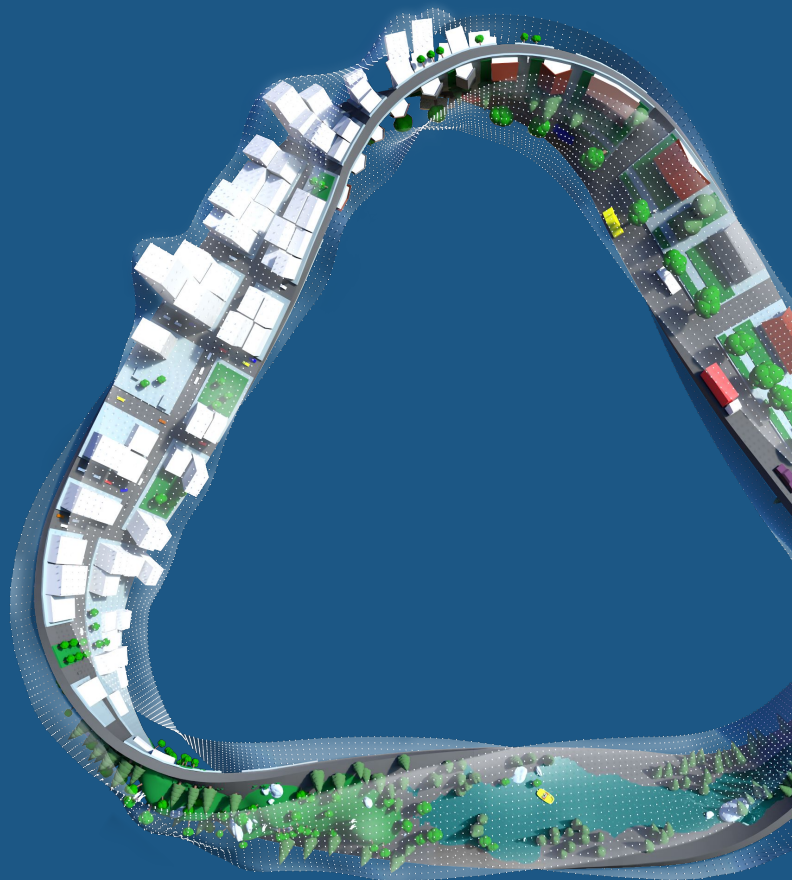




Environmental intelligence for people and the planet

San Diego Hyper-Local Air Quality
March - June 2019



Agenda

About Aclima

Overview of first mapping campaign in San Diego

Review of Aclima's Findings

Upcoming tools for community engagement

Q&A

About Aclima

A New Approach

Block-by-block air quality monitoring

NO₂ concentration (ppb)



Air quality data from Google / Aclima

Google Earth

Aclima Team Present Today



Davida Herzl
CEO
Co-Founder



Josh Carr
UX
15+ years design
experience



Joe Hicken
Strategy & BD
12+ years city and
federal gov't



Brian Crisp
Strategy
Founding team



Melissa Lunden
Science
Caltech, Sandia, LBNL,
30 years career



Joshua Richey
Senior Product
Designer
15+ years design
experience



Context

Regulatory Standards

What does the data mean to me?

What is considered “unhealthy” or “healthy”?

