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AFOS-ERA VERIFICATION OF GUIDANCE AND LOCAL AVIATION/PUBLIC WEATHER FORECASTS--NO. 20 (APRIL 1993 - SEPTEMBER 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 warm season months of April 1993 through September 1993 for maximum/minimum (max/min) temperature, probability of precipitation (PoP), 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.

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. Tables 4.1 - 4.12 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 5.1 - 5.12, while the analogous local scores are given in Tables 5.13 - 5.24. Comparative verification results for the 42-h significant wind speed are presented for the Alaska Region only in Tables 5.25 and 5.26. For ceiling height and visibility, verification scores are shown only for the conterminous U.S. stations combined and for the Alaska Region. Tables 6.1 - 6.4 contain the objective ceiling height forecast results for the conterminous U.S. and the Alaska Region, while Tables 6.5 - 6.8 contain ceiling height scores for the local forecasts. Tables 7.1 - 7.8 show objective and local visibility forecast results for the conterminous U.S. and the Alaska Region.

2. SUMMARY (APRIL 1993 - SEPTEMBER 1993)

During the 1993 warm season, the NGM-based MOS replaced the LFM-based MOS as the official objective guidance for the conterminous U.S. For most stations, the local collection of NGM-based MOS began on June 21, 1993. Table 1.5 lists the forecast cycle when the conversion occurred (i.e., the first forecast cycle for which NGM-based guidance was collected) at each conterminous U.S. station. Note, therefore, that the official guidance was a mixture of LFM- and NGM-based MOS for this warm season. Wherever the heading "GUID" or "LFM/NGM" appears in the attached verification tables, the scores are based on the mixed sample. Please note that for some weather elements, forecast definitions for LFM- and NGM-based MOS differ slightly. For most weather elements, comparative verification results are also presented for NGM-based MOS that was archived centrally by TDL.

A new NGM MOS cloud amount forecast system replaced the existing NGM-based MOS cloud forecast system, and NGM MOS visibility guidance was added to the NGM MOS forecast bulletin (Dallavalle et al. 1992) on 1200 UTC July 7, 1993. Note that for a short period after the NGM MOS guidance became the official guidance, and before the NGM MOS visibility was added to the bulletin, no visibility guidance was available for stations in the conterminous U.S. For visibility, the centrally-archived NGM MOS guidance was not included in verification results presented here because NGM MOS visibility guidance was not produced for the first half of the warm season. Thus, in order to verify a matched sample of the locally-collected official guidance and the centrally-archived NGM MOS guidance, the sample would have covered only the second half of the warm season, coincident to the period when NGM MOS visibility guidance was collected as the official guidance.

For ceiling height and visibility, the categories used for verification now match the definitions of aviation flight rules (LIFR, IFR, MVFR, and VFR). Note that the NGM-based MOS ceiling and visibility categorical forecast definitions also match the flight rule definitions, while the LFM-based MOS categories differ slightly for MVFR and VFR. In general, care must be used when interpreting verification results for rare events, for example, the lower categories of ceiling height or visibility.

The climatic normal temperatures used in the max/min temperature verification were replaced with normals for a more recent period. 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.

On July 1, 1993, Jackson, Mississippi was commissioned as an ASOS site. Because the ASOS cloud amount observations are incomplete, we set to missing the observed cloud amount data for Jackson after it was commissioned. In addition, the observed cloud amount data were set to missing for the five AEV ASOS sites listed in Table 1.3 that were commissioned during the 1992-93 cool season.

For stations in the conterminous U.S., the local data collection software used after approximately June 21, 1993, contained an error in which missing data were set equal to 15 instead of a coded value used by other parts of the local data collection software. For this reason, we eliminated from the data archive all local forecasts and observations equal to 15 after this version of the software was installed at a given forecast office. Note that legitimate values equal to 15 were probably also 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 set to missing.

In June 1995, we discovered that the locally-collected MOS PoP forecasts for stations in the Alaska Region 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.

During the 1992-93 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 mismatch of the forecast valid time and the verifying observation began in late June 1987. Consequently, the 42-h significant wind verification results are correct for some stations and incorrect for others. Thus, overall verification results for the conterminous U.S. for the 1993 warm season were not included in this office note. In addition, the 42-h significant wind verification results for the conterminous U.S. presented in office notes for the 1987 warm season through 1992 warm season should be disregarded. For the Alaska Region, the forecast valid time and the projection of the verifying observation are correct; therefore, verification results presented in previous office notes need not be disregarded, and results for the 1993 warm season were included in this office note.

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 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	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.
	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.
	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.
	NGM MOS	FWC	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 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	LFM	319
		NGM	421
	snow amount	LFM	318
		NGM	420
	cloud amount	LFM	378
		NGM	387
	surface wind	LFM	347
		NGM	399
	ceiling height	LFM	303
		NGM	414
	visibility	LFM	303
		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, 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	Miami, Florida	TPA	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[2]	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[3]	Lubbock, Texas	ELP[3]	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	Louisville, Kentucky	LEX	Lexington, Kentucky
DTW	Detroit, Michigan	GRR	Grand Rapids, Michigan
MSP	Minneapolis, Minnesota	DLH	Duluth, Minnesota
STL	St. Louis, Missouri	MCI	Kansas City, Missouri
OMA	Omaha, Nebraska	LBF	North Platte, Nebraska
BIS	Bismarck, North Dakota	FAR	Fargo, North Dakota
FSD	Sioux Falls, South Dakota	RAP	Rapid City, South Dakota
MKE	Milwaukee, Wisconsin	MSN	Madison, Wisconsin
CYS	Cheyenne, Wyoming	CPR	Casper, Wyoming
PHX	Phoenix, Arizona	TUS	Tucson, Arizona
LAX[4]	Los Angeles, California	SAN	San Diego, California
SFO	San Francisco, California	FAT	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	Anchorage, Alaska	BET	Bethel, Alaska
FAI	Fairbanks, Alaska	OME	Nome, Alaska
JNU	Juneau, Alaska	YAK	Yakutat, Alaska

[1]Cloud amount observations were not used after the station was commissioned as an ASOS site.
[2]TCC had no data for the max/min temperature and PoP 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.
[3]LBB and ELP were not included in the local ceiling height, visibility, and surface wind verifications.
[4]LAX was not included in the max/min temperature and PoP 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	1000-3000	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 1.5. Forecast cycle when NGM-based guidance replaced LFM-based guidance in the local data collection system for ninety-five stations in the conterminous U.S.

DCA	0000 UTC June 21, 1993	ORF	0000 UTC June 21, 1993
PWM	0000 UTC June 21, 1993	CON	0000 UTC June 21, 1993
BOS	0000 UTC June 21, 1993	PVD	0000 UTC June 21, 1993
ALB	0000 UTC June 21, 1993	BTV	0000 UTC June 21, 1993
BUF	0000 UTC June 21, 1993	SYR	0000 UTC June 21, 1993
LGA	0000 UTC June 21, 1993	EWR	0000 UTC June 21, 1993
RDU	0000 UTC June 21, 1993	CLT	0000 UTC June 21, 1993
CLE	0000 UTC June 21, 1993	CMH	0000 UTC June 21, 1993
PHL	1200 UTC June 21, 1993	AVP	1200 UTC June 21, 1993
PIT	0000 UTC June 26, 1993	ERI	0000 UTC June 26, 1993
CAE	0000 UTC June 21, 1993	CHS	0000 UTC June 21, 1993
CRW	1200 UTC April 26, 1993	BKW	1200 UTC April 26, 1993
BHM	0000 UTC July 3, 1993	MOB	0000 UTC July 3, 1993
AMA	0000 UTC April 28, 1993		
LIT	1200 UTC June 22, 1993	FSM	1200 UTC June 22, 1993
MIA	1200 UTC June 20, 1993	TPA	1200 UTC June 20, 1993
ATL	0000 UTC June 21, 1993	SAV	0000 UTC June 21, 1993
MSY	1200 UTC June 24, 1993	SHV	1200 UTC June 24, 1993
JAN	0000 UTC June 21, 1993	MEI	0000 UTC June 21, 1993
ABQ	0000 UTC July 1, 1993	TCC	0000 UTC July 1, 1993
OKC	0000 UTC June 21, 1993	TUL	0000 UTC June 21, 1993
MEM	0000 UTC June 21, 1993	BNA	0000 UTC June 21, 1993
DFW	1200 UTC June 21, 1993	ABI	1200 UTC June 21, 1993
LBB	0000 UTC June 26, 1993	ELP	0000 UTC June 26, 1993
SAT	0000 UTC June 21, 1993	IAH	0000 UTC June 21, 1993
DEN	0000 UTC June 21, 1993	GJT	0000 UTC June 21, 1993
ORD	0000 UTC June 21, 1993	SPI	0000 UTC June 21, 1993
IND	0000 UTC June 21, 1993	SBN	0000 UTC June 21, 1993
DSM	0000 UTC June 21, 1993	ALO	0000 UTC June 21, 1993
TOP	1200 UTC June 20, 1993	ICT	1200 UTC June 20, 1993
SDF	0000 UTC June 21, 1993	LEX	0000 UTC June 21, 1993
DTW	1200 UTC June 20, 1993	GRR	1200 UTC June 20, 1993
MSP	1200 UTC June 21, 1993	DLH	1200 UTC June 21, 1993
STL	0000 UTC June 20, 1993	MCI	0000 UTC June 20, 1993
OMA	0000 UTC July 1, 1993	LBF	0000 UTC July 1, 1993
BIS	1200 UTC June 24, 1993	FAR	1200 UTC June 24, 1993
FSD	1200 UTC June 20, 1993	RAP	1200 UTC June 20, 1993
MKE	1200 UTC June 21, 1993	MSN	1200 UTC June 21, 1993
CYS	0000 UTC June 21, 1993	CPR	0000 UTC June 21, 1993
PHX	0000 UTC June 21, 1993	TUS	0000 UTC June 21, 1993
LAX	0000 UTC June 20, 1993	SAN	0000 UTC June 20, 1993
SFO	0000 UTC June 21, 1993	FAT	0000 UTC June 21, 1993
BOI	0000 UTC June 21, 1993	PIH	0000 UTC June 21, 1993
GTF	1200 UTC June 20, 1993	BIL	1200 UTC June 20, 1993
RNO	0000 UTC June 21, 1993	LAS	0000 UTC June 21, 1993
PDX	0000 UTC June 21, 1993	MFR	0000 UTC June 21, 1993
SLC	0000 UTC June 21, 1993	CDC	0000 UTC June 21, 1993
SEA	1200 UTC June 20, 1993	GEG	1200 UTC June 20, 1993

