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AFOS-ERA VERIFICATION OF GUIDANCE AND LOCAL AVIATION/PUBLIC WEATHER FORECASTS--NO. 12 (APRIL 1989 - SEPTEMBER 1989)

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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 has been changed significantly. Most text has been eliminated and descriptive information about the verification data is now presented in tabular form. In addition, the new 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 1989 through September 1989 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. Official local max/min temperature forecasts and verifying observations, in turn, differ from 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). 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 100 stations in the conterminous U.S. and NWS Alaska Region 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 the NWS Alaska Region differ from that of the conterminous U.S., data for the six Alaskan stations were verified separately from that 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 NWS regions in the conterminous U.S. and for the NWS Alaska Region. Max/min temperature scores are presented in Tables 2.1 - 2.12, followed by PoP and cloud amount results in Tables 3.1 - 3.12 and 4.1 - 4.12, respectively. Precipitation type and snow amount forecasts are not issued during the warm season and, therefore, are not verified. For wind speed and direction, except for the 42-h significant wind speed, 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. Due to the small sample size for the warm season, 42-h significant wind scores are not presented. For ceiling height and visibility, objective and local forecast verification scores are shown only for the conterminous U.S. stations combined and for the NWS Alaska Region. Tables 6.1 - 6.4 contain the objective ceiling height forecast results for the conterminous U.S. and the NWS Alaska Region, while Tables 6.5 - 6.8 contain ceiling height scores for the local forecasts. Analogously, Tables 7.1 - 7.8 show guidance and local visibility forecast verification scores for the conterminous U.S. stations and the Alaskan stations.

2. SUMMARY (APRIL 1989 - SEPTEMBER 1989)

Monthly relative frequencies of precipitation are used as a verification standard for PoP. New monthly relative frequencies were available for this warm season. Prior to this season, the climatic values were based on a 15-year sample from 1949 to 1964 (Jorgensen, 1967). The new values described in Jensenius and Erickson (1987) are based on a more recent 13-year sample (1972 - 1985).

3. REFERENCES

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

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

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

Jensenius, J. S., Jr., and M. C. Erickson, 1987: Monthly relative frequencies of precipitation for the United States for 6-, 12-, and 24-h periods. NOAA Tech. Report NWS 39, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, 262 pp.

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

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

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

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

Weather Element	Type of Data	Data Source[1]	Projections From Forecast Cycle	Forecast Cycle (UTC)	Comments
Max temp	LFM MOS	FXX	24, 48 36, 60	0000 1200	Daytime max temperature forecast for the conterminous U.S.; calendar day max temperature forecast for Alaska.
	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 guidance definition of daytime. For Alaska, forecasts are valid for 12-h periods ending at 30- (42-) and 54- (66-) h after 0000 (1200) UTC.
	Obs	SAO		0000, 1200	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.
	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 guidance definition of nighttime. For Alaska, forecasts are valid for 12-h periods ending at 30- (42-) and 54- (66-) h after 1200 (0000) UTC.
	Obs	SAO		0000, 1200	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-h from the forecast cycle.
	Local Fcst	FP	24, 36, 48	0000, 1200	Same as the guidance forecasts.
	Obs	SAO		0000, 1200	Precipitation amount for 12-h periods that match that of the local forecasts.
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.
	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		0000, 1200	Obs are collected at the verifying time and ± 1 hour of the verifying time.

Table 1.1. Continued.

Weather Element	Type of Data	Data Source[1]	Projections From Forecast Cycle	Forecast Cycle (UTC)	Comments
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		0000, 1200	12-h snow amount.
Cloud amount	LFM MOS	FXX	12, 18, 24	0000, 1200	Categorical forecasts of opaque sky cover.
	Local Fcst	MEF	12, 18, 24	0000, 1200	Categorical forecasts of sky cover.
	Obs	SAO		0000, 1200	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.
	Local Fcst	FT	3, 9, 15	0900, 1800	Terminal aviation 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 $\geq$ 23 kt wind speed.
	Obs	SAO		0900, 1800	Observed values at the specific hour and $\pm$ 3 hours (highest sustained wind) correspond to the valid times of the local terminal aviation forecasts. 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.
		SAO		0000, 1200	Observations at the verifying hour and $\pm$ 3 hours surrounding the verifying hour are collected at the stations. Observations verify the local forecasts and the MOS guidance of 42-h significant wind.
Wind direction	LFM MOS	FXX	12, 18, 24	0000, 1200	Valid at specific hours after 0000 or 1200 UTC.
	Local Fcst	FT	3, 9, 15	0900, 1800	Same as for local wind speed.
	Obs	SAO		0900, 1800	Observed values at the specific hour.

Table 1.1. Continued.

Weather Element	Type of Data	Data Source[1]	Projections From Forecast Cycle	Forecast Cycle (UTC)	Comments
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.
	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		0900, 1800	Persistence observations used for comparison with the local forecasts are collected at the stations. Since March 1987, persistence obs used for comparison with the MOS guidance are from hourly observations collected at TDL.
	Obs	SAO		0900, 1800	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	Categorical value. Definitions of categories match the official definitions of LIFR and IFR, but differ slightly from the official definitions of MVFR and VFR.
	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		0900, 1800	See ceiling height.
	Obs	SAO		0900, 1800	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
- 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 forecasts for all 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) containing information about LFM MOS guidance.

Geographical Area	Subject	TPB No.
Conterminous U.S.	max/min temperature	356
	PoP	386
	precipitation type	319
	snow amount	318
	cloud amount	378
	surface wind	347
	ceiling height	303
	visibility	303
Alaska	max/min temperature	329
	PoP	329
	cloud amount	329
	surface wind	329
	ceiling height	338
	visibility	338

Table 1.3. Ninety-four stations in the conterminous U.S. and 6 stations in the Alaska Region used for comparative verification of LFM MOS guidance and local forecasts of max/min temperature, probability of precipitation, cloud amount, ceiling height, visibility, and surface wind. Please note that LAX was not included in the max/min temperature and PoP verifications, and LBB and ELP were not included in the ceiling height, visibility, and local surface wind verifications. TCC was not available during the 0000 UTC cycle for the local ceiling height, visibility, and surface wind verifications.

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

Table 1.3. Ninety-four stations in the conterminous U.S. and 6 stations in the Alaska Region used for comparative verification of LFM MOS guidance and local forecasts of max/min temperature, probability of precipitation, cloud amount, ceiling height, visibility, and surface wind. Please note that LAX was not included in the max/min temperature and PoP verifications, and LBB and ELP were not included in the ceiling height, visibility, and local surface wind verifications. TCC was not available during the 0000 UTC cycle for the local ceiling height, visibility, and surface wind verifications.

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

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, and 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. Verification of MOS and local 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	MOS	15857	-0.1	2.9	1.6	--	--	77.5
	LOCAL		0.2	2.6	1.5	--	--	80.2
Tonight's Min	MOS	15791	0.0	2.7	0.8	0.38	0.42	73.4
	LOCAL		0.0	2.6	0.9	0.35	0.36	74.3
Tomorrow's Max	MOS	15807	0.3	3.5	3.9	--	--	66.1
	LOCAL		0.4	3.3	3.4	--	--	69.0
Tomorrow Night's Min	MOS	15750	0.3	3.3	2.4	0.28	0.31	61.1
	LOCAL		0.1	3.2	2.1	0.27	0.36	61.7

Table 2.2. Same as Table 2.1 except for the 1200 UTC cycle.

