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SPECIFICATION SHEET: NONROAD 2016beta Platform

Description: Mobile nonroad equipment emissions were developed with the MOVES2014b model, for simulating 2016 and future year U.S. air quality

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1. EXECUTIVE SUMMARY

The beta platform nonroad emissions were generated using the Motor Vehicle Emissions Simulator (MOVES) 2014b model without any state-provided inputs, except in California where inventories are provided by the California Air Resources Board (CARB). CARB-provided data for 2014 and 2017, which were interpolated to the year 2016. For the rest of the country, monthly MOVES2014b output inventories were used after a limited amount of post-processing. Speciation profile assignments for VOC and PM_{2.5} are internal to MOVES. Future year projections are based on separate runs of the MOVES model and separate CARB inventories. Base and future year inventories were processed with the Sparse Matrix Operating Kernel Emissions (SMOKE) modeling system version 4.6. SMOKE creates emissions in a format that can be input into air quality models. National and state-level emission summaries for key pollutants are provided.

2. INTRODUCTION

This document details the approach and data sources to be used for developing 2016 emissions for the mobile nonroad equipment sector, which includes all mobile source emissions that do not operate on roads, excluding commercial marine vehicles, railways, and aircraft. Types of nonroad equipment include recreational vehicles, pleasure craft, and construction, mining, and lawn and garden equipment. Nonroad equipment emissions were computed by from running the MOVES2014b model, which incorporates the NONROAD2008 model. MOVES2014b (<https://www.epa.gov/moves>) replaced MOVES2014a and compared to the previous version incorporates updated nonroad engine population growth rates, nonroad Tier 4 engine emission rates, and sulfur levels of nonroad diesel fuels. MOVES2014b provides a complete set of hazardous air pollutants (HAPs) and incorporates updated nonroad emission factors for HAPs. MOVES2014b was used for all states other than California, which uses their own model. VOC and PM speciation profile assignments are determined by MOVES and applied by SMOKE.

3. INVENTORY DEVELOPMENT METHODS

Emissions outside California

The MOVES2014b model is used to create a nonroad emissions inventory for modeling years 2016, 2023, and 2028. MOVES2014b creates a monthly emissions inventory for criteria air pollutants (CAPs) and a full set of HAPs, plus additional pollutants such as NONHAPTOG and ETHANOL, which are not part of the NEI but are used for speciation.

MOVES2014b provides estimates of NONHAPTOG along with the speciation profile code for the NONHAPTOG emission source. This was accomplished by using NHTOG#### as the pollutant code in the Flat File 2010 (FF10) inventory file that can be read into SMOKE, where #### is a speciation profile code. One of the speciation profile codes is '95335a' (lowercase 'a'); the corresponding inventory pollutant is NONHAPTOG95335A (uppercase 'A') because SMOKE does not support inventory pollutant names with lowercase letters. Since speciation profiles are applied by SCC and pollutant, no changes to SMOKE were needed to use the inventory file with this profile information. This approach was not used for California, because their model provides VOC.

MOVES2014b, unlike MOVES2014a, also provides estimates of PM_{2.5} by speciation profile code for the PM_{2.5} emission source, using PM25_#### as the pollutant code in the FF10 inventory file, where #### is a speciation profile code. To facilitate calculation of PMC within SMOKE, and to help create emissions summaries, an additional pollutant representing total PM_{2.5} called

PM25TOTAL was added to the inventory. As with VOC / TOG, this approach is not used for California.

MOVES2014b outputs emissions data in county-specific databases, and then a post-processing script converted the data into FF10 format. Additional post-processing steps were performed as follows:

- County-specific FF10s were combined into a single FF10 file.
- To reduce the size of the inventory, HAPs that are not needed for air quality modeling, such as dioxins and furans, were removed from the inventory.
- To reduce the size of the inventory further, all emissions for sources (identified by county/SCC) for which total CAP emissions are less than 1×10^{-10} were removed from the inventory. The MOVES model attributes a very tiny amount of emissions to sources that are actually zero, for example, snowmobile emissions in Florida. Removing these sources from the inventory reduces the total size of the inventory by 7%.
- Gas and particulate components of HAPs that come out of MOVES separately, such as naphthalene, were combined.
- VOC was renamed VOC_INV so that SMOKE does not speciate both VOC and NONHAPTOG, which would result in a double count.
- PM25TOTAL, referenced above, was also created at this stage of the process.
- California emissions from MOVES were deleted, in favor of the CARB data.
- Emissions for airport ground support vehicles (SCCs ending in -8005), and oil field equipment (SCCs ending in -10010), were removed from the inventory at this stage, to prevent a double count with the ptnonipm and np_oilgas sectors, respectively.

The alpha platform used a nonroad inventory created with MOVES2014a, while the beta platform uses a brand-new set of inventories created with MOVES2014b.

Tables listing the Source Classification Codes (SCCs) are available in Appendix A.

Emissions inside California

California nonroad emissions were provided by the California Air Resources Board (CARB) for the years 2014 and 2017. Those two inventories were used to develop a 2016 inventory.

A direct interpolation of the 2014 and 2017 inventories would not be straightforward, because the two inventories were developed by CARB in different ways at different times, and include

different pollutants and occasionally different SCCs. For example, the 2014 inventory includes a full set of HAPs, whereas the 2017 inventory does not. Emissions are needed for all VOC HAPs to support integration, as described in the speciation section. The 2017 inventory was also developed a few years earlier than the 2014 inventory.

For those reasons, a direct interpolation of the two inventories by county-SCC was not performed. Instead, growth factors were calculated at the county-pollutant level, and for CAPs only. Because the factors are county-pollutant, the resulting inventory reflects 2016 total emissions but with an SCC distribution reflecting 2014. Also, this approach allows for projection of HAPs as well, by applying the VOC growth factor to all VOC HAPs. Growth factors were first calculated for the 3-year period from 2014 to 2017, and then scaled to 2016 by multiplying the growth factors by 2/3. This 2016 California nonroad inventory was first developed for the alpha platform; no changes were made for beta platform.

For modeling years 2023 and 2028, CARB nonroad inventories provided for those years from the 2011 emissions modeling platform were used.

All California nonroad inventories are annual, with monthly temporalization applied in SMOKE.

Emissions for airport ground support vehicles (SCCs ending in -8005) and oil field equipment (SCCs ending in -10010) were removed from the inventory in order to prevent a double count with the ptnonipm and np_oilgas sectors, respectively.

4. ANCILLARY DATA

Spatial Allocation

Spatial allocation of nonroad emissions to the national 36km and 12km domains used for air quality modeling is accomplished using spatial surrogates. Spatial surrogates map county polygons to the uniformly spaced grid cells of a modeling domain. Most nonroad emissions are allocated using spatial surrogates based on the National Landcover Database (NLCD). The remaining nonroad emissions are allocated using spatial surrogates for golf courses, mines, water, or total railroad density. Reports summarizing total emissions by spatial surrogate at the state and county level are included in the emissions modeling workgroup reports package. A national emissions summary by spatial surrogate is in Table 1.

Table 1. 2016beta nonroad emissions by spatial surrogate (tons/yr; 36US3 domain)

Surrogate	Description	CO	NH3	NOX	PM10	PM2.5	SO2	VOC
261	NTAD Total Railroad Density	4,961	3	2,157	230	222	2	431
304	NLCD Open + Low	66,368	4	1,836	165	159	5	2,988
305	NLCD Low + Med	1,683,707	95	16,298	4,224	3,866	129	116,725
306	NLCD Med + High	2,300,352	306	184,311	12,591	11,935	426	96,119
307	NLCD All Development	1,431,151	107	33,798	17,657	16,275	135	178,932
308	NLCD Low + Med + High	493,693	491	340,485	30,309	29,187	510	53,506
309	NLCD Open + Low + Med	2,205,710	131	22,947	1,487	1,367	178	49,881
310	NLCD Total Agriculture	320,175	366	347,896	26,857	25,991	408	38,673
320	NLCD Forest Land	31,715	15	6,020	719	674	15	3,666
321	NLCD Recreational Land	654,052	83	11,923	6,915	6,353	139	243,437
350	NLCD Water	1,469,214	184	121,152	7,670	6,929	248	365,285
850	Golf Courses	254,440	13	2,052	129	119	18	5,704
860	Mines	2,214	2	2,698	290	281	3	522

Temporal Allocation

Outside of California, monthly emissions are provided by MOVES2014b. Inside California, monthly temporalization is performed in SMOKE using temporal profiles that are specific to California and were first developed for the 2014v7.0 emissions modeling platform based on regional monthly factor data provided by OTAQ. Day-of-week and hour-of-day profiles are applied to all sources nationwide within SMOKE. The day-of-week profiles for nonroad allocate the same emissions to all weekdays Tuesday through Friday, allowing for use of “MWDSS” (Monday, WeekDay, Saturday, Sunday) representative dates, plus holidays. Reports summarizing total emissions according to the monthly, day-of-week, and hour-of-day temporal profile assignments are included in the emissions modeling workgroup reports package at the

state and county level. A national emissions summary by weekly and diurnal temporal profile is in Table 2.

Table 2. 2016beta nonroad emissions by weekly and diurnal temporal profile (tons/yr)

Weekly profile	Diurnal profile	CO	NH3	NOX	PM10	PM2.5	SO2	VOC
7	26	16,213	37	30,729	1,452	1,396	38	2,748
9	26	996,446	103	16,226	7,418	6,822	165	259,222
9	27	1,719,169	97	16,614	4,311	3,946	131	119,036
16	27	1,494,144	188	123,269	7,768	7,019	253	372,080
18	26	502,251	182	143,364	10,737	10,278	265	41,058
18	27	1,842,762	107	20,938	1,550	1,349	145	57,562
18	25a	320,747	367	348,360	26,894	26,027	409	38,724
19	24	4,971	3	2,161	230	223	2	431
19	25a	3,722,238	243	57,989	19,598	18,061	321	233,794
19	26a	500,909	500	346,328	30,804	29,666	519	54,355

Chemical Speciation

Outside of California, speciation profile assignments for VOC and PM_{2.5} are determined by the MOVES2014b model. For each county/SCC, MOVES2014b outputs separate NONHAPTOG and PM_{2.5} emissions totals by speciation profile (e.g. NONHAPTOG8754 for profile 8754, NONHAPTOG8769 for profile 8769, and so on). This allows SMOKE to perform a more accurate speciation than it otherwise could using traditional profiles. It also eliminates the need for SCC-specific profile assignments or a GSPRO_COMBO, at least outside of California, as all NONHAPTOG8754 emissions receive profile 8754 for all SCCs.

In most sectors that use HAP integration as part of VOC speciation, the only HAPs that are integrated are naphthalene, benzene, acetaldehyde, formaldehyde, and methanol, collectively known as “NBAFM”. The MOVES model uses a much longer set of integrate HAPs, shown in Table 3. The NONHAPTOG emissions in the nonroad inventory from MOVES incorporate the full MOVES set of HAPs. Since NONHAPTOG speciation profiles change depending on which HAPs are integrated, this means nonroad cannot use the same NONHAPTOG profiles as other sectors in the platform. Therefore, nonroad-specific NONHAPTOG profiles in which all HAPs listed in Table 3 are integrated, were created in the Speciation Tool and then included in the nonroad-specific GSPRO file. The nonroad GSPRO file also maps each MOVES integrate HAP to one or more CB6 model species.