Table 2.1. Comparative verification of local, guidance, 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		0.1	2.5	1.0	--	--	80.3
	LFM/NGM	16268	-0.3	2.8	1.3	--	--	76.3
	NGM MOS		-0.3	2.8	1.1	--	--	77.9
Tonight's Min	LOCAL		-0.3	2.5	0.4	0.38	0.48	74.2
	LFM/NGM	16210	-0.6	2.7	0.4	0.35	0.46	71.0
	NGM MOS		-0.7	2.7	0.4	0.51	0.56	71.3
Tomorrow's Max	LOCAL		0.1	3.2	2.4	--	--	69.9
	LFM/NGM	16232	-0.3	3.5	3.1	--	--	64.4
	NGM MOS		-0.4	3.5	3.0	--	--	64.7
Tomorrow Night's Min	LOCAL		-0.5	3.0	1.3	0.27	0.57	62.2
	LFM/NGM	16180	-0.7	3.2	1.4	0.25	0.65	59.7
	NGM MOS		-0.9	3.2	1.3	0.37	0.67	60.6

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	2.4	0.3	0.49	0.41	76.8
	LFM/NGM	16271	-0.4	2.5	0.3	0.39	0.42	74.4
	NGM MOS		-0.3	2.5	0.3	0.39	0.50	75.4
Tomorrow's Max	LOCAL		0.2	2.9	1.9	--	--	73.7
	LFM/NGM	16260	0.0	3.3	2.8	--	--	67.7
	NGM MOS		0.1	3.3	2.5	--	--	68.6
Tomorrow Night's Min	LOCAL		-0.4	2.8	0.8	0.37	0.50	68.8
	LFM/NGM	16209	-0.6	3.0	0.9	0.31	0.62	65.4
	NGM MOS		-0.6	2.9	0.8	0.38	0.61	67.1
Day After Tomorrow's Max	LOCAL		0.1	3.5	3.8	--	--	62.4
	LFM/NGM	16257	-0.3	3.9	4.6	--	--	56.1
	NGM MOS		-0.4	3.8	4.3	--	--	56.8

Table 2.3. Comparative verification of local, guidance, 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	4199	-0.3	2.6	0.8	--	--	80.9
	LFM/NGM		-1.0	3.0	1.2	--	--	75.0
	NGM MOS		-0.8	2.9	1.1	--	--	77.2
Tonight's Min	LOCAL	4188	-0.5	2.5	0.3	0.55	0.45	79.1
	LFM/NGM		-0.8	2.7	0.3	0.50	0.48	76.8
	NGM MOS		-0.8	2.7	0.2	0.59	0.57	77.2
Tomorrow's Max	LOCAL	4184	-0.7	3.2	1.8	--	--	71.8
	LFM/NGM		-1.4	3.6	3.0	--	--	64.2
	NGM MOS		-1.2	3.6	2.9	--	--	64.9
Tomorrow Night's Min	LOCAL	4174	-0.7	3.0	0.9	0.35	0.42	69.7
	LFM/NGM		-0.9	3.1	1.0	0.35	0.53	68.7
	NGM MOS		-0.8	3.1	0.9	0.40	0.62	69.3

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	4194	-0.6	2.4	0.3	0.62	0.41	80.8
	LFM/NGM		-0.7	2.5	0.2	0.52	0.42	79.1
	NGM MOS		-0.7	2.5	0.2	0.52	0.50	79.8
Tomorrow's Max	LOCAL	4175	-0.4	3.0	1.7	--	--	74.3
	LFM/NGM		-0.9	3.4	2.4	--	--	68.5
	NGM MOS		-0.8	3.3	2.0	--	--	69.9
Tomorrow Night's Min	LOCAL	4181	-0.7	2.8	0.5	0.55	0.45	74.9
	LFM/NGM		-0.9	2.9	0.5	0.50	0.55	72.6
	NGM MOS		-0.7	2.9	0.5	0.50	0.55	74.4
Day After Tomorrow's Max	LOCAL	4186	-0.9	3.5	3.1	--	--	63.8
	LFM/NGM		-1.6	4.0	4.3	--	--	55.5
	NGM MOS		-1.6	4.0	4.1	--	--	56.2

Table 2.5. Comparative verification of local, guidance, 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	4153	0.1	2.1	0.7	--	--	78.4
	LFM/NGM		-0.5	2.5	0.8	--	--	71.7
	NGM MOS		-0.9	2.5	0.5	--	--	73.2
Tonight's Min	LOCAL	4142	-0.1	2.3	0.4	0.20	0.67	71.3
	LFM/NGM		-0.5	2.6	0.5	0.40	0.00	65.7
	NGM MOS		-1.0	2.7	0.7	0.60	0.00	63.4
Tomorrow's Max	LOCAL	4151	0.0	2.6	1.4	--	--	67.2
	LFM/NGM		-0.7	3.1	2.0	--	--	57.1
	NGM MOS		-1.2	3.2	1.9	--	--	55.2
Tomorrow Night's Min	LOCAL	4144	-0.1	2.8	1.3	0.00	1.00	57.2
	LFM/NGM		-0.5	3.0	1.1	0.00	*	53.7
	NGM MOS		-1.2	3.1	1.2	0.50	0.50	51.4

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	4159	-0.2	2.2	0.3	0.60	0.00	74.4
	LFM/NGM		-0.4	2.4	0.3	0.40	0.00	70.5
	NGM MOS		-0.6	2.4	0.2	0.40	0.00	70.9
Tomorrow's Max	LOCAL	4156	0.1	2.4	1.2	--	--	71.3
	LFM/NGM		-0.6	3.0	1.7	--	--	60.6
	NGM MOS		-0.8	3.0	1.4	--	--	61.8
Tomorrow Night's Min	LOCAL	4145	-0.1	2.6	0.8	0.00	*	64.3
	LFM/NGM		-0.6	2.8	0.9	0.00	*	59.1
	NGM MOS		-0.9	2.9	0.9	0.00	1.00	57.6
Day After Tomorrow's Max	LOCAL	4152	0.0	2.9	2.2	--	--	58.7
	LFM/NGM		-0.8	3.4	2.8	--	--	47.6
	NGM MOS		-1.2	3.4	2.6	--	--	47.7

* Events of $\leq$ 32°F were observed but not forecast.

Table 2.7. Comparative verification of local, guidance, 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	4888	0.4	2.9	1.7	--	--	78.7
	LFM/NGM		0.2	3.1	1.9	--	--	76.5
	NGM MOS		0.4	3.0	1.7	--	--	77.8
Tonight's Min	LOCAL	4862	-0.5	2.7	0.5	0.39	0.48	74.6
	LFM/NGM		-0.7	2.9	0.6	0.36	0.41	72.1
	NGM MOS		-0.6	2.9	0.5	0.53	0.59	72.4
Tomorrow's Max	LOCAL	4883	0.5	3.7	3.7	--	--	66.8
	LFM/NGM		0.4	3.8	4.3	--	--	64.1
	NGM MOS		0.3	3.8	3.9	--	--	64.7
Tomorrow Night's Min	LOCAL	4858	-0.8	3.4	1.6	0.29	0.63	61.5
	LFM/NGM		-1.0	3.5	2.1	0.29	0.71	58.3
	NGM MOS		-1.2	3.5	2.1	0.40	0.74	58.8

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	4882	-0.6	2.6	0.4	0.49	0.42	77.0
	LFM/NGM		-0.5	2.7	0.4	0.43	0.38	75.0
	NGM MOS		-0.2	2.6	0.4	0.41	0.52	76.2
Tomorrow's Max	LOCAL	4894	0.5	3.4	3.1	--	--	71.2
	LFM/NGM		0.9	3.7	4.1	--	--	66.4
	NGM MOS		1.0	3.7	4.3	--	--	66.6
Tomorrow Night's Min	LOCAL	4857	-0.6	3.0	1.1	0.34	0.58	68.6
	LFM/NGM		-0.7	3.1	1.4	0.32	0.67	65.6
	NGM MOS		-0.6	3.0	1.2	0.45	0.62	67.5
Day After Tomorrow's Max	LOCAL	4889	0.6	4.0	5.8	--	--	59.9
	LFM/NGM		0.6	4.2	6.4	--	--	56.3
	NGM MOS		0.5	4.2	6.2	--	--	56.9

