



2022 Onroad Mobile Emissions Updates

MJO-MOVES, March 21, 2024

2023 NEI Onroad

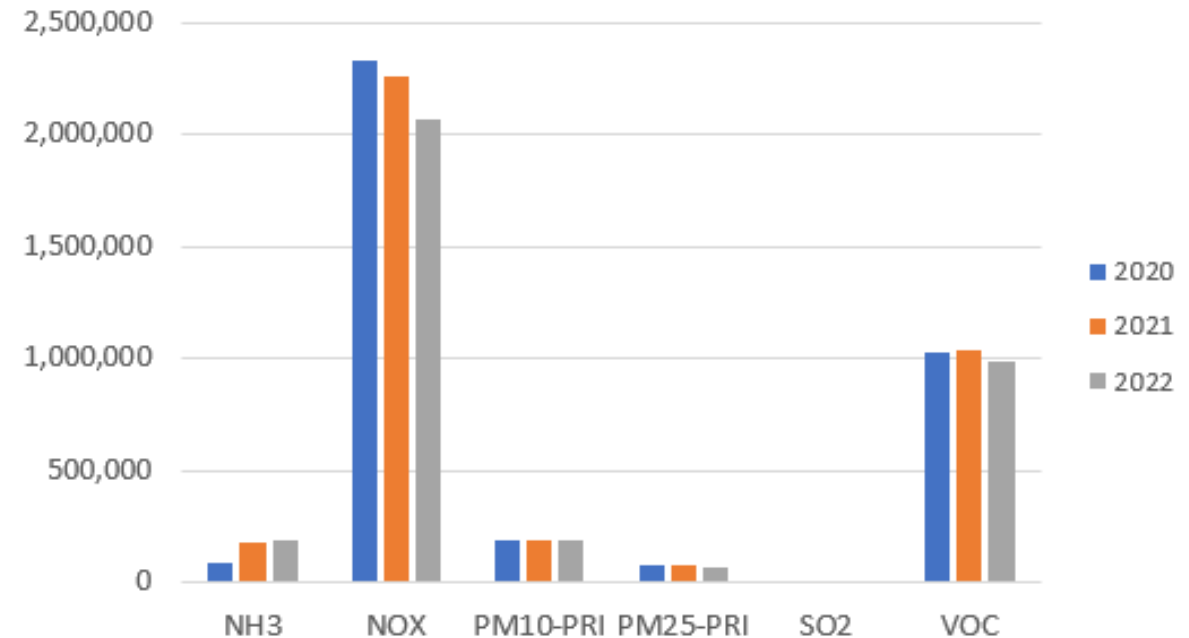
- Using MOVES4
- Working on initial CDBs to post for states
- Getting telematics data
- Getting new IHS registration data

Development of 2020-2022 Onroad Emissions

- 2020 NEI year (pandemic) used state-submitted + county-level FHWA VMT and MOVES3
- There were notable VMT differences between 2020 and 2021. Used MOVES4.
 - VMT was created by applying state-level projection factors from 2020->2021 to 2020 VMT
 - VPOP was held constant at 2020 levels
 - Ammonia increased with MOVES4
- 2022 VMT provided by 22 states and one county.
 - VMT was submitted by: AK, CT, CO, DE, GA, KS, MA, MI, MD, ME, NC, NH, NJ, NY, OR , SC, TN, TX, VA, WA, WI, WV, and Jefferson Co. KY
 - In states that did not submit, county-level 2022 VMT from FHWA was used
 - VPOP was mostly held constant with 2020 except where a few states provided it

CONUS Onroad Emissions from 2020-2022

Pollutant	2020	2021	2022
CO	14,061,703	14,391,846	13,339,732
NH3	89,328	183,954	185,081
NOX	2,327,083	2,258,178	2,072,074
PM10-PRI	188,706	188,833	189,501
PM25-PRI	78,614	74,375	70,557
SO2	9,785	8,748	8,752
VOC	1,030,366	1,039,569	982,937

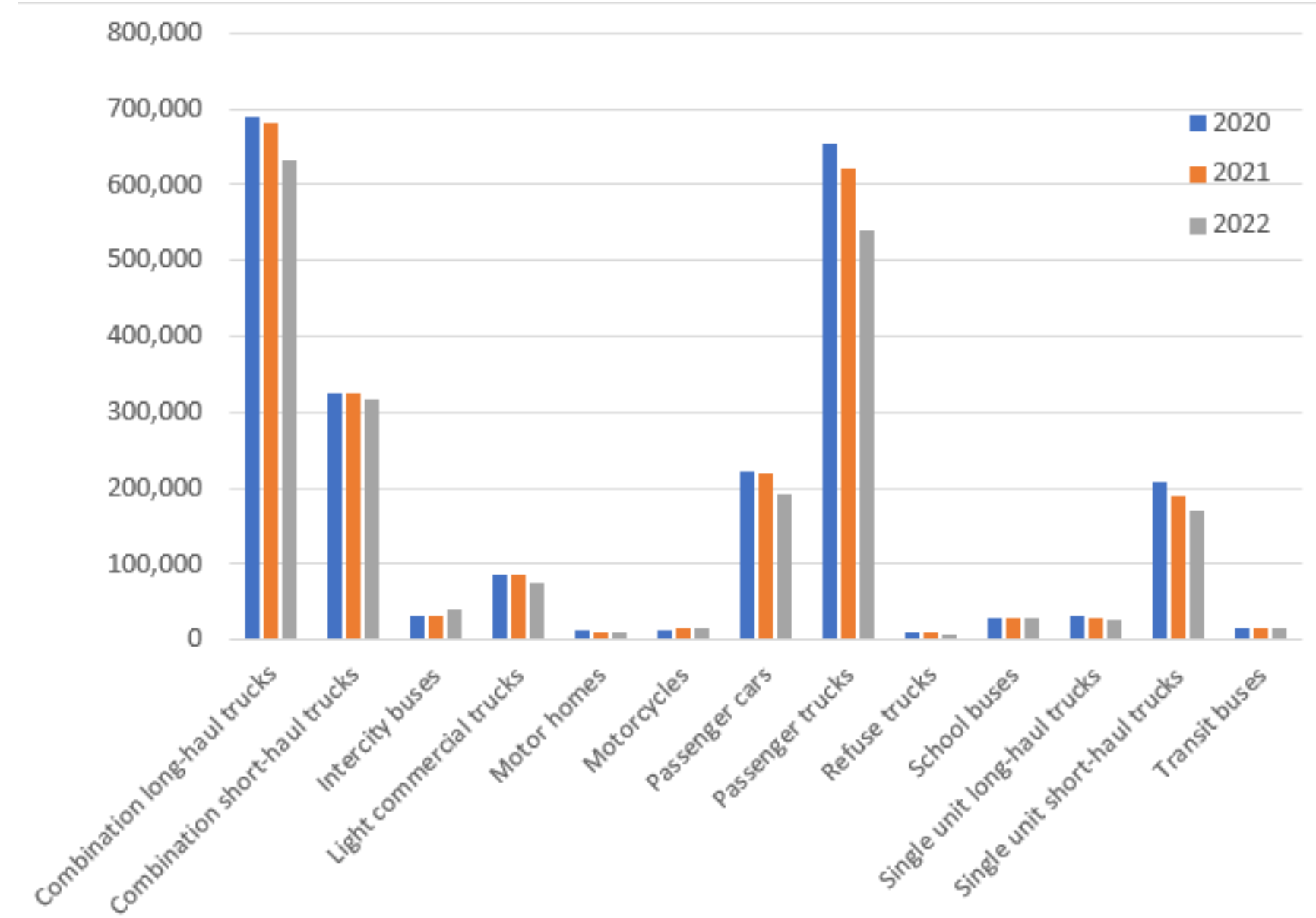


NH3 is higher in 2021 and 2022 due to use of MOVES4

NOx is continuing to drop from 2020 through 2022

VOC is lower in 2022 than in 2020 or 2021

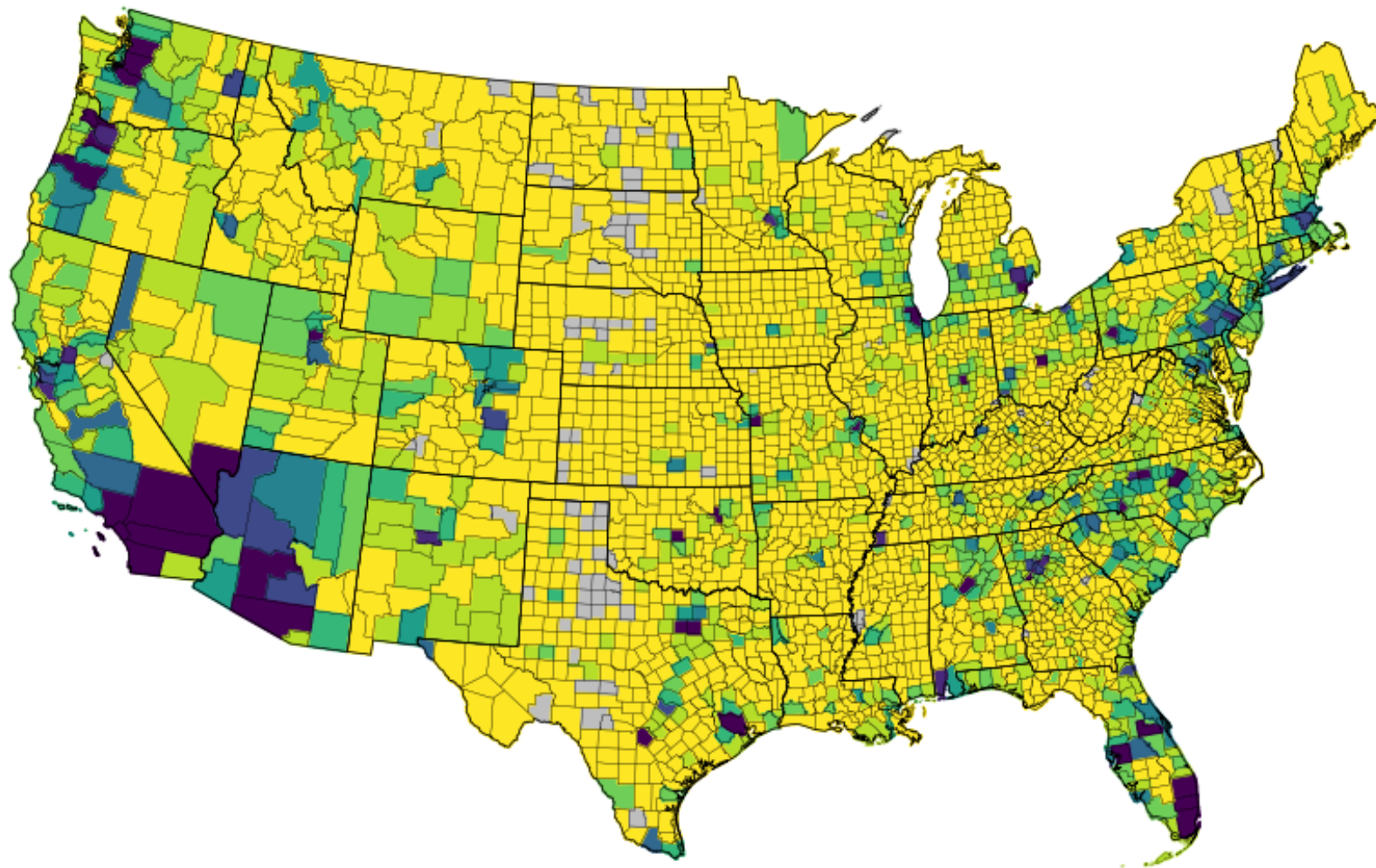
Onroad NOx Emissions by Source Type 2020-2022



Key sources types for NOx are Combination long and short-haul and passenger cars and trucks

Passenger truck NOx emissions are decreasing, as are combination long haul and single unit short haul

