Monitoring, Modeling & Other Technical Updates

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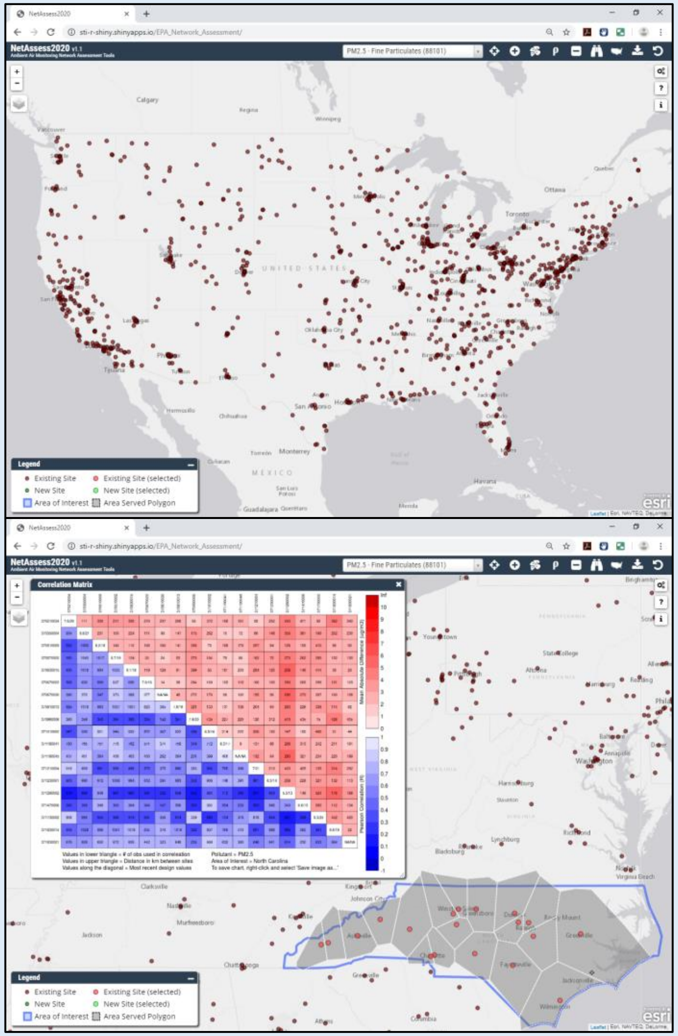
2020 Network Assessments

- Required every five years as described in§58.10(d)
  - This would be the third one; previous ones in 2010, 2015
- Due to applicable EPA Regional Office by July 1, 2020 along with annual monitoring network plan.
- Ideally:
  - The Network Assessment looks ahead to what the monitoring agency would like to change over multiple years.
  - The Annual Monitoring Network Plan is the actual proposal to change in the coming 18 months.
- To facilitate efficiently assessing ambient air networks, EPA has made an online application available– NetAssess2020!
  - https://sti-r-shiny.shinyapps.io/EPA_Network_Assessment/



PAMS Equipment Purchases

- EPA finalized the National Contract for the Markes/Agilent auto-GCs in fall of 2018
  - Those systems were shipped out in the spring of 2019
- Contract for CAS auto-GCs is in progress and expected to be completed this fall/winter
- Contract for ceilometers is being initiated with expectations of completion in Spring/Summer 2020
- EPA has decided to not develop a national contract for the purchase of true NO2 and will instead send states “targeted” 105 grant money for the purchase of those systems next FY

Air Toxics Strategy

- Emerging pollutants such as EtO* and PFAS/PFOA are requiring us to reevaluate how we look at air toxics
- Ongoing GAO audit of monitoring program seems to be toxics focused
- CAA is less prescriptive in the ambient monitoring and action/response for toxics than for criteria pollutants
- Desire to “operationalize” air toxics analyses and evaluation similar to how we deal with criteria pollutants in hopes of getting ahead of issues
- From a technical perspective this cuts across many programs
  - ambient monitoring
  - source monitoring
  - emissions inventory development/analysis
  - modeling
  - data analyses
- Early stages of an evolving strategy, but plan to build on lessons learned from EtO and other emerging pollutants and will be seeking input from our state/local partners

Advanced Monitoring (Personal Sensors)

