9	741
36-48	LOCAL	0.1118		38.2				
(3rd period)	LFM MOS	0.1224	8.7	32.3	4597	0.2569	20.3	732
	NGM MOS	0.1059	-5.5	41.4		0.1886	-15.7	702

Table 3.9. Comparative verification of local, LFM MOS, and NGM MOS PoP 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	0.0854		50.1				
(1st period)	LFM MOS	0.0960	11.0	43.9	2921	0.2471	28.0	374
	NGM MOS	0.0931	8.2	45.6		0.2349	18.5	467
24-36	LOCAL	0.0942		44.3				
(2nd period)	LFM MOS	0.0988	4.7	41.6	2920	0.2019	8.3	337
	NGM MOS	0.1007	6.4	40.5		0.2434	16.6	445
36-48	LOCAL	0.1055		38.3				
(3rd period)	LFM MOS	0.1162	9.2	32.0	2920	0.2500	24.1	365
	NGM MOS	0.1125	6.2	34.2		0.2306	13.2	475

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	0.0848		49.5				
(1st period)	LFM MOS	0.0913	7.1	45.7	2924	0.2150	12.7	347
	NGM MOS	0.0903	6.1	46.3		0.2186	14.2	462
24-36	LOCAL	0.0970		43.7				
(2nd period)	LFM MOS	0.1046	7.2	39.4	2923	0.2268	20.6	368
	NGM MOS	0.1026	5.4	40.5		0.2318	12.2	435
36-48	LOCAL	0.1051		38.2				
(3rd period)	LFM MOS	0.1129	6.9	33.6	2923	0.2464	19.9	379
	NGM MOS	0.1105	4.8	35.1		0.2363	13.3	397

Table 3.11. Comparative verification of local and LFM MOS PoP for 6 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
12-24 (1st period)	LOCAL	0.1488		*				
	LFM MOS	0.1675	11.2	*	784	0.2410	15.8	297
24-36 (2nd period)	LOCAL	0.1453		*				
	LFM MOS	0.1610	9.7	*	789	0.2381	18.0	281
36-48 (3rd period)	LOCAL	0.1615		*				
	LFM MOS	0.1670	3.3	*	784	0.2214	9.9	280

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
12-24 (1st period)	LOCAL	0.1442		*				
	LFM MOS	0.1623	11.1	*	794	0.2512	16.9	320
24-36 (2nd period)	LOCAL	0.1590		*				
	LFM MOS	0.1629	2.4	*	791	0.2202	2.7	301
36-48 (3rd period)	LOCAL	0.1514		*				
	LFM MOS	0.1599	5.4	*	797	0.2356	8.1	274

*Percent improvement over climate scores were not available.

Table 4.1. Comparative verification of local and LFM 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. Data for TCC were not available for the 30-h projection.

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	0.79	0.94	1.05	88.8	0.776	0.37	0.84	0.53	0.10
		MOS	0.95	0.90	1.07	89.6	0.790	0.42	0.84	0.56	0.07
		No. Obs.	19	387	553						
	Southern 23	LOCAL	0.53	0.64	1.06	90.0	0.475	0.18	0.45	0.67	0.30
		MOS	0.71	0.76	1.04	92.4	0.627	0.35	0.55	0.50	0.28
		No. Obs.	17	42	399						
	Central 28	LOCAL	0.91	0.97	1.05	87.0	0.759	0.44	0.88	0.51	0.09
		MOS	0.84	0.97	1.06	87.3	0.765	0.40	0.88	0.53	0.09
		No. Obs.	43	434	336						
	Western 12	LOCAL	1.00	0.89	1.12	90.6	0.815	0.50	0.86	0.50	0.03
		MOS	2.00	0.94	1.05	90.9	0.821	0.00	0.89	1.00	0.05
		No. Obs.	2	195	177						
	All Stations	LOCAL	0.80	0.93	1.06	88.7	0.778	0.37	0.84	0.54	0.09
		MOS	0.86	0.93	1.06	89.6	0.796	0.38	0.86	0.56	0.08
		No. Obs.	81	1058	1465						
30	Eastern 24	LOCAL	0.71	1.15	0.92	87.6	0.763	0.37	0.93	0.48	0.19
		MOS	1.46	0.98	0.98	86.1	0.738	0.51	0.84	0.65	0.14
		No. Obs.	41	383	572						
	Southern 22	LOCAL	0.59	1.48	1.00	91.5	0.506	0.23	0.71	0.62	0.52
		MOS	0.86	0.71	1.02	94.1	0.613	0.45	0.67	0.47	0.07
		No. Obs.	22	21	429						
	Central 28	LOCAL	0.67	1.07	0.96	84.8	0.719	0.37	0.92	0.45	0.15
		MOS	1.43	0.92	1.03	82.9	0.701	0.53	0.83	0.63	0.10
		No. Obs.	70	495	354						
	Western 12	LOCAL	0.14	1.04	0.99	87.6	0.757	0.00	0.89	1.00	0.14
		MOS	0.43	0.93	1.09	87.3	0.752	0.00	0.84	1.00	0.09
		No. Obs.	7	171	185						
	All Stations	LOCAL	0.64	1.10	0.96	87.3	0.761	0.33	0.91	0.49	0.17
		MOS	1.30	0.94	1.01	86.6	0.750	0.49	0.83	0.63	0.11
		No. Obs.	140	1070	1540						
42	Eastern 24	LOCAL	1.00	0.97	1.02	86.0	0.723	0.13	0.83	0.88	0.15
		MOS	2.13	0.94	1.01	87.7	0.760	0.56	0.84	0.74	0.10
		No. Obs.	16	398	528						
	Southern 23	LOCAL	0.22	0.67	1.05	92.4	0.532	0.11	0.51	0.50	0.23
		MOS	2.11	0.56	1.02	91.5	0.549	0.56	0.44	0.74	0.23
		No. Obs.	9	39	386						
	Central 28	LOCAL	0.69	1.01	1.02	82.1	0.664	0.21	0.85	0.69	0.16
		MOS	1.83	0.95	0.95	84.3	0.718	0.60	0.86	0.68	0.09
		No. Obs.	42	434	324						
	Western 12	LOCAL	1.00	0.87	1.13	83.7	0.678	0.00	0.78	1.00	0.10
		MOS	1.00	0.95	1.05	88.3	0.769	0.00	0.87	1.00	0.09
		No. Obs.	2	186	180						
	All Stations	LOCAL	0.71	0.96	1.04	85.5	0.716	0.17	0.82	0.76	0.15
		MOS	1.91	0.93	1.00	87.3	0.759	0.57	0.84	0.70	0.10
		No. Obs.	69	1057	1418						

Table 4.2. Same as Table 4.1 except for the 1200 UTC cycle. Data for TCC were not available for the 18- and 42-h projections.

