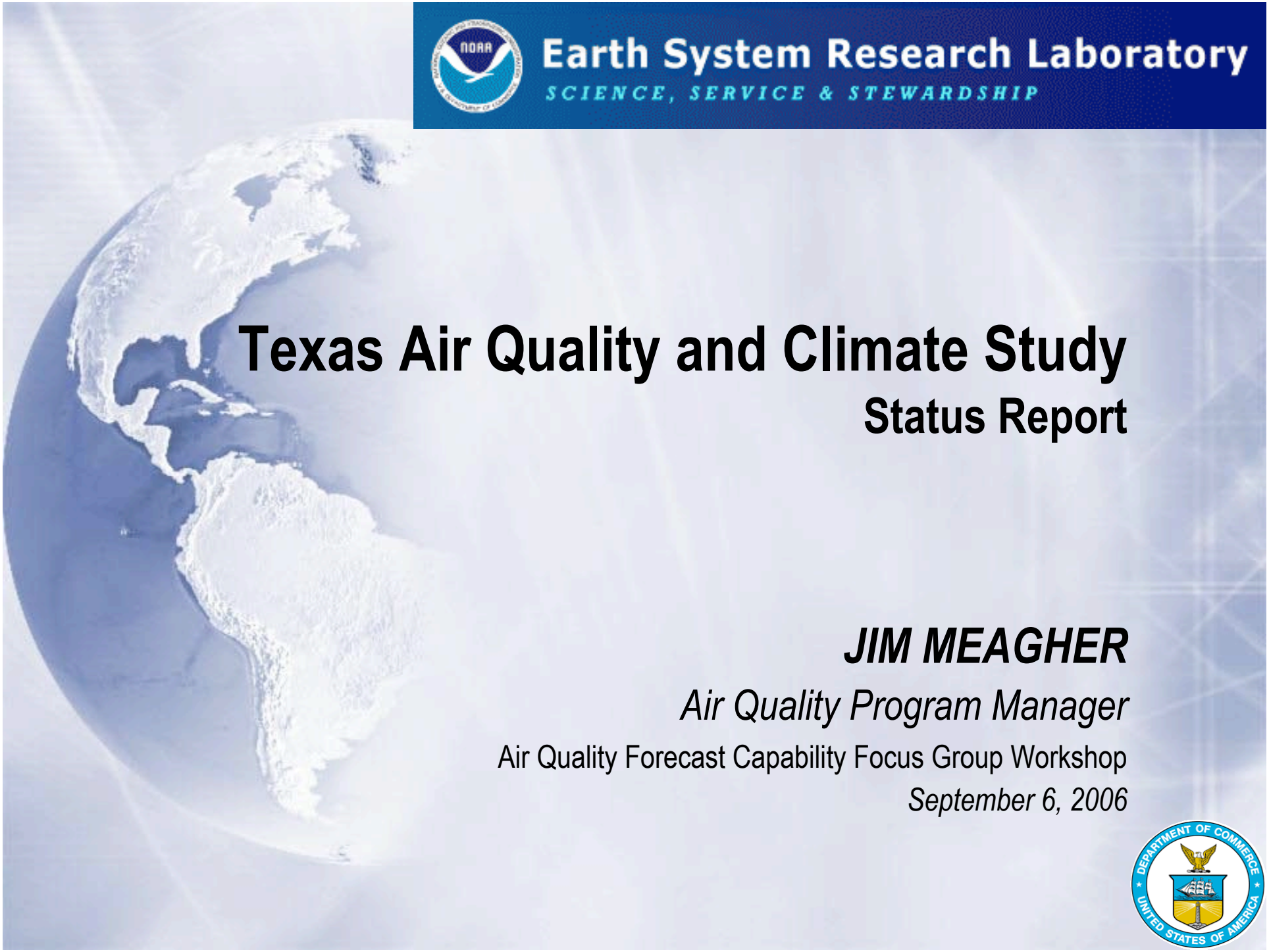

Earth System Research Laboratory
SCIENCE, SERVICE & STEWARDSHIP
Texas Air Quality and Climate Study
Status Report
JIM MEAGHER
Air Quality Program Manager
Air Quality Forecast Capability Focus Group Workshop
September 6, 2006

Outline

- Study goals and objectives

  From a NOAA perspective
- Measurement platforms and “super site”
- “First look” data
- Forecast models verification
- Ozonesonde network

NOAA's Objectives In TexAQS II

NOAA's Focus is on Climate Change and Air Quality

During TexAQSII NOAA Will Focus on:

- **Emissions Verification** - petrochemical, urban, power plant, marine
- **Transport and Mixing** - intra- and inter-regional transport, boundary layer/free Troposphere
- **Chemical Transformation** - O_3 and PM, Day and Night
- **Aerosol Properties and Radiative Effects** - Regional haze, direct and indirect effect, satellite validation
- **Forecast Models** - Diagnostic evaluation, chemical data assimilation

For More Information http://esrl.noaa.gov/csd/2006/

TexAQS II Planning Participants

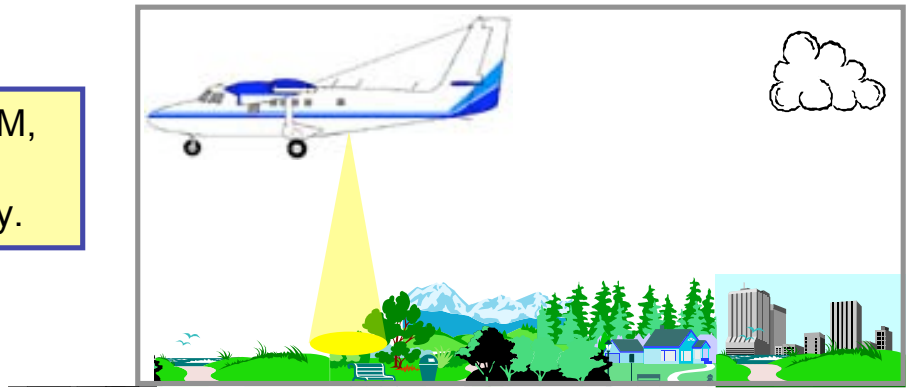
- Texas Commission on Environmental Quality (TCEQ)
- Research Scientists
  - Federal: NOAA, NASA, DoE
  - National Science Foundation (NSF - NCAR)
  - Texas Universities (U of Houston, U of Texas , Texas A&M, Lamar, Rice, Texas A&M Kingsville, U of Texas Arlington, Baylor, Texas Tech)
  - Other National Experts
- EPA
- Non-Government Research Institutions: Texas Environmental Research Consortium (TERC), Houston Advanced Research Center (HARC), Texas Air Research Center (TARC), Houston Regional Monitoring (HRM) Network
- Local Governments
- Contractors
- Industry

NOAA's Assets In TexAQS II

NOAA WP-3D Aircraft - urban and power plant plume studies, emissions verification, regional and inter-regional transport, day/night O_3/PM chemistry, aerosol optics

NOAA R/V Ronald H. Brown - marine chemistry, marine emissions, chemistry in the land/bay/sea breeze recirculation, coastal emissions, satellite validation, aerosol physics, chemistry, optics.

NOAA LIDAR Aircraft - regional distribution of O_3 and PM, urban and power plant plume studies, regional and inter-regional transport, boundary layer evolution and variability.



