

VOC Canister Sampling for Victoria

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Air Quality Monitoring Activities Fy 2008/2009

Surface Mobile monitoring

- trips in 2008

VOC Canisters at one site from 8:00 to 9:00 a.m.

- 14 days in 2008
- Sep 17 to Oct 1

VOC Canister Sampling

- Emission inventory development and refinement is a critical component for photochemical modeling studies.
- 1-hour averaged VOC samples can be used to evaluate the VOC emissions inventory.
- The sample results can be compared to model results

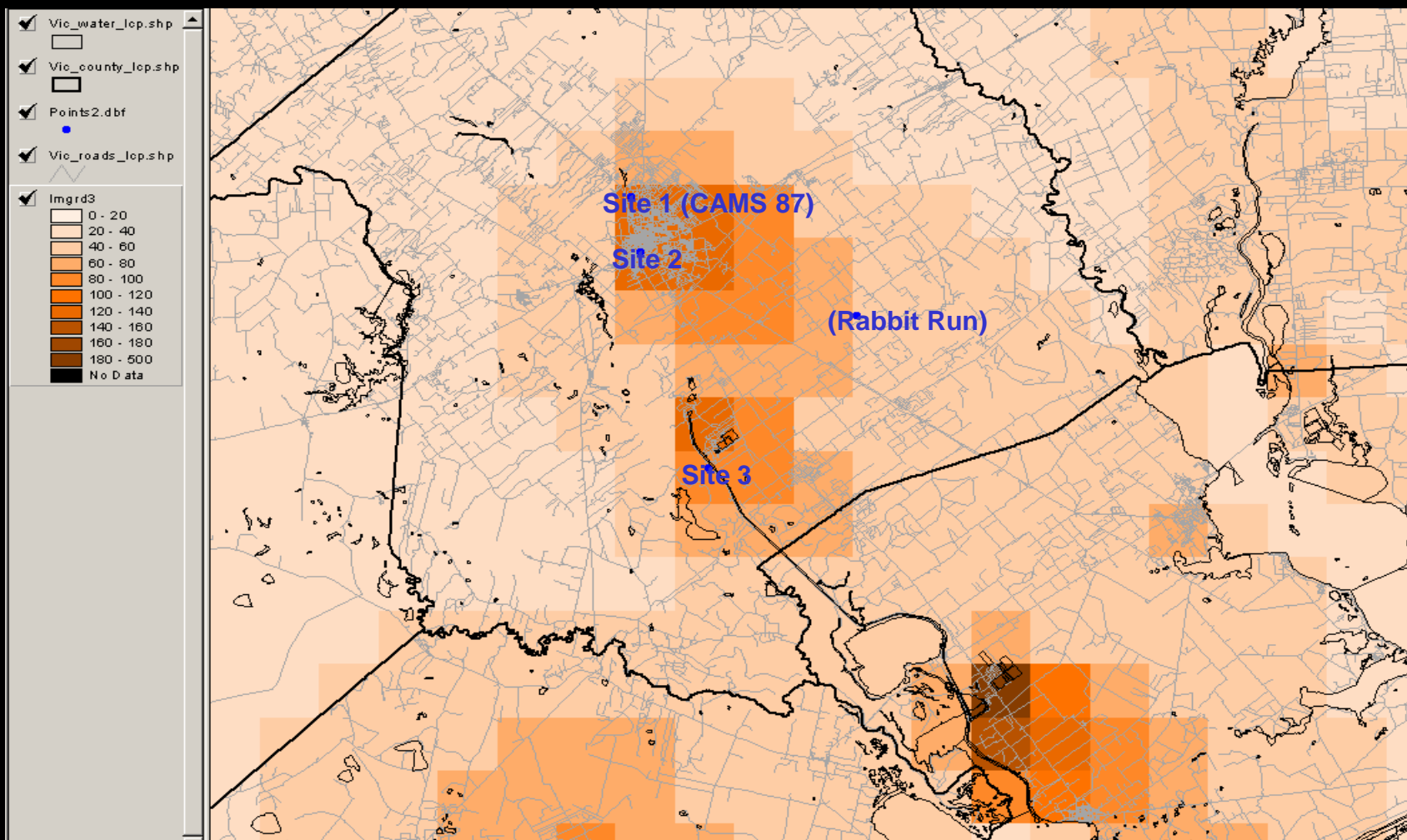
VOC Canister Sampling

- 2005 - 40 samples collected at 3 sites on 13 days
 - CAMS87
 - Memorial Park
 - Invista
- 2006 - 7 samples collected at 1 site on 7 days
 - Memorial Park
- 2007 - 28 samples collected at 1 site on 28 days
 - Memorial Park
- 2008 – 14 samples collected at 1 site on 14 days
 - Memorial Park

VOC Canister Sample Collection

- 1-hour averaged samples were collected in 6-liter stainless steel canisters
- The canisters were placed on the surface for the sampling
- Samples sites and times were based on modeling results
- The time of the year for the sample collection was based on conceptual model for ozone formation in Victoria
- Samples collected in September and October
- Samples collected between 7:00 am and 9:00 am
- Samples collected on consecutive days as much as possible
- Samples collected by City of Victoria

Map of Victoria Area Showing VOC concentrations from the photochemical modeling and the VOC canister sampling sites

