Transport in DFW, East & Central Texas

Influences on 8-Hour Ozone

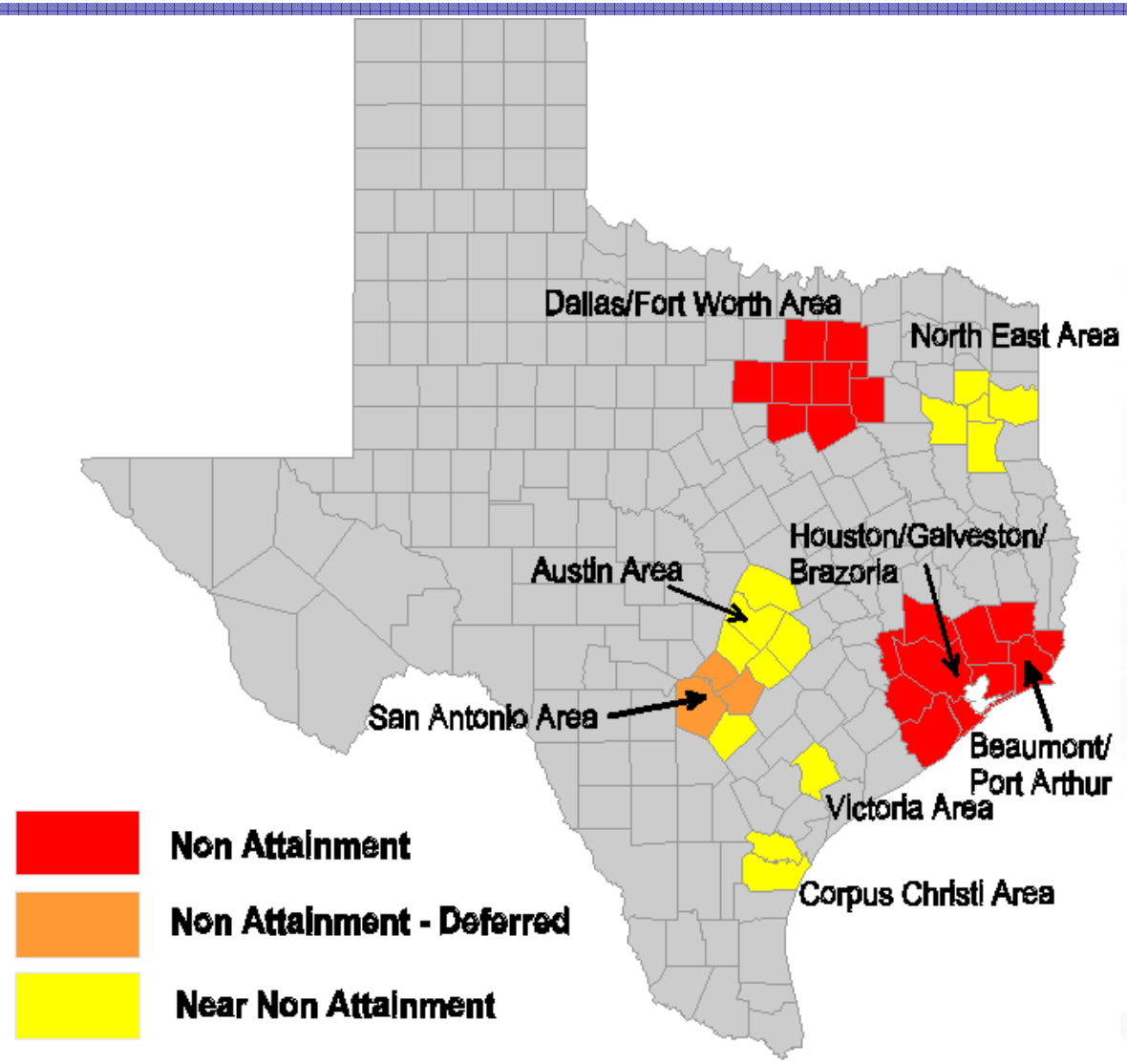
Air Quality Planning and Implementation Division

Introduction

- How frequently does transport from East Texas regions influence the Dallas-Fort Worth area?
- Does transport affect Central and East Texas?

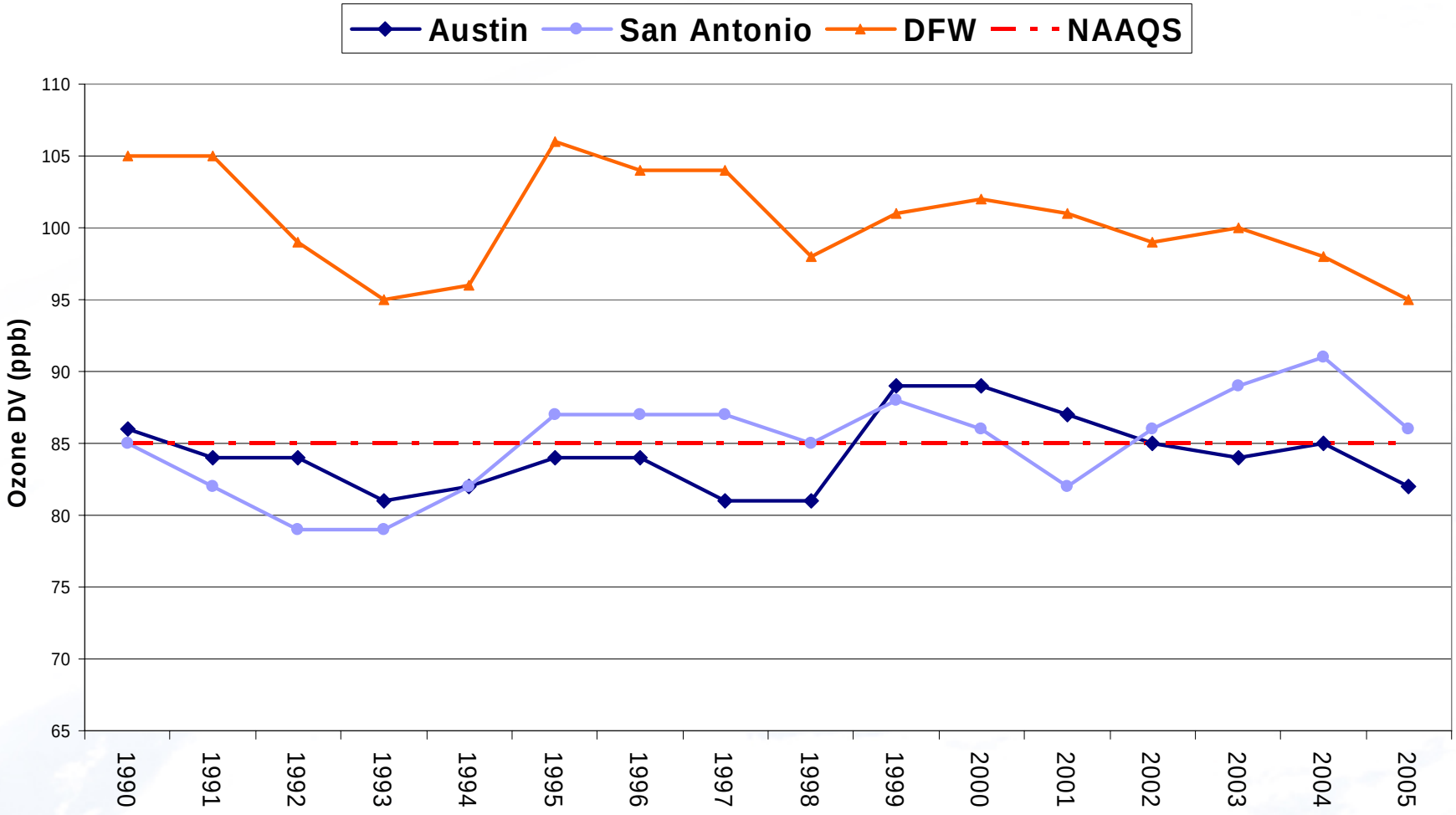
Texas 8-Hour Ozone Standard Status

April 15, 2004



Source: TCEQ / 2004

Eight Hour Ozone Design Value Trend (1990-2005)



Where are the Highest 8-hour Design Values in DFW ?

