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# New Technology Research & Development Program
# Grant Contract 582-5-65591-0003

# Tasks 1, 2, 3, & 4 Deliverable Report
# Final Report – Appendix 2

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by the State of Texas through a Grant from the
Texas Commission on Environmental Quality.

# Assessing the Predicted Ozone Concentrations Averaged over 8 Hours with a June through September 2002 Seasonal Photochemical Grid Modeling Episode using 2002 and 2009 Anthropogenic Emissions

**Prepared for**
**Texas Commission on Environmental Quality**
**New Technology Research & Development (NTRD) Program**
**Contract Number: 582-5-85591-0003**

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## Executive Summary

The objectives of the modeling studies described in this report were to predict ozone concentrations over eastern Texas using 2002 meteorology for the June through September period with: 1.) 2002 anthropogenic emissions; and, 2.) 2009 anthropogenic emissions. Biogenic emissions from 2002 were used for both the 2002 and 2009 simulations. Air quality impacts were evaluated for each of these scenarios using statistical and graphical metrics for ozone concentrations averaged over 8 hours.

Ozone contour maps were developed to show the daily maximum ozone concentrations averaged over 8 hours predicted for the years 2002 and 2009 for each day during the June through September episode. In addition, ozone concentration maps were developed to show the average monthly concentrations for the 2002 and 2009 scenarios.

For 2002, the Dallas/Fort Worth and Tyler/Longview/Marshall areas were characterized by monthly average maximum ozone concentrations of 70 ppb or greater. Monthly maximum averages in southeast Texas ranged between 65 ppb and 70 ppb. In the Austin/San Antonio area, concentrations were 55-60 ppb during June and July increasing to 60-65 ppb during August and September. Over the rural areas of eastern Texas, average monthly maximum ozone concentrations during June and July ranged between 50 ppb and 60 ppb increasing to the 55 ppb to 65 ppb range during August and September. In general, monthly average concentrations predicted over eastern Texas during 2009 were 5-10 ppb lower compared to the 2002 predictions.

To investigate the spatial and temporal variability of ozone concentrations within rural areas of eastern Texas, the monthly average daily maximum ozone concentrations averaged over 8 hours were extracted at nineteen rural area monitoring stations operational during the TexAQS II (2005-2006) program for the 2002 simulation. Of the nineteen stations, Denton Airport was characterized by the highest concentrations, ranging from 68 ppb in September to 76 ppb in August. The Hallettsville monitoring station was generally characterized by the lowest predicted monthly averages, ranging from 47 ppb during July to 59 ppb during September. Throughout the June through September period, the majority of the rural monitoring stations were characterized by ozone concentrations in the upper 50 ppb to lower 60 ppb range. August and September were generally characterized by relatively higher concentrations compared to June and July.

Ozone concentrations averaged over 8 hours were also investigated by averaging the daily maximum concentrations for all days characterized by a maximum predicted ozone concentration of 85 ppb or greater in selected metropolitan areas. On average, concentrations in rural areas were 15-20 ppb lower than the average maximum concentrations in the Dallas/Fort Worth and Tyler/Longview/Marshall area, and 10-15 ppb lower than the average maximum concentrations in the Houston/Galveston/Brazoria area. In contrast, rural concentrations were within 5-10 ppb of the average daily maximum concentrations in the Austin area.

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## 1.0 Introduction

This report documents the development and results of two seasonal photochemical grid modeling runs designed to estimate ozone concentrations over eastern Texas for the June through September period using emission inventories developed for the years 2002 and 2009. The air quality study results are specific to the impacts on ozone concentrations averaged over eight hours.

## 2.0 Model Preparation

The Comprehensive Air Quality Model with Extensions (CAMx) was used to perform photochemical grid modeling for this project. Two CAMx runs were developed for the analyses presented in this report. For all runs, the model configuration, meteorological fields, boundary and initial conditions, dry deposition algorithms, chemical mechanisms, and biogenic emissions were the same as those developed for the 2002 seasonal model described in the ENVIRON report entitled *TERC Project H60, Phase I Dallas/Fort-Worth Future Year 2009 Ozone Modeling with Four Ozone Episodes from 1999 and 2002* dated April 3, 2006[1]. ENVIRON developed the 2002 episode for the June through September period from data used by the Central Regional Air Planning Association (CENRAP) for annual modeling of regional haze and visibility. The meteorological data were originally developed by the Iowa Department of Natural Resources (IDNR) using the PSU/NCAR Mesoscale Model Version 5 (MM5) [2]. The biogenic emissions inventory was developed using the Global Biosphere Emissions and Interactions System (GloBEIS) model with MM5 temperatures, and solar radiation derived from GOES satellite data. Landuse/landcover data used for the August 13-22, 1999 Dallas/Fort Worth episode were employed[3]. This August 13-22 episode was used by the Texas Commission on Environmental Quality (TCEQ) to develop a State Implementation Plan (SIP) for the Dallas/Fort Worth (DFW) ozone nonattainment area.

### 2.1 2002 Base Case

The base case anthropogenic emissions inventory for the simulations presented in this report was based on the CENRAP 2002 inventory as summarized in the April 23, 2006 ENVIRON report[1]. The 2002 anthropogenic inventory consisted of emissions as reported to EPA's 2002 National Emissions Inventory (NEI) with updates and corrections provided by CENRAP member states (including Texas) and other Regional Planning Organizations. All data used in the development of the Texas regional emissions inventory were taken from the CENRAP 2002 data with the exception of U.S. on-road mobile and Gulf of Mexico offshore sources. The U.S. on-road mobile emissions inventory was the EPA NEI 2002 preliminary data that was posted on EPA's website in summer 2004. The Gulf of Mexico offshore inventory was provided by the TCEQ.

## 2.2 2009 Future Case

The future case anthropogenic emissions inventory for the two CAMx runs presented in this report was TCEQ's 2009 "a2" emissions inventory. The "a2" emissions inventory has been used by TCEQ in support of the Proposed Eight-Hour Attainment Demonstration SIP Revision for the DFW area as documented in Appendix B: Emissions Inventory Development available from the TCEQ website (http://www.tceq.state.tx.us/implementation/air/sip/dfw.html#Plans). The 2009 "a2" emissions inventory was used by ENVIRON for previous modeling of proposed power plants as summarized in a report entitled *Ozone Impacts in DFW of Proposed NEW EGUs and an Offset Strategy* dated August 23, 2006[4].

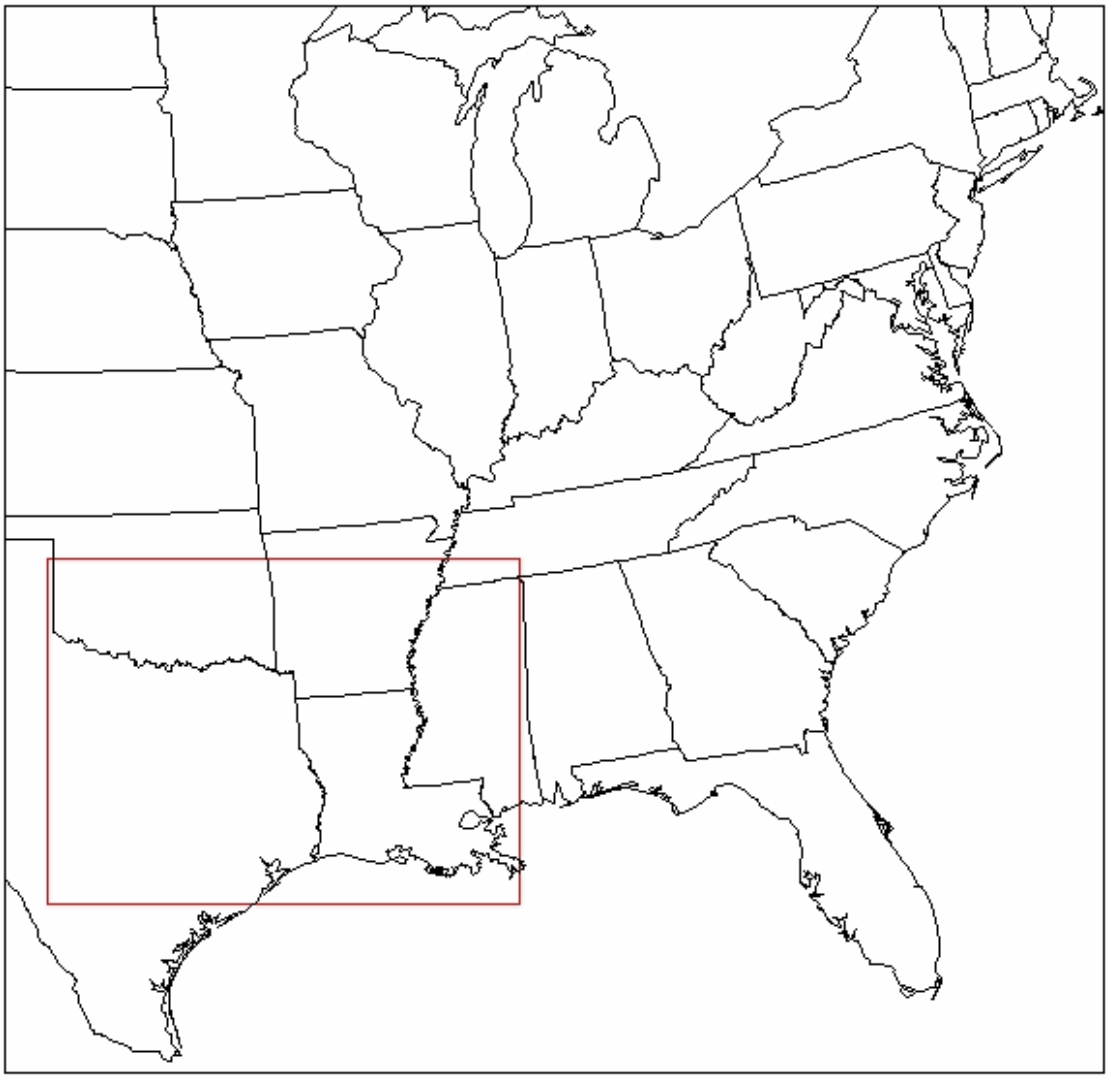
## 2.3 Emissions Processing

All input modeling files for the 2002 and 2009 simulations were retrieved from ENVIRON by UT-Austin Staff via file transfer protocol (ftp) during December 2006. The CAMx-ready surface emissions inventory files provided by ENVIRON were used without modification for both the 2002 and 2009 UT-Austin simulations. The 2002 point source inventory was reprocessed by UT-Austin Staff using data files provided by ENVIRON with no modifications to the original point source emissions inventory. For the 2009 point source processing, emissions from the Sandow 5 facility located in Milam County were removed from the original point source emissions file. Other than this single modification, the 2009 point source emissions were reprocessed by UT-Austin Staff as provided by ENVIRON.

## 2.4 CAMx Domains

Figure 1 provides the 36-km and 12-km CAMx domains used for the 2002 and 2009 simulations. All ozone predictions presented in this report were simulated on the 12-km domain. The domain consists of 65 (north-south) by 89 (east-west) grid cells at a 12-km horizontal resolution. Due to the limited extent of the 12-km CENRAP meteorological data, the southern boundary of the 12-km CAMx domain is located to the north of both the Victoria and Corpus Christi ozone near non-attainment areas.

**Figure 1. CAMx modeling domains (outer 36-km and inner 12-km grids) for the June through September 2002 episode. The 12-km domain is outlined in red.**



## 3.0 Air Quality Impacts

The objectives of the modeling studies described in this report were to predict ozone concentrations over eastern Texas using 2002 meteorology for the June through September period with: 1.) 2002 anthropogenic emissions; and, 2.) 2009 anthropogenic emissions. Biogenic emissions from 2002 were used for both the 2002 and 2009 simulations. Air quality impacts were evaluated for each of these scenarios using statistical and graphical metrics for ozone concentrations averaged over 8 hours.

### 3.1 Daily Ozone Maps

Ozone contour maps were developed to show the daily maximum ozone concentrations averaged over 8 hours predicted for the years 2002 and 2009. For each grid cell, these contour maps show the predicted maximum ozone concentrations averaged over 8 hours for the 2002 Base Case and the 2009 Future Case. Due to the number of figures, the daily ozone maps for the 2002 and 2009 scenarios have been provided as Appendix A.

The differences in the daily maximum ozone concentrations averaged over 8 hours between the 2002 Base Case and the 2009 Future Case are shown in ozone difference maps. For each grid cell, these contour maps show the difference between the daily maximum ozone concentrations averaged over 8 hours. Due to the number of figures, the daily ozone difference maps have been provided as Appendix B.

Figures 2 and 3 present the ozone contour maps for September 14$^{th}$ for the 2002 Base Case and for the 2009 Future Case, respectively. Figures 2 and 3 present the predicted daily maximum ozone at each 12-km grid cell. Figure 4 presents the difference in the daily maximum ozone concentrations averaged over 8 hours between the 2002 and 2009 scenarios for September 14$^{th}$ at each 12-km grid cell.

As shown in Figure 2 for the 2002 Base Case, ozone concentrations averaged over 8 hours greater than 100 ppb were predicted in eastern Texas over the Dallas/Forth Worth area and over southeast Texas, which includes the Houston/Galveston/Brazoria and Beaumont/Port Arthur areas. Similarly, ozone concentrations averaged over 8 hours greater than 100 ppb are also predicted along the Interstate-35 corridor south of Dallas/Fort Worth into the Austin and San Antonio areas, which are located in the southwestern portion of the CAMx domain. Eight-hour averaged ozone concentrations over 100 ppb are also predicted over northeast Texas, which includes the Tyler/Longview/Marshall area. Over rural areas of eastern Texas, maximum ozone concentrations averaged over 8 hours are generally predicted in the 60 ppb to 80 ppb range for the 2002 Base Case. As shown in Figure 3, the predicted maximum ozone concentrations averaged over 8 hours are generally lower for the 2009 Future Case compared to the 2002 Base Case predictions, although the spatial variability of high ozone concentrations is similar.

As shown in the ozone difference map provided in Figure 4, predicted 8-hour averaged ozone concentrations are relatively lower over most of eastern Texas for the 2009 Future

Case compared to the 2002 Base Case. The maximum daily predicted 8-hour ozone concentrations over rural areas decrease by approximately 5 ppb to 10 ppb for the 2009 Future Case compared to the 2002 Base Case. Although most of the metropolitan areas in eastern Texas are characterized by a relative decrease in ozone concentrations on this particular day, portions of the Dallas/Fort Worth and Houston/Galveston/Brazoria areas are characterized by relatively higher predicted 8-hour averaged ozone concentrations in 2009 compared to 2002.

### 3.2 Average Daily Ozone by Month

Figures 5 through 8 present concentration maps for the average daily maximum ozone concentrations averaged over 8 hours for the months of June through September, respectively, for the 2002 Base Case. Figures 9 through 12 present the analogous monthly maps for the 2009 Future Case. The Dallas/Forth Worth area and northeast Texas (including Tyler/Longview/Marshall) are generally characterized by monthly averages of the maximum daily 8-hour ozone concentrations that are greater than 70 ppb across all months during 2002. Maximum averages in southeast Texas range between 65 ppb and 70 ppb. The Interstate-35 corridor including the Austin and San Antonio areas is characterized by monthly averages of the maximum 8-hour ozone concentrations that range between 55 ppb and 60 ppb during June/July increasing to between 60 ppb and 65 ppb during August/September. In general, the predicted average concentrations for the 2009 Future Case are approximately 5 ppb lower than those predicted in the 2002 Base Case.

For the June through September period for both the 2002 Base Case and the 2009 Future Case, the Dallas/Fort Worth area is characterized by a large spatial area of average maximum daily 8-hour ozone concentrations of 60 ppb or greater. The spatial coverage of high ozone concentrations over northeast Texas is qualitatively comparable to that predicted over Dallas/Forth Worth for July and August. In comparison to the Dallas/Fort Worth and Longview/Tyler/Marshall areas, the magnitude and spatial coverage of relatively high average ozone concentrations is much lower in the Houston/Galveston/Brazoria and Beaumont/Port Arthur areas. Over the rural areas of eastern Texas, June is generally characterized by the lowest average concentrations while maximum concentrations are generally observed during August.

### 3.3 Average Monthly Ozone at TexAQS II Rural Ground-Level Monitoring Stations

To further investigate the spatial and temporal variability of ozone concentrations within rural areas of eastern Texas, the monthly average daily maximum ozone concentrations averaged over 8 hours were extracted from the 12-km grid cells containing selected monitoring locations for the 2002 Base Case simulation. Based on the network of monitoring stations active during the 2005-2006 TexAQS II period, UT Staff chose nineteen monitoring stations located within the 12-km CAMx domain that are generally representative of rural areas in eastern Texas. A list of the nineteen monitoring stations is provided in Table 1 and the locations are presented in Figure 13. Table 1 also provides

the average daily maximum ozone concentrations averaged over 8 hours for the months of June through September for the 2002 Base Case. Figures 14 through 17 present maps labeled with the average ozone concentrations for the months of June through September, respectively, at each of these nineteen monitoring locations.

**Table 1. Average daily maximum ozone concentrations averaged over 8 hours for the months of June through September for the 2002 Base Case at selected TexAQS II monitoring stations.**

| Monitoring Station | CAMS Number | Average of 2002 predicted daily maximum 8-hour ozone concentrations, ppb | | | |
|---|---|---|---|---|---|
| | | June | July | August | September |
| Alabama-Coushatta | C1027 | 57 | 55 | 58 | 58 |
| Clarksville | C648 | 56 | 59 | 60 | 57 |
| Clute | C11 | 56 | 51 | 59 | 63 |
| Conroe | C78 | 63 | 70 | 67 | 60 |
| Denton Airport South | C56 | 72 | 74 | 76 | 68 |
| Fayette County | C601 | 56 | 51 | 56 | 58 |
| Greenville | C106 | 55 | 61 | 60 | 59 |
| Hallettsville | C649 | 52 | 47 | 53 | 59 |
| Hamshire | C64 | 55 | 52 | 60 | 62 |
| Italy High School | C650 | 59 | 61 | 62 | 63 |
| Karnack | C85 | 62 | 69 | 65 | 59 |
| Mauriceville | C642 | 60 | 63 | 63 | 63 |
| Newton | C639 | 55 | 57 | 59 | 58 |
| Palestine | C647 | 52 | 57 | 60 | 58 |
| Panola | C627 | 59 | 67 | 65 | 63 |
| Sabine Pass | C640 | 59 | 55 | 64 | 64 |
| San Augustine | C646 | 54 | 55 | 60 | 58 |
| Temple | C651 | 58 | 54 | 60 | 61 |
| Wamba | C645 | 57 | 65 | 62 | 57 |

As shown in Table 1 and Figure 14, the highest average daily maximum predicted 8-hour ozone concentration during June was 72 ppb at the Denton Airport. Average daily maximum predicted 8-hour ozone concentrations of 63 ppb, 62 ppb and 60 ppb are predicted at the Conroe, Karnack, and Mauriceville monitoring stations, respectively. The lowest average daily maximum predicted 8-hour ozone concentrations of 54 ppb, 52 ppb, and 52 ppb are predicted at the San Augustine, Palestine, and Hallettsville monitoring stations, respectively.

During July, as shown in Table 1 and Figure 15, the northern portion of the monitoring network is generally characterized by the highest daily maximum average 8-hour ozone concentrations. Denton Airport is characterized by the average 8-hour ozone

concentration of 74 ppb. In northeast Texas, average daily maximum 8-hour ozone concentrations between 65 ppb and 69 ppb are predicted at the Wamba, Panola, and Karnack monitoring stations. Within the southern portion of the rural monitoring network, a relatively high average concentration of 70 ppb was predicted at the Conroe monitoring station; otherwise, only Mauriceville, with an average concentration of 63 ppb, is characterized by a daily maximum predicted 8-hour ozone concentration of 60 ppb or greater. Overall, the lowest averages of daily maximum predicted 8-hour ozone concentrations among the nineteen monitoring stations are at the three central Texas monitoring stations (Temple, Fayette County, and Hallettsville) and at Clute, with a minimum of 47 ppb at Hallettsville.

As shown in Figure 16, the highest average daily maximum predicted 8-hour ozone concentrations during August are at the Denton Airport, Conroe, Panola, and Karnack monitoring stations at 76 ppb, 67 ppb, 65 ppb, and 65 ppb, respectively. Average daily maximum predicted 8-hour ozone concentrations at most of the remaining stations are in the upper 50 ppb or lower 60 ppb range, with a minimum of 53 ppb at the Hallettsville monitoring station.

The month of September is qualitatively characterized by the least variation in average daily maximum predicted 8-hour ozone concentrations across the monitoring network, with concentrations across most of the network ranging in the upper 50 ppb to lower 60 ppb range. The maximum average daily maximum predicted 8-hour ozone concentrations are 68 ppb at Denton Airport and 63 ppb at the Panola, Mauriceville, and Italy High School monitoring stations. Hallettsville is characterized by a relatively high average daily maximum predicted 8-hour ozone concentration of 59 ppb compared to that predicted for previous months. The coastal monitoring stations of Sabine Pass and Clute are characterized by average concentrations of 64 ppb and 63 ppb, respectively.

### 3.4 Average Ozone during High Ozone Events

Ozone concentrations averaged over 8 hours were also investigated by averaging the daily maximum concentrations for all days characterized by a maximum predicted ozone concentration of 85 ppb or greater in selected metropolitan areas during 2002. For example, Figure 18 presents the average daily maximum predicted 8-hour ozone concentrations on days characterized by a maximum predicted concentration of 85 ppb or greater at one or more grid cells in the 9-county Dallas/Forth Worth area. Figures 19 through 21 present the analogous results for the 5-county Austin area, 5-county Tyler/Longview/Marshall, and 8-county Houston/Galveston/Brazoria areas, respectively.

As shown in Figure 18, the highest average daily maximum predicted 8-hour ozone concentrations in the Dallas/Fort Worth area range between 85 ppb and 90 ppb in the vicinity of Tarrant county. Outside of the 9-county Dallas/Fort Worth area, most of the surrounding area is characterized by average daily maximum predicted 8-hour ozone concentrations of 65 to 70 ppb. Note that highest average daily maximum predicted 8-hour ozone concentrations in the Tyler/Longview/Marshall area are 80 ppb to 85 ppb.

Figure 22 presents the average daily maximum predicted 8-hour ozone concentrations at the nineteen rural monitoring stations on days characterized by a maximum predicted concentration of 85 ppb or greater in Dallas/Fort Worth. Average concentrations across the northern portion of the monitoring network are generally in the upper 60 ppb range with maximum concentrations of 84 ppb, 74 ppb, and 70 ppb at the Denton Airport, Panola, and Italy High School monitoring stations, respectively. Concentrations across the southern portion of the network are generally in the middle 60 ppb range with a minimum concentration of 59 ppb at Hallettsville.

As shown in Figure 19, Austin is characterized by a localized area centered over Travis County of average daily maximum predicted 8-hour ozone concentrations that range between 80 ppb and 85 ppb. Interestingly, much of eastern Texas is characterized by average daily maximum predicted 8-hour ozone concentrations that range between 70 ppb and 75 ppb, including the region along the Interstate-35 corridor south of Dallas/Fort Worth through the Austin and San Antonio areas. Similarly, average daily maximum predicted 8-hour ozone concentrations of 70 ppb to 75 ppb are found in the region between Austin and southeast Texas. Smaller areas of relatively lower average daily maximum predicted 8-hour ozone concentrations of 65 ppb to 70 ppb are noted several counties to the northeast and southeast of Travis county. The Dallas/Fort Worth and Houston/Galveston/Brazoria areas are characterized by high average daily maximum predicted 8-hour ozone concentrations of 95 ppb to 100 ppb, respectively. Overall, the spatial pattern of high ozone concentrations shown in Figure 19 suggests that high ozone events in Austin are often accompanied by high ozone concentrations throughout eastern Texas.

Figure 23 presents the average daily maximum predicted 8-hour ozone concentrations at the nineteen rural monitoring stations on high ozone days in Austin. An average concentration of 73 ppb is predicted at each of the central Texas monitoring stations (Temple, Fayette County, and Hallettsville). The predicted average concentrations at the four southeast coastal stations range from 81 ppb at Sabine Pass to 85 ppb at Hamshire. Concentrations throughout northern Texas are in the middle to upper 60 ppb range, with maximum concentrations of 86 ppb, 75 ppb, and 74 ppb at the Denton Airport, Italy High School, and Panola monitoring stations, respectively.

Figure 20 presents the average daily maximum ozone concentrations averaged over 8 hours when one or more grid cells in the Houston/Galveston/Brazoria area are characterized by a maximum concentration of 85 ppb or greater. Much of southeast Texas, including the Beaumont/Port Arthur area, is characterized by average daily maximum predicted 8-hour ozone concentrations between 75 ppb and 80 ppb. Average daily maximum predicted 8-hour ozone concentrations in the 75 ppb to 80 ppb range are also predicted over the Dallas/Fort Worth and Tyler/Longview/Marshall areas, and in highly localized portions of Austin and San Antonio. Interestingly, the spatial coverage and magnitude of average daily maximum predicted 8-hour ozone concentrations greater than 85 ppb is quite small over the Houston/Galveston/Brazoria area in comparison to that noted for Dallas/Fort Worth shown in Figure 18. This suggests that the location and/or spatial scale of high ozone concentrations in the Houston/Galveston/Brazoria area

among high ozone days may be characterized by relatively greater variability in time and space, which would be consistent with a relatively smaller region of high averaged daily maximum predicted 8-hour ozone concentrations compared to that predicted for Dallas/Fort Worth. Average daily maximum predicted 8-hour ozone concentrations in the rural areas surrounding southeast Texas outside of the Houston/Galveston/Brazoria and Beaumont/Port Arthur areas generally range between 60 ppb and 65 ppb. Note that average daily maximum predicted 8-hour ozone concentrations in the 65 ppb to 75 ppb range extend offshore from southeast Texas over the Gulf of Mexico.

Figure 24 presents the average daily maximum predicted 8-hour ozone concentrations at the nineteen rural monitoring stations on high ozone days in Houston/Galveston/Brazoria. Across southeast Texas, the predicted average concentrations range from 70 ppb at Conroe to 74 ppb at Sabine Pass. Elsewhere over the southern half of the monitoring network, concentrations are in the low to middle 60 ppb range. Over northern Texas, concentrations are generally in the middle to upper 60 ppb range with a maximum of 81 ppb at Denton Airport.

As shown in Figure 21, Tyler/Longview/Marshall is characterized by a small region of high average daily maximum predicted 8-hour ozone concentrations of 80 ppb to 85 ppb centered over Gregg county and northern Rusk county. Average daily maximum predicted 8-hour ozone concentrations between 65 ppb and 75 ppb cover most of the northern half of eastern Texas extending from northeast Texas westward across the Dallas/Fort Worth area. A small area of average daily maximum predicted 8-hour ozone concentrations of 85 ppb to 90 ppb are predicted over Tarrant county. The comparison of Figure 21 and Figure 18 (high ozone concentrations in Dallas/Fort Worth) reveals very similar spatial patterns of high ozone concentrations across the northern half of Texas.

Figure 25 presents the average daily maximum predicted 8-hour ozone concentrations at the nineteen rural monitoring stations on high ozone days in Tyler/Longview/Marshall. The magnitude of average predicted ozone concentrations is very similar to that shown for Dallas/Fort Worth in Figure 22. Average concentrations are generally in the middle 60 ppb to 70 ppb range across northern Texas with maximum concentrations of 83 ppb and 76 ppb at the Denton Airport and Panola monitoring stations, respectively. Over the southern portions of the rural monitoring network, concentrations are in the low to middle 60 ppb range, ranging from 59 ppb at Hallettsville 71 ppb at Mauriceville.

**Figure 2: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 14 for the 2002 Base Case.**

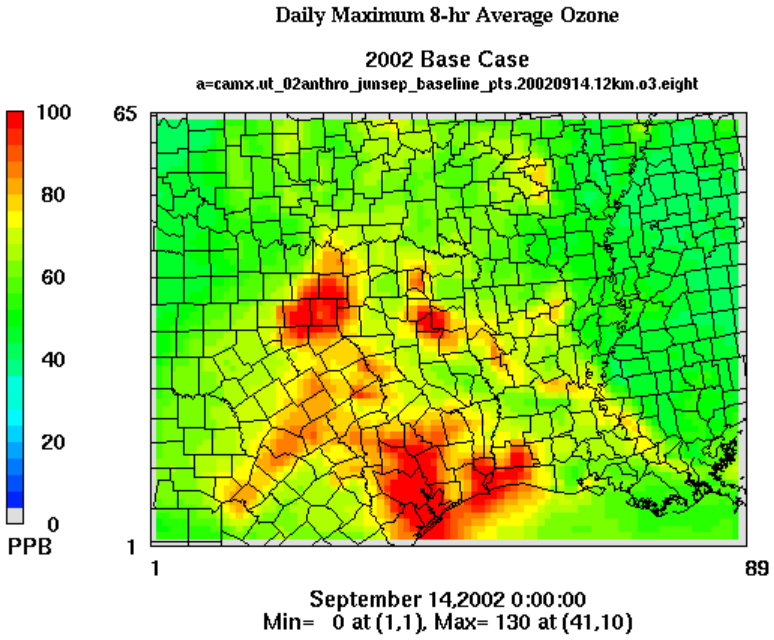



**Figure 3: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 14 for the 2009 Future Case.**

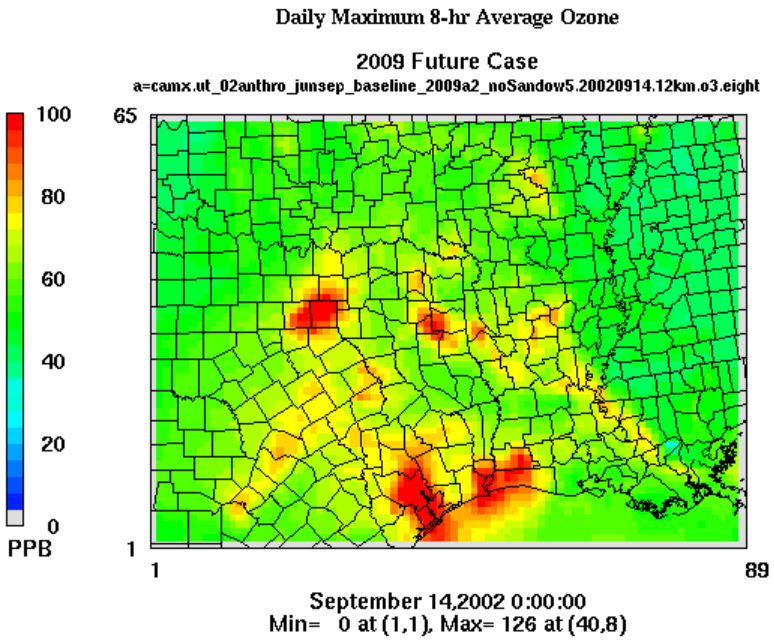


**Figure 4: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 14 between the 2002 Base Case and 2009 Future Case.**

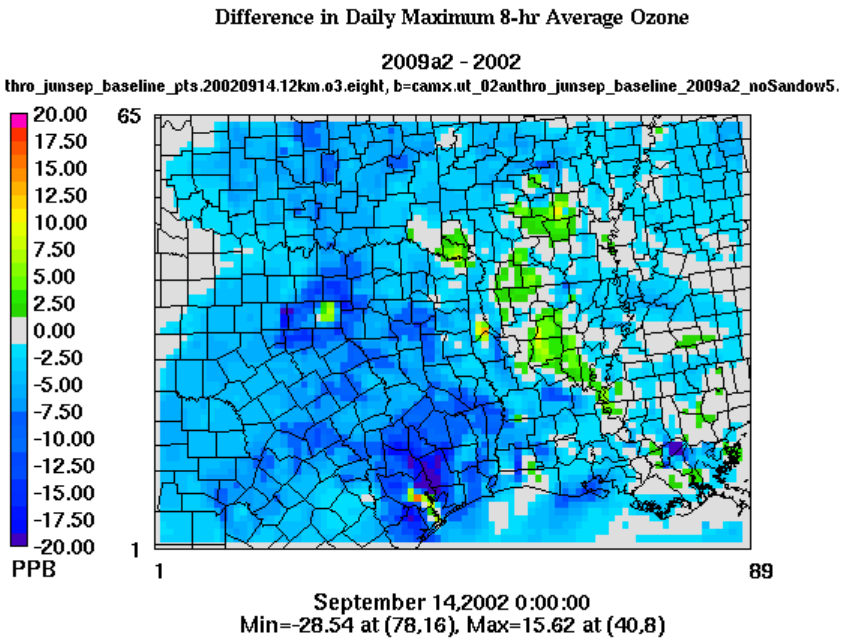


**Figure 5: Average of daily maximum 8-hour ozone concentrations in the 12-km CAMx domain during June for the 2002 Base Case.**

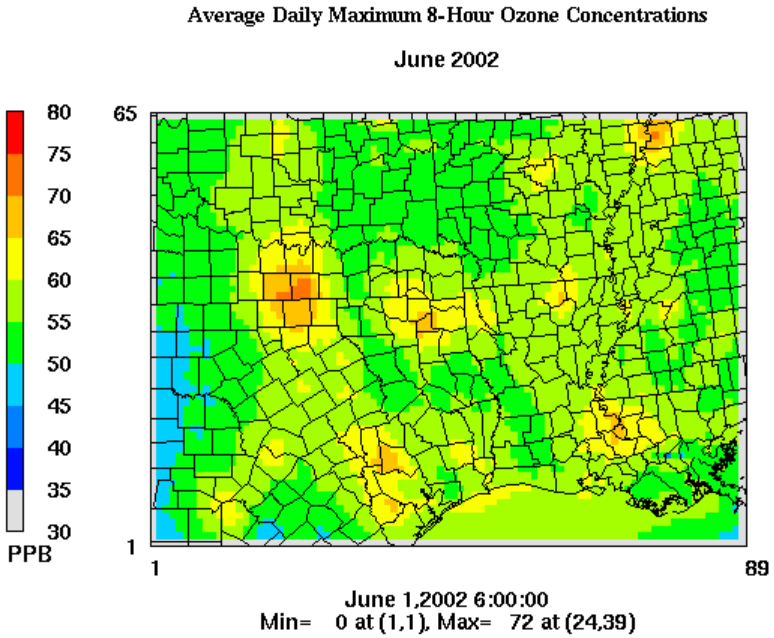



**Figure 6: Average of daily maximum 8-hour ozone concentrations in the 12-km CAMx domain during July for the 2002 Base Case.**

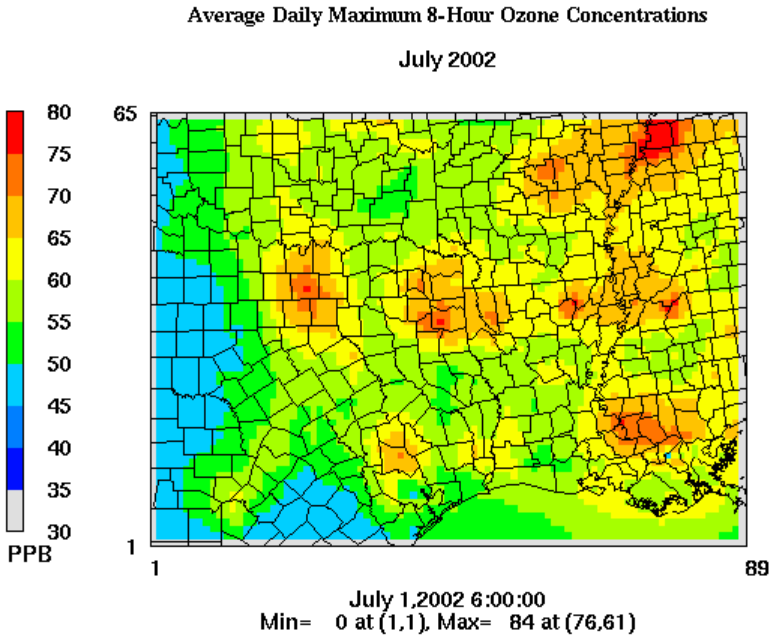


**Figure 7: Average of daily maximum 8-hour ozone concentrations in the 12-km CAMx domain during August for the 2002 Base Case.**

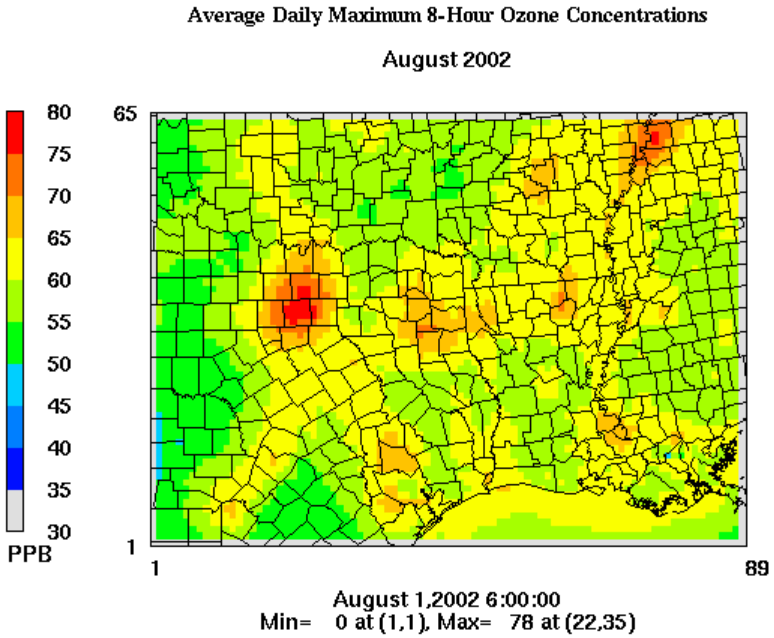



**Figure 8: Average of daily maximum 8-hour ozone concentrations in the 12-km CAMx domain during September for the 2002 Base Case.**

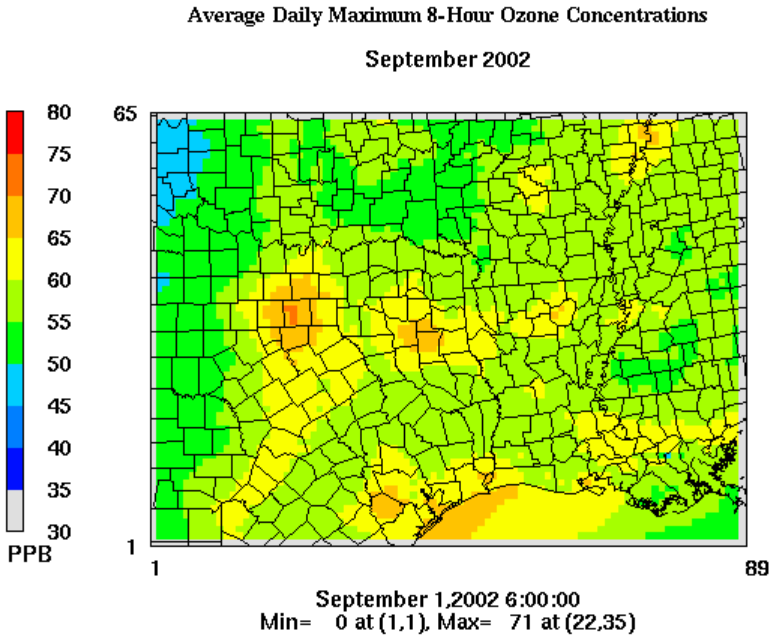


**Figure 9: Average of daily maximum 8-hour ozone concentrations in the 12-km CAMx domain during June for the 2009 Future Case.**

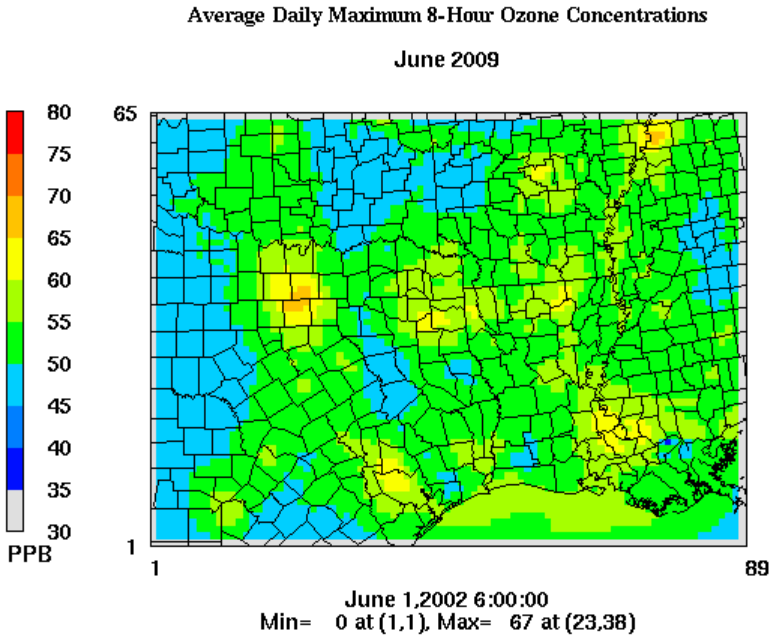



**Figure 10: Average of daily maximum 8-hour ozone concentrations in the 12-km CAMx domain during July for the 2009 Future Case.**

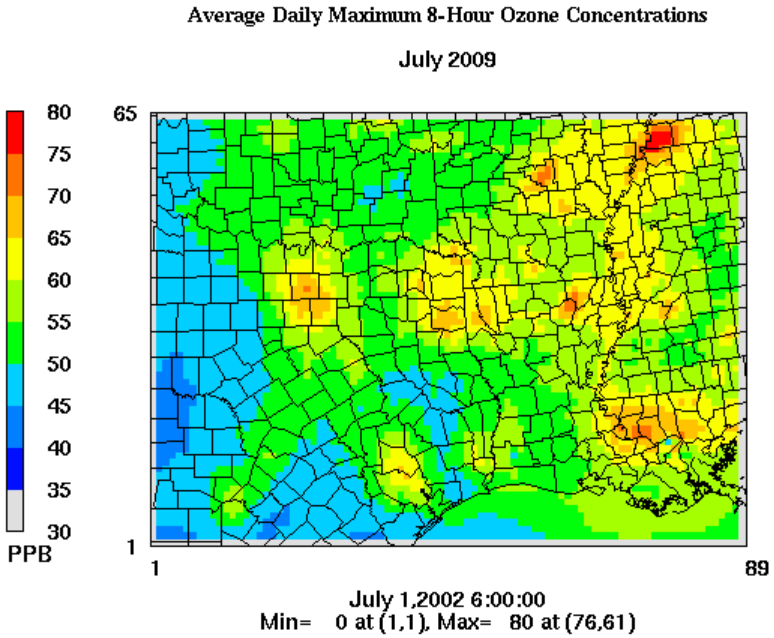


**Figure 11: Average of daily maximum 8-hour ozone concentrations in the 12-km CAMx domain during August for the 2009 Future Case.**

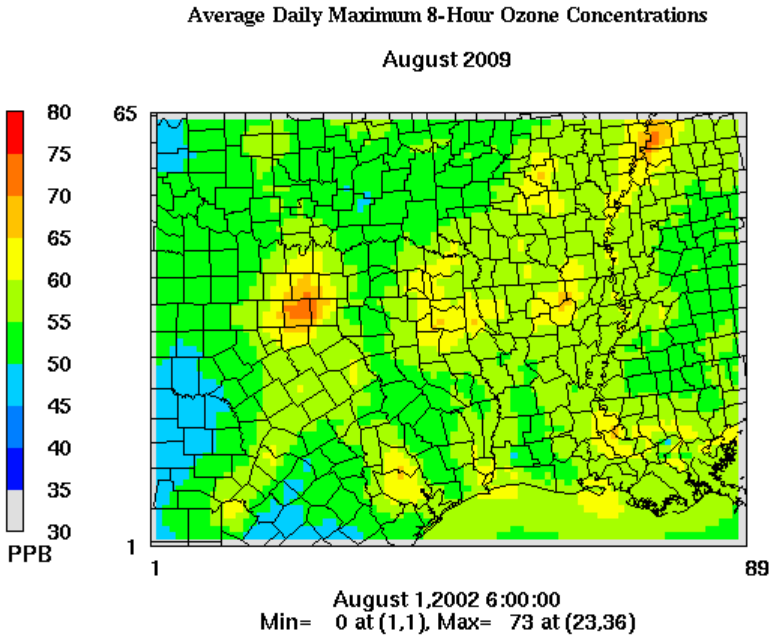



**Figure 12: Average of daily maximum 8-hour ozone concentrations in the 12-km CAMx domain during September for the 2009 Future Case.**

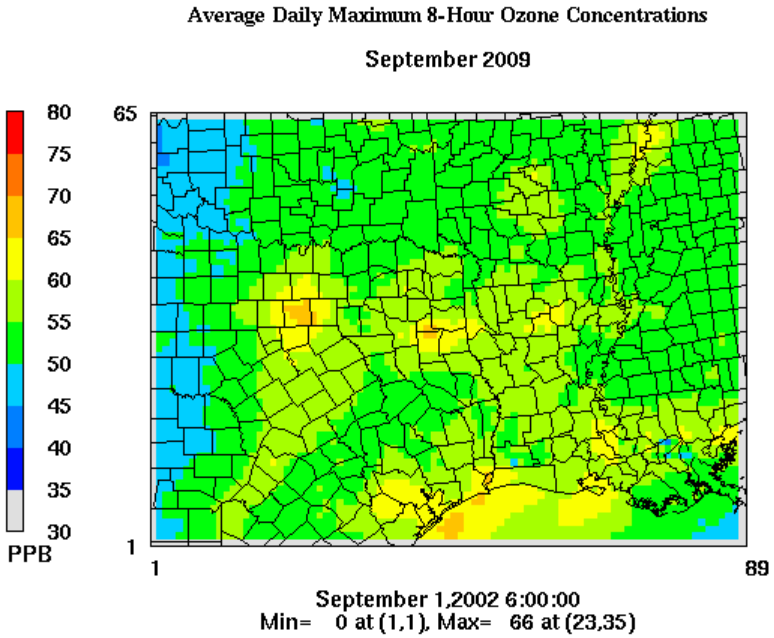


**Figure 13: Locations of the nineteen rural monitoring stations in eastern Texas.**

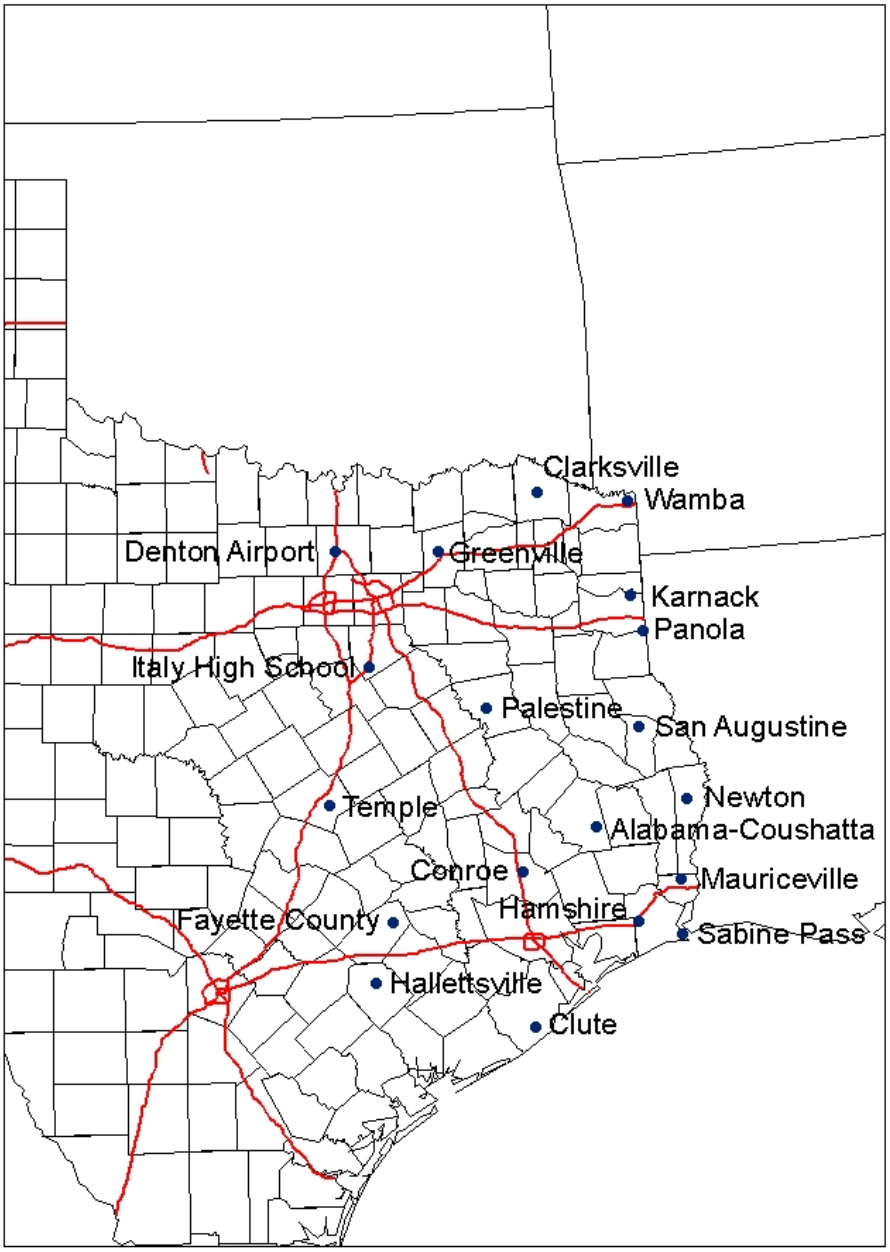


**Figure 14: Average daily maximum ozone concentrations averaged over 8 hours at the nineteen rural monitoring stations in eastern Texas during June.**

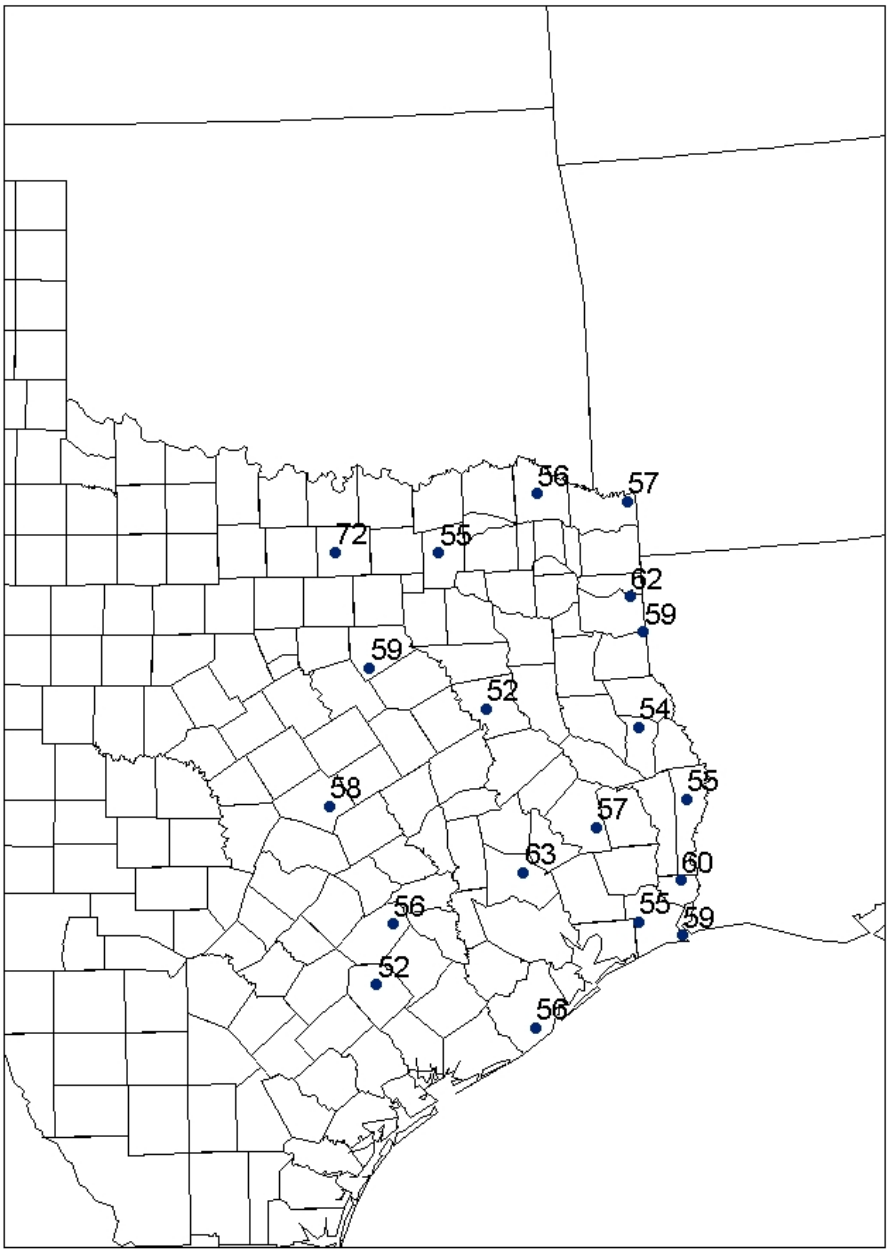


**Figure 15: Average daily maximum ozone concentrations averaged over 8 hours at the nineteen rural monitoring stations in eastern Texas during July.**

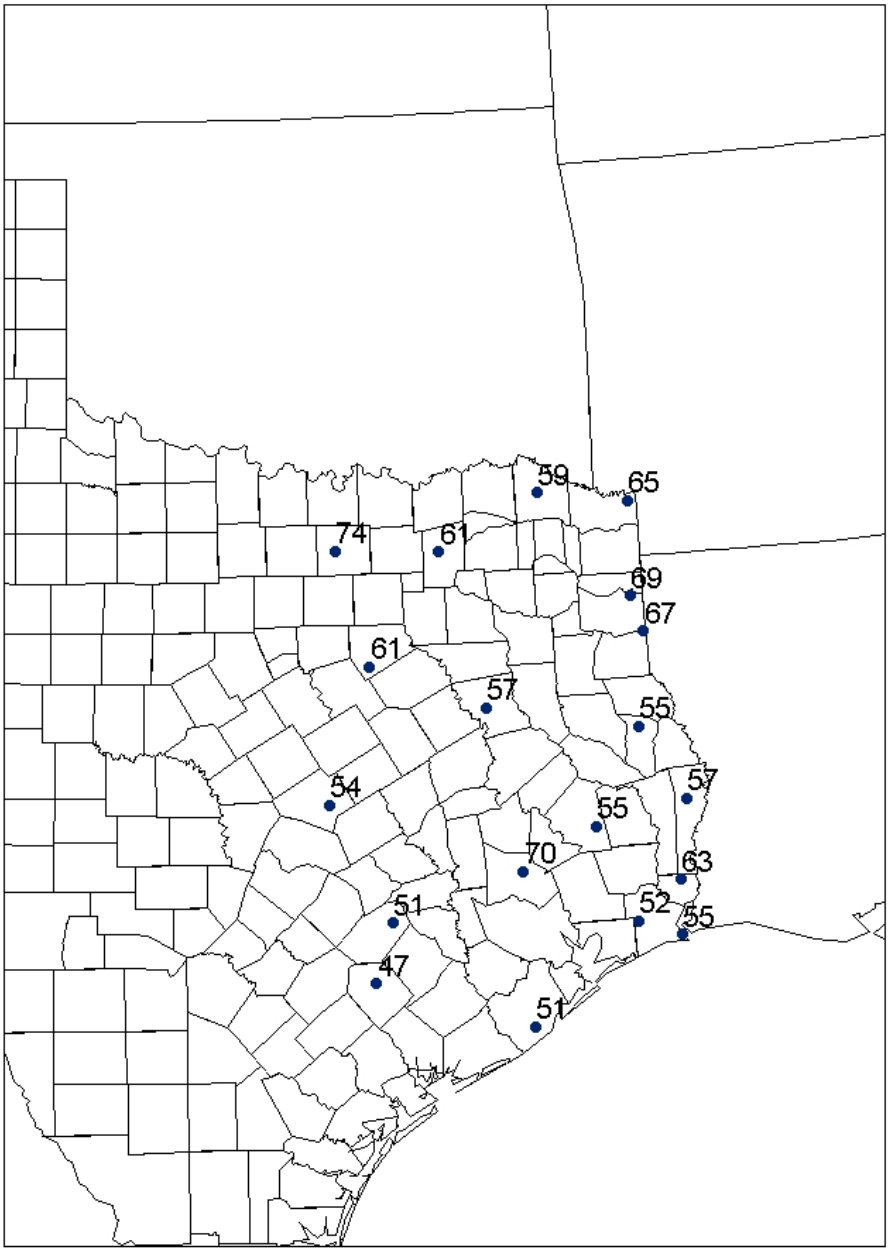


**Figure 16: Average daily maximum ozone concentrations averaged over 8 hours at the nineteen rural monitoring stations in eastern Texas during August.**

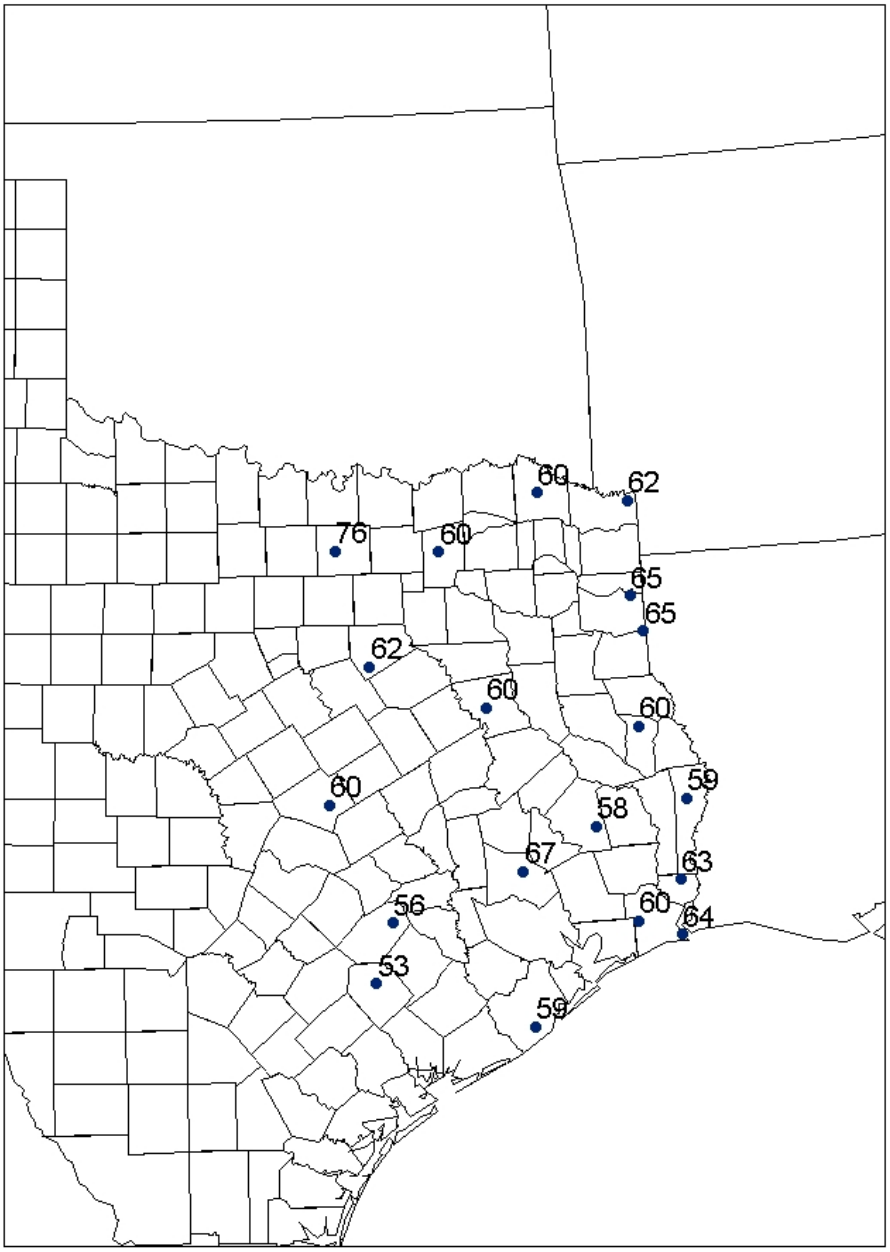


**Figure 17: Average daily maximum ozone concentrations averaged over 8 hours at the nineteen rural monitoring stations in eastern Texas during September.**

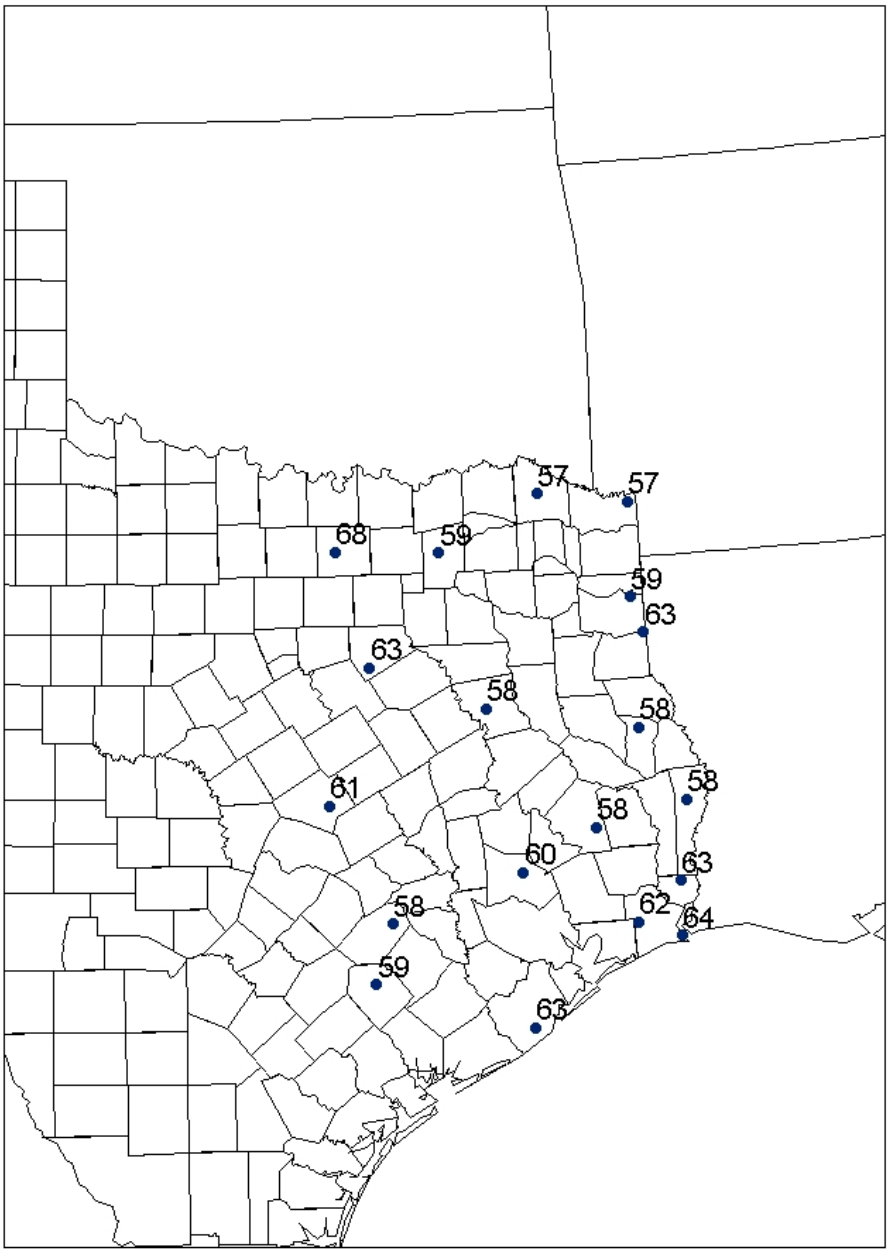


**Figure 18: Average of daily maximum 8-hour ozone concentrations in the 12-km CAMx domain on days during the June through September period characterized by ozone concentrations of 85 ppb or greater at one or more grid cells in the Dallas/Fort Worth area (54 total days).**

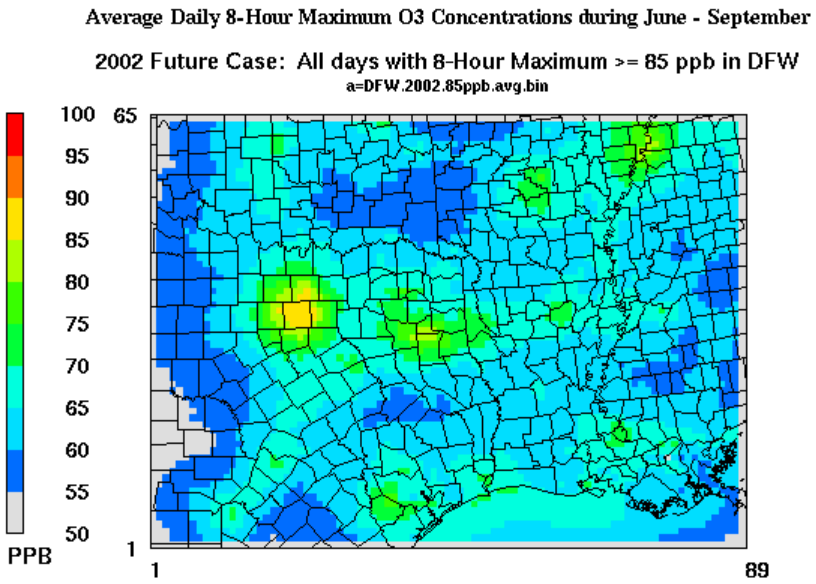



**Figure 19: Average of daily maximum 8-hour ozone concentrations in the 12-km CAMx domain on days during the June through September period characterized by ozone concentrations of 85 ppb or greater at one or more grid cells in the Austin area (12 total days).**

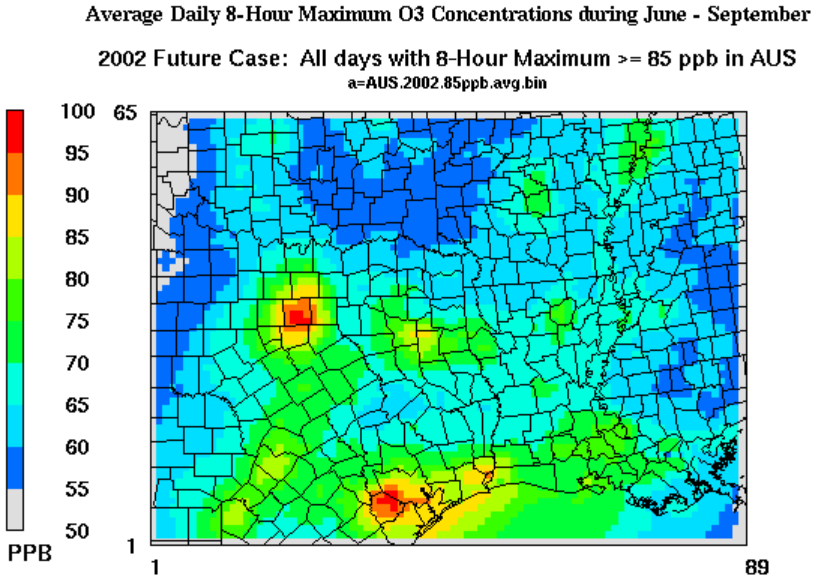


**Figure 20: Average of daily maximum 8-hour ozone concentrations in the 12-km CAMx domain on days during the June through September period characterized by ozone concentrations of 85 ppb or greater at one or more grid cells in the Houston/Galveston/Brazoria area (47 total days).**

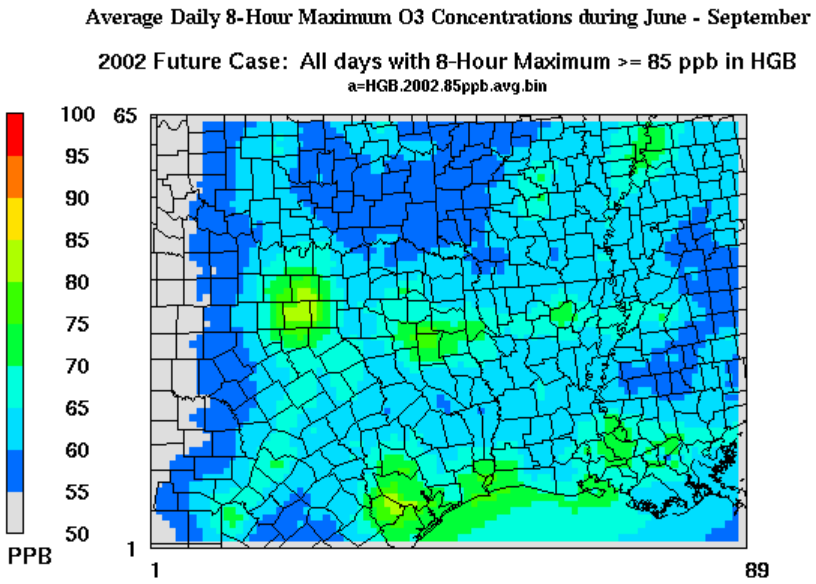



**Figure 21: Average of daily maximum 8-hour ozone concentrations in the 12-km CAMx domain on days during the June through September period characterized by ozone concentrations of 85 ppb or greater at one or more grid cells in the Tyler/Longview/Marshall area (48 total days).**

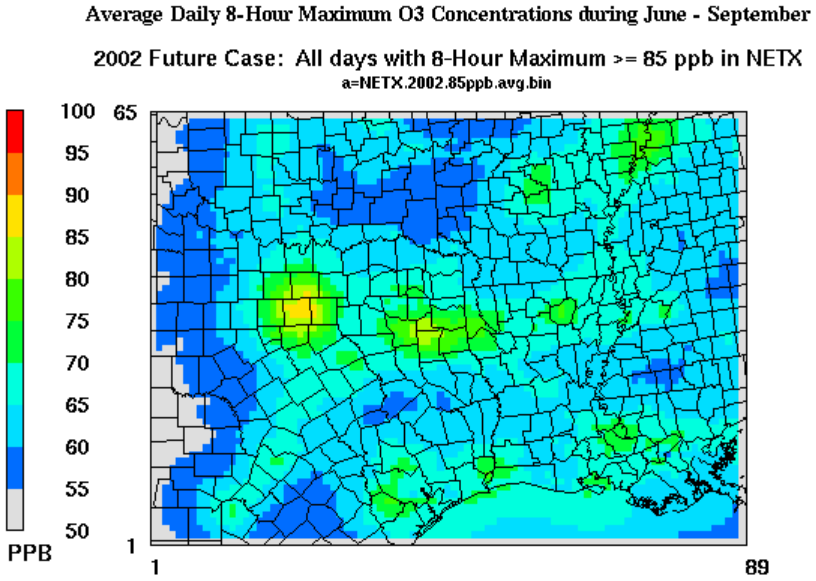


**Figure 22: Average daily maximum ozone concentrations averaged over 8 hours at the nineteen rural monitoring stations in eastern Texas on days during the June through September period characterized by ozone concentrations of 85 ppb or greater at one or more grid cells in the Dallas/Fort Worth area.**

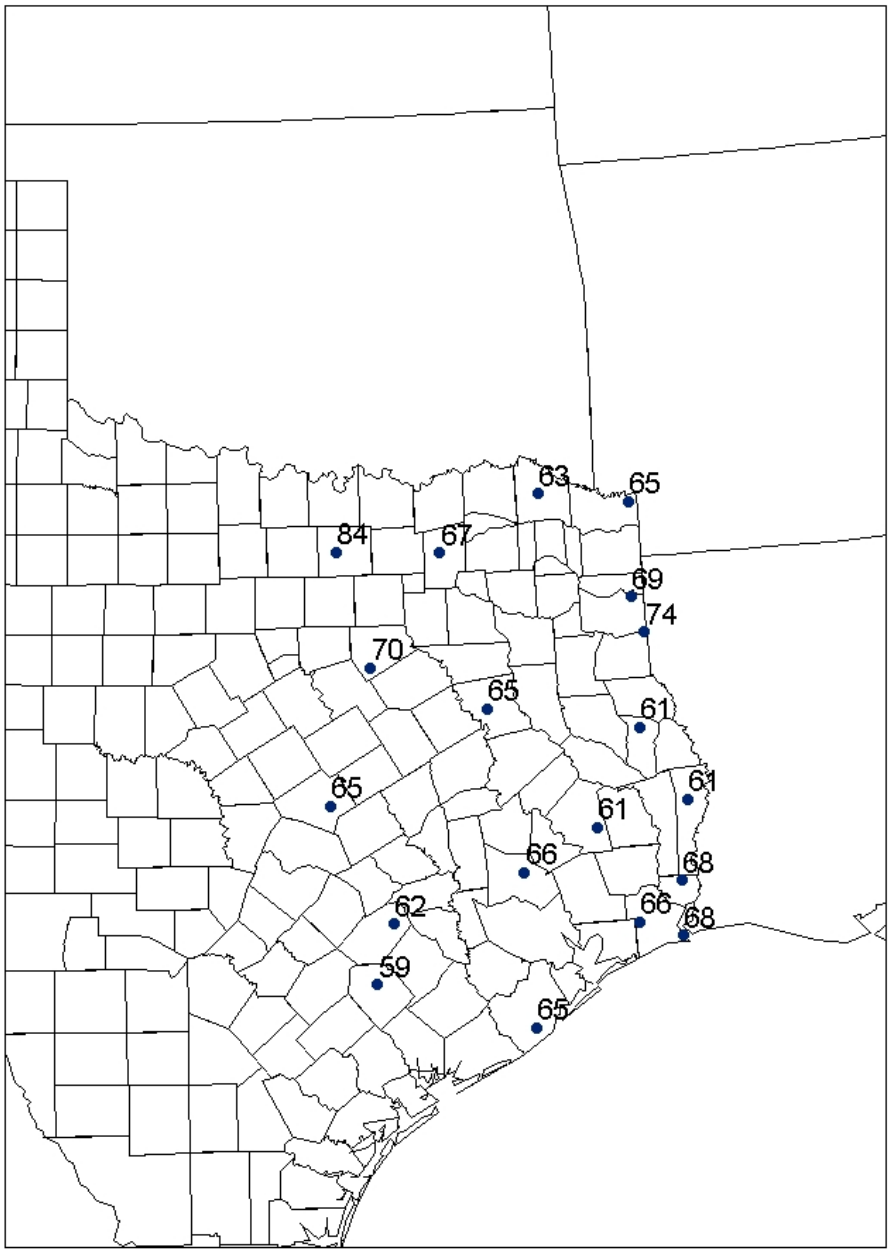


**Figure 23: Average daily maximum ozone concentrations averaged over 8 hours at the nineteen rural monitoring stations in eastern Texas on days during the June through September period characterized by ozone concentrations of 85 ppb or greater at one or more grid cells in the Austin area.**

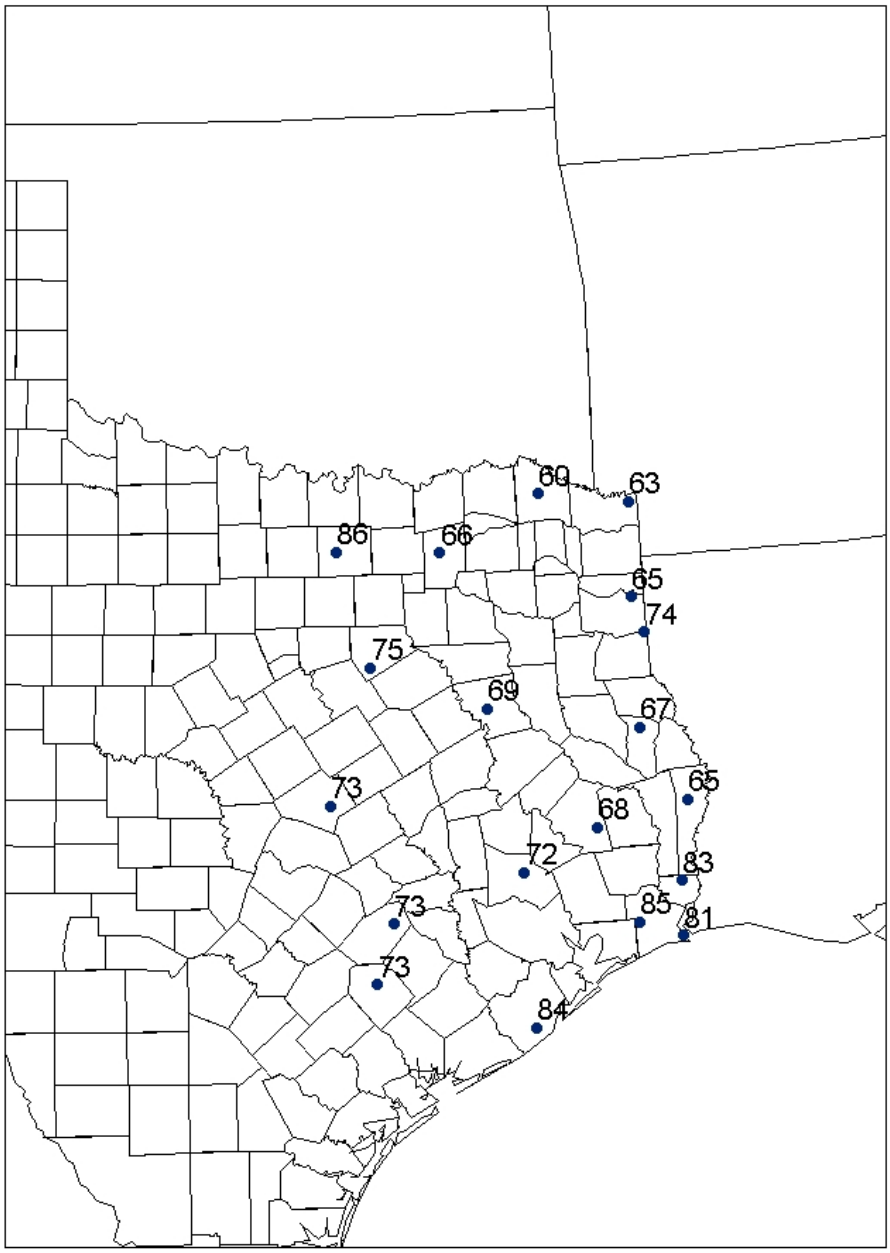


**Figure 24: Average daily maximum ozone concentrations averaged over 8 hours at the nineteen rural monitoring stations in eastern Texas on days during the June through September period characterized by ozone concentrations of 85 ppb or greater at one or more grid cells in the Houston/Galveston/Brazoria area.**

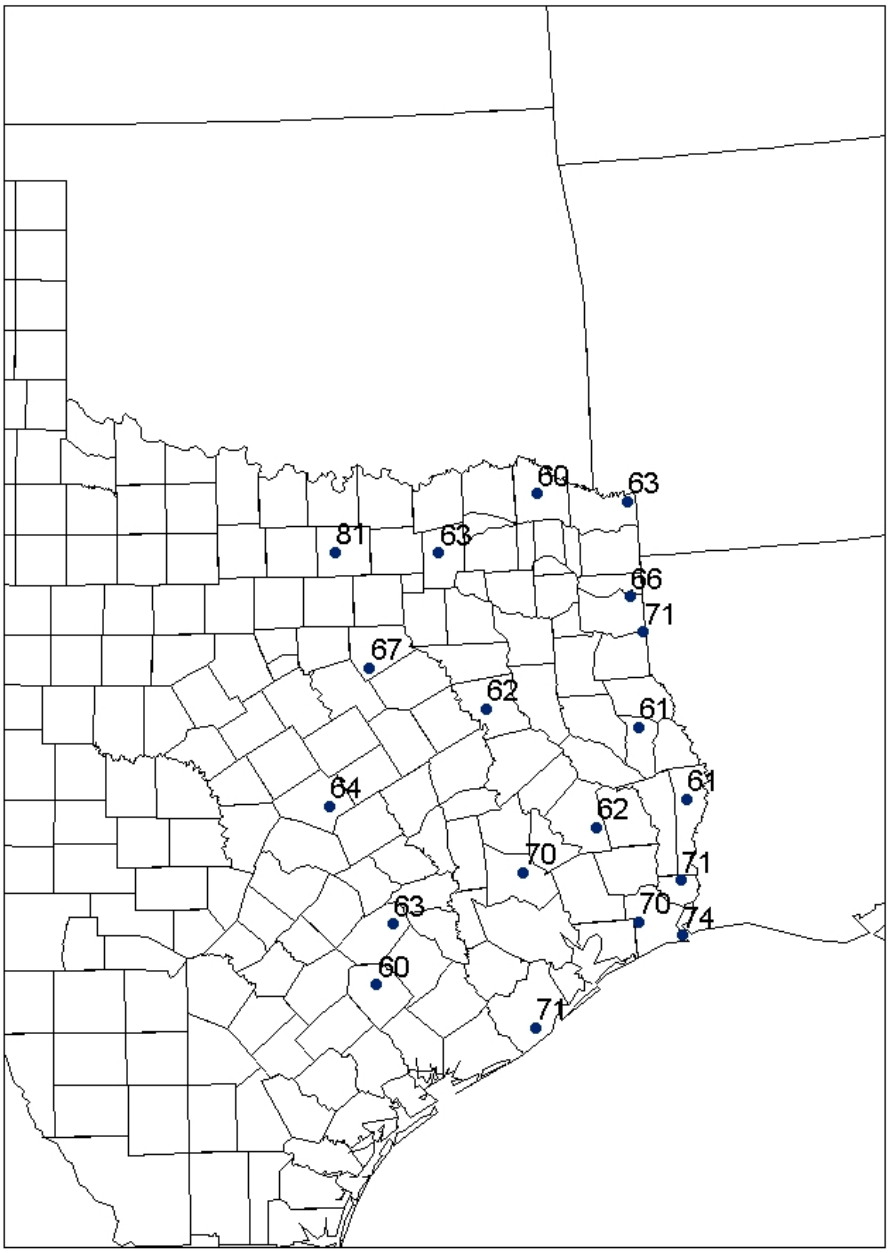
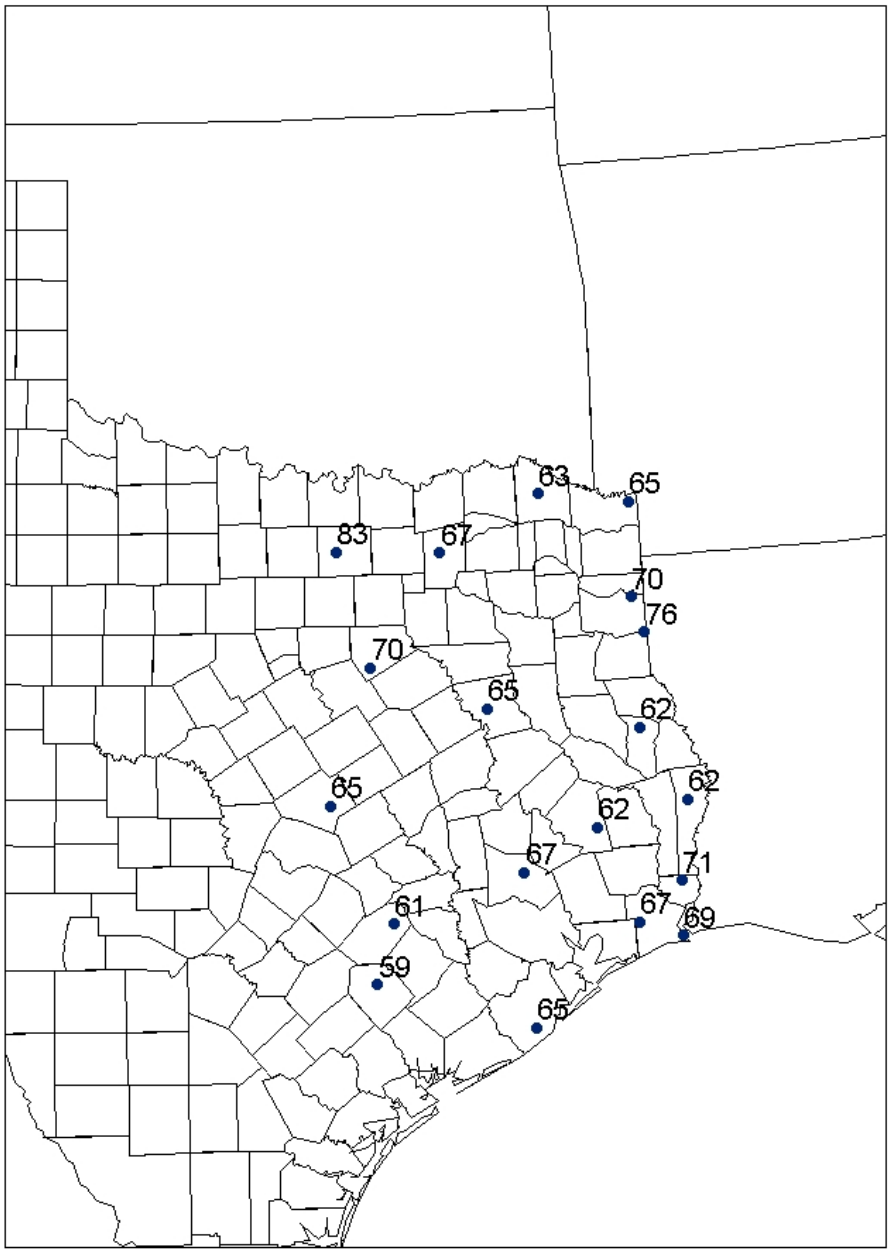


**Figure 25: Average daily maximum ozone concentrations averaged over 8 hours at the nineteen rural monitoring stations in eastern Texas on days during the June through September period characterized by ozone concentrations of 85 ppb or greater at one or more grid cells in the Tyler/Longview/Marshall area.**



## 4.0 Summary

The objectives of the modeling studies described in this report were to predict ozone concentrations over eastern Texas using 2002 meteorology for the June through September period with: 1.) 2002 anthropogenic emissions; and, 2.) 2009 anthropogenic emissions. Biogenic emissions from 2002 were used for both the 2002 and 2009 simulations. Air quality impacts were evaluated for each of these scenarios using statistical and graphical metrics for ozone concentrations averaged over 8 hours.

Ozone contour maps were developed to show the daily maximum ozone concentrations averaged over 8 hours predicted for the years 2002 and 2009 for each day during the June through September episode. For each grid cell, these contour maps show the predicted maximum ozone concentrations averaged over 8 hours for the 2002 Base Case and the 2009 Future Case. In addition, ozone concentration maps were developed to show the average monthly concentrations for the 2002 and 2009 scenarios.

For the 2002 Base Case, the Dallas/Fort Worth and Tyler/Longview/Marshall areas were characterized by monthly average maximum ozone concentrations of 70 ppb or greater. The monthly average concentrations in southeast Texas generally ranged between 65 ppb and 70 ppb. In the Austin/San Antonio area, monthly average maximum ozone concentrations were 55-60 ppb during June and July increasing to 60-65 ppb during August and September. Over the rural areas of eastern Texas, average monthly concentrations during June and July ranged between 50 ppb and 60 ppb increasing to 55 ppb to 65 ppb during August and September. In general, predicted monthly average concentrations throughout the 12-km CAMx domain were 5-10 ppb lower for the 2009 scenario compared to the 2002 scenario.

To further investigate the spatial and temporal variability of ozone concentrations within rural areas of eastern Texas, the monthly average daily maximum ozone concentrations averaged over 8 hours were extracted at nineteen rural area monitoring stations operational during the TexAQS II (2005-2006) program. Of the nineteen stations, Denton Airport was characterized by the highest monthly concentrations, ranging from 68 ppb in September to 76 ppb in August. The Hallettsville monitoring station was characterized by the lowest predicted monthly average of the maximum ozone concentrations for all months except September, ranging from 47 ppb during July to 59 ppb during September. The majority of the eastern Texas rural monitoring stations were characterized by ozone concentrations in the upper 50 ppb to lower 60 ppb range, with relatively highest predicted average concentrations during the months of August and September.

