

Surface Mobile Monitoring for Victoria

Cyril Durrenberger

Jarett Spinhirne

Elena McDonald-Buller

David Allen

The University of Texas at Austin

Air Quality Monitoring Activities Fy 2008/2009

Surface Mobile monitoring

- 8 trips in 2008
- 18 VOC Canisters collected
- Added instrument to measure methane and TNMHC
- Sampling vehicle had to be reconfigured for the new instrument

VOC Canisters at one site from 8:00 to 9:00 a.m.

- 14 days in 2008
- Sep 17 to Oct 1

Surface Mobile Sampling

The purpose of surface mobile sampling

- Sample air pollutants over a large area where CAMS are not located
- Evaluate transport into the Victoria area
- Evaluate the impact of industrial facilities
 - Power plants
 - Chemical plants
 - Oil and Gas production areas
 - Gas compressor plants
- Evaluate the impact of emission sources in urban areas
 - Specific sources
 - Area source emissions
 - Mobile source emissions
- Compare measurements with model predictions

Surface Mobile Sampling Platform

- General Motors suburban platform
- Measured Ozone, SO₂, NO_x, CO, Methane and THMHC
- GPS used to determine location of vehicle
- Power for the instruments was supplied by two portable 2000 W gasoline powered generators that were mounted on a cargo platform attached to the rear of the vehicle
- The intake was mounted on the roof and elevated to 8' above the surface to prevent self contamination from the generator exhaust
- VOC canister samples were collected at times and locations of interest based on real time rapid evaluation of sampling results

Mobile Sampling Platform



Generators Mounted on Platform at the Rear of the Mobile Sampling Vehicle



Surface Mobile Sampling Trip Planning

Playbook of sampling modules each with specific preplanned objectives

Trip route based on

- Set of specific sampling modules for major trip objectives
- Travel on paved roads to minimize dust
- Travel on roads with low traffic density to minimize impact of local mobile sources
- Forecast wind directions and wind speeds
- Forecast ozone concentrations
- Locations and time of trips based on model predictions of high VOC and NO_x concentrations
- Days and times when photochemical activity would not impact NO_x and TNMHC concentrations

Sampling Modules

General air quality objectives of different sampling modules:

- Map pollution concentrations upwind and downwind of specific sources – chemical plants, power plants, gas compressor plants
- Map pollution concentrations upwind and downwind of specific large area sources – mobile sources, area sources, oil and gas production areas
- Map pollution concentrations upwind and downwind of Victoria and other urban areas
- Map pollution concentrations transported into the Victoria area
- Map pollution concentrations in areas where no ground monitoring stations are located

Surface Mobile Sampling Trips

| <u>Date of Trip</u> | <u>Time for Trip</u> |
|---------------------|--------------------------|
| Oct 1, 2008 | Trip to test instruments |
| Oct 17, 2008 | 09:10 to 21:16 |
| Oct 20, 2008 | 10:29 to 21:08 |
| Oct 22, 2008 | 09:28 to 22:00 |
| Oct 27, 2008 | 10:29 to 22:45 |
| Nov 5, 2008 | 02:04 to 14:48 |
| Nov 7, 2008 | 02:11 to 11:51 |
| Nov 14, 2008 | 09:14 to 21:30 |

Surface Mobile Sampling for 2008

For 2008 the focus was on methane and TNMHC instead of ozone

- Methane and TNMHC concentrations had not been measured before
- The ozone concentrations were lower than in the past so we did not plan trips to focus on ozone measurements
- 2 trips taken during early morning hours when the model predicts highest concentrations of VOC and NO_x
- Planned trips to focus on evaluation of methane and TNMHC to evaluate
 - Area sources
 - Transport
 - Specific sources

Surface Mobile Sampling for 2008

Planned trips to focus on evaluation of methane and TNMHC

- Small urban areas
 - Lockhart
 - Cuero
 - Refugio
 - Yoakum
 - Hallettsville
- Victoria urban area
 - Whole urban area
 - Waste water treatment plant
 - Service stations
 - Bulk fuel plant
- Transport