99DV=104ppb

00DV=102ppb

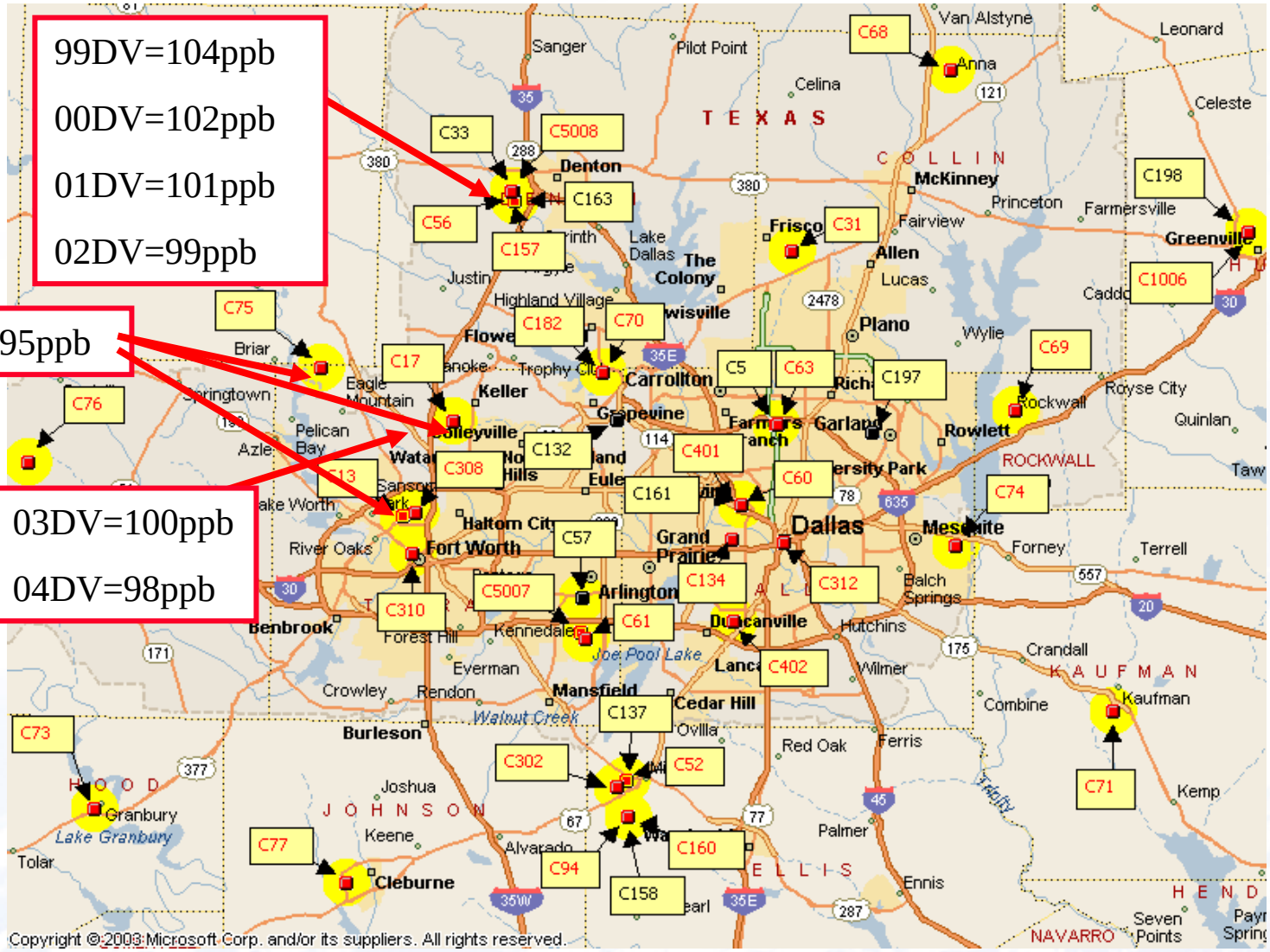
01DV=101ppb

02DV=99ppb

05DV=95ppb

03DV=100ppb

04DV=98ppb



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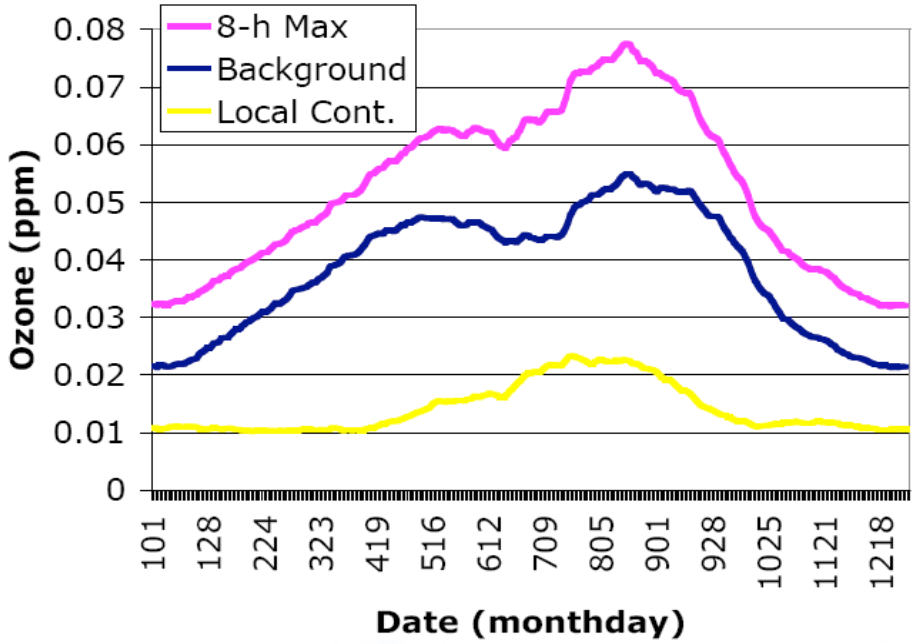
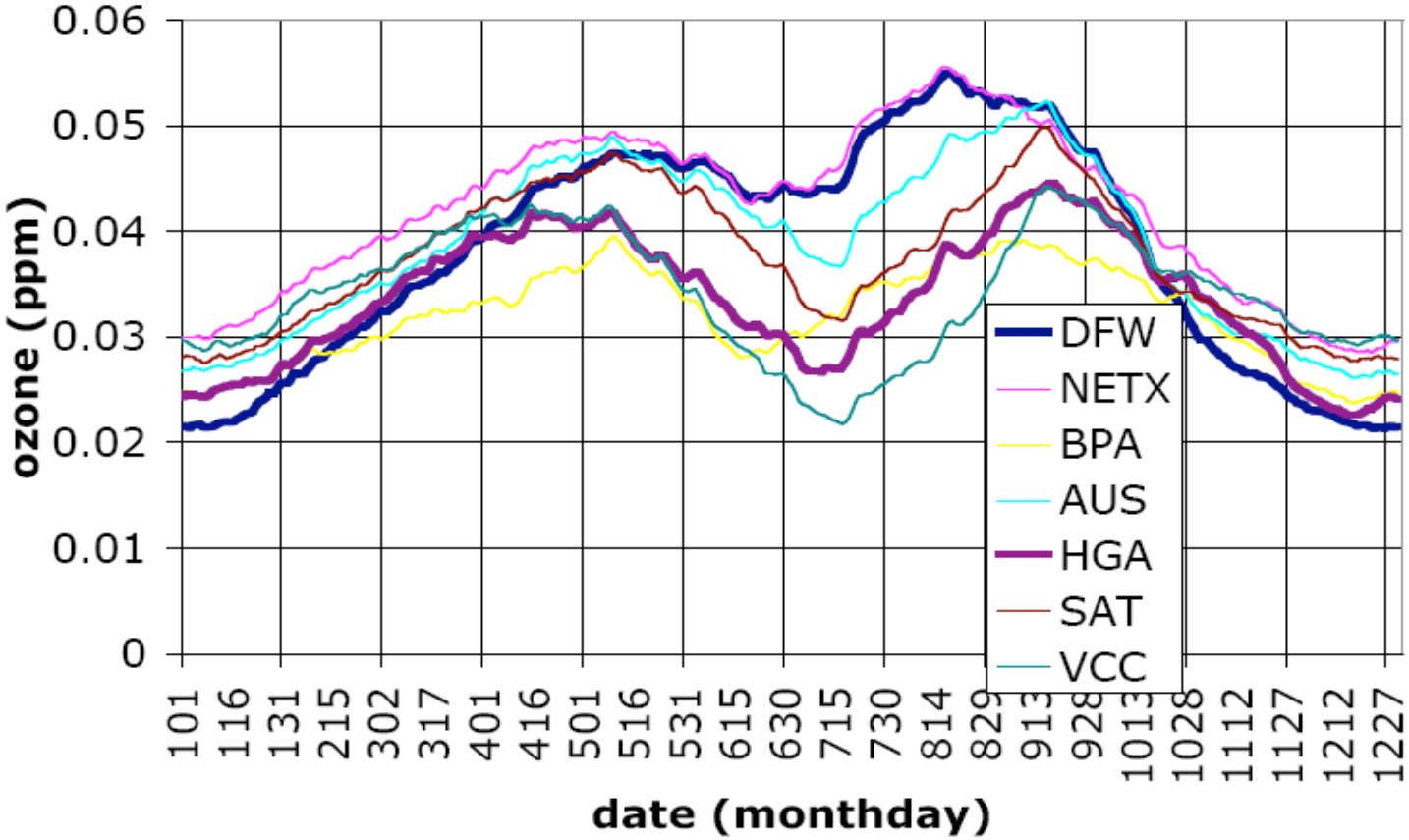
Why Are We Concerned About the Background Ozone?



Nielsen-Gammon, 2004

- 8-hr often driven by background/transport influences
- Local contribution on top of high upwind ozone increases likelihood of an 8-hr exceedance

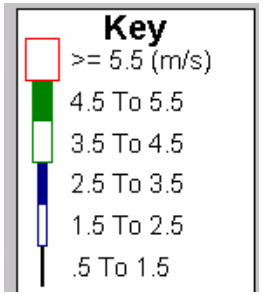
Average Background Ozone in Texas
(1998-2003)