Forecast Projection	Forecast Type	Number of Cases	Mean Algebraic Error (°F)	Mean Absolute Error (°F)	Percent of Absolute Errors >10°F	Probability of Detection (32°F)	False Alarm Ratio (32°F)	Improvement Over Climate
Tonight's Min	MOS	15919	-0.4	2.6	0.6	0.48	0.36	76.0
	LOCAL		-0.4	2.5	0.5	0.48	0.36	77.5
Tomorrow's Max	MOS	15927	0.2	3.4	3.0	--	--	69.2
	LOCAL		0.1	3.0	2.5	--	--	73.7
Tomorrow Night's Min	MOS	15912	-0.2	3.0	1.2	0.38	0.34	68.0
	LOCAL		-0.1	3.0	1.3	0.33	0.34	68.2
Day After Tomorrow's Max	MOS	15937	0.4	4.0	5.6	--	--	57.6
	LOCAL		0.4	3.7	5.1	--	--	61.3

Table 2.3. Verification of MOS and local max/min 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	MOS		0.1	2.9	1.2	--	--	74.7
	LOCAL	4076	0.2	2.7	1.3	--	--	76.3
Tonight's Min	MOS		0.1	2.5	0.5	0.29	0.31	77.5
	LOCAL	4037	0.0	2.5	0.6	0.32	0.33	77.0
Tomorrow's Max	MOS		0.4	3.3	2.8	--	--	65.5
	LOCAL	4065	0.3	3.3	2.6	--	--	65.9
Tomorrow Night's Min	MOS		-0.2	3.1	1.7	0.35	0.39	66.4
	LOCAL	4027	-0.2	3.1	1.9	0.32	0.38	64.8

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	MOS		-0.1	2.4	0.2	0.32	0.38	80.3
	LOCAL	4055	-0.4	2.3	0.1	0.42	0.19	80.4
Tomorrow's Max	MOS		0.5	3.3	2.6	--	--	66.9
	LOCAL	4084	0.1	3.1	2.1	--	--	69.1
Tomorrow Night's Min	MOS		-0.2	2.8	0.6	0.39	0.45	71.8
	LOCAL	4057	-0.3	2.9	0.9	0.26	0.27	71.4
Day After Tomorrow's Max	MOS		0.5	3.7	4.2	--	--	57.4
	LOCAL	4088	0.3	3.7	4.5	--	--	57.4

Table 2.5. Verification of MOS and local 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	MOS	4012	0.1	2.6	1.2	--	--	75.3
	LOCAL		0.3	2.3	1.0	--	--	79.2
Tonight's Min	MOS	4016	0.2	2.4	0.4	0.63	0.50	73.5
	LOCAL		0.1	2.3	0.4	0.38	0.25	74.5
Tomorrow's Max	MOS	4003	0.5	3.1	3.5	--	--	61.6
	LOCAL		0.6	2.9	2.8	--	--	67.6
Tomorrow Night's Min	MOS	4007	0.6	2.9	1.3	0.38	0.25	59.1
	LOCAL		0.4	2.8	1.0	0.13	0.00	61.3

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	MOS	4060	-0.1	2.2	0.4	0.63	0.29	75.7
	LOCAL		-0.2	2.2	0.4	0.63	0.29	77.0
Tomorrow's Max	MOS	4045	0.3	3.0	2.6	--	--	65.5
	LOCAL		0.3	2.6	2.0	--	--	72.4
Tomorrow Night's Min	MOS	4059	0.0	2.7	0.6	0.38	0.25	66.7
	LOCAL		0.1	2.6	0.8	0.38	0.00	67.2
Day After Tomorrow's Max	MOS	4041	0.4	3.4	4.5	--	--	54.4
	LOCAL		0.5	3.2	4.1	--	--	60.0

Table 2.7. Verification of MOS and local 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	MOS	4812	-0.2	3.1	2.1	--	--	78.9
	LOCAL		0.3	2.9	1.8	--	--	81.0
Tonight's Min	MOS	4792	0.1	3.0	0.9	0.44	0.42	74.8
	LOCAL		0.3	2.9	1.1	0.40	0.42	75.4
Tomorrow's Max	MOS	4795	0.2	3.9	4.9	--	--	67.6
	LOCAL		0.5	3.7	4.5	--	--	69.1
Tomorrow Night's Min	MOS	4787	0.7	3.7	3.8	0.28	0.26	60.7
	LOCAL		0.6	3.7	3.2	0.34	0.35	61.0

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	MOS	4851	-0.4	2.9	0.8	0.62	0.36	76.8
	LOCAL		-0.3	2.8	0.5	0.57	0.37	78.2
Tomorrow's Max	MOS	4851	0.1	3.7	3.8	--	--	70.7
	LOCAL		0.2	3.4	3.4	--	--	74.3
Tomorrow Night's Min	MOS	4850	0.1	3.3	1.6	0.46	0.29	69.5
	LOCAL		0.2	3.3	1.7	0.44	0.36	69.1
Day After Tomorrow's Max	MOS	4856	0.4	4.4	7.3	--	--	58.3
	LOCAL		0.6	4.2	6.7	--	--	61.5

Table 2.9. Verification of MOS and local 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	MOS		-0.3	2.9	2.0	--	--	79.7
	LOCAL	2957	0.1	2.5	1.6	--	--	83.7
Tonight's Min	MOS		-0.5	3.1	1.6	0.21	0.50	63.7
	LOCAL	2946	-0.5	2.8	1.6	0.21	0.00	67.6
Tomorrow's Max	MOS		0.3	3.7	4.4	--	--	68.0
	LOCAL	2944	0.1	3.3	3.4	--	--	73.1
Tomorrow Night's Min	MOS		-0.1	3.3	2.5	0.07	0.00	55.8
	LOCAL	2929	-0.5	3.1	2.0	0.00	1.00	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	MOS		-1.1	2.8	1.4	0.25	0.50	68.3
	LOCAL	2953	-0.7	2.6	1.0	0.17	0.71	72.4
Tomorrow's Max	MOS		-0.3	3.5	2.7	--	--	72.2
	LOCAL	2947	-0.1	2.9	2.2	--	--	78.3
Tomorrow Night's Min	MOS		-0.7	3.2	1.9	0.08	0.00	60.4
	LOCAL	2946	-0.7	3.0	1.9	0.08	0.67	62.7
Day After Tomorrow's Max	MOS		0.1	4.2	6.1	--	--	59.6
	LOCAL	2952	0.0	3.7	4.9	--	--	66.2

Table 2.11. Verification of MOS and local max/min temperature 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	MOS		0.4	2.8	1.2	--	--	*
	LOCAL	857	0.3	2.8	1.1	--	--	*
Tonight's Min	MOS		-0.4	3.1	1.5	0.17	0.00	*
	LOCAL	861	-0.2	3.1	1.5	0.00	**	*
Tomorrow's Max	MOS		0.1	3.3	1.7	--	--	*
	LOCAL	860	-0.1	3.4	2.7	--	--	*
Tomorrow Night's Min	MOS		-0.3	3.4	2.3	0.00	1.00	*
	LOCAL	856	-0.1	3.5	2.6	0.00	**	*

* Percent improvement over climate score is not available.
** No forecasts of ≤32°F were made.