Surface Mobile Sampling for 2008

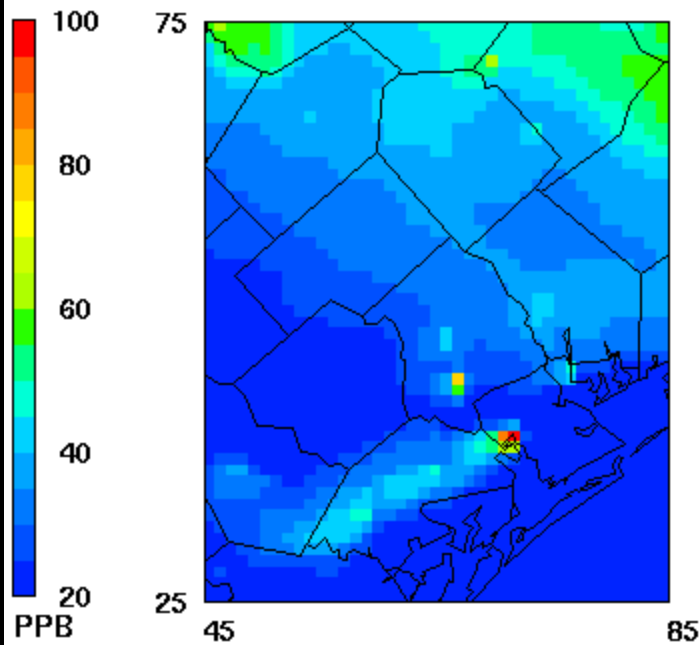
Planned trips to focus on evaluation of methane and TNMHC

- Oil and gas production areas
 - Gas compressors
 - Liquid storage tanks
 - Well head
 - Fugitive emissions
- Gas treating plants
- Chemical plants
 - Dow
 - Dupont/Invista
 - Formosa

VOC Concentrations from CAMx Modeling

1-hr Average VOC Conc.

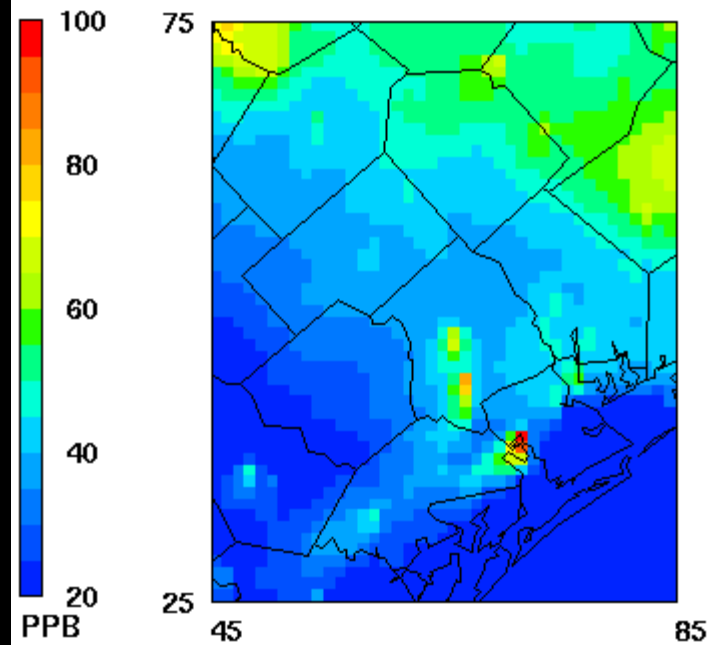
September 17, 2007



September 17, 1999 3:00:00
Min= 11 at (79,41), Max= 128 at (72,39)

1-hr Average VOC Conc.