2022hc draft onroad NOX Light Duty



tons/yr

2033

1807

1581

1355

1129

903

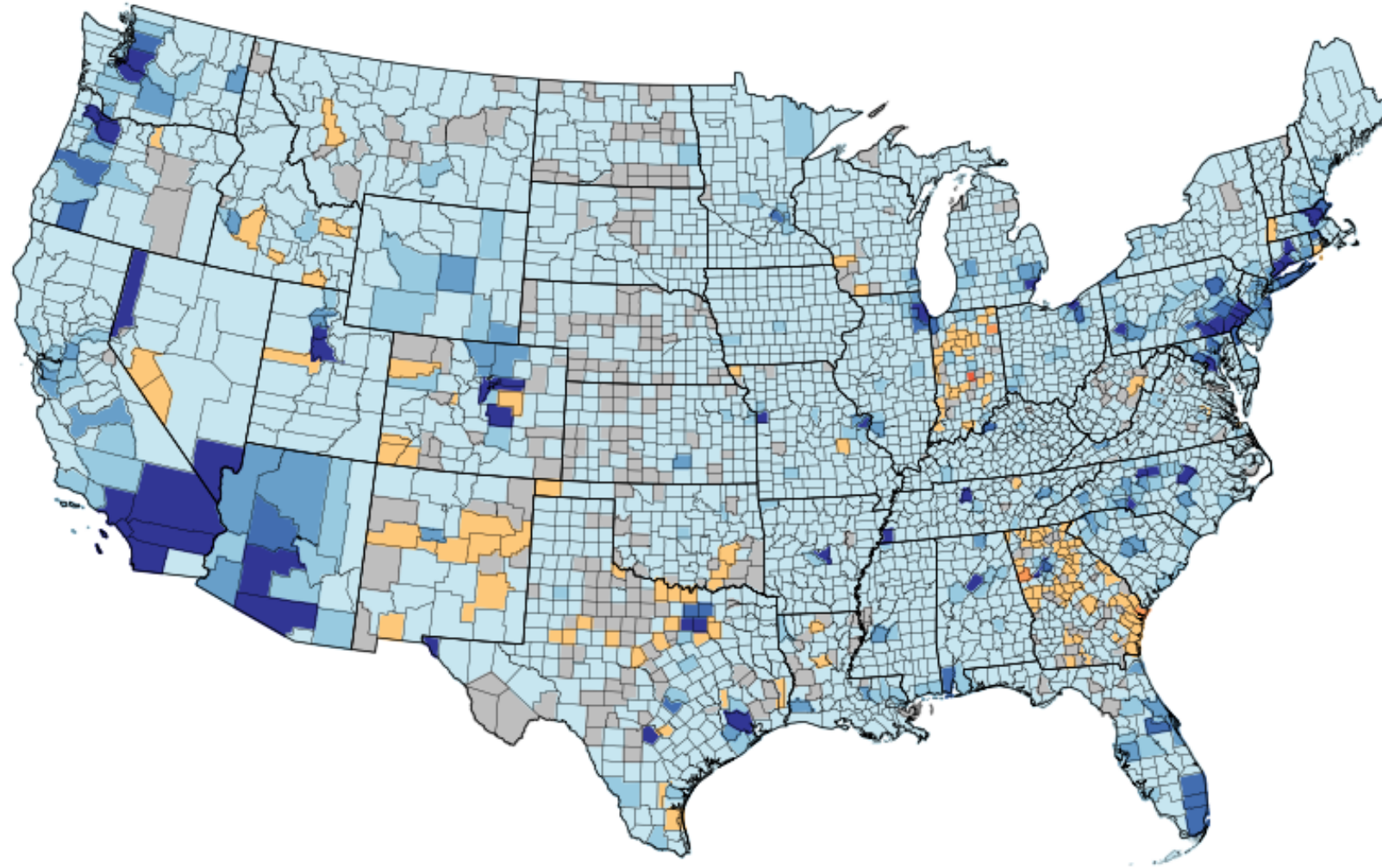
677

451

225

Max: 10630.858 Min: 5.4656634

2022hc draft onroad NOX Light Duty : minus 2021hb



tons/yr

301

226

150

75

0

-75

-150

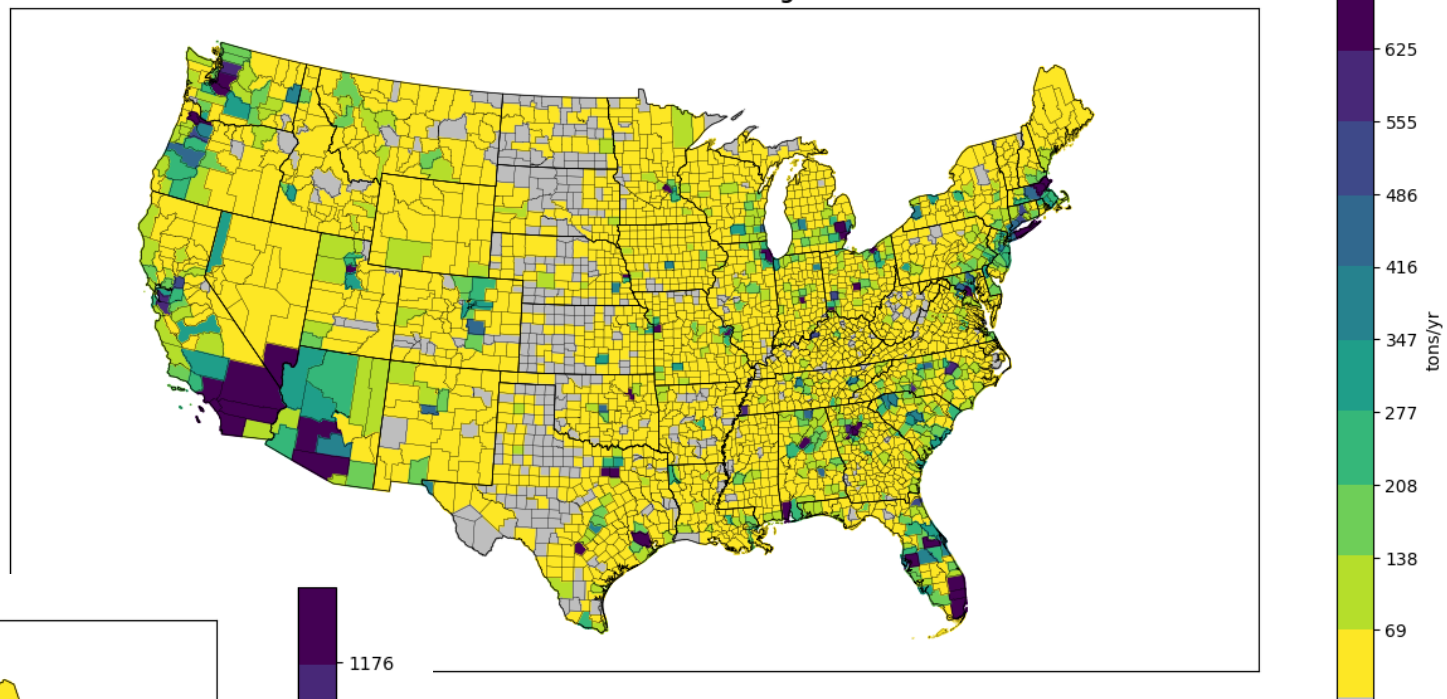
-226

-301

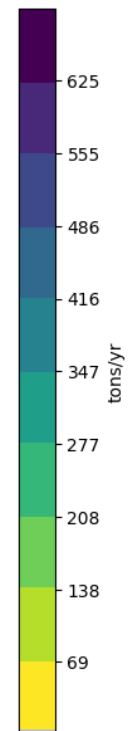
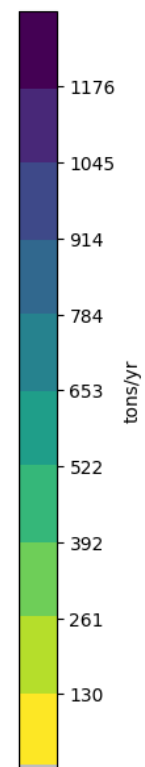
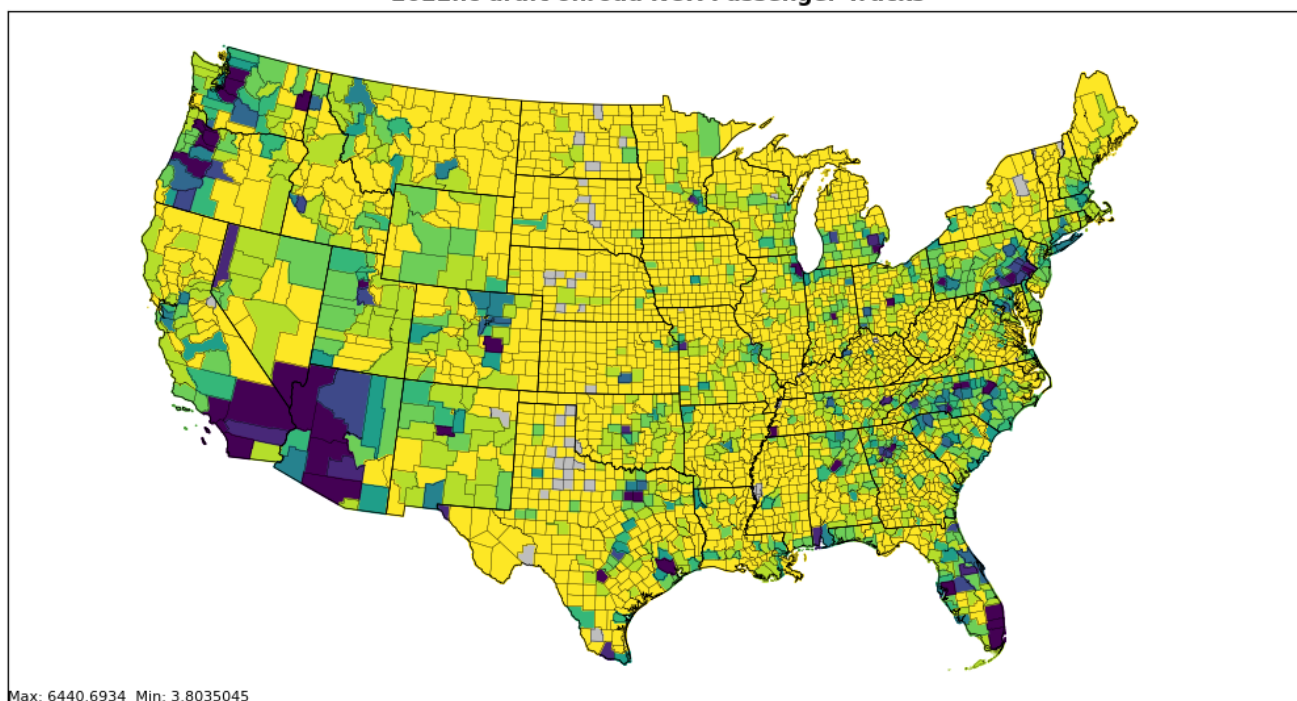
Max: 199.37675 Min: -3244.7656

Passenger trucks have more emissions and a somewhat different geographic distribution than cars

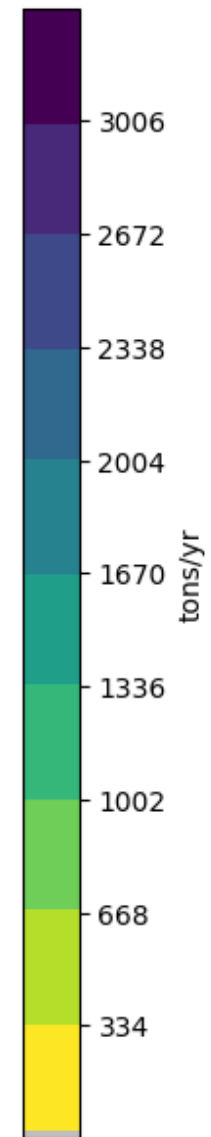
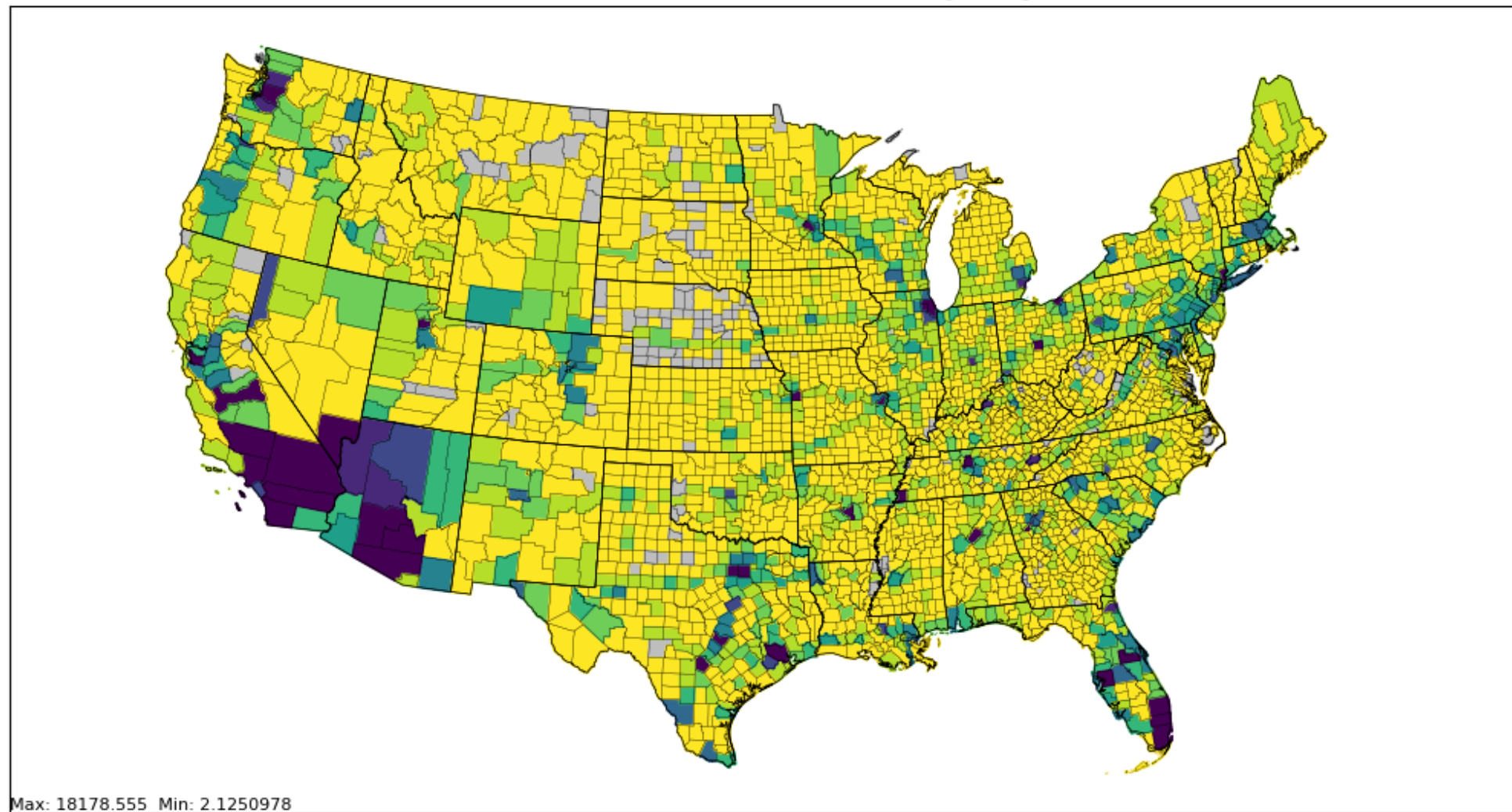
2022hc draft onroad NOX Passenger Cars



