
Item #2

Air Quality Trends in the Basin and Design Values

STMPR meeting on Jan 27, 2021

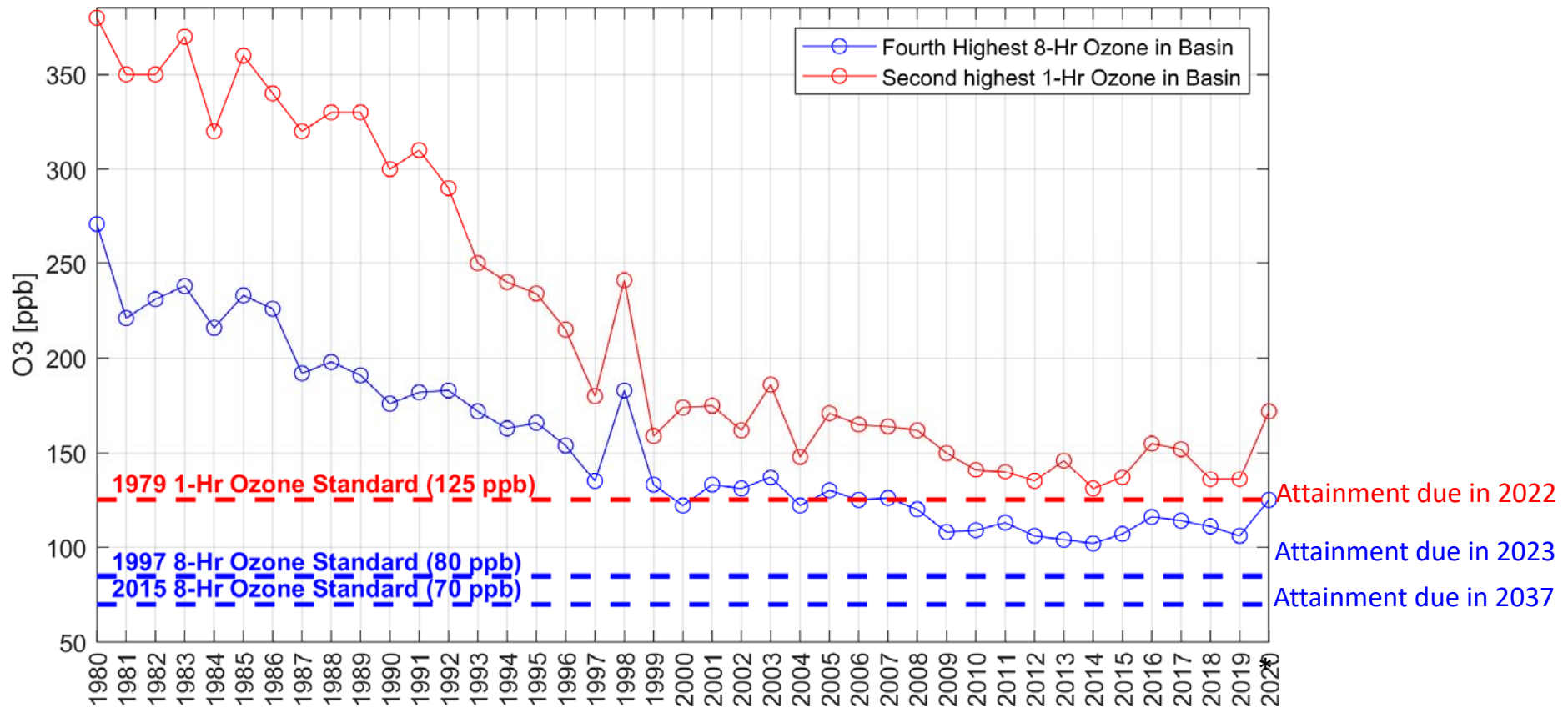
Sang-Mi Lee, Ph.D.
Program Supervisor

South Coast Air Quality Management District



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Air Quality Management District

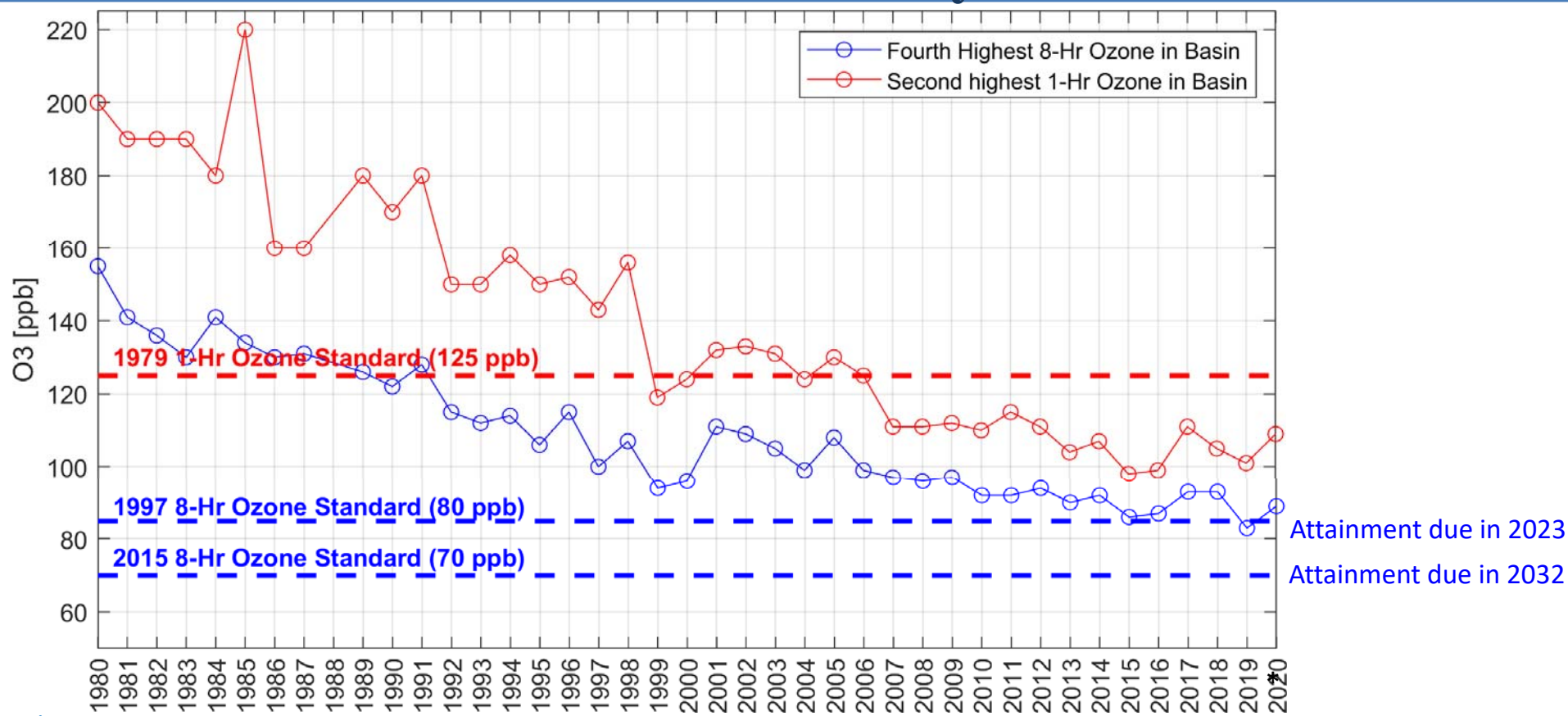
Progress Towards Attaining Ozone Standards in the Basin



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* As of 10/21/2020. Data is preliminary.

Progress Towards Attaining Ozone Standards in the Coachella Valley



* As of 10/21/2020. Data is preliminary.

8-hour Ozone Design Value Calculation

- Rank the daily max. 8-hour ozone for each year

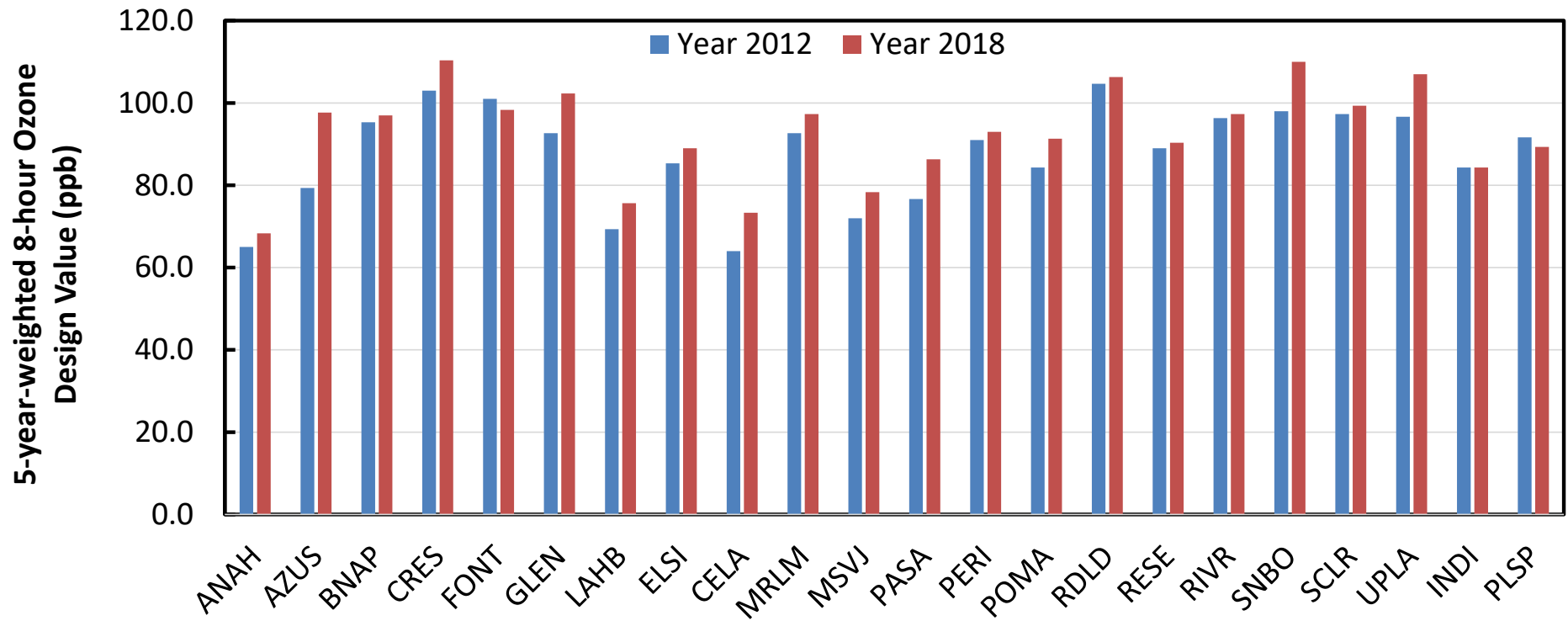
Crestline	2016	2017	2018
First Highest	0.121	0.121	0.125
Second Highest	0.121	0.115	0.107
Third Highest	0.117	0.115	0.106
Fourth Highest	0.116	0.114	0.105

- Average the 4th highest daily maximum over 3 years:
2018 Design Value = $(0.116 + 0.114 + 0.105)/3 = 0.111$

- ❖ For attainment demonstration, EPA recommends using an average of 3 design value periods (5 year-weighted avg.) as a base year design value

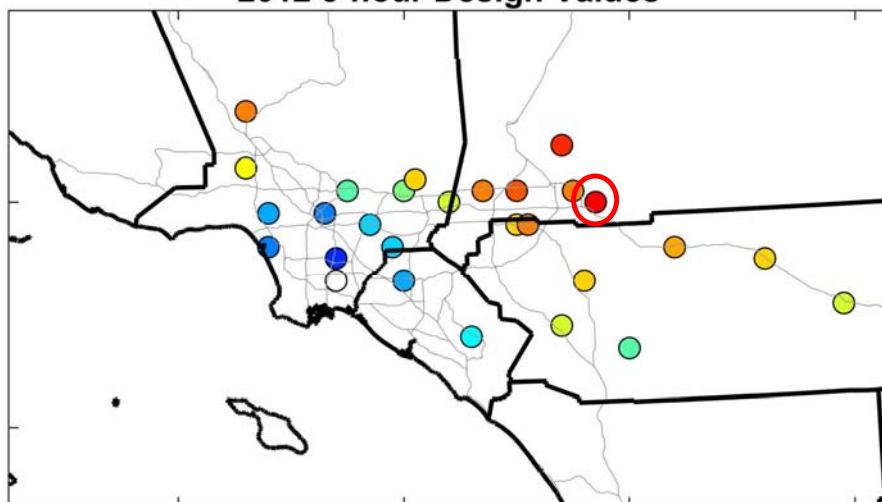
	2015	2016	2017	2018	2019	2020
Period 1	X	X	X			
Period 2		X	X	X		
Period 3			X	X	X	

5-year weighted 8-hour Ozone – 2012 vs. 2018 Base Year

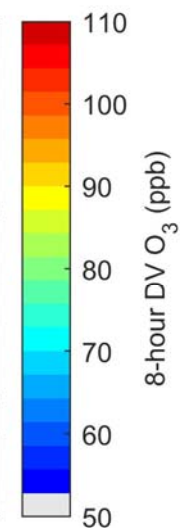
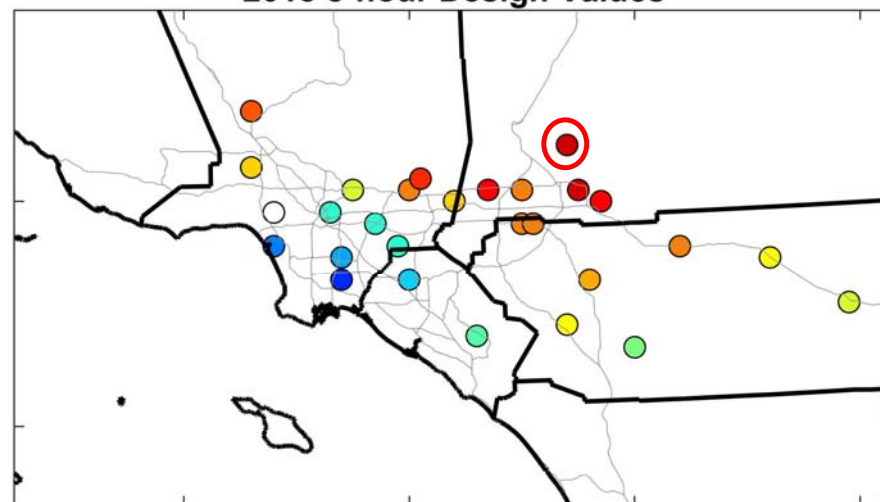


