

# **Dallas**

**4-8 Sep. ozone buildup**

**A broad-brush look at meteorological and transport issues**

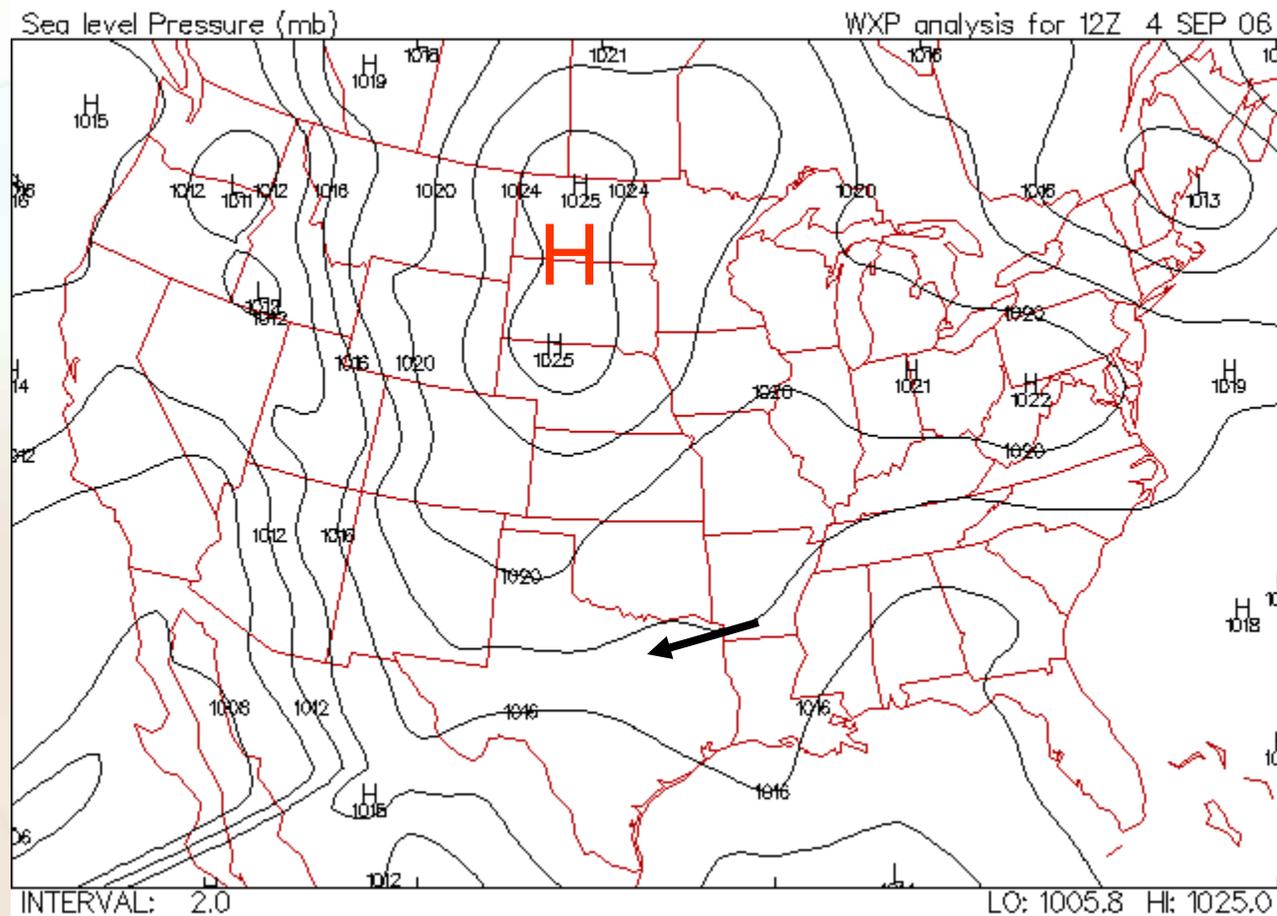
**Lisa Darby**

**Bob Banta and Christoph Senff**

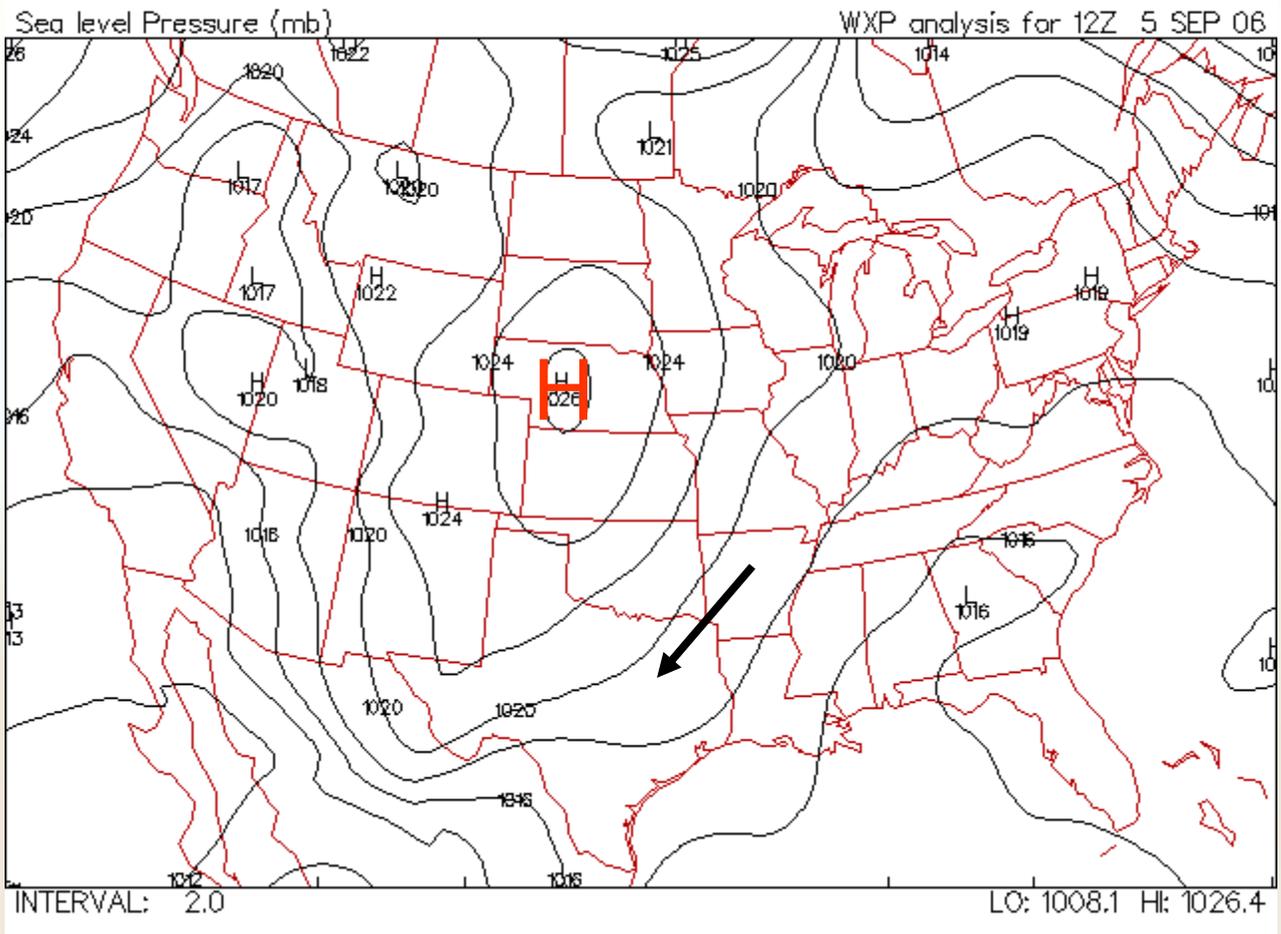
## Migrating synoptic-scale high pressure circulation

- 1) caused transition from northerly to southerly wind in the Dallas area and
- 2) allowed regional build-up of ozone.

