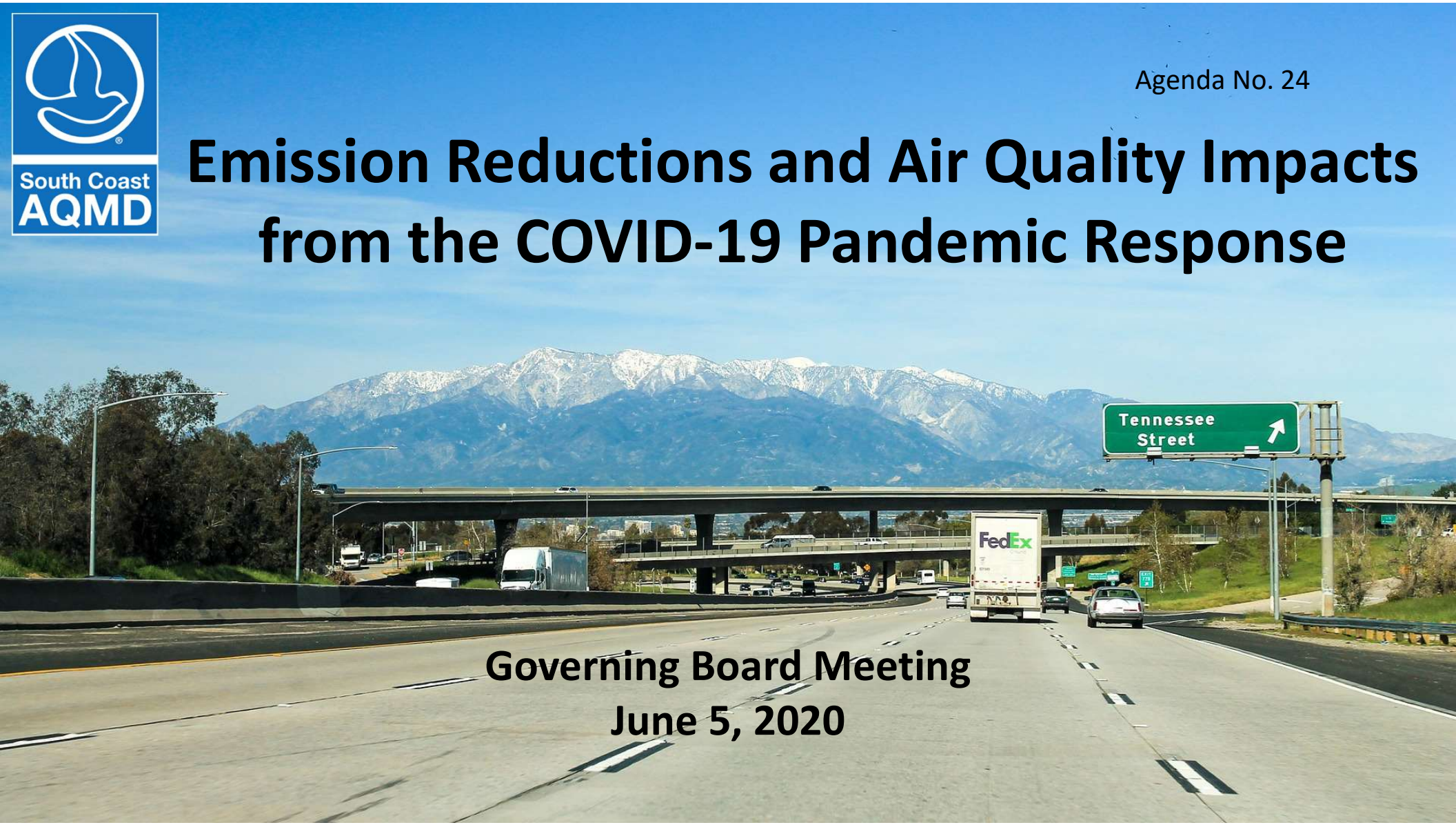
Agenda No. 24

Emission Reductions and Air Quality Impacts from the COVID-19 Pandemic Response



Governing Board Meeting
June 5, 2020

The Question Everyone is Asking

How has the COVID-19 pandemic response affected air quality?