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	1.09	0.97	89.1	0.789	0.35	0.91	0.42	0.16
		MOS	1.23	1.02	0.97	86.0	0.735	0.49	0.86	0.60	0.15
		No. Obs.	43	375	569						
	Southern 22	LOCAL	0.48	1.35	1.01	93.8	0.634	0.32	0.74	0.33	0.45
		MOS	0.84	0.70	1.02	95.0	0.686	0.56	0.65	0.33	0.06
		No. Obs.	25	23	449						
	Central 28	LOCAL	0.64	1.04	1.01	86.2	0.747	0.37	0.91	0.43	0.13
		MOS	1.10	0.94	1.06	83.8	0.713	0.47	0.85	0.57	0.10
		No. Obs.	73	490	361						
	Western 12	LOCAL	1.00	1.02	0.98	87.3	0.754	0.00	0.88	1.00	0.14
		MOS	0.57	0.97	1.04	88.1	0.768	0.00	0.87	1.00	0.11
		No. Obs.	7	166	189						
	All Stations	LOCAL	0.62	1.06	0.99	88.7	0.785	0.34	0.90	0.46	0.15
		MOS	1.07	0.97	1.01	87.2	0.758	0.47	0.85	0.56	0.12
		No. Obs.	148	1054	1568						
30	Eastern 24	LOCAL	1.16	0.97	1.02	87.1	0.745	0.32	0.84	0.73	0.13
		MOS	1.95	0.99	0.97	87.7	0.761	0.37	0.87	0.81	0.12
		No. Obs.	19	382	540						
	Southern 23	LOCAL	0.36	0.64	1.06	91.1	0.523	0.14	0.50	0.60	0.21
		MOS	1.71	0.73	1.01	90.4	0.582	0.50	0.55	0.71	0.25
		No. Obs.	14	44	390						
	Central 28	LOCAL	0.93	1.00	1.01	87.1	0.759	0.40	0.90	0.56	0.10
		MOS	1.50	1.00	0.94	85.9	0.741	0.50	0.90	0.67	0.10
		No. Obs.	42	453	334						
	Western 12	LOCAL	2.00	0.91	1.09	86.7	0.736	0.00	0.83	1.00	0.09
		MOS	3.00	0.91	1.09	86.4	0.731	0.00	0.83	1.00	0.09
		No. Obs.	1	192	182						
	All Stations	LOCAL	0.89	0.96	1.04	87.7	0.761	0.33	0.85	0.63	0.11
		MOS	1.67	0.97	0.99	87.4	0.760	0.46	0.86	0.72	0.11
		No. Obs.	76	1071	1446						
42	Eastern 24	LOCAL	0.51	1.07	0.98	86.4	0.732	0.17	0.88	0.67	0.18
		MOS	2.00	0.92	0.99	85.2	0.719	0.60	0.80	0.70	0.13
		No. Obs.	35	348	551						
	Southern 22	LOCAL	0.37	1.20	1.02	92.2	0.469	0.21	0.55	0.43	0.54
		MOS	1.47	0.60	1.00	91.7	0.499	0.58	0.40	0.61	0.33
		No. Obs.	19	20	408						
	Central 28	LOCAL	0.75	1.09	0.93	82.1	0.670	0.27	0.90	0.64	0.17
		MOS	1.86	0.92	0.95	79.6	0.648	0.59	0.82	0.68	0.11
		No. Obs.	63	468	342						
	Western 12	LOCAL	0.00	1.08	0.96	88.9	0.782	0.00	0.93	*	0.14
		MOS	0.83	0.92	1.08	83.6	0.682	0.00	0.81	1.00	0.13
		No. Obs.	6	165	171						
	All Stations	LOCAL	0.59	1.08	0.98	86.3	0.738	0.22	0.89	0.63	0.18
		MOS	1.79	0.92	0.99	84.2	0.709	0.56	0.80	0.69	0.13
		No. Obs.	123	1001	1472						

* This category was observed but was not forecast.

Table 5.1. Comparative verification of local and LFM MOS snow amount forecasts for 81 stations in the contermi-nous 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
0000	LOCAL	1.62	1.42	1.27	97.0	0.297	0.266	0.270	0.210	0.55	0.51	0.39	0.66	0.64	0.69
	MOS	1.27	1.23	1.12	97.3	0.288	0.247	0.241	0.296	0.45	0.43	0.48	0.65	0.65	0.57
	No. Obs.	225	74	33											
1200	LOCAL	1.40	1.07	1.18	96.9	0.370	0.316	0.252	0.156	0.58	0.42	0.29	0.59	0.61	0.75
	MOS	1.17	1.03	0.76	97.0	0.324	0.274	0.182	0.176	0.47	0.31	0.26	0.60	0.70	0.65
	No. Obs.	279	96	34											

Table 6.1. Comparative verification of local, LFM MOS, and NGM MOS forecasts of four categories of cloud amount (clear, scattered, broken, and overcast) for 93 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	0.76	1.43	1.52	0.94	70.3	0.567
	LFM MOS	0.91	1.64	1.13	0.88	60.9	0.431
	NGM MOS	0.82	1.56	1.24	0.93	62.5	0.451
	No. Obs.	5074	1760	1634	7166		
18	LOCAL	0.56	1.67	2.12	0.78	54.0	0.374
	LFM MOS	0.71	1.89	1.49	0.78	54.1	0.368
	NGM MOS	0.62	1.89	1.61	0.80	54.6	0.376
	No. Obs.	4732	2251	1857	6925		
24	LOCAL	0.59	1.67	2.37	0.75	51.2	0.338
	LFM MOS	0.78	1.76	1.52	0.78	54.5	0.368
	NGM MOS	0.73	1.80	1.70	0.77	55.1	0.381
	No. Obs.	4899	2271	1603	6852		

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	0.74	1.36	1.81	0.88	64.9	0.505
	LFM MOS	0.80	1.81	1.49	0.77	56.5	0.397
	NGM MOS	0.75	1.63	1.57	0.84	58.0	0.412
	No. Obs.	4909	2249	1598	6833		
18	LOCAL	0.63	1.90	2.28	0.85	58.1	0.409
	LFM MOS	0.96	1.80	1.15	0.83	61.9	0.438
	NGM MOS	0.86	1.92	1.35	0.85	61.2	0.435
	No. Obs.	5692	1531	1375	6989		
24	LOCAL	0.61	1.78	1.99	0.86	54.2	0.354
	LFM MOS	0.91	1.73	1.08	0.87	58.9	0.401
	NGM MOS	0.79	1.84	1.28	0.88	58.8	0.406
	No. Obs.	5009	1740	1635	7209		