Ozone concentrations averaged over 8 hours were also investigated by averaging the daily maximum concentrations for all days characterized by a maximum predicted ozone concentration of 85 ppb or greater in selected metropolitan areas. On average, concentrations in rural areas well outside of major metropolitan areas were 15-20 ppb lower than the average maximum concentrations in the Dallas/Fort Worth, Tyler/Longview/Marshall, and Houston/Galveston/Brazoria areas. In contrast, rural

concentrations were within 5-10 ppb of the average daily maximum concentrations in the Austin area.

## 5.0 References

[1]ENVIRON, 2006. "Final Report, TERC Project H60, Phase I. Dallas/Fort-Worth Future Year 2009 Ozone Modeling with Four Ozone Episodes from 1999 and 2002." Submitted by ENVIRON to Houston Advanced Research Center, April 3, 2006.

[2]Johnson, M., 2003. "Meteorological Modeling Protocol, IDNR 2002 Annual MM5 Application." Iowa Department of Natural Resources, Air Quality Bureau, June 25, 2003.

[3]Mansell, G., G. Yarwood, M. Jimenex, T. Dihn, and Y. Jia, 2003. "Development of Base Case Photochemical Modeling to Address 1-Hour and 8-Hour Ozone Attainment in the Dallas/Fort Worth Area." Prepared for the Texas Commission on Environmental Quality, August, 2003.

[4]ENVIRON, 2006. "Ozone Impacts in DFW of Proposed NEW EGUs and an Offset Strategy". Submitted by ENVIRON to Houston Advanced Research Center, April 23, 2006.