Ambient Air Quality Standards						
Pollutant	Averaging Time	California Standards ¹		National Standards ²		
		Concentration ³	Method ⁴	Primary ^{3,5}	Secondary ^{3,6}	Method ⁷
Ozone (O ₃) ⁸	1 Hour	0.09 ppm (180 µg/m ³)	Ultraviolet Photometry	—	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 µg/m ³)		0.070 ppm (137 µg/m ³)		
Respirable Particulate Matter (PM ₁₀) ⁹	24 Hour	50 µg/m ³	Gravimetric or Beta Attenuation	150 µg/m ³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m ³		—		
Fine Particulate Matter (PM _{2.5}) ⁹	24 Hour	—	—	35 µg/m ³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m ³	Gravimetric or Beta Attenuation	12.0 µg/m ³		
Carbon Monoxide (CO)	1 Hour	20 ppm (23 mg/m ³)	Non-Dispersive Infrared Photometry (NDIR)	35 ppm (40 mg/m ³)	—	Non-Dispersive Infrared Photometry (NDIR)
	8 Hour	9.0 ppm (10 mg/m ³)		9 ppm (10 mg/m ³)	—	
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m ³)		—	—	
Nitrogen Dioxide (NO ₂) ¹⁰	1 Hour	0.18 ppm (339 µg/m ³)	Gas Phase Chemiluminescence	100 ppb (188 µg/m ³)	—	Gas Phase Chemiluminescence
	Annual Arithmetic Mean	0.030 ppm (57 µg/m ³)		0.053 ppm (100 µg/m ³)	Same as Primary Standard	
Sulfur Dioxide (SO ₂) ¹¹	1 Hour	0.25 ppm (655 µg/m ³)	Ultraviolet Fluorescence	75 ppb (196 µg/m ³)	—	Ultraviolet Fluorescence; Spectrophotometry (Pararosaniline Method)
	3 Hour	—		—	0.5 ppm (1300 µg/m ³)	
	24 Hour	0.04 ppm (105 µg/m ³)		0.14 ppm (for certain areas) ¹¹	—	
	Annual Arithmetic Mean	—		0.030 ppm (for certain areas) ¹¹	—	
Lead ^{12,13}	30 Day Average	1.5 µg/m ³	Atomic Absorption	—	—	High Volume Sampler and Atomic Absorption
	Calendar Quarter	—		1.5 µg/m ³ (for certain areas) ¹²	Same as Primary Standard	
	Rolling 3-Month Average	—		0.15 µg/m ³		
Visibility Reducing Particles ¹⁴	8 Hour	See footnote 14	Beta Attenuation and Transmittance through Filter Tape	No National Standards		
Sulfates	24 Hour	25 µg/m ³	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m ³)	Ultraviolet Fluorescence			
Vinyl Chloride ¹²	24 Hour	0.01 ppm (26 µg/m ³)	Gas Chromatography			

Standards were defined around traditional technology

Block-by-block measurement wasn't possible when regulatory standards were defined