Table 2.9. Comparative verification of local, guidance, 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	3028	0.4	2.4	0.8	--	--	83.9
	LFM/NGM		0.2	2.6	1.3	--	--	81.3
	NGM MOS		0.3	2.5	1.2	--	--	82.7
Tonight's Min	LOCAL	3018	0.0	2.5	0.5	0.19	0.50	66.7
	LFM/NGM		-0.3	2.7	0.4	0.13	0.71	63.3
	NGM MOS		-0.2	2.5	0.4	0.31	0.55	67.2
Tomorrow's Max	LOCAL	3014	0.7	3.1	2.4	--	--	74.8
	LFM/NGM		0.8	3.3	2.9	--	--	71.2
	NGM MOS		0.8	3.2	2.8	--	--	72.3
Tomorrow Night's Min	LOCAL	3004	-0.1	2.9	1.2	0.19	0.57	54.7
	LFM/NGM		-0.1	3.1	1.2	0.13	0.60	52.4
	NGM MOS		0.0	2.8	0.6	0.25	0.20	58.9

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	3036	-0.1	2.3	0.1	0.31	0.50	71.0
	LFM/NGM		-0.1	2.5	0.2	0.13	0.67	68.2
	NGM MOS		0.3	2.4	0.1	0.19	0.57	70.4
Tomorrow's Max	LOCAL	3035	0.5	2.8	1.5	--	--	79.1
	LFM/NGM		0.8	3.0	2.4	--	--	74.6
	NGM MOS		0.8	3.0	1.9	--	--	76.0
Tomorrow Night's Min	LOCAL	3026	-0.1	2.7	0.8	0.31	0.29	62.3
	LFM/NGM		0.0	2.9	0.8	0.13	0.60	58.2
	NGM MOS		0.0	2.7	0.5	0.19	0.67	63.6
Day After Tomorrow's Max	LOCAL	3030	0.7	3.5	3.6	--	--	67.9
	LFM/NGM		0.7	3.7	4.7	--	--	63.0
	NGM MOS		0.7	3.6	4.1	--	--	64.7

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	1060	0.4	2.8	1.1	--	--	73.9
	LFM MOS		0.5	2.9	0.8	--	--	73.7
Tonight's Min	LOCAL	1078	-0.6	3.2	1.4	0.29	0.60	63.2
	LFM MOS		-0.9	3.2	1.2	0.14	0.00	63.8
Tomorrow's Max	LOCAL	1060	0.0	3.5	2.2	--	--	61.3
	LFM MOS		-0.1	3.6	2.3	--	--	60.4
Tomorrow Night's Min	LOCAL	1078	-0.7	3.7	3.0	0.13	0.50	50.9
	LFM MOS		-1.1	3.7	2.3	0.13	0.67	52.2

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	1069	-0.9	3.0	0.9	0.13	0.67	67.5
	LFM MOS		-1.3	3.2	1.0	0.13	0.67	64.9
Tomorrow's Max	LOCAL	1051	-0.2	3.2	1.4	--	--	68.4
	LFM MOS		-0.3	3.4	1.3	--	--	64.0
Tomorrow Night's Min	LOCAL	1067	-1.0	3.5	2.5	0.00	1.00	55.7
	LFM MOS		-1.3	3.5	2.0	0.13	0.75	57.3
Day After Tomorrow's Max	LOCAL	1055	-0.3	3.8	4.2	--	--	52.4
	LFM MOS		-0.5	3.8	3.9	--	--	52.7

Table 3.1. Comparative verification of local, guidance, and NGM MOS PoP 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	Changes GE 20% to Guidance: Local % Imprv.	Changes GE 20% to Guidance: No. of Changes
12-24 (1st period)	LOCAL	0.1030		35.7				
	LFM/NGM	0.1060	2.8	33.9	15991	0.2126	9.7	2033
	NGM MOS	0.1047	1.6	34.7		0.2105	5.7	2227
24-36 (2nd period)	LOCAL	0.1052		29.9				
	LFM/NGM	0.1083	2.9	27.8	15958	0.2136	8.6	1871
	NGM MOS	0.1070	1.7	28.7		0.2138	5.4	2010
36-48 (3rd period)	LOCAL	0.1184		25.7				
	LFM/NGM	0.1209	2.0	24.2	15958	0.2100	8.2	1891
	NGM MOS	0.1193	0.8	25.1		0.2077	4.1	1974

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 (1st period)	LOCAL	0.0983		34.3				
	LFM/NGM	0.1009	2.6	32.5	15998	0.2071	5.3	2200
	NGM MOS	0.0990	0.7	33.8		0.2049	1.6	2330
24-36 (2nd period)	LOCAL	0.1124		29.4				
	LFM/NGM	0.1132	0.7	28.9	15992	0.2014	-0.2	1932
	NGM MOS	0.1118	-0.5	29.8		0.1991	-3.7	2106
36-48 (3rd period)	LOCAL	0.1121		25.2				
	LFM/NGM	0.1148	2.4	23.4	15968	0.2177	7.7	1740
	NGM MOS	0.1130	0.8	24.6		0.2145	2.3	1834

Table 3.3. Comparative verification of local, guidance, and NGM 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	Changes GE 20% to Guidance: Local % Imprv.	Changes GE 20% to Guidance: No. of Changes
12-24 (1st period)	LOCAL	0.1069		39.2				
	LFM/NGM	0.1086	1.6	38.2	4219	0.1996	6.5	588
	NGM MOS	0.1082	1.2	38.5		0.1985	5.9	661
24-36 (2nd period)	LOCAL	0.1067		35.8				
	LFM/NGM	0.1105	3.4	33.6	4203	0.2084	9.2	506
	NGM MOS	0.1102	3.2	33.7		0.2153	9.8	532
36-48 (3rd period)	LOCAL	0.1221		30.0				
	LFM/NGM	0.1245	1.9	28.7	4203	0.1994	9.5	568
	NGM MOS	0.1233	1.0	29.3		0.1944	8.5	588

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 (1st period)	LOCAL	0.1037		37.3				
	LFM/NGM	0.1061	2.2	35.9	4202	0.2059	3.0	602
	NGM MOS	0.1040	0.3	37.2		0.2077	-0.3	623
24-36 (2nd period)	LOCAL	0.1154		33.9				
	LFM/NGM	0.1152	-0.1	34.0	4201	0.1747	-3.1	575
	NGM MOS	0.1161	0.6	33.5		0.1762	-1.3	623
36-48 (3rd period)	LOCAL	0.1159		30.2				
	LFM/NGM	0.1190	2.6	28.3	4182	0.2228	6.9	505
	NGM MOS	0.1183	2.0	28.8		0.2174	4.7	558

Table 3.5. Comparative verification of local, guidance, and NGM 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	0.1072		27.1				
(1st period)	LFM/NGM	0.1105	2.9	24.9	3996	0.2042	13.5	495
	NGM MOS	0.1114	3.7	24.3		0.2137	13.1	522
24-36	LOCAL	0.0940		21.4				
(2nd period)	LFM/NGM	0.0943	0.2	21.2	3992	0.2003	3.6	402
	NGM MOS	0.0942	0.2	21.2		0.2009	1.2	423
36-48	LOCAL	0.1209		17.8				
(3rd period)	LFM/NGM	0.1199	-0.9	18.5	3988	0.1870	0.3	453
	NGM MOS	0.1206	-0.3	18.0		0.2002	1.8	501

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	0.0870		27.0				
(1st period)	LFM/NGM	0.0906	4.0	23.9	4008	0.2056	14.3	480
	NGM MOS	0.0884	1.7	25.7		0.1984	10.8	505
24-36	LOCAL	0.1155		20.8				
(2nd period)	LFM/NGM	0.1156	0.1	20.8	4002	0.1996	-0.3	486
	NGM MOS	0.1160	0.3	20.5		0.2080	0.9	515
36-48	LOCAL	0.0996		17.0				
(3rd period)	LFM/NGM	0.1002	0.6	16.4	4005	0.1943	0.5	387
	NGM MOS	0.0987	-0.9	17.7		0.2062	-1.1	373

Table 3.7. Comparative verification of local, guidance, and NGM 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	0.1196		38.4				
	LFM/NGM	0.1234	3.1	36.4	4737	0.2229	8.1	744
	NGM MOS	0.1196	0.0	38.4		0.2154	1.0	799
24-36 (2nd period)	LOCAL	0.1339		29.9				
	LFM/NGM	0.1381	3.1	27.7	4728	0.2183	8.7	745
	NGM MOS	0.1350	0.8	29.3		0.2127	2.2	800
36-48 (3rd period)	LOCAL	0.1419		26.7				
	LFM/NGM	0.1466	3.2	24.2	4732	0.2262	8.5	682
	NGM MOS	0.1414	-0.4	27.0		0.2178	-0.8	669

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	0.1252		34.6				
	LFM/NGM	0.1264	1.0	34.0	4746	0.2004	-0.2	888
	NGM MOS	0.1225	-2.2	36.0		0.1984	-7.0	927
24-36 (2nd period)	LOCAL	0.1358		30.0				
	LFM/NGM	0.1359	0.1	29.9	4746	0.2157	-3.8	676
	NGM MOS	0.1314	-3.3	32.2		0.2055	-11.7	706
36-48 (3rd period)	LOCAL	0.1426		25.4				
	LFM/NGM	0.1458	2.2	23.7	4735	0.2189	7.9	673
	NGM MOS	0.1417	-0.7	25.9		0.2088	-2.8	670