# Appendix A
## Daily Ozone Maps

**Figure A1: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 01 for the 2002 Base Case.**

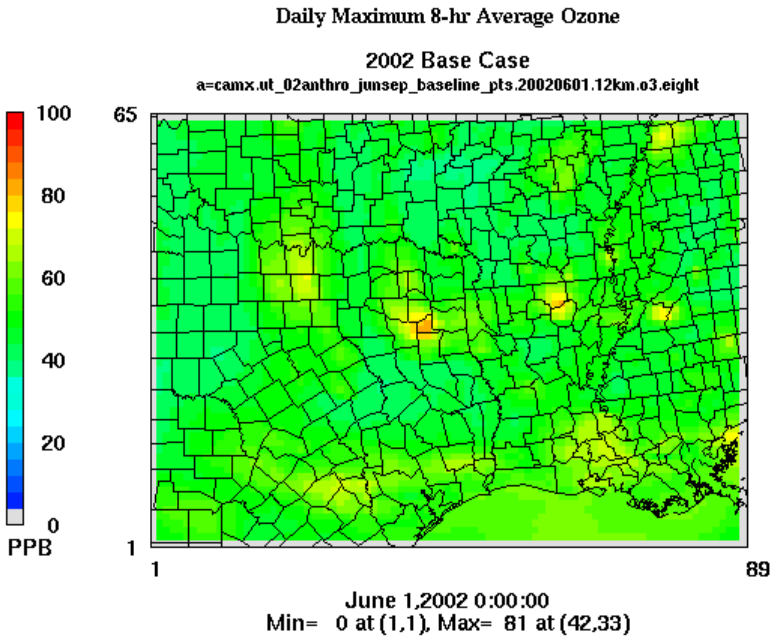



**Figure A2: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 01 for the 2009 Future Case.**

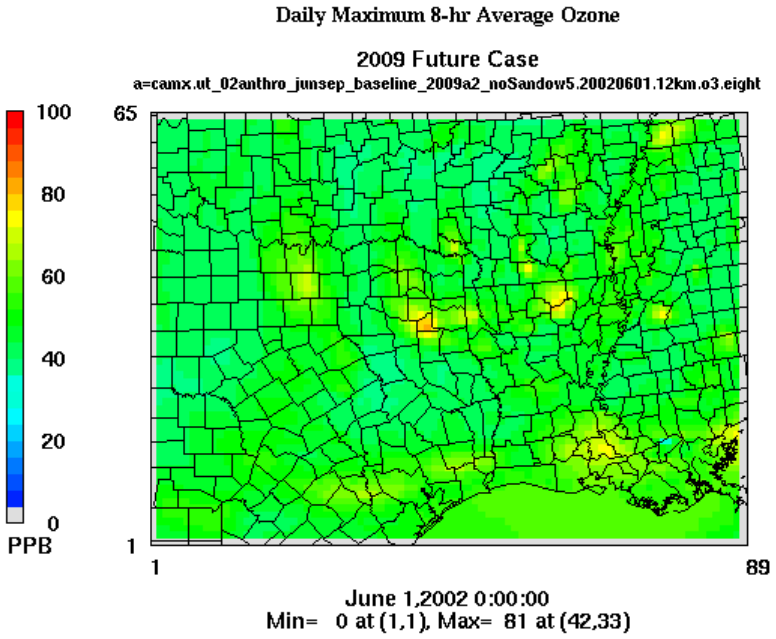


**Figure A3: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 02 for the 2002 Base Case.**

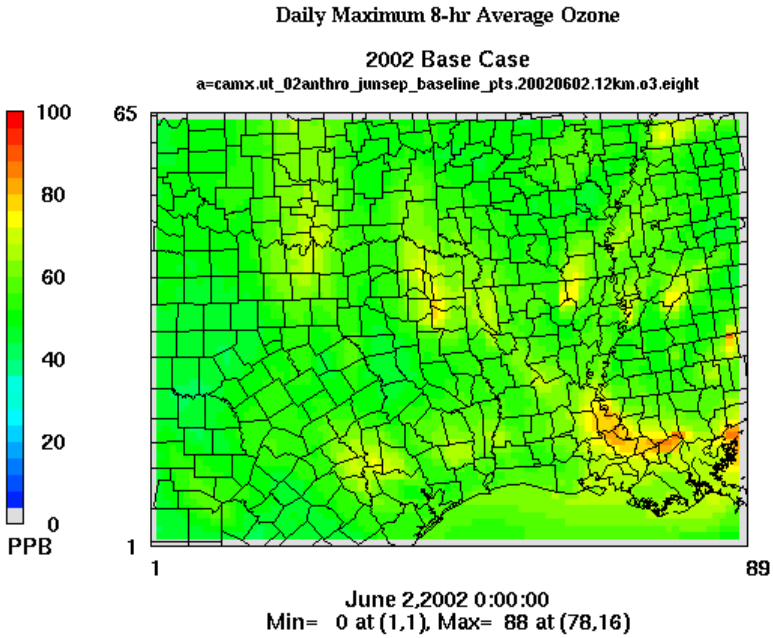



**Figure A4: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 02 for the 2009 Future Case.**

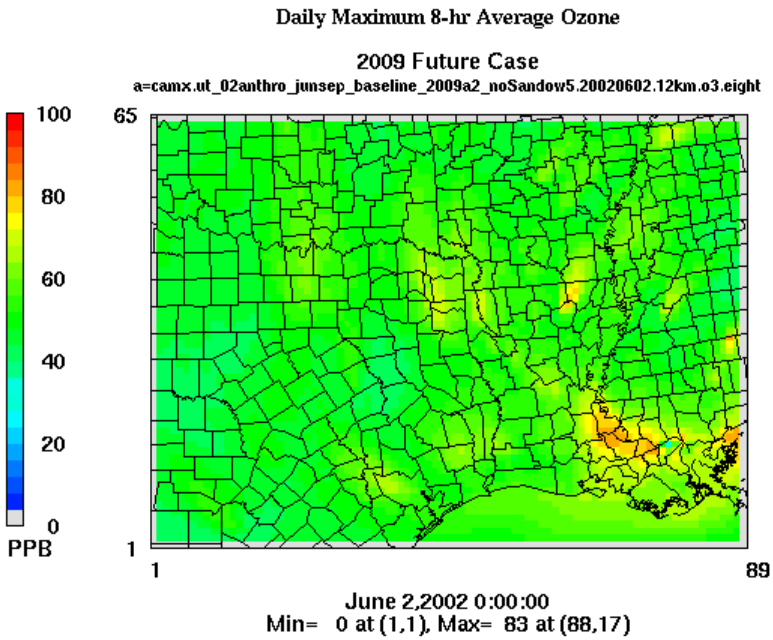


**Figure A5: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 03 for the 2002 Base Case.**

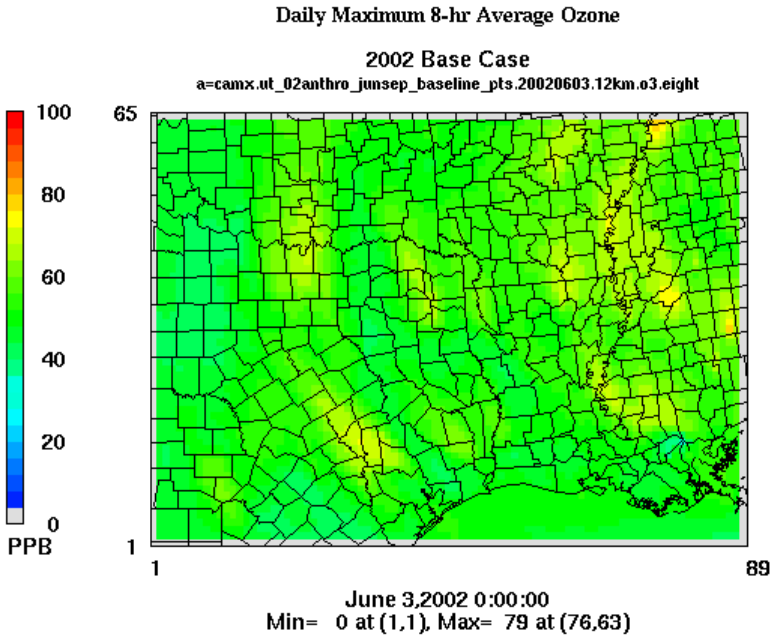



**Figure A6: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 03 for the 2009 Future Case.**

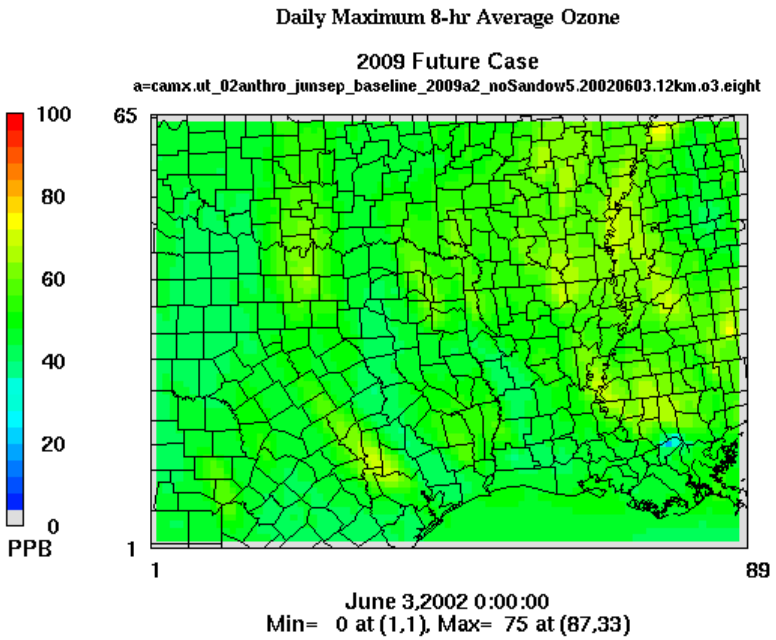


**Figure A7: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 04 for the 2002 Base Case.**

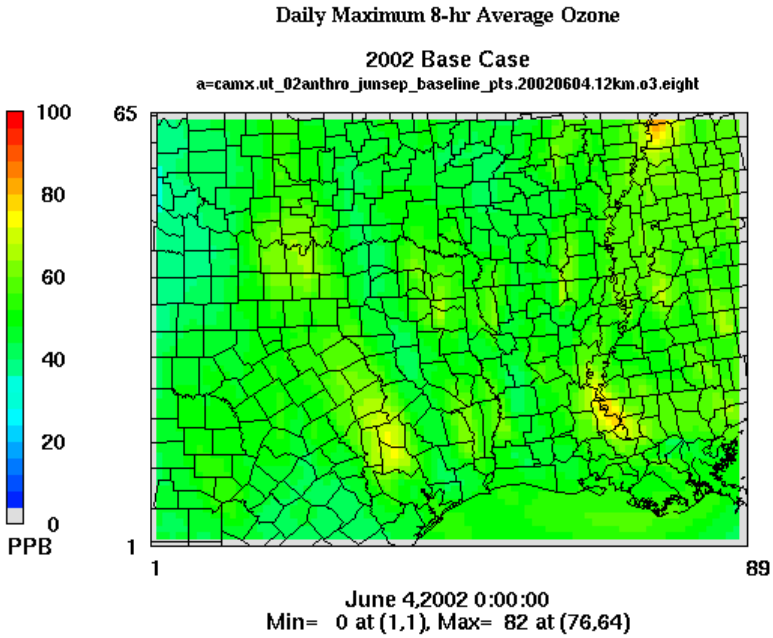



**Figure A8: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 04 for the 2009 Future Case.**

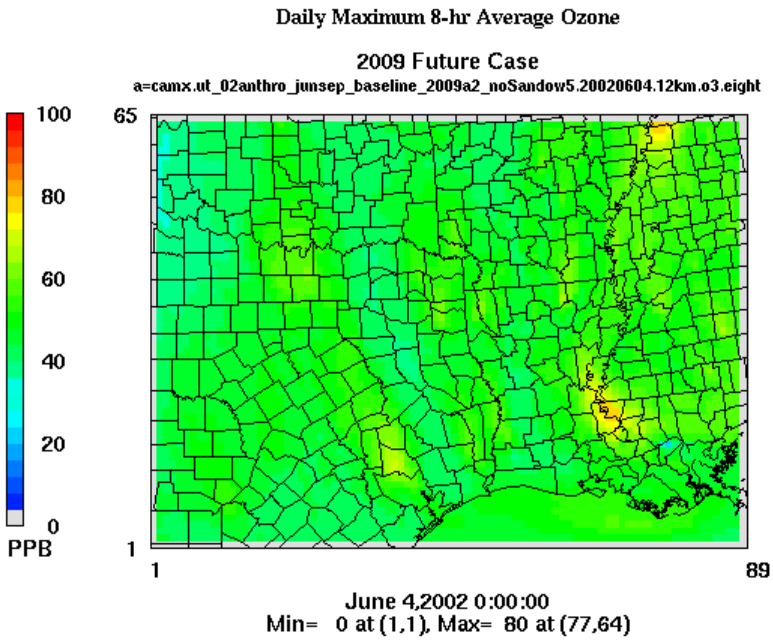


**Figure A9: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 05 for the 2002 Base Case.**

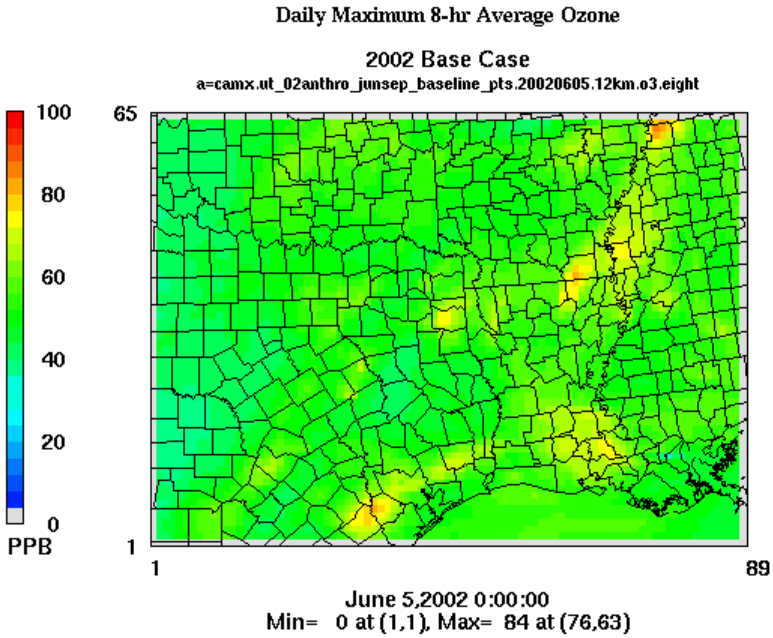



**Figure A10: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 05 for the 2009 Future Case.**

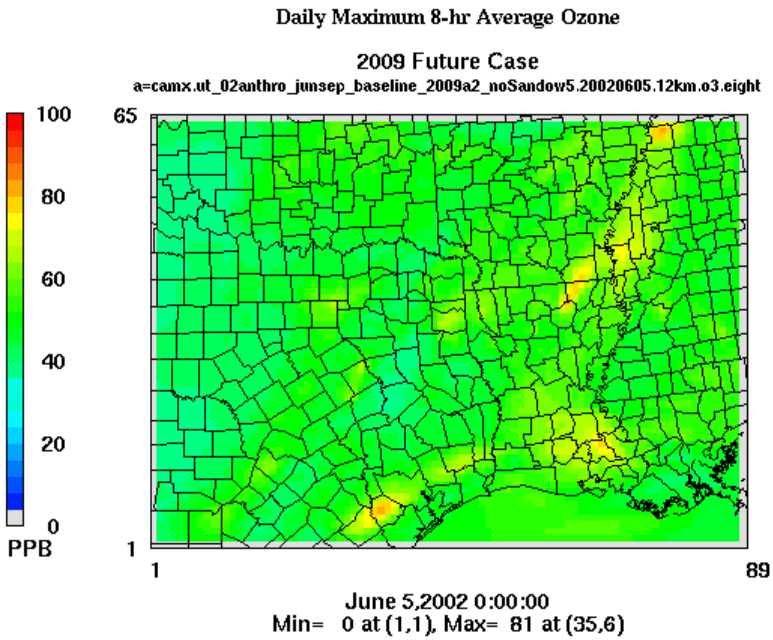


**Figure A11: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 06 for the 2002 Base Case.**

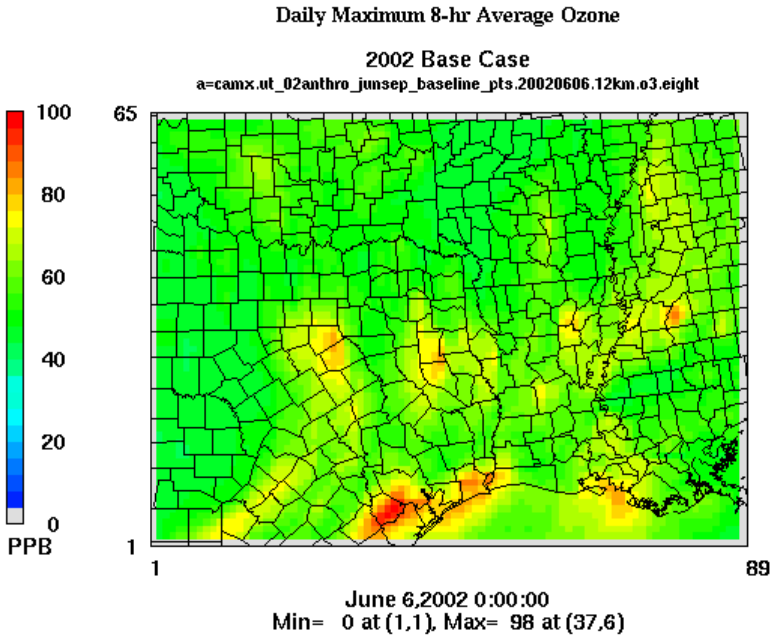



**Figure A12: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 06 for the 2009 Future Case.**

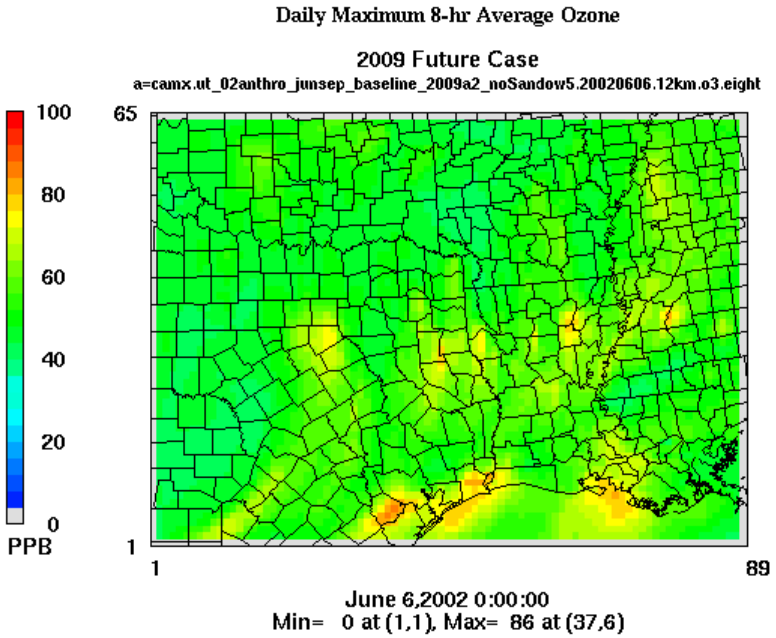


**Figure A13: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 07 for the 2002 Base Case.**

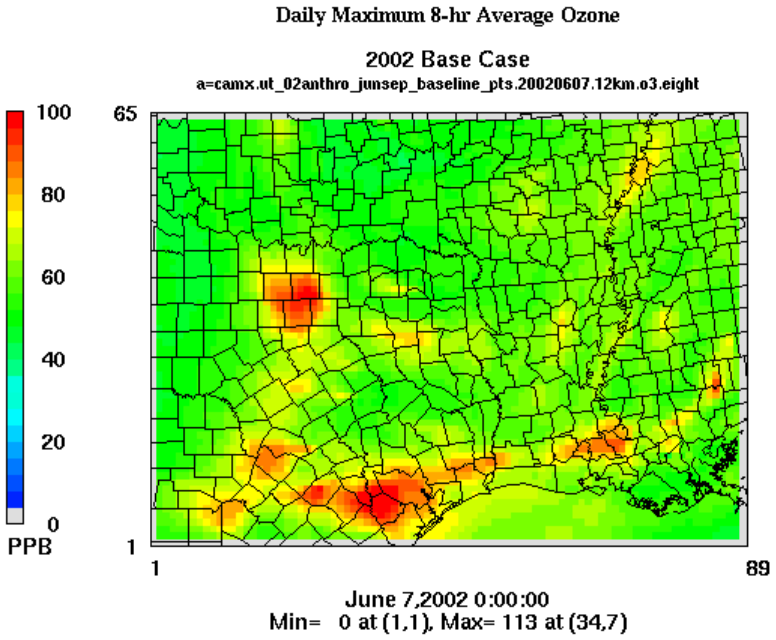



**Figure A14: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 07 for the 2009 Future Case.**

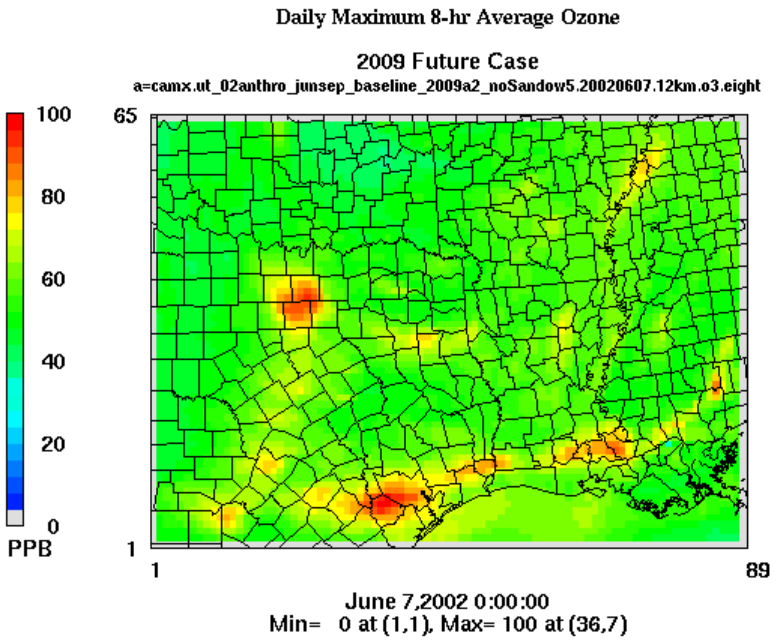


**Figure A15: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 08 for the 2002 Base Case.**

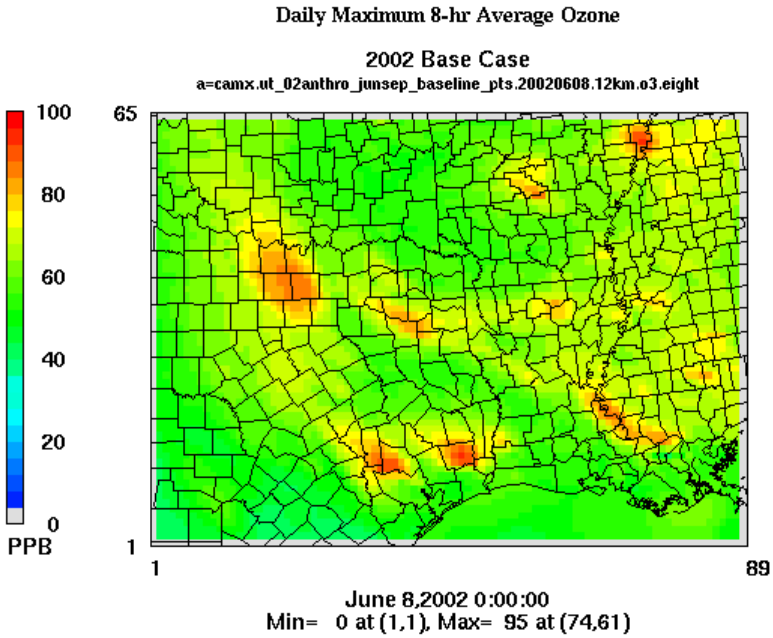



**Figure A16: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 08 for the 2009 Future Case.**

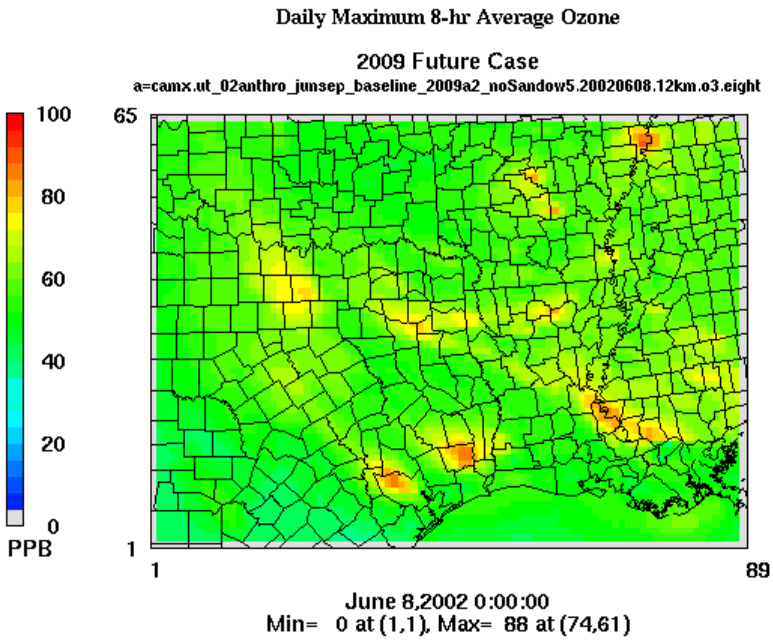


**Figure A17: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 09 for the 2002 Base Case.**

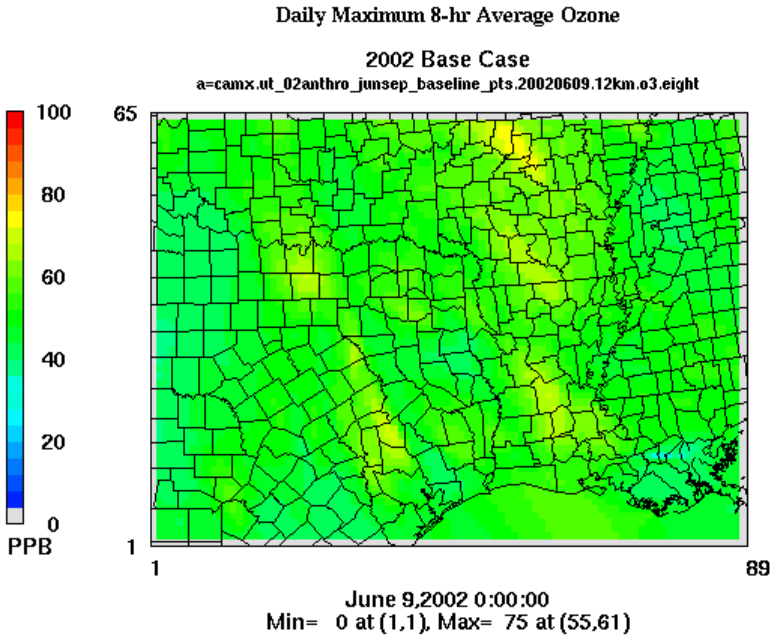



**Figure A18: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 09 for the 2009 Future Case.**

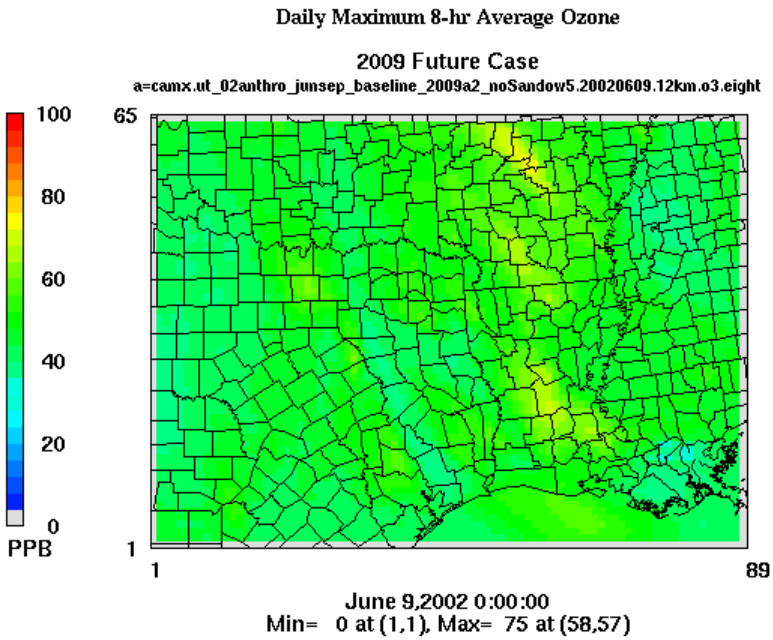


**Figure A19: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 10 for the 2002 Base Case.**

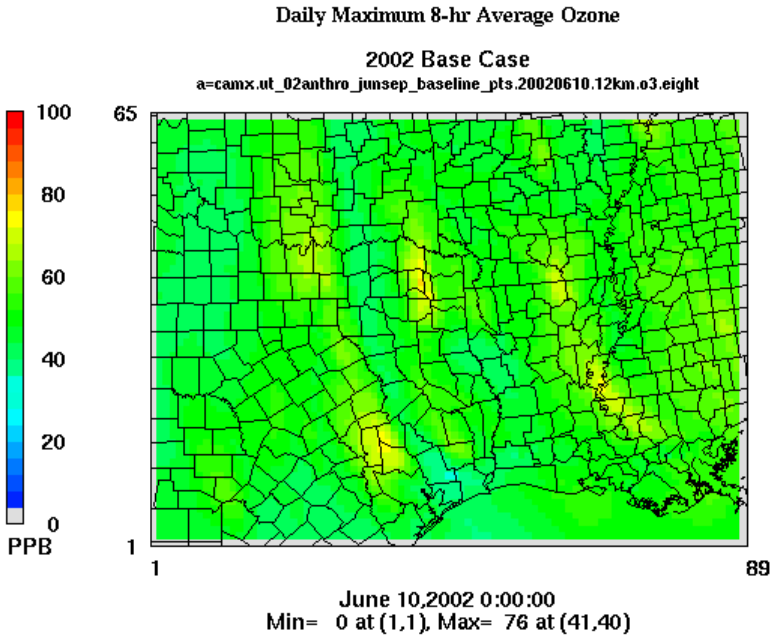



**Figure A20: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 10 for the 2009 Future Case.**

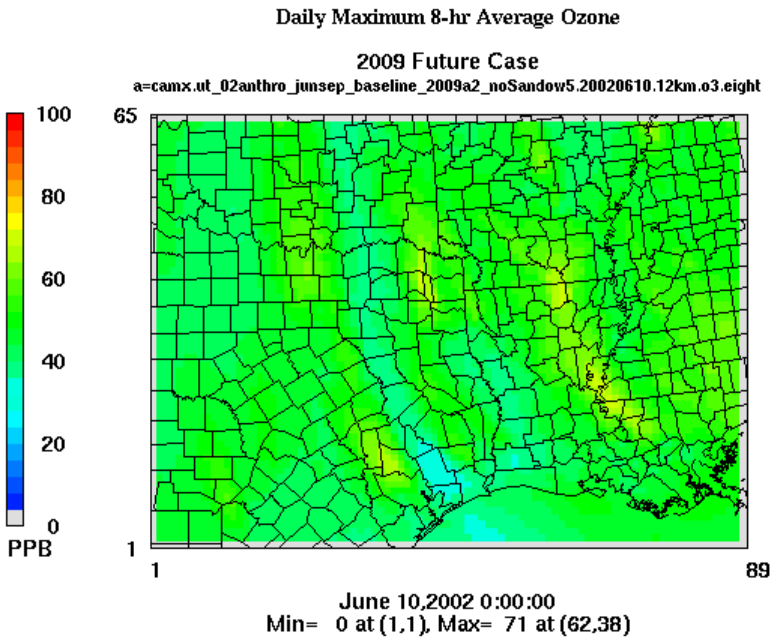


**Figure A21: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 11 for the 2002 Base Case.**

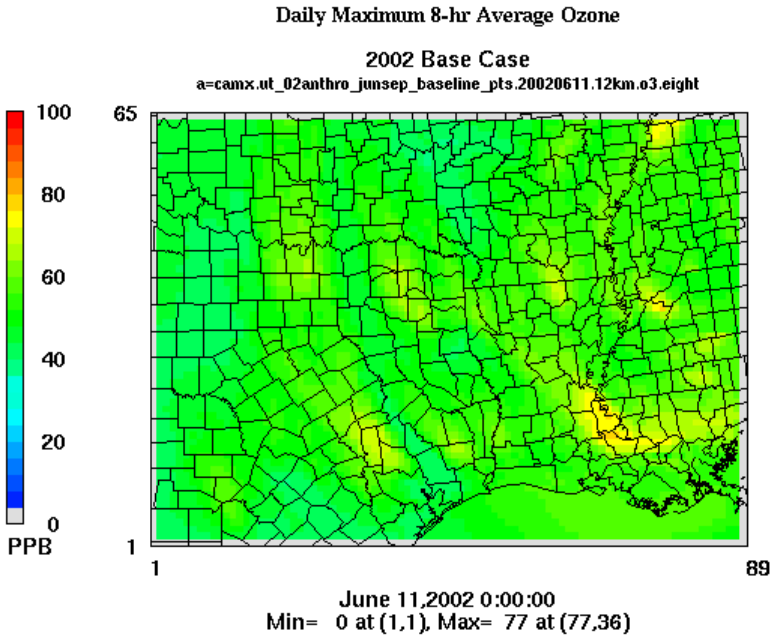



**Figure A22: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 11 for the 2009 Future Case.**

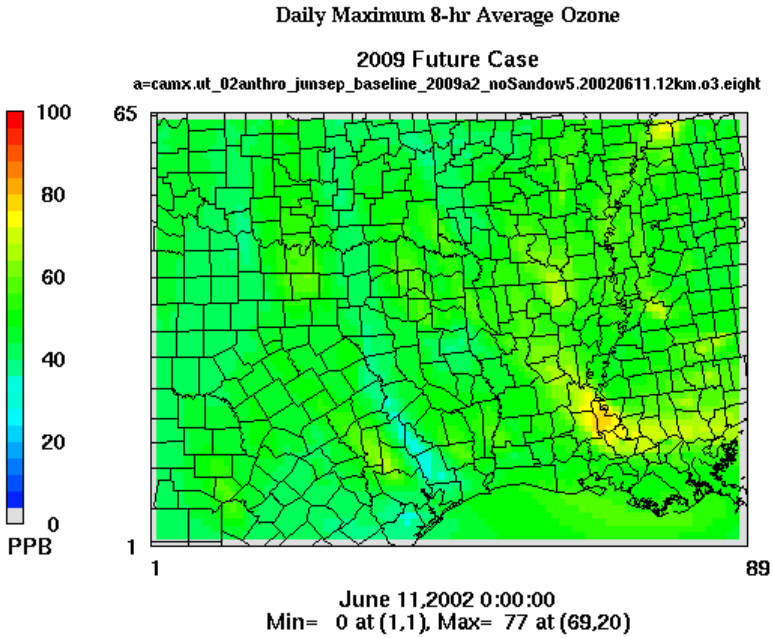


**Figure A23: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 12 for the 2002 Base Case.**

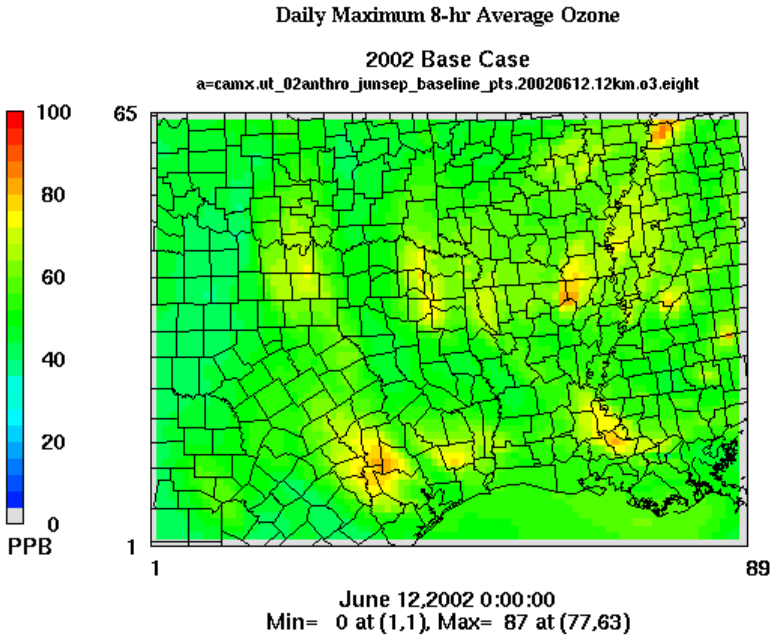



**Figure A24: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 12 for the 2009 Future Case.**

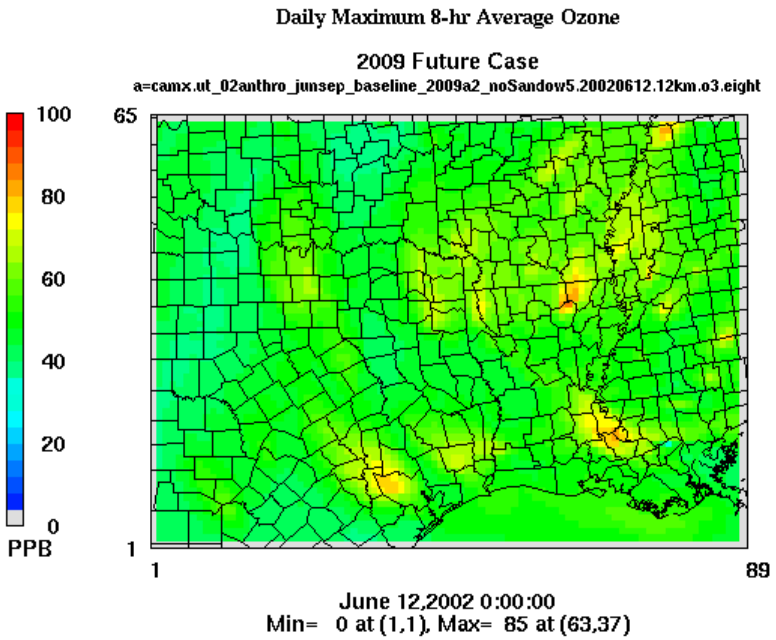


**Figure A25: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 13 for the 2002 Base Case.**

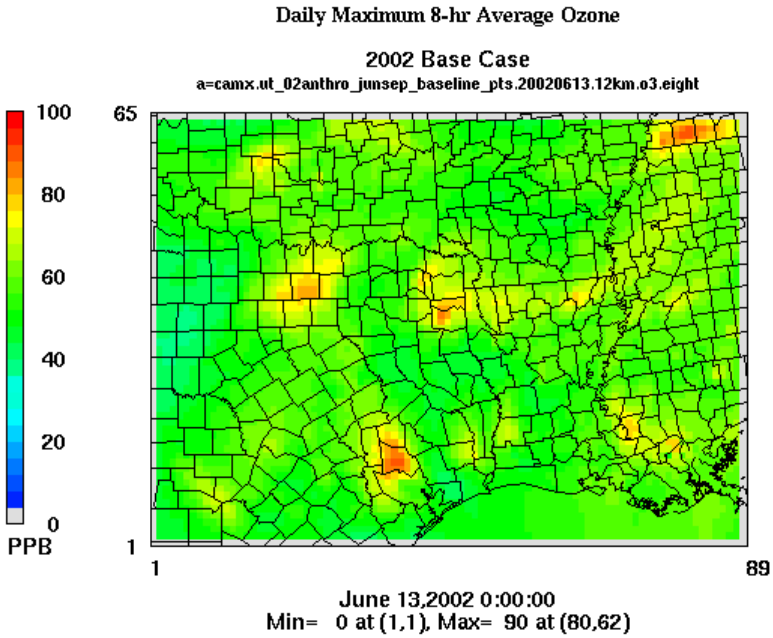



**Figure A26: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 13 for the 2009 Future Case.**

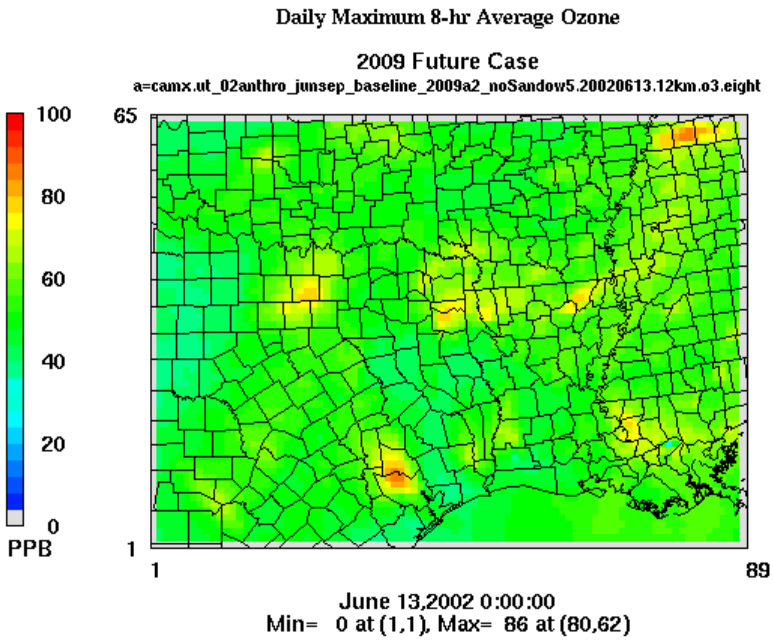


**Figure A27: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 14 for the 2002 Base Case.**

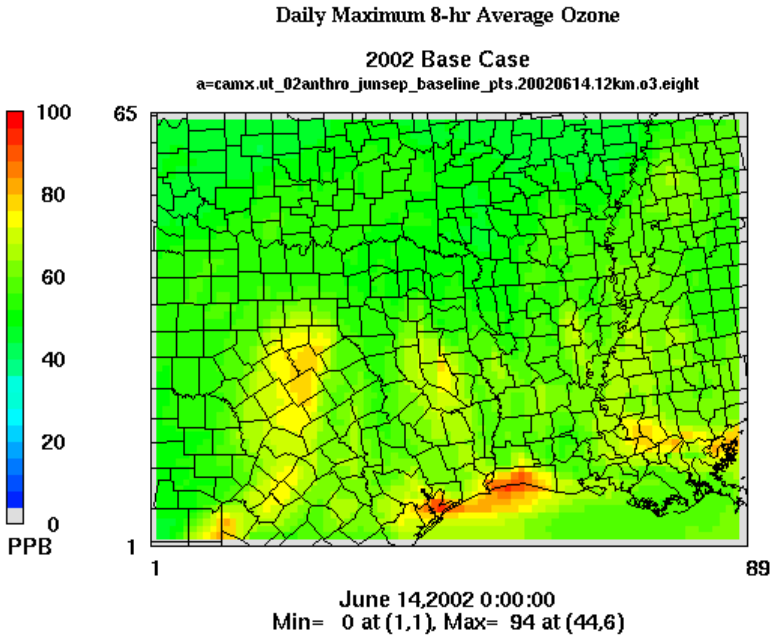



**Figure A28: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 14 for the 2009 Future Case.**

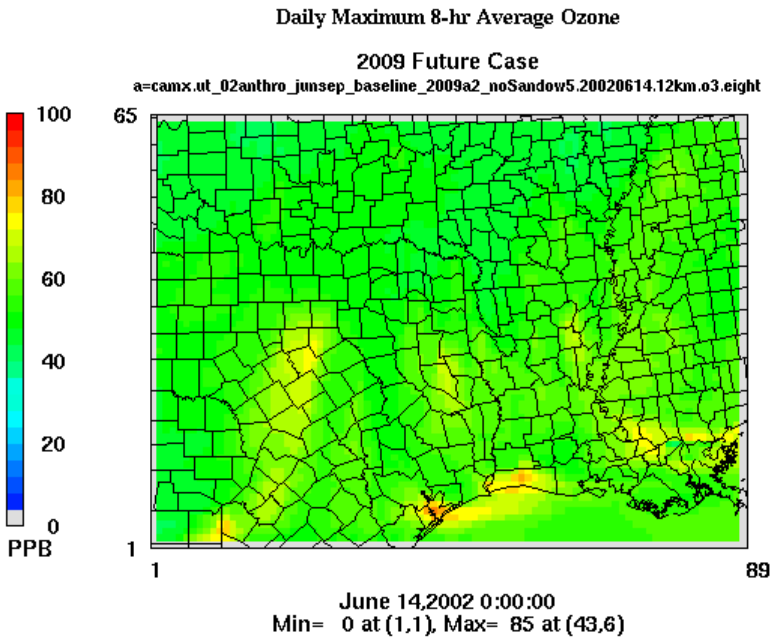


**Figure A29: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 15 for the 2002 Base Case.**

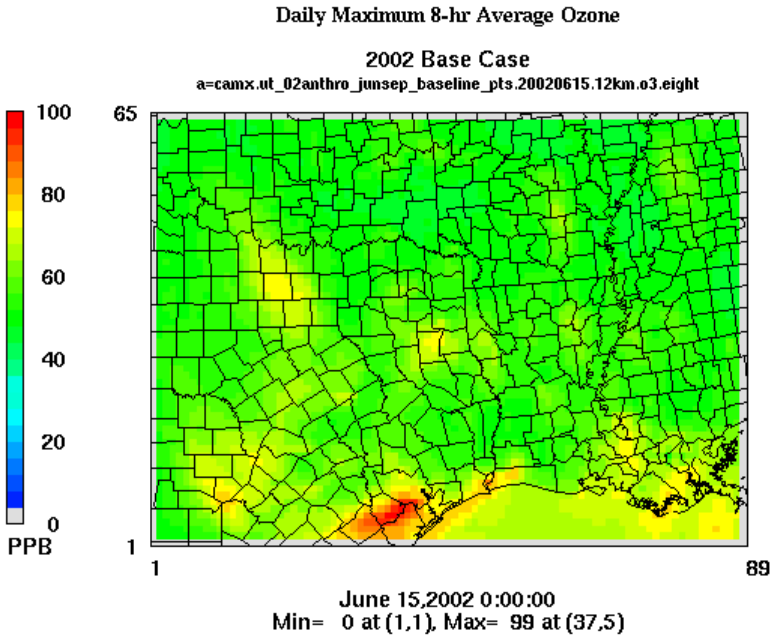



**Figure A30: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 15 for the 2009 Future Case.**

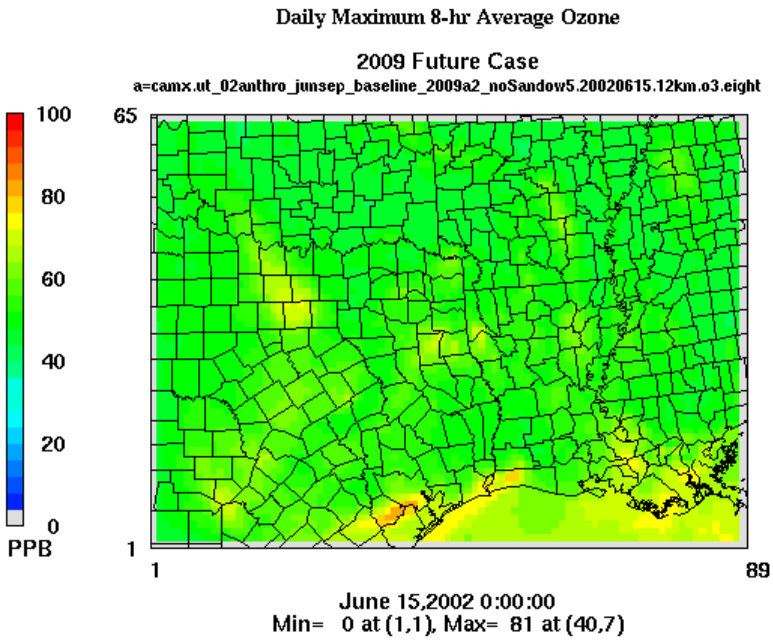


**Figure A31: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 16 for the 2002 Base Case.**

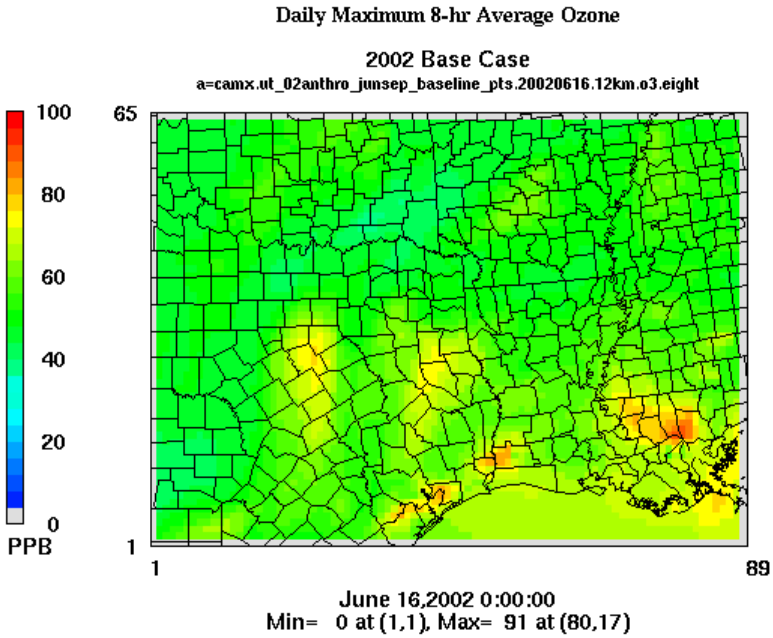



**Figure A32: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 16 for the 2009 Future Case.**

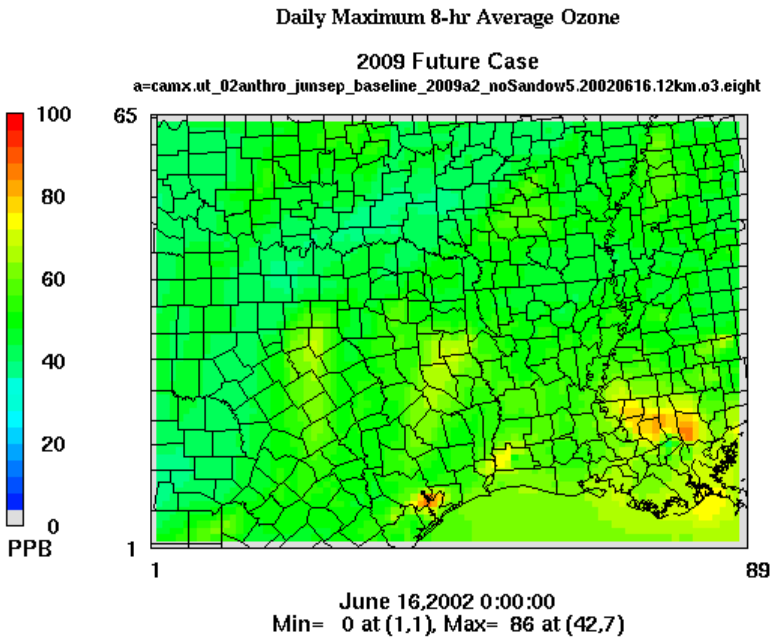


**Figure A33: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 17 for the 2002 Base Case.**

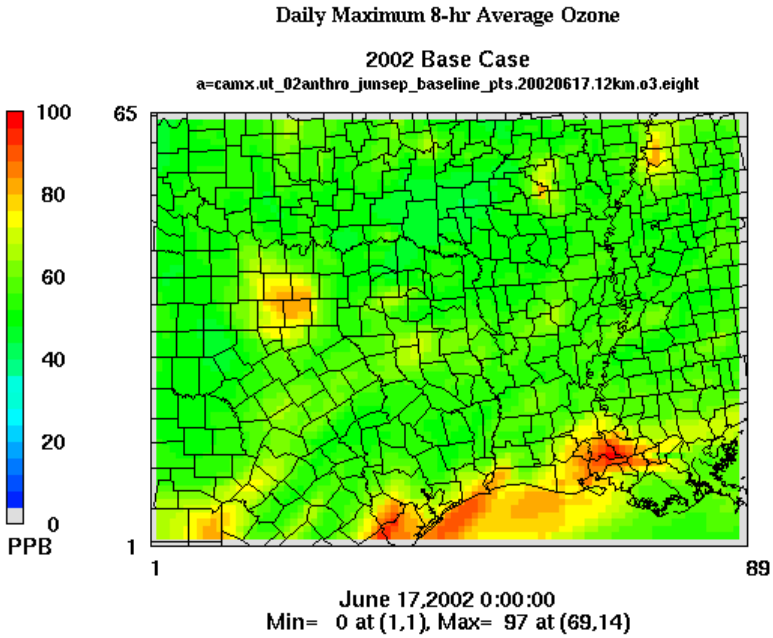



**Figure A34: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 17 for the 2009 Future Case.**

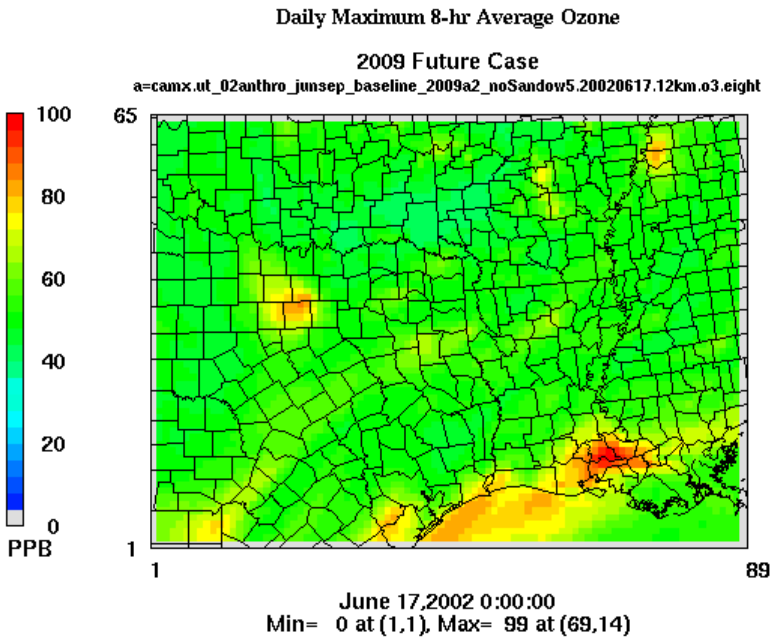


**Figure A35: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 18 for the 2002 Base Case.**

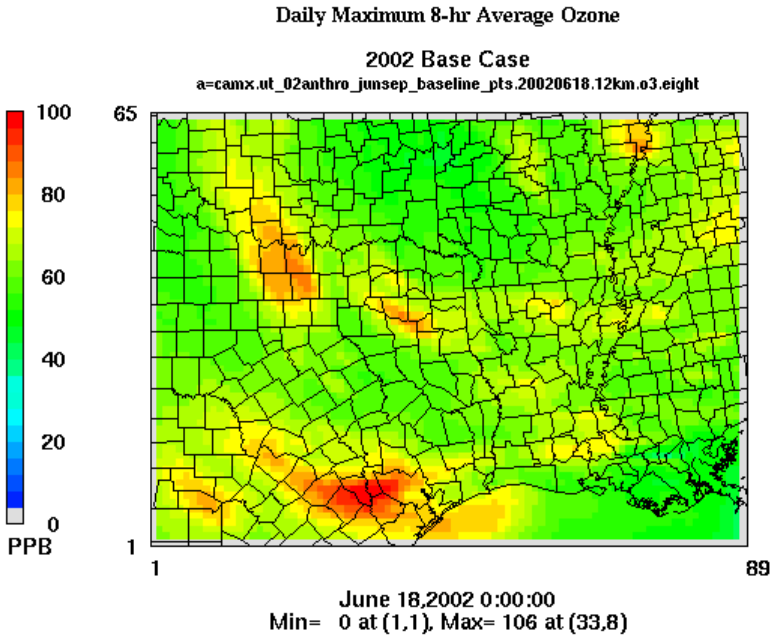



**Figure A36: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 18 for the 2009 Future Case.**

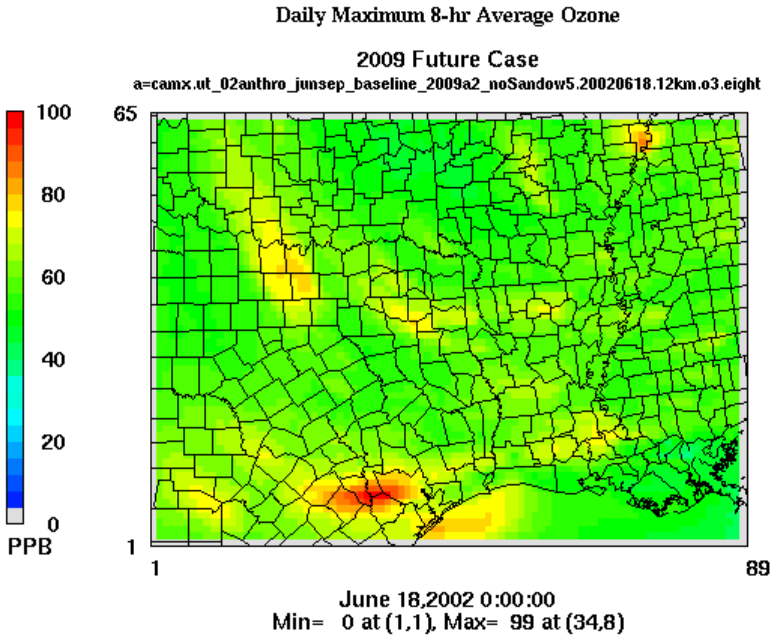


**Figure A37: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 19 for the 2002 Base Case.**

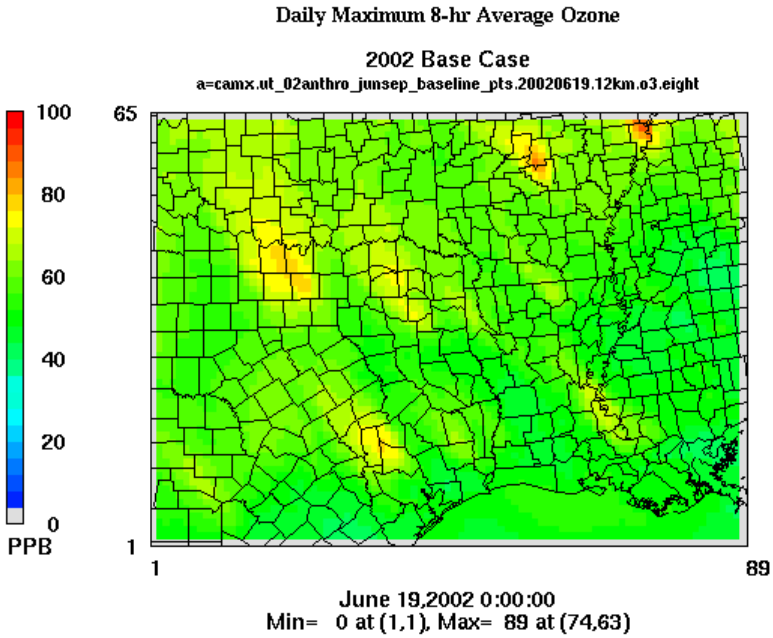



**Figure A38: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 19 for the 2009 Future Case.**

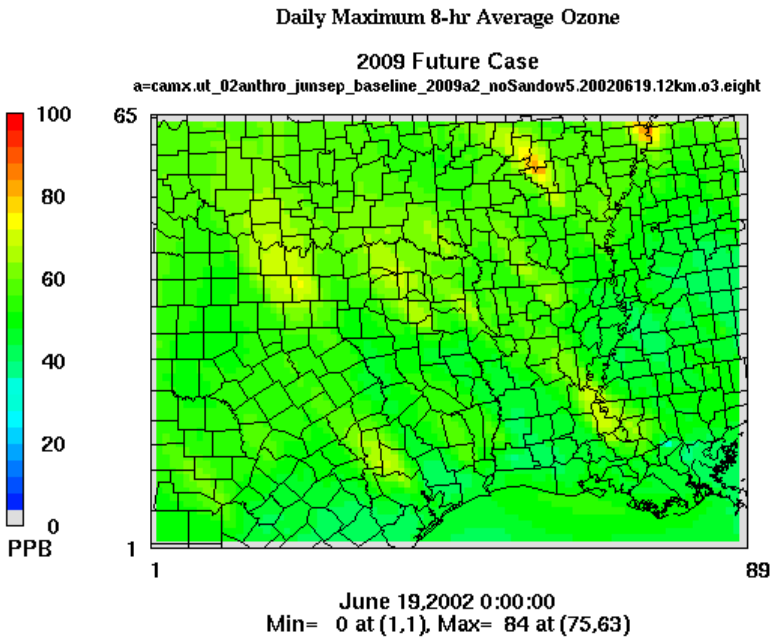


**Figure A39: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 20 for the 2002 Base Case.**

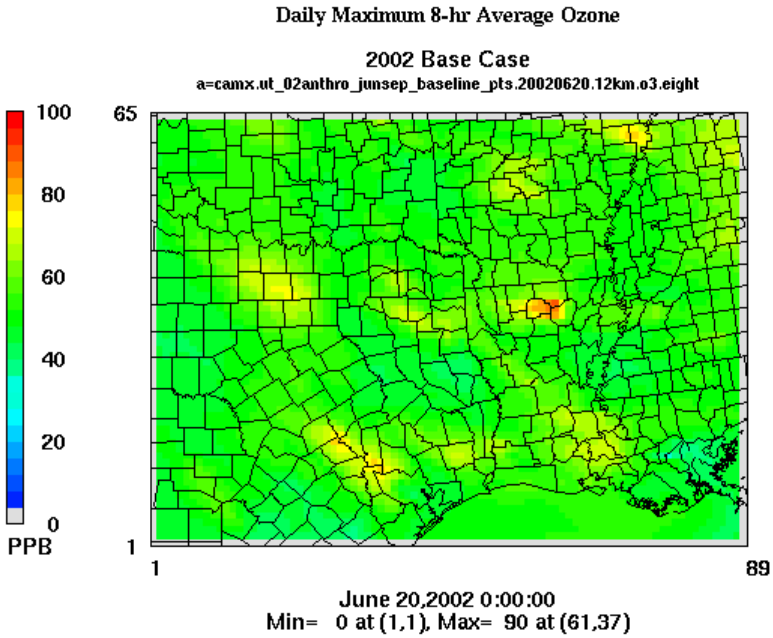



**Figure A40: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 20 for the 2009 Future Case.**

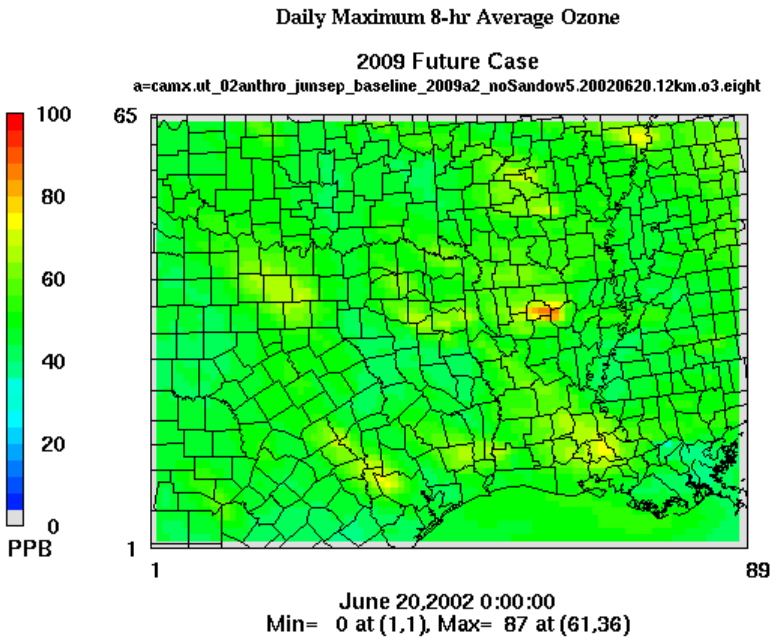


**Figure A41: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 21 for the 2002 Base Case.**

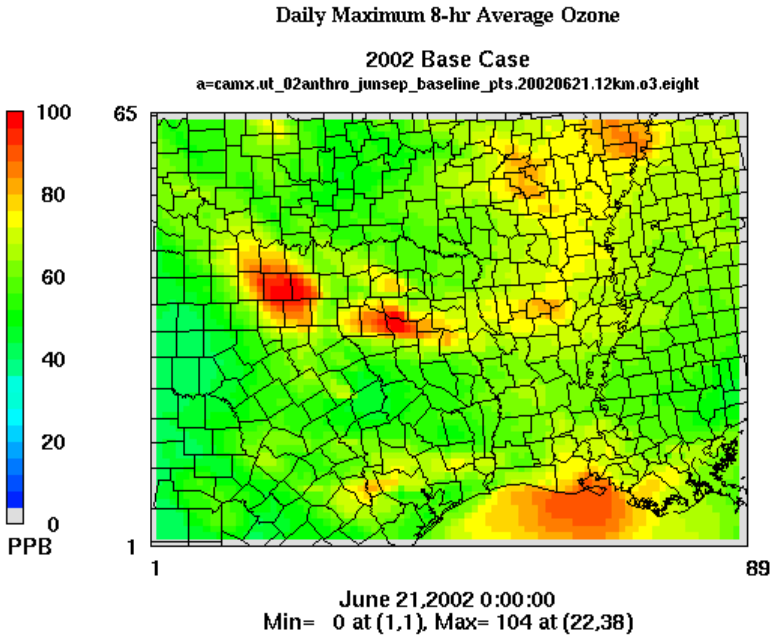



**Figure A42: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 21 for the 2009 Future Case.**

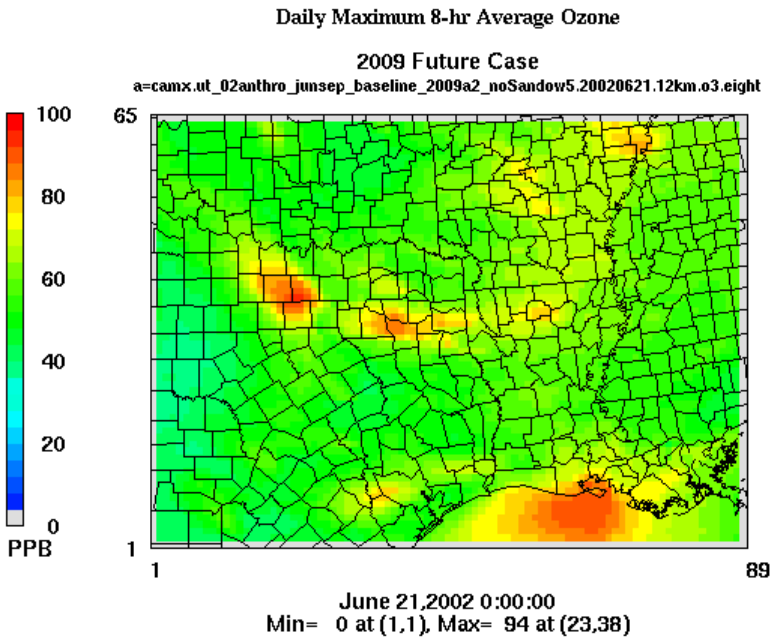


**Figure A43: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 22 for the 2002 Base Case.**

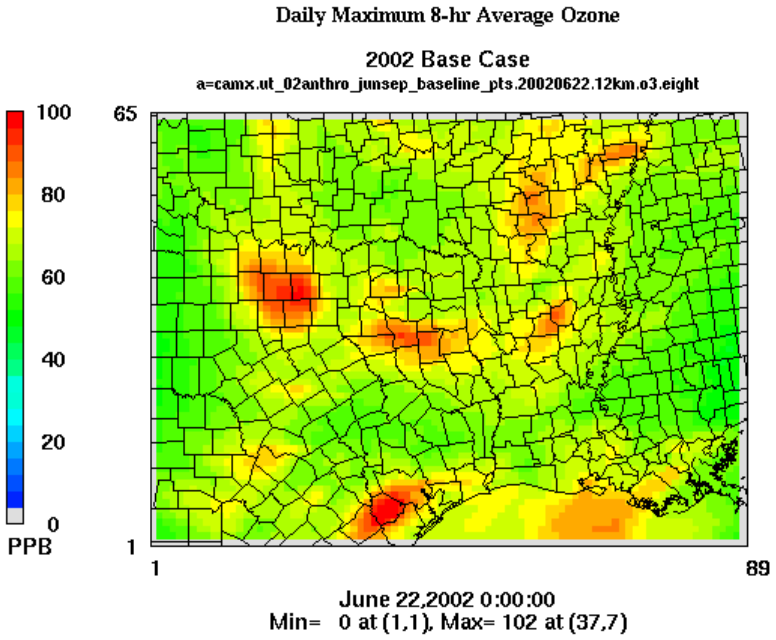



**Figure A44: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 22 for the 2009 Future Case.**

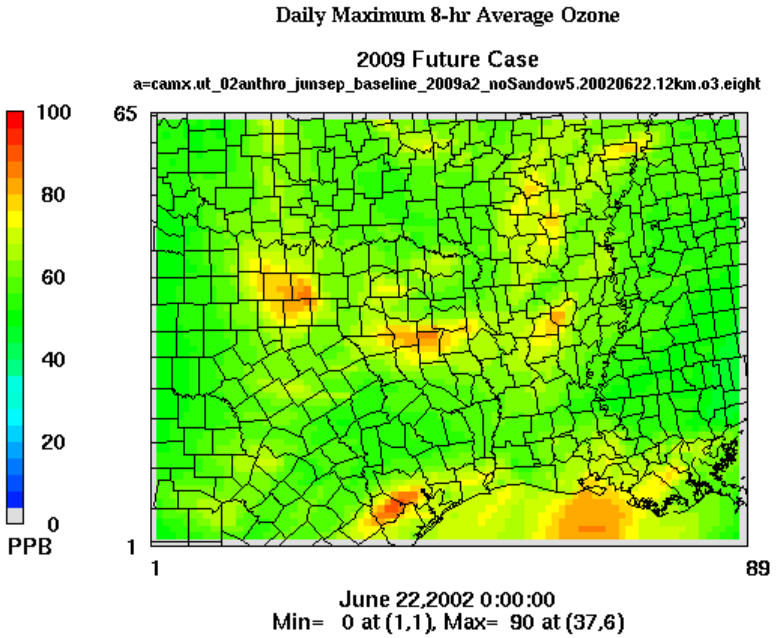


**Figure A45: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 23 for the 2002 Base Case.**

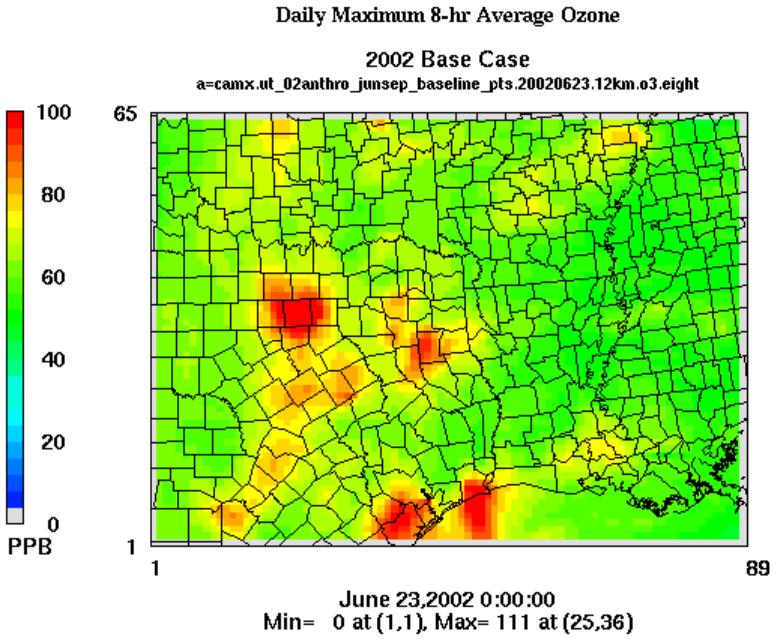



**Figure A46: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 23 for the 2009 Future Case.**

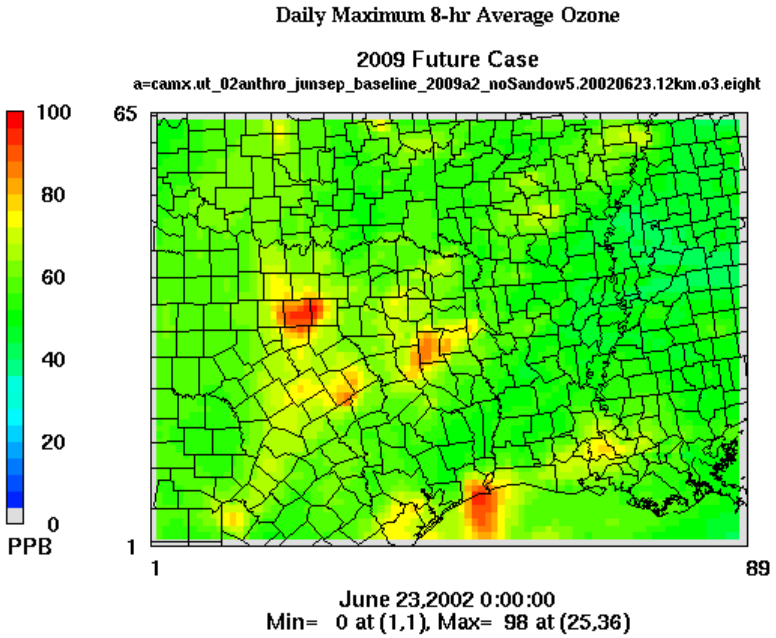


**Figure A47: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 24 for the 2002 Base Case.**

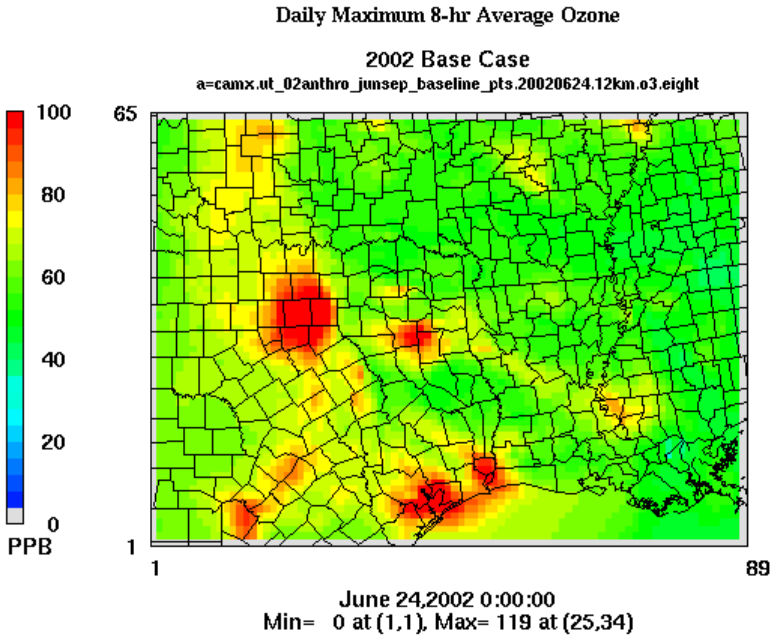



**Figure A48: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 24 for the 2009 Future Case.**

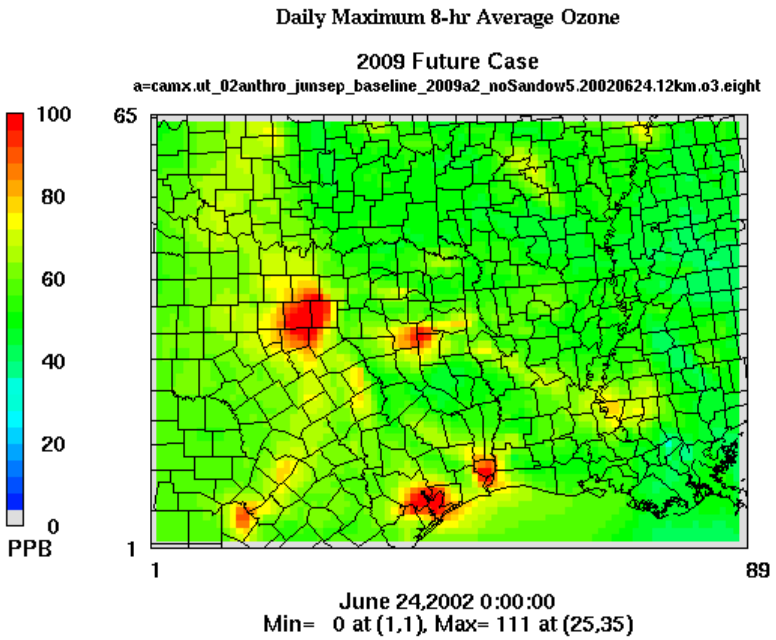


**Figure A49: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 25 for the 2002 Base Case.**

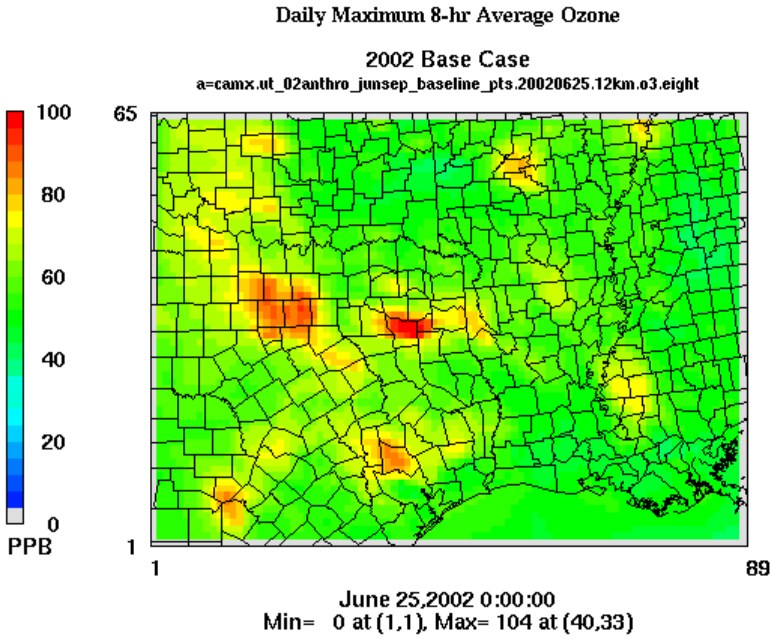



**Figure A50: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 25 for the 2009 Future Case.**

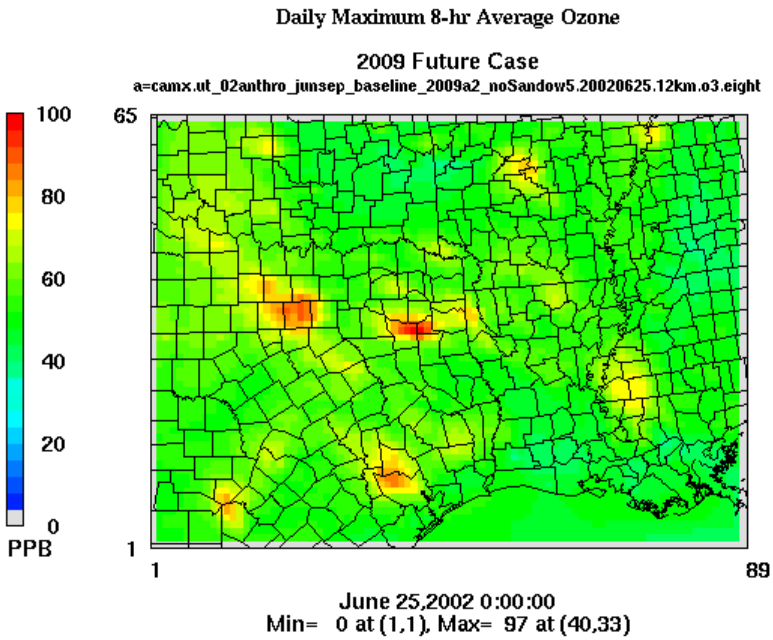


**Figure A51: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 26 for the 2002 Base Case.**

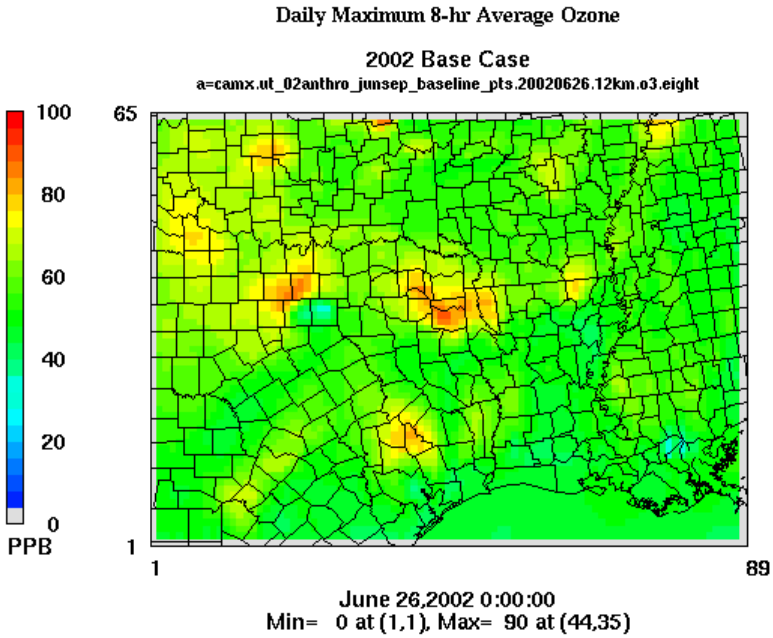



**Figure A52: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 26 for the 2009 Future Case.**

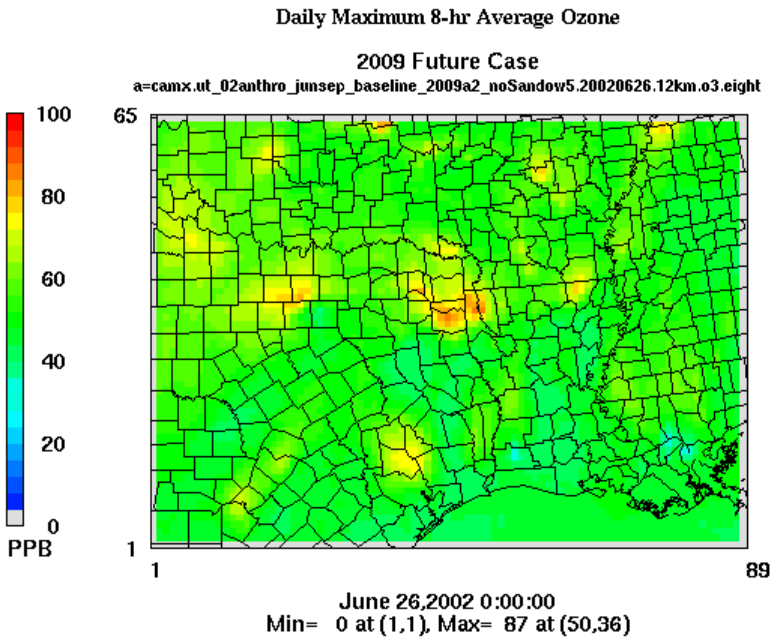


**Figure A53: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 27 for the 2002 Base Case.**

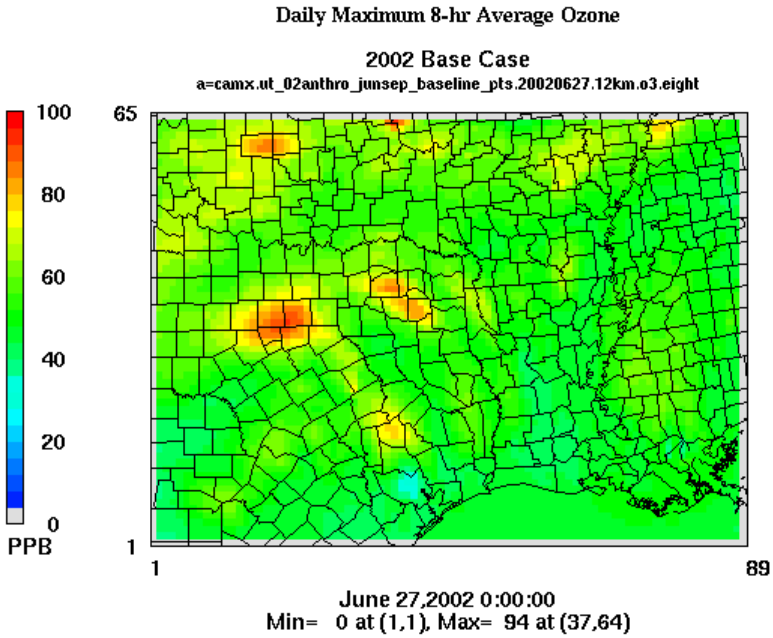



**Figure A54: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 27 for the 2009 Future Case.**

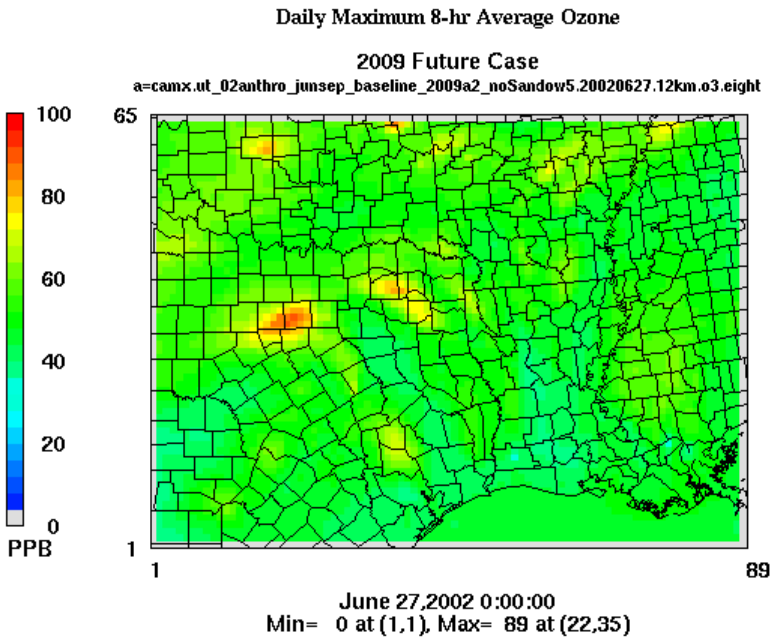


**Figure A55: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 28 for the 2002 Base Case.**

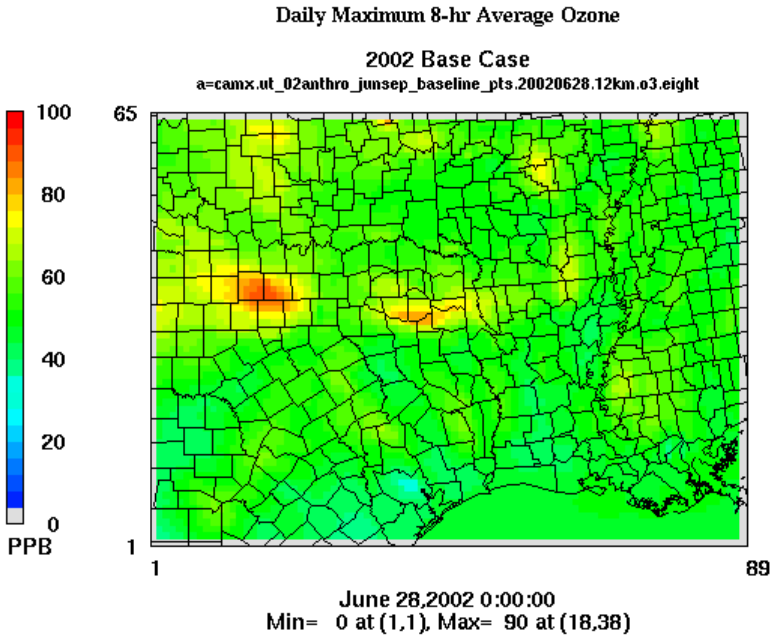



**Figure A56: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 28 for the 2009 Future Case.**

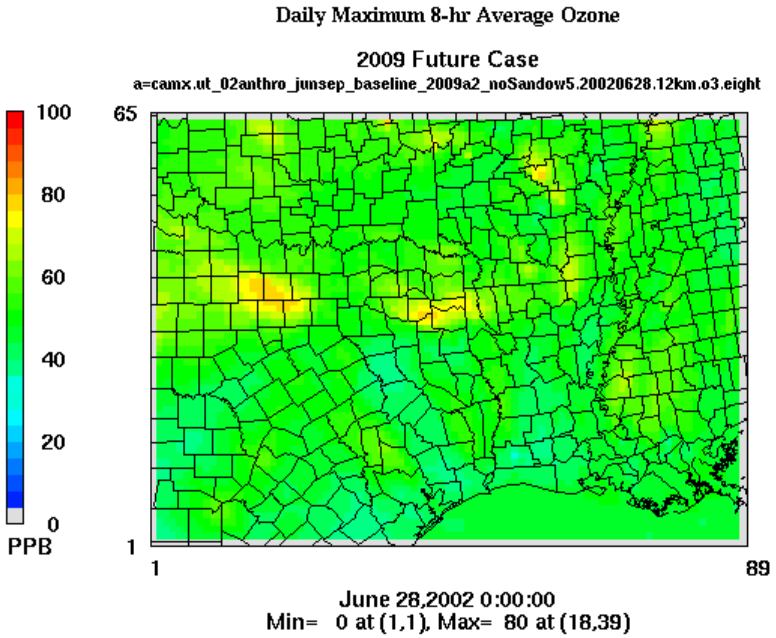


**Figure A57: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 29 for the 2002 Base Case.**

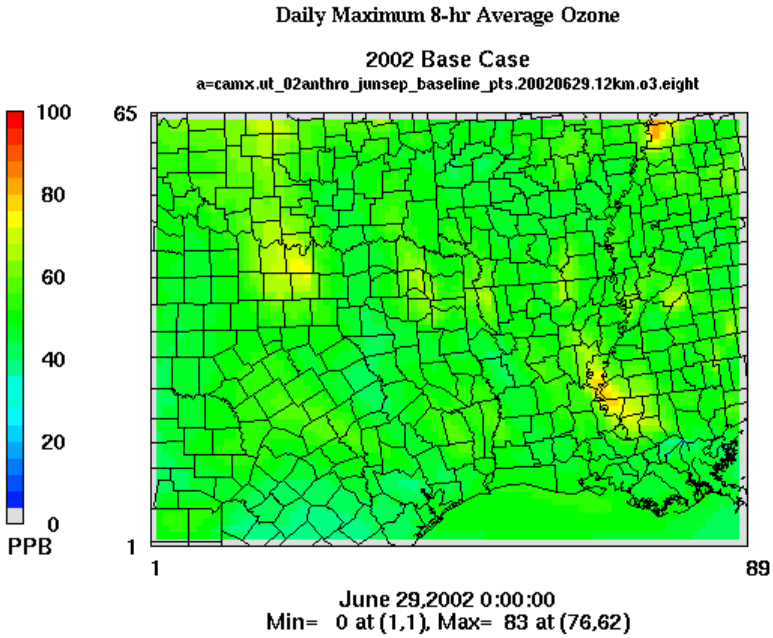



**Figure A58: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 29 for the 2009 Future Case.**

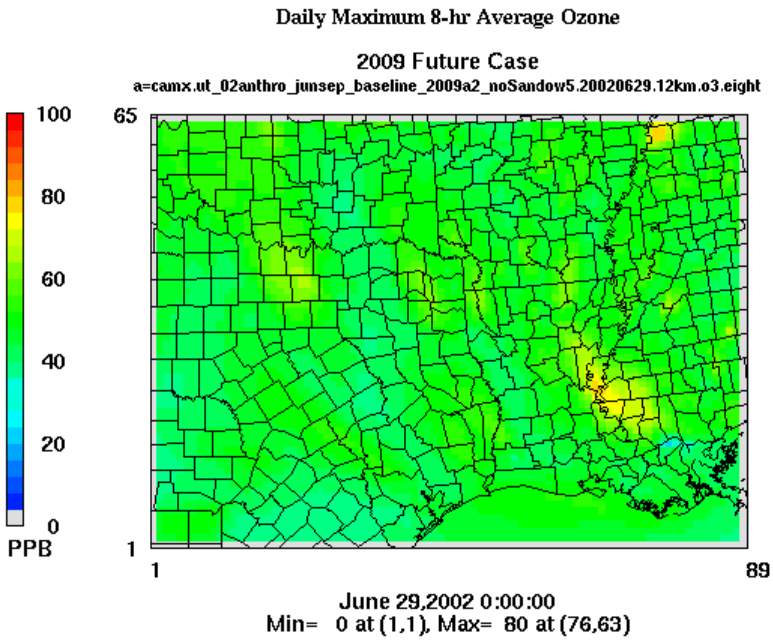


**Figure A59: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 30 for the 2002 Base Case.**

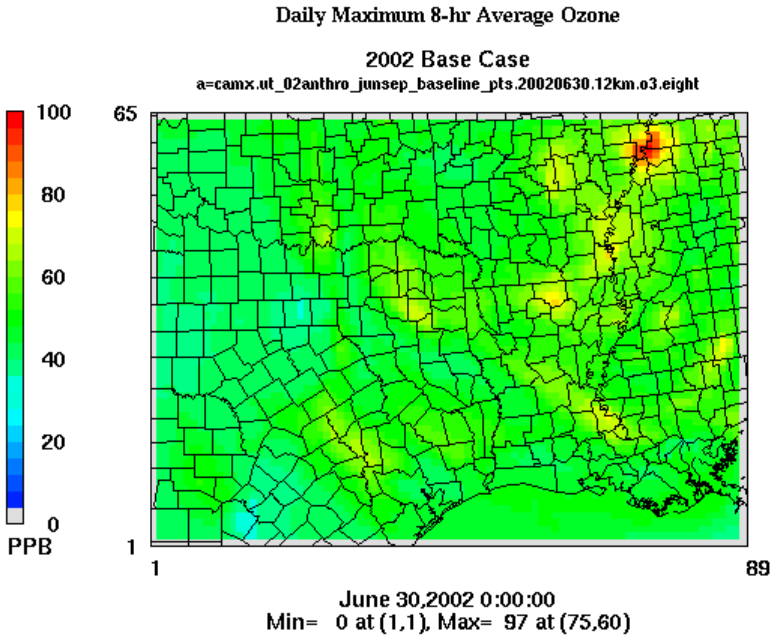



**Figure A60: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 30 for the 2009 Future Case.**

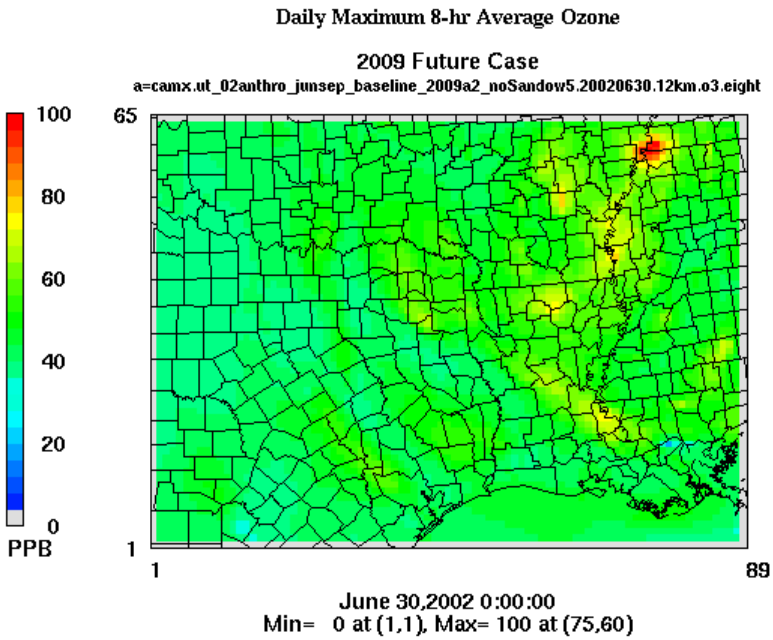


**Figure A61: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 01 for the 2002 Base Case.**

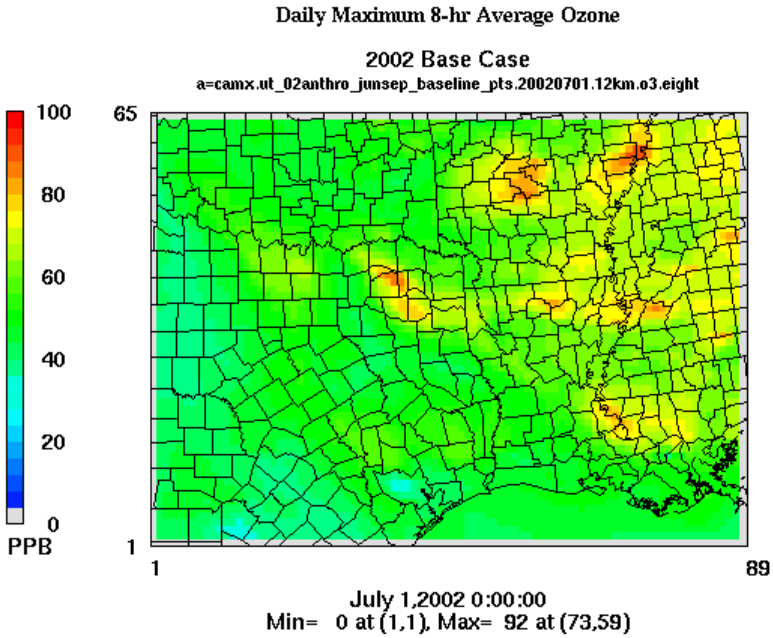



**Figure A62: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 01 for the 2009 Future Case.**

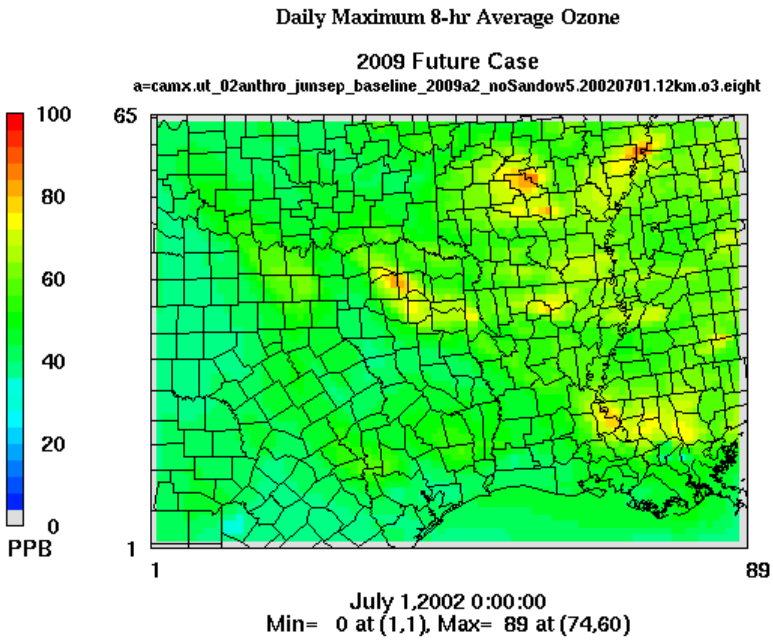


**Figure A63: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 02 for the 2002 Base Case.**

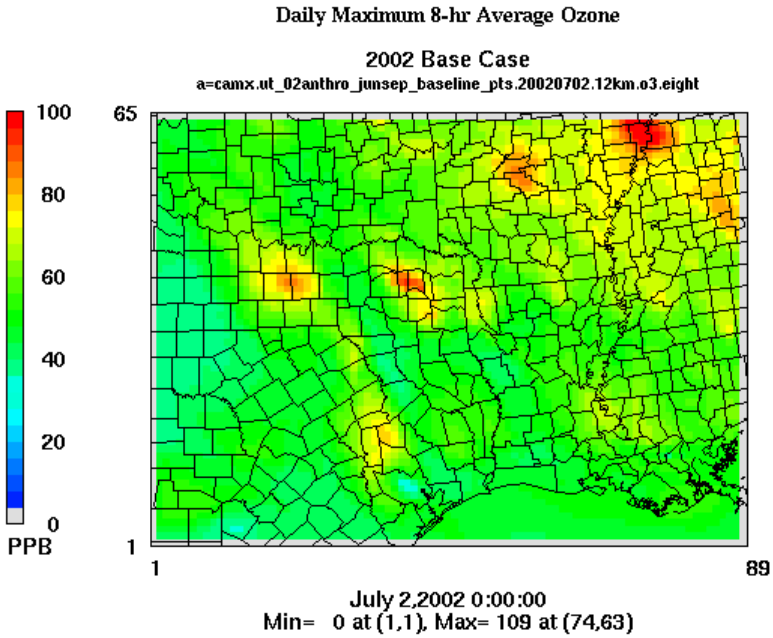



**Figure A64: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 02 for the 2009 Future Case.**

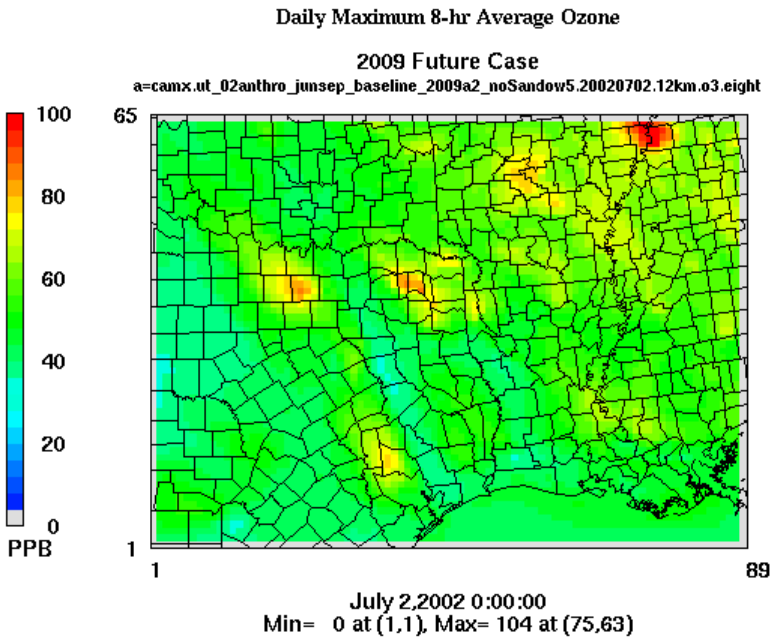


**Figure A65: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 03 for the 2002 Base Case.**

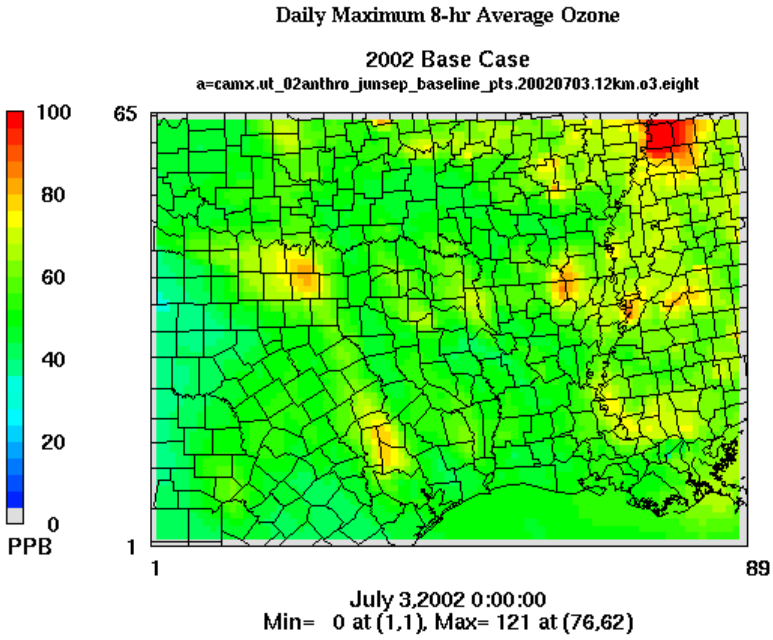



**Figure A66: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 03 for the 2009 Future Case.**

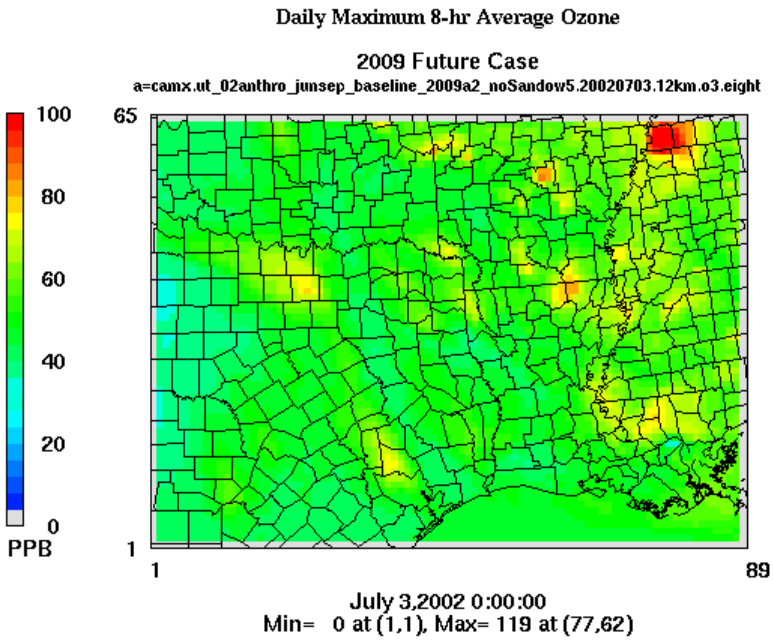


**Figure A67: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 04 for the 2002 Base Case.**

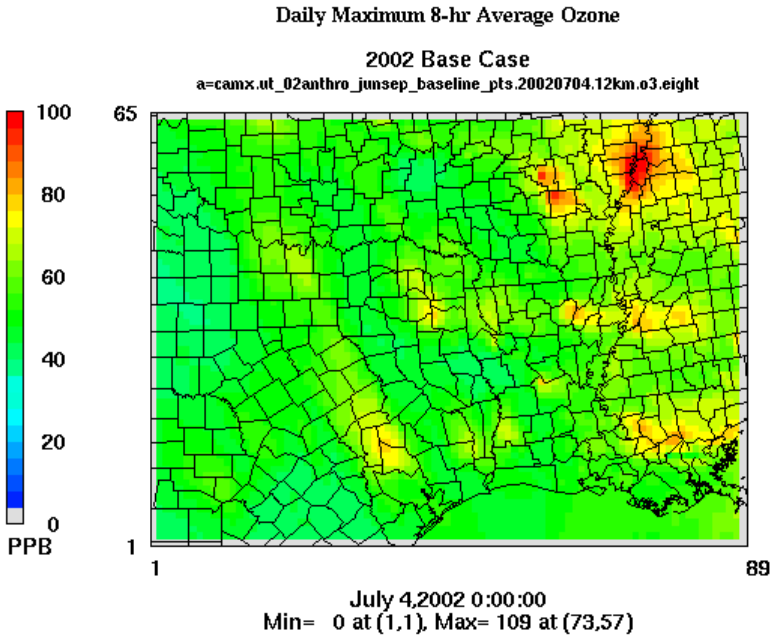



**Figure A68: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 04 for the 2009 Future Case.**

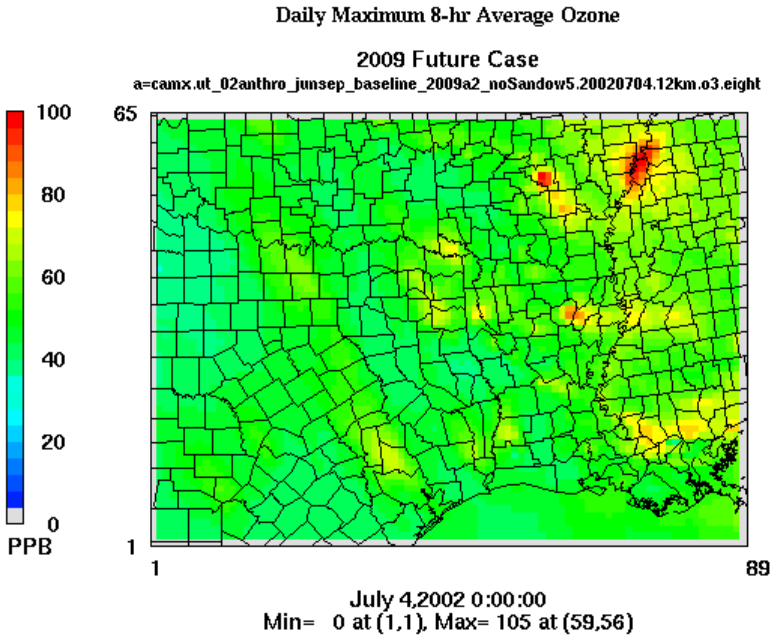


**Figure A69: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 05 for the 2002 Base Case.**

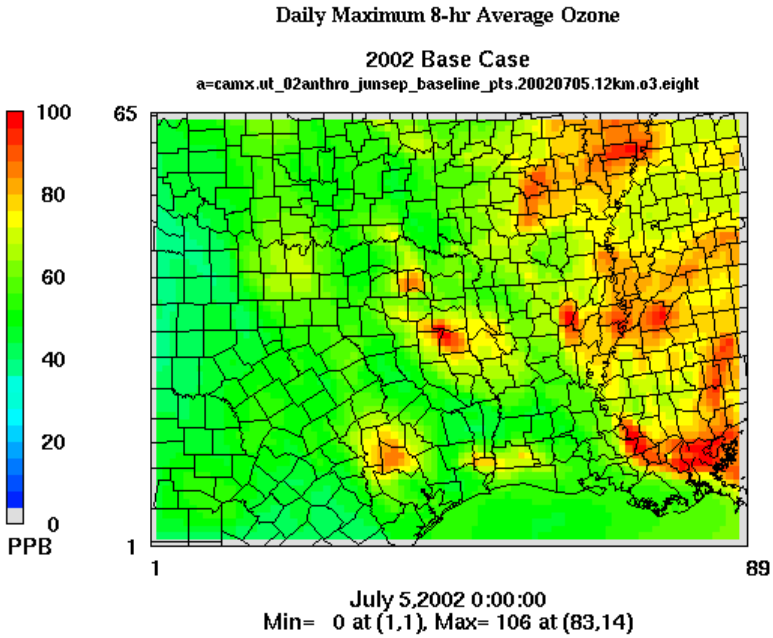



**Figure A70: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 05 for the 2009 Future Case.**

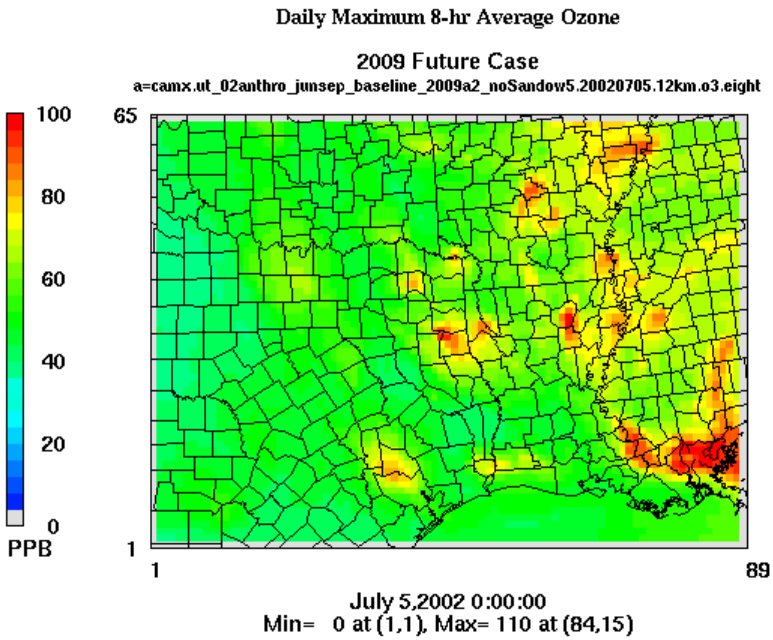