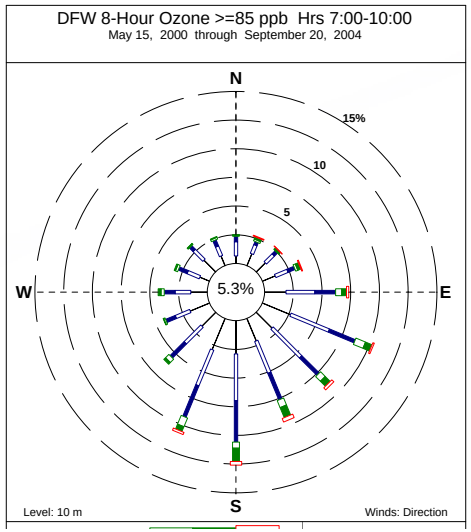


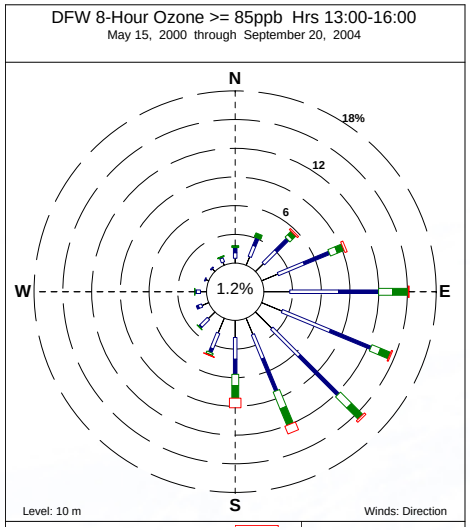
Nielsen-Gammon, 2004

Dallas/Fort Worth (DFW) WindRoses

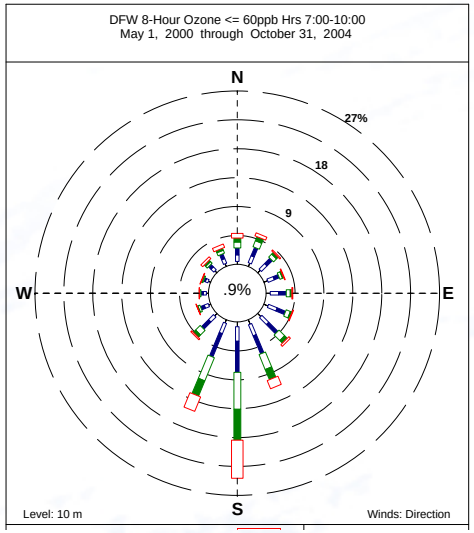
O3>=85ppb

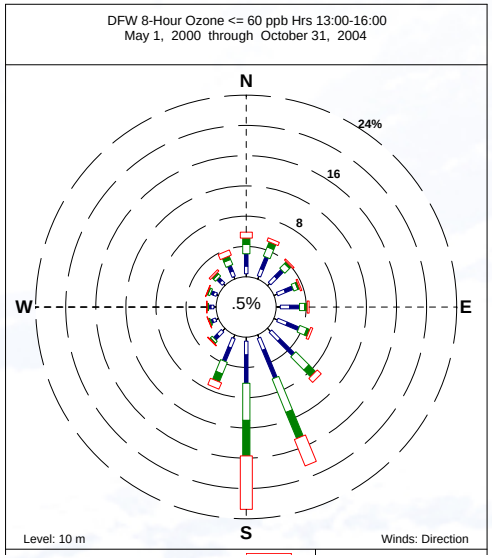






O3<= 60ppb

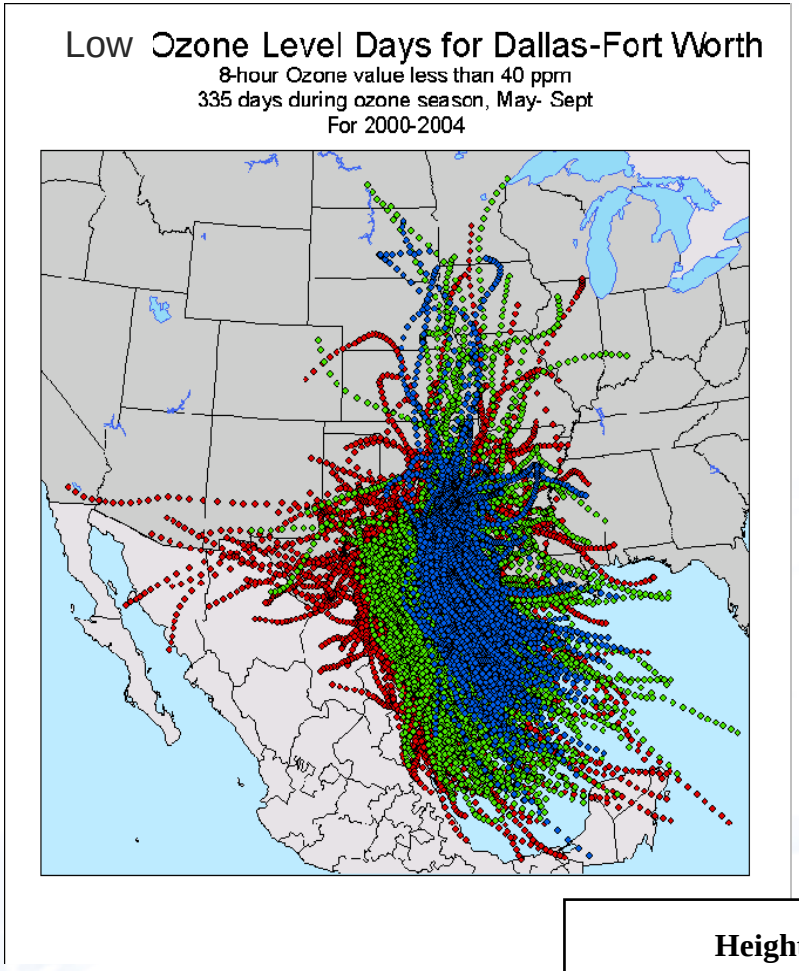


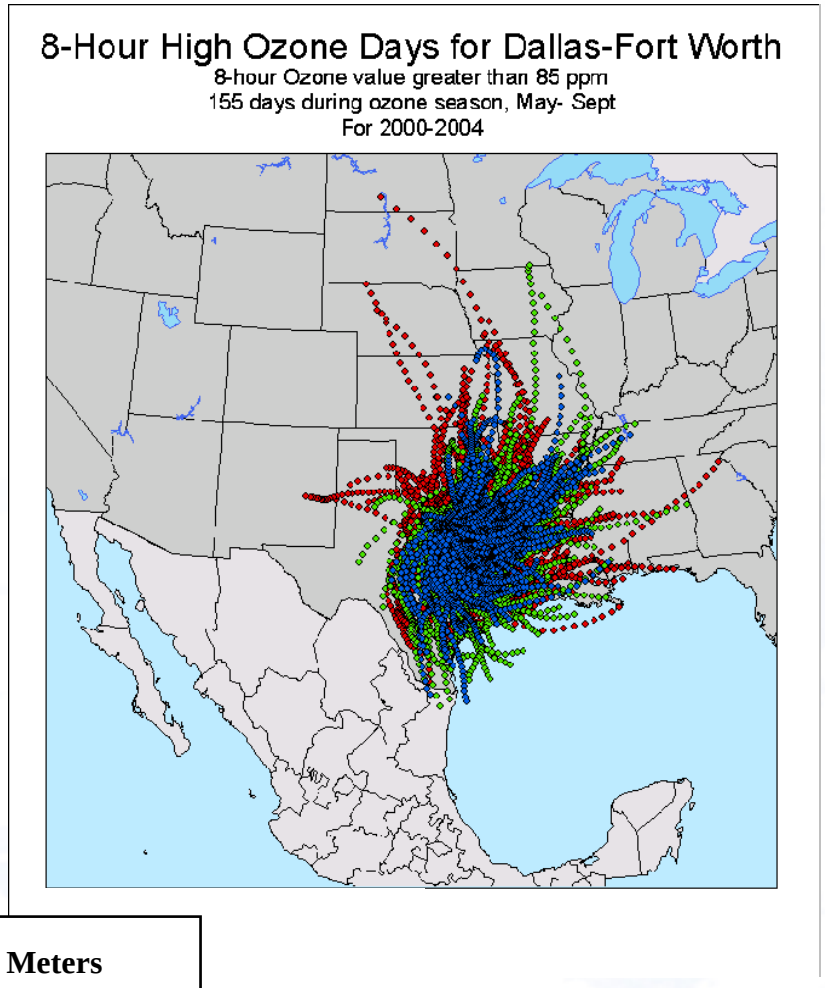


Morning (6-11 AM)

Afternoon (12-6 PM)

Hysplit Back Trajectories for DFW
(2000–2004)

