**Topical Report**

# Annual Application of MM5 for Calendar Year 2001 At 12km Resolution

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# 1 INTRODUCTION

Over the past half decade, emergent requirements for direct numerical simulation of urban and regional scale photochemical and secondary aerosol air quality—spawned largely by the new particulate matter ($PM_{2.5}$) and regional haze regulations—have led to intensified efforts to construct high-resolution emissions, meteorological and air quality data sets. The concomitant increase in computational throughput of low-cost modern scientific workstations has ushered in a new era of regional air quality modeling. It is now possible, for example, to exercise sophisticated mesoscale prognostic meteorological models and Eulerian and Lagrangian photochemical/aerosol models for the full annual period, simulating ozone, sulfate and nitrate deposition, and secondary organic aerosols (SOA) across the entire United States (U.S.) or over discrete subregions.

The report describes an application of the Pennsylvania State University/National Center for Atmospheric Research (NCAR) Mesoscale Model (MM5) for a simulation from 15 December 2000 through 28 February 2002 for a 12km domain covering the majority of the continental United States.

# 2 METHODOLOGY

The methodology for this approach is very straightforward. The MM5 model is applied for the annual period and the model results are compared with available observations and synoptic weather charts.

## 2.1 Model Selection and Application

Below we give a brief summary of the MM5 input data preparation procedure used for this annual modeling exercise.

Model Selection: The most recent version of the publicly available non-hydrostatic version of MM5 (version 3.6.3) is used. The MM5 released terrain, pregrid, little_r and interpf processor were used to develop model inputs.

Horizontal Domain Definition: The computational is presented in Figure 2-1. The domain is a 36km domain with 165 x 129 grid cells, selected to maximize the coverage of the ETA analysis region, with a single 12km nest with 290 x 251 grid cells. The projection is Lambert Conformal with the "national RPO" grid projection pole of $40^0$, $-97^0$ with true latitudes of $33^0$ and $45^0$.

Vertical Domain Definition: The MM5 modeling is based on 34 vertical layers with an approximately 50 meter deep surface layer. The MM5 vertical domain is presented in both sigma and height coordinates in Table 2-1.

Topographic Inputs: Topographic information for the MM5 is developed using the NCAR and the United States Geological Survey (USGS) terrain databases. The grid is based the 10 min (~19 km) Geophysical Data Center global data. Terrain data is interpolated to the model grid using a Cressman-type objective analysis scheme. To avoid interpolating elevated terrain over water, after the terrain databases are interpolated onto the MM5 grid, the NCAR graphic water body database will be used to correct elevations over water bodies.

Vegetation Type and Land Use Inputs: Vegetation type and land use information is developed using the most recently released NCAR/PSU databases provided with the MM5 distribution. Standard MM5 surface characteristics corresponding to each land use category will be employed.

Atmospheric Data Inputs: The focus of this study is to examine the influence the choice of "first guess" meteorological fields has on the MM5 model predictions. The first guess fields are taken from the NCAR ETA archives. Surface and upper-air observations used in the objective analyses, following the procedures outlined by Stauffer and Seaman at PSU, are quality-inspected by MM5 pre-processors using automated gross-error checks and "buddy" checks. In addition, rawinsonde soundings undergo vertical consistency

checks. The synoptic-scale data used for this initialization (and in the analysis nudging discussed below) are obtained from the conventional National Weather Service (NWS) twice-daily radiosondes and 3-hr NWS surface observations.

Water Temperature Inputs: The NNRP and ETA database contains a "skin temperature" field. This can be used as a water temperature input to MM5. It is recognized that these skin temperatures can lead to temperature errors along coastlines. However, for this analysis, focusing on bulk continental scale transport, this issue is likely not important.

FDDA Data Assimilation: This simulation uses an analysis-nudging technique were the observations are nudged toward a field prepared by objective analyzing surface and aloft monitor data into the first-guess fields. For these simulations a nudging coefficient of $2.5 \times 10^{-4}$ was used for winds and temperature and $1 \times 10^{-5}$ for mixing ratio. Only 3D analysis nudging was performed and thermodynamic variables are not nudged within the boundary layer.

Physics Options: The MM5 model physics options in this simulation are as follows:

Kain-Fritsch 2 Cumulus Parameterization
Pleim-Xiu PBL and Land Surface Schemes
Reisner 2 Graupel Moisture Scheme
RRTM Atmospheric Radiation Scheme
Interppx Continuous Soil Moisture Updating Only

Application Methodology: The model was applied in seven segments covering the periods in Table 2-2. Each nominal 2 month segment was run with a 15 day spin-up period. Within each segment, the model was run in 5.5 day periods, initialized at 12Z with every fifth day. This allowed a 12-hour spin-up within each computational period. The model was run on 4 dual Athlon 2600 computers with 3 Gbytes of RAM memory and required 4.2 processor years and 3.5 terabytes of disk storage.

## 2.2 Evaluation Approach

The model evaluation approach is based on a combination of qualitative and quantitative analyses. The qualitative approach is to compare the model estimated sea level pressure and radar reflectivity fields with observed values from historical weather chart archives. The statistical approach is to examine the model bias and error for temperature, mixing ratio and precipitation and the Index of Agreement for the windfields.

Interpretation of bulk statistics over a continental scale domain is problematic. It is difficult to detect if the model is missing important sub-regional features. For this analysis the statistics are performed on a state by state basis, a Regional Planning Organization (RPO) basis, and on a domain-wide basis.

The observed database for winds, temperature, and water mixing ratio used in this analysis is the NOAA Techniques Development Lab (TDL) Surface Hourly Observation database obtained from the NCAR archives. The rain observations are taken from the National Climatic Data Center (NCDC) 3240 hourly rainfall archives.

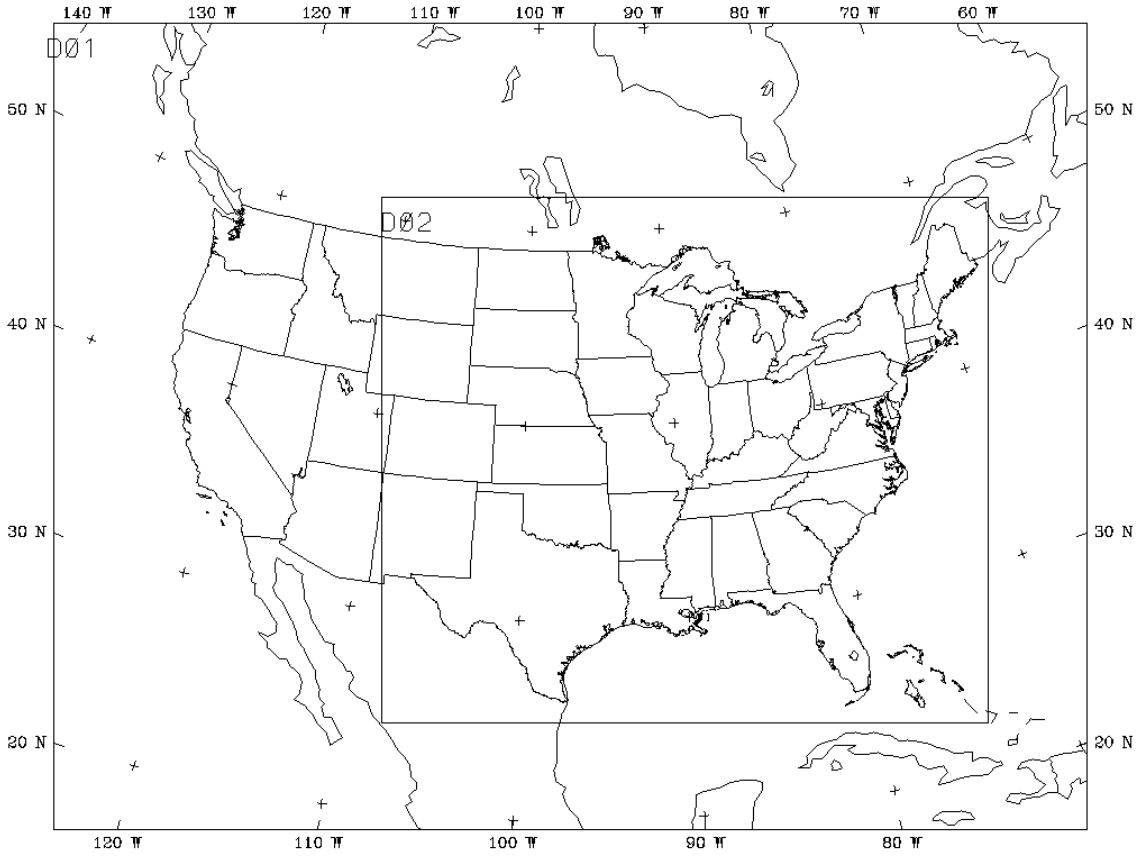
**Table 2-1: MM5 Vertical Domain Specification.**

| k(MM5) | sigma | press.(mb) | height(m) | depth(m) |
|---|---|---|---|---|
| 34 | 0.000 | 10000 | 15674 | 2004 |
| 33 | 0.050 | 14500 | 13670 | 1585 |
| 32 | 0.100 | 19000 | 12085 | 1321 |
| 31 | 0.150 | 23500 | 10764 | 1139 |
| 30 | 0.200 | 28000 | 9625 | 1004 |
| 29 | 0.250 | 32500 | 8621 | 900 |
| 28 | 0.300 | 37000 | 7720 | 817 |
| 27 | 0.350 | 41500 | 6903 | 750 |
| 26 | 0.400 | 46000 | 6153 | 693 |
| 25 | 0.450 | 50500 | 5461 | 645 |
| 24 | 0.500 | 55000 | 4816 | 604 |
| 23 | 0.550 | 59500 | 4212 | 568 |
| 22 | 0.600 | 64000 | 3644 | 536 |
| 21 | 0.650 | 68500 | 3108 | 508 |
| 20 | 0.700 | 73000 | 2600 | 388 |
| 19 | 0.740 | 76600 | 2212 | 282 |
| 18 | 0.770 | 79300 | 1930 | 274 |
| 17 | 0.800 | 82000 | 1657 | 178 |
| 16 | 0.820 | 83800 | 1478 | 175 |
| 15 | 0.840 | 85600 | 1303 | 172 |
| 14 | 0.860 | 87400 | 1130 | 169 |
| 13 | 0.880 | 89200 | 961 | 167 |
| 12 | 0.900 | 91000 | 794 | 82 |
| 11 | 0.910 | 91900 | 712 | 82 |
| 10 | 0.920 | 92800 | 631 | 81 |
| 9 | 0.930 | 93700 | 550 | 80 |
| 8 | 0.940 | 94600 | 469 | 80 |
| 7 | 0.950 | 95500 | 389 | 79 |
| 6 | 0.960 | 96400 | 310 | 78 |
| 5 | 0.970 | 97300 | 232 | 78 |
| 4 | 0.980 | 98200 | 154 | 39 |
| 3 | 0.985 | 98650 | 115 | 39 |
| 2 | 0.990 | 99100 | 77 | 38 |
| 1 | 0.995 | 99550 | 38 | 38 |
| 0 | 1.000 | 100000 | 0 | 0 |

**Table 2-2: Computational Segment Time Periods for Annual 2001 Simulation.**

| Segment Number | Starting Time | Ending Time |
|---|---|---|
| 1 | 16 December 2000 | 24 February 2001 |
| 2 | 14 February 2001 | 30 April 2001 |
| 3 | 15 April 2001 | 29 June 2001 |
| 4 | 14 June 2001 | 28 August 2001 |
| 5 | 18 August 2001 | 27 October 2001 |
| 6 | 17 October 2001 | 31 December 2001 |
| 7 | 16 December 2001 | 28 February 2002 |

**Figure 2-1: National ETA Computational Grid.**



# 3 RESULTS

## 3.1 Model Evaluation Results

The synoptic and statistical model evaluation results are presented in this section. It is very difficult to attempt to summarize a full annual model evaluation in a single document, especially a simulation that could be used for many different purposes. With this in mind, this section presents results so potential data users can independently judge the adequacy of the model simulation.

### 3.1.1 Synoptic Evaluation

One very important metric of model performance is to qualitatively assess whether how well the model is able to capture the evolution of synoptic systems. Sea level pressure and radar reflectivity plots for every 5 ½ days throughout the episode are presented in Figures 3-1 through 3-77. On each figure, the first frame presents the model estimated fields with blue Sea Level Pressure contours, red wind barbs and gray shaded diagnosed Radar Reflectivity. The second frame is the archived surface chart from weather.unisys.com. Care must be taken in comparing these synoptic charts since the archived synoptic chart covers the entire continental United States, while the model estimates cover approximately the eastern two-thirds.

Some general conclusions from these figures are:

> The model does a very good job in timing synoptic pattern traversal across the domain. The model is neither too fast not too slow in estimating frontal passages.
>
> The model is able to accurately place the location of cut-off high and low pressure regions.
>
> The model derived radar reflectivity tends to cover small regions than the archived synoptic evaluations. During periods of large scale reflective events the model underestimates the extent, but captures general patterns.

### 3.1.2 Statistical Evaluation

The results for the statistical evaluation are presented in this section. The tables present the statistical metric for each state, for each Regional Planning Organization, and for the United States portion of the modeling domain. In this comparison the level 1 (~25m) model estimates are compared directly with the nominal ~2m temperature and moisture and ~10m wind measurements.

Temperature bias statistics are presented in Table 3-1. A graphical depiction of Table 3-1 is presented in Figure 3-78. Averaged over the entire episode and the entire modeling domain, the model has a bias of –0.2 degrees C. The model tends to have a positive bias (overestimate) temperatures in the southeast and to have a negative bias (underestimate) temperatures in the northeast. On a monthly basis, the model tends to have a negative bias in the winter and a positive bias in the spring, summer and fall.

Temperature error data are presented in Table 3-2 and Figure 3-79. The overall temperature error is 2.29 degrees C. Temperature errors tend to be higher in the western portion of the domain, and fairly constant month to month.

Monthly mean temperature plots by month for the entire domain are presented in 3-81 through 3-93. These are computed by averaging all the temperature observations and model estimates at stations with valid temperature observations for each hour. This metric offers a concise treatment of the overall model performance. On these spatial mean plots the model estimate is a red trace and the observations are black symbols. For virtually the entire episode the model estimates are within a few degrees of the observations. Monthly mean temperature plots for the CENRAP RPO states are presented in Figures 3-94 through 3-107. Overall, the model and observations agree, and the model does an excellent job replicating wintertime frontal passages (ie. Figure 3-95). Results for the MANE-VU states are presented in Figures 3-108 through 3-121. In the wintertime the model tends to underestimate nighttime low temperatures by a few degrees. In to summertime, the model does a better job tracking observations, but when the model and observations differ, the model tends to be overestimating nighttime temperatures.

Figures 2-122 through 3-135 present monthly mean temperature plots for the Midwestern RPO states. The model has somewhat of a tendency to underestimate temperatures during the winter, but is able to track the overall synoptic (5-7 day) scale warming and cooling trends. The model performs better in the warmer months, but does have a tendency to overestimate during the day and underestimate at night. The final RPO in the domain, VISTAS, is presented in Figures 3-136 through 3-149. For the majority of the episode the temperatures agree within 2 degrees. When the temperatures are off, the model tends to underestimate during the daytime and overestimate during the night.

Mixing ratio bias data are presented in Table 3-3 and Figure 3-150. Averaged over the entire 14-month period at all stations, the model has a bias of –0.12 g/kg. The model biases are negative for all months except July through September. The model tends toward a positive bias in the western domain. Mixing ratio error results are presented in Table 3-4 and Figure 3-151. The mean error is 1.03 g/kg with the highest values in the more moist summertime months of July through September. Spatially, the biases tend to be larger in the southern portion of the domain.

Spatial mean mixing ratio results for the entire domain are presented in Figures 3-152 through 3-165. For the most part the model and estimated mixing ratios are within 1

g/kg. When the model and estimated mixing ratios differ by more than 1 g/kg, the model tends to underestimate. Spatial mean mixing ratio plots for the CENRAP region are presented in Figures 3-166 through 3-179. During the summer, the model is tending to overestimate by one to two g/kg. During the rest of the year the model is tending to underestimate by one to two g/kg. MANE-VU RPO results are presented in Figures 3-180 through 3-193. For much of the year the observations and model estimates agree to within one g/kg. However the model tends to overestimate moisture during particularly moist periods and to underestimate moisture during particularly dry periods.

Midwestern RPO mixing ratio results are presented in Figures 3-194 through 3-207. In the Midwest, the model tends to underestimate moisture by about two g/kg for much of the year. Finally, the southeastern VISTAS RPO states are presented in Figures 3-208 through 3-221. In this region the model does a very good job estimating synoptic moisture trends with a 5-7 day frequency, but tends to underestimate moisture during the night.

Monthly accumulated precipitation bias data are presented in Table 3-5 and Figure 3-222. Summing the model estimated and observed precipitation at each monitor for each month. The episode averaged domain mean bias is 0.38 cm. The model is underestimating precipitation for all months except for May through August where the model has positive bias. No clear spatial trend is evident for the annual precipitation. Monthly accumulated precipitation error data are presented in Table 3-6 and Figure 3-223. The mean error is 3.11 cm with the largest values in the months of May through August. The mean precipitation error is largest in the southeast and smallest in the western portion of the domain.

Model estimated and observed mean monthly precipitation results for the entire domain are presented in Figure 3-225. Overall the model captures the precipitation well, except for a tendency to overestimate during June, July and August. The RPO specific mean monthly precipitation results are presented in Figures 3-226 through 3-229. The model simulates precipitation quite accurately in the Midwestern RPO throughout the year, and the other RPOS in the winter, spring and fall. During the summer months the model is tending to overestimate precipitation.

Wind comparison index of agreement (IA) are presented in Table 3-6 and Figure 3-23. The domain-wide episode average IA is 0.89 with no significant monthly trend. The model is tending to perform better in the western portion of the domain than the eastern or southern. Monthly IA over the entire modeling domain are presented in Figures 3-231 through 3-231. Throughout the year, the model is performing better during daylight hours than at night, but as is seen in Table 3-6, no month or season is significantly better than any other.

IA time series results for the CENRAP, MANE-VU, Midwestern RPO, and VISTAS states are presented in Figures 3-245 through 3-258, Figures 3-259 through 3-272, Figures 3-273 through 3-286, and Figures 3-287 through 3-300, respectively. The model

is tending to do a better job during the day than at night, but no month or season is significantly different than another.