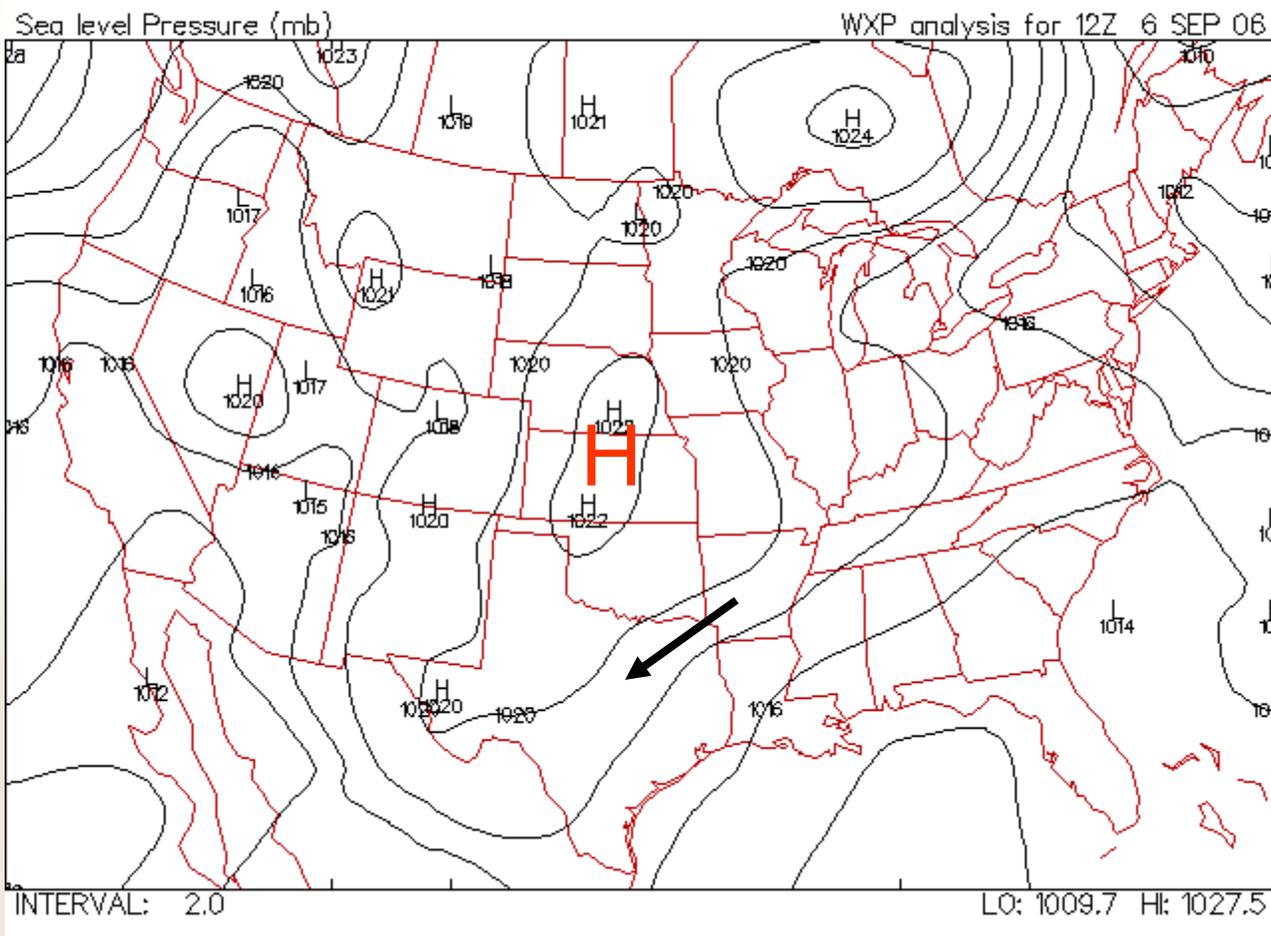
### ▼ Plymouth State Weather Center ▼



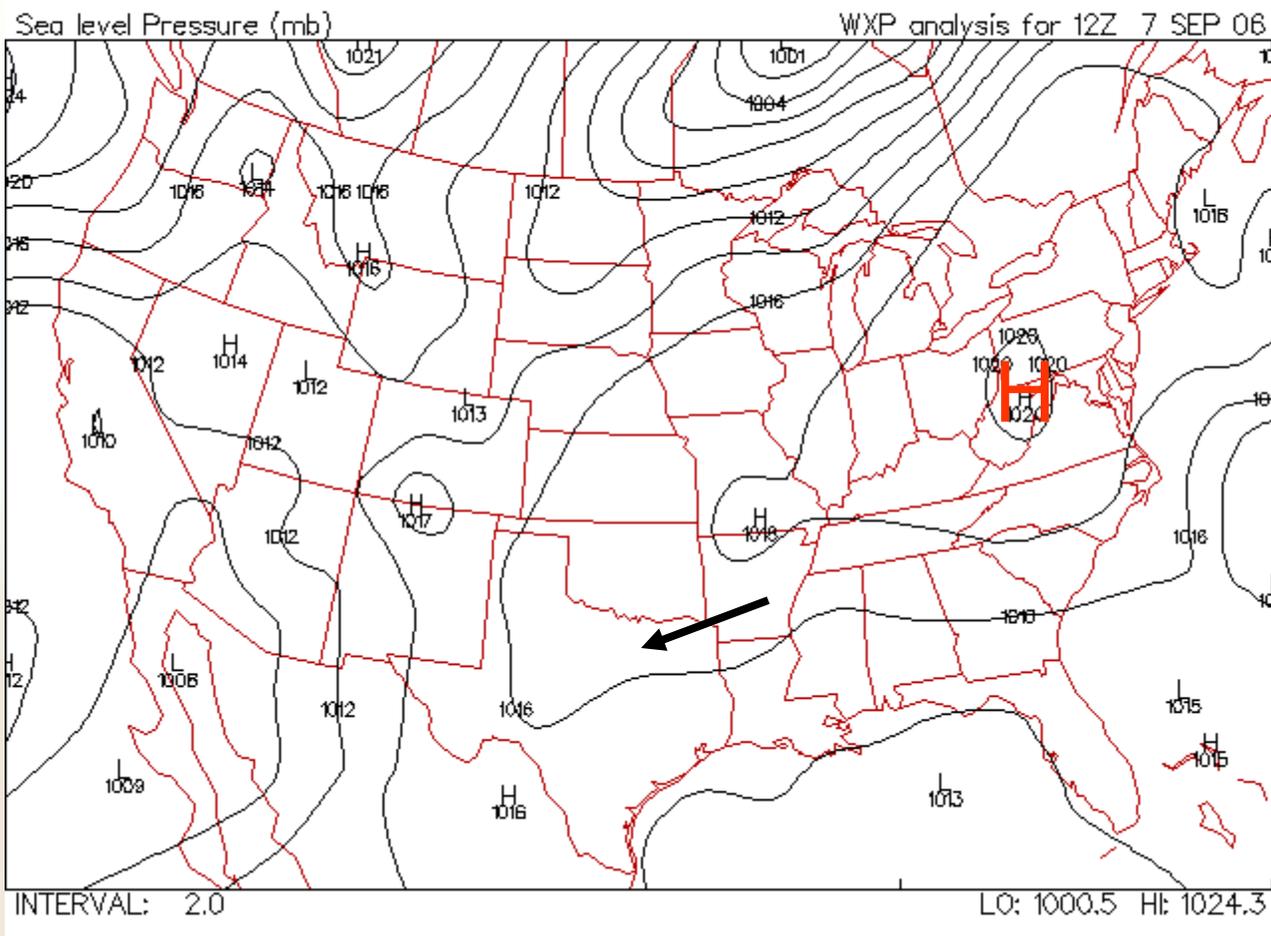
# ▼ Plymouth State Weather Center ▼



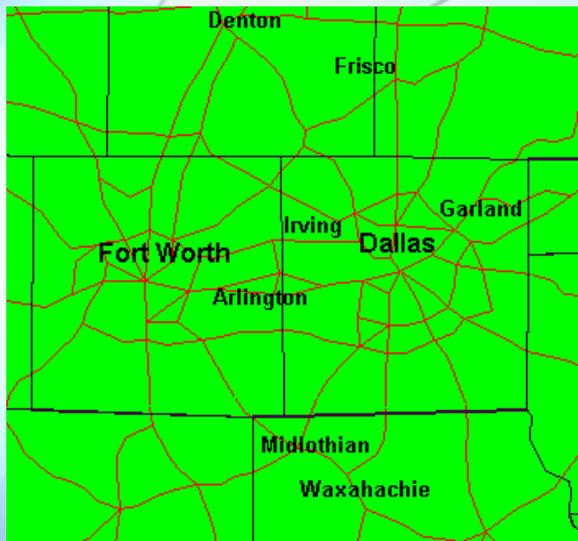