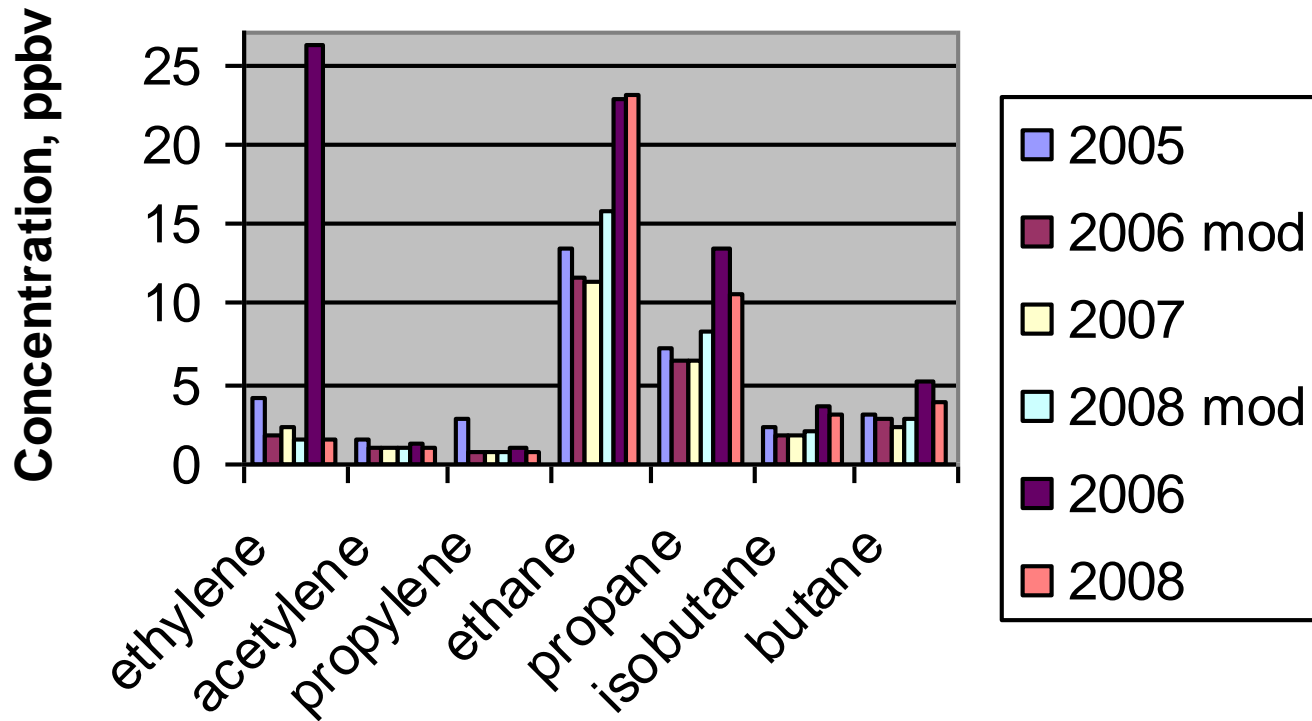


Analysis of Canisters

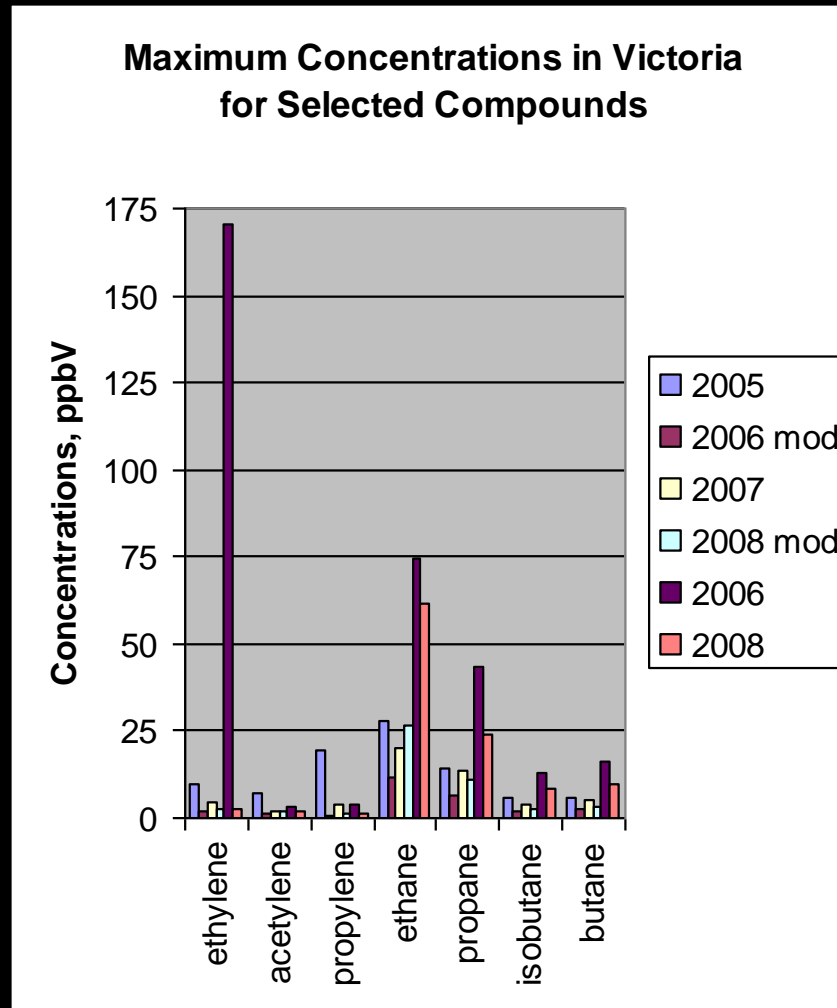
- Analyses with modified version of EPA method TO-14
- Analyses performed with gas chromatograph with flame ionization detector
- 57 compounds analyzed
- 15 compounds were most often measured at concentrations greater than 1.0 ppbV