Table 6.3. Comparative verification of local, LFM MOS, 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	0.74	1.36	1.44	0.95	67.4	0.504
	LFM MOS	0.78	1.66	1.37	0.87	60.1	0.406
	NGM MOS	0.74	1.54	1.19	0.96	63.3	0.440
	No. Obs.	1040	505	472	2235		
18	LOCAL	0.48	1.49	2.15	0.82	55.9	0.375
	LFM MOS	0.62	1.65	1.70	0.82	55.7	0.369
	NGM MOS	0.55	1.72	1.70	0.82	57.6	0.395
	No. Obs.	980	647	498	2121		
24	LOCAL	0.56	1.88	2.71	0.79	54.9	0.353
	LFM MOS	0.79	1.83	1.67	0.84	58.7	0.386
	NGM MOS	0.77	1.98	1.77	0.80	59.9	0.412
	No. Obs.	1205	467	348	2231		

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	0.65	1.59	2.28	0.87	64.4	0.473
	LFM MOS	0.81	1.89	1.59	0.82	60.3	0.412
	NGM MOS	0.77	1.86	1.60	0.85	61.9	0.432
	No. Obs.	1202	462	347	2207		
18	LOCAL	0.63	1.80	2.74	0.83	59.2	0.395
	LFM MOS	0.95	1.67	1.30	0.88	64.3	0.443
	NGM MOS	0.89	1.79	1.44	0.87	64.3	0.448
	No. Obs.	1259	359	328	2270		
24	LOCAL	0.68	1.48	1.87	0.85	56.6	0.359
	LFM MOS	0.73	1.73	1.28	0.90	58.8	0.380
	NGM MOS	0.72	1.75	1.31	0.90	59.9	0.398
	No. Obs.	1020	492	473	2233		

Table 6.5. Comparative verification of local, LFM MOS, and NGM MOS forecasts of four categories of cloud amount (clear, scattered, broken, and overcast) for 23 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	0.75	1.62	1.39	0.92	68.3	0.554
	LFM MOS	0.91	1.69	0.99	0.89	61.4	0.451
	NGM MOS	0.85	1.68	1.13	0.90	61.3	0.453
	No. Obs.	1347	433	460	1479		
18	LOCAL	0.58	1.85	1.87	0.69	49.8	0.337
	LFM MOS	0.76	1.90	1.27	0.74	53.2	0.369
	NGM MOS	0.74	1.86	1.33	0.75	55.2	0.397
	No. Obs.	1250	603	537	1473		
24	LOCAL	0.58	1.73	2.10	0.70	47.9	0.313
	LFM MOS	0.79	1.76	1.38	0.72	52.5	0.358
	NGM MOS	0.81	1.76	1.48	0.67	52.9	0.366
	No. Obs.	1264	638	445	1374		

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	0.74	1.28	1.85	0.84	63.7	0.506
	LFM MOS	0.80	1.80	1.45	0.67	54.0	0.381
	NGM MOS	0.83	1.50	1.38	0.81	56.5	0.405
	No. Obs.	1255	629	441	1370		
18	LOCAL	0.62	1.91	2.40	0.80	55.9	0.398
	LFM MOS	0.96	1.79	1.11	0.78	61.5	0.442
	NGM MOS	0.89	1.86	1.31	0.80	62.3	0.460
	No. Obs.	1514	413	342	1426		
24	LOCAL	0.56	2.16	1.83	0.82	51.6	0.346
	LFM MOS	0.87	1.86	0.89	0.91	59.4	0.422
	NGM MOS	0.82	1.95	1.17	0.84	58.2	0.414
	No. Obs.	1343	423	447	1480		

Table 6.7. Comparative verification of local, LFM MOS, and NGM MOS forecasts of four categories of cloud amount (clear, scattered, broken, and overcast) for 28 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	0.71	1.58	1.87	0.95	71.0	0.564
	LFM MOS	0.93	1.69	1.14	0.88	63.5	0.447
	NGM MOS	0.79	1.62	1.45	0.95	64.7	0.464
	No. Obs.	1527	462	337	2234		
18	LOCAL	0.46	1.95	2.41	0.82	55.1	0.379
	LFM MOS	0.61	2.35	1.57	0.80	54.0	0.357
	NGM MOS	0.51	2.21	1.83	0.85	53.7	0.353
	No. Obs.	1432	535	453	2137		
24	LOCAL	0.47	1.91	2.65	0.80	51.5	0.331
	LFM MOS	0.68	2.11	1.61	0.80	54.3	0.356
	NGM MOS	0.62	1.94	1.85	0.84	56.0	0.378
	No. Obs.	1428	581	398	2142		

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	0.69	1.59	1.77	0.91	67.1	0.523
	LFM MOS	0.73	2.04	1.53	0.81	58.0	0.403
	NGM MOS	0.65	1.85	1.73	0.88	59.6	0.421
	No. Obs.	1455	573	394	2156		
18	LOCAL	0.57	2.31	2.27	0.90	59.9	0.420
	LFM MOS	0.95	1.98	1.19	0.83	63.3	0.447
	NGM MOS	0.83	2.12	1.37	0.88	61.7	0.428
	No. Obs.	1670	391	340	2182		
24	LOCAL	0.52	1.95	2.57	0.88	54.5	0.343
	LFM MOS	0.97	1.81	1.16	0.83	60.0	0.400
	NGM MOS	0.77	1.92	1.56	0.88	60.6	0.416
	No. Obs.	1502	467	348	2270		

Table 6.9. Comparative verification of local, LFM MOS, 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	0.87	1.13	1.46	0.94	75.5	0.649
	LFM MOS	0.99	1.46	1.01	0.87	57.8	0.391
	NGM MOS	0.91	1.35	1.24	0.91	59.5	0.420
	No. Obs.	1160	360	365	1218		
18	LOCAL	0.74	1.38	2.09	0.75	55.0	0.392
	LFM MOS	0.86	1.68	1.42	0.73	53.1	0.359
	NGM MOS	0.69	1.81	1.63	0.76	50.9	0.336
	No. Obs.	1070	466	369	1194		
24	LOCAL	0.79	1.21	2.10	0.67	49.5	0.329
	LFM MOS	0.90	1.37	1.46	0.72	51.4	0.344
	NGM MOS	0.74	1.54	1.73	0.68	49.8	0.333
	No. Obs.	1002	585	412	1105		

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	0.92	1.05	1.43	0.88	63.6	0.501
	LFM MOS	0.88	1.51	1.40	0.68	52.3	0.358
	NGM MOS	0.77	1.39	1.58	0.78	52.4	0.360
	No. Obs.	997	585	416	1100		
18	LOCAL	0.72	1.56	1.78	0.87	56.5	0.398
	LFM MOS	0.96	1.76	1.01	0.79	56.8	0.385
	NGM MOS	0.82	1.90	1.28	0.81	54.9	0.371
	No. Obs.	1249	368	365	1111		
24	LOCAL	0.70	1.51	1.78	0.89	53.6	0.354
	LFM MOS	1.02	1.46	0.96	0.86	56.8	0.377
	NGM MOS	0.85	1.72	1.12	0.89	55.2	0.364
	No. Obs.	1144	358	367	1226		

