2022 Regulatory Emissions Modeling Platform Quarterly Update

National Emissions Collaborative

May 1, 2024




Agenda

- Summary of activities and accomplishments to date
- Communication support update
- 2022v1 draft data release
- U.S. EPA 2022 AQ modeling update
- 2022v1 emissions data summaries
- Analytic year review/development plans
- Schedule reminders
- Next steps

2022 EMP Collaborative

- Co-leads
  - Zac Adelman (LADCO), Mary Uhl (WESTAR), and Alison Eyth (EPA OAQPS)
- Communication support
  - Rhonda Payne (WESTAR/WRAP), Tom Richardson (OK DEQ), Tom Moore (Denver/NFR RAQC)
- Coordination Committee
  - 28 members from MJOs, state agencies, and US EPA staff from OAQPS, OTAQ, and CAMD
  - Monthly calls
  - Quarterly outreach webinars
- Workgroups
  - Leverage existing national emissions workgroups
  - Some 2022-specific workgroups have been created, e.g., fires and projection

Communication Support Update

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2022 EMP Communications Plan

Goals of Outreach

- Broaden and focus engagement via targeted outreach to national and regional committee and workgroup meetings throughout project lifecycle
- Augment and reinforce mainstream EMP work as communication facilitators and advocates
- Emphasize the importance of involvement in deciding EMP data to represent your jurisdiction

Communications Outreach since last Quarterly Report Out

Feb. 7	2022 EMP National Report Out – Quarterly Update	
8	National Oil & Gas Emissions Committee (NOGEC)	Contact: Jeff Vukovich
15	MJO MOVES Workgroup 3rd Thursday of each month at 3 Eastern	Contact: Marc Cone
21	CMV Committee - 3rd Wednesday at 11 Eastern	Contact: Marc Cone
21	Nonpoint Methods Advisory (NOMAD) Committee– 2 Eastern	Contact: Jennifer Snyder
22	National EGU Workgroup / Projections Task Force – 4th Thursday at 2 Eastern	Contact: Serpil Kayin
Mar. 14	NOGEC meeting - 2nd Thursday at 2 Eastern	Contact: Jeff Vukovich
26	Northeast EI Leads meeting	Contact: Susan McCusker
Apr. 17	NOMAD Committee – 2 Eastern	Contact: Jennifer Snyder
18	WESTAR/WRAP Spring Business Meeting	Contact: Rhonda Payne
18	AAPCA Emissions Inventory Committee Call	Contact: Morgan Dickie
May 1	2022 EMP National Report Out – Quarterly Update	

Communications Outreach Plans for May-July

May 1*	2022 EMP Projections Workgroup – 4 Eastern	Contact: Zac Adelman
9	National Oil & Gas Emissions Committee (NOGEC) - 2 Eastern	Contact: Jeff Vukovich
15	Nonpoint Methods Advisory (NOMAD) Committee– 2 Eastern	Contact: Jennifer Snyder
23	National EGU Workgroup / Projections Task Force – 4th Thursday at 2 Eastern	Contact: Serpil Kayin
June 4*	NACAA Emissions & Modeling Committee – 2 Eastern	Contact: Karen Mongoven
5	2022 EMP Projections Workgroup – 4 Eastern	Contact: Zac Adelman
13	NOGEC - 2 Eastern	Contact: Jeff Vukovich
19	CMV Committee - 3rd Wednesday at 11 Eastern	Contact: Jesse Carpentier
20	MJO MOVES Workgroup 3rd Thursday of each month at 3 Eastern	Contact: Jesse Carpentier
July 3*	2022 EMP Projections Workgroup – 4 Eastern	Contact: Zac Adelman
11	NOGEC - 2 Eastern	Contact: Jeff Vukovich
25	AAPCA Emissions Inventory Committee Call	Contact: Morgan Dickie

*updates on activities of sector projection task forces

A Note on Collaboration

- Data Review Period:
    - Reviewing and providing feedback on the data was a significant accomplishment!
    - For many, this period marked the first exposure to draft data that will be used for many analysis and planning purposes
    - Keep in mind - this won't be the only data review period

- It is important to stay involved
    - Take advantage of data review periods
    - Review of analytic year data is next (late Summer) and is very important

Key Topics for Future Outreach

- Analytic year work will take center stage over the next two quarters
- Careful consideration of what is projected and what is held constant.
- Emphasis on the importance of agencies getting their analytic year approach feedback to EPA early!

2022v1 Analytic Year Timeline

Q2 2024
- Collect data from SLT agencies for analytic year emissions
- Develop 2022v1 analytic year inventories

Q3 2024
- 30-day SLT review of 2022v1 analytic year inventories

Q4 2024
- Finalize analytic year inventories
- 2022v1 platform release
- 2022v1 final technical support documentation

2022v1 Emissions Data Release

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2022v1 Draft Base Year Release

- Draft data for all planned sectors have been released in the data review tool
  - Most data were released April 1; some were released April 8 and 17
  - 2022-specific fertilizer emissions will be computed over the summer
- A Sharepoint site is being used to collect comments on the data
- Links to these sites and high-level summary documentation are available on the EPA web site

  https://www.epa.gov/air-emissions-modeling/2022v1-emissions-modeling-platform

Review Schedule Update:

Due to the delay in posting data for some sectors, the last day to submit comments is now May 17

2022v1 Emissions Modeling Platform

The 2022 Emissions Modeling Platform is based on the 2020 National Emissions Inventory released in the spring of 2023 with updates to better represent 2022. It is being created as a product of the National Emissions Inventory Collaborative and will support multiple regulatory and non-regulatory applications. The modeling platform will contain emissions inventories for 2022, spatial surrogates, temporal profiles, and other ancillary files. The platform will include projection years as well. Version 1 of the 2022 platform is currently being developed. Version 2 of the platform is scheduled to be developed in 2025.

- 2022v1 Data Files and Summaries
- 2022v1 Summary Documentation
- 2022 National Emissions Collaborative Wiki
- View the 2022v1 Emissions Data Retrieval Tool
- Comment on the 2022v1 EMP [comment window closes 4/30]

If you would like to provide EPA with a comment on the 2022v1 EMP and have not received an invite to "collaborate on Comments on the 2022v1 EMP," please use the Contact Us link below (include "2022v1 EMP Comment Access" and your email address in the "Comments" box). Following this request, you will receive an email with a link to the "Comments on the 2022v1 EMP" SharePoint site.

Snapshot of Some Comments on the Sharepoint Site

Submit a 2022v1 EMP Comment

Name	Date	Organization	Email	EIS Sector
Mark Muldoon	04/08/2024 11:00 AM	Texas Commission on Environmental Quality	mark.muldoon@tceq.texas.gov	Industrial Processes - Petroleum Re
Farren Thorpe	04/08/2024 12:00 PM	Washington State Department of Ecology	fher461@ecy.wa.gov	Industrial Processes - Pulp & Paper
Paige McDaniel	04/11/2024 02:00 PM	North Dakota Department of Environmental Quality	pmcdaniel@nd.gov	Fuel Comb - Electric Generation - C
Paige McDaniel	04/11/2024 02:00 PM	North Dakota Department of Environmental Quality	pmcdaniel@nd.gov	Fuel Comb - Electric Generation - C

Examples of Comments Received

So far, comments have been received from:
CO, CT, DE, GA, ID, IN, KS, MI, MN, NC, ND,
NH, NY, SC, OR, TX, VA, WA – Thank you all!

Q: The unpaved road dust is higher than expected

A: We posted unadjusted emissions instead of met-adjusted or met. and transportable fraction adjusted - the modeling will use both types of adjustments.

Q: Some facility emissions were posted multiple times.

A: There was a cross referencing bug in the tool

Q: Some facility emissions were not in the Retrieval Tool.

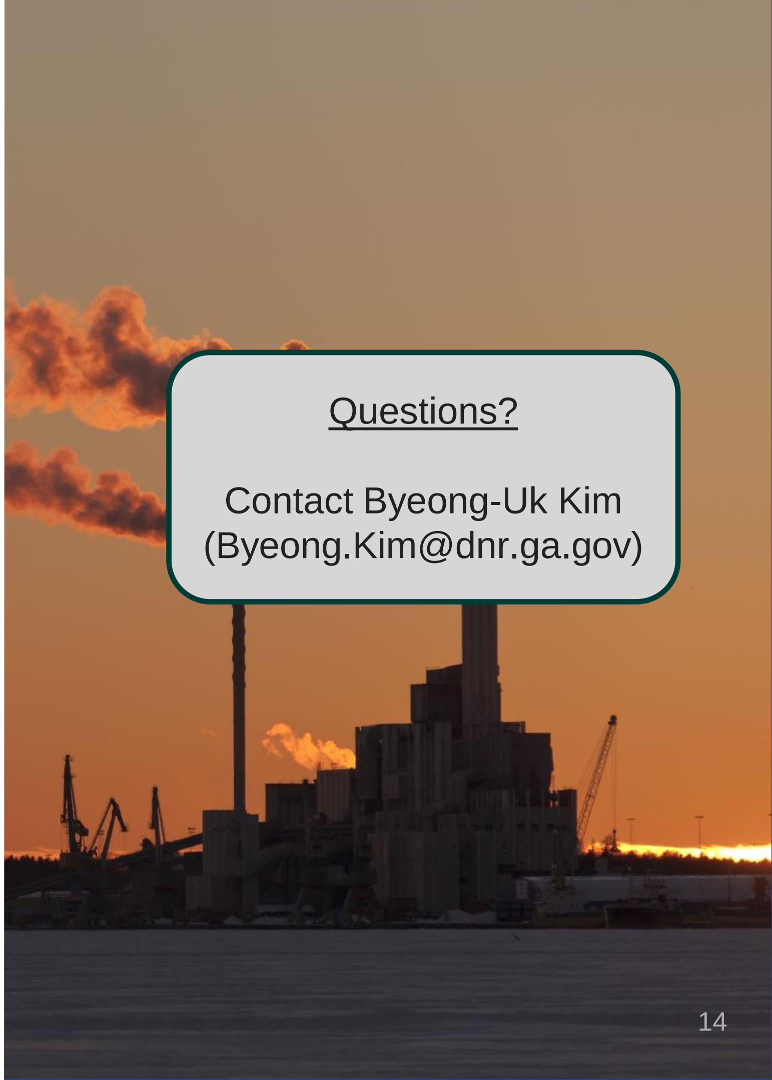
A: There was a bug in the tool that duplicated emissions when the facility had emissions from multiple modeling sectors (e.g., EGU and non-EGU); also facilities with counties ending in 777 are not included

Q: Some comments related to unit retirements and name changes.

A: The EIS windows for the facility inventory and 2022 emissions are still open

Ancillary Data Review

- Wiki: https://views.cira.colostate.edu/wiki/SiteSettings/Wiki/Index/12219
- Kickoff Meeting held on April 18, 2024
  - Mark Janssen (LADCO) provided review materials and the introduction:
    - Powerpoint presentation
    - Google Earth file for non-EGU point sources
    - Profiles: https://www.ladco.org/technical/modeling-results/2022_eic/#Reviews/Profile_Review
- Next Meeting on May 3, 2024
  - Anyone wants to join the review group should contact Byeong.Kim@dnr.ga.gov.



U.S. EPA 2022 Air Quality Modeling Update

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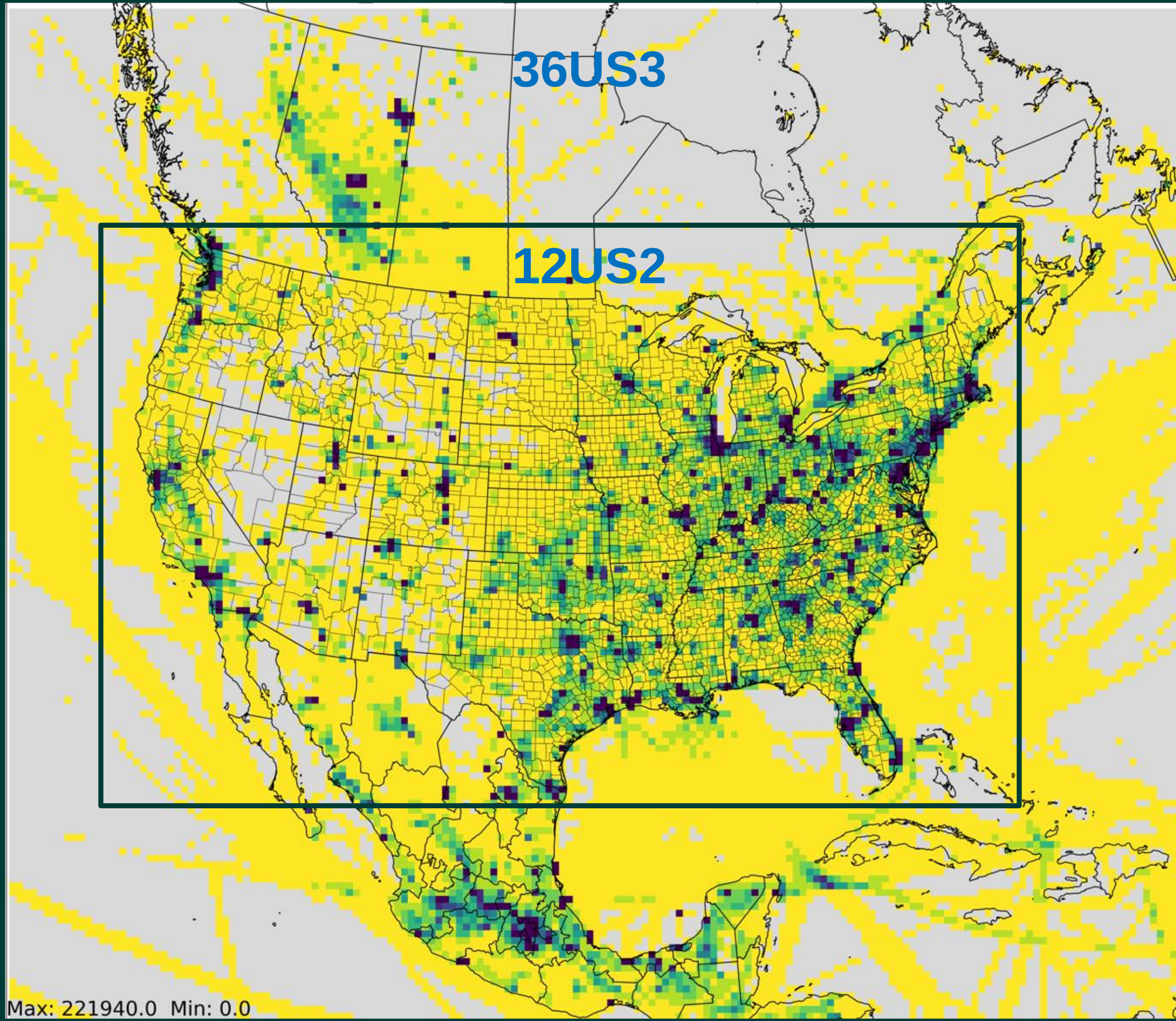
EPA's 2022 Air Quality Modeling Platform – Support for States

- Applications of WRF for 2022 to provide met data for the 36 km and 12 km AQ modeling domains (as shown on the next slide)
  - Documentation, including EPA's evaluation, and model outputs
- Global/Hemispheric modeling data from H-CMAQ, GEOS-Chem, and NASA GEOS-CF
  - Documentation, including EPA's evaluation of all three models, as well as model outputs for H-CMAQ and GEOS-Chem along with tools for accessing online GEOS-CF data
  - States can use these data to develop BCON data for their specific modeling domain(s)
  - EPA's model-ready 36US3 and 12US2 BCON data will not be available until later this year
- States can consider using EPA's data or their own met and BCON data for AQ modeling
- EPA is expecting that states will conduct their own base year AQ model runs and model performance evaluation

