

Baylor University Airborne Measurements during TEXAQS II

terc science advisory committee
June 4-5, 2007



sergioalvarez **levikauffman** **maxwellshauck** **graziazanin**

baylor university
waco, texas

martinbuhr

air quality design, inc.
golden, colorado

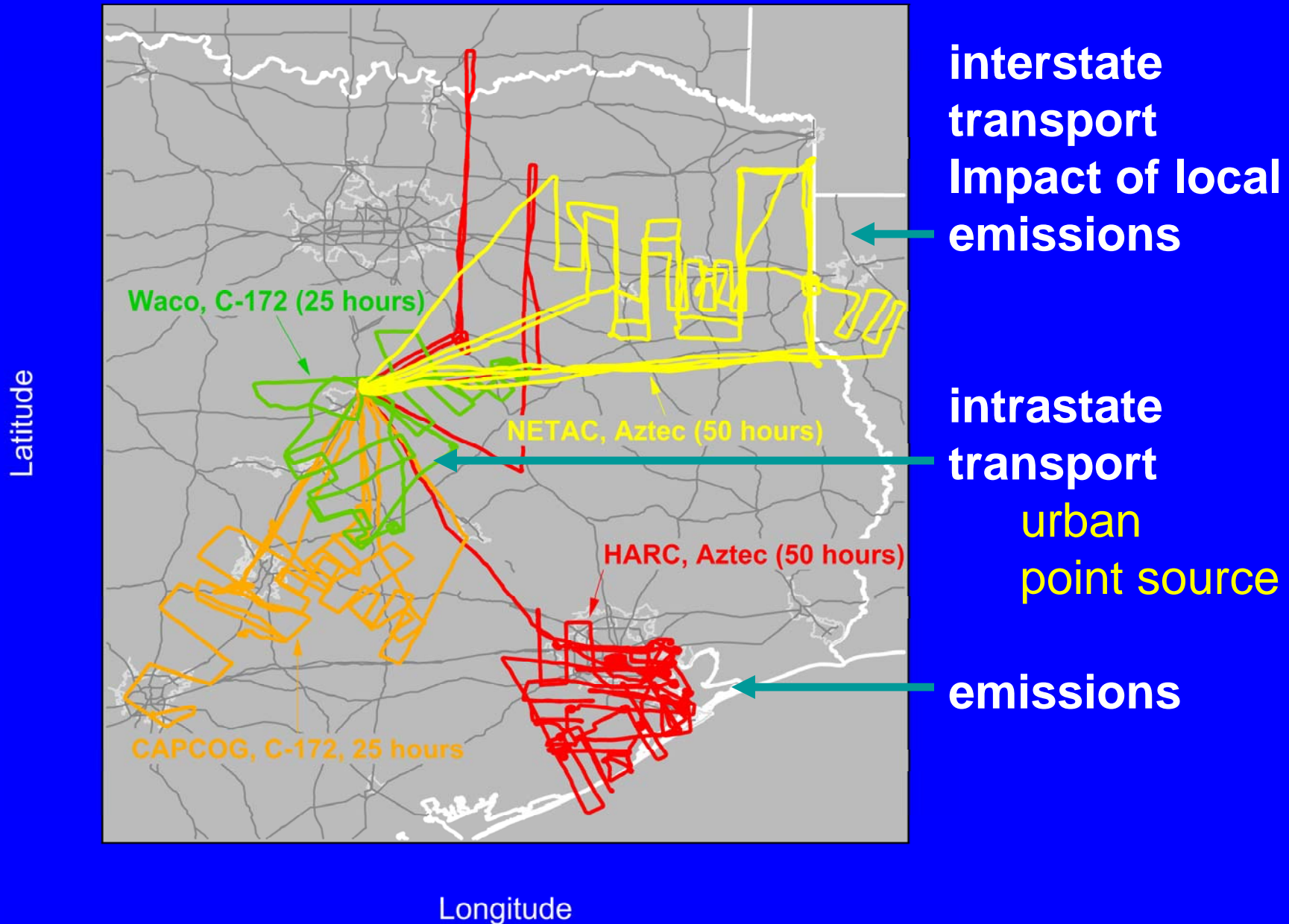
outline

- overview of **measurement** systems and flights conducted
 - stationary front experiment,
 - top down emissions verification,
 - vertical mixing experiment, and
 - regional transport, interstate and intrastate
- overview of **data set** collected
- initial evaluation of **formaldehyde** measurements in the **Houston** area.