Table 3. MOVES integrated species

MOVES ID	Pollutant Name
5	Methane (CH ₄)
20	Benzene
21	Ethanol
22	MTBE
24	1,3-Butadiene
25	Formaldehyde
26	Acetaldehyde
27	Acrolein
40	2,2,4-Trimethylpentane
41	Ethyl Benzene
42	Hexane
43	Propionaldehyde
44	Styrene
45	Toluene
46	Xylene
185	Naphthalene gas

Inside California, a CARB dataset which does not have NONHAPTOG or PM_{2.5} pre-split by profile was used, and so traditional speciation profiles by VOC mode (exhaust and evaporative) are applied along with a GSPRO_COMBO to account for mixes of E0 and E10 fuel. When performing VOC HAP integration, SMOKE must use the same set of integrate HAPs for the entire sector. Therefore, when integrating HAP emissions in California, the full set of MOVES integrate HAPs is required, not just NBAFM, in California as well as the rest of the US. In California, PM_{2.5} speciation uses separate profiles for gasoline, diesel, and natural gas combustion.

NO_x is speciated to HONO (0.8%), NO (90%), and NO₂ (9.2%) for all nonroad sources nationwide.

5. EMISSIONS PROJECTION METHODS

Outside California, the MOVES2014b model was run separately for each future year, including 2023 and 2028, resulting in a separate inventory for each year. The fuels used are specific to each future year, but the meteorological data represented the year 2016. Inside California,

CARB has provided separate datasets for each future year. Because the CARB inventories already reflect future year emissions, no additional work related to projections was required.

6. EMISSIONS PROCESSING REQUIREMENTS

Nonroad emissions were processed for air quality modeling using the Sparse Matrix Operator Kernel Emissions (SMOKE¹) modeling system. Two inventories were input to SMOKE: the California inventory from CARB, and the inventory for the rest of the country output from MOVES2014b. Because the MOVES2014b inventory is monthly, the sector was processed through SMOKE as a monthly sector; i.e. Smkinven was run once per month with the appropriate SMKINVEN_MONTH setting (this is handled automatically by the platform scripts when using smk_ar_monthly_emf.csh). Spcmat, Grdmat, and Temporal were run once per month, followed by Smkmerge. This is a 2-D sector in which all emissions were output to a single layer gridded emissions file.

7. EMISSIONS SUMMARIES

National and state totals by pollutant for the beta platform cases are provided here, and some example plots. Figures 1-6 display county-level annual 2016 nonroad emissions of criteria pollutants for the continental United States. Figures 7-12 display the gridded annual 2016 nonroad emissions of criteria pollutants within the 12-km CONUS domain.

Additional plots and maps are available online through the LADCO website² and the Intermountain West Data Warehouse³.

The case descriptions are as follows:

2011en, 2023en, 2028el = final 2011, 2023, and 2028 cases from the 2011v6.3 platform

2014fd = 2014NElv2 and 2014 NATA

2016fe = 2016 alpha platform (grown from 2014NElv2)

2016ff, 2023ff, and 2028ff = 2016, 2023, and 2028 cases from the 2016 beta platform

¹ <http://www.smoke-model.org/index.cfm>

² <https://www.ladco.org/technical/modeling-results/2016-inventory-collaborative/>

³ <http://views.cira.colostate.edu/iwdw/eibrowser2016>

Table 4. Comparison of national total annual CAPS nonroad emissions (tons/yr)

Pollutant	2011en	2014fd	2016fe	2016ff	2023en	2023ff	2028el	2028ff
CO	14,245,158	12,614,644	12,419,558	11,089,466	12,868,773	11,154,989	13,433,875	11,526,892
NH3	2,656	2,252	2,297	1,822	3,263	2,005	3,478	2,076
NOX	1,646,173	1,393,217	1,219,766	1,102,956	866,679	741,087	753,557	615,637
PM10	164,594	142,017	123,887	110,458	85,502	73,747	73,120	60,761
PM2.5	156,710	134,428	117,081	104,500	80,118	69,058	68,160	56,546
SO2	4,119	3,176	2,453	2,243	2,409	1,556	2,527	1,573
VOC	2,065,518	1,662,430	1,495,541	1,175,789	1,201,558	892,850	1,156,628	839,719

Table 5. Comparison of state total annual NOx nonroad emissions (tons/yr)

State	2011en	2014fd	2016fe	2016ff	2023en	2023ff	2028el	2028ff
Alabama	22,869	19,132	16,776	17,481	12,242	11,204	11,092	9,452
Alaska	2,760	2,794	2,612	2,594	2,217	1,967	2,144	1,718
Arizona	29,500	24,554	21,304	23,647	14,581	14,328	13,020	11,553
Arkansas	22,156	18,819	16,561	20,746	11,374	12,049	9,482	8,921
California	113,192	92,316	87,271	87,271	63,457	62,724	52,741	52,210
Colorado	27,337	22,672	19,840	13,660	13,910	9,766	12,160	8,573
Connecticut	13,046	10,640	9,286	8,141	7,127	5,699	6,668	5,061
Delaware	4,347	4,020	3,452	3,740	2,337	3,017	2,070	2,718
D.C.	2,364	1,934	1,639	664	1,030	390	895	334
Florida	98,584	84,375	74,632	69,228	53,956	49,166	48,803	42,466
Georgia	44,449	29,785	25,367	26,840	22,230	18,177	19,888	15,565
Hawaii	3,842	3,228	2,872	3,457	2,125	2,452	1,943	2,086
Idaho	12,743	11,023	9,828	7,856	6,882	5,558	5,785	4,457
Illinois	86,021	65,994	58,048	50,786	41,646	32,007	35,828	25,901
Indiana	47,665	39,273	33,879	37,509	23,142	23,363	20,062	18,463
Iowa	50,254	43,281	38,288	31,506	25,537	20,100	20,385	14,508
Kansas	37,631	32,000	28,252	25,813	18,461	14,624	14,289	10,580
Kentucky	24,375	20,448	17,940	13,073	12,690	8,751	11,084	7,491
Louisiana	23,507	19,427	17,332	12,201	13,221	8,435	11,759	7,220
Maine	6,759	5,977	5,457	6,623	4,537	5,092	4,338	4,581
Maryland	22,050	18,740	16,539	10,916	12,118	7,889	11,000	7,124
Massachusetts	22,688	18,770	16,502	15,331	12,526	10,421	11,732	9,310
Michigan	56,259	47,615	41,461	25,819	30,209	18,932	27,755	16,676
Minnesota	53,486	47,088	41,733	43,898	27,988	30,366	23,369	24,026
Mississippi	17,266	14,517	12,779	9,849	9,076	6,097	7,850	4,736
Missouri	41,971	35,857	31,663	36,369	21,914	21,969	18,404	16,936
Montana	15,418	13,403	11,957	11,180	7,888	6,650	6,044	4,738
Nebraska	32,009	27,545	24,379	24,016	15,732	13,399	11,971	9,392
Nevada	14,706	12,337	10,701	15,832	7,117	9,369	6,254	7,198

State	2011en	2014fd	2016fe	2016ff	2023en	2023ff	2028el	2028ff
New Hampshire	6,532	5,565	4,982	4,452	3,957	3,334	3,732	2,987
New Jersey	30,303	25,055	21,965	21,139	16,735	15,248	15,567	13,306
New Mexico	7,537	6,087	5,348	5,778	3,893	3,797	3,431	3,051
New York	62,622	53,071	47,377	38,463	36,126	29,238	33,393	27,485
North Carolina	46,950	32,556	28,213	26,849	23,804	19,741	21,309	18,046
North Dakota	31,169	27,031	24,076	30,138	15,441	18,912	11,380	13,132
Ohio	62,035	53,056	44,917	40,920	28,808	27,170	25,604	22,450
Oklahoma	24,650	20,462	18,126	13,713	12,908	8,992	10,828	7,510
Oregon	20,571	17,287	15,208	14,751	10,798	10,577	9,544	9,286
Pennsylvania	46,194	37,994	33,170	31,040	24,586	21,990	22,588	18,689
Rhode Island	3,506	2,901	2,555	2,326	1,961	1,586	1,842	1,390
South Carolina	23,155	19,247	16,785	14,932	11,978	10,351	10,831	9,188
South Dakota	22,193	19,250	17,127	15,592	11,052	9,614	8,271	6,855
Tennessee	31,193	25,953	22,645	20,000	16,083	13,156	14,268	11,236
Texas	133,895	137,784	111,281	71,095	73,346	47,965	62,097	41,054
Utah	11,709	9,790	8,632	7,306	6,333	5,576	5,737	5,128
Vermont	3,244	2,777	2,488	5,066	1,951	3,481	1,809	2,823
Virginia	34,799	28,932	25,258	22,167	17,987	14,249	16,203	12,052
Washington	33,659	28,470	25,116	24,517	17,940	16,290	15,886	13,784
West Virginia	6,495	5,367	4,745	3,591	3,669	2,661	3,390	2,348
Wisconsin	40,845	35,182	30,888	24,069	22,101	16,562	19,817	13,896
Wyoming	4,390	3,578	3,216	2,255	2,449	1,604	2,088	1,350
Puerto Rico	8,829	7,863	6,950	6,417	5,256	4,799	4,899	4,400
Virgin Islands	441	398	352	331	251	231	227	197

Table 6. Comparison of state total annual VOC nonroad emissions (tons/yr)

State	2011en	2014fd	2016fe	2016ff	2023en	2023ff	2028el	2028ff
Alabama	41,818	32,349	29,060	21,829	22,810	15,669	21,639	14,295
Alaska	16,654	14,862	13,387	8,522	9,478	5,832	8,918	5,265
Arizona	38,147	29,885	27,165	21,810	24,350	18,022	24,186	17,395
Arkansas	29,365	23,204	20,739	13,871	16,065	10,458	15,180	9,835
California	118,376	107,496	92,270	92,270	66,571	66,502	60,782	60,723
Colorado	30,737	25,030	23,104	19,104	20,725	17,614	20,809	18,199
Connecticut	16,827	13,181	11,989	10,558	10,699	7,987	10,731	7,399
Delaware	5,646	4,503	3,943	7,151	3,185	4,694	3,063	4,095
D.C.	1,250	950	859	539	756	439	757	433
Florida	162,907	119,571	106,686	98,385	88,762	72,860	84,066	68,322
Georgia	58,581	44,677	40,678	33,466	35,528	26,913	34,950	25,893
Hawaii	5,428	4,313	3,824	4,365	3,315	3,253	3,306	3,012
Idaho	19,680	16,513	14,822	11,426	11,558	8,199	11,031	7,472