Standards track to regional averages

Attainment is based on regional averages

Regional averages don't capture hyperlocal experience



The Opportunity

Define a new
future together

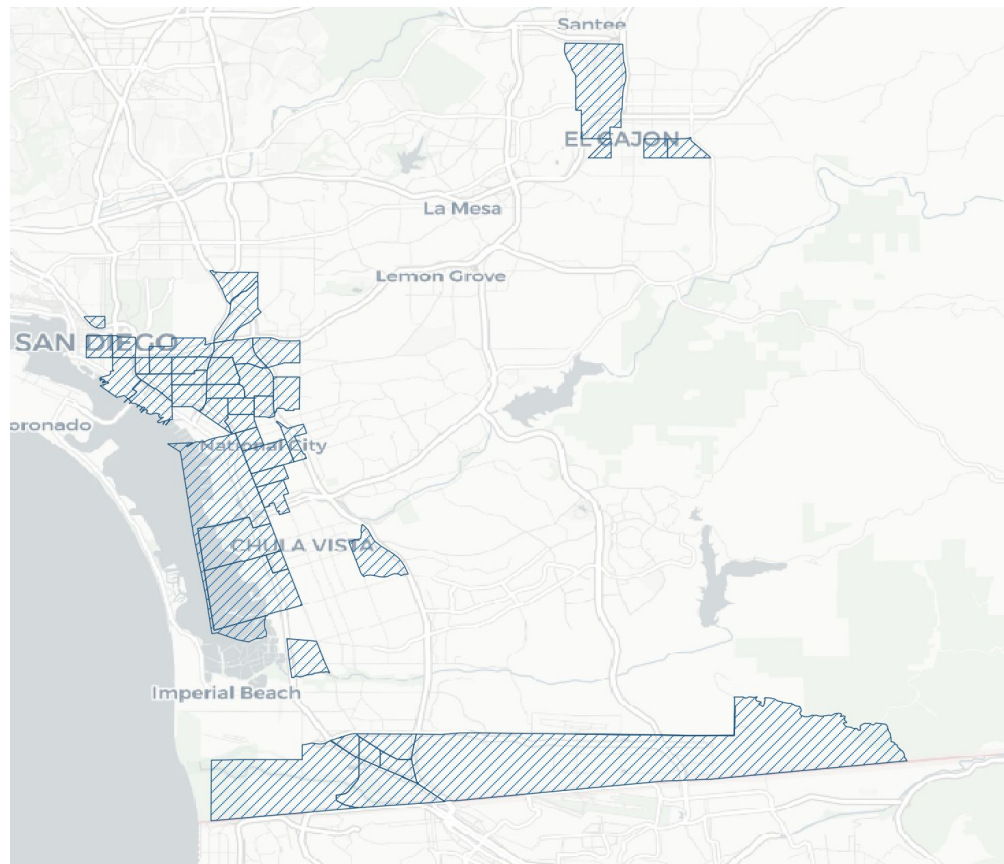


San Diego AB-617 Mapping Campaign

Operational Summary

Mobile data collection took place from
March 1 to June 4, 2019

32,000 Miles
80 million data points



Local Jobs

Five local jobs recruited directly
from the community

Local drivers know the area and
conditions best



Key pollutants: PM_{2.5}

Source: Combustion, photochemistry

Effect: Respiratory damage, asthma, increased mortality

Regulatory Standard:

24 hour = $35 \mu\text{g}/\text{m}^3$, Annual = $12 \mu\text{g}/\text{m}^3$



Key pollutants: Black Carbon

Fraction of PM_{2.5} that is soot

Emitted by diesel engines and wood fires

As “Diesel particulate matter”, classified as a carcinogen

No regulatory standard



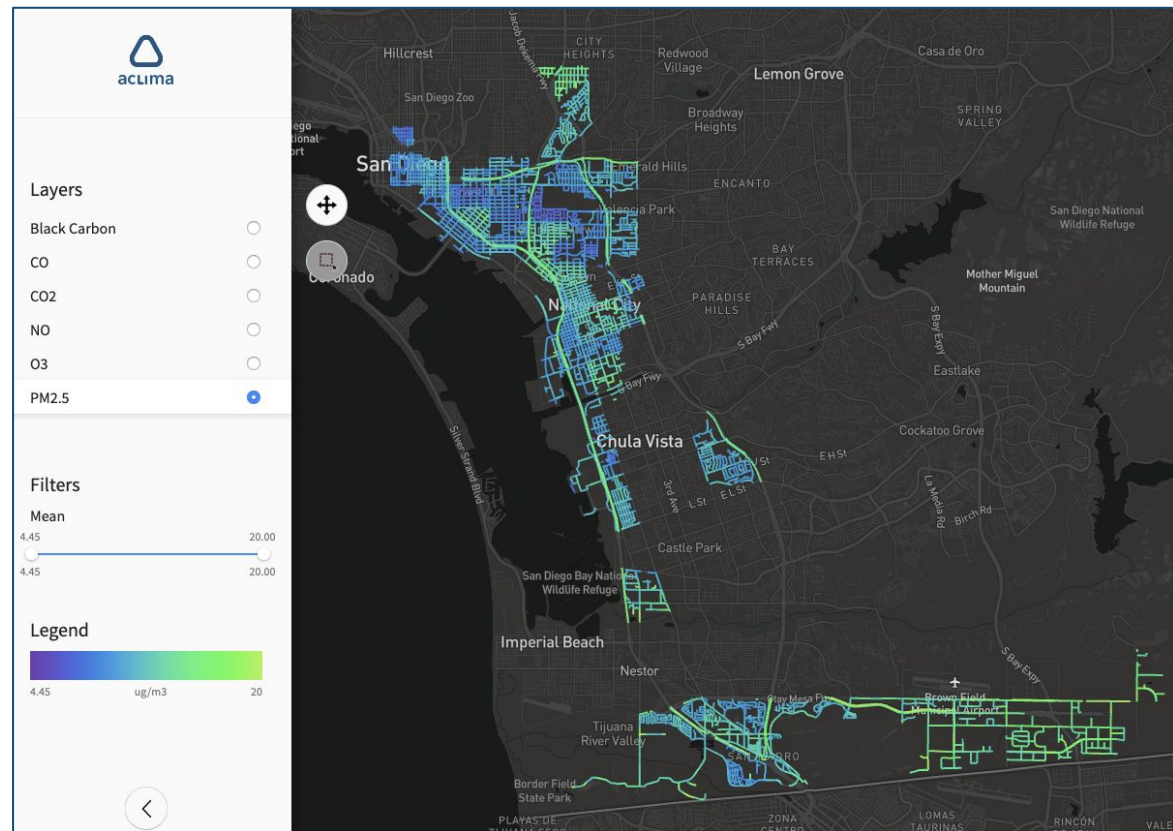


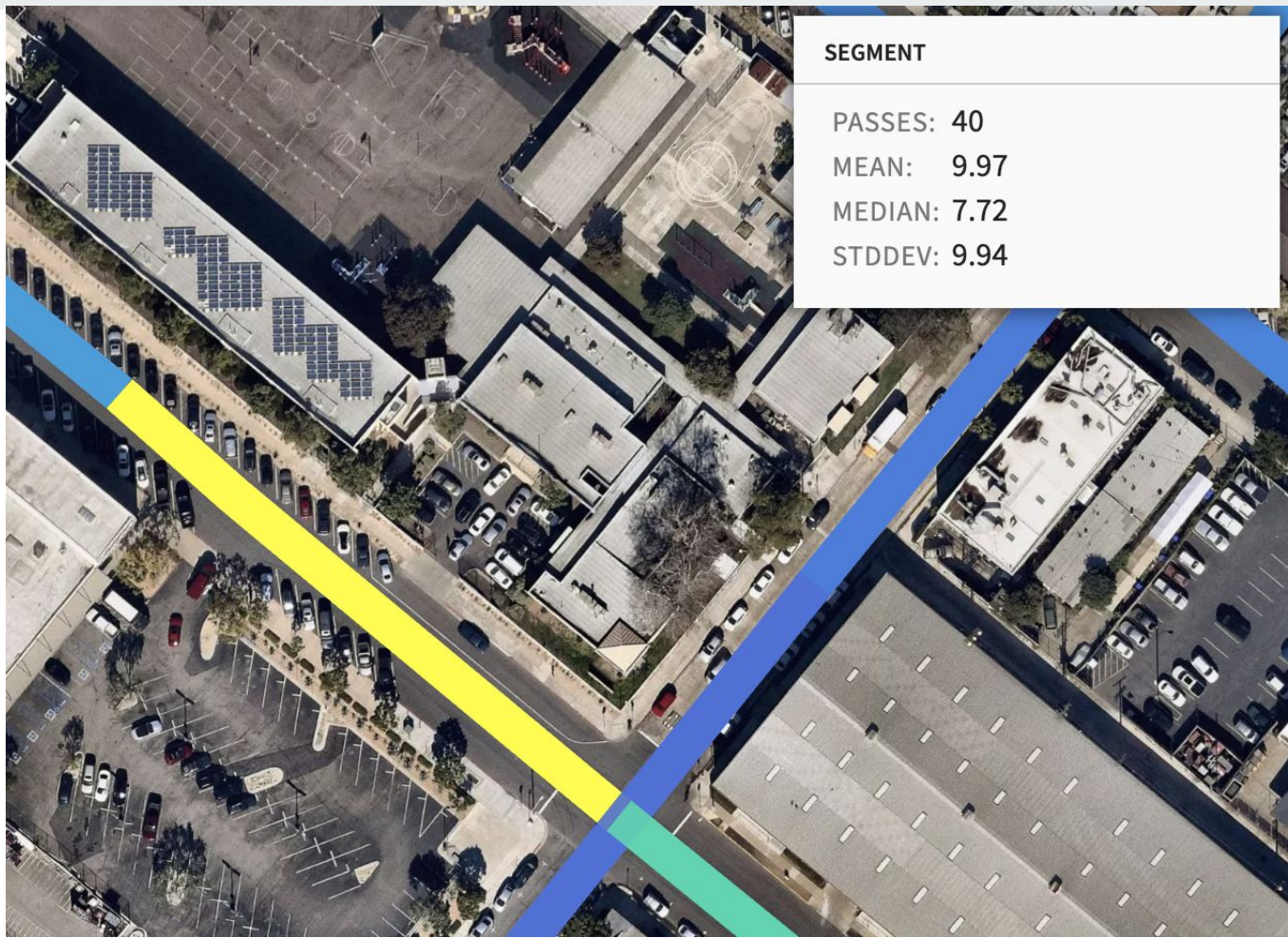