- Emerging technical and communications challenge for EPA, State/Local/Tribal Agencies as well as citizen groups and regulators
- EPA focused on three major areas of emphasis
  - Data Quality
  - Interpretation / Communication of sensor data
  - Data Management

Advanced Monitoring (Data Quality)

- O_3 & $PM_{2.5}$ performance targets workshop held in summer 2018
- NO_2, SO_2, CO and PM_{10} workshop held in summer 2019
- Many state and local agencies doing independent evaluations across the country
- EPA's Office of Research and Development is working on non-regulatory performance targets, evaluation protocols, and best practices for sensors to assist state and local agencies and citizens in selecting sensors for proper use

Advanced Monitoring (Interpretation / Communication)

- EPA developing outreach materials (e.g. short video clips, FAQs, and factsheets) to promote understanding of regulatory vs. sensor data

- Held a small AQ Exchange communications summit in June 2019 with key conveyors of air quality data (states, locals, private sector) to develop a coordinated effort to better communicate air quality to the public

AQ Exchange: Common Themes

- Confusion exists because data is being generated for different purposes, needs, and users
- Strong desire to be more aligned in messaging air quality to the public
- Companies are developing global solutions
- Demand from consumers for trusted, real-time, localized, actionable information
    - Resulting in what look like "EPA AQIs"
- Standardized terminology desired (e.g. current conditions, air quality alert)
- Need for transparency in the "source" of the data including uncertainty in the output
- Include more people in the conversation

2016v1 Modeling Platform Update

- States, MJOs, local agencies and MJOs worked together to develop a Collaborative Emissions Modeling Platform
- The base year is 2016, and future years of 2023 and 2028 are included
  - 2023 is relevant for ozone, and 2028 for regional haze
- The 2016 beta version was released in March, 2019
  - State and local agencies provided comments on the base and future year data through June 1, 2019
- The 2016v1 was released in early October, 2019
  - Includes base and future year emission inventories and ancillary data
  - Also includes scripts to run SMOKE, SMOKE outputs for 2016 and summaries
- Access the release from the Inventory Collaborative Wiki page:
  - http://views.cira.colostate.edu/wiki/wiki/9169#2016v1-Platform
  - Data will be available on the Intermountain West Data Warehouse (IWDW)

Key improvements in the 2016v1 Platform

- Updated data for all sectors based on comments on the beta version from MJOs, state, and local agencies
- California provided mobile source emissions and Texas provided nonroad emissions
- Annual Energy Outlook 2019 is used to project non-EGU point and nonpoint sources plus onroad activity data
- EGU projections updated to use May 2019 IPM case including improved PM emissions; plus ERTAC and WRAP are providing alternative EGU inventories for use
- Key onroad mobile source inputs were updated including vehicle age distributions, representative counties, and activity data; plus there is an improved representation of speed distribution and NOx humidity adjustments
- Nonroad mobile source have improved temporal allocation and improved distribution of agricultural and construction emissions to counties

Key improvements in the 2016v1 Platform

- Airport emissions are based on FAA Aviation Environmental Design Tool (AEDT) and are compatible with 2017 NEI
- Commercial Marine Vessel emissions available hourly by grid cell and are compatible with 2017 NEI
- Rail inventories include base year inventory refinements and updated projections
- Oil and gas inventories were improved for PA and IL as were the future year projections; WRAP is also providing updated inventories based on new surveys
- Wild and prescribed fire inventory incorporated new national and state-supplied data sets, and estimates for major fires were improved through quality assurance
- Agricultural ammonia emissions incorporate corrected animal counts and updated fertilizer estimates
- Biogenic emissions include land use updates in Canada

Combined Air Emissions Reporting (CAER) Benefits and Implementation Highlights

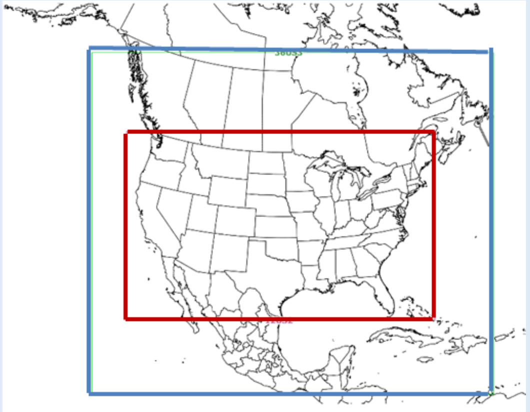
- Project purpose:
  - To consolidate emissions reporting activities through modern data sharing technologies and streamlined program collaboration
- Expected benefits include:
  - **Industry**: Reduced reporting burden for industry by avoiding duplicative efforts
  - **Co-regulators**: Support timely decision making and analyses
  - **Public**: Improvements to the quality, consistency, availability, timeliness and transparency of data
- Both information technology (IT) and business rules need to be changed
- CAER needs a distributed, flexible, adaptable architecture to meet diverse and shifting SLT and EPA program needs