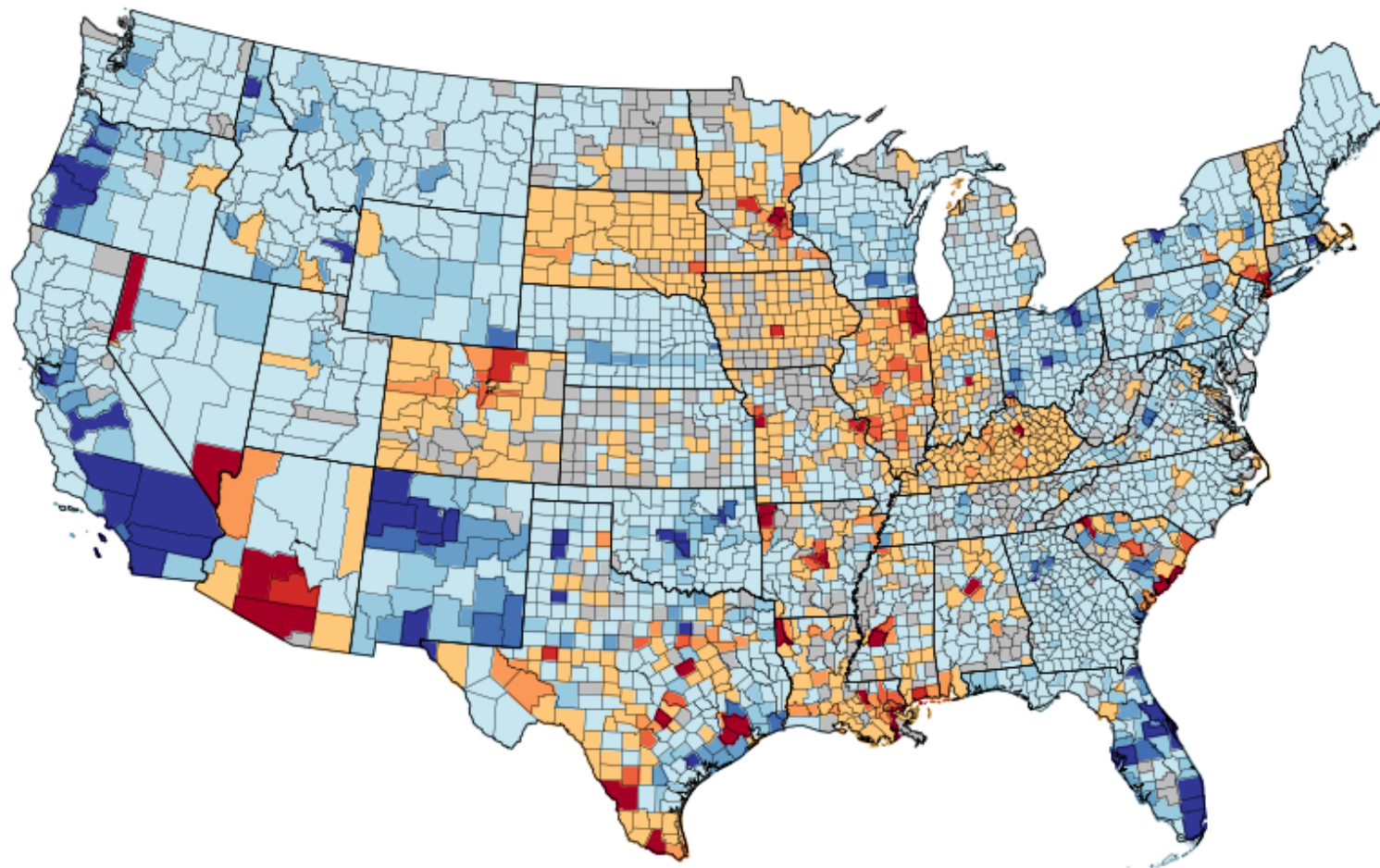
2022hc draft onroad NOX Passenger Trucks



2022hc draft onroad NOX Heavy Duty



2022hc draft onroad NOX Heavy Duty : minus 2021hb



tons/yr

457

342

228

114

0

-114

-228

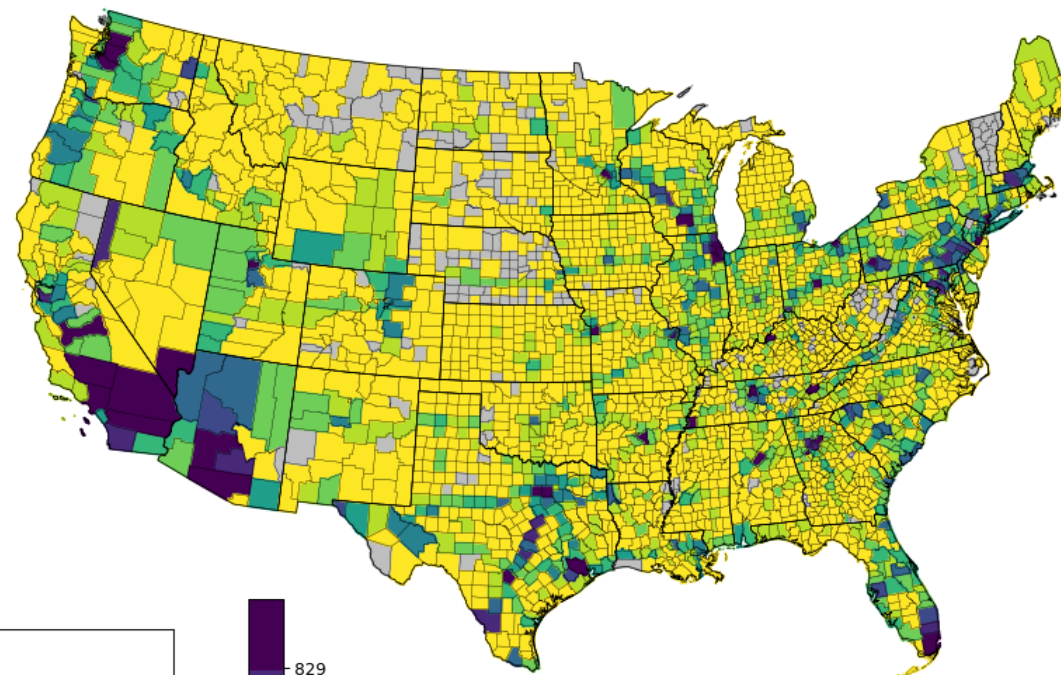
-342

-457

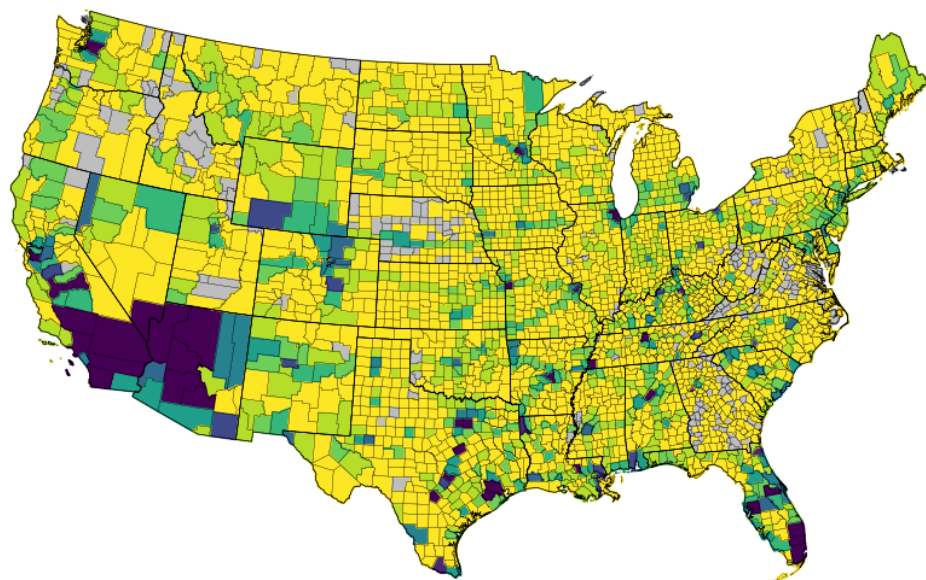
Max: 7330.3335 Min: -4817.948

Combination long-haul trucks have more emissions and a somewhat different geographic distribution than short-haul

2022hc draft onroad NOX Combination Long-Haul Trucks

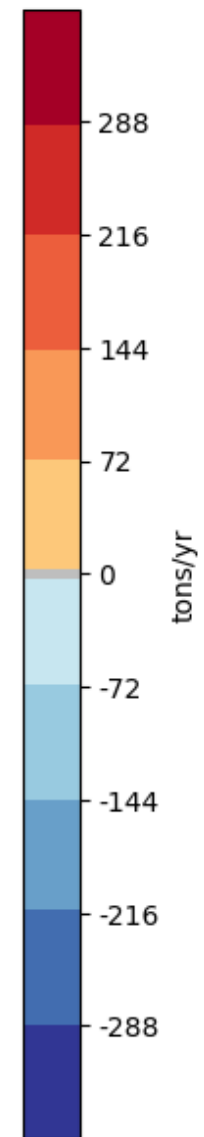
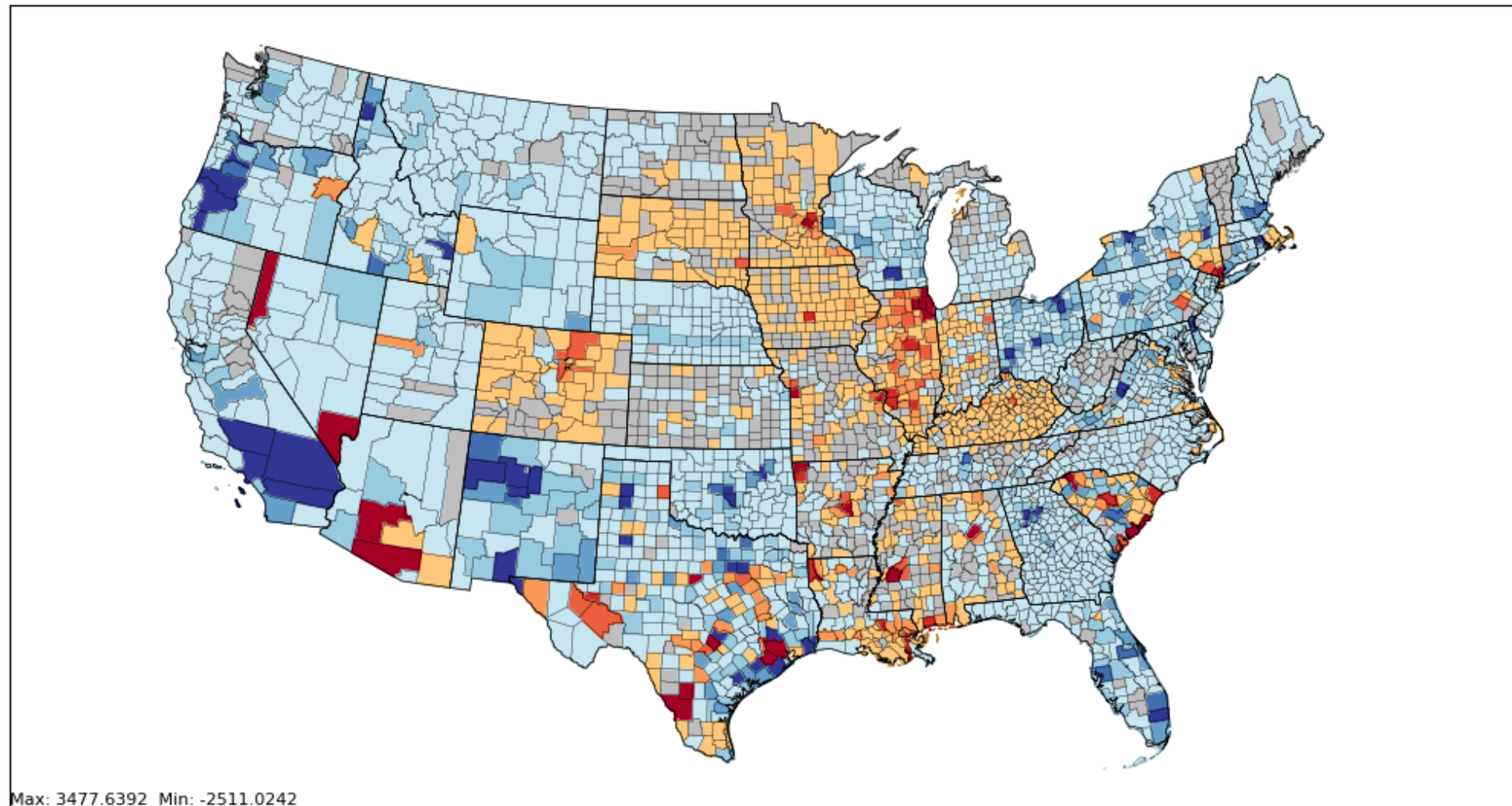


