

Air Quality Progress in California Communities

June 23, 2016

California Environmental Protection Agency

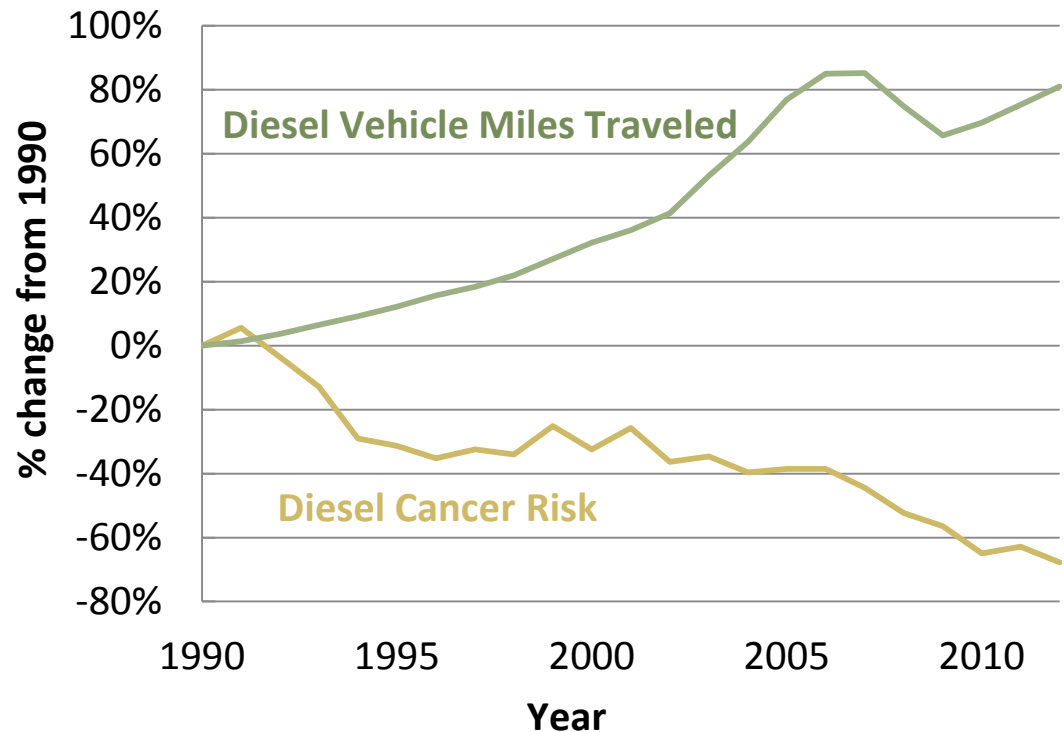
 **Air Resources Board**

Introduction

- Evaluation of air pollution trends in California communities
- Disproportionate burden in poor and minority communities
- Are ARB, local, and federal efforts shrinking this disparity?

Progress in Lowering Statewide Airborne Cancer Risk

- Diesel cancer risk decreased 68% since 1990
- While diesel vehicle miles increased 80%



Propper et al. (2015) Ambient and Emission Trends of Toxic Air Contaminants in California, *Environmental Science & Technology*

Do All Communities Benefit Equally?

- Comparison of long-term air pollution trends in EJ and non-EJ communities
 - Diesel PM, NO₂, CO, PM2.5, and ozone
- Limitations
 - Not intended to evaluate total exposures from all known airborne pollutants
 - Limited to available monitoring – not able to look at all neighborhoods and all near-source exposures