Results from VOC Canister Sampling

Average Concentrations in Victoria for Selected Compounds

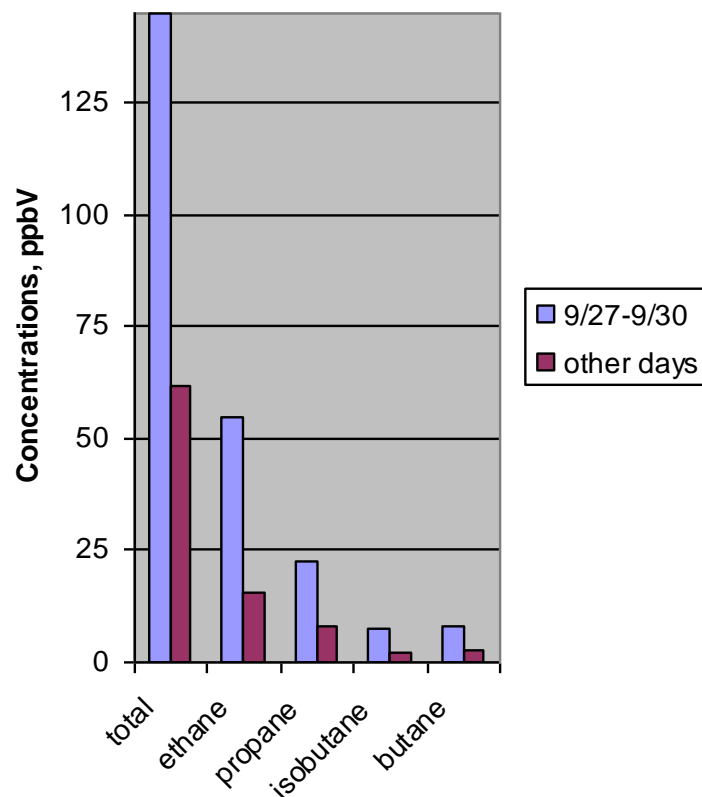


Results from VOC Canister Sampling

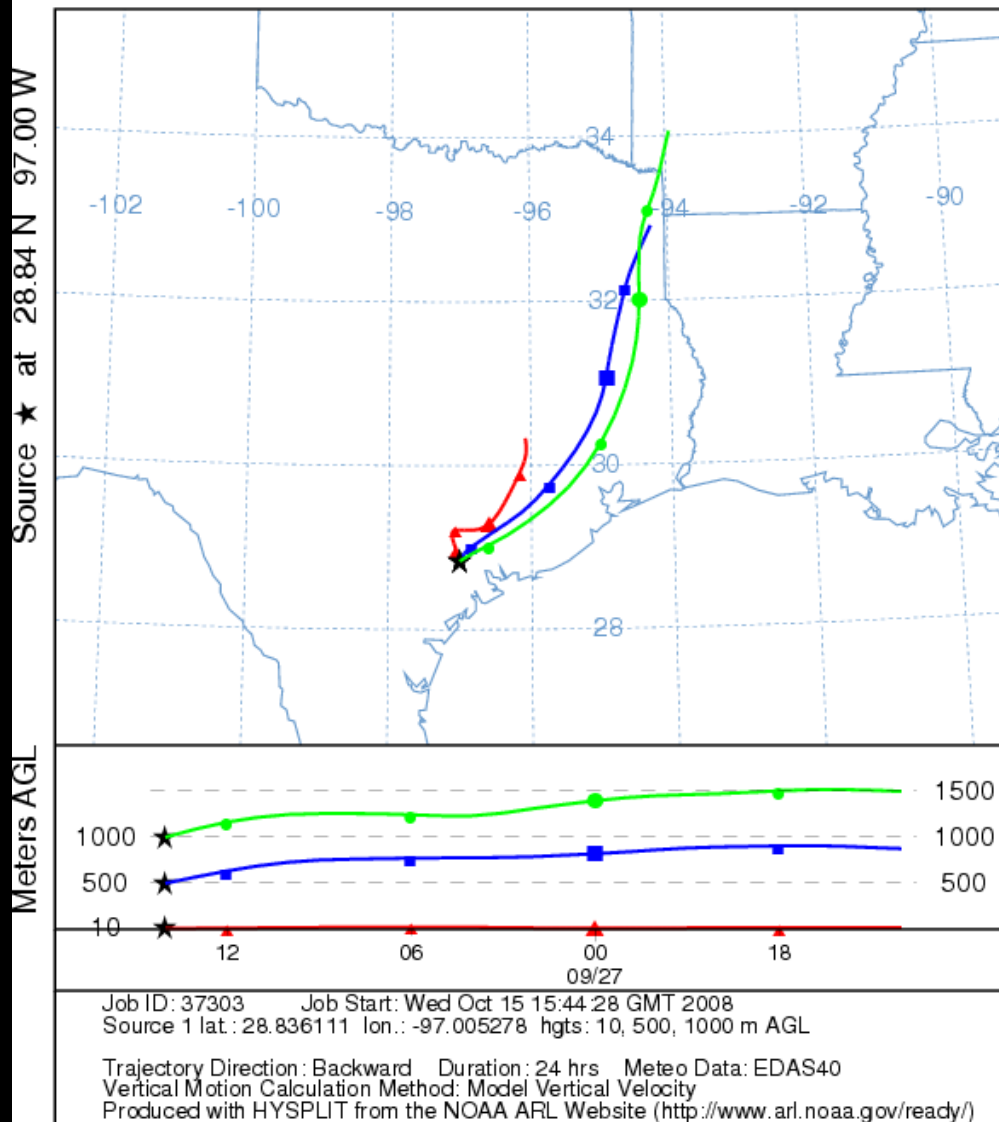


Concentrations for 9/27, 9/28 and 9/29 Compared to Other days in 2008

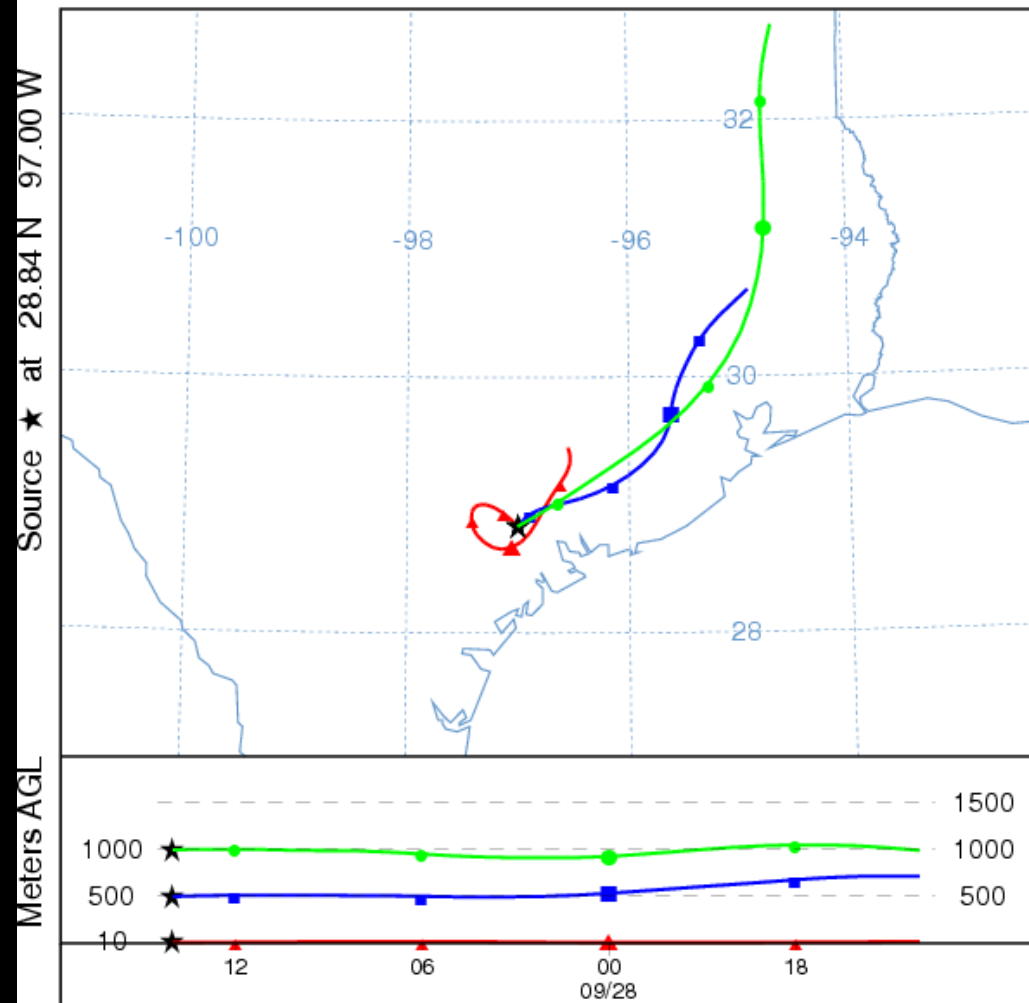
Maximum Concentrations in Victoria for Selected Compounds