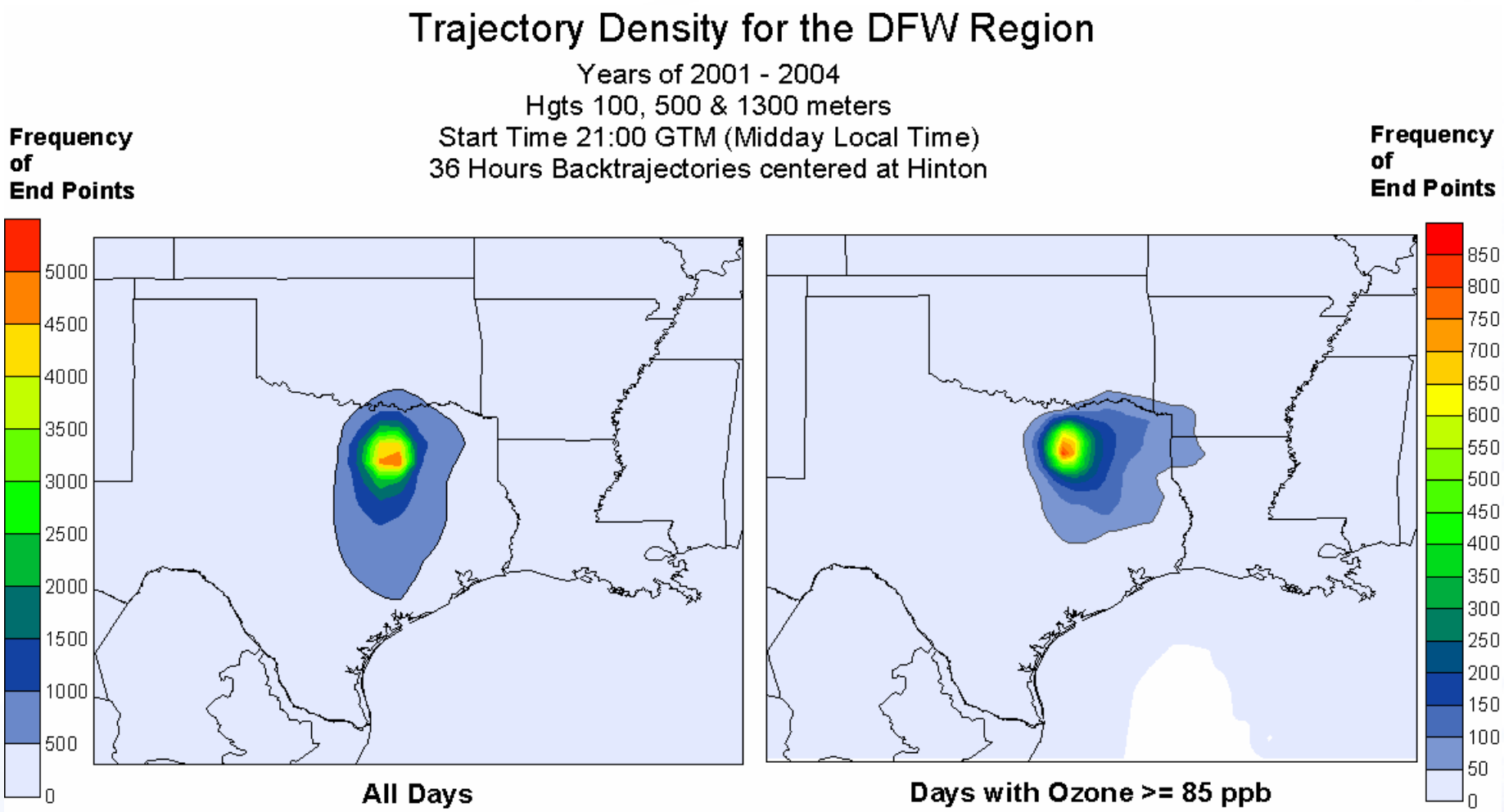




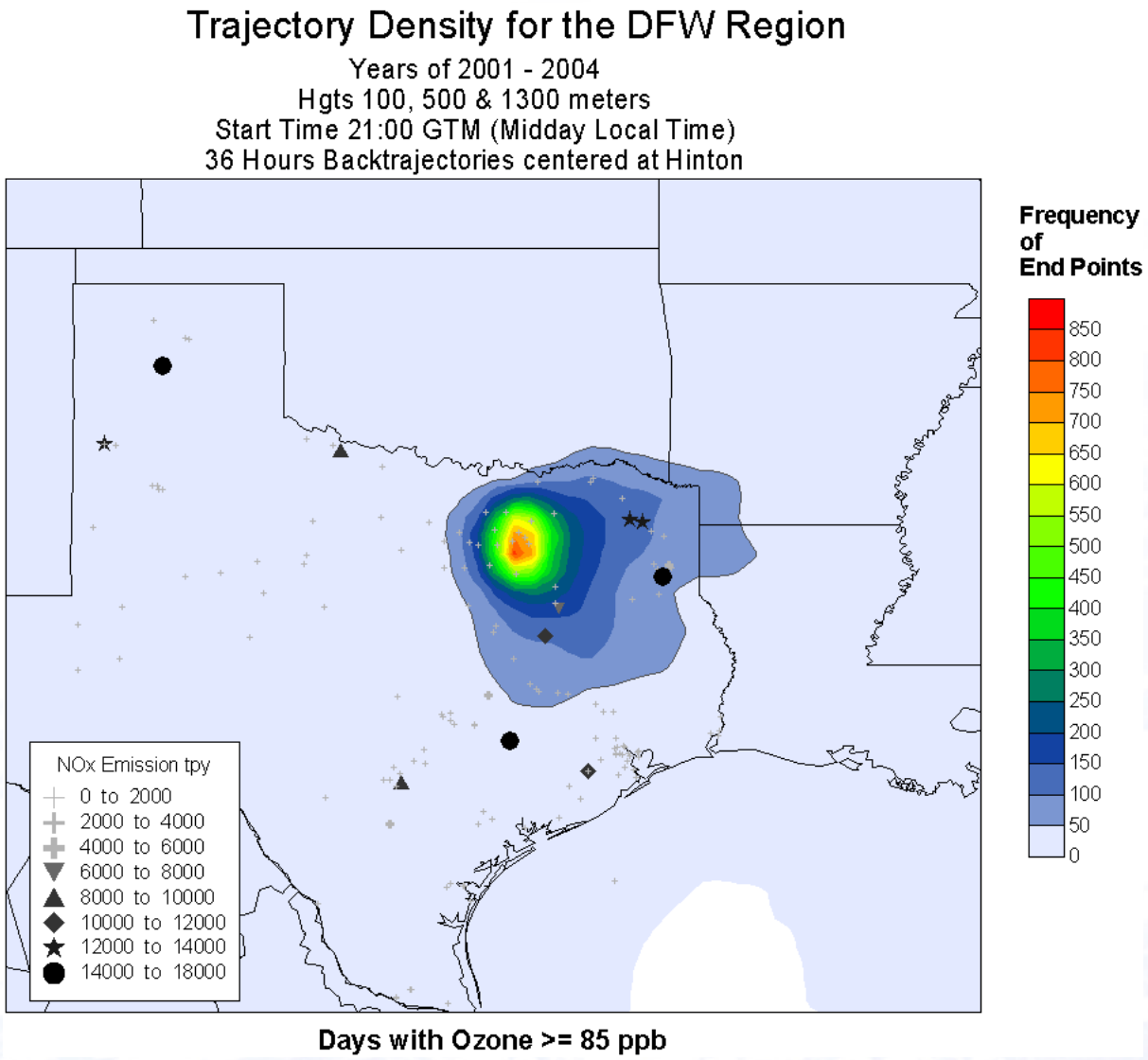
Height in Meters

- 100
- 500
- 1300

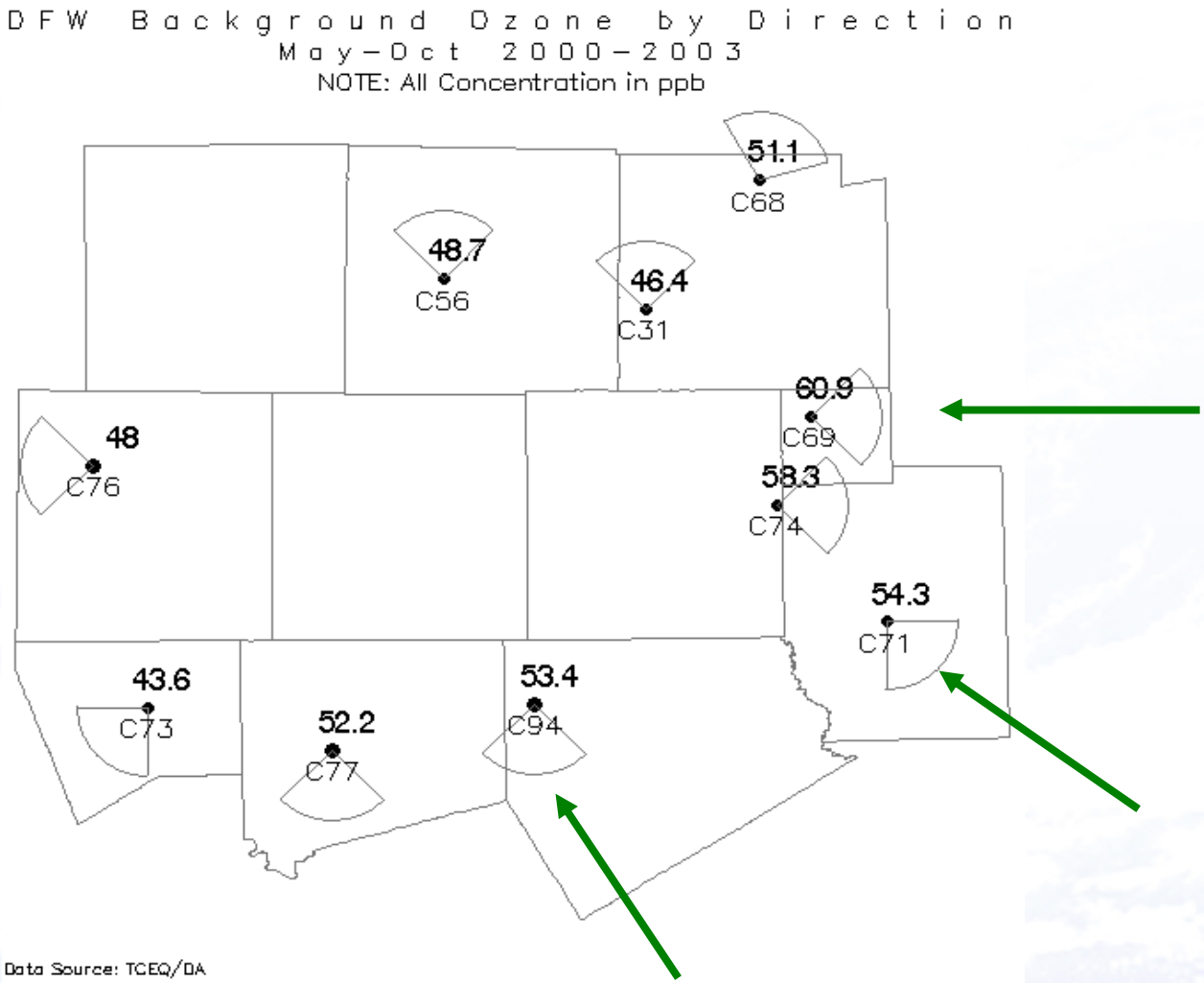
Back Trajectories Density for DFW



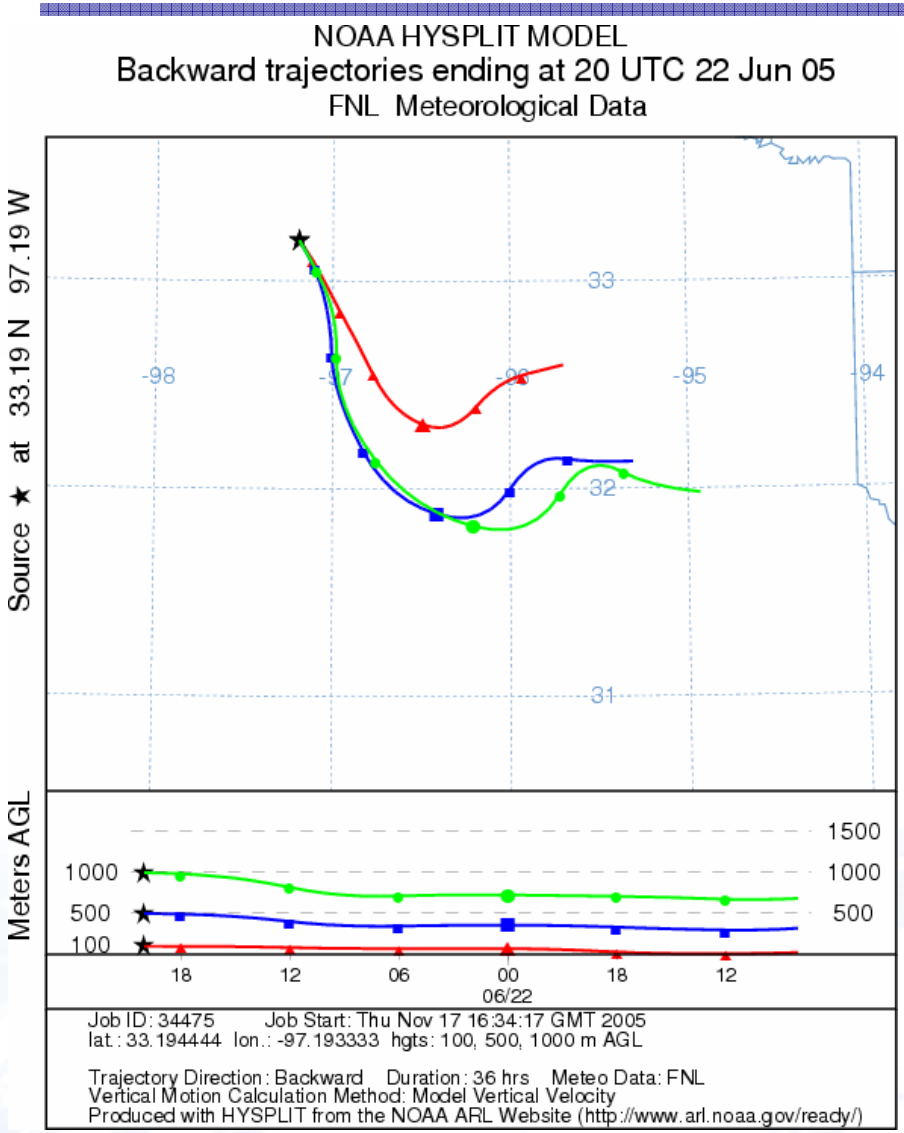
Back Trajectories Density with Power Plant NOx Emissions for DFW



