



Environmental
Monitoring:
We All Live
Downwind

Ann Marie Carlton

National Environmental Monitoring August 2018

UCI



B. Chan for *The LA Times*



W. Zhou for *Getty images*



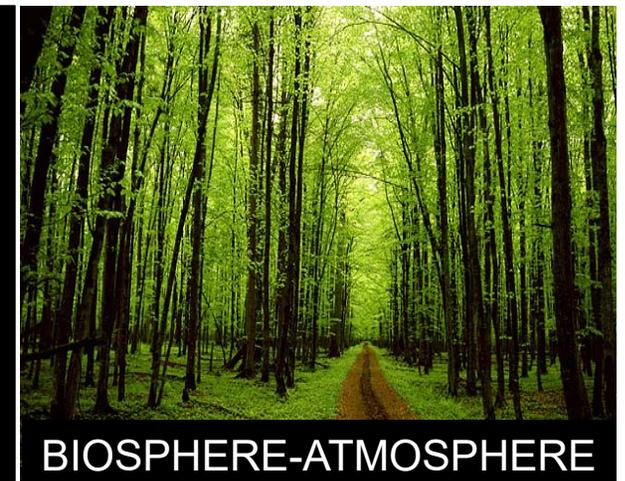
J. Upton for *Slate magazine*



National Park Service



NASA

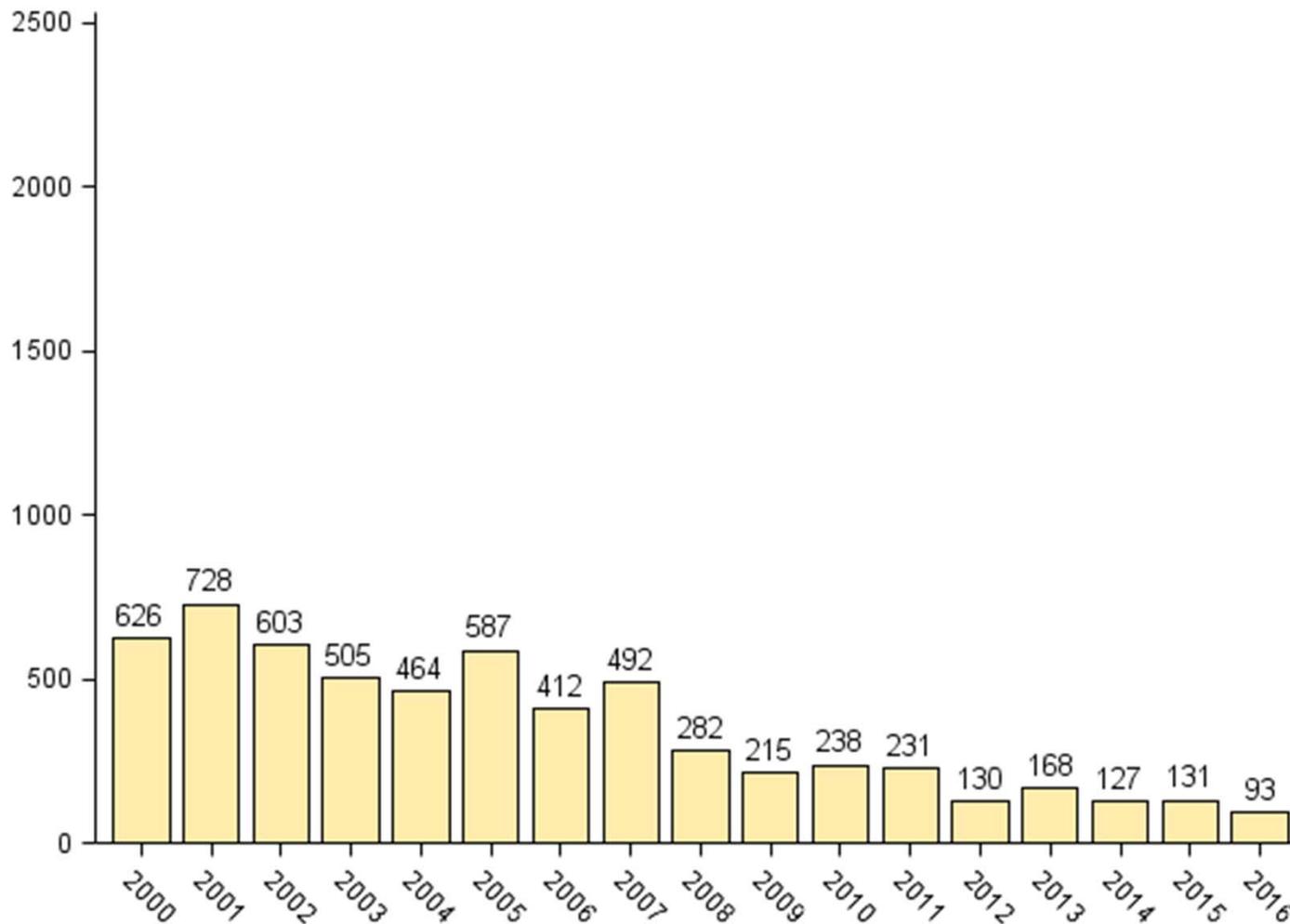


S. Franklin for *TIME magazine*





**Total Number of Days Reaching *Unhealthy for Sensitive Groups* or Above on the Air Quality Index
(Among 35 major U.S. Cities, for PM2.5 only)**



Economically & environmentally sustainable, healthy, resilient communities

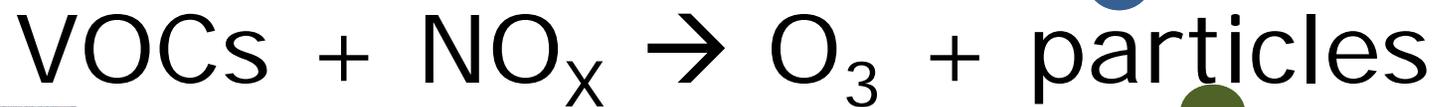
- 1 in 8 deaths globally due to air pollution
- Federal, State & Local rules exist to safeguard human health
- To what extent are existing programs effective? Only way to assess: accurately measured, properly recorded & effectively communicated environmental monitoring

Environmental aftermath of extreme events is often poorly documented

- Society is adapting to increasing frequency & scale related to intensifying variables related to temperature, precipitation, winds & flooding

Air quality impacts of natural disasters & human pollution perturbations in the US

- Best approaches to safeguard human health in the future & now



5 "criteria" air pollutants regulated by Clean Air Act

Sensitive individuals: children, 65 & older (women in their mid 40s+)

