

25 August Preview

Rapid Science Synthesis*

Questions **A, C, D, E** - Emissions:

- **Emission Inventory Targets** (Revisit 18 August discussion)

Questions **F, K** - VOC vs. NO_x Sensitive Photochemistry

- **Observation based analysis**
- **Model based analysis**

Questions **G, H** - Regional Background O₃ and aerosol:

- **Possible Ozone Advection into Texas Aug. 17-18, 2006:
Analysis with Rural O₃ Sites** (Dave Sullivan)

*<http://esrl.noaa.gov/csd/2006/rss/>

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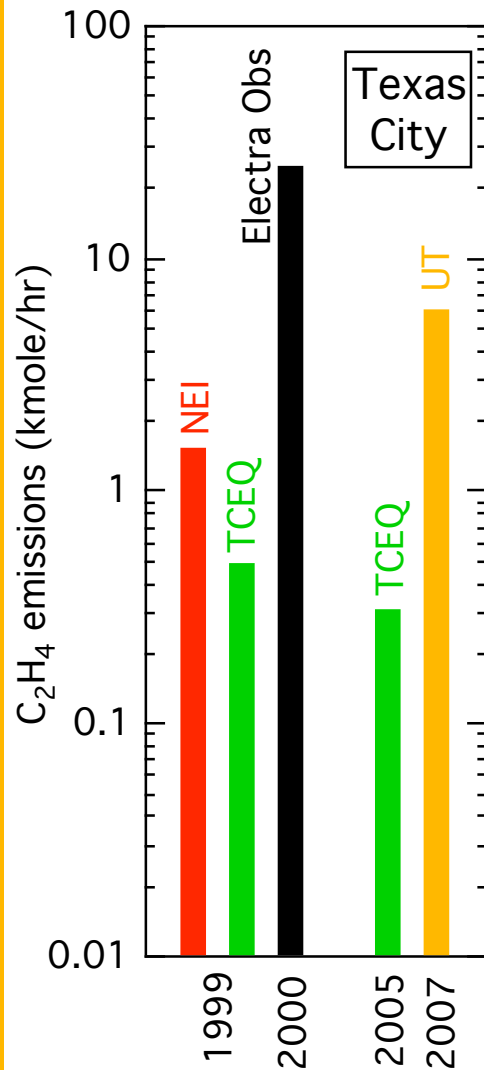
**Preliminary Data & Analysis
Do Not Cite or Distribute!!!!**

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Questions A, C, D, E - Emissions:

- **Emission Inventory Targets**

(Stu McKeen, Greg Frost, Dave Allen)



NEI 1999 = EPA NET-99 Version Point Emissions

TCEQ 1999 = TCEQ Point Emissions used in 2000

TCEQ 2005 = Latest TCEQ VOC Emissions
specified as they were in 1999

UT = 13:00-14:00 CST emissions (elevated
point sources plus fugitive)

Forecast models: NEI 1999 with all ethylene and
propylene emissions scaled by representative
2000 observed/inventory ratio

Questions F, K - VOC vs. NO_x Sensitive Photochemistry

- Observation based analysis

Observation-based methods (OBMs) for analyzing urban/regional ozone production and Ozone-NO_x-VOC sensitivity.*

Dr. Sanford Sillman
Research Scientist
University of Michigan
sillman@umich.edu

*<http://www-personal.engin.umich.edu/~sillman/obm.htm>

Apply to TexAQS 2000 Electra data

Observation-based methods (OBMs) for analyzing urban/regional ozone production and Ozone-NO_x-VOC sensitivity.*

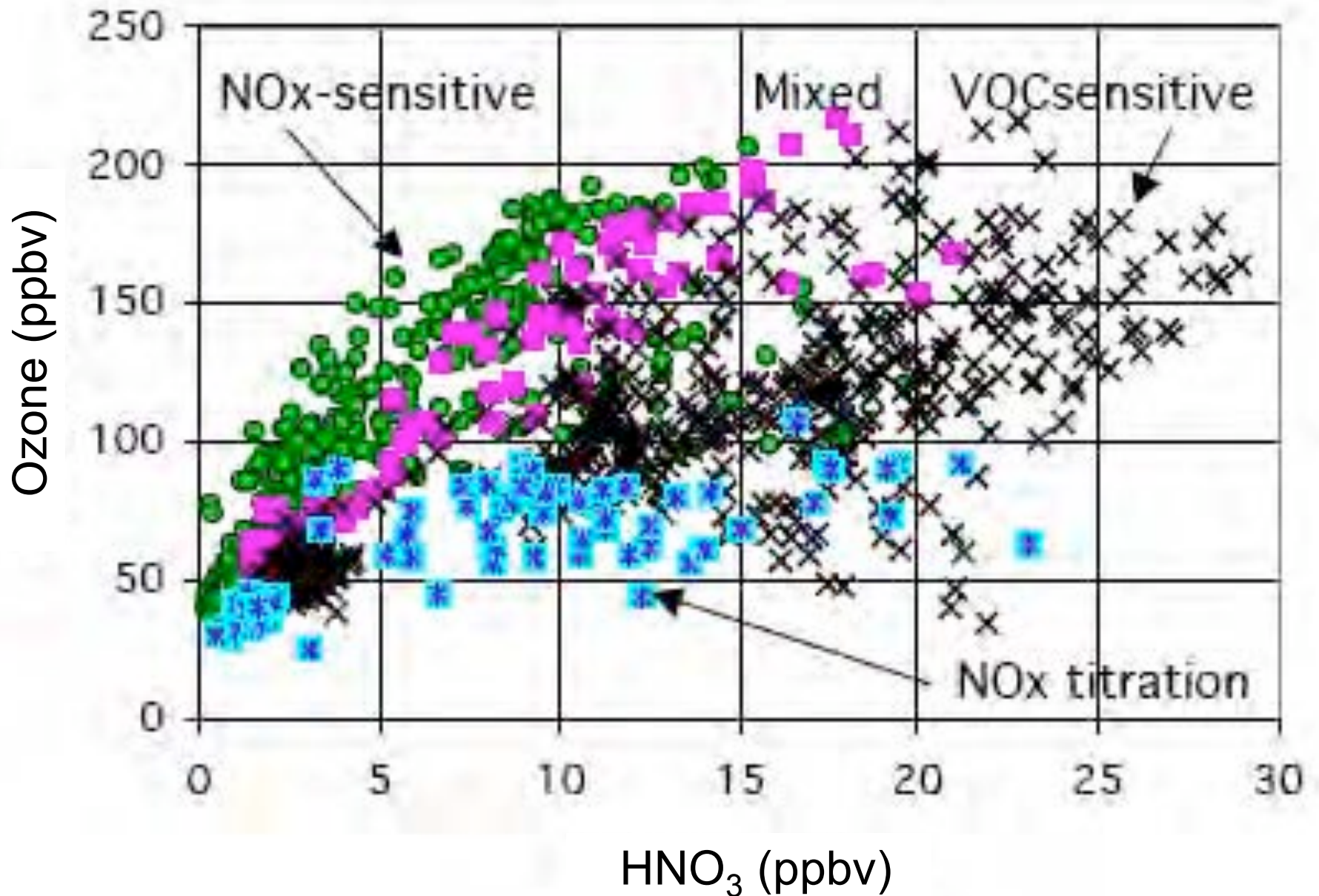
Based on 6 modeling studies throughout the US

Location	Photochemistry	Reference
Nashville	Modified Lurmann et al., 1986	Sillman et al., 1998
Lake Michigan	“	Sillman, 1995
Northeast Corridor	“	Sillman, 1995
Atlanta	CB4 (Gery et al., 1989)	Sillman et al., 1997
San Joaquin	“	Sillman et al., 2001
Los Angeles	“	Godowitch et al., 1994; Sillman et al., 1997

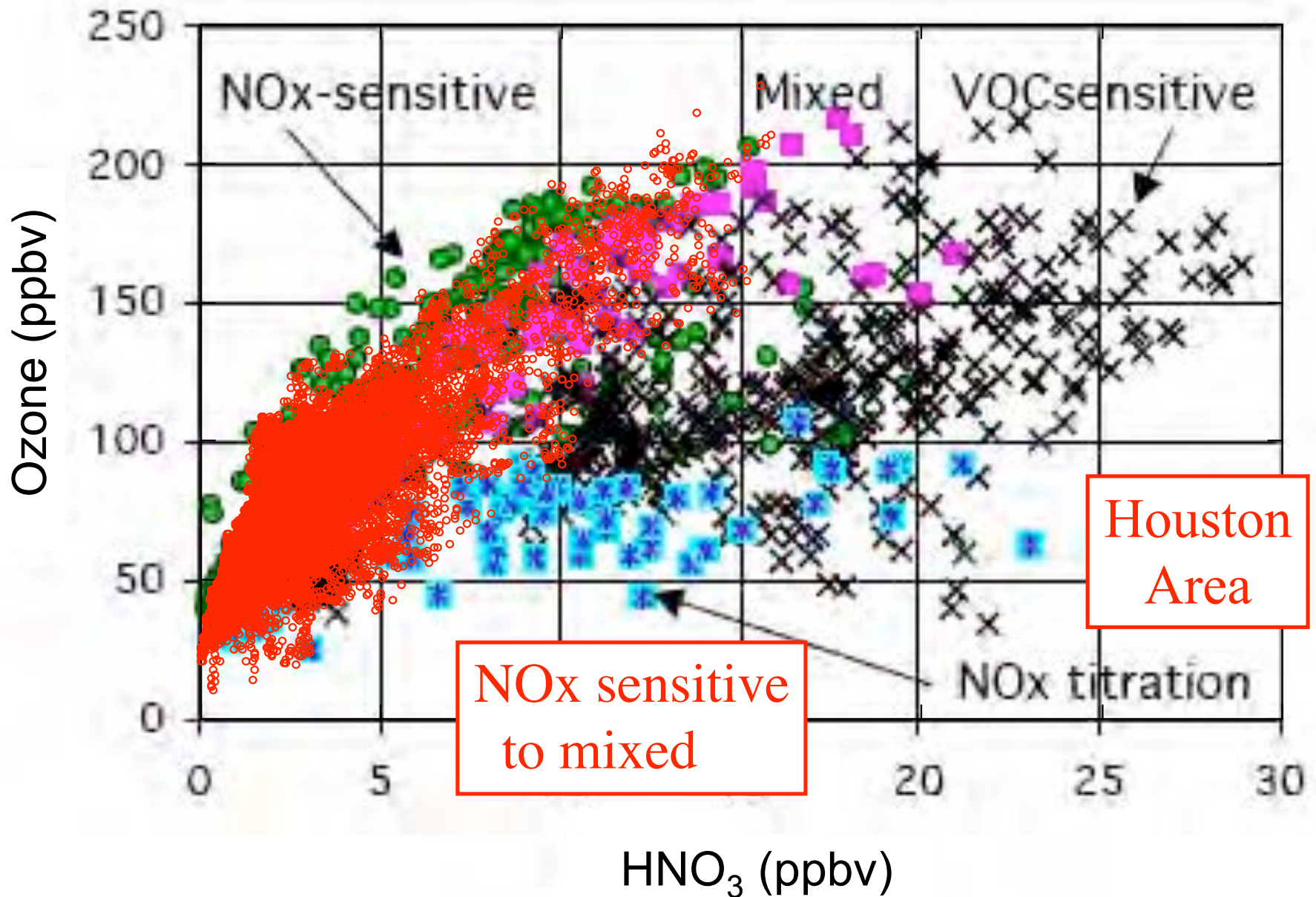
Analysis focused on maximum O₃, not 8-hour average

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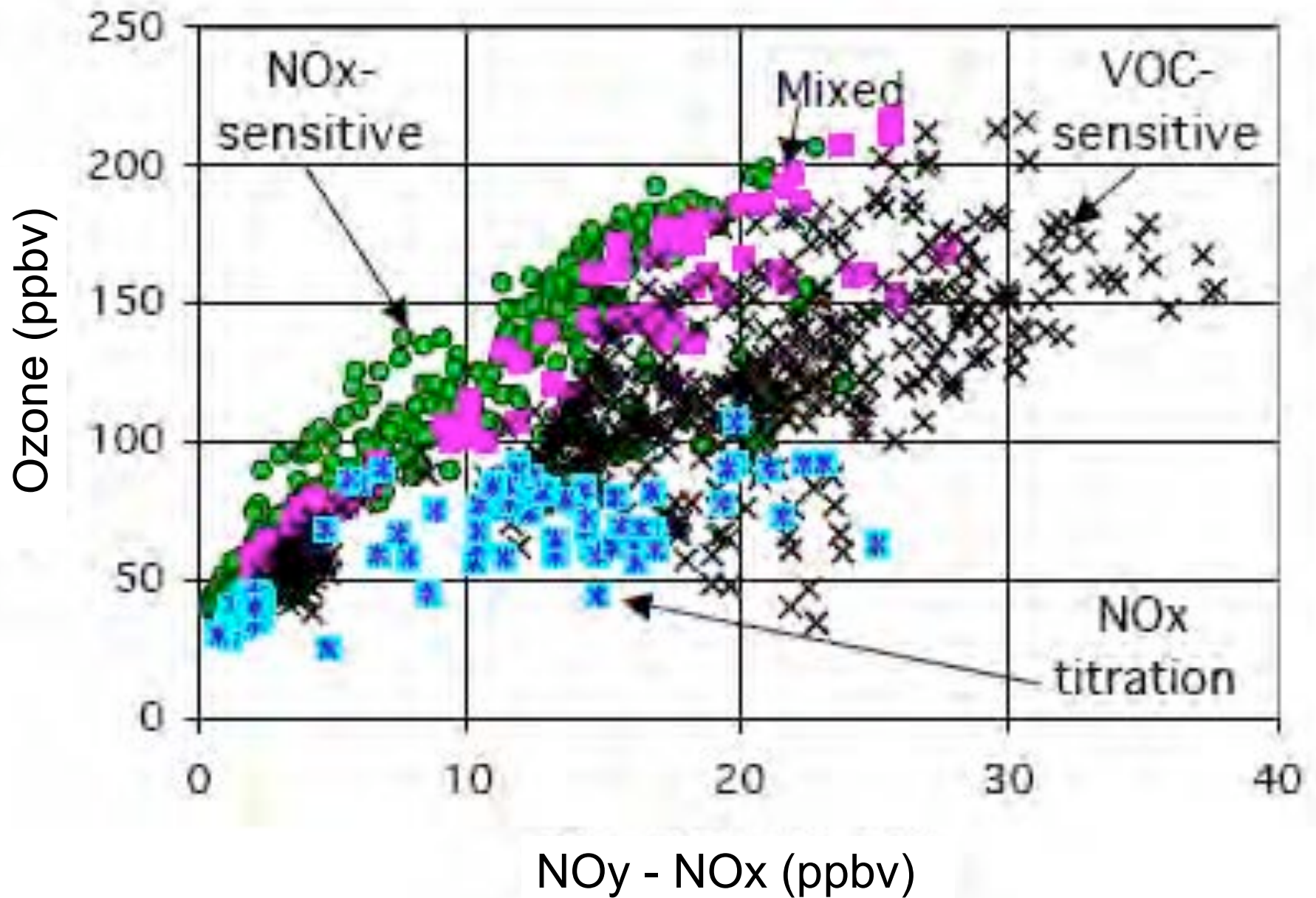
Sillman: Observation-based methods (OBMs)