Ozone Background by Wind Direction in DFW

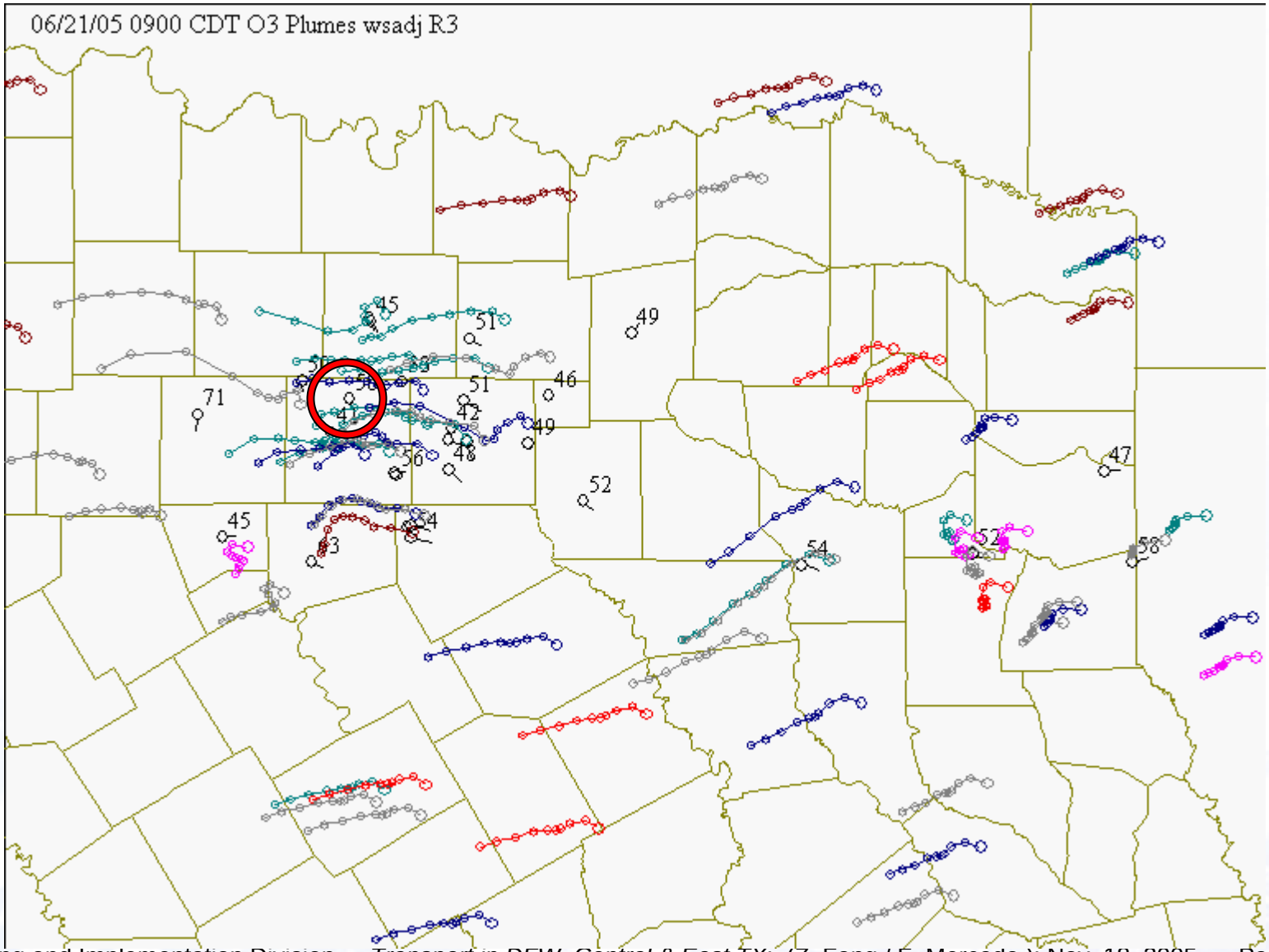


Case Study : June 21-22, 2005 HYSPLIT

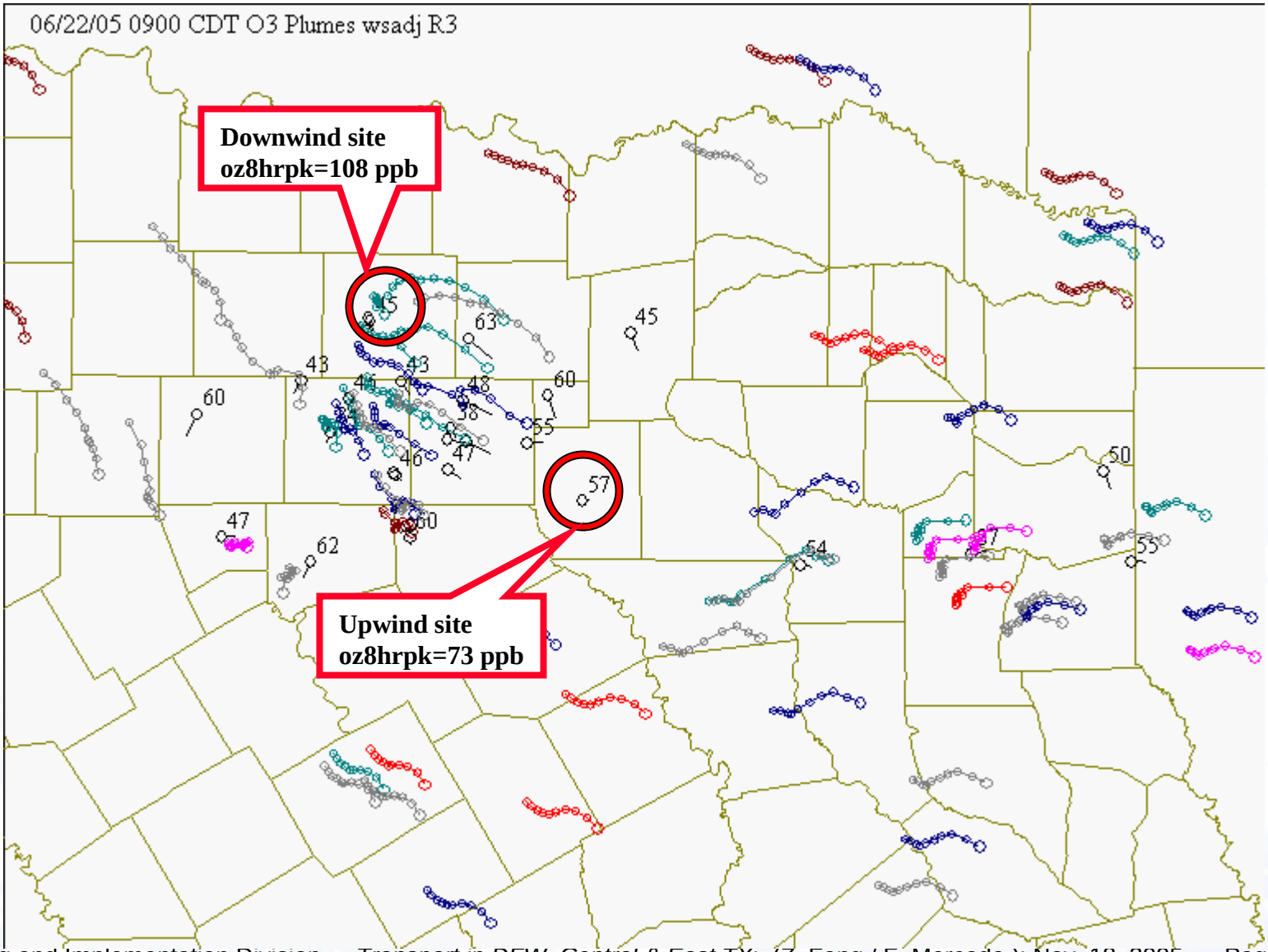


- Trajectory Heights (m) 100, 500, 1000
- Back 36 hours from Denton C56

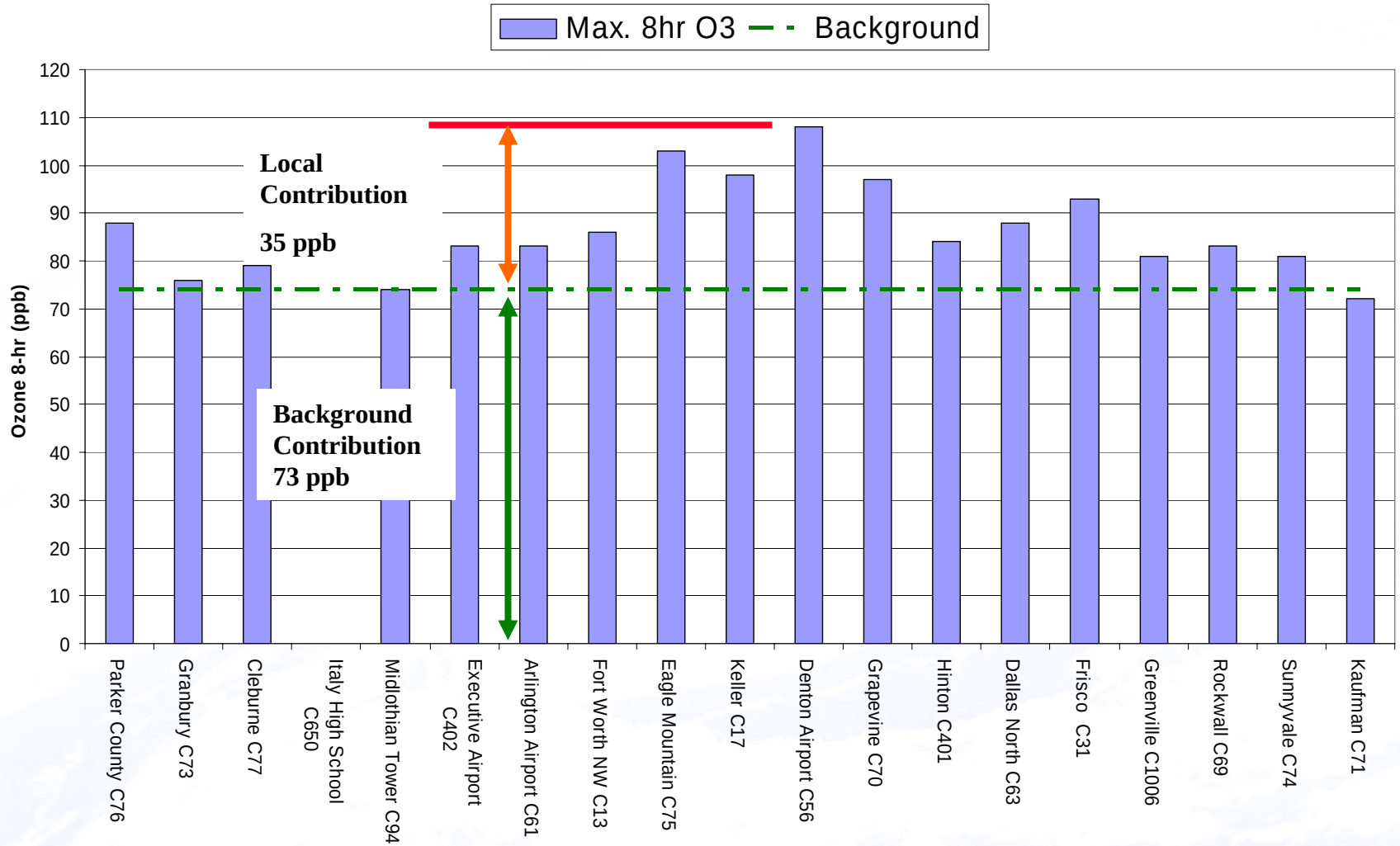
Case Study : June 21, 2005 Plume



Case Study: June 22, 2005 Plume



Daily Maximum Ozone 8-hour Average for DFW Area (6/22/05)



Upwind and Downwind Comparison

8-hr Exceedance Days 2001-2004

	Avg. Upwind 8hr ozone (ppb)	Avg. Downwind 8hr ozone (ppb)	Avg. Difference 8hr ozone (ppb)
Average	64	88	23
Northeast	64	84	20
South	66	91	24
Southeast	64	90	26
East	62	85	23

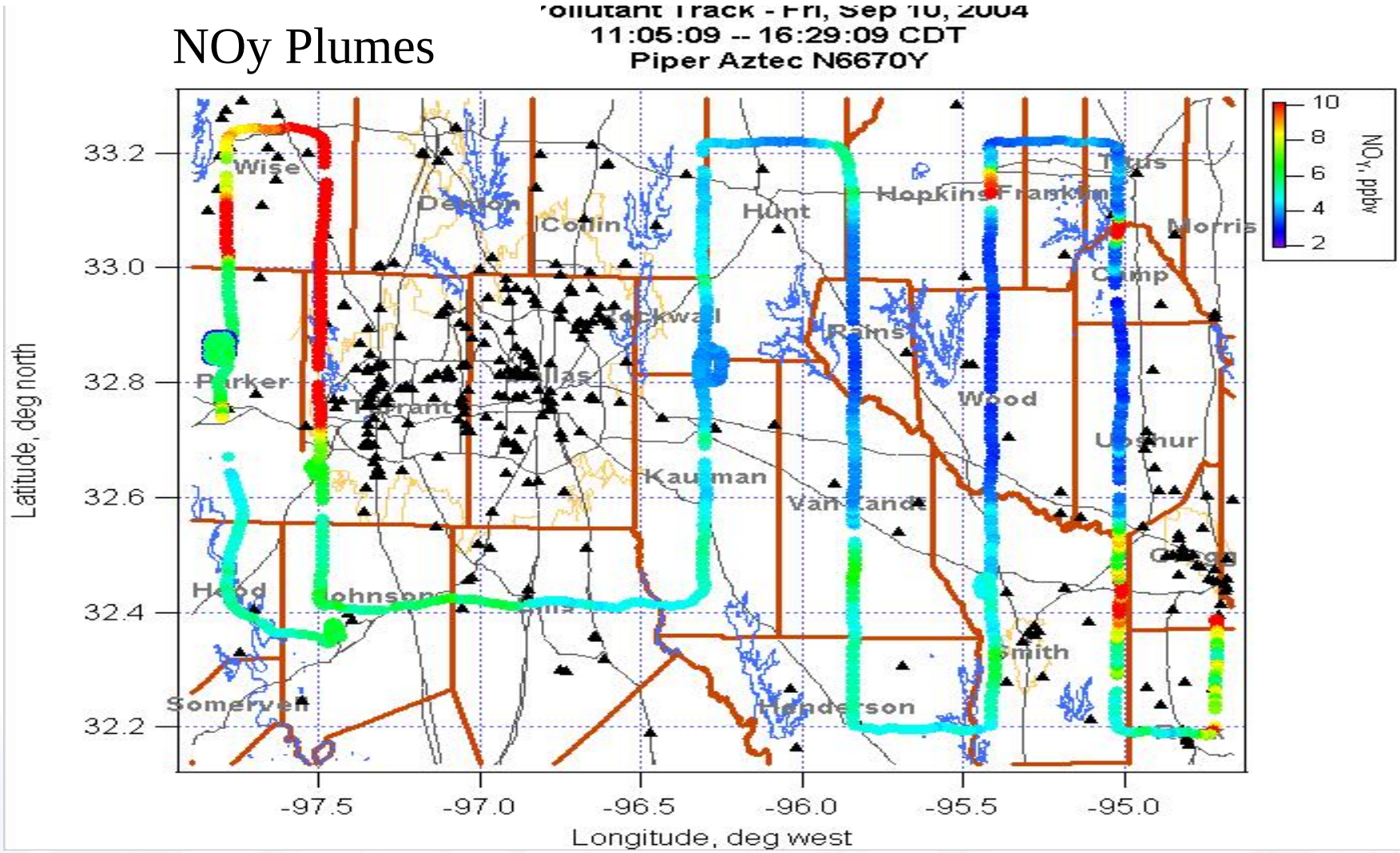
Source Direction Summary Dallas–Fort Worth