In Addition: Wind profiler network, Instrumented tall tower, flux towers

Additional Platforms In TexAQS II

NOAA / Univ. of New Hampshire Smart Balloon - Lagrangian air mass tracking, ozone concentrations and profiles.

Navy / Cal. Tech. CIRPAS Twin Otter - Aerosol formation and growth, evolution of aerosol chemical, physical, and optical properties during transport, aerosol - cloud interactions including aerosol impacts on the optical properties of clouds.

NASA King Air - Airborne aerosol lidar, regional aerosol formation and transport, satellite validation

Baylor University Piper Aztec - Regional ozone formation and transport, emission verification.

Moody Tower "Super Site"

B. Lefer & B. Rappenglueck

Instrumentation

Gas-phase Chemistry

Aerosol Composition

Aerosol Optics

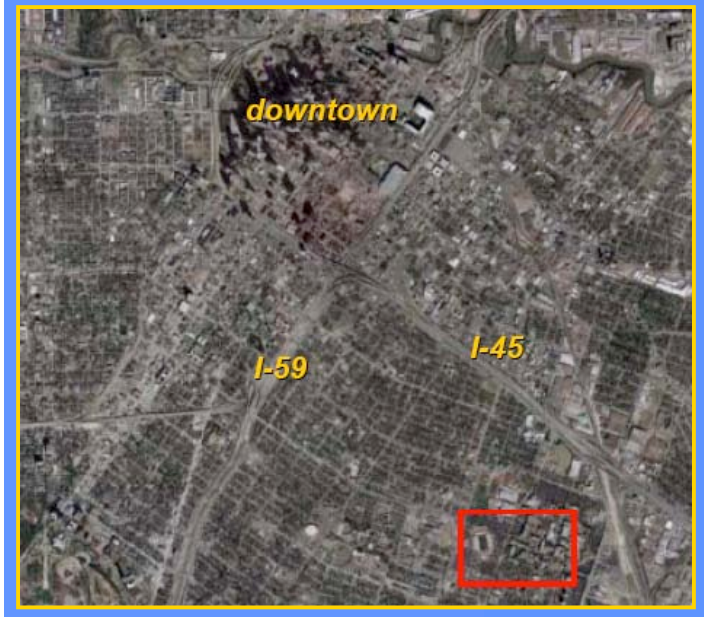
Radicals

LIDAR

DOAS

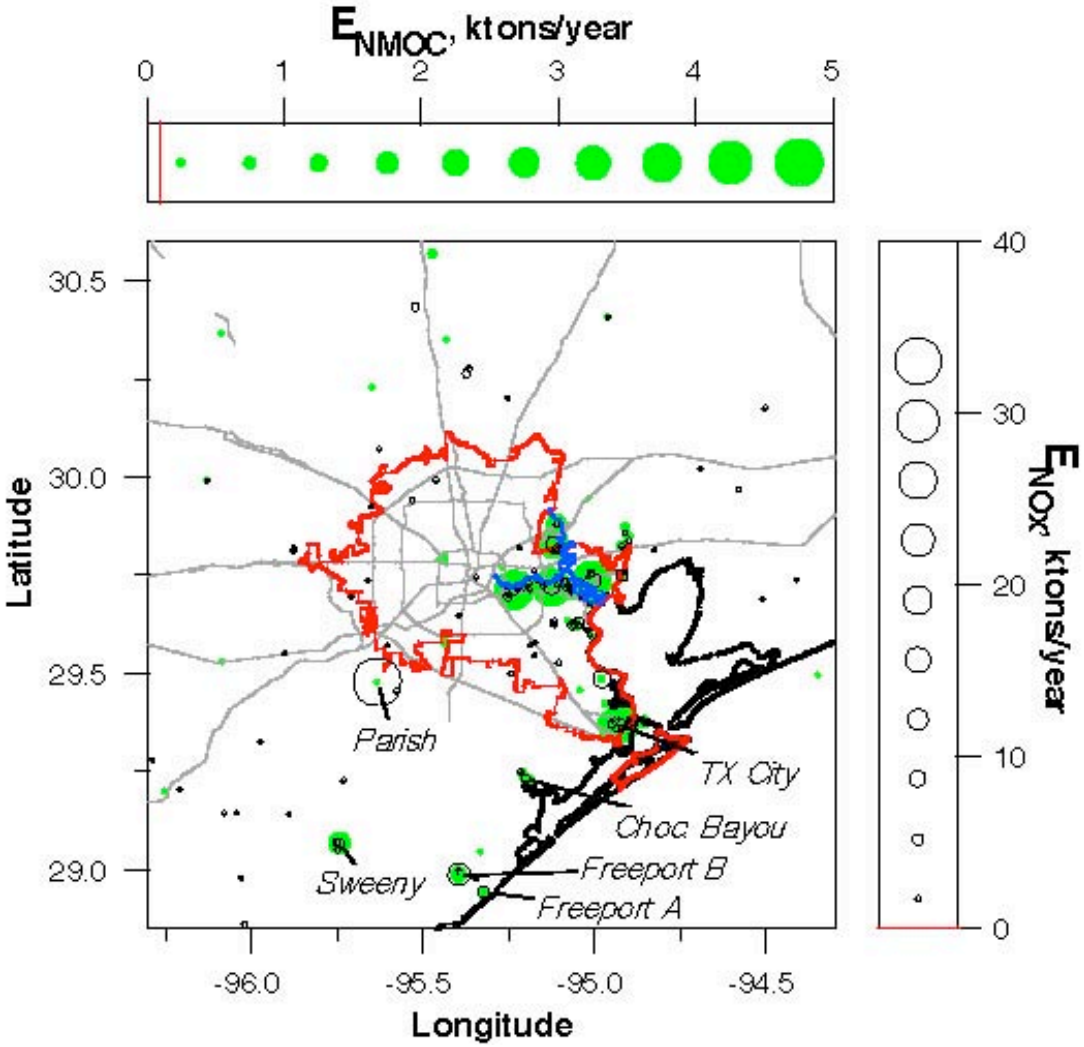
UH Moody Tower

- 18 story tall building (200 ft tall)
- 30 ft Met Tower
- representative site with no direct surface emission impacts