5-year weighted 8-hour Ozone DV

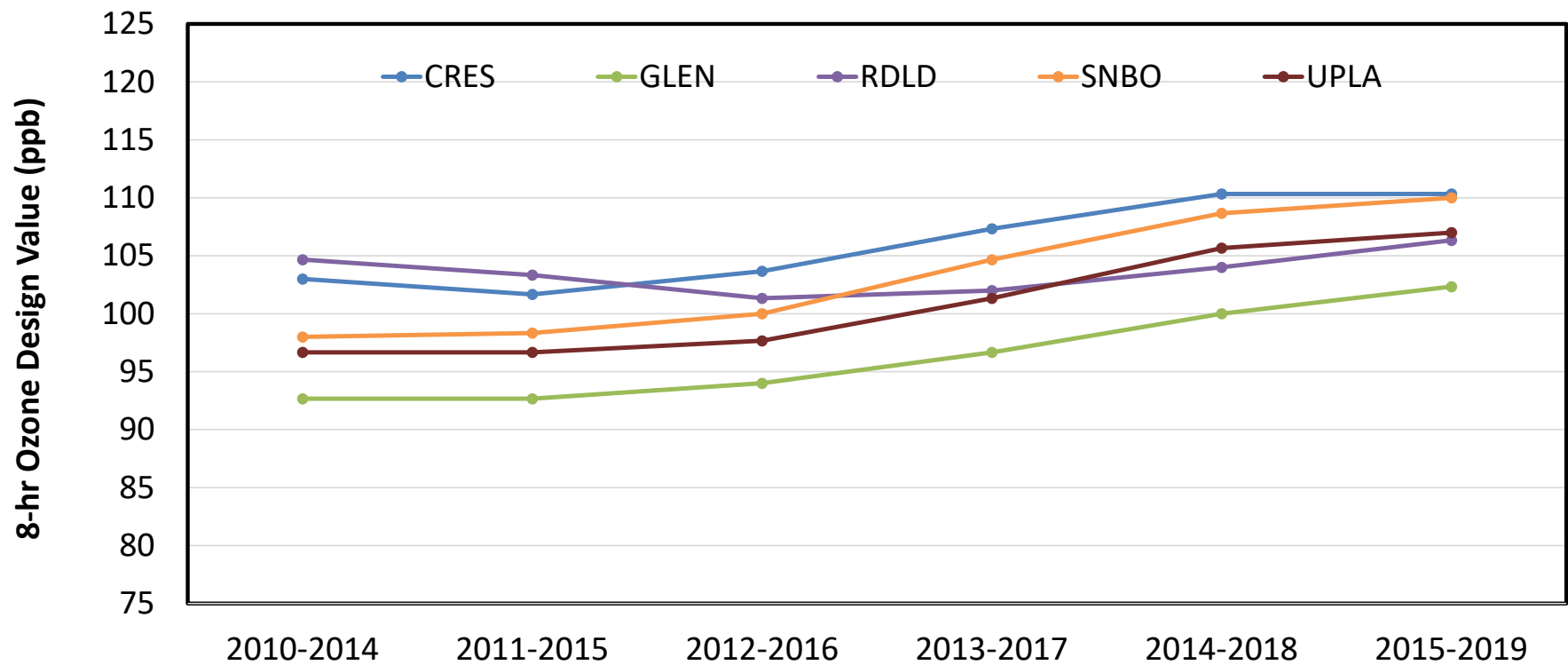
2012 8-hour Design Values



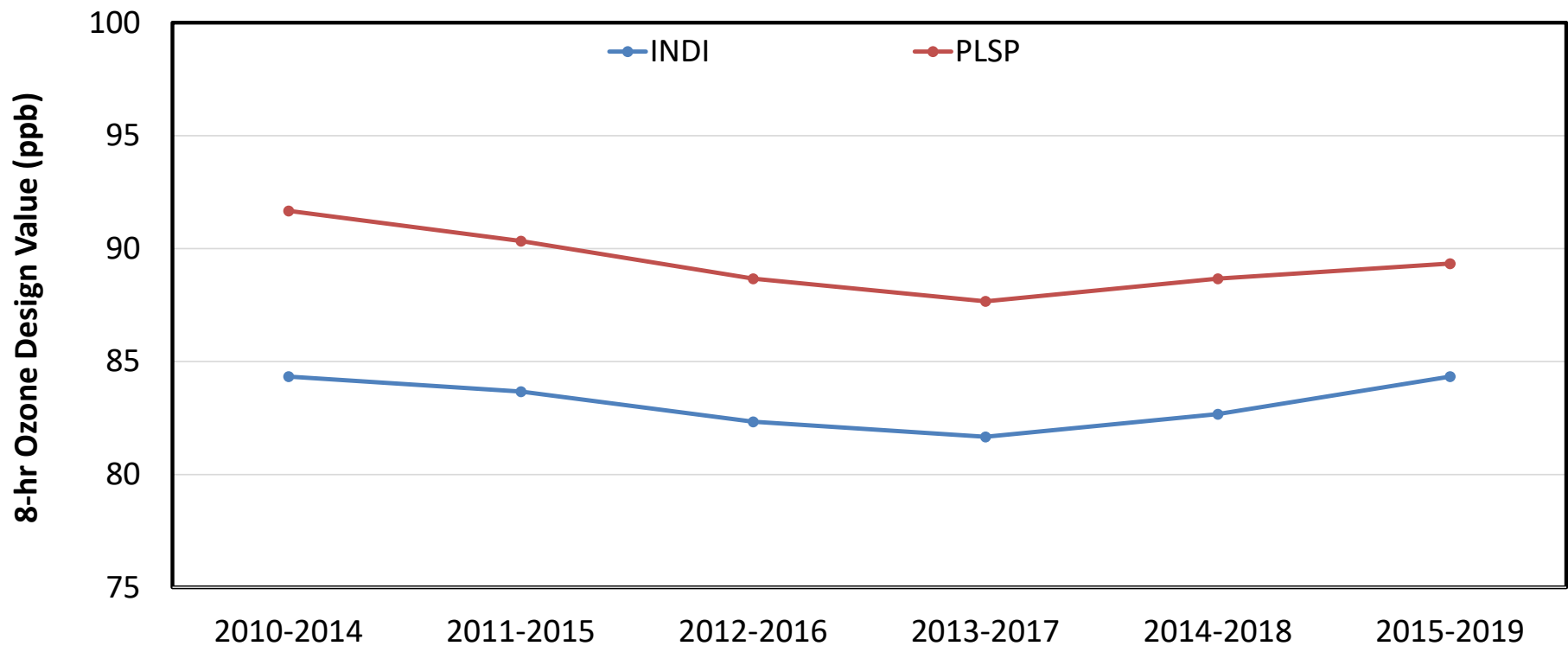
2018 8-hour Design Values



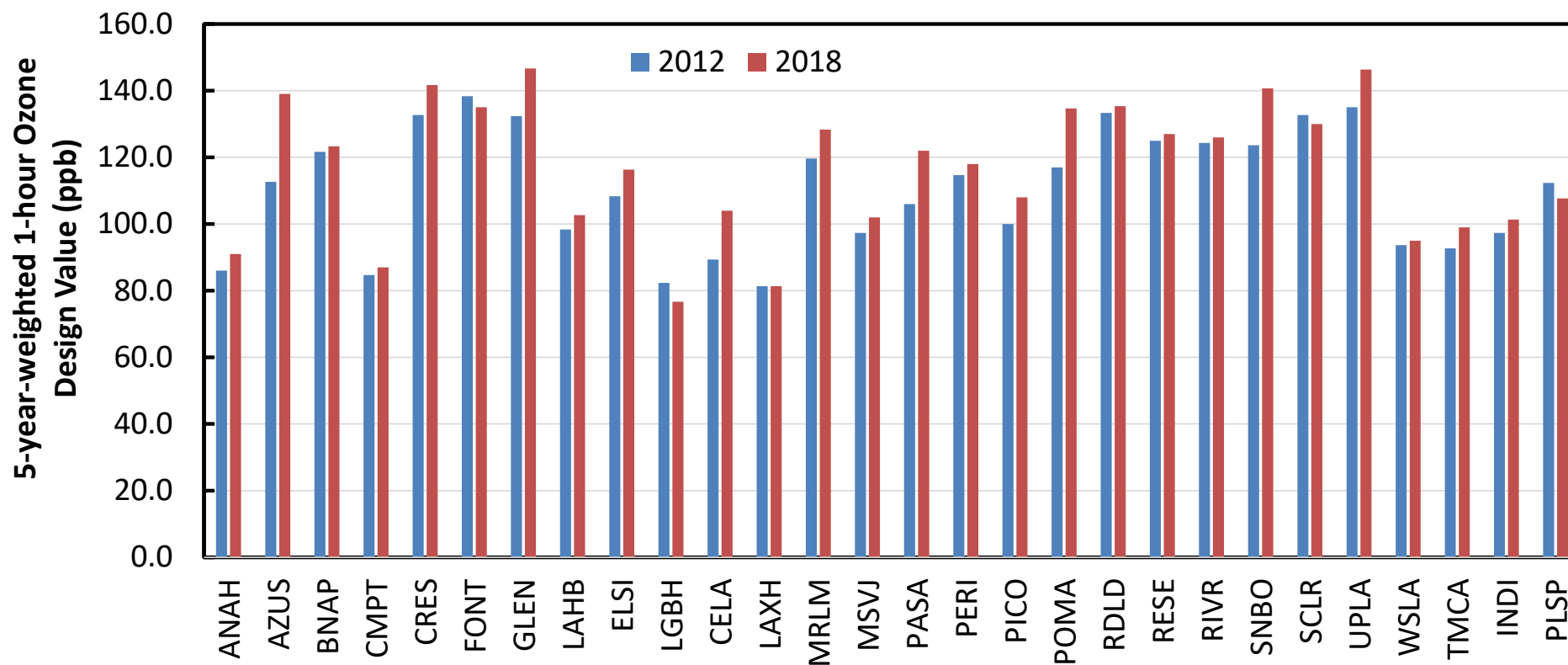
5-year weighted 8-hour Ozone Design Value Trends – SCAB



5-year weighted 8-hour Ozone Design Value Trends – CV

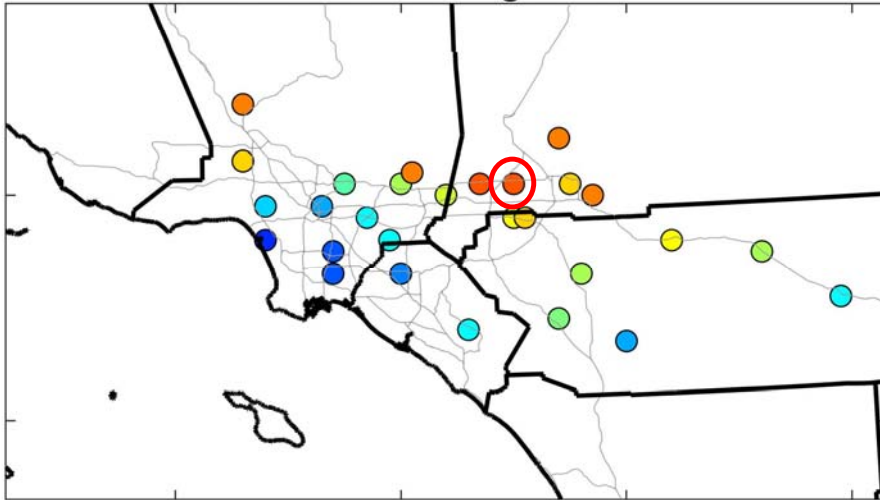


5-year weighted 1-hour Ozone : 2012 vs. 2018 Base Year

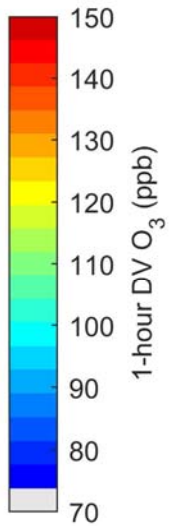
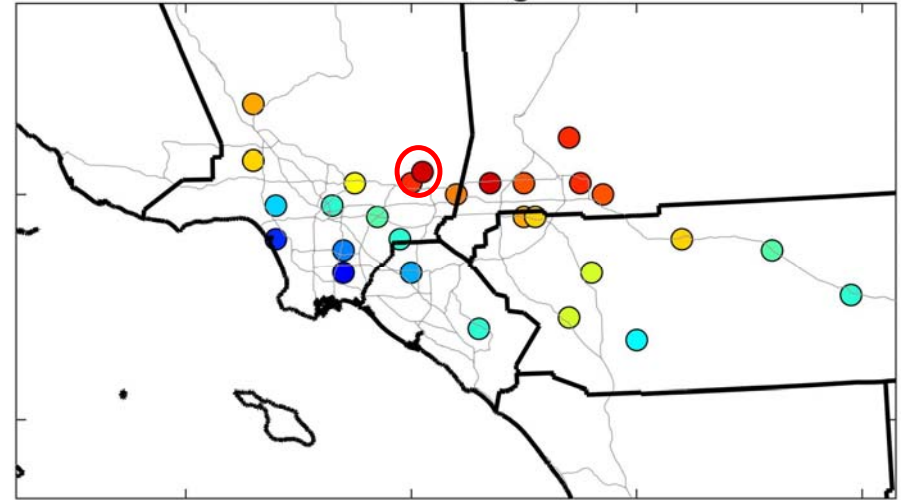


5-year weighted 1-hour Ozone DV

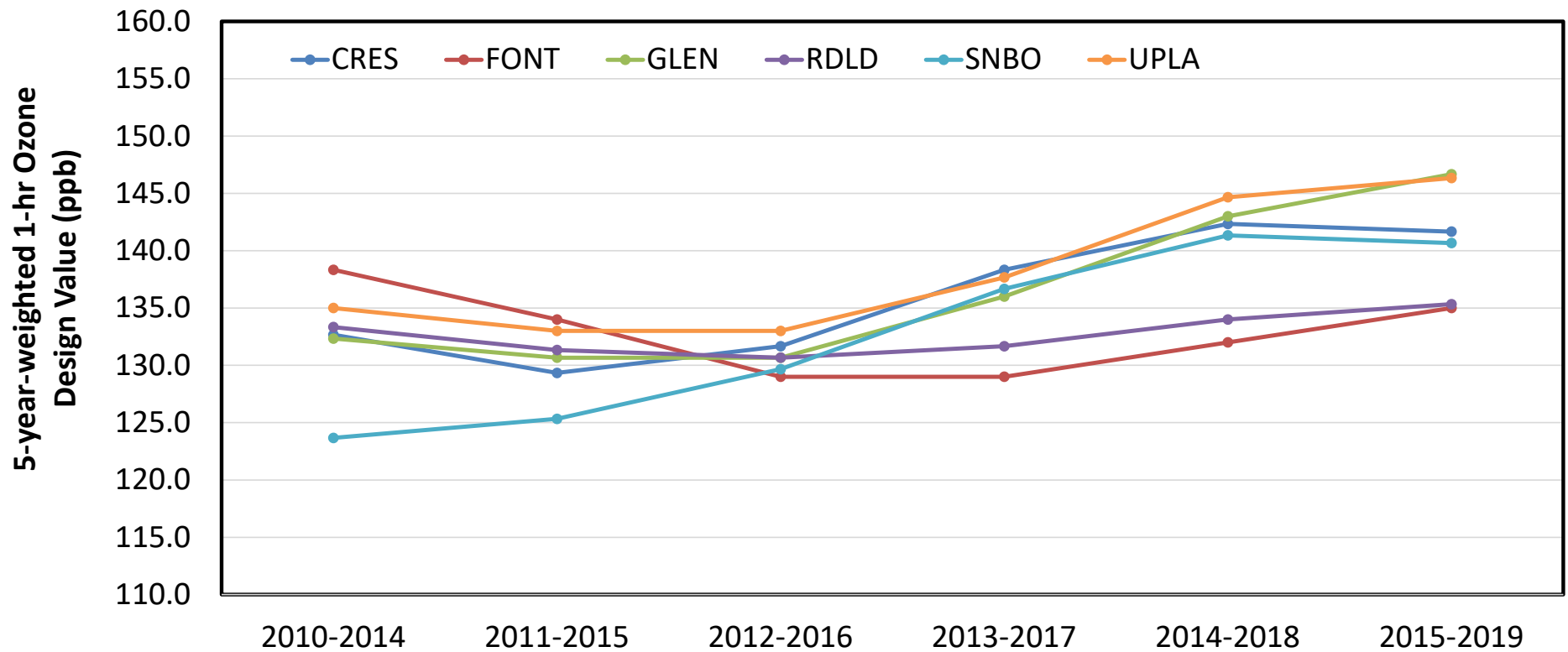
2012 1-hour Design Values



2018 1-hour Design Values



5-year weighted 1-hour Ozone Design Value Trends – SCAB



Summary

- 5-year weighted 8-hour ozone DV for 2022 AQMP is higher than the DV in 2016 AQMP by 5.6 ppb
- 1-hour ozone shows similar pattern as 8-hour ozone DV: 5-year weighted 1-hour ozone DV increased by 8.3 ppb
- The design site for 8-hour ozone has changed from Redlands to Crestline
- The location of the design site for 1-hour ozone has changed from Fontana to Glendora
- Coachella Valley 8-hour DV in 2022 AQMP is lower than in 2016 AQMP by 2.3 ppb



Item #3

Estimating Biogenic Emissions in the South Coast Air Basin

STMPR Advisory Group Meeting
January 27, 2021

Eric Praske, Ph.D.
Air Quality Specialist

South Coast Air Quality Management District



South Coast
Air Quality Management District

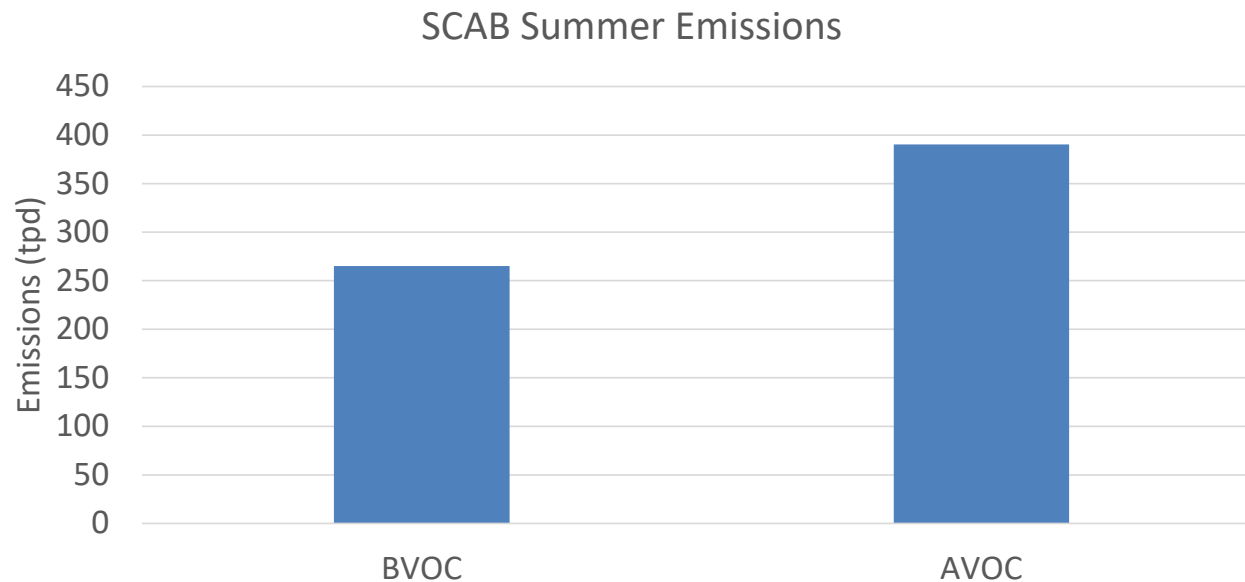
Background

- Model of Emissions of Gases and Aerosols from Nature (MEGAN)¹ was used to develop the biogenic inventory
- While MEGAN estimates emissions for > 30 SAPRC07 species, isoprene (ISOP) and terpenes (TERP) account for majority of VOC emissions

¹ Guenther et al., Geosci. Model Dev., 2012.