Common Emissions Form (CEF) Project Roadmap and Status

- **Architecture and Analysis Phase** *COMPLETED APRIL 2019*
  - Select IT approach and development plan
  - Pilot state (Georgia) will use CEF System (no legacy system)
- **Pilot Phase** *SCHEDULED THROUGH OCTOBER 2019*
  - 5 pilot facilities, no "real" data submissions, foundation for functioning Minimal Viable Product (MVP)
- **MVP Phase** *SCHEDULED THROUGH JUNE 2020*
  - Develop CEF System for Georgia to use for ~170 facilities for the 2019 inventory year
- **Post-MVP enhancements** *SCHEDULED JULY 2021 ONWARD*
  - Support existing Georgia needs and onboard additional facilities for 2020 emissions reporting year
  - Add at least 2 agencies who can use MVP approach for the 2020 reporting year
  - Add at least 1 agency for a different workflow case for the 2020 inventory year
  - Determine requirements for remaining agencies for 2021 inventory year and beyond
  - Add workflow to include additional inventory reporting programs

Updated EPA Regional Haze Modeling

2028 Projected Emissions



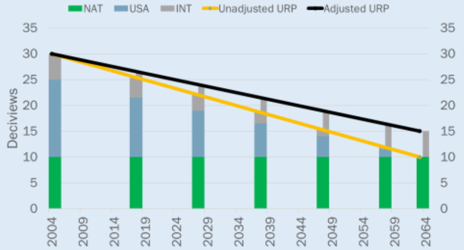
- 2028 projections consistent with 2016 base case for Regional Haze includes “on-the-books” emissions controls
- 2028 EGU emissions from IPM
  - November 2018 IPM version
  - IPM sensitivity run based on newer May 2019 version
- 2028 boundary conditions were held constant from 2016
  - From 2016 Hemispheric CMAQ
- Wildfire, prescribed fire, and ag fire are 2016 year specific and held constant
- Canadian emissions were projected to 2028 from 2015 based on factors provided by Environment and Climate Change Canada
- Mexico emissions were projected to 2028 from their 2008 inventory
  - Onroad mobile sources were overridden with outputs from MOVES-Mexico
  - We requested new 2016 emissions data from Mexico, but have not received anything yet