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	MOS		-0.9	3.0	0.8	0.17	0.50	*
	LOCAL	841	-0.4	2.8	0.7	0.17	0.50	*
Tomorrow's Max	MOS		0.0	3.2	1.8	--	--	*
	LOCAL	841	-0.1	3.1	2.0	--	--	*
Tomorrow Night's Min	MOS		-0.8	3.3	1.4	0.17	0.00	*
	LOCAL	833	-0.4	3.2	1.8	0.00	1.00	*
Day After Tomorrow's Max	MOS		0.1	3.7	3.4	--	--	*
	LOCAL	831	-0.1	3.7	4.3	--	--	*

* Percent improvement over climate score is not available.

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

Forecast Projection (h)	Type of Forecast	Brier Score	% Imp. Over Guid.	% Imp. Over Clim.	No. of Cases	Changes GE 20% to Guidance: Brier Score	Changes GE 20% to Guidance: % Imp. Over Guid.	Changes GE 20% to Guidance: No. of Changes
12-24 (1st period)	MOS	0.1061		31.5		0.2270		
	LOCAL	0.1020	3.9	34.1	16025	0.2015	11.2	2130
24-36 (2nd period)	MOS	0.1101		25.9		0.2257		
	LOCAL	0.1079	2.0	27.3	15796	0.2103	6.8	1737
36-48 (3rd period)	MOS	0.1210		21.1		0.2138		
	LOCAL	0.1206	0.3	21.3	15924	0.2140	-0.1	1819

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

Forecast Projection (h)	Type of Forecast	Brier Score	% Imp. Over Guid.	% Imp. Over Clim.	No. of Cases	Changes GE 20% to Guidance: Brier Score	Changes GE 20% to Guidance: % Imp. Over Guid.	Changes GE 20% to Guidance: No. of Changes
12-24 (1st period)	MOS	0.1002		33.1		0.2049		
	LOCAL	0.0975	2.7	34.9	15942	0.1915	6.5	2176
24-36 (2nd period)	MOS	0.1167		25.0		0.2162		
	LOCAL	0.1147	1.7	26.2	16068	0.2073	4.1	1888
36-48 (3rd period)	MOS	0.1206		19.4		0.2182		
	LOCAL	0.1191	1.2	20.4	15932	0.2193	-0.5	1776

Revised percent improvement over climate scores.

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

Forecast Projection (h)	Type of Forecast	Brier Score	% Imp. Over Guid.	% Imp. Over Clim.	No. of Cases	Changes GE 20% to Guidance: Brier Score	Changes GE 20% to Guidance: % Imp. Over Guid.	Changes GE 20% to Guidance: No. of Changes
12-24 (1st period)	MOS	0.1245		39.4		0.2162		
	LOCAL	0.1199	3.7	41.7	4080	0.1961	9.3	744
24-36 (2nd period)	MOS	0.1325		32.2		0.2283		
	LOCAL	0.1281	3.3	34.5	4037	0.1995	12.6	534
36-48 (3rd period)	MOS	0.1474		27.1		0.2171		
	LOCAL	0.1467	0.4	27.4	4052	0.2180	-0.4	596

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

Forecast Projection (h)	Type of Forecast	Brier Score	% Imp. Over Guid.	% Imp. Over Clim.	No. of Cases	Changes GE 20% to Guidance: Brier Score	Changes GE 20% to Guidance: % Imp. Over Guid.	Changes GE 20% to Guidance: No. of Changes
12-24 (1st period)	MOS	0.1168		40.5		0.2008		
	LOCAL	0.1133	3.0	42.3	4068	0.1851	7.8	660
24-36 (2nd period)	MOS	0.1401		32.6		0.2160		
	LOCAL	0.1386	1.1	33.4	4080	0.2098	2.8	660
36-48 (3rd period)	MOS	0.1514		23.4		0.2329		
	LOCAL	0.1489	1.7	24.7	4062	0.2286	1.8	621

Revised percent improvement over climate scores.

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

Forecast Projection (h)	Type of Forecast	Brier Score	% Imp. Over Guid.	% Imp. Over Clim.	No. of Cases	Changes GE 20% to Guidance: Brier Score	Changes GE 20% to Guidance: % Imp. Over Guid.	Changes GE 20% to Guidance: No. of Changes
12-24 (1st period)	MOS	0.1176		25.1		0.2282		
	LOCAL	0.1158	1.6	26.2	4150	0.2170	4.9	571
24-36 (2nd period)	MOS	0.1145		17.9		0.2314		
	LOCAL	0.1125	1.8	19.3	4002	0.2103	9.1	518
36-48 (3rd period)	MOS	0.1327		15.2		0.2171		
	LOCAL	0.1322	0.4	15.5	4125	0.2170	0.0	534

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

Forecast Projection (h)	Type of Forecast	Brier Score	% Imp. Over Guid.	% Imp. Over Clim.	No. of Cases	Changes GE 20% to Guidance: Brier Score	Changes GE 20% to Guidance: % Imp. Over Guid.	Changes GE 20% to Guidance: No. of Changes
12-24 (1st period)	MOS	0.1038		26.3		0.1943		
	LOCAL	0.1042	-0.4	26.1	4049	0.1955	-0.6	613
24-36 (2nd period)	MOS	0.1262		20.4		0.2082		
	LOCAL	0.1264	-0.2	20.2	4172	0.2122	-1.9	508
36-48 (3rd period)	MOS	0.1212		14.4		0.1876		
	LOCAL	0.1230	-1.4	13.2	4048	0.2104	-12.2	467

Revised percent improvement over climate scores.

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

Forecast Projection (h)	Type of Forecast	Brier Score	% Imp. Over Guid.	% Imp. Over Clim.	No. of Cases	Changes GE 20% to Guidance: Brier Score	Changes GE 20% to Guidance: % Imp. Over Guid.	Changes GE 20% to Guidance: No. of Changes
12-24 (1st period)	MOS	0.1071		30.5		0.2278		
	LOCAL	0.1009	5.8	34.5	4824	0.1915	15.9	636
24-36 (2nd period)	MOS	0.1127		26.5		0.2097		
	LOCAL	0.1124	0.3	26.7	4804	0.2183	-4.1	517
36-48 (3rd period)	MOS	0.1219		20.5		0.2042		
	LOCAL	0.1220	0.0	20.5	4796	0.2040	0.1	526

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

Forecast Projection (h)	Type of Forecast	Brier Score	% Imp. Over Guid.	% Imp. Over Clim.	No. of Cases	Changes GE 20% to Guidance: Brier Score	Changes GE 20% to Guidance: % Imp. Over Guid.	Changes GE 20% to Guidance: No. of Changes
12-24 (1st period)	MOS	0.1055		31.5		0.2141		
	LOCAL	0.1009	4.4	34.5	4861	0.1924	10.1	711
24-36 (2nd period)	MOS	0.1189		22.6		0.2183		
	LOCAL	0.1152	3.1	25.0	4856	0.2022	7.4	549
36-48 (3rd period)	MOS	0.1236		19.1		0.2267		
	LOCAL	0.1205	2.6	21.1	4863	0.2170	4.3	549

Revised percent improvement over climate scores.