THE WALL STREET JOURNAL.

English Edition ▾ | May 11, 2020 | Print Edition | Video

Coronavirus got rid of smog: can electric cars do so permanently?

The Washington Post

The silver lining to coronavirus lockdowns: air quality is improving

Los Angeles MAGAZINE

As many stay home, L.A.'s air quality is better than it's been in decades

The New York Times

Traffic and pollution plummet as U.S. cities shut down for coronavirus

CNN

Los Angeles has notoriously polluted air. But right now it has some of the cleanest of any major city

CAL MATTERS

As Californians stay at home, air quality improves – for now.

THE SACRAMENTO BEE

Fires and climate change polluted California's air. Has coronavirus shutdown helped?

South Coast AQMD

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capradio

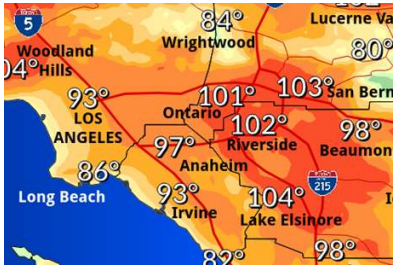
The 'unprecedented natural experiment:' Stay-at-home order reduces air pollution, offers clues in climate change fight

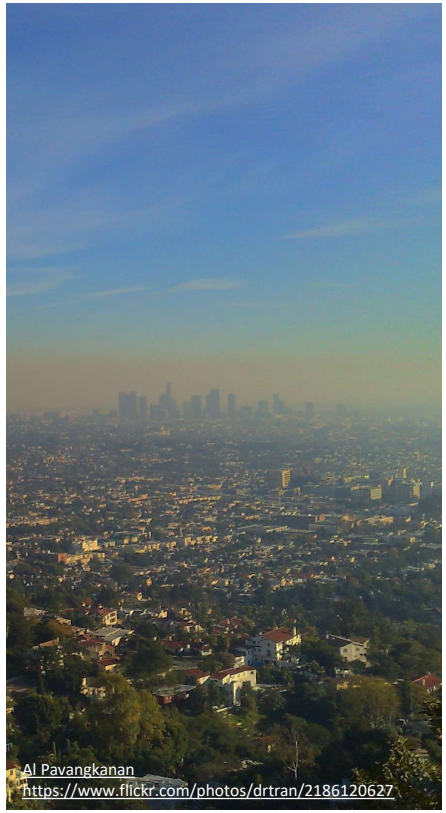
CBS Los Angeles

LA Has The Cleanest Air In The World, Report Says

How do Emissions Influence Air Quality?

Emissions + **Meteorology and Chemistry** → **Air Quality**





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How do Emissions Influence Air Quality?

Emissions + Meteorology and Chemistry → Air Quality

- Emissions are usually not measured directly
- Emissions are estimated based on activity data that is not available in real-time
- An **Emissions Inventory** combines these estimates and measurements to track past emissions and predict future emissions

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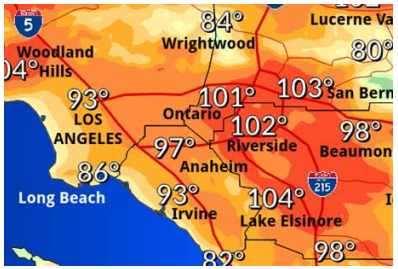
How do Emissions Influence Air Quality?