Biogenic vs. Anthropogenic Emissions

- 2018 Anthropogenic VOC (AVOC) vs. Biogenic VOC (BVOC)¹



¹ BVOC emissions quantified using MEGAN3.1



Updating BVOC Emissions

Latest Available version of MEGAN

Improving LAI using remote sensing products

Improving Tree species and their Emission Factors



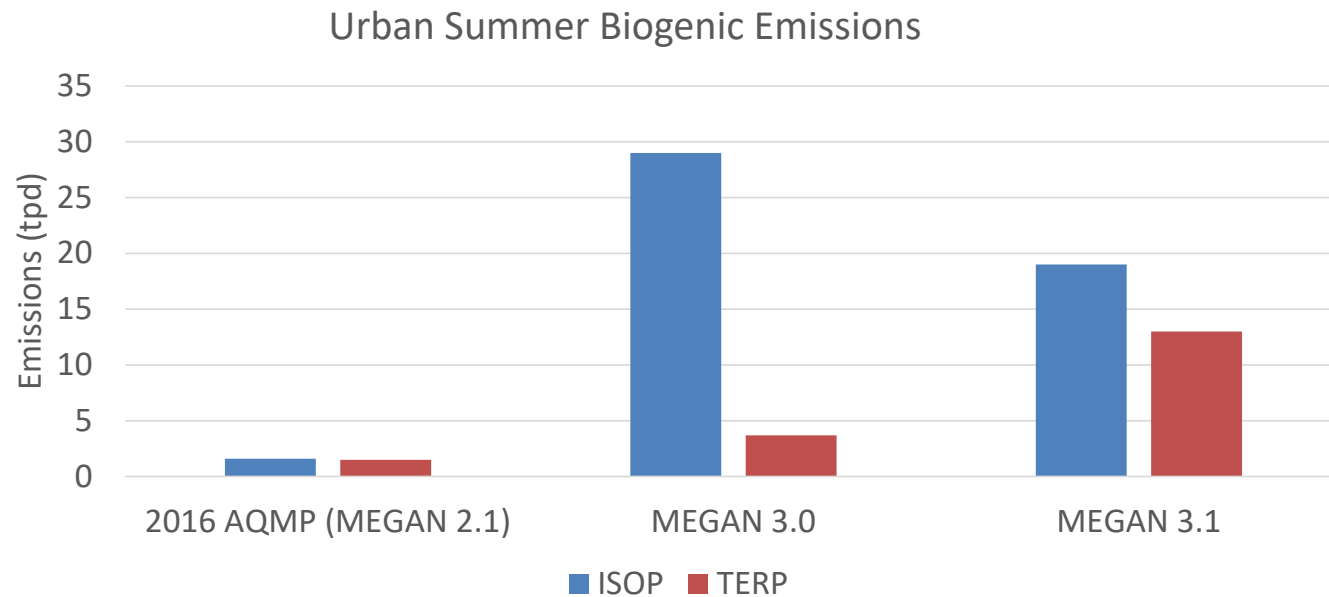
MEGAN Version Differences

- MEGAN2.1 was employed in the 2016 AQMP
- MEGAN3.0
 - Significant update which introduced leaf area and emission factors in urban areas
- MEGAN3.1
 - Berkeley Dalhousie Soil NO Processor
 - Updated emission factors



Biogenic Summer Emissions Comparison

- Biogenic emissions differ widely depending on model version

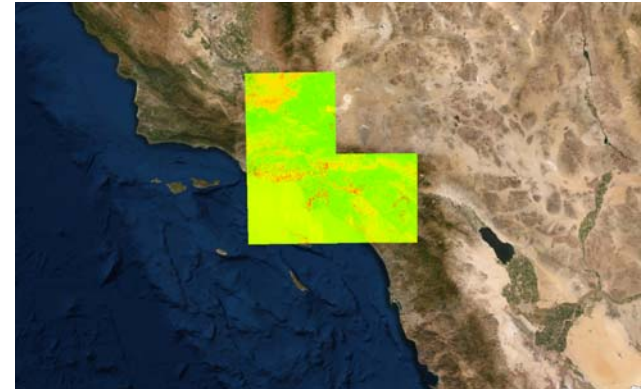


Improving LAI using Remote Sensing Products

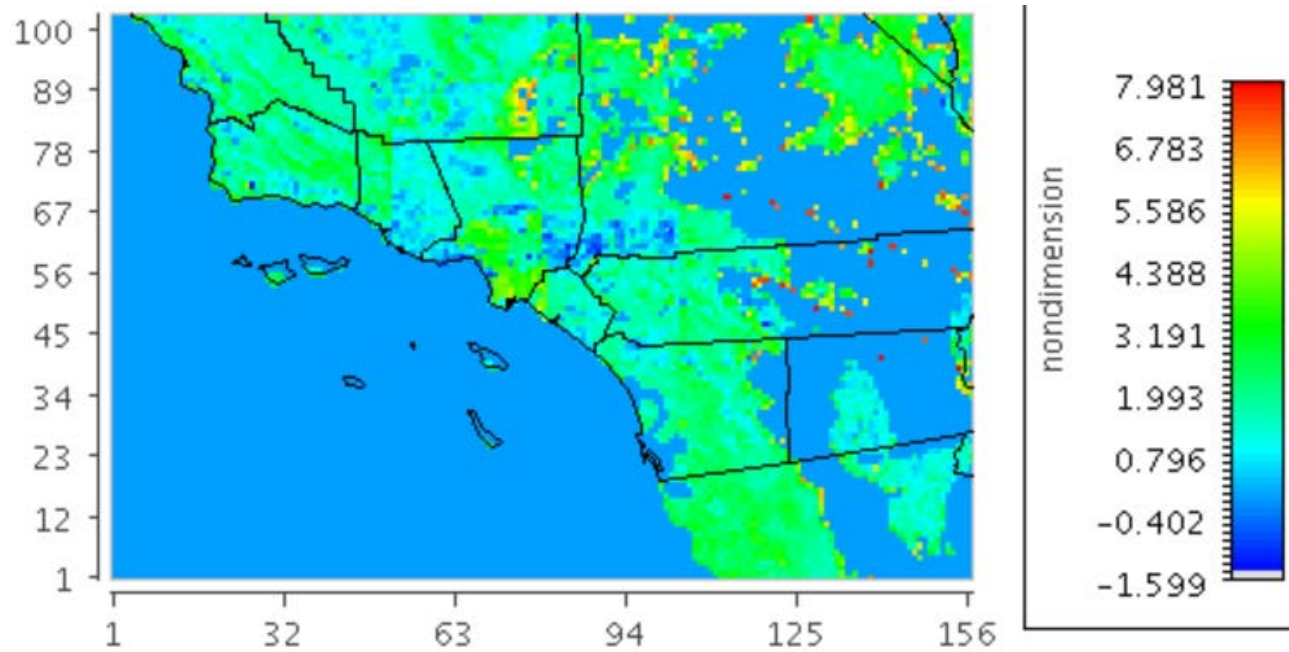
- MEGAN 3.1 uses 2008 Leaf Area Index (LAI) for North America, with average values assigned for urban areas
 - Dataset based on MODIS retrieval algorithm v5 (1 km)
- **Objective:** Replace default LAI with latest available, high resolution satellite imagery targeting urban vegetation

Remote Sensing Products

- LAI
 - Sentinel (10 m) – purchased product
 - Significant SCAB coverage, but little beyond
 - MODIS (1 km) retrieval algorithm v6
 - Does not include urban areas
- GVF
 - NOAA VIIRS (1 km)
 - USGS MGVF used in MEGAN was discontinued in 2012

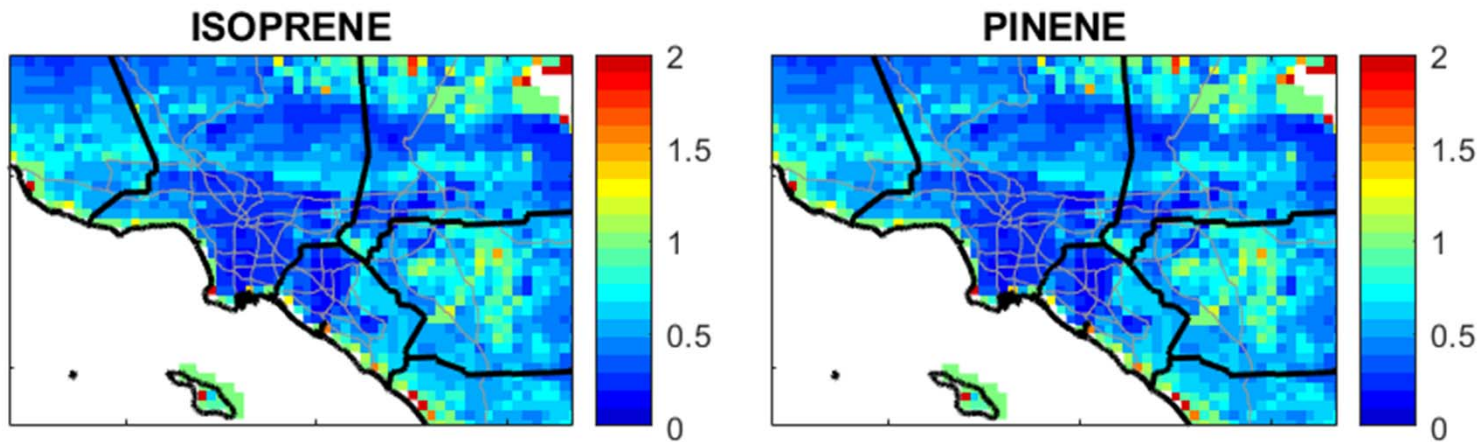


June LAIv Comparison {Updated} – {Base}



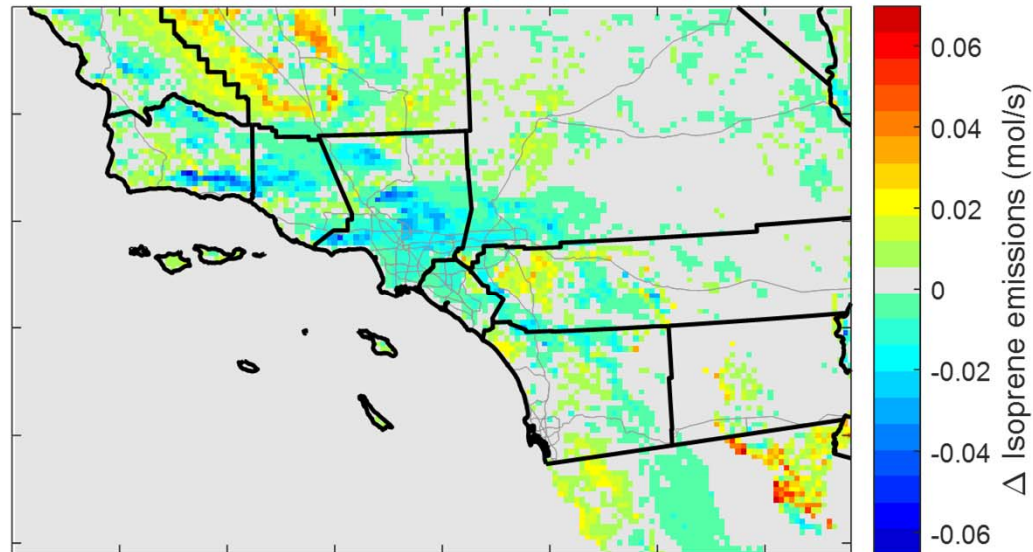
Landscape Weighted EF Ratio

- Emission factor ratios expressed as: $\frac{\text{Updated}}{\text{Base}}$



Isoprene Emissions Difference {Updated} – {Base}

- Annual average isoprene emission difference at 2200 UTC

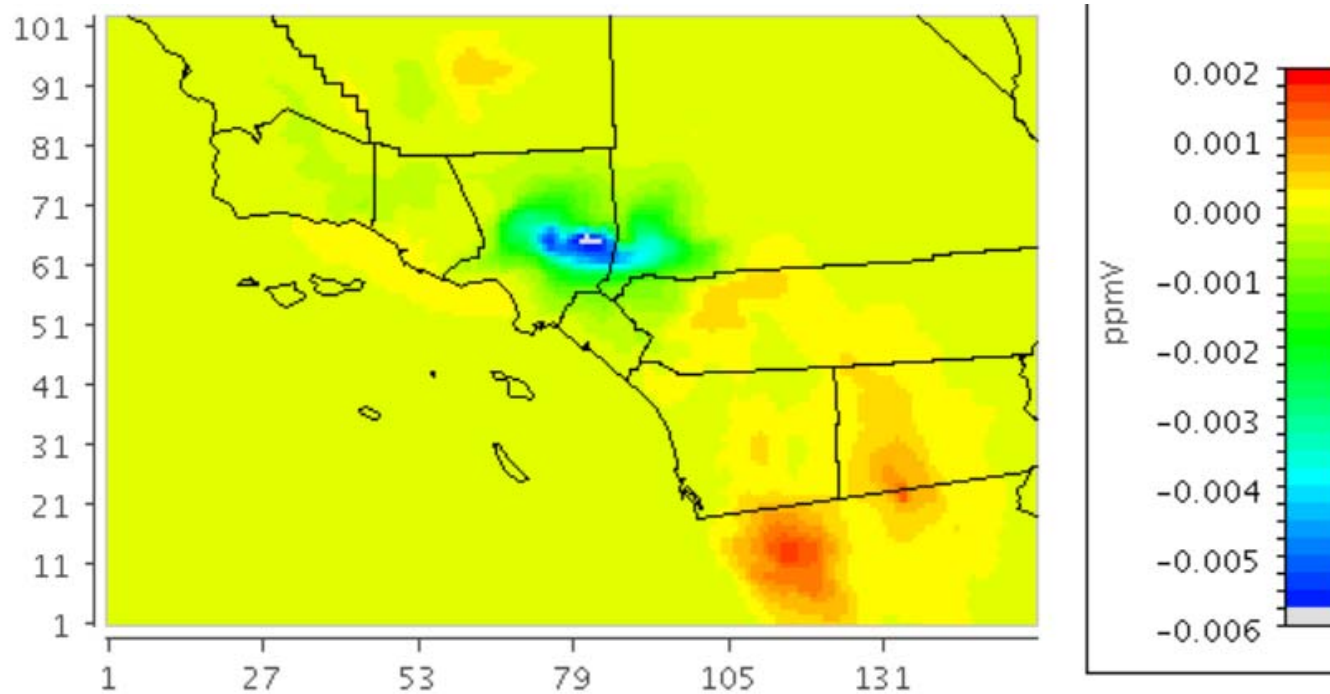


Emissions Summary

- While domain-wide BVOC emissions increase, significant decreases observed in SCAB and urban areas

Summer Average Emission Rates				
	Base		Updated	
	ISOP (tpd)	TERP (tpd)	ISOP (tpd)	TERP (tpd)
Urban	19	13	7.9	9.0
SCAB	110	53	84	50
Domain	500	250	530	370

Preliminary Summer Average Ozone Difference at 2200 UTC {Updated} – {Base}



Improving Tree species and their Emission Factors

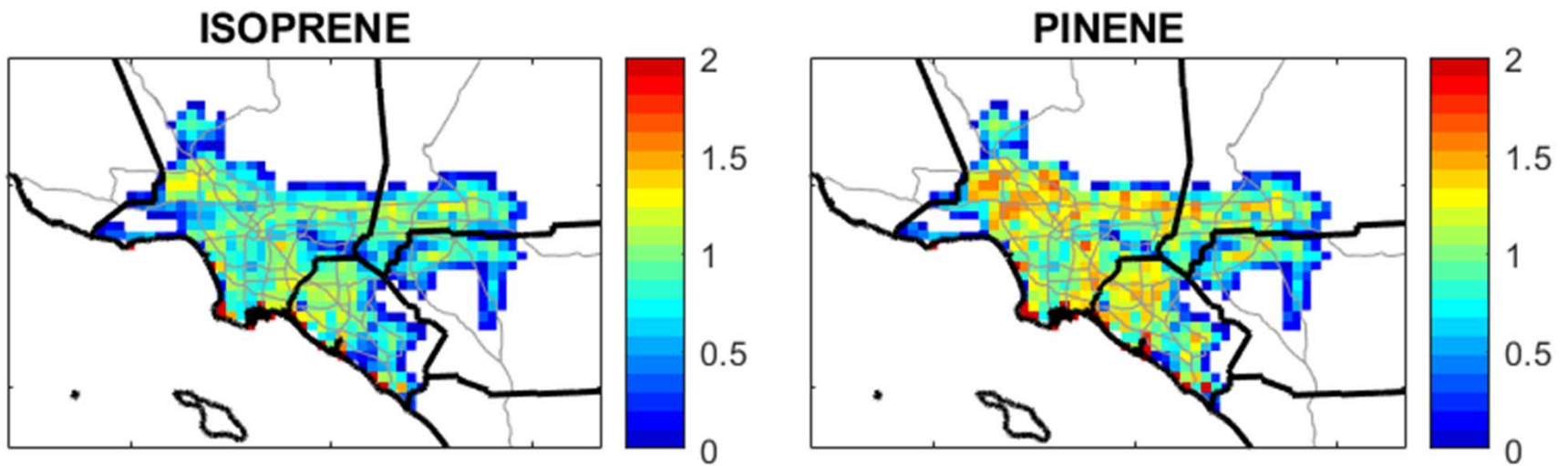
- Collaboration with UC Irvine utilizing urban tree inventory
- Tree species composition was estimated for 140 cities within Basin
- 45 tree species account for 80% of all trees
- Compared to 1982 inventory,¹ substantial decrease in native species (e.g. oaks, pines, elm)
- About half of tree species do not emit isoprene
- > 50% of tree species lack reliable BVOC measurements

¹ Miller, P. R., and Winer, A. M. Composition and dominance in Los Angeles Basin urban vegetation, Urban Ecology, 1984.



