

## TERC Research Highlights

Jay Olaguer and Jim Lester  
HARC

December 15, 2005

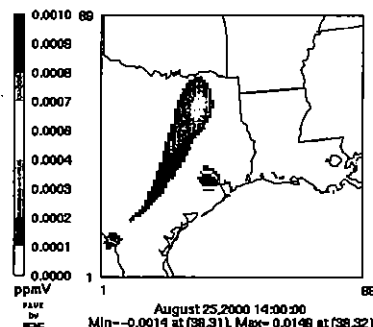
## Modeling in Support of TexAQ5 II and 8-hr O<sub>3</sub> Assessment

- Successful Summer 2005 field study with tetroon/aircraft (SETTS/NETPS) studies.
- Small uncertainties in wind (~1 m/s) and temperature (~1 °C) lead to large O<sub>3</sub> uncertainties (>10 ppb).
- Houston OVOCs are 4-5x less effective than HRVOCs in contributing to local O<sub>3</sub>.
- Ship Channel OVOCs may have some effect on O<sub>3</sub> in NE TX (~0.5 ppb per 100% change in OVOC emissions).
- Compare: ~80% NOx reductions on EGUs in E. TX reduces DFW O<sub>3</sub> by ~1 ppb (TCEQ).

## Sensitivity of Ozone to VOC Emissions

- Analysis of 140 ppb Ozone Episode in Houston at 3 pm on 8/25/2000
- Raising Ship Channel VOC emissions by 100% can account for 40 ppb ozone
  - HRVOCs account for 33 ppb
  - OVOCs account for 7 ppb

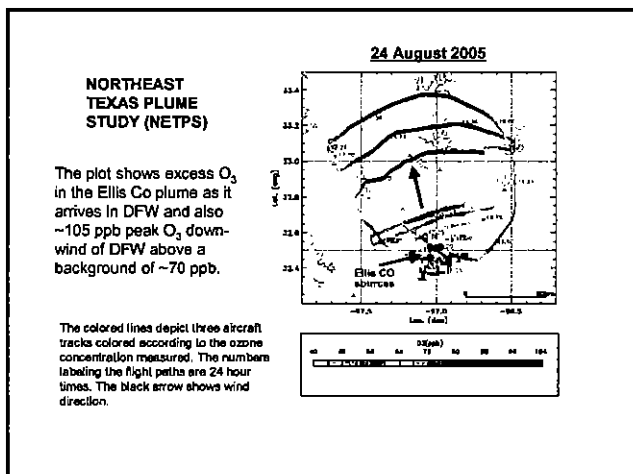
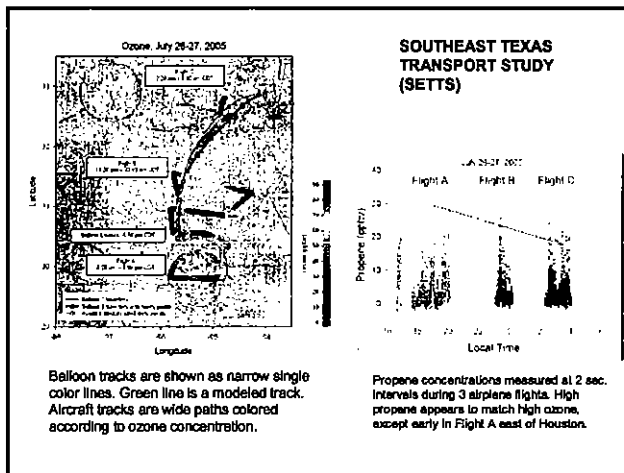
Low OVOC + Elevated OVOC



Regional distribution of sensitivity coefficients of ozone to Ship Channel emissions of OVOC from ground level and stack sources on 8/25/2005 at 2 p.m.

## SETTS and NETPS

- The Southeast Texas Transport Study (SETTS) was a balloon and aircraft campaign that took place in July, 2005.
- The Northeast Texas Plume Study (NETPS) was an aircraft campaign that took place in August, 2005.