September 17, 2007

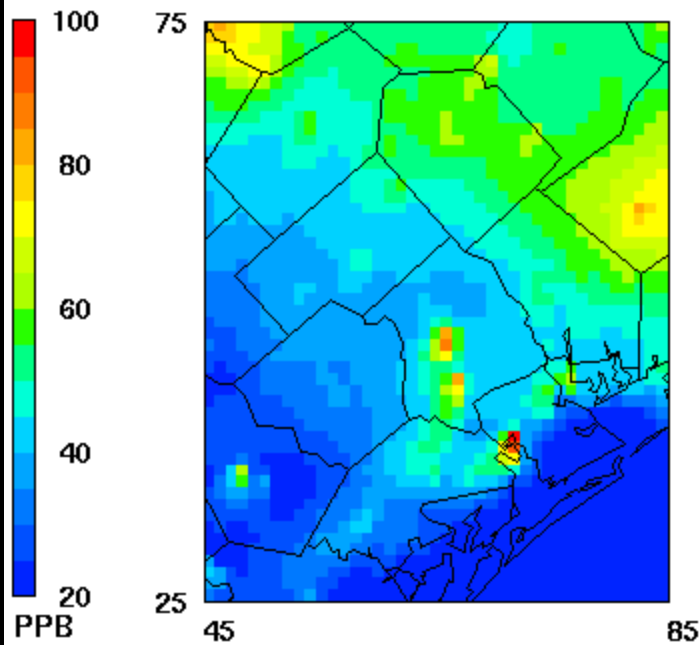


September 17, 1999 5:00:00
Min= 12 at (74,28), Max= 101 at (72,39)

VOC Concentrations from CAMx Modeling

1-hr Average VOC Conc.

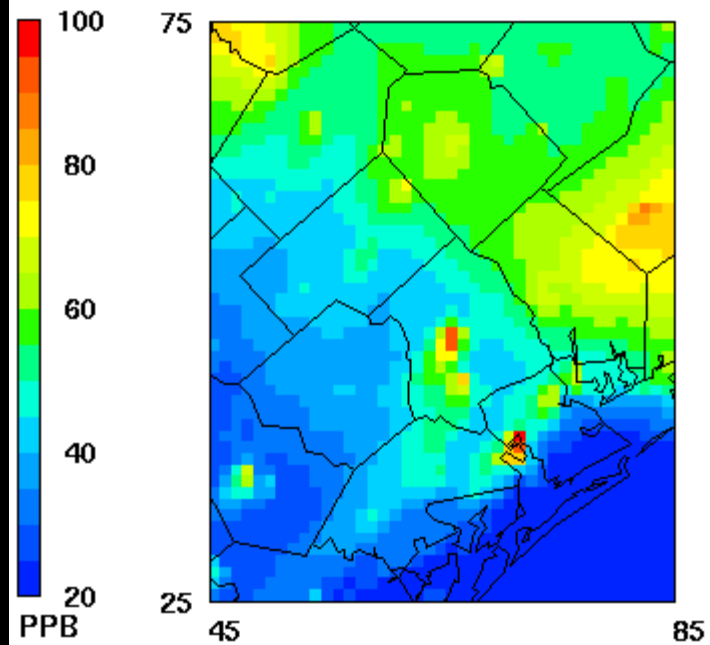
September 17, 2007



September 17, 1999 6:00:00
Min= 12 at (72,26), Max= 107 at (72,39)

1-hr Average VOC Conc.

