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Very Short Range Statistical Forecasting of Automated Weather Observations

Robert G. Miller, Ph. D.

February 1987

Third Interim Report

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16. Abstract

A procedure is developed for providing weather forecasting guidance over the short range period of 10, 20, 30, ..., 60 minutes. It uses the automated weather observing system (AWOS) elements as predictors and predictands. The model is founded on Markov assumptions and uses multivariate linear regression as the statistical operator. Details are given on how the Generalized Exponential Markov (GEM) model compares with persistence. Tests are performed on an independent data sample. Overall, GEM succeeds in bettering current short range weather forecasting techniques (i.e., persistence) over the six projection periods of 10, 20, 30, ..., 60 minutes.

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1. BACKGROUND

In 1983, the National Weather Service's (NWS's) Techniques Development Laboratory (TDL) was approached by the Federal Aviation Administration (FAA) to develop a very short range weather forecasting procedure for 1-60 minutes in advance. This contact resulted in an interagency agreement between the NWS and FAA that is now (December 1986) in its fourth year. The procedure being employed is the generalized exponential Markov (GEM) model which has been under development at TDL since 1980. The basic data to be used in the procedure is that contained in the automated weather observing system (AWOS). In particular, the AWOS site at Sterling, Virginia is providing minute-by- minute surface weather data through a semi-permanent microcomputer installation. Additional data archival sites at Atlantic City, New Jersey and Indianapolis, Indiana were added in 1986.

A time/activity chart is shown in Fig. 1.1 covering the 3 years of the interagency agreement. The major activities appear under the general headings of:

- o Computers
- o Data collection
- o Data processing
- o Statistical analyses
- o Verification
- o FAA presentations
- o Reports
- o Technical papers
- o Personnel

At the end of each year's effort, an interim report was published which documented the progress made to date (see Miller, 1984; 1986). These two reports describe the mathematical model in some detail; that material will not be covered here, nor will the portions of those reports relating to the GEM model as it was applied and verified on AWOS sensor output. These results were sufficiently encouraging to prompt additional research. This interim report will concentrate on those follow-on research efforts. In particular, it will cover the research conducted by applying GEM to the variables created, through the use of algorithms applied to the sensor measurements, to make AWOS observations emulate human observations.

A recent analysis of rotorcraft operations (Taylor and Adams, 1986) indicates that the "... typical flight mission consists of point A to point B flights that average 22 minutes in length, incorporating 5 interim stops for a total round robin flight averaging 1 hour 48 minutes." The granularity (geographical and time) of weather information for rotorcraft operations is very small in comparison with what is required for fixed wing operations. Thus, the rotorcraft pilot has little interest in mid-range (4-6 hours) weather forecasts. What is needed is short range (10-120 minutes) forecasts for short range distances. The unique characteristics of rotorcraft allow them to land at

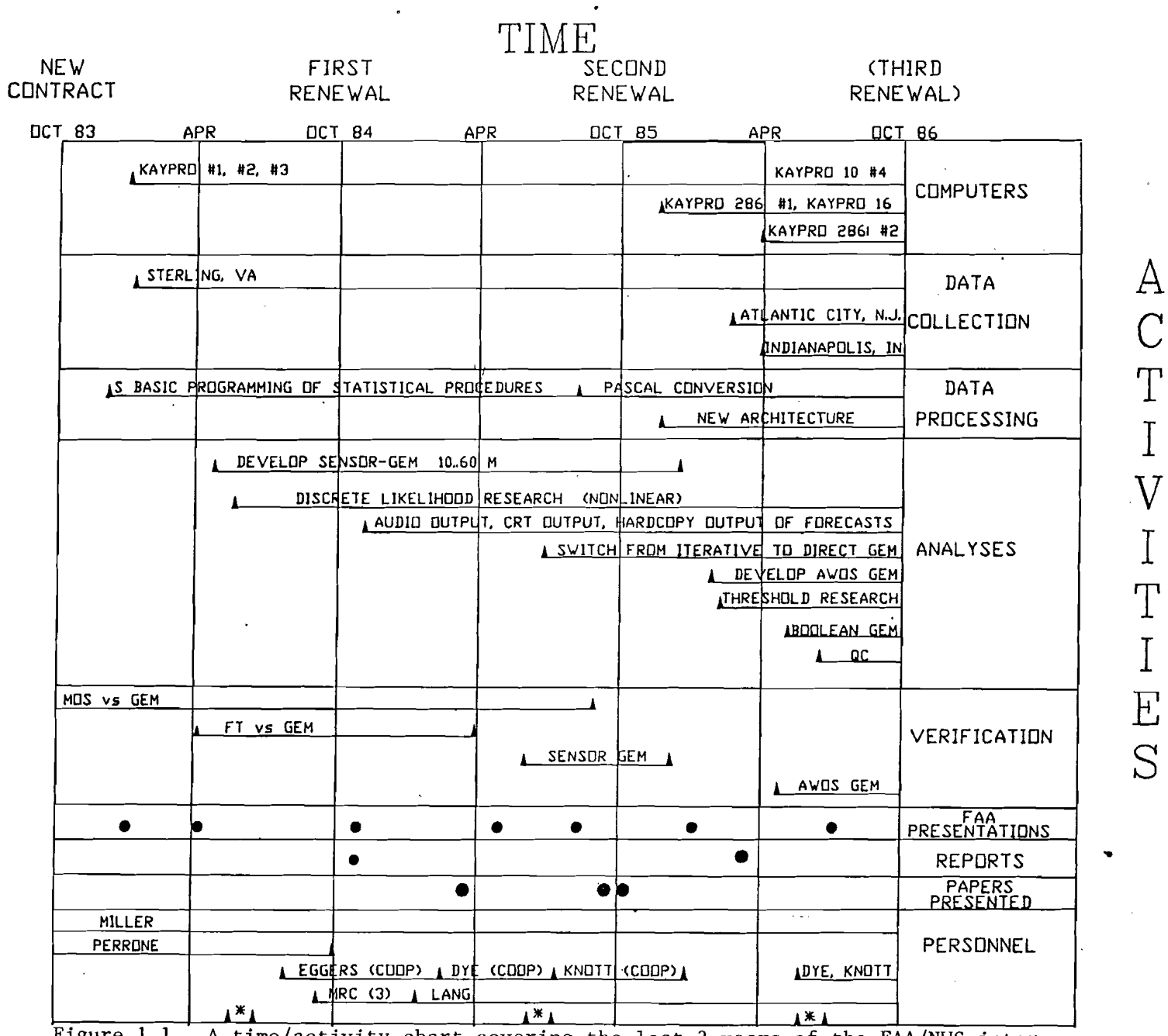

Figure 1.1. A time/activity chart covering the last 3 years of the FAA/NWS inter-agency agreement. Personnel abbreviations are:
MRC - Maryland Rehabilitation Center interns,
Coop - Cooperative university students, and
* - Research Science Institute (formerly Rickover Science Institute).

places where airplanes cannot. Many of these landing areas have low density traffic which does not justify a weather observer, much less a forecaster. The rotorcraft community is extremely interested in an automatic weather sensor and an associated system for short term weather forecasting. It is for this reason that the FAA is sponsoring the NWS effort described in this report.

There are not many alternative ways to make 1-120 minute weather forecasts:

1. Persistence represents one approach; that is, forecast that the current conditions will prevail into the short term future. Even though it does not constitute a forecast per se, it does represent a formidable scheme against which to show skill.

2. Human forecasts represent another alternative. All current weather information can be placed at the disposal of the forecaster. This information includes radar, satellite, numerical prognoses, statistical guidance, spatial and temporal weather conditions at the surface and aloft, and, of course, the local AWOS observation. Combined with the forecaster's experience and training, this would constitute the best source from which to obtain 1-120 minute forecasts. However, it may not be economically feasible to produce forecasts frequently and to distribute this information quickly to the user community.

3. GEM represents another alternative. It uses only the most recent locally available AWOS observation for its input and can easily be automated. The key to GEM is that it usually is developed on millions of past observations from which statistical relationships are derived. The fact that it has been found not to need the previous-to-the-current observation has been viewed as curious. The Markov principle of needing only what condition presently exists and not how it got there has been shown in the past to apply (see Miller, 1981).

One point to make in GEM's comparison with advection or trajectory models is that should the parcel of air that is expected to constitute the forecast be located, it is very unlikely to be located at the spot of an available observation because of the sparsity of observations. The consequence of this is that a network interpolation would likely be required of highly discontinuous elements such as clouds, visibility, and precipitation types. This necessary step would surely weaken the resulting forecast.

Armed with some degree of success in applying GEM to sensor variables, we were very optimistic at applying it to AWOS variables. However, there is one very important difference between the two. Sensor variables have no "memory" whereas the algorithm that determines the AWOS observation utilizes as many as 30 minutes of past sensor observations temporally weighted in a fixed manner. The observation derived in this manner is not at all in question. The source of a problem exists in attempting to make comparative verifications against a persistence observation that is related in a direct way to the verifying observation. This will surely make it most difficult for GEM to show skill over persistence if it is not able to capture this relationship in its equations. Should GEM's ability against persistence not be demonstrated, as it has been in the past, the inclusion of sensor variables as predictors would be necessary.

2. DEVELOPMENT OF AWOS-GEM

The mathematical/statistical method employed in AWOS-GEM is multivariate regression analysis. Details can be found in previous interim reports (see Miller, 1984; 1986) and in the original report on GEM (see Miller, 1981). An important change was instituted in sensor-GEM from the original GEM in that the iteration of time projections gave way to direct predictions to the desired projection time. Sensor-GEM still retains the inclusion of all available sensor variables in the observations as predictors. AWOS-GEM is carried out with a forward predictor selection procedure known as REEP (see Miller, 1964). The first 30 predictors selected by REEP are included in each equation. The list of all available predictors and predictands are as follows:

Predictors	Predictands
o Pressure (9)	o Pressure (9)
o Temperature (14)	o Temperature (14)
o Dew point depression (5)	o Dew point depression (5)
o Wind speed (5)	o Wind speed (5)
o Wind direction (8)	o Wind direction (8)
o First cloud height (7)	o First cloud height (7)
o Second cloud height (6)	o Second cloud height (6)
o Third cloud height (6)	o Third cloud height (6)
o First cloud amount (5)	o First cloud amount (5)
o Second cloud amount (4)	o Second cloud amount (4)
o Third cloud amount (4)	o Third cloud amount (4)
o Visibility (6)	o Visibility (6)
o Precipitation (2)	o Precipitation (2)
o Gustiness of Wind (5)	o Gustiness of wind (5)
o Ceiling (6)	o Ceiling (6)
o Total cloud amount (5)	o Total cloud amount (5)
o Month (12)	
o Hour of day (12)	

The figures in parentheses denote the number of categories used to describe that variable. Predictand projection times were for 10, 20, 30, 40, 50, and 60 minutes in advance.

Column 4 in Table 2.1 contains the percent reductions of variance obtained for each regression equation and for each category of every predictand specified at the 10-minute projection. In column 3, we show the percent reduction associated with what conditional persistence explains in the variable's original variance. Conditional persistence is a regression whose predictors consist of only members of the predictand's initial conditions producing the conditional probability of persistence as the forecast. The percentages are computed in relation to the total variance which comes from using straight climatological percentage as the element's forecast probability. Column 5 is the difference between the two percentages.

Table 2.1. Percent reductions of variance associated with the 30-predictor AWOS-GEM regression equations (REEP) for each predictand for the 10-minute projection are in column 4. Column 3 shows conditional persistence's percent reduction of variance, while column 5 gives their difference.

Predictand		Percent Reduction of Variance		
Element	Category	Conditional Persistence	REEP	Conditional (REEP-Persistence)
Pressure (Inches)	0 - 29.235	84.01	84.03	0.02
	29.236 - 29,530	95.45	95.46	0.01
	29.531 - 29.677	92.61	92.62	0.01
	29.678 - 29.825	93.87	93.87	0.00
	29.826 - 29.973	93.99	93.99	0.00
	29.974 - 30.120	78.80	78.82	0.02
	29.974 - 30.120	94.53	94.53	0.00
	30.121 - 30.268	94.46	94.46	0.00
	30.269 - 30.563	96.33	96.33	0.00
	30.564+	93.96	93.97	0.01
Temperature (Degrees F)	< 5	00.00	00.00	0.00
	5 - 14	67.59	67.62	0.03
	15 - 24	82.55	82.59	0.04
	25 - 34	85.24	85.26	0.02
	35 - 39	73.18	73.20	0.02
	40 - 44	72.06	72.08	0.02
	45 - 49	73.29	73.32	0.03
	50 - 54	71.68	71.69	0.01
	55 - 59	72.00	72.02	0.02
	60 - 64	72.55	72.59	0.04
	65 - 74	84.69	84.72	0.03
	75 - 84	84.54	84.58	0.04
	85 - 94	86.02	86.05	0.03
	95+	22.86	22.93	0.07
Dew point Depression (Degrees F)	0 - 1	53.23	57.98	4.75
	2 - 7	69.69	70.57	0.88
	8 - 15	69.19	69.46	0.27
	16 - 25	75.37	75.48	0.11
	26+	81.31	81.40	0.09
Wind speed (Knots)	0 - 1	18.91	21.46	2.55
	2 - 9	42.67	46.43	3.76
	10 - 19	50.42	54.39	3.97
	20 - 29	28.27	32.03	3.76
	30+	1.73	4.77	3.04
Wind direction (Degrees)	0 - 44	34.40	34.94	0.54
	45 - 89	31.16	31.33	0.17
	90 - 134	38.70	38.95	0.25
	135 - 179	40.65	40.98	0.33
	180 - 224	53.72	54.38	0.66
	225 - 269	24.97	25.63	0.66
	270 - 314	47.05	48.35	1.30
	315 - 359	45.55	45.96	0.41

Table 2.1. Continued.

Predictand		Percent Reduction of Variance		
Element	Category	Conditional Persistence	REEP	Conditional (REEP-Persistence)
Cloud height One (Feet)	0 - 100	48.39	49.50	1.11
	200 - 400	72.55	73.80	1.25
	500 - 900	66.73	68.02	1.29
	1000 - 2900	75.95	76.95	1.00
	3000 - 6000	75.03	76.05	1.02
	> 6000	83.75	84.77	1.02
	Obscure	59.88	63.55	3.67
Cloud height Two (Feet)	0 - 100	61.54	62.96	1.42
	200 - 400	50.56	51.87	1.31
	500 - 900	31.83	34.46	2.63
	1000 - 2900	13.53	18.55	5.02
	1000 - 2900	47.87	50.78	2.91
	3000 - 6000	60.66	63.99	3.33
	> 6000	62.03	65.18	3.15
Cloud height Three (Feet)	0 - 100	0.17	1.92	1.75
	200 - 400	1.75	3.69	1.94
	500 - 900	7.93	9.12	1.19
	1000 - 2900	13.10	16.27	3.17
	3000 - 6000	34.55	36.16	1.61
	> 6000	39.72	40.49	0.77
Cloud amount One	Clear below 6000'	84.40	84.76	0.36
	SCT	59.48	60.77	1.29
	BKN	31.39	32.29	0.90
	OVC	75.96	76.72	0.76
	Partly obscured	0.07	0.93	0.86
Cloud amount Two	Clear below 6000'	61.86	64.91	3.05
	SCT	37.77	40.81	3.04
	BKN	31.50	34.18	2.68
	OVC	36.47	39.15	2.68
Cloud amount Three	Clear below 6000'	48.14	49.51	1.37
	SCT	14.13	19.09	4.96
	BKN	24.06	28.60	4.54
	OVC	34.88	37.19	2.31
Visibility (Miles)	0 - < 1/2	54.76	55.31	0.55
	1/2 - < 1	38.39	40.01	1.62
	1 - < 3	59.80	60.11	0.31
	3 - < 5	56.68	57.03	0.35
	5 - < 7	48.07	48.32	0.25
	7+	85.17	85.40	0.23

Table 2.1. Continued.

Predictand		Percent Reduction of Variance		
Element	Category	Conditional Persistence	REEP	Conditional (REEP-Persistence)
Precipitation Occurrence	No	61.84	62.44	0.60
	Yes	61.84	62.44	0.60
Gusts (Knots)	0 - 10	48.27	50.19	1.92
	11 - 20	23.30	25.27	1.97
	21 - 30	43.21	44.15	0.94
	31 - 40	29.23	35.67	6.44
	41+	4.15	6.77	2.62
Ceiling (Feet)	0 - 100	61.45	62.91	1.46
	200 - 400	81.00	81.56	0.56
	500 - 900	66.34	67.56	1.22
	1000 - 2900	77.83	79.23	1.40
	3000 - 6000	73.53	76.30	2.77
	> 6000	86.38	88.25	1.87
Total cloud Amount	Clear below 6000'	84.44	84.77	0.33
	SCT	53.14	53.67	0.53
	BKN	36.13	36.95	0.82
	OVC	86.61	86.89	0.28
	Obscure	0.09	0.88	0.79

There are some interesting things to observe about the percent reduction figures just presented.

- Pressure and temperature show very little predictability over what persistence terms contribute.

- The lowest dew point depression condition does receive benefit from other than its own persistence while higher depressions do not.

- All wind speed categories show very good predictability when predictors are added to persistence.

- Wind direction is among the variables that REEP finds most difficult to improve upon over persistence.

- Cloud condition predictands (excluding ceiling and total cloud amount) are greatly benefitted by additional predictors.

- Visibility shows only a mild amount of predictability being added by terms beyond persistence.

- Precipitation shows very little predictability to be added over persistence.

- Gusts are aided about like wind speed, as might be expected.

- Ceiling is mildly aided by adding linear terms to persistence variables.

- Total cloud amount is among those mildly helped by adding predictors to persistence.

2.1 Data Structure

A typical minute-by-minute Sterling, Virginia observation, including sensor variables and algorithm-derived AWOS variables, consists of 200 bytes or 200 x 8 = 1600 bits of data. One year of such data amounts to almost 1 billion bits--in terms of floppy disks, over 2000. Each of the FAA's research micro-computers holds about 1/4 billion bits at one time. Statistical processing of these data is best served if all of the data reside in the computer at one time. The architecture we created to do this is defined by the following steps:

1. Decode and edit the sensor and AWOS variables once and for all.

2. Transform each variable into a binary (0-1) number according to which category the observation falls into.

3. Pack the bits into integer numbers.

4. Store the integers in files in two forms, i.e., a file with the observations in rows and variables in columns and a file of its transpose.

5. Process the data in the files using logical operations ('ANDS', 'ORS', and 'NOTS') by way of Turbo Pascal's speedy integer operators.

6. Repeat the above structure for each full year of data.

The result of these steps yields four files each of 11.7 million bytes called:

File Name	Period Covered
NOAASARC.DAT	APRIL 1984 to APRIL 1985
TRNSNOAA.DAT	APRIL 1984 to APRIL 1985
NOAASARC.IND	APRIL 1985 to APRIL 1986
TRNSNOAA.IND	APRIL 1985 to APRIL 1986

The consequences of designing and implementing such a data structure are:

1. All suspicious observations are identified and henceforth omitted from any statistical analysis.

2. No further handling of raw data floppy disks.

3. No further data editing is required.

4. To obtain a statistical crossproduct of about 400,000 observations requires under 10 seconds on a table-top microcomputer.

5. Dependent and independent data testing can be performed more easily.

3. IMPROVED TECHNIQUE DEVELOPMENT

3.1. Nonlinear Experimentation

Research efforts were conducted on the discrete likelihood function (DLF) procedure to investigate the presence of nonlinear predictive information among the AWOS variables (for a description of DLF see Miller, 1979). Nonlinearity was found to exist in the interactions among the variables. However, the procedure showed an inordinate amount of instability. For example, it showed an ability to predict lowering ceiling conditions correctly but with side effects that were unacceptable. These were manifest in occasionally predicting totally unreasonable conditions. This is attributed to the inadequate size of the dependent sample. DLF should return as a viable approach for capturing nonlinear predictability when the numerous equations that are required are based on two years of data.

Since DLF accounts for all paired interactions between variables included in the set of predictors, it was reasoned that a subset of interactions from among the most important 30 linear predictors might approximate the DLF capabilities with fewer side effects. A method published 15 years ago under the acronym SLAM, for screening lattice algorithm (see Miller, 1969), was employed in this effort. Specifically, all logical 'ANDS' between the first 20 predictors selected in REEP were created as additional possible predictors. The best 15 of these, whose joint event occurred at least 500 times, were added to the 20 linear predictors from REEP. Equations for each predictand were determined in this manner. Each equation consisted of 35 predictors--20 linear and 15 non-linear booleans.

The results on the dependent data were encouraging. Reductions of variance over REEP at the 10-minute projection had percentage improvements as high as 5.99% on a variable as tough as visibility. To give perspective to these improvements in variance reduction, Model Output Statistics (MOS) will use between .1% and 1% on the dependent sample (one with less serial correlation to be sure) as an indication that the predictor is significant and will include such a predictor in an operational MOS equation. The full set of percent reductions of variance for each predictand category can be seen in Table 3.1.

Since the Sterling, Virginia AWOS sample used in the experiment was close to 1/2 million cases, it was a big surprise and a terrible disappointment when the improvement over REEP failed to hold up on independent data. We had to conclude that the minute-by-minute sample of data had too much serial correlation. Obviously a one year sample of 1-minute observations is inadequate for this type of nonlinear investigation. For that matter, the linear equations also showed a sizeable 'shrinkage,' as Professor Lorenz of M.I.T. calls it, on independent data. The phenomenon of having the independent data applications show less predictability than the dependent data did. This comes about because the equation coefficients are fitted to do their best on the dependent data. As a result, a natural shrinkage in the verifying statistics occurs. Experiments performed on selecting boolean predictors for 60-minute forecasts produced percent reduction improvements in double figures. However, they too suffered from the same shrinkage as 10-minute projections did.

To avoid this kind of shrinkage, a larger sample of data must be utilized in the derivation of the prediction equations whether they contain linear or nonlinear predictors. Fortunately, there is now a two year sample in our data files with a new independent sample that is growing every day.

Just to complete this discussion of our efforts to secure a better set of results using boolean predictors, we did one other reasonable thing. In the selection of linear variables with REEP and with the selection of boolean variables with SLAM, we applied tests of statistical significance in place of forcing 20 linear predictors and 15 boolean predictors. The results were in all respects the same. That is, the dependent sample results were impressive but the independent results were not any better than the linear taken alone.

Table 3.1. Percent reductions of variance obtained from the 30 linear predictor equations at the 10-minute projection are in column 3 and those obtained from the 20 linear plus 15 boolean predictor equations are in column 4. These are given for each predictand category. Also shown are the differences in percent reduction between the two equations.

Predictand Element	Category	Percent Reduction of Variance REEP	SLAM	(SLAM-REEP)
Pressure (Inches)	0 - 29.235	84.03	84.59	0.56
	29.236 - 29.530	95.46	95.51	0.05
	29.531 - 29.677	92.62	92.68	0.06
	29.678 - 29.825	93.87	93.88	0.01
	29.826 - 29.973	93.99	93.99	0.00
	29.974 - 30.120	94.53	94.53	0.00
	30.121 - 30.268	94.46	94.46	0.00
	30.269 - 30.563	96.33	96.33	0.00
	30.564+	93.97	93.97	0.00
Temperature (Degrees F)	> 5	00.00	00.00	0.00
	5 - 14	67.62	75.11	7.49
	15 - 24	82.59	82.82	0.23
	25 - 34	85.26	85.28	0.02
	35 - 39	73.20	73.30	0.10
	40 - 44	72.08	72.17	0.09
	50 - 54	71.69	71.79	0.10
	55 - 59	72.02	72.14	0.12
	60 - 64	72.59	72.59	0.00
	65 - 74	84.72	84.72	0.00
	75 - 84	84.58	84.65	0.07
	85 - 94	86.05	86.28	0.23
	95+	22.93	23.38	0.45
Dew point Depression (Degrees F)	0 - 1	57.98	57.98	0.00
	2 - 7	70.57	70.85	0.28
	8 - 15	69.46	69.42	-0.04
	16 - 25	75.48	75.53	0.05
	26+	81.40	81.49	0.09
Wind speed (Knots)	0 - 1	21.46	26.82	5.36
	2 - 9	46.43	48.40	1.97
	10 - 19	54.39	55.30	0.91
	20 - 29	32.03	33.29	1.26
	30+	4.77	6.34	1.57
Wind direction (Degrees)	0 - 44	34.94	36.51	1.57
	45 - 89	31.33	32.78	1.45
	90 - 134	38.95	39.69	0.74
	135 - 179	40.98	41.22	0.24
	180 - 224	54.38	54.57	0.19
	225 - 269	25.63	25.83	0.20
	270 - 314	48.35	48.83	0.48
	315 - 359	45.96	46.34	0.38

Table 3.1. Continued.

Predictand Element	Category	Percent Reduction of Variance REEP	SLAM	(SLAM-REEP)
Cloud height One (Feet)	0 - 100	49.50	51.31	1.81
	200 - 400	73.80	74.39	0.59
	500 - 900	68.02	68.49	0.47
	1000 - 2900	76.95	76.97	0.02
	3000 - 6000	76.05	75.96	-0.09
	> 6000	84.77	84.76	-0.01
	Obscure	63.55	63.82	0.27
Cloud height Two (Feet)	0 - 100	62.96	63.77	0.81
	200 - 400	51.87	54.79	2.92
	500 - 900	34.46	34.93	0.47
	1000 - 2900	50.78	50.86	0.08
	3000 - 6000	63.99	64.08	0.09
	> 6000	65.18	65.26	0.08
Cloud height Three (Feet)	0 - 100	1.92	4.49	2.57
	200 - 400	3.69	4.57	0.88
	500 - 900	9.12	10.57	1.45
	1000 - 2900	16.27	17.93	1.66
	3000 - 6000	36.16	36.82	0.66
	> 6000	40.49	40.90	0.41
Cloud amount One	Clear below 6000'	84.76	84.85	0.09
	SCT	60.77	60.93	0.16
	BKN	32.29	32.66	0.37
	OVC	76.72	76.81	0.09
	Partly obscured	.93	1.00	0.07
Cloud amount Two	Clear below 6000'	64.91	65.05	0.14
	SCT	40.81	40.90	0.09
	BKN	34.18	34.57	0.39
	OVC	39.15	39.79	0.64
Cloud amount Three	Clear below 6000'	49.51	49.86	0.35
	SCT	19.09	19.51	0.42
	BKN	28.60	29.24	0.64
	OVC	37.19	37.90	0.71
Visibility (Miles)	0 - < 1/2	55.31	57.12	1.81
	1/2 - < 1	40.01	46.00	5.99
	1 - < 3	60.11	61.28	1.17
	3 - < 5	57.03	57.34	0.31
	5 - < 7	48.32	48.60	0.28
	7+	85.40	85.42	0.02

Table 3.1. Continued.

