Sacramento Winter Study
Measuring Toxics from Wood Smoke

Air Sensors International Conference

September 14, 2018

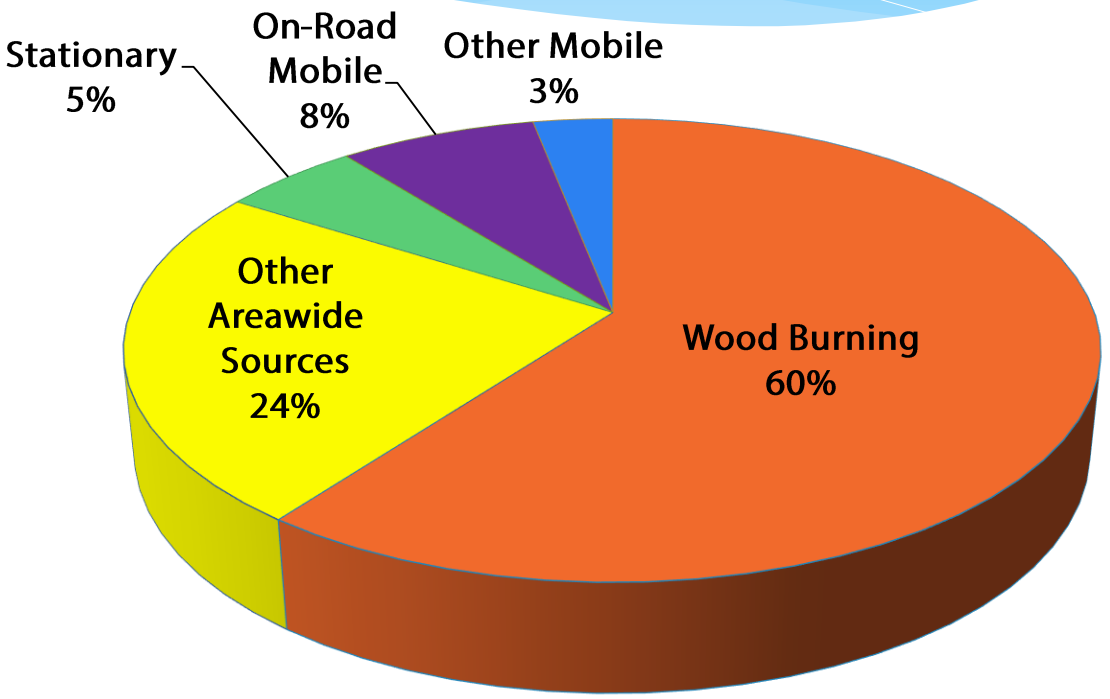
Janice Lam Snyder, SMAQMD

Steven Brown, Sonoma Technology Inc.

