# Wilmington Tracer Studies

**Akula Venkatram**
**Department of Mechanical Engineering**
**Bourns College of Engineering**
**University of California, Riverside**

**1/10/2007**
**Wilmington Senior Citizen Center**

- Objective
- Background
- Approach
- Results


California Air Resources Board

# Objective

To develop methods to estimate the impact of elevated (power plant) and surface sources in Wilmington on air quality in the surrounding community

Sponsored by the California Air Resources Board (ARB) and the California Energy Commission (CEC)

# Communities Next to Roads

# Small Neighborhood Businesses among Residences

# Major Industrial Activities

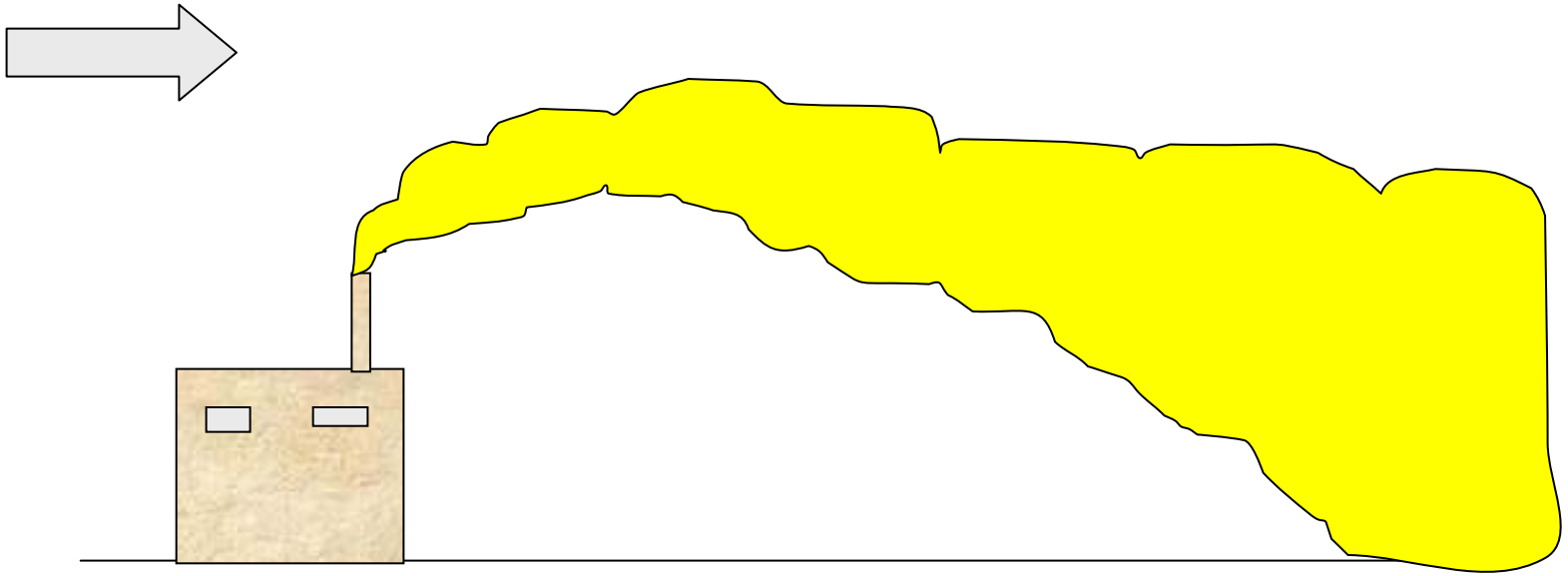
# LADWP Power Plant

# Background

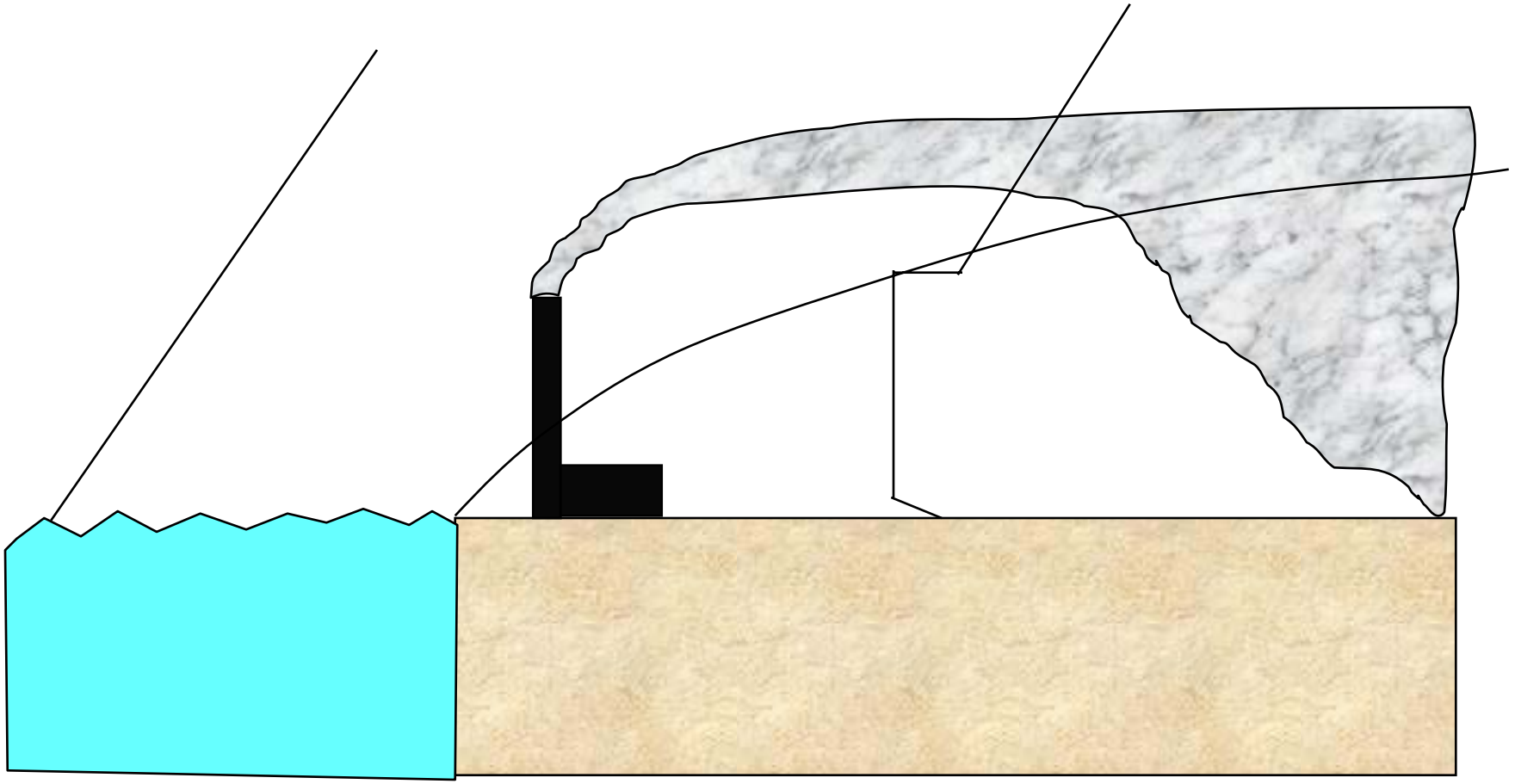
Impact

- increases with emission rate
- decreases with wind speed
- decreases with size of plume

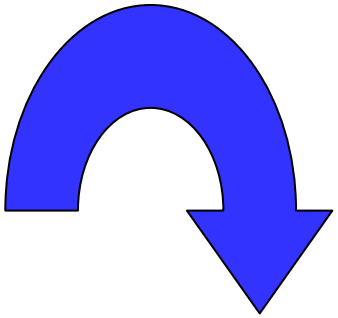
Wind



# Shoreline Dispersion



# What do we measure ?



- Dilution rate
  - Sampler concentrations
- Dimensions of plume
  - Sampler concentration patterns
- Winds and temperatures
  - Meteorological instrumentation

# Approach

- Release harmless tracer from source
- Sample tracer at locations in the community
- Figure out how material was transported
- Summarize observations into method (model) that can used to estimate air quality impact of any source

# Tracer Studies

- Conducted tracer studies in Wilmington, LA to obtain data on dispersion from near surface and elevated releases in urban areas
  - August 26th to September 10th 2004- 8 days
  - June 24th to June 28th 2005- 4 days

# Acknowledgements

Special thanks to:

- Marla Mueller, CEC
- Vlad Isakov, ARB
- Jesse Marquez, community representative
- The Los Angeles Department of Water and Power
- The Los Angeles Sanitation District