Predictand Element	Category	Percent Reduction of Variance REEP	SLAM	(SLAM-REEP)
Precipitation occurrence	NO	62.44	62.90	0.46
	YES	62.44	62.90	0.46
Gusts (Knots)	0 - 10	50.19	50.64	0.45
	11 - 20	25.17	27.12	1.95
	21 - 30	44.15	45.87	1.72
	31 - 40	35.67	40.42	4.75
	41+	6.77	8.73	1.96
Ceiling (Feet)	0 - 100	62.91	63.52	0.61
	200 - 400	81.56	82.63	1.07
	500 - 900	67.56	69.11	1.55
	1000 - 2900	79.23	80.40	1.17
	3000 - 6000	76.30	77.37	1.07
	> 6000	88.25	88.28	0.03
Total cloud amount	Clear below 6000'	84.77	84.84	0.07
	SCT	53.67	53.86	0.19
	BKN	36.95	37.30	0.35
	OVC	86.89	86.96	0.07
	Obscure	0.09	0.88	0.79

3.2. Thresholding Experimentation

GEM's equations predict the probability of each predictand category each time a forecast is made. These probabilities are of value when a loss function is available to determine the action of least expected loss. However, operational loss functions are difficult to determine. In lieu of their availability, it is still advisable to attempt a conversion from probability forecasts to categorical forecasts. Choosing the category having the highest probability will yield the greatest number of correct forecasts. However, as projection times lengthen the event with the highest climatological frequency eventually becomes the forecast category. This may not be a desirable happening. It has been found that an acceptable criterion for making categorical forecasts is to predict categories about as frequently as they occur in nature. Experience has shown that this requires a set of threshold probabilities. That is, when a category's probability exceeds its threshold, that category becomes the forecast category, provided the choice is made with some firm ordering placed on the category to be tested, e.g., first, second, ..., last.

Deriving thresholds has most often been done empirically where a run through the data is made to see the probability values that yield the desired consequences. The difficulty here is that the values chosen are greatly influenced by the developmental sample from which they are determined. Should the sample not be representative, operational forecasting based upon their values will not produce the desired outcome.

In the original development of GEM, a parametric procedure based on the beta distribution was proposed. It succeeded in producing acceptably balanced results where the forecast frequencies were like the observed frequencies. However, there have been occasions where the actual distributions differ greatly from beta distributions. As a result, one of the tasks undertaken in this year's effort was to seek out alternative thresholding methods. The following are some of those that were investigated.

- o Beta (accumulated, unaccumulated)
- o Empirical (accumulated, unaccumulated, maximum probability ordering)
- o Persistence-based loss function
- o Calibration to adjust beta thresholds based on the dependent sample

The conclusions drawn from these experiments are that empirically determined thresholds from cumulative probabilities (with maximum probability ordering) were extremely good on the developmental sample. For example, for predictions of 60 minutes with thresholds determined by empirical methods, the ratio of skill scores (percent correct, Heidke,, and threat) was 24 to 5 favoring GEM over persistence with 3 ties. This was accomplished by merely imposing a condition of balancing the forecast frequencies with the observed frequencies through empirical thresholding. The balancing was so well accomplished that the chi square for goodness of fit was lower (better) for GEM than for persistence. The disappointment came when these same threshold values failed to maintain this superiority over persistence on the independent data for just about all variables. The only thresholding method testing consistently better

than the rest was the cumulative beta. Unfortunately, the beta method still leaves much to be desired. We intend to rederive the empirical thresholds on two years of developmental data to make them more stable and reliable. We feel this disappointment is temporary, and the application of 2 years of developmental data will show that empirical thresholding is the way to go.

4. COMPARATIVE VERIFICATION BETWEEN AWOS-GEM AND PERSISTENCE

Independent data forecasts were made on the second year of Sterling, Virginia's AWOS observations covering the period from April 25, 1985 to April 25, 1986. To keep the amount of computing time needed to make forecasts within reason and because the minute-by-minute observations would be so dependent with one another as to render them as almost redundant, the sample actually processed in the comparison between GEM and persistence was created by taking only one observation in every 15 (the high order bit in each integer of the NOAASARC.IND file). Depending upon the projection interval, the samples ranged from 25493 for 10 minutes to 25089 for 60 minutes. The sample sizes are not the same because there needs to be a pair of good observations satisfying the interval being tested, one for making the forecast and one for verifying it.

The initial test was to compare GEM's forecast probabilities with persistence's conditional probabilities as applied to observations in this independent sample. The test parameter is the Brier score. This score measures how well a procedure's forecast probabilities agrees with the occurrence or non-occurrence of the event being predicted. That is, high probabilities are desired when the event occurs and low probabilities when it does not occur. The equation for the Brier score is as follows:

$$\sum_{i=1}^{N} \sum_{j=1}^{G} (\hat{P}_{ij} - O_{ij})^2 / N$$

where $\hat{P}_{ij}$ is the predicted probability for observation i and weather element category j. O signifies whether event j occurred (1) or did not occur (0). The independent sample size is N.

Low Brier scores signify better forecast probabilities, and in the field of statistics is referred to as the residual variance. Table 4.1 displays the Brier scores for both GEM and persistence on all weather elements in this study and for all projections 10 ... 60 minutes in advance.

The results indicate conclusively that GEM's probability forecasts are better than conditional persistence. The elements that do not favor GEM are pressure, temperature, dew point depression, and wind direction at 10 minute projections. Fortunately, these are among the least important elements for aviation.

Tangible evidence of this superiority is provided in Table 4.2. In this table are the results of choosing the weather element category for which GEM'S probability was highest.

Table 4.1. Brier scores obtained from the independent sample forecasts made by GEM and by conditional persistence for all weather elements and for each 10 minute projection.

	Brier scores Projection											
	Gem						Persistence					
	10	20	30	40	50	60	10	20	30	40	50	60
Pressure	.04054	.06795	.08856	.10939	.13046	.14886	.04051*	.06785*	.08836*	.10911*	.13008*	.14837*
Temperature	.19871	.29347	.36500	.41604	.45783	.48801	.19852*	.29293*	.36427*	.41482*	.45611*	.48609*
Dew point depression	.21110	.29347	.33962	.37977	.41390	.44025	.20762*	.27649*	.33294*	.37387*	.40833*	.43550*
Wind speed	.18543*	.19684*	.20922*	.21329*	.21583*	.22257*	.19722	.20971	.22202	.22749	.22725	.23392
Wind direction	.50158	.57551*	.61881*	.64606*	.66248*	.67622*	.50142*	.57556	.61980	.64674	.66302	.67798
Cloud height one	.09052*	.13822*	.17017*	.19106*	.20933*	.22294*	.09560	.14823	.18001	.20139	.21929	.23133
Cloud height two	.07189*	.09914*	.11409*	.12074*	.12683*	.13180*	.07719	.10747	.12296	.13012	.13633	.13990
Cloud height three	.02989*	.03507*	.03779*	.04080*	.03957*	.03967*	.03199	.03735	.03999	.04305	.04175	.04169
Cloud cover one	.12258*	.17591*	.20317*	.22061*	.23336*	.24316*	.12712	.18264	.20959	.22692	.23928	.24851
Cloud cover two	.08459*	.11021*	.12435*	.12956*	.13334*	.13730*	.08958	.11738	.13163	.13667	.14039	.14328
Cloud cover three	.03511*	.04286*	.04606*	.04965*	.04909*	.04844*	.03699	.04514	.04808	.05180	.05137	.05017
Visibility	.10683*	.13403*	.14837*	.15942*	.16996*	.17727*	.10728	.13471	.14888	.15962	.17035	.17745
Gusts	.11039*	.11347*	.11853*	.12363*	.12472*	.12736*	.11850	.11967	.12633	.13011	.13137	.13307
Ceiling	.05152*	.08287*	.10575*	.12106*	.13372*	.14305*	.05624	.09226	.11721	.13327	.14633	.15534
Total cloud amount	.11214*	.16213*	.19187*	.21072*	.22359*	.23454*	.11420	.16412	.19344	.21223	.22484	.23554
Totals							Totals					
*'s for GEM	11	12	12	12	12	12	71					
*'s for persistence	4	3	3	3	3	3	19					

* signifies superiority

Table 4.2. The percentage of correct forecasts obtained by choosing the category for which GEM predicted the highest probability. Shown also are the percentage of correct forecasts achieved by persistence.

	Percentage correct Projection											
	Gem						Persistence					
	10	20	30	40	50	60	10	20	30	40	50	60
Presssure	97.94	96.51	95.42	94.29	93.13	92.10	97.94	96.51	95.42	94.29	93.13	92.10
Temperature	88.99	82.88	77.72	73.68	70.18	67.46	89.10*	82.98*	77.81*	73.76*	70.23*	67.51*
Dew point depression	88.33	83.58*	78.86	75.95*	73.55*	71.48*	88.33	83.57	79.21*	75.80	72.97	70.86
Wind speed	88.06*	87.65*	86.88*	86.62*	86.30*	85.83*	86.84	85.48	84.37	83.68	83.64	83.00
Wind direction	67.49	60.62	55.75	52.59	50.77	48.83	67.49	60.72*	56.02*	52.96*	51.07*	48.92*
Cloud height one	94.84	91.62	89.61*	87.88*	86.63	85.72	94.84	91.62	89.58	88.12*	86.73*	85.86*
Cloud height two	95.50	93.52*	92.43*	91.86*	91.65*	91.33*	95.50	93.23	91.84	91.11	90.51	90.10
Cloud height three	98.06*	97.75*	97.79*	97.67*	97.76*	97.80*	97.91	97.25	96.86	96.62	96.60	96.50
Cloud cover one	92.34*	88.26*	86.32*	84.93*	83.94*	83.17*	92.32	87.93	85.64	84.21	83.13	82.26
Cloud cover two	94.27	92.21*	91.50*	91.27*	91.21*	91.15*	94.28*	91.69	90.16	89.48	89.09	88.82
Cloud cover three	97.63*	97.17*	97.28*	97.14*	97.22*	97.30*	97.59	96.66	96.24	95.89	95.81	95.83
Visibility	93.35	91.15	89.91	88.88	87.91	87.16	93.35	91.15	89.91	88.88	87.91	87.27*
Gusts	92.27*	92.17*	91.98*	91.64*	91.67*	91.60*	92.04	91.88	91.20	90.87	90.65	90.52
Ceiling	96.98	94.79	93.14*	91.98	91.04	90.28*	96.98	94.79	93.13	91.99*	91.04	90.24
Total cloud amount	93.15*	89.24*	86.70*	85.01	84.01*	83.46*	93.14	89.09	86.63	85.16*	83.98	83.16
Totals							Totals					
*'s for Gem	6	9	10	8	9	10	52					
*'s for persistence	2	2	3	5	3	4	19					

* signifies superiority

These results confirm that GEM's predicted probabilities possess skill relative to persistence. However, as was mentioned previously, applying the principle of maximum probability has a tendency to predict conditions that have the highest climatological frequencies as projection times lengthen. This is not as crucial for these very short range predictions since there is considerable balance between predicted and observed frequencies. Nevertheless, we have employed a thresholding procedure to GEM for the purpose of making categorical forecasts possessing as much balance as possible at this time.

The appendix to this report gives a complete set of tables depicting GEM's threshold-controlled predicted category against the verifying observation. Similar tables are provided depicting persistence's predicted category against the verifying observation. In addition to these so called contingency tables, verification scores for percent correct, Heidke skill score, and threat score (when appropriate), as well as biases and chi-squares for goodness of fit are given. Table 4.3 is a summary of the comparisons between GEM and persistence.

Table 4.3. A summarization of the comparative skill between GEM, "G", and persistence, "P", (ties are denoted by "T") for appropriate scores at projections of 10, 20, 30, 40, 50, and 60 minutes with a tally for each. Percent correct (PC), Heidke skill score (H), and threat score ('T') are shown for the predictands listed in Table 2 except precipitation occurrence. The actual data from which this table was constructed are given in the appendix.

		Projection Interval						
		10	20	30	40	50	60	
Pressure	PC	T	T	T	T	T	T	
	H	T	T	T	T	T	T	
Temperature	PC	T	T	T	T	T	T	
	H	T	T	T	T	T	T	
Dew Point	PC	T	P	P	P	P	P	
Depression	H	T	P	P	P	P	P	
Wind Speed	PC	G	G	G	G	G	G	
	H	G	G	G	G	G	G	
Wind Direction	PC	T	P	P	P	P	P	
	H	T	P	P	P	P	P	
First Cloud	PC	T	P	P	P	P	P	
Height	H	T	P	P	P	P	P	
Second Cloud	PC	T	T	P	P	P	P	
Height	H	T	T	P	G	G	G	
Third Cloud	PC	P	P	P	P	P	P	
Height	H	P	G	G	G	G	G	
First Cloud	PC	G	G	G	G	G	G	
Cover	H	G	G	G	G	G	G	
Second Cloud	PC	G	G	G	G	G	G	
Cover	H	G	P	P	P	G	G	
Third Cloud	PC	T	G	G	G	P	P	
Cover	H	T	G	P	G	G	G	
Visibility	PC	T	T	P	T	P	P	
	H	T	T	P	T	P	P	
	'T'	T	T	P	T	P	P	
Gustiness of	PC	G	G	G	G	G	G	
Wind	H	P	P	P	P	P	P	
Ceiling	PC	T	T	P	P	P	G	
	H	T	T	T	G	G	P	
	'T'	T	T	G	G	G	G	
Total Cloud	PC	G	G	G	G	G	G	
Amount	H	G	G	G	G	G	G	
								Totals
Totals	G	9	11	11	14	14	14	73
	P	3	9	16	11	14	14	67
	'T'	20	12	5	7	4	4	52

Observations about the results as they pertain to aviation elements are:

4.1. CEILING

When predicting ceiling conditions for the 60-minute projection, there were 20 forecast situations in the dependent sample in which GEM broke from persistence and predicted that the ceiling would be in the interval 0-100' when persistence was in the > 6000' category. Twice the verifying condition was 0-100' and eight times the verifying condition was 200-400' while the remaining ten cases had the verifying condition as > 6000'. This same capability was demonstrated in the independent sample as well. Here, there were 13 forecast situations were GEM broke from persistence hitting 7 and missing 3 by one category with the remaining 3 having the verifying observation in the > 6000' category. This information is revealed in the following independent sample contingency tables:

VERIFYING OBSERVATION

		0-100'	200-400'	500-900'	1000-2900'	3000-6000	> 6000'	TOTAL
P	0-100'	34	35	4	3	0	33	109
E	200-400'	39	536	91	20	2	64	752
R	500-900'	8	79	233	108	9	60	497
S	1000-2900'	0	19	90	1052	75	412	1648
I	3000-6000'	0	7	5	100	550	293	955
S	> 6000'	31	73	82	363	319	20260	21128
T								
	TOTAL	112	749	505	1646	955	21122	25089

VERIFYING OBSERVATION

		0-100'	200-400'	500-900'	1000-2900'	3000-6000'	> 6000'	TOTAL
	0-100'	41	38	4	3	0	36	122
G	200-400'	39	536	91	21	2	64	753
	500-900'	8	79	233	107	9	60	496
E	1000-2900'	0	19	90	1051	75	414	1649
	3000-6000'	0	7	6	97	532	274	916
M	> 6000'	24	70	81	367	337	20274	21159
	TOTAL	112	749	505	1646	955	21122	25089

We consider this extremely important. It demonstrates a capability that was heretofore thought to be impossible for a purely linear scheme to accomplish. That is, to anticipate worsening conditions in 1 hour and to succeed in correctly predicting this event with a percentage correct of 54% on independent data. The

actual ability of GEM to predict changes over persistence like these became apparent starting with the 30-minute projections. For a detailed description of these 13 forecast situations and the attendant AWOS observations, synoptic conditions, probability foreçasts, categorical predictions when applying thresholding and other matters, see Section 5, Demonstration Plans, of this report.

4.2. VISIBILITY

At 30, 50, and 60 minutes, GEM achieved one more correct forecast in the < 1/2 mile category than persistence. Despite this, all of the skill scores slightly favored persistence.

4.3. TOTAL CLOUD AMOUNT

GEM successfully changed from persistence and in so doing netted more hits and better Heidke skill scores at projections 10 minutes and beyond.

4.4. WIND

Wind speed verifications showed GEM changing from persistence beginning at 10 minutes and succeeding in bettering persistence in all scores throughout all projections tested.

Wind direction verifications were slightly but uniformly worse than persistence beginning with 20-minute forecasts.

4.5. GUSTINESS OF WIND

As with wind speed, GEM bettered persistence in percent correct for all projections under study. However, GEM failed to obtain a better Heidke score than persistence for any of those projections.

4.6. PRECIPITATION

For essentially all of the independent year of data collection, the sensor for measuring whether precipitation is occurring was not functioning. As a result, there are no verification statistics presented, even though GEM prediction equations had been developed. Furthermore, many of the equations selected precipitation as an important predictor (among its top 30). There was no effort made at this time to rerun all of the equations to specifically remedy this inconsistency. Were these to become operational equations or if it were believed that erroneous conclusions might have been drawn regarding the results, this would certainly have been done.

4.7. CLOUD CONDITIONS (OTHER THAN CEILING AND TOTAL CLOUD AMOUNT)

The cloud height and cloud amount variables for the three levels (first, second, and third) showed mixed results favoring GEM by 36 to 28 on the scores computed on the independent sample.

Overall, AWOS-GEM verification results are not as good as those achieved on sensor-GEM relative to persistence. That is, comparing the relative number of better scores, sensor GEM had 84 better and 42 worse (see Miller, 1986) while AWOS-GEM has 73 better and 67 worse. There are, however, sufficient differences in the variables in the two schemes to possibly account for this result. In either case, the results remain encouraging, suggesting that we pursue the step of using more developmental data such as the 2 years that are on hand, with independent verification to be performed on the third year of Sterling, Virginia and from the other two locations, Atlantic City and Indianapolis.

5. DEMONSTRATION PLANS

Prior to discussing a demonstration plan, it is appropriate to first describe the process that is used in making an AWOS-GEM forecast. In particular, we will present some of the details performed behind the scenes in creating the verification sample that was used to compare against persistence. Specifically, the 13 instances that showed GEM deviating from persistence in going from a ceiling condition initially at > 6000' to forecasts of 0-100' and successfully verifying in 7 will be covered.

In what follows, we give details of the initial AWOS observation: case number, date, hour, sky condition (ceiling, lowest cloud, second cloud, third cloud), visibility, pressure, dry bulb temperature, dew point temperature, wind direction and speed, and altimeter setting. For example, in Case 1, the sky condition was partially obscured (-X) with 100' scattered clouds (1 SCT), with zero visibility (0), with pressure at 1013.2 (132), with temperature at 66°F (66), with dew point temperature at 65° (65), with wind direction 070° (07), with wind speed at 3 knots (03), and with the altimeter setting of 29.93 inches of mercury (993). The last column displays the number of the observed ceiling category.

INITIAL OBSERVATION

Case #	Month	Day	Year	Hour	AWOS Observation	Ceiling Category
1	JUNE	5	1985	1403	-X 1 SCT 0 132/66/65/0703/993	6
2	JUNE	5	1985	1418	-X 1 SCT 0 131/66/66/1104/992	6
3	JUNE	5	1985	1433	-X 1 SCT 0 132/67/66/0803/993	6
4	JUNE	5	1985	1448	-X 1 SCT 0 133/67/67/1503/993	6
5	JUNE	5	1985	1503	-X 1 SCT 1/4 133/67/67/0000/993	6
6	JUNE	24	1985	1148	-X 1 SCT 1/4 168/68/68/0000/004	6
7	DEC	6	1985	1318	-X 1 SCT 1/4 154/32/29/3304/997	6
8	DEC	6	1985	1333	-X 1 SCT 1/4 153/32/29/3604/997	6
9	DEC	6	1985	1348	-X 1 SCT 1/4 155/32/30/3403/997	6
10	APR	7	1985	1148	-X 1 SCT 0 117/51/50/2903/988	6
11	APR	7	1985	1218	-X 1 SCT 0 116/51/51/2503/987	6
12	APR	7	1985	1233	-X 1 SCT 0 116/51/51/0000/987	6
13	APR	7	1985	1248	-X 1 SCT 1/4 116/52/51/2704/987	6

(Please note that the entire independent data sample of 25089 was composed of taking one observation every 15 minutes causing the somewhat systematic looking pattern of hours shown above.)

Next is shown the GEM probability forecasts emanating from each of the 13 initial AWOS conditions.

AWOS-GEM PROBABILITY FORECASTS FOR THE ABOVE CASES (CEILING ONLY)

	CATEGORIES OF CEILING					
CASE #	1 0-100'	2 200-400'	3 500-900'	4 1000-2900'	5 3000-6000'	6 > 6000'
1	.234	.152	.039	.035	.004	.535
2	.232	.145	.055	.063	.010	.494
3	.234	.152	.039	.035	.004	.535
4	.234	.152	.039	.035	.004	.535
5	.232	.145	.055	.063	.010	.494
6	.234	.152	.039	.035	.004	.535
7	.234	.152	.039	.035	.004	.535
8	.234	.152	.039	.035	.004	.535
9	.234	.152	.039	.035	.004	.535
10	.234	.152	.039	.035	.004	.535
11	.234	.152	.039	.035	.004	.535
12	.234	.152	.039	.035	.004	.535
13	.234	.152	.039	.035	.004	.535

AWOS-GEM 60 MINUTE CEILING CUMULATIVE BETA THRESHOLD PROBABILITIES

	Ceiling Category					
	1	2	3	4	5	6
	0-100'	200-400'	500-900'	1000-2900'	3000-6000'	> 6000'
THRESHOLDS	.206	.388	.422	.440	.444	---

The procedure for making a categorical ceiling forecast for 60 minutes is to test whether the first category's probability exceeds its threshold probability. In case #1 the forecast probability is .234 while the threshold probability for the first category is .206. Since the condition for forecasting category 1 is satisfied, the forecast is that in 60 minutes the ceiling will be inside the interval 0-100'. Had the condition not been satisfied, we would accumulate the first two categories' probabilities (.234+.152=.386) and compared it with the cumulative probability of .388. Since this would not have been exceeded, GEM would not have forecast the category 2 (200-400'). The procedure is continued until a category is chosen. The default selection is category 6 should no category be selected among the first 5.

By following this procedure, each of the 13 cases above produced a category 1 forecast for GEM. The corresponding verification observation is shown in the last column of the following verification-observation display:

VERIFYING OBSERVATION

Case #	Month	Day	Year	Hour	AWOS Observation		Ceiling Category
1	JUNE	5	1985	1503	-X 1 SCT 1/4	133/67/67/0000/993	6
2	JUNE	5	1985	1518	-X M1 BKN 1/4	134/67/67/3003/993	1
3	JUNE	5	1985	1533	-X M1 BKN 1/4	132/67/67/0403/993	1
4	JUNE	5	1985	1548	-X M1 BKN 3/4	127/68/68/1606/991	1
5	JUNE	5	1985	1603	-X M1 BKN 1 1/4	128/69/69/2005/991	1
6	JUNE	24	1985	1203	-X 1 SCT 1	170/68/68/0000/004	6
7	DEC	6	1985	1418	-X M1 OVC 1 1/4	157/32/31/3504/998	1
8	DEC	6	1985	1433	-X M1 OVC 1 1/4	157/33/32/3304/998	1
9	DEC	6	1985	1448	-X M2 OVC 1 3/4	159/33/33/3304/999	2
10	APR	7	1985	1248	-X 1 SCT 1/4	116/52/51/2704/987	6
11	APR	7	1985	1318	-X M1 OVC 1	116/52/52/3104/987	1
12	APR	7	1985	1333	M2 OVC 4	116/53/53/3205/987	2
13	APR	7	1985	1348	M3 OVC 8+	117/53/53/3105/988	2

For Case 1, the sky condition section of the observation signifies that there is still partial obscuration (-X) and with 100' scattered (1 SCT) but with 1/4 m visibility (1/4).

To complete the description of these interesting and important situations, we thought it would be worthwhile to present the attendant synoptic conditions. Reproduction of the appropriate daily weather maps for the 4 days are provided in Figs. 5.1 to 5.4 for this purpose.

Getting back now to the issue of a demonstration plan, the following questions need to be addressed:

- o Should the capability of making an AWOS-GEM forecast reside at the location at which the observation is taken, say, with a portable microcomputer or from a centralized installation?
- o What form should the output take--probabilities, categories, best single value estimates, or expected values?
- o How many projections should be given for the span of 1-120 minutes?
- o Will the mediums for dissemination be voice, hard copy, CRT, and/or others?
- o Is it necessary to have the forecasts produced automatically or will a manual entry suffice, i.e., using a user friendly prompting?
- o Will the forecasts be issued on a continuous basis, on demand only, or both?
- o Should there be an archiving made for the on-demand forecasts since they will not be representative but will constitute important situations and will show a bias?
- o Where should a test demonstration be held?

This incomplete list is only a start. We feel that the users of the forecasts--those who have the operational requirements--will answer such questions. We hope the contents of this report will help.

6. DOWNWASH PROBLEM

There is no solid AWOS data archived for the purpose of studying the problem of helicopter downwash or its effect on the variables in an AWOS observation quantitatively. If we did possess such data, a study could be undertaken to determine whether the lingering effects of downwash are sufficiently perverse to prevent the use of the most recent AWOS observation prior to downwash incident from acting as the input to an AWOS-GEM forecast. It would be unreasonable to think an AWOS-GEM forecast would be expected to verify under circumstances in which downwash was influencing the sensors. Studying the contribution wind speed and wind direction have on the prediction of AWOS variables without knowing the source or cause of the wind would not appear to be scientifically based.

