AGENDA: 4

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

Climate Protection Program Update

Climate Protection Committee
January 15, 2015

Henry Hilken,
Director of Planning, Rules & Research

Abby Young
Principal Environmental Planner

Climate Protection Work Program

Represents the focus and direction of the Air District's Climate Protection Program in 2014/2015, and includes:

Technical Program

- Inventory and Forecasting
- GHG Emissions Monitoring
- GHG Rule Enforcement

Assist Local Governments

- Support & Enhance Local Action
- Report Progress to the Public

Policy Approaches

- GHG Reduction Goals
- Regional Climate Strategy
- Rule Development
- Climate Change & Public Health
- Bay Area's Energy Future

Regional Climate Protection Strategy

Regional Climate Protection Strategy (RCPS) will focus on Scoping Plan Sectors

Energy
Transportation
Green Buildings
Water
Waste
Agriculture
Natural & Working Lands
Cap & Trade
Short-lived Climate Pollutants

Through a sector-by-sector analysis of:

- Quantitative gap in reducing GHGs
- Policy gaps in addressing GHGs
- Best role and value-added for Air District

Regional Climate Protection Strategy

Sector-based Gap Analysis

Step 1: Determine 1990 – 2030 GHG emissions for sector

Step 2: Assess federal, state, regional and local policies impacting sector GHGs in the Bay Area

Step 3: Draft "Gap Analysis" memo, send to sector experts

Step 4: Convene meeting with sector experts from public agencies, private sector, and advocacy groups to review and provide feedback

Step 5: Incorporate feedback into text of RCPS and Clean Air Plan control measures

Regional Climate Protection Strategy

Sector expert meetings convened

Transportation

Short-lived Climate Pollutants

Natural & Working Lands

Agriculture

- A total of 33 outside experts attended meetings
- Clarifications on inventory, projections and overlap with other sectors
- Discussion focus on needed policies and role of Air District

Input will be incorporated into text of RCPS and 2015 Clean Air Plan GHG reduction measures

Regional Climate Protection Strategy

Next steps for RCPS:

✓ Convene expert meetings on remaining sectors (January):

Energy	Cap & Trade
Water	Waste
Green Buildings	

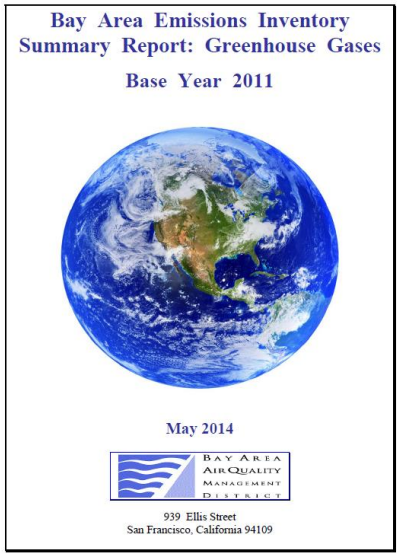
✓ Draft text of RCPS:

- Discussion of climate planning at federal, state, regional and local levels
- Discussion of climate change impacts and adaptation in the Bay Area
- Nine Sector analyses
- GHG reduction strategies

Technical Program

Update Inventorying & Forecasting:

- ✓ Updated *Bay Area Emissions Inventory Summary Report*
  - Base year 2011
  - Emissions trends from 1990 through 2030



In the Works:

- ✓ Forecasts for 2035 and 2050
- ✓ Adding new elements to inventory and forecast
  - Additional pollutant: black carbon
  - Consider natural GHG "sinks": regional and urban forests
  - Methane assessments/concentration measurements
  - Impacts from local climate action plans
  - Impacts from local cap & trade offsets
- ✓ Forecast scenarios incorporating federal, state, regional & local GHG policy impacts
- ✓ Consumption-based inventory

Technical Program

Implement GHG Emissions Monitoring:

- ✓ Continuing collaboration with UC Berkeley Atmospheric CO_2 Observing Network (BEACON) on CO_2 and air pollutant measurements
- ✓ Preparing for regional methane monitoring
- ✓ Planning local, source-based methane measurements

Assist Local Governments

Support & Enhance Local Action:

- ✓ Continue providing continuous support to local government staff:
  - Review and comment on climate action plans (CAPs)
  - Respond to daily requests for information and guidance
  - Facilitate the sharing of best practices
  - Facilitate networking between local government and state agency staff
  - Provide and help interpret data for GHG inventories
  - Ongoing support and guidance for 58 Bay Area CAPs
- ✓ Actively monitor and participate in state and federal initiatives that forward local climate planning

Assist Local Governments

Report Progress to the Public:

- ✓ With JPC, convened webinar for 20+ local governments on GHG indicators
  - Need for standardized methods for measuring and analyzing data
  - Focus on fewer, but meaningful, indicators
  - Co-benefit indicators on health, economy help climate story resonate with broader audience

Bay Area Joint Policy Committee

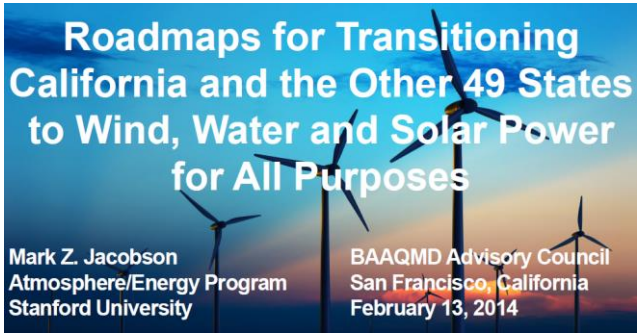
Policy Approaches

Climate Change & Public Health:

- ✓ Developing climate change impacts and public health content for Regional Climate Protection Strategy

Explore the Bay Area's Energy Future:

- ✓ Advisory Council studied this issue in 2014 and is developing recommendations for the Board



Rule Development

- ✓ Potential measures to reduce GHGs in the 2015 Clean Air Plan:
  - Control Measures
    - Black carbon from back-up generators*
    - Methane leaks from oil and gas wells, including capped wells*
    - Methane from leaking equipment at refineries and marine loading operations
    - Methane from solid waste disposal sites
    - Methane from composting operations
  - Study Measures
    - Incorporate GHG emissions reduction into permitting program (consulting with CARB)
    - Increase deployment of heat mitigating strategies (Advisory Council)
    - Reducing GHGs from combustion devices

*Rule development underway

Staffing Resources

Staff resources assigned to Climate Protection

- ✓ 7.3 FTE in preliminary budget for FYE 2016

Hiring of new staff for Climate Protection

- ✓ Senior Environmental Planner hired in 12/2014
- ✓ Senior AQ Engineer hired 12/2014 (Rule Development)
- ✓ Senior AQ Engineer recruitment underway (Emission Inventory)
- ✓ 2 additional staff positions to be hired in FYE 2016 (Technical Services, Compliance & Enforcement)

Next Steps

Continue developing staff resources

- ✓ 1 climate staff position to be filled in FYE 2015
- ✓ 2 climate staff positions to be filled in FYE 2016

Develop the Regional Climate Protection Strategy

- ✓ Complete sector-based gap analysis
- ✓ Continue developing consumption-based inventory
- ✓ Continue developing control measures/rule development
- ✓ Public workshops in March/April

Observing CO_2 in the Bay Area:

Documenting emissions changes as they happen

Ronald C. Cohen
Professor of Chemistry
Professor of Earth and Planetary Science
UC Berkeley

$NSF, BAAQMD, HEI, UC Berkeley

Climate

Illustration by John Heinly

Climate: Emissions

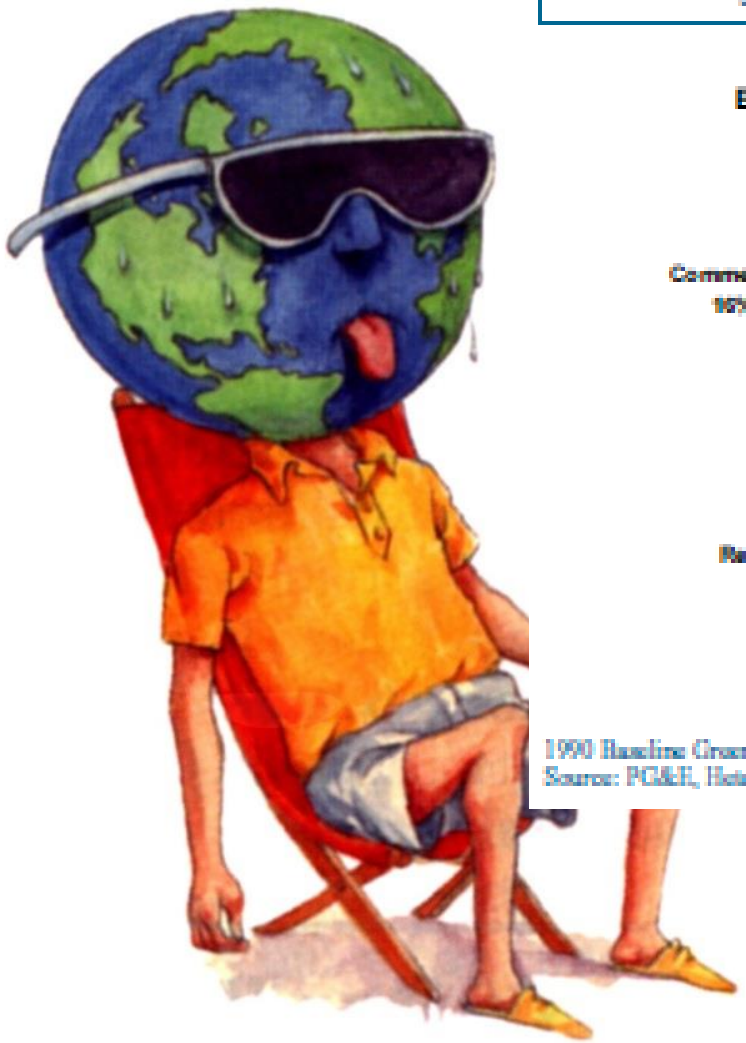
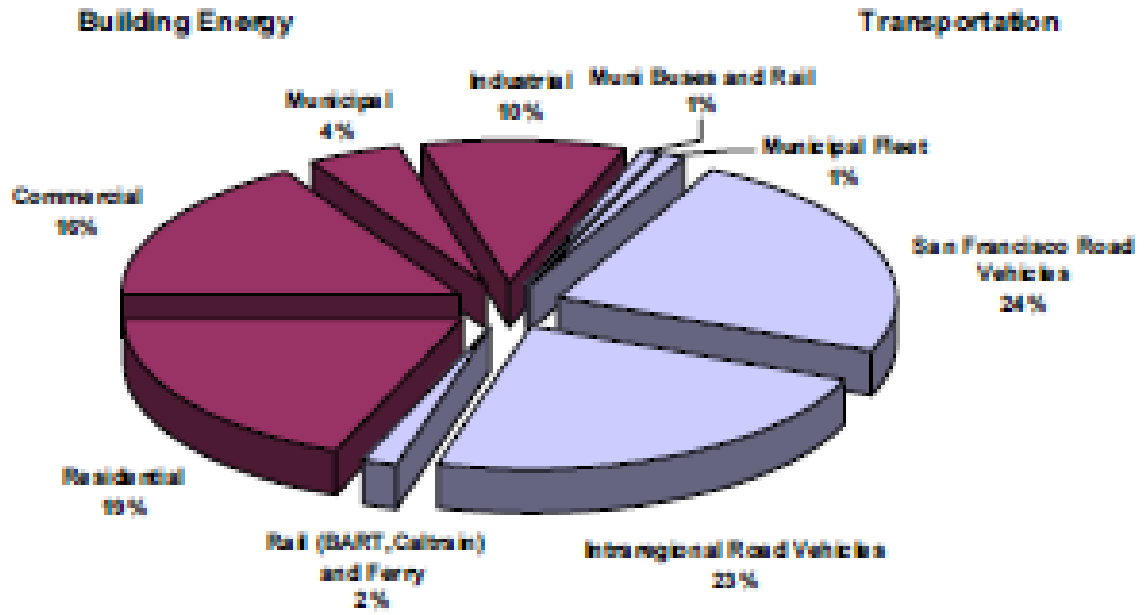


Illustration by John Heinly

Figure ES.2 - San Francisco Greenhouse Gas Emissions (eCO_2), 1990



1990 Baseline Greenhouse Gas Emissions. Total = 9.1 million tons eCO_2 per year
Source: PG&E, Hetch Hetchy Water and Power, CA. Dept. of Transportation, MTC, Muni, BART