PM_{2.5} and O₃ pose greatest threat to human health

Disasters and their AQ Impacts

- Harvey-Arkema
- NE Blackout
- George Washington Bridge Closure
- Fires

Harvey



Nickolay Lamm/StorageFront



Marcus Yam / Los Angeles Times



Posted to Twitter by
Stephanie Ann Mata



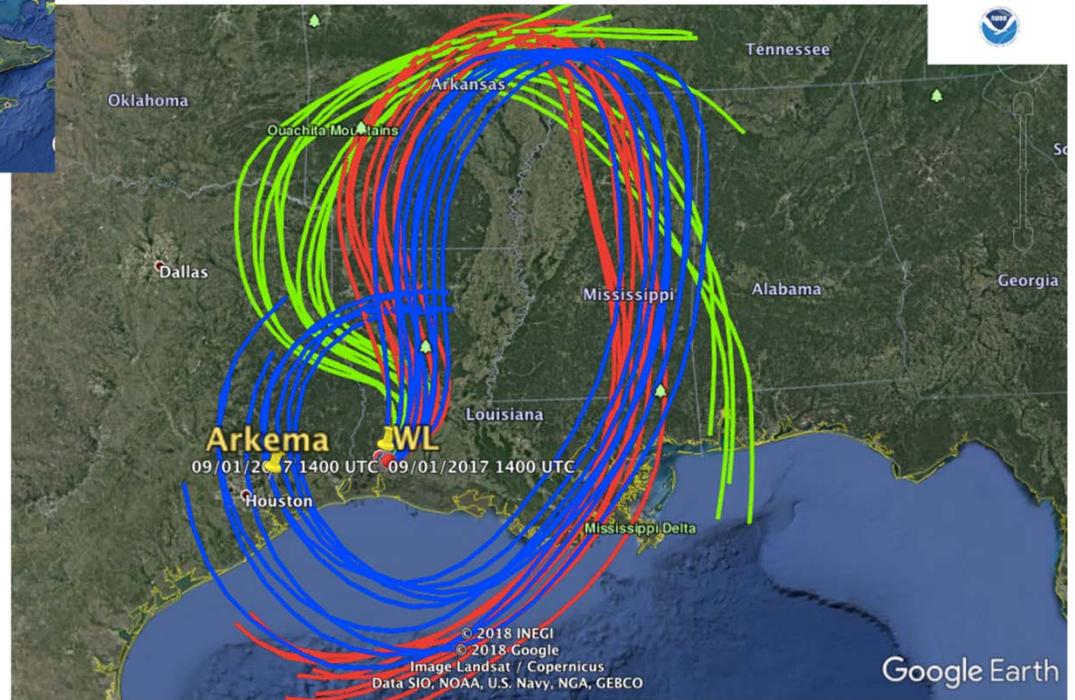
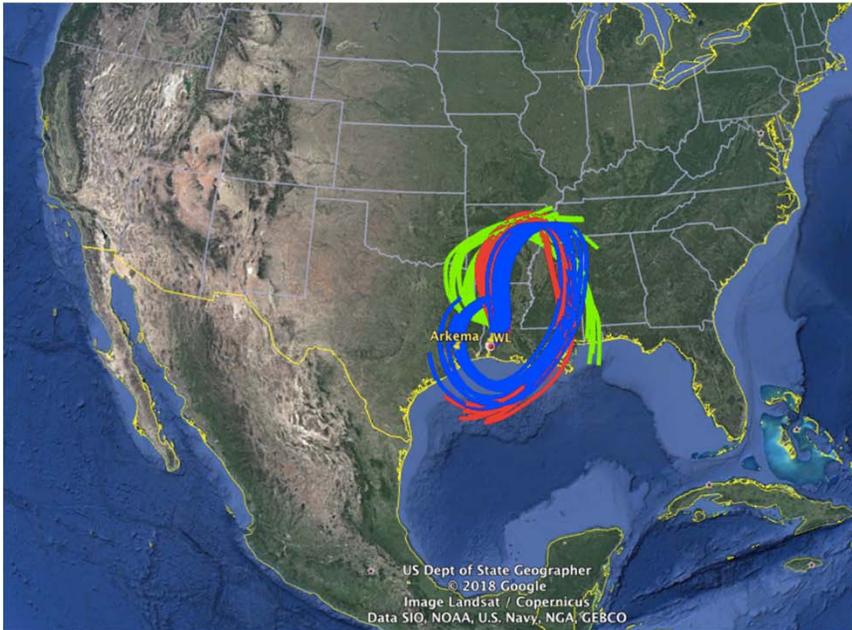
Adrees Latif/Reuters