WEDNESDAY, JUNE 5, 1985

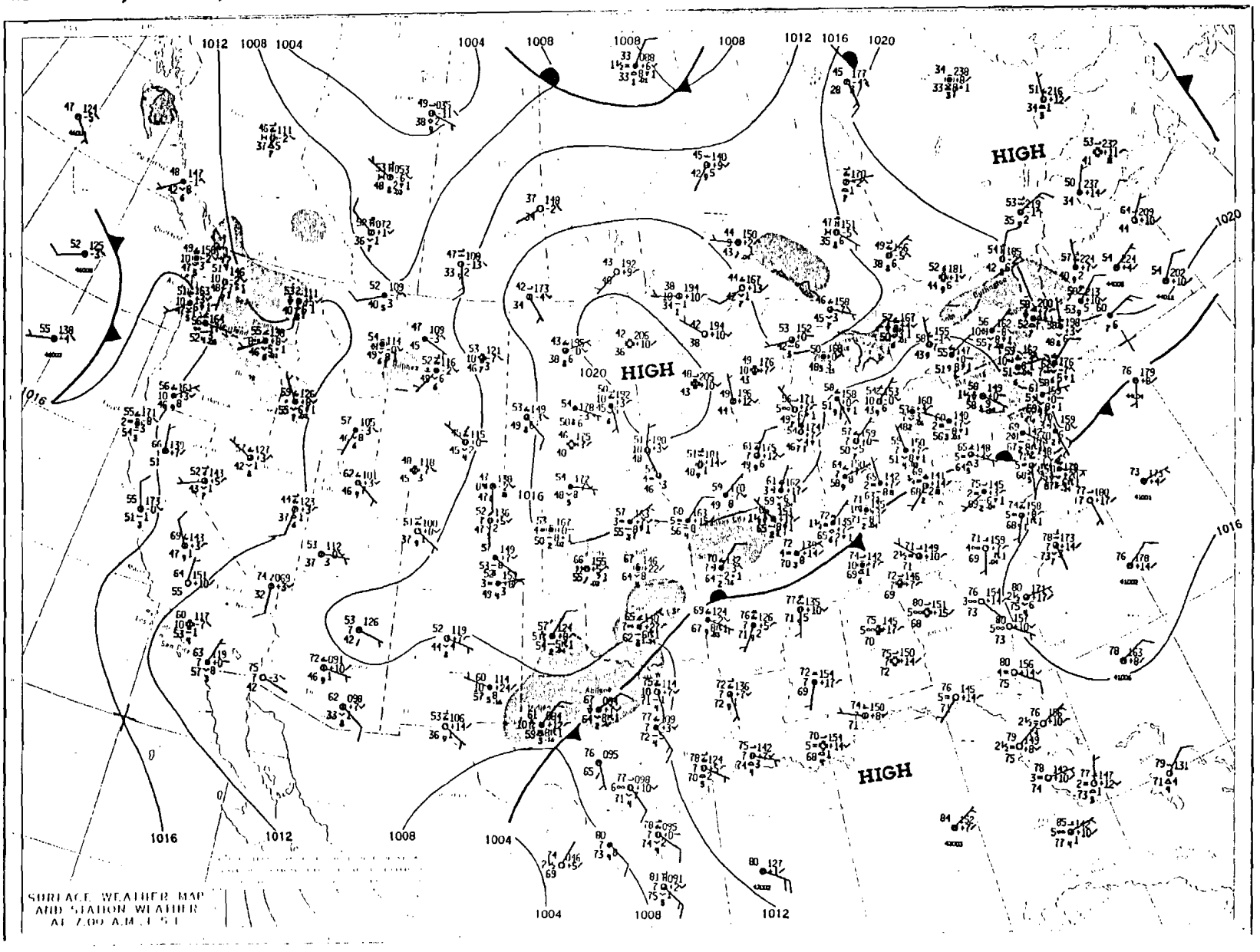

Figure 5.1. Daily weather map for June 5, 1985.

MONDAY, JUNE 24, 1985

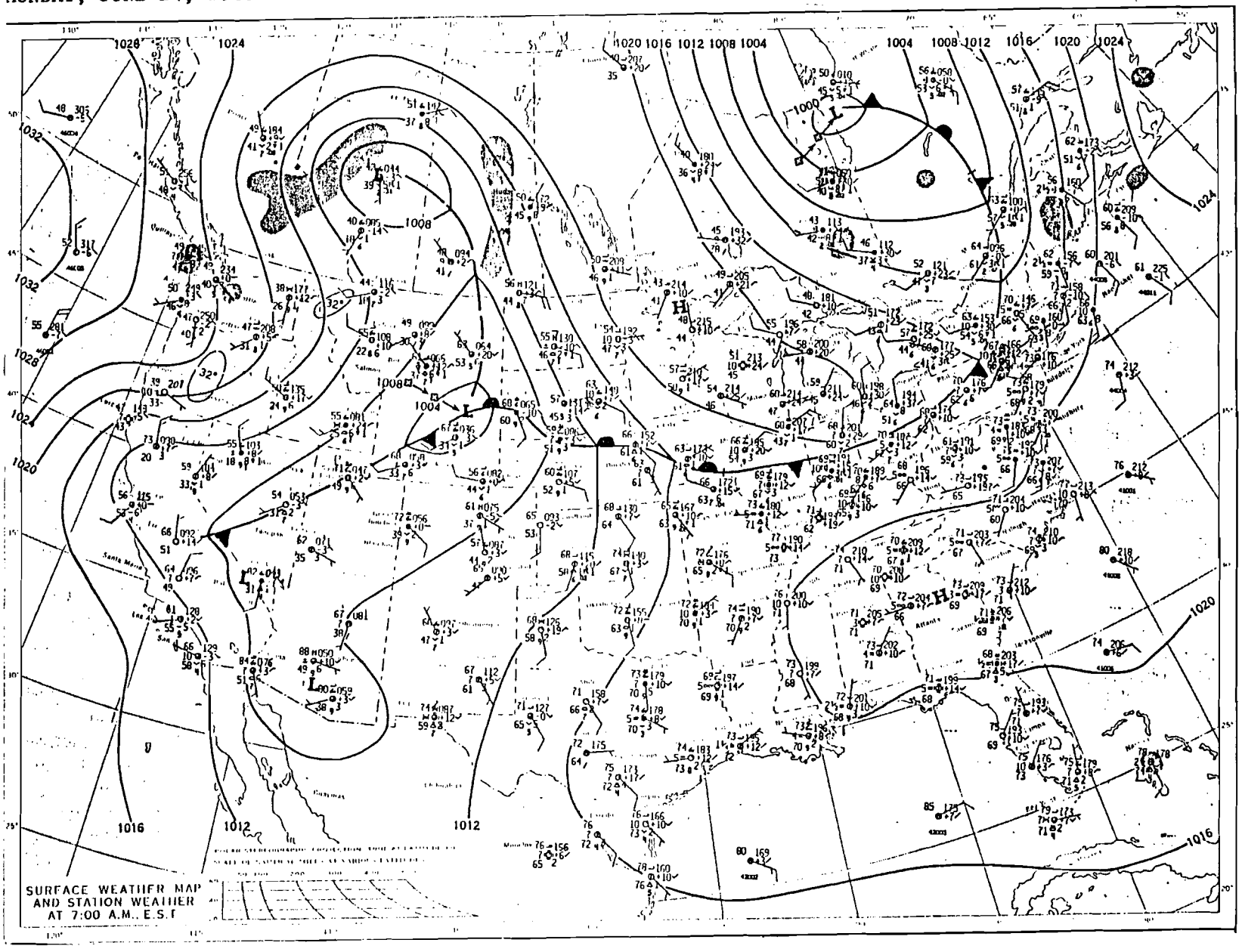

Figure 5.2. Daily weather map for Monday, June 24, 1985.

FRIDAY, DECEMBER 6, 1985

Figure 5.3. Daily weather map for Friday, December 6, 1985.

MONDAY, APRIL 7, 1986

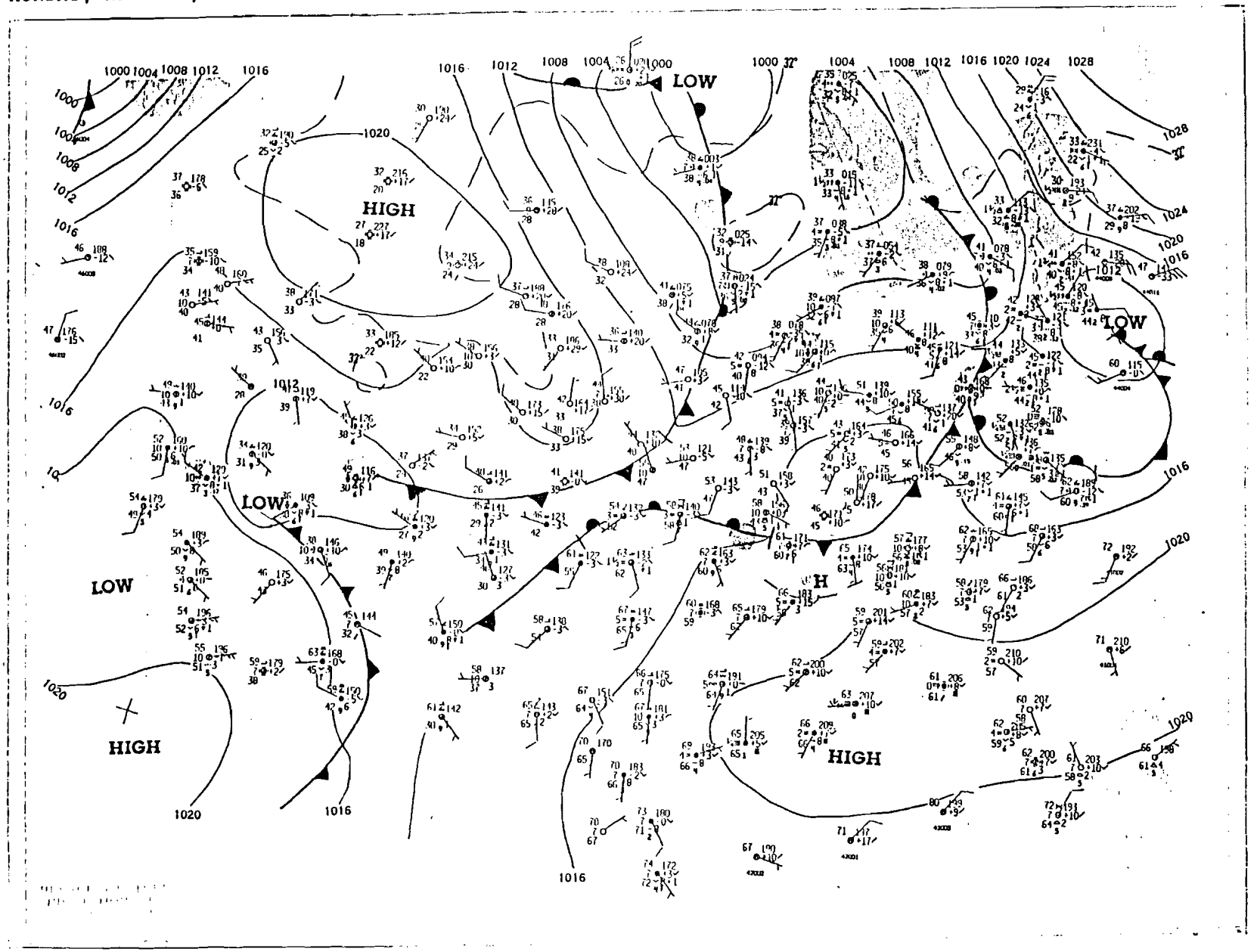

Figure 5.4. Daily weather map for Monday, April 7, 1986.

It is our feeling that the desired forecast is of the subsequent sensor and the resulting AWOS observation unaffected by downwash. Thus, we would use the last observation unaffected by downwash and refrain from having a verification performed on a downwash-affected AWOS observation.

7. SUMMARY AND FUTURE PLANS

This year's efforts to develop an AWOS-GEM produced somewhat surprising results in three areas. First, the same advantage over persistence did not occur on the AWOS variables as it did on the sensor variables. This is partly attributed to the built-in relationship that the algorithm creates between persistence and the verification observation. Another possible explanation is that the cases used in the sensor independent sample covered only summer situations whereas the AWOS verification sample spanned the entire 12 months of the year.

Second, the inclusion of nonlinear variables, in addition to linear variables, helped immensely on the predictions in the dependent sample but failed to show any improvement over linear alone on the independent sample. It is our opinion that when a larger dependent sample is used, overfitting will fail to wipe out the advantage the boolean predictors showed over linear predictors on the dependent sample.

Third, the efforts taken to produce a better thresholding procedure by using empirical methods did not prove to outperform the beta method that has been part of GEM since its inception. Again, it is our opinion that taking a larger dependent sample on which to base the empirical thresholds will produce results akin to the impressive results achieved on the dependent sample.

Plans for the coming year call for the inclusion of our second year of Sterling, Virginia data into the developmental sample. The year being collected at present will constitute the new independent sample. The bottom line conclusion is that a single year of minute-by-minute AWOS data or, for that matter, sensor data is not sufficient for developing GEM equations that will withstand the rigors of independent data testing. Thus,

- The issue of instability can be resolved by increasing the developmental sample size.
- The issue of bettering persistence can be resolved by adding sensor variables as predictors.
- The issue of thresholding can be resolved through larger sample sizes.
- The issue of nonlinear predictability can be aided by larger samples.

We intend to create a quality control procedure founded on either sensor or AWOS variables to help prevent the situation that occurred when the precipitation

element was inoperative without being detected until it caused us to lose a variable of considerable importance as a predictor over a protracted period of time.

Statistical experiments will be performed to determine the feasibility of a single equation set applicable to other locations to AWOS-GEM based on the data being collected at the current three sites, and others should they become available. Success in this effort, as it was in TDL's hourly GEM (see Miller, 1981), would suggest that one set of prediction equations would be applicable anywhere.

Microcomputer upgrading would enhance our research efforts. These should take the form of additional hard-disk capability and a backup system which would avoid completely the use of floppy disks, which are both expensive and tedious to use

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APPENDIX

Contingency tables, percent correct, Heidke skill score, chi square, threat score, and sample size for each predictand element. These are presented for GEM and persistence at 10-, 20-, 30-, 40-, 50-, and 60-minute projections.

10 MINUTE PROJECTION

PRESSURE (INCHES)

VERIFYING OBSERVATION

		0- 29.235	29.236- 29.530	29.531- 29.677	29.678- 29.825	29.826- 29.973	29.974- 30.120	30.121- 30.268	30.269- 30.563	30.564 +	ROW TOTALS
	0 - 29.235	0	0	0	0	0	0	0	0	0	0
	29.236 - 29.530	0	465	4	0	0	0	0	0	0	469
	29.531 - 29.677	0	6	1162	27	1	0	0	0	0	1196
	29.678 - 29.825	0	0	24	2679	57	0	1	0	0	2761
GEM	29.826 - 29.973	0	0	0	42	5950	93	1	0	0	6086
	29.974 - 30.120	0	0	0	0	83	7572	61	0	0	7716
	30.121 - 30.268	0	0	0	0	1	54	4462	27	0	4544
	30.269 - 30.563	0	0	0	0	0	0	42	2593	0	2635
	30.564 +	0	0	0	0	0	0	0	1	85	86
	COLUMN TOTALS:	0	471	1190	2748	6092	7719	4567	2621	85	25493
	BIASES:	99.99	1.00	1.01	1.00	1.00	1.00	0.99	1.01	1.01	

PERCENT CORRECT: 97.9406
HEIDKE SKILL SCORE: 0.97408
CHI SCORE: 0.31

CASES = 25493

PRESSURE (INCHES)

VERIFYING OBSERVATION

		0- 29.235	29.236- 29.530	29.531- 29.677	29.678- 29.825	29.826- 29.973	29.974- 30.120	30.121- 30.268	30.269- 30.563	30.564 +	ROW TOTALS
	0 - 29.235	0	0	0	0	0	0	0	0	0	0
	29.236 - 29.530	0	465	4	0	0	0	0	0	0	469
	29.531 - 29.677	0	6	1162	27	1	0	0	0	0	1196
	29.678 - 29.825	0	0	24	2679	57	0	1	0	0	2761
PERSISTENCE	29.826 - 29.973	0	0	0	42	5950	93	1	0	0	6086
	29.974 - 30.120	0	0	0	0	83	7572	61	0	0	7716
	30.121 - 30.268	0	0	0	0	1	54	4462	27	0	4544
	30.269 - 30.563	0	0	0	0	0	0	42	2593	0	2635
	30.564 +	0	0	0	0	0	0	0	1	85	86
	COLUMN TOTALS:	0	471	1190	2748	6092	7719	4567	2621	85	25493
	BIASES:	99.99	1.00	1.01	1.00	1.00	1.00	0.99	1.01	1.01	

PERCENT CORRECT: 97.9406
HEIDKE SKILL SCORE: 0.97408
CHI SCORE: 0.31

CASES = 25493

TEMPERATURE (DEGREES FAHRENHEIT)

VERIFYING OBSERVATION

		< 5	5-14	15-24	25-34	35-39	40-44	45-49	50-54	55-59	60-64	65-74	75-84	85-94	95 +	ROW TOTALS
	< 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5 - 14	0	64	0	0	0	0	0	0	0	0	0	0	0	0	64
	15 - 24	0	2	748	78	0	1	0	0	0	0	0	0	0	0	829
	25 - 34	0	0	60	2207	104	2	0	0	0	0	0	0	0	0	2373
	35 - 39	0	0	0	115	1545	149	0	0	0	0	0	0	0	0	1809
GEM	40 - 44	0	0	0	2	130	1935	131	0	0	0	0	0	0	0	2198
	45 - 49	0	0	0	1	2	134	1742	162	2	0	1	0	0	0	2044
	50 - 54	0	0	0	0	0	1	162	1579	179	1	0	0	0	0	1922
	55 - 59	0	0	0	1	0	0	2	173	1971	154	1	0	0	0	2302
	60 - 64	0	0	0	0	0	1	1	1	146	2131	190	0	0	0	2470
	65 - 74	0	0	0	0	1	0	0	0	1	210	4972	140	0	0	5324
	75 - 84	0	0	0	0	0	0	0	0	2	0	152	2893	84	0	3131
	85 - 94	0	0	0	0	0	0	0	0	0	0	0	77	887	12	976
	95 +	0	0	0	0	0	0	0	0	0	0	0	0	12	39	51
	COLUMN TOTALS:	0	66	808	2404	1782	2223	2038	1915	2301	2496	5316	3110	983	51	25493
	BIASES:	99.99	0.97	1.03	0.99	1.02	0.99	1.00	1.00	1.00	0.99	1.00	1.01	0.99	1.00	

PERCENT CORRECT: 89.0950
HEIDKE SKILL SCORE: 0.87719
CHI SCORE: 2.21

CASES = 25493

TEMPERATURE (DEGREES FAHRENHEIT)

VERIFYING OBSERVATION

		< 5	5-14	15-24	25-34	35-39	40-44	45-49	50-54	55-59	60-64	65-74	75-84	85-94	95 +	ROW TOTALS
	< 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5 - 14	0	64	0	0	0	0	0	0	0	0	0	0	0	0	64
	15 - 24	0	2	748	78	0	1	0	0	0	0	0	0	0	0	829
	25 - 34	0	0	60	2207	104	2	0	0	0	0	0	0	0	0	2373
	35 - 39	0	0	0	115	1545	149	0	0	0	0	0	0	0	0	1809
PERSISTENCE	40 - 44	0	0	0	2	130	1935	131	0	0	0	0	0	0	0	2198
	45 - 49	0	0	0	1	2	134	1742	162	2	0	1	0	0	0	2044
	50 - 54	0	0	0	0	0	1	162	1579	179	1	0	0	0	0	1922
	55 - 59	0	0	0	1	0	0	2	173	1971	154	1	0	0	0	2302
	60 - 64	0	0	0	0	0	1	1	1	146	2131	190	0	0	0	2470
	65 - 74	0	0	0	0	1	0	0	0	1	210	4972	140	0	0	5324
	75 - 84	0	0	0	0	0	0	0	0	2	0	152	2893	84	0	3131
	85 - 94	0	0	0	0	0	0	0	0	0	0	0	77	887	12	976
	95 +	0	0	0	0	0	0	0	0	0	0	0	0	12	39	51
	COLUMN TOTALS:	0	66	808	2404	1782	2223	2038	1915	2301	2496	5316	3110	983	51	25493
	BIASES:	99.99	0.97	1.03	0.99	1.02	0.99	1.00	1.00	1.00	0.99	1.00	1.01	0.99	1.00	

PERCENT CORRECT: 89.0950
HEIDKE SKILL SCORE: 0.87719
CHI SCORE: 2.21

CASES = 25493

DEW POINT DEPRESSION (DEGREES FAHRENHEIT)

VERIFYING OBSERVATION

		0-1	2-7	8-15	16-25	26 +	ROW TOTALS
	0 - 1	1842	583	0	0	0	2425
	2 - 7	595	8487	455	2	0	9539
GEM	8 - 15	0	408	6428	356	1	7193
	16 - 25	0	4	367	4616	109	5096
	26 +	0	1	2	93	1144	1240
	COLUMN TOTALS:	2437	9483	7252	5067	1254	25493
	BIASES:	1.00	1.01	0.99	1.01	0.99	

PERCENT CORRECT: 88.3262
HEIDKE SKILL SCORE: 0.83994
CHI SCORE: 1.19

CASES = 25493

DEW POINT DEPRESSION (DEGREES FAHRENHEIT)

VERIFYING OBSERVATION

		0-1	2-7	8-15	16-25	26 +	ROW TOTALS
	0 - 1	1842	583	0	0	0	2425
	2 - 7	595	8487	455	2	0	9539
PERSISTENCE	8 - 15	0	408	6428	356	1	7193
	16 - 25	0	4	367	4616	109	5096
	26 +	0	1	2	93	1144	1240
	COLUMN TOTALS:	2437	9483	7252	5067	1254	25493
	BIASES:	1.00	1.01	0.99	1.01	0.99	

PERCENT CORRECT: 88.3262
HEIDKE SKILL SCORE: 0.83994
CHI SCORE: 1.19

CASES = 25493

WIND SPEED (KTS)

VERIFYING OBSERVATION

		0-1	2-9	10-19	20-29	30 +	ROW TOTALS
	0 - 1	440	725	0	0	0	1165
	2 - 9	678	19425	903	1	0	21007
GEM	10 - 19	0	891	2227	77	0	3195
	20 - 29	0	0	67	59	0	126
	30 +	0	0	0	0	0	0
	COLUMN TOTALS:	1118	21041	3197	137	0	25493
	BIASES:	1.04	1.00	1.00	0.92	99.99	

PERCENT CORRECT: 86.8905
HEIDKE SKILL SCORE: 0.56609
CHI SCORE: 2.92

CASES = 25493

WIND SPEED (KTS)

VERIFYING OBSERVATION

		0-1	2-9	10-19	20-29	30 +	ROW TOTALS
	0 - 1	440	725	0	0	0	1165
	2 - 9	678	19425	906	1	0	21010
PERSISTENCE	10 - 19	0	891	2219	82	0	3192
	20 - 29	0	0	72	54	0	126
	30 +	0	0	0	0	0	0
	COLUMN TOTALS:	1118	21041	3197	137	0	25493
	BIASES:	1.04	1.00	1.00	0.92	99.99	

PERCENT CORRECT: 86.8395
HEIDKE SKILL SCORE: 0.56429
CHI SCORE: 2.91

CASES = 25493

WIND DIRECTION (DEGS)

VERIFYING OBSERVATION

		0-44	45-89	90-134	135-179	180-224	225-269	270-314	315-359	ROW TOTALS
	0 - 44	1605	280	48	32	9	18	61	587	2640
	45 - 89	244	755	181	25	11	15	45	77	1353
	90 - 134	44	163	900	261	53	24	48	36	1529
GEM	135 - 179	18	12	237	2029	680	52	61	28	3117
	180 - 224	20	12	48	597	3777	389	115	33	4991
	225 - 269	13	9	43	80	340	1110	399	38	2032
	270 - 314	68	36	46	64	82	403	3281	630	4610
	315 - 359	653	80	47	27	26	55	585	3748	5221
	COLUMN TOTALS:	2665	1347	1550	3115	4978	2066	4595	5177	25493
	BIASES:	0.99	1.00	0.99	1.00	1.00	0.98	1.00	1.01	

PERCENT CORRECT: 67.4891
HEIDKE SKILL SCORE: 0.61703
CHI SCORE: 1.56

CASES = 25493

WIND DIRECTION (DEGS)

VERIFYING OBSERVATION

		0-44	45-89	90-134	135-179	180-224	225-269	270-314	315-359	ROW TOTALS
	0 - 44	1605	280	48	32	9	18	61	587	2640
	45 - 89	244	755	181	25	11	15	45	77	1353
	90 - 134	44	163	900	261	53	24	48	36	1529
PERSISTENCE	135 - 179	18	12	237	2029	680	52	61	28	3117
	180 - 224	20	12	48	597	3777	389	115	33	4991
	225 - 269	13	9	43	80	340	1110	399	38	2032
	270 - 314	68	36	46	64	82	403	3281	630	4610
	315 - 359	653	80	47	27	26	55	585	3748	5221
	COLUMN TOTALS:	2665	1347	1550	3115	4978	2066	4595	5177	25493
	BIASES:	0.99	1.00	0.99	1.00	1.00	0.98	1.00	1.01	

PERCENT CORRECT: 67.4891
HEIDKE SKILL SCORE: 0.61703
CHI SCORE: 1.56

CASES = 25493

CLOUD HEIGHT ONE (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	PART. OBSCURE	ROW TOTALS
	0 - 100	206	24	1	1	1	16	1	250
	200 - 400	29	859	43	8	3	35	14	991
	500 - 900	1	50	650	61	4	18	4	788
GEM	1000 - 2900	1	8	45	2276	67	124	5	2526
	3000 - 6000	0	4	3	52	1421	137	4	1621
	CLR BELOW 6001	17	47	19	128	138	18549	82	18980
	PART. OBSCURE	6	13	7	2	2	91	216	337
	COLUMN TOTALS:	260	1005	768	2528	1636	18970	326	25493
	BIASES:	0.96	0.99	1.03	1.00	0.99	1.00	1.03	

PERCENT CORRECT: 94.8378
HEIDKE SKILL SCORE: 0.87977
CHI SCORE: 1.62
THREAT SCORE: 0.80548

CASES = 25493

CLOUD HEIGHT ONE (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	PART. OBSCURE	ROW TOTALS
	0 - 100	206	24	1	1	1	16	1	250
	200 - 400	29	859	43	8	3	35	14	991
	500 - 900	1	50	650	61	4	18	4	788
PERSISTENCE	1000 - 2900	1	8	45	2276	67	124	5	2526
	3000 - 6000	0	4	3	52	1421	137	4	1621
	CLR BELOW 6001	17	47	19	128	138	18549	82	18980
	PART. OBSCURE	6	13	7	2	2	91	216	337
	COLUMN TOTALS:	260	1005	768	2528	1636	18970	326	25493
	BIASES:	0.96	0.99	1.03	1.00	0.99	1.00	1.03	

PERCENT CORRECT: 94.8378
HEIDKE SKILL SCORE: 0.87977
CHI SCORE: 1.62
THREAT SCORE: 0.80548

CASES = 25493

CLOUD HEIGHT TWO (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	ROW TOTALS
	0 - 100	28	6	2	0	0	11	47
	200 - 400	4	44	5	2	0	19	74
	500 - 900	1	4	136	32	3	59	235
GEM	1000 - 2900	0	2	32	506	25	197	762
	3000 - 6000	0	0	1	35	931	216	1183
	CLR BELOW 6001	6	21	60	184	220	22701	23192
	COLUMN TOTALS:	39	77	236	759	1179	23203	25493
	BIASES:	1.21	0.96	1.00	1.00	1.00	1.00	

PERCENT CORRECT: 95.5007
HEIDKE SKILL SCORE: 0.73353
CHI SCORE: 1.79
THREAT SCORE: 0.52903

CASES = 25493

CLOUD HEIGHT TWO (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	ROW TOTALS
	0 - 100	28	6	2	0	0	11	47
	200 - 400	4	44	5	2	0	19	74
	500 - 900	1	4	136	32	3	59	235
PERSISTENCE	1000 - 2900	0	2	32	506	25	197	762
	3000 - 6000	0	0	1	35	931	216	1183
	CLR BELOW 6001	6	21	60	184	220	22701	23192
	COLUMN TOTALS:	39	77	236	759	1179	23203	25493
	BIASES:	1.21	0.96	1.00	1.00	1.00	1.00	