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

Forecast Projection (h)	Type of Forecast	Brier Score	% Imp. Over Guid.	% Imp. Over Clim.	No. of Cases	Changes GE 20% to Guidance: Brier Score	Changes GE 20% to Guidance: % Imp. Over Guid.	Changes GE 20% to Guidance: No. of Changes
12-24 (1st period)	MOS	0.0630		24.3		0.2649		
	LOCAL	0.0599	5.0	28.1	2971	0.2102	20.7	179
24-36 (2nd period)	MOS	0.0692		22.1		0.2492		
	LOCAL	0.0668	3.4	24.8	2953	0.2203	11.6	168
36-48 (3rd period)	MOS	0.0667		18.0		0.2220		
	LOCAL	0.0665	0.3	18.2	2951	0.2219	0.0	163

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

Forecast Projection (h)	Type of Forecast	Brier Score	% Imp. Over Guid.	% Imp. Over Clim.	No. of Cases	Changes GE 20% to Guidance: Brier Score	Changes GE 20% to Guidance: % Imp. Over Guid.	Changes GE 20% to Guidance: No. of Changes
12-24 (1st period)	MOS	0.0640		29.4		0.2187		
	LOCAL	0.0610	4.6	32.6	2964	0.1974	9.7	192
24-36 (2nd period)	MOS	0.0674		18.0		0.2339		
	LOCAL	0.0643	4.5	21.7	2960	0.1994	14.7	171
36-48 (3rd period)	MOS	0.0727		19.3		0.2222		
	LOCAL	0.0708	2.6	21.4	2959	0.2160	2.8	139

Revised percent improvement over climate scores.

Table 3.11. Comparative verification of MOS and local PoP forecasts for 6 stations in the Alaska Region, 0000 UTC cycle.

Forecast Projection (h)	Type of Forecast	Brier Score	% Imp. Over Guid.	% Imp. Over Clim.	No. of Cases	Changes GE 20% to Guidance: Brier Score	% Imp. Over Guid.	No. of Changes
6-18	MOS	0.1725		*		0.2553		
(1st period)	LOCAL	0.1467	15.0	*	853	0.1842	27.9	272
18-30	MOS	0.1820		*		0.2599		
(2nd period)	LOCAL	0.1671	8.2	*	853	0.2172	16.4	287
30-42	MOS	0.1805		*		0.2457		
(3rd period)	LOCAL	0.1747	3.2	*	847	0.2223	9.5	248

* Percent improvement over climate score is not available.

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

Forecast Projection (h)	Type of Forecast	Brier Score	% Imp. Over Guid.	% Imp. Over Clim.	No. of Cases	Changes GE 20% to Guidance: Brier Score	% Imp. Over Guid.	No. of Changes
6-18	MOS	0.1773		*		0.2773		
(1st period)	LOCAL	0.1501	15.3	*	840	0.2056	25.9	288
18-30	MOS	0.1787		*		0.2363		
(2nd period)	LOCAL	0.1650	7.7	*	835	0.1920	18.7	242
30-42	MOS	0.1782		*		0.2353		
(3rd period)	LOCAL	0.1817	-2.0	*	838	0.2416	-2.7	250

* Percent improvement over climate score is not available.

Table 4.1. Comparative verification of MOS and local forecasts of four categories of cloud amount (clear, scattered, broken, and overcast) for 94 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	MOS	0.80	1.69	1.21	0.74	52.1	0.350
	LOCAL	0.76	1.38	1.50	0.84	60.7	0.468
	No. Obs.	6124	2987	2120	4889		
18	MOS	0.78	1.35	1.23	0.68	52.6	0.364
	LOCAL	0.61	1.31	1.65	0.61	48.7	0.318
	No. Obs.	4559	4557	2985	4020		
24	MOS	0.77	1.37	1.38	0.63	49.7	0.326
	LOCAL	0.63	1.28	1.83	0.62	45.1	0.274
	No. Obs.	4925	4431	2634	4146		

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	MOS	0.88	1.37	1.23	0.61	51.7	0.349
	LOCAL	0.79	1.14	1.60	0.72	55.9	0.412
	No. Obs.	4883	4436	2617	4184		
18	MOS	0.94	1.67	1.07	0.71	56.2	0.364
	LOCAL	0.67	1.82	2.13	0.69	48.9	0.306
	No. Obs.	7521	2377	1690	4353		
24	MOS	0.88	1.58	1.14	0.74	51.6	0.339
	LOCAL	0.72	1.51	1.74	0.71	47.7	0.301
	No. Obs.	6101	2952	2115	4915		

Table 4.3. Comparative verification of MOS and local 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	MOS	0.74	1.59	1.29	0.85	53.1	0.348
	LOCAL	0.66	1.45	1.71	0.83	56.0	0.394
	No. Obs.	1089	661	518	1755		
18	MOS	0.45	1.24	1.40	0.84	51.3	0.332
	LOCAL	0.41	1.15	1.78	0.71	48.2	0.298
	No. Obs.	664	1108	825	1423		
24	MOS	0.61	1.39	1.67	0.79	49.1	0.317
	LOCAL	0.49	1.33	2.17	0.72	44.0	0.260
	No. Obs.	1052	859	583	1525		

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	MOS	0.70	1.55	1.40	0.74	50.2	0.331
	LOCAL	0.64	1.25	1.84	0.79	52.2	0.360
	No. Obs.	1030	849	578	1515		
18	MOS	0.84	1.81	1.29	0.82	55.0	0.367
	LOCAL	0.62	1.76	2.25	0.78	49.0	0.307
	No. Obs.	1424	489	419	1625		
24	MOS	0.79	1.41	1.43	0.85	51.5	0.324
	LOCAL	0.70	1.39	1.87	0.79	47.6	0.282
	No. Obs.	1068	647	509	1745		

Table 4.5. Comparative verification of MOS and local forecasts of four categories of cloud amount (clear, scattered, broken, and overcast) for 24 stations in the Southern Region, 0000 UTC cycle.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Percent Correct	Skill Score
	MOS	0.73	1.79	1.01	0.67	47.0	0.289
12	LOCAL	0.66	1.41	1.49	0.81	55.1	0.403
	No. Obs.	1468	948	669	1085		
	MOS	0.83	1.34	1.02	0.57	52.6	0.341
18	LOCAL	0.56	1.30	1.33	0.53	46.9	0.260
	No. Obs.	871	1437	1042	819		
	MOS	0.75	1.37	1.20	0.55	48.8	0.296
24	LOCAL	0.49	1.29	1.77	0.53	42.6	0.220
	No. Obs.	1079	1405	768	926		

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
	MOS	0.89	1.36	1.03	0.56	52.6	0.345
12	LOCAL	0.72	1.15	1.55	0.65	55.3	0.394
	No. Obs.	1076	1422	766	941		
	MOS	0.96	1.70	0.75	0.65	55.0	0.335
18	LOCAL	0.55	1.98	2.11	0.61	43.0	0.239
	No. Obs.	1971	715	478	884		
	MOS	0.83	1.77	0.86	0.65	48.0	0.298
24	LOCAL	0.60	1.62	1.69	0.59	42.6	0.245
	No. Obs.	1465	947	673	1109		

Table 4.7. Comparative verification of MOS and local 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	MOS	0.77	1.76	1.39	0.69	50.1	0.322
	LOCAL	0.78	1.42	1.51	0.84	60.3	0.457
	No. Obs.	1968	864	590	1400		
18	MOS	0.78	1.37	1.33	0.61	50.6	0.335
	LOCAL	0.53	1.38	1.82	0.56	45.7	0.278
	No. Obs.	1388	1402	796	1228		
24	MOS	0.76	1.38	1.41	0.56	47.3	0.293
	LOCAL	0.55	1.31	1.81	0.63	43.7	0.255
	No. Obs.	1456	1345	840	1182		