# Plymouth State Weather Center



# Plymouth State Weather Center



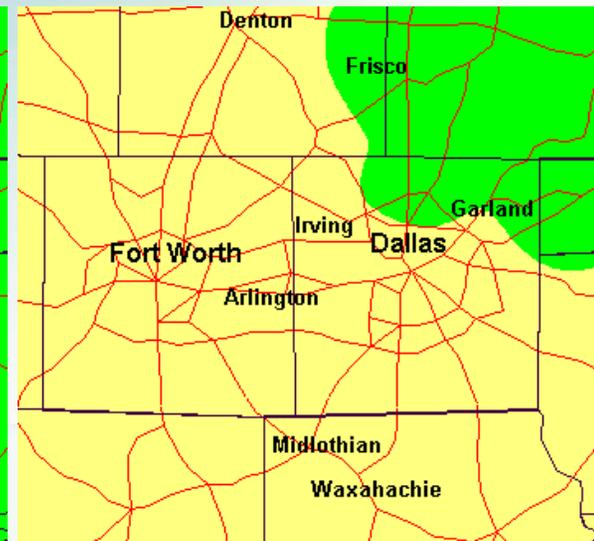




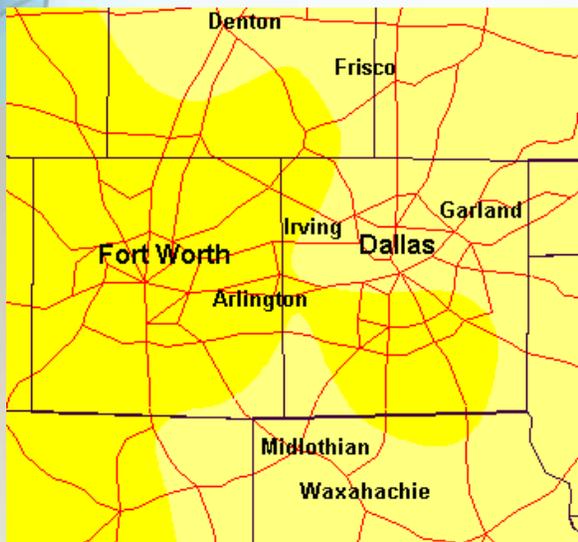
September 4, 2006



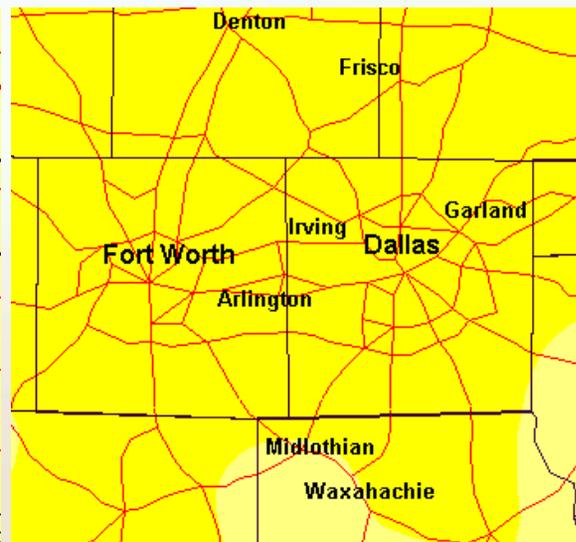
September 5, 2006



September 6, 2006



September 7, 2006



September 8, 2006

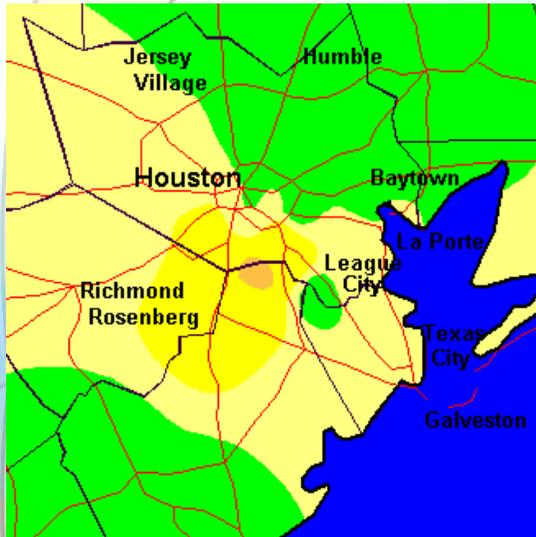
1-hr ozone maxima indicate a gradual build up of ozone in the Dallas/Ft. Worth area.