PERCENT CORRECT: 95.5007
HEIDKE SKILL SCORE: 0.73353
CHI SCORE: 1.79
THREAT SCORE: 0.52903

CASES = 25493

CLOUD HEIGHT THREE (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	ROW TOTALS
	0 - 100	0	0	0	1	0	1	2
	200 - 400	0	2	0	4	4	7	17
	500 - 900	0	0	14	0	13	29	56
GEM	1000 - 2900	0	4	1	37	15	53	110
	3000 - 6000	0	2	13	23	227	165	430
	CLR BELOW 6001	2	13	22	61	135	24645	24878
	COLUMN TOTALS:	2	21	50	126	394	24900	25493
	BIASES:	1.00	0.81	1.12	0.87	1.09	1.00	

PERCENT CORRECT: 97.7719
HEIDKE SKILL SCORE: 0.52123
CHI SCORE: 6.82
THREAT SCORE: 0.05000

CASES = 25493

CLOUD HEIGHT THREE (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	ROW TOTALS
	0 - 100	0	0	0	1	0	1	2
	200 - 400	0	2	0	4	4	7	17
	500 - 900	0	0	13	0	13	27	53
PERSISTENCE	1000 - 2900	0	4	1	37	15	54	111
	3000 - 6000	0	2	9	21	219	123	374
	CLR BELOW 6001	2	13	27	63	143	24688	24936
	COLUMN TOTALS:	2	21	50	126	394	24900	25493
	BIASES:	1.00	0.81	1.06	0.88	0.95	1.00	

PERCENT CORRECT: 97.9053
HEIDKE SKILL SCORE: 0.52768
CHI SCORE: 3.79
THREAT SCORE: 0.05000

CASES = 25493

CLOUD COVER ONE

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	OBSCURE	ROW TOTALS
	CLR BELOW 6001	18498	421	1	2	0	18922
	SCT	444	2589	280	43	1	3357
GEM	BKN	0	300	611	210	0	1121
	OVC	1	49	201	1842	0	2093
	OBSCURE	0	0	0	0	0	0
	COLUMN TOTALS:	18943	3359	1093	2097	1	25493
	BIASES:	1.00	1.00	1.03	1.00	0.00	

PERCENT CORRECT: 92.3391
HEIDKE SKILL SCORE: 0.81867
CHI SCORE: 1.75

CASES = 25493

CLOUD COVER ONE

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	OBSCURE	ROW TOTALS
	CLR BELOW 6001	18498	421	1	2	0	18922
	SCT	444	2594	289	49	1	3377
PERSISTENCE	BKN	0	294	602	204	0	1100
	OVC	1	49	201	1842	0	2093
	OBSCURE	0	1	0	0	0	1
	COLUMN TOTALS:	18943	3359	1093	2097	1	25493
	BIASES:	1.00	1.01	1.01	1.00	1.00	

PERCENT CORRECT: 92.3234
HEIDKE SKILL SCORE: 0.81826
CHI SCORE: 0.17

CASES = 25493

CLOUD COVER TWO

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	ROW TOTALS
	CLR BELOW 6001	22764	230	99	141	23234
GEM	SCT	246	568	109	3	926
	BKN	101	132	391	108	732
	OVC	163	11	108	319	601
	COLUMN TOTALS:	23274	941	707	571	25493
	BIASES:	1.00	0.98	1.04	1.05	

PERCENT CORRECT: 94.3082
HEIDKE SKILL SCORE: 0.65562
CHI SCORE: 2.77

CASES = 25493

CLOUD COVER TWO

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	ROW TOTALS
	CLR BELOW 6001	22764	230	99	141	23234
PERSISTENCE	SCT	248	576	125	10	959
	BKN	99	124	375	101	699
	OVC	163	11	108	319	601
	COLUMN TOTALS:	23274	941	707	571	25493
	BIASES:	1.00	1.02	0.99	1.05	

PERCENT CORRECT: 94.2769
HEIDKE SKILL SCORE: 0.65370
CHI SCORE: 2.08

CASES = 25493

CLOUD COVER THREE

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	ROW TOTALS
	CLR BELOW 6001	24545	96	71	91	24803
GEM	SCT	86	76	44	0	206
	BKN	62	28	123	29	242
	OVC	74	0	33	135	242
	COLUMN TOTALS:	24767	200	271	255	25493
	BIASES:	1.00	1.03	0.89	0.95	

PERCENT CORRECT: 97.5915
HEIDKE SKILL SCORE: 0.55819
CHI SCORE: 4.00

CASES = 25493

CLOUD COVER THREE

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	ROW TOTALS
	CLR BELOW 6001	24545	96	71	91	24803
PERSISTENCE	SCT	86	76	44	0	206
	BKN	62	28	123	29	242
	OVC	74	0	33	135	242
	COLUMN TOTALS:	24767	200	271	255	25493
	BIASES:	1.00	1.03	0.89	0.95	

PERCENT CORRECT: 97.5915
HEIDKE SKILL SCORE: 0.55819
CHI SCORE: 4.00

CASES = 25493

VISIBILITY (MILES)

VERIFYING OBSERVATION

		0 < 1/2	1/2 < 1	1 < 3	3 < 5	5 < 7	7 +	ROW TOTALS
	0 < 1/2	39	20	10	1	2	1	73
	1/2 < 1	8	40	40	12	7	0	107
GEM	1 < 3	6	31	608	186	15	17	863
	3 < 5	1	10	172	1166	230	44	1623
	5 < 7	1	2	30	248	945	280	1506
	7 +	1	0	4	43	274	20999	21321
	COLUMN TOTALS:	56	103	864	1656	1473	21341	25493
	BIASES:	1.30	1.04	1.00	0.98	1.02	1.00	

PERCENT CORRECT: 93.3472
HEIDKE SKILL SCORE: 0.77150
CHI SCORE: 6.73
THREAT SCORE: 0.46121

CASES = 25493

VISIBILITY (MILES)

VERIFYING OBSERVATION

		0 < 1/2	1/2 < 1	1 < 3	3 < 5	5 < 7	7 +	ROW TOTALS
	0 < 1/2	39	20	10	1	2	1	73
	1/2 < 1	8	40	40	12	7	0	107
PERSISTENCE	1 < 3	6	31	608	186	15	17	863
	3 < 5	1	10	172	1166	230	44	1623
	5 < 7	1	2	30	248	945	280	1506
	7 +	1	0	4	43	274	20999	21321
	COLUMN TOTALS:	56	103	864	1656	1473	21341	25493
	BIASES:	1.30	1.04	1.00	0.98	1.02	1.00	

PERCENT CORRECT: 93.3472
HEIDKE SKILL SCORE: 0.77150
CHI SCORE: 6.73
THREAT SCORE: 0.46121

CASES = 25493

GUSTS (KTS)

VERIFYING OBSERVATION

		0-10	11-20	21-30	31-40	41 +	ROW TOTALS
	0 - 10	22459	956	93	1	0	23509
	11 - 20	467	567	150	1	0	1185
GEM	21 - 30	108	144	479	29	0	760
	31 - 40	0	1	28	10	0	39
	41 +	0	0	0	0	0	0
	COLUMN TOTALS:	23034	1668	750	41	0	25493
	BIASES:	1.02	0.71	1.01	0.95	99.99	

PERCENT CORRECT: 92.2410
HEIDKE SKILL SCORE: 0.52357
CHI SCORE: 149.89

CASES = 25493

GUSTS (KTS)

VERIFYING OBSERVATION

		0-10	11-20	21-30	31-40	41 +	ROW TOTALS
	0 - 10	22203	751	86	2	0	23042
	11 - 20	723	772	157	0	0	1652
PERSISTENCE	21 - 30	108	144	479	29	0	760
	31 - 40	0	1	28	10	0	39
	41 +	0	0	0	0	0	0
	COLUMN TOTALS:	23034	1668	750	41	0	25493
	BIASES:	1.00	0.99	1.01	0.95	99.99	

PERCENT CORRECT: 92.0410
HEIDKE SKILL SCORE: 0.55339
CHI SCORE: 0.39

CASES = 25493

CEILING (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	ROW TOTALS
	0 - 100	83	19	4	0	0	8	114
	200 - 400	24	687	31	3	1	10	756
	500 - 900	2	37	403	52	3	15	512
GEM	1000 - 2900	1	3	39	1482	28	121	1674
	3000 - 6000	0	1	2	32	844	87	966
	CLR BELOW 6001	9	21	19	102	97	21223	21471
	COLUMN TOTALS:	119	768	498	1671	973	21464	25493
	BIASES:	0.96	0.98	1.03	1.00	0.99	1.00	

PERCENT CORRECT: 96.9756
HEIDKE SKILL SCORE: 0.89344
CHI SCORE: 0.85
THREAT SCORE: 0.86123

CASES = 25493

CEILING (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	ROW TOTALS
	0 - 100	83	19	4	0	0	8	114
	200 - 400	24	687	31	3	1	10	756
	500 - 900	2	37	403	52	3	15	512
PERSISTENCE	1000 - 2900	1	3	39	1482	28	121	1674
	3000 - 6000	0	1	2	32	844	87	966
	CLR BELOW 6001	9	21	19	102	97	21223	21471
	COLUMN TOTALS:	119	768	498	1671	973	21464	25493
	BIASES:	0.96	0.98	1.03	1.00	0.99	1.00	

PERCENT CORRECT: 96.9756
HEIDKE SKILL SCORE: 0.89344
CHI SCORE: 0.85
THREAT SCORE: 0.86123

CASES = 25493

TOTAL CLOUD AMOUNT

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	OBSCURE	ROW TOTALS
	CLR BELOW 6001	18498	420	1	3	0	18922
	SCT	443	1861	240	4	1	2549
GEM	BKN	0	237	660	189	0	1086
	OVC	2	2	205	2727	0	2936
	OBSCURE	0	0	0	0	0	0
	COLUMN TOTALS:	18943	2520	1106	2923	1	25493
	BIASES:	1.00	1.01	0.98	1.00	0.00	

PERCENT CORRECT: 93.1471
HEIDKE SKILL SCORE: 0.83820
CHI SCORE: 1.78

CASES = 25493

TOTAL CLOUD AMOUNT

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	OBSCURE	ROW TOTALS
	CLR BELOW 6001	18498	420	1	3	0	18922
	SCT	443	1860	240	4	1	2548
PERSISTENCE	BKN	0	237	660	189	0	1086
	OVC	2	2	205	2727	0	2936
	OBSCURE	0	1	0	0	0	1
	COLUMN TOTALS:	18943	2520	1106	2923	1	25493
	BIASES:	1.00	1.01	0.98	1.00	1.00	

PERCENT CORRECT: 93.1432
HEIDKE SKILL SCORE: 0.83810
CHI SCORE: 0.75

CASES = 25493

GEM VS. PERSISTENCE 20 MINUTE PROJECTION

PRESSURE (INCHES)

VERIFYING OBSERVATION

		0- 29.235	29.236- 29.530	29.531- 29.677	29.678- 29.825	29.826- 29.973	29.974- 30.120	30.121- 30.268	30.269- 30.563	30.564 +	ROW TOTALS
	0 - 29.235	0	0	0	0	0	0	0	0	0	0
	29.236 - 29.530	0	457	10	0	0	0	0	0	0	467
	29.531 - 29.677	0	12	1146	33	0	0	0	0	0	1191
	29.678 - 29.825	0	0	33	2622	90	0	0	1	0	2746
GEM	29.826 - 29.973	0	0	0	75	5823	147	1	0	0	6046
	29.974 - 30.120	0	0	0	0	147	7434	104	0	0	7685
	30.121 - 30.268	0	0	0	0	1	99	4360	66	0	4526
	30.269 - 30.563	0	0	0	0	0	0	61	2549	2	2612
	30.564 +	0	0	0	0	0	0	0	2	82	84
	COLUMN TOTALS:	0	469	1189	2730	6061	7680	4526	2618	84	25357
	BIASES:	99.99	1.00	1.00	1.01	1.00	1.00	1.00	1.00	1.00	

PERCENT CORRECT: 96.5138
HEIDKE SKILL SCORE: 0.95612
CHI SCORE: 0.16

CASES = 25357

PRESSURE (INCHES)

VERIFYING OBSERVATION

		0- 29.235	29.236- 29.530	29.531- 29.677	29.678- 29.825	29.826- 29.973	29.974- 30.120	30.121- 30.268	30.269- 30.563	30.564 +	ROW TOTALS
	0 - 29.235	0	0	0	0	0	0	0	0	0	0
	29.236 - 29.530	0	457	10	0	0	0	0	0	0	467
	29.531 - 29.677	0	12	1146	33	0	0	0	0	0	1191
	29.678 - 29.825	0	0	33	2622	90	0	0	1	0	2746
PERSISTENCE	29.826 - 29.973	0	0	0	75	5823	147	1	0	0	6046
	29.974 - 30.120	0	0	0	0	147	7434	104	0	0	7685
	30.121 - 30.268	0	0	0	0	1	99	4360	66	0	4526
	30.269 - 30.563	0	0	0	0	0	0	61	2549	2	2612
	30.564 +	0	0	0	0	0	0	0	2	82	84
	COLUMN TOTALS:	0	469	1189	2730	6061	7680	4526	2618	84	25357
	BIASES:	99.99	1.00	1.00	1.01	1.00	1.00	1.00	1.00	1.00	

PERCENT CORRECT: 96.5138
HEIDKE SKILL SCORE: 0.95612
CHI SCORE: 0.16

CASES = 25357

TEMPERATURE (DEGREES FAHRENHEIT)

VERIFYING OBSERVATION

		< 5	5-14	15-24	25-34	35-39	40-44	45-49	50-54	55-59	60-64	65-74	75-84	85-94	95 +	ROW TOTALS
	< 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5 - 14	0	62	0	0	0	0	0	0	0	0	0	0	0	0	62
	15 - 24	0	2	715	94	0	1	0	0	0	0	0	0	0	0	812
	25 - 34	0	0	93	2101	162	3	2	0	0	0	0	0	0	0	2361
	35 - 39	0	0	0	160	1402	233	3	0	0	0	1	0	0	0	1799
GEM	40 - 44	0	0	0	3	235	1740	218	4	0	0	0	0	0	0	2200
	45 - 49	0	0	0	0	2	215	1556	246	4	0	1	0	0	0	2024
	50 - 54	0	0	0	0	0	3	241	1390	272	4	0	0	0	0	1910
	55 - 59	0	0	0	1	0	0	6	268	1772	243	6	0	0	0	2296
	60 - 64	0	0	0	0	0	0	1	2	233	1913	305	1	0	0	2455
	65 - 74	0	0	0	0	0	0	0	0	3	336	4726	232	1	0	5298
	75 - 84	0	0	0	0	0	0	0	0	2	0	239	2778	101	0	3120
	85 - 94	0	0	0	0	0	0	0	0	0	0	0	108	848	14	970
	95 +	0	0	0	0	0	0	0	0	0	0	0	0	13	37	50
	COLUMN TOTALS:	0	64	808	2359	1801	2195	2027	1910	2286	2496	5278	3119	963	51	25357
	BIASES:	99.99	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	1.00	1.00	1.01	0.98	

PERCENT CORRECT: 82.9751
HEIDKE SKILL SCORE: 0.80826
CHI SCORE: 0.97

CASES = 25357

TEMPERATURE (DEGREES FAHRENHEIT)

VERIFYING OBSERVATION

		< 5	5-14	15-24	25-34	35-39	40-44	45-49	50-54	55-59	60-64	65-74	75-84	85-94	95 +	ROW TOTALS
	< 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5 - 14	0	62	0	0	0	0	0	0	0	0	0	0	0	0	62
	15 - 24	0	2	715	94	0	1	0	0	0	0	0	0	0	0	812
	25 - 34	0	0	93	2101	162	3	2	0	0	0	0	0	0	0	2361
	35 - 39	0	0	0	160	1402	233	3	0	0	0	1	0	0	0	1799
PERSISTENCE	40 - 44	0	0	0	3	235	1740	218	4	0	0	0	0	0	0	2200
	45 - 49	0	0	0	0	2	215	1556	246	4	0	1	0	0	0	2024
	50 - 54	0	0	0	0	0	3	241	1390	272	4	0	0	0	0	1910
	55 - 59	0	0	0	1	0	0	6	268	1772	243	6	0	0	0	2296
	60 - 64	0	0	0	0	0	0	1	2	233	1913	305	1	0	0	2455
	65 - 74	0	0	0	0	0	0	0	0	3	336	4726	232	1	0	5298
	75 - 84	0	0	0	0	0	0	0	0	2	0	239	2778	101	0	3120
	85 - 94	0	0	0	0	0	0	0	0	0	0	0	108	848	14	970
	95 +	0	0	0	0	0	0	0	0	0	0	0	0	13	37	50
	COLUMN TOTALS:	0	64	808	2359	1801	2195	2027	1910	2286	2496	5278	3119	963	51	25357
	BIASES:	99.99	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	1.00	1.00	1.01	0.98	

PERCENT CORRECT: 82.9751
HEIDKE SKILL SCORE: 0.80826
CHI SCORE: 0.97

CASES = 25357

DEW POINT DEPRESSION (DEGREES FAHRENHEIT)

VERIFYING OBSERVATION

		0-1	2-7	8-15	16-25	26 +	ROW TOTALS
	0 - 1	1576	932	6	1	0	2515
	2 - 7	837	7949	615	1	2	9404
GEM	8 - 15	3	596	6077	473	0	7149
	16 - 25	0	5	504	4396	149	5054
	26 +	0	1	1	131	1102	1235
	COLUMN TOTALS:	2416	9483	7203	5002	1253	25357
	BIASES:	1.04	0.99	0.99	1.01	0.99	

PERCENT CORRECT: 83.2117
HEIDKE SKILL SCORE: 0.77004
CHI SCORE: 5.92

CASES = 25357

DEW POINT DEPRESSION (DEGREES FAHRENHEIT)

VERIFYING OBSERVATION

		0-1	2-7	8-15	16-25	26 +	ROW TOTALS
	0 - 1	1571	836	5	1	0	2413
	2 - 7	842	8045	616	1	2	9506
PERSISTENCE	8 - 15	3	596	6077	473	0	7149
	16 - 25	0	5	504	4396	149	5054
	26 +	0	1	1	131	1102	1235
	COLUMN TOTALS:	2416	9483	7203	5002	1253	25357
	BIASES:	1.00	1.00	0.99	1.01	0.99	

PERCENT CORRECT: 83.5706
HEIDKE SKILL SCORE: 0.77461
CHI SCORE: 1.26

CASES = 25357

WIND SPEED (KTS)

VERIFYING OBSERVATION

		0-1	2-9	10-19	20-29	30 +	ROW TOTALS
	0 - 1	358	796	0	0	0	1154
	2 - 9	747	19173	997	2	0	20919
GEM	10 - 19	1	977	2111	70	0	3159
	20 - 29	0	1	75	49	0	125
	30 +	0	0	0	0	0	0
	COLUMN TOTALS:	1106	20947	3183	121	0	25357
	BIASES:	1.04	1.00	0.99	1.03	99.99	

PERCENT CORRECT: 85.5425
HEIDKE SKILL SCORE: 0.51945
CHI SCORE: 2.43

CASES = 25357

WIND SPEED (KTS)

VERIFYING OBSERVATION

		0-1	2-9	10-19	20-29	30 +	ROW TOTALS
	0 - 1	358	796	0	0	0	1154
	2 - 9	747	19170	1002	2	0	20921
PERSISTENCE	10 - 19	1	980	2102	74	0	3157
	20 - 29	0	1	79	45	0	125
	30 +	0	0	0	0	0	0
	COLUMN TOTALS:	1106	20947	3183	121	0	25357
	BIASES:	1.04	1.00	0.99	1.03	99.99	

PERCENT CORRECT: 85.4794
HEIDKE SKILL SCORE: 0.51726
CHI SCORE: 2.46

CASES = 25357

WIND DIRECTION (DEGS)

VERIFYING OBSERVATION

		0-44	45-89	90-134	135-179	180-224	225-269	270-314	315-359	ROW TOTALS
	0 - 44	1461	290	77	40	20	22	99	618	2627
	45 - 89	284	617	194	39	17	28	69	95	1343
	90 - 134	57	166	729	293	81	48	90	57	1521
GEM	135 - 179	25	22	233	1814	782	82	93	51	3102
	180 - 224	21	17	77	697	3486	423	186	68	4975
	225 - 269	22	24	63	106	376	912	442	68	2013
	270 - 314	123	60	90	91	123	472	2937	698	4594
	315 - 359	770	100	79	47	47	68	639	3432	5182
	COLUMN TOTALS:	2763	1296	1542	3127	4932	2055	4555	5087	25357
	BIASES:	0.95	1.04	0.99	0.99	1.01	0.98	1.01	1.02	

PERCENT CORRECT: 60.6854
HEIDKE SKILL SCORE: 0.53700
CHI SCORE: 12.23

CASES = 25357

WIND DIRECTION (DEGS)

VERIFYING OBSERVATION

		0-44	45-89	90-134	135-179	180-224	225-269	270-314	315-359	ROW TOTALS
	0 - 44	1461	290	77	40	20	22	99	618	2627
	45 - 89	284	617	194	39	17	28	69	95	1343
	90 - 134	57	166	729	293	81	48	90	57	1521
PERSISTENCE	135 - 179	25	22	233	1814	782	82	93	51	3102
	180 - 224	21	17	77	697	3486	423	186	68	4975
	225 - 269	22	24	63	106	377	923	443	68	2026
	270 - 314	123	60	90	91	122	461	2936	698	4581
	315 - 359	770	100	79	47	47	68	639	3432	5182
	COLUMN TOTALS:	2763	1296	1542	3127	4932	2055	4555	5087	25357
	BIASES:	0.95	1.04	0.99	0.99	1.01	0.99	1.01	1.02	

PERCENT CORRECT: 60.7248
HEIDKE SKILL SCORE: 0.53750
CHI SCORE: 11.59

CASES = 25357

CLOUD HEIGHT ONE (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	PART. OBSCURE	ROW TOTALS
	0 - 100	175	32	1	5	3	27	3	246
	200 - 400	41	763	79	14	6	62	24	989
	500 - 900	2	81	560	95	7	36	10	791
GEM	1000 - 2900	2	12	81	2084	89	241	5	2514
	3000 - 6000	1	7	4	87	1294	229	4	1626
	CLR BELOW 6001	24	72	39	222	231	18191	91	18870
	PART. OBSCURE	11	19	6	7	4	110	164	321
	COLUMN TOTALS:	256	986	770	2514	1634	18896	301	25357
	BIASES:	0.96	1.00	1.03	1.00	1.00	1.00	1.07	

PERCENT CORRECT: 91.6157
HEIDKE SKILL SCORE: 0.80446
CHI SCORE: 2.38
THREAT SCORE: 0.68963

CASES = 25357

CLOUD HEIGHT ONE (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	PART. OBSCURE	ROW TOTALS
	0 - 100	175	32	1	5	3	27	3	246
	200 - 400	41	763	79	14	6	62	24	989
	500 - 900	2	81	559	95	7	36	7	787
PERSISTENCE	1000 - 2900	2	12	81	2084	89	241	5	2514
	3000 - 6000	1	7	4	87	1294	229	4	1626
	CLR BELOW 6001	24	72	39	222	231	18191	91	18870
	PART. OBSCURE	11	19	7	7	4	110	167	325
	COLUMN TOTALS:	256	986	770	2514	1634	18896	301	25357
	BIASES:	0.96	1.00	1.02	1.00	1.00	1.00	1.08	

PERCENT CORRECT: 91.6236
HEIDKE SKILL SCORE: 0.80464
CHI SCORE: 2.76
THREAT SCORE: 0.68963

CASES = 25357

CLOUD HEIGHT TWO (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	ROW TOTALS
	0 - 100	24	6	1	0	0	13	44
	200 - 400	3	36	5	3	0	23	70
	500 - 900	0	9	91	39	3	92	234
GEM	1000 - 2900	0	3	36	390	43	290	762
	3000 - 6000	0	1	3	43	796	339	1182
	CLR BELOW 6001	12	29	102	267	352	22303	23065
	COLUMN TOTALS:	39	84	238	742	1194	23060	25357
	BIASES:	1.13	0.83	0.98	1.03	0.99	1.00	

PERCENT CORRECT: 93.2287
HEIDKE SKILL SCORE: 0.60078
CHI SCORE: 3.70
THREAT SCORE: 0.41071

CASES = 25357

CLOUD HEIGHT TWO (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	ROW TOTALS
	0 - 100	24	6	1	0	0	13	44
	200 - 400	3	36	5	3	0	23	70
	500 - 900	0	9	91	39	3	92	234
PERSISTENCE	1000 - 2900	0	3	36	390	43	290	762
	3000 - 6000	0	1	3	43	796	339	1182
	CLR BELOW 6001	12	29	102	267	352	22303	23065
	COLUMN TOTALS:	39	84	238	742	1194	23060	25357
	BIASES:	1.13	0.83	0.98	1.03	0.99	1.00	

PERCENT CORRECT: 93.2287
HEIDKE SKILL SCORE: 0.60078
CHI SCORE: 3.70
THREAT SCORE: 0.41071

CASES = 25357

CLOUD HEIGHT THREE (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	ROW TOTALS
	0 - 100	0	0	0	1	0	1	2
	200 - 400	0	0	0	0	0	0	0
	500 - 900	0	0	5	5	10	50	70
GEM	1000 - 2900	0	2	1	21	22	99	145
	3000 - 6000	0	3	8	18	174	235	438
	CLR BELOW 6001	3	5	30	65	198	24401	24702
	COLUMN TOTALS:	3	10	44	110	404	24786	25357
	BIASES:	0.67	0.00	1.59	1.32	1.08	1.00	

PERCENT CORRECT: 97.0186
HEIDKE SKILL SCORE: 0.37184
CHI SCORE: 39.98
THREAT SCORE: 0.00000

CASES = 25357

CLOUD HEIGHT THREE (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	ROW TOTALS
	0 - 100	0	0	0	1	0	1	2
	200 - 400	0	0	0	1	3	13	17
	500 - 900	0	0	4	2	10	38	54
PERSISTENCE	1000 - 2900	0	2	1	17	18	73	111
	3000 - 6000	0	3	7	17	162	185	374
	CLR BELOW 6001	3	5	32	72	211	24476	24799
	COLUMN TOTALS:	3	10	44	110	404	24786	25357
	BIASES:	0.67	1.70	1.23	1.01	0.93	1.00	

PERCENT CORRECT: 97.2473
HEIDKE SKILL SCORE: 0.37111
CHI SCORE: 9.75
THREAT SCORE: 0.00000

CASES = 25357

CLOUD COVER ONE

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	OBSCURE	ROW TOTALS
	CLR BELOW 6001	18186	656	20	7	1	18870
	SCT	684	1980	380	89	0	3133
GEM	BKN	20	444	461	278	0	1203
	OVC	0	151	285	1715	0	2151
	OBSCURE	0	0	0	0	0	0
	COLUMN TOTALS:	18890	3231	1146	2089	1	25357
	BIASES:	1.00	0.97	1.05	1.03	0.00	