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	MOS	0.91	1.33	1.25	0.56	49.1	0.314
	LOCAL	0.72	1.16	1.56	0.77	55.2	0.404
	No. Obs.	1445	1350	839	1206		
18	MOS	0.94	1.70	1.22	0.66	55.8	0.347
	LOCAL	0.63	2.02	2.34	0.66	48.2	0.296
	No. Obs.	2405	694	462	1279		
24	MOS	0.84	1.68	1.33	0.68	49.5	0.307
	LOCAL	0.70	1.68	1.85	0.65	46.1	0.279
	No. Obs.	1980	854	591	1409		

Table 4.9. Comparative verification of MOS and local 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	MOS	0.95	1.49	1.13	0.66	60.7	0.408
	LOCAL	0.92	1.17	1.22	0.94	75.0	0.626
	No. Obs.	1599	514	343	649		
18	MOS	0.89	1.50	1.28	0.60	57.5	0.361
	LOCAL	0.79	1.45	1.92	0.58	56.4	0.366
	No. Obs.	1636	610	322	550		
24	MOS	0.93	1.31	1.25	0.48	55.4	0.362
	LOCAL	0.93	1.17	1.53	0.45	52.3	0.322
	No. Obs.	1338	822	443	513		

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	MOS	0.99	1.23	1.29	0.42	56.5	0.374
	LOCAL	1.02	1.00	1.44	0.58	62.2	0.459
	No. Obs.	1332	815	434	522		
18	MOS	1.01	1.42	1.07	0.57	59.9	0.355
	LOCAL	0.89	1.38	1.74	0.59	57.7	0.352
	No. Obs.	1721	479	331	565		
24	MOS	1.02	1.29	0.94	0.75	60.0	0.385
	LOCAL	0.90	1.17	1.48	0.86	57.3	0.366
	No. Obs.	1588	504	342	652		

Table 4.11. Comparative verification of MOS and local 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	MOS	0.99	1.08	1.03	0.98	59.6	0.340
	LOCAL	0.76	1.17	1.63	0.91	59.2	0.354
	No. Obs.	192	136	121	607		
18	MOS	0.93	1.09	1.18	0.95	57.9	0.338
	LOCAL	0.69	1.21	1.50	0.91	52.3	0.261
	No. Obs.	175	132	163	590		
24	MOS	0.97	0.94	1.03	1.02	57.3	0.357
	LOCAL	0.60	1.20	1.32	0.96	49.7	0.253
	No. Obs.	176	161	191	526		

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	MOS	0.94	0.99	1.17	0.96	58.3	0.378
	LOCAL	0.81	0.91	1.29	0.99	58.3	0.373
	No. Obs.	176	159	184	523		
18	MOS	1.03	0.97	1.13	0.96	57.2	0.344
	LOCAL	0.64	0.93	1.65	0.98	54.1	0.297
	No. Obs.	183	166	141	551		
24	MOS	0.92	1.04	0.95	1.02	60.4	0.335
	LOCAL	0.51	1.07	1.78	0.98	54.2	0.252
	No. Obs.	186	130	119	603		

Table 5.1. Verification of MOS surface wind forecasts for 91 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	MOS	26	0.482	2321	3.4	1.7	2343	0.339	92.9	0.20	1.01 14455	0.84 798	0.76 136	0.35 20	0.33 3	1.00 1
18	MOS	28	0.424	5129	3.1	0.5	5147	0.355	81.1	0.06	1.07 12417	0.75 2420	0.56 576	0.45 97	0.60 10	0.00 2
24	MOS	32	0.410	4650	3.3	0.7	4674	0.307	81.3	0.03	1.07 12683	0.71 2152	0.62 550	0.48 114	0.17 23	0.00 4

Table 5.2. Same as Table 5.1 except for 92 stations in the conterminous U.S., 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	MOS	29	0.447	4865	3.2	0.6	4883	0.332	81.7	0.10	1.06 12770	0.76 2158	0.61 553	0.50 115	0.30 23	0.00 4
18	MOS	30	0.455	2231	3.6	1.6	2266	0.289	91.7	0.14	1.02 14302	0.77 903	0.53 158	0.16 45	0.00 7	** 0
24	MOS	29	0.431	1942	3.7	1.8	1967	0.272	92.8	0.00	1.02 14490	0.76 780	0.39 138	0.23 22	0.00 3	0.00 1

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

Table 5.3. Verification of 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	MOS	23	0.495	609	3.3	1.5	611	0.304	92.4	0.00	1.01 3788	0.77 225	1.04 28	0.33 6	** 0	* 0
18	MOS	30	0.362	1476	3.0	0.6	1480	0.352	81.1	0.00	1.06 3270	0.81 662	0.52 116	0.40 10	** 0	* 0
24	MOS	32	0.357	752	3.4	1.7	758	0.265	90.5	0.00	1.02 3724	0.74 282	0.67 39	0.00 2	0.00 1	* 0

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

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	MOS	30	0.391	795	3.2	1.5	799	0.336	91.3	0.00	1.02 3770	0.79 278	0.61 41	0.50 2	0.00 1	* 0
18	MOS	25	0.477	444	3.7	1.9	456	0.286	94.3	0.00	1.01 3901	0.72 169	0.86 21	0.29 7	0.00 2	* 0
24	MOS	28	0.451	529	3.6	1.8	534	0.288	92.6	*	1.02 3822	0.79 218	0.62 29	0.17 6	* 0	* 0

* This category was neither forecast nor observed.

Table 5.5. Verification of MOS surface wind forecasts for 21 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	MOS	26	0.476	505	3.6	2.3	511	0.294	93.7	0.50	1.00 3438	1.01 141	0.83 24	0.33 3	0.00 2	** 0
18	MOS	28	0.423	1182	2.9	1.0	1186	0.342	83.4	0.00	1.04 3053	0.79 486	0.86 80	0.31 13	2.00 1	** 0
24	MOS	29	0.440	1004	3.1	1.1	1007	0.295	84.8	0.00	1.04 3151	0.81 399	0.66 77	0.29 14	0.50 2	** 0

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

Table 5.6. Same as Table 5.5 except for 22 stations in the Southern Region, 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	MOS	26	0.463	1027	2.9	1.1	1031	0.342	85.6	0.00	1.03 3160	0.87 403	0.60 78	0.13 15	0.00 2	* 0
18	MOS	28	0.420	508	3.7	2.2	512	0.346	92.6	0.25	1.00 3284	1.13 167	0.81 26	0.09 11	0.00 4	** 0
24	MOS	31	0.389	468	3.9	2.6	473	0.228	93.5	0.00	1.00 3440	1.05 135	0.32 25	1.00 3	0.00 2	* 0

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

Table 5.7. Verification of 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	MOS	25	0.460	763	3.3	1.1	769	0.355	91.9	0.00	1.02 4370	0.82 288	0.52 60	0.40 10	0.00 1	0.00 1
18	MOS	25	0.485	1772	3.1	-0.1	1778	0.341	75.8	0.00	1.14 3453	0.69 964	0.47 272	0.52 42	0.00 7	0.00 2
24	MOS	31	0.419	1469	3.3	-0.3	1478	0.266	77.5	0.00	1.15 3635	0.56 841	0.42 216	0.29 38	0.20 5	0.00 3

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	MOS	27	0.471	1553	3.2	-0.2	1560	0.280	77.3	0.00	1.13 3664	0.62 850	0.44 218	0.47 36	0.00 5	0.00 3
18	MOS	34	0.409	760	3.7	1.3	772	0.248	89.6	*	1.04 4325	0.65 362	0.31 70	0.14 14	* 0	* 0
24	MOS	29	0.408	645	3.6	1.2	654	0.272	91.8	0.00	1.03 4388	0.64 284	0.33 60	0.10 10	0.00 1	0.00 1

* This category was neither forecast nor observed.