2022hc draft onroad NOX Combination Short-Haul Trucks

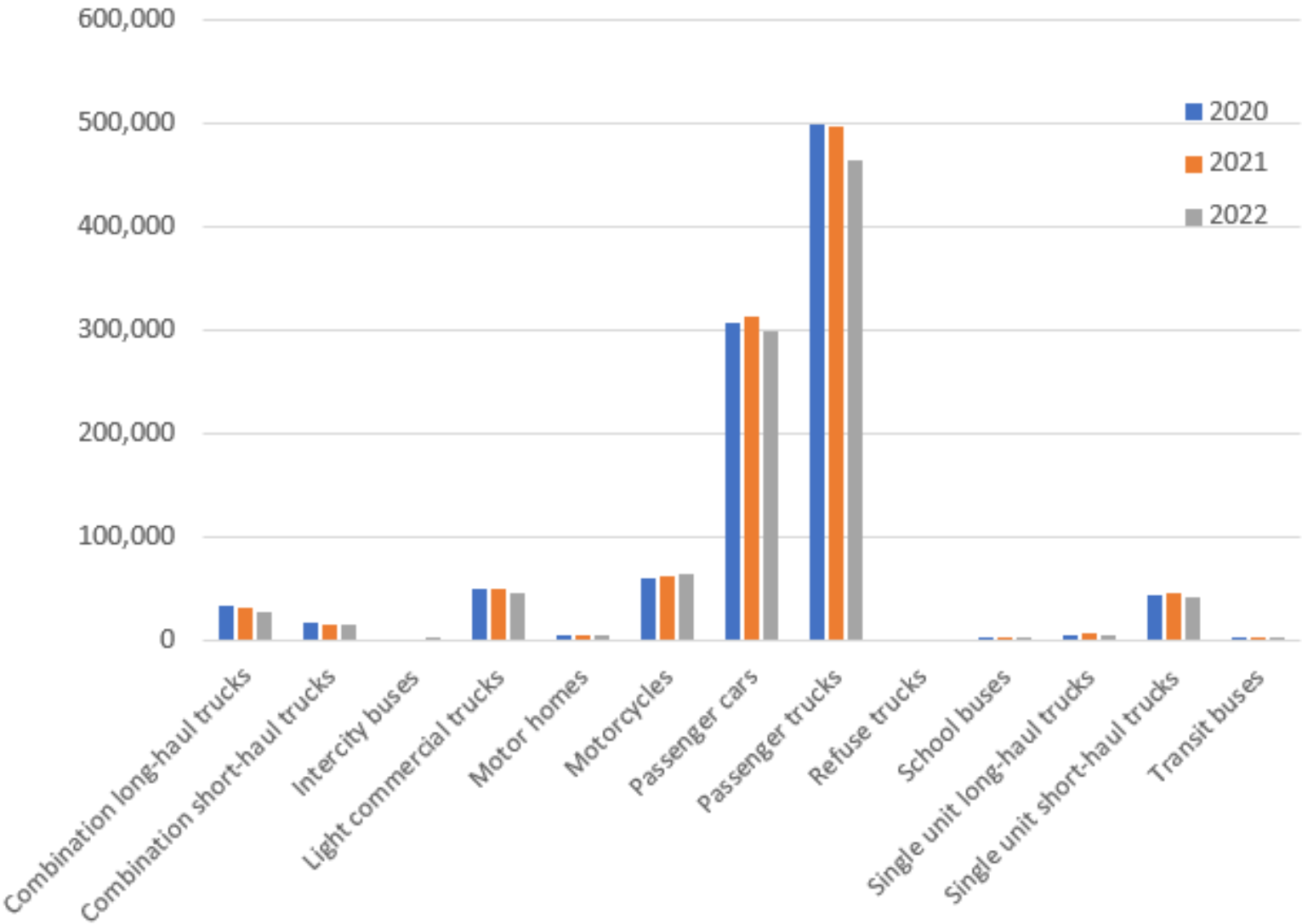


Max: 6037.8594 Min: 0.075398326

2022hc draft onroad NOX Combination Long-Haul Trucks : minus 2021hb

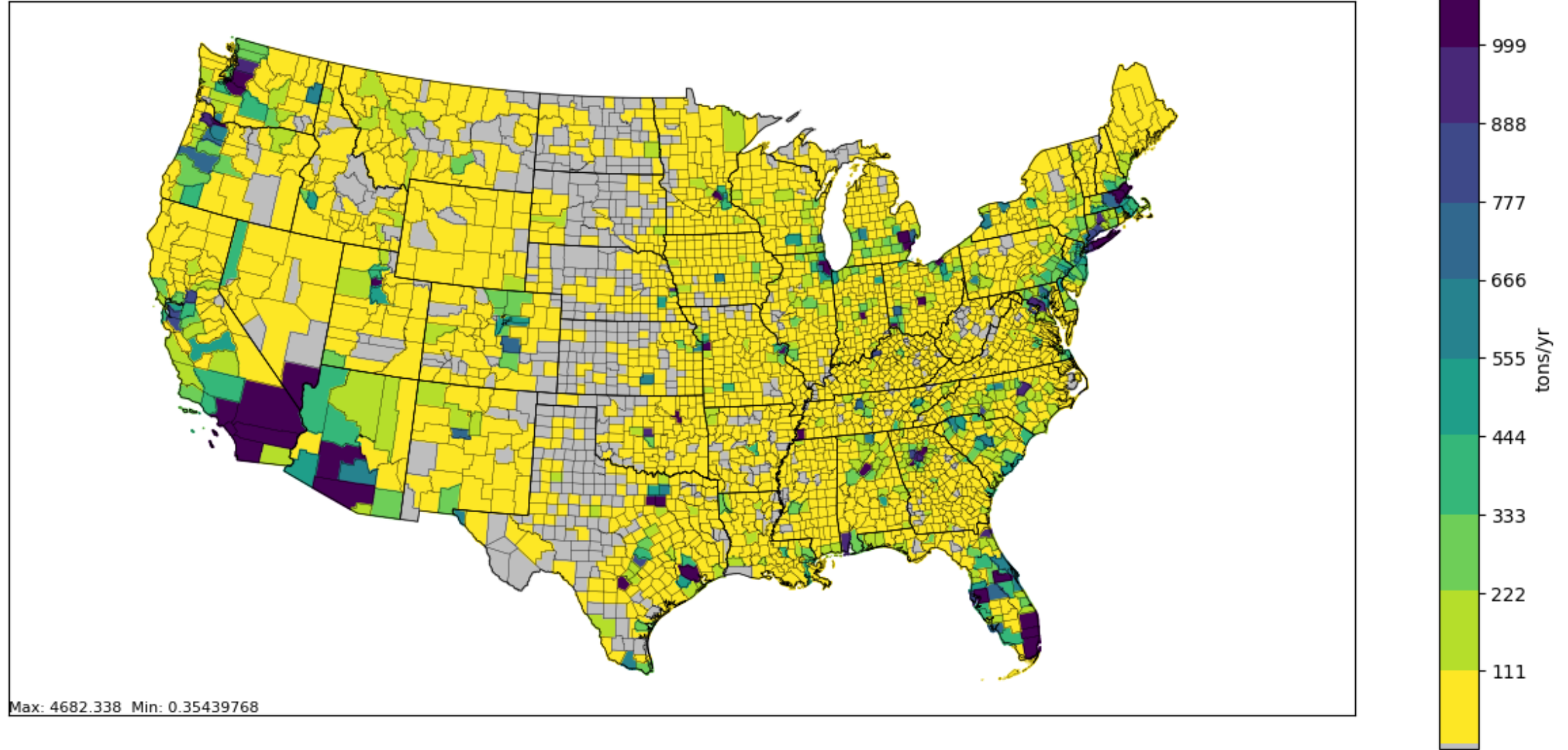


Onroad VOC Emissions by Source Type 2020-2022

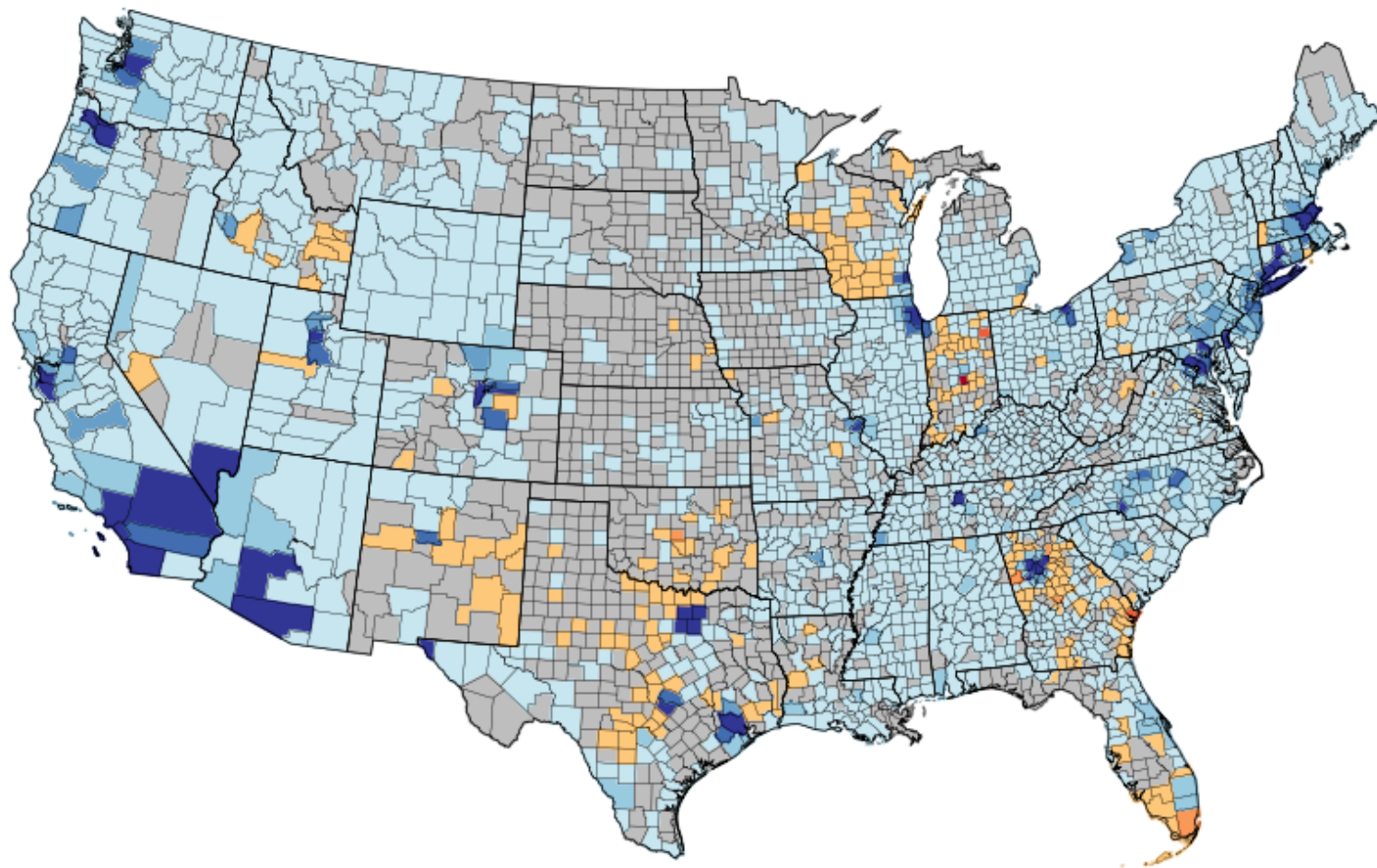


Passenger truck VOC emissions are decreasing, as are passenger car VOC emissions

2022hc draft onroad VOC Passenger Cars



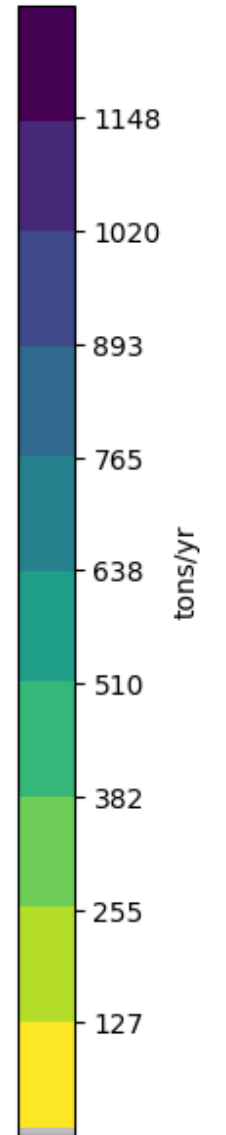
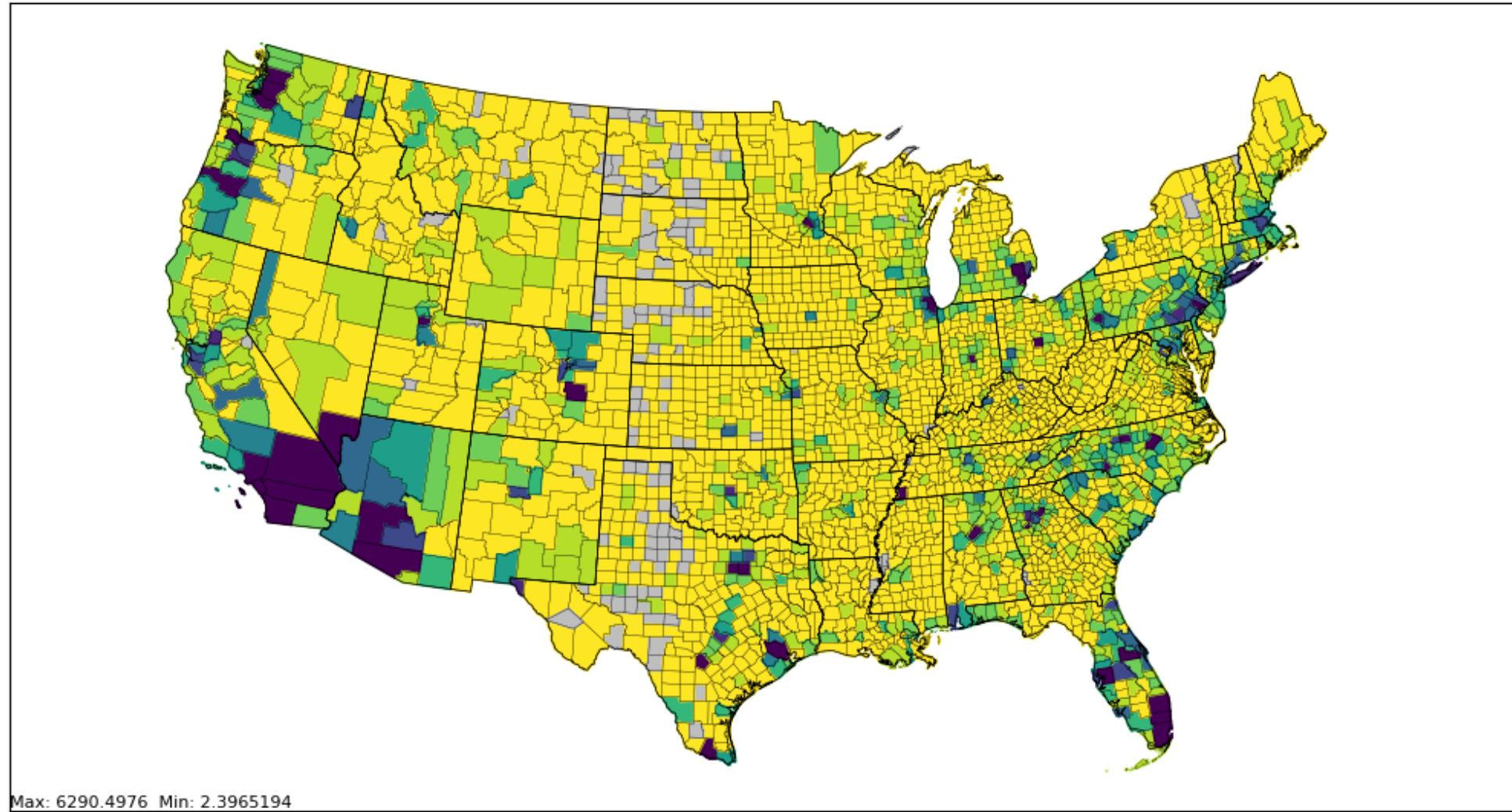
2022hc draft onroad VOC Passenger Cars : minus 2021hb