NOAA HYSPLIT MODEL
Backward trajectories ending at 14 UTC 27 Sep 08
EDAS Meteorological Data



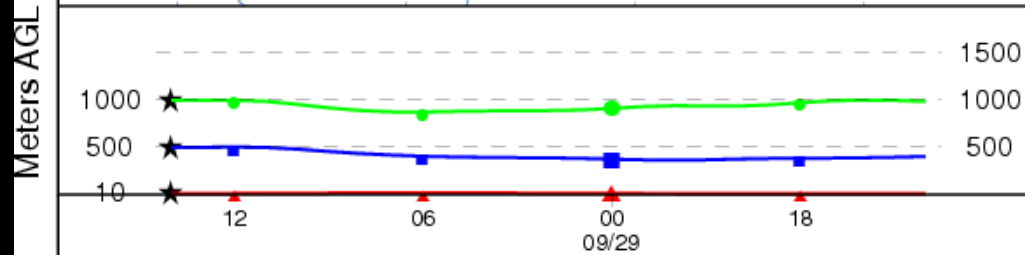
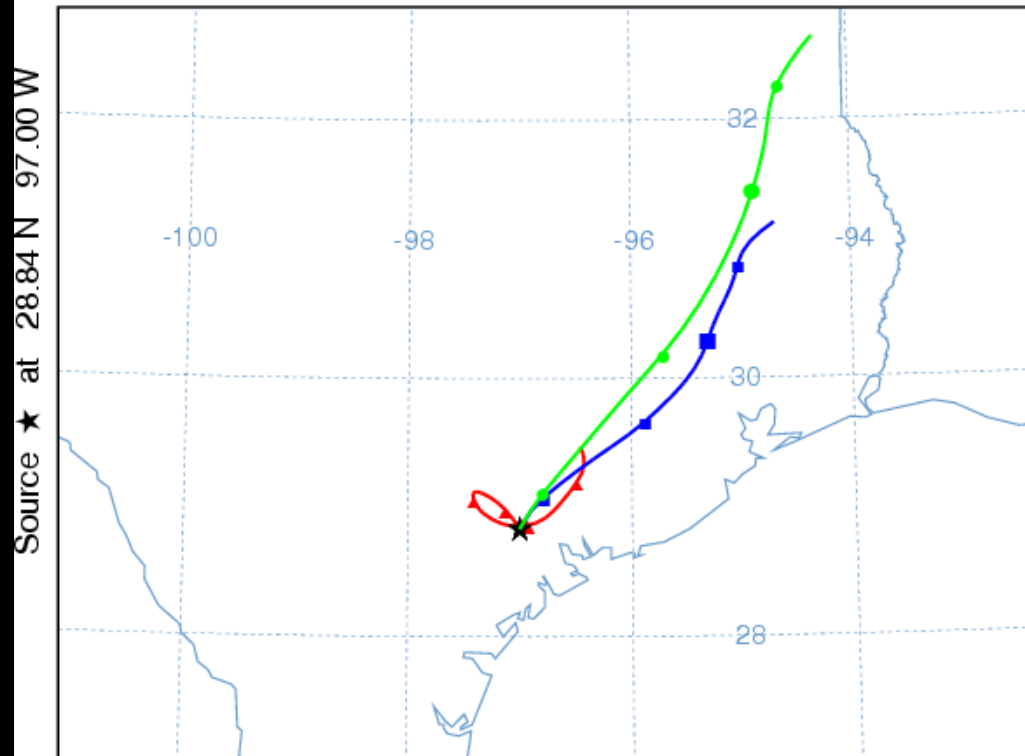
NOAA HYSPLIT MODEL
 Backward trajectories ending at 14 UTC 28 Sep 08
 EDAS Meteorological Data



Job ID: 37318 Job Start: Wed Oct 15 15:45:46 GMT 2008
 Source 1 lat.: 28.836111 lon.: -97.005278 hgts: 10, 500, 1000 m AGL

Trajectory Direction: Backward Duration: 24 hrs Meteo Data: EDAS40
 Vertical Motion Calculation Method: Model Vertical Velocity
 Produced with HYSPLIT from the NOAA ARL Website (<http://www.arl.noaa.gov/ready/>)

NOAA HYSPLIT MODEL
 Backward trajectories ending at 14 UTC 29 Sep 08
 EDAS Meteorological Data