Emissions + **Meteorology and Chemistry** → Air Quality

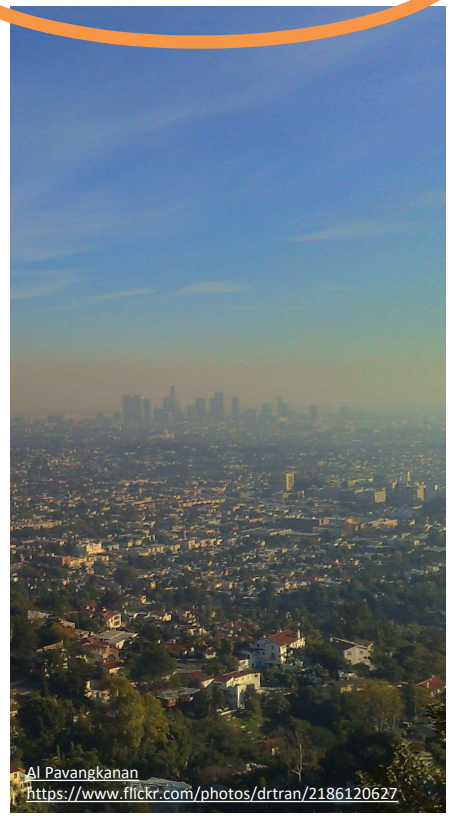
- Meteorology is measured at our monitoring stations and by other agencies
- We also use scientific models to predict:
  - Meteorology
  - Chemical transport
  - Chemistry



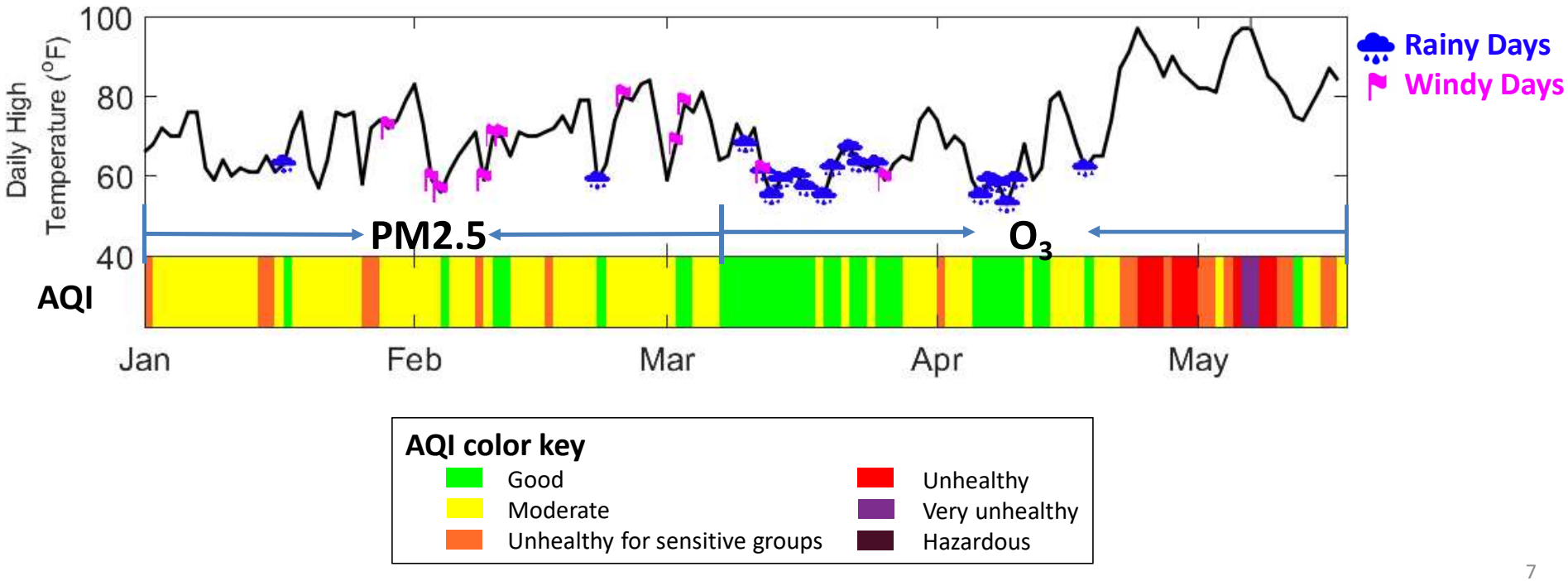
How do Emissions Influence Air Quality?