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

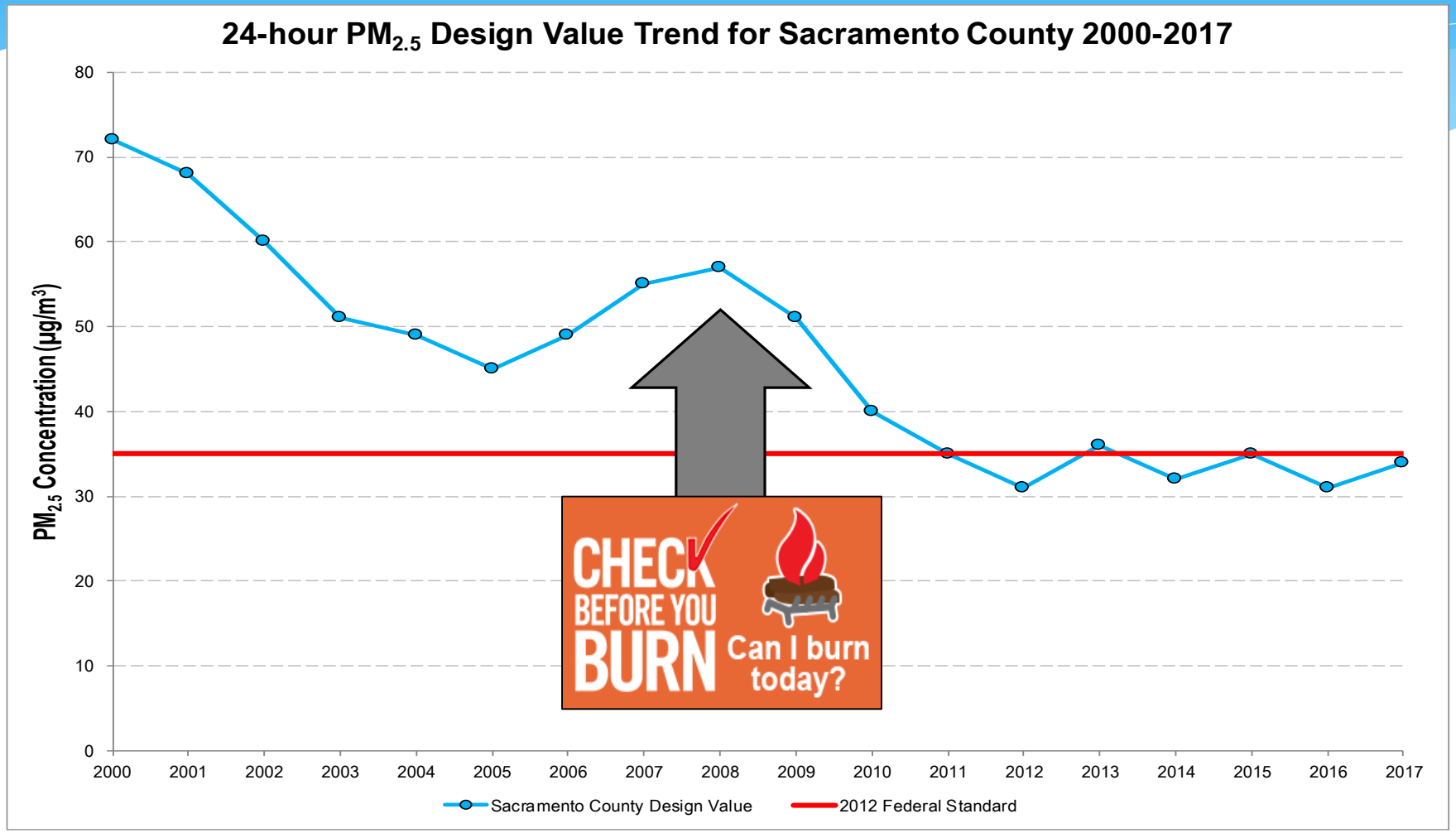
PM is Bad for Your Health

Wood smoke makes up 60% of the $PM_{2.5}$ emission inventory in Sacramento County on an average winter day



Source: 2016_SIP_V105_SAC_PM25. Accessed: 01/20/2017 13:36:38.

The Good News: Declining Since 2008

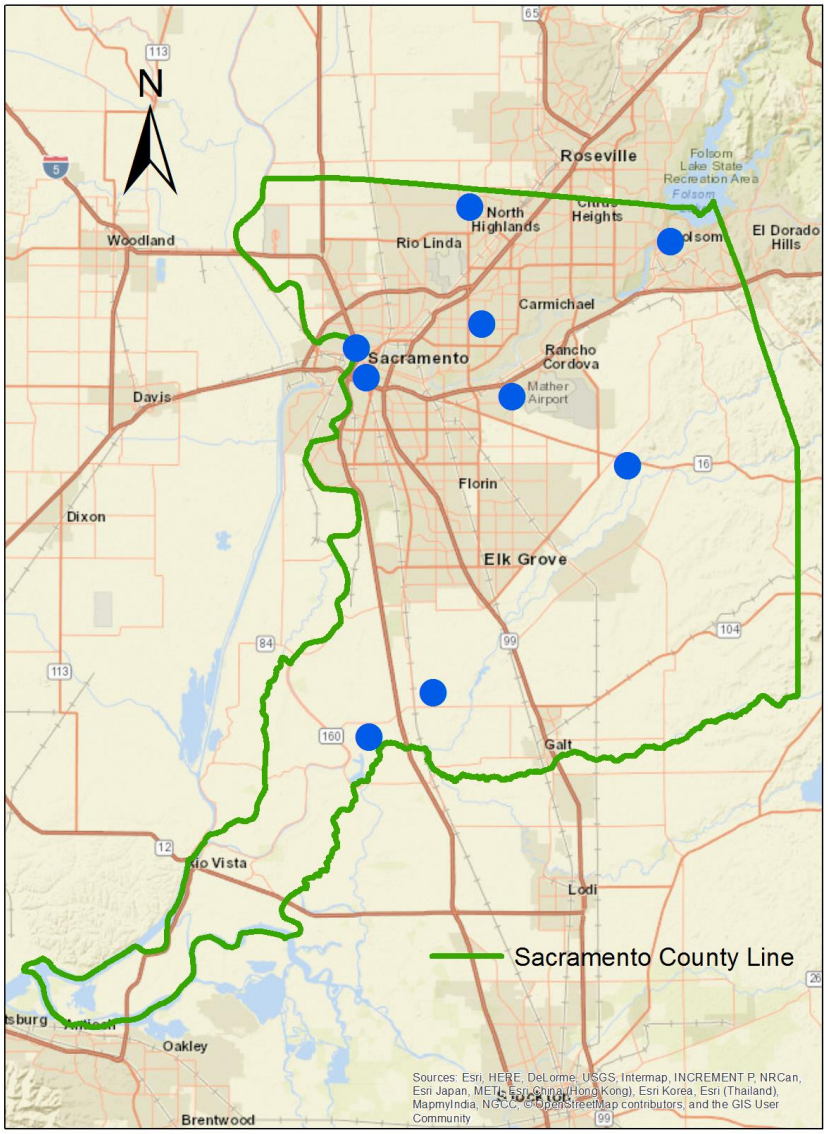


District Monitoring Network

Monitoring Objectives

1. Public awareness and notification
2. Demonstrate compliance with health standards
3. Support research studies

- Received $360,000 grant from EPA for **community monitoring** of air toxics from wood smoke
- Study conducted during Winter 2016-2017