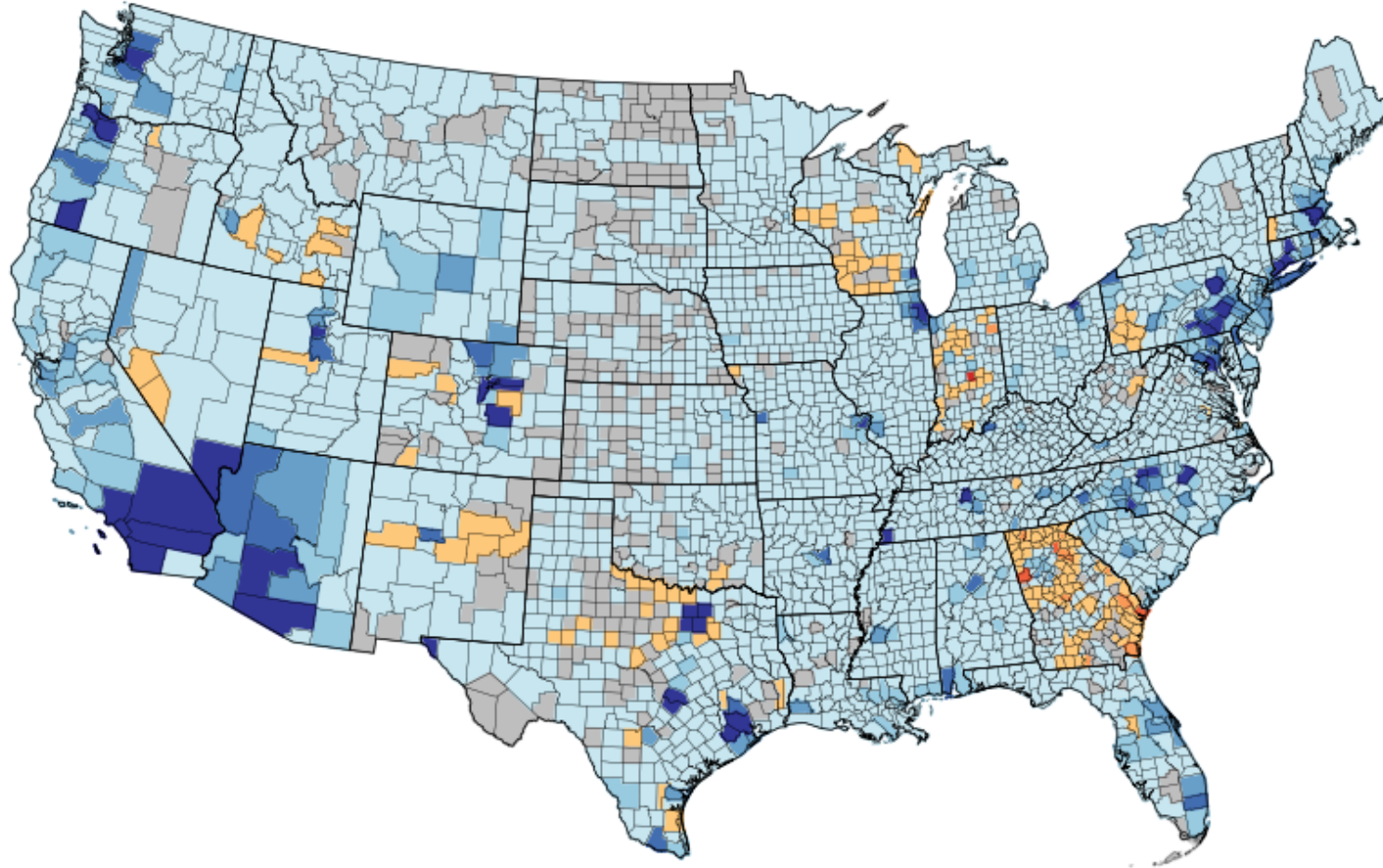
tons/yr

Max: 88.30492 Min: -487.90814

2022hc draft onroad VOC Passenger Trucks



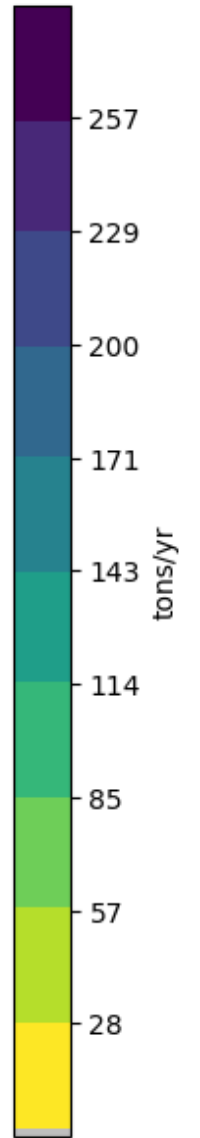
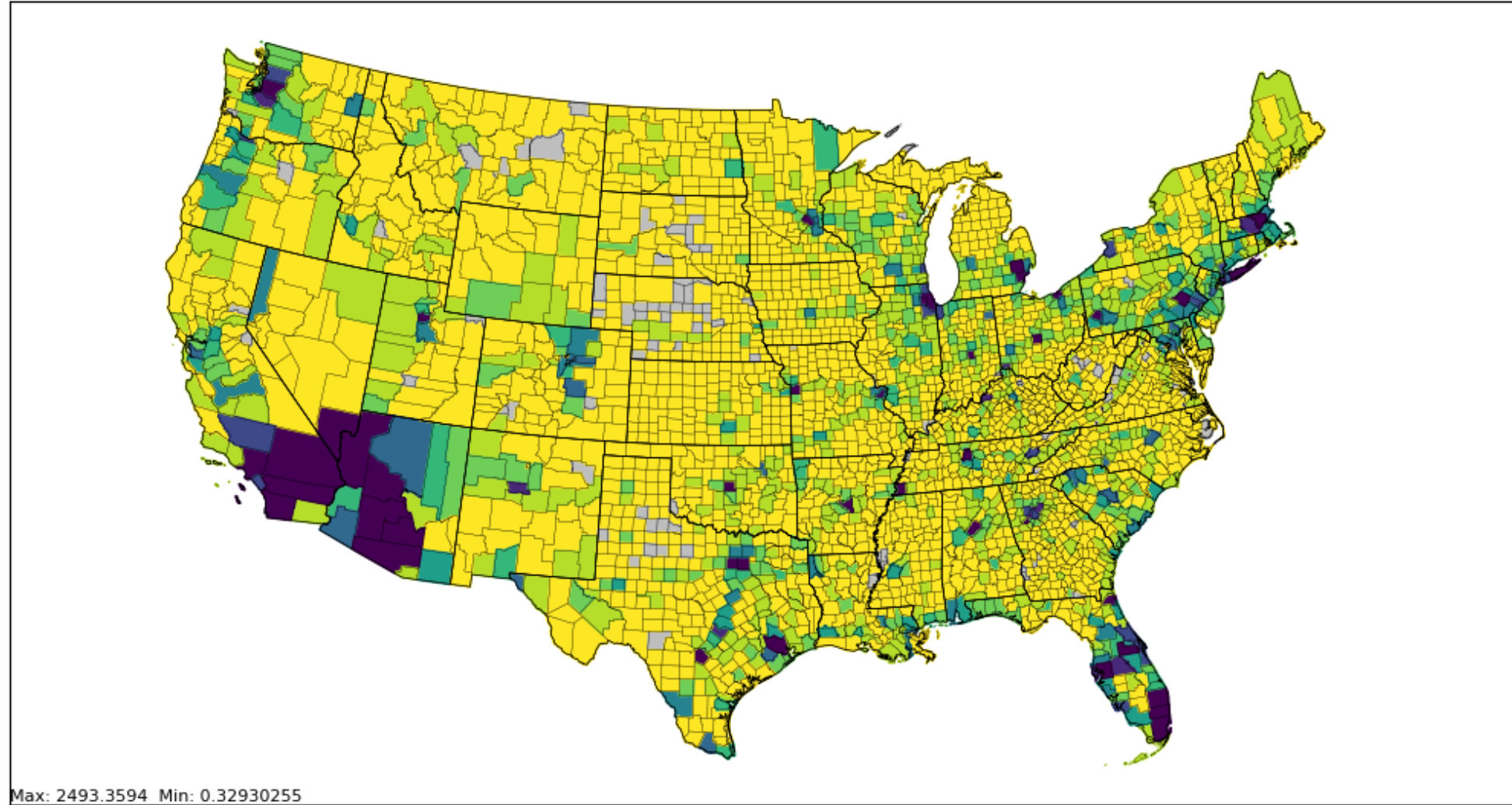
2022hc draft onroad VOC Passenger Trucks : minus 2021hb



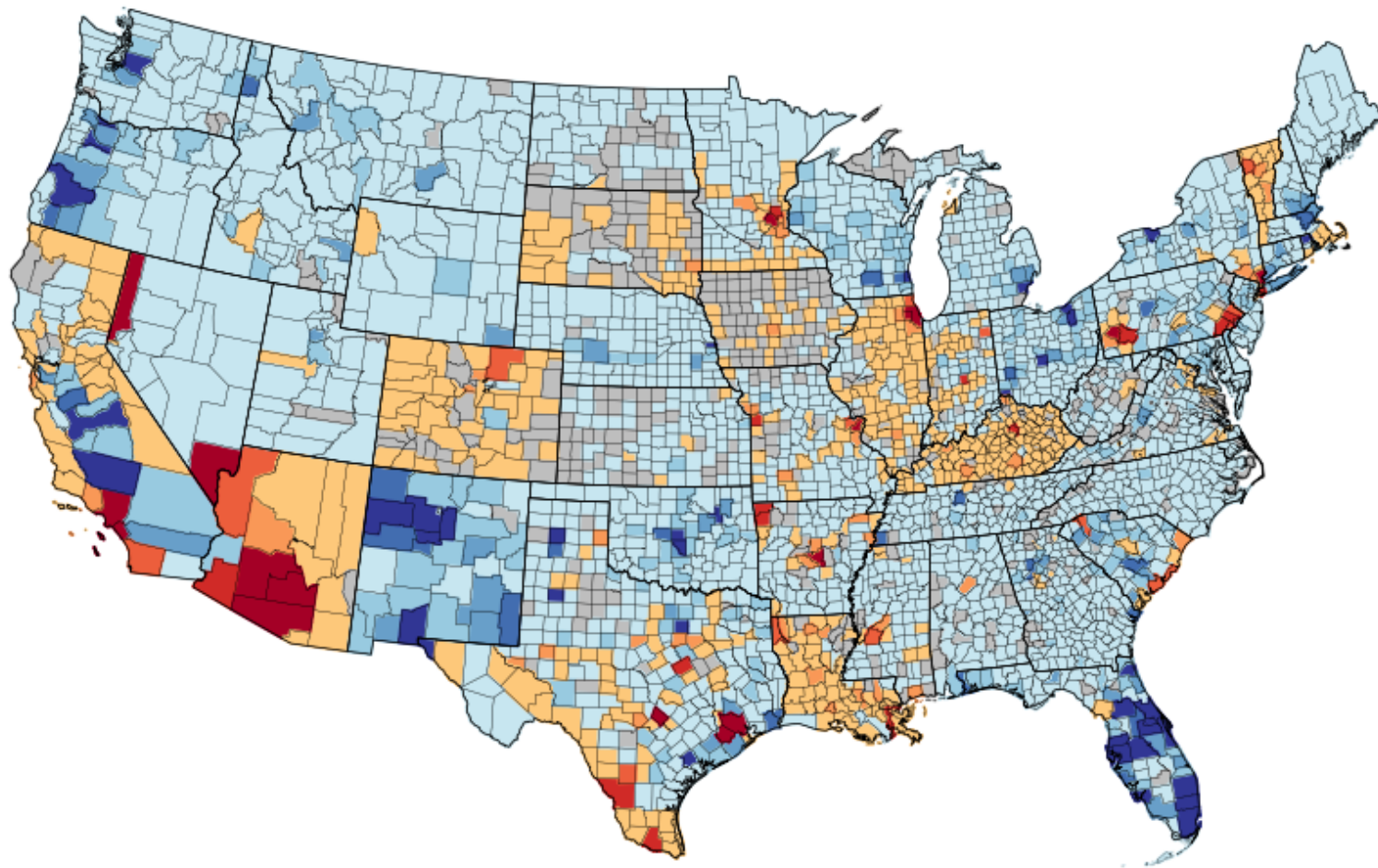
tons/yr

Max: 72.73274 Min: -1023.9999

2022hc draft onroad VOC Heavy Duty



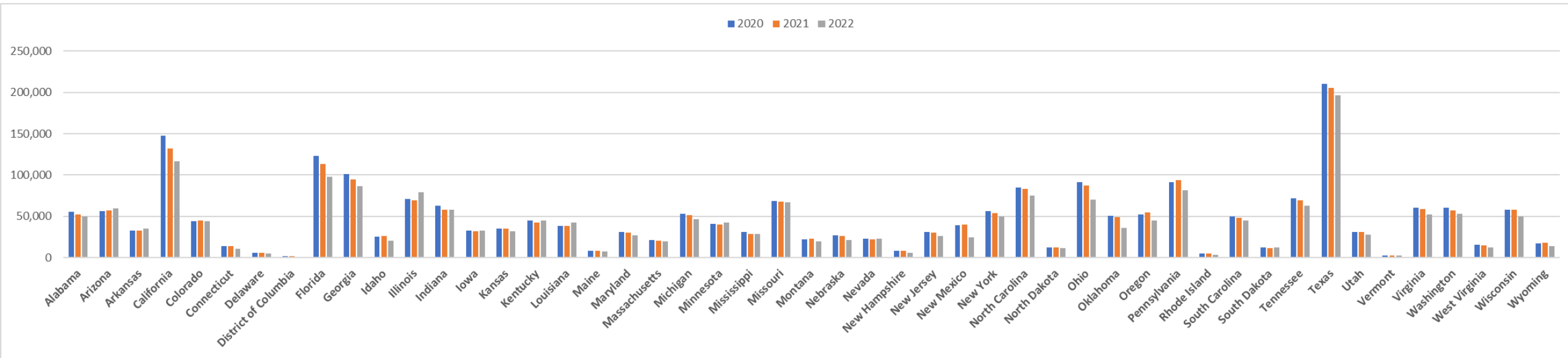
2022hc draft onroad VOC Heavy Duty : minus 2021hb