Plume Analysis for 8-hr Ozone Exceedance Days (2001-2004)

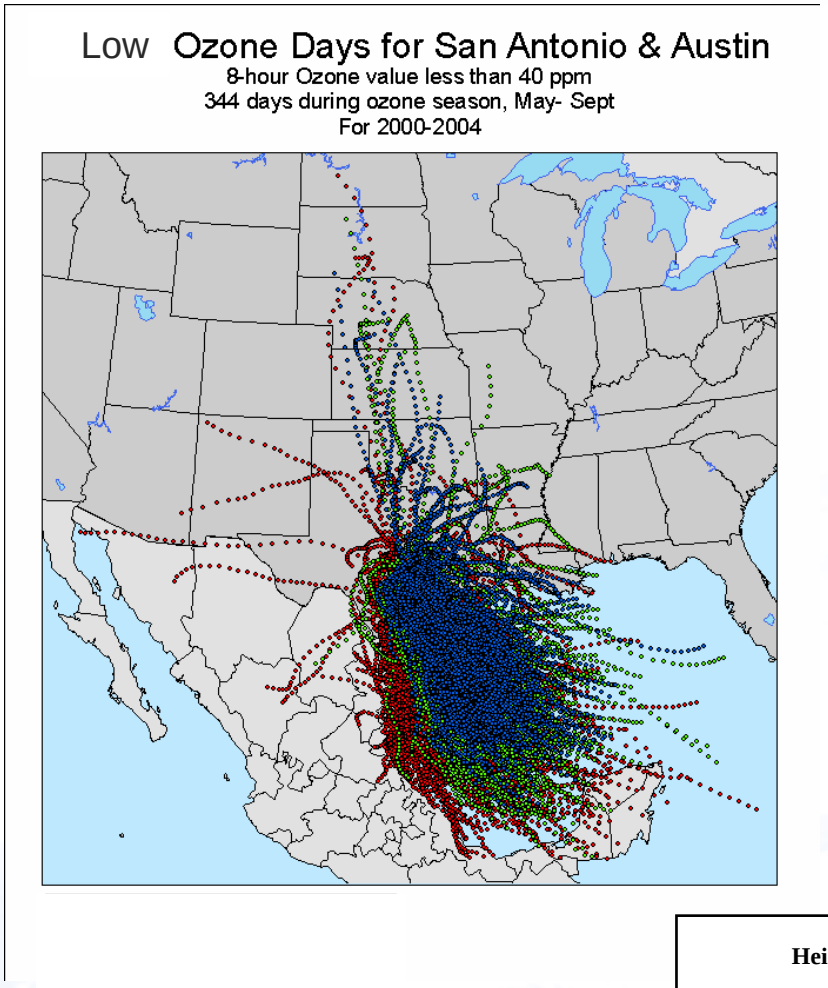
Source Direction	Total Days	Percent of Total
Southeast	49	40%
East	25	20%
Northeast	22	18%
South	10	8%
Southwest	6	5%
North+Others	1+10	9%
Total	123	

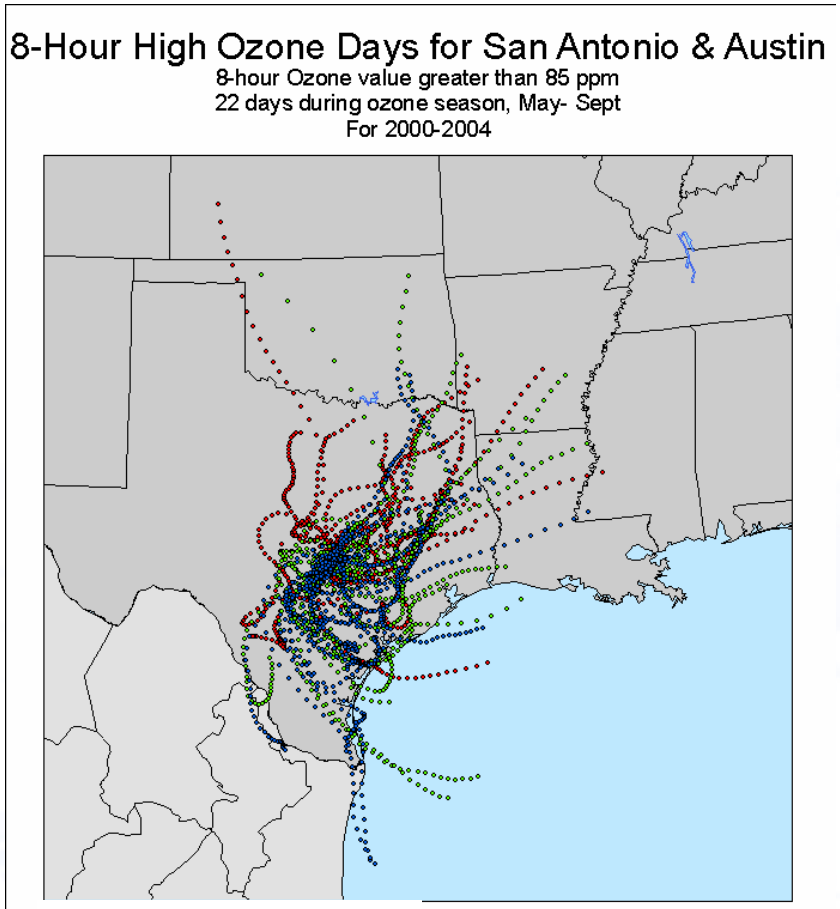
9/10/2004 Aircraft Flight

NOy Plumes



Hysplit Back Trajectories for Central Texas
(2000–2004)