PERCENT CORRECT: 88.1098
HEIDKE SKILL SCORE: 0.71740
CHI SCORE: 8.67

CASES = 25357

CLOUD COVER ONE

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	OBSCURE	ROW TOTALS
	CLR BELOW 6001	18143	647	19	3	1	18813
	SCT	727	2048	434	153	0	3362
PERSISTENCE	BKN	20	389	429	257	0	1095
	OVC	0	146	264	1676	0	2086
	OBSCURE	0	1	0	0	0	1
	COLUMN TOTALS:	18890	3231	1146	2089	1	25357
	BIASES:	1.00	1.04	0.96	1.00	1.00	

PERCENT CORRECT: 87.9284
HEIDKE SKILL SCORE: 0.71372
CHI SCORE: 7.90

CASES = 25357

CLOUD COVER TWO

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	ROW TOTALS
	CLR BELOW 6001	22425	364	168	209	23166
GEM	SCT	333	325	98	18	774
	BKN	173	182	280	114	749
	OVC	224	54	144	246	668
	COLUMN TOTALS:	23155	925	690	587	25357
	BIASES:	1.00	0.84	1.09	1.14	

PERCENT CORRECT: 91.7932
HEIDKE SKILL SCORE: 0.49718
CHI SCORE: 40.88

CASES = 25357

CLOUD COVER TWO

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	ROW TOTALS
	CLR BELOW 6001	22372	355	166	209	23102
PERSISTENCE	SCT	392	390	149	27	958
	BKN	174	141	260	124	699
	OVC	217	39	115	227	598
	COLUMN TOTALS:	23155	925	690	587	25357
	BIASES:	1.00	1.04	1.01	1.02	

PERCENT CORRECT: 91.6867
HEIDKE SKILL SCORE: 0.49730
CHI SCORE: 1.62

CASES = 25357

CLOUD COVER THREE

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	ROW TOTALS
	CLR BELOW 6001	24322	130	105	124	24681
GEM	SCT	115	38	35	6	194
	BKN	101	23	79	38	241
	OVC	116	5	38	82	241
	COLUMN TOTALS:	24654	196	257	250	25357
	BIASES:	1.00	0.99	0.94	0.96	

PERCENT CORRECT: 96.7031
HEIDKE SKILL SCORE: 0.38254
CHI SCORE: 1.37

CASES = 25357

CLOUD COVER THREE

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	ROW TOTALS
	CLR BELOW 6001	24309	129	103	124	24665
PERSISTENCE	SCT	126	39	36	6	207
	BKN	103	23	80	38	244
	OVC	116	5	38	82	241
	COLUMN TOTALS:	24654	196	257	250	25357
	BIASES:	1.00	1.06	0.95	0.96	

PERCENT CORRECT: 96.6597
HEIDKE SKILL SCORE: 0.38147
CHI SCORE: 1.60

CASES = 25357

VISIBILITY (MILES)

VERIFYING OBSERVATION

		0 < 1/2	1/2 < 1	1 < 3	3 < 5	5 < 7	7 +	ROW TOTALS
	0 < 1/2	27	13	19	5	2	3	69
	1/2 < 1	9	25	38	23	3	5	103
GEM	1 < 3	5	28	550	206	33	26	848
	3 < 5	6	14	231	989	266	102	1608
	5 < 7	1	5	37	302	789	373	1507
	7 +	1	5	25	78	380	20733	21222
	COLUMN TOTALS:	49	90	900	1603	1473	21242	25357
	BIASES:	1.41	1.14	0.94	1.00	1.02	1.00	

PERCENT CORRECT: 91.1504
HEIDKE SKILL SCORE: 0.69507
CHI SCORE: 13.86
THREAT SCORE: 0.31224

CASES = 25357

VISIBILITY (MILES)

VERIFYING OBSERVATION

		0 < 1/2	1/2 < 1	1 < 3	3 < 5	5 < 7	7 +	ROW TOTALS
	0 < 1/2	27	13	19	5	2	3	69
	1/2 < 1	9	25	38	23	3	5	103
PERSISTENCE	1 < 3	5	28	550	206	33	26	848
	3 < 5	6	14	231	989	266	102	1608
	5 < 7	1	5	37	302	789	373	1507
	7 +	1	5	25	78	380	20733	21222
	COLUMN TOTALS:	49	90	900	1603	1473	21242	25357
	BIASES:	1.41	1.14	0.94	1.00	1.02	1.00	

PERCENT CORRECT: 91.1504
HEIDKE SKILL SCORE: 0.69507
CHI SCORE: 13.86
THREAT SCORE: 0.31224

CASES = 25357

GUSTS (KTS)

VERIFYING OBSERVATION

		0-10	11-20	21-30	31-40	41 +	ROW TOTALS
	0 - 10	22349	947	104	1	0	23401
	11 - 20	478	540	152	0	0	1170
GEM	21 - 30	112	154	449	31	0	746
	31 - 40	0	1	27	12	0	40
	41 +	0	0	0	0	0	0
	COLUMN TOTALS:	22939	1642	732	44	0	25357
	BIASES:	1.02	0.71	1.02	0.91	99.99	

PERCENT CORRECT: 92.0850
HEIDKE SKILL SCORE: 0.50930
CHI SCORE: 145.61

CASES = 25357

GUSTS (KTS)

VERIFYING OBSERVATION

		0-10	11-20	21-30	31-40	41 +	ROW TOTALS
	0 - 10	22092	741	102	1	0	22936
	11 - 20	735	746	155	0	0	1636
PERSISTENCE	21 - 30	112	154	448	31	0	745
	31 - 40	0	1	27	12	0	40
	41 +	0	0	0	0	0	0
	COLUMN TOTALS:	22939	1642	732	44	0	25357
	BIASES:	1.00	1.00	1.02	0.91	99.99	

PERCENT CORRECT: 91.8800
HEIDKE SKILL SCORE: 0.54047
CHI SCORE: 0.62

CASES = 25357

CEILING (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	ROW TOTALS
	0 - 100	63	29	2	0	0	17	111
	200 - 400	30	637	57	10	3	16	753
	500 - 900	4	58	342	75	5	26	510
GEM	1000 - 2900	2	8	65	1325	55	212	1667
	3000 - 6000	0	4	4	53	759	147	967
	CLR BELOW 6001	15	38	38	184	164	20910	21349
	COLUMN TOTALS:	114	774	508	1647	986	21328	25357
	BIASES:	0.97	0.97	1.00	1.01	0.98	1.00	

PERCENT CORRECT: 94.7904
HEIDKE SKILL SCORE: 0.81705
CHI SCORE: 1.29
THREAT SCORE: 0.76435

CASES = 25357

CEILING (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	ROW TOTALS
	0 - 100	63	29	2	0	0	17	111
	200 - 400	30	637	57	10	3	16	753
	500 - 900	4	58	342	75	5	26	510
PERSISTENCE	1000 - 2900	2	8	65	1325	55	212	1667
	3000 - 6000	0	4	4	53	759	147	967
	CLR BELOW 6001	15	38	38	184	164	20910	21349
	COLUMN TOTALS:	114	774	508	1647	986	21328	25357
	BIASES:	0.97	0.97	1.00	1.01	0.98	1.00	

PERCENT CORRECT: 94.7904
HEIDKE SKILL SCORE: 0.81705
CHI SCORE: 1.29
THREAT SCORE: 0.76435

CASES = 25357

TOTAL CLOUD AMOUNT

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	OBSCURE	ROW TOTALS
	CLR BELOW 6001	18186	647	29	7	1	18870
	SCT	676	1400	329	74	0	2479
GEM	BKN	25	313	470	274	0	1082
	OVC	3	77	275	2571	0	2926
	OBSCURE	0	0	0	0	0	0
	COLUMN TOTALS:	18890	2437	1103	2926	1	25357
	BIASES:	1.00	1.02	0.98	1.00	0.00	

PERCENT CORRECT: 89.2337
HEIDKE SKILL SCORE: 0.74430
CHI SCORE: 2.14

CASES = 25357

TOTAL CLOUD AMOUNT

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	OBSCURE	ROW TOTALS
	CLR BELOW 6001	18143	640	26	3	1	18813
	SCT	719	1406	332	78	0	2535
PERSISTENCE	BKN	25	313	471	274	0	1083
	OVC	3	77	274	2571	0	2925
	OBSCURE	0	1	0	0	0	1
	COLUMN TOTALS:	18890	2437	1103	2926	1	25357
	BIASES:	1.00	1.04	0.98	1.00	1.00	

PERCENT CORRECT: 89.0918
HEIDKE SKILL SCORE: 0.74183
CHI SCORE: 4.62

CASES = 25357

30 MINUTE PROJECTION

PRESSURE (INCHES)

VERIFYING OBSERVATION

		0- 29.235	29.236- 29.530	29.531- 29.677	29.678- 29.825	29.826- 29.973	29.974- 30.120	30.121- 30.268	30.269- 30.563	30.564 +	ROW TOTALS
	0 - 29.235	0	0	0	0	0	0	0	0	0	0
	29.236 - 29.530	0	449	17	0	0	0	0	0	0	466
	29.531 - 29.677	0	15	1118	52	0	0	0	0	0	1185
	29.678 - 29.825	0	0	44	2580	112	1	0	0	0	2737
GEM	29.826 - 29.973	0	0	0	108	5736	199	1	0	0	6044
	29.974 - 30.120	0	0	0	0	191	7332	125	0	0	7648
	30.121 - 30.268	0	0	0	0	1	127	4303	80	0	4511
	30.269 - 30.563	0	0	0	0	0	0	81	2527	2	2610
	30.564 +	0	0	0	0	0	0	0	2	82	84
	COLUMN TOTALS:	0	464	1179	2740	6040	7659	4510	2609	84	25285
	BIASES:	99.99	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00	

PERCENT CORRECT: 95.4202
HEIDKE SKILL SCORE: 0.94236
CHI SCORE: 0.06

CASES = 25285

PRESSURE (INCHES)

VERIFYING OBSERVATION

		0- 29.235	29.236- 29.530	29.531- 29.677	29.678- 29.825	29.826- 29.973	29.974- 30.120	30.121- 30.268	30.269- 30.563	30.564 +	ROW TOTALS
	0 - 29.235	0	0	0	0	0	0	0	0	0	0
	29.236 - 29.530	0	449	17	0	0	0	0	0	0	466
	29.531 - 29.677	0	15	1118	52	0	0	0	0	0	1185
	29.678 - 29.825	0	0	44	2580	112	1	0	0	0	2737
PERSISTENCE	29.826 - 29.973	0	0	0	108	5736	199	1	0	0	6044
	29.974 - 30.120	0	0	0	0	191	7332	125	0	0	7648
	30.121 - 30.268	0	0	0	0	1	127	4303	80	0	4511
	30.269 - 30.563	0	0	0	0	0	0	81	2527	2	2610
	30.564 +	0	0	0	0	0	0	0	2	82	84
	COLUMN TOTALS:	0	464	1179	2740	6040	7659	4510	2609	84	25285
	BIASES:	99.99	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00	

PERCENT CORRECT: 95.4202
HEIDKE SKILL SCORE: 0.94236
CHI SCORE: 0.06

CASES = 25285

TEMPERATURE (DEGREES FAHRENHEIT)

VERIFYING OBSERVATION

		< 5	5-14	15-24	25-34	35-39	40-44	45-49	50-54	55-59	60-64	65-74	75-84	85-94	95 +	ROW TOTALS
	< 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5 - 14	0	58	0	0	0	0	0	0	0	0	0	0	0	0	58
	15 - 24	0	2	689	116	0	1	0	0	0	0	0	0	0	0	808
	25 - 34	0	0	106	2019	208	15	2	0	0	0	0	0	0	0	2350
	35 - 39	0	0	1	214	1271	298	13	0	0	0	0	0	0	0	1797
GEM	40 - 44	0	0	0	10	307	1591	264	13	0	1	0	0	0	0	2186
	45 - 49	0	0	0	0	12	277	1426	304	16	1	0	0	0	0	2036
	50 - 54	0	0	0	0	0	10	297	1264	325	5	1	0	0	0	1902
	55 - 59	0	0	0	0	0	0	23	315	1620	310	13	1	0	0	2282
	60 - 64	0	0	0	0	0	0	1	10	305	1701	425	1	0	0	2443
	65 - 74	0	0	0	0	0	0	0	0	17	417	4532	327	0	0	5293
	75 - 84	0	0	0	0	0	0	0	1	1	1	323	2645	136	0	3107
	85 - 94	0	0	0	0	0	0	0	0	0	0	0	137	821	14	972
	95 +	0	0	0	0	0	0	0	0	0	0	0	0	15	36	51
	COLUMN TOTALS:	0	60	796	2359	1798	2192	2026	1907	2284	2436	5294	3111	972	50	25285
	BIASES:	99.99	0.97	1.02	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.02	

PERCENT CORRECT: 77.8050
HEIDKE SKILL SCORE: 0.74999
CHI SCORE: 0.41

CASES = 25285

TEMPERATURE (DEGREES FAHRENHEIT)

VERIFYING OBSERVATION

		< 5	5-14	15-24	25-34	35-39	40-44	45-49	50-54	55-59	60-64	65-74	75-84	85-94	95 +	ROW TOTALS
	< 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5 - 14	0	58	0	0	0	0	0	0	0	0	0	0	0	0	58
	15 - 24	0	2	689	116	0	1	0	0	0	0	0	0	0	0	808
	25 - 34	0	0	106	2019	208	15	2	0	0	0	0	0	0	0	2350
	35 - 39	0	0	1	214	1271	298	13	0	0	0	0	0	0	0	1797
PERSISTENCE	40 - 44	0	0	0	10	307	1591	264	13	0	1	0	0	0	0	2186
	45 - 49	0	0	0	0	12	277	1426	304	16	1	0	0	0	0	2036
	50 - 54	0	0	0	0	0	10	297	1264	325	5	1	0	0	0	1902
	55 - 59	0	0	0	0	0	0	23	315	1620	310	13	1	0	0	2282
	60 - 64	0	0	0	0	0	0	1	10	305	1701	425	1	0	0	2443
	65 - 74	0	0	0	0	0	0	0	0	17	417	4532	327	0	0	5293
	75 - 84	0	0	0	0	0	0	0	1	1	1	323	2645	136	0	3107
	85 - 94	0	0	0	0	0	0	0	0	0	0	0	137	821	14	972
	95 +	0	0	0	0	0	0	0	0	0	0	0	0	15	36	51
	COLUMN TOTALS:	0	60	796	2359	1798	2192	2026	1907	2284	2436	5294	3111	972	50	25285
	BIASES:	99.99	0.97	1.02	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.02	

PERCENT CORRECT: 77.8050
HEIDKE SKILL SCORE: 0.74999
CHI SCORE: 0.41

CASES = 25285

DEW POINT DEPRESSION (DEGREES FAHRENHEIT)

VERIFYING OBSERVATION

		0-1	2-7	8-15	16-25	26 +	ROW TOTALS
	0 - 1	1260	1227	8	0	0	2495
	2 - 7	1120	7491	765	3	1	9380
GEM	8 - 15	6	754	5739	631	0	7130
	16 - 25	0	8	623	4240	186	5057
	26 +	0	1	3	179	1040	1223
	COLUMN TOTALS:	2386	9481	7138	5053	1227	25285
	BIASES:	1.05	0.99	1.00	1.00	1.00	

PERCENT CORRECT: 78.1886
HEIDKE SKILL SCORE: 0.70108
CHI SCORE: 6.08

CASES = 25285

DEW POINT DEPRESSION (DEGREES FAHRENHEIT)

VERIFYING OBSERVATION

		0-1	2-7	8-15	16-25	26 +	ROW TOTALS
	0 - 1	1339	1049	10	0	0	2398
	2 - 7	1041	7669	763	3	1	9477
PERSISTENCE	8 - 15	6	754	5739	631	0	7130
	16 - 25	0	8	623	4240	186	5057
	26 +	0	1	3	179	1040	1223
	COLUMN TOTALS:	2386	9481	7138	5053	1227	25285
	BIASES:	1.01	1.00	1.00	1.00	1.00	

PERCENT CORRECT: 79.2051
HEIDKE SKILL SCORE: 0.71459
CHI SCORE: 0.09

CASES = 25285

WIND SPEED (KTS)

VERIFYING OBSERVATION

		0-1	2-9	10-19	20-29	30 +	ROW TOTALS
	0 - 1	314	831	0	0	0	1145
	2 - 9	841	18972	1065	3	0	20881
GEM	10 - 19	1	1045	2013	72	0	3131
	20 - 29	0	0	75	53	0	128
	30 +	0	0	0	0	0	0
	COLUMN TOTALS:	1156	20848	3153	128	0	25285
	BIASES:	0.99	1.00	0.99	1.00	99.99	

PERCENT CORRECT: 84.4453
HEIDKE SKILL SCORE: 0.48418
CHI SCORE: 0.31

CASES = 25285

WIND SPEED (KTS)

VERIFYING OBSERVATION

		0-1	2-9	10-19	20-29	30 +	ROW TOTALS
	0 - 1	314	831	0	0	0	1145
	2 - 9	841	18958	1065	3	0	20867
PERSISTENCE	10 - 19	1	1059	2010	75	0	3145
	20 - 29	0	0	78	50	0	128
	30 +	0	0	0	0	0	0
	COLUMN TOTALS:	1156	20848	3153	128	0	25285
	BIASES:	0.99	1.00	1.00	1.00	99.99	

PERCENT CORRECT: 84.3662
HEIDKE SKILL SCORE: 0.48222
CHI SCORE: 0.14

CASES = 25285

WIND DIRECTION (DEGS)

VERIFYING OBSERVATION

		0-44	45-89	90-134	135-179	180-224	225-269	270-314	315-359	ROW TOTALS
	0 - 44	1295	303	103	53	21	27	116	701	2619
	45 - 89	267	563	202	42	31	39	83	116	1343
	90 - 134	70	168	625	297	102	74	109	77	1522
GEM	135 - 179	41	37	229	1634	831	124	140	58	3094
	180 - 224	34	19	83	748	3328	441	229	90	4972
	225 - 269	38	36	74	134	431	724	452	95	1984
	270 - 314	121	77	125	125	165	487	2726	771	4597
	315 - 359	760	142	86	54	66	91	707	3248	5154
	COLUMN TOTALS:	2626	1345	1527	3087	4975	2007	4562	5156	25285
	BIASES:	1.00	1.00	1.00	1.00	1.00	0.99	1.01	1.00	

PERCENT CORRECT: 55.9343
HEIDKE SKILL SCORE: 0.48070
CHI SCORE: 0.59

CASES = 25285

WIND DIRECTION (DEGS)

VERIFYING OBSERVATION

		0-44	45-89	90-134	135-179	180-224	225-269	270-314	315-359	ROW TOTALS
	0 - 44	1295	303	103	53	21	27	116	701	2619
	45 - 89	267	563	202	42	31	39	83	116	1343
	90 - 134	70	168	625	297	102	74	109	77	1522
PERSISTENCE	135 - 179	41	37	229	1636	834	124	140	58	3099
	180 - 224	34	19	83	746	3325	441	229	90	4967
	225 - 269	38	36	74	134	433	750	455	95	2015
	270 - 314	121	77	125	125	163	461	2723	771	4566
	315 - 359	760	142	86	54	66	91	707	3248	5154
	COLUMN TOTALS:	2626	1345	1527	3087	4975	2007	4562	5156	25285
	BIASES:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	

PERCENT CORRECT: 56.0214
HEIDKE SKILL SCORE: 0.48181
CHI SCORE: 0.13

CASES = 25285

CLOUD HEIGHT ONE (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	PART. OBSCURE	ROW TOTALS
	0 - 100	156	38	1	6	4	36	4	245
	200 - 400	41	716	105	18	7	71	27	985
	500 - 900	3	99	518	115	7	39	7	788
GEM	1000 - 2900	5	18	113	1955	102	311	8	2512
	3000 - 6000	1	10	6	109	1188	295	7	1616
	CLR BELOW 6001	27	89	41	306	304	17962	97	18826
	PART. OBSCURE	9	19	4	8	3	116	154	313
	COLUMN TOTALS:	242	989	788	2517	1615	18830	304	25285
	BIASES:	1.01	1.00	1.00	1.00	1.00	1.00	1.03	

PERCENT CORRECT: 89.5748
HEIDKE SKILL SCORE: 0.75689
CHI SCORE: 0.33
THREAT SCORE: 0.62980

CASES = 25285

CLOUD HEIGHT ONE (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	PART. OBSCURE	ROW TOTALS
	0 - 100	156	38	1	6	4	36	4	245
	200 - 400	41	717	105	18	7	71	27	986
	500 - 900	3	96	516	115	7	39	5	781
PERSISTENCE	1000 - 2900	5	18	112	1955	102	311	8	2511
	3000 - 6000	1	10	6	109	1187	295	5	1613
	CLR BELOW 6001	27	89	41	306	304	17962	97	18826
	PART. OBSCURE	9	21	7	8	4	116	158	323
	COLUMN TOTALS:	242	989	788	2517	1615	18830	304	25285
	BIASES:	1.01	1.00	0.99	1.00	1.00	1.00	1.06	

PERCENT CORRECT: 89.5828
HEIDKE SKILL SCORE: 0.75708
CHI SCORE: 1.31
THREAT SCORE: 0.63046

CASES = 25285

CLOUD HEIGHT TWO (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	ROW TOTALS
	0 - 100	21	8	0	0	0	15	44
	200 - 400	8	29	7	4	2	22	72
	500 - 900	0	6	52	31	4	94	187
GEM	1000 - 2900	0	4	56	350	49	348	807
	3000 - 6000	0	1	4	46	687	437	1175
	CLR BELOW 6001	13	25	113	334	435	22080	23000
	COLUMN TOTALS:	42	73	232	765	1177	22996	25285
	BIASES:	1.05	0.99	0.81	1.05	1.00	1.00	

PERCENT CORRECT: 91.8291
HEIDKE SKILL SCORE: 0.51797
CHI SCORE: 11.15
THREAT SCORE: 0.40000

CASES = 25285

CLOUD HEIGHT TWO (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	ROW TOTALS
	0 - 100	21	8	0	0	0	14	43
	200 - 400	8	29	7	4	2	22	72
	500 - 900	0	7	62	41	4	117	231
PERSISTENCE	1000 - 2900	0	3	46	340	50	325	764
	3000 - 6000	0	1	4	46	686	434	1171
	CLR BELOW 6001	13	25	113	334	435	22084	23004
	COLUMN TOTALS:	42	73	232	765	1177	22996	25285
	BIASES:	1.02	0.99	1.00	1.00	0.99	1.00	

PERCENT CORRECT: 91.8410
HEIDKE SKILL SCORE: 0.51838
CHI SCORE: 0.08
THREAT SCORE: 0.40244

CASES = 25285

CLOUD HEIGHT THREE (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	ROW TOTALS
	0 - 100	0	0	0	0	0	0	0
	200 - 400	0	0	0	0	0	0	0
	500 - 900	0	0	4	2	7	49	62
GEM	1000 - 2900	0	0	2	27	25	111	165
	3000 - 6000	0	1	12	13	110	260	396
	CLR BELOW 6001	2	16	35	69	235	24305	24662
	COLUMN TOTALS:	2	17	53	111	377	24725	25285
	BIASES:	0.00	0.00	1.17	1.49	1.05	1.00	

PERCENT CORRECT: 96.6818
HEIDKE SKILL SCORE: 0.27824
CHI SCORE: 47.92
THREAT SCORE: 0.00000

CASES = 25285

CLOUD HEIGHT THREE (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	ROW TOTALS
	0 - 100	0	0	0	0	0	2	2
	200 - 400	0	0	0	2	4	11	17
	500 - 900	0	0	3	1	7	43	54
PERSISTENCE	1000 - 2900	0	1	1	16	14	79	111
	3000 - 6000	0	0	11	15	113	232	371
	CLR BELOW 6001	2	16	38	77	239	24358	24730
	COLUMN TOTALS:	2	17	53	111	377	24725	25285
	BIASES:	1.00	1.00	1.02	1.00	0.98	1.00	

PERCENT CORRECT: 96.8558
HEIDKE SKILL SCORE: 0.27501
CHI SCORE: 0.12
THREAT SCORE: 0.00000

CASES = 25285

CLOUD COVER ONE

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	OBSCURE	ROW TOTALS
	CLR BELOW 6001	17945	814	45	22	0	18826
	SCT	817	1793	421	161	1	3193
GEM	BKN	40	458	326	286	0	1110
	OVC	9	226	302	1619	0	2156
	OBSCURE	0	0	0	0	0	0
	COLUMN TOTALS:	18811	3291	1094	2088	1	25285
	BIASES:	1.00	0.97	1.01	1.03	0.00	

PERCENT CORRECT: 85.7544
HEIDKE SKILL SCORE: 0.66139
CHI SCORE: 6.38

CASES = 25285

CLOUD COVER ONE

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	OBSCURE	ROW TOTALS
	CLR BELOW 6001	17905	805	44	18	0	18772
	SCT	847	1840	426	228	1	3342
PERSISTENCE	BKN	50	427	338	272	0	1087
	OVC	9	219	285	1570	0	2083
	OBSCURE	0	0	1	0	0	1
	COLUMN TOTALS:	18811	3291	1094	2088	1	25285
	BIASES:	1.00	1.02	0.99	1.00	1.00	

PERCENT CORRECT: 85.6358
HEIDKE SKILL SCORE: 0.65946
CHI SCORE: 0.93

CASES = 25285

CLOUD COVER TWO

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	ROW TOTALS
	CLR BELOW 6001	22194	459	226	253	23132
GEM	SCT	442	242	121	44	849
	BKN	151	146	184	88	569
	OVC	283	74	169	209	735
	COLUMN TOTALS:	23070	921	700	594	25285
	BIASES:	1.00	0.92	0.81	1.24	

PERCENT CORRECT: 90.2867
HEIDKE SKILL SCORE: 0.40322
CHI SCORE: 63.78

CASES = 25285

CLOUD COVER TWO

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	ROW TOTALS
	CLR BELOW 6001	22132	444	216	251	23043
PERSISTENCE	SCT	462	282	148	57	949
	BKN	227	147	210	113	697
	OVC	249	48	126	173	596
	COLUMN TOTALS:	23070	921	700	594	25285
	BIASES:	1.00	1.03	1.00	1.00	

PERCENT CORRECT: 90.1602
HEIDKE SKILL SCORE: 0.40659
CHI SCORE: 0.90

CASES = 25285

CLOUD COVER THREE

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	ROW TOTALS
	CLR BELOW 6001	24192	135	141	145	24613
GEM	SCT	136	33	21	6	196
	BKN	131	19	56	28	234
	OVC	139	15	24	64	242
	COLUMN TOTALS:	24598	202	242	243	25285
	BIASES:	1.00	0.97	0.97	1.00	

PERCENT CORRECT: 96.2824
HEIDKE SKILL SCORE: 0.29567
CHI SCORE: 0.46

CASES = 25285

CLOUD COVER THREE

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	ROW TOTALS
	CLR BELOW 6001	24178	135	136	146	24595
PERSISTENCE	SCT	144	33	24	5	206
	BKN	138	20	59	28	245
	OVC	138	14	23	64	239
	COLUMN TOTALS:	24598	202	242	243	25285
	BIASES:	1.00	1.02	1.01	0.98	