**Figure 3-1: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 00Z 02 January 2001.**

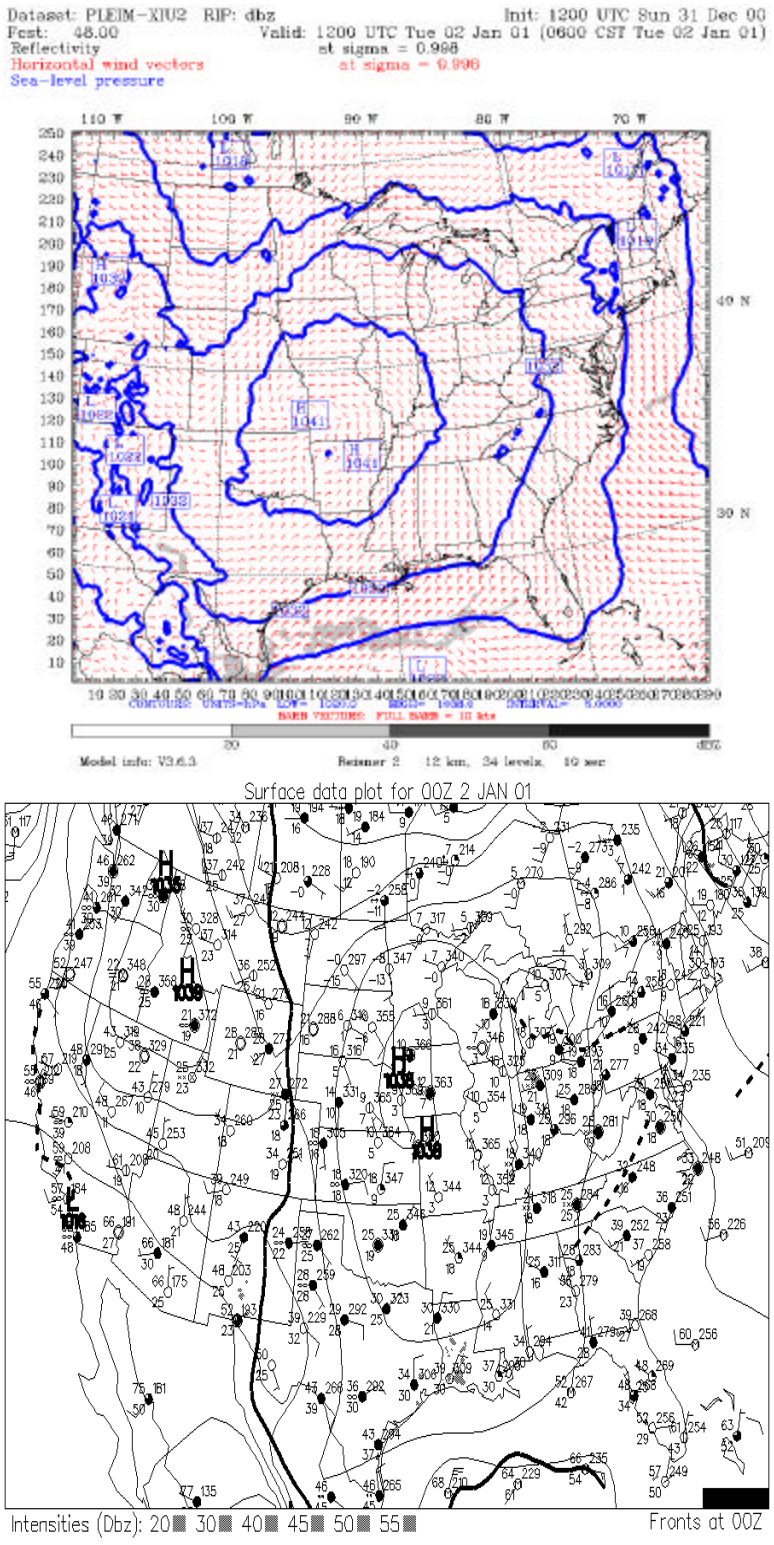


**Figure 3-2: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 12Z 07 January 2001.**

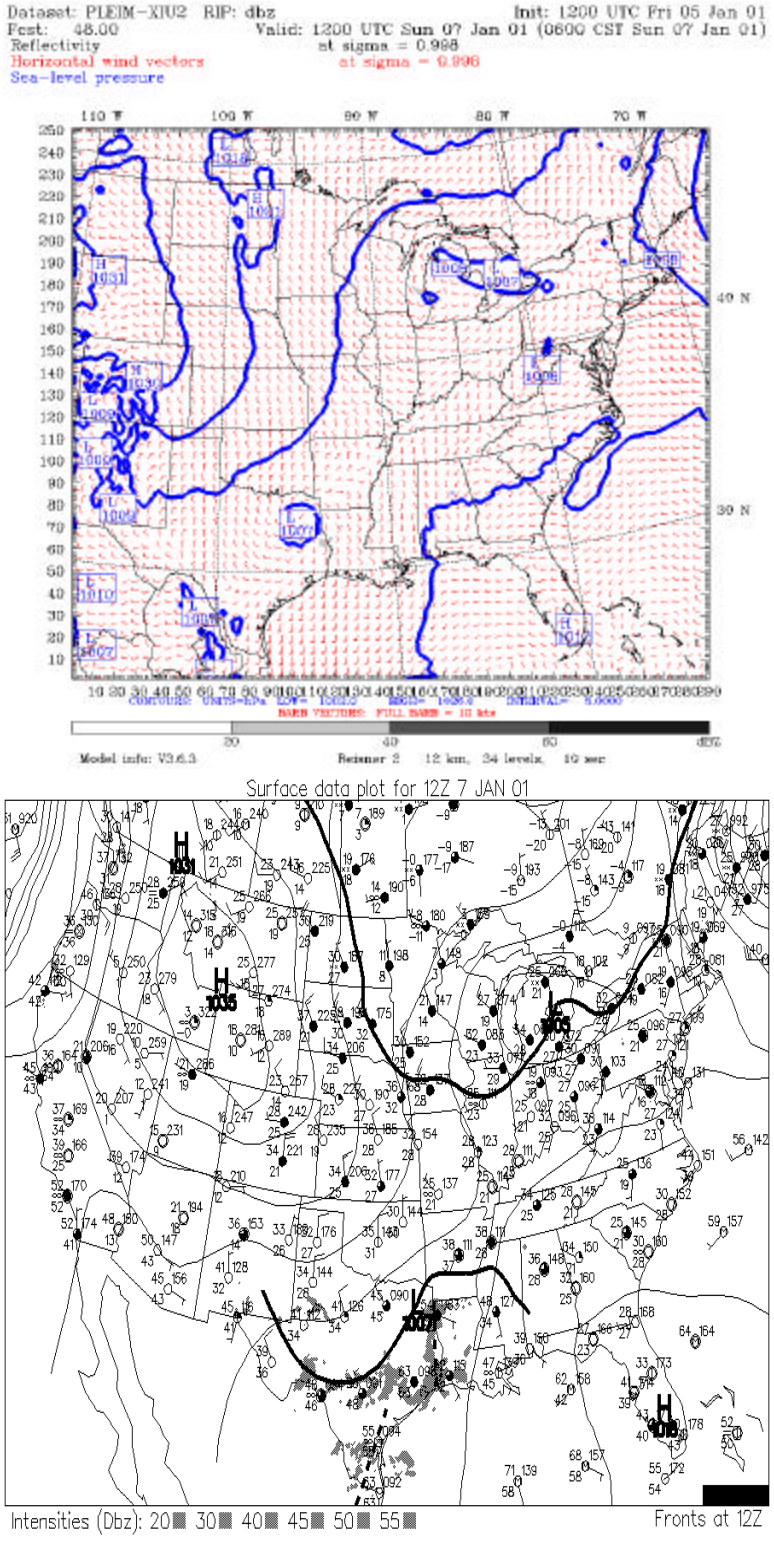


**Figure 3-3: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 00Z 13 January 2001.**

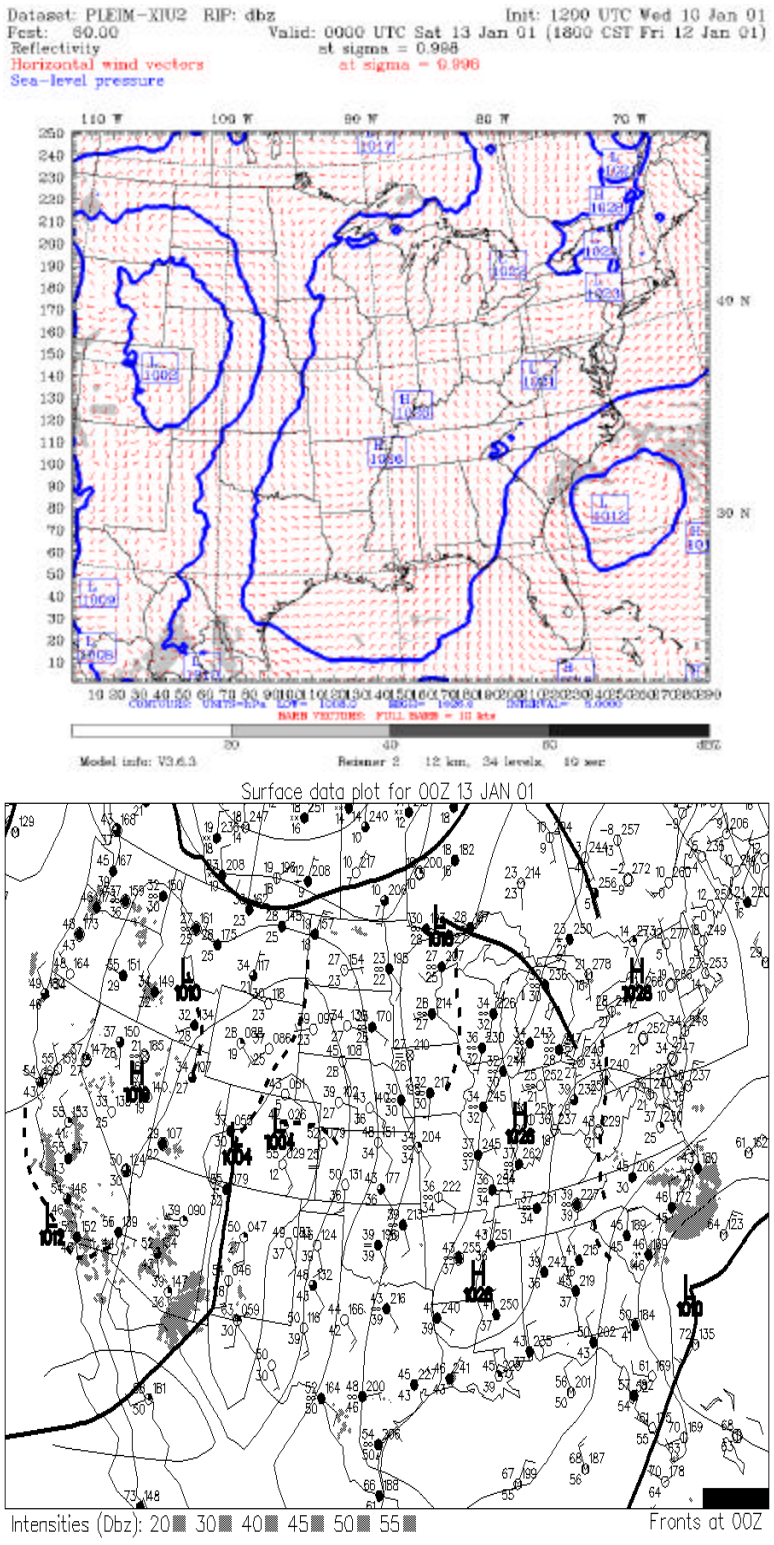


**Figure 3-4: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 12Z 18 January 2001.**

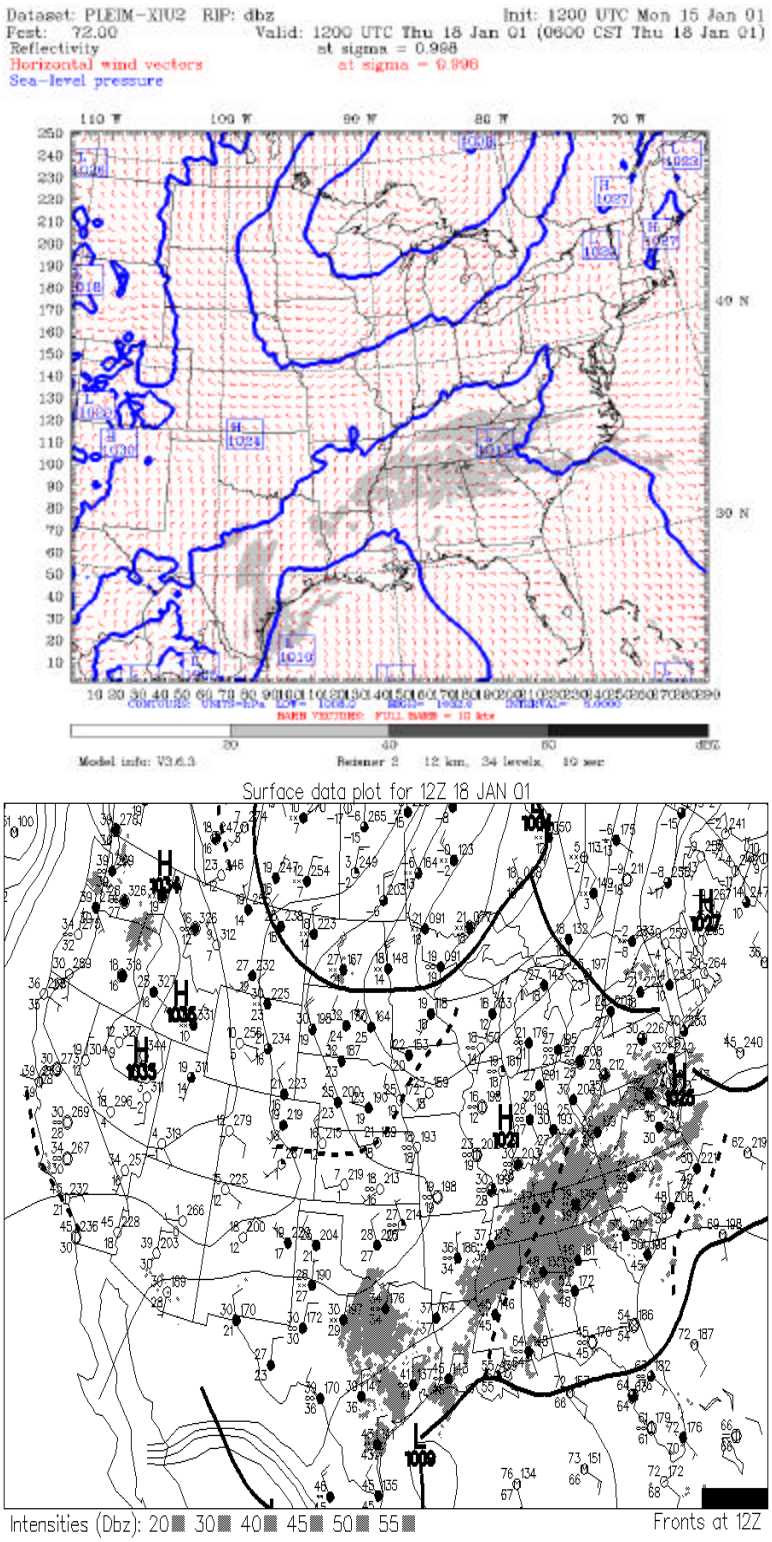


**Figure 3-5: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 00Z 24 January 2001.**

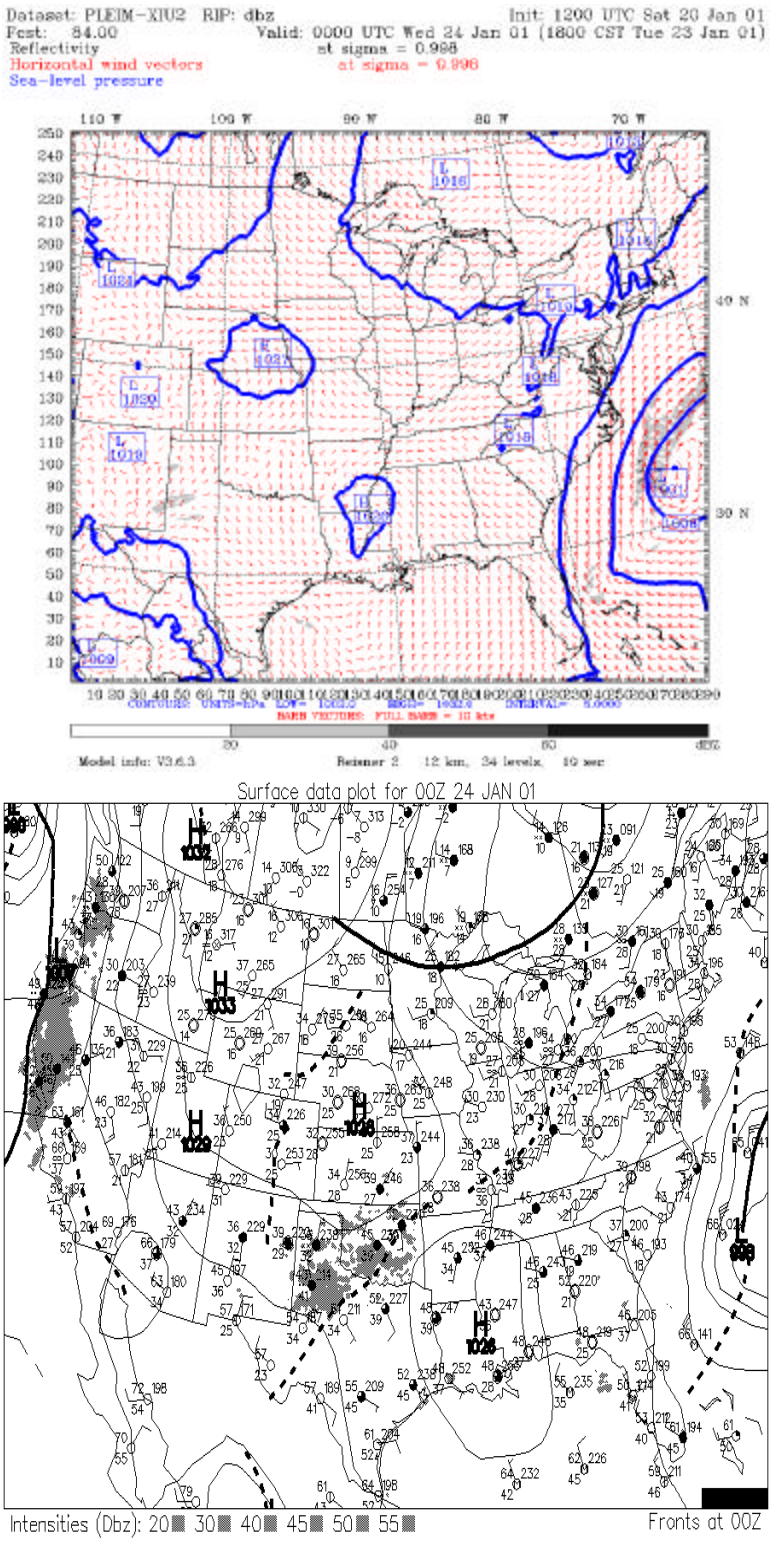


**Figure 3-6: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 12Z 29 January 2001.**

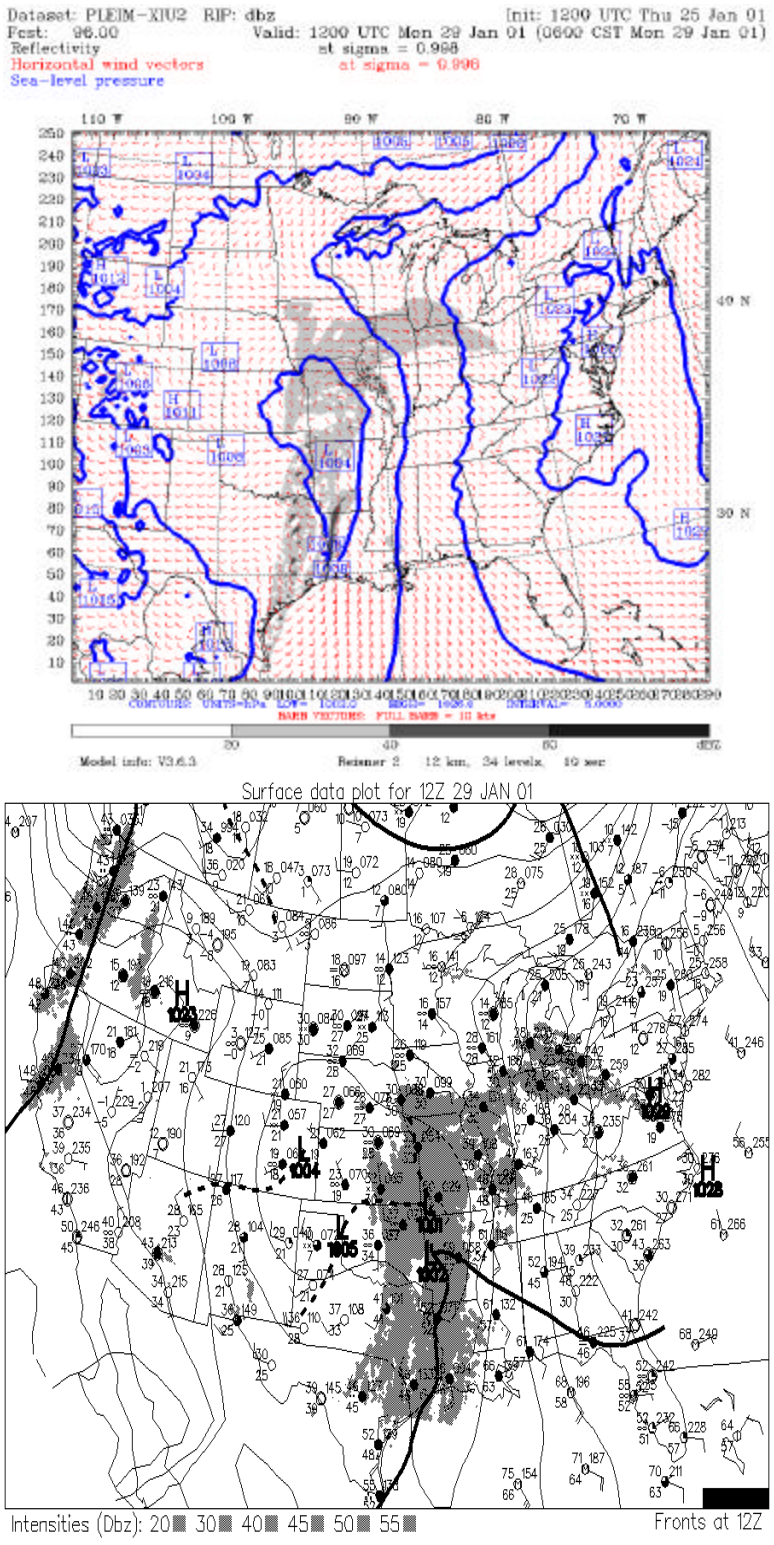


**Figure 3-7: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 00Z 04 February 2001.**

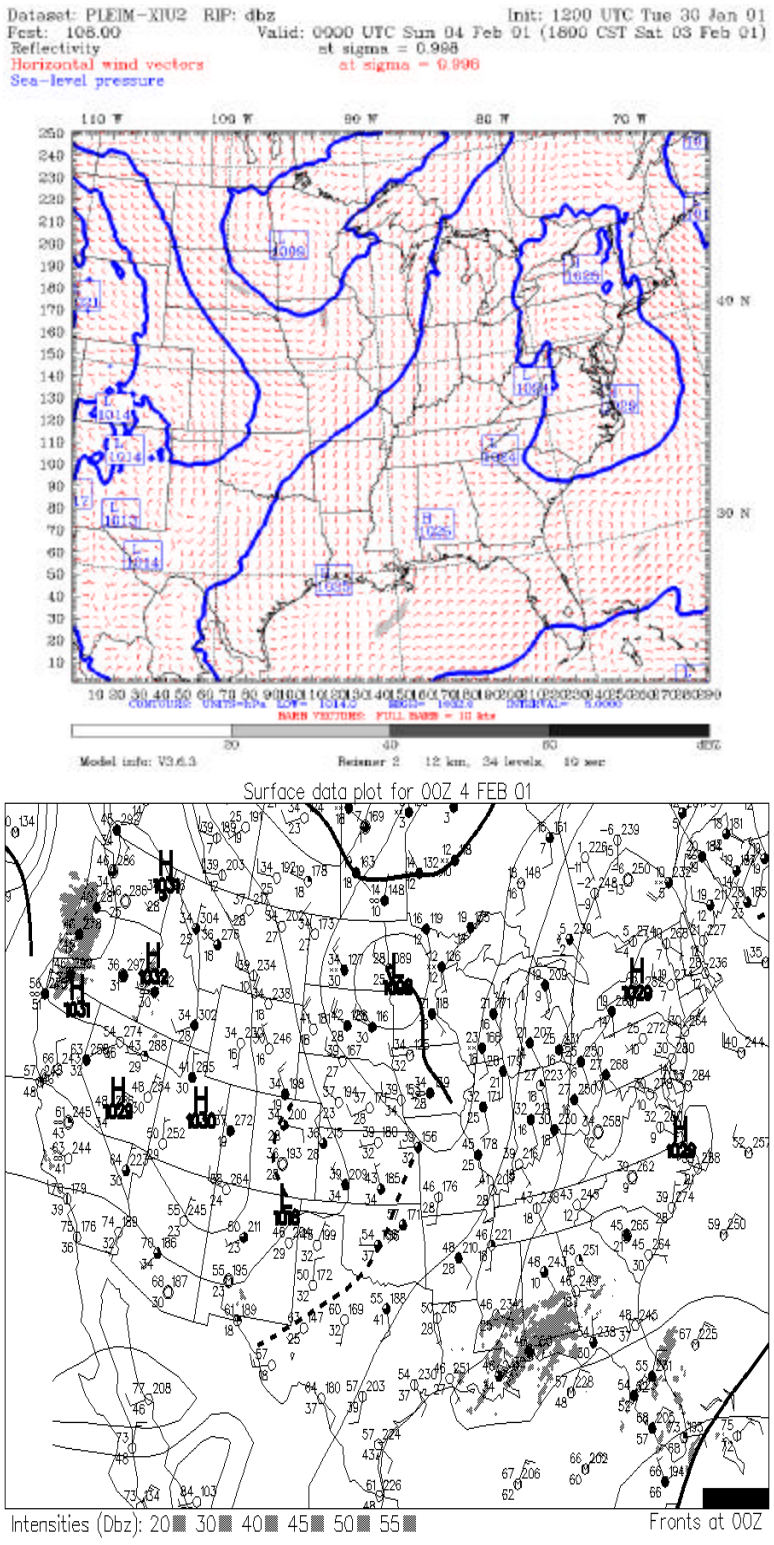


**Figure 3-8: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 12Z 09 February 2001.**

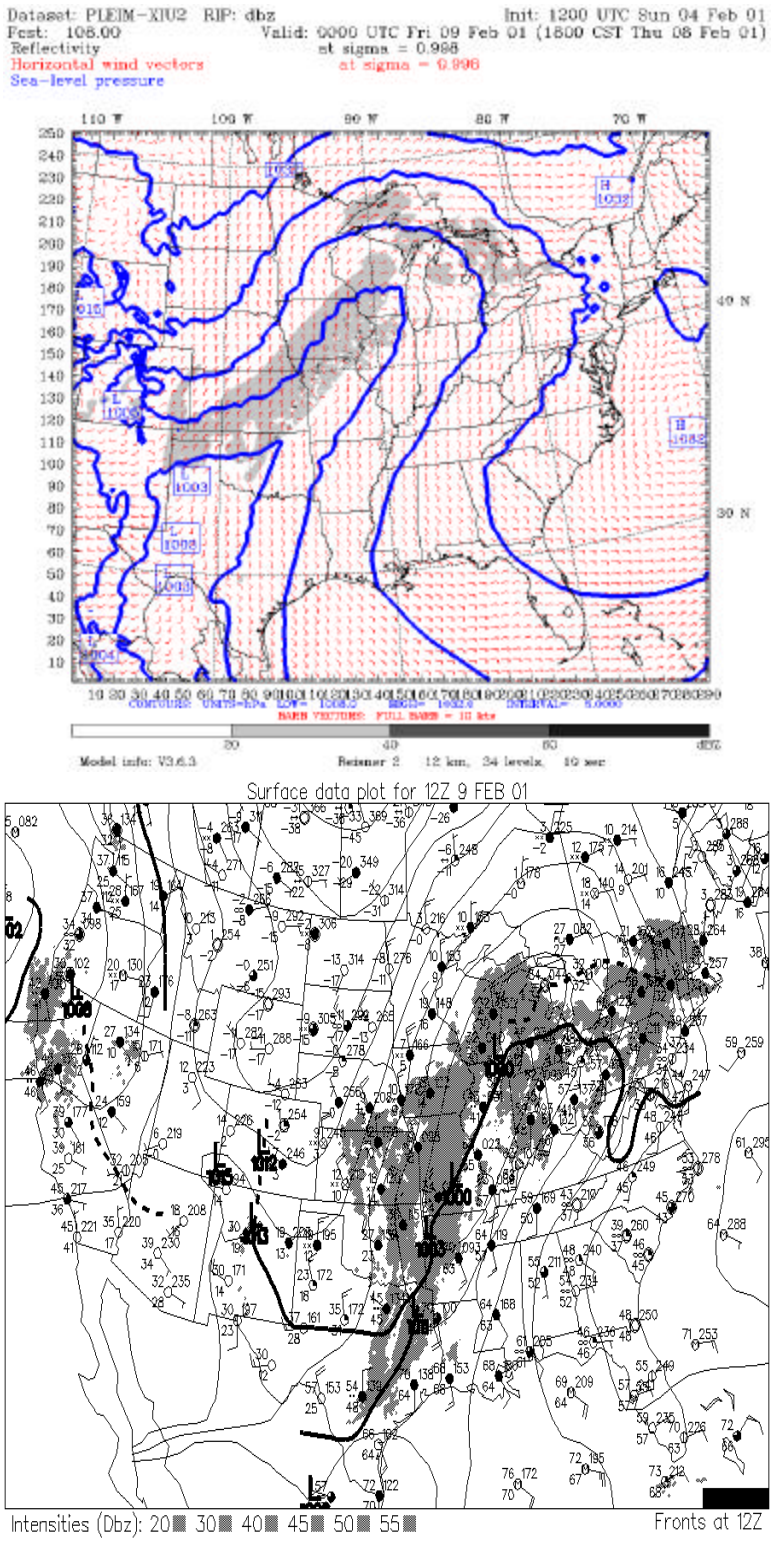


**Figure 3-9: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 00Z 15 February 2001.**

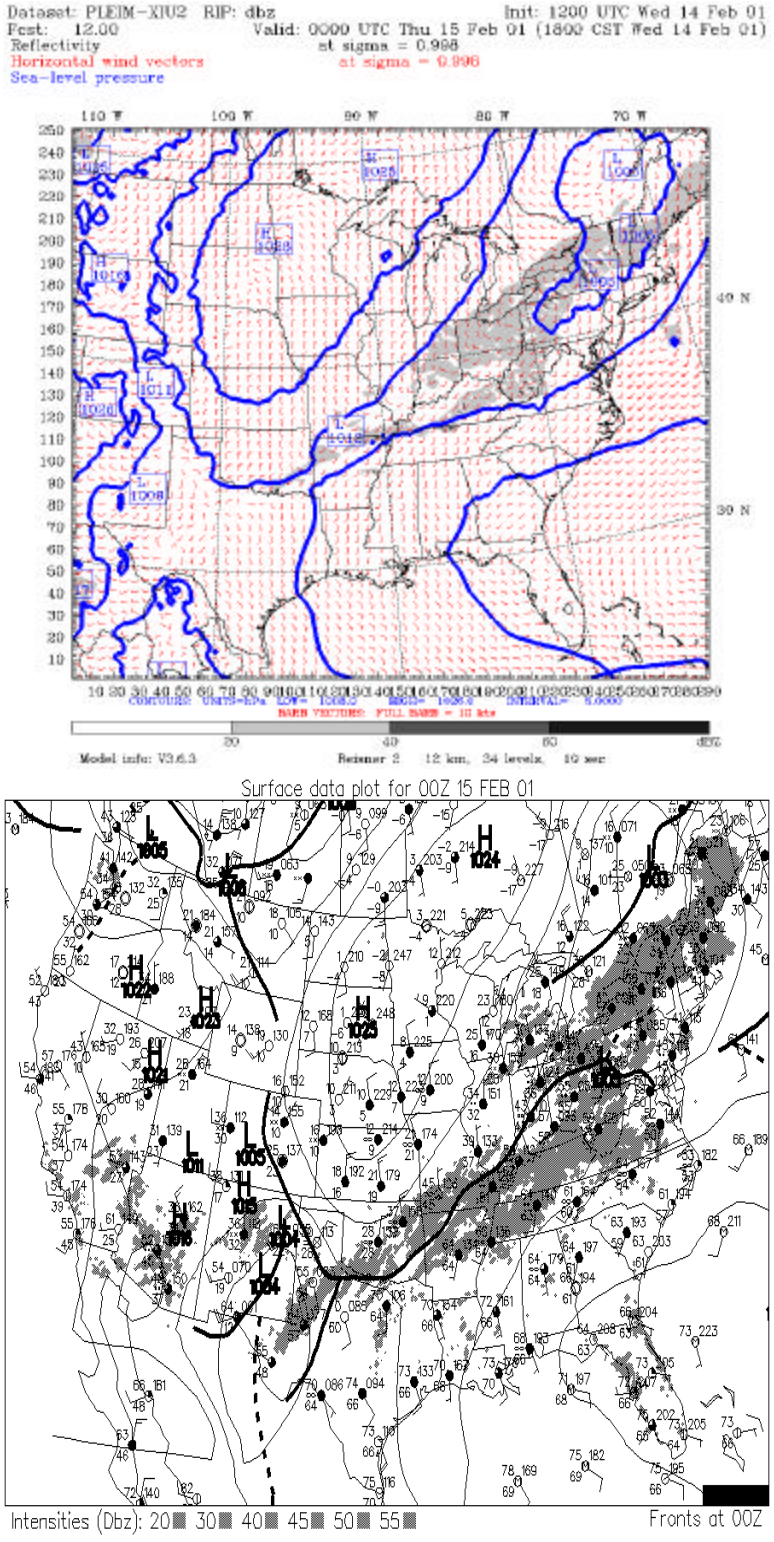


**Figure 3-10: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 12Z 20 February 2001.**

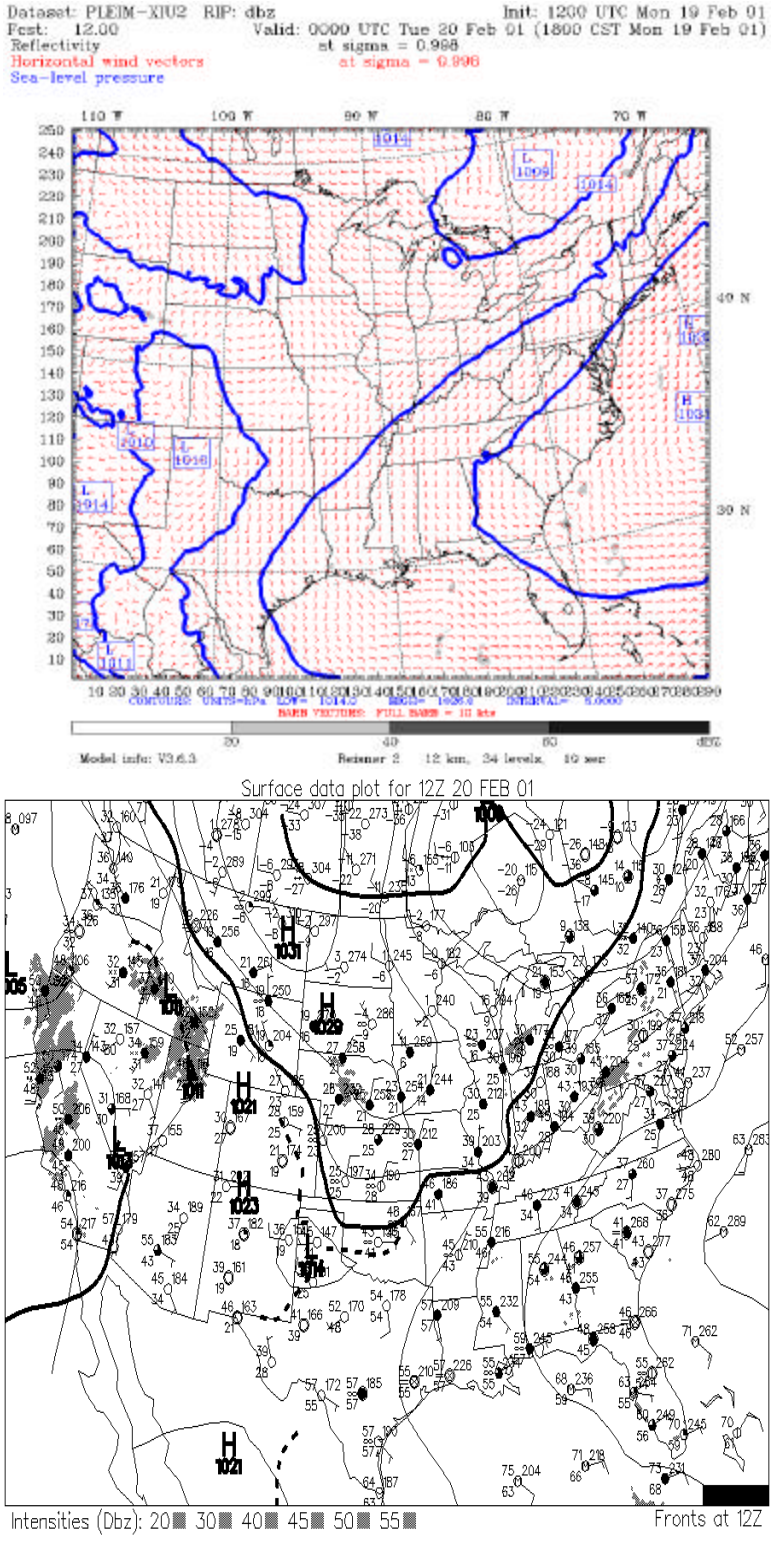


**Figure 3-11: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 00Z 26 February 2001.**

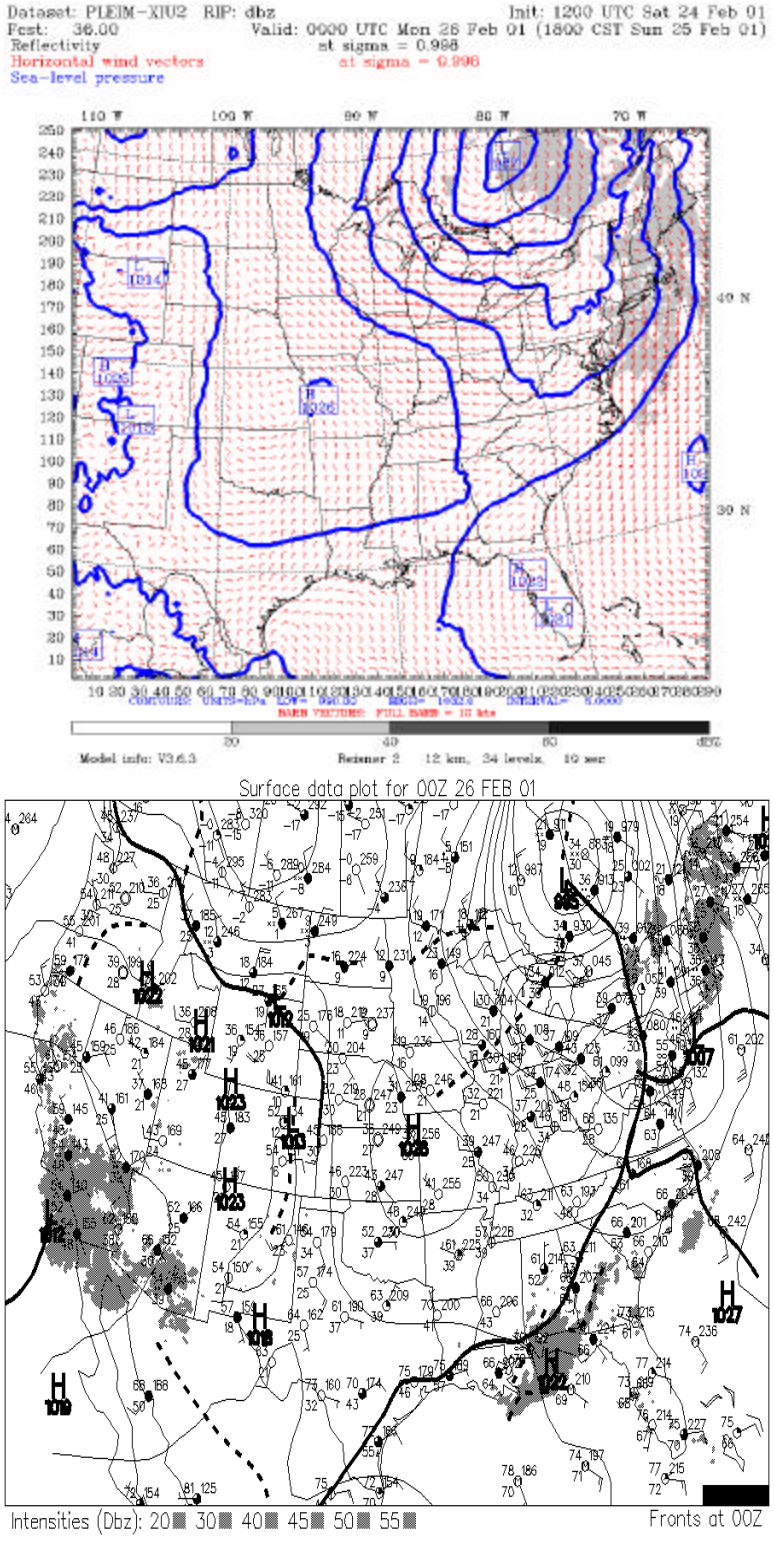


**Figure 3-12: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 12Z 03 March 2001.**

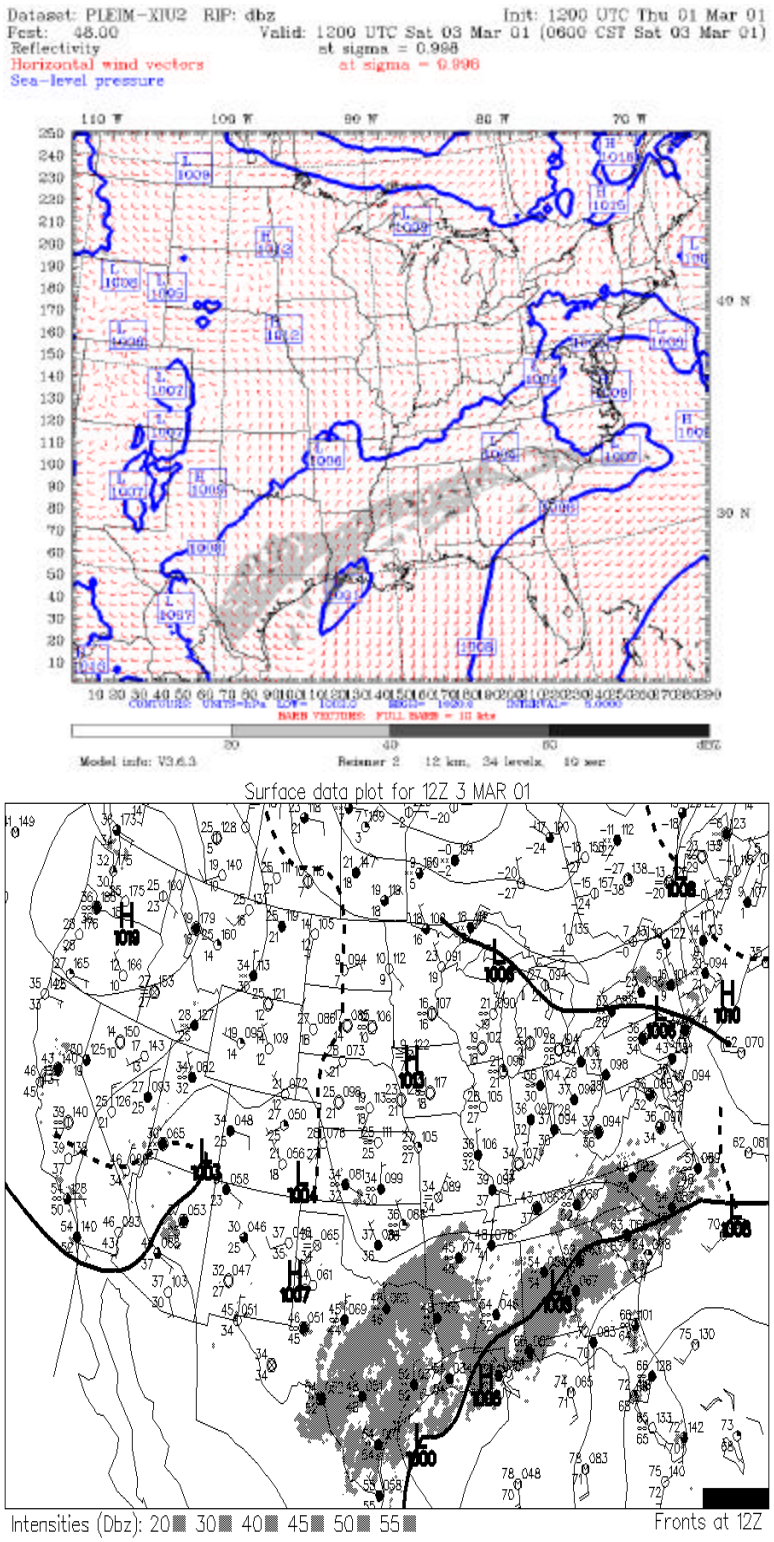


**Figure 3-13: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 00Z 09 March 2001.**

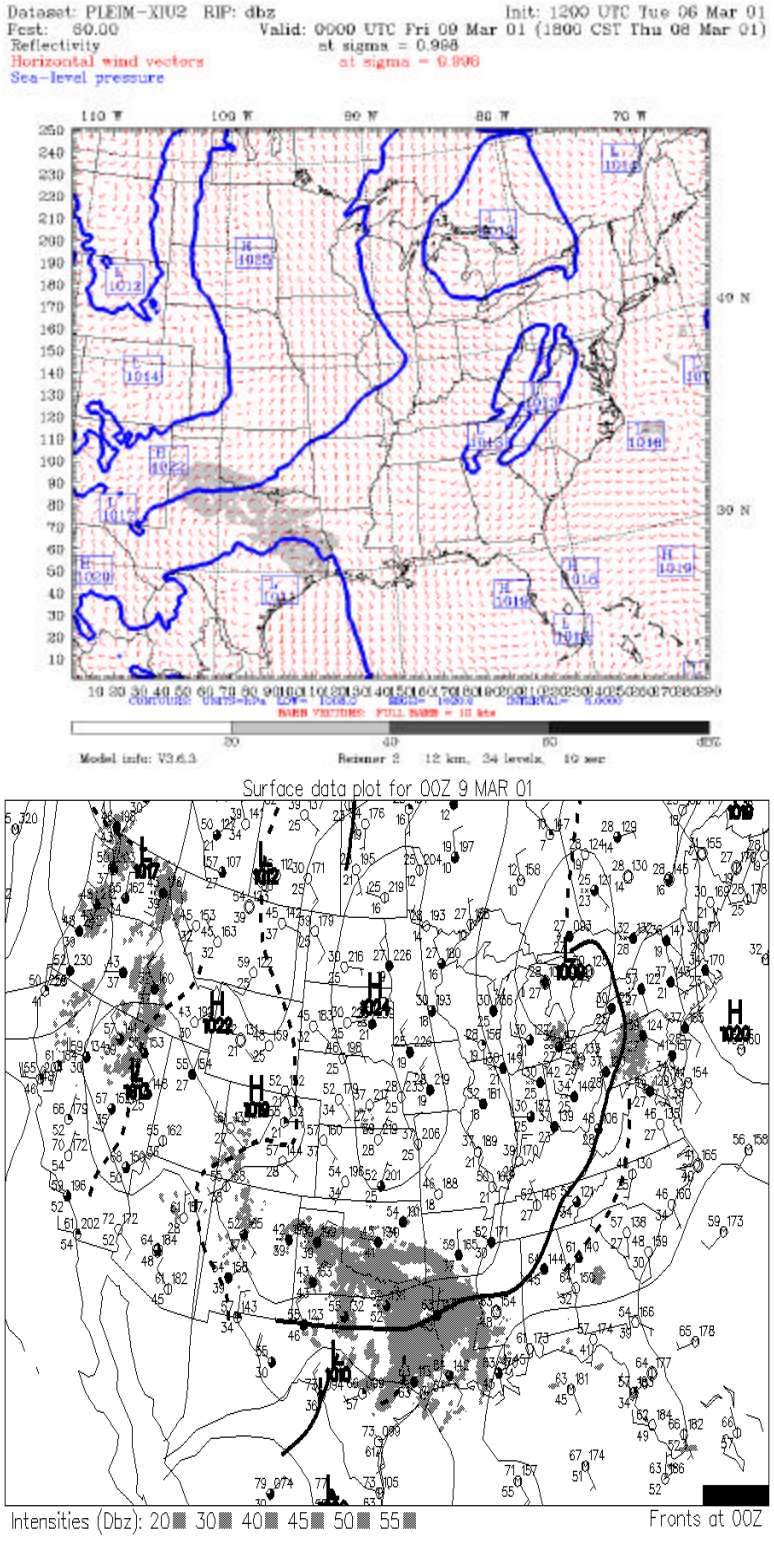


**Figure 3-14: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 12Z 14 March 2001.**

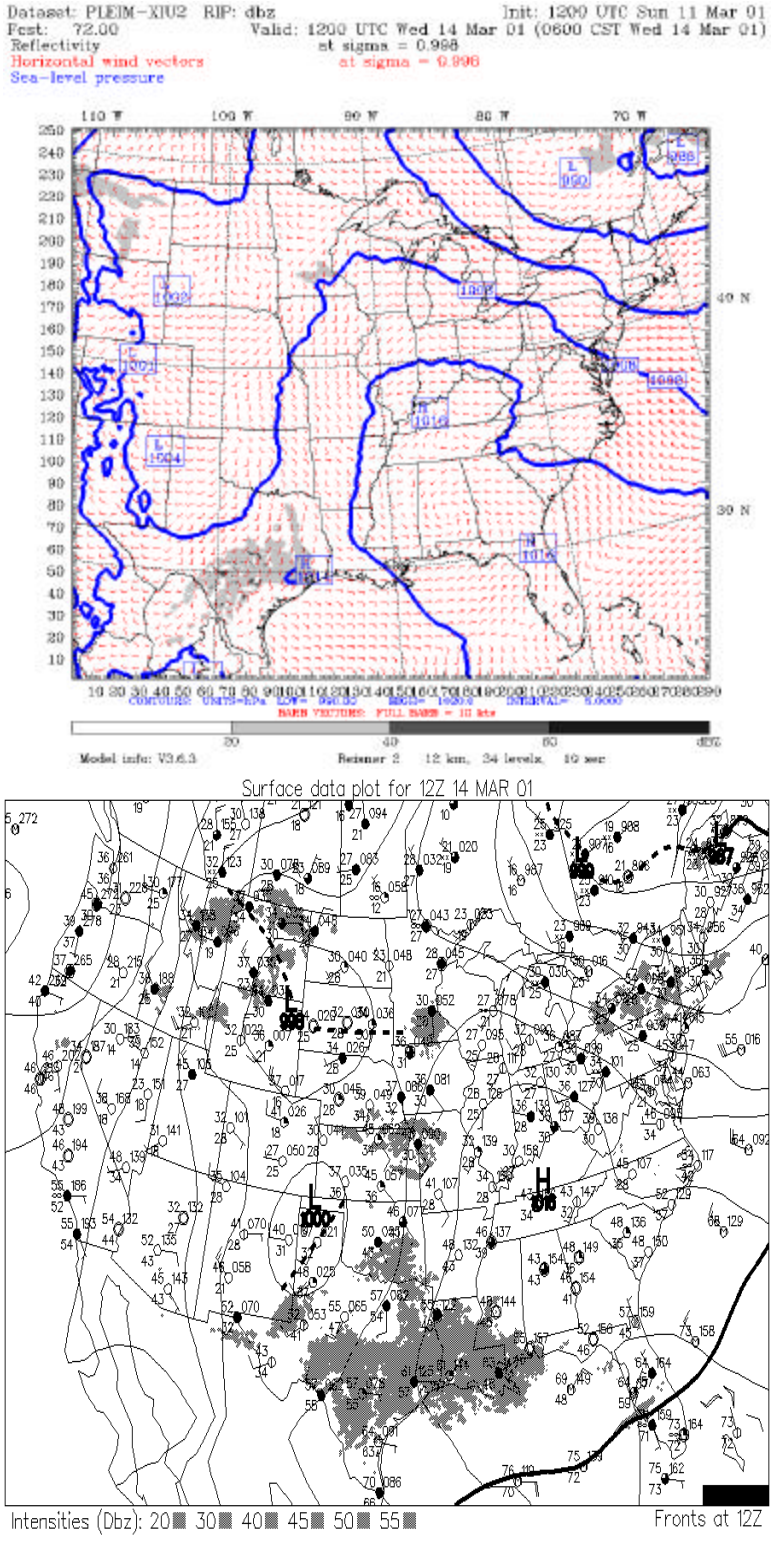


**Figure 3-15: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 00Z 20 March 2001.**

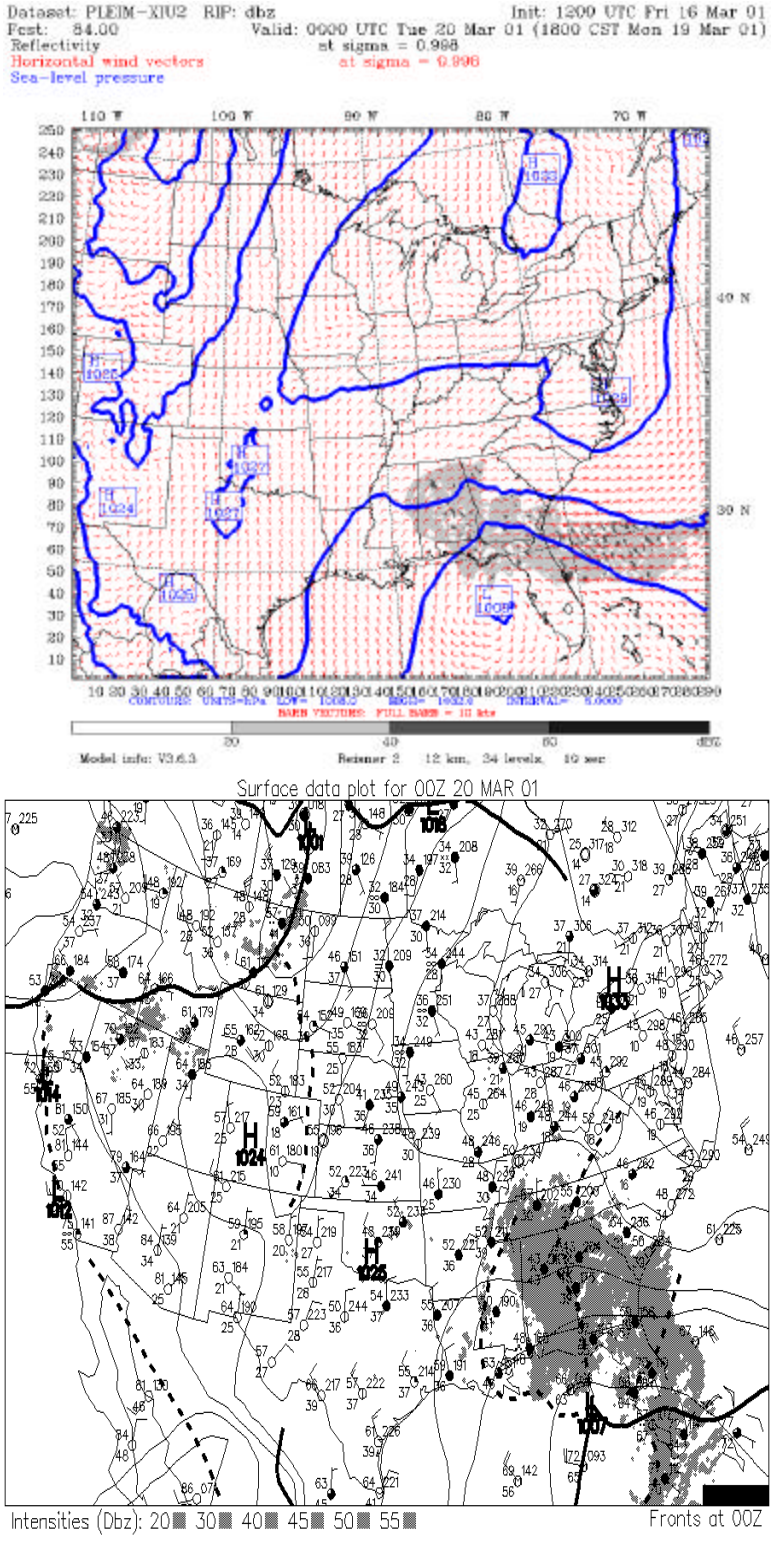


**Figure 3-16: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 12Z 25 March 2001.**

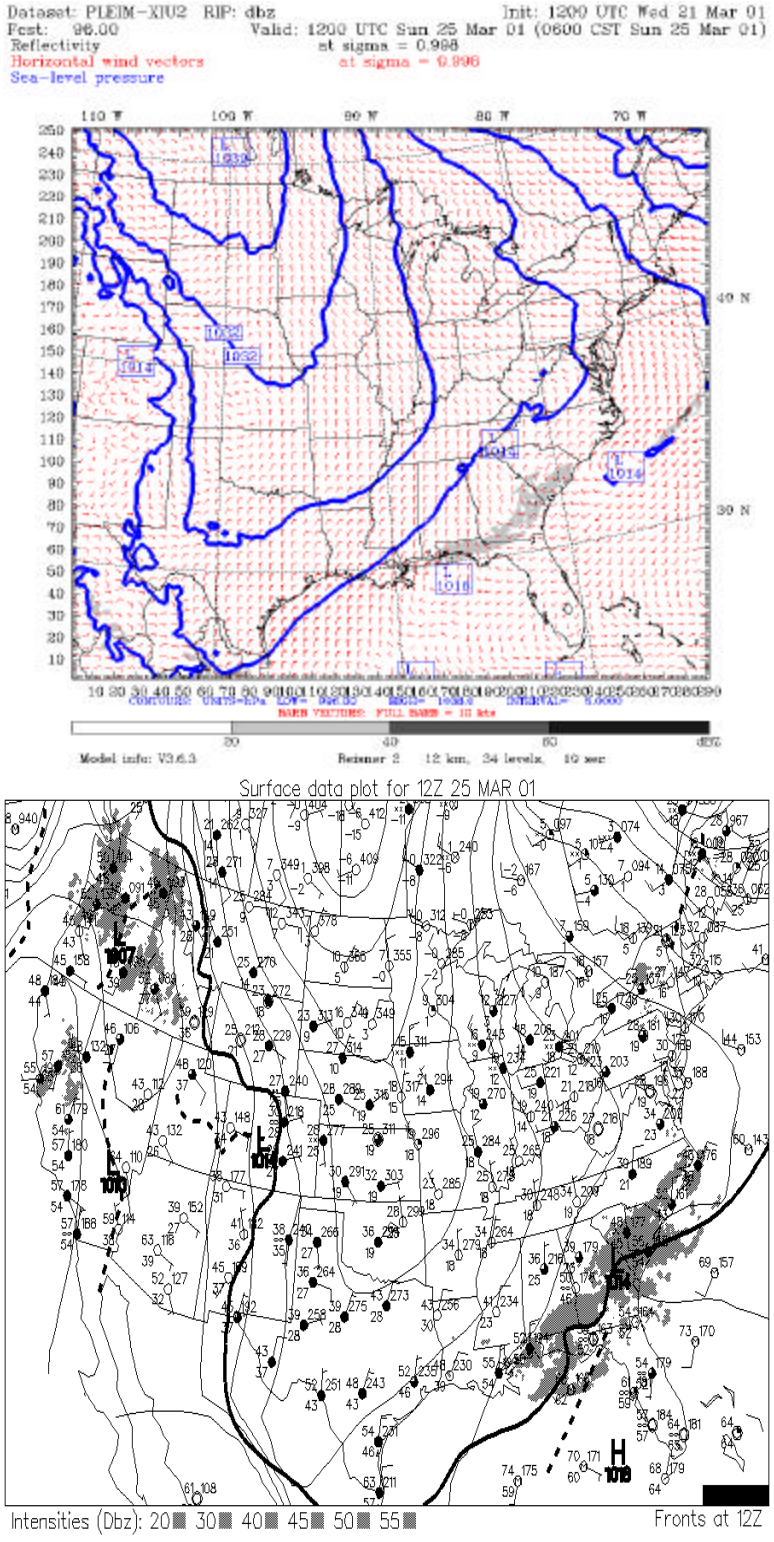


**Figure 3-17: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 00Z 31 March 2001.**

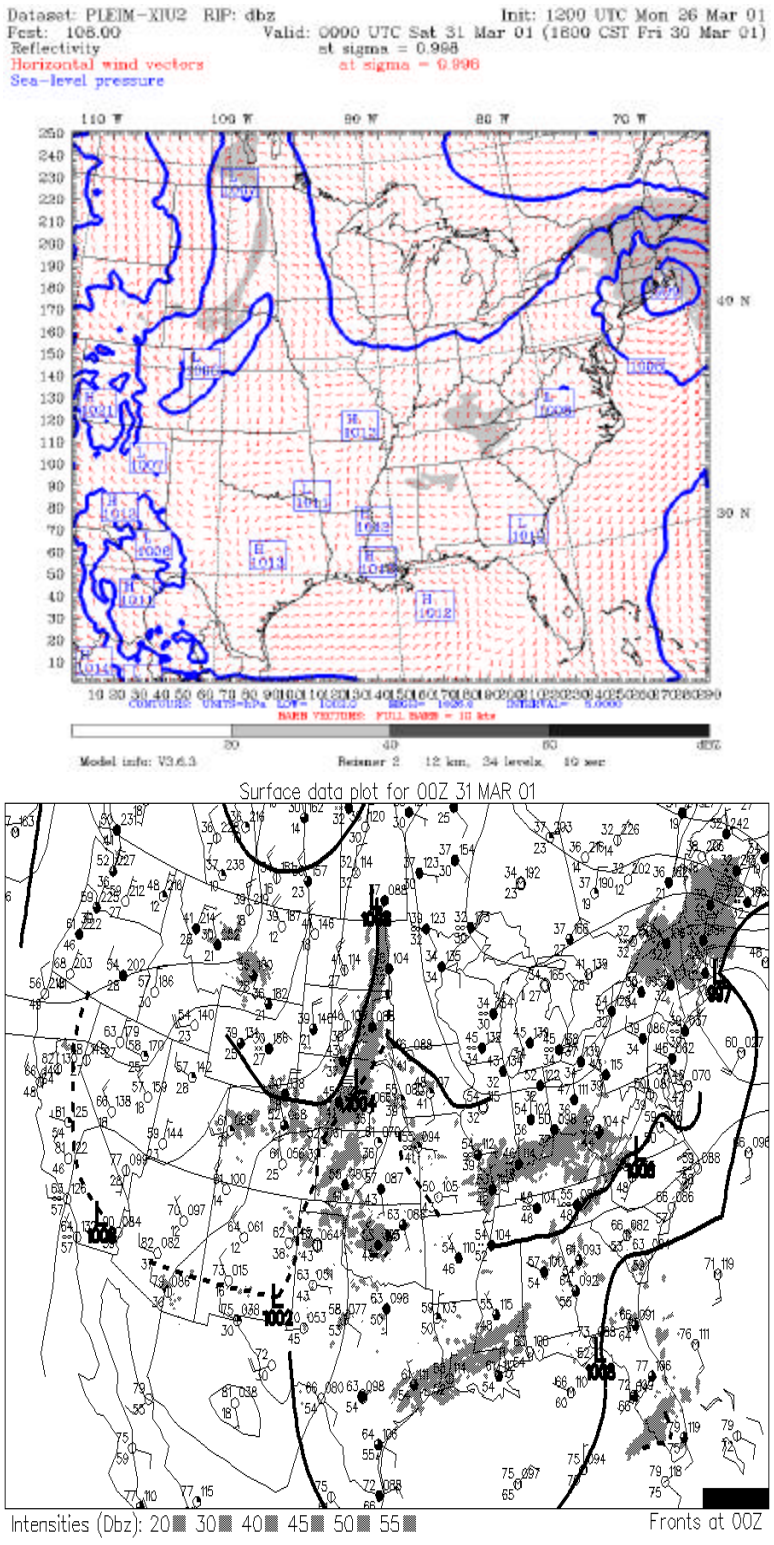


**Figure 3-18: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 12Z 05 April 2001.**

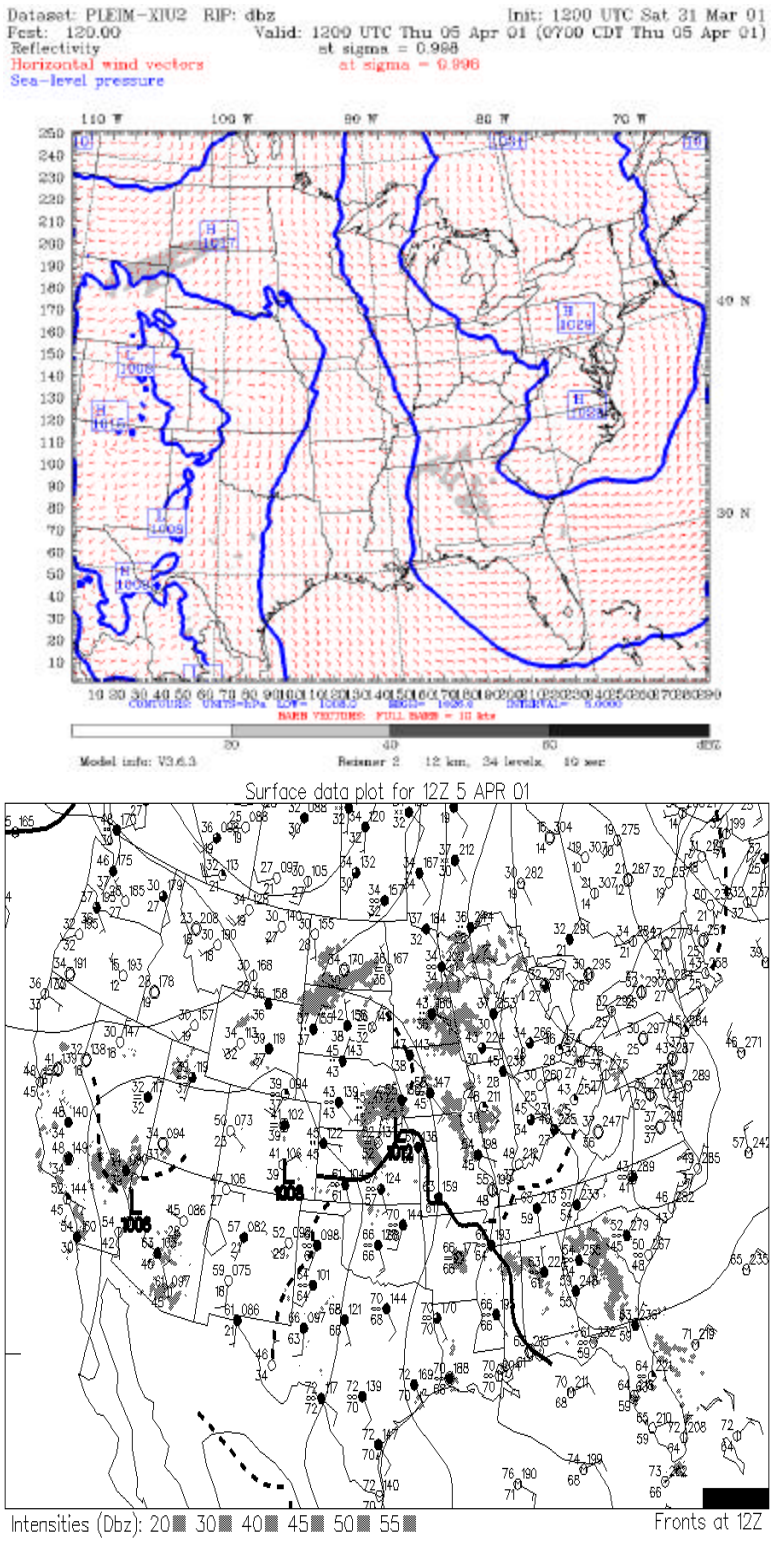


**Figure 3-19: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 00Z 11 April 2001.**

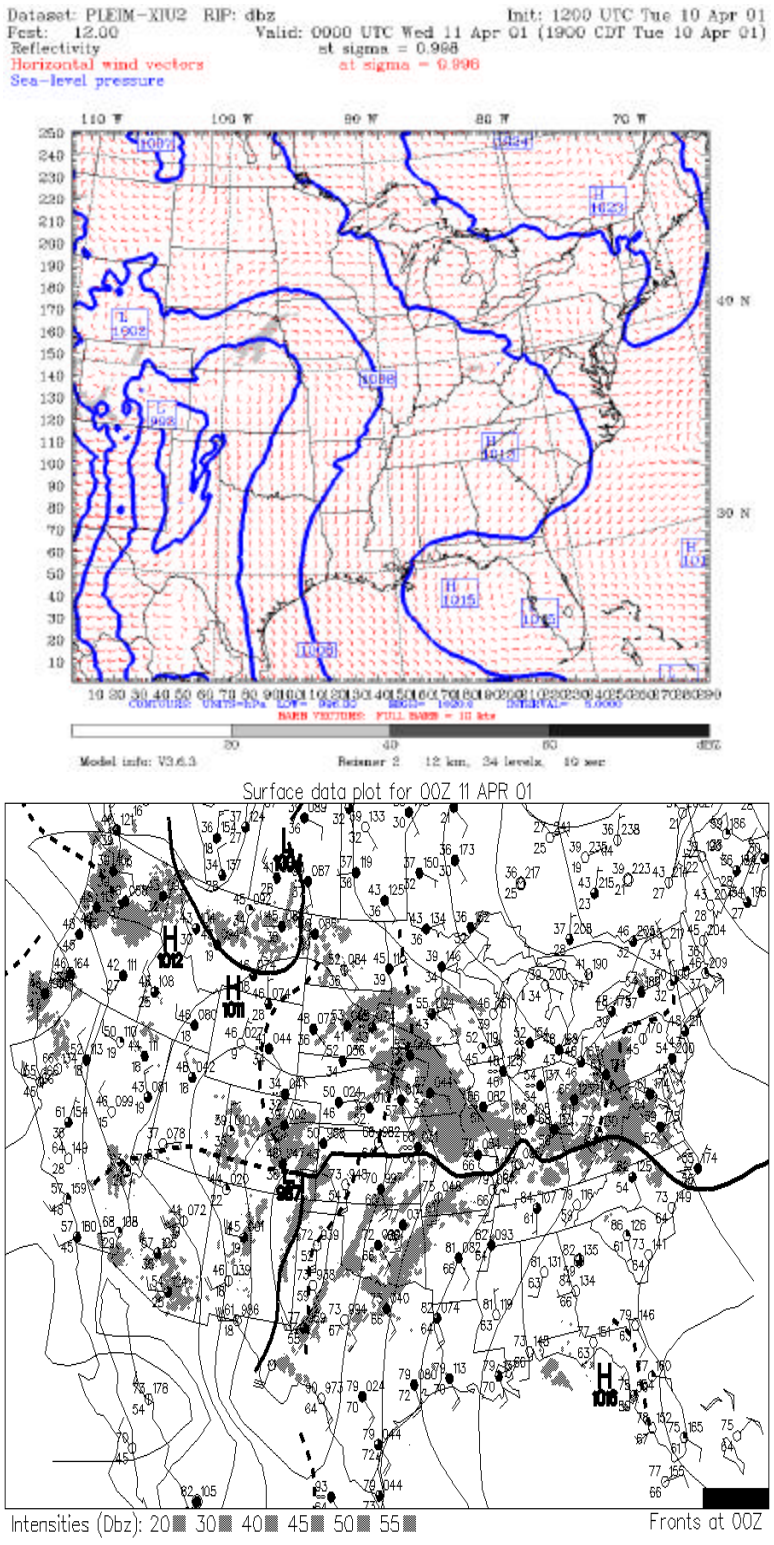


**Figure 3-20: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 12Z 16 April 2001.**

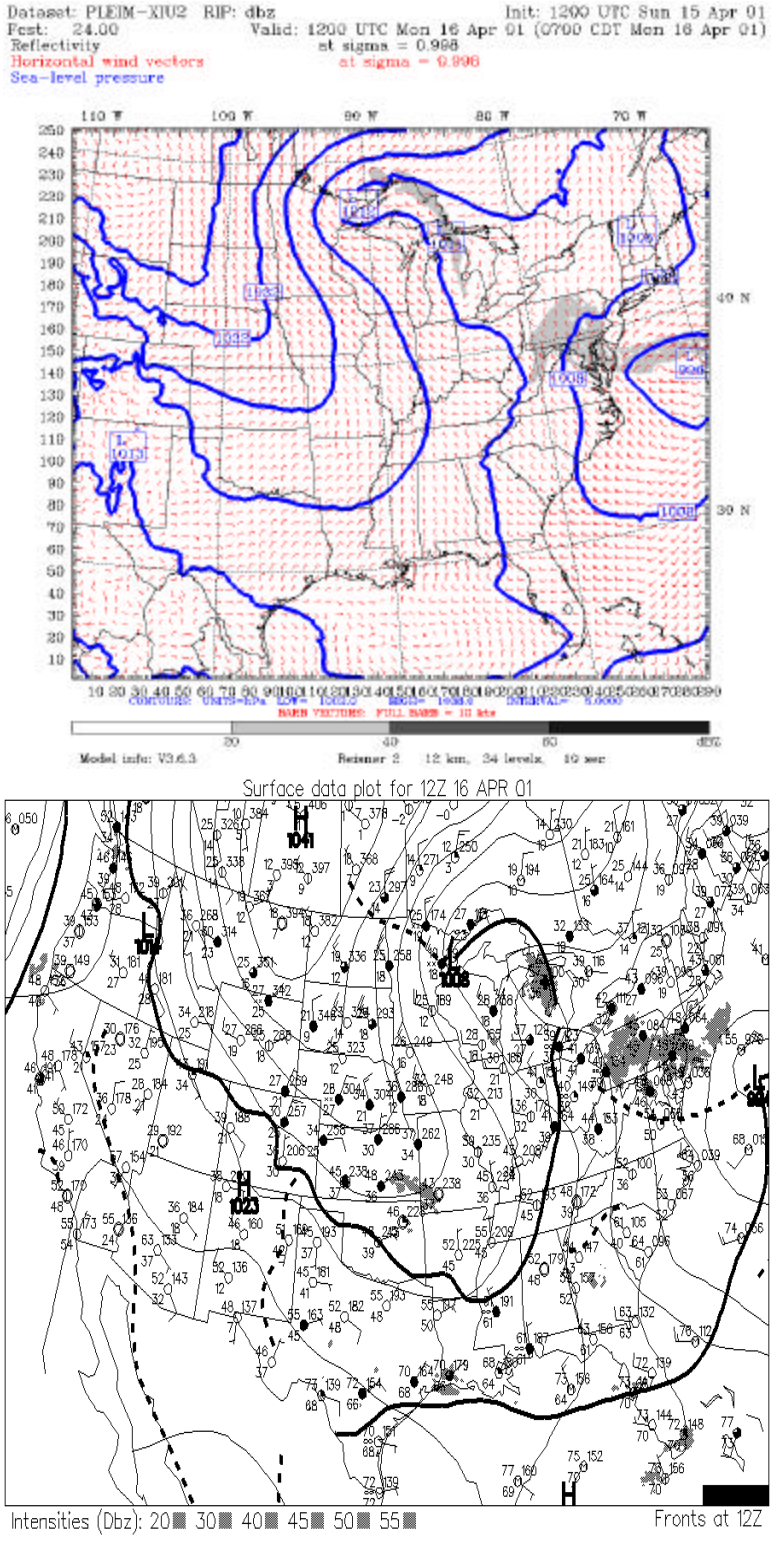


**Figure 3-21: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 00Z 22 April 2001.**

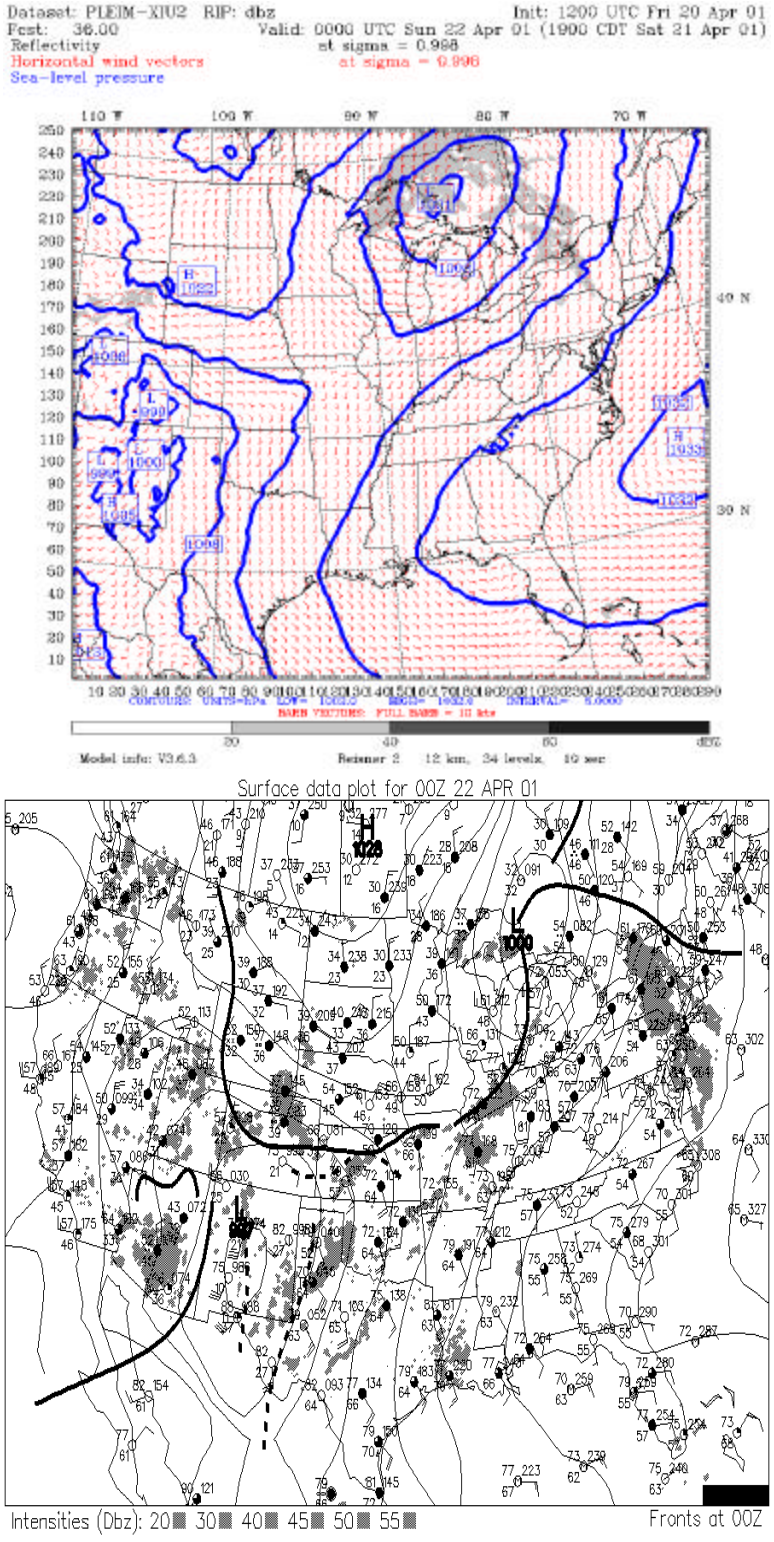


**Figure 3-22: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 12Z 27 April 2001.**

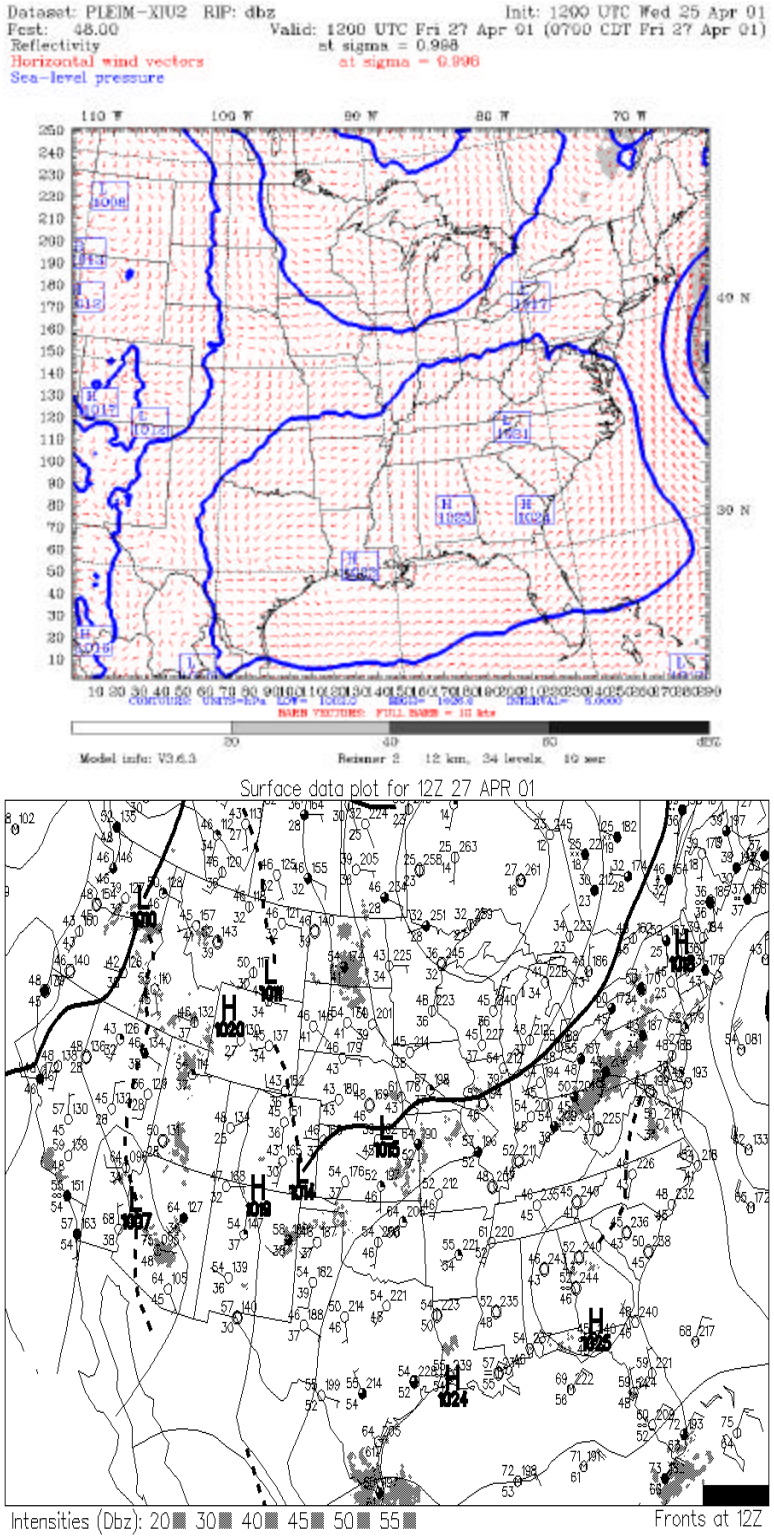


**Figure 3-23: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 00Z 03 May 2001.**

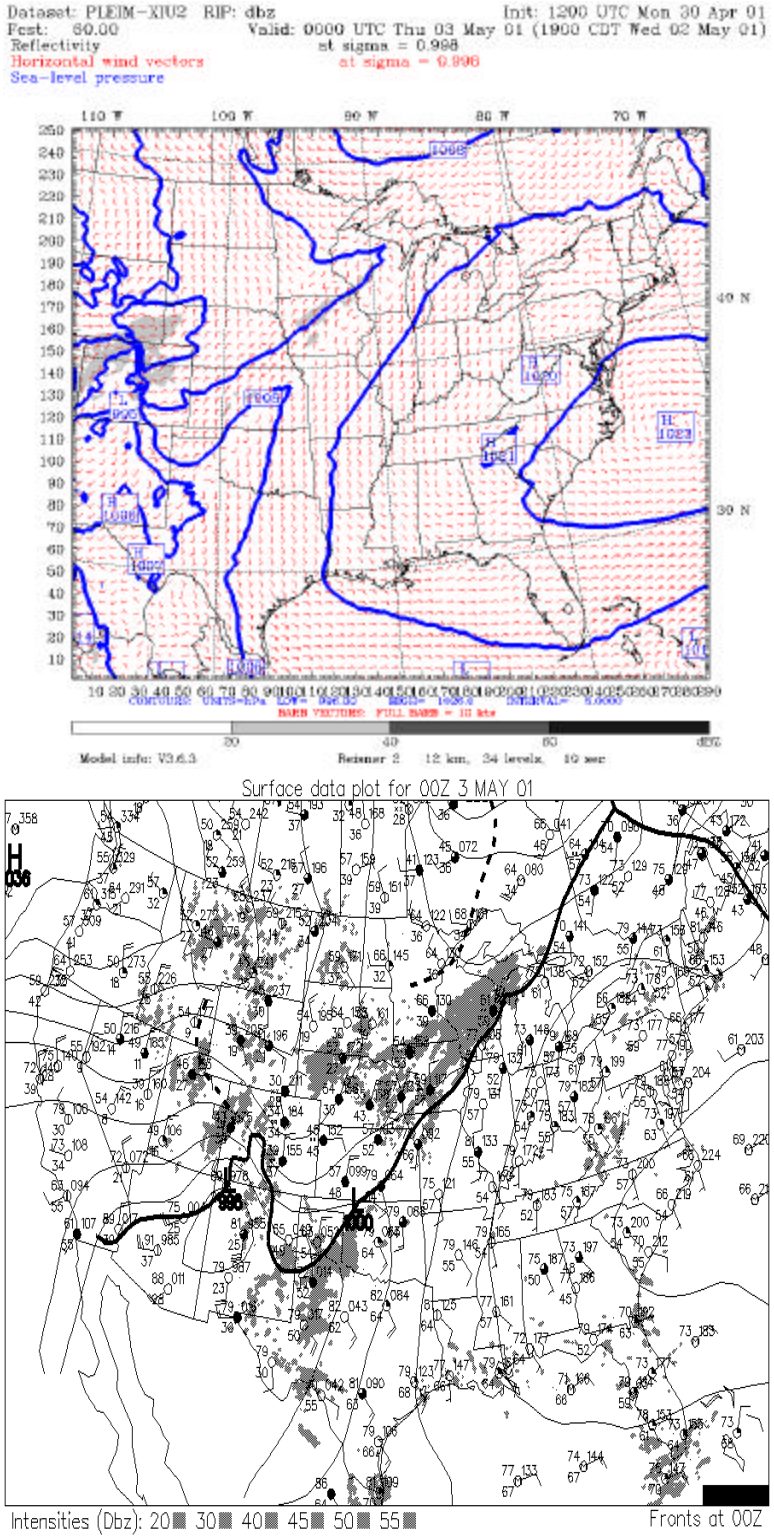


**Figure 3-24: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 12Z 08 May 2001.**

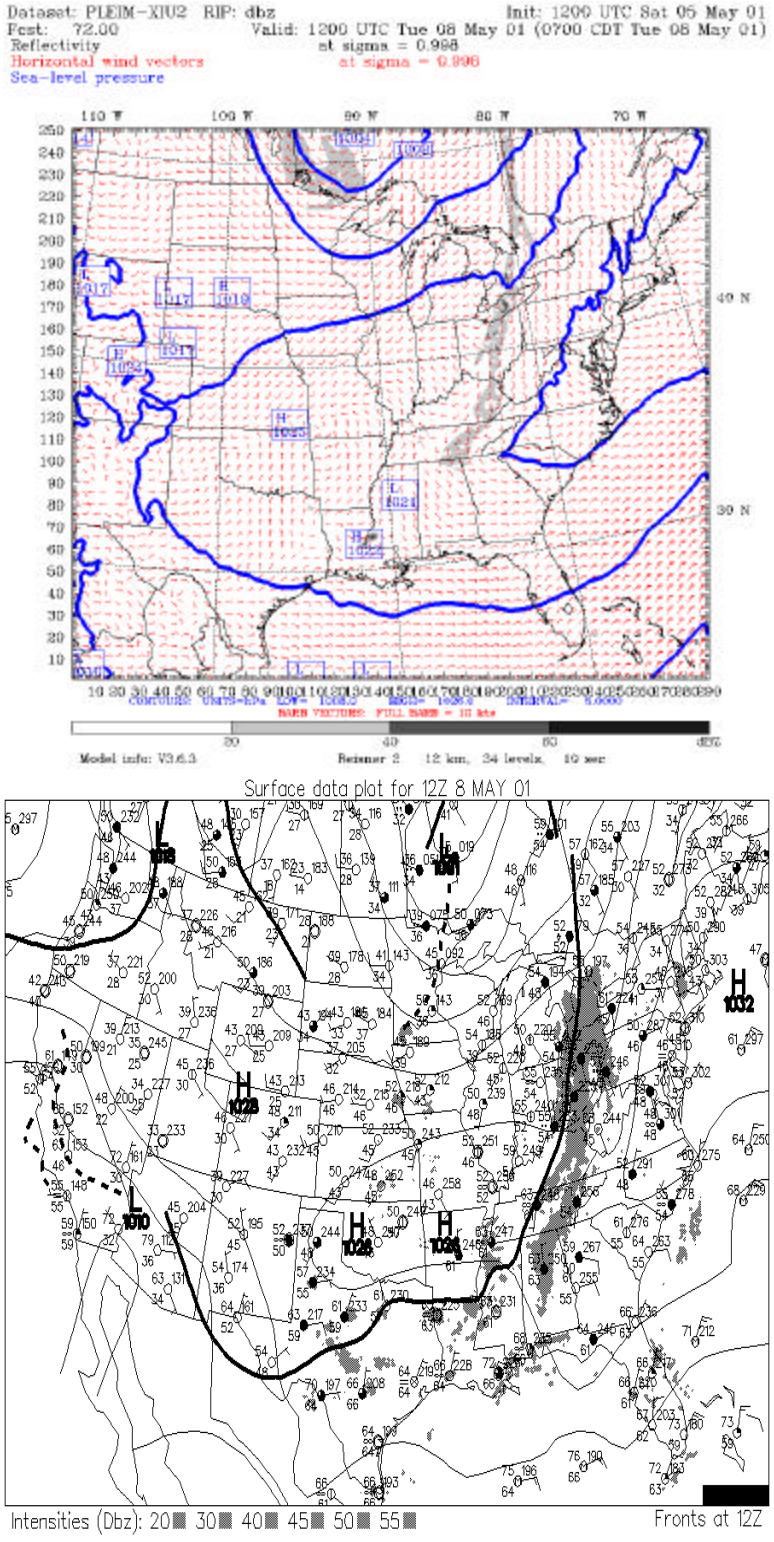


**Figure 3-25: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 00Z 14 May 2001.**

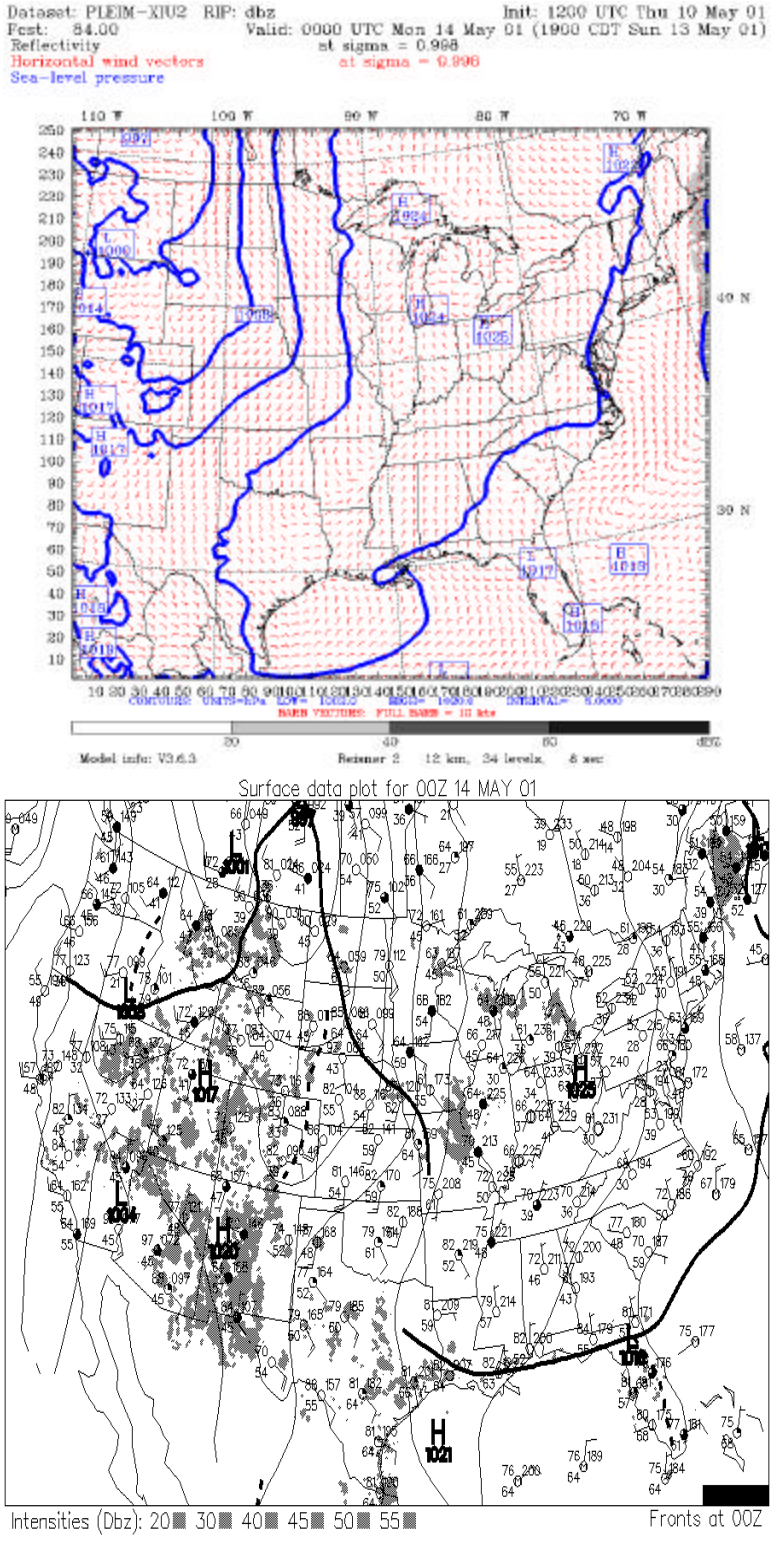


**Figure 3-26: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 12Z 19 May 2001.**

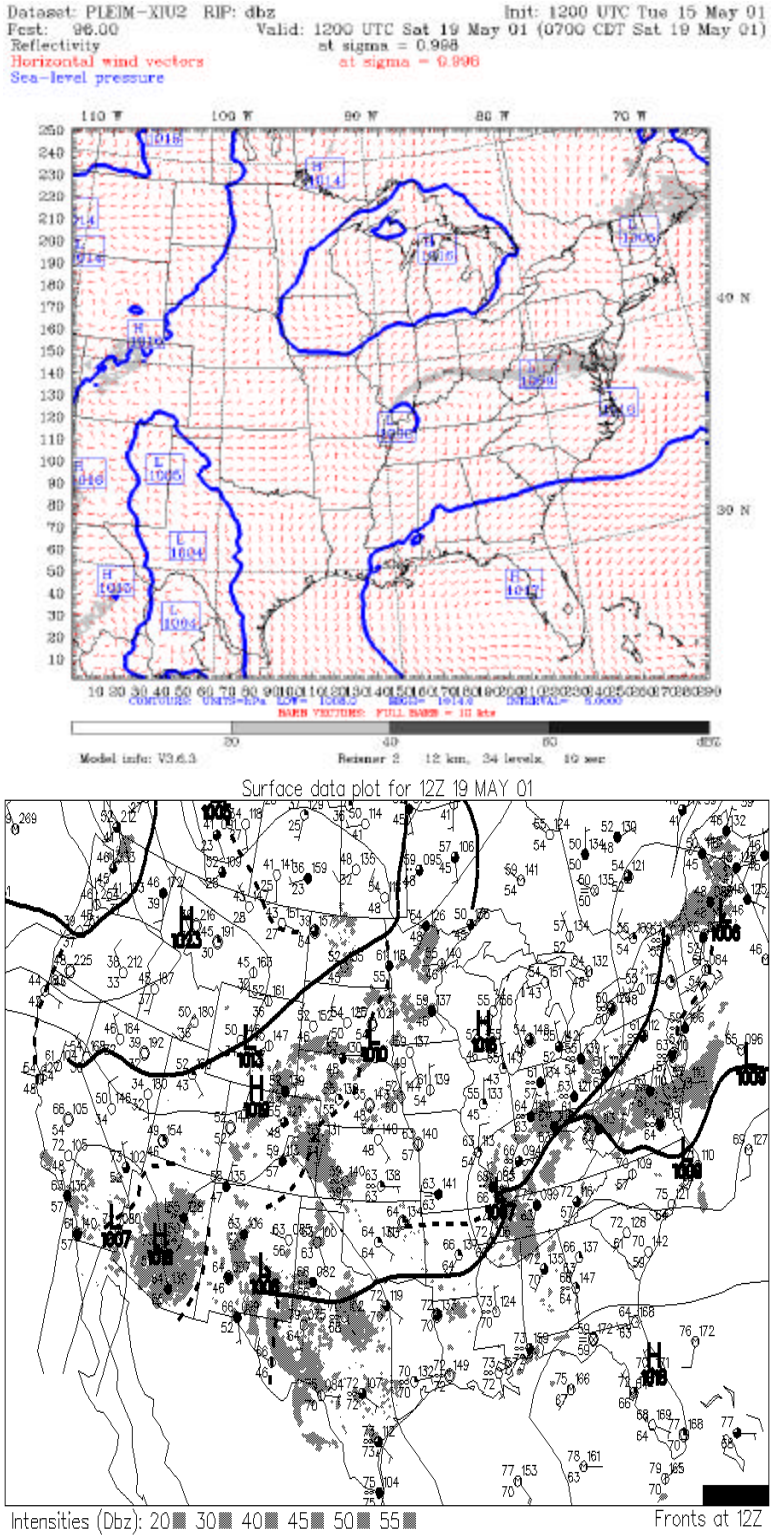


**Figure 3-27: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 00Z 25 May 2001.**

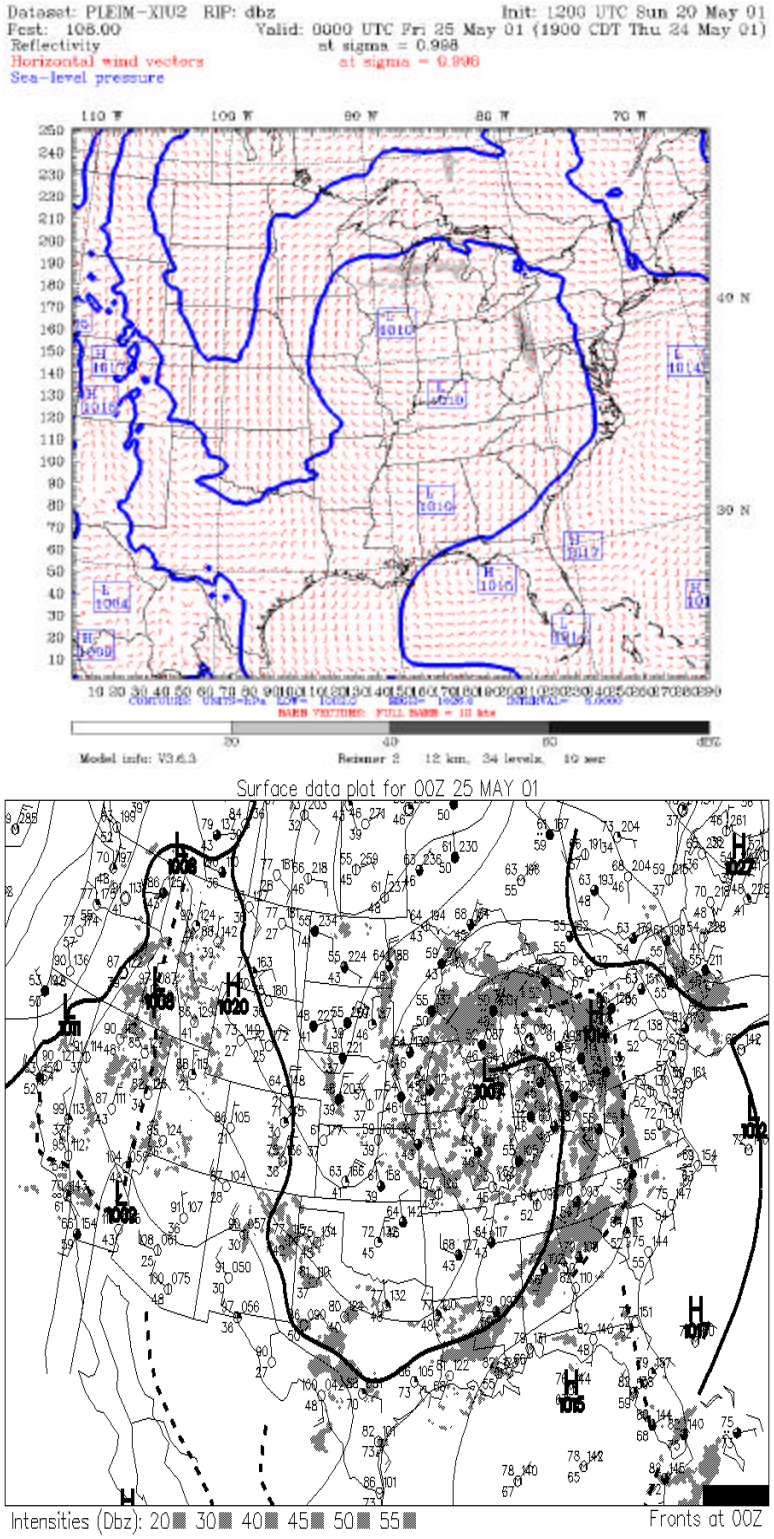


**Figure 3-28: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 12Z 30 May 2001.**

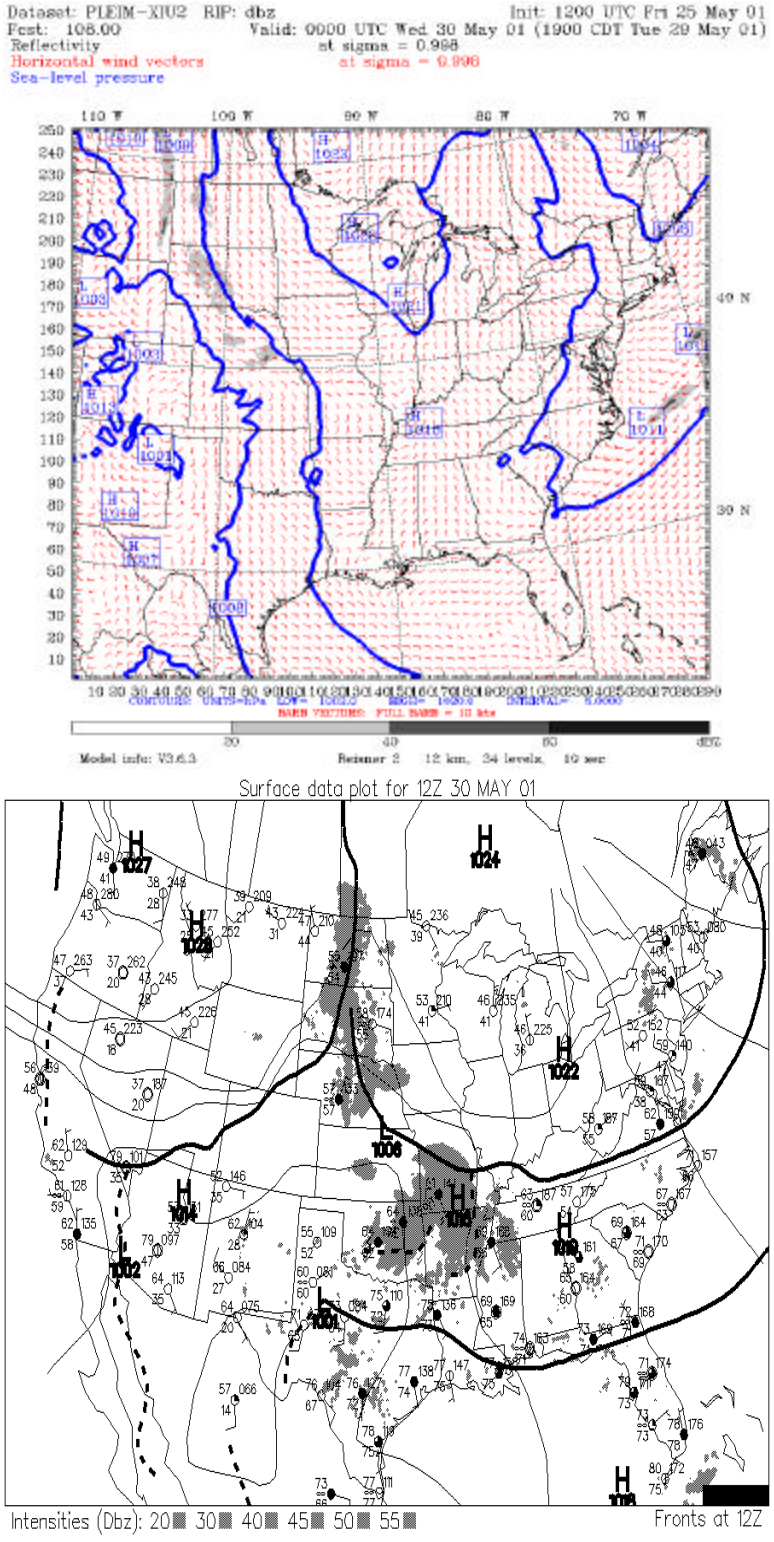


**Figure 3-29: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 00Z 05 June 2001.**

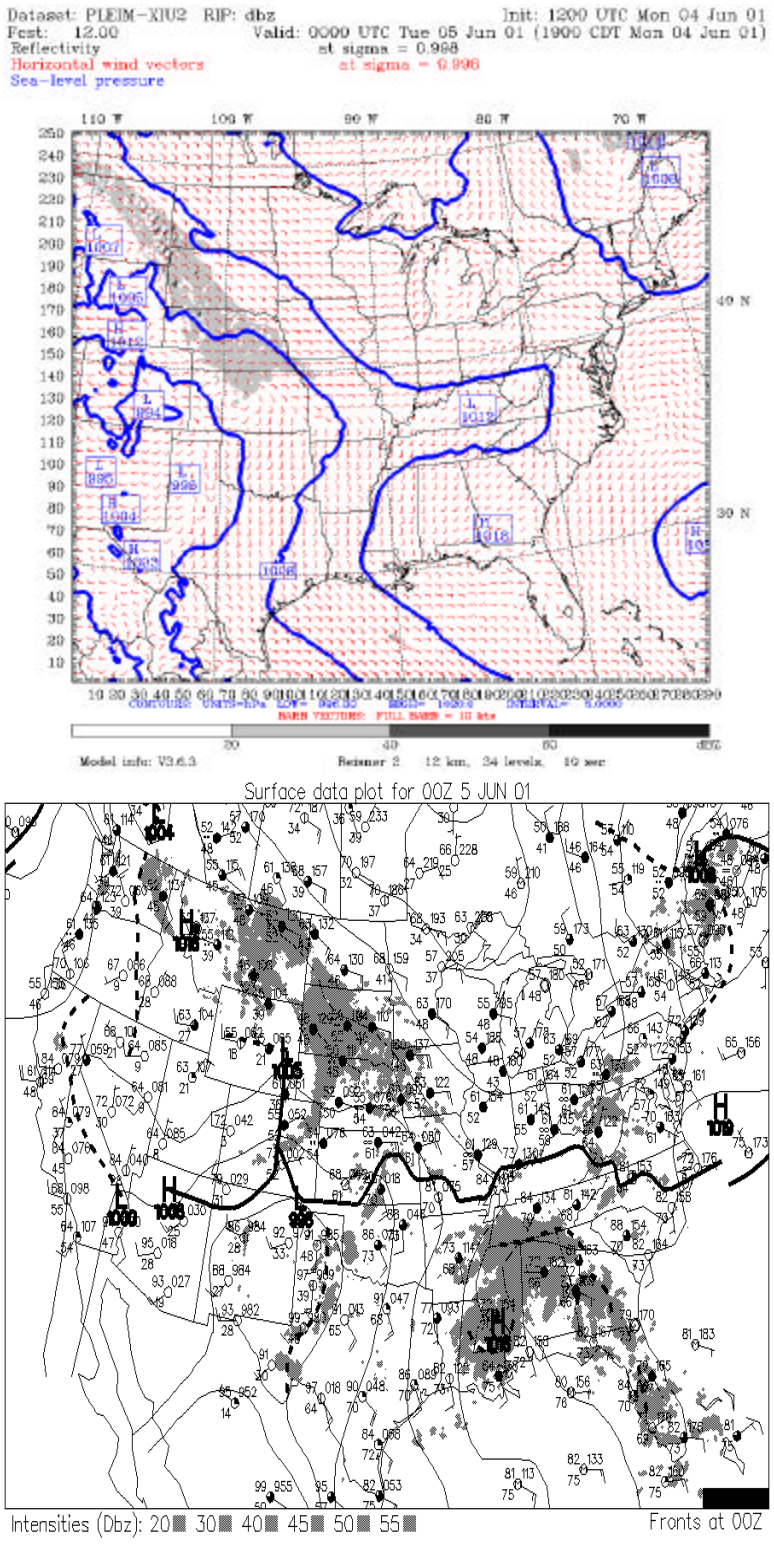


**Figure 3-30: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 12Z 10 June 2001.**

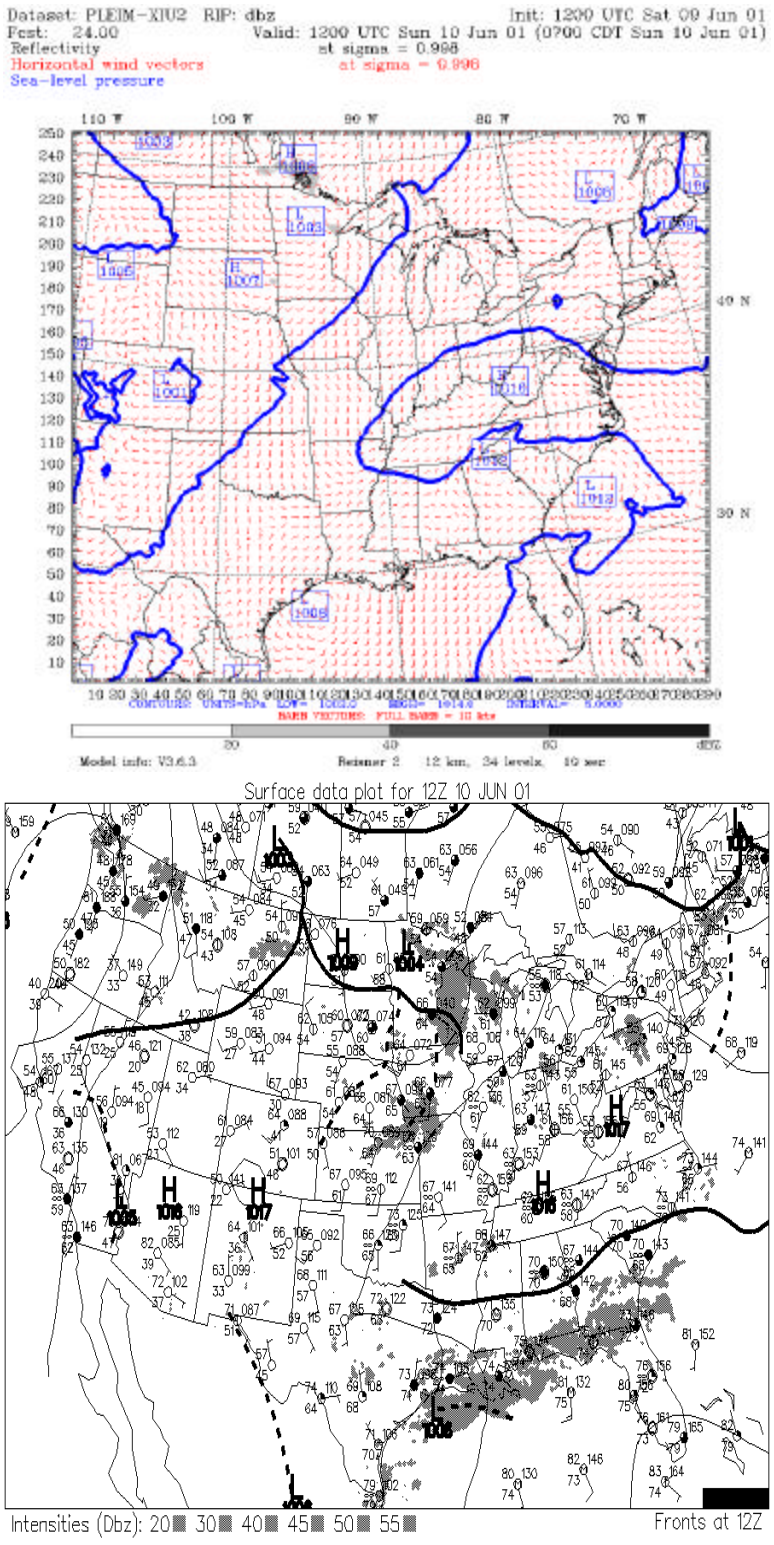


**Figure 3-31: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 00Z 16 June 2001.**

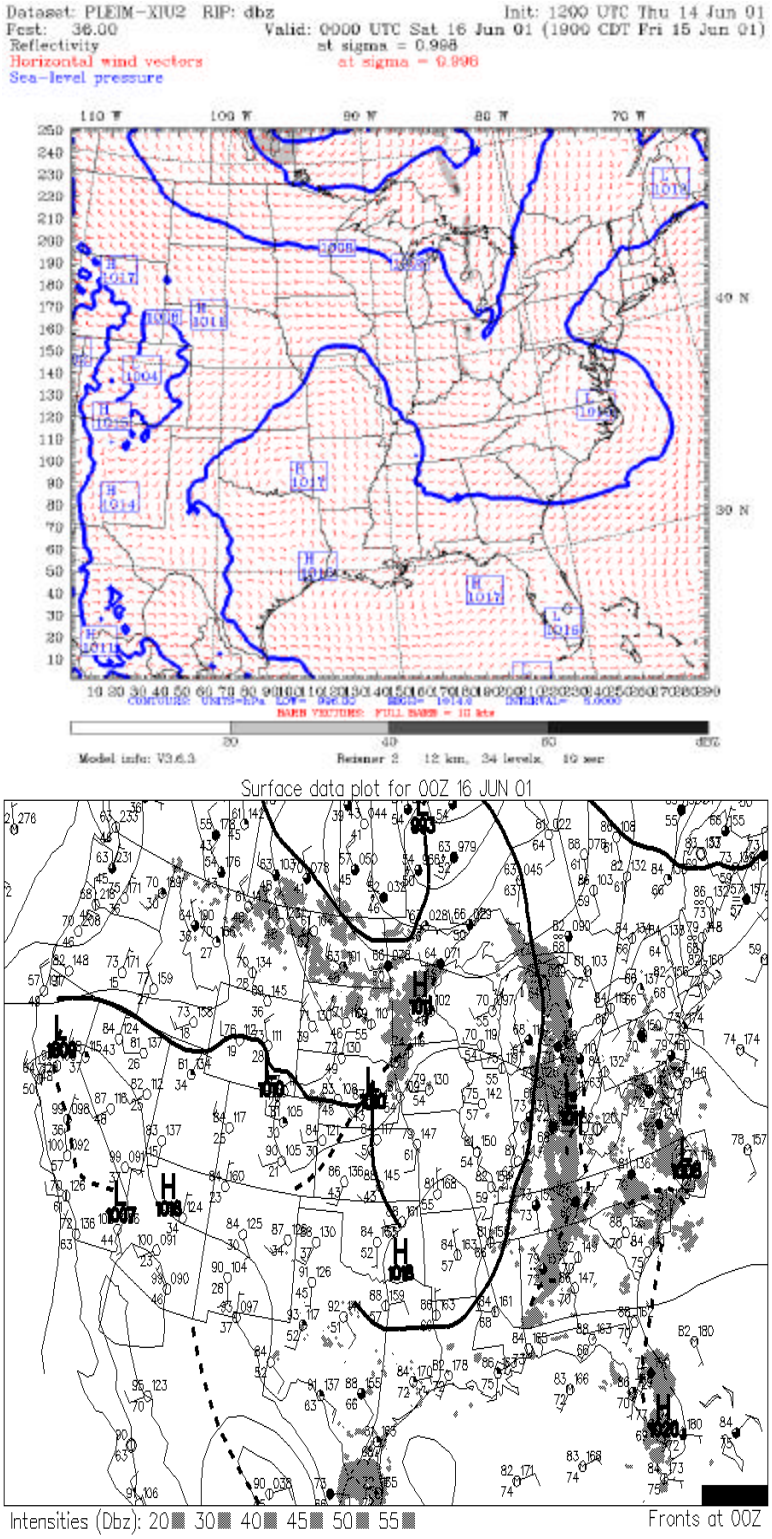


**Figure 3-32: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 12Z 21 June 2001.**

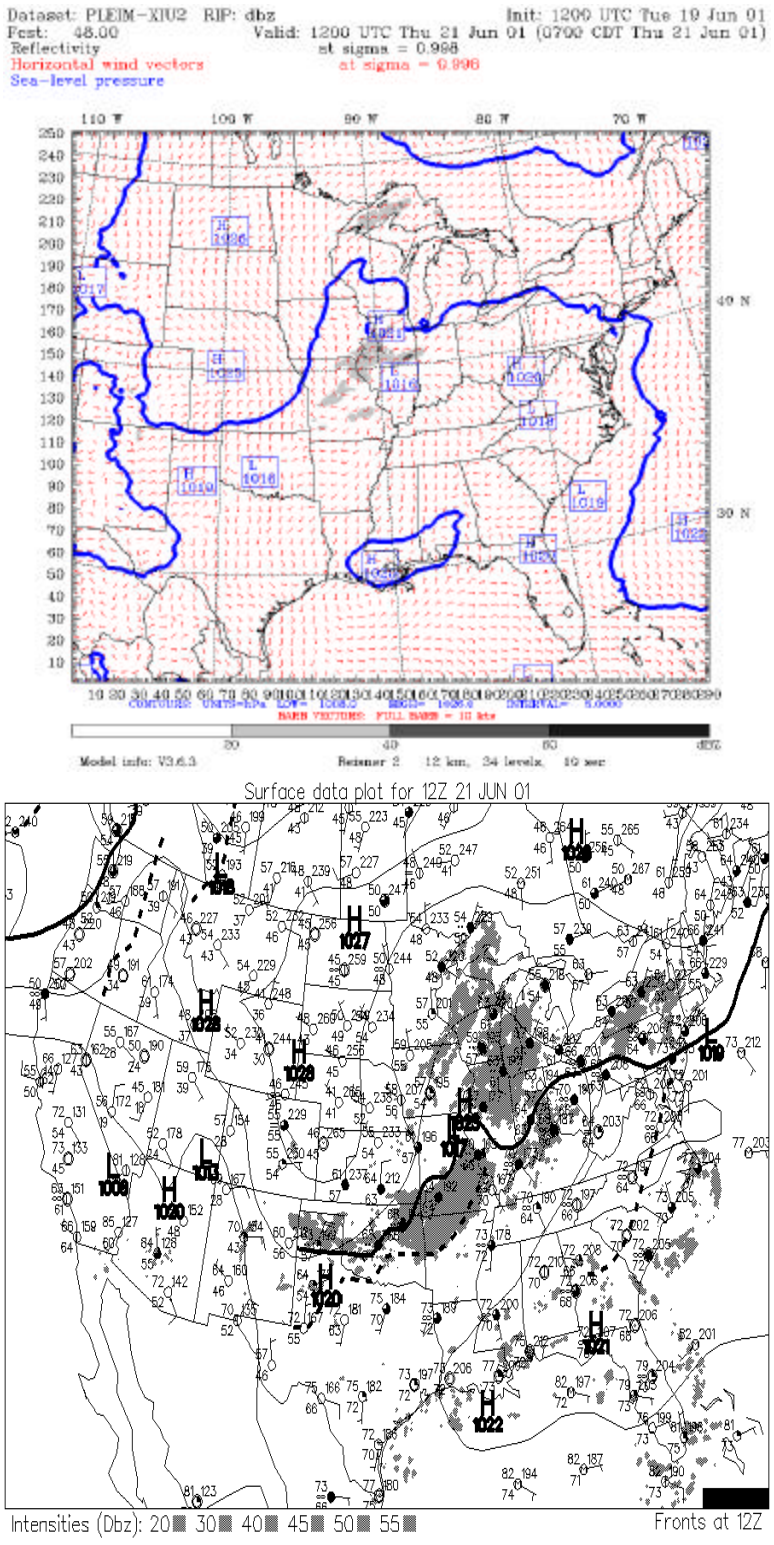


**Figure 3-33: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 00Z 27 June 2001.**

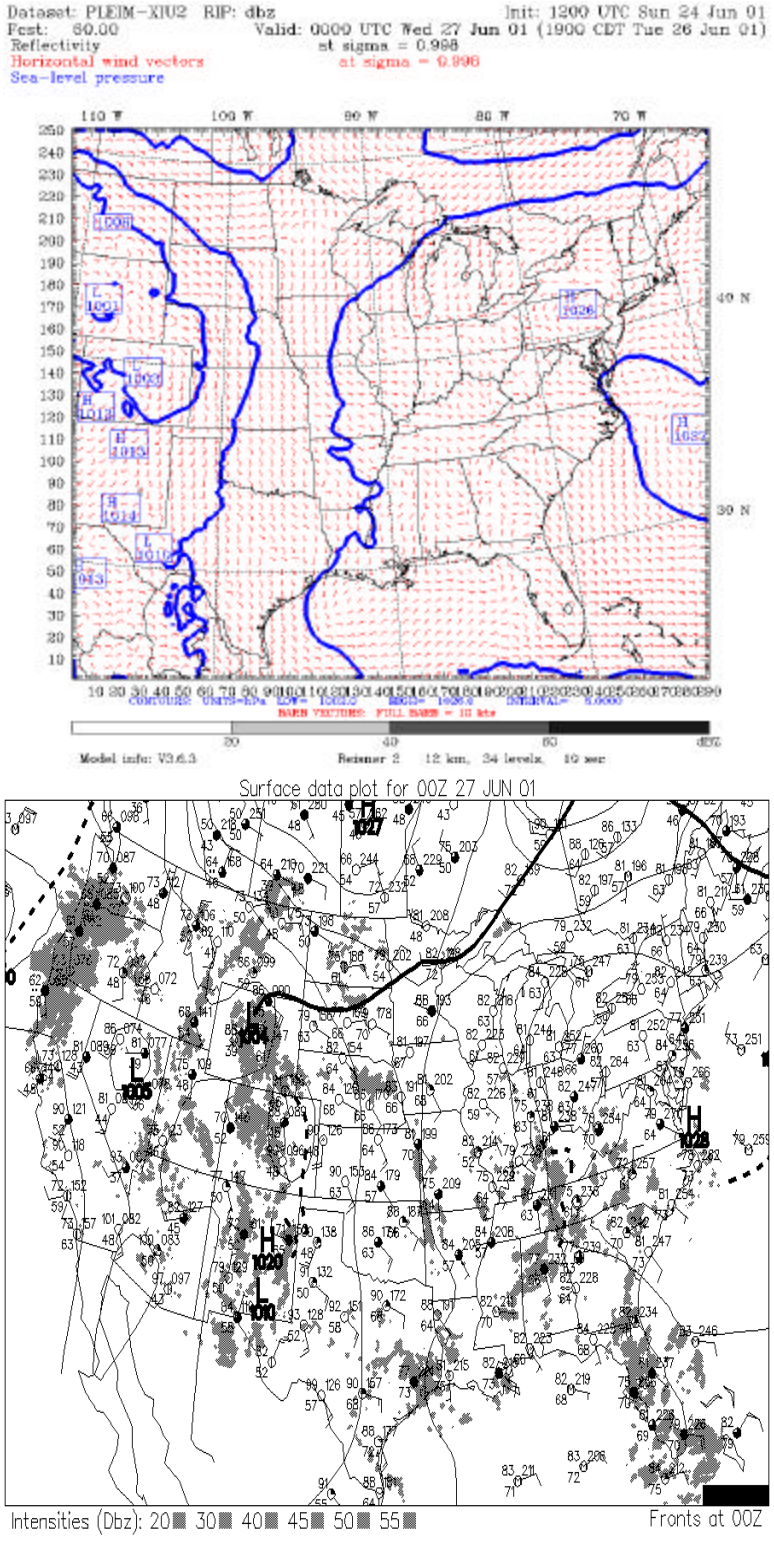


**Figure 3-34: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 12Z 02 July 2001.**

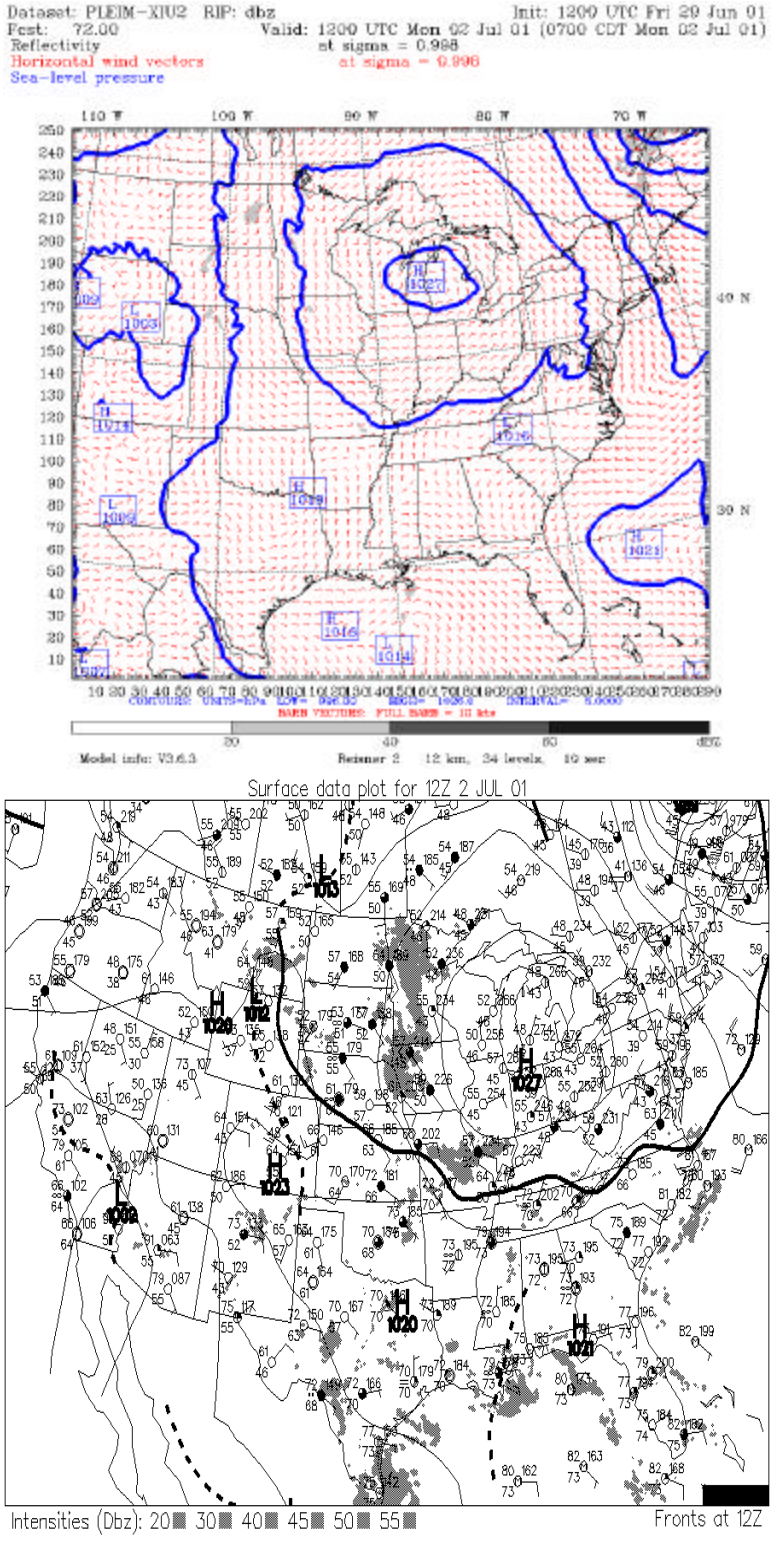


**Figure 3-35: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 00Z 08 July 2001.**

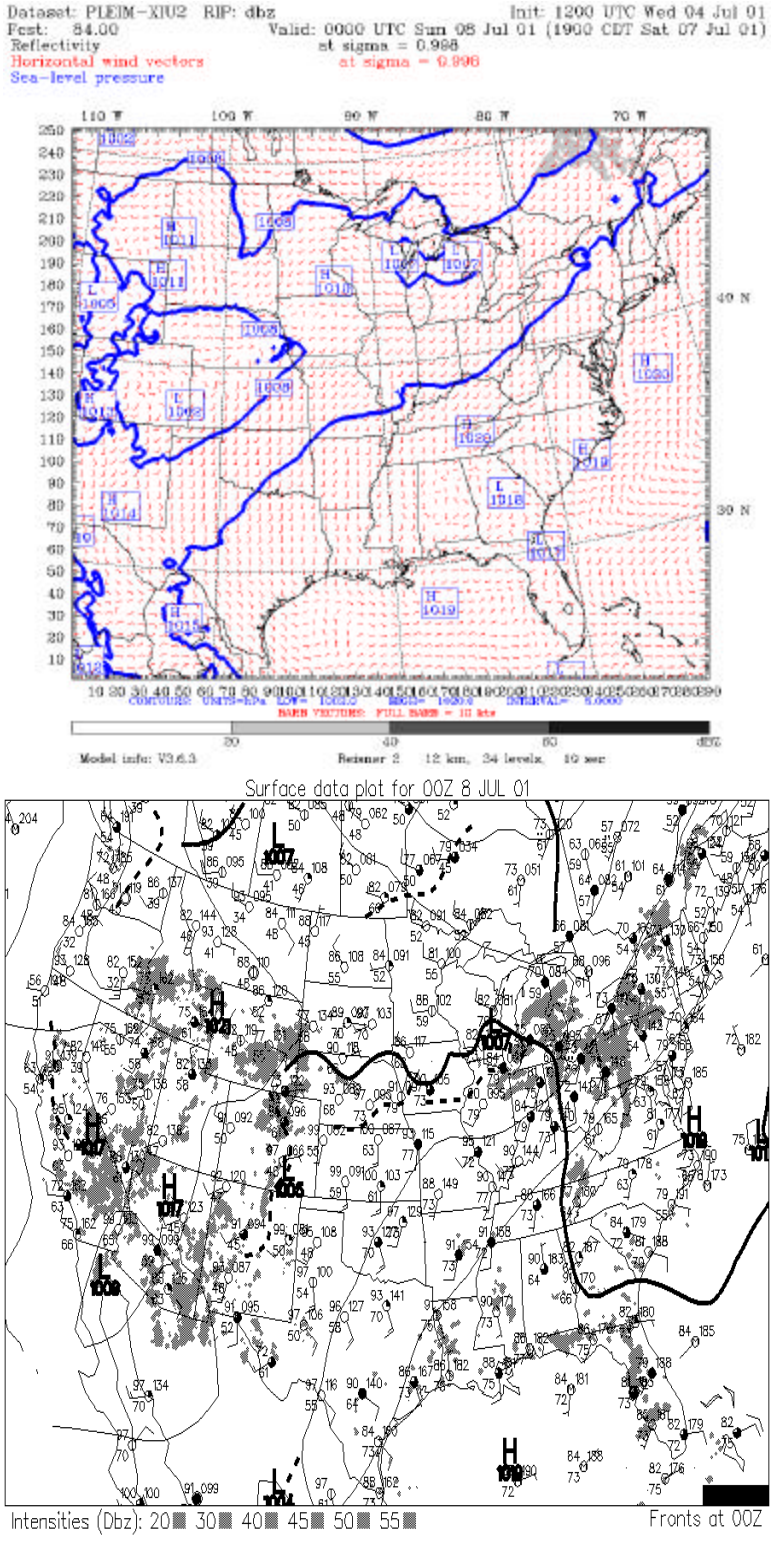


**Figure 3-36: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 12Z 13 July 2001.**

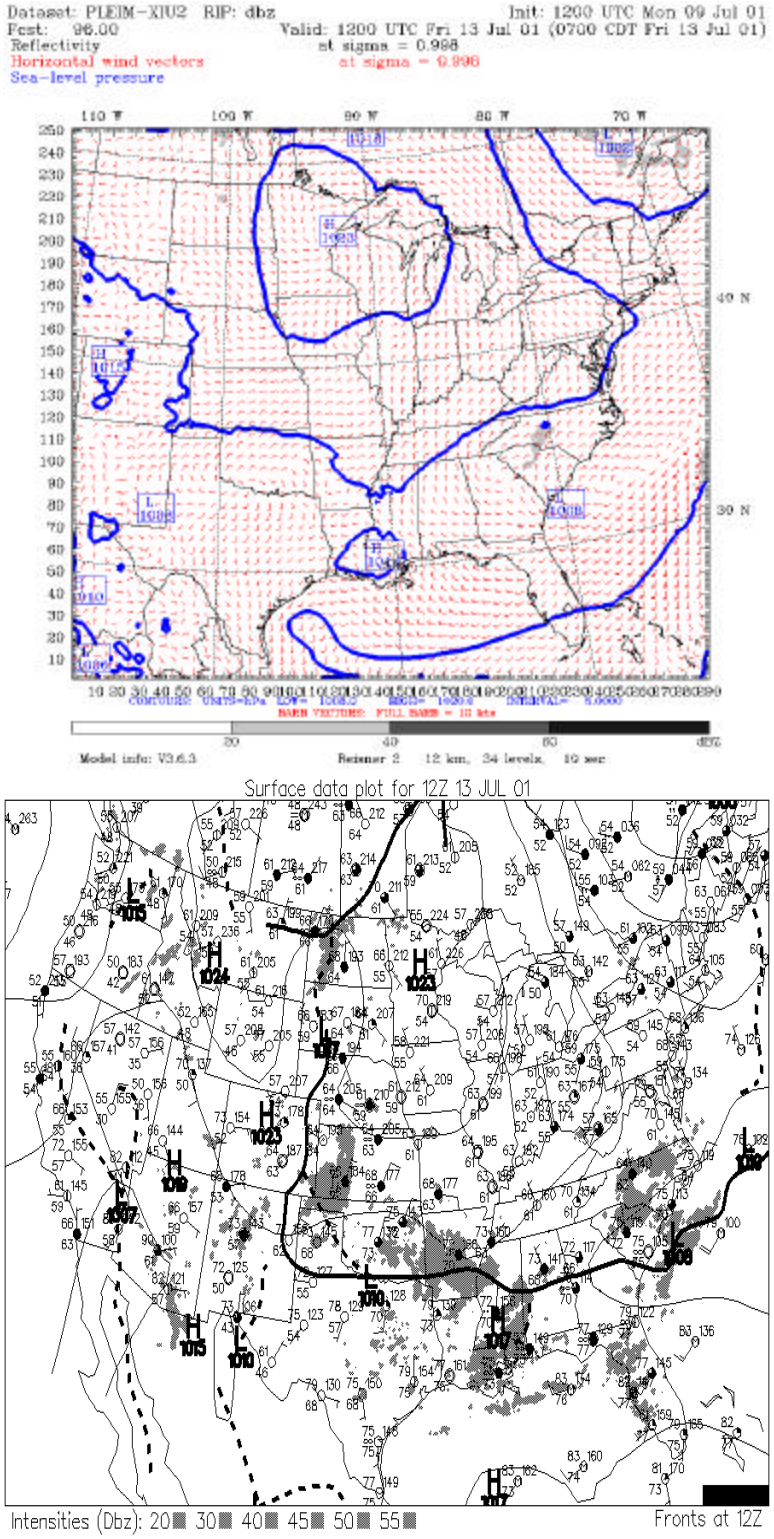