## Diesel Construction Equipment NOx in DFW (H43)

- ~ 45 tons/day of NOx from all types equipment
- Largest type contributor was skid steer loaders
  - Each emits small amount of NOx
  - All emit >8 tons/day, much more than cranes



### **Project H60 Intra-State Transport**

- TERC Board placed **top priority** on project to assess potential impact of emission from new and distant NO<sub>x</sub> sources on DFW ozone compliance.
- Project H60 will combine a control strategy analysis with MM5 and CMAQ/CAMx modeling of historical episodes (\$390K).
- Control strategy scenarios (e.g., statewide NO<sub>x</sub> cap) will be developed in consultation with the TCEQ and industry.
- Phase I will use off-the-shelf episodes. Results by Jan 31, 2006.
- Phase II will use TexAQS II-2005 data for ozone season model. Detailed model comparison and process analysis. Results by March 31, 2006.
- Final report will include an enhanced conceptual model of regional transport and background ozone that can be tested during TexAQS II-2006. Due April 30, 2006.
- Project H45.S.2004.T1 extended and enhanced by \$60K to provide critical emissions input.
- Notice to proceed given to ENVIRON, UH, and UNC.

### **New VOC Research Projects**

- Budget revision for ~\$850K in funding
- Formulating 4-6 new research projects to address VOCs in the HGB non-attainment area.
- Goals
  - correct VOC emissions.
  - Improve ozone productivity in SIP model
- Project concepts
  - Industry HRVOC monitoring data analysis
  - Modeling of VOC contribution to O<sub>3</sub> productivity
  - Helicopter, tower, and surface monitoring of VOCs.

## TexAQS II Study Progress and Remaining Activities



Presented by  
Jim Thomas  
December 15, 2005

12/8/2005

1

## Projects funded in TexAQS II/Phase I



- Pilot test monitoring site -UT @ Austin/TCEQ
- Implementation of a rural transport, met, and regional haze monitoring network- UT @ Austin/TCEQ
- Development of a field study real time forecasting capability - TAMU/ UH/TERC
- Analyze transport in East Texas - Environ/TERC
- Develop conceptual model of Transport in East Texas - TAMU/TERC
- Integrated transport analysis and database of ozone formation in East Texas using transport monitoring network - UT @ Austin/City of Victoria NNA
- North East Texas Plume Study (NETPS) -UAH/TERC
- South East Texas Transport Study (SETTS) - PNL/TERC
- Other projects Implemented may be found at HARC and TCEQ websites

12/8/2005

2

## Questions to be answered by TexAQS II/Phase II



- Ozone Formation
  - What factors are responsible for very high ozone levels in Houston?
  - How are particulate matter chemistry and ozone chemistry related?
  - What is the role of nighttime chemistry in ozone formation?

12/8/2005

3

## Questions to be answered by TexAQS II/Phase II



- Emissions
  - Are emissions still at levels found in 2000?
  - What are temporal and spatial distribution of emissions in Houston and East Texas?
  - Are levels of emissions used in current modeling and air quality planning accurate?

12/8/2005

4

## Questions to be answered by TexAQS II/Phase II



### Transport

- What role does transport play in eight hour ozone violations?
- What sources are contributing to high ozone levels upwind of some non-attainment areas and near non-attainment areas
- What sources outside of Texas contribute to high ozone levels in Texas and how much is this contribution?

12/8/2005

5

## Questions to be answered by TexAQS II/Phase II



### Modeling

- What changes in modeling inputs and model calculation mechanisms are necessary to insure accurate photochemical modeling resulting in appropriate control strategies?

12/8/2005

6

## Major Resources Available for TexAQS II/Phase II



### Aircraft

- NOAA – P3 Orlon (particle and gas phase chemistry)
- NOAA – Twin Otter (DIAL Lidar / Ozone and Aerosol)
- DOE – G1 (particle and gas phase chemistry)

### Ship

- NOAA – Ron Brown

12/8/2005

7

## TexAQS II/Phase II Challenges



- Continue planning and logistical support for FY 06 Intensive Phase (Phase II).
- Successfully implement TexAQS II/Phase II.
- Develop and implement a rapid synthesis and reporting effort to provide timely study results for use in State Implementation Plans.
- Work to secure adequate aircraft support for Intensive Phase of Study.
- Work to maximize the development and use of satellite data as a more efficient source of information for air quality planning purposes.
- Expedite receipt of additional funds in FY 07.

12/8/2005

8