Geographic Extent

Similar to 2016 platform, we will perform CONUS modeling on 36US3 and on 12US2

36US3 outputs would be used to derive boundary conditions for 12US2

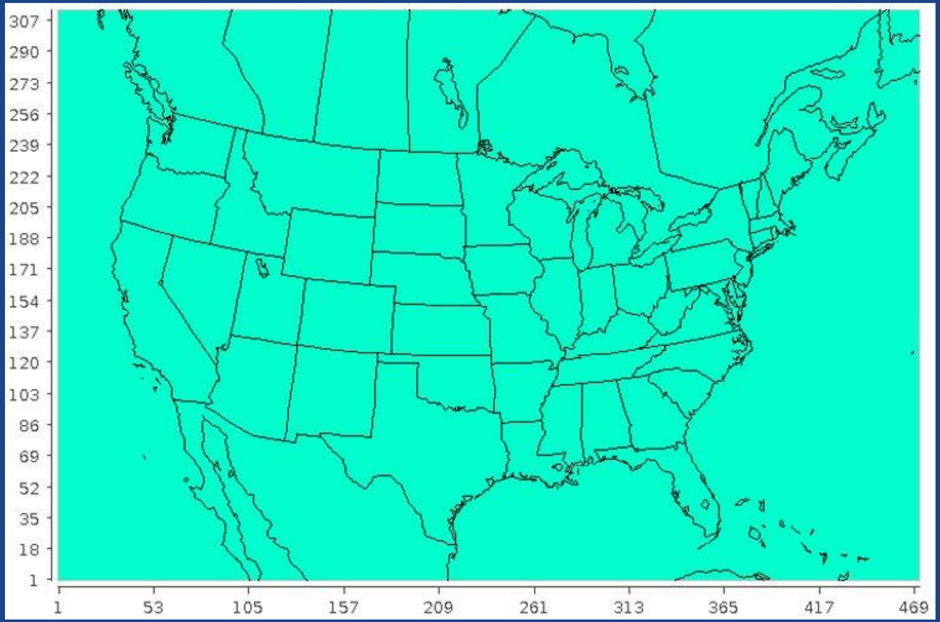


Meteorological Modeling for 2022

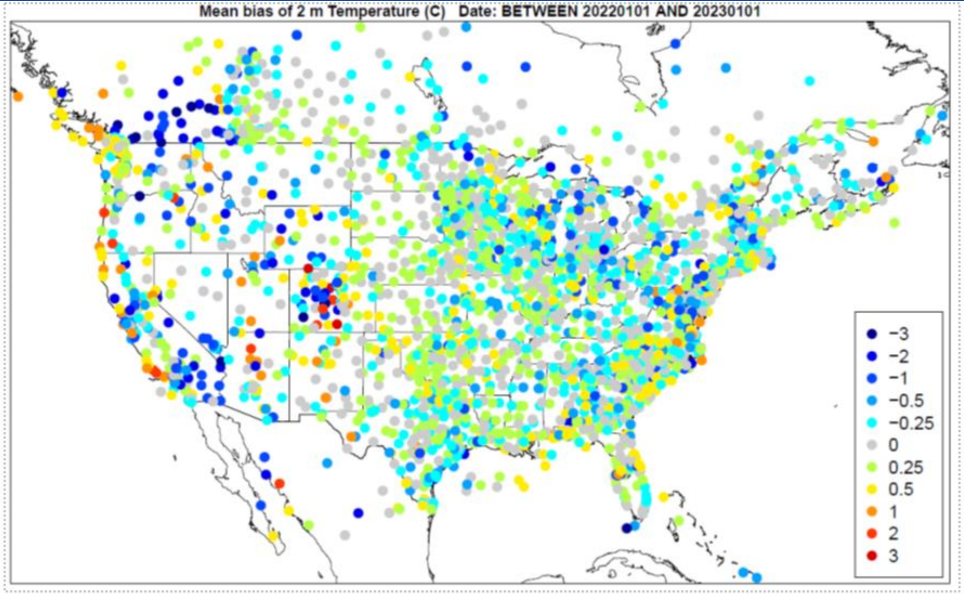
- 2022 meteorological data have been evaluated and ready for use for 12km CONUS
  - These are available for distribution as needed
  - 12km WRF and MCIP Data are available via Amazon Web Services (AWS): OAQPS 2022 Modeling Platform
- Data are also available, but not yet evaluated, for Alaska, Hawaii and Puerto Rico + Virgin Islands
- Meteorological model performance TSD is available on SCRAM

U.S. EPA WRF Configuration

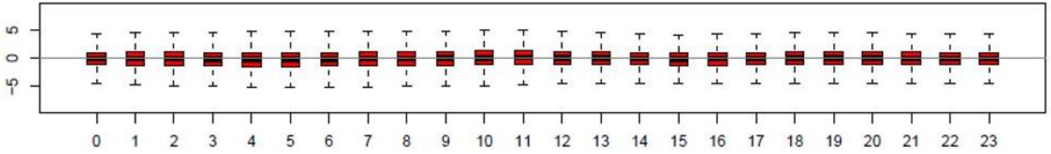
- Standard 12km CONUS
- WRF v4.4.2
- Base WRF setup:
  - Pleim-Xiu land-surface model
  - ACM2 PBL scheme
  - Kain-Fritsch Convective w/ cumulus/radiative feedback
  - GHRSST sea-surface temperatures
  - NAM initialization
  - Lightning assimilation



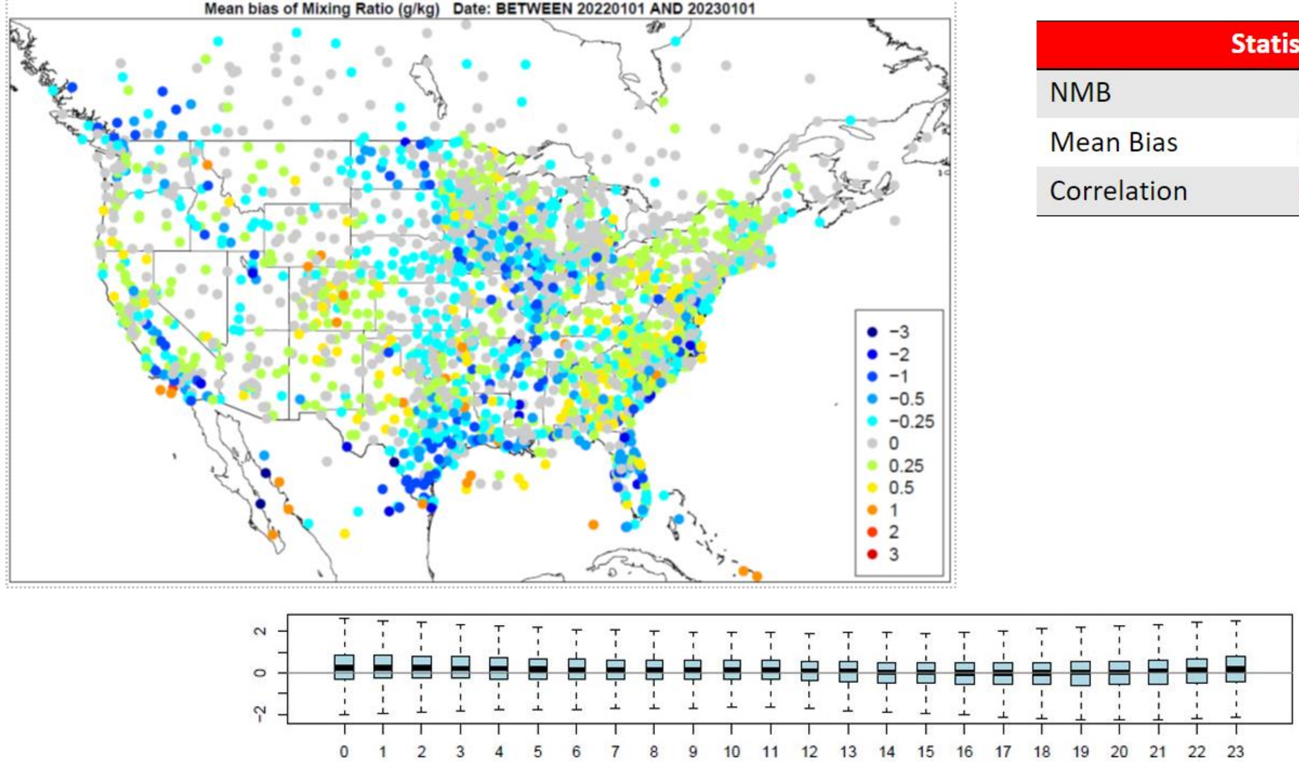
Spatial Bias – Temperature



Statistics	
NMB	0.03
Mean Bias	0.09
Correlation	0.99

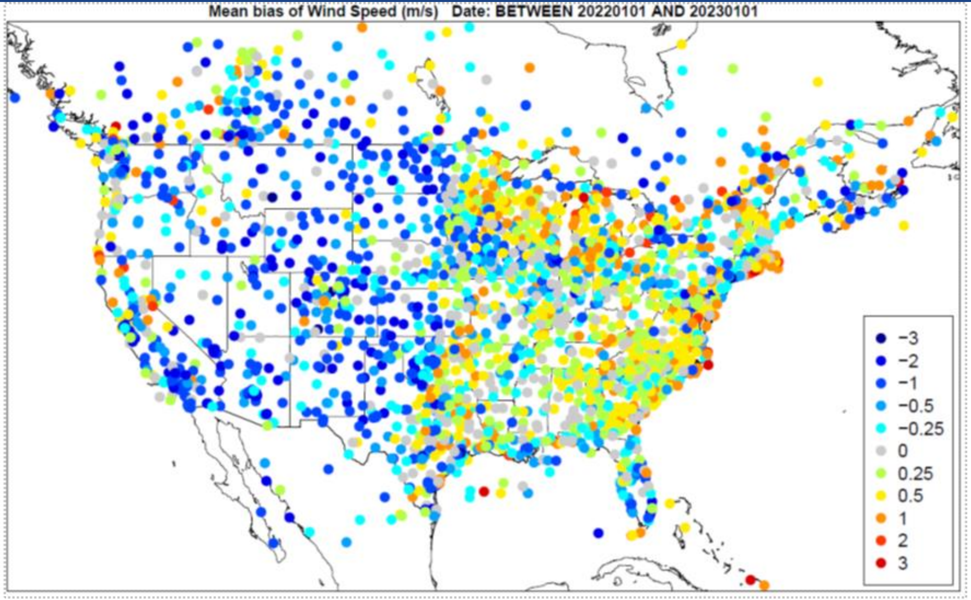


Spatial Bias – Mixing Ratio

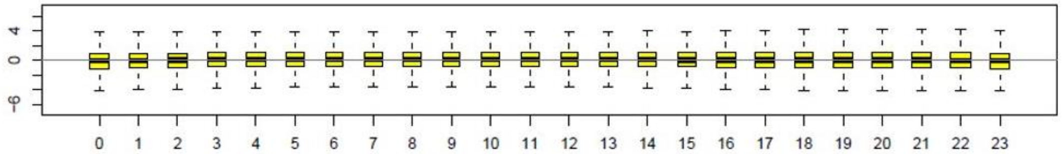


Statistics	
NMB	1.23
Mean Bias	0.09
Correlation	0.97

Spatial Bias – Wind Speed

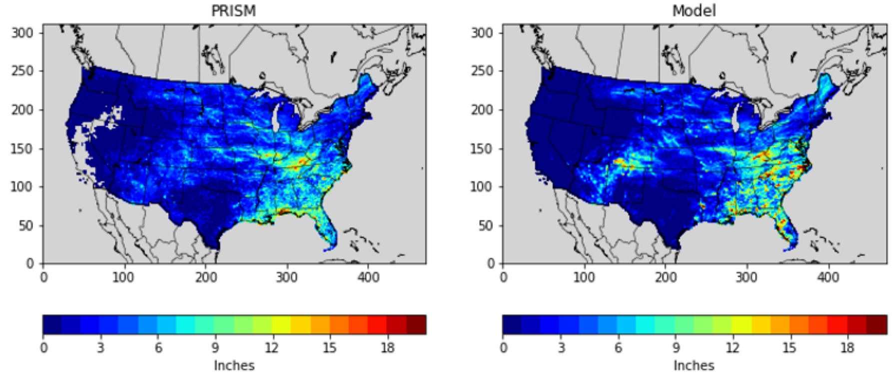


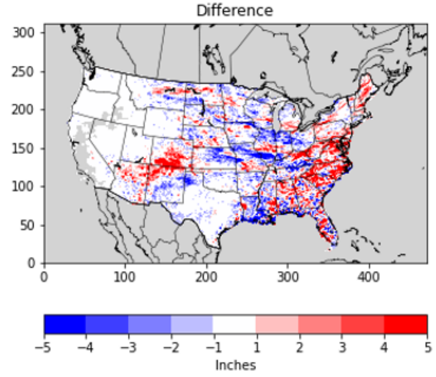
Statistics	
NMB	-0.17
Mean Bias	-0.01
Correlation	0.73



Model Performance – Precipitation

Precipitation, July 2022





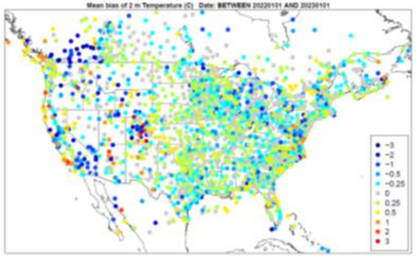
- Generally captures spatial features of precipitation well
- Struggles slightly with magnitude, particularly in complex terrain

Month	Domain Bias (mm)
January	4.95
February	3.20
March	3.22
April	3.97
May	0.56
June	0.20
July	0.44
August	-2.12
September	-1.70
October	-3.71
November	-0.66
December	1.65

WRF Sensitivity Runs

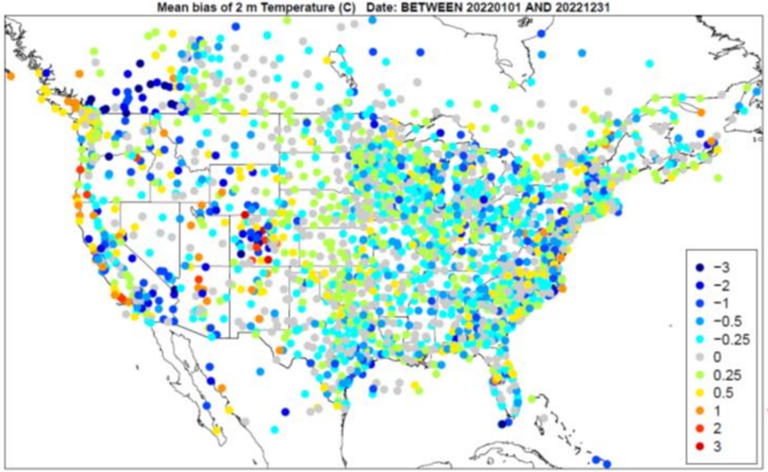
- U.S. EPA is asked routinely if we evaluate other meteorological setups in WRF
- We ran several sensitivity simulations to understand impacts of different options
  - Sensitivity 1 – No Lightning Assimilation (annual)
  - Sensitivity 2 – NOAH LSM and YSU PBL (annual)
    - Commonly used setup across community
  - Sensitivity 3 – Multi-scale Kain-Fritsch Convective (MSKF, Jun-Aug only)
    - Updated, scale-aware version of Kain-Fritsch. Lightning assimilation not available.

Spatial Bias – Temperature

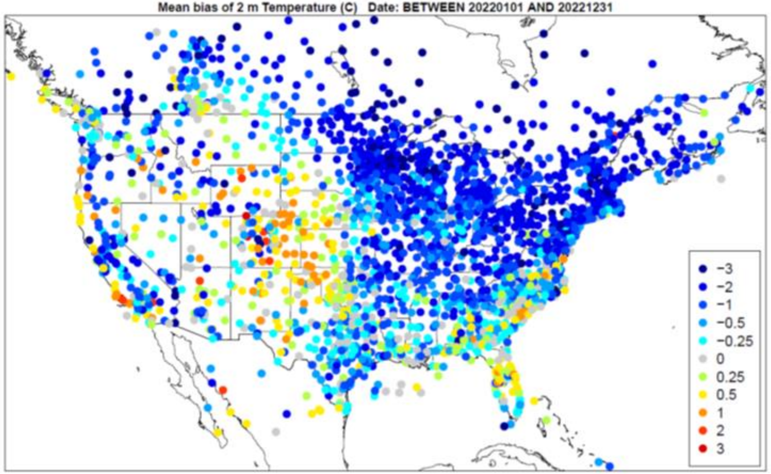


Run	Bias	NMB	Corr
Standard	0.09	0.03	0.99
No Lightning	0.04	0.01	0.99
NOAH/YSU	-0.63	-0.22	0.98

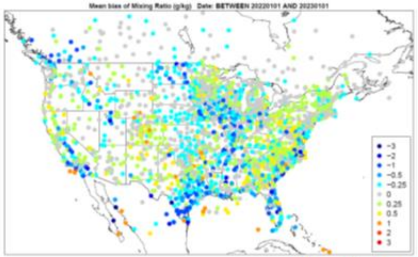
No Lightning



NOAH/YSU

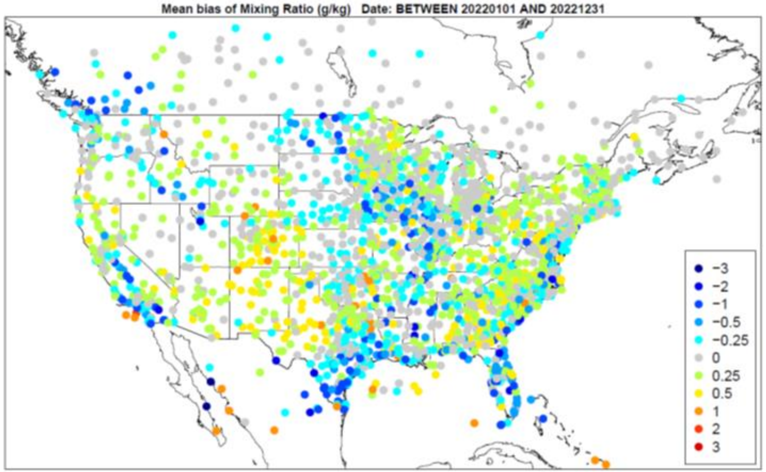


Spatial Bias – Mixing Ratio

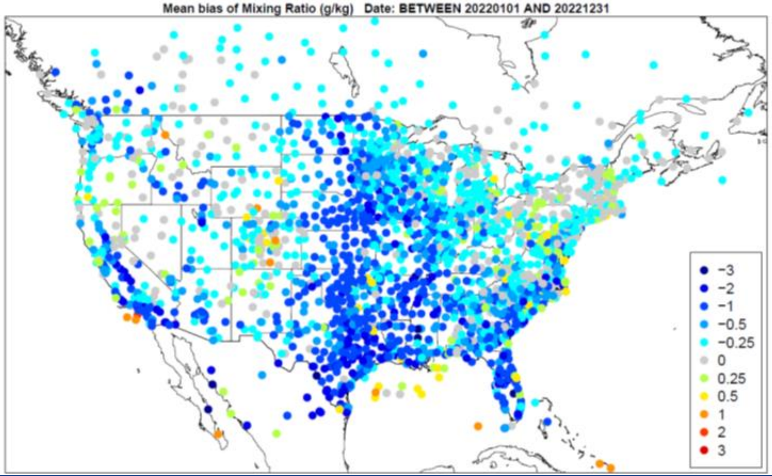


Run	Bias	NMB	Corr
Standard	0.09	1.23	0.97
No Lightning	0.14	1.83	0.97
NOAH/YSU	-0.30	-3.96	0.97