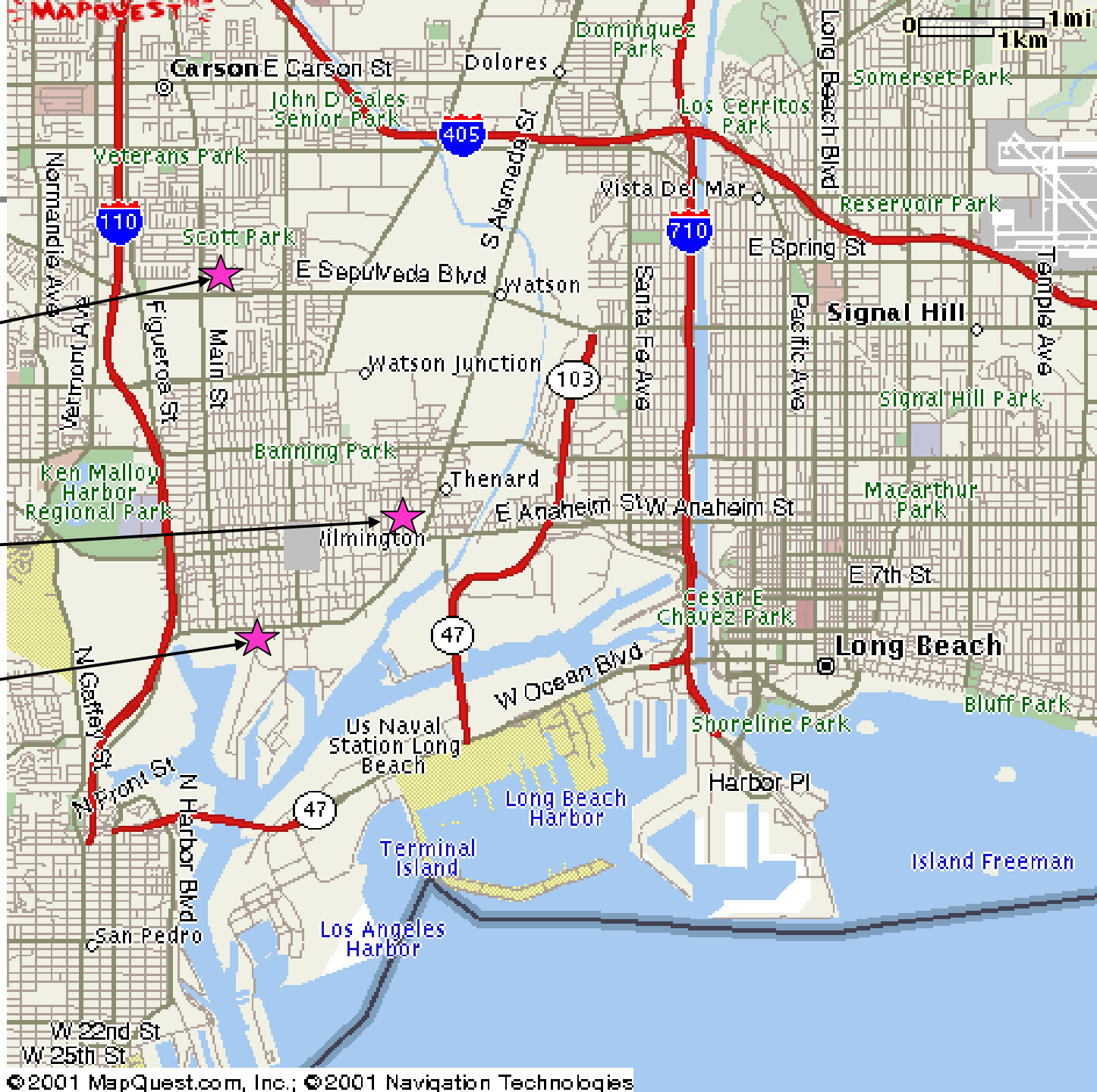
We appreciate the help from the residents and business owners who participated in the studies