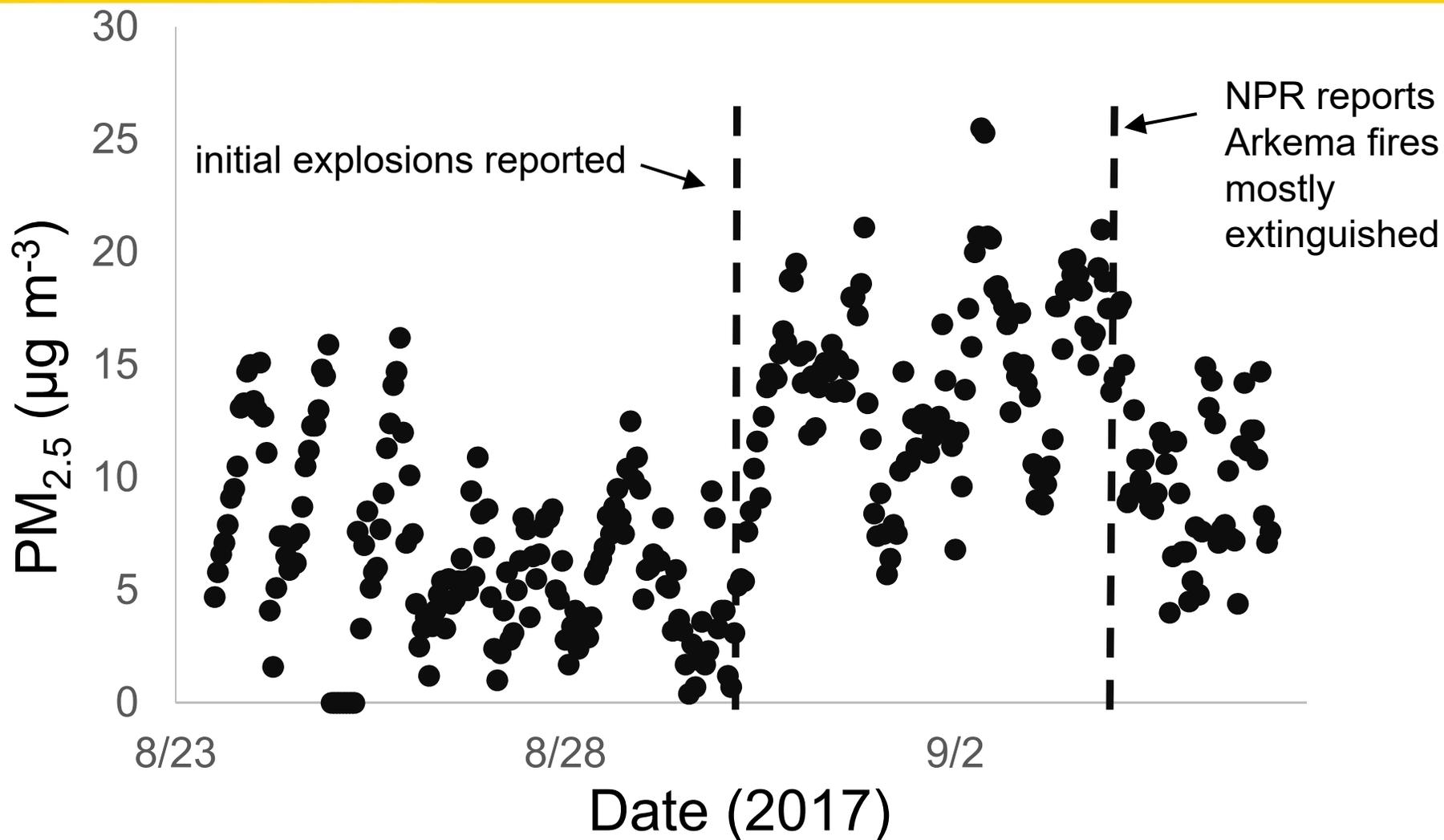
Hell and High Water

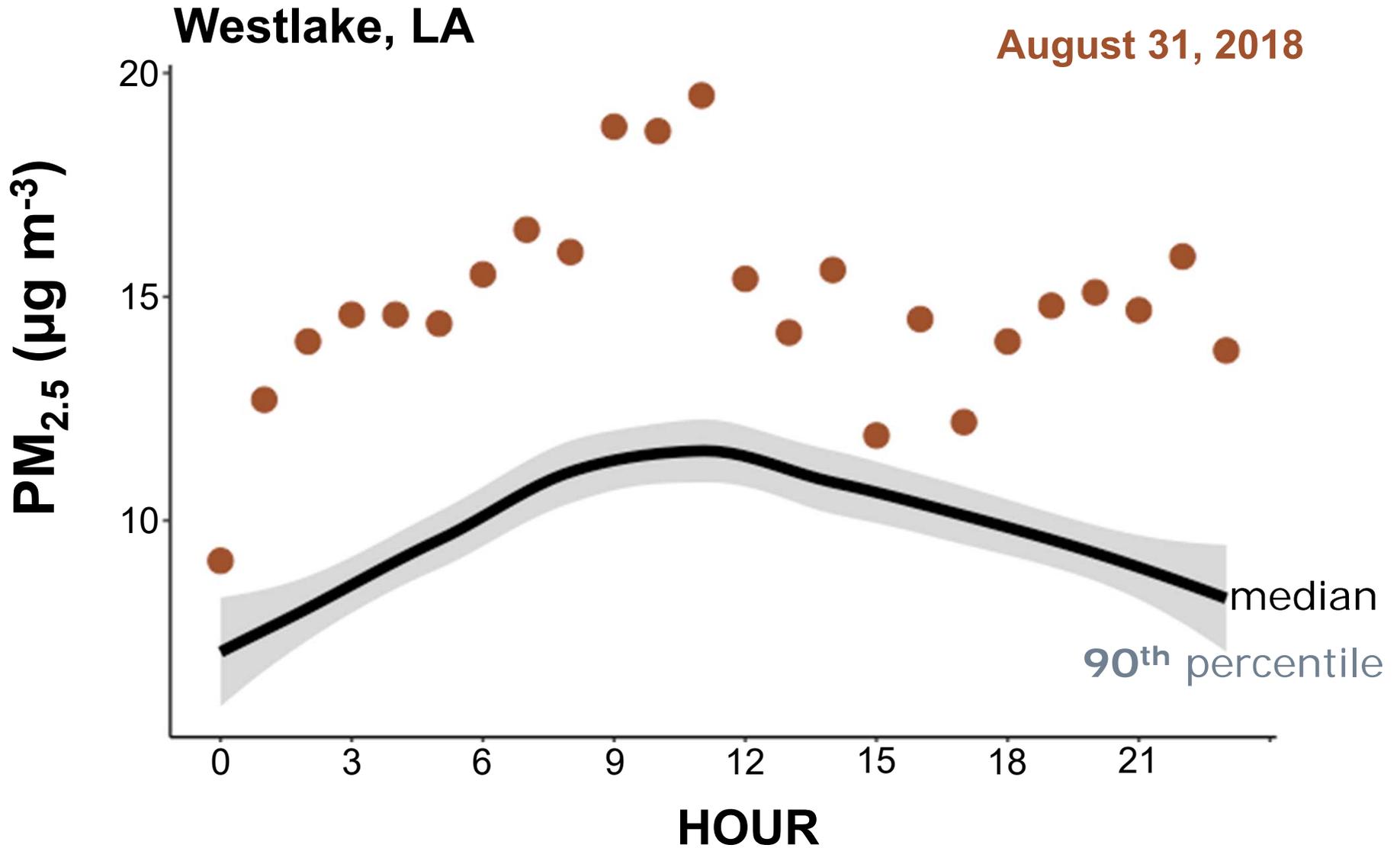
Neena Satija, *The Texas Tribune and Reveal*; Kiah Collier, *The Texas Tribune*; Al Shaw and Jeff Larson, *ProPublica*, March 3, 2016

Houston is the fourth-largest city in the country. It's home to the nation's largest refining and petrochemical complex, where billions of gallons of oil and dangerous chemicals are stored. And it's a sitting duck for the next big hurricane. Learn why Texas isn't ready.









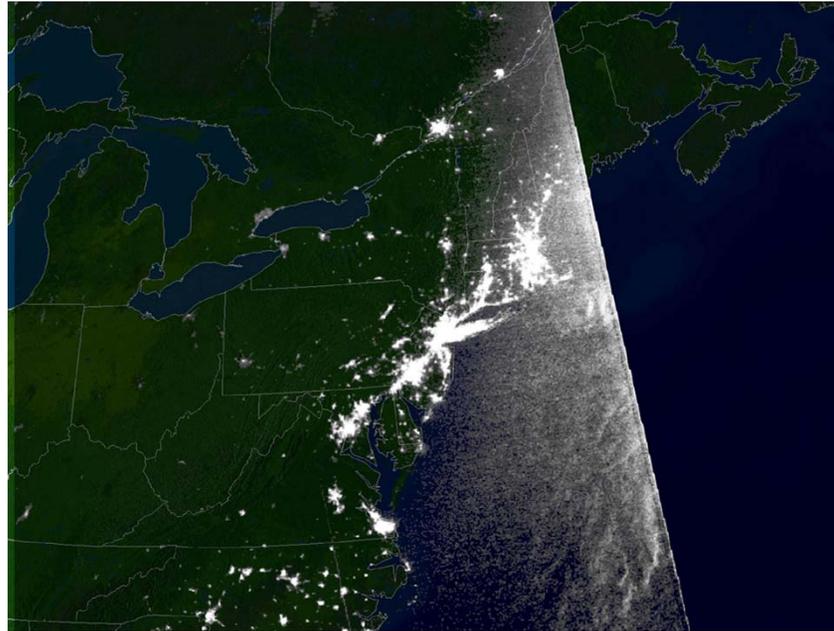
What were the health impacts related to particle exposure from Arkema?

What were the exact compounds, how toxic are they?