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	0.79	1.09	1.64	0.97	64.3	0.441
	LFM MOS	1.02	0.97	0.79	1.04	64.9	0.426
	No. Obs.	263	99	101	539		
18	LOCAL	0.73	1.27	1.65	0.92	56.4	0.331
	LFM MOS	0.87	0.83	1.08	1.07	62.4	0.387
	No. Obs.	238	102	125	551		
24	LOCAL	0.57	1.19	1.88	0.95	51.5	0.273
	LFM MOS	0.78	0.92	0.89	1.15	60.9	0.369
	No. Obs.	246	111	127	520		

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	0.78	1.00	1.45	0.99	62.3	0.421
	LFM MOS	0.93	0.80	1.03	1.07	62.7	0.408
	No. Obs.	240	113	127	519		
18	LOCAL	0.63	1.08	1.78	1.00	56.8	0.347
	LFM MOS	0.96	0.79	0.71	1.14	62.2	0.392
	No. Obs.	272	115	117	518		
24	LOCAL	0.62	1.07	2.07	0.96	54.9	0.299
	LFM MOS	0.94	0.86	0.73	1.10	62.6	0.372
	No. Obs.	259	94	103	540		

Table 7.1. Comparative verification of LFM and 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	LFM	20	0.553	2901	3.4	0.9	2911	0.393	88.1	0.06	1.02	0.85	0.80	0.78	1.08	0.43
	NGM	19	0.586		3.7	1.8		0.411	86.8	0.06	0.98	1.08	1.27	1.34	2.00	1.29
											14136	1456	328	73	13	7
18	LFM	23	0.525	5178	3.3	0.4	5198	0.375	77.9	0.16	1.05	0.84	0.79	0.63	0.69	1.67
	NGM	21	0.544		3.5	1.5		0.401	76.7	0.16	0.98	1.03	1.10	1.23	1.14	3.33
											12301	2712	782	195	42	6
24	LFM	26	0.473	3541	3.7	0.9	3565	0.343	83.8	0.11	1.03	0.88	0.67	0.69	0.62	1.43
	NGM	25	0.499		3.9	1.8		0.349	82.0	0.12	0.98	1.06	1.13	1.10	1.71	1.86
											13597	1819	482	103	21	7

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	LFM	23	0.507	3693	3.5	0.8	3713	0.365	84.2	0.12	1.03	0.88	0.72	0.65	0.91	1.14
	NGM	22	0.533		3.6	1.5		0.397	83.4	0.14	0.99	1.07	1.03	1.09	1.18	1.57
											13536	1819	485	100	22	7
18	LFM	24	0.508	2889	3.7	1.2	2901	0.341	86.9	0.08	1.02	0.88	0.79	0.78	0.56	1.75
	NGM	22	0.529		3.8	1.9		0.375	86.0	0.07	0.98	1.13	1.02	1.43	0.94	1.75
											14142	1438	359	63	18	4
24	LFM	24	0.521	2591	3.8	0.9	2612	0.335	86.9	0.03	1.03	0.84	0.72	0.68	0.79	0.29
	NGM	22	0.538		3.9	1.8		0.367	85.9	0.06	0.99	1.06	1.13	1.09	1.71	0.71
											14065	1475	335	75	14	7

Table 7.3. Comparative verification of LFM and NGM MOS surface wind forecasts for 24 stations in the Eastern 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	LFM	20	0.534	818	3.3	0.6	818	0.418	87.3	0.11	1.03	0.80	0.69	1.40	1.67	0.33
	NGM	18	0.572		3.5	1.6		0.425	85.6	0.13	0.98	1.04	1.25	1.95	1.17	0.67
											3555	425	96	20	6	3
18	LFM	21	0.502	1503	3.1	0.3	1505	0.379	76.7	0.15	1.06	0.83	0.80	0.87	0.85	1.00
	NGM	19	0.518		3.2	1.3		0.418	75.9	0.11	0.97	1.05	1.12	1.34	0.62	2.00
											3068	765	201	47	13	3
24	LFM	23	0.481	884	3.7	0.7	890	0.373	85.2	0.18	1.04	0.80	0.53	0.93	1.33	2.00
	NGM	20	0.534		3.9	1.7		0.362	82.9	0.15	0.99	1.00	1.05	1.21	2.00	2.00
											3505	446	131	29	6	4

Table 7.4. Same as Table 7.3 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	LFM	20	0.503	875	3.5	0.5	878	0.388	85.7	0.19	1.04	0.77	0.61	0.81	1.67	1.25
	NGM	18	0.552		3.6	1.5		0.440	84.8	0.15	0.99	1.13	0.90	1.11	1.17	1.50
											3468	440	128	27	6	4
18	LFM	22	0.472	805	3.6	1.2	808	0.364	86.8	0.07	1.01	0.88	0.85	1.59	1.50	1.00
	NGM	19	0.530		3.8	1.8		0.384	85.7	0.07	0.98	1.13	1.19	1.76	1.25	1.00
											3614	378	91	17	4	3
24	LFM	22	0.524	748	3.8	0.9	750	0.369	86.3	0.00	1.03	0.79	0.88	1.42	1.00	0.00
	NGM	19	0.534		3.7	1.5		0.395	85.5	0.11	0.99	1.04	1.04	1.11	1.50	0.67
											3539	414	95	19	6	3

Table 7.5. Comparative verification of LFM and 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	LFM	23	0.484	556	3.6	1.6	557	0.326	90.5	0.00	1.01	0.86	0.76	1.14	*	2.00
	NGM	21	0.551		3.4	1.6		0.367	90.5	0.00	1.00	1.00	1.00	0.86	**	1.00
											3714	268	49	7	0	1
18	LFM	25	0.467	1234	3.4	1.0	1240	0.344	78.8	0.27	1.04	0.85	0.86	0.76	1.00	6.00
	NGM	22	0.532		3.3	1.3		0.382	79.0	0.31	1.01	1.01	0.86	0.73	1.67	0.00
											3288	654	160	33	6	1
24	LFM	28	0.446	679	3.6	1.5	689	0.310	87.9	0.17	1.01	0.90	0.78	1.25	0.33	2.00
	NGM	27	0.494		3.5	1.6		0.348	87.9	0.20	1.00	1.04	0.86	1.38	0.67	0.00
											3631	332	65	8	3	1