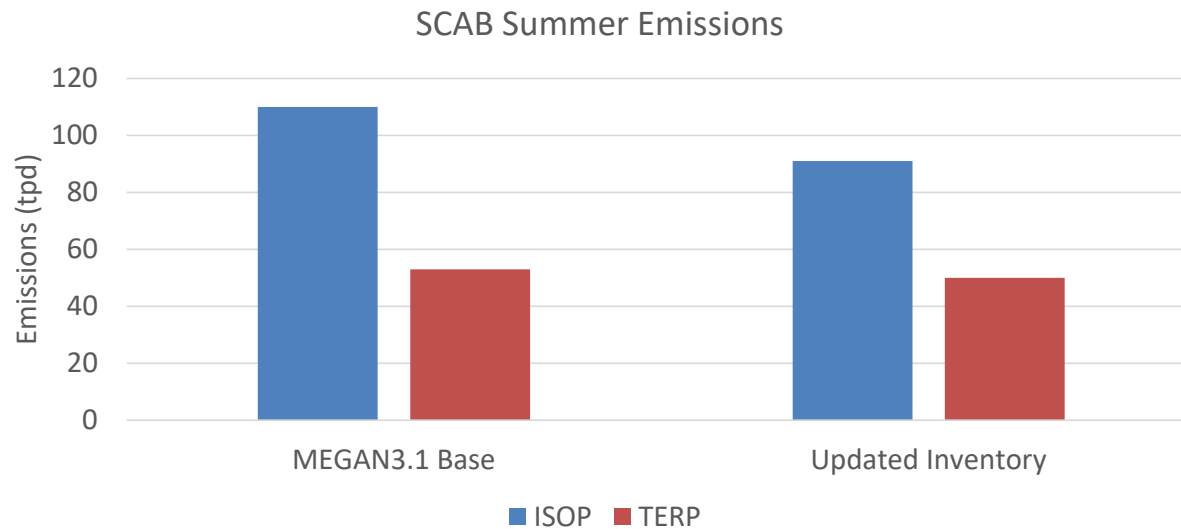
Emission Factor Ratio

- Emission factor ratios expressed as: $\frac{\text{Updated}}{\text{Base}}$

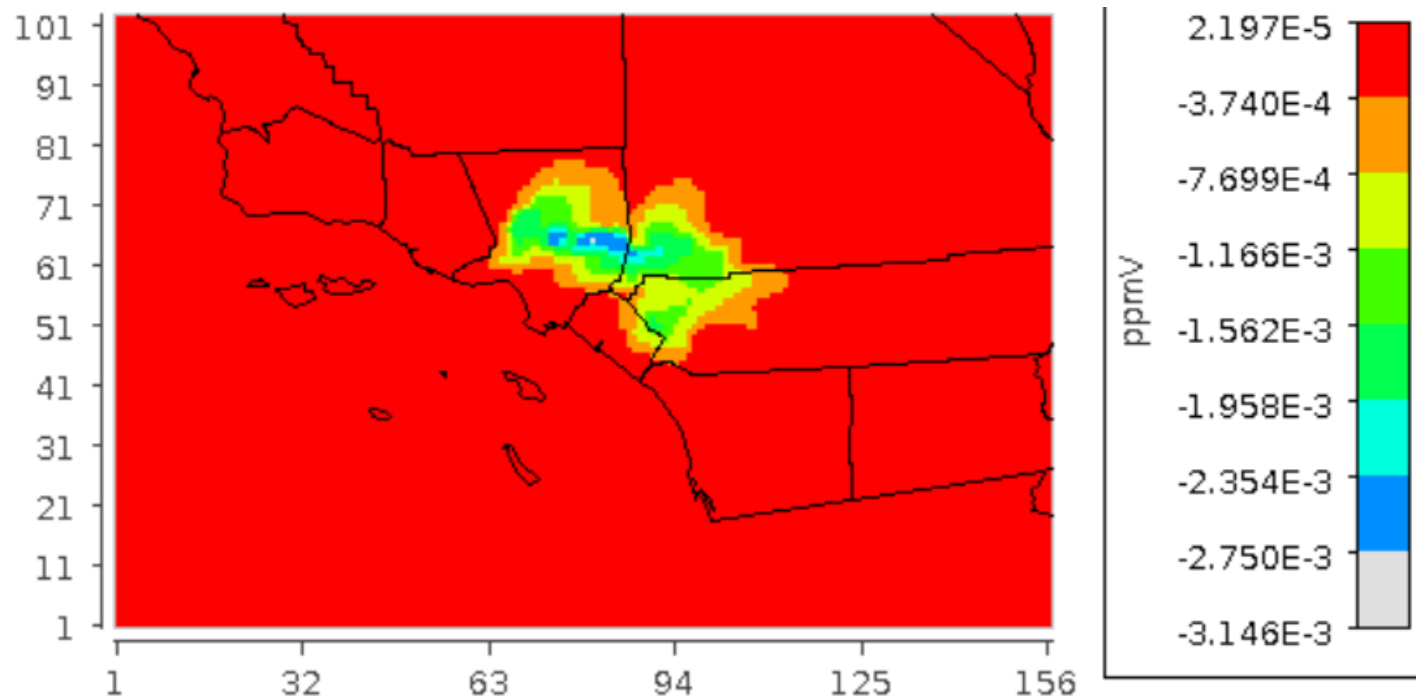


Emissions Comparison

- Isoprene emissions decrease, while terpenes are similar



Preliminary Summer Average Ozone Difference at 2200 UTC {Updated} – {Base}



Areas of Further Improvement

- Growth forms
 - Default distribution poorly characterizes urban areas
 - Few trees in SCAB, mostly bare soil or grass
 - High resolution imagery can be used to quantify individual trees
- Emission factors
 - Majority of tree species have poorly constrained emission factors
 - Enclosure experiments would benefit to validate and improve EFs



Summary and Conclusions

- MEGAN3.1 LAIv and growth form inputs were updated using the latest available, high resolution satellite products
 - Preliminary CMAQ results show high sensitivity to BVOCs. Further evaluation is on-going
- MEGAN3.1 ecotypes were updated using municipal tree inventories
 - Majority of tree species do not emit isoprene or have poorly constrained emission factors
- SCAB BVOC emissions likely artificially low following updates
 - Improvements to the growth forms and quantification of emissions factors would likely yield more accurate estimates



Item #4

Ozone Sensitivity to Meteorological Factors and Emission Changes – a case study with the COVID-19 Shelter-in-Place period

STMPR meeting on Jan 27, 2021

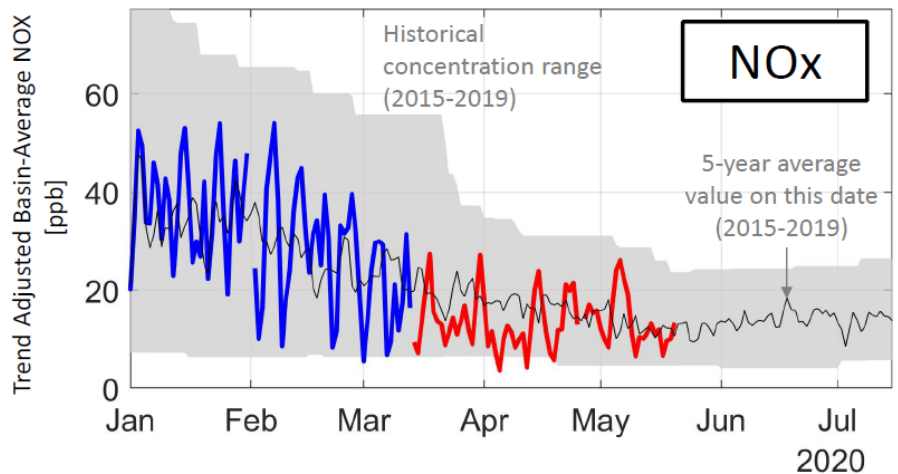
Sang-Mi Lee, Ph.D.
Program Supervisor

South Coast Air Quality Management District

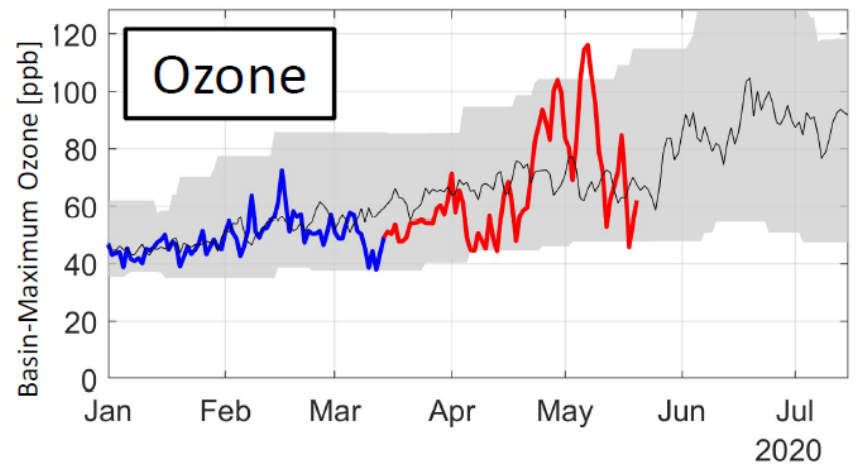
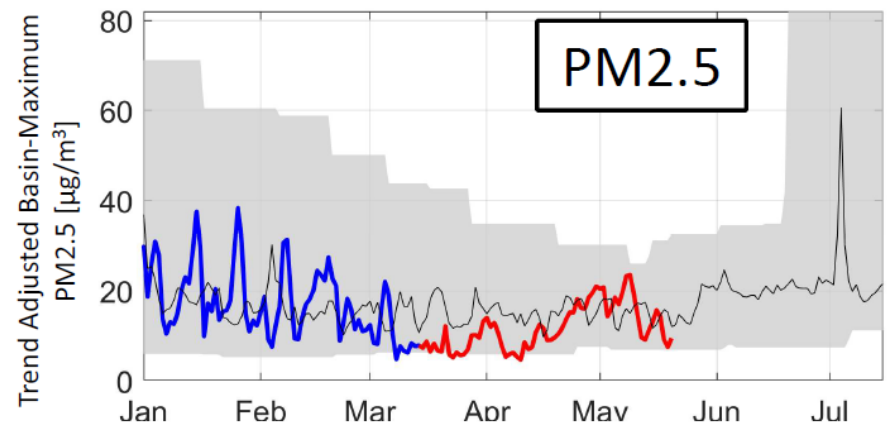


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Air Quality During COVID-19 Study Period



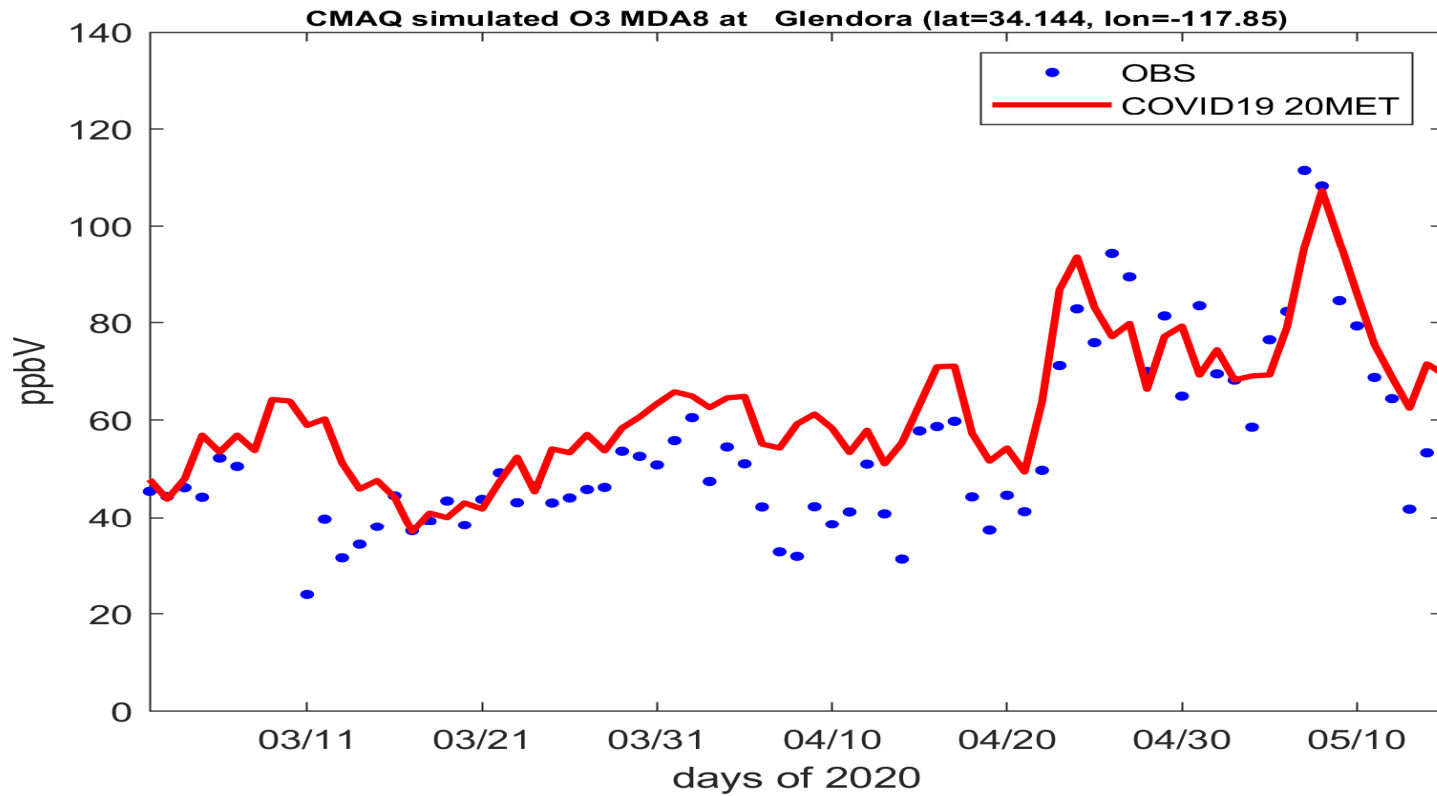
— Business as usual — Reduced Activity from COVID response



Experiment Design

- Study Period: Mar 15 – May 15, 2020
- CMAQ-WRF-SMOKE-MEGAN platform
- Anthropogenic Emissions:
 - Point, area and Off-Road mobile sources: projection from the 2016 AQMP
 - On-Road mobiles – 2016 AQMP activity data with EMFAC2017

Predicted vs Observed 8-hour Ozone in 2020



Sensitivity Experiments

Meteorological Impact

- 2018, 2019 and 2020

Biogenic Emissions

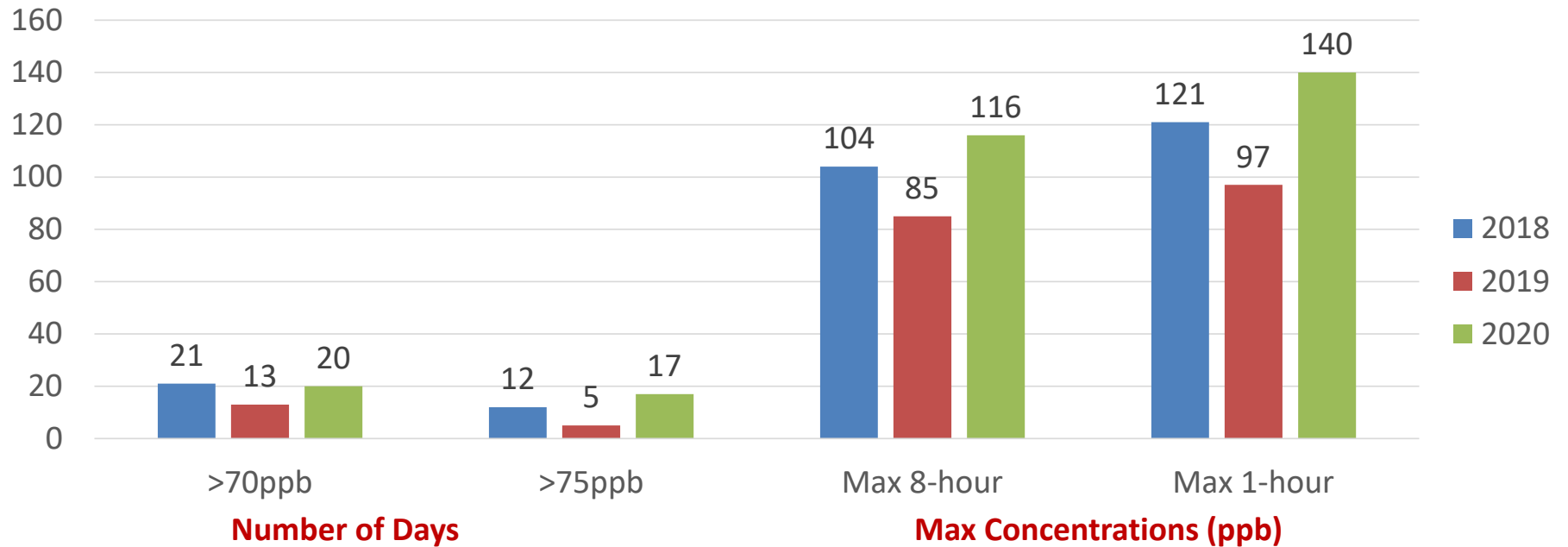
Changes in Anthropogenic Emissions



Meteorological Impact

Ozone Measurements in 2018 - 2020

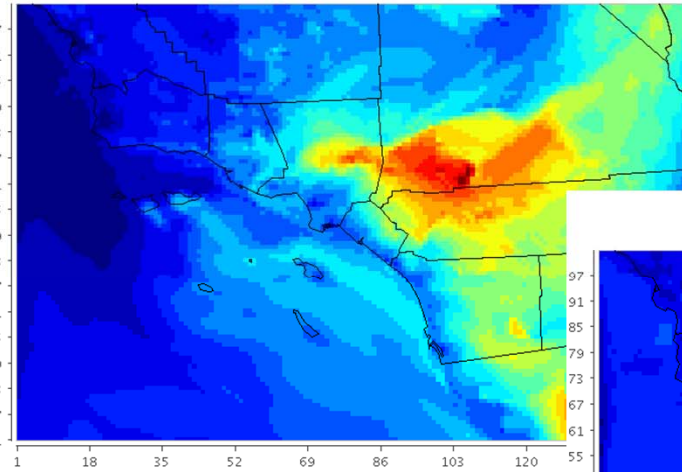
Number of Exceedance Days & Max Concentrations



MDA8 averaged over the simulation period

max MDA8 O3 (COVID19_18MET)

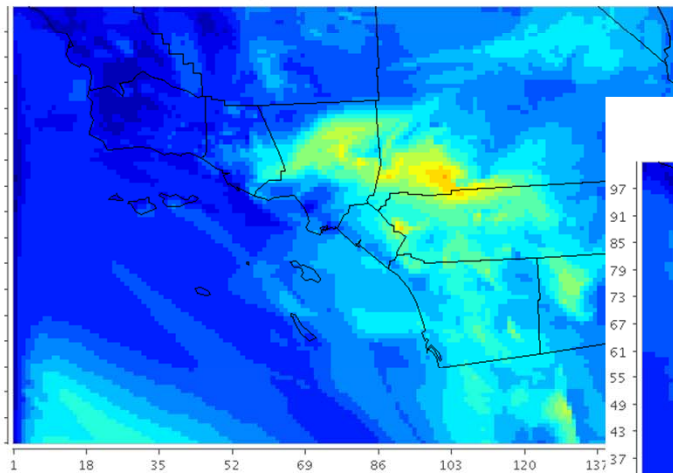
[1]=concat_03_COVID19_df18.nc



March 01, 2018 08:00:00 UTC
Min (1, 84) = 58.2, Max (105, 61) = 110.6

max MDA8 O3 (COVID19_19MET)