PERCENT CORRECT: 96.2389
HEIDKE SKILL SCORE: 0.29658
CHI SCORE: 0.18

CASES = 25285

VISIBILITY (MILES)

VERIFYING OBSERVATION

		0 < 1/2	1/2 < 1	1 < 3	3 < 5	5 < 7	7 +	ROW TOTALS
	0 < 1/2	24	13	24	7	2	6	76
	1/2 < 1	5	20	31	23	9	9	97
GEM	1 < 3	15	41	470	237	43	29	835
	3 < 5	6	13	247	914	297	132	1609
	5 < 7	2	9	39	318	722	410	1500
	7 +	3	4	36	116	427	20582	21168
	COLUMN TOTALS:	55	100	847	1615	1500	21168	25285
	BIASES:	1.38	0.97	0.99	1.00	1.00	1.00	

PERCENT CORRECT: 89.9031
HEIDKE SKILL SCORE: 0.65234
CHI SCORE: 8.30
THREAT SCORE: 0.23308

CASES = 25285

VISIBILITY (MILES)

VERIFYING OBSERVATION

		0 < 1/2	1/2 < 1	1 < 3	3 < 5	5 < 7	7 +	ROW TOTALS
	0 < 1/2	23	11	21	7	2	6	70
	1/2 < 1	6	22	34	23	9	9	103
PERSISTENCE	1 < 3	15	41	470	237	43	29	835
	3 < 5	6	13	247	914	297	132	1609
	5 < 7	2	9	39	318	722	410	1500
	7 +	3	4	36	116	427	20582	21168
	COLUMN TOTALS:	55	100	847	1615	1500	21168	25285
	BIASES:	1.27	1.03	0.99	1.00	1.00	1.00	

PERCENT CORRECT: 89.9071
HEIDKE SKILL SCORE: 0.65248
CHI SCORE: 4.37
THREAT SCORE: 0.23308

CASES = 25285

GUSTS (KTS)

VERIFYING OBSERVATION

		0-10	11-20	21-30	31-40	41 +	ROW TOTALS
	0 - 10	22215	967	136	0	0	23318
	11 - 20	523	504	155	2	0	1184
GEM	21 - 30	124	157	431	31	0	743
	31 - 40	2	0	31	7	0	40
	41 +	0	0	0	0	0	0
	COLUMN TOTALS:	22864	1628	753	40	0	25285
	BIASES:	1.02	0.73	0.99	1.00	99.99	

PERCENT CORRECT: 91.5839
HEIDKE SKILL SCORE: 0.48113
CHI SCORE: 130.24

CASES = 25285

GUSTS (KTS)

VERIFYING OBSERVATION

		0-10	11-20	21-30	31-40	41 +	ROW TOTALS
	0 - 10	21947	795	129	0	0	22871
	11 - 20	791	676	162	2	0	1631
PERSISTENCE	21 - 30	124	157	431	31	0	743
	31 - 40	2	0	31	7	0	40
	41 +	0	0	0	0	0	0
	COLUMN TOTALS:	22864	1628	753	40	0	25285
	BIASES:	1.00	1.00	0.99	1.00	99.99	

PERCENT CORRECT: 91.2043
HEIDKE SKILL SCORE: 0.50320
CHI SCORE: 0.14

CASES = 25285

CEILING (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	ROW TOTALS
	0 - 100	54	32	3	0	0	33	122
	200 - 400	32	596	79	15	1	31	754
	500 - 900	5	68	301	88	6	38	506
GEM	1000 - 2900	2	7	75	1234	59	286	1663
	3000 - 6000	0	4	6	71	679	207	967
	CLR BELOW 6001	16	45	49	259	223	20681	21273
	COLUMN TOTALS:	109	752	513	1667	968	21276	25285
	BIASES:	1.12	1.00	0.99	1.00	1.00	1.00	

PERCENT CORRECT: 93.1184
HEIDKE SKILL SCORE: 0.75850
CHI SCORE: 1.66
THREAT SCORE: 0.69795

CASES = 25285

CEILING (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	ROW TOTALS
	0 - 100	48	32	3	0	0	26	109
	200 - 400	32	596	79	15	1	31	754
	500 - 900	5	68	301	88	6	38	506
PERSISTENCE	1000 - 2900	2	7	75	1234	59	286	1663
	3000 - 6000	0	4	6	71	679	205	965
	CLR BELOW 6001	22	45	49	259	223	20690	21288
	COLUMN TOTALS:	109	752	513	1667	968	21276	25285
	BIASES:	1.00	1.00	0.99	1.00	1.00	1.00	

PERCENT CORRECT: 93.1303
HEIDKE SKILL SCORE: 0.75850
CHI SCORE: 0.13
THREAT SCORE: 0.69685

CASES = 25285

TOTAL CLOUD AMOUNT

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	OBSCURE	ROW TOTALS
	CLR BELOW 6001	17945	774	80	27	0	18826
	SCT	784	1186	335	156	1	2462
GEM	BKN	65	340	361	300	0	1066
	OVC	17	164	308	2442	0	2931
	OBSCURE	0	0	0	0	0	0
	COLUMN TOTALS:	18811	2464	1084	2925	1	25285
	BIASES:	1.00	1.00	0.98	1.00	0.00	

PERCENT CORRECT: 86.7471
HEIDKE SKILL SCORE: 0.68549
CHI SCORE: 1.32

CASES = 25285

TOTAL CLOUD AMOUNT

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	OBSCURE	ROW TOTALS
	CLR BELOW 6001	17905	768	76	23	0	18772
	SCT	824	1192	338	160	1	2515
PERSISTENCE	BKN	65	341	369	304	0	1079
	OVC	17	163	300	2438	0	2918
	OBSCURE	0	0	1	0	0	1
	COLUMN TOTALS:	18811	2464	1084	2925	1	25285
	BIASES:	1.00	1.02	1.00	1.00	1.00	

PERCENT CORRECT: 86.6284
HEIDKE SKILL SCORE: 0.68374
CHI SCORE: 1.18

CASES = 25285

40 MINUTE PROJECTION

PRESSURE (INCHES)

VERIFYING OBSERVATION

		0- 29.235	29.236- 29.530	29.531- 29.677	29.678- 29.825	29.826- 29.973	29.974- 30.120	30.121- 30.268	30.269- 30.563	30.564 +	ROW TOTALS
	0 - 29.235	0	0	0	0	0	0	0	0	0	0
	29.236 - 29.530	0	444	20	0	0	0	0	0	0	464
	29.531 - 29.677	0	21	1096	69	1	0	0	0	0	1187
	29.678 - 29.825	0	0	59	2525	144	0	1	0	0	2729
GEM	29.826 - 29.973	0	0	0	126	5658	239	1	0	0	6024
	29.974 - 30.120	0	0	0	0	224	7233	172	0	0	7629
	30.121 - 30.268	0	0	0	0	1	163	4249	90	0	4503
	30.269 - 30.563	0	0	0	0	0	0	103	2484	2	2589
	30.564 +	0	0	0	0	0	0	0	3	81	84
	COLUMN TOTALS:	0	465	1175	2720	6028	7635	4526	2577	83	25209
	BIASES:	99.99	1.00	1.01	1.00	1.00	1.00	0.99	1.00	1.01	

PERCENT CORRECT: 94.2917
HEIDKE SKILL SCORE: 0.92814
CHI SCORE: 0.35

CASES = 25209

PRESSURE (INCHES)

VERIFYING OBSERVATION

		0- 29.235	29.236- 29.530	29.531- 29.677	29.678- 29.825	29.826- 29.973	29.974- 30.120	30.121- 30.268	30.269- 30.563	30.564 +	ROW TOTALS
	0 - 29.235	0	0	0	0	0	0	0	0	0	0
	29.236 - 29.530	0	444	20	0	0	0	0	0	0	464
	29.531 - 29.677	0	21	1096	69	1	0	0	0	0	1187
	29.678 - 29.825	0	0	59	2525	144	0	1	0	0	2729
PERSISTENCE	29.826 - 29.973	0	0	0	126	5658	239	1	0	0	6024
	29.974 - 30.120	0	0	0	0	224	7233	172	0	0	7629
	30.121 - 30.268	0	0	0	0	1	163	4249	90	0	4503
	30.269 - 30.563	0	0	0	0	0	0	103	2484	2	2589
	30.564 +	0	0	0	0	0	0	0	3	81	84
	COLUMN TOTALS:	0	465	1175	2720	6028	7635	4526	2577	83	25209
	BIASES:	99.99	1.00	1.01	1.00	1.00	1.00	0.99	1.00	1.01	

PERCENT CORRECT: 94.2917
HEIDKE SKILL SCORE: 0.92814
CHI SCORE: 0.35

CASES = 25209

TEMPERATURE (DEGREES FAHRENHEIT)

VERIFYING OBSERVATION

		< 5	5-14	15-24	25-34	35-39	40-44	45-49	50-54	55-59	60-64	65-74	75-84	85-94	95 +	ROW TOTALS
	< 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5 - 14	0	55	0	0	0	0	0	0	0	0	0	0	0	0	55
	15 - 24	0	3	660	141	1	0	0	0	0	0	0	0	0	0	805
	25 - 34	0	0	113	1962	236	27	3	0	0	0	0	0	0	0	2341
	35 - 39	0	0	0	264	1152	351	27	0	0	0	0	0	0	0	1794
GEM	40 - 44	0	0	0	17	355	1498	284	29	2	0	0	0	0	0	2185
	45 - 49	0	0	0	0	19	321	1314	333	30	2	0	0	0	0	2019
	50 - 54	0	0	0	0	0	15	348	1132	378	19	2	0	0	0	1894
	55 - 59	0	0	0	1	0	0	30	369	1492	354	31	0	0	0	2277
	60 - 64	0	0	0	0	0	0	1	23	353	1602	473	0	0	0	2452
	65 - 74	0	0	0	0	1	0	0	1	27	494	4360	387	0	0	5270
	75 - 84	0	0	0	0	0	0	0	1	1	1	394	2535	165	0	3097
	85 - 94	0	0	0	0	0	0	0	0	0	0	1	156	796	16	969
	95 +	0	0	0	0	0	0	0	0	0	0	0	0	16	35	51
	COLUMN TOTALS:	0	58	773	2385	1764	2212	2007	1888	2283	2472	5261	3078	977	51	25209
	BIASES:	99.99	0.95	1.04	0.98	1.02	0.99	1.01	1.00	1.00	0.99	1.00	1.01	0.99	1.00	

PERCENT CORRECT: 73.7554
HEIDKE SKILL SCORE: 0.70439
CHI SCORE: 3.60

CASES = 25209

TEMPERATURE (DEGREES FAHRENHEIT)

VERIFYING OBSERVATION

		< 5	5-14	15-24	25-34	35-39	40-44	45-49	50-54	55-59	60-64	65-74	75-84	85-94	95 +	ROW TOTALS
	< 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5 - 14	0	55	0	0	0	0	0	0	0	0	0	0	0	0	55
	15 - 24	0	3	660	141	1	0	0	0	0	0	0	0	0	0	805
	25 - 34	0	0	113	1962	236	27	3	0	0	0	0	0	0	0	2341
	35 - 39	0	0	0	264	1152	351	27	0	0	0	0	0	0	0	1794
PERSISTENCE	40 - 44	0	0	0	17	355	1498	284	29	2	0	0	0	0	0	2185
	45 - 49	0	0	0	0	19	321	1314	333	30	2	0	0	0	0	2019
	50 - 54	0	0	0	0	0	15	348	1132	378	19	2	0	0	0	1894
	55 - 59	0	0	0	1	0	0	30	369	1492	354	31	0	0	0	2277
	60 - 64	0	0	0	0	0	0	1	23	353	1602	473	0	0	0	2452
	65 - 74	0	0	0	0	1	0	0	1	27	494	4360	387	0	0	5270
	75 - 84	0	0	0	0	0	0	0	1	1	1	394	2535	165	0	3097
	85 - 94	0	0	0	0	0	0	0	0	0	0	1	156	796	16	969
	95 +	0	0	0	0	0	0	0	0	0	0	0	0	16	35	51
COLUMN TOTALS:		0	58	773	2385	1764	2212	2007	1888	2283	2472	5261	3078	977	51	25209
BIASES:		99.99	0.95	1.04	0.98	1.02	0.99	1.01	1.00	1.00	0.99	1.00	1.01	0.99	1.00	

PERCENT CORRECT: 73.7554
HEIDKE SKILL SCORE: 0.70439
CHI SCORE: 3.60

CASES = 25209

DEW POINT DEPRESSION (DEGREES FAHRENHEIT)

VERIFYING OBSERVATION

		0-1	2-7	8-15	16-25	26 +	ROW TOTALS
	0 - 1	958	1202	15	0	0	2175
	2 - 7	1417	7329	905	7	1	9659
GEM	8 - 15	8	863	5520	721	1	7113
	16 - 25	0	9	739	4069	221	5038
	26 +	1	0	2	206	1015	1224
	COLUMN TOTALS:	2384	9403	7181	5003	1238	25209
	BIASES:	0.91	1.03	0.99	1.01	0.99	

PERCENT CORRECT: 74.9375
HEIDKE SKILL SCORE: 0.65502
CHI SCORE: 26.34

CASES = 25209

DEW POINT DEPRESSION (DEGREES FAHRENHEIT)

VERIFYING OBSERVATION

		0-1	2-7	8-15	16-25	26 +	ROW TOTALS
	0 - 1	1165	1191	25	1	0	2382
	2 - 7	1210	7340	895	6	1	9452
PERSISTENCE	8 - 15	8	863	5520	721	1	7113
	16 - 25	0	9	739	4069	221	5038
	26 +	1	0	2	206	1015	1224
	COLUMN TOTALS:	2384	9403	7181	5003	1238	25209
	BIASES:	1.00	1.01	0.99	1.01	0.99	

PERCENT CORRECT: 75.8023
HEIDKE SKILL SCORE: 0.66797
CHI SCORE: 1.30

CASES = 25209

WIND SPEED (KTS)

VERIFYING OBSERVATION

		0-1	2-9	10-19	20-29	30 +	ROW TOTALS
	0 - 1	281	859	1	0	0	1141
	2 - 9	823	18880	1145	5	0	20853
GEM	10 - 19	0	1079	1929	81	0	3089
	20 - 29	0	1	75	50	0	126
	30 +	0	0	0	0	0	0
	COLUMN TOTALS:	1104	20819	3150	136	0	25209
	BIASES:	1.03	1.00	0.98	0.93	99.99	

PERCENT CORRECT: 83.8589
HEIDKE SKILL SCORE: 0.46112
CHI SCORE: 3.21

CASES = 25209

WIND SPEED (KTS)

VERIFYING OBSERVATION

		0-1	2-9	10-19	20-29	30 +	ROW TOTALS
	0 - 1	281	859	1	0	0	1141
	2 - 9	823	18842	1142	6	0	20813
PERSISTENCE	10 - 19	0	1116	1928	85	0	3129
	20 - 29	0	2	79	45	0	126
	30 +	0	0	0	0	0	0
	COLUMN TOTALS:	1104	20819	3150	136	0	25209
	BIASES:	1.03	1.00	0.99	0.93	99.99	

PERCENT CORRECT: 83.6844
HEIDKE SKILL SCORE: 0.45730
CHI SCORE: 2.12

CASES = 25209

WIND DIRECTION (DEGS)

VERIFYING OBSERVATION

		0-44	45-89	90-134	135-179	180-224	225-269	270-314	315-359	ROW TOTALS
	0 - 44	1239	304	119	70	32	25	123	709	2621
	45 - 89	257	500	202	54	38	42	96	140	1329
	90 - 134	70	188	540	308	110	77	122	88	1503
GEM	135 - 179	50	37	253	1509	889	139	154	72	3103
	180 - 224	40	25	118	765	3198	475	246	99	4966
	225 - 269	44	40	81	154	436	626	451	100	1932
	270 - 314	153	85	127	157	179	561	2580	782	4624
	315 - 359	792	146	90	70	58	92	765	3118	5131
	COLUMN TOTALS:	2645	1325	1530	3087	4940	2037	4537	5108	25209
	BIASES:	0.99	1.00	0.98	1.01	1.01	0.95	1.02	1.00	

PERCENT CORRECT: 52.7986
HEIDKE SKILL SCORE: 0.44376
CHI SCORE: 8.11

CASES = 25209

WIND DIRECTION (DEGS)

VERIFYING OBSERVATION

		0-44	45-89	90-134	135-179	180-224	225-269	270-314	315-359	ROW TOTALS
	0 - 44	1237	303	119	70	32	25	123	699	2608
	45 - 89	257	501	202	54	37	42	96	140	1329
	90 - 134	69	188	541	307	111	77	121	86	1500
PERSISTENCE	135 - 179	50	37	250	1508	888	139	155	71	3098
	180 - 224	40	25	116	765	3192	472	245	99	4954
	225 - 269	44	40	85	155	451	675	465	102	2017
	270 - 314	153	85	127	157	171	515	2567	781	4556
	315 - 359	795	146	90	71	58	92	765	3130	5147
	COLUMN TOTALS:	2645	1325	1530	3087	4940	2037	4537	5108	25209
	BIASES:	0.99	1.00	0.98	1.00	1.00	0.99	1.00	1.01	

PERCENT CORRECT: 52.9612
HEIDKE SKILL SCORE: 0.44585
CHI SCORE: 1.77

CASES = 25209

CLOUD HEIGHT ONE (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	PART. OBSCURE	ROW TOTALS
	0 - 100	149	49	0	9	4	33	4	248
	200 - 400	54	684	105	24	8	69	45	989
	500 - 900	5	122	468	143	6	53	11	808
GEM	1000 - 2900	4	23	128	1858	118	370	7	2508
	3000 - 6000	3	11	7	112	1137	336	8	1614
	CLR BELOW 6001	28	96	50	352	353	17775	113	18767
	PART. OBSCURE	11	14	4	7	1	122	116	275
	COLUMN TOTALS:	254	999	762	2505	1627	18758	304	25209
	BIASES:	0.98	0.99	1.06	1.00	0.99	1.00	0.90	

PERCENT CORRECT: 88.0122
HEIDKE SKILL SCORE: 0.72075
CHI SCORE: 5.90
THREAT SCORE: 0.60232

CASES = 25209

CLOUD HEIGHT ONE (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	PART. OBSCURE	ROW TOTALS
	0 - 100	149	49	0	9	4	33	4	248
	200 - 400	54	690	104	26	8	75	27	984
	500 - 900	4	109	466	140	6	46	7	778
PERSISTENCE	1000 - 2900	4	20	126	1858	118	370	7	2503
	3000 - 6000	3	11	7	112	1136	336	6	1611
	CLR BELOW 6001	28	96	50	352	353	17775	113	18767
	PART. OBSCURE	12	24	9	8	2	123	140	318
	COLUMN TOTALS:	254	999	762	2505	1627	18758	304	25209
	BIASES:	0.98	0.98	1.02	1.00	0.99	1.00	1.05	

PERCENT CORRECT: 88.1193
HEIDKE SKILL SCORE: 0.72327
CHI SCORE: 1.51
THREAT SCORE: 0.61050

CASES = 25209

CLOUD HEIGHT TWO (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	ROW TOTALS
	0 - 100	14	9	1	0	0	18	42
	200 - 400	8	25	4	6	3	25	71
	500 - 900	0	5	51	34	5	92	187
GEM	1000 - 2900	0	5	47	316	46	392	806
	3000 - 6000	0	2	4	59	637	499	1201
	CLR BELOW 6001	15	29	128	337	476	21917	22902
	COLUMN TOTALS:	37	75	235	752	1167	22943	25209
	BIASES:	1.14	0.95	0.80	1.07	1.03	1.00	

PERCENT CORRECT: 91.0786
HEIDKE SKILL SCORE: 0.47502
CHI SCORE: 15.63
THREAT SCORE: 0.33136

CASES = 25209

CLOUD HEIGHT TWO (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	ROW TOTALS
	0 - 100	14	9	1	0	0	18	42
	200 - 400	8	25	4	6	3	25	71
	500 - 900	0	7	58	43	5	117	230
PERSISTENCE	1000 - 2900	0	3	40	307	46	367	763
	3000 - 6000	0	2	5	50	628	480	1165
	CLR BELOW 6001	15	29	127	346	485	21936	22938
	COLUMN TOTALS:	37	75	235	752	1167	22943	25209
	BIASES:	1.14	0.95	0.98	1.01	1.00	1.00	

PERCENT CORRECT: 91.1103
HEIDKE SKILL SCORE: 0.47317
CHI SCORE: 1.16
THREAT SCORE: 0.33136

CASES = 25209

CLOUD HEIGHT THREE (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	ROW TOTALS
	0 - 100	0	0	0	0	0	0	0
	200 - 400	0	0	0	0	0	0	0
	500 - 900	0	1	6	1	8	41	57
GEM	1000 - 2900	0	0	3	21	18	108	150
	3000 - 6000	0	1	10	11	102	286	410
	CLR BELOW 6001	2	19	31	92	262	24186	24592
	COLUMN TOTALS:	2	21	50	125	390	24621	25209
	BIASES:	0.00	0.00	1.14	1.20	1.05	1.00	

PERCENT CORRECT: 96.4536
HEIDKE SKILL SCORE: 0.24456
CHI SCORE: 30.04
THREAT SCORE: 0.00000

CASES = 25209

CLOUD HEIGHT THREE (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	ROW TOTALS
	0 - 100	0	0	0	0	0	2	2
	200 - 400	0	0	0	2	2	12	16
	500 - 900	0	1	6	1	8	38	54
PERSISTENCE	1000 - 2900	0	0	0	13	15	83	111
	3000 - 6000	0	1	8	12	100	249	370
	CLR BELOW 6001	2	19	36	97	265	24237	24656
	COLUMN TOTALS:	2	21	50	125	390	24621	25209
	BIASES:	1.00	0.76	1.08	0.89	0.95	1.00	

PERCENT CORRECT: 96.6163
HEIDKE SKILL SCORE: 0.23955
CHI SCORE: 4.15
THREAT SCORE: 0.00000

CASES = 25209

CLOUD COVER ONE

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	OBSCURE	ROW TOTALS
	CLR BELOW 6001	17752	905	75	35	0	18767
	SCT	879	1680	413	218	0	3190
GEM	BKN	72	452	298	277	0	1099
	OVC	28	273	305	1547	0	2153
	OBSCURE	0	0	0	0	0	0
	COLUMN TOTALS:	18731	3310	1091	2077	0	25209
	BIASES:	1.00	0.96	1.01	1.04	99.99	

PERCENT CORRECT: 84.4024
HEIDKE SKILL SCORE: 0.62978
CHI SCORE: 7.26

CASES = 25209

CLOUD COVER ONE

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	OBSCURE	ROW TOTALS
	CLR BELOW 6001	17708	897	73	31	0	18709
	SCT	914	1718	428	280	0	3340
PERSISTENCE	BKN	82	433	304	268	0	1087
	OVC	27	262	285	1498	0	2072
	OBSCURE	0	0	1	0	0	1
	COLUMN TOTALS:	18731	3310	1091	2077	0	25209
	BIASES:	1.00	1.01	1.00	1.00	99.99	

PERCENT CORRECT: 84.2080
HEIDKE SKILL SCORE: 0.62625
CHI SCORE: 0.32

CASES = 25209

CLOUD COVER TWO

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	ROW TOTALS
	CLR BELOW 6001	22059	490	266	264	23079
GEM	SCT	461	216	127	36	840
	BKN	192	142	152	93	579
	OVC	299	88	151	173	711
	COLUMN TOTALS:	23011	936	696	566	25209
	BIASES:	1.00	0.90	0.83	1.26	

PERCENT CORRECT: 89.6505
HEIDKE SKILL SCORE: 0.36041
CHI SCORE: 66.86

CASES = 25209

CLOUD COVER TWO

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	ROW TOTALS
	CLR BELOW 6001	21979	470	257	263	22969
PERSISTENCE	SCT	505	251	150	49	955
	BKN	259	156	177	103	695
	OVC	268	59	112	151	590
	COLUMN TOTALS:	23011	936	696	566	25209
	BIASES:	1.00	1.02	1.00	1.04	

PERCENT CORRECT: 89.4839
HEIDKE SKILL SCORE: 0.36500
CHI SCORE: 1.48

CASES = 25209

CLOUD COVER THREE

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	ROW TOTALS
	CLR BELOW 6001	24071	144	173	156	24544
GEM	SCT	131	24	21	10	186
	BKN	142	22	47	29	240
	OVC	144	13	26	56	239
	COLUMN TOTALS:	24488	203	267	251	25209
	BIASES:	1.00	0.92	0.90	0.95	

PERCENT CORRECT: 95.9895
HEIDKE SKILL SCORE: 0.25692
CHI SCORE: 4.86

CASES = 25209

CLOUD COVER THREE

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	ROW TOTALS
	CLR BELOW 6001	24046	144	170	160	24520
PERSISTENCE	SCT	155	24	24	6	209
	BKN	143	23	47	29	242
	OVC	144	12	26	56	238
	COLUMN TOTALS:	24488	203	267	251	25209
	BIASES:	1.00	1.03	0.91	0.95	

PERCENT CORRECT: 95.8904
HEIDKE SKILL SCORE: 0.25127
CHI SCORE: 3.23

CASES = 25209

VISIBILITY (MILES)

VERIFYING OBSERVATION

		0 < 1/2	1/2 < 1	1 < 3	3 < 5	5 < 7	7 +	ROW TOTALS
	0 < 1/2	17	13	20	10	1	8	69
	1/2 < 1	5	19	38	15	9	12	98
GEM	1 < 3	14	37	427	255	59	43	835
	3 < 5	3	11	262	857	290	173	1596
	5 < 7	4	8	48	347	635	444	1486
	7 +	1	10	44	146	472	20452	21125
	COLUMN TOTALS:	44	98	839	1630	1466	21132	25209
	BIASES:	1.57	1.00	1.00	0.98	1.01	1.00	

PERCENT CORRECT: 88.8849
HEIDKE SKILL SCORE: 0.61525
CHI SCORE: 15.21
THREAT SCORE: 0.21176

CASES = 25209

VISIBILITY (MILES)

VERIFYING OBSERVATION

		0 < 1/2	1/2 < 1	1 < 3	3 < 5	5 < 7	7 +	ROW TOTALS
	0 < 1/2	17	13	20	10	1	8	69
	1/2 < 1	5	19	38	15	9	12	98
PERSISTENCE	1 < 3	14	37	427	255	59	43	835
	3 < 5	3	11	262	857	290	173	1596
	5 < 7	4	8	48	347	635	444	1486
	7 +	1	10	44	146	472	20452	21125
	COLUMN TOTALS:	44	98	839	1630	1466	21132	25209
	BIASES:	1.57	1.00	1.00	0.98	1.01	1.00	

PERCENT CORRECT: 88.8849
HEIDKE SKILL SCORE: 0.61525
CHI SCORE: 15.21
THREAT SCORE: 0.21176

CASES = 25209

GUSTS (KTS)