September 17, 2007

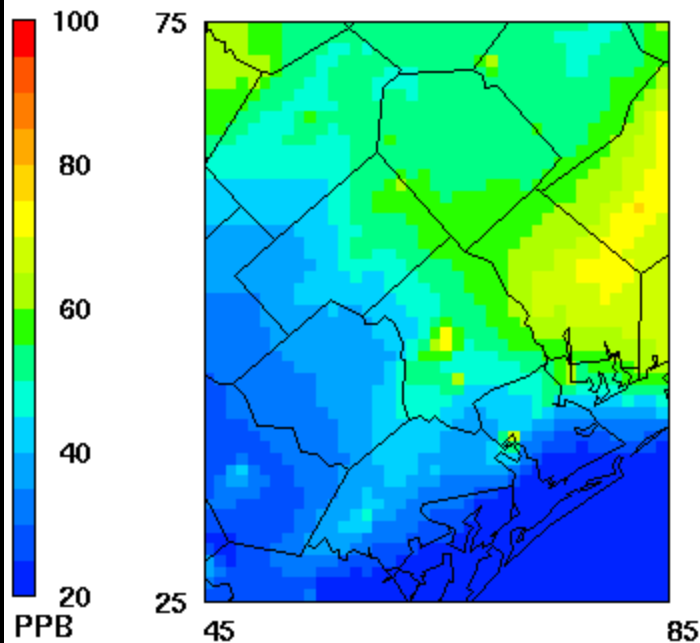


September 17, 1999 7:00:00
Min= 13 at (74,27), Max= 109 at (72,39)

VOC Concentrations from CAMx Modeling

1-hr Average VOC Conc.

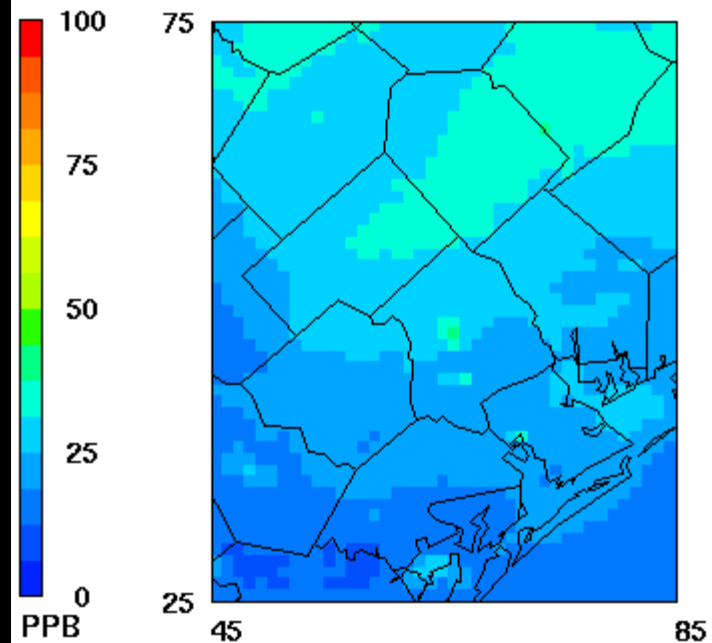
September 17, 2007



September 17, 1999 8:00:00
Min= 13 at (72,25), Max= 79 at (83,59)

1-hr Average VOC Conc.

September 17, 2007

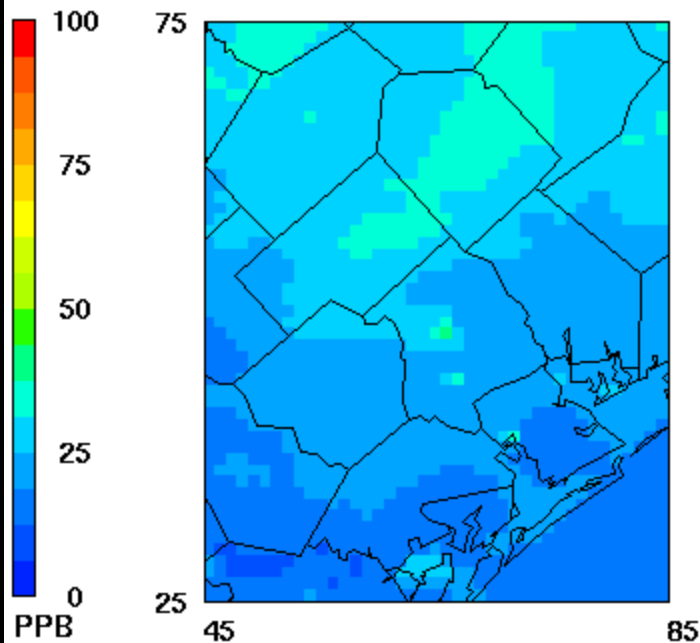


September 17, 1999 13:00:00
Min= 12 at (58,28), Max= 41 at (66,48)

VOC Concentrations from CAMx Modeling

1-hr Average VOC Conc.