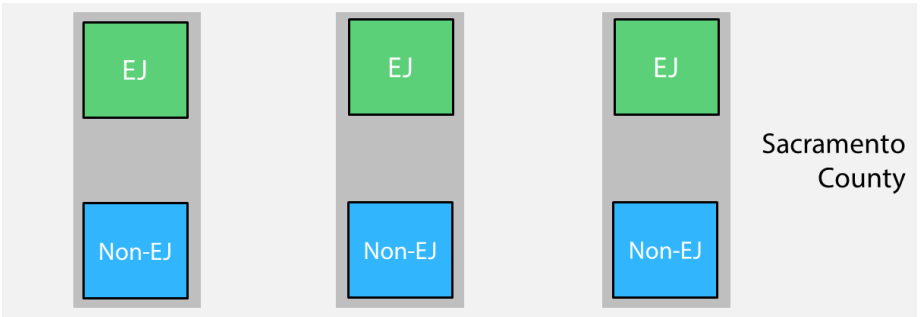


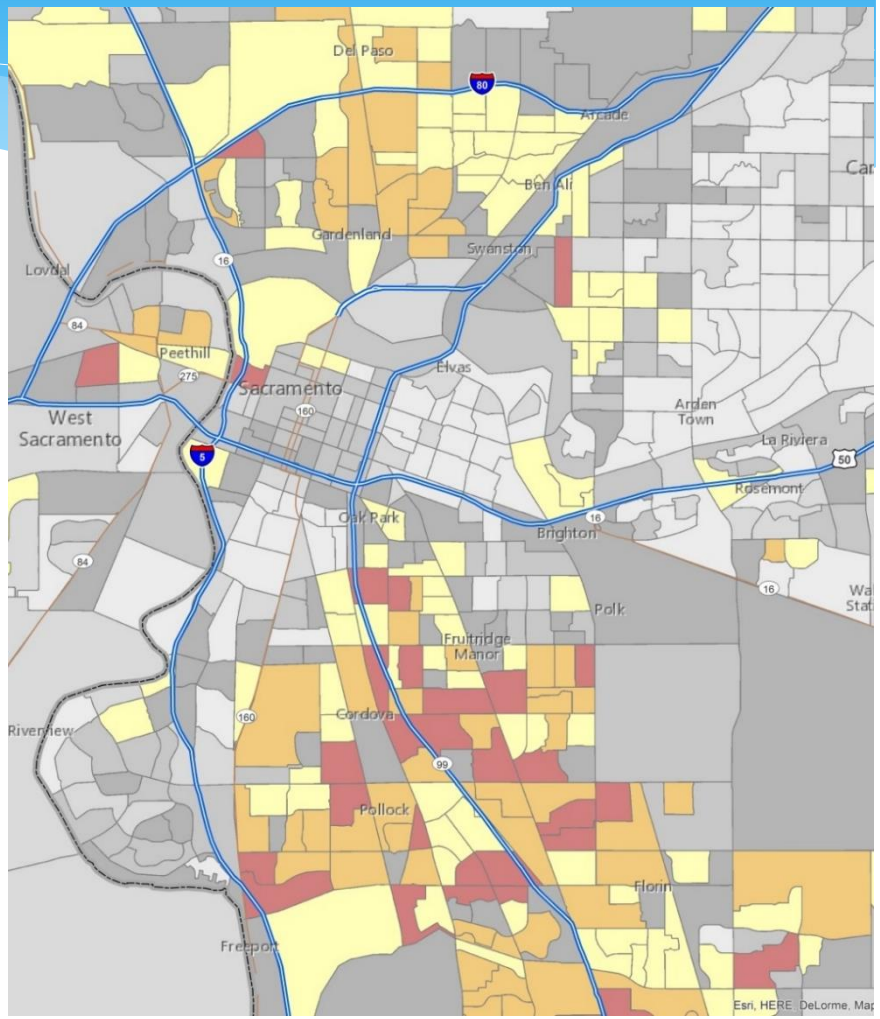
What questions did this study answer for our communities?

- What are the concentrations of air toxics?
- To what degree does wood smoke versus traffic contribute to air toxics?
- Are some communities disproportionately impacted by wood smoke than others?
- Are there outreach efforts that could assist in reducing this toxics exposure?