CAMx 2016 and 2028 Emissions Sector Totals

Tag #	Tag Name	2016fg Annual Emissions NH3	NOX	PM2.5	SO2	VOC	2028fg Annual Emissions NH3	NOX	PM2.5	SO2	VOC
1	Biogenics	-	975,807	-	-	43,161,614	-	975,807	-	-	43,161,614
2	Point EGUs	23,977	1,290,226	133,515	1,540,557	33,771	39,555	804,093	111,632	878,680	29,816
3	Onroad mobile	100,856	4,066,815	130,614	27,550	1,986,602	83,643	1,354,187	63,060	11,550	886,243
4	Nonroad mobile	1,783	1,081,598	102,159	2,198	1,164,615	2,028	604,942	55,094	1,536	825,951
5	C1 & C2 commercial marine	309	514,611	13,720	3,130	9,546	312	287,866	7,945	1,252	5,904
6	C3 commercial marine	96	567,284	6,870	15,144	25,013	139	486,975	9,968	21,969	36,328
7	C3 commercial marine - non-US	-	1,043,852	81,432	657,836	37,557	-	1,482,984	116,059	133,509	53,535
8	Railroads	323	558,732	16,158	364	26,062	340	588,788	17,036	383	27,469
9	Agricultural burning	54,454	10,825	28,632	3,909	18,323	54,454	10,825	28,632	3,909	18,323
10	Agricultural ammonia	2,862,779	-	-	-	186,941	2,990,703	-	-	-	198,161
11	Nonpoint and point oil and gas	4,376	955,824	26,021	57,475	3,092,777	4,394	930,941	30,783	72,187	3,577,561
12	Point non-EGU sources	63,613	1,087,999	261,565	675,797	816,127	64,188	1,140,722	144,393	641,564	820,105
13	Residential wood combustion	15,554	31,492	318,999	7,739	342,959	14,627	32,128	300,284	6,722	326,350
14	US wildfires	125,577	110,960	665,171	59,430	1,804,428	125,577	110,960	665,171	59,430	1,804,428
15	US prescribed fires	128,554	121,368	640,518	56,376	1,513,923	128,554	121,368	640,518	56,376	1,513,923
16	Area source fugitive dust	-	-	1,006,412	-	-	-	-	1,017,675	-	-
17	Non-point	121,721	759,882	499,779	161,732	3,718,709	123,021	763,173	543,498	119,048	3,937,967
18	Canada fires	104,683	134,301	580,958	60,914	1,501,988	104,683	134,301	580,958	60,914	1,501,988
19	Canada anthropogenic	533,657	1,926,159	584,899	1,147,090	2,023,308	730,509	1,244,887	588,794	1,245,794	1,905,101
20	Mexico fires	120,627	347,132	746,107	45,222	2,260,695	120,627	347,132	746,107	45,222	2,260,695
21	Mexico anthropogenic	925,033	3,029,834	677,215	2,344,667	4,649,026	936,519	3,352,508	802,946	2,865,746	5,349,517
22	Oceanic sea salt and DMS	-	-	-	-	-	-	-	-	-	-
	US Anthropogenic Total	**3,249,840**	**10,925,288**	**2,544,443**	**2,495,595**	**11,421,444**	**3,377,404**	**7,004,640**	**2,329,998**	**1,758,801**	**10,690,177**
	Percent change in US anthropogenic between 2016 and 2028						**3.9%**	**-35.9%**	**-8.4%**	**-29.5%**	**-6.4%**

International Anthropogenic Contributions and Glidepath Adjustment

- EPA contracted with the CAMx developer to create a new PSAT version that allows tracking of individual components of the boundary conditions
  - New PSAT allows the separation of boundary conditions into:
    - International anthropogenic
    - Natural
- All components of international anthropogenic contributions are now available
  - Mexico anthropogenic
  - Canada anthropogenic
  - C3 Marine outside of the US ECA region
  - International anthropogenic boundary conditions



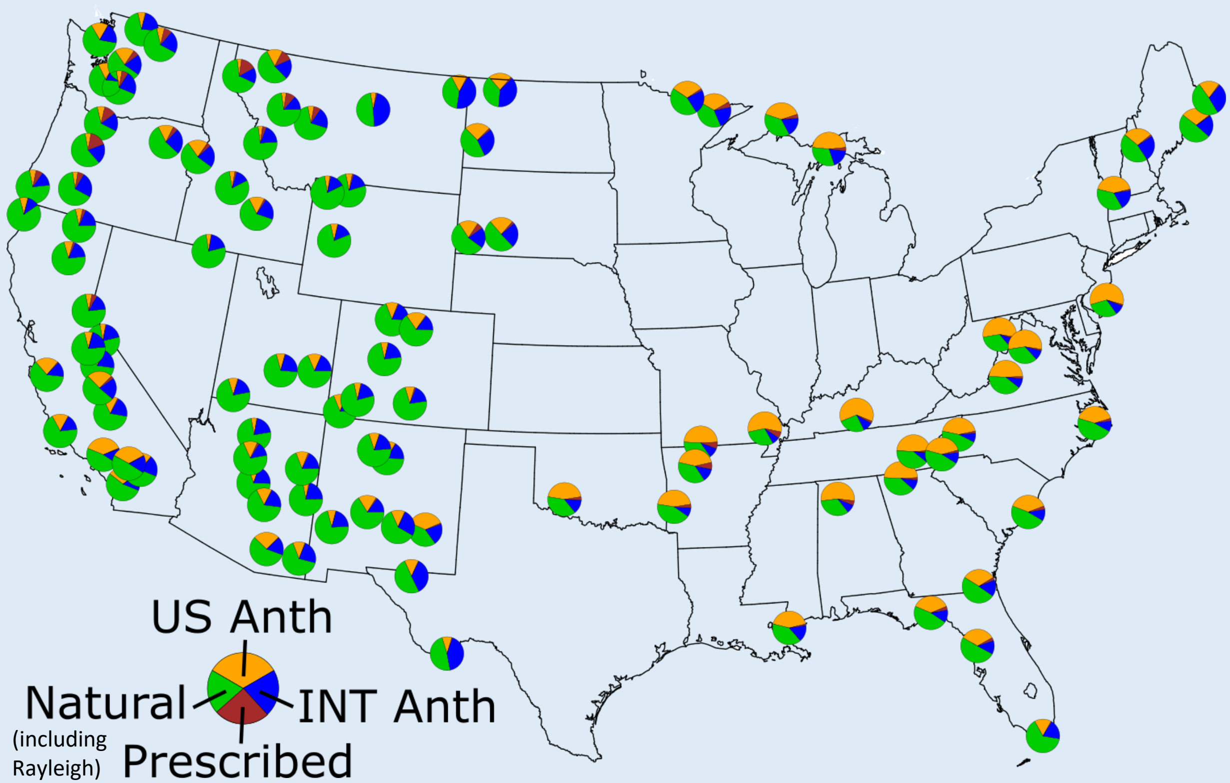
- Glidepath adjustment uses the total contributions of the international anthropogenic components