Similar catastrophes will happen. How can environmental monitoring inform policy to safeguard human health?

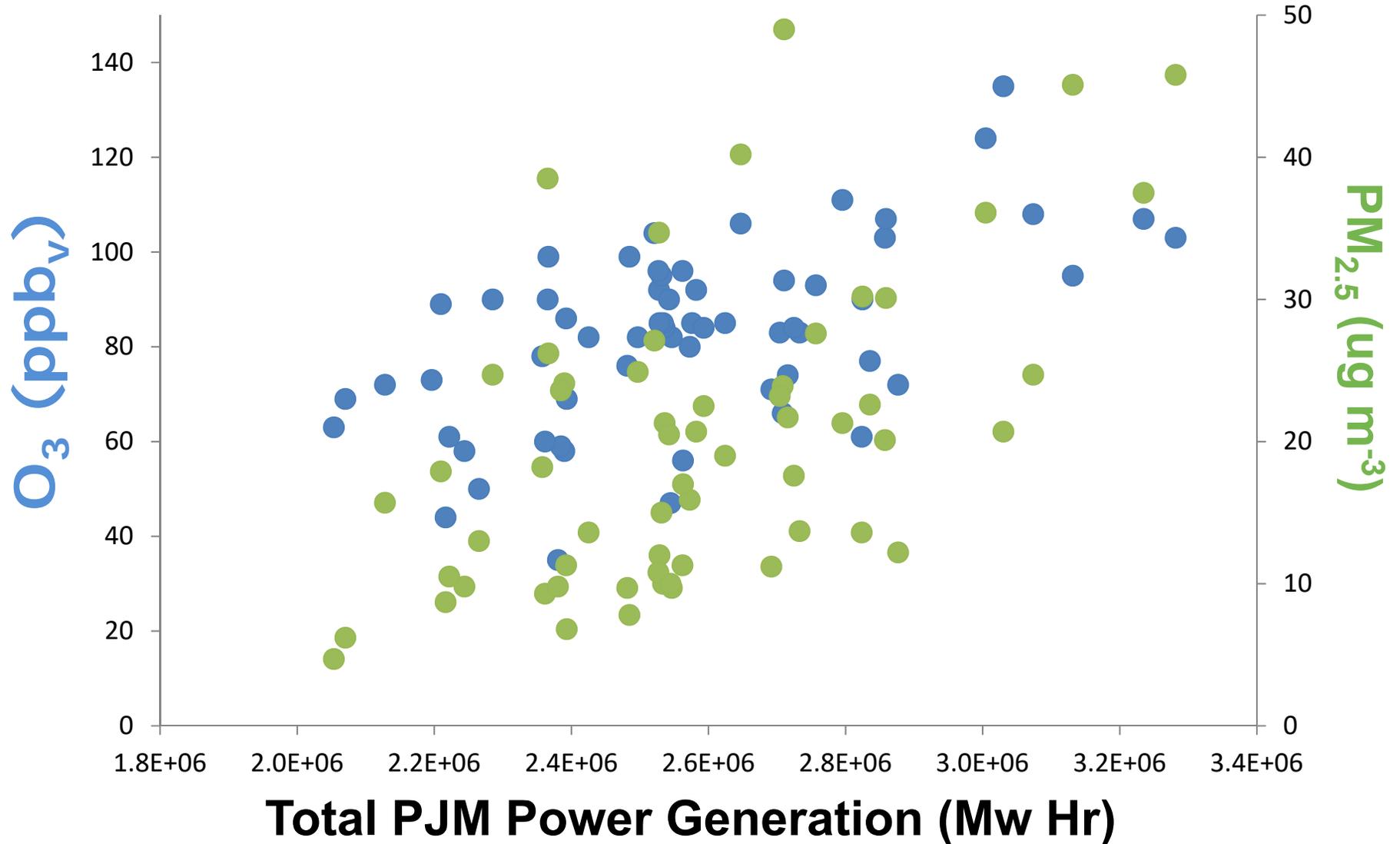


WIKIPEDIA
The Free Encyclopedia

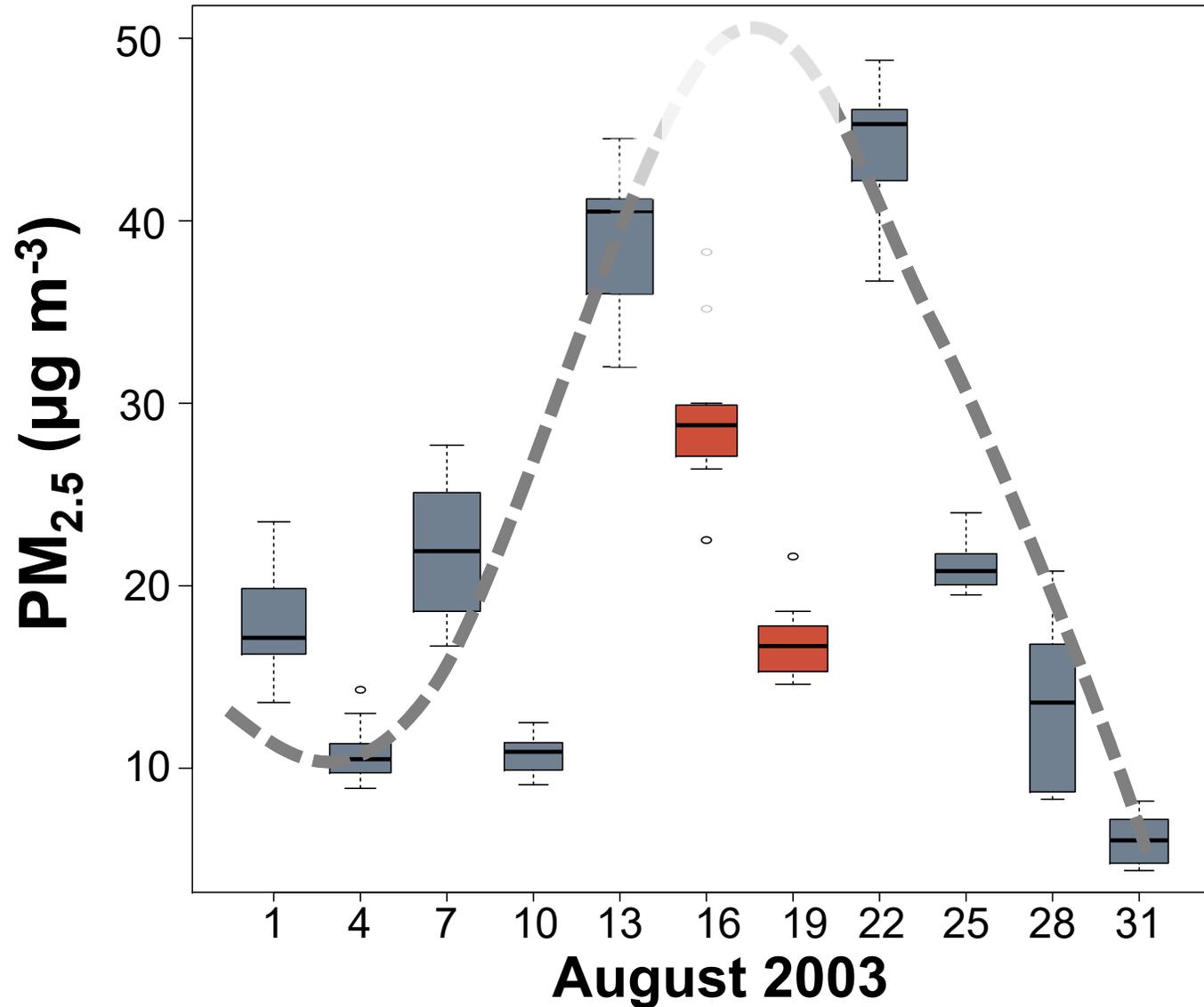


August 14 – 17, 2003 (some areas out a week)