Emissions + Meteorology and Chemistry → **Air Quality**

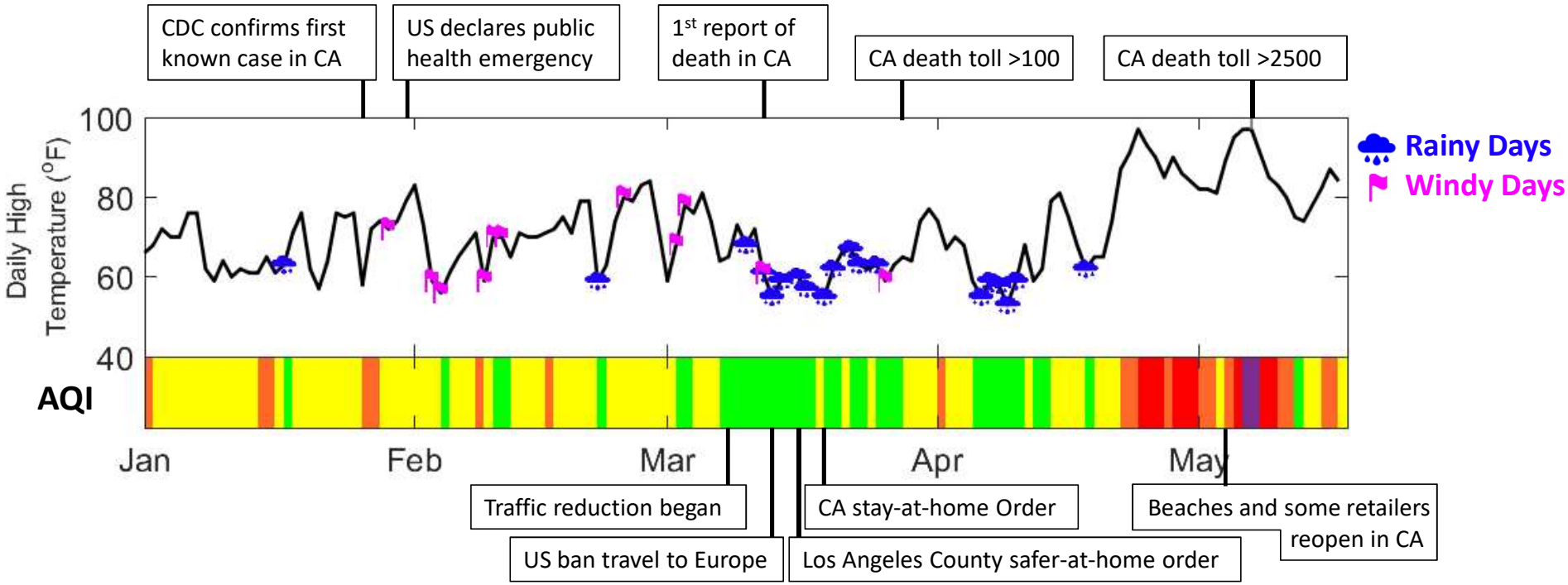
- Air pollution concentrations are measured in real-time for many pollutants at 42 stations in the South Coast AQMD jurisdiction
- Satellites also measure air pollution from space (but this may not reflect ground-level concentrations that people breathe)



Meteorology and Air Quality Timeline



Meteorology and Air Quality Timeline



Three Key Ongoing Analyses

Emissions + **Meteorology and Chemistry** → **Air Quality**

1. Emissions: Evaluating changes in mobile source emissions from activity data
2. Air Quality: Concentration measurements during the COVID-19 period
3. Meteorology and Chemistry: Using statistical and modeling analysis to account for the influence of meteorology and chemistry

Changes in Mobile Source Emissions

Cargo at Ports of LA & Long Beach[1]

↓~11%

Flights at Major Airports in Jurisdiction[2]

