Corpus Christi Air Monitoring and Surveillance Camera Project

Third Annual Report to the US District Court

by

THE UNIVERSITY OF TEXAS AT AUSTIN

Center for Energy and Environmental Resources

Vincent M. Torres, Project Manager
Dave Sullivan, Quality Assurance Manager

December 13, 2006

Today's Presentation

- Introductions
- Project Overview
- Project Budget
- Project Financial Status
- Statement by Representatives of the Project Voluntary Advisory Board
- Monitoring Highlights/Actions/TCEQ Interactions
- Q & A

Project Overview

- Year 1
  - Hired contractors and began construction of sites
  - Established Voluntary Advisory Board
- Year 2
  - Completed construction of sites, conducted acceptance testing of sites & began reporting data April 1, 2005 (collected data for 6 months of Year 2) through TCEQ & project websites
- Year 3
  - Continued collection & reporting of data; optimized operation of sites to maximize use of project funds
  - Project remains on schedule & within budget

Project Budget

- Of total project costs for first 3 years, only site construction (1.5 years) and 0.5 year of operations & maintenance (O&M) costs have been funded by this project
- Additional funds provided by a Supplemental Environmental Project (SEP) awarded by the TCEQ funded O&M costs for one year
- Beginning October 2, 2006, all O&M costs are being charged to this project.
- Total expenditures for the first 3 years of the project included only 0.5 year of O&M costs

Project Financial Status

Expenditures

Total for prior years	$1,954,721.02
Current year (ending 9/30/06)	$531,913.23
Total* to date (9/30/06)	$2,486,634.25

* Initial budget estimated $2,300,000 for site construction & deployment and $316,127 for operations & maintenance after construction for approximately 0.5 year for a total initial estimate of $2,616,127; Actual costs were $2,486,634.25.

Funds Remaining

Initial deposit (10/2/03)	$6,761,718.02
Less expenditures to date (9/30/06)	($2,486,634.25)
Plus interest earned to date (9/30/06)	$385,672.80
Project funds remaining**	$4,660,756.57

**The remaining project funds plus future interest earned are estimated to allow the project to operate for five more years (total of 8 years compared to initial estimate of 7 years) to September 2011, assuming no extraordinary costs arise.

Statement by Representatives of the Volunteer Advisory Board

Ms. Gretchen Arnold
Mr. Ron Barnard

Air Monitoring Network, Site Designations and Major Instrumentation

Contract Reference	TCEQ CAMS No.	Description of Site Location	Major Monitoring Equipment/Systems				
			Auto GC	Event Triggered Sampler	H2S & SO2 Monitor	Meteorology Station	Surveillance Camera
1.a	634	Oak Park Recreation Center	Yes			Yes	
1.b	629	Grain Elevator @ Port of Corpus Christi		Yes	Yes	Yes	
1.c	630	J. I. Hailey Site @ Port of Corpus Christi		Yes	Yes	Yes	
1.d	635	TCEQ Monitoring Site C199 @ Dona Park		Yes	Yes	Yes	Yes
1.e	631	West End of CC Inner Harbor @ Port of Corpus Christi		Yes	Yes	Yes	
1.f	632	Off Up River Road on Flint Hills Resources easement		Yes	Yes	Yes	
1.g	633	Solar Estates Park at end of Sunshine Road	Yes		Yes	Yes	Yes

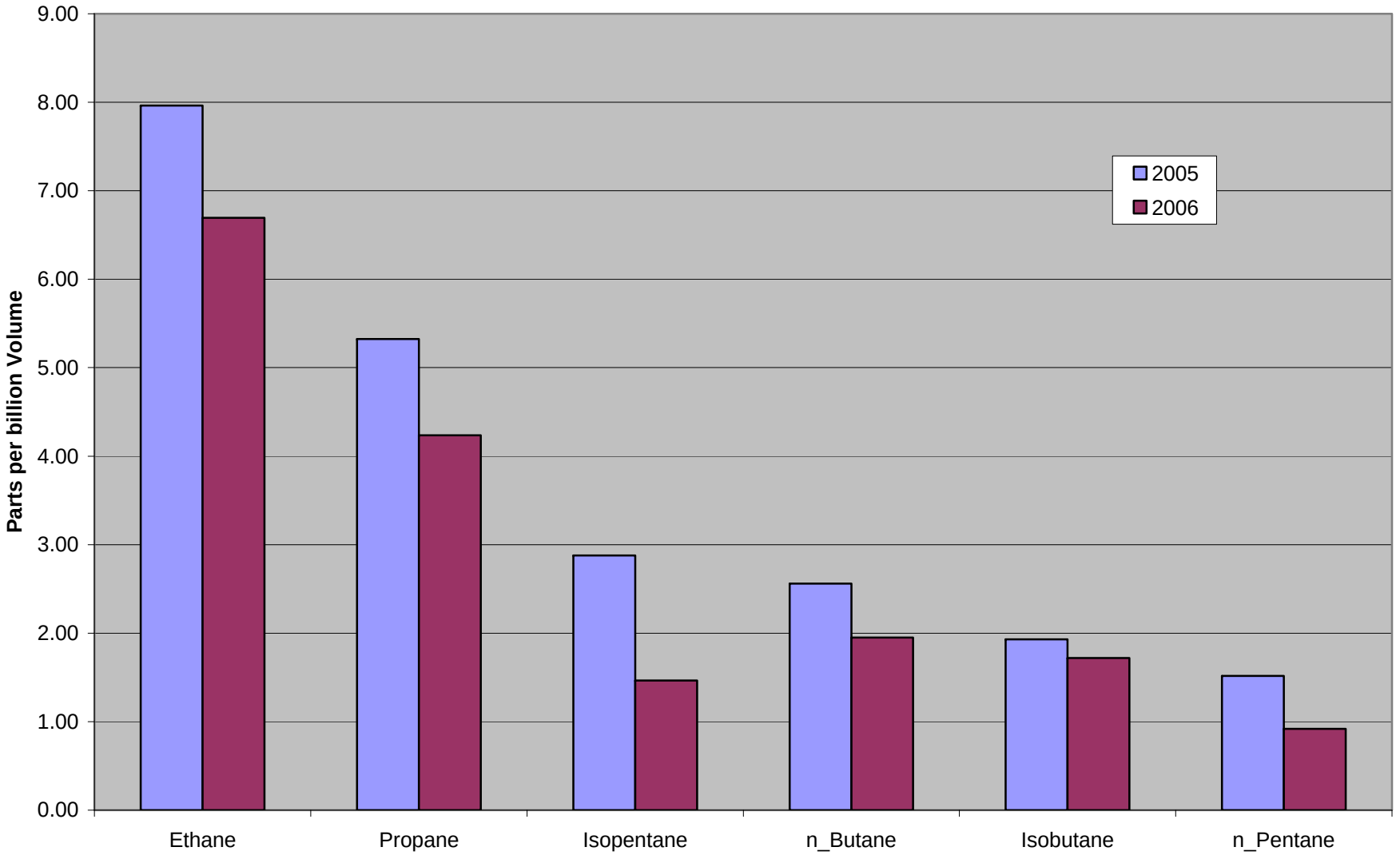
Air Monitoring Network Site Locations

Air Monitoring Network Results

- Average concentrations for most hydrocarbon lower in 2006 vs. 2005. (March – Oct. period)
- Average benzene higher at Oak Park in 2006 vs. 2005. (March – Oct. period)
- All hydrocarbon average below annual Effects Screening Levels (ESLs);
  - Some hourly benzene concentrations over the 1-hr ESL.
- No 30-min. averages above the State's regulatory thresholds for SO_2 or H_2S.

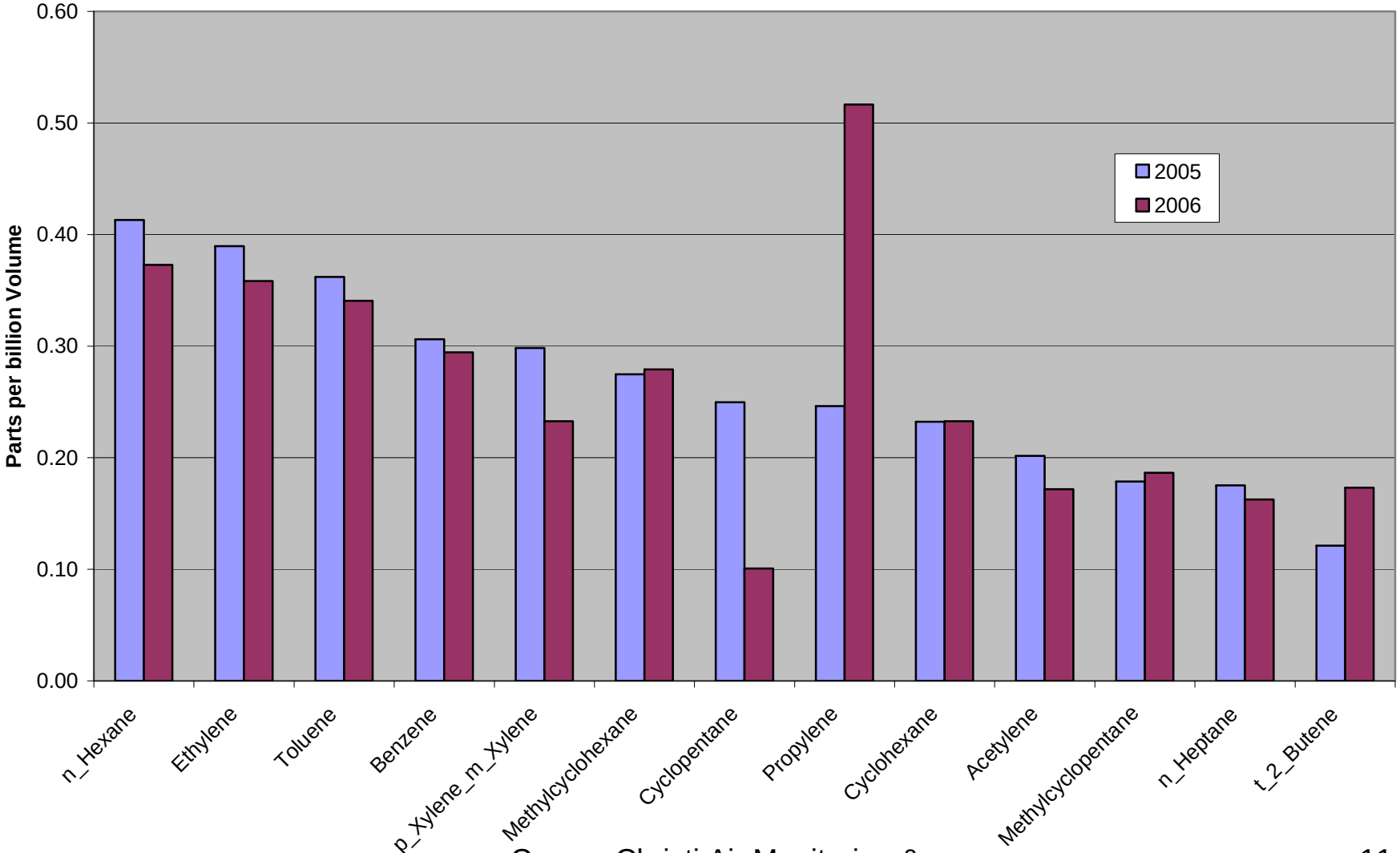
Auto-GC: Changes from year to year

Solar Estates C633, most common auto-GC species Mar.-Oct. 2005 vs 2006



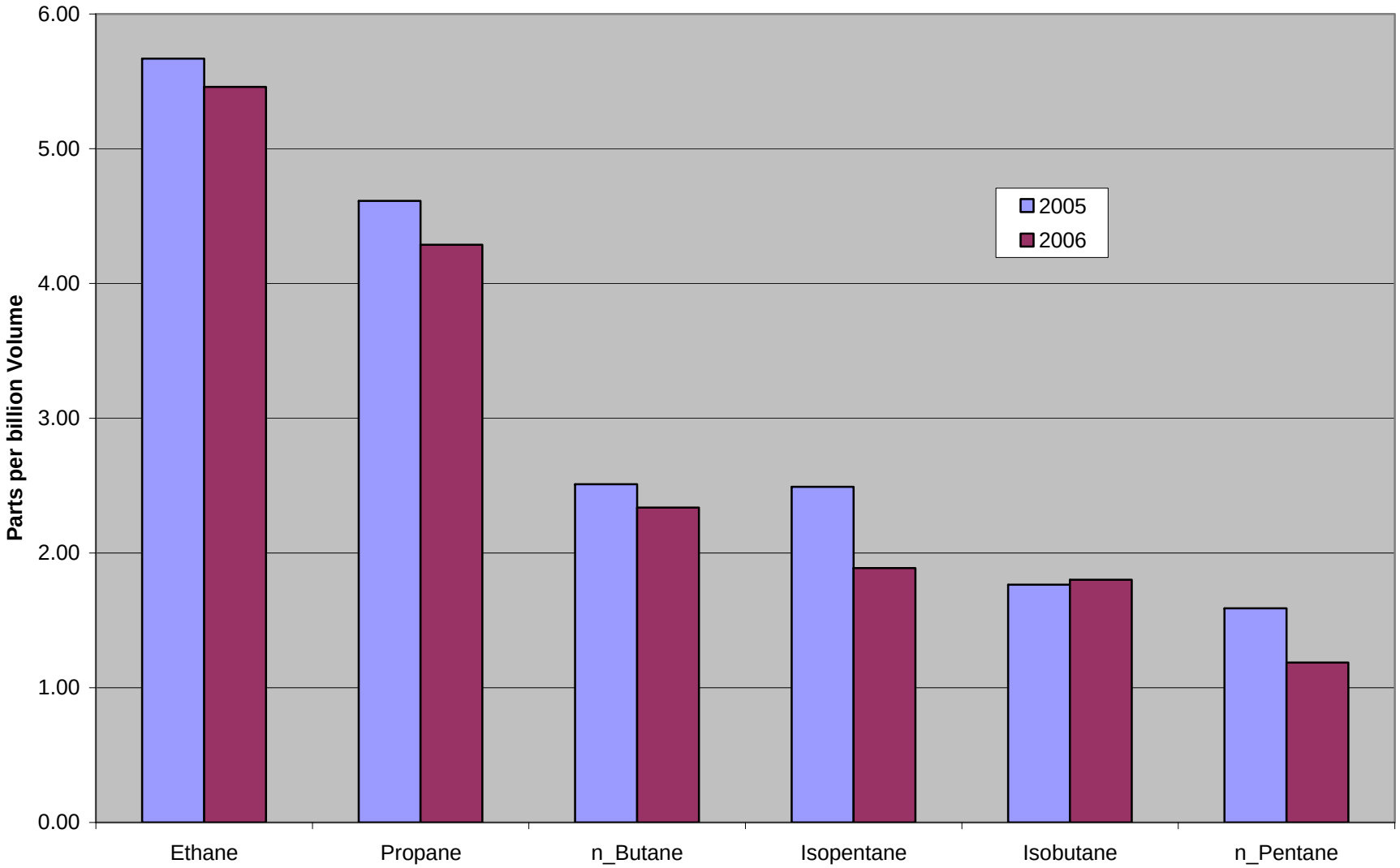
Auto-GC: Changes from year to year

Solar Estates C633, mid-range concentration auto-GC species Mar.-Oct. 2005 vs 2006