Map of the study area: Wilmington / Long Beach

Locations of sodar and sonic tower

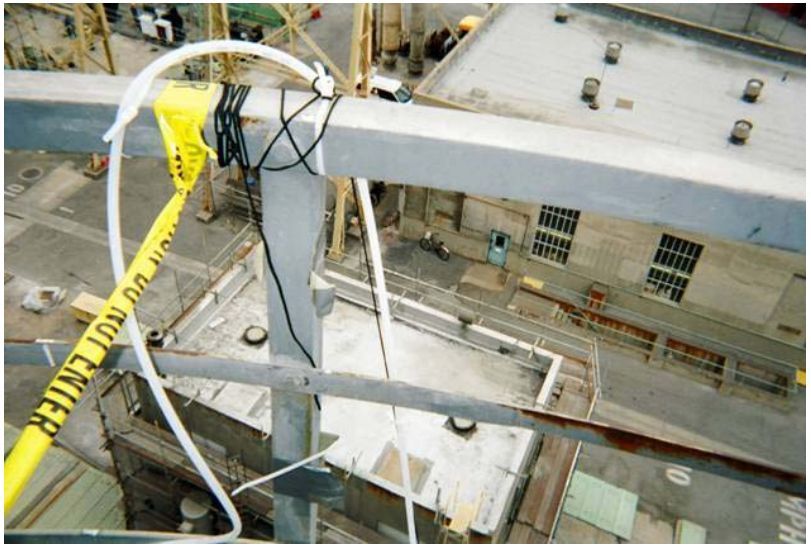
Wilmington Park Elementary School

LADWP tracer release sonic mini-sodar



# Wilmington Surroundings

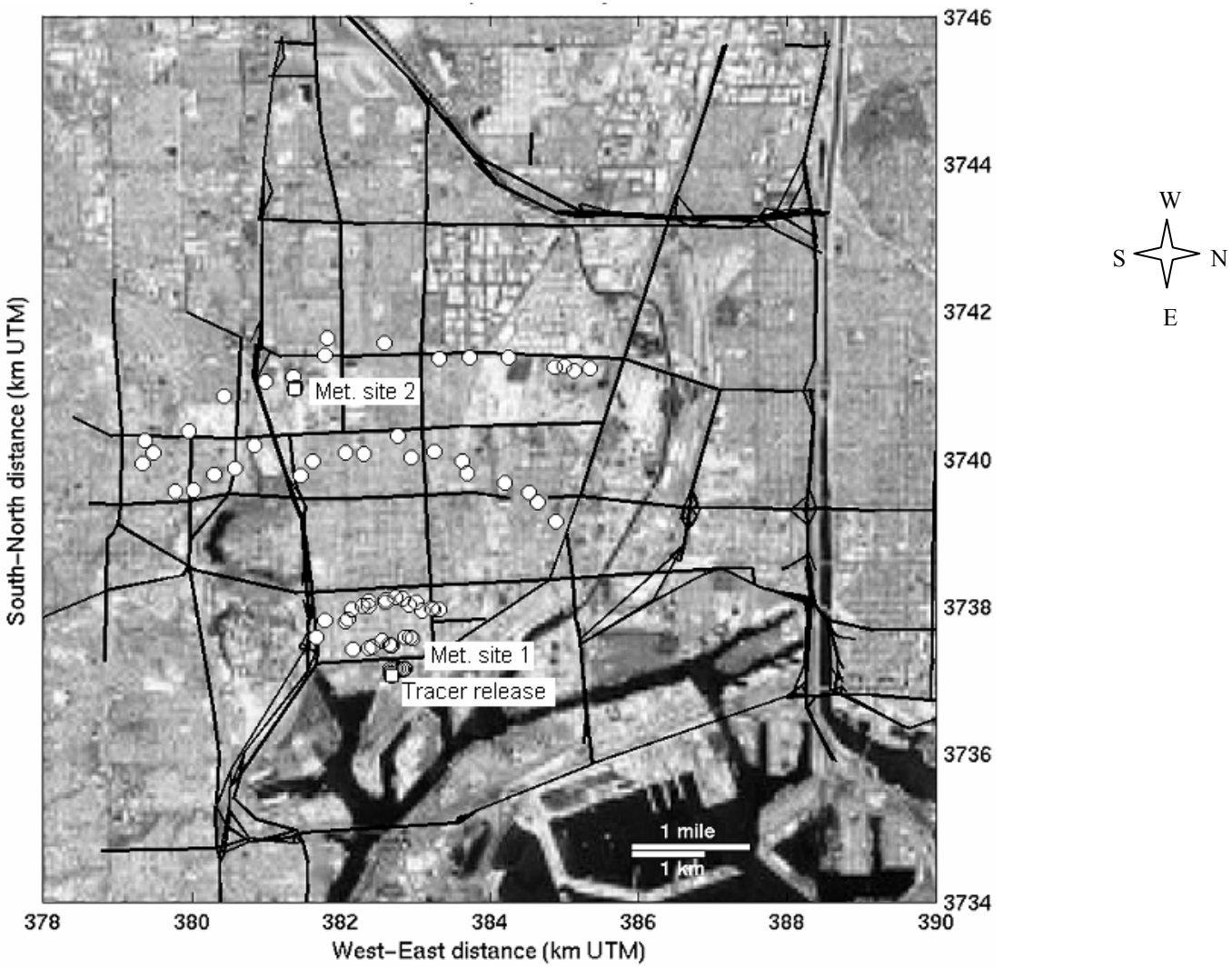