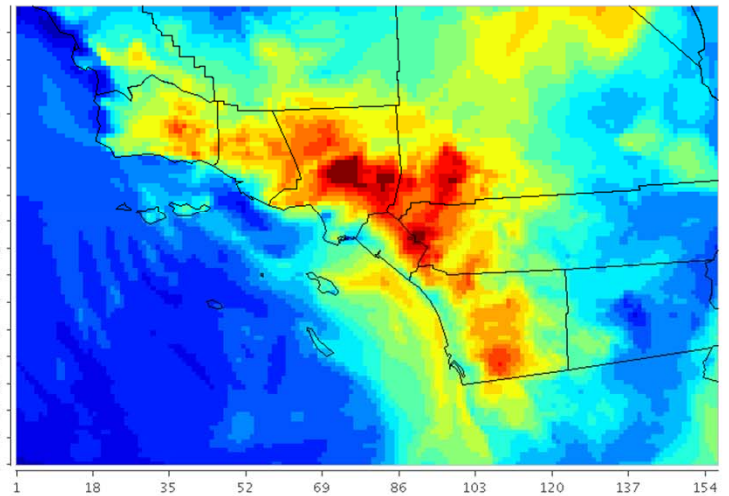
[2]=concat_03_COVID19_df19.nc



March 01, 2019 08:00:00 UTC
Min (1, 56) = 62.3, Max (101, 63) = 95.3

max MDA8 O3 (COVID19_20MET)

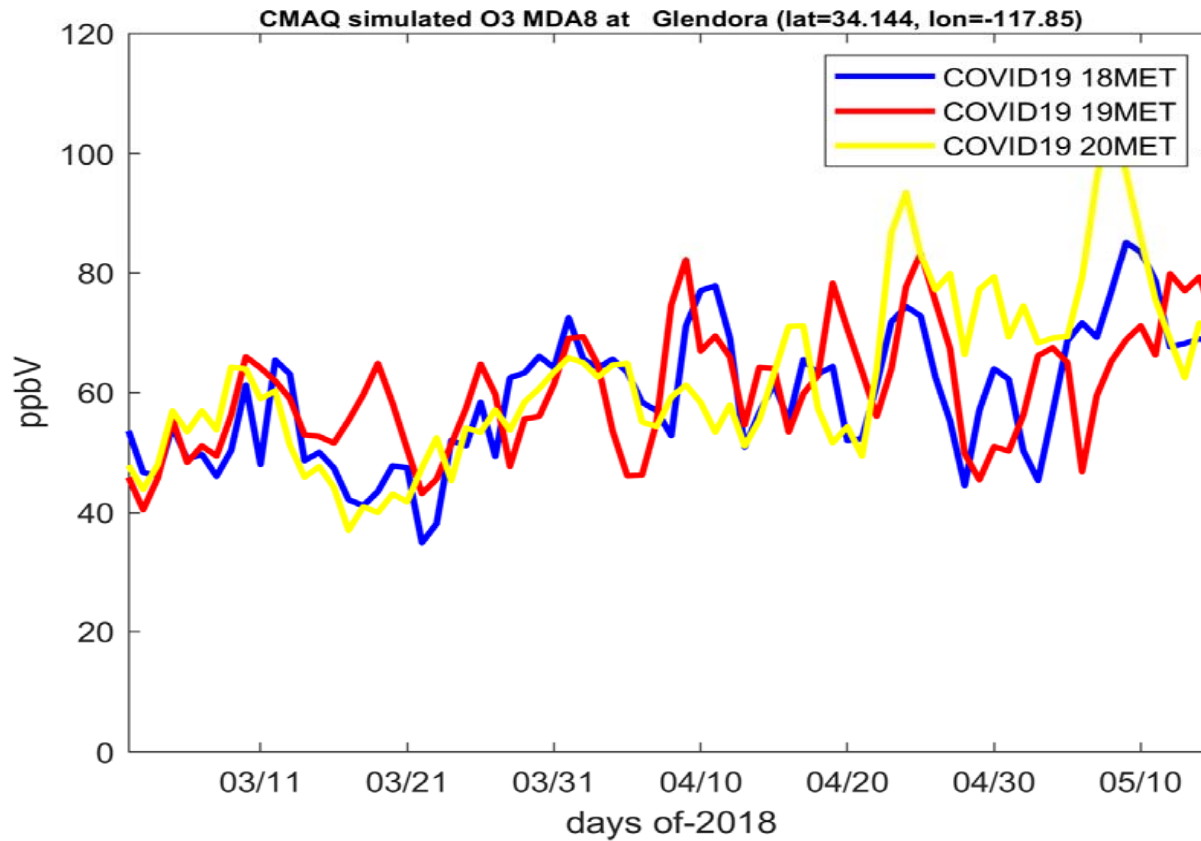
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March 01, 2020 08:00:00 UTC
Min (9, 98) = 62.9, Max (74, 67) = 112.9

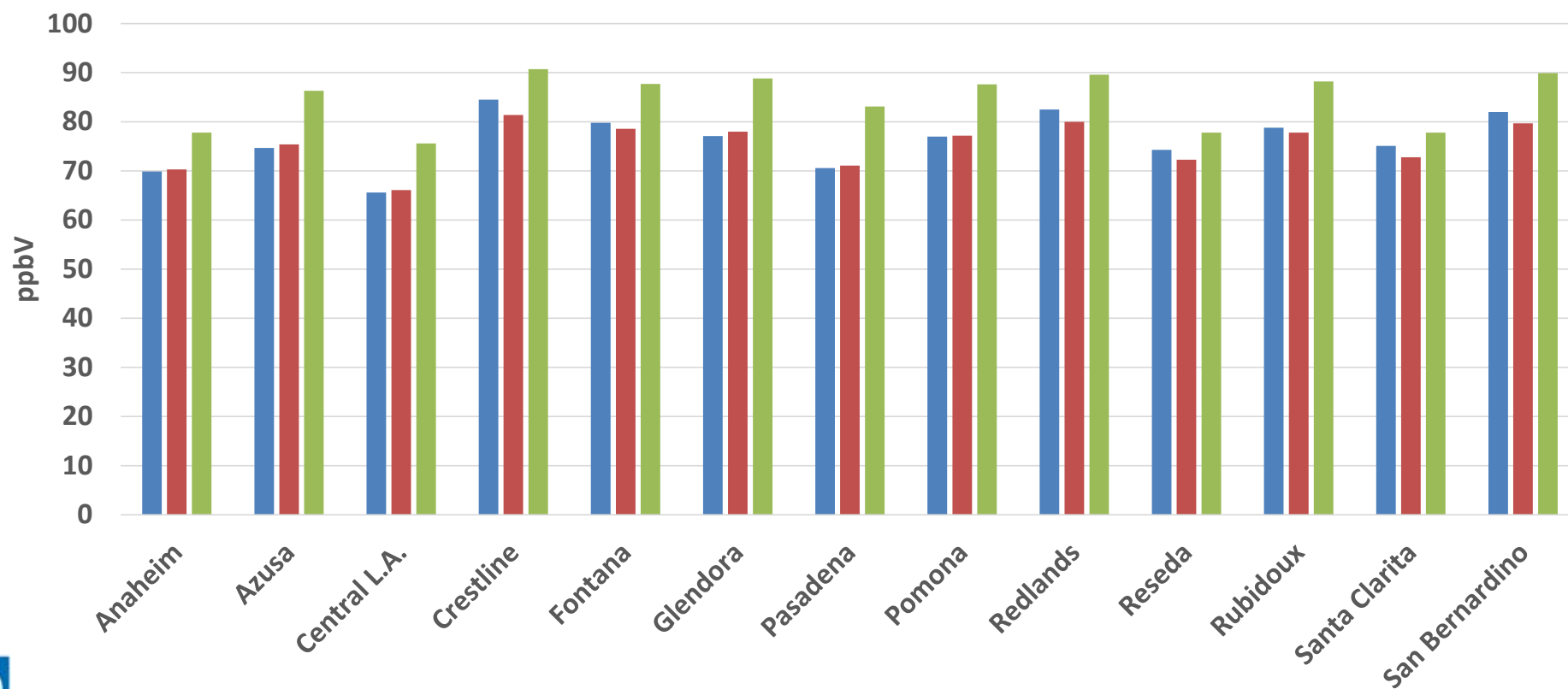


CMAQ Simulations – MDA8



CMAQ Simulations – Top 10 days MDA8

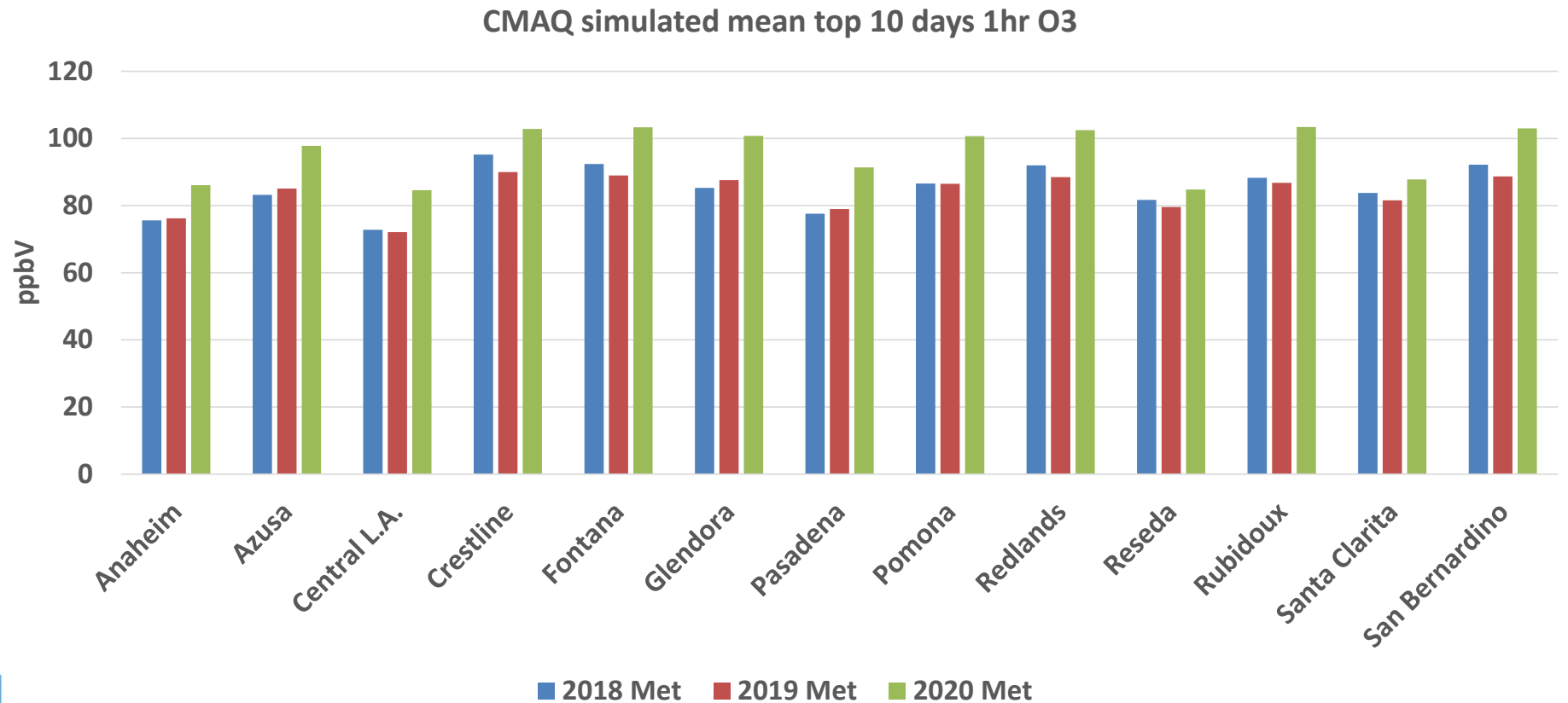
CMAQ simulated mean top 10 days 8hr O3



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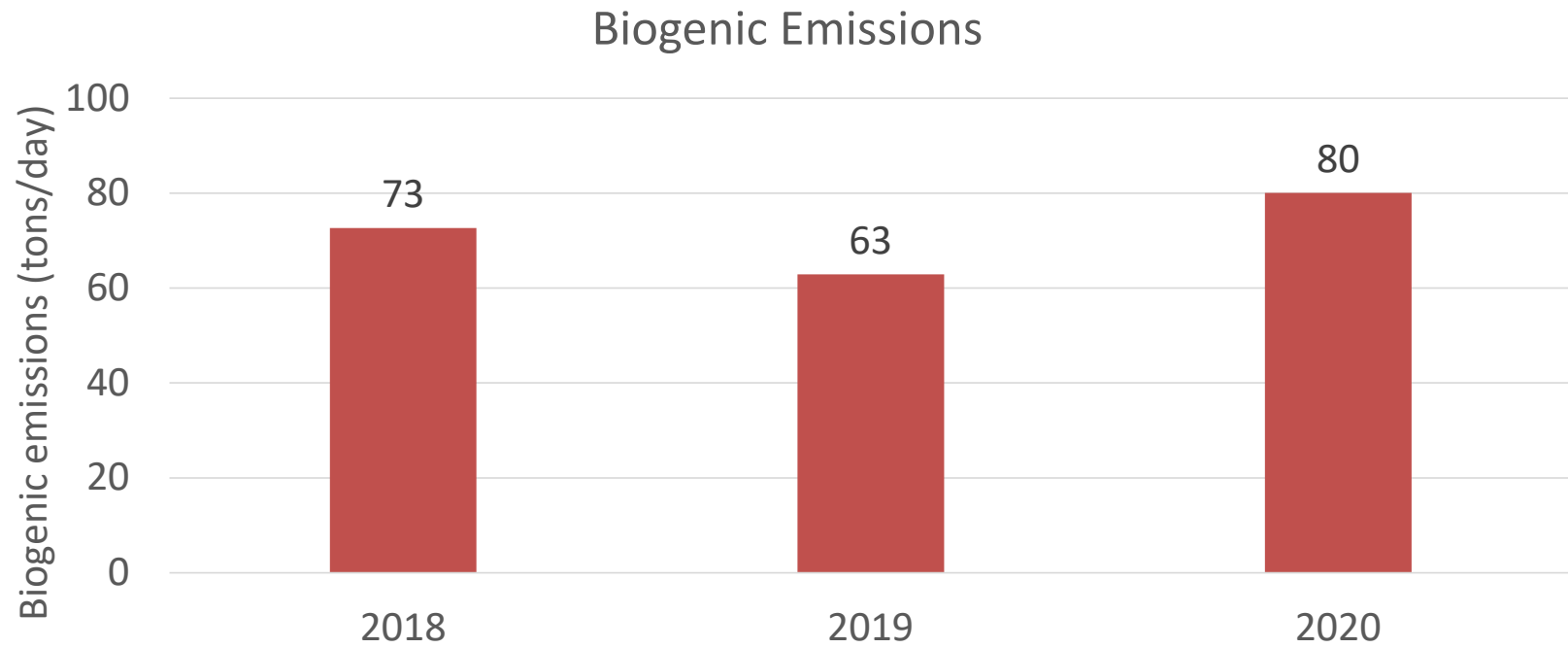
■ 2018 Met ■ 2019 Met ■ 2020 Met

CMAQ Simulations – Top 10 days MD1



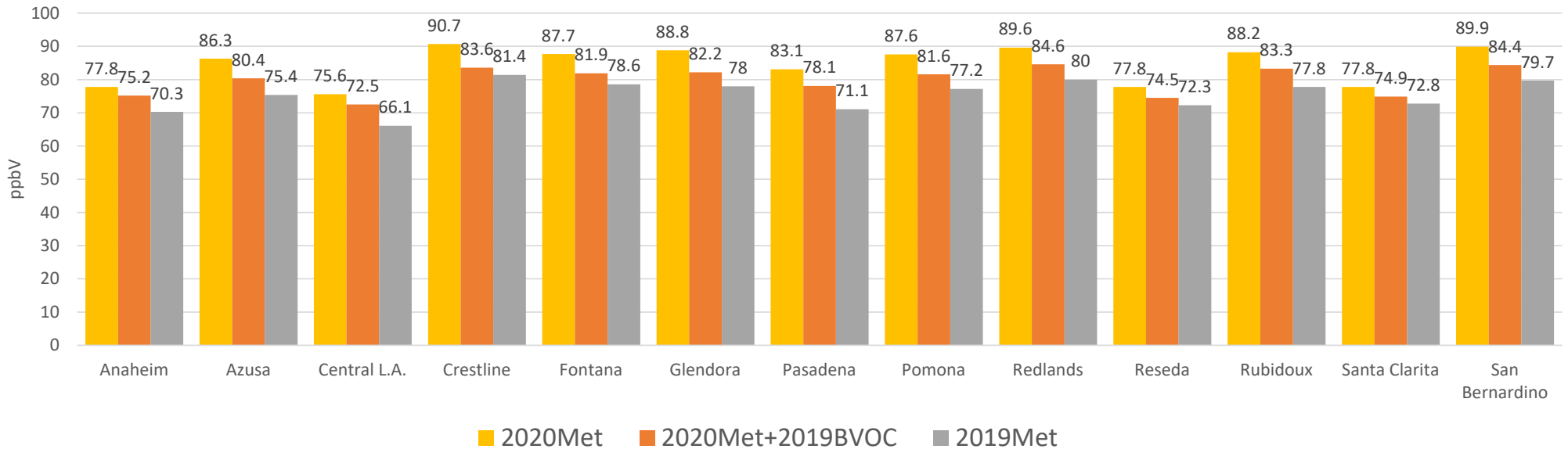
Biogenic Emissions

Biogenic emissions



Impact of Biogenic Emissions

CMAQ simulated mean top 10 days 8hr O3 during Mar-May 2020



Changes in Anthropogenic Emissions

Data to Estimate Emission Changes

On-Road mobile

- CalTrans Performance Measurement System (PeMS), which includes traffic detectors, weigh-in-motion stations and other incident reports on freeways
- Other sources such as streetlight and Geotab considered