Approach to Answering the Question

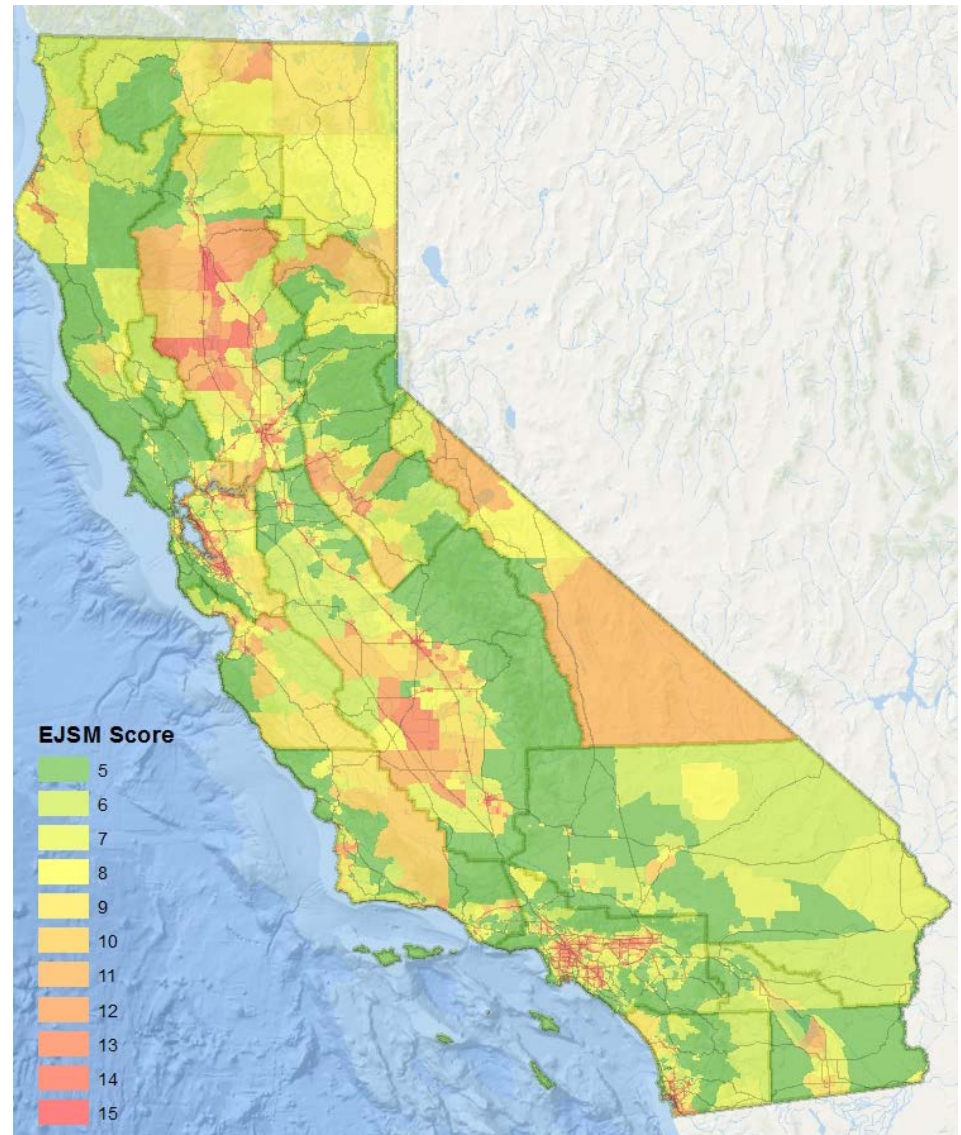
- Environmental Justice Screening Method (EJSM)
- Air pollution monitoring network from 1990 to 2014
- Surrogate method for diesel PM using NO_x and emissions inventory