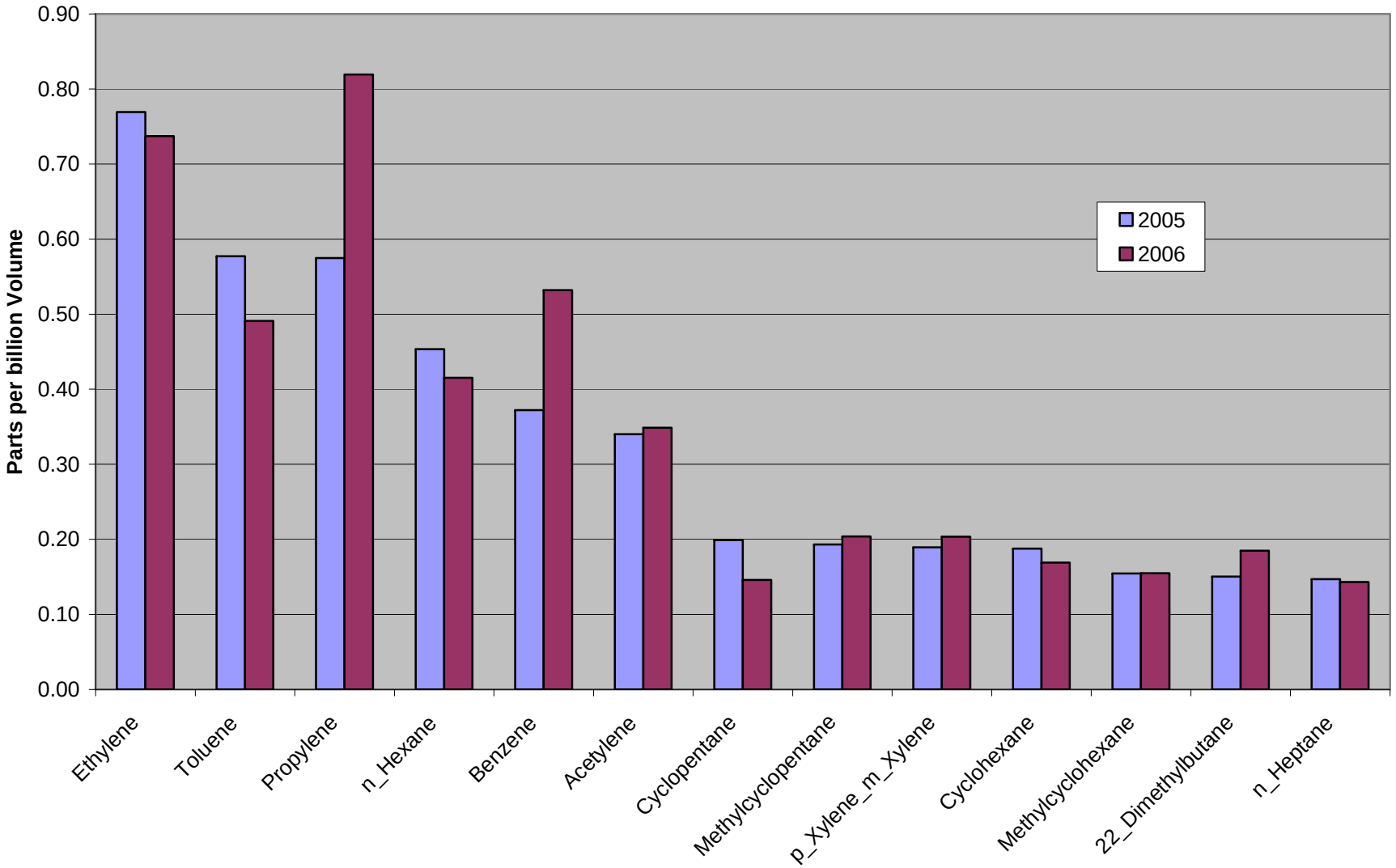
Auto-GC: Changes from year to year

Oak Park C634, most common auto-GC species Mar.-Oct. 2005 vs 2006

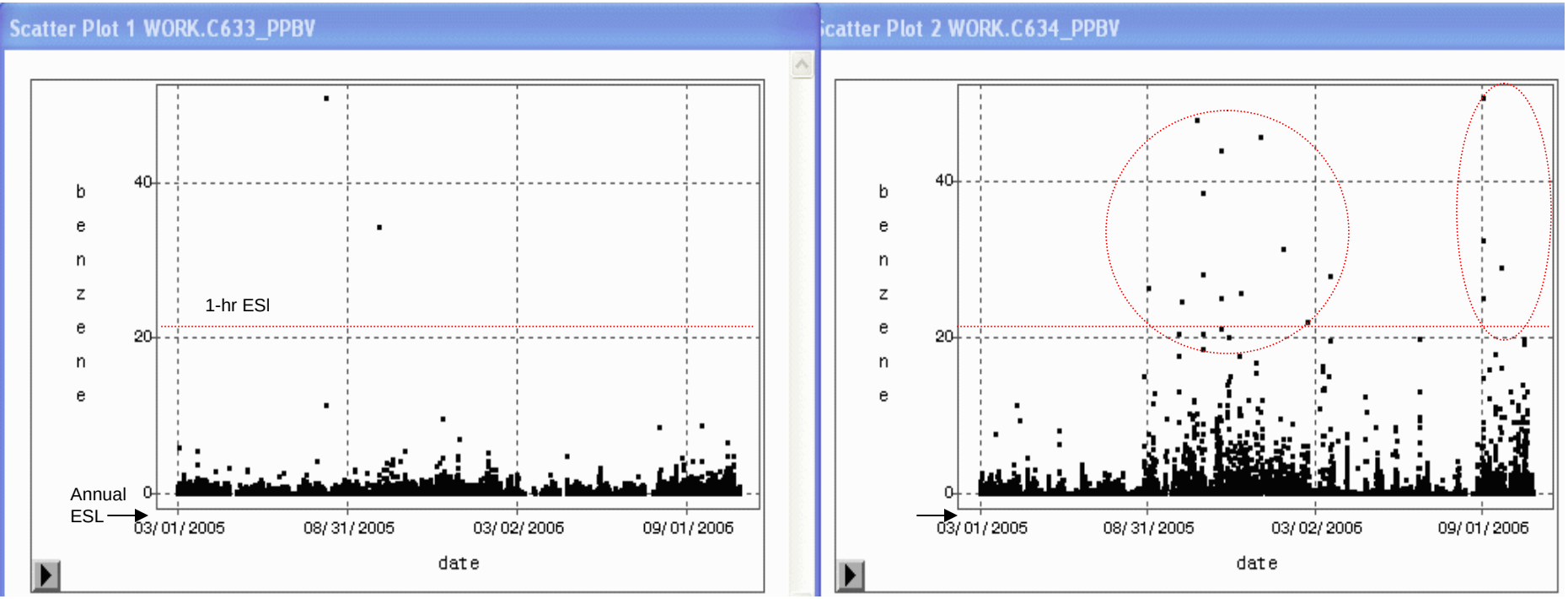


Auto-GC: Changes from year to year

Oak Park C634, mid-range concentration auto-GC species Mar.-Oct. 2005 vs 2006

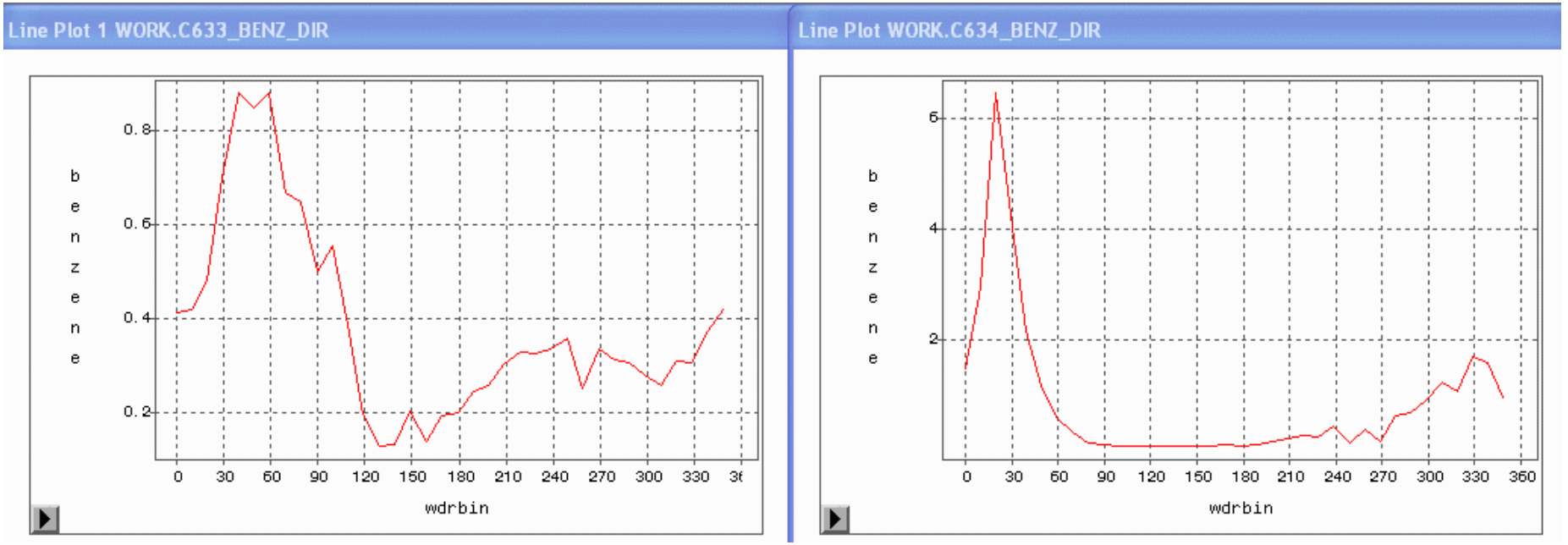


Time series of benzene at Solar Estates (C633) & Oak Park (C634), ppbV units on y-axis



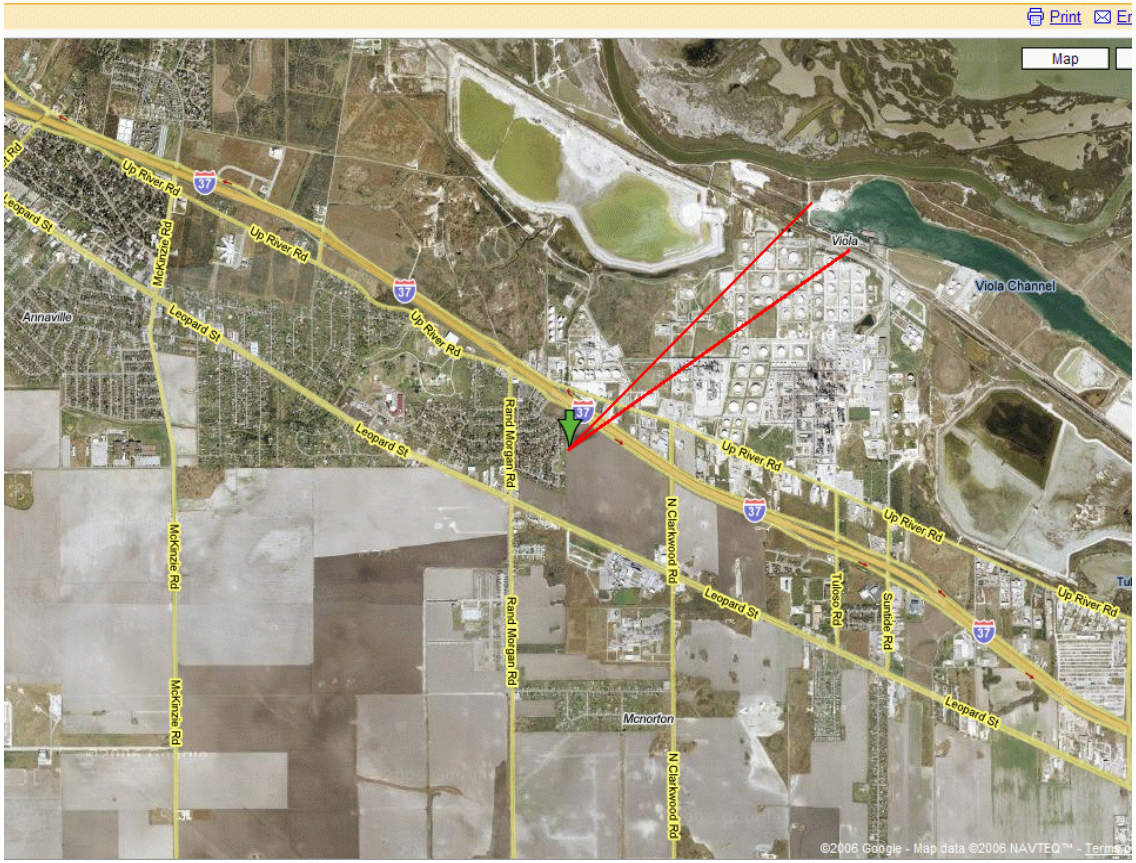
- Slight increase in benzene in 2006 at Oak Park, several values over 1hr ESL of 25 ppbV
- Concentrations at Oak Park higher than Solar Estates.
- Concentrations highest late/early in the year under northerly winds.
- Annual means 0.3 at Solar, 0.7 at Oak Park, TCEQ ESL = 1.0 ppbV

Mean benzene in ppbV units by wind direction at Solar (C633) & Oak Park (C634)



- Merge wind direction and benzene data & compute average concentration by 10 deg. wind bin, Mar. 2005-Oct. 2006.
- Peak at Solar Estates (left) at 50 deg.(0.9 ppbV)
- Two peaks at Oak Park at 20 deg.(6.5 ppbV) & 330 deg. (1.7 ppbV)
- Confirms earlier findings by TCEQ regarding likely sources.

Aerial map at Solar Estates with cone pointing to NE, peak general direction for benzene

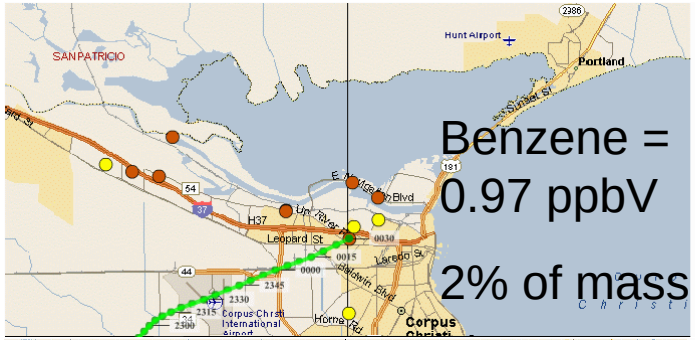


Aerial map at Oak Park with cones pointing to NW & NE, peak general directions for benzene

Case Study

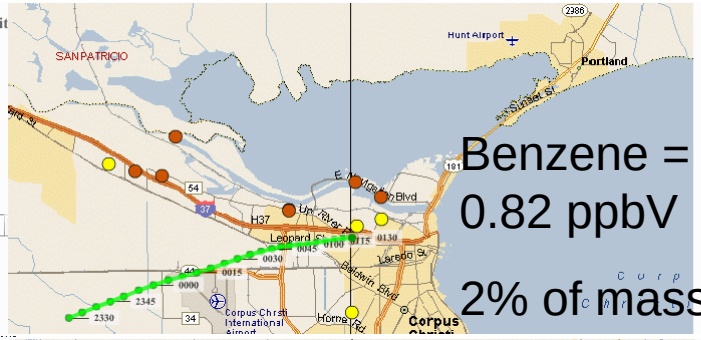
- Benzene on 11/22/2005
  - Two hourly values > 25 ppbV (1-hr ESL)
  - Changes in concentrations and TNMHC fraction clearly associated with wind direction.
  - UT trajectory tool used to assess upwind source areas.