VERIFYING OBSERVATION

		0-10	11-20	21-30	31-40	41 +	ROW TOTALS
	0 - 10	22089	989	137	1	0	23216
	11 - 20	550	489	164	3	0	1206
GEM	21 - 30	148	162	411	27	0	748
	31 - 40	1	1	28	9	0	39
	41 +	0	0	0	0	0	0
	COLUMN TOTALS:	22788	1641	740	40	0	25209
	BIASES:	1.02	0.73	1.01	0.97	99.99	

PERCENT CORRECT: 91.2293
HEIDKE SKILL SCORE: 0.46362
CHI SCORE: 123.46

CASES = 25209

GUSTS (KTS)

VERIFYING OBSERVATION

		0-10	11-20	21-30	31-40	41 +	ROW TOTALS
	0 - 10	21843	833	128	1	0	22805
	11 - 20	799	646	175	3	0	1623
PERSISTENCE	21 - 30	145	161	409	27	0	742
	31 - 40	1	1	28	9	0	39
	41 +	0	0	0	0	0	0
	COLUMN TOTALS:	22788	1641	740	40	0	25209
	BIASES:	1.00	0.99	1.00	0.97	99.99	

PERCENT CORRECT: 90.8683
HEIDKE SKILL SCORE: 0.48462
CHI SCORE: 0.24

CASES = 25209

CEILING (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	ROW TOTALS
	0 - 100	49	37	4	0	0	35	125
	200 - 400	39	575	78	17	3	39	751
	500 - 900	8	73	269	98	8	47	503
GEM	1000 - 2900	2	14	78	1160	65	339	1658
	3000 - 6000	0	6	5	79	624	246	960
	CLR BELOW 6001	20	59	61	298	263	20511	21212
	COLUMN TOTALS:	118	764	495	1652	963	21217	25209
	BIASES:	1.06	0.98	1.02	1.00	1.00	1.00	

PERCENT CORRECT: 91.9830
HEIDKE SKILL SCORE: 0.71843
CHI SCORE: 0.80
THREAT SCORE: 0.66163

CASES = 25209

CEILING (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	ROW TOTALS
	0 - 100	42	36	4	0	0	30	112
	200 - 400	39	575	78	17	3	39	751
	500 - 900	8	73	269	98	8	47	503
PERSISTENCE	1000 - 2900	2	14	78	1161	65	339	1659
	3000 - 6000	0	5	4	78	625	243	955
	CLR BELOW 6001	27	61	62	298	262	20519	21229
	COLUMN TOTALS:	118	764	495	1652	963	21217	25209
	BIASES:	0.95	0.98	1.02	1.00	0.99	1.00	

PERCENT CORRECT: 91.9949
HEIDKE SKILL SCORE: 0.71829
CHI SCORE: 0.76
THREAT SCORE: 0.65717

CASES = 25209

TOTAL CLOUD AMOUNT

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	OBSCURE	ROW TOTALS
	CLR BELOW 6001	17752	844	119	52	0	18767
	SCT	833	1092	334	210	0	2469
GEM	BKN	96	334	326	292	0	1048
	OVC	50	216	319	2340	0	2925
	OBSCURE	0	0	0	0	0	0
	COLUMN TOTALS:	18731	2486	1098	2894	0	25209
	BIASES:	1.00	0.99	0.95	1.01	99.99	

PERCENT CORRECT: 85.3267
HEIDKE SKILL SCORE: 0.65234
CHI SCORE: 2.79

CASES = 25209

TOTAL CLOUD AMOUNT

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	OBSCURE	ROW TOTALS
	CLR BELOW 6001	17708	840	113	48	0	18709
	SCT	877	1094	336	212	0	2519
PERSISTENCE	BKN	96	341	337	306	0	1080
	OVC	50	211	311	2328	0	2900
	OBSCURE	0	0	1	0	0	1
	COLUMN TOTALS:	18731	2486	1098	2894	0	25209
	BIASES:	1.00	1.01	0.98	1.00	99.99	

PERCENT CORRECT: 85.1561
HEIDKE SKILL SCORE: 0.64960
CHI SCORE: 0.77

CASES = 25209

50 MINUTE PROJECTION

PRESSURE (INCHES)

VERIFYING OBSERVATION

		0- 29.235	29.236- 29.530	29.531- 29.677	29.678- 29.825	29.826- 29.973	29.974- 30.120	30.121- 30.268	30.269- 30.563	30.564 +	ROW TOTALS
	0 - 29.235	0	0	0	0	0	0	0	0	0	0
	29.236 - 29.530	0	438	25	0	0	0	0	0	0	463
	29.531 - 29.677	0	26	1085	74	0	0	0	0	0	1185
	29.678 - 29.825	0	0	67	2483	172	0	0	1	0	2723
GEM	29.826 - 29.973	0	0	0	152	5563	283	1	0	0	5999
	29.974 - 30.120	0	0	0	0	273	7132	207	0	0	7612
	30.121 - 30.268	0	0	0	0	0	200	4166	121	0	4487
	30.269 - 30.563	0	0	0	0	0	0	116	2468	4	2588
	30.564 +	0	0	0	0	0	0	0	4	79	83
	COLUMN TOTALS:	0	464	1177	2709	6008	7615	4490	2594	83	25140
	BIASES:	99.99	1.00	1.01	1.01	1.00	1.00	1.00	1.00	1.00	

PERCENT CORRECT: 93.1344
HEIDKE SKILL SCORE: 0.91359
CHI SCORE: 0.16

CASES = 25140

PRESSURE (INCHES)

VERIFYING OBSERVATION

		0- 29.235	29.236- 29.530	29.531- 29.677	29.678- 29.825	29.826- 29.973	29.974- 30.120	30.121- 30.268	30.269- 30.563	30.564 +	ROW TOTALS
	0 - 29.235	0	0	0	0	0	0	0	0	0	0
	29.236 - 29.530	0	438	25	0	0	0	0	0	0	463
	29.531 - 29.677	0	26	1085	74	0	0	0	0	0	1185
	29.678 - 29.825	0	0	67	2483	172	0	0	1	0	2723
PERSISTENCE	29.826 - 29.973	0	0	0	152	5563	283	1	0	0	5999
	29.974 - 30.120	0	0	0	0	273	7132	207	0	0	7612
	30.121 - 30.268	0	0	0	0	0	200	4166	121	0	4487
	30.269 - 30.563	0	0	0	0	0	0	116	2468	4	2588
	30.564 +	0	0	0	0	0	0	0	4	79	83
	COLUMN TOTALS:	0	464	1177	2709	6008	7615	4490	2594	83	25140
	BIASES:	99.99	1.00	1.01	1.01	1.00	1.00	1.00	1.00	1.00	

PERCENT CORRECT: 93.1344
HEIDKE SKILL SCORE: 0.91359
CHI SCORE: 0.16

CASES = 25140

TEMPERATURE (DEGREES FAHRENHEIT)

VERIFYING OBSERVATION

		< 5	5-14	15-24	25-34	35-39	40-44	45-49	50-54	55-59	60-64	65-74	75-84	85-94	95 +	ROW TOTALS
	< 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5 - 14	0	56	1	0	0	0	0	0	0	0	0	0	0	0	57
	15 - 24	0	4	640	154	1	0	0	0	0	0	0	0	0	0	799
	25 - 34	0	0	143	1871	267	45	6	0	0	0	0	0	0	0	2332
	35 - 39	0	0	0	298	1084	358	48	2	0	0	0	0	0	0	1790
GEM	40 - 44	0	0	0	18	411	1422	297	44	2	0	1	0	0	0	2195
	45 - 49	0	0	0	0	26	348	1231	341	59	3	1	0	0	0	2009
	50 - 54	0	0	0	0	2	17	392	1046	398	39	2	0	0	0	1896
	55 - 59	0	0	0	1	0	0	41	412	1371	384	53	0	0	0	2262
	60 - 64	0	0	0	0	0	0	5	29	400	1490	522	1	0	0	2447
	65 - 74	0	0	0	0	0	0	0	1	40	562	4198	451	1	0	5253
	75 - 84	0	0	0	0	0	0	0	1	1	1	450	2458	179	0	3090
	85 - 94	0	0	0	0	0	0	0	0	0	0	2	181	758	19	960
	95 +	0	0	0	0	0	0	0	0	0	0	0	0	19	31	50
	COLUMN TOTALS:	0	60	784	2342	1791	2190	2020	1876	2271	2479	5229	3091	957	50	25140
	BIASES:	99.99	0.95	1.02	1.00	1.00	1.00	0.99	1.01	1.00	0.99	1.00	1.00	1.00	1.00	

PERCENT CORRECT: 70.2307
HEIDKE SKILL SCORE: 0.66471
CHI SCORE: 1.33

CASES = 25140

TEMPERATURE (DEGREES FAHRENHEIT)

VERIFYING OBSERVATION

		< 5	5-14	15-24	25-34	35-39	40-44	45-49	50-54	55-59	60-64	65-74	75-84	85-94	95 +	ROW TOTALS
	< 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5 - 14	0	56	1	0	0	0	0	0	0	0	0	0	0	0	57
	15 - 24	0	4	640	154	1	0	0	0	0	0	0	0	0	0	799
	25 - 34	0	0	143	1871	267	45	6	0	0	0	0	0	0	0	2332
	35 - 39	0	0	0	298	1084	358	48	2	0	0	0	0	0	0	1790
PERSISTENCE	40 - 44	0	0	0	18	411	1422	297	44	2	0	1	0	0	0	2195
	45 - 49	0	0	0	0	26	348	1231	341	59	3	1	0	0	0	2009
	50 - 54	0	0	0	0	2	17	392	1046	398	39	2	0	0	0	1896
	55 - 59	0	0	0	1	0	0	41	412	1371	384	53	0	0	0	2262
	60 - 64	0	0	0	0	0	0	5	29	400	1490	522	1	0	0	2447
	65 - 74	0	0	0	0	0	0	0	1	40	562	4198	451	1	0	5253
	75 - 84	0	0	0	0	0	0	0	1	1	1	450	2458	179	0	3090
	85 - 94	0	0	0	0	0	0	0	0	0	0	2	181	758	19	960
	95 +	0	0	0	0	0	0	0	0	0	0	0	0	19	31	50
	COLUMN TOTALS:	0	60	784	2342	1791	2190	2020	1876	2271	2479	5229	3091	957	50	25140
	BIASES:	99.99	0.95	1.02	1.00	1.00	1.00	0.99	1.01	1.00	0.99	1.00	1.00	1.00	1.00	

PERCENT CORRECT: 70.2307
HEIDKE SKILL SCORE: 0.66471
CHI SCORE: 1.33

CASES = 25140

DEW POINT DEPRESSION (DEGREES FAHRENHEIT)

VERIFYING OBSERVATION

		0-1	2-7	8-15	16-25	26 +	ROW TOTALS
	0 - 1	884	1270	26	1	0	2181
	2 - 7	1476	7143	1007	13	2	9641
GEM	8 - 15	11	1003	5260	805	2	7081
	16 - 25	0	17	844	3894	258	5013
	26 +	1	0	10	236	977	1224
	COLUMN TOTALS:	2372	9433	7147	4949	1239	25140
	BIASES:	0.92	1.02	0.99	1.01	0.99	

PERCENT CORRECT: 72.2275
HEIDKE SKILL SCORE: 0.61756
CHI SCORE: 21.59

CASES = 25140

DEW POINT DEPRESSION (DEGREES FAHRENHEIT)

VERIFYING OBSERVATION

		0-1	2-7	8-15	16-25	26 +	ROW TOTALS
	0 - 1	1068	1268	44	1	0	2381
	2 - 7	1292	7145	989	13	2	9441
PERSISTENCE	8 - 15	11	1003	5260	805	2	7081
	16 - 25	0	17	844	3894	258	5013
	26 +	1	0	10	236	977	1224
	COLUMN TOTALS:	2372	9433	7147	4949	1239	25140
	BIASES:	1.00	1.00	0.99	1.01	0.99	

PERCENT CORRECT: 72.9674
HEIDKE SKILL SCORE: 0.62889
CHI SCORE: 1.66

CASES = 25140

WIND SPEED (KTS)

VERIFYING OBSERVATION

		0-1	2-9	10-19	20-29	30 +	ROW TOTALS
	0 - 1	292	856	0	0	0	1148
	2 - 9	799	18851	1176	4	0	20830
GEM	10 - 19	1	1081	1891	69	0	3042
	20 - 29	0	1	73	46	0	120
	30 +	0	0	0	0	0	0
	COLUMN TOTALS:	1092	20789	3140	119	0	25140
	BIASES:	1.05	1.00	0.97	1.01	99.99	

PERCENT CORRECT: 83.8504
HEIDKE SKILL SCORE: 0.45756
CHI SCORE: 6.02

CASES = 25140

WIND SPEED (KTS)

VERIFYING OBSERVATION

		0-1	2-9	10-19	20-29	30 +	ROW TOTALS
	0 - 1	292	856	0	0	0	1148
	2 - 9	799	18788	1161	5	0	20753
PERSISTENCE	10 - 19	1	1141	1902	70	0	3114
	20 - 29	0	4	77	44	0	125
	30 +	0	0	0	0	0	0
	COLUMN TOTALS:	1092	20789	3140	119	0	25140
	BIASES:	1.05	1.00	0.99	1.05	99.99	

PERCENT CORRECT: 83.6356
HEIDKE SKILL SCORE: 0.45433
CHI SCORE: 3.45

CASES = 25140

WIND DIRECTION (DEGS)

VERIFYING OBSERVATION

		0-44	45-89	90-134	135-179	180-224	225-269	270-314	315-359	ROW TOTALS
	0 - 44	1210	297	125	57	39	33	143	690	2594
	45 - 89	283	452	219	59	38	51	102	122	1326
	90 - 134	89	178	495	312	126	88	147	99	1534
GEM	135 - 179	58	38	227	1426	911	168	166	85	3079
	180 - 224	49	30	129	811	3110	476	269	114	4988
	225 - 269	50	45	80	170	409	560	443	106	1863
	270 - 314	182	91	130	170	210	557	2510	818	4668
	315 - 359	813	144	116	81	69	98	754	3013	5088
	COLUMN TOTALS:	2734	1275	1521	3086	4912	2031	4534	5047	25140
	BIASES:	0.95	1.04	1.01	1.00	1.02	0.92	1.03	1.01	

PERCENT CORRECT: 50.8194
HEIDKE SKILL SCORE: 0.42039
CHI SCORE: 28.70

CASES = 25140

WIND DIRECTION (DEGS)

VERIFYING OBSERVATION

		0-44	45-89	90-134	135-179	180-224	225-269	270-314	315-359	ROW TOTALS
	0 - 44	1210	297	125	57	39	33	143	689	2593
	45 - 89	283	452	219	59	38	51	102	122	1326
	90 - 134	84	178	497	311	126	87	147	76	1506
PERSISTENCE	135 - 179	58	37	224	1433	910	166	166	85	3079
	180 - 224	49	29	126	802	3093	471	266	111	4947
	225 - 269	50	47	85	172	448	630	470	110	2012
	270 - 314	182	90	129	169	189	494	2486	817	4556
	315 - 359	818	145	116	83	69	99	754	3037	5121
	COLUMN TOTALS:	2734	1275	1521	3086	4912	2031	4534	5047	25140
	BIASES:	0.95	1.04	0.99	1.00	1.01	0.99	1.00	1.01	

PERCENT CORRECT: 51.0660
HEIDKE SKILL SCORE: 0.42360
CHI SCORE: 11.09

CASES = 25140

CLOUD HEIGHT ONE (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	PART. OBSCURE	ROW TOTALS
	0 - 100	142	56	3	11	4	29	4	249
	200 - 400	50	649	109	27	9	70	57	971
	500 - 900	8	136	437	161	8	72	18	840
GEM	1000 - 2900	5	21	141	1765	139	420	7	2498
	3000 - 6000	3	11	9	133	1070	385	10	1621
	CLR BELOW 6001	31	99	57	387	395	17649	118	18736
	PART. OBSCURE	13	8	6	7	4	109	78	225
	COLUMN TOTALS:	252	980	762	2491	1629	18734	292	25140
	BIASES:	0.99	0.99	1.10	1.00	1.00	1.00	0.77	

PERCENT CORRECT: 86.6746
HEIDKE SKILL SCORE: 0.68858
CHI SCORE: 23.54
THREAT SCORE: 0.57685

CASES = 25140

CLOUD HEIGHT ONE (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	PART. OBSCURE	ROW TOTALS
	0 - 100	142	55	2	11	4	29	4	247
	200 - 400	55	653	115	30	9	86	34	982
	500 - 900	3	117	430	155	8	54	11	778
PERSISTENCE	1000 - 2900	5	21	139	1765	139	420	7	2496
	3000 - 6000	3	11	9	133	1069	385	7	1617
	CLR BELOW 6001	29	98	57	386	395	17625	109	18699
	PART. OBSCURE	15	25	10	11	5	135	120	321
	COLUMN TOTALS:	252	980	762	2491	1629	18734	292	25140
	BIASES:	0.98	1.00	1.02	1.00	0.99	1.00	1.10	

PERCENT CORRECT: 86.7303
HEIDKE SKILL SCORE: 0.69070
CHI SCORE: 3.48
THREAT SCORE: 0.58162

CASES = 25140

CLOUD HEIGHT TWO (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	ROW TOTALS
	0 - 100	13	6	1	1	0	19	40
	200 - 400	6	22	7	2	4	29	70
	500 - 900	1	6	39	30	4	69	149
GEM	1000 - 2900	0	8	48	280	54	409	799
	3000 - 6000	3	3	5	65	622	565	1263
	CLR BELOW 6001	16	39	136	360	495	21773	22819
	COLUMN TOTALS:	39	84	236	738	1179	22864	25140
	BIASES:	1.03	0.83	0.63	1.08	1.07	1.00	

PERCENT CORRECT: 90.4893
HEIDKE SKILL SCORE: 0.44428
CHI SCORE: 45.55
THREAT SCORE: 0.25269

CASES = 25140

CLOUD HEIGHT TWO (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	ROW TOTALS
	0 - 100	13	6	1	1	0	19	40
	200 - 400	6	22	7	2	4	29	70
	500 - 900	1	11	57	42	5	115	231
PERSISTENCE	1000 - 2900	0	5	33	271	55	392	756
	3000 - 6000	0	3	4	43	602	519	1171
	CLR BELOW 6001	19	37	134	379	513	21790	22872
	COLUMN TOTALS:	39	84	236	738	1179	22864	25140
	BIASES:	1.03	0.83	0.98	1.02	0.99	1.00	

PERCENT CORRECT: 90.5131
HEIDKE SKILL SCORE: 0.44002
CHI SCORE: 2.96
THREAT SCORE: 0.25269

CASES = 25140

CLOUD HEIGHT THREE (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	ROW TOTALS
	0 - 100	0	0	0	0	0	0	0
	200 - 400	0	0	0	0	0	0	0
	500 - 900	1	0	1	1	7	31	41
GEM	1000 - 2900	0	1	2	16	21	123	163
	3000 - 6000	0	2	12	12	105	313	444
	CLR BELOW 6001	2	7	31	78	263	24111	24492
	COLUMN TOTALS:	3	10	46	107	396	24578	25140
	BIASES:	0.00	0.00	0.89	1.52	1.12	1.00	

PERCENT CORRECT: 96.3922
HEIDKE SKILL SCORE: 0.23637
CHI SCORE: 48.97
THREAT SCORE: 0.00000

CASES = 25140

CLOUD HEIGHT THREE (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	ROW TOTALS
	0 - 100	0	0	0	0	0	2	2
	200 - 400	0	0	0	1	2	14	17
	500 - 900	1	0	3	1	9	39	53
PERSISTENCE	1000 - 2900	0	1	1	10	14	84	110
	3000 - 6000	0	0	5	9	93	261	368
	CLR BELOW 6001	2	9	37	86	278	24178	24590
	COLUMN TOTALS:	3	10	46	107	396	24578	25140
	BIASES:	0.67	1.70	1.15	1.03	0.93	1.00	

PERCENT CORRECT: 96.5951
HEIDKE SKILL SCORE: 0.21708
CHI SCORE: 8.37
THREAT SCORE: 0.00000

CASES = 25140

CLOUD COVER ONE

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	OBSCURE	ROW TOTALS
	CLR BELOW 6001	17605	935	105	53	1	18699
	SCT	966	1569	423	258	0	3216
GEM	BKN	85	411	269	248	0	1013
	OVC	51	307	344	1510	0	2212
	OBSCURE	0	0	0	0	0	0
	COLUMN TOTALS:	18707	3222	1141	2069	1	25140
	BIASES:	1.00	1.00	0.89	1.07	0.00	

PERCENT CORRECT: 83.3453
HEIDKE SKILL SCORE: 0.60446
CHI SCORE: 25.26

CASES = 25140

CLOUD COVER ONE

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	OBSCURE	ROW TOTALS
	CLR BELOW 6001	17561	928	102	49	1	18641
	SCT	991	1590	444	315	0	3340
PERSISTENCE	BKN	105	429	300	258	0	1092
	OVC	50	275	294	1447	0	2066
	OBSCURE	0	0	1	0	0	1
	COLUMN TOTALS:	18707	3222	1141	2069	1	25140
	BIASES:	1.00	1.04	0.96	1.00	1.00	

PERCENT CORRECT: 83.1265
HEIDKE SKILL SCORE: 0.60062
CHI SCORE: 6.66

CASES = 25140

CLOUD COVER TWO

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	ROW TOTALS
	CLR BELOW 6001	21941	511	272	266	22990
GEM	SCT	478	199	120	51	848
	BKN	206	136	155	87	584
	OVC	316	93	135	174	718
	COLUMN TOTALS:	22941	939	682	578	25140
	BIASES:	1.00	0.90	0.86	1.24	

PERCENT CORRECT: 89.3755
HEIDKE SKILL SCORE: 0.34805
CHI SCORE: 56.92

CASES = 25140

CLOUD COVER TWO

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	ROW TOTALS
	CLR BELOW 6001	21847	493	283	278	22901
PERSISTENCE	SCT	543	237	121	54	955
	BKN	269	143	172	105	689
	OVC	282	66	106	141	595
	COLUMN TOTALS:	22941	939	682	578	25140
	BIASES:	1.00	1.02	1.01	1.03	

PERCENT CORRECT: 89.0891
HEIDKE SKILL SCORE: 0.34285
CHI SCORE: 0.91

CASES = 25140

CLOUD COVER THREE

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	ROW TOTALS
	CLR BELOW 6001	23947	152	160	154	24413
GEM	SCT	171	23	22	12	228
	BKN	168	16	45	32	261
	OVC	155	10	26	47	238
	COLUMN TOTALS:	24441	201	253	245	25140
	BIASES:	1.00	1.13	1.03	0.97	

PERCENT CORRECT: 95.7120
HEIDKE SKILL SCORE: 0.22946
CHI SCORE: 4.11

CASES = 25140

CLOUD COVER THREE

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	ROW TOTALS
	CLR BELOW 6001	23973	152	166	163	24454
PERSISTENCE	SCT	160	24	19	5	208
	BKN	152	16	43	30	241
	OVC	156	9	25	47	237
	COLUMN TOTALS:	24441	201	253	245	25140
	BIASES:	1.00	1.03	0.95	0.97	

PERCENT CORRECT: 95.8115
HEIDKE SKILL SCORE: 0.22547
CHI SCORE: 1.08

CASES = 25140

VISIBILITY (MILES)

VERIFYING OBSERVATION

		0 < 1/2	1/2 < 1	1 < 3	3 < 5	5 < 7	7 +	ROW TOTALS
	0 < 1/2	14	13	23	7	9	9	75
	1/2 < 1	7	16	33	15	14	13	98
GEM	1 < 3	15	34	396	265	62	58	830
	3 < 5	1	13	288	783	278	221	1584
	5 < 7	4	8	77	357	581	461	1488
	7 +	4	8	60	162	523	20308	21065
	COLUMN TOTALS:	45	92	877	1589	1467	21070	25140
	BIASES:	1.67	1.07	0.95	1.00	1.01	1.00	

PERCENT CORRECT: 87.8998
HEIDKE SKILL SCORE: 0.58150
CHI SCORE: 23.23
THREAT SCORE: 0.19231

CASES = 25140

VISIBILITY (MILES)

VERIFYING OBSERVATION

		0 < 1/2	1/2 < 1	1 < 3	3 < 5	5 < 7	7 +	ROW TOTALS
	0 < 1/2	13	12	23	6	9	9	72
	1/2 < 1	8	17	31	16	13	13	98
PERSISTENCE	1 < 3	15	34	398	265	62	57	831
	3 < 5	1	13	288	783	279	222	1586
	5 < 7	4	8	77	357	581	461	1488
	7 +	4	8	60	162	523	20308	21065
	COLUMN TOTALS:	45	92	877	1589	1467	21070	25140
	BIASES:	1.60	1.07	0.95	1.00	1.01	1.00	

PERCENT CORRECT: 87.9077
HEIDKE SKILL SCORE: 0.58177
CHI SCORE: 19.31
THREAT SCORE: 0.19455

CASES = 25140

GUSTS (KTS)

VERIFYING OBSERVATION

		0-10	11-20	21-30	31-40	41 +	ROW TOTALS
	0 - 10	22027	975	148	3	0	23153
	11 - 20	562	484	155	1	0	1202
GEM	21 - 30	155	167	395	29	0	746
	31 - 40	2	0	28	9	0	39
	41 +	0	0	0	0	0	0
	COLUMN TOTALS:	22746	1626	726	42	0	25140
	BIASES:	1.02	0.74	1.03	0.93	99.99	

PERCENT CORRECT: 91.1496
HEIDKE SKILL SCORE: 0.45631
CHI SCORE: 118.61

CASES = 25140

GUSTS (KTS)

VERIFYING OBSERVATION

		0-10	11-20	21-30	31-40	41 +	ROW TOTALS
	0 - 10	21767	837	137	3	0	22744
	11 - 20	827	622	169	1	0	1619
PERSISTENCE	21 - 30	150	167	392	29	0	738
	31 - 40	2	0	28	9	0	39
	41 +	0	0	0	0	0	0
	COLUMN TOTALS:	22746	1626	726	42	0	25140
	BIASES:	1.00	1.00	1.02	0.93	99.99	

PERCENT CORRECT: 90.6523
HEIDKE SKILL SCORE: 0.47021
CHI SCORE: 0.44

CASES = 25140

CEILING (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	ROW TOTALS
	0 - 100	45	39	6	1	0	33	124
	200 - 400	41	556	85	22	2	46	752
	500 - 900	7	82	247	97	7	60	500
GEM	1000 - 2900	1	18	86	1085	78	386	1654
	3000 - 6000	0	6	5	91	595	268	965
	CLR BELOW 6001	24	70	75	328	290	20358	21145
	COLUMN TOTALS:	118	771	504	1624	972	21151	25140
	BIASES:	1.05	0.98	0.99	1.02	0.99	1.00	