Off-Road mobile

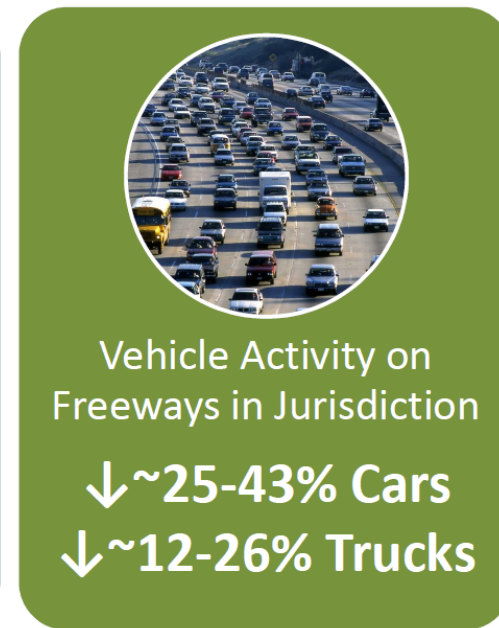
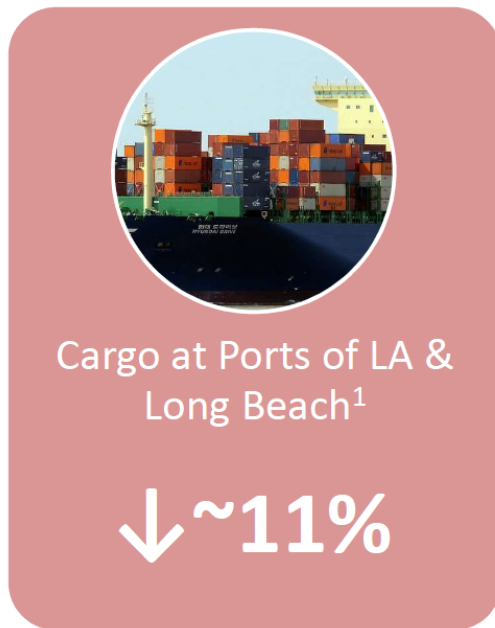
- Aircraft: FAA Operations Network (OPSNET) data
- Ocean Going Vessels: in-house analysis based on IHS-seaweb data

RECLAIM facilities

- Based on Continuous Emissions Monitoring System (CEMS)

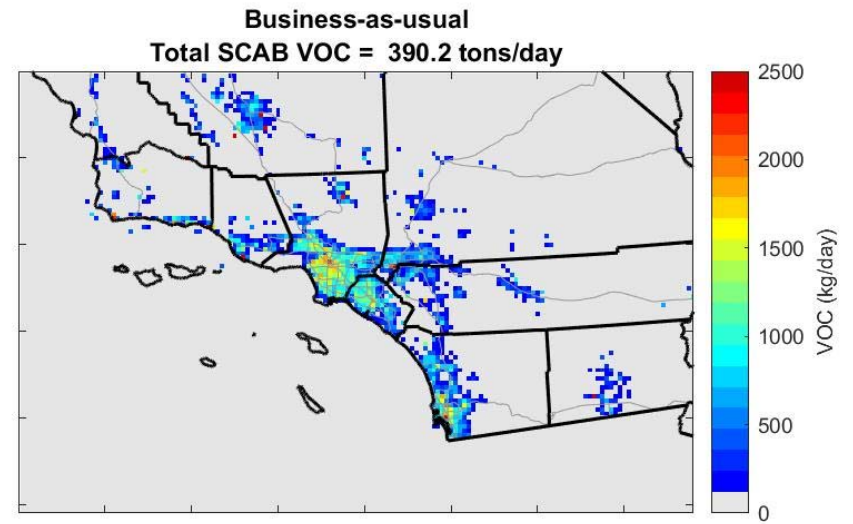
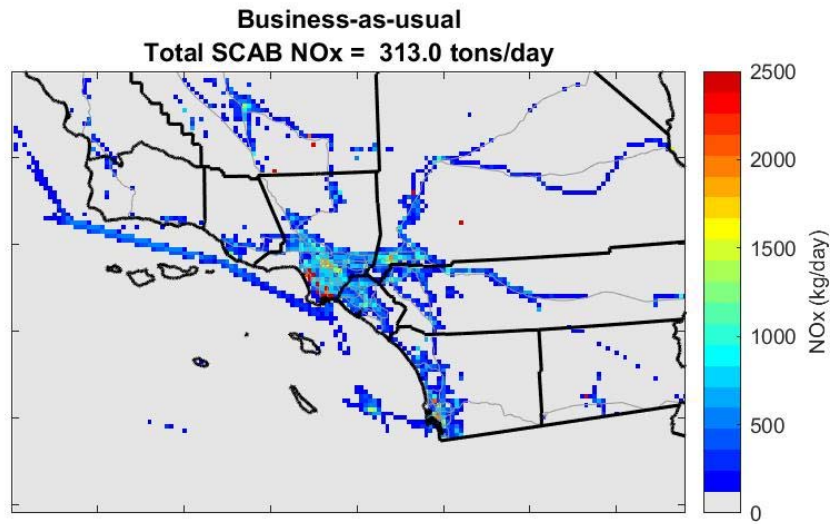


Changes in Economic Activities during the initial COVID-19 shelter-in-place period

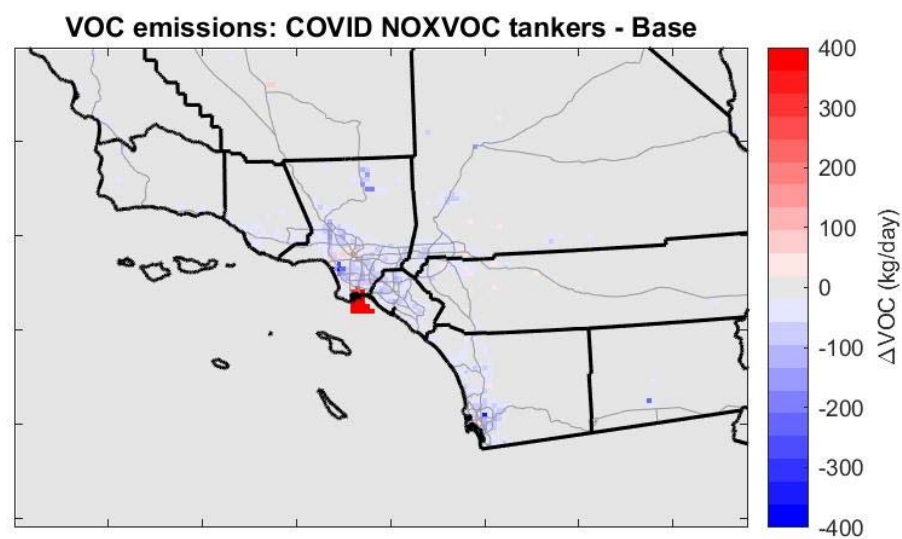
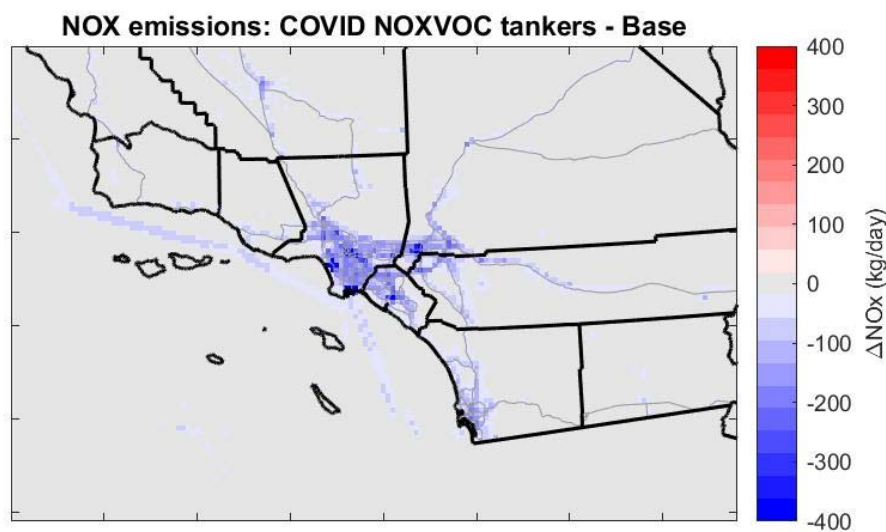


- 1) Approximate change in TEUs (Twenty foot equivalent units) comparing April 2020 to April 2019
- 2) Approximate change in aircraft operations at LAX, LGB, SNA, BUR, PSP, ONT from April 2020 to April 2019 from FAA Operations Network (OPSNET)
- 3) Approximate change in car and truck flow from pre-COVID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

NOx and VOC emissions of Business-As-Usual Scenario



Emission Changes due to COVID-19

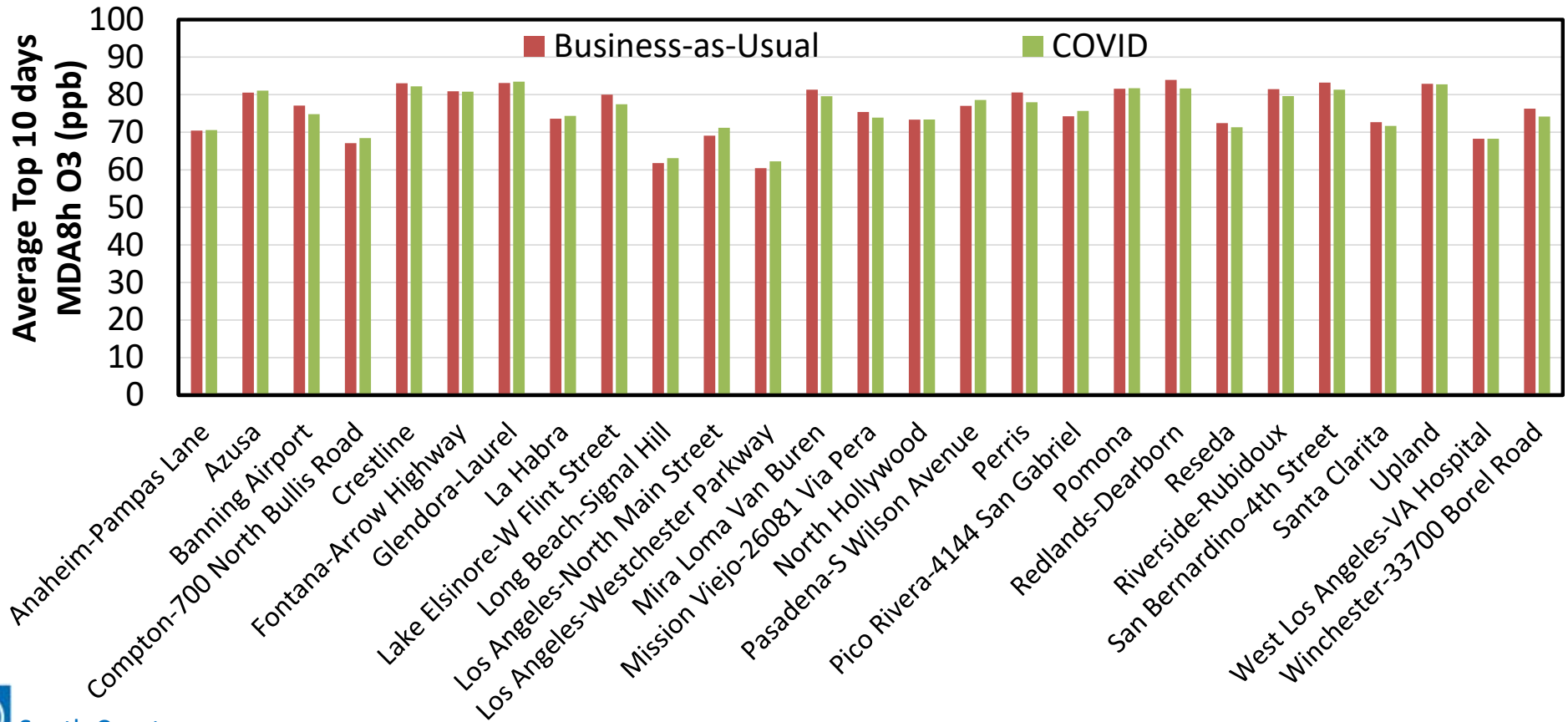


Emission Changes

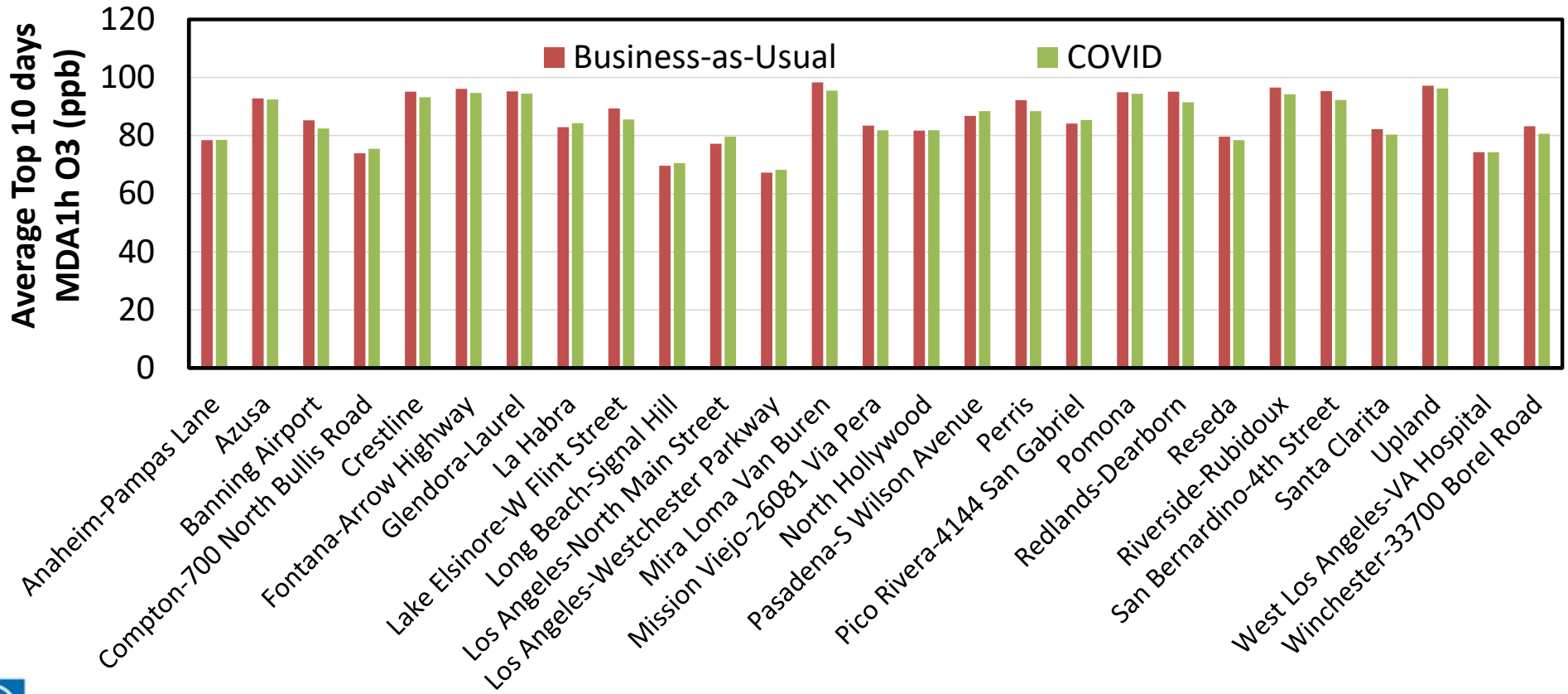
	Emissions in Modeling Domain (tons/day)		Emissions in SCAB (tons/day)	
	NOX	VOC	NOX	VOC
Business As Usual	723.2	798.3	313.0	390.2
COVID	599.0	768.4	240.0	372.8