International and Prescribed Fire Contributions

- International anthropogenic
  - Boundary conditions (from outside the 36km CAMx domain)
    - Dominated by sulfate
    - Mostly from Asia and non-US shipping (these modeling results cannot distinguish between the BC source types)
  - Canada
    - Sometimes large sulfate, nitrate, and primary OC contributions at near border Class I areas
  - Mexico
    - Large sulfate contributions in near border Class I areas
  - Non-US C3 shipping within the 36km domain
    - Small amounts of sulfate and nitrate, largest impacts in the Gulf of Mexico and Florida
- Prescribed fires
  - Largest contributions in the Southeast and Northwest
  - Large carbon contributions in some months
    - Visibility impacts depend on whether the burning is coincident with the 20% most impaired days
    - Note that prescribed burning is based on 2016 emissions

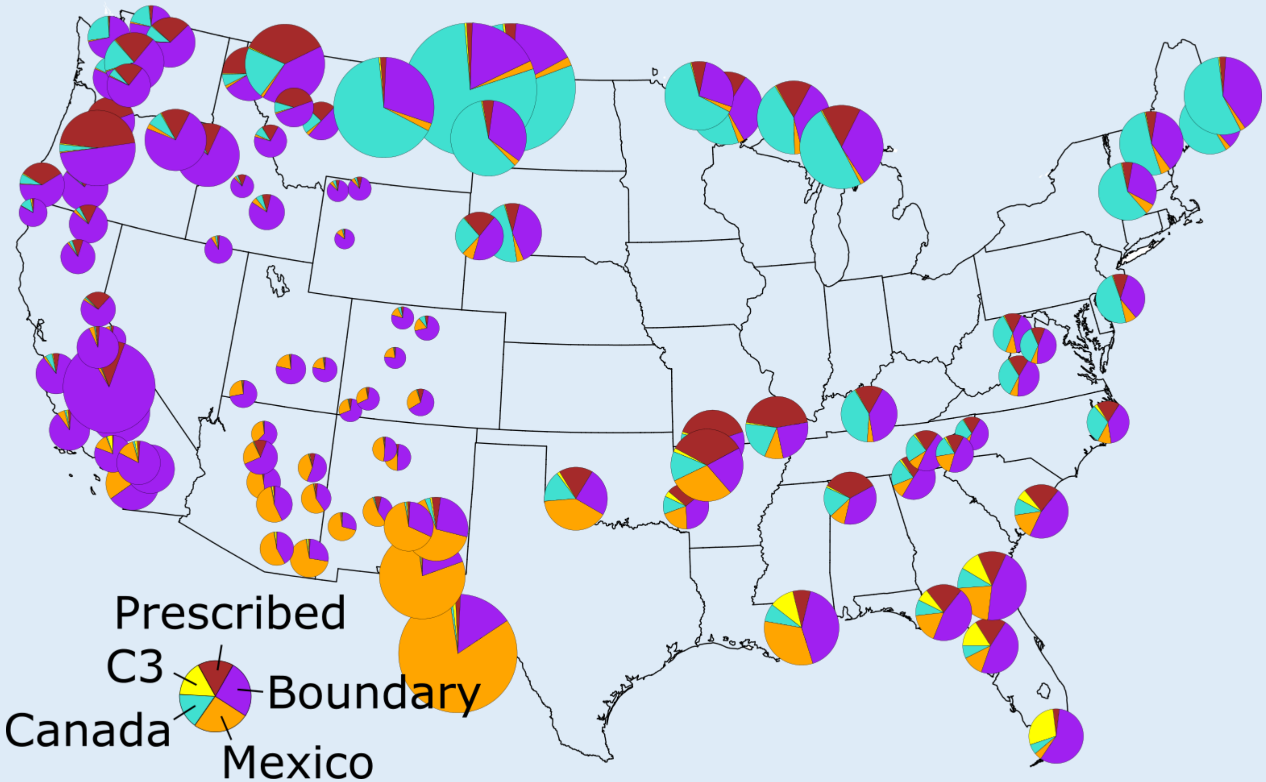
2028 Total Visibility Impairment Components (20% most impaired days)