No Lightning



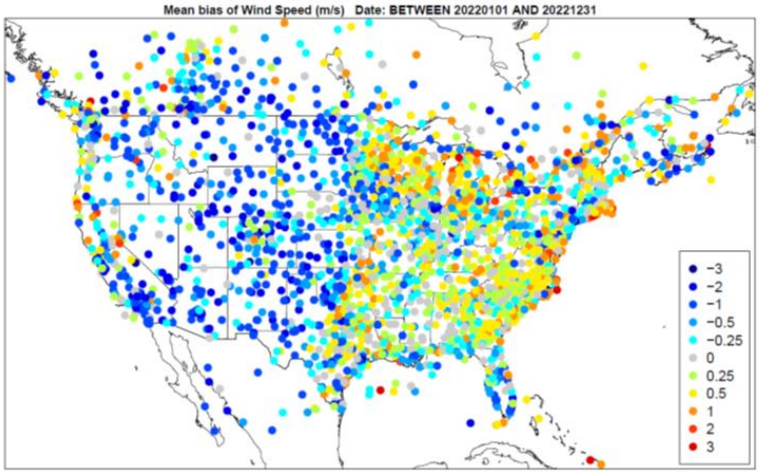
NOAH/YSU



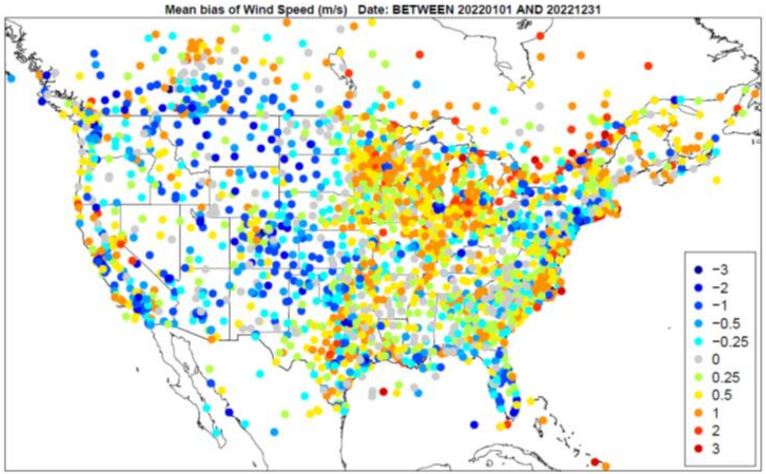
Spatial Bias – Wind Speed

Run	Bias	NMB	Corr
Standard	-0.01	-0.17	0.73
No Lightning	-0.03	-0.63	0.72
NOAH/YSU	0.30	6.99	0.70

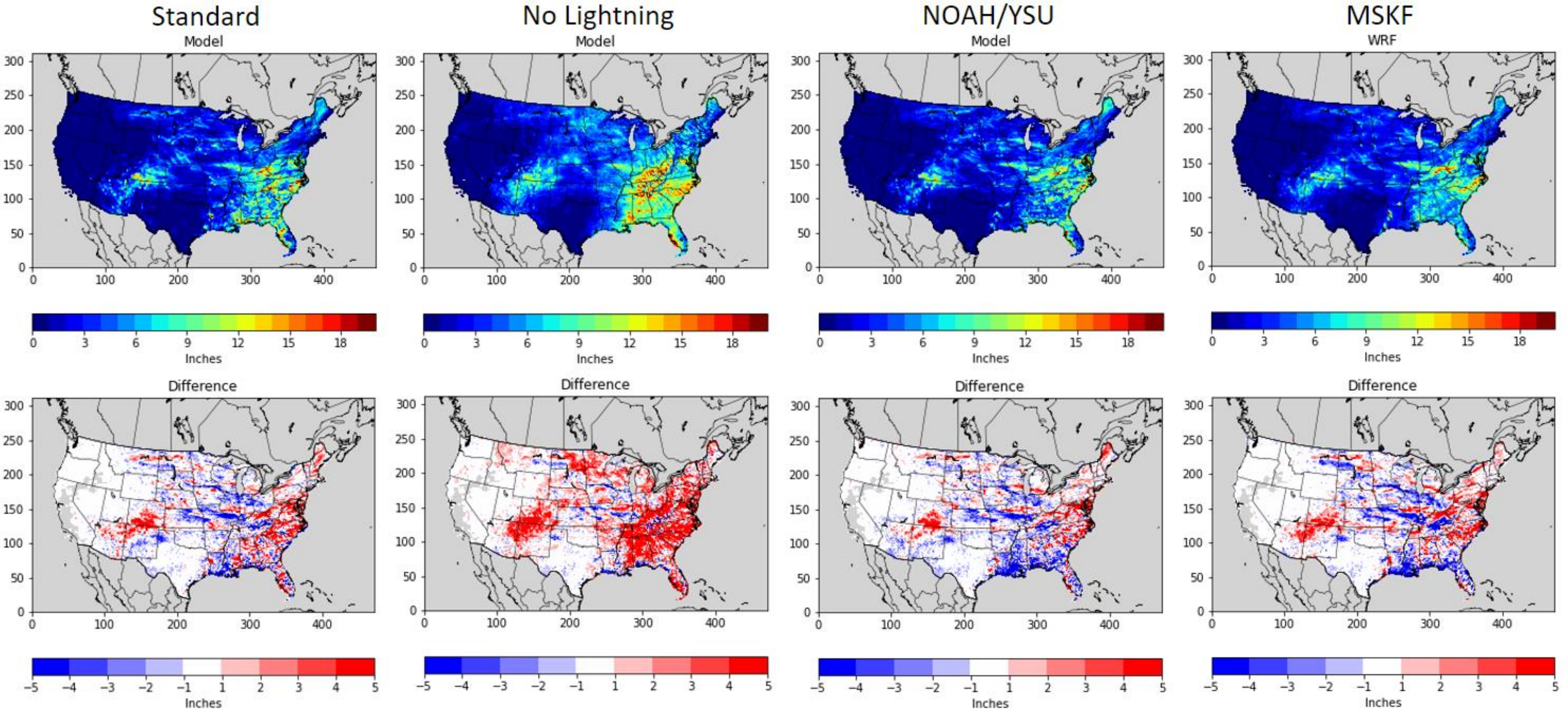
No Lightning



NOAH/YSU



WRF Sensitivity Comparison – Precipitation



WRF Sensitivity Comparisons – Precipitation Bias

Month	Standard	No Lightning	NOAH/YSU	MSKF
January	4.95	4.78	3.72	--
February	3.20	3.18	1.80	--
March	3.22	6.06	1.49	--
April	3.97	10.60	4.19	--
May	0.56	12.50	-0.33	--
June	0.20	17.29	-0.65	-4.12
July	0.44	31.10	-5.49	0.23
August	-2.12	32.55	-9.66	0.62
September	-1.70	9.74	-5.22	--
October	-3.71	-1.65	-5.38	--
November	-0.66	-0.86	-1.47	--
December	1.65	1.23	0.49	--

U.S. EPA 2022 WRF Sensitivity Results

- Standard WRF configuration performed adequately for surface variables and precipitation. Typical performance issues remain (complex terrain, etc.) from previous WRF simulations.
  - Lightning assimilation significantly improves precipitation predictions
- NOAH/YSU combination was worst performer for surface variables (consistent underprediction of temperature and mixing ratio and overprediction of wind speed most months) but relatively adequate precipitation
- MSKF simulation appeared statistically to perform well for precipitation, but spatial magnitudes varied
- **Standard WRF setup remains preferred setup for CONUS simulations at this time given relative performance of surface variables and precipitation**

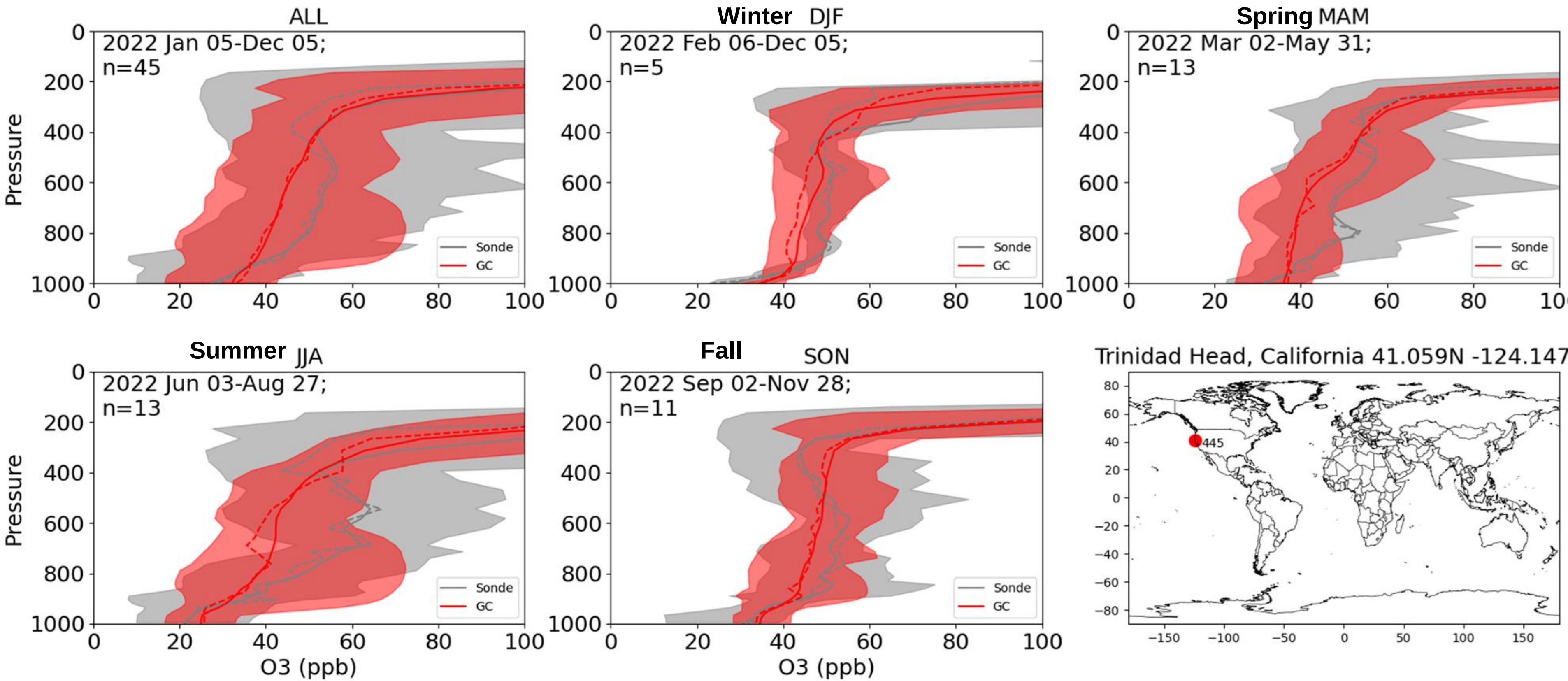
2022 Air Quality Model Boundary Condition (BC) Data

Model	Simulation	BCON
GEOS-Chem v14.0.1	2022 Complete	36US3 Complete
Hemispheric CMAQ v5.4+	2022 Complete	36US3 In process
NASA GMAO GEOS-CF	Daily 1-day hindcasts Daily 5-day forecast	36US3 in process (Jan-Oct: done)

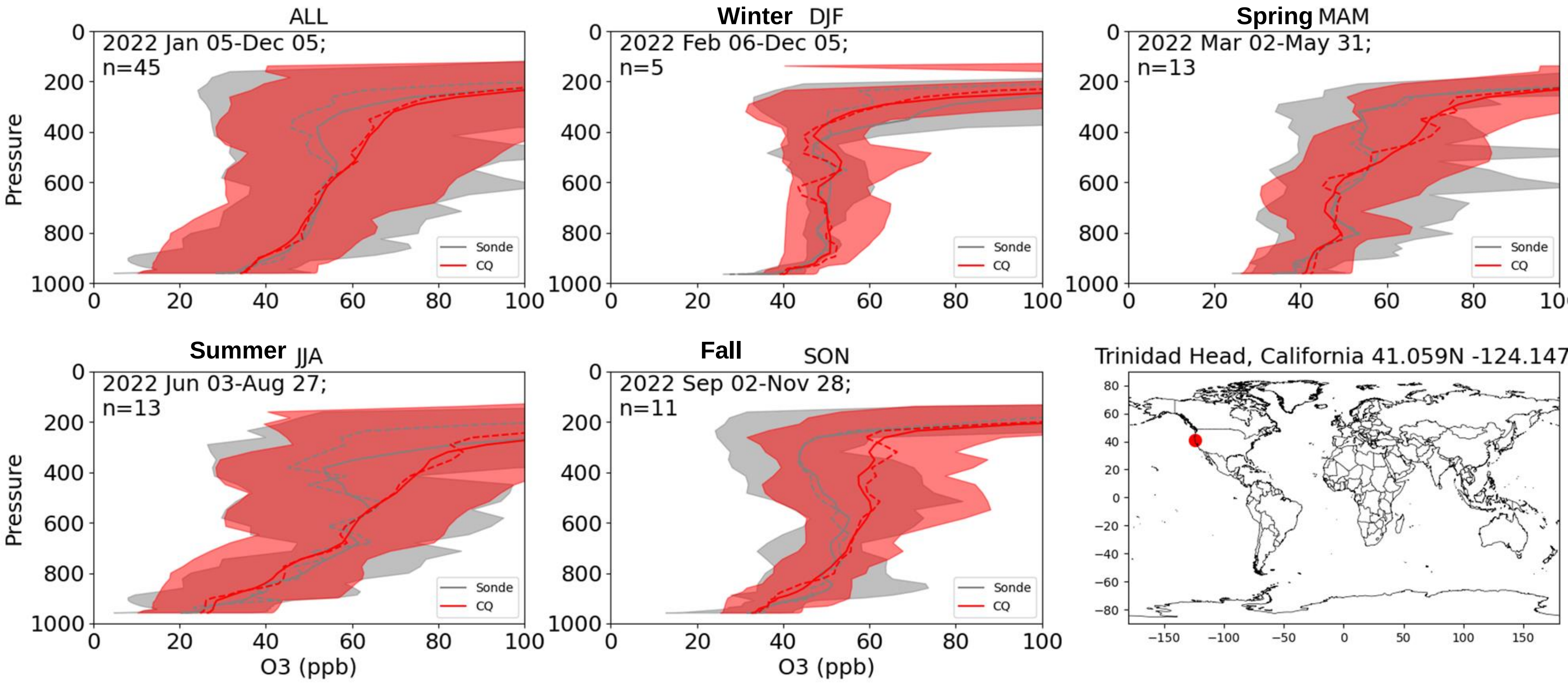
- 2022 BC and IC data and evaluation will be ready by Q2 2024
- CMAQ Version v5.4+ includes aerosol nitrate photolysis*
- Evaluation
  - Sondes: NOAA GML and World Ozone and Ultraviolet Radiation Data Centre
  - Surface: CASTNET surface data monitors

*Sarwar, G., Hogrefe, C., Henderson, B. H., Mathur, R., Gilliam, R., Callaghan, A. B., Lee, J., and Carpenter, L. J.: Impact of particulate nitrate photolysis on air quality over the Northern Hemisphere, Science of The Total Environment, 917, 170406, https://doi.org/10.1016/j.scitotenv.2024.170406, 2024.