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	LFM	26	0.501	727	3.6	1.6	737	0.313	87.5	0.33	1.00	1.02	0.78	1.50	0.33	3.00
	NGM	24	0.523		3.3	1.6		0.381	88.5	0.17	1.00	1.05	0.90	1.38	1.00	0.00
											3616	321	67	8	3	1
18	LFM	27	0.490	585	3.9	2.1	587	0.312	88.8	0.11	1.00	0.98	1.14	1.20	0.67	4.00
	NGM	24	0.495		3.7	1.7		0.359	89.7	0.00	1.00	1.06	0.67	1.80	0.33	1.00
											3667	283	58	5	3	1
24	LFM	29	0.457	472	3.8	1.4	474	0.282	89.8	0.17	1.01	0.84	0.78	0.57	*	2.00
	NGM	25	0.495		3.6	1.4		0.311	90.0	0.00	1.01	0.92	0.69	1.00	*	0.00
											3682	274	49	7	0	1

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

Table 7.7. Comparative verification of LFM and 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	LFM	17	0.597	1119	3.2	0.7	1125	0.399	85.7	0.00	1.02	0.90	0.89	0.48	0.00	0.00
	NGM	16	0.624		3.7	2.2		0.416	83.2	0.04	0.95	1.21	1.64	1.26	3.00	2.00
											4087	531	117	27	5	3
18	LFM	19	0.592	1864	3.1	0.0	1867	0.371	73.7	0.15	1.09	0.82	0.80	0.52	0.47	0.00
	NGM	18	0.595		3.5	1.7		0.401	71.6	0.17	0.95	1.00	1.38	1.34	1.33	11.00
											3338	1000	288	86	15	1
24	LFM	21	0.536	1218	3.5	0.4	1219	0.340	81.6	0.00	1.04	0.89	0.58	0.54	0.50	0.00
	NGM	20	0.541		4.0	2.0		0.345	78.1	0.03	0.95	1.23	1.22	1.02	2.00	5.00
											3920	614	183	41	8	1

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	LFM	19	0.568	1285	3.2	0.3	1287	0.373	82.1	0.00	1.04	0.91	0.65	0.35	0.78	0.00
	NGM	18	0.584		3.5	1.6		0.389	79.8	0.09	0.96	1.18	1.08	1.25	1.00	5.00
											3927	628	185	40	9	1
18	LFM	20	0.553	1067	3.5	0.5	1068	0.339	83.9	0.11	1.04	0.85	0.66	0.40	0.25	**
	NGM	19	0.574		3.6	1.8		0.381	82.1	0.11	0.97	1.19	1.12	1.40	1.38	*
											4073	561	143	25	8	0
24	LFM	21	0.558	1009	3.7	0.6	1020	0.321	83.7	0.00	1.03	0.86	0.72	0.60	0.00	0.00
	NGM	19	0.571		3.9	2.2		0.371	81.5	0.05	0.95	1.21	1.56	1.27	2.00	1.00
											4081	550	125	30	5	3

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

Table 7.9. Comparative verification of LFM and NGM MOS surface wind forecasts for 18 stations in the Western 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	26	0.472	408	4.0	1.0	411	0.396	89.7	0.00	1.02	0.81	0.83	0.42	0.00	**
	NGM	27	0.461		4.3	1.6		0.392	88.8	0.00	1.01	0.95	0.86	1.00	2.00	**
											2780	232	66	19	2	0
18	LFM	34	0.423	577	4.4	0.8	586	0.387	84.8	0.07	1.03	0.94	0.70	0.41	0.63	1.00
	NGM	36	0.399		5.0	1.9		0.343	82.3	0.10	1.00	1.09	0.77	1.28	1.25	3.00
											2607	293	133	29	8	1
24	LFM	36	0.338	760	4.0	1.4	767	0.329	80.2	0.00	1.02	0.92	0.94	0.48	0.00	0.00
	NGM	35	0.354		4.3	1.9		0.320	79.2	0.22	1.01	0.90	1.23	1.00	1.50	0.00
											2541	427	103	25	4	1

Table 7.10. Same as Table 7.9 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	32	0.373	806	3.7	1.1	811	0.358	81.2	0.00	1.03	0.85	0.94	0.68	0.50	0.00
	NGM	31	0.400		3.8	1.5		0.354	80.5	0.20	1.02	0.87	1.17	0.72	1.75	0.00
											2525	430	105	25	4	1
18	LFM	32	0.377	432	4.2	1.4	438	0.327	89.1	0.00	1.02	0.83	0.72	0.38	0.00	**
	NGM	33	0.372		4.5	2.1		0.334	87.8	0.00	1.00	1.09	0.90	1.00	0.00	*
											2788	216	67	16	3	0
24	LFM	31	0.373	362	4.3	1.0	368	0.347	89.0	0.00	1.03	0.86	0.45	0.11	0.33	**
	NGM	30	0.390		4.6	1.8		0.334	88.0	0.00	1.02	0.89	0.77	0.84	1.00	**
											2763	237	66	19	3	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	29	0.439	311	4.9	3.0	316	0.353	79.4	0.14	0.96 855	1.10 112	1.32 41	1.35 17	3.00 1	0.33 3
18	LFM	30	0.390	329	5.4	2.6	335	0.377	79.5	0.00	0.96 852	1.20 106	1.12 52	1.36 14	1.00 6	0.50 4
24	LFM	35	0.332	388	5.3	2.8	393	0.350	75.5	0.00	0.96 819	1.14 121	1.00 61	1.42 24	1.00 7	3.00 2

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	29	0.428	348	4.6	1.4	350	0.386	78.6	0.00	1.00 832	1.21 120	0.72 58	0.79 24	1.00 7	1.00 2
18	LFM	29	0.415	317	4.9	2.7	323	0.331	79.1	0.07	0.97 863	1.15 103	1.13 47	1.36 14	1.17 6	0.50 2
24	LFM	33	0.359	313	5.5	3.7	324	0.342	78.6	0.25	0.96 861	1.09 113	1.42 43	1.06 17	10.00 1	0.33 3

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	0.535	5871	3.4	2.0	5951	0.423	86.9	0.11	0.98 14237	1.27 1427	0.98 343	0.61 67	0.82 17	0.50 6
9	LOCAL	31	0.431	9308	3.5	1.5	9385	0.368	75.7	0.17	0.98 12350	1.19 2706	0.75 782	0.41 204	0.74 35	1.29 7
15	LOCAL	35	0.377	8505	4.2	2.9	8678	0.298	78.1	0.05	0.92 13688	1.61 1794	1.00 467	0.66 108	1.00 22	2.00 5