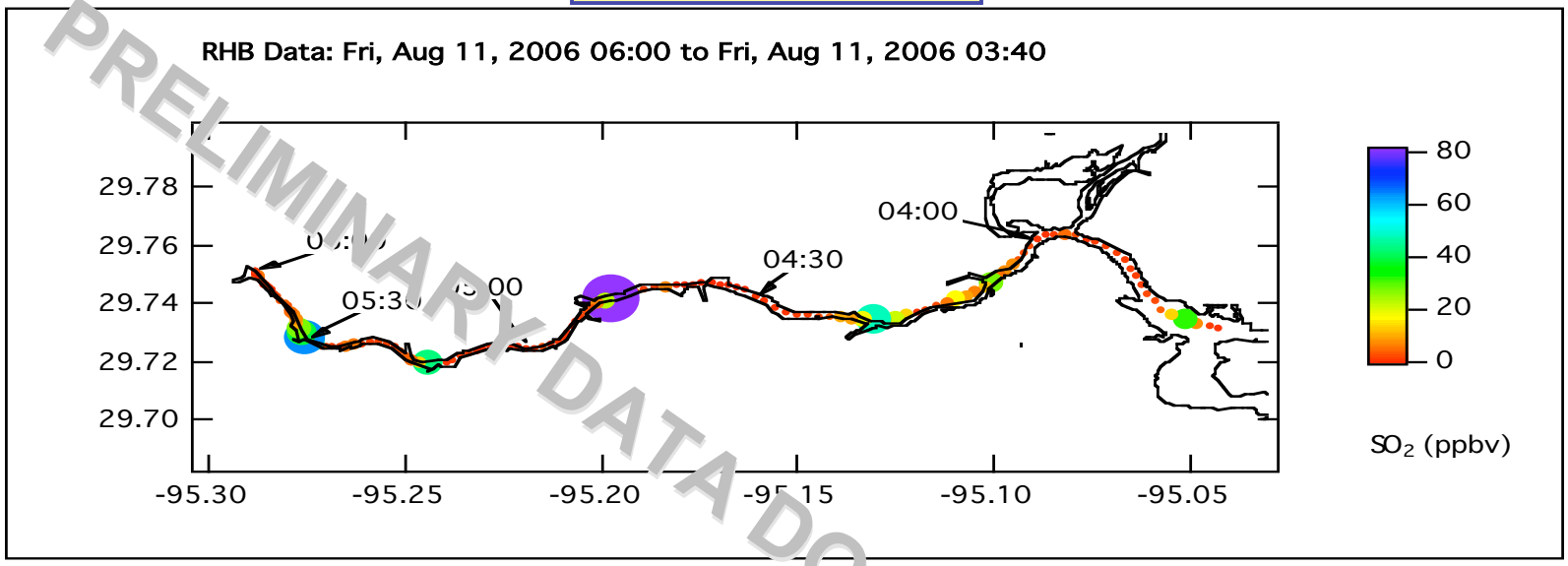
Houston NO_X and VOC Sources

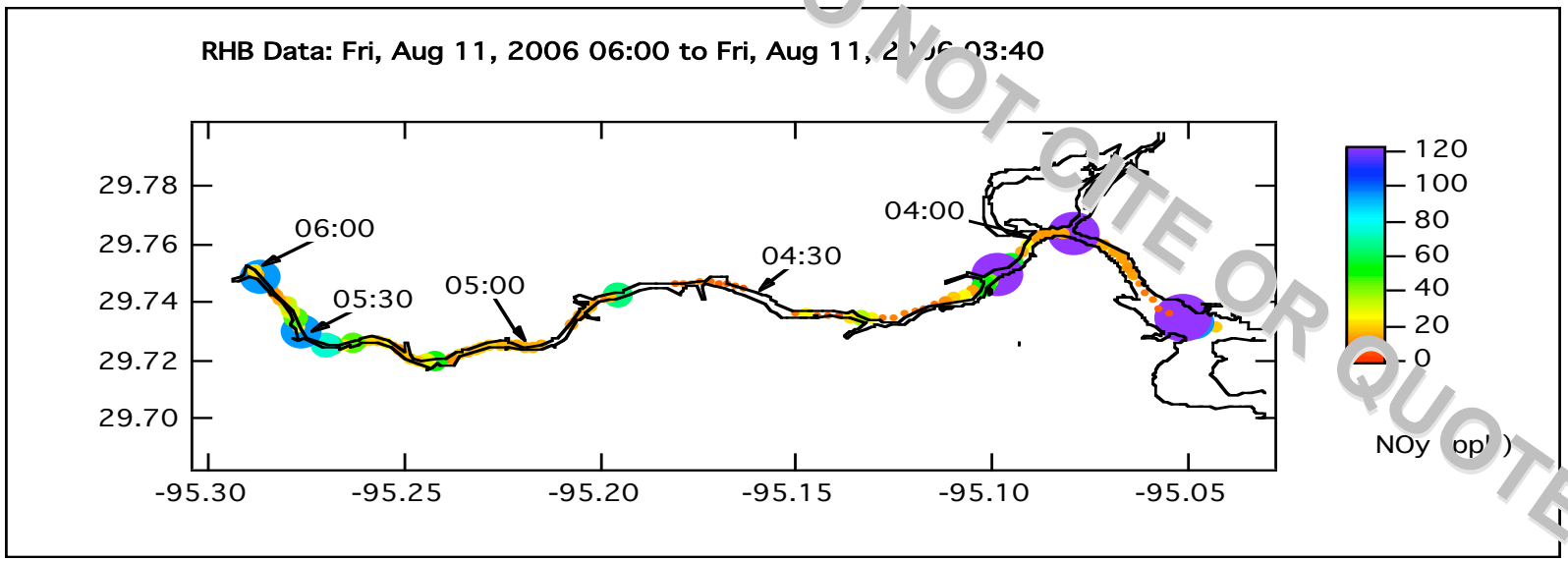
2000
The Texas Air Quality Study



Emission locations - Houston Ship Channel

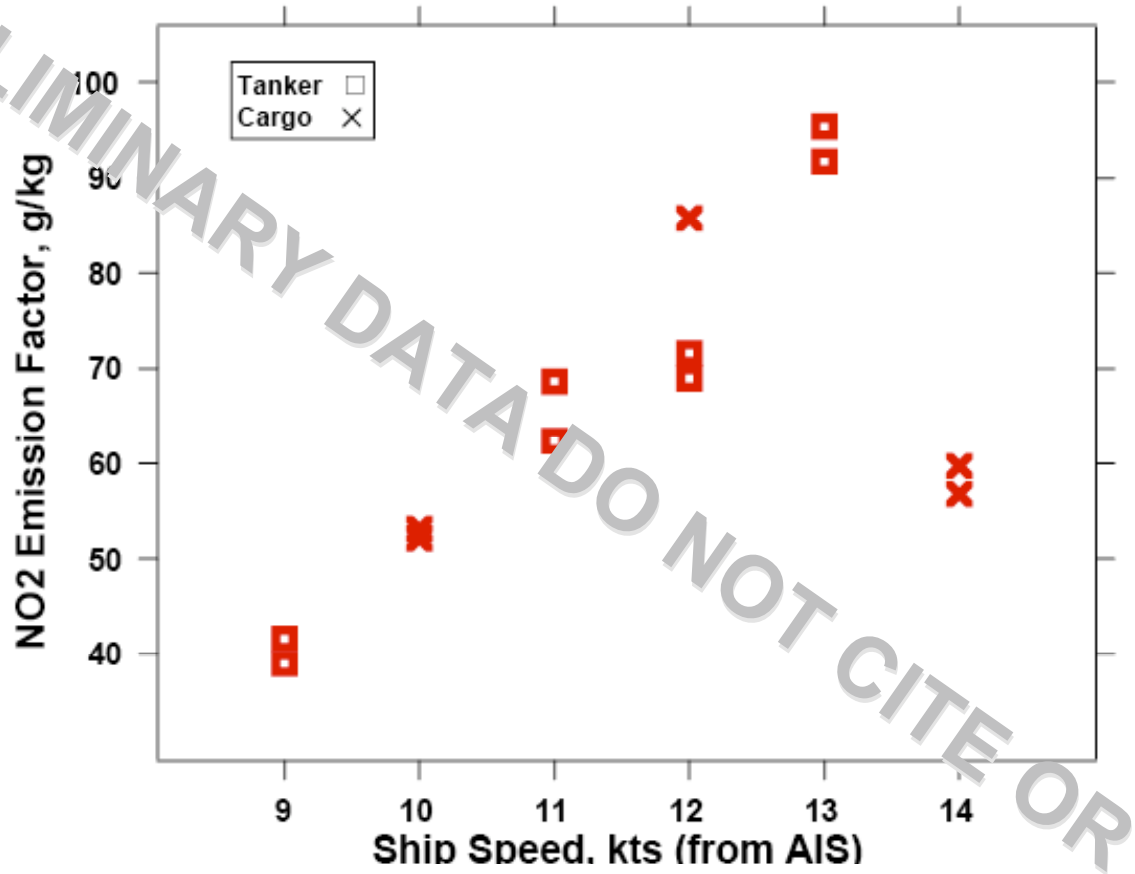
Eric Williams





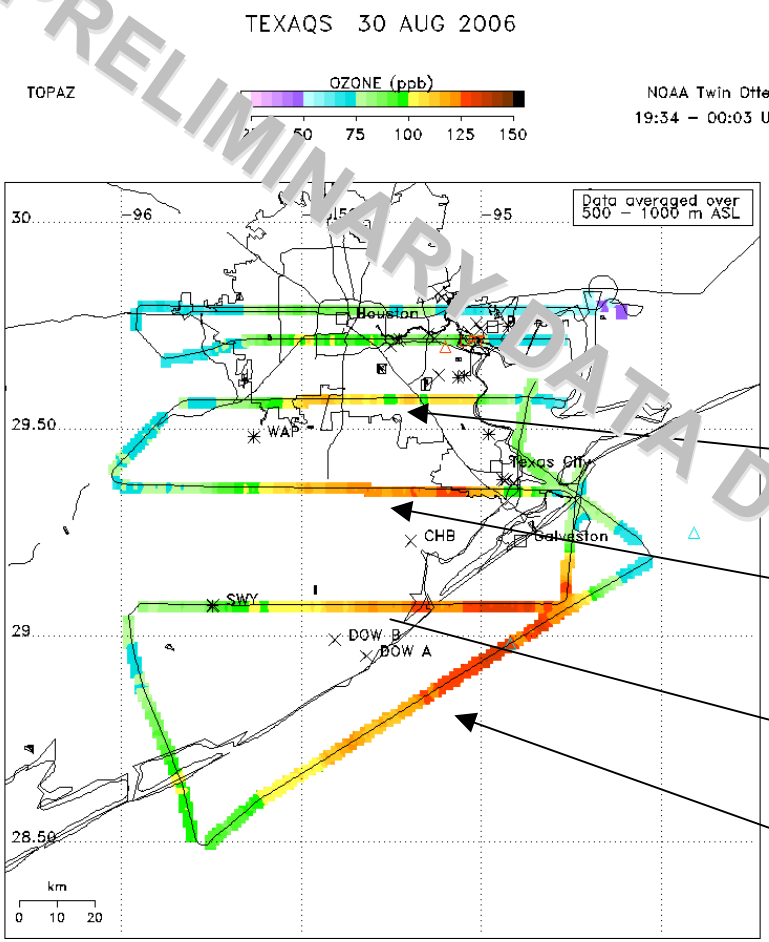
Characterization of Ship Emissions