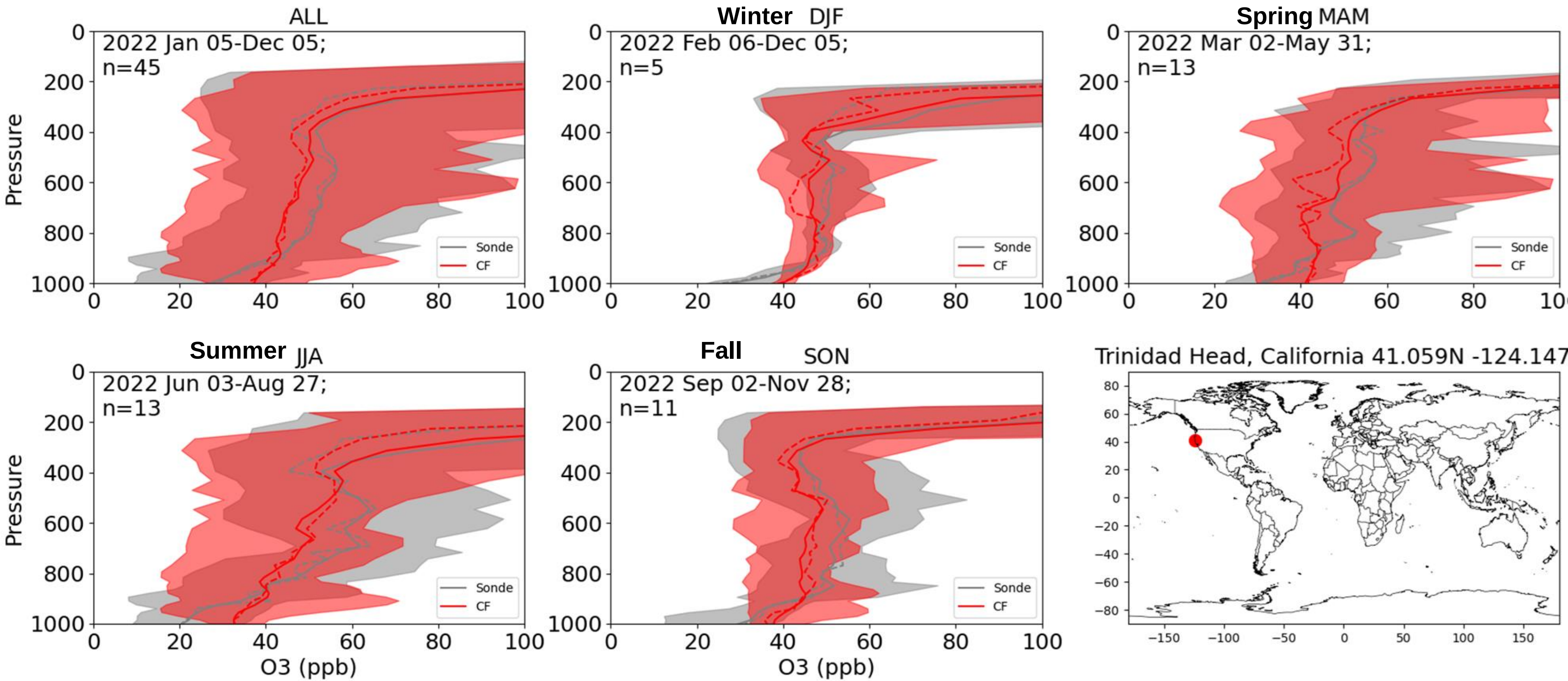
GEOS-Chem v14 Sonde Evaluation: Trinidad Head



Hemispheric CMAQ Sonde Evaluation: Trinidad Head



GEOS-CF Sonde Evaluation: Trinidad Head



Availability of U.S. EPA 2022 Boundary Condition Data

- Outputs from the models will be uploaded to the AWS site
  - Users defined boundary conditions can be extracted from the global models
  - Boundary condition extracting scripts will be available
- Once available, boundary condition data for 36US3 will also be uploaded to the AWS site.
- For 12 km or finer modeling, you may prefer to use boundary conditions output from a regional model run.
- NASA Health and Air Quality Applied Science Tiger Team on Boundary Conditions will be a useful resource for other data sources and extended evaluation.

2022 Air Quality Modeling Plans

- The detailed CMAQv5.4 and CAMx v7.20 configurations are TBD based on internal testing and sensitivity runs
- We will review the performance of GEOS-CF, GEOS-Chem and H-CMAQ boundary conditions
- Annual simulations will be performed at 36km (36US3) and 12km (12US2) with CMAQ and CAMx
- v1 modeling performance evaluation is expected to be finished in early 2025

Products: A powerpoint presentation of annual simulations' performance evaluations, inputs, runscripts, outputs, plus the performance evaluations of models will be released online

2022v1 Emissions Development and Summaries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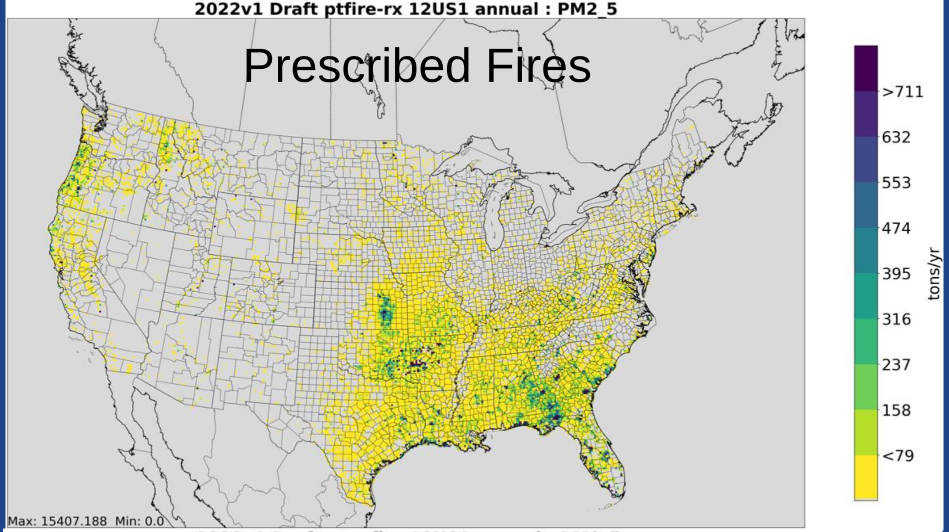
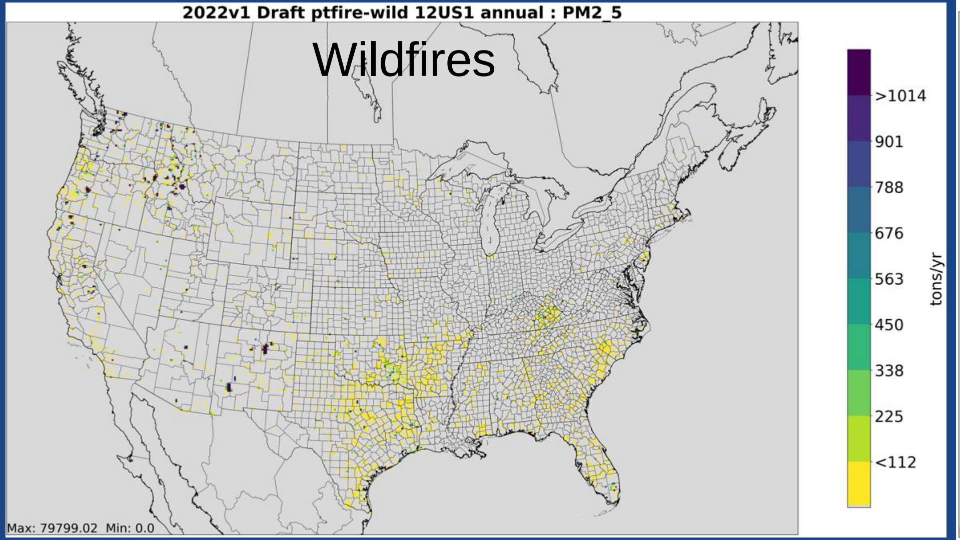
Collaborative Fires Workgroup

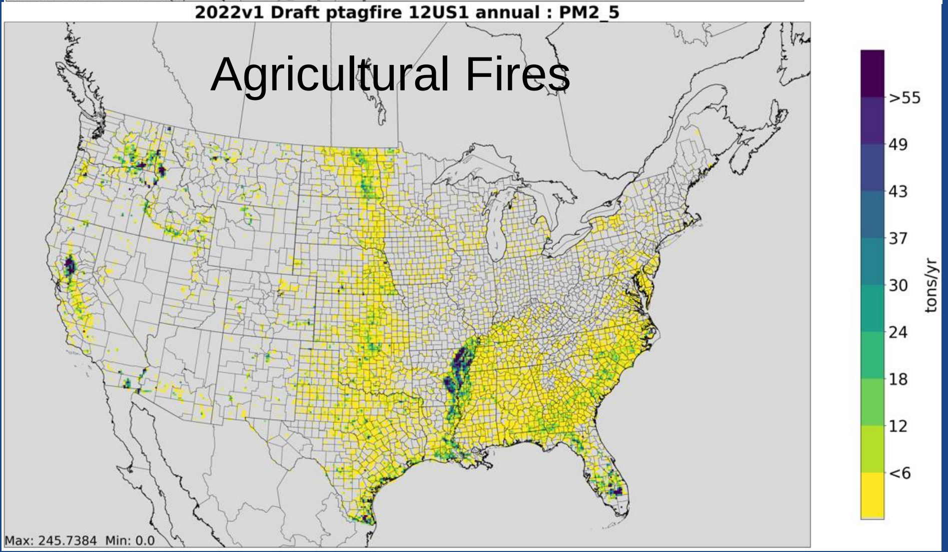
- Includes wildland, prescribed, and agricultural burn emissions
- Somewhat quiet wildfire season with about 4.4M acres burned in CONUS
- Python SMARTFIRE2 used for daily acres burned
- Bluesky Pipeline (BSP) used for daily emissions
- Key new changes: SERA emissions factors and pile burn methodology
- Fire activity data received from 29 SLTs
- Beta version inventory shared Apr 12, 2024
- Created similar to an NEI with a few meetings
- Emissions and activity data sources:
    - Data Retrieval Tool
    - https://gaftp.epa.gov/Air/emismod/2022/v1/draft/fires/
- Pile burn emissions also generated
- Fires Workgroup meeting held April 29
- Wiki site: https://views.cira.colostate.edu/wiki/wiki/12211
- 2022v1 fire inventory to be finalized (June 2024)

2022v1 draft Annual $PM_{2.5}$ Emissions from Fires*

** Note: the scales differ*

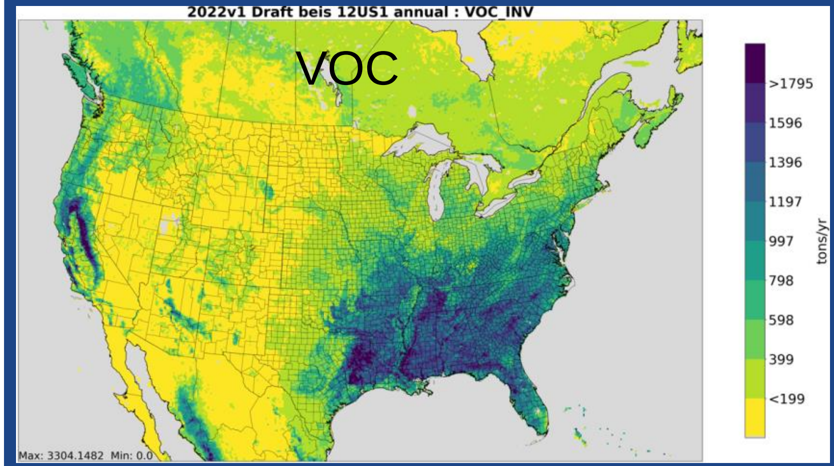


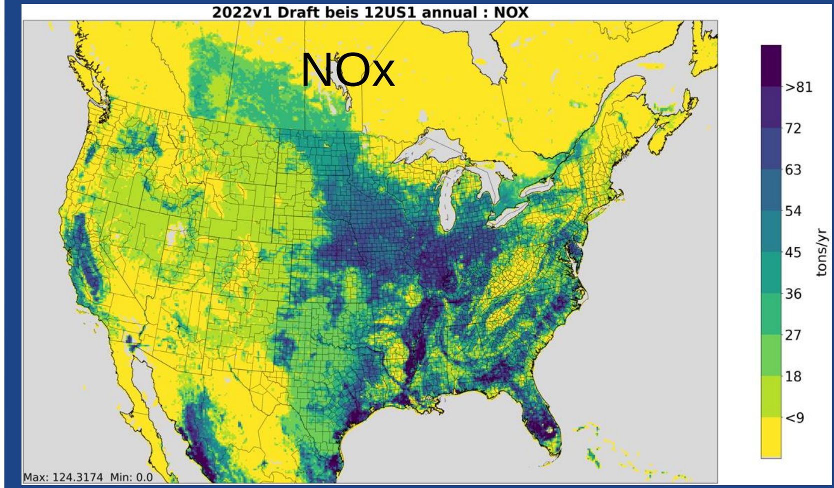




2022 Biogenic Emissions Update

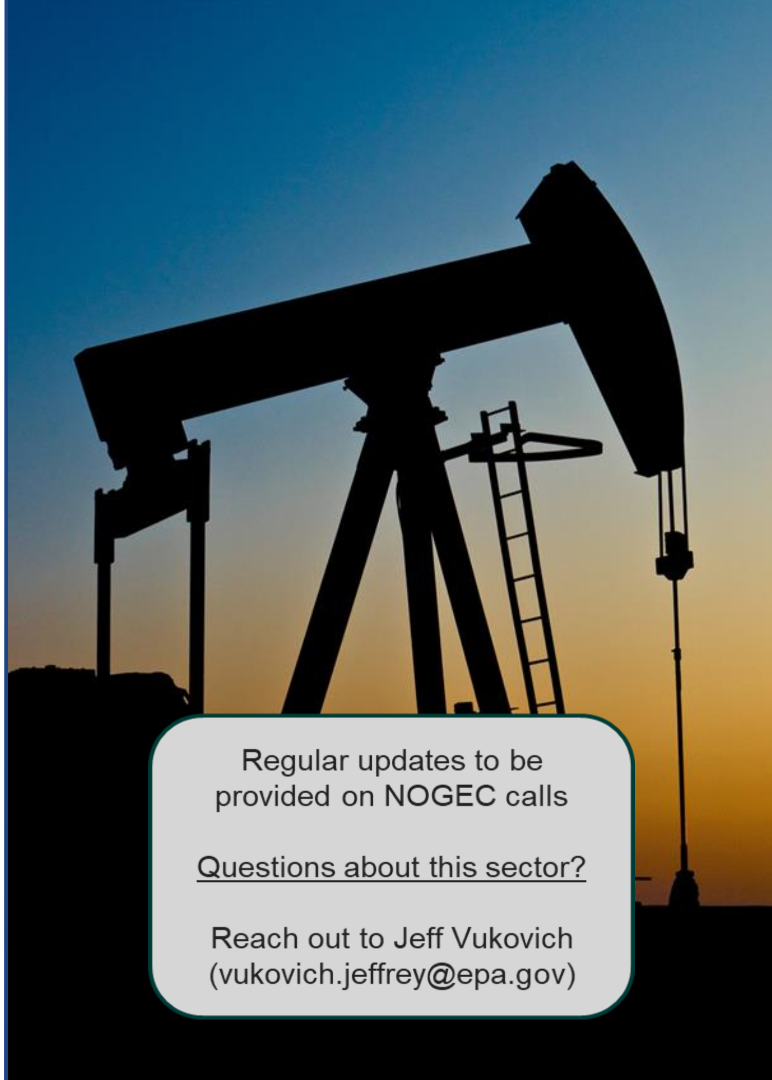
- MCIP meteorology and Biogenic Emissions Landcover Database version 6 (BELD6) used in SMOKE-Biogenic Emissions Inventory System (BEIS4)
- Same configuration as used in 2020NEI
- ~ 28M tons of VOC and ~1M tons of NOX
- BELD6 utilizes high resolution tree species and biomass data from Wilson et al. 2013a/b
- Including USDA Cropscape database for agriculture landuse data
- Calculates Nitric Oxide from soils (fertilized and non-fertilized)
    - *J.J. Yienger and H. Levy II, Journal of Geophysical Research, vol 100, 1995*





2022 Oil and Gas Update

- County activity reviewed Jan/Feb 2024
- Oil and Gas Tool (2020NEI version with modifications) used to compute emissions
- Abandoned well emissions and Blowdowns/Pigging emissions estimated outside of Tool and available (non-point)
- Year 2022 inventory finalized (May/June 2024)
- Draft non-point and point emissions now available
- Emissions and activity data available
  - Data Retrieval Tool
  - https://gaftp.epa.gov/Air/emismod/2022/v1/draft/oilgas/
- NOGEC Workgroup calls: May 9 and June 13