Top 10 days – MDA8

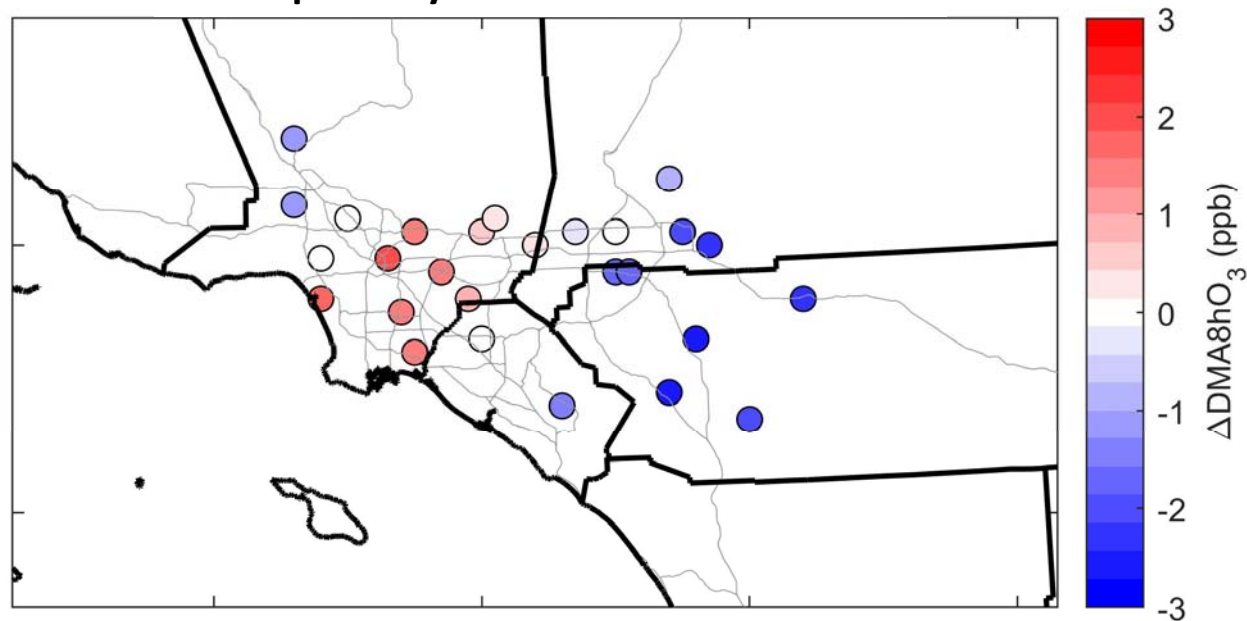


Top 10 Days – MD 1h



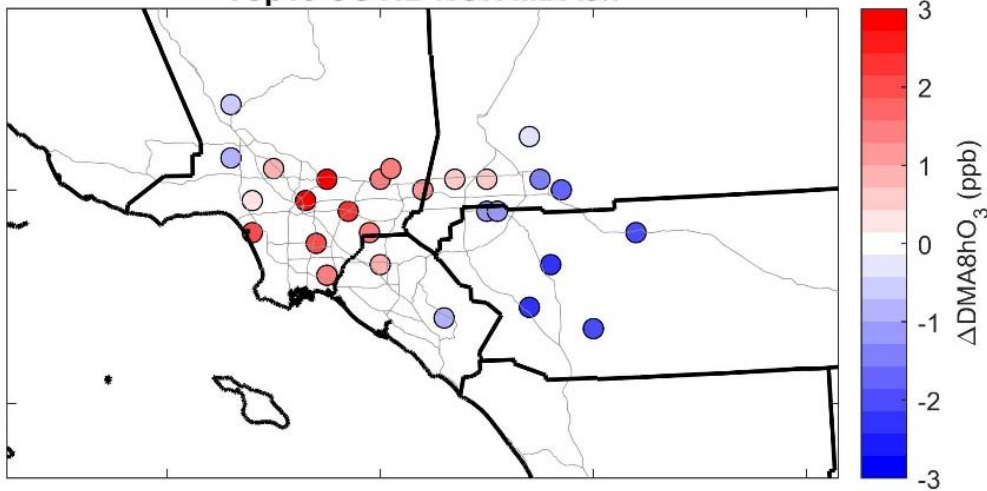
Spatial Variability of MDA8 Responses

Top 10 days MDA8h COVID - BAU

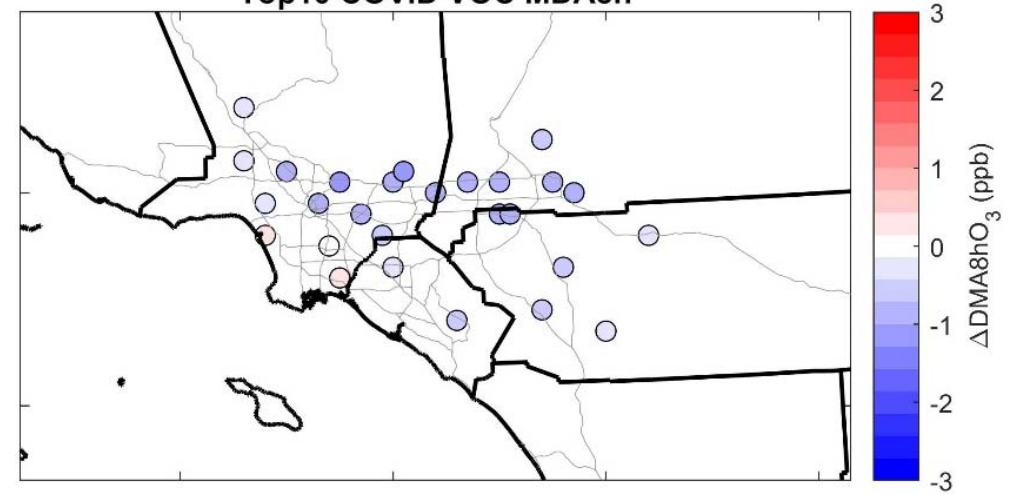


Responses to NOx and VOC reductions

Top10 COVID NOx MDA8h



Top10 COVID VOC MDA8h



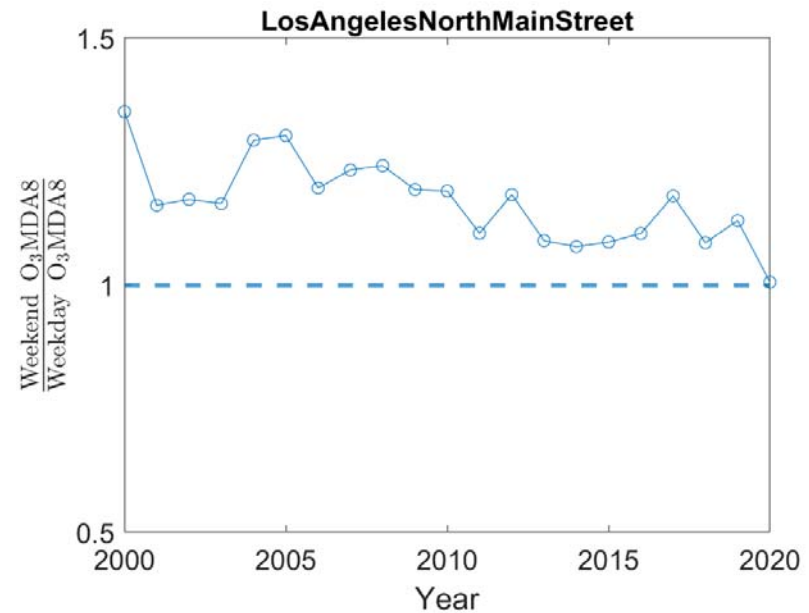
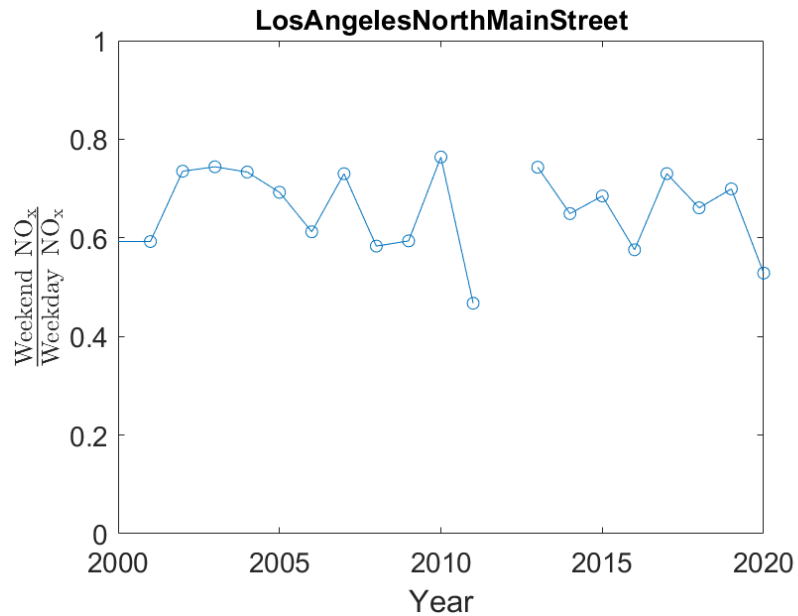
Ozone Chemistry (Isopleths & Weekend effect)



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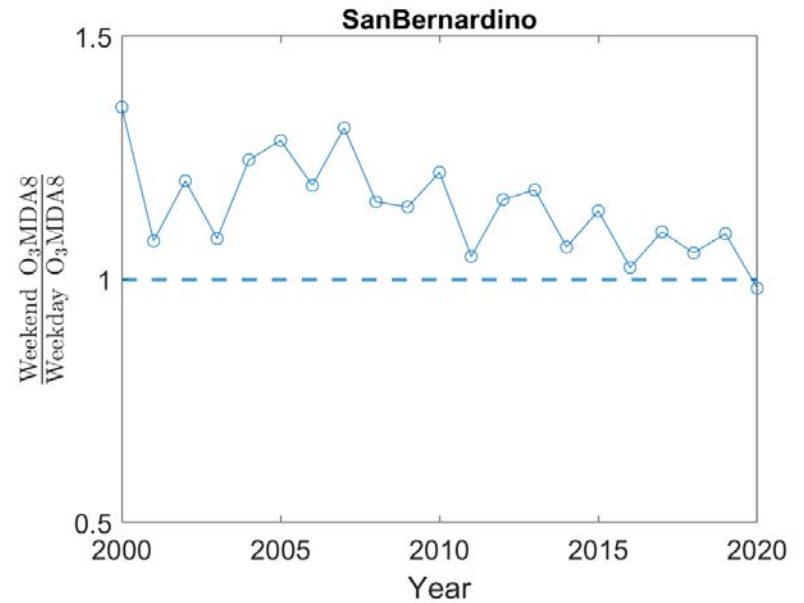
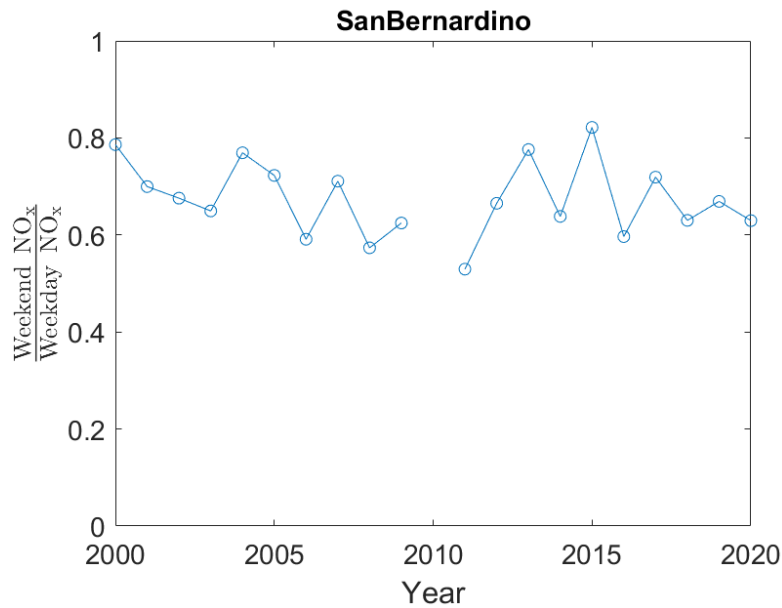
Weekend Effect – Central Los Angeles

- NOx decrease during weekend causes higher ozone (NOx disbenefit)



Weekend Effect – Inland Receptors

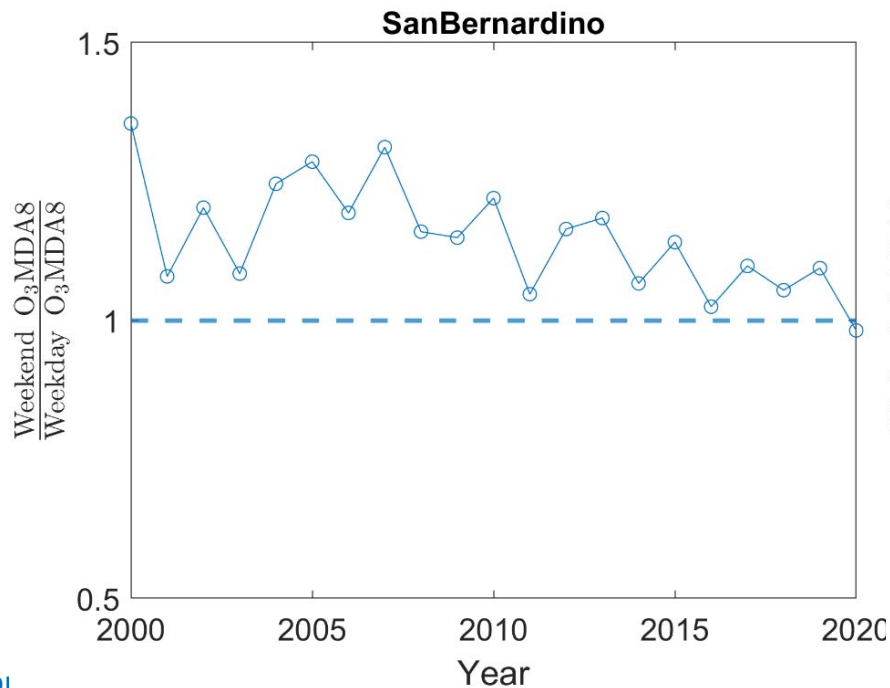
- NOx disbenefit diminishes with time



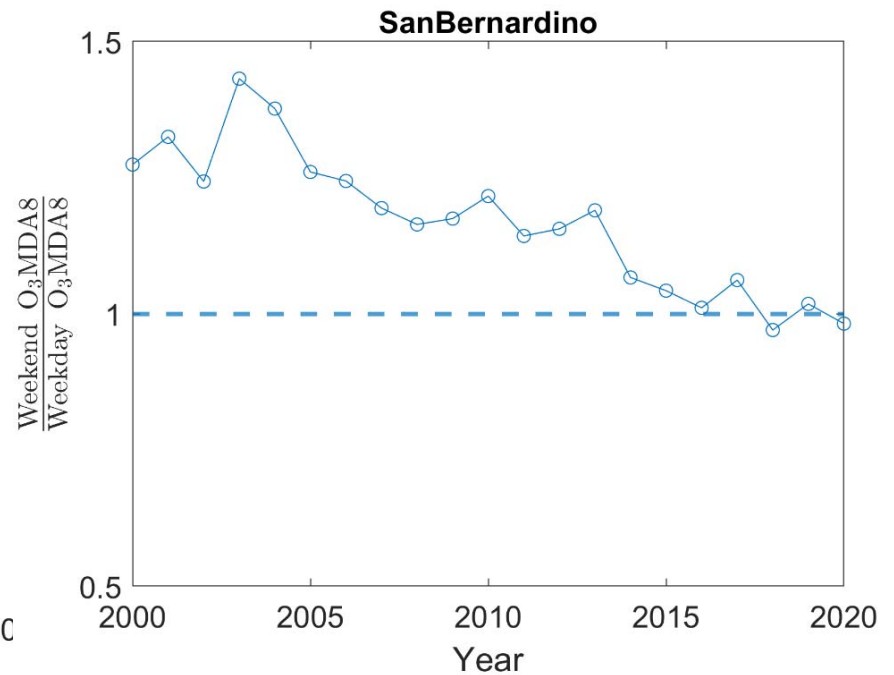
Seasonality of NOx disbenefit

- NOx disbenefit is stronger in spring

March-May

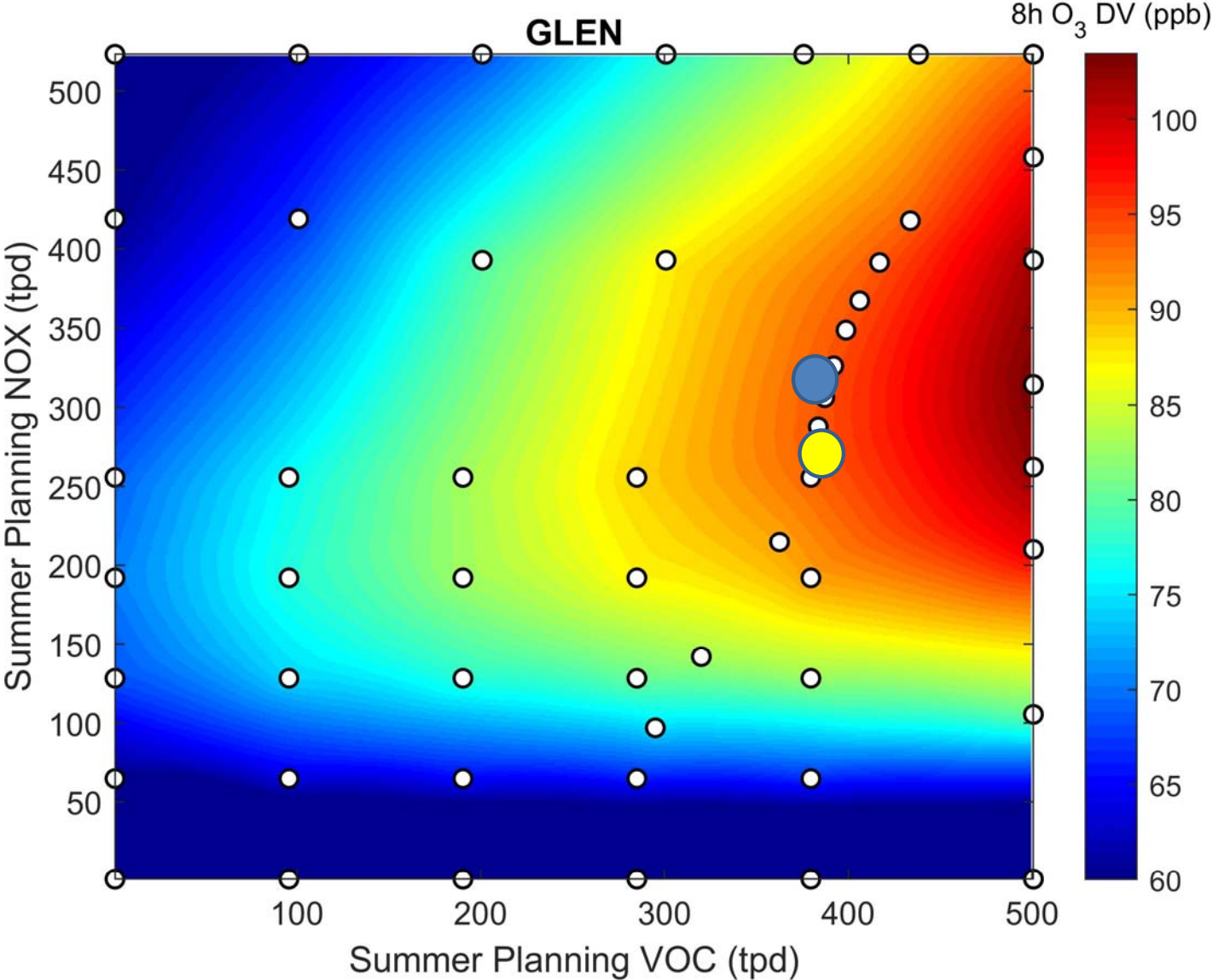


June-September



8-hour Ozone

Isopleths from 2016 AQMP modeling platform



Summary

- A set of sensitivity tests was performed to understand chemistry and dynamics of high ozone episodes during Mar 15- May 15, 2020.
- Numerical modeling results indicate that meteorology combined with the biogenic emissions in response to the meteorology have much larger impact on ozone than the changes in anthropogenic emissions
- Emission source areas in LA county are still VOC-limited and downwind inland receptor areas are transitioning to NO_x-limited regime.
- The weekend effect is stronger during spring, which resulted in the higher ozone episodes during the study period