State	2011en	2014fd	2016fe	2016ff	2023en	2023ff	2028el	2028ff
Illinois	69,715	56,743	51,130	38,521	43,335	30,136	42,984	28,484
Indiana	41,189	32,772	29,903	20,425	24,788	16,695	24,320	15,980
Iowa	30,213	22,037	20,062	15,398	17,517	11,294	17,363	10,372
Kansas	17,321	13,638	12,433	9,397	10,649	7,186	10,465	6,678
Kentucky	30,470	23,985	21,498	14,468	16,813	10,535	16,066	9,697
Louisiana	47,045	35,217	31,147	20,508	23,947	13,807	22,074	12,181
Maine	26,171	22,165	19,960	17,730	15,291	11,597	14,462	10,285
Maryland	29,451	25,859	23,520	17,992	19,280	14,530	19,282	14,015
Massachusetts	34,756	26,895	24,070	19,296	20,163	14,750	19,714	13,807
Michigan	123,250	103,089	93,761	53,280	70,932	37,242	67,623	33,846
Minnesota	76,049	68,309	63,319	52,067	43,667	36,430	38,163	33,220
Mississippi	28,862	22,374	19,972	9,888	15,214	6,928	14,206	6,255
Missouri	45,083	35,332	31,780	24,028	25,309	17,429	24,282	15,867
Montana	11,055	9,210	8,298	6,045	6,448	4,386	6,139	4,015
Nebraska	13,242	10,765	9,768	8,133	7,825	5,861	7,559	5,267
Nevada	15,328	12,295	11,375	10,518	10,106	9,022	10,138	8,788
New Hampshire	15,094	12,598	11,404	9,104	9,089	6,542	8,727	6,024
New Jersey	38,698	30,068	27,513	24,847	25,292	19,155	25,699	18,028
New Mexico	10,260	8,022	7,235	5,358	6,373	4,370	6,292	4,183
New York	107,912	85,444	75,948	53,331	61,992	42,839	60,196	41,568
North Carolina	61,753	46,875	42,144	34,586	35,967	26,735	35,012	25,313
North Dakota	10,448	8,728	7,925	7,500	5,975	5,567	5,596	5,020
Ohio	68,739	56,416	51,612	38,182	41,866	29,324	41,690	27,289
Oklahoma	27,815	20,885	18,799	16,118	15,909	12,339	15,281	11,666
Oregon	29,077	23,686	21,070	16,334	17,217	13,657	16,758	13,519
Pennsylvania	71,264	57,142	52,102	35,979	44,325	29,054	43,900	27,681
Rhode Island	5,174	3,850	3,390	2,443	2,802	1,815	2,738	1,673
South Carolina	34,267	25,981	23,302	23,603	19,089	17,080	18,266	15,672
South Dakota	9,591	7,945	7,241	5,611	5,392	3,932	5,137	3,500
Tennessee	44,035	34,300	30,974	23,324	24,590	17,375	23,638	16,214
Texas	99,796	79,817	71,294	67,341	61,314	57,813	59,899	58,229
Utah	21,441	17,728	15,874	11,968	12,586	9,825	12,105	9,821
Vermont	9,087	7,630	6,897	4,896	5,408	3,667	5,160	3,447
Virginia	45,062	35,131	31,907	26,637	27,671	20,667	27,307	19,221
Washington	45,137	36,244	32,395	25,527	26,469	19,890	25,718	19,161
West Virginia	15,158	12,384	11,128	5,679	8,831	4,539	8,543	4,336
Wisconsin	83,858	72,250	64,965	40,898	41,862	27,825	38,625	24,727
Wyoming	8,218	6,849	6,183	4,180	4,834	3,076	4,594	2,885
Puerto Rico	18,242	14,606	13,162	10,891	11,190	9,151	11,083	9,125
Virgin Islands	775	631	554	464	428	342	405	320

Table 7. 2016 total nonroad carbon monoxide (CO), nitrogen oxides (NOx), volatile organic compounds (VOC), ammonia (NH3), sulfur dioxide (SO2), and particulate matter (PM2.5) emissions by state, annual emissions (tons/yr)

FIPS CODE	State	CO	NOx	VOC	NH3	SO2	PM2.5
1000	Alabama	179,563	17,481	21,829	29	36	1,650
2000	Alaska	33,932	2,594	8,522	6	7	357
4000	Arizona	246,450	23,647	21,810	41	40	2,423
5000	Arkansas	121,458	20,746	13,871	27	33	1,650
6000	California	679,100	87,271	92,270	77	151	6,422
8000	Colorado	228,897	13,660	19,104	29	35	1,755
9000	Connecticut	121,286	8,141	10,558	15	19	813
10000	Delaware	52,149	3,740	7,151	7	9	293
11000	District of Columbia	7,501	664	539	1	1	73
12000	Florida	902,859	69,228	98,385	135	159	6,785
13000	Georgia	352,121	26,840	33,466	52	62	2,824
15000	Hawaii	47,324	3,457	4,365	7	8	324
16000	Idaho	79,731	7,856	11,427	14	17	836
17000	Illinois	443,153	50,786	38,521	81	96	4,640
18000	Indiana	239,212	37,509	20,425	57	67	3,266
19000	Iowa	141,644	31,506	15,398	45	51	2,780
20000	Kansas	111,682	25,813	9,397	32	38	2,199
21000	Kentucky	128,437	13,073	14,468	22	26	1,233
22000	Louisiana	146,369	12,201	20,508	21	26	1,100
23000	Maine	92,126	6,623	17,730	14	18	694
24000	Maryland	211,095	10,916	17,992	22	28	1,286
25000	Massachusetts	229,427	15,331	19,296	28	36	1,578
26000	Michigan	359,890	25,819	53,280	53	67	2,929
27000	Minnesota	306,349	43,898	52,067	73	87	4,257
28000	Mississippi	80,595	9,849	9,888	16	19	956
29000	Missouri	238,976	36,369	24,028	49	59	2,999
30000	Montana	47,306	11,180	6,045	14	16	984
31000	Nebraska	85,871	24,016	8,133	28	32	1,902
32000	Nevada	120,446	15,832	10,518	27	31	1,664
33000	New Hampshire	67,911	4,452	9,104	10	12	506
34000	New Jersey	297,926	21,139	24,847	43	52	2,101
35000	New Mexico	58,425	5,778	5,358	11	12	607
36000	New York	561,465	38,463	53,331	75	95	3,791
37000	North Carolina	357,840	26,849	34,586	52	64	2,731
38000	North Dakota	70,397	30,138	7,500	39	44	2,364
39000	Ohio	406,247	40,920	38,182	69	83	3,740

FIPS CODE	State	CO	NOx	VOC	NH3	SO2	PM2.5
40000	Oklahoma	166,562	13,713	16,118	23	29	1,358
41000	Oregon	184,652	14,751	16,334	28	34	1,493
42000	Pennsylvania	409,514	31,040	35,979	61	74	3,335
72000	Puerto Rico	122,847	6,417	10,891	14	18	770
44000	Rhode Island	29,129	2,326	2,443	4	5	216
45000	South Carolina	201,751	14,932	23,603	26	33	1,412
46000	South Dakota	44,616	15,592	5,611	20	23	1,291
47000	Tennessee	217,385	20,000	23,324	34	42	1,852
48000	Texas	831,970	71,096	67,341	128	155	7,094
49000	Utah	99,409	7,306	11,968	15	18	800
50000	Vermont	33,317	5,066	4,896	10	11	500
78000	Virgin Islands	4,312	331	464	1	1	34
51000	Virginia	299,555	22,167	26,637	40	49	2,374
53000	Washington	251,142	24,517	25,527	40	49	2,344
54000	West Virginia	52,490	3,591	5,679	7	9	415
55000	Wisconsin	260,080	24,069	40,898	44	54	2,441
56000	Wyoming	25,576	2,255	4,180	4	5	258
	Total	11,089,466	1,102,956	1,175,789	1,822	2,243	104,500

Table 8. 2023 total nonroad carbon monoxide (CO), nitrogen oxides (NOx), volatile organic compounds (VOC), ammonia (NH3), sulfur dioxide (SO2), and particulate matter (PM2.5) emissions by state, annual emissions (tons/yr)

FIPS CODE	State	CO	NOx	VOC	NH3	SO2	PM2.5
1000	Alabama	178,513	11,204	15,669	32	24	1,023
2000	Alaska	30,540	1,967	5,832	7	4	240
4000	Arizona	252,067	14,328	18,022	46	35	1,639
5000	Arkansas	119,818	12,049	10,458	23	20	934
6000	California	629,039	62,724	66,502	77	67	4,298
8000	Colorado	247,904	9,766	17,614	33	24	1,342
9000	Connecticut	119,240	5,699	7,987	17	13	576
10000	Delaware	53,899	3,017	4,694	7	5	213
11000	District of Columbia	7,647	390	439	1	1	40
12000	Florida	957,996	49,166	72,860	159	114	4,776
13000	Georgia	365,915	18,177	26,913	60	45	1,999
15000	Hawaii	48,457	2,452	3,253	8	6	234
16000	Idaho	77,163	5,558	8,199	15	11	557
17000	Illinois	435,994	32,007	30,136	87	70	2,919
18000	Indiana	239,313	23,363	16,695	64	55	1,979

FIPS CODE	State	CO	NOx	VOC	NH3	SO2	PM2.5
19000	Iowa	137,059	20,101	11,294	47	41	1,705
20000	Kansas	106,422	14,624	7,186	34	30	1,177
21000	Kentucky	125,875	8,751	10,535	24	19	759
22000	Louisiana	141,319	8,435	13,807	22	15	666
23000	Maine	86,372	5,092	11,597	15	10	454
24000	Maryland	215,542	7,889	14,530	25	17	975
25000	Massachusetts	227,648	10,421	14,750	31	23	1,083
26000	Michigan	338,079	18,932	37,242	56	41	1,990
27000	Minnesota	291,477	30,366	36,430	78	62	2,794
28000	Mississippi	77,028	6,097	6,928	16	13	586
29000	Missouri	229,629	21,969	17,429	51	42	1,705
30000	Montana	45,186	6,650	4,386	14	12	563
31000	Nebraska	81,178	13,399	5,861	29	25	961
32000	Nevada	124,913	9,369	9,022	32	25	1,080
33000	New Hampshire	66,051	3,334	6,542	11	7	362
34000	New Jersey	296,643	15,248	19,155	50	38	1,509
35000	New Mexico	58,909	3,797	4,370	12	9	397
36000	New York	588,965	29,238	42,839	86	65	2,702
37000	North Carolina	368,524	19,741	26,735	59	46	1,914
38000	North Dakota	68,678	18,912	5,567	41	37	1,404
39000	Ohio	398,395	27,170	29,324	76	60	2,426
40000	Oklahoma	169,357	8,992	12,339	26	19	903
41000	Oregon	198,706	10,577	13,657	33	25	1,073
42000	Pennsylvania	405,287	21,990	29,054	68	52	2,389
72000	Puerto Rico	132,193	4,799	9,151	17	12	618
44000	Rhode Island	28,491	1,586	1,815	5	4	144
45000	South Carolina	205,682	10,351	17,080	28	20	952
46000	South Dakota	41,592	9,614	3,932	21	19	736
47000	Tennessee	218,296	13,156	17,375	39	30	1,212
48000	Texas	901,795	47,965	57,813	149	115	4,878
49000	Utah	106,184	5,576	9,825	18	13	597
50000	Vermont	32,505	3,481	3,667	12	10	334
78000	Virgin Islands	4,529	231	342	1	1	23
51000	Virginia	293,671	14,249	20,667	43	31	1,628
53000	Washington	259,740	16,290	19,890	43	33	1,571
54000	West Virginia	52,263	2,661	4,539	8	6	301
55000	Wisconsin	242,034	16,562	27,825	48	35	1,547
56000	Wyoming	25,268	1,604	3,076	5	3	169
	Total	11,154,989	741,087	892,850	2,005	1,556	69,058