EPA's EJScreen Tool

- **EPA** developed a tool to identify EJ areas based on demographic and environmental information
- **SMAQMD** used EJ Screen tool as a starting point to help identify EJ and non-EJ areas
- Monitoring in six communities represented as three "pairs"

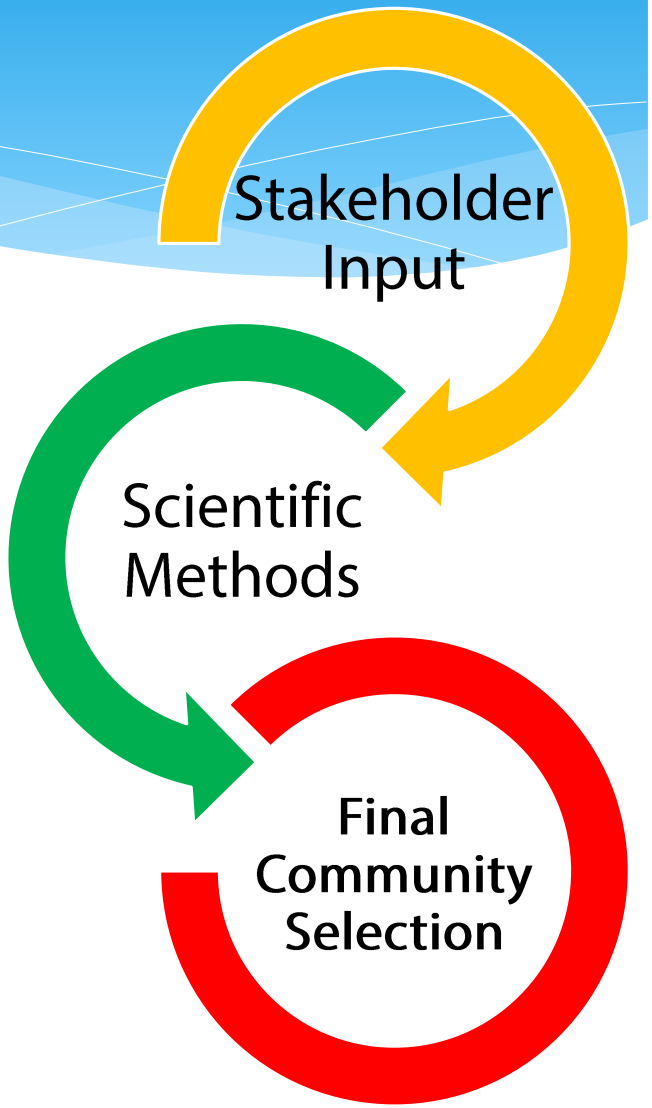




ejscreen.epa.gov

How Were the Communities Selected?

- To determine optimum locations, SMAQMD combined:
  - what is important to the communities
  - scientific considerations (terrain, meteorology, traffic, county coverage)



Three Types of Project Monitors

Tier 1: Existing regulatory sites

Tier 2: New temporary community sites

Tier 3: New temporary tripod sites
(low cost monitors)

Study Measurements

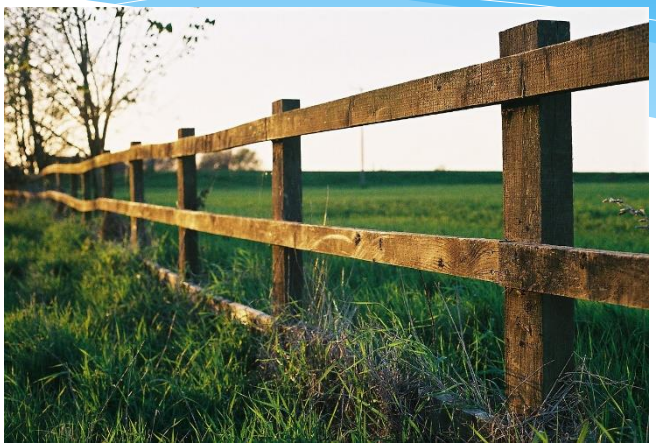
Pollutant	Technique	Duration	Sites	Tier 1	Tier 2	Tier 3	Use
Gaseous toxics[a]	Canisters	12-hr	6 sites	X	X		Quantify individual gaseous toxics of high risk
Levoglucosan	Quartz filter	12-hr	3 sites	X			Apportion and relate PM and toxics from wood smoke
Black carbon, BC_{WB}, BC_{ff}	Aethalometer	1-hr	6 sites	X	X		Apportion and relate PM and toxics from wood smoke and other sources
PM mass	MetOne BAM	1-hr	2 sites	X			Relate PM to air toxics and wood smoke
	AirBeam (low-cost)	1-hr	15 sites	X	X	X	Obtain detailed community-scale data, relate to potential air toxics exposure

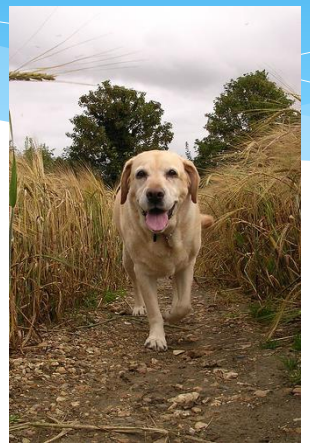
[a] Toxics measured as part of this work include acetaldehyde, acrolein, naphthalene, acetonitrile, benzene, and 1,3-butadiene. All are listed by EPA as urban toxics and are among the highest health-risk drivers nationally. Iso-octane, a tracer for mobile-source emissions, will also be measured.