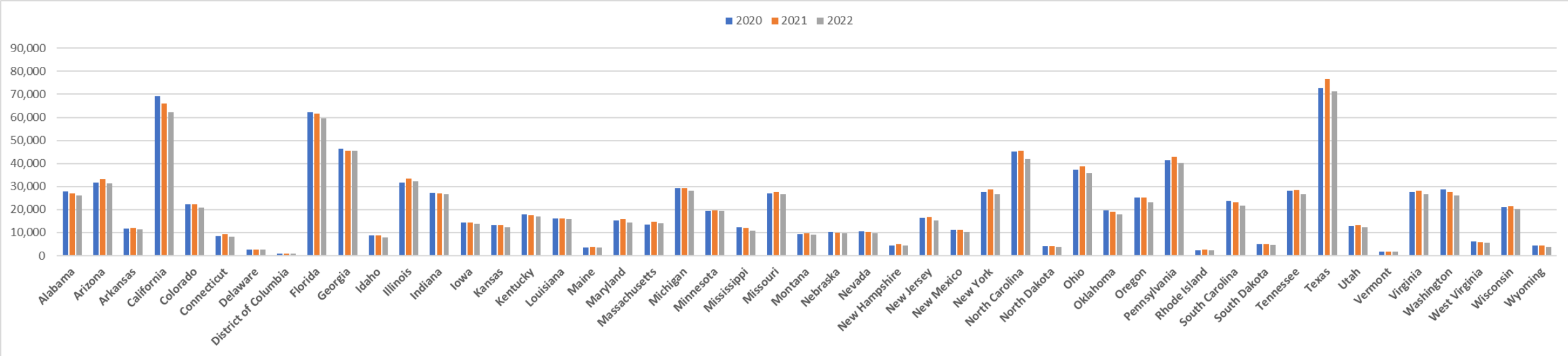
tons/yr

Max: 534.3516 Min: -249.7226

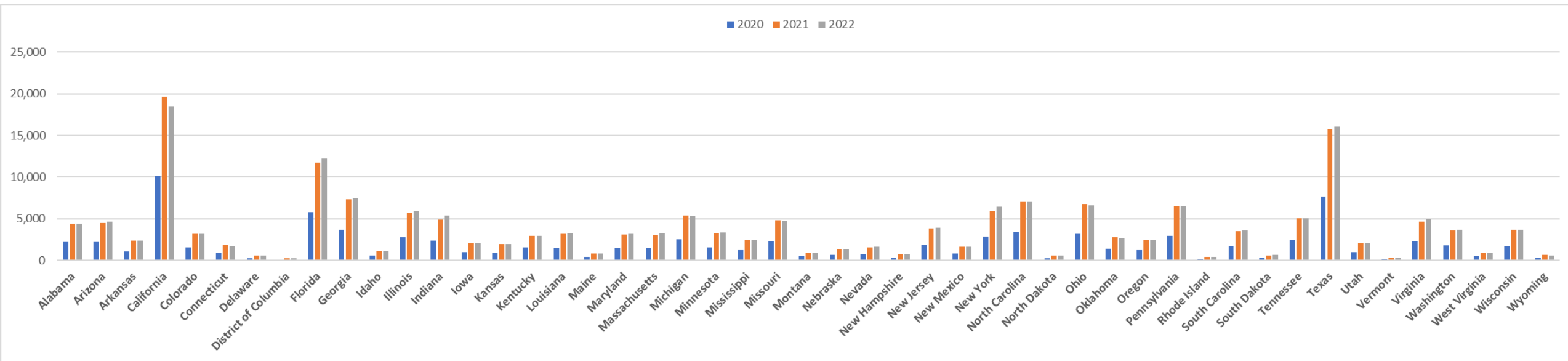
Onroad NOx by State (tpy)



Onroad VOC by State (tpy)



Onroad NH3 by State (tpy)



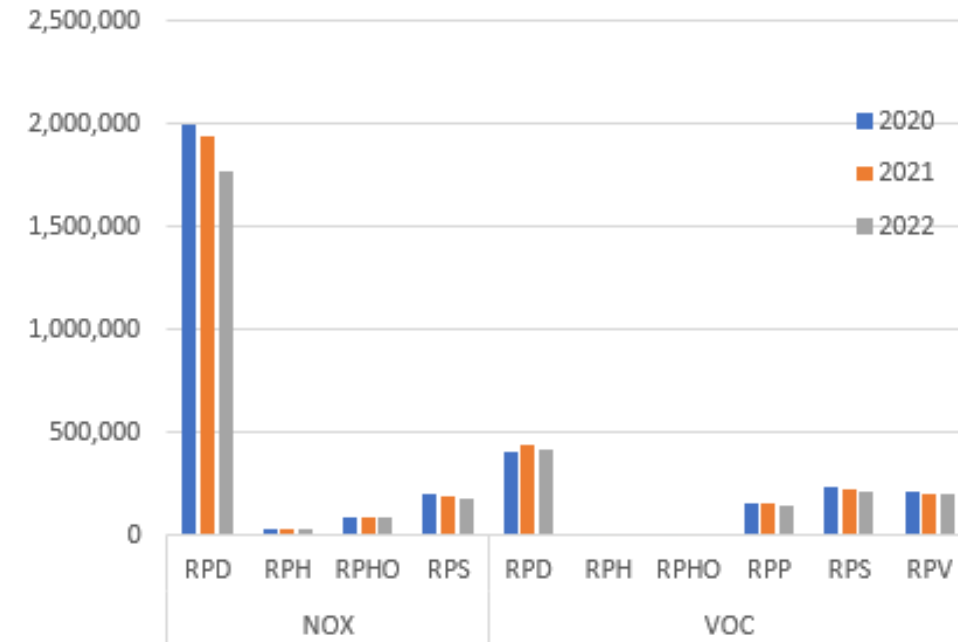
Notice the increased NH3 in 2021 and 2022 due to the use of MOVES4

MOVES4 Processes by Activity Type

- Rate-per-distance (RPD) [grams/mile]:
 - running exhaust, crankcase running exhaust, brake and tire wear
- Rate-per-vehicle (RPV) [grams/vehicle/hour]:
 - evaporative permeation, evaporative fuel leaks, refueling displacement vapor loss, refueling spillage loss
- Rate-per-profile (RPP) [grams/vehicle/hour]:
 - evaporative fuel vapor venting (due to changes in temperature over the day)
- Rate-per-hour (RPH) [grams/hour]:
 - extended idle exhaust, crankcase extended idle exhaust, auxiliary power exhaust
- Rate-per-start (RPS) [grams/start]:
 - start exhaust, crankcase start exhaust
- Rate-per-hour-off network idling (RPHO) [grams/hour]:
 - idling during pick-up and drop-off of passengers and idling during deliveries

Onroad emissions by “activity type”

<i>Poll and rate</i>	<i>2020</i>	<i>2021</i>	<i>2022</i>
NOX	2,327,083	2,258,178	2,072,074
RPD	1,996,035	1,935,937	1,764,588
RPH	35,389	35,560	34,862
RPHO	91,248	92,758	92,982
RPS	204,411	193,924	179,642
VOC	1,030,366	1,039,569	982,937
RPD	407,373	442,114	412,752
RPH	3,958	3,133	2,731
RPHO	12,850	12,065	10,805
RPP	156,698	154,615	142,409
RPS	238,275	226,795	217,322
RPV	211,213	200,846	196,919



RPD = on-roadway (VMT)

RPH = extended idling (hours)

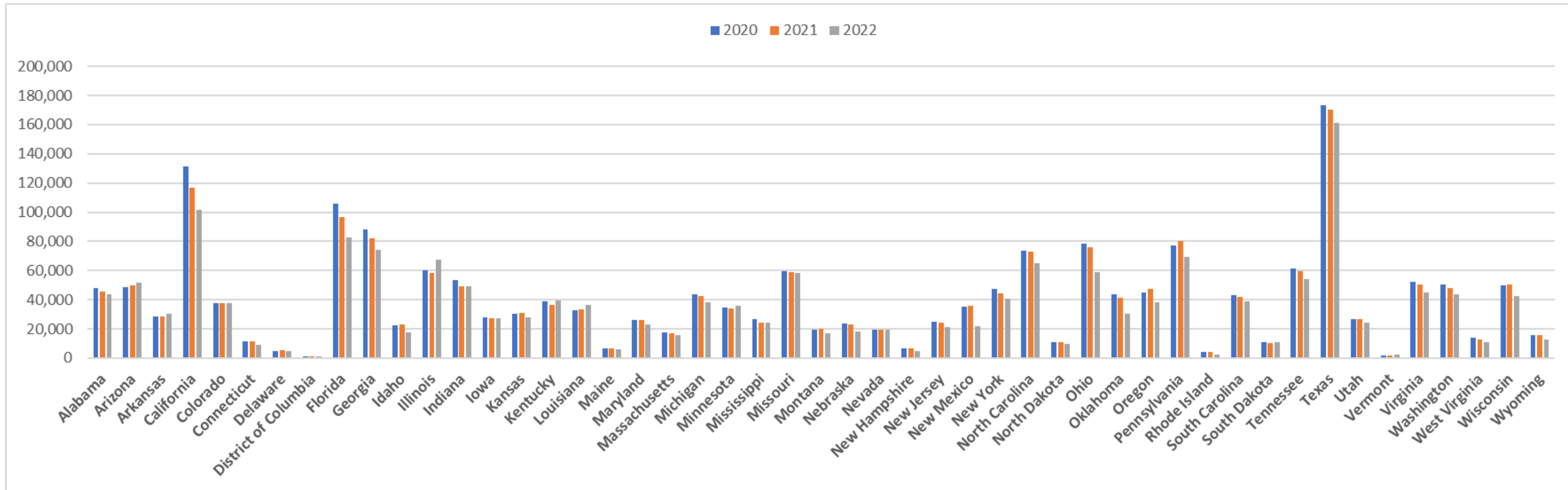
RPHO = off-network idling (hours)

RPS = start+crank case exhaust (starts)

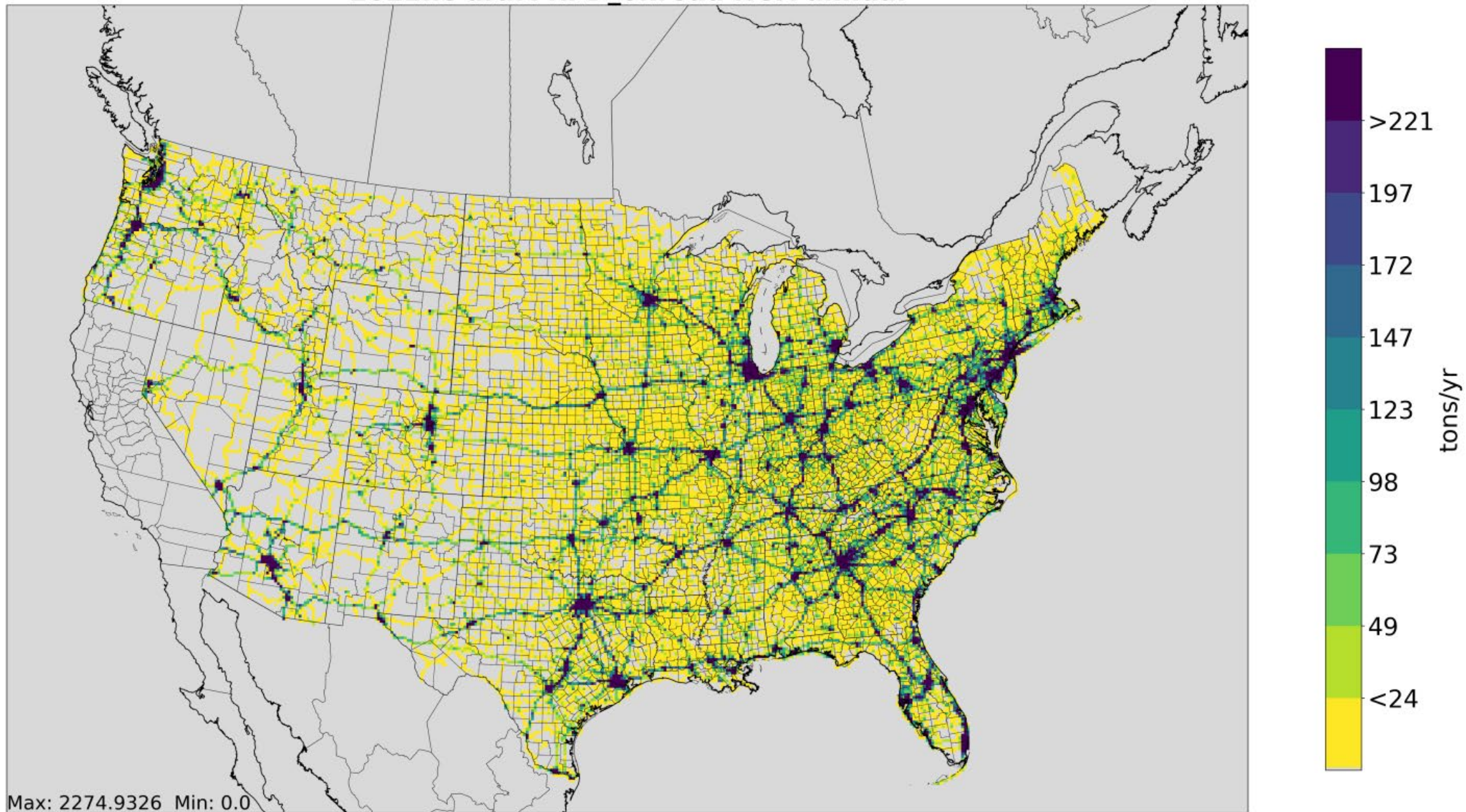
RPP = diurnal vapor losses (VPOP)