Table 9. 2028 total nonroad carbon monoxide (CO), nitrogen oxides (NOx), volatile organic compounds (VOC), ammonia (NH3), sulfur dioxide (SO2), and particulate matter (PM2.5) emissions by state, annual emissions (tons/yr)

FIPS CODE	State	CO	NOx	VOC	NH3	SO2	PM2.5
1000	Alabama	182,940	9,452	14,295	33	24	829
2000	Alaska	29,903	1,718	5,265	7	4	200
4000	Arizona	260,800	11,553	17,395	48	35	1,321
5000	Arkansas	122,256	8,921	9,835	22	18	712
6000	California	648,301	52,210	60,723	84	72	3,473
8000	Colorado	266,468	8,573	18,199	35	24	1,228
9000	Connecticut	120,455	5,061	7,399	17	13	497
10000	Delaware	56,348	2,718	4,095	8	5	194
11000	District of Columbia	8,020	334	433	1	1	31
12000	Florida	1,015,906	42,466	68,322	166	116	4,150
13000	Georgia	382,798	15,565	25,893	62	46	1,736
15000	Hawaii	50,087	2,086	3,012	8	6	200
16000	Idaho	77,698	4,457	7,472	15	11	436
17000	Illinois	443,256	25,901	28,484	89	70	2,328
18000	Indiana	245,490	18,463	15,980	66	55	1,540
19000	Iowa	138,917	14,508	10,372	48	40	1,147
20000	Kansas	106,748	10,580	6,678	34	28	813
21000	Kentucky	128,099	7,491	9,697	25	19	621
22000	Louisiana	142,217	7,220	12,181	23	15	537
23000	Maine	86,043	4,581	10,285	15	10	399
24000	Maryland	222,853	7,124	14,015	26	17	890
25000	Massachusetts	232,303	9,310	13,807	32	24	926
26000	Michigan	337,596	16,676	33,846	58	41	1,669
27000	Minnesota	293,299	24,026	33,220	80	61	2,075
28000	Mississippi	77,250	4,736	6,255	16	13	434
29000	Missouri	229,806	16,936	15,867	51	41	1,297
30000	Montana	45,382	4,738	4,015	14	11	376
31000	Nebraska	80,820	9,392	5,267	29	24	642
32000	Nevada	128,703	7,198	8,788	32	24	848
33000	New Hampshire	66,869	2,987	6,024	11	8	318
34000	New Jersey	301,095	13,306	18,028	51	38	1,300
35000	New Mexico	60,023	3,051	4,183	12	9	322
36000	New York	615,573	27,485	41,568	92	68	2,444
37000	North Carolina	386,444	18,046	25,313	63	49	1,694
38000	North Dakota	68,677	13,132	5,020	41	35	884
39000	Ohio	402,197	22,450	27,289	78	60	1,962

FIPS CODE	State	CO	NOx	VOC	NH3	SO2	PM2.5
40000	Oklahoma	175,705	7,510	11,666	27	19	759
41000	Oregon	212,986	9,286	13,519	35	26	926
42000	Pennsylvania	410,398	18,689	27,681	69	53	2,009
72000	Puerto Rico	141,623	4,400	9,125	18	12	584
44000	Rhode Island	28,860	1,390	1,673	5	4	120
45000	South Carolina	213,737	9,188	15,672	30	21	831
46000	South Dakota	41,249	6,855	3,500	21	18	468
47000	Tennessee	225,281	11,236	16,214	40	31	1,009
48000	Texas	976,827	41,054	58,229	158	119	4,196
49000	Utah	114,108	5,128	9,821	19	14	550
50000	Vermont	32,962	2,823	3,447	12	9	265
78000	Virgin Islands	4,765	197	320	1	1	20
51000	Virginia	295,222	12,052	19,221	44	32	1,365
53000	Washington	273,054	13,784	19,161	45	34	1,320
54000	West Virginia	53,043	2,348	4,336	8	6	260
55000	Wisconsin	239,622	13,896	24,727	49	36	1,253
56000	Wyoming	25,814	1,350	2,885	5	3	139
	Total	11,562,892	615,637	839,719	2,076	1,573	56,546