Table 3.9. Comparative verification of local, guidance, and NGM 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	Local % Imprv.	No. of Changes
12-24	LOCAL	0.0664		36.1				
(1st period)	LFM/NGM	0.0691	3.9	33.5	3039	0.2319	14.8	206
	NGM MOS	0.0681	2.5	34.4		0.2197	4.9	245
24-36	LOCAL	0.0728		29.9				
(2nd period)	LFM/NGM	0.0775	6.1	25.4	3035	0.2341	15.4	218
	NGM MOS	0.0759	4.0	26.9		0.2356	12.2	255
36-48	LOCAL	0.0735		27.4				
(3rd period)	LFM/NGM	0.0769	4.5	24.0	3035	0.2384	18.9	188
	NGM MOS	0.0779	5.6	23.1		0.2300	12.9	216

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	Local % Imprv.	No. of Changes
12-24	LOCAL	0.0636		37.6				
(1st period)	LFM/NGM	0.0676	5.8	33.7	3042	0.2398	11.8	230
	NGM MOS	0.0691	8.0	32.2		0.2319	15.7	275
24-36	LOCAL	0.0677		33.2				
(2nd period)	LFM/NGM	0.0719	5.7	29.1	3043	0.2348	17.8	195
	NGM MOS	0.0699	3.1	31.1		0.2183	3.7	262
36-48	LOCAL	0.0759		26.5				
(3rd period)	LFM/NGM	0.0801	5.3	22.5	3046	0.2501	21.1	175
	NGM MOS	0.0802	5.4	22.4		0.2371	14.4	233

Table 3.11. Comparative verification of local and LFM MOS PoP forecasts 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	Local % Imprv.	No. of Changes
18-30 (1st period)	LOCAL	0.1254		*	857			
	LFM MOS	**	**	**		**	**	**
30-42 (2nd period)	LOCAL	0.1330		*	878			
	LFM MOS	**	**	**		**	**	**
42-54 (3rd period)	LOCAL	0.1339		*	858			
	LFM MOS	**	**	**		**	**	**

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	Local % Imprv.	No. of Changes
18-30 (1st period)	LOCAL	0.1279		*	866			
	LFM MOS	**	**	**		**	**	**
30-42 (2nd period)	LOCAL	0.1317		*	846			
	LFM MOS	**	**	**		**	**	**
42-54 (3rd period)	LOCAL	0.1404		*	867			
	LFM MOS	**	**	**		**	**	**

*Percent improvement over climate scores were not available.
**LFM MOS PoP forecasts were not available for the same valid period as the local forecasts.

Table 4.1. Comparative verification of local, guidance, and NGM MOS forecasts of four categories of cloud amount (clear, scattered, broken, and overcast) for 90 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	0.75	1.41	1.49	0.85	60.4	0.465
	LFM/NGM	0.74	1.66	1.26	0.81	52.9	0.365
	NGM MOS	0.72	1.67	1.32	0.80	53.0	0.368
	No. Obs.	5751	2792	2105	4788		
18	LOCAL	0.62	1.32	1.56	0.63	50.7	0.343
	LFM/NGM	0.69	1.39	1.20	0.75	53.6	0.376
	NGM MOS	0.64	1.43	1.27	0.70	52.9	0.367
	No. Obs.	4160	4469	2926	3981		
24	LOCAL	0.61	1.37	1.81	0.59	45.0	0.274
	LFM/NGM	0.66	1.51	1.37	0.66	48.4	0.312
	NGM MOS	0.64	1.52	1.41	0.65	48.2	0.310
	No. Obs.	4724	4067	2509	4154		

Table 4.2. Same as Table 4.1 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	1.22	1.65	0.69	54.2	0.392
	LFM/NGM	0.72	1.50	1.29	0.67	51.0	0.344
	NGM MOS	0.69	1.51	1.31	0.67	51.1	0.346
	No. Obs.	4722	4082	2496	4159		
18	LOCAL	0.66	1.81	1.96	0.69	48.4	0.303
	LFM/NGM	0.89	1.62	1.07	0.79	55.2	0.362
	NGM MOS	0.85	1.73	1.12	0.78	54.4	0.355
	No. Obs.	7068	2437	1792	4114		
24	LOCAL	0.72	1.62	1.72	0.67	46.7	0.291
	LFM/NGM	0.75	1.76	1.23	0.76	50.5	0.333
	NGM MOS	0.71	1.84	1.29	0.73	50.3	0.334
	No. Obs.	5789	2806	2089	4735		

Table 4.3. Comparative verification of local, guidance, 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	0.61	1.63	1.62	0.82	51.8	0.357
	LFM/NGM	0.68	1.74	1.29	0.83	50.6	0.335
	NGM MOS	0.66	1.75	1.35	0.82	50.9	0.341
	No. Obs.	1388	717	584	1501		
18	LOCAL	0.45	1.20	1.69	0.66	49.0	0.307
	LFM/NGM	0.51	1.28	1.31	0.79	54.4	0.374
	NGM MOS	0.41	1.37	1.37	0.71	53.9	0.366
	No. Obs.	772	1359	829	1241		
24	LOCAL	0.51	1.53	1.95	0.68	43.2	0.255
	LFM/NGM	0.54	1.74	1.44	0.73	46.6	0.292
	NGM MOS	0.54	1.79	1.47	0.68	45.9	0.284
	No. Obs.	1299	954	593	1353		

Table 4.4. Same as Table 4.3 except for the 1200 UTC cycle.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Percent Correct	Skill Score
12	LOCAL	0.59	1.35	1.98	0.71	47.9	0.315
	LFM/NGM	0.61	1.72	1.37	0.70	47.5	0.303
	NGM MOS	0.64	1.71	1.33	0.70	48.1	0.309
	No. Obs.	1294	954	595	1351		
18	LOCAL	0.63	2.06	1.99	0.68	46.7	0.290
	LFM/NGM	0.86	1.85	1.18	0.77	53.7	0.355
	NGM MOS	0.86	1.86	1.08	0.79	53.5	0.349
	No. Obs.	1719	568	486	1415		
24	LOCAL	0.64	1.80	1.71	0.67	43.2	0.250
	LFM/NGM	0.62	1.90	1.35	0.79	47.0	0.293
	NGM MOS	0.59	1.94	1.34	0.80	46.7	0.290
	No. Obs.	1410	715	577	1473		

Table 4.5. Comparative verification of local, guidance, and NGM MOS forecasts of four categories of cloud amount (clear, scattered, broken, and overcast) for 22 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	0.73	1.33	1.47	0.80	56.6	0.415
	LFM/NGM	0.69	1.65	1.20	0.70	48.3	0.302
	NGM MOS	0.68	1.65	1.21	0.72	48.5	0.306
	No. Obs.	1375	843	546	789		
18	LOCAL	0.58	1.31	1.23	0.57	51.4	0.313
	LFM/NGM	0.67	1.37	1.04	0.58	53.4	0.338
	NGM MOS	0.68	1.37	1.07	0.52	53.3	0.336
	No. Obs.	839	1346	862	598		
24	LOCAL	0.52	1.42	1.57	0.51	43.0	0.225
	LFM/NGM	0.64	1.47	1.30	0.51	49.2	0.303
	NGM MOS	0.59	1.53	1.30	0.48	48.0	0.286
	No. Obs.	1016	1150	646	740		

Table 4.6. Same as Table 4.5 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	1.27	1.49	0.58	55.0	0.388
	LFM/NGM	0.69	1.45	1.17	0.58	52.4	0.346
	NGM MOS	0.64	1.49	1.19	0.58	51.3	0.331
	No. Obs.	1026	1159	648	750		
18	LOCAL	0.60	1.98	2.10	0.55	45.1	0.246
	LFM/NGM	0.89	1.71	0.92	0.67	54.7	0.318
	NGM MOS	0.84	1.84	1.15	0.56	52.9	0.304
	No. Obs.	1877	633	394	670		
24	LOCAL	0.69	1.55	1.59	0.54	44.5	0.254
	LFM/NGM	0.67	1.71	1.14	0.71	47.7	0.293
	NGM MOS	0.60	1.82	1.23	0.65	47.6	0.297
	No. Obs.	1381	856	544	795		

Table 4.7. Comparative verification of local, guidance, 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	0.71	1.34	1.56	0.88	61.1	0.471
	LFM/NGM	0.66	1.64	1.41	0.84	52.8	0.362
	NGM MOS	0.62	1.68	1.48	0.82	52.7	0.364
	No. Obs.	1407	794	604	1699		
18	LOCAL	0.44	1.44	1.70	0.62	45.9	0.280
	LFM/NGM	0.59	1.46	1.24	0.77	50.1	0.329
	NGM MOS	0.52	1.48	1.32	0.75	49.9	0.327
	No. Obs.	969	1159	868	1513		
24	LOCAL	0.44	1.33	1.99	0.60	42.3	0.239
	LFM/NGM	0.56	1.48	1.48	0.67	46.4	0.285
	NGM MOS	0.54	1.40	1.56	0.71	47.3	0.297
	No. Obs.	1041	1186	790	1488		