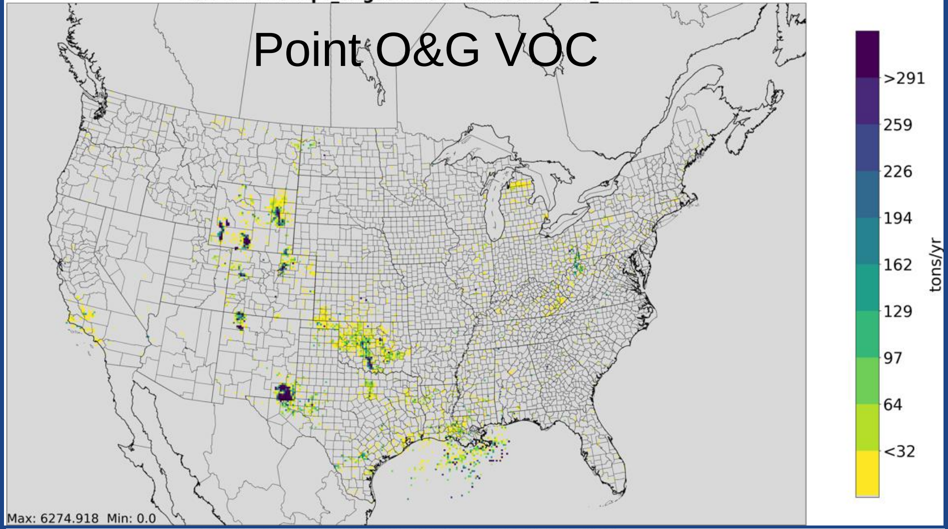


Regular updates to be provided on NOGEC calls

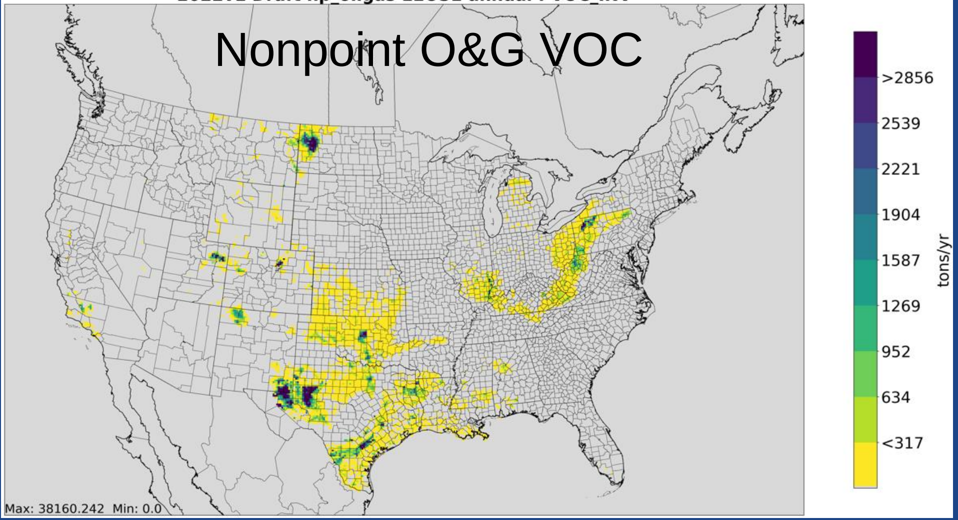
Questions about this sector?

Reach out to Jeff Vukovich (vukovich.jeffrey@epa.gov)

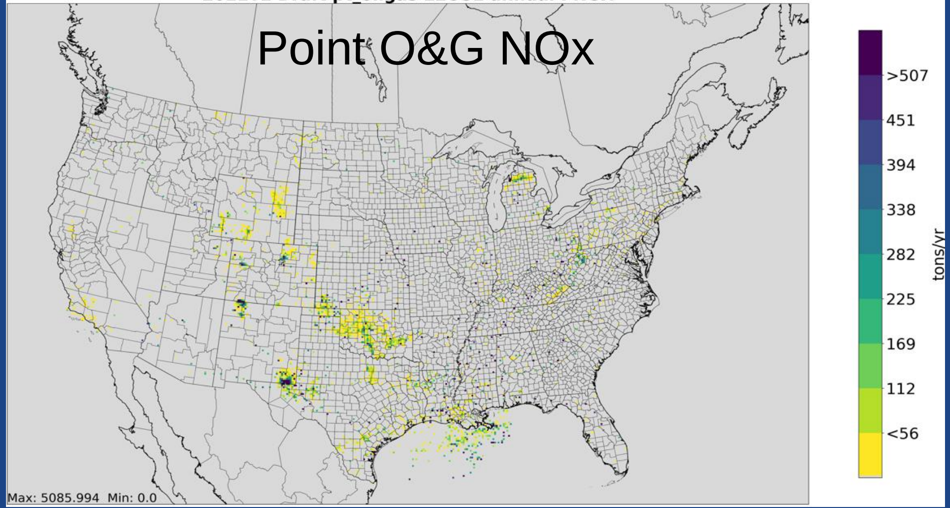
2022v1 Draft pt_oilgas 12US1 annual : VOC_INV



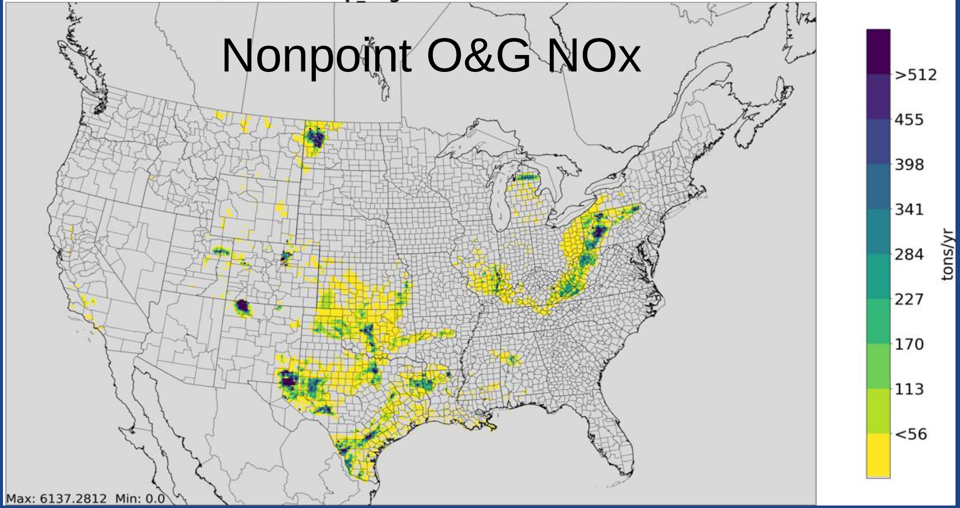
2022v1 Draft np_oilgas 12US1 annual : VOC_INV



2022v1 Draft pt_oilgas 12US1 annual : NOX



2022v1 Draft np_oilgas 12US1 annual : NOX

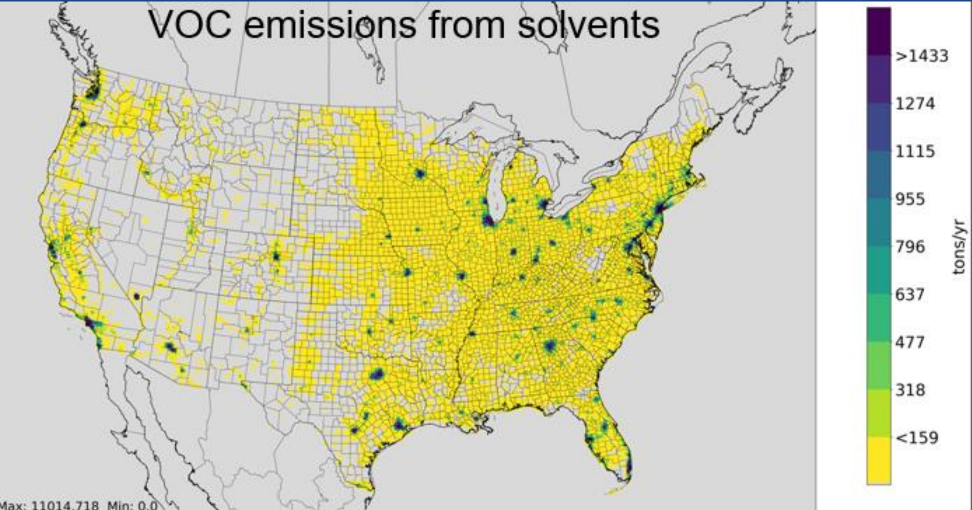


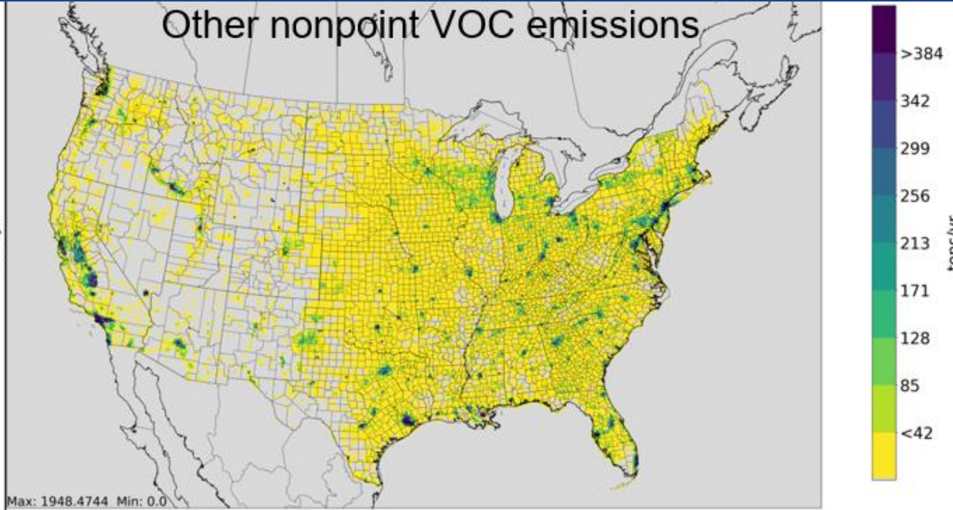
2022 Nonpoint Sectors Development Overview

Source Category	Final Projection Method for 2022
Fugitive Dust (Construction, Ag. Crops, Mining and Quarrying, Unpaved Roads), Commercial Cooking, Charcoal Grilling, Portable Fuel Containers, Asphalt Paving, Open Burning, Landfills/POTWs,	Hold Constant at 2020 NEI levels
Fugitive Dust from hooves	Adjust 2020 NEI using 2022/2020 livestock count
Fugitive dust from Paved Roads	Adjust 2020 NEI using 2022/2020 VMT- based growth rates
Ag Livestock	Run the Farm Emissions Model using 2022 animal counts and met. data
Residential Wood Combustion, All Other Stationary Nonpoint Source Fuel Combustion, Stage I Unloading at Gas Stations and Stage I Gasoline Unloading at Bulk Terminals/Plants, Aviation Gasoline Stage I and II, Pipeline Gasoline	Apply the appropriate EIA State Energy Data System (SEDS) consumption ratios
Solvents	Apply 2021/2020 emissions ratios to 2020 NEI data
Cremation	Apply 2022/2020 ratios to 2020 NEI for deaths while factoring in changes in cremation rates 2020->2022
Ag Fertilizer	EPA to run CMAQ/EPIC in Summer 2024

Nonpoint Solvent Emissions

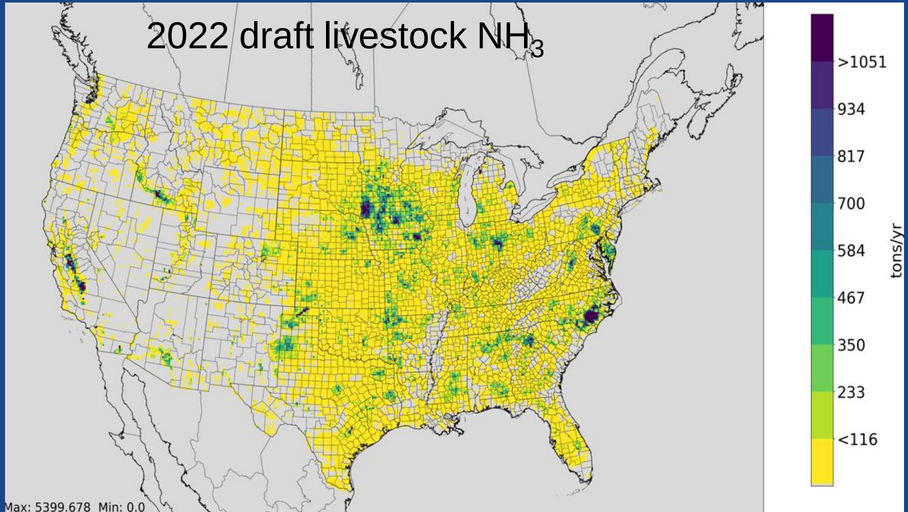
- All emissions, except asphalt paving, are projected from the 2020NEI, including state-submitted emissions.
    - SLTs were concerned that if EPA-only data were used, that their 2020 NEI emissions proportions, by SCC, would be inaccurate. Therefore, EPA developed SCC-specific 2021/2020 ratios and applied those ratios to 2020NEI emissions.
    - For asphalt paving, 2020NEI emissions are carried forward.
    - In the 2022v2 platform, 2021 data will be updated to 2022 data, but similar methods will be applied.

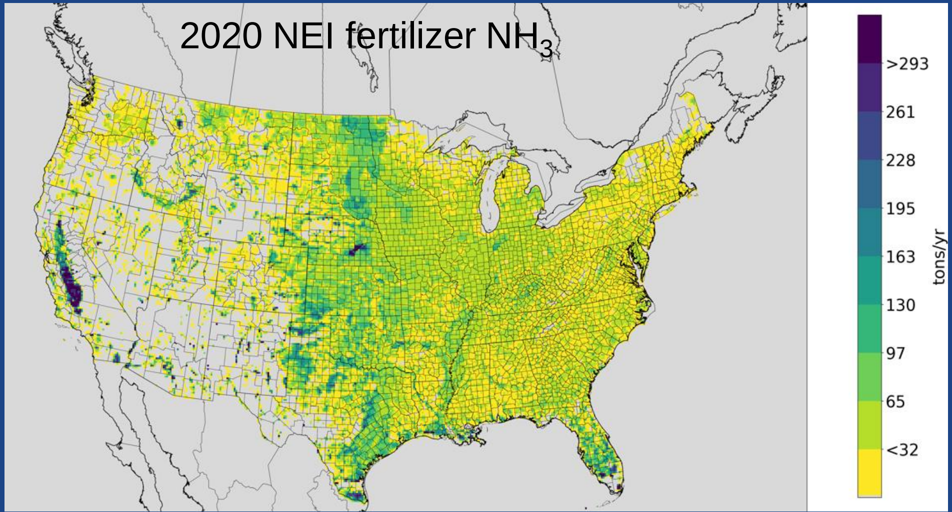


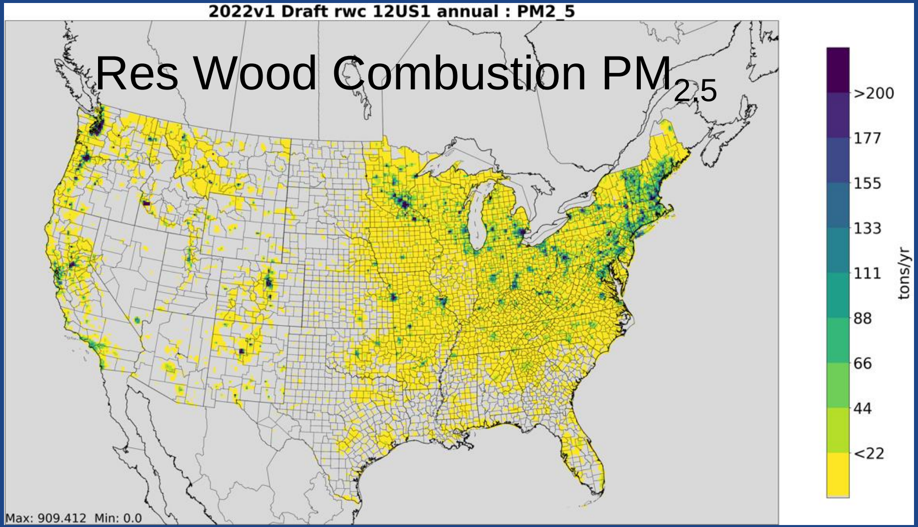


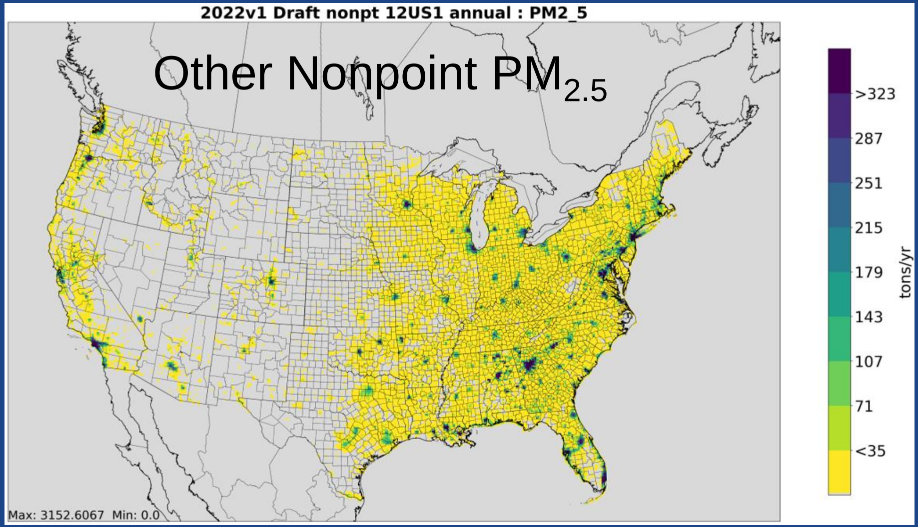
Agricultural Livestock Emissions

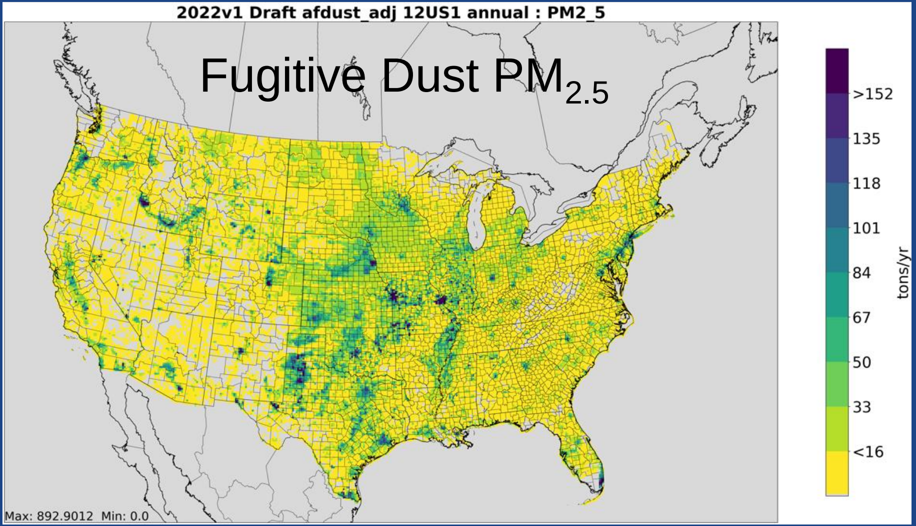
- The Farm Emissions Model (FEM) was used to develop emissions using a parameterization consistent with that used for 2020 NEI
- Activity data were from USDA 2022 census (available in Feb 2024)
  - “D” counties without values specified filled using 2021 values (adjusted from 2020)
  - State-submitted data included for Idaho
- 2022 meteorological data were used (temperature, wind speed, and precipitation)