Environmental Justice Screening Method

Map Layers

- Social and Health Vulnerability
- Exposure and Risk
- Hazard Proximity

Within-Region Scoring

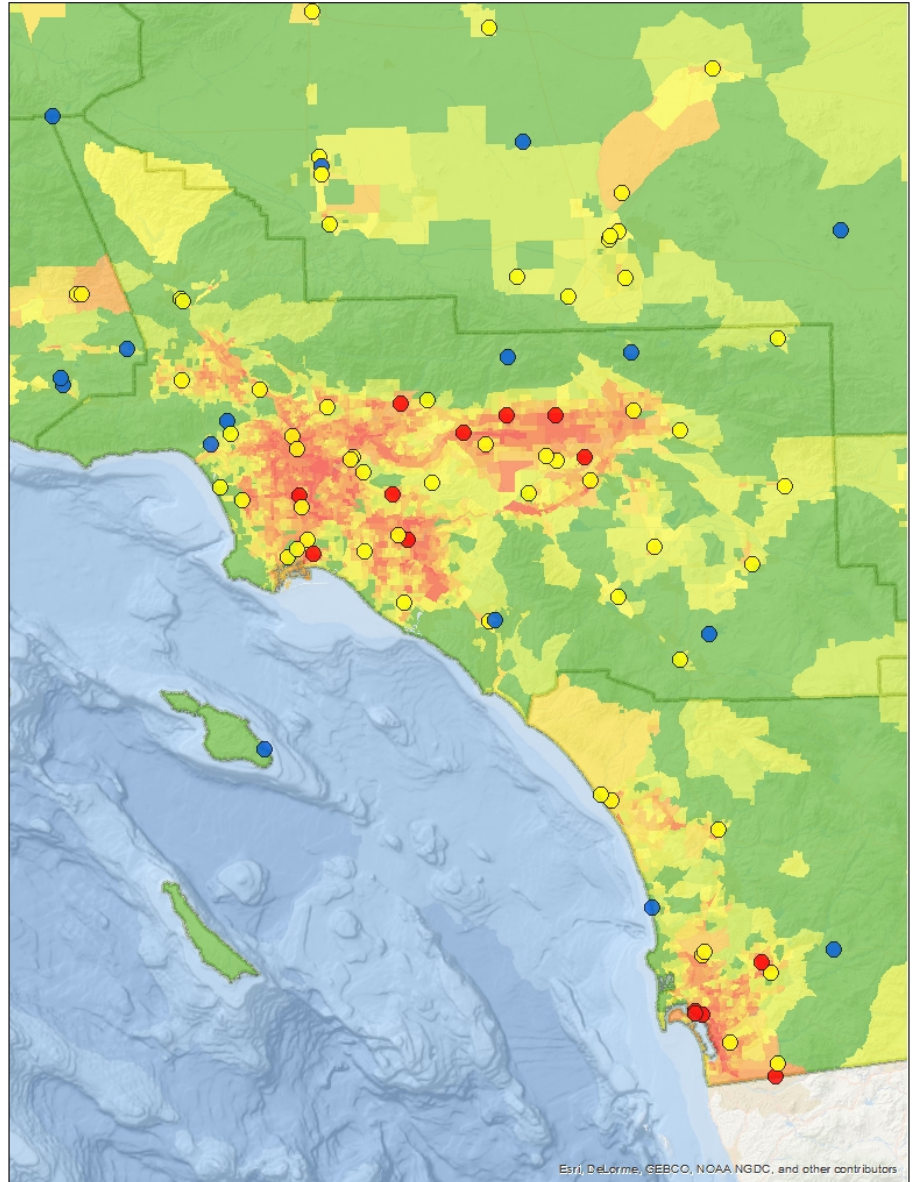


Air Pollutant Monitoring

- 25 year period: 1990-2014
 - Over 150 sites for each pollutant
 - Calculate annual average
- Each monitoring site given an EJSM score
- Compare EJ and non-EJ monitors
 - Average all EJ monitors by year
 - Average all non-EJ monitors by year