Table 4.8. Same as Table 4.7 except for the 1200 UTC cycle.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Percent Correct	Skill Score
12	LOCAL	0.68	1.11	1.75	0.75	53.5	0.382
	LFM/NGM	0.63	1.48	1.36	0.68	49.5	0.323
	NGM MOS	0.60	1.45	1.47	0.67	49.9	0.330
	No. Obs.	1041	1190	778	1488		
18	LOCAL	0.57	1.76	2.16	0.73	46.1	0.289
	LFM/NGM	0.85	1.59	1.11	0.85	53.4	0.353
	NGM MOS	0.80	1.63	1.21	0.86	53.8	0.362
	No. Obs.	1788	716	537	1454		
24	LOCAL	0.67	1.58	1.96	0.66	44.1	0.261
	LFM/NGM	0.71	1.74	1.34	0.77	49.4	0.320
	NGM MOS	0.68	1.75	1.44	0.75	50.0	0.330
	No. Obs.	1418	799	603	1681		

Table 4.9. Comparative verification of local, guidance, 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	0.92	1.30	1.20	0.90	74.9	0.629
	LFM/NGM	0.92	1.61	1.07	0.79	61.2	0.429
	NGM MOS	0.91	1.55	1.17	0.80	61.3	0.432
	No. Obs.	1581	438	371	799		
18	LOCAL	0.83	1.39	1.69	0.65	59.1	0.413
	LFM/NGM	0.84	1.51	1.26	0.76	57.5	0.386
	NGM MOS	0.79	1.62	1.38	0.70	55.2	0.360
	No. Obs.	1580	605	367	629		
24	LOCAL	0.92	1.15	1.65	0.46	53.2	0.343
	LFM/NGM	0.88	1.33	1.22	0.65	52.9	0.339
	NGM MOS	0.85	1.38	1.24	0.64	52.5	0.336
	No. Obs.	1368	777	480	573		

Table 4.10. Same as Table 4.9 except for the 1200 UTC cycle.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Percent Correct	Skill Score
12	LOCAL	0.96	1.13	1.31	0.66	62.6	0.471
	LFM/NGM	0.89	1.31	1.21	0.65	56.3	0.384
	NGM MOS	0.85	1.38	1.16	0.70	56.3	0.387
	No. Obs.	1361	779	475	570		
18	LOCAL	0.84	1.40	1.49	0.77	57.5	0.369
	LFM/NGM	0.96	1.32	1.02	0.80	60.5	0.390
	NGM MOS	0.90	1.57	0.99	0.77	58.1	0.365
	No. Obs.	1684	520	375	575		
24	LOCAL	0.84	1.49	1.54	0.79	57.7	0.389
	LFM/NGM	0.96	1.67	1.00	0.72	59.8	0.402
	NGM MOS	0.93	1.88	1.02	0.65	58.6	0.391
	No. Obs.	1580	436	365	786		

Table 4.11. 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	0.92	0.96	1.39	0.92	55.8	0.357
	LFM MOS	0.88	1.21	0.96	1.00	56.2	0.351
	No. Obs.	216	166	167	521		
18	LOCAL	0.75	1.13	1.34	0.93	49.9	0.286
	LFM MOS	0.81	0.98	1.08	1.06	51.4	0.292
	No. Obs.	217	170	200	492		
24	LOCAL	0.61	1.04	1.44	0.92	46.3	0.248
	LFM MOS	0.91	0.80	1.07	1.10	53.2	0.331
	No. Obs.	180	215	223	451		

Table 4.12. Same as Table 4.11 except for the 1200 UTC cycle.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Percent Correct	Skill Score
12	LOCAL	0.85	0.91	1.32	0.95	57.3	0.401
	LFM MOS	0.96	0.87	1.09	1.04	53.1	0.336
	No. Obs.	182	214	223	451		
18	LOCAL	0.58	0.96	1.34	1.07	46.3	0.244
	LFM MOS	0.85	1.10	0.99	1.03	49.4	0.289
	No. Obs.	216	211	201	441		
24	LOCAL	0.53	1.10	1.53	0.99	50.7	0.273
	LFM MOS	0.94	1.10	0.99	1.00	52.6	0.298
	No. Obs.	215	168	166	521		

Table 5.1. Comparative verification of guidance 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	GUID	24	0.499	2727	3.5	2.3	2751	0.343	91.2	0.08	0.99	1.17	1.19	1.44	2.67	*
	NGM	23	0.503		3.6	2.6		0.352	90.7	0.13	0.98	1.28	1.63	2.44	1.67	*
											15006	878	142	18	3	0
18	GUID	27	0.415	6207	3.1	1.0	6225	0.391	78.6	0.04	1.02	0.91	1.03	0.89	1.18	0.33
	NGM	27	0.433		3.2	1.5		0.409	78.0	0.14	0.98	1.00	1.28	1.39	2.36	3.33
											12513	2754	640	116	11	3
24	GUID	29	0.433	5871	3.5	1.6	5895	0.342	79.4	0.03	0.99	1.02	1.06	1.16	0.36	0.33
	NGM	29	0.431		3.6	2.1		0.354	78.1	0.00	0.95	1.18	1.29	1.78	1.18	2.33
											13153	2239	555	97	22	3

Table 5.2. Same as Table 5.1 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	GUID	27	0.454	5708	3.3	1.4	5719	0.370	80.5	0.03	1.00	1.00	0.97	1.17	0.55	0.33
	NGM	27	0.455		3.4	2.0		0.383	79.2	0.06	0.95	1.17	1.30	1.68	1.23	1.00
											13090	2230	557	95	22	3
18	GUID	27	0.459	2930	3.8	2.4	2964	0.320	89.8	0.00	0.99	1.15	1.01	1.00	0.00	0.00
	NGM	26	0.466		3.9	2.8		0.330	89.0	0.00	0.97	1.34	1.36	1.67	0.75	0.00
											14785	976	202	24	4	1
24	GUID	26	0.465	2496	3.8	2.3	2533	0.314	91.4	0.00	0.99	1.08	0.98	1.50	3.00	*
	NGM	26	0.456		3.8	2.6		0.341	90.9	0.00	0.98	1.28	1.35	1.94	3.00	*
											14964	862	141	18	2	0

* This category was forecast but was not observed.

Table 5.3. Comparative verification of guidance and 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	GUID	22	0.514	685	2.9	1.8	688	0.358	92.2	0.00	1.00	1.02	0.96	1.33	*	**
	NGM	22	0.520		3.0	2.2		0.405	91.6	**	0.98	1.33	1.60	2.33	**	**
											3803	232	25	3	0	0
18	GUID	28	0.398	1649	2.8	0.9	1651	0.349	78.0	0.00	1.02	0.93	0.87	1.22	*	**
	NGM	27	0.403		3.0	1.6		0.383	77.2	0.00	0.96	1.09	1.33	3.56	*	*
											3181	727	127	9	0	0
24	GUID	29	0.393	940	3.5	2.1	945	0.273	88.0	0.00	1.00	1.06	0.93	1.40	*	**
	NGM	29	0.402		3.8	2.8		0.286	85.4	0.00	0.95	1.50	1.78	2.80	*	*
											3699	305	45	5	0	0

Table 5.4. Same as Table 5.3 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	GUID	27	0.409	932	3.0	1.6	935	0.330	89.5	**	1.00	0.97	0.86	1.00	**	**
	NGM	27	0.413		3.4	2.4		0.331	87.3	**	0.96	1.35	1.59	4.00	**	**
											3674	303	44	3	0	0
18	GUID	25	0.429	552	3.6	2.6	556	0.305	93.2	**	0.99	1.24	1.07	3.00	**	**
	NGM	25	0.444		4.0	3.3		0.306	91.5	**	0.96	1.74	1.93	6.00	**	**
											3856	158	27	1	0	0
24	GUID	24	0.499	600	3.1	1.7	602	0.327	92.4	**	1.01	0.85	1.13	1.50	**	**
	NGM	23	0.485		3.1	2.0		0.389	91.9	0.00	0.98	1.21	1.30	1.50	*	**
											3785	233	23	2	0	0

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

Table 5.5. Comparative verification of guidance 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	GUID	23	0.499	527	3.7	2.0	537	0.349	92.7	0.00	0.99	1.22	0.89	0.75	0.00	**
	NGM	21	0.549		3.7	2.1		0.351	92.8	0.00	0.99	1.17	0.91	1.25	0.00	**
											3798	173	45	4	1	0
18	GUID	23	0.450	1432	3.0	0.8	1437	0.421	81.2	0.00	1.01	0.95	1.03	0.69	0.33	0.00
	NGM	22	0.489		2.9	1.2		0.442	81.1	0.17	0.99	1.01	1.24	1.00	1.00	0.00
											3275	617	148	35	3	1
24	GUID	25	0.453	1237	3.3	1.2	1244	0.382	83.4	0.00	1.00	1.09	0.95	0.20	0.00	0.00
	NGM	26	0.470		3.3	1.4		0.398	83.1	0.00	0.98	1.16	1.04	0.68	0.13	0.00
											3419	461	123	25	8	1