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	26	0.498	9812	3.1	1.5	9872	0.411	76.5	0.22	0.96 12398	1.23 2818	0.85 816	0.54 155	0.73 41	1.33 12
9	LOCAL	33	0.384	6604	4.0	2.5	6735	0.328	83.6	0.06	0.97 14085	1.34 1517	0.77 376	0.46 110	1.25 12	9.00 1
15	LOCAL	34	0.384	5837	4.1	2.5	6011	0.339	85.2	0.07	0.98 14219	1.26 1468	0.70 326	0.47 81	0.64 22	1.40 5

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	0.502	1796	3.4	2.1	1813	0.414	84.9	0.21	0.97 3688	1.20 442	1.15 101	0.84 19	1.00 6	0.67 3
9	LOCAL	28	0.431	2649	3.3	1.5	2666	0.377	74.7	0.17	0.98 3197	1.13 789	0.88 210	0.62 45	0.86 14	1.67 3
15	LOCAL	34	0.358	2315	4.3	3.1	2357	0.305	77.8	0.03	0.92 3614	1.58 471	1.07 137	1.21 29	2.33 6	1.75 4

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	0.493	2608	3.1	1.6	2615	0.395	76.3	0.35	0.95 3277	1.24 731	0.92 179	0.72 39	0.82 11	1.50 6
9	LOCAL	32	0.368	1825	4.0	2.6	1865	0.343	83.1	0.05	0.98 3671	1.22 440	0.77 101	1.10 31	1.33 6	7.00 1
15	LOCAL	33	0.341	1663	4.1	2.7	1709	0.347	84.0	0.14	0.97 3718	1.29 418	0.75 87	1.10 21	1.29 7	2.00 3

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	0.538	1200	3.4	2.3	1220	0.383	90.5	0.00	0.99 3552	1.19 250	1.08 38	0.43 7	* 0	0.00 1
9	LOCAL	30	0.431	2208	3.3	1.6	2224	0.337	78.4	0.60	0.99 3110	1.21 577	0.49 127	0.35 23	0.50 4	1.00 1
15	LOCAL	36	0.358	1955	4.2	3.3	2003	0.258	82.5	0.33	0.92 3474	2.04 299	0.58 57	0.50 8	0.40 5	* 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	27	0.474	2461	3.2	1.8	2481	0.376	78.3	0.38	0.95 3208	1.38 585	0.59 153	0.61 18	0.25 4	5.00 1
9	LOCAL	33	0.362	1416	4.0	2.9	1453	0.292	88.0	0.00	0.97 3525	1.47 255	0.78 32	0.08 13	2.00 1	** 0
15	LOCAL	34	0.368	1213	4.1	2.9	1261	0.285	89.2	0.00	0.99 3540	1.21 249	0.69 39	0.25 8	* 0	** 0

* 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	0.566	2096	3.2	1.8	2123	0.445	84.1	0.09	0.95 4127	1.39 546	0.96 126	0.53 30	1.25 4	0.50 2
9	LOCAL	28	0.460	3119	3.4	1.2	3143	0.383	71.5	0.13	0.97 3410	1.24 1013	0.82 299	0.32 94	0.62 13	1.00 3
15	LOCAL	31	0.413	2862	4.0	2.4	2903	0.310	73.8	0.00	0.90 3891	1.62 681	0.94 195	0.40 47	0.67 9	2.00 1

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	0.545	3188	2.9	1.0	3199	0.413	72.0	0.11	0.94 3396	1.26 1055	0.89 320	0.50 66	0.75 20	0.33 3
9	LOCAL	30	0.413	2311	3.8	2.0	2343	0.335	79.5	0.11	0.97 4044	1.37 595	0.69 168	0.26 46	0.60 5	* 0
15	LOCAL	30	0.432	2108	3.8	2.0	2146	0.363	81.8	0.00	0.98 4096	1.27 586	0.65 139	0.27 33	0.22 9	0.50 2

* 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	0.467	779	3.9	1.9	795	0.392	89.7	0.00	1.00 2870	1.21 189	0.74 78	0.55 11	0.14 7	** 0
9	LOCAL	44	0.334	1332	4.3	2.1	1352	0.297	80.2	0.00	1.01 2633	1.16 327	0.65 146	0.40 42	1.00 4	** 0
15	LOCAL	43	0.328	1373	4.4	3.0	1415	0.275	80.0	0.00	0.96 2709	1.27 343	1.33 78	0.54 24	0.00 2	** 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	33	0.421	1555	3.5	1.6	1577	0.444	81.3	0.17	1.02 2517	0.98 447	0.92 164	0.38 32	0.83 6	0.50 2
9	LOCAL	43	0.329	1052	4.6	3.1	1074	0.287	85.6	0.00	0.98 2845	1.35 227	0.92 75	0.20 20	* 0	** 0
15	LOCAL	44	0.301	853	4.8	3.1	895	0.282	87.2	0.00	1.00 2865	1.22 215	0.72 61	0.21 19	0.33 6	** 0

* This category was forecast but was not observed.
** 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	23	0.489	358	3.4	1.8	368	0.570	87.2	0.60	1.00 816	1.01 108	1.26 39	0.44 16	3.00 1	0.33 3
9	LOCAL	35	0.376	365	5.1	2.3	379	0.347	80.4	0.07	0.99 831	1.09 99	1.06 47	0.85 13	0.67 6	0.25 4
15	LOCAL	42	0.302	406	4.8	2.1	416	0.326	76.9	0.00	1.01 784	1.01 114	1.09 57	0.48 23	0.57 7	0.00 2

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	36	0.370	437	4.6	2.4	450	0.385	77.6	0.00	0.97 800	1.14 115	1.32 56	0.79 24	0.29 7	1.00 2
9	LOCAL	41	0.278	426	5.6	4.0	454	0.353	77.8	0.09	0.93 852	1.33 103	1.63 48	1.13 15	0.33 6	1.00 2
15	LOCAL	45	0.279	418	6.2	4.6	449	0.286	75.4	0.14	0.93 826	1.14 111	1.81 43	1.25 16	2.00 1	0.67 3

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	1.69	0.094	92.9	0.07
	LFM MOS	1.00	1.07	0.105	94.6	0.07
	No. Obs.	927	29			
± 3-h Max	LOCAL	1.01	0.80	0.131	90.4	0.10
	LFM MOS	1.03	0.51	0.181	92.3	0.12
	No. Obs.	872	61			

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	0.97	1.83	0.252	93.7	0.16
	LFM MOS	0.99	1.37	0.196	94.3	0.13
	No. Obs.	933	30			
± 3-h Max	LOCAL	1.01	0.86	0.291	91.6	0.20
	LFM MOS	1.03	0.64	0.205	91.6	0.14
	No. Obs.	875	64			