Terms to know

Block-by-block = Your Lived Experience

Segment = average city block with more than
20 passes from an Aclima car

Demonstration





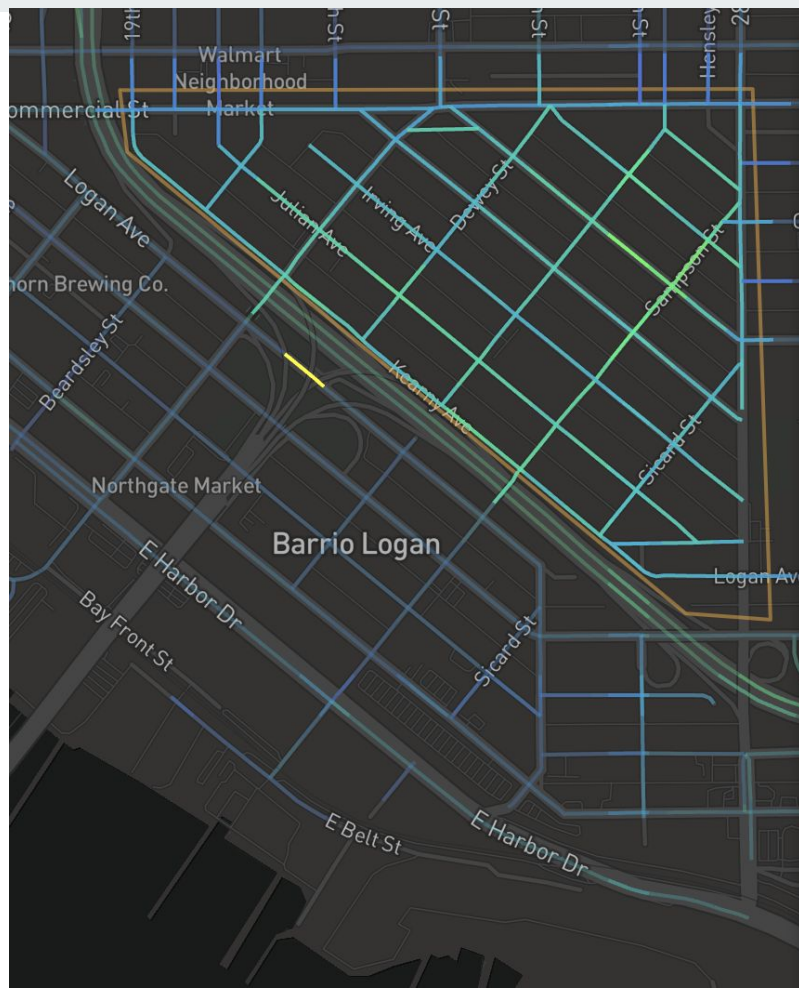
SEGMENT

PASSES: 40

MEAN: 9.97

MEDIAN: 7.72

STDDEV: 9.94



SELECTION

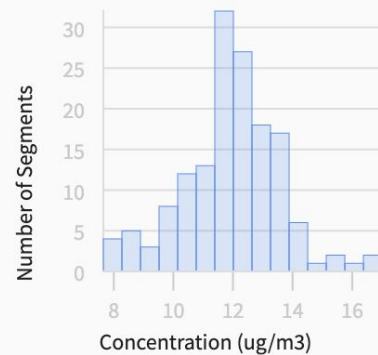
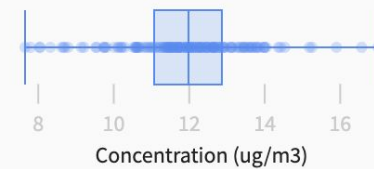
151 SEGMENTS