8 Sep was an 8-hr exceedance day in Dallas.

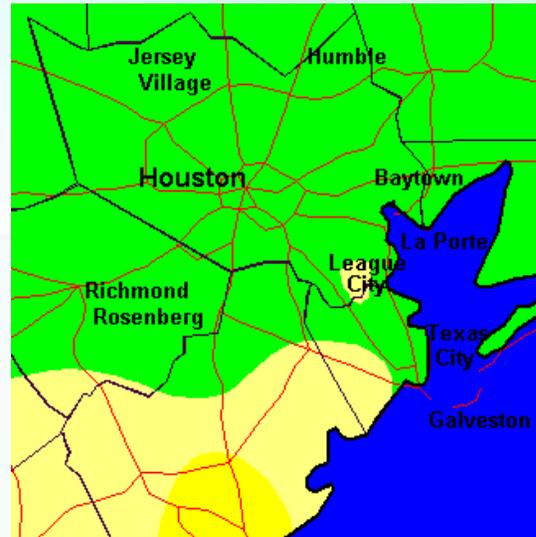
## 8-hr average maximum ozone Dallas Region 4

CAMS #	4 Sep	5 Sep	6 Sep	7 Sep	8 Sep
C31	40	49	56	66	87
C401	35	50	59	71	75
C63	35	49	56	67	76
C402	37	56	65	80	81
C56	38	50	57	70	83
C1032	35	49	56	63	87
C94	34	48	63	64	74
C52	35	53	64	63	75
C650	36	57	65	68	72
C73	37	52	62	74	74
C1006	37	54	56	67	71
C77	32	54	65	75	78
C71	34	54	60	69	74
C76	40	50	56	77	72
C69	35	51	57	69	77
C75	39	51	58	81	80
C13	35	53	61	82	79
C17	37	50	59	78	82
C70	36	51	61	78	85
C61	35	52	63	76	77

# Meanwhile, back in Houston...



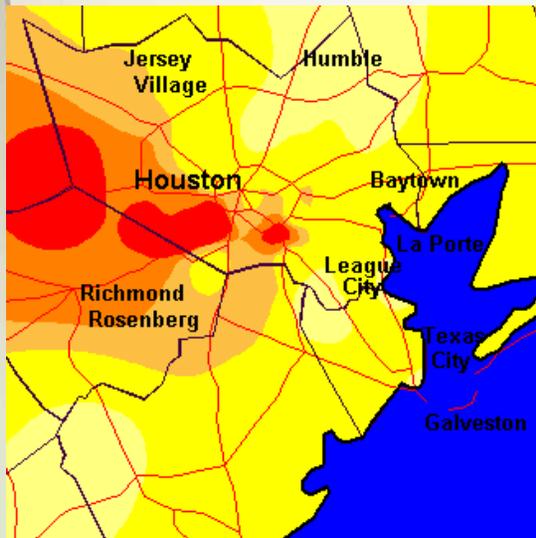
September 4, 2006



September 5, 2006



September 6, 2006



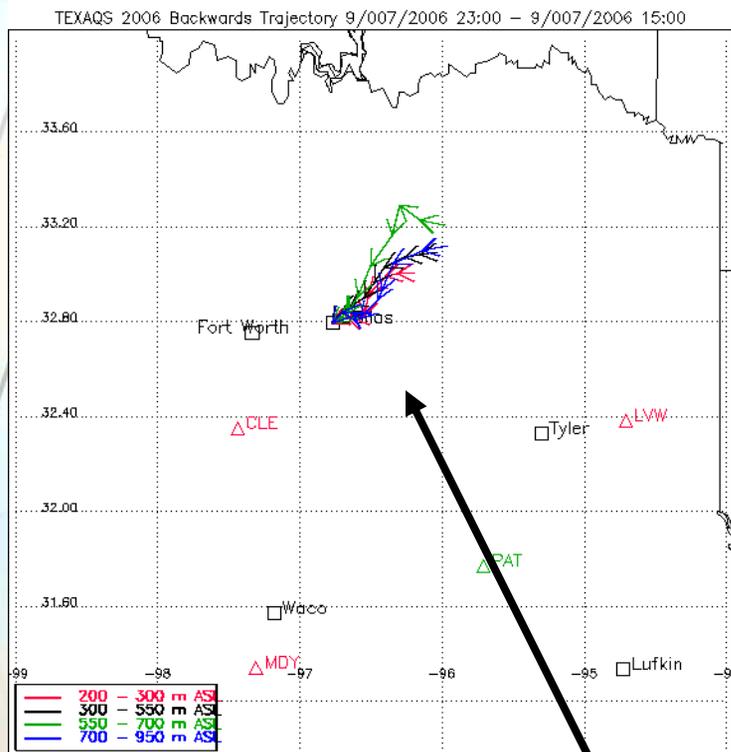
September 7, 2006



September 8, 2006

Houston air quality was in the “unhealthy” category on 7 Sep., with 8-hr ozone maxima up to 110 ppbv.