Back-trajectories from Oak Park hours 00-06 CST on 11/22/05



Benzene = 0.97 ppbV

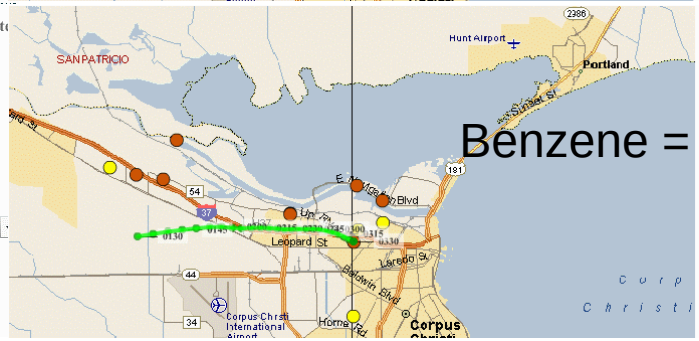
2% of mass



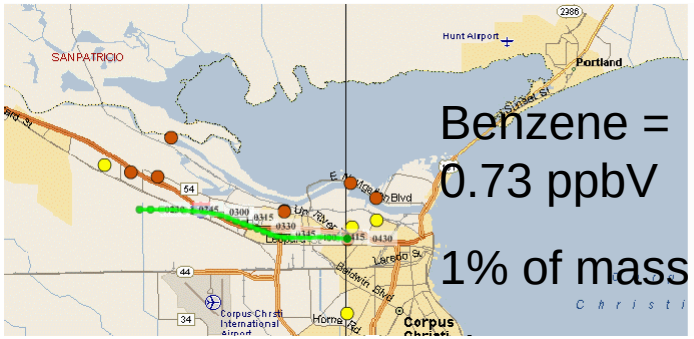
Benzene = 0.82 ppbV

2% of mass

Benzene = N/A

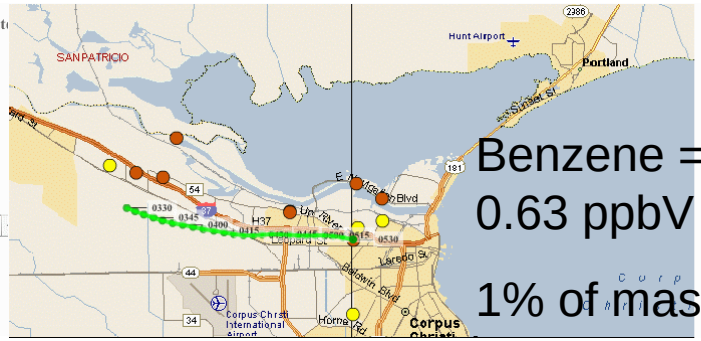


Benzene = N/A



Benzene = 0.73 ppbV

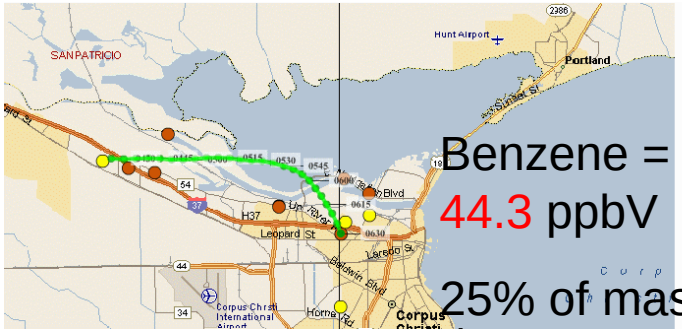
1% of mass



Benzene = 0.63 ppbV

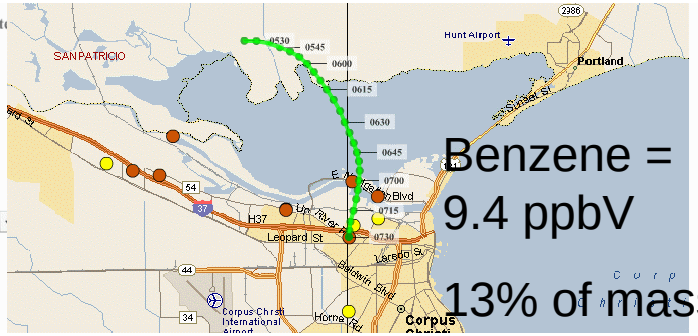
1% of mass

Back-trajectories from Oak Park hours 07-12 CST on 11/22/05



Benzene = 44.3 ppbV

25% of mass

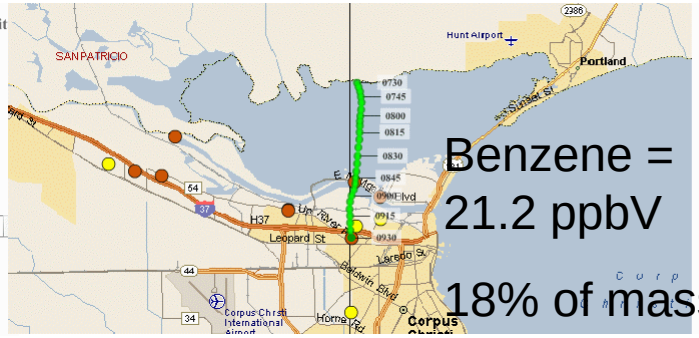


Benzene = 9.4 ppbV

13% of mass

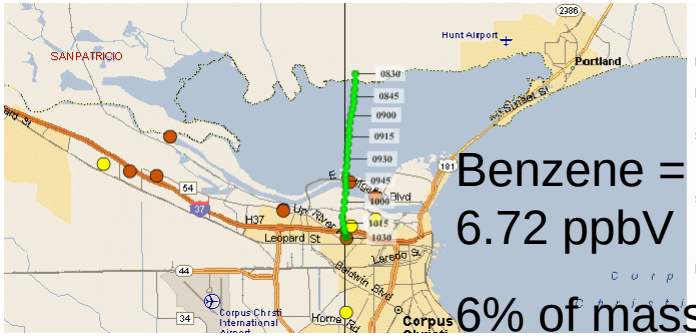
Benzene = 25.2 ppbV

22% of mass



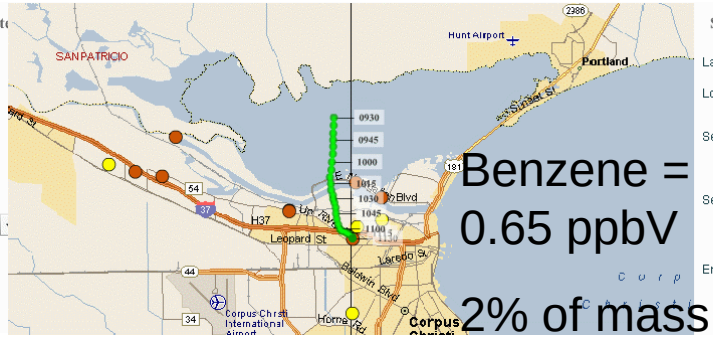
Benzene = 21.2 ppbV

18% of mass



Benzene = 6.72 ppbV

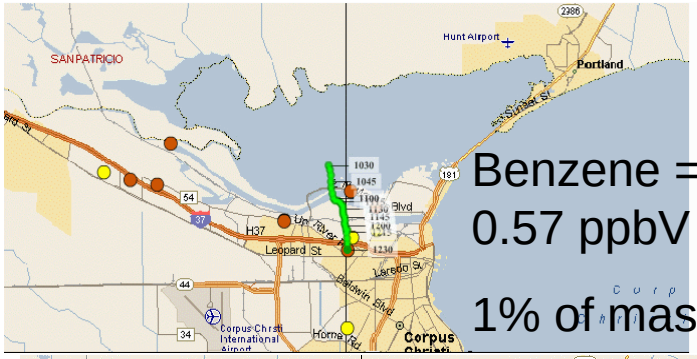
6% of mass



Benzene = 0.65 ppbV

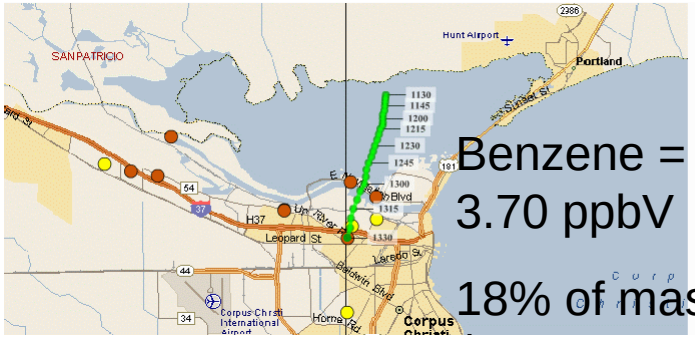
2% of mass

Back-trajectories from Oak Park hours 13-17 CST on 11/22/05



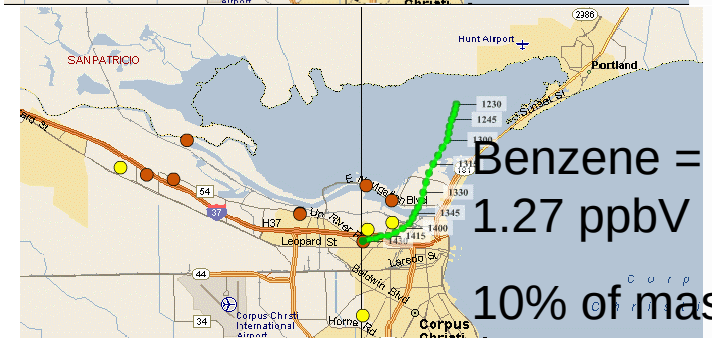
Benzene = 0.57 ppbV

1% of mass



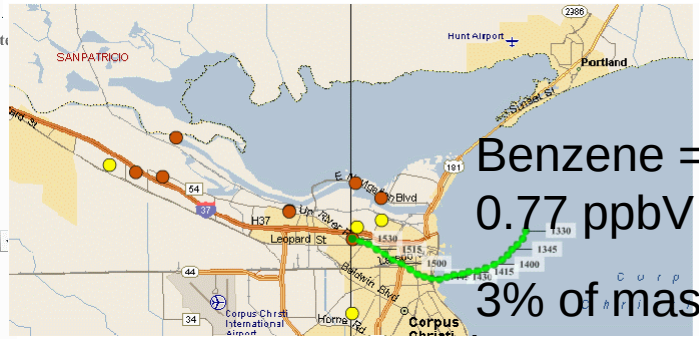
Benzene = 3.70 ppbV

18% of mass



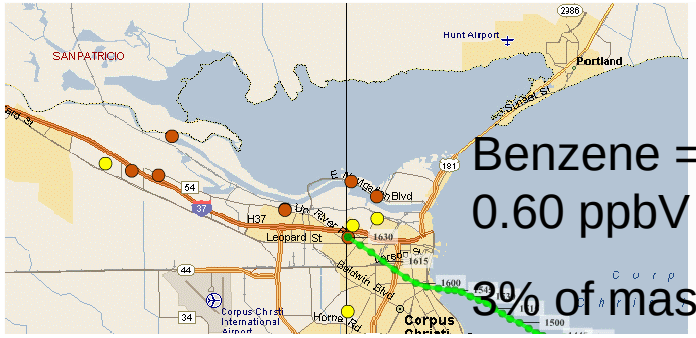
Benzene = 1.27 ppbV

10% of mass



Benzene = 0.77 ppbV

3% of mass



Benzene = 0.60 ppbV

3% of mass

Conclusions

- Average auto-GC concentrations for most hydrocarbons lower in 2006 vs. 2005. (March – Oct. period)
- All hydrocarbon averages < annual ESLs, rolling 4 quarter period.
- Special attention paid to benzene, a carcinogen.
  - Average benzene higher at Oak Park in 2006 vs. 2005. (March – Oct. period)
  - Some hourly benzene concentrations > 1-hr ESL.
  - Concentrations highest overnight -- early a.m.; caused by inversions and rush-hours.
  - Key wind directions are associated with highest concentrations.
  - UT trajectory tool can assist in assessments – one example presented.
- No 30-min. averages above the State's regulatory thresholds for SO_2 or H_2S.
- Coordination continues between UT, TCEQ Central, and TCEQ Region in use of these data.

Contact Information for Project Personnel

Principal Investigator - Dr. David T. Allen
Phone: 512-471-0049
allen@che.utexas.edu

Project Manager - Vincent M. Torres
Phone: 512-471-5803
vmtorres@mail.utexas.edu

Quality Assurance Officer – Dr. David Sullivan
Phone: 512/471-7805
Sullivan231@mail.utexas.edu

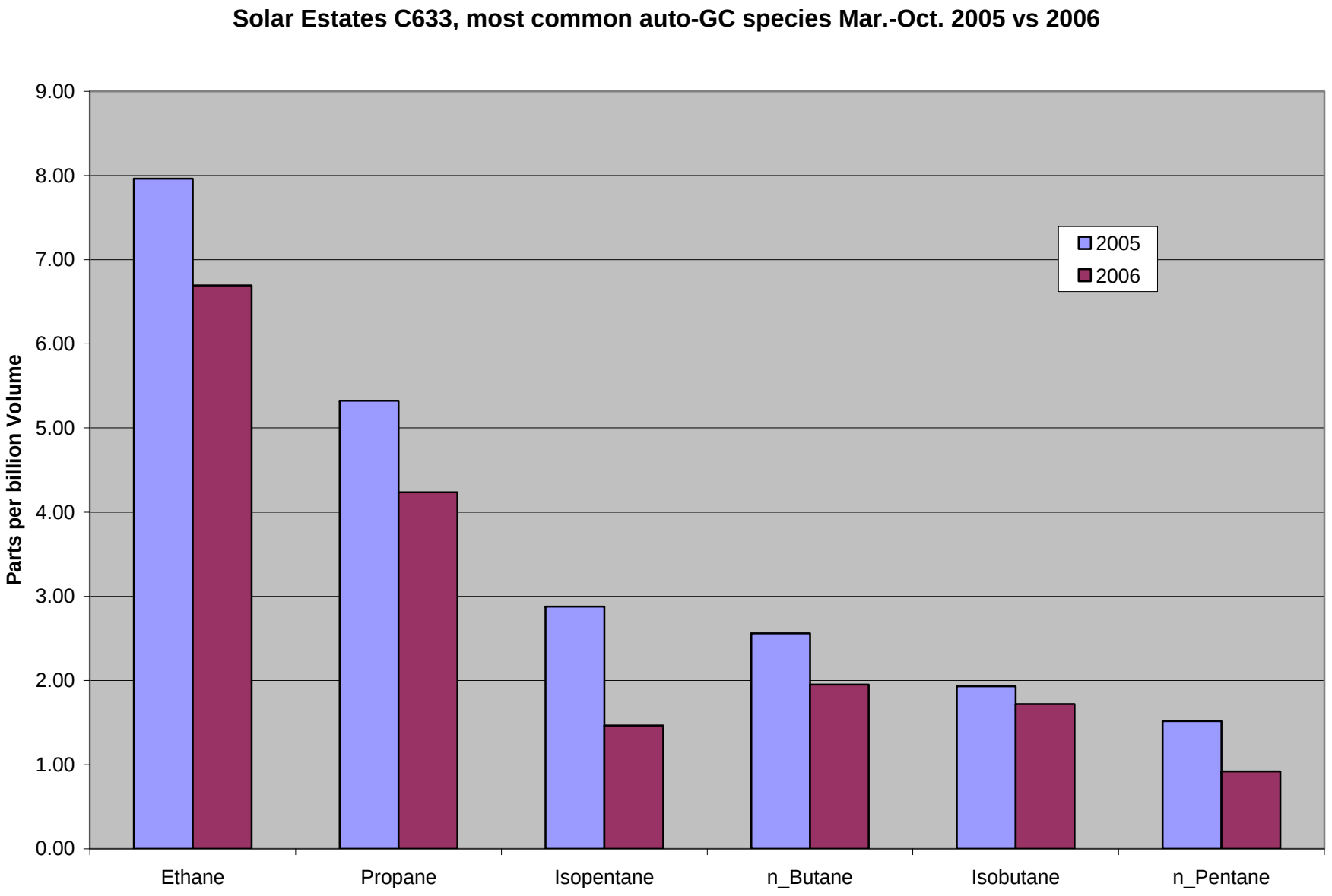
Contracts Manager - MaryAnn Foran
Phone: 512-232-5040
ma_foran@mail.utexas.edu

Project Web Site: http://www.utexas.edu/research/ceer/ccaqp

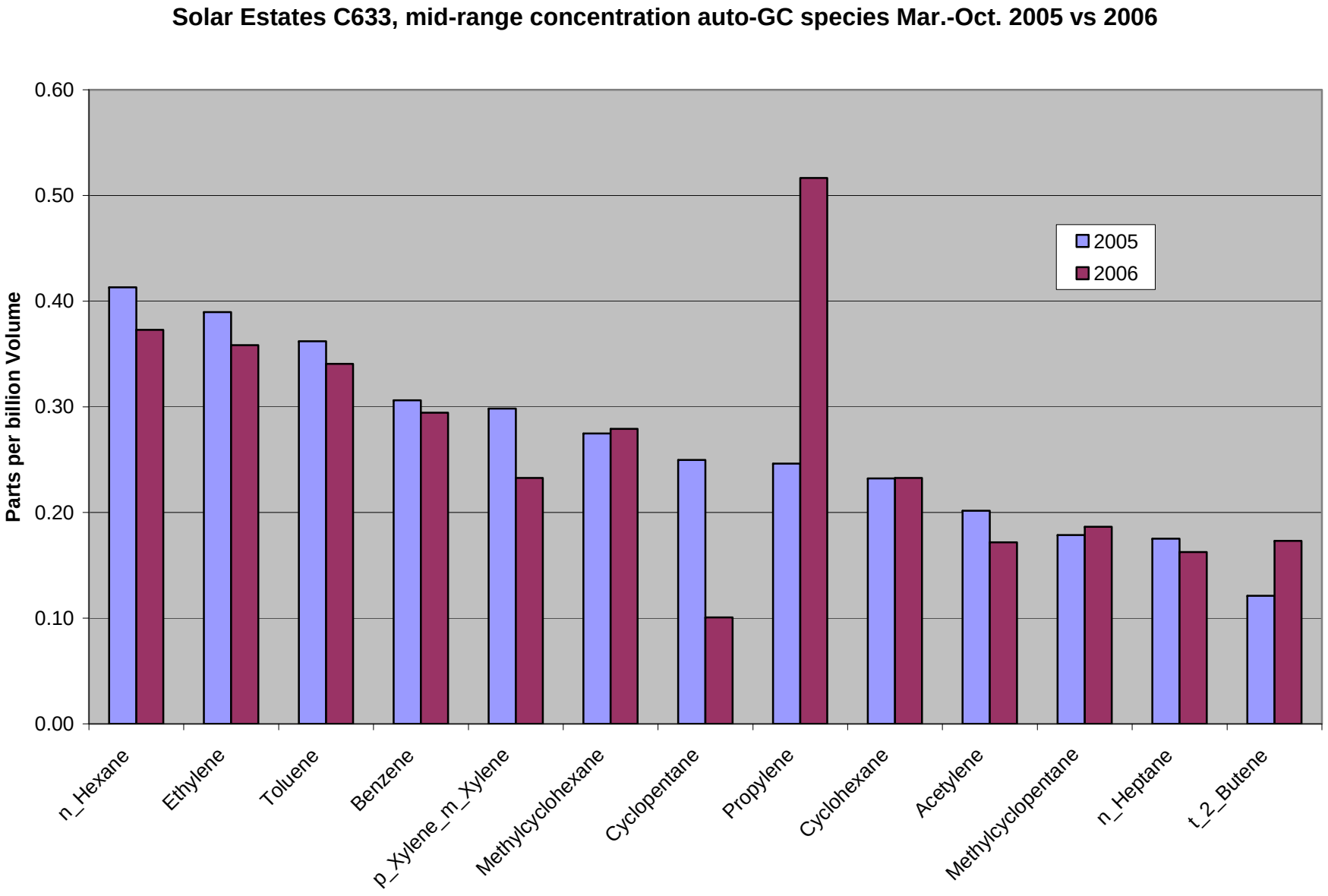
Air Monitoring Network Results

- Average concentrations for most hydrocarbon lower in 2006 vs. 2005. (March – Oct. period)
- Average benzene higher at Oak Park in 2006 vs. 2005. (March – Oct. period)
- All hydrocarbon average below annual ESLs;
  - Some hourly benzene concentrations over the 1-hr ESL.
- No 30-min. averages above the State's regulatory thresholds for SO_2 or H_2S.