↓~61%

Vehicle Activity on Freeways in Jurisdiction

↓~25-43% Cars

↓~12-26% Trucks

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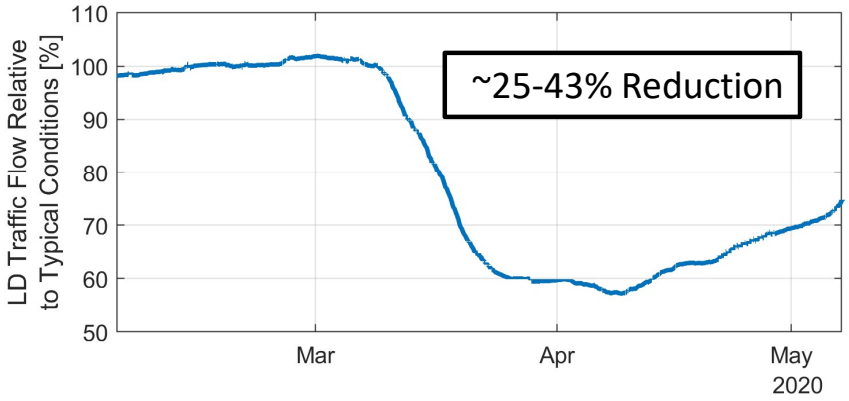
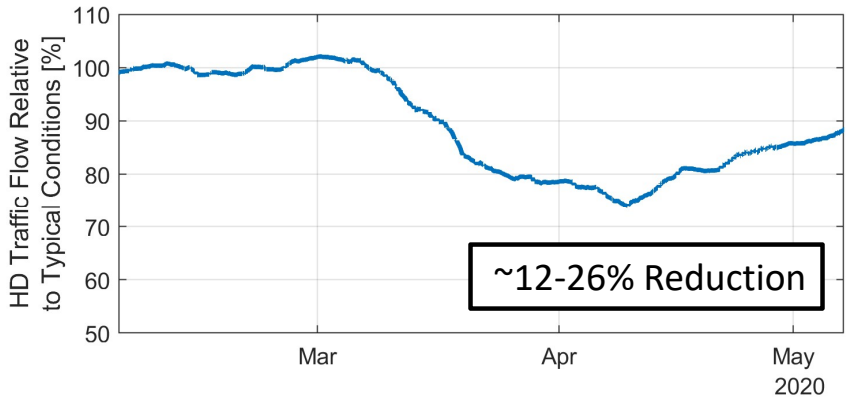
1) Approximate change in TEUs (Twenty foot equivalent units) comparing April 2020 to April 2019
2) Approximate change in aircraft operations at LAX, LGB, SNA, BUR, PSP, ONT from April 2020 to April 2019 from FAA Operations Network (OPSNET)
3) Approximate change in car and truck flow from pre-COVID orders (Feb 1 – Mar 7) to post-COVID orders (Apr 9 to May 7) calculated from CalTrans PeMS data.