[b] Levoglucosan is a tracer for wood smoke.

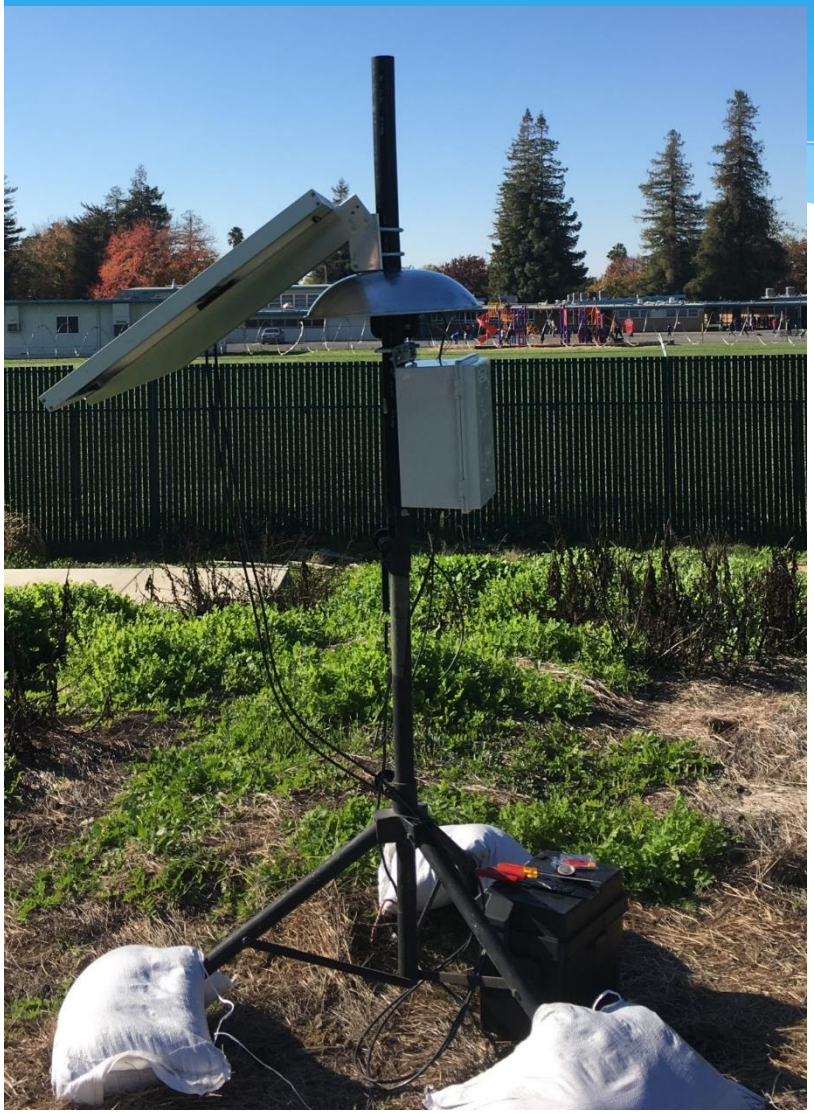
[c] Midday-to-midday samples will be collected to capture peak wood smoke concentrations overnight and to simplify the ability to take back-to-back 24-hr samples without additional equipment.