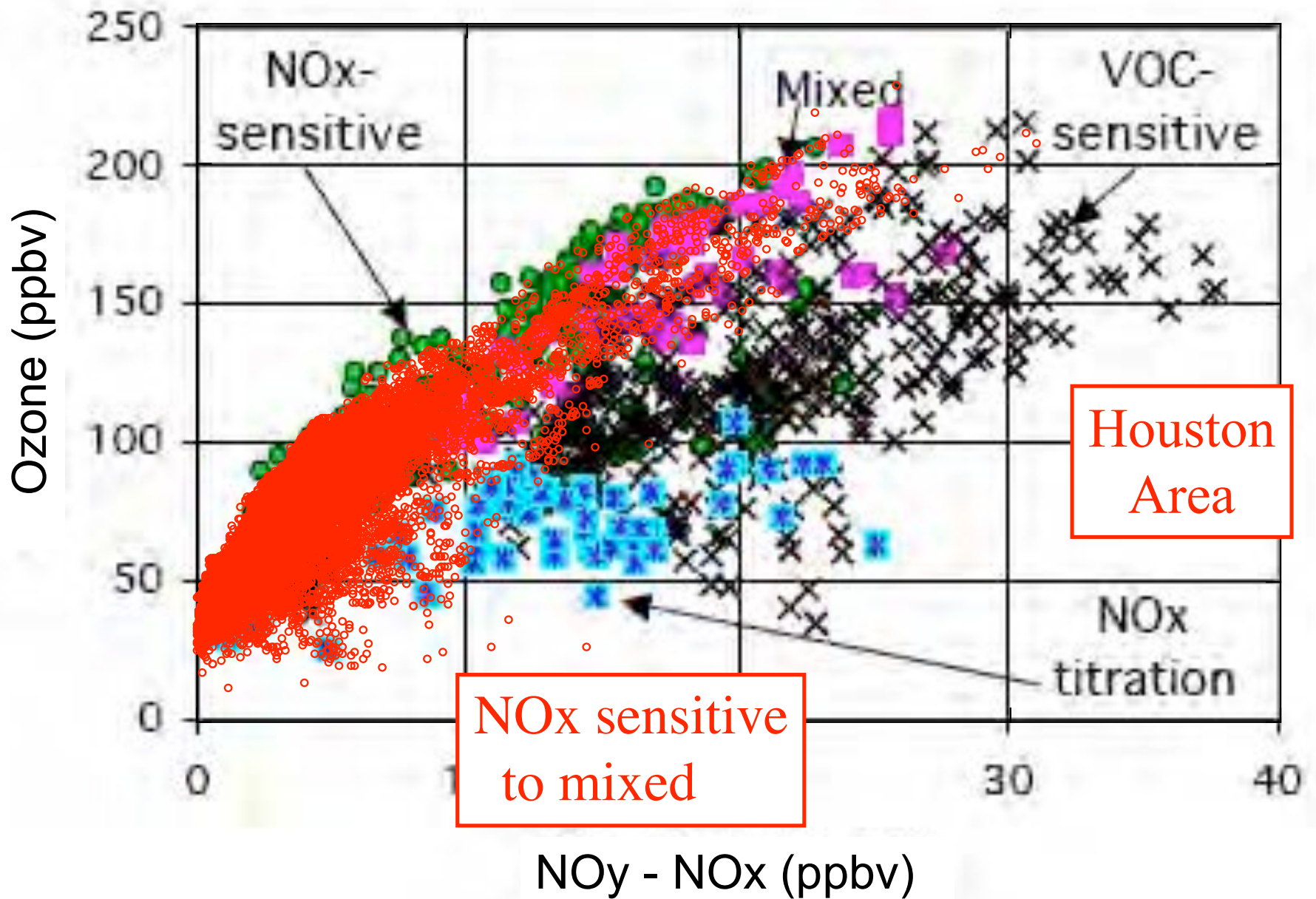
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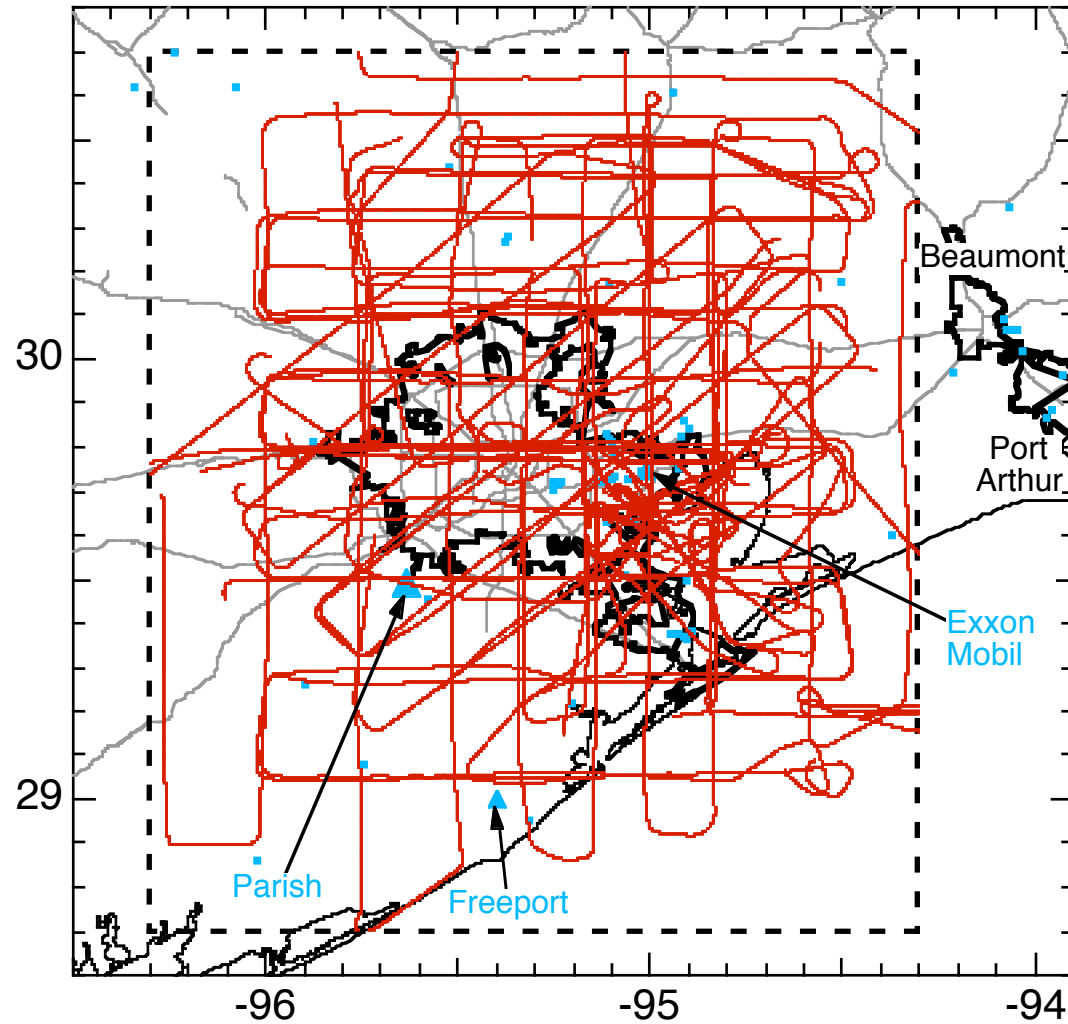
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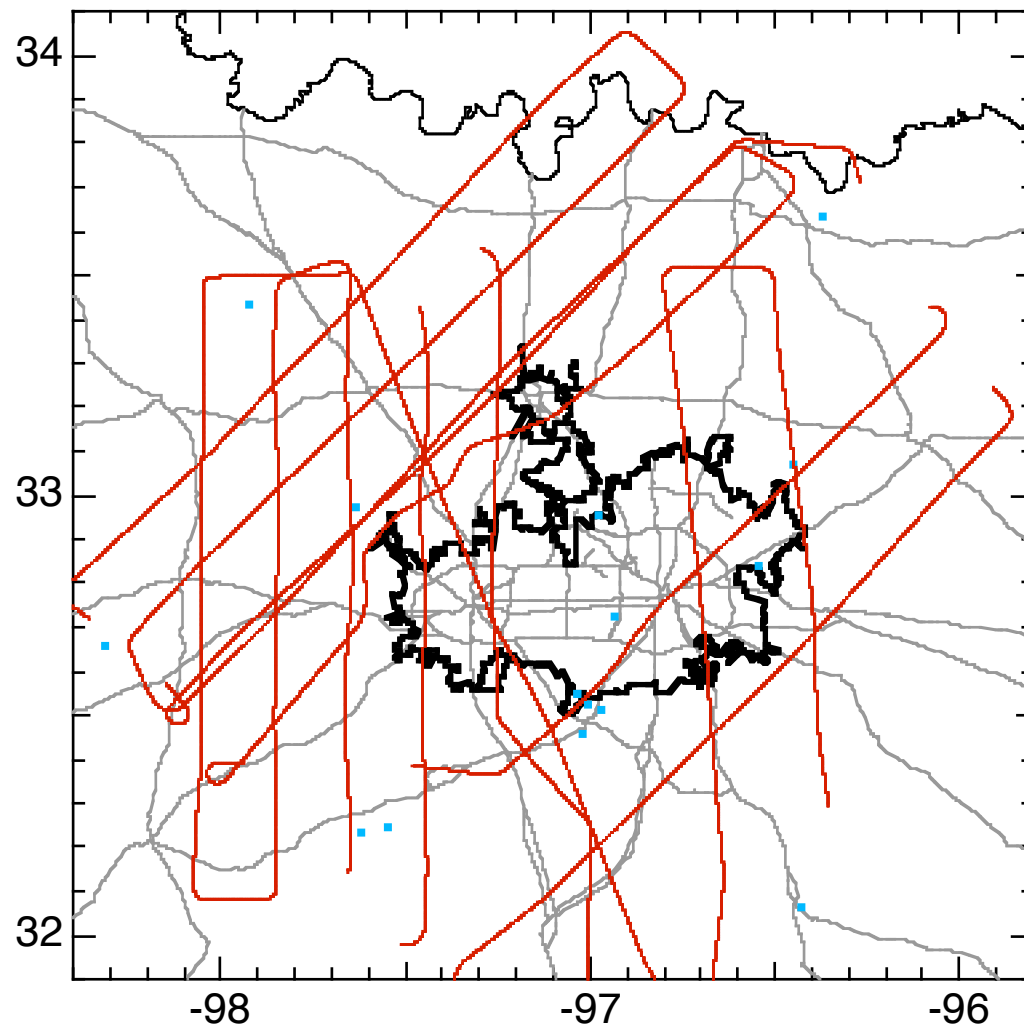
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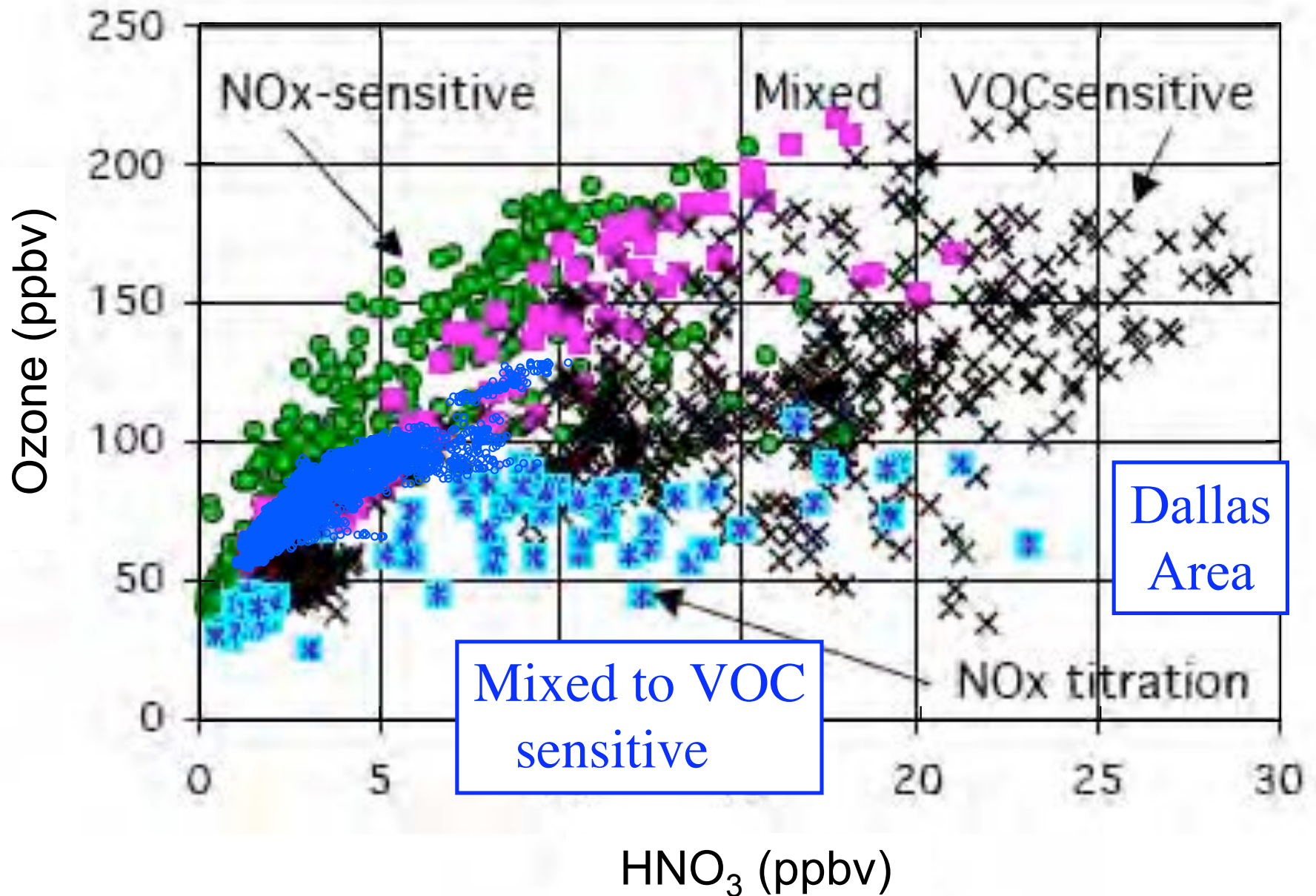
Houston Area