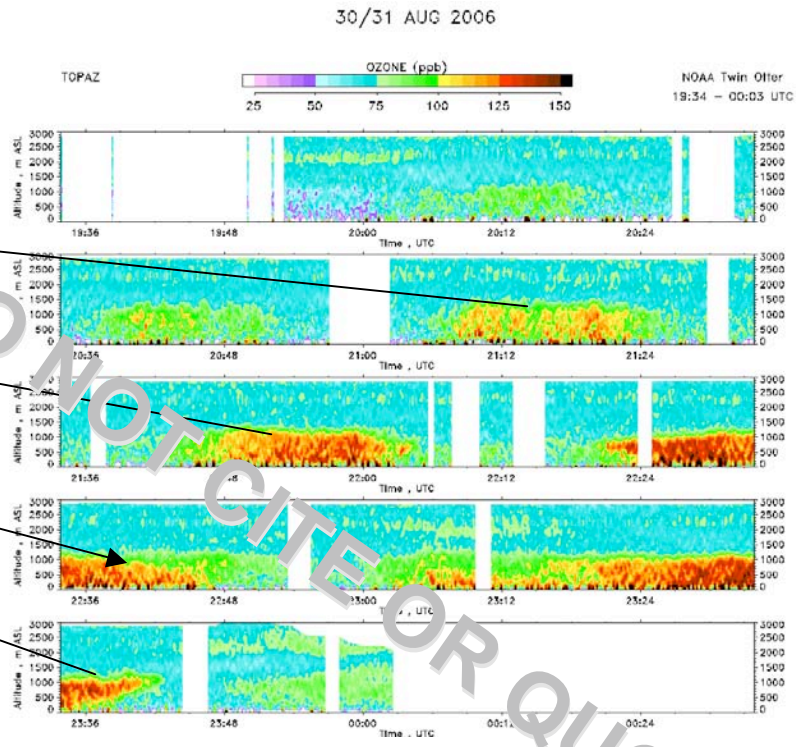
Eric Williams



Mapping Ozone Plumes

Mike Hardesty





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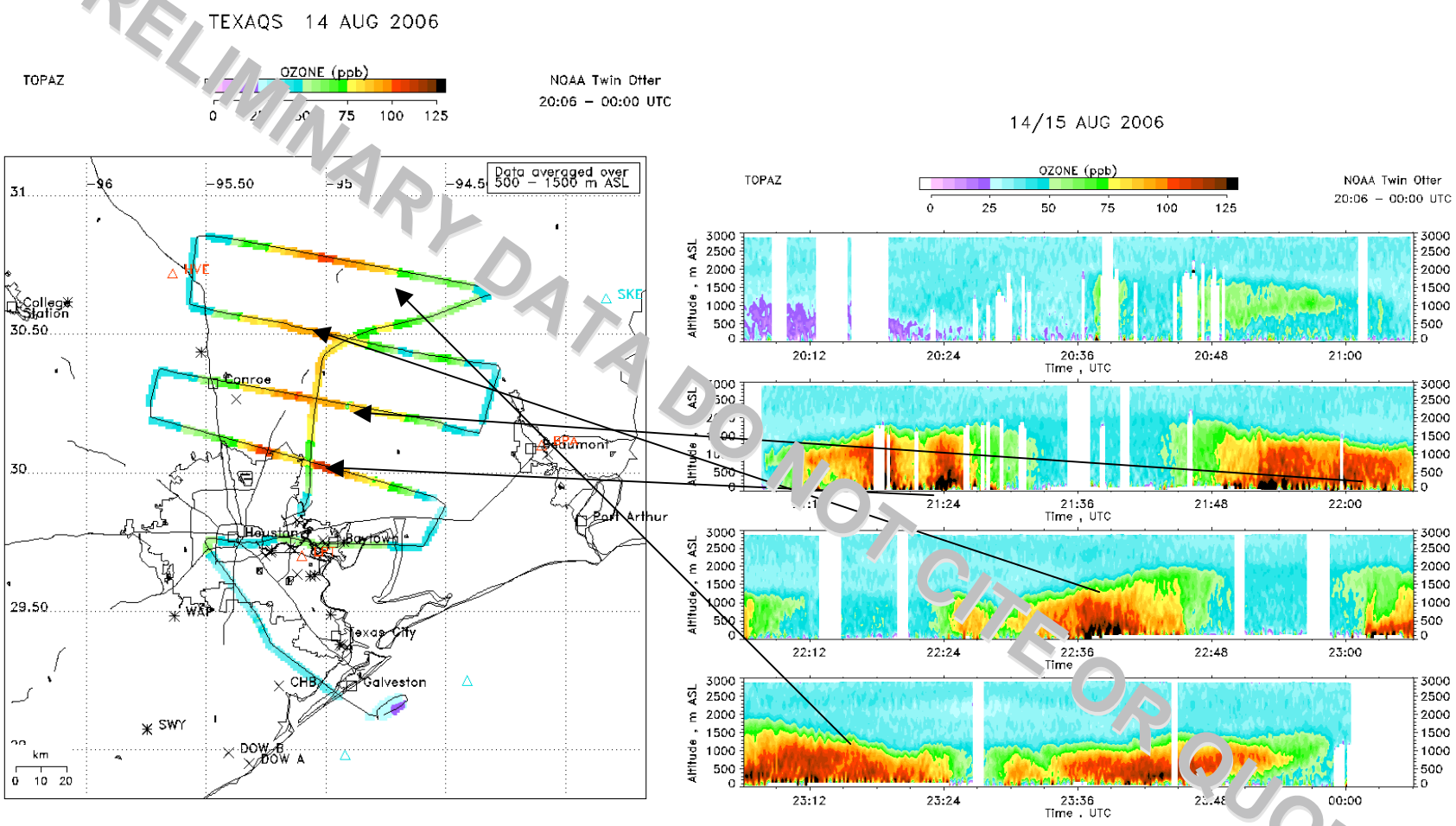


TexAQS-2006 Model Verification Project

Stu McKeen & Jim Wilczak

Eight O_3 and PM2.5 Forecasts Available in Real-Time

NOAA NWS/NCEP, 12km, WRF/CMAQ - surface O_3, PM2.5, Modal