**Figure 3-37: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 00Z 19 July 2001.**

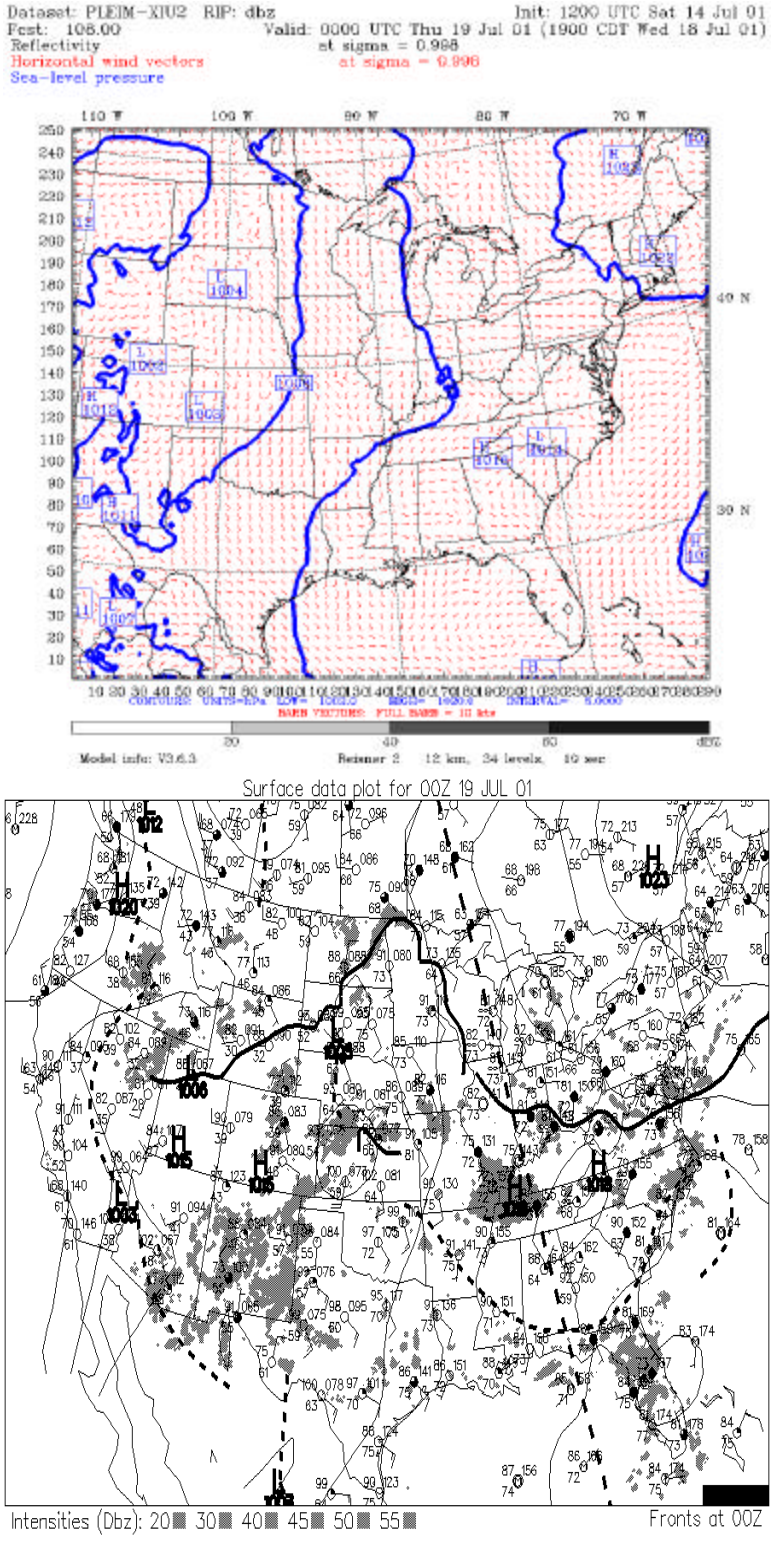


**Figure 3-38: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 12Z 24 July 2001.**

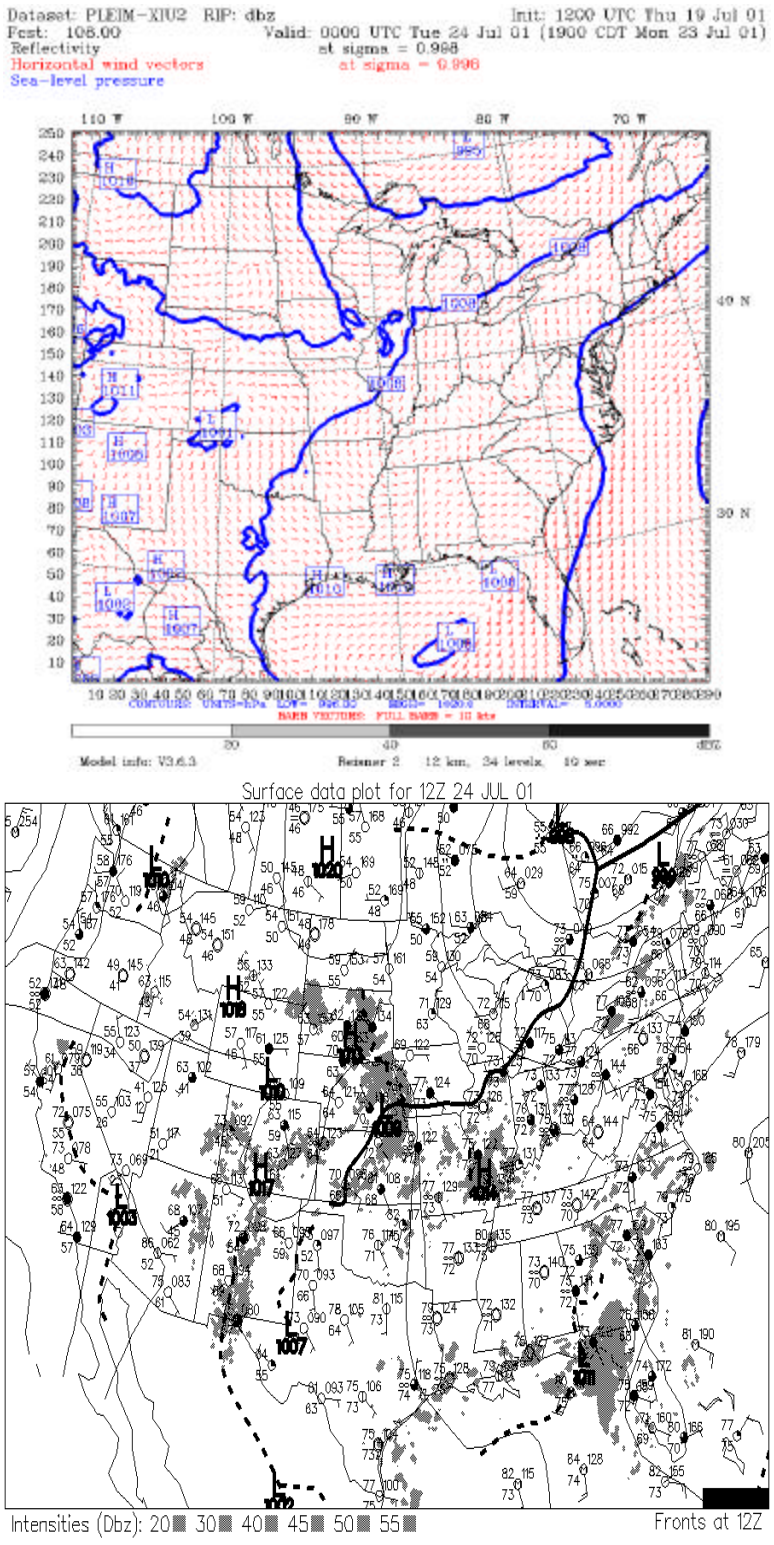


**Figure 3-39: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 00Z 30 July 2001.**

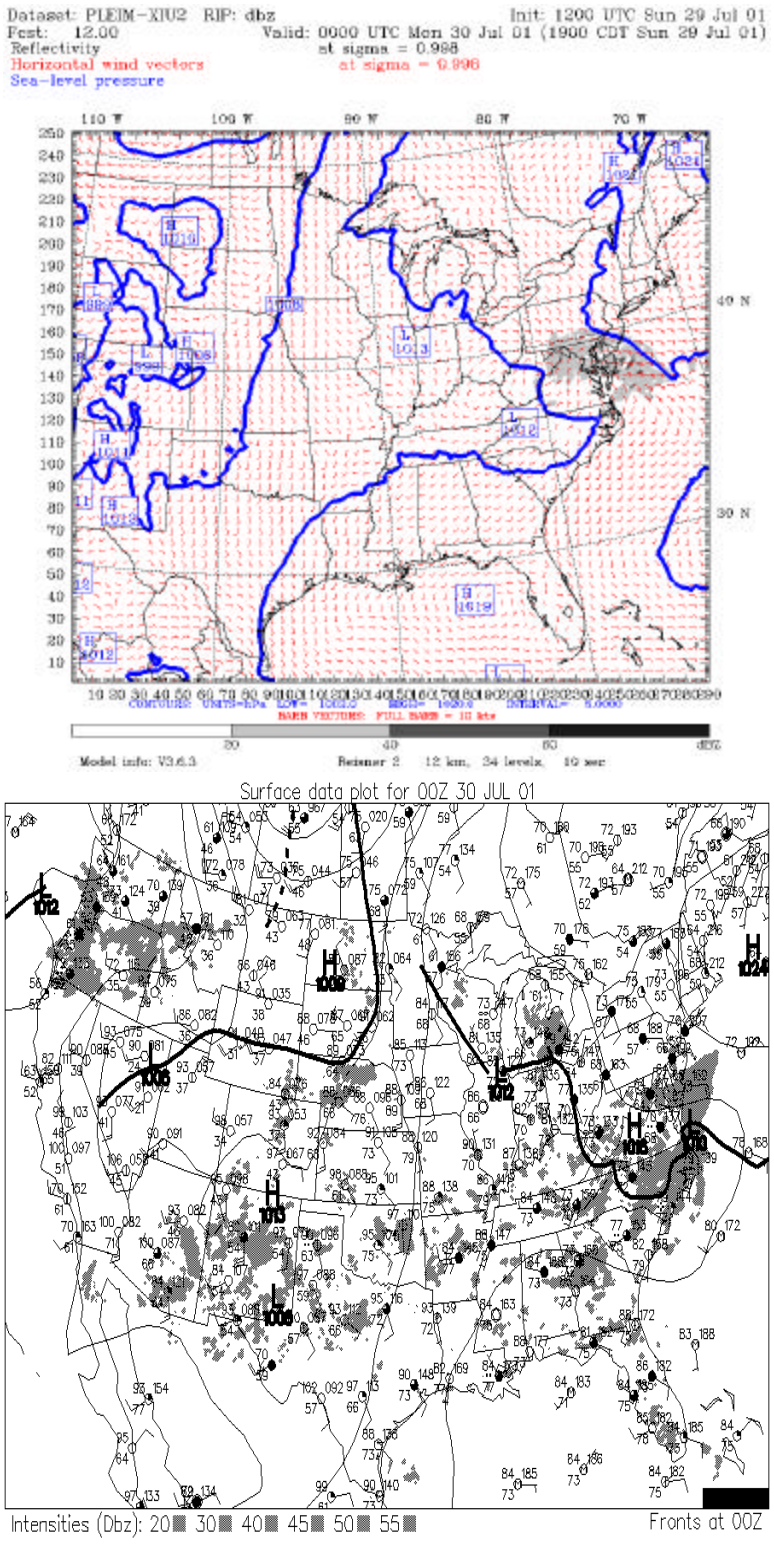


**Figure 3-40: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 12Z 04 August 2001.**

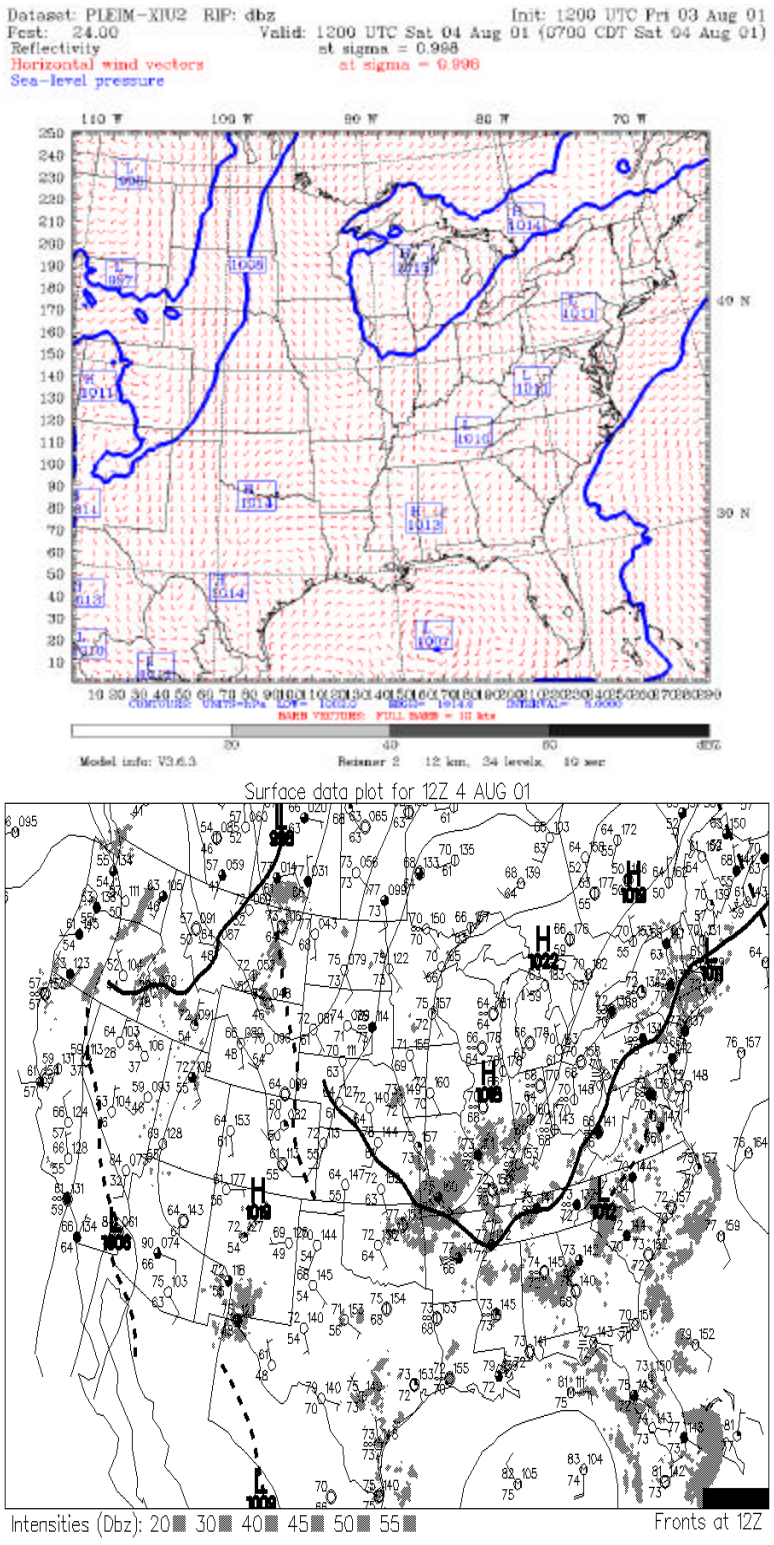


**Figure 3-41: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 00Z 10 August 2001.**

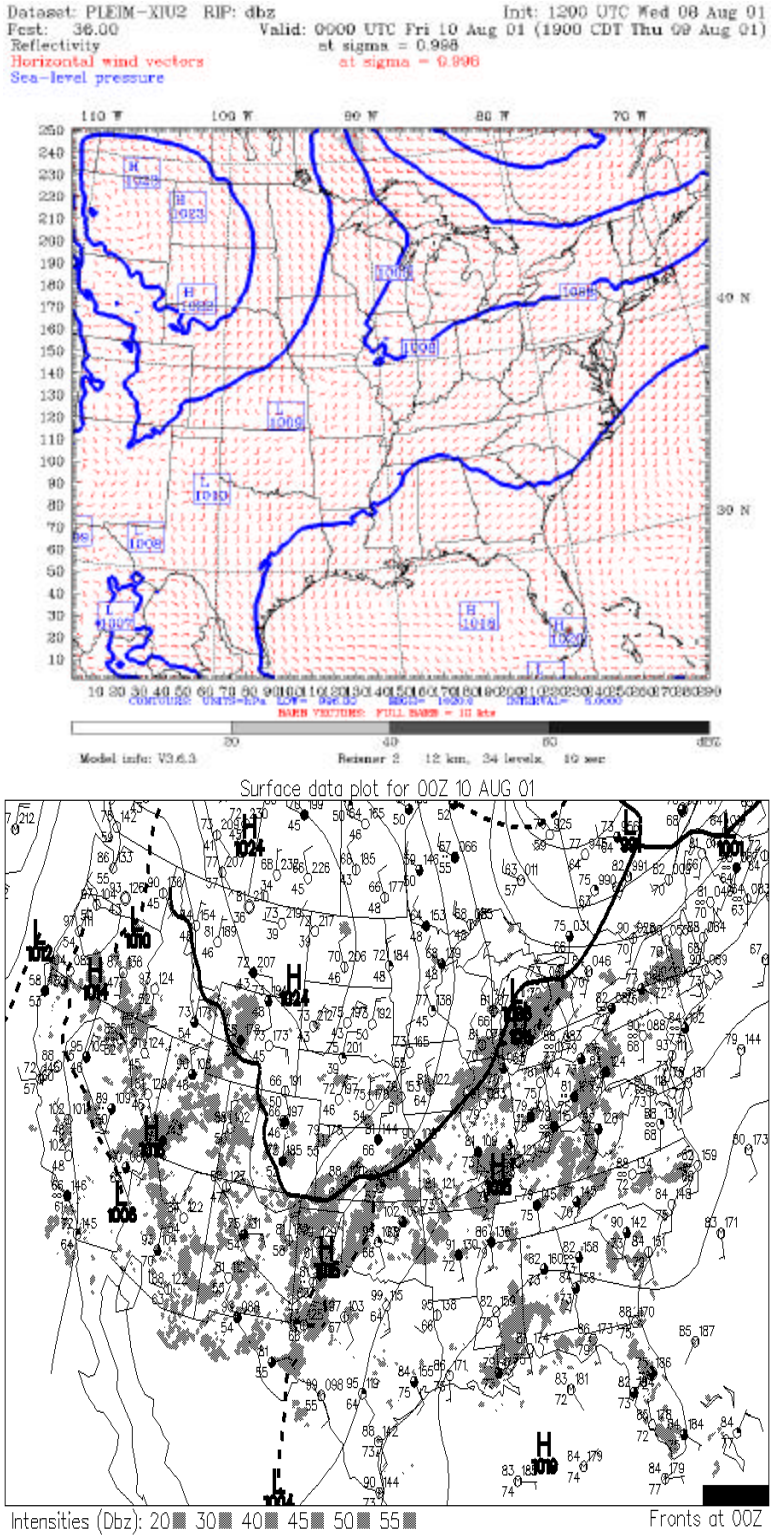


**Figure 3-42: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 12Z 15 August 2001.**

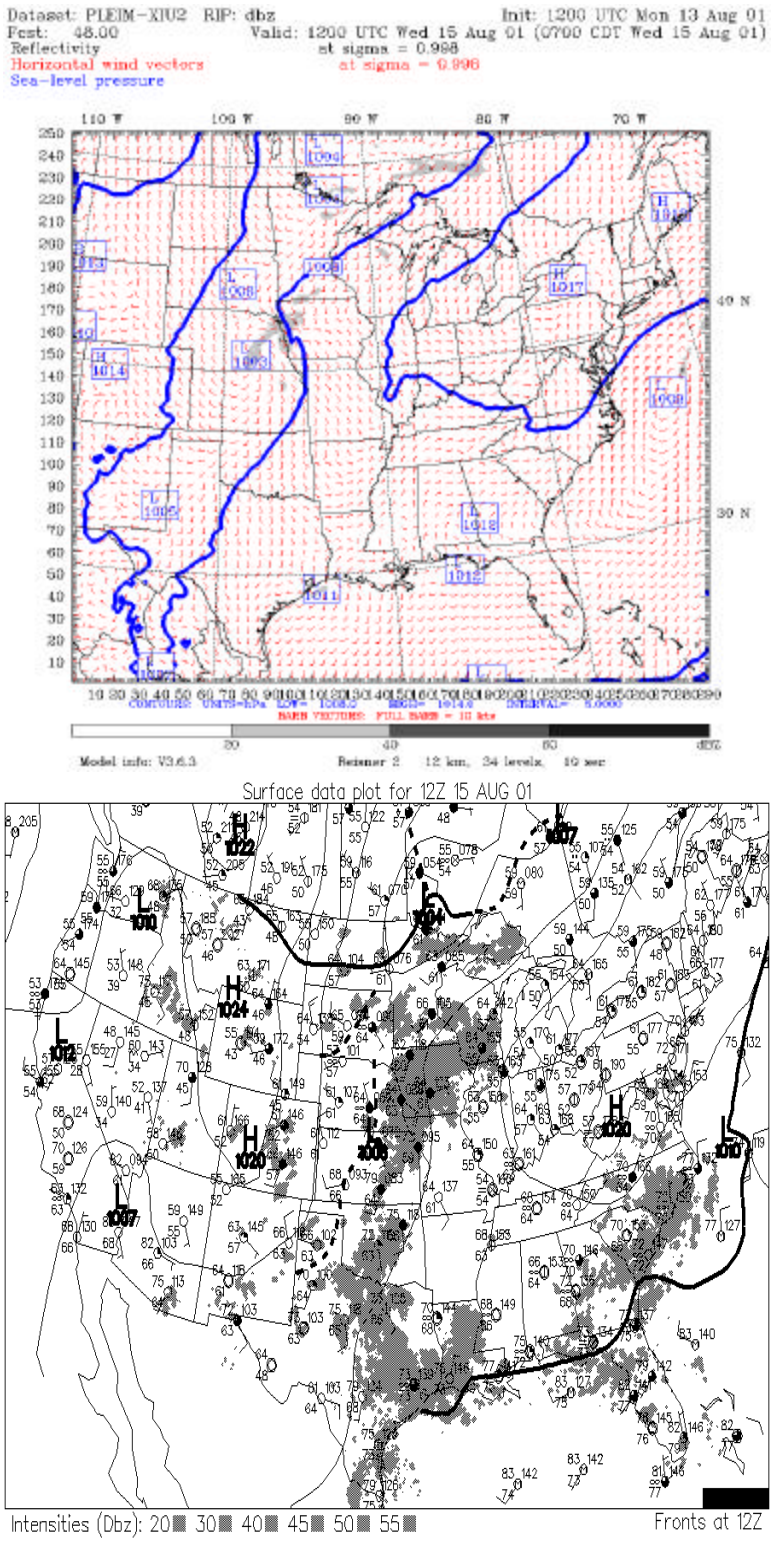


**Figure 3-43: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 00Z 21 August 2001.**

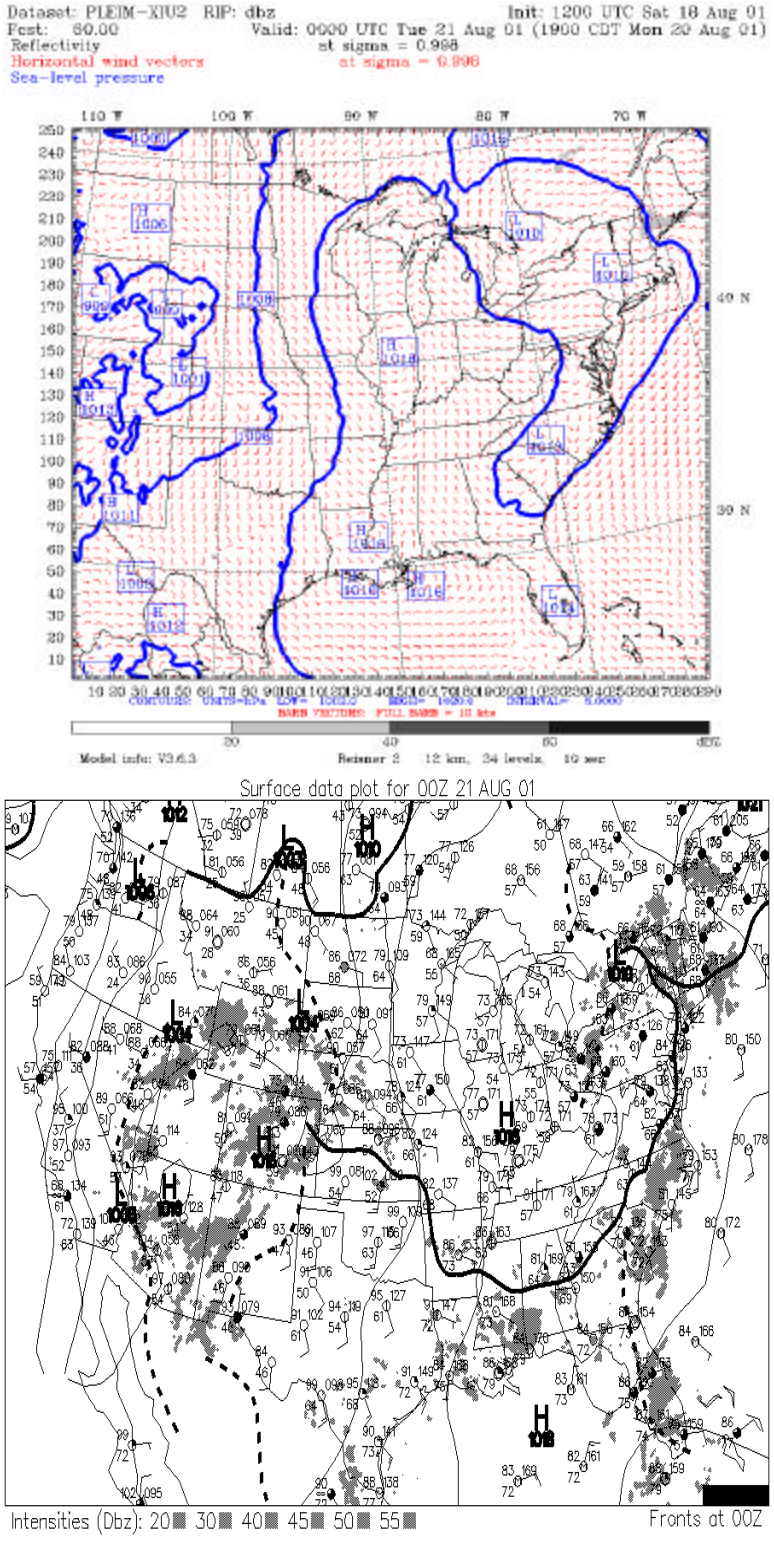


**Figure 3-44: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 12Z 26 August 2001.**

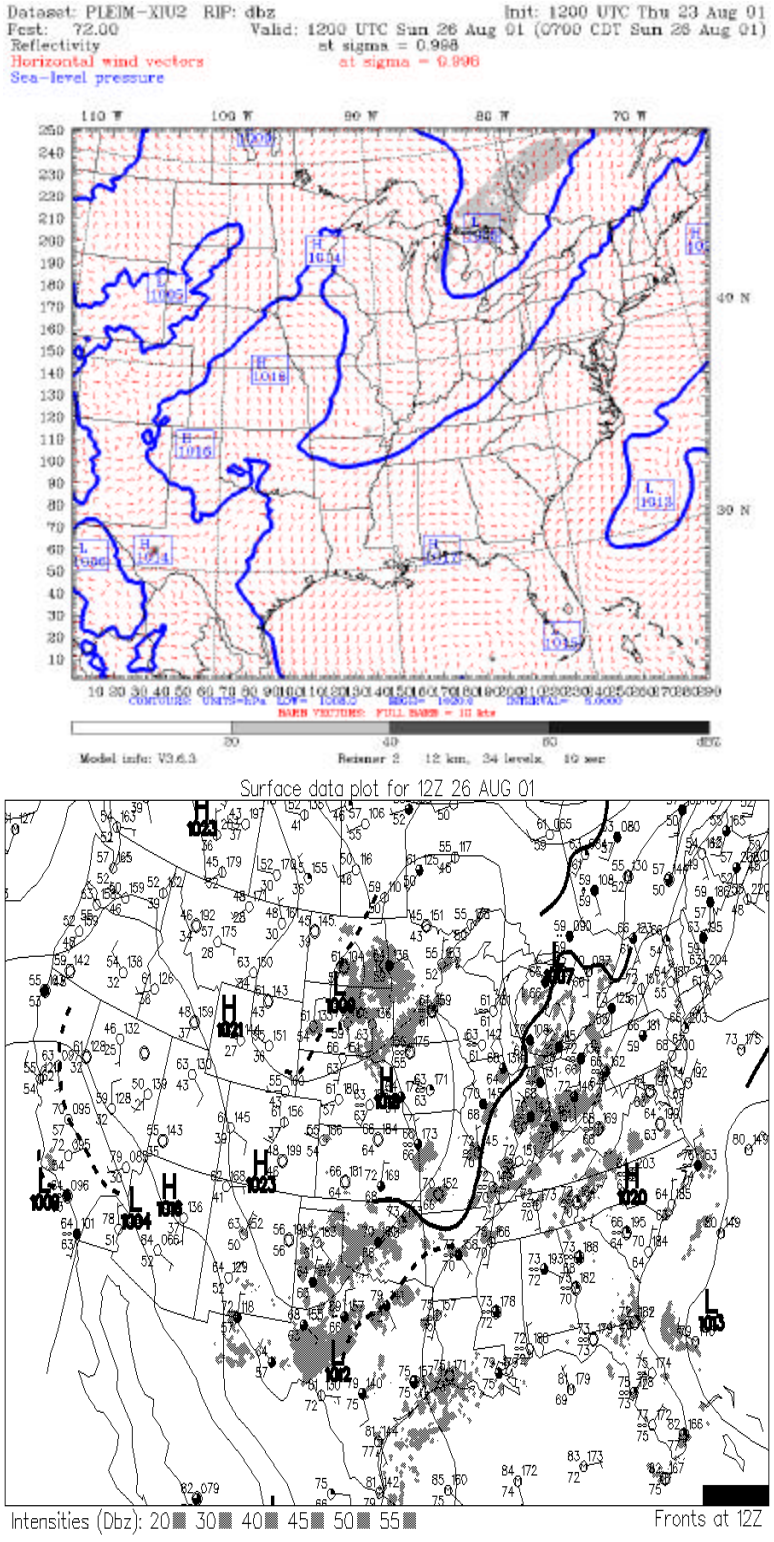


**Figure 3-45: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 00Z 01 September 2001.**

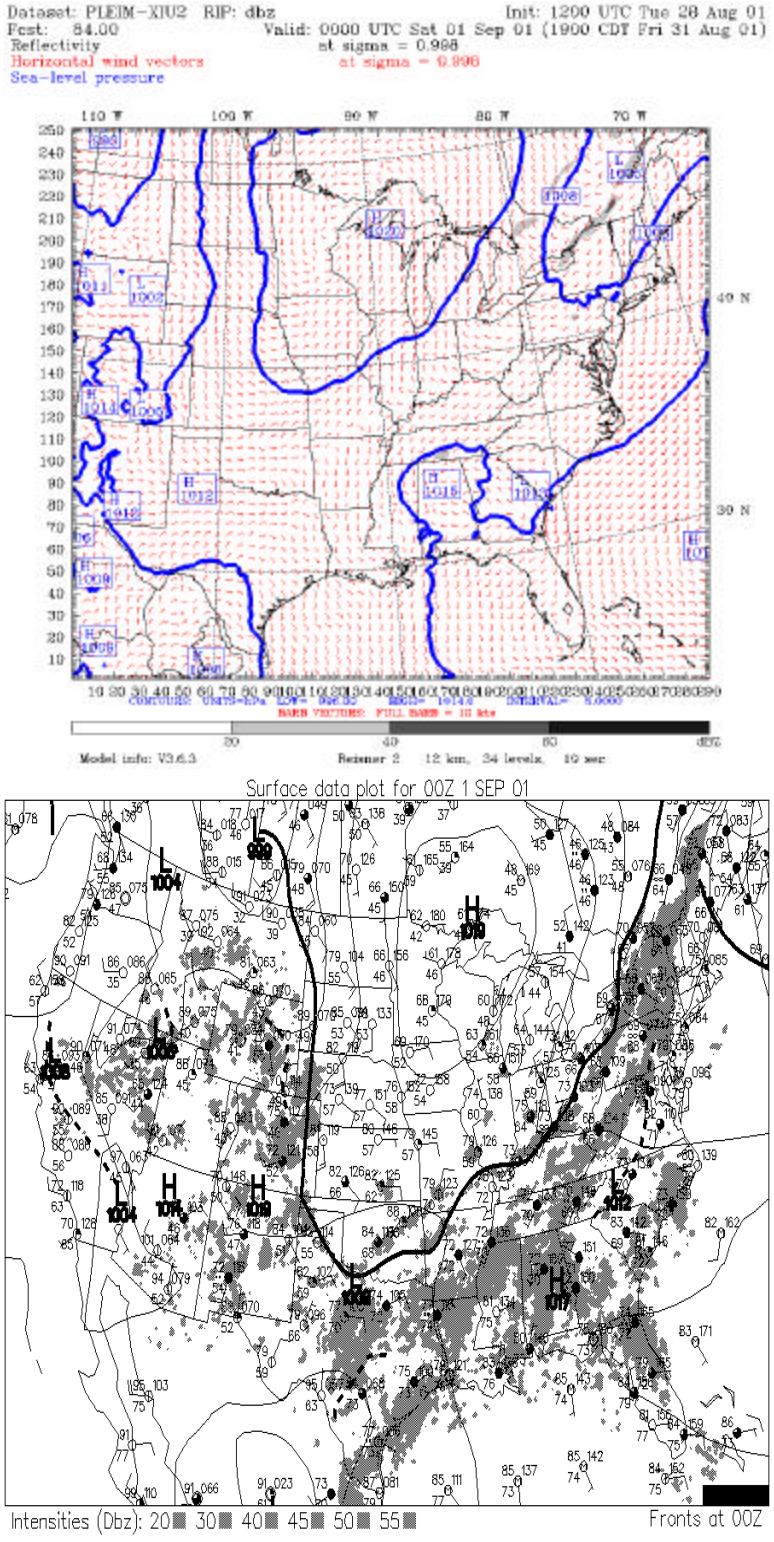


**Figure 3-46: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 12Z 06 September 2001.**

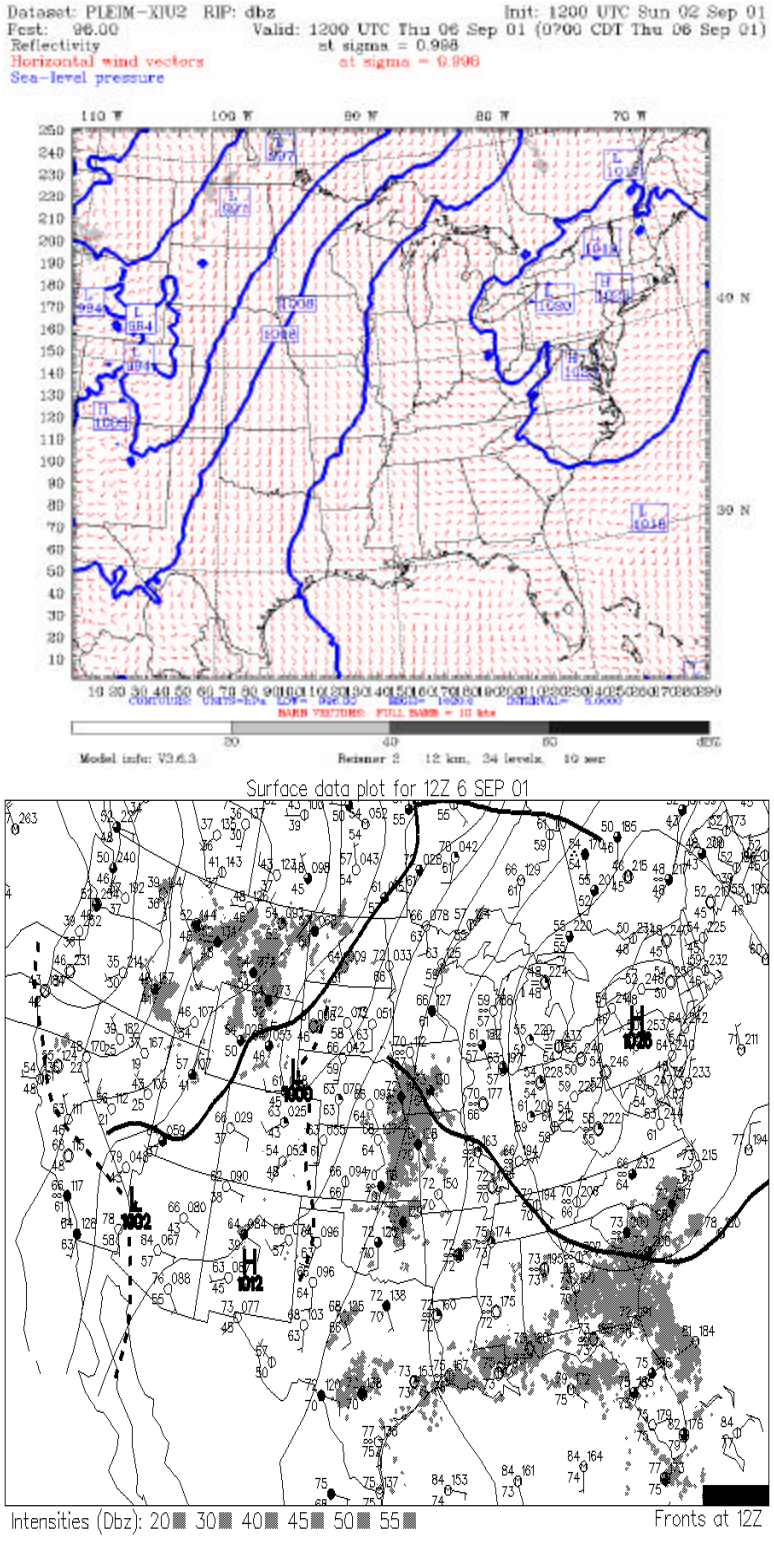


**Figure 3-47: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 12Z 12 September 2001.**

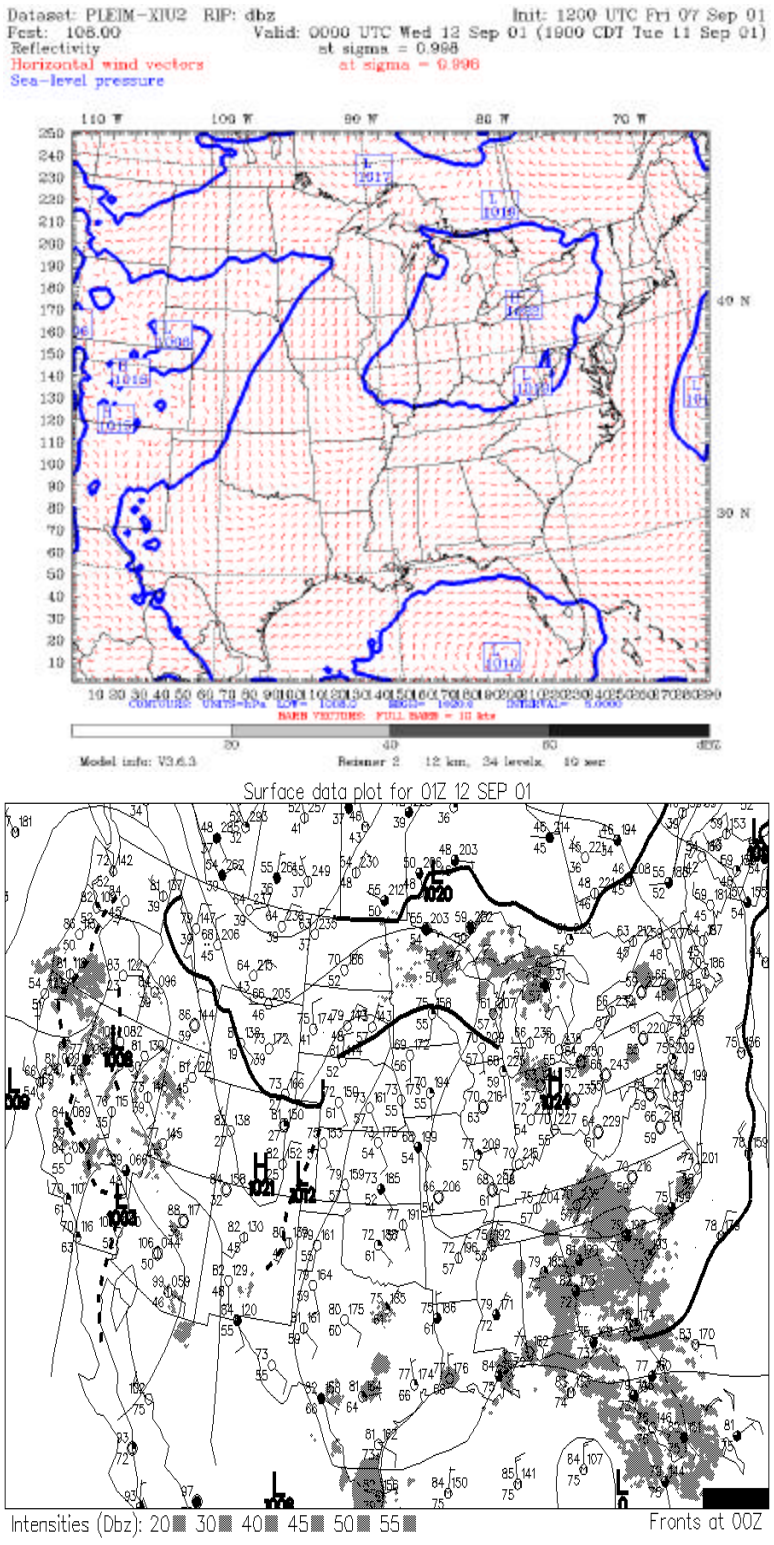


**Figure 3-48: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 12Z 17 September 2001.**

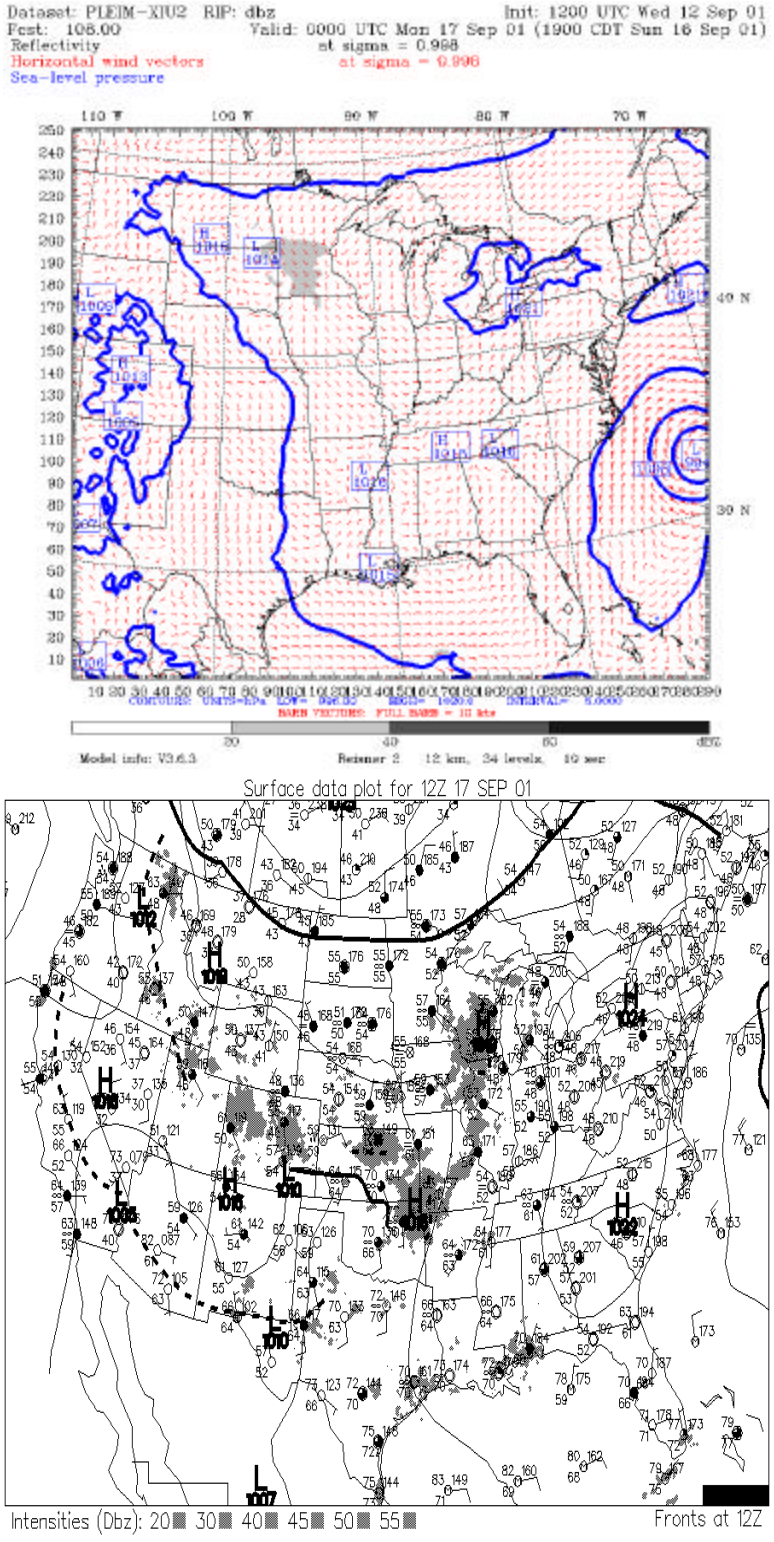


**Figure 3-49: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 00Z 23 September 2001.**

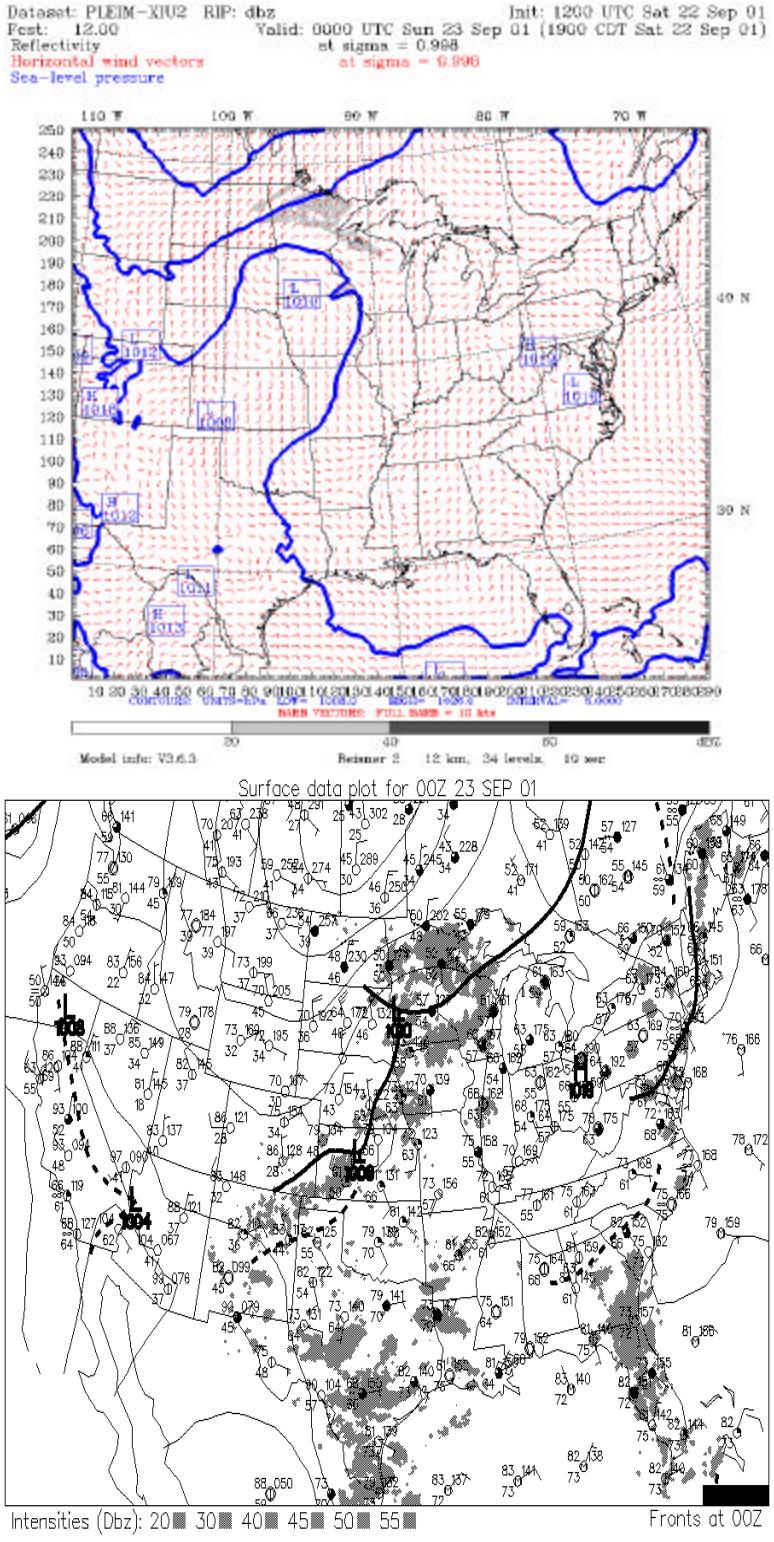


**Figure 3-50: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 12Z 28 September 2001.**

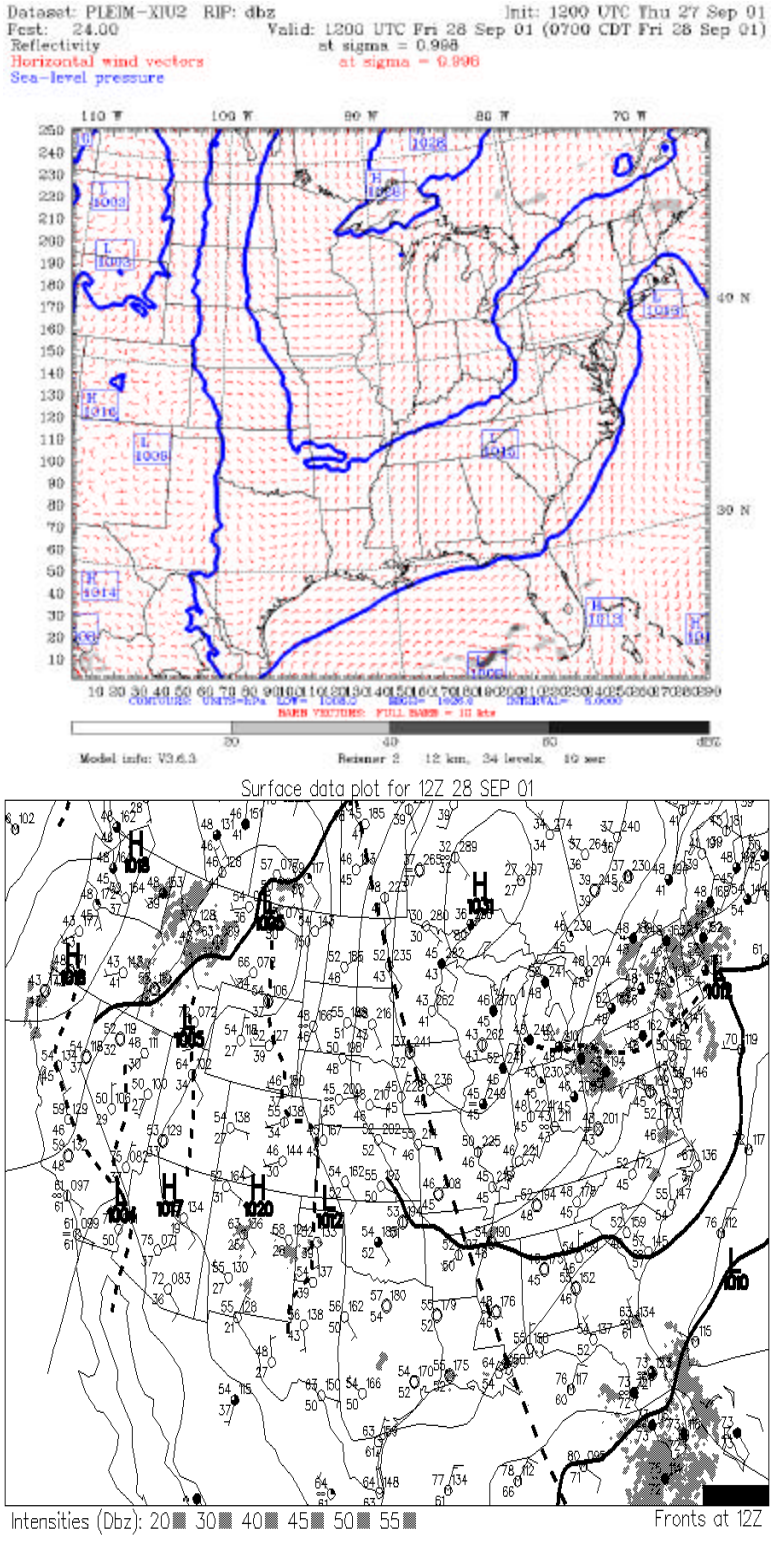


**Figure 3-51: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 00Z 04 October 2001.**

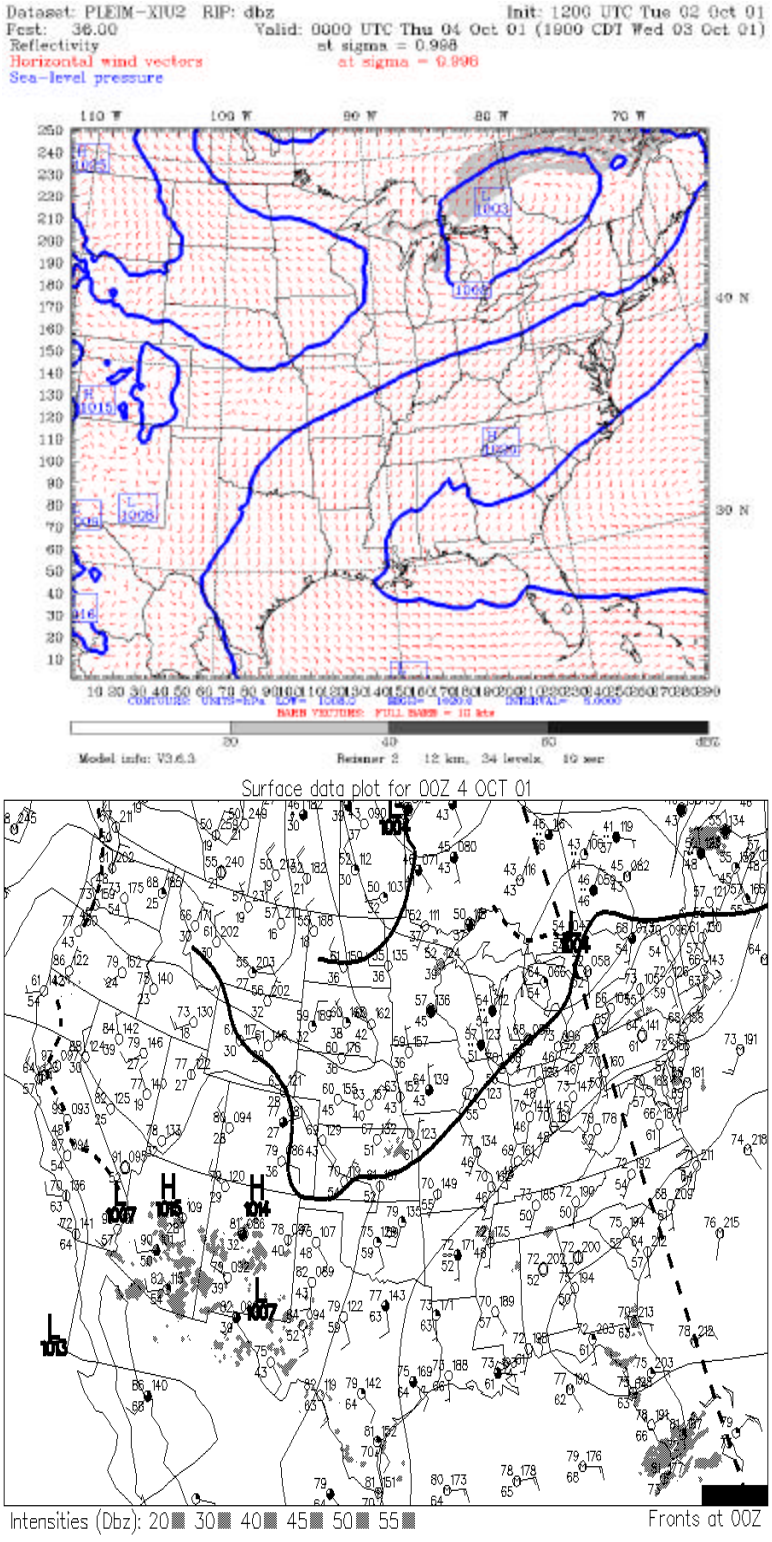


**Figure 3-52: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 12Z 09 October 2001.**

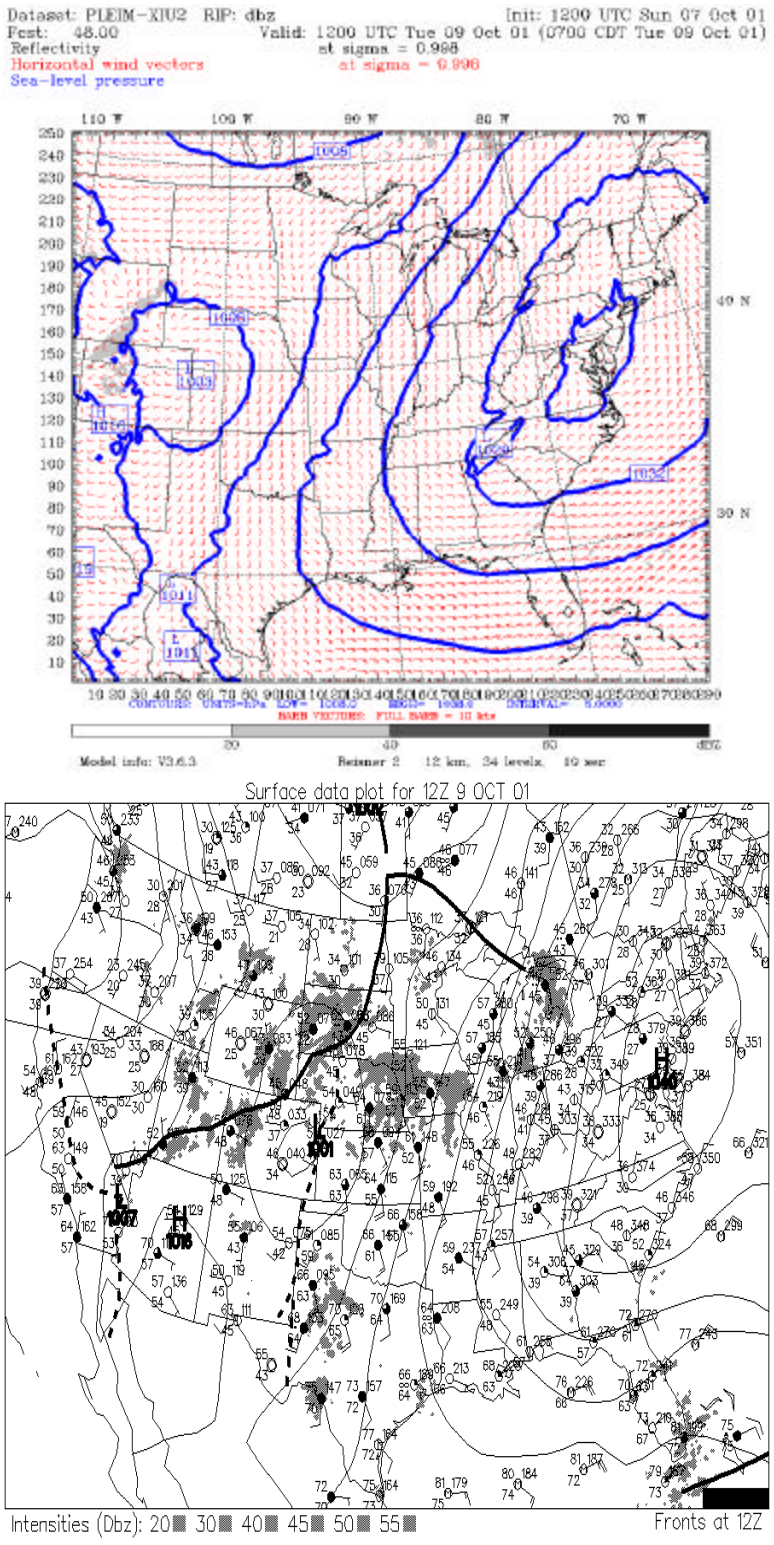


**Figure 3-53: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 00Z 15 October 2001.**

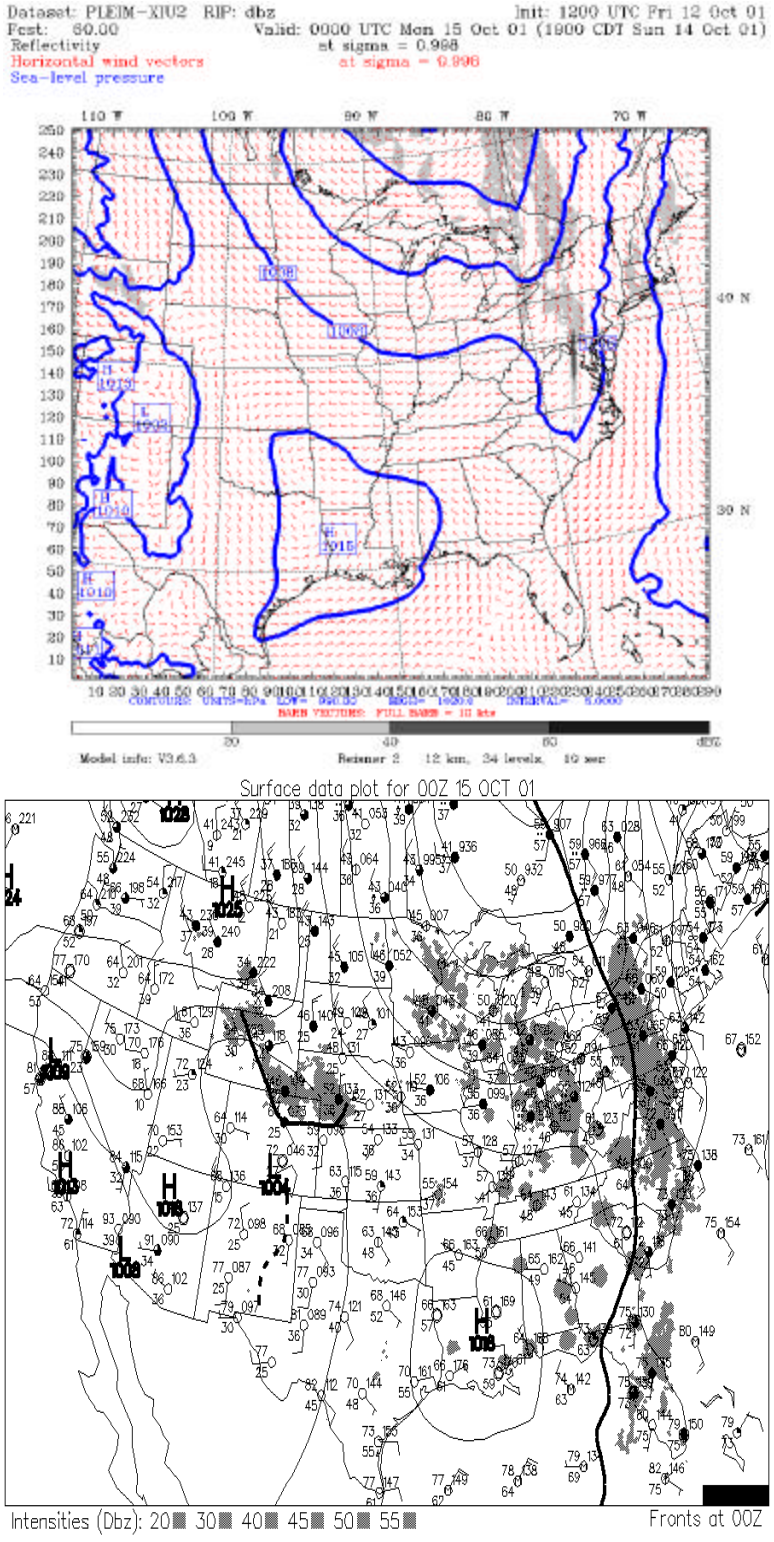


**Figure 3-54: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 12Z 20 October 2001.**

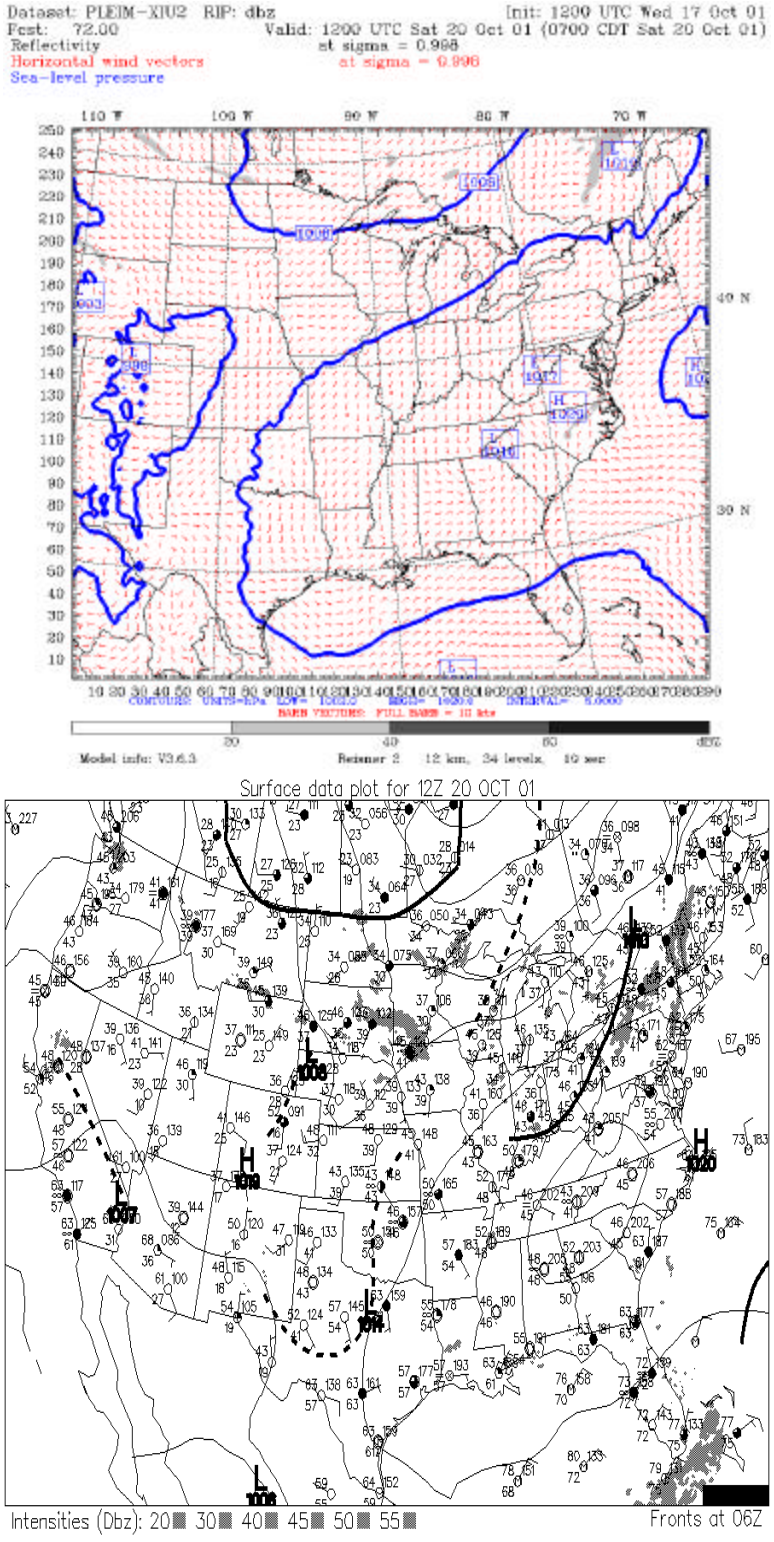


**Figure 3-55: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 00Z 26 October 2001.**

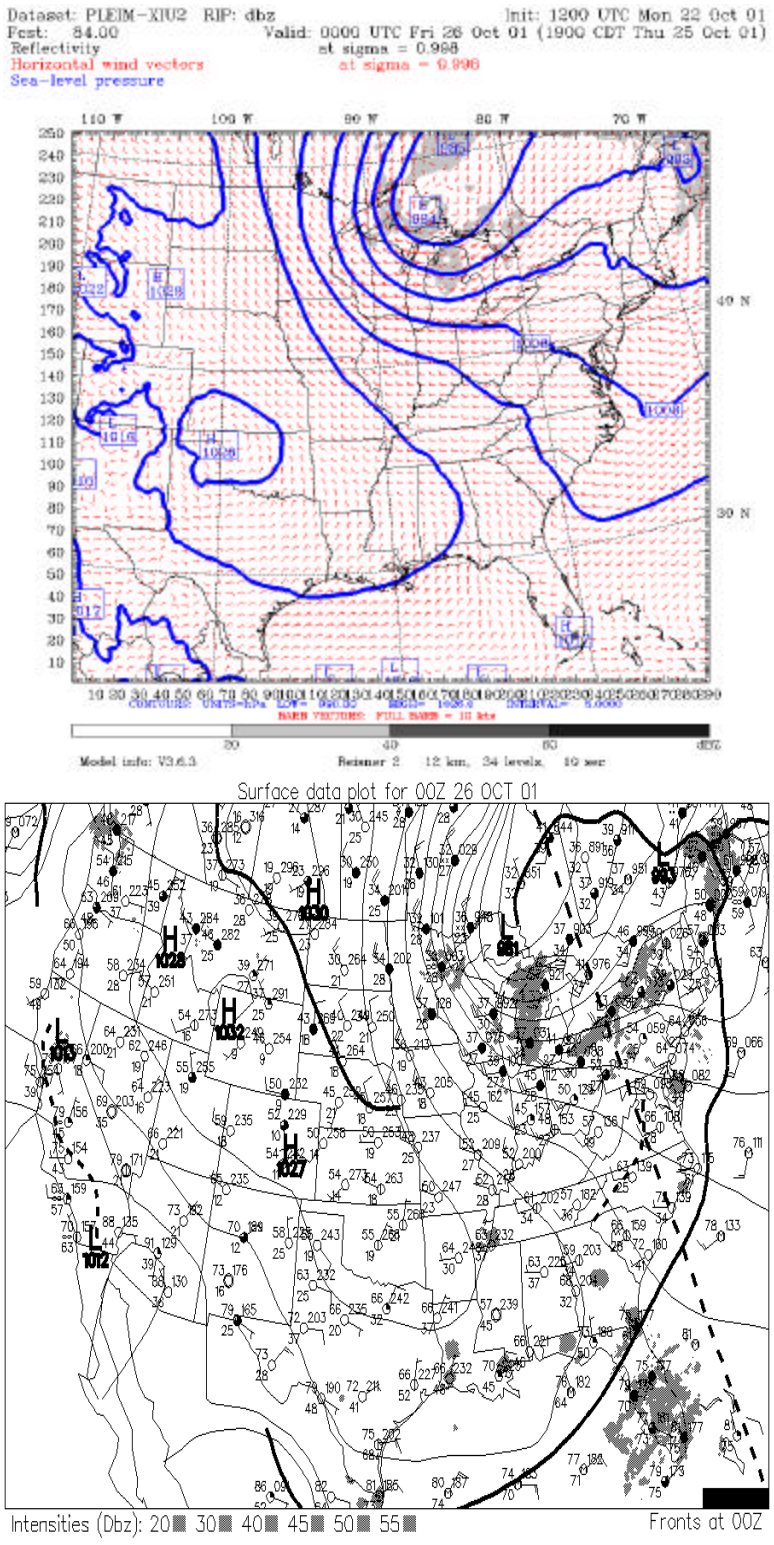


**Figure 3-56: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 12Z 31 October 2001.**

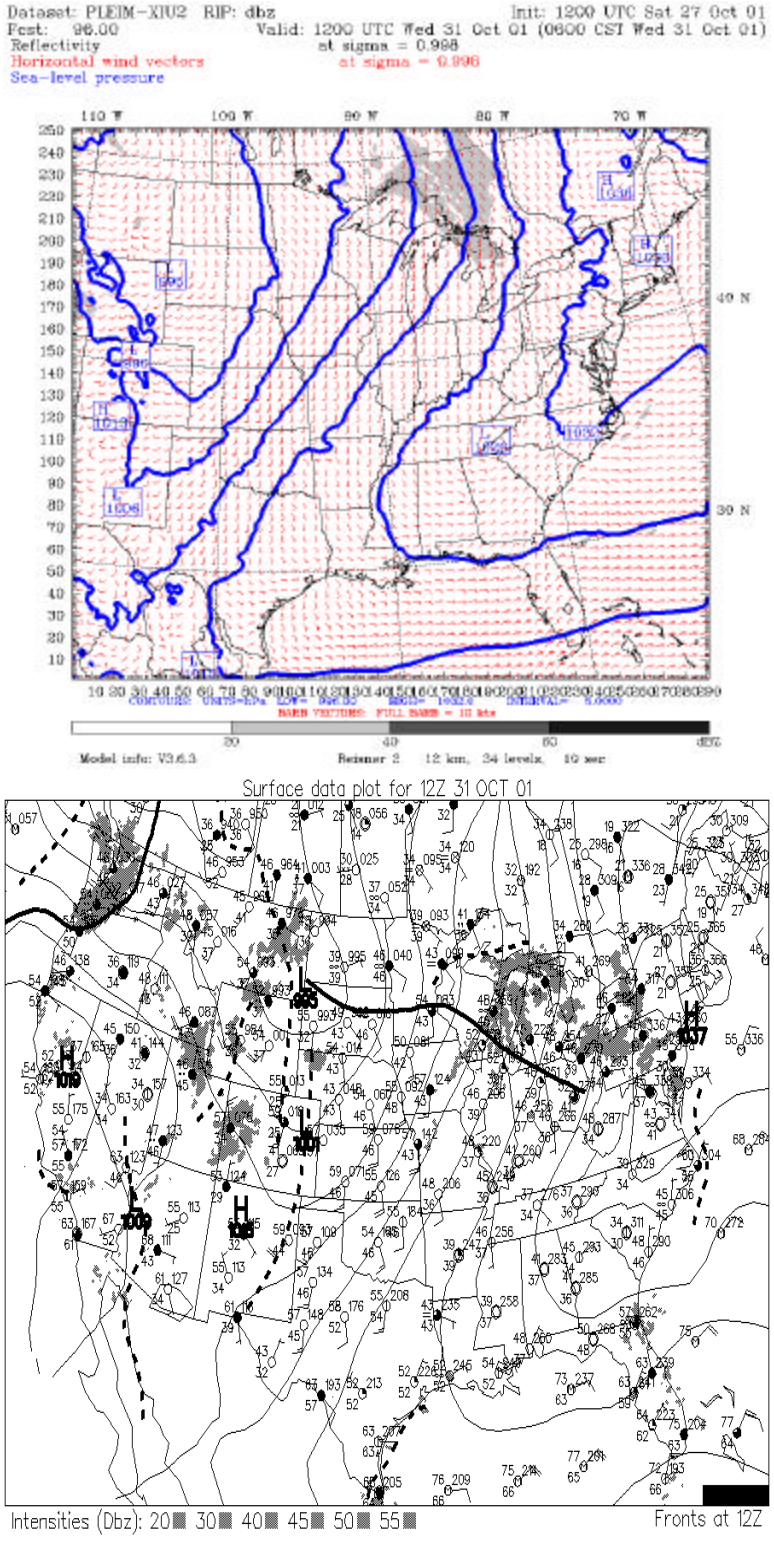


**Figure 3-57: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 00Z 06 November 2001.**

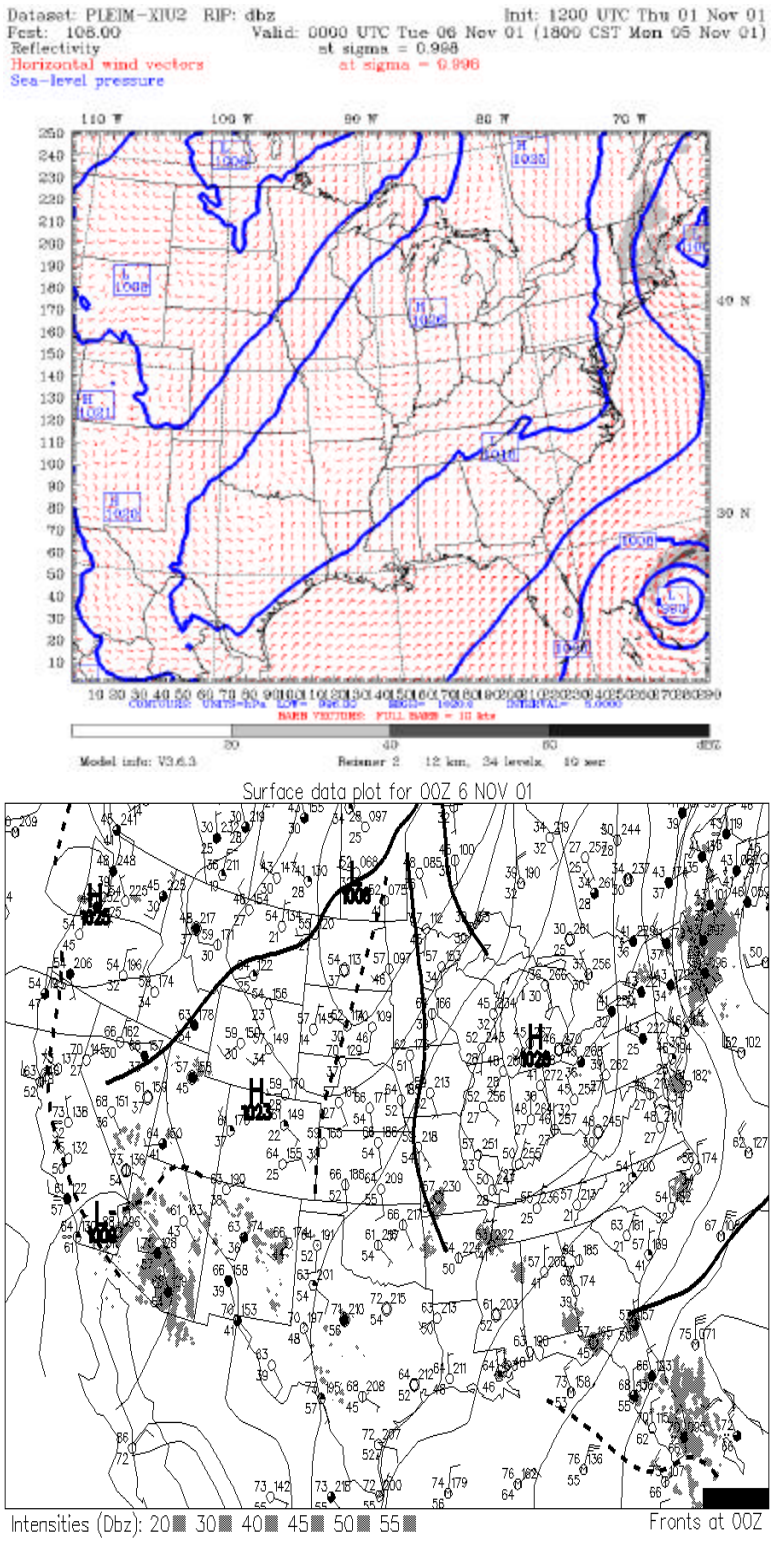


**Figure 3-58: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 12Z 11November 2001.**

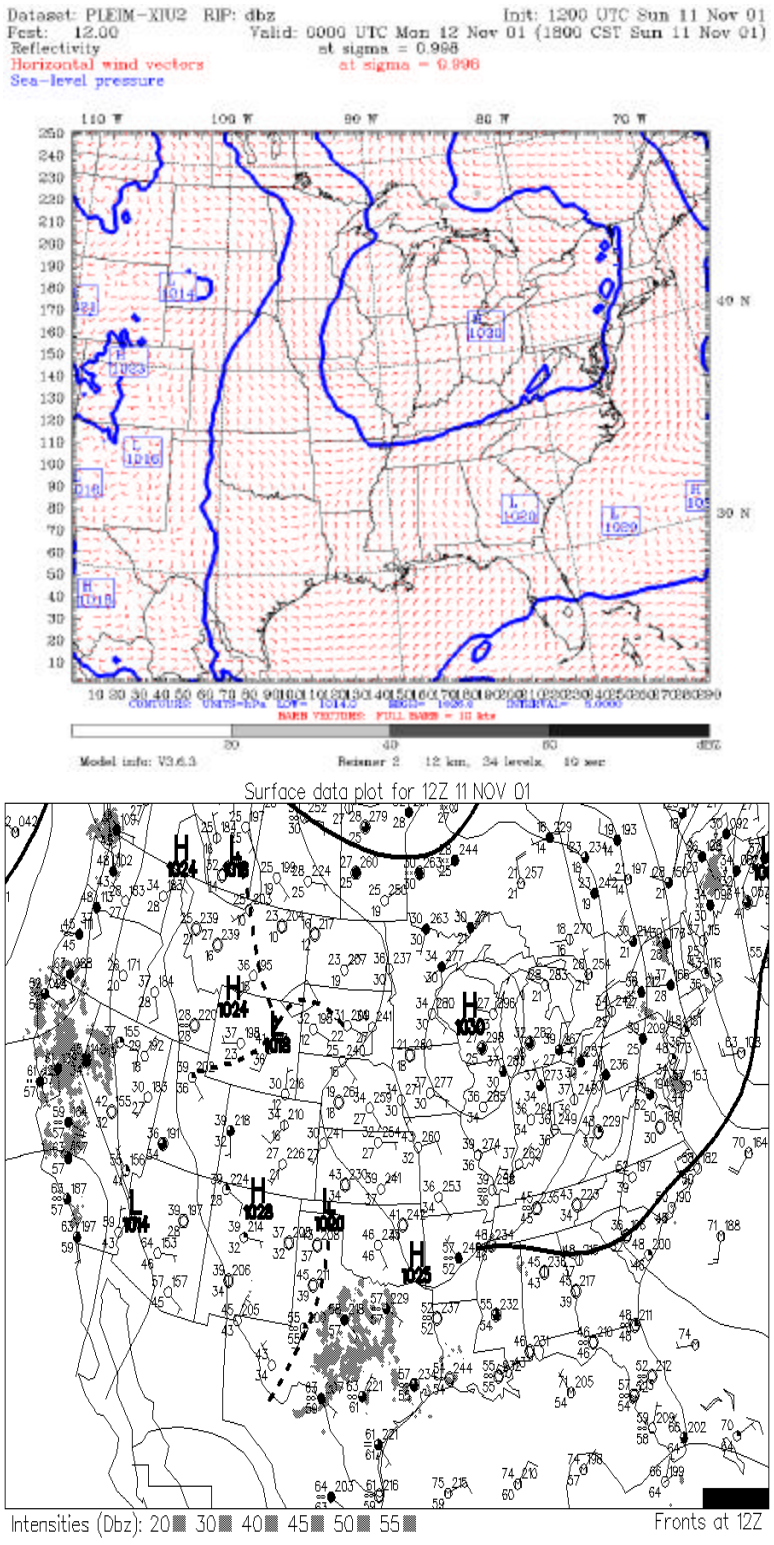


**Figure 3-59: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 00Z 17 November 2001.**

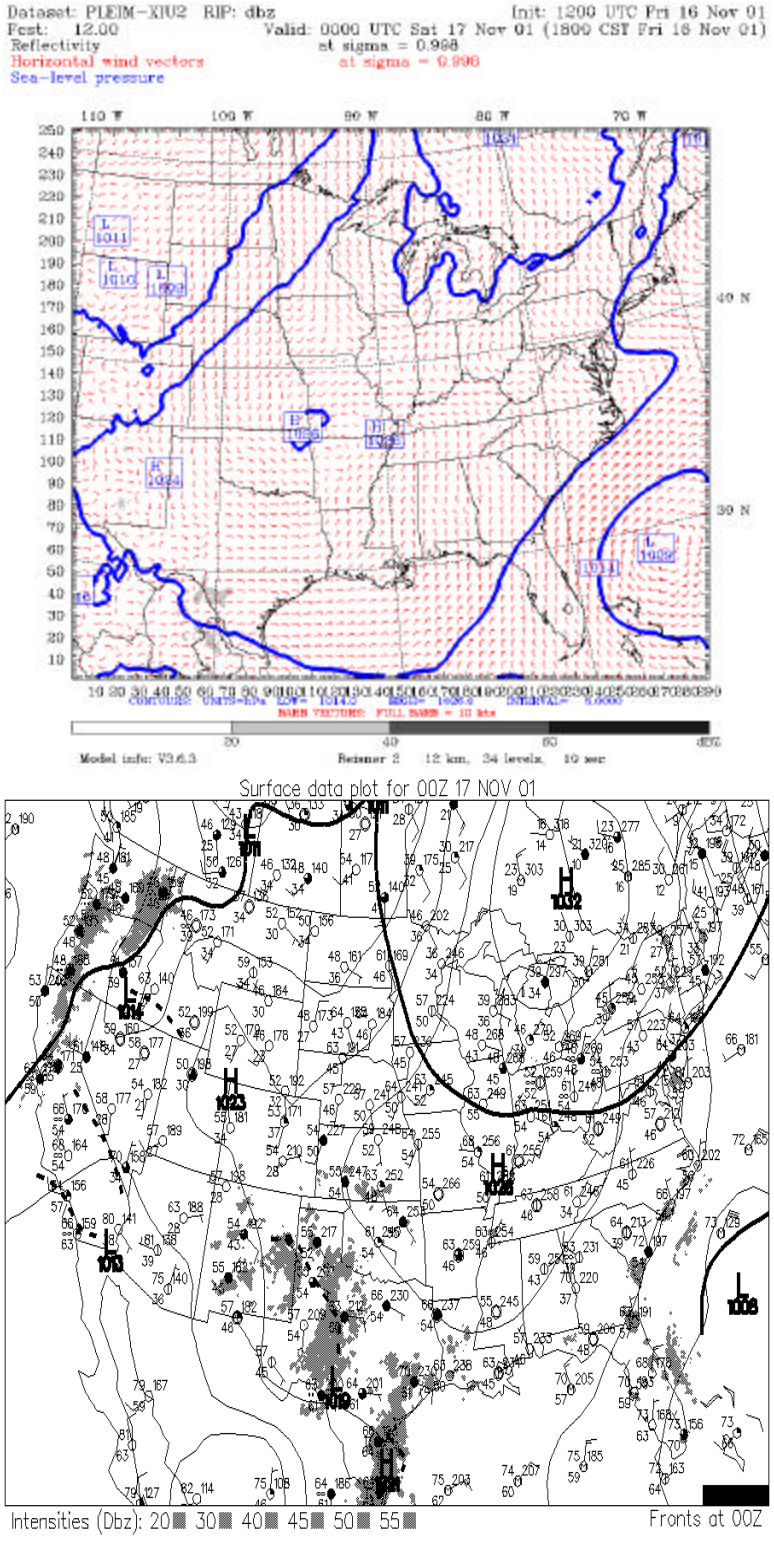


**Figure 3-60: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 12Z 22 November 2001.**

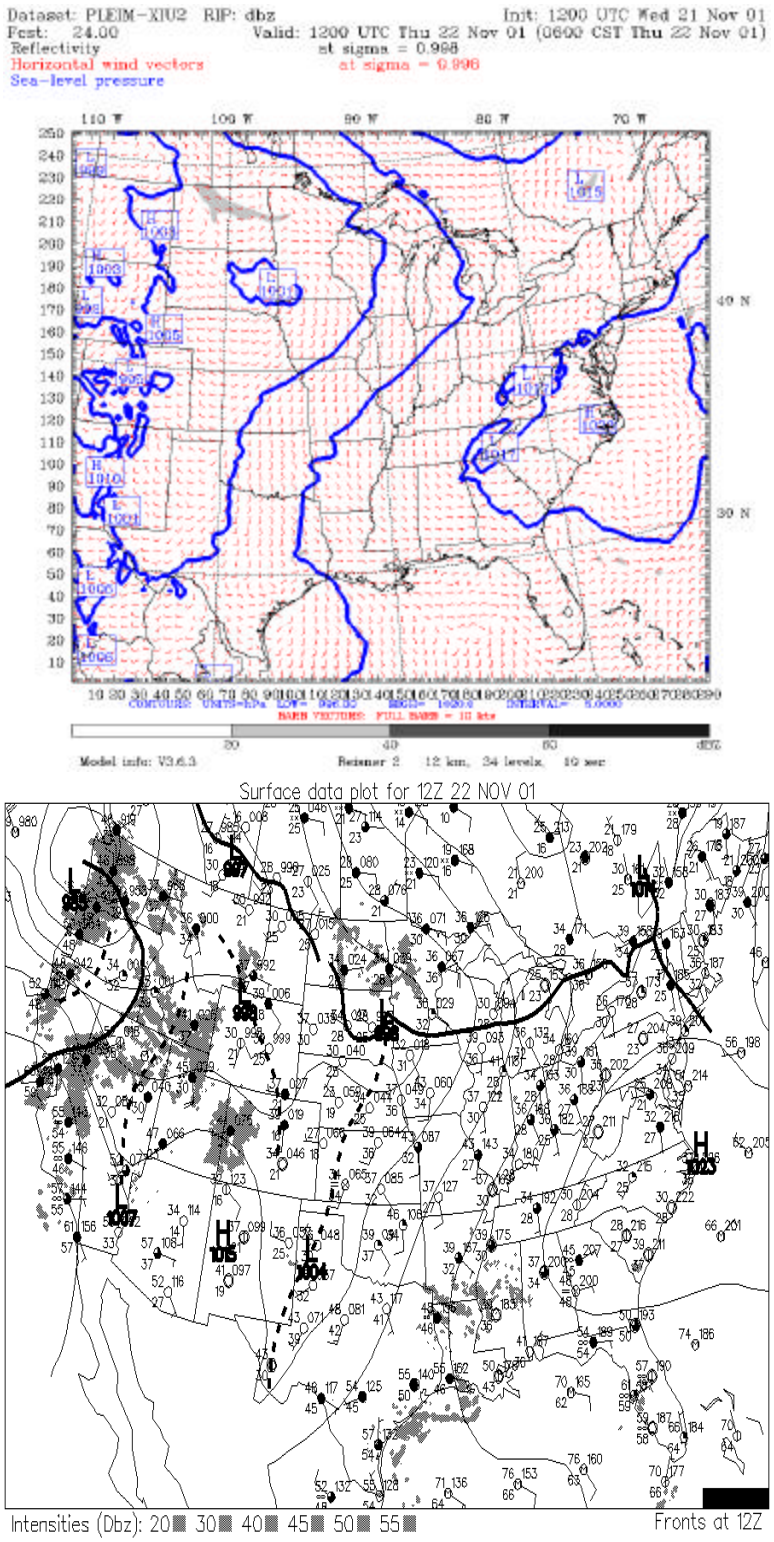


**Figure 3-61: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 00Z 28 November 2001.**

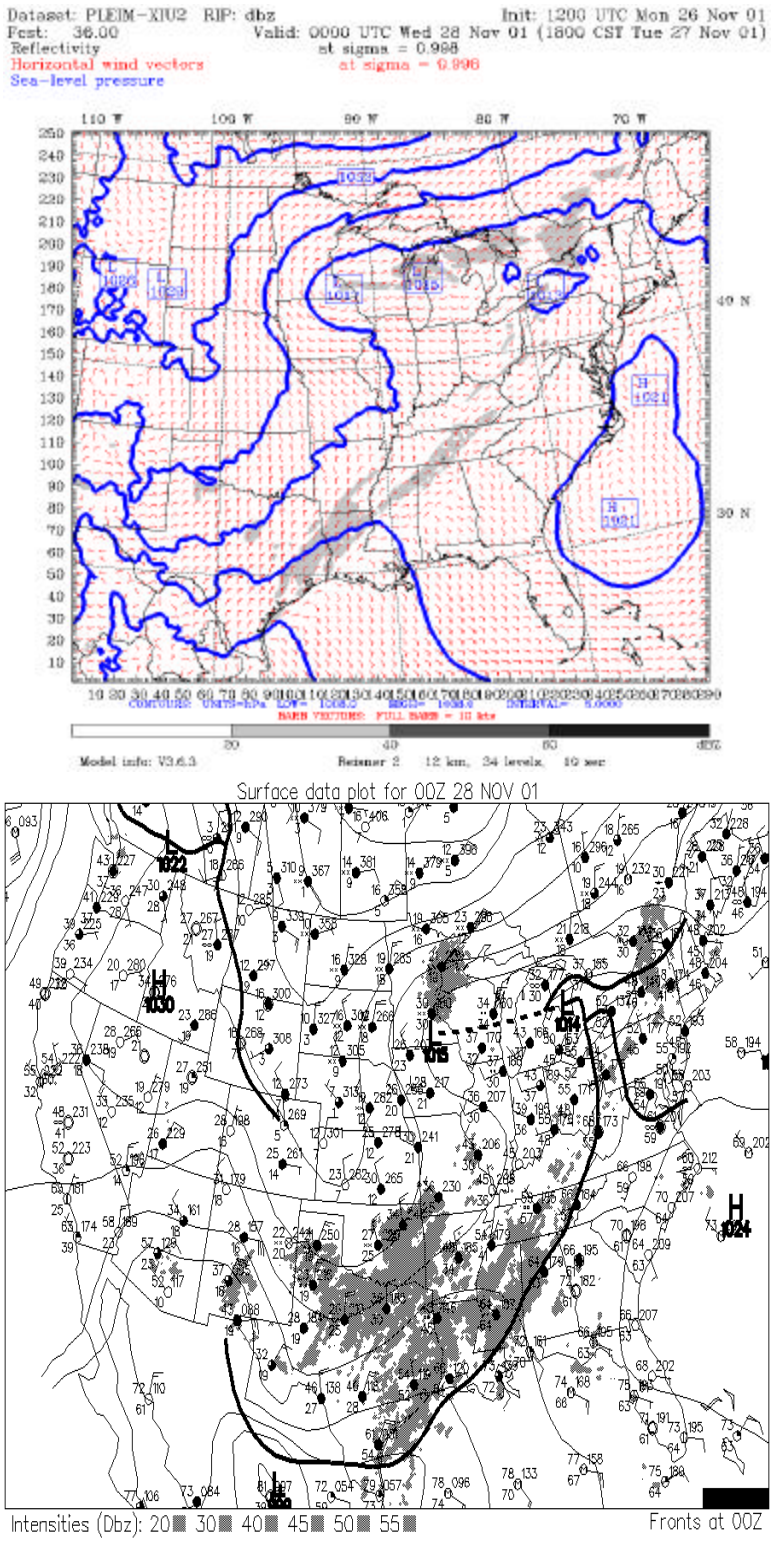


**Figure 3-62: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 12Z 03 December 2001.**

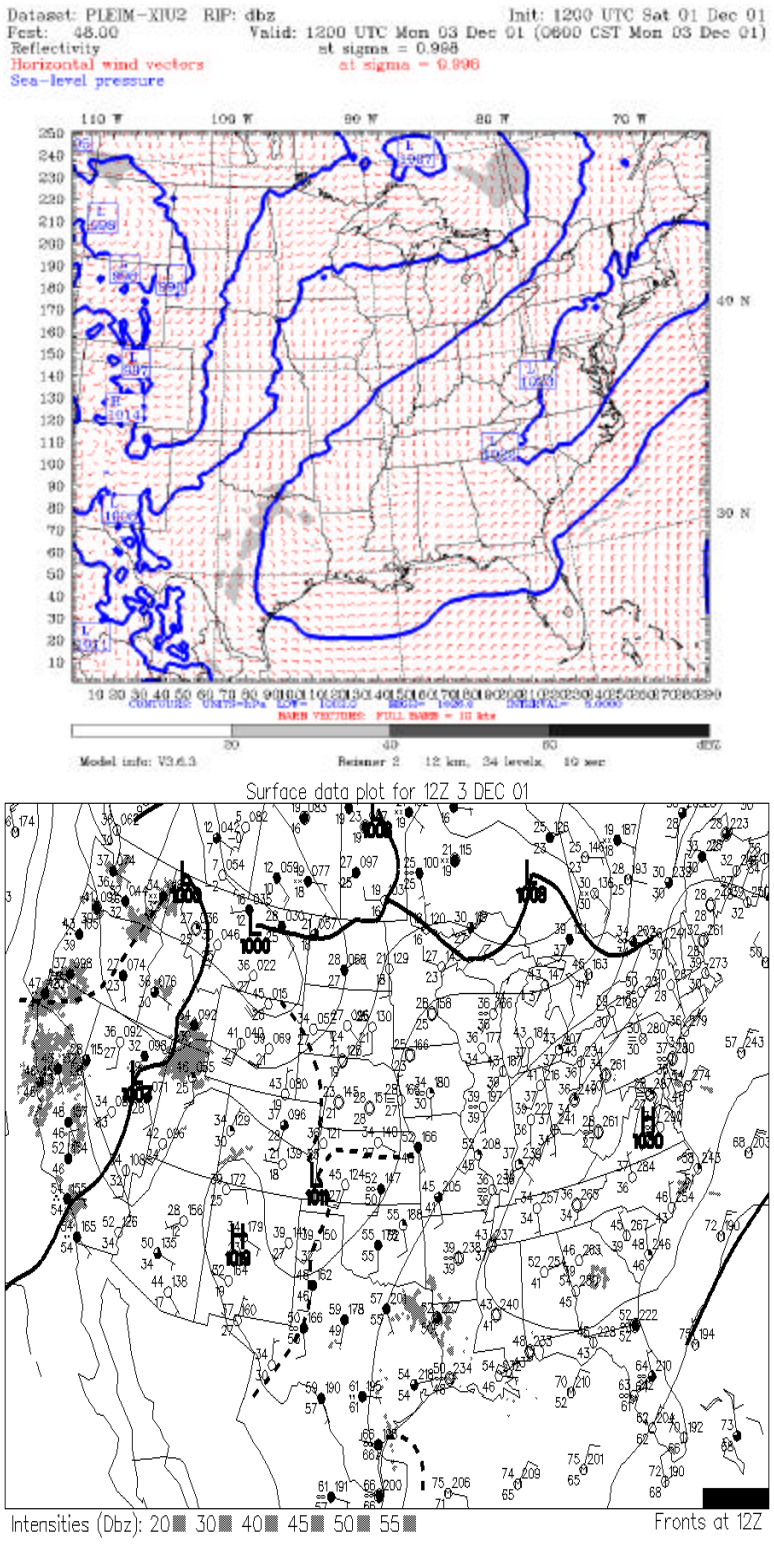


**Figure 3-63: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 00Z 09 December 2001.**

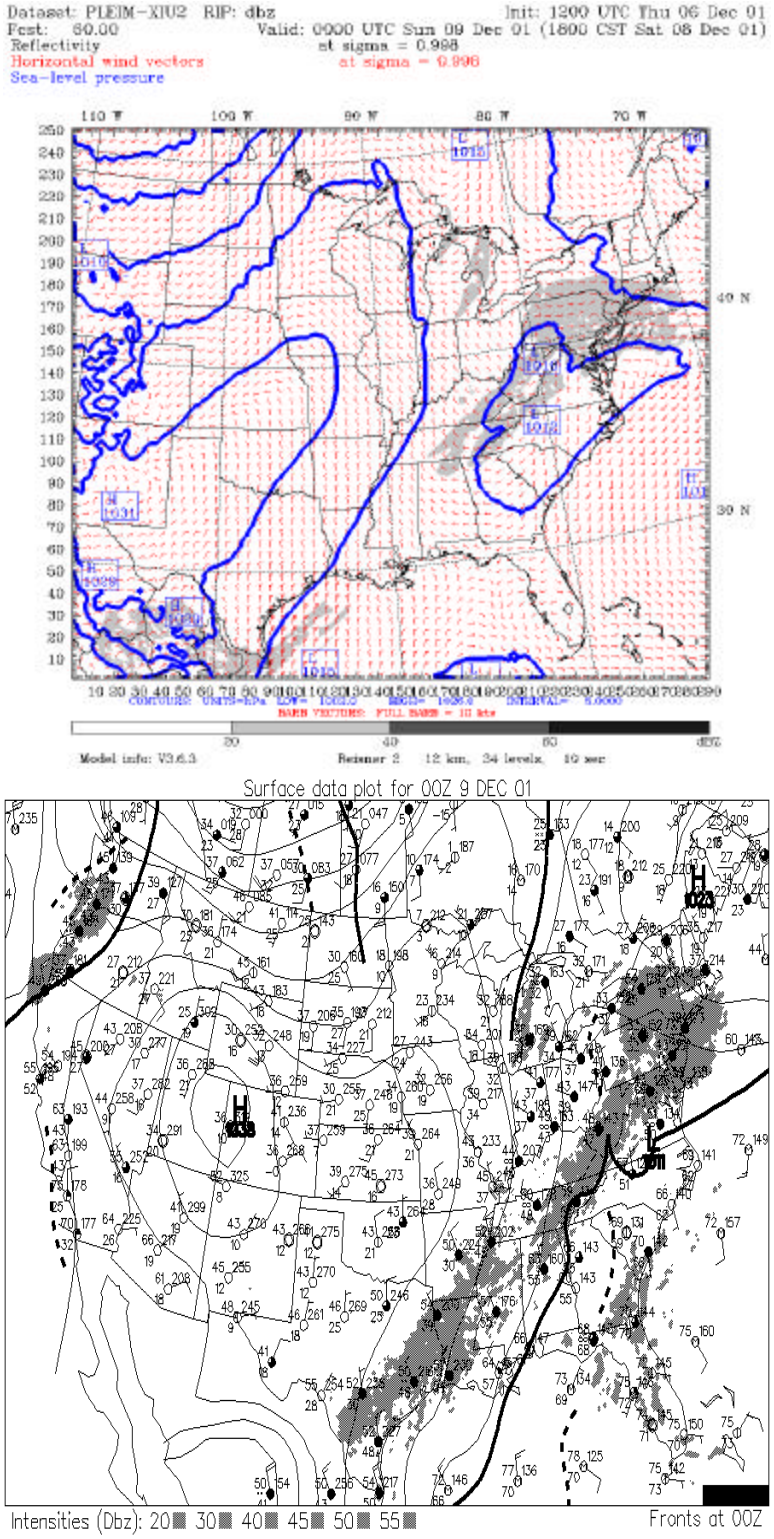


**Figure 3-64: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 12Z 14 December 2001.**

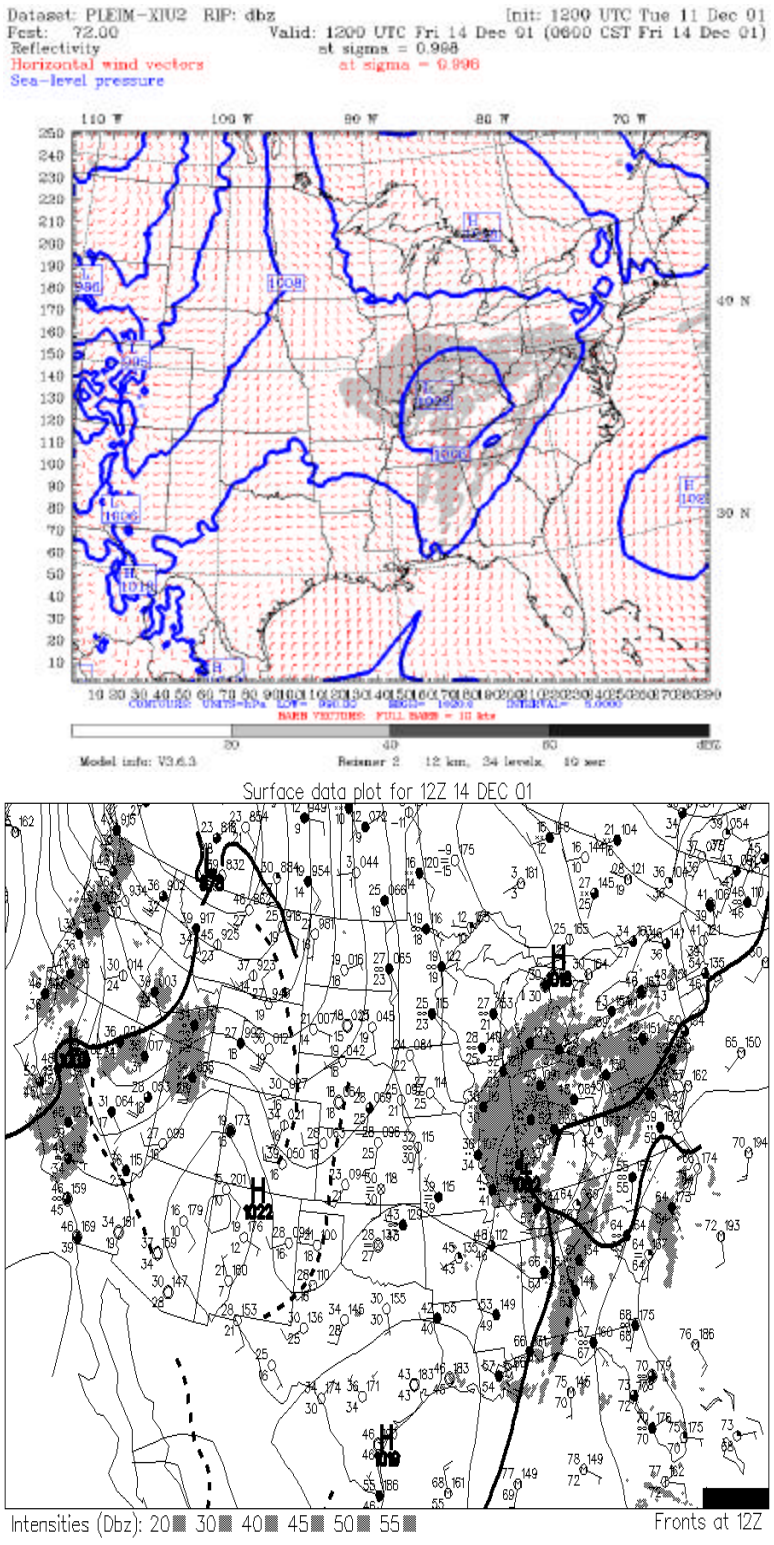


**Figure 3-65: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 00Z 20 December 2001.**

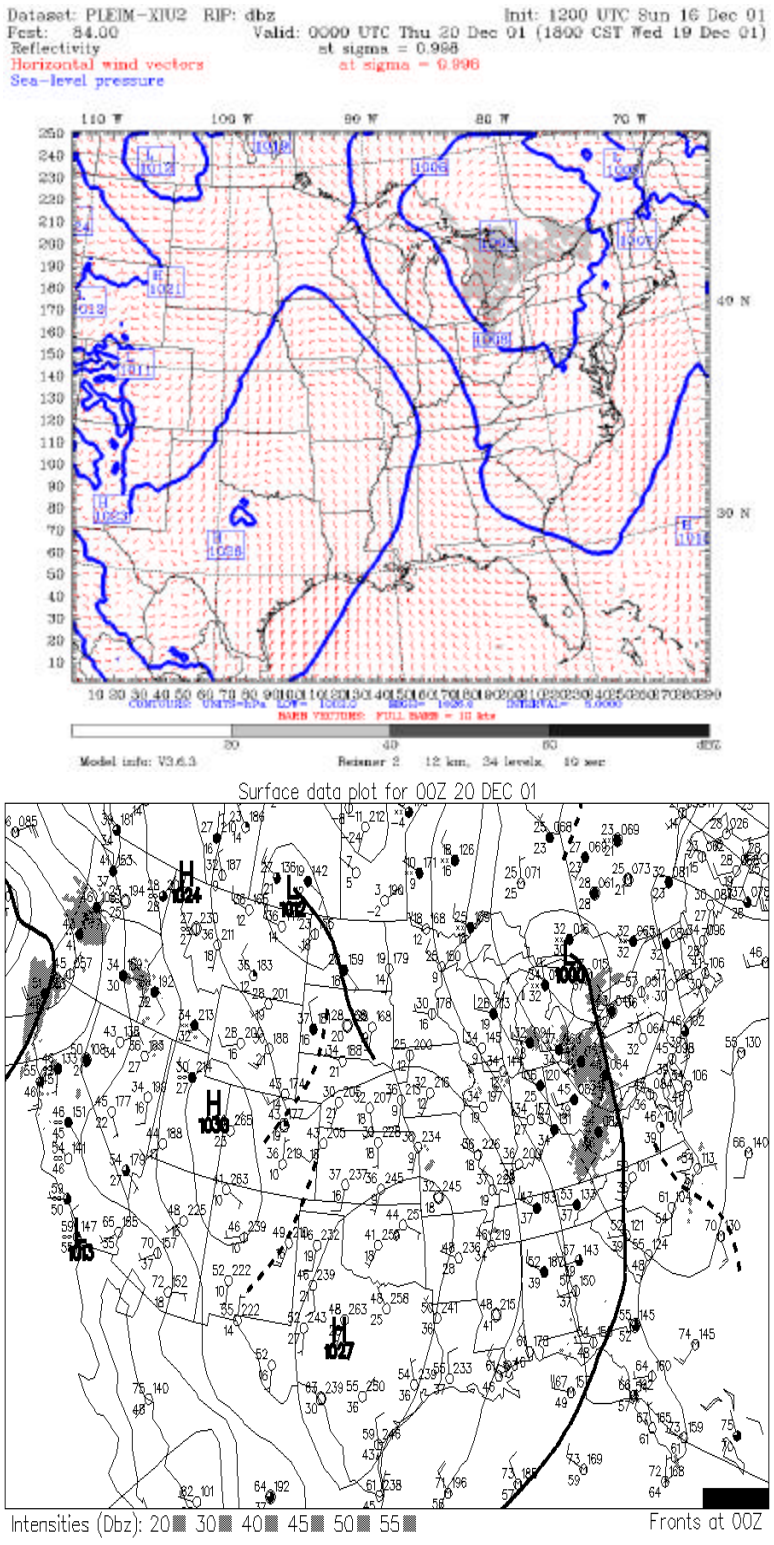


**Figure 3-66: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 12Z 25 December 2001.**

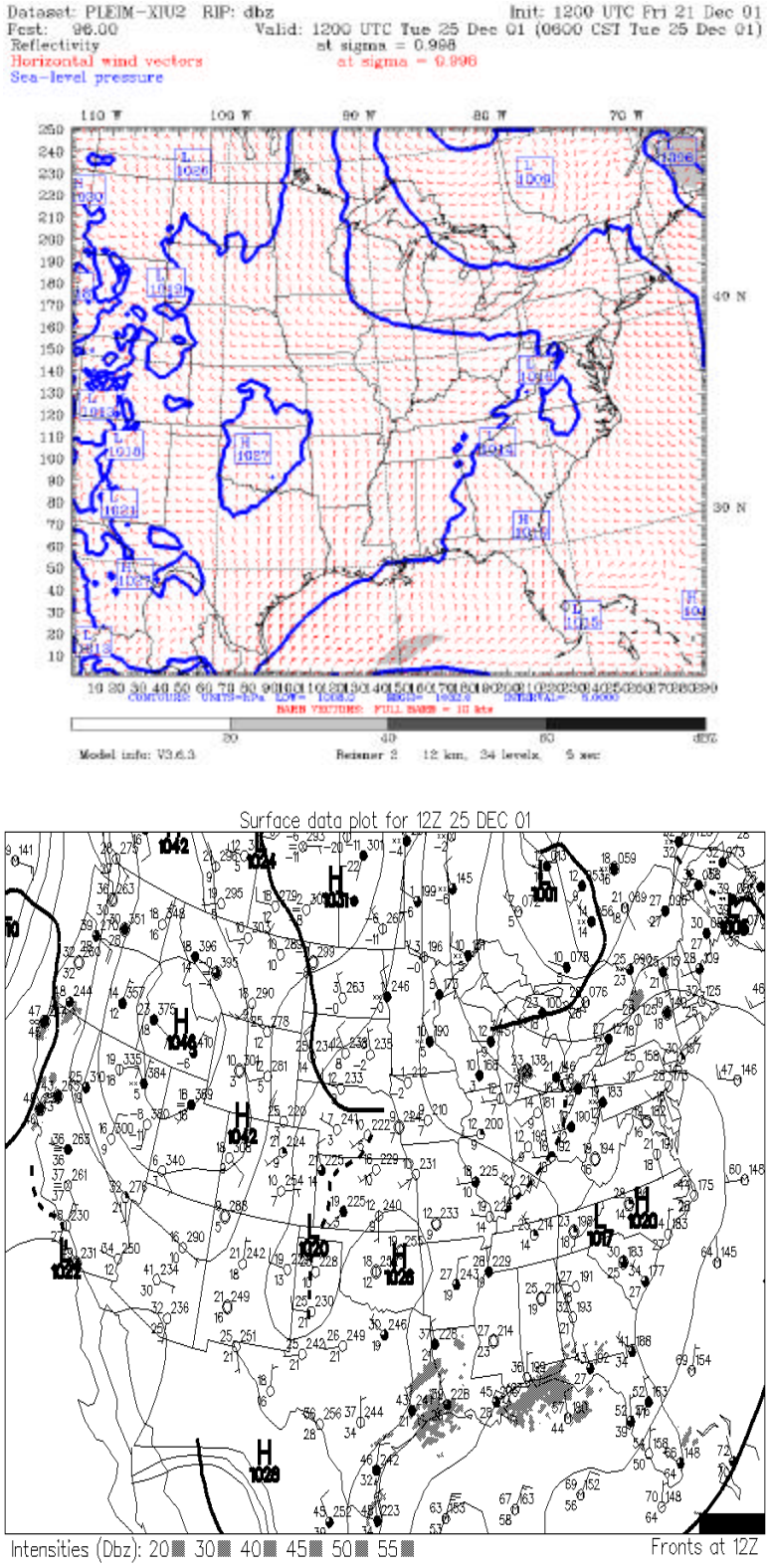


**Figure 3-67: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 00Z 31 December 2001.**

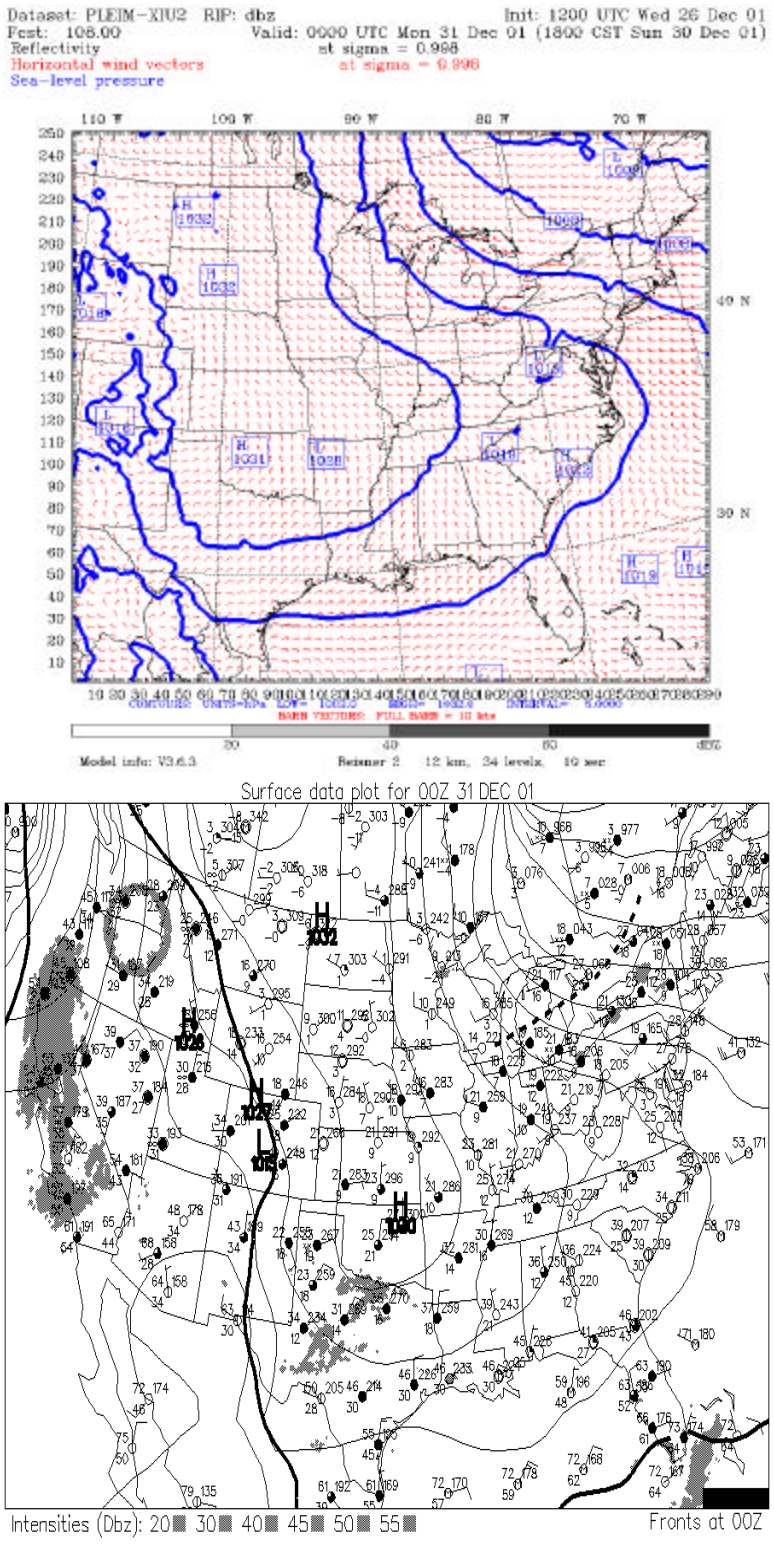


**Figure 3-68: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 12Z 05 January 2002.**

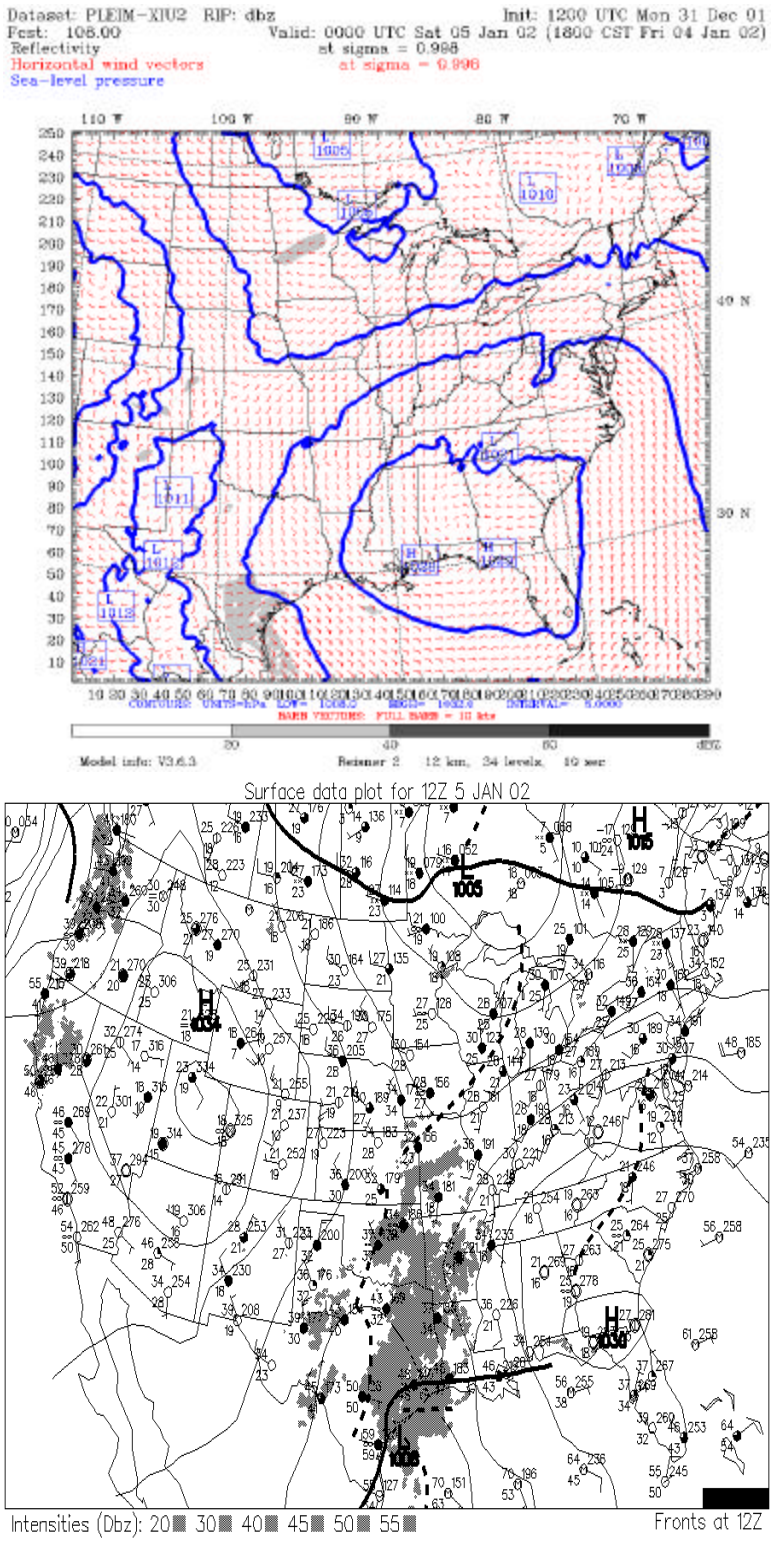


**Figure 3-69: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 00Z 11 January 2002.**

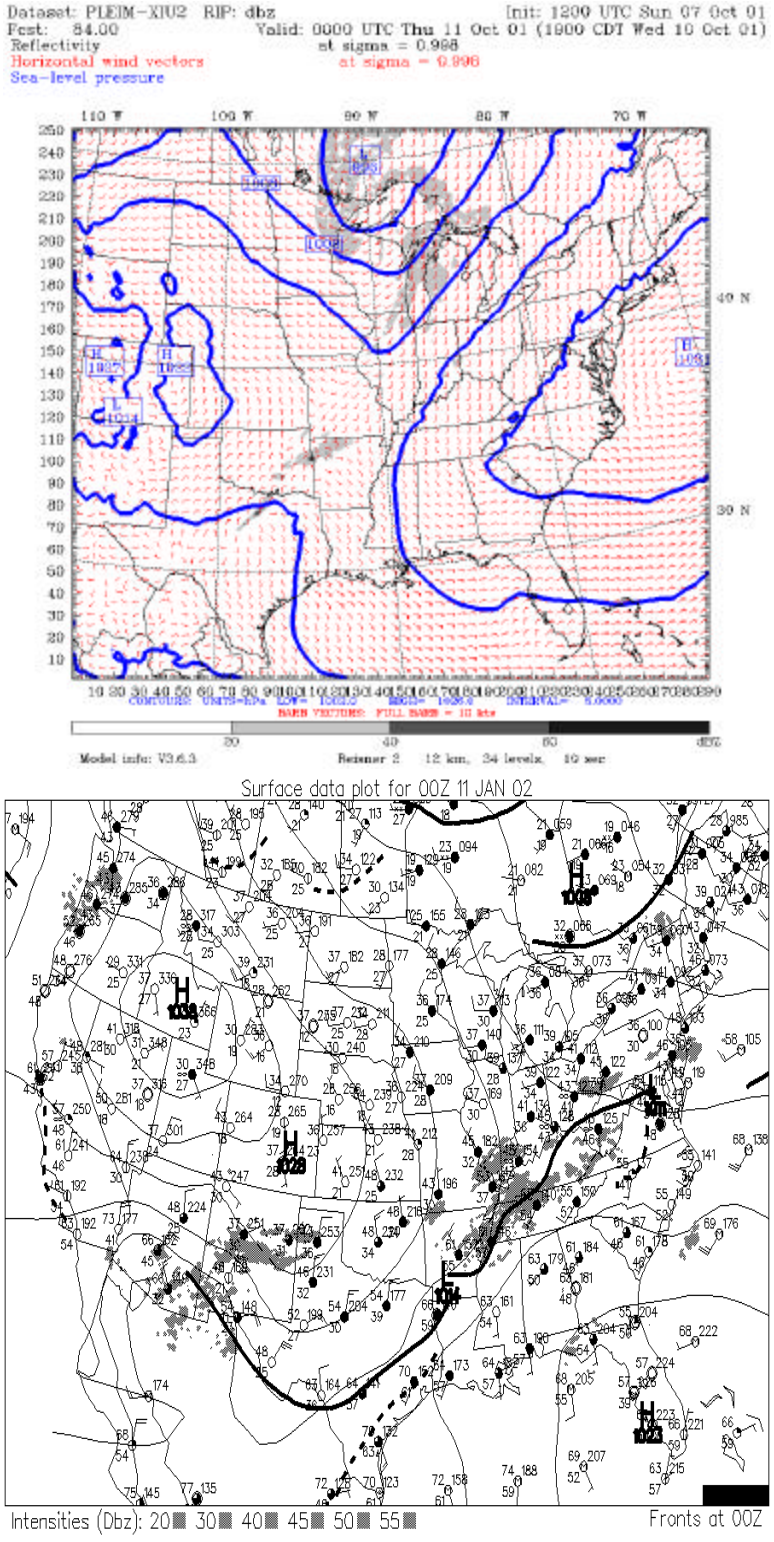


**Figure 3-70: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 12Z 16 January 2002.**

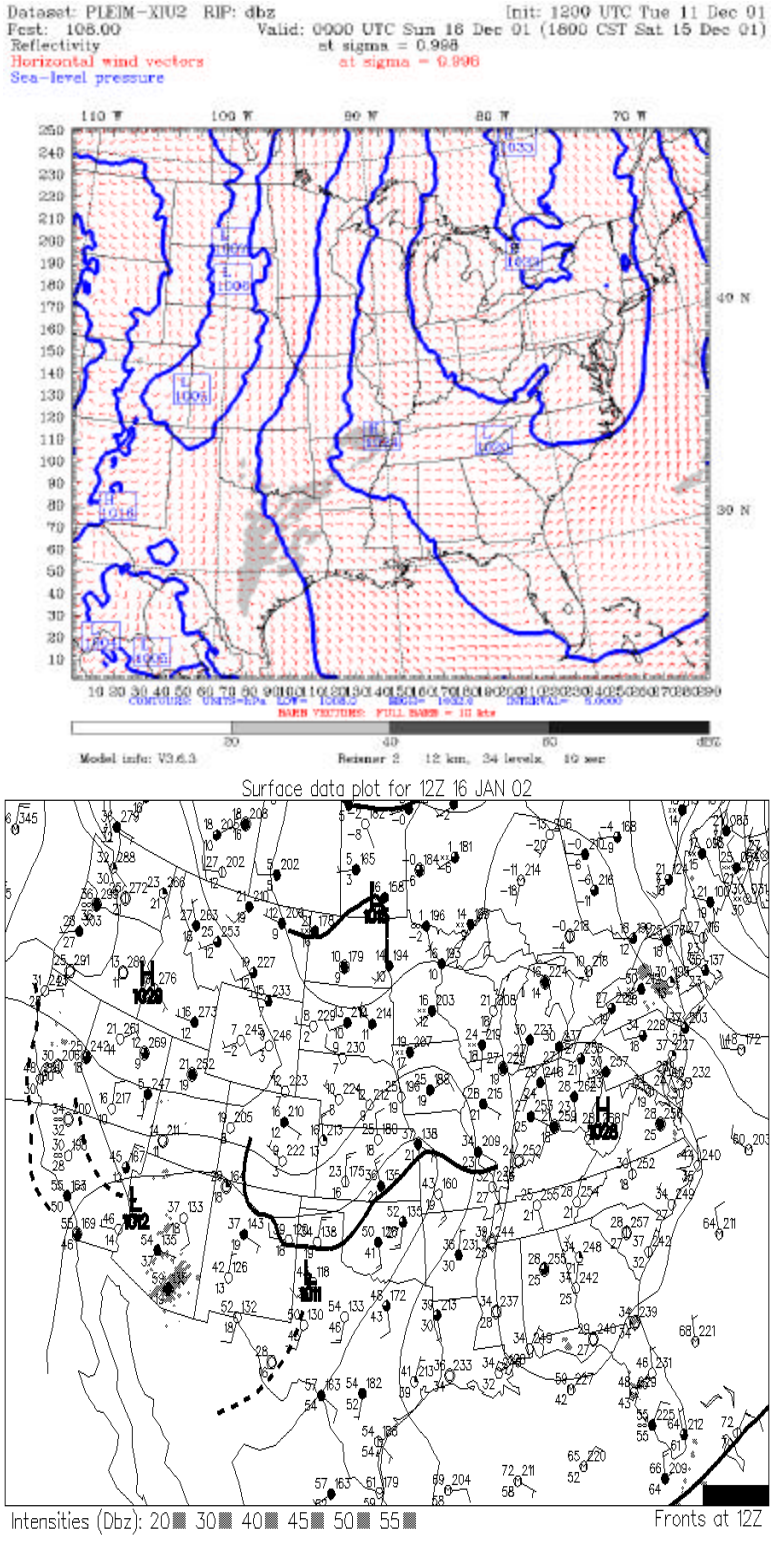


**Figure 3-71: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 00Z 22 January 2002.**

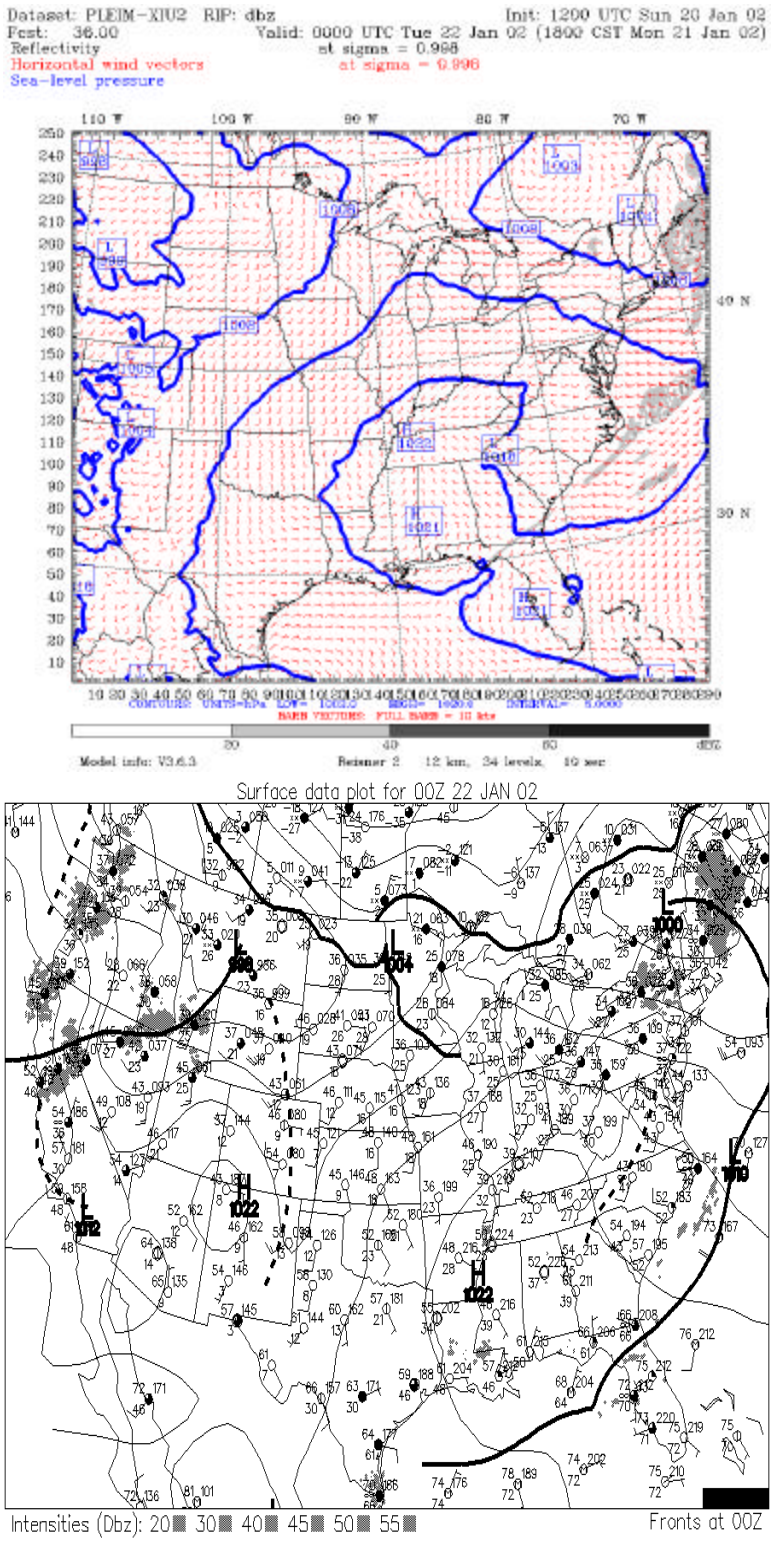


**Figure 3-72: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 12Z 27 January 2002.**

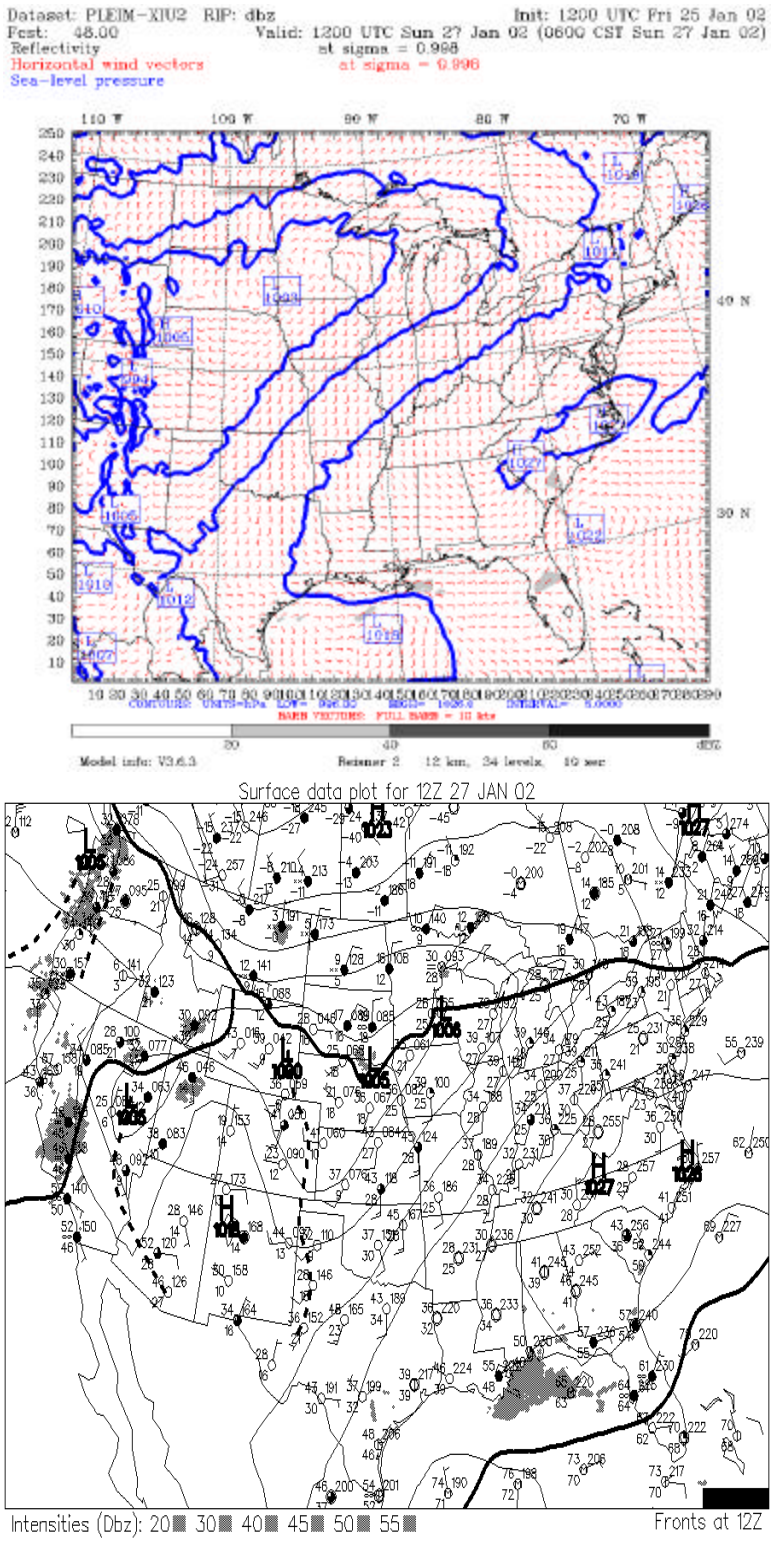
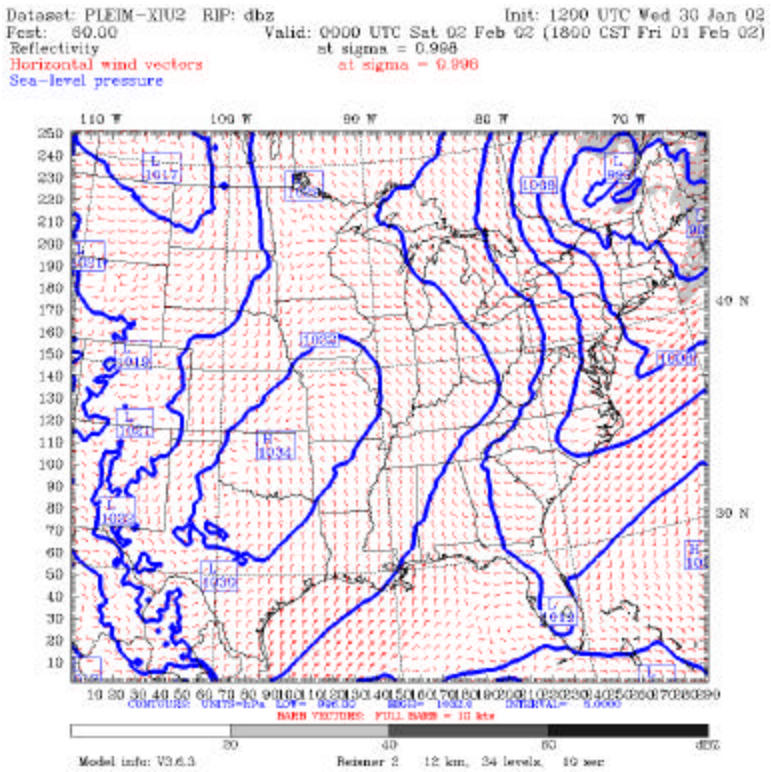