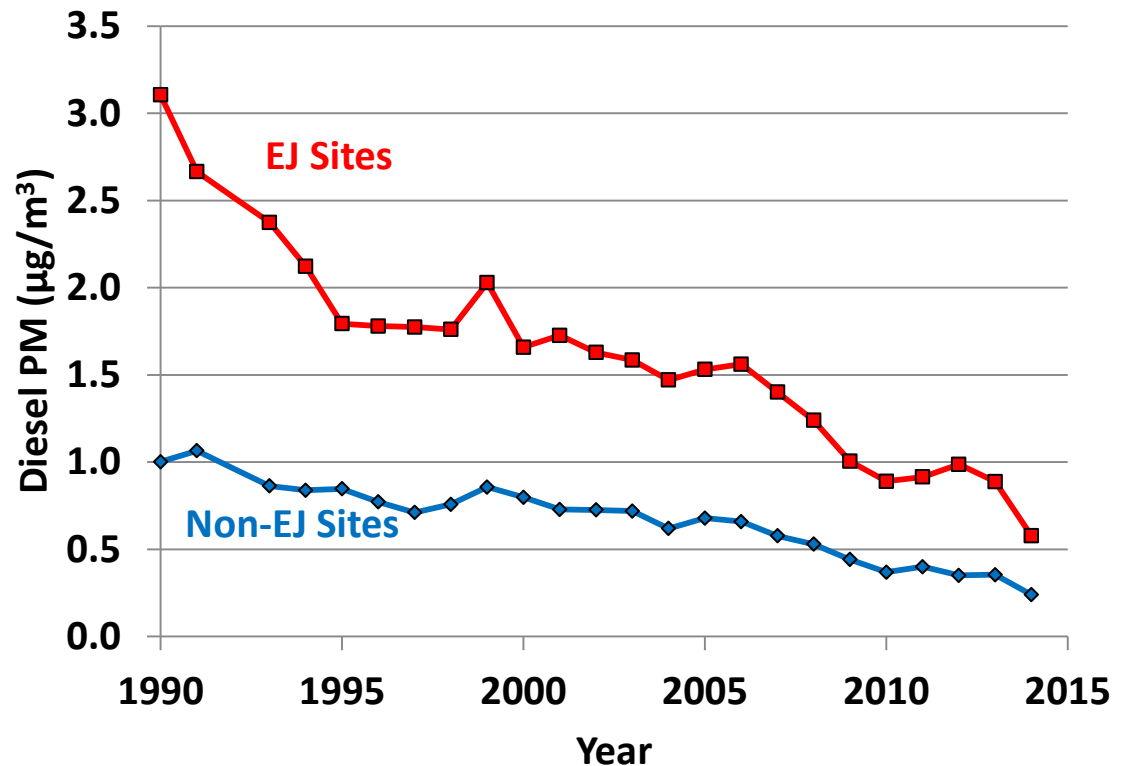
Southern California Monitoring Sites

- 20% Least Burdened
- Average Burden
- 20% Most Burdened



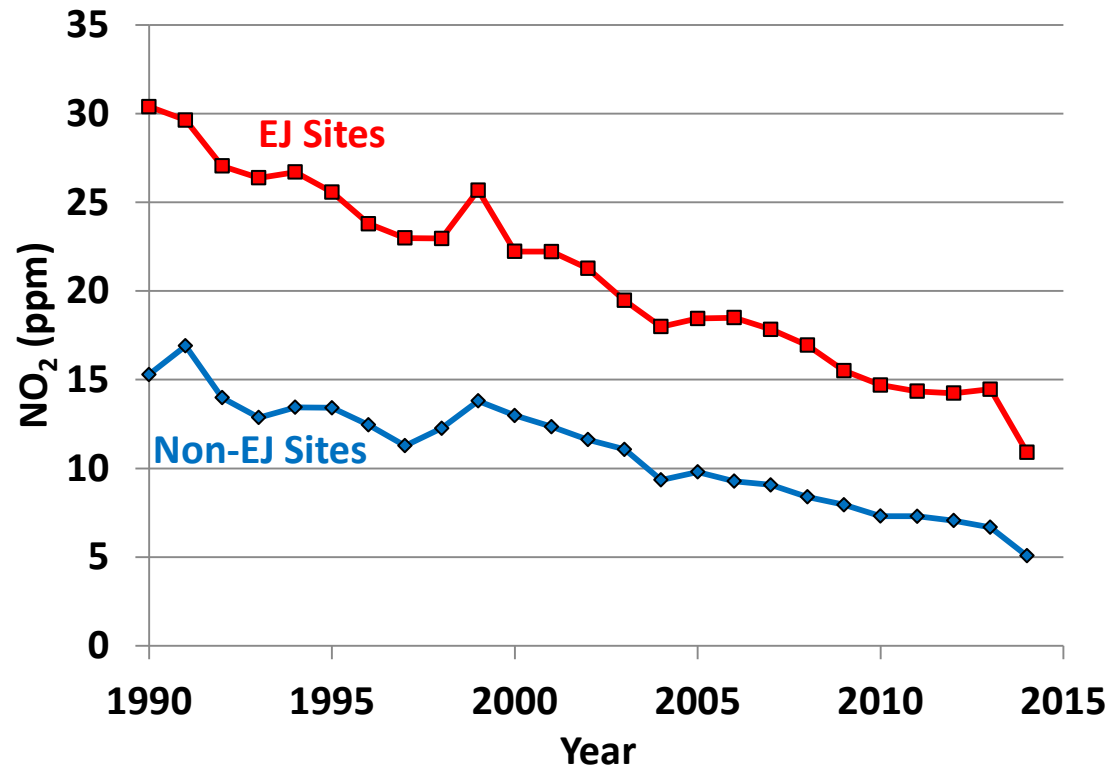
Greatest Diesel PM Reduction at Monitors in EJ Communities