RPV = rate per vehicle (VPOP)

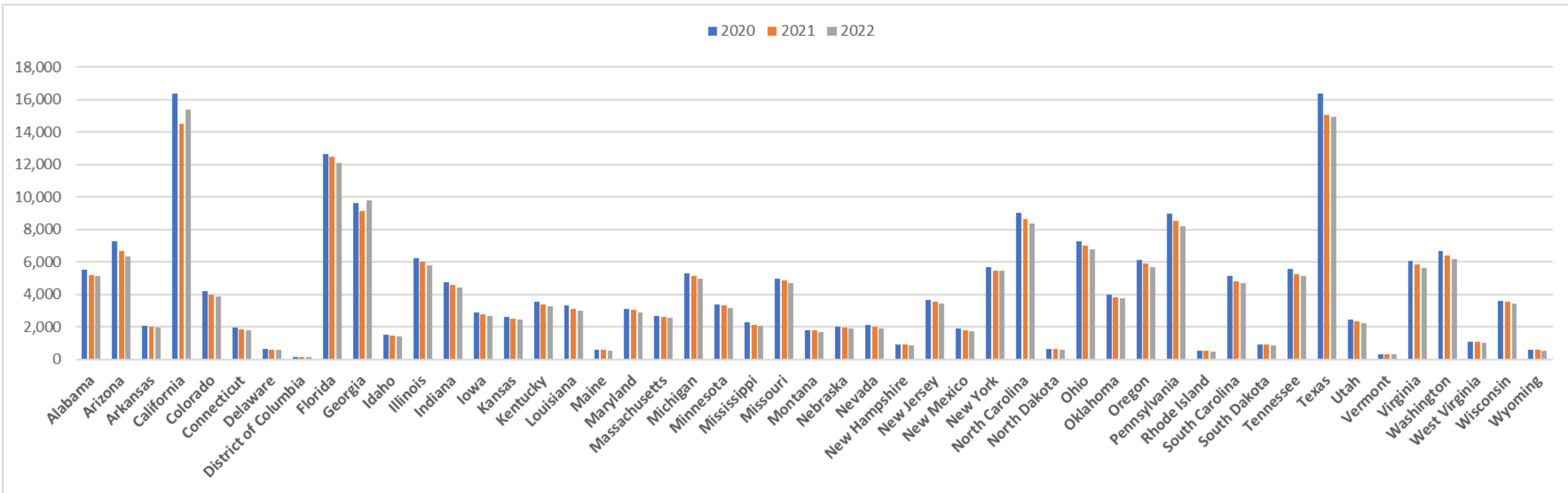
Onroad RPD (on-roadway) NOx (tpy)



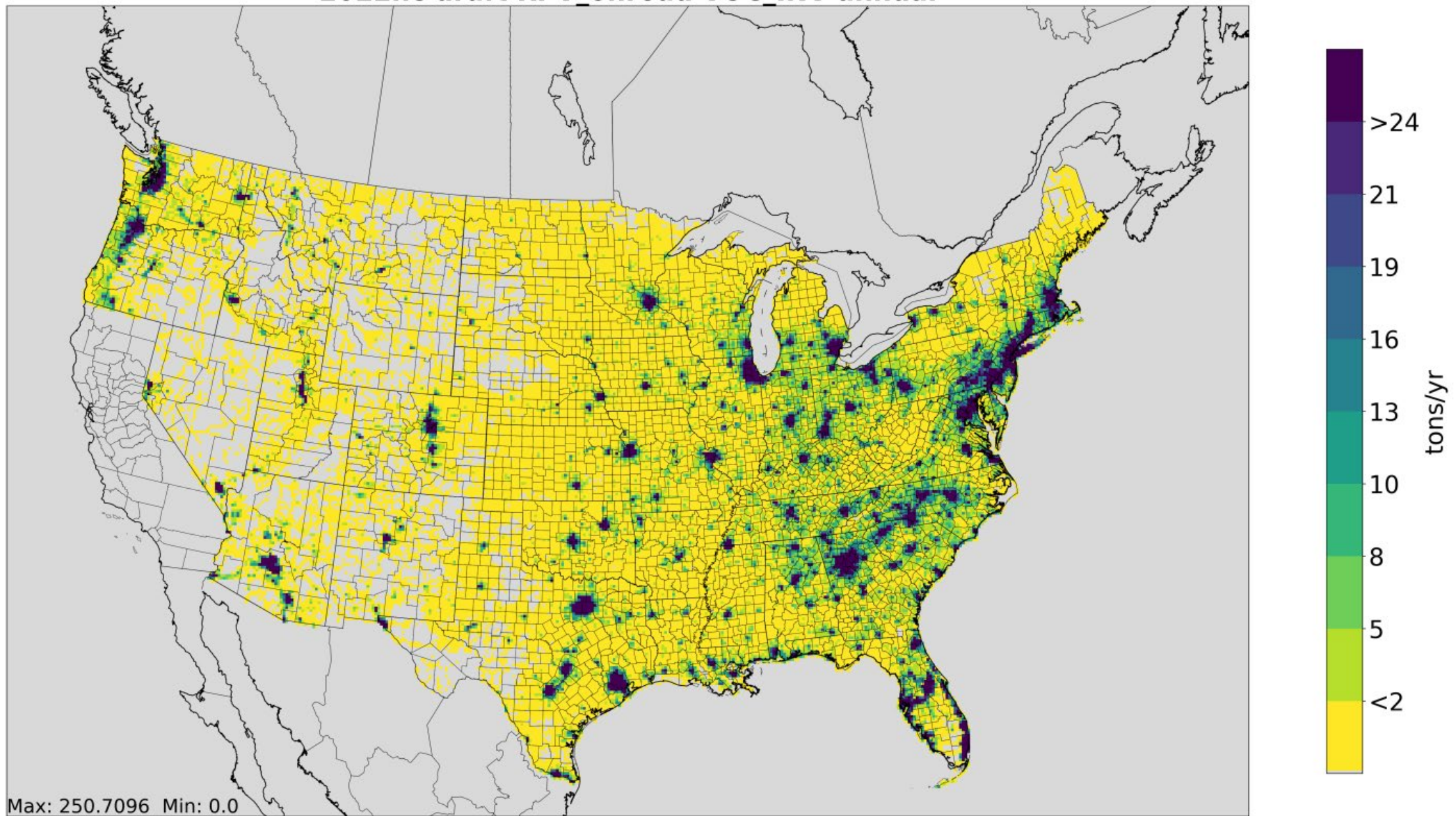
2022hc draft RPD_onroad NOX annual



Onroad RPV VOC (tpy)

