

DFW Ozone Transport Analysis for the Summer of 2002

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Results from TERC Project H60 Phase 1

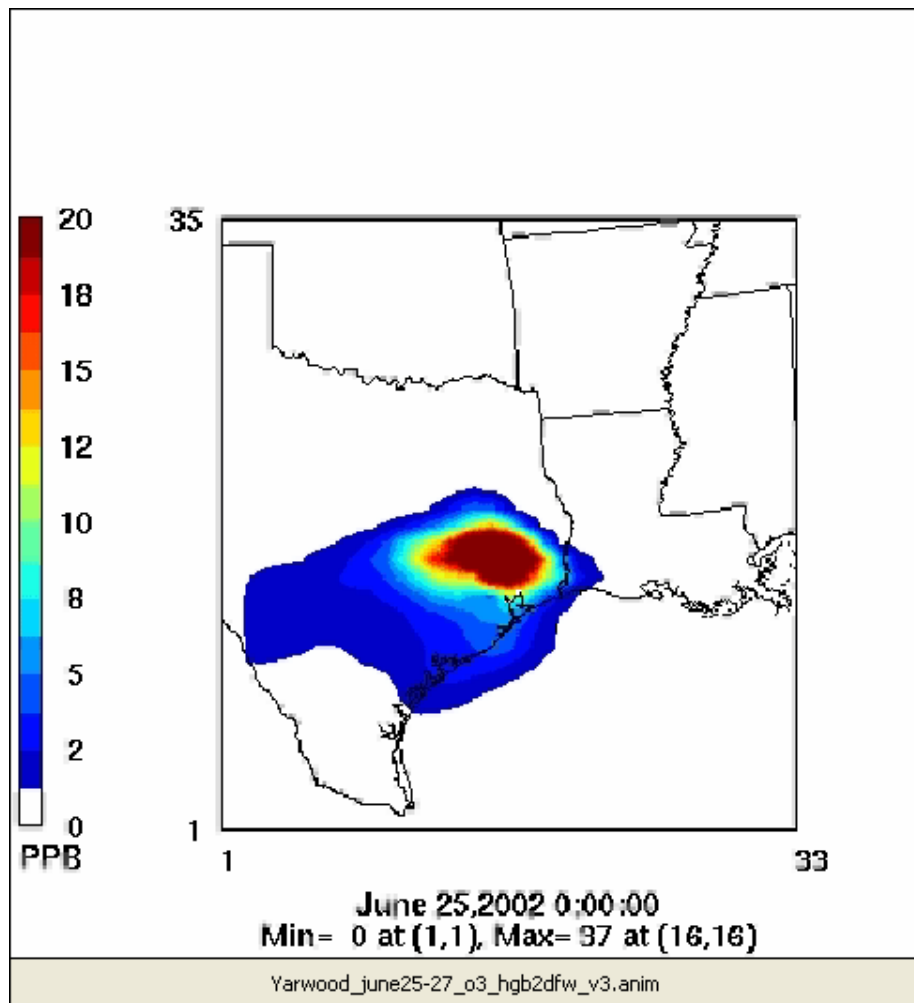
H60 Modeling

- Ozone model for summer 2002
 - Transport analysis
 - Future (2009) emissions sensitivities
- Ozone model for summer 2005
- June and September 2005 episodes
 - 36/12/4-km 2-way nested grids
 - Future (2009) emissions sensitivities

2002 Ozone Transport Analysis

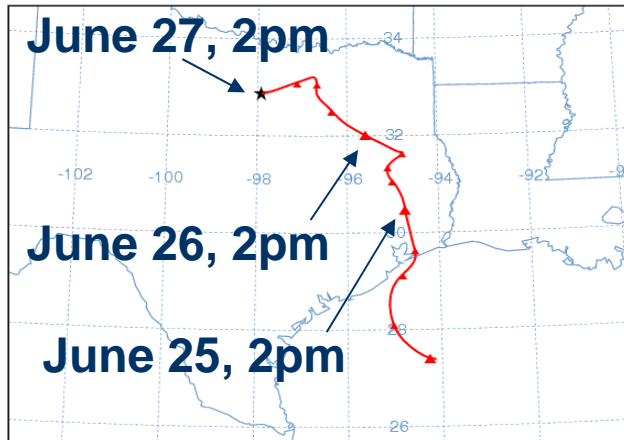
- We have developed a seasonal ozone model for the summer of 2002 using CAMx
- We used CAMx ozone source apportionment to perform an ozone transport analysis for DFW for summer, 2002
- Examples of intrastate and interstate transport
- Results of transport analysis for entire summer