Item #5

Net Emissions Analysis Tool (NEAT)

STMPR meeting on Jan 27, 2021

Marc Carreras Sospedra, Ph.D.
Air Quality Specialist

South Coast Air Quality Management District



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Air Quality Management District

Net Emissions Analysis Tool (NEAT)

- Analytical software tool that will help policy-makers determine the most cost-effective strategies for NO_x and GHG emission reductions from the residential sector
- Calculates changes in emissions and utility costs associated with a retrofit of existing appliances



Developmental History

- First working group meeting: August 30, 2017
- 6 working group meetings through Jan 2019
- 10+ comment letters
- URL: aqmd.gov/NEAT

The screenshot shows the South Coast AQMD website. At the top, a red banner reads: "During this difficult time, South Coast AQMD is committed to protecting air quality and public health. Please visit our COVID-19 page for the operational updates and latest information. [Learn more.](#)" Below this is a dark navigation bar with links for Language, F.I.N.D., About, Contact, Grants & Bids, Online Services, I'm Looking For, and Sign Up. A search bar is on the right. The main navigation menu includes AIR QUALITY, INCENTIVES & PROGRAMS, RULES & COMPLIANCE, PERMITS, NEWS, WEBCASTS, & CALENDAR, TECHNOLOGY ADVANCEMENT, RESOURCES, and MEETING AGENDAS & MINUTES. The page title is "Net Emissions Analysis Tool (NEAT)". A breadcrumb trail reads: Home / Air Quality / Clean Air Plans / Air Quality Mgt. Plan / Net Emissions Analysis Tool (NEAT). On the right, there are social media share icons for Facebook and Twitter. The main content area features a heading "Net Emissions Analysis Tool (NEAT)" and a list of links: "Net Emissions Analysis Tool (NEAT)", "Working Group", and "User's Guide and Sample Cases". A text box on the right explains: "The Net Emissions Analysis Tool (NEAT) is a computational tool, developed by staff at the South Coast Air Quality Management District (South Coast AQMD), which calculates the changes in NOx and greenhouse gases (GHG) emissions and the costs associated with switching residential appliances to cleaner and more efficient technologies. The development of NEAT stems from the need to evaluate measures in the 2016 Air Quality Management Plan, such as CMB-02 - Emission Reduction from Replacement with Zero or Near Zero NOx Appliances in Commercial and Residential..."

Net Emissions Analysis Tool (NEAT) Inputs

Residential Net Emissions Analysis Tool version 1.11 Beta

File Capture Screen Help

Demand Demand Input Summary Power Supply Economics Computation Results

Housing Category: Single-Family Multi-Family Mobile Home Aggregate

Climate Zone: 6 Coastal 8 S. Near-Coastal 9 N. Near-Coastal 10 S. Inland 15 S. Desert 16 Mountain All [CZ MAP](#)

Populate Baseline and Scenario Technology Mix Parameters:

Populate List of New Technologies for Possible Implementation: *Edit parameters in "Add Technology for Scenario Selection" and implement with "Replace Technology Tool"*

Hot water heating Kitchen Laundry Miscellaneous Pool Space heating and cooling Transportation

BASELINE TECHNOLOGY MIX PARAMETERS

Hover over Fuel or Technology to see selected profile
View column information and units with "Show Column Information" button

Fuel	Technology	UEC	NOX EF	CO2e EF	Unit Cost	Install Cost	Lifetime	Penetration
A Electric	Water Heat	3169	0	0	361	1700	13	0.0500
B Electric	Solar Water Heat with Electric Backup	1877	0	0	1411	3869	13	0
C NatGas	Conventional Water Heater	199.9600	0.0023	11.7600	647	1900	13	0.8770
D NatGas	Solar Water Heat with Gas Backup	156.8200	0.0023	11.7600	4349	3869	13	0

SCENARIO TECHNOLOGY MIX PARAMETERS

[View Tech Definitions](#) [Show Column Information](#)

Fuel	Technology	UEC	NOX EF	CO2e EF	Unit Cost	Install Cost	Lifetime
Electric	Water Heat	3169	0	0	361	1700	13
Electric	Solar Water Heat with Electric Backup	1877	0	0	1411	3869	13
NatGas	High-Efficiency Condensing	155	0.0023	11.7600	1000	1900	13
NatGas	Solar Water Heat with Gas Backup	156.8200	0.0023	11.7600	4349	3869	13

NEW TECHNOLOGY PARAMETERS CAUTION: Default appliance parameters may not be appropriate for most scenarios. For the most accurate results, South Coast AQMD recommends using actual values for the appliances that are being replaced or retrofit. Note that units of UEC vary based on fuel.

#	Fuel	Technology	Hourly Profile	UEC	NOX EF	CO2e EF	Unit Cost	Install Cost	Lifetime	Notes
18	NatGas	High-Efficiency Condensing	Water Heating	155	0.0023	11.7600	1000	1900	13	Values not specified
19	Electric	Heat Pump	Water Heating	1105	0	0	1500	1700	13	Values not specified
20	Electric	Standard Tank	Water Heating	-9999	-9999	-9999	-9999	-9999	-9999	Values not specified
21	Electric	Point-of-Use Tankless System	Water Heating	2923	0	0	850	3400	13	Values not specified
22	NatGas	Heat Pump	Water Heating	-9999	-9999	-9999	-9999	-9999	-9999	Values not specified
23	Undefined	New Technology	Undefined	-9999	-9999	-9999	-9999	-9999	-9999	Values not specified

Replace Technology Tool

(All households with the baseline technology will switch to the replacement tech.)

Select baseline technology to phase-out:

Select new technology to replace baseline technology in "scenario":



Net Emissions Analysis Tool (NEAT) Inputs

Residential Net Emissions Analysis Tool version 1.11 Beta

File Capture Screen Help

Demand Demand Input Summary Power Supply Economics Computation Results

Housing Category: Single-Family Multi-Family Mobile Home Aggregate

Climate Zone: 6 Coastal 8 S. Near-Coastal 9 N. Near-Coastal 10 S. Inland 15 S. Desert 16 Mountain

Populate Baseline and Scenario Technology Mix Parameters:

Populate List of New Technologies for Possible Implementation: *Edit parameters in "Add Technology for Scenario Selection" and implement with "Replace Technology Tool"*

Hot water heating Kitchen

By housing type **By climate zone**

BASELINE TECHNOLOGY MIX PARAMETERS									SCENARIO TECHNOLOGY MIX PARAMETERS								
Fuel	Technology	UEC	NOX EF	CO2e EF	Unit Cost	Install Cost	Lifetime	Penetration	Fuel	Technology	UEC	NOX EF	CO2e EF	Unit Cost	Install Cost	Lifetime	
A Electric	Water Heat	3169	0	0	361	1700	13	0.0500	= Electric	Water Heat	3169	0	0	361	1700	13	
B Electric	Solar Water Heat with Electric Backup	1877	0	0	1411	3869	13	0	= Electric	Solar Water Heat with Electric Backup	1877	0	0	1411	3869	13	
C NatGas	Conventional Water Heater	199.9600	0.0023	11.7600	647	1900	13	0.8770	≠ NatGas	High-Efficiency Condensing	155	0.0023	11.7600	1000	1900	13	
D NatGas	Solar Water Heat with Gas Backup	156.8200	0.0023	11.7600	4349	3869	13	0	= NatGas	Solar Water Heat with Gas Backup	156.8200	0.0023	11.7600	4349	3869	13	

Uses Residential Appliance Saturation Survey (RASS, 2009) detailed energy use

Ability to add new technologies

NEW TECHNOLOGY PARAMETERS

CAUTION: Default appliance parameters may not be appropriate for most scenarios. For the most accurate results, South Coast AQMD recommends using actual values for the appliances that are being replaced or retrofit. Note that units of UEC vary based on fuel.

#	Fuel	Technology	Hourly Profile	UEC	NOX EF	CO2e EF	Unit Cost	Install Cost	Lifetime	Notes
18	NatGas	High-Efficiency Condensing	Water Heating	155	0.0023	11.7600	1000	1900	13	Values not specified
19	Electric	Heat Pump	Water Heating	1105	0	0	1500	1700	13	Values not specified
20	Electric	Standard Tank	Water Heating	-9999	-9999	-9999	-9999	-9999	-9999	Values not specified
21	Electric	Point-of-Use Tankless System	Water Heating	2923	0	0	850	3400	13	Values not specified
22	NatGas	Heat Pump	Water Heating	-9999	-9999	-9999	-9999	-9999	-9999	Values not specified
23	Undefined	New Technology	Undefined	-9999	-9999	-9999	-9999	-9999	-9999	Values not specified

Replace Technology Tool

(All households with the baseline technology will switch to the replacement tech.)

Select baseline technology to phase-out:
C NatGas Conventional Water Heater

Select new technology to replace baseline technology in "scenario":
18 NatGas High-Efficiency Condensing

View Profile Definitions Add Technology Save List of New Technologies to File



Net Emissions Analysis Tool (NEAT) Inputs

Residential Net Emissions Analysis Tool version 1.11 Beta

File Capture Screen Help

Demand Demand Input Summary Power Supply Economics Computation Results

Methane Emissions from Natural Gas

Natural Gas Leak Rates (As percentage of usage)

- 2018 EPA GHG Emissions Inventory: 1.27%
- The 16 Study Series Synthesis Report: 1.7%
- Alvarez et al., 2018 Science Paper: 2.3%
- Custom Value

Before Meter Leak Rate [%] Before Meter Transmission/Storage/Distribution Leak Rate [%]

Behind Meter Leak Rate [%] Heat Content [Btu/ft³]

Global Warm. Potential

Electricity Generation from Grid

Emission Factor of INCREASED Electricity Use

- All additional electricity from centralized photovoltaics, wind, and centralized battery storage (Case 1)
- All additional electricity provided at the Basin-average dispatchable power emission factor (Case 2)
- All additional electricity provided by peaker plants (Case 3)
- Grid emission factor changes modeled with HIGRID
- Additional electricity provided by a mixture of technologies

[%] Case 1 [%] Case 2 [%] Case 3

Emission Factor of REDUCED Electricity Use

- Reductions in electricity generation emissions determined with the Basin-average dispatchable power emission factor
- Reductions in electricity generation emissions arise by curtailing peaker plant emissions
- Grid emission factor changes modeled with HIGRID

Test HIGRID

GHG Emis. from Increased Natural Gas Production

(For Advanced Users)

Type	Pathway	Supply Fraction	CO2e Emis. (lb/therm)
bio	landfill	0	-0.8604
bio	wastewater	0	-7.2321
bio	manure	0	-73.1118
bio	food & green waste	0	-17.0455
fossil	natural gas	1	6.8368

Well-to-Pump Emis. of Transportation

(For Advanced Users)

Fuel	CO2e (lb/gal)	NOx (lb/gal)
Gasoline	6.3030	0.0117
Diesel	7.2201	0.0152

Transmission and Distribution Loss in Power Grid

(For Advanced Users)

- Use Flat Loss Percentage for all Utilities Loss [%]
- Use Hourly Loss Percentage for all Utilities
- Use Utility Specific Loss Percentages

Utility Name	Valid Years	Loss [%]
Azusa Light & Power	9	2.5000
Bear Valley Electric Service	9	12.2000
Burbank Water & Power	10	3.5000
City of Anaheim Public Utilities Department	10	4.9000

Distributed Solar Photovoltaics

Implement Rooftop Solar PV using PVWatts

For Advanced Users

Solar Cost Function: COST = where "X" is defined as the panel size in kW DC under standard test conditions.

Module Type Rooftop Area Availability Ratio

System Loss Value Useful Lifespan [yrs]

Inverter Efficiency [%] Panel Tilt [degrees]

DC to AC Size Ratio

Residential Battery Storage

Implement Residential Battery using Battery Model

For Advanced Users

Battery System	Battery Capacity [kW-hr]	Installation Cost \$	Lifetime [years]
Tesla NMC	6.2	1400	10
Battery Setup B			
Battery Setup C	9.5	6200	

Battery Power [kW] Battery Cost \$



Net Emissions Analysis Tool (NEAT) Inputs

Residential Net Emissions Analysis Tool version 1.11 Beta

File Capture Screen Help

Demand Demand Input Summary Power Supply Economics Computation Results

Methane Emissions from Natural Gas

Natural Gas Leak Rates (As percentage of usage)

- 2018 EPA GHG Emissions Inventory: 1.27%
- The 16 Study Series Synthesis Report: 1.7%
- Alvarez et al., 2018 Science Paper: 2.3%
- Custom Value

Before Meter Leak Rate [%]

Behind Meter Leak Rate [%]

Global Warm. Potential Heat Content [Btu/ft³]

Before Meter Transmission/Storage/Distribution Leak Rate [%]

Electricity Generation from Grid

Emission Factor of INCREASED Electricity Use

- All additional electricity from centralized photovoltaics, wind, and centralized battery storage (Case 1)
- All additional electricity provided at the Basin-average dispatchable power emission factor (Case 2)
- All additional electricity provided by peaker plants (Case 3)

Emission Factor of REDUCED Electricity Use

- Reductions in electricity generation emissions determined with the Basin-average dispatchable power emission factor
- Reductions in electricity generation emissions arise by curtailing peaker plant emissions
- Grid emission factor changes modeled with HiGRID

bio	wastewater	0	-7.2321
bio	manure	0	-73.1118
bio	food & green waste	0	-17.0455
fossil	natural gas	1	6.8368

"Supply Fraction" column must sum to unity

Reset to Default More Information

(For Advanced Users)

Fuel	CO2e (lb/gal)	NOx (lb/gal)
Gasoline	6.3030	0.0117
Diesel	7.2201	0.0152

Reset to Default More Information

Transmission and Distribution Loss in Power Grid (For Advanced Users)

Loss [%]

- Use Flat Loss Percentage for all Utilities
- Use Hourly Loss Percentage for all Utilities
- Use Utility Specific Loss Percentages

Utility Name	Valid Years	Loss [%]
Azusa Light & Power	9	2.5000
Bear Valley Electric Service	9	12.2000
Burbank Water & Power	10	3.5000
City of Anaheim Public Utilities Department	10	4.9000

More Information

Distributed Solar Photovoltaics

Implement Rooftop Solar PV using PVWatts

Rooftop Solar PV Module Documentation

For Advanced Users

Equation: $COST = 2135 * X$ where "X" is defined as the panel size in kW DC under standard test conditions.

Reset to Default Test Function More Information

Module Type Rooftop Area Availability Ratio

System Loss Value Useful Lifespan [yrs]

Inverter Efficiency [%] Panel Tilt [degrees]

DC to AC Size Ratio

Reset to Default More Information

Residential Battery Storage

Implement Residential Battery using Battery Model

Residential Battery Module Documentation

For Advanced Users

Battery System	Tesla NMC	Battery Capacity [kW-hr]	6.2	Installation Cost \$	1400	Lifetime [years]	10
	Battery Setup B	Battery Power [kW]	9.5	Battery Cost \$	6200		
	Battery Setup C						

Reset to Default More Information

Flexibility in emission factors for NG transmission and RNG, vehicle emissions and electricity transmission losses

Rooftop Solar PV Installation



RETURN TO PREVIOUS ADVANCE TO NEXT

Net Emissions Analysis Tool (NEAT) Outputs

Residential Net Emissions Analysis Tool version 1.11 Beta

File Capture Screen Help

Demand Demand Input Summary Power Supply Economics Computation Results

Analyze Most Recent Results Analyze Saved Results

Select Cost Effectiveness Subset Cost Effectiveness Appliance Mix Apply Prescribed Funding Query Individual Homes

Select Cost Calculation Option: Change in total annual cost (purchase + installation + utility costs)

Stage-of-Life for Appliances Being Replaced: Appliances that are replaced are at the end of their life

Selection Criteria

- Select Homes Meeting NOx Criteria
- Select Homes Meeting CO2e Criteria
- Select Homes That Meet Both Criteria

Green regions are always cost effective. Yellow regions may be cost effective. Red regions are never cost effective. All values are per year

NOx Cost Effectiveness Selector

Scenario NOx Emissions - Baseline NOx Emissions [lb] ×10⁴

Scenario Cost - Baseline Cost [\$]

Minimum Selector [deg.] 180 Maximum Selector [deg.] 360

CO2e Cost Effectiveness Selector

Scenario CO2e Emissions - Baseline CO2e Emissions [lb] ×10⁴

Scenario Cost - Baseline Cost [\$]

Minimum Selector [deg.] 180 Maximum Selector [deg.] 360

# of Modified Homes Meeting Filter	# of Modified Homes in NOx Selector	# of Modified Homes in CO2e Selector	# of Modified Homes in Both Selectors
408334	359206	408334	359206

Update Table

409,427 homes meeting filter criteria above
7.3813% of the total homes in SoCAB meet filter criteria

More Information View CZ MAP ANALYZE

Previous computation loaded from . Press "ANALYZE" to see results.

RETURN TO PREVIOUS ADVANCE TO NEXT

Visual Outputs



So Air

Current Status of NEAT

- Released to Working Group members in December 2019 for beta-testing
- Stakeholders provided comments and identified potential bugs
 - Minor bug fixes have been incorporated as recently as Dec 2020
 - Major comments are related to the vintage of underlying data:
 - Appliance data from RASS 2009 and information on purchase and installation costs
 - Vehicle well-to-tank and tank-to-wheel emissions (EMFAC and GREET versions)
- Contract with UC Irvine finalized to provide an additional module (HiGRID) to model grid emissions with integration of high penetration of renewable electricity generation
 - This module will be incorporated in a future version
- Data and final reports from RASS 2019 is currently under review
 - Data will be reviewed and incorporated when available