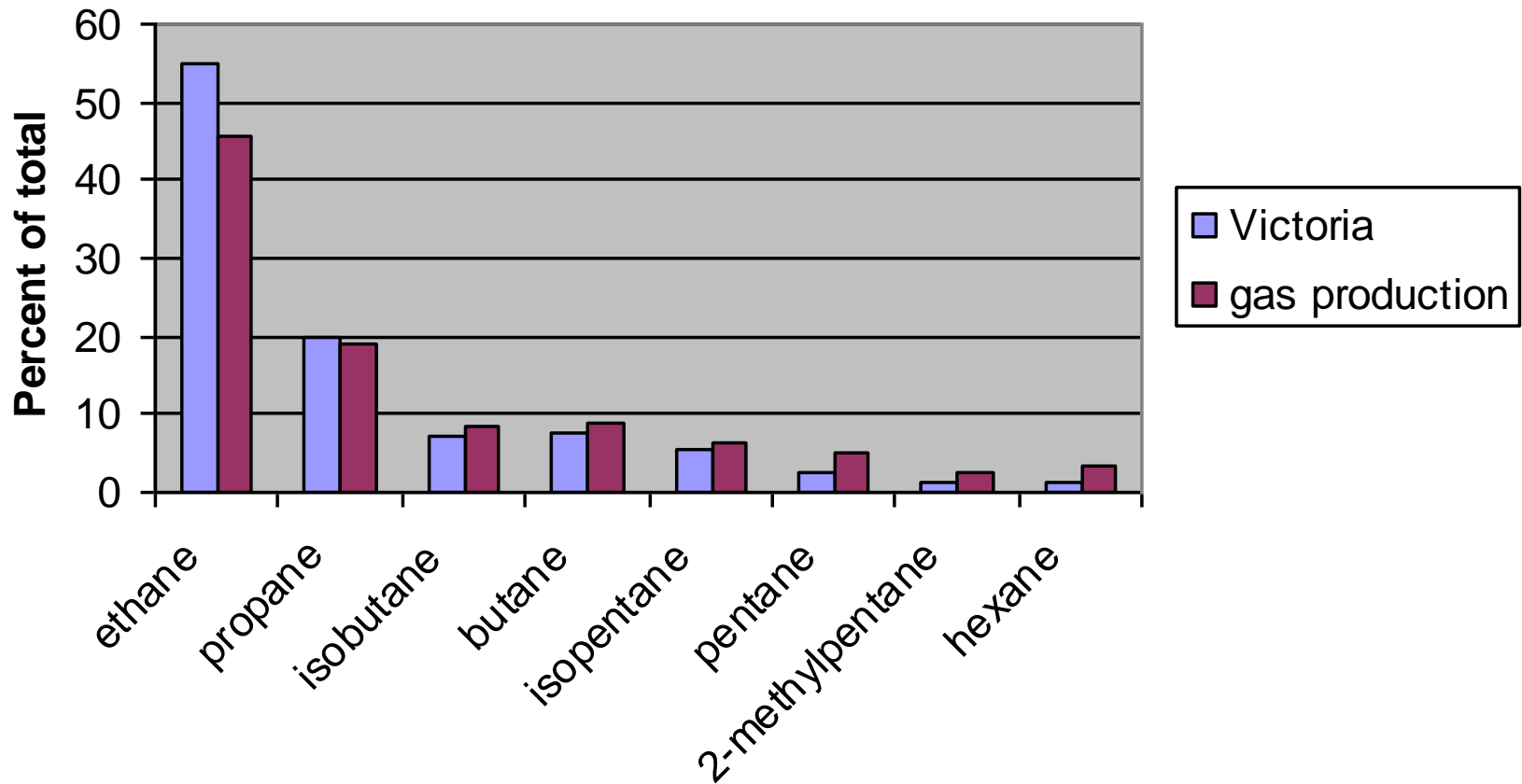


Job ID: 37330 Job Start: Wed Oct 15 15:46:56 GMT 2008
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 Trajectory Direction: Backward Duration: 24 hrs Meteo Data: EDAS40
 Vertical Motion Calculation Method: Model Vertical Velocity
 Produced with HYSPLIT from the NOAA ARL Website (<http://www.arl.noaa.gov/ready/>)

Further Analyses

- Surface mobile sampling conducted on Nov 5, 2008
- Canister taken at 07:10 downwind of an gas producing area between Refugio and Victoria
- Trajectories of air parcel on Sep 27, 28 and 29 passed over this area prior to reaching the sampling site.
- Concentrations of compounds associated with gas production analyzed and compared between two sets of samples.

Comparison between VOC Canister Samples Memorial Park Sep 27, 28 and 29 Gas Field Production on Nov 5

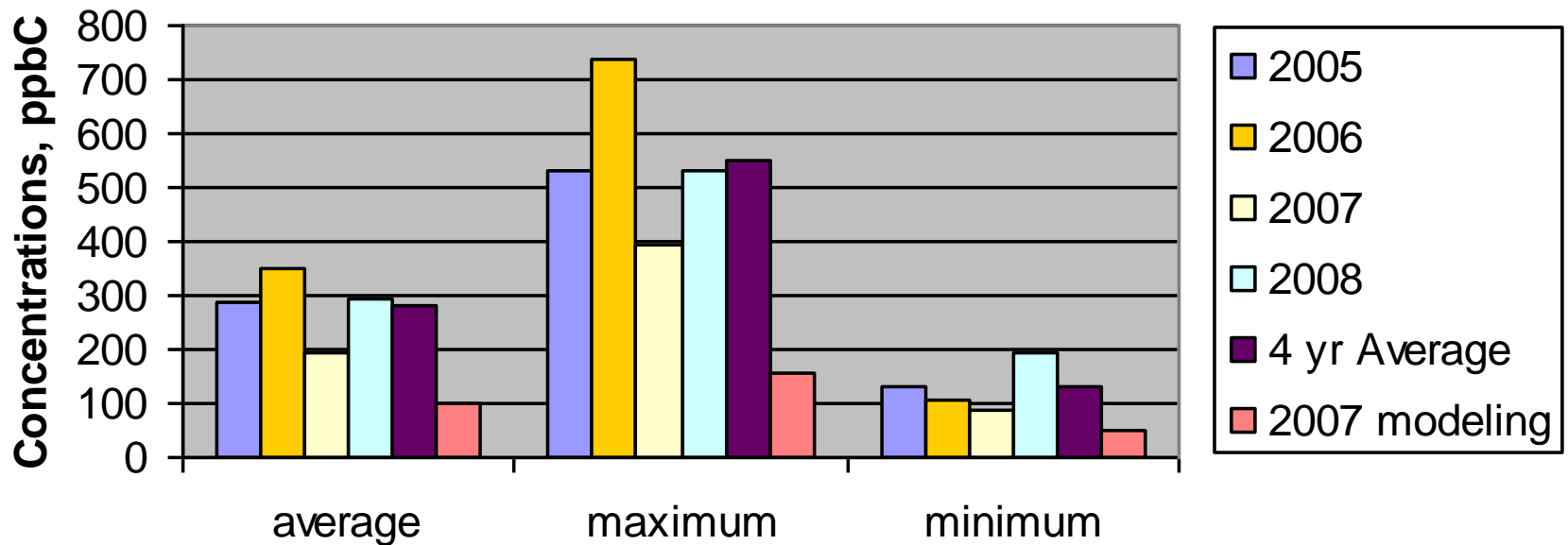


Comparisons of Monitored Emissions with Modeled Emissions

- CAMx Model used for photochemical modeling in Victoria
- September 13-20, 1999 episode with emissions projected to 2007
- Model results for each day for the grid cell containing Memorial Park
- The hour between 8:00 am and 9:00 am evaluated
- Model output is in 8 CBIV reactivity classes
- Comparisons performed with
 - Total VOC
 - Ethylene
 - Isoprene