**Figure 3-73: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 00Z 02 February 2002.**




Analysis
Not Available

**Figure 3-74: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 12Z 07 February 2002.**

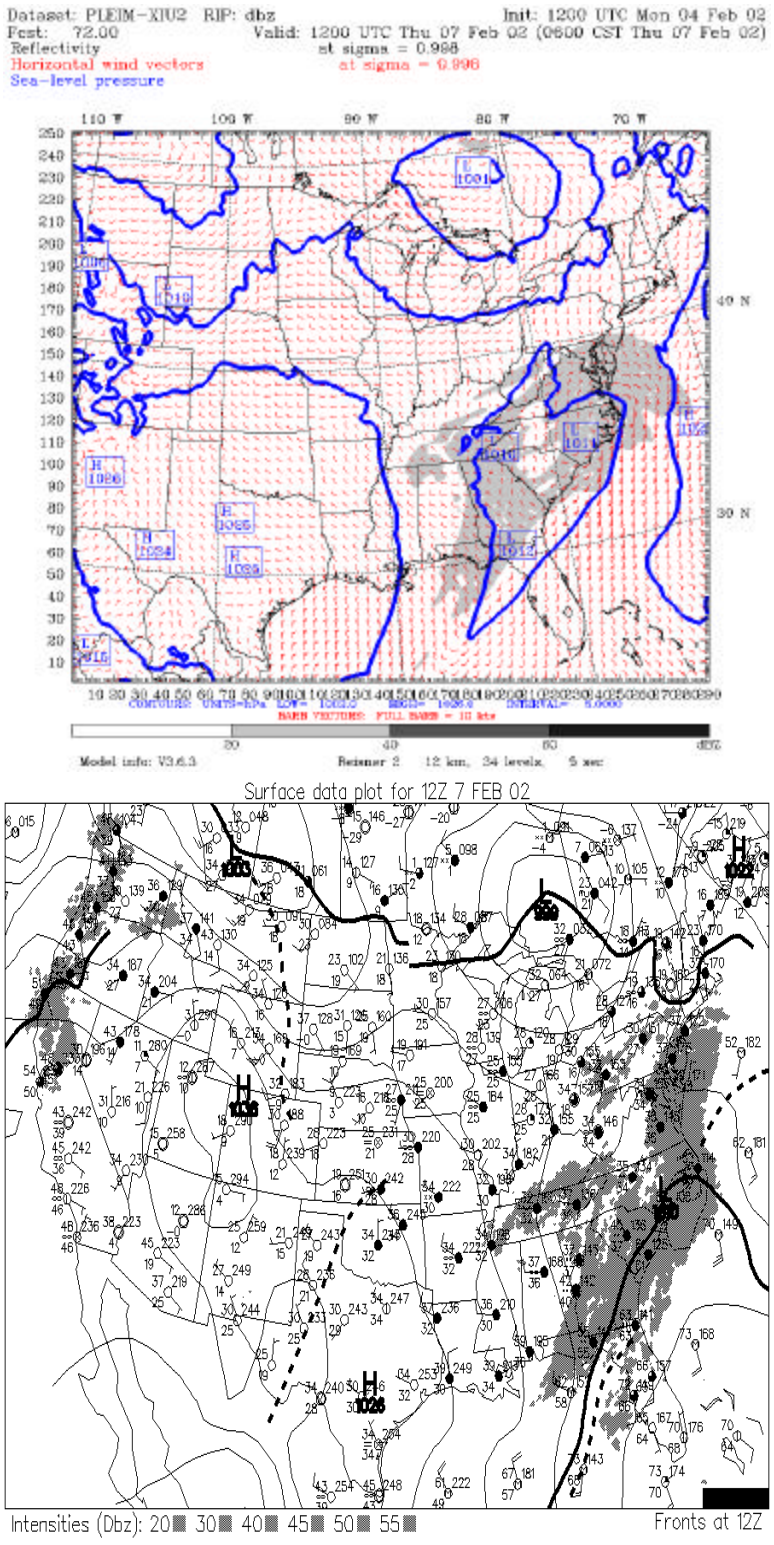


**Figure 3-75: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 00Z 13 February 2002.**

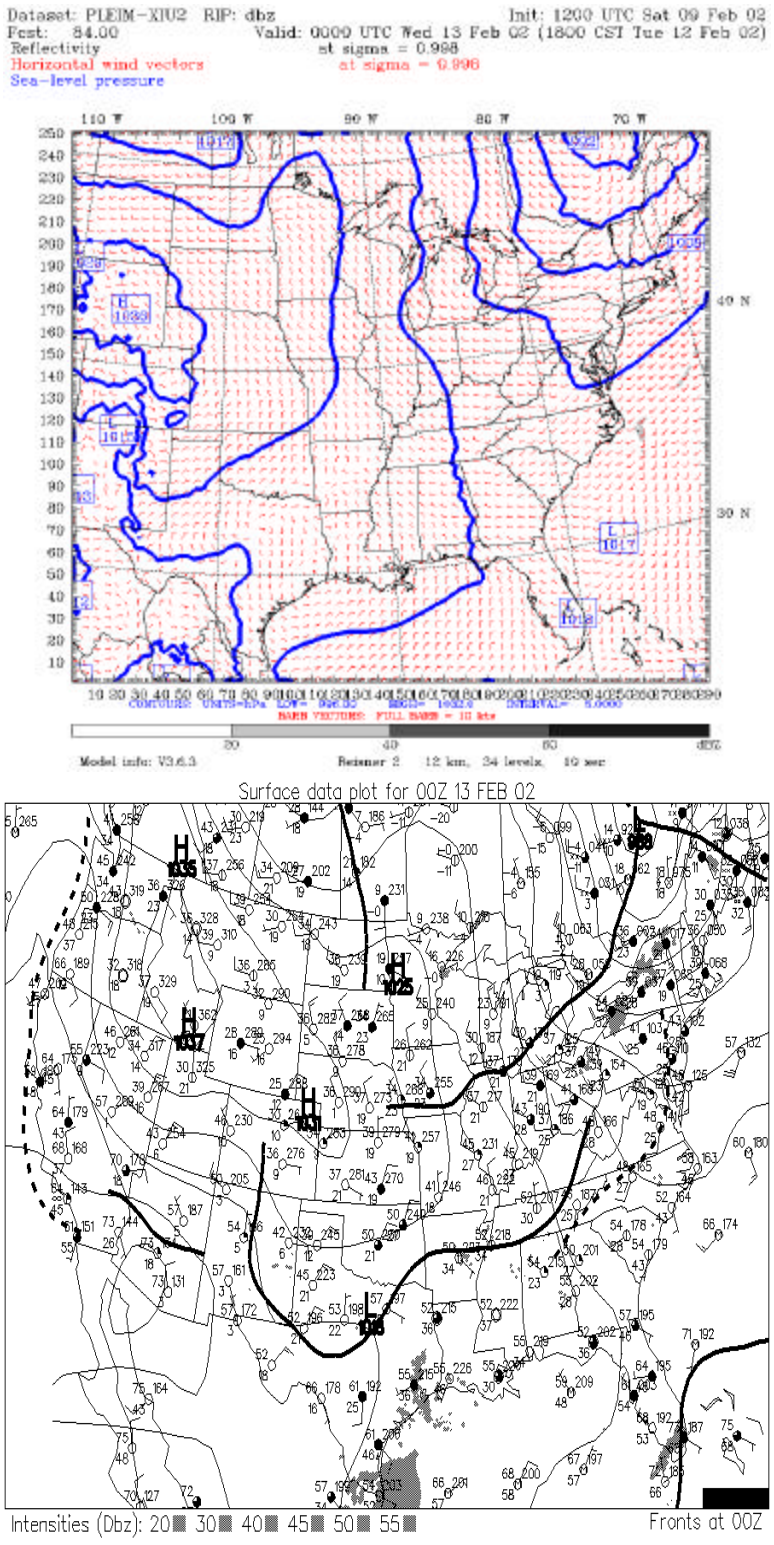


**Figure 3-76: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid12Z 18 February 2002.**

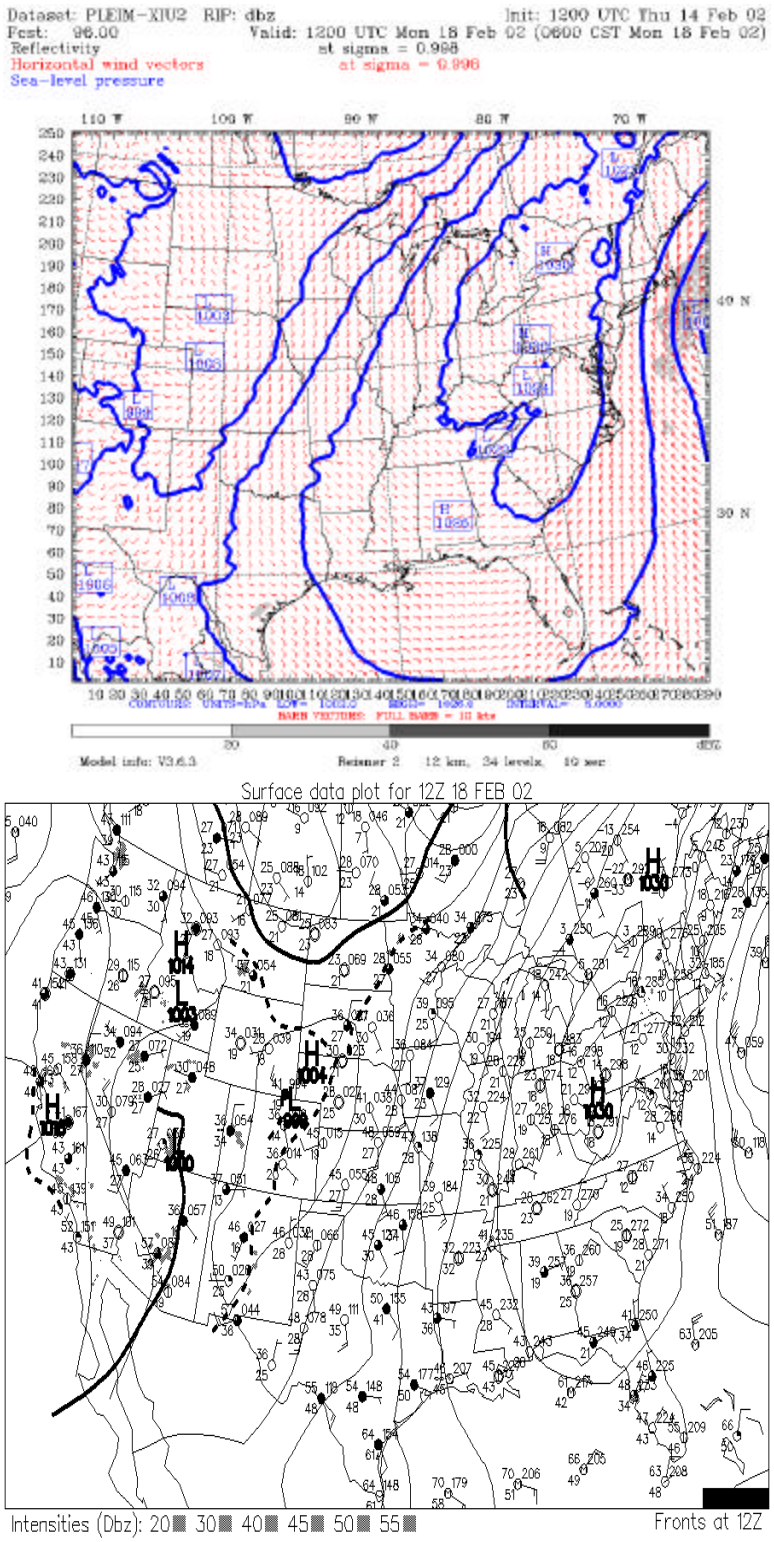


**Figure 3-77: Model Predicted (top) and Observed (bottom) Sea Level Pressure, Surface Wind Vectors and Radar Reflectivity valid 00Z 24 February 2002.**

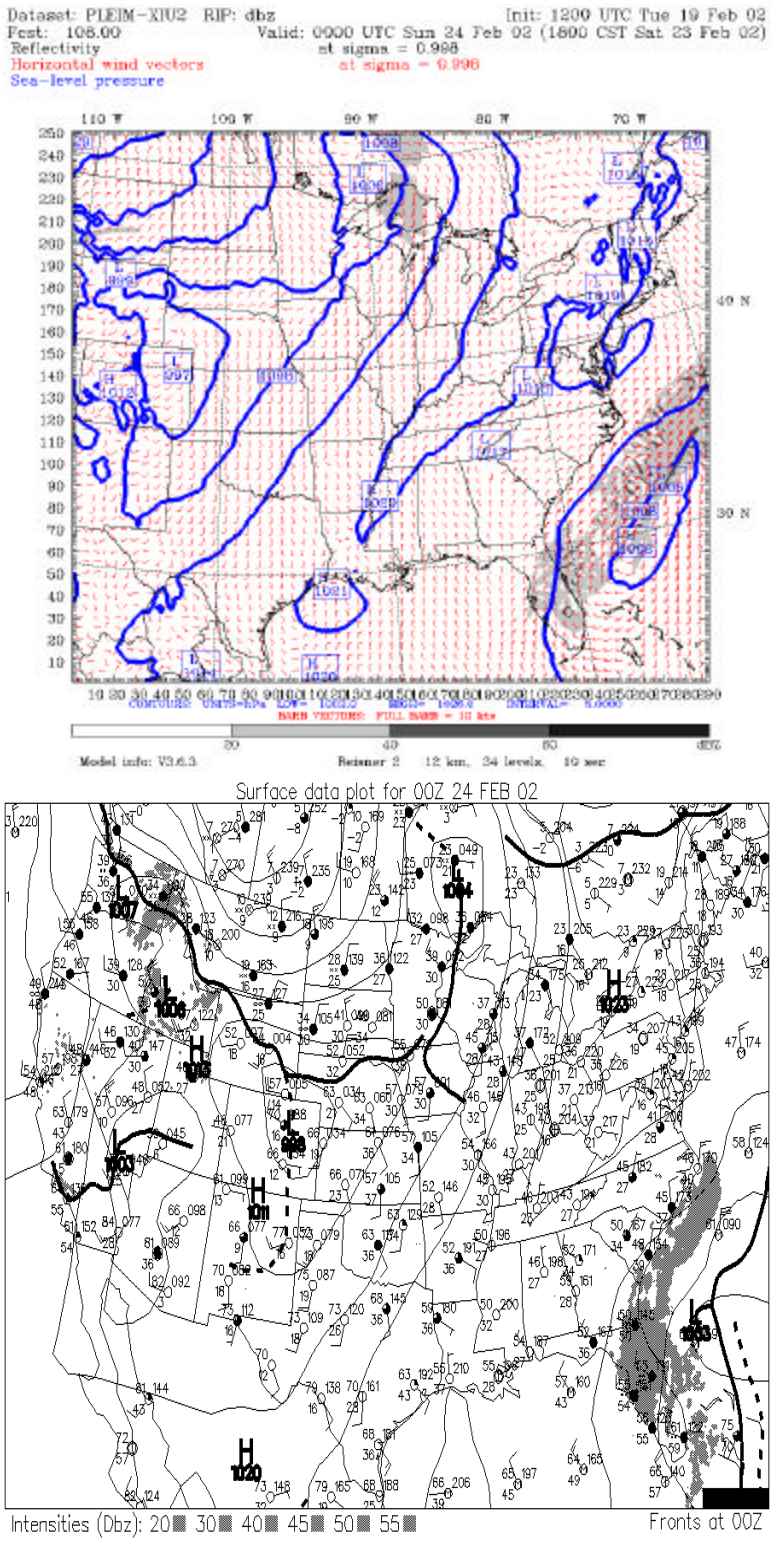


**Table 3-1: Temperature Bias (K) by Month.**

| Region | Jan '01 | Feb '01 | Mar `01 | Apr `01 | May `01 | Jun `01 | Jul `01 | Aug `01 | Sep `01 | Oct `01 | Nov `01 | Dec `01 | Jan `02 | Feb `02 | Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ALL | -0.44 | -0.29 | -0.32 | 0.18 | 0.43 | 0.27 | 0.15 | 0.02 | 0.20 | 0.21 | 0.14 | -0.19 | -0.48 | -0.11 | -0.02 |
| AL | 0.02 | 0.36 | 0.29 | 0.39 | 0.51 | 0.60 | 0.42 | 0.42 | 0.42 | 0.64 | 0.58 | 0.29 | 0.24 | 0.60 | 0.41 |
| AR | -0.35 | 0.26 | 0.64 | 0.63 | 1.08 | 1.04 | 0.57 | 0.30 | 0.52 | 0.54 | 0.57 | 0.15 | 0.08 | 0.70 | 0.48 |
| CO | 0.49 | -0.78 | -1.59 | -2.02 | -0.57 | -0.78 | -0.57 | -0.11 | 0.13 | 0.38 | 0.90 | 0.32 | -0.24 | -0.09 | -0.32 |
| CT | -1.35 | -2.29 | -1.61 | 0.38 | 0.39 | 0.63 | 0.63 | 0.33 | 0.11 | 0.26 | 0.06 | -0.51 | -1.00 | -0.05 | -0.29 |
| DE | -0.26 | -0.41 | 0.13 | 0.82 | 0.42 | 0.48 | 0.65 | 0.53 | 0.64 | 0.34 | 0.43 | 0.39 | 0.51 | 0.35 | 0.36 |
| DC | -1.12 | -1.53 | -1.18 | 0.04 | -0.04 | -0.10 | -0.19 | -0.36 | -1.05 | -0.90 | -1.32 | -1.42 | -1.15 | -0.84 | -0.80 |
| FL | 0.77 | 0.24 | -0.02 | -0.26 | -0.38 | 0.06 | 0.06 | -0.08 | 0.08 | 0.01 | 0.28 | 0.37 | 0.34 | 0.22 | 0.12 |
| GA | 0.16 | 0.58 | 0.10 | 0.53 | 0.69 | 0.80 | 0.36 | 0.27 | 0.46 | 0.70 | 0.67 | 0.43 | 0.40 | 0.60 | 0.48 |
| IL | -1.00 | -0.38 | 0.15 | 0.57 | 0.89 | 0.63 | 0.59 | 0.41 | 0.38 | 0.19 | 0.20 | -0.47 | -0.96 | 0.30 | 0.11 |
| IN | -0.96 | -0.06 | 0.15 | 0.39 | 0.83 | 0.40 | 0.67 | 0.25 | 0.35 | 0.14 | -0.06 | -0.91 | -0.89 | -0.02 | 0.02 |
| IA | -0.68 | -0.47 | -0.99 | 0.57 | 0.76 | 0.10 | 0.28 | 0.16 | 0.35 | 0.02 | -0.19 | -0.53 | -0.61 | -0.81 | -0.15 |
| KS | -0.37 | -0.15 | 0.58 | 0.36 | 0.49 | 0.05 | -0.52 | -0.33 | 0.05 | 0.14 | 0.03 | 0.13 | 0.14 | -0.07 | 0.04 |
| KY | -0.74 | 0.15 | 0.37 | 0.29 | 0.83 | 0.97 | 0.67 | 0.52 | 0.47 | 0.31 | 0.50 | -0.12 | -0.35 | 0.35 | 0.30 |
| LA | 0.87 | 0.24 | 0.40 | 0.14 | -0.09 | 0.27 | 0.04 | 0.22 | 0.36 | 0.53 | 0.46 | 0.41 | -0.01 | 0.67 | 0.32 |
| ME | -0.78 | -1.30 | -1.78 | -0.81 | 0.95 | 0.71 | 0.76 | 0.27 | 0.32 | 0.58 | -0.17 | -0.65 | -0.73 | -1.09 | -0.27 |
| MD | 0.08 | -0.55 | -0.15 | 0.67 | 0.66 | 0.42 | 0.51 | 0.35 | 0.26 | 0.27 | 0.26 | 0.00 | -0.25 | 0.39 | 0.21 |
| MA | -1.17 | -1.86 | -1.43 | 0.08 | 0.29 | 0.46 | 0.62 | 0.38 | 0.30 | 0.27 | 0.13 | -0.07 | -0.61 | -0.46 | -0.22 |
| MI | -1.55 | -1.21 | -0.39 | 0.12 | 0.39 | 0.37 | 0.29 | -0.15 | 0.29 | -0.08 | -0.49 | -0.71 | -1.26 | -0.77 | -0.37 |
| MN | -0.42 | 0.21 | -0.82 | 0.77 | 1.07 | 0.78 | 0.88 | 0.42 | 0.30 | 0.14 | -0.25 | -0.86 | -0.83 | -0.88 | 0.04 |
| MS | 0.46 | 0.48 | 0.66 | 0.60 | 0.60 | 0.73 | 0.43 | 0.67 | 0.72 | 1.12 | 1.19 | 0.72 | 0.46 | 1.02 | 0.70 |
| MO | -1.17 | 0.00 | 0.46 | 0.52 | 0.79 | 0.76 | 0.65 | 0.35 | 0.53 | 0.19 | 0.23 | -0.16 | -0.70 | 0.12 | 0.18 |
| NE | -0.57 | -0.44 | -0.22 | 0.79 | 0.51 | -0.23 | 0.10 | 0.10 | 0.15 | 0.54 | 0.46 | 0.09 | 0.25 | 0.20 | 0.12 |
| NH | -0.62 | -1.30 | -1.35 | 0.11 | 1.24 | 1.29 | 1.25 | 0.72 | 0.91 | 1.10 | 0.59 | 0.11 | -0.54 | -0.76 | 0.20 |
| NJ | -1.11 | -1.41 | -0.53 | 0.10 | -0.19 | 0.24 | 0.37 | 0.22 | 0.38 | 0.26 | 0.00 | -0.22 | -0.73 | -0.04 | -0.19 |
| NM | -0.36 | -0.46 | 0.03 | -0.48 | -0.43 | -1.06 | -1.09 | -0.14 | -0.19 | 0.02 | 0.24 | 0.40 | 0.12 | 0.53 | -0.20 |
| NY | -1.30 | -1.43 | -1.00 | -0.29 | 0.23 | 0.42 | 0.37 | -0.03 | 0.13 | 0.08 | -0.29 | -0.60 | -1.46 | -0.51 | -0.41 |
| NC | -0.20 | 0.41 | -0.06 | 0.10 | 0.47 | 0.17 | 0.28 | 0.05 | 0.36 | 0.50 | 0.44 | 0.05 | -0.40 | -0.02 | 0.15 |

| Region | Jan '01 | Feb '01 | Mar `01 | Apr `01 | May `01 | Jun `01 | Jul `01 | Aug `01 | Sep `01 | Oct `01 | Nov `01 | Dec `01 | Jan `02 | Feb `02 | Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ND | 0.21 | 0.47 | -0.75 | 0.54 | 0.71 | 0.71 | 0.31 | -0.27 | -0.37 | 0.16 | 0.14 | -0.37 | -0.12 | -0.23 | 0.08 |
| OH | -1.24 | -0.20 | 0.08 | 0.51 | 1.15 | 0.64 | 0.54 | 0.43 | 0.42 | 0.01 | 0.00 | -0.61 | -0.48 | 0.12 | 0.10 |
| OK | -0.04 | 0.03 | 0.71 | 0.27 | 0.56 | -0.04 | -0.96 | -0.68 | -0.08 | -0.18 | -0.05 | -0.03 | -0.07 | 0.26 | -0.02 |
| PA | -1.46 | -1.15 | -0.52 | 0.40 | 0.36 | 0.62 | 0.37 | -0.09 | 0.10 | -0.04 | -0.41 | -0.46 | -1.99 | -0.38 | -0.33 |
| RI | -1.66 | -1.88 | -1.30 | 0.19 | -0.17 | -0.05 | 0.43 | 0.29 | 0.06 | -0.02 | -0.36 | -0.27 | -0.50 | -0.27 | -0.39 |
| SC | 0.11 | 0.60 | 0.12 | 0.15 | 0.33 | 0.45 | 0.36 | -0.08 | 0.31 | 0.43 | 0.30 | 0.48 | -0.02 | 0.53 | 0.29 |
| SD | -0.12 | 1.02 | -0.08 | 0.64 | 0.62 | 0.31 | 0.24 | -0.18 | -0.38 | 0.26 | 0.16 | -0.78 | -0.51 | -0.09 | 0.08 |
| TN | -0.36 | 0.23 | 0.01 | 0.22 | 0.60 | 0.86 | 0.26 | 0.14 | 0.27 | 0.44 | 0.65 | -0.03 | 0.07 | 0.36 | 0.27 |
| TX | -0.01 | -0.01 | 0.45 | 0.02 | -0.29 | -0.87 | -1.23 | -1.00 | -0.23 | -0.01 | 0.13 | 0.37 | 0.19 | 0.68 | -0.13 |
| VT | -1.44 | -2.25 | -1.98 | -0.73 | 0.15 | 0.50 | 0.22 | -0.21 | 0.10 | -0.10 | -0.67 | -1.30 | -1.63 | -1.80 | -0.80 |
| VA | -0.01 | -0.27 | -0.15 | 0.26 | 0.61 | 0.31 | 0.21 | 0.15 | 0.13 | 0.20 | 0.20 | -0.10 | -0.52 | -0.03 | 0.07 |
| WV | -0.73 | -0.36 | -0.14 | 0.04 | 1.14 | 1.13 | 1.00 | 0.61 | 0.41 | 0.34 | 0.49 | -0.05 | -0.95 | -0.02 | 0.21 |
| WI | -1.14 | -1.16 | -1.47 | 0.36 | 1.01 | 0.77 | 0.49 | 0.03 | 0.18 | -0.11 | -0.33 | -1.02 | -1.62 | -1.05 | -0.36 |
| WY | 0.66 | 0.59 | -1.56 | -0.65 | -0.51 | -0.87 | -0.92 | -0.46 | 0.27 | 0.34 | 1.17 | -0.30 | -0.84 | -0.75 | -0.27 |
| CENRAP | -0.31 | -0.02 | -0.04 | 0.45 | 0.52 | 0.11 | -0.06 | -0.12 | 0.16 | 0.15 | 0.06 | -0.16 | -0.24 | -0.04 | 0.03 |
| MANE_VU | -1.13 | -1.45 | -1.06 | 0.00 | 0.39 | 0.54 | 0.53 | 0.17 | 0.25 | 0.24 | -0.12 | -0.40 | -1.10 | -0.48 | -0.26 |
| MW | -1.26 | -0.79 | -0.46 | 0.34 | 0.80 | 0.56 | 0.47 | 0.12 | 0.30 | -0.01 | -0.21 | -0.75 | -1.14 | -0.45 | -0.18 |

**Figure 3-78: Episode AverageTemperature Bias (Deg. C).**

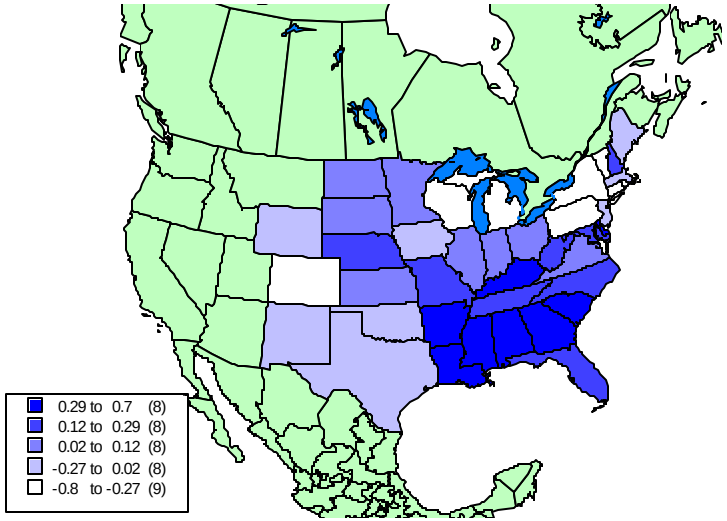


**Table 3-2: Temperature Error (K) by Month by Region.**

| Region | Jan '01 | Feb '01 | Mar `01 | Apr `01 | May `01 | Jun `01 | Jul `01 | Aug `01 | Sep `01 | Oct `01 | Nov `01 | Dec `01 | Jan `02 | Feb `02 | Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ALL | 2.31 | 2.17 | 2.00 | 2.22 | 2.21 | 2.16 | 2.22 | 2.28 | 2.32 | 2.54 | 2.61 | 2.29 | 2.48 | 2.29 | 2.29 |
| AL | 2.18 | 2.29 | 1.86 | 2.38 | 2.46 | 2.03 | 2.08 | 1.97 | 2.19 | 3.12 | 3.29 | 2.54 | 2.42 | 2.39 | 2.37 |
| AR | 1.98 | 2.15 | 1.59 | 2.15 | 2.15 | 2.20 | 2.07 | 2.18 | 2.42 | 2.86 | 2.58 | 2.17 | 2.41 | 2.02 | 2.21 |
| CO | 3.43 | 3.10 | 3.18 | 4.00 | 3.25 | 3.62 | 3.46 | 3.44 | 3.92 | 3.80 | 3.67 | 3.48 | 3.48 | 3.77 | 3.54 |
| CT | 2.50 | 2.62 | 2.13 | 1.73 | 2.03 | 1.87 | 1.97 | 1.81 | 2.09 | 2.37 | 2.34 | 1.97 | 2.37 | 1.69 | 2.11 |
| DE | 1.98 | 2.22 | 1.56 | 1.84 | 1.66 | 1.53 | 1.63 | 1.45 | 1.96 | 2.37 | 2.62 | 1.88 | 2.08 | 1.87 | 1.90 |
| DC | 1.62 | 2.19 | 1.52 | 1.40 | 1.26 | 1.06 | 1.20 | 1.05 | 1.45 | 1.69 | 1.91 | 1.68 | 2.00 | 1.38 | 1.53 |
| FL | 2.65 | 2.13 | 2.02 | 2.20 | 2.23 | 2.10 | 1.76 | 1.90 | 1.81 | 1.90 | 2.14 | 2.12 | 2.26 | 2.11 | 2.10 |
| GA | 2.40 | 2.41 | 1.90 | 2.46 | 2.65 | 2.01 | 1.99 | 1.97 | 2.21 | 3.16 | 3.30 | 2.65 | 2.58 | 2.42 | 2.44 |
| IL | 1.99 | 1.67 | 1.57 | 1.94 | 1.95 | 1.83 | 2.10 | 2.04 | 2.25 | 2.10 | 2.27 | 1.83 | 2.22 | 1.68 | 1.96 |
| IN | 1.81 | 1.61 | 1.47 | 1.97 | 1.90 | 1.76 | 2.03 | 1.93 | 2.08 | 2.06 | 2.44 | 2.04 | 2.08 | 1.80 | 1.93 |
| IA | 2.02 | 1.82 | 1.95 | 2.12 | 1.86 | 1.97 | 1.98 | 2.12 | 2.45 | 2.42 | 2.55 | 2.20 | 2.41 | 2.45 | 2.17 |
| KS | 2.32 | 2.06 | 2.06 | 2.29 | 2.14 | 2.18 | 2.45 | 2.83 | 2.55 | 2.75 | 2.53 | 2.92 | 2.89 | 2.58 | 2.47 |
| KY | 2.16 | 1.87 | 1.52 | 1.87 | 1.98 | 2.03 | 1.92 | 1.79 | 1.98 | 2.47 | 2.75 | 1.93 | 2.18 | 1.87 | 2.02 |
| LA | 2.31 | 2.17 | 1.82 | 1.96 | 2.16 | 2.06 | 1.94 | 1.97 | 2.05 | 2.84 | 3.13 | 2.56 | 2.73 | 2.36 | 2.29 |
| ME | 2.31 | 2.08 | 2.44 | 2.61 | 2.41 | 1.98 | 2.04 | 2.24 | 2.22 | 2.31 | 1.94 | 1.96 | 1.73 | 2.15 | 2.17 |
| MD | 2.09 | 2.36 | 1.75 | 1.83 | 1.84 | 1.74 | 1.86 | 1.70 | 2.06 | 2.46 | 2.72 | 2.01 | 2.37 | 1.91 | 2.05 |
| MA | 2.35 | 2.44 | 2.13 | 2.01 | 2.18 | 2.03 | 2.14 | 1.95 | 2.23 | 2.33 | 2.29 | 1.85 | 2.02 | 2.10 | 2.15 |
| MI | 2.03 | 1.68 | 1.66 | 2.04 | 2.04 | 2.18 | 2.39 | 2.16 | 2.02 | 1.88 | 1.98 | 1.71 | 1.92 | 1.75 | 1.96 |
| MN | 2.10 | 1.92 | 2.17 | 2.06 | 2.12 | 2.05 | 2.27 | 2.31 | 2.19 | 2.14 | 2.27 | 2.10 | 2.12 | 2.10 | 2.14 |
| MS | 2.25 | 2.38 | 1.87 | 2.18 | 2.43 | 2.18 | 2.09 | 2.01 | 2.18 | 3.09 | 3.46 | 2.45 | 2.40 | 2.36 | 2.38 |
| MO | 2.14 | 1.86 | 1.62 | 2.01 | 1.83 | 1.77 | 1.79 | 2.04 | 2.41 | 2.37 | 2.30 | 2.02 | 2.53 | 1.91 | 2.04 |
| NE | 2.52 | 2.07 | 2.16 | 2.36 | 2.13 | 2.47 | 2.40 | 2.82 | 2.72 | 2.88 | 3.28 | 2.66 | 3.01 | 3.21 | 2.62 |
| NH | 2.88 | 2.94 | 2.93 | 3.24 | 3.07 | 2.91 | 2.96 | 3.00 | 3.08 | 3.11 | 2.75 | 2.47 | 2.59 | 2.85 | 2.91 |
| NJ | 2.61 | 2.44 | 1.69 | 1.89 | 1.97 | 1.97 | 2.07 | 2.01 | 2.48 | 2.68 | 2.83 | 2.05 | 2.44 | 2.03 | 2.23 |
| NM | 2.73 | 2.98 | 2.60 | 3.11 | 3.10 | 3.37 | 3.15 | 3.03 | 3.45 | 3.43 | 2.85 | 3.15 | 3.03 | 3.15 | 3.08 |

| Region | Jan '01 | Feb '01 | Mar `01 | Apr `01 | May `01 | Jun `01 | Jul `01 | Aug `01 | Sep `01 | Oct `01 | Nov `01 | Dec `01 | Jan `02 | Feb `02 | Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NY | 2.33 | 2.15 | 1.78 | 2.14 | 1.96 | 1.95 | 1.95 | 2.11 | 2.16 | 2.12 | 2.12 | 1.90 | 2.34 | 1.87 | 2.06 |
| NC | 2.40 | 2.40 | 1.93 | 2.32 | 2.26 | 1.90 | 1.77 | 1.96 | 2.17 | 3.13 | 3.22 | 2.58 | 2.83 | 2.45 | 2.38 |
| ND | 2.13 | 1.93 | 2.06 | 2.26 | 2.29 | 2.00 | 2.28 | 3.18 | 2.56 | 2.41 | 2.88 | 2.30 | 2.46 | 2.36 | 2.36 |
| OH | 1.96 | 1.52 | 1.36 | 1.99 | 2.06 | 1.89 | 2.01 | 1.84 | 1.98 | 1.98 | 2.34 | 1.84 | 1.78 | 1.69 | 1.87 |
| OK | 2.00 | 2.14 | 1.96 | 2.25 | 2.05 | 2.25 | 2.52 | 2.74 | 2.42 | 2.87 | 2.29 | 2.71 | 2.71 | 2.37 | 2.38 |
| PA | 2.25 | 2.08 | 1.52 | 1.92 | 1.91 | 1.94 | 1.96 | 1.89 | 2.12 | 2.14 | 2.33 | 1.82 | 2.81 | 1.78 | 2.03 |
| RI | 2.25 | 2.18 | 1.83 | 1.63 | 1.87 | 1.70 | 1.84 | 1.62 | 1.88 | 1.85 | 1.81 | 1.56 | 1.62 | 1.57 | 1.80 |
| SC | 2.36 | 2.34 | 1.91 | 2.35 | 2.41 | 1.90 | 1.76 | 1.96 | 2.12 | 3.05 | 3.08 | 2.57 | 2.78 | 2.45 | 2.36 |
| SD | 2.40 | 2.36 | 2.21 | 2.19 | 2.12 | 2.17 | 2.45 | 3.01 | 2.67 | 2.56 | 3.13 | 2.34 | 2.53 | 2.52 | 2.48 |
| TN | 2.00 | 2.05 | 1.60 | 1.92 | 1.98 | 2.01 | 1.80 | 1.65 | 1.97 | 2.75 | 3.01 | 2.07 | 2.29 | 1.97 | 2.08 |
| TX | 2.18 | 2.19 | 2.01 | 1.97 | 2.04 | 2.30 | 2.43 | 2.47 | 2.19 | 2.62 | 2.31 | 2.42 | 2.71 | 2.60 | 2.32 |
| VT | 2.64 | 2.84 | 2.51 | 2.62 | 2.53 | 2.49 | 2.21 | 2.66 | 2.56 | 2.52 | 2.26 | 2.45 | 2.46 | 2.99 | 2.55 |
| VA | 2.43 | 2.51 | 2.03 | 2.38 | 2.31 | 2.09 | 2.14 | 2.03 | 2.34 | 3.09 | 3.29 | 2.50 | 2.64 | 2.42 | 2.44 |
| WV | 2.32 | 2.24 | 1.68 | 2.23 | 2.32 | 2.22 | 2.07 | 1.80 | 2.08 | 2.68 | 3.12 | 2.21 | 2.72 | 2.28 | 2.28 |
| WI | 2.09 | 1.93 | 2.24 | 1.85 | 2.10 | 2.00 | 2.39 | 2.11 | 1.97 | 2.02 | 2.13 | 1.99 | 2.36 | 1.91 | 2.08 |
| WY | 3.32 | 2.80 | 2.95 | 2.63 | 2.77 | 3.02 | 3.33 | 3.70 | 3.53 | 2.98 | 3.52 | 2.84 | 3.31 | 3.29 | 3.14 |
| CENRAP | 2.16 | 2.03 | 1.99 | 2.10 | 2.05 | 2.15 | 2.25 | 2.39 | 2.33 | 2.55 | 2.49 | 2.36 | 2.54 | 2.39 | 2.27 |
| MANE_VU | 2.38 | 2.32 | 1.97 | 2.15 | 2.12 | 2.02 | 2.06 | 2.07 | 2.25 | 2.33 | 2.32 | 1.96 | 2.33 | 2.03 | 2.16 |
| MW | 2.01 | 1.71 | 1.72 | 1.96 | 2.03 | 1.99 | 2.25 | 2.05 | 2.04 | 1.98 | 2.17 | 1.85 | 2.07 | 1.77 | 1.97 |