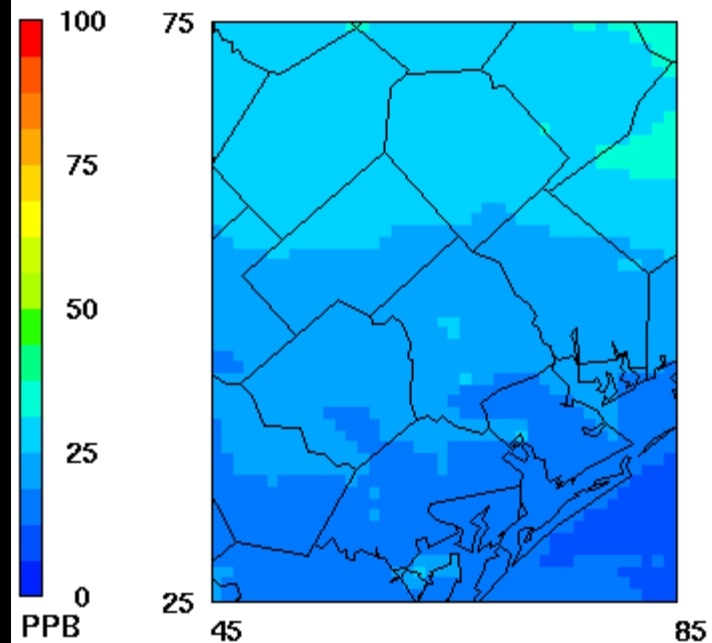
September 17, 2007



September 17, 1999 15:00:00
Min= 11 at (48,28), Max= 40 at (66,48)

1-hr Average VOC Conc.

September 17, 2007

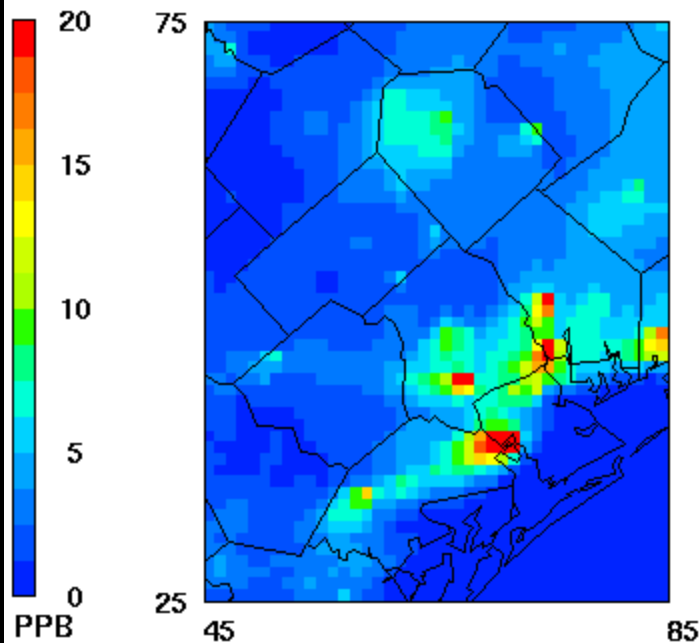


September 17, 1999 18:00:00
Min= 12 at (81,33), Max= 37 at (85,75)

NOx Concentrations from CAMx Modeling

1-hr Average NOx Conc.