Table 5.6. Same as Table 5.5 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	GUID	24	0.488	1148	3.1	0.9	1151	0.374	83.9	0.00	1.01	0.96	0.90	0.60	0.00	0.00
	NGM	24	0.499		3.2	1.2		0.404	83.4	0.00	0.98	1.16	0.98	0.92	0.38	0.00
											3412	453	125	25	8	1
18	GUID	24	0.461	635	3.8	1.8	642	0.365	89.9	0.00	1.00	1.04	0.85	0.78	0.00	**
	NGM	24	0.481		3.6	1.6		0.393	90.7	0.00	1.01	0.92	0.89	0.78	0.00	**
											3663	271	66	9	1	0
24	GUID	25	0.505	448	4.0	1.8	459	0.286	92.3	0.00	0.99	1.28	0.53	0.00	1.00	**
	NGM	25	0.487		3.7	1.7		0.332	93.0	0.00	1.00	1.18	0.49	0.40	0.00	**
											3792	165	47	5	1	0

** This category was neither forecast nor observed.

Table 5.7. Comparative verification of guidance 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	GUID	23	0.512	1124	3.7	2.6	1134	0.333	88.1	0.11	0.98	1.14	1.81	1.89	3.00	*
	NGM	23	0.507		3.8	3.0		0.335	87.0	0.20	0.96	1.31	2.38	2.78	1.50	*
											4413	353	52	9	2	0
18	GUID	27	0.434	2321	3.2	0.9	2328	0.384	73.1	0.07	1.03	0.88	1.06	0.94	1.00	0.50
	NGM	26	0.453		3.2	1.5		0.398	72.3	0.19	0.98	0.95	1.30	1.31	2.83	3.50
											3394	1054	282	62	6	2
24	GUID	31	0.405	2186	3.7	1.6	2195	0.323	74.7	0.09	0.98	1.07	1.00	1.08	0.22	*
	NGM	31	0.397		3.9	2.4		0.348	73.1	0.00	0.91	1.25	1.44	1.86	1.22	*
											3747	828	206	37	9	0

Table 5.8. Same as Table 5.7 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	GUID	27	0.455	2091	3.4	1.5	2095	0.365	76.4	0.00	0.99	1.03	0.98	1.03	0.44	*
	NGM	27	0.458		3.6	2.2		0.384	75.0	0.05	0.93	1.20	1.40	1.54	1.11	*
											3731	834	209	37	9	0
18	GUID	28	0.432	1150	3.9	2.6	1165	0.320	87.5	0.00	0.98	1.22	1.06	1.33	0.00	**
	NGM	28	0.434		4.1	3.2		0.330	85.9	0.00	0.95	1.56	1.35	2.22	0.33	**
											4383	349	82	9	3	0
24	GUID	27	0.459	1047	3.9	2.7	1061	0.316	88.5	0.00	0.99	1.08	1.39	2.11	5.00	*
	NGM	26	0.457		4.0	3.1		0.329	86.9	0.00	0.95	1.39	2.20	2.67	3.00	*
											4416	346	51	9	1	0

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

Table 5.9. Comparative verification of guidance 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	GUID	31	0.338	391	3.8	2.6	392	0.320	93.1	0.00	0.98	1.49	0.55	1.00	*	**
	NGM	32	0.320		4.0	2.8		0.287	92.8	0.00	0.98	1.29	1.35	3.50	*	**
											2992	120	20	2	0	0
18	GUID	36	0.263	805	3.8	1.9	809	0.382	84.5	0.00	1.01	0.92	1.16	1.00	0.50	**
	NGM	36	0.267		3.8	2.0		0.374	84.0	0.00	1.00	0.93	1.20	1.30	1.50	*
											2663	356	83	10	2	0
24	GUID	28	0.377	1508	3.5	1.8	1511	0.313	70.4	0.00	1.00	0.89	1.23	2.03	1.00	0.00
	NGM	28	0.372		3.5	1.9		0.317	70.0	0.00	0.98	0.95	1.17	2.43	2.20	0.00
											2288	645	181	30	5	2

Table 5.10. Same as Table 5.9 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	GUID	29	0.365	1537	3.3	1.6	1538	0.333	71.1	0.07	0.99	0.99	1.03	1.83	1.60	0.00
	NGM	29	0.357		3.5	2.0		0.339	69.8	0.10	0.94	1.06	1.33	2.27	2.80	0.50
											2273	640	179	30	5	2
18	GUID	28	0.427	593	3.8	2.5	601	0.256	89.1	0.00	0.99	1.13	1.22	0.40	**	0.00
	NGM	27	0.425		4.0	2.9		0.266	88.3	0.00	0.98	1.22	1.96	1.40	*	0.00
											2883	198	27	5	0	1
24	GUID	32	0.309	401	4.1	3.0	411	0.318	93.5	**	0.99	1.27	0.80	2.50	**	**
	NGM	32	0.299		4.2	3.0		0.283	93.0	0.00	0.99	1.23	1.30	3.00	*	**
											2971	118	20	2	0	0

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

Table 5.11. 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	33	0.402	170	4.0	3.1	171	0.359	92.7	0.00	0.99 1005	1.04 50	1.67 9	* 0	** 0	0.00 1
18	LFM	30	0.436	216	4.2	2.6	223	0.331	89.1	0.00	0.99 969	0.96 76	1.90 10	0.40 5	* 0	** 0
24	LFM	41	0.304	458	4.3	3.2	459	0.237	75.6	0.00	0.95 897	1.11 150	1.92 24	2.40 5	1.00 1	* 0

Table 5.12. Same as Table 5.11 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	33	0.393	376	3.5	1.8	376	0.305	80.5	0.00	1.01 891	0.79 150	1.70 23	1.20 5	3.00 1	* 0
18	LFM	35	0.341	249	4.1	3.0	253	0.342	89.0	0.00	0.99 966	1.13 68	0.95 19	6.00 1	0.00 1	** 0
24	LFM	36	0.330	198	4.4	3.5	199	0.352	91.7	0.00	0.97 1000	1.52 48	1.11 9	* 0	** 0	0.00 1

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

Table 5.13. 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	26	0.507	4248	3.3	2.4	4299	0.373	92.2	0.00	0.99 15302	1.31 811	0.88 129	0.59 22	1.00 1	0.00 1
9	LOCAL	34	0.366	8974	3.2	1.4	9040	0.357	78.2	0.00	1.01 12841	1.06 2680	0.64 610	0.23 115	0.08 12	0.00 1
15	LOCAL	36	0.356	9880	3.3	1.8	9949	0.324	75.7	0.00	0.98 12819	1.17 2688	0.88 620	0.35 116	0.11 18	0.00 2

Table 5.14. Same as Table 5.13 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	30	0.414	10275	3.0	1.1	10309	0.377	75.6	0.03	1.02 12229	1.06 3122	0.69 836	0.30 147	0.16 25	0.00 5
9	LOCAL	38	0.336	6554	4.3	3.3	6730	0.251	84.9	0.00	0.95 14870	1.75 1136	1.02 205	0.37 46	0.00 14	0.00 1
15	LOCAL	37	0.354	4866	4.3	3.3	5039	0.272	89.5	0.00	0.97 15218	1.57 871	0.58 154	0.19 27	0.00 3	** 0

** This category was neither forecast nor observed.

Table 5.15. Verification of local surface wind forecasts for 24 stations in the Eastern Region for the FT issuance time of approximately 0900 UTC.

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
3	LOCAL	24	0.474	1051	3.2	2.4	1059	0.323	93.5	**	0.99 4103	1.39 165	0.62 21	0.00 1	** 0	** 0
9	LOCAL	35	0.340	2429	2.9	1.2	2437	0.335	79.5	**	1.03 3440	0.96 716	0.43 117	0.14 14	** 0	** 0
15	LOCAL	38	0.313	2301	3.4	2.3	2314	0.274	80.7	**	0.97 3679	1.22 536	0.76 71	0.40 5	** 0	** 0

Table 5.16. Same as Table 5.15 except for the FT issuance time of approximately 1800 UTC.

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
3	LOCAL	30	0.395	2498	2.8	0.8	2501	0.302	76.9	0.00	1.06 3338	0.86 796	0.55 145	0.23 13	0.00 1	** 0
9	LOCAL	38	0.297	1545	4.4	3.7	1595	0.223	88.7	0.00	0.95 4053	1.92 207	1.07 27	0.67 3	0.00 1	** 0
15	LOCAL	36	0.332	1228	4.4	3.8	1262	0.205	91.1	**	0.97 4103	1.74 172	1.19 16	0.50 2	** 0	** 0

** This category was neither forecast nor observed.

Table 5.17. 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	24	0.522	836	3.4	2.5	849	0.437	93.2	**	0.98 3637	1.49 167	1.13 31	0.50 8	** 0	** 0
9	LOCAL	31	0.362	2017	3.2	1.6	2040	0.379	81.3	0.00	1.00 3161	1.12 516	0.78 122	0.06 35	0.50 2	** 0
15	LOCAL	34	0.353	2210	3.3	1.9	2237	0.341	79.7	0.00	0.97 3193	1.29 508	0.96 100	0.11 28	0.13 8	0.00 1

Table 5.18. Same as Table 5.17 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	31	0.389	2368	3.1	1.6	2384	0.398	79.5	0.13	0.99 3143	1.18 594	0.72 149	0.39 38	0.29 7	** 0
9	LOCAL	34	0.325	1246	4.2	3.2	1287	0.318	89.1	0.00	0.97 3576	1.70 214	0.74 39	0.09 11	0.00 5	** 0
15	LOCAL	32	0.419	925	4.4	2.9	979	0.303	90.9	**	0.99 3601	1.55 179	0.29 51	0.00 12	** 0	** 0