**Figure 3-79: Episode AverageTemperature Error (Deg. C).**

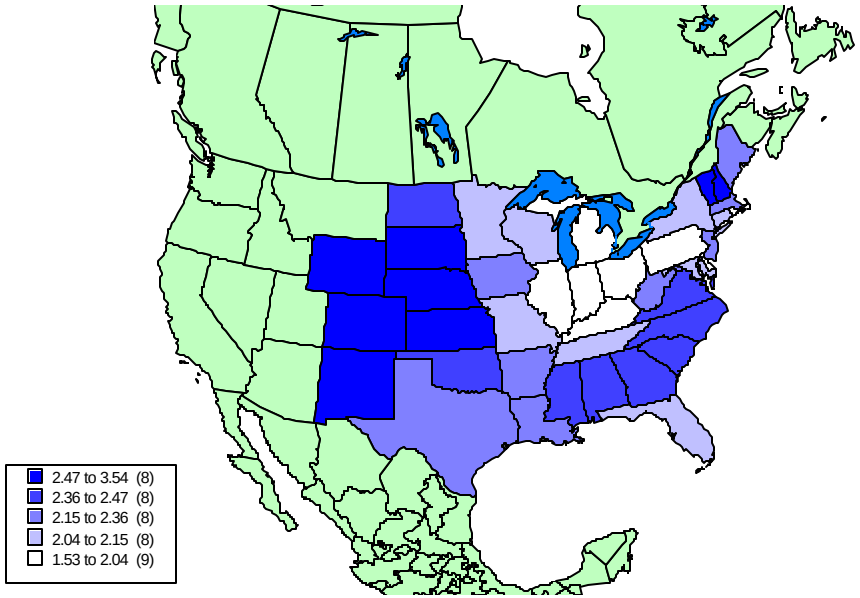


**Figure 3-80: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for January 2001.**

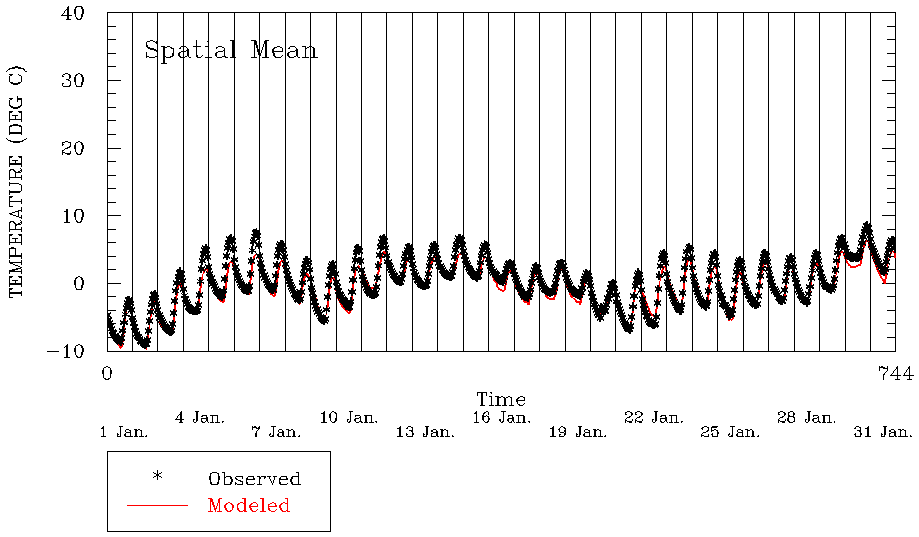



**Figure 3-81: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for February 2001.**

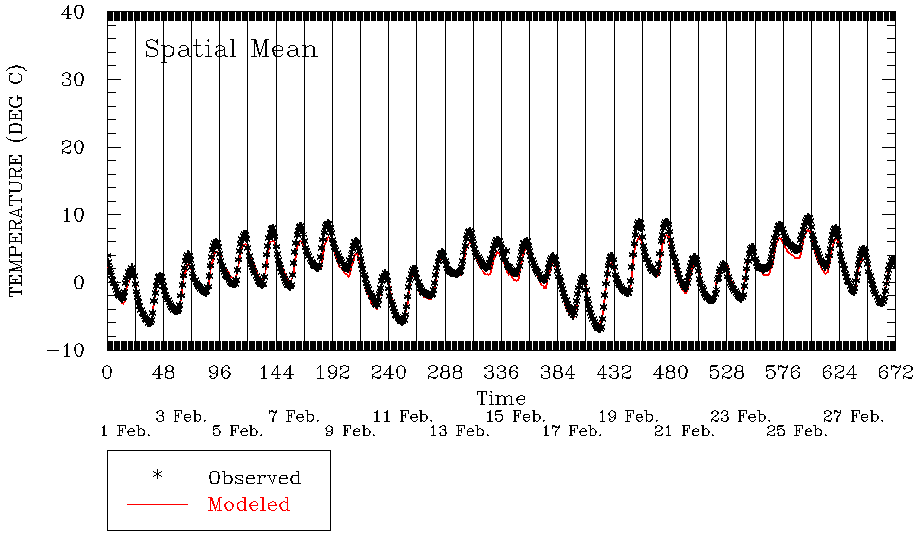


**Figure 3-82: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for March 2001.**

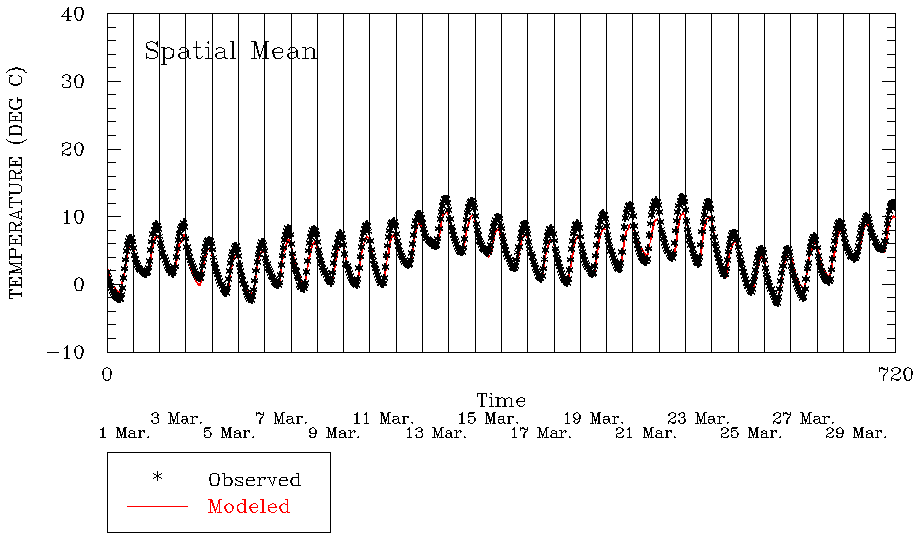



**Figure 3-83: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for April 2001.**

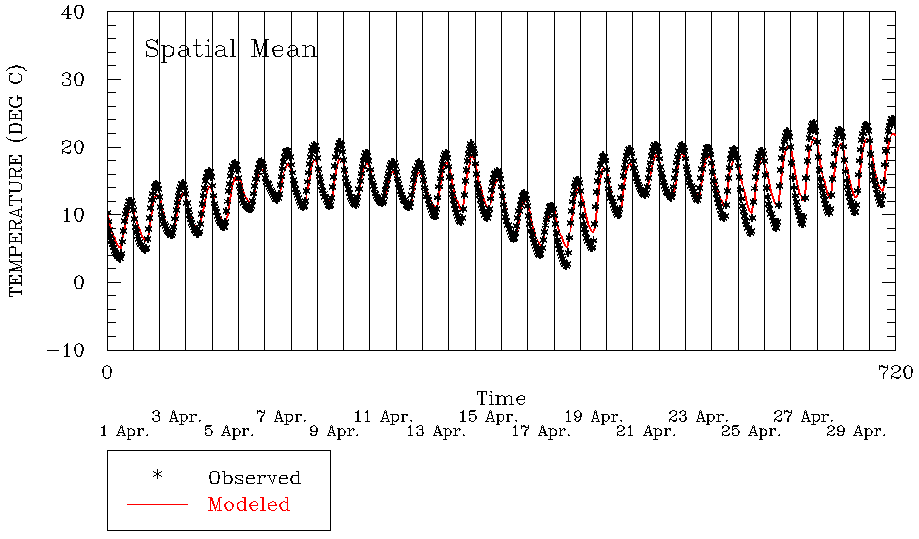


**Figure 3-84: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for May 2001.**

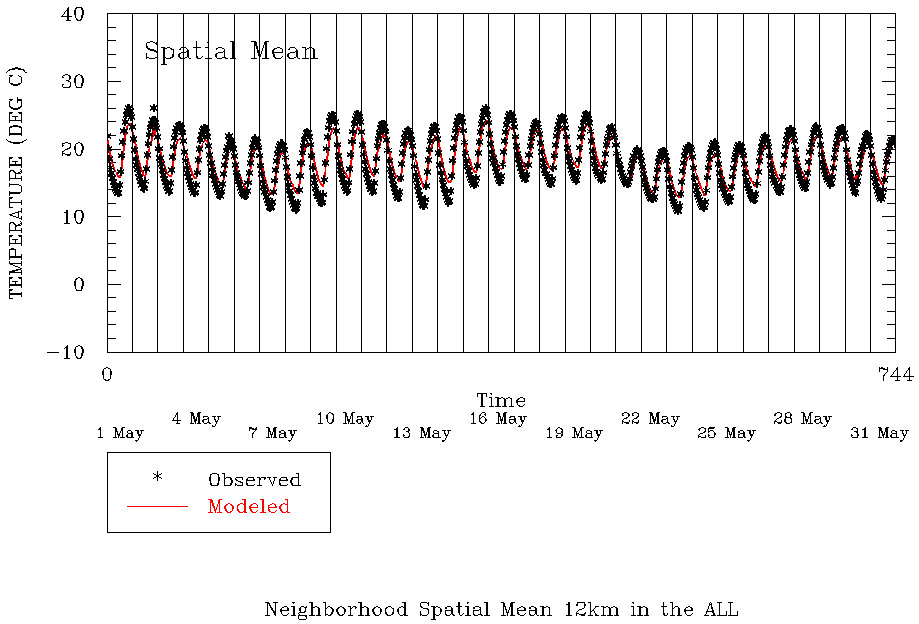



**Figure 3-85: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for June 2001.**

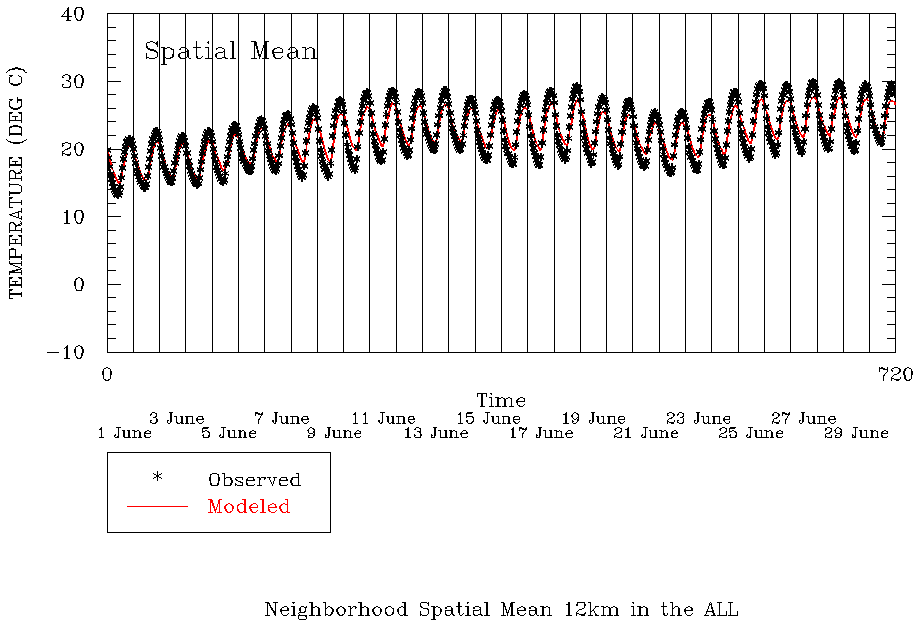


**Figure 3-86: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for July 2001.**

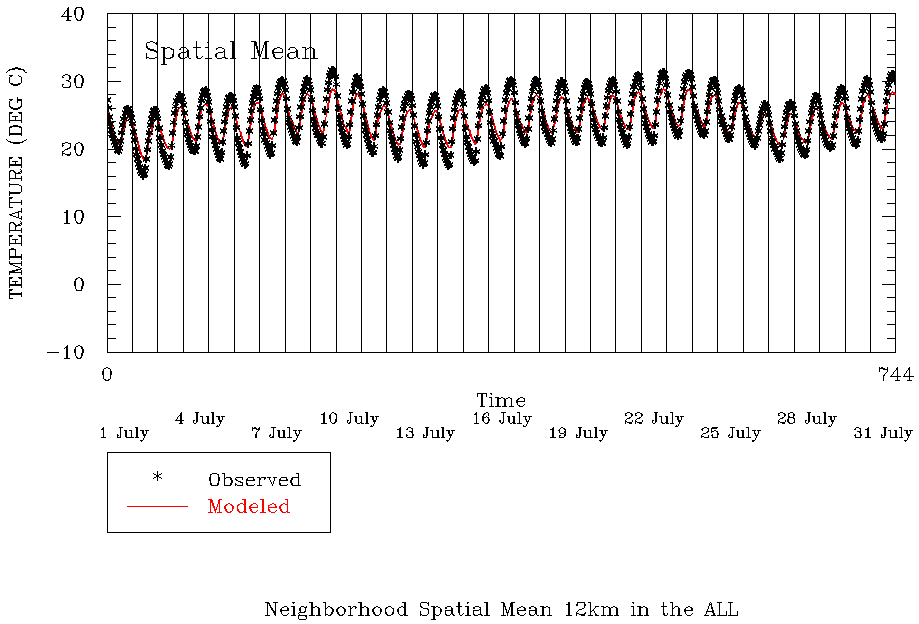



**Figure 3-87: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for August 2001.**

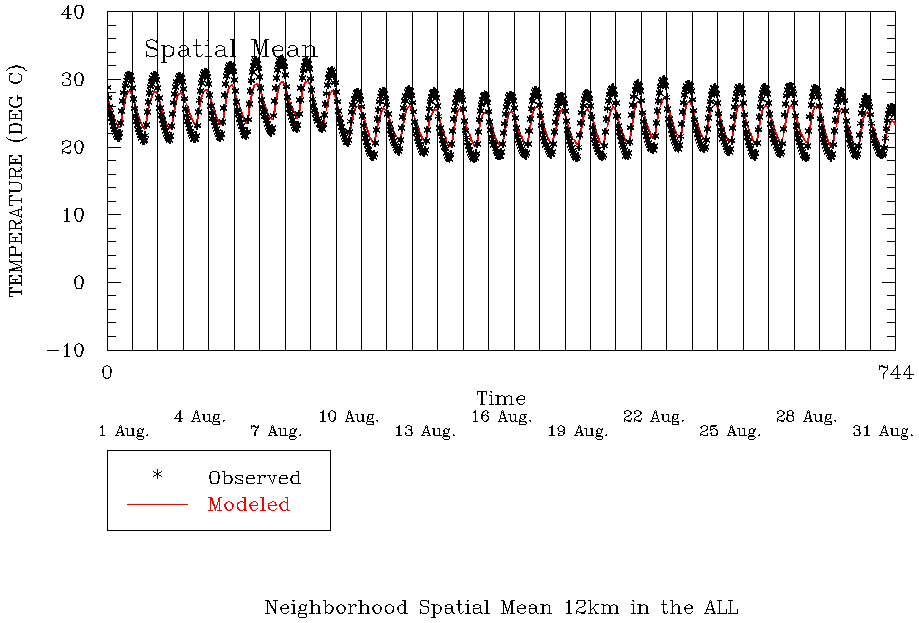


**Figure 3-88: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for September 2001.**

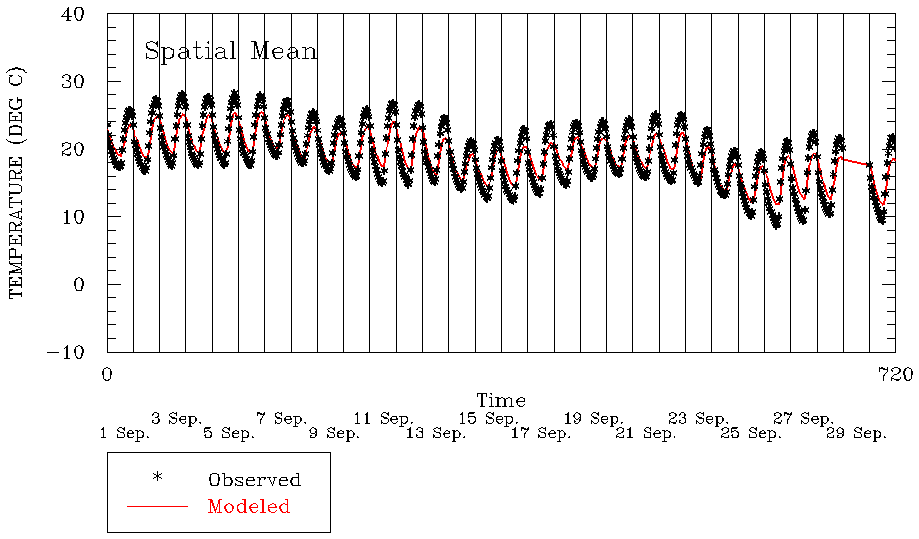



**Figure 3-89: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for October 2001.**

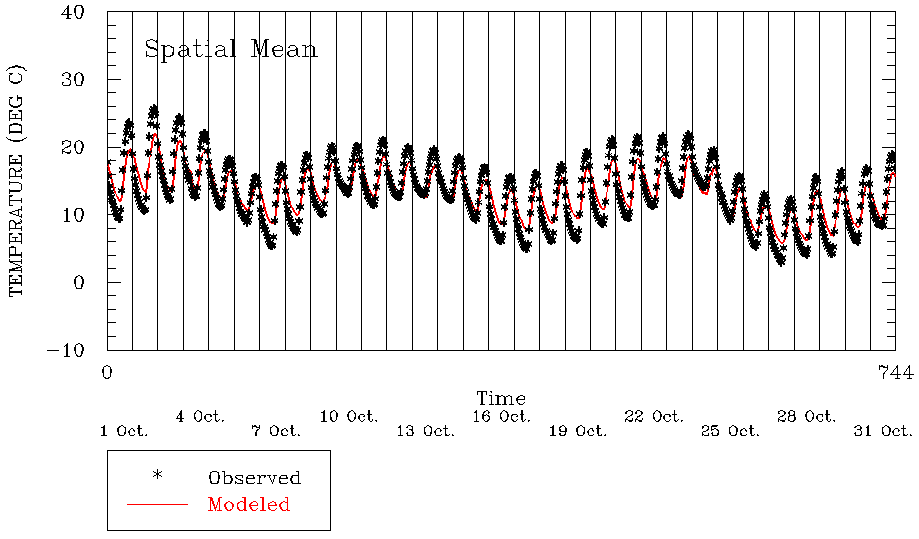


**Figure 3-90: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for November 2001.**

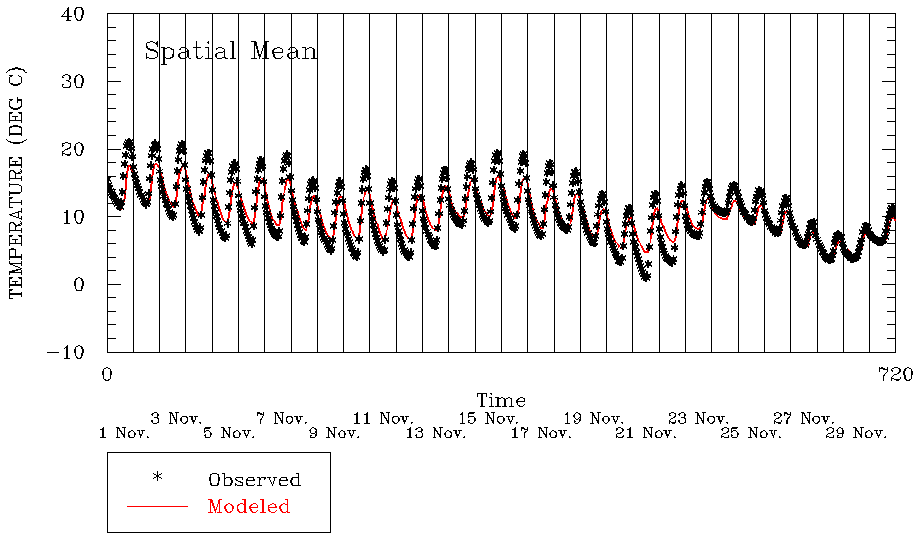



**Figure 3-91: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for December 2001.**

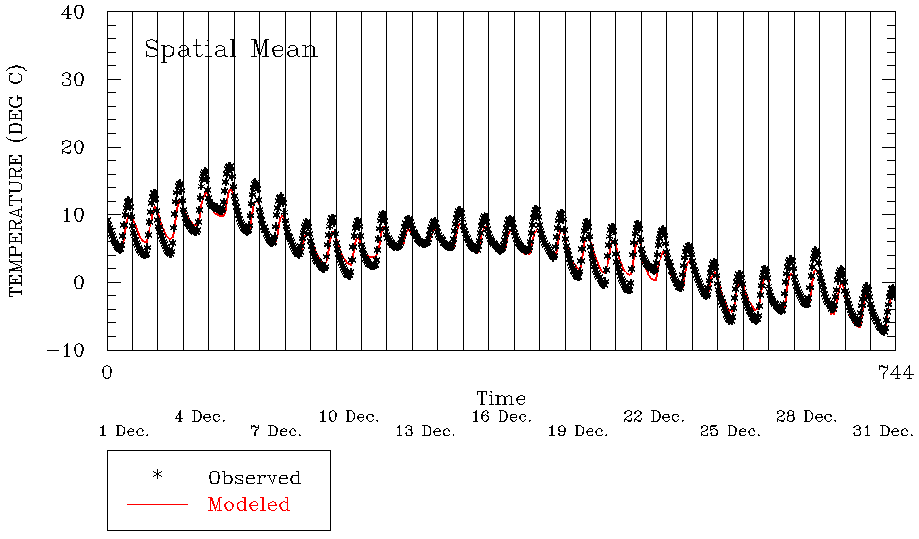


**Figure 3-92: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for January 2002.**

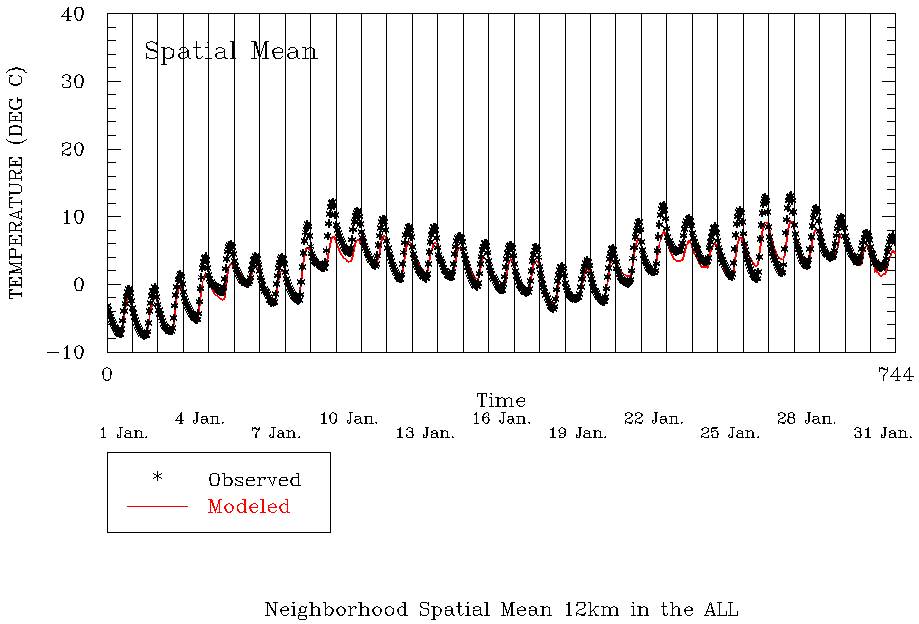



**Figure 3-93: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for February 2002.**

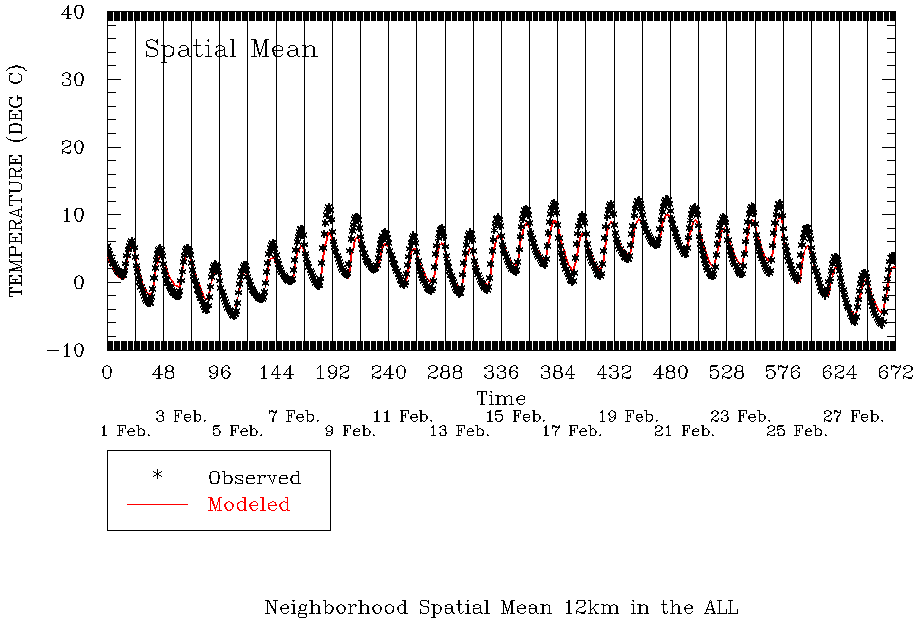


**Figure 3-94: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for January 2001 for the CENRAP States.**

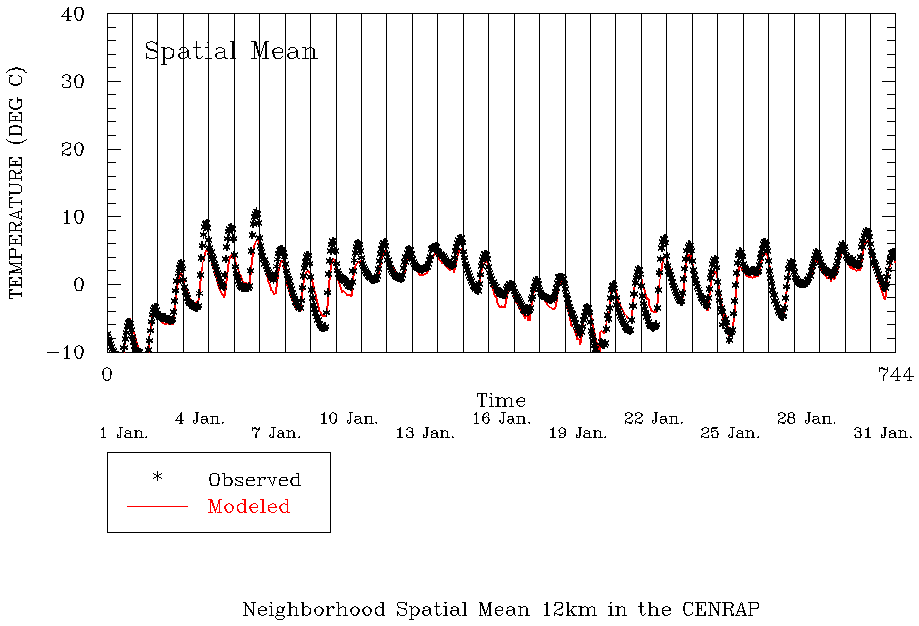



**Figure 3-95: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for February 2001 for the CENRAP States.**

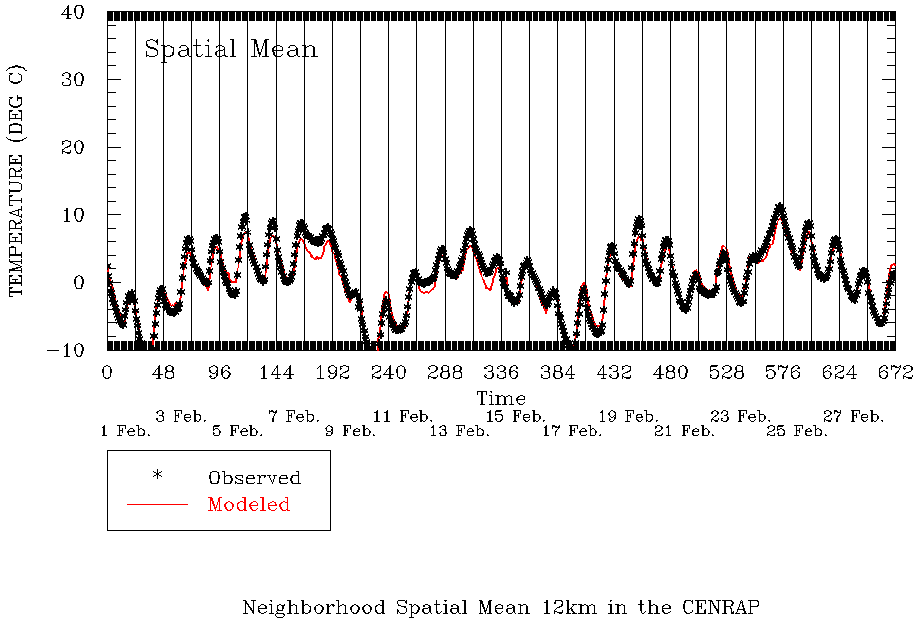


**Figure 3-96: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for March 2001 for the CENRAP States.**

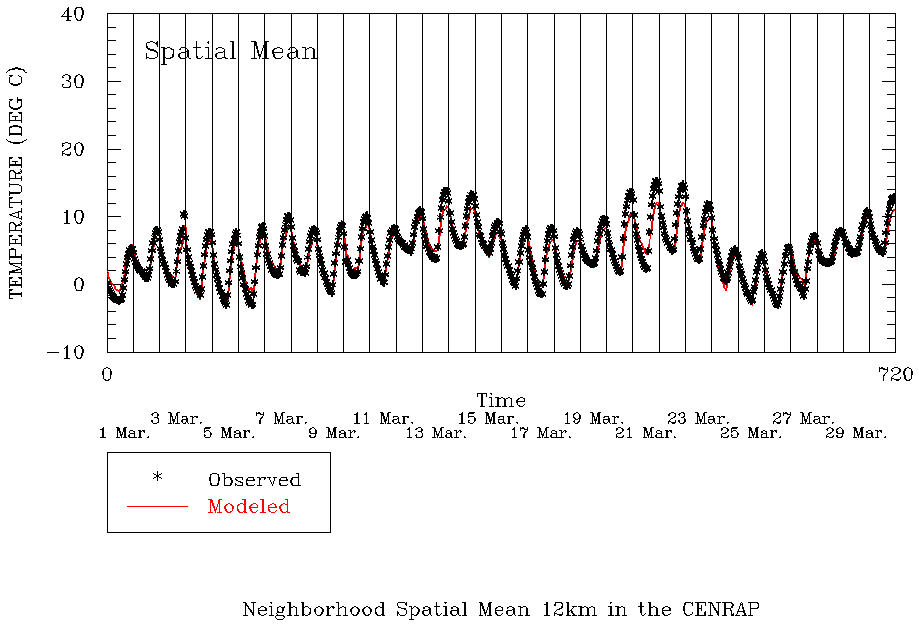



**Figure 3-97: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for April 2001 for the CENRAP States.**

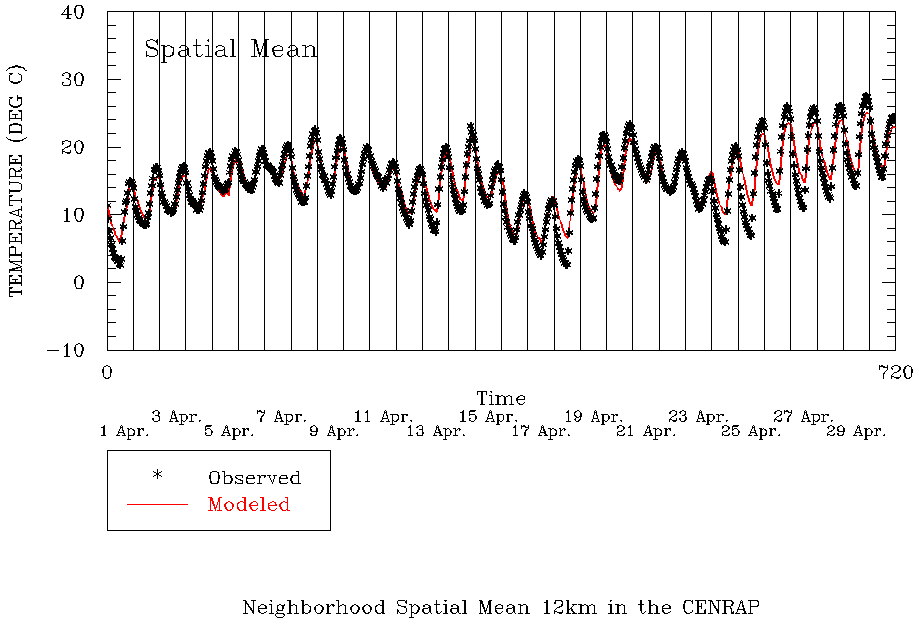


**Figure 3-98: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for May 2001 for the CENRAP States.**

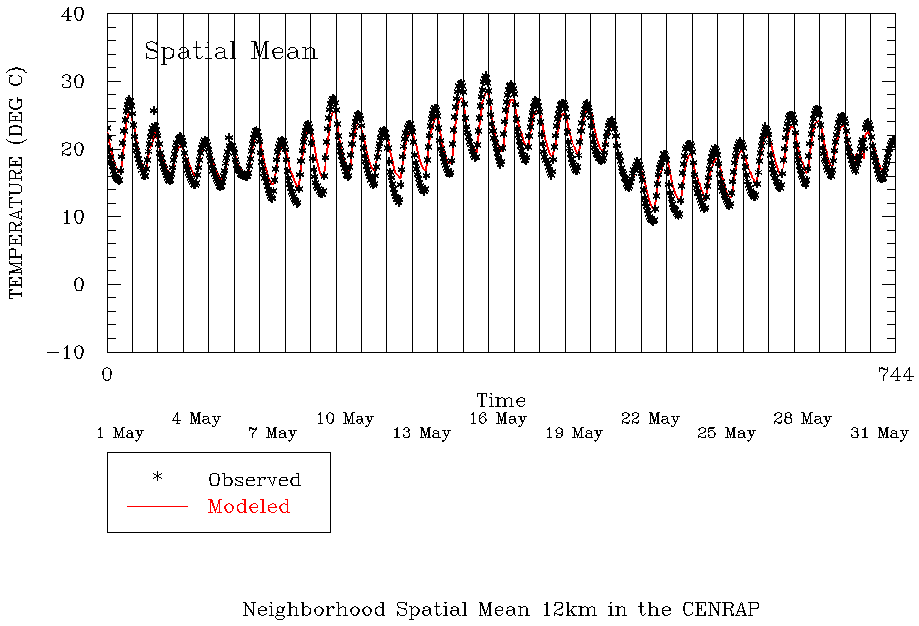



**Figure 3-99: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for June 2001 for the CENRAP States.**

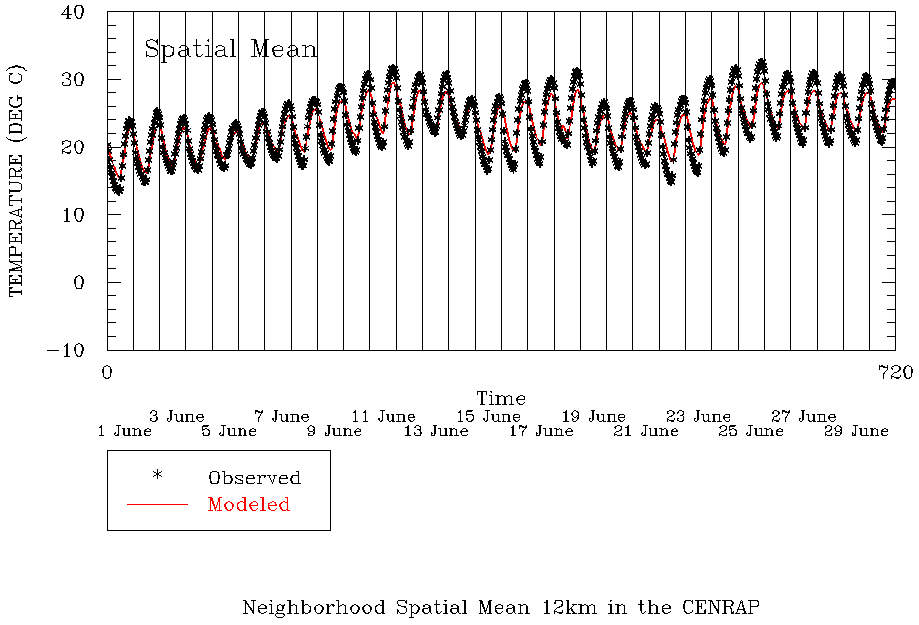


**Figure 3-100: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for July 2001 for the CENRAP States.**

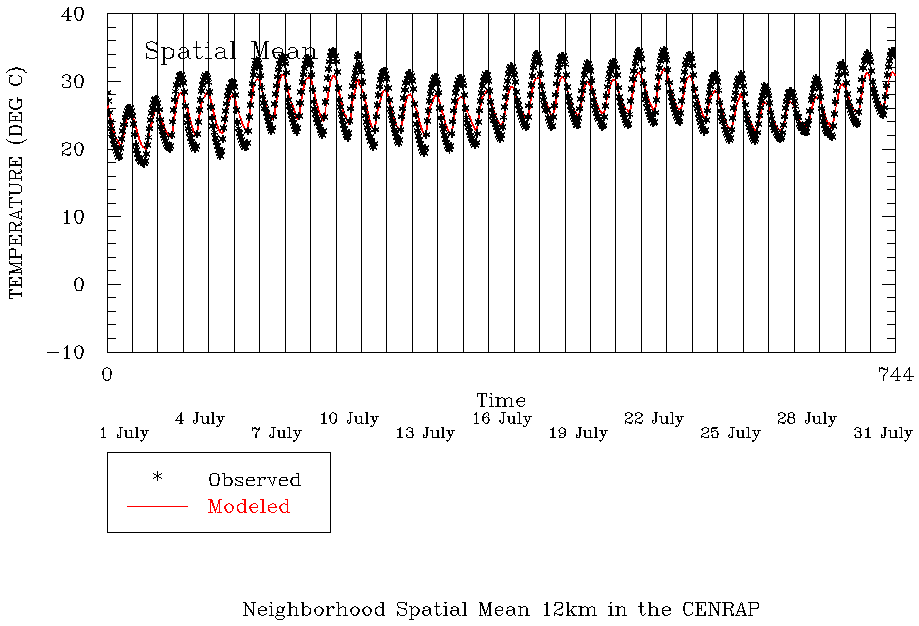



**Figure 3-101: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for August 2001 for the CENRAP States.**

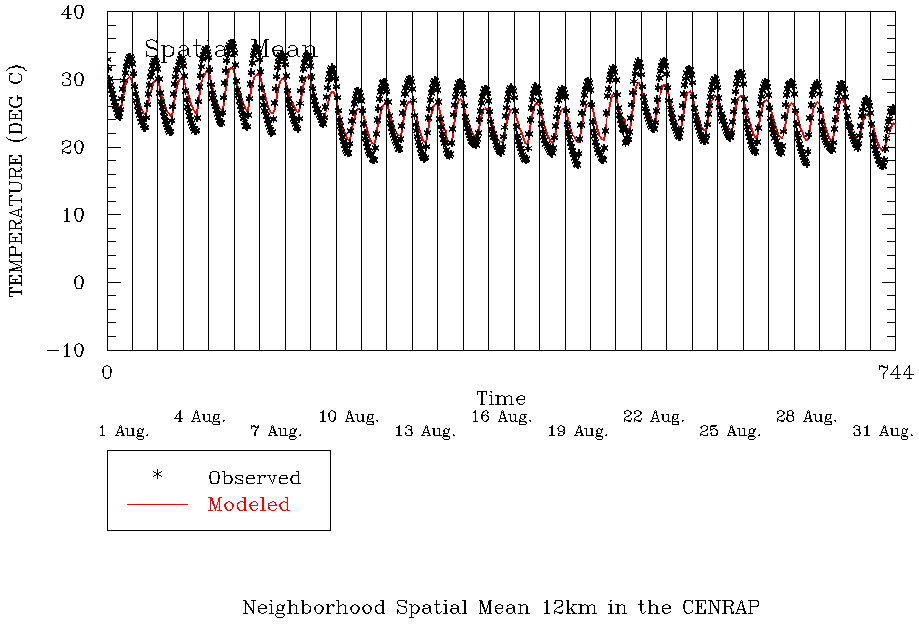


**Figure 3-102: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for September 2001 for the CENRAP States.**

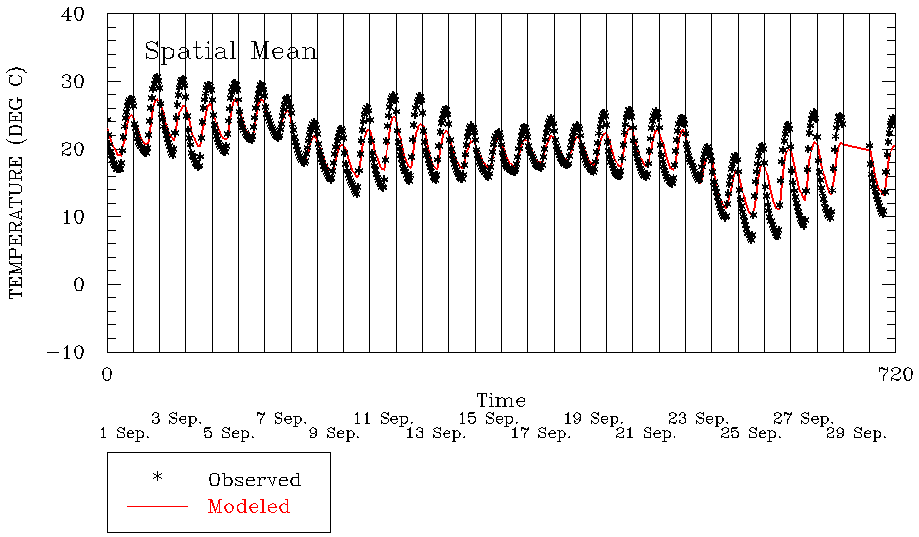



**Figure 3-103: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for October 2001 for the CENRAP States.**

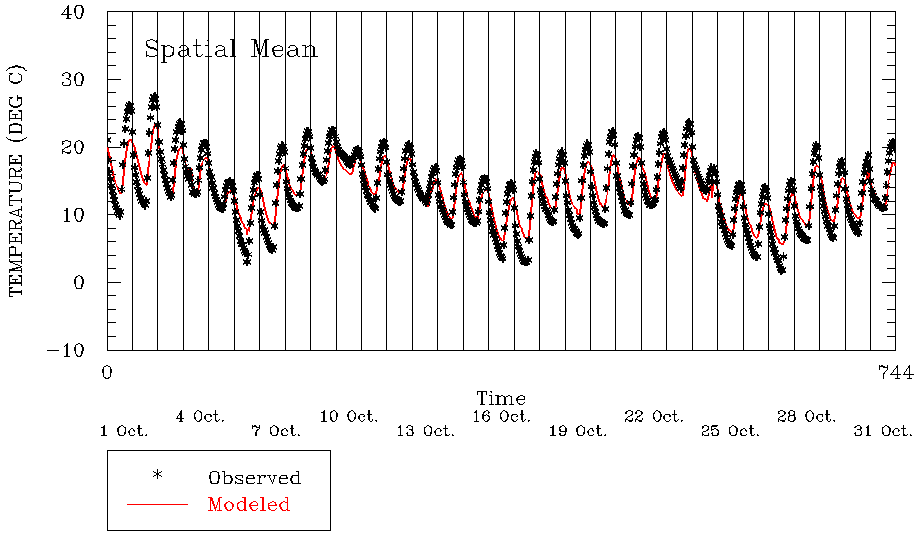


**Figure 3-104: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for November 2001 for the CENRAP States.**

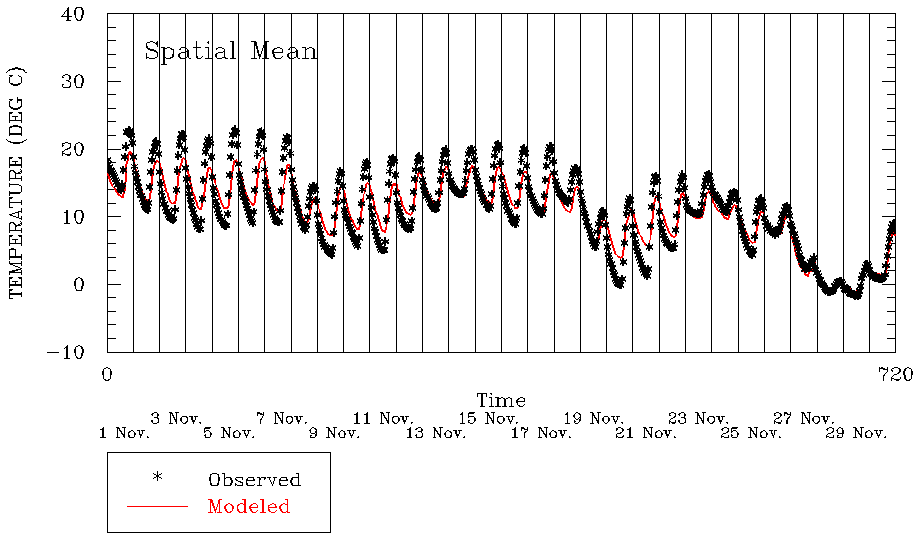



**Figure 3-105: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for December 2001 for the CENRAP States.**

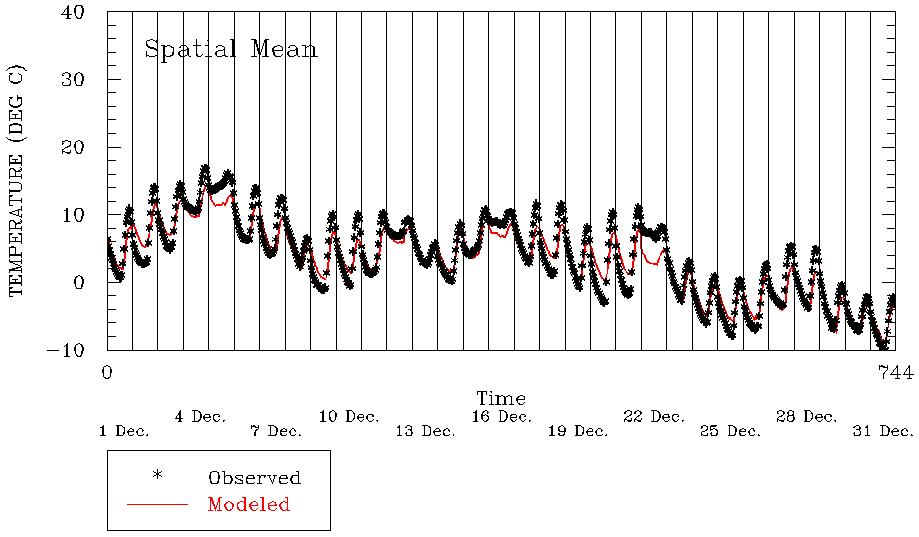


**Figure 3-106: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for January 2002 for the CENRAP States.**

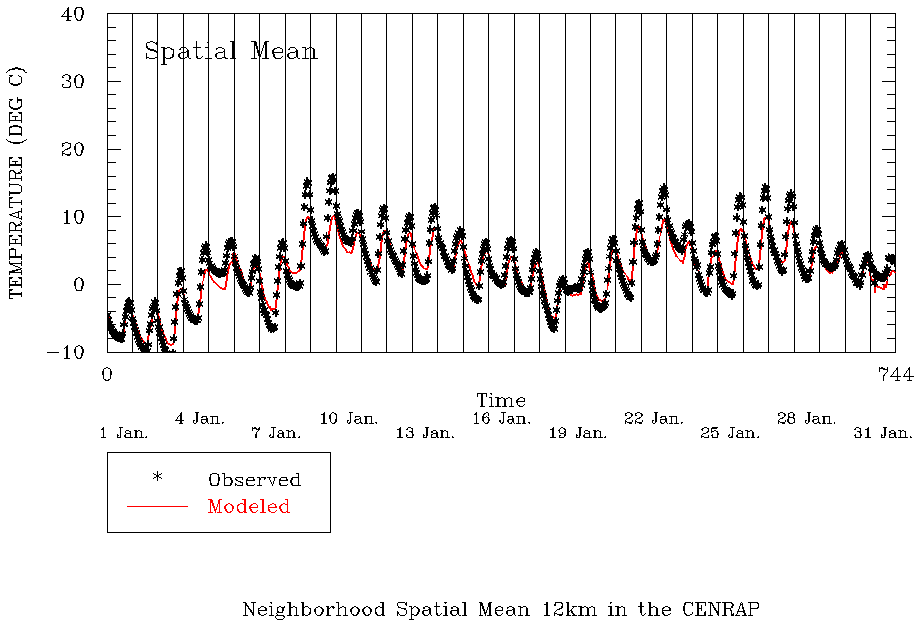



**Figure 3-107: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for February 2002 for the CENRAP States.**

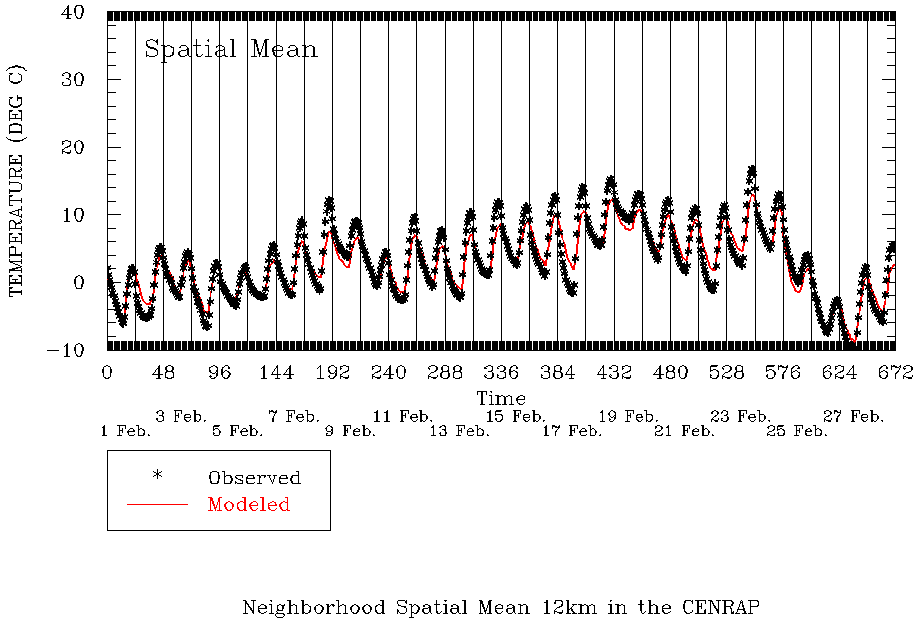


**Figure 3-108: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for January 2001 for the MANE-VU States.**

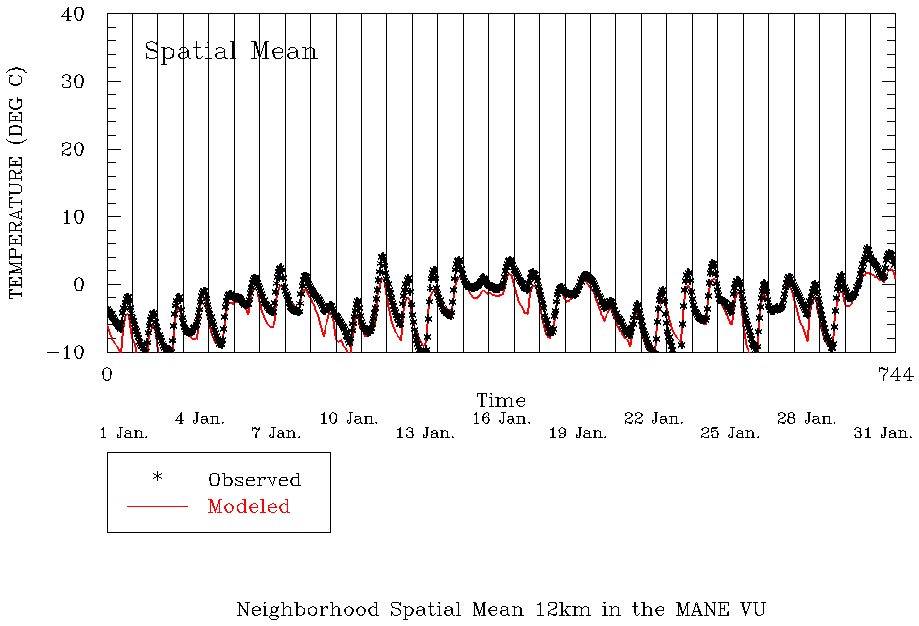



**Figure 3-109: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for February 2001 for the MANE-VU States.**

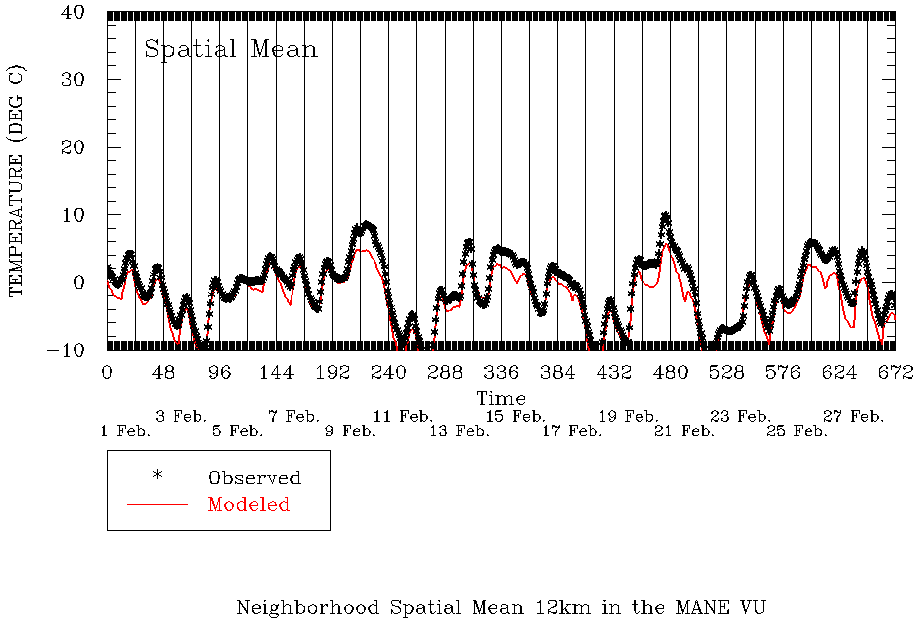


**Figure 3-110: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for March 2001 for the MANE-VU States.**

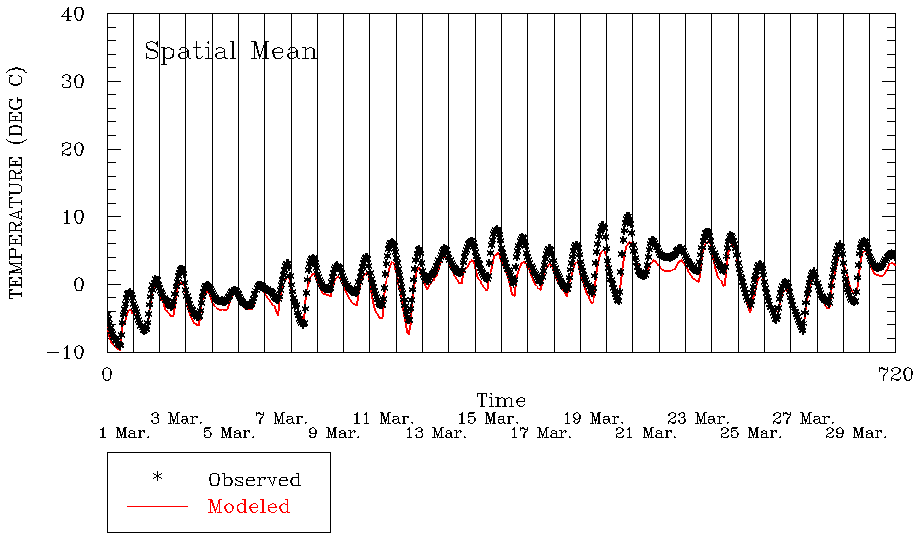



**Figure 3-111: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for April 2001 for the MANE-VU States.**

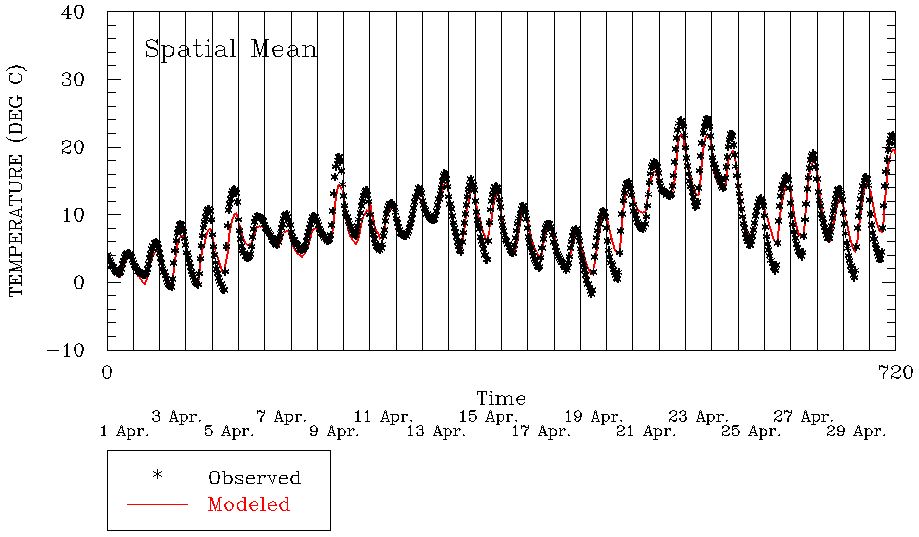


**Figure 3-112: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for May 2001 for the MANE-VU States.**

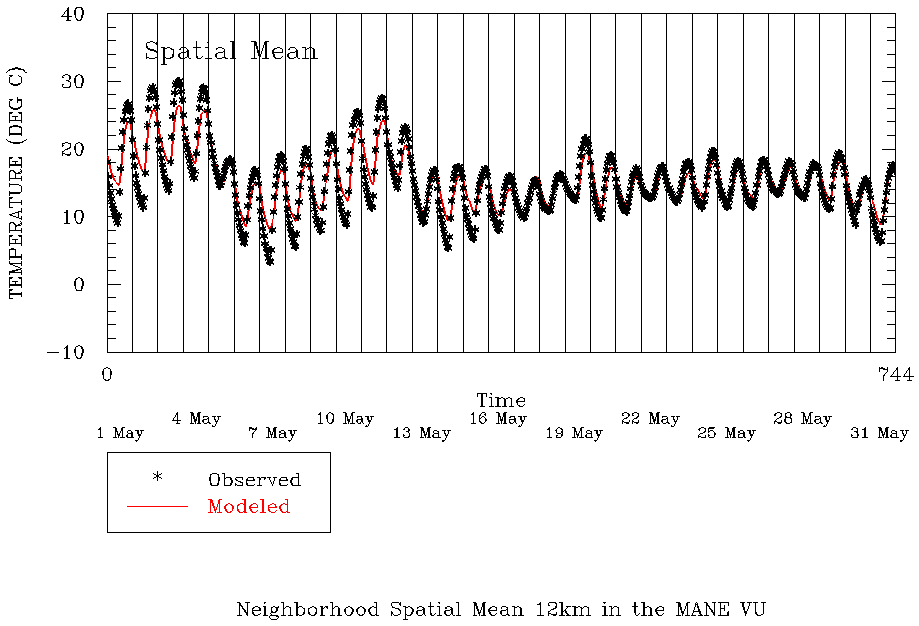



**Figure 3-113: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for June 2001 for the MANE-VU States.**

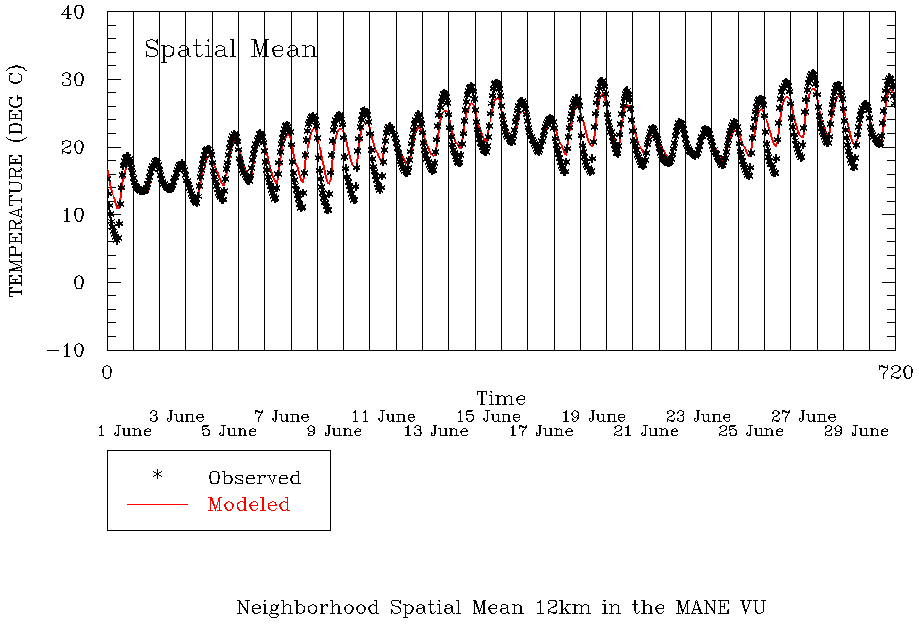


**Figure 3-114: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for July 2001 for the MANE-VU States.**

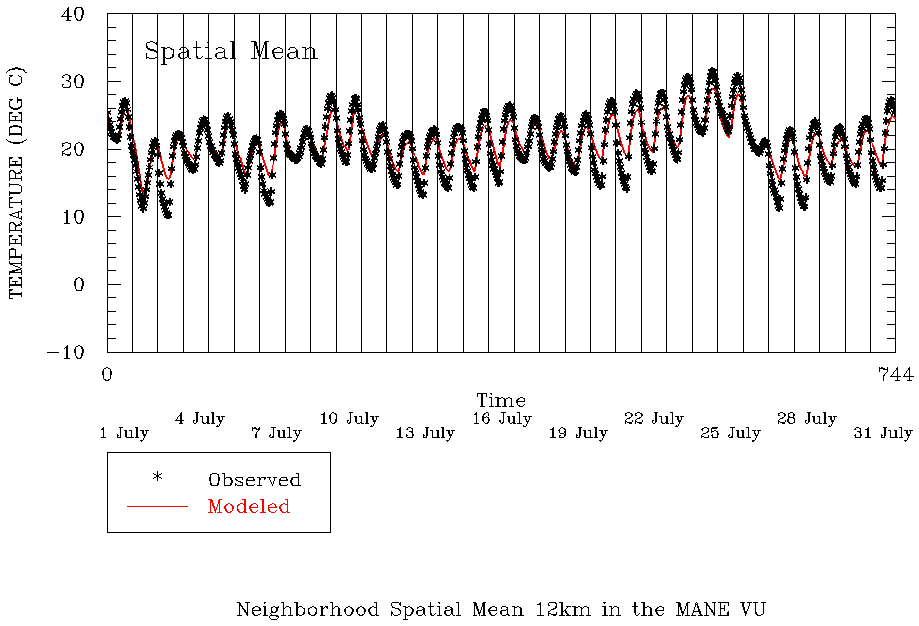



**Figure 3-115: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for August 2001 for the MANE-VU States.**

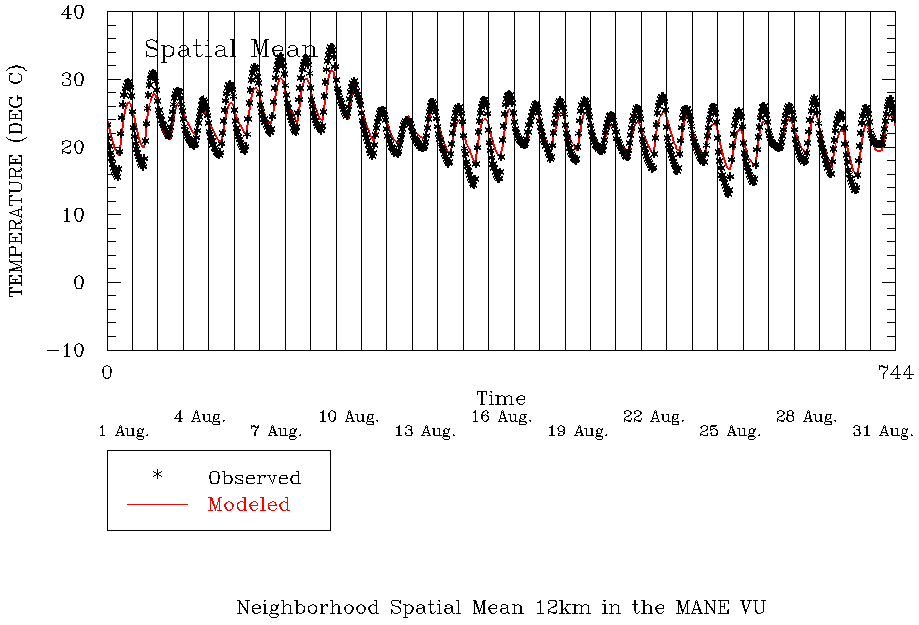


**Figure 3-116: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for September 2001 for the MANE-VU States.**

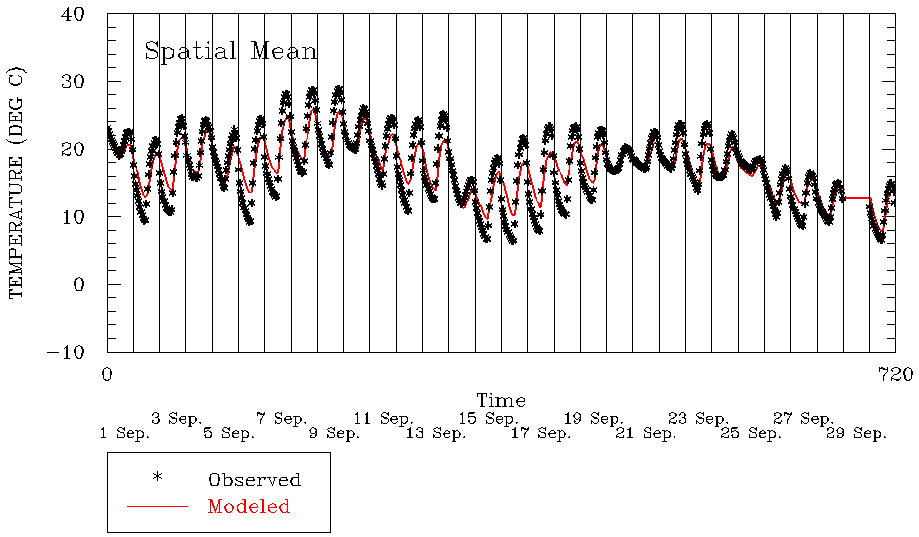



**Figure 3-117: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for October 2001 for the MANE-VU States.**

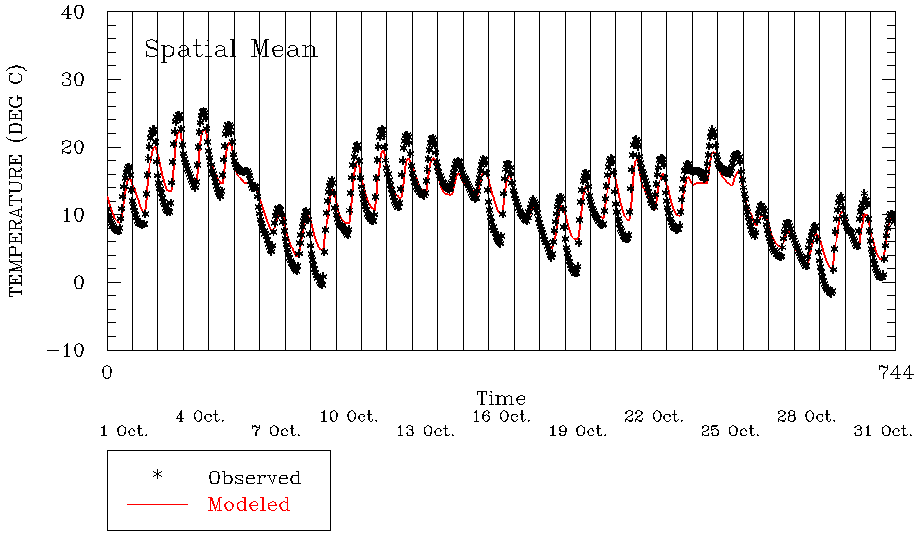


**Figure 3-118: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for November 2001 for the MANE-VU States.**

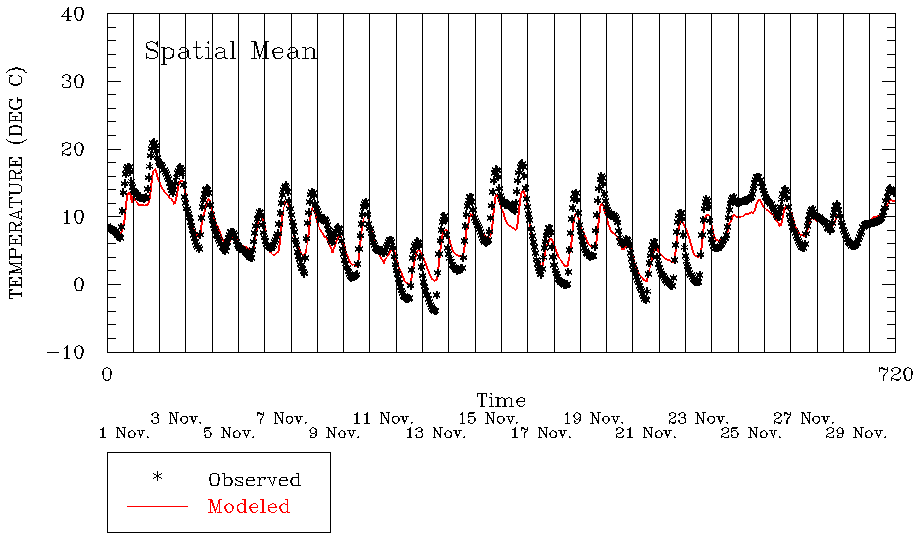



**Figure 3-119: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for December 2001 for the MANE-VU States.**

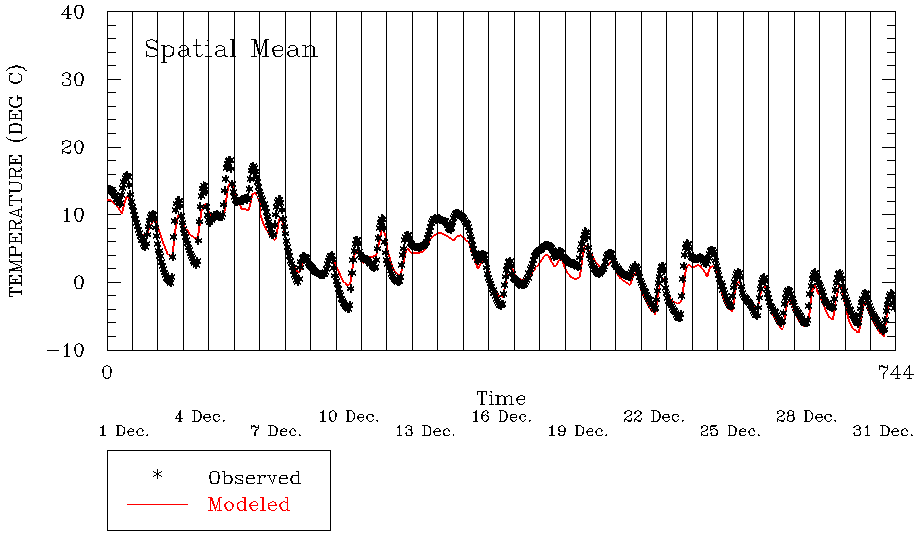


**Figure 3-120: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for January 2002 for the MANE-VU States.**

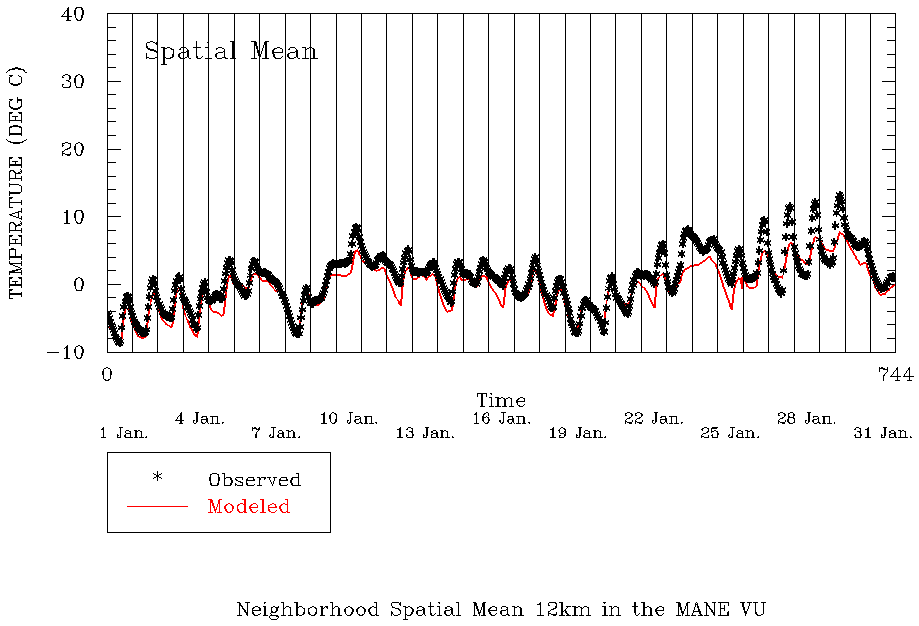



**Figure 3-121: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for February 2002 for the MANE-VU States.**

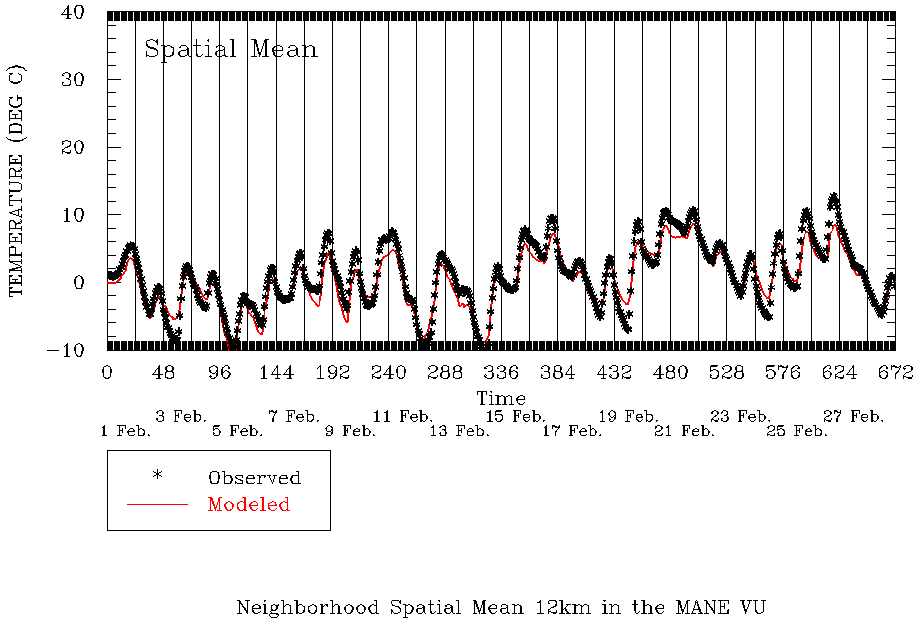


**Figure 3-122: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for January 2001 for the Midwestern RPO States.**

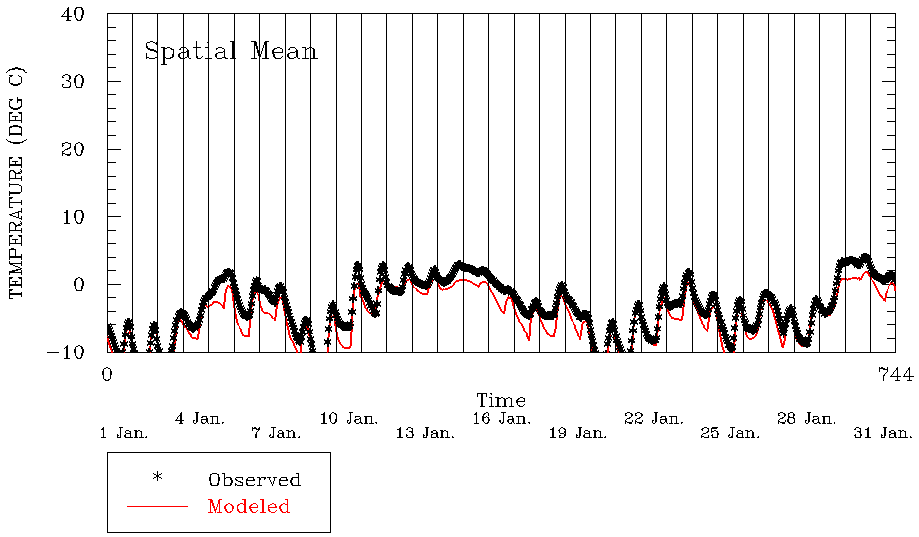



**Figure 3-123: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for February 2001 for the Midwestern RPO States.**

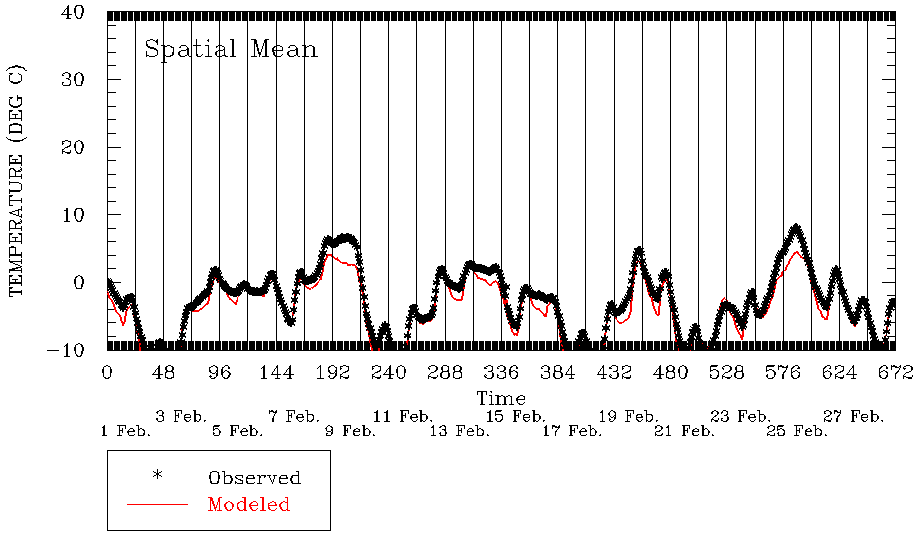


**Figure 3-124: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for March 2001 for the Midwestern RPO States.**

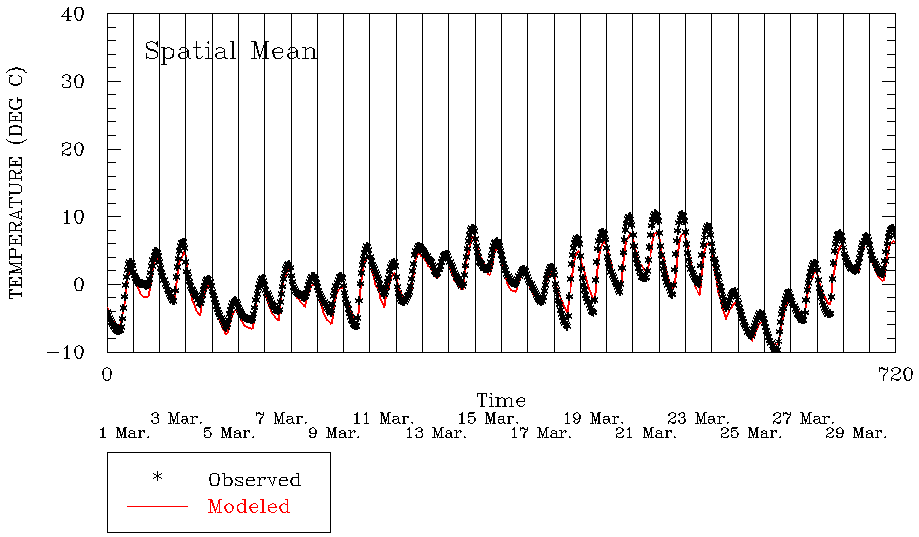



**Figure 3-125: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for April 2001 for the Midwestern RPO States.**

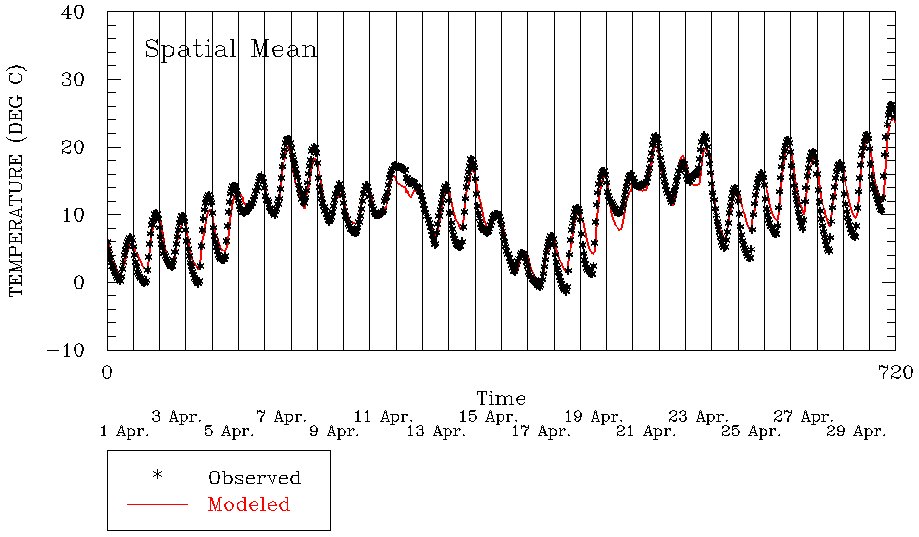


**Figure 3-126: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for May 2001 for the Midwestern RPO States.**

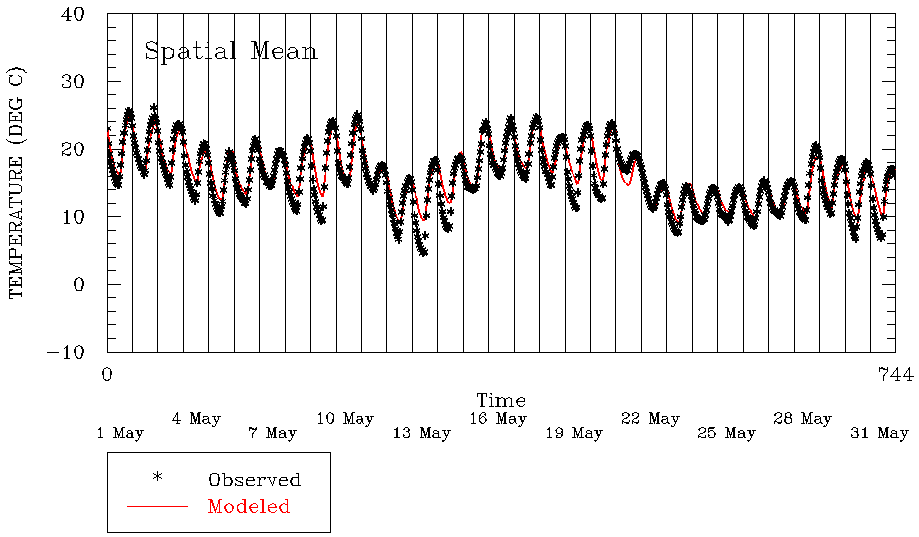



**Figure 3-127: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for June 2001 for the Midwestern RPO States.**

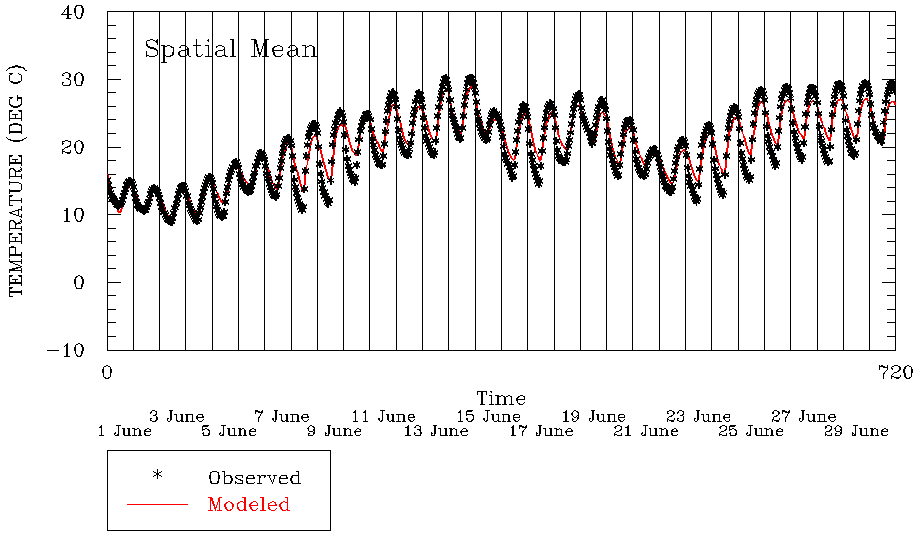


**Figure 3-128: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for July 2001 for the Midwestern RPO States.**

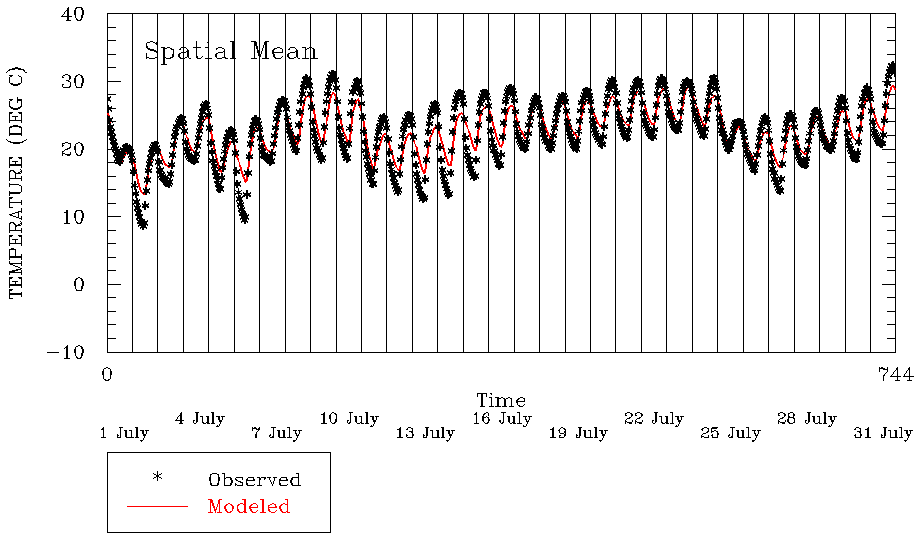



**Figure 3-129: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for August 2001 for the Midwestern RPO States.**

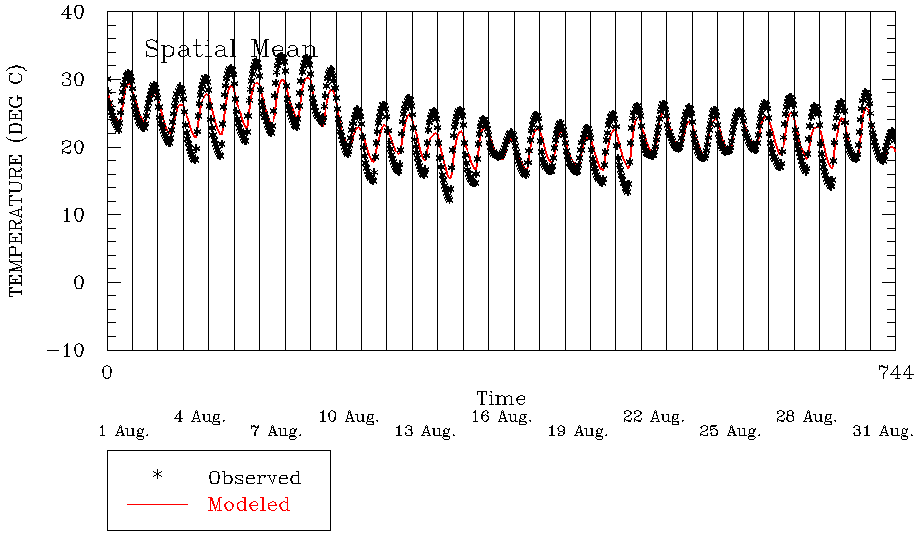


**Figure 3-130: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for September 2001 for the Midwestern RPO States.**

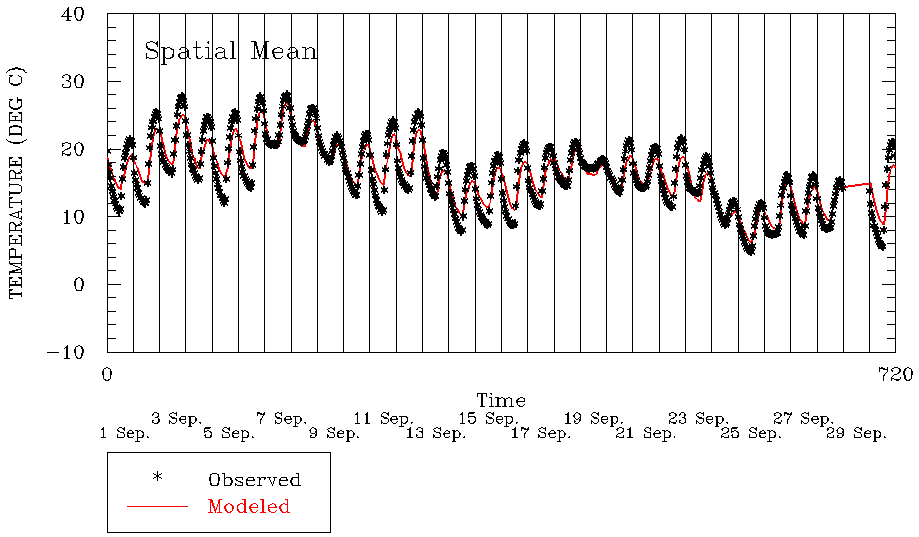



**Figure 3-131: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for October 2001 for the Midwestern RPO States.**

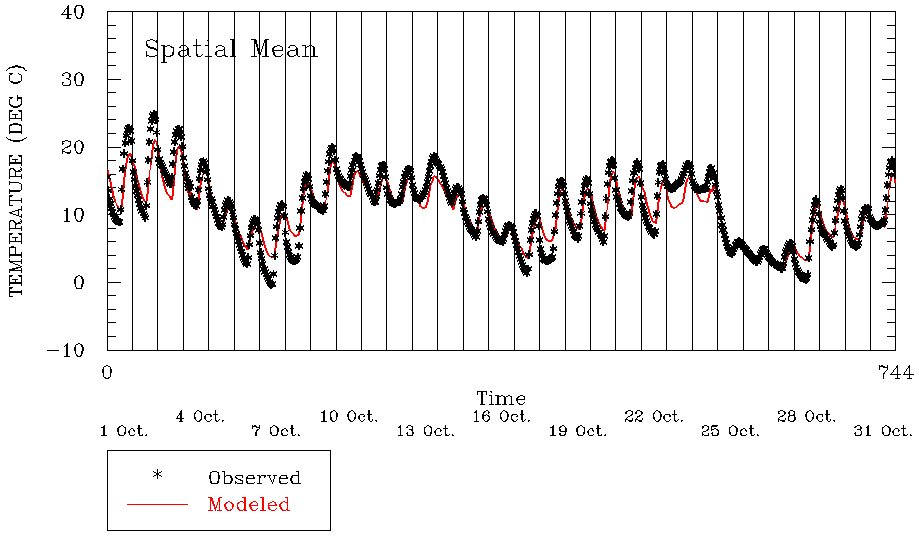


**Figure 3-132: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for November 2001 for the Midwestern RPO States.**

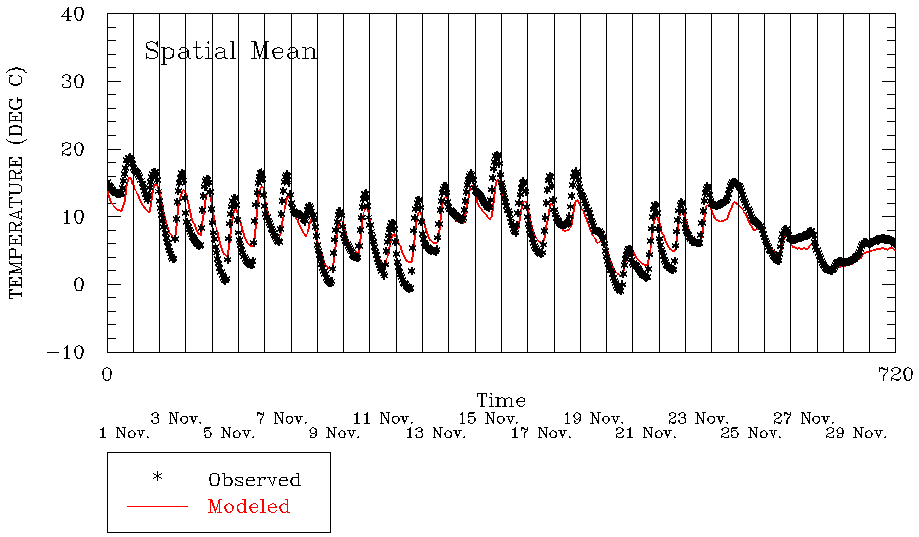



**Figure 3-133: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for December 2001 for the Midwestern RPO States.**

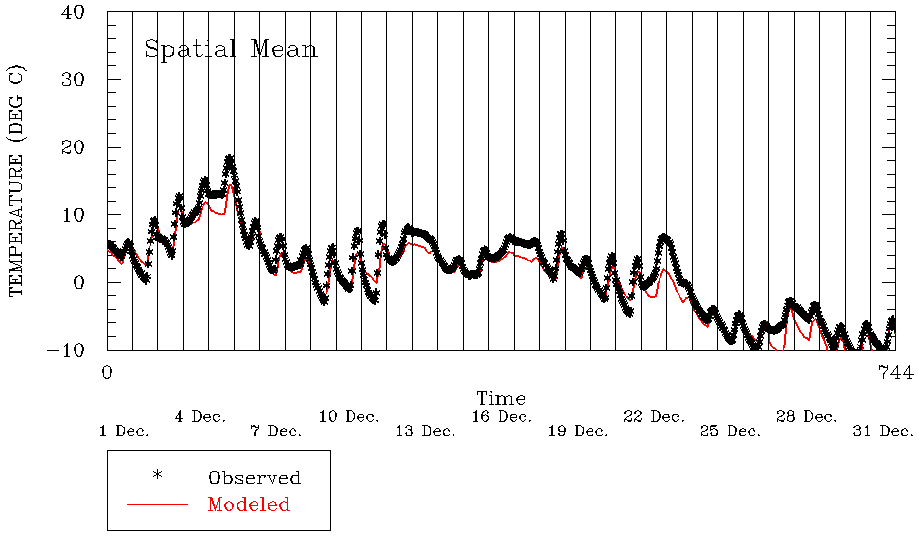


**Figure 3-134: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for January 2002 for the Midwestern RPO States.**

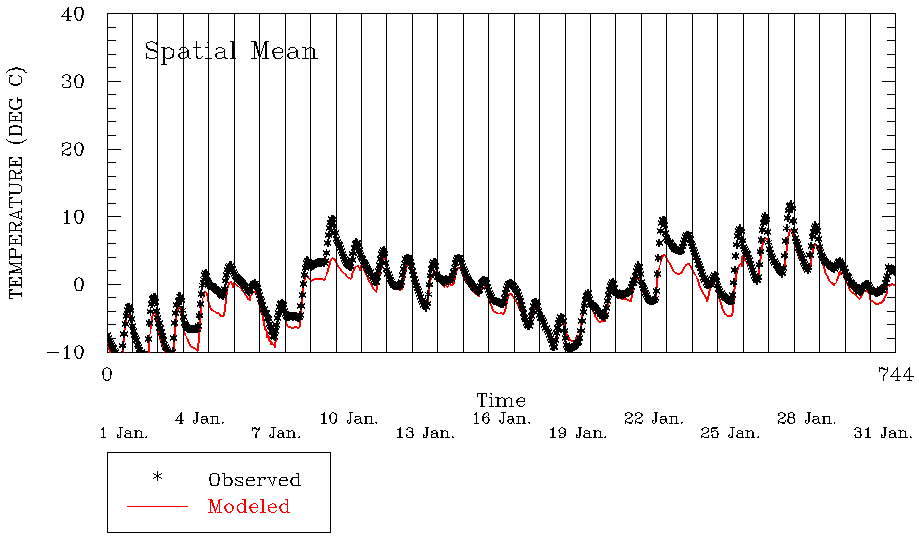



**Figure 3-135: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for February 2002 for the Midwestern RPO States.**

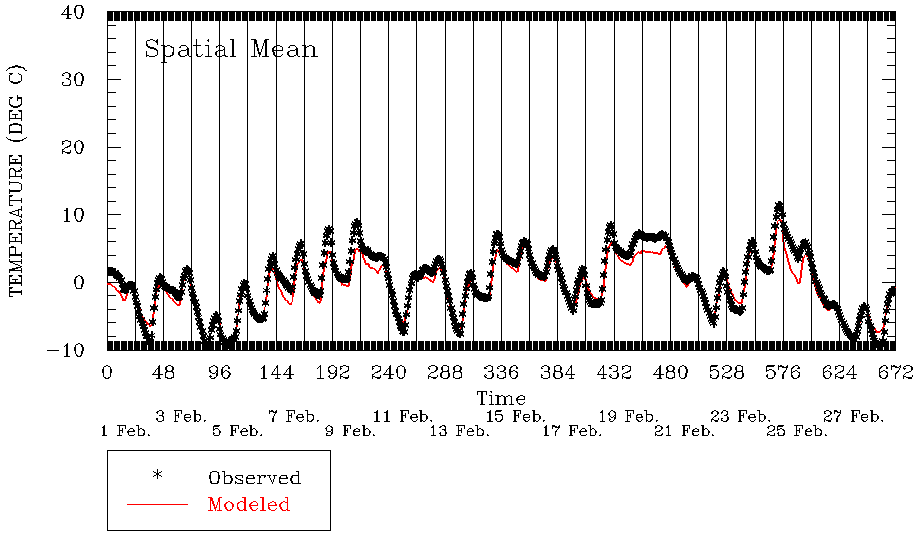


**Figure 3-136: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for January 2001 for the VISTAS States.**

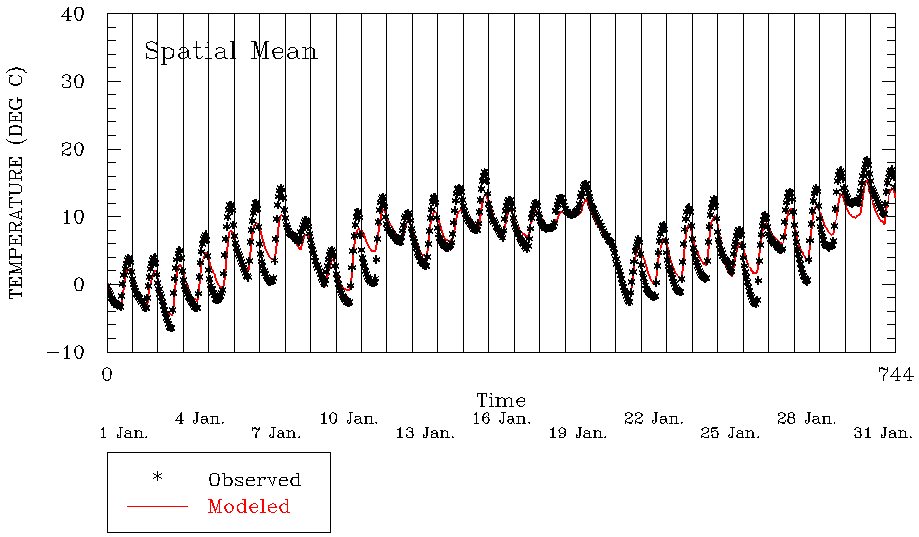



**Figure 3-137: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for February 2001 for the VISTAS States.**

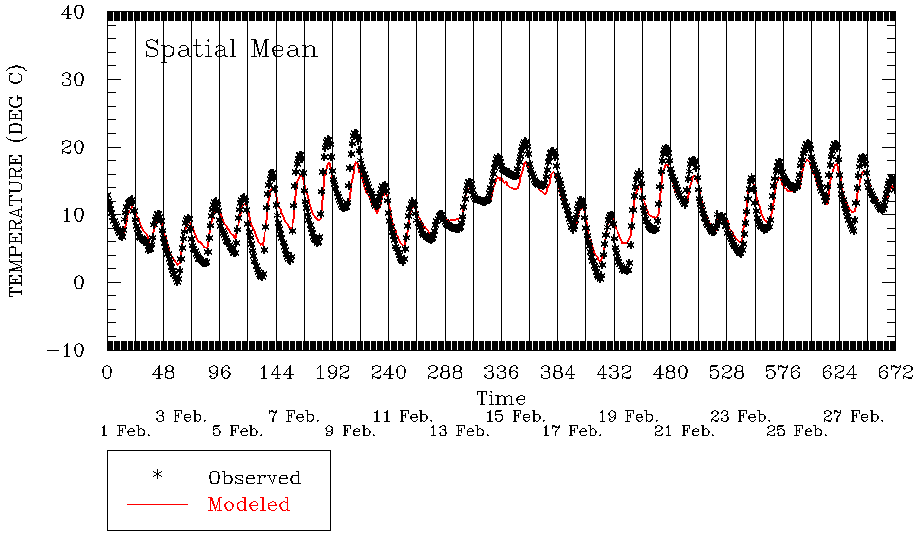


**Figure 3-138: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for March 2001 for the VISTAS States.**

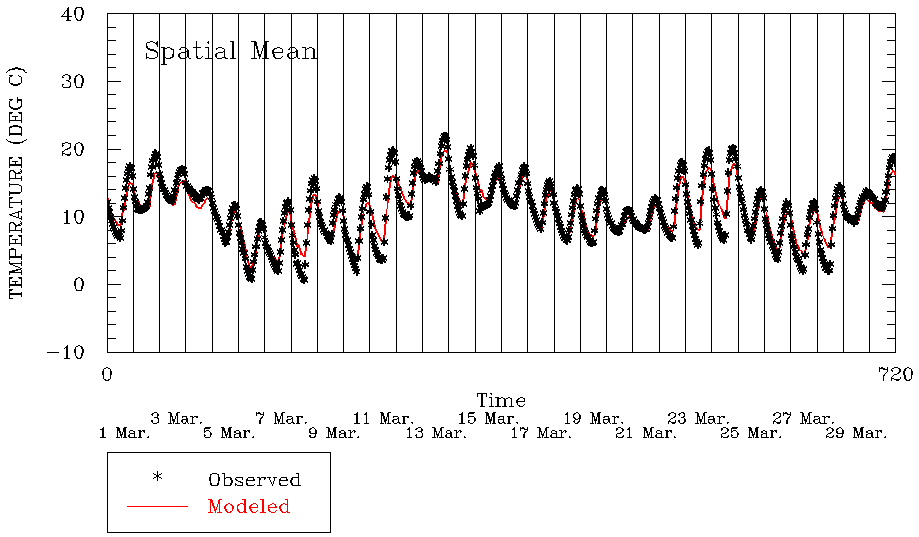



**Figure 3-139: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for April 2001 for the VISTAS States.**

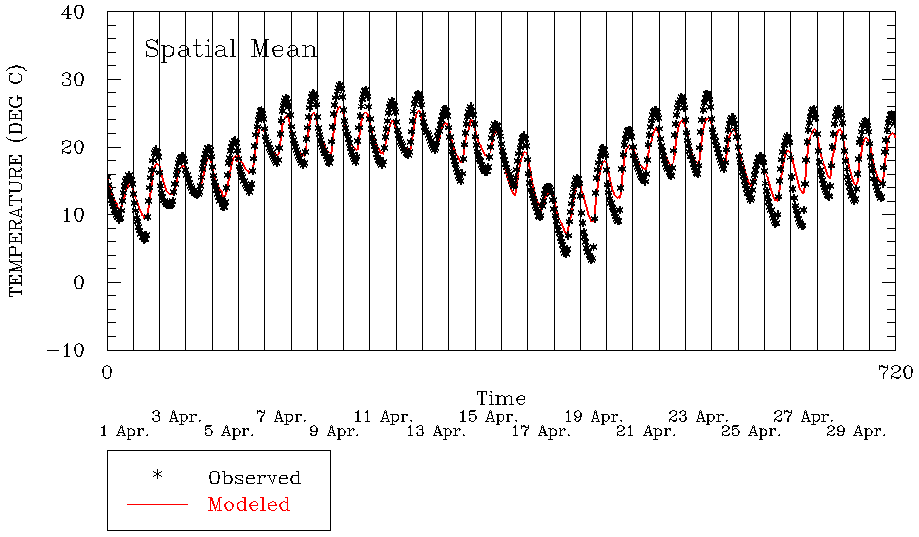


**Figure 3-140: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for May 2001 for the VISTAS States.**

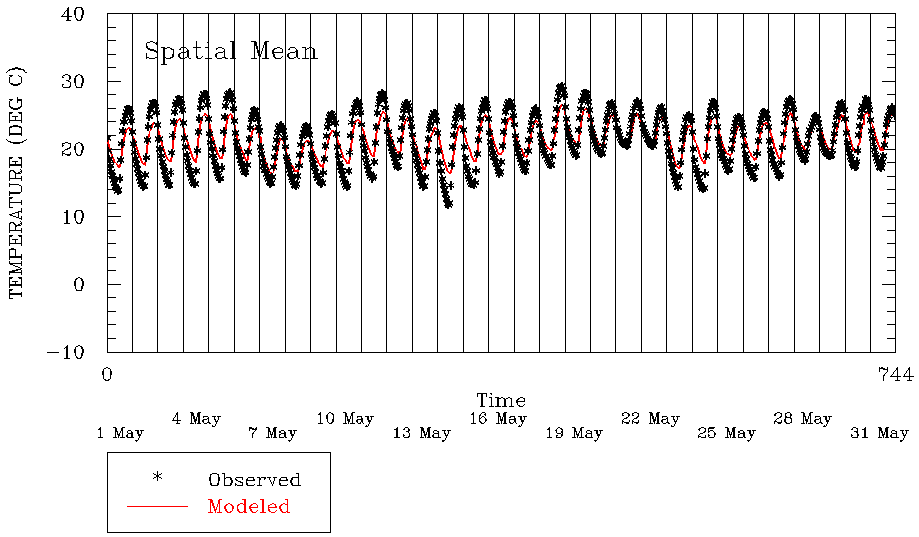



**Figure 3-141: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for June 2001 for the VISTAS States.**

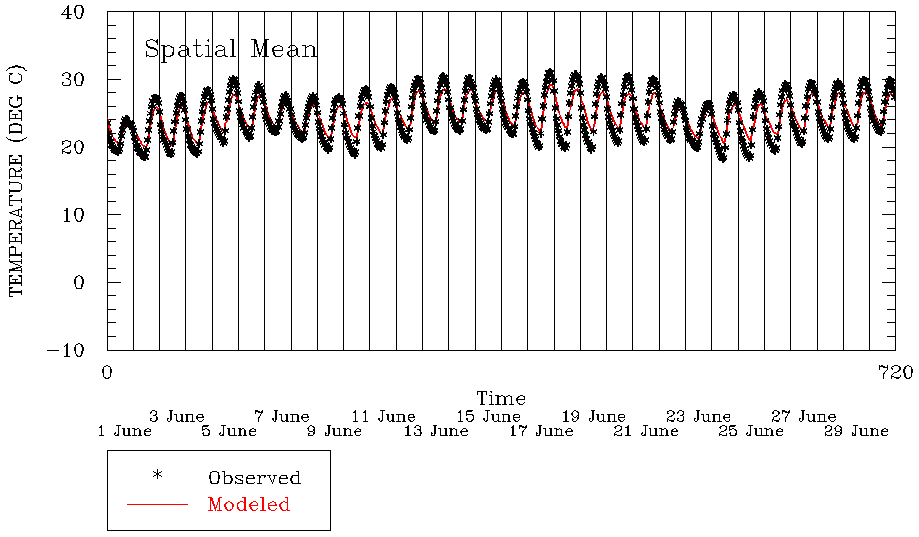


**Figure 3-142: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for July 2001 for the VISTAS States.**

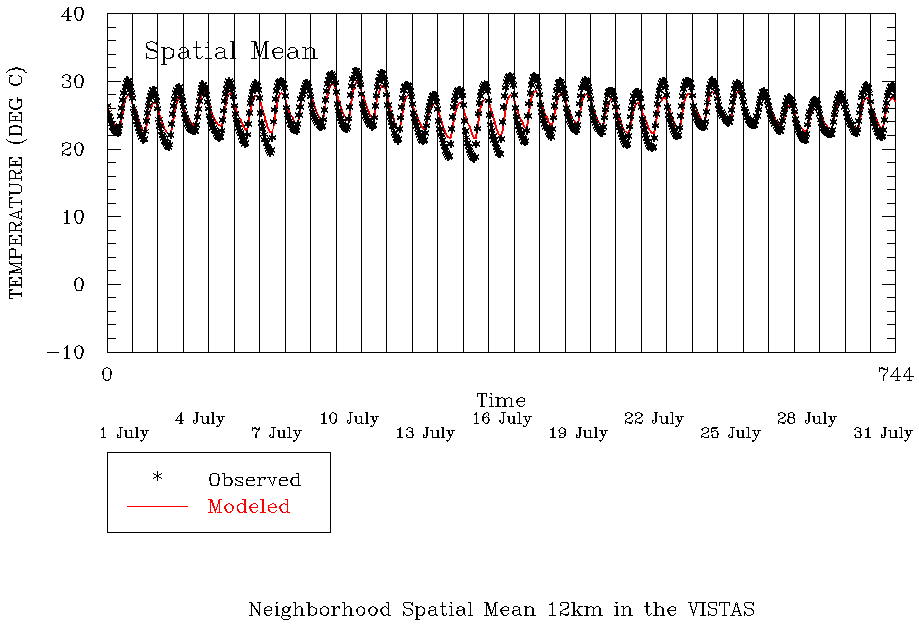



**Figure 3-143: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for August 2001 for the VISTAS States.**

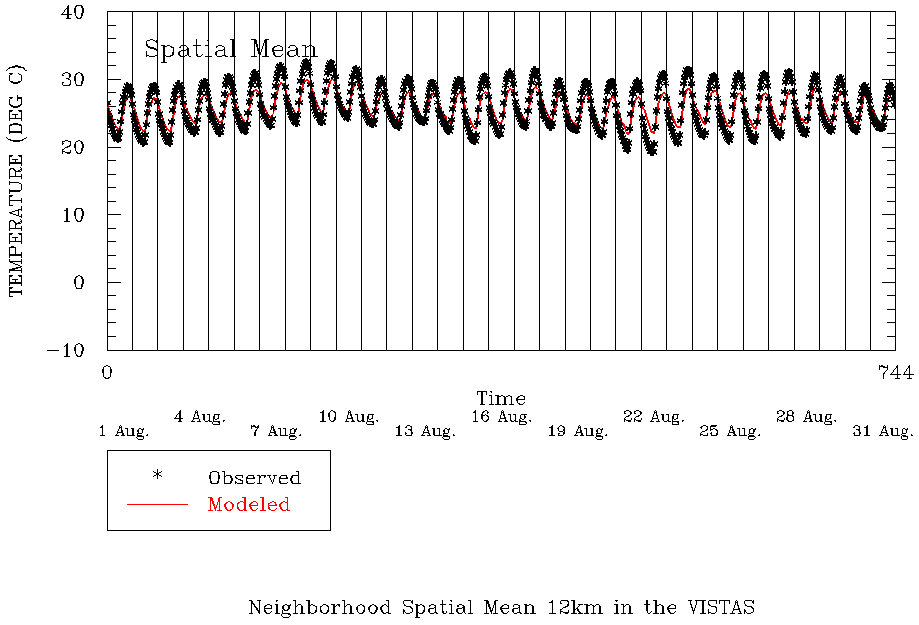


**Figure 3-144: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for September 2001 for the VISTAS States.**

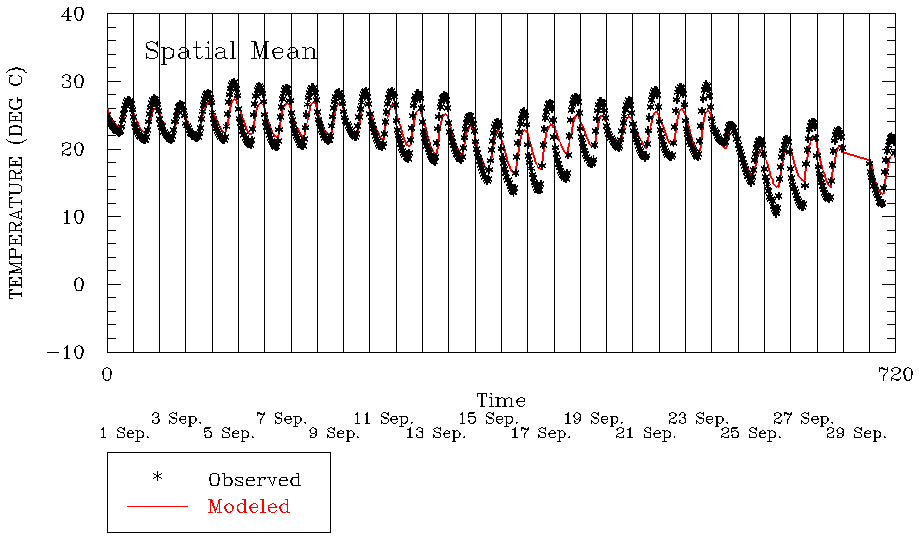



**Figure 3-145: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for October 2001 for the VISTAS States.**

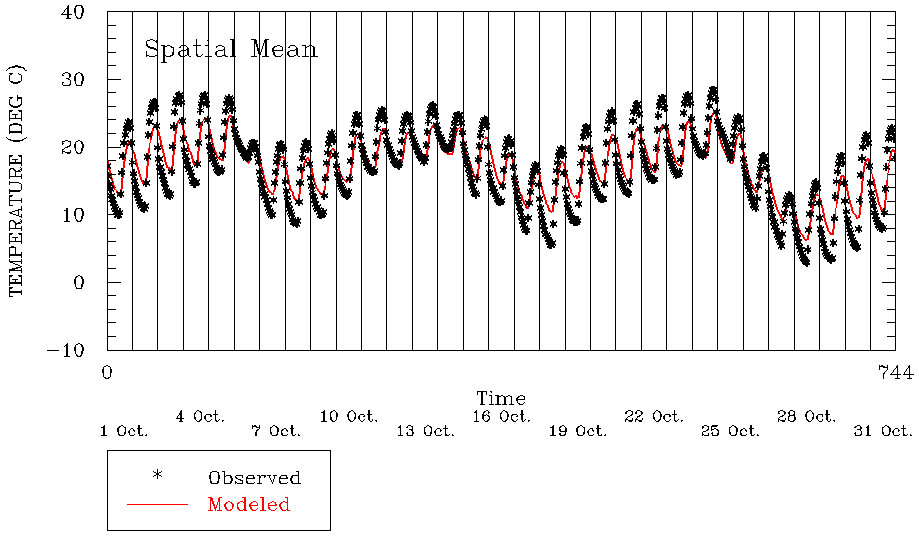


**Figure 3-146: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for November 2001 for the VISTAS States.**

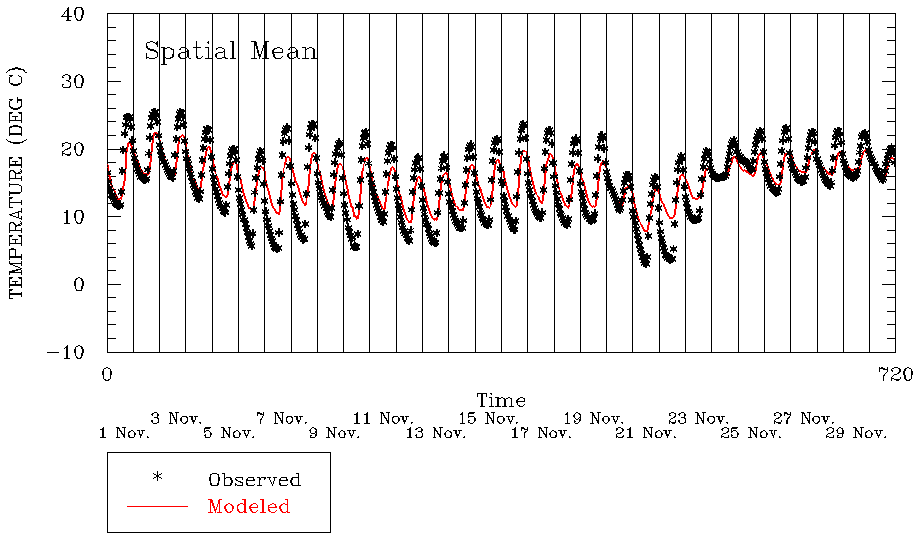



**Figure 3-147: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for December 2001 for the VISTAS States.**

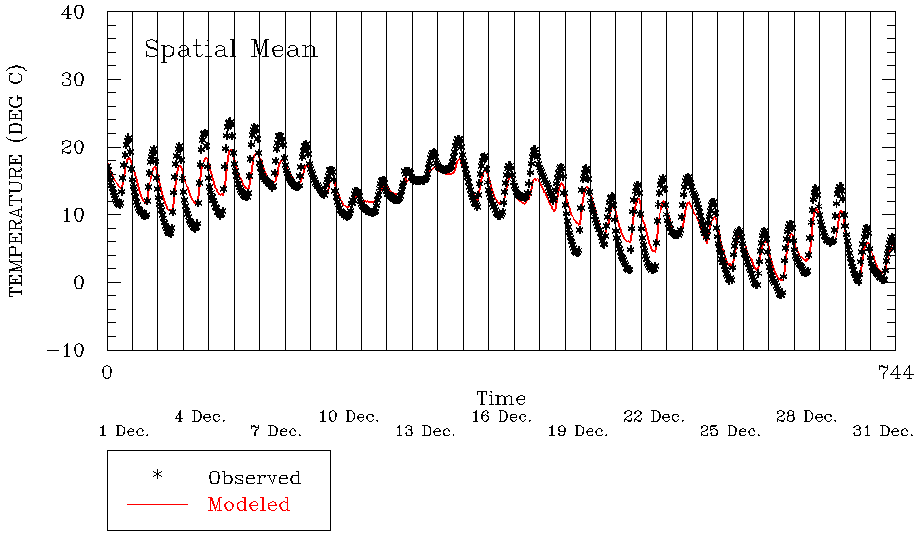


**Figure 3-148: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for January 2002 for the VISTAS States.**

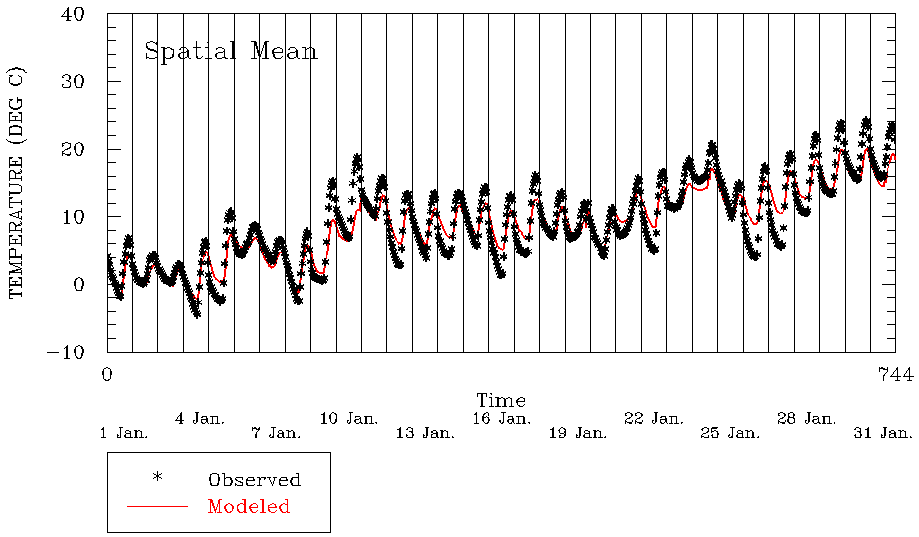



**Figure 3-149: Model Estimated and Observed Spatial Mean Temperatures (Deg. C) for February 2002 for the VISTAS States.**

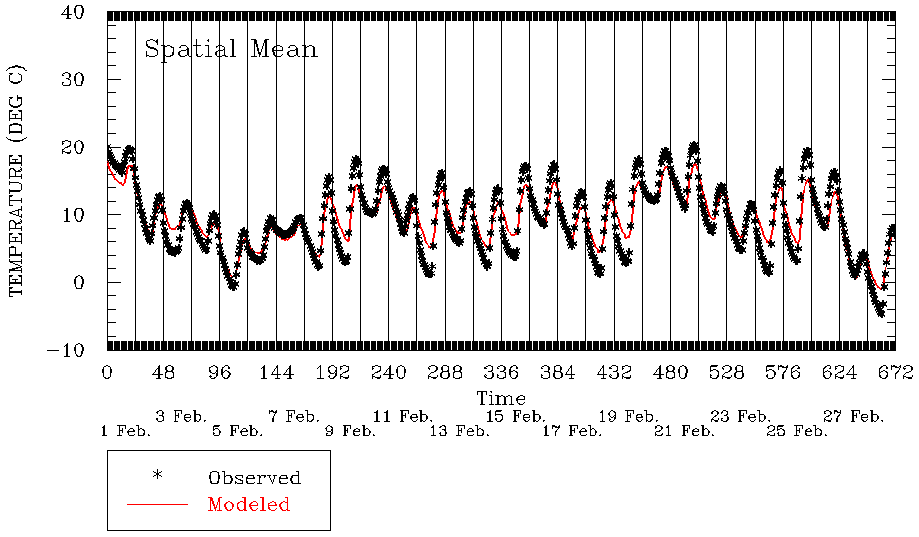


**Table 3-3: Mixing Ratio Bias (g/kg) by Month.**

| Region | Jan '01 | Feb '01 | Mar `01 | Apr `01 | May `01 | Jun `01 | Jul `01 | Aug `01 | Sep `01 | Oct `01 | Nov `01 | Dec `01 | Jan `02 | Feb `02 | Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ALL | -0.19 | -0.29 | -0.43 | -0.42 | -0.27 | -0.01 | 0.33 | 0.46 | 0.16 | -0.11 | -0.11 | -0.29 | -0.15 | -0.35 | -0.12 |
| AL | -0.57 | -0.47 | -0.65 | -0.13 | -0.01 | -0.27 | -0.13 | 0.07 | -0.14 | -0.03 | 0.66 | -0.19 | -0.11 | -0.71 | -0.19 |
| AR | -0.59 | -0.85 | -1.01 | -0.06 | 0.06 | 0.13 | 0.65 | 0.79 | 0.29 | 0.12 | 0.12 | -0.49 | -0.45 | -0.72 | -0.14 |
| CO | -0.01 | -0.19 | -0.56 | -0.42 | -0.56 | 0.36 | 0.69 | 0.43 | 0.68 | 0.18 | -0.26 | -0.04 | 0.14 | 0.13 | 0.04 |
| CT | 0.03 | 0.00 | -0.15 | -0.69 | -0.18 | -0.74 | -0.83 | -0.07 | -0.34 | -0.30 | -0.26 | -0.24 | -0.19 | -0.27 | -0.30 |
| DE | -0.20 | -0.40 | -0.45 | -0.54 | -0.10 | -0.81 | -0.36 | 0.07 | 0.03 | 0.21 | 0.09 | -0.08 | -0.13 | -0.63 | -0.24 |
| DC | -0.54 | -0.96 | -0.55 | -0.51 | -0.58 | -1.34 | -1.00 | -0.71 | -0.69 | -0.46 | -0.35 | -0.48 | -0.34 | -0.58 | -0.65 |
| FL | 0.18 | 0.34 | 0.03 | 0.06 | 0.17 | 0.09 | -0.10 | 0.03 | -0.09 | -0.14 | 0.13 | 0.03 | 0.23 | -0.19 | 0.05 |
| GA | -0.48 | -0.28 | -0.56 | 0.18 | 0.09 | -0.18 | -0.03 | -0.02 | 0.02 | 0.11 | 0.82 | 0.16 | 0.09 | -0.36 | -0.03 |
| IL | -0.13 | -0.64 | -0.75 | -0.79 | -0.72 | -0.19 | 0.12 | 0.11 | 0.14 | -0.37 | -0.60 | -0.64 | -0.47 | -0.70 | -0.40 |
| IN | -0.27 | -0.88 | -0.87 | -0.94 | -0.81 | -0.36 | -0.29 | 0.08 | 0.24 | -0.28 | -0.66 | -0.63 | -0.45 | -0.76 | -0.49 |
| IA | 0.07 | 0.01 | -0.33 | -1.10 | -1.21 | -0.46 | 0.27 | 0.41 | 0.41 | -0.37 | -0.49 | -0.53 | -0.29 | -0.41 | -0.29 |
| KS | -0.25 | -0.56 | -0.92 | -0.45 | -0.29 | 0.47 | 2.15 | 1.95 | 0.80 | 0.18 | -0.03 | -0.32 | -0.14 | -0.44 | 0.15 |
| KY | -0.44 | -0.84 | -0.85 | 0.01 | 0.09 | 0.19 | 0.40 | 0.29 | 0.21 | 0.01 | -0.14 | -0.43 | -0.54 | -0.77 | -0.20 |
| LA | -0.22 | -0.55 | -0.78 | -0.22 | 0.67 | 0.00 | 0.56 | 0.61 | 0.34 | 0.08 | 0.60 | -0.17 | -0.06 | -0.60 | 0.02 |
| ME | 0.01 | 0.07 | 0.17 | -0.11 | 0.08 | 0.01 | 0.00 | 0.71 | 0.27 | -0.26 | -0.18 | -0.10 | 0.04 | 0.03 | 0.05 |
| MD | -0.15 | -0.45 | -0.49 | -0.38 | -0.34 | -0.88 | -0.41 | -0.01 | -0.07 | -0.09 | 0.02 | -0.12 | -0.17 | -0.43 | -0.28 |
| MA | -0.01 | 0.04 | 0.00 | -0.34 | -0.10 | -0.40 | -0.43 | 0.16 | 0.08 | 0.08 | -0.05 | -0.03 | -0.06 | -0.16 | -0.09 |
| MI | -0.13 | -0.27 | -0.35 | -0.76 | -0.71 | -0.33 | 0.14 | 0.25 | -0.01 | -0.42 | -0.52 | -0.31 | -0.13 | -0.28 | -0.27 |
| MN | 0.04 | 0.10 | 0.10 | -0.85 | -0.98 | -0.13 | 0.36 | 0.28 | -0.11 | -0.38 | -0.36 | -0.26 | -0.08 | -0.10 | -0.17 |
| MS | -0.47 | -0.59 | -0.79 | -0.15 | 0.21 | -0.09 | 0.05 | 0.14 | -0.09 | -0.16 | 0.63 | -0.42 | -0.33 | -0.74 | -0.20 |
| MO | -0.35 | -0.78 | -0.86 | -0.40 | -0.39 | -0.12 | 0.10 | 0.23 | 0.21 | -0.06 | -0.16 | -0.50 | -0.49 | -0.64 | -0.30 |
| NE | -0.10 | -0.09 | -0.57 | -0.85 | -0.33 | 1.08 | 2.03 | 2.03 | 1.31 | 0.08 | -0.15 | -0.36 | -0.09 | -0.16 | 0.27 |
| NH | 0.04 | 0.09 | 0.09 | -0.25 | -0.05 | -0.23 | -0.42 | 0.53 | 0.26 | -0.28 | -0.29 | -0.18 | -0.03 | -0.11 | -0.06 |
| NJ | -0.02 | -0.29 | -0.44 | -0.51 | -0.07 | -0.87 | -0.73 | -0.15 | 0.04 | -0.01 | 0.00 | -0.18 | -0.11 | -0.32 | -0.26 |
| NM | -0.39 | -0.30 | -0.61 | 0.12 | 0.37 | 1.06 | 0.64 | 0.38 | 0.74 | 0.73 | -0.01 | -0.24 | -0.11 | -0.35 | 0.15 |
| NY | -0.03 | -0.12 | -0.15 | -0.65 | -0.26 | -0.55 | -0.59 | 0.10 | -0.09 | -0.32 | -0.34 | -0.29 | -0.03 | -0.30 | -0.26 |
| NC | -0.39 | -0.38 | -0.54 | 0.41 | 0.56 | 0.65 | 0.16 | 0.23 | -0.11 | 0.21 | 0.34 | -0.01 | -0.16 | -0.37 | 0.04 |
| ND | 0.06 | 0.05 | -0.23 | -0.70 | -0.90 | -0.48 | 0.04 | 1.43 | 0.60 | -0.28 | -0.24 | -0.02 | 0.05 | -0.04 | -0.05 |

| Region | Jan '01 | Feb '01 | Mar `01 | Apr `01 | May `01 | Jun `01 | Jul `01 | Aug `01 | Sep `01 | Oct `01 | Nov `01 | Dec `01 | Jan `02 | Feb `02 | Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OH | -0.30 | -0.74 | -0.78 | -0.80 | -0.72 | -0.55 | -0.31 | 0.01 | -0.02 | -0.31 | -0.72 | -0.56 | -0.39 | -0.69 | -0.49 |
| OK | -0.59 | -0.97 | -1.06 | -0.71 | -0.70 | -0.18 | 1.63 | 1.16 | 0.02 | -0.01 | 0.01 | -0.41 | -0.32 | -0.65 | -0.20 |
| PA | -0.10 | -0.34 | -0.42 | -0.44 | -0.13 | -0.50 | -0.39 | 0.12 | 0.06 | -0.21 | -0.29 | -0.36 | -0.24 | -0.48 | -0.27 |
| RI | -0.05 | 0.02 | -0.10 | -0.40 | -0.13 | -0.41 | -0.22 | 0.20 | -0.01 | -0.10 | -0.24 | -0.28 | -0.23 | -0.22 | -0.15 |
| SC | -0.50 | -0.26 | -0.54 | 0.47 | 0.59 | 0.54 | 0.41 | 0.45 | 0.04 | 0.03 | 0.37 | 0.14 | 0.02 | -0.37 | 0.10 |
| SD | 0.05 | 0.15 | -0.19 | -0.84 | -0.72 | 0.36 | 1.37 | 1.88 | 1.11 | -0.14 | -0.05 | -0.08 | -0.05 | -0.17 | 0.19 |
| TN | -0.55 | -0.80 | -0.94 | -0.21 | 0.02 | 0.17 | 0.10 | 0.17 | -0.11 | -0.21 | 0.11 | -0.49 | -0.58 | -0.79 | -0.29 |
| TX | -0.55 | -0.63 | -0.43 | -0.18 | 0.40 | 0.97 | 1.48 | 1.34 | 0.44 | 0.21 | 0.07 | -0.66 | -0.11 | -0.35 | 0.14 |
| VT | -0.01 | -0.01 | 0.04 | -0.34 | -0.24 | -0.27 | -0.53 | 0.49 | -0.02 | -0.36 | -0.26 | -0.18 | 0.04 | -0.06 | -0.12 |
| VA | -0.35 | -0.62 | -0.69 | -0.28 | -0.25 | -0.69 | -0.62 | -0.48 | -0.47 | -0.17 | -0.09 | -0.25 | -0.39 | -0.51 | -0.42 |
| WV | -0.31 | -0.55 | -0.62 | -0.24 | -0.16 | -0.64 | -0.87 | -0.74 | -0.56 | -0.28 | -0.16 | -0.33 | -0.46 | -0.54 | -0.46 |
| WI | 0.01 | -0.05 | -0.10 | -0.77 | -0.86 | -0.23 | 0.07 | -0.14 | -0.44 | -0.56 | -0.62 | -0.47 | -0.13 | -0.25 | -0.32 |
| WY | 0.08 | 0.14 | -0.31 | -0.66 | -0.75 | -0.07 | 1.13 | 1.16 | 0.50 | -0.20 | -0.08 | 0.11 | 0.16 | 0.18 | 0.10 |
| CENRAP | -0.25 | -0.37 | -0.47 | -0.57 | -0.36 | 0.25 | 0.99 | 0.92 | 0.35 | -0.06 | -0.11 | -0.43 | -0.19 | -0.38 | -0.05 |
| MANE_VU | -0.04 | -0.13 | -0.17 | -0.44 | -0.14 | -0.49 | -0.45 | 0.19 | 0.03 | -0.18 | -0.21 | -0.21 | -0.10 | -0.27 | -0.19 |
| MW | -0.14 | -0.41 | -0.46 | -0.79 | -0.76 | -0.33 | 0.00 | 0.07 | -0.08 | -0.42 | -0.60 | -0.48 | -0.26 | -0.46 | -0.37 |

**Figure 3-150: Episode Average Mixing Ratio Bias (g/kg).**

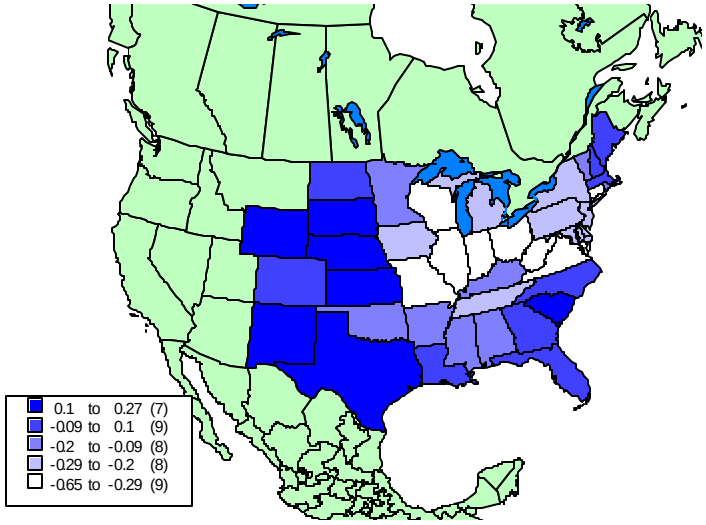


**Table 3-4: Mixing Ratio Error (g/kg) for Base and Sensitivity Simulations for 2001 February 2-26.**

| Region | Jan '01 | Feb '01 | Mar `01 | Apr `01 | May `01 | Jun `01 | Jul `01 | Aug `01 | Sep `01 | Oct `01 | Nov `01 | Dec `01 | Jan `02 | Feb `02 | Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ALL | 0.54 | 0.70 | 0.78 | 1.17 | 1.36 | 1.48 | 1.65 | 1.62 | 1.22 | 1.06 | 0.90 | 0.70 | 0.60 | 0.67 | 1.03 |
| AL | 0.86 | 1.11 | 1.11 | 1.22 | 1.30 | 1.49 | 1.56 | 1.35 | 1.21 | 1.08 | 1.18 | 0.96 | 0.90 | 0.91 | 1.16 |
| AR | 0.72 | 1.10 | 1.18 | 1.24 | 1.55 | 1.49 | 1.63 | 1.74 | 1.17 | 1.12 | 0.99 | 0.88 | 0.82 | 0.90 | 1.18 |
| CO | 0.48 | 0.54 | 0.76 | 1.04 | 1.32 | 1.61 | 2.04 | 1.84 | 1.48 | 0.86 | 0.69 | 0.49 | 0.48 | 0.50 | 1.01 |
| CT | 0.32 | 0.38 | 0.41 | 1.03 | 1.09 | 1.19 | 1.28 | 1.24 | 0.99 | 0.88 | 0.75 | 0.48 | 0.44 | 0.54 | 0.79 |
| DE | 0.41 | 0.58 | 0.59 | 1.05 | 0.95 | 1.25 | 1.15 | 1.22 | 0.95 | 1.09 | 0.77 | 0.58 | 0.48 | 0.79 | 0.85 |
| DC | 0.56 | 1.02 | 0.65 | 1.30 | 1.19 | 1.73 | 1.50 | 1.46 | 1.08 | 1.03 | 0.87 | 0.68 | 0.62 | 0.68 | 1.03 |
| FL | 1.08 | 1.20 | 1.04 | 1.09 | 1.37 | 1.53 | 1.38 | 1.42 | 1.22 | 1.13 | 1.11 | 1.08 | 1.11 | 1.04 | 1.20 |
| GA | 0.85 | 1.07 | 1.06 | 1.20 | 1.40 | 1.55 | 1.59 | 1.47 | 1.20 | 1.12 | 1.25 | 0.99 | 0.86 | 0.82 | 1.17 |
| IL | 0.39 | 0.73 | 0.83 | 1.26 | 1.49 | 1.31 | 1.64 | 1.52 | 1.11 | 1.15 | 0.92 | 0.75 | 0.60 | 0.77 | 1.03 |
| IN | 0.46 | 0.96 | 0.91 | 1.46 | 1.59 | 1.27 | 1.46 | 1.24 | 0.94 | 1.06 | 1.03 | 0.76 | 0.66 | 0.85 | 1.05 |
| IA | 0.34 | 0.35 | 0.58 | 1.51 | 1.73 | 1.48 | 1.66 | 1.54 | 1.21 | 1.13 | 0.84 | 0.65 | 0.44 | 0.61 | 1.00 |
| KS | 0.44 | 0.67 | 1.01 | 1.32 | 1.34 | 1.64 | 2.73 | 2.44 | 1.42 | 1.10 | 0.95 | 0.55 | 0.44 | 0.57 | 1.19 |
| KY | 0.58 | 0.97 | 0.99 | 1.26 | 1.48 | 1.41 | 1.55 | 1.44 | 1.04 | 1.08 | 0.91 | 0.72 | 0.74 | 0.85 | 1.07 |
| LA | 0.97 | 1.28 | 1.28 | 1.26 | 1.86 | 1.84 | 1.96 | 2.08 | 1.69 | 1.60 | 1.41 | 1.29 | 1.01 | 1.03 | 1.47 |
| ME | 0.27 | 0.27 | 0.32 | 0.60 | 1.06 | 1.15 | 1.06 | 1.33 | 1.01 | 0.89 | 0.57 | 0.40 | 0.27 | 0.32 | 0.68 |
| MD | 0.44 | 0.66 | 0.67 | 1.17 | 1.14 | 1.45 | 1.27 | 1.37 | 1.09 | 1.01 | 0.78 | 0.56 | 0.52 | 0.62 | 0.91 |
| MA | 0.32 | 0.35 | 0.35 | 0.77 | 1.11 | 1.14 | 1.11 | 1.14 | 1.01 | 0.90 | 0.72 | 0.54 | 0.36 | 0.48 | 0.74 |
| MI | 0.30 | 0.39 | 0.53 | 0.97 | 1.20 | 1.15 | 1.23 | 1.20 | 0.91 | 0.85 | 0.78 | 0.48 | 0.38 | 0.48 | 0.77 |
| MN | 0.31 | 0.24 | 0.38 | 1.08 | 1.39 | 1.44 | 1.61 | 1.49 | 1.16 | 0.91 | 0.66 | 0.43 | 0.33 | 0.42 | 0.85 |
| MS | 0.87 | 1.23 | 1.27 | 1.22 | 1.41 | 1.44 | 1.53 | 1.44 | 1.17 | 1.14 | 1.17 | 1.08 | 0.96 | 1.01 | 1.21 |
| MO | 0.48 | 0.85 | 0.96 | 1.36 | 1.46 | 1.32 | 1.57 | 1.55 | 1.09 | 1.12 | 0.94 | 0.71 | 0.64 | 0.73 | 1.06 |
| NE | 0.37 | 0.36 | 0.72 | 1.29 | 1.28 | 1.89 | 2.40 | 2.35 | 1.68 | 1.07 | 0.74 | 0.53 | 0.37 | 0.44 | 1.11 |
| NH | 0.32 | 0.31 | 0.33 | 0.75 | 1.07 | 1.11 | 1.10 | 1.26 | 1.23 | 0.93 | 0.66 | 0.47 | 0.32 | 0.41 | 0.73 |
| NJ | 0.39 | 0.51 | 0.60 | 1.09 | 1.15 | 1.39 | 1.38 | 1.42 | 1.12 | 0.97 | 0.74 | 0.53 | 0.47 | 0.57 | 0.88 |
| NM | 0.64 | 0.74 | 0.95 | 1.04 | 1.59 | 2.08 | 2.20 | 1.88 | 1.67 | 1.22 | 0.89 | 0.56 | 0.54 | 0.62 | 1.19 |
| NY | 0.33 | 0.36 | 0.40 | 0.94 | 1.05 | 1.17 | 1.25 | 1.25 | 0.98 | 0.91 | 0.70 | 0.51 | 0.38 | 0.49 | 0.77 |
| NC | 0.76 | 0.98 | 0.95 | 1.41 | 1.39 | 1.57 | 1.39 | 1.55 | 1.18 | 1.27 | 1.06 | 0.93 | 0.81 | 0.79 | 1.15 |
| ND | 0.33 | 0.22 | 0.46 | 1.03 | 1.30 | 1.36 | 1.55 | 1.97 | 1.35 | 0.81 | 0.56 | 0.33 | 0.34 | 0.40 | 0.86 |

| Region | Jan '01 | Feb '01 | Mar `01 | Apr `01 | May `01 | Jun `01 | Jul `01 | Aug `01 | Sep `01 | Oct `01 | Nov `01 | Dec `01 | Jan `02 | Feb `02 | Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OH | 0.44 | 0.81 | 0.83 | 1.37 | 1.45 | 1.29 | 1.36 | 1.30 | 0.99 | 1.06 | 0.99 | 0.68 | 0.60 | 0.77 | 1.00 |
| OK | 0.74 | 1.12 | 1.24 | 1.38 | 1.59 | 1.75 | 2.65 | 2.41 | 1.51 | 1.15 | 1.08 | 0.79 | 0.67 | 0.81 | 1.35 |
| PA | 0.36 | 0.55 | 0.57 | 1.18 | 1.13 | 1.34 | 1.38 | 1.42 | 0.97 | 0.93 | 0.74 | 0.56 | 0.53 | 0.60 | 0.88 |
| RI | 0.30 | 0.38 | 0.37 | 0.81 | 1.15 | 1.06 | 1.11 | 1.12 | 0.84 | 0.72 | 0.57 | 0.50 | 0.41 | 0.46 | 0.70 |
| SC | 0.83 | 1.02 | 1.03 | 1.29 | 1.37 | 1.47 | 1.35 | 1.62 | 1.16 | 1.26 | 1.16 | 0.98 | 0.84 | 0.85 | 1.16 |
| SD | 0.35 | 0.31 | 0.50 | 1.14 | 1.31 | 1.56 | 2.05 | 2.29 | 1.53 | 0.87 | 0.57 | 0.33 | 0.34 | 0.41 | 0.97 |
| TN | 0.67 | 1.07 | 1.12 | 1.26 | 1.37 | 1.42 | 1.52 | 1.36 | 1.05 | 1.06 | 0.93 | 0.78 | 0.81 | 0.91 | 1.10 |
| TX | 0.86 | 1.16 | 1.13 | 1.29 | 1.53 | 1.81 | 2.24 | 2.17 | 1.42 | 1.31 | 1.19 | 1.05 | 0.91 | 0.90 | 1.35 |
| VT | 0.29 | 0.27 | 0.31 | 0.73 | 1.08 | 1.14 | 1.16 | 1.21 | 0.92 | 0.89 | 0.61 | 0.44 | 0.28 | 0.36 | 0.69 |
| VA | 0.61 | 0.87 | 0.86 | 1.32 | 1.31 | 1.58 | 1.52 | 1.60 | 1.25 | 1.15 | 0.92 | 0.82 | 0.70 | 0.74 | 1.09 |
| WV | 0.48 | 0.75 | 0.75 | 1.39 | 1.32 | 1.57 | 1.67 | 1.66 | 1.17 | 1.06 | 0.95 | 0.63 | 0.67 | 0.68 | 1.05 |
| WI | 0.31 | 0.27 | 0.43 | 1.02 | 1.30 | 1.25 | 1.40 | 1.26 | 1.05 | 0.91 | 0.86 | 0.57 | 0.37 | 0.49 | 0.82 |
| WY | 0.41 | 0.37 | 0.59 | 0.93 | 1.11 | 1.49 | 1.90 | 1.84 | 1.38 | 0.81 | 0.57 | 0.38 | 0.40 | 0.45 | 0.90 |
| CENRAP | 0.56 | 0.73 | 0.86 | 1.28 | 1.51 | 1.62 | 2.00 | 1.91 | 1.34 | 1.14 | 0.94 | 0.74 | 0.60 | 0.68 | 1.14 |
| MANE_VU | 0.34 | 0.41 | 0.44 | 0.93 | 1.09 | 1.23 | 1.23 | 1.29 | 1.01 | 0.92 | 0.70 | 0.51 | 0.41 | 0.50 | 0.79 |
| MW | 0.36 | 0.53 | 0.64 | 1.14 | 1.35 | 1.24 | 1.38 | 1.29 | 0.99 | 0.97 | 0.88 | 0.61 | 0.47 | 0.61 | 0.89 |