Changes in Traffic in the South Coast AQMD

Car Flow Reductions



Truck Flow Reductions



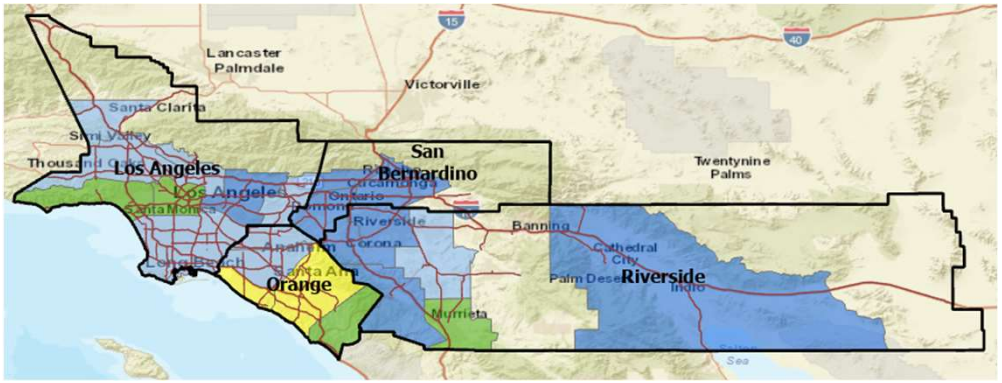
- **On-Road trucks** are responsible for **35%** of NOx emissions in the SCAB (Cars responsible for 5%)
- Car and truck flow data based on CalTrans sensors on freeways. Traffic trends on local roads will differ.
- Results are generally consistent with other independent analyses (at different spatial and temporal scales):
  - Apple Maps: 20 to 60% decrease in routing requests from February baseline in the City of Los Angeles[1]
  - CalTrans: 34% decrease in car VMT and 33% decrease in truck VMT on freeways in LA County[2]
  - Inrix: 46 to 57% decrease in miles driven in City of Los Angeles[3]

1 https://www.apple.com/covid19/mobility
2 https://laist.com/2020/04/13/coronavirus-los-angeles-freeways-caltrans.php
3 https://www.latimes.com/california/story/2020-05-08/coronavirus-traffic-uptick-los-angeles-freeways-congestion-busier-heavier

Spatial Changes in Traffic in the South Coast AQMD

Car Traffic Reduction

Truck Traffic Reduction



Color key

- <8% reduction
- 8% - 16% reduction
- 16% - 24% reduction
- 24% - 32% reduction
- 32% - 40% reduction
- 40% - 50% reduction

- Coastal areas had biggest reductions in car and truck activity
- Inland Empire did not see as much reduction in truck flow