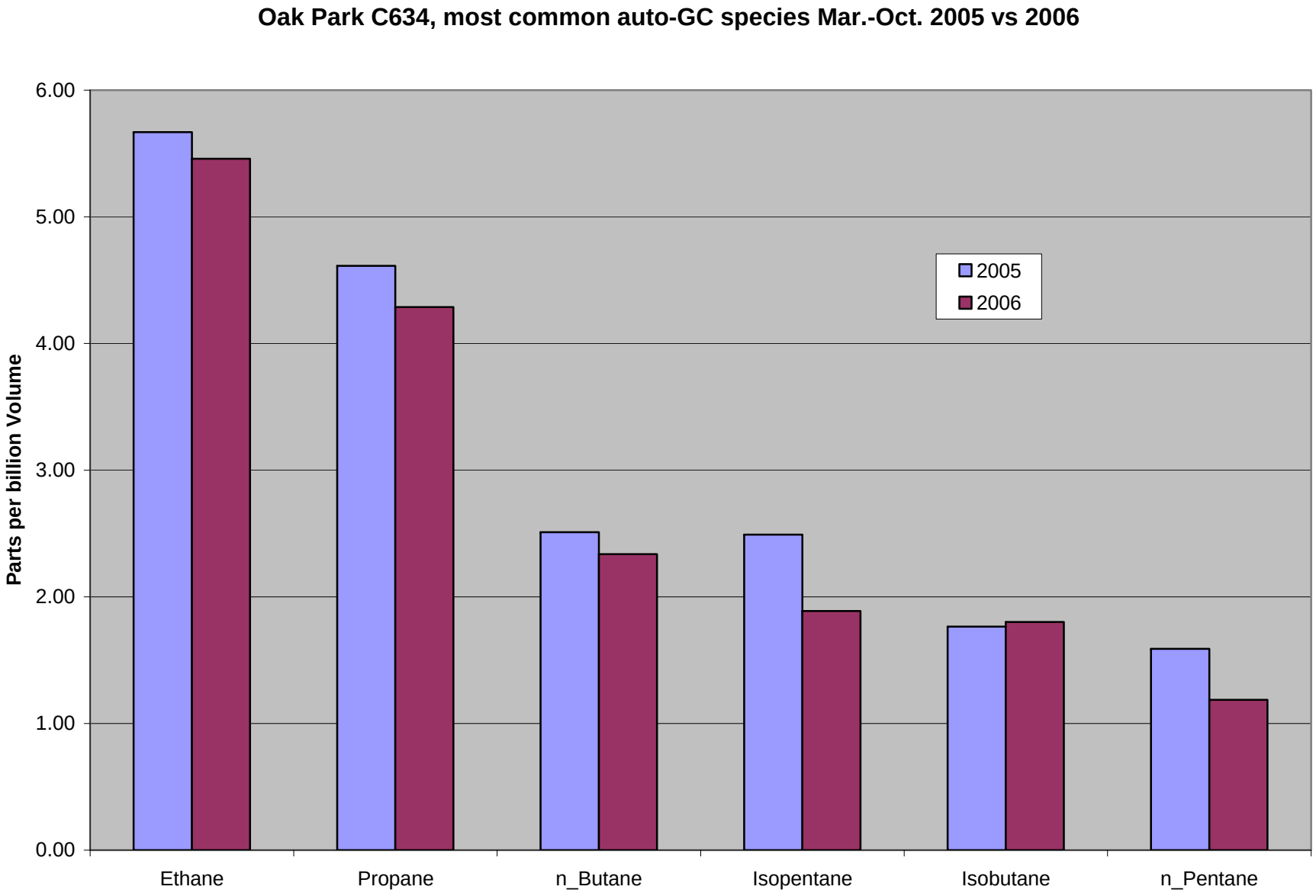
Auto-GC: Changes from year to year



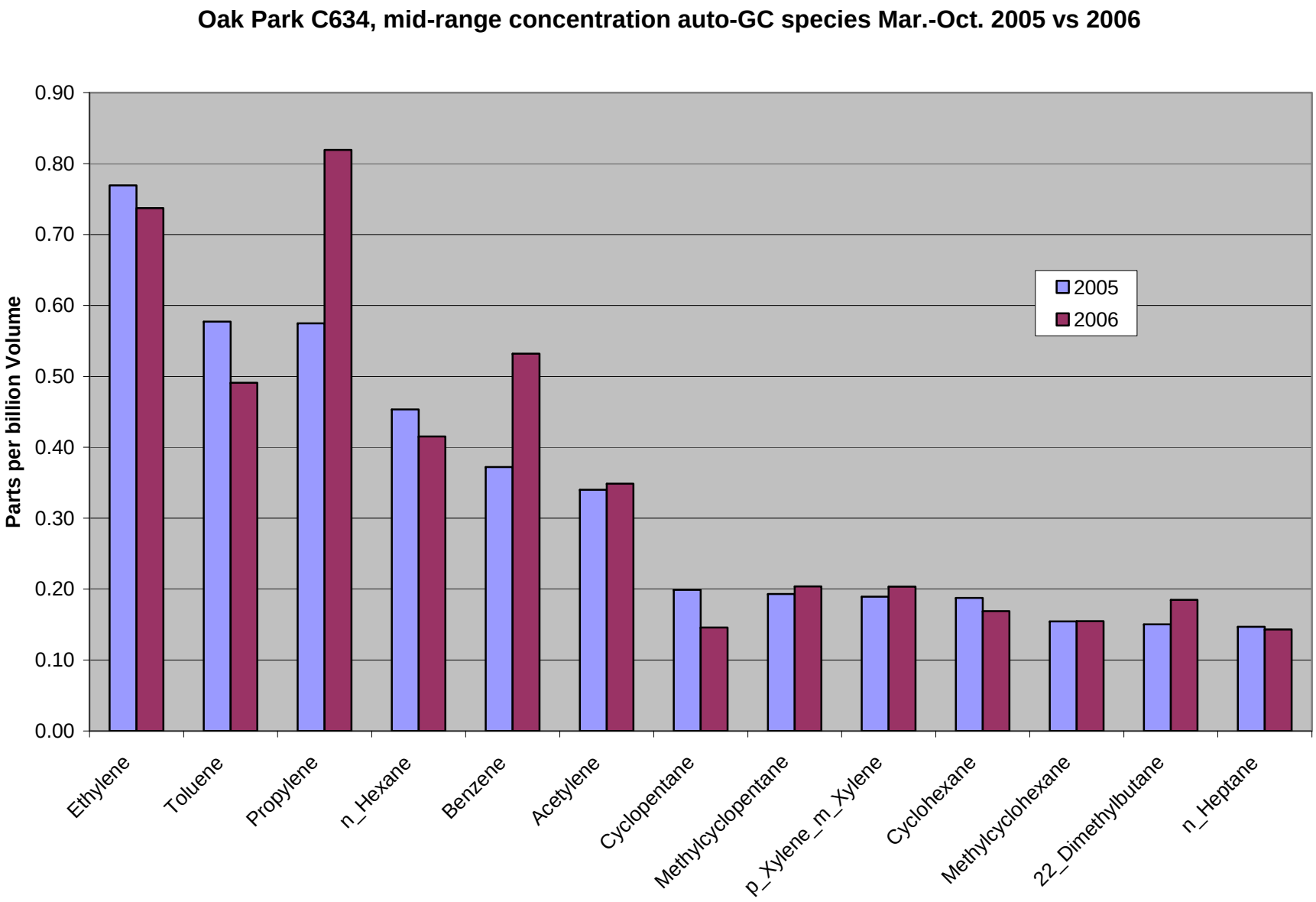
Auto-GC: Changes from year to year



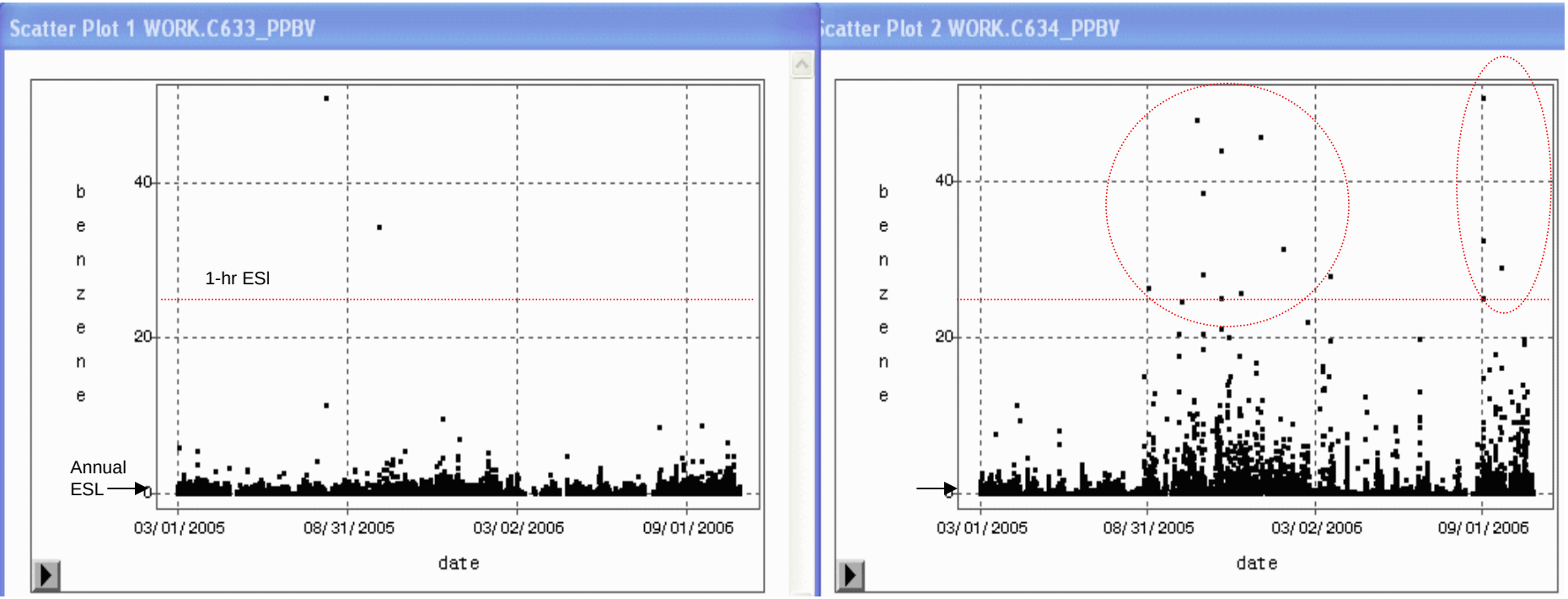
Auto-GC: Changes from year to year



Auto-GC: Changes from year to year

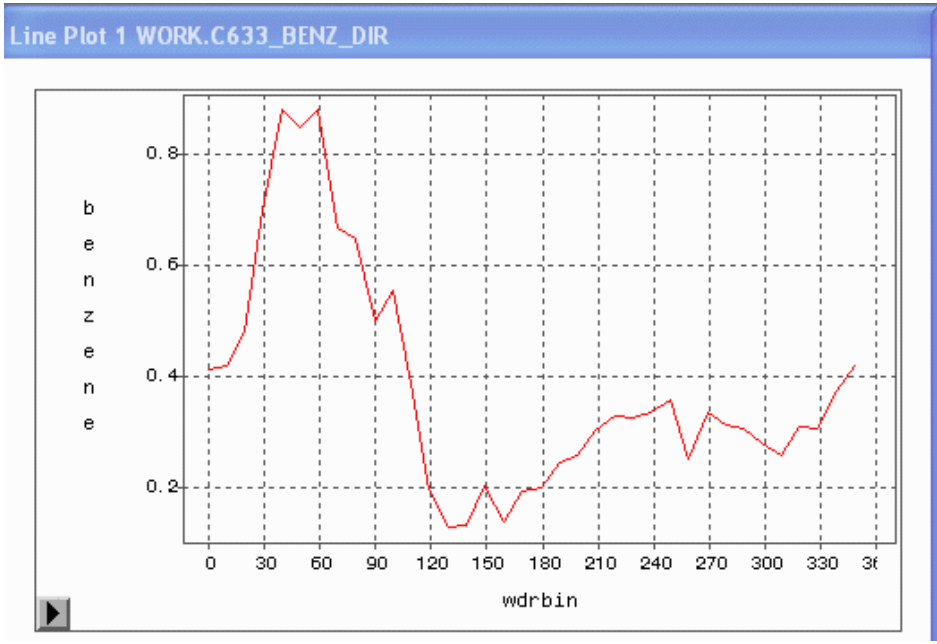


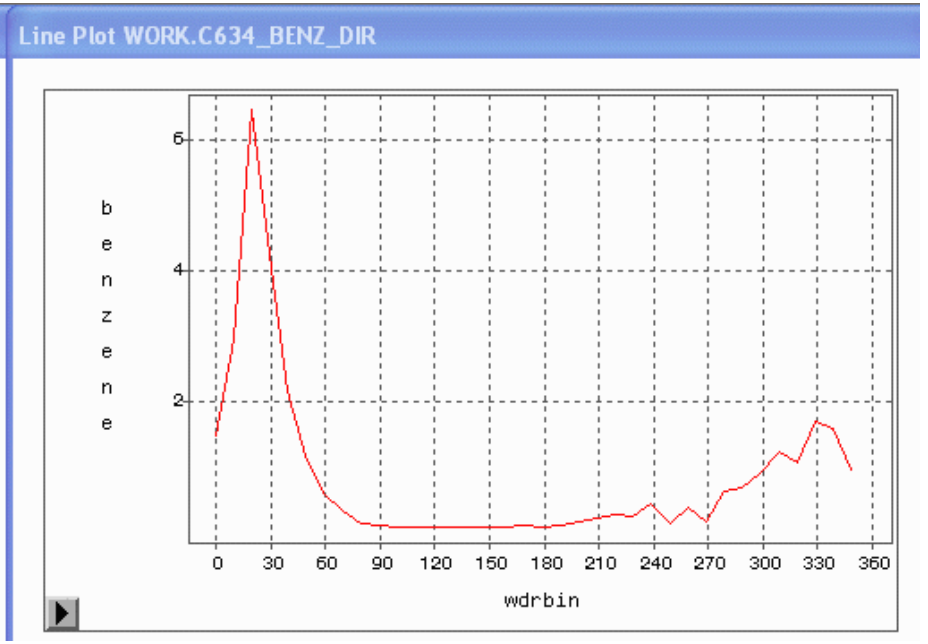
Time series of benzene at Solar Estates (C633) & Oak Park (C634), ppbV units on y-axis



- Slight increase in benzene in 2006 at Oak Park, several values over 1hr ESL of 25 ppbV
- Concentrations at Oak Park higher than Solar Estates.
- Concentrations highest late/early in the year under northerly winds.
- Annual means 0.3 at Solar, 0.7 at Oak Park, TCEQ ESL = 1.0 ppbV

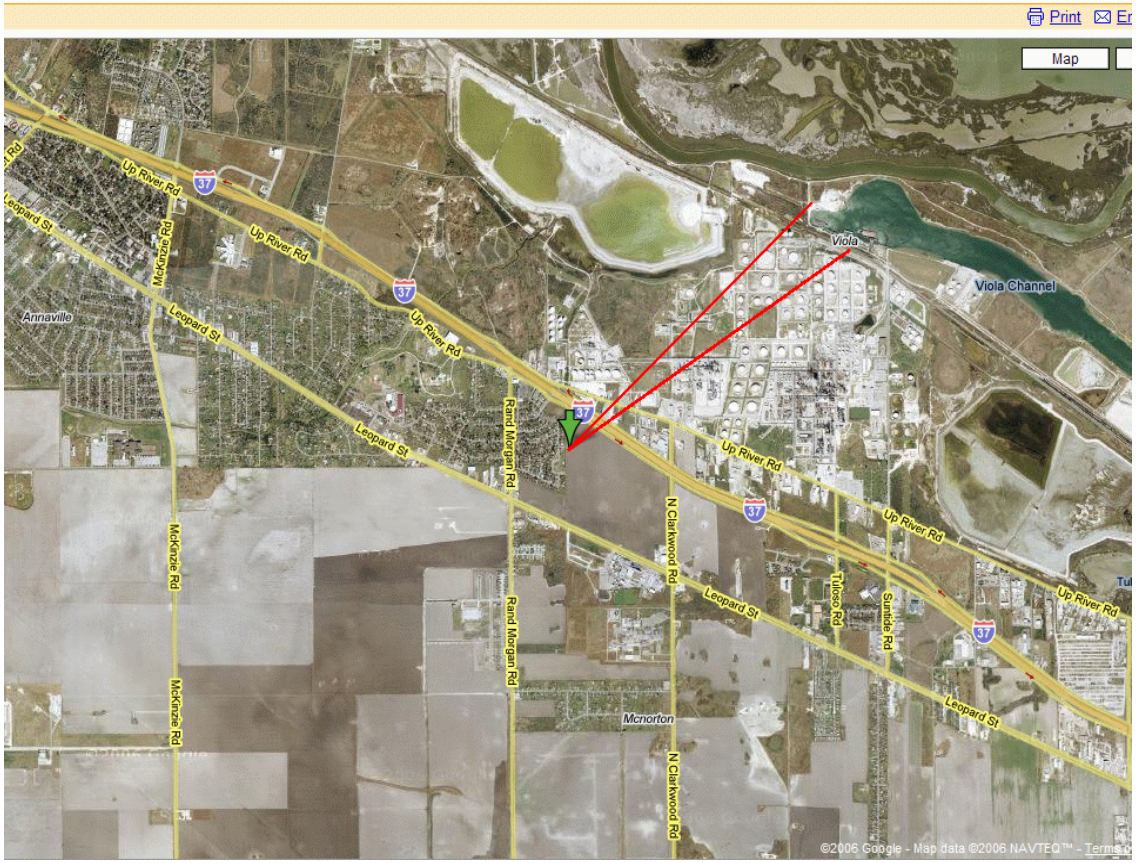
Mean benzene in ppbV units by wind direction at Solar (C633) & Oak Park (C634)





- Merge wind direction and benzene data & compute average concentration by 10 deg. wind bin, Mar. 2005-Oct. 2006.
- Peak at Solar Estates (left) at 50 deg.(0.9 ppbV)
- Two peaks at Oak Park at 20 deg.(6.5 ppbV) & 330 deg. (1.7 ppbV)
- Confirms earlier findings by TCEQ regarding likely sources.

Aerial map at Solar Estates with cone pointing to NE, peak general direction for benzene

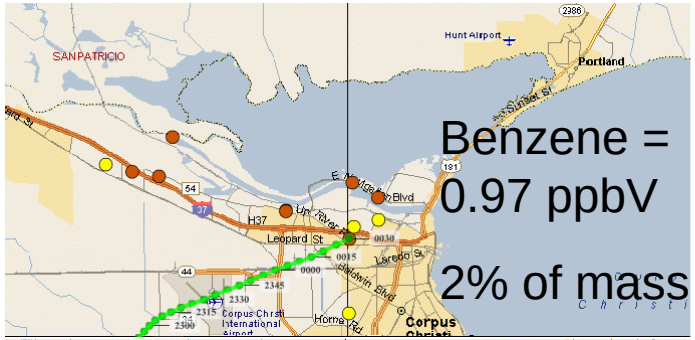


Aerial map at Oak Park with cones pointing to NW & NE, peak general directions for benzene

Case Study

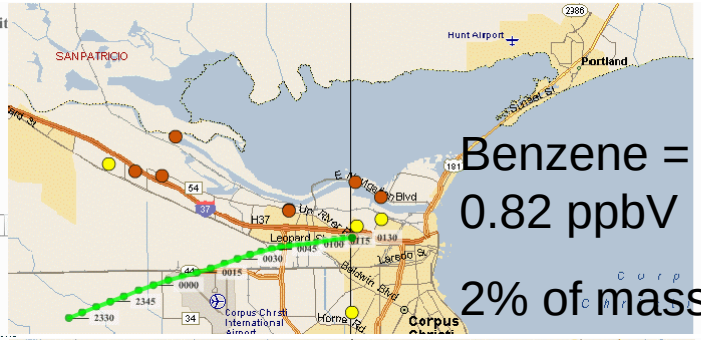
- Benzene on 11/22/2005
  - Two hourly values > 25 ppbV (1-hr ESL)
    - Another close to the ESL
    - Other benzene samples representing statistically significantly large fractions of total hydrocarbons.
  - Changes in concentrations and TNMHC fraction clearly associated with wind direction.
  - UT trajectory tool used to assess upwind source areas.