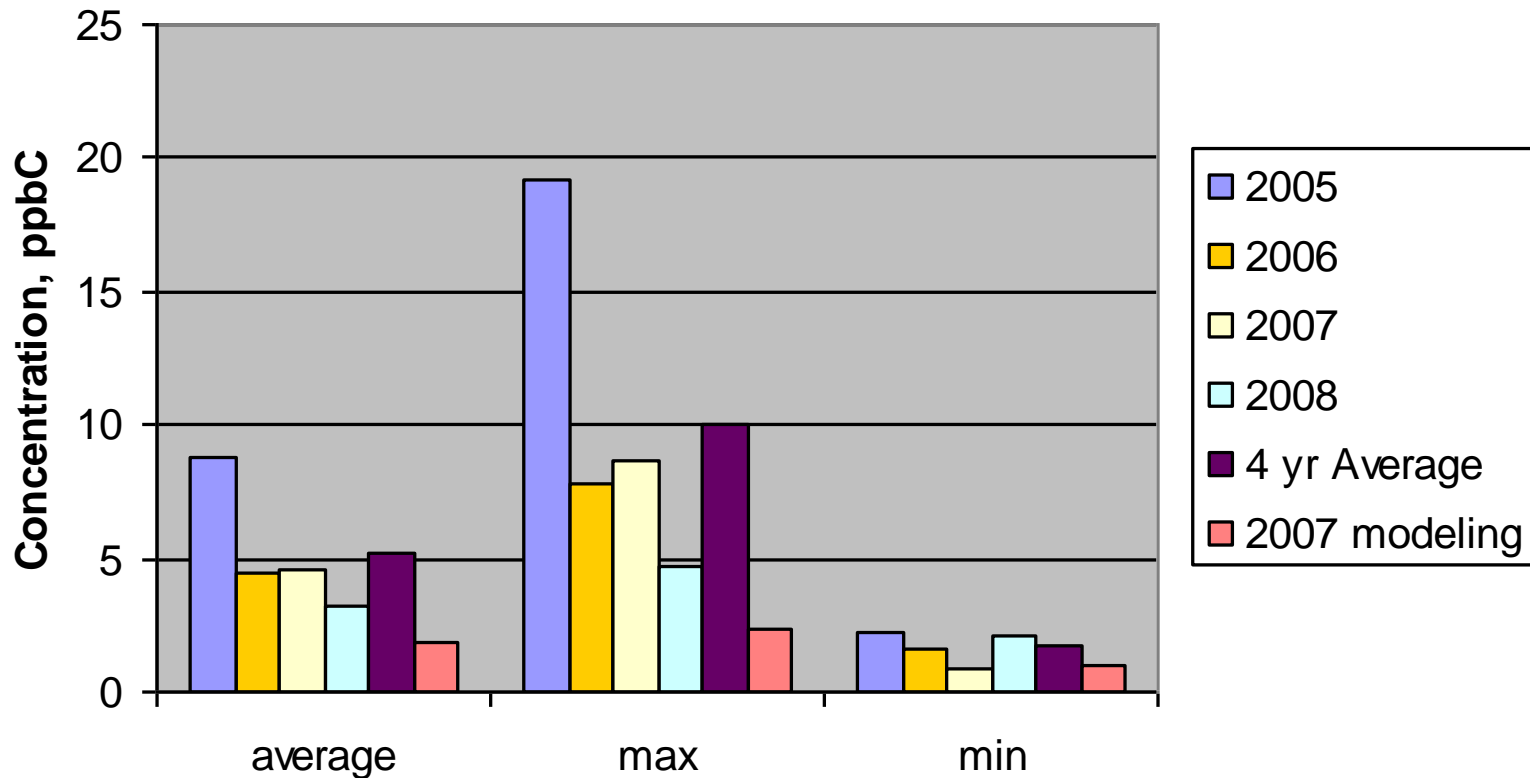
Comparison with EI in Victoria

Total Measured VOC Concentrations Compared to Total VOC Concentrations Used in 2007 Modeling



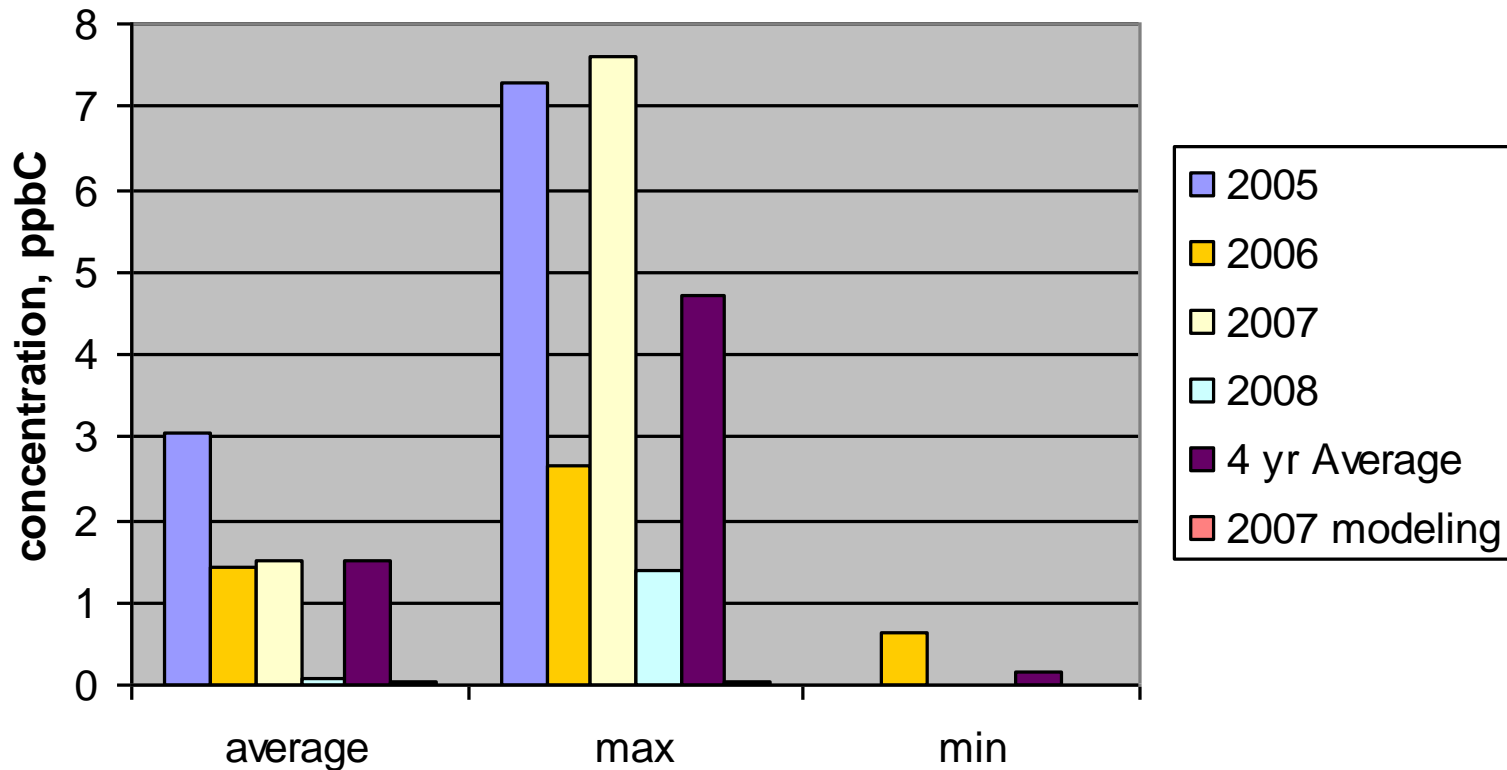
Comparison with EI in Victoria

Measured Ethylene Concentrations Compared to ETH Concentrations Used in 2007 Modeling