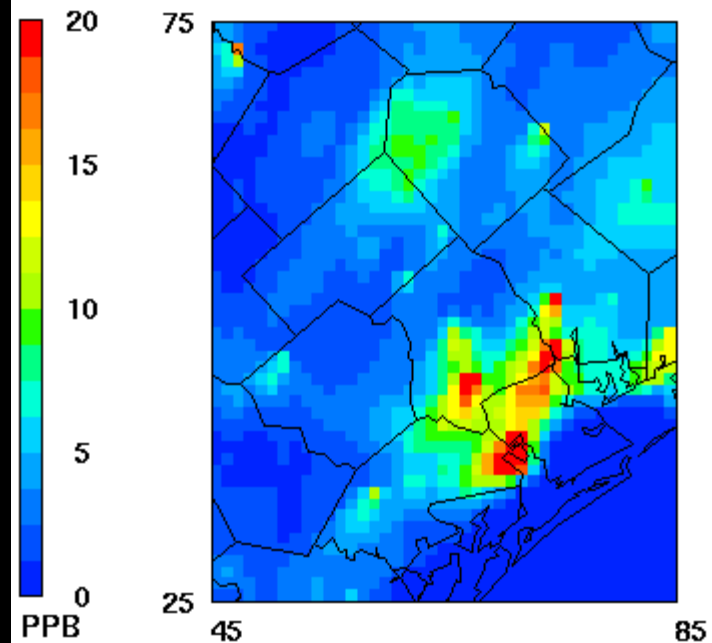
September 17, 2007



September 17, 1999 3:00:00
Min= 0 at (85,26), Max= 47 at (72,39)

1-hr Average NOx Conc.

September 17, 2007

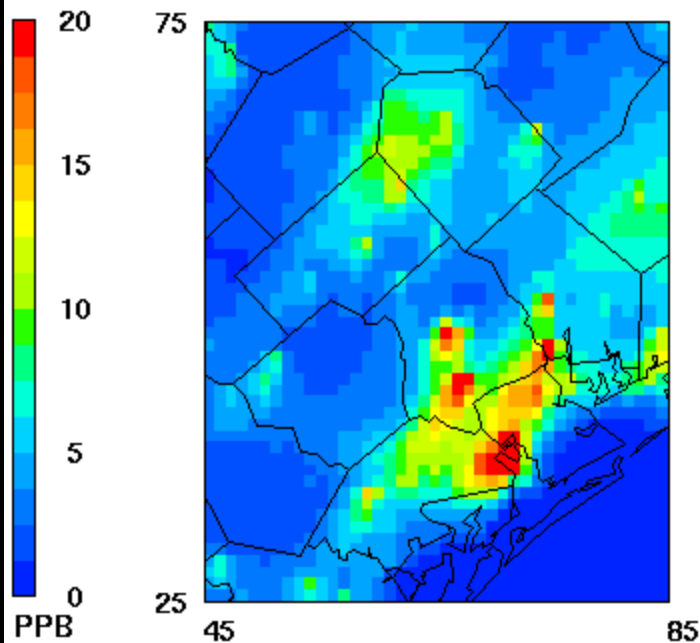


September 17, 1999 5:00:00
Min= 0 at (85,26), Max= 56 at (72,39)

NOx Concentrations from CAMx Modeling

1-hr Average NOx Conc.