**Figure 3-151: Episode Average Mixing Ratio Error (g/kg).**

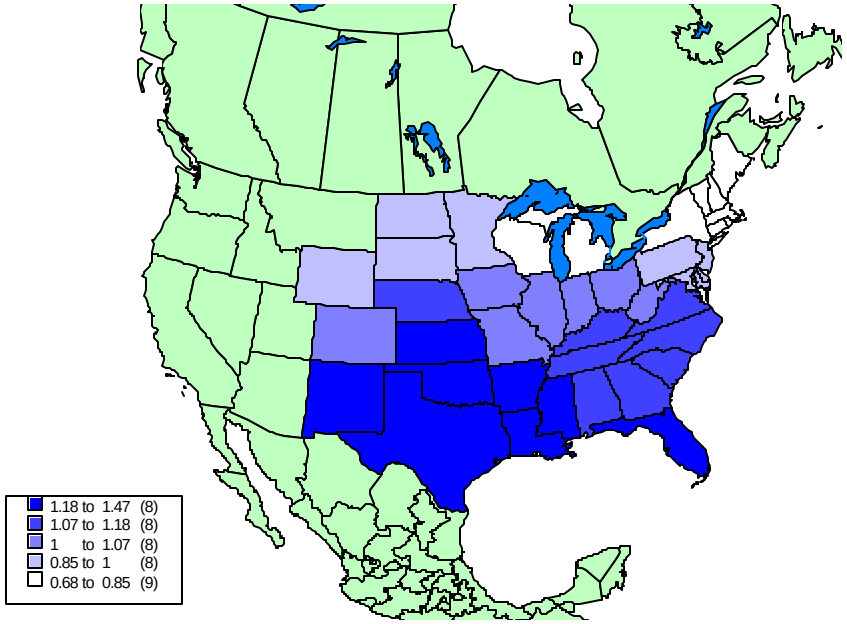


**Figure 3-152: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for January 2001.**

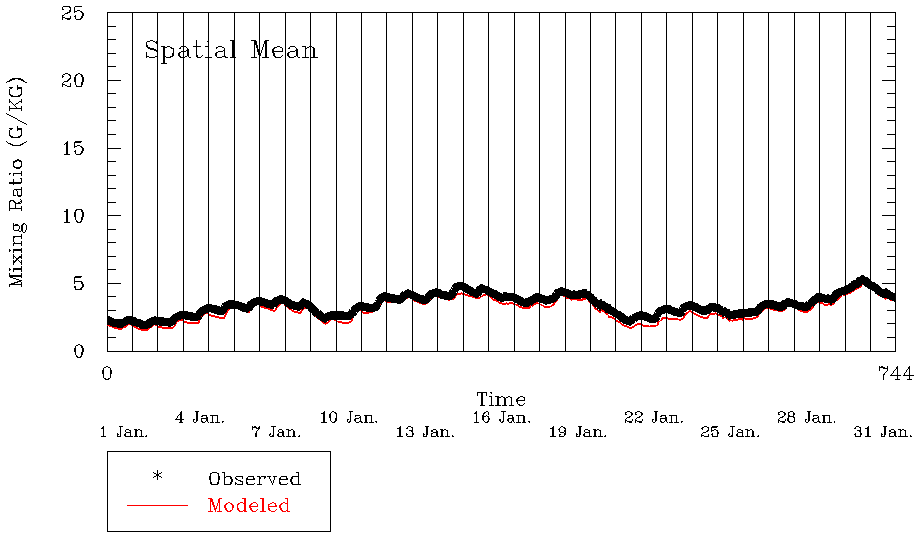



**Figure 3-153: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for February 2001.**

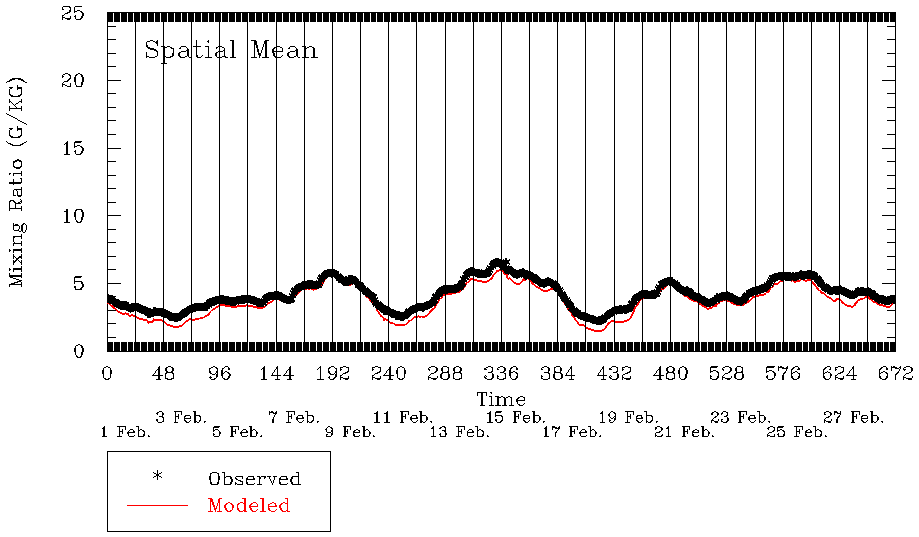


**Figure 3-154: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for March 2001.**

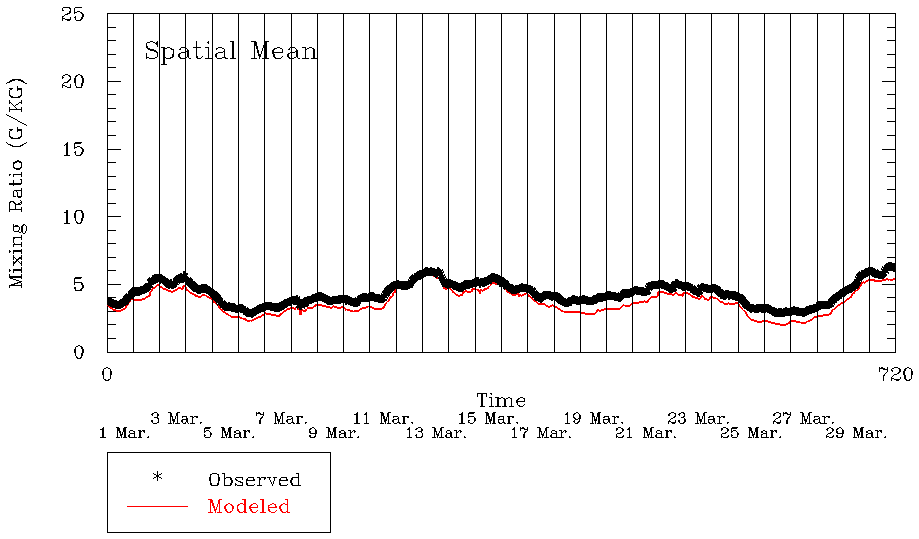



**Figure 3-155: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for April 2001.**

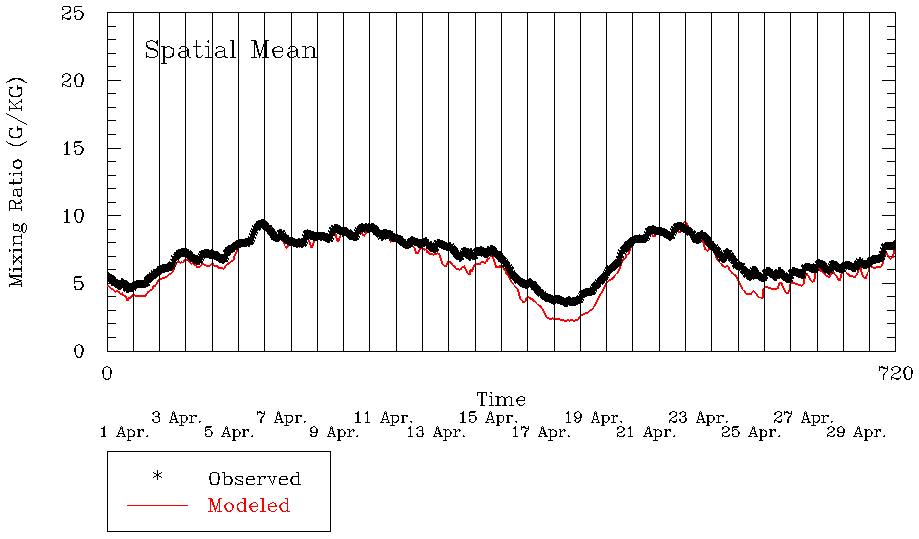


**Figure 3-156: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for May 2001.**

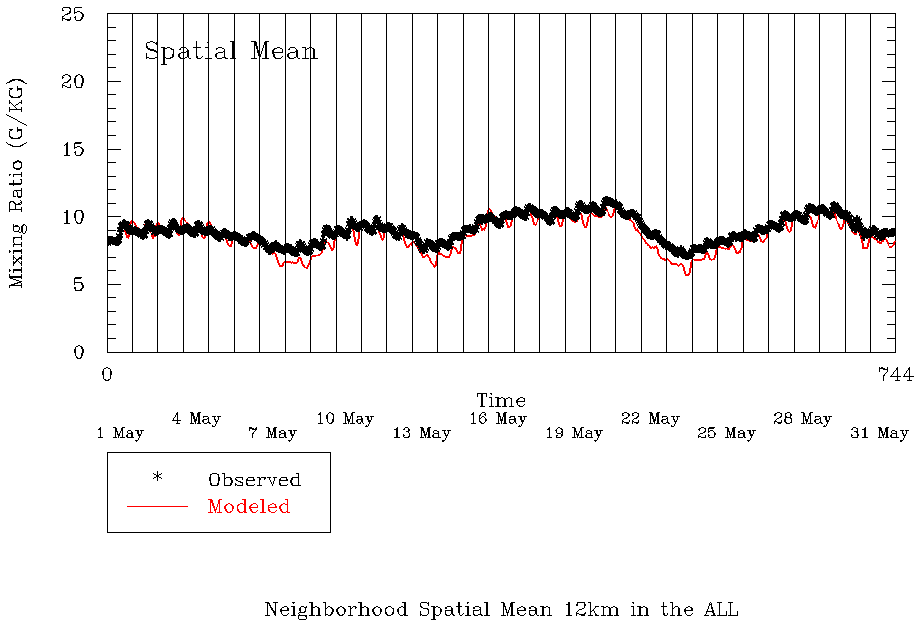



**Figure 3-157: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for June 2001.**

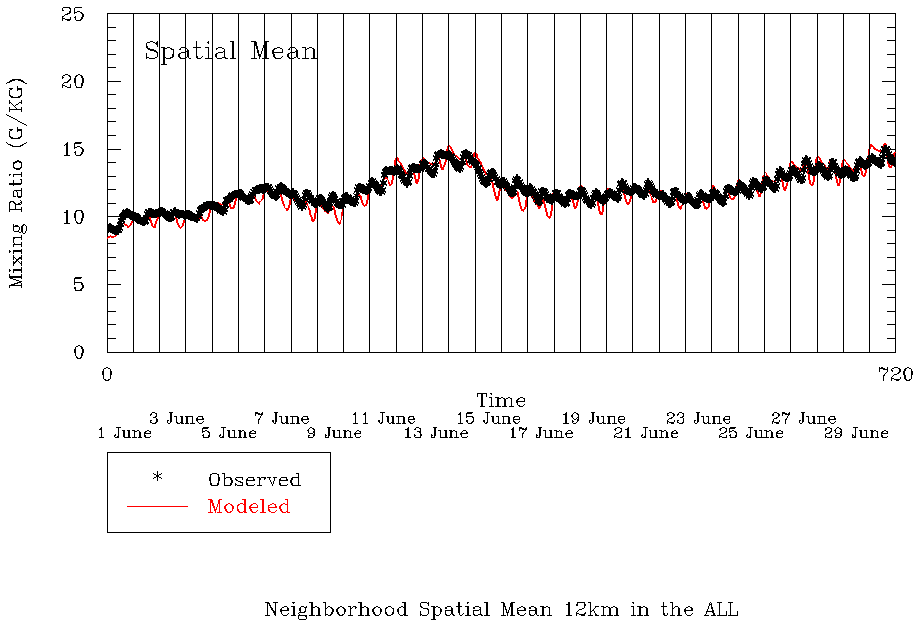


**Figure 3-158: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for July 2001.**

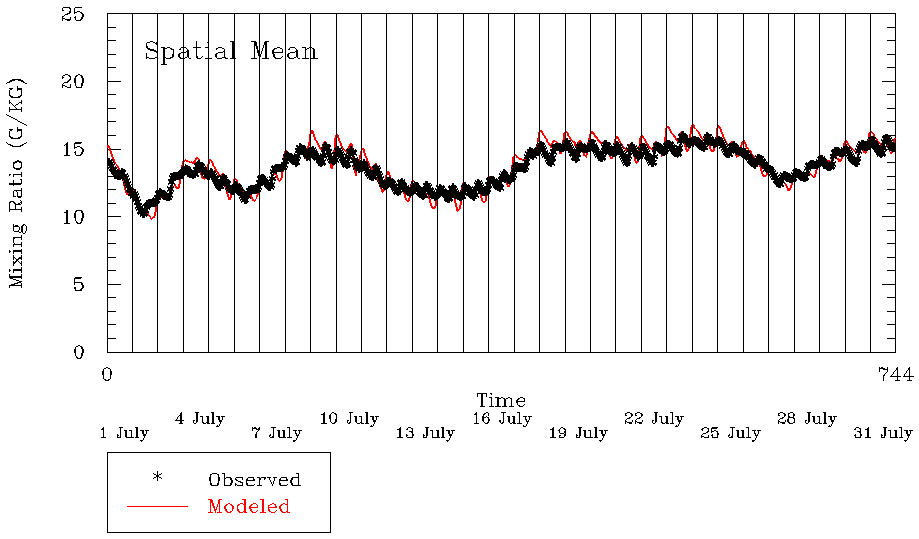



**Figure 3-159: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for August 2001.**

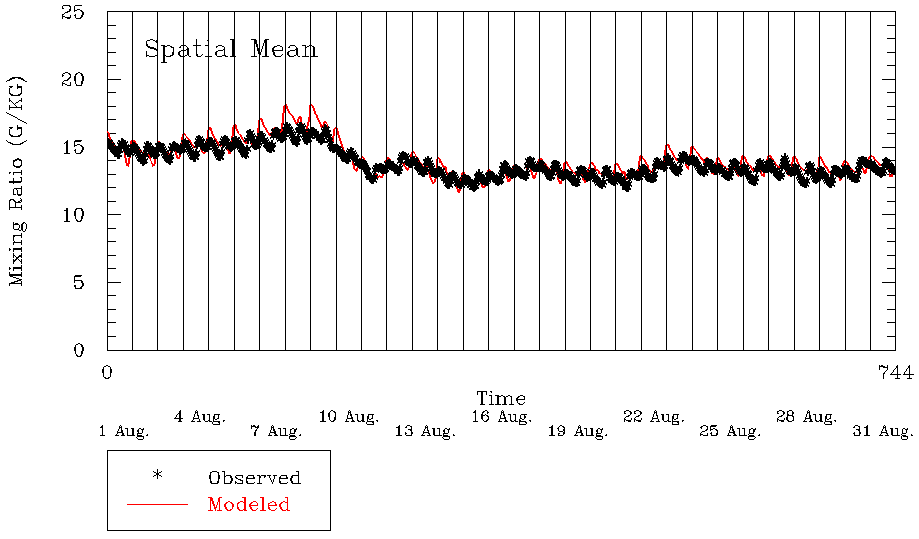


**Figure 3-160: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for September 2001.**

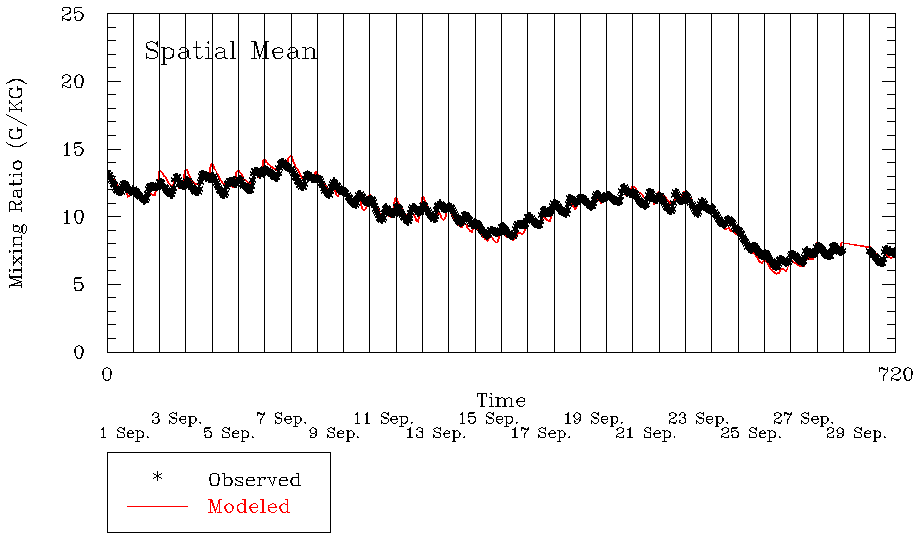



**Figure 3-161: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for October 2001.**

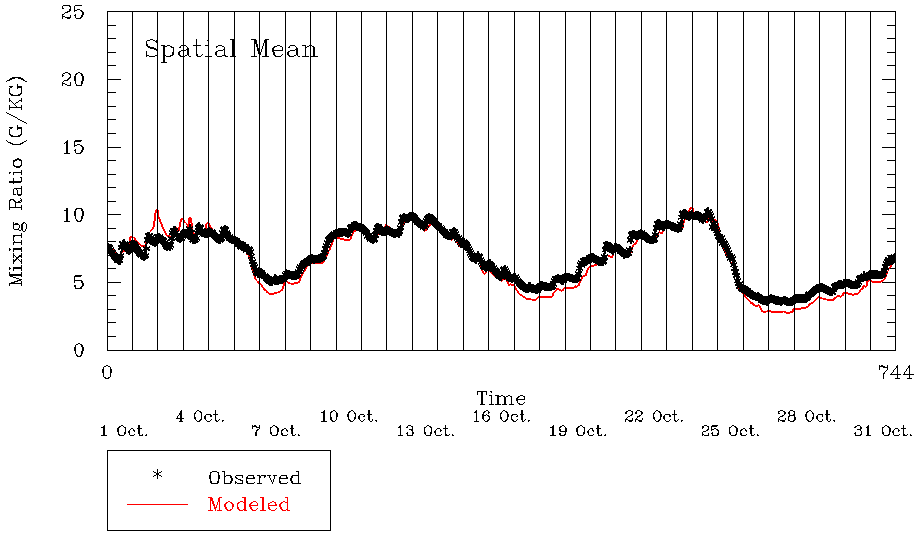


**Figure 3-162: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for November 2001.**

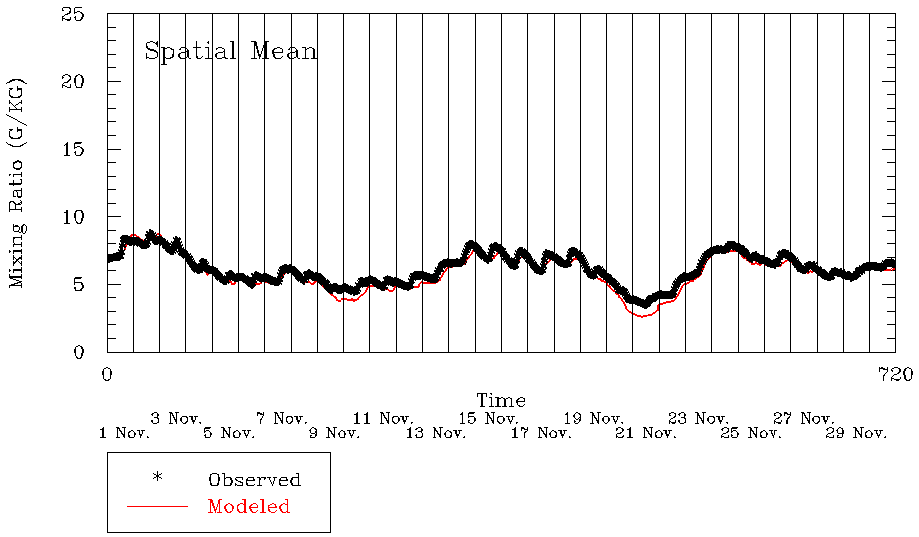



**Figure 3-163: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for December 2001.**

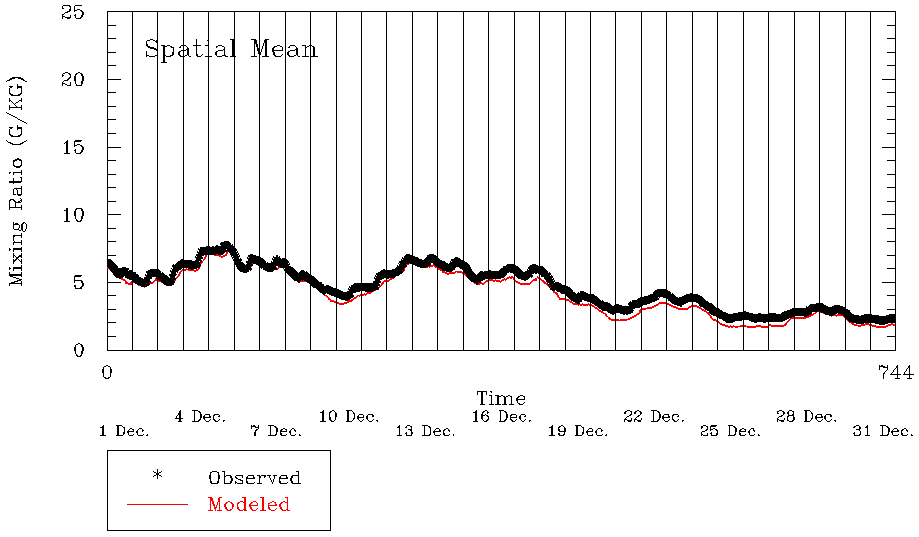


**Figure 3-164: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for January 2002.**

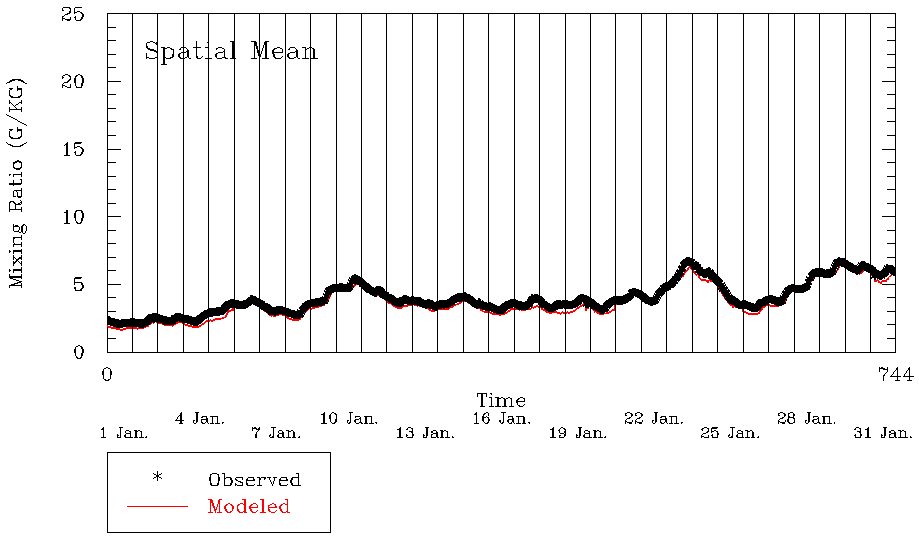



**Figure 3-165: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for February 2002.**

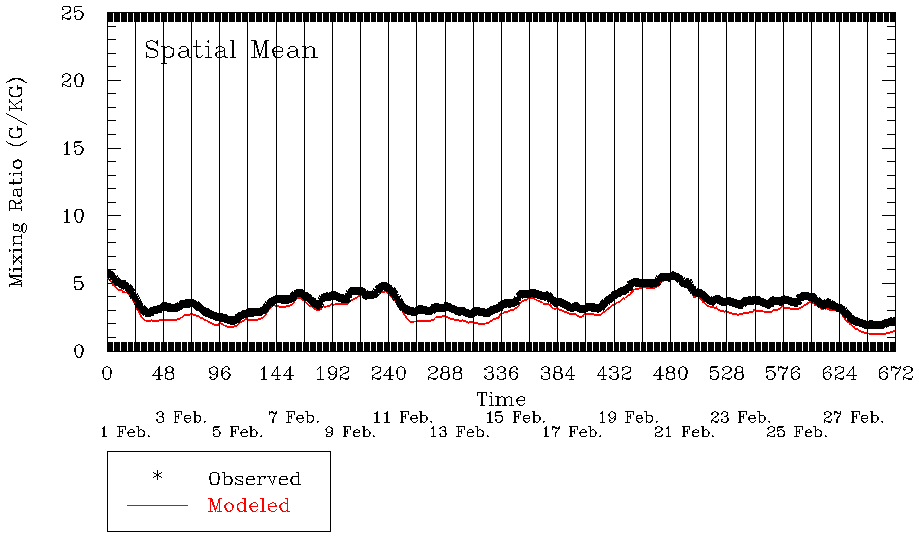


**Figure 3-166: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for January 2001 for the CENRAP States.**

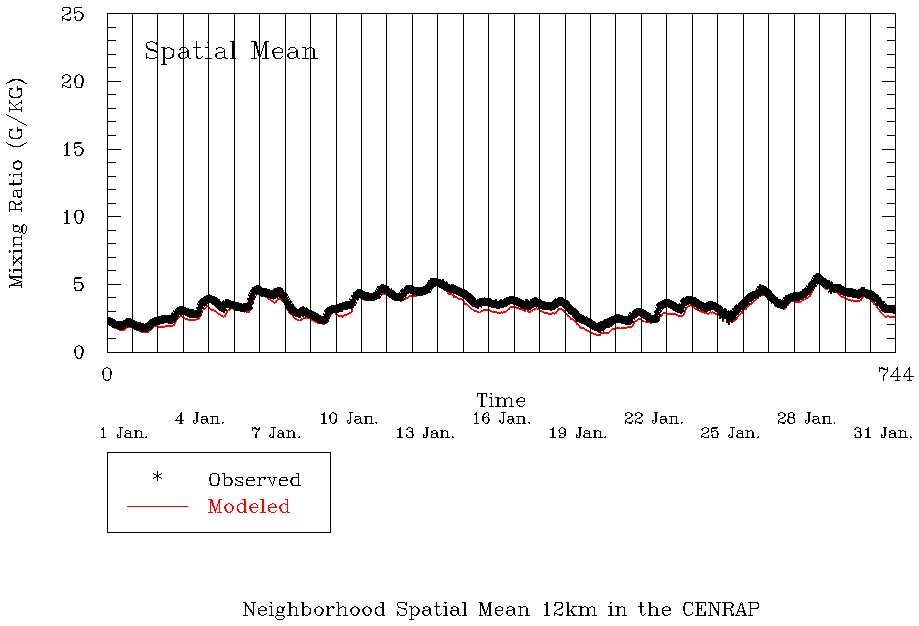



**Figure 3-167: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for February 2001 for the CENRAP States.**

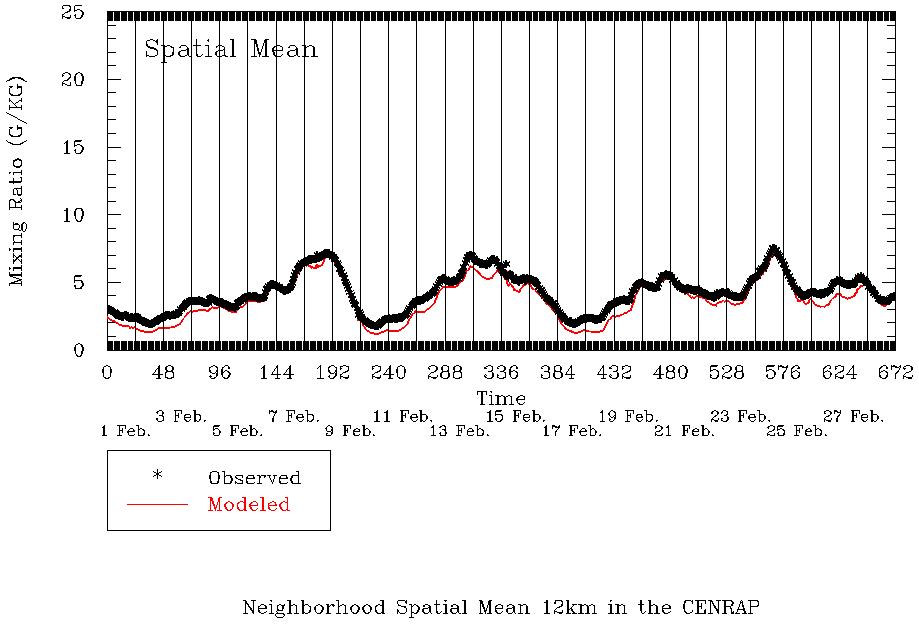


**Figure 3-168: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for March 2001 for the CENRAP States.**

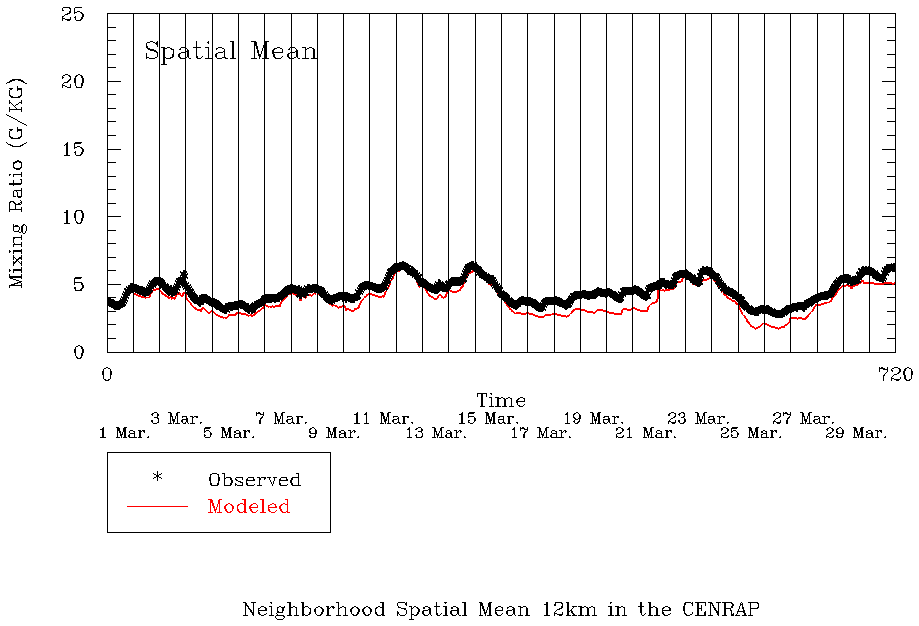



**Figure 3-169: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for April 2001 for the CENRAP States.**

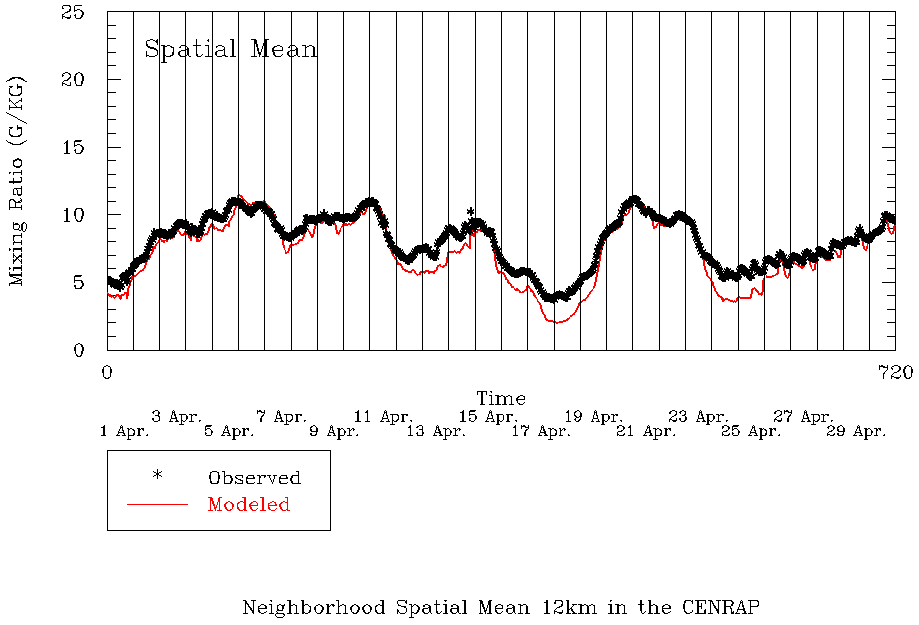


**Figure 3-170: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for May 2001 for the CENRAP States.**

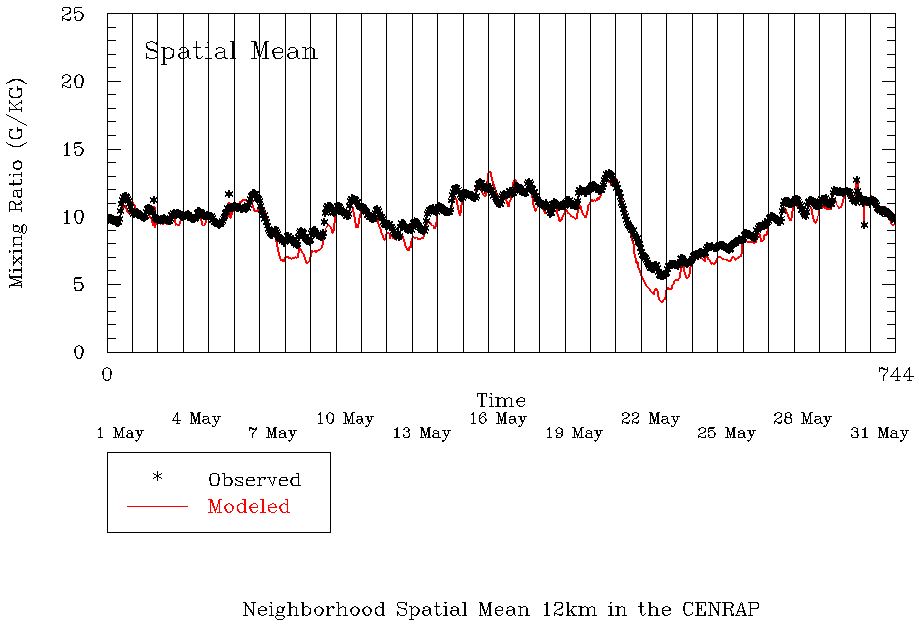



**Figure 3-171: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for June 2001 for the CENRAP States.**

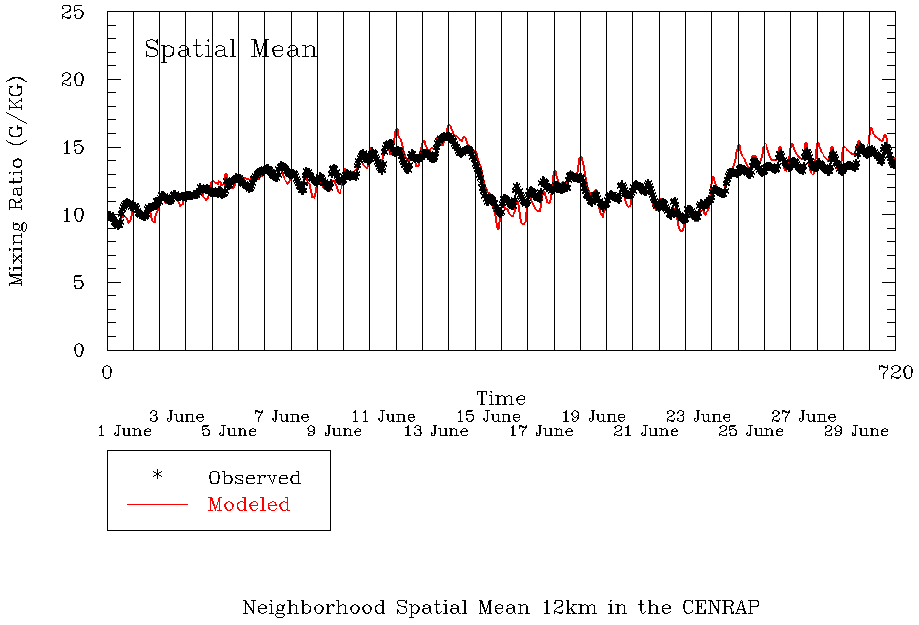


**Figure 3-172: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for July 2001 for the CENRAP States.**

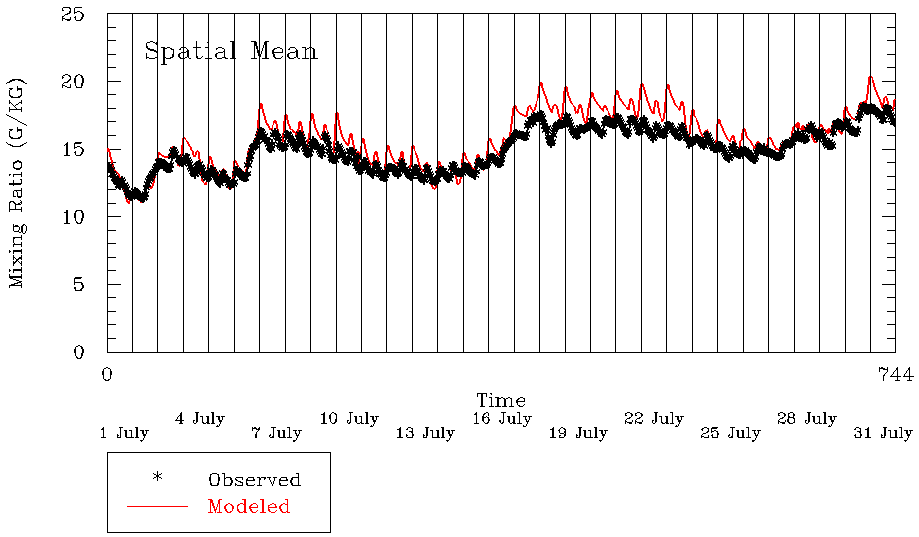



**Figure 3-173: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for August 2001 for the CENRAP States.**

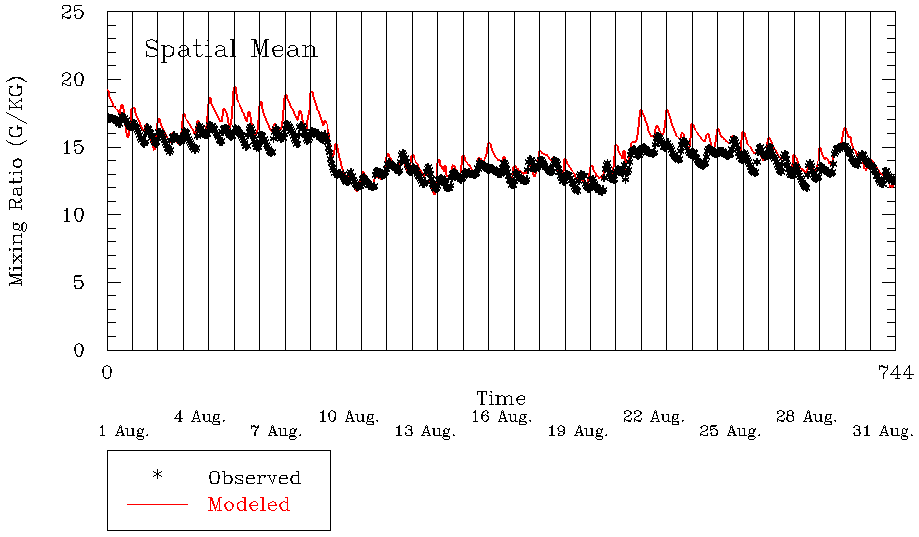


**Figure 3-174: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for September 2001 for the CENRAP States.**

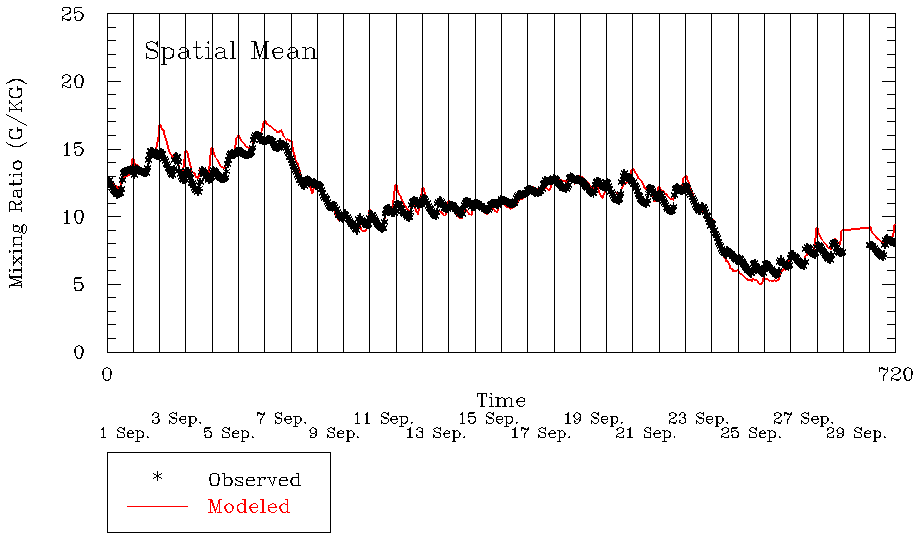



**Figure 3-175: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for October 2001 for the CENRAP States.**

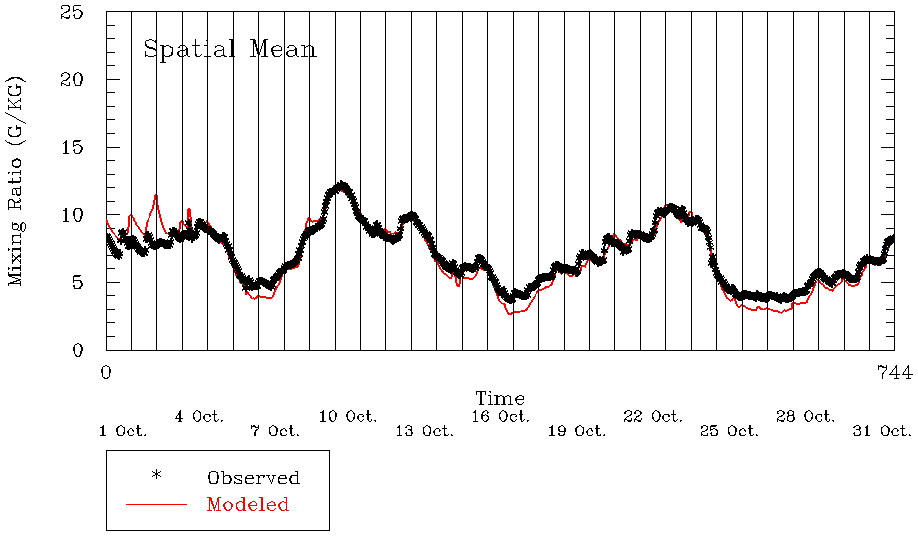


**Figure 3-176: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for November 2001 for the CENRAP States.**

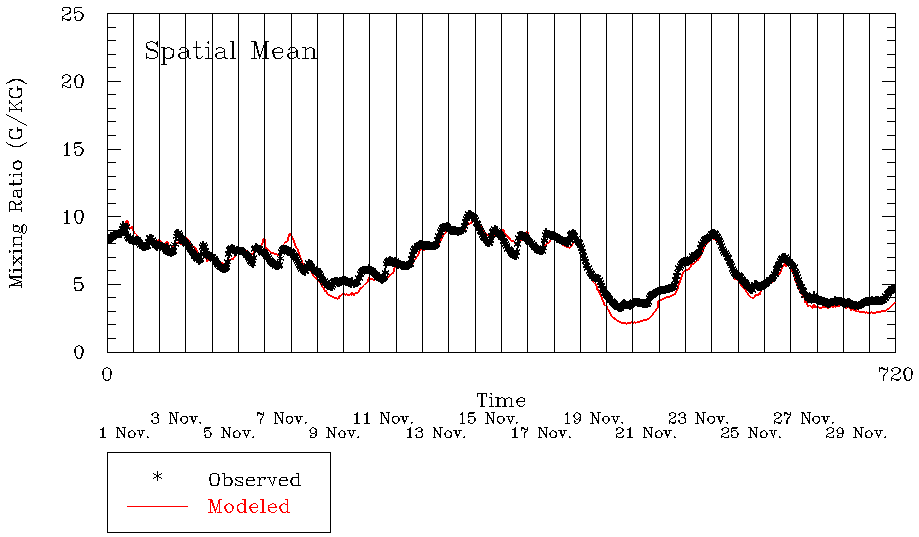



**Figure 3-177: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for December 2001 for the CENRAP States.**

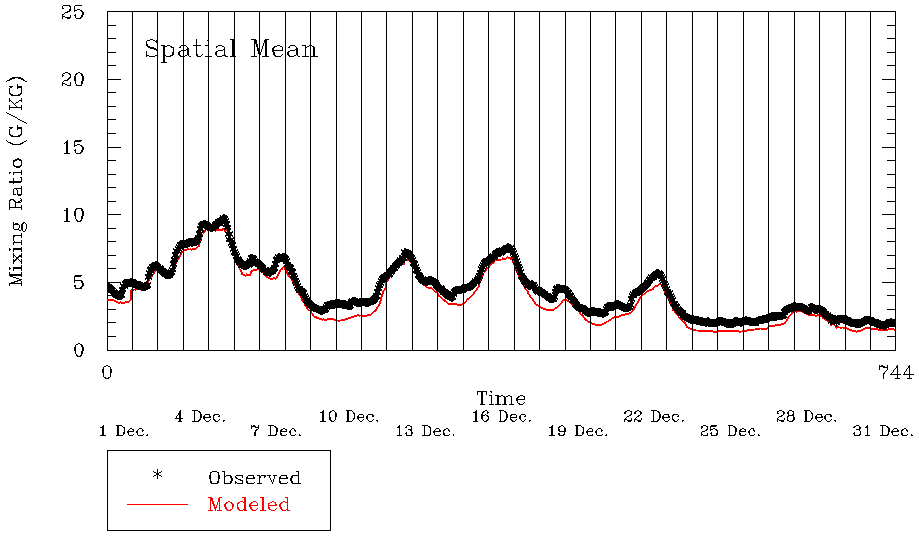


**Figure 3-178: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for January 2002 for the CENRAP States.**

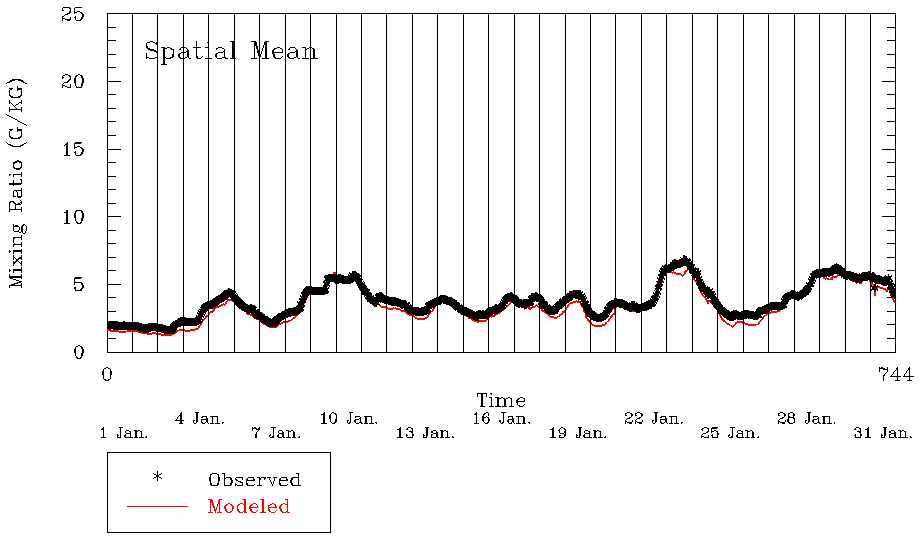



**Figure 3-179: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for February 2002 for the CENRAP States.**

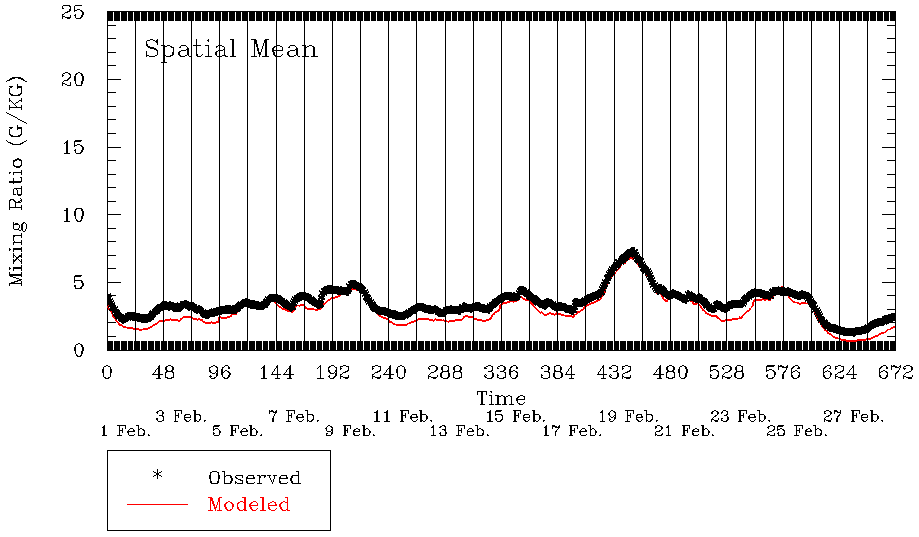


**Figure 3-180: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for January 2001 for the MANE-VU States.**

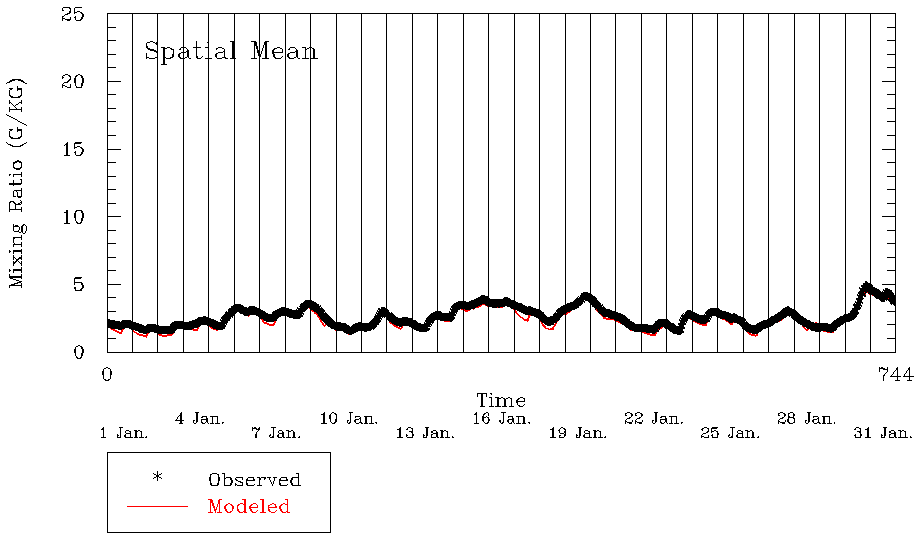



**Figure 3-181: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for February 2001 for the MANE-VU States.**

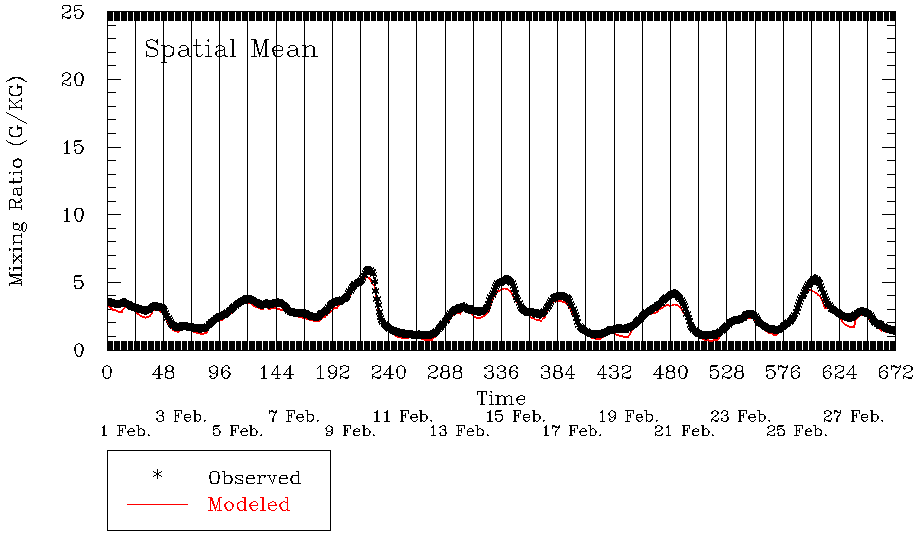


**Figure 3-182: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for March 2001 for the MANE-VU States.**

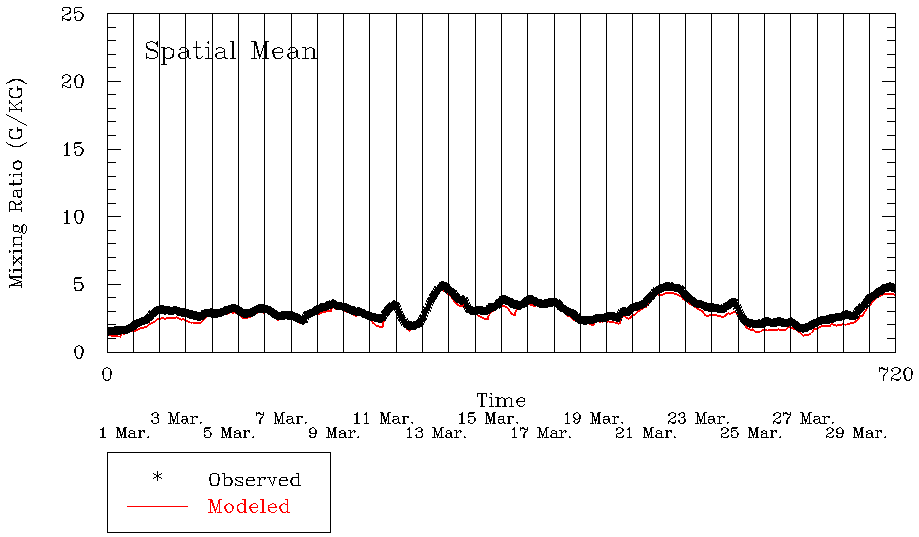



**Figure 3-183: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for April 2001 for the MANE-VU States.**

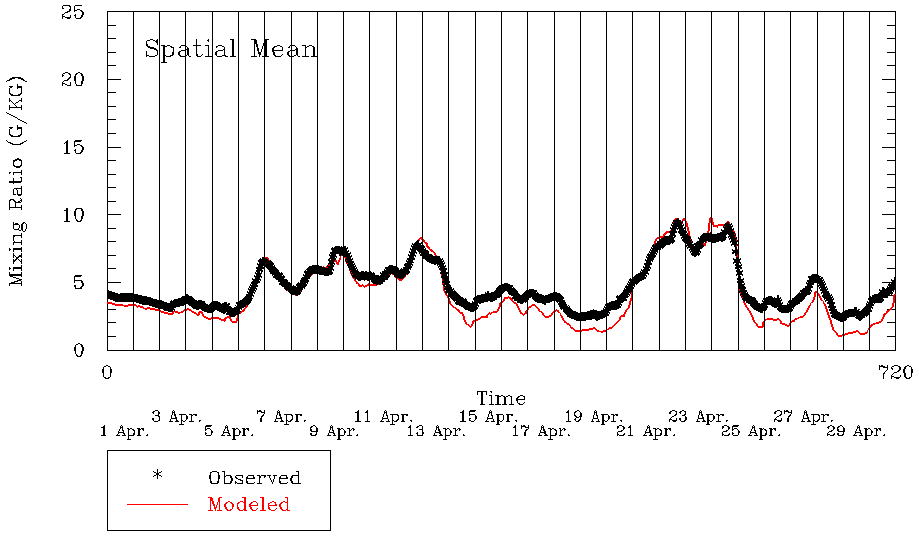


**Figure 3-184: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for May 2001 for the MANE-VU States.**

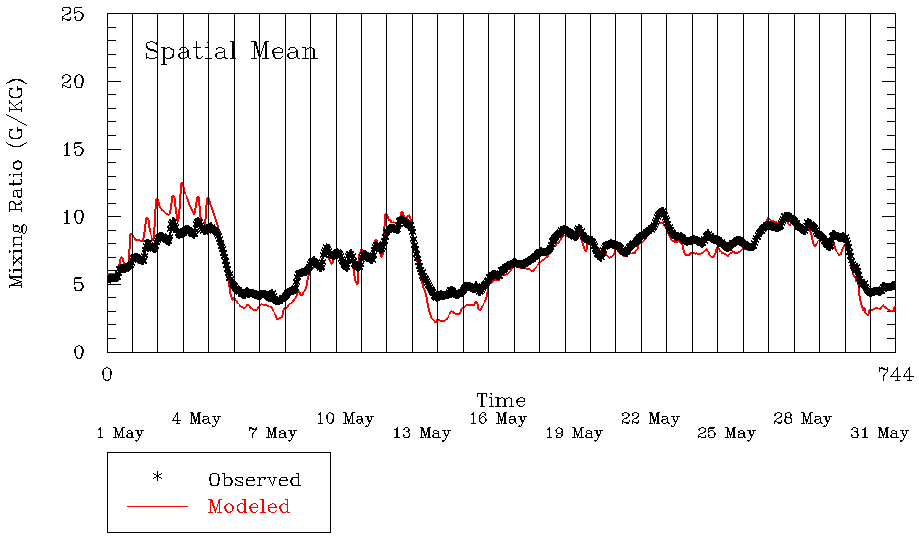



**Figure 3-185: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for June 2001 for the MANE-VU States.**

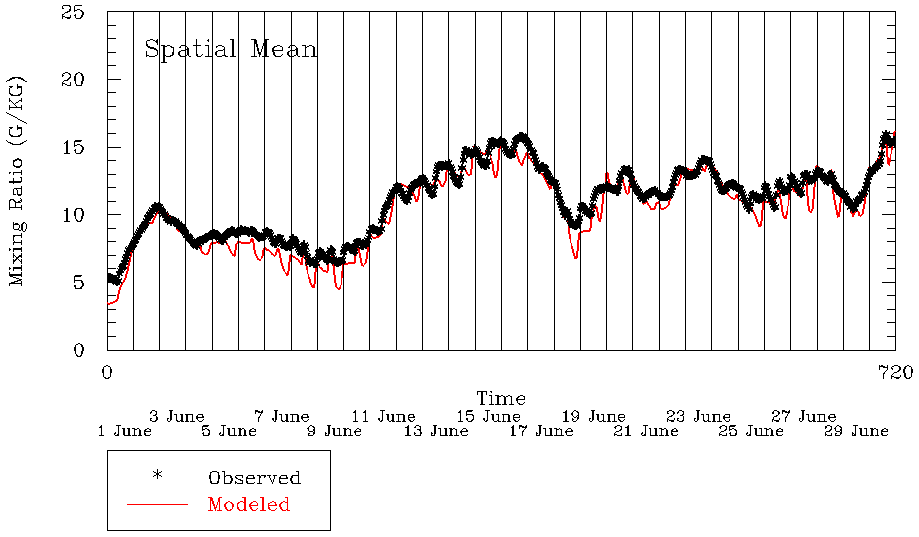


**Figure 3-186: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for July 2001 for the MANE-VU States.**

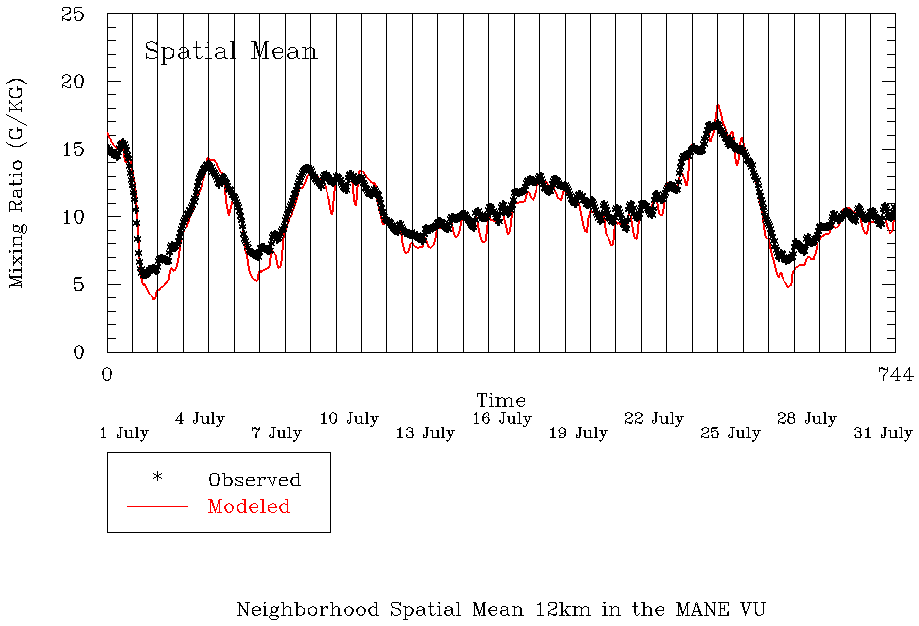



**Figure 3-187: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for August 2001 for the MANE-VU States.**

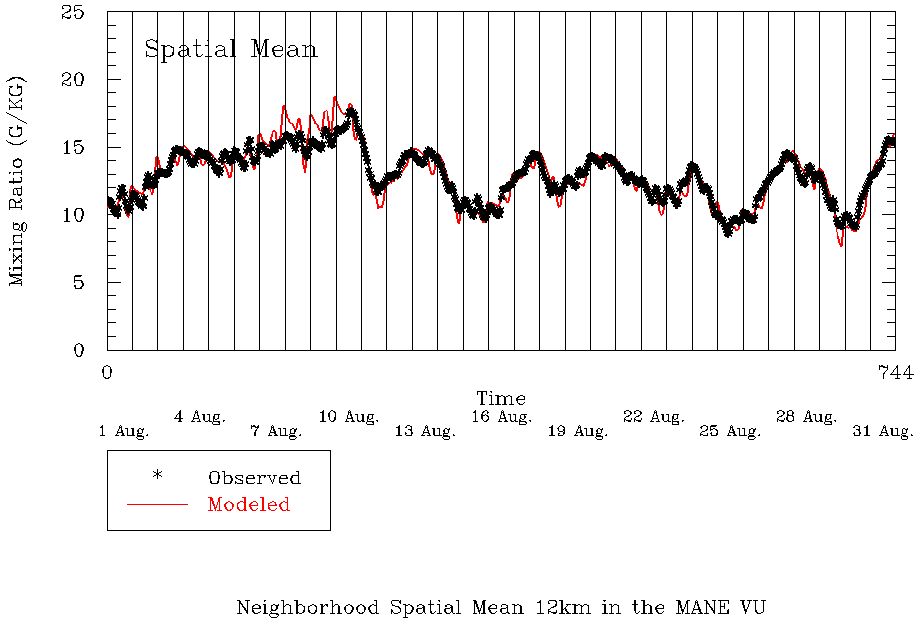


**Figure 3-188: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for September 2001 for the MANE-VU States.**

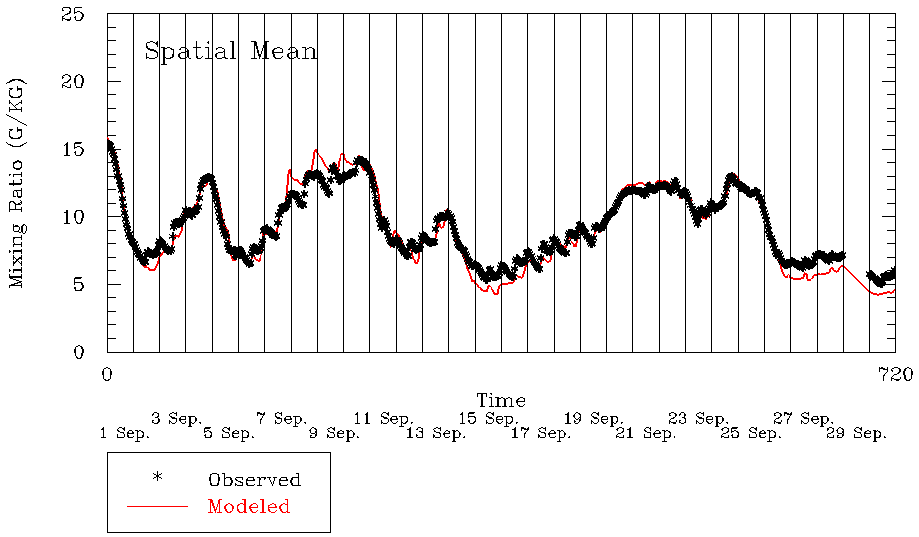



**Figure 3-189: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for October 2001 for the MANE-VU States.**

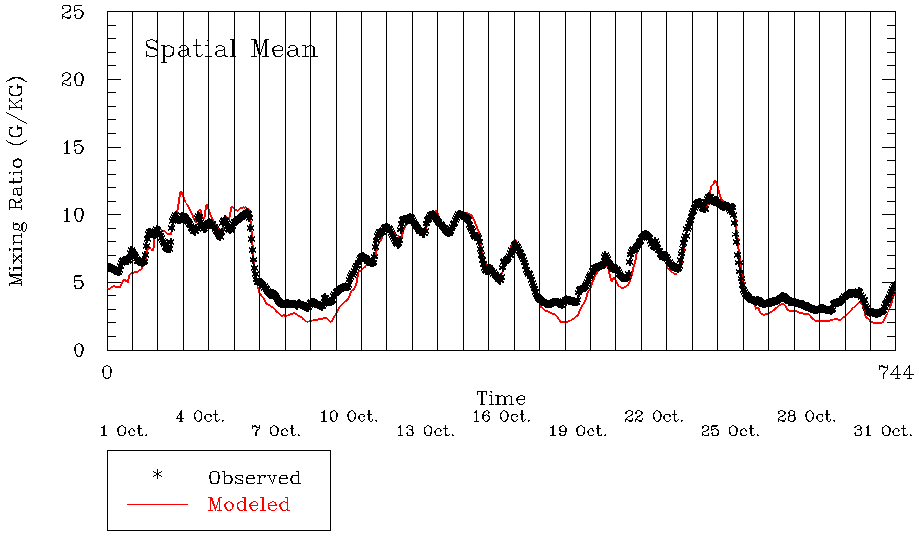


**Figure 3-190: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for November 2001 for the MANE-VU States.**

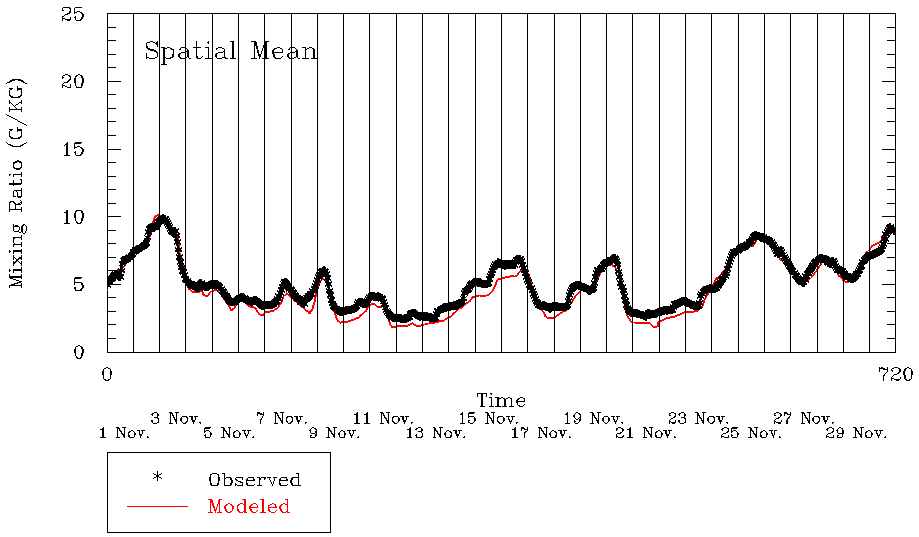



**Figure 3-191: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for December 2001 for the MANE-VU States.**

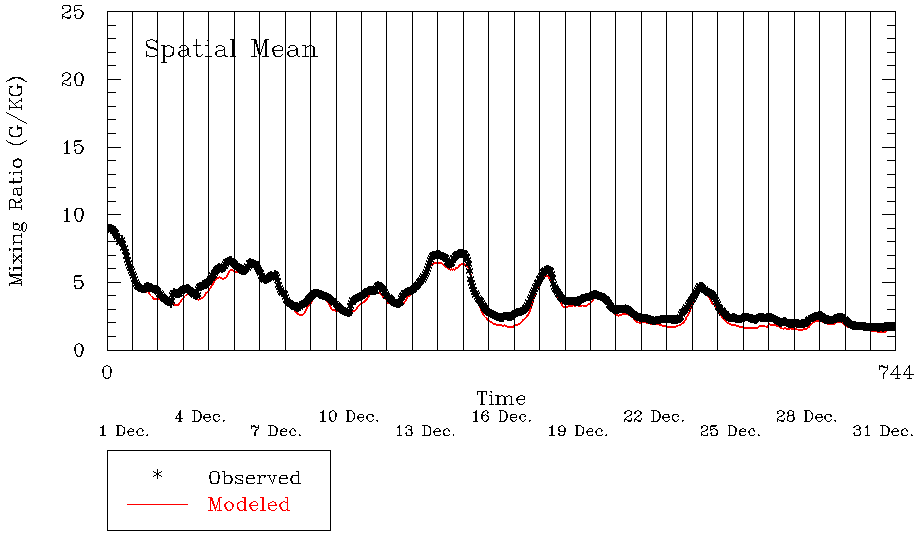


**Figure 3-192: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for January 2002 for the MANE-VU States.**

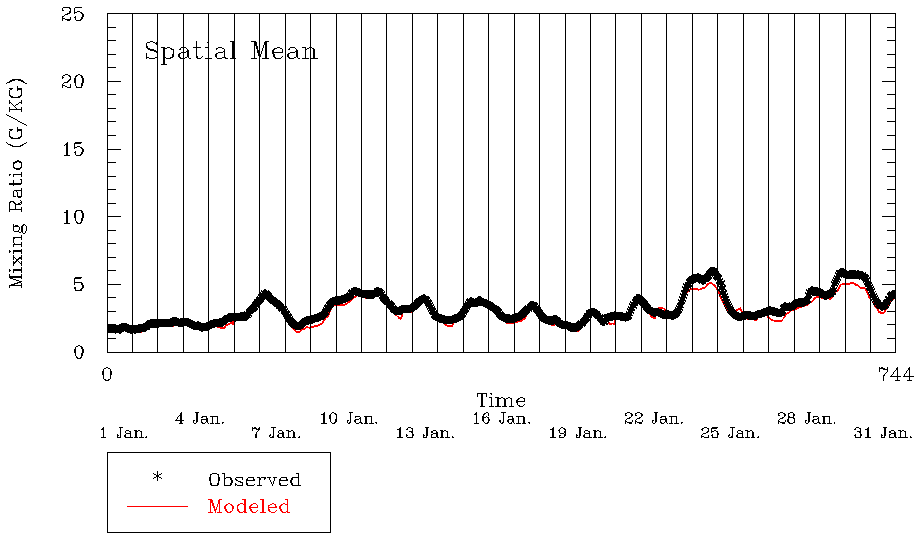



**Figure 3-193: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for February 2002 for the MANE-VU States.**

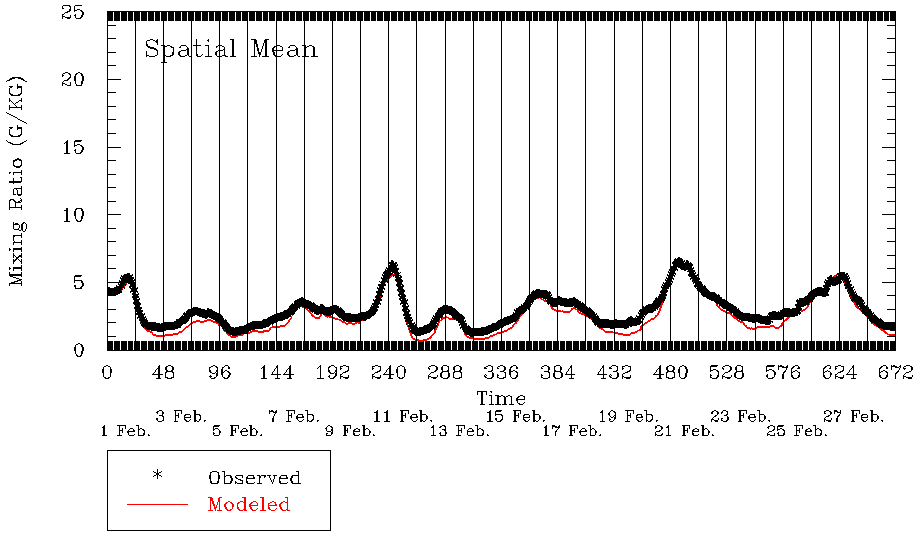
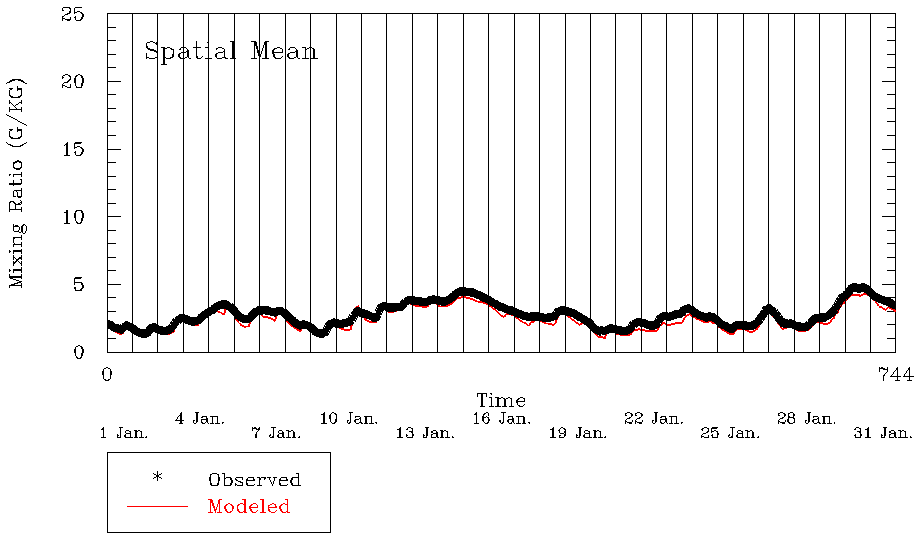
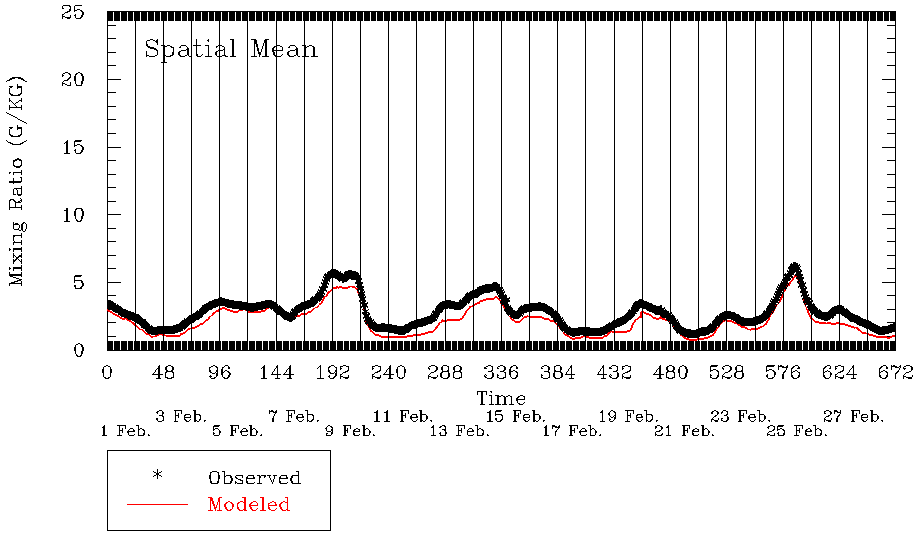