Ozone Transport from Houston/Beaumont June 25-27, 2002



Transport from Houston to Dallas June 27, 2002 Case Study

NOAA HYSPLIT MODEL
Backward trajectory ending at 23 UTC 27 Jun 02
EDAS Meteorological Data

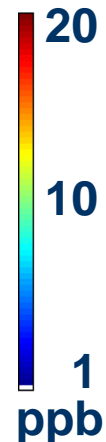
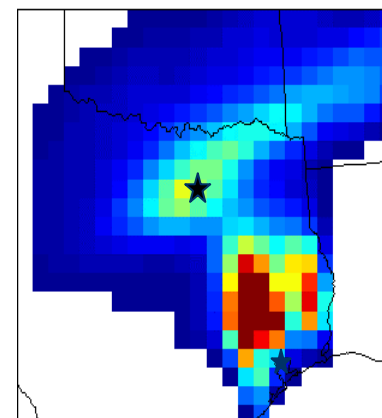
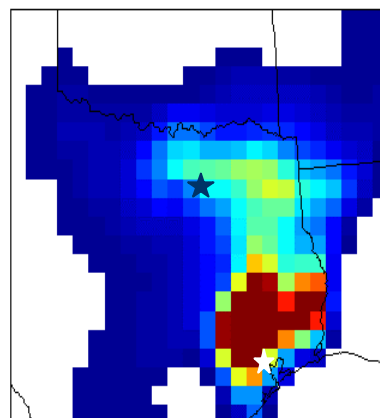
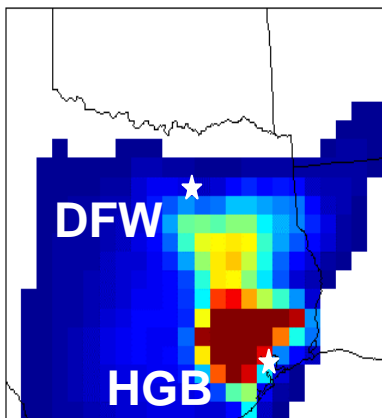


- **HYSPLIT (left)** 500 m back-trajectory suggests transport of air from Houston to DFW over several days
- **CAMx (below)** source apportionment shows Houston ozone plume extending north on 3 days and directly over DFW on June 27