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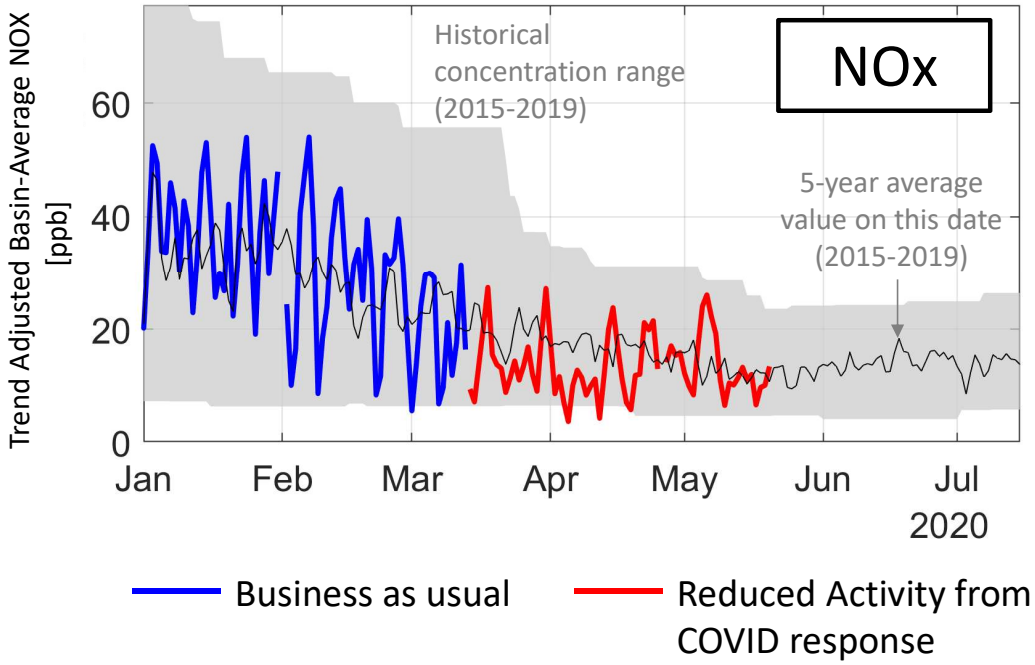
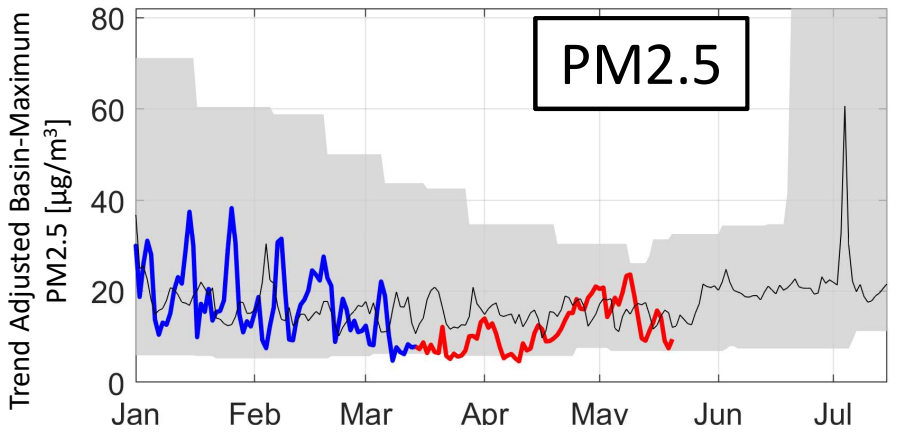
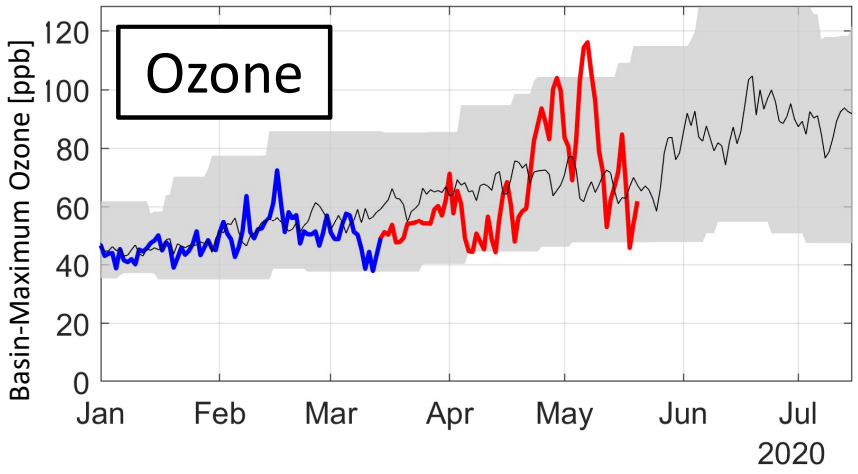
Business-as-usual defined as Feb 1st to March 7th, COVID period defined as March 23rd to May 11th
Source receptor areas with less than 25 sensors are not shown

Air Quality Measurements During COVID-19







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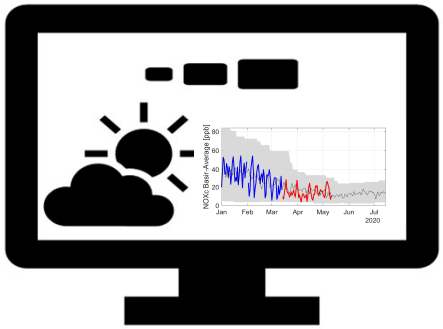
How Much did NOx Emissions Decrease Due to COVID-19 Response?

To estimate emissions from concentration measurements, must remove influence of meteorology using models



Measured NOx concentrations from COVID-19 time period

compare

Measured NOx concentrations from previous years with similar:

- meteorology
- time-of-year
- time-of-day

Preliminary estimates indicate that NOx emissions have decreased by about 17-20% (March 14th to May 20th)

Future Work

- Evaluating high ozone concentrations in late April/early May, considering:
  - Relative impact of COVID on NOx and VOC emissions (NOx to VOC ratio)
  - Meteorology
  - Satellite measurements working with researchers at Columbia University