**Figure 3-194: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for January 2001 for the Midwestern RPO States.**




Neighborhood Spatial Mean 12km in the MW

**Figure 3-195: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for February 2001 for the Midwestern RPO States.**




Neighborhood Spatial Mean 12km in the MW

**Figure 3-196: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for March 2001 for the Midwestern RPO States.**

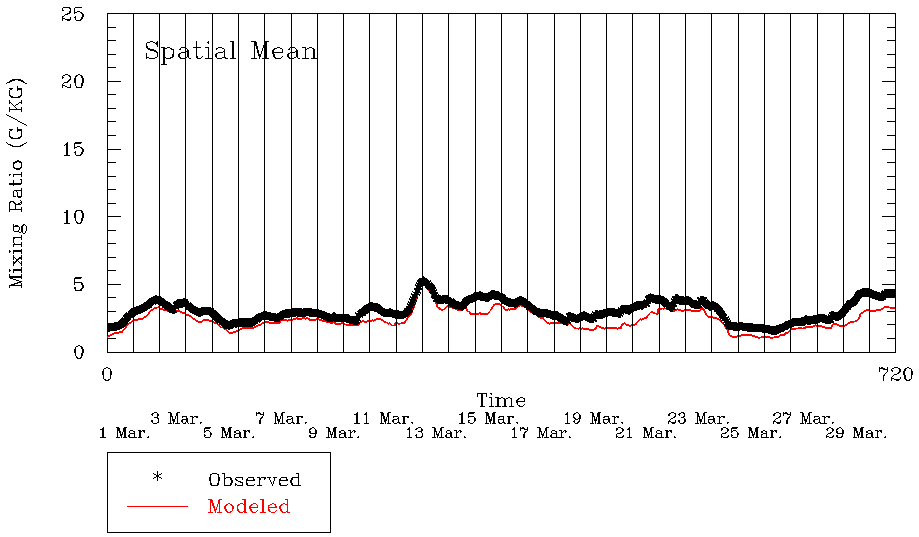



**Figure 3-197: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for April 2001 for the Midwestern RPO States.**

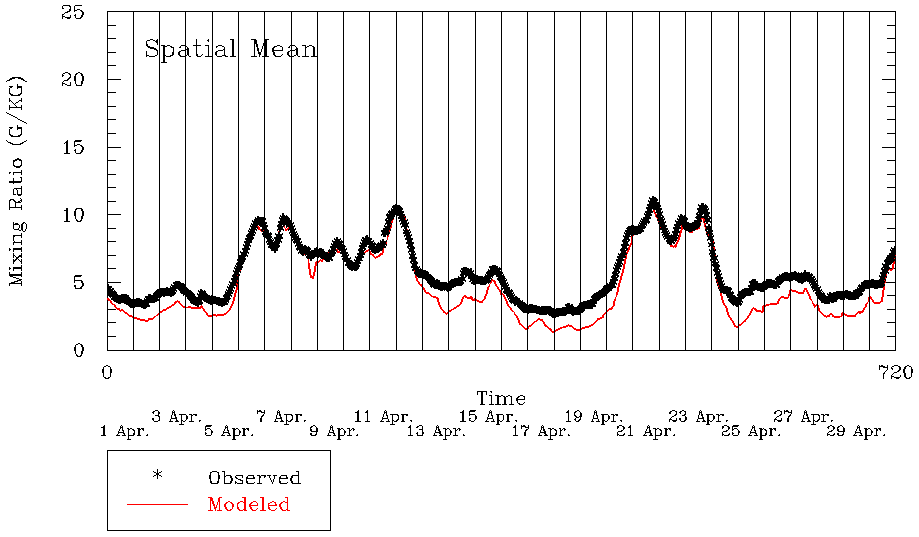


**Figure 3-198: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for May 2001 for the Midwestern RPO States.**

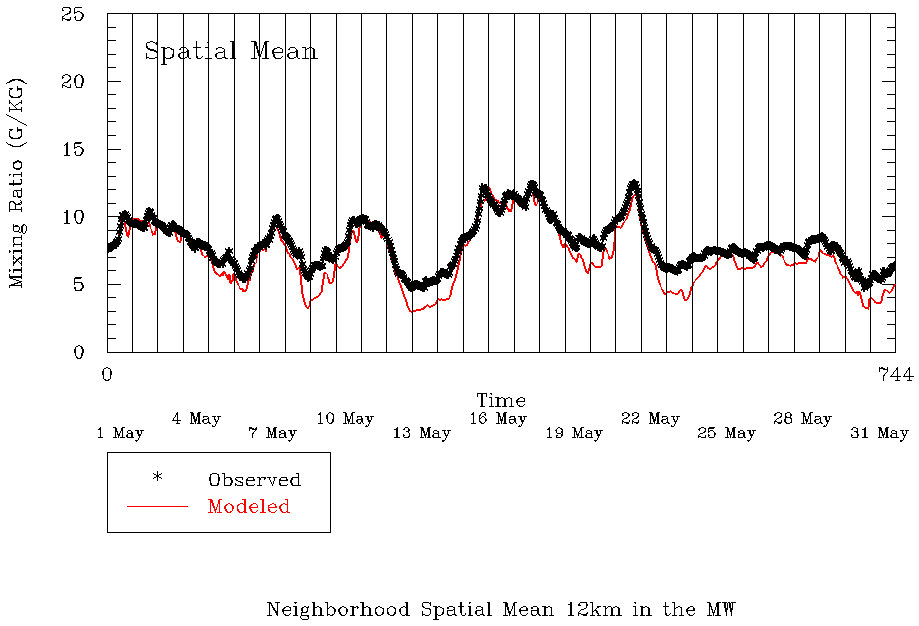



**Figure 3-199: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for June 2001 for the Midwestern RPO States.**

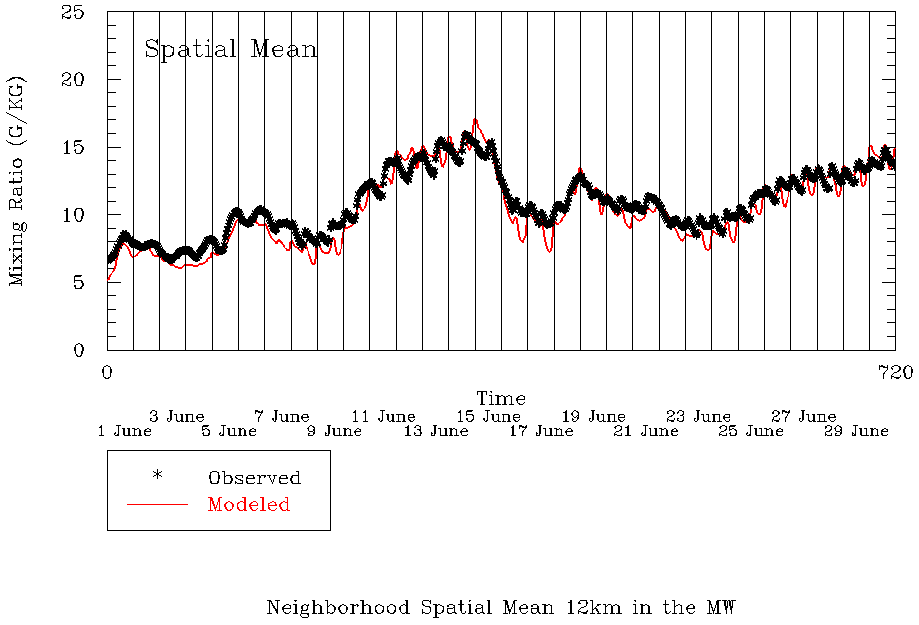


**Figure 3-200: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for July 2001 for the Midwestern RPO States.**

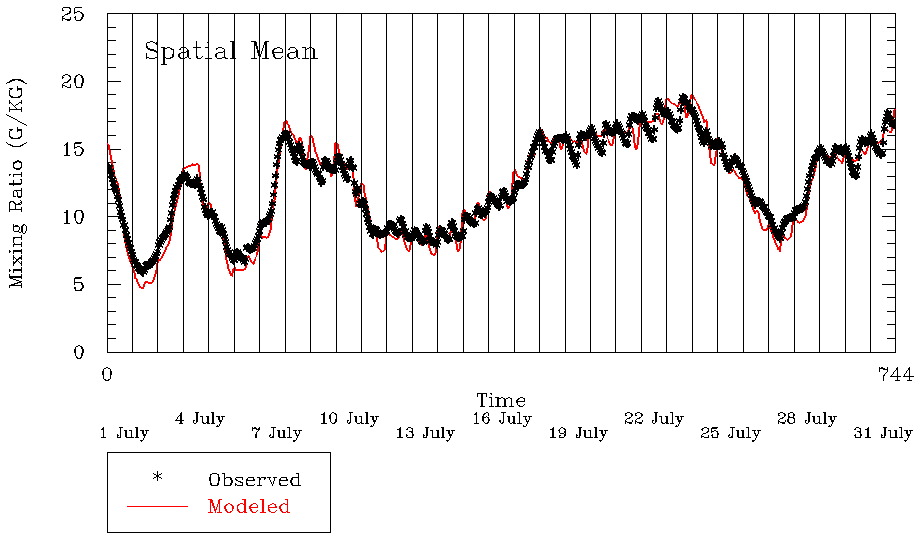



**Figure 3-201: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for August 2001 for the Midwestern RPO States.**

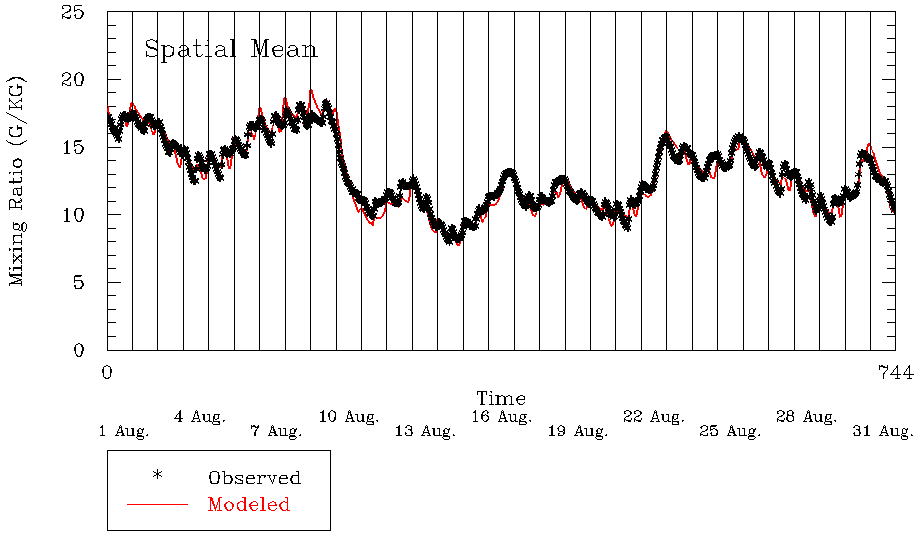


**Figure 3-202: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for September 2001 for the Midwestern RPO States.**

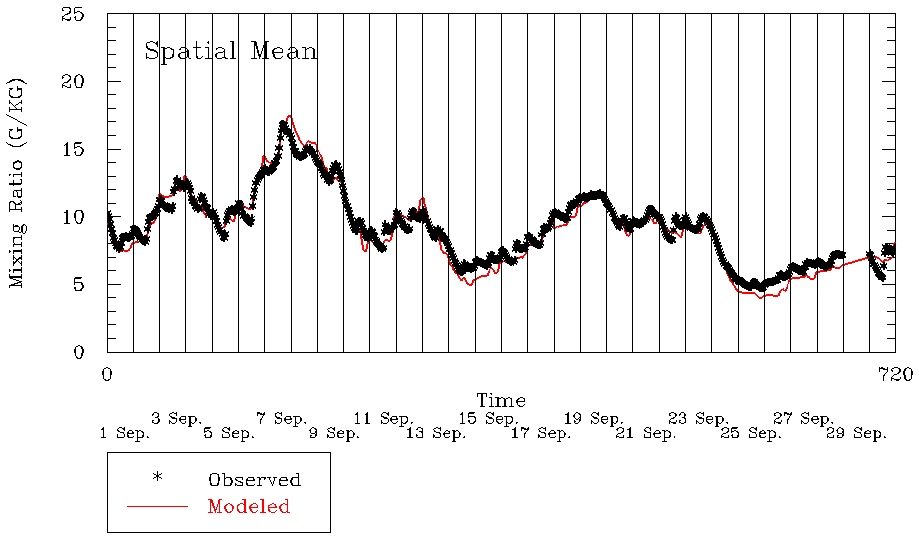



**Figure 3-203: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for October 2001 for the Midwestern RPO States.**

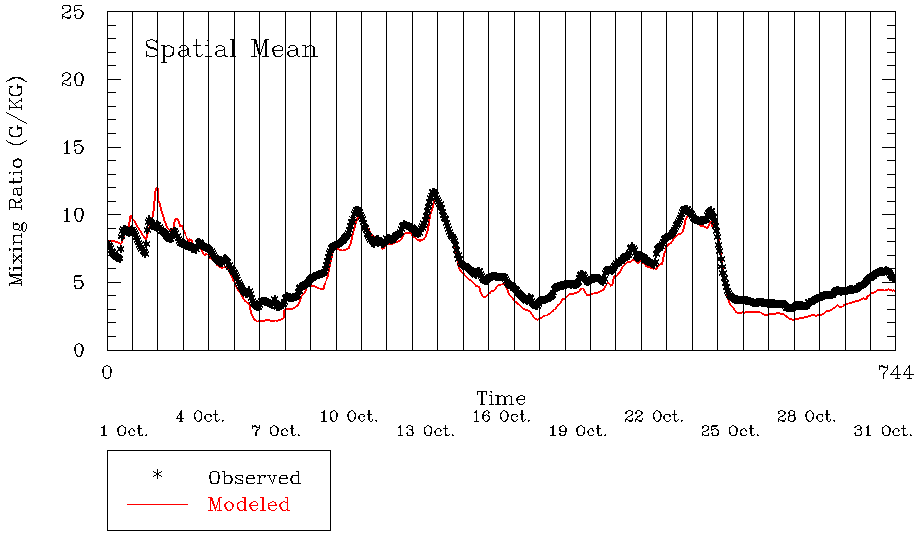


**Figure 3-204: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for November 2001 for the Midwestern RPO States.**

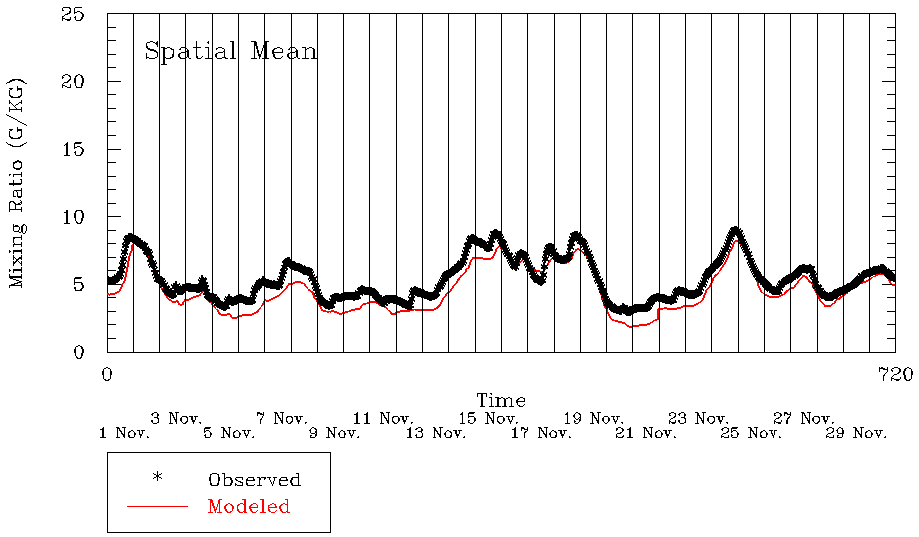



**Figure 3-205: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for December 2001 for the Midwestern RPO States.**

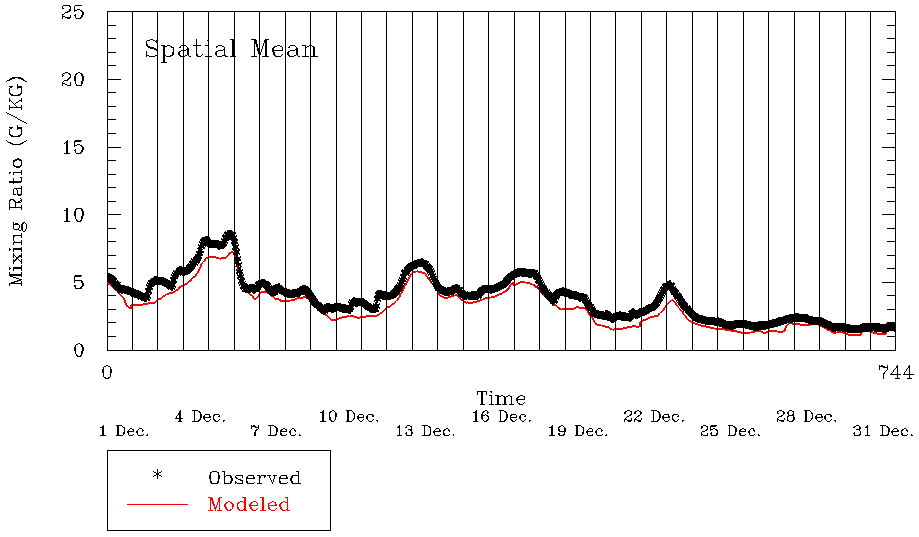


**Figure 3-206: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for January 2002 for the Midwestern RPO States.**

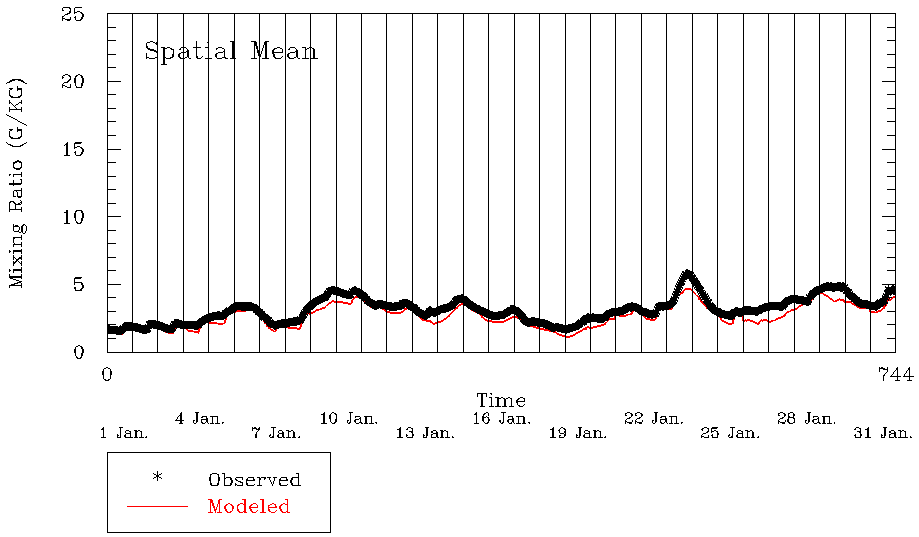



**Figure 3-207: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for February 2002 for the Midwestern RPO States.**

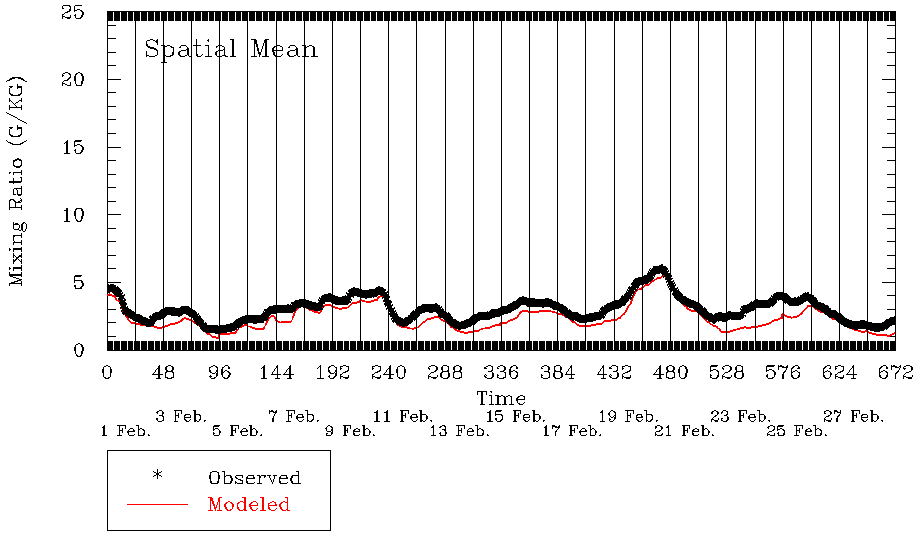


**Figure 3-208: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for January 2001 for the VISTAS States.**

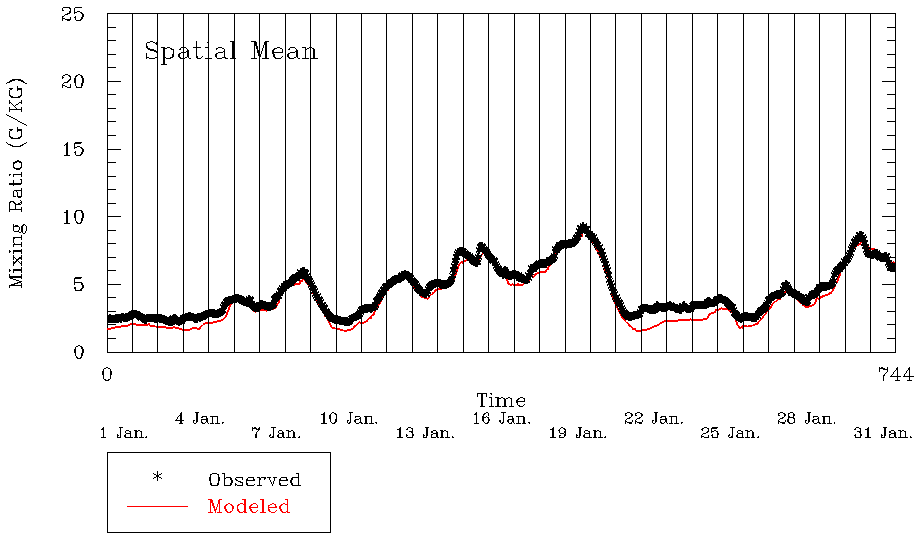



**Figure 3-209: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for February 2001 for the VISTAS States.**

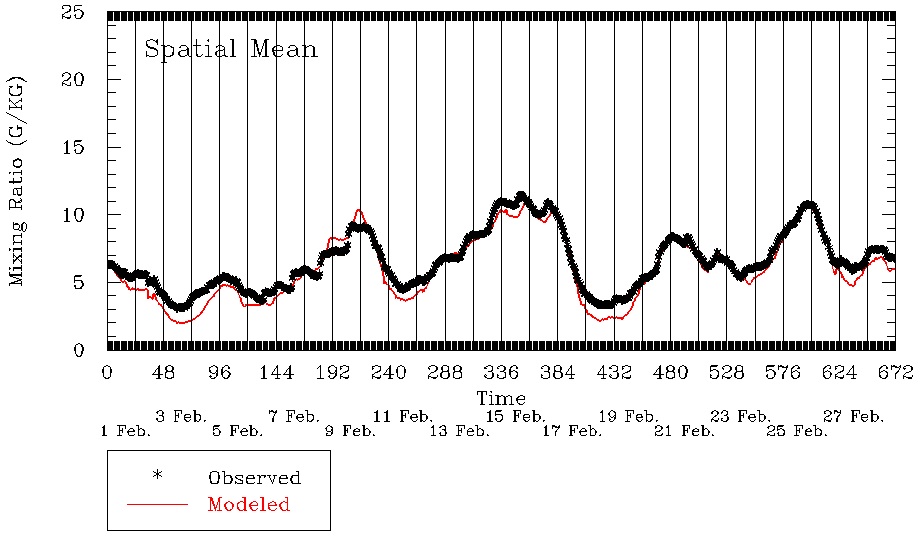


**Figure 3-210: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for March 2001 for the VISTAS States.**

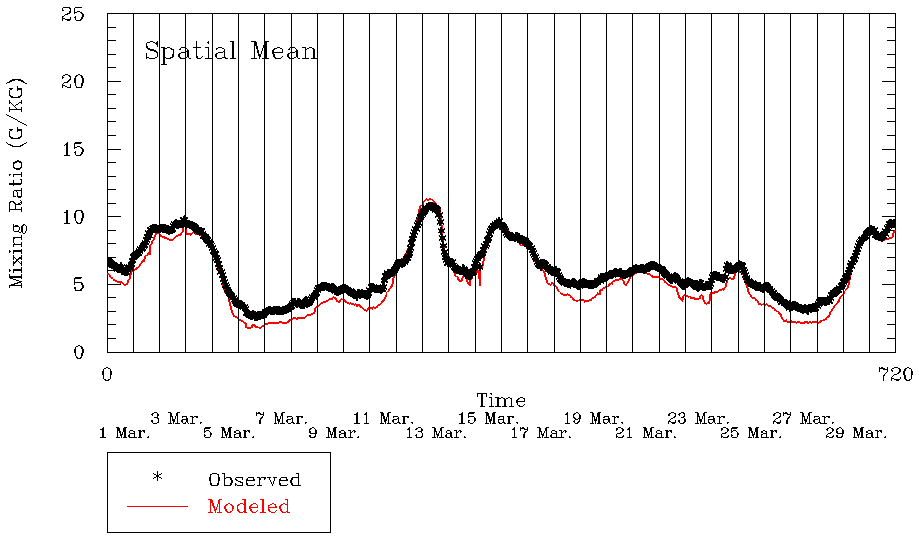



**Figure 3-211: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for April 2001 for the VISTAS States.**

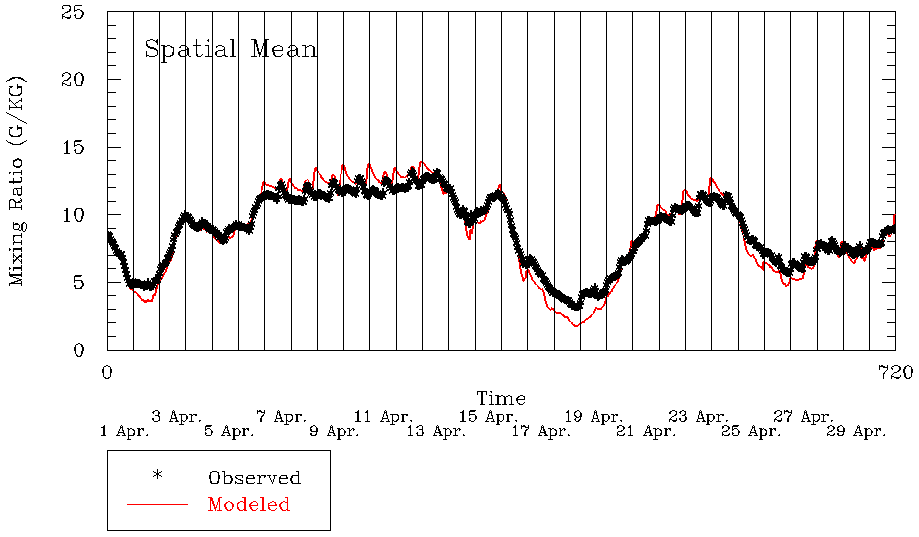


**Figure 3-212: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for May 2001 for the VISTAS States.**

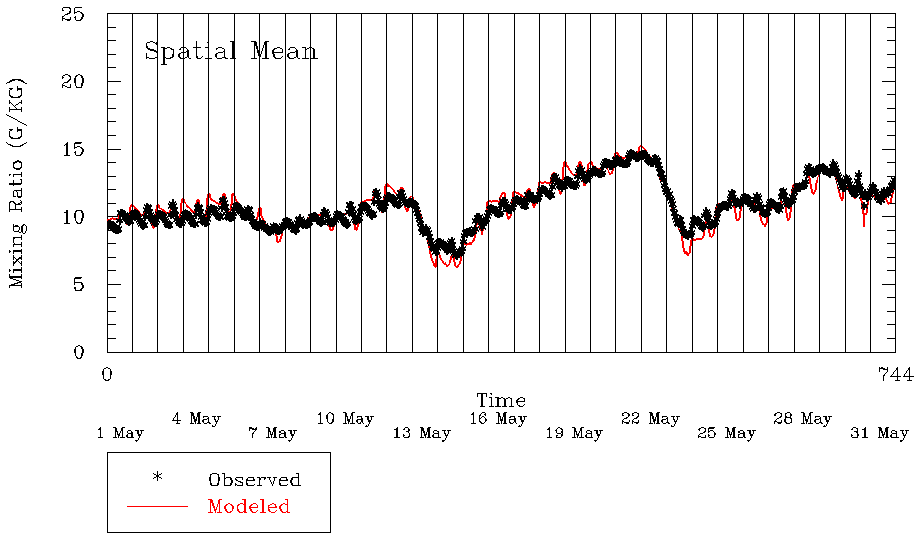



**Figure 3-213: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for June 2001 for the VISTAS States.**

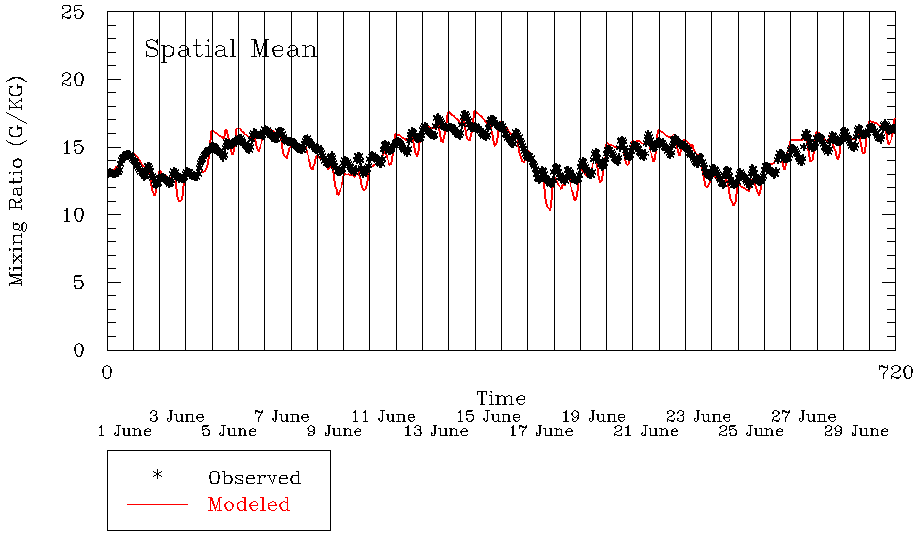


**Figure 3-214: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for July 2001 for the VISTAS States.**

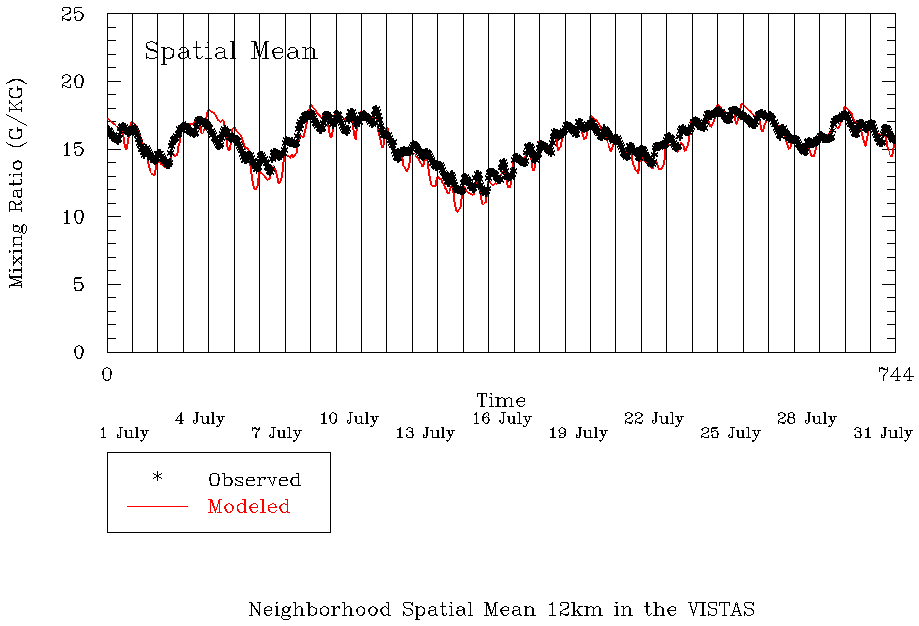



**Figure 3-215: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for August 2001 for the VISTAS States.**

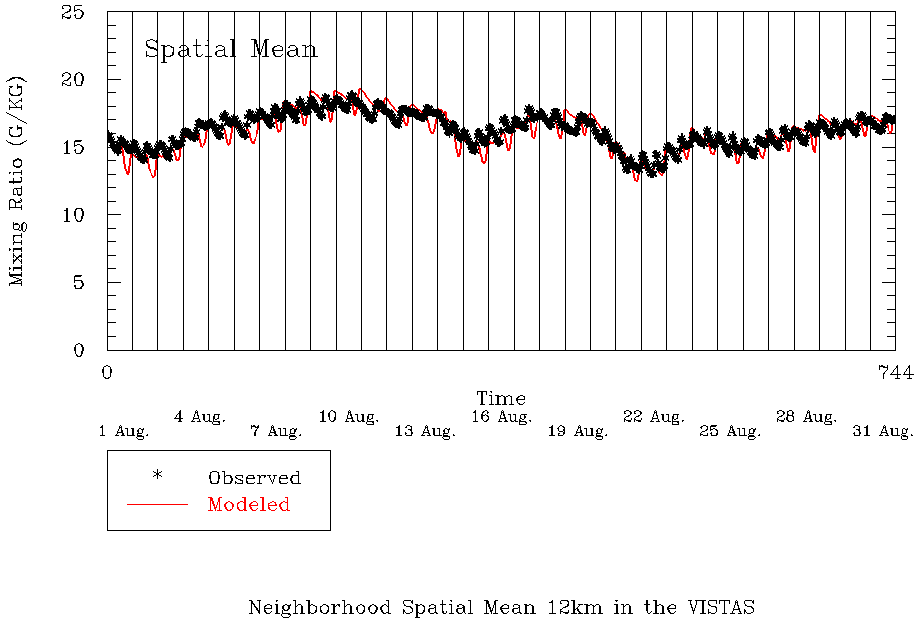


**Figure 3-216: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for September 2001 for the VISTAS States.**

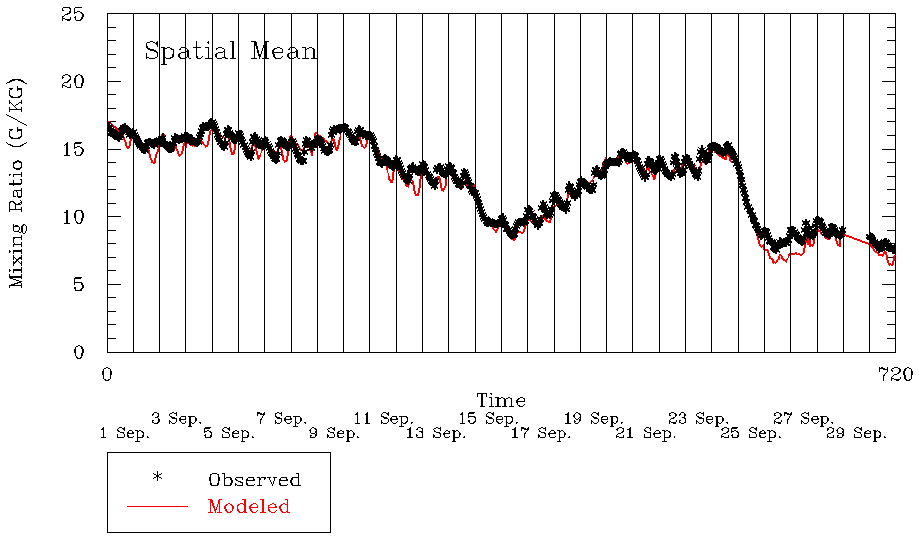



**Figure 3-217: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for October 2001 for the VISTAS States.**

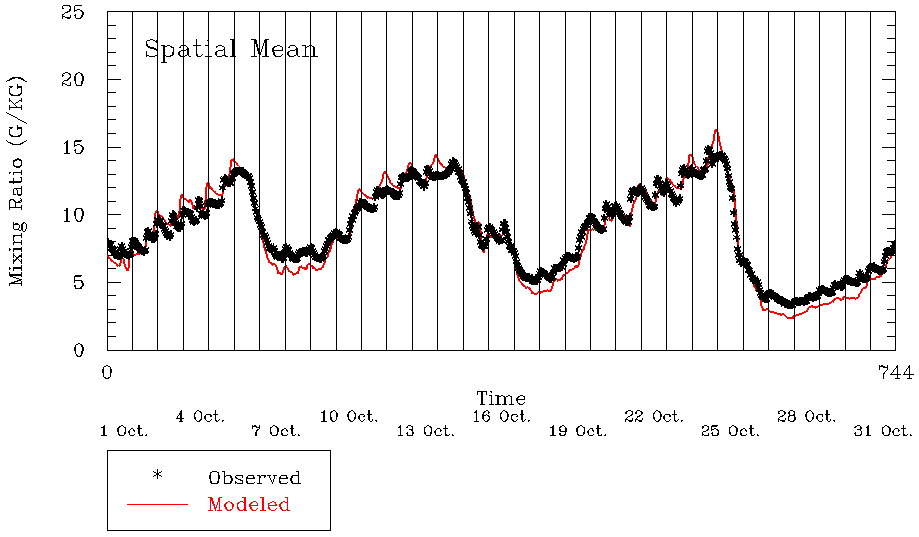


**Figure 3-218: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for November 2001 for the VISTAS States.**

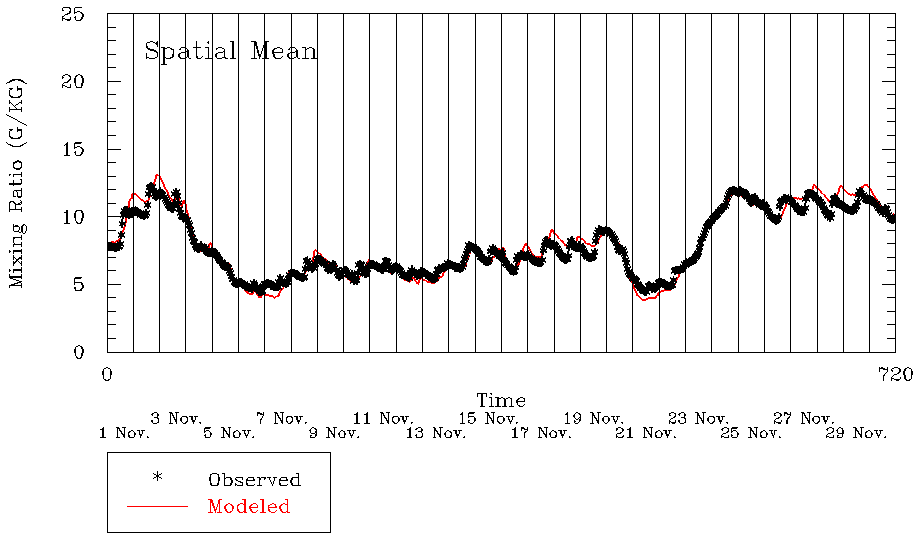



**Figure 3-219: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for December 2001 for the VISTAS States.**

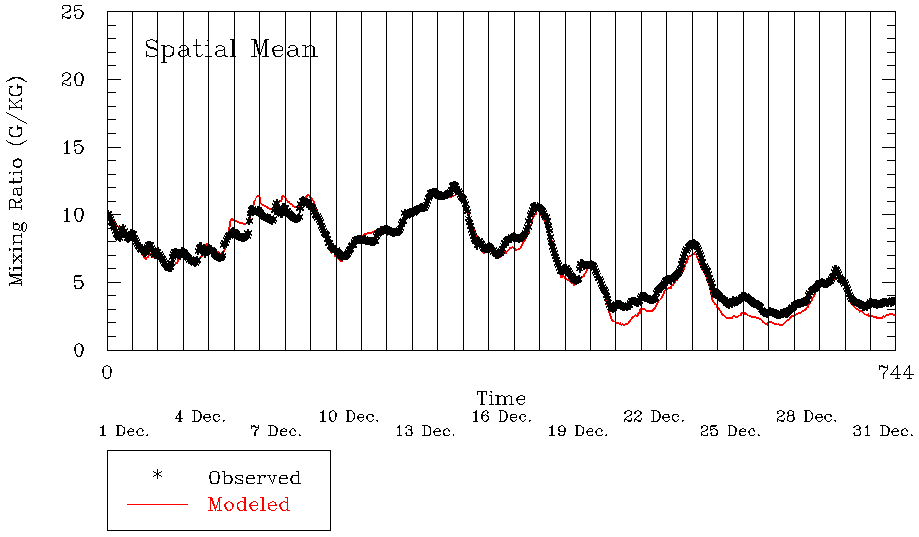


**Figure 3-220: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for January 2002 for the VISTAS States.**

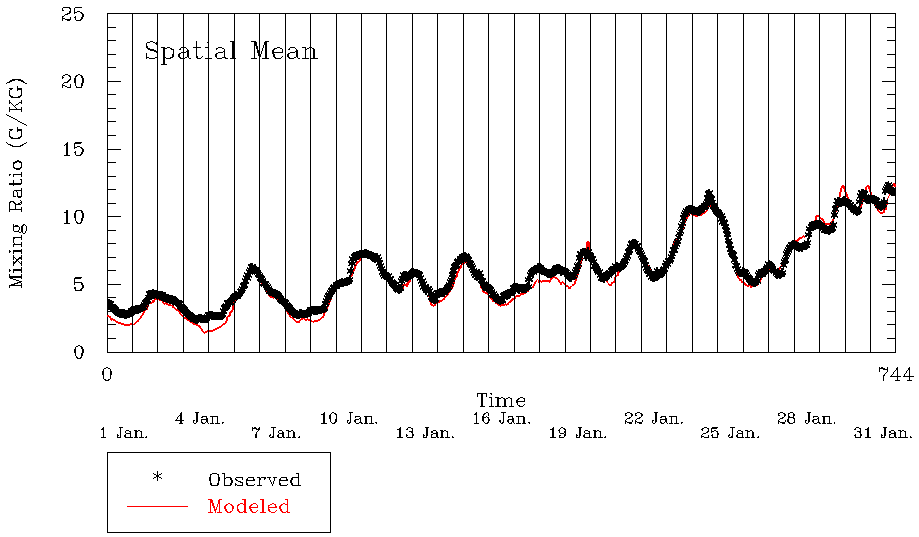



**Figure 3-221: Model Estimated and Observed Spatial Mean Mixing Ratio (g/kg) for February 2002 for the VISTAS States.**

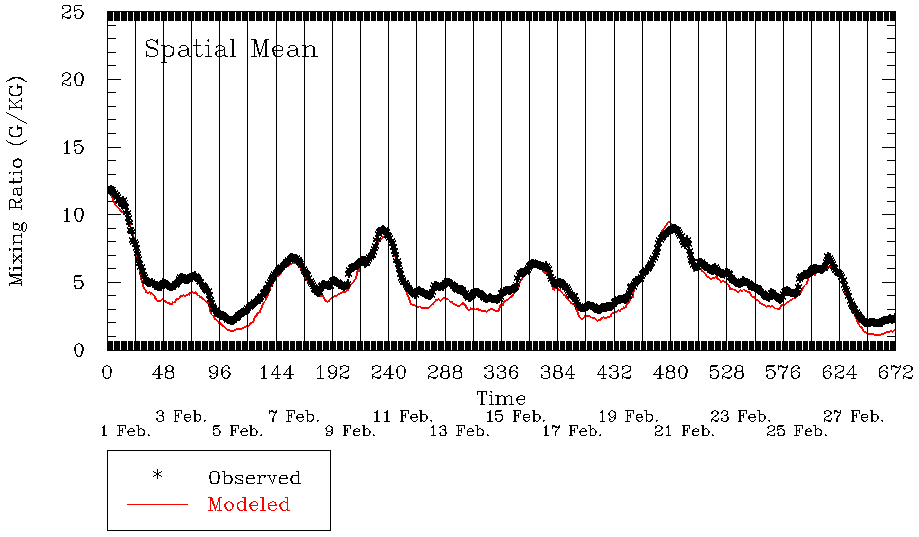


**Table 3-5: Accumulated Precipitation Bias (cm).**

| Region | Jan '01 | Feb '01 | Mar `01 | Apr `01 | May `01 | Jun `01 | Jul `01 | Aug `01 | Sep `01 | Oct `01 | Nov `01 | Dec `01 | Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ALL | -0.09 | -0.28 | -0.27 | -0.11 | 0.48 | 1.35 | 2.12 | 3.27 | -0.34 | -1.21 | -0.65 | 0.35 | 0.38 |
| AL | 0.22 | -4.41 | -6.80 | -3.51 | -0.15 | -1.15 | 2.80 | 0.14 | 2.26 | -2.27 | -4.22 | -0.91 | -1.50 |
| AR | -2.63 | -3.15 | -3.01 | -1.37 | -2.63 | 4.68 | 7.66 | 3.26 | -0.65 | -2.75 | -0.77 | -0.76 | -0.18 |
| CO | 0.12 | 0.78 | -0.24 | 0.39 | 1.05 | 1.00 | -1.63 | -0.22 | -0.10 | -0.04 | -0.21 | 0.64 | 0.13 |
| CT | -0.03 | 1.59 | 0.38 | 0.56 | 0.33 | -3.21 | 0.72 | -1.47 | -1.14 | -1.00 | -0.36 | 2.69 | -0.08 |
| DE | 1.82 | -1.03 | -1.80 | -1.11 | -7.59 | -4.36 | 2.53 | 4.05 | -1.64 | 0.26 | -1.51 | 3.14 | -0.60 |
| FL | -0.55 | -0.32 | -1.31 | 0.42 | 4.05 | 0.91 | 4.94 | 18.51 | 1.64 | 1.80 | -1.81 | 0.17 | 2.37 |
| GA | -0.37 | -1.66 | -0.85 | -0.26 | -0.58 | -0.56 | 2.13 | 2.91 | 0.52 | -1.28 | -0.83 | -0.46 | -0.11 |
| IL | 0.54 | -0.33 | -0.22 | -0.49 | -0.51 | 2.04 | 1.99 | 1.16 | 0.19 | -2.40 | -0.57 | 1.76 | 0.26 |
| IN | 0.41 | -1.50 | -0.55 | 1.56 | 3.31 | 2.60 | -2.74 | 2.19 | -2.00 | -1.97 | -0.23 | 2.40 | 0.29 |
| IA | 0.26 | 0.32 | 0.09 | -0.25 | -0.52 | 0.31 | 2.41 | 4.77 | -1.15 | -2.45 | -0.22 | 0.26 | 0.32 |
| KS | -0.74 | 0.01 | -0.53 | 0.08 | -0.28 | 5.06 | 10.37 | 5.90 | 0.44 | 0.07 | -0.31 | -0.13 | 1.66 |
| KY | -0.06 | -1.10 | -0.40 | 1.81 | 5.53 | 9.36 | 10.36 | 8.73 | -0.63 | -2.39 | -0.78 | 1.80 | 2.69 |
| LA | -1.06 | -0.98 | -5.63 | -0.11 | 2.73 | -8.95 | -2.30 | 1.07 | -2.81 | -3.74 | -3.82 | -1.07 | -2.22 |
| ME | -0.51 | 1.54 | 1.68 | -0.40 | -1.18 | 1.16 | 0.17 | -1.35 | -2.86 | -0.39 | 0.34 | 0.93 | -0.07 |
| MD | 2.09 | 1.02 | 2.39 | -1.19 | -0.63 | 0.45 | -0.72 | -1.02 | -2.22 | -0.53 | -1.49 | 2.76 | 0.08 |
| MA | 1.10 | 1.01 | 4.47 | 0.85 | -3.27 | -0.36 | -1.67 | -0.65 | -2.30 | -0.60 | 0.36 | 0.97 | -0.01 |
| MI | 1.01 | 0.26 | 0.52 | -0.92 | -1.33 | 0.96 | -0.54 | 0.50 | 0.12 | -2.78 | 0.05 | 0.99 | -0.10 |
| MN | 0.78 | 1.62 | 0.08 | 0.15 | -1.38 | 1.36 | 0.81 | 2.56 | -0.44 | -0.24 | 0.52 | -0.13 | 0.47 |
| MS | -2.96 | -5.19 | -2.24 | -3.94 | 2.67 | -1.18 | 3.14 | 6.69 | 2.04 | -4.92 | -3.87 | 0.03 | -0.81 |
| MO | -0.42 | -2.27 | 0.24 | -0.38 | 1.09 | -0.32 | 5.22 | 3.79 | -0.27 | -2.77 | -0.87 | -0.06 | 0.25 |
| NE | -0.06 | 0.39 | -0.84 | -1.27 | 0.32 | 3.85 | 3.15 | 4.94 | -2.34 | -0.48 | -0.48 | 0.17 | 0.61 |
| NH | -1.39 | 0.16 | 4.77 | 0.09 | -1.21 | -2.18 | -2.80 | -1.99 | -5.08 | -1.48 | 0.82 | 0.57 | -0.81 |
| NJ | 0.98 | 1.14 | -2.69 | -0.42 | -2.92 | -3.67 | -0.35 | -0.14 | 0.14 | 0.12 | -0.30 | 2.35 | -0.48 |
| NM | 0.19 | 0.72 | 0.39 | 0.83 | 1.87 | 1.34 | 0.53 | 1.58 | -0.36 | -0.03 | -0.45 | -0.03 | 0.55 |
| NY | -0.02 | 0.99 | 2.06 | 0.16 | 0.09 | -1.26 | -0.64 | -1.34 | -3.06 | -0.92 | 0.21 | 1.30 | -0.20 |
| NC | 0.35 | -0.36 | -0.01 | 0.81 | 3.34 | 6.01 | 3.18 | 4.41 | -2.31 | -0.99 | -0.47 | 0.08 | 1.17 |
| ND | 0.33 | 0.86 | 0.39 | -0.22 | -0.38 | -0.37 | 5.00 | 1.93 | 1.01 | -0.34 | 0.11 | 0.69 | 0.75 |
| OH | -0.09 | -0.12 | 0.13 | 1.02 | -0.88 | 2.67 | 1.07 | 1.47 | -1.63 | -0.99 | 1.67 | 1.75 | 0.51 |
| OK | -1.72 | 0.13 | -0.72 | 0.20 | -3.53 | 3.99 | 5.12 | 3.46 | 0.02 | -2.75 | -0.45 | -0.16 | 0.30 |

| Region | Jan '01 | Feb '01 | Mar `01 | Apr `01 | May `01 | Jun `01 | Jul `01 | Aug `01 | Sep `01 | Oct `01 | Nov `01 | Dec `01 | Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PA | 0.32 | 0.21 | -0.02 | -0.86 | 1.07 | 0.63 | 0.39 | -1.71 | -2.16 | -1.26 | -0.08 | 0.76 | -0.23 |
| RI | 0.19 | -0.99 | 2.02 | -1.45 | -5.86 | -1.27 | -3.02 | -3.40 | -3.78 | 0.19 | 0.53 | 3.78 | -1.09 |
| SC | -0.05 | -0.49 | 2.33 | 1.52 | 3.64 | 5.13 | 6.42 | 8.61 | -2.14 | -1.14 | -0.71 | 0.25 | 1.95 |
| SD | 0.82 | 1.52 | 0.18 | -0.73 | -1.45 | 0.96 | 0.19 | 2.16 | 0.04 | -0.57 | 0.95 | 0.23 | 0.36 |
| TN | -1.14 | -4.83 | 0.26 | -1.44 | 1.60 | 2.63 | 7.70 | 8.37 | 0.69 | -2.90 | -4.28 | -0.23 | 0.54 |
| TX | 0.43 | 0.44 | -0.20 | 0.54 | 1.86 | 1.59 | 2.90 | 7.57 | 3.25 | 0.18 | -1.61 | -1.19 | 1.31 |
| VT | 0.09 | 0.58 | 1.84 | 0.12 | -0.55 | -1.26 | -2.35 | -1.51 | -4.84 | -0.63 | 0.17 | 1.18 | -0.60 |
| VA | 1.19 | -0.65 | 0.53 | 0.24 | 0.39 | 5.28 | -2.27 | 3.12 | -1.34 | -1.04 | -0.22 | 1.16 | 0.53 |
| WV | 0.33 | 0.62 | 0.13 | 2.38 | 3.15 | 5.73 | -1.36 | 1.49 | -1.55 | -0.33 | 0.60 | 1.85 | 1.09 |
| WI | 0.03 | 0.47 | -0.15 | -0.07 | -2.68 | -4.42 | -3.80 | -0.62 | -2.90 | -1.10 | -0.62 | -0.06 | -1.33 |
| WY | 0.28 | 1.71 | 0.72 | 0.53 | -0.31 | 1.95 | 2.18 | 1.24 | 0.74 | 0.88 | 0.41 | 0.78 | 0.93 |
| CENRAP | -0.36 | -0.24 | -0.75 | -0.14 | 0.10 | 1.57 | 4.02 | 5.03 | 0.42 | -1.32 | -0.93 | -0.48 | 0.58 |
| MANE_VU | 0.13 | 0.68 | 1.45 | -0.26 | -0.21 | -0.61 | -0.47 | -1.41 | -2.78 | -0.92 | 0.10 | 1.14 | -0.26 |
| MW | 0.35 | -0.30 | -0.07 | 0.33 | -0.32 | 1.05 | -0.53 | 1.01 | -1.28 | -1.74 | 0.13 | 1.44 | 0.01 |

**Figure 3-222: Annual Accumulated Mean Precipitation Bias (cm).**

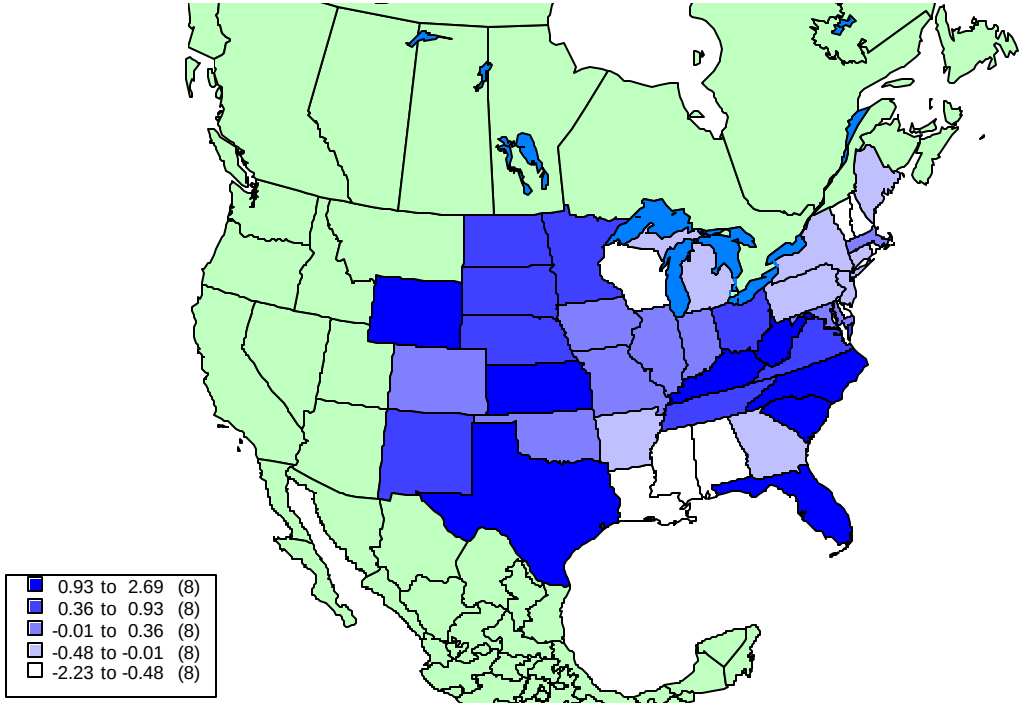


**Figure 3-223: Accumulated Precipitation Error (cm).**

| Region | Jan '01 | Feb '01 | Mar `01 | Apr `01 | May `01 | Jun `01 | Jul `01 | Aug `01 | Sep `01 | Oct `01 | Nov `01 | Dec `01 | Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ALL | 1.40 | 2.09 | 2.17 | 2.22 | 3.68 | 4.71 | 5.29 | 5.71 | 3.55 | 2.57 | 2.08 | 1.84 | 3.11 |
| AL | 1.80 | 4.75 | 8.62 | 4.75 | 4.51 | 6.51 | 4.60 | 5.11 | 4.89 | 3.73 | 4.81 | 2.55 | 4.72 |
| AR | 3.21 | 4.13 | 3.52 | 1.94 | 5.42 | 5.93 | 7.92 | 5.53 | 3.96 | 4.68 | 2.52 | 4.38 | 4.43 |
| CO | 0.87 | 1.13 | 1.24 | 2.18 | 2.55 | 2.02 | 3.36 | 3.07 | 1.40 | 0.55 | 0.82 | 0.82 | 1.67 |
| CT | 1.14 | 2.06 | 1.35 | 0.65 | 4.89 | 4.75 | 2.22 | 3.95 | 2.22 | 1.00 | 0.45 | 2.69 | 2.28 |
| DE | 1.82 | 1.03 | 1.80 | 1.11 | 7.59 | 4.36 | 2.53 | 4.05 | 1.64 | 0.26 | 1.51 | 3.14 | 2.57 |
| FL | 1.42 | 1.34 | 5.57 | 1.71 | 6.27 | 7.78 | 10.72 | 21.28 | 9.29 | 4.32 | 2.43 | 2.33 | 6.21 |
| GA | 2.10 | 2.10 | 4.61 | 1.61 | 3.75 | 6.72 | 6.26 | 4.88 | 3.43 | 1.93 | 1.45 | 1.69 | 3.38 |
| IL | 1.22 | 2.09 | 1.05 | 2.07 | 3.90 | 3.90 | 3.90 | 3.89 | 2.65 | 3.81 | 2.02 | 1.98 | 2.71 |
| IN | 1.06 | 2.28 | 0.82 | 2.71 | 3.99 | 4.29 | 5.61 | 5.57 | 3.40 | 3.28 | 1.83 | 2.41 | 3.10 |
| IA | 0.90 | 1.13 | 0.97 | 2.63 | 4.90 | 3.70 | 6.17 | 6.51 | 4.12 | 2.67 | 1.10 | 0.72 | 2.96 |
| KS | 1.05 | 1.82 | 1.40 | 2.73 | 4.06 | 5.93 | 10.86 | 6.77 | 4.19 | 1.20 | 0.82 | 0.53 | 3.45 |
| KY | 0.91 | 1.86 | 1.22 | 2.18 | 5.81 | 9.67 | 11.26 | 9.34 | 2.77 | 3.89 | 3.92 | 2.84 | 4.64 |
| LA | 2.72 | 2.40 | 7.50 | 1.86 | 4.72 | 14.07 | 5.00 | 4.17 | 5.71 | 5.21 | 6.80 | 4.47 | 5.39 |
| ME | 1.11 | 1.62 | 2.35 | 0.80 | 2.03 | 3.24 | 2.90 | 2.05 | 3.87 | 1.42 | 1.06 | 1.15 | 1.97 |
| MD | 2.09 | 1.02 | 2.39 | 1.57 | 1.85 | 2.33 | 4.78 | 2.71 | 3.09 | 0.53 | 1.90 | 2.76 | 2.25 |
| MA | 1.25 | 1.01 | 4.47 | 1.88 | 3.49 | 2.67 | 1.75 | 2.91 | 2.67 | 0.90 | 0.66 | 1.17 | 2.07 |
| MI | 1.19 | 2.00 | 0.78 | 1.90 | 3.18 | 2.24 | 2.70 | 3.11 | 2.29 | 4.00 | 1.55 | 1.70 | 2.22 |
| MN | 0.86 | 1.72 | 0.53 | 4.28 | 2.32 | 4.88 | 4.27 | 3.87 | 1.95 | 1.87 | 1.49 | 0.63 | 2.39 |
| MS | 4.16 | 6.60 | 5.77 | 5.34 | 3.89 | 6.93 | 7.29 | 7.94 | 6.59 | 6.30 | 6.18 | 3.85 | 5.90 |
| MO | 1.28 | 3.64 | 1.34 | 2.92 | 5.06 | 3.58 | 6.73 | 4.91 | 3.01 | 3.83 | 1.59 | 1.56 | 3.29 |
| NE | 0.56 | 1.20 | 1.13 | 2.62 | 3.84 | 4.39 | 5.36 | 5.48 | 2.91 | 1.06 | 1.48 | 0.35 | 2.53 |
| NH | 1.63 | 2.58 | 4.77 | 0.98 | 2.01 | 4.41 | 3.38 | 2.84 | 5.31 | 2.21 | 2.13 | 1.62 | 2.82 |
| NJ | 1.99 | 1.67 | 4.16 | 1.11 | 3.37 | 6.04 | 4.70 | 4.89 | 2.85 | 0.42 | 1.02 | 2.35 | 2.88 |
| NM | 1.01 | 1.08 | 1.21 | 0.96 | 2.08 | 2.04 | 3.96 | 4.82 | 1.50 | 0.55 | 0.89 | 0.43 | 1.71 |
| NY | 1.11 | 1.50 | 2.85 | 0.96 | 1.44 | 3.68 | 1.95 | 3.29 | 3.64 | 1.79 | 1.17 | 1.66 | 2.09 |
| NC | 1.07 | 1.47 | 2.53 | 1.63 | 3.82 | 8.13 | 6.76 | 5.44 | 3.65 | 1.47 | 0.88 | 1.21 | 3.17 |
| ND | 0.37 | 0.87 | 0.53 | 1.33 | 1.54 | 3.04 | 6.39 | 2.45 | 1.69 | 1.22 | 0.39 | 0.78 | 1.72 |
| OH | 0.94 | 0.73 | 0.95 | 2.02 | 3.10 | 3.45 | 4.12 | 4.11 | 2.35 | 2.84 | 2.02 | 1.96 | 2.38 |
| OK | 1.90 | 2.97 | 1.20 | 1.87 | 6.27 | 4.21 | 5.93 | 4.12 | 4.80 | 3.60 | 1.61 | 2.44 | 3.41 |

| Region | Jan '01 | Feb '01 | Mar `01 | Apr `01 | May `01 | Jun `01 | Jul `01 | Aug `01 | Sep `01 | Oct `01 | Nov `01 | Dec `01 | Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PA | 1.02 | 0.76 | 1.91 | 2.10 | 2.26 | 3.23 | 2.88 | 3.83 | 2.84 | 1.80 | 1.44 | 1.44 | 2.13 |
| RI | 0.19 | 1.31 | 2.69 | 1.45 | 5.86 | 7.96 | 3.02 | 3.40 | 3.78 | 0.81 | 0.86 | 3.78 | 2.93 |
| SC | 1.28 | 1.61 | 4.14 | 1.77 | 4.56 | 5.39 | 7.45 | 8.61 | 4.59 | 2.39 | 1.08 | 1.11 | 3.66 |
| SD | 1.01 | 1.97 | 0.64 | 2.18 | 1.86 | 2.71 | 3.77 | 2.74 | 1.47 | 1.01 | 1.46 | 0.35 | 1.76 |
| TN | 1.80 | 5.67 | 1.51 | 2.18 | 4.17 | 4.46 | 9.18 | 11.36 | 2.54 | 3.92 | 4.83 | 2.92 | 4.55 |
| TX | 2.16 | 2.76 | 2.58 | 1.79 | 4.41 | 4.84 | 4.15 | 10.54 | 5.63 | 3.24 | 3.83 | 2.98 | 4.08 |
| VT | 0.42 | 1.42 | 2.74 | 0.42 | 1.69 | 3.44 | 3.74 | 3.45 | 5.66 | 1.40 | 1.47 | 1.22 | 2.26 |
| VA | 1.34 | 1.13 | 1.98 | 1.37 | 4.24 | 6.39 | 4.18 | 4.52 | 2.07 | 1.09 | 0.71 | 1.60 | 2.55 |
| WV | 0.93 | 1.07 | 1.32 | 2.73 | 4.10 | 6.29 | 7.66 | 3.34 | 2.14 | 0.81 | 1.05 | 1.86 | 2.77 |
| WI | 0.57 | 0.93 | 0.55 | 3.29 | 4.06 | 5.44 | 4.21 | 3.75 | 3.89 | 2.12 | 1.48 | 0.93 | 2.60 |
| WY | 0.47 | 1.71 | 1.01 | 1.23 | 1.36 | 2.00 | 3.39 | 1.46 | 1.70 | 1.36 | 1.03 | 0.82 | 1.46 |
| CENRAP | 1.68 | 2.48 | 2.05 | 2.41 | 4.54 | 5.17 | 6.02 | 6.87 | 4.29 | 3.03 | 2.48 | 2.12 | 3.60 |
| MANE_VU | 1.16 | 1.33 | 2.76 | 1.35 | 2.20 | 3.62 | 2.71 | 3.41 | 3.53 | 1.60 | 1.30 | 1.58 | 2.21 |
| MW | 1.01 | 1.59 | 0.85 | 2.38 | 3.63 | 3.87 | 4.19 | 4.15 | 2.89 | 3.16 | 1.83 | 1.82 | 2.61 |

**Figure 3-224: Annual Accumulated Mean Precipitation Error (cm).**

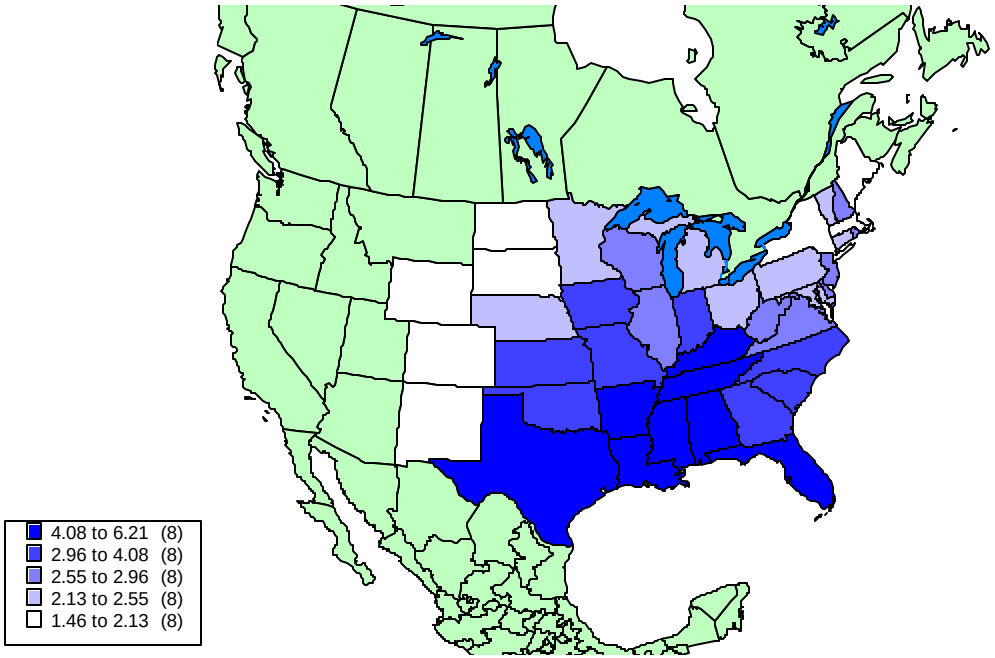


**Figure 3-225: Model Estimated and Observed Mean Monthly Total Precipitation for 2001.**

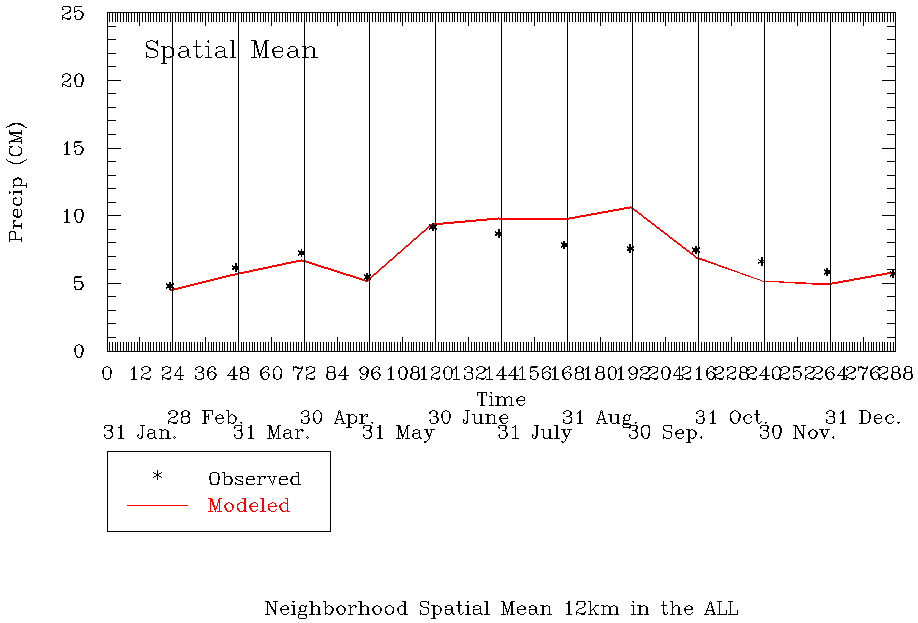



**Figure 3-226: Model Estimated and Observed Mean Monthly Total Precipitation for 2001 in the CENRAP States.**

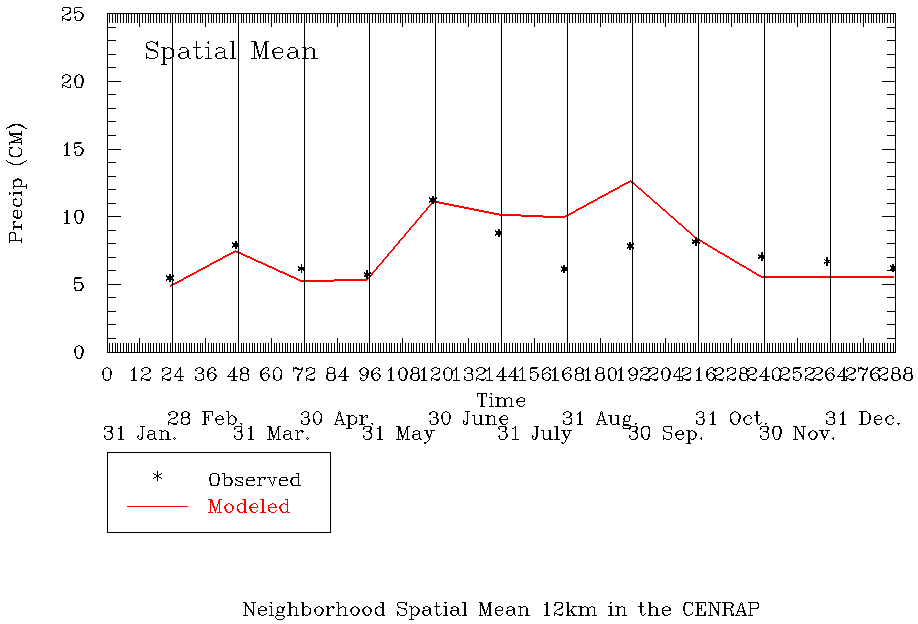


**Figure 3-227: Model Estimated and Observed Mean Monthly Total Precipitation for 2001 in the MANE_VU States.**

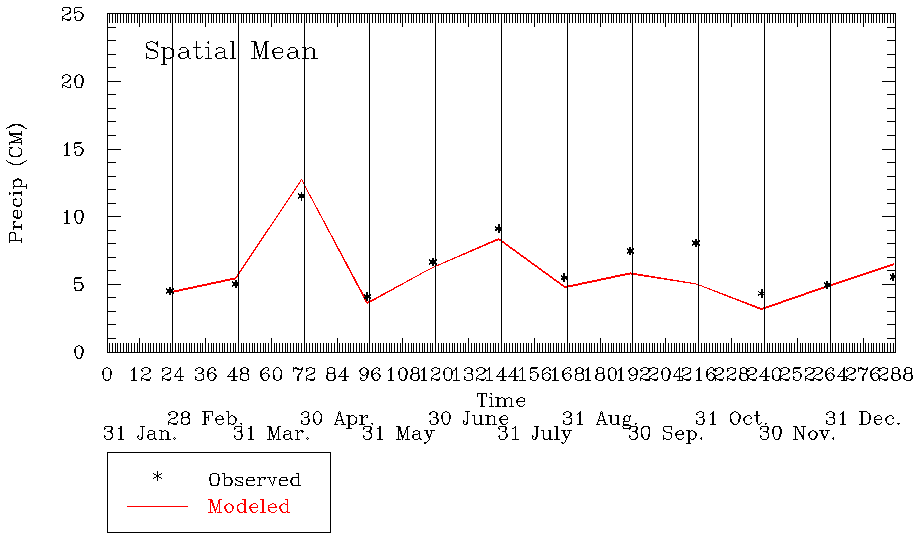



**Figure 3-228: Model Estimated and Observed Mean Monthly Total Precipitation for 2001 in the Midwest RPO States.**

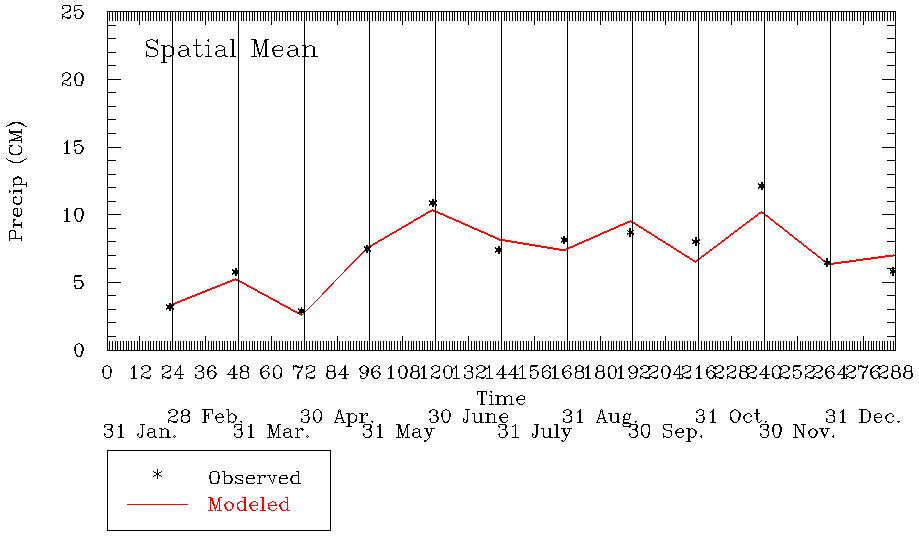
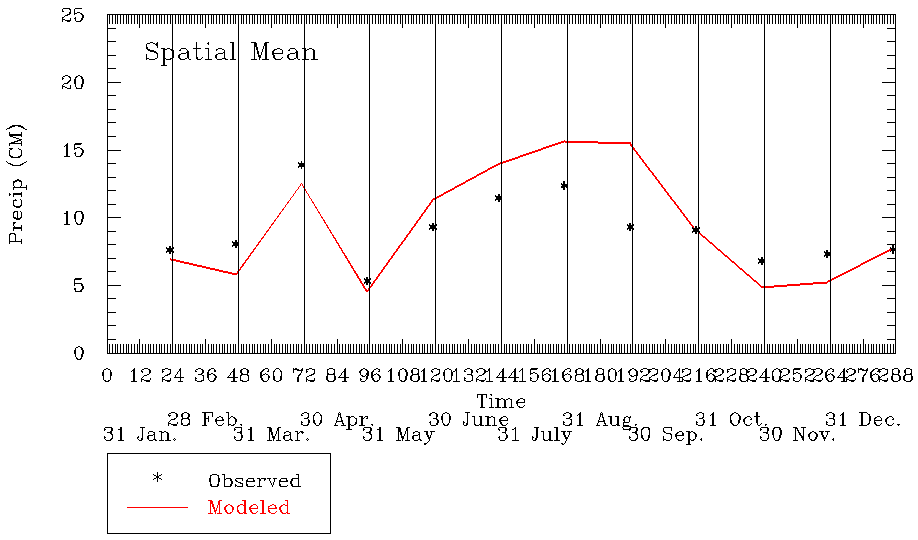


**Figure 3-229: Model Estimated and Observed Mean Monthly Total Precipitation for 2001 in the VISTAS States.**




Neighborhood Spatial Mean 12km in the VISTAS

**Table 3-6: Wind Index of Agreement.**

| Region | Jan '01 | Feb '01 | Mar `01 | Apr `01 | May `01 | Jun `01 | Jul `01 | Aug `01 | Sep `01 | Oct `01 | Nov `01 | Dec `01 | Jan '02 | Feb '02 | Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ALL | 0.88 | 0.90 | 0.89 | 0.91 | 0.91 | 0.89 | 0.87 | 0.88 | 0.88 | 0.88 | 0.89 | 0.87 | 0.87 | 0.90 | 0.89 |
| AL | 0.68 | 0.70 | 0.70 | 0.71 | 0.70 | 0.72 | 0.71 | 0.69 | 0.70 | 0.67 | 0.66 | 0.67 | 0.67 | 0.69 | 0.69 |
| AR | 0.69 | 0.73 | 0.75 | 0.71 | 0.70 | 0.69 | 0.69 | 0.69 | 0.68 | 0.67 | 0.71 | 0.71 | 0.73 | 0.73 | 0.71 |
| CO | 0.80 | 0.78 | 0.79 | 0.78 | 0.82 | 0.82 | 0.79 | 0.79 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.81 | 0.80 |
| CT | 0.49 | 0.51 | 0.54 | 0.58 | 0.59 | 0.57 | 0.57 | 0.56 | 0.52 | 0.52 | 0.52 | 0.53 | 0.52 | 0.51 | 0.54 |
| DE | 0.43 | 0.49 | 0.50 | 0.52 | 0.49 | 0.48 | 0.49 | 0.48 | 0.44 | 0.46 | 0.45 | 0.46 | 0.45 | 0.48 | 0.47 |
| FL | 0.68 | 0.75 | 0.69 | 0.74 | 0.77 | 0.73 | 0.74 | 0.75 | 0.72 | 0.68 | 0.69 | 0.68 | 0.70 | 0.70 | 0.72 |
| GA | 0.59 | 0.63 | 0.66 | 0.63 | 0.67 | 0.66 | 0.67 | 0.64 | 0.62 | 0.58 | 0.60 | 0.58 | 0.58 | 0.61 | 0.62 |
| IL | 0.64 | 0.69 | 0.64 | 0.71 | 0.70 | 0.67 | 0.69 | 0.68 | 0.65 | 0.64 | 0.63 | 0.62 | 0.65 | 0.69 | 0.66 |
| IN | 0.64 | 0.66 | 0.64 | 0.66 | 0.66 | 0.64 | 0.63 | 0.65 | 0.61 | 0.62 | 0.62 | 0.61 | 0.64 | 0.65 | 0.64 |
| IA | 0.66 | 0.66 | 0.67 | 0.71 | 0.71 | 0.70 | 0.69 | 0.70 | 0.67 | 0.66 | 0.65 | 0.65 | 0.65 | 0.68 | 0.68 |
| KS | 0.68 | 0.68 | 0.78 | 0.75 | 0.75 | 0.74 | 0.68 | 0.73 | 0.75 | 0.73 | 0.71 | 0.69 | 0.68 | 0.69 | 0.72 |
| KY | 0.55 | 0.60 | 0.59 | 0.60 | 0.60 | 0.60 | 0.57 | 0.59 | 0.55 | 0.54 | 0.54 | 0.58 | 0.58 | 0.58 | 0.58 |
| LA | 0.61 | 0.60 | 0.65 | 0.59 | 0.62 | 0.62 | 0.63 | 0.64 | 0.58 | 0.61 | 0.58 | 0.60 | 0.60 | 0.62 | 0.61 |
| ME | 0.59 | 0.61 | 0.60 | 0.59 | 0.64 | 0.65 | 0.61 | 0.60 | 0.61 | 0.62 | 0.64 | 0.63 | 0.60 | 0.60 | 0.61 |
| MD | 0.50 | 0.56 | 0.55 | 0.61 | 0.64 | 0.61 | 0.66 | 0.62 | 0.57 | 0.54 | 0.53 | 0.57 | 0.52 | 0.53 | 0.57 |
| MA | 0.61 | 0.59 | 0.64 | 0.68 | 0.66 | 0.65 | 0.63 | 0.64 | 0.60 | 0.61 | 0.64 | 0.61 | 0.63 | 0.62 | 0.63 |
| MI | 0.69 | 0.66 | 0.67 | 0.70 | 0.69 | 0.70 | 0.67 | 0.69 | 0.67 | 0.64 | 0.68 | 0.69 | 0.70 | 0.70 | 0.68 |
| MN | 0.69 | 0.69 | 0.68 | 0.74 | 0.72 | 0.72 | 0.68 | 0.69 | 0.70 | 0.70 | 0.70 | 0.68 | 0.70 | 0.73 | 0.70 |
| MS | 0.59 | 0.61 | 0.62 | 0.58 | 0.62 | 0.63 | 0.63 | 0.64 | 0.60 | 0.57 | 0.57 | 0.59 | 0.61 | 0.62 | 0.61 |
| MO | 0.64 | 0.68 | 0.69 | 0.70 | 0.70 | 0.71 | 0.71 | 0.70 | 0.66 | 0.67 | 0.66 | 0.67 | 0.67 | 0.68 | 0.68 |
| NE | 0.70 | 0.76 | 0.79 | 0.78 | 0.77 | 0.77 | 0.74 | 0.76 | 0.76 | 0.74 | 0.74 | 0.71 | 0.71 | 0.72 | 0.75 |
| NH | 0.51 | 0.45 | 0.49 | 0.53 | 0.55 | 0.58 | 0.56 | 0.54 | 0.54 | 0.45 | 0.44 | 0.48 | 0.45 | 0.49 | 0.50 |
| NJ | 0.48 | 0.53 | 0.57 | 0.61 | 0.59 | 0.59 | 0.57 | 0.58 | 0.53 | 0.50 | 0.49 | 0.53 | 0.51 | 0.55 | 0.55 |
| NM | 0.78 | 0.76 | 0.81 | 0.75 | 0.78 | 0.76 | 0.75 | 0.75 | 0.79 | 0.80 | 0.78 | 0.79 | 0.81 | 0.82 | 0.78 |
| NY | 0.71 | 0.69 | 0.71 | 0.75 | 0.73 | 0.76 | 0.71 | 0.72 | 0.71 | 0.70 | 0.69 | 0.72 | 0.68 | 0.72 | 0.71 |
| NC | 0.62 | 0.64 | 0.66 | 0.68 | 0.68 | 0.66 | 0.68 | 0.68 | 0.63 | 0.59 | 0.59 | 0.63 | 0.62 | 0.63 | 0.64 |
| ND | 0.65 | 0.72 | 0.73 | 0.77 | 0.74 | 0.74 | 0.77 | 0.72 | 0.73 | 0.71 | 0.68 | 0.65 | 0.68 | 0.69 | 0.71 |
| OH | 0.62 | 0.63 | 0.64 | 0.67 | 0.67 | 0.65 | 0.65 | 0.63 | 0.63 | 0.65 | 0.64 | 0.66 | 0.65 | 0.65 | 0.65 |
| OK | 0.64 | 0.62 | 0.70 | 0.70 | 0.70 | 0.74 | 0.70 | 0.67 | 0.71 | 0.71 | 0.69 | 0.68 | 0.69 | 0.70 | 0.69 |
| PA | 0.66 | 0.68 | 0.70 | 0.70 | 0.70 | 0.69 | 0.67 | 0.66 | 0.68 | 0.66 | 0.68 | 0.70 | 0.68 | 0.69 | 0.68 |

| Region | Jan '01 | Feb '01 | Mar `01 | Apr `01 | May `01 | Jun `01 | Jul `01 | Aug `01 | Sep `01 | Oct `01 | Nov `01 | Dec `01 | Jan '02 | Feb '02 | Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RI | 0.56 | 0.57 | 0.52 | 0.58 | 0.57 | 0.57 | 0.54 | 0.56 | 0.50 | 0.54 | 0.60 | 0.56 | 0.59 | 0.57 | 0.56 |
| SC | 0.57 | 0.59 | 0.62 | 0.59 | 0.64 | 0.62 | 0.62 | 0.61 | 0.57 | 0.54 | 0.54 | 0.56 | 0.57 | 0.59 | 0.59 |
| SD | 0.71 | 0.79 | 0.78 | 0.77 | 0.76 | 0.78 | 0.77 | 0.79 | 0.78 | 0.75 | 0.75 | 0.71 | 0.71 | 0.73 | 0.76 |
| TN | 0.64 | 0.68 | 0.65 | 0.67 | 0.65 | 0.62 | 0.61 | 0.63 | 0.61 | 0.60 | 0.59 | 0.67 | 0.67 | 0.67 | 0.64 |
| TX | 0.79 | 0.78 | 0.80 | 0.79 | 0.78 | 0.79 | 0.76 | 0.76 | 0.78 | 0.78 | 0.76 | 0.79 | 0.80 | 0.80 | 0.78 |
| VT | 0.55 | 0.52 | 0.50 | 0.49 | 0.55 | 0.54 | 0.54 | 0.53 | 0.52 | 0.54 | 0.55 | 0.53 | 0.55 | 0.55 | 0.53 |
| VA | 0.66 | 0.67 | 0.70 | 0.70 | 0.70 | 0.68 | 0.72 | 0.68 | 0.66 | 0.61 | 0.63 | 0.64 | 0.63 | 0.65 | 0.67 |
| WV | 0.58 | 0.60 | 0.63 | 0.63 | 0.62 | 0.59 | 0.59 | 0.56 | 0.56 | 0.56 | 0.58 | 0.59 | 0.60 | 0.58 | 0.59 |
| WI | 0.64 | 0.64 | 0.62 | 0.68 | 0.67 | 0.64 | 0.64 | 0.65 | 0.65 | 0.63 | 0.65 | 0.63 | 0.64 | 0.66 | 0.65 |
| WY | 0.76 | 0.76 | 0.74 | 0.77 | 0.76 | 0.77 | 0.76 | 0.76 | 0.79 | 0.77 | 0.79 | 0.75 | 0.73 | 0.77 | 0.76 |
| CENRAP | 0.86 | 0.88 | 0.88 | 0.89 | 0.88 | 0.86 | 0.84 | 0.85 | 0.85 | 0.86 | 0.86 | 0.84 | 0.87 | 0.88 | 0.86 |
| MANE-VU | 0.71 | 0.70 | 0.75 | 0.76 | 0.76 | 0.77 | 0.73 | 0.73 | 0.71 | 0.69 | 0.69 | 0.72 | 0.69 | 0.71 | 0.72 |
| MW | 0.74 | 0.76 | 0.74 | 0.80 | 0.78 | 0.76 | 0.74 | 0.77 | 0.75 | 0.74 | 0.75 | 0.75 | 0.76 | 0.79 | 0.76 |
| VISTAS | 0.77 | 0.81 | 0.80 | 0.81 | 0.82 | 0.79 | 0.81 | 0.79 | 0.77 | 0.78 | 0.77 | 0.78 | 0.77 | 0.79 | 0.79 |