NOAA ESRL/GSD, 12km and 36km, WRF-CHEM, Modal

Canadian CMC, 21km, CHRONOS, Mass only

Canadian CMC, 28km, AURAMS, Sectional-8

University of Iowa, 12km, WRF/STEM, Sectional-6

Baron AMS, 4km and 12km, MM5/MAQSIP-RT, Modal

Available after the Experiment

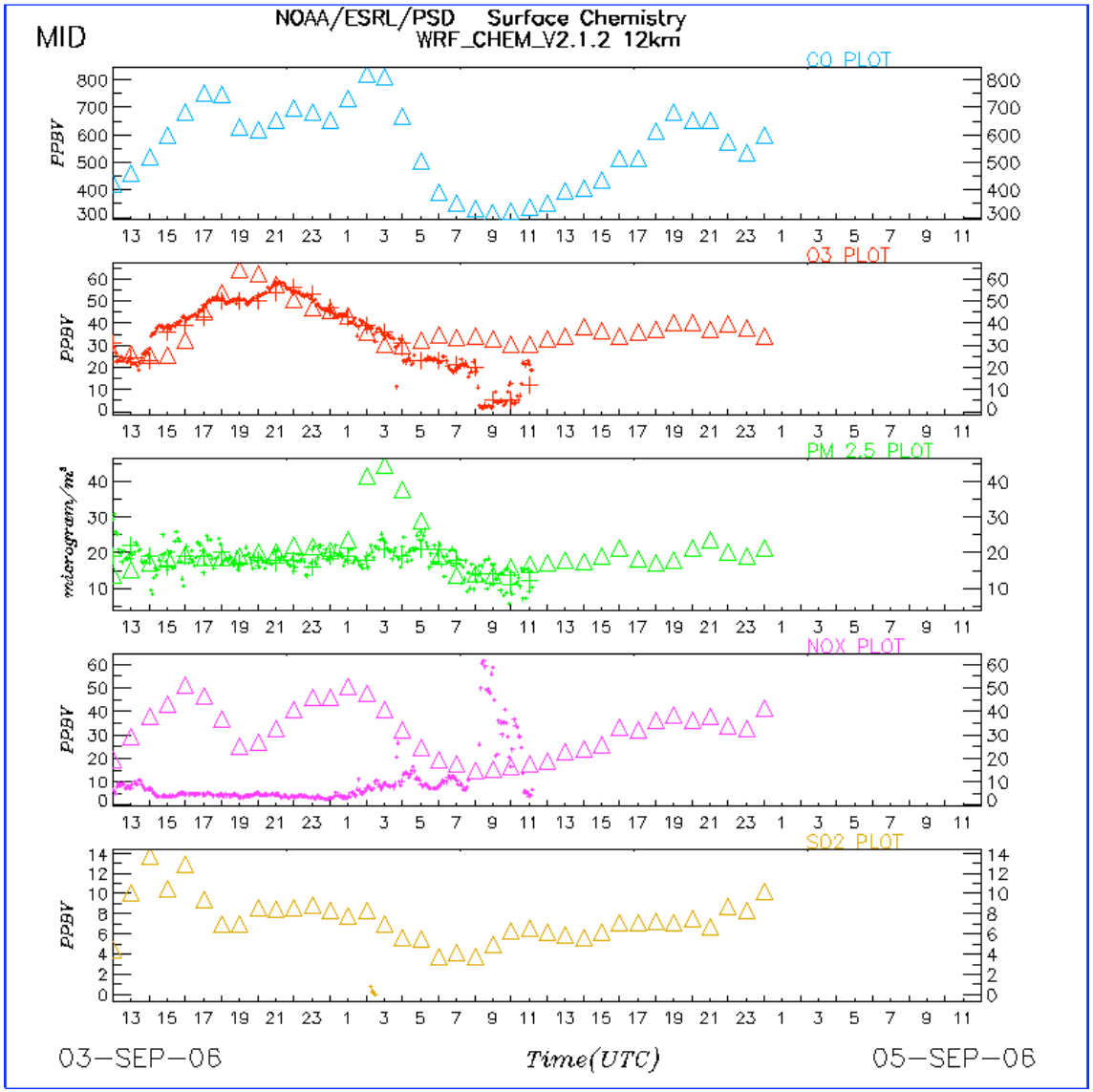
NOAA NWS/NCEP, Upper-Air Composition, Modal