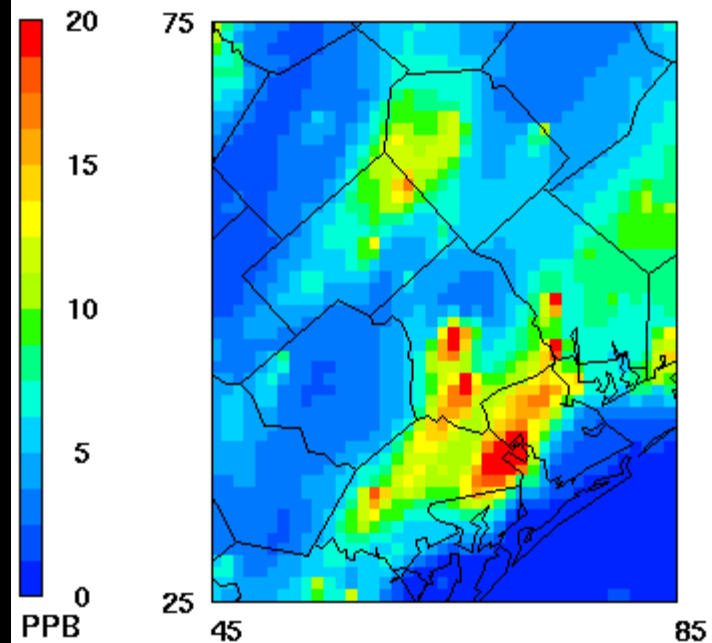
September 17, 2007



September 17, 1999 6:00:00
Min= 0 at (85,26), Max= 54 at (72,39)

1-hr Average NOx Conc.

September 17, 2007

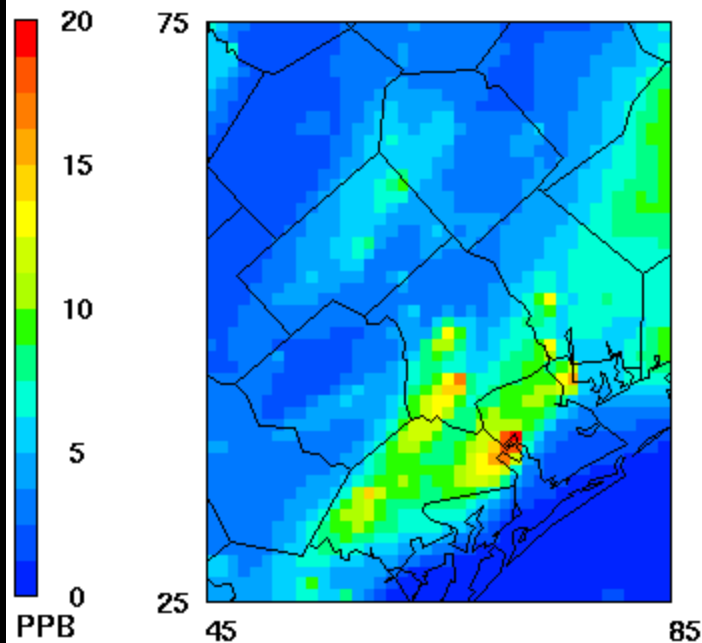


September 17, 1999 7:00:00
Min= 0 at (85,26), Max= 36 at (72,38)

NOx Concentrations from CAMx Modeling

1-hr Average NOx Conc.

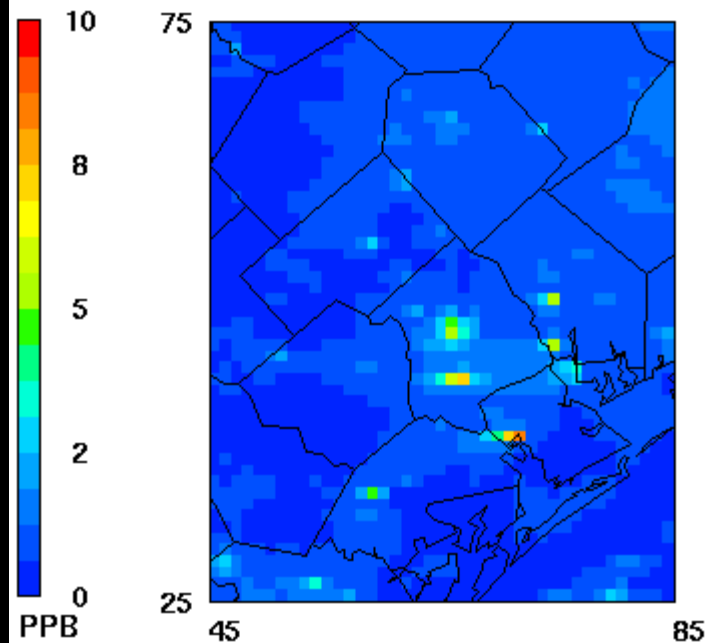
September 17, 2007



September 17, 1999 8:00:00
Min= 0 at (77,29), Max= 24 at (72,39)

1-hr Average NOx Conc.