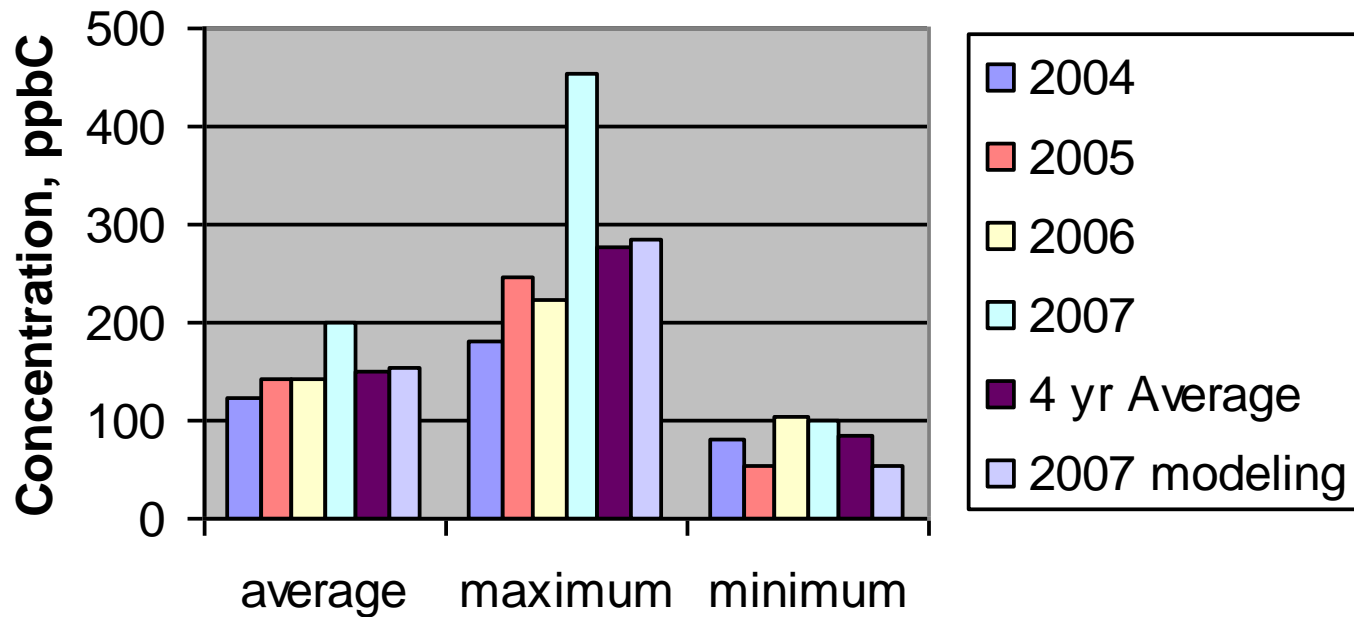
Comparison with EI in Victoria

Measured Isoprene Concentrations Compared to ISOP Concentrations Used in 2007 Modeling



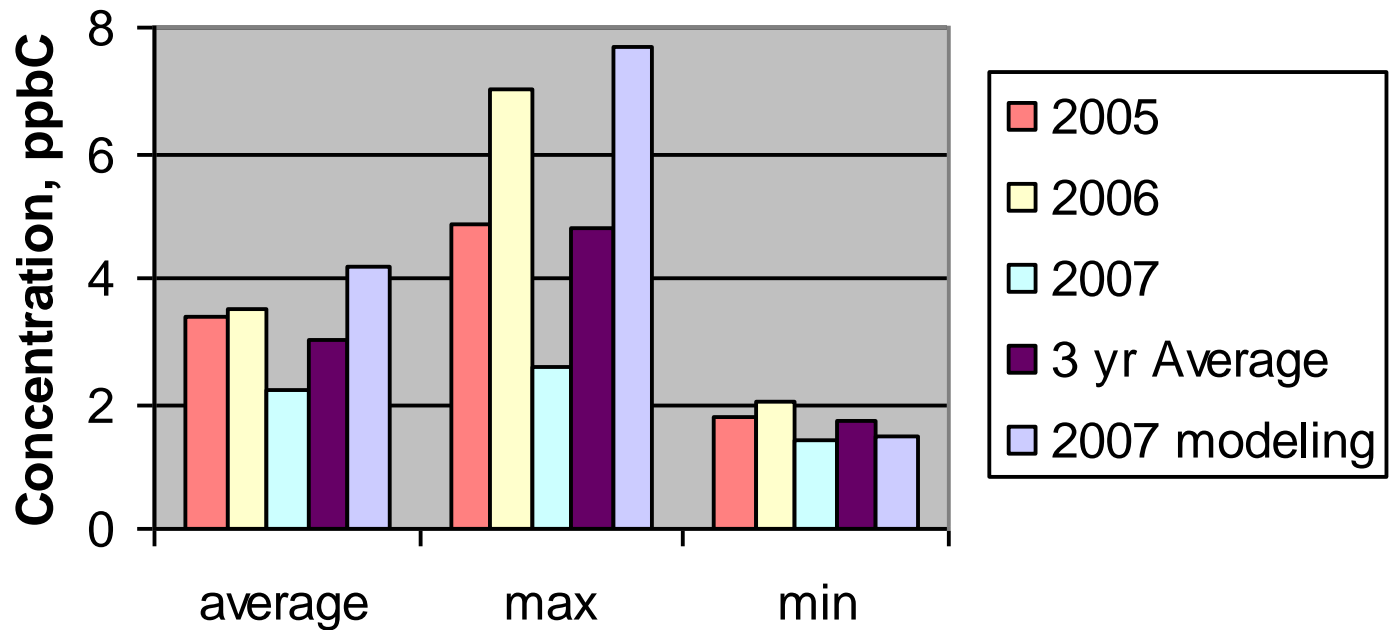
Comparison with EI in Austin at CAMS3

Total Measured VOC Concentrations Compared to Total VOC Concentrations Used in 2007 Modeling