PERCENT CORRECT: 91.0342
HEIDKE SKILL SCORE: 0.68573
CHI SCORE: 1.41
THREAT SCORE: 0.62823

CASES = 25140

CEILING (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	ROW TOTALS
	0 - 100	39	36	6	1	0	29	111
	200 - 400	40	556	84	21	2	46	749
	500 - 900	8	82	247	98	7	60	502
PERSISTENCE	1000 - 2900	1	18	86	1086	78	384	1653
	3000 - 6000	0	6	4	89	594	266	959
	CLR BELOW 6001	30	73	77	329	291	20366	21166
	COLUMN TOTALS:	118	771	504	1624	972	21151	25140
	BIASES:	0.94	0.97	1.00	1.02	0.99	1.00	

PERCENT CORRECT: 91.0422
HEIDKE SKILL SCORE: 0.68526
CHI SCORE: 1.75
THREAT SCORE: 0.62245

CASES = 25140

TOTAL CLOUD AMOUNT

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	OBSCURE	ROW TOTALS
	CLR BELOW 6001	17606	874	135	84	1	18700
	SCT	904	998	342	260	0	2504
GEM	BKN	109	316	281	274	0	980
	OVC	88	255	339	2274	0	2956
	OBSCURE	0	0	0	0	0	0
	COLUMN TOTALS:	18707	2443	1097	2892	1	25140
	BIASES:	1.00	1.02	0.89	1.02	0.00	

PERCENT CORRECT: 84.1647
HEIDKE SKILL SCORE: 0.62440
CHI SCORE: 16.42

CASES = 25140

TOTAL CLOUD AMOUNT

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	OBSCURE	ROW TOTALS
	CLR BELOW 6001	17561	870	130	79	1	18641
	SCT	944	990	334	256	0	2524
PERSISTENCE	BKN	115	345	310	306	0	1076
	OVC	87	238	322	2251	0	2898
	OBSCURE	0	0	1	0	0	1
	COLUMN TOTALS:	18707	2443	1097	2892	1	25140
	BIASES:	1.00	1.03	0.98	1.00	1.00	

PERCENT CORRECT: 83.9777
HEIDKE SKILL SCORE: 0.62155
CHI SCORE: 3.33

CASES = 25140

60 MINUTE PROJECTION

PRESSURE (INCHES)

VERIFYING OBSERVATION

		0- 29.235	29.236- 29.530	29.531- 29.677	29.678- 29.825	29.826- 29.973	29.974- 30.120	30.121- 30.268	30.269- 30.563	30.564 +	ROW TOTALS
	0 - 29.235	0	0	0	0	0	0	0	0	0	0
	29.236 - 29.530	0	431	31	0	0	0	0	0	0	462
	29.531 - 29.677	0	27	1063	89	0	0	0	0	0	1179
	29.678 - 29.825	0	0	77	2452	195	1	0	0	0	2725
GEM	29.826 - 29.973	0	0	0	181	5486	326	1	0	0	5994
	29.974 - 30.120	0	0	0	0	315	7044	227	0	0	7586
	30.121 - 30.268	0	0	0	0	1	232	4107	136	0	4476
	30.269 - 30.563	0	0	0	0	0	0	134	2447	4	2585
	30.564 +	0	0	0	0	0	0	0	4	78	82
	COLUMN TOTALS:	0	458	1171	2722	5997	7603	4469	2587	82	25089
	BIASES:	99.99	1.01	1.01	1.00	1.00	1.00	1.00	1.00	1.00	

PERCENT CORRECT: 92.1041
HEIDKE SKILL SCORE: 0.90062
CHI SCORE: 0.14

CASES = 25089

PRESSURE (INCHES)

VERIFYING OBSERVATION

		0- 29.235	29.236- 29.530	29.531- 29.677	29.678- 29.825	29.826- 29.973	29.974- 30.120	30.121- 30.268	30.269- 30.563	30.564 +	ROW TOTALS
	0 - 29.235	0	0	0	0	0	0	0	0	0	0
	29.236 - 29.530	0	431	31	0	0	0	0	0	0	462
	29.531 - 29.677	0	27	1063	89	0	0	0	0	0	1179
	29.678 - 29.825	0	0	77	2452	195	1	0	0	0	2725
PERSISTENCE	29.826 - 29.973	0	0	0	181	5486	326	1	0	0	5994
	29.974 - 30.120	0	0	0	0	315	7044	227	0	0	7586
	30.121 - 30.268	0	0	0	0	1	232	4107	136	0	4476
	30.269 - 30.563	0	0	0	0	0	0	134	2447	4	2585
	30.564 +	0	0	0	0	0	0	0	4	78	82
	COLUMN TOTALS:	0	458	1171	2722	5997	7603	4469	2587	82	25089
	BIASES:	99.99	1.01	1.01	1.00	1.00	1.00	1.00	1.00	1.00	

PERCENT CORRECT: 92.1041
HEIDKE SKILL SCORE: 0.90062
CHI SCORE: 0.14

CASES = 25089

TEMPERATURE (DEGREES FAHRENHEIT)

VERIFYING OBSERVATION

		< 5	5-14	15-24	25-34	35-39	40-44	45-49	50-54	55-59	60-64	65-74	75-84	85-94	95 +	ROW TOTALS
	< 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5 - 14	0	53	2	0	0	0	0	0	0	0	0	0	0	0	55
	15 - 24	0	4	621	166	4	0	0	0	0	0	0	0	0	0	795
	25 - 34	0	0	149	1827	286	54	12	0	0	0	0	0	0	0	2328
	35 - 39	0	0	1	328	1014	379	57	6	0	0	0	0	0	0	1785
GEM	40 - 44	0	0	0	27	450	1342	297	64	5	0	0	0	0	0	2185
	45 - 49	0	0	0	1	32	377	1182	335	84	4	0	0	0	0	2015
	50 - 54	0	0	0	0	1	33	410	990	393	57	4	0	0	0	1888
	55 - 59	0	0	0	0	0	0	52	443	1292	385	78	1	0	0	2251
	60 - 64	0	0	0	0	0	0	6	39	441	1384	568	1	0	0	2439
	65 - 74	0	0	0	0	0	0	0	3	48	592	4084	519	0	0	5246
	75 - 84	0	0	0	0	0	0	0	0	1	4	513	2369	200	0	3087
	85 - 94	0	0	0	0	0	0	0	0	0	0	2	196	748	18	964
	95 +	0	0	0	0	0	0	0	0	0	0	0	1	18	32	51
	COLUMN TOTALS:	0	57	773	2349	1787	2185	2016	1880	2264	2426	5249	3087	966	50	25089
	BIASES:	99.99	0.96	1.03	0.99	1.00	1.00	1.00	1.00	0.99	1.01	1.00	1.00	1.00	1.02	

PERCENT CORRECT: 67.5117
HEIDKE SKILL SCORE: 0.63403
CHI SCORE: 1.09

CASES = 25089

TEMPERATURE (DEGREES FAHRENHEIT)

VERIFYING OBSERVATION

		< 5	5-14	15-24	25-34	35-39	40-44	45-49	50-54	55-59	60-64	65-74	75-84	85-94	95 +	ROW TOTALS
	< 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5 - 14	0	53	2	0	0	0	0	0	0	0	0	0	0	0	55
	15 - 24	0	4	621	166	4	0	0	0	0	0	0	0	0	0	795
	25 - 34	0	0	149	1827	286	54	12	0	0	0	0	0	0	0	2328
	35 - 39	0	0	1	328	1014	379	57	6	0	0	0	0	0	0	1785
PERSISTENCE	40 - 44	0	0	0	27	450	1342	297	64	5	0	0	0	0	0	2185
	45 - 49	0	0	0	1	32	377	1182	335	84	4	0	0	0	0	2015
	50 - 54	0	0	0	0	1	33	410	990	393	57	4	0	0	0	1888
	55 - 59	0	0	0	0	0	0	52	443	1292	385	78	1	0	0	2251
	60 - 64	0	0	0	0	0	0	6	39	441	1384	568	1	0	0	2439
	65 - 74	0	0	0	0	0	0	0	3	48	592	4084	519	0	0	5246
	75 - 84	0	0	0	0	0	0	0	0	1	4	513	2369	200	0	3087
	85 - 94	0	0	0	0	0	0	0	0	0	0	2	196	748	18	964
	95 +	0	0	0	0	0	0	0	0	0	0	0	1	18	32	51
	COLUMN TOTALS:	0	57	773	2349	1787	2185	2016	1880	2264	2426	5249	3087	966	50	25089
	BIASES:	99.99	0.96	1.03	0.99	1.00	1.00	1.00	1.00	0.99	1.01	1.00	1.00	1.00	1.02	

PERCENT CORRECT: 67.5117
HEIDKE SKILL SCORE: 0.63403
CHI SCORE: 1.09

CASES = 25089

DEW POINT DEPRESSION (DEGREES FAHRENHEIT)

VERIFYING OBSERVATION

		0-1	2-7	8-15	16-25	26 +	ROW TOTALS
	0 - 1	951	1385	39	0	0	2375
	2 - 7	1390	6908	1079	27	2	9406
GEM	8 - 15	9	1100	5018	931	7	7065
	16 - 25	0	32	939	3782	273	5026
	26 +	0	1	12	269	935	1217
	COLUMN TOTALS:	2350	9426	7087	5009	1217	25089
	BIASES:	1.01	1.00	1.00	1.00	1.00	

PERCENT CORRECT: 70.1264
HEIDKE SKILL SCORE: 0.58987
CHI SCORE: 0.43

CASES = 25089

DEW POINT DEPRESSION (DEGREES FAHRENHEIT)

VERIFYING OBSERVATION

		0-1	2-7	8-15	16-25	26 +	ROW TOTALS
	0 - 1	1031	1281	64	0	0	2376
	2 - 7	1310	7012	1054	27	2	9405
PERSISTENCE	8 - 15	9	1100	5018	931	7	7065
	16 - 25	0	32	939	3782	273	5026
	26 +	0	1	12	269	935	1217
	COLUMN TOTALS:	2350	9426	7087	5009	1217	25089
	BIASES:	1.01	1.00	1.00	1.00	1.00	

PERCENT CORRECT: 70.8597
HEIDKE SKILL SCORE: 0.59994
CHI SCORE: 0.46

CASES = 25089

WIND SPEED (KTS)

VERIFYING OBSERVATION

		0-1	2-9	10-19	20-29	30 +	ROW TOTALS
	0 - 1	268	869	0	0	0	1137
	2 - 9	873	18747	1212	2	0	20834
GEM	10 - 19	2	1088	1824	83	0	2997
	20 - 29	0	2	76	43	0	121
	30 +	0	0	0	0	0	0
	COLUMN TOTALS:	1143	20706	3112	128	0	25089
	BIASES:	0.99	1.01	0.96	0.95	99.99	

PERCENT CORRECT: 83.2317
HEIDKE SKILL SCORE: 0.43685
CHI SCORE: 5.46

CASES = 25089

WIND SPEED (KTS)

VERIFYING OBSERVATION

		0-1	2-9	10-19	20-29	30 +	ROW TOTALS
	0 - 1	268	869	0	0	0	1137
	2 - 9	873	18664	1176	3	0	20716
PERSISTENCE	10 - 19	2	1169	1855	87	0	3113
	20 - 29	0	4	81	38	0	123
	30 +	0	0	0	0	0	0
	COLUMN TOTALS:	1143	20706	3112	128	0	25089
	BIASES:	0.99	1.00	1.00	0.96	99.99	

PERCENT CORRECT: 83.0045
HEIDKE SKILL SCORE: 0.43549
CHI SCORE: 0.23

CASES = 25089

WIND DIRECTION (DEGS)

VERIFYING OBSERVATION

		0-44	45-89	90-134	135-179	180-224	225-269	270-314	315-359	ROW TOTALS
	0 - 44	1112	312	136	68	38	45	153	742	2606
	45 - 89	261	426	222	67	34	52	118	144	1324
	90 - 134	87	197	450	297	136	89	158	77	1491
GEM	135 - 179	59	43	239	1348	923	186	183	101	3082
	180 - 224	48	37	115	831	3043	521	286	112	4993
	225 - 269	57	49	86	182	441	466	441	114	1836
	270 - 314	171	114	144	170	263	530	2424	860	4676
	315 - 359	793	159	118	89	70	106	775	2971	5081
	COLUMN TOTALS:	2588	1337	1510	3052	4948	1995	4538	5121	25089
	BIASES:	1.01	0.99	0.99	1.01	1.01	0.92	1.03	0.99	

PERCENT CORRECT: 48.7863
HEIDKE SKILL SCORE: 0.39595
CHI SCORE: 18.38

CASES = 25089

WIND DIRECTION (DEGS)

VERIFYING OBSERVATION

		0-44	45-89	90-134	135-179	180-224	225-269	270-314	315-359	ROW TOTALS
	0 - 44	1112	312	136	68	38	44	153	736	2599
	45 - 89	261	426	221	67	34	52	117	143	1321
	90 - 134	82	200	453	304	138	90	156	76	1499
PERSISTENCE	135 - 179	59	40	235	1346	927	185	182	101	3075
	180 - 224	48	36	111	820	3019	516	276	112	4938
	225 - 269	58	51	92	189	490	540	477	116	2013
	270 - 314	170	113	142	169	232	461	2398	858	4543
	315 - 359	798	159	120	89	70	107	779	2979	5101
	COLUMN TOTALS:	2588	1337	1510	3052	4948	1995	4538	5121	25089
	BIASES:	1.00	0.99	0.99	1.01	1.00	1.01	1.00	1.00	

PERCENT CORRECT: 48.9179
HEIDKE SKILL SCORE: 0.39801
CHI SCORE: 0.76

CASES = 25089

CLOUD HEIGHT ONE (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	PART. OBSCURE	ROW TOTALS
	0 - 100	134	57	4	11	5	27	4	242
	200 - 400	45	599	117	25	7	38	70	901
	500 - 900	13	166	417	157	10	107	19	889
GEM	1000 - 2900	10	33	160	1722	137	453	10	2525
	3000 - 6000	4	18	11	143	1022	412	8	1618
	CLR BELOW 6001	29	101	63	432	428	17548	128	18729
	PART. OBSCURE	9	5	7	7	2	96	59	185
	COLUMN TOTALS:	244	979	779	2497	1611	18681	298	25089
	BIASES:	0.99	0.92	1.14	1.01	1.00	1.00	0.62	

PERCENT CORRECT: 85.6989
HEIDKE SKILL SCORE: 0.66533
CHI SCORE: 65.08
THREAT SCORE: 0.54540

CASES = 25089

CLOUD HEIGHT ONE (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	PART. OBSCURE	ROW TOTALS
	0 - 100	134	57	4	11	5	27	4	242
	200 - 400	53	632	126	32	9	93	34	979
	500 - 900	4	124	412	157	8	57	13	775
PERSISTENCE	1000 - 2900	10	23	151	1712	137	444	10	2487
	3000 - 6000	4	16	11	143	1021	412	6	1613
	CLR BELOW 6001	27	101	62	431	427	17515	116	18679
	PART. OBSCURE	12	26	13	11	4	133	115	314
	COLUMN TOTALS:	244	979	779	2497	1611	18681	298	25089
	BIASES:	0.99	1.00	0.99	1.00	1.00	1.00	1.05	

PERCENT CORRECT: 85.8583
HEIDKE SKILL SCORE: 0.67030
CHI SCORE: 0.94
THREAT SCORE: 0.55867

CASES = 25089

CLOUD HEIGHT TWO (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	ROW TOTALS
	0 - 100	14	4	2	1	1	18	40
	200 - 400	7	19	2	5	3	30	66
	500 - 900	1	4	33	24	4	66	132
GEM	1000 - 2900	2	6	63	269	59	356	755
	3000 - 6000	0	3	6	98	551	643	1301
	CLR BELOW 6001	16	39	125	361	547	21707	22795
	COLUMN TOTALS:	40	75	231	758	1165	22820	25089
	BIASES:	1.00	0.88	0.57	1.00	1.12	1.00	

PERCENT CORRECT: 90.0514
HEIDKE SKILL SCORE: 0.41557
CHI SCORE: 59.42
THREAT SCORE: 0.24859

CASES = 25089

CLOUD HEIGHT TWO (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	ROW TOTALS
	0 - 100	14	4	2	1	1	18	40
	200 - 400	7	19	4	5	3	33	71
	500 - 900	1	9	50	44	7	115	226
PERSISTENCE	1000 - 2900	0	3	47	267	58	382	757
	3000 - 6000	0	3	4	55	543	560	1165
	CLR BELOW 6001	18	37	124	386	553	21712	22830
	COLUMN TOTALS:	40	75	231	758	1165	22820	25089
	BIASES:	1.00	0.95	0.98	1.00	1.00	1.00	

PERCENT CORRECT: 90.0992
HEIDKE SKILL SCORE: 0.41476
CHI SCORE: 0.33
THREAT SCORE: 0.24176

CASES = 25089

CLOUD HEIGHT THREE (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	ROW TOTALS
	0 - 100	0	0	0	0	0	0	0
	200 - 400	0	0	0	0	0	0	0
	500 - 900	0	0	2	1	5	29	37
GEM	1000 - 2900	0	0	0	13	19	116	148
	3000 - 6000	0	5	13	18	104	398	538
	CLR BELOW 6001	2	12	39	78	240	23995	24366
	COLUMN TOTALS:	2	17	54	110	368	24538	25089
	BIASES:	0.00	0.00	0.69	1.35	1.46	0.99	

PERCENT CORRECT: 96.1138
HEIDKE SKILL SCORE: 0.21969
CHI SCORE: 117.22
THREAT SCORE: 0.00000

CASES = 25089

CLOUD HEIGHT THREE (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	ROW TOTALS
	0 - 100	0	0	0	0	0	2	2
	200 - 400	0	0	0	1	5	11	17
	500 - 900	0	0	3	1	9	41	54
PERSISTENCE	1000 - 2900	0	1	0	12	12	85	110
	3000 - 6000	0	2	6	11	70	274	363
	CLR BELOW 6001	2	14	45	85	272	24125	24543
	COLUMN TOTALS:	2	17	54	110	368	24538	25089
	BIASES:	1.00	1.00	1.00	1.00	0.99	1.00	

PERCENT CORRECT: 96.4965
HEIDKE SKILL SCORE: 0.18541
CHI SCORE: 0.07
THREAT SCORE: 0.00000

CASES = 25089

CLOUD COVER ONE

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	OBSCURE	ROW TOTALS
	CLR BELOW 6001	17495	1004	114	71	0	18684
	SCT	1042	1605	467	331	1	3446
GEM	BKN	45	295	156	165	0	661
	OVC	70	380	345	1503	0	2298
	OBSCURE	0	0	0	0	0	0
	COLUMN TOTALS:	18652	3284	1082	2070	1	25089
	BIASES:	1.00	1.05	0.61	1.11	0.00	

PERCENT CORRECT: 82.7414
HEIDKE SKILL SCORE: 0.58878
CHI SCORE: 197.97

CASES = 25089

CLOUD COVER ONE

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	OBSCURE	ROW TOTALS
	CLR BELOW 6001	17446	997	111	67	0	18621
	SCT	1022	1527	428	339	1	3317
PERSISTENCE	BKN	123	449	259	257	0	1088
	OVC	61	311	283	1407	0	2062
	OBSCURE	0	0	1	0	0	1
	COLUMN TOTALS:	18652	3284	1082	2070	1	25089
	BIASES:	1.00	1.01	1.01	1.00	1.00	

PERCENT CORRECT: 82.2631
HEIDKE SKILL SCORE: 0.57996
CHI SCORE: 0.45

CASES = 25089

CLOUD COVER TWO

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	ROW TOTALS
	CLR BELOW 6001	21791	542	283	263	22879
GEM	SCT	481	183	113	48	825
	BKN	283	117	158	94	652
	OVC	328	89	135	181	733
	COLUMN TOTALS:	22883	931	689	586	25089
	BIASES:	1.00	0.89	0.95	1.25	

PERCENT CORRECT: 88.9354
HEIDKE SKILL SCORE: 0.33206
CHI SCORE: 50.93

CASES = 25089

CLOUD COVER TWO

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	ROW TOTALS
	CLR BELOW 6001	21757	535	296	273	22861
PERSISTENCE	SCT	550	214	124	61	949
	BKN	290	124	166	105	685
	OVC	286	58	103	147	594
	COLUMN TOTALS:	22883	931	689	586	25089
	BIASES:	1.00	1.02	0.99	1.01	

PERCENT CORRECT: 88.8198
HEIDKE SKILL SCORE: 0.32737
CHI SCORE: 0.50

CASES = 25089

CLOUD COVER THREE

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	ROW TOTALS
	CLR BELOW 6001	23905	163	141	141	24350
GEM	SCT	147	20	25	18	210
	BKN	203	11	46	29	289
	OVC	156	11	24	49	240
	COLUMN TOTALS:	24411	205	236	237	25089
	BIASES:	1.00	1.02	1.22	1.01	

PERCENT CORRECT: 95.7392
HEIDKE SKILL SCORE: 0.23112
CHI SCORE: 12.21

CASES = 25089

CLOUD COVER THREE

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	ROW TOTALS
	CLR BELOW 6001	23938	165	148	157	24408
PERSISTENCE	SCT	157	18	24	7	206
	BKN	162	9	41	26	238
	OVC	154	13	23	47	237
	COLUMN TOTALS:	24411	205	236	237	25089
	BIASES:	1.00	1.00	1.01	1.00	

PERCENT CORRECT: 95.8348
HEIDKE SKILL SCORE: 0.21690
CHI SCORE: 0.02

CASES = 25089

VISIBILITY (MILES)

VERIFYING OBSERVATION

		0 < 1/2	1/2 < 1	1 < 3	3 < 5	5 < 7	7 +	ROW TOTALS
	0 < 1/2	13	7	16	12	5	16	69
	1/2 < 1	7	13	38	18	12	18	106
GEM	1 < 3	13	32	364	256	79	64	808
	3 < 5	5	28	279	767	284	248	1611
	5 < 7	7	7	72	369	534	478	1467
	7 +	7	12	68	176	567	20198	21028
	COLUMN TOTALS:	52	99	837	1598	1481	21022	25089
	BIASES:	1.33	1.07	0.97	1.01	0.99	1.00	

PERCENT CORRECT: 87.2454
HEIDKE SKILL SCORE: 0.55880
CHI SCORE: 7.30
THREAT SCORE: 0.13986

CASES = 25089

VISIBILITY (MILES)

VERIFYING OBSERVATION

		0 < 1/2	1/2 < 1	1 < 3	3 < 5	5 < 7	7 +	ROW TOTALS
	0 < 1/2	12	7	14	12	5	16	66
	1/2 < 1	8	13	32	17	12	16	98
PERSISTENCE	1 < 3	13	32	372	256	79	65	817
	3 < 5	5	28	279	761	279	248	1600
	5 < 7	7	7	72	376	539	479	1480
	7 +	7	12	68	176	567	20198	21028
	COLUMN TOTALS:	52	99	837	1598	1481	21022	25089
	BIASES:	1.27	0.99	0.98	1.00	1.00	1.00	

PERCENT CORRECT: 87.2693
HEIDKE SKILL SCORE: 0.55961
CHI SCORE: 4.26
THREAT SCORE: 0.14545

CASES = 25089

GUSTS (KTS)

VERIFYING OBSERVATION

		0-10	11-20	21-30	31-40	41 +	ROW TOTALS
	0 - 10	21967	982	160	2	0	23111
	11 - 20	566	464	168	2	0	1200
GEM	21 - 30	154	172	388	27	0	741
	31 - 40	3	0	25	9	0	37
	41 +	0	0	0	0	0	0
	COLUMN TOTALS:	22690	1618	741	40	0	25089
	BIASES:	1.02	0.74	1.00	0.93	99.99	

PERCENT CORRECT: 90.9881
HEIDKE SKILL SCORE: 0.44699
CHI SCORE: 116.02

CASES = 25089

GUSTS (KTS)

VERIFYING OBSERVATION

		0-10	11-20	21-30	31-40	41 +	ROW TOTALS
	0 - 10	21708	842	153	1	0	22704
	11 - 20	827	607	176	3	0	1613
PERSISTENCE	21 - 30	152	169	387	27	0	735
	31 - 40	3	0	25	9	0	37
	41 +	0	0	0	0	0	0
	COLUMN TOTALS:	22690	1618	741	40	0	25089
	BIASES:	1.00	1.00	0.99	0.93	99.99	

PERCENT CORRECT: 90.5217
HEIDKE SKILL SCORE: 0.46322
CHI SCORE: 0.30

CASES = 25089

CEILING (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	ROW TOTALS
	0 - 100	41	38	4	3	0	36	122
	200 - 400	39	536	91	21	2	64	753
	500 - 900	8	79	233	107	9	60	496
GEM	1000 - 2900	0	19	90	1051	75	414	1649
	3000 - 6000	0	7	6	97	532	274	916
	CLR BELOW 6001	24	70	81	367	337	20274	21153
	COLUMN TOTALS:	112	749	505	1646	955	21122	25089
	BIASES:	1.09	1.01	0.98	1.00	0.96	1.00	

PERCENT CORRECT: 90.3464
HEIDKE SKILL SCORE: 0.65909
CHI SCORE: 2.72
THREAT SCORE: 0.60444

CASES = 25089

CEILING (FEET)

VERIFYING OBSERVATION

		0-100	200-400	500-900	1000-2900	3000-6000	CLR BELOW 6001	ROW TOTALS
	0 - 100	34	35	4	3	0	33	109
	200 - 400	39	536	91	20	2	64	752
	500 - 900	8	79	233	108	9	60	497
PERSISTENCE	1000 - 2900	0	19	90	1052	75	412	1648
	3000 - 6000	0	7	5	100	550	293	955
	CLR BELOW 6001	31	73	82	363	319	20260	21128
	COLUMN TOTALS:	112	749	505	1646	955	21122	25089
	BIASES:	0.97	1.00	0.98	1.00	1.00	1.00	

PERCENT CORRECT: 90.3384
HEIDKE SKILL SCORE: 0.65976
CHI SCORE: 0.22
THREAT SCORE: 0.59740

CASES = 25089

TOTAL CLOUD AMOUNT

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	OBSCURE	ROW TOTALS
	CLR BELOW 6001	17493	920	152	117	0	18682
	SCT	912	955	328	291	1	2487
GEM	BKN	129	290	246	261	0	926
	OVC	118	304	348	2224	0	2994
	OBSCURE	0	0	0	0	0	0
	COLUMN TOTALS:	18652	2469	1074	2893	1	25089
	BIASES:	1.00	1.01	0.86	1.03	0.00	

PERCENT CORRECT: 83.3752
HEIDKE SKILL SCORE: 0.60541
CHI SCORE: 25.10

CASES = 25089

TOTAL CLOUD AMOUNT

VERIFYING OBSERVATION

		CLR BELOW 6001	SCT	BKN	OVC	OBSCURE	ROW TOTALS
	CLR BELOW 6001	17446	917	147	111	0	18621
	SCT	952	944	324	285	1	2506
PERSISTENCE	BKN	144	334	283	307	0	1068
	OVC	110	274	319	2190	0	2893
	OBSCURE	0	0	1	0	0	1
	COLUMN TOTALS:	18652	2469	1074	2893	1	25089
	BIASES:	1.00	1.01	0.99	1.00	1.00	

PERCENT CORRECT: 83.1560
HEIDKE SKILL SCORE: 0.60206
CHI SCORE: 0.64

CASES = 25089