Figure 1. County-level nonroad emissions of CO for 2016

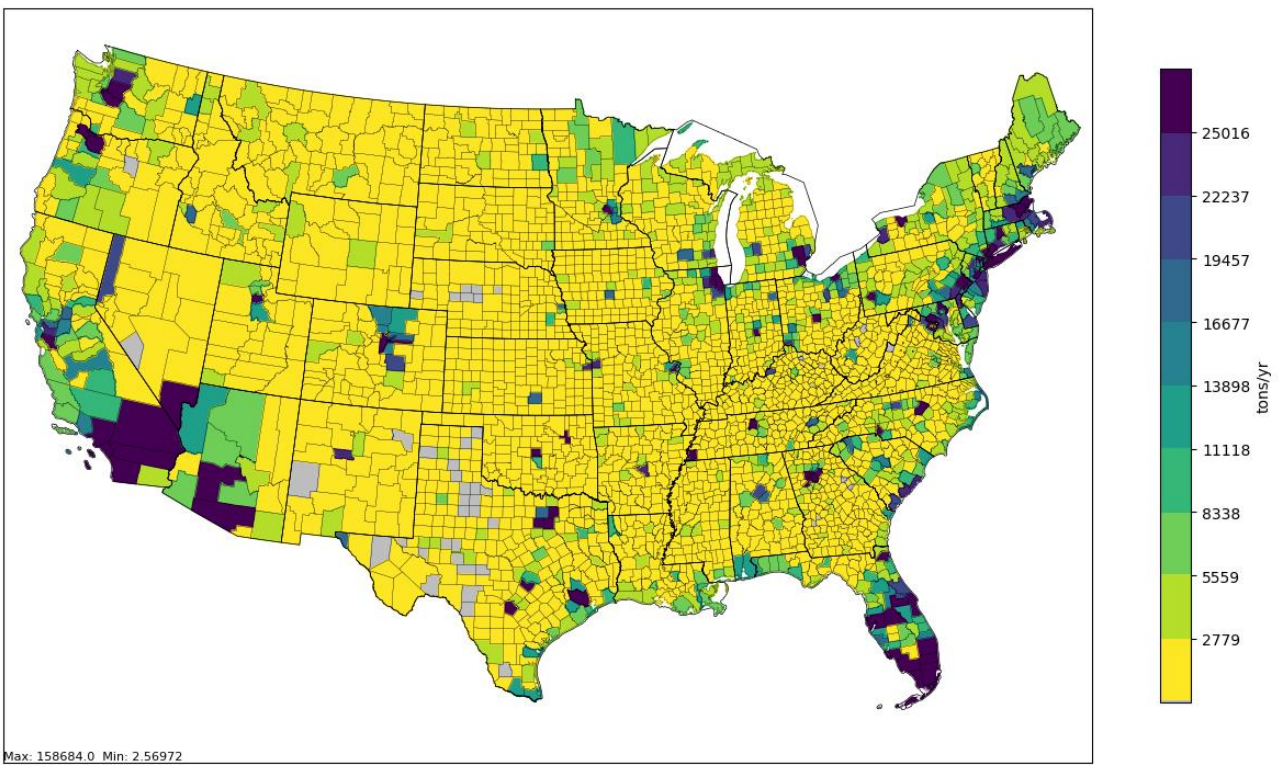


Figure 2. County-level nonroad emissions of NH3 for 2016

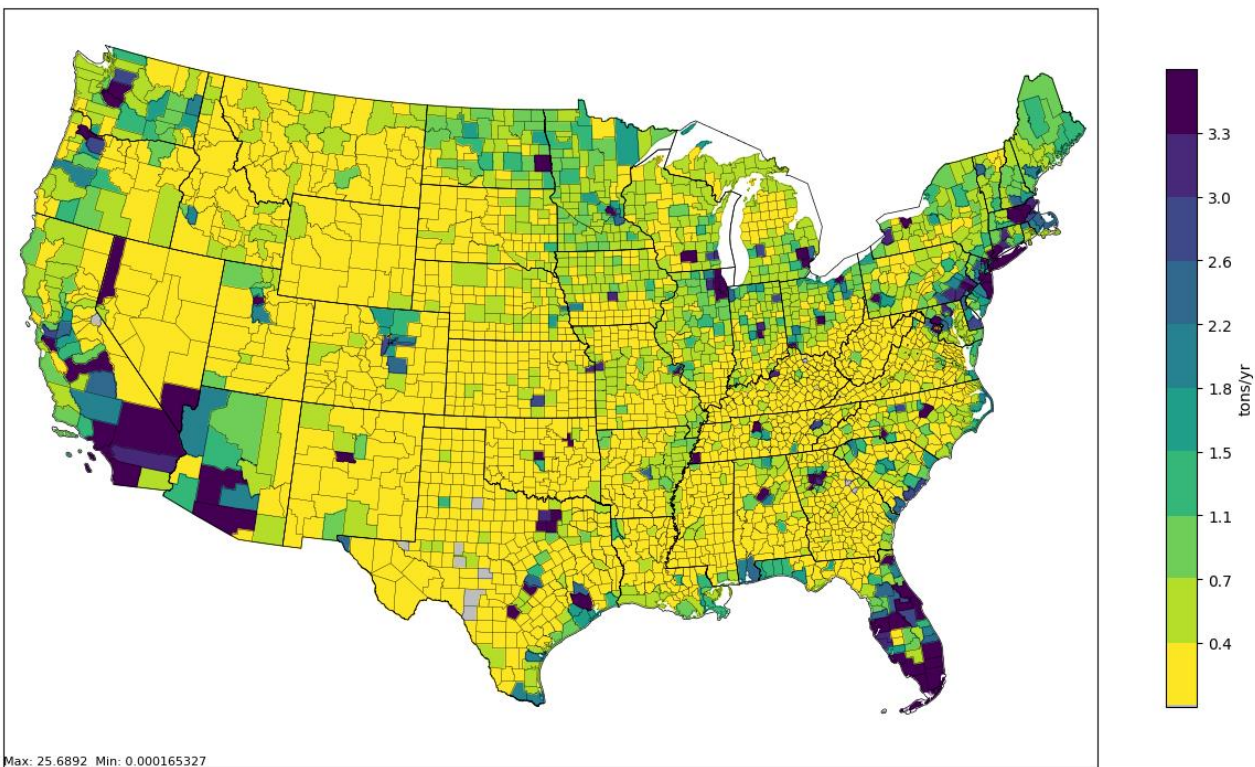


Figure 3. County-level nonroad emissions of NO_x for 2016

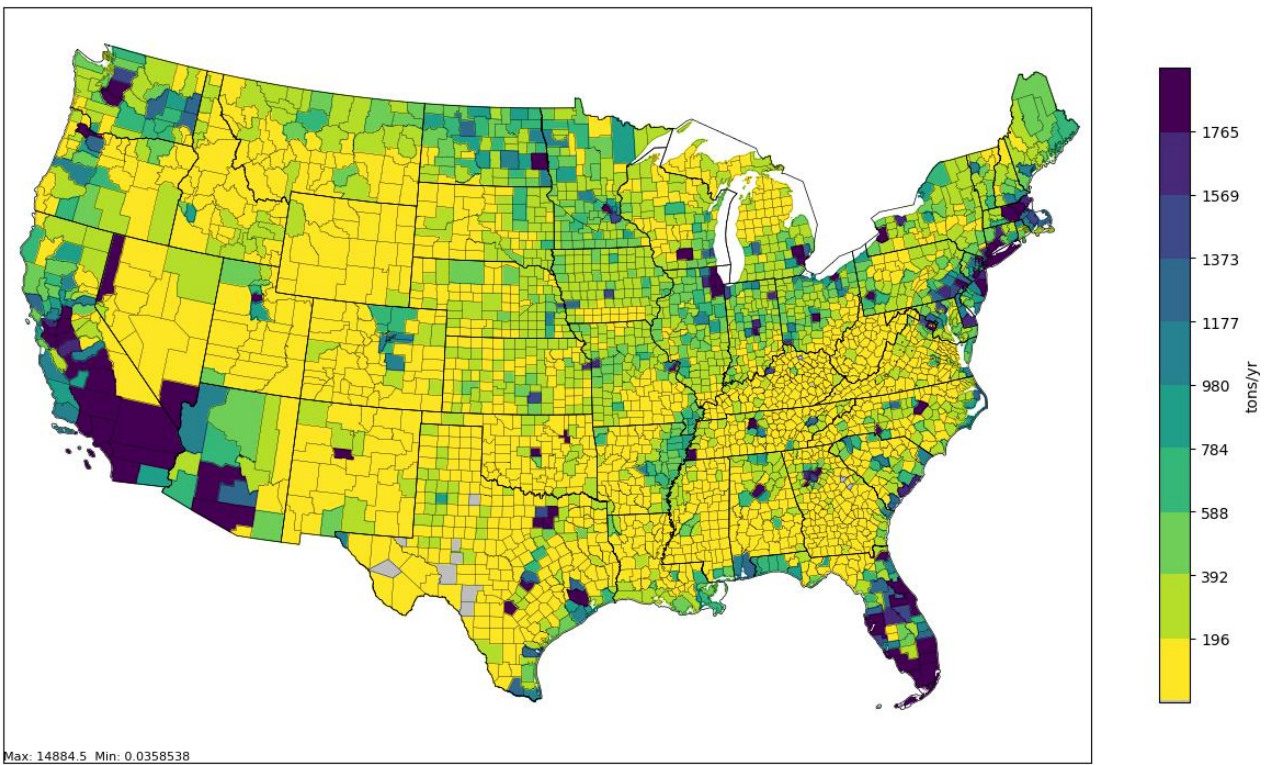


Figure 4. County-level nonroad emissions of PM_{2.5} for 2016

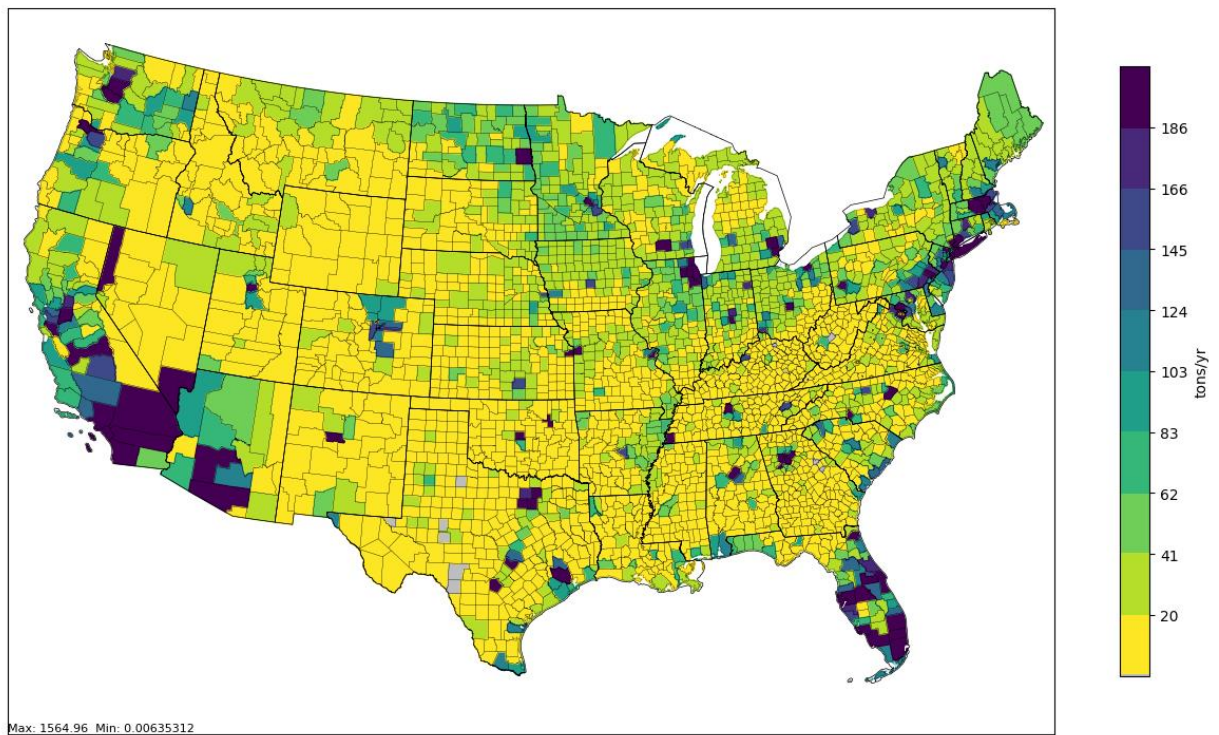


Figure 5. County-level nonroad emissions of SO₂ for 2016.