** This category was neither forecast nor observed.

Table 5.19. 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	25	0.517	1715	3.3	2.3	1731	0.368	88.6	0.00	0.98 4504	1.35 355	0.80 64	0.90 10	1.00 1	0.00 1
9	LOCAL	32	0.408	3095	3.3	1.1	3118	0.344	71.5	0.00	0.98 3555	1.19 1036	0.67 277	0.36 53	0.00 6	0.00 1
15	LOCAL	35	0.362	3309	3.4	1.6	3328	0.314	69.5	0.00	0.93 3589	1.32 1011	0.80 268	0.43 47	0.00 7	0.00 1

Table 5.20. Same as Table 5.19 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	28	0.450	3396	2.9	0.7	3402	0.391	71.0	0.00	1.00 3330	1.21 1135	0.57 366	0.30 70	0.00 14	0.00 4
9	LOCAL	38	0.329	2397	4.4	3.3	2451	0.233	78.9	0.00	0.90 4357	2.03 446	0.91 85	0.39 23	0.00 5	** 0
15	LOCAL	37	0.343	1998	4.2	3.3	2056	0.302	85.2	0.00	0.94 4475	1.81 368	0.67 66	0.38 8	0.00 2	** 0

** This category was neither forecast nor observed.

Table 5.21. 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	32	0.449	646	3.5	2.4	660	0.316	94.7	**	1.01 3058	0.82 124	1.08 13	0.00 3	** 0	** 0
9	LOCAL	41	0.265	1433	3.8	1.9	1445	0.334	83.0	0.00	1.04 2685	0.83 412	0.66 94	0.31 13	0.00 4	** 0
15	LOCAL	35	0.307	2060	3.2	1.3	2070	0.330	73.8	0.00	1.07 2358	0.79 633	1.00 181	0.44 36	0.33 3	** 0

Table 5.22. Same as Table 5.21 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	32	0.346	2013	3.2	1.5	2022	0.381	76.2	0.00	1.03 2418	0.90 597	1.03 176	0.19 26	0.67 3	0.00 1
9	LOCAL	40	0.315	1366	4.2	3.0	1397	0.224	83.9	0.00	0.98 2884	1.20 269	1.37 54	0.56 9	0.00 3	0.00 1
15	LOCAL	47	0.250	715	4.3	3.2	742	0.185	92.2	0.00	1.01 3039	0.85 152	0.57 21	0.20 5	0.00 1	** 0

** This category was neither forecast nor observed.

Table 5.23. 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	0.496	269	3.2	2.5	274	0.556	94.8	1.00	1.00 1008	1.04 52	1.18 11	* 0	* 0	0.00 1
9	LOCAL	40	0.361	286	4.0	2.1	288	0.274	89.7	0.00	1.02 987	0.71 77	1.30 10	0.17 6	* 0	** 0
15	LOCAL	43	0.263	349	3.4	1.1	351	0.244	82.6	0.00	1.10 892	0.49 149	0.75 24	0.17 6	0.00 1	** 0

Table 5.24. Same as Table 5.23 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	0.324	452	3.3	1.4	454	0.256	81.3	1.00	1.06 893	0.67 150	0.95 22	0.50 6	1.00 1	** 0
9	LOCAL	46	0.246	446	4.7	3.7	467	0.218	84.7	0.00	0.95 978	1.65 68	0.95 21	1.50 2	2.00 1	** 0
15	LOCAL	58	0.188	429	5.7	5.0	452	0.207	86.1	0.00	0.93 1005	2.12 52	1.27 15	* 0	* 0	0.00 1

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

Table 5.25. 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	0.99	1.89	0.144	98.0	0.08
	LFM MOS	1.00	1.56	0.165	98.2	0.10
	No. Obs.	1068	9			
± 3-h Max	LOCAL	1.01	0.71	0.230	97.1	0.14
	LFM MOS	1.01	0.58	0.251	97.4	0.15
	No. Obs.	1050	24			

Table 5.26. Same as Table 5.25 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	1.00	1.80	0.000	98.7	0.00
	LFM MOS	0.99	2.20	0.000	98.5	0.00
	No. Obs.	1049	5			
± 3-h Max	LOCAL	1.01	0.56	0.070	97.8	0.04
	LFM MOS	1.00	0.69	0.212	98.0	0.13
	No. Obs.	1037	16			

Table 6.1. Comparative verification of guidance 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	LFM/NGM MOS	0.98	0.98	1.09	0.99	2.531	79.9	0.348
	NGM MOS	0.87	1.08	1.13	0.99	2.436	80.4	0.370
	PERSISTENCE	0.79	0.83	0.85	1.04	1.565	87.0	0.536
	No. Obs.	523	656	1478	12777			
18	LFM/NGM MOS	1.53	0.98	1.14	0.98	1.292	84.3	0.389
	NGM MOS	1.60	1.16	1.19	0.97	1.321	83.8	0.386
	PERSISTENCE	5.58	1.64	0.73	0.99	1.943	82.6	0.303
	No. Obs.	73	326	1697	13184			
24	LFM/NGM MOS	1.70	1.13	0.97	1.00	0.891	90.6	0.328
	NGM MOS	1.49	1.25	1.02	0.99	0.865	90.7	0.342
	PERSISTENCE	5.19	2.65	1.47	0.93	1.901	84.1	0.193
	No. Obs.	73	191	809	13800			

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	Log Score	Percent Correct	Skill Score
12	LFM/NGM MOS	1.46	0.92	1.01	1.00	0.786	91.5	0.381
	NGM MOS	1.53	1.16	1.06	0.99	0.810	91.1	0.377
	PERSISTENCE	0.83	1.06	1.29	0.98	0.587	92.8	0.517
	No. Obs.	72	192	816	13857			
18	LFM/NGM MOS	1.32	0.80	0.95	1.00	1.462	87.7	0.330
	NGM MOS	1.28	0.87	0.93	1.00	1.422	87.7	0.334
	PERSISTENCE	0.28	0.57	1.14	1.01	1.202	87.7	0.304
	No. Obs.	213	375	953	13726			
24	LFM/NGM MOS	1.02	0.92	0.98	1.01	2.703	79.8	0.316
	NGM MOS	0.86	1.01	1.00	1.00	2.584	80.2	0.328
	PERSISTENCE	0.12	0.35	0.76	1.10	2.309	80.5	0.175
	No. Obs.	520	625	1447	12704			

Table 6.3. 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	0.47	1.17	1.48	0.96	2.481	77.3	0.338
	PERSISTENCE	0.63	1.03	0.84	1.04	1.543	86.5	0.544
	No. Obs.	43	35	114	856			
18	LFM MOS	0.61	1.60	1.45	0.90	2.740	72.9	0.341
	PERSISTENCE	0.96	0.76	0.64	1.08	2.269	80.1	0.371
	No. Obs.	28	45	151	824			
24	LFM MOS	0.90	1.70	1.56	0.88	2.141	73.9	0.295
	PERSISTENCE	2.70	1.09	0.67	1.03	2.236	79.5	0.284
	No. Obs.	10	33	144	875			

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	Log Score	Percent Correct	Skill Score
12	LFM MOS	1.10	1.42	1.42	0.92	1.849	78.3	0.374
	PERSISTENCE	0.90	1.21	1.16	0.97	1.111	87.2	0.596
	No. Obs.	10	33	141	879			
18	LFM MOS	0.71	1.03	2.05	0.89	1.975	77.3	0.290
	PERSISTENCE	0.71	1.26	1.62	0.93	1.879	79.9	0.315
	No. Obs.	14	31	99	906			
24	LFM MOS	1.02	1.47	2.05	0.84	3.308	70.0	0.267
	PERSISTENCE	0.23	1.18	1.42	0.98	2.660	75.0	0.236
	No. Obs.	43	34	113	858			

Table 6.5. 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				Log Score	Percent Correct	Skill Score
		1	2	3	4			
3	LOCAL	0.64	0.89	1.08	1.01	1.603	86.5	0.493
	PERSISTENCE	0.67	0.86	0.80	1.04	1.472	88.1	0.522
	No. Obs.	552	608	1301	13516			
6	LOCAL	0.32	0.53	0.99	1.04	1.683	83.5	0.394
	PERSISTENCE	1.07	0.69	0.62	1.06	1.832	83.9	0.390
	No. Obs.	336	731	1679	13135			
9	LOCAL	0.15	0.41	0.89	1.04	1.098	86.1	0.374
	PERSISTENCE	3.58	1.39	0.62	1.02	1.788	83.2	0.288
	No. Obs.	99	358	1774	13748			
15	LOCAL	0.18	0.52	1.47	0.98	0.771	90.0	0.329
	PERSISTENCE	5.52	2.46	1.29	0.94	1.771	85.0	0.186
	No. Obs.	67	211	877	14940			

Table 6.6. Same as Table 6.5 except for 93 stations for the FT issuance time of approximately 1800 UTC.