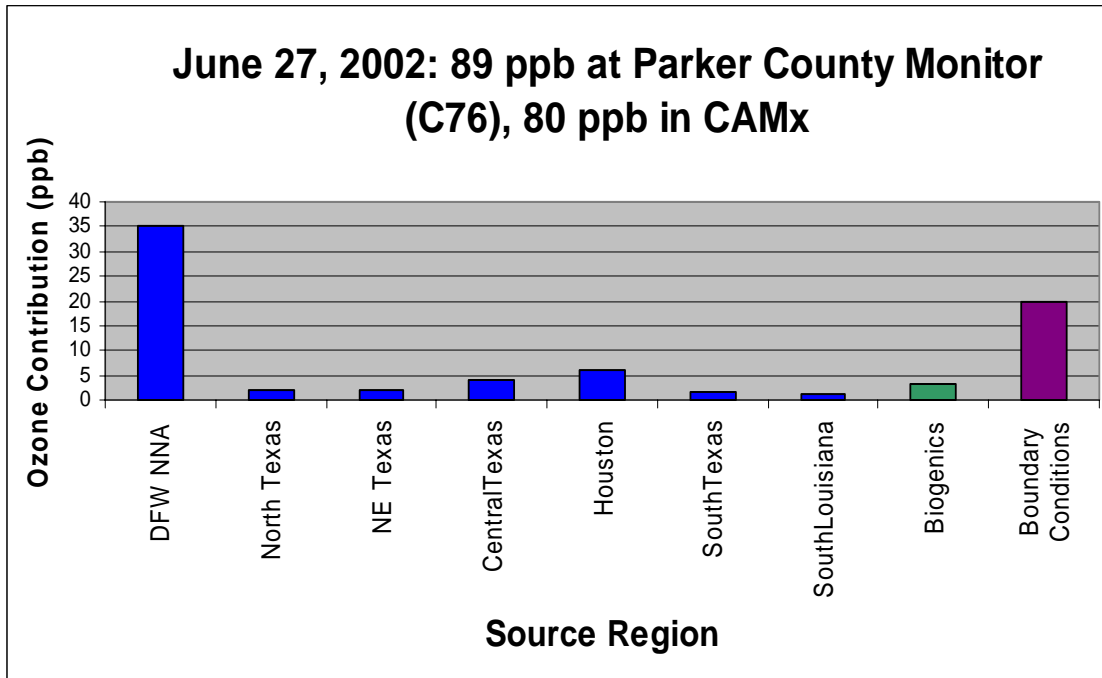
June 25, 2pm

June 26, 2pm

June 27, 2pm



CAMx Source Apportionment Summary June 27, 2002 Case Study

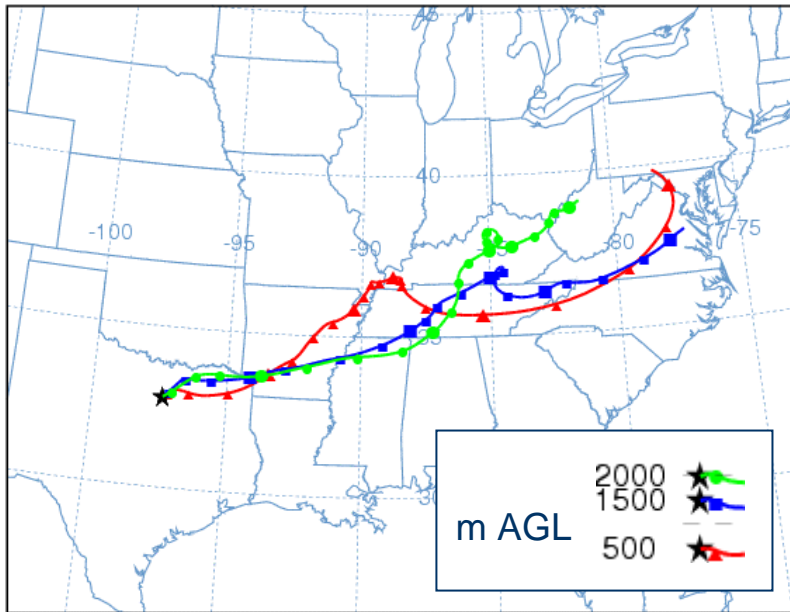


- Local DFW sources contribute ~35 ppb.
- Houston and Central Texas both contribute ~5 ppb.
- CAMx apportionment is consistent with HYSPLIT trajectory

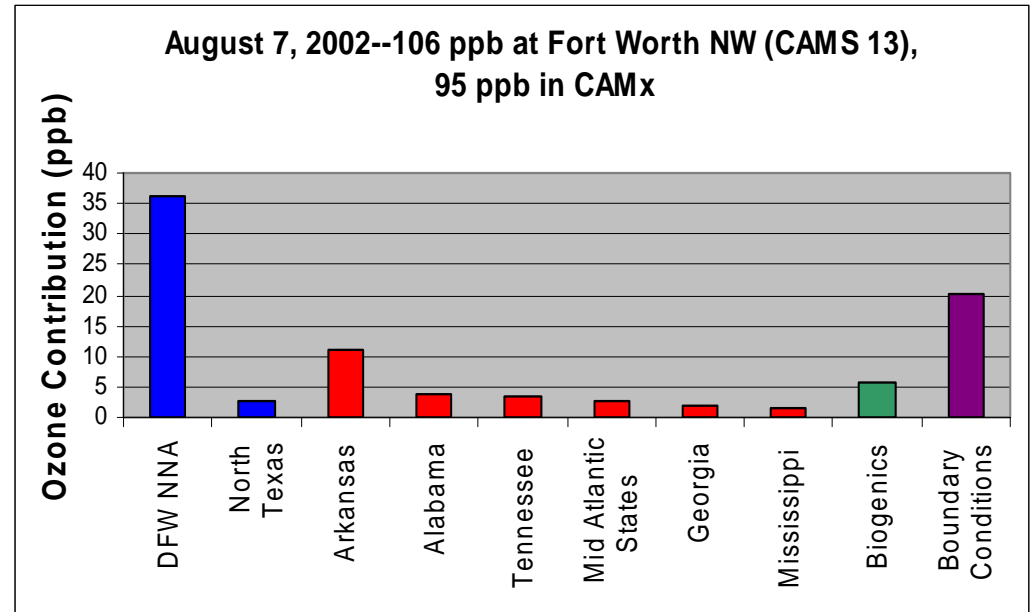
Transport from Houston and Central Texas contributes to, but is not the sole cause of, the 89 ppb 8-hour max ozone at CAMS 76