Climate: CO_2 Plans

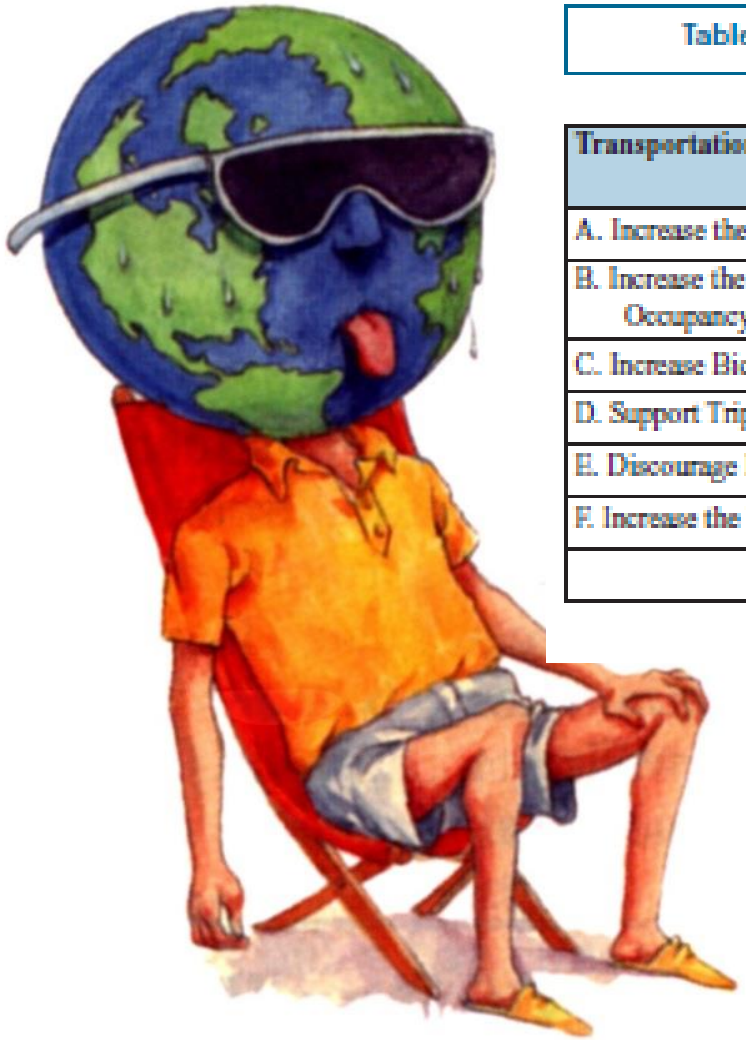
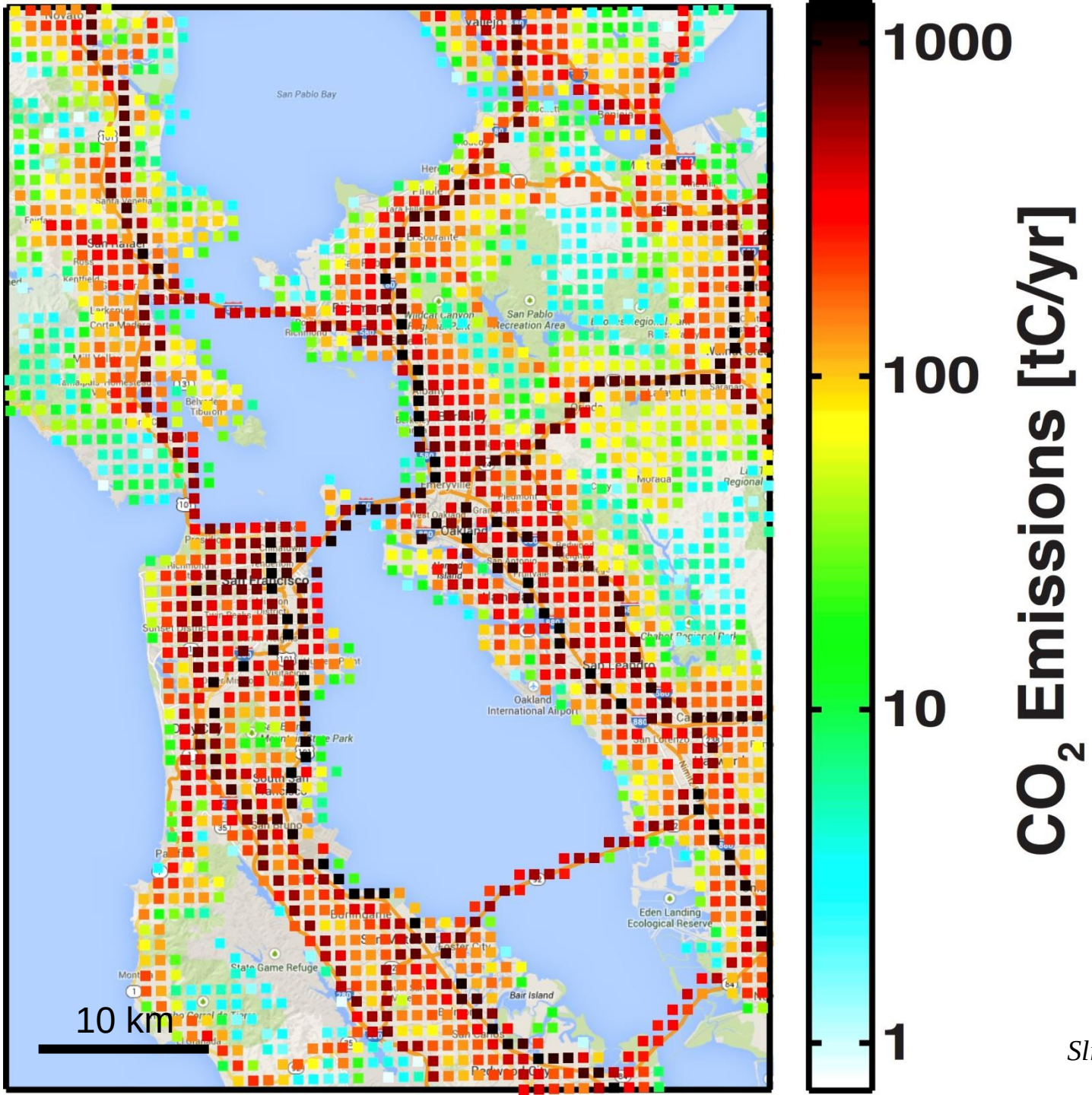
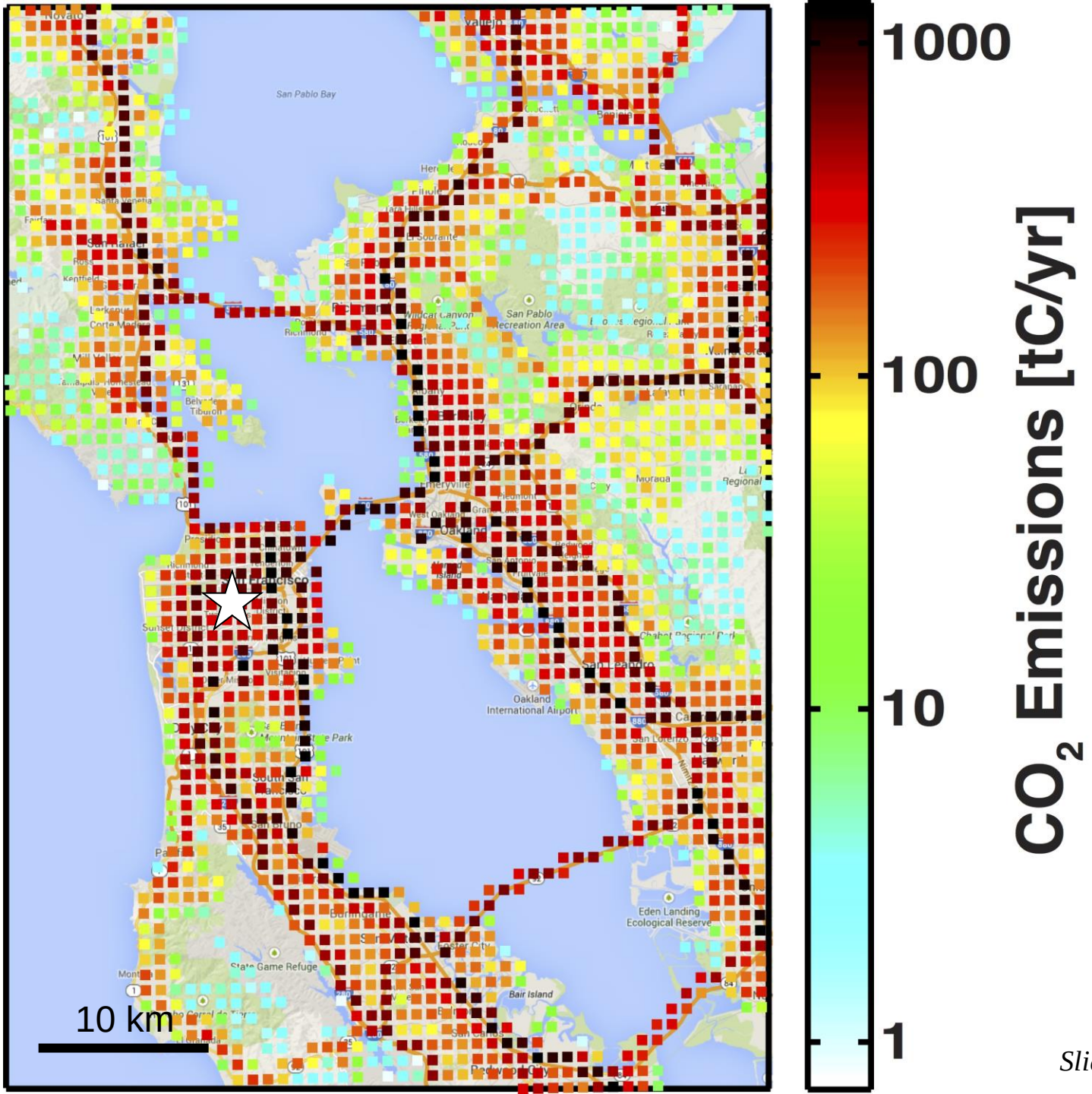


Illustration by John Heinly

Table 3.2 Summary of Transportation Actions and Estimated CO_2 Reductions

Transportation Action Categories	Estimated CO_2 Reduction (tons/year)
A. Increase the Use of Public Transit as an Alternative to Driving	87,000
B. Increase the Use of Ridesharing as an Alternative to Single Occupancy Driving	42,000
C. Increase Bicycling and Walking as an Alternative to Driving	10,000
D. Support Trip Reduction Through Employer-Based Programs	28,000
E. Discourage Driving	155,000
F. Increase the Use of Clean Air Vehicles and Improve Fleet Efficiency	641,000
Total	**963,000**


San Pablo Bay
San Francisco
Oakland
Oakland International Airport
San Leandro
Eden Landing Ecological Reserve
State Game Refuge
Bair Island
San Pablo Recreation Area
10 km
1000
100
10
1
CO_2 Emissions [tC/yr]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Oakland International Airport
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10 km
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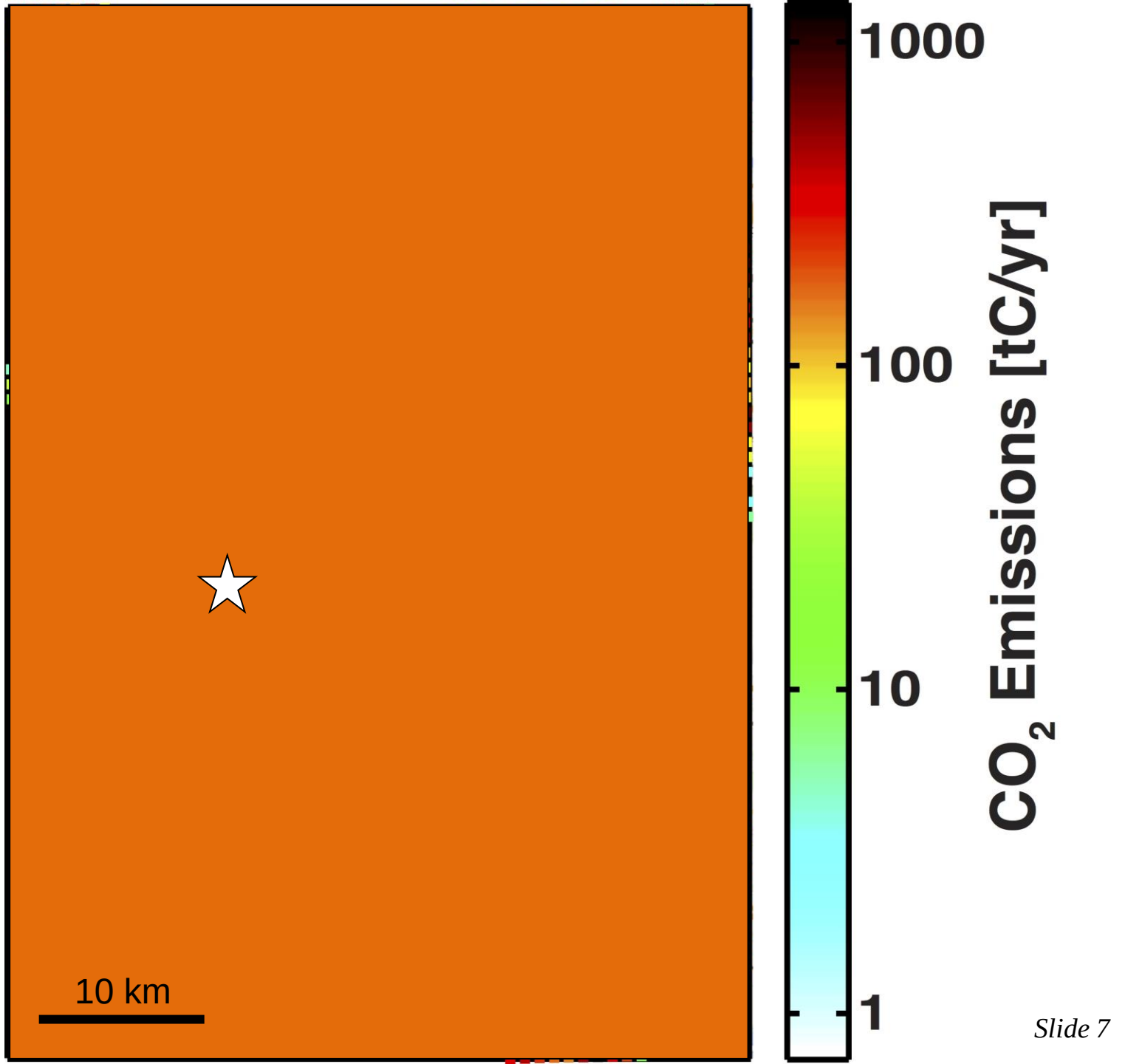
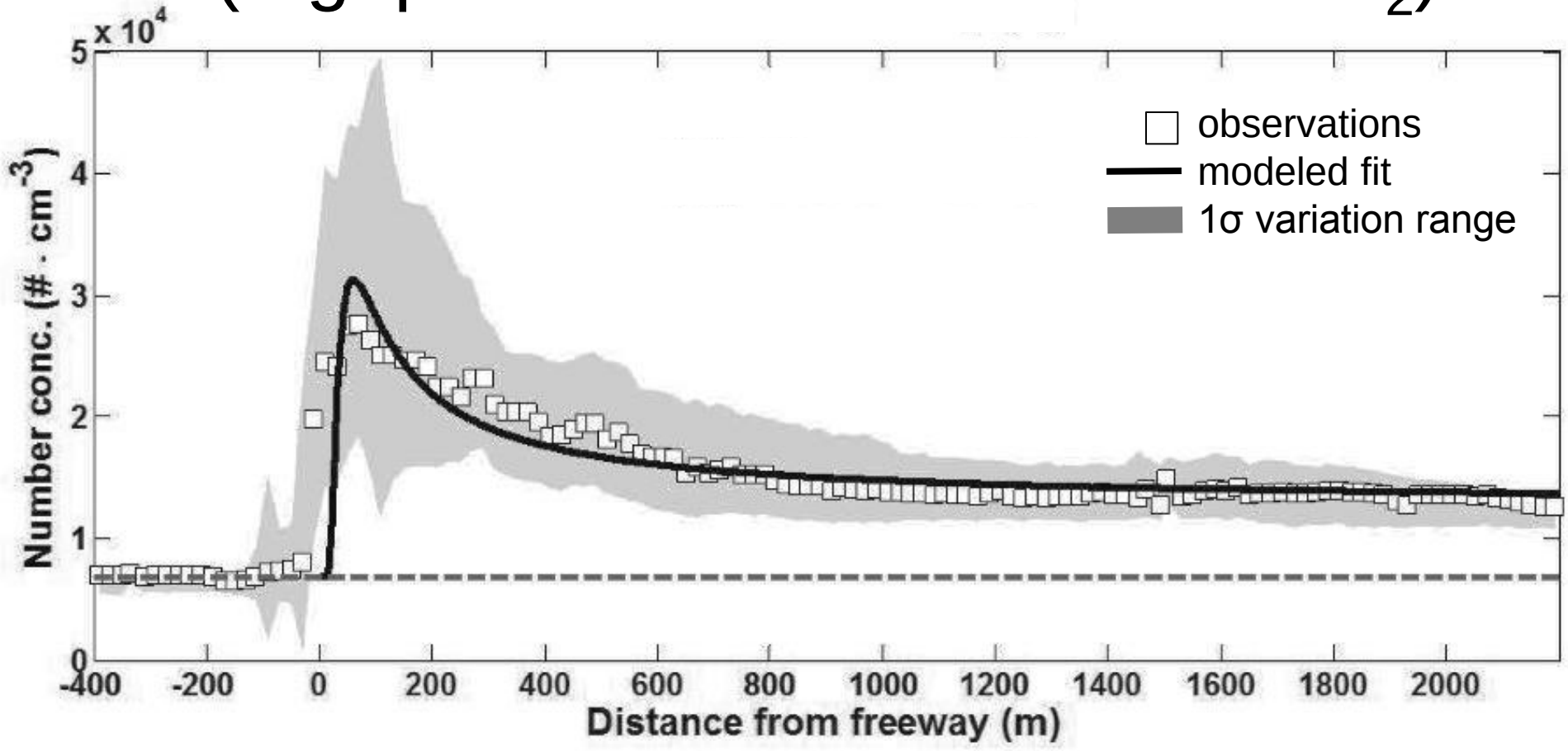
CO_2 Emissions [tC/yr]