- Large reductions at all sites
- 3 times greater reduction at EJ sites



Greatest NO₂ Reduction at Monitors in EJ Communities

- Large reductions at all sites
- 2 times greater reduction at EJ sites

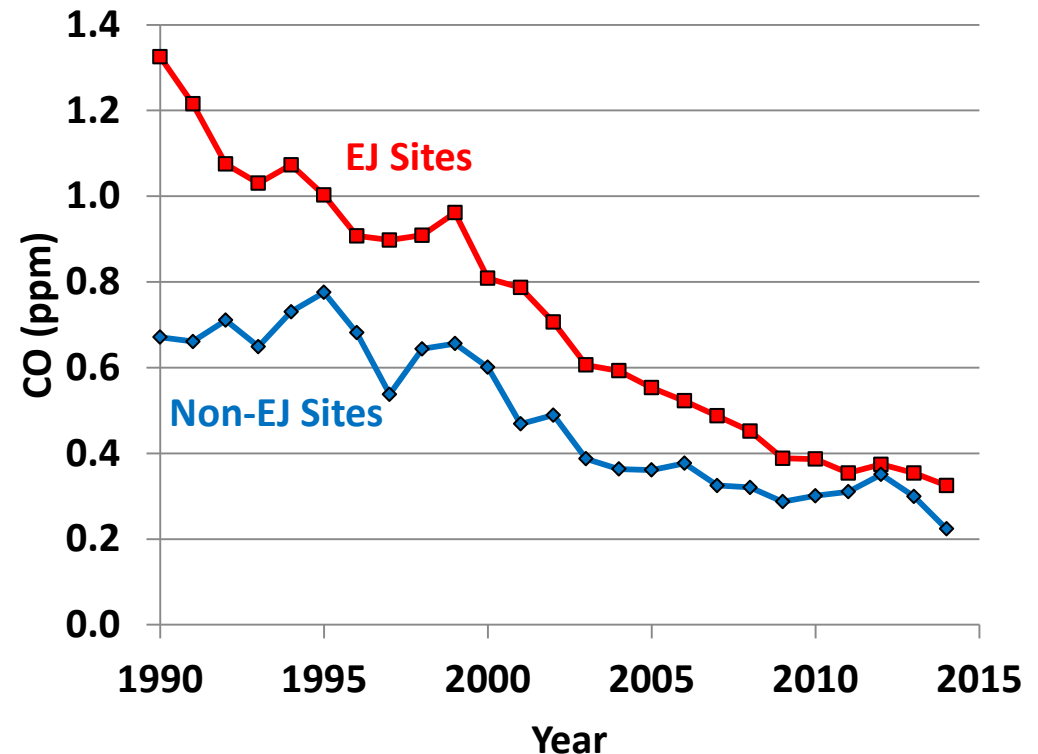


Diesel Particulate Matter and NO₂

- Concentrations going down everywhere with greatest reductions at EJ monitors
- Why?
 - Regulations and enforcement aimed at local sources: anti-idling, ports, and rail yards