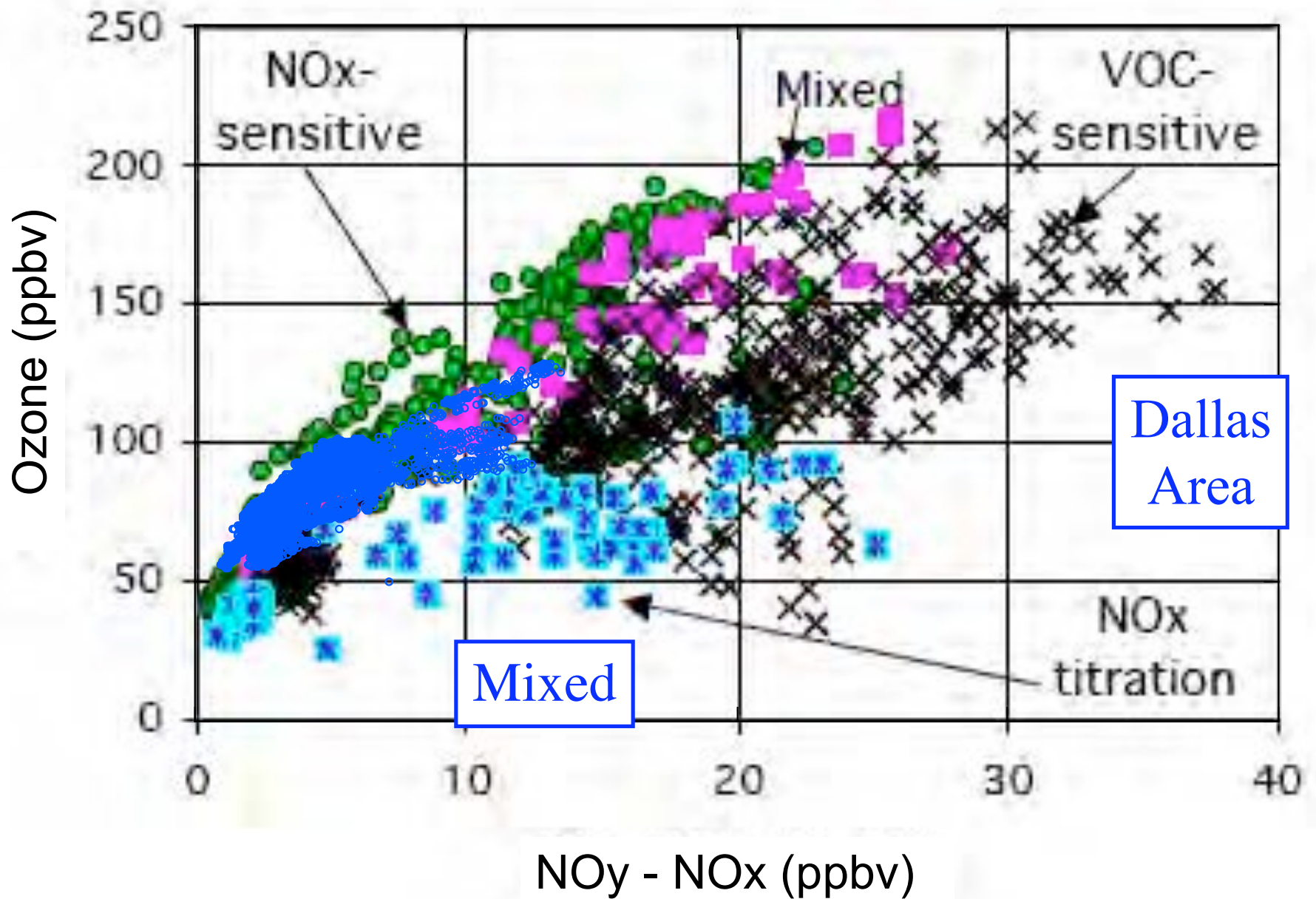
Dallas Area



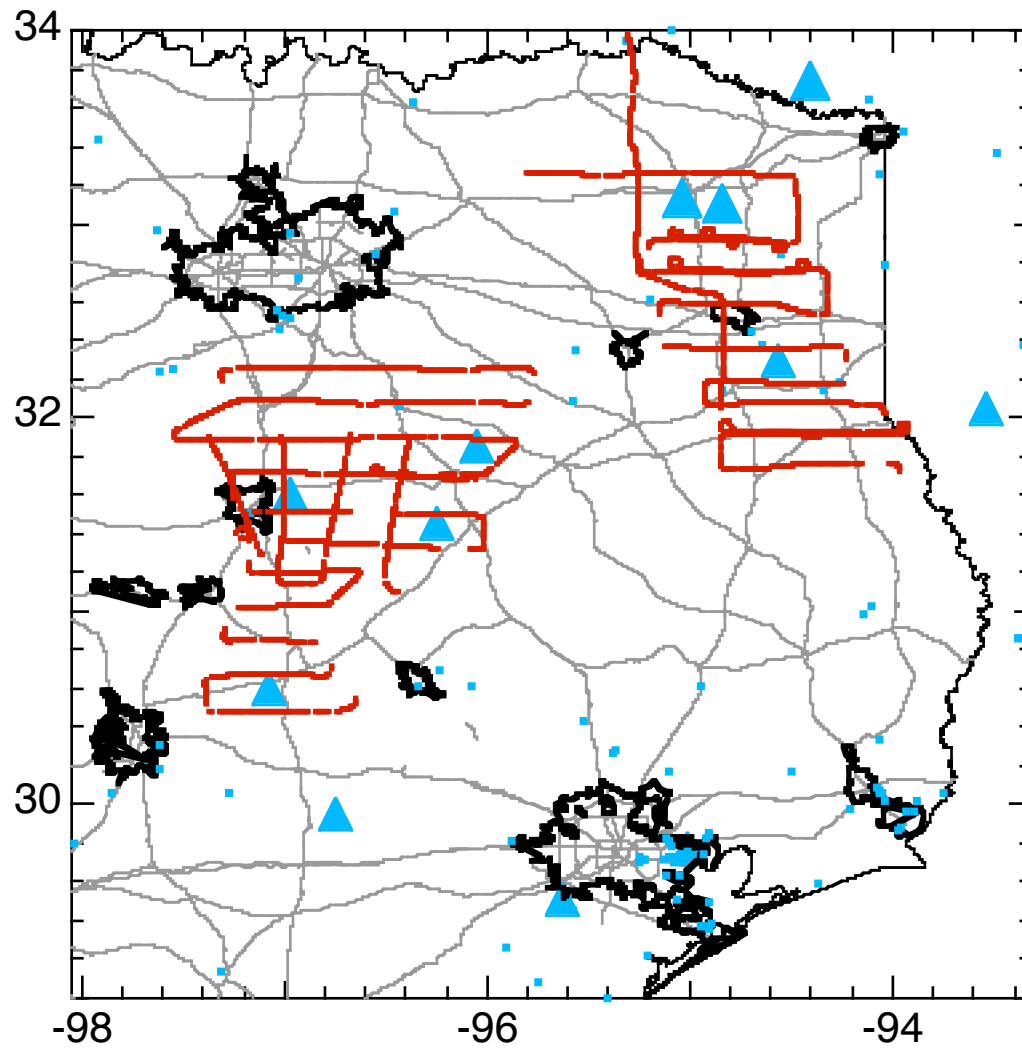
Sillman: Observation-based methods (OBMs)



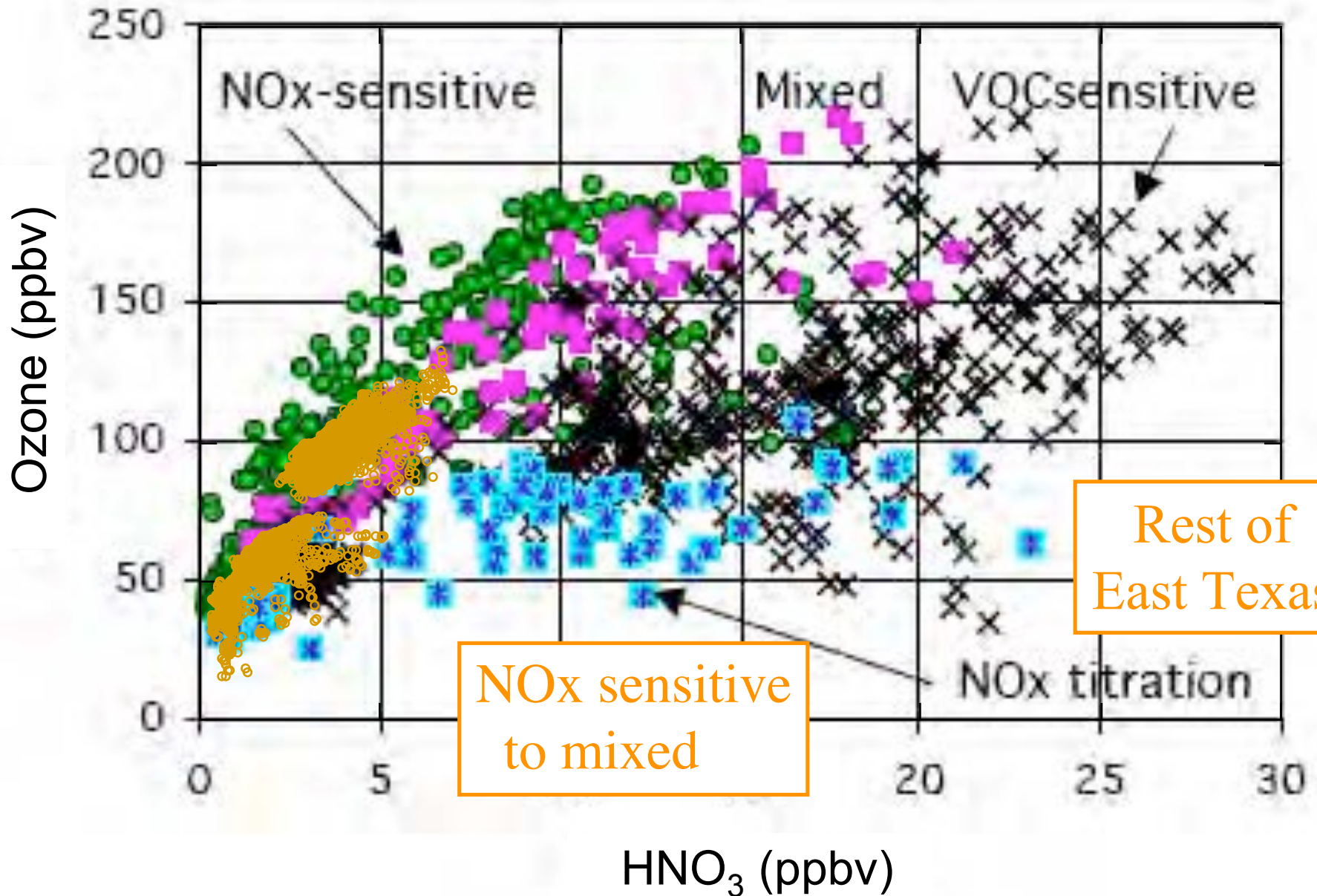
Sillman: Observation-based methods (OBMs)