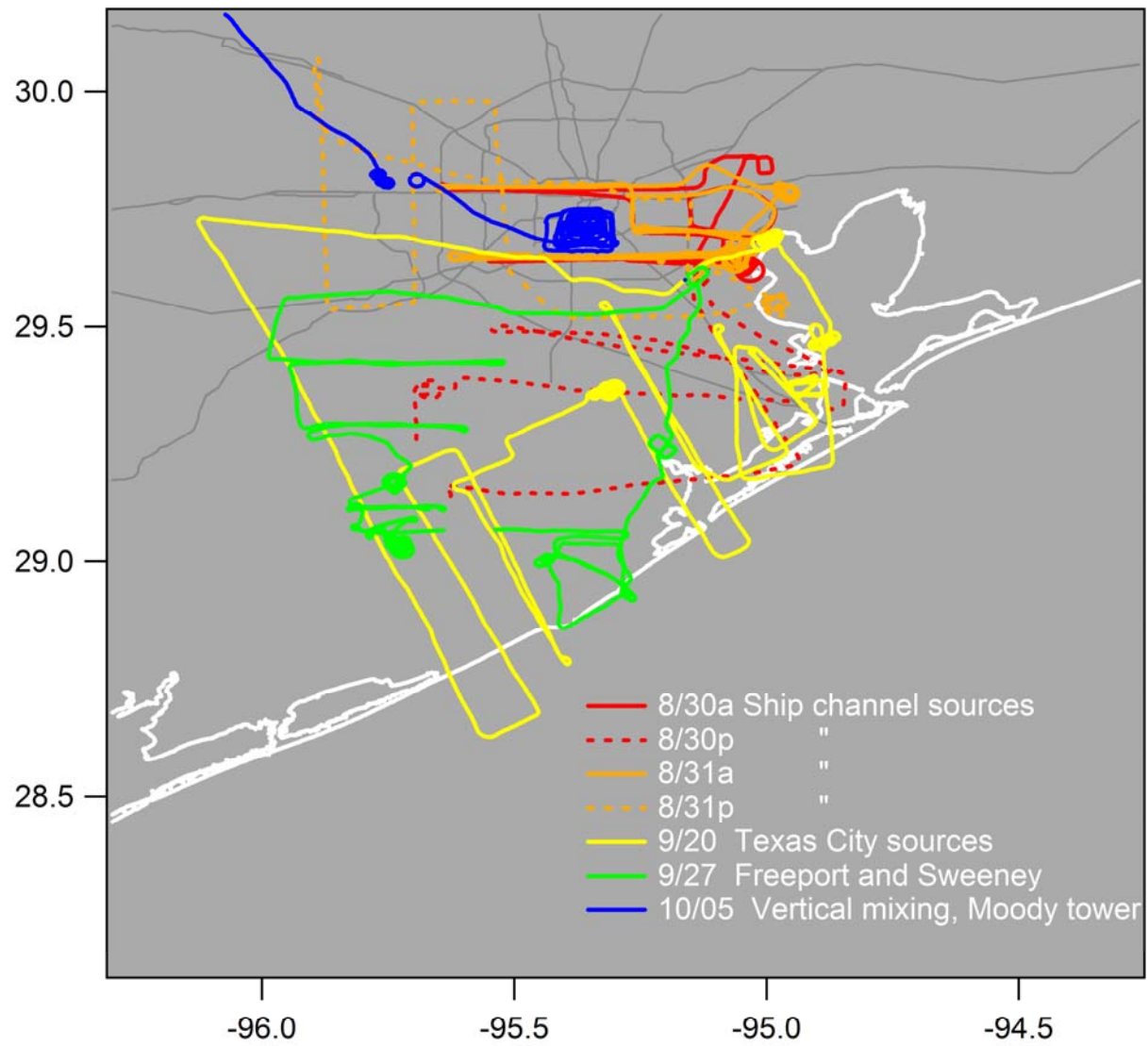
measurement systems

Parameter	Method	Speed
NO	chemiluminescence	5-sec
NO ₂	Chemiluminescence / photolytic conversion	5-sec
NO _y	Chemiluminescence / catalytic conversion	5-sec
CO	VUV fluorescence	1-sec, 5-sec
SO ₂	Fluorescence	5-sec (30 sec)
Alkenes	Chemiluminescence	1-sec, 5-sec
Formaldehyde	Hantzsch rxn / fluorescence	5-sec (90 sec)
Ozone	UV absorption	5-sec
Light scattering	3-1 nephelometer	1-sec, 5-sec
Hydrocarbons	GC/FID/MS – Univ Houston canisters	1-min fill time
Meteorological	Various	1-sec, 5-sec