# Tracer Release



# Project team at the release site

# Sampling System

# The locations of samplers

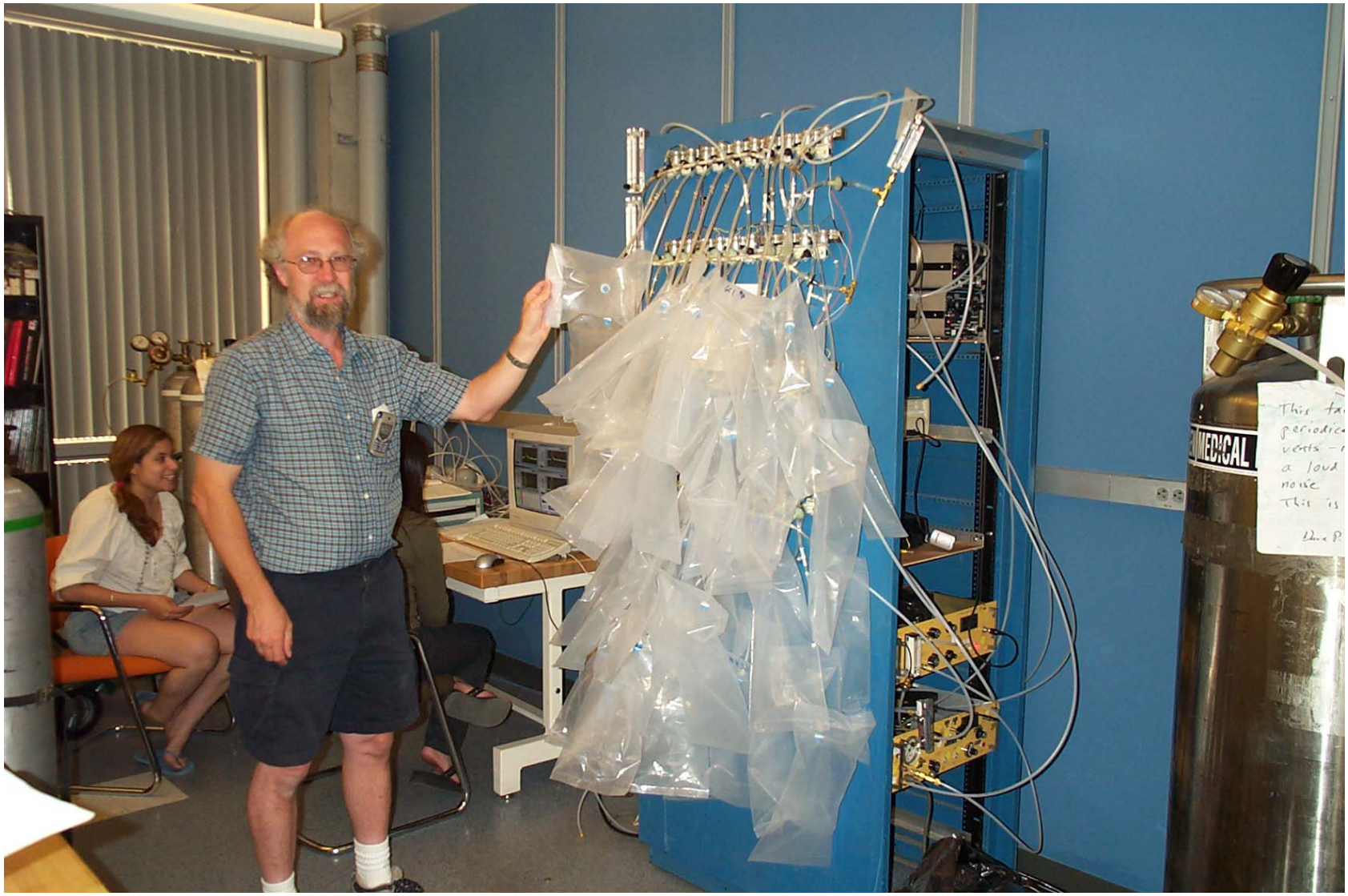


# 72 Sampler Locations Provided by Wilmington Residents and Businesses



# Stationary Tracer Sampler