10 km
1000
100
10
1
CO_2 Emissions [tC/yr]

How many measurements do we need?

How many measurements do we need? (e.g. particles co-emitted with CO_2)



from Choi et al. 2014

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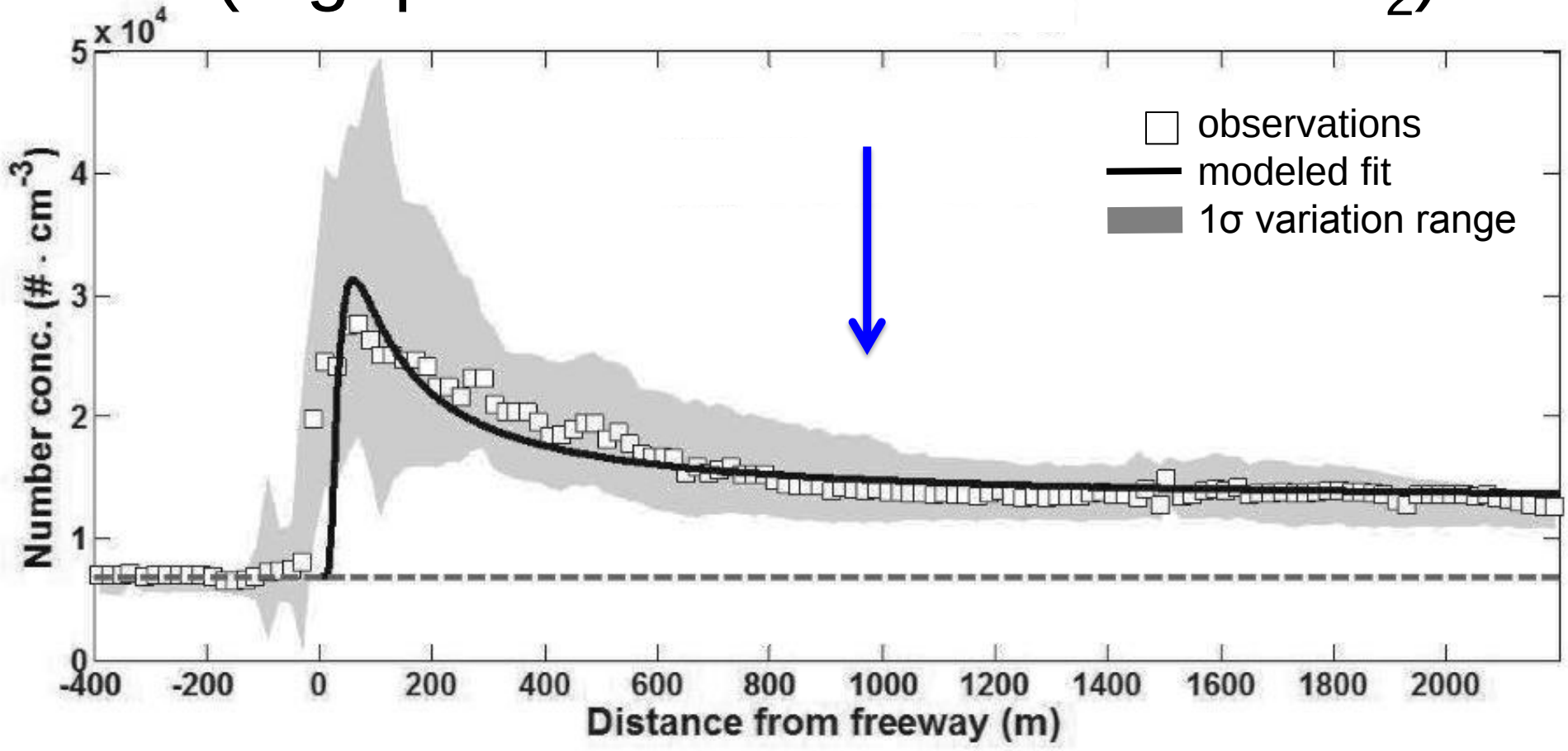
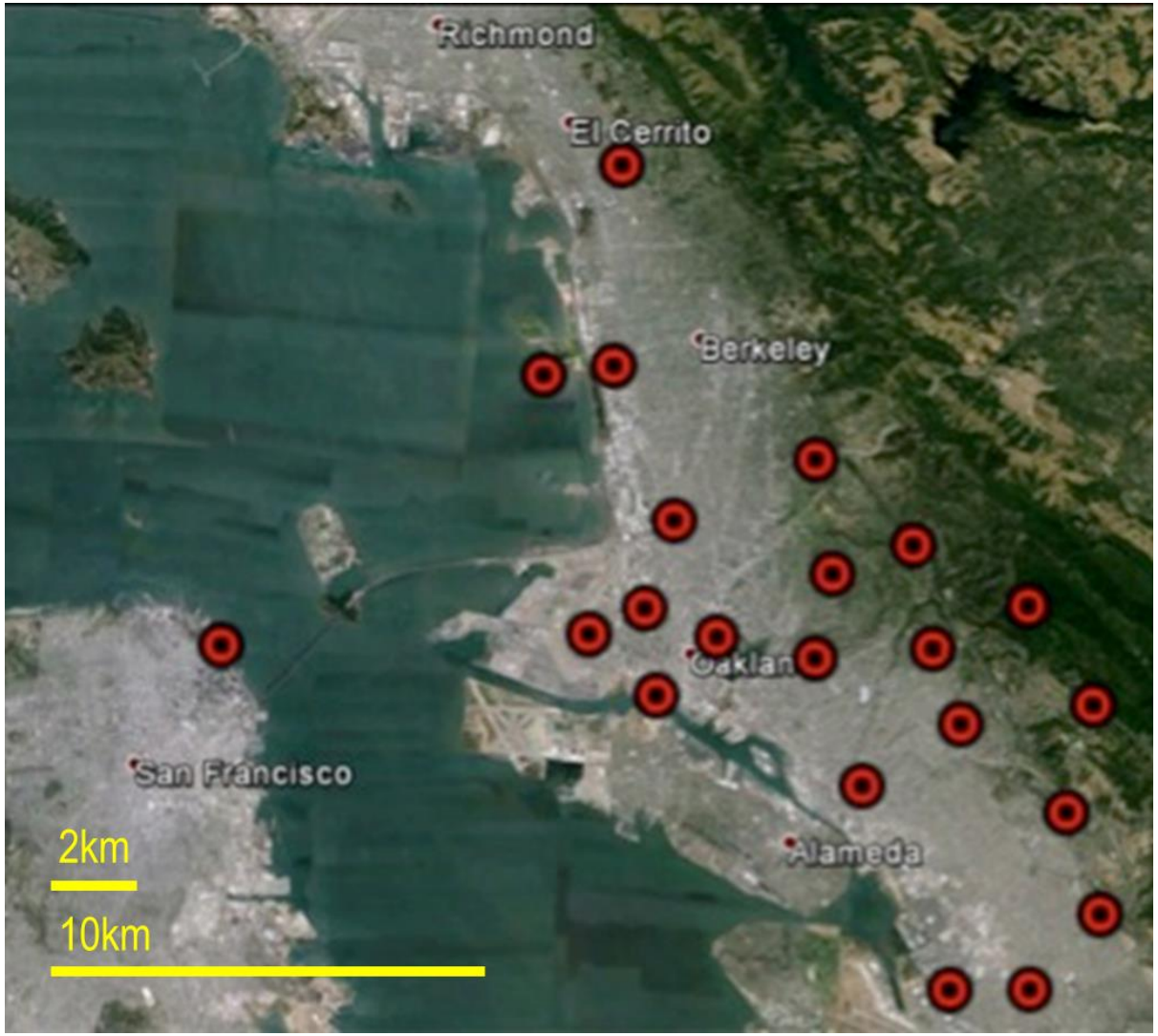