2028 Visibility Impairment	Range (Mm-1)
US anthropogenic	0.98–45.68
International anthropogenic	2.96–19.68
Prescribed Fires	0.03-5.15
Modeled natural (including Rayleigh)	11.72-29.83



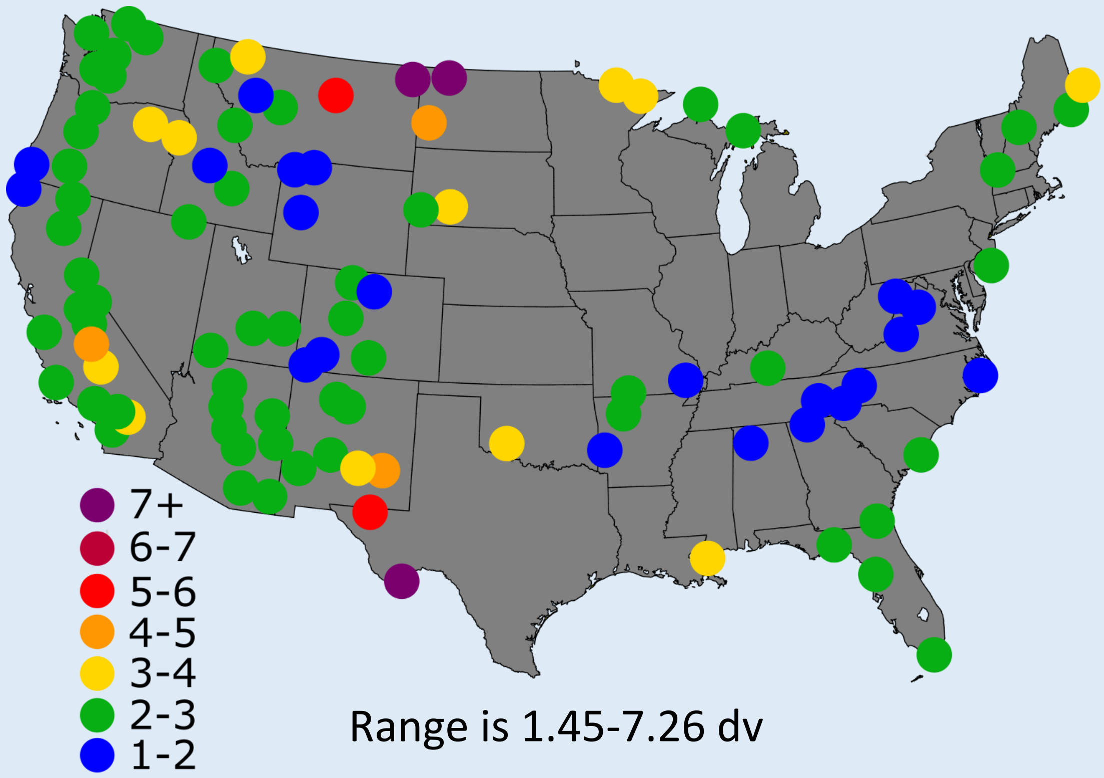
International Anthropogenic and Prescribed Fire Contributions (20% most impaired days)

Glidepath Adjustment components	Range (Mm-1)
Prescribed fires	0.03-5.15
C3 commercial marine outside the US ECA region	0-2.28
Canada anthropogenic	0.01–15.49
Mexico anthropogenic	0.02–14.39
International anthropogenic from outside the 36km domain (boundary conditions)	1.19–11.73