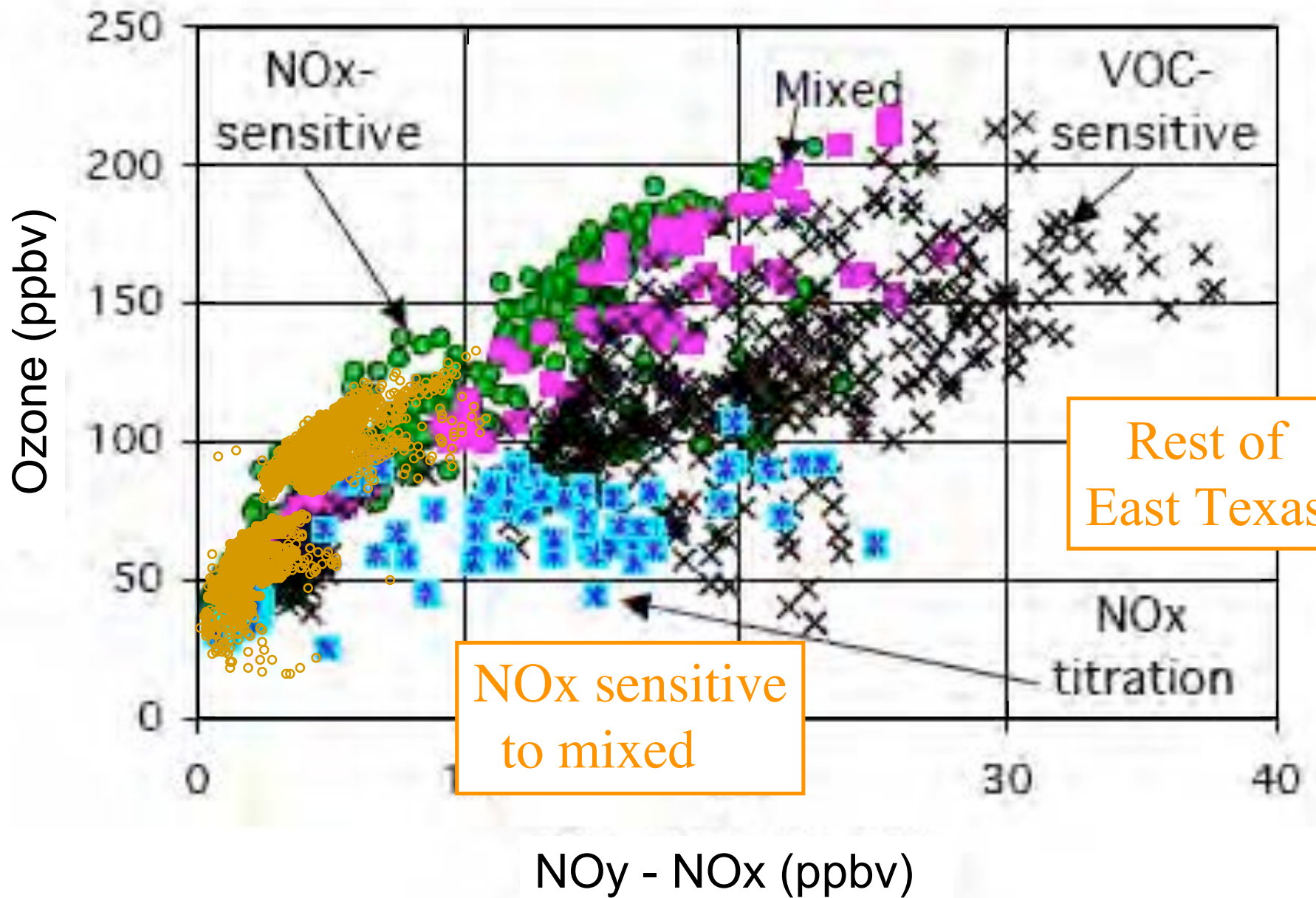
Rest of East Texas



Sillman: Observation-based methods (OBMs)



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Questions F, K - VOC vs. NO_x Sensitive Photochemistry

- Observation based analysis

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- TexAQS 2000 Electra data indicates generally NO_x sensitive to mixed except Dallas area approaches VOC sensitive.
- Compare to 2006 data with presumably reduced emissions.

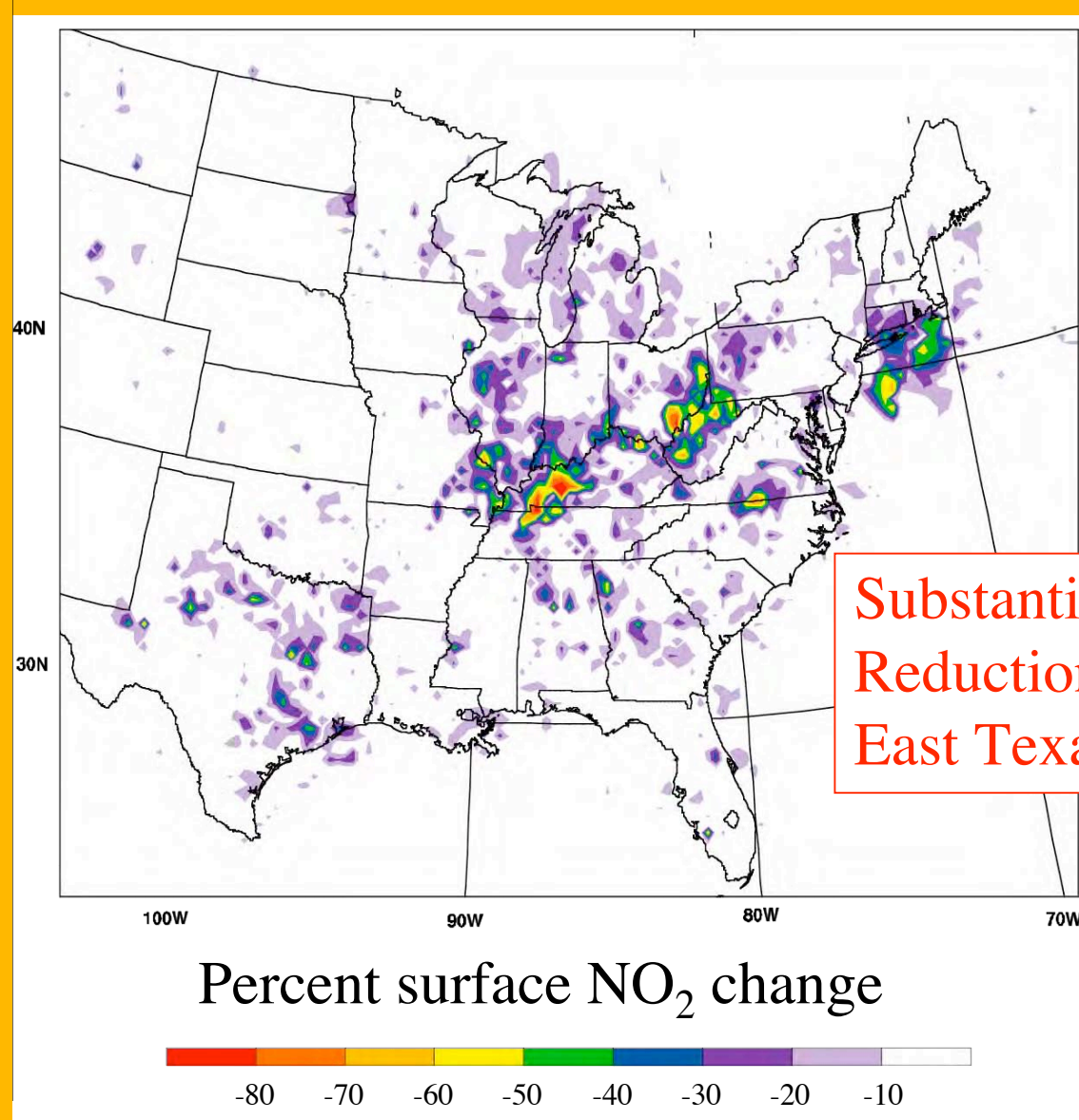
Questions F, K - VOC vs. NO_x Sensitive Photochemistry

- **Model based analysis** (Kim, Frost, Hsie, Trainer, Peckham, Grell)

Compare modeled NO₂ and O₃ levels using emissions from NEI 1999 vs. NEI 1999 updated with 2004 CEMS data

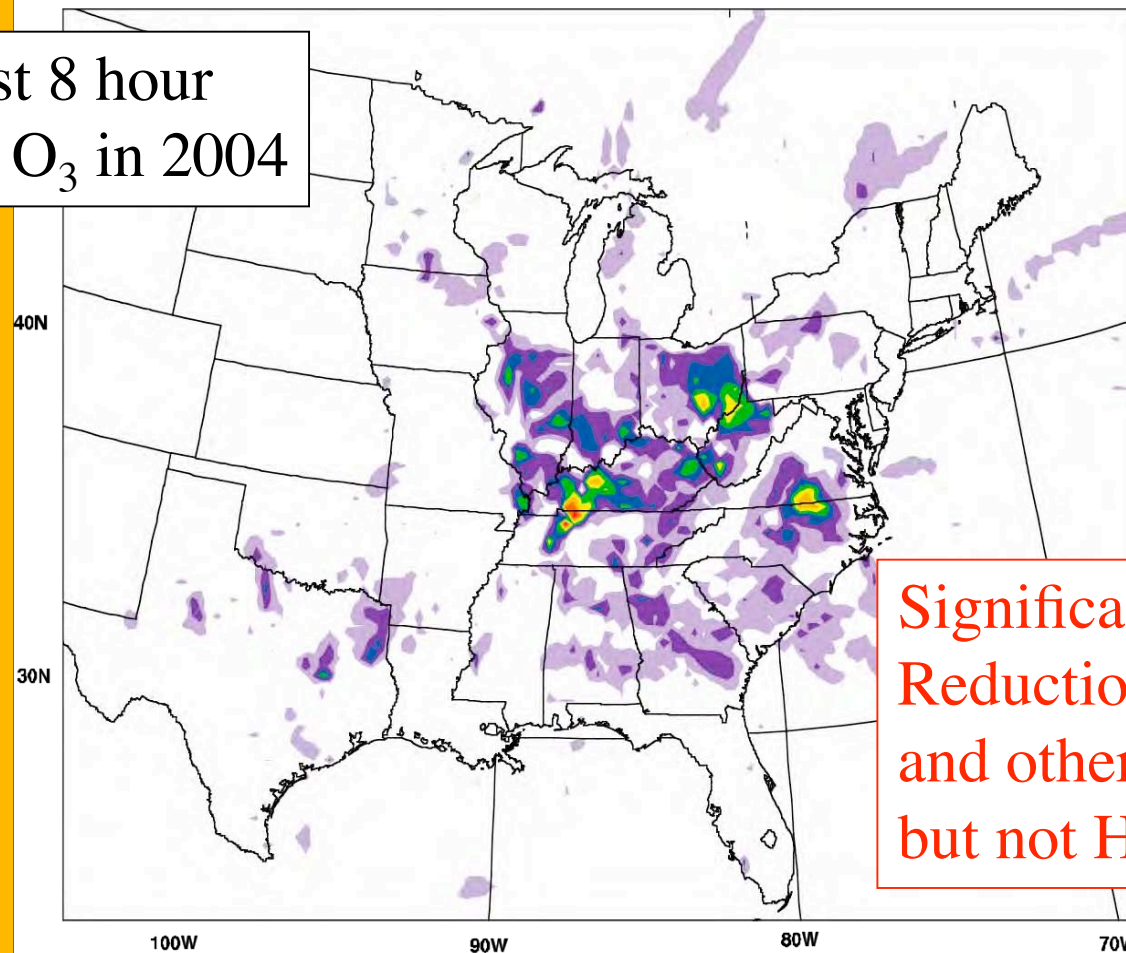
Analysis focused on maximum 8-hour average O₃

- **Model based analysis** (Kim, Frost, Hsie, Trainer, Peckham, Grell)



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4th highest 8 hour average O₃ in 2004



Significant Ozone Reductions in Dallas and other East Texas, but not Houston

Percent surface O₃ change



Questions F, K - VOC vs. NO_x Sensitive Photochemistry

- Observation based analysis - Houston Area NO_x sensitive to mixed
- Model based analysis - Houston Area O₃ does not respond to point source NO_x reductions

Devil's Advocate - Is any of this analysis useful?
Should we just reduce both NO_x and VOC?

Questions G, H - Regional Background O₃ and aerosol:

- **Possible Ozone Advection into Texas Aug. 17-18, 2006:
Analysis with Rural O₃ Sites (Dave Sullivan)**

Possible Ozone Advection into Texas Aug. 17-18, 2006: Analysis with Rural O₃ Sites

Rapid Science Synthesis

Put together quickly for this call, subject to significant
change.