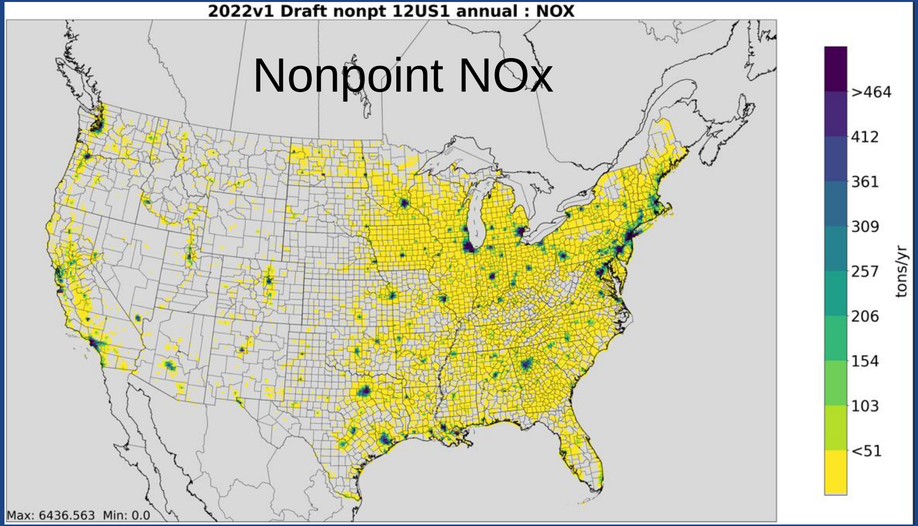





2022v1 Draft rwc 12US1 annual : PM2_5
Res Wood Combustion $PM_{2.5}$
>200
177
155
133
111
88
66
44
<22
tons/yr
Max: 909.412 Min: 0.0

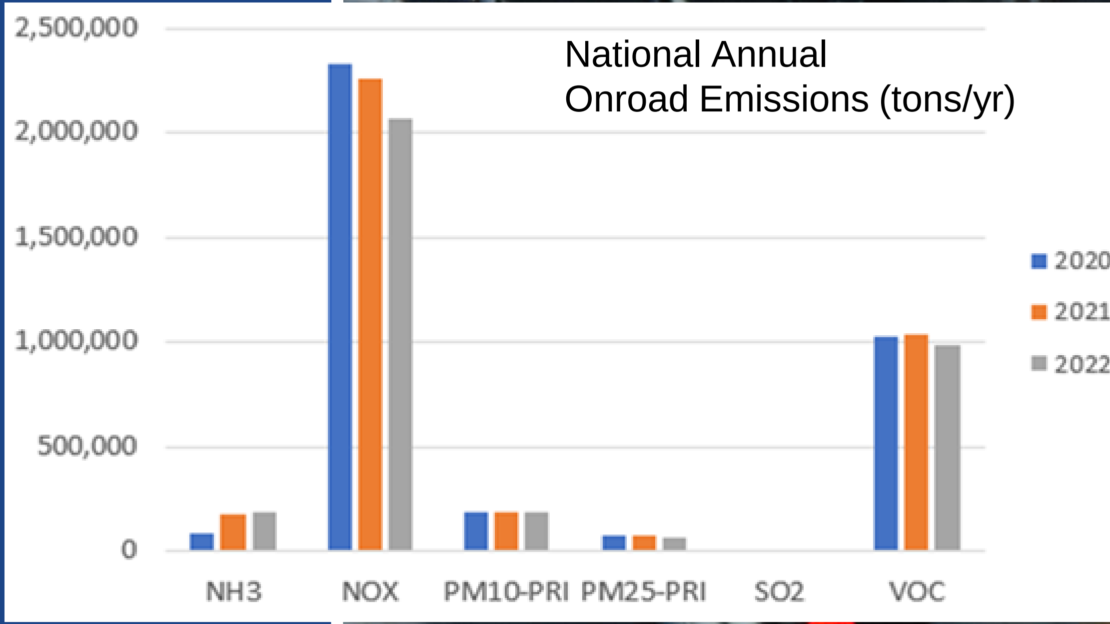

2022v1 Draft nonpt 12US1 annual : PM2_5
Other Nonpoint $PM_{2.5}$
>323
287
251
215
179
143
107
71
<35
tons/yr
Max: 3152.6067 Min: 0.0


2022v1 Draft afdust_adj 12US1 annual : PM2_5
Fugitive Dust $PM_{2.5}$
>152
135
118
101
84
67
50
33
<16
tons/yr
Max: 892.9012 Min: 0.0


2022v1 Draft nonpt 12US1 annual : NOX
Nonpoint NOx
>464
412
361
309
257
206
154
103
<51
tons/yr
Max: 6436.563 Min: 0.0

Onroad Mobile

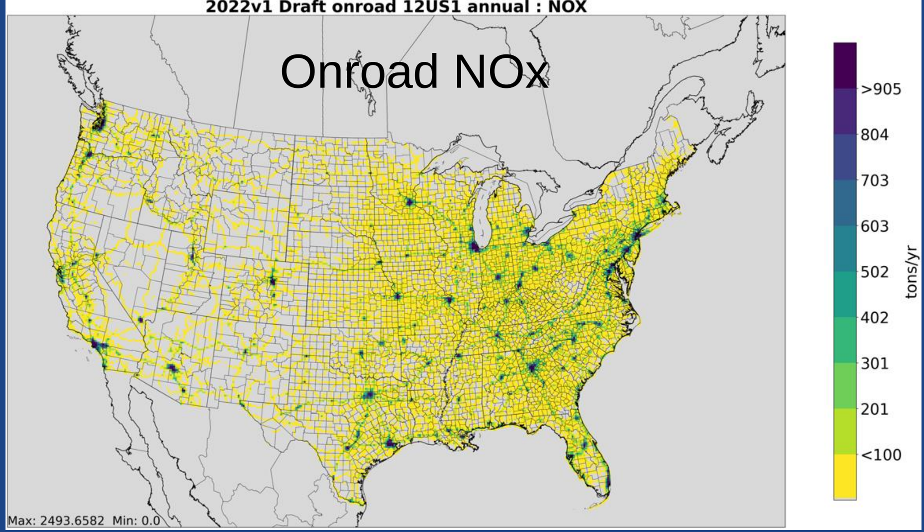
- Emissions factors derived from MOVES4
- Onroad VMT submitted by 22 states* and Jefferson Co. KY
  - For states that did not submit, county-level 2022 VMT from FHWA was used
- VPOP was mostly held constant with 2020 except where a few states provided it
- Ammonia increased with MOVES4
- NOx drops from 2020 through 2022
- VOC is lower in 2022 than in 2020

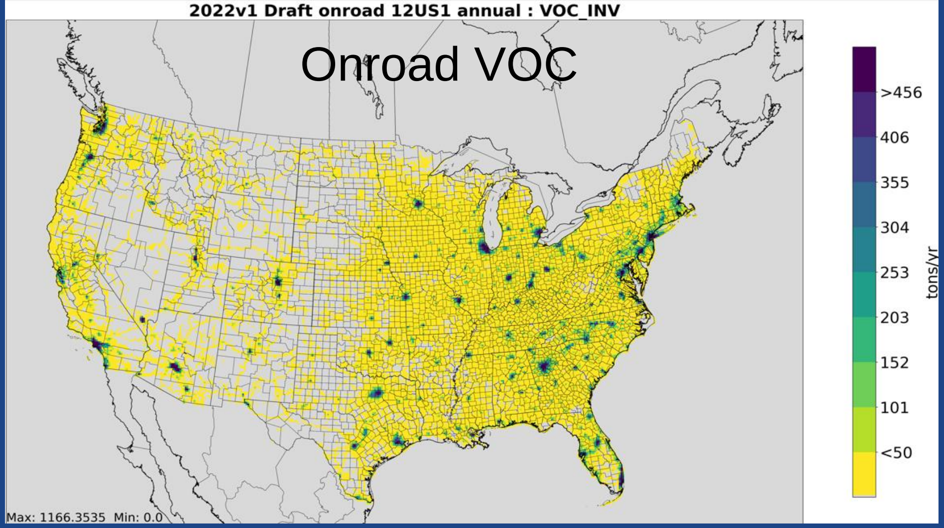


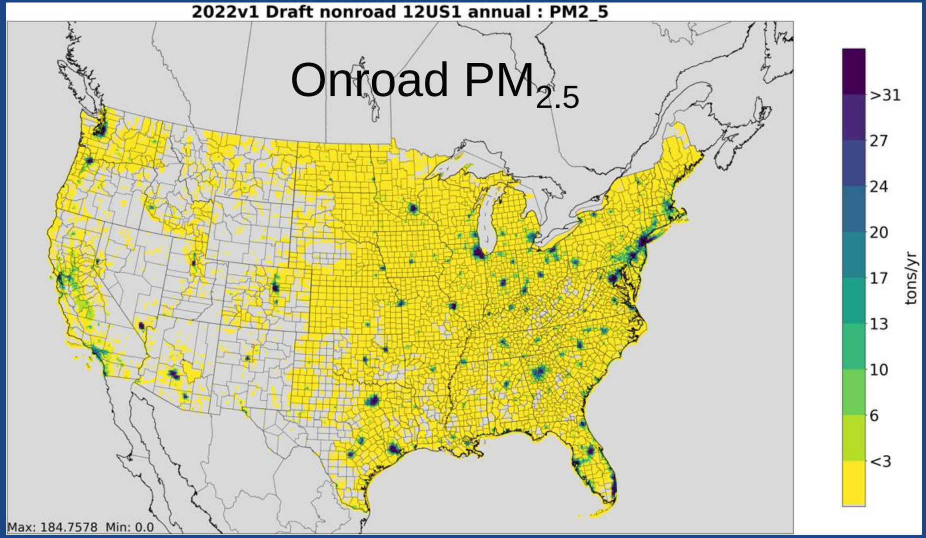
Questions?

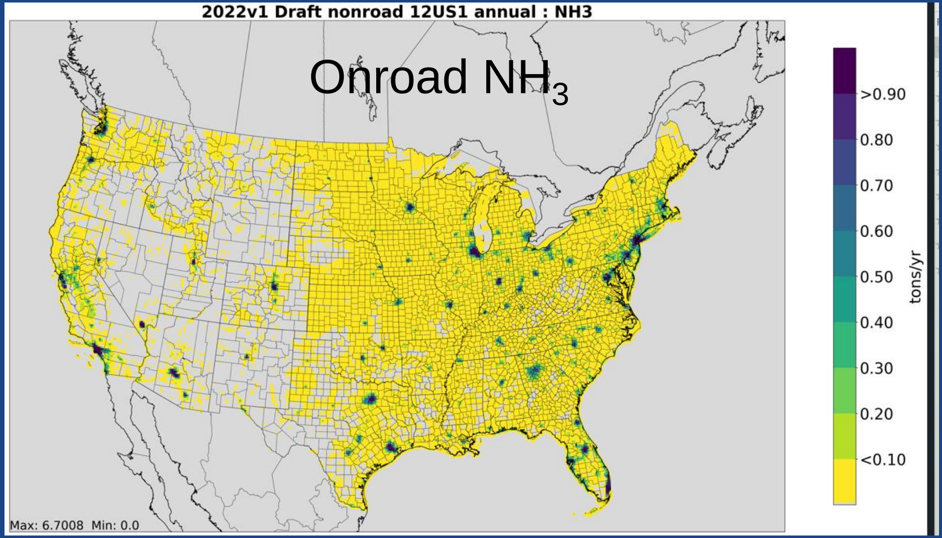
Contact Janice Godfrey (godfrey.janice@epa.gov)

*AK, CT, CO, DE, GA, KS, MA, MI, MD, ME, NC, NH, NJ, NY, OR , SC, TN, TX, VA, WA, WI, WV


2022v1 Draft onroad 12US1 annual : NOX
Onroad NOx
>905
804
703
603
502
402
301
201
<100
tons/yr
Max: 2493.6582 Min: 0.0

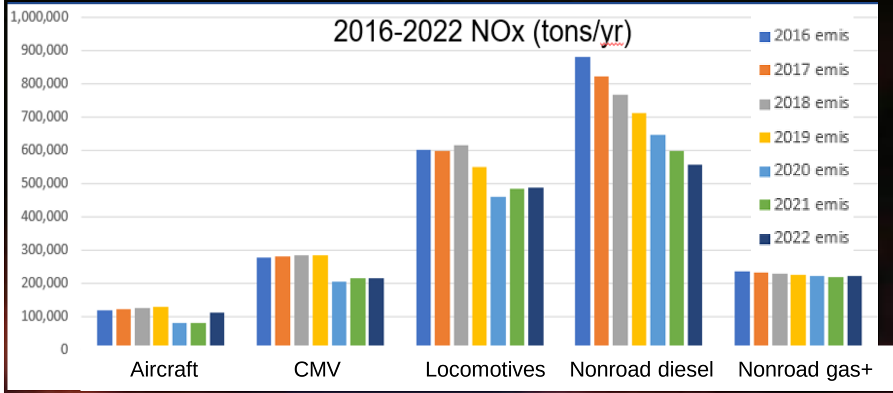

2022v1 Draft onroad 12US1 annual : VOC_INV
Onroad VOC
>456
406
355
304
253
203
152
101
<50
tons/yr
Max: 1166.3535 Min: 0.0

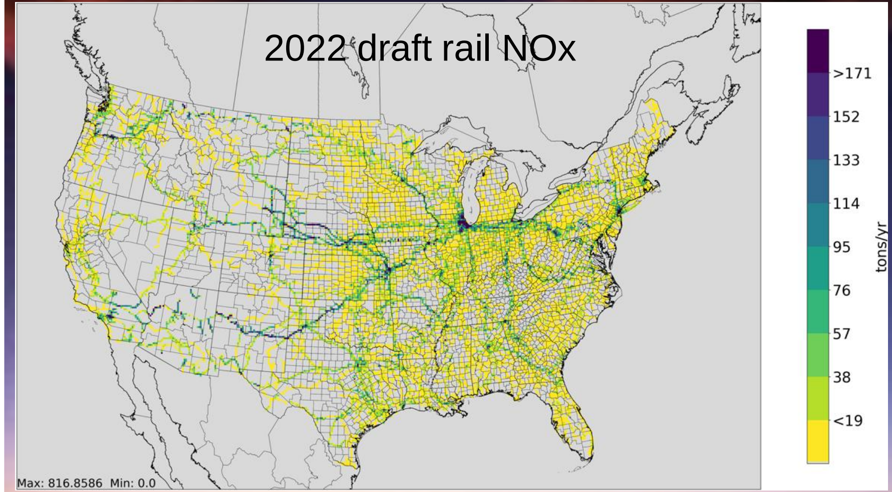

2022v1 Draft nonroad 12US1 annual : PM2_5
Onroad PM2.5
>31
27
24
20
17
13
10
6
<3
tons/yr
Max: 184.7578 Min: 0.0