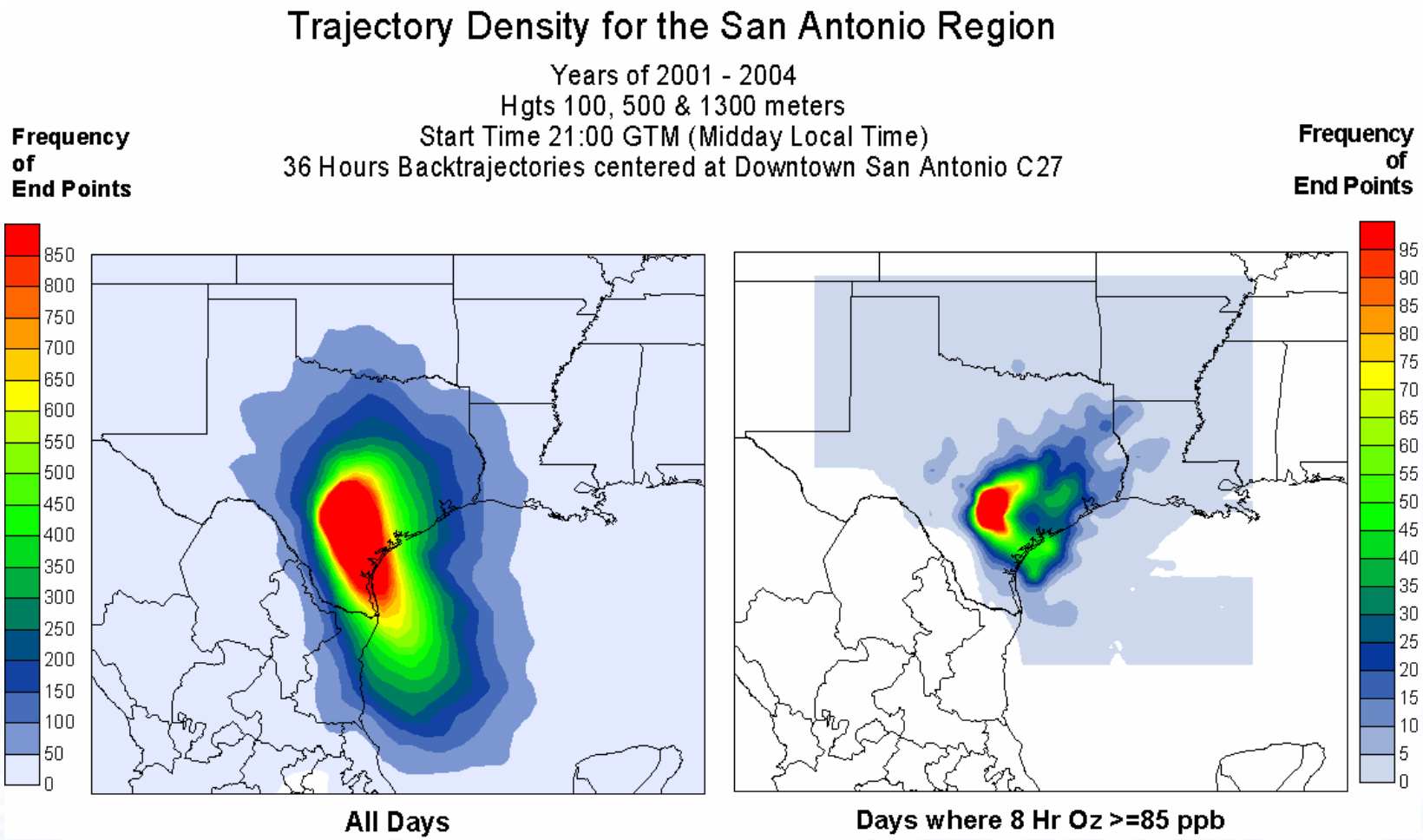




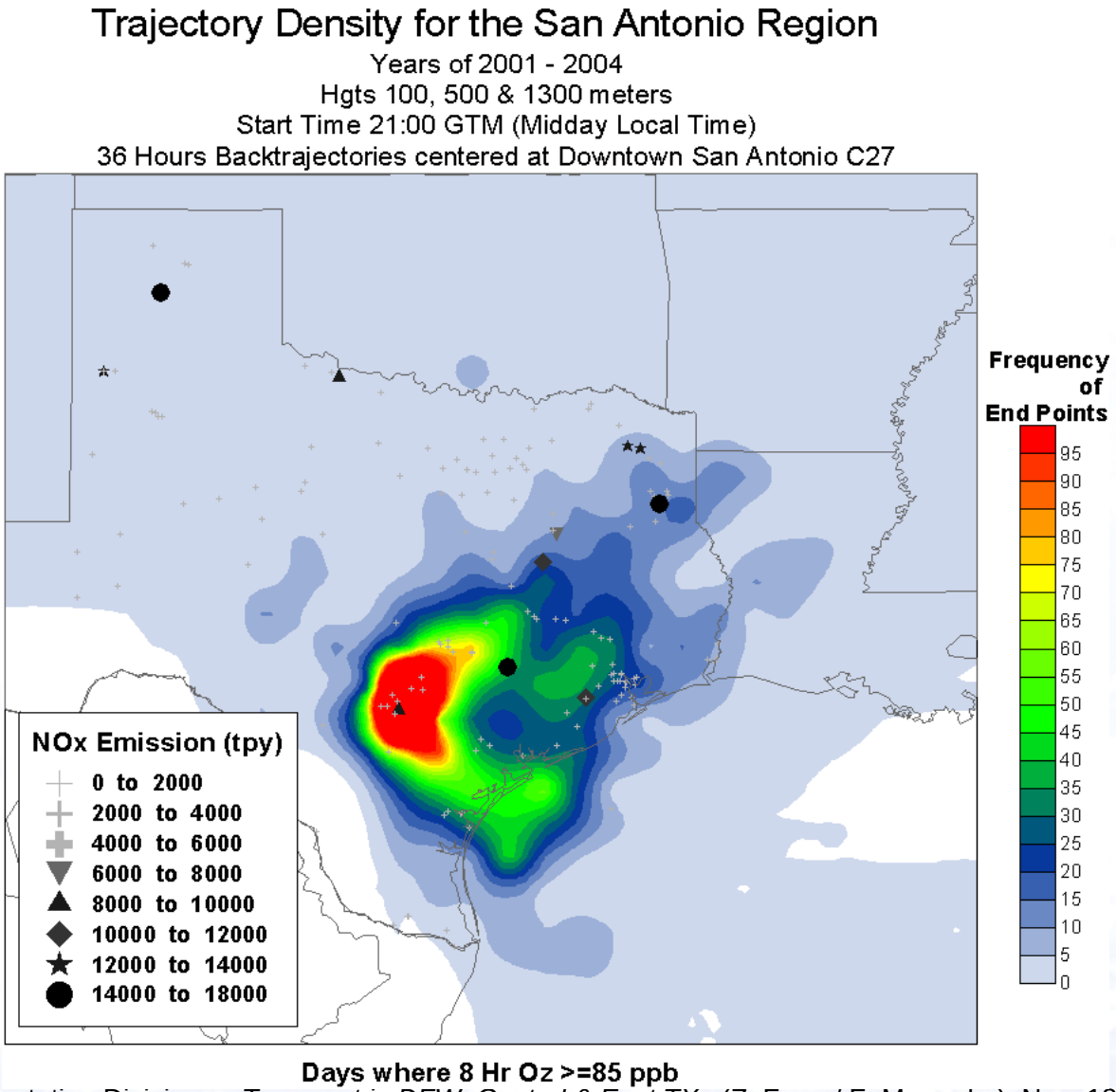
Height in Meters

- 100
- 500
- 1300

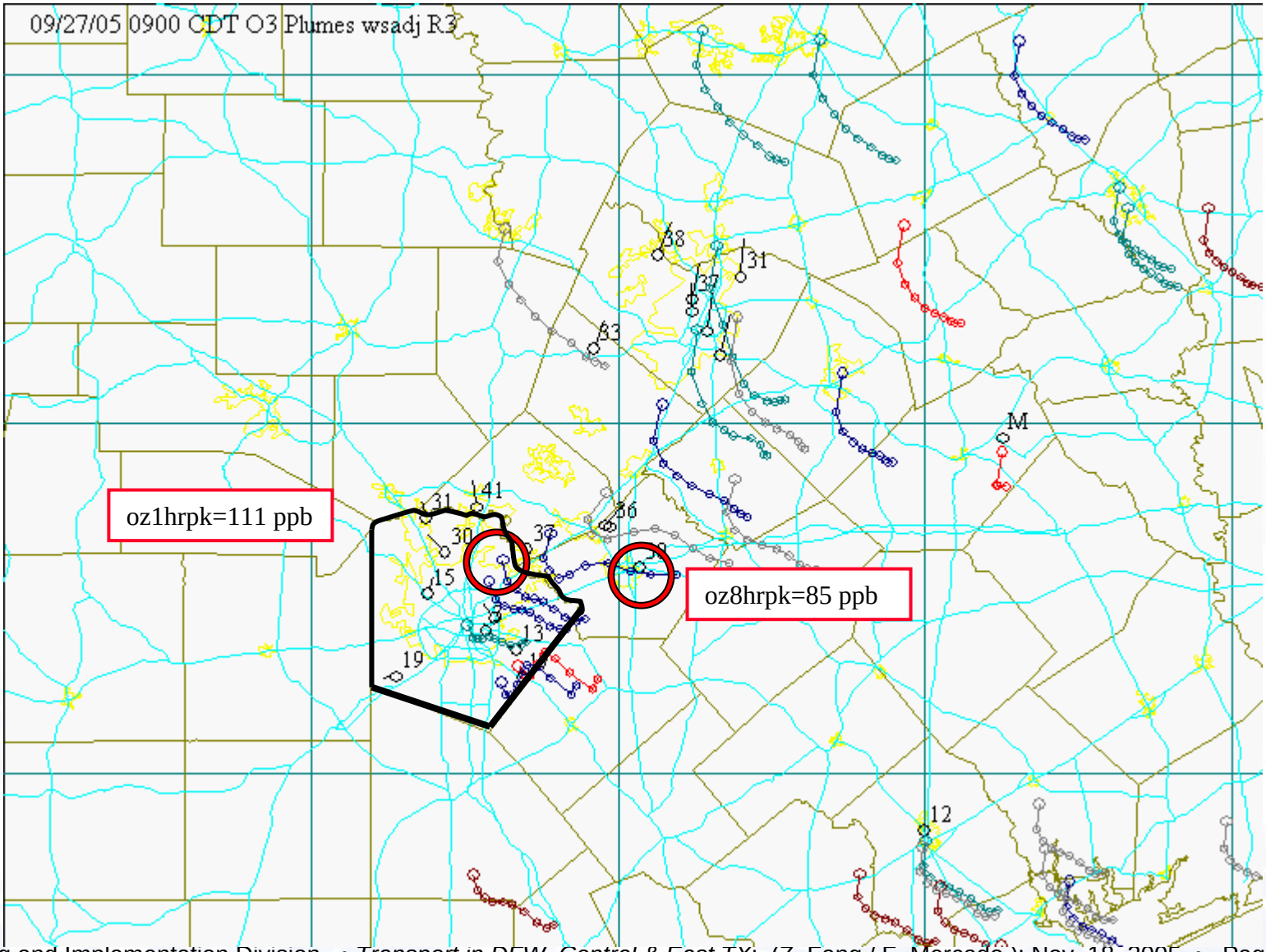
Back Trajectories Density for Central TX



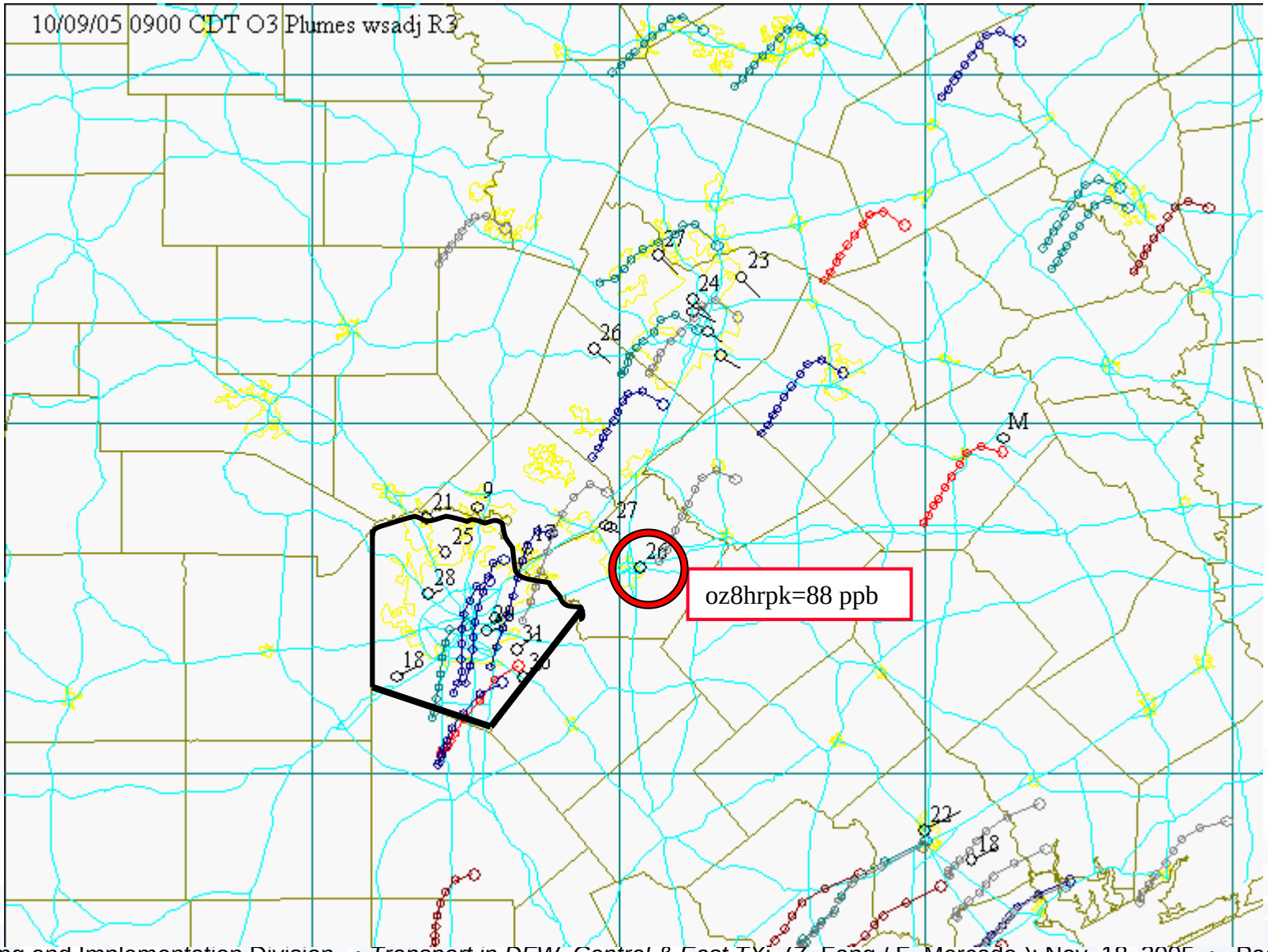
Back Trajectories Density with Power Plant NOx Emissions for Central TX