from Choi et al. 2014

BEACO$_2$N



BErkeley

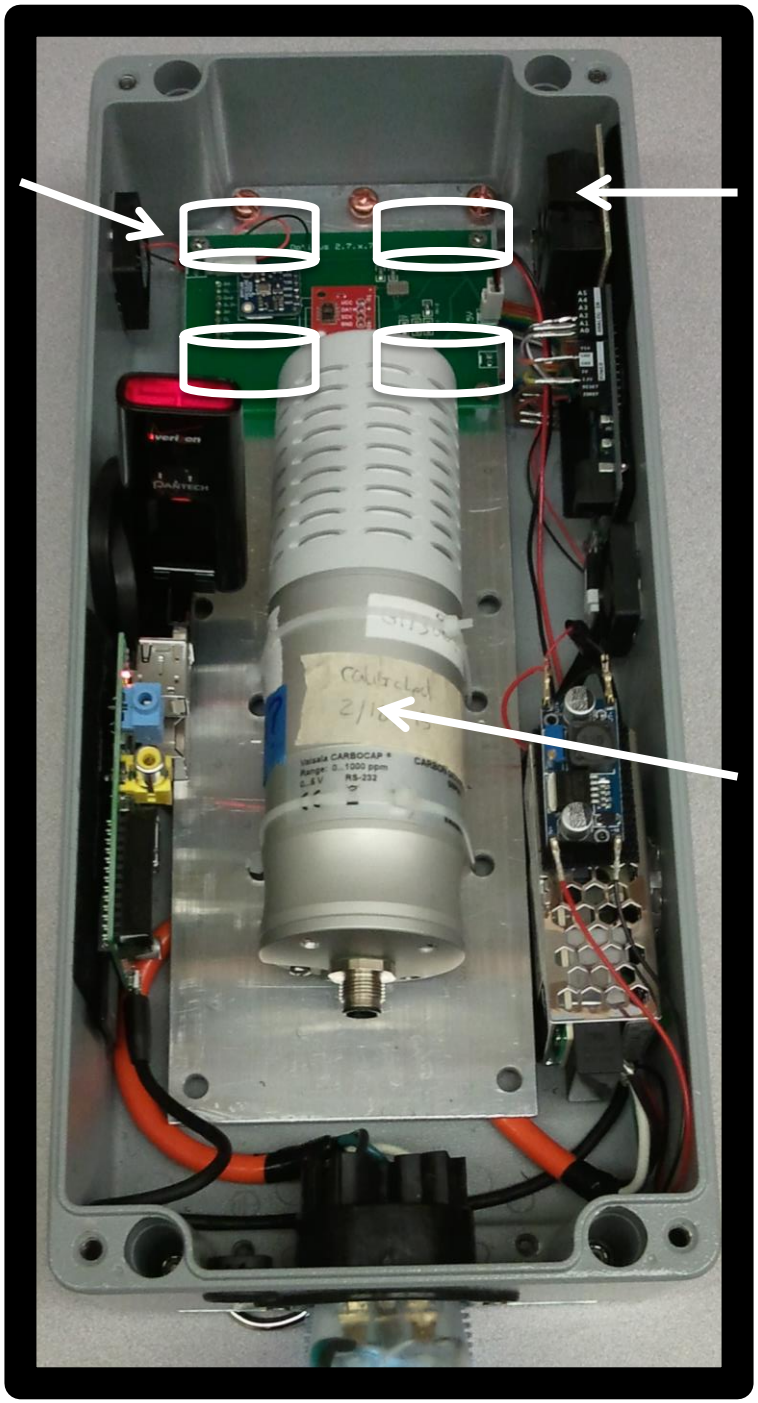
Atmospheric

CO_2

Observation

Network

Electrochemical O_3, NO, NO_2 & CO Sensors

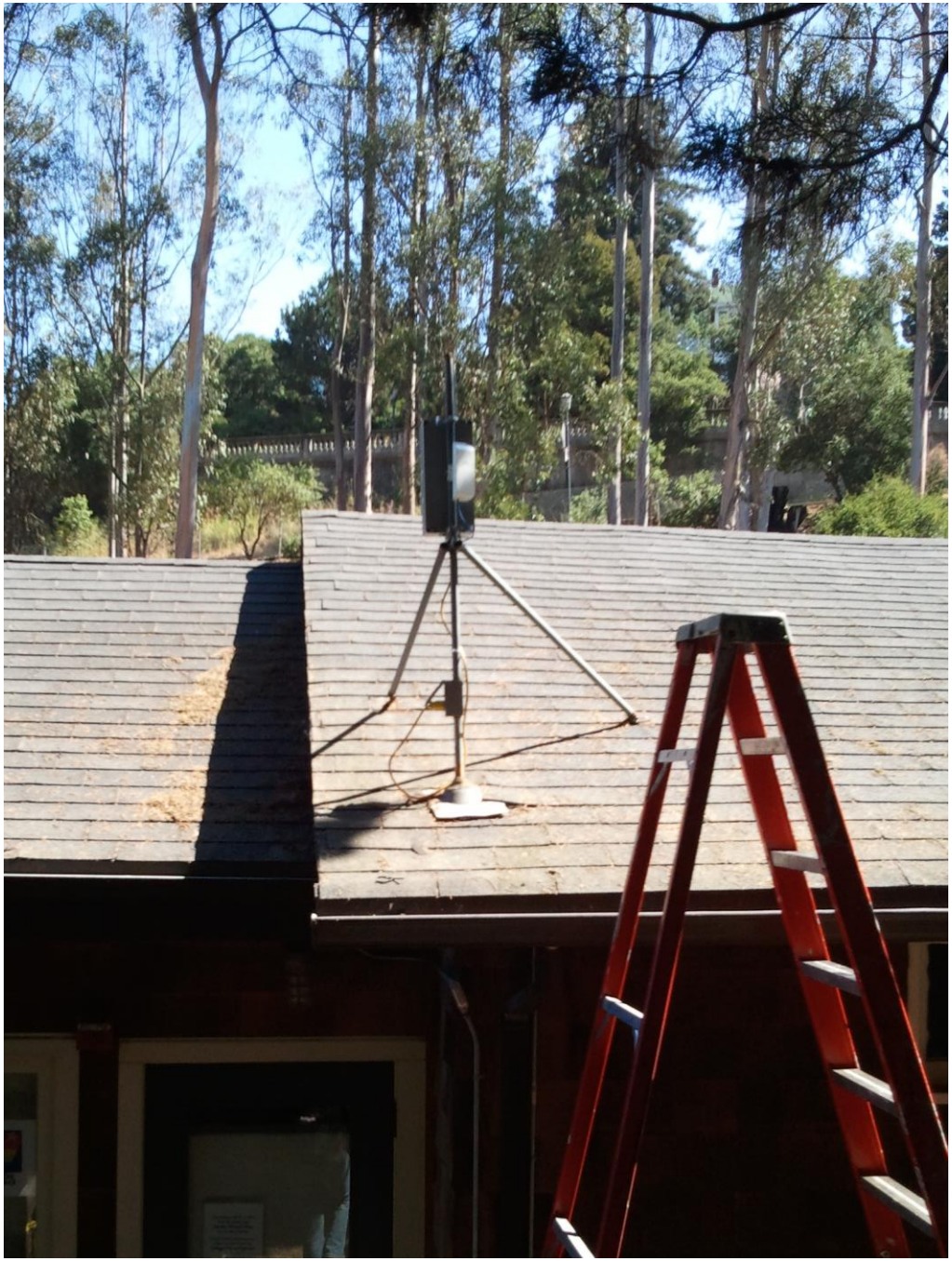


Shinyei Grove Particulate Sensor

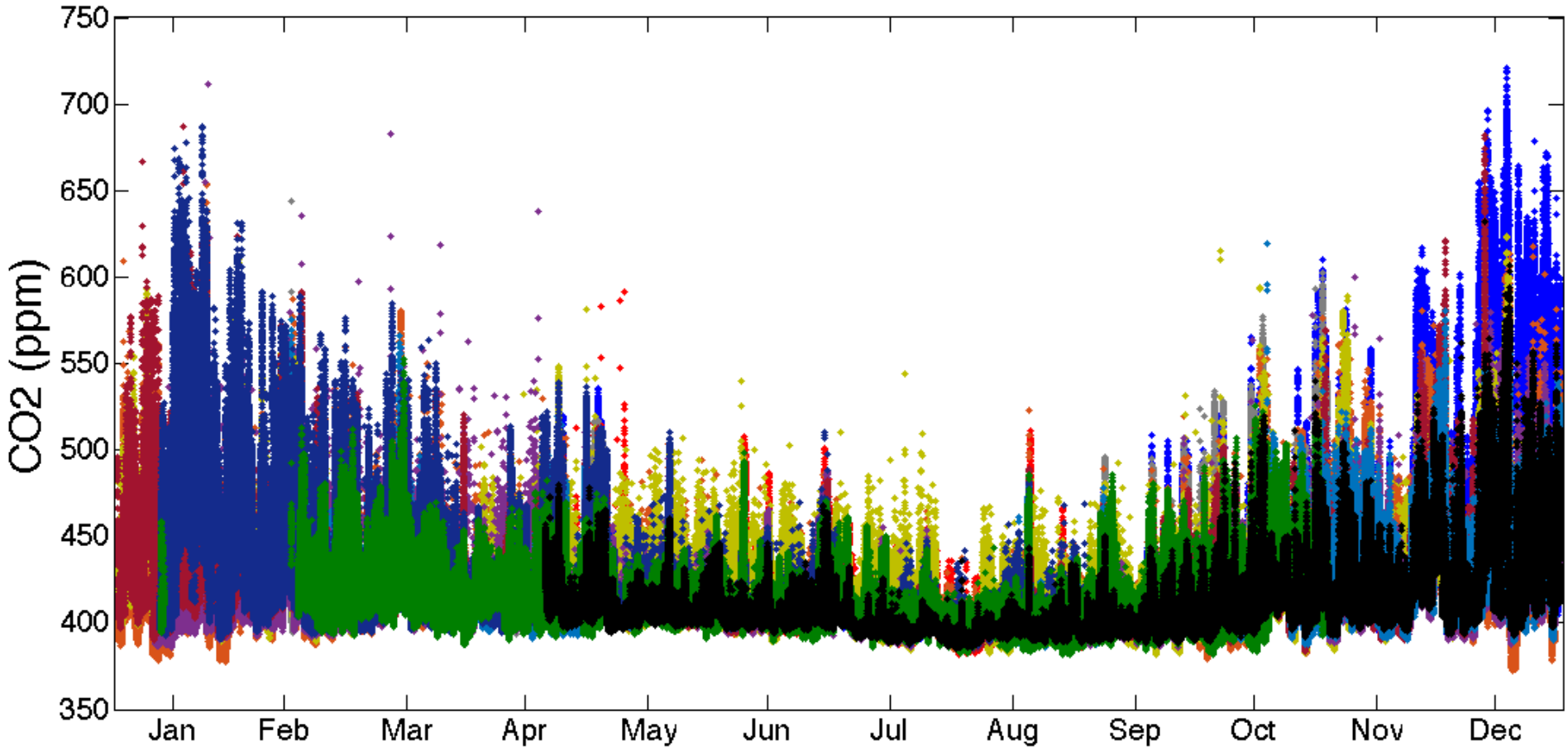
Vaisala GMP343 NDIR CO_2 Sensor

Performance	Picarro G2301	Vaisala GMP343
Accuracy	± 1 ppm	± 7 ppm
Precision	± < 0.2 ppm (5s)	± 3 ppm (2s)
Drift	± 6 ppm/yr	± 8 ppm/yr
Weight	58 lbs	0.8 lbs
Price	$50,000-100,000	$3,000


San Francisco Bay Ferry



BEACO$_2$N CO$_2$ 2013

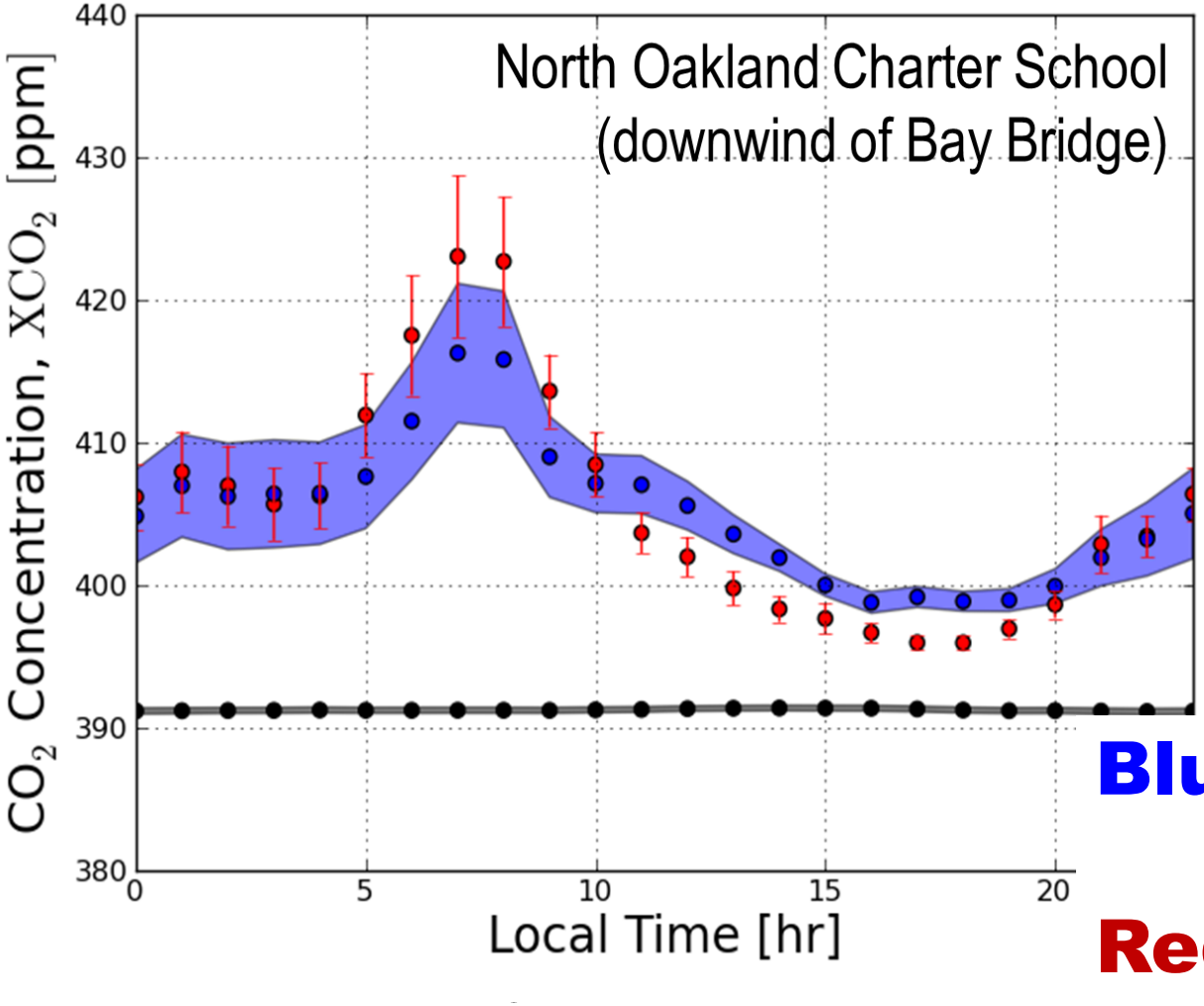


Sites:

Burckhalter
Prescott
Laurel
Kaiser
CollegePrep
Korematsu
ODowd
StLiz
HeadRoyce
ElCerrito
NOakland


Downwind of Bay Bridge
Downwind of Port of Oakland
wind
2km
Golden Gate
Rockridge
Emeryville
Temescal
Canyon
Clawson
West Oakland
Adams Point
Oakmore
Joaquin Miller Park
Oakland
Glenview
Redwood Heights
Mills College
Fruitvale
Millsmont
Seminary
Alameda
Eastmont
O.co Coliseum
Oakland Zoo
East 14th Street Business District
San Leandro
Oakland International Airport
Google