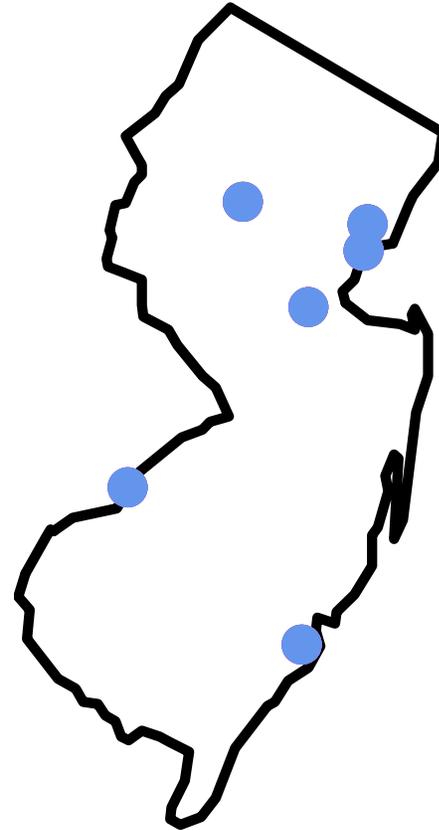
**caused by stagnation heatwave event
that overburdened grid**



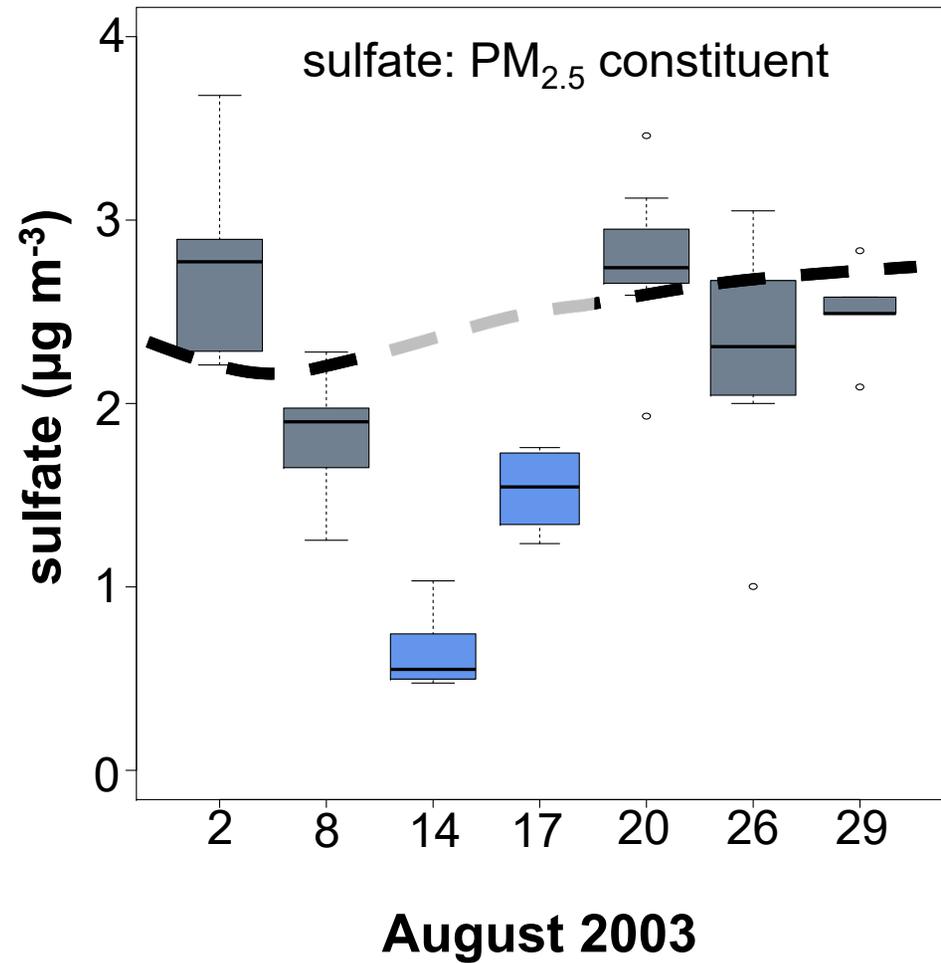
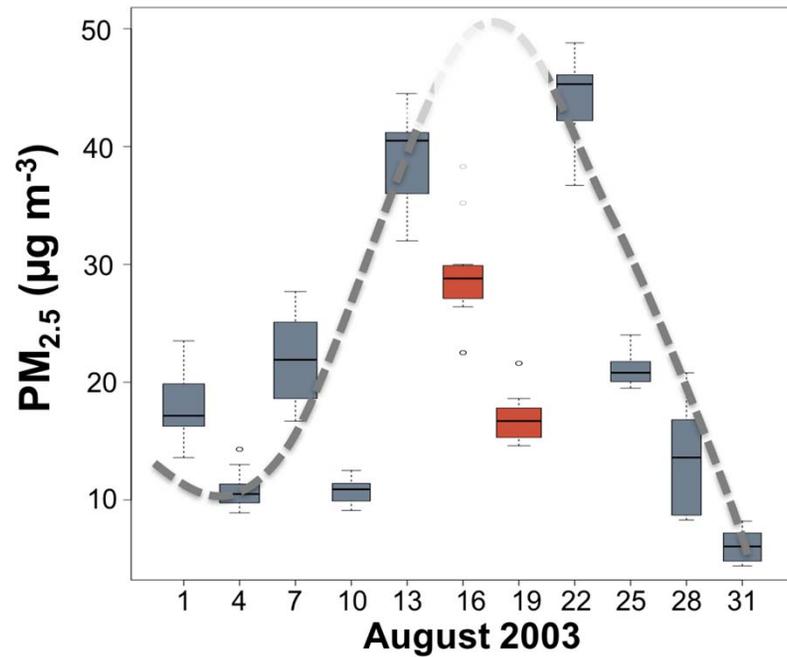
Farkas et al., *Environ. Sci. Technol.*, 2014



PM_{2.5} & Speciation Sites



most sulfate is from electric generating units



Air pollution concentrations decreased during blackout.

Concentration of the $PM_{2.5}$ chemical constituent sulfate, predominantly from power plants, decreased when the number of operating power plants reduced.