September 17, 2007

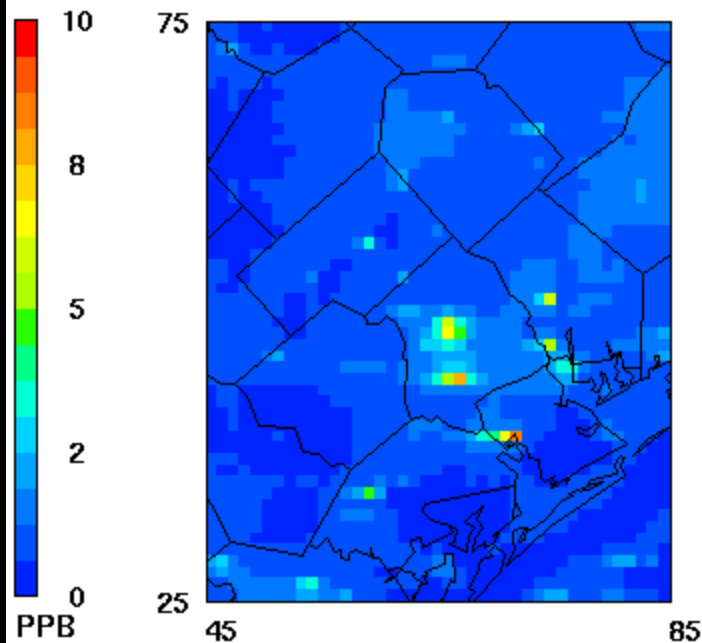


September 17, 1999 13:00:00
Min= 0 at (85,25), Max= 8 at (72,39)

NOx Concentrations from CAMx Modeling

1-hr Average NOx Conc.

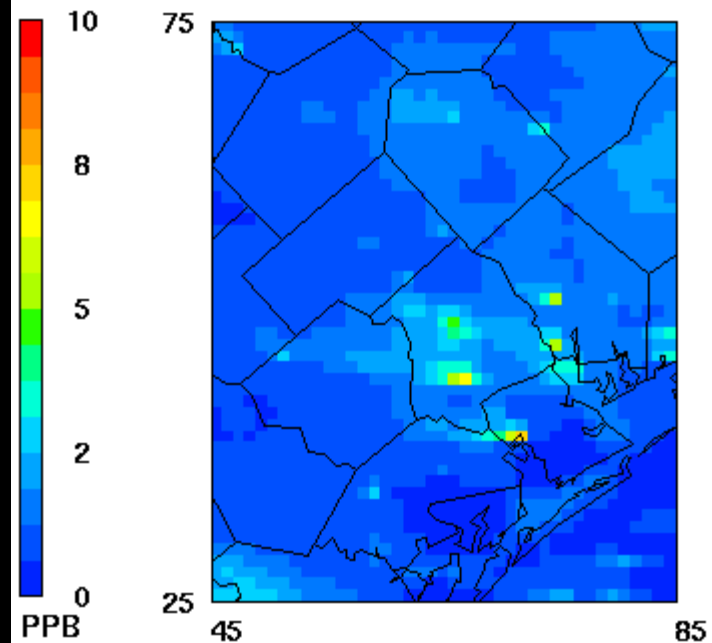
September 17, 2007



September 17, 1999 15:00:00
Min= 0 at (85,26), Max= 9 at (72,39)

1-hr Average NOx Conc.

September 17, 2007



September 17, 1999 18:00:00
Min= 0 at (85,26), Max= 7 at (72,39)

Questions?