Monitoring Site Challenges



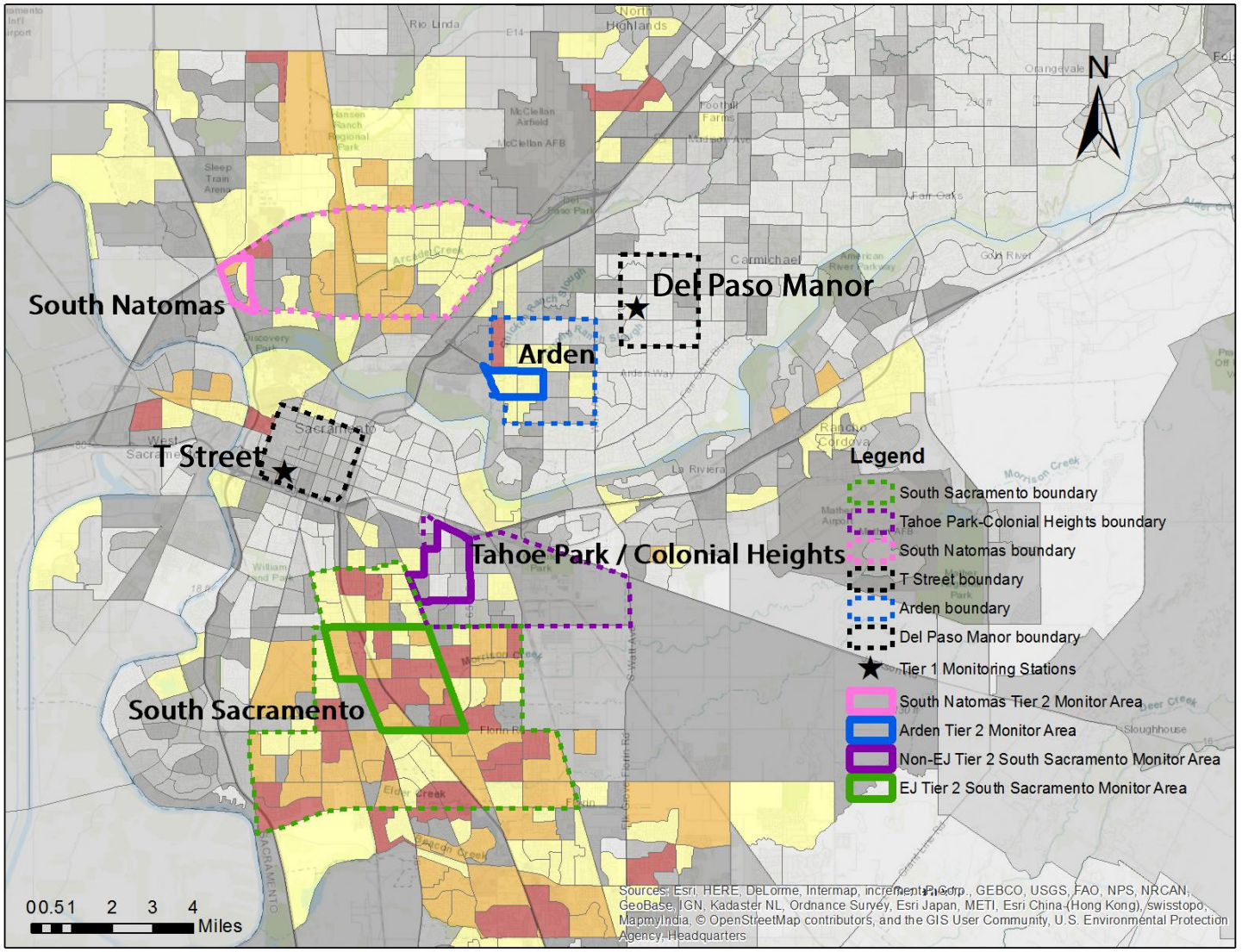


Tier 3 – AirBeam Setup

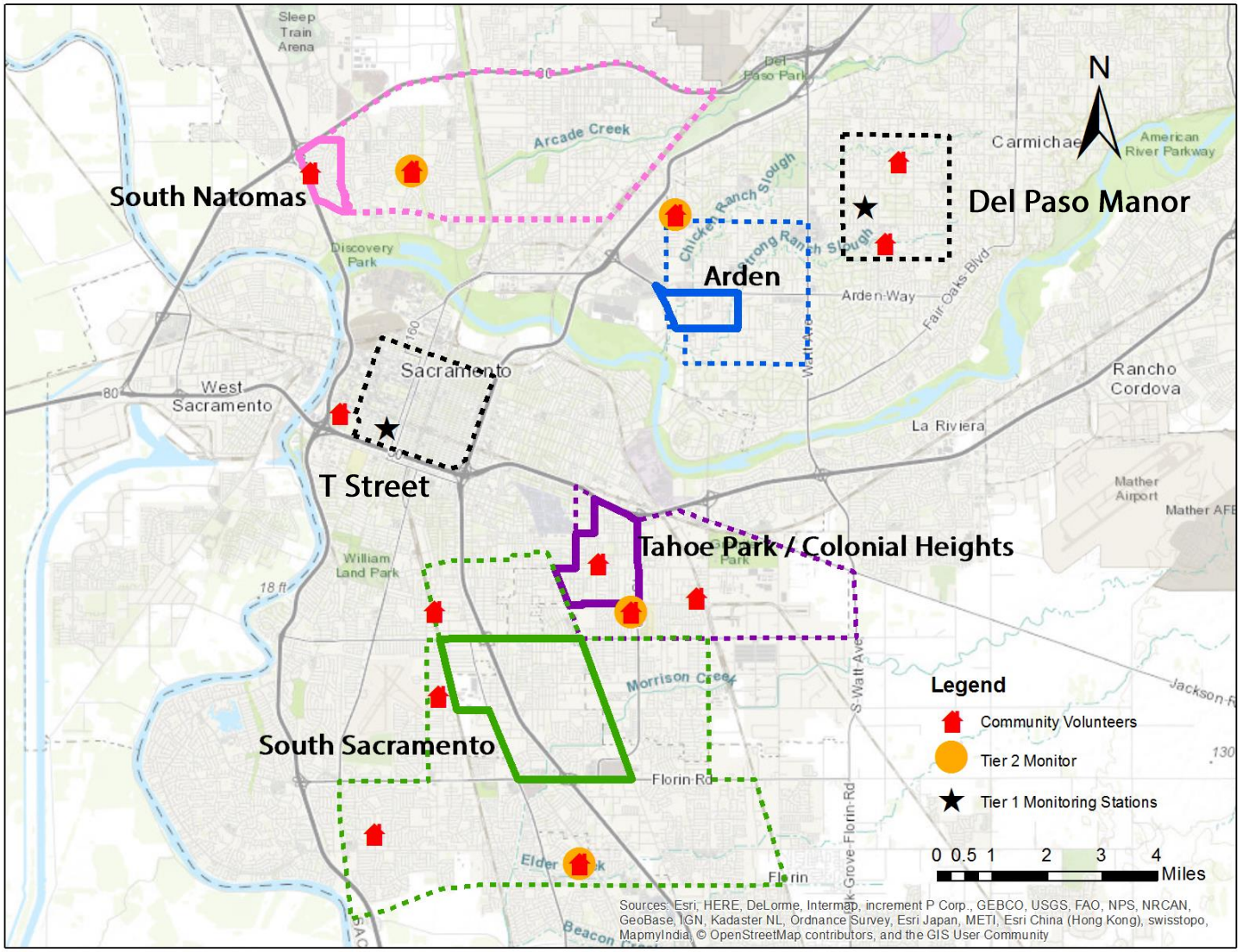


- All components were mounted on a tripod
- Solar panels with rechargeable batteries or power from an outlet were used to power the AirBeam and communications
- AirBeam was mounted underneath a “hat” so that rain/fog would not affect it
- Hardware box housed communications equipment