2022v1 Draft nonroad 12US1 annual : NH3
Onroad NH3
>0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
<0.10
tons/yr
Max: 6.7008 Min: 0.0

Nonroad, Rail, and Airports

- Nonroad emissions from MOVES4
- Rail inputs were updated from 2020 to reflect 2023 fleet mix and 2022 fuel usage
- Airports:
  - Emissions for top 50 US airports computed using FAA's AEDT model (like the NEI)
  - Emissions for other airports were developed by multiplying 2020 emissions by 2022 / 2020 ratios based on landing and takeoff activity data in the January 2024 Terminal Area Forecast (TAF)





Questions?
Contact Janice Godfrey
(godfrey.janice@epa.gov)

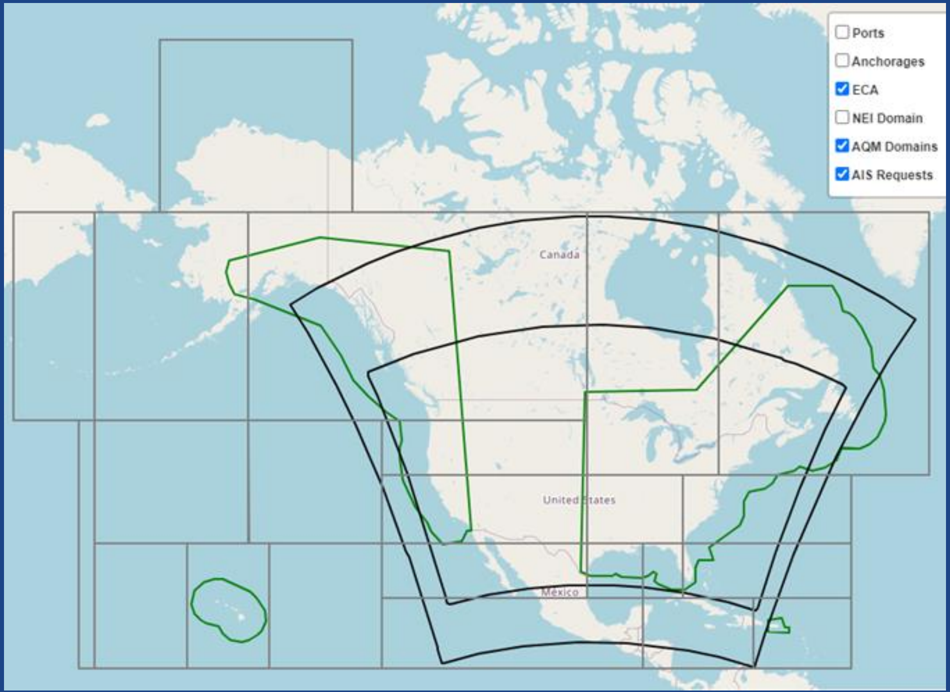
Commercial Marine Vessels

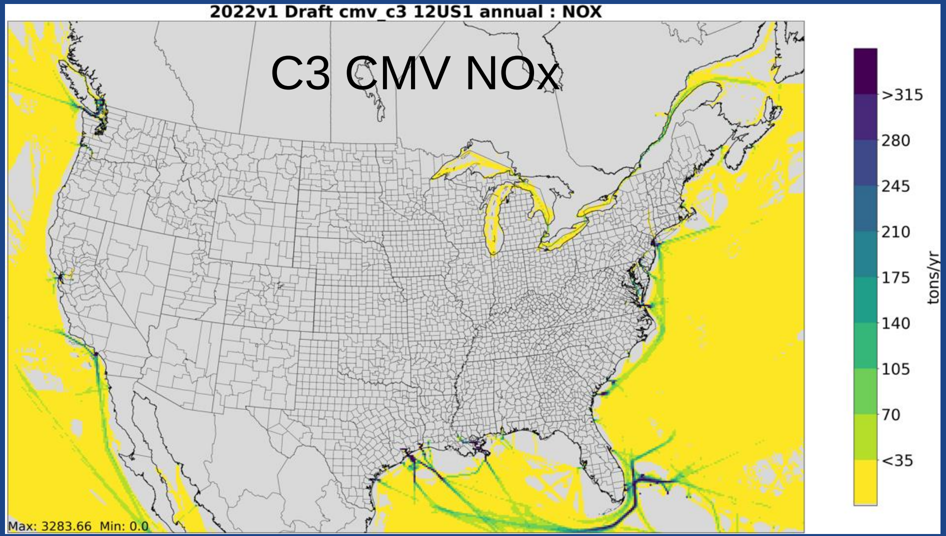
- 2022 CMV emissions were computed using 2020 NEI methods and ship database information combined with 2022 AIS transponder data
- CMV emissions are divided into larger Category 3 and smaller Category 1 and 2 vessels
- Emissions are computed at 5 minute intervals and aggregated into hourly emissions for each grid cell + county combination
- Some transponder data are missing for 2022 especially in June but also some in April-May – this needs to be addressed before finalizing the emissions for 2022v1

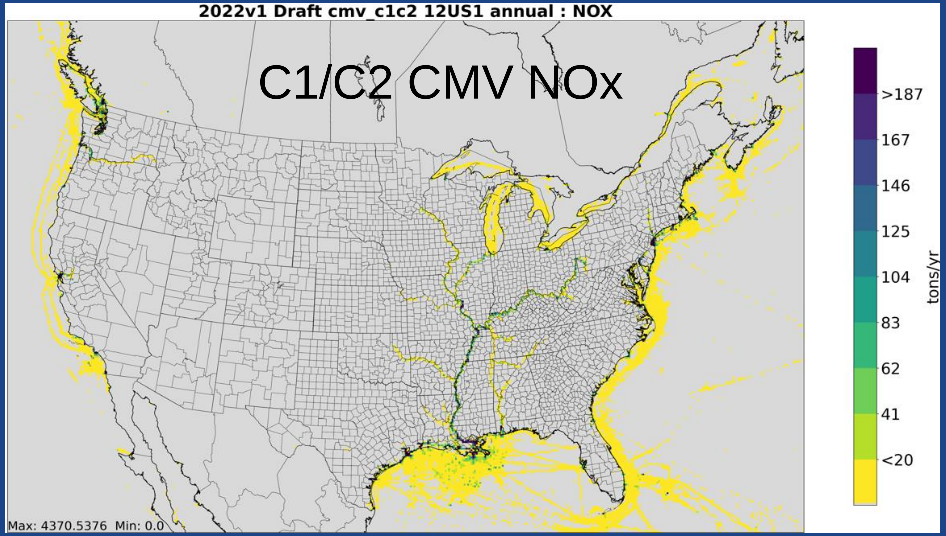
Questions?

Contact Janice Godfrey (godfrey.janice@epa.gov)

Request boxes for 2022 AIS data

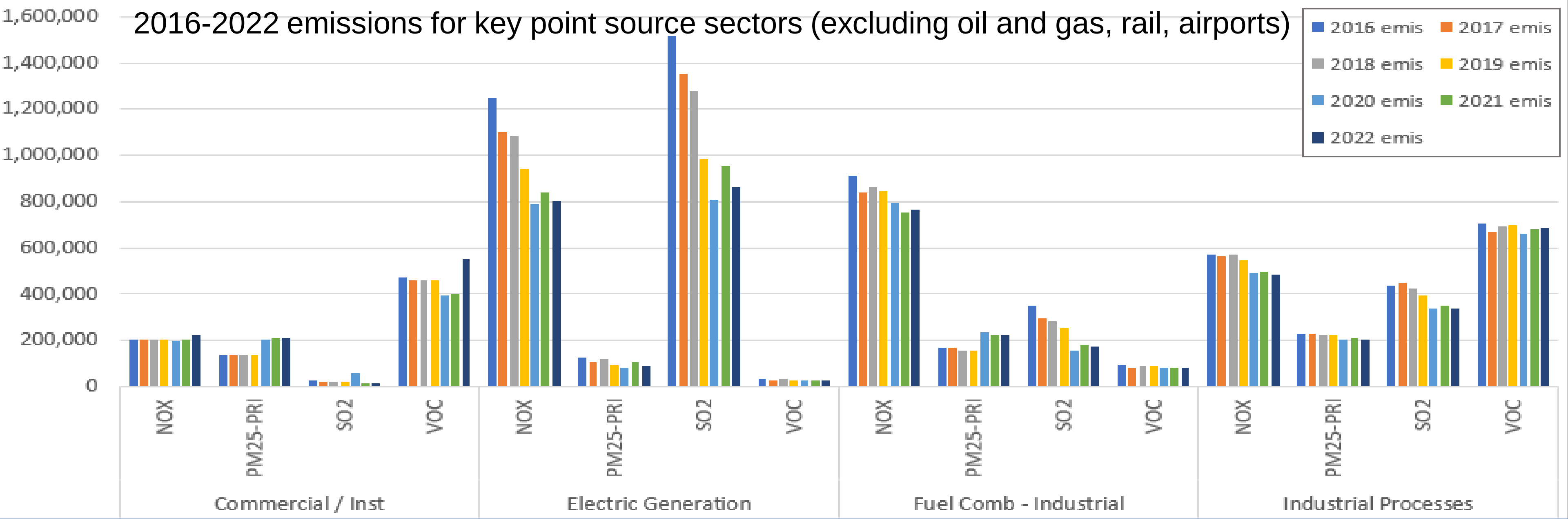


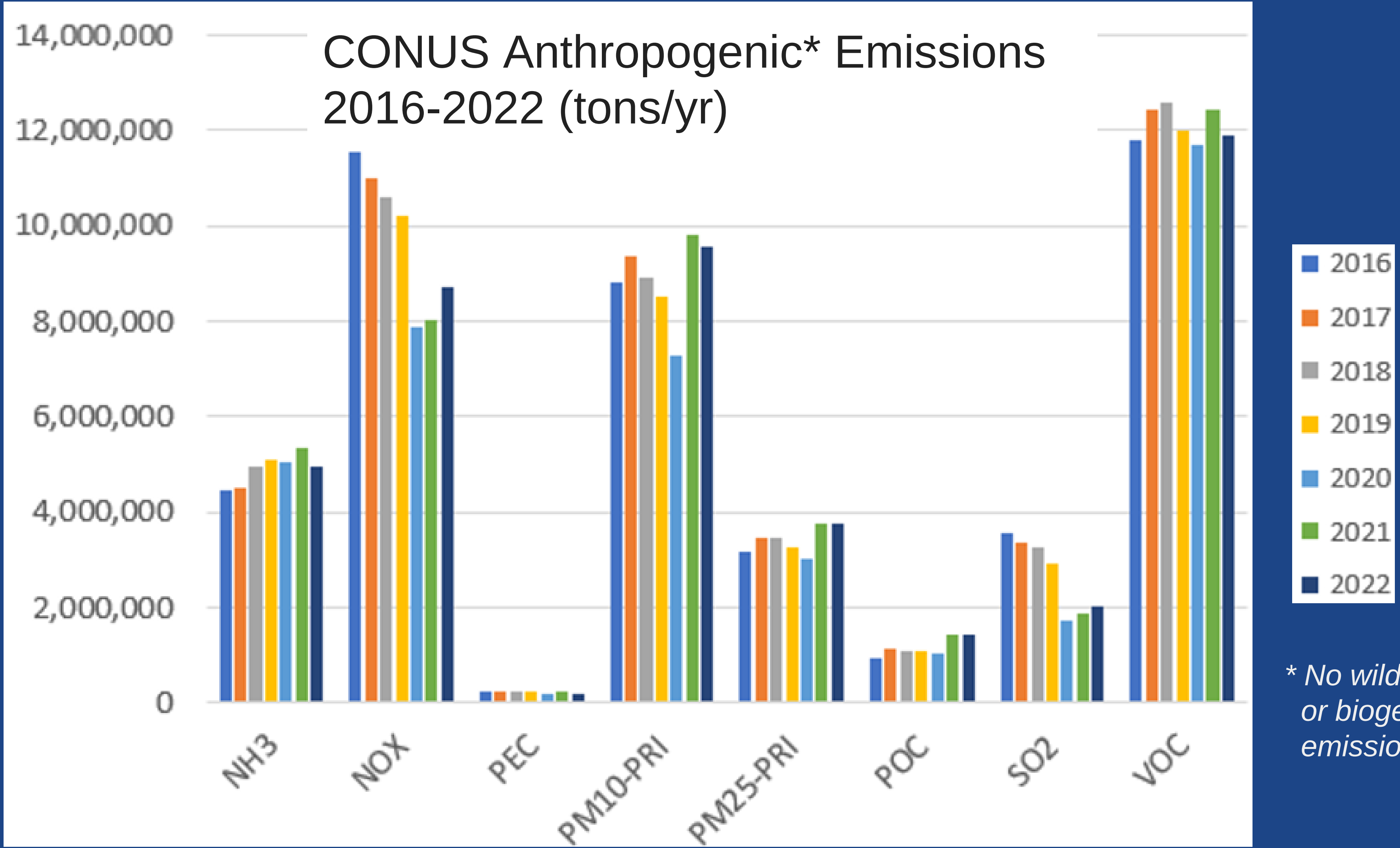




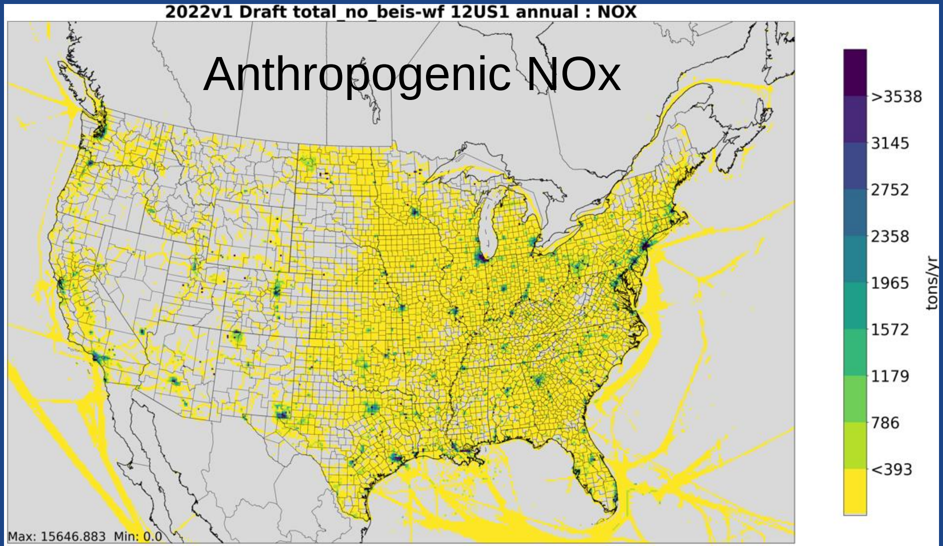
2022 Point Source Emissions

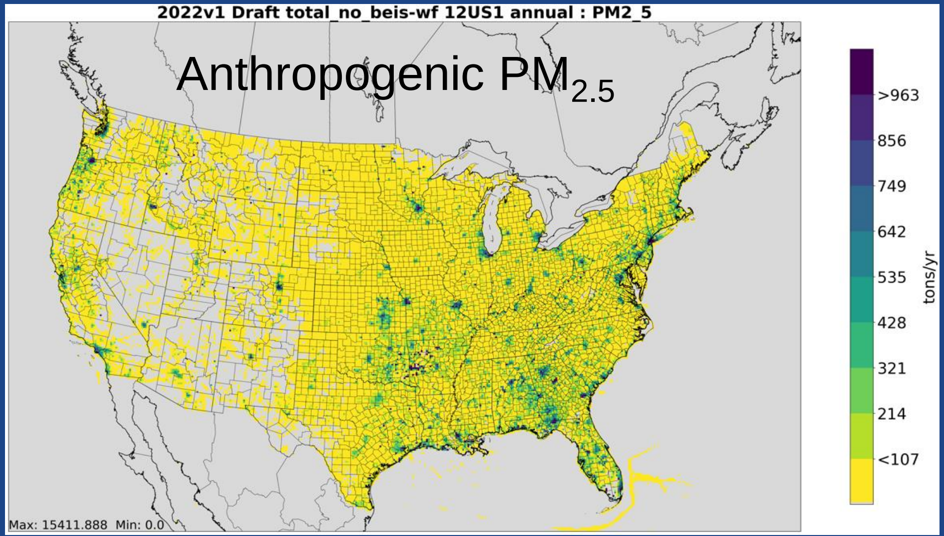
- Point source emissions were submitted by S/L/T agencies
  - Emissions for Type A (larger) sources are required to be submitted in non-triennial years, but some states submitted emissions for additional smaller sources
  - For sources without 2022 emissions but not closed, EPA used emissions from 2021 or 2020