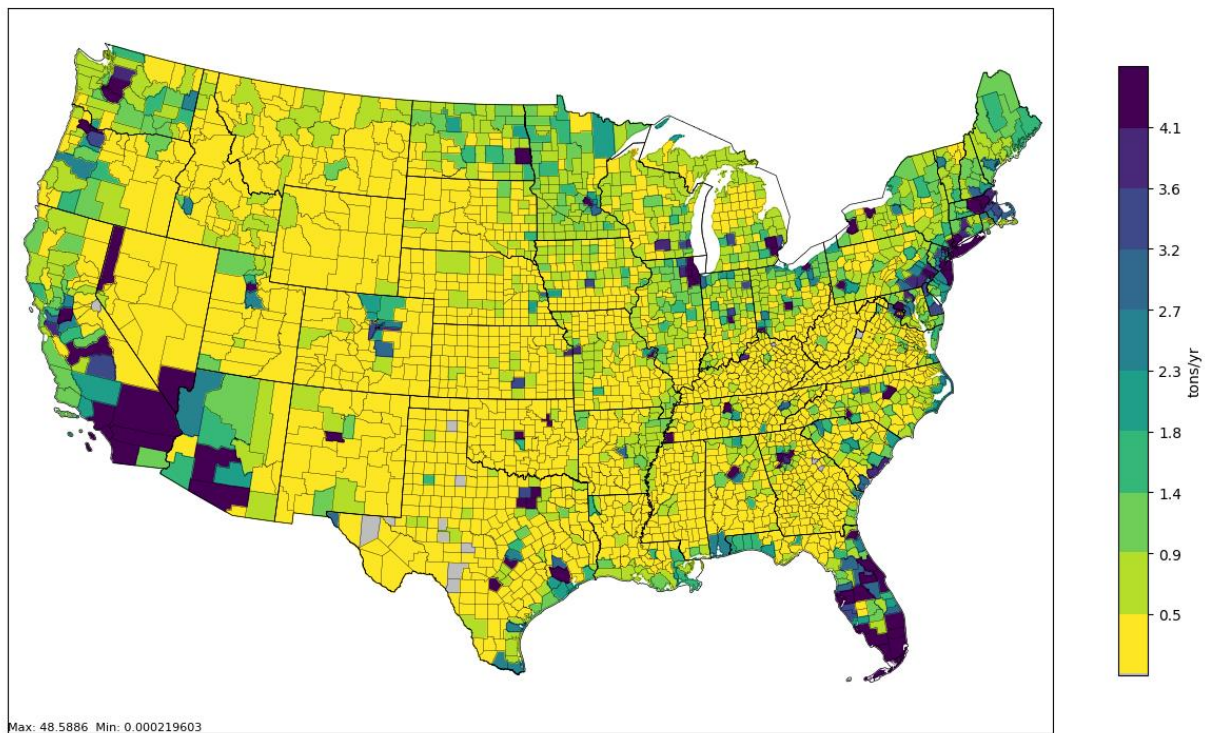


Figure 6. County-level nonroad emissions of VOC for 2016

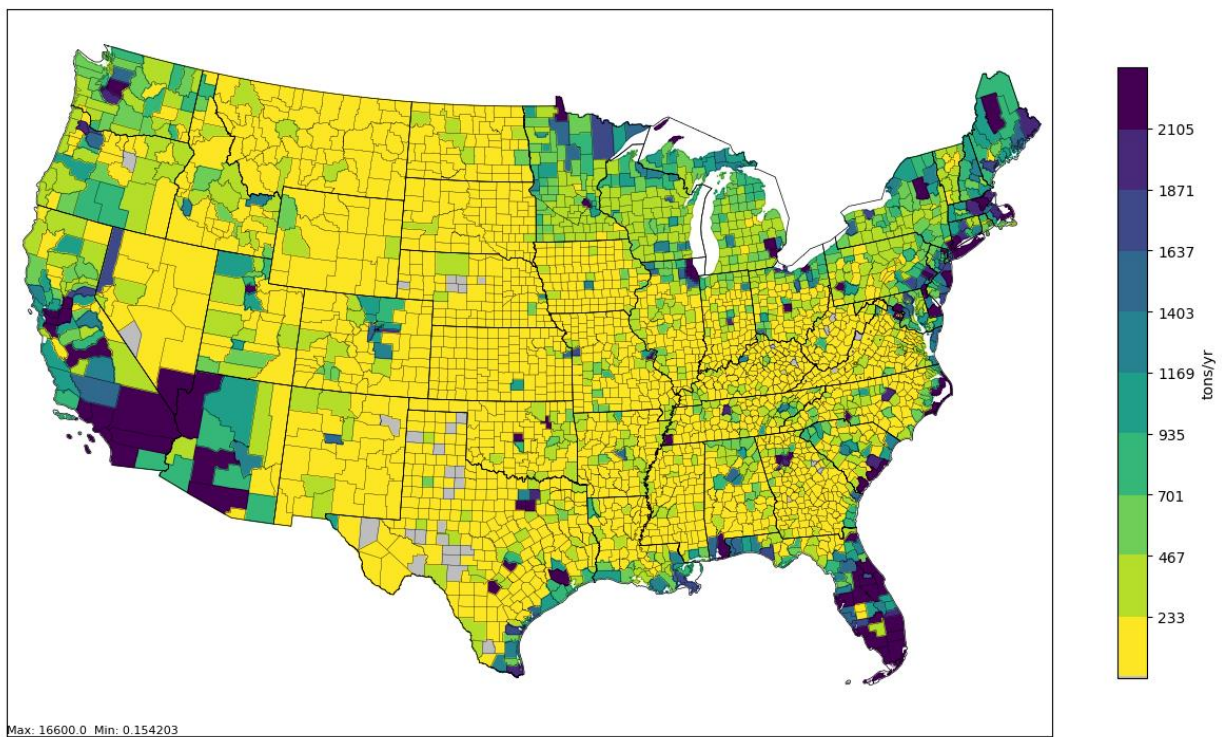


Figure 7. Annual nonroad emissions of CO across the 12-km CONUS domain for 2016

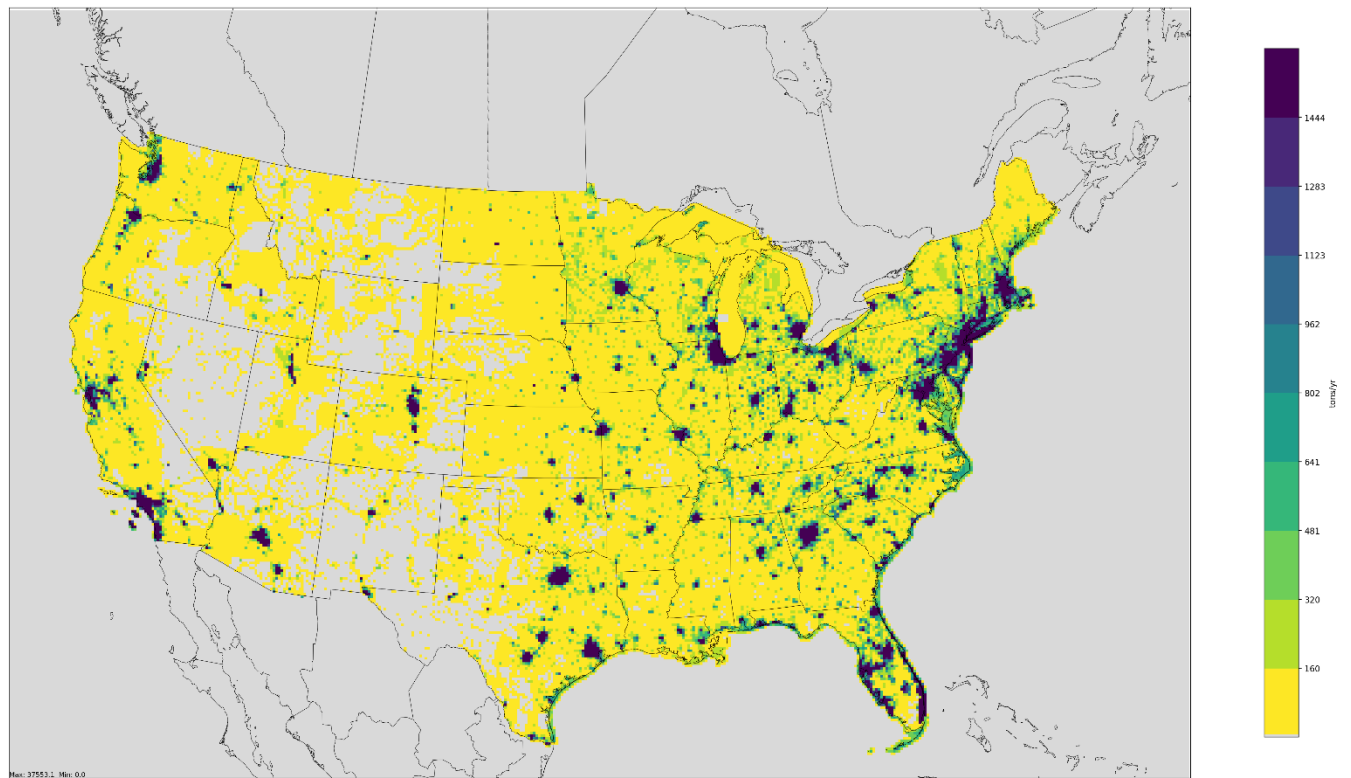


Figure 8. Annual nonroad emissions of NH₃ across the 12-km CONUS domain for 2016

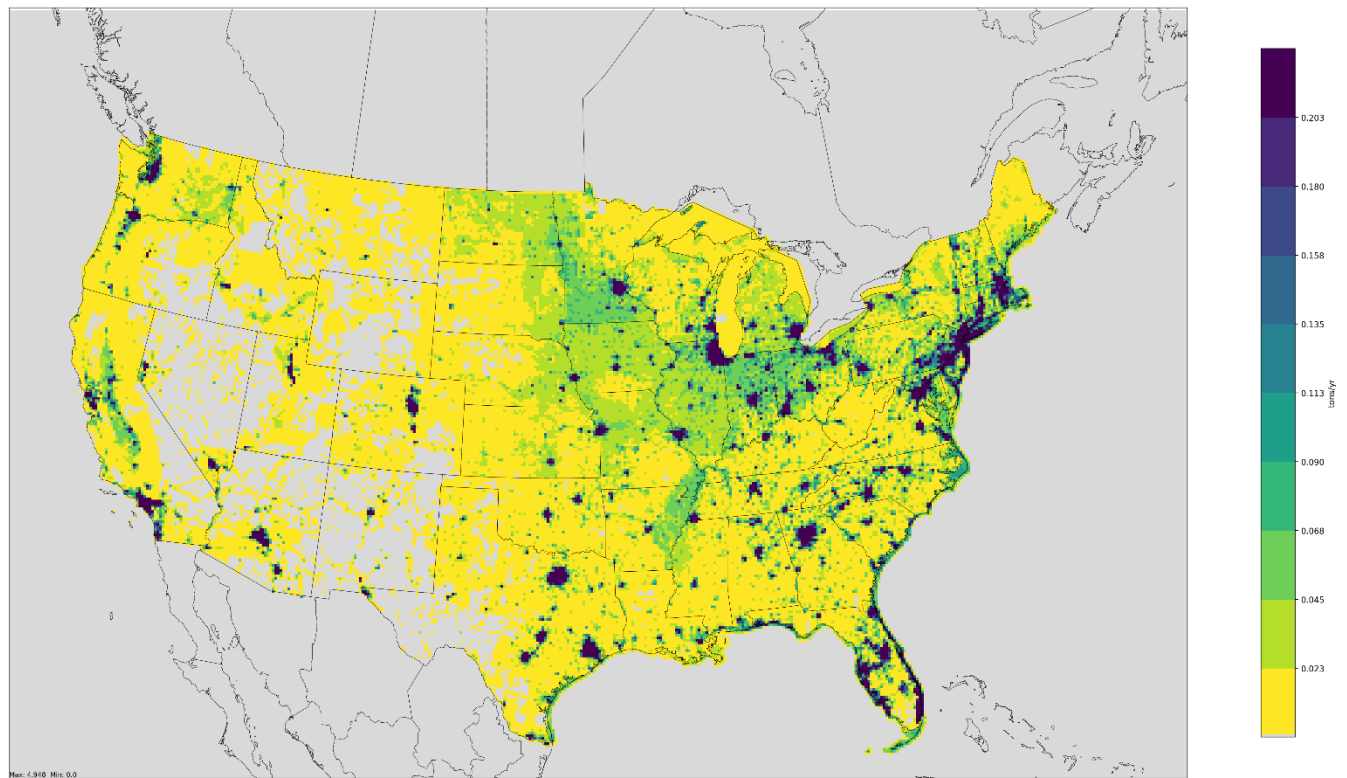


Figure 9. Annual nonroad emissions of NOx across the 12-km CONUS domain for 2016

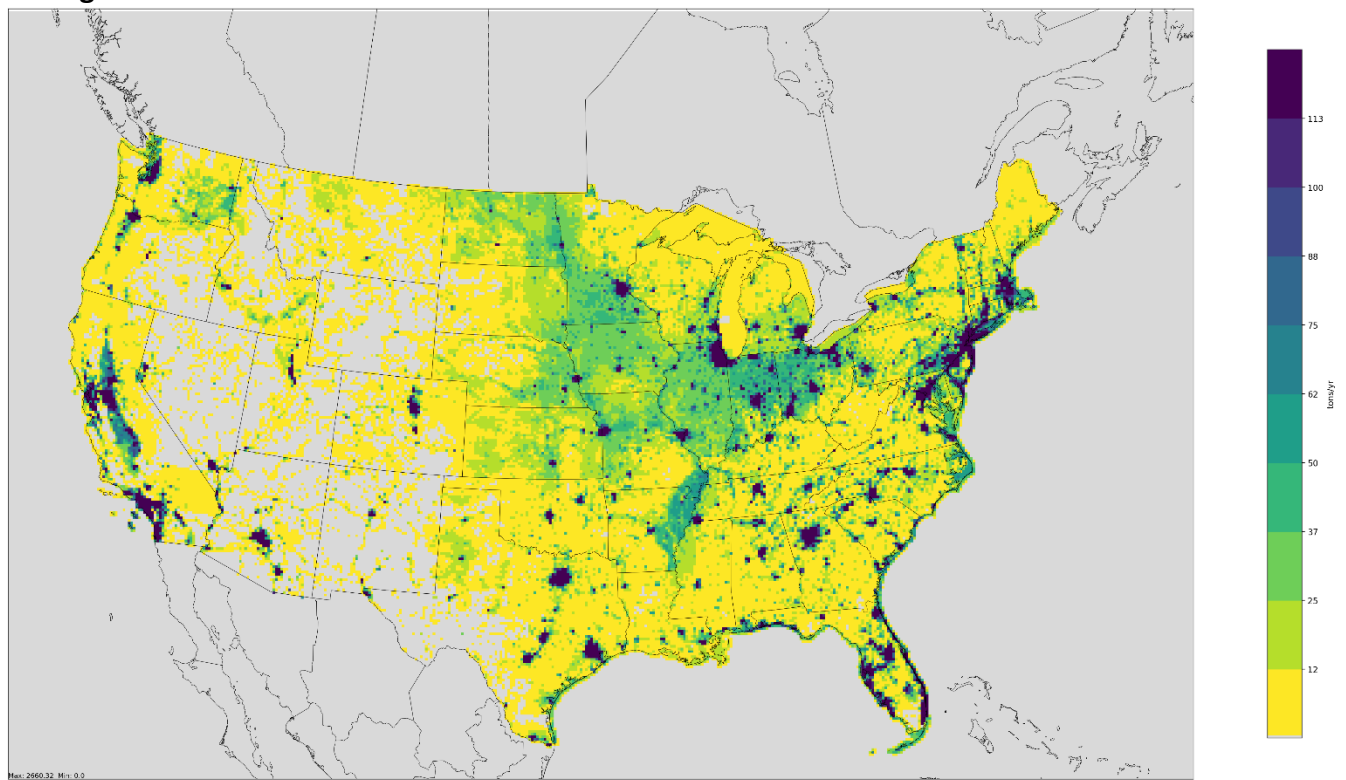


Figure 10. Annual nonroad emissions of PM2.5 across the 12-km CONUS domain for 2016