Study Communities



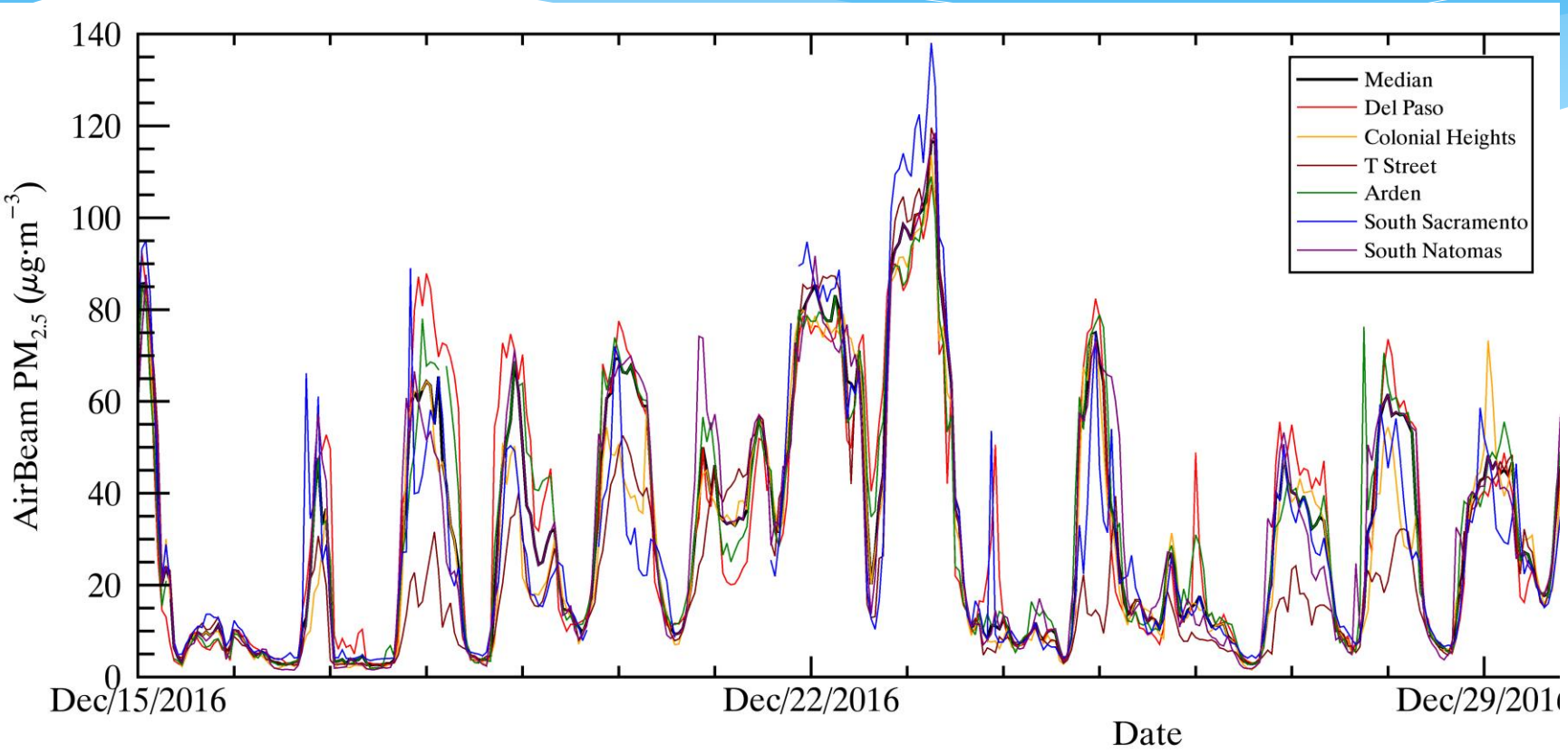
Study Monitoring Communities



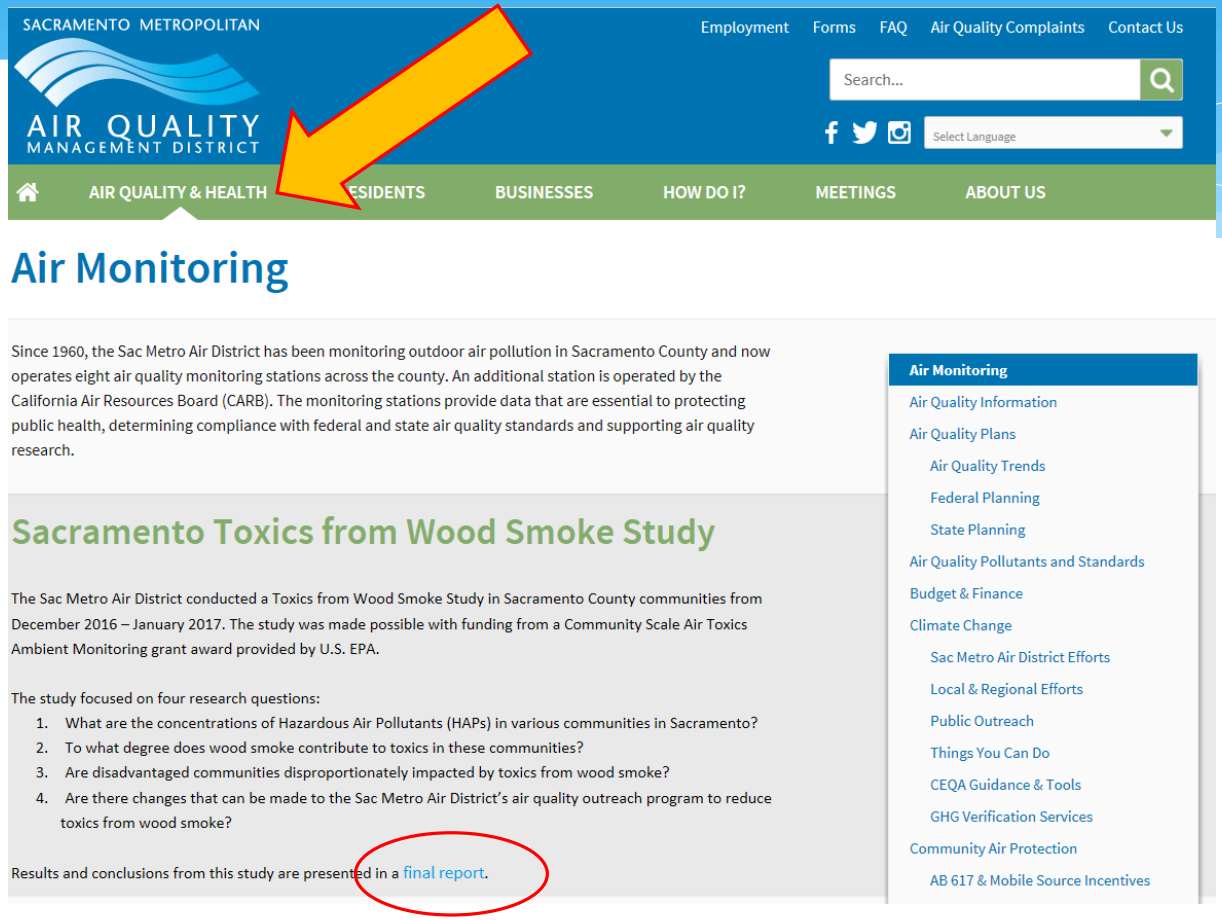
Summary of Results for Sacramento

1. Smoke from wood burning does not significantly contribute to air toxic concentrations
2. Fossil fuel-related pollutants were highest in EJ communities
3. Wood burning indicators were highest in non-EJ communities
4. Phone survey results were consistent with measurements – there was more wood burning in non-EJ areas
5. Sensor to sensor, the low-cost sensors performed well during the study, with modest variation of PM concentrations between communities
6. Focus outreach (time of day, area, unaware residents)

Neighborhood Differences



More Study Results



Link:http://www.airquality.org/ProgramCoordination/Documents/Wintertime%20Air%20Toxics%20from%20Wood%20Smoke%20in%20Sacramento_Final%20Report.pdf

Study Team

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

STi Sonoma Technology, Inc. *Innovative Environmental Solutions*

Colorado State University

ERG

Meta Research, Inc.

Prosio COMMUNICATIONS

South Coast AQMD

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

CALIFORNIA AIR RESOURCES BOARD

UCDAVIS UNIVERSITY OF CALIFORNIA

Many Local Groups Helped with Community Selection!

Thank you!

Contact information:

Janice Lam Snyder, Program Manager
Sacramento Metro AQMD
jlam@airquality.org
(916) 874-4835