Back-trajectories from Oak Park hours 00-06 CST on 11/22/05



Benzene = 0.97 ppbV

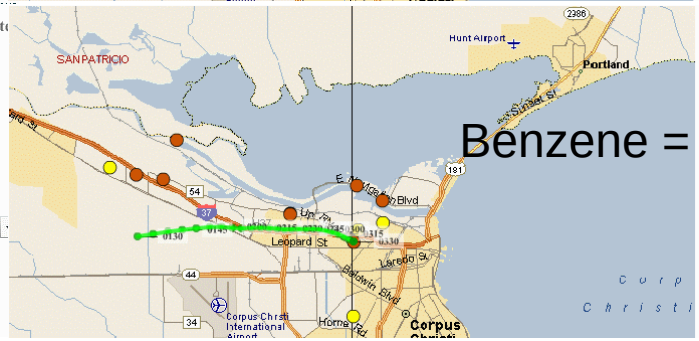
2% of mass



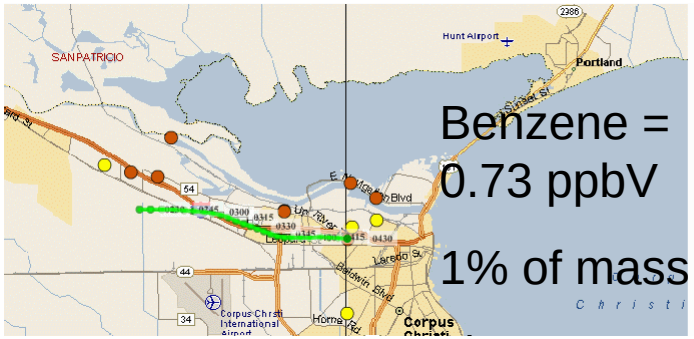
Benzene = 0.82 ppbV

2% of mass

Benzene = N/A

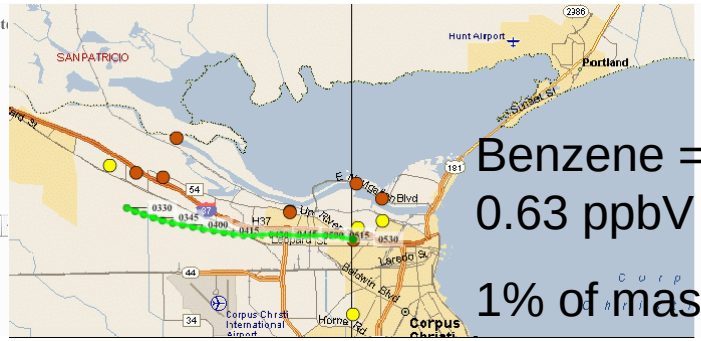


Benzene = N/A



Benzene = 0.73 ppbV

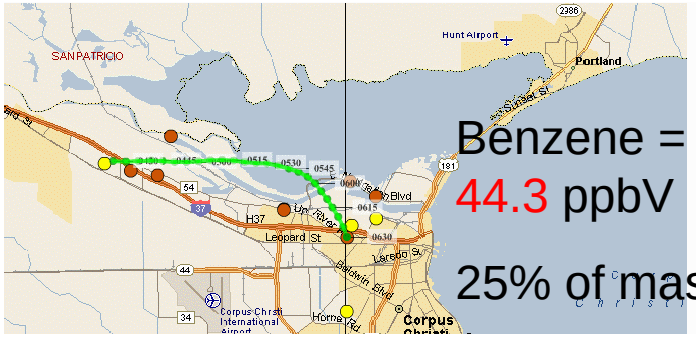
1% of mass



Benzene = 0.63 ppbV

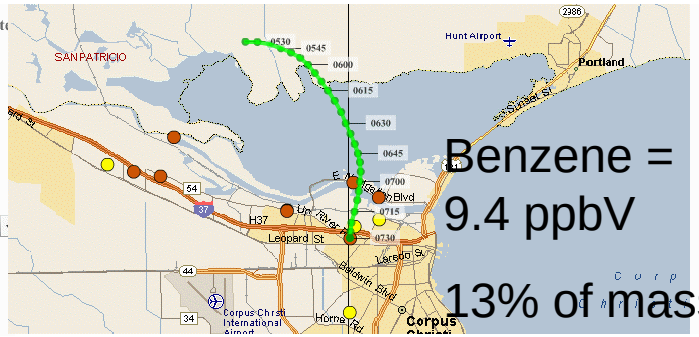
1% of mass

Back-trajectories from Oak Park hours 07-12 CST on 11/22/05



Benzene = 44.3 ppbV

25% of mass

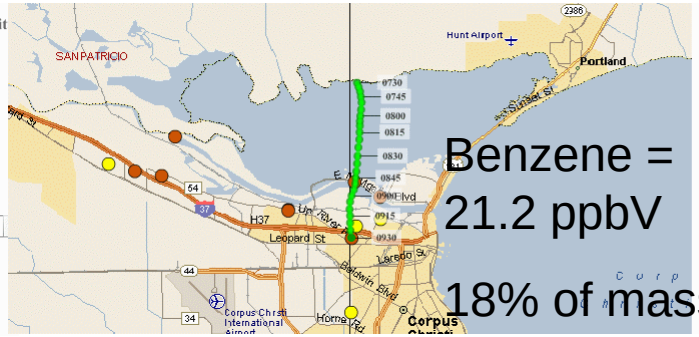


Benzene = 9.4 ppbV

13% of mass

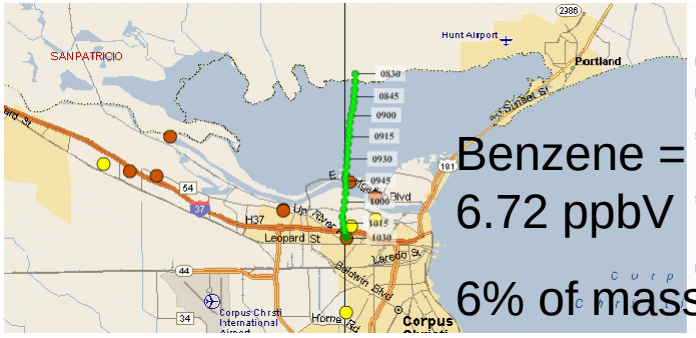
Benzene = 25.2 ppbV

22% of mass



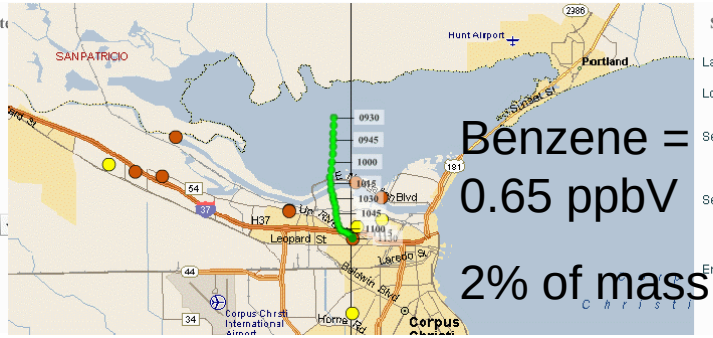
Benzene = 21.2 ppbV

18% of mass



Benzene = 6.72 ppbV

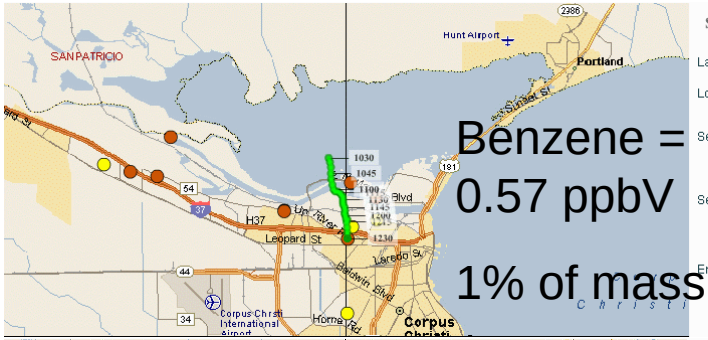
6% of mass



Benzene = 0.65 ppbV

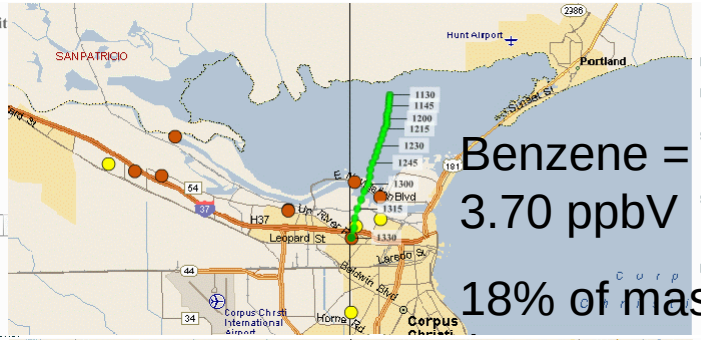
2% of mass

Back-trajectories from Oak Park hours 13-17 CST on 11/22/05



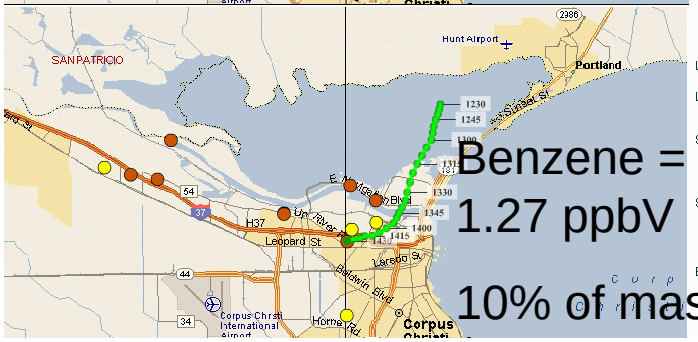
Benzene = 0.57 ppbV

1% of mass



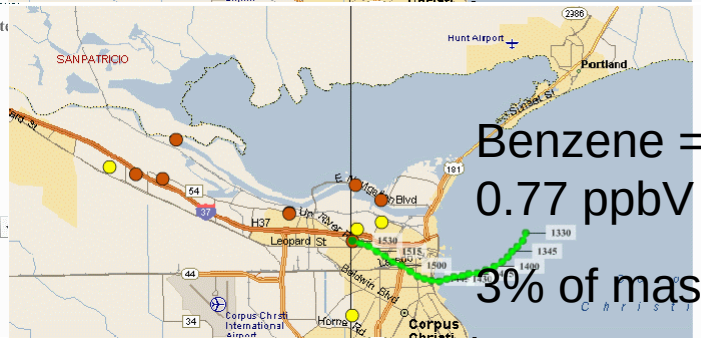
Benzene = 3.70 ppbV

18% of mass



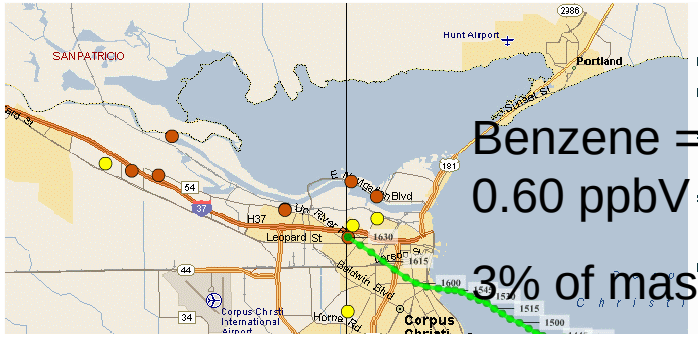
Benzene = 1.27 ppbV

10% of mass



Benzene = 0.77 ppbV

3% of mass



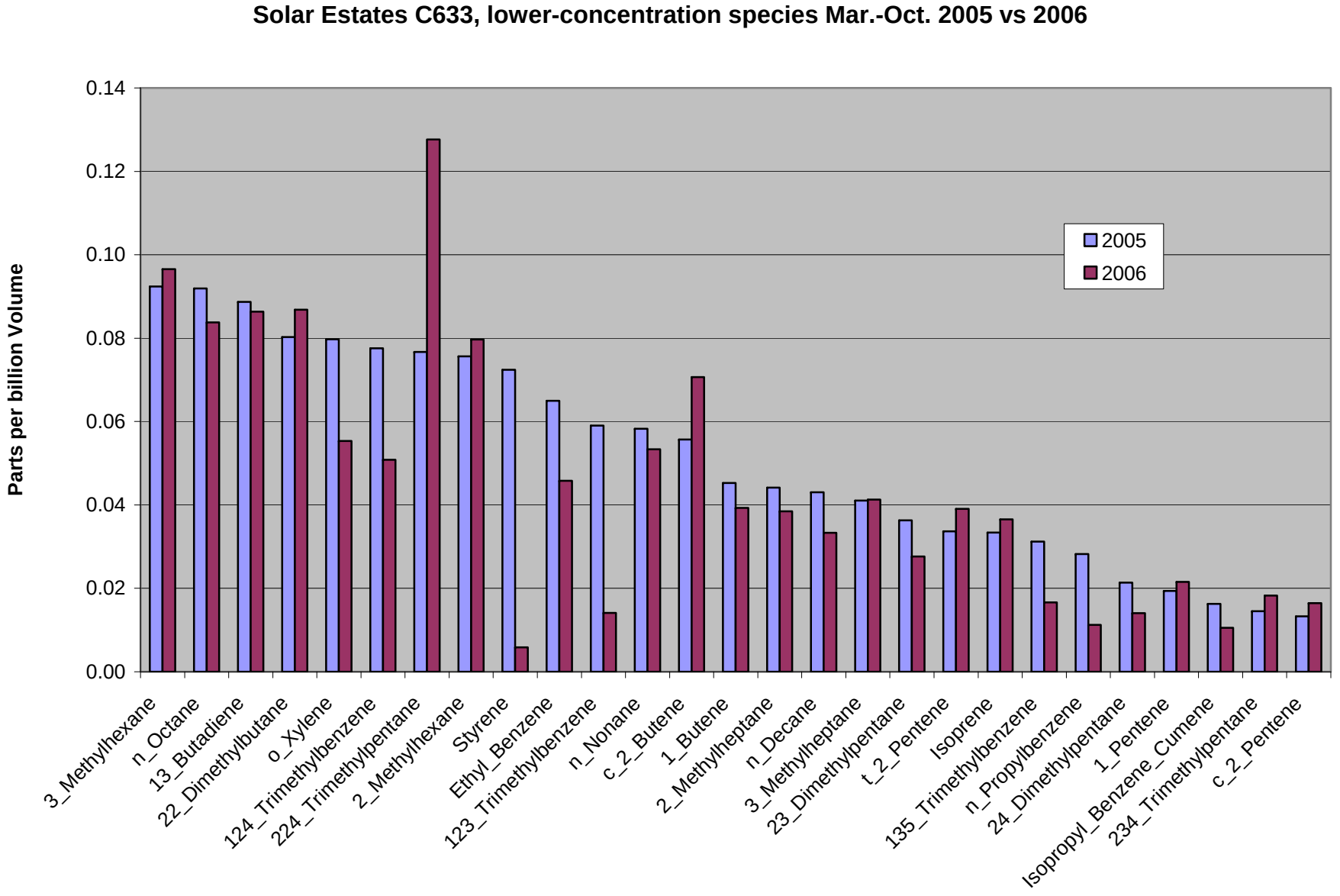
Benzene = 0.60 ppbV

3% of mass

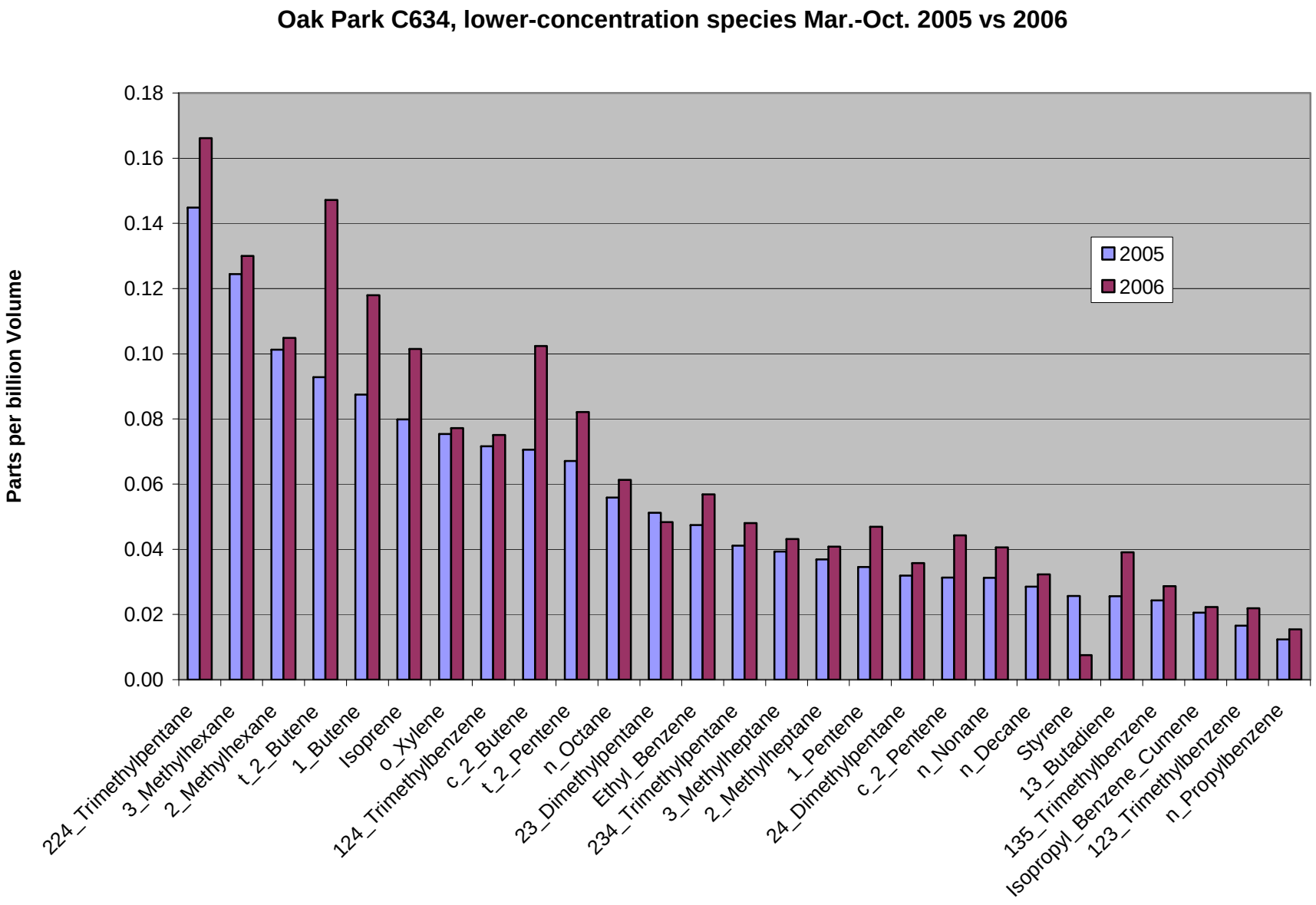
Conclusions

- Average auto-GC concentrations for most hydrocarbons lower in 2006 vs. 2005. (March – Oct. period)
- All hydrocarbon averages < annual ESLs, rolling 4 quarter period.
- Special attention paid to benzene, a carcinogen.
  - Average benzene higher at Oak Park in 2006 vs. 2005. (March – Oct. period)
  - Some hourly benzene concentrations > 1-hr ESL.
  - Concentrations highest overnight -- early a.m.; caused by inversions and rush-hours.
  - Key wind directions are associated with highest concentrations.
  - UT trajectory tool can assist in assessments – one example presented.
- No 30-min. averages above the State's regulatory thresholds for SO_2 or H_2S.
- Coordination continues between UT, TCEQ Central, and TCEQ Region in use of these data.