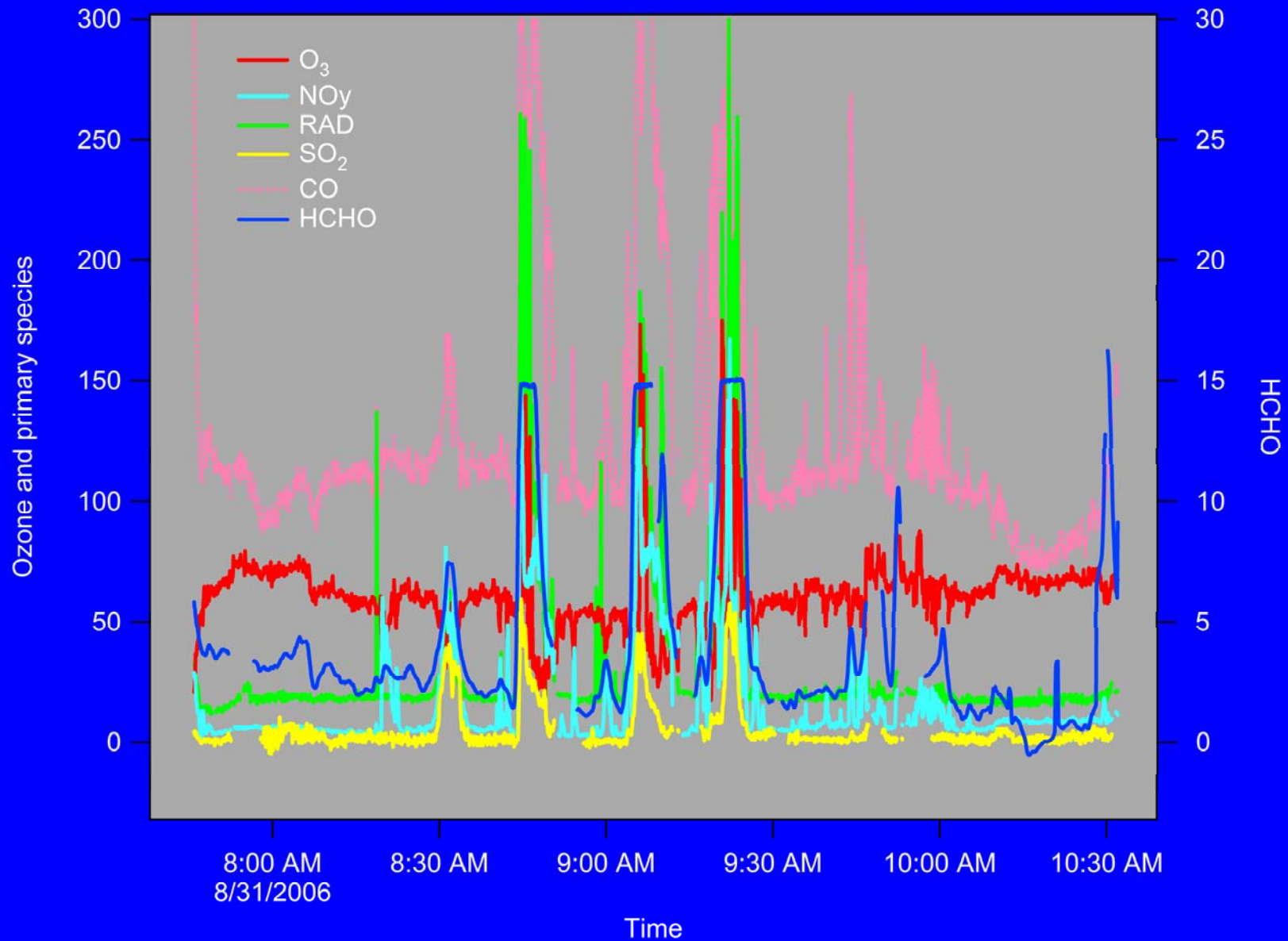
2006 flight tracks 150 flight hours



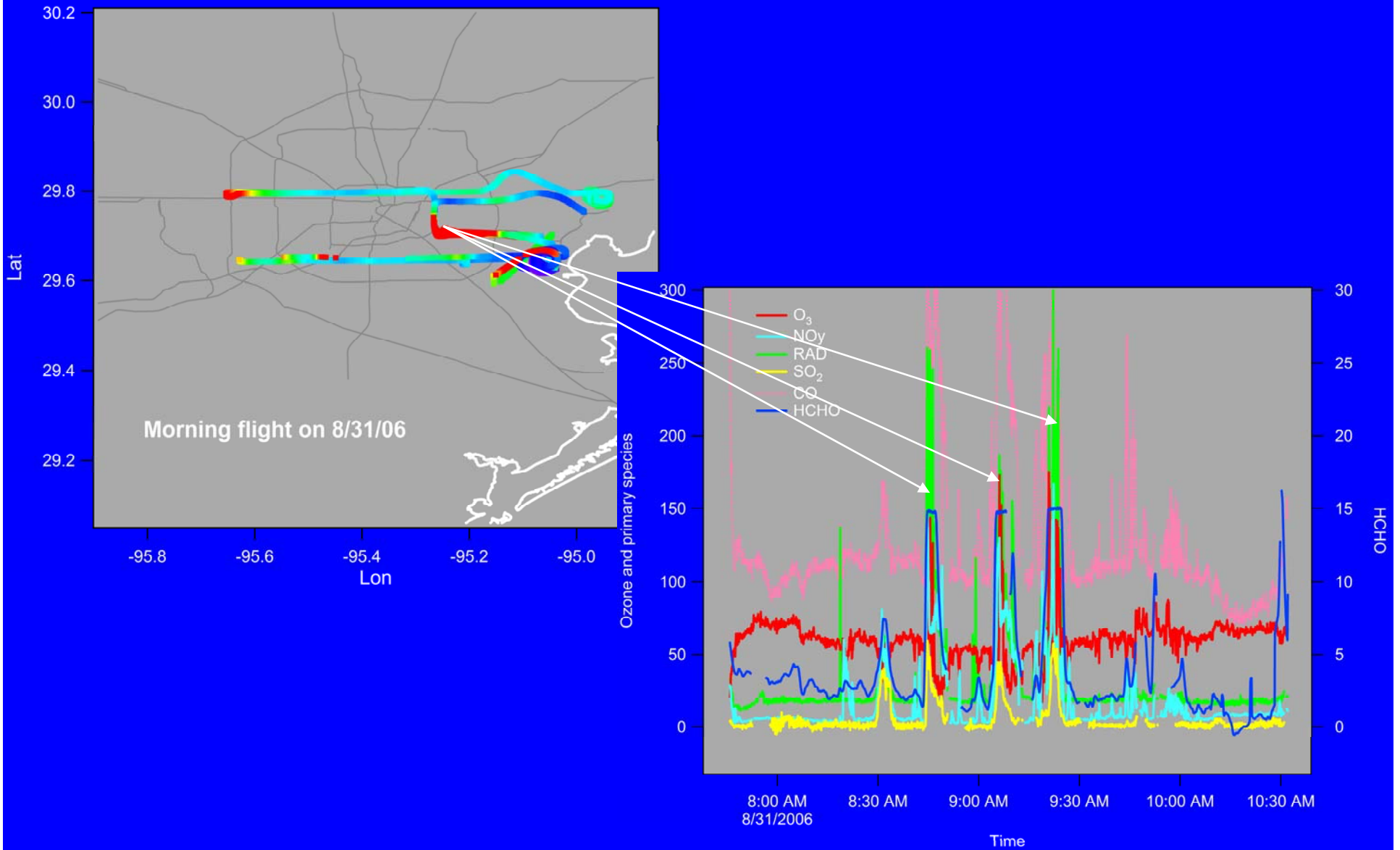
2006 Houston area flights



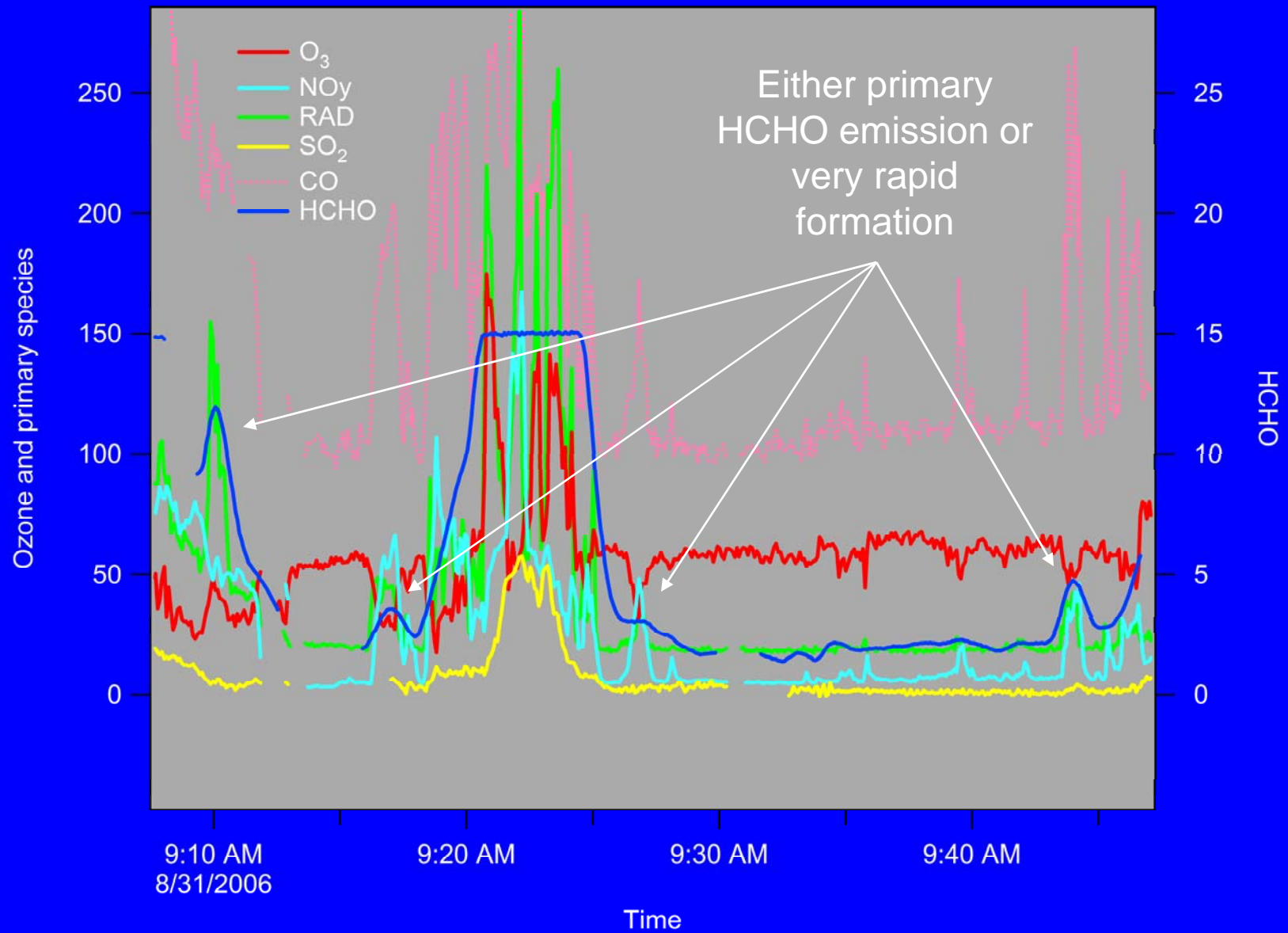
August 31 morning flight



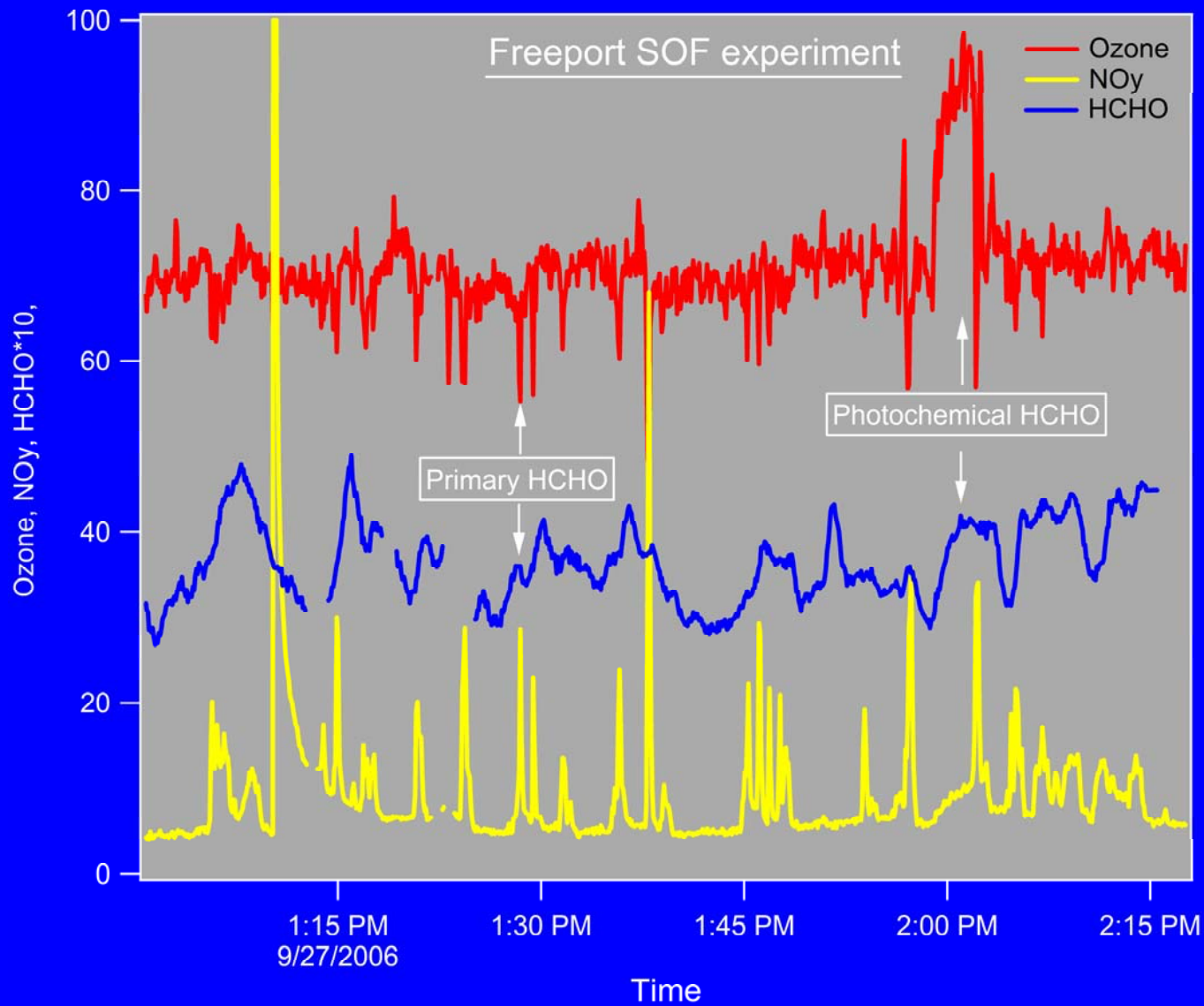
August 31 morning flight