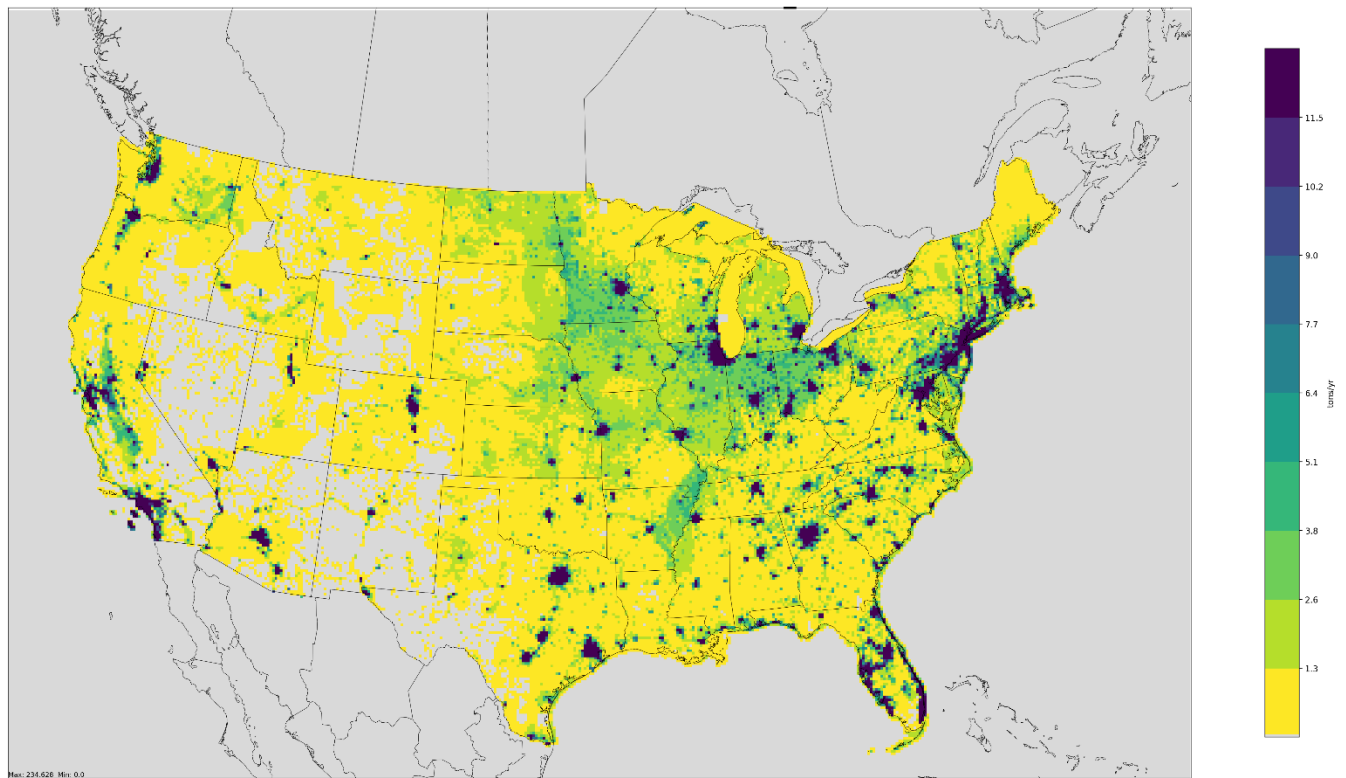


Figure 11. Annual nonroad emissions of SO₂ across the 12-km CONUS domain for 2016

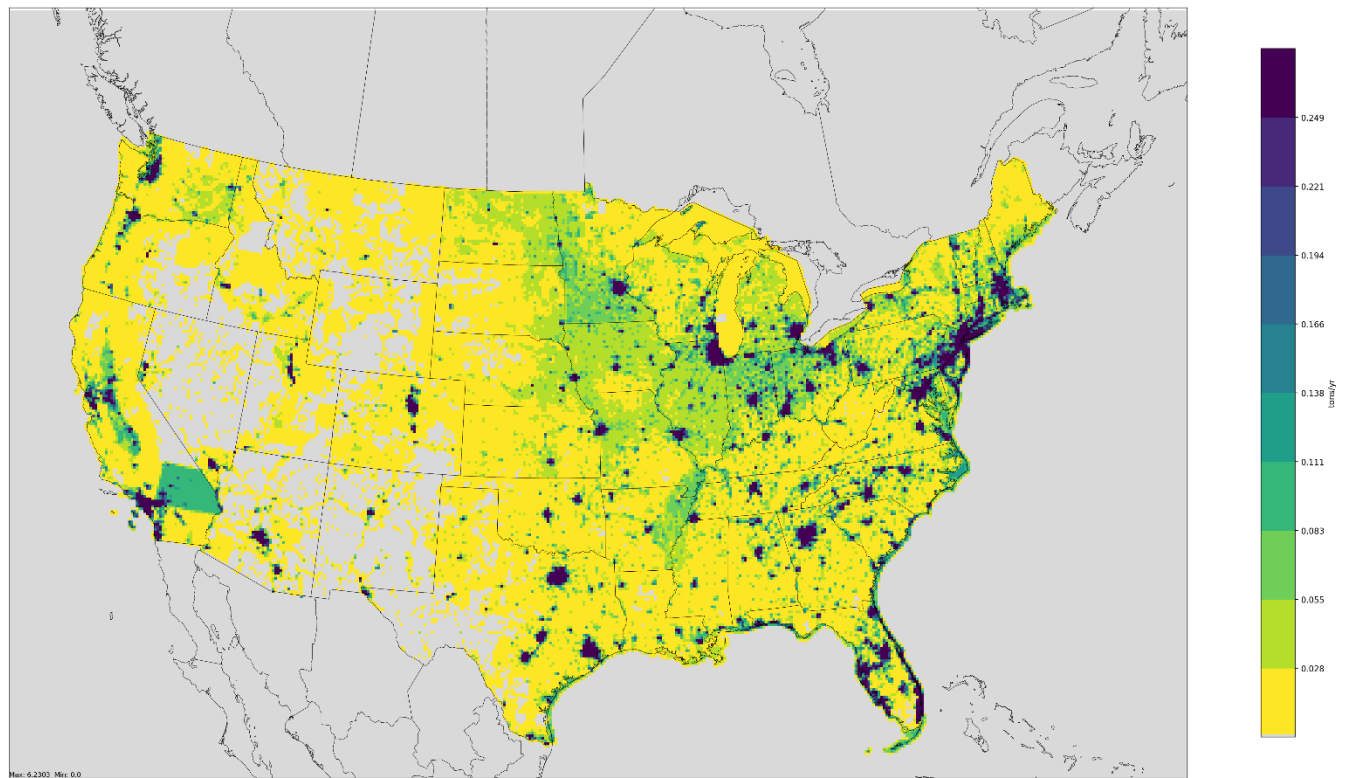
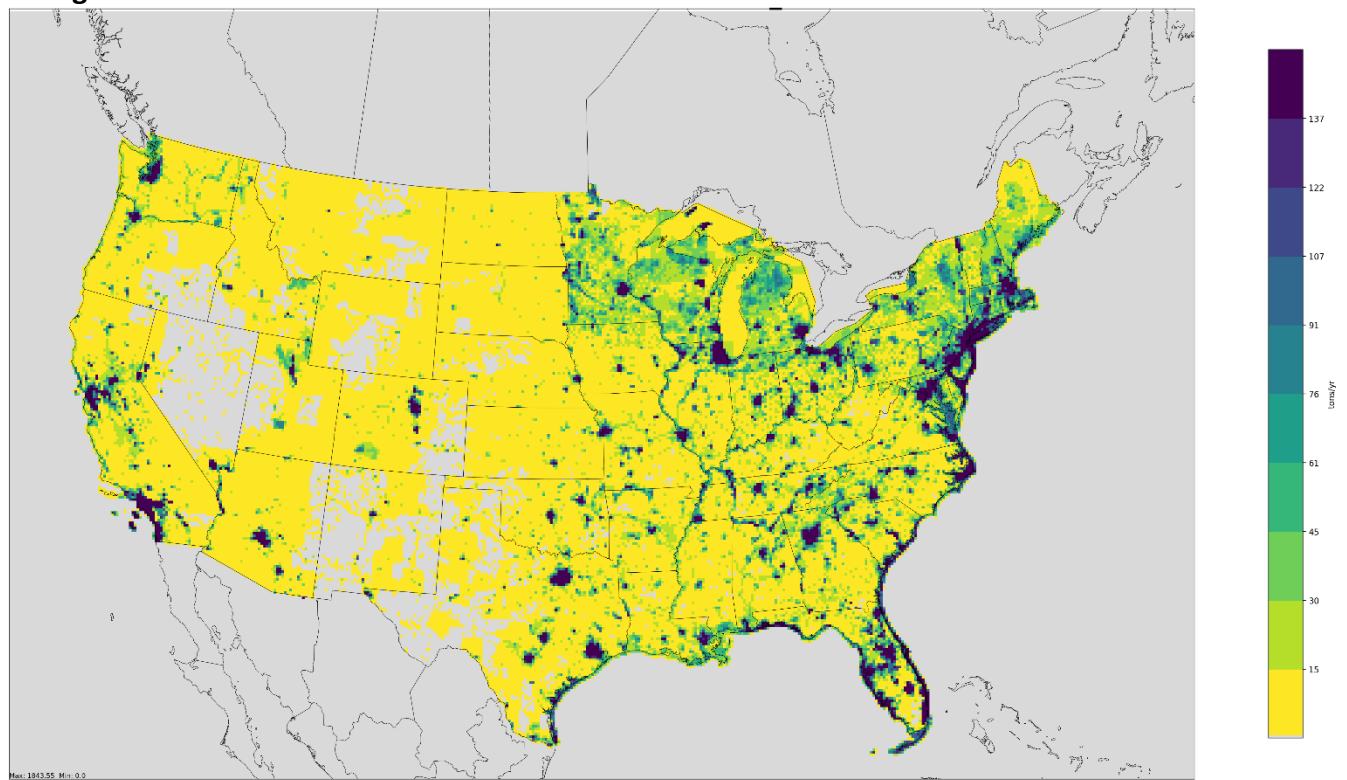


Figure 12. Annual nonroad emissions of VOC across the 12-km CONUS domain for 2016



APPENDIX A

Table A-1. Nonroad Agricultural Equipment SCCs in the 2016 platform.