MIN: 7.65

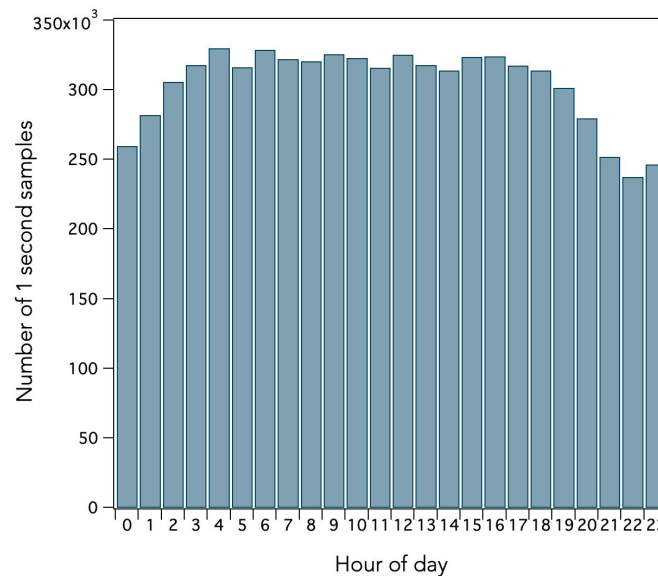
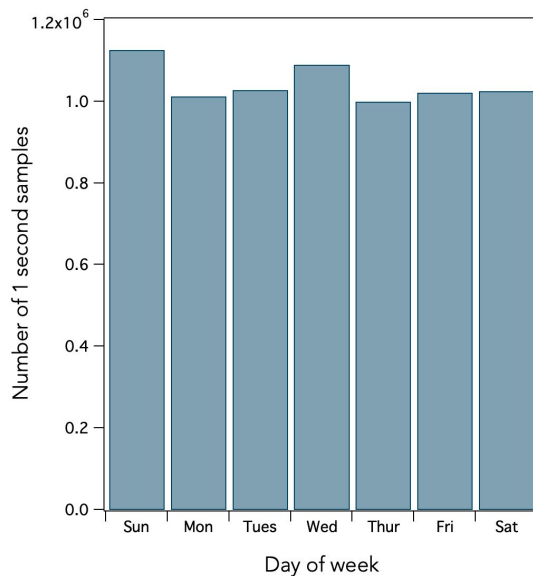
MEAN: 11.92

MAX: 17

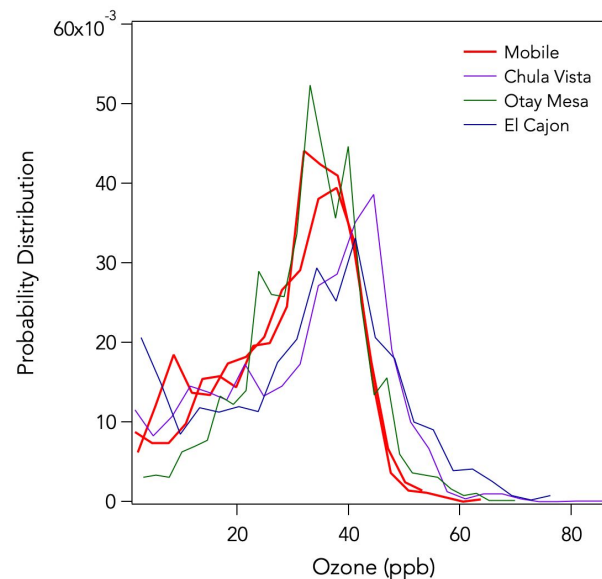
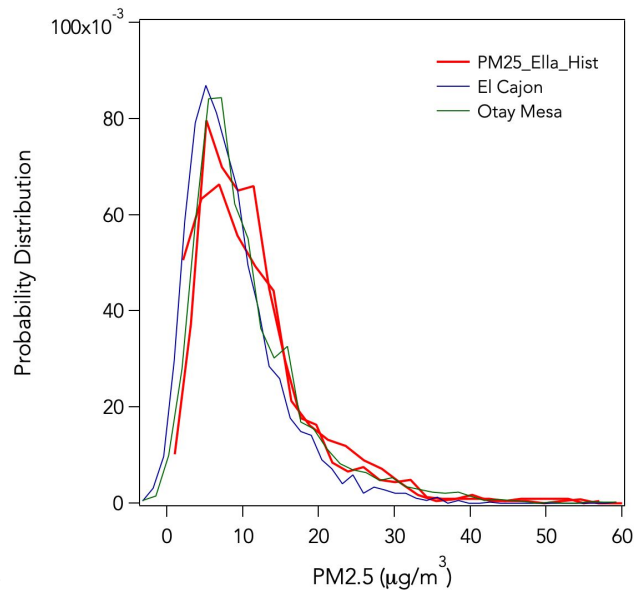
STDDEV: 1.64