The southerly flow helped to clear out Houston on 8 Sep., and enhanced transport toward Dallas.

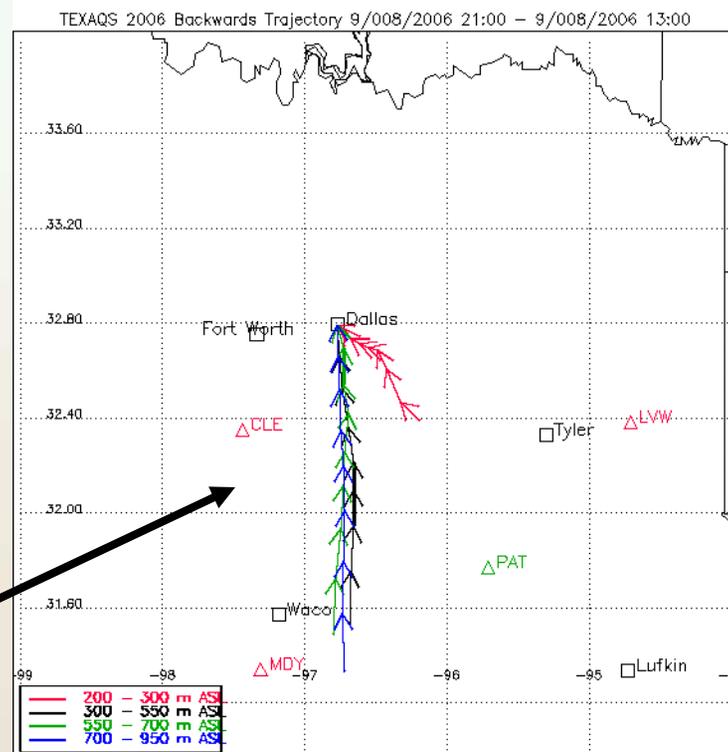


7 Sep. Weak transport from the northeast direction.

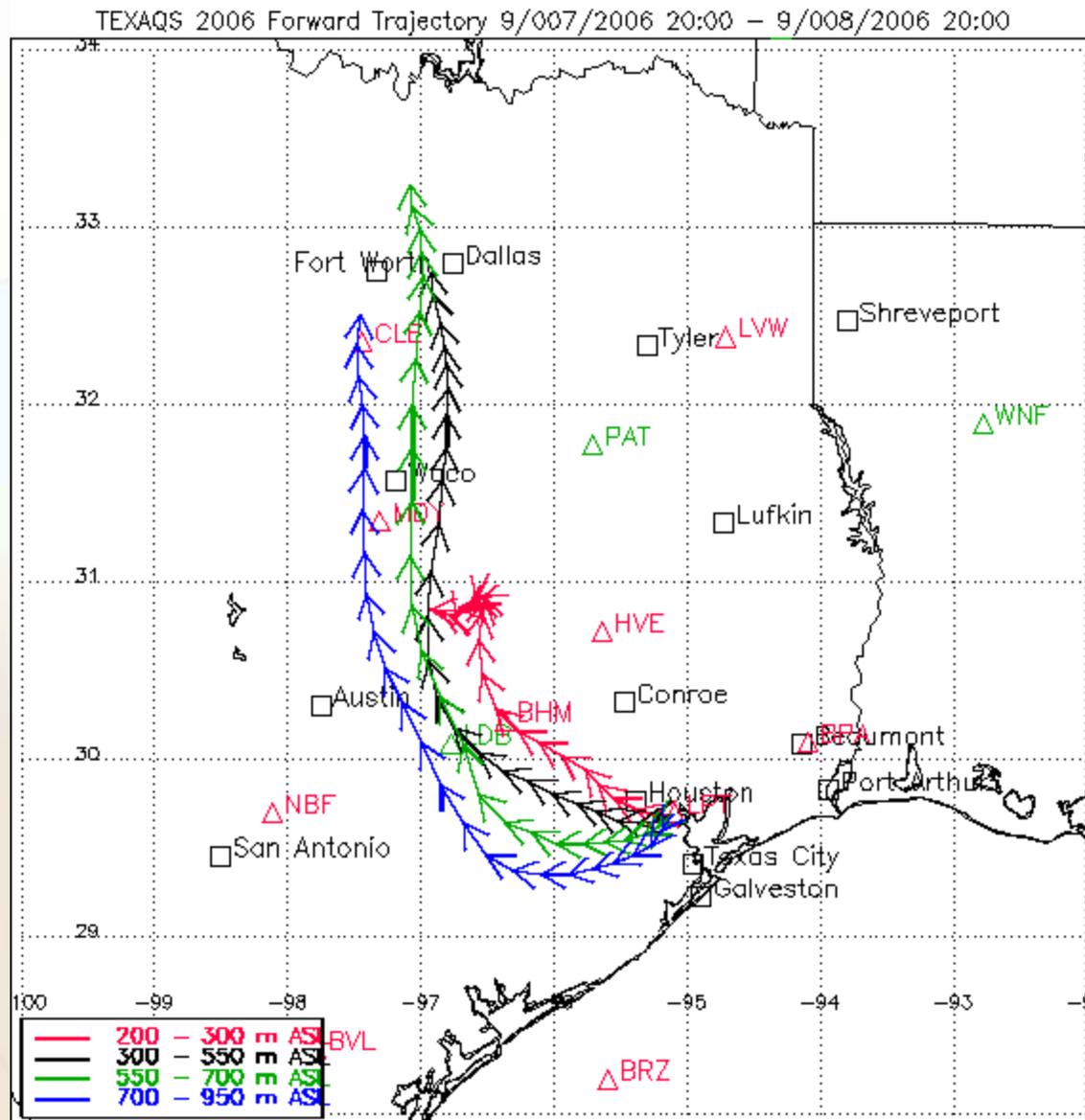
8 Sep. stronger transport from the south.