Table 5.9. Verification of 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	MOS	29	0.418	444	3.6	2.2	452	0.407	94.1	*	1.01 2859	0.85 144	0.96 24	0.00 1	* 0	* 0
18	MOS	35	0.298	699	3.6	0.8	703	0.383	86.3	0.25	1.05 2641	0.74 308	0.58 108	0.44 32	1.50 2	* 0
24	MOS	34	0.297	1425	3.5	0.8	1431	0.319	70.9	0.06	1.08 2173	0.83 630	0.80 218	0.67 60	0.13 15	0.00 1

* This category was neither forecast nor observed.

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	MOS	31	0.337	1490	3.3	0.6	1493	0.328	71.2	0.15	1.08 2176	0.86 627	0.79 216	0.60 62	0.47 15	0.00 1
18	MOS	29	0.431	519	3.3	1.3	526	0.296	90.6	0.00	1.03 2792	0.73 205	0.54 41	0.15 13	0.00 1	* 0
24	MOS	28	0.399	300	3.9	1.8	306	0.300	93.9	*	1.02 2840	0.68 143	0.33 24	0.00 3	* 0	* 0

* This category was neither forecast nor observed.

Table 5.11. Verification of MOS surface wind forecasts for 6 stations in the Alaska Region, 0000 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
12	MOS	33	0.333	117	4.9	3.9	123	0.253	92.8	0.00	0.99 968	1.18 38	2.20 5	1.00 1	** 0	* 0
18	MOS	45	0.212	169	4.6	3.6	173	0.205	90.9	0.00	0.99 958	1.00 51	1.80 5	3.00 1	*** 0	* 0
24	MOS	46	0.255	362	4.3	2.9	369	0.183	79.6	0.00	0.96 895	1.37 102	1.05 19	0.50 4	1.00 1	* 0

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

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	MOS	44	0.285	323	3.7	2.4	326	0.246	83.8	0.00	1.01 892	1.02 101	0.79 19	0.25 4	0.00 1	* 0
18	MOS	42	0.291	203	4.2	2.6	209	0.216	88.4	0.00	1.03 932	0.68 87	0.86 7	0.50 2	0.00 1	* 0
24	MOS	35	0.321	120	5.0	4.5	131	0.238	93.5	0.00	1.00 966	0.92 38	1.60 5	**** 0	* 0	** 0

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

Table 5.13. Verification of local surface wind forecasts for 91 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	28	0.452	3896	3.6	2.5	3977	0.388	93.1	0.25	0.99 15091	1.22 723	0.69 154	0.87 15	0.75 4	0.50 2
9	LOCAL	38	0.342	8635	3.3	1.6	8686	0.344	79.3	0.00	1.02 12862	1.03 2457	0.60 543	0.27 96	0.23 13	0.33 3
15	LOCAL	38	0.341	9605	3.4	1.6	9686	0.308	76.1	0.00	1.01 12587	1.10 2615	0.66 626	0.29 119	0.09 23	0.33 3

Table 5.14. Same as Table 5.13 except for 92 stations in the conterminous U.S. 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	0.388	10161	3.0	1.2	10217	0.375	76.4	0.11	1.01 12343	1.08 2961	0.62 767	0.37 144	0.24 29	0.00 5
9	LOCAL	41	0.315	6214	4.2	3.1	6367	0.246	85.7	0.00	0.97 14794	1.46 1168	0.96 214	0.22 49	0.07 14	1.00 1
15	LOCAL	43	0.310	4328	4.5	3.3	4528	0.237	90.4	0.08	0.99 14991	1.26 816	0.52 163	0.21 19	0.14 7	0.20 5

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.

		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	0.450	1000	3.5	2.5	1018	0.356	93.6	0.25	0.99 4001	1.18 174	0.81 27	1.00 3	1.00 1	0.50 2
9	LOCAL	38	0.316	2373	3.1	1.5	2382	0.330	81.7	0.00	1.04 3460	0.85 648	0.40 88	0.63 8	** 0	** 0
15	LOCAL	40	0.311	2241	3.6	2.5	2262	0.233	82.6	0.00	0.98 3695	1.21 453	0.52 50	0.33 3	0.00 1	** 0

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

Table 5.16. Same as Table 5.15 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	31	0.375	2460	2.9	1.0	2467	0.303	78.4	*	1.05 3375	0.93 712	0.34 140	0.08 13	* 0	* 0
9	LOCAL	43	0.278	1409	4.4	3.6	1466	0.194	89.9	0.00	0.98 4003	1.43 210	0.76 25	0.25 4	1.00 1	** 0
15	LOCAL	45	0.269	1069	4.6	3.6	1130	0.242	92.5	0.33	1.00 4018	1.17 179	0.60 25	0.33 3	** 0	0.50 2

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

Table 5.17. Verification of local surface wind forecasts for 21 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	29	0.469	739	3.5	2.4	745	0.361	94.1	0.33	1.00 3562	1.10 141	0.62 34	1.33 3	1.00 2	* 0
9	LOCAL	38	0.334	1911	3.2	1.6	1920	0.336	83.0	0.00	1.03 3148	0.94 502	0.55 69	0.00 17	0.00 2	0.00 1
15	LOCAL	38	0.326	2082	3.2	1.8	2106	0.297	80.5	*	1.01 3117	1.05 522	0.52 83	0.00 15	* 0	* 0

* This category was neither forecast nor observed.

Table 5.18. Same as Table 5.17 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	0.385	2306	3.0	1.5	2315	0.366	80.6	0.00	1.01 3177	1.06 594	0.51 106	0.54 24	0.00 3	* 0
9	LOCAL	39	0.315	1304	4.1	3.2	1338	0.278	89.7	0.00	0.97 3646	1.59 202	0.72 32	0.22 9	0.00 4	* 0
15	LOCAL	39	0.368	803	4.5	3.3	838	0.253	91.9	0.00	1.00 3522	1.08 179	0.44 32	0.40 5	0.00 2	* 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	30	0.438	1552	3.6	2.6	1593	0.413	91.0	0.00	0.98 4529	1.35 289	0.70 69	0.43 7	0.00 1	* 0
9	LOCAL	35	0.372	3049	3.4	1.5	3073	0.348	73.1	0.00	0.98 3623	1.21 957	0.64 262	0.29 35	0.00 8	0.00 2
15	LOCAL	37	0.331	3230	3.4	1.3	3257	0.319	70.3	0.00	0.97 3532	1.24 1031	0.59 276	0.29 41	0.00 11	0.00 2

* This category was neither forecast nor observed.

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	31	0.409	3441	3.1	1.1	3464	0.394	71.5	0.10	0.96 3413	1.29 1114	0.66 309	0.19 59	0.36 14	0.00 4
9	LOCAL	42	0.309	2236	4.2	3.1	2281	0.231	80.9	0.00	0.93 4381	1.84 422	0.78 90	0.06 16	0.00 3	0.00 1
15	LOCAL	42	0.301	1764	4.4	3.2	1834	0.238	86.6	0.00	0.97 4511	1.63 310	0.55 73	0.00 8	0.00 2	0.00 2

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	31	0.413	605	3.6	2.4	621	0.390	94.6	*	1.00 2999	1.08 119	0.67 24	1.50 2	* 0	* 0
9	LOCAL	44	0.276	1302	3.9	1.8	1311	0.310	81.4	0.00	1.02 2631	1.01 350	0.69 124	0.31 36	0.67 3	* 0
15	LOCAL	36	0.317	2052	3.3	1.0	2061	0.296	71.1	0.00	1.09 2243	0.80 609	0.85 217	0.37 60	0.18 11	0.00 1

* This category was neither forecast nor observed.