**Figure A71: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 06 for the 2002 Base Case.**

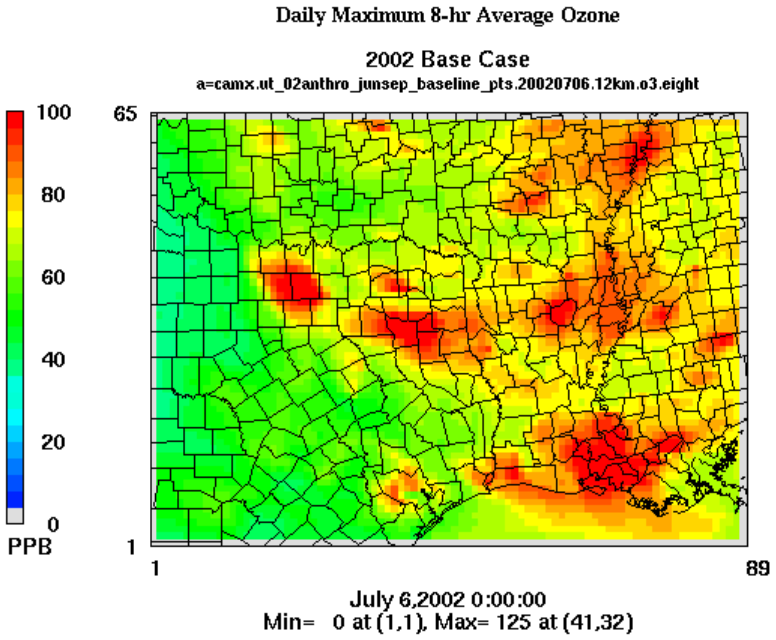



**Figure A72: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 06 for the 2009 Future Case.**

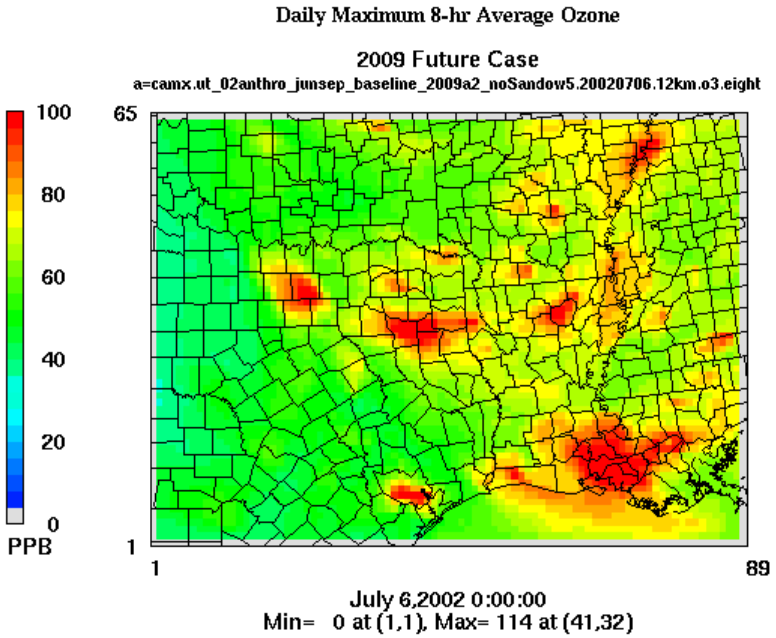


**Figure A73: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 07 for the 2002 Base Case.**

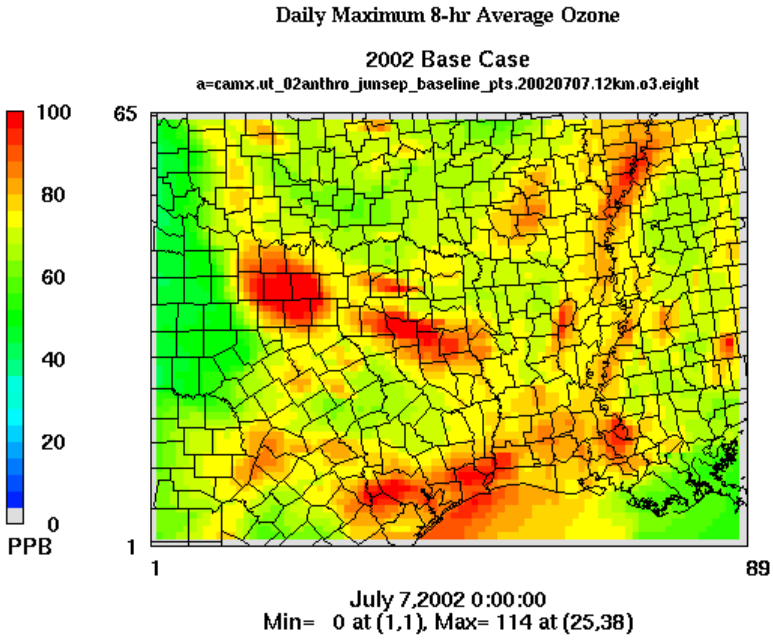



**Figure A74: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 07 for the 2009 Future Case.**

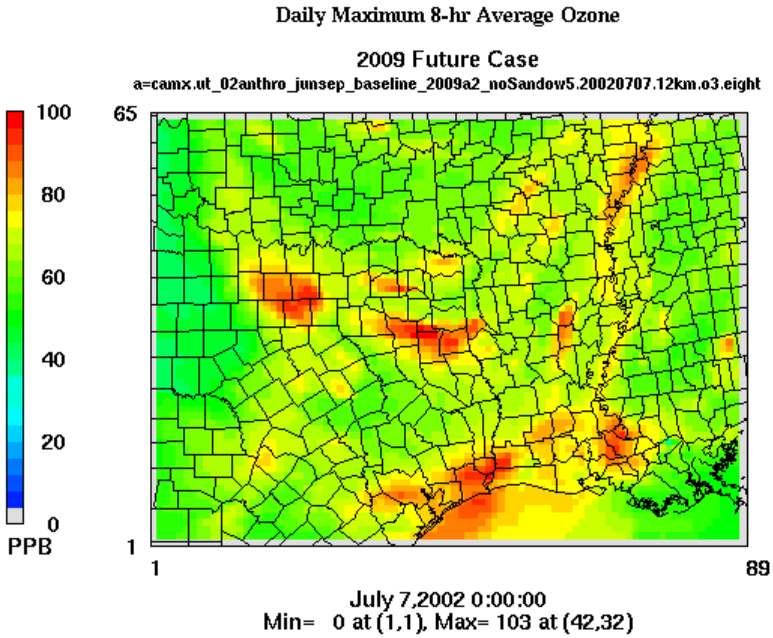


**Figure A75: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 08 for the 2002 Base Case.**

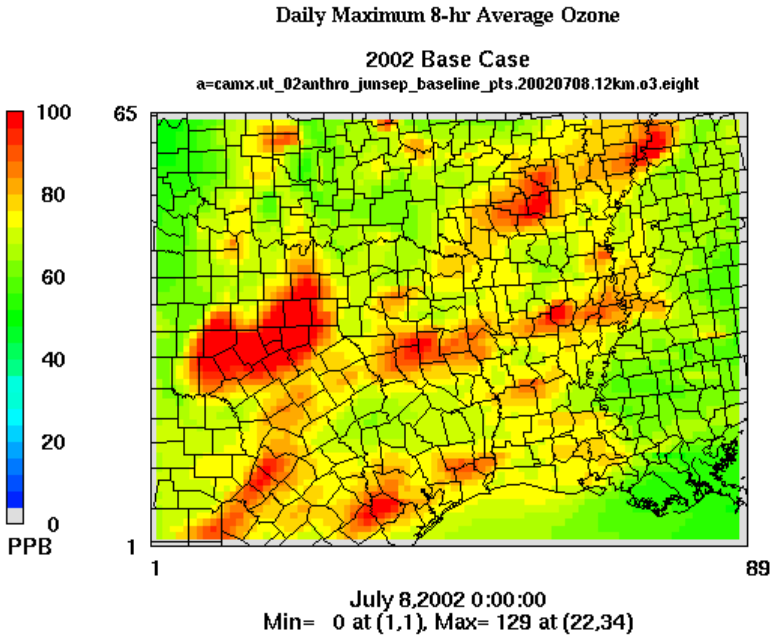



**Figure A76: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 08 for the 2009 Future Case.**

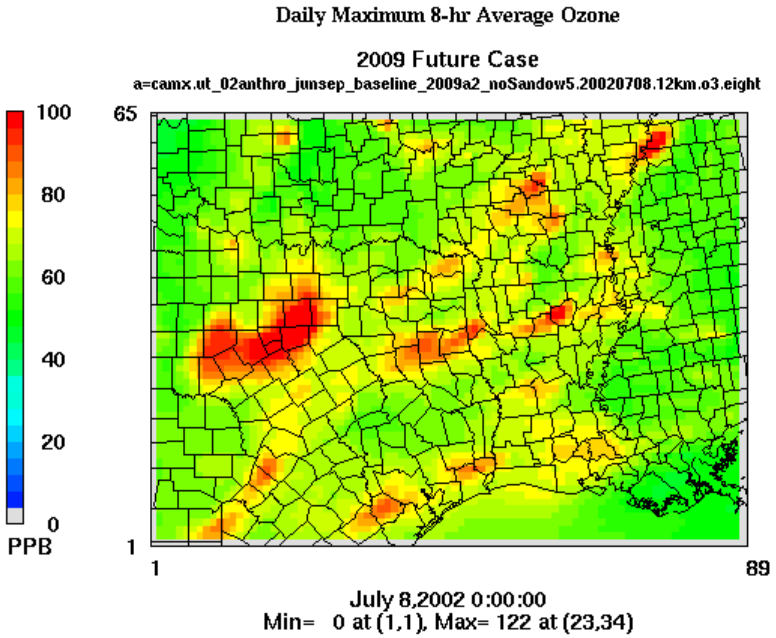


**Figure A77: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 09 for the 2002 Base Case.**

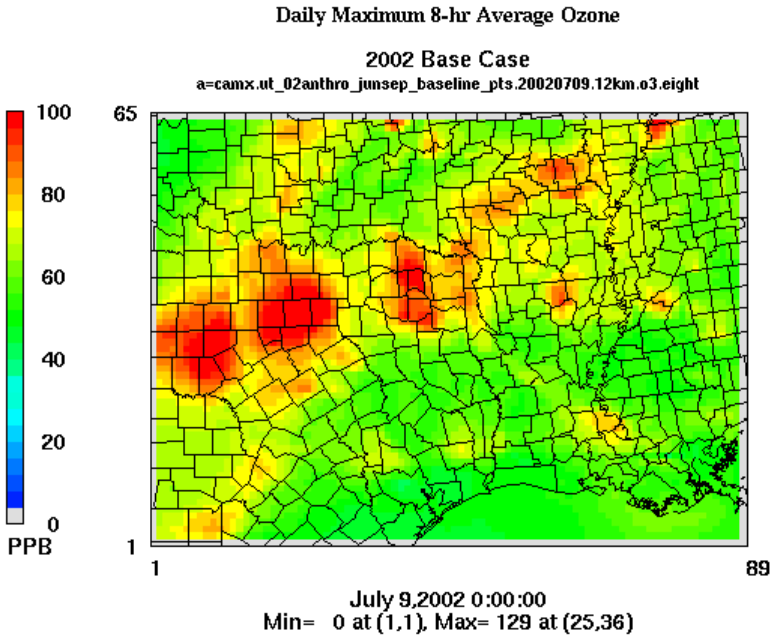



**Figure A78: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 09 for the 2009 Future Case.**

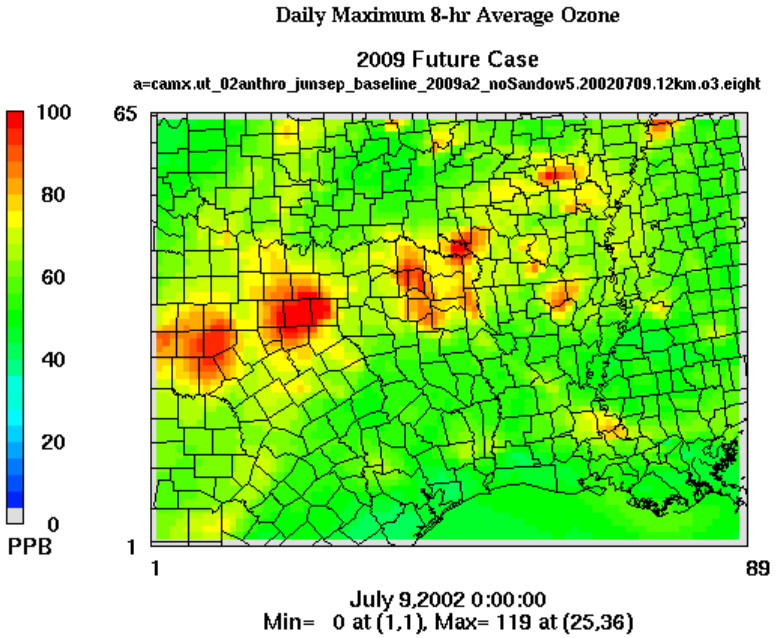


**Figure A79: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 10 for the 2002 Base Case.**

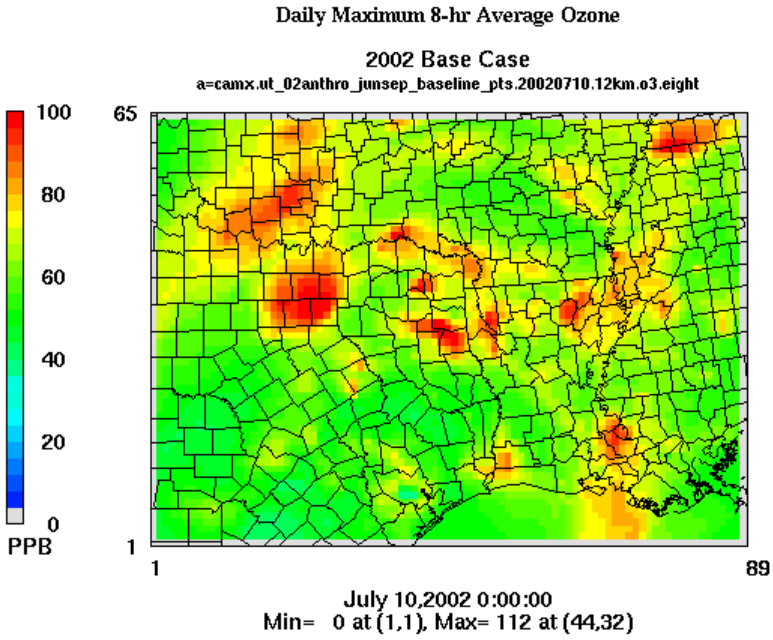



**Figure A80: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 10 for the 2009 Future Case.**

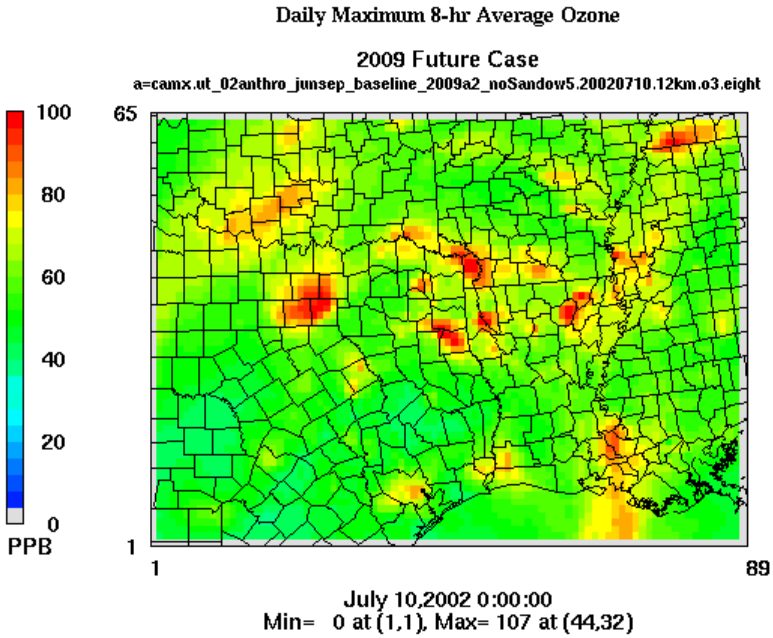


**Figure A81: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 11 for the 2002 Base Case.**

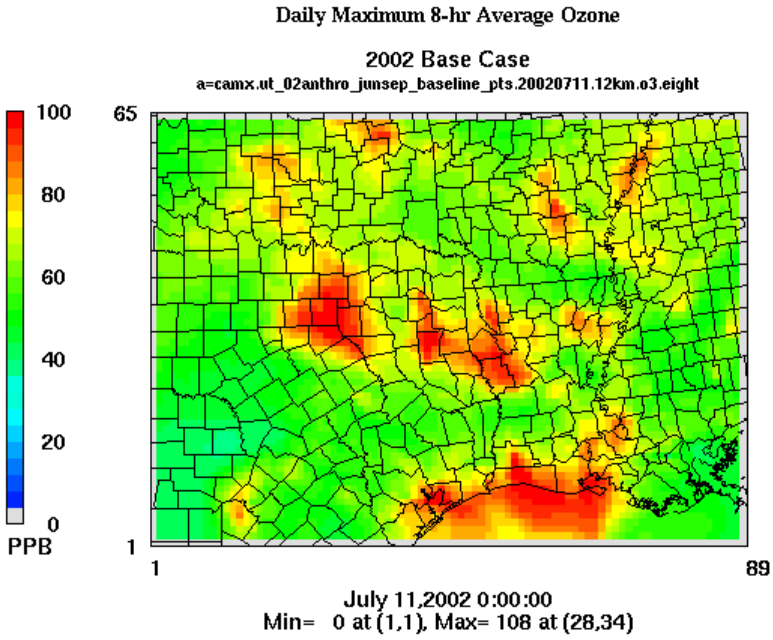



**Figure A82: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 11 for the 2009 Future Case.**

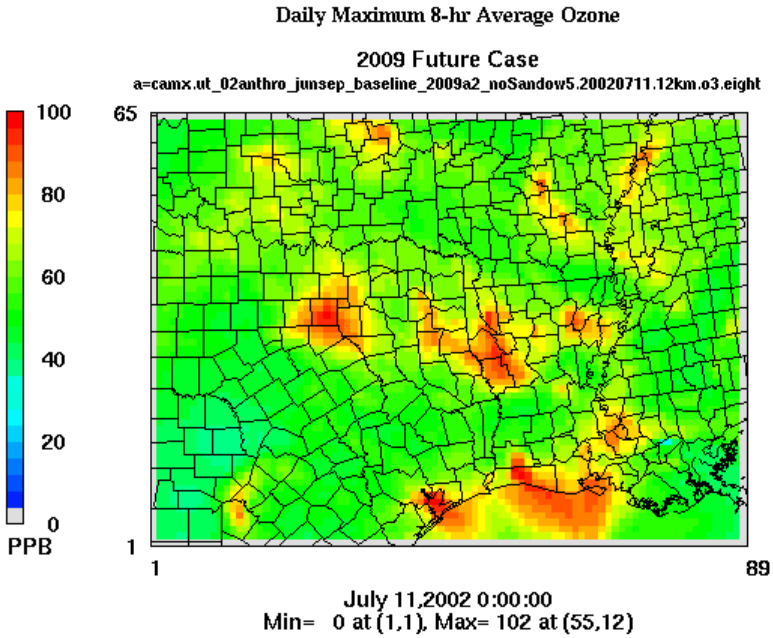


**Figure A83: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 12 for the 2002 Base Case.**

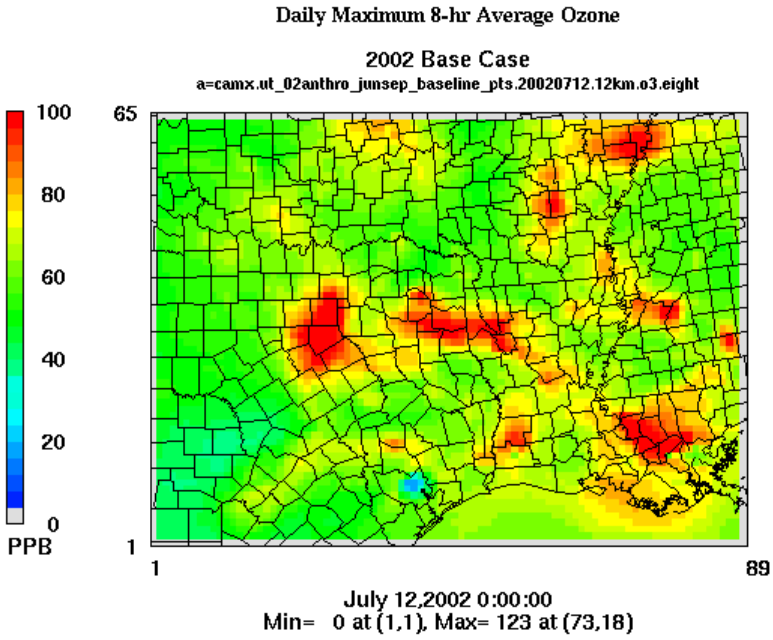



**Figure A84: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 12 for the 2009 Future Case.**

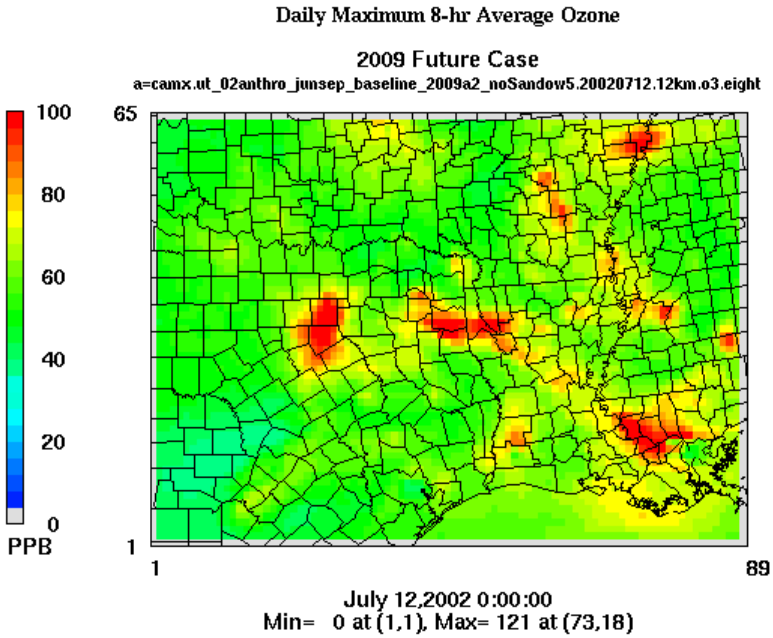


**Figure A85: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 13 for the 2002 Base Case.**

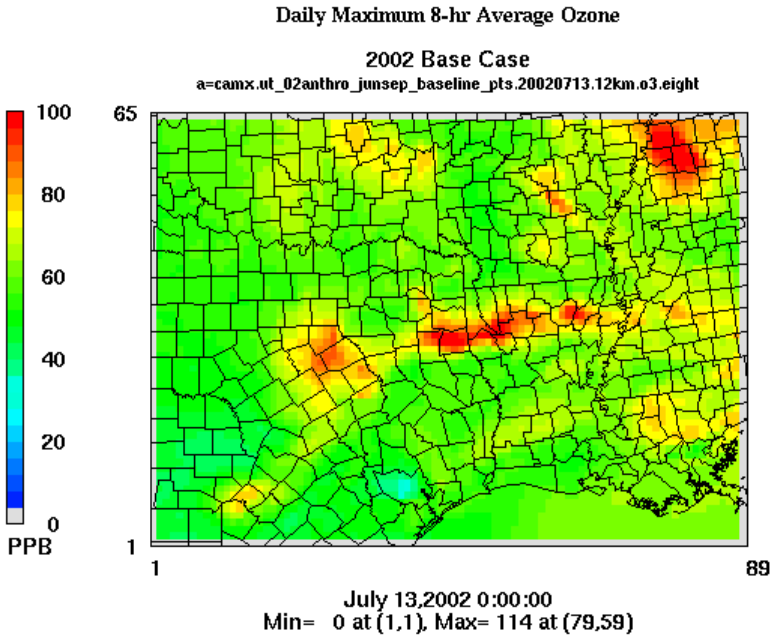



**Figure A86: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 13 for the 2009 Future Case.**

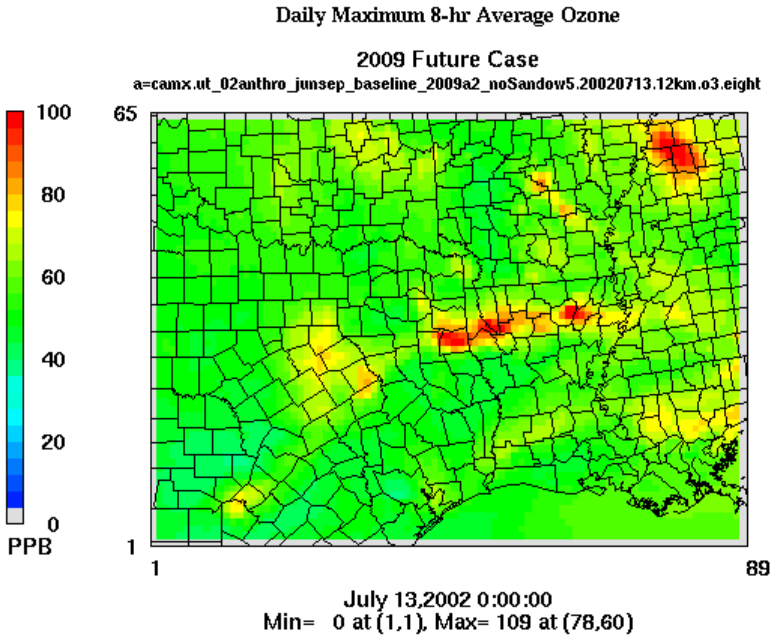


**Figure A87: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 14 for the 2002 Base Case.**

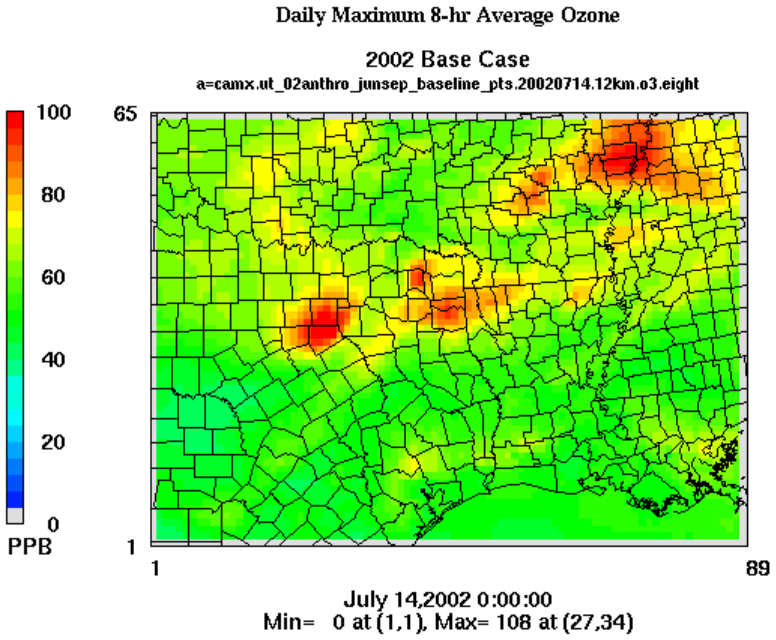



**Figure A88: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 14 for the 2009 Future Case.**

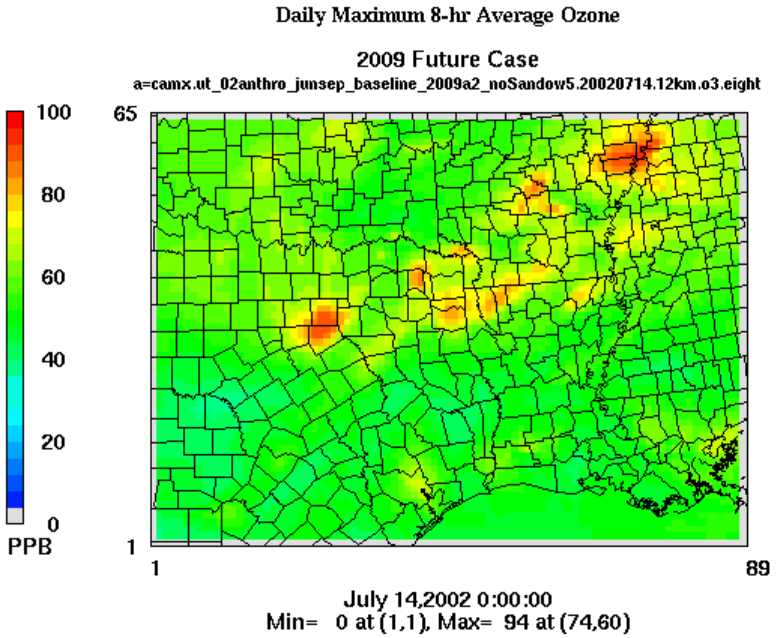


**Figure A89: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 15 for the 2002 Base Case.**

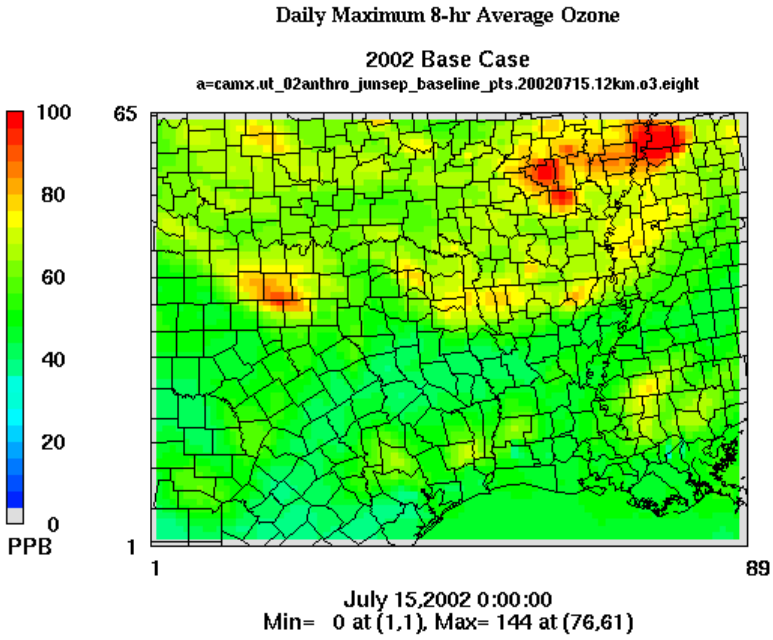



**Figure A90: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 15 for the 2009 Future Case.**

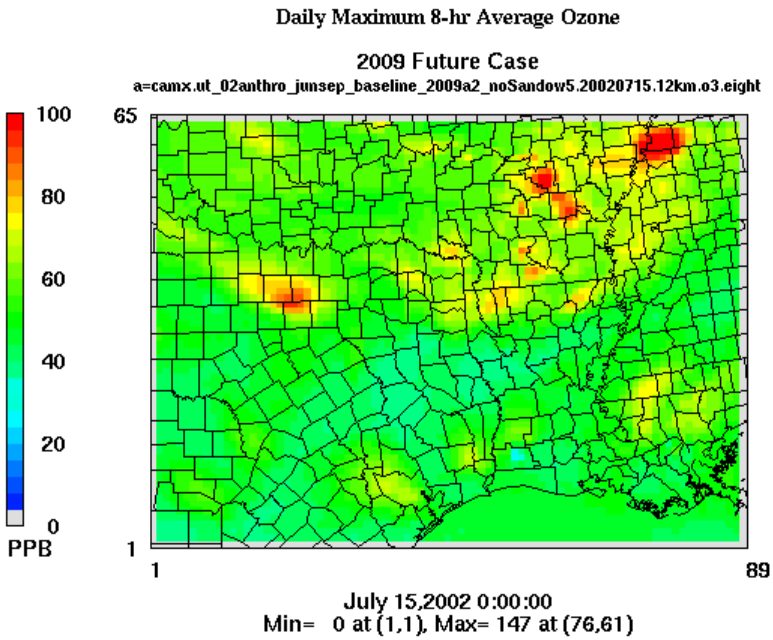


**Figure A91: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 16 for the 2002 Base Case.**

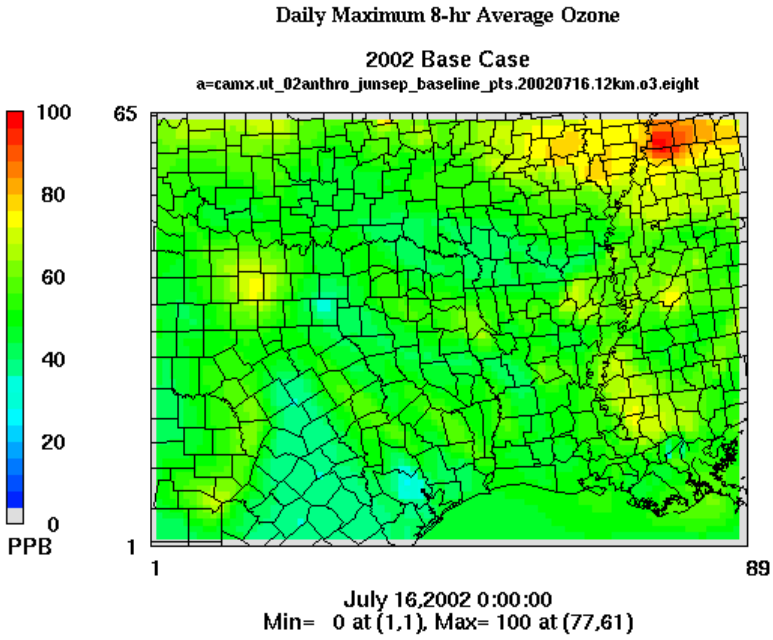



**Figure A92: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 16 for the 2009 Future Case.**

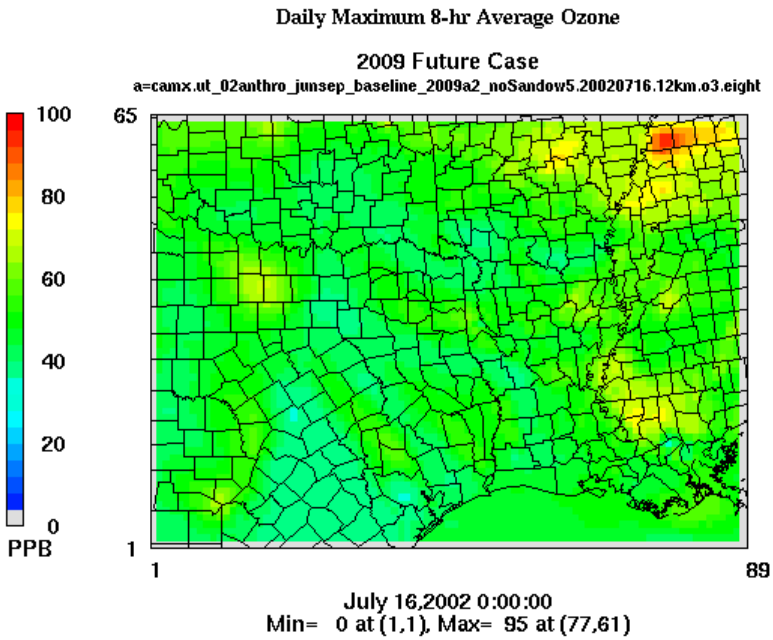


**Figure A93: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 17 for the 2002 Base Case.**

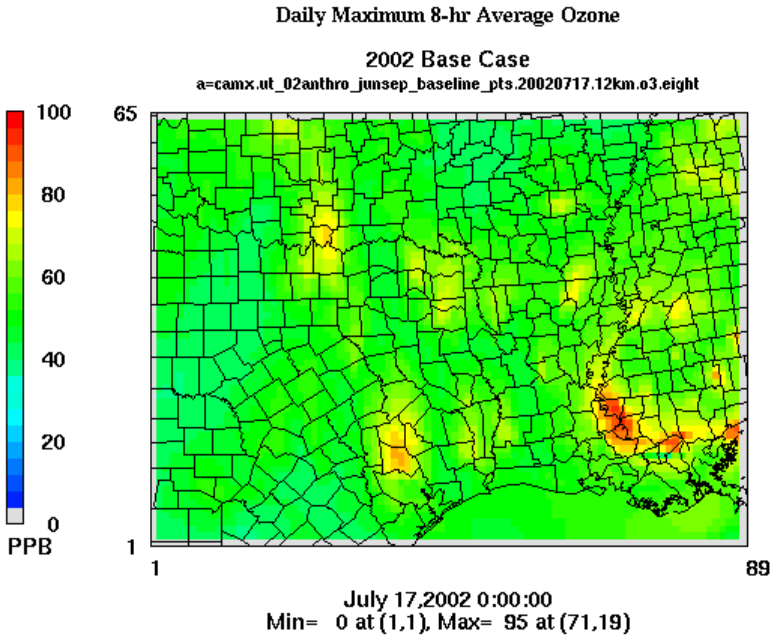



**Figure A94: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 17 for the 2009 Future Case.**

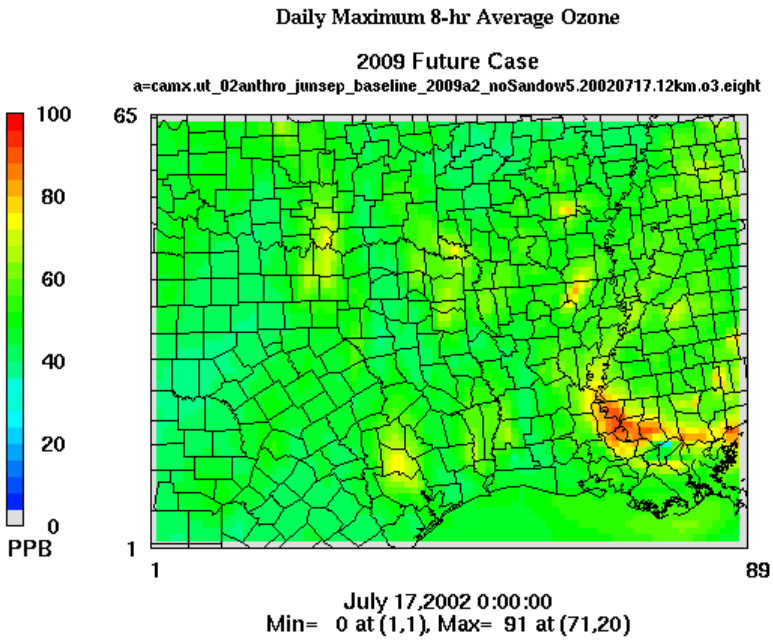


**Figure A95: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 18 for the 2002 Base Case.**

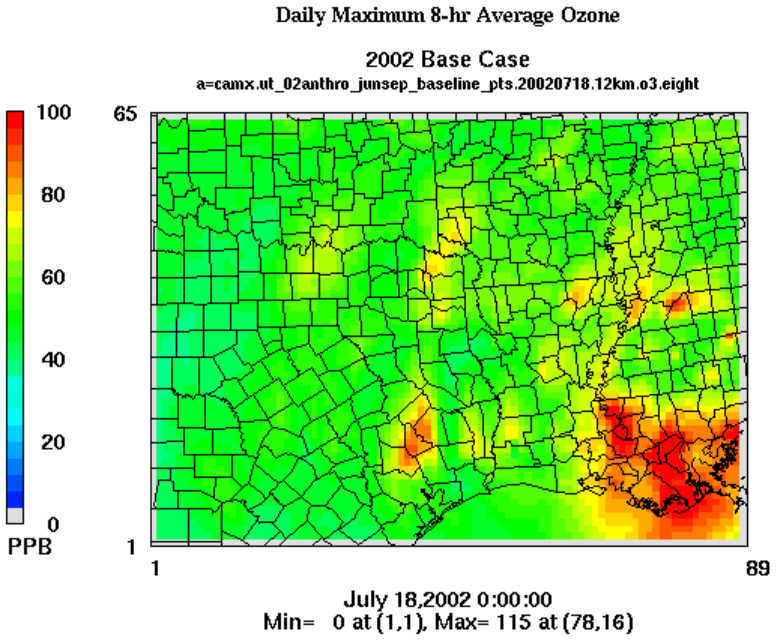



**Figure A96: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 18 for the 2009 Future Case.**

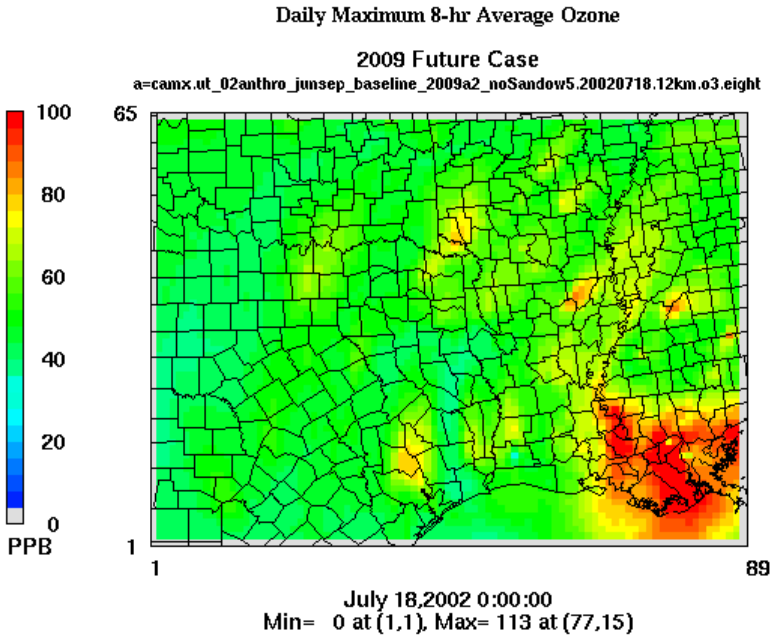


**Figure A97: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 19 for the 2002 Base Case.**

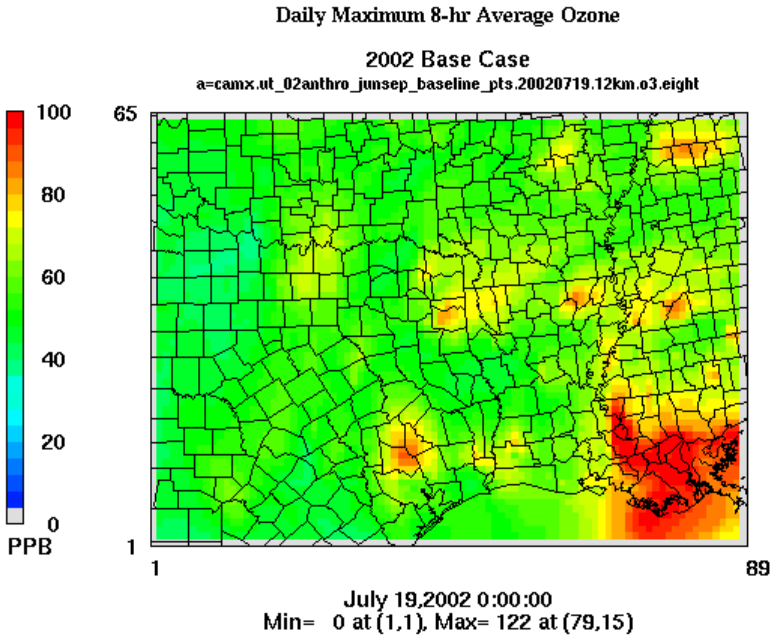



**Figure A98: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 19 for the 2009 Future Case.**

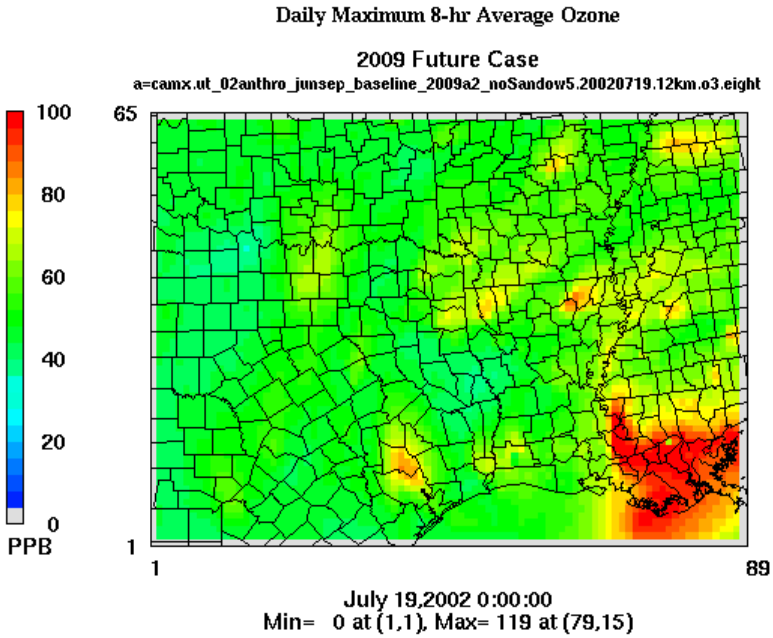


**Figure A99: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 20 for the 2002 Base Case.**

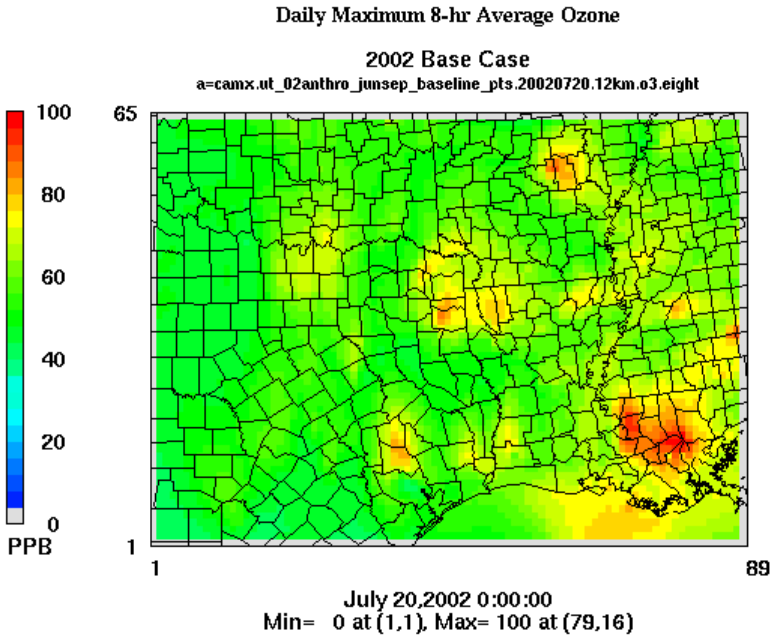



**Figure A100: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 20 for the 2009 Future Case.**

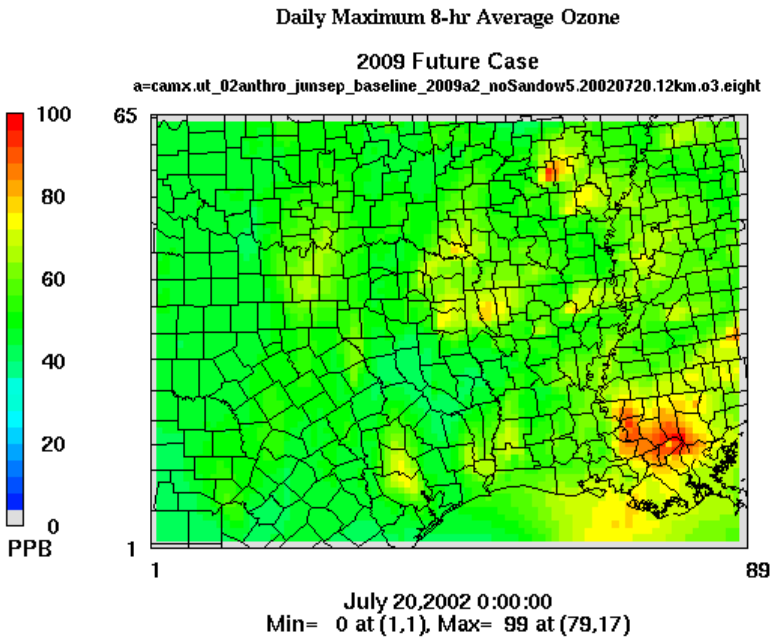


**Figure A101: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 21 for the 2002 Base Case.**

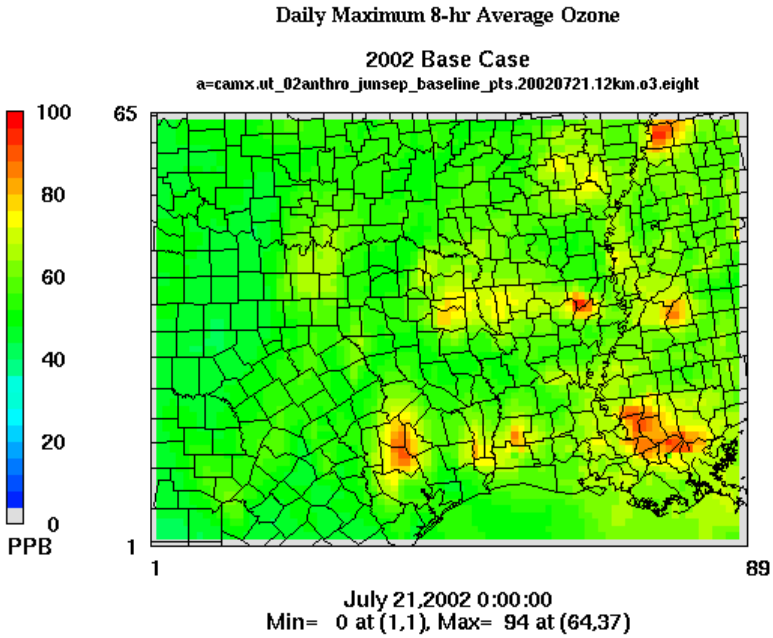



**Figure A102: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 21 for the 2009 Future Case.**

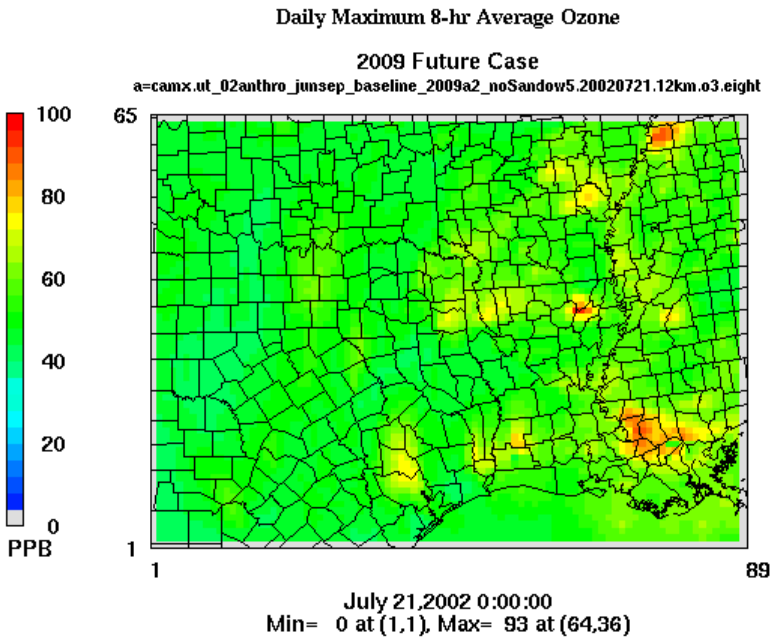


**Figure A103: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 22 for the 2002 Base Case.**

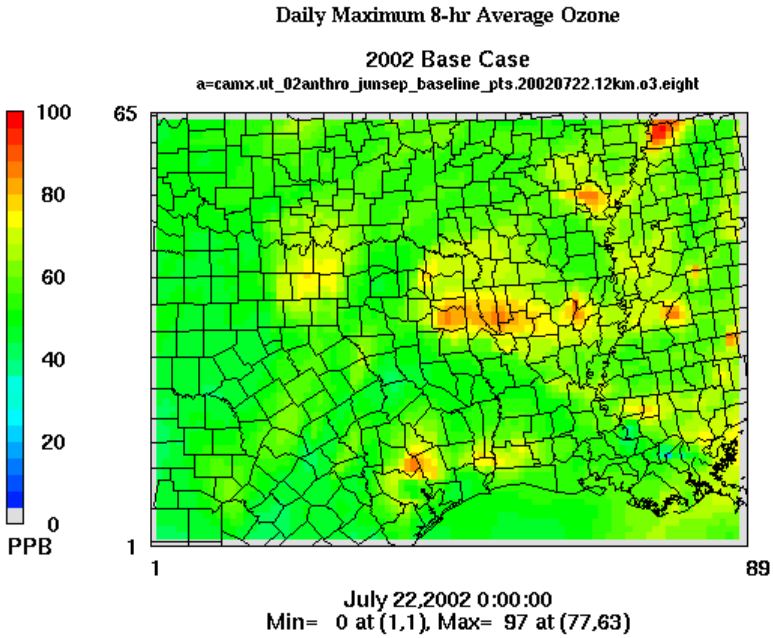



**Figure A104: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 22 for the 2009 Future Case.**

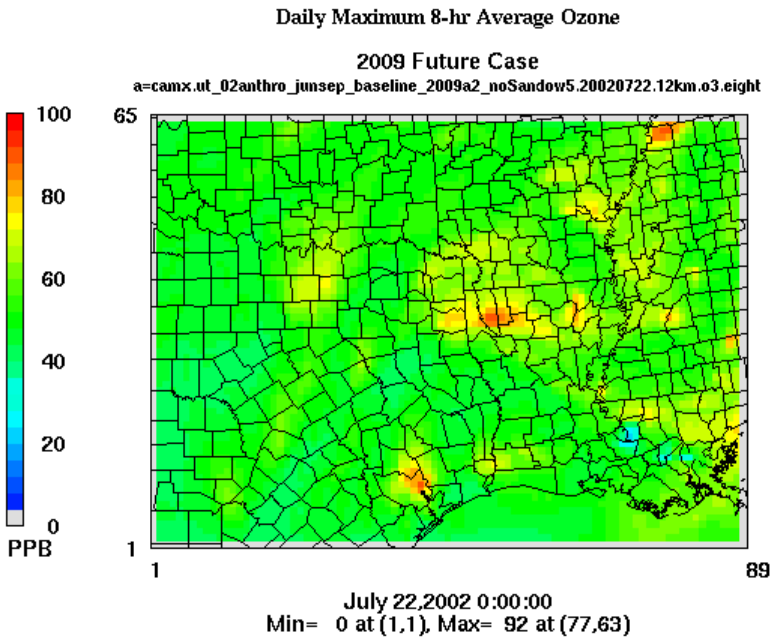


**Figure A105: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 23 for the 2002 Base Case.**

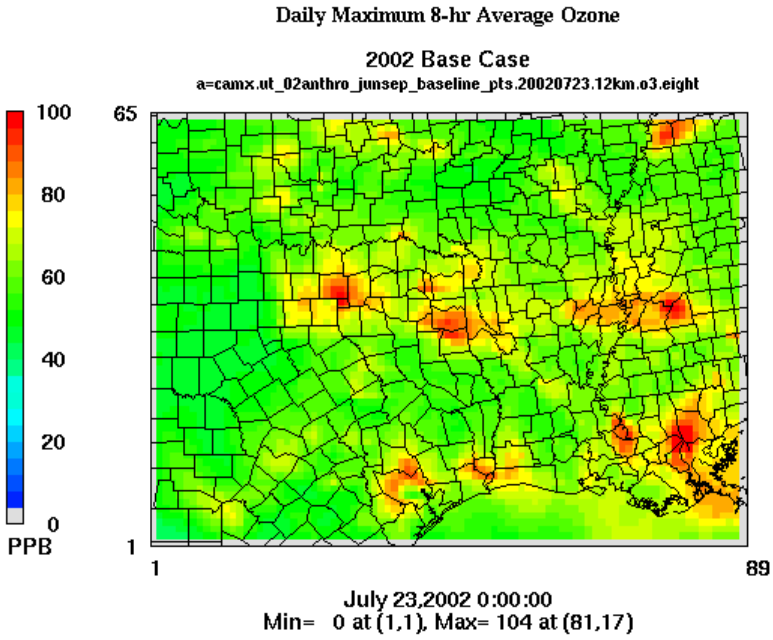



**Figure A106: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 23 for the 2009 Future Case.**

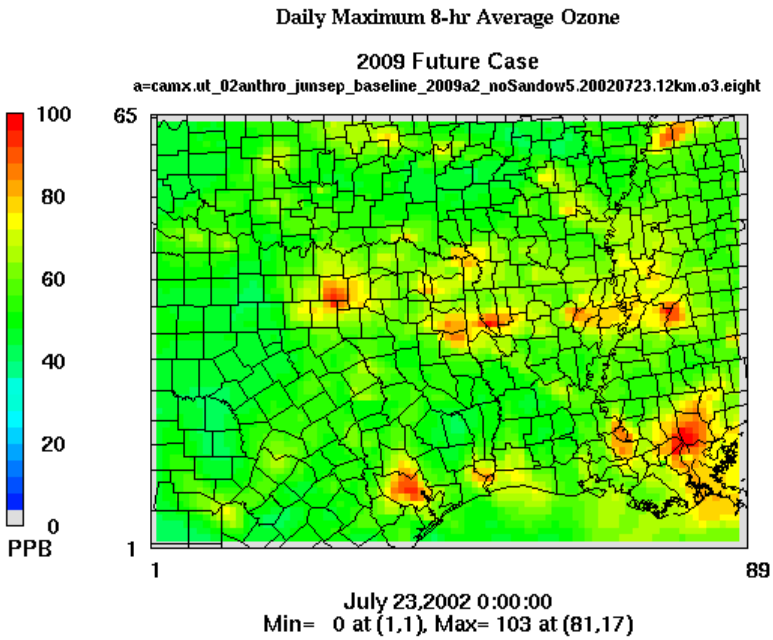


**Figure A107: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 24 for the 2002 Base Case.**

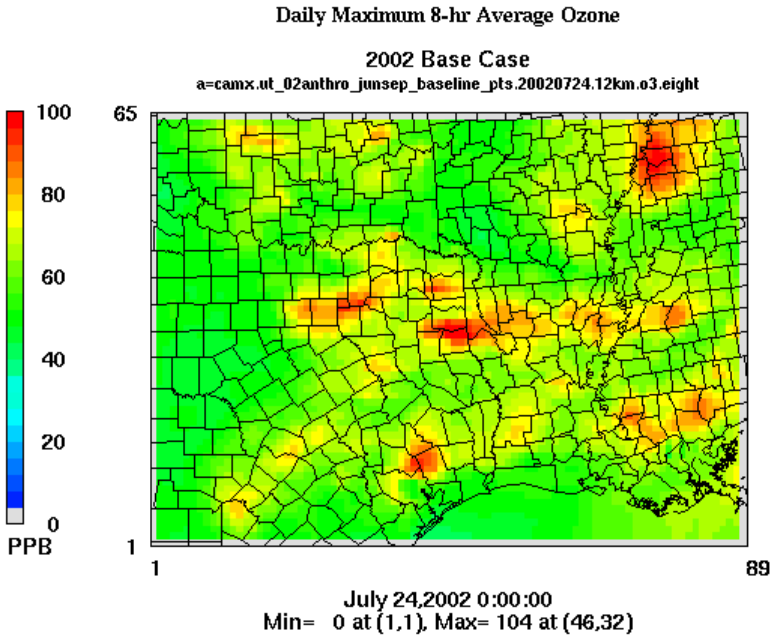



**Figure A108: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 24 for the 2009 Future Case.**

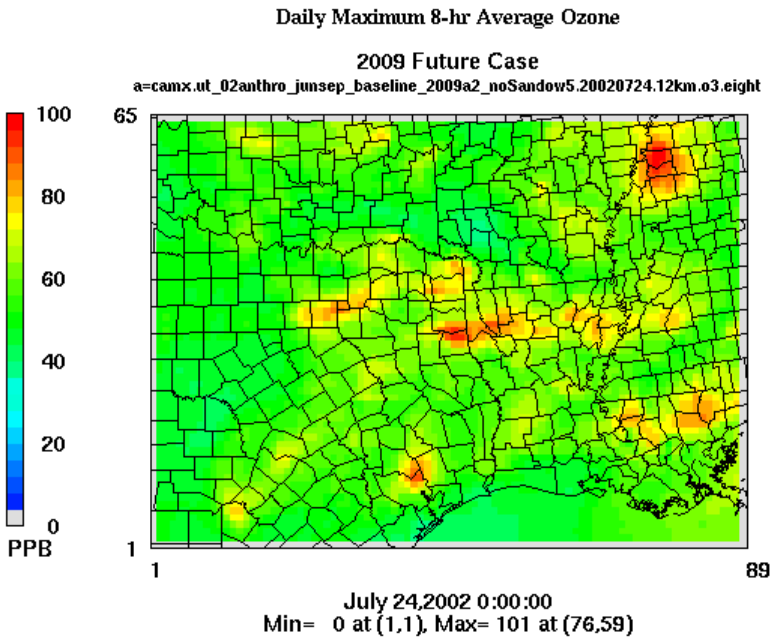


**Figure A109: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 25 for the 2002 Base Case.**

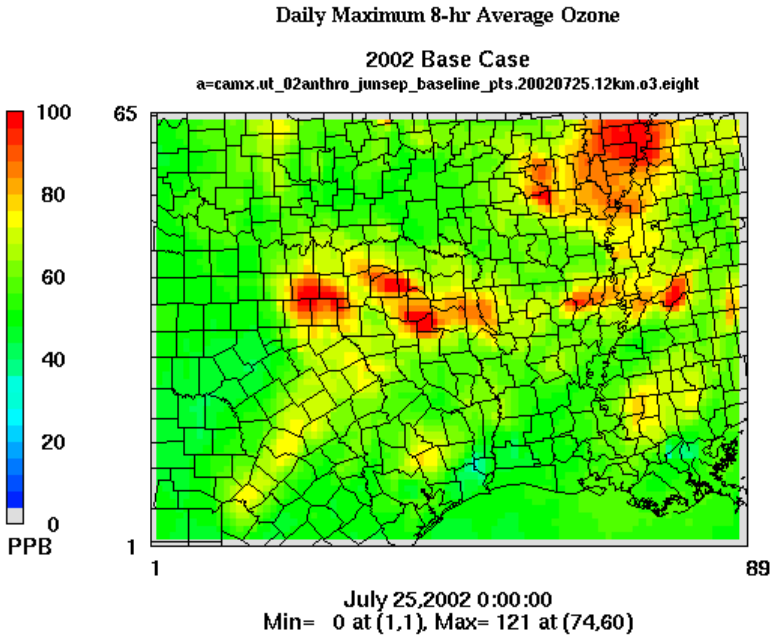



**Figure A110: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 25 for the 2009 Future Case.**

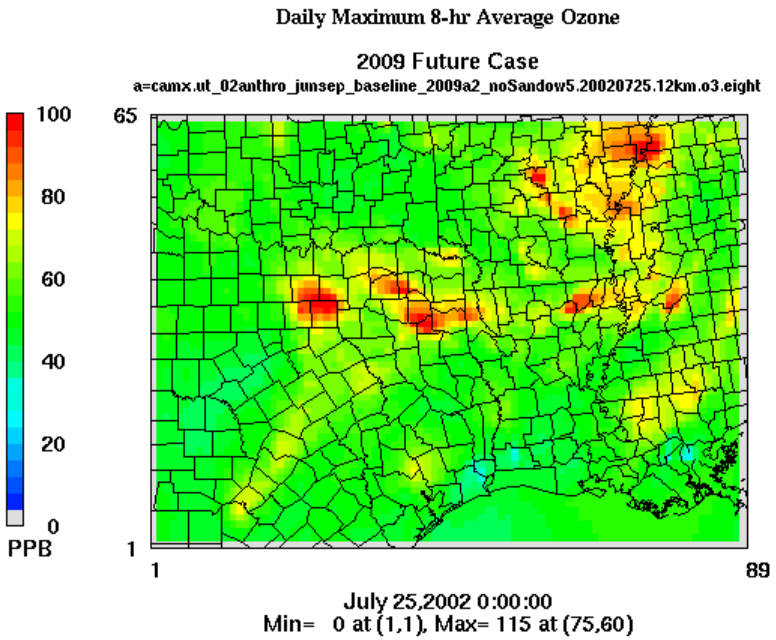


**Figure A111: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 26 for the 2002 Base Case.**

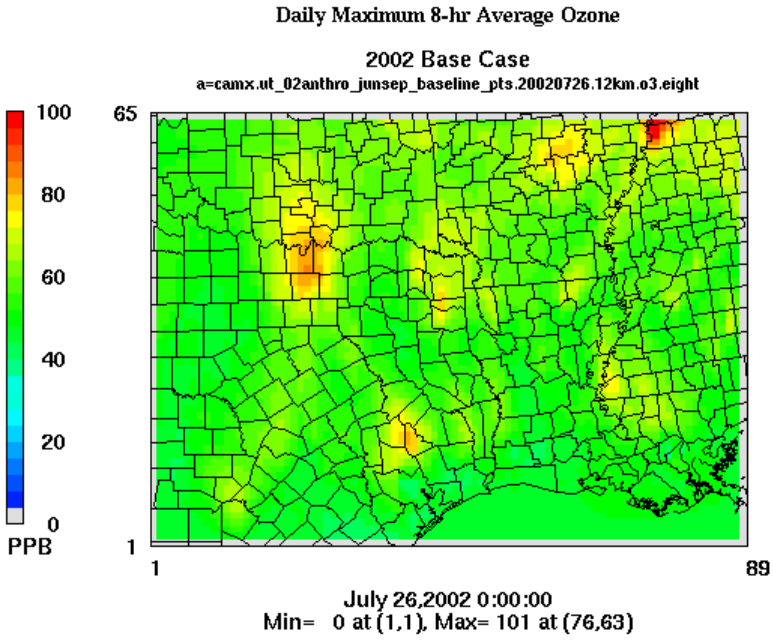



**Figure A112: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 26 for the 2009 Future Case.**

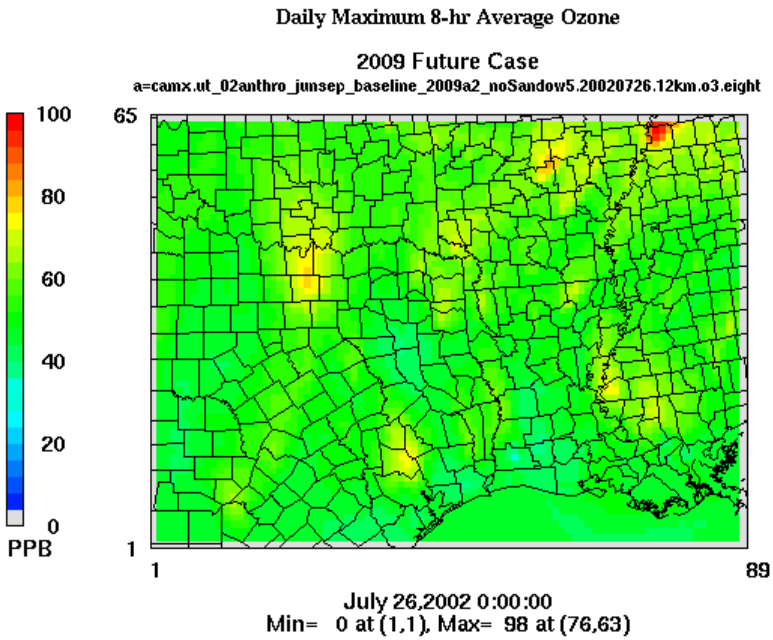


**Figure A113: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 27 for the 2002 Base Case.**

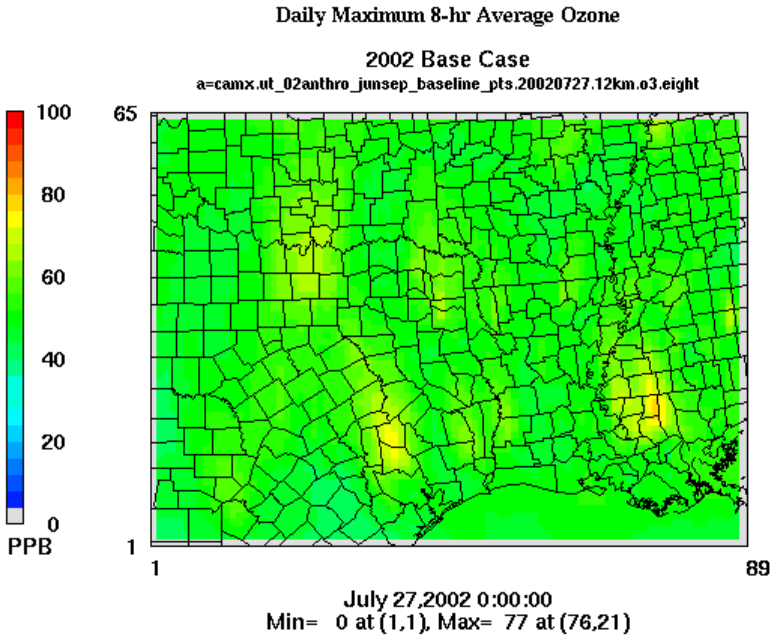



**Figure A114: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 27 for the 2009 Future Case.**

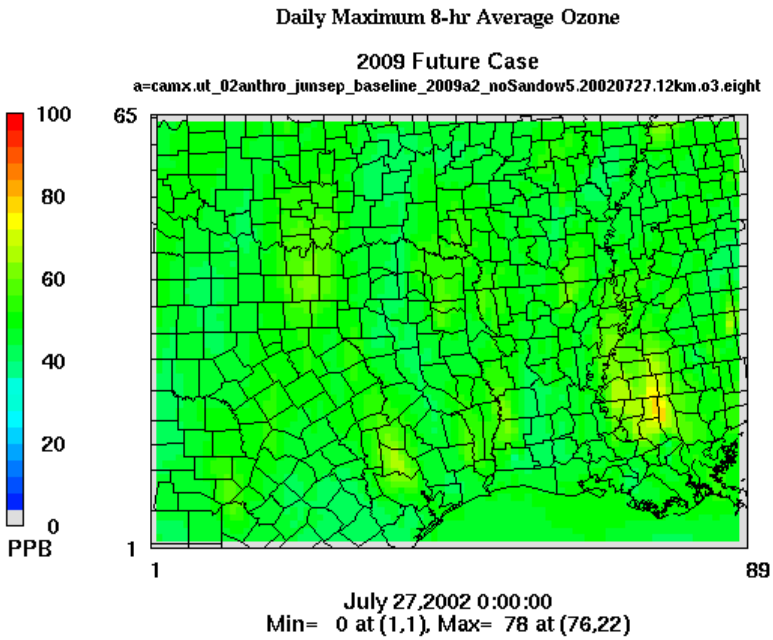


**Figure A115: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 28 for the 2002 Base Case.**

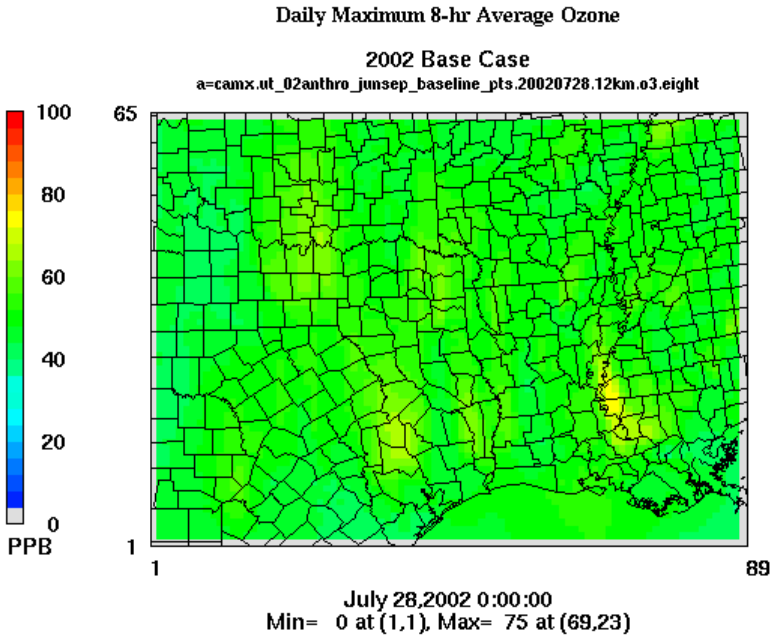



**Figure A116: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 28 for the 2009 Future Case.**

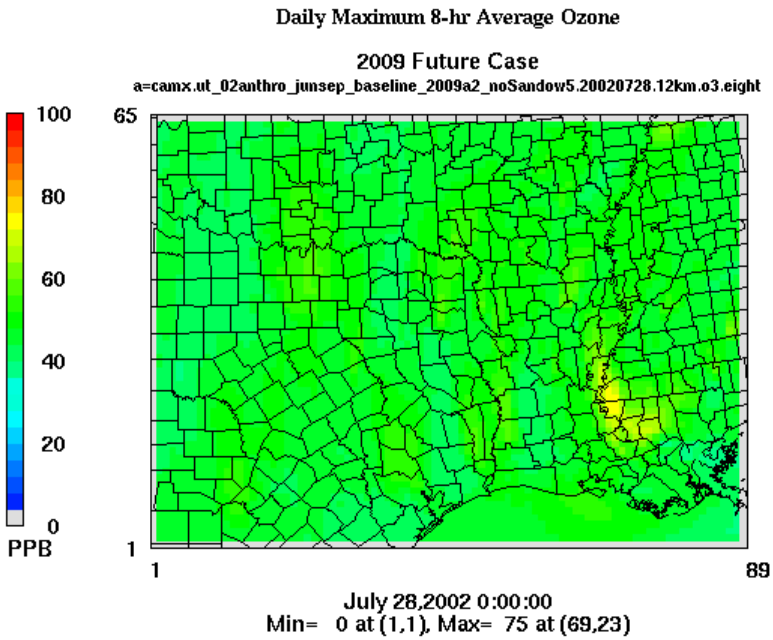


**Figure A117: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 29 for the 2002 Base Case.**

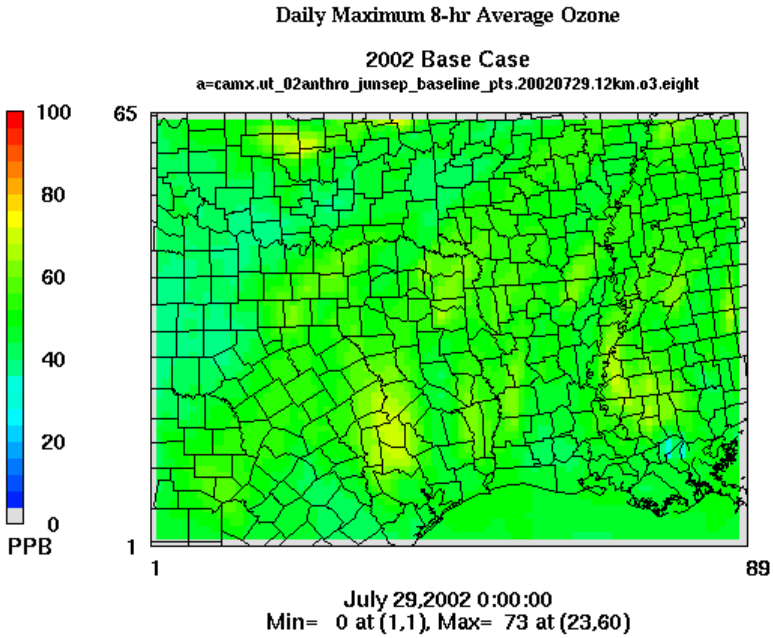



**Figure A118: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 29 for the 2009 Future Case.**

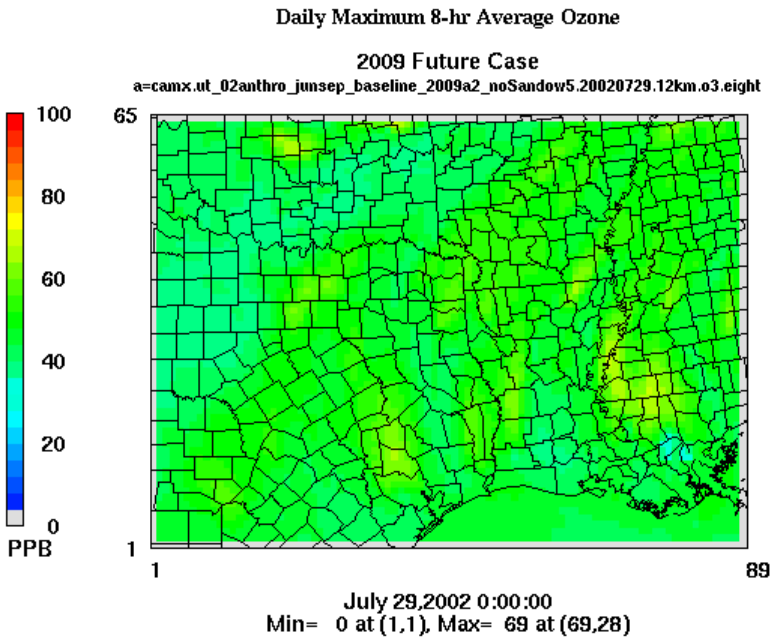


**Figure A119: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 30 for the 2002 Base Case.**

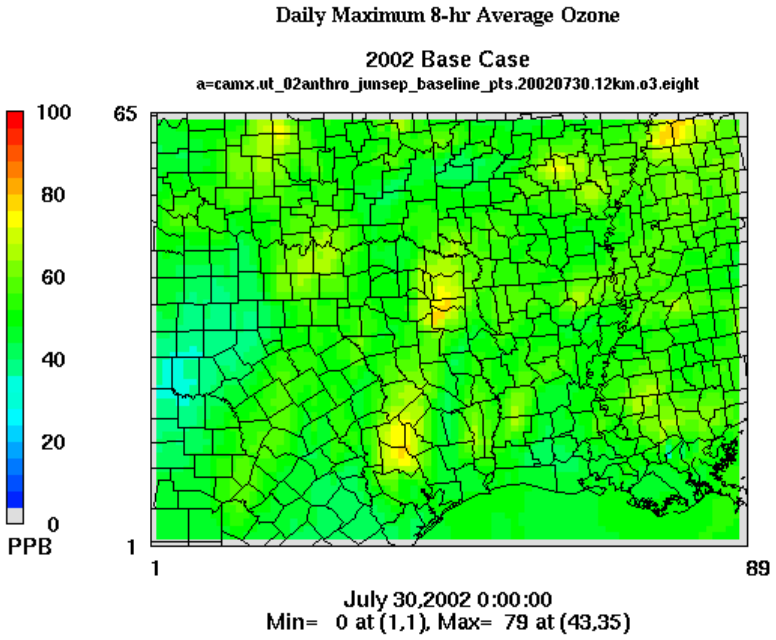



**Figure A120: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 30 for the 2009 Future Case.**

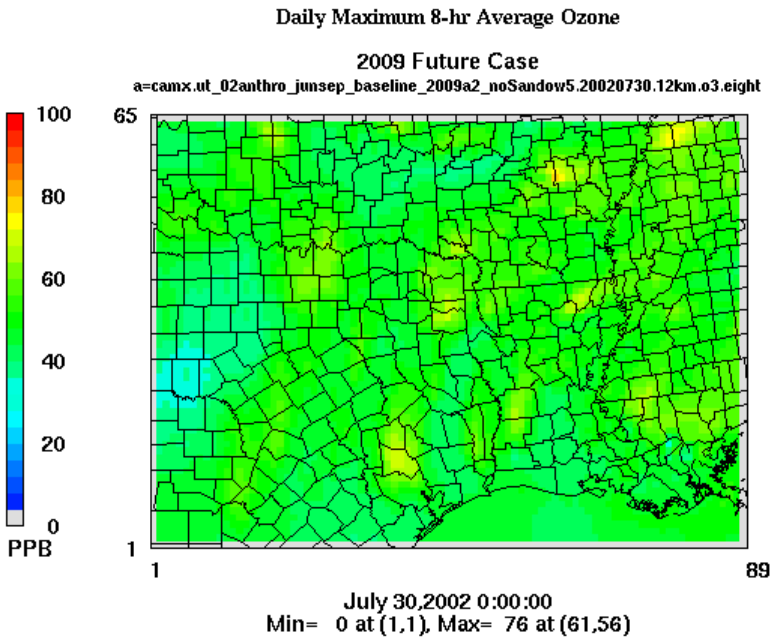


**Figure A121: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 31 for the 2002 Base Case.**

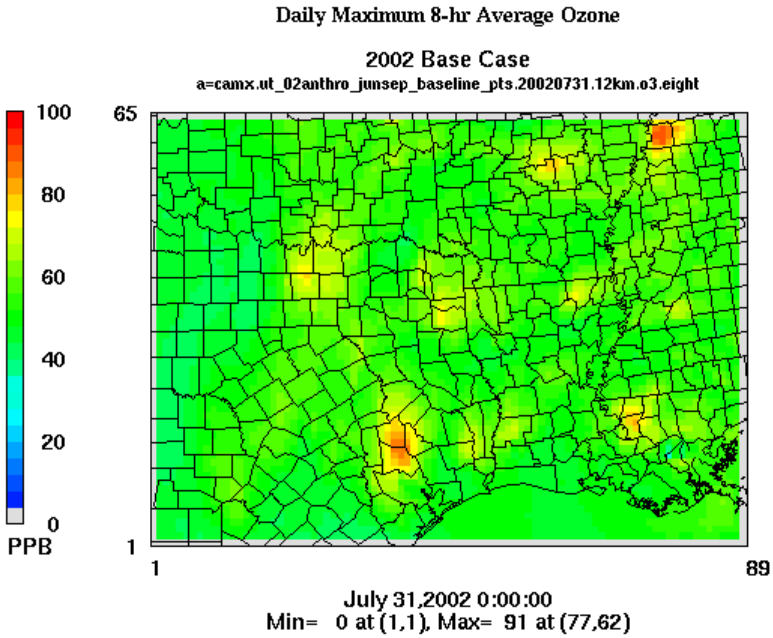



**Figure A122: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 31 for the 2009 Future Case.**

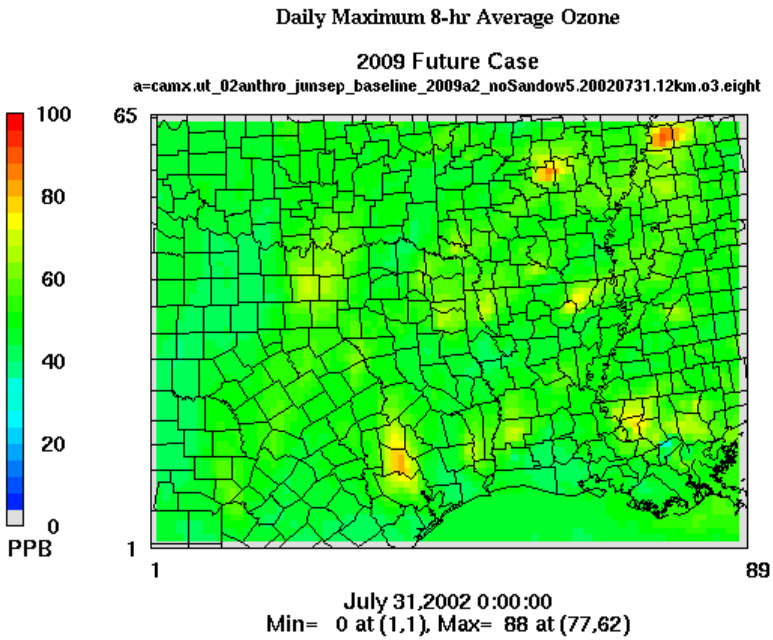


**Figure A123: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 01 for the 2002 Base Case.**

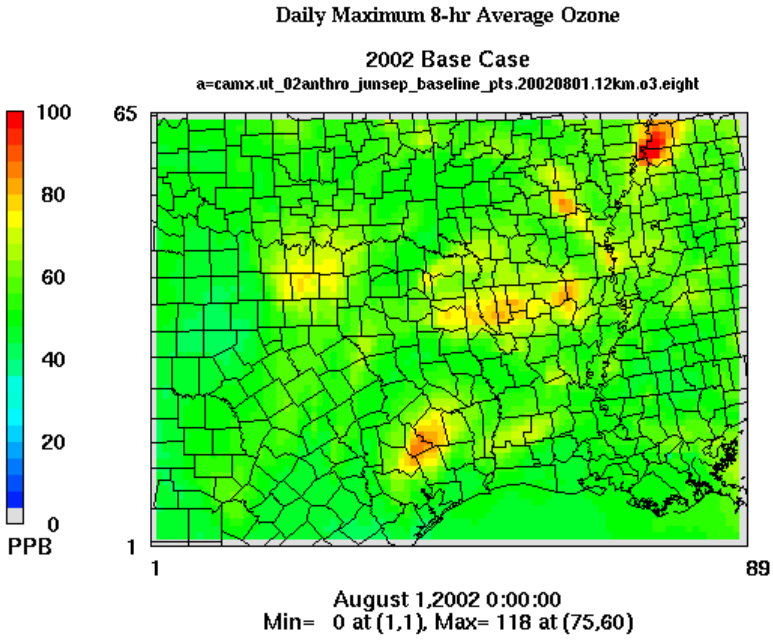



**Figure A124: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 01 for the 2009 Future Case.**

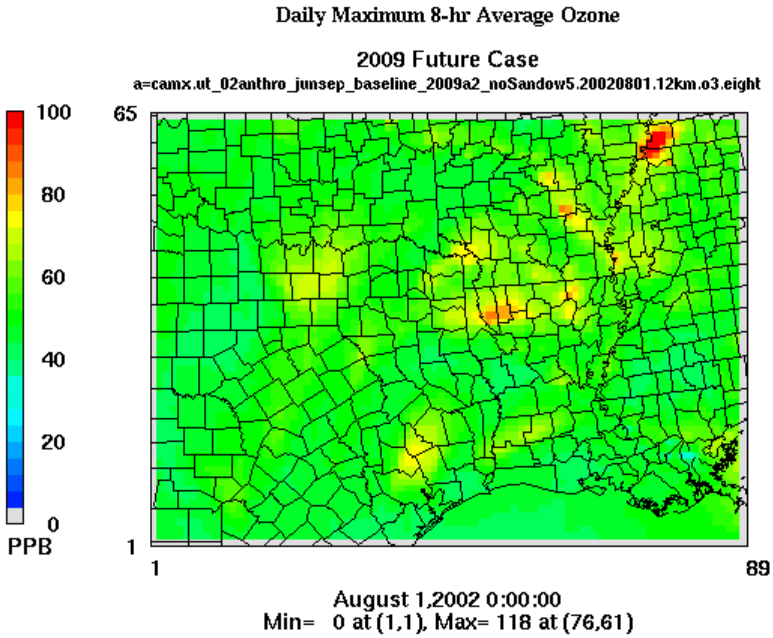


**Figure A125: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 02 for the 2002 Base Case.**

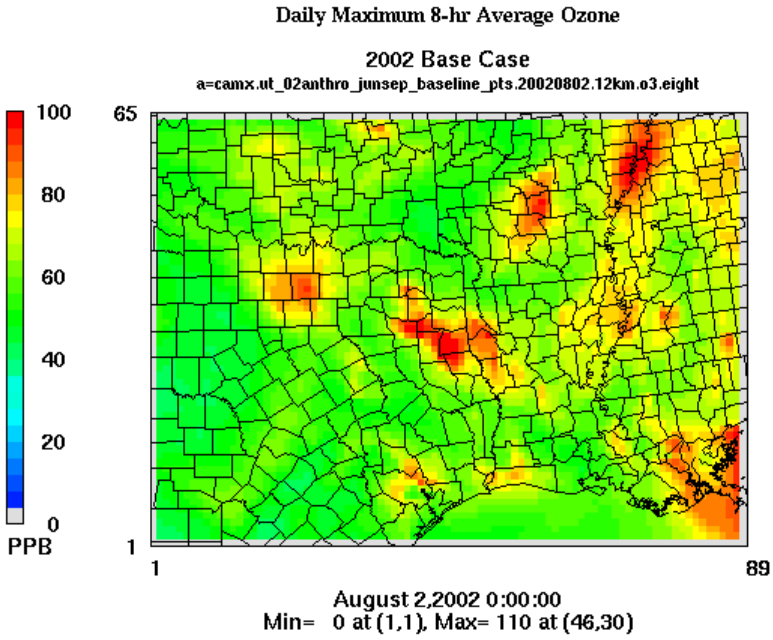



**Figure A126: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 02 for the 2009 Future Case.**

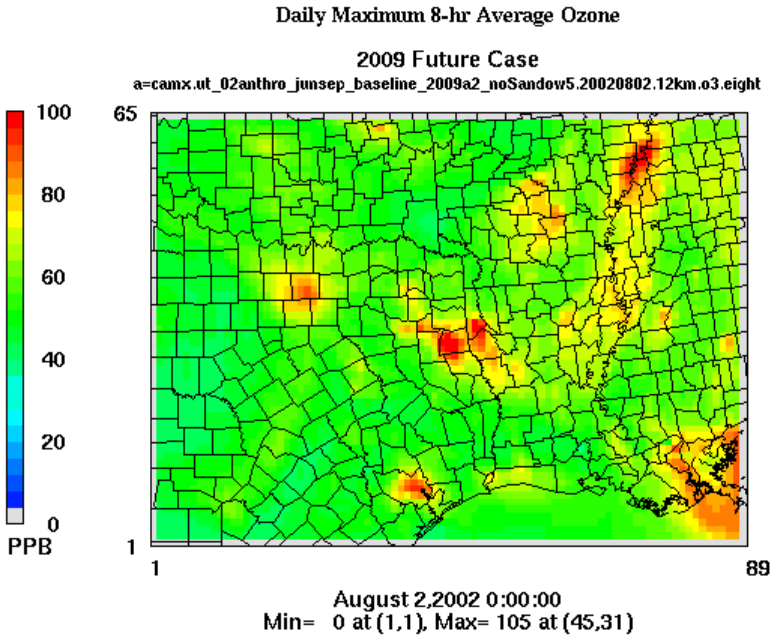


**Figure A127: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 03 for the 2002 Base Case.**

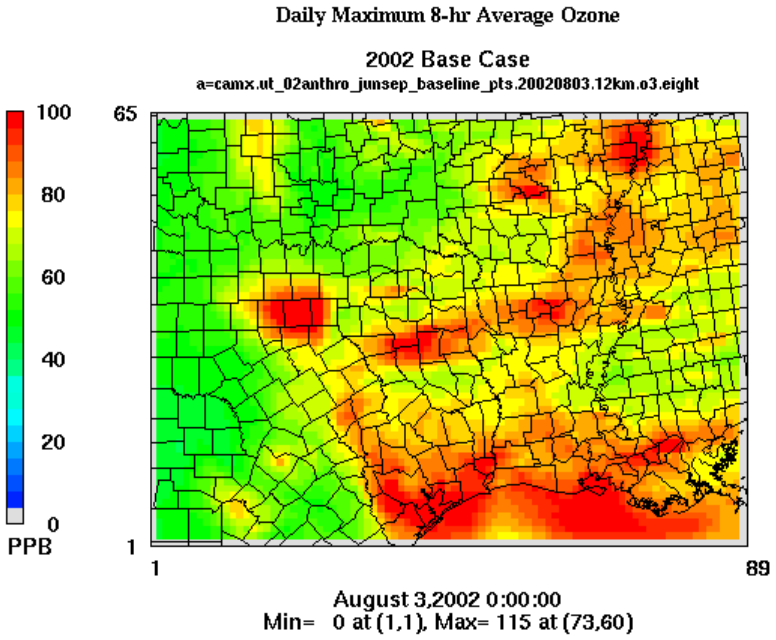



**Figure A128: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 03 for the 2009 Future Case.**

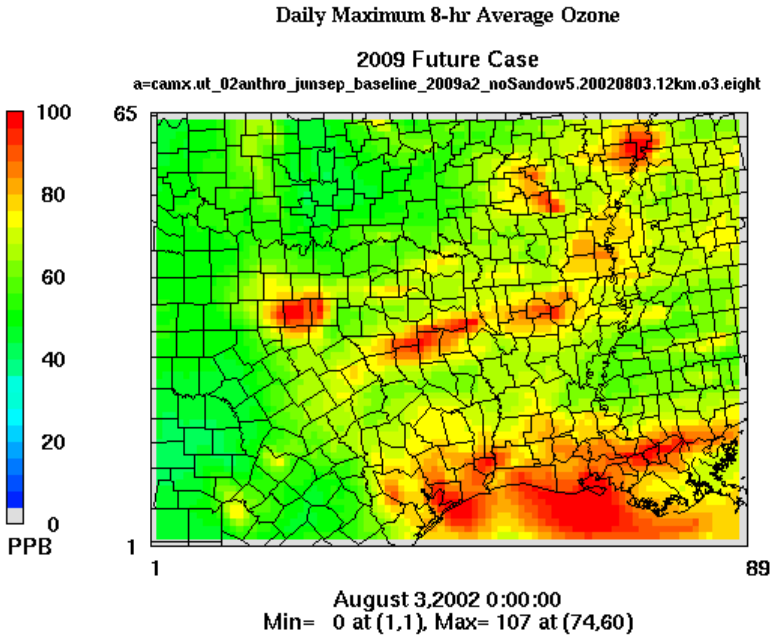


**Figure A129: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 04 for the 2002 Base Case.**

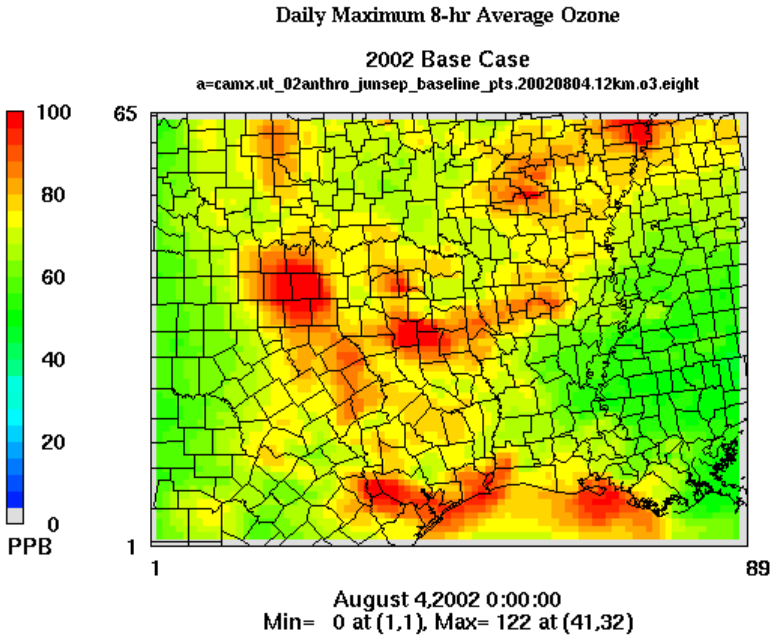



**Figure A130: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 04 for the 2009 Future Case.**

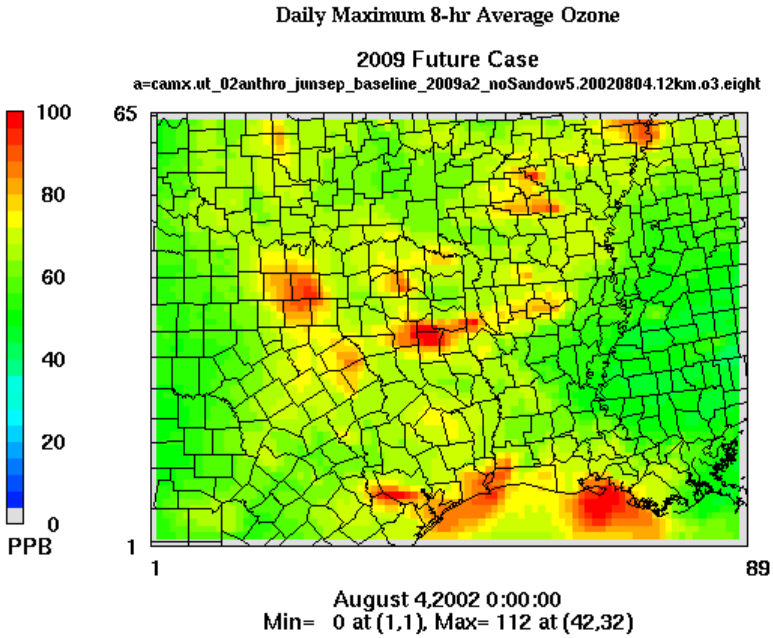


**Figure A131: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 05 for the 2002 Base Case.**

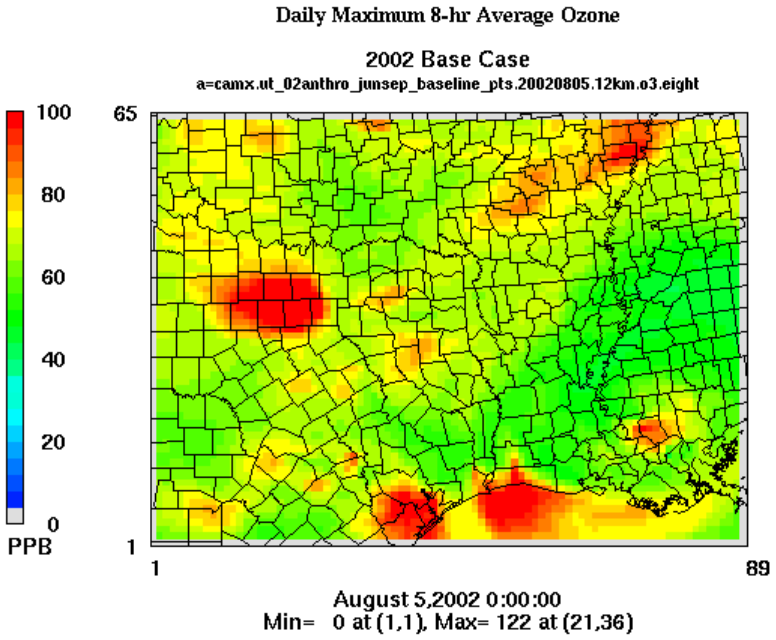



**Figure A132: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 05 for the 2009 Future Case.**

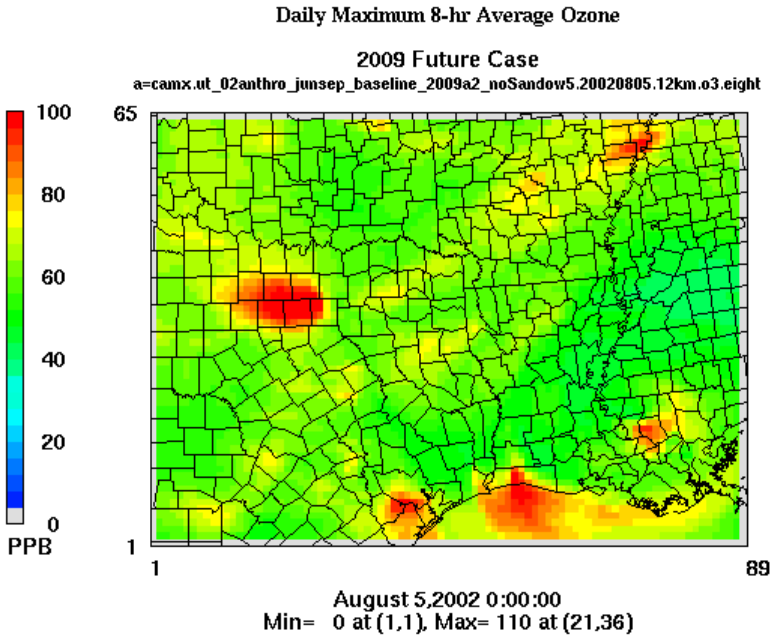


**Figure A133: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 06 for the 2002 Base Case.**

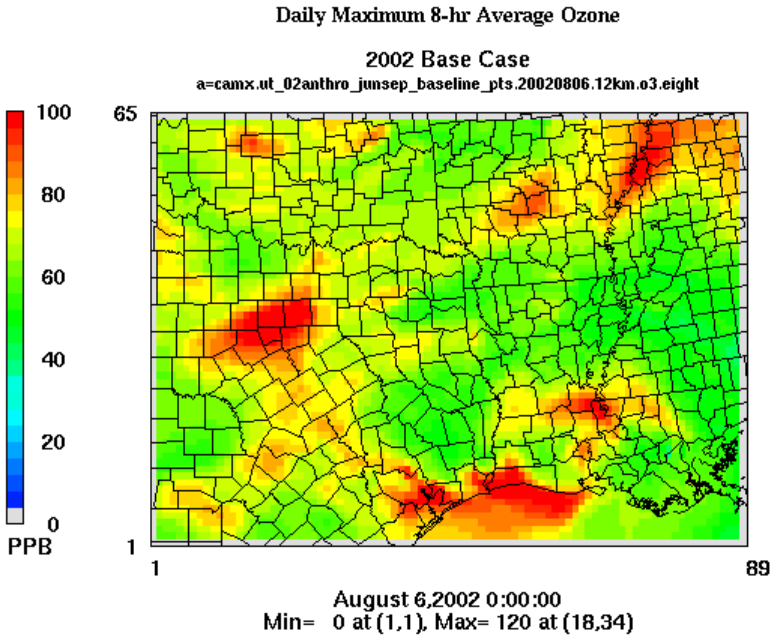



**Figure A134: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 06 for the 2009 Future Case.**

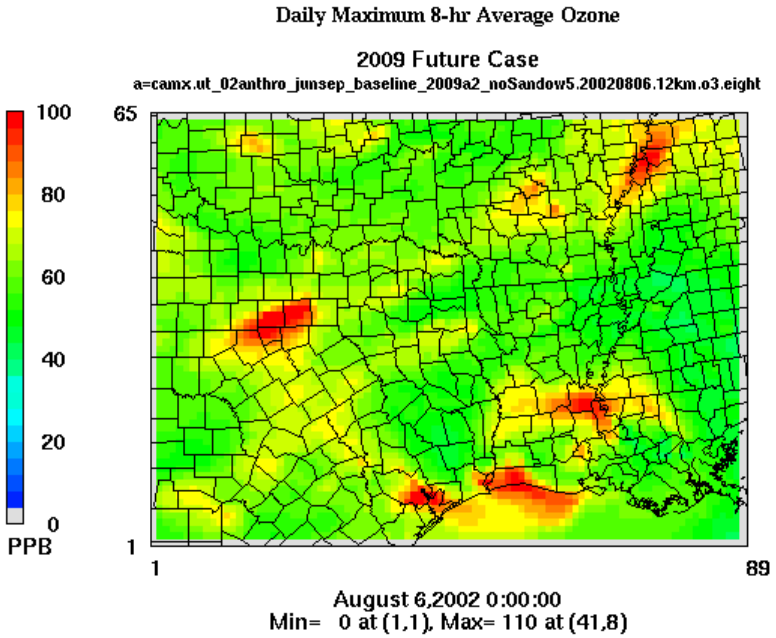


**Figure A135: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 07 for the 2002 Base Case.**

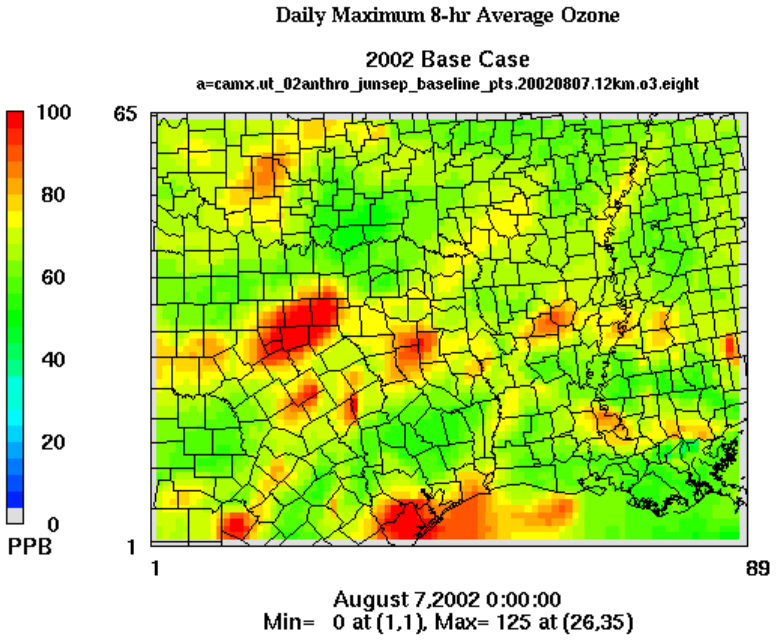



**Figure A136: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 07 for the 2009 Future Case.**

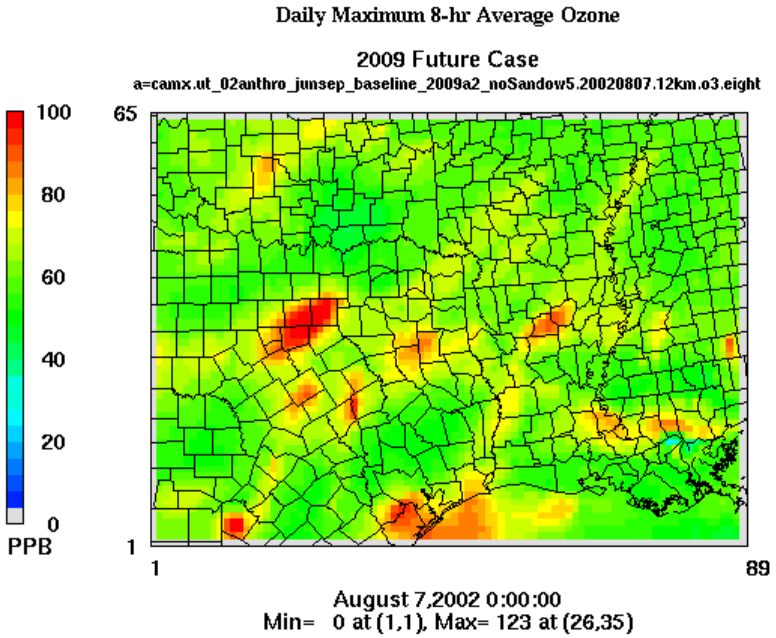


**Figure A137: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 08 for the 2002 Base Case.**

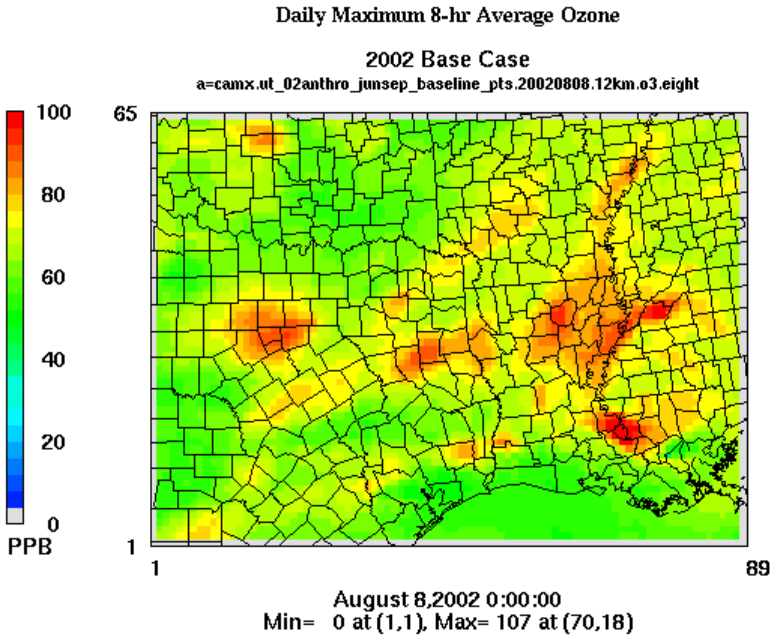



**Figure A138: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 08 for the 2009 Future Case.**

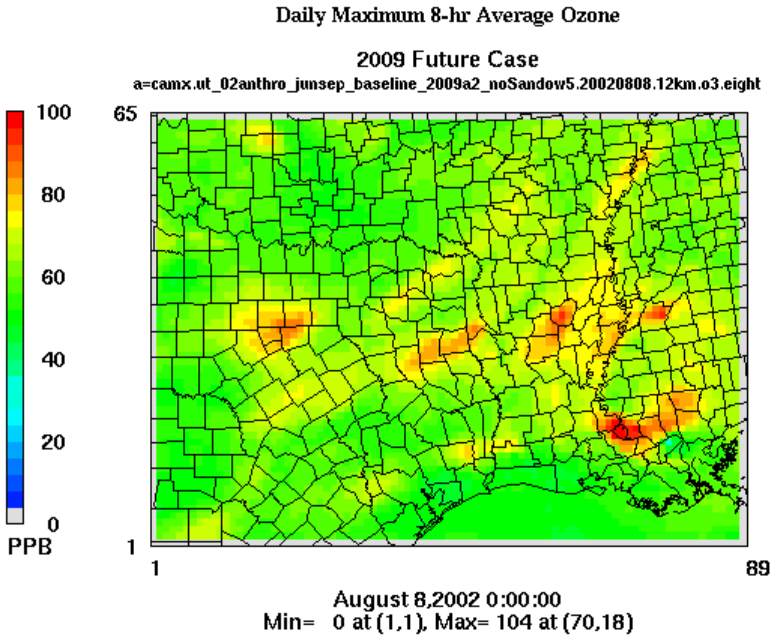


**Figure A139: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 09 for the 2002 Base Case.**

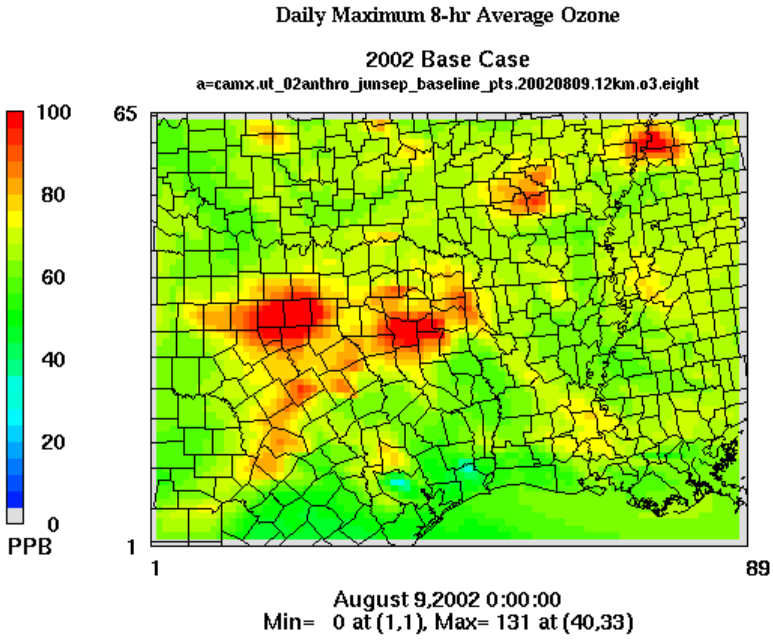



**Figure A140: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 09 for the 2009 Future Case.**

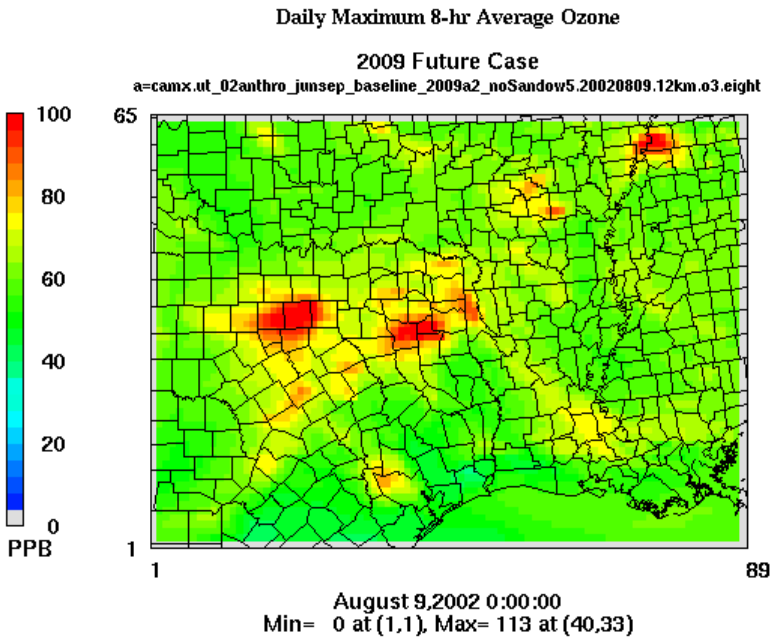