 - Cleaner diesel fuel provides immediate benefits
 - Reductions over time from tailpipe emission standards
 - Retrofit requirements accelerate reductions
- Further reductions expected from Truck and Bus Rule and continued fleet turnover

CO Levels Now Roughly Equal at Monitors in EJ and Non-EJ Communities

- Large reductions at all sites
- 2 times greater reduction at EJ sites

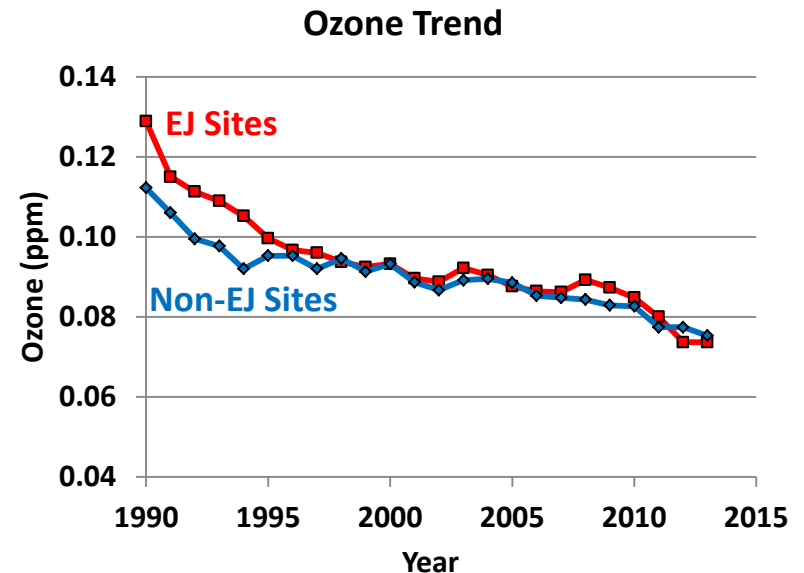
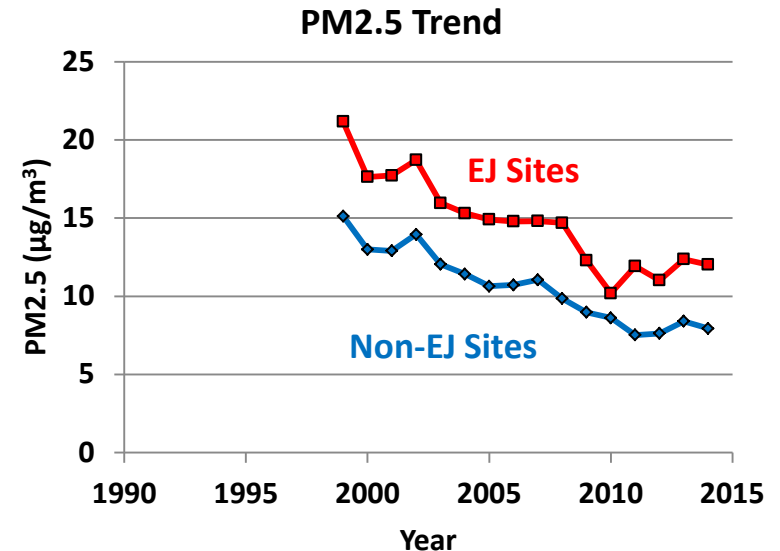