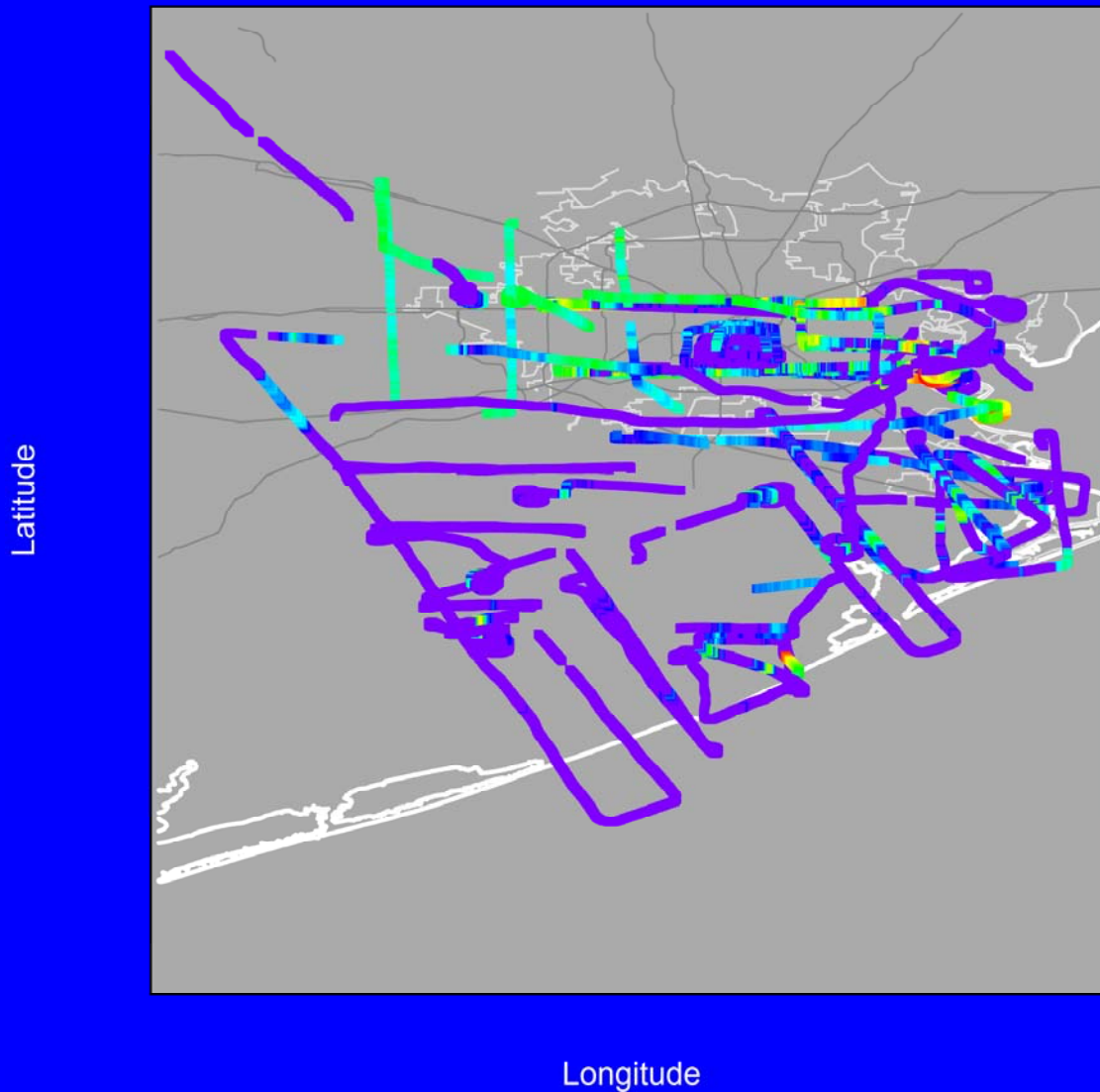
August 31 morning flight



Freeport SOF experiment



All Houston flight data



The HCHO/NO_y ratio works as an indicator of primary HCHO

All Houston area flight tracks, colored as a function of the HCHO/NO_y ratio

HCHO hotspots observed at several ship channel locations, Texas City, Freeport, and Sweeny

summary

- **150 flight hours**
 - Emission evaluation and product formation
 - Effects of stationary fronts on air composition
 - Vertical mixing experiment
 - Interstate/intrastate transport
- Rich data set of **primary and secondary** pollutants collected in the source region
- Formaldehyde measurements suggest either very **rapid formation** or a **primary source** at many locations in the Houston area

recommendations

- Analysis of the **HCHO** data
 - Possible primary source evaluated as a function of co-variation with the other measured parameters
 - Time series analysis
 - Principal component analysis
 - Geographic source assignment
- Additional flights during **photochemically quiescent** periods (winter months)
 - Slow the chemical transformation for a **clearer picture of emissions**