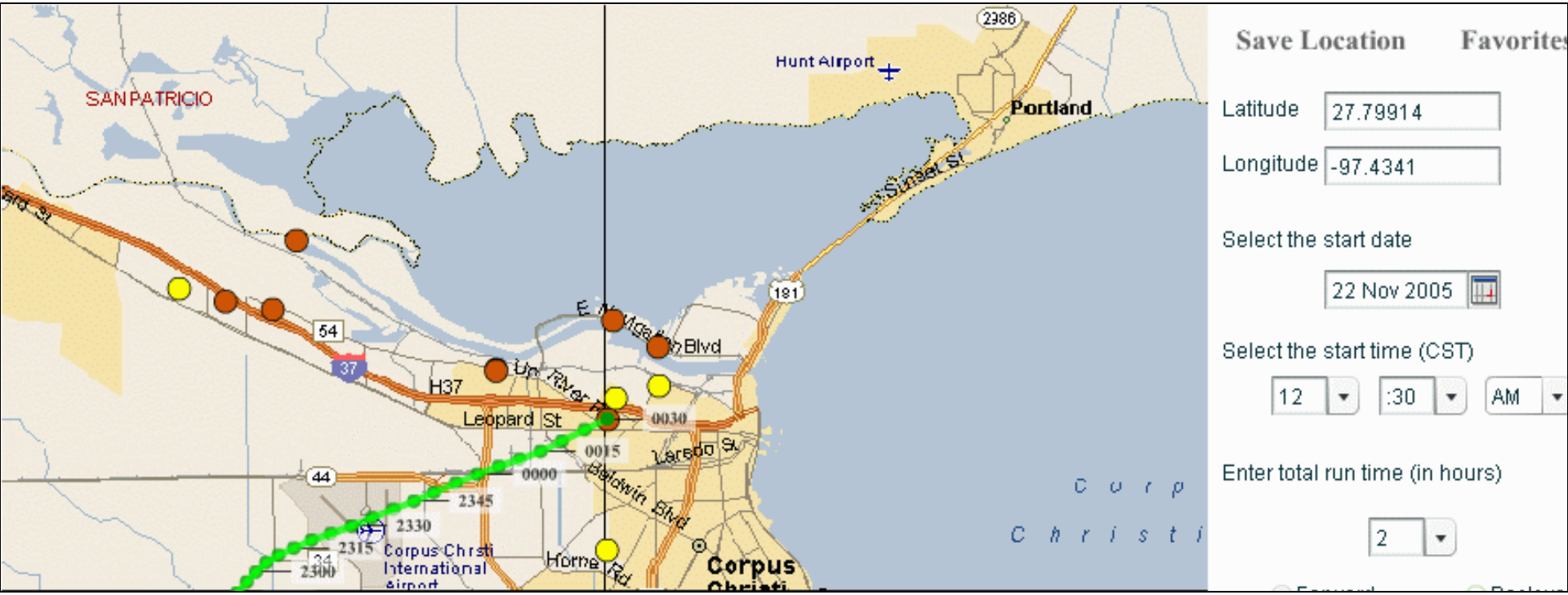
Auto-GC: Changes from year to year



Auto-GC: Changes from year to year

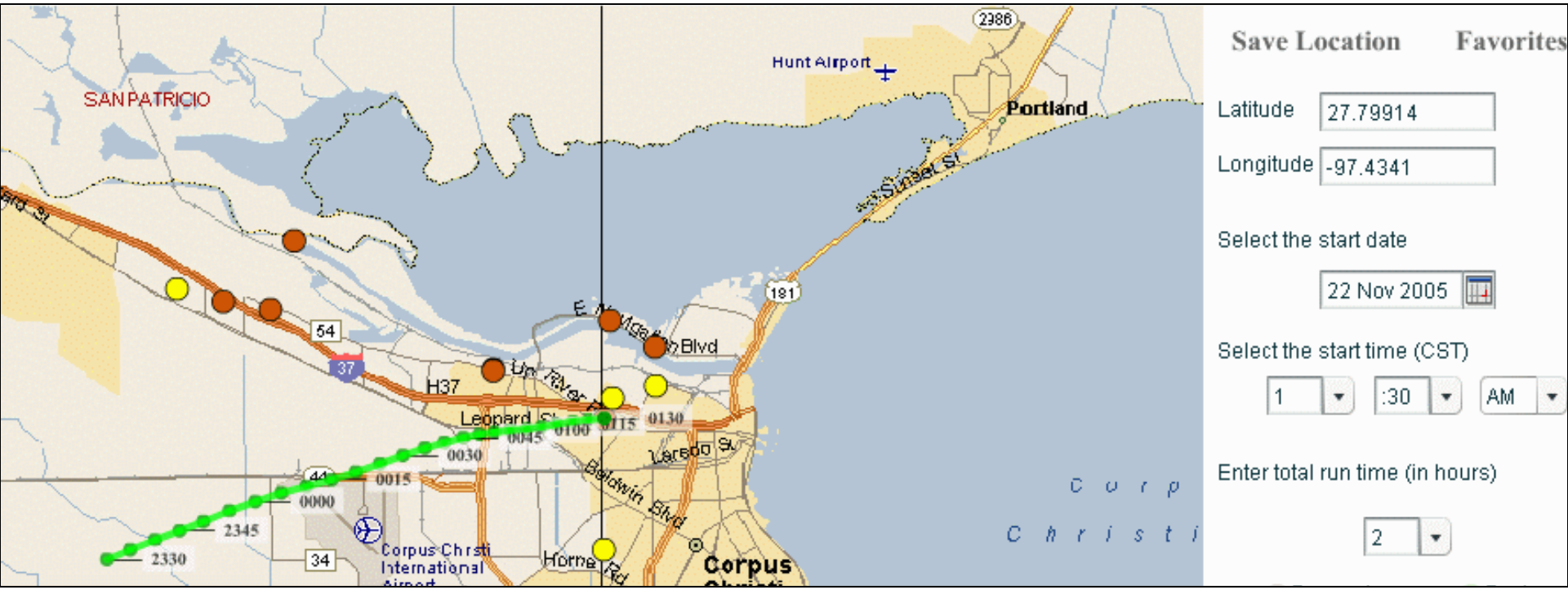


Back-trajectories 11/22/05
Benzene > 1 hr ESL two hours



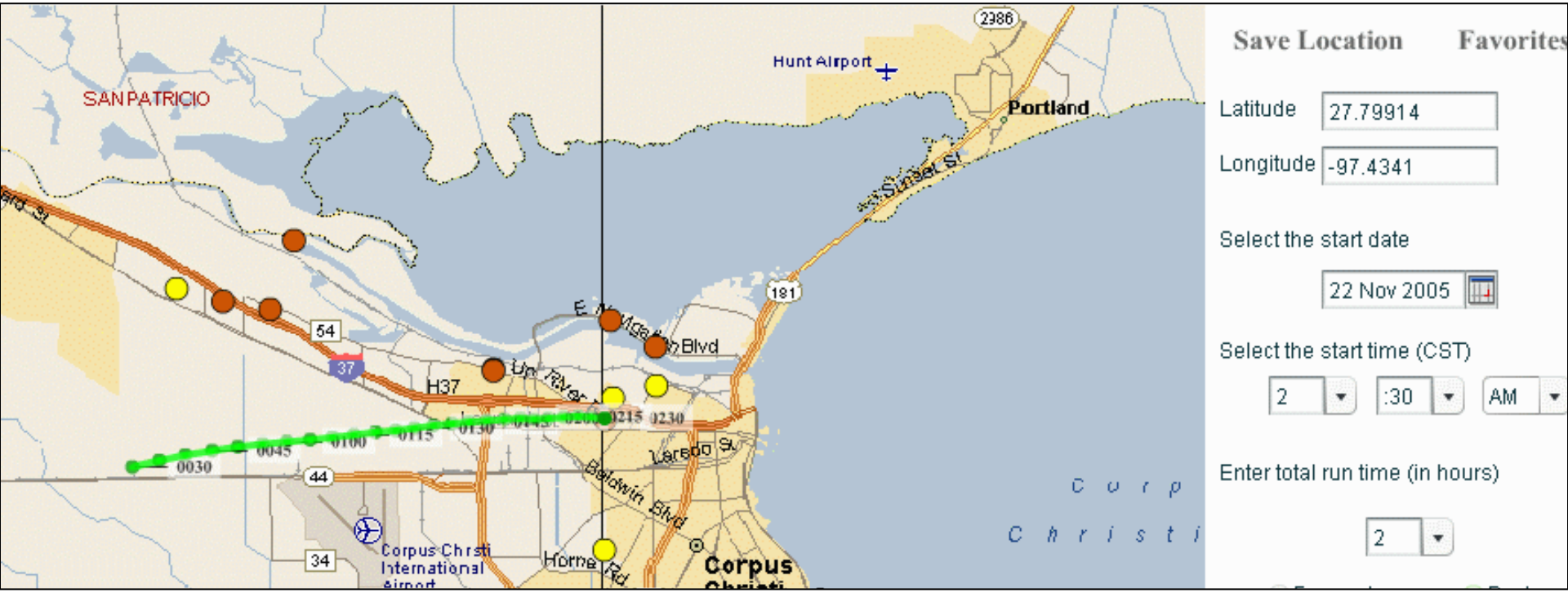
Benzene =
0.97 ppbV

2% of mass

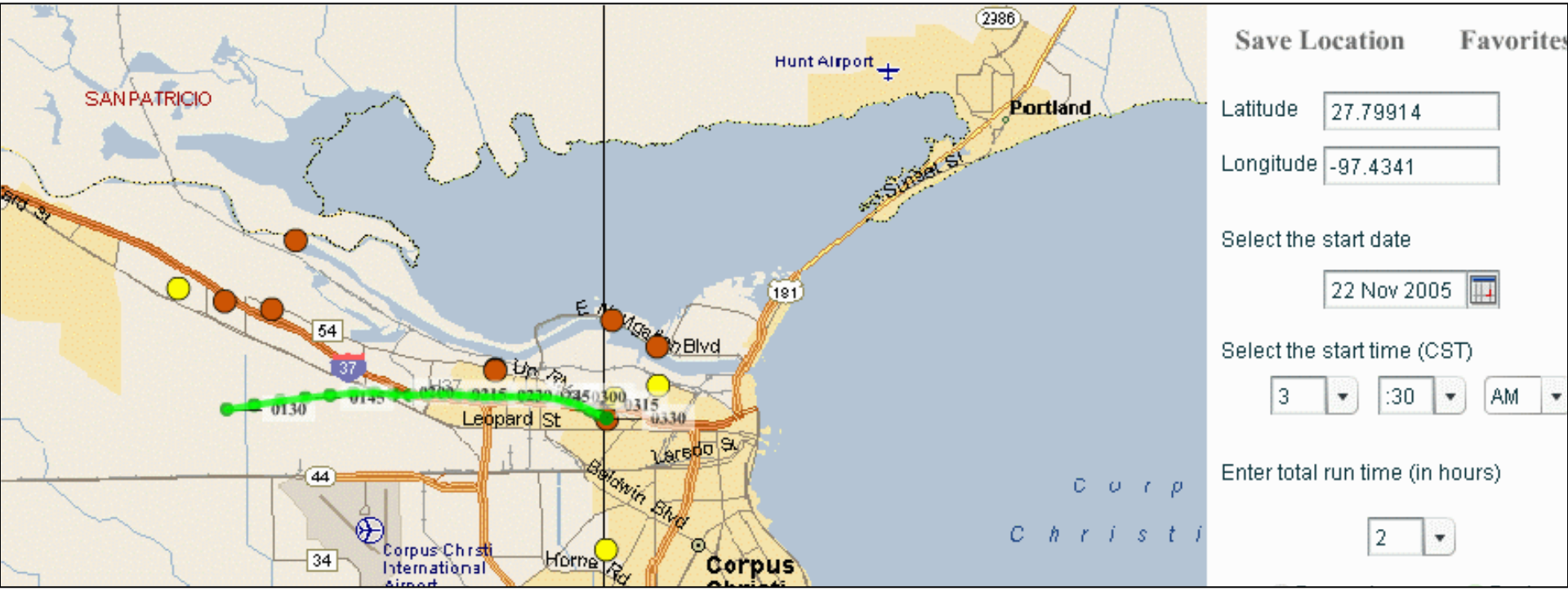


Benzene =
0.82 ppbV

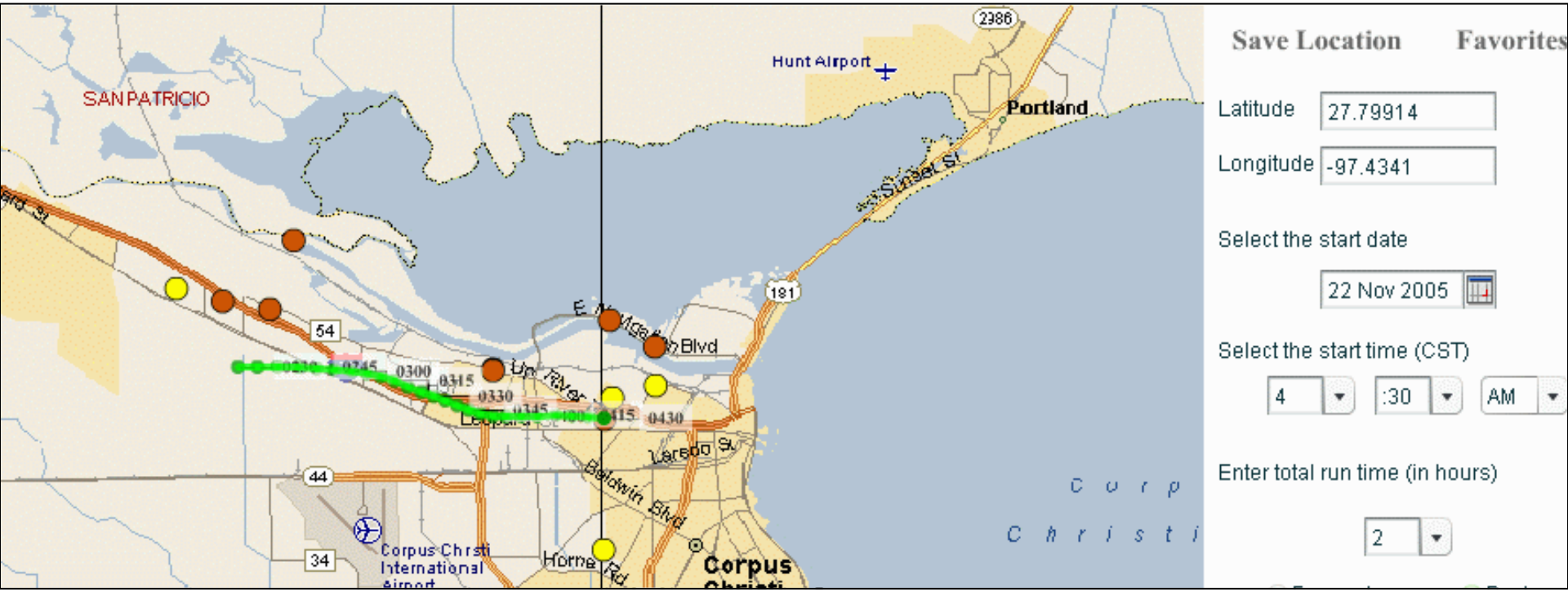
2% of mass


SAN PATRICIO
Hunt Airport
Portland
2986
Save Location
Favorites
Latitude
27.79914
Longitude
-97.4341
Select the start date
22 Nov 2005
Select the start time (CST)
2
:30
AM
Enter total run time (in hours)
2
54
37
181
44
34
H37
Laredo St
Baldwin Blvd
Horne Rd
Corpus Christi International Airport
Corpus Christi
0030
0045
0100
0115
0130
0215
0230