Heatwaves stagnation events are increasing in frequency and duration.



Chester Higgans for EPA, 1973

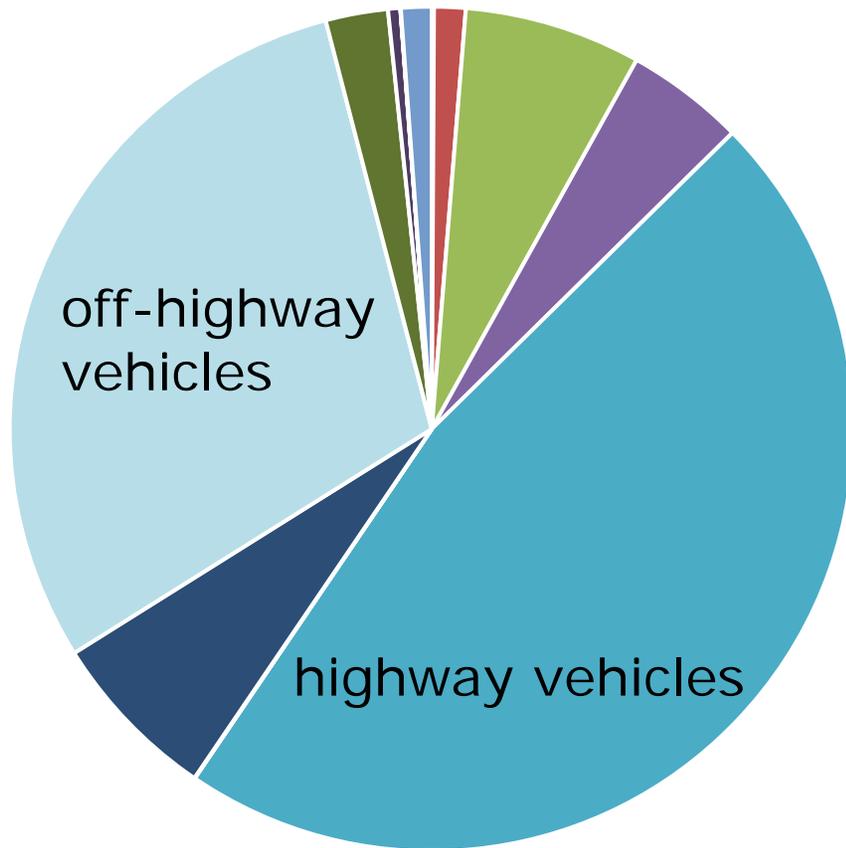


George Washington Bridge Closure

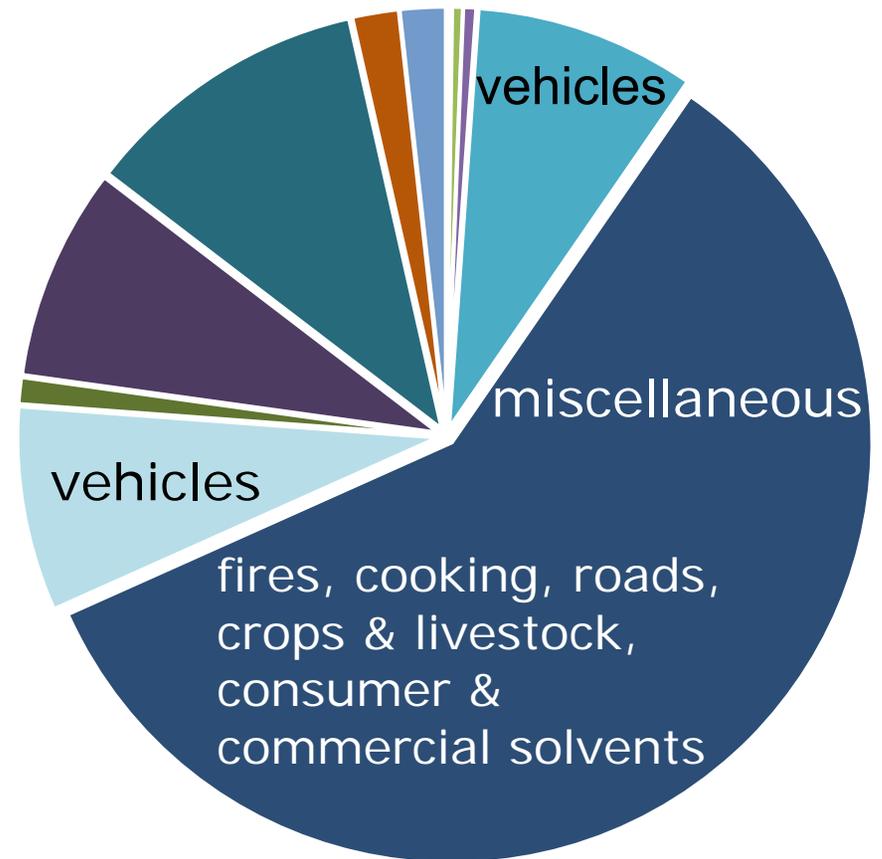
Staff of NJ Governor Chris Christie colluded to create "traffic problems" in Fort Lee, NJ by closing lanes at the main toll plaza of the GWB.

Sept. 9 - 13, 2013: 2 of the 3 toll lanes for a local street entrance were closed during morning rush hour. Fort Lee declared a threat to public safety.

NOx



VOC



Air Monitors See Spike in Pollution During 'Bridgegate'

The monitor closest to the bridge shut down at the height of the traffic jams.



By Alan Neuhauser, Staff Writer Jan. 22, 2014, at 12:00 a.m.