# Tracer Bag Analysis - UCR Lab



# The Lab at UCR

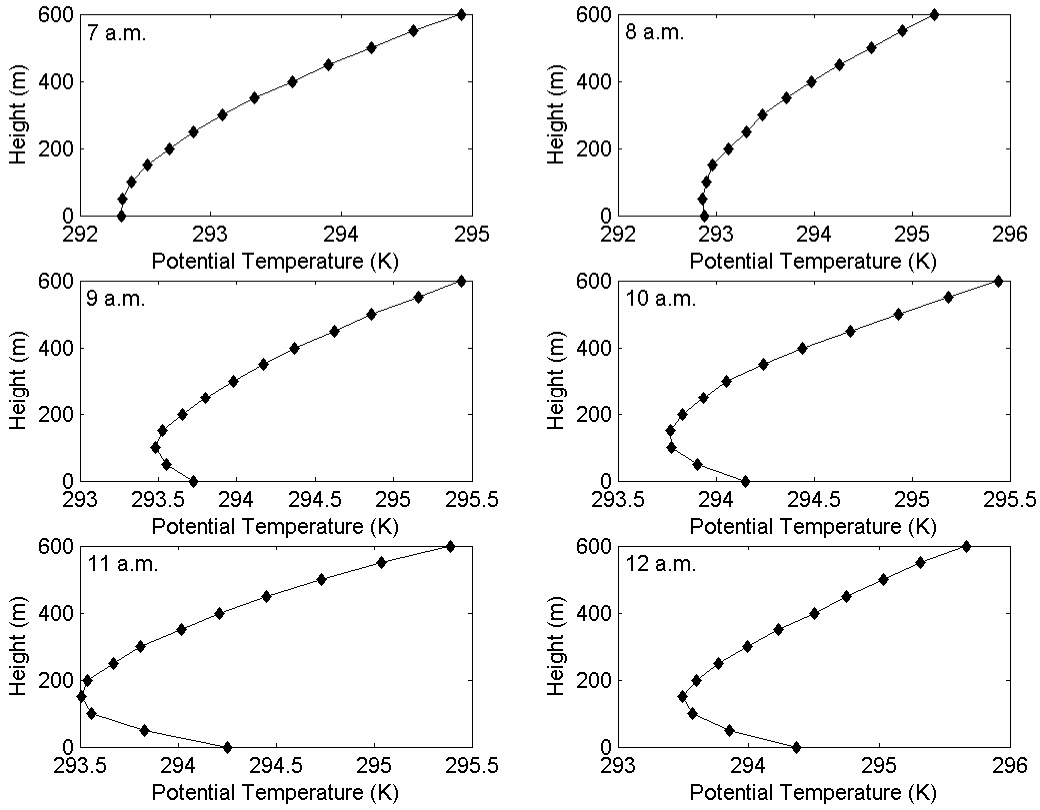
# Meteorological Measurements

# CE-CERT Parking Lot

# Dugway Experiment

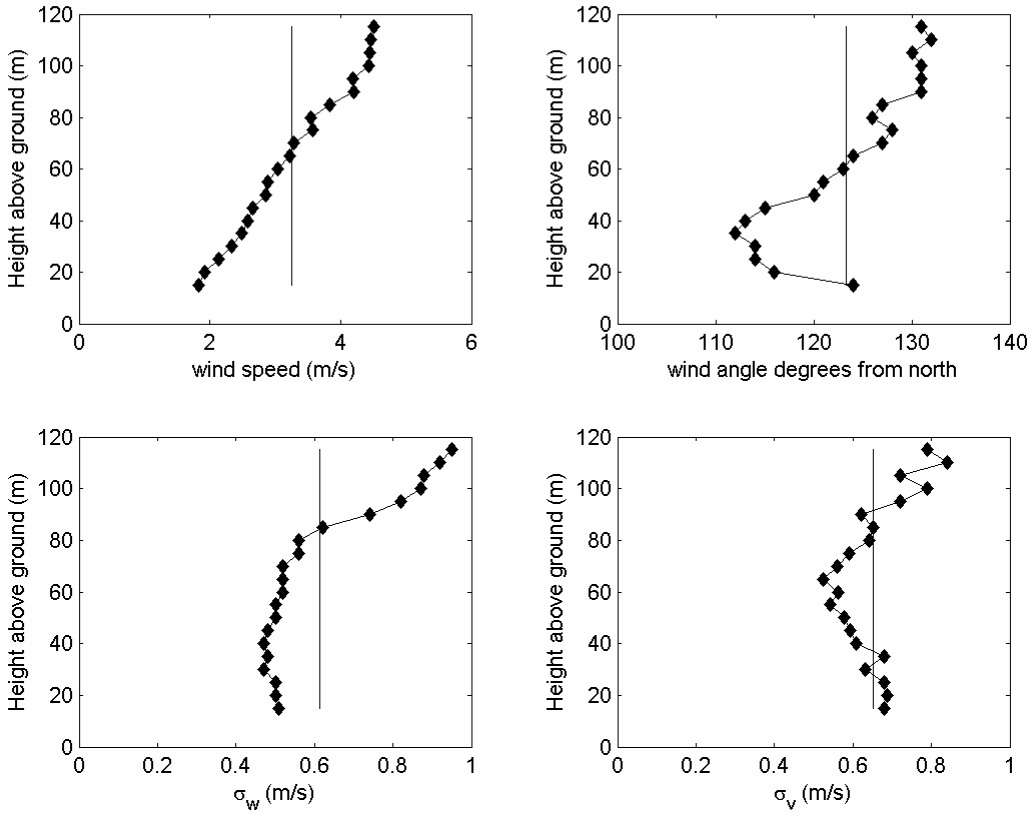
# Temperature Sensor and Sodar at the JWPCP site