Dave Sullivan sullivan231@mail.utexas.edu

(512)471-7805

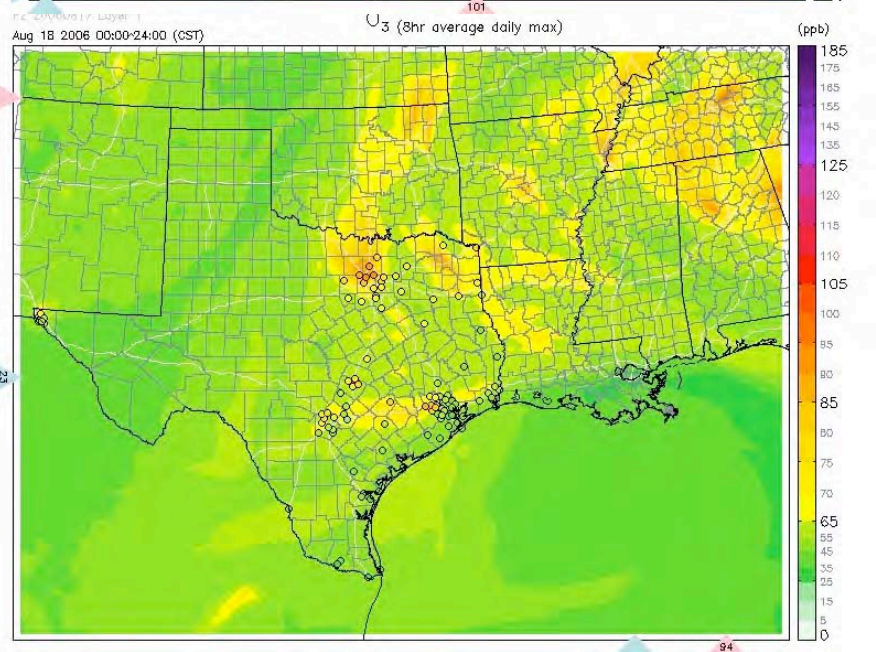
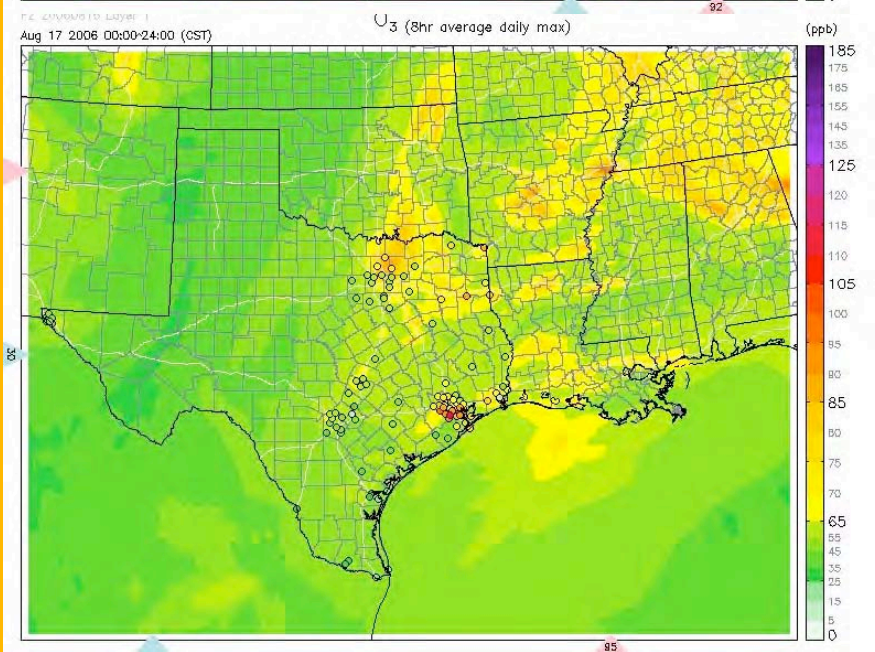
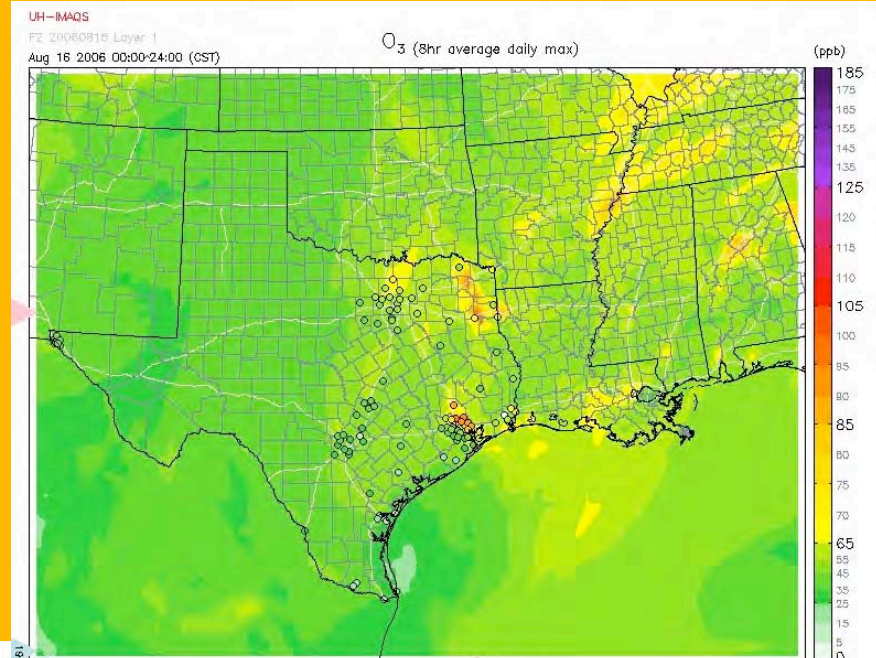
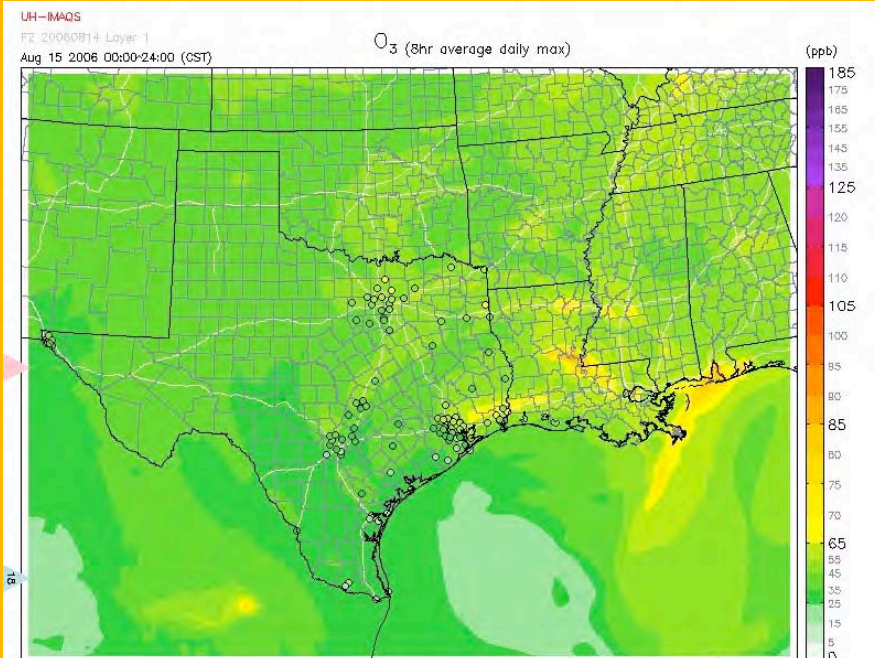
Onset of High O3 Aug. 16

- First O3 Exceedances Since July 23 hit on Aug. 16 (Houston area).
 - Right on time, based on historical data!
- On Aug. 17, East TX had exceedances:
 - Wamba, Longview in NE TX
 - Sabine Pass, Port Arthur in SE TX
 - Houston area (of course)
- On Aug. 18, DFW had exceedances.

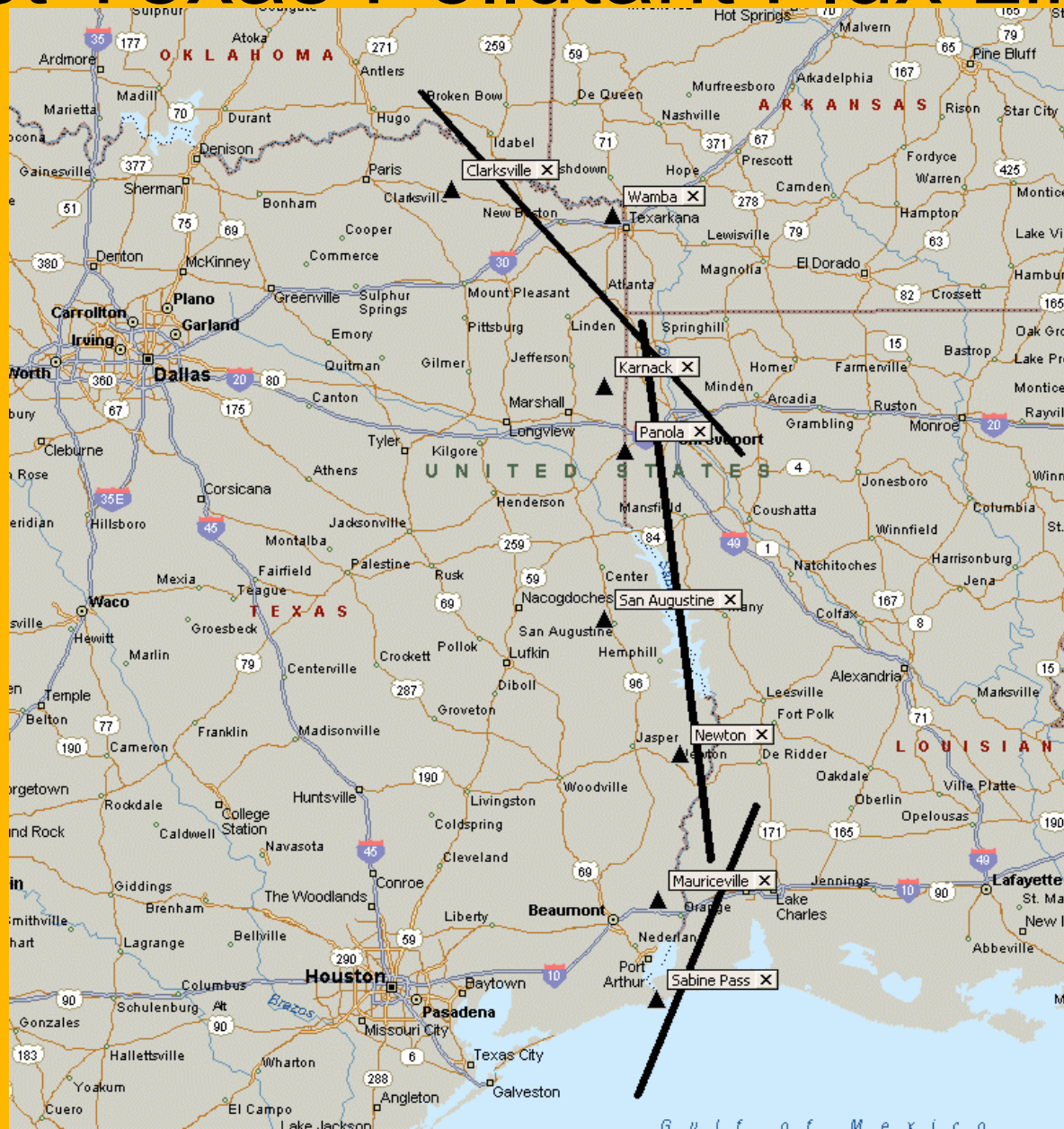
Distribution of O₃ along Flux Lines

- Along NE, high O₃ on 8/17
 - Clarksville 77 ppb, Wamba 86, Panola 81
- Along E, moderate O₃
 - San Augustine 60 ppb, Newton 61, Mauriceville 54
- Along SE Gulf Coast, high O₃
 - Sabine Pass 92 ppb
- IMAQS Forecast predicts high O₃ one day earlier.

UH IMAQS 1st Day Forecasts Aug. 15-18



East Texas Pollutant Flux Lines



Back-Trajectories

- Ran Hysplit with FNL data sets, as EDAS40 were unavailable on 8/23.
- Fetch from northeast on 8/17, east on 8/18
- Following maps show trajs color-coded by rounded 8hr O3 daily peak at flux sites
 - 48-hr back traj from 20 Z start time
 - using model vertical velocity,
 - 10, 500, & 1000 m AGL starting pts
 - Sites = Clarksville, Wamba, Panola, Karnack, San Augustine, Newton, Mauriceville.