Interstate Ozone Transport on Dallas August 7, 2002 Case Study

NOAA HYSPLIT MODEL
 Backward trajectories ending at 20 UTC 07 Aug 02
 EDAS Meteorological Data



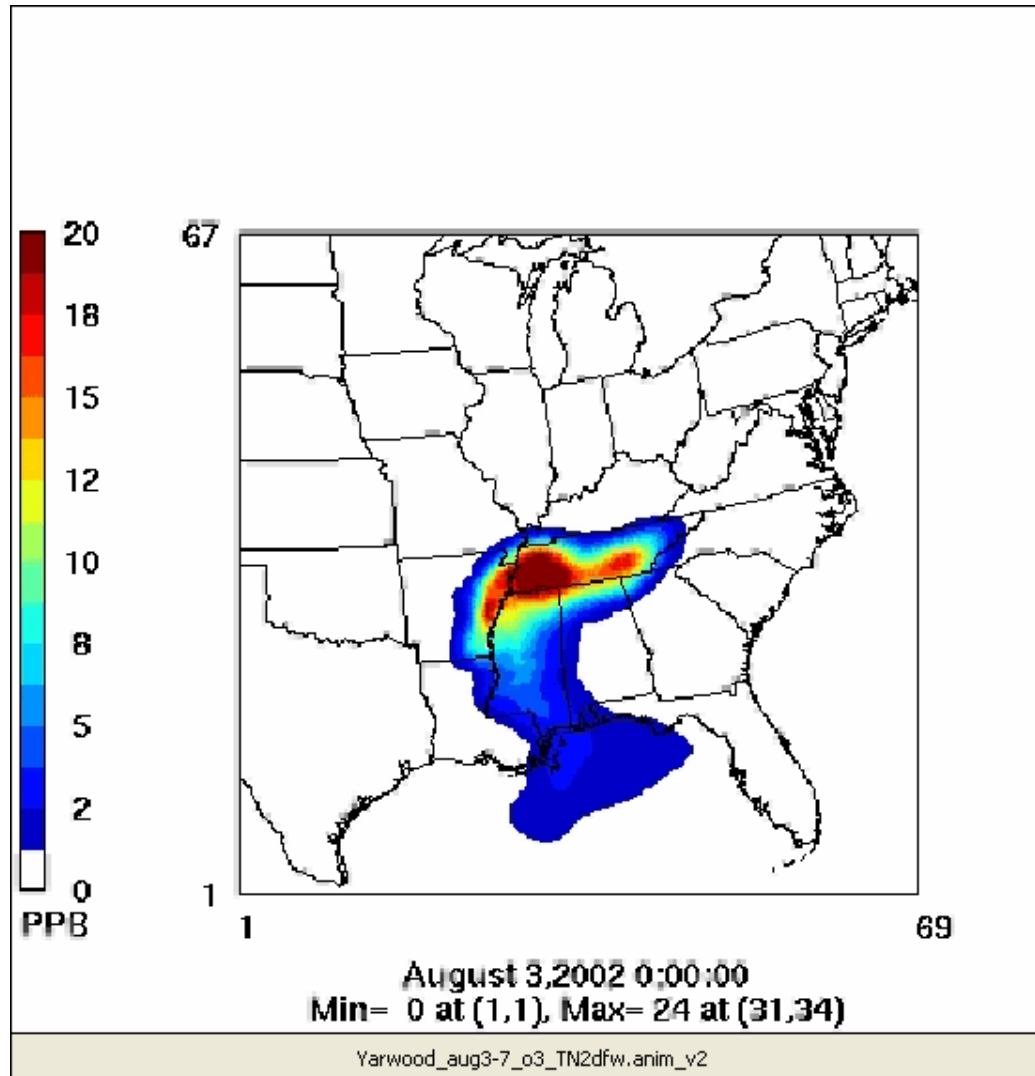
CAMx Source Apportionment



- 96-hour back trajectories show transport of air from neighboring states to DFW
- CAMx apportionment results are consistent with HYSPLIT model
- AK and AL are the largest out-of-state contributors, after global background
- North Texas is the largest Texas contributor, after DFW