## Daytime profiler-based back trajectories for Dallas.

Trajectories end at the hour with the highest ozone and start 8 hours earlier.

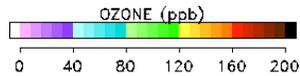


24-hour profiler-based forward trajectory from Houston indicated transport from Houston to Dallas, above 300 m.

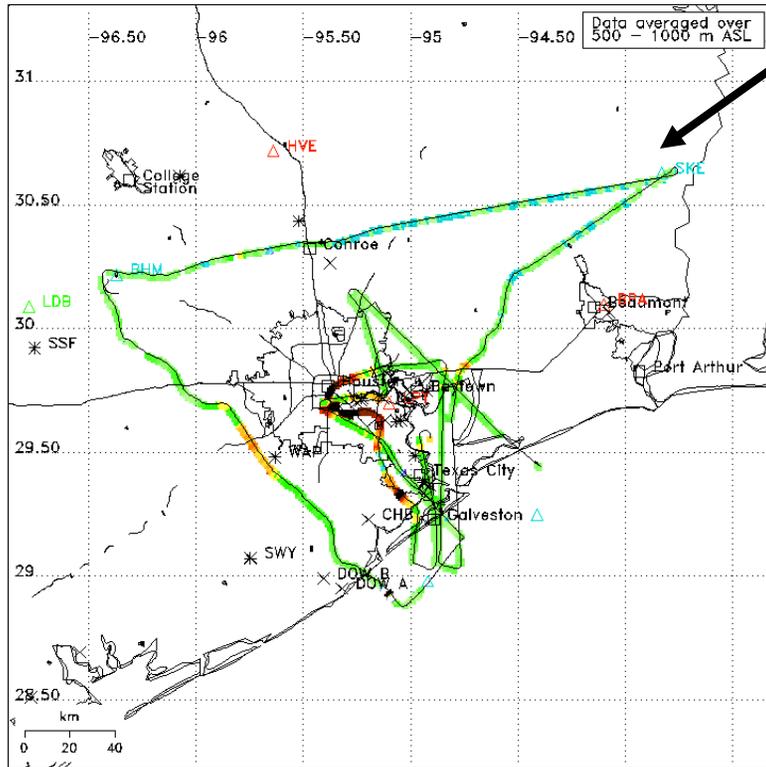


TEXAQS 7 SEP 2006

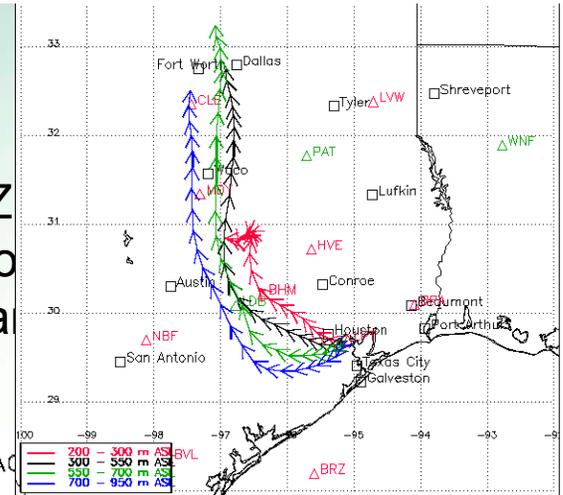
TOPAZ



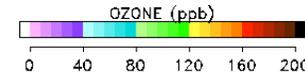
NOAA Twin Otter  
16:04 - 22:03 UTC



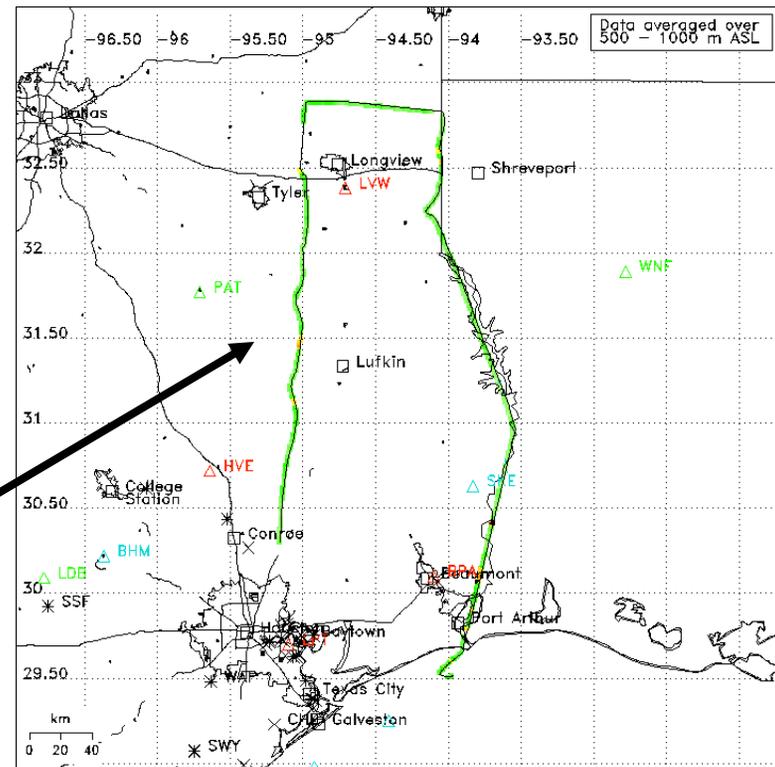
7 Sep TOPAZ  
ozone transpo  
with the forwa



TOPAZ



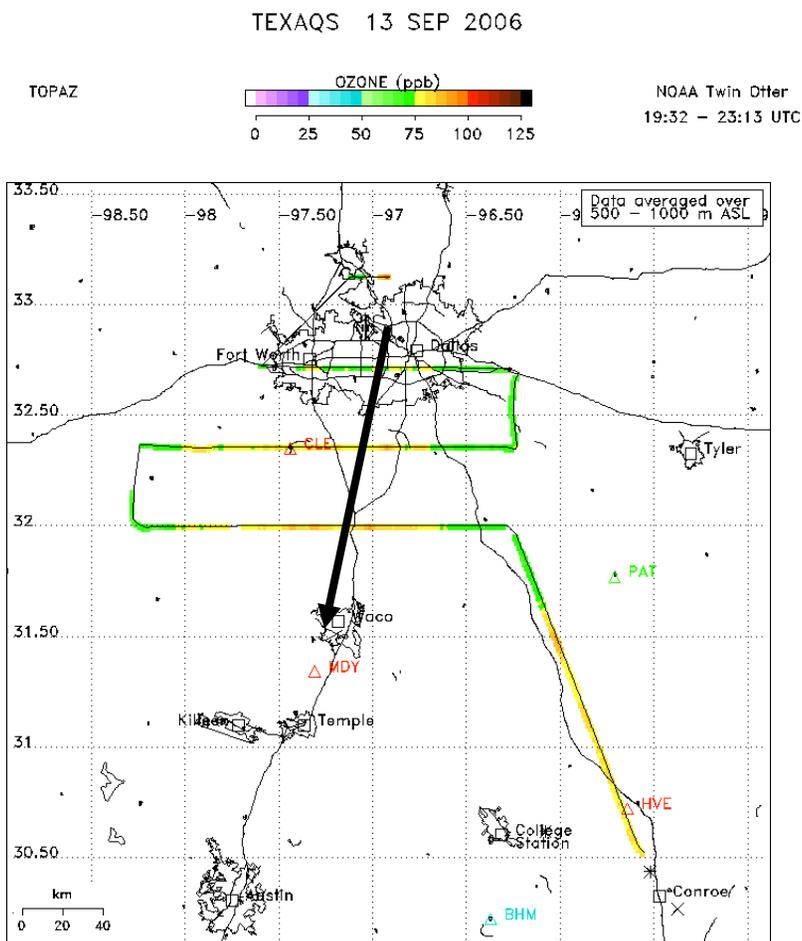
NOAA Twin Otter  
17:11 - 20:27 UTC



8 Sep TOPAZ measurements show a wide area of ozone  $\geq 80$  ppbv along the Texas border and north of Houston.

Note the increase in ozone near SKE.

# 13 Sep TOPAZ Flight



Moderately strong northerly flow

60 ppbv background ozone

Dallas plume reaching 85 ppbv

High ozone values well south of  
the network

# Summary

- **High pressure migration influenced large-scale flow in east Texas.**
- **Gradual build-up of ozone ensued.**
- **Southerly flow on the 8<sup>th</sup> brought ozone from the Houston area to Dallas, where the background ozone had been building, providing a final “kick” to the ozone values in Dallas.**
- **Profiler trajectories and TOPAZ measurements support this scenario.**

# **Future Work**

- **Incorporate boundary layer depth into the analysis**
- **More trajectory analysis for the Dallas area once the profiler data has been “de-birded”**
- **Analysis of surface ozone and meteorological data**

Height  
(m-agl)

Cleburne (077)

Date: 9/7/2006

3000

2000

1000

0

9/7/2006

Mode: All

Time (LST)

9/8/2006

Elev. (ft): 820.25

Printed: 9/8/2006 11:01:11 AM