Benzene = N/A

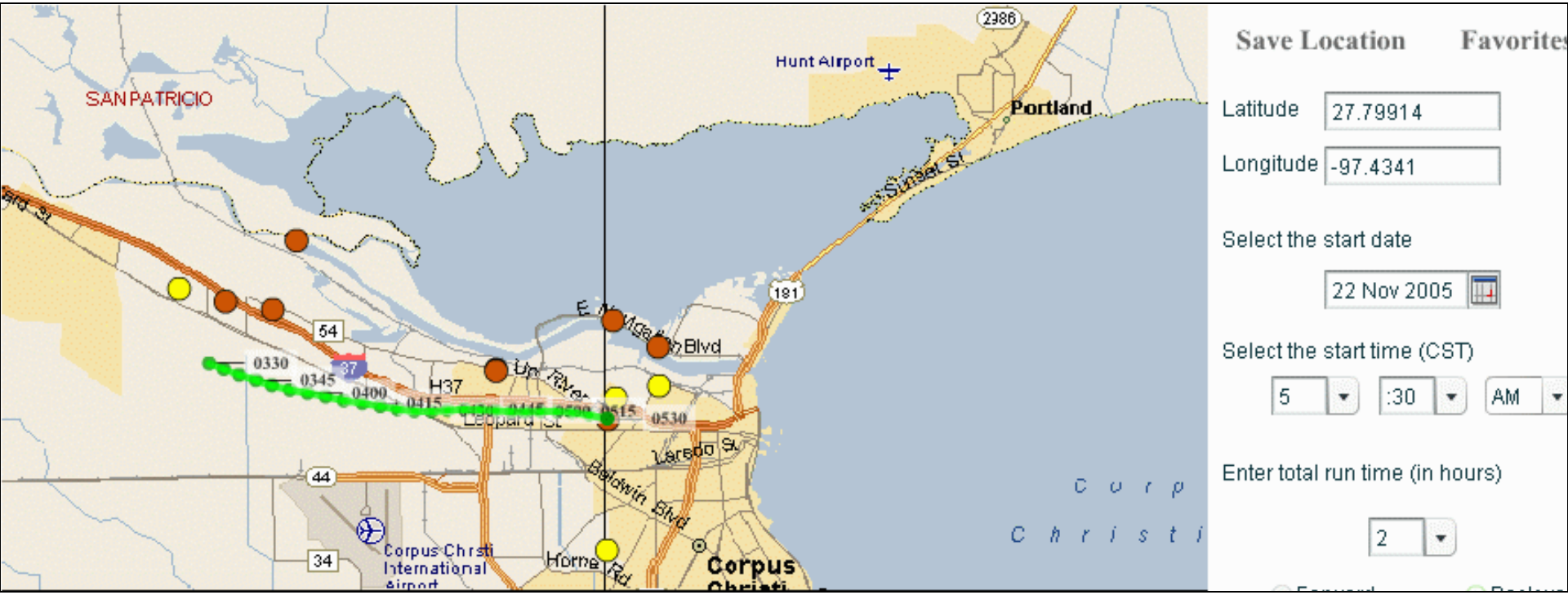

SAN PATRICIO
Hunt Airport
Portland
2986
Save Location
Favorites
Latitude
27.79914
Longitude
-97.4341
Select the start date
22 Nov 2005
Select the start time (CST)
3
:30
AM
Enter total run time (in hours)
2
54
37
44
34
181
Leopard St
Lerdo St
Baldwin Blvd
Horne Rd
Corpus Christi International
Corpus Christi
0130
0315
0330