Ozone Transport from Tennessee

Aug 3-7, 2002



Texas Areas Consistently Contributing to 2002 DFW 8-Hour O₃ Exceedances

Region	AVERAGE MAGNITUDE ppb	FREQUENCY Count	MAXIMUM CONTRIBUTION ppb
DFW NNA	47.7	35	73.3
NE Texas	3.7	21	13.5
Central Texas	3.3	18	8.9
North Texas	1.2	4	2.9
South Texas	0.7	3	10.7
Houston	0.5	3	10.6
West Texas	0.4	4	5.6

Considering maximum O₃ contribution:

- Northeast Texas, Central Texas, South Texas, Houston/Beaumont
- North Texas, West/Southwest Texas

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Considering average magnitude and frequency:

- Northeast Texas, Central Texas
- North Texas, South Texas, Houston/Beaumont, West/Southwest Texas

Areas Outside Texas Contributing to 2002 DFW 8-Hour O₃ Exceedances

Region	AVERAGE MAGNITUDE ppb	FREQUENCY Count	MAXIMUM CONTRIBUTION ppb
Arkansas	3.7	19	16.2
Oklahoma	3.0	6	14.0
Louisiana	2.2	15	12.9
Mid Atlantic States	2.1	15	5.8
Tennessee	1.9	10	6.0
Mississippi	1.8	18	6.9
Alabama	1.6	14	6.4
Missouri	1.2	4	4.2
Kentucky	1.2	6	4.4
Georgia	1.1	9	4.8
Kansas	1.1	2	7.3

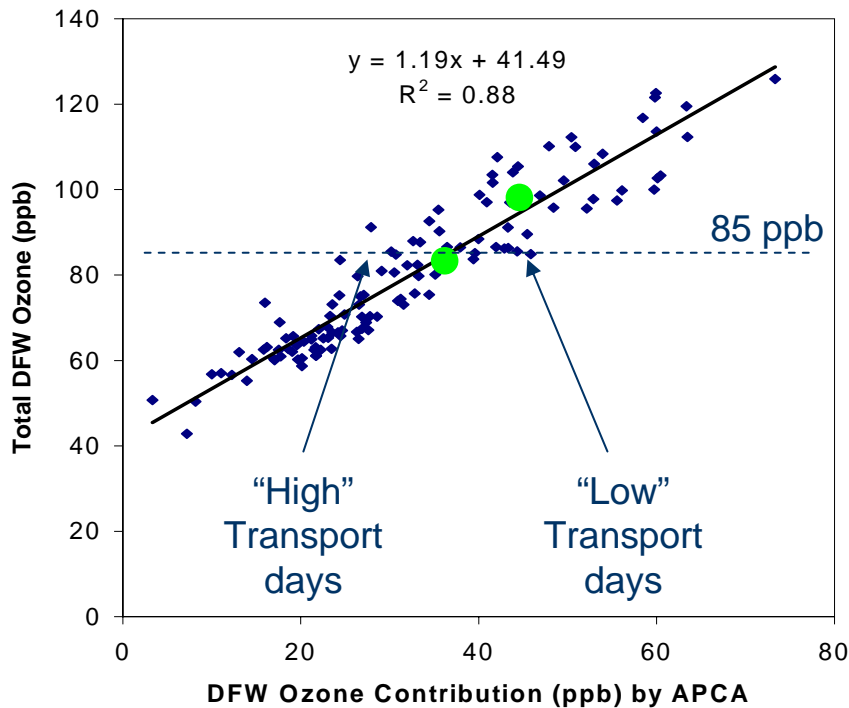
Based on average magnitude and frequency:

Tier 1: AR, LA, MS

Tier 2: AL, TN

Tier 3: GA, OK, KY, Mid-Atlantic States

Local Contribution to DFW Ozone



- Scatter plot shows modeled DFW peak 8-hr O_3 compared to the DFW contribution
- Green circles show TexAQS aircraft flights of 8/23 and 9/7 of 2000

- Modeling Summary:
 - Total DFW ozone strongly determined by DFW contribution
 - Imported contribution (transport) varies by ~20 ppb
 - Imported and DFW contributions are correlated by weather (hence slope > 1)
- Modeling consistent with limited TexAQS aircraft data (courtesy D. Parrish)
 - Compare TexAQS2 data with 2005 (or 2006) modeling
 - Evaluate other parts of Texas