Carbon Monoxide

- Concentrations going down everywhere with greatest reductions at EJ monitors
- Why?
 - Fuels
 - Reformulated gasoline, oxygenates
 - Tailpipe standards
 - LEV I and II
 - Fleet turnover
 - 2005: 23% pre-LEV vehicles in EJ versus 8% in non-EJ
 - 2013: 6% pre-LEV in EJ versus 3% in non-EJ

Regional Pollutants: PM2.5 and Ozone

- PM2.5 and ozone are formed in atmosphere downwind of sources
- Regulations to control precursors have impact regionally, not locally

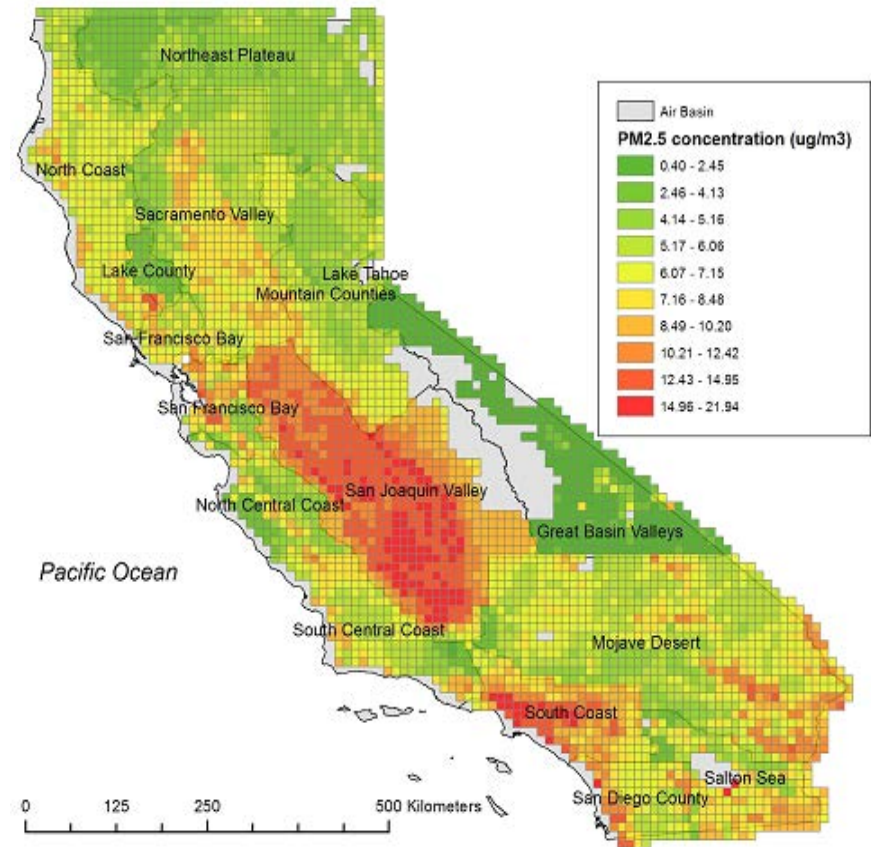


Conclusion: All Pollutants Decreasing

- Diesel PM, CO, and NO₂
 - Decreases everywhere with greatest reductions at monitoring sites in EJ communities
- Regional Pollutants: PM_{2.5} and ozone
 - PM_{2.5} decreases everywhere, remaining gap between EJ and non-EJ monitors
 - Ozone decreases everywhere, no gap between EJ and non-EJ monitors
- Continued efforts to reduce local exposures
 - Enforcement, Truck and Bus Rule, SIP, Freight Plan, etc.

New Capabilities to Evaluate Air Pollutant Levels in EJ Areas

- Near-roadway network
- Source-specific monitoring
- Satellite data
- Portable devices
- Mobile platforms



Lee et al (2016). Enhancing the applicability of satellite remote sensing for PM2.5 estimation using MODIS deep blue AOD and land use regression in California, United States. *Environmental Science & Technology*