September 2013

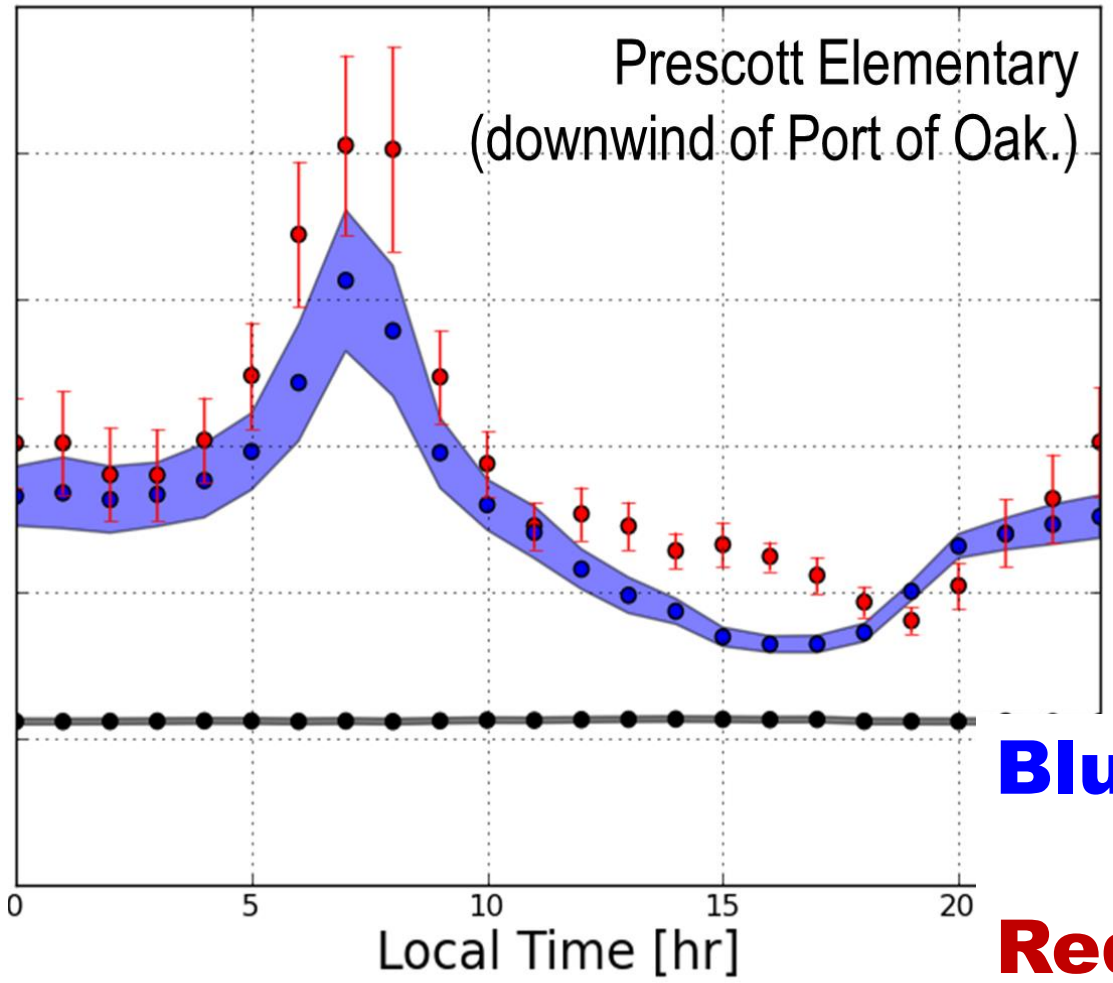


Blue: Observations

Red: Model

Black: Background

September 2013



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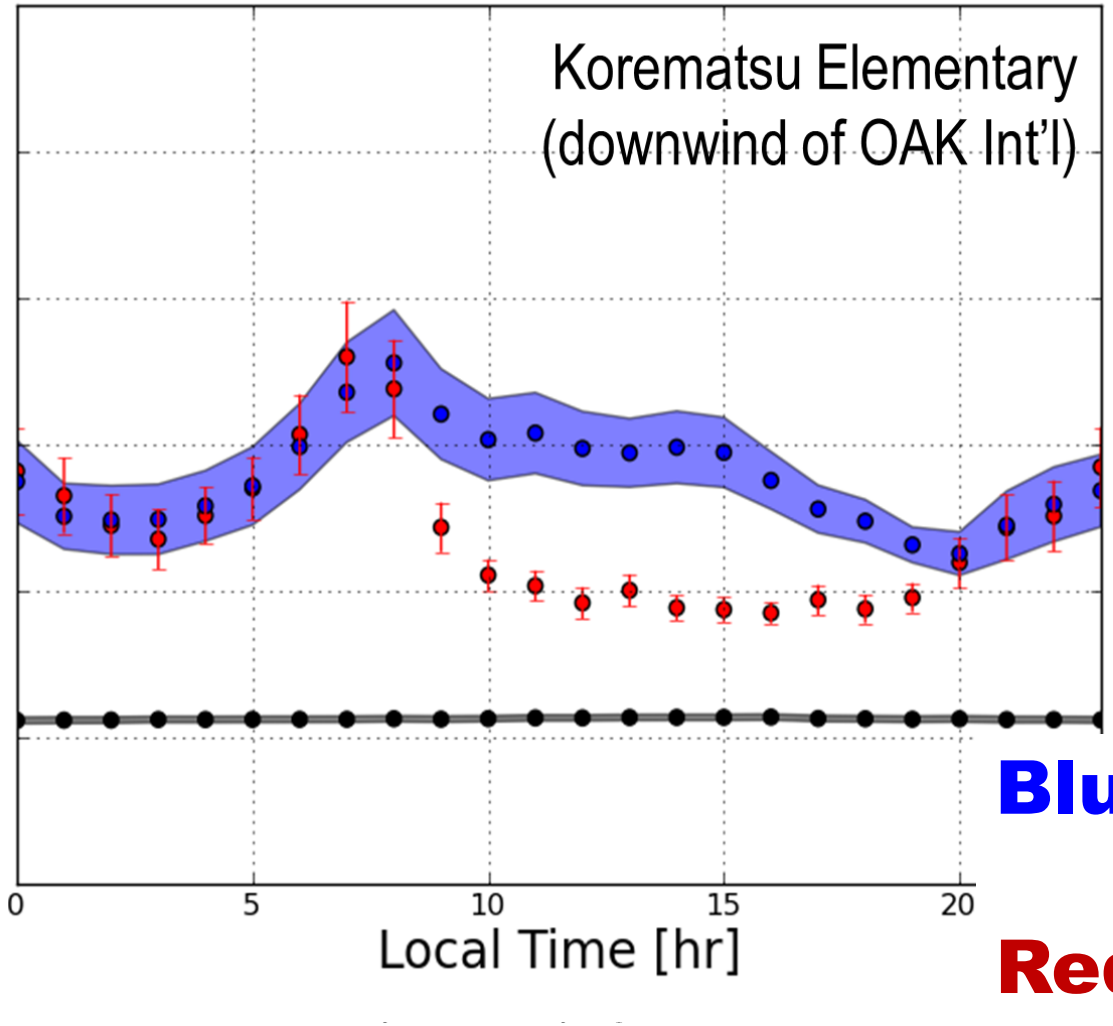

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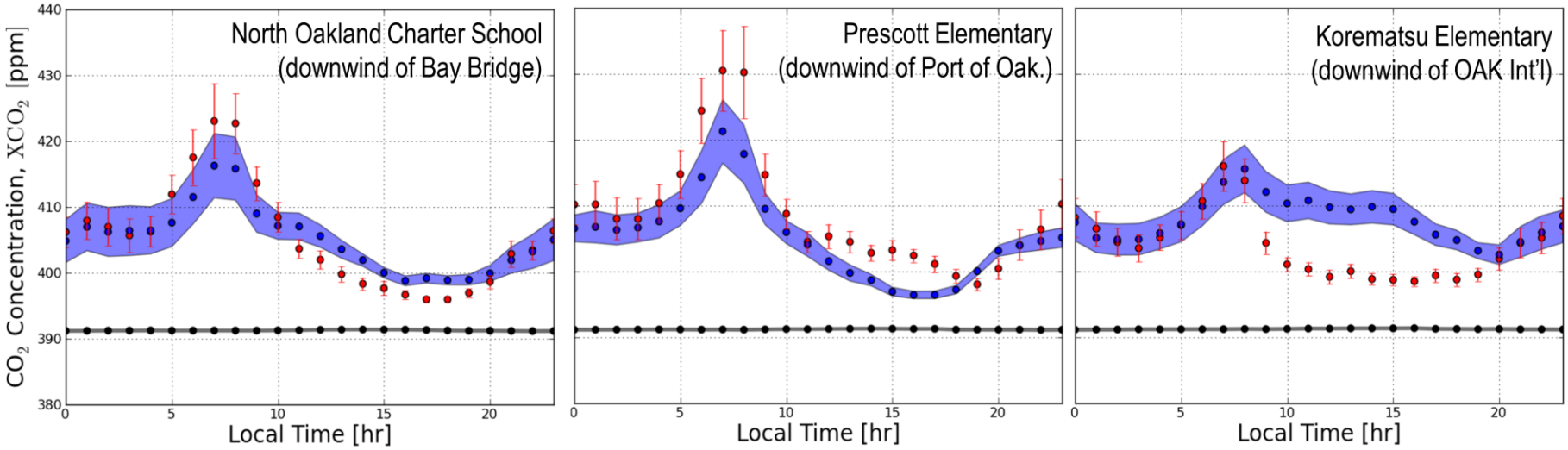
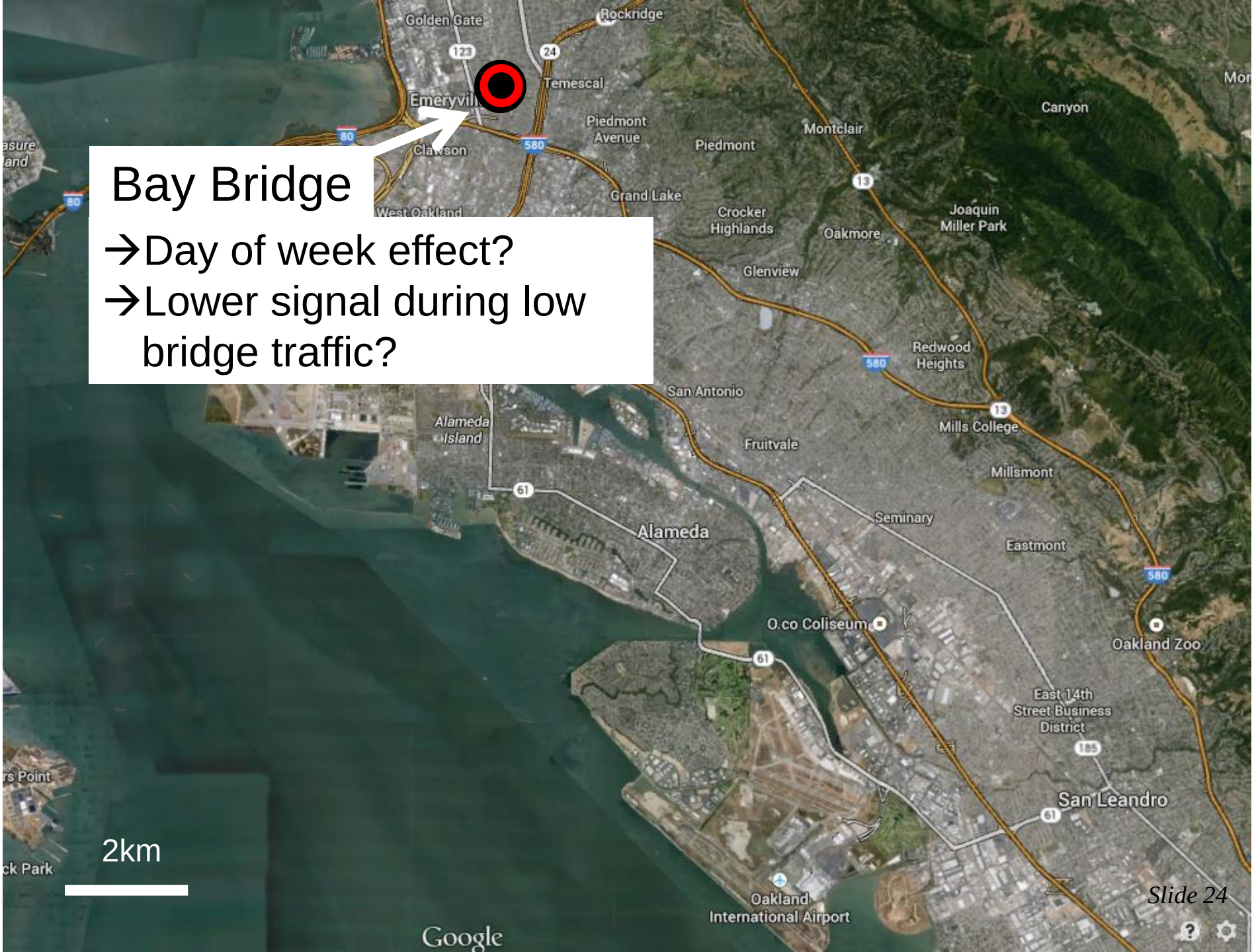
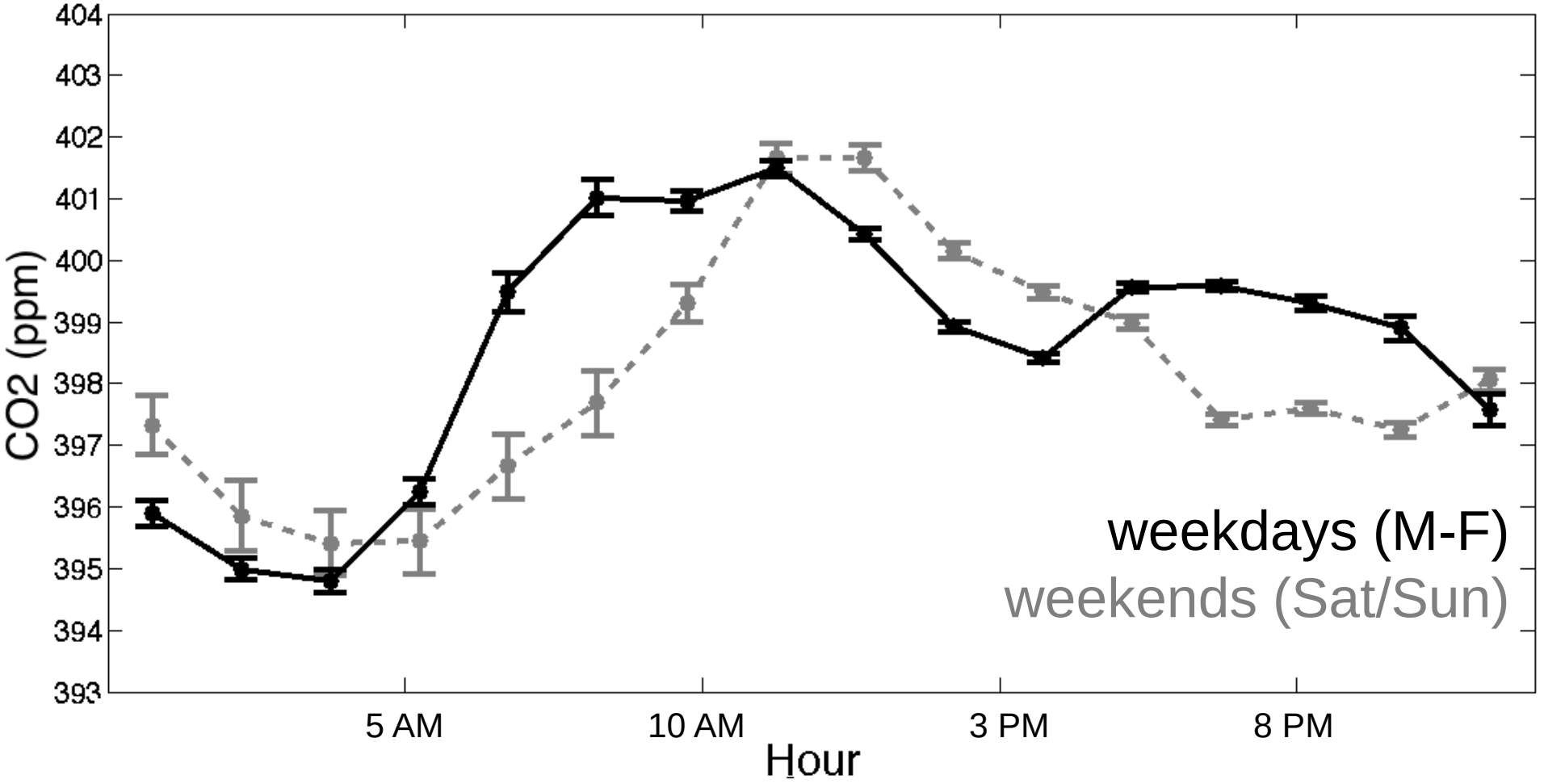
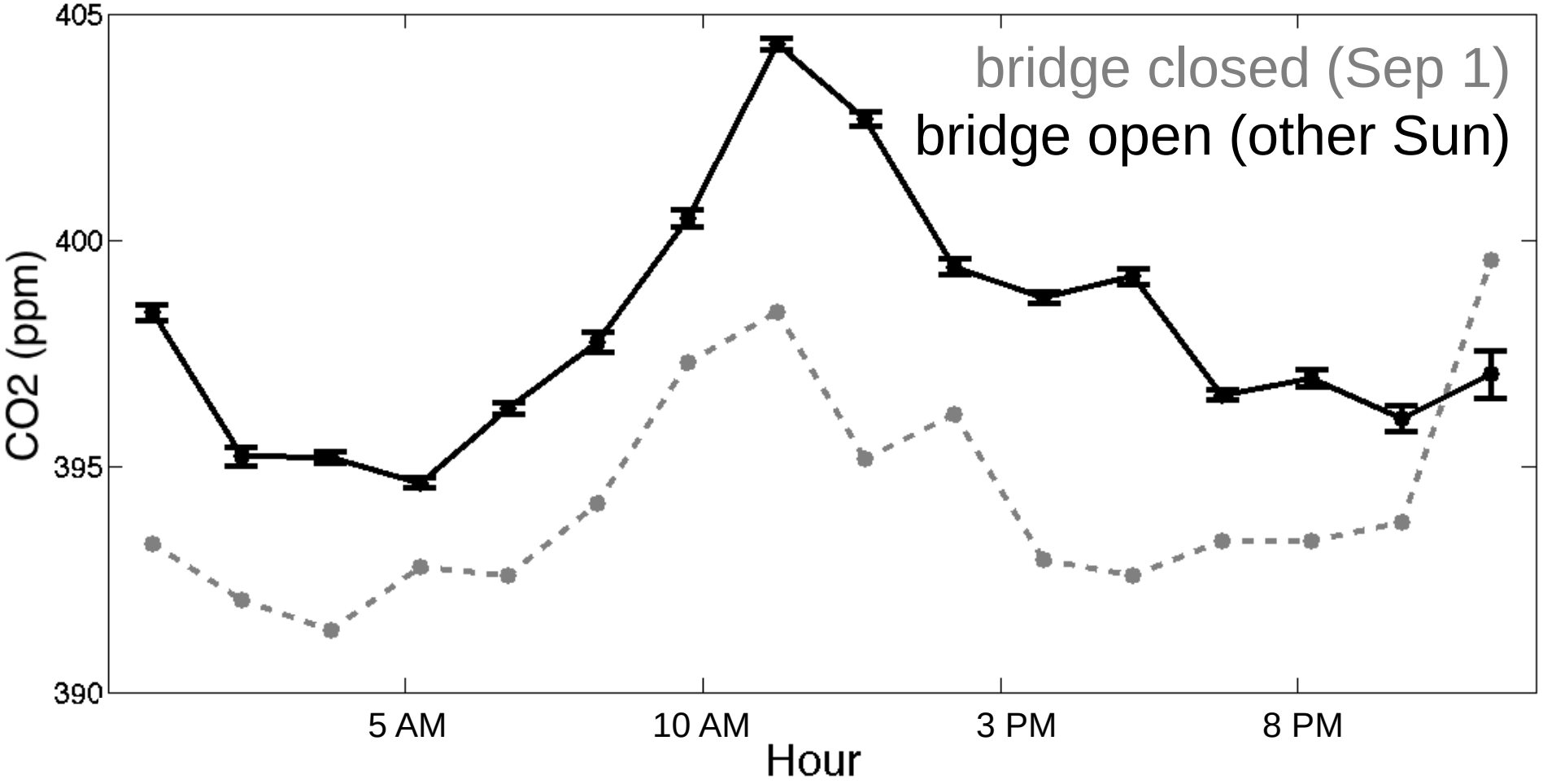