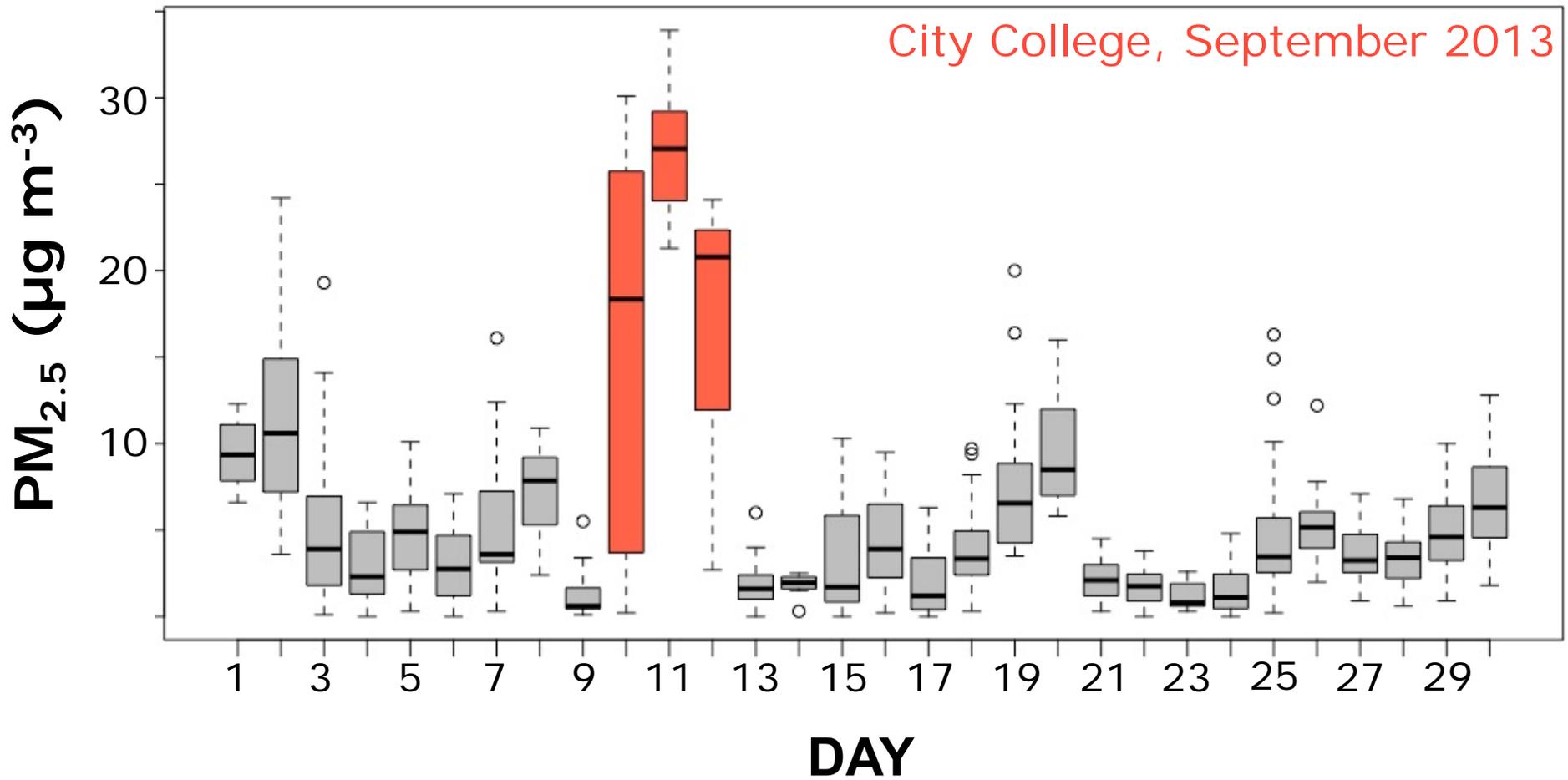
(ANDREW BURTON/GETTY IMAGES)

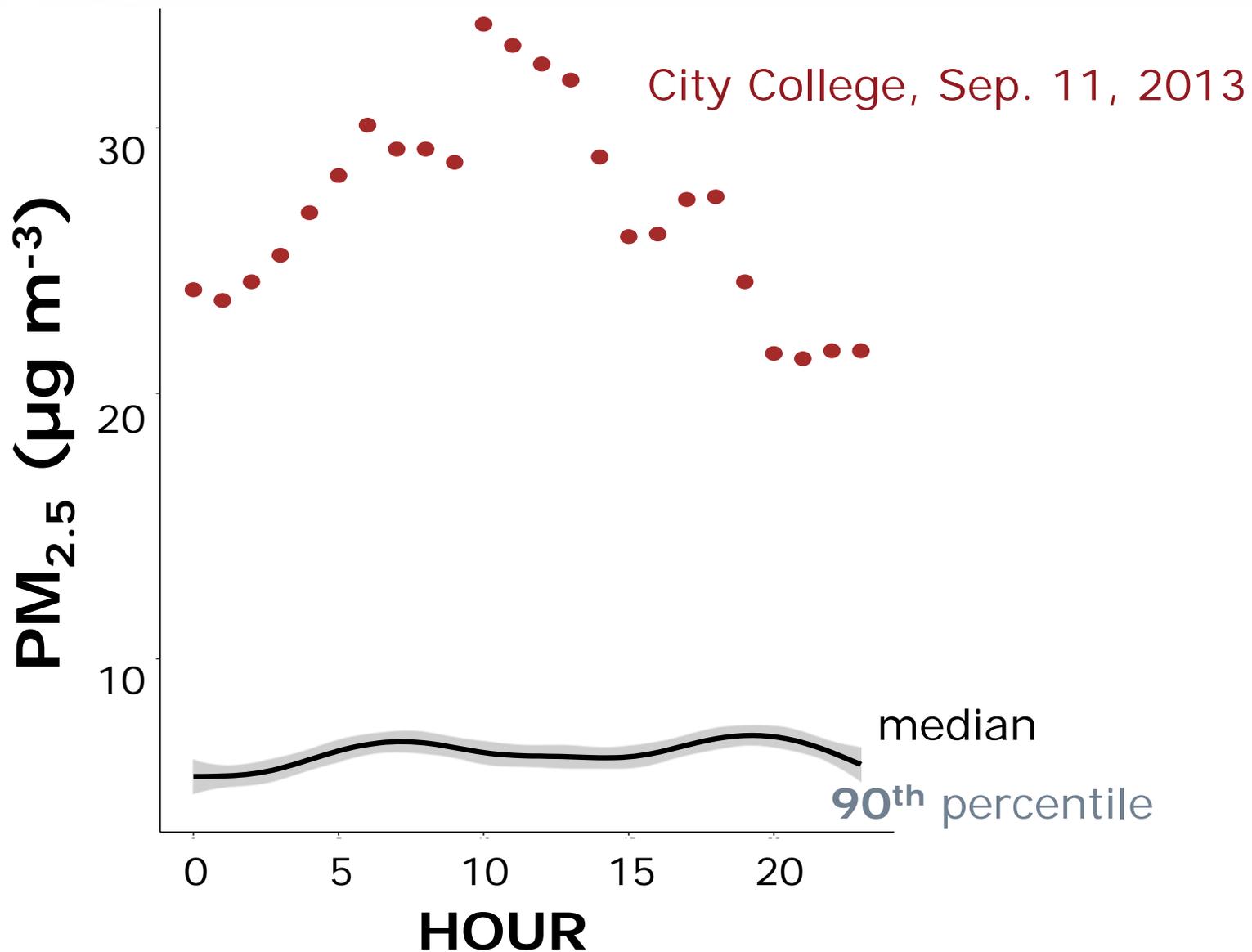
TALK ABOUT DISAPPEARING into thin air.

One night before local access lanes to New Jersey's George Washington Bridge were closed last fall in an apparent act of political retribution that sparked miles-long traffic jams for four straight days, an air quality monitor run by the New Jersey Department of Environmental Protection in Trenton abruptly ceased collecting data.