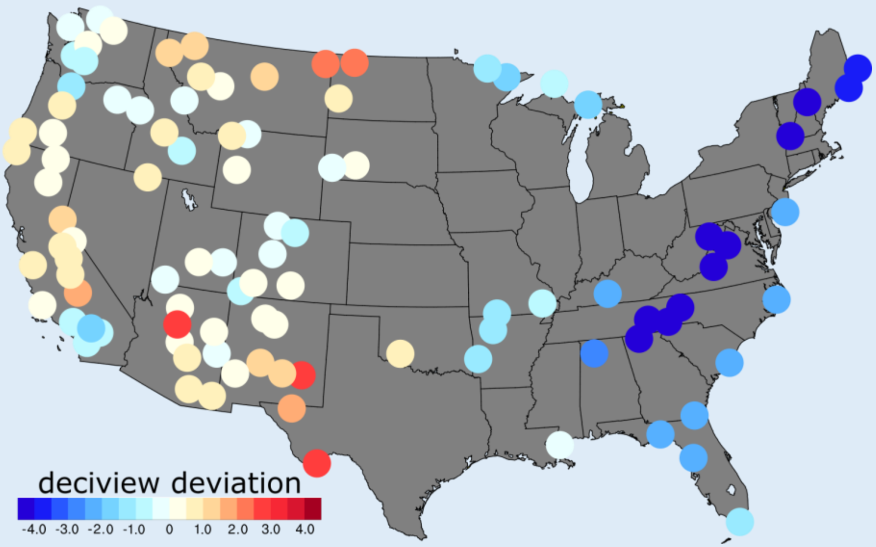
Total Deciview Default Glidepath 2064 Endpoint Adjustment (20% most impaired days)

Glidepath Adjustment components
C3 commercial marine from outside the US ECA region
Canada anthropogenic
Mexico anthropogenic
International anthropogenic from outside the 36km domain (boundary conditions)

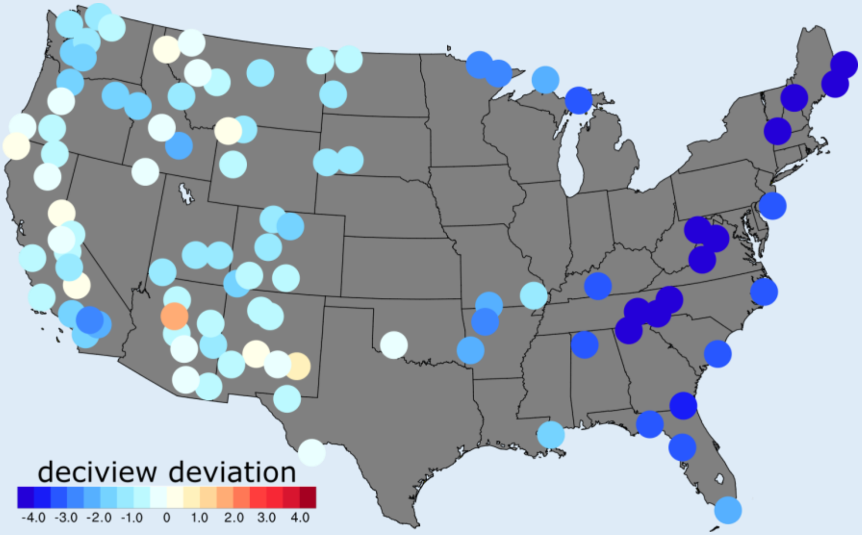


Updated EPA Regional Haze Modeling (2028fg) Deviation from 2028 Glidepath (20% most impaired days)