**Figure A141: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 10 for the 2002 Base Case.**

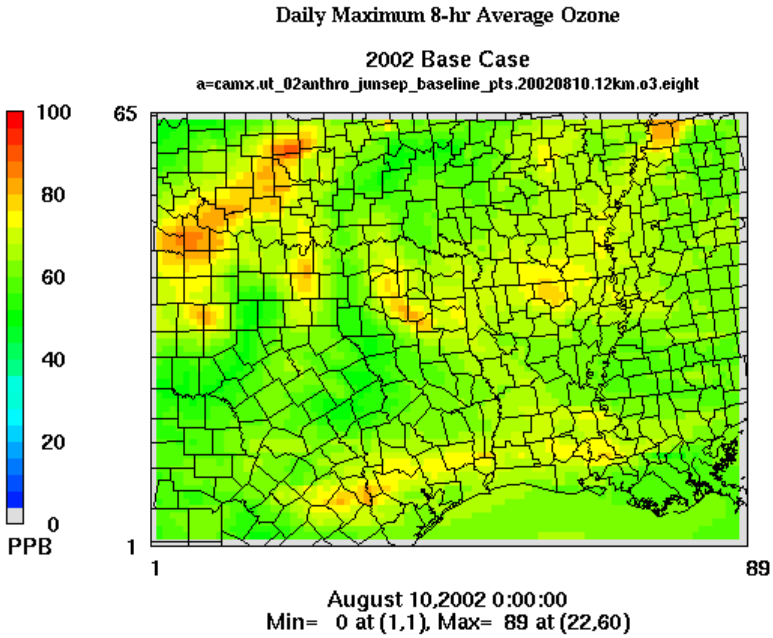



**Figure A142: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 10 for the 2009 Future Case.**

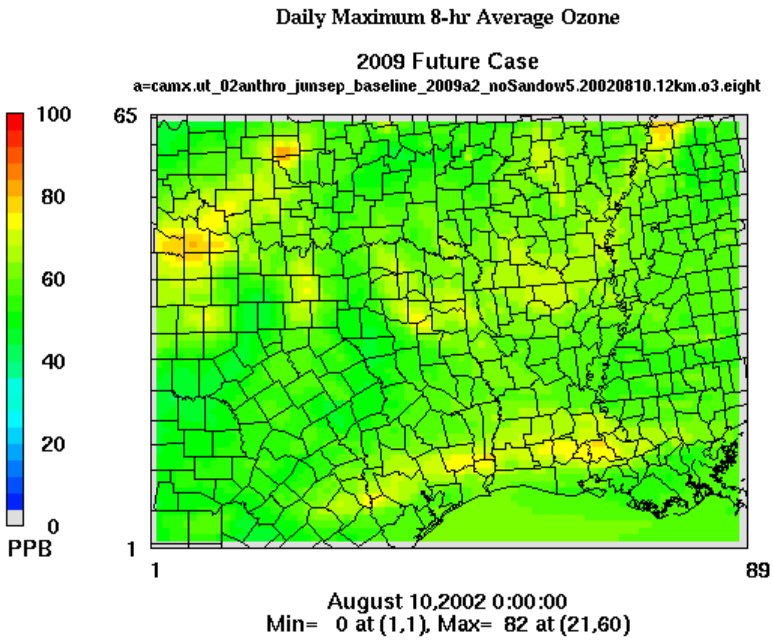


**Figure A143: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 11 for the 2002 Base Case.**

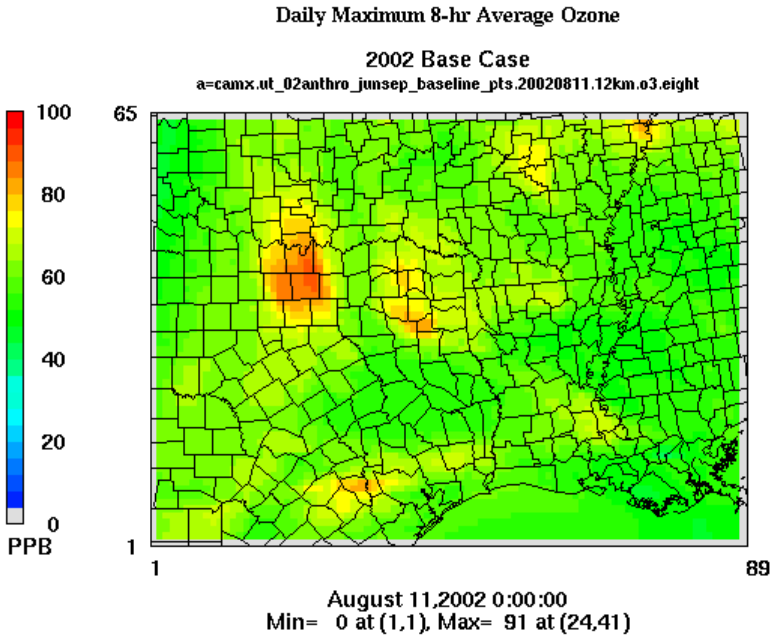



**Figure A144: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 11 for the 2009 Future Case.**

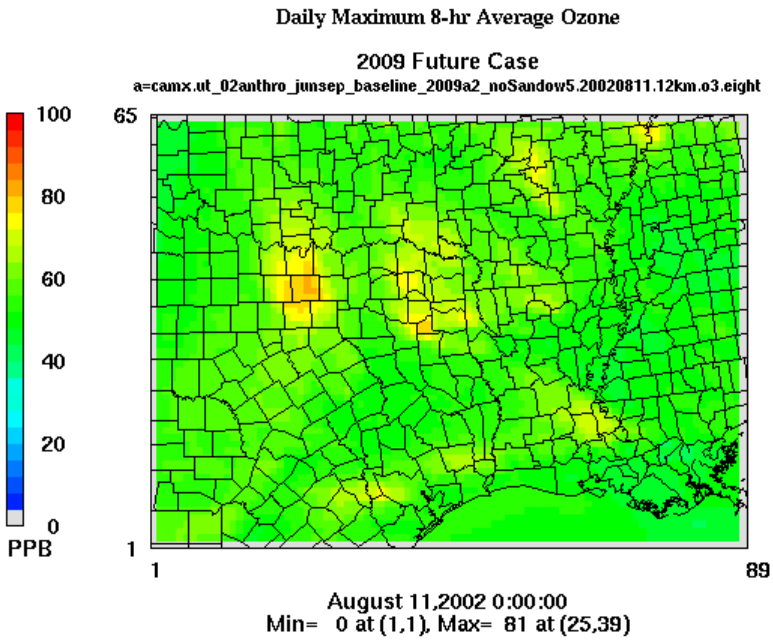


**Figure A145: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 12 for the 2002 Base Case.**

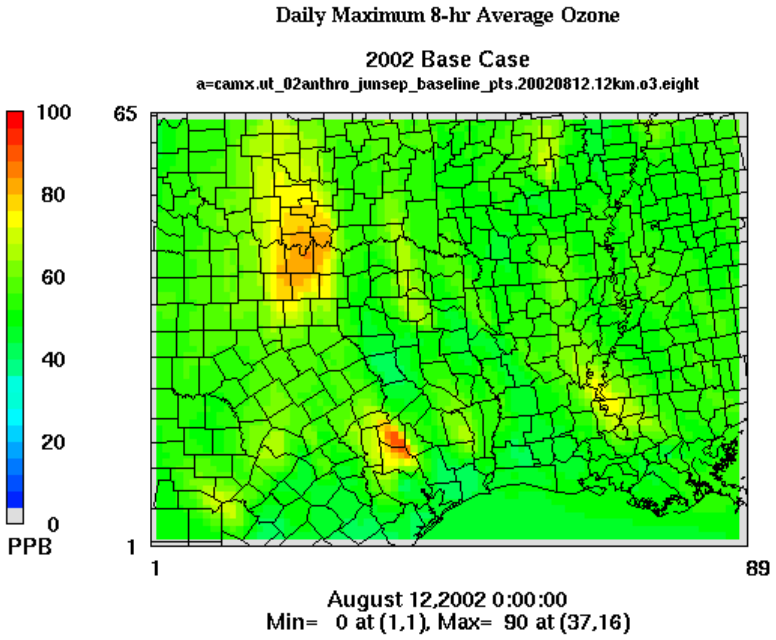



**Figure A146: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 12 for the 2009 Future Case.**

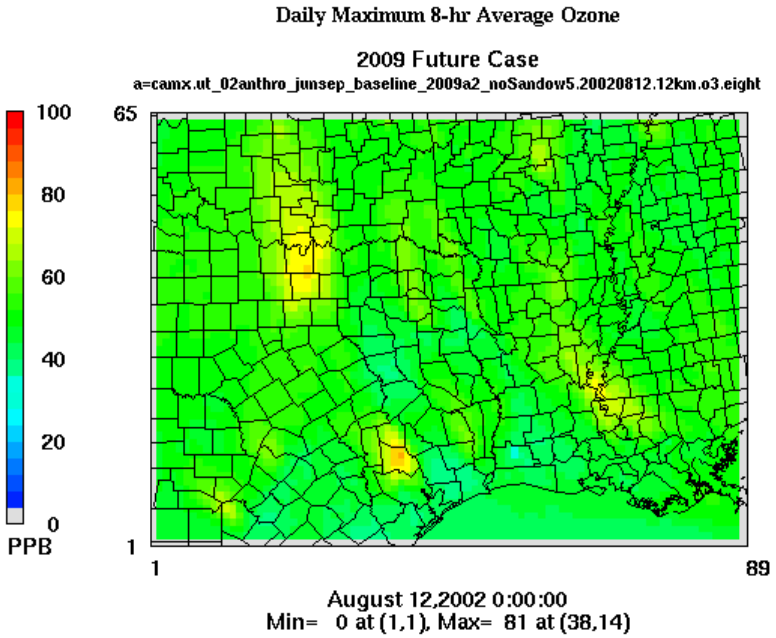


**Figure A147: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 13 for the 2002 Base Case.**

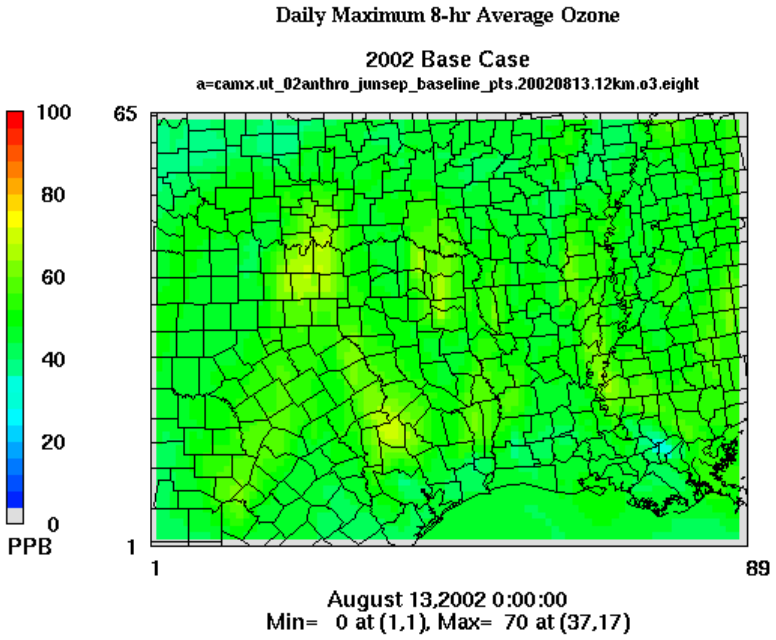



**Figure A148: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 13 for the 2009 Future Case.**

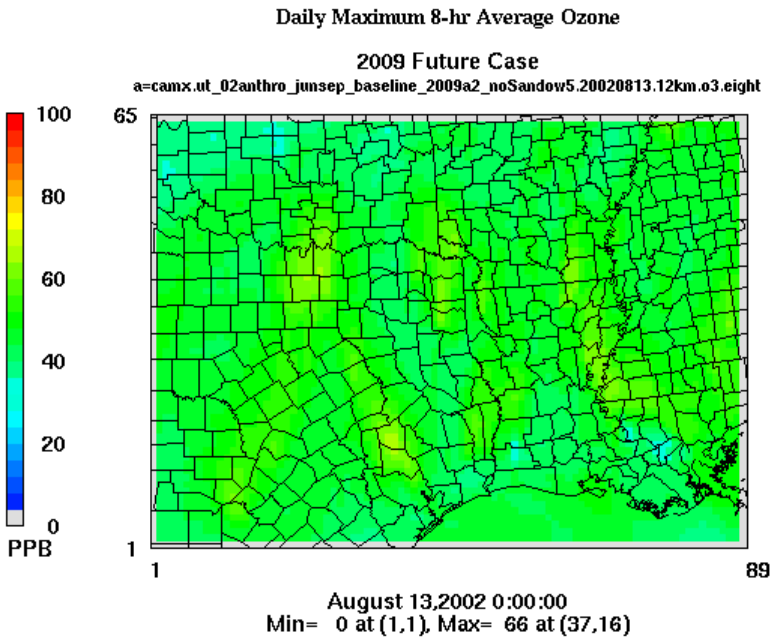


**Figure A149: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 14 for the 2002 Base Case.**

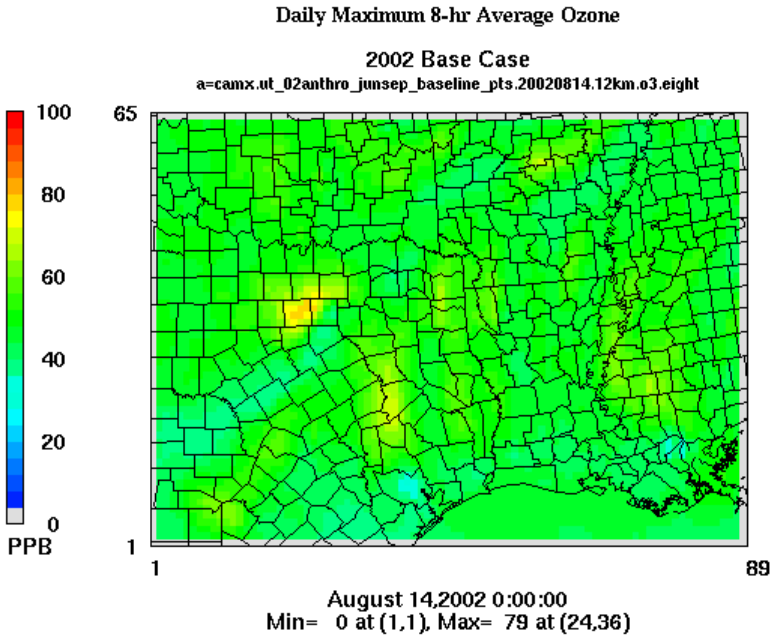



**Figure A150: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 14 for the 2009 Future Case.**

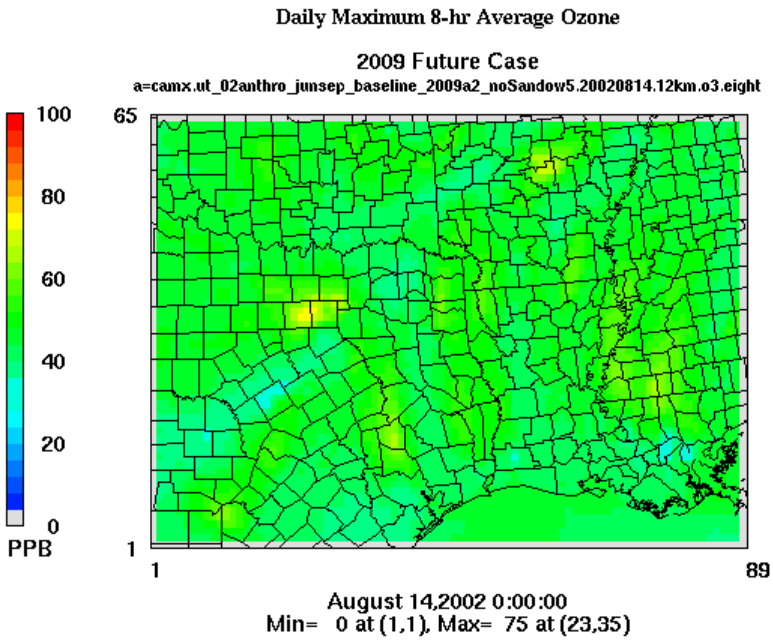


**Figure A151: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 15 for the 2002 Base Case.**

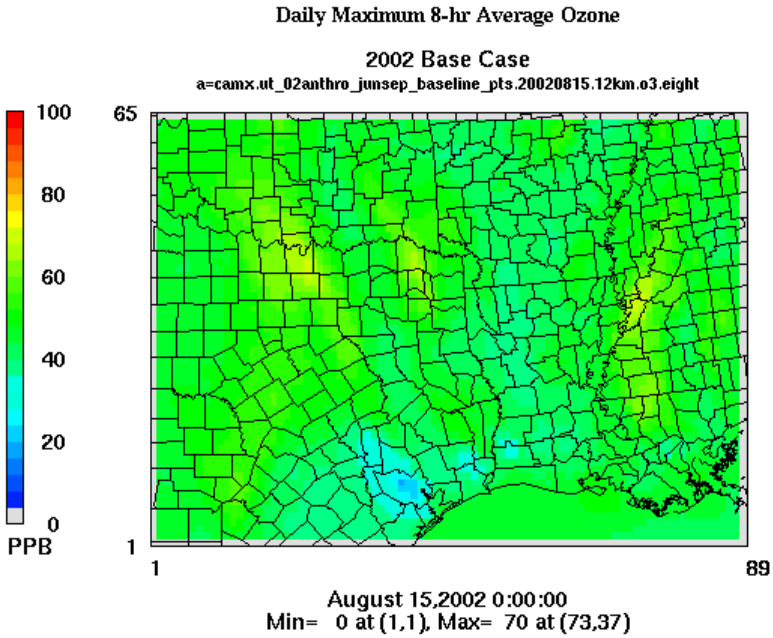



**Figure A152: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 15 for the 2009 Future Case.**

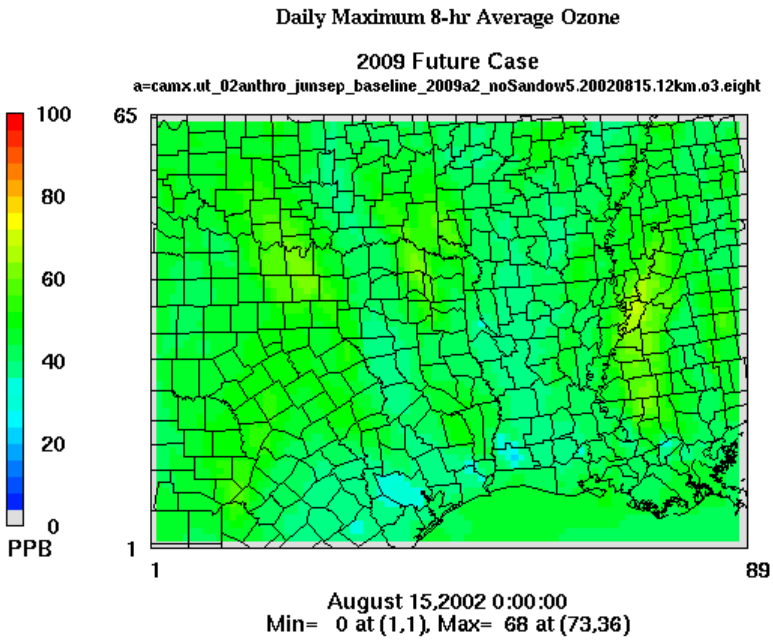


**Figure A153: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 16 for the 2002 Base Case.**

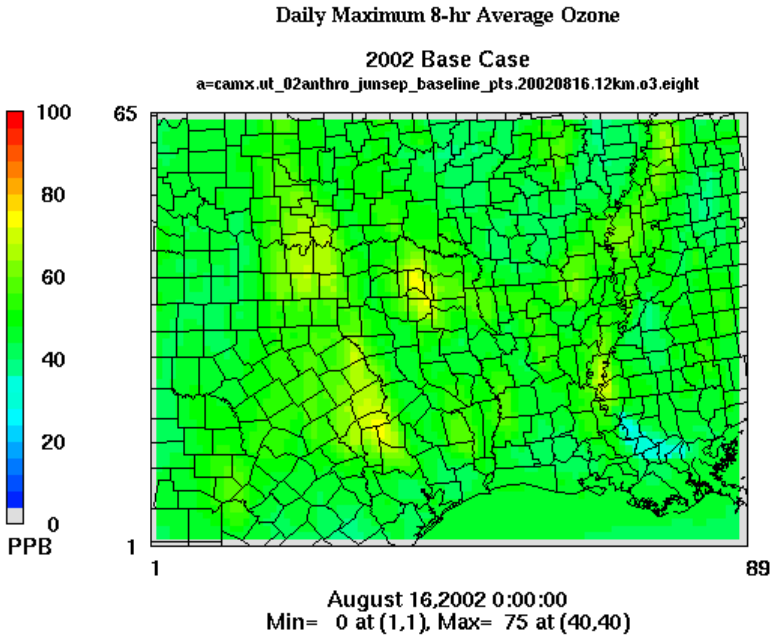



**Figure A154: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 16 for the 2009 Future Case.**

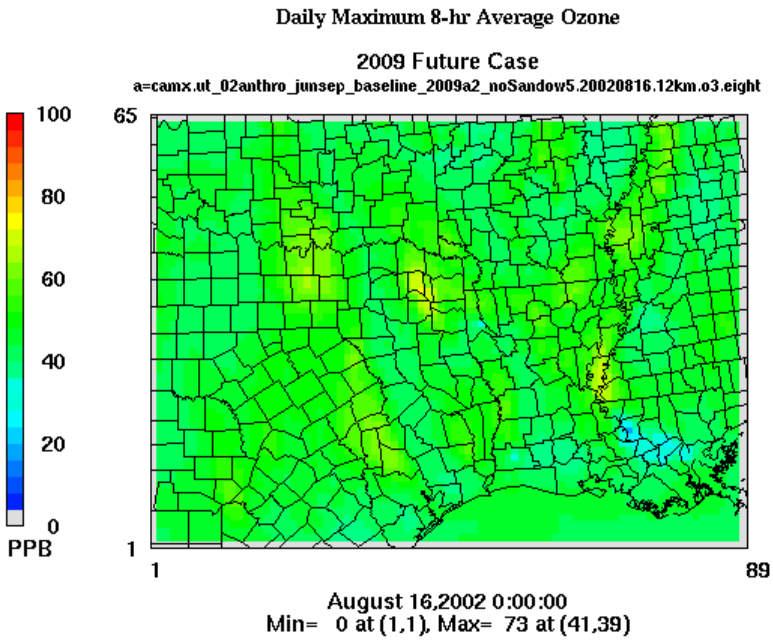


**Figure A155: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 17 for the 2002 Base Case.**

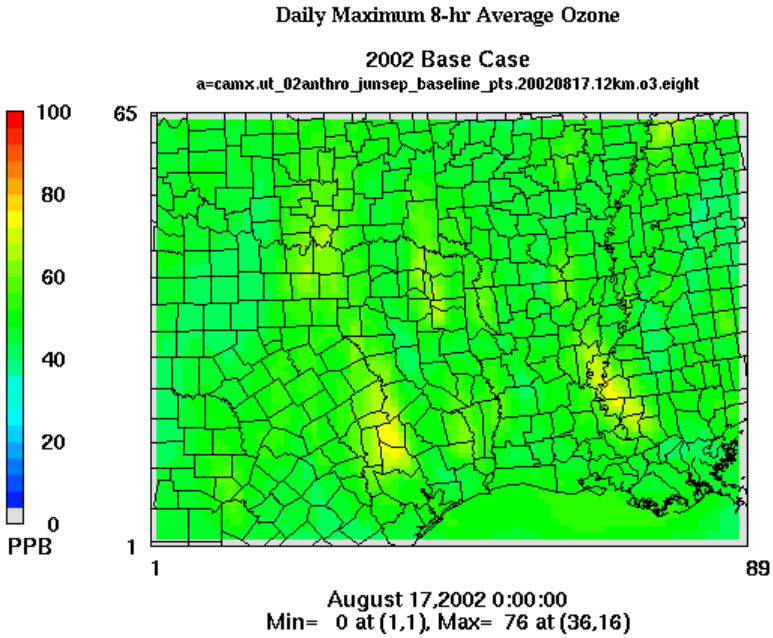



**Figure A156: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 17 for the 2009 Future Case.**

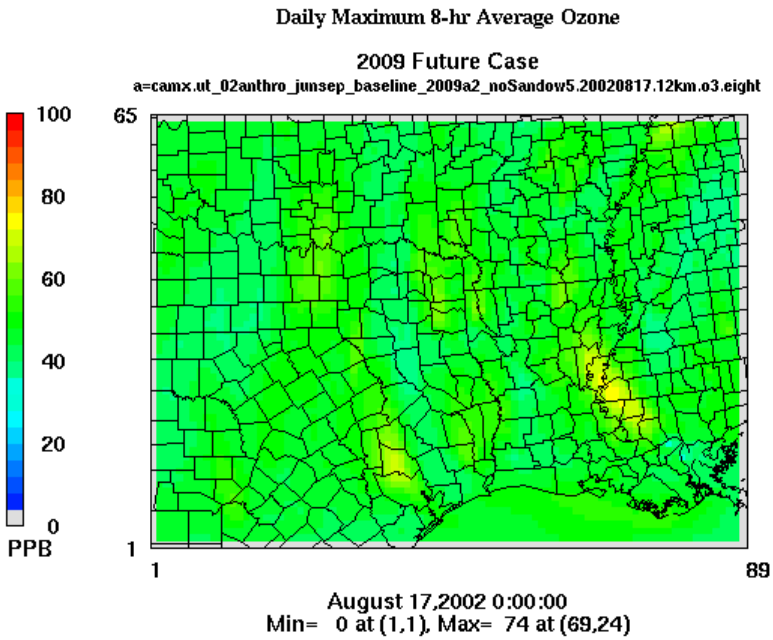


**Figure A157: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 18 for the 2002 Base Case.**

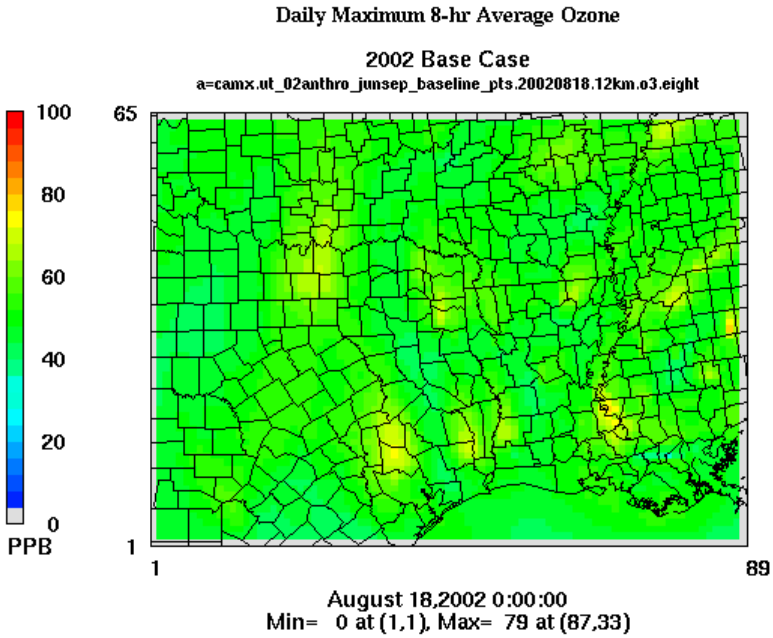



**Figure A158: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 18 for the 2009 Future Case.**

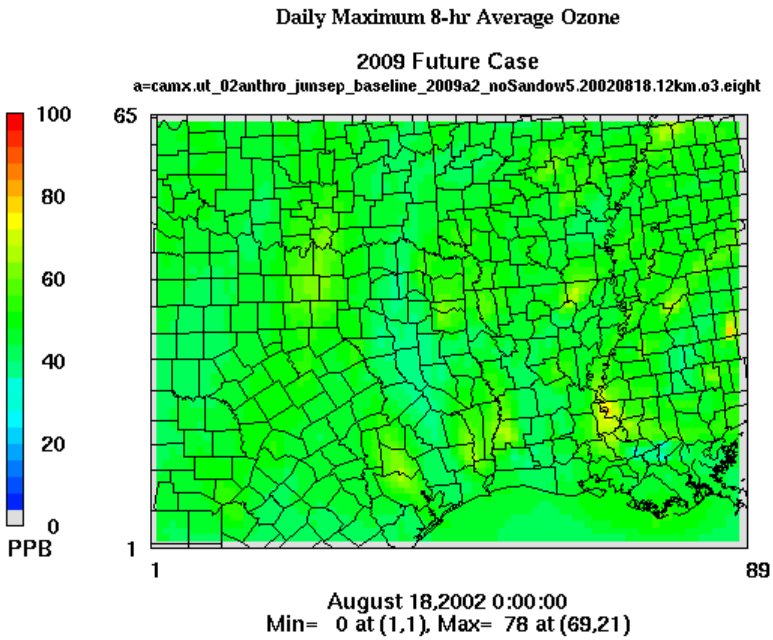


**Figure A159: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 19 for the 2002 Base Case.**

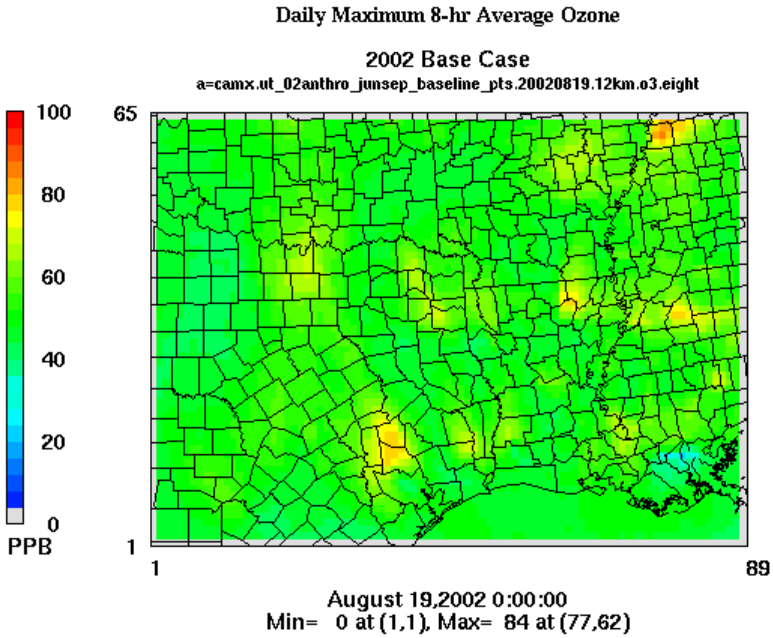



**Figure A160: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 19 for the 2009 Future Case.**

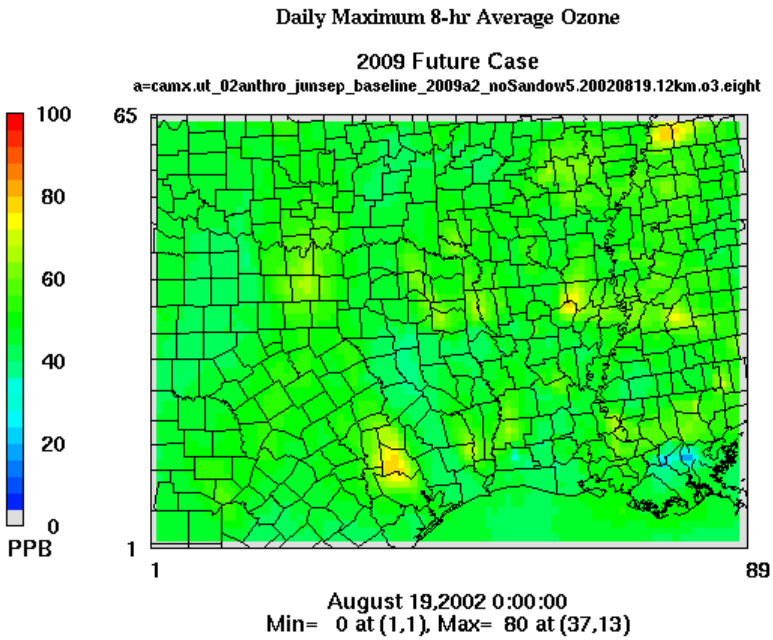


**Figure A161: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 20 for the 2002 Base Case.**

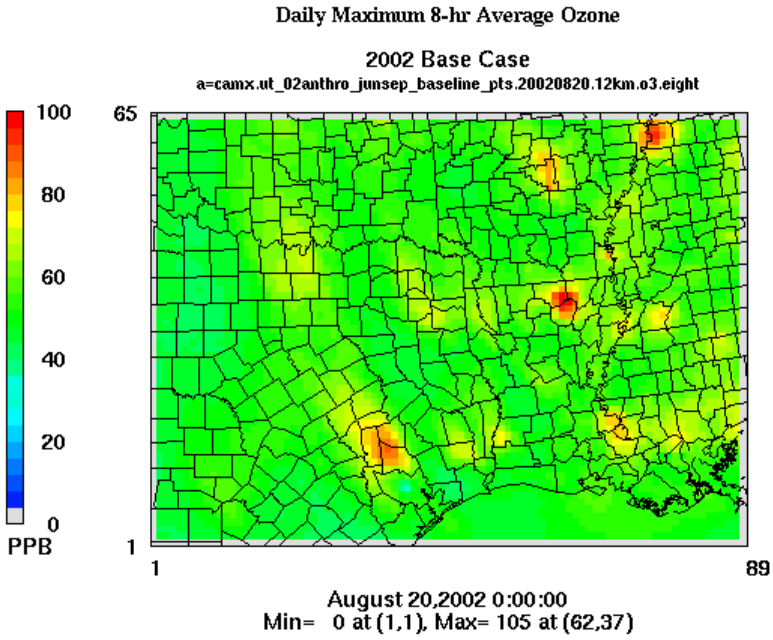



**Figure A162: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 20 for the 2009 Future Case.**

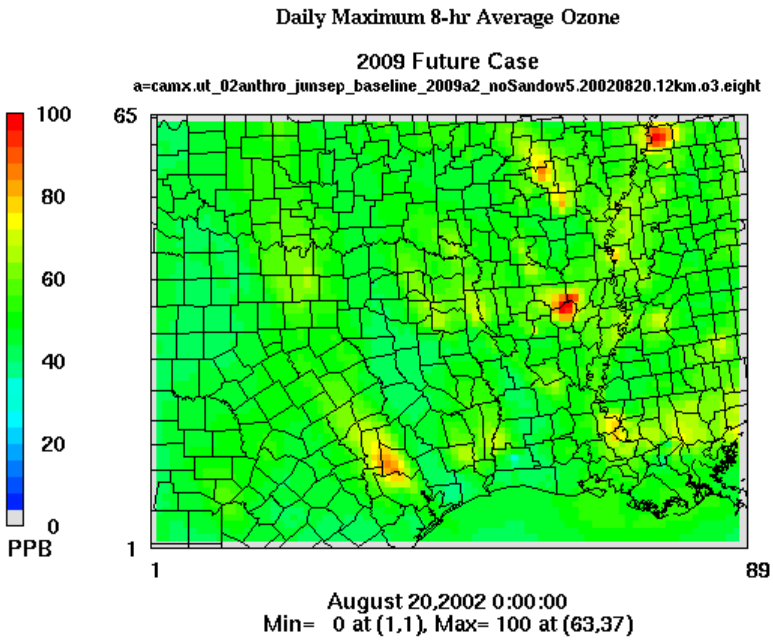


**Figure A163: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 21 for the 2002 Base Case.**

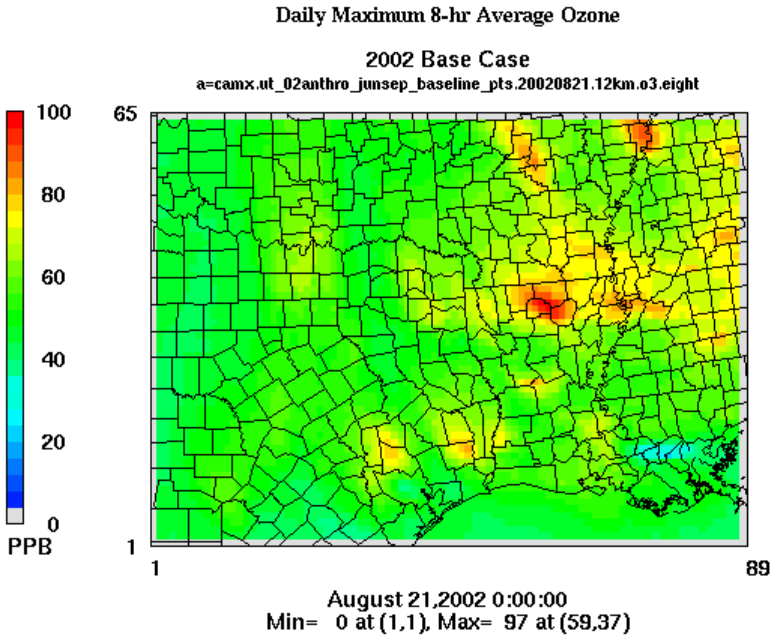



**Figure A164: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 21 for the 2009 Future Case.**

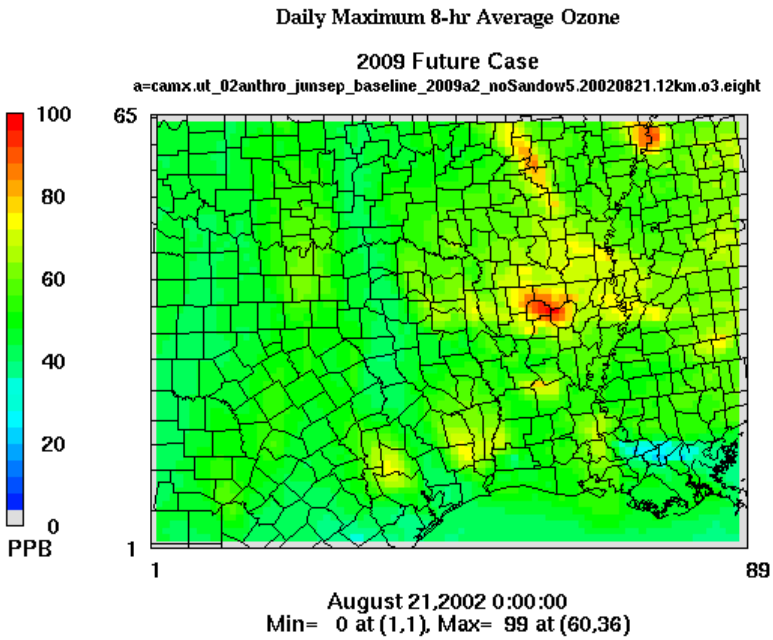


**Figure A165: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 22 for the 2002 Base Case.**

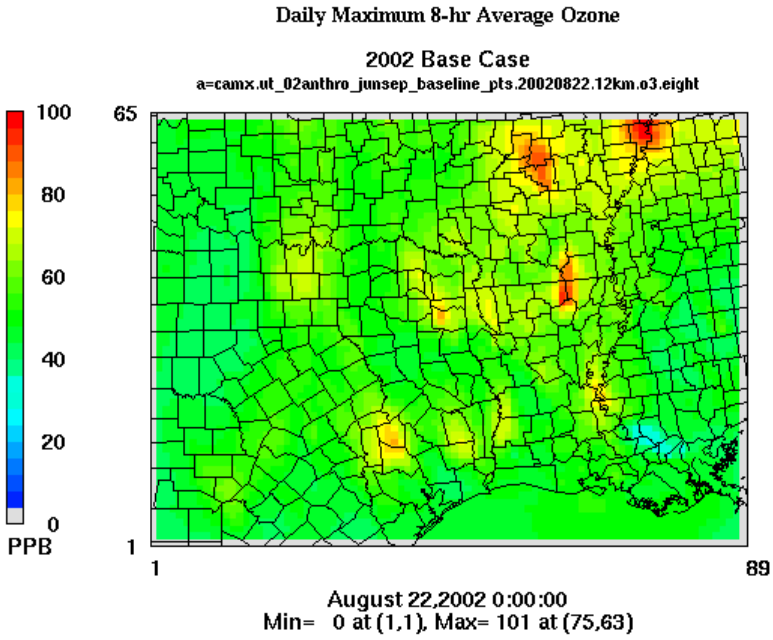



**Figure A166: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 22 for the 2009 Future Case.**

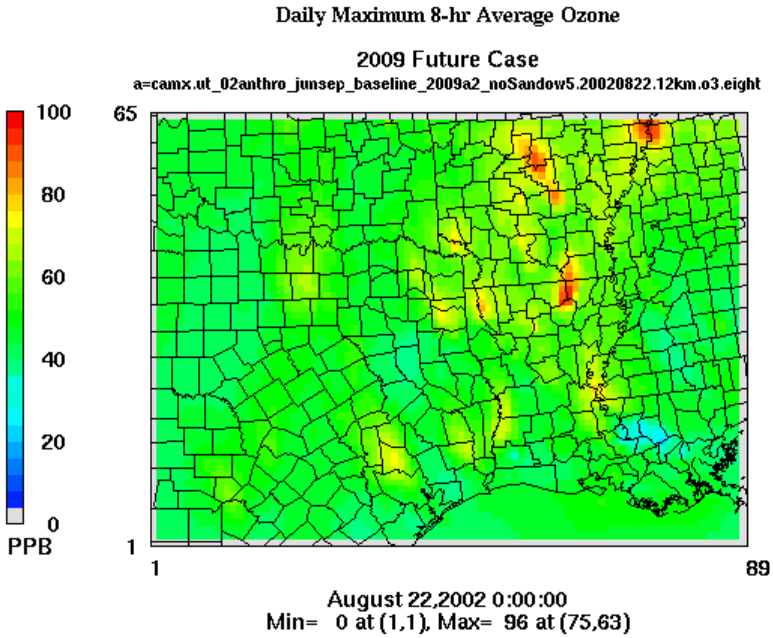


**Figure A167: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 23 for the 2002 Base Case.**

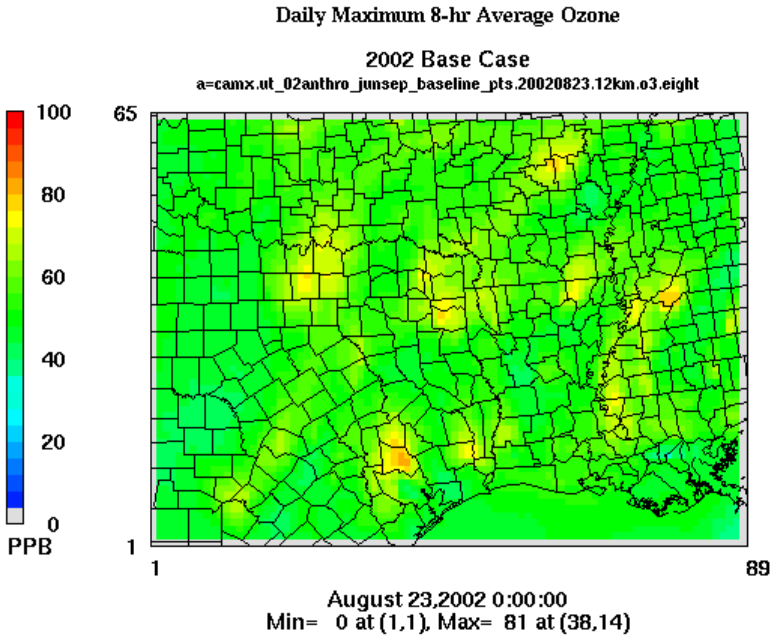



**Figure A168: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 23 for the 2009 Future Case.**

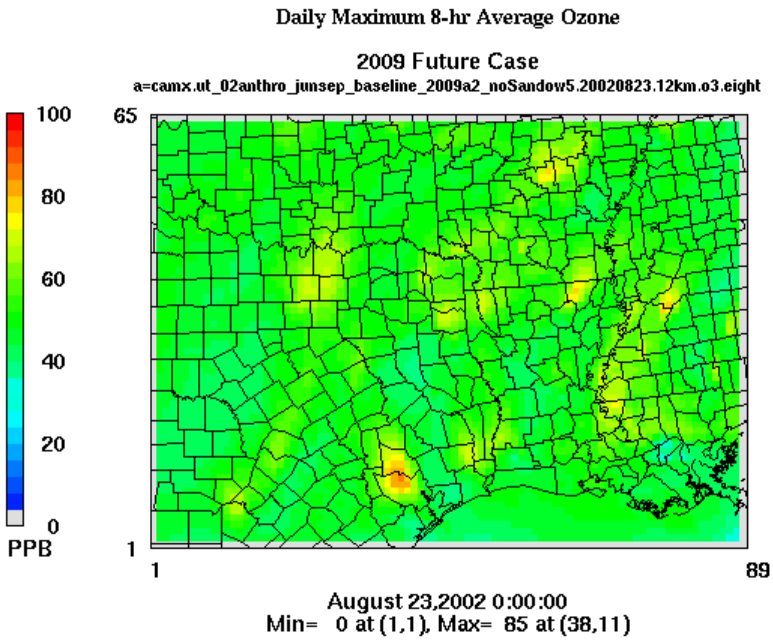


**Figure A169: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 24 for the 2002 Base Case.**

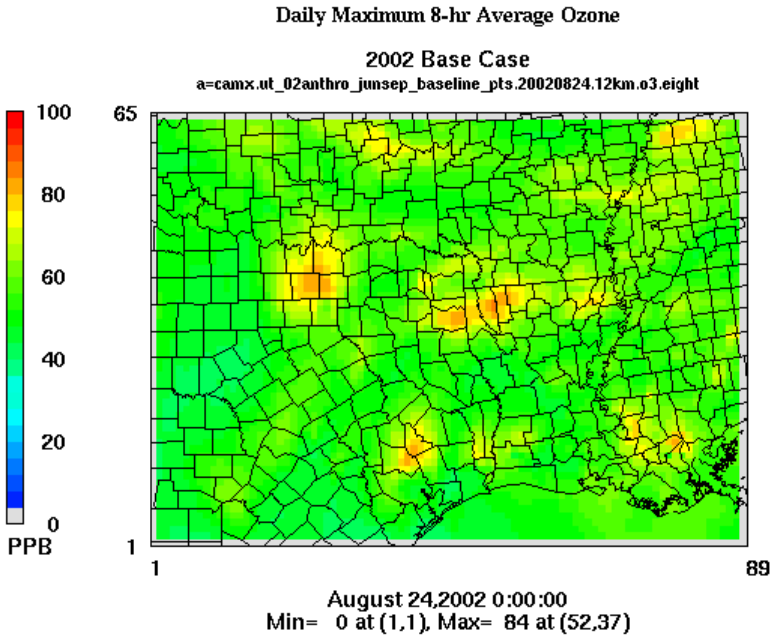



**Figure A170: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 24 for the 2009 Future Case.**

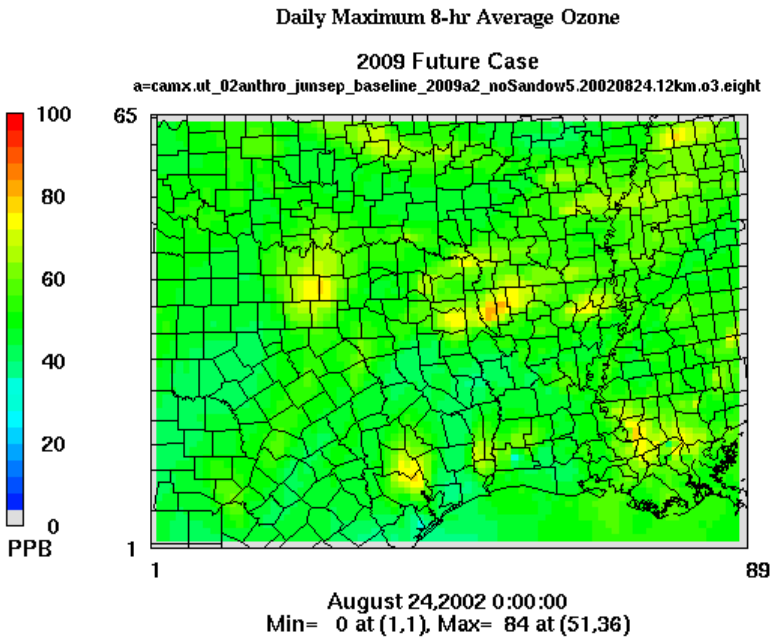


**Figure A171: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 25 for the 2002 Base Case.**

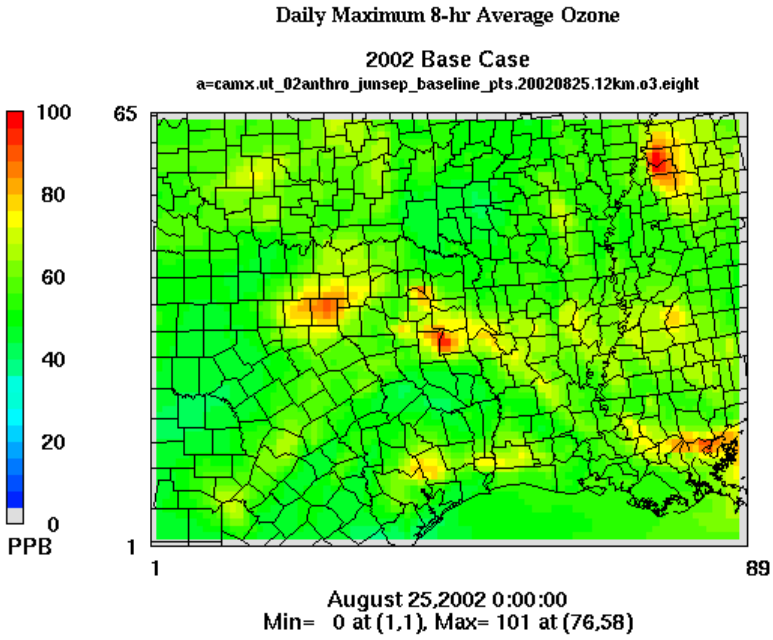



**Figure A172: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 25 for the 2009 Future Case.**

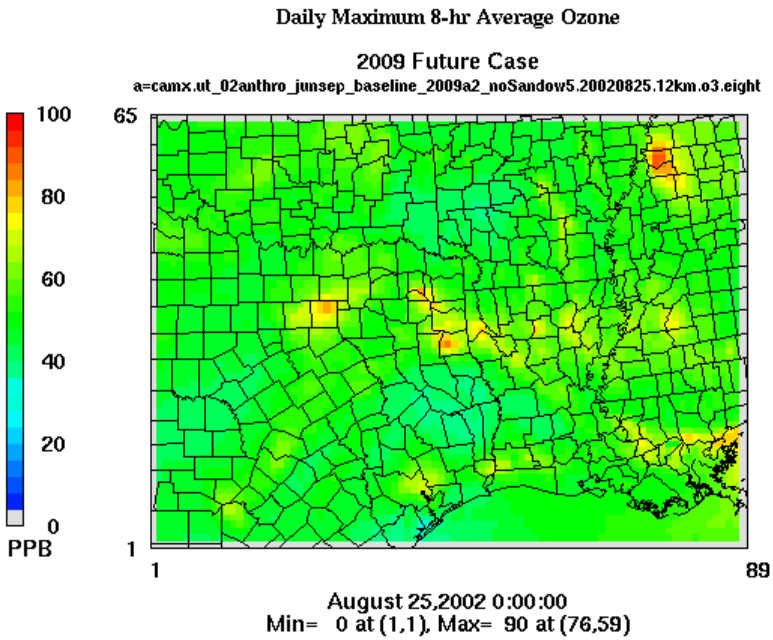


**Figure A173: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 26 for the 2002 Base Case.**

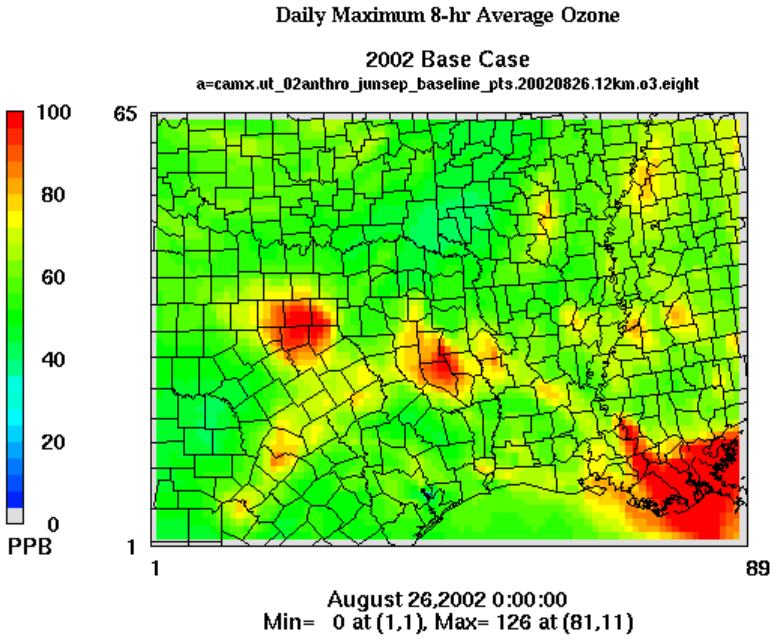



**Figure A174: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 26 for the 2009 Future Case.**

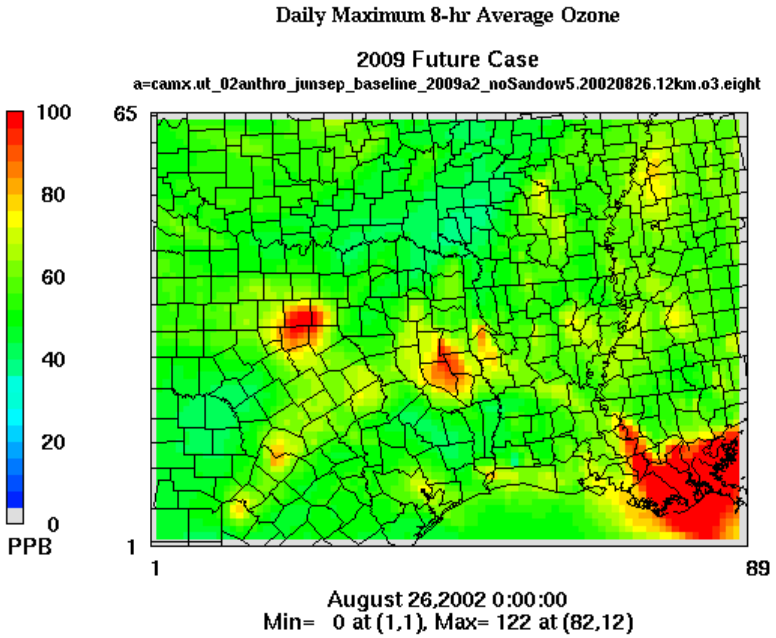


**Figure A175: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 27 for the 2002 Base Case.**

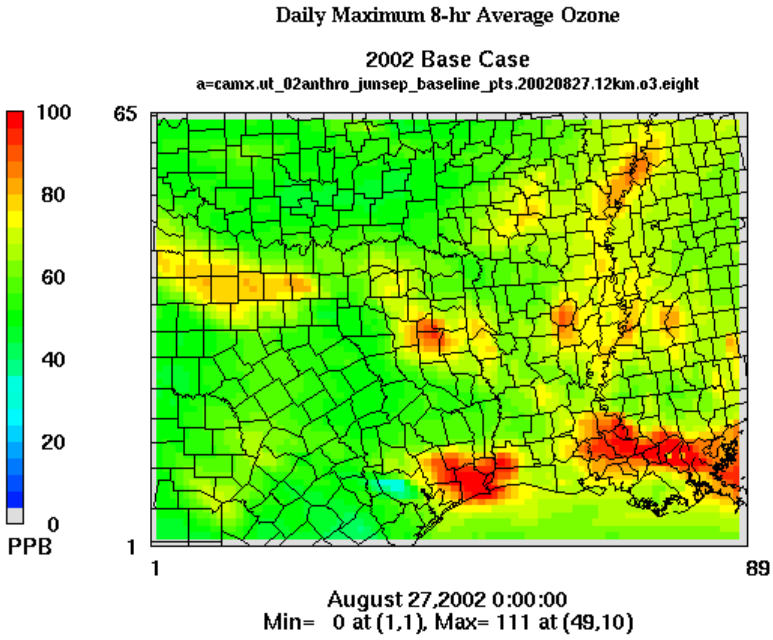



**Figure A176: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 27 for the 2009 Future Case.**

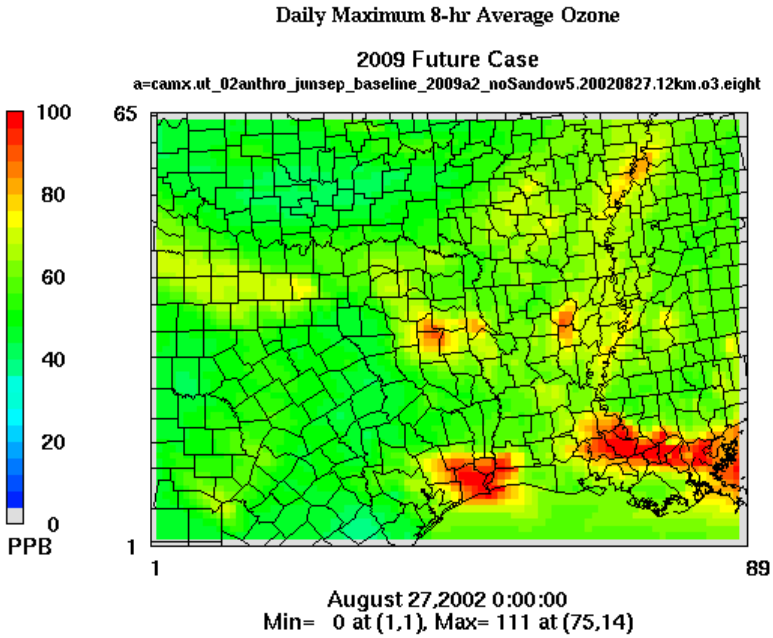


**Figure A177: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 28 for the 2002 Base Case.**

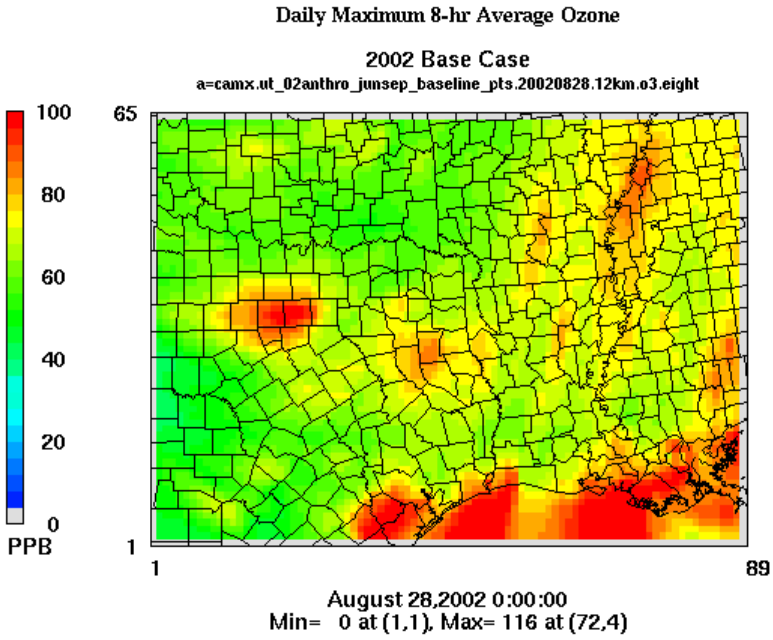



**Figure A178: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 28 for the 2009 Future Case.**

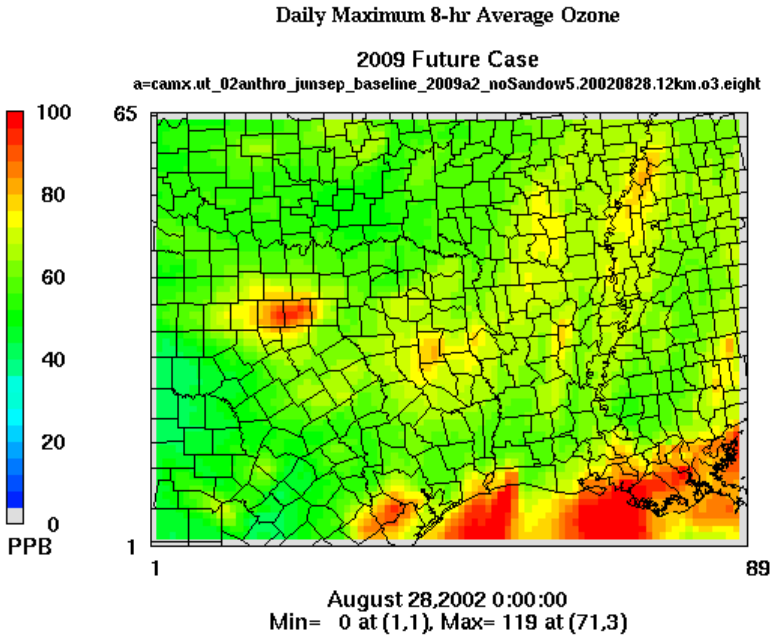


**Figure A179: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 29 for the 2002 Base Case.**

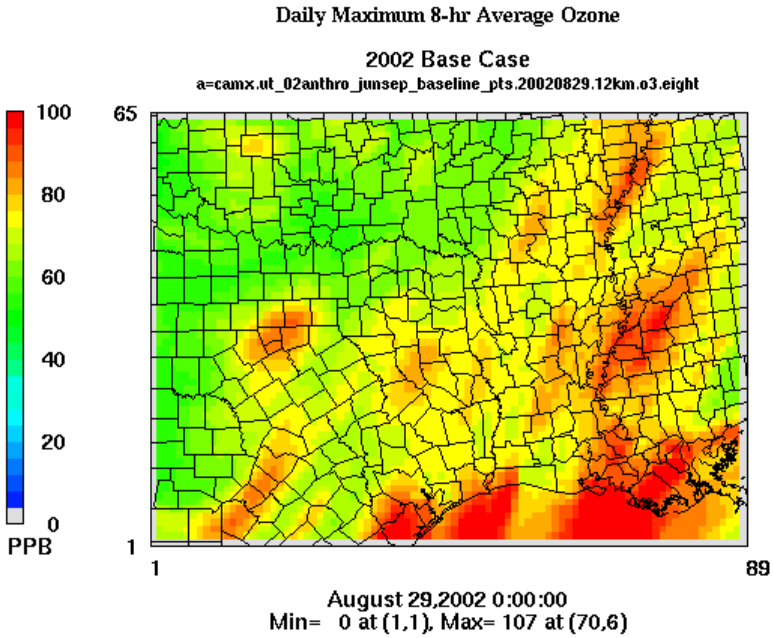



**Figure A180: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 29 for the 2009 Future Case.**

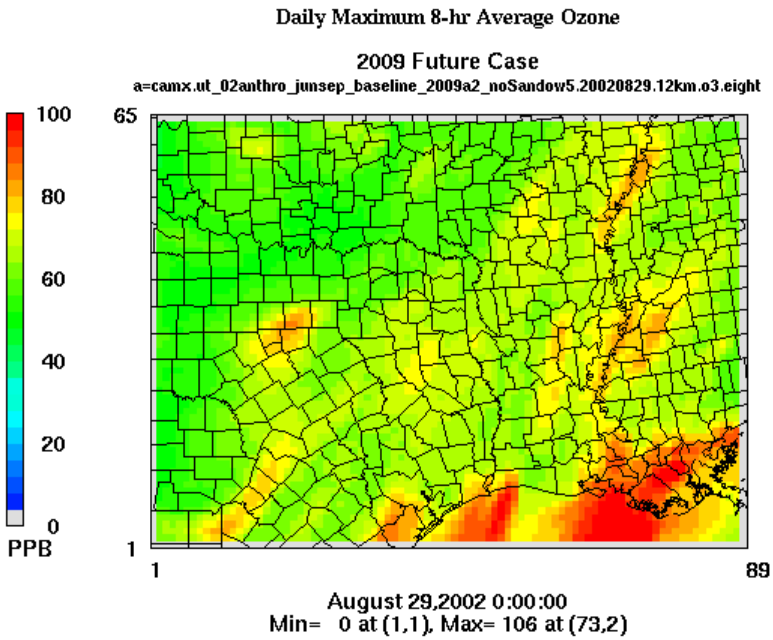


**Figure A181: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 30 for the 2002 Base Case.**

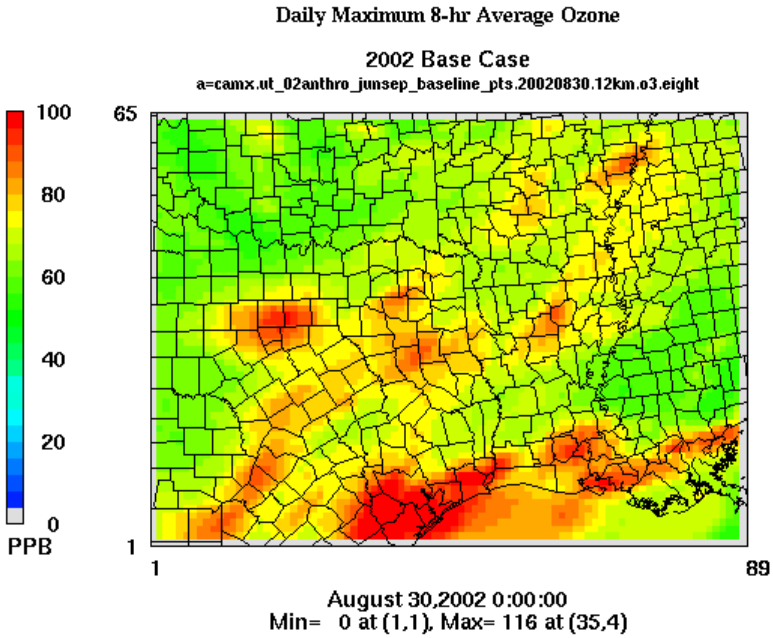



**Figure A182: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 30 for the 2009 Future Case.**

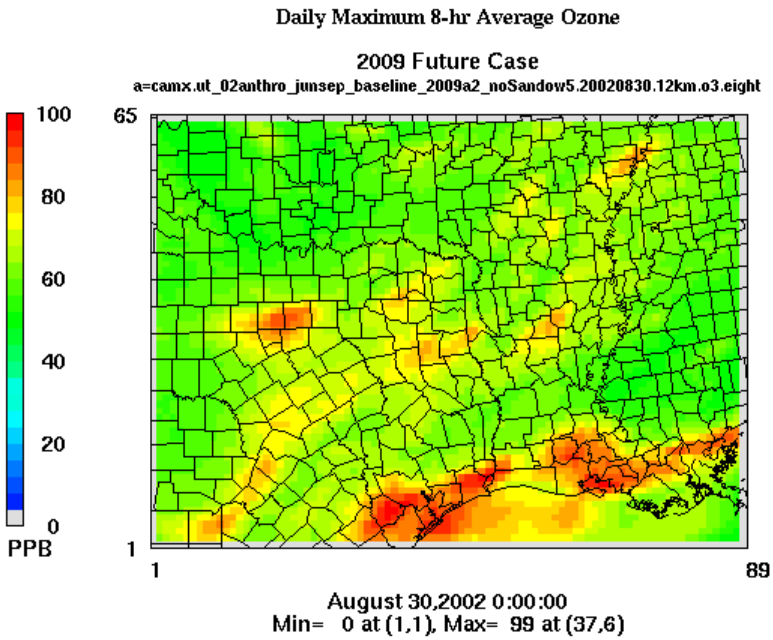


**Figure A183: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 31 for the 2002 Base Case.**

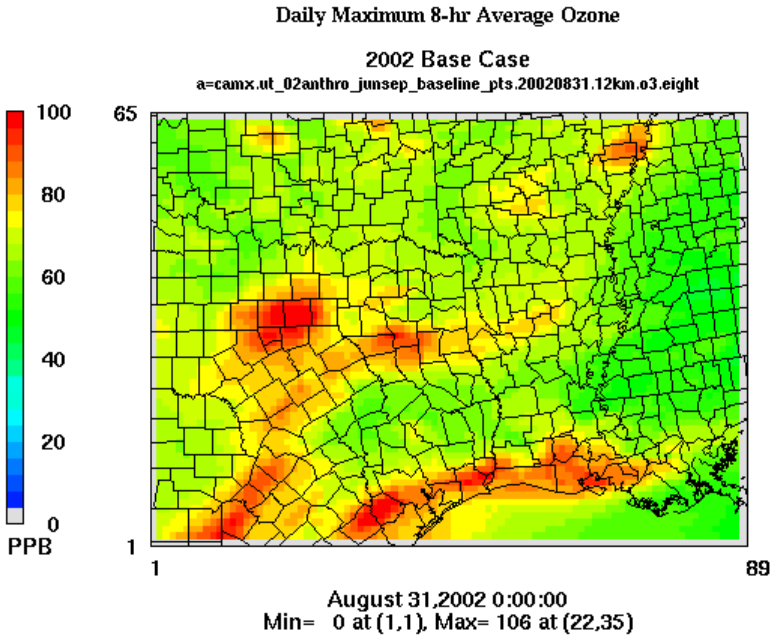



**Figure A184: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 31 for the 2009 Future Case.**

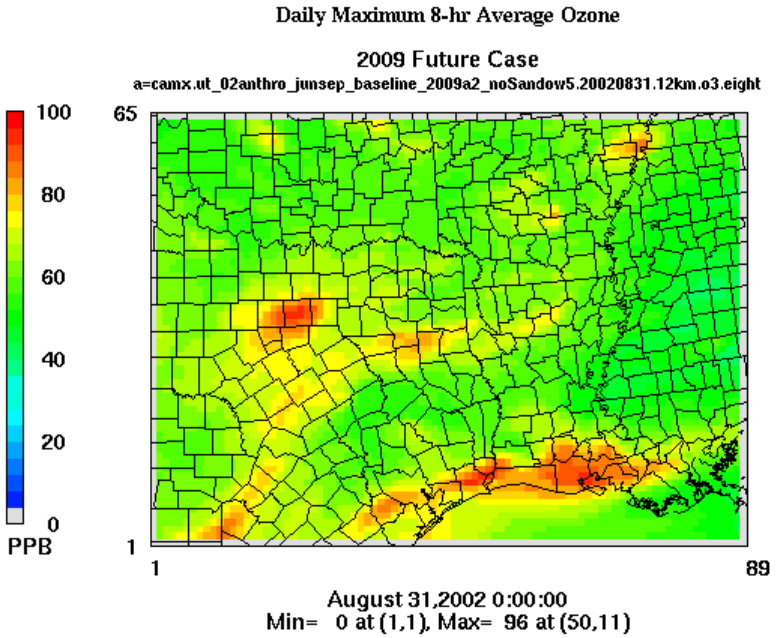


**Figure A185: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 01 for the 2002 Base Case.**

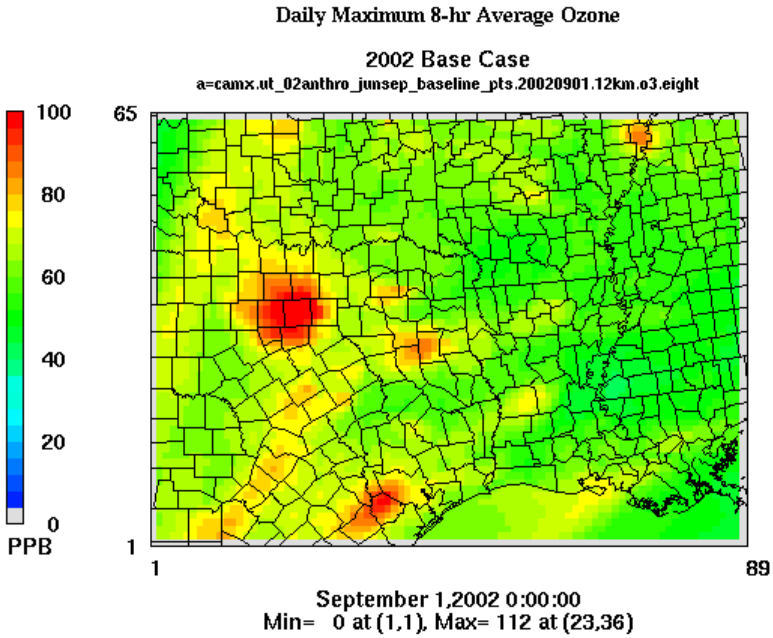



**Figure A186: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 01 for the 2009 Future Case.**

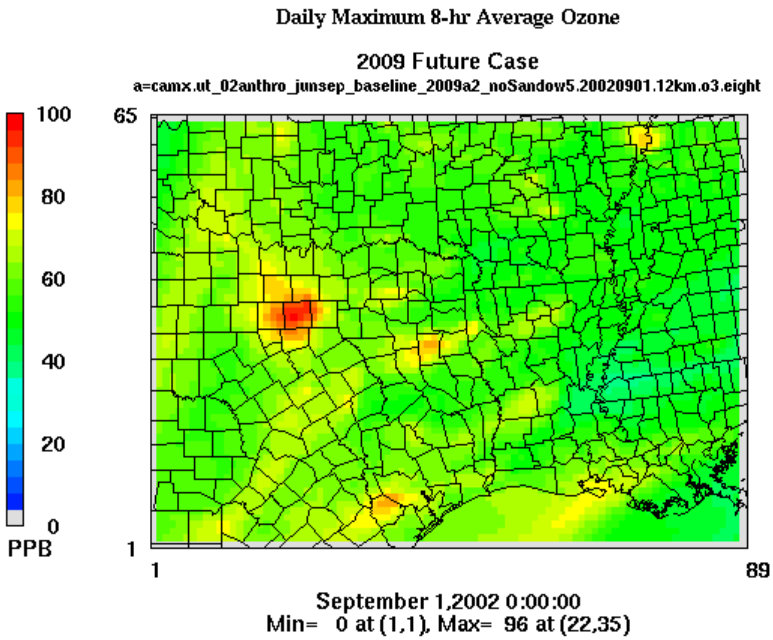


**Figure A187: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 02 for the 2002 Base Case.**

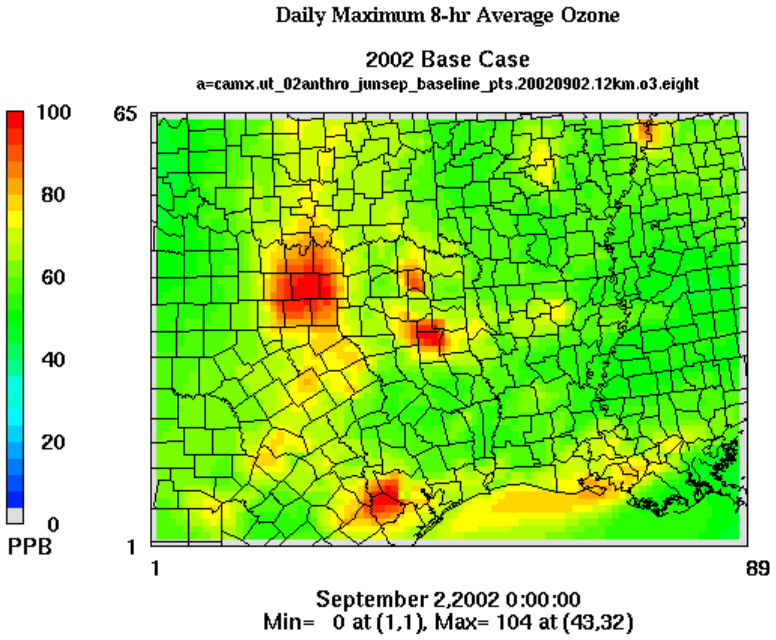



**Figure A188: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 02 for the 2009 Future Case.**

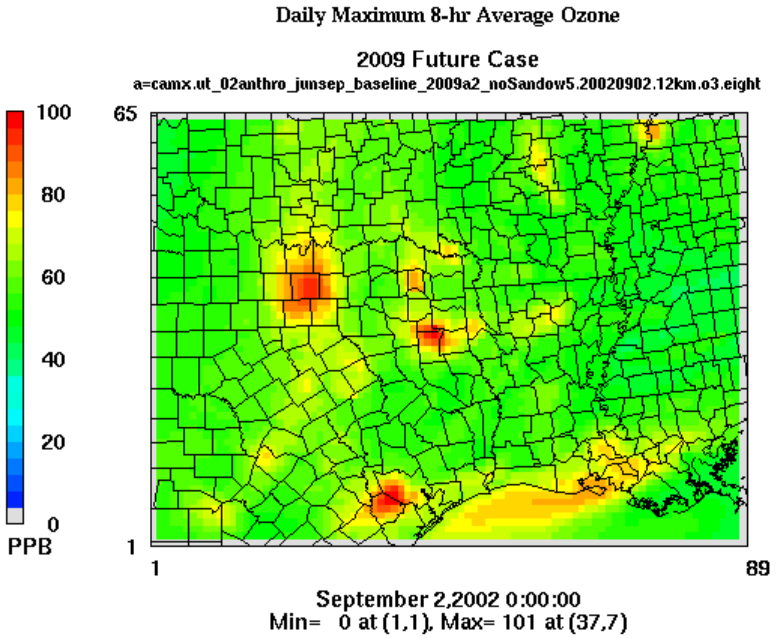


**Figure A189: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 03 for the 2002 Base Case.**

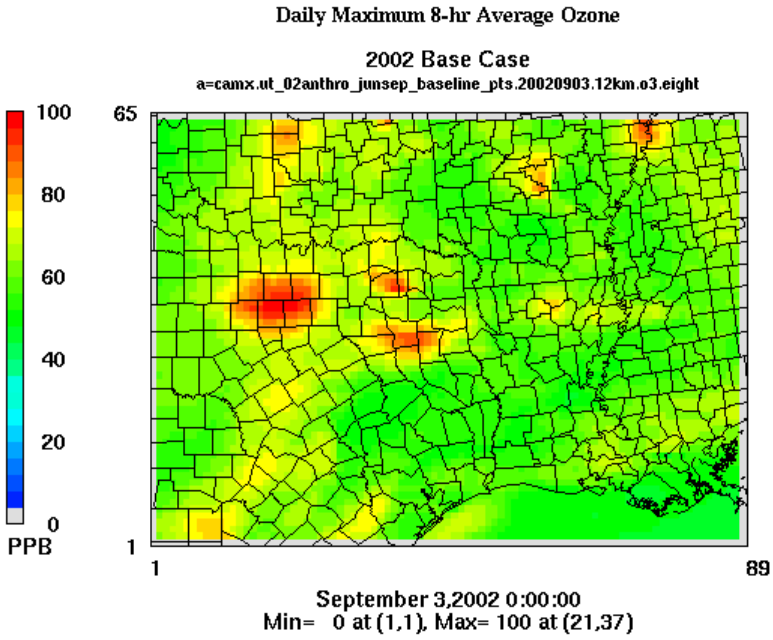



**Figure A190: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 03 for the 2009 Future Case.**

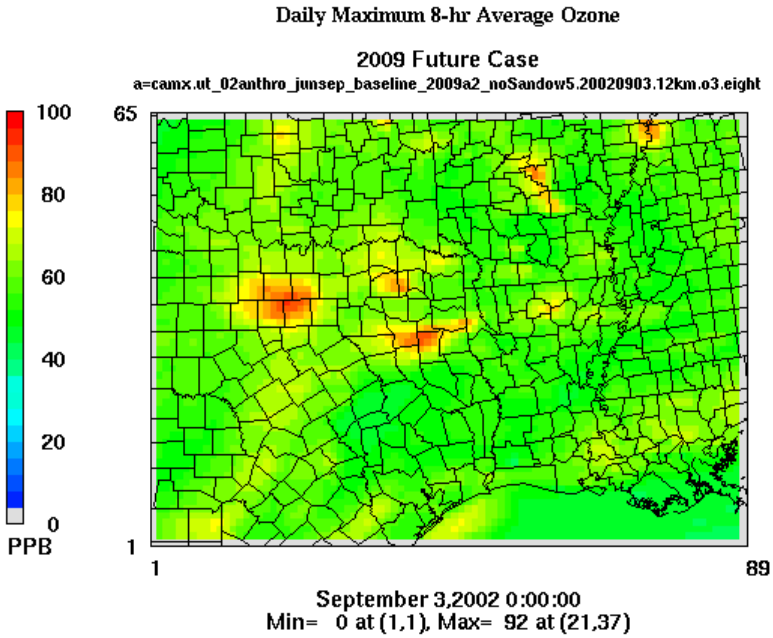


**Figure A191: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 04 for the 2002 Base Case.**

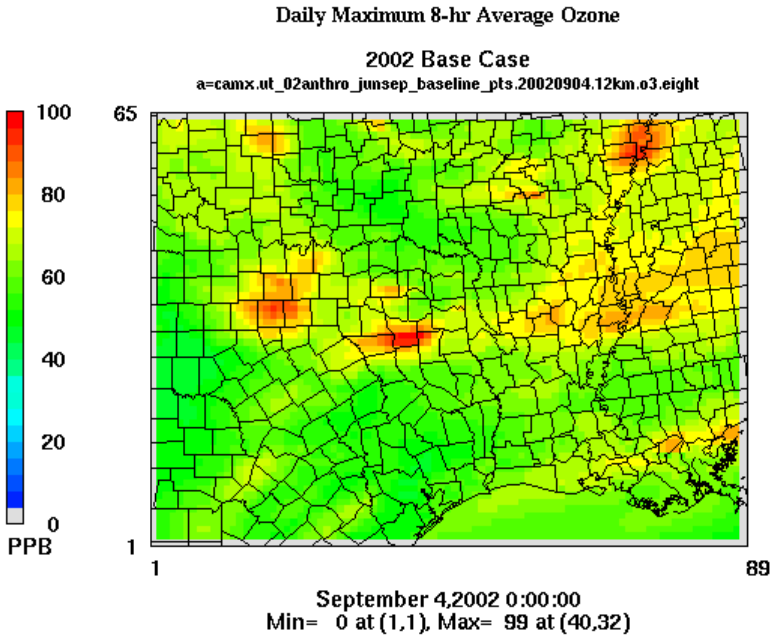



**Figure A192: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 04 for the 2009 Future Case.**

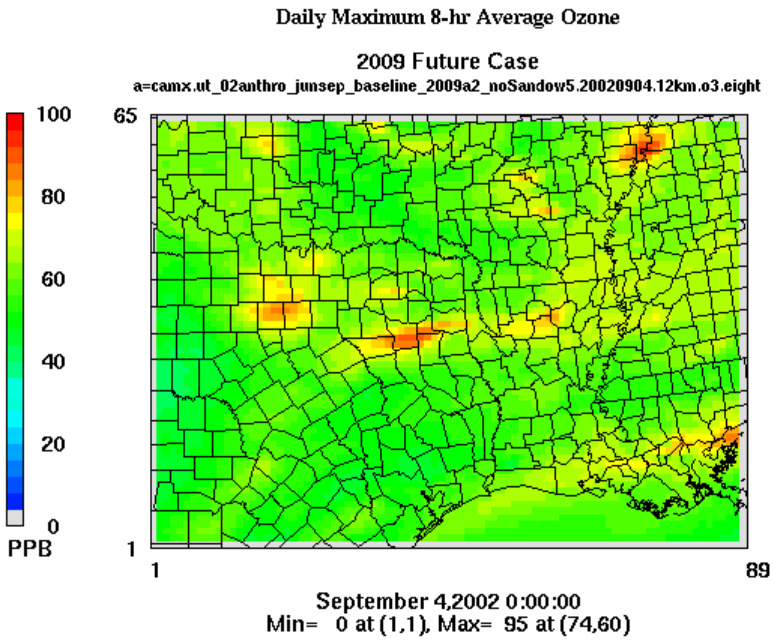


**Figure A193: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 05 for the 2002 Base Case.**

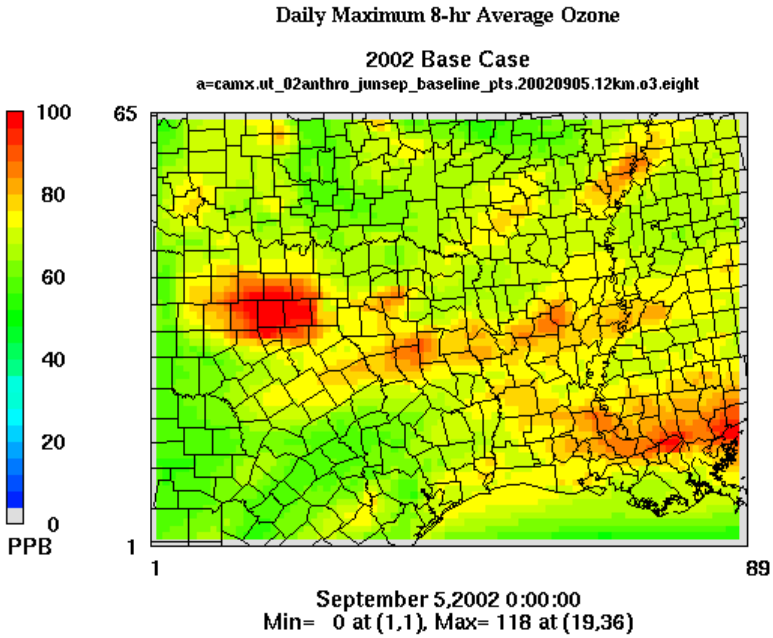



**Figure A194: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 05 for the 2009 Future Case.**

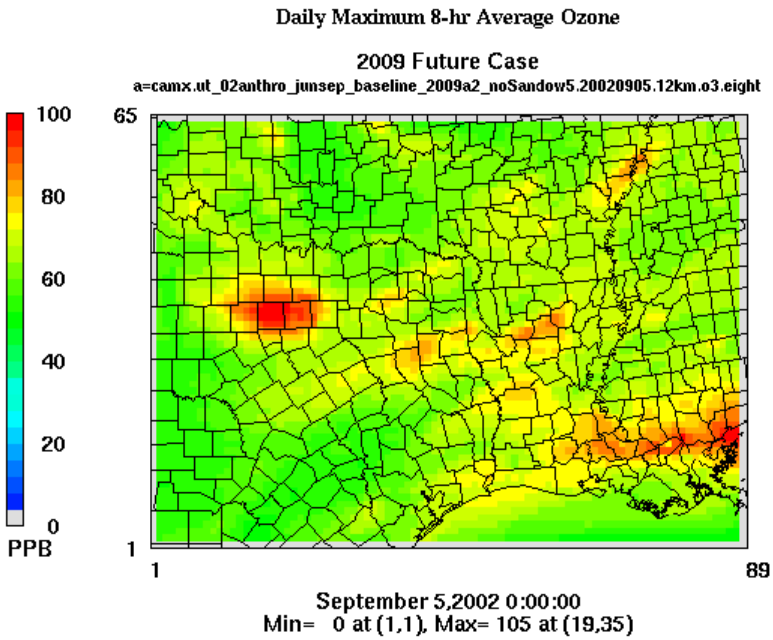


**Figure A195: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 06 for the 2002 Base Case.**

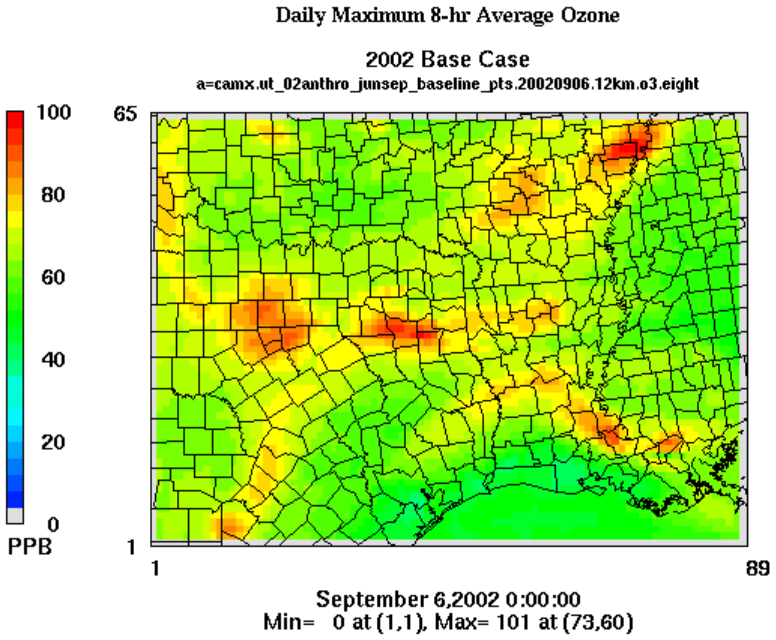



**Figure A196: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 06 for the 2009 Future Case.**

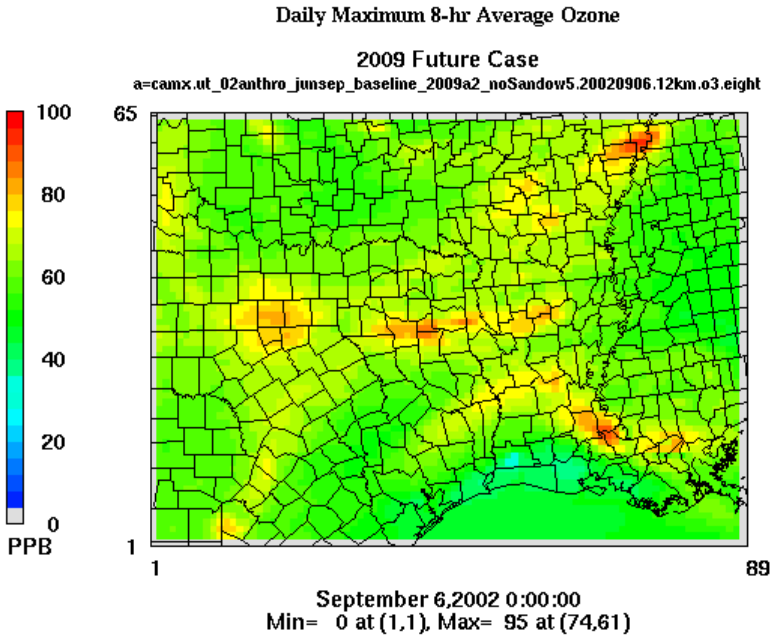


**Figure A197: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 07 for the 2002 Base Case.**

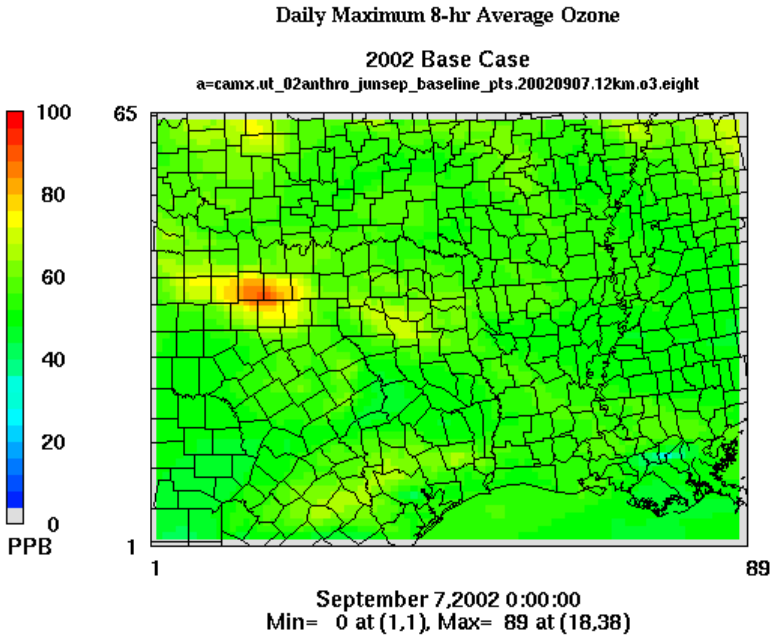



**Figure A198: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 07 for the 2009 Future Case.**

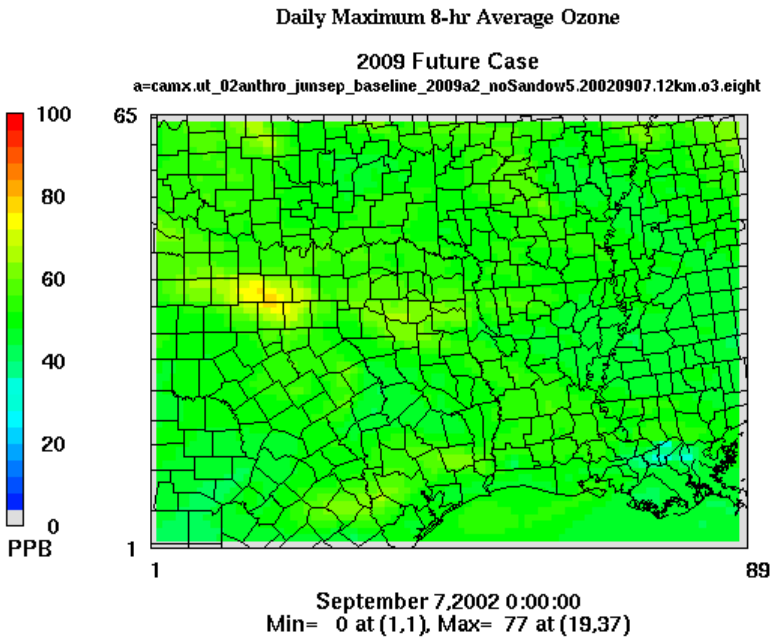


**Figure A199: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 08 for the 2002 Base Case.**

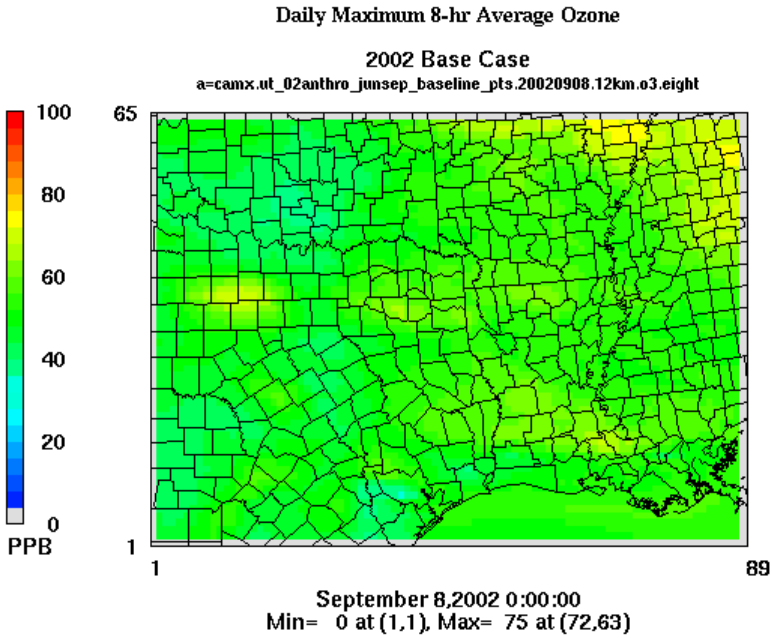



**Figure A200: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 08 for the 2009 Future Case.**

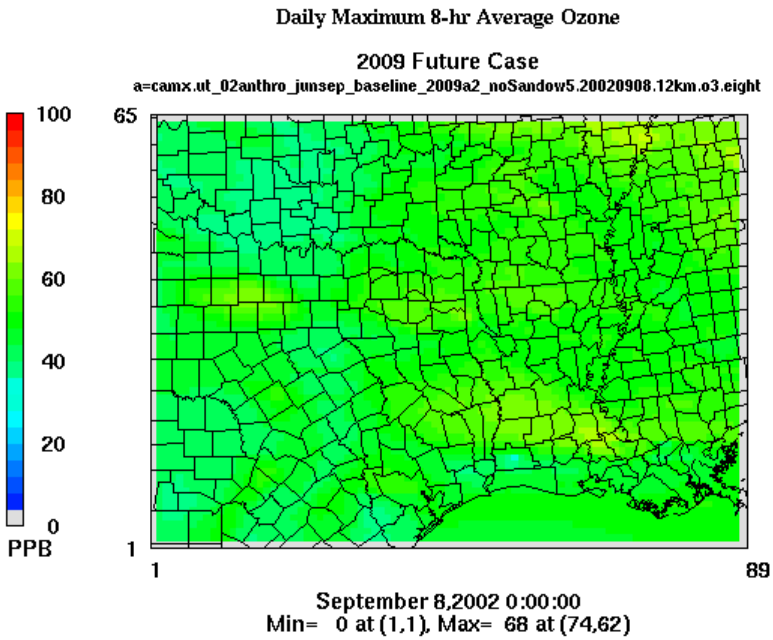


**Figure A201: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 09 for the 2002 Base Case.**

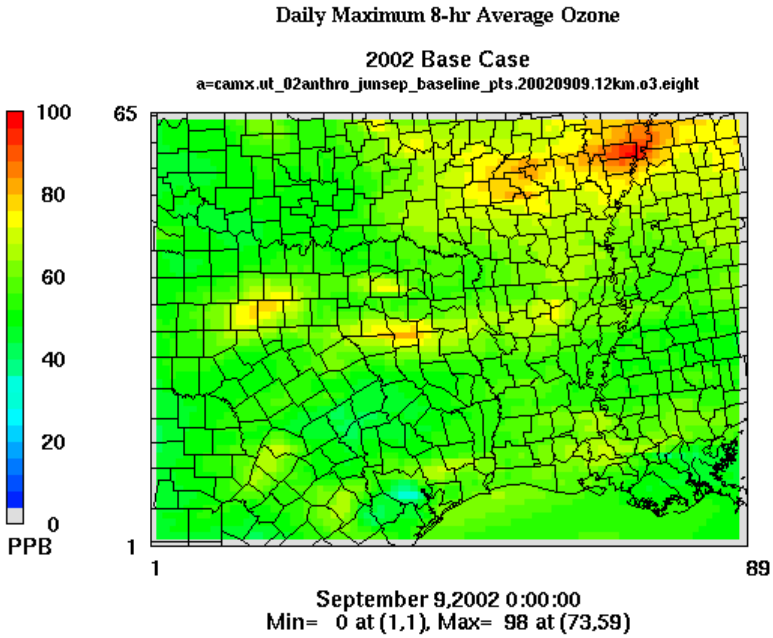



**Figure A202: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 09 for the 2009 Future Case.**

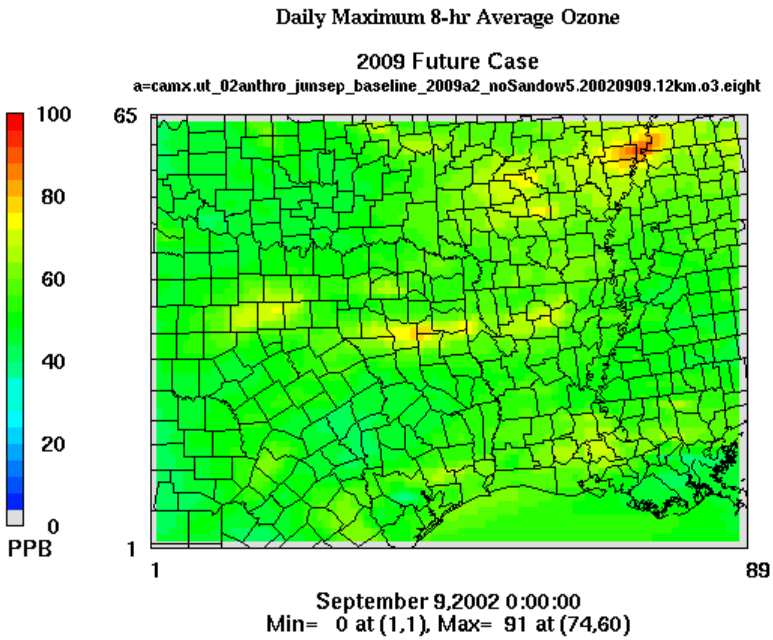


**Figure A203: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 10 for the 2002 Base Case.**

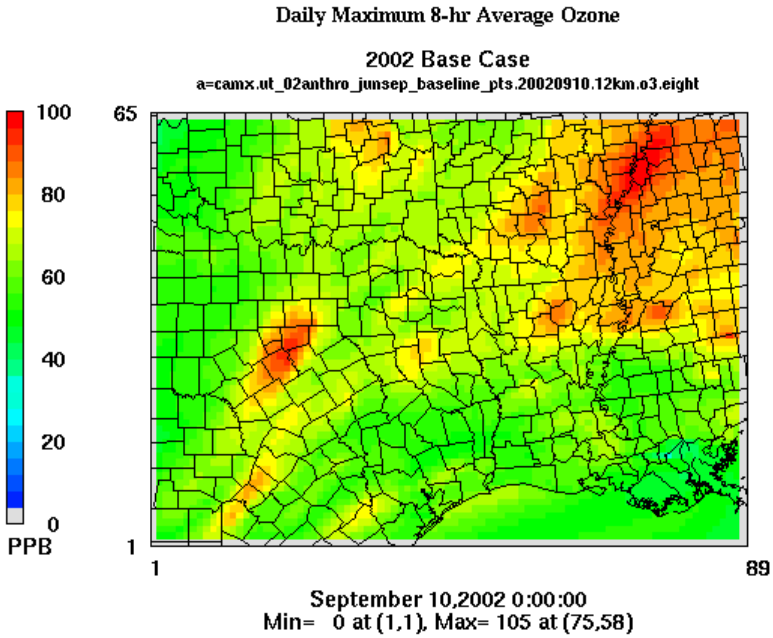



**Figure A204: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 10 for the 2009 Future Case.**

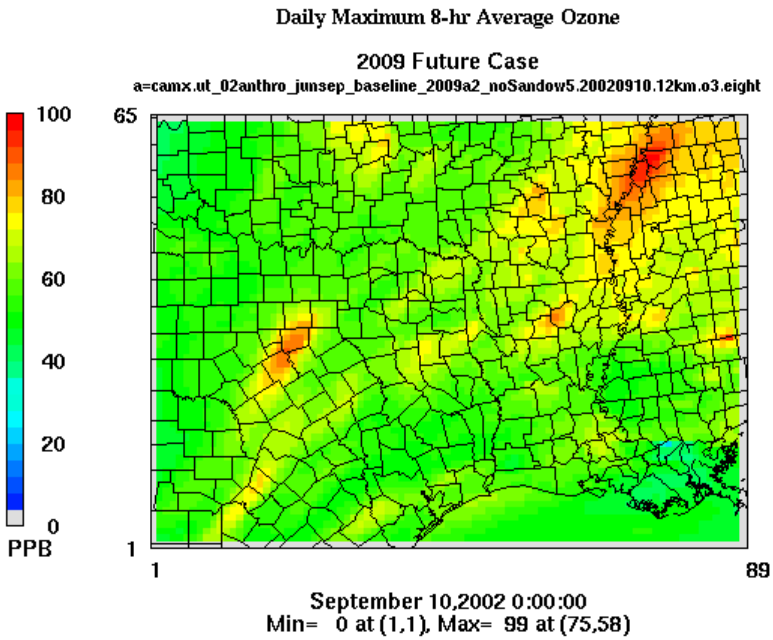


**Figure A205: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 11 for the 2002 Base Case.**

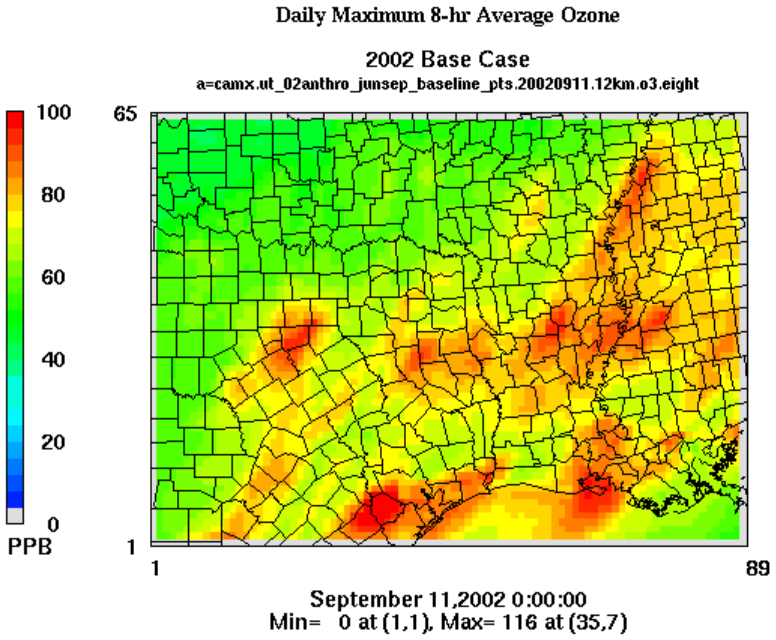



**Figure A206: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 11 for the 2009 Future Case.**

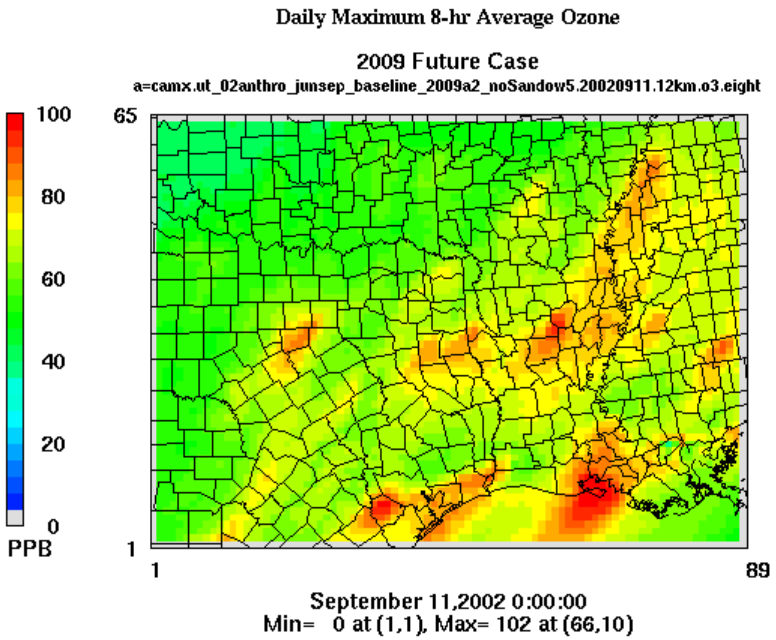


**Figure A207: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 12 for the 2002 Base Case.**

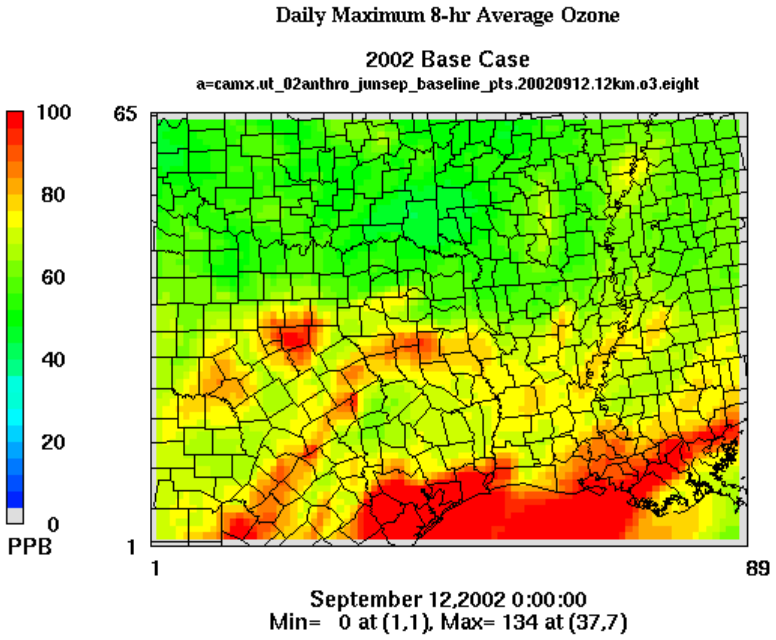



**Figure A208: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 12 for the 2009 Future Case.**

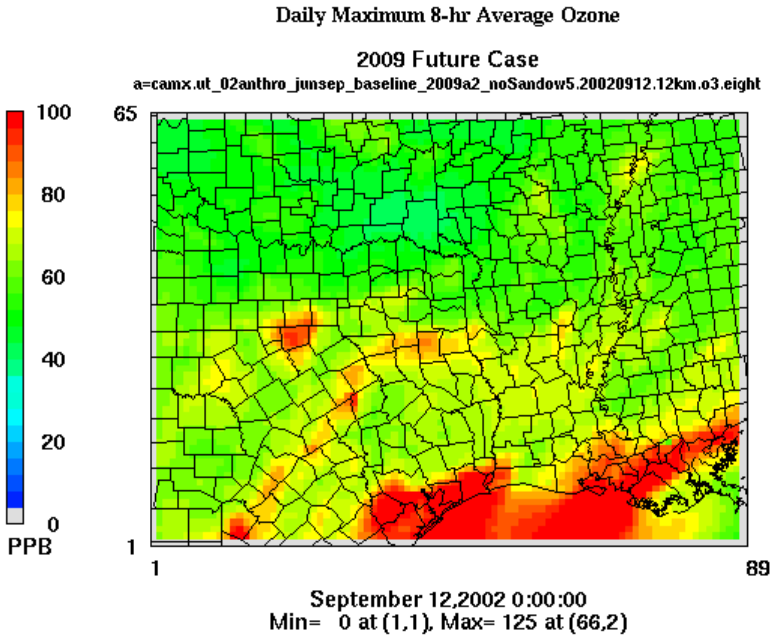


**Figure A209: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 13 for the 2002 Base Case.**

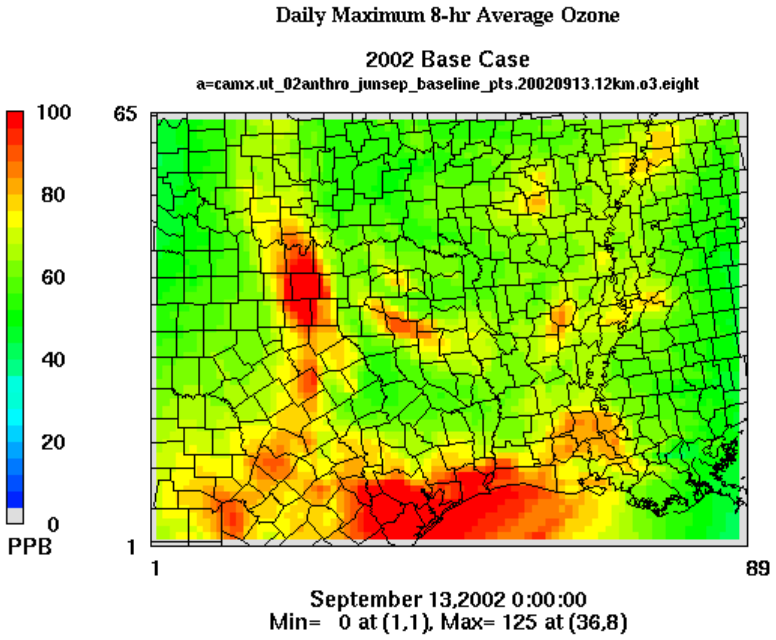