Legend and Overview

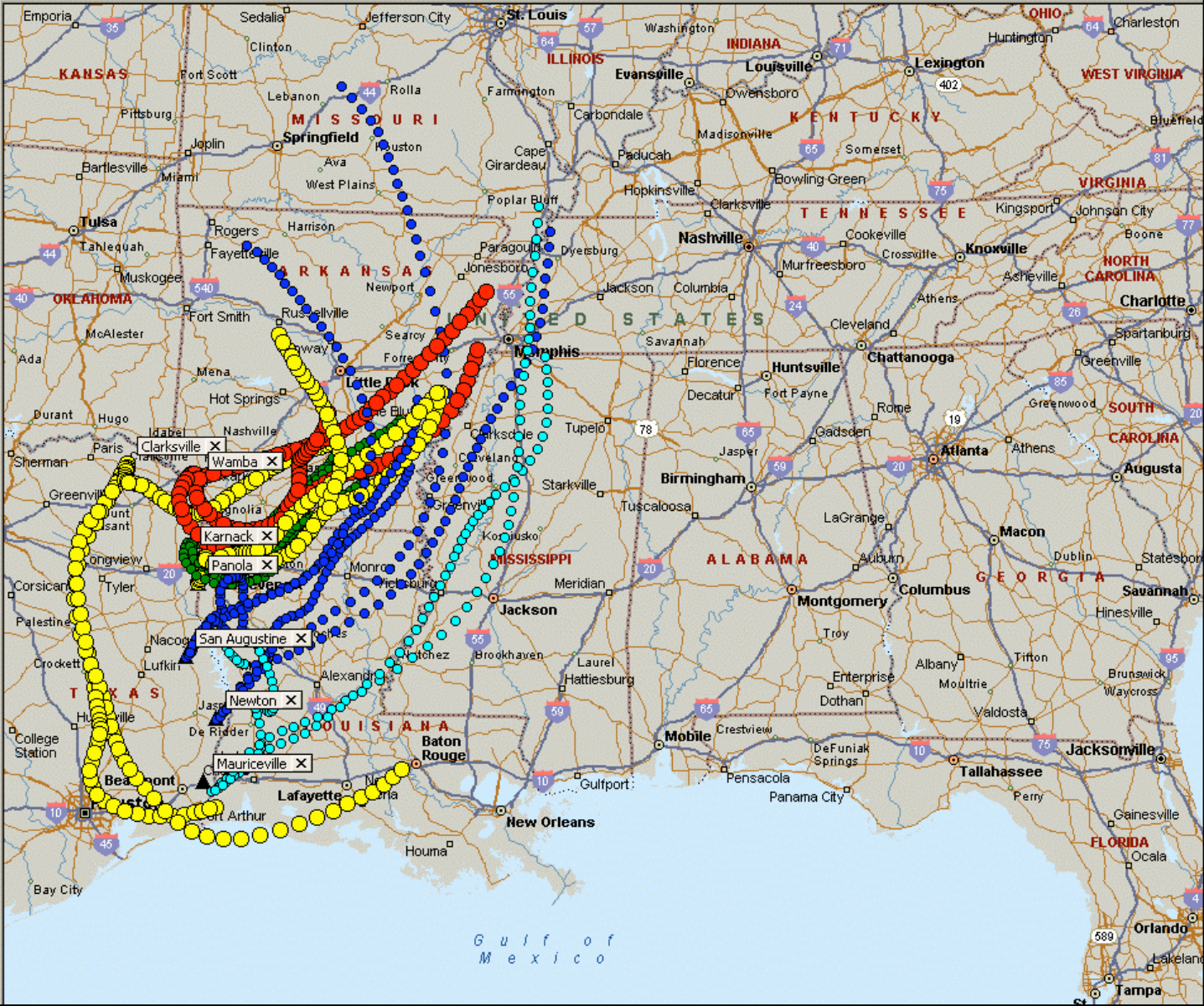


- Aug. 17
- 90
- 80
- 70
- 60
- 50

- Pushpins
- Sites

Aug. 17

North America United States States-



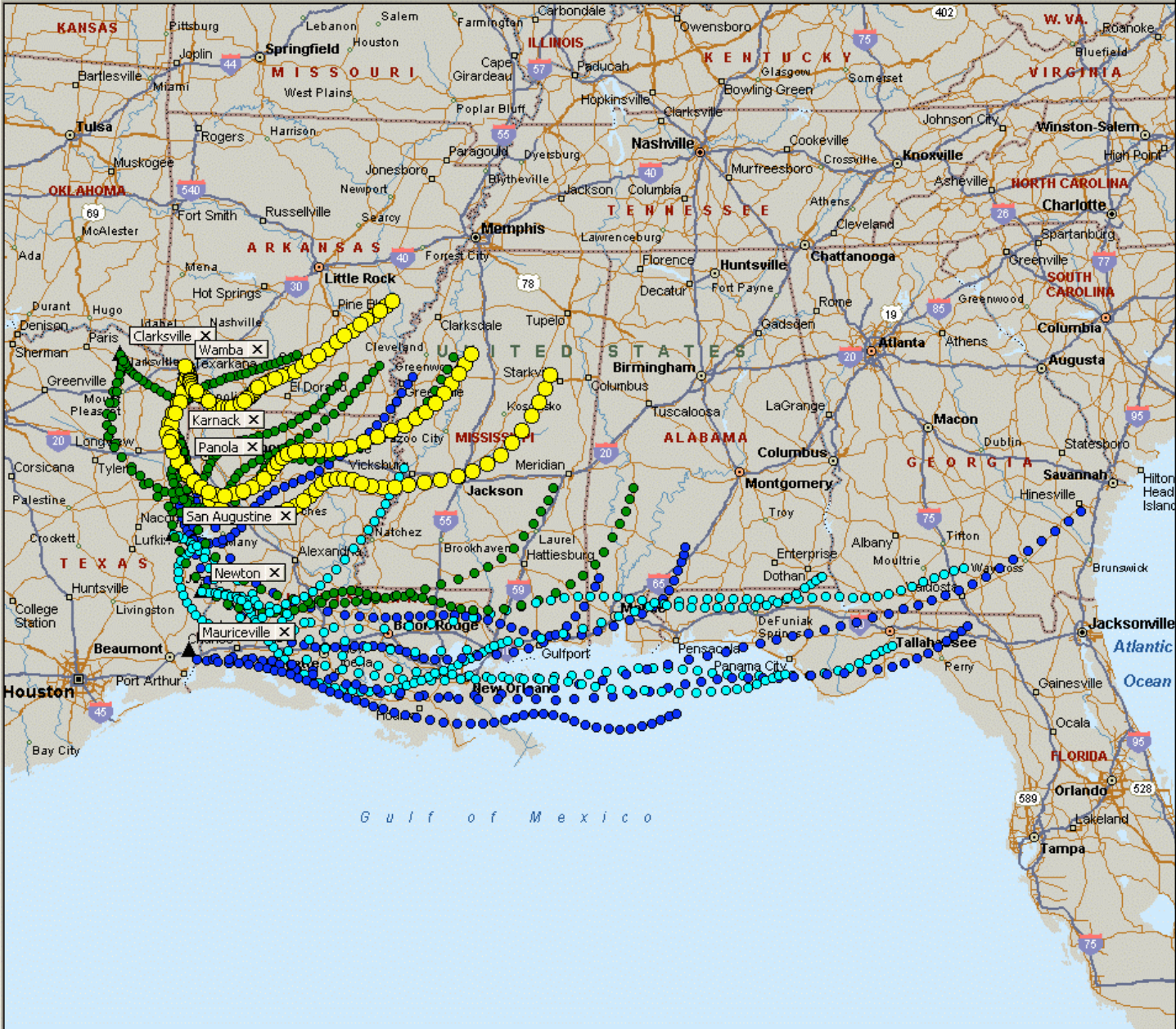
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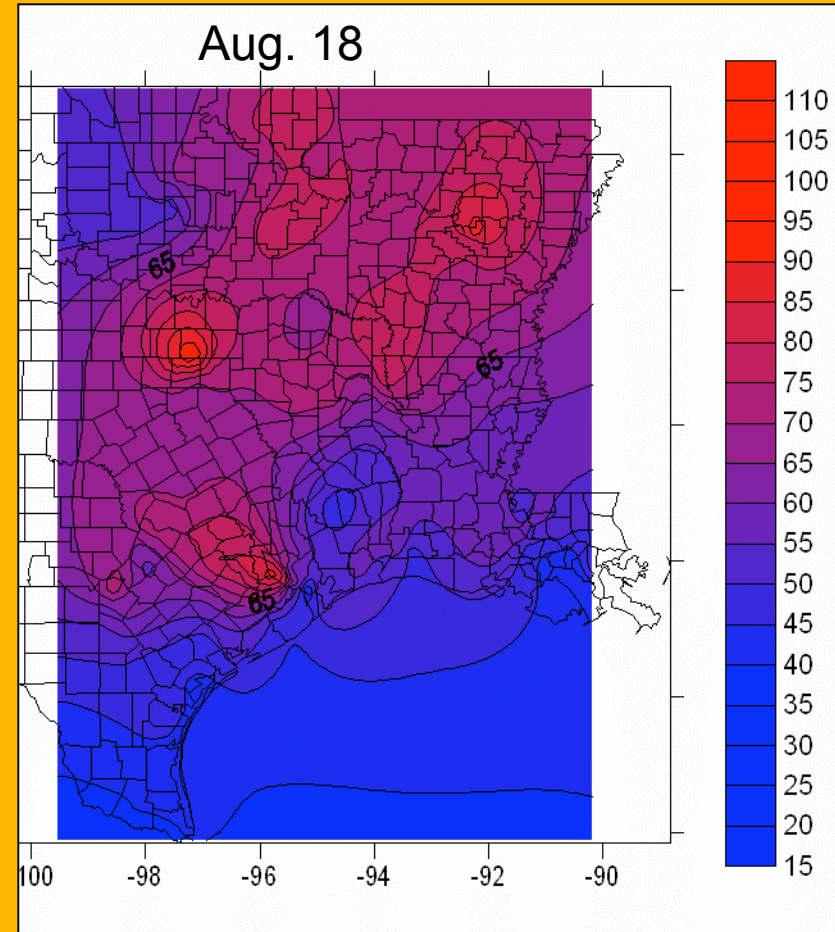
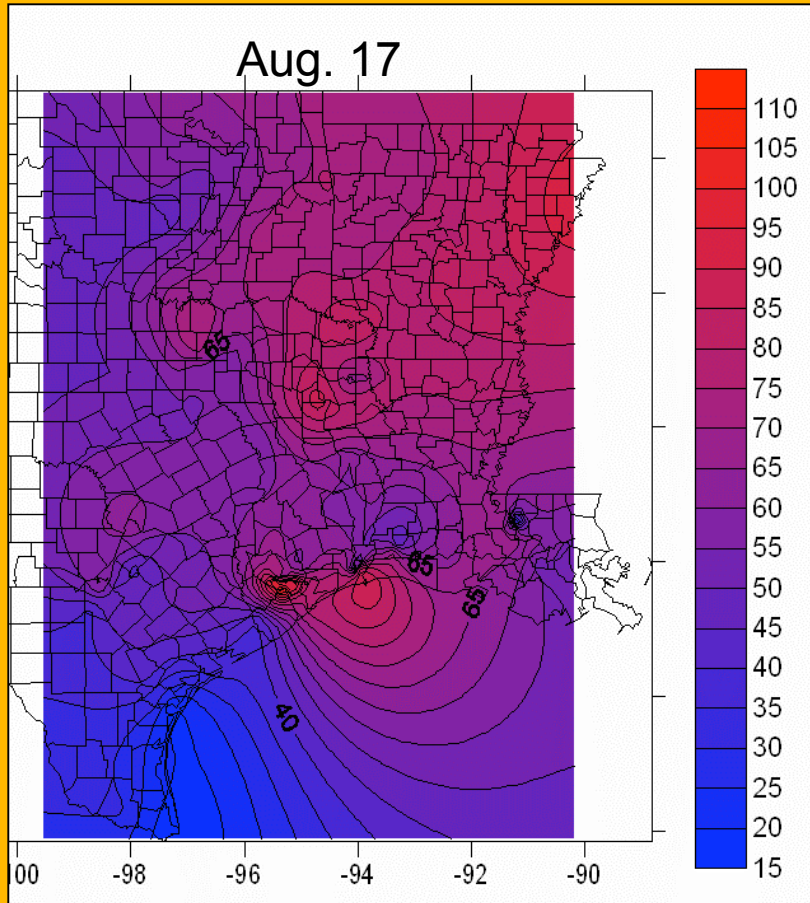


Aug. 18

AIRNOW Suggests Possible Advection from Memphis Area

- 8 hr daily maxima across U.S. from Aug.
14 – 22

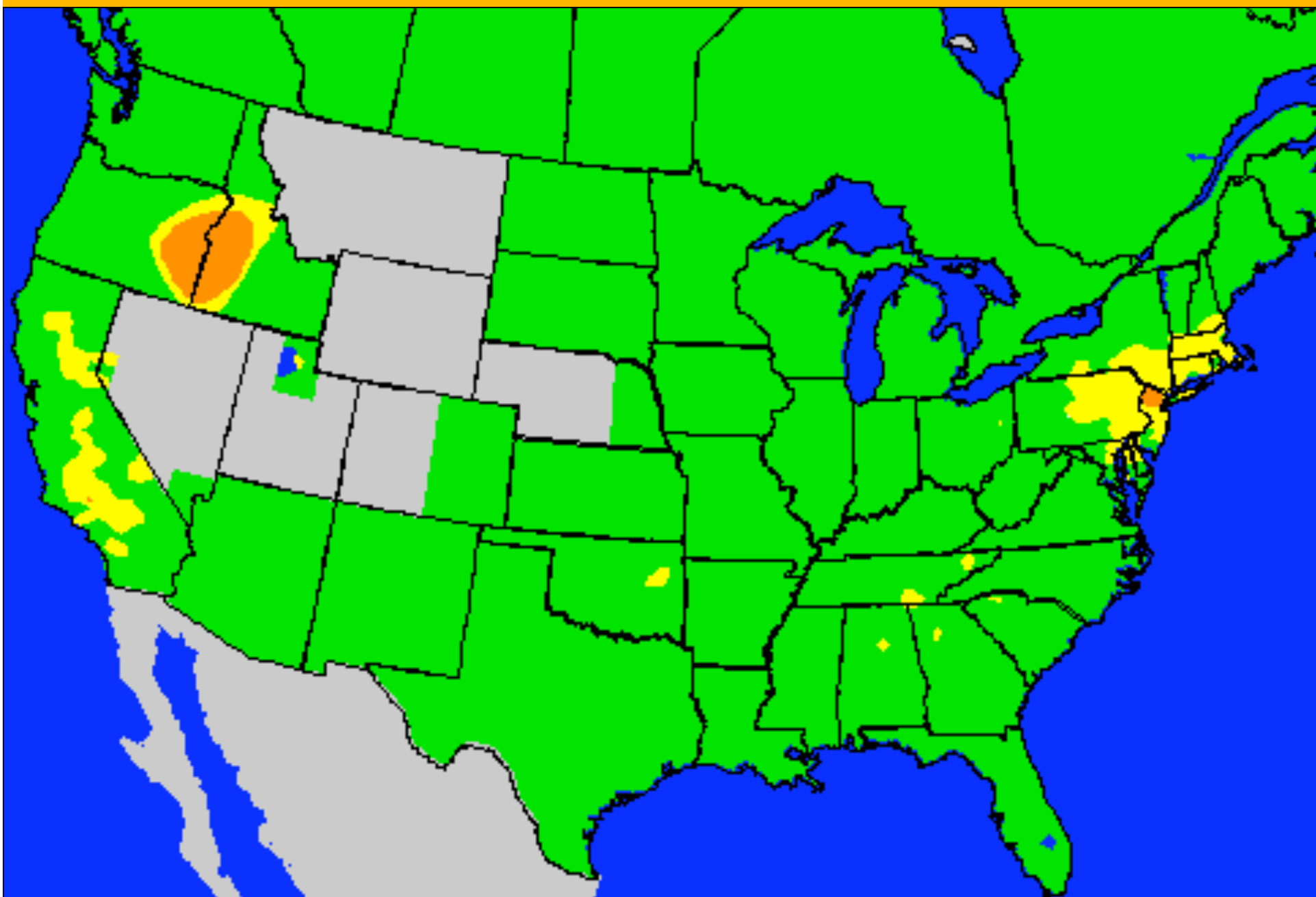
TX, LA, OK, AR O3 8hr Maxima Aug. 17, 18 from AIRNOW Data



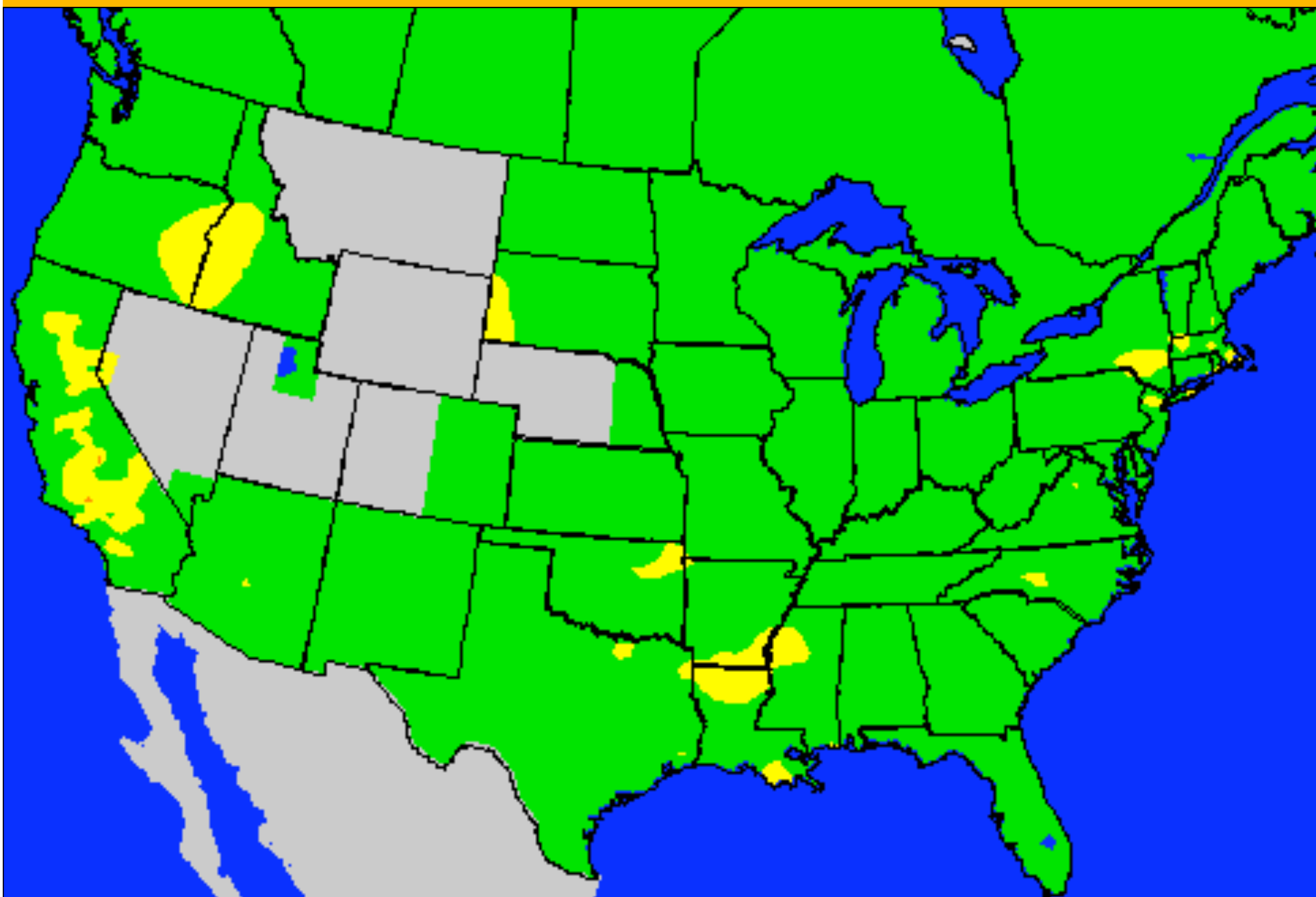
National AIRNOW Contours

(Using TexAQS Rural Sites)