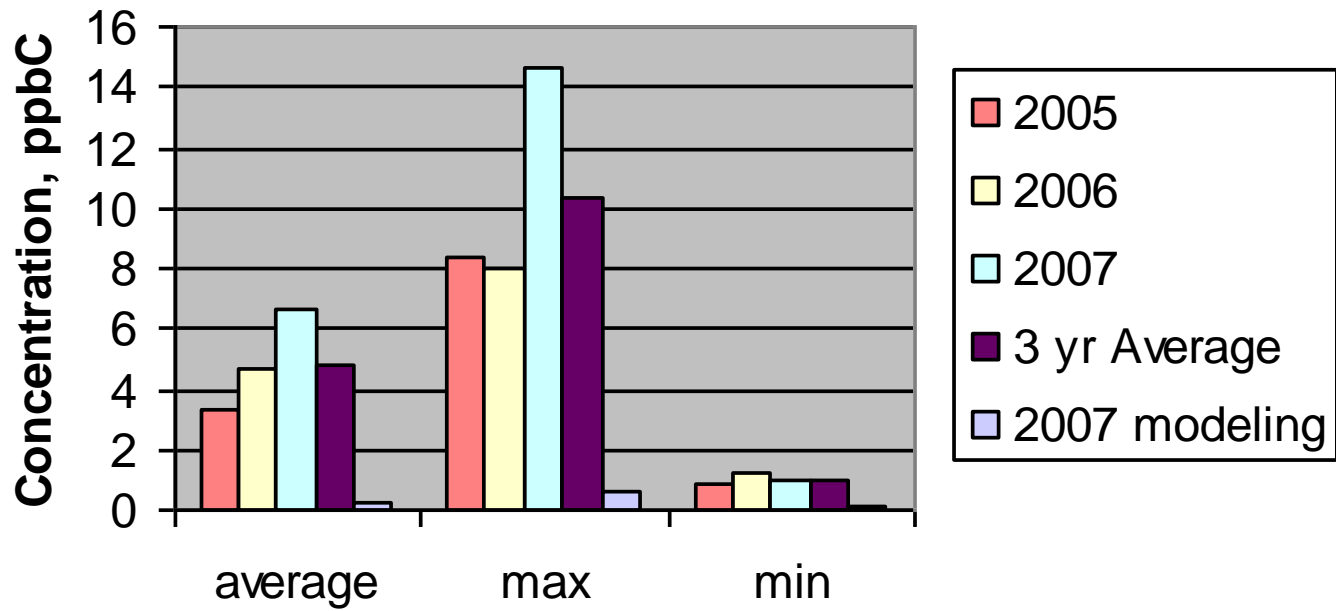
Comparison with EI in Austin at CAMS3

Measured Ethylene Concentrations Compared to ETH Concentrations Used in 2007 Modeling



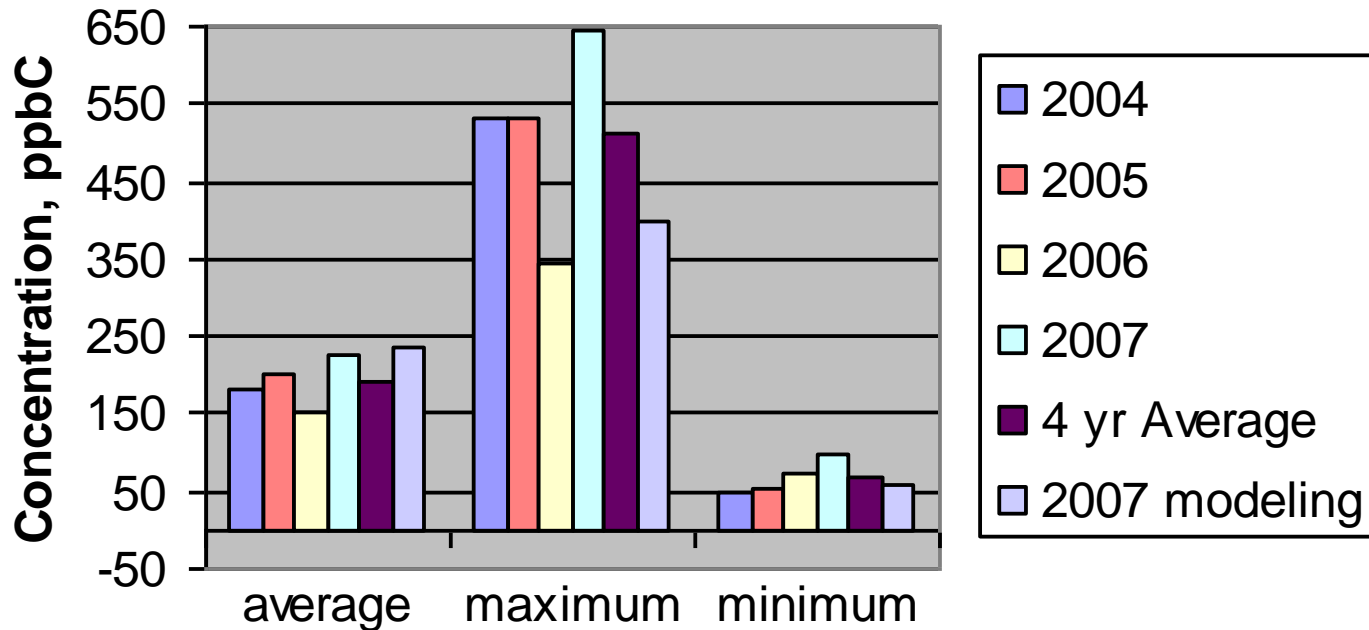
Comparison with EI in Austin at CAMS3

Measured Isoprene Concentrations Compared to ISOP Concentrations Used in 2007 Modeling



Comparison with EI in Austin at all Sites

Total Measured VOC Concentrations Compared to Total VOC Concentrations Used in 2007 Modeling



Findings

Four year average of the measured concentrations compared to average predicted non-methane hydrocarbons used in the model at the corresponding time of day

- Average measured Total VOC (281 ppbC) was higher than average modeled (99 ppbC)
- Maximum measured Total VOC (549 ppbC) was higher than maximum modeled (155 ppbC)

This indicates that the values for VOC emissions in the Victoria area emissions inventory are likely lower than actual emissions.

Findings

Four year average of the measured concentrations compared to average predicted non-methane hydrocarbons used in the model at the corresponding time of day

- Average measured ethylene (5.26 ppbC) was higher than average modeled ethylene (1.87 ppbC)
- Average measured isoprene (1.52 ppbC) was higher than averaged modeled isoprene (0.03 ppbC)

This indicates that the values for VOC emissions in the Victoria area emissions inventory are likely lower than actual emissions

Questions?