Table 8.1. Comparative verification of LFM MOS and persistence ceiling height 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	MOS	1.28	0.85	1.03	0.98	3.813	71.6	0.399
	PERSISTENCE	0.91	0.87	0.96	1.03	2.077	82.2	0.606
	No. Obs.	1102	1128	2230	10950			
18	MOS	1.26	0.93	1.11	0.96	3.032	72.6	0.402
	PERSISTENCE	1.68	0.99	0.79	1.02	3.242	72.7	0.382
	No. Obs.	590	976	2683	10940			
24	MOS	1.45	0.88	1.03	0.99	2.679	76.7	0.374
	PERSISTENCE	2.07	1.28	1.02	0.94	3.632	71.3	0.282
	No. Obs.	462	751	2037	11820			

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	MOS	1.58	0.89	1.03	0.98	2.532	77.9	0.409
	PERSISTENCE	0.88	1.16	1.15	0.97	1.441	85.5	0.617
	No. Obs.	457	760	2034	11849			
18	MOS	1.51	0.79	0.99	0.98	3.431	73.7	0.373
	PERSISTENCE	0.52	0.99	1.12	1.01	2.729	75.8	0.399
	No. Obs.	802	902	2118	11571			
24	MOS	1.71	0.72	0.97	0.96	4.535	68.3	0.341
	PERSISTENCE	0.38	0.79	1.06	1.07	3.910	69.1	0.281
	No. Obs.	1093	1115	2226	10875			

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	MOS	0.62	1.72	1.56	0.86	3.235	68.4	0.299
	PERSISTENCE	0.97	1.19	0.92	1.01	2.020	81.3	0.510
	No. Obs.	29	36	160	733			
18	MOS	0.51	1.22	1.97	0.82	3.651	64.2	0.252
	PERSISTENCE	0.83	0.86	1.04	1.01	3.272	71.1	0.256
	No. Obs.	35	51	144	732			
24	MOS	0.57	1.76	1.87	0.80	3.245	65.1	0.259
	PERSISTENCE	1.26	1.05	1.00	0.99	3.293	70.0	0.202
	No. Obs.	23	42	150	749			

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	MOS	1.04	1.02	1.83	0.83	3.269	67.4	0.293
	PERSISTENCE	1.29	0.83	1.06	0.99	2.028	80.1	0.483
	No. Obs.	24	52	160	787			
18	MOS	0.91	1.46	1.96	0.79	3.674	63.7	0.241
	PERSISTENCE	0.97	1.02	1.07	0.99	3.071	73.2	0.299
	No. Obs.	32	41	158	787			
24	MOS	0.62	1.63	1.74	0.81	3.878	62.2	0.225
	PERSISTENCE	0.81	1.00	0.97	1.02	3.712	67.1	0.171
	No. Obs.	37	43	174	762			

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

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Log Score	Percent Correct	Skill Score
3	LOCAL	0.87	0.82	1.10	1.01	2.337	80.2	0.562
	PERSISTENCE	0.90	0.87	0.99	1.03	2.075	82.4	0.607
	No. Obs.	1142	1170	2293	11508			
6	LOCAL	0.52	0.76	1.15	1.04	2.800	75.5	0.451
	PERSISTENCE	1.02	0.82	0.93	1.03	2.872	76.3	0.475
	No. Obs.	1000	1250	2437	11393			
9	LOCAL	0.35	0.70	1.00	1.06	2.316	76.7	0.428
	PERSISTENCE	1.84	0.99	0.81	1.01	3.197	72.7	0.375
	No. Obs.	554	1029	2806	11695			
15	LOCAL	0.30	0.86	1.22	1.00	2.199	77.9	0.379
	PERSISTENCE	2.09	1.30	1.06	0.93	3.646	71.0	0.273
	No. Obs.	489	785	2139	12678			

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

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Log Score	Percent Correct	Skill Score
3	LOCAL	0.70	0.84	1.10	1.00	1.605	82.8	0.547
	PERSISTENCE	1.34	1.14	1.16	0.95	1.594	83.4	0.594
	No. Obs.	416	914	2425	12496			
6	LOCAL	0.55	0.92	1.23	0.98	1.923	80.5	0.464
	PERSISTENCE	1.13	1.32	1.32	0.92	2.199	78.2	0.454
	No. Obs.	490	789	2123	12710			
9	LOCAL	0.56	0.93	1.33	0.97	2.299	77.7	0.425
	PERSISTENCE	0.89	1.17	1.35	0.94	2.600	75.5	0.399
	No. Obs.	622	886	2079	12520			
15	LOCAL	0.56	1.09	1.32	0.97	3.289	71.8	0.374
	PERSISTENCE	0.54	1.00	1.23	0.99	3.689	69.3	0.298
	No. Obs.	1018	1035	2285	11774			

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

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Log Score	Percent Correct	Skill Score
3	LOCAL	0.97	0.75	0.81	1.06	1.857	81.9	0.502
	PERSISTENCE	0.97	1.14	0.94	1.01	2.017	81.5	0.522
	No. Obs.	29	36	160	716			
6	LOCAL	0.88	0.58	0.88	1.05	2.570	77.5	0.361
	PERSISTENCE	0.85	0.93	1.06	1.00	2.688	76.0	0.367
	No. Obs.	33	45	142	741			
9	LOCAL	0.47	0.35	0.99	1.07	2.802	75.1	0.287
	PERSISTENCE	0.85	0.86	1.06	1.01	3.198	71.7	0.262
	No. Obs.	34	49	141	732			
15	LOCAL	0.17	0.31	0.81	1.10	2.442	75.4	0.229
	PERSISTENCE	1.22	0.98	1.00	0.99	3.306	69.6	0.195
	No. Obs.	23	42	149	731			

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

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Log Score	Percent Correct	Skill Score
3	LOCAL	0.40	0.21	0.83	1.10	2.312	76.2	0.261
	PERSISTENCE	1.30	0.85	1.04	0.99	1.925	80.8	0.494
	No. Obs.	20	47	156	754			
6	LOCAL	0.27	0.32	0.78	1.11	2.383	75.7	0.267
	PERSISTENCE	1.23	1.11	0.92	1.01	2.609	75.9	0.370
	No. Obs.	22	37	178	761			
9	LOCAL	0.25	0.37	0.89	1.08	2.665	74.7	0.236
	PERSISTENCE	0.96	1.00	1.03	0.99	3.006	73.1	0.289
	No. Obs.	28	41	159	771			
15	LOCAL	0.24	0.33	0.84	1.11	2.899	72.0	0.208
	PERSISTENCE	0.76	0.95	0.93	1.03	3.742	66.6	0.156
	No. Obs.	34	43	171	729			