**Figure A210: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 13 for the 2009 Future Case.**

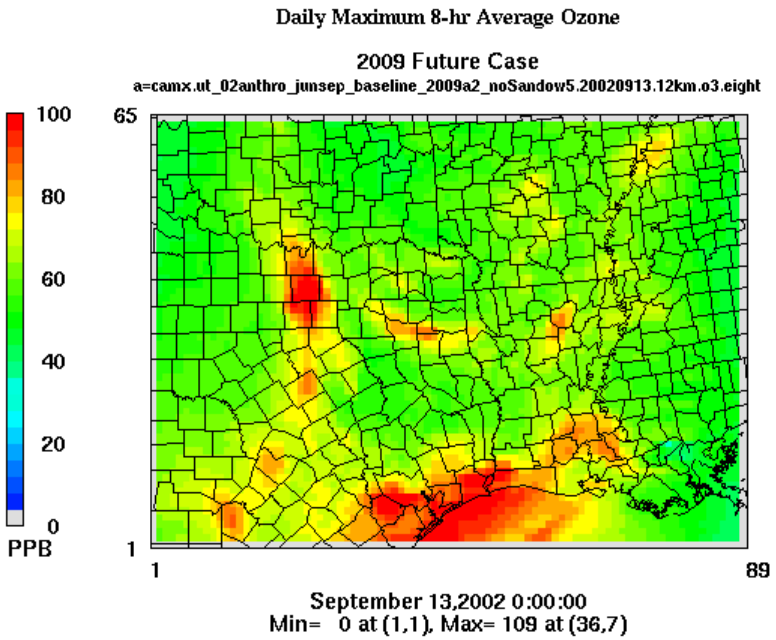


**Figure A211: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 14 for the 2002 Base Case.**

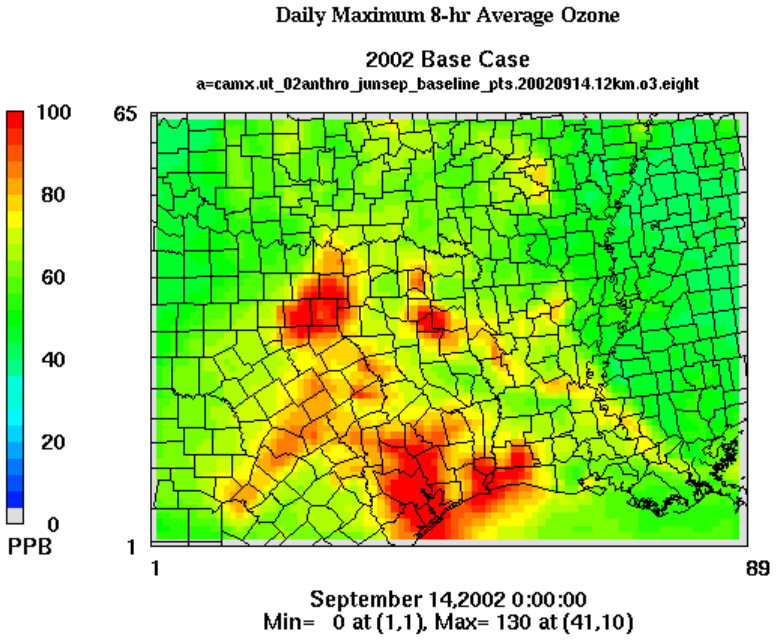



**Figure A212: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 14 for the 2009 Future Case.**

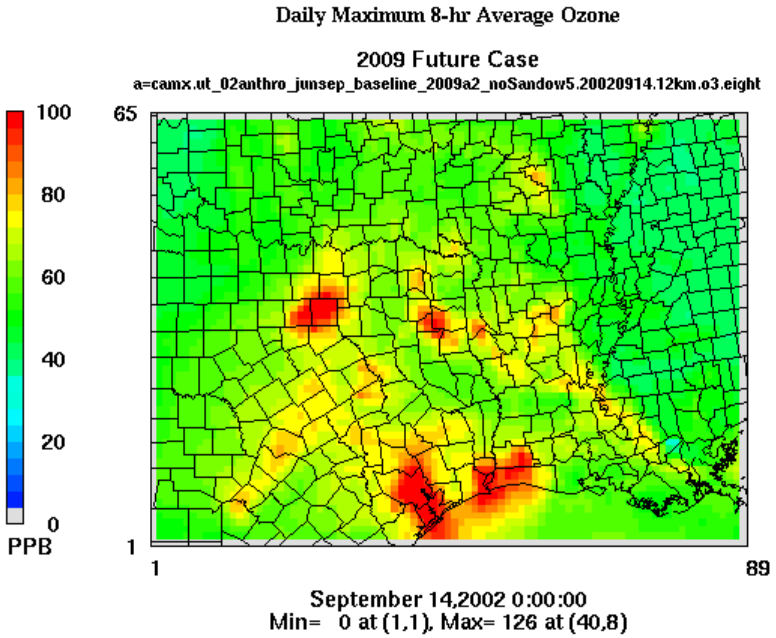


**Figure A213: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 15 for the 2002 Base Case.**

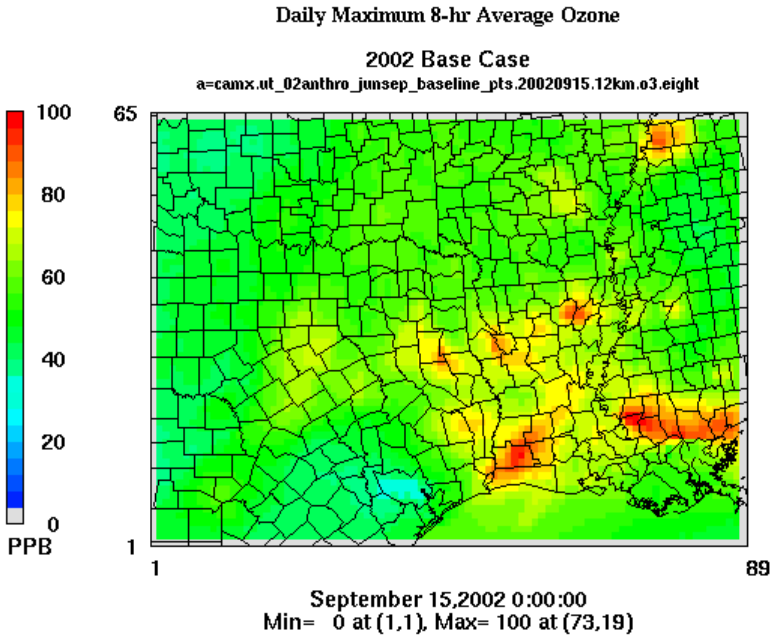



**Figure A214: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 15 for the 2009 Future Case.**

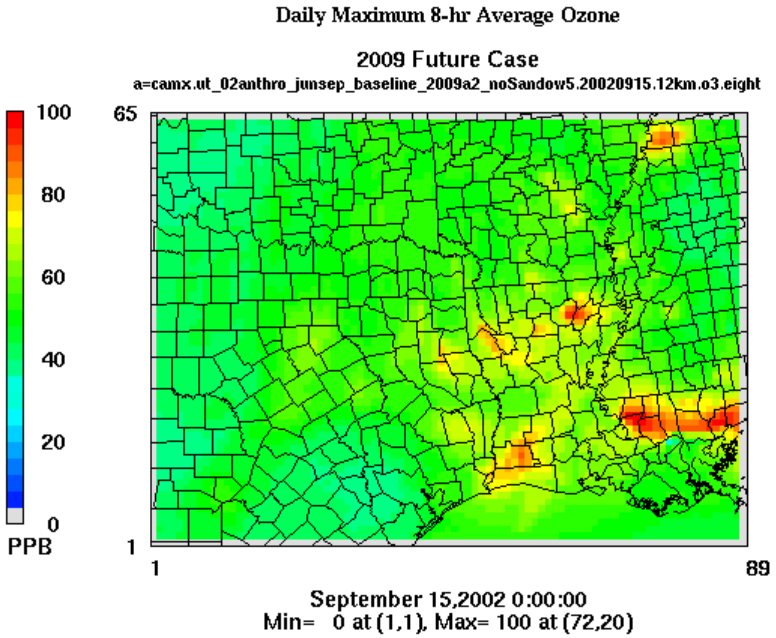


**Figure A215: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 16 for the 2002 Base Case.**

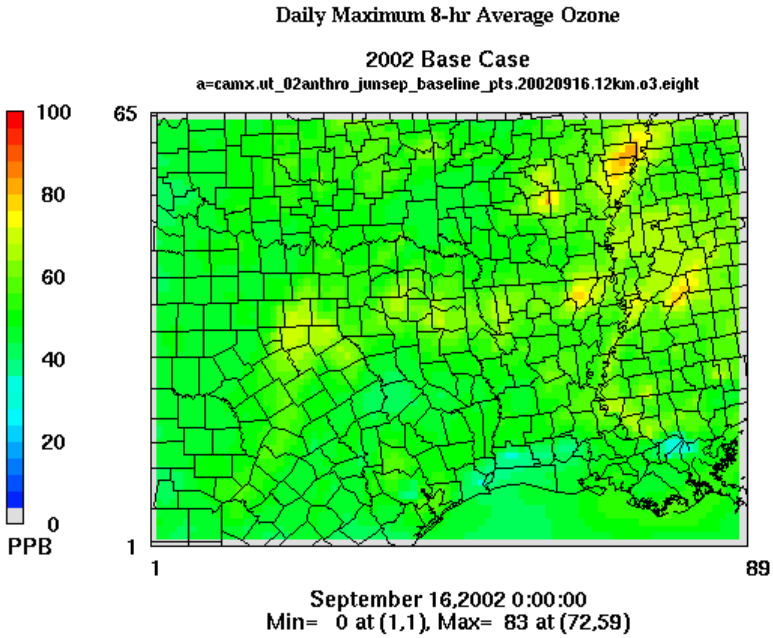



**Figure A216: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 16 for the 2009 Future Case.**

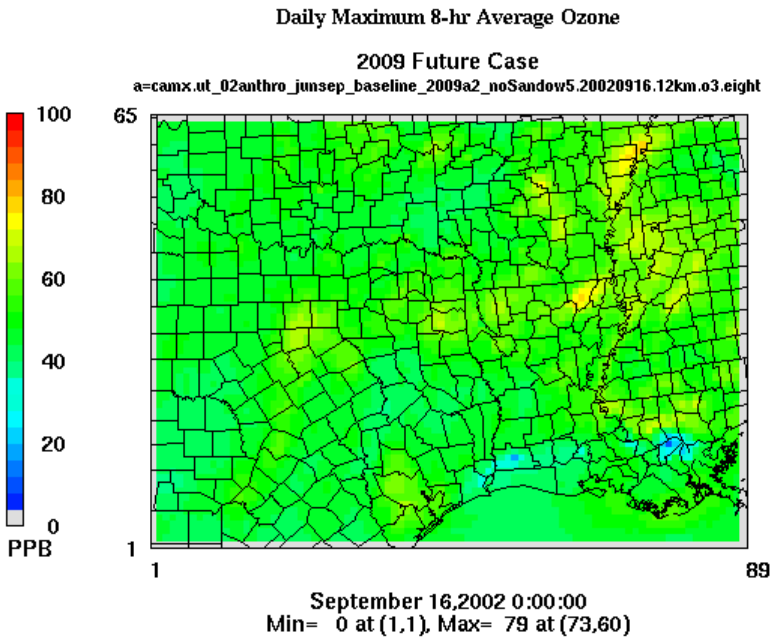


**Figure A217: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 17 for the 2002 Base Case.**

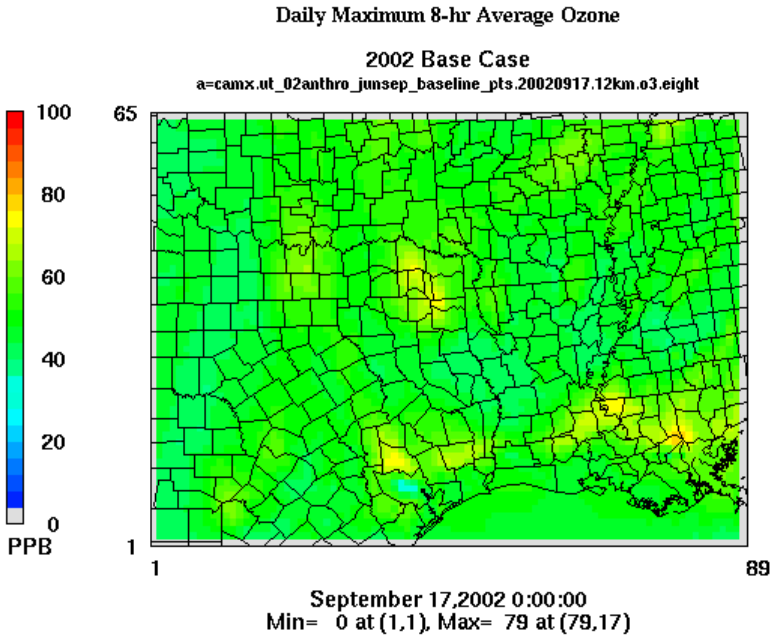



**Figure A218: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 17 for the 2009 Future Case.**

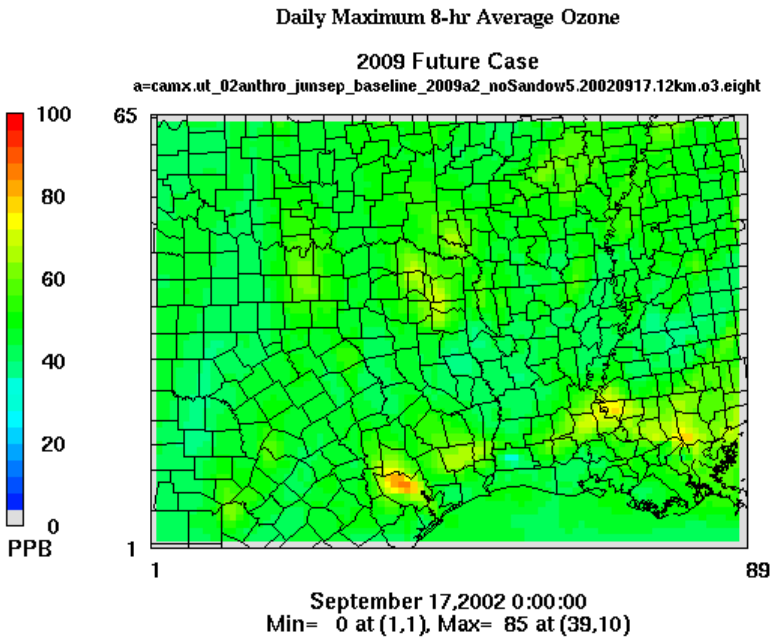


**Figure A219: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 18 for the 2002 Base Case.**

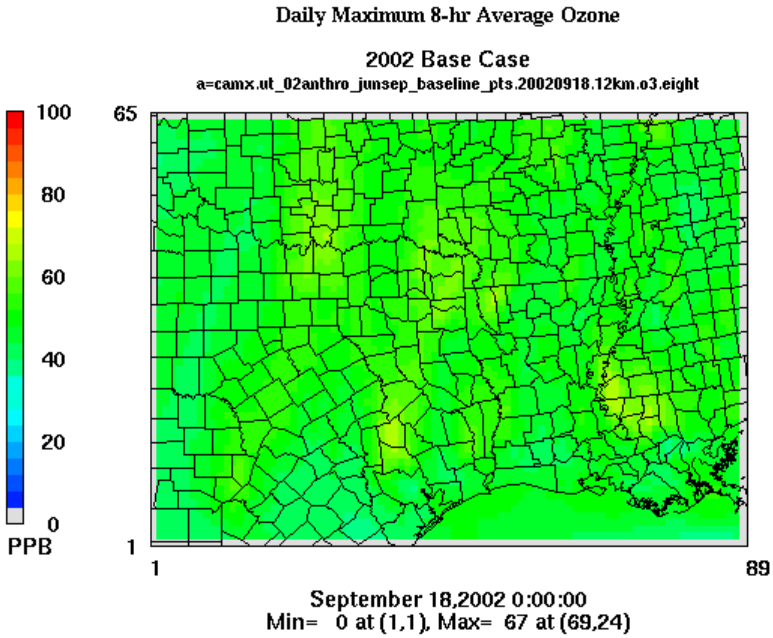



**Figure A220: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 18 for the 2009 Future Case.**

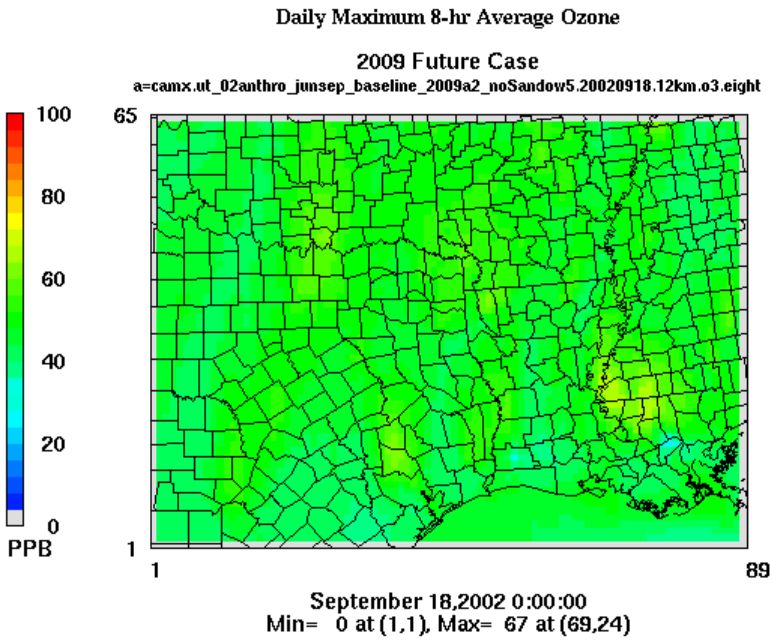


**Figure A221: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 19 for the 2002 Base Case.**

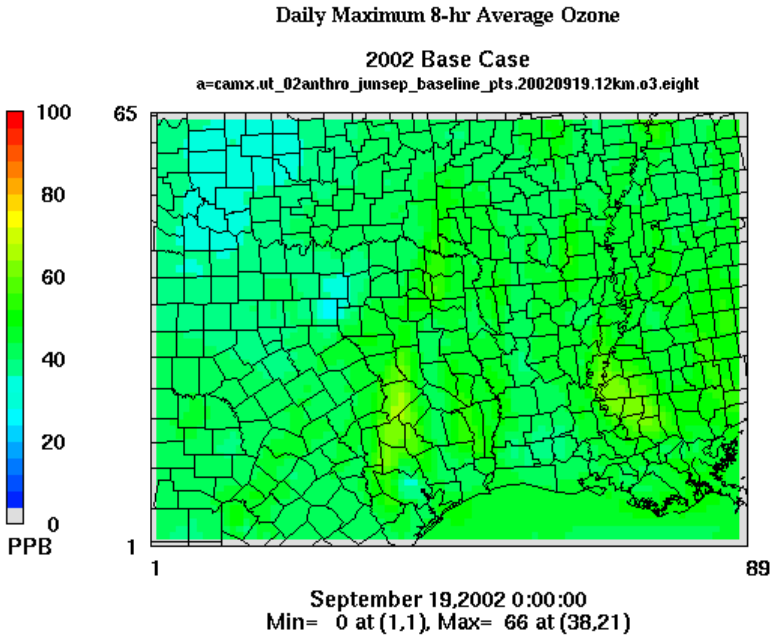



**Figure A222: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 19 for the 2009 Future Case.**

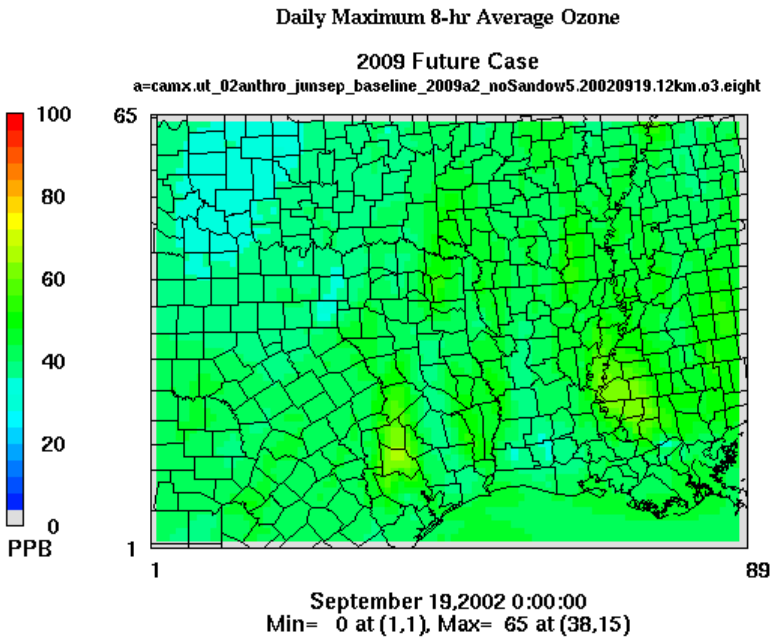


**Figure A223: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 20 for the 2002 Base Case.**

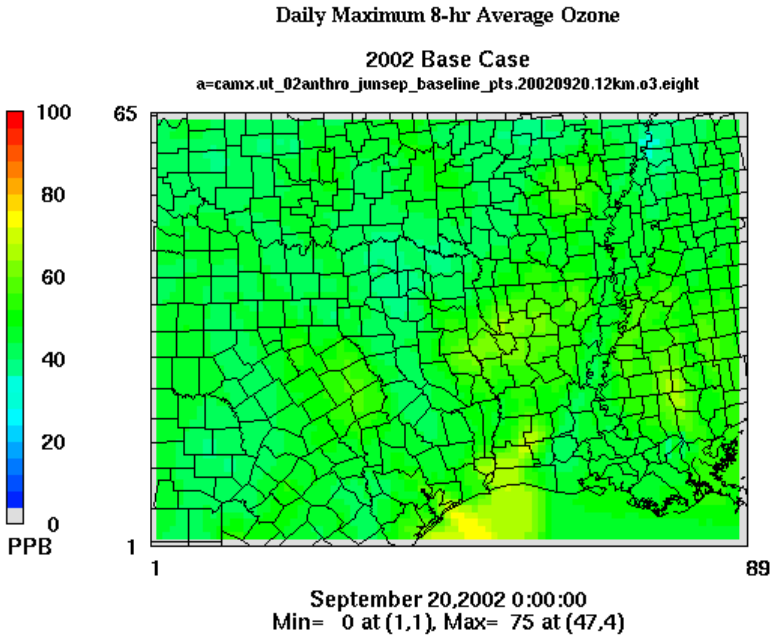



**Figure A224: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 20 for the 2009 Future Case.**

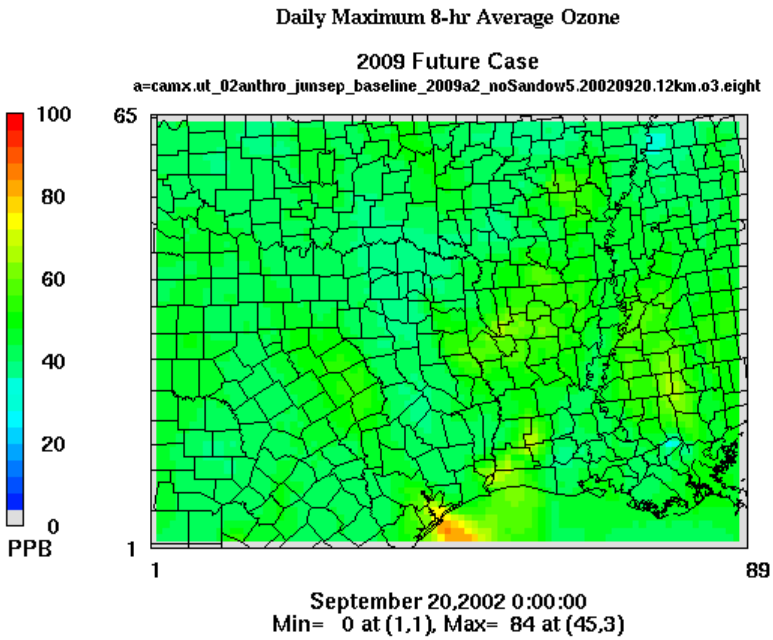


**Figure A225: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 21 for the 2002 Base Case.**

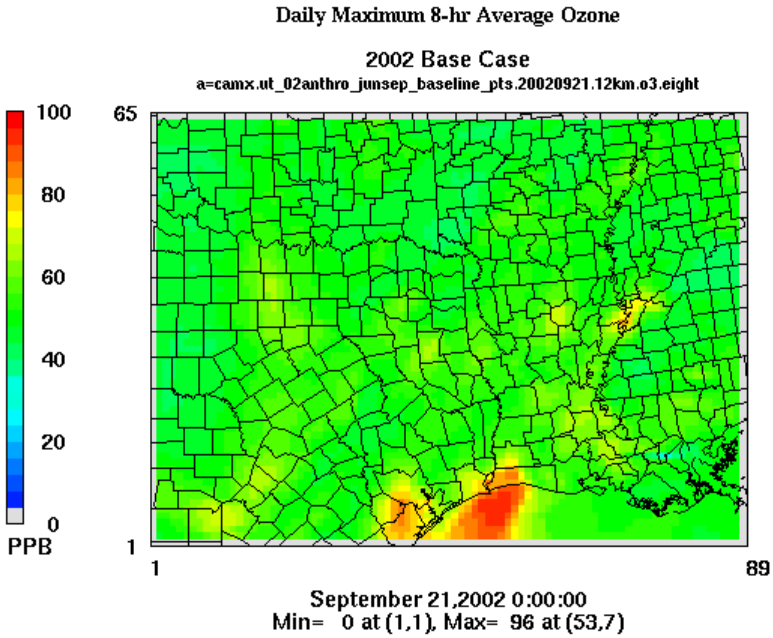



**Figure A226: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 21 for the 2009 Future Case.**

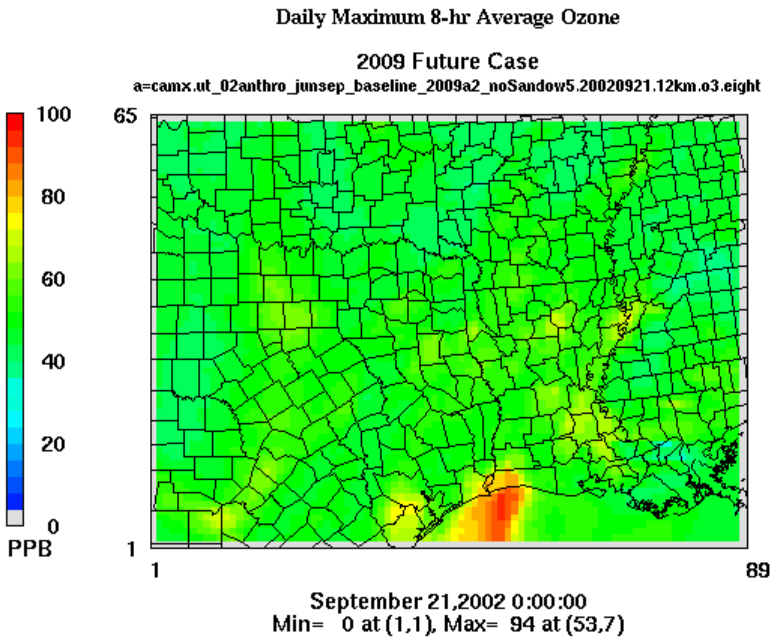


**Figure A227: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 22 for the 2002 Base Case.**

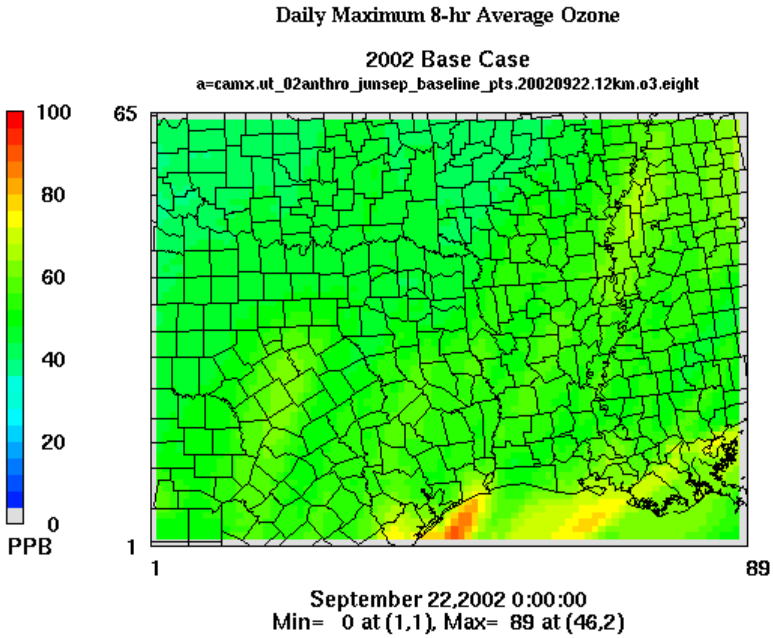



**Figure A228: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 22 for the 2009 Future Case.**

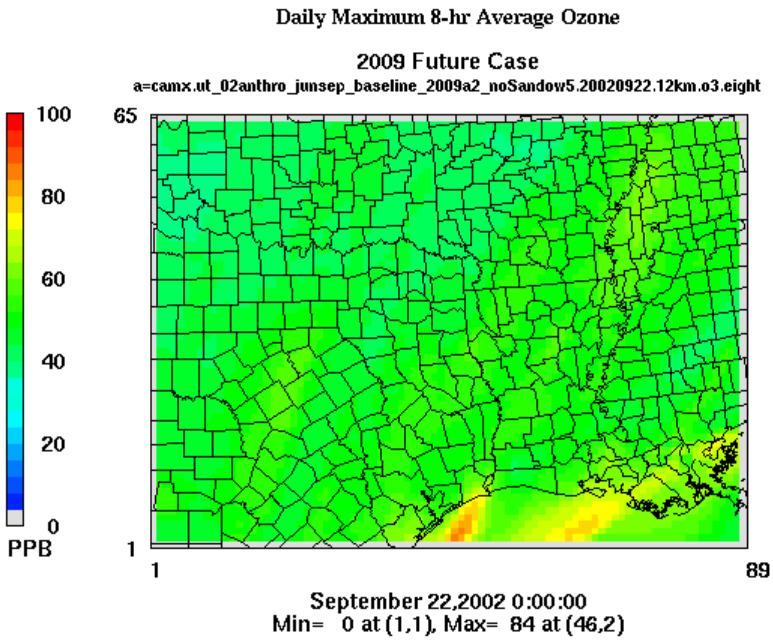


**Figure A229: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 23 for the 2002 Base Case.**

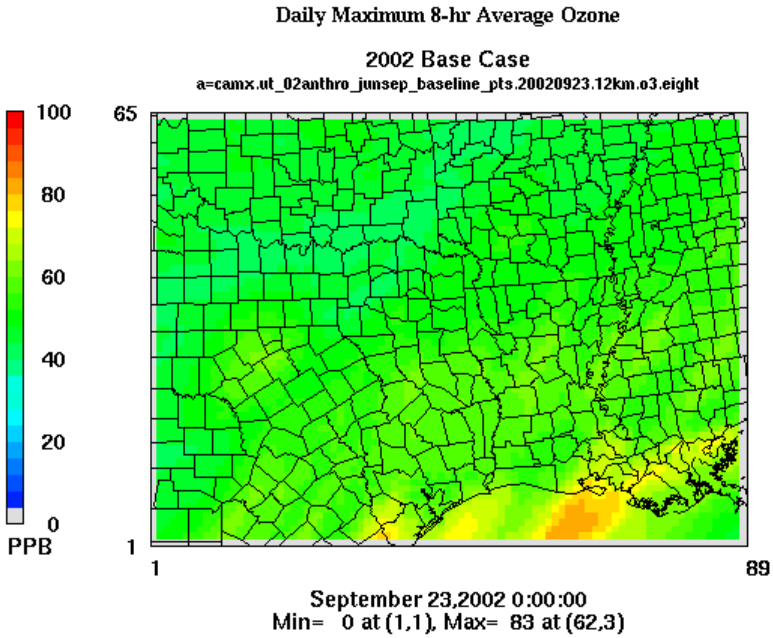



**Figure A230: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 23 for the 2009 Future Case.**

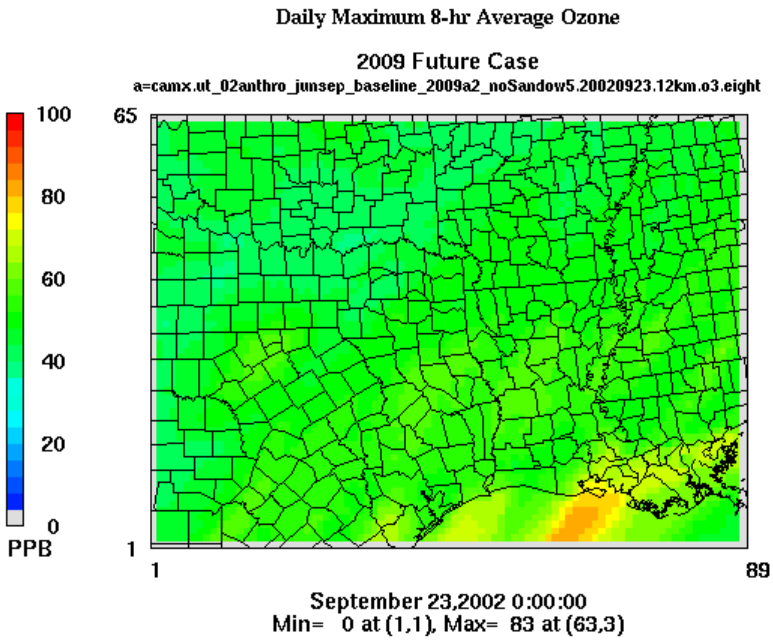


**Figure A231: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 24 for the 2002 Base Case.**

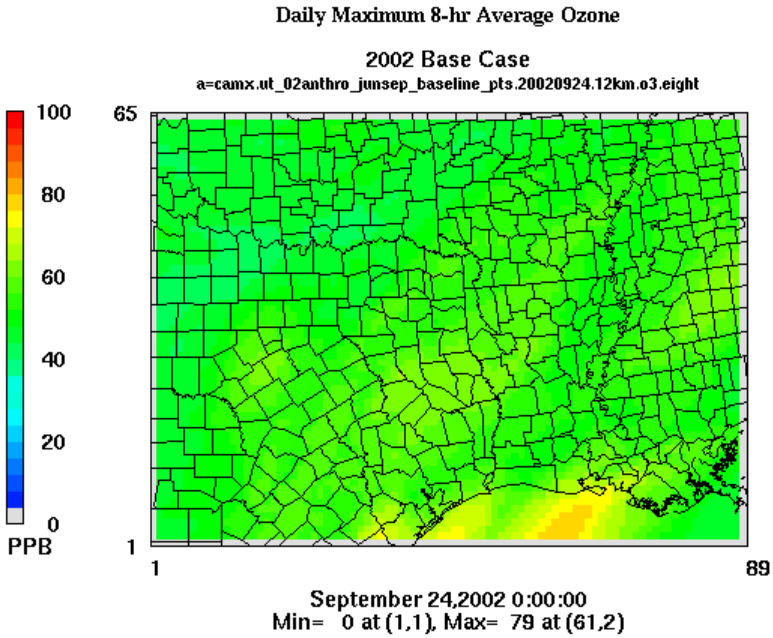



**Figure A232: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 24 for the 2009 Future Case.**

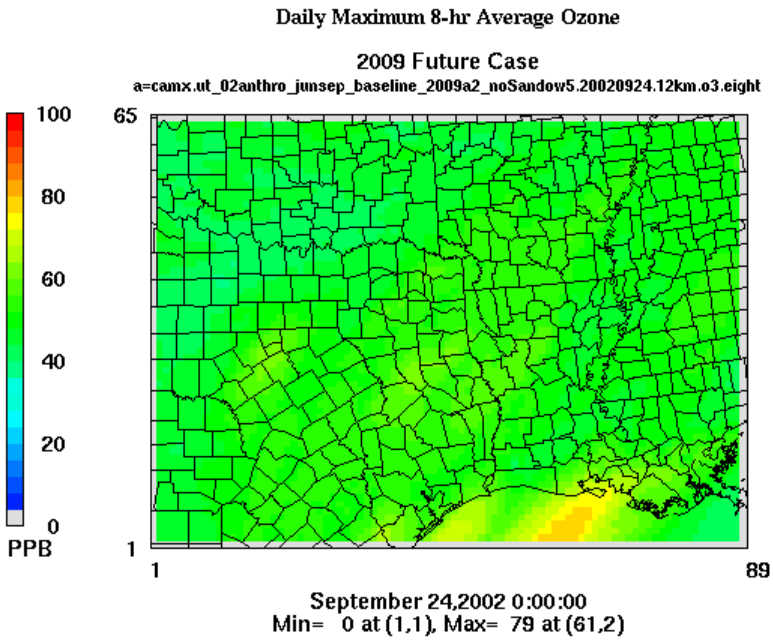


**Figure A233: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 25 for the 2002 Base Case.**

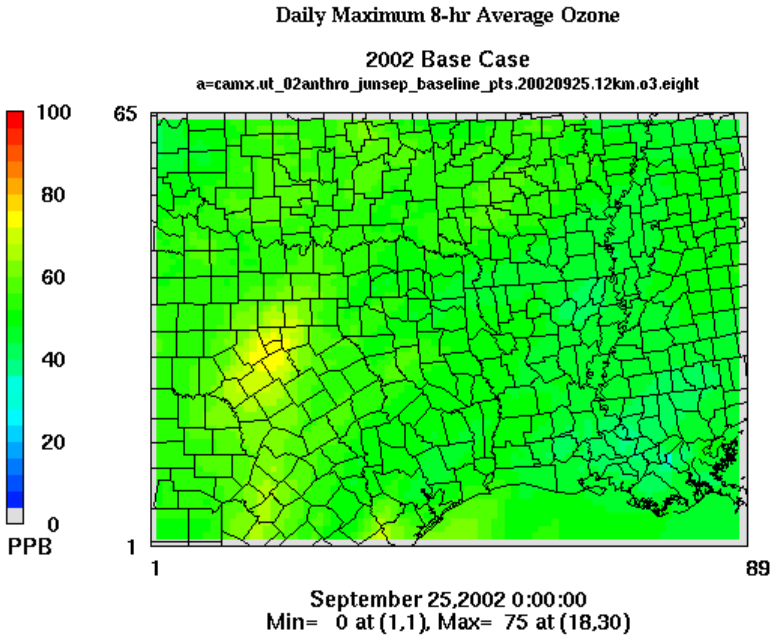



**Figure A234: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 25 for the 2009 Future Case.**

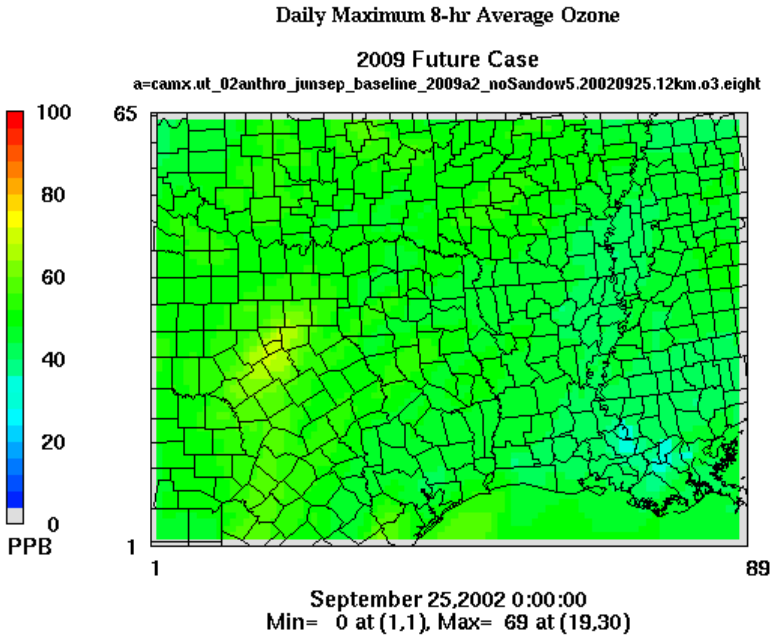


**Figure A235: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 26 for the 2002 Base Case.**

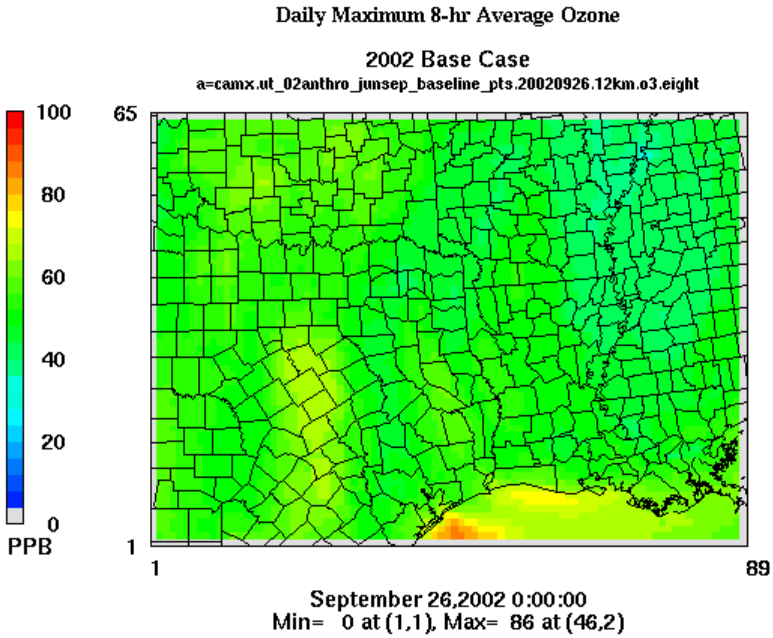



**Figure A236: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 26 for the 2009 Future Case.**

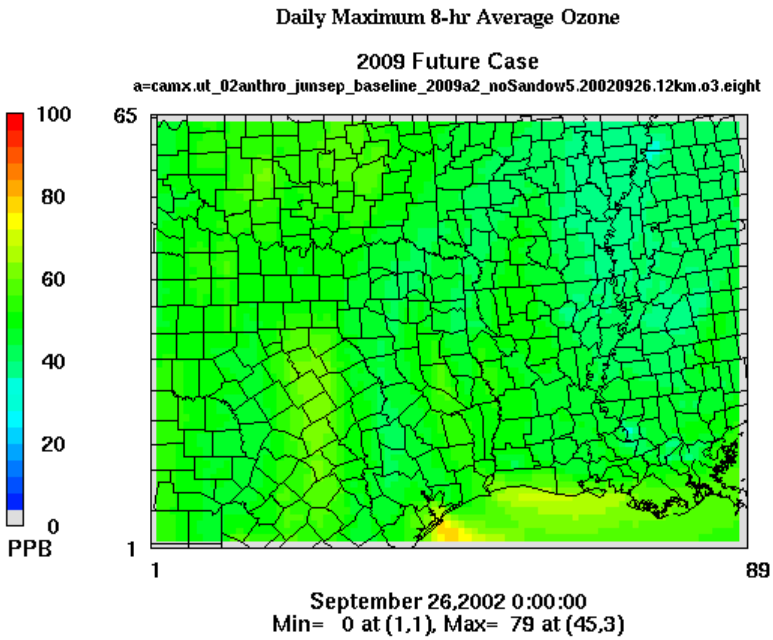


**Figure A237: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 27 for the 2002 Base Case.**

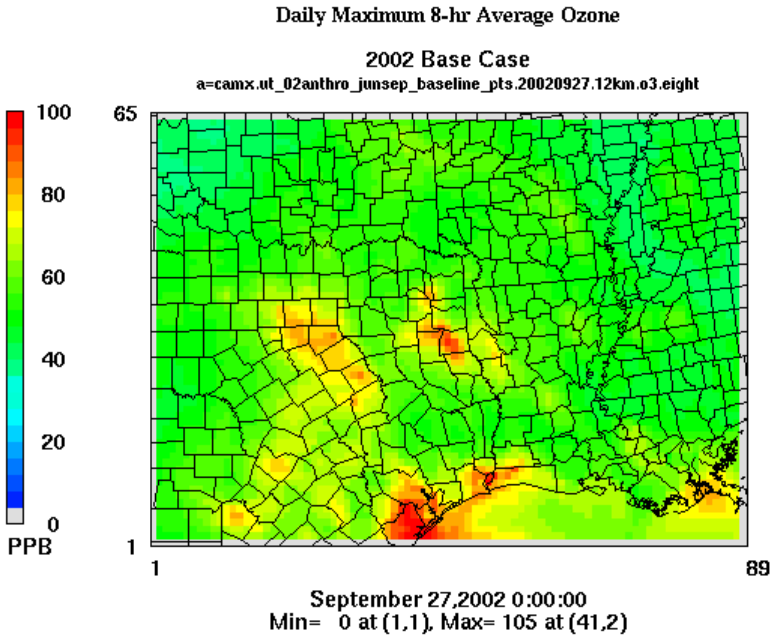



**Figure A238: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 27 for the 2009 Future Case.**

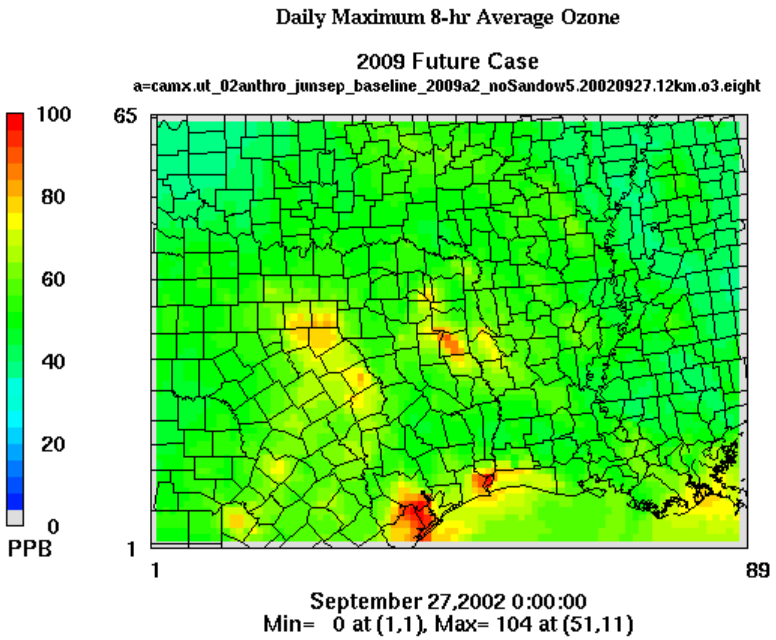


**Figure A239: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 28 for the 2002 Base Case.**

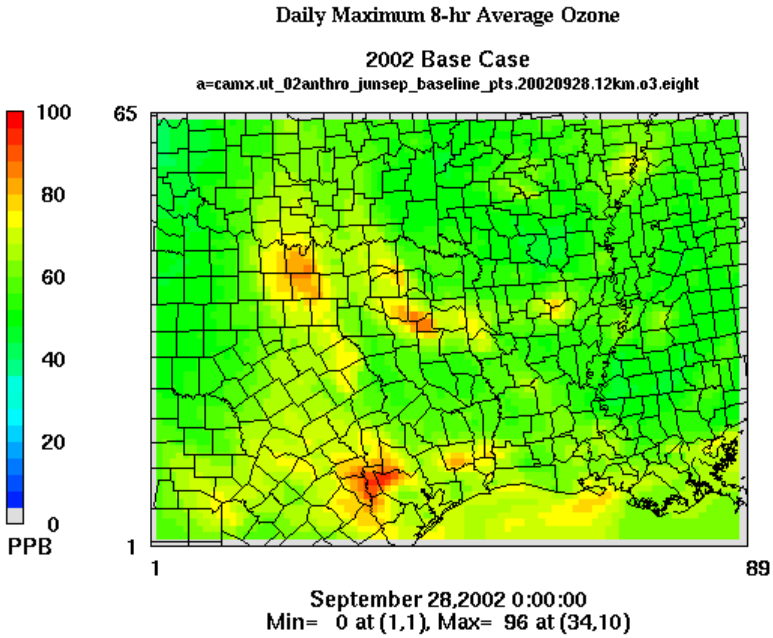



**Figure A240: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 28 for the 2009 Future Case.**

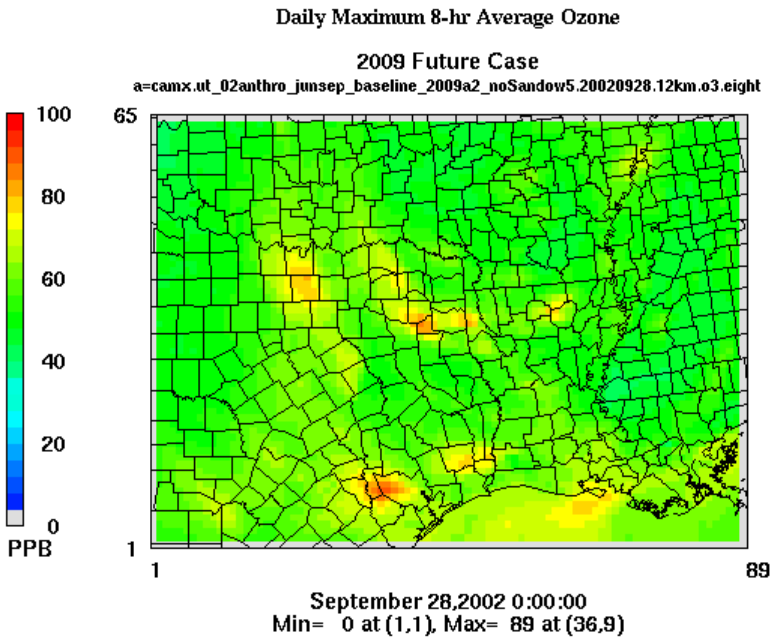


**Figure A241: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 29 for the 2002 Base Case.**

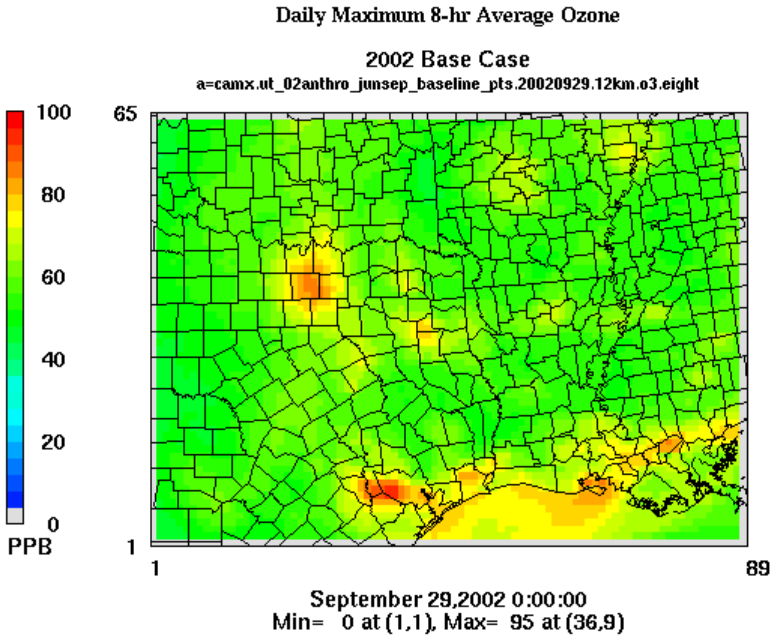



**Figure A242: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 29 for the 2009 Future Case.**

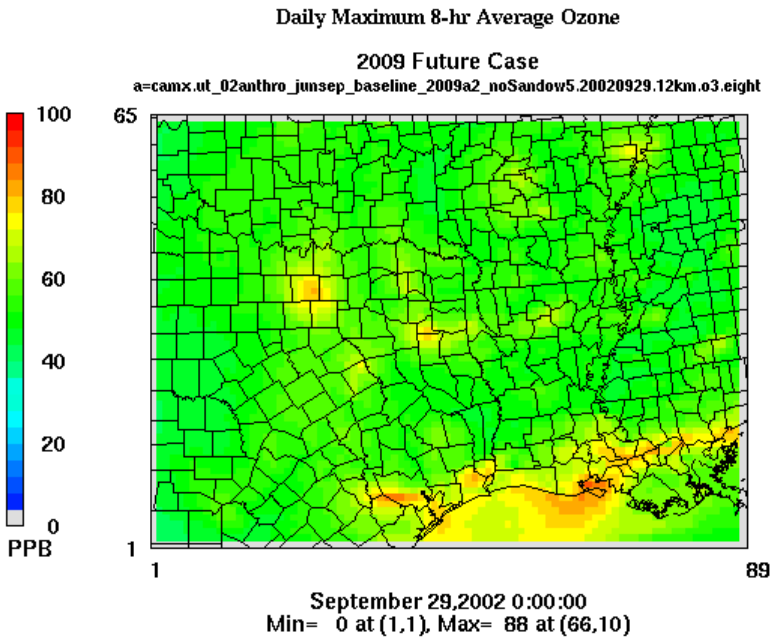


**Figure A243: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 30 for the 2002 Base Case.**

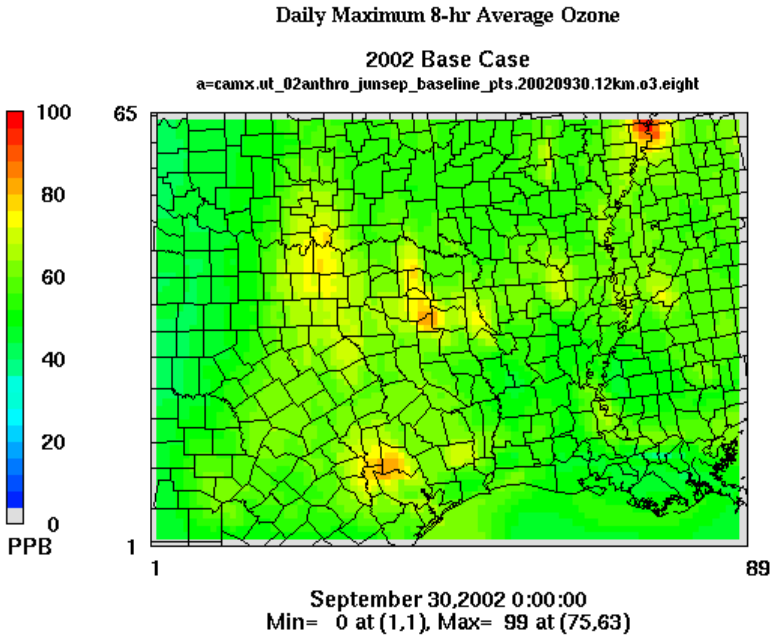
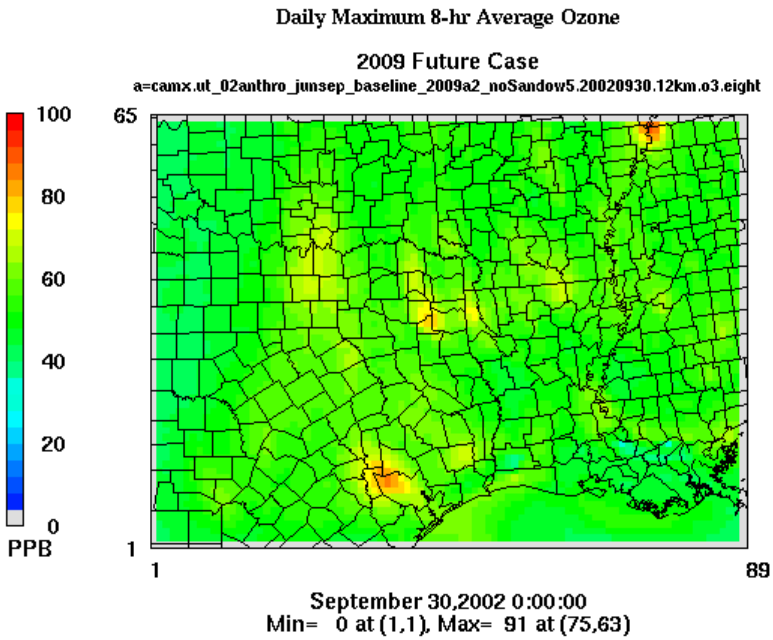



**Figure A244: Maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 30 for the 2009 Future Case.**



# Appendix B
## Daily Ozone Difference Maps

**Figure B1: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 01 between the 2002 Base Case and 2009 Future Case.**

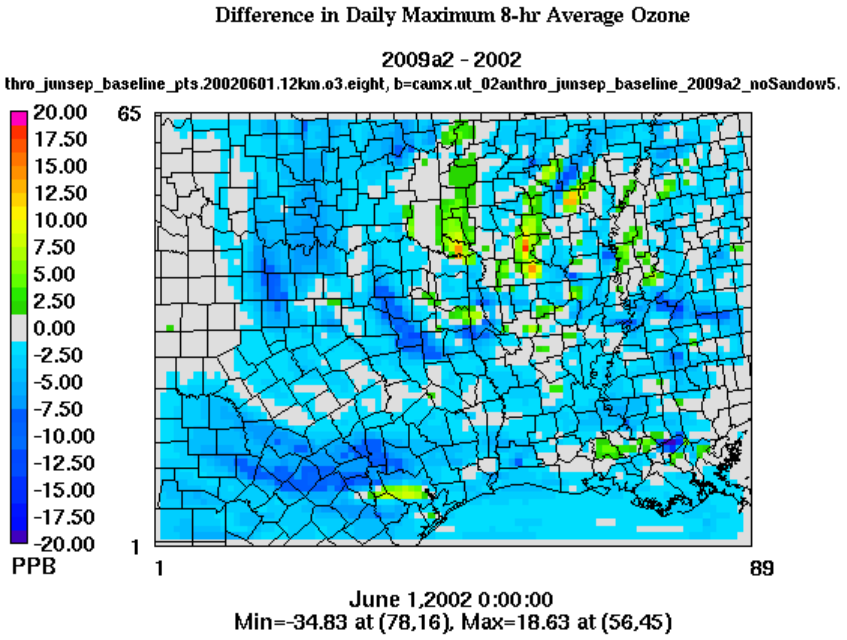



**Figure B2: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 02 between the 2002 Base Case and 2009 Future Case.**

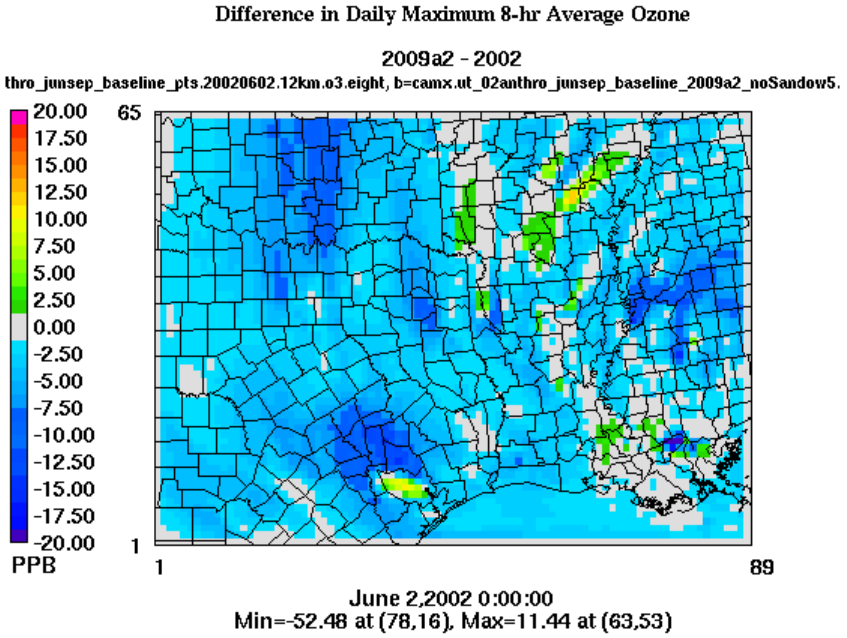


**Figure B3: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 03 between the 2002 Base Case and 2009 Future Case.**

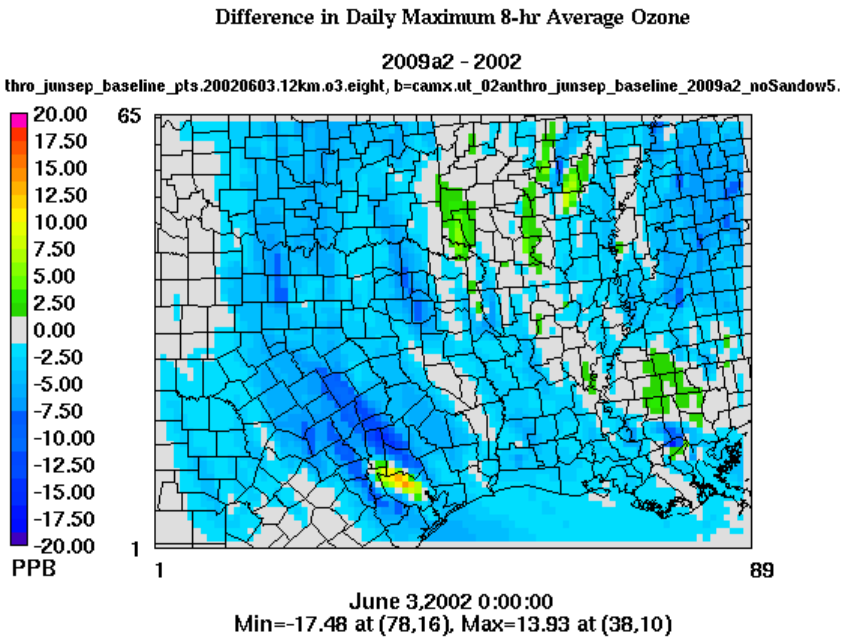



**Figure B4: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 04 between the 2002 Base Case and 2009 Future Case.**

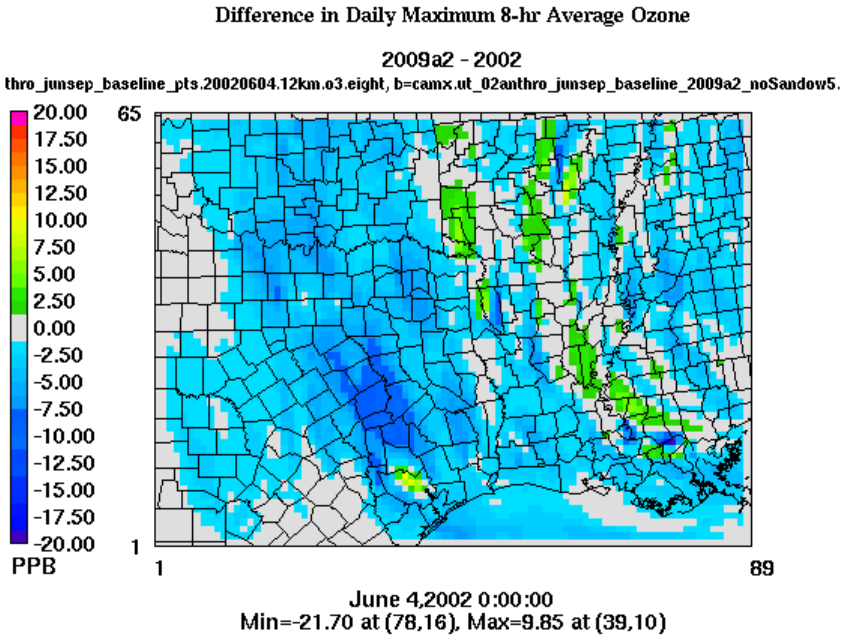


**Figure B5: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 05 between the 2002 Base Case and 2009 Future Case.**

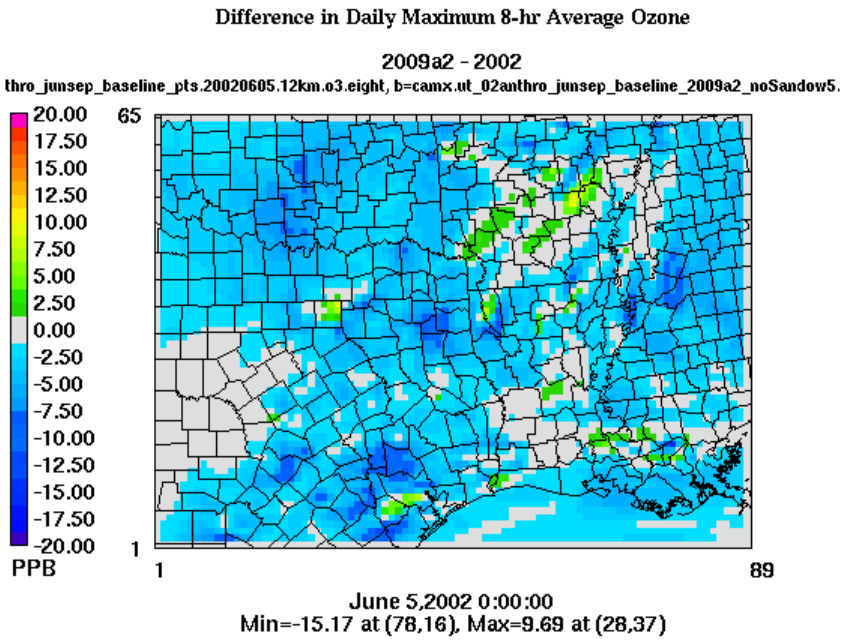



**Figure B6: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 06 between the 2002 Base Case and 2009 Future Case.**

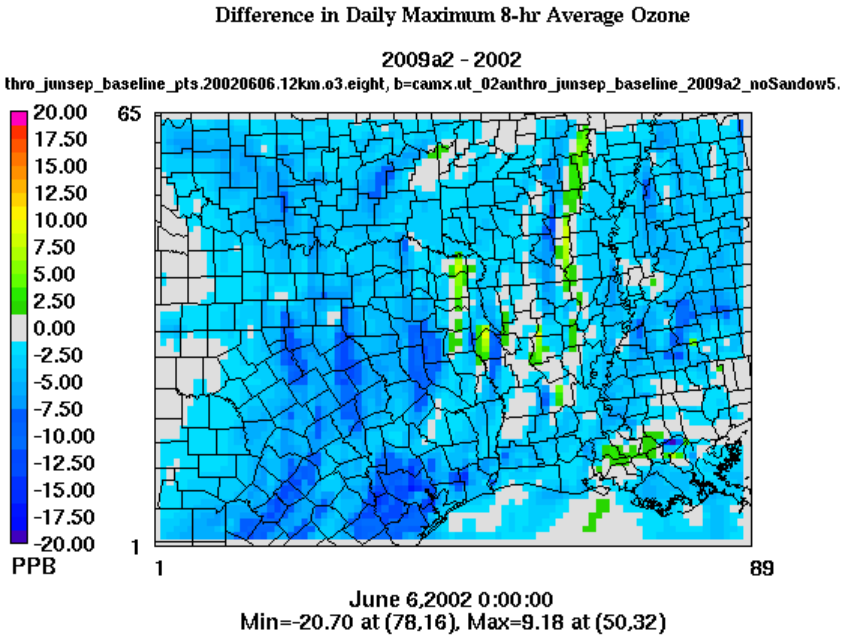


**Figure B7: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 07 between the 2002 Base Case and 2009 Future Case.**

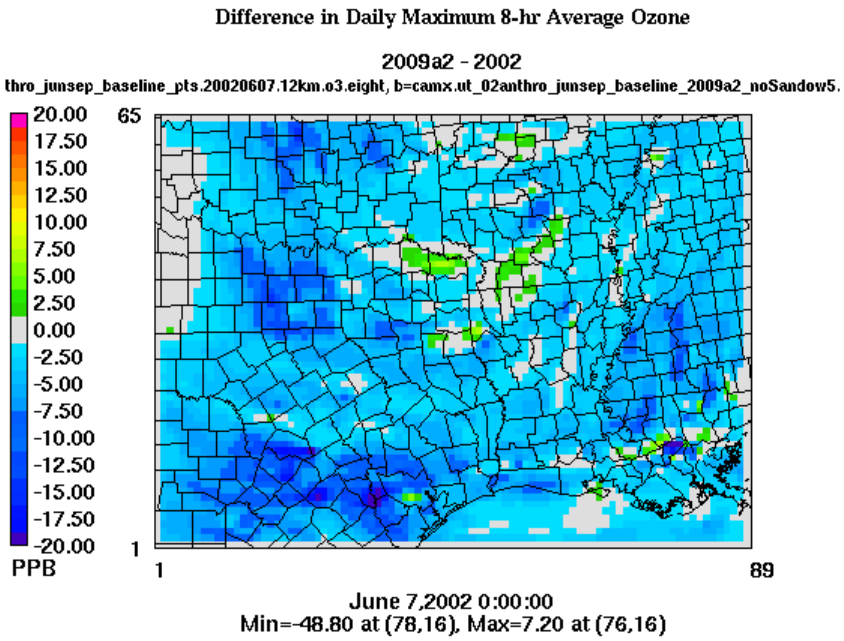



**Figure B8: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 08 between the 2002 Base Case and 2009 Future Case.**

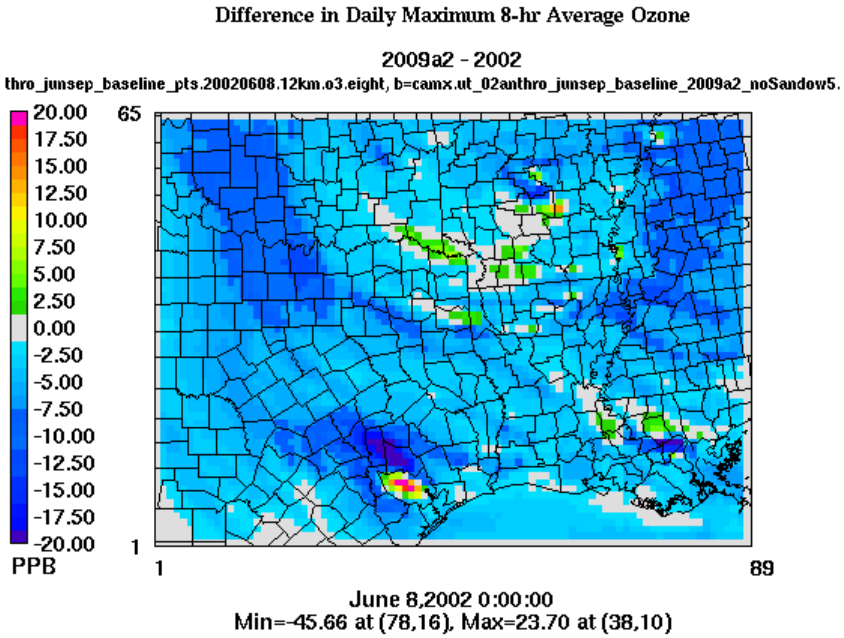


**Figure B9: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 09 between the 2002 Base Case and 2009 Future Case.**

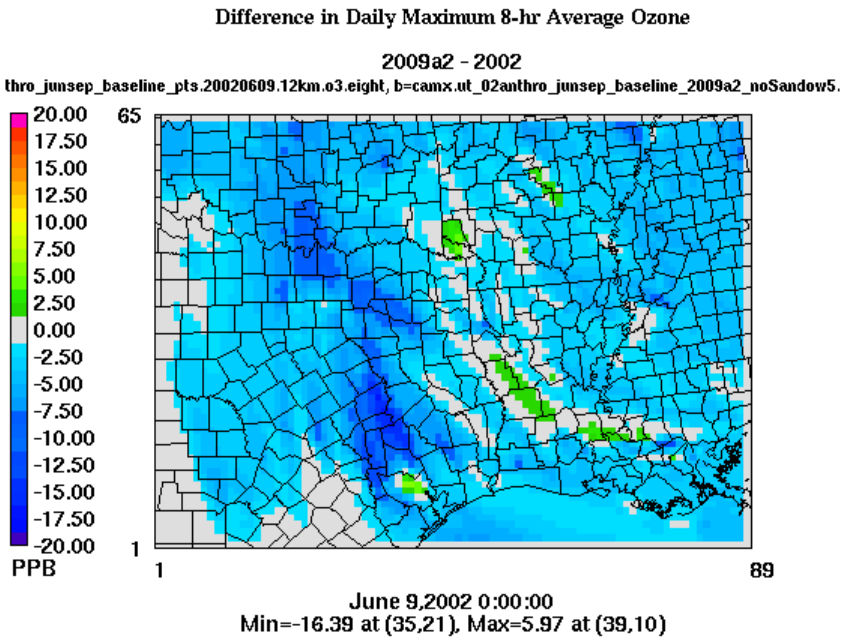



**Figure B10: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 10 between the 2002 Base Case and 2009 Future Case.**

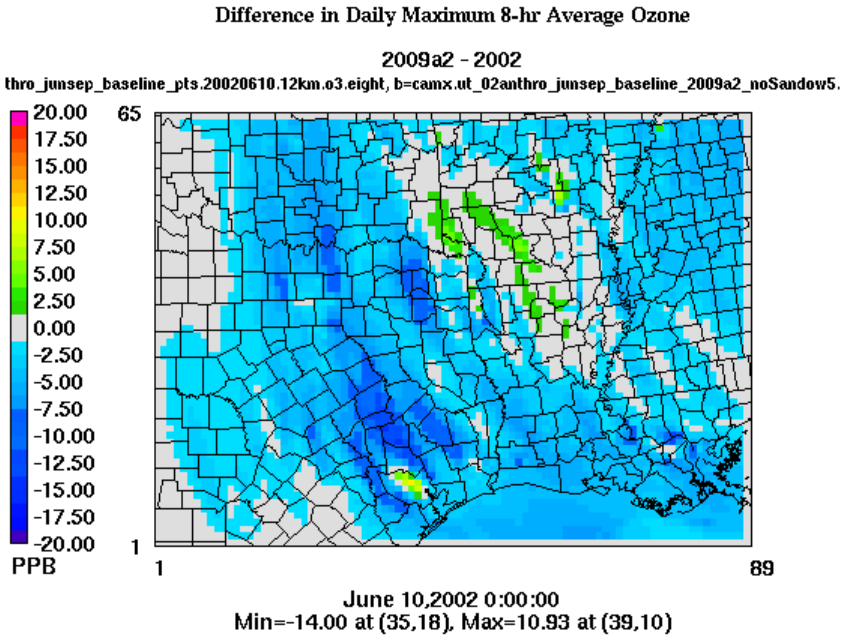


**Figure B11: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 11 between the 2002 Base Case and 2009 Future Case.**

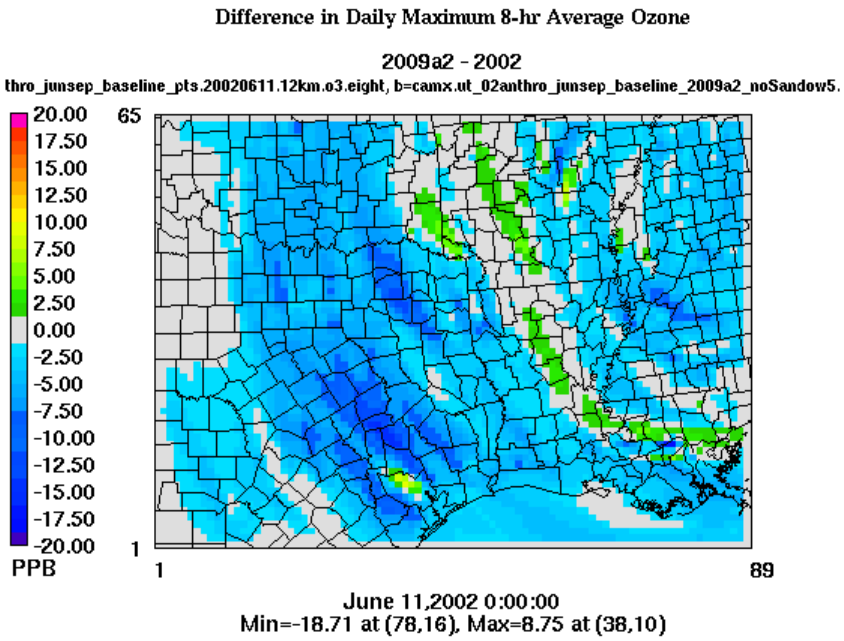



**Figure B12: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 12 between the 2002 Base Case and 2009 Future Case.**

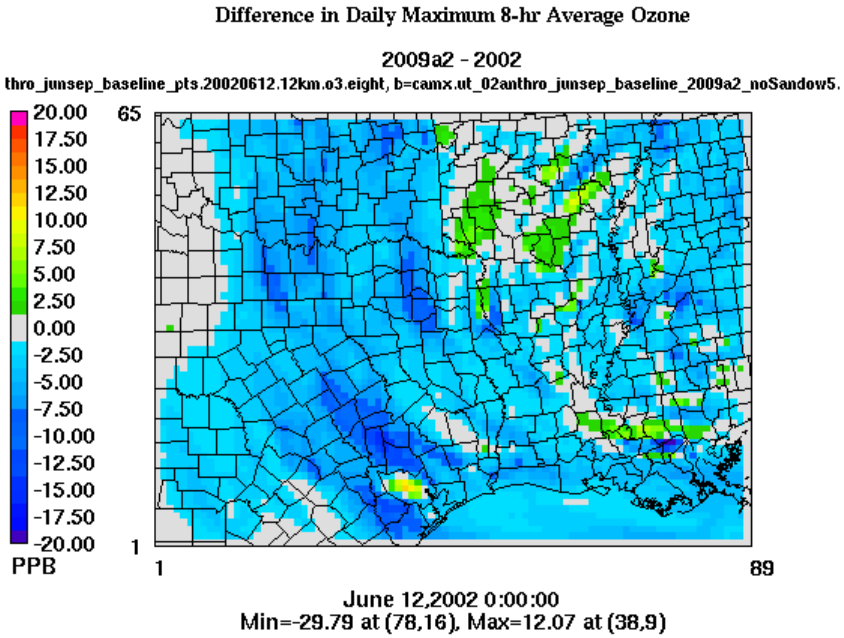


**Figure B13: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 13 between the 2002 Base Case and 2009 Future Case.**

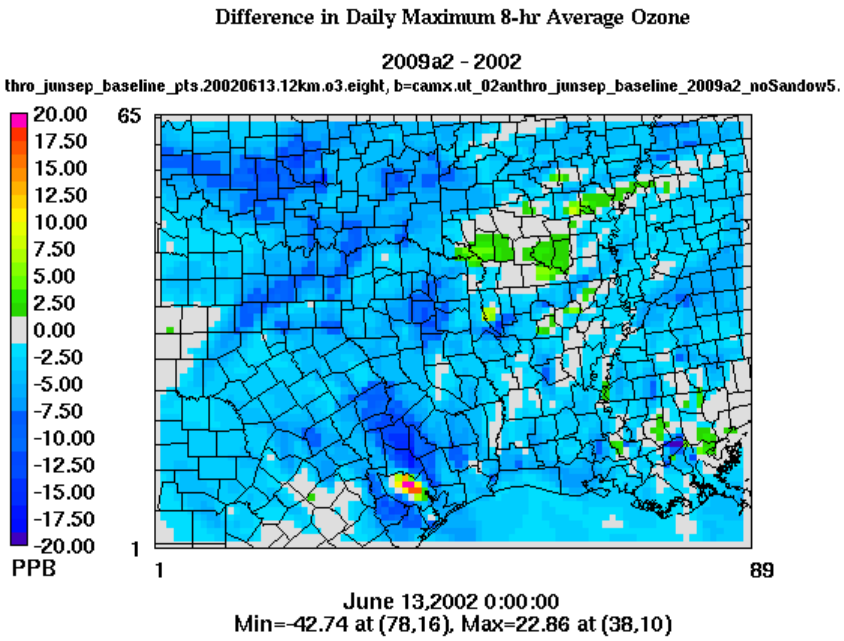



**Figure B14: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 14 between the 2002 Base Case and 2009 Future Case.**

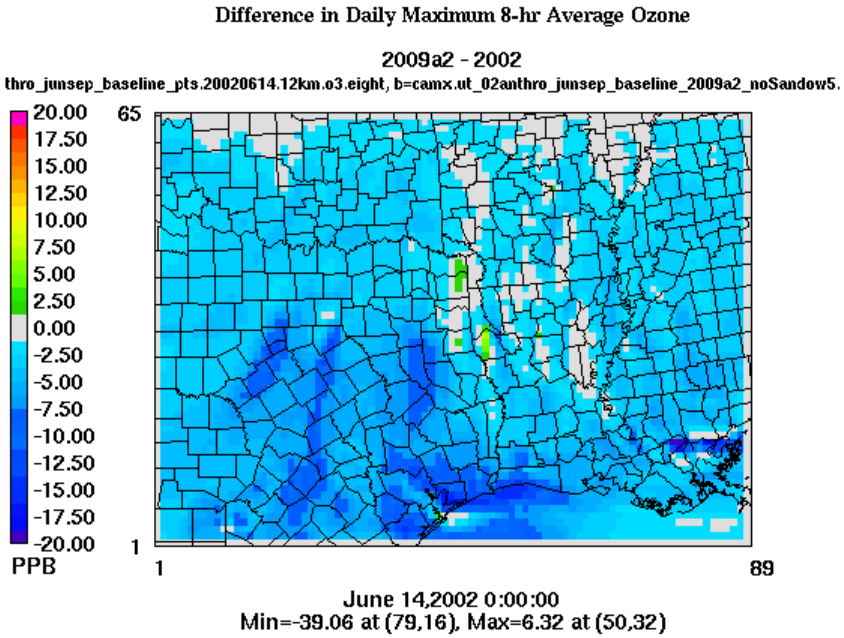


**Figure B15: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 15 between the 2002 Base Case and 2009 Future Case.**

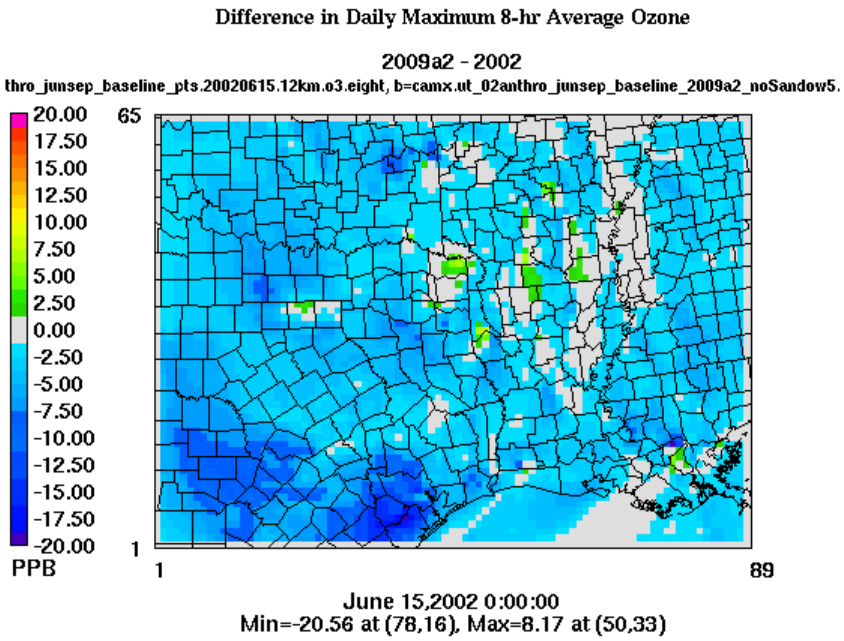



**Figure B16: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 16 between the 2002 Base Case and 2009 Future Case.**

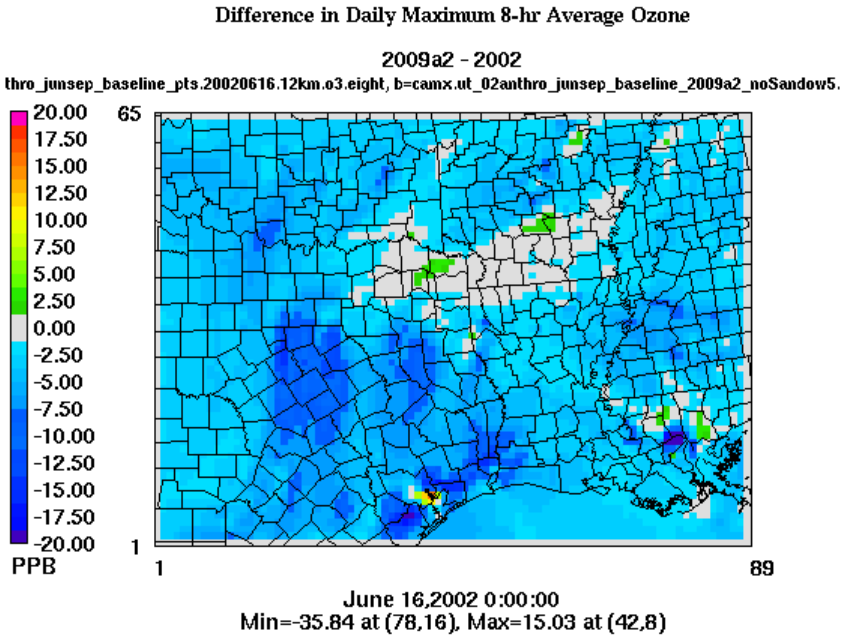


**Figure B17: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 17 between the 2002 Base Case and 2009 Future Case.**

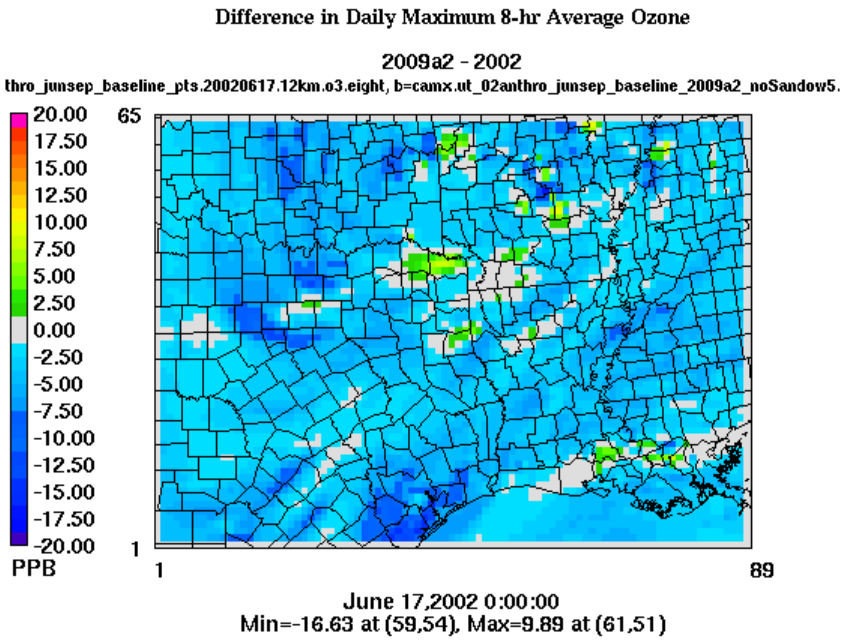



**Figure B18: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 18 between the 2002 Base Case and 2009 Future Case.**

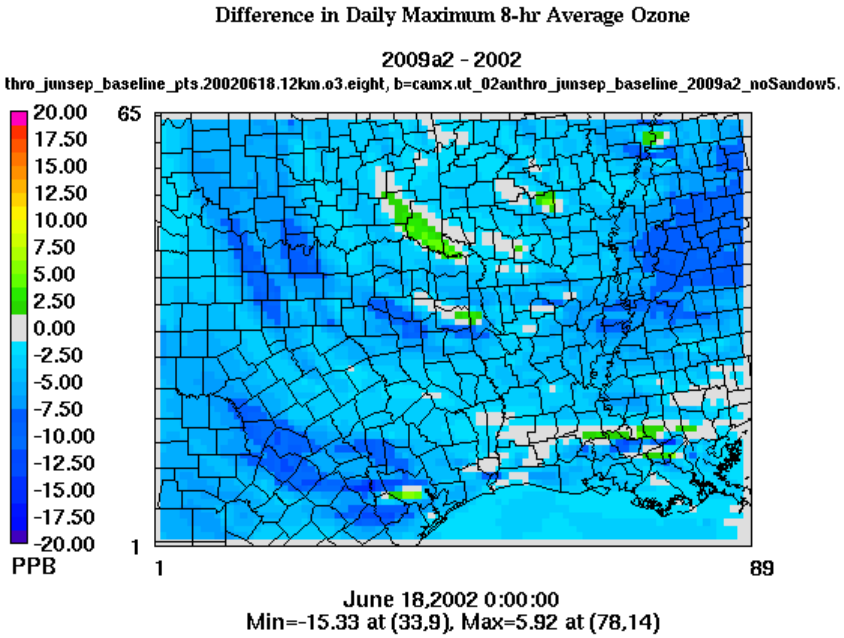


**Figure B19: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 19 between the 2002 Base Case and 2009 Future Case.**

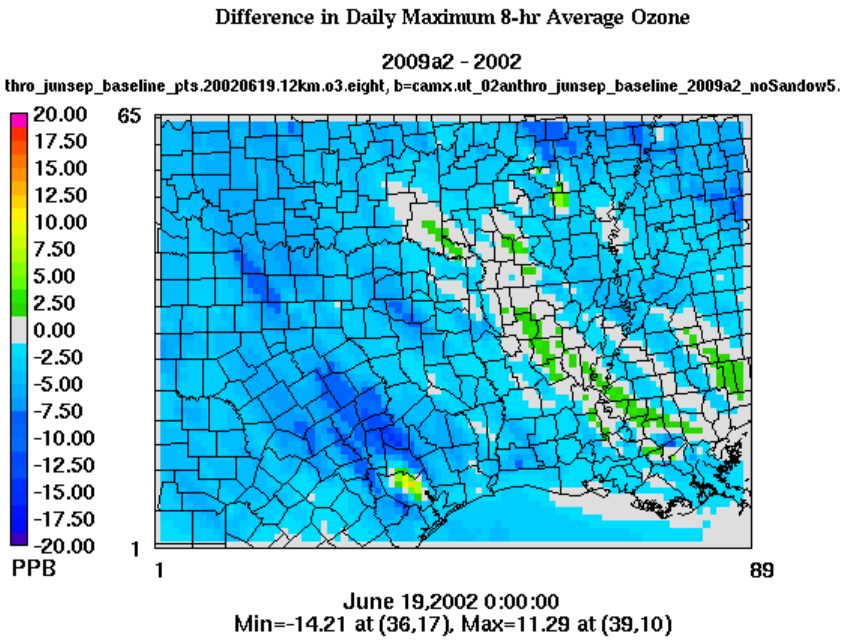



**Figure B20: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 20 between the 2002 Base Case and 2009 Future Case.**

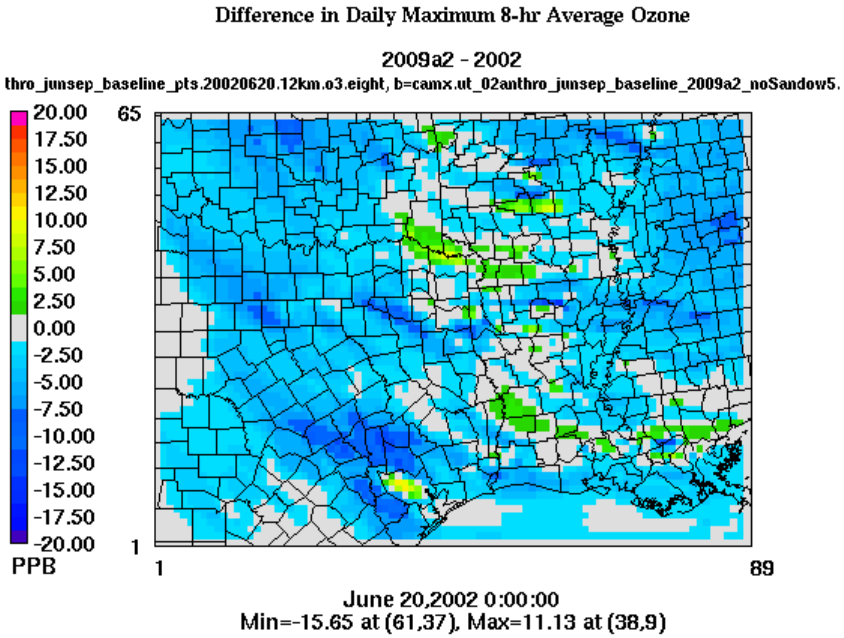


**Figure B21: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 21 between the 2002 Base Case and 2009 Future Case.**

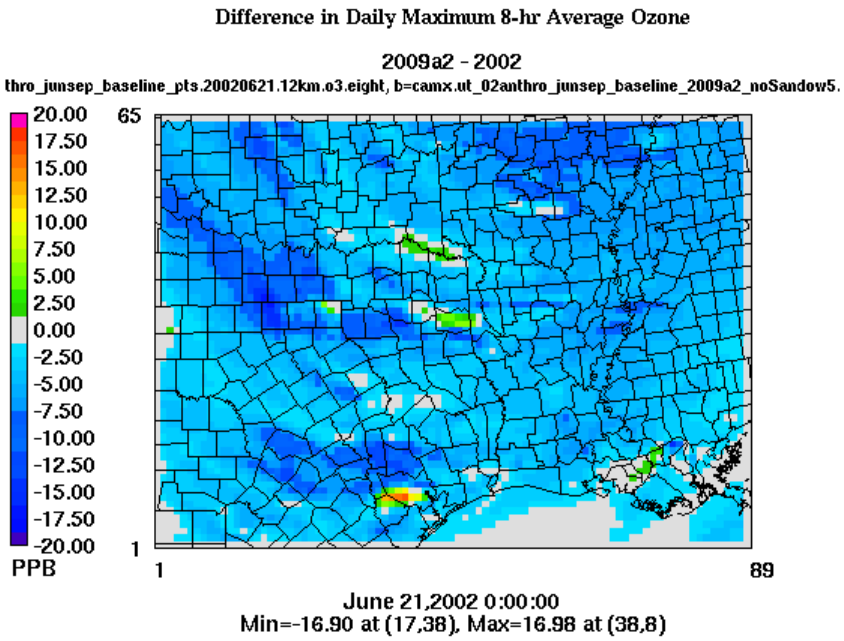



**Figure B22: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 22 between the 2002 Base Case and 2009 Future Case.**

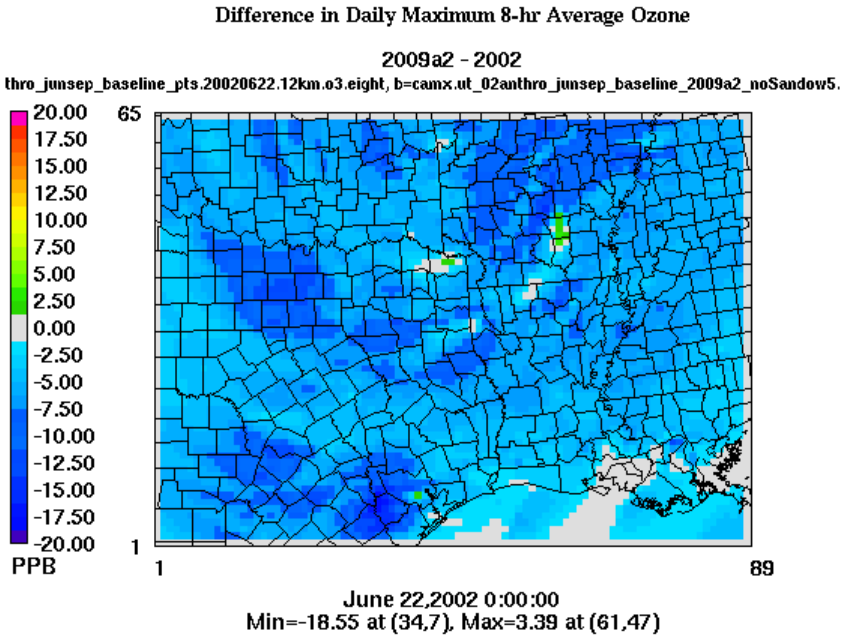


**Figure B23: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 23 between the 2002 Base Case and 2009 Future Case.**

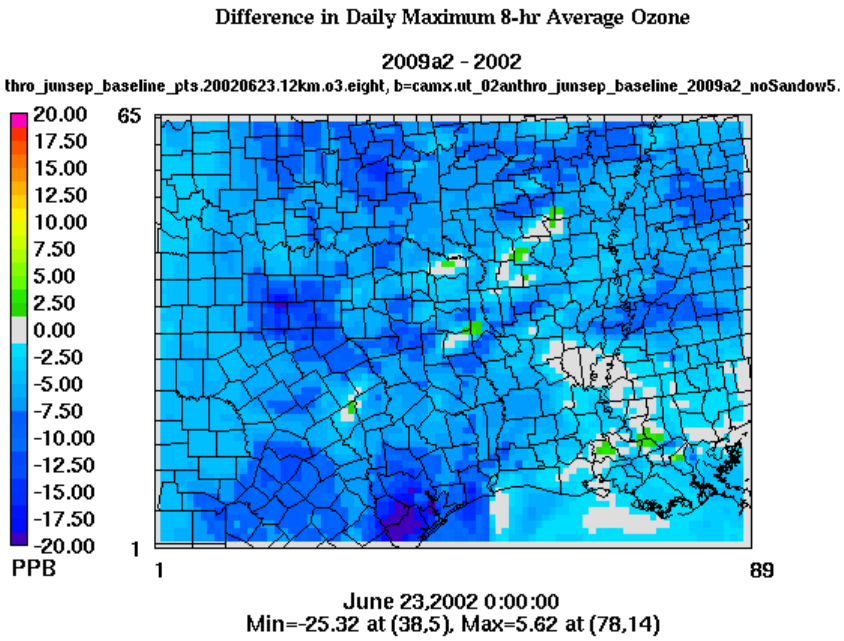



**Figure B24: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 24 between the 2002 Base Case and 2009 Future Case.**

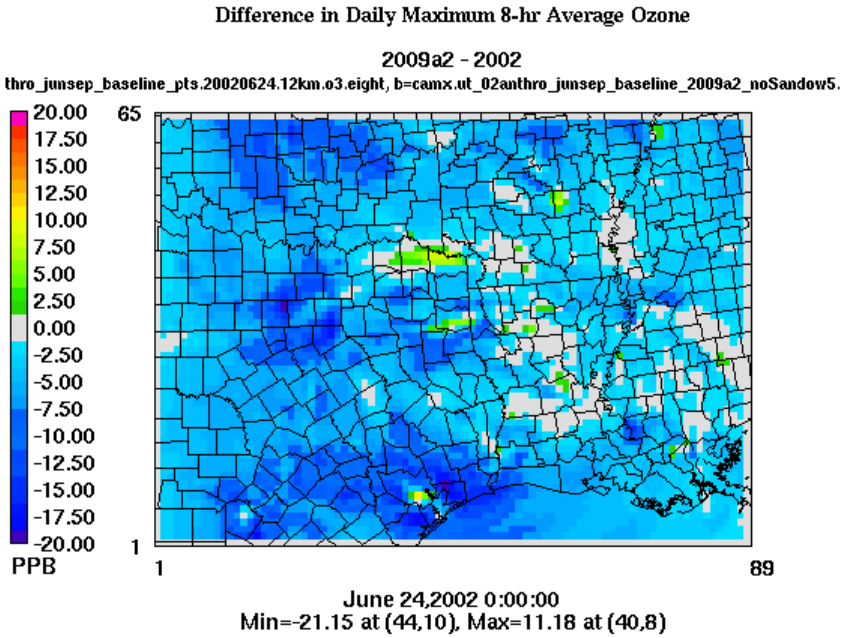


**Figure B25: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 25 between the 2002 Base Case and 2009 Future Case.**

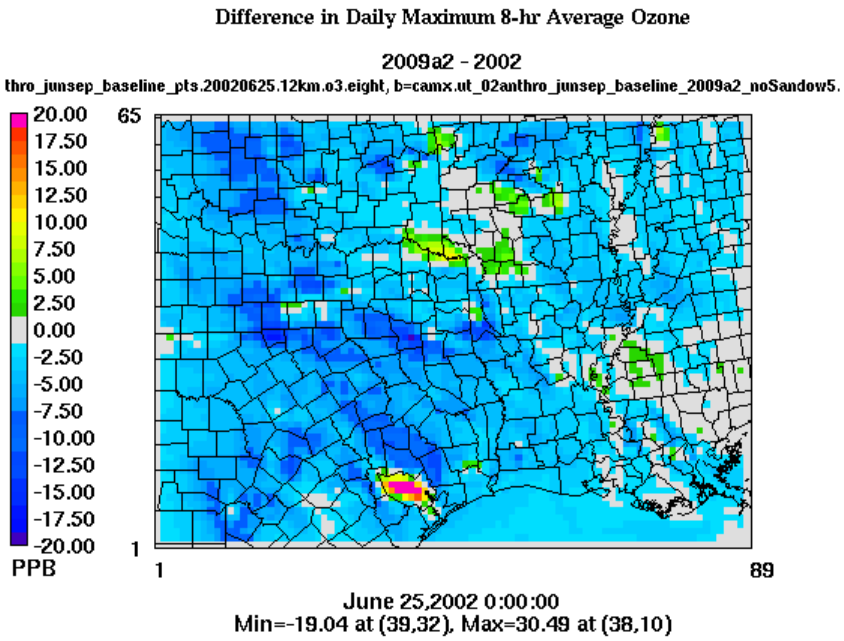



**Figure B26: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 26 between the 2002 Base Case and 2009 Future Case.**

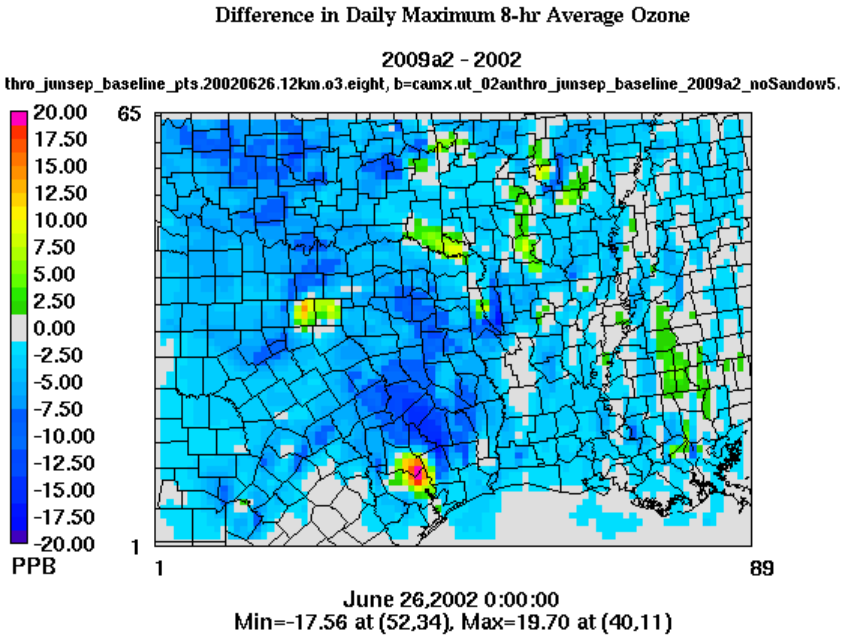


**Figure B27: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 27 between the 2002 Base Case and 2009 Future Case.**

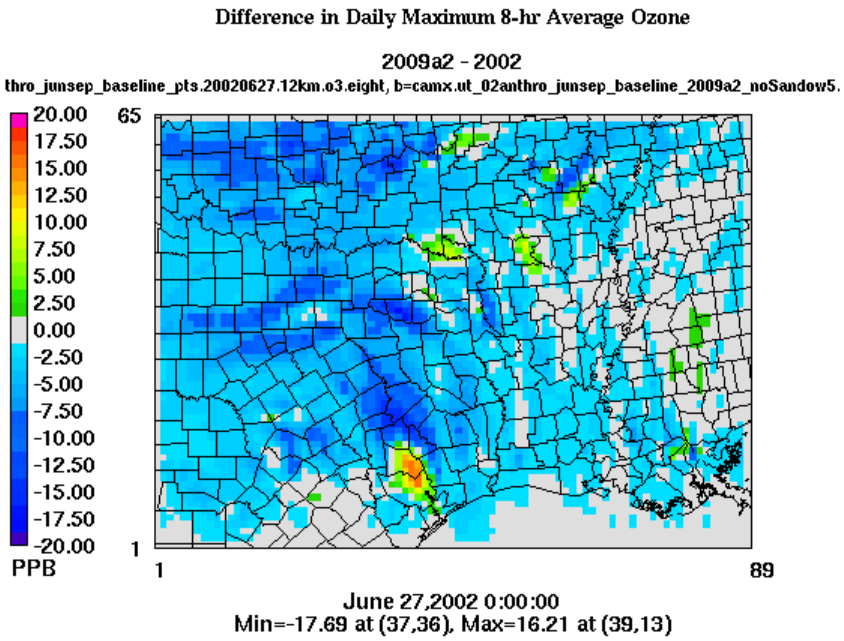



**Figure B28: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 28 between the 2002 Base Case and 2009 Future Case.**

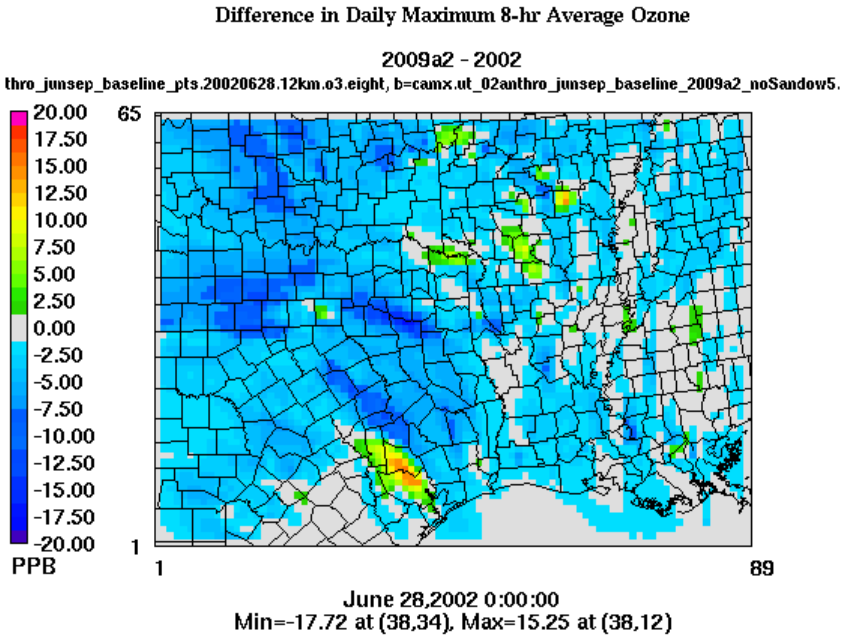


**Figure B29: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 29 between the 2002 Base Case and 2009 Future Case.**

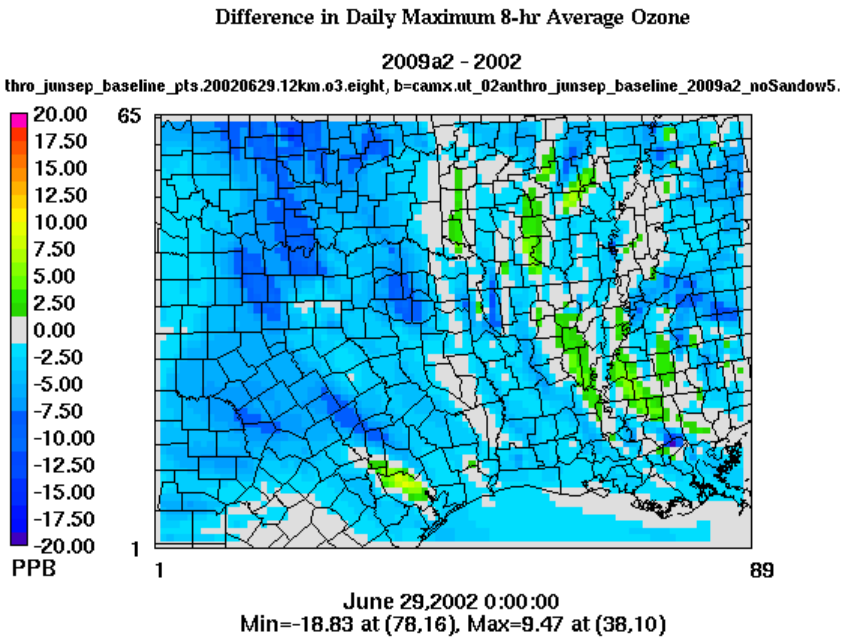



**Figure B30: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on June 30 between the 2002 Base Case and 2009 Future Case.**