Projection (h)	Type of Forecast	Bias by Category				Log Score	Percent Correct	Skill Score
		1	2	3	4			
3	LOCAL	0.66	0.87	1.34	0.98	0.747	90.1	0.460
	PERSISTENCE	1.48	1.50	1.54	0.95	0.836	89.5	0.486
	No. Obs.	64	229	1145	14679			
6	LOCAL	0.50	0.79	1.65	0.97	0.757	90.0	0.366
	PERSISTENCE	1.53	1.74	2.09	0.93	1.078	86.8	0.315
	No. Obs.	62	204	852	14949			
9	LOCAL	0.42	0.88	1.83	0.96	0.874	89.5	0.353
	PERSISTENCE	0.96	1.52	2.29	0.92	1.250	85.4	0.246
	No. Obs.	99	237	777	14918			
15	LOCAL	0.32	0.80	1.80	0.97	1.673	84.4	0.354
	PERSISTENCE	0.27	0.72	1.70	0.98	1.928	81.5	0.208
	No. Obs.	355	500	1040	14034			

Table 6.7. 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	0.50	0.85	0.99	1.03	1.600	85.8	0.526
	PERSISTENCE	0.59	1.09	0.82	1.04	1.543	86.6	0.545
	No. Obs.	44	33	118	865			
6	LOCAL	0.46	0.67	1.06	1.04	2.189	81.0	0.401
	PERSISTENCE	0.54	0.90	0.79	1.06	2.141	82.0	0.412
	No. Obs.	48	40	124	857			
9	LOCAL	0.30	0.33	0.98	1.06	2.122	78.8	0.323
	PERSISTENCE	0.93	0.78	0.66	1.07	2.219	80.4	0.368
	No. Obs.	27	45	149	847			
15	LOCAL	0.40	0.31	1.03	1.03	1.565	81.9	0.358
	PERSISTENCE	2.60	1.09	0.68	1.03	2.179	79.8	0.292
	No. Obs.	10	32	144	873			

Table 6.8. Same as Table 6.7 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	0.78	0.42	0.95	1.03	1.372	84.1	0.426
	PERSISTENCE	0.89	1.24	1.18	0.96	1.071	87.5	0.608
	No. Obs.	9	33	142	881			
6	LOCAL	0.31	0.59	1.17	1.00	1.462	84.1	0.376
	PERSISTENCE	0.56	1.52	1.49	0.93	1.537	82.5	0.422
	No. Obs.	16	27	112	910			
9	LOCAL	0.36	0.48	1.47	0.98	1.728	80.7	0.265
	PERSISTENCE	0.64	1.24	1.63	0.93	1.851	79.8	0.323
	No. Obs.	14	33	101	914			
15	LOCAL	0.15	0.46	1.30	1.02	2.527	76.3	0.219
	PERSISTENCE	0.22	1.17	1.40	0.97	2.598	74.9	0.244
	No. Obs.	41	35	120	866			

Table 7.1. Comparative verification of guidance 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	LFM/NGM MOS	1.20	1.24	1.17	0.96	2.343	78.6	0.357
	PERSISTENCE	0.66	0.46	0.75	1.07	1.491	84.8	0.422
	No. Obs.	319	708	1540	11958			
18	LFM/NGM MOS	1.10	1.25	1.67	0.97	0.919	89.3	0.232
	PERSISTENCE	6.81	1.53	1.92	0.94	1.435	86.4	0.175
	No. Obs.	31	211	600	13592			
24	LFM/NGM MOS	1.65	1.52	1.34	0.98	0.851	90.5	0.274
	PERSISTENCE	9.04	1.61	1.87	0.94	1.478	85.9	0.133
	No. Obs.	23	199	617	13709			

Table 7.2. Same as Table 7.1 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	LFM/NGM MOS	1.86	1.32	1.28	0.98	0.822	90.8	0.269
	PERSISTENCE	1.09	1.02	0.80	1.01	0.490	94.5	0.461
	No. Obs.	22	197	617	13667			
18	LFM/NGM MOS	1.61	1.31	1.15	0.98	1.201	88.4	0.264
	PERSISTENCE	0.25	0.94	0.62	1.03	0.874	91.0	0.248
	No. Obs.	97	213	788	13382			
24	LFM/NGM MOS	1.69	1.31	1.26	0.93	2.821	76.1	0.321
	PERSISTENCE	0.07	0.28	0.32	1.16	2.121	81.1	0.118
	No. Obs.	321	709	1536	11904			

Table 7.3. 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	0.25	0.65	1.24	1.02	1.676	86.5	0.220
	PERSISTENCE	0.45	0.53	0.88	1.03	1.165	90.9	0.425
	No. Obs.	20	34	51	945			
18	LFM MOS	0.38	1.79	1.24	0.98	1.275	88.2	0.241
	PERSISTENCE	1.13	0.71	1.05	1.00	1.109	89.6	0.203
	No. Obs.	8	24	42	972			
24	LFM MOS	0.50	0.95	2.36	0.97	0.637	92.9	0.339
	PERSISTENCE	4.50	0.86	2.05	0.97	1.104	90.5	0.103
	No. Obs.	2	21	22	1016			

Table 7.4. Same as Table 7.3 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	0.50	0.75	2.00	0.98	0.563	94.4	0.402
	PERSISTENCE	1.00	0.90	1.64	0.99	0.520	94.8	0.431
	No. Obs.	2	20	22	1020			
18	LFM MOS	0.17	1.30	1.58	0.98	0.830	92.1	0.279
	PERSISTENCE	0.33	0.90	1.38	1.00	0.846	92.0	0.192
	No. Obs.	6	20	26	997			
24	LFM MOS	1.19	1.18	1.57	0.96	2.240	83.1	0.209
	PERSISTENCE	0.10	0.55	0.73	1.05	1.525	88.1	0.174
	No. Obs.	21	33	49	950			

Table 7.5. 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				Log Score	Percent Correct	Skill Score
		1	2	3	4			
3	LOCAL	0.52	0.55	1.15	1.02	1.639	83.5	0.423
	PERSISTENCE	0.53	0.49	0.71	1.08	1.431	85.9	0.441
	No. Obs.	416	682	1694	13488			
6	LOCAL	0.23	0.31	1.05	1.04	1.470	84.9	0.294
	PERSISTENCE	1.06	0.54	0.89	1.03	1.601	85.0	0.317
	No. Obs.	207	616	1342	14105			
9	LOCAL	0.04	0.18	0.93	1.02	0.766	91.7	0.227
	PERSISTENCE	2.29	1.23	1.63	0.96	1.466	86.6	0.186
	No. Obs.	96	273	732	15165			
15	LOCAL	0.09	0.23	0.86	1.02	0.611	93.2	0.227
	PERSISTENCE	3.86	1.58	1.90	0.94	1.459	86.4	0.116
	No. Obs.	57	212	631	15379			

Table 7.6. Same as Table 7.5 except for 93 stations for the FT issuance time of approximately 1800 UTC.

Projection (h)	Type of Forecast	Bias by Category				Log Score	Percent Correct	Skill Score
		1	2	3	4			
3	LOCAL	0.29	0.41	1.15	1.01	0.555	93.8	0.344
	PERSISTENCE	1.32	1.19	1.29	0.99	0.638	93.5	0.424
	No. Obs.	59	225	566	15518			
6	LOCAL	0.17	0.33	1.00	1.01	0.674	92.9	0.260
	PERSISTENCE	0.84	1.28	1.17	0.99	0.846	91.7	0.289
	No. Obs.	93	207	624	15400			
9	LOCAL	0.17	0.54	1.19	1.00	0.796	91.5	0.257
	PERSISTENCE	0.63	1.77	1.01	1.00	0.943	91.0	0.253
	No. Obs.	123	150	724	15319			
15	LOCAL	0.24	0.87	1.46	0.98	1.519	84.5	0.273
	PERSISTENCE	0.29	0.83	0.62	1.05	1.453	86.9	0.196
	No. Obs.	265	321	1183	14543			

Table 7.7. 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
3	LOCAL	0.43	0.52	1.08	1.03	1.219	89.9	0.393
	PERSISTENCE	0.38	0.55	0.85	1.04	1.153	90.8	0.416
	No. Obs.	21	33	52	953			
6	LOCAL	0.28	0.42	1.30	1.03	1.756	86.7	0.242
	PERSISTENCE	0.25	0.50	0.94	1.05	1.604	88.4	0.290
	No. Obs.	32	36	47	953			
9	LOCAL	0.33	0.13	1.31	1.01	0.938	90.5	0.214
	PERSISTENCE	0.89	0.78	1.02	1.01	1.053	90.1	0.221
	No. Obs.	9	23	42	993			
15	LOCAL	0.00	0.10	1.27	1.01	0.548	94.4	0.182
	PERSISTENCE	4.00	0.90	2.00	0.97	1.060	90.7	0.108
	No. Obs.	2	20	22	1013			

Table 7.8. Same as Table 7.7 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	0.00	0.65	1.41	1.00	0.591	94.1	0.261
	PERSISTENCE	1.00	0.85	1.82	0.99	0.523	94.6	0.427
	No. Obs.	2	20	22	1019			
6	LOCAL	0.00	0.45	1.19	1.01	0.567	94.2	0.318
	PERSISTENCE	0.67	0.82	1.52	0.99	0.670	93.1	0.328
	No. Obs.	3	22	27	1010			
9	LOCAL	0.00	0.55	1.48	1.00	0.670	93.6	0.260
	PERSISTENCE	0.50	0.82	1.78	0.99	0.785	92.3	0.226
	No. Obs.	4	22	23	1011			
15	LOCAL	0.05	0.38	0.68	1.06	1.511	88.0	0.136
	PERSISTENCE	0.10	0.56	0.77	1.05	1.488	88.0	0.193
	No. Obs.	20	32	53	956			