Benzene = N/A



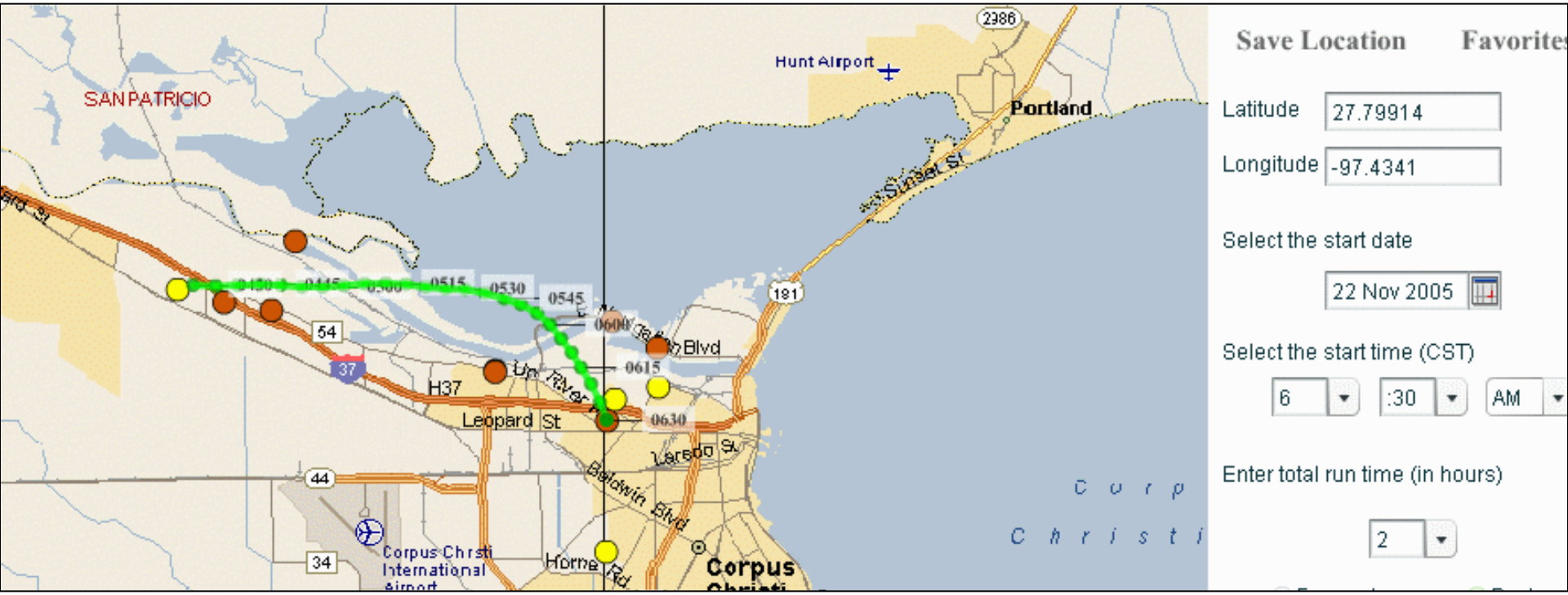
Benzene =
0.73 ppbV

1% of mass



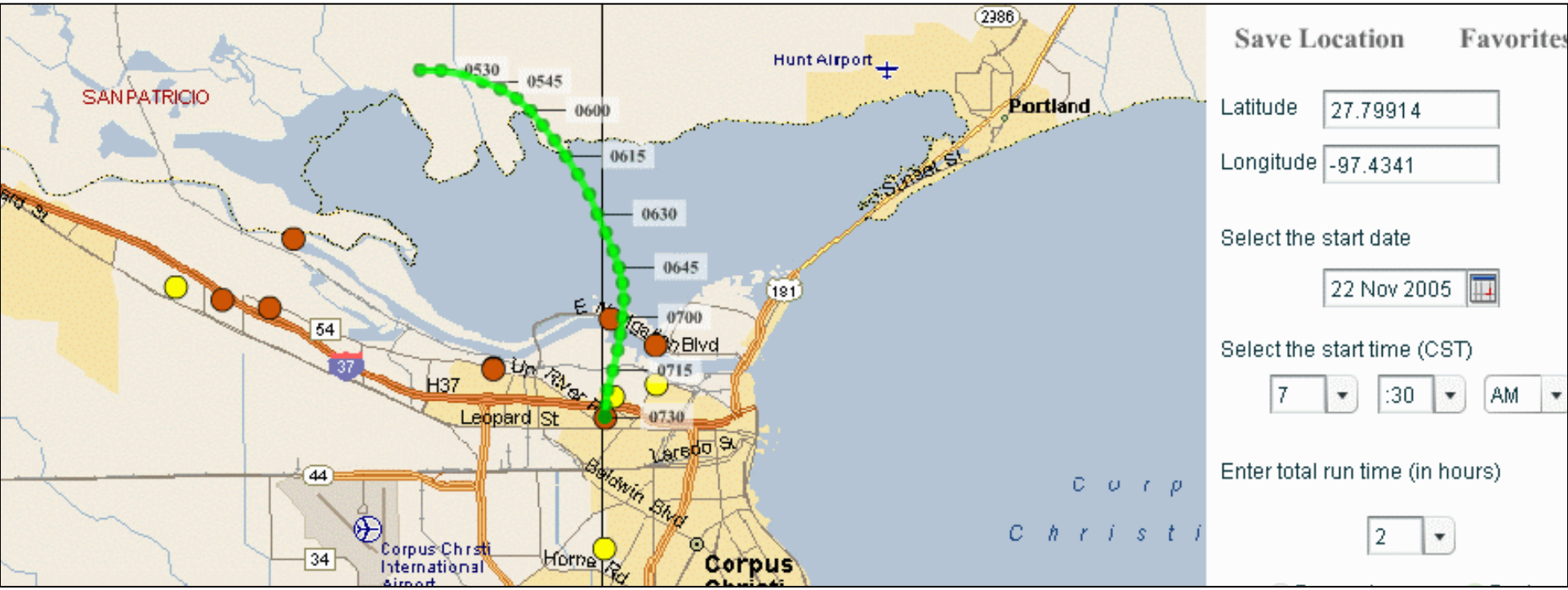
Benzene =
0.63 ppbV

1% of mass



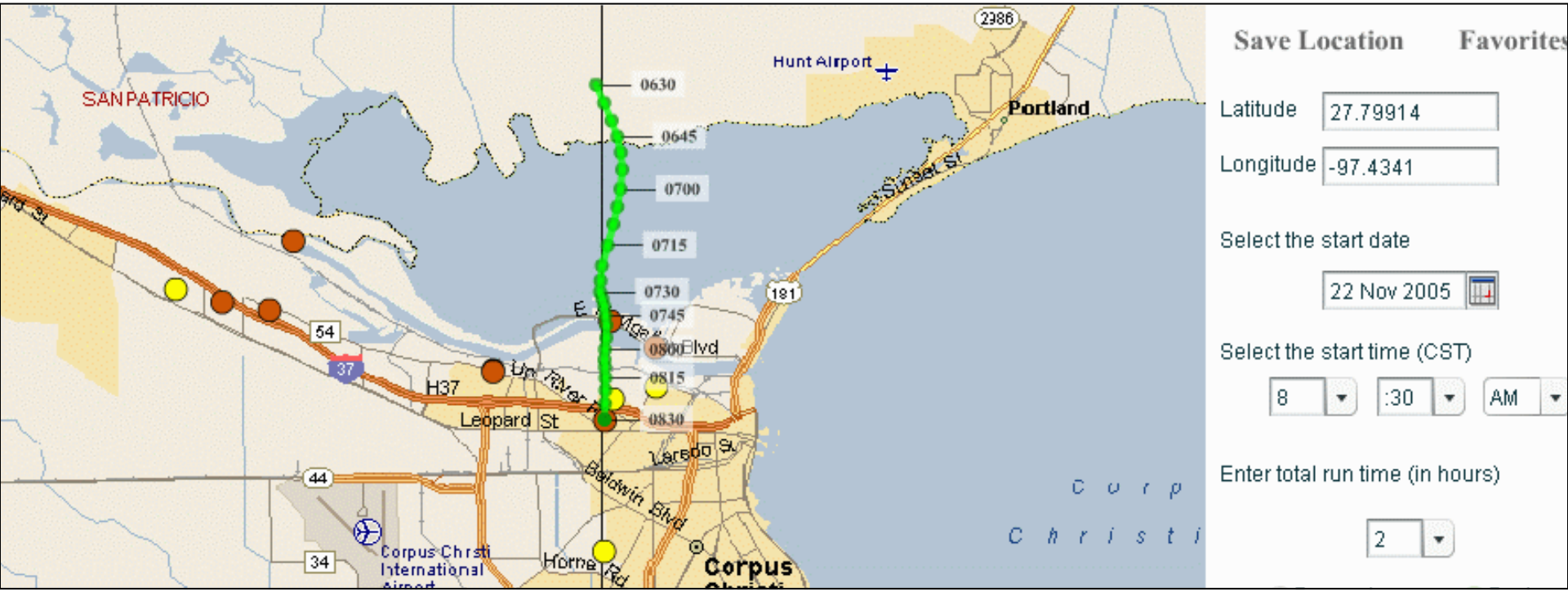
Benzene =
44.3 ppbV

25% of mass



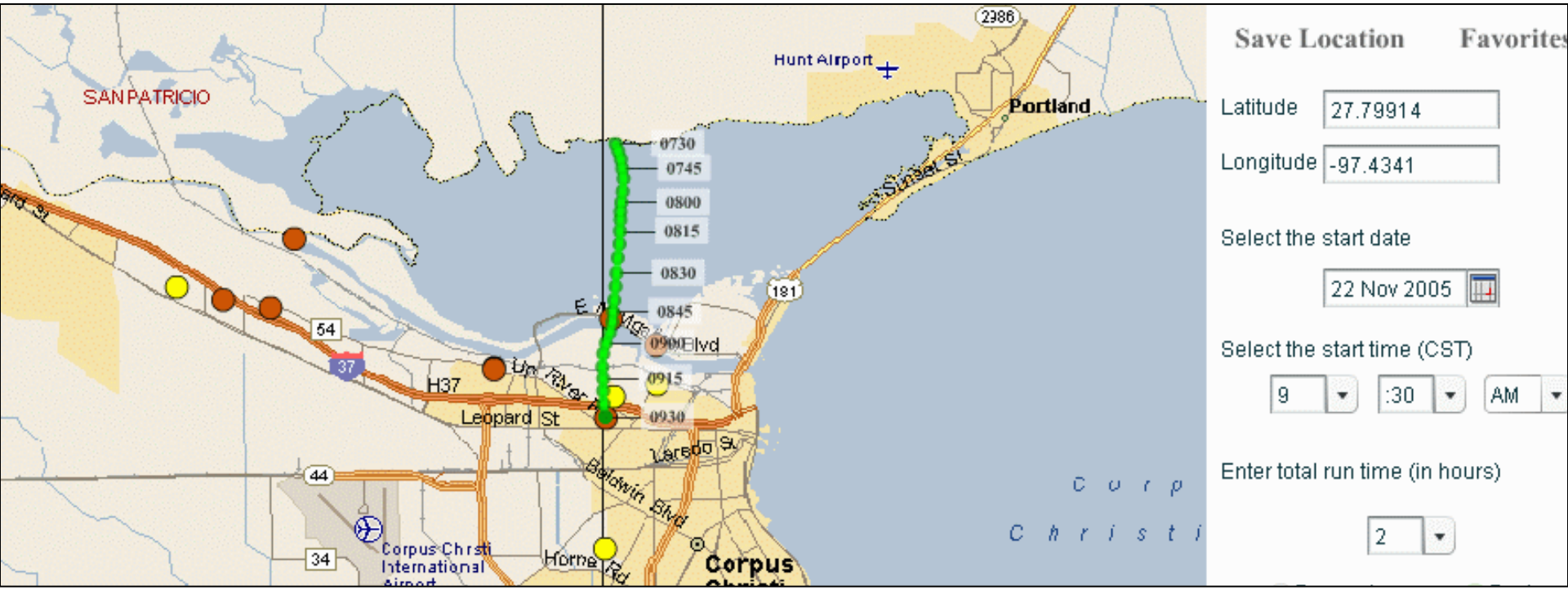
Benzene =
9.4 ppbV

13% of mass



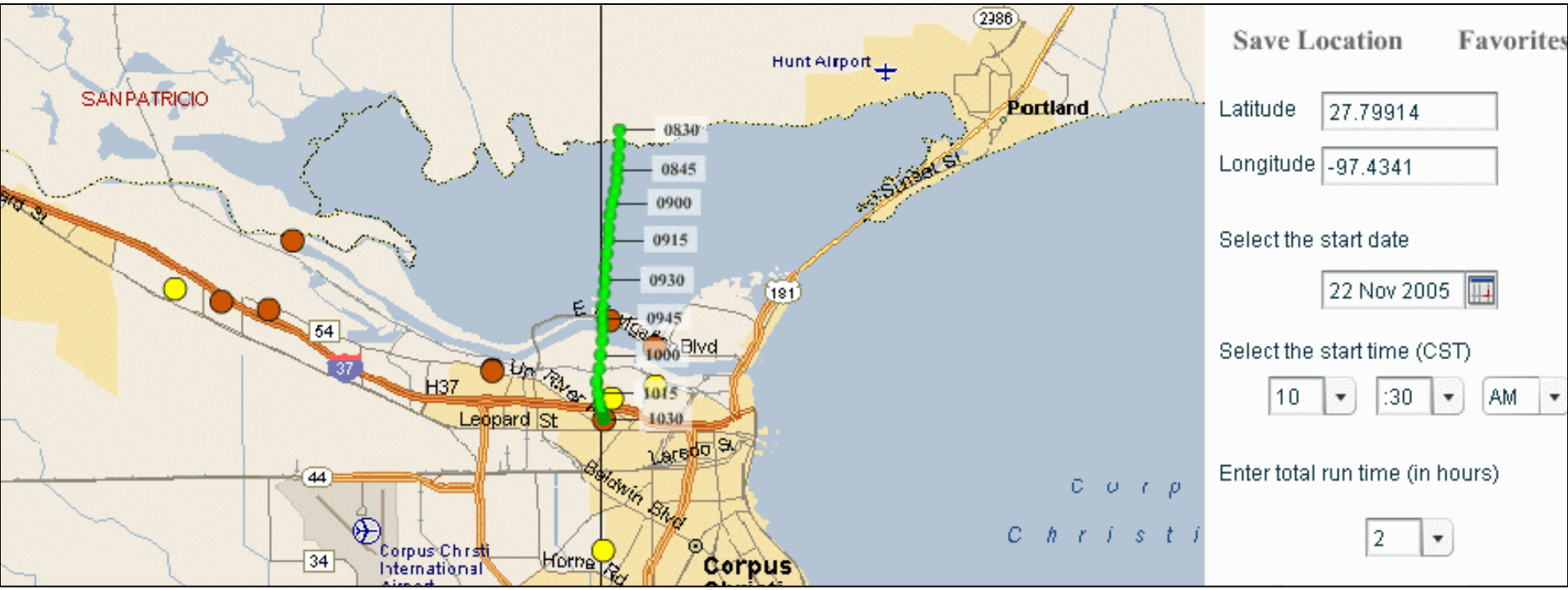
Benzene =
25.2 ppbV

22% of mass



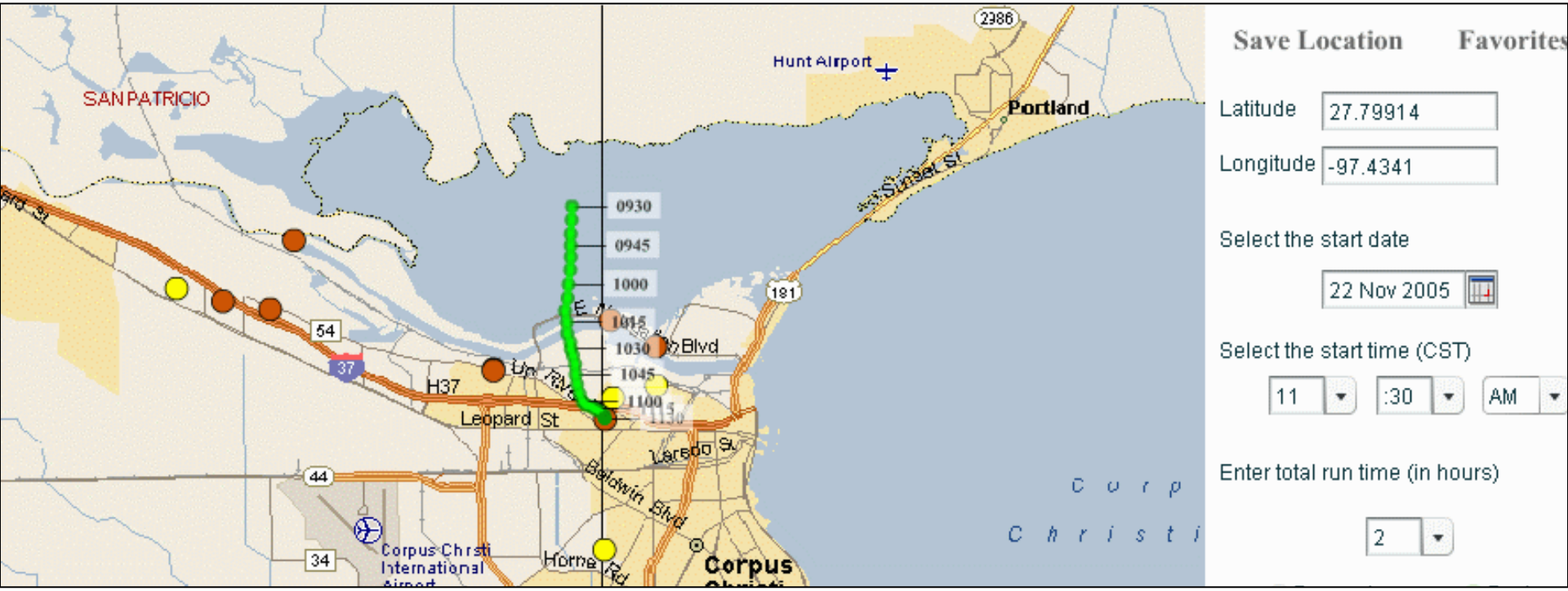
Benzene =
21.2 ppbV

18% of mass



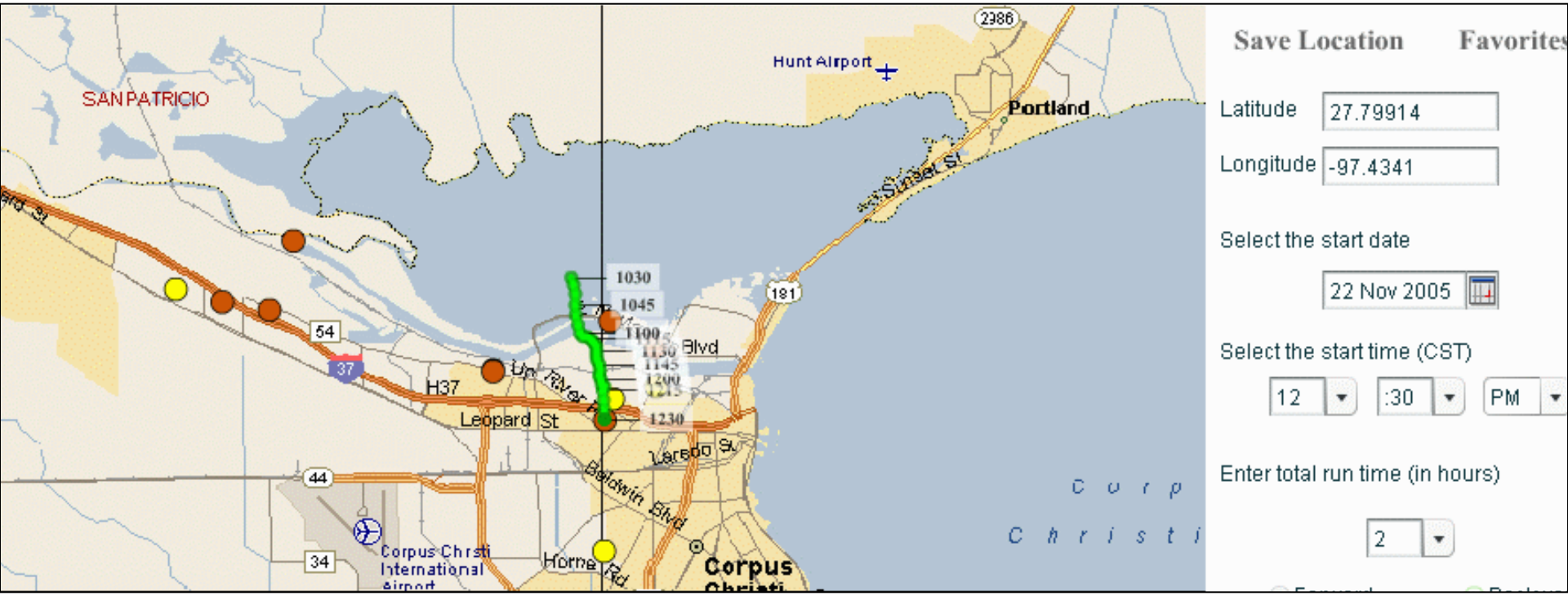
Benzene =
6.72 ppbV

6% of mass



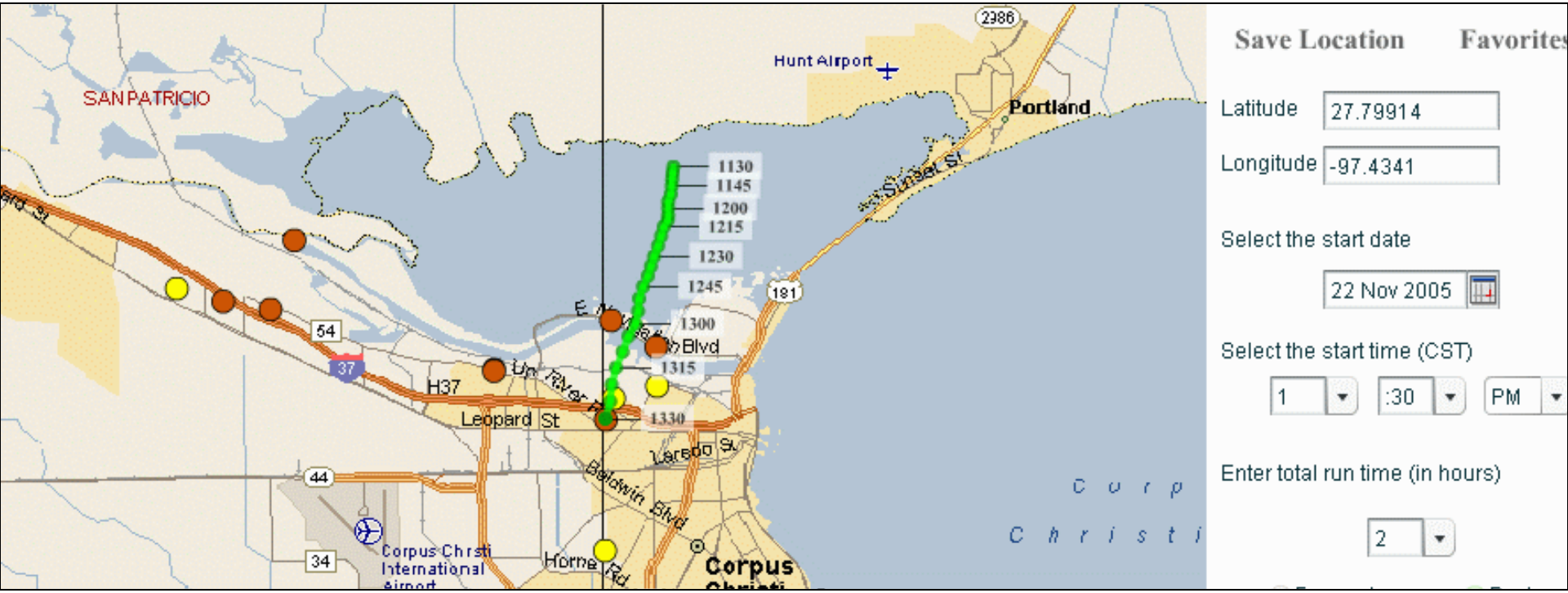
Benzene =
0.65 ppbV

2% of mass



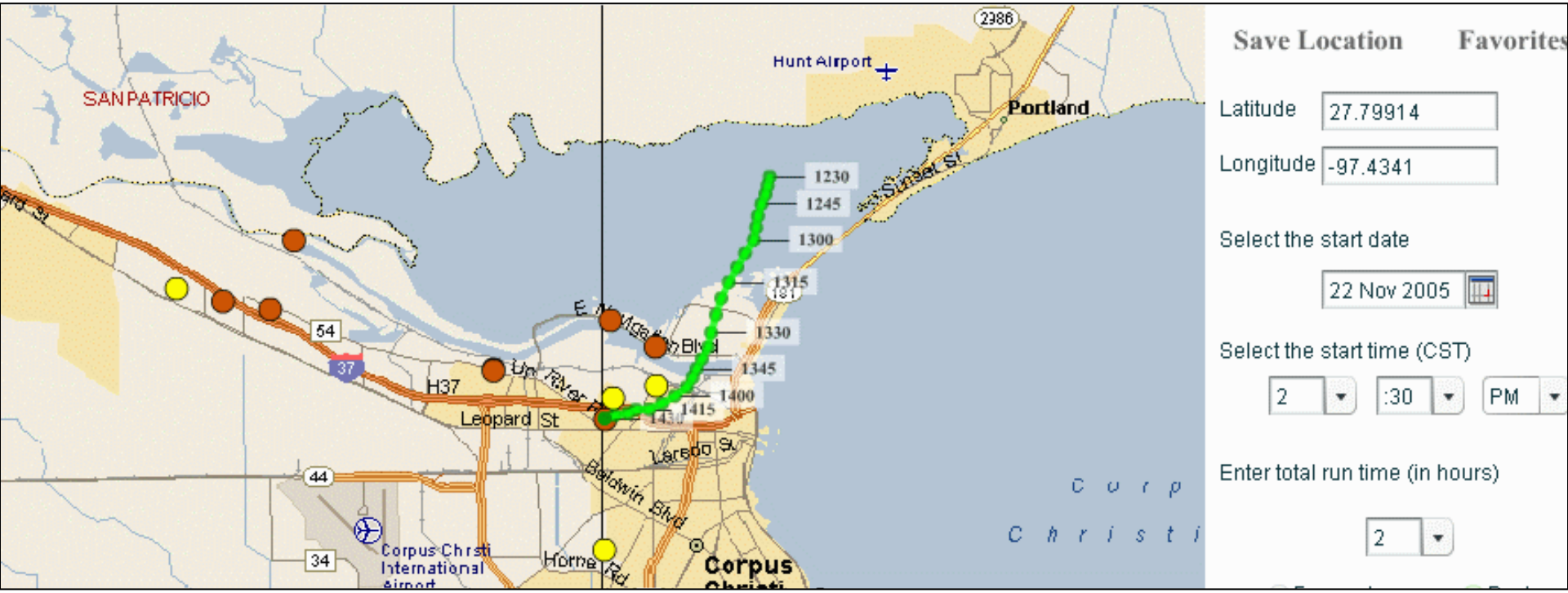
Benzene =
0.57 ppbV

1% of mass



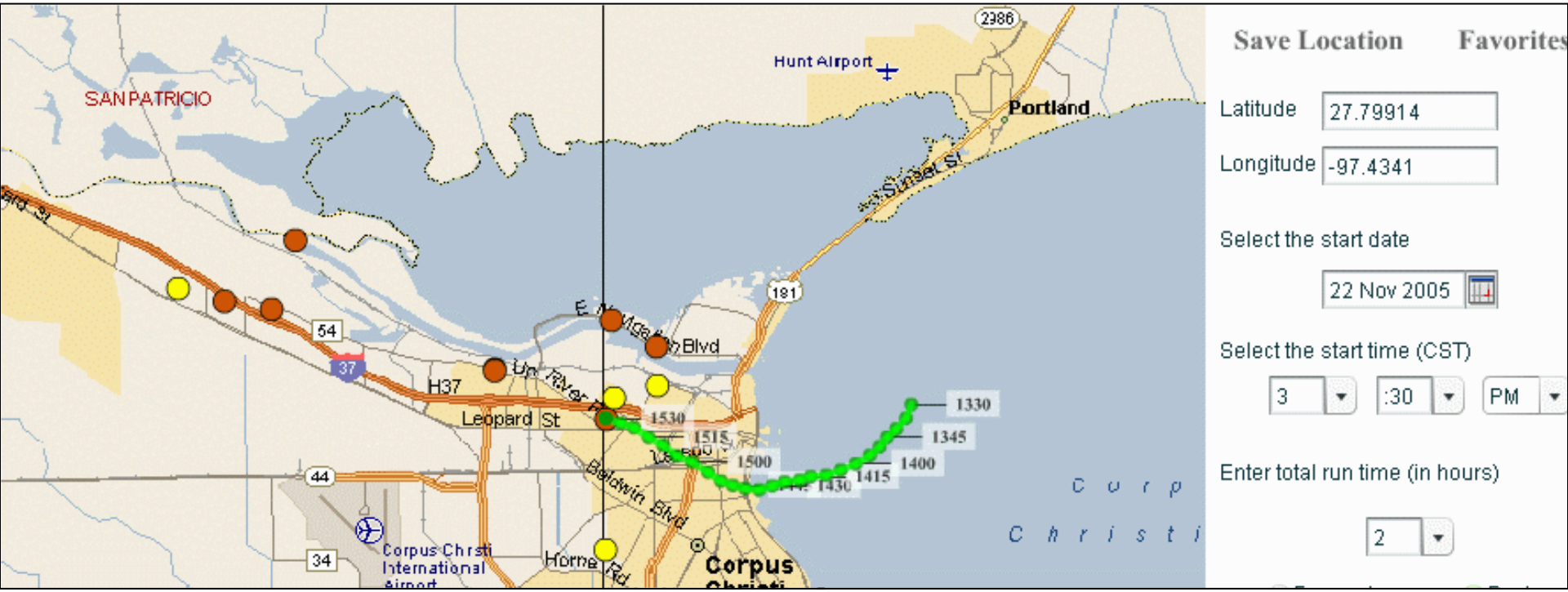
Benzene =
3.70 ppbV

18% of mass



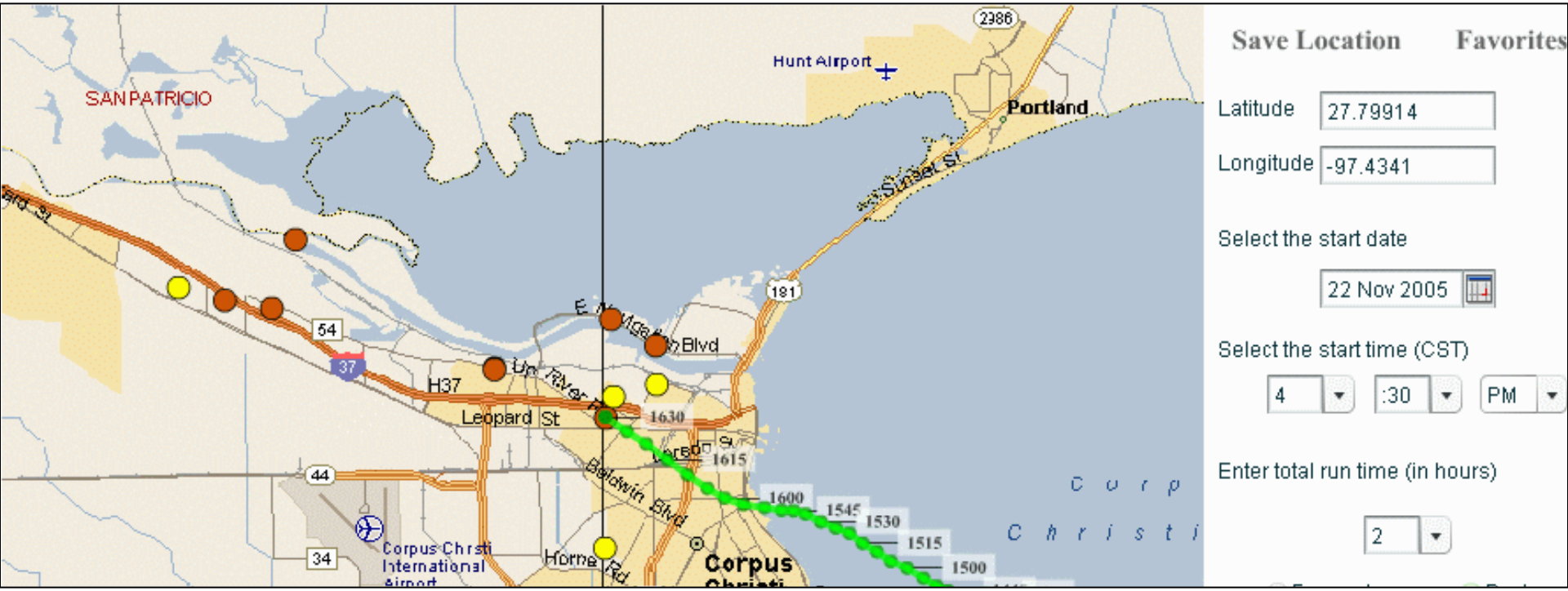
Benzene =
1.27 ppbV

10% of mass



Benzene =
0.77 ppbV

3% of mass



Benzene =
0.60 ppbV

3% of mass