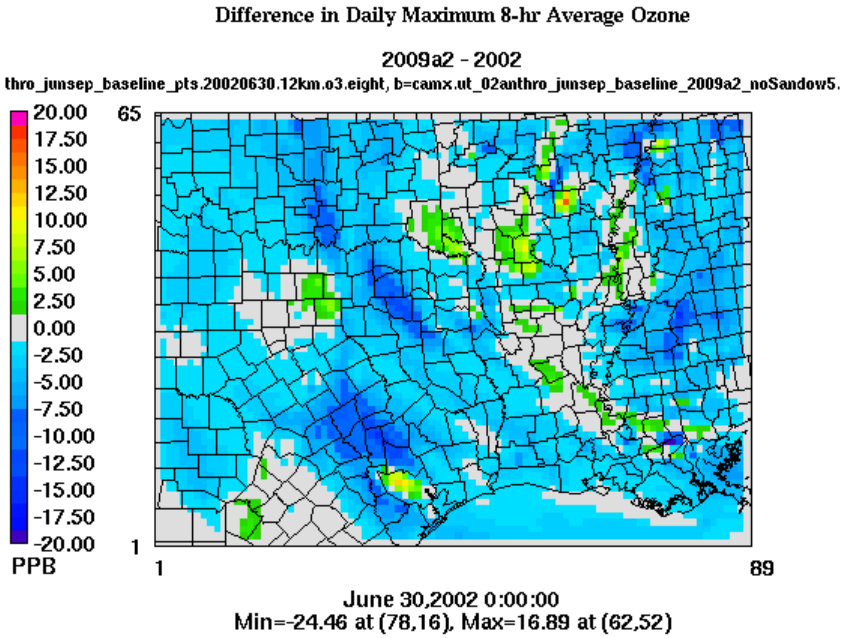


**Figure B31: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 01 between the 2002 Base Case and 2009 Future Case.**

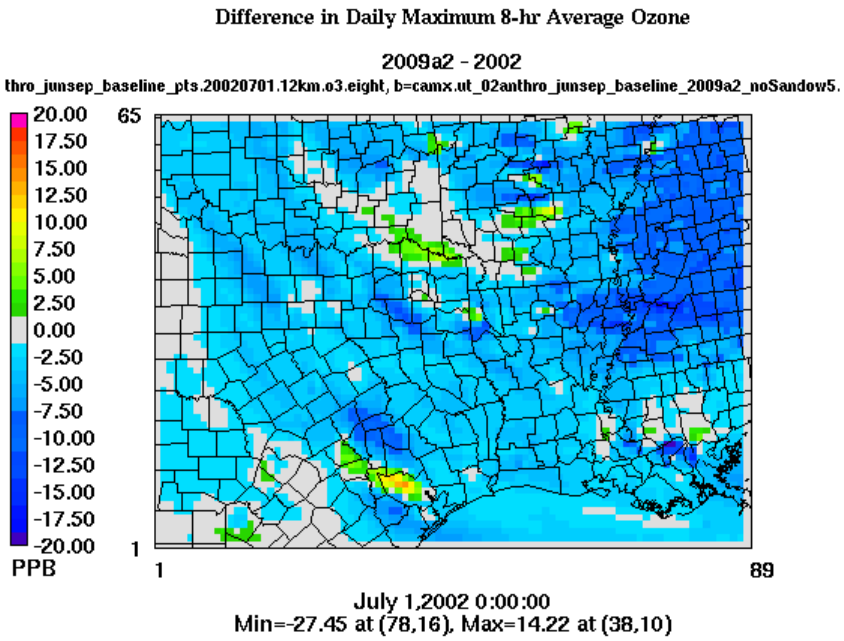



**Figure B32: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 02 between the 2002 Base Case and 2009 Future Case.**

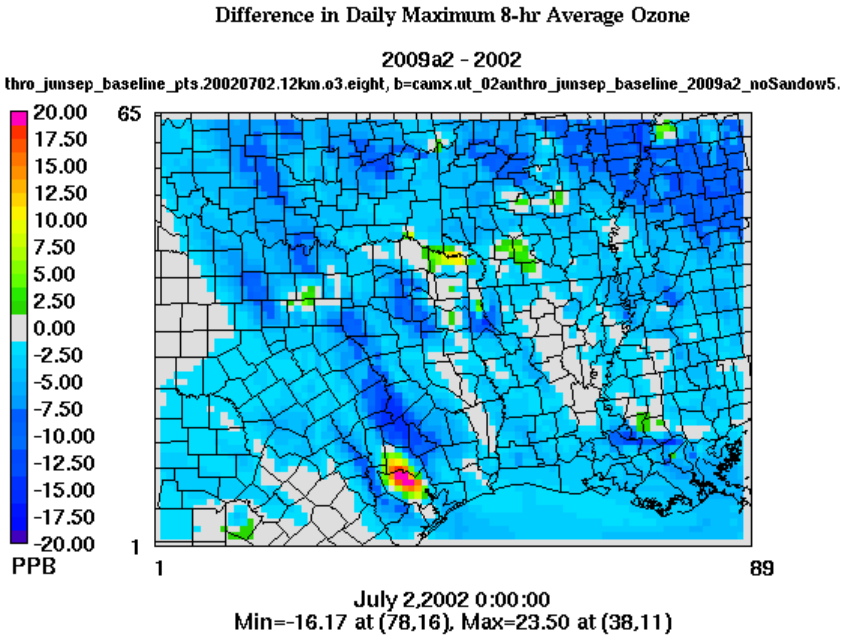


**Figure B33: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 03 between the 2002 Base Case and 2009 Future Case.**

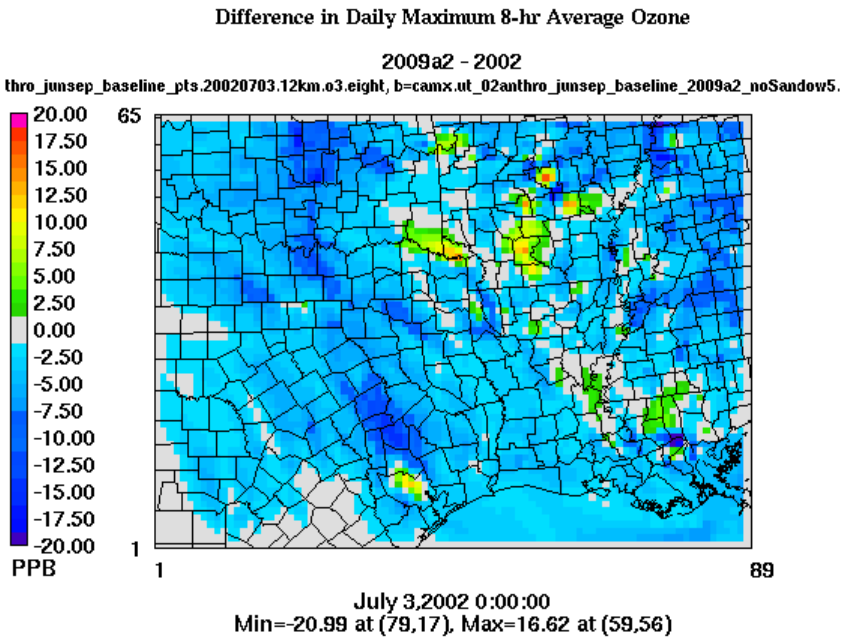



**Figure B34: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 04 between the 2002 Base Case and 2009 Future Case.**

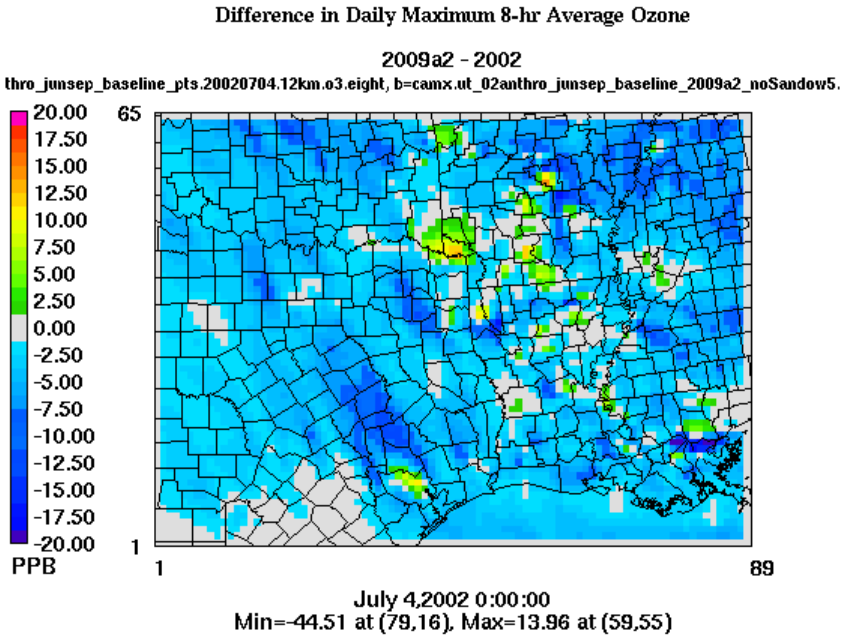


**Figure B35: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 05 between the 2002 Base Case and 2009 Future Case.**

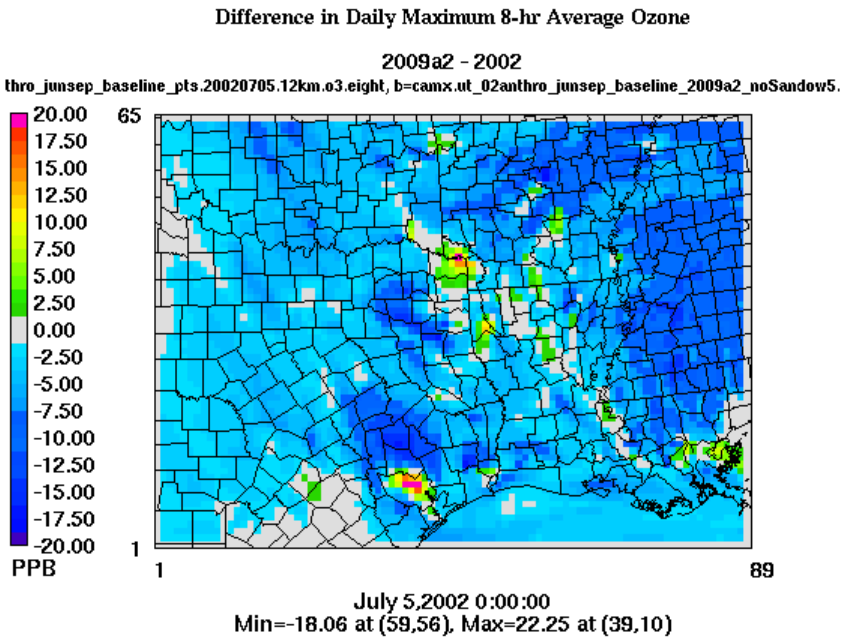



**Figure B36: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 06 between the 2002 Base Case and 2009 Future Case.**

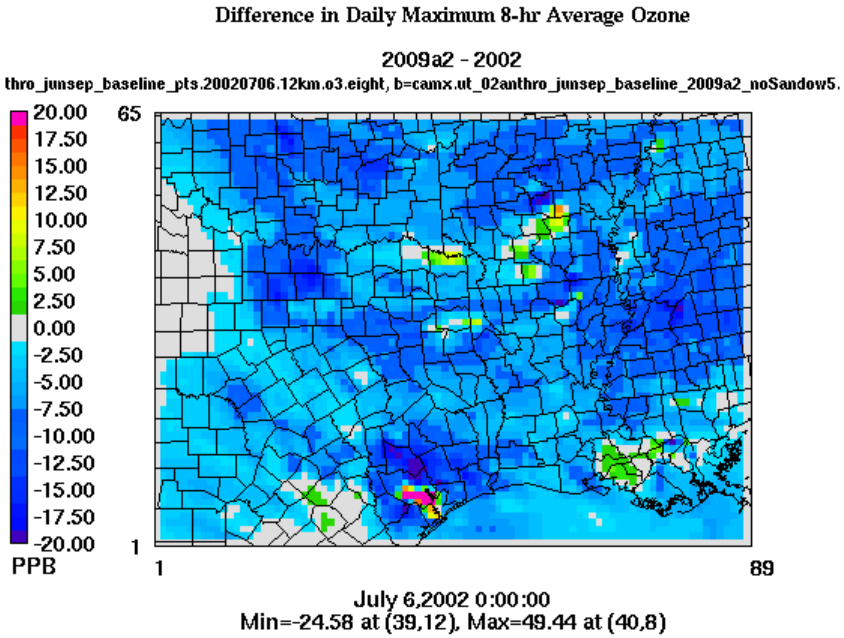


**Figure B37: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 07 between the 2002 Base Case and 2009 Future Case.**

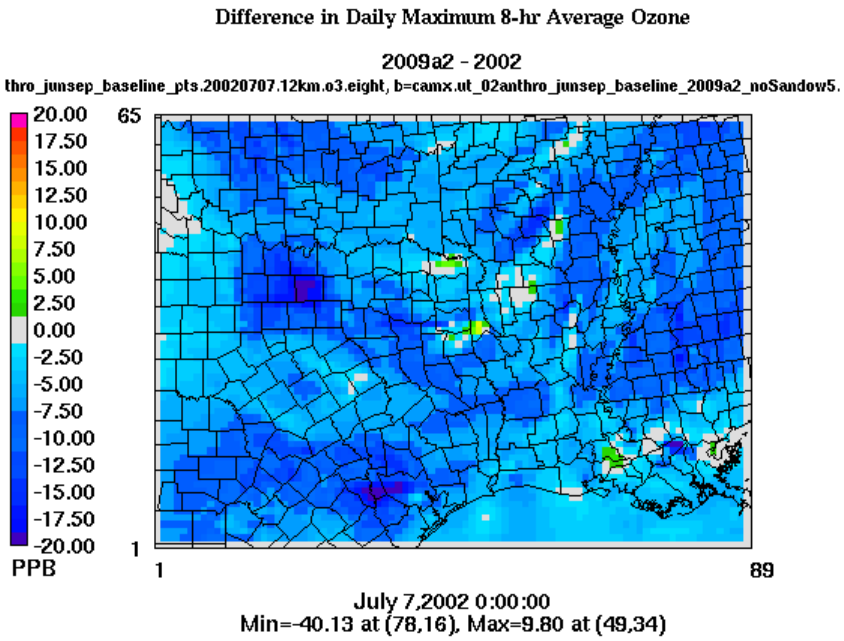



**Figure B38: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 08 between the 2002 Base Case and 2009 Future Case.**

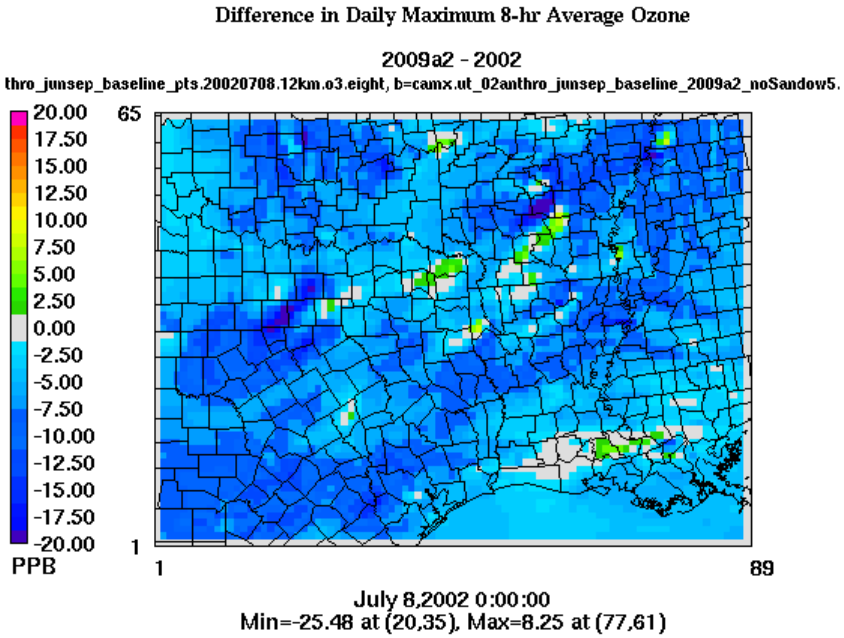


**Figure B39: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 09 between the 2002 Base Case and 2009 Future Case.**

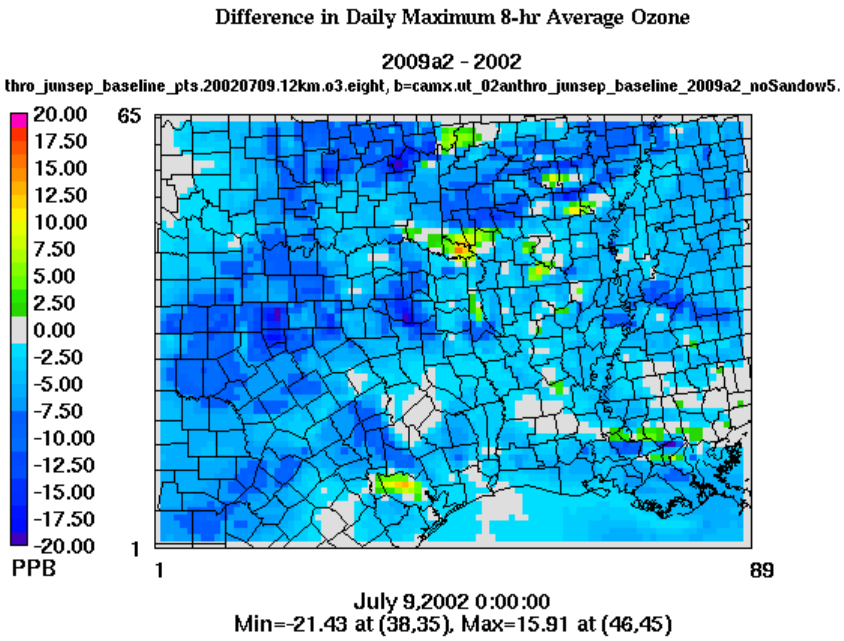



**Figure B40: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 10 between the 2002 Base Case and 2009 Future Case.**

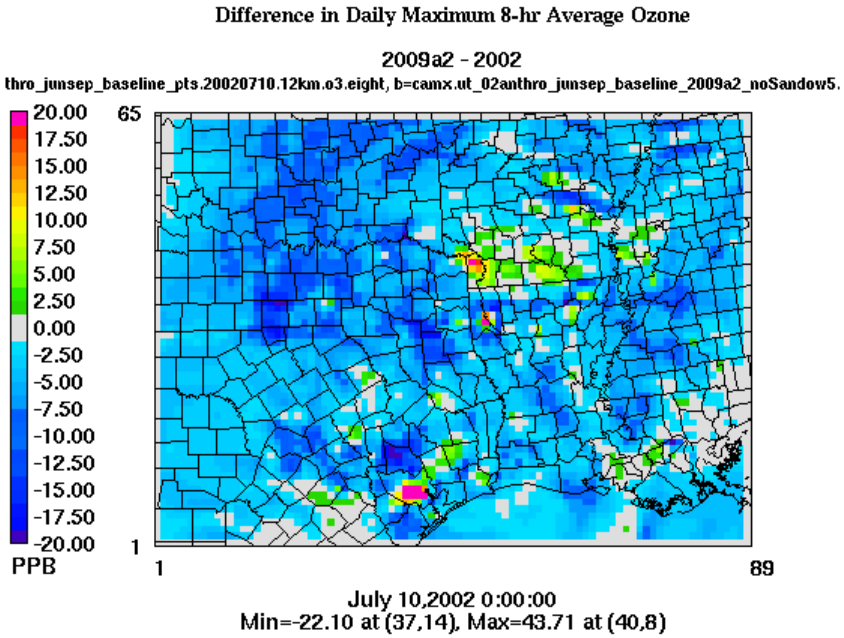


**Figure B41: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 11 between the 2002 Base Case and 2009 Future Case.**

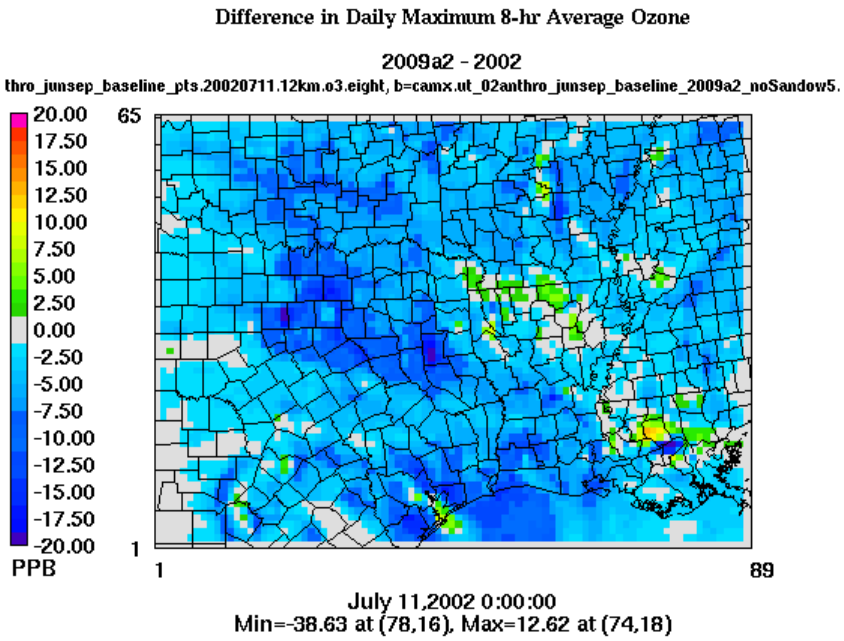



**Figure B42: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 12 between the 2002 Base Case and 2009 Future Case.**

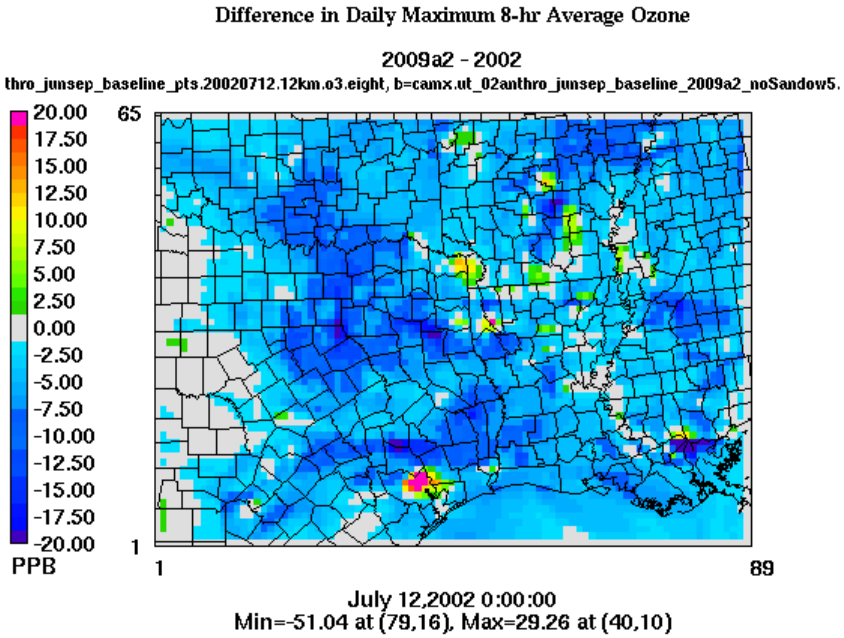


**Figure B43: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 13 between the 2002 Base Case and 2009 Future Case.**

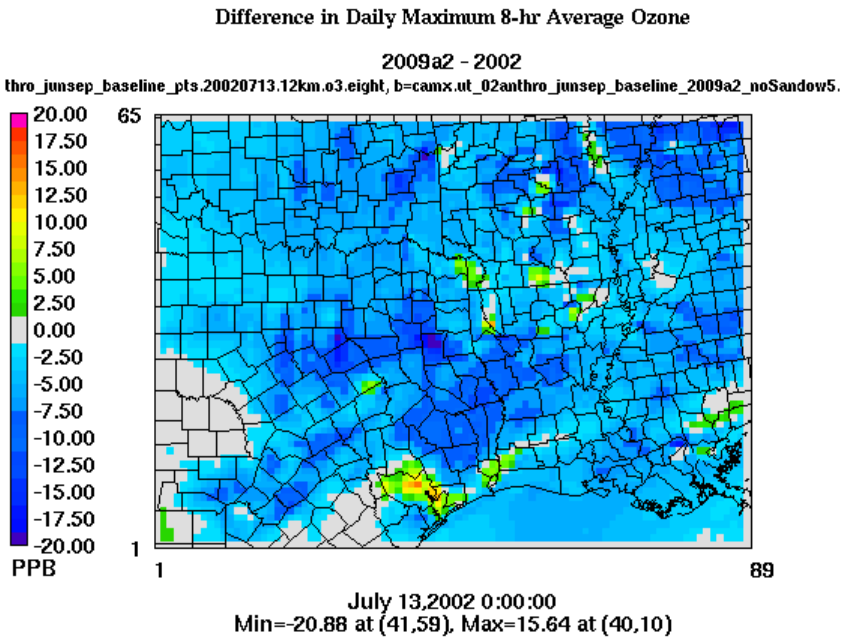



**Figure B44: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 14 between the 2002 Base Case and 2009 Future Case.**

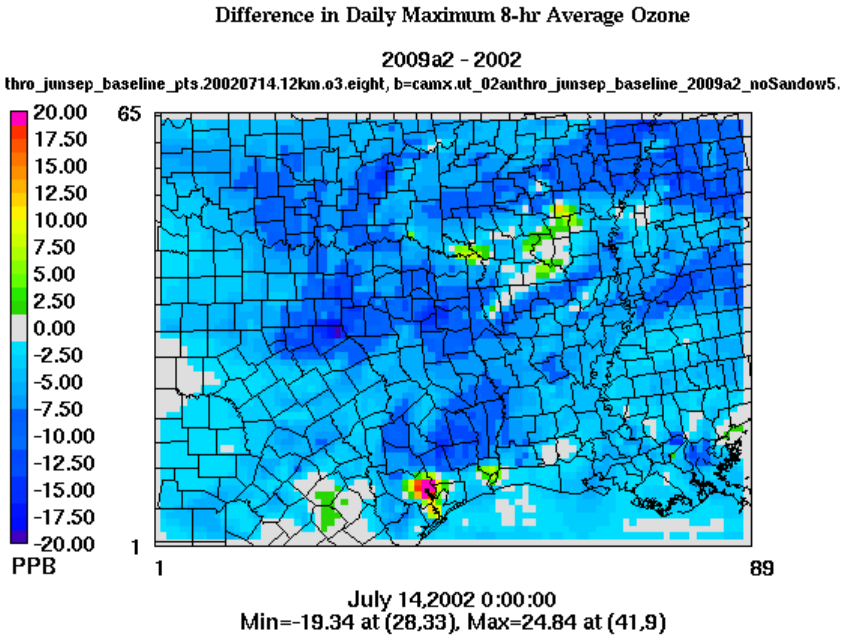


**Figure B45: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 15 between the 2002 Base Case and 2009 Future Case.**

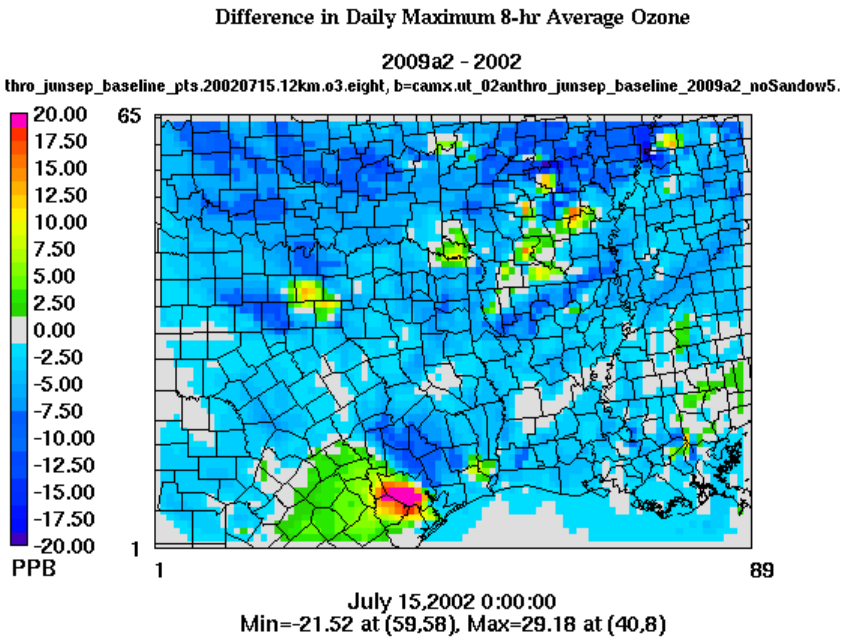



**Figure B46: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 16 between the 2002 Base Case and 2009 Future Case.**

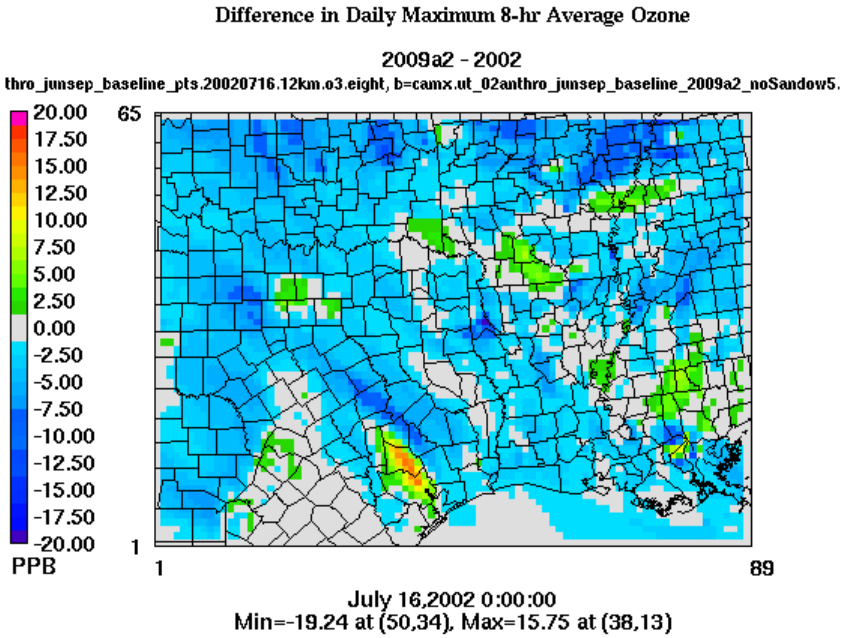


**Figure B47: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 17 between the 2002 Base Case and 2009 Future Case.**

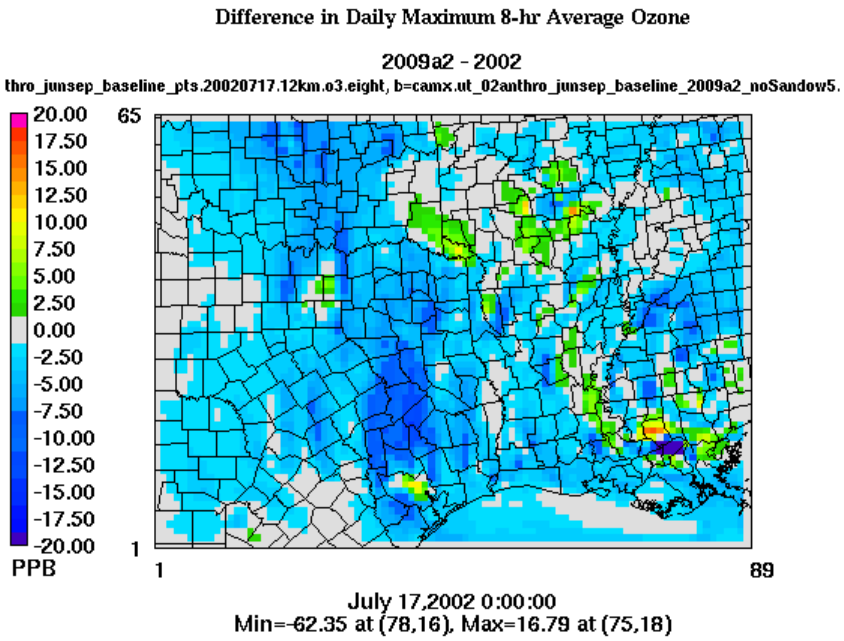



**Figure B48: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 18 between the 2002 Base Case and 2009 Future Case.**

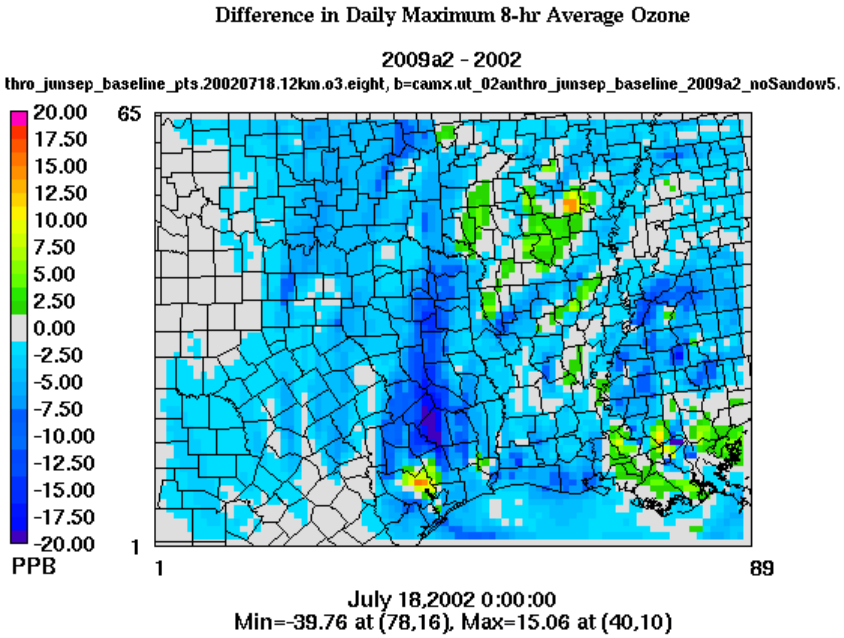


**Figure B49: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 19 between the 2002 Base Case and 2009 Future Case.**

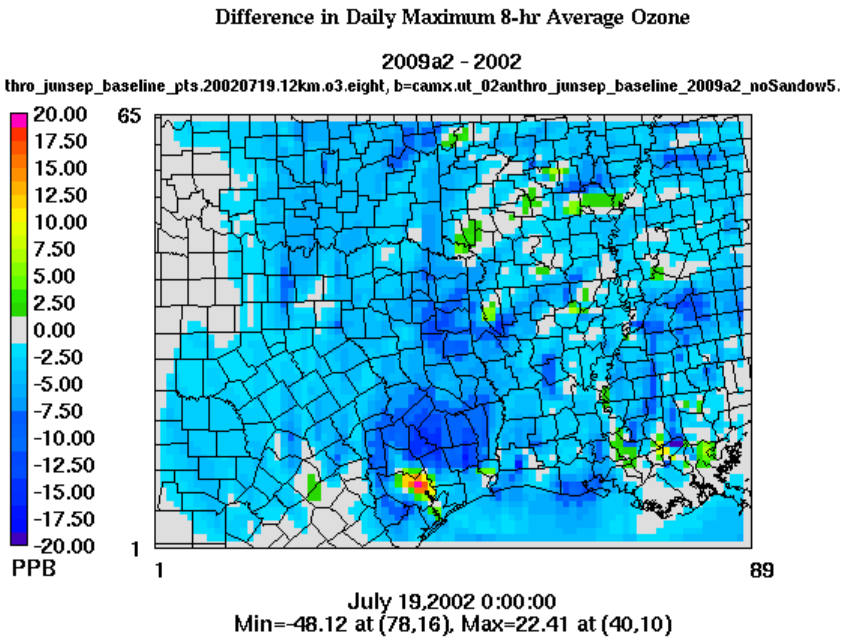



**Figure B50: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 20 between the 2002 Base Case and 2009 Future Case.**

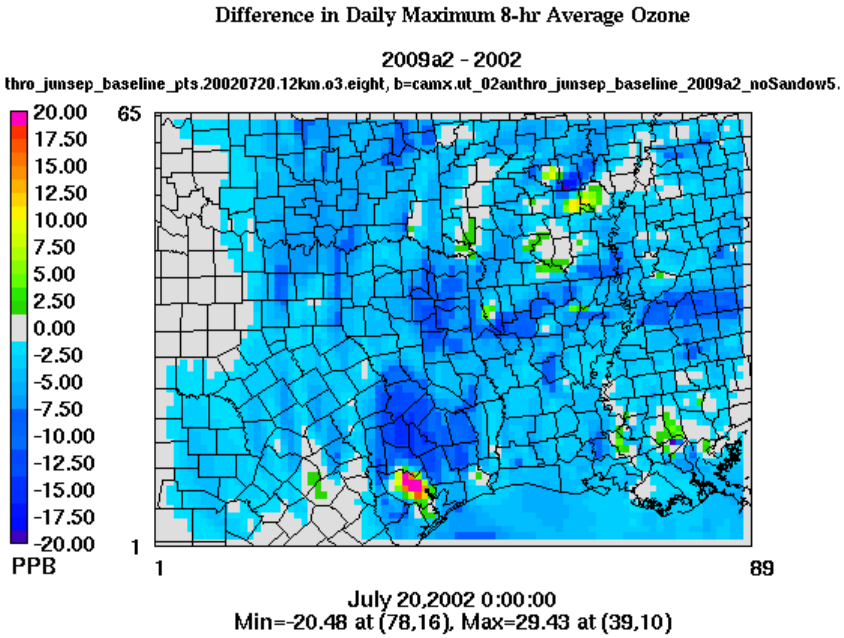


**Figure B51: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 21 between the 2002 Base Case and 2009 Future Case.**

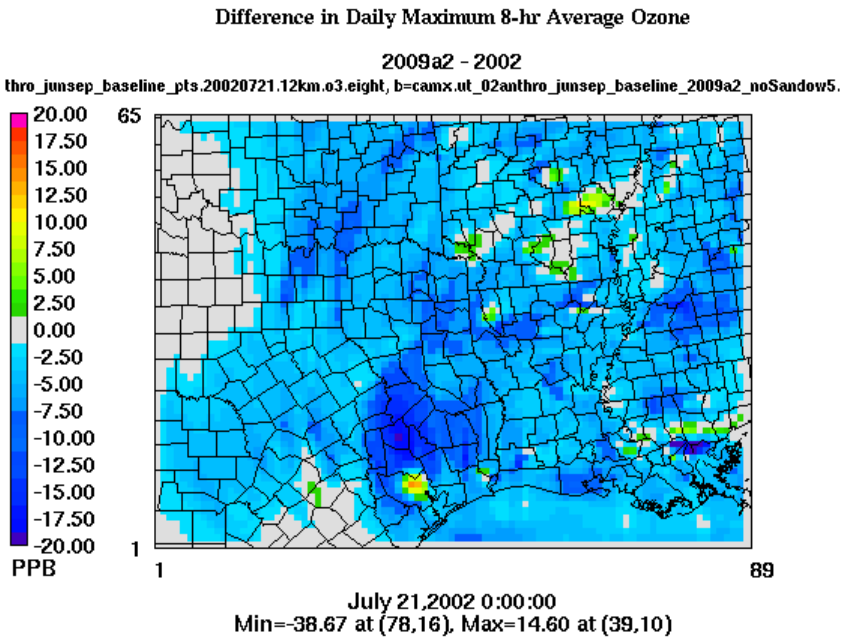



**Figure B52: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 22 between the 2002 Base Case and 2009 Future Case.**

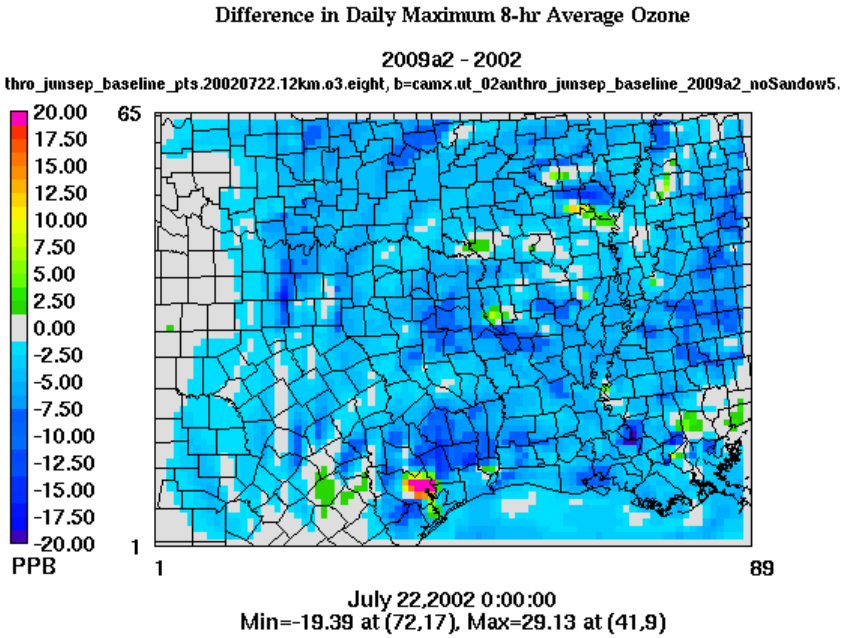


**Figure B53: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 23 between the 2002 Base Case and 2009 Future Case.**

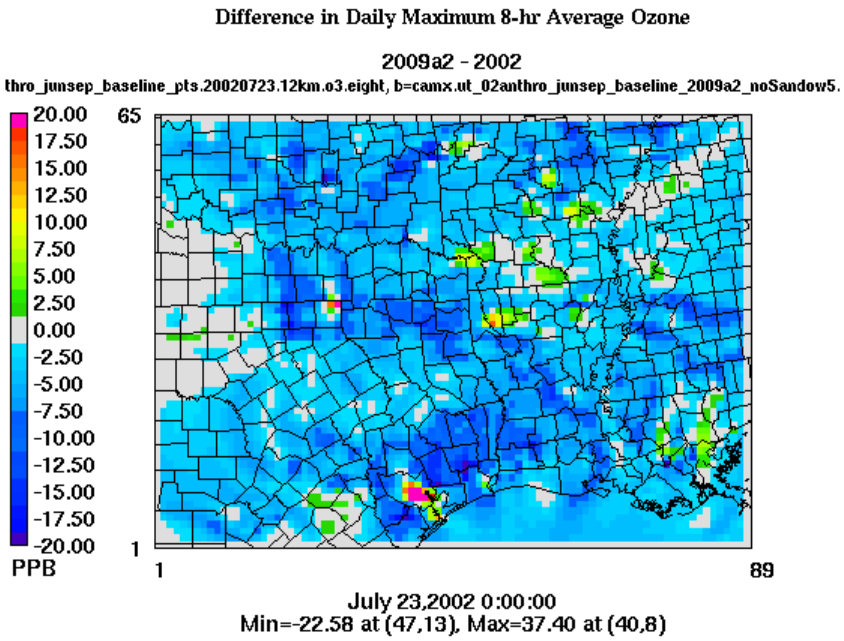



**Figure B54: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 24 between the 2002 Base Case and 2009 Future Case.**

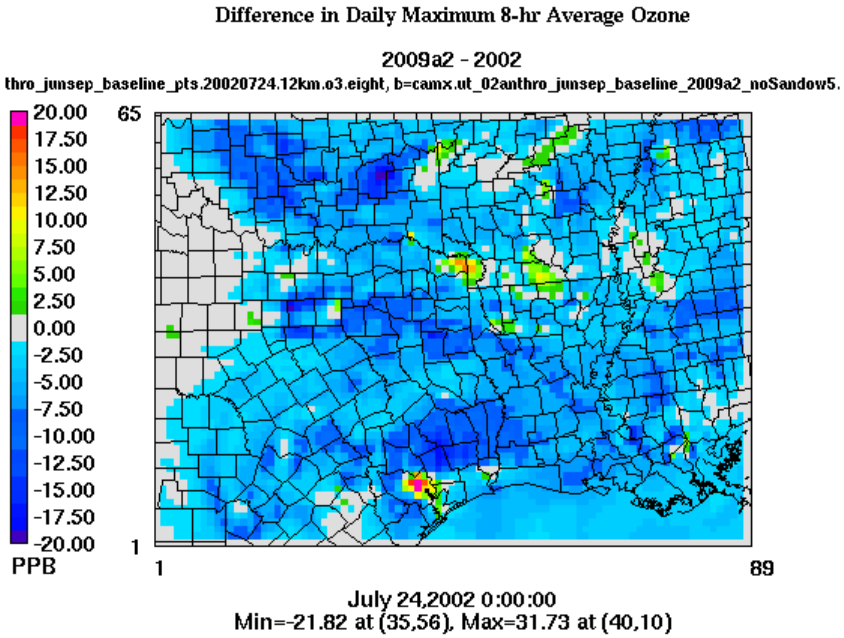


**Figure B55: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 25 between the 2002 Base Case and 2009 Future Case.**

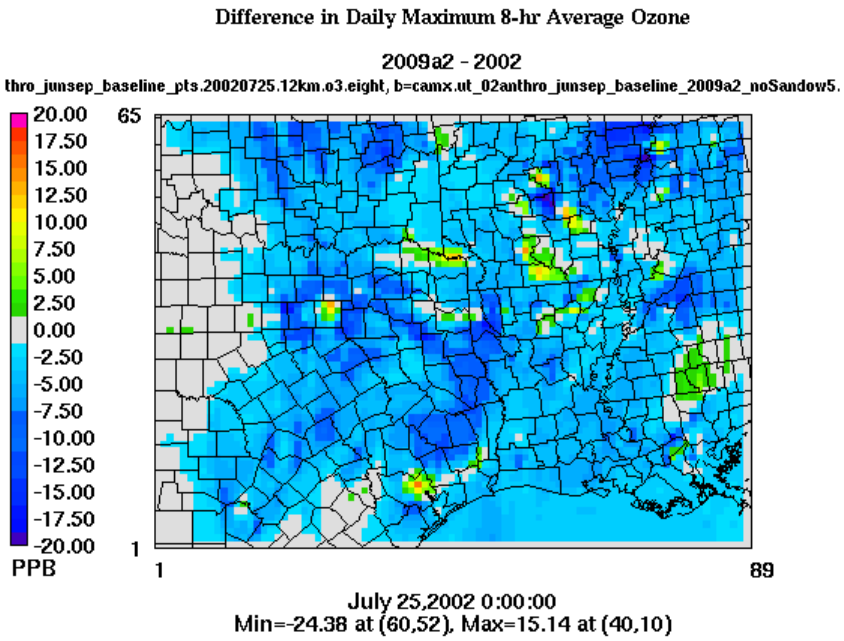



**Figure B56: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 26 between the 2002 Base Case and 2009 Future Case.**

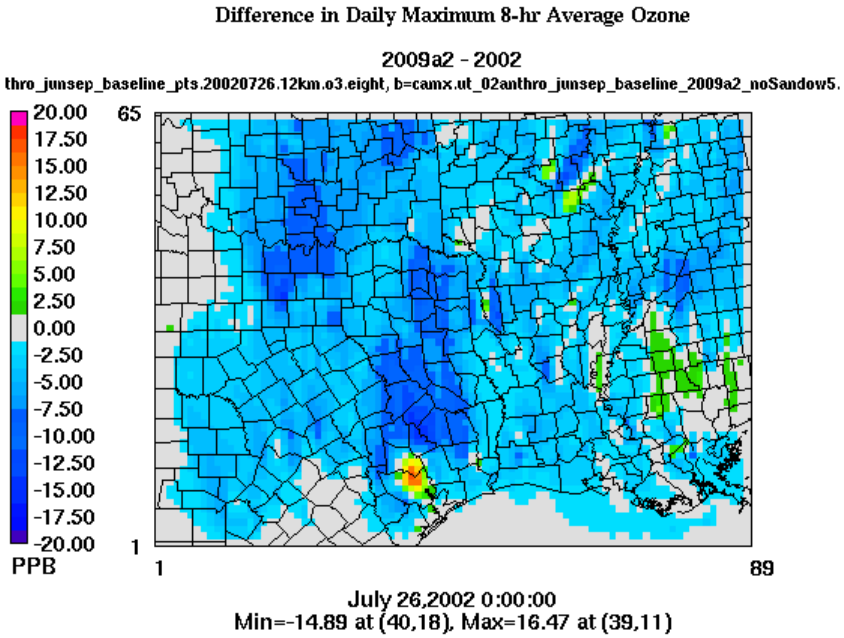


**Figure B57: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 27 between the 2002 Base Case and 2009 Future Case.**

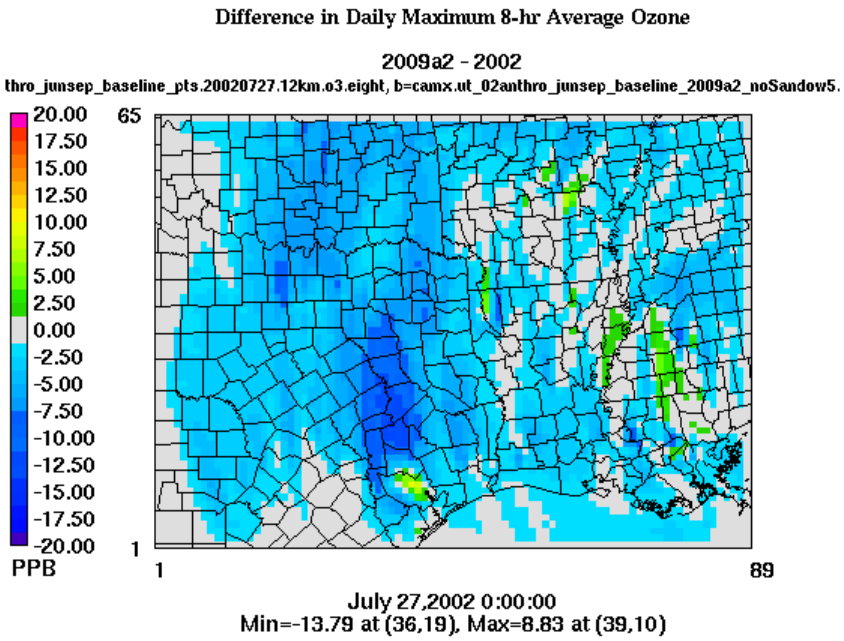



**Figure B58: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 28 between the 2002 Base Case and 2009 Future Case.**

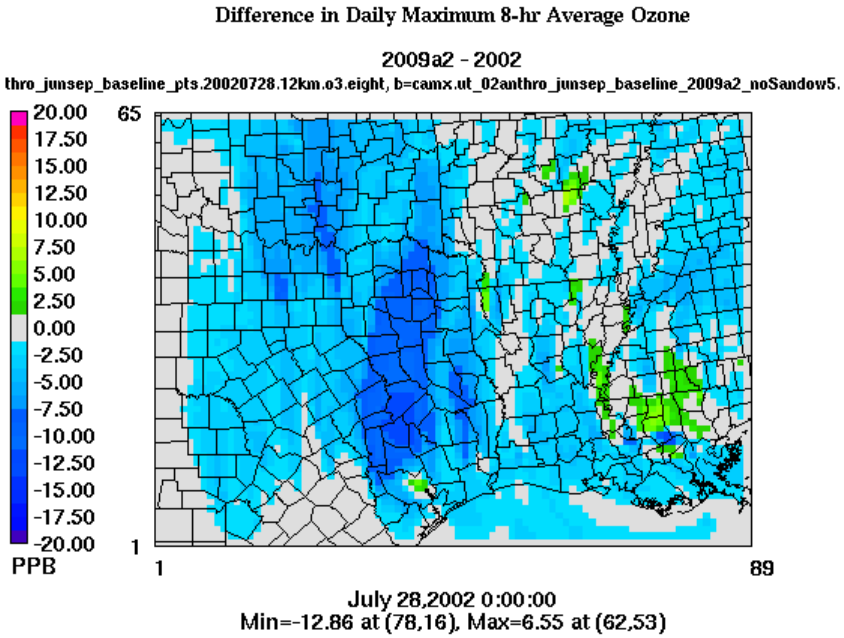


**Figure B59: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 29 between the 2002 Base Case and 2009 Future Case.**

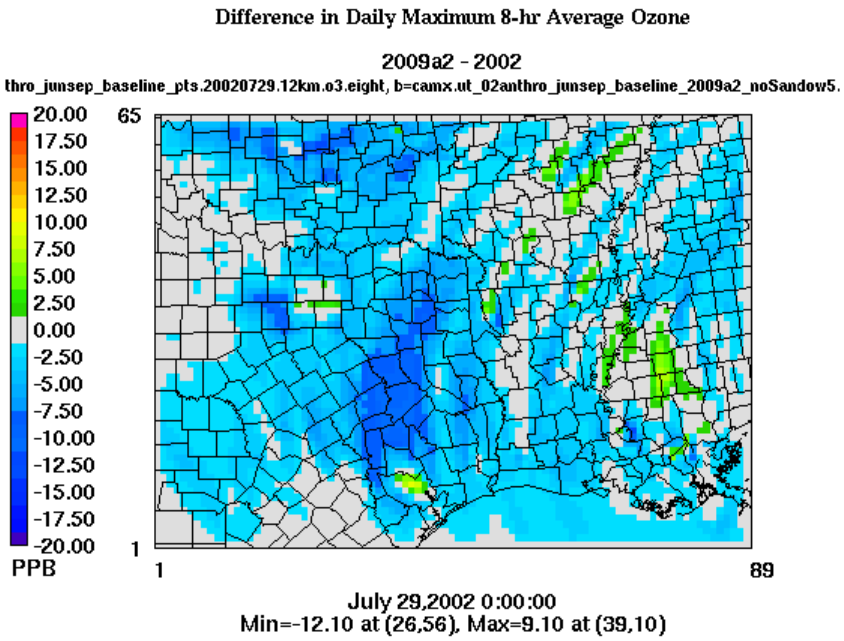



**Figure B60: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 30 between the 2002 Base Case and 2009 Future Case.**

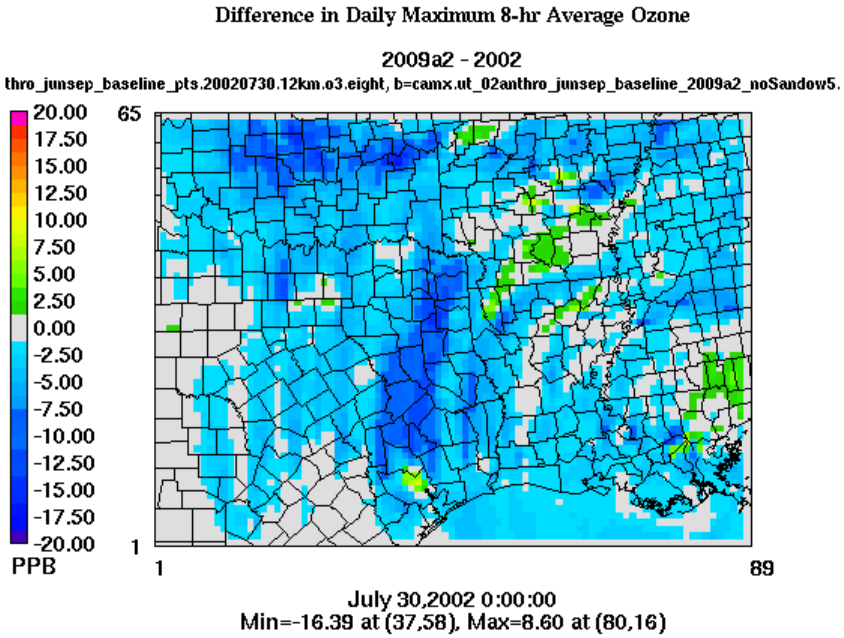


**Figure B61: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on July 31 between the 2002 Base Case and 2009 Future Case.**