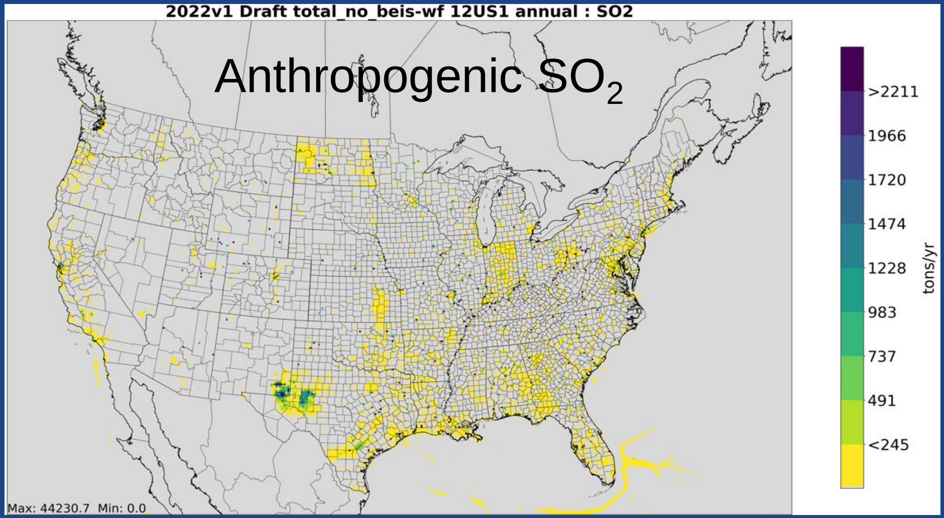


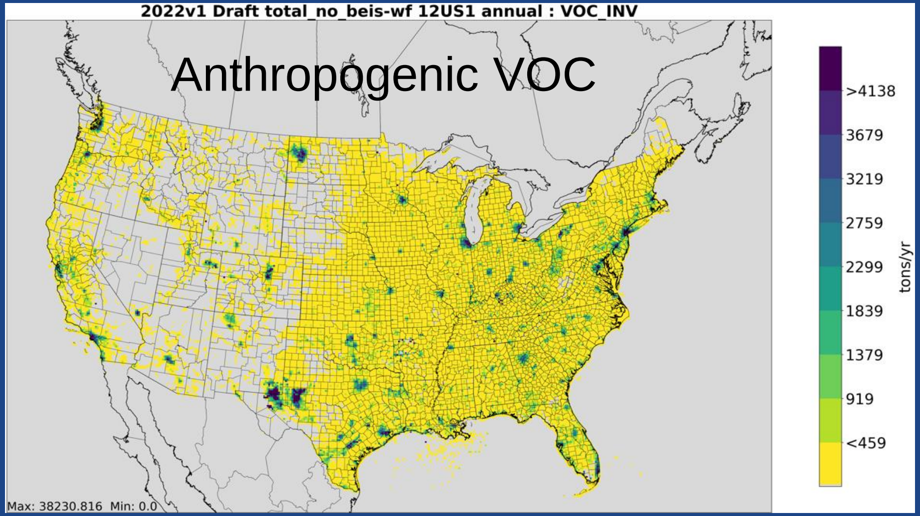


** No wildfires or biogenic emissions*


2022v1 Draft total_no_beis-wf 12US1 annual : NOX
Anthropogenic NOx
>3538
3145
2752
2358
1965
1572
1179
786
<393
tons/yr
Max: 15646.883 Min: 0.0


2022v1 Draft total_no_beis-wf 12US1 annual : PM2_5
Anthropogenic $PM_{2.5}$
>963
856
749
642
535
428
321
214
<107
tons/yr
Max: 15411.888 Min: 0.0


2022v1 Draft total_no_beis-wf 12US1 annual : SO2
Anthropogenic SO_2
>2211
1966
1720
1474
1228
983
737
491
<245
tons/yr
Max: 44230.7 Min: 0.0


2022v1 Draft total_no_beis-wf 12US1 annual : VOC_INV
Anthropogenic VOC
>4138
3679
3219
2759
2299
1839
1379
919
<459
tons/yr
Max: 38230.816 Min: 0.0

Analytic Year Review and Development Plans

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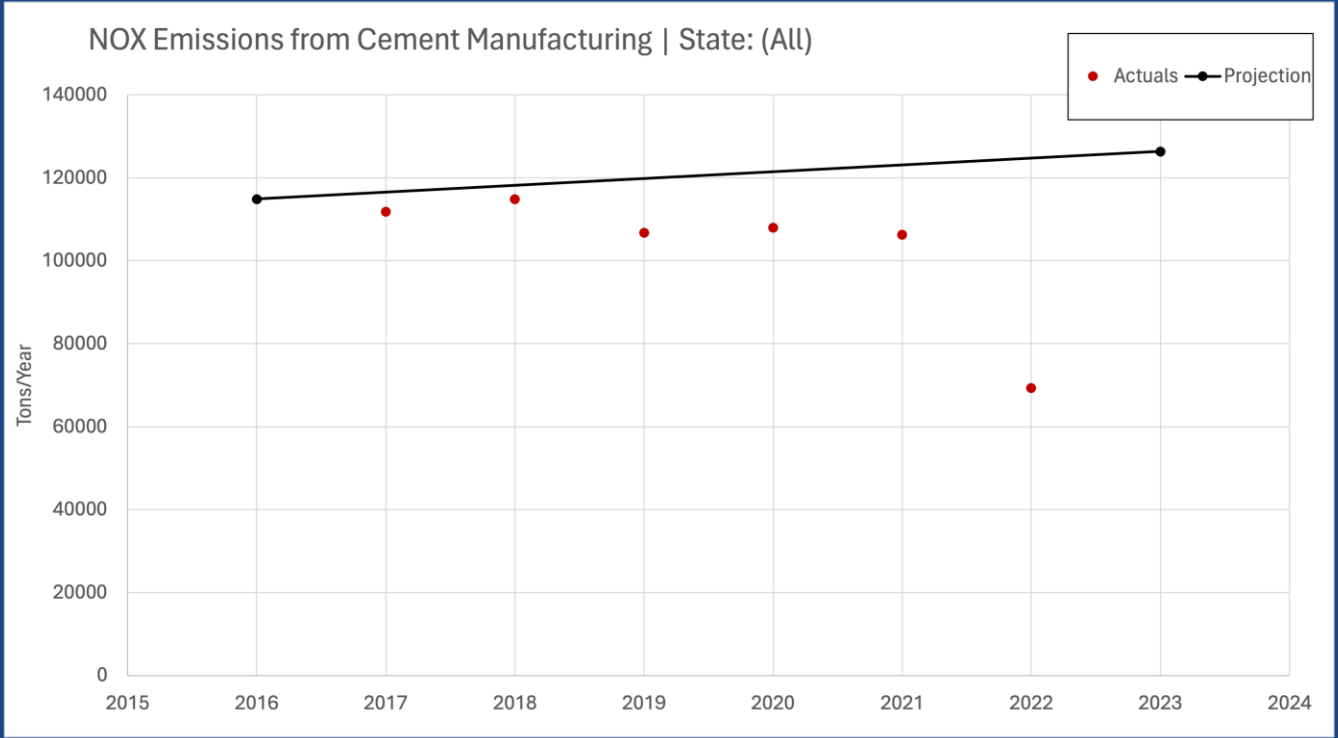
Analytic Year Development

- 2022 EIC Projections Workgroup
  - Organized into task forces that are reviewing projection methods and data by sector: EGU point, non-EGU point, onroad/nonroad mobile, marine/airport/rail, oil and gas
  - Current work has been focused on understanding current US EPA methods and data to project activity
  - Goal is to make recommendations to U.S. EPA about data sources or methodology changes for projecting emissions in the 2022v1 platform

Non-EGU (Industrial Point) Projections Task Force



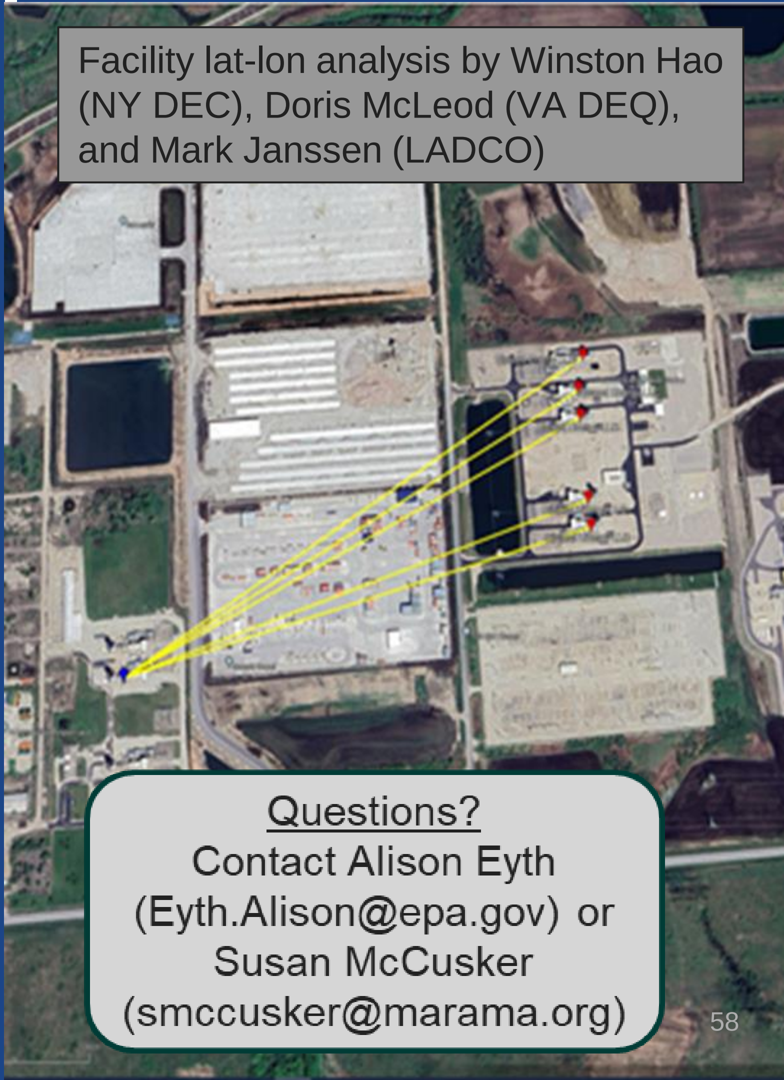
Task force is comparing 2016 to 2023 projections to actual reported emissions by sector

Looking to prioritize sectors for more in-depth review of projection methods

Electric Generating Unit Task Force

- Coordinating to reconcile lat-lon differences with potential air quality modeling impacts
- EPA Platform
  - 2026 projections developed using engineering analytics based on the most recent data
  - 2032 and 2038 are mapped to IPM run years
    - 2023 Reference Case available now (IRA, Final Good Neighbor Plan)
    - Updated baseline (Final OTAQ Rules, Final MATS RTR, Final 111, Final ELG) available late summer
- ERTAC EGU Platform
  - State shutdowns, fuel switches, controls, new units incorporated
  - May 21 S/L/T outreach to discuss GNP budgets
  - 2026, 2032, 2038 runs ~ late summer

Facility lat-lon analysis by Winston Hao (NY DEC), Doris McLeod (VA DEQ), and Mark Janssen (LADCO)



Questions?
Contact Alison Eyth (Eyth.Alison@epa.gov) or Susan McCusker (smccusker@marama.org)

2022v1 Analytic Year Timeline

- U.S. EPA needs data about known point source changes through 2038, e.g., shutdowns, fuel switches
- Regional projections approaches and data need to be communicated to the U.S. EPA by the end of Q2 (June 2024)
- 2022v1 analytic year inventory open review to occur during Q3 (TBD) using the online Emissions Data Review Tool
- Finalize 2022v1 analytic year inventories and documentation by the end of CY2024

Collaborative Timeline Review and Next Steps

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Timeline for 2022v1 Platform Development

Q3 2023
- Kickoff 2022 EC
- Initiate workgroups
- 2023 EI Conference
- Gather 2022 activity data from SLT agencies

Q4 2023
- Review 2020 NEI data
- Gather data and develop 2022 fire and biogenic emissions
- US EPA 2022 WRF modeling and evaluation
- Submit point data to US EPA

Q1 2024
- Review submitted 2022 data
- Develop 2022v1 base year inventories and ancillary data

April 2024
- 30-day SLT review of 2022v1 base year inventory

Q2 2024
- Collect data from SLT agencies for analytic year emissions
- Develop 2022v1 analytic year inventories
- 2022 BC development

Q3 2024
- Air quality modeling and evaluation of 2022 base year
- 30-day SLT review of 2022v1 analytic year inventories

Q4 2024
- Finalize analytic year inventories
- Release 2022 v1 platform
- 2022v1 technical support documentation

Timeline for 2022v2 Platform Development

Q3 2024
- Update 2022 activity data from SLT agencies as needed

Q4 2024
- Review and update 2022 emissions data

Q1 2025
- Develop 2022v2 base year emissions data
- Update and gather 2022v2 analytic year data

April, 2025
- 30-day SLT review of 2022v2 base inventory

Q2 2025
- Process 2022v2 base year data through SMOKE
- Develop 2022v2 analytic year inventories

Q3 2025
- Air quality modeling and evaluation of 2022v2
- 30-day SLT review of 2022v2 analytic year inventories

Q4 2025
- Finalize 2022v2 analytic year inventories
- Release 2022v2 platform
- 2022v2 technical support documentation

2022 Platforms and Planning Timelines

2024

Summer: 2022v1 base year inventories

August: 2015 O3 NAAQS moderate area attainment date

Fall: 2022v1 analytic year inventories

2025

Summer: 2022v2 base year inventories

Fall: 2022v2 analytic year inventories

2026

January: 2015 O3 NAAQS Serious NAA SIPs

2027

August: 2015 O3 NAAQS serious area attainment date

2028

Summer/Fall: Haze 3rd implementation period SIPs

Stay Informed

- 2022EMP Wiki at Intermountain West Data Warehouse (IWDW)
- 2022v1 web page now available on EPA site: https://www.epa.gov/air-emissions-modeling/2022v1-emissions-modeling-platform
- Quarterly outreach calls
  - **1st Wednesday in August, November, February, and May @ 2 p.m. Eastern**
- Attend workgroup meetings
  - MJO MOVES, EGU, NOMAD, NOGEC, projections, fires, ...
- Participate in data reviews

2022 EMP Wiki

Next Steps

- S/L/T agencies can:
  - Participate in workgroup meetings
  - Work with other inventory contacts in your region to review the data
    - Explore the 2022v1 data using the online Emissions Review Tool
    - Explore projections data available in Fall 2024
- Workgroups will proceed with reviewing data
- Next quarterly call: August 7, 2024 @ 2 PM Eastern
- Email Mary Uhl if you are not already on the email list and want to be added

Appendix

U.S EPA GEOS-Chem Details for Boundary Condition Development

Configuration

- v14 with mostly standard options
- 2x2.5 degree resolution
- 72 vertical layers (36 in trop, 120m first layer)
- MERRA2 meteorology (2x2.5)
- Full chemistry (online strat)
- Non-local PBL
- Simple SOA
- Updated methane, lightning, and other parameters for 2020 and 2021

Emissions

- On-line MEGAN v2.1
- On-line DUST
- On-line Seasalt
- GFED fires – monthly mean
- CEDS v2 2019 (including shipping)
- AEIC monthly aircraft
- NH3 : GEIA + SEABIRD
- C2H6: Tzompa ; C3H8 Xiao
- Bromo/Iodine carbon: Liang/Ordonez
- Decaying plants
- Anthro Fugitive/Combustion/Industrial Dust: Philip et al. 2017

U.S. EPA CMAQ Details for Boundary Condition Development

Configuration

- v54 with mostly standard options
- 108km polar stereographic projection
- 44 vertical hybrid sigma/pressure layers to 50hPa
- WRFv4.4.2 and MCIPv5.3.3
- Aerosol option 7
- cb6r5m w/ aerosol nitrate photolysis

Emissions

- Similar to EQUATES
- MEGAN v2.1 via CAMS /ECCAD
- Soil NOx via CAMS/ECCAD
- On-line DUST
- On-line Seasalt
- FINNv1.5 daily fires from WACCM
- Climatological Lightning NOx from GEIA
- HTAP Phase 3 anthropogenic emissions baseyear 2018
    - Surrogate for 2022 (no scaling)
    - Best available, but may miss sector growth in rapidly changing areas
    - Brake/Tyre missing

U.S. EPA GEOS-CF Details for Boundary Condition Development

Configuration

- v12 with mostly standard options
- 0.25-degree resolution
- 72 vertical layers (36 in trop, 120m first layer)
- GEOS meteorology (2x2.5)
- Full chemistry (online strat)
- Non-local PBL
- Runs a historical reanalysis for every day.

Emissions

- On-line MEGAN v2.1
- On-line DUST
- On-line Seasalt
- QFED daily fires
- HTAPv2 2010
    - Only CO is scaled based on CO2.
    - Other species are not scaled

Keller et al. (2021). **Description of the NASA GEOS composition forecast modeling system GEOS-CF v1.0** *JAMES* doi:10.1029/2020MS002413