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	36	0.310	1954	3.2	1.1	1971	0.378	76.0	0.15	1.05 2378	0.89 541	0.81 212	0.58 48	0.17 12	0.00 1
9	LOCAL	41	0.288	1265	4.0	2.6	1282	0.259	82.6	0.00	1.01 2764	0.93 334	1.40 67	0.35 20	0.00 6	* 0
15	LOCAL	48	0.271	692	4.6	3.1	726	0.185	91.8	0.00	1.02 2940	0.84 148	0.48 33	0.33 3	0.00 3	0.00 1

* 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.

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	32	0.431	256	4.1	3.4	269	0.386	94.7	*	0.99 1013	1.21 38	1.00 4	2.00 1	* 0	* 0
9	LOCAL	51	0.214	272	4.1	3.4	285	0.337	93.2	0.00	1.00 1005	0.94 52	1.00 5	1.00 1	** 0	* 0
15	LOCAL	51	0.207	313	3.7	1.8	318	0.172	86.1	0.00	1.08 930	0.46 107	0.37 19	0.50 4	1.00 1	* 0

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

Table 5.24. Same as Table 5.23 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	34	0.334	318	3.1	1.2	320	0.330	88.4	0.00	1.07 919	0.52 106	0.53 19	0.00 4	1.00 1	* 0
9	LOCAL	49	0.233	302	4.5	3.3	318	0.209	88.2	0.00	1.03 949	0.69 87	1.29 7	0.00 2	1.00 1	* 0
15	LOCAL	57	0.175	265	5.5	5.0	295	0.135	91.3	0.00	0.98 1000	1.36 39	2.20 5	** 0	** 0	* 0

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

Table 6.1. Comparative verification of MOS and persistence ceiling height forecasts for 91 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	1.05	0.85	0.95	1.01	2.590	80.6	0.343
	PERSISTENCE	0.75	0.76	0.82	1.04	1.586	87.1	0.531
	No. Obs.	551	691	1334	12423			
18	MOS	0.80	0.87	1.00	1.00	1.265	84.4	0.358
	PERSISTENCE	4.96	1.77	0.65	1.00	1.972	82.3	0.288
	No. Obs.	85	302	1716	12964			
24	MOS	1.17	0.76	0.90	1.01	0.885	91.1	0.314
	PERSISTENCE	4.35	2.36	1.48	0.93	2.015	83.7	0.167
	No. Obs.	95	225	753	13828			

Table 6.2. Same as Table 6.1 except for 92 stations, 1200 UTC cycle.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Log Score	Percent Correct	Skill Score
12	MOS	1.36	0.82	0.95	1.00	0.872	91.3	0.358
	PERSISTENCE	0.77	1.00	1.35	0.98	0.620	92.7	0.520
	No. Obs.	99	228	780	14011			
18	MOS	1.54	0.75	0.97	1.00	1.624	87.1	0.341
	PERSISTENCE	0.31	0.54	1.13	1.02	1.317	87.4	0.305
	No. Obs.	252	419	938	13528			
24	MOS	1.61	0.79	0.89	1.00	3.132	78.7	0.318
	PERSISTENCE	0.13	0.31	0.78	1.10	2.401	80.5	0.195
	No. Obs.	576	718	1362	12480			

Table 6.3. Comparative verification of 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	0.79	1.02	1.29	0.95	3.454	70.9	0.386
	PERSISTENCE	0.71	1.21	0.90	1.03	1.956	82.2	0.598
	No. Obs.	56	57	165	694			
18	MOS	0.65	1.25	1.30	0.92	3.732	66.5	0.331
	PERSISTENCE	0.85	1.04	0.82	1.05	3.253	72.8	0.400
	No. Obs.	52	71	171	679			
24	MOS	0.43	0.98	1.45	0.92	2.603	69.1	0.282
	PERSISTENCE	2.10	1.23	0.92	0.97	3.507	69.8	0.276
	No. Obs.	21	60	156	737			

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	MOS	0.55	1.08	1.43	0.91	2.355	72.9	0.383
	PERSISTENCE	1.40	1.13	1.14	0.95	1.746	81.9	0.576
	No. Obs.	20	64	153	726			
18	MOS	0.49	0.96	1.51	0.92	2.851	71.8	0.378
	PERSISTENCE	0.83	1.03	1.20	0.97	2.692	75.1	0.431
	No. Obs.	35	73	148	729			
24	MOS	0.93	1.10	1.60	0.84	4.267	64.1	0.325
	PERSISTENCE	0.47	1.22	1.01	1.02	3.798	68.3	0.316
	No. Obs.	59	58	174	668			

Table 6.5. Comparative verification of local and persistence ceiling height forecasts for 91 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	0.71	0.72	1.10	1.02	1.740	85.6	0.491
	PERSISTENCE	0.72	0.75	0.84	1.04	1.527	87.8	0.540
	No. Obs.	551	717	1380	13331			
6	LOCAL	0.47	0.41	0.98	1.06	1.866	82.2	0.386
	PERSISTENCE	1.15	0.64	0.64	1.07	1.984	82.9	0.396
	No. Obs.	343	846	1803	12974			
9	LOCAL	0.21	0.31	0.72	1.07	1.187	84.9	0.324
	PERSISTENCE	4.38	1.44	0.59	1.03	1.933	81.5	0.272
	No. Obs.	90	373	1974	13521			
15	LOCAL	0.15	0.40	1.25	1.00	0.852	90.0	0.299
	PERSISTENCE	3.81	2.19	1.32	0.94	1.888	84.2	0.183
	No. Obs.	104	245	878	14739			

Table 6.6. Same as Table 6.5 except for 92 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	0.58	0.65	1.14	1.00	0.781	89.9	0.456
	PERSISTENCE	1.42	1.38	1.57	0.94	0.921	88.1	0.480
	No. Obs.	67	272	1289	14569			
6	LOCAL	0.34	0.64	1.49	0.98	0.807	90.2	0.386
	PERSISTENCE	0.85	1.48	2.26	0.92	1.168	85.6	0.321
	No. Obs.	109	252	892	14940			
9	LOCAL	0.39	0.69	1.61	0.98	0.958	89.2	0.354
	PERSISTENCE	0.62	1.27	2.39	0.92	1.354	84.2	0.262
	No. Obs.	155	294	844	14892			
15	LOCAL	0.31	0.86	1.60	0.98	1.848	83.1	0.341
	PERSISTENCE	0.23	0.68	1.71	0.98	2.090	79.6	0.202
	No. Obs.	409	543	1164	13855			

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	1.71	0.97	0.96	0.95	3.609	76.3	0.509
	PERSISTENCE	*	*	*	*	*	*	*
	No. Obs.	62	62	179	740			
6	LOCAL	1.27	0.90	1.15	0.95	4.526	69.5	0.387
	PERSISTENCE	*	*	*	*	*	*	*
	No. Obs.	84	69	163	735			
9	LOCAL	1.40	0.60	1.11	0.98	4.494	67.8	0.337
	PERSISTENCE	*	*	*	*	*	*	*
	No. Obs.	60	78	184	727			
15	LOCAL	2.59	0.49	1.23	0.95	3.758	69.1	0.270
	PERSISTENCE	*	*	*	*	*	*	*
	No. Obs.	22	67	168	791			

* Observations used as persistence forecasts were unavailable.