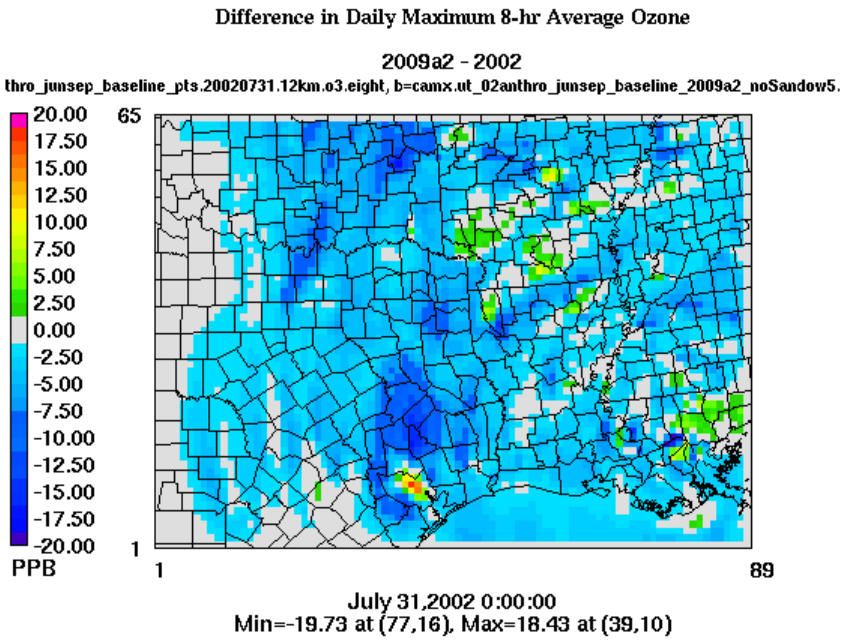



**Figure B62: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 01 between the 2002 Base Case and 2009 Future Case.**

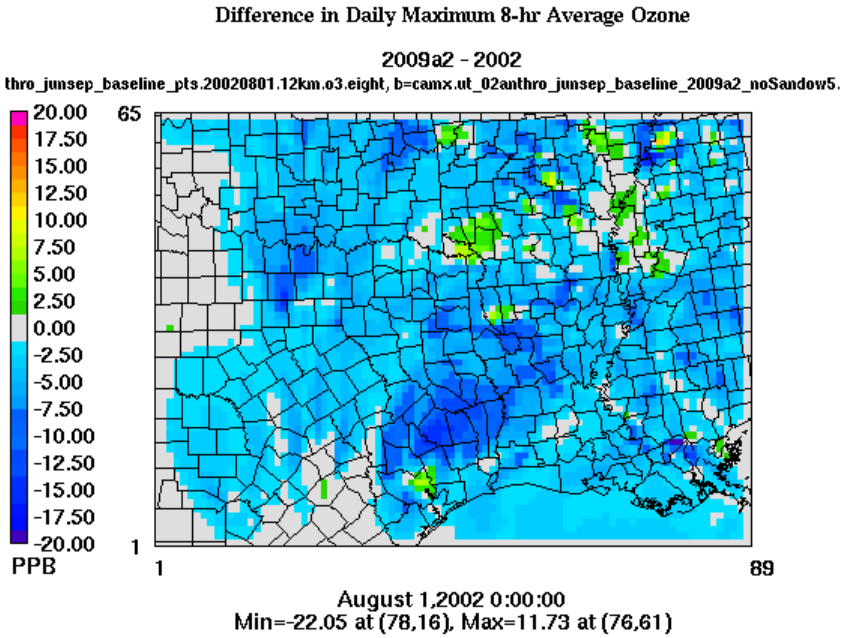


**Figure B63: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 02 between the 2002 Base Case and 2009 Future Case.**

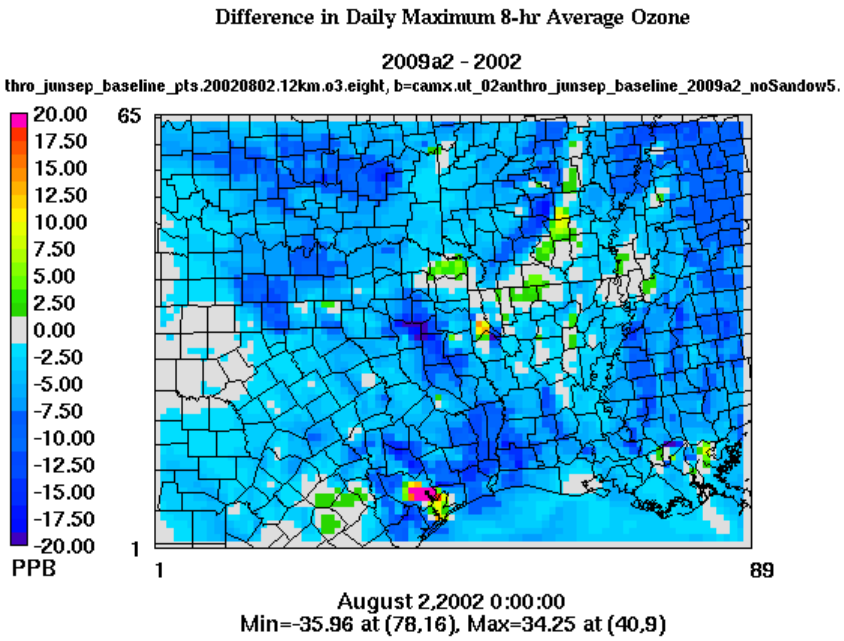



**Figure B64: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 03 between the 2002 Base Case and 2009 Future Case.**

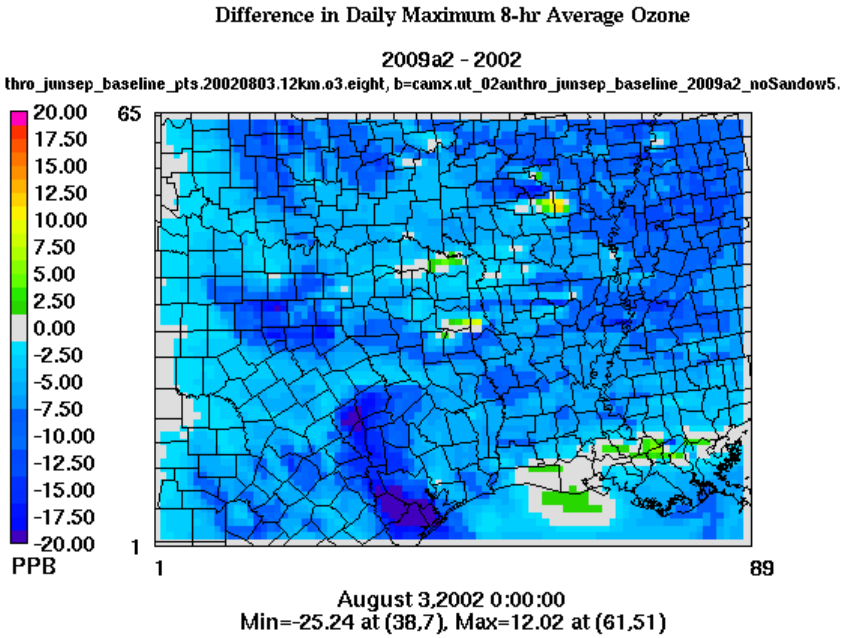


**Figure B65: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 04 between the 2002 Base Case and 2009 Future Case.**

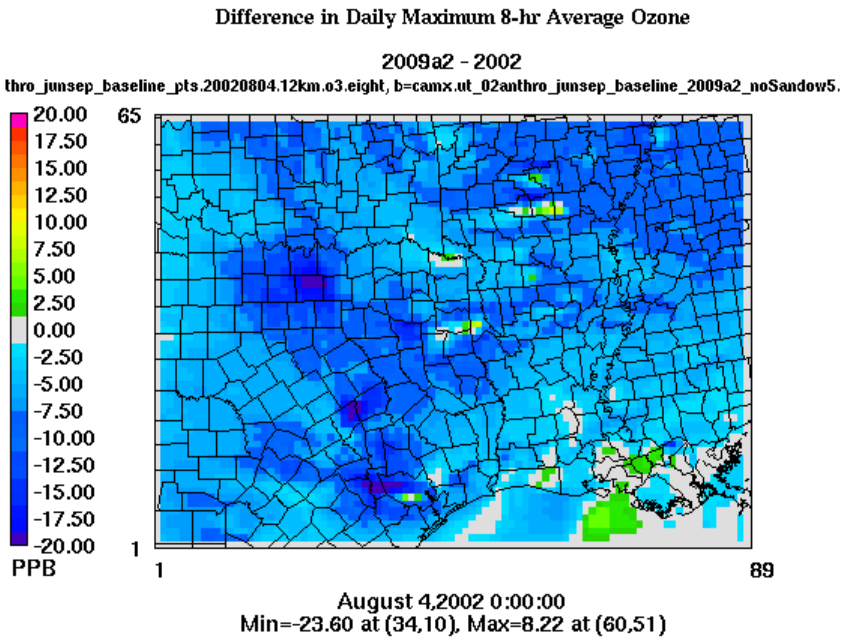



**Figure B66: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 05 between the 2002 Base Case and 2009 Future Case.**

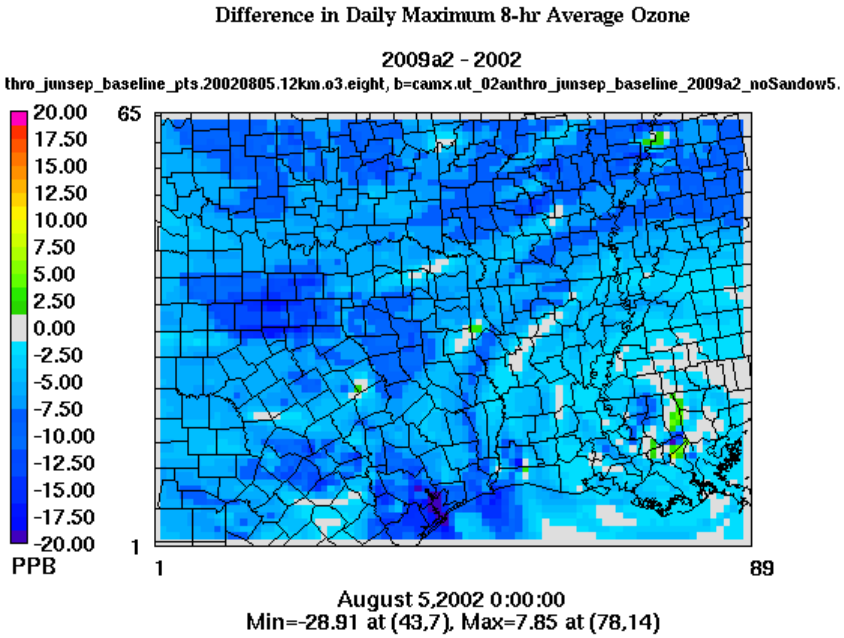


**Figure B67: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 06 between the 2002 Base Case and 2009 Future Case.**

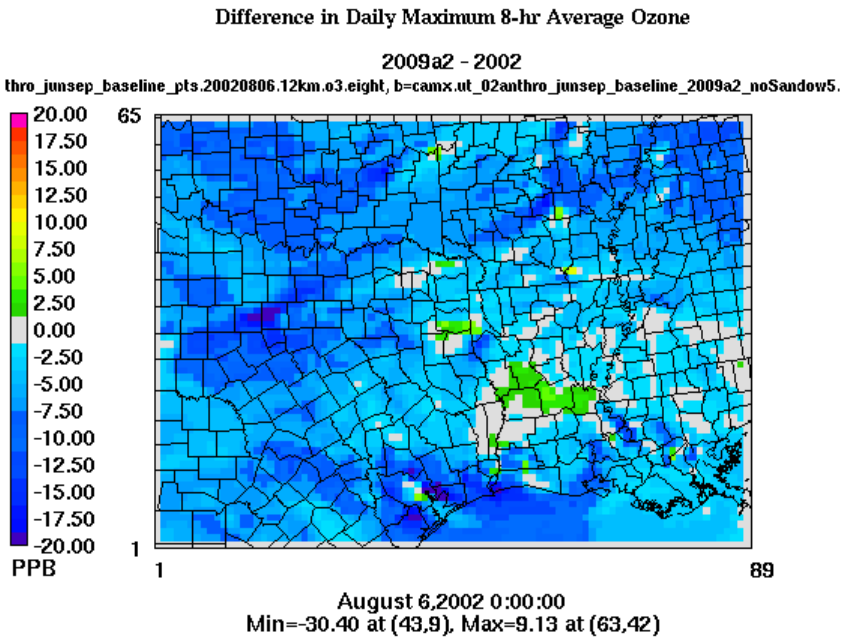



**Figure B68: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 07 between the 2002 Base Case and 2009 Future Case.**

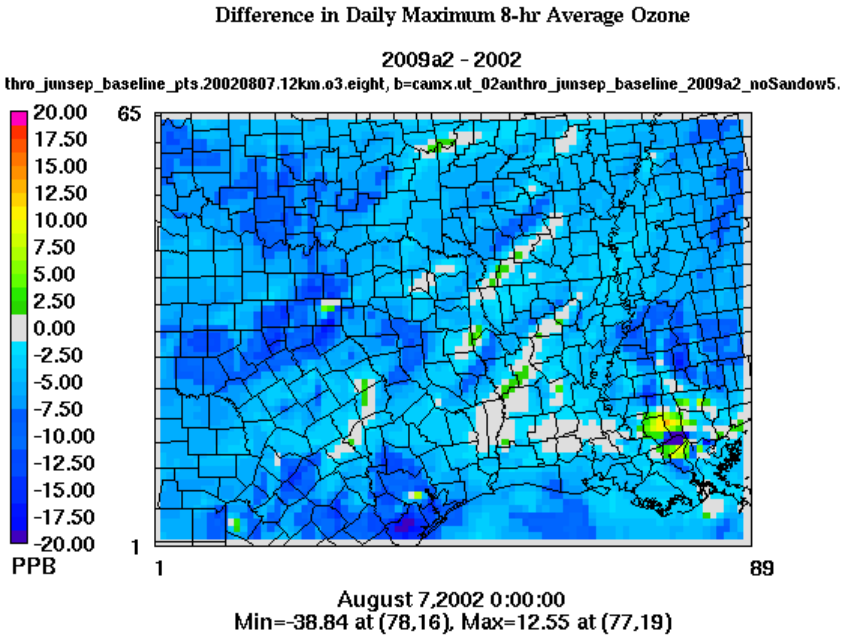


**Figure B69: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 08 between the 2002 Base Case and 2009 Future Case.**

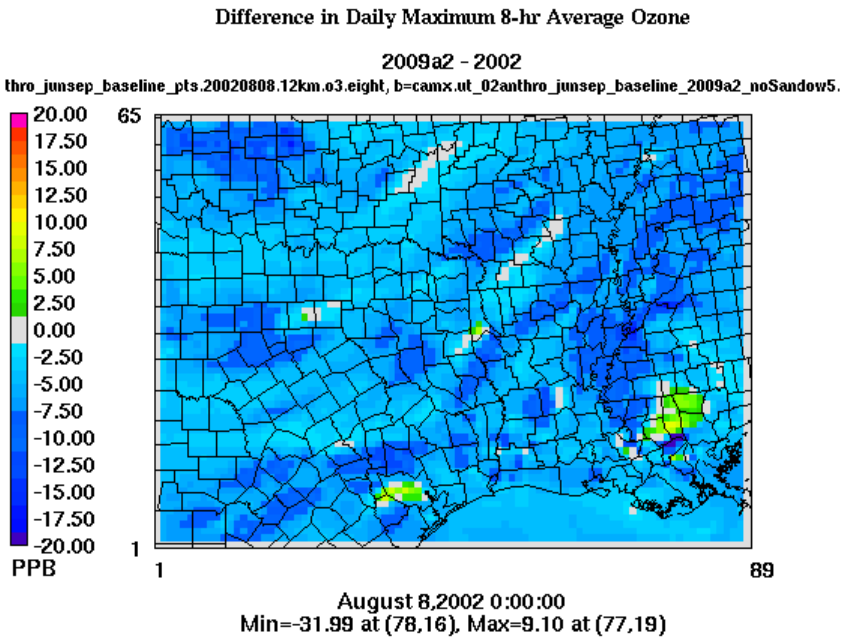



**Figure B70: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 09 between the 2002 Base Case and 2009 Future Case.**

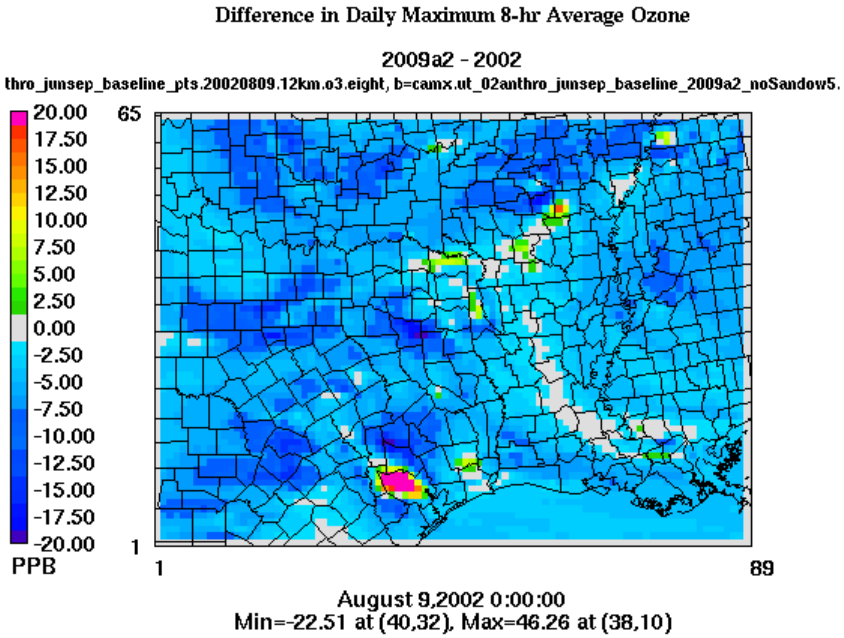


**Figure B71: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 10 between the 2002 Base Case and 2009 Future Case.**

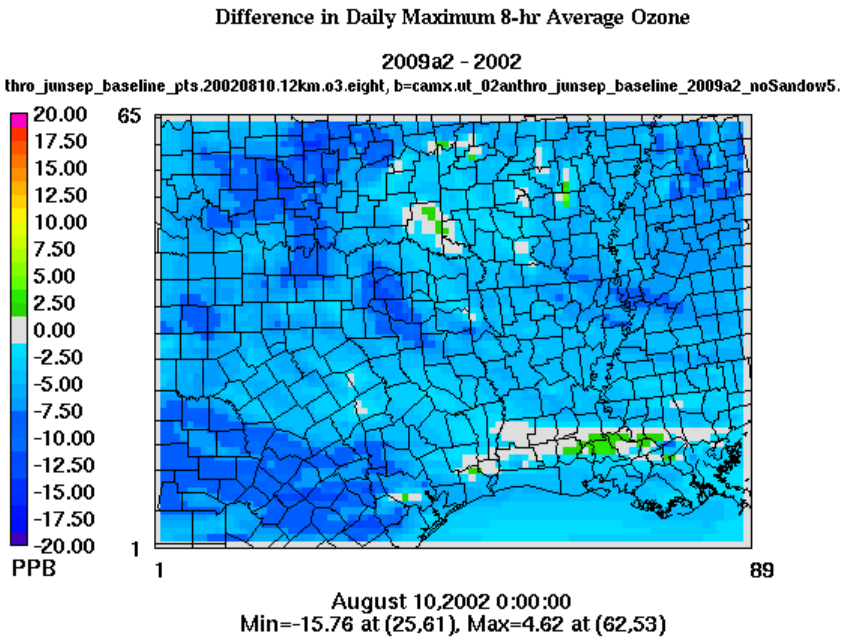



**Figure B72: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 11 between the 2002 Base Case and 2009 Future Case.**

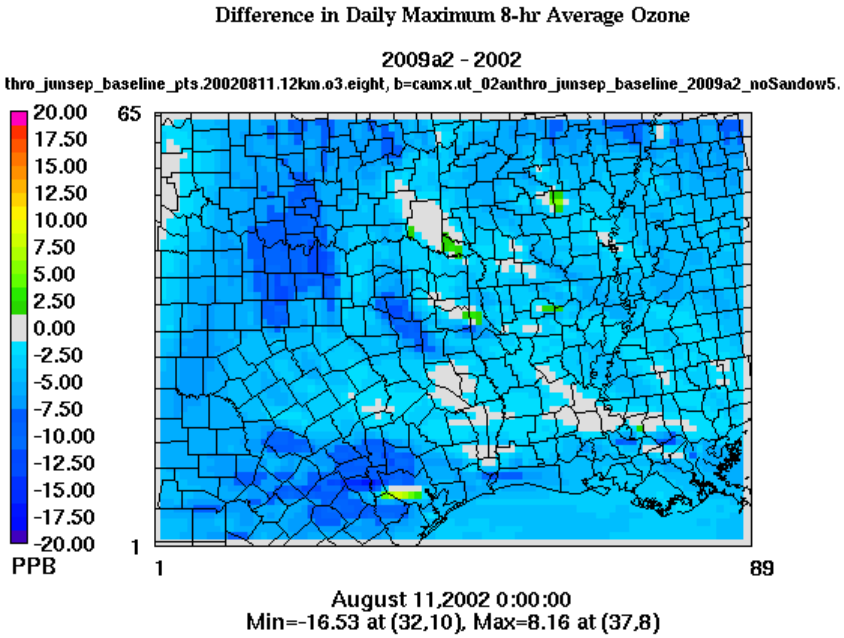


**Figure B73: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 12 between the 2002 Base Case and 2009 Future Case.**

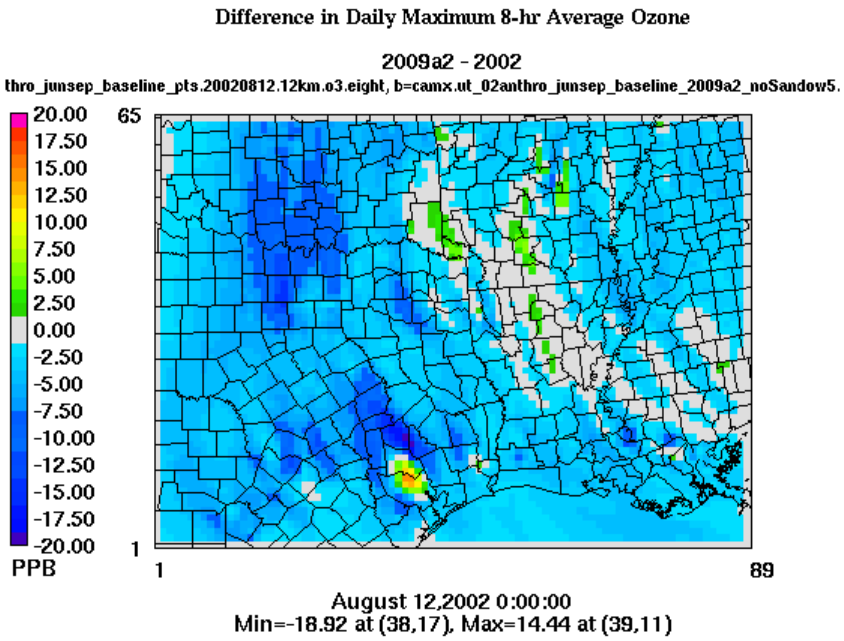



**Figure B74: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 13 between the 2002 Base Case and 2009 Future Case.**

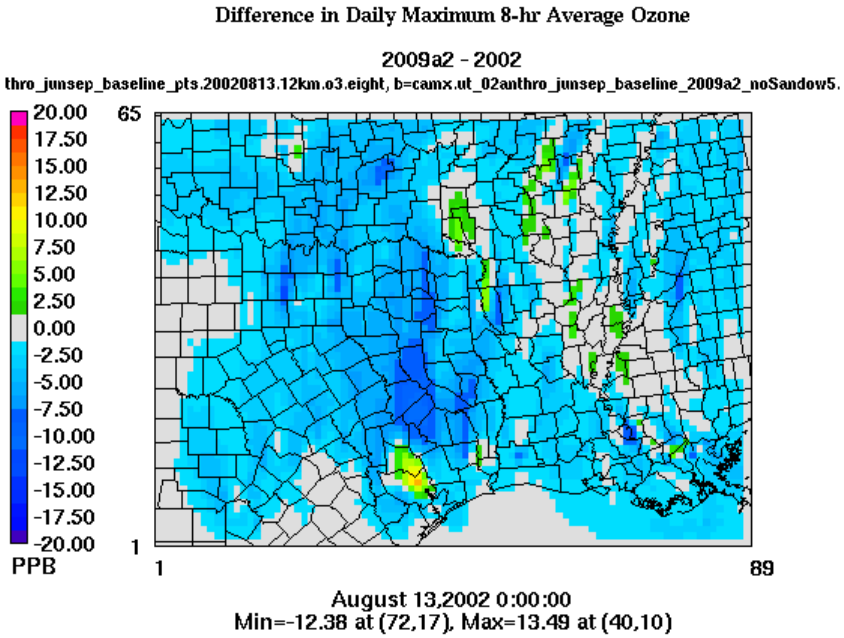


**Figure B75: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 14 between the 2002 Base Case and 2009 Future Case.**

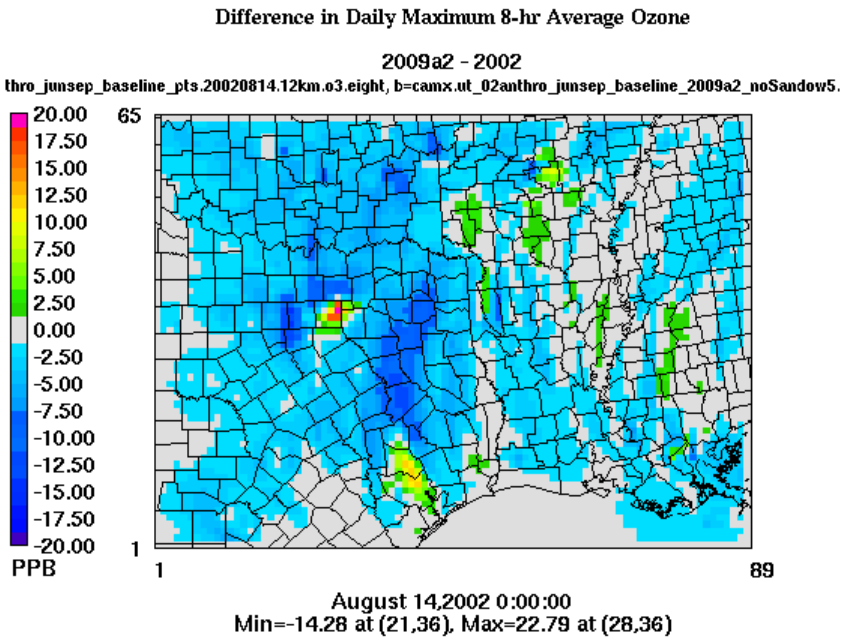



**Figure B76: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 15 between the 2002 Base Case and 2009 Future Case.**

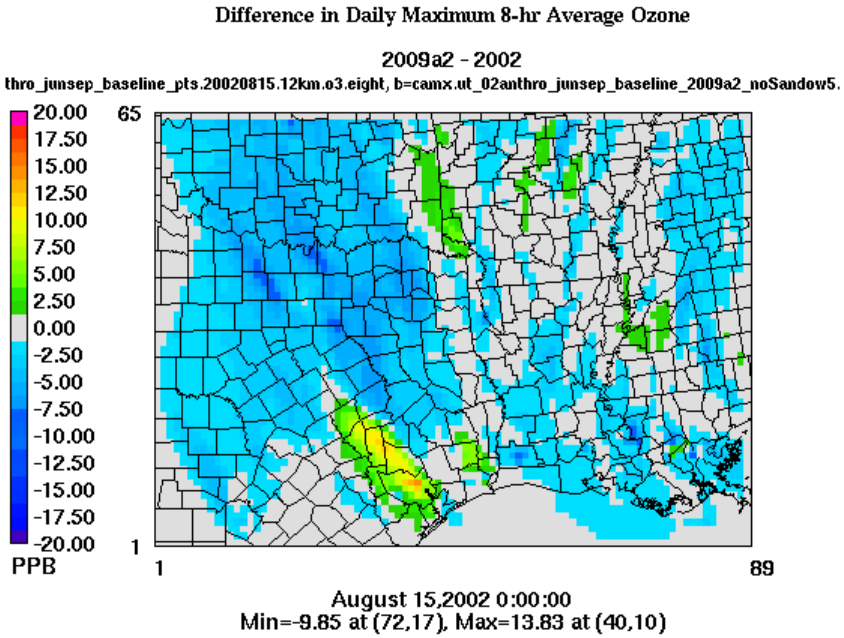


**Figure B77: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 16 between the 2002 Base Case and 2009 Future Case.**

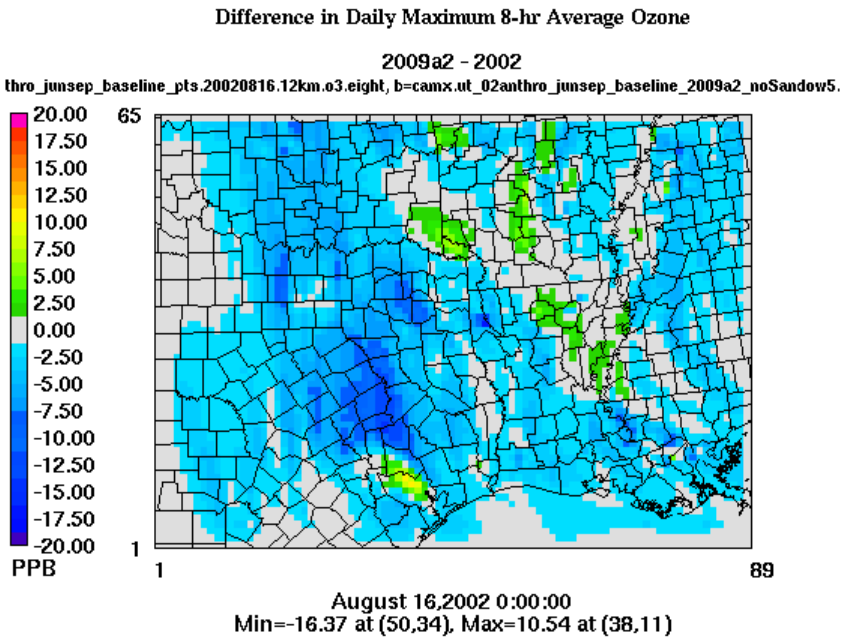



**Figure B78: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 17 between the 2002 Base Case and 2009 Future Case.**

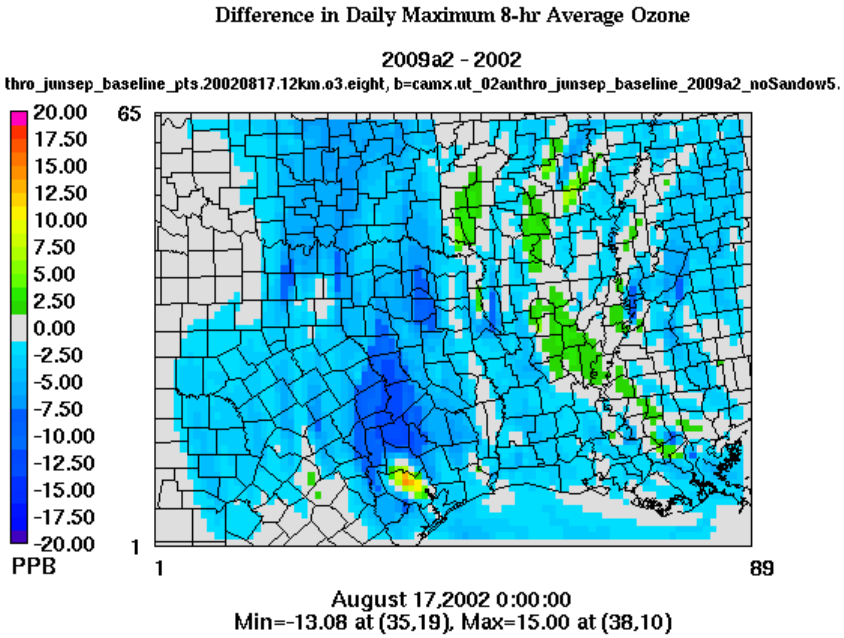


**Figure B79: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 18 between the 2002 Base Case and 2009 Future Case.**

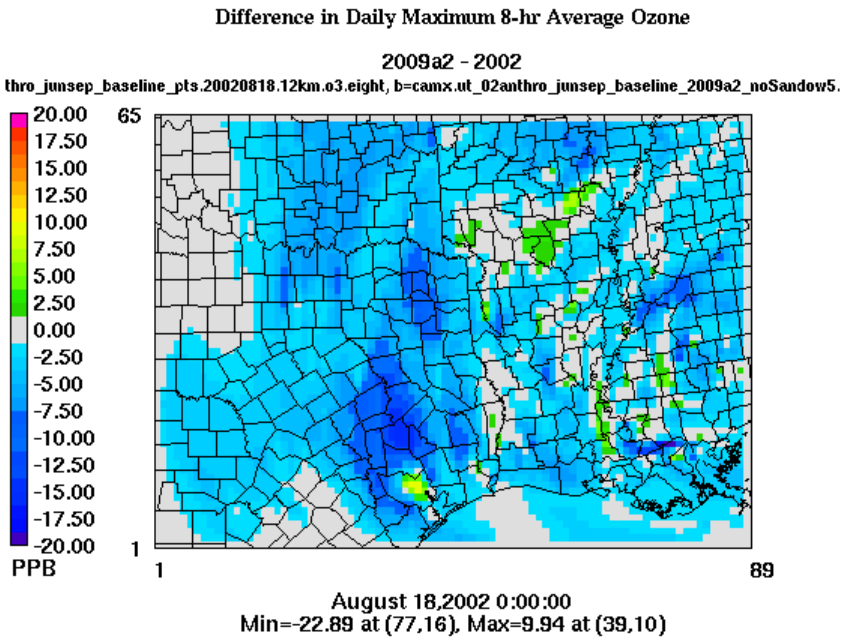



**Figure B80: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 19 between the 2002 Base Case and 2009 Future Case.**

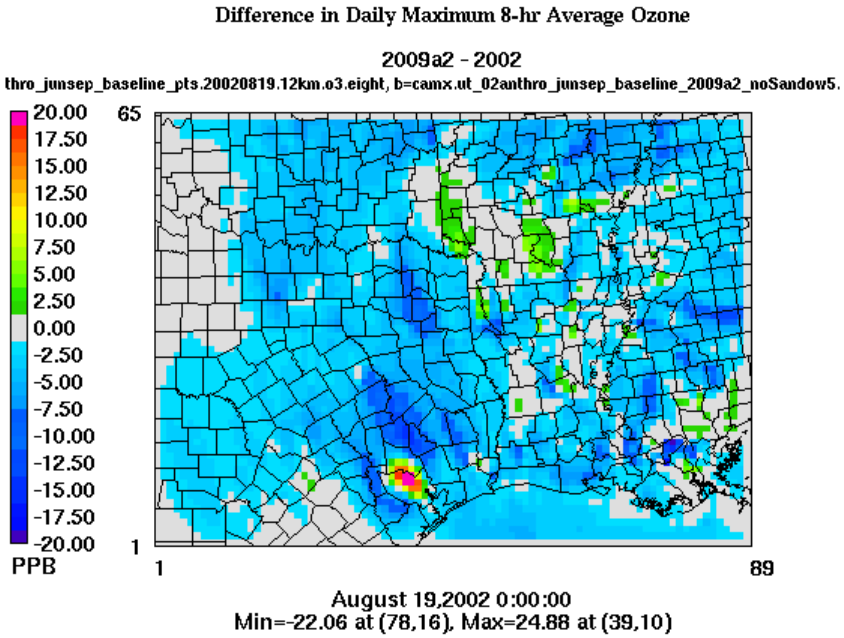


**Figure B81: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 20 between the 2002 Base Case and 2009 Future Case.**

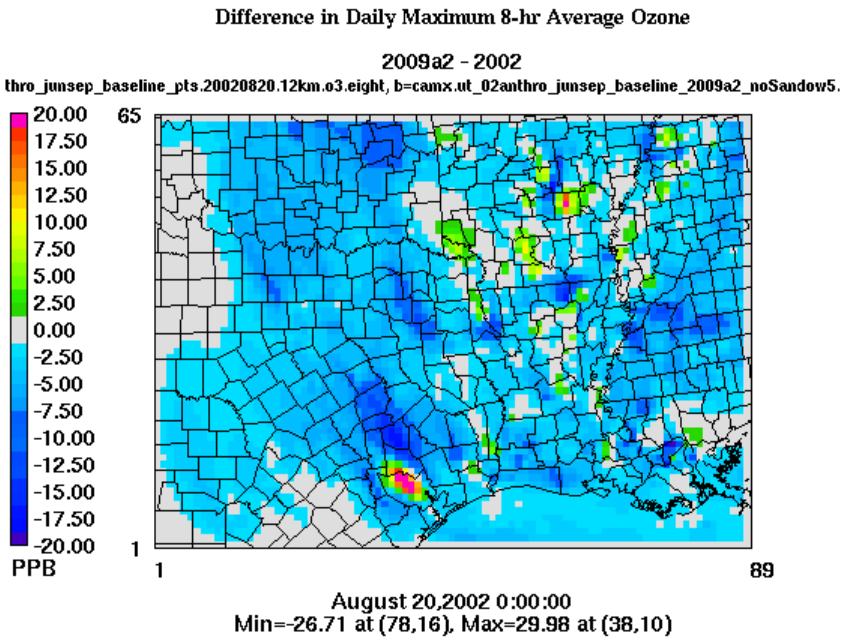



**Figure B82: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 21 between the 2002 Base Case and 2009 Future Case.**

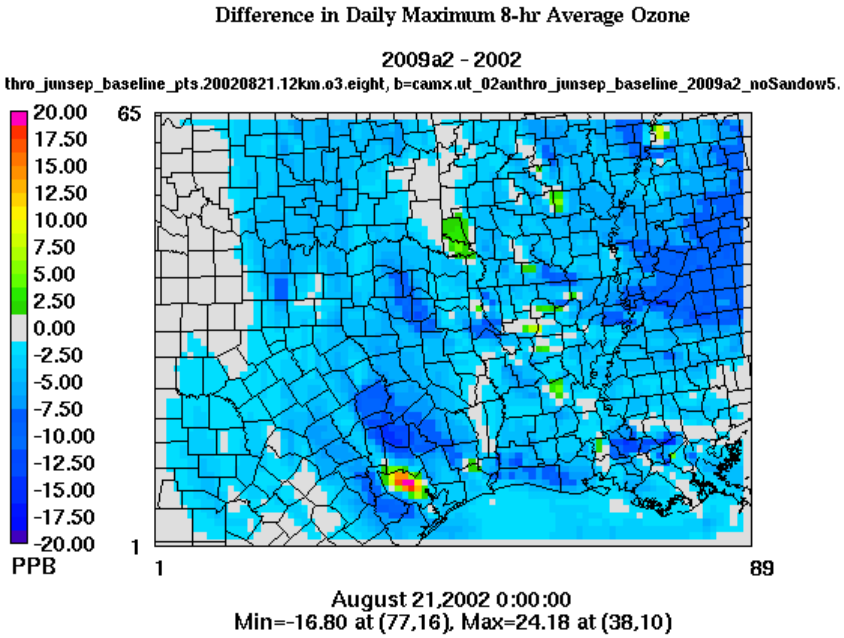


**Figure B83: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 22 between the 2002 Base Case and 2009 Future Case.**

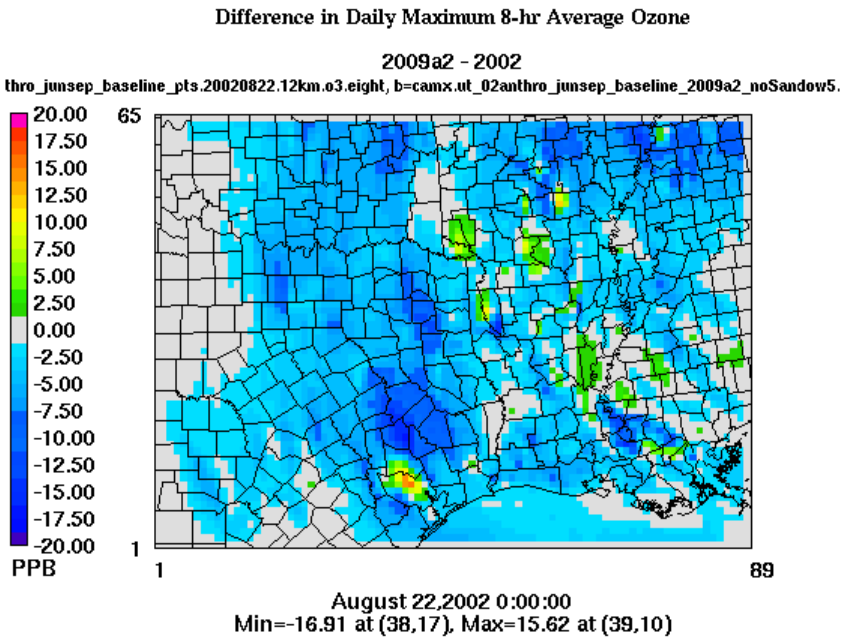



**Figure B84: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 23 between the 2002 Base Case and 2009 Future Case.**

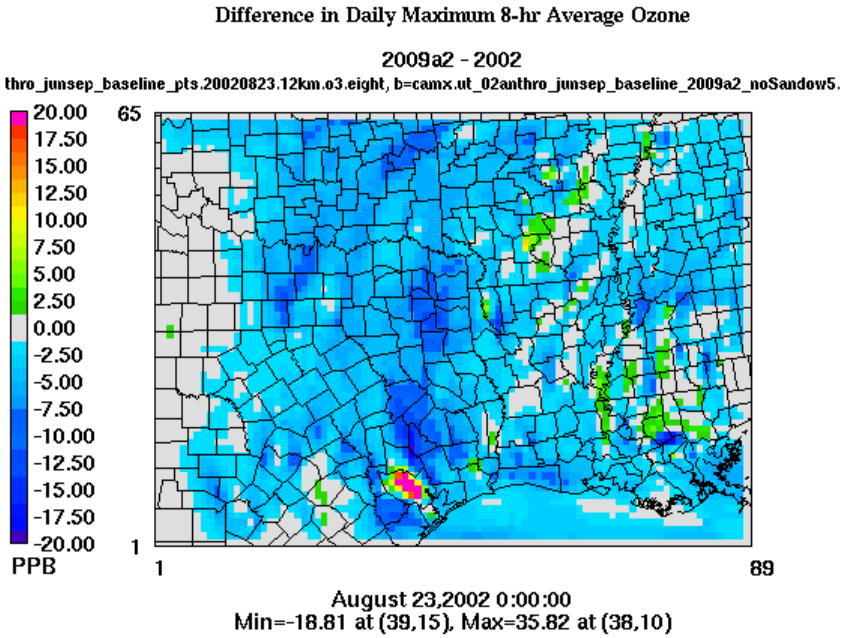


**Figure B85: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 24 between the 2002 Base Case and 2009 Future Case.**

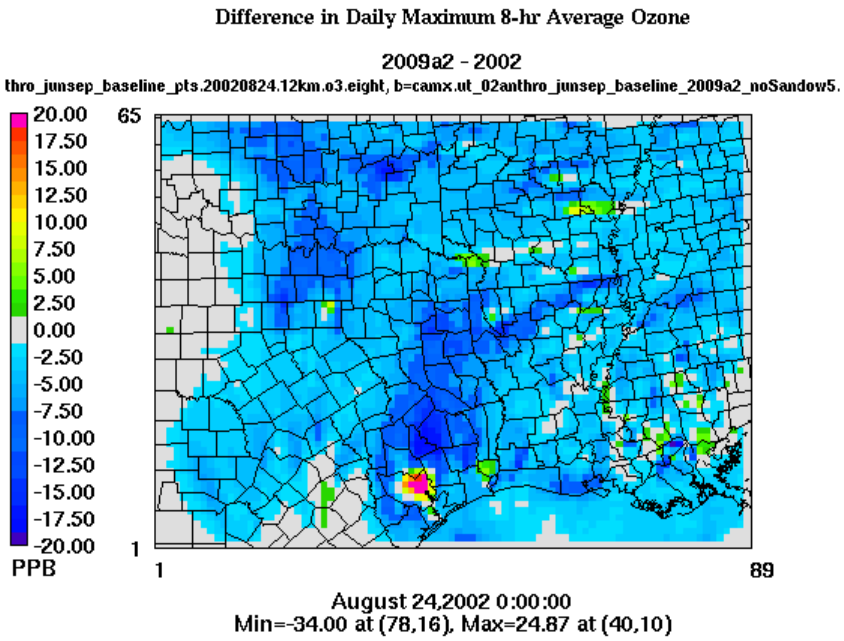



**Figure B86: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 25 between the 2002 Base Case and 2009 Future Case.**

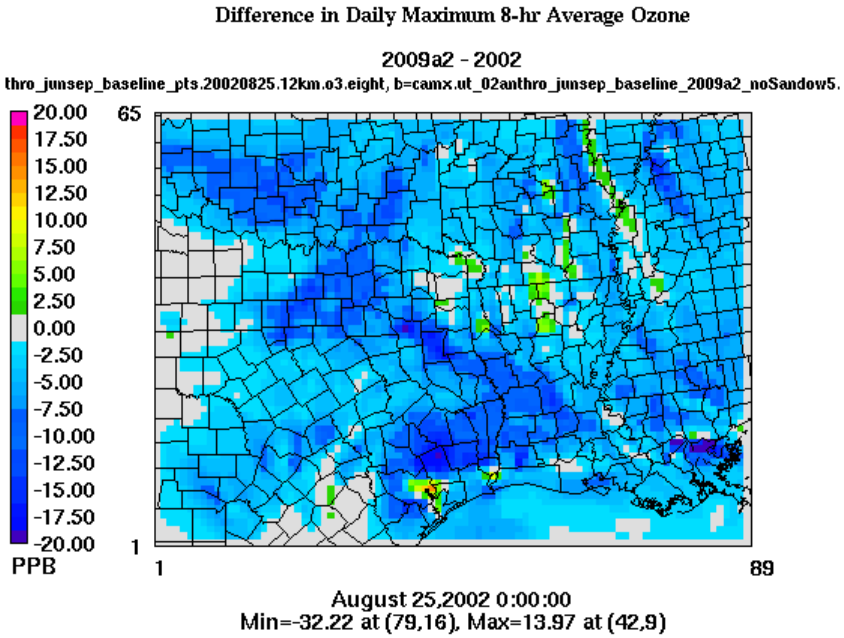


**Figure B87: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 26 between the 2002 Base Case and 2009 Future Case.**

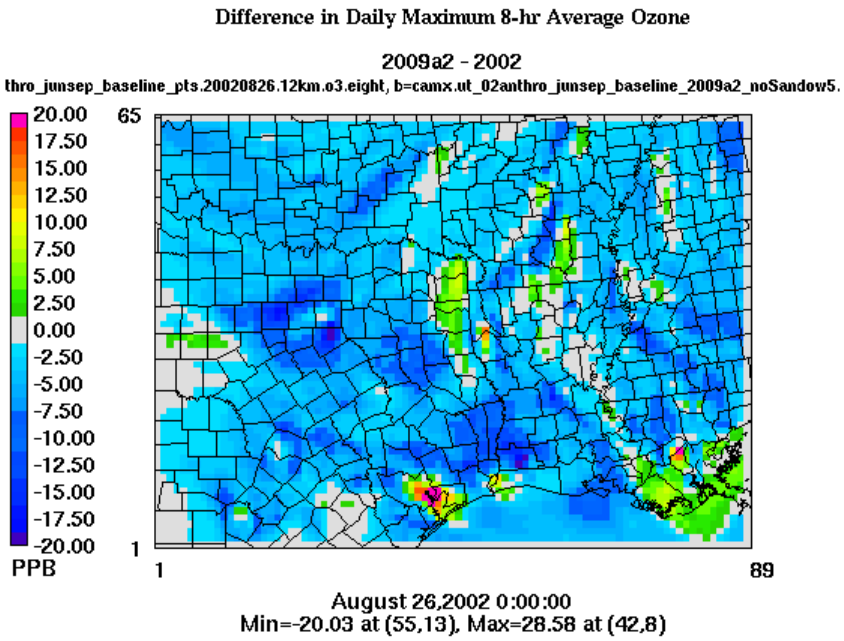



**Figure B88: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 27 between the 2002 Base Case and 2009 Future Case.**

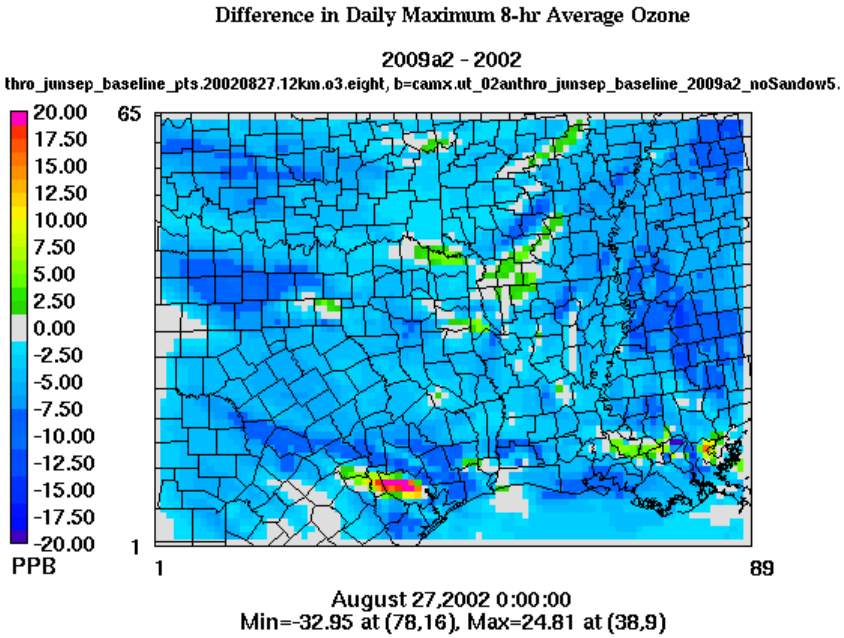


**Figure B89: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 28 between the 2002 Base Case and 2009 Future Case.**

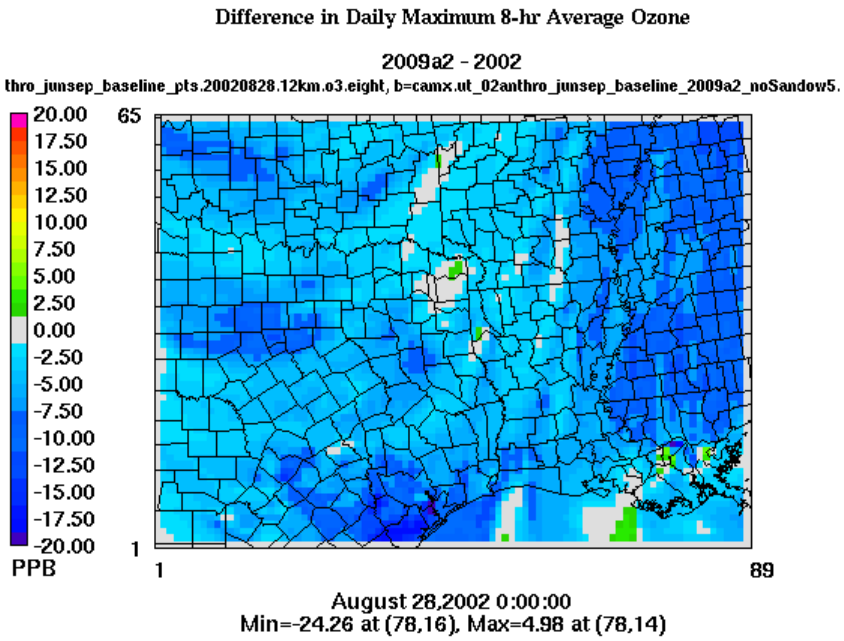



**Figure B90: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 29 between the 2002 Base Case and 2009 Future Case.**

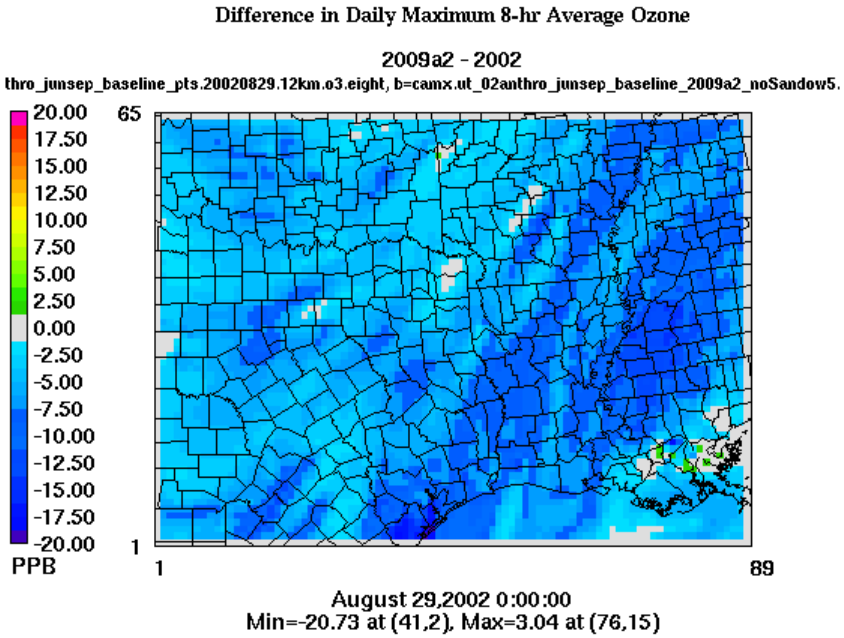


**Figure B91: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 30 between the 2002 Base Case and 2009 Future Case.**

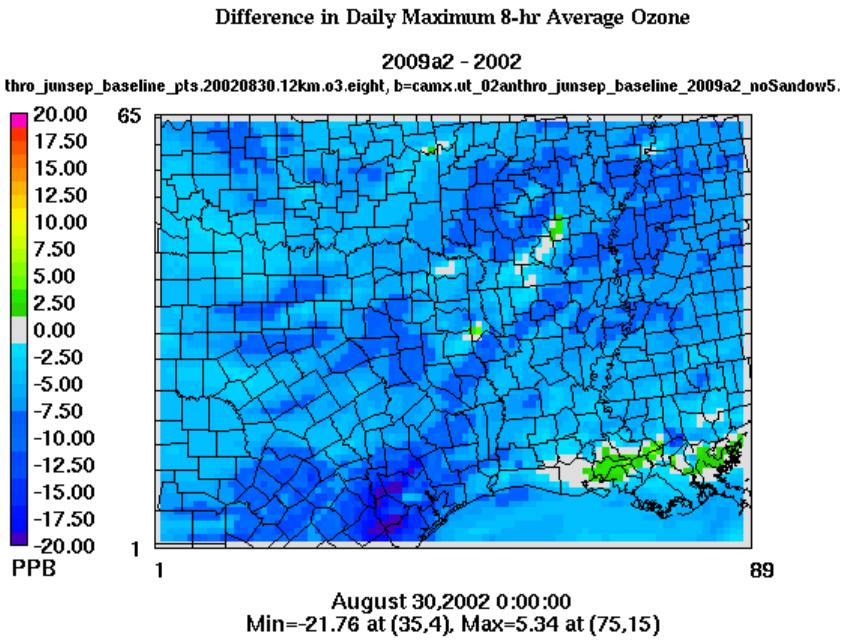



**Figure B92: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on August 31 between the 2002 Base Case and 2009 Future Case.**

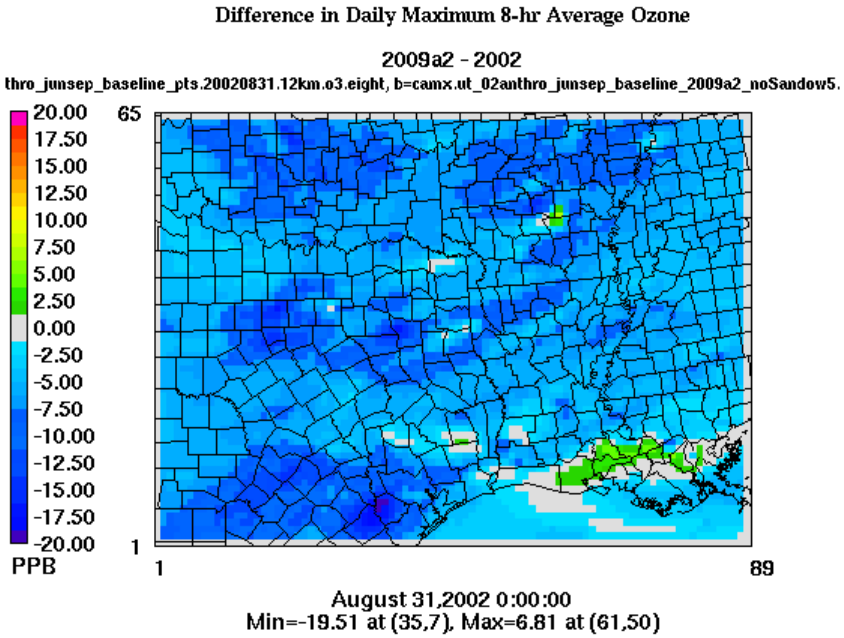


**Figure B93: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 01 between the 2002 Base Case and 2009 Future Case.**

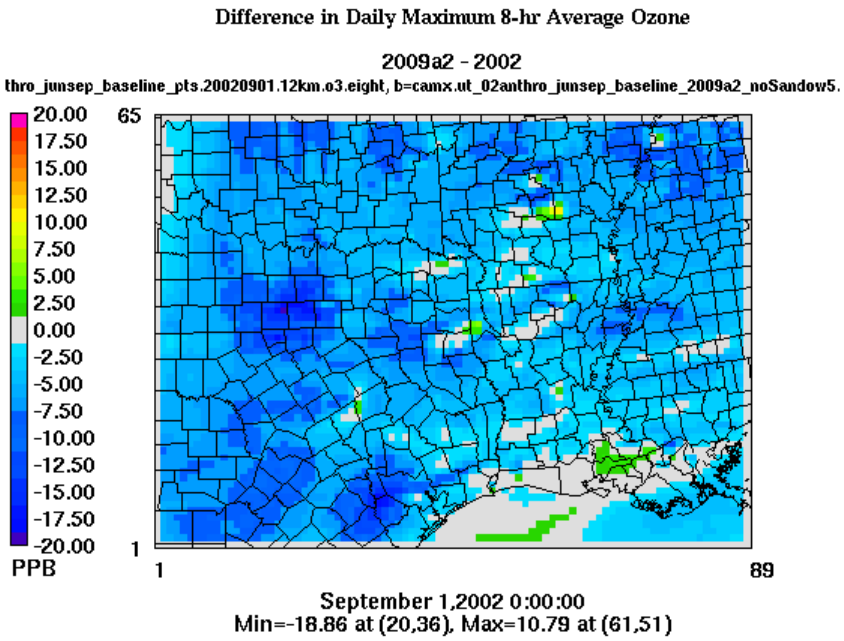



**Figure B94: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 02 between the 2002 Base Case and 2009 Future Case.**

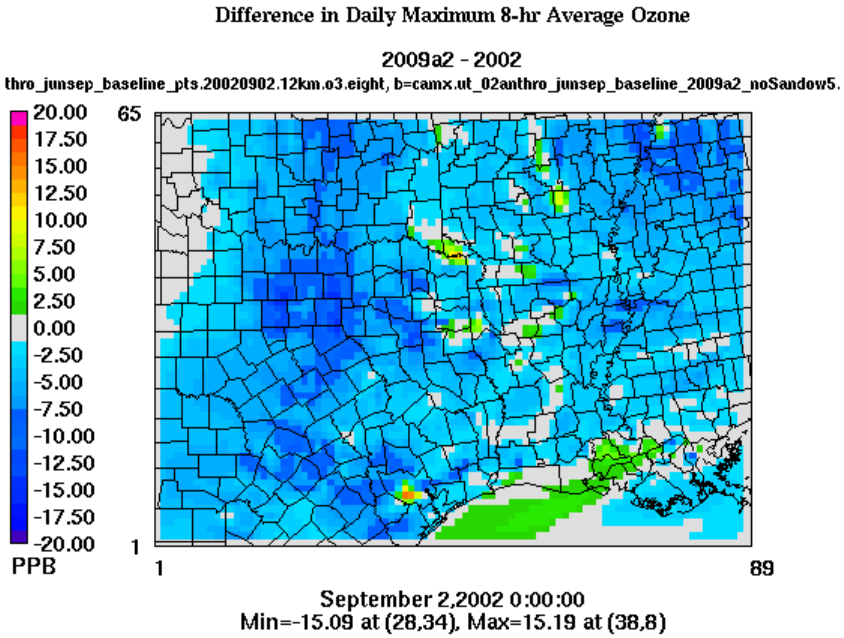


**Figure B95: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 03 between the 2002 Base Case and 2009 Future Case.**

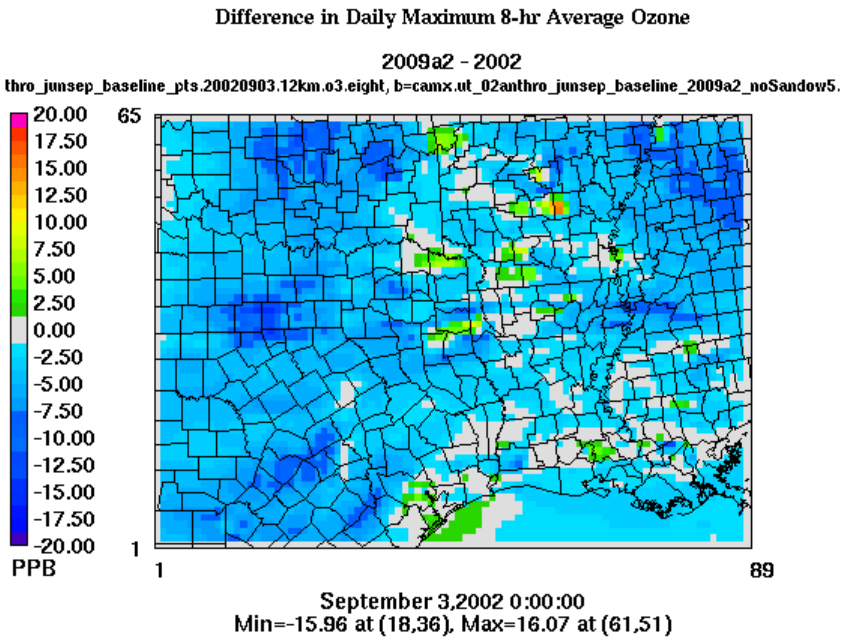



**Figure B96: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 04 between the 2002 Base Case and 2009 Future Case.**

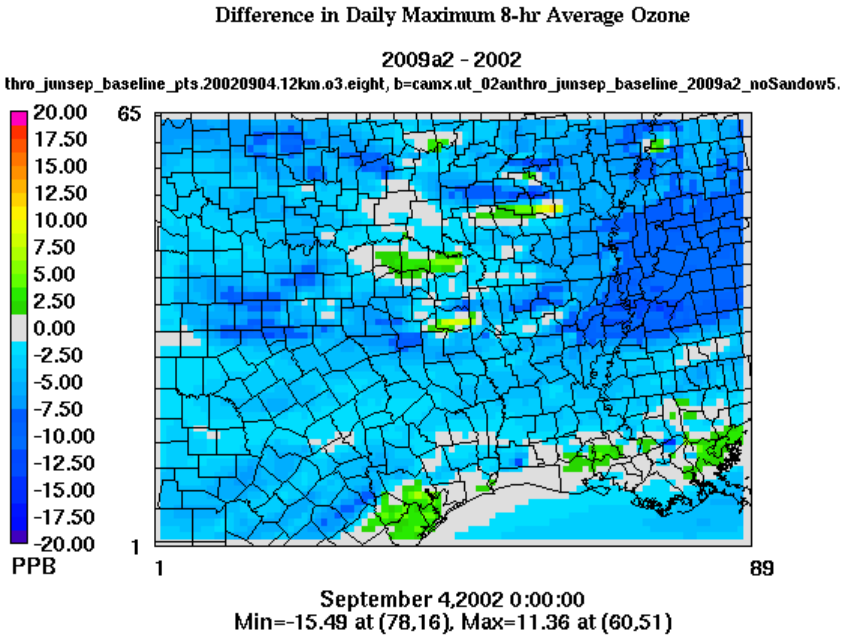


**Figure B97: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 05 between the 2002 Base Case and 2009 Future Case.**

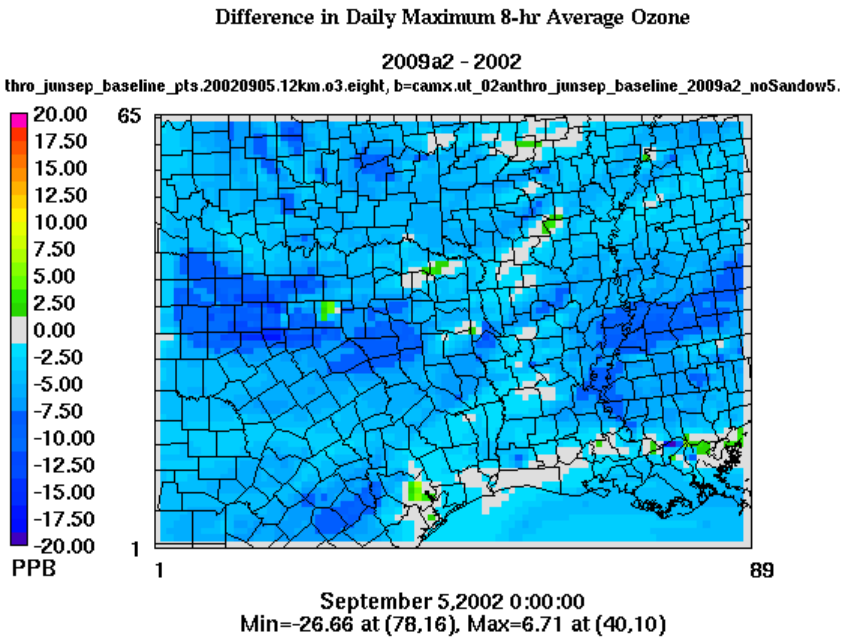



**Figure B98: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 06 between the 2002 Base Case and 2009 Future Case.**

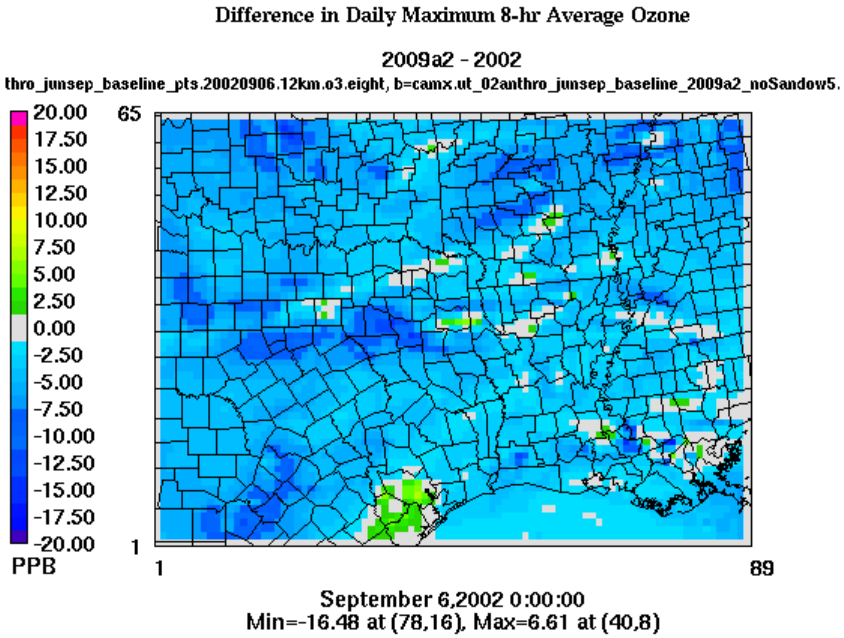


**Figure B99: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 07 between the 2002 Base Case and 2009 Future Case.**

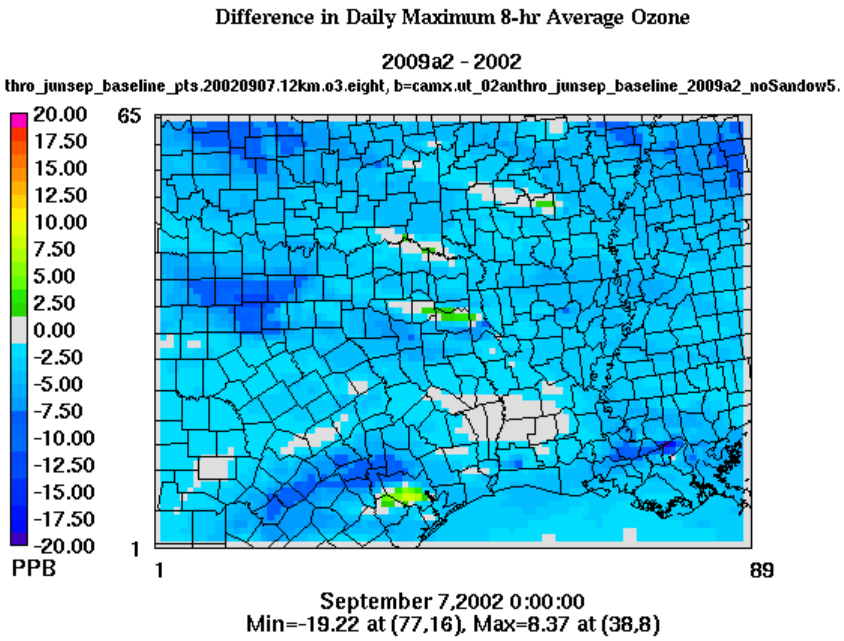



**Figure B100: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 08 between the 2002 Base Case and 2009 Future Case.**

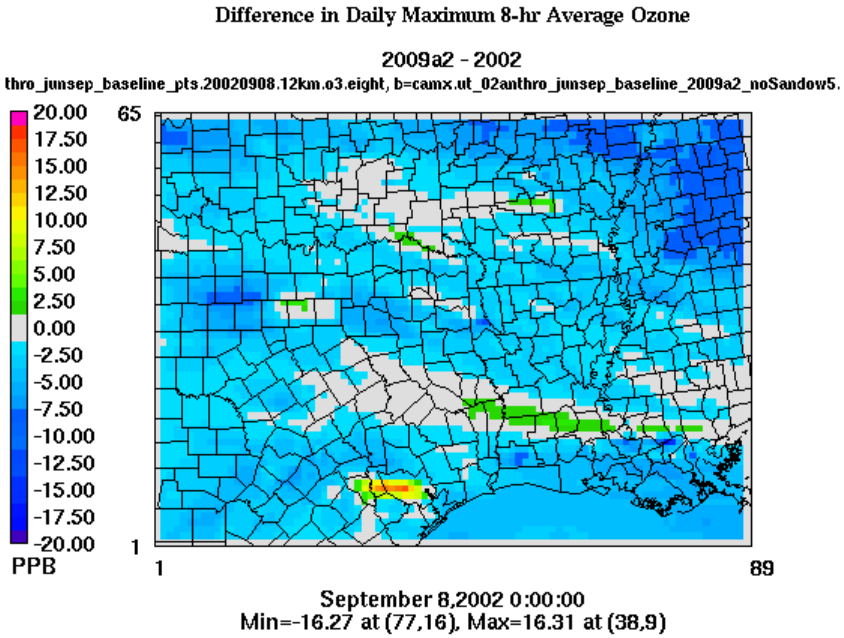


**Figure B101: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 09 between the 2002 Base Case and 2009 Future Case.**

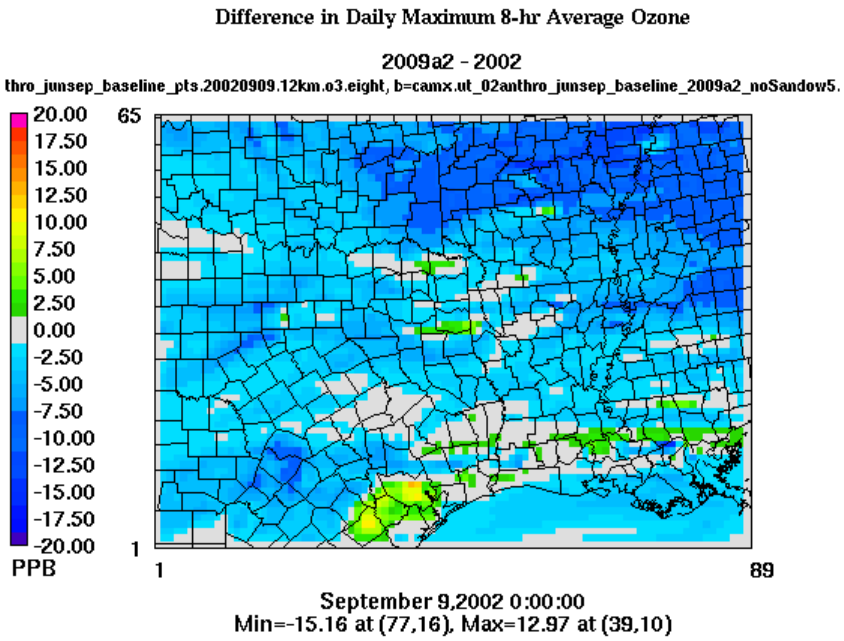



**Figure B102: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 10 between the 2002 Base Case and 2009 Future Case.**

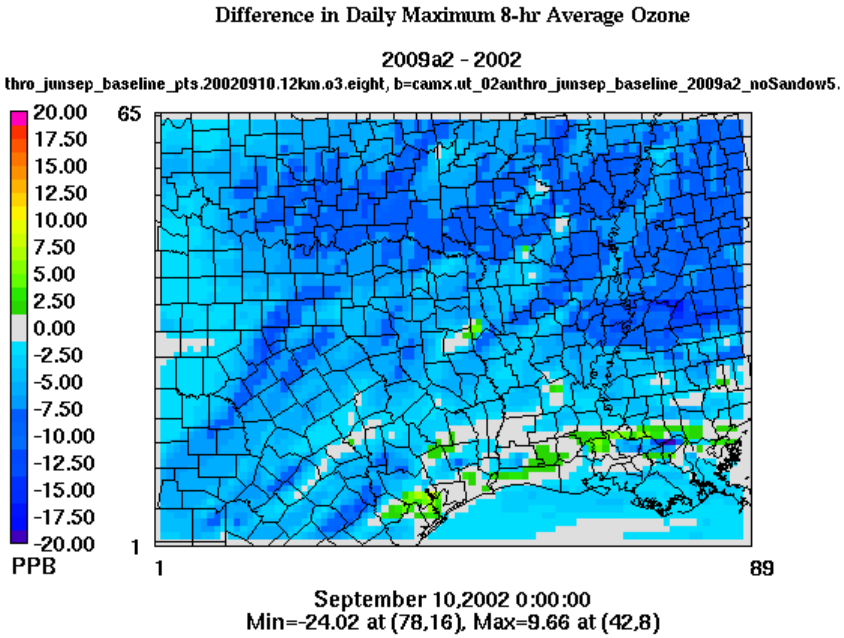


**Figure B103: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 11 between the 2002 Base Case and 2009 Future Case.**

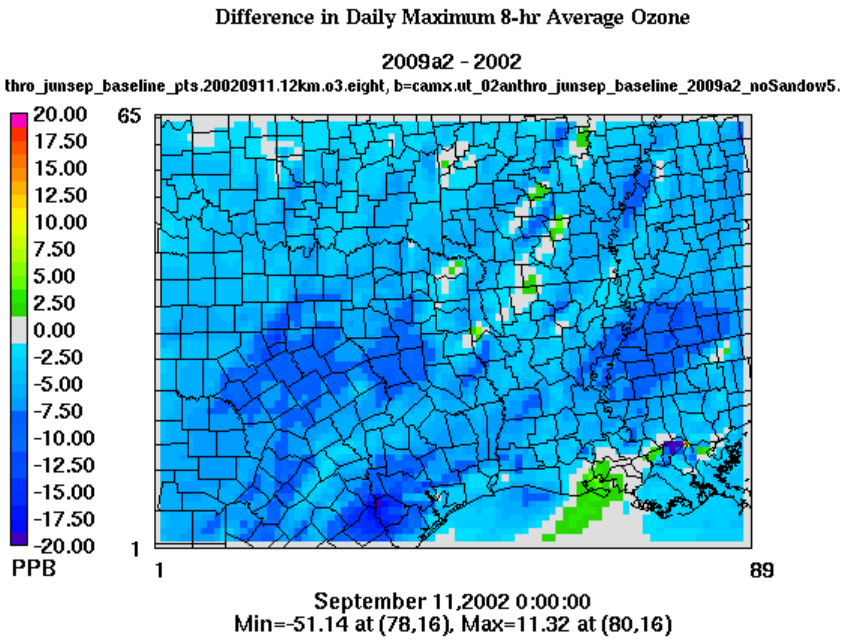



**Figure B104: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 12 between the 2002 Base Case and 2009 Future Case.**

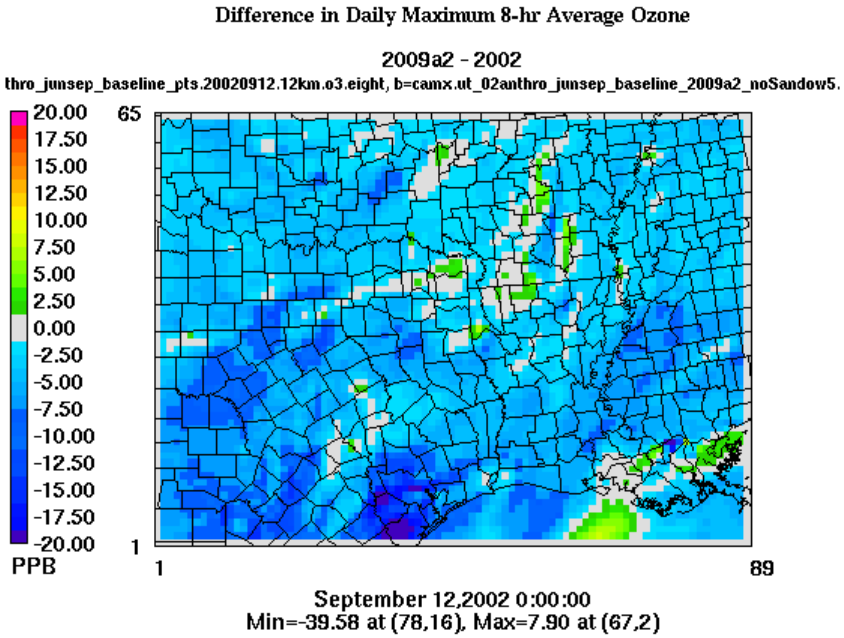


**Figure B105: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 13 between the 2002 Base Case and 2009 Future Case.**

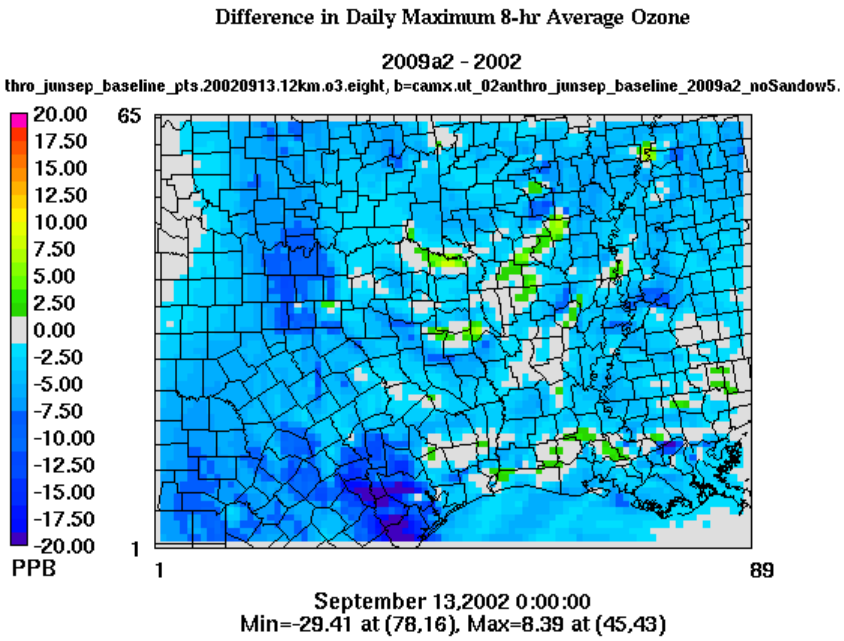



**Figure B106: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 14 between the 2002 Base Case and 2009 Future Case.**

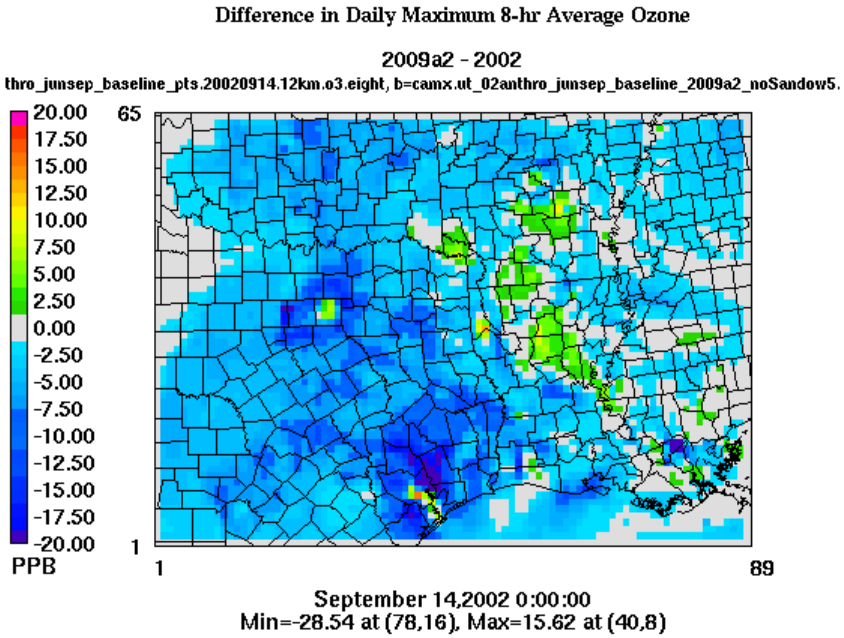


**Figure B107: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 15 between the 2002 Base Case and 2009 Future Case.**

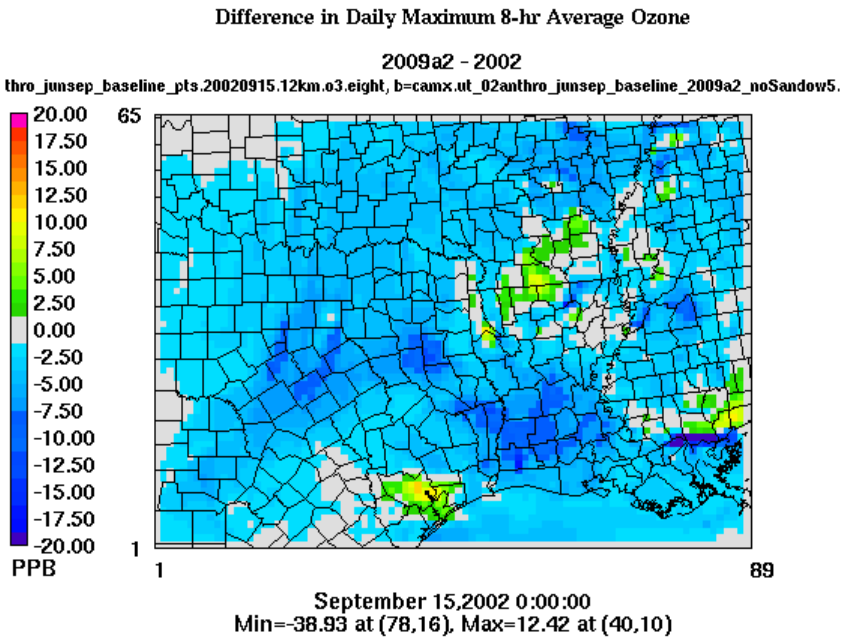



**Figure B108: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 16 between the 2002 Base Case and 2009 Future Case.**

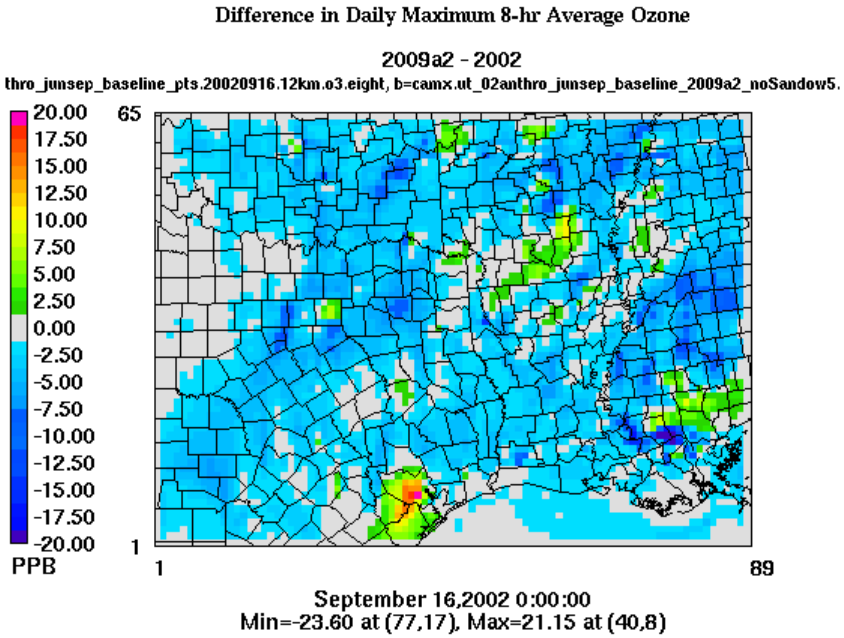


**Figure B109: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 17 between the 2002 Base Case and 2009 Future Case.**

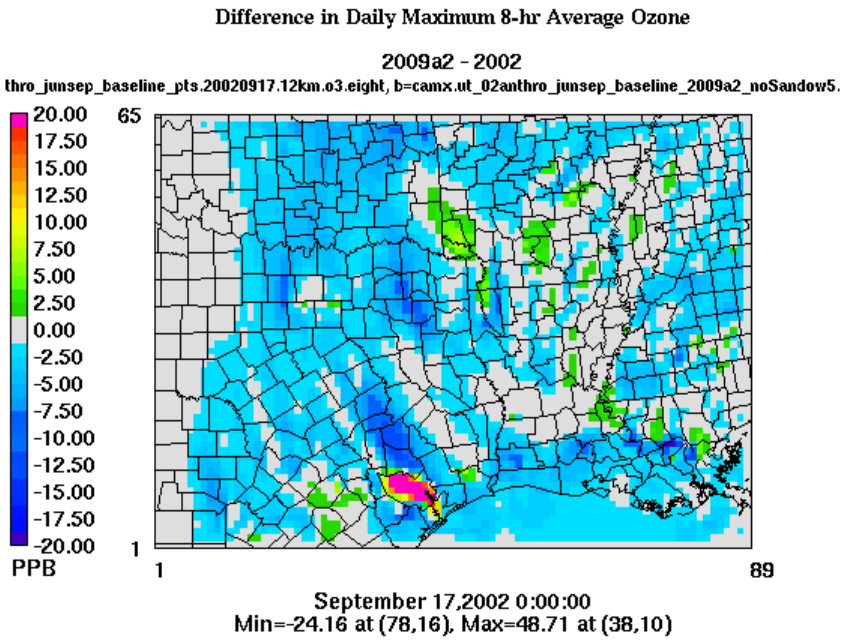



**Figure B110: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 18 between the 2002 Base Case and 2009 Future Case.**

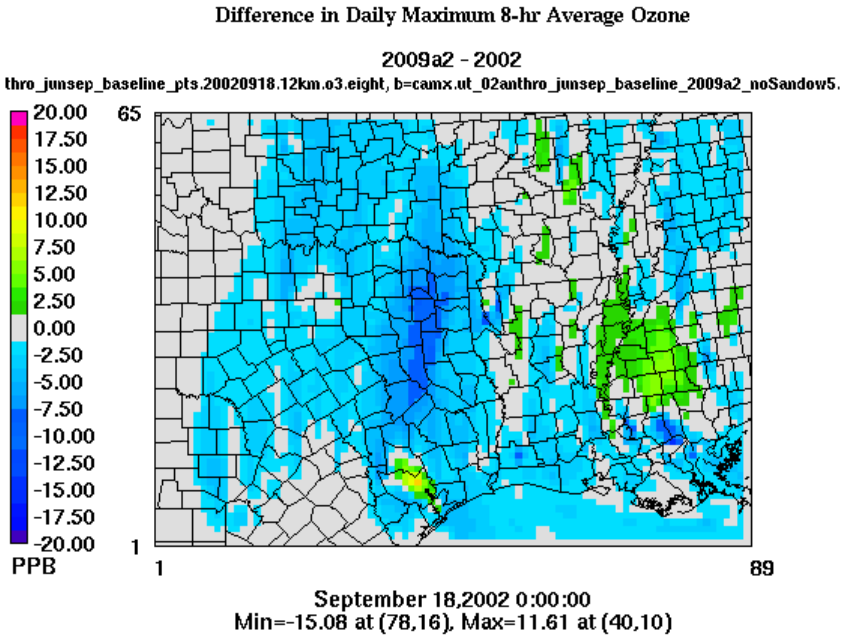


**Figure B111: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 19 between the 2002 Base Case and 2009 Future Case.**

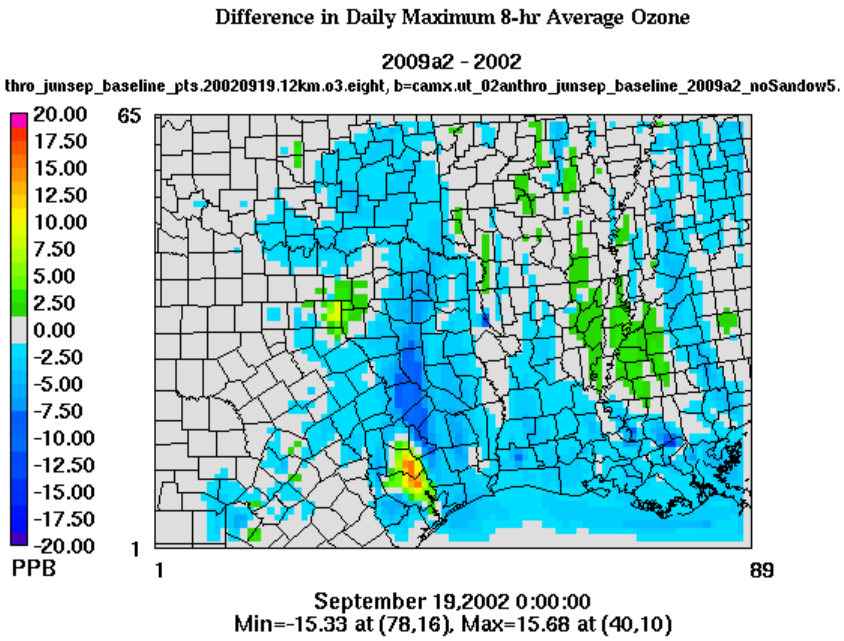



**Figure B112: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 20 between the 2002 Base Case and 2009 Future Case.**

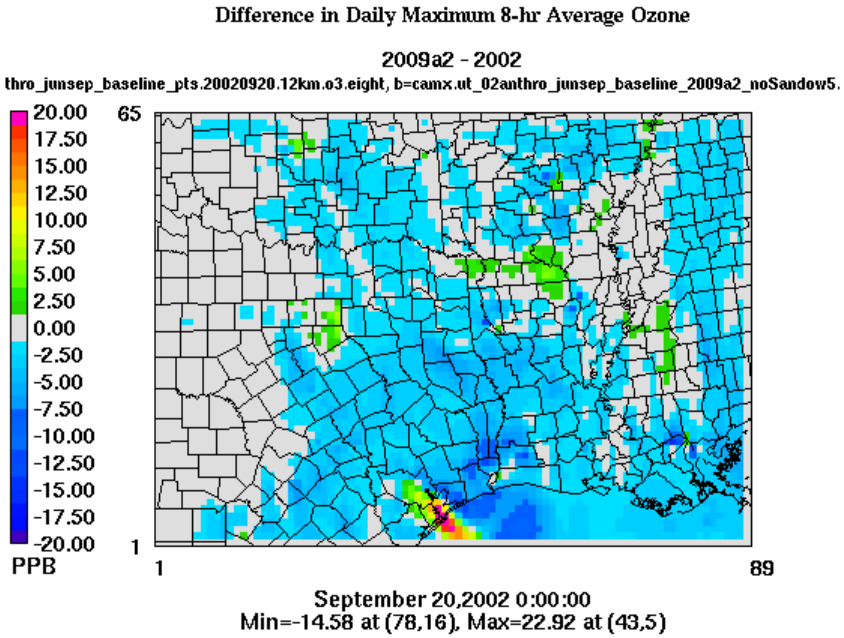


**Figure B113: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 21 between the 2002 Base Case and 2009 Future Case.**

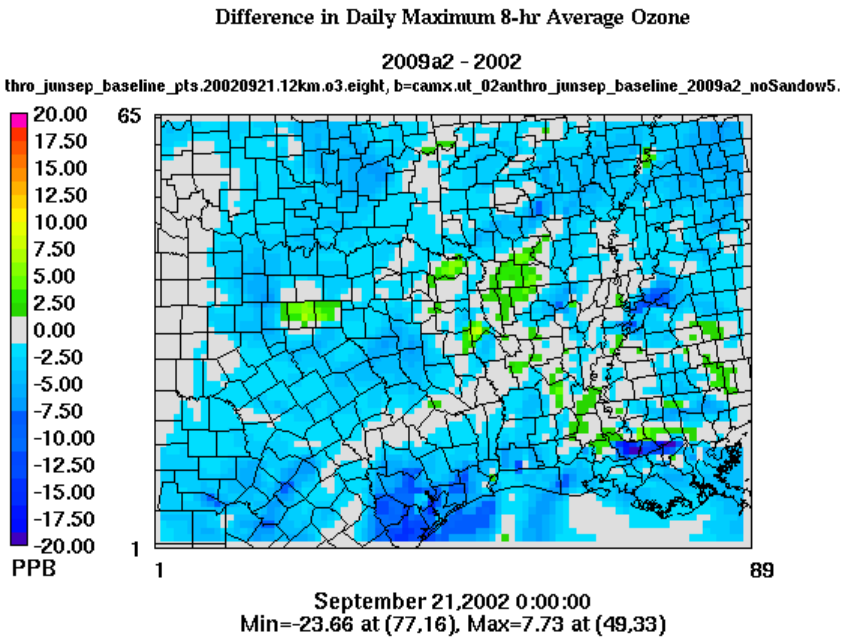



**Figure B114: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 22 between the 2002 Base Case and 2009 Future Case.**

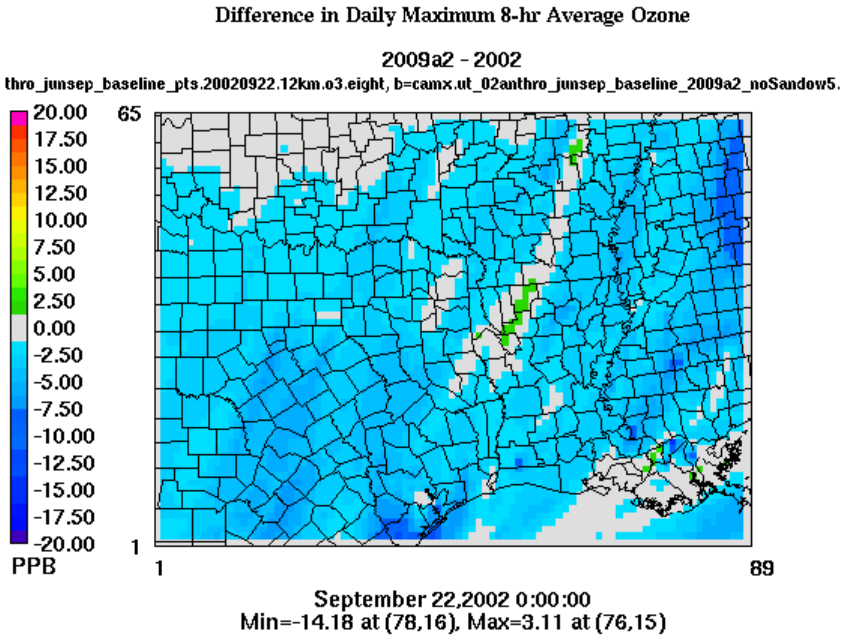


**Figure B115: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 23 between the 2002 Base Case and 2009 Future Case.**

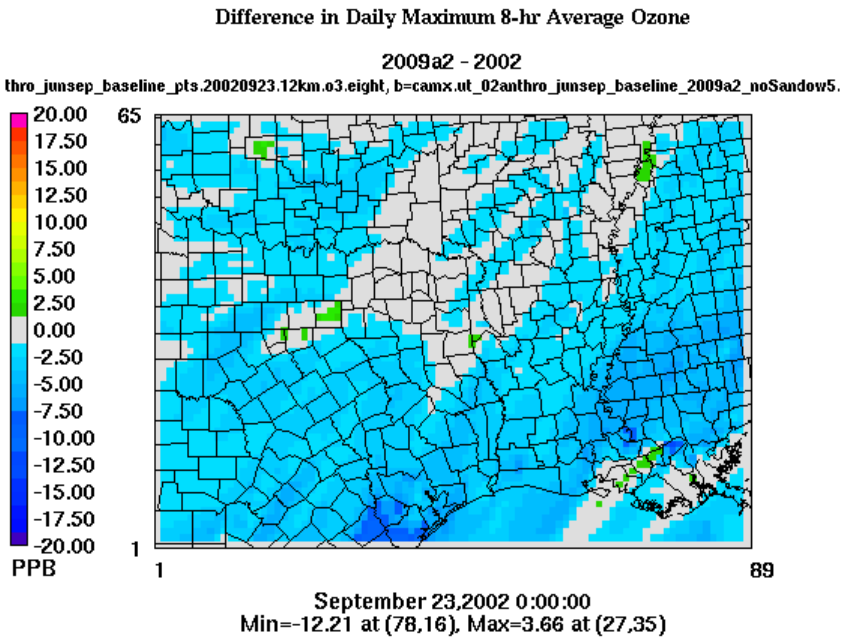



**Figure B116: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 24 between the 2002 Base Case and 2009 Future Case.**

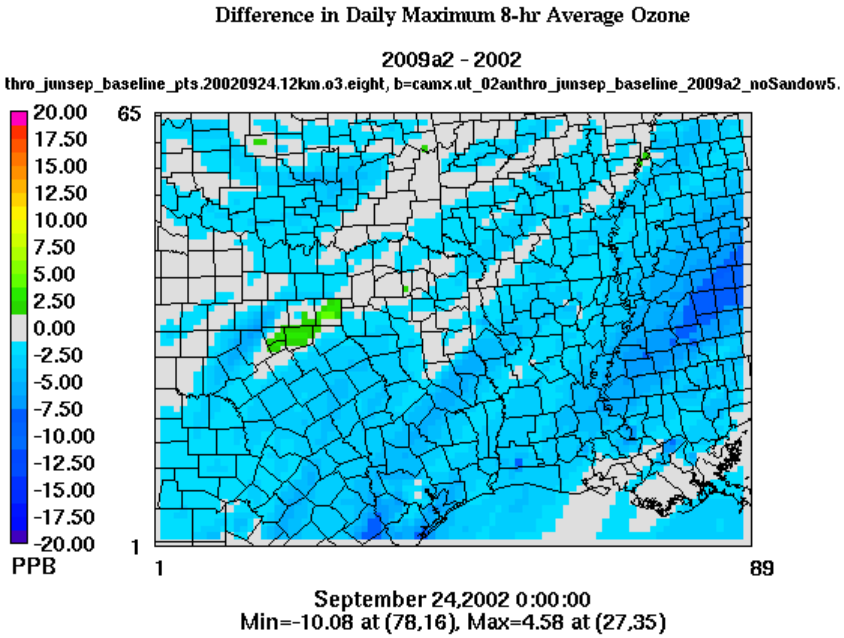


**Figure B117: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 25 between the 2002 Base Case and 2009 Future Case.**

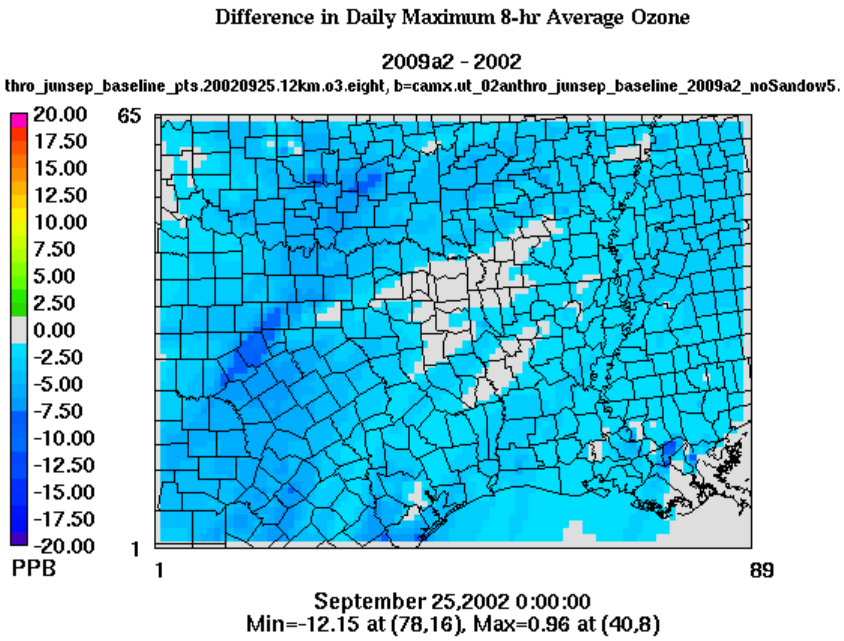



**Figure B118: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 26 between the 2002 Base Case and 2009 Future Case.**

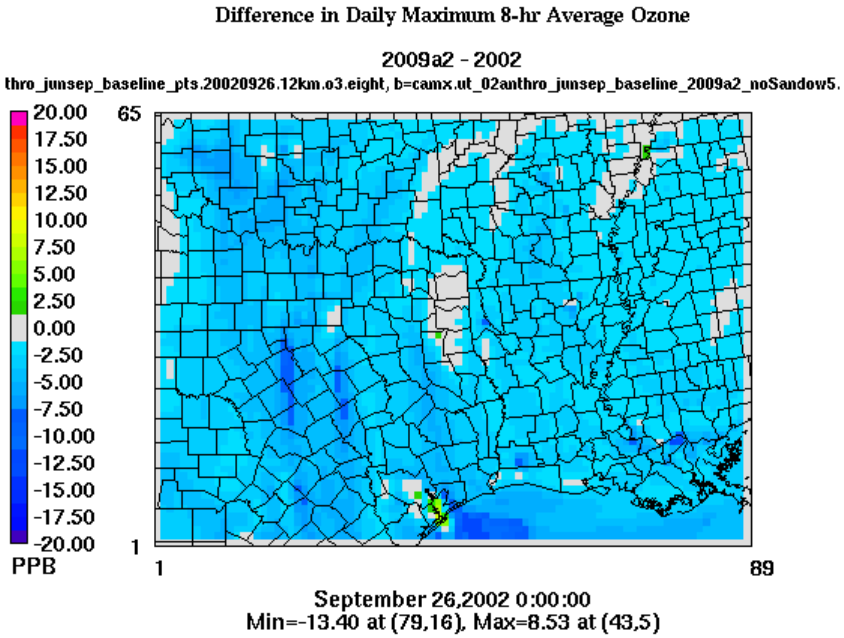


**Figure B119: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 27 between the 2002 Base Case and 2009 Future Case.**

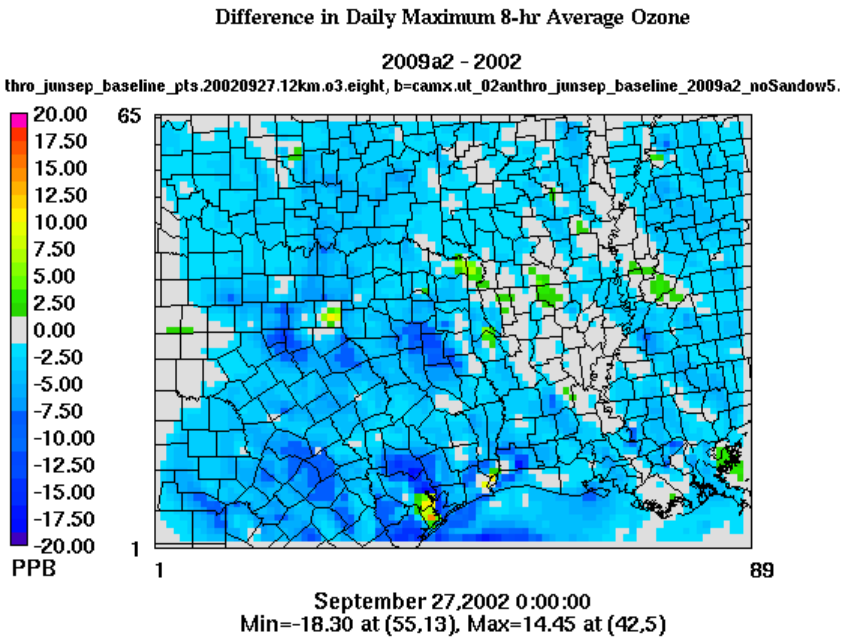



**Figure B120: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 28 between the 2002 Base Case and 2009 Future Case.**

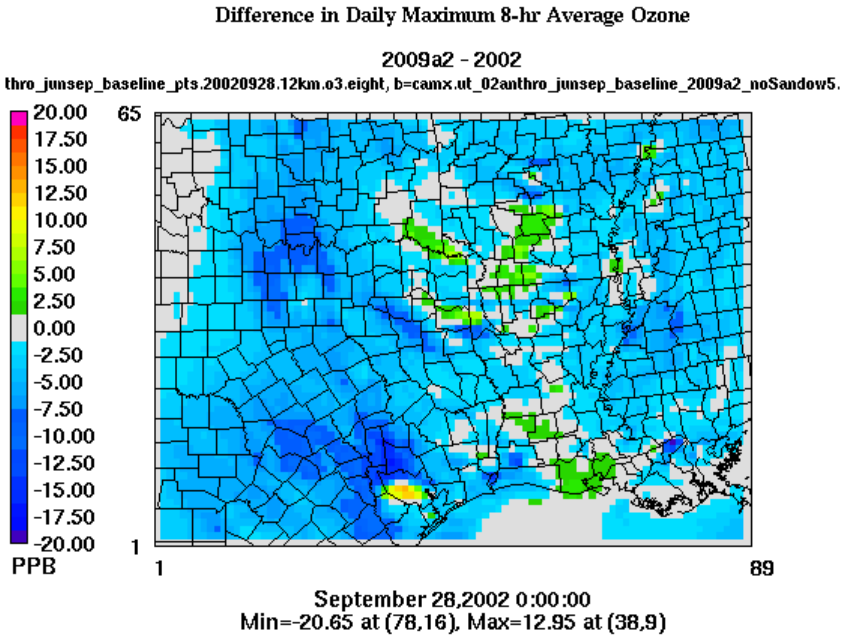
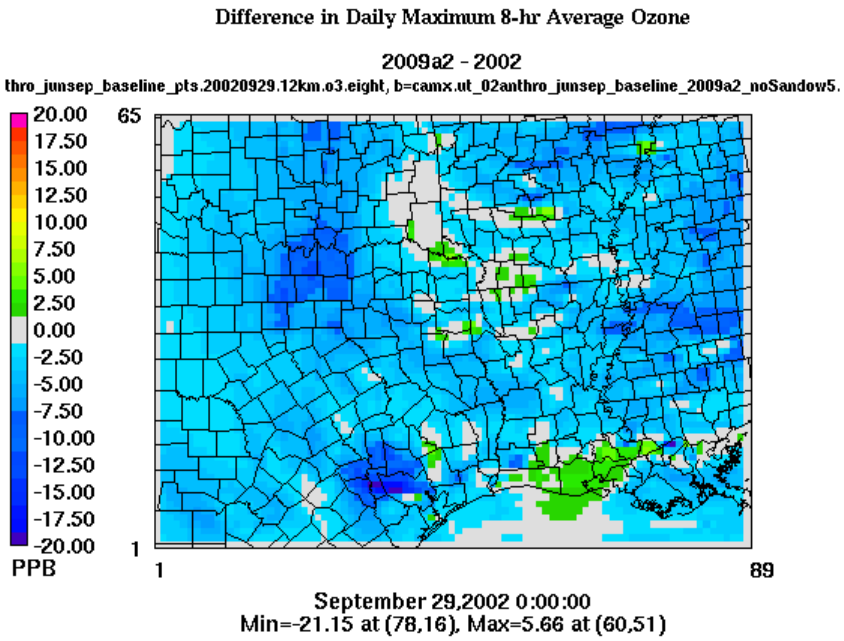


**Figure B121: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 29 between the 2002 Base Case and 2009 Future Case.**



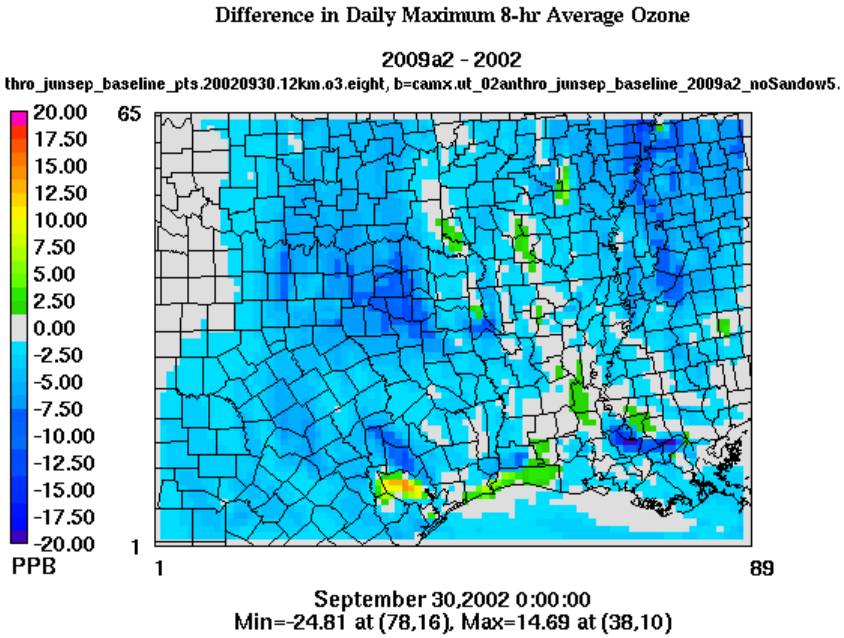


**Figure B122: Difference in predicted daily maximum ozone concentrations (ground-level) averaged over 8 hours on the 12-km CAMx domain on September 30 between the 2002 Base Case and 2009 Future Case.**