Deviation from Unadjusted Glidepath



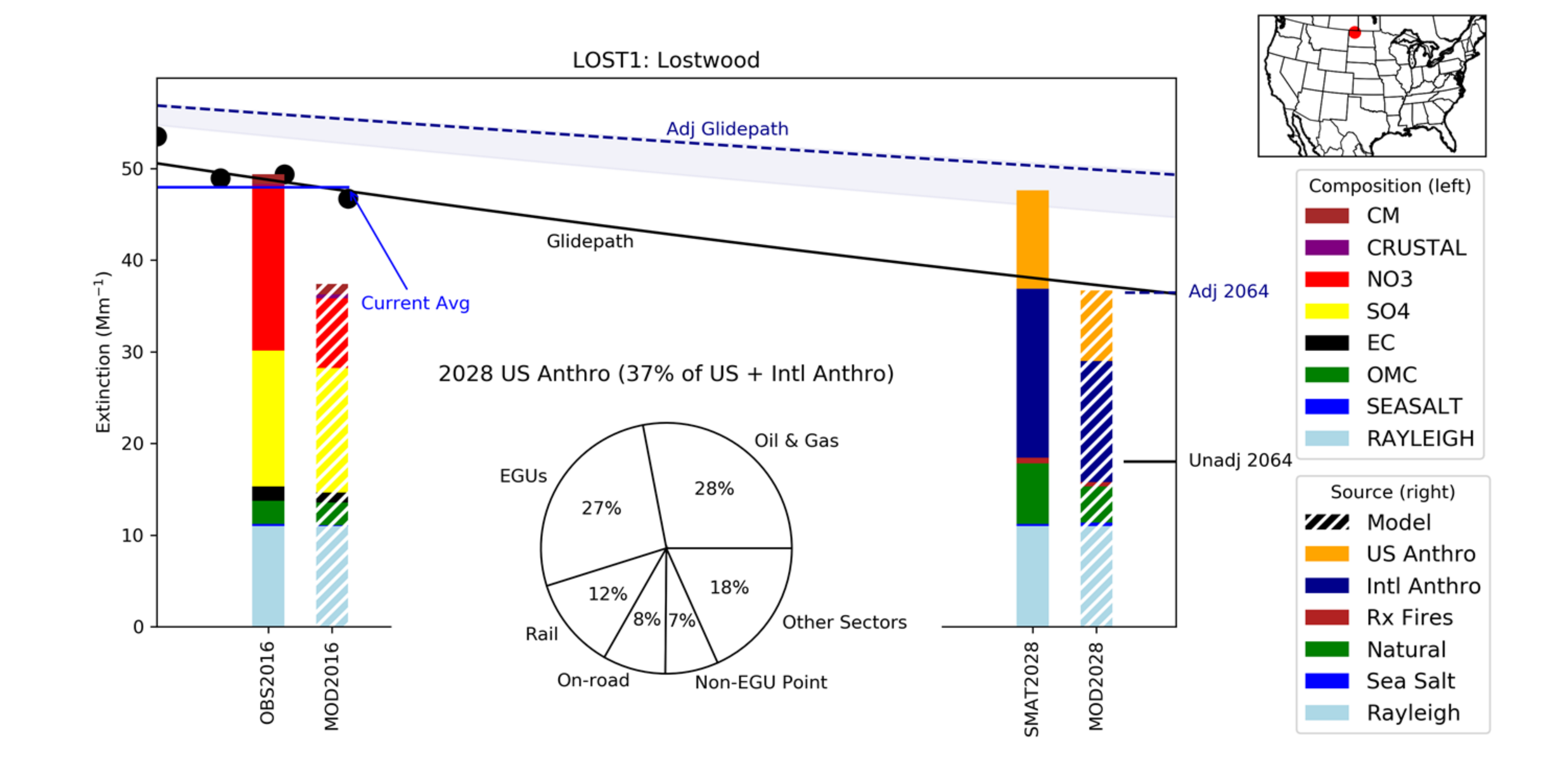
Deviation from Default Adjusted Glidepath



	Default Glidepath	Adjusted Glidepath
Number of IMPROVE sites below the glidepath	51	91
Number of IMPROVE sites above the glidepath	47	8
Total	99	99

Note that the 99 IMPROVE sites represent 142 Class I areas

Lostwood Wilderness (ND) 2016-2028



2028 Adjusted Glidepath Conclusions

- Nearly all IMPROVE sites (Class I areas) are below the "default" adjusted glidepath in 2028
  - Eight IMPROVE sites remain above the adjusted glidepath
- The modeled glidepath adjustments range from 1.5 to 7 deciviews
  - The largest adjustments are at IMPROVE sites near the Canada and Mexico border
  - Prescribed fire impacts can be included in the adjustment, but are more uncertain
- The modeled contributions and resultant glidepath adjustment need to be closely examined on a site-by-site basis.
  - Many site values may be reasonable, but some may be biased high or low for different reasons
  - Further analysis of the modeled international and prescribed fire contributions, ambient natural conditions, and impact of model bias on the results