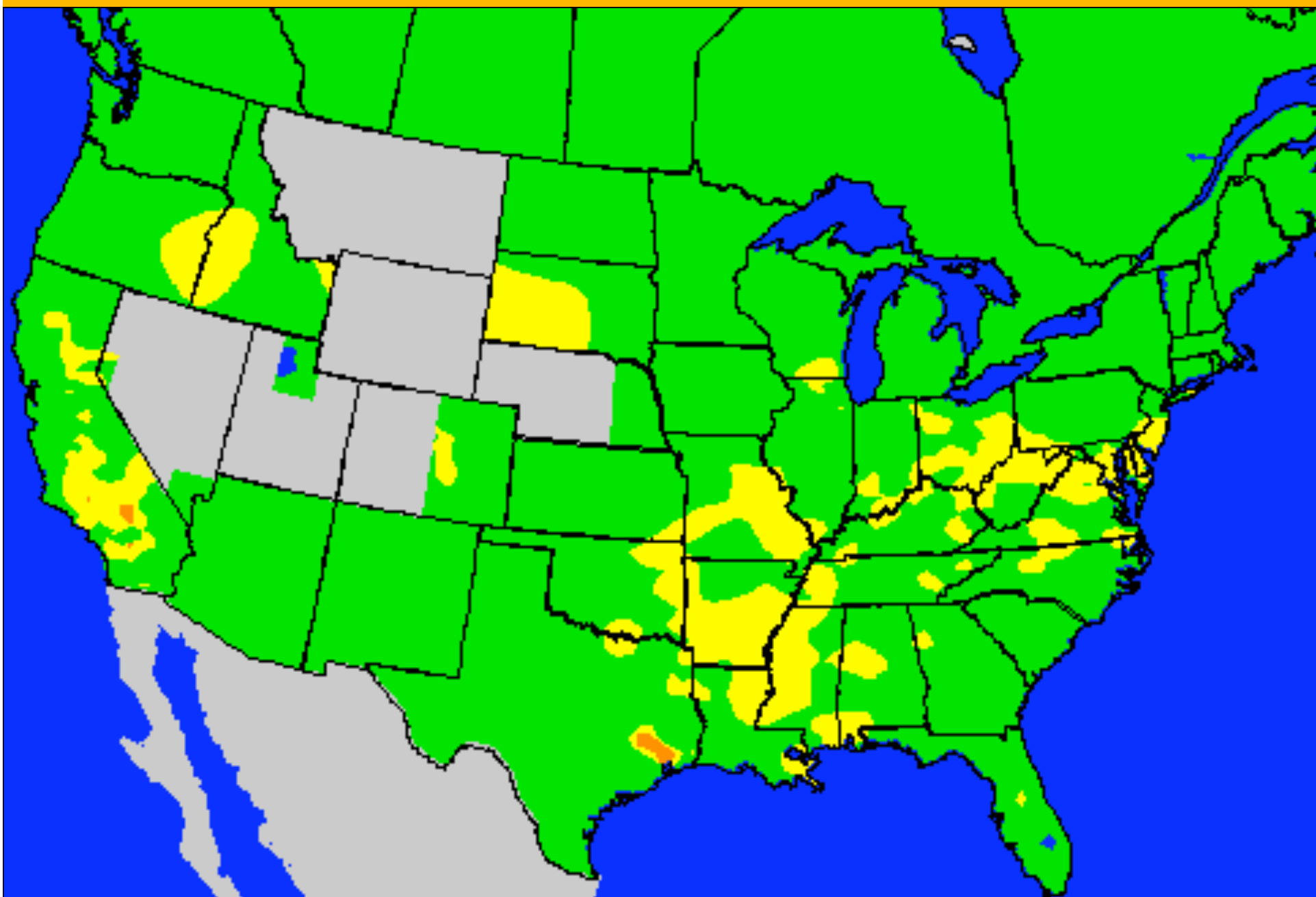
Aug. 14 - 22



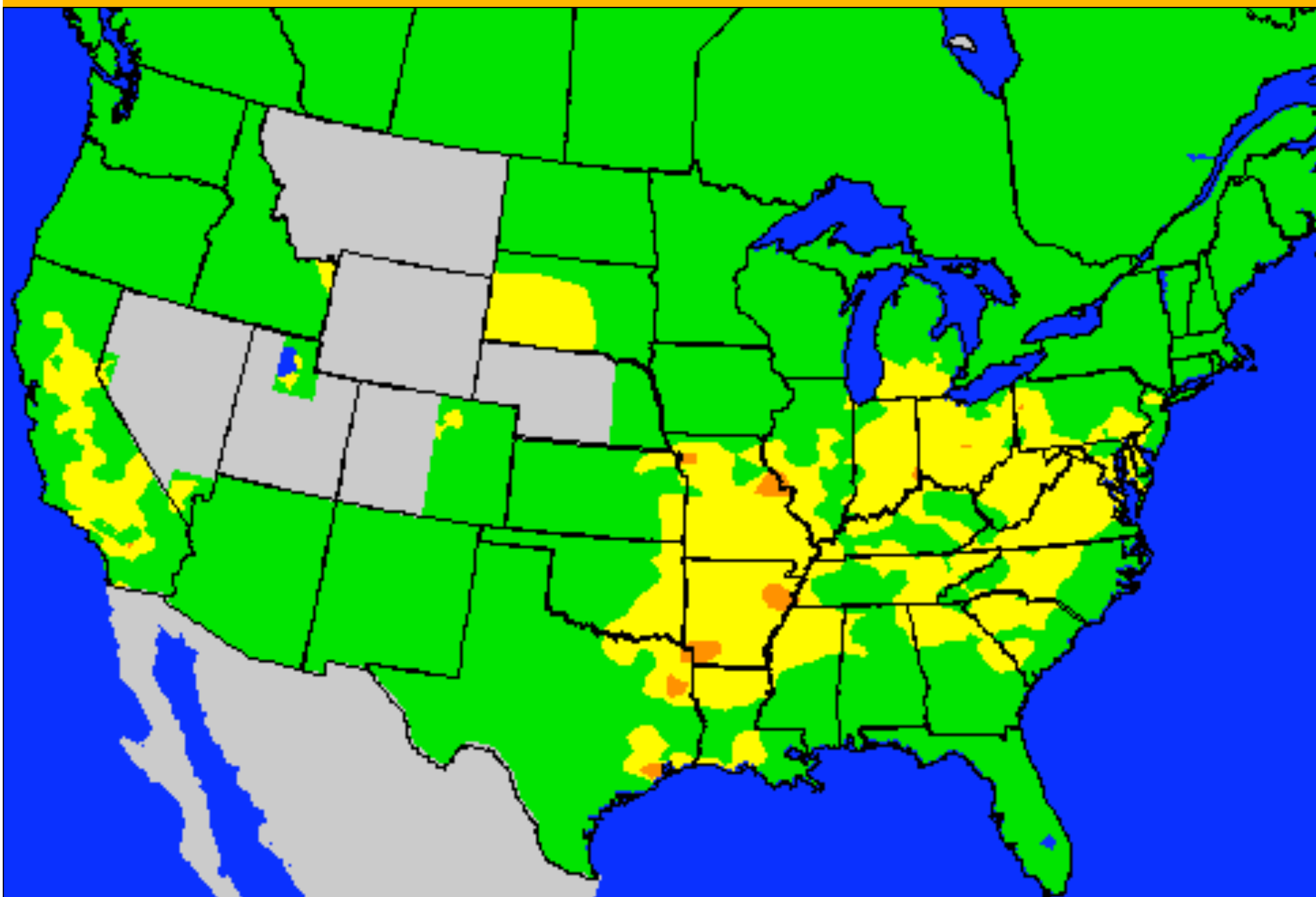
August 14, 2006



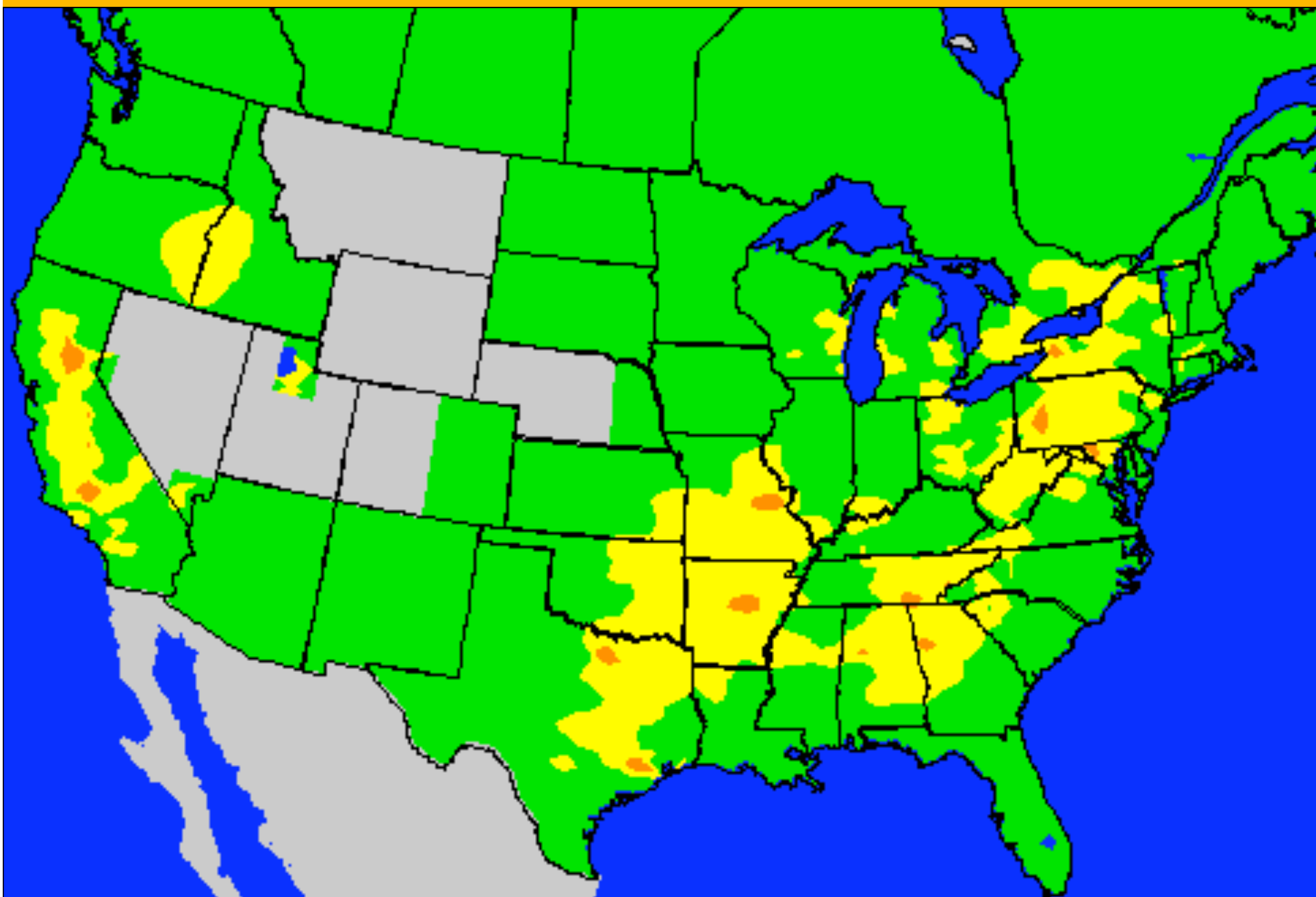
August 15, 2006



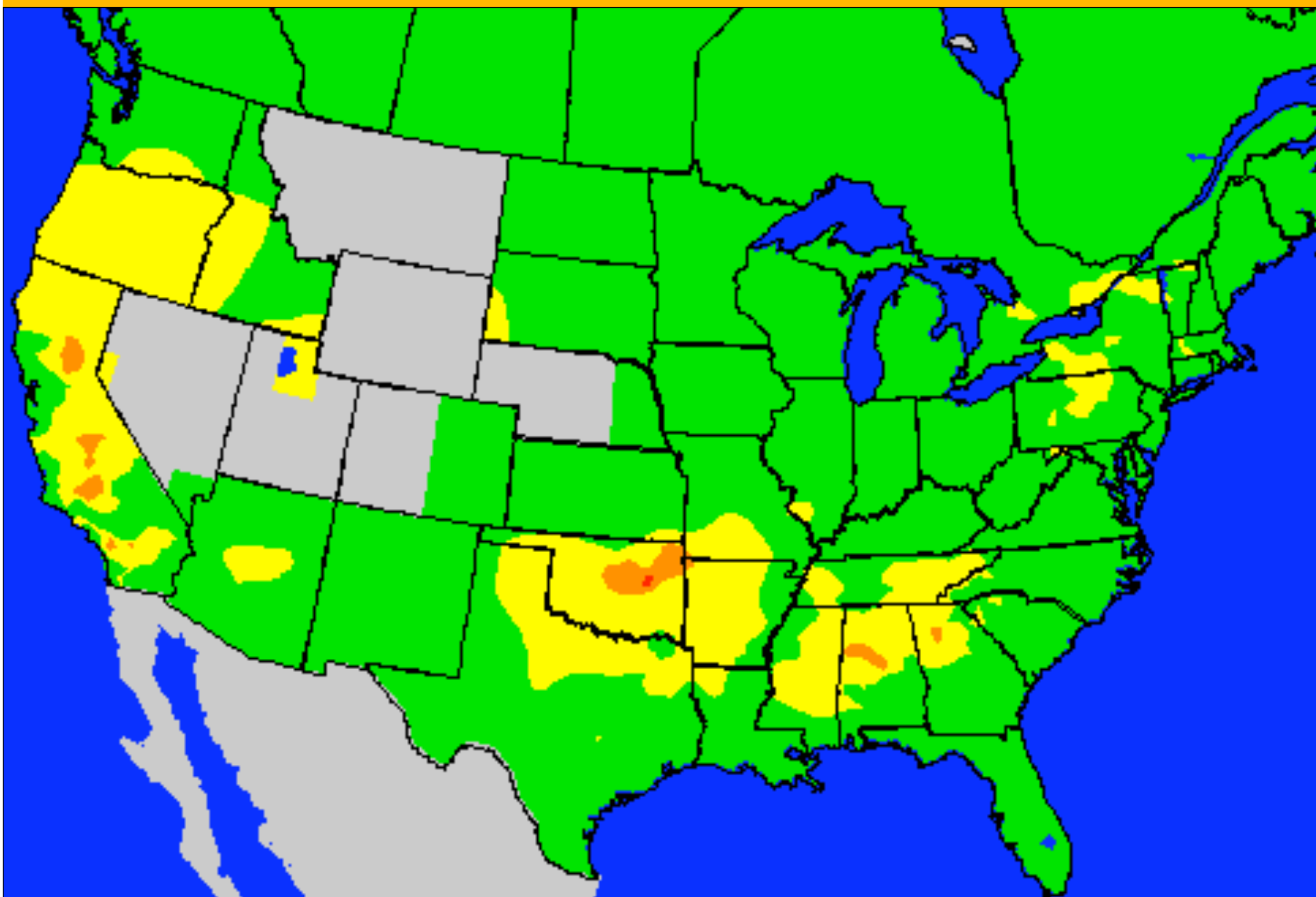
August 16, 2006



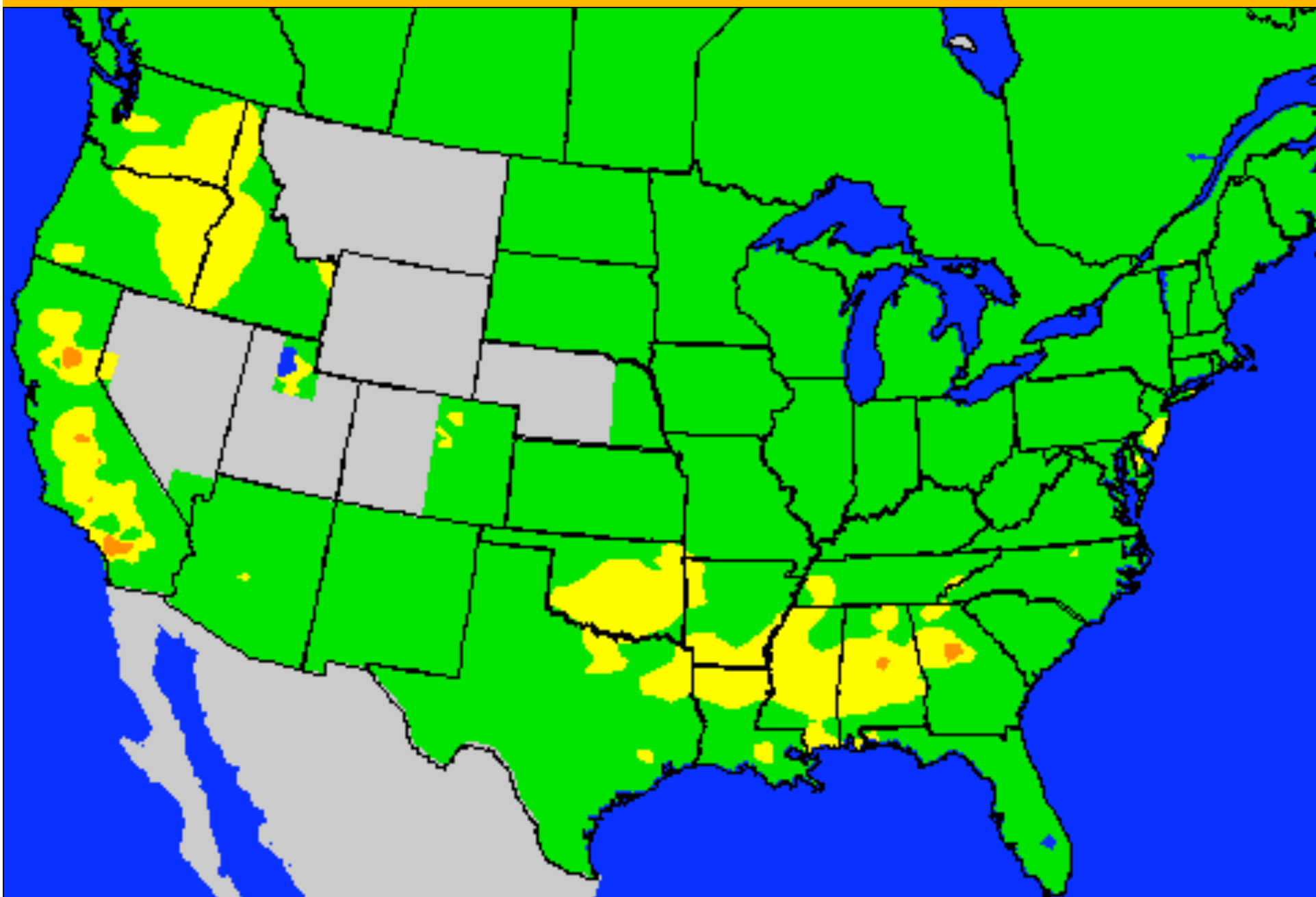
August 17, 2006