University of Houston, 4km and 12km, MM5/CB-IV, Modal

http://www.etl.noaa.gov/programs/2006/texaqs/verification/

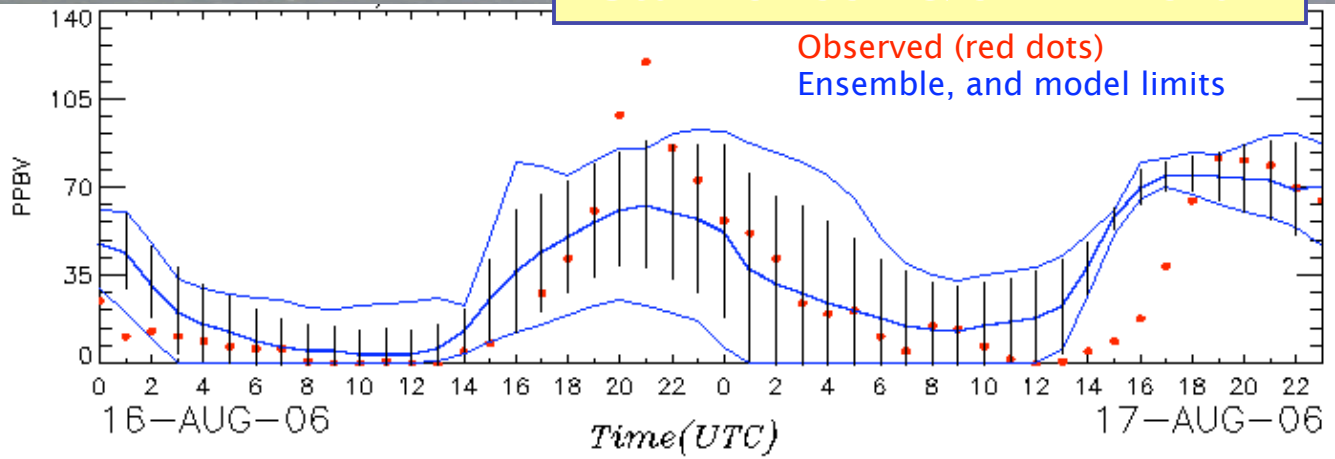
TexAQS-2006 Model Verification Project

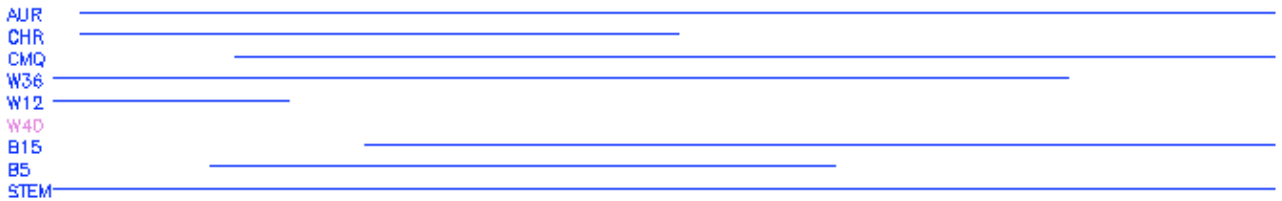
Midlothian Tower, Dallas

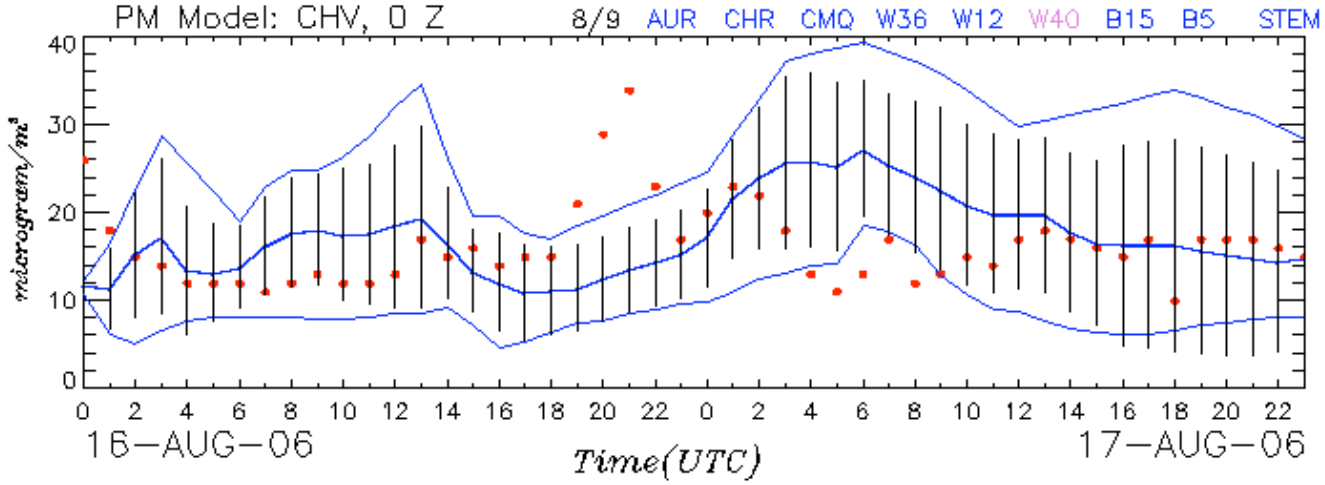


Ensemble Forecasts: Channelview, TX - O_3 and PM2.5 event of 8/16/06

Stu McKeen & Jim Wilczak







O_3 Ensemble:

None of 7 models predict observed peak

< Models contributing
< to ensemble

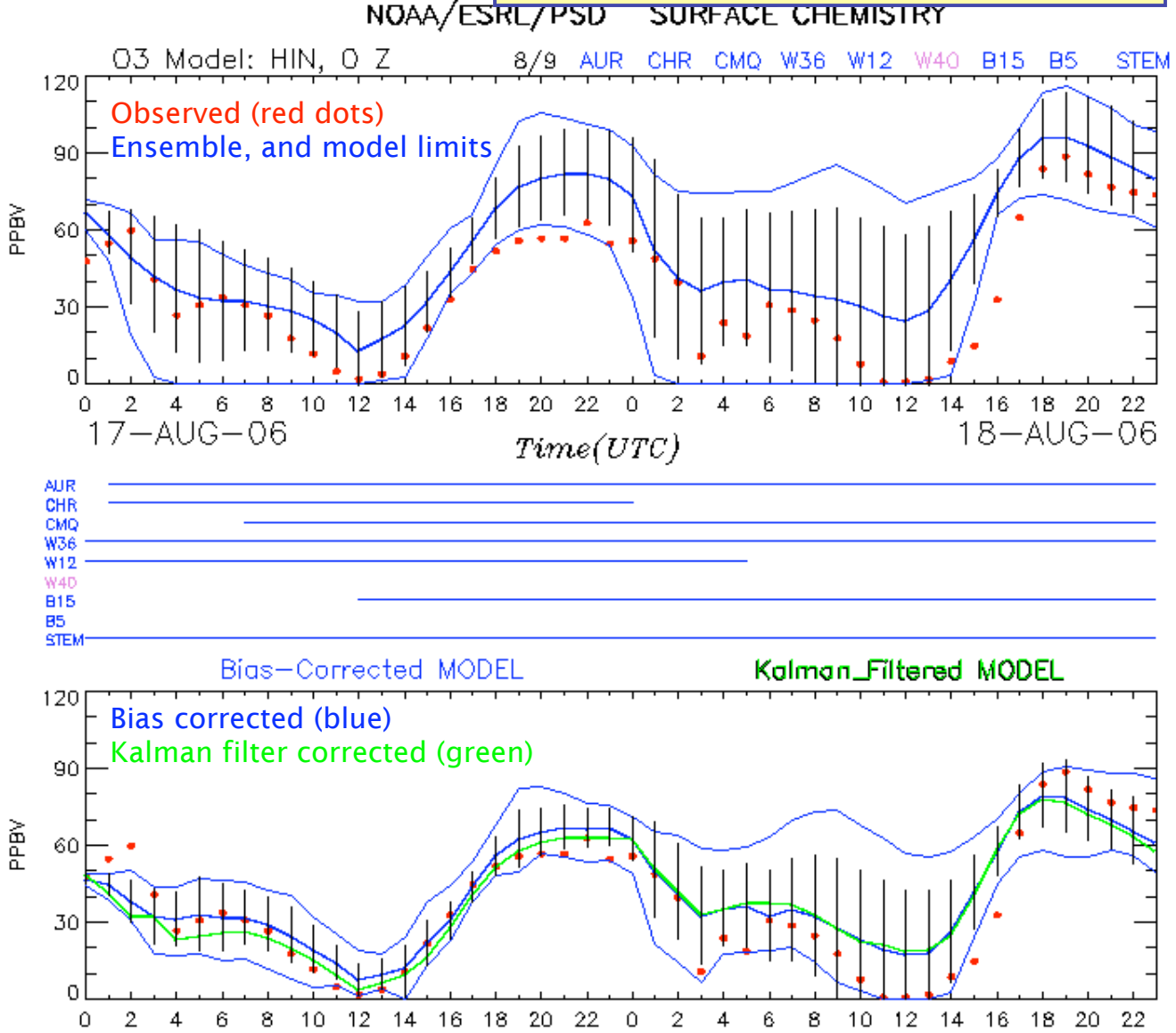
PM2.5 Ensemble:

First real-time PM2.5 ensemble forecast

No mid-day peak correlated with O_3

Dallas TX, Hinton Street site, 8/17/06

Stu McKeen & Jim Wilczak



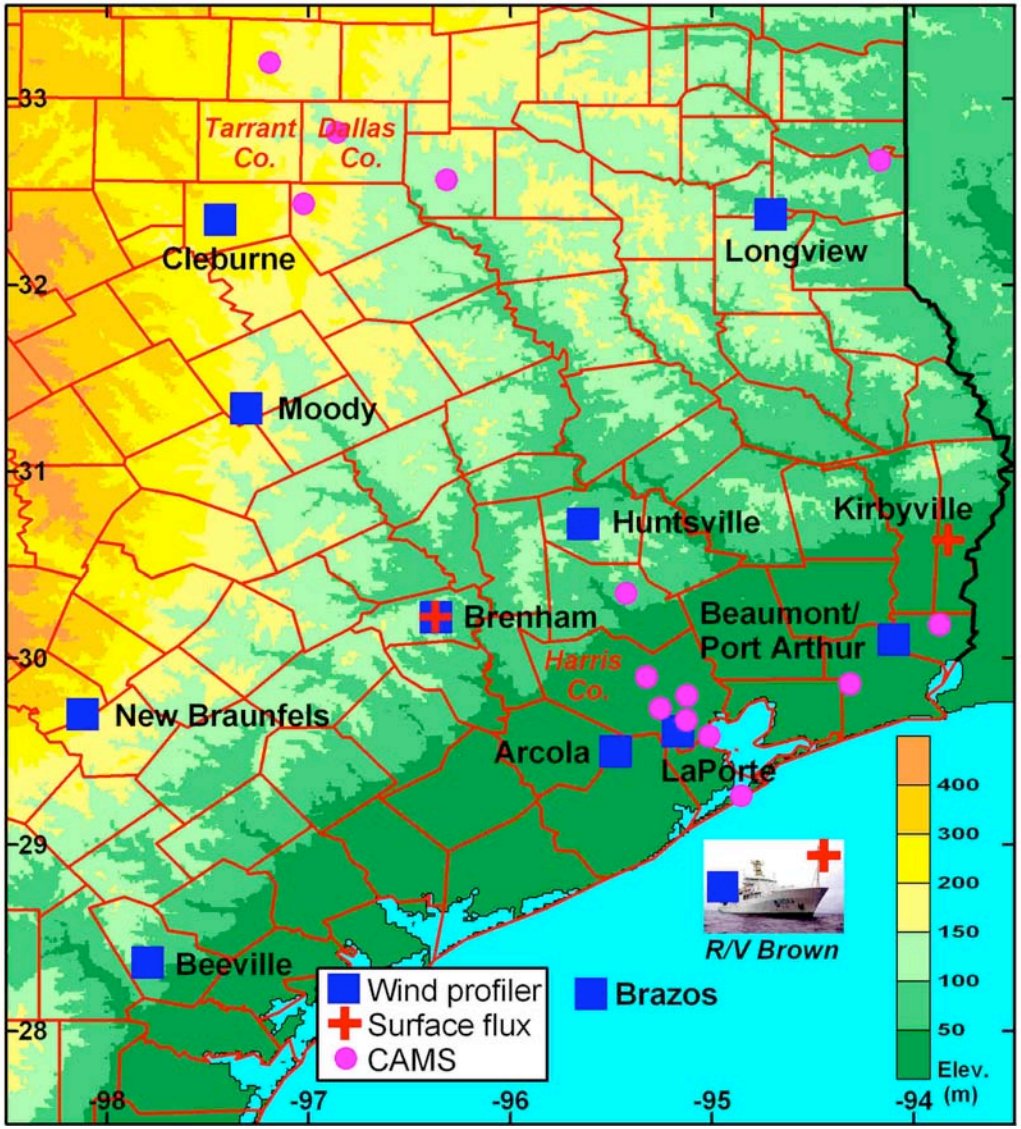
O_3 ensemble sometimes has bias

Bias corrected ensemble refines forecast further

No advantage of Kalman filter over simple bias correction technique

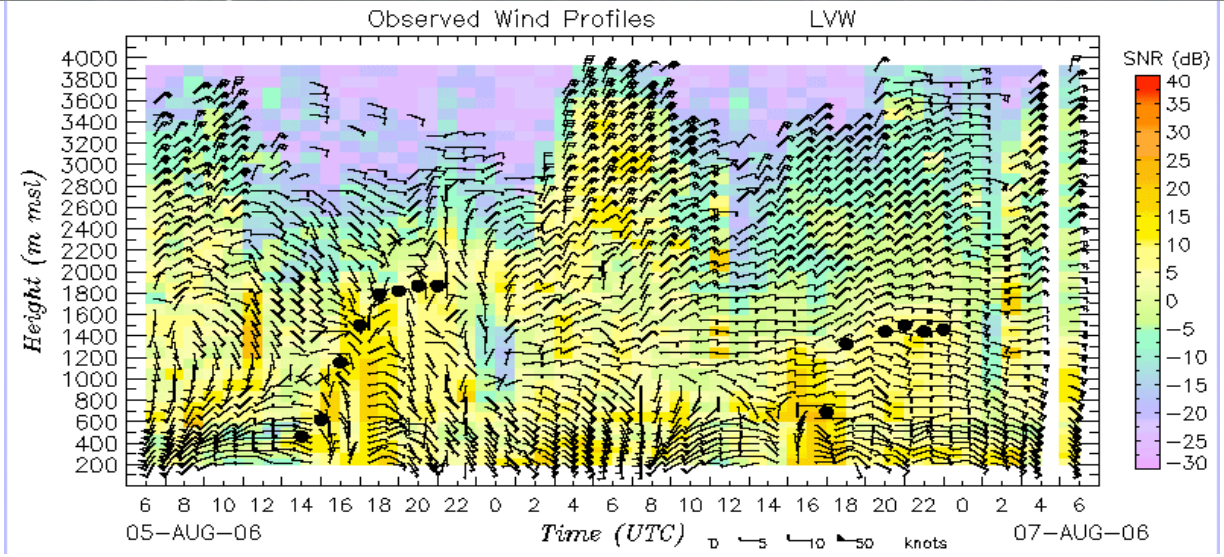
Surface Fluxes and Radar Profiler Sites

Allen White

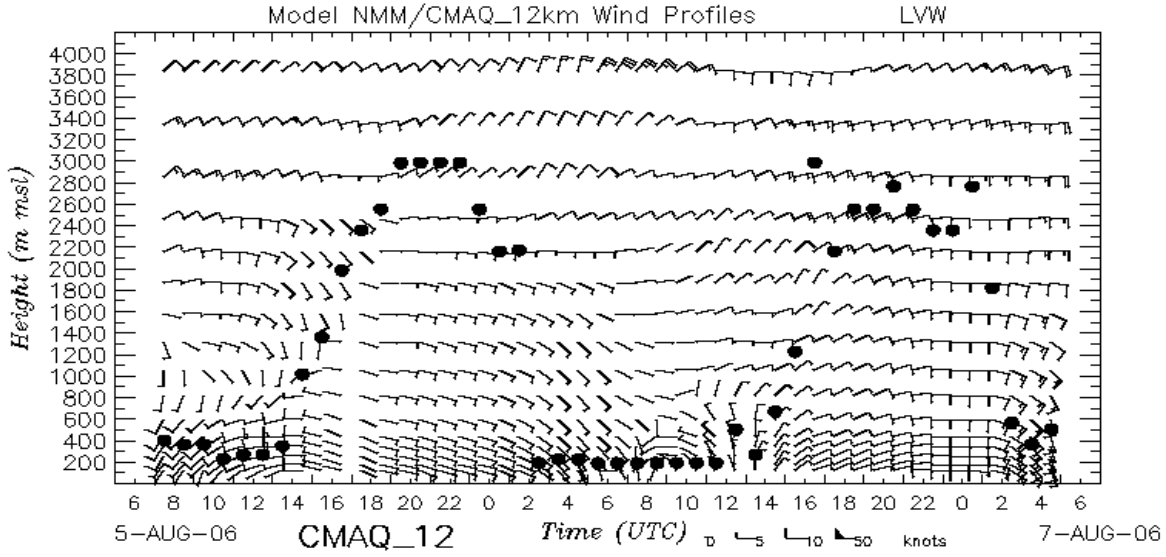


Verifying Mixing Height Forecasts

Jim Wilczak