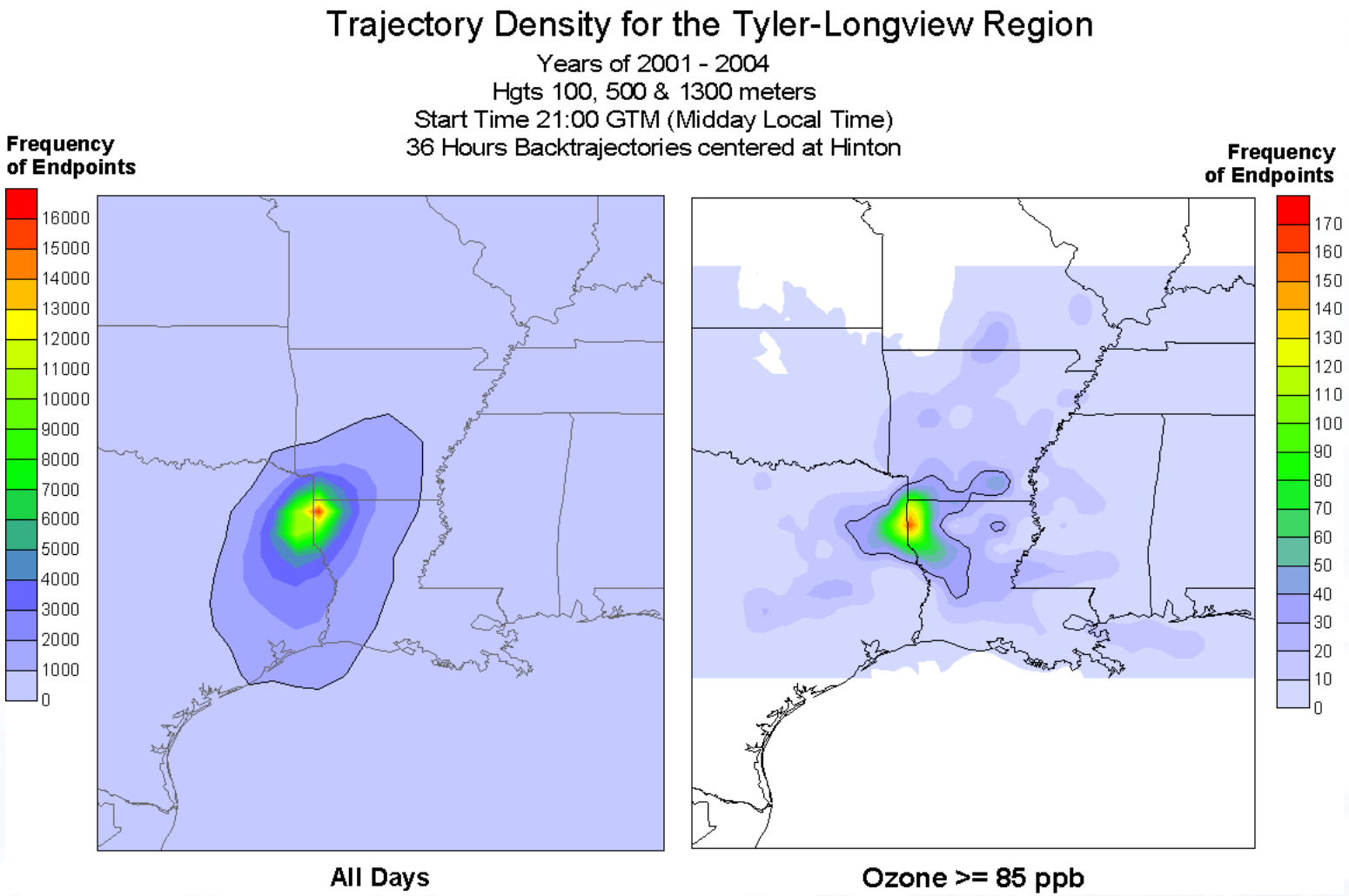
9/27/2005 Plume



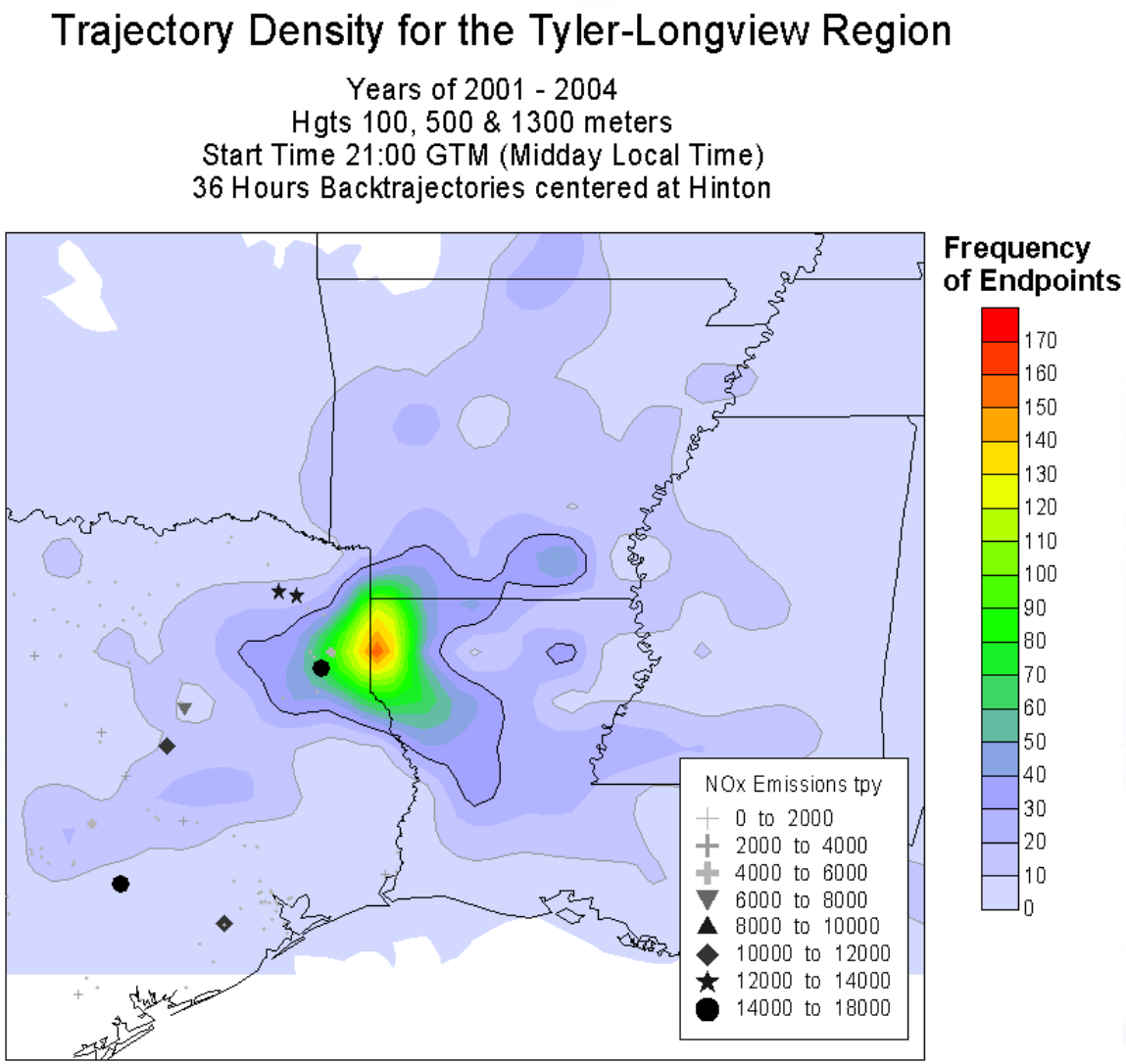
10/9/2005 Plume



Back Trajectories Density for Tyler-Longview

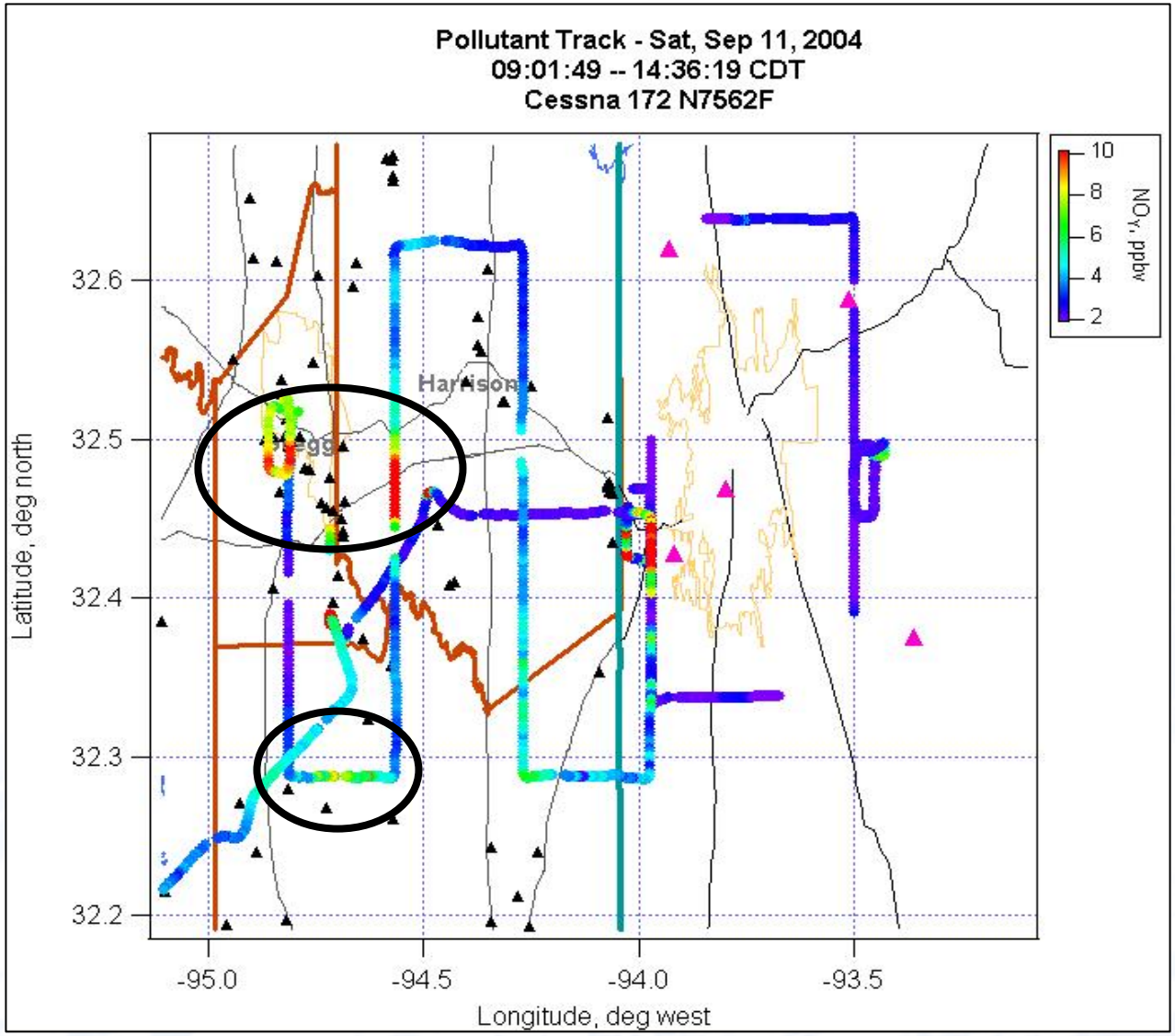


Back Trajectories Density with Power Plant NOx Emissions for Tyler-Longview



Ozone >= 85 ppb

Tyler-Longview Aircraft Flight Plume Examples



Summary

- Transport/Upper Wind Directions that Influence 8-Hour Ozone Days Compared to All Days:
  - For DFW: directions from east and southeast
  - For San Antonio: directions from northeast and southeast
  - For Tyler-Longview: directions from southwest, southeast, and northeast
- Surface Winds
  - Regions east and southeast of DFW have higher average background ozone concentrations.
  - Upwind/downwind ozone comparisons suggest DFW locally contributes about 23 ppb to its 8-hour ozone on 8-hr exceedance days
- Aircraft Observations - Plumes carry emissions from sources within Tyler-Longview towards DFW.

Contributors

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