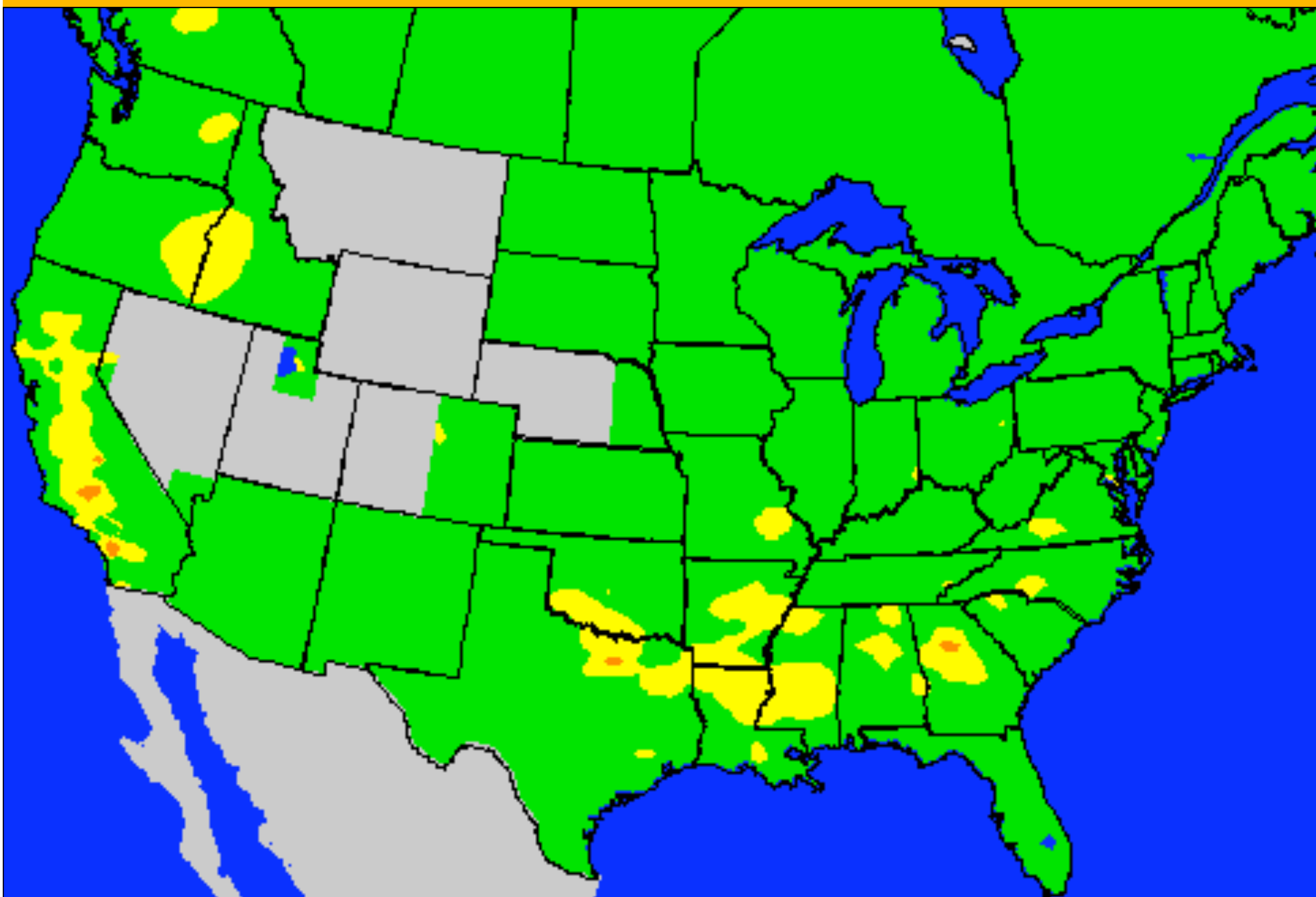
August 18, 2006



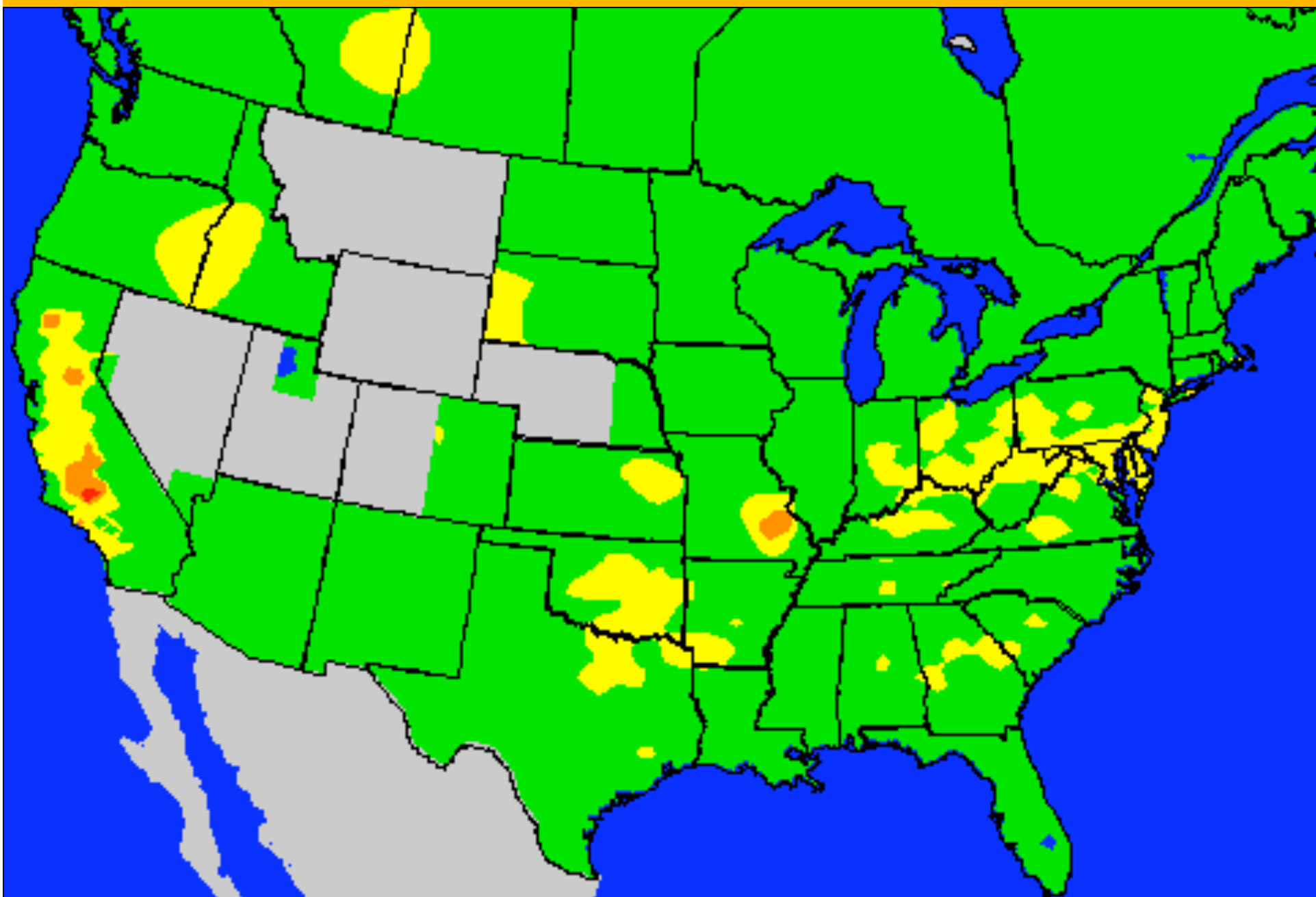
August 19, 2006



August 20, 2006



August 21, 2006



August 22, 2006

Conclusion

- Preliminary conclusion - air moved into NE TX on 8/17 and contributed to DFW exceedances on 8/18.