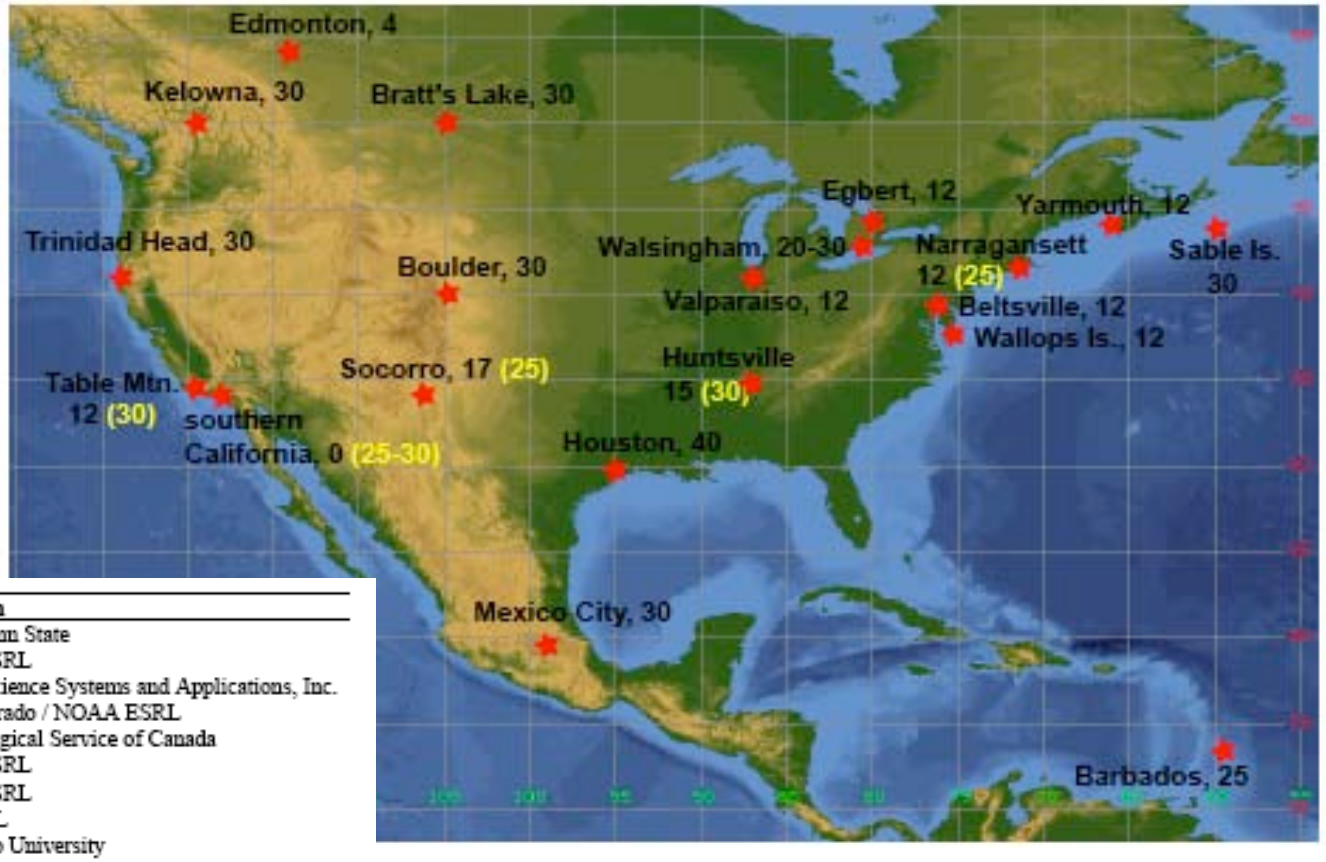


Wind profiler winds and PBL depths



NCEP NMM/CMAQ winds and PBL depths

Ozonesonde Network



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Jim Meagher	NOAA ESRL
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Trevor Carey-Smith	Meteorological Service of Canada
Gerry Forbes	Environment Canada
Frank Schmidlin	NASA: Wallops Space Flight Facility
Bryan Johnson	NOAA ESRL
Tony VanCuren	California Air Resources Board
Terry Keating	USA EPA
Everette Joseph	Howard University