North Oakland Charter School
(downwind of Bay Bridge)
Prescott Elementary
(downwind of Port of Oak.)
Korematsu Elementary
(downwind of OAK Int'l)
CO_2 Concentration, XCO_2 [ppm]
Local Time [hr]
Local Time [hr]
Local Time [hr]

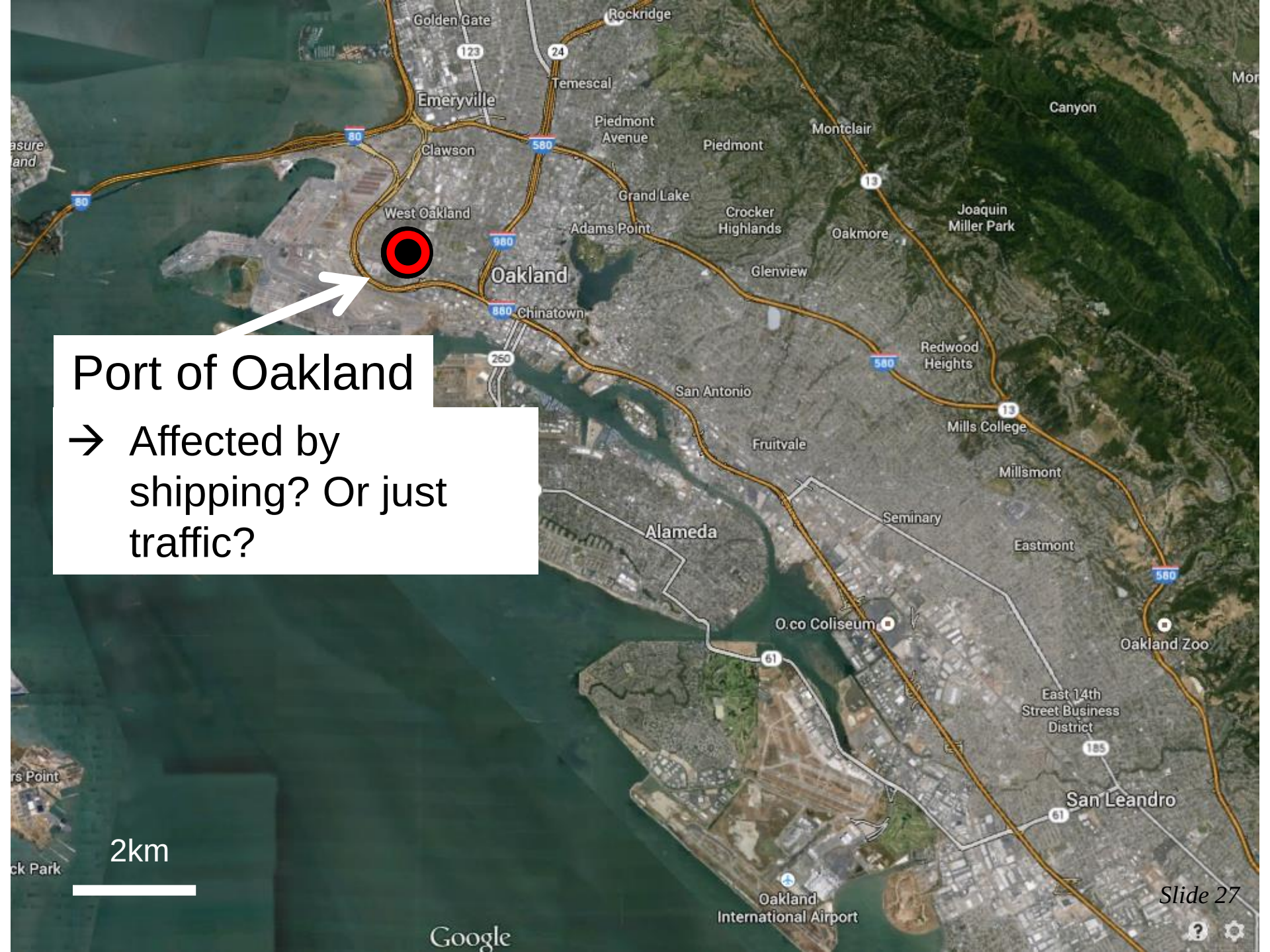

Bay Bridge
→Day of week effect?
→Lower signal during low bridge traffic?
Golden Gate
Rockridge
Temescal
Emeryville
Piedmont Avenue
Piedmont
Montclair
Canyon
Clawson
Grand Lake
West Oakland
Crocker Highlands
Oakmore
Joaquin Miller Park
Glenview
Redwood Heights
San Antonio
Alameda Island
Fruitvale
Mills College
Millsmont
Seminary
Alameda
Eastmont
O.co Coliseum
Oakland Zoo
East 14th Street Business District
San Leandro
Oakland International Airport
2km
Google