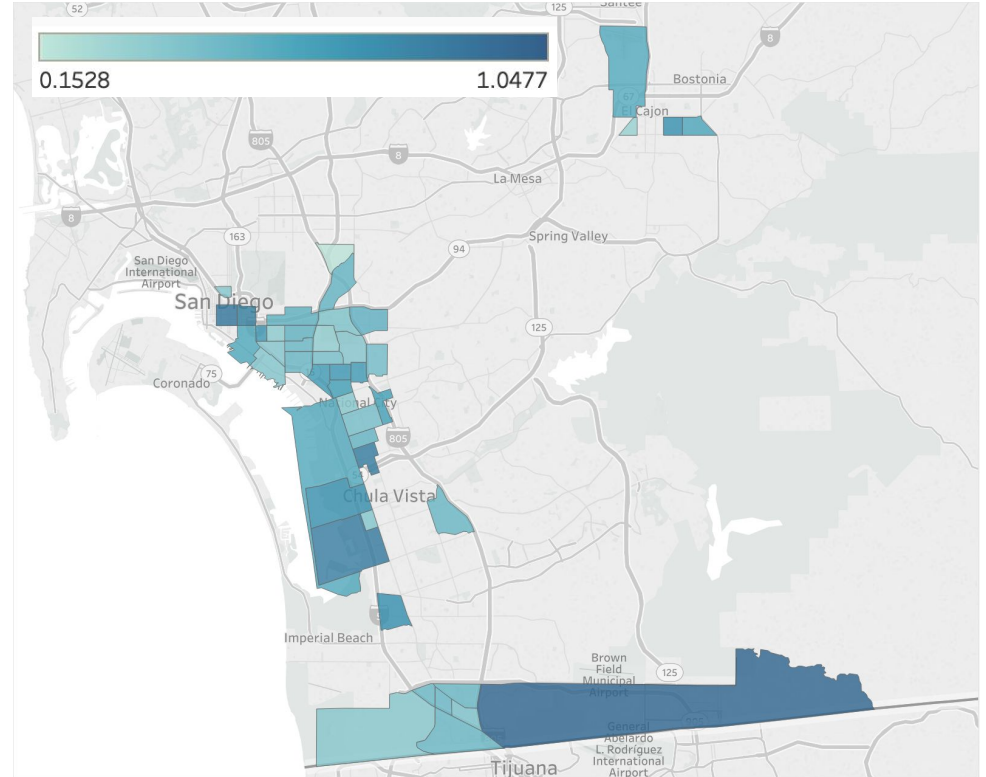
Mapping well distributed by day of week and hour of day