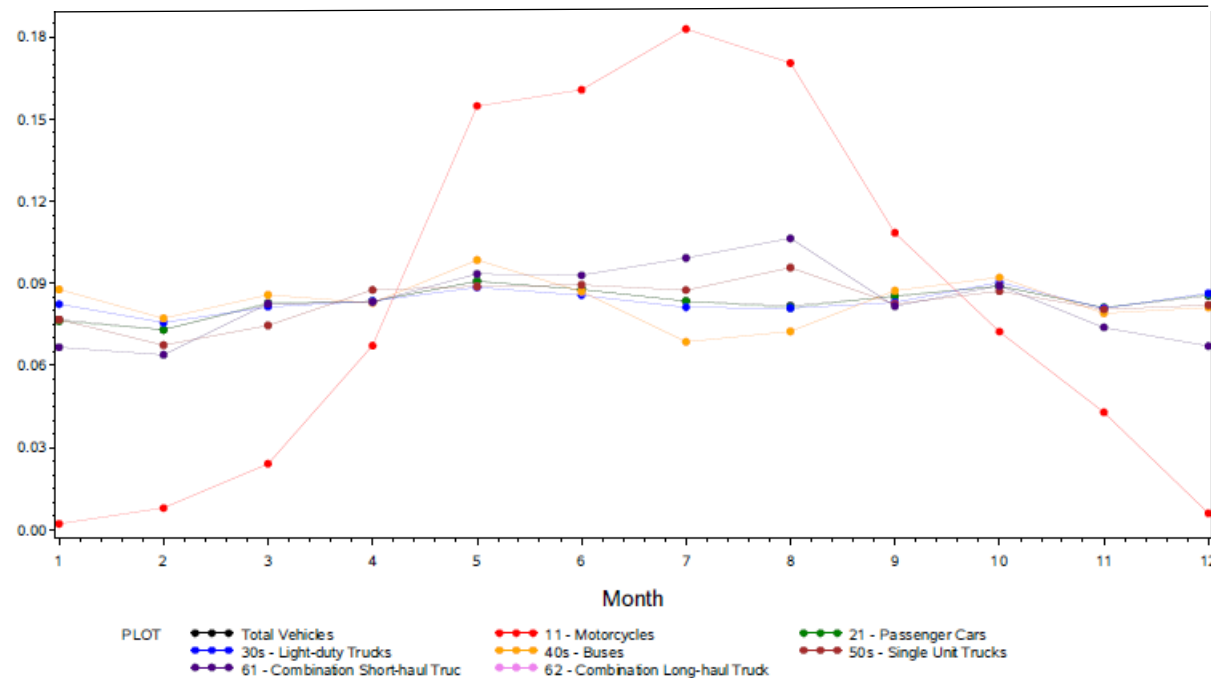


2022hc draft RPV_onroad VOC_INV annual

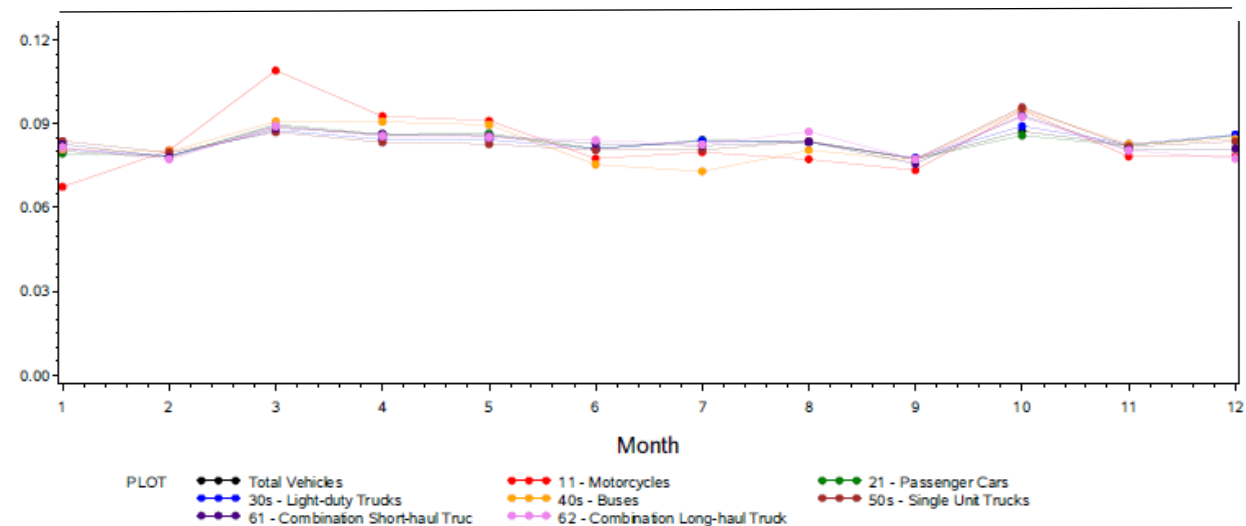


Examples of 2022 TMAS Plots – month of year

Connecticut



Florida

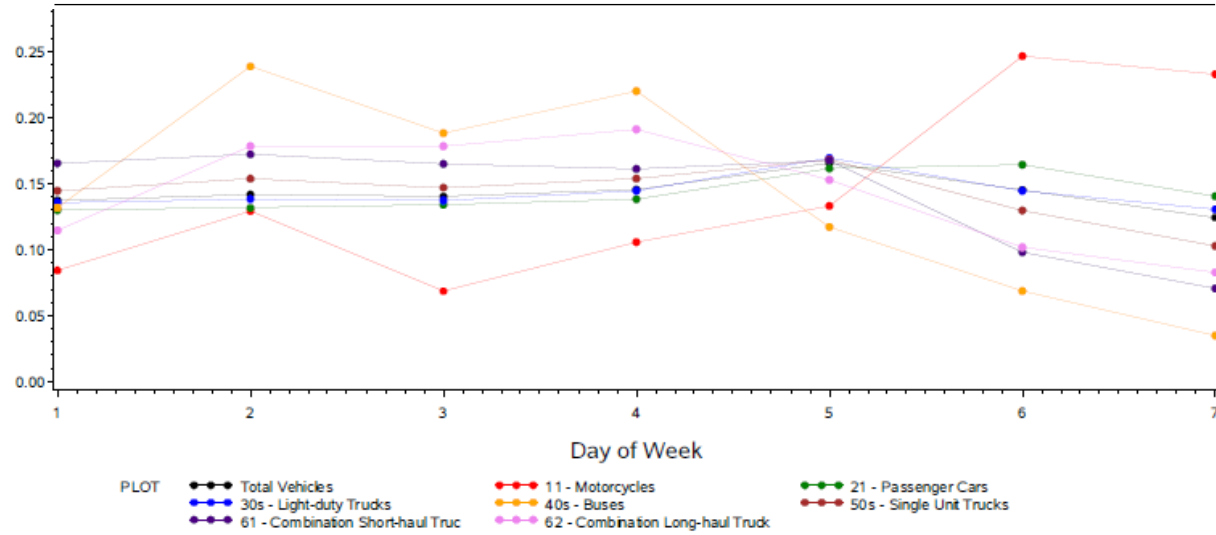


2022 TMAS data were grouped by state and profiles derived

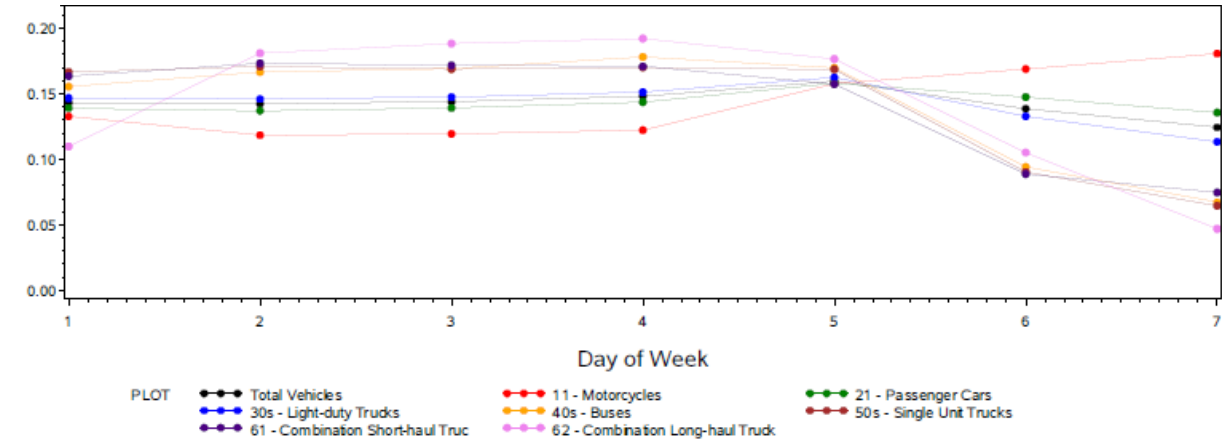
In cases where profiles were noisy or with small sample size, substitutions were made from other states or 2021

Examples of 2022 TMAS Plots – day of week

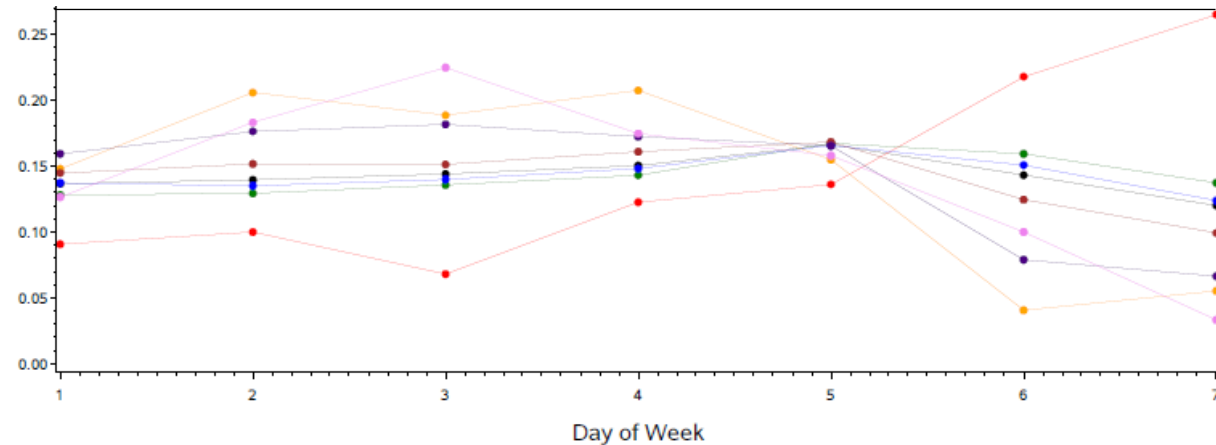
Arkansas - May



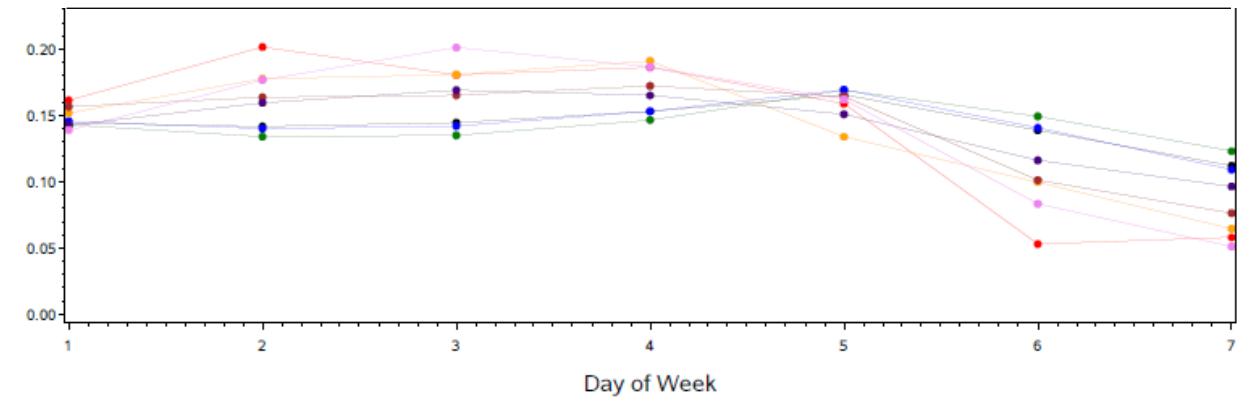
Florida – March



Arkansas - October

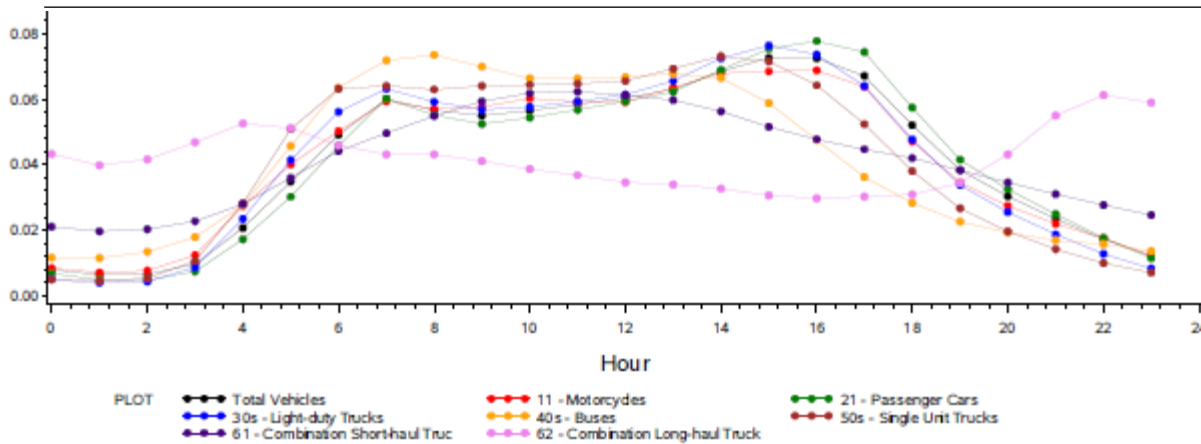


Idaho – February

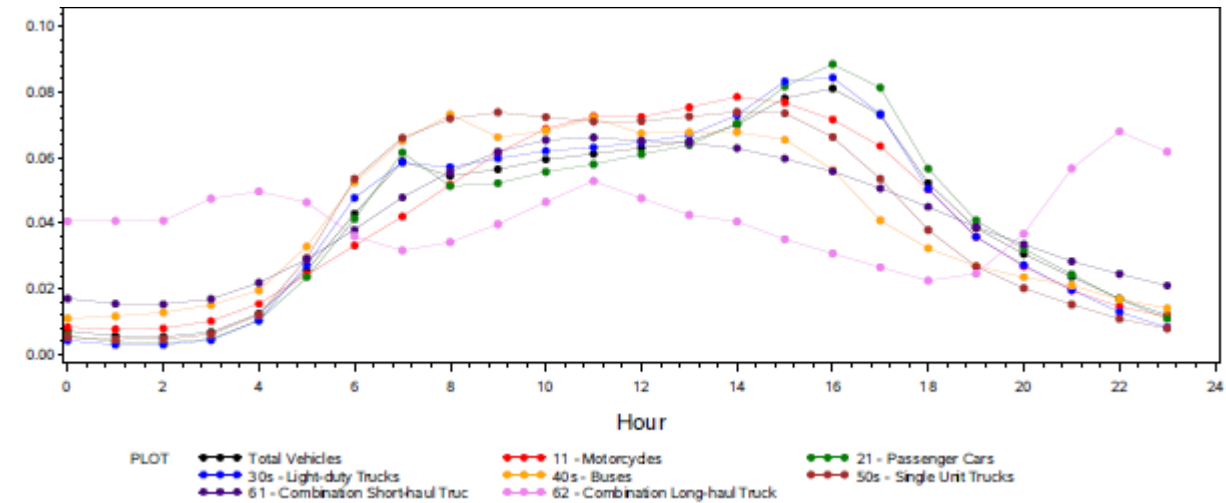


Examples of 2022 TMAS Plots – hour of day

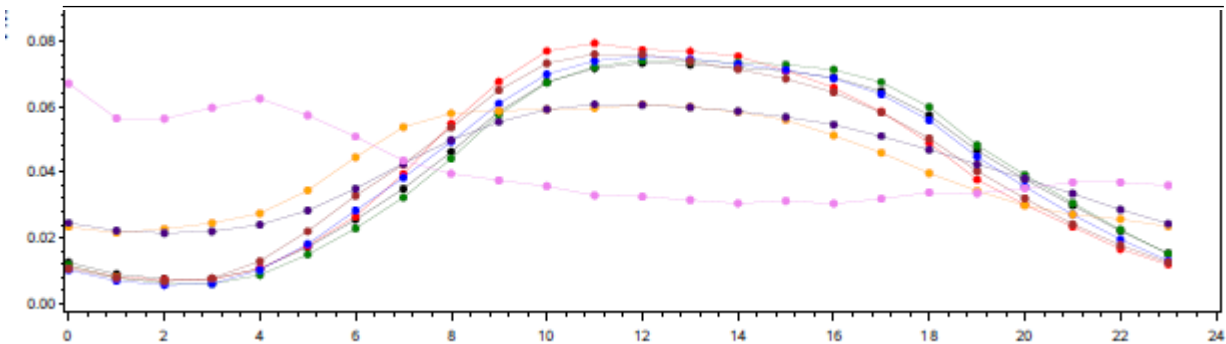
Arizona - weekday



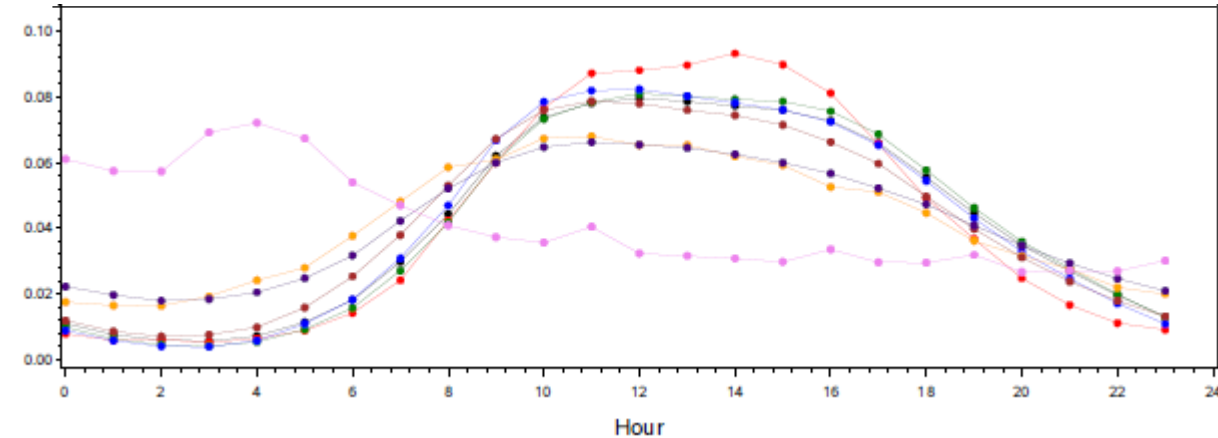
Missouri - weekday



Arizona - weekend



Missouri - weekend



Next Steps for 2022 Onroad

- Collect and address comments on the draft emissions
 - Recompute emissions as needed
- County databases (CDBs), summaries, and plots will be posted on the EPA ftp site: <https://gaftp.epa.gov/Air/emismod/2022/v1/draft/>
- The data review starts April 1, with a preview call on March 27 at 1 EDT
 - Email Janice Godfrey if you need the invitation to call forwarded
- Updates for v2:
 - Analyze telematics data to obtain updated temporal patterns and speeds
 - Update VPOP by source type and fuel mixes based on registration data

Timeline for 2022v1 Platform Development