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

Projection (h)	Type of Forecast	Bias by Category				Log Score	Percent Correct	Skill Score
		1	2	3	4			
12	MOS	1.46	1.07	1.16	0.94	3.453	71.2	0.346
	PERSISTENCE	0.86	0.89	0.90	1.04	1.834	83.2	0.570
	No. Obs.	708	1001	2210	11914			
18	MOS	1.34	1.11	1.30	0.94	2.647	75.6	0.339
	PERSISTENCE	1.68	0.91	1.15	0.97	2.895	75.2	0.302
	No. Obs.	366	982	1707	12659			
24	MOS	1.05	1.04	1.20	0.97	2.204	79.2	0.332
	PERSISTENCE	2.08	1.14	1.27	0.94	3.160	73.5	0.208
	No. Obs.	298	788	1564	13203			

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

Projection (h)	Type of Forecast	Bias by Category				Log Score	Percent Correct	Skill Score
		1	2	3	4			
12	MOS	1.18	0.90	1.11	0.99	2.052	80.7	0.359
	PERSISTENCE	0.94	1.12	0.96	1.00	1.346	86.4	0.541
	No. Obs.	293	789	1561	13152			
18	MOS	1.67	0.93	1.10	0.97	2.771	76.9	0.335
	PERSISTENCE	0.65	1.09	0.85	1.03	2.354	78.9	0.324
	No. Obs.	426	818	1767	12828			
24	MOS	1.91	1.16	1.06	0.92	4.195	68.6	0.301
	PERSISTENCE	0.38	0.88	0.68	1.11	3.412	71.8	0.210
	No. Obs.	710	1002	2195	11870			

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	MOS	0.69	1.22	1.07	0.99	2.887	75.5	0.270
	PERSISTENCE	0.84	1.20	0.98	0.99	2.016	82.2	0.464
	No. Obs.	32	54	96	778			
18	MOS	0.51	1.15	1.31	0.99	4.050	70.0	0.215
	PERSISTENCE	0.49	0.93	1.12	1.03	3.585	73.5	0.258
	No. Obs.	57	71	84	749			
24	MOS	0.61	1.42	1.40	0.95	3.846	71.1	0.207
	PERSISTENCE	0.57	1.10	1.21	1.00	3.675	73.0	0.201
	No. Obs.	49	60	78	777			

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	MOS	0.48	0.96	1.13	1.02	3.434	74.9	0.237
	PERSISTENCE	0.91	1.28	1.04	0.98	2.382	81.2	0.473
	No. Obs.	54	67	83	824			
18	MOS	0.63	0.90	1.06	1.01	3.121	72.8	0.190
	PERSISTENCE	1.81	1.43	0.74	0.98	3.391	73.1	0.248
	No. Obs.	27	60	117	813			
24	MOS	0.69	0.98	1.50	0.95	3.664	69.2	0.164
	PERSISTENCE	1.26	1.39	0.83	0.98	3.982	70.5	0.168
	No. Obs.	39	61	103	819			

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

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Log Score	Percent Correct	Skill Score
3	LOCAL	0.83	0.84	1.18	0.99	2.143	79.5	0.505
	PERSISTENCE	0.87	0.91	0.92	1.03	1.851	83.1	0.573
	No. Obs.	739	1008	2272	12074			
6	LOCAL	0.39	0.52	1.03	1.09	2.750	74.4	0.353
	PERSISTENCE	0.93	0.65	0.94	1.06	2.894	74.6	0.382
	No. Obs.	696	1415	2219	11732			
9	LOCAL	0.27	0.47	1.02	1.06	1.934	80.5	0.343
	PERSISTENCE	1.98	0.91	1.18	0.96	2.897	75.1	0.303
	No. Obs.	327	1002	1770	12968			
15	LOCAL	0.24	0.52	1.08	1.04	1.771	82.3	0.339
	PERSISTENCE	2.13	1.13	1.33	0.93	3.170	73.3	0.213
	No. Obs.	303	811	1561	13393			

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

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Log Score	Percent Correct	Skill Score
3	LOCAL	0.60	0.56	1.34	1.00	1.452	84.6	0.471
	PERSISTENCE	1.14	1.12	1.17	0.97	1.462	85.4	0.532
	No. Obs.	290	895	1521	13527			
6	LOCAL	0.51	0.62	1.25	1.00	1.648	83.0	0.411
	PERSISTENCE	1.08	1.24	1.13	0.97	1.904	81.6	0.412
	No. Obs.	305	809	1566	13413			
9	LOCAL	0.54	0.84	1.23	0.99	1.886	81.1	0.378
	PERSISTENCE	0.92	1.38	1.05	0.98	2.202	79.5	0.352
	No. Obs.	357	724	1686	13324			
15	LOCAL	0.55	1.00	1.21	0.99	2.777	74.5	0.336
	PERSISTENCE	0.52	1.10	0.84	1.04	3.164	73.2	0.247
	No. Obs.	636	908	2094	12454			

Table 9.7. Comparative verification of local and persistence visibility forecasts for 6 stations in the Alaska Region for the FT issuance time of approximately 0900 UTC.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Log Score	Percent Correct	Skill Score
	LOCAL	1.13	0.75	1.19	0.99	2.106	80.9	0.426
3	PERSISTENCE	0.87	1.21	1.00	0.99	2.010	82.1	0.460
	No. Obs.	30	52	94	763			
	LOCAL	0.77	0.52	1.49	1.01	2.886	77.6	0.337
6	PERSISTENCE	0.55	1.00	1.22	1.01	2.793	78.1	0.353
	No. Obs.	47	65	77	771			
	LOCAL	0.43	0.39	1.40	1.06	3.143	76.4	0.301
9	PERSISTENCE	0.48	0.94	1.17	1.03	3.471	74.1	0.270
	No. Obs.	56	69	81	749			
	LOCAL	0.22	0.37	1.34	1.06	2.997	76.9	0.202
15	PERSISTENCE	0.60	1.03	1.29	0.99	3.606	73.6	0.203
	No. Obs.	45	59	73	767			

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

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Log Score	Percent Correct	Skill Score
	LOCAL	0.33	0.30	1.47	1.05	2.555	78.8	0.297
3	PERSISTENCE	0.96	1.33	1.04	0.97	2.263	82.0	0.480
	No. Obs.	45	61	79	792			
	LOCAL	0.48	0.18	1.36	1.05	2.519	77.1	0.257
6	PERSISTENCE	1.59	1.17	0.87	0.98	3.079	75.3	0.298
	No. Obs.	29	71	95	802			
	LOCAL	0.65	0.28	1.12	1.04	2.483	75.8	0.219
9	PERSISTENCE	2.00	1.43	0.72	0.98	3.272	73.4	0.246
	No. Obs.	23	58	116	801			
	LOCAL	0.44	0.31	1.28	1.04	2.898	74.1	0.166
15	PERSISTENCE	1.19	1.39	0.84	0.98	3.906	70.8	0.167
	No. Obs.	36	59	96	785			