Bay Bridge Aug/Sept Diurnal Cycle



Bay Bridge Closure Diurnal Cycle




Port of Oakland
→ Affected by shipping? Or just traffic?
Golden Gate
Rockridge
Temescal
Emeryville
Piedmont Avenue
Piedmont
Montclair
Canyon
Clawson
Grand Lake
West Oakland
Adams Point
Crocker Highlands
Oakmore
Joaquin Miller Park
Oakland
Glenview
Chinatown
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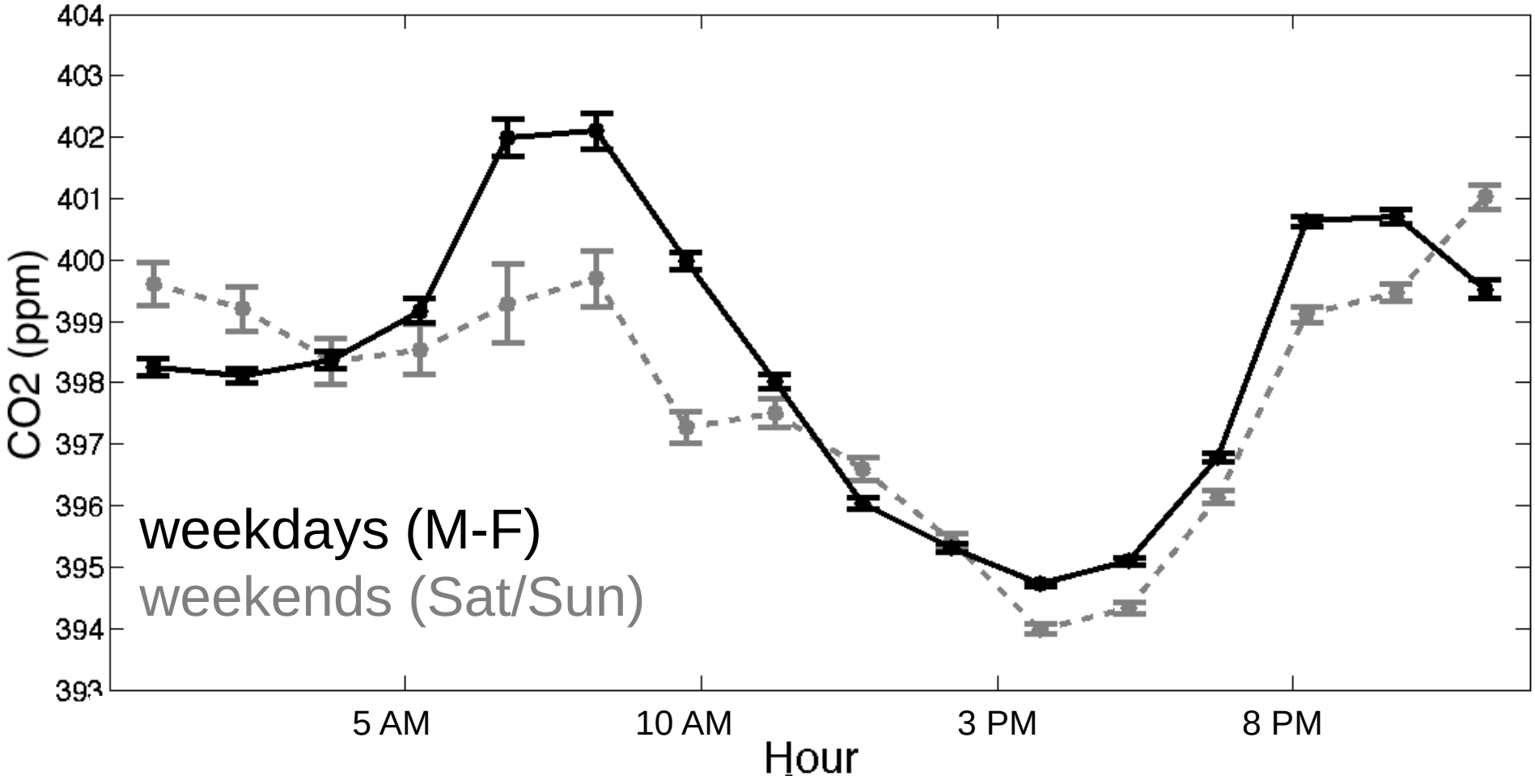
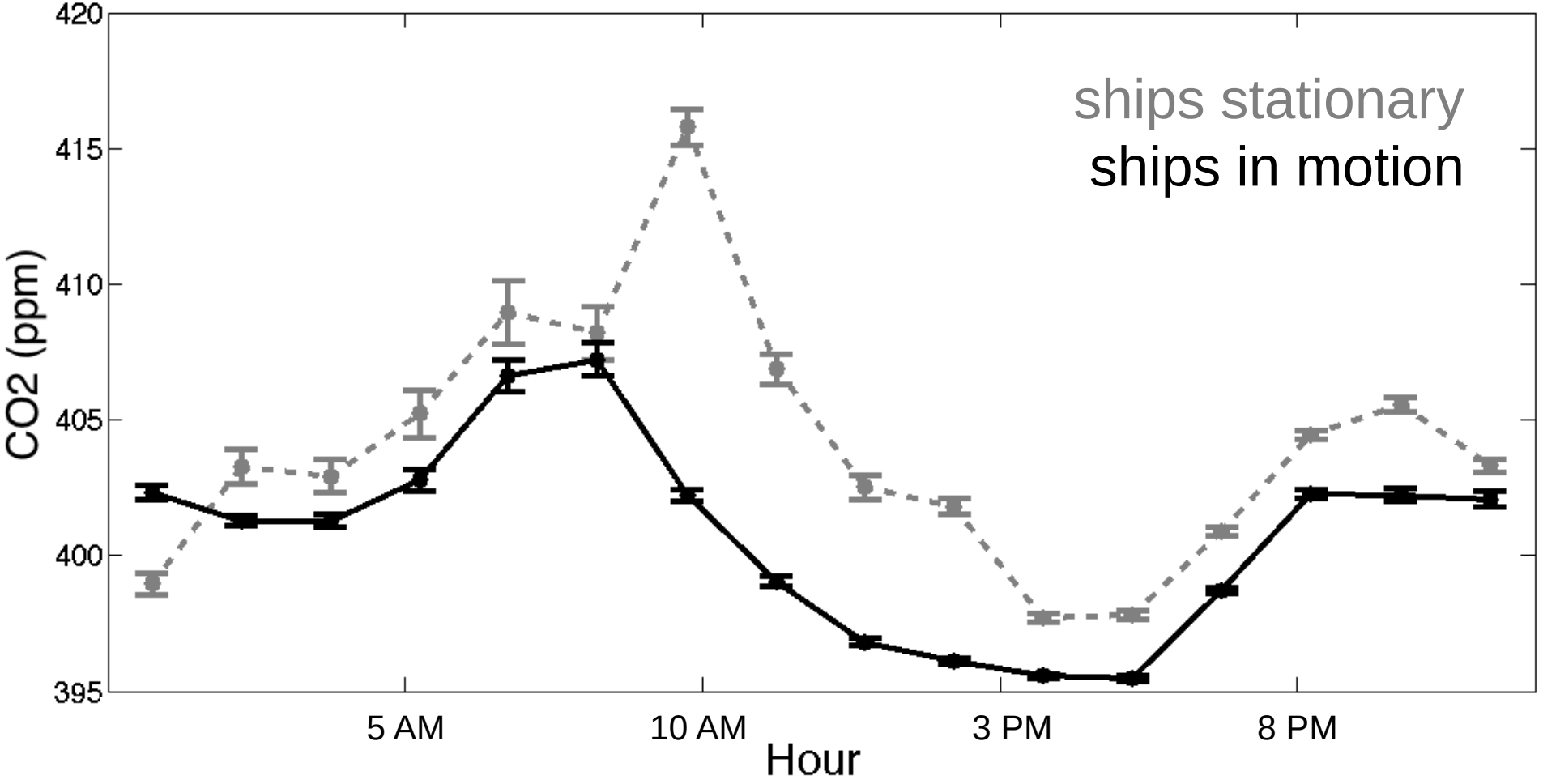
Mills College
Fruitvale
Millsmont
Seminary
Alameda
Eastmont
O.co Coliseum
Oakland Zoo
East 14th Street Business District
San Leandro
Oakland International Airport
2km
Google
Slide 27

Port Aug/Sept Diurnal Cycle



Port Diurnal Cycle by Ship Movement




☑ Sensitivity
☑ Spatial Resolution
☑ Temporal Resolution
2km
Golden Gate
Rockridge
Temescal
Emeryville
Piedmont Avenue
Piedmont
Montclair
Canyon
Clawson
Grand Lake
West Oakland
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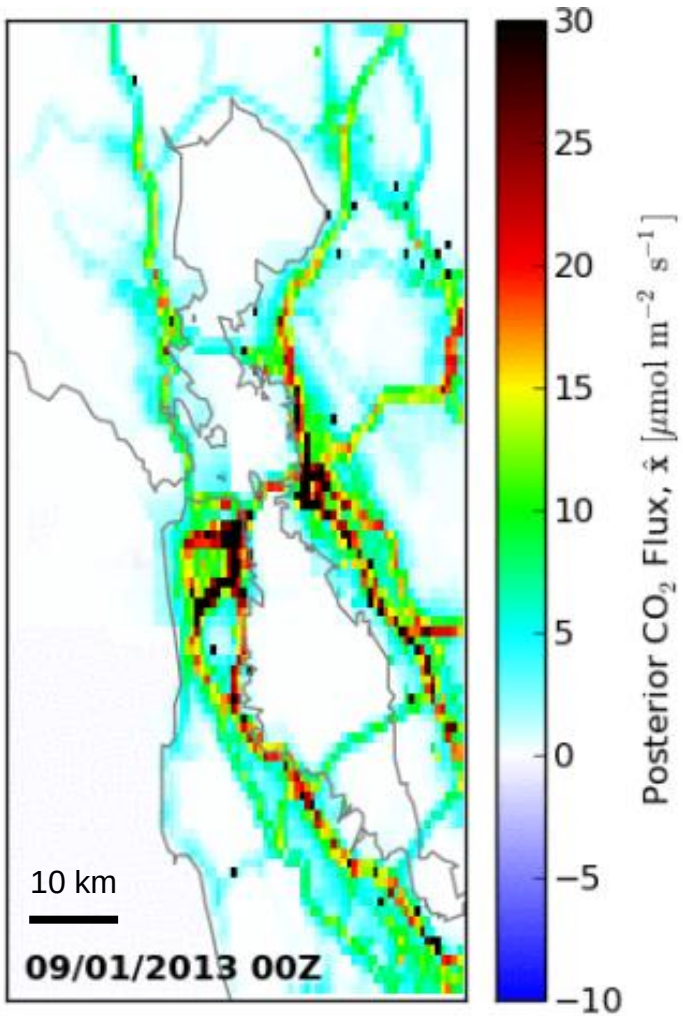
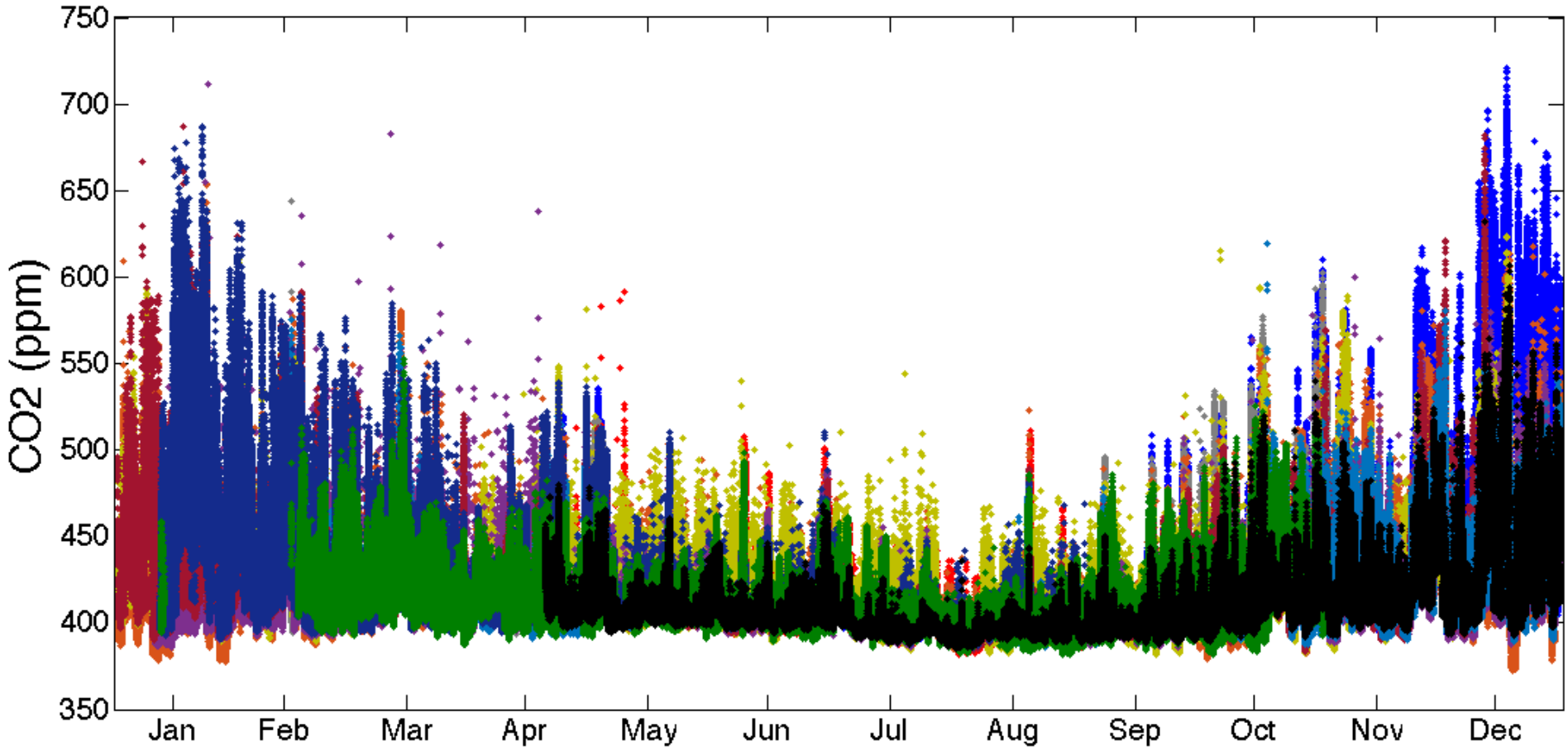
Seminary
Eastmont
O.co Coliseum
Oakland Zoo
East 14th Street Business District
San Leandro
Oakland International Airport
Google

Using all the observations



c/o Alex Turner

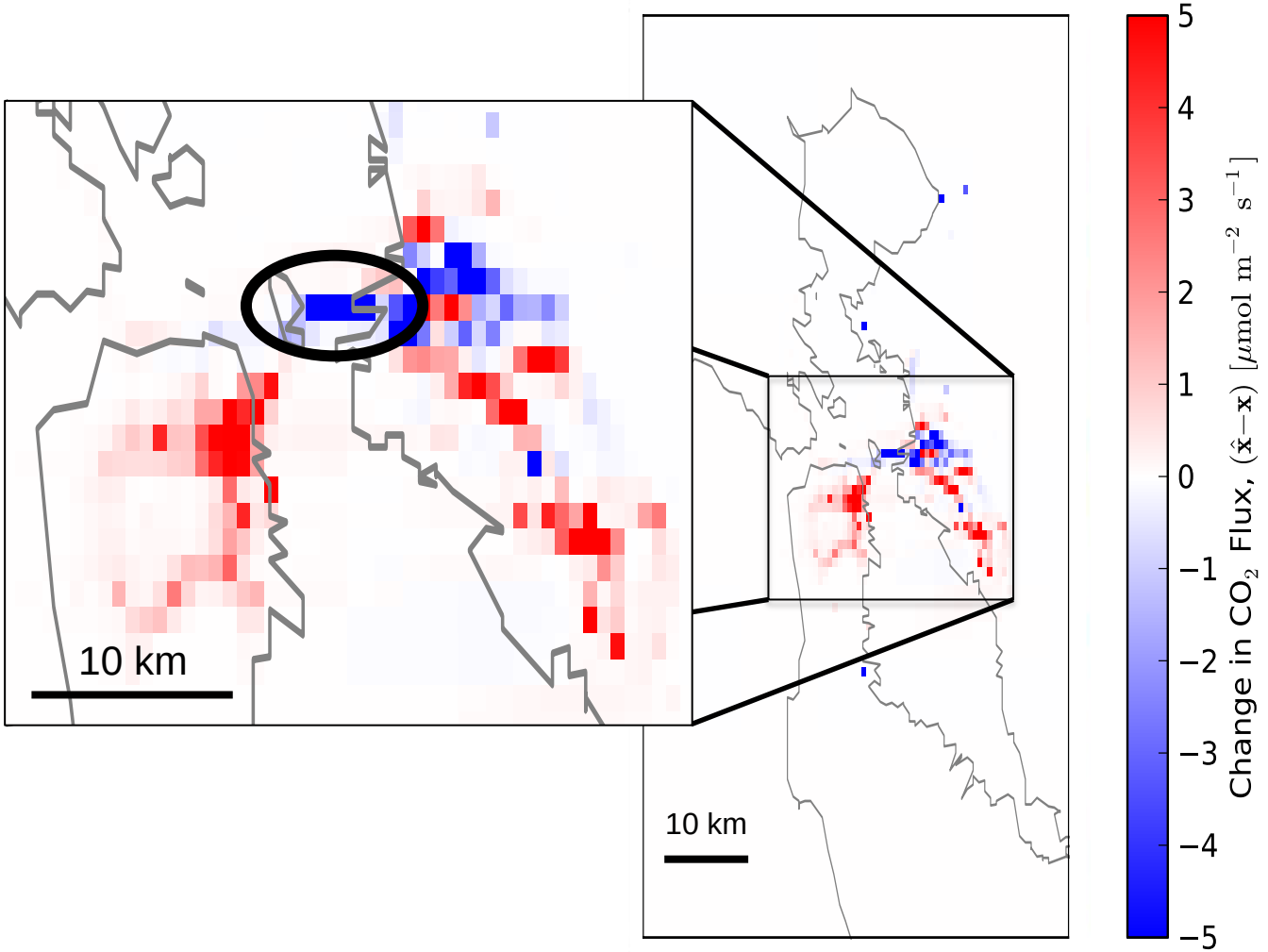
BEACO$_2$N CO$_2$ 2013



Sites:

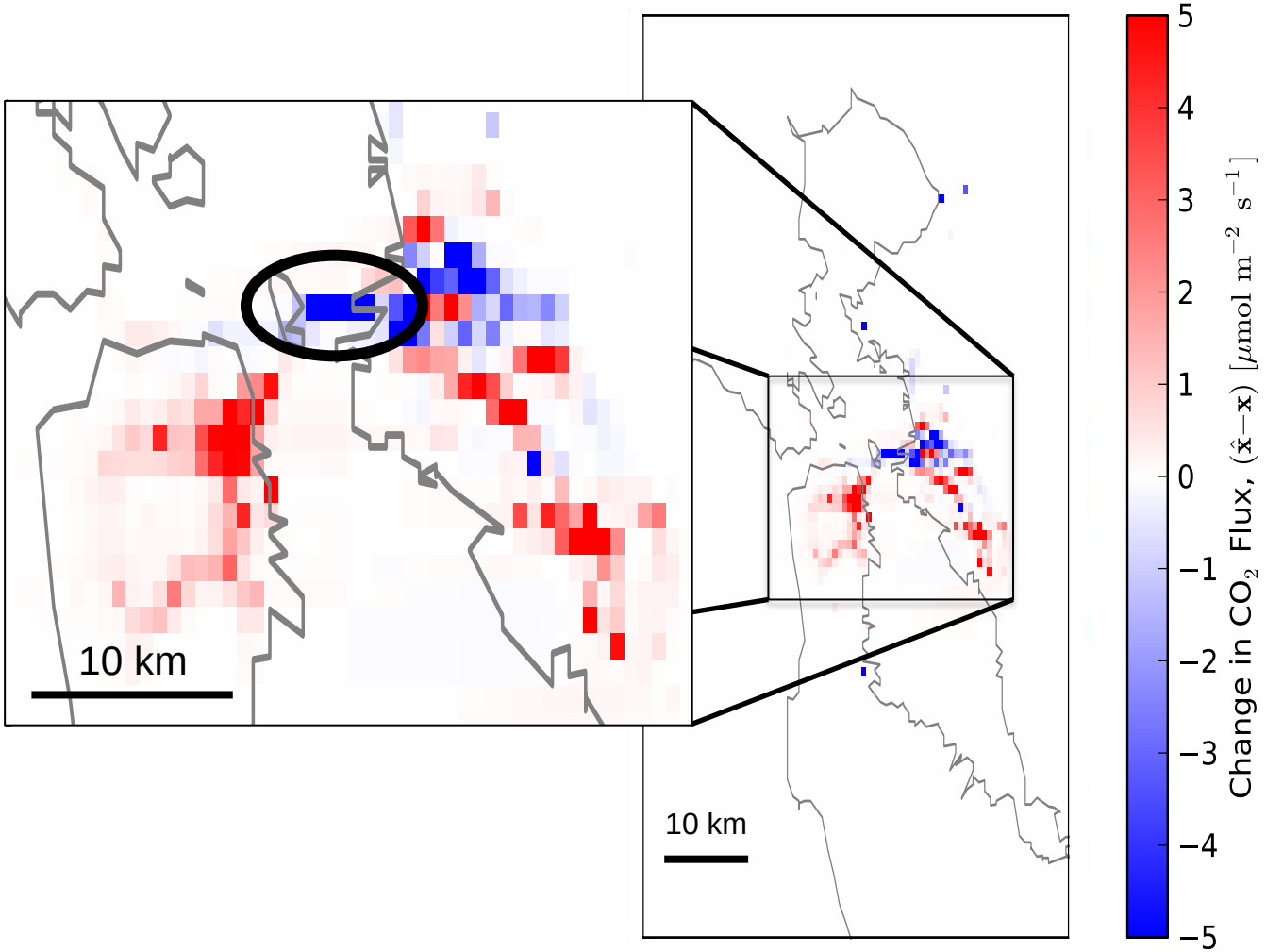
Burckhalter
Prescott
Laurel
Kaiser
CollegePrep
Korematsu
ODowd
StLiz
HeadRoyce
ElCerrito
NOakland

Combine observations and a weather model to solve for emissions

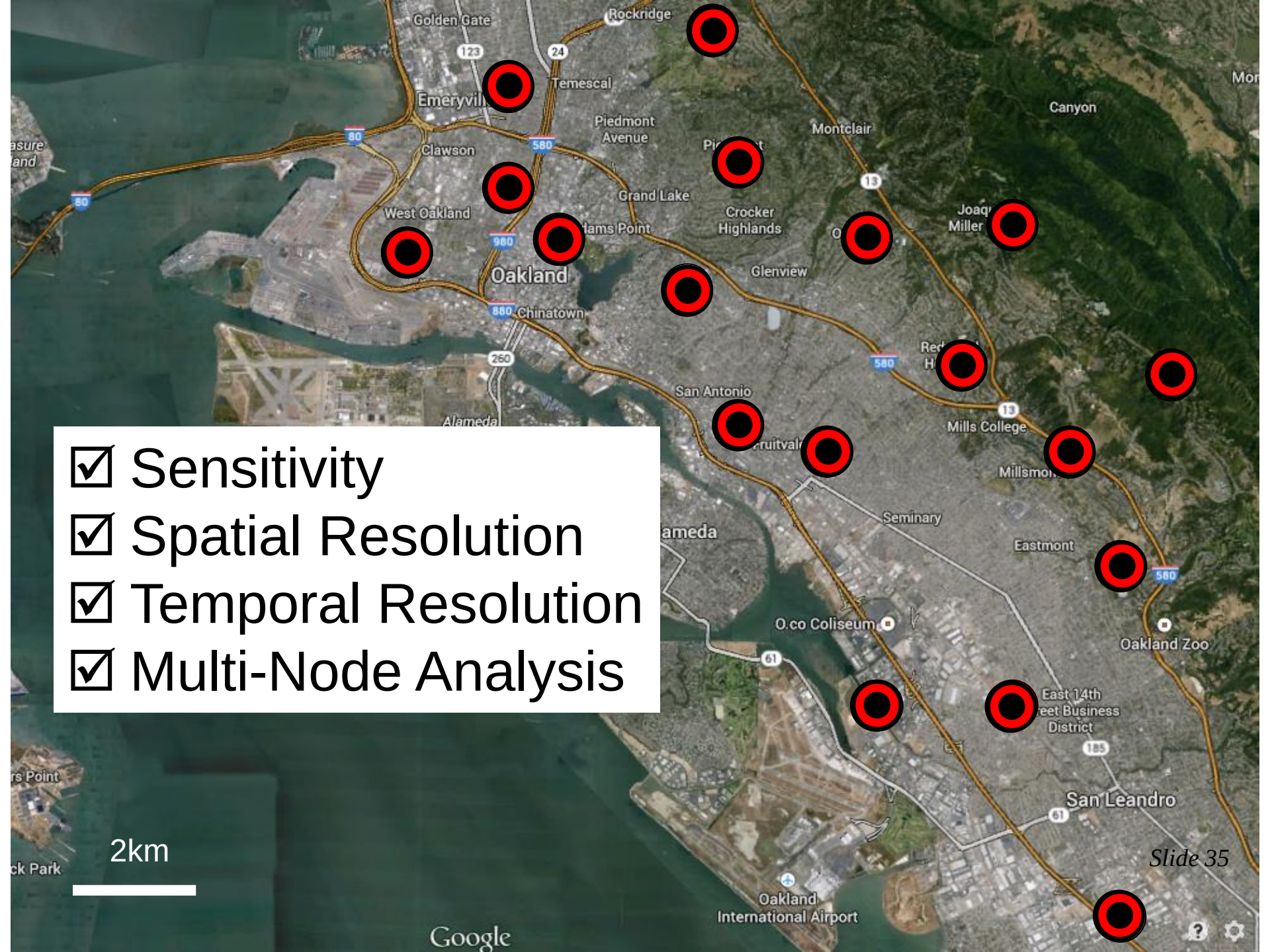


Alex Turner

The data tells us the Bay Bridge was closed on the day of preparations to open the new span



Alex Turner


☑ Sensitivity
☑ Spatial Resolution
☑ Temporal Resolution
☑ Multi-Node Analysis
2km
Google
Golden Gate
Rockridge
Temescal
Emeryville
Piedmont Avenue
Montclair
Canyon
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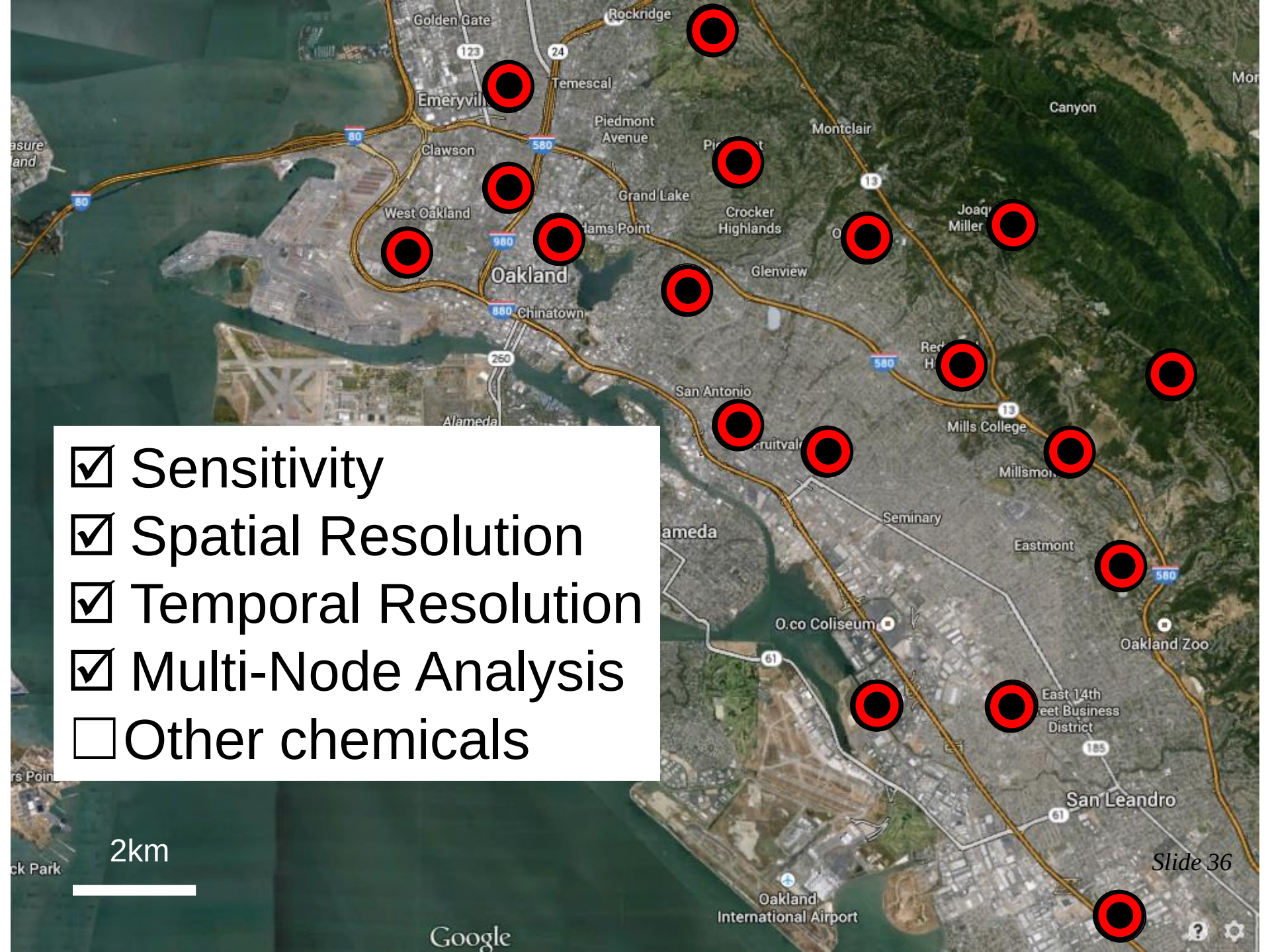
☑ Sensitivity
☑ Spatial Resolution
☑ Temporal Resolution
☑ Multi-Node Analysis
☐ Other chemicals
2km
Google
Golden Gate
Rockridge
Temescal
Emeryville
Piedmont Avenue
Montclair
Canyon
Clawson
Grand Lake
West Oakland
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Oakland Zoo
East 14th Street Business District
San Leandro
Oakland International Airport

Slide 36

Alexis Shusterman David Holstius

Jill Teige

Alex Turner

Catherine Newman

Thank you!