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	3.67	0.74	1.10	0.93	3.635	72.2	0.366
	PERSISTENCE	*	*	*	*	*	*	*
	No. Obs.	21	65	167	776			
6	LOCAL	3.09	0.69	1.19	0.92	3.830	71.1	0.328
	PERSISTENCE	*	*	*	*	*	*	*
	No. Obs.	23	59	162	784			
9	LOCAL	1.82	0.59	1.50	0.90	4.198	66.8	0.283
	PERSISTENCE	*	*	*	*	*	*	*
	No. Obs.	34	71	157	763			
15	LOCAL	1.22	0.92	1.38	0.89	5.233	61.3	0.244
	PERSISTENCE	*	*	*	*	*	*	*
	No. Obs.	63	60	185	718			

* Observations used as persistence forecasts were unavailable.

Table 7.1. Comparative verification of MOS and persistence visibility forecasts for 91 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	1.26	1.02	0.96	1.00	3.001	71.3	0.368
	PERSISTENCE	0.61	0.43	0.83	1.12	1.980	79.0	0.475
	No. Obs.	417	1160	2770	10764			
18	MOS	0.71	0.78	1.18	0.98	1.221	84.2	0.361
	PERSISTENCE	9.32	1.56	1.37	0.92	1.941	79.6	0.298
	No. Obs.	28	322	1678	13134			
24	MOS	0.79	0.85	1.27	0.97	1.147	85.4	0.368
	PERSISTENCE	6.17	1.63	1.60	0.90	2.041	78.8	0.248
	No. Obs.	42	311	1453	13425			

Table 7.2. Same as Table 7.1 except for 92 stations, 1200 UTC cycle.

Projection (h)	Type of Forecast	Bias by Category 1	2	3	4	Log Score	Percent Correct	Skill Score
12	MOS	1.77	1.06	1.18	0.98	1.169	86.3	0.394
	PERSISTENCE	0.97	0.89	1.02	1.00	0.682	91.8	0.606
	No. Obs.	39	321	1433	13646			
18	MOS	2.25	1.23	0.99	0.98	1.694	82.7	0.369
	PERSISTENCE	0.28	0.83	0.81	1.04	1.302	85.4	0.382
	No. Obs.	134	344	1787	12958			
24	MOS	2.00	1.16	1.02	0.94	3.518	69.1	0.359
	PERSISTENCE	0.08	0.24	0.52	1.24	2.938	71.7	0.196
	No. Obs.	426	1192	2784	10835			

Table 7.3. Comparative verification of 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	0.68	1.10	1.04	1.00	2.269	81.0	0.337
	PERSISTENCE	0.82	0.98	0.76	1.03	1.557	86.9	0.507
	No. Obs.	28	42	91	828			
18	MOS	0.00	0.56	1.16	1.04	1.764	84.2	0.336
	PERSISTENCE	1.85	0.65	1.03	1.01	2.255	82.3	0.308
	No. Obs.	13	66	67	848			
24	MOS	0.17	0.33	1.07	1.04	1.229	86.9	0.259
	PERSISTENCE	3.83	0.91	1.24	0.97	2.122	82.3	0.221
	No. Obs.	6	46	59	890			

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	MOS	0.67	0.48	0.83	1.04	1.282	87.4	0.296
	PERSISTENCE	0.83	0.88	1.14	1.00	0.947	89.8	0.514
	No. Obs.	6	48	59	874			
18	MOS	0.14	0.55	1.08	1.03	1.594	84.8	0.278
	PERSISTENCE	0.36	0.84	1.03	1.02	1.545	85.5	0.351
	No. Obs.	14	51	64	867			
24	MOS	0.85	1.27	1.06	0.98	2.652	77.3	0.249
	PERSISTENCE	0.19	0.95	0.73	1.06	2.219	80.9	0.248
	No. Obs.	27	44	90	814			

Table 7.5. Comparative verification of local and persistence visibility forecasts for 91 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	0.55	0.56	1.31	0.98	2.091	77.4	0.476
	PERSISTENCE	0.46	0.49	0.80	1.11	1.816	81.2	0.500
	No. Obs.	474	974	2835	11688			
6	LOCAL	0.43	0.34	1.11	1.03	1.864	77.8	0.399
	PERSISTENCE	1.37	0.54	0.81	1.07	1.975	78.3	0.387
	No. Obs.	161	879	2777	12141			
9	LOCAL	0.17	0.21	0.95	1.03	1.119	85.2	0.367
	PERSISTENCE	5.37	1.30	1.18	0.95	1.800	80.6	0.320
	No. Obs.	41	365	1918	13629			
15	LOCAL	0.22	0.25	1.01	1.02	0.973	87.4	0.340
	PERSISTENCE	5.52	1.53	1.54	0.92	1.880	79.9	0.240
	No. Obs.	40	311	1464	14141			

Table 7.6. Same as Table 7.5 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	0.39	1.23	0.99	0.832	89.0	0.487
	PERSISTENCE	1.20	1.25	1.25	0.97	0.801	90.2	0.575
	No. Obs.	35	297	1536	14325			
6	LOCAL	0.29	0.30	1.25	0.99	0.879	88.3	0.440
	PERSISTENCE	1.20	1.17	1.31	0.96	1.030	87.4	0.449
	No. Obs.	35	317	1467	14367			
9	LOCAL	0.66	0.49	1.20	0.99	1.018	86.7	0.408
	PERSISTENCE	0.94	1.25	1.18	0.97	1.151	85.9	0.402
	No. Obs.	47	296	1624	14214			
15	LOCAL	0.36	0.82	1.20	0.98	1.804	79.4	0.368
	PERSISTENCE	0.19	0.78	0.84	1.05	1.806	80.0	0.306
	No. Obs.	226	474	2288	12974			

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	0.81	0.88	0.94	1.02	1.321	87.6	0.538
	PERSISTENCE	*	*	*	*	*	*	*
	No. Obs.	27	43	93	873			
6	LOCAL	0.55	0.68	0.93	1.05	2.247	81.6	0.390
	PERSISTENCE	*	*	*	*	*	*	*
	No. Obs.	40	62	99	844			
9	LOCAL	0.92	0.42	1.19	1.03	1.954	82.7	0.302
	PERSISTENCE	*	*	*	*	*	*	*
	No. Obs.	12	73	73	890			
15	LOCAL	0.33	0.40	1.21	1.02	1.327	86.7	0.285
	PERSISTENCE	*	*	*	*	*	*	*
	No. Obs.	6	48	61	934			

* Observations used as persistence forecasts were unavailable.

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	0.33	0.80	0.85	1.02	0.989	89.6	0.419
	PERSISTENCE	*	*	*	*	*	*	*
	No. Obs.	6	45	59	918			
6	LOCAL	1.00	0.73	1.00	1.01	1.030	89.5	0.384
	PERSISTENCE	*	*	*	*	*	*	*
	No. Obs.	3	45	52	925			
9	LOCAL	0.42	0.62	1.03	1.03	1.605	85.2	0.281
	PERSISTENCE	*	*	*	*	*	*	*
	No. Obs.	12	50	65	899			
15	LOCAL	0.62	0.83	0.93	1.03	2.445	79.9	0.246
	PERSISTENCE	*	*	*	*	*	*	*
	No. Obs.	26	47	92	860			

* Observations used as persistence forecasts were unavailable.