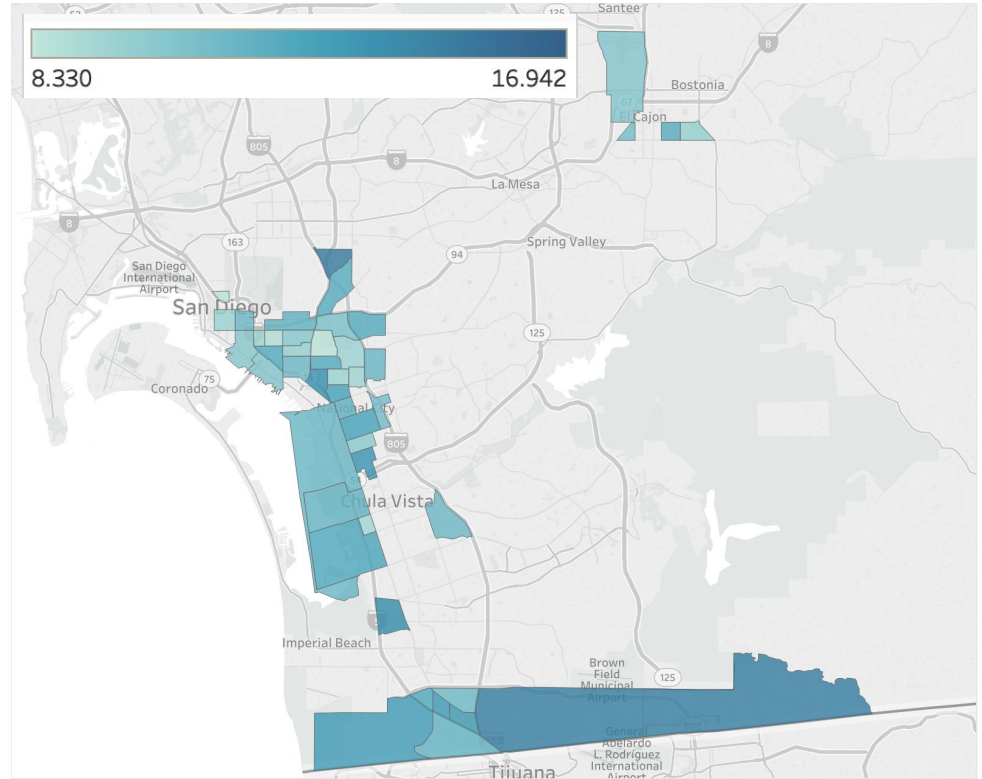
Excellent agreement between hourly averaged mobile and regulatory data



Black Carbon by census tract



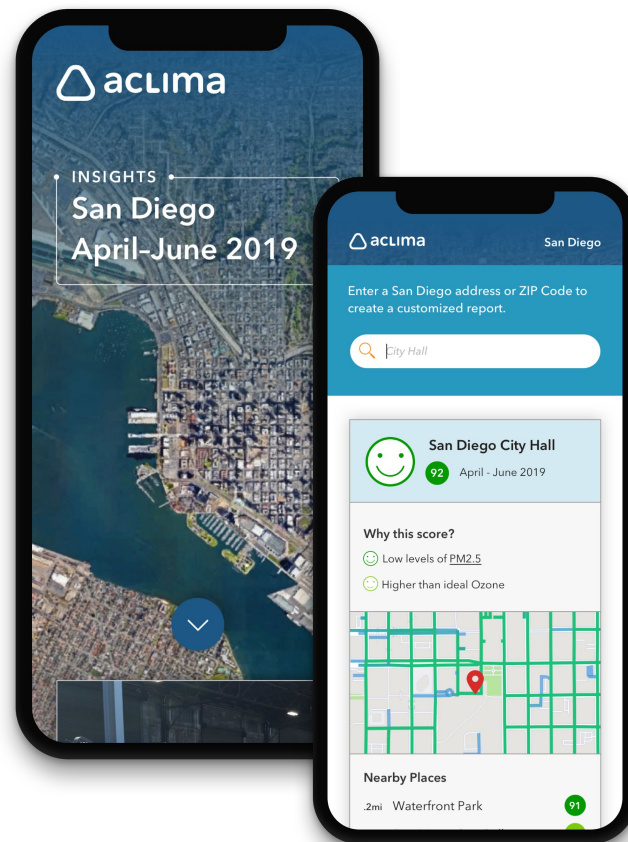
PM2.5 by census tract



Tools for Community Engagement

Aclima Insights for Communities

Complex science and big data made accessible to the general public through an intuitive, freemium app designed to expand awareness and action to improve air quality.



Thank you.