# Temperature Profiles

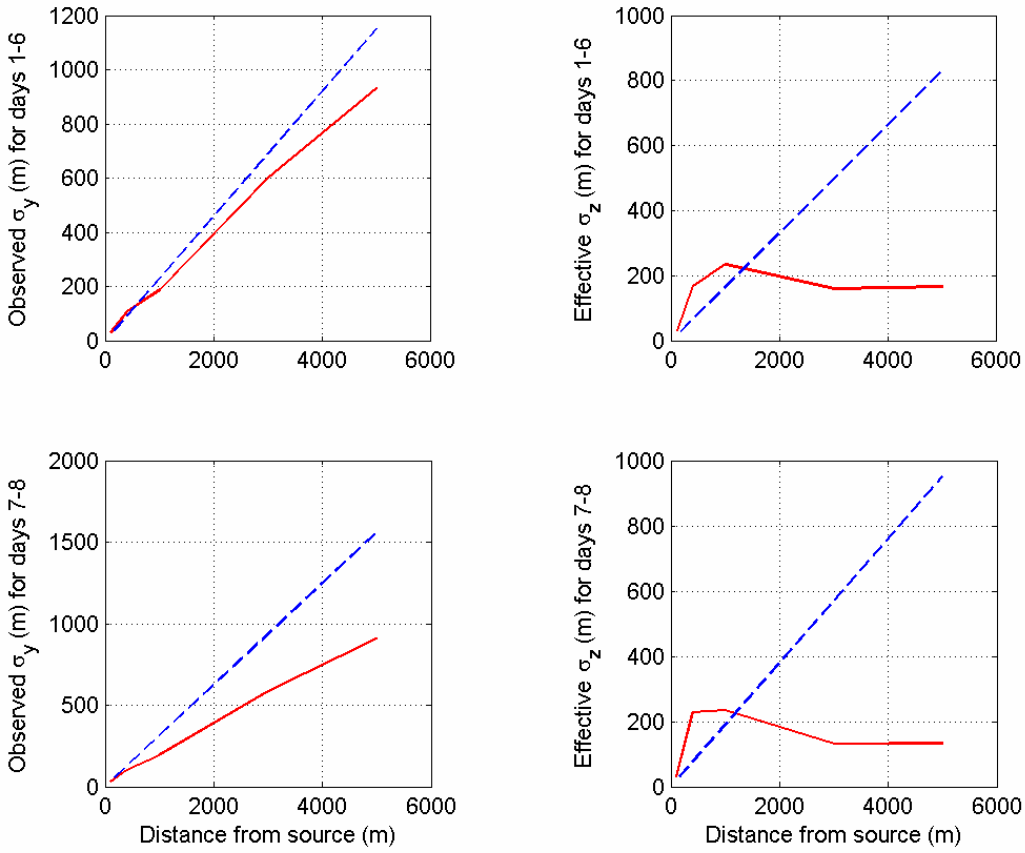


# Sonic and mini-sodar at the LADWP site

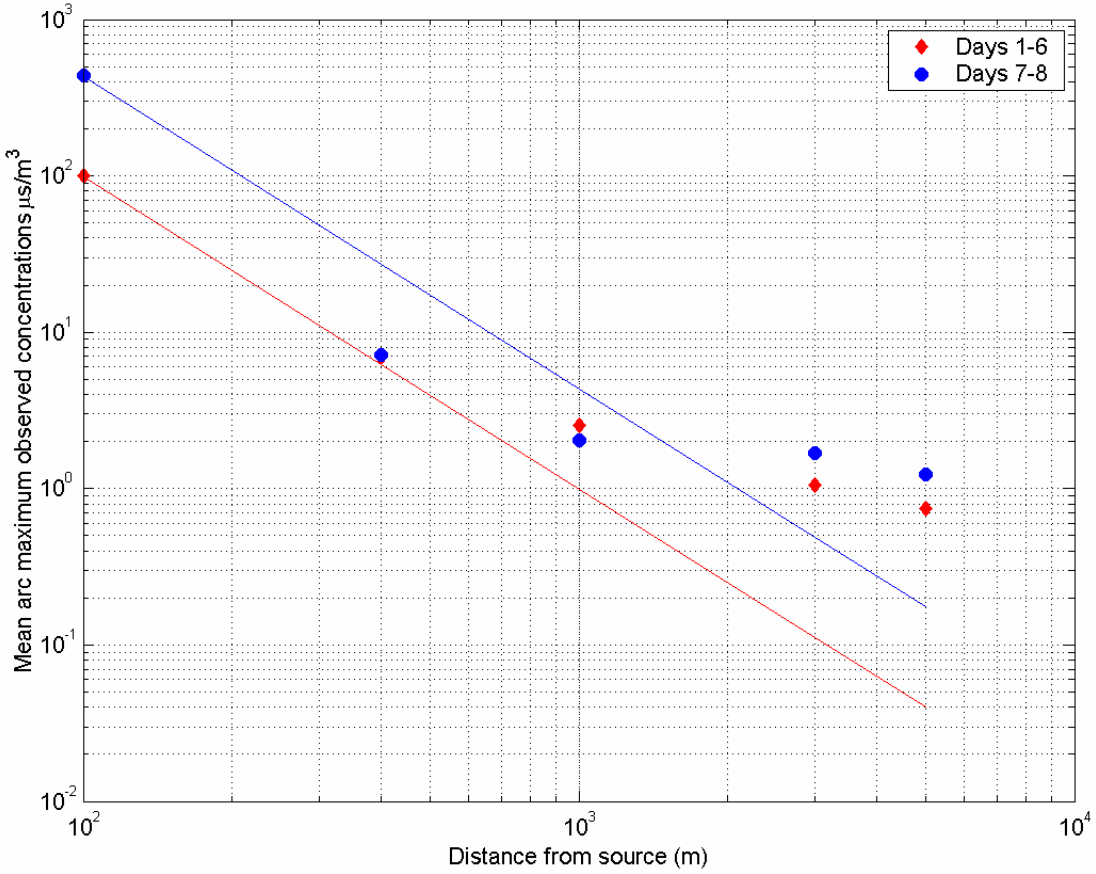
# Meteorological Profiles



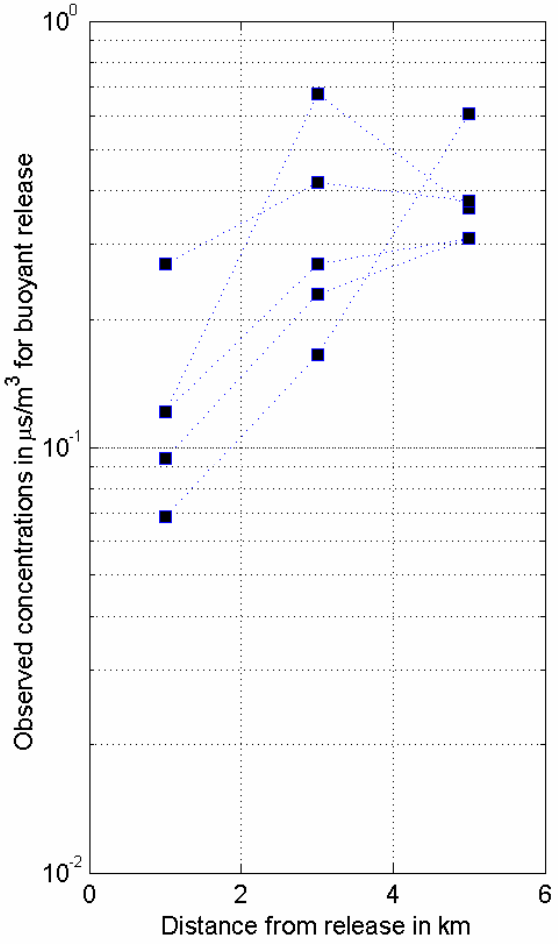
# Plume Spread

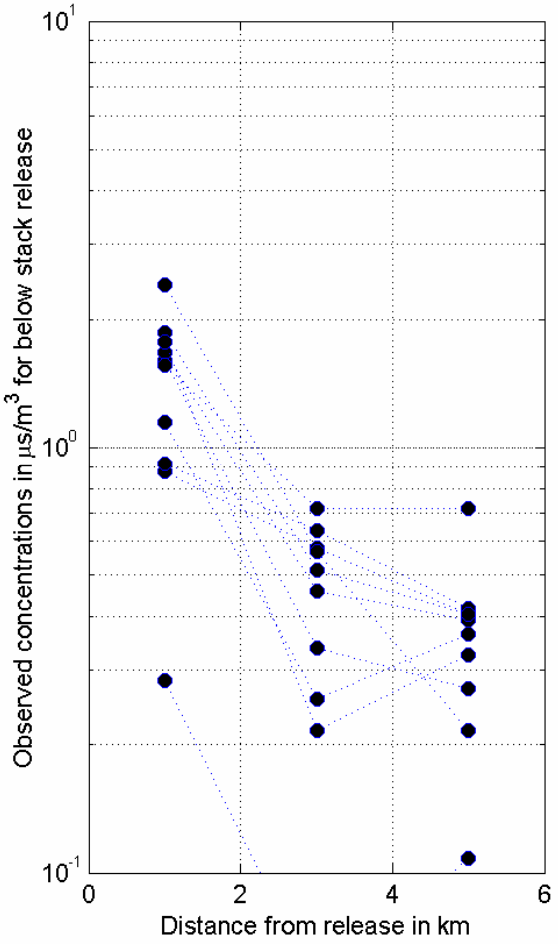


# Results from Wilmington 2004 Shoreline Study



# Results from Wilmington 2005 Shoreline Study



# Conclusions from Field Studies

1. Observed dilution rates range from 100 $\mu s/m^3$ at 100 m to 1 $\mu s/m^3$ at 1000 m
2. Elevated sources have a maximum impact of 1 $\mu s/m^3$ at 5000 m
3. We can make estimates of the impact of sources if local meteorology is measured

# The Players

- Over 25 students and staff involved in the study
- Volunteers from Wilmington

# Acknowledgements

Special thanks to:

- Marla Mueller, CEC
- Vlad Isakov, ARB
- Jesse Marquez, community representative
- The Los Angeles Department of Water and Power
- The Los Angeles Sanitation District

We appreciate the help from the residents and business owners who participated in the studies