**Figure 3-230: Wind Index of Agreement.**

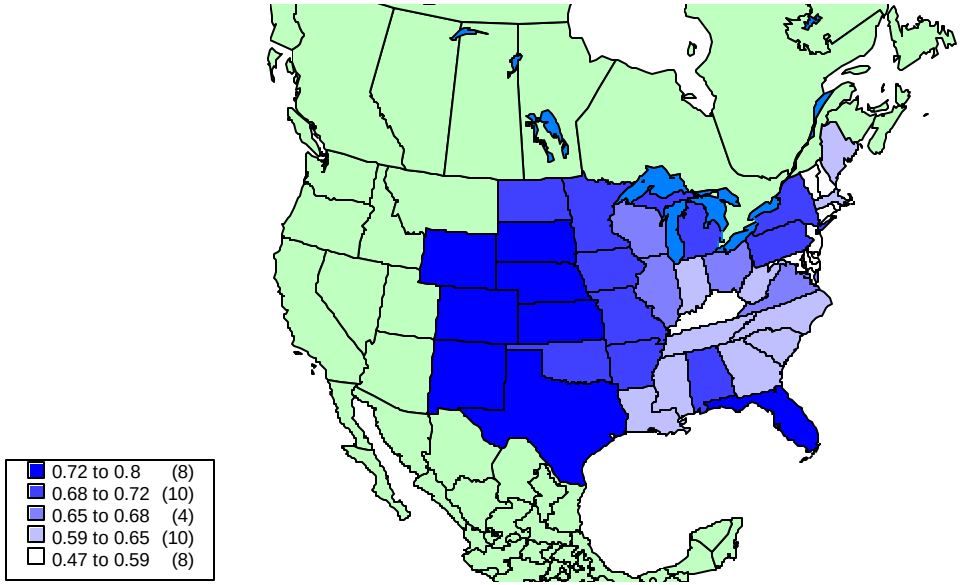


**Figure 3-231: Wind Index of Agreement for January 2001.**

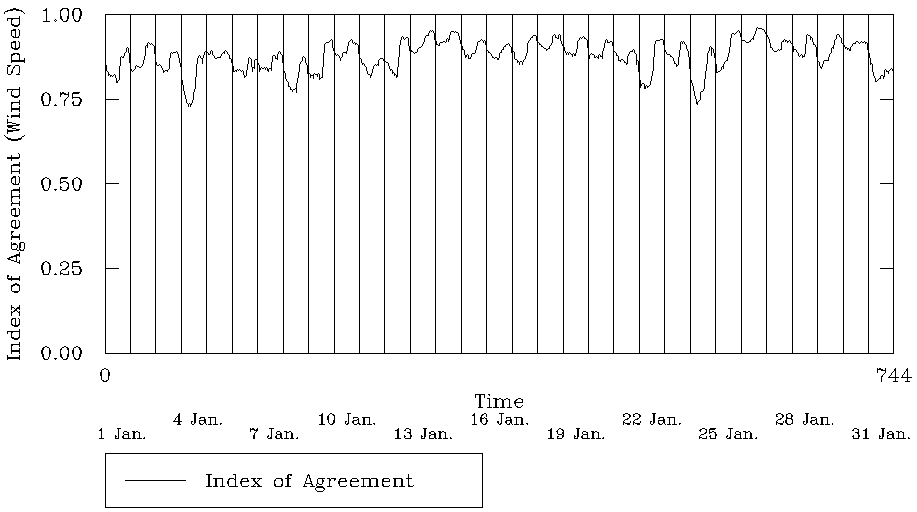



**Figure 3-232: Wind Index of Agreement for February 2001.**

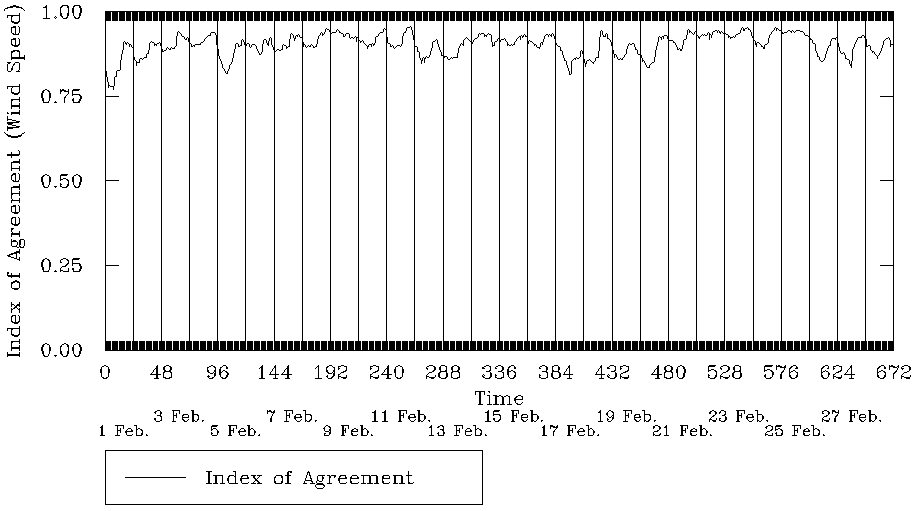


**Figure 3-233: Wind Index of Agreement for March 2001.**

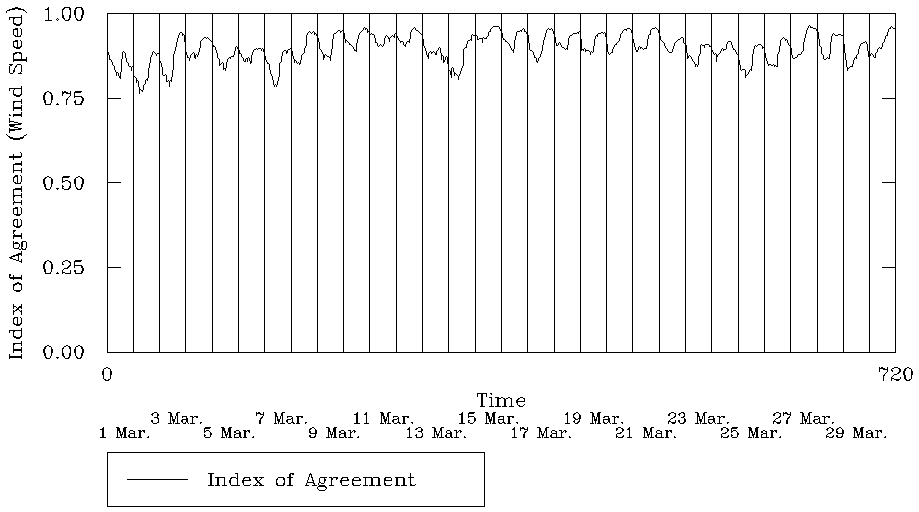



**Figure 3-234: Wind Index of Agreement for April 2001.**

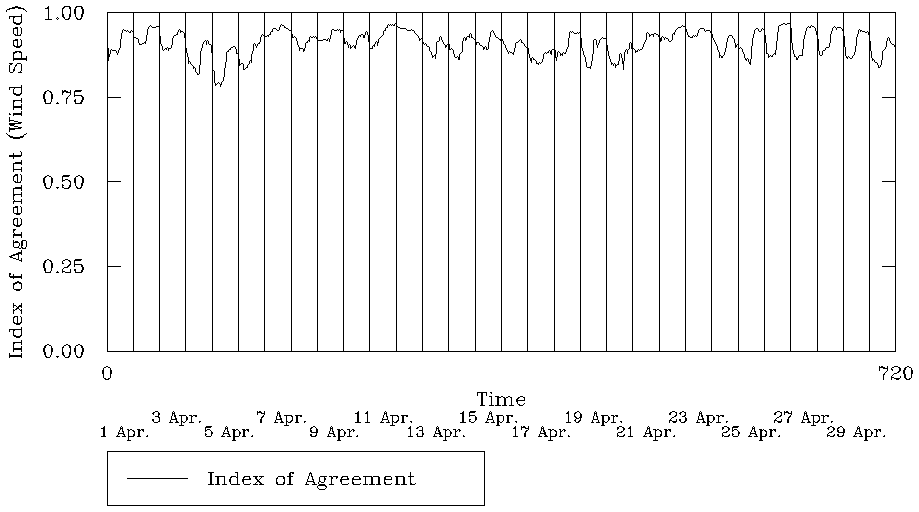


**Figure 3-235 Wind Index of Agreement for May 2001.**

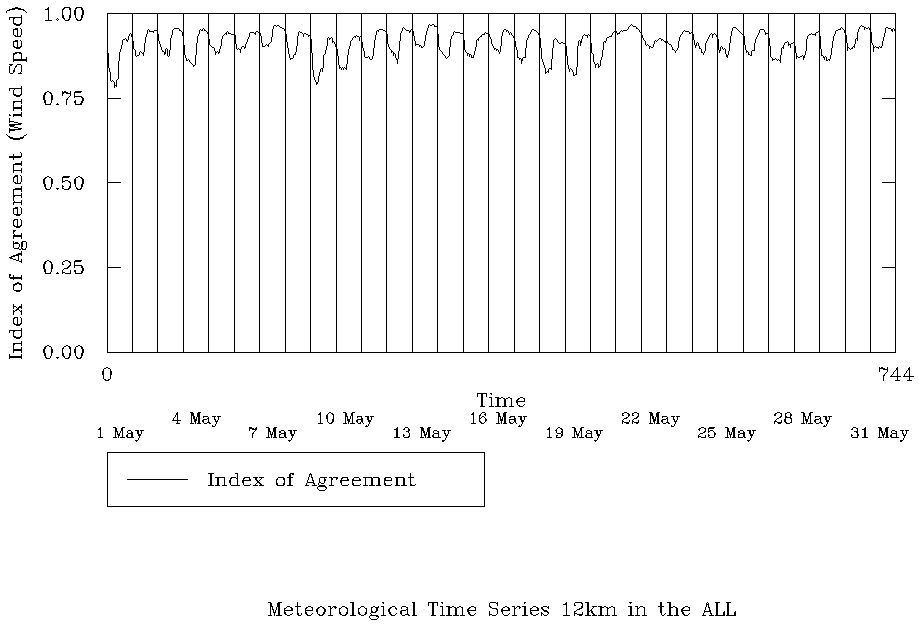



**Figure 3-236: Wind Index of Agreement for June 2001.**

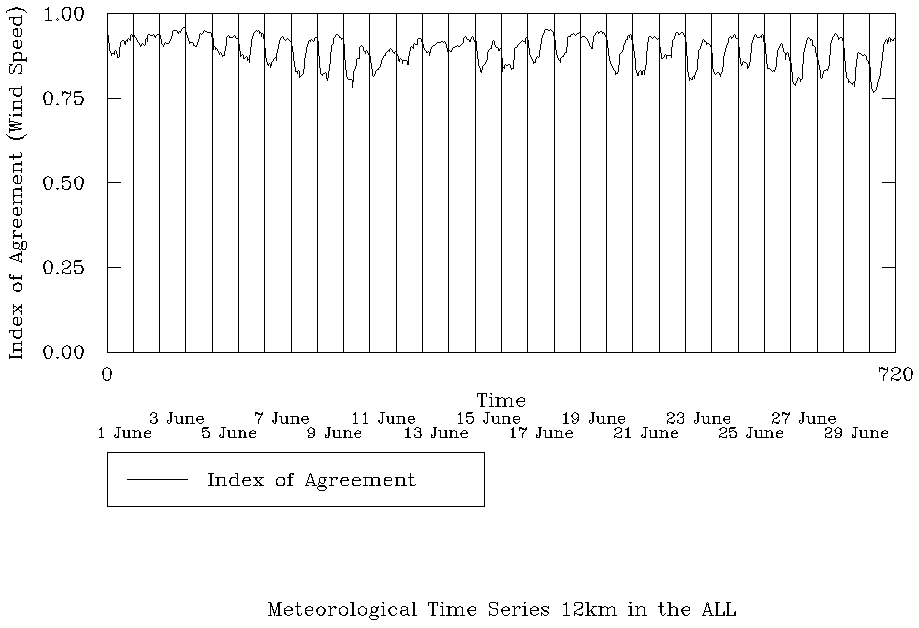


**Figure 3-237: Wind Index of Agreement for July 2001.**

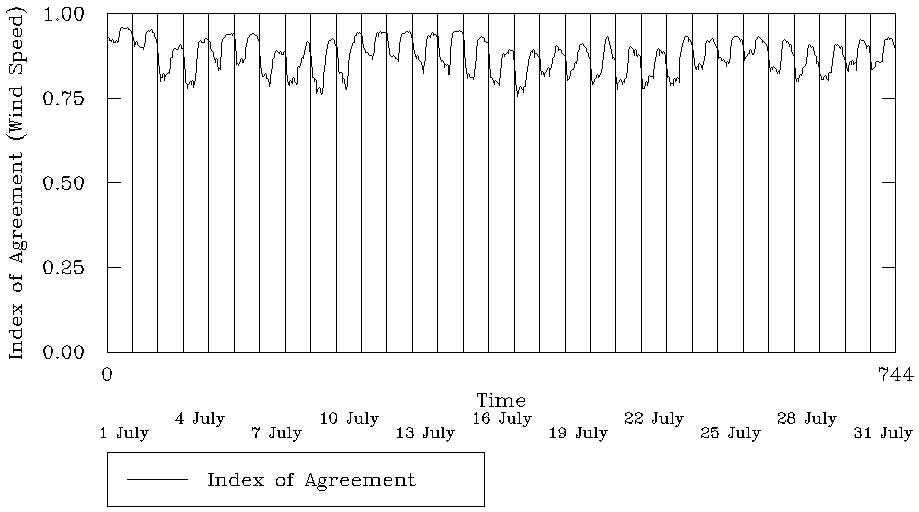



**Figure 3-238: Wind Index of Agreement for August 2001.**

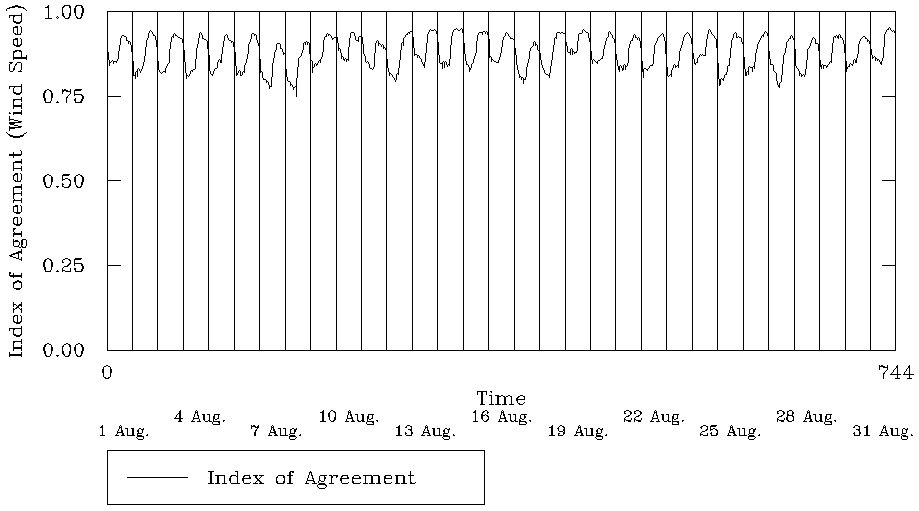


**Figure 3-239: Wind Index of Agreement for September 2001.**

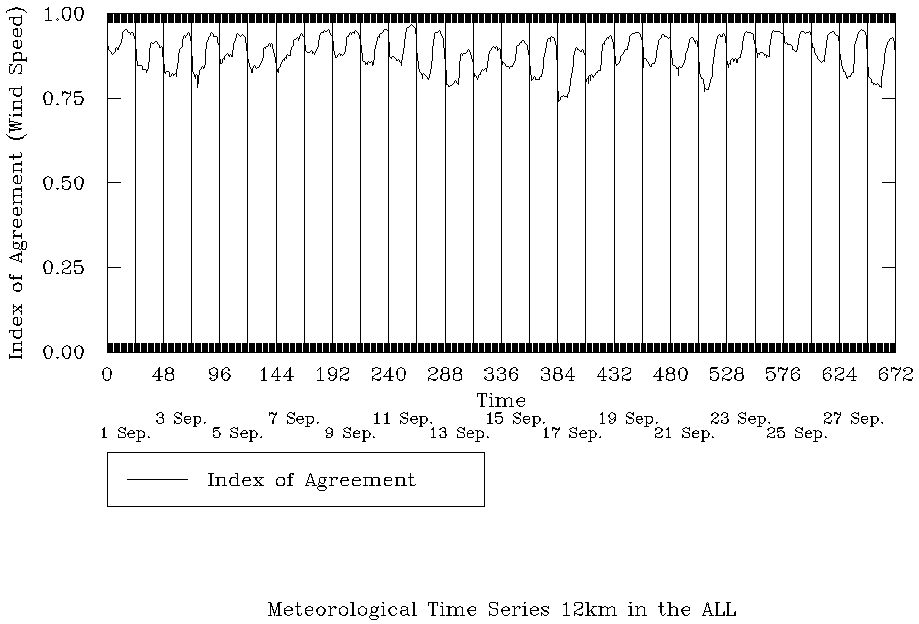



**Figure 3-240: Wind Index of Agreement for October 2001.**

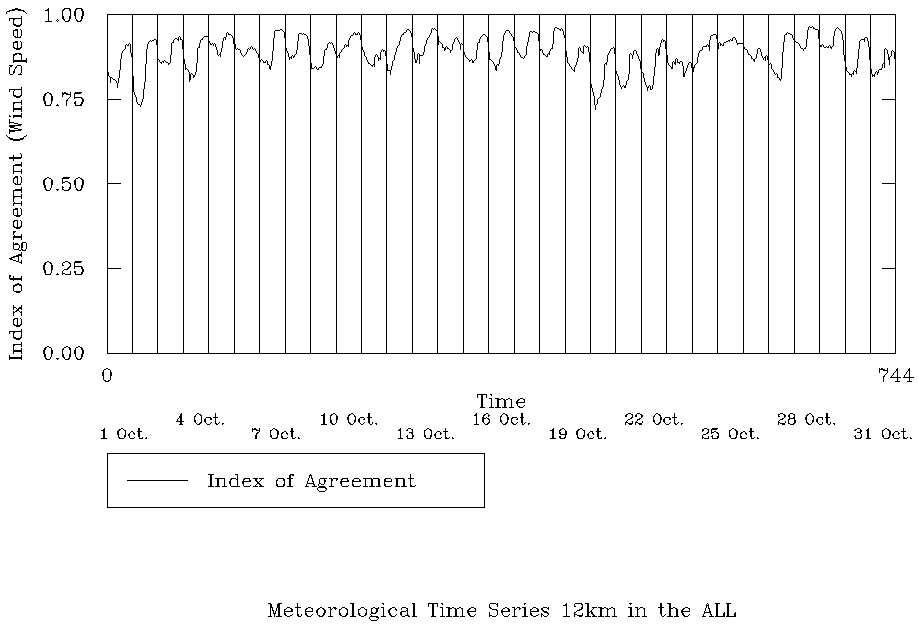


**Figure 3-241: Wind Index of Agreement for November 2001.**

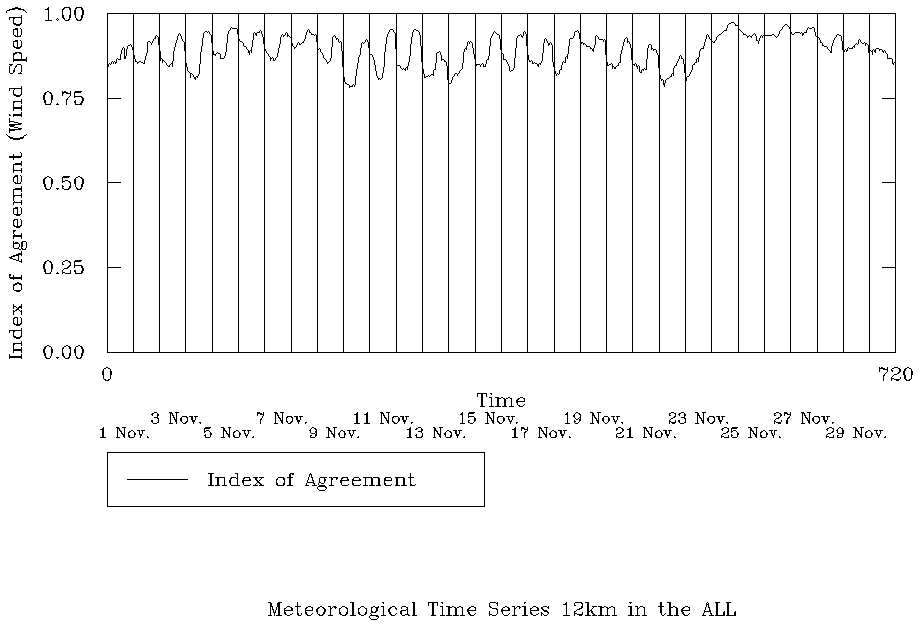



**Figure 3-242: Wind Index of Agreement for December 2001.**

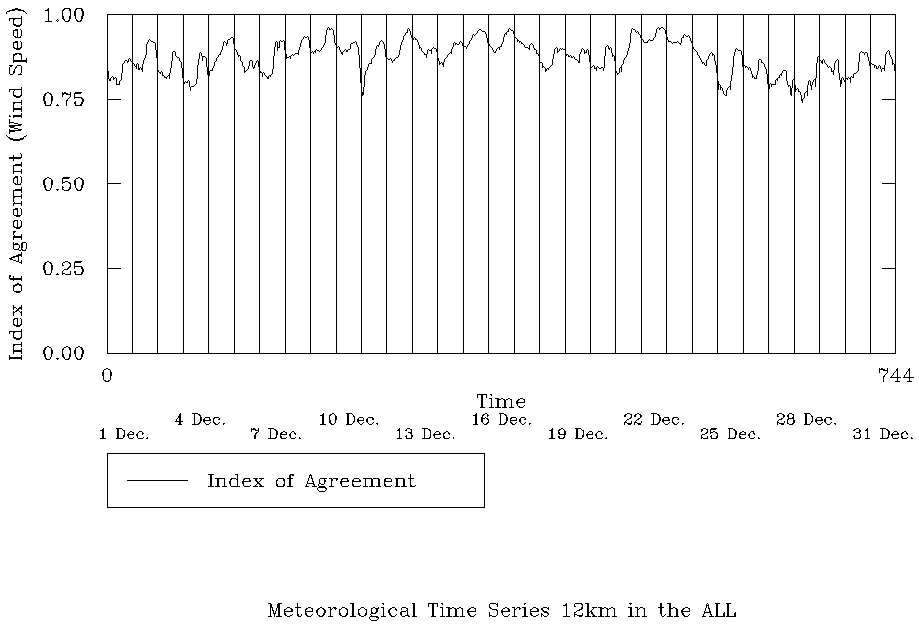


**Figure 3-243: Wind Index of Agreement for January 2002.**

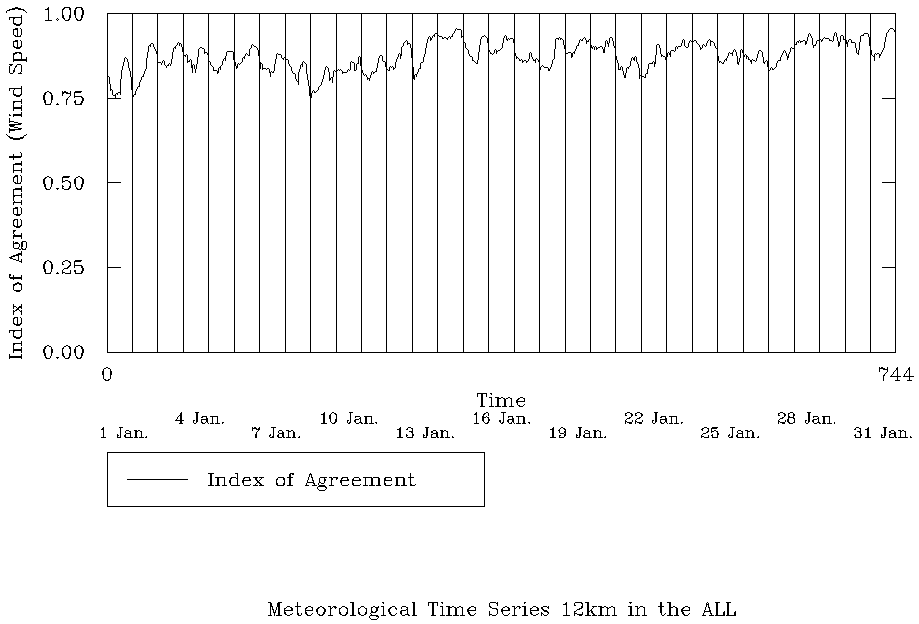



**Figure 3-244: Wind Index of Agreement for February 2002.**

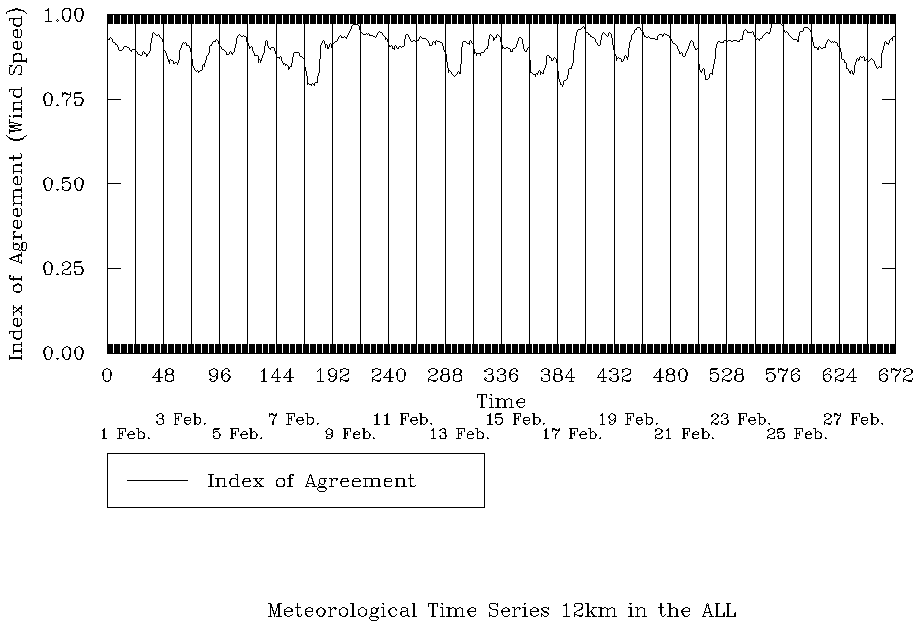


**Figure 3-245: Wind Index of Agreement for January 2001 for the CENRAP States.**

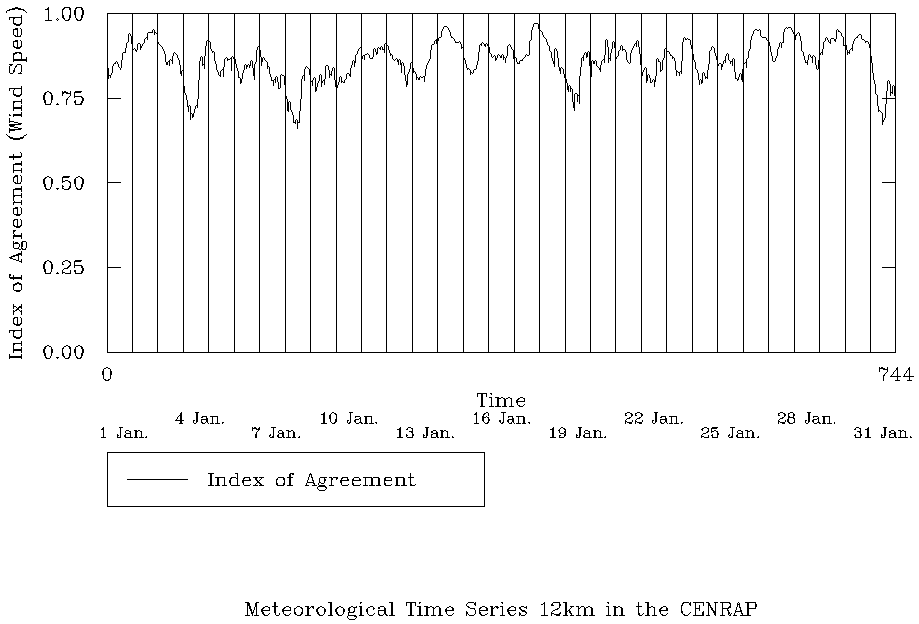



**Figure 3-246: Wind Index of Agreement for February 2001 for the CENRAP States.**

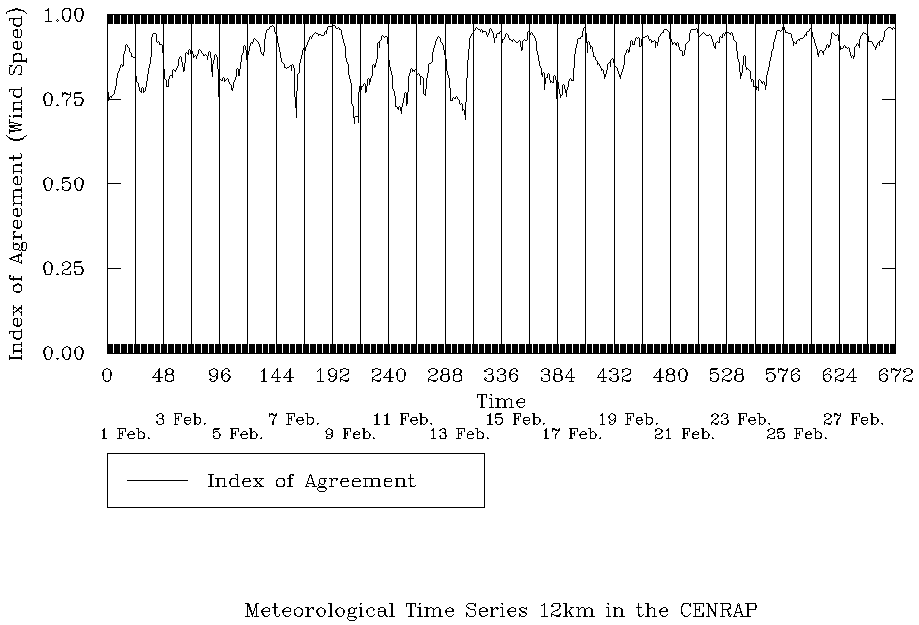


**Figure 3-247: Wind Index of Agreement for March 2001 for the CENRAP States.**

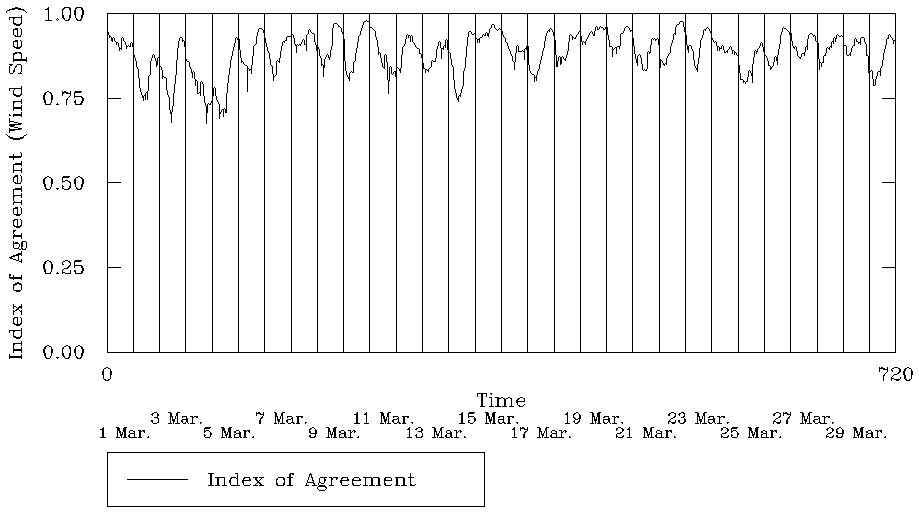



**Figure 3-248: Wind Index of Agreement for April 2001 for the CENRAP States.**

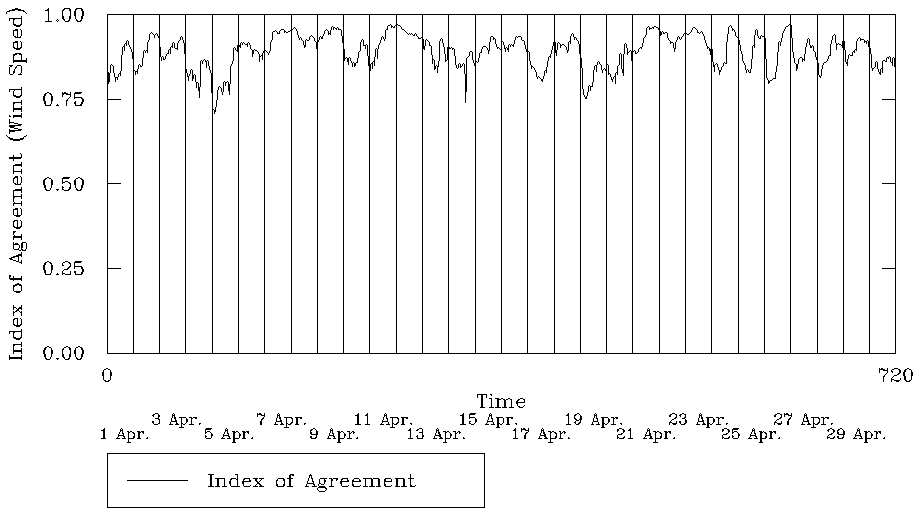


**Figure 3-249: Wind Index of Agreement for May 2001 for the CENRAP States.**

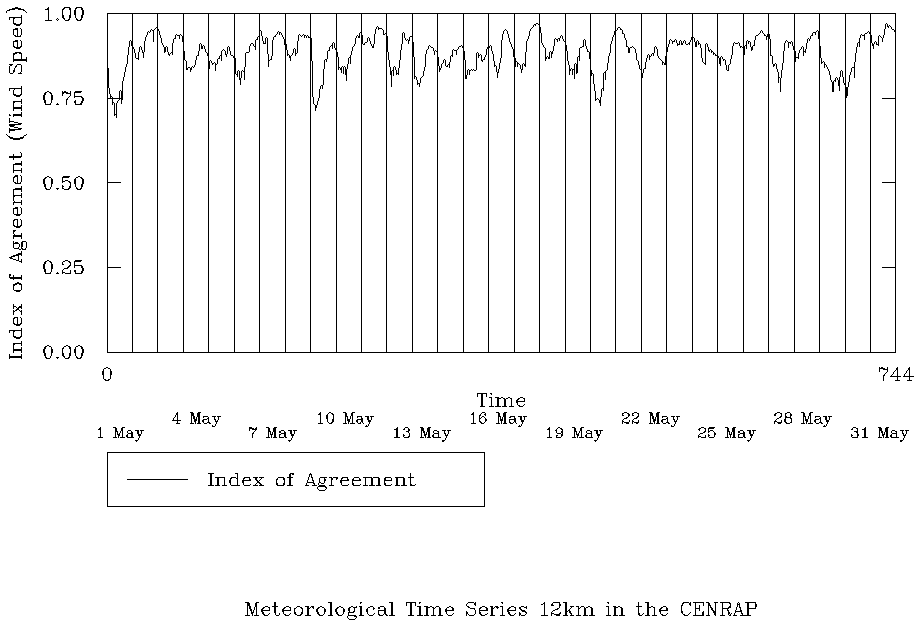



**Figure 3-250: Wind Index of Agreement for June 2001 for the CENRAP States.**

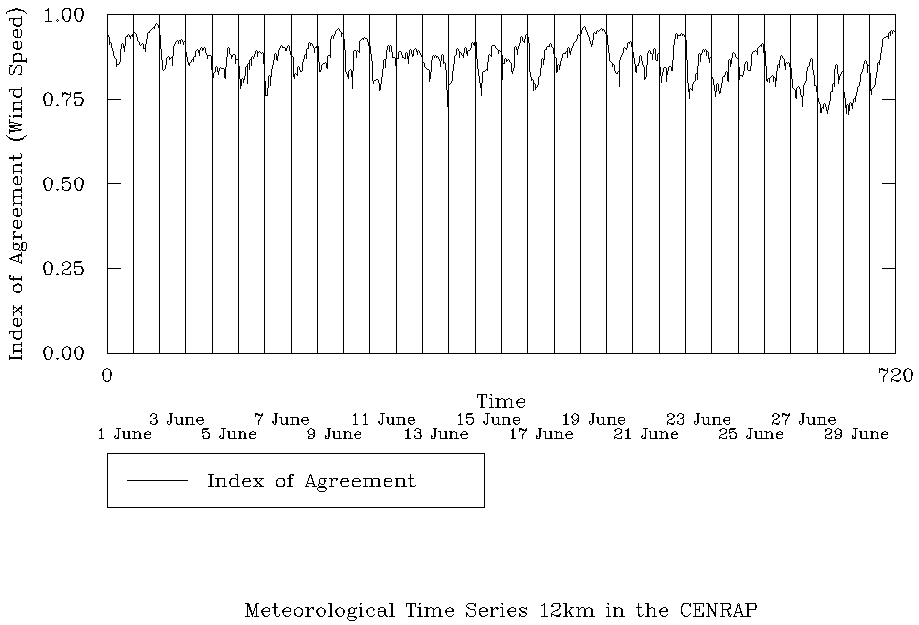


**Figure 3-251: Wind Index of Agreement for July 2001 for the CENRAP States.**

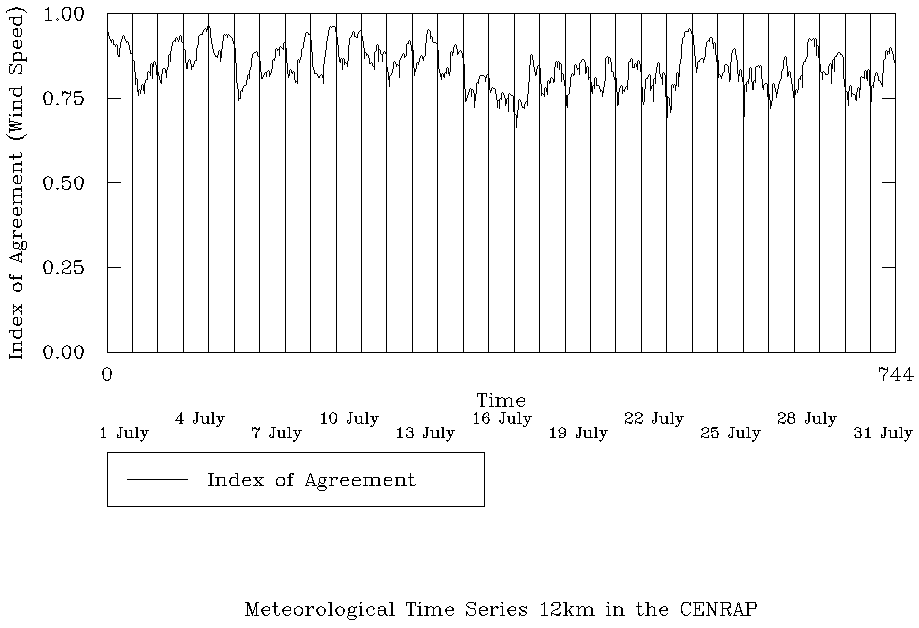



**Figure 3-252: Wind Index of Agreement for August 2001 for the CENRAP States.**

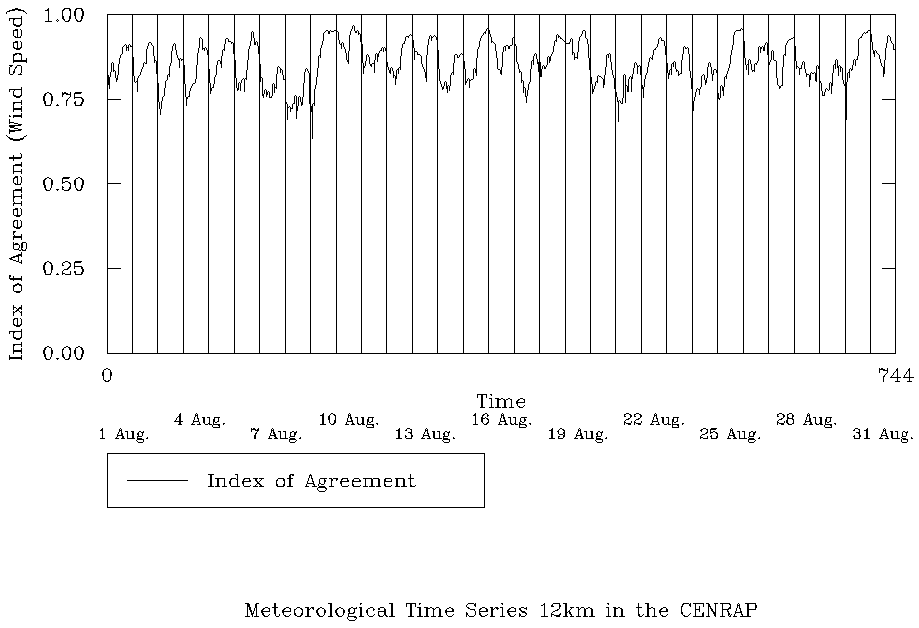


**Figure 3-253: Wind Index of Agreement for September 2001 for the CENRAP States.**

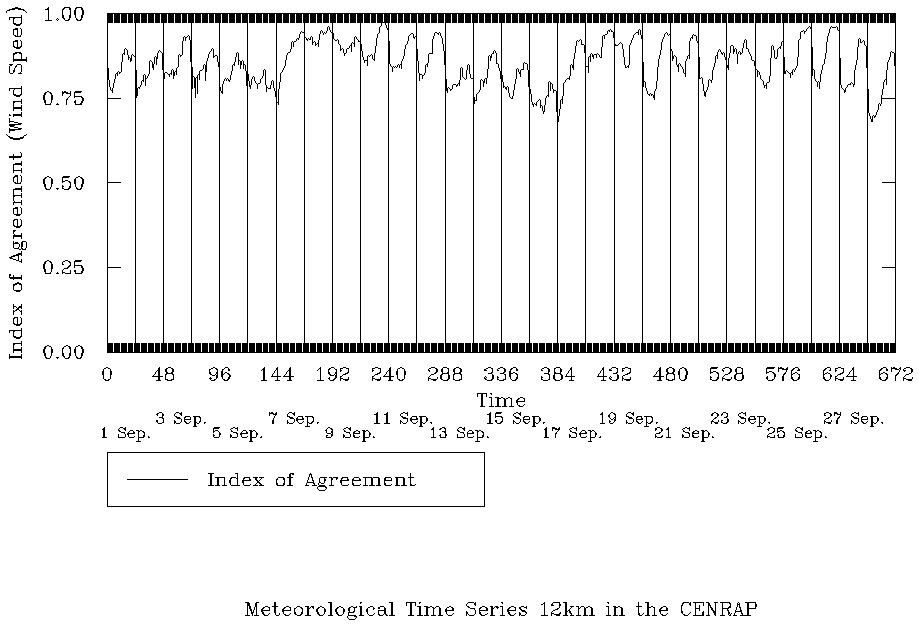



**Figure 3-254: Wind Index of Agreement for October 2001 for the CENRAP States.**

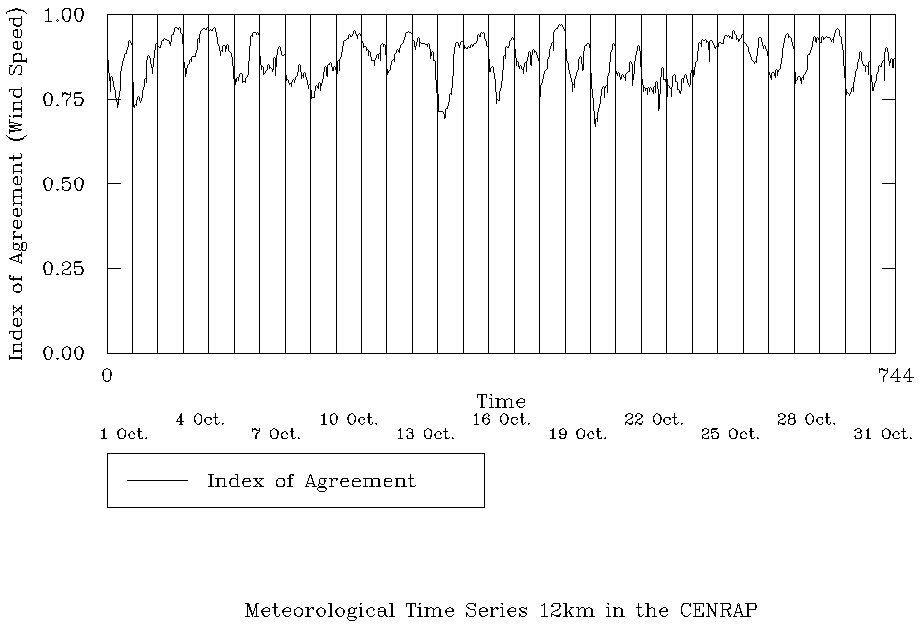


**Figure 3-255: Wind Index of Agreement for November 2001 for the CENRAP States.**

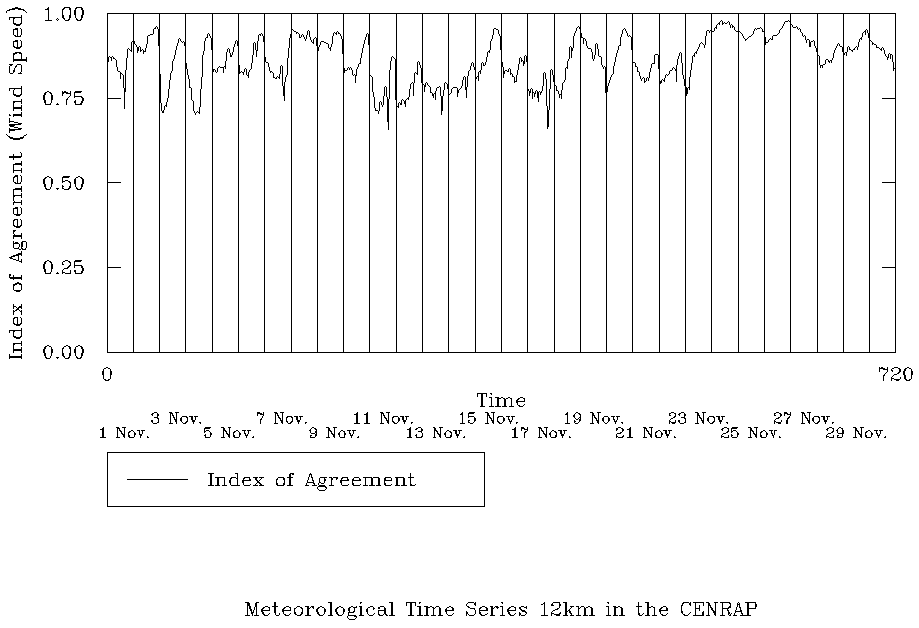



**Figure 3-256: Wind Index of Agreement for December 2001 for the CENRAP States.**

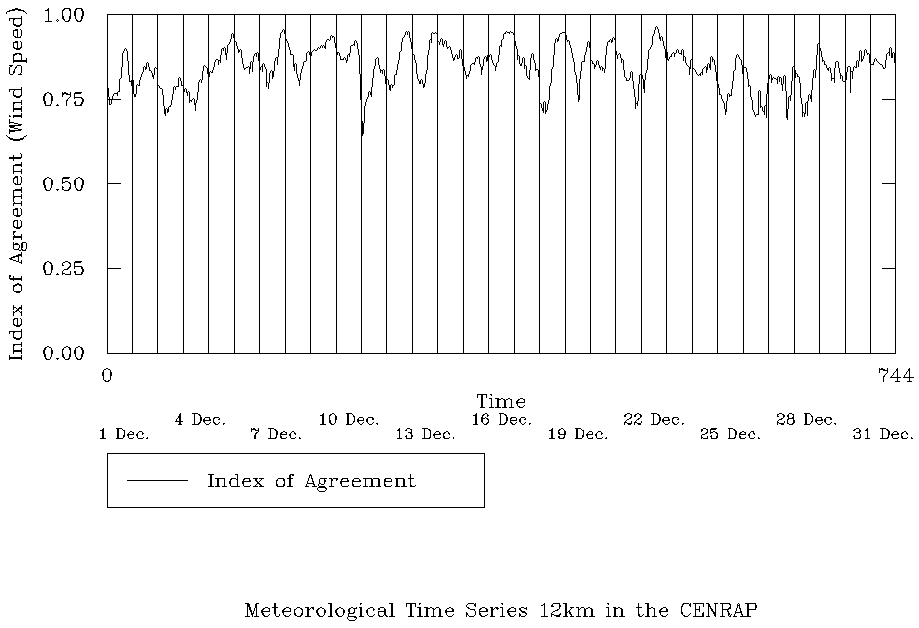


**Figure 3-257: Wind Index of Agreement for January 2002 for the CENRAP States.**

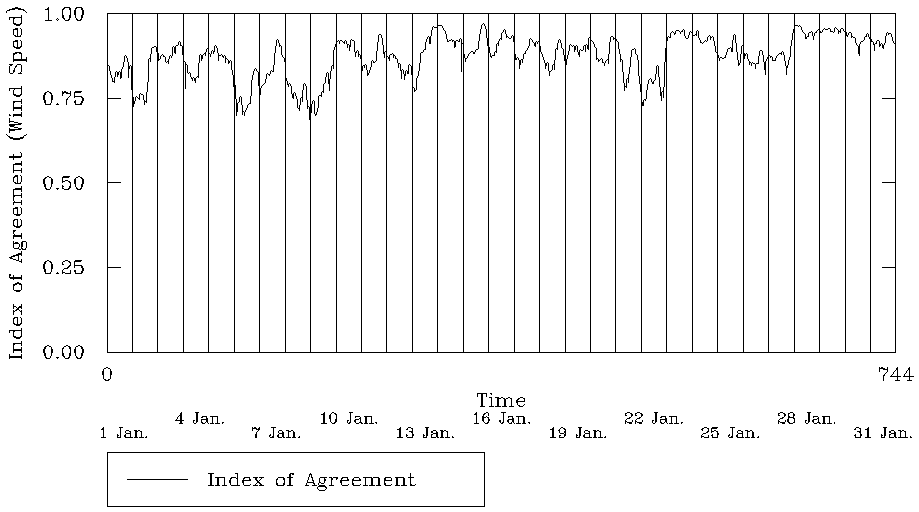



**Figure 3-258: Wind Index of Agreement for February 2002 for the CENRAP States.**

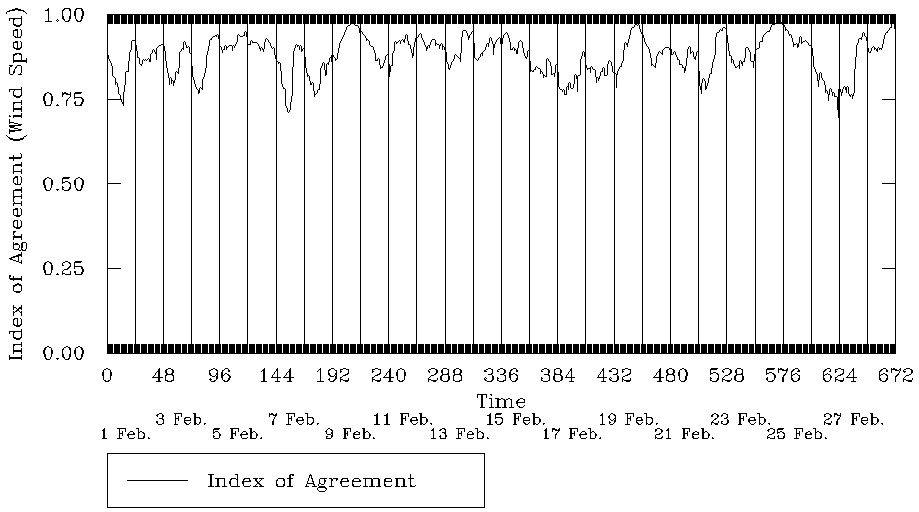


**Figure 3-259: Wind Index of Agreement for January 2001 for the MANE-VU States.**

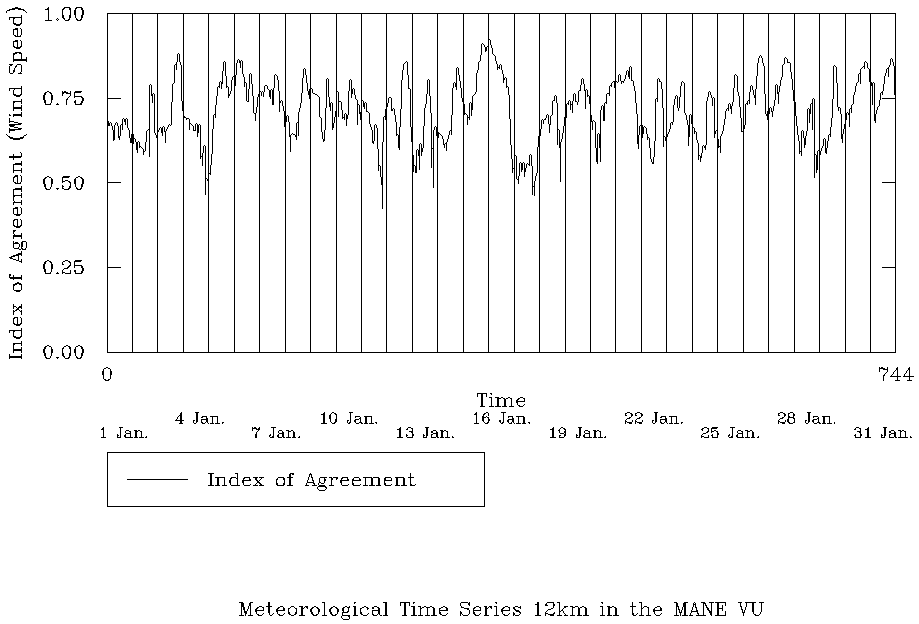



**Figure 3-260: Wind Index of Agreement for February 2001 for the MANE-VU States.**

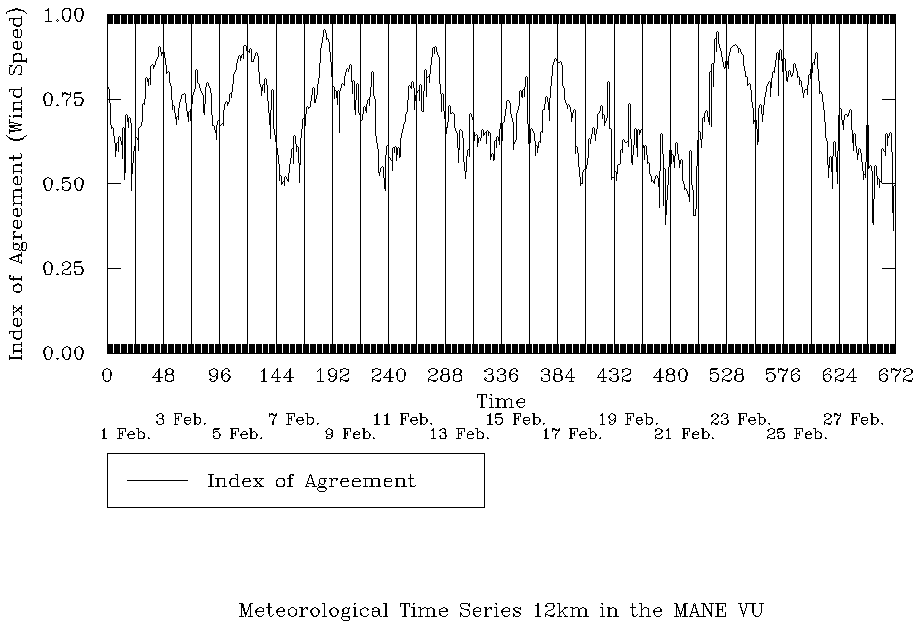


**Figure 3-261: Wind Index of Agreement for March 2001 for the MANE-VU States.**

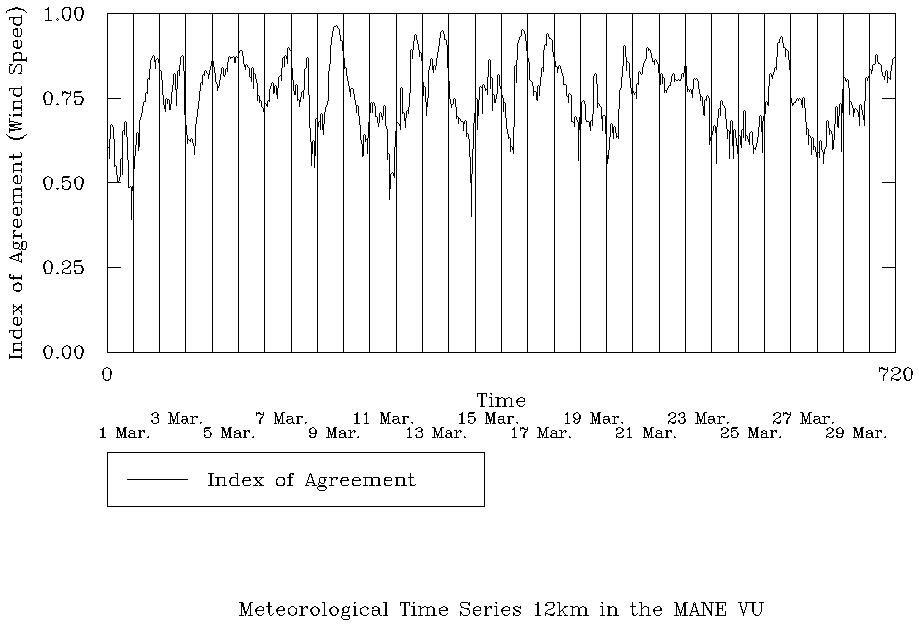



**Figure 3-262: Wind Index of Agreement for April 2001 for the MANE-VU States.**

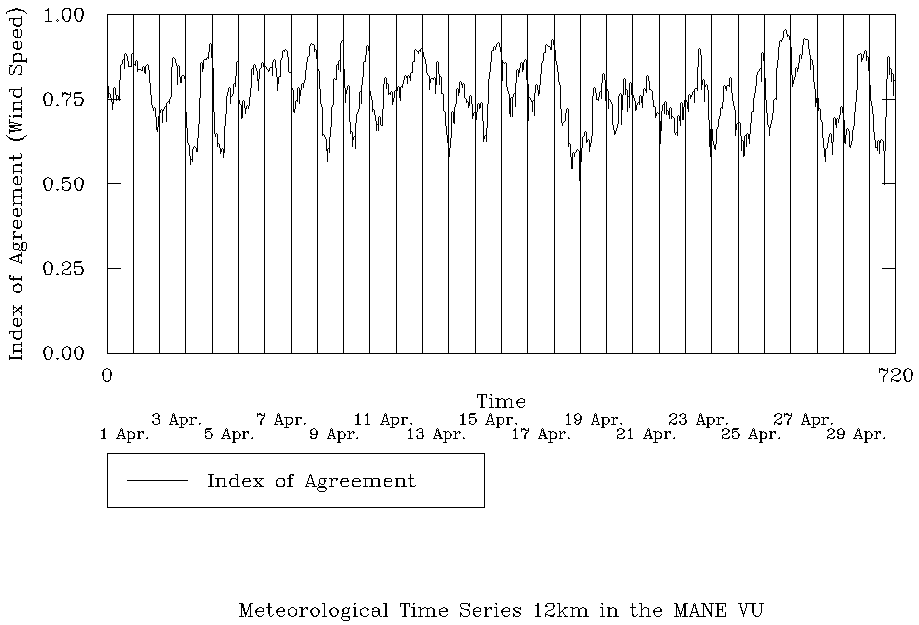


**Figure 3-263: Wind Index of Agreement for May 2001 for the MANE-VU States.**

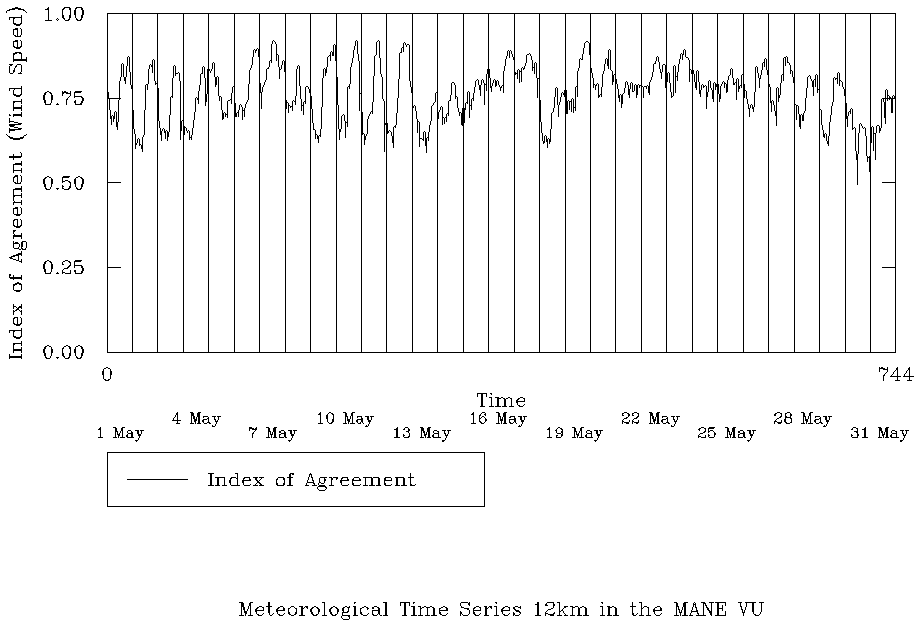



**Figure 3-264: Wind Index of Agreement for June 2001 for the MANE-VU States.**

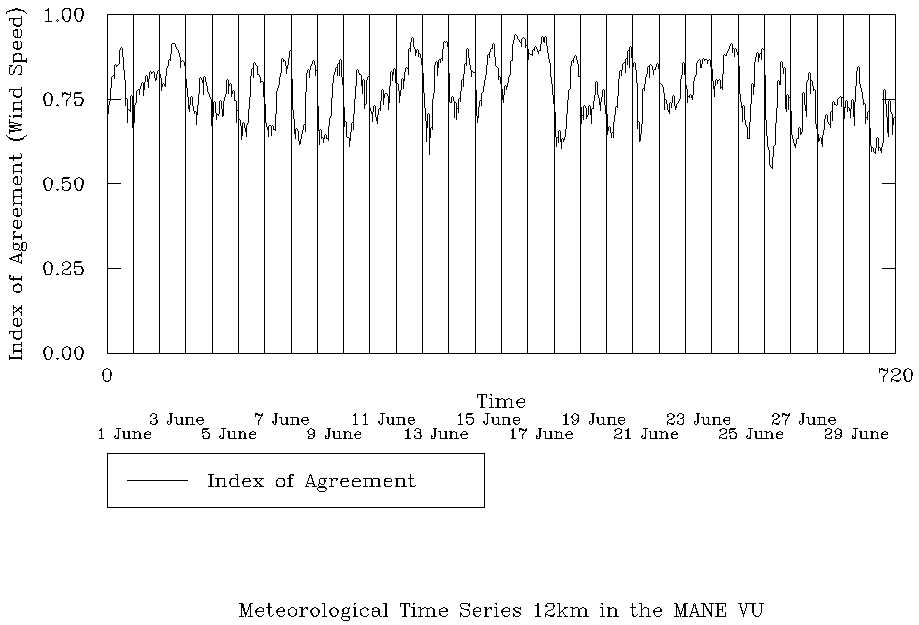


**Figure 3-265: Wind Index of Agreement for July 2001 for the MANE-VU States.**

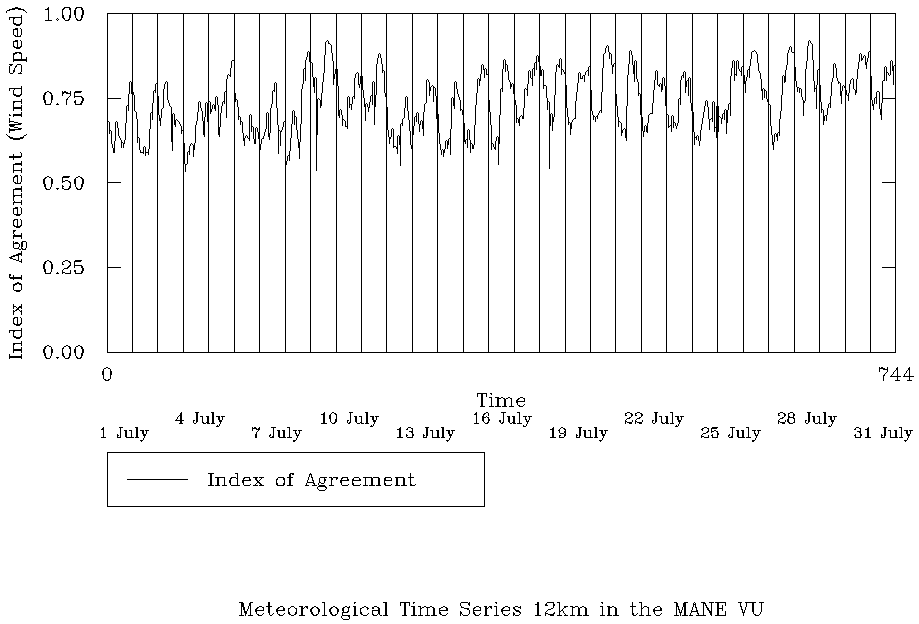



**Figure 3-266: Wind Index of Agreement for August 2001 for the MANE-VU States.**

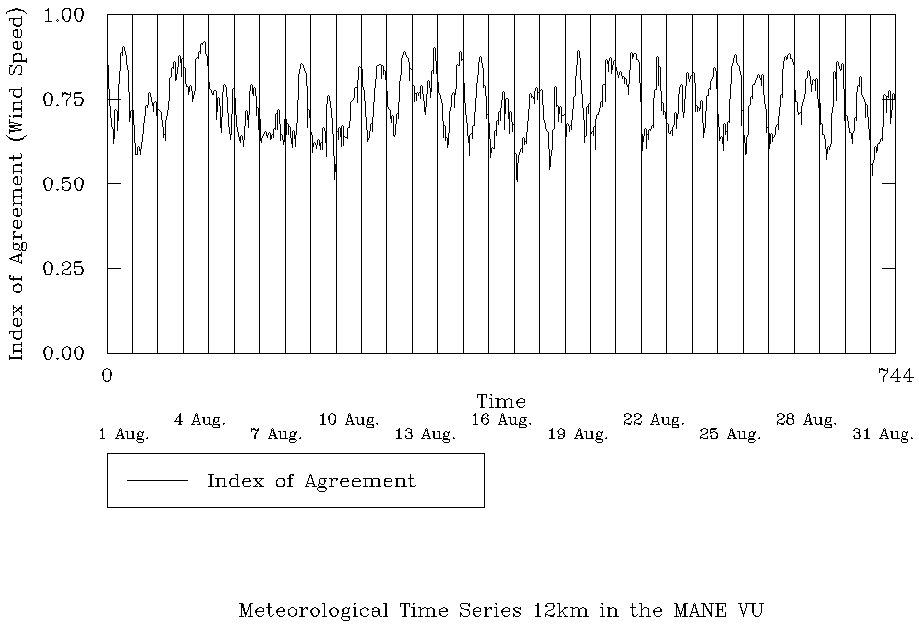


**Figure 3-267: Wind Index of Agreement for September 2001 for the MANE-VU States.**

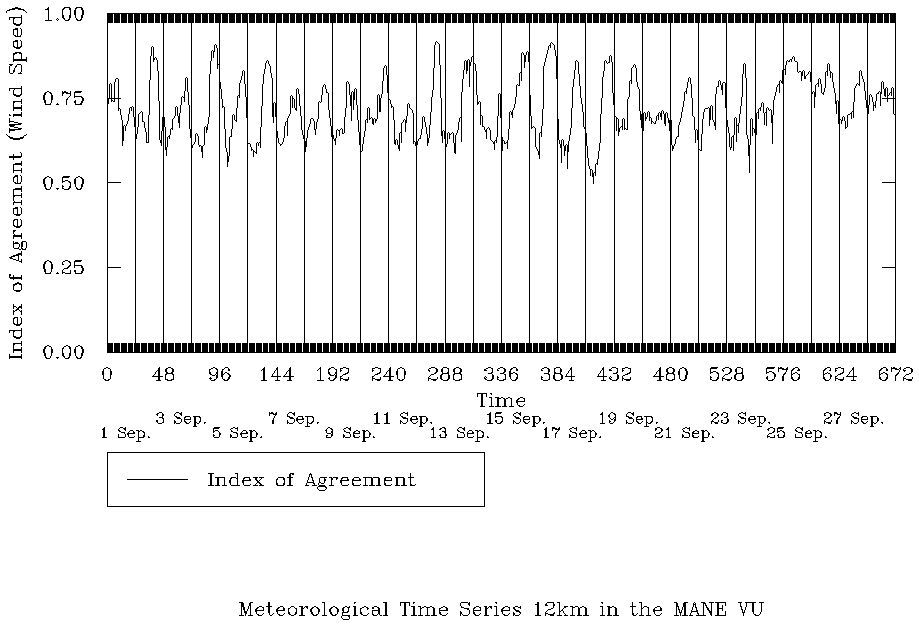



**Figure 3-268: Wind Index of Agreement for October 2001 for the MANE-VU States.**

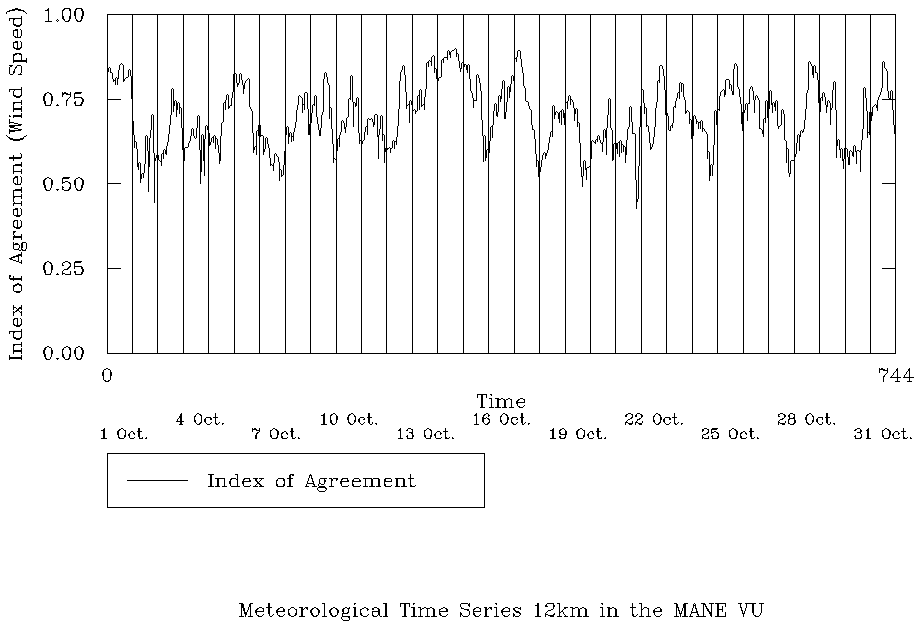


**Figure 3-269: Wind Index of Agreement for November 2001 for the MANE-VU States.**

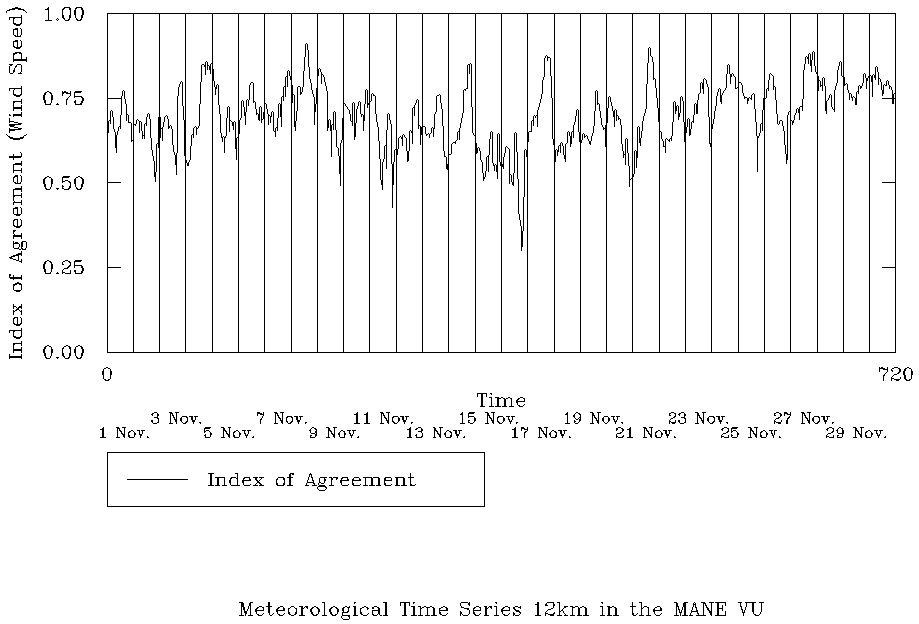



**Figure 3-270: Wind Index of Agreement for December 2001 for the MANE-VU States.**

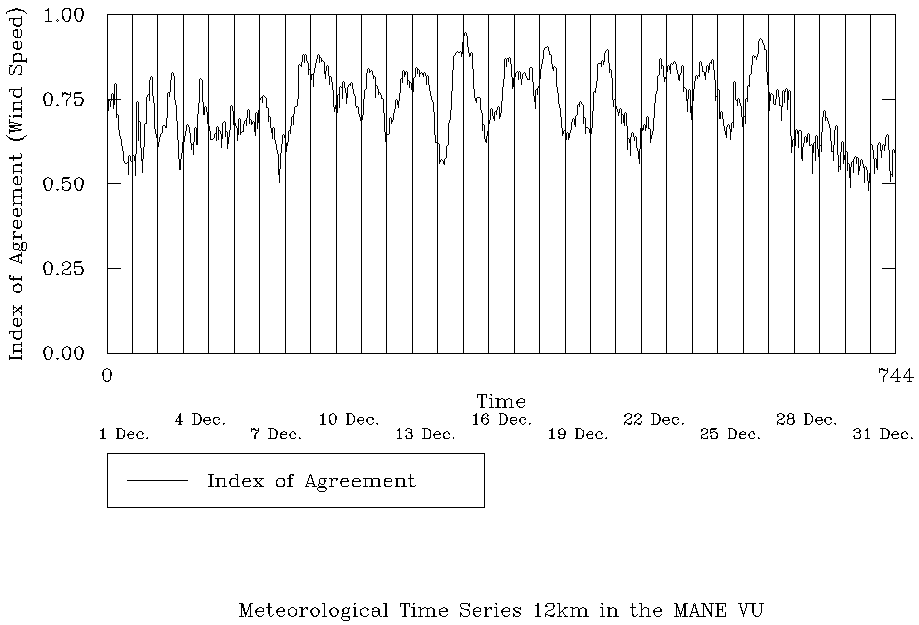


**Figure 3-271: Wind Index of Agreement for January 2002 for the MANE-VU States.**

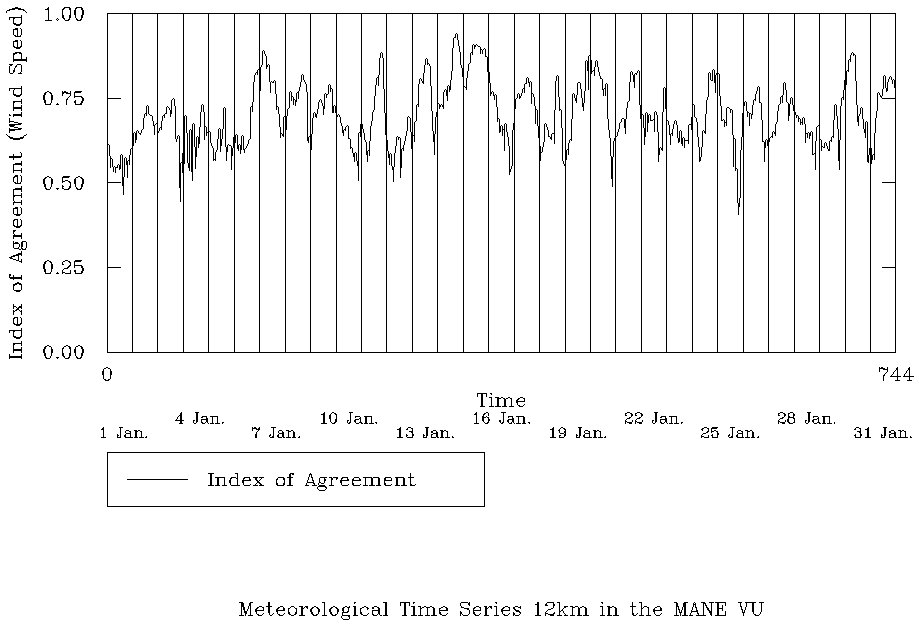



**Figure 3-272: Wind Index of Agreement for February 2002 for the MANE-VU States.**

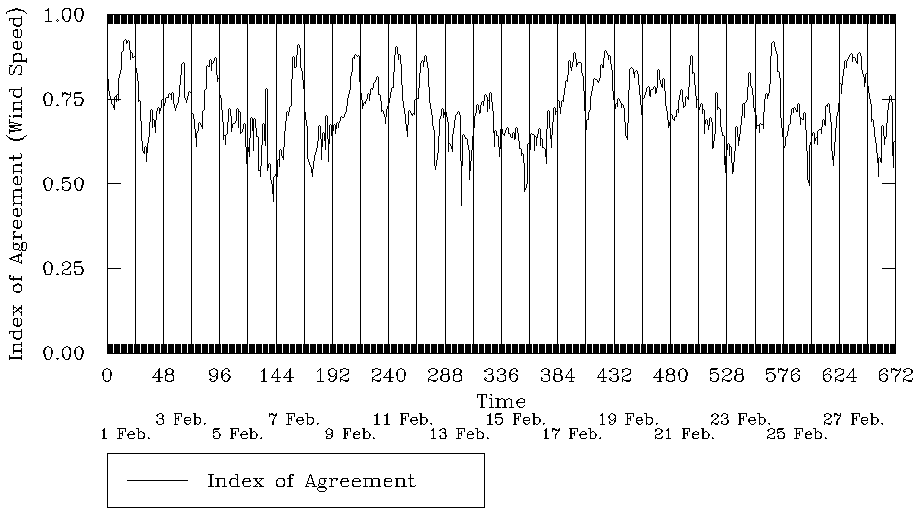


**Figure 3-273: Wind Index of Agreement for January 2001 for the Midwestern RPO States.**

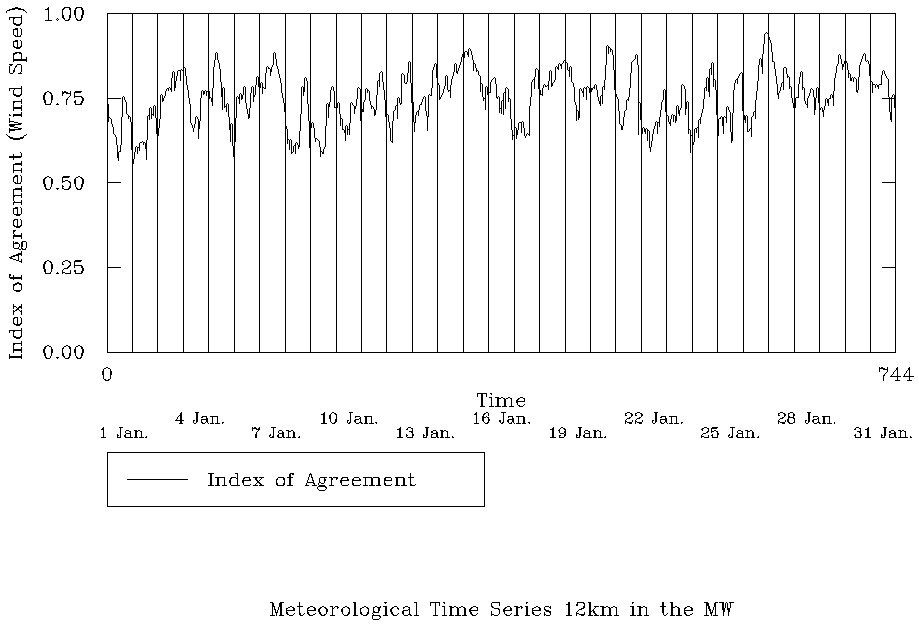



**Figure 3-274: Wind Index of Agreement for February 2001 for the Midwestern RPO States.**

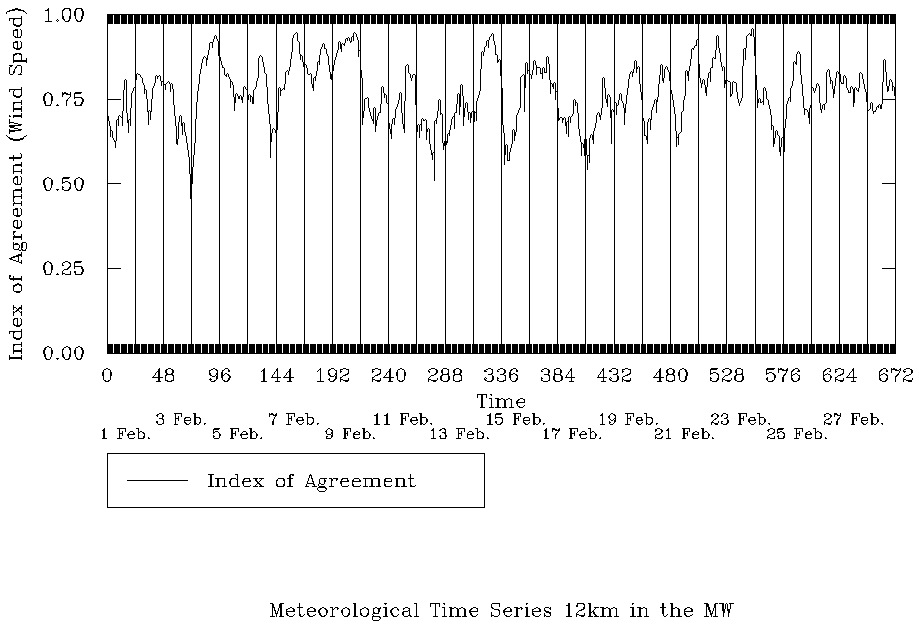


**Figure 3-275: Wind Index of Agreement for March 2001 for the Midwestern RPO States.**

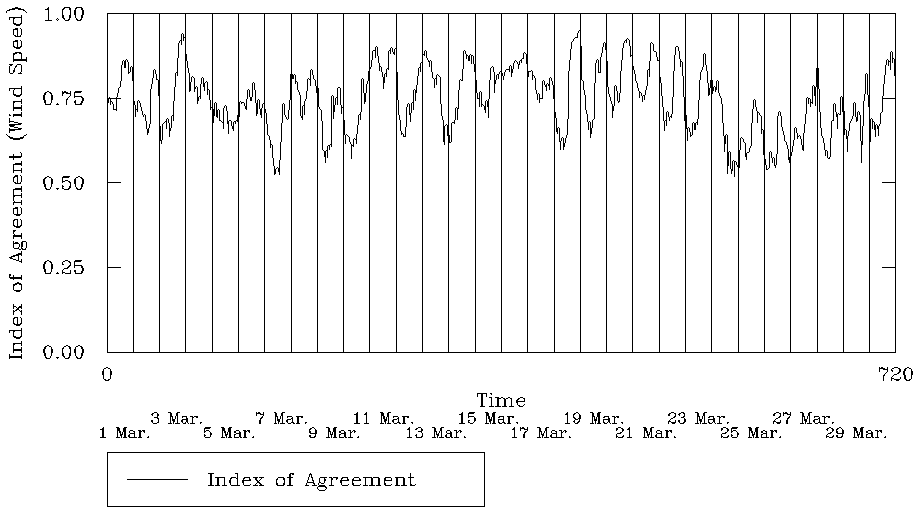



**Figure 3-276: Wind Index of Agreement for April 2001 for the Midwestern RPO States.**

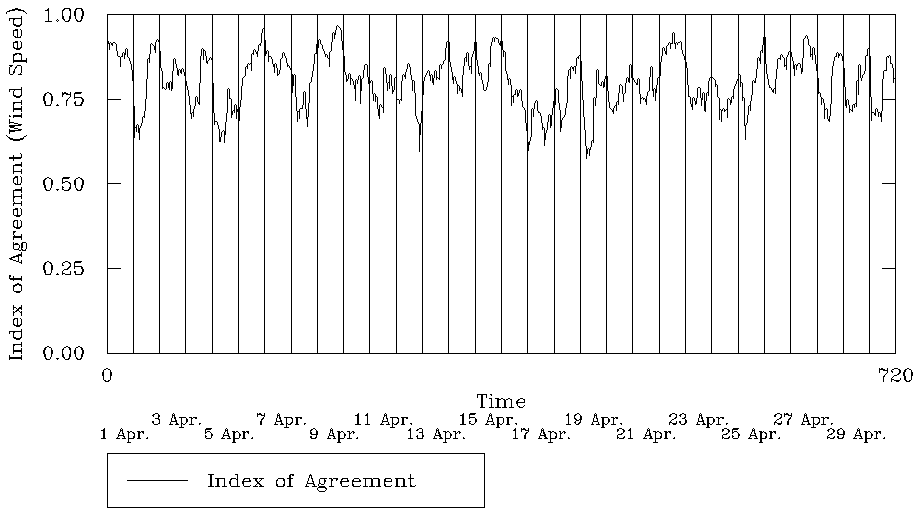


**Figure 3-277: Wind Index of Agreement for May 2001 for the Midwestern RPO States.**

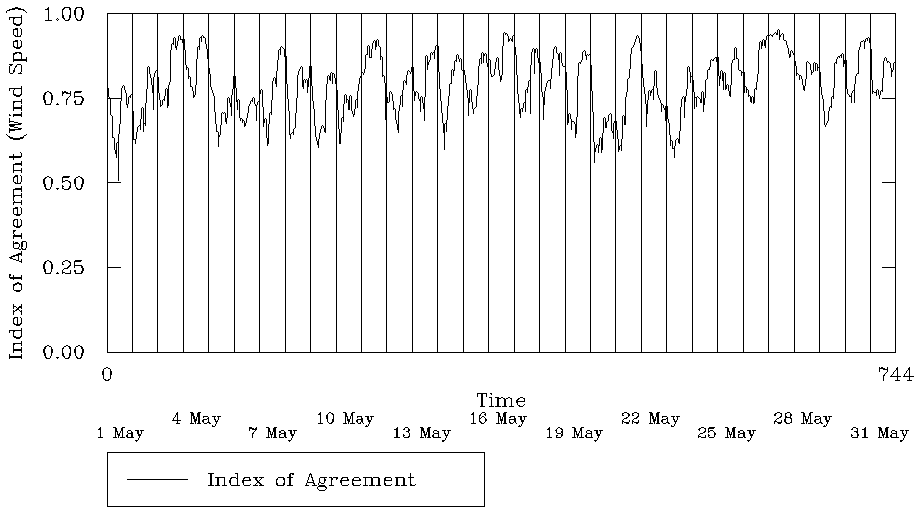



**Figure 3-278: Wind Index of Agreement for June 2001 for the Midwestern RPO States.**

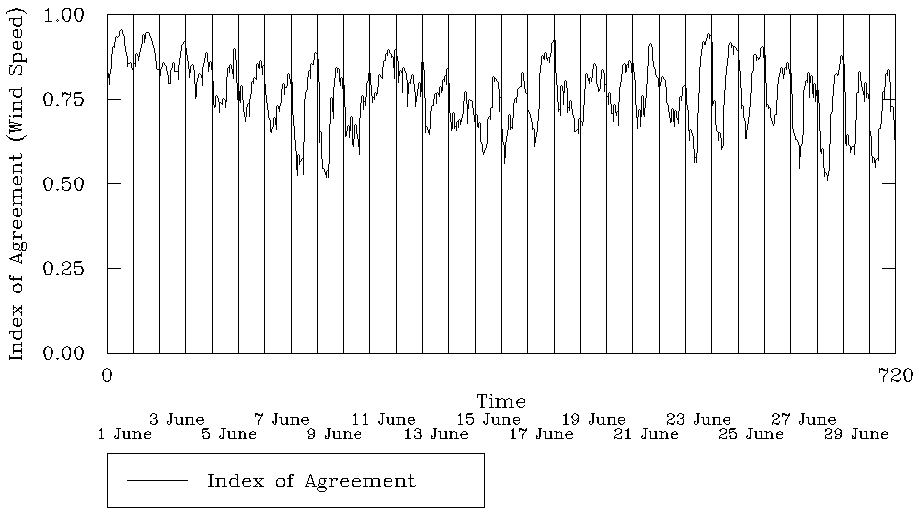


**Figure 3-279: Wind Index of Agreement for July 2001 for the Midwestern RPO States.**

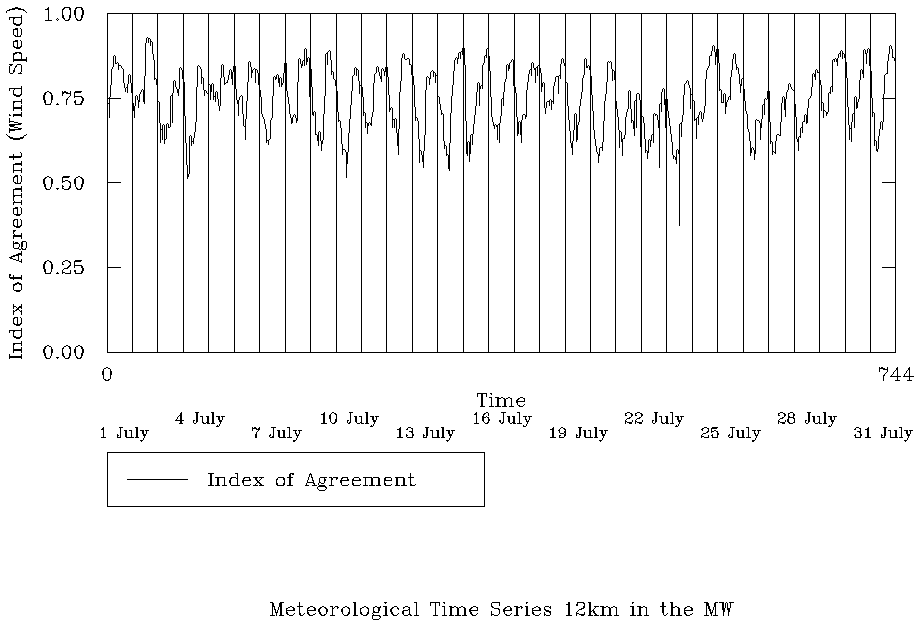



**Figure 3-280: Wind Index of Agreement for August 2001 for the Midwestern RPO States.**

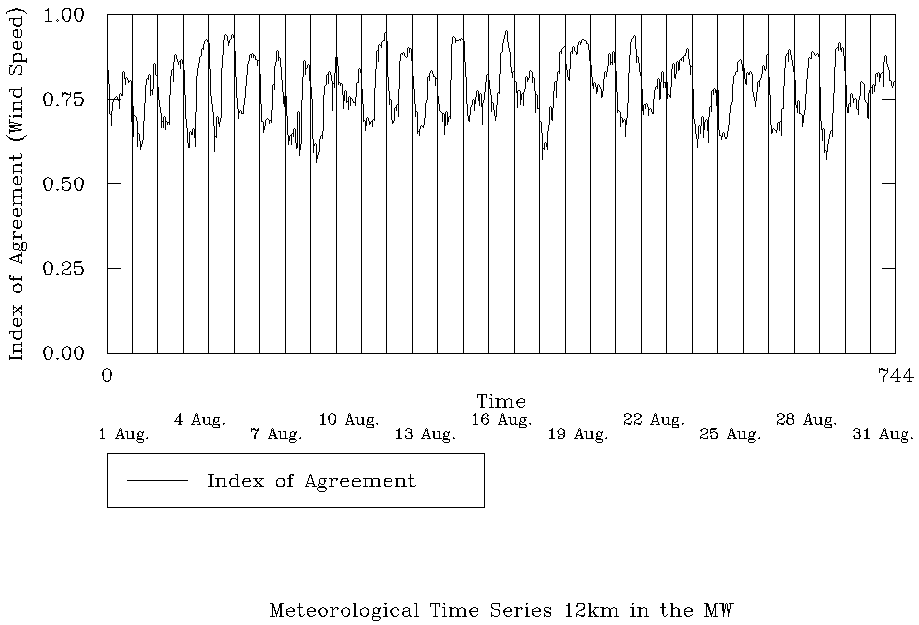


**Figure 3-281: Wind Index of Agreement for September 2001 for the Midwestern RPO States.**

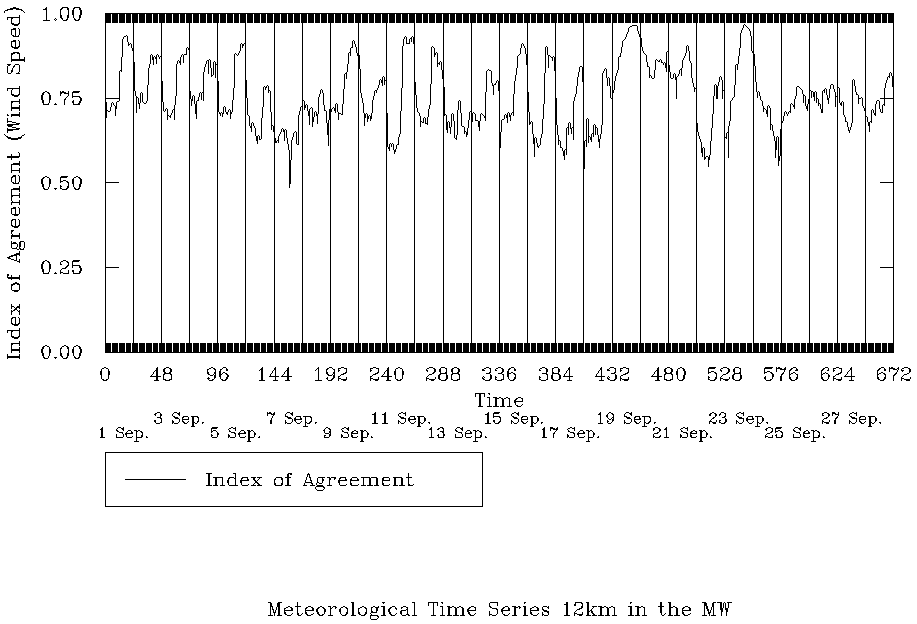



**Figure 3-282: Wind Index of Agreement for October 2001 for the Midwestern RPO States.**

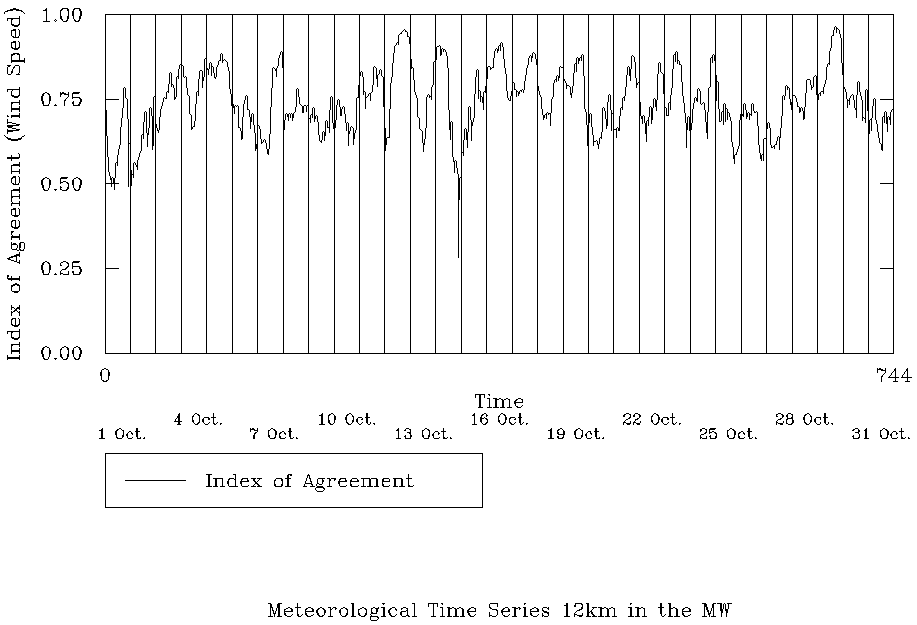


**Figure 3-283: Wind Index of Agreement for November 2001 for the Midwestern RPO States.**

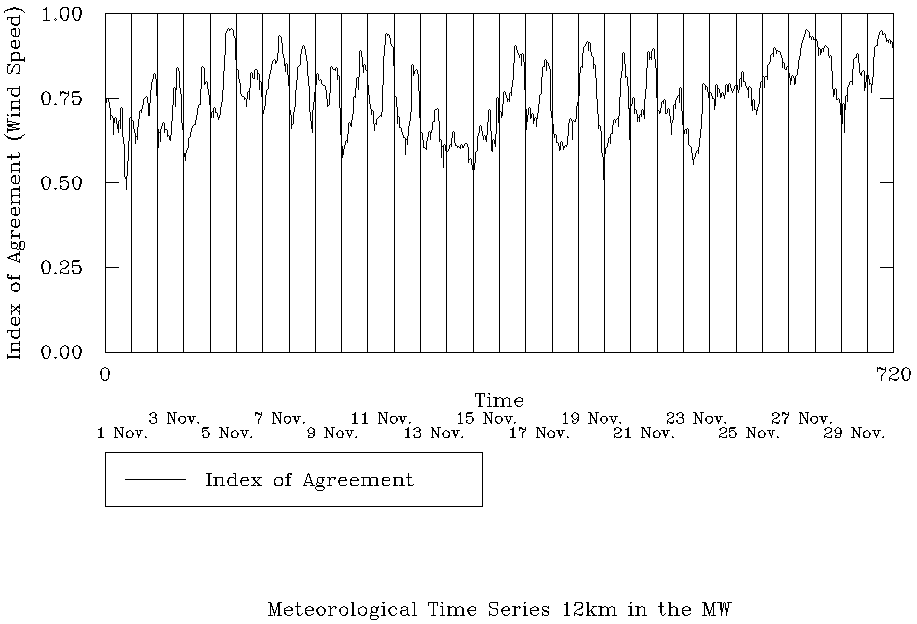



**Figure 3-284: Wind Index of Agreement for December 2001 for the Midwestern RPO States.**

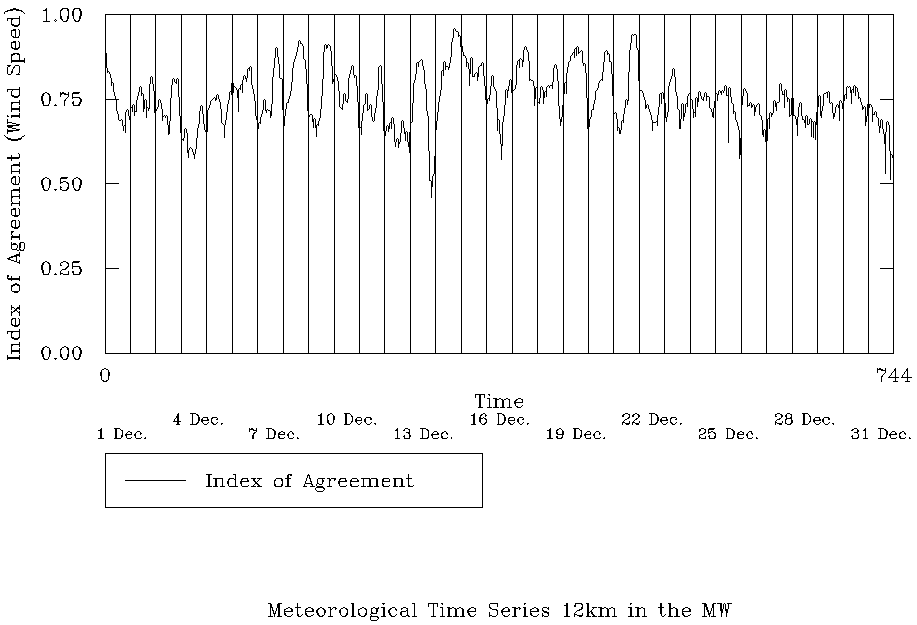


**Figure 3-285: Wind Index of Agreement for January 2002 for the Midwestern RPO States.**

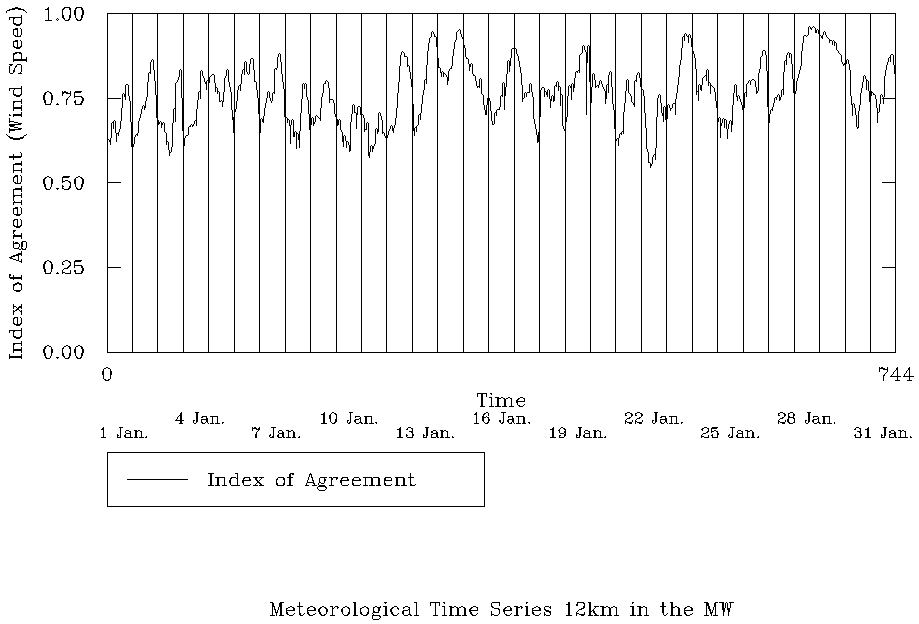



**Figure 3-286: Wind Index of Agreement for February 2002 for the Midwestern RPO States.**

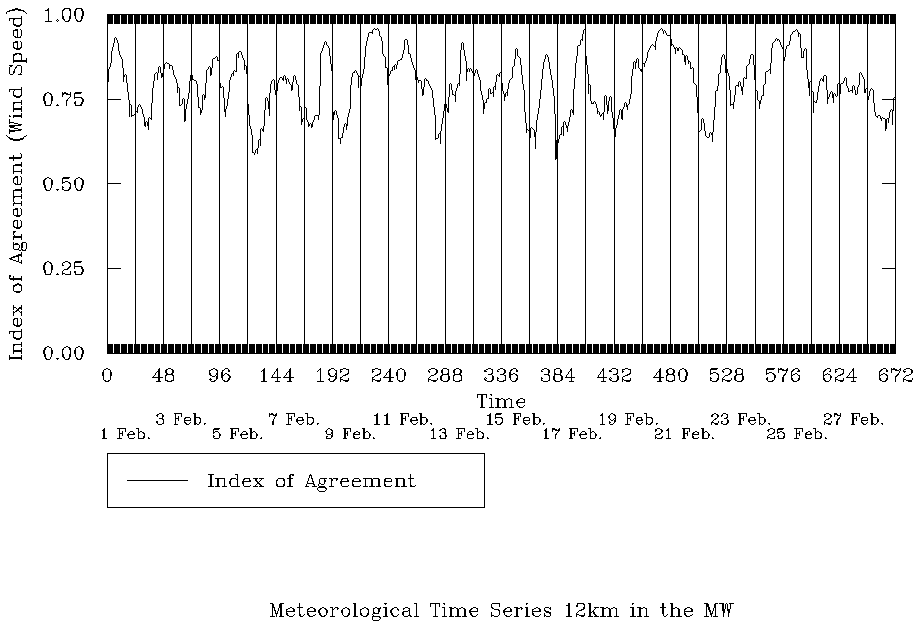


**Figure 3-287: Wind Index of Agreement for January 2001 for the VISTAS States.**

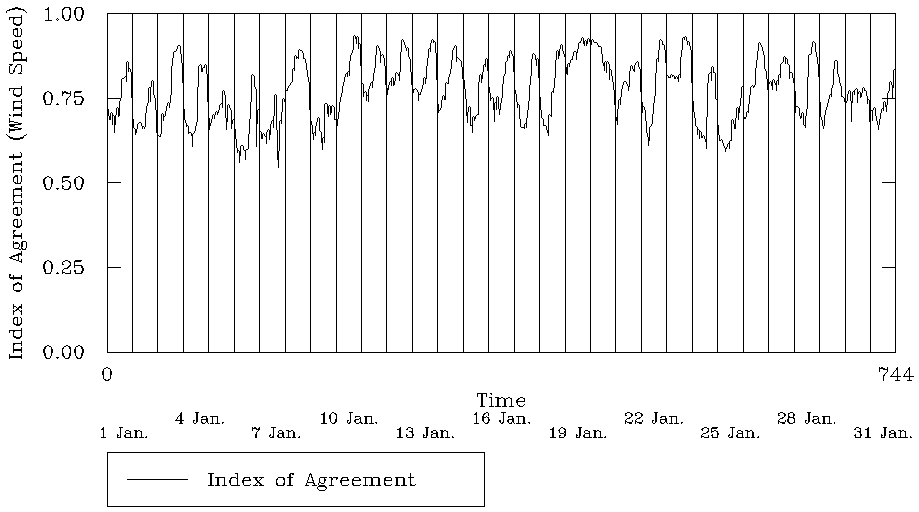



**Figure 3-288: Wind Index of Agreement for February 2001 for the VISTAS States.**

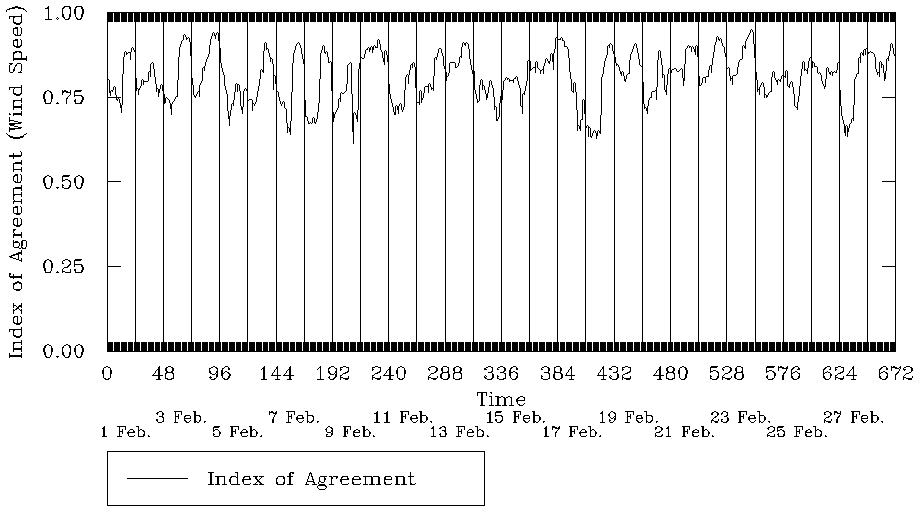


**Figure 3-289: Wind Index of Agreement for March 2001 for the VISTAS States.**

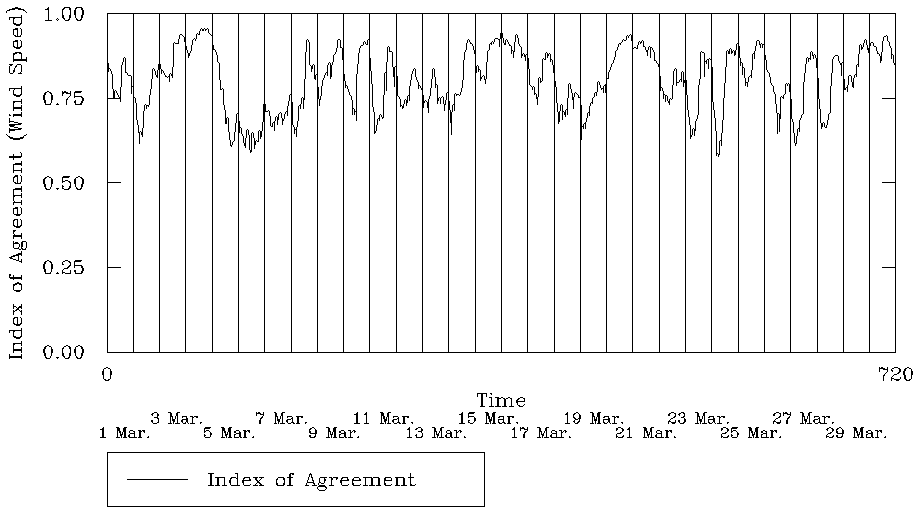



**Figure 3-290: Wind Index of Agreement for April 2001 for the VISTAS States.**

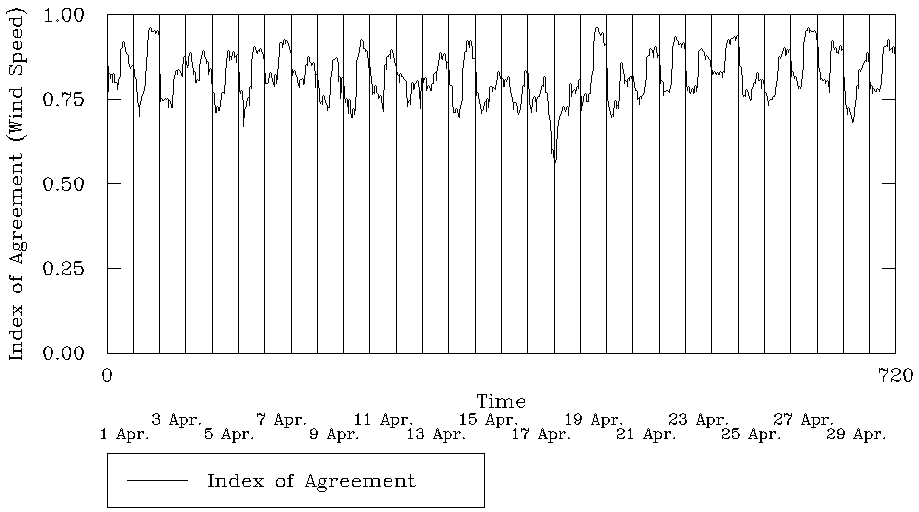
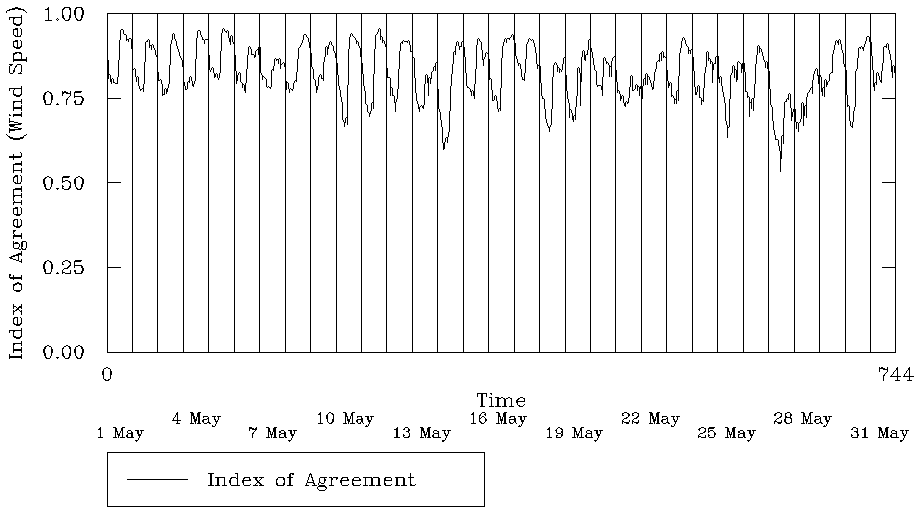
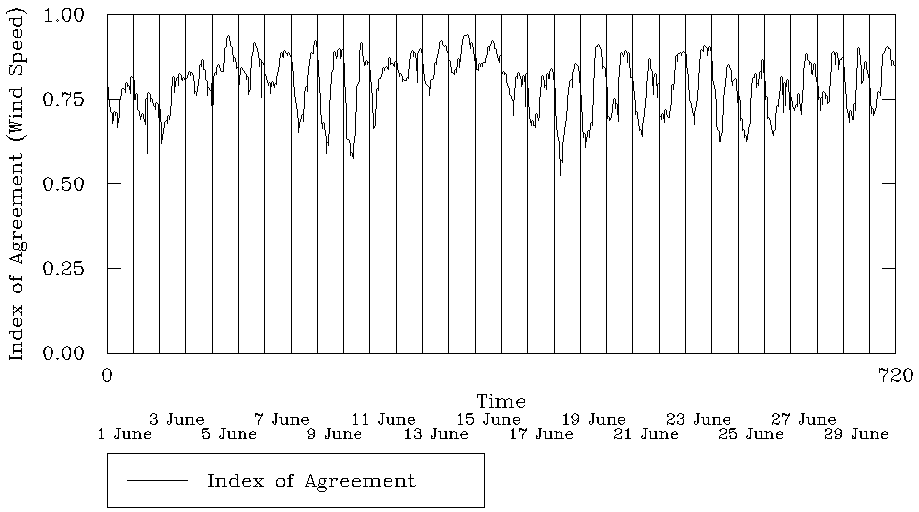


**Figure 3-291: Wind Index of Agreement for May 2001 for the VISTAS States.**




Meteorological Time Series 12km in the VISTAS

**Figure 3-292: Wind Index of Agreement for June 2001 for the VISTAS States.**




Meteorological Time Series 12km in the VISTAS

**Figure 3-293: Wind Index of Agreement for July 2001 for the VISTAS States.**

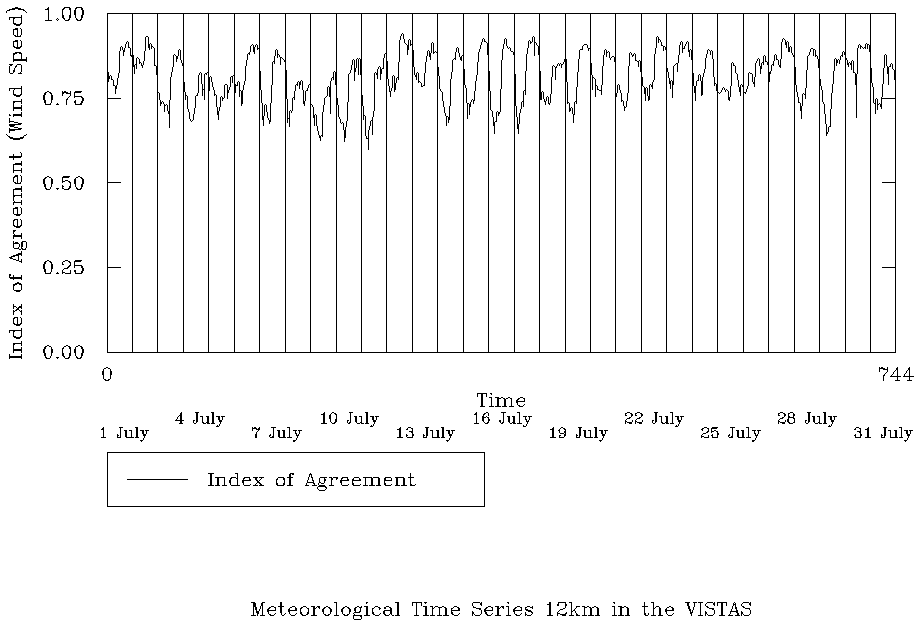



**Figure 3-294: Wind Index of Agreement for August 2001 for the VISTAS States.**

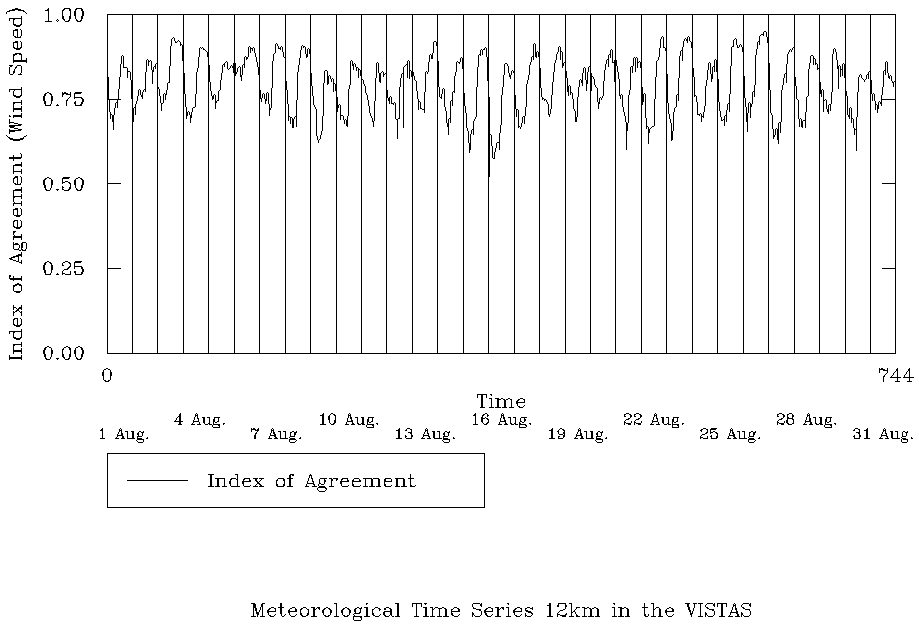


**Figure 3-295: Wind Index of Agreement for September 2001 for the VISTAS States.**

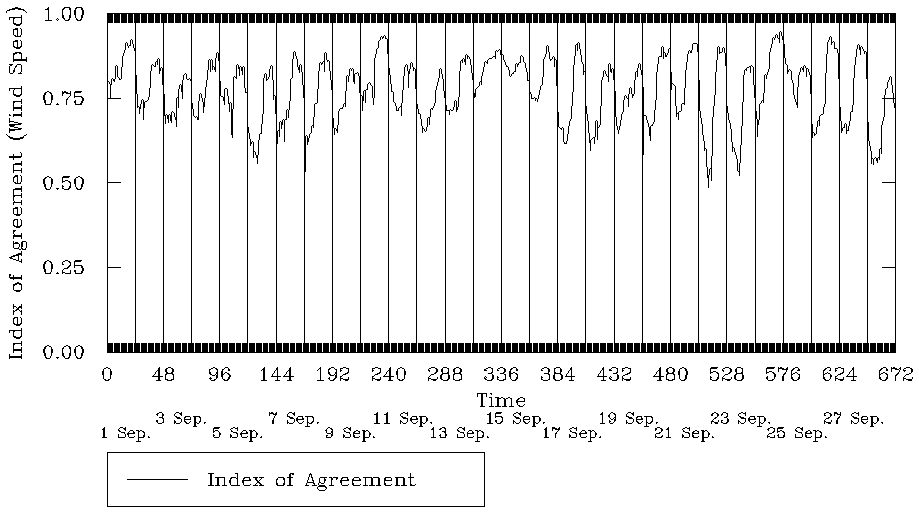



**Figure 3-296: Wind Index of Agreement for October 2001 for the VISTAS States.**

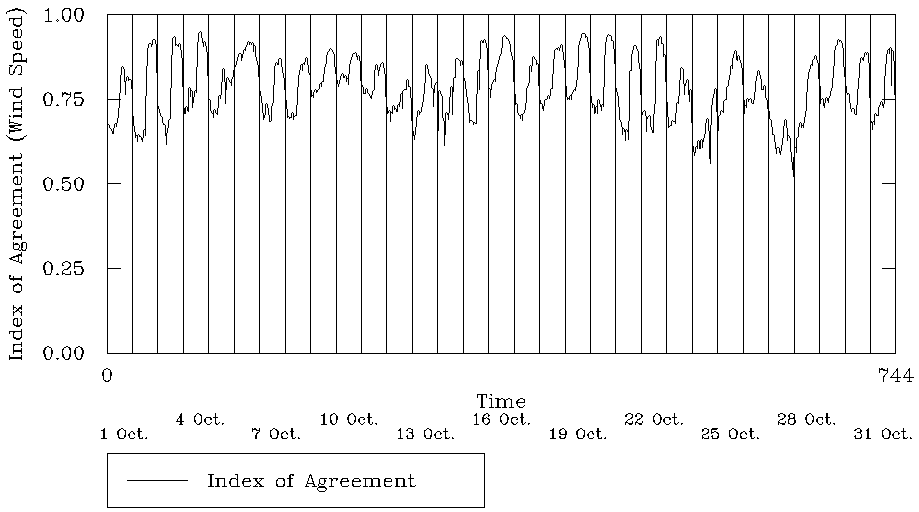


**Figure 3-297: Wind Index of Agreement for November 2001 for the VISTAS States.**

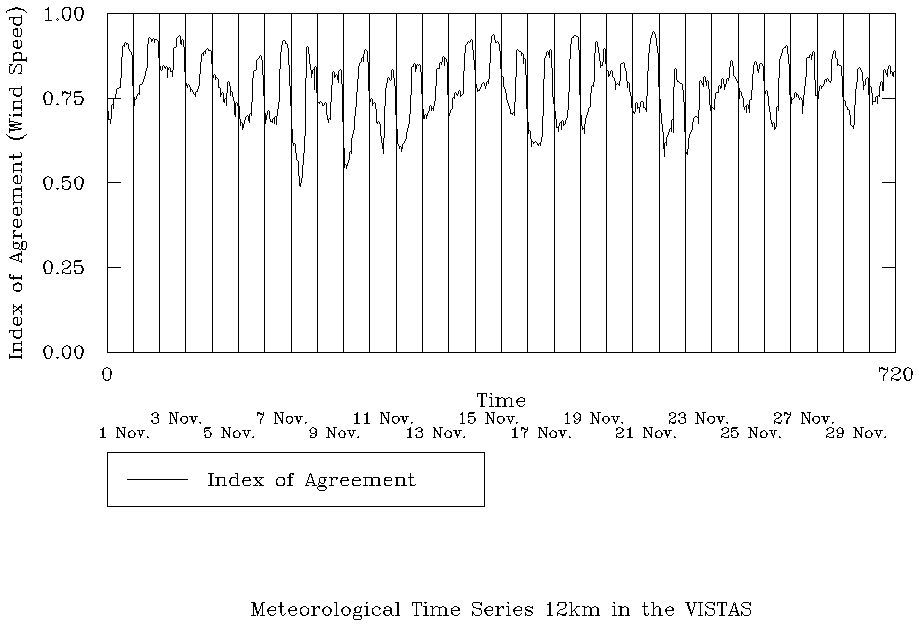



**Figure 3-298: Wind Index of Agreement for December 2001 for the VISTAS States.**

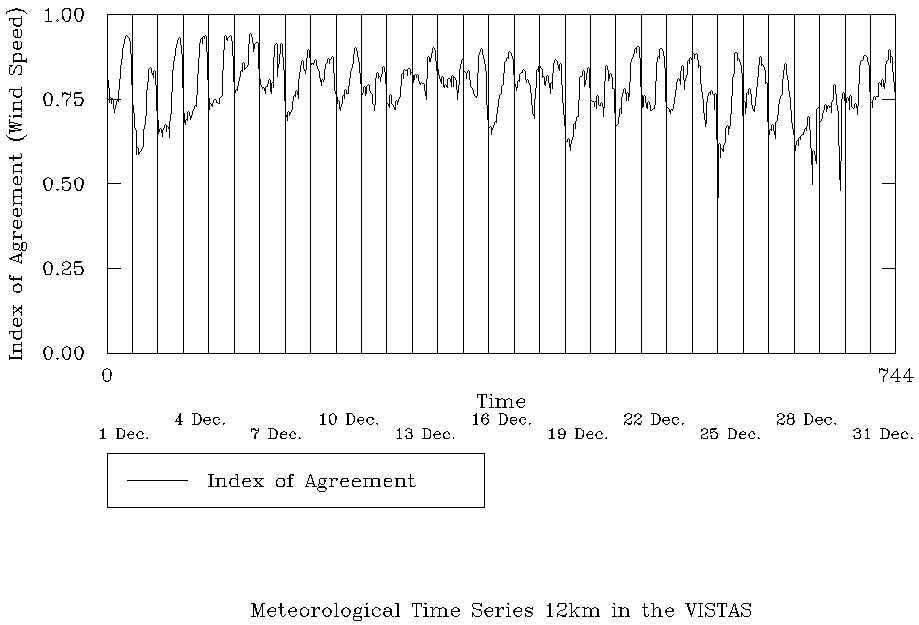


**Figure 3-299: Wind Index of Agreement for January 2002 for the VISTAS States.**

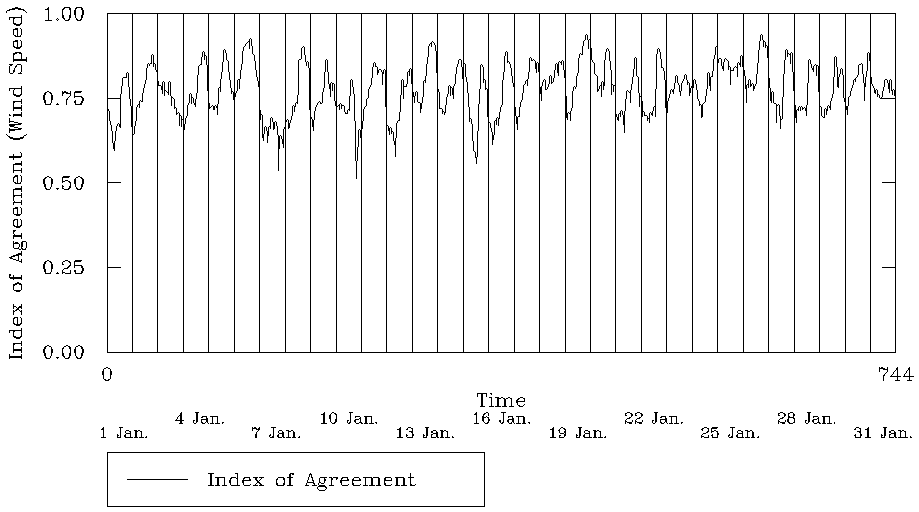



**Figure 3-300: Wind Index of Agreement for February 2002 for the VISTAS States.**