SCC	SCC Description
2260005035	2-Stroke Sprayers
2265005010	4-Stroke 2-Wheel Tractors
2265005015	4-Stroke Agricultural Tractors
2265005020	4-Stroke Combines
2265005025	4-Stroke Balers
2265005030	4-Stroke Agricultural Mowers
2265005035	4-Stroke Sprayers
2265005040	4-Stroke Tillers (6 HP)
2265005045	4-Stroke Swathers
2265005055	4-Stroke Other Agricultural Equipment
2265005060	4-Stroke Irrigation Sets
2268005055	CNG Other Agricultural Equipment
2268005060	CNG Irrigation Sets
2270005010	Diesel 2-Wheel Tractors
2270005015	Diesel Agricultural Tractors
2270005020	Diesel Combines
2270005025	Diesel Balers
2270005030	Diesel Agricultural Mowers
2270005035	Diesel Sprayers
2270005040	Diesel Tillers (6 HP)
2270005045	Diesel Swathers
2270005055	Diesel Other Agricultural Equipment
2270005060	Diesel Irrigation Sets
2267005055	LPG Other Agricultural Equipment
2267005060	LPG Irrigation Sets

Table A-2. Nonroad Construction Equipment SCCs in the 2016 platform.

SCC	SCC Description
2260002006	2-Stroke Tampers/Rammers
2260002009	2-Stroke Plate Compactors
2260002021	2-Stroke Paving Equipment
2260002027	2-Stroke Signal Boards/Light Plants
2260002039	2-Stroke Concrete/Industrial Saws
2260002054	2-Stroke Crushing/Processing Equipment
2265002003	4-Stroke Pavers
2265002006	4-Stroke Tampers/Rammers

2265002009	4-Stroke Plate Compactors
2265002015	4-Stroke Rollers
2265002021	4-Stroke Paving Equipment
2265002024	4-Stroke Surfacing Equipment
2265002027	4-Stroke Signal Boards/Light Plants
2265002030	4-Stroke Trenchers
2265002033	4-Stroke Bore/Drill Rigs
2265002039	4-Stroke Concrete/Industrial Saws
2265002042	4-Stroke Cement and Mortar Mixers
2265002045	4-Stroke Cranes
2265002054	4-Stroke Crushing/Processing Equipment
2265002057	4-Stroke Rough Terrain Forklifts
2265002060	4-Stroke Rubber Tire Loaders
2265002066	4-Stroke Tractors/Loaders/Backhoes
2265002072	4-Stroke Skid Steer Loaders
2265002078	4-Stroke Dumpers/Tenders
2265002081	4-Stroke Other Construction Equipment
2268002081	CNG Other Construction Equipment
2270002003	Diesel Pavers
2270002006	Diesel Tampers/Rammers
2270002009	Diesel Plate Compactors
2270002015	Diesel Rollers
2270002018	Diesel Scrapers
2270002021	Diesel Paving Equipment
2270002024	Diesel Surfacing Equipment
2270002027	Diesel Signal Boards/Light Plants
2270002030	Diesel Trenchers
2270002033	Diesel Bore/Drill Rigs
2270002036	Diesel Excavators
2270002039	Diesel Concrete/Industrial Saws
2270002042	Diesel Cement and Mortar Mixers
2270002045	Diesel Cranes
2270002048	Diesel Graders
2270002051	Diesel Off-highway Trucks
2270002054	Diesel Crushing/Processing Equipment
2270002057	Diesel Rough Terrain Forklifts
2270002060	Diesel Rubber Tire Loaders
2270002066	Diesel Tractors/Loaders/Backhoes
2270002069	Diesel Crawler Tractor/Dozers
2270002072	Diesel Skid Steer Loaders
2270002075	Diesel Off-highway Tractors
2270002078	Diesel Dumpers/Tenders

2270002081	Diesel Other Construction Equipment
2267002003	LPG Pavers
2267002015	LPG Rollers
2267002021	LPG Paving Equipment
2267002024	LPG Surfacing Equipment
2267002030	LPG Trenchers
2267002033	LPG Bore/Drill Rigs
2267002039	LPG Concrete/Industrial Saws
2267002045	LPG Cranes
2267002054	LPG Crushing/Processing Equipment
2267002057	LPG Rough Terrain Forklifts
2267002060	LPG Rubber Tire Loaders
2267002066	LPG Tractors/Loaders/Backhoes
2267002072	LPG Skid Steer Loaders
2267002081	LPG Other Construction Equipment

Table A-3. Nonroad Industrial Equipment SCCs in the 2016 platform.

SCC	SCC Description
2260003030	2-Stroke Sweepers/Scrubbers
2260003040	2-Stroke Other Industrial Equipment
2265003010	4-Stroke Aerial Lifts
2265003020	4-Stroke Forklifts
2265003030	4-Stroke Sweepers/Scrubbers
2265003040	4-Stroke Other General Industrial Equipment
2265003050	4-Stroke Other Material Handling Equipment
2265003060	4-Stroke AC/Refrigeration
2265003070	4-Stroke Terminal Tractors
2268003020	CNG Forklifts
2268003030	CNG Sweepers/Scrubbers
2268003040	CNG Other General Industrial Equipment
2268003060	CNG AC/Refrigeration
2268003070	CNG Terminal Tractors
2270003010	Diesel Aerial Lifts
2270003020	Diesel Forklifts
2270003030	Diesel Sweepers/Scrubbers
2270003040	Diesel Other General Industrial Equipment
2270003050	Diesel Other Material Handling Equipment
2270003060	Diesel AC/Refrigeration
2270003070	Diesel Terminal Tractors
2267003010	LPG Aerial Lifts
2267003020	LPG Forklifts

2267003030	LPG Sweepers/Scrubbers
2267003040	LPG Other General Industrial Equipment
2267003050	LPG Other Material Handling Equipment
2267003070	LPG Terminal Tractors

Table A-4. Nonroad Commercial Equipment SCCs in the 2016 platform.

SCC	SCC Description
2260006005	2-Stroke Generator Sets
2260006010	2-Stroke Pumps
2260006015	2-Stroke Air Compressors
2260006035	2-Stroke Hydro-power Units
2265006005	4-Stroke Generator Sets
2265006010	4-Stroke Pumps
2265006015	4-Stroke Air Compressors
2265006025	4-Stroke Welders
2265006030	4-Stroke Pressure Washers
2265006035	4-Stroke Hydro-power Units
2268006005	CNG Generator Sets
2268006010	CNG Pumps
2268006015	CNG Air Compressors
2268006020	CNG Gas Compressors
2268006035	CNG Hydro-power Units
2270006005	Diesel Generator Sets
2270006010	Diesel Pumps
2270006015	Diesel Air Compressors
2270006020	Diesel Gas Compressors
2270006025	Diesel Welders
2270006030	Diesel Pressure Washers
2270006035	Diesel Hydro-power Units
2267006005	LPG Generator Sets
2267006010	LPG Pumps
2267006015	LPG Air Compressors
2267006025	LPG Welders
2267006030	LPG Pressure Washers
2267006035	LPG Hydro-power Units

Table A-5. Nonroad Lawn & Garden Equipment SCCs in the 2016 platform.

SCC	SCC Description
2260004015	2-Stroke Rotary Tillers < 6 HP (Residential)
2260004016	2-Stroke Rotary Tillers < 6 HP (Commercial)

2260004020	2-Stroke Chain Saws < 6 HP (Residential)
2260004021	2-Stroke Chain Saws < 6 HP (Residential)
2260004025	2-Stroke Trimmers/Edgers/Brush Cutters (Residential)
2260004026	2-Stroke Trimmers/Edgers/Brush Cutters (Commercial)
2260004030	2-Stroke Leafblowers/Vacuums (Residential)
2260004031	2-Stroke Leafblowers/Vacuums (Commercial)
2260004035	2-Stroke Snowblowers (Residential)
2260004036	2-Stroke Snowblowers (Commercial)
2260004071	2-Stroke Turf Equipment (Commercial)
2265004010	4-Stroke Lawn Mowers (Residential)
2265004011	4-Stroke Lawn Mowers (Commercial)
2265004015	4-Stroke Rotary Tillers < 6 HP (Residential)
2265004016	4-Stroke Rotary Tillers < 6 HP (Commercial)
2265004025	4-Stroke Trimmers/Edgers/Brush Cutters (Residential)
2265004026	4-Stroke Trimmers/Edgers/Brush Cutters (Commercial)
2265004030	4-Stroke Leafblowers/Vacuums (Residential)
2265004031	4-Stroke Leafblowers/Vacuums (Commercial)
2265004035	4-Stroke Snowblowers (Residential)
2265004036	4-Stroke Snowblowers (Commercial)
2265004040	4-Stroke Rear Engine Riding Mowers (Residential)
2265004041	4-Stroke Rear Engine Riding Mowers (Commercial)
2265004046	4-Stroke Front Mowers (Commercial)
2265004051	4-Stroke Shredders < 6 HP (Commercial)
2265004055	4-Stroke Lawn and Garden Tractors (Residential)
2265004056	4-Stroke Lawn and Garden Tractors (Commercial)
2265004066	4-Stroke Chippers/Stump Grinders (Commercial)
2265004071	4-Stroke Turf Equipment (Commercial)
2265004075	4-Stroke Other Lawn and Garden Equipment (Residential)
2265004076	4-Stroke Other Lawn and Garden Equipment (Commercial)
2270004031	Diesel Leafblowers/Vacuums (Commercial)
2270004036	Diesel Snowblowers (Commercial)
2270004046	Diesel Front Mowers (Commercial)
2270004056	Diesel Lawn and Garden Tractors (Commercial)
2270004066	Diesel Chippers/Stump Grinders (Commercial)
2270004071	Diesel Turf Equipment (Commercial)
2270004076	Diesel Other Lawn and Garden Equipment (Commercial)
2267004066	LPG Chippers/Stump Grinders (Commercial)

Table A-6. Nonroad Recreational Equipment SCCs in the 2016 platform.

SCC	SCC Description
2260001010	2-Stroke Off-road Motorcycles

2260001020	2-Stroke Snowmobiles
2260001030	2-Stroke All Terrain Vehicles
2260001060	2-Stroke Specialty Vehicles/Carts
2265001010	4-Stroke Off-road Motorcycles
2265001030	4-Stroke Snowmobiles
2265001050	4-Stroke All Terrain Vehicles
2265001060	4-Stroke Specialty Vehicles/Carts
2270001060	Diesel Specialty Vehicles/Carts
2267001060	LPG Specialty Vehicles/Carts

Table A-7. Nonroad Pleasure Craft SCCs in the 2016 platform.

SCC	SCC Description
2282005010	2-Stroke Outboard
2282005015	2-Stroke Personal Watercraft
2282010005	4-Stroke Inboard/Sterndrive
2282020005	Diesel Inboard/Sterndrive
2282020010	Diesel Outboard

Table A-8. Nonroad Logging Equipment SCCs in the 2016 platform.

SCC	SCC Description
2260007005	2-Stroke Chain Saws > 6 HP
2265007010	4-Stroke Shredders > 6 HP
2265007015	4-Stroke Feller/Bunch/Skidder
2270007015	Diesel Feller/Bunch/Skidder

Table A-9. Nonroad Railroad Equipment SCCs in the 2016 platform.

SCC	SCC Description
2285002015	Diesel Railway Maintenance Equipment
2285004015	4-Stroke Railway Maintenance Equipment
2285006015	LPG Railway Maintenance Equipment

Table A-10. Nonroad Underground Mining Equipment SCCs in the 2016 platform.

SCC	SCC Description
2270009010	Diesel Other Underground Mining Equipment