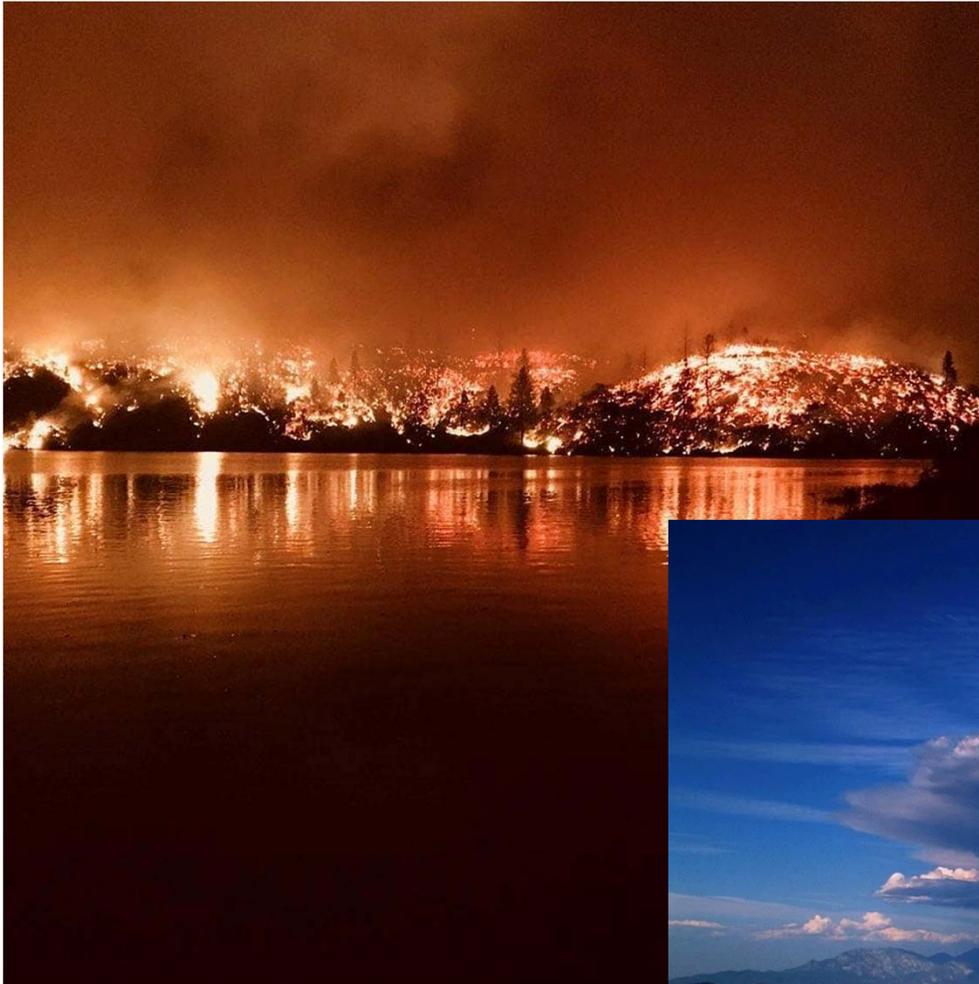
City College, September 2013





Motor vehicles emit pollution that forms $PM_{2.5}$ and individuals are exposed *in situ* and downwind

Political leaders influence your exposure to air pollution.

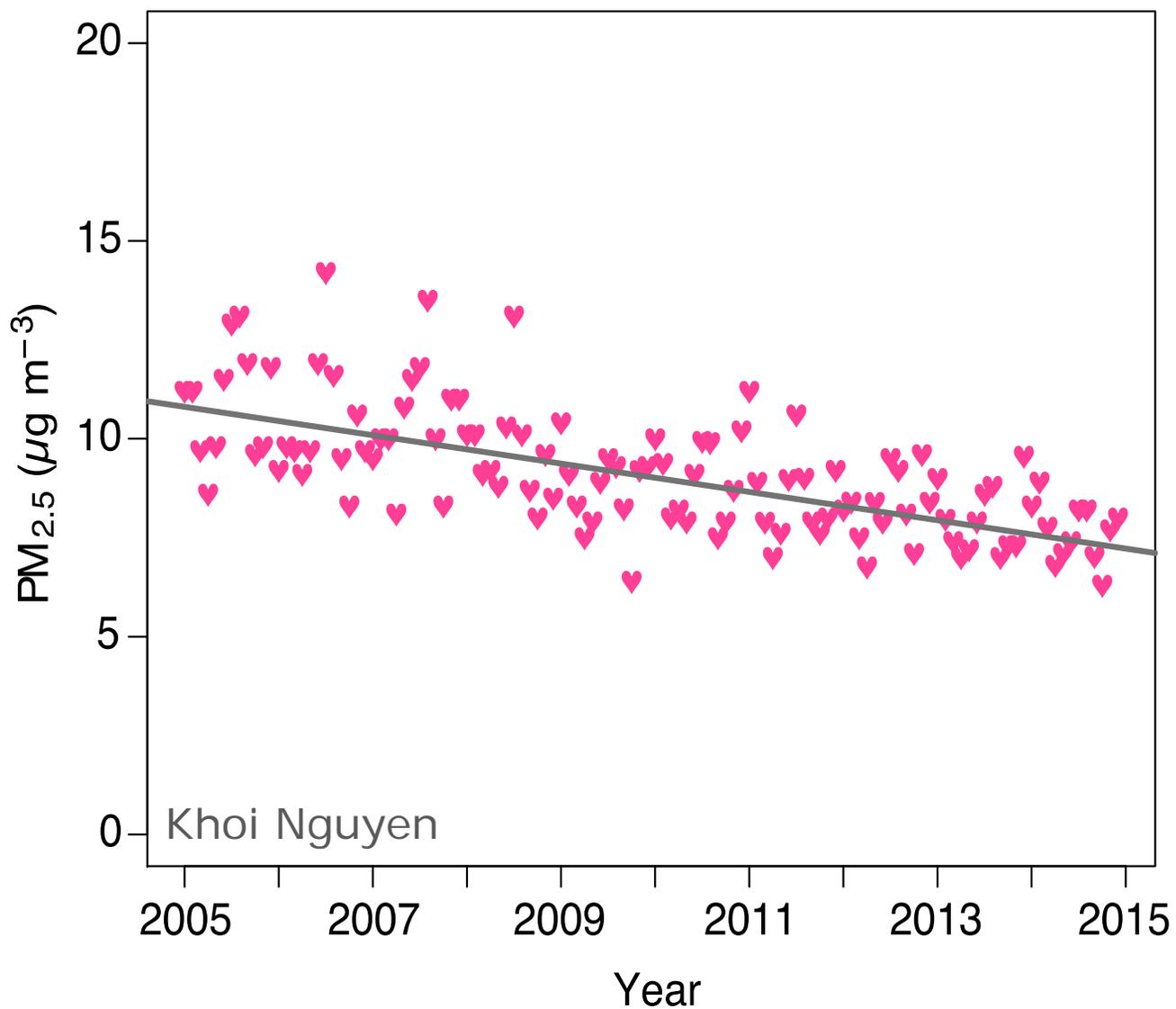


Pyrocumulus cloud





- What are the emissions of gases and aerosols of fires?
- What chemical transformations affect those emissions?
- What is the local air quality impact of fires?
- What are the regional and long-term impacts of fires?
- What are the climate-relevant properties of biomass burning aerosols?



Federal independent science and monitoring data

