

Application and Coordination of Regional Modeling for Projecting Reasonable Progress Goals

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Acknowledgments

- Modeling results shown here are from the Western Air Quality Study 2011 CAMx simulations available on the Intermountain West Data Warehouse: <http://views.cira.colostate.edu/tsdw/>
- The WAQS is a collaborative effort of western states, federal land managers and EPA, with staff support by WRAP and contractor analysis work by Ramboll Environ
- Special thanks to Ou Nopmongcol and Ralph Morris of Ramboll Environ for developing spreadsheets to support analysis of CAMx PSAT results.

Example Topics

- What is different in the draft guidance in terms of using regional modeling results?
- Planning metric and algorithm(s) to derive worst 20% average are different – what and where is the effect of those changes?
- Does the metric change really affect control evaluation and planning, and if so, how?
- How are these source-by-state contributions translated into RPGs?
- How to evaluate international anthropogenic impairment?
- How to address concerns with model performance in both the global scale models and regional scale models?

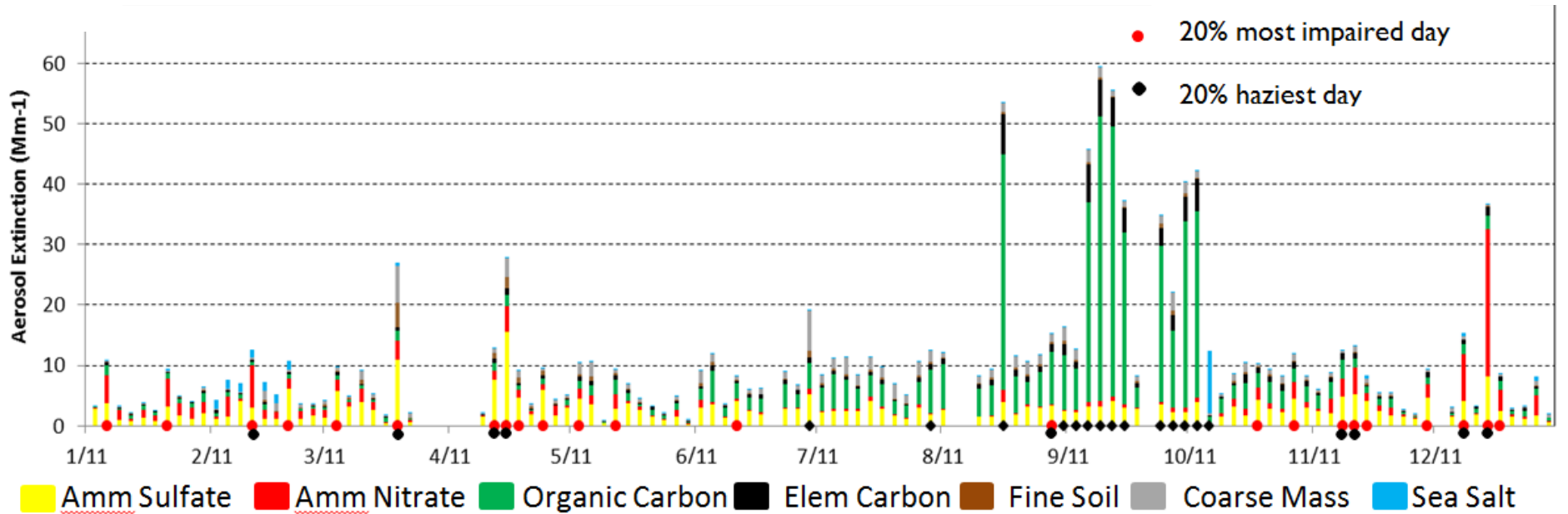
What is different in the draft guidance in terms of using regional modeling results?


- Draft regional haze guidance does not specify how to use air quality models to project RPGs, but it refers to the 2014 “Draft Modeling Guidance for Demonstrating Attainment of Air Quality Goals for Ozone, PM_{2.5}, and Regional Haze”
- The 2014 Draft Guidance does not address all topics that might be relevant to RH SIPs, such as adjustments to the URP for international emissions.
- Ongoing collaboration between EPA, States, Tribes and FLMs is needed to improve estimates of RPG and comparison to URP.
- This collaboration will be informed by the results of OAQPS, EPRI, WRAP and WAQS modeling studies.

Most Impaired Days vs. Haziest Days Metrics

For Class I areas affected by wildfires or dust storms there is a substantial change in the tracked days using the impairment metric.

IMPROVE Measured Aerosol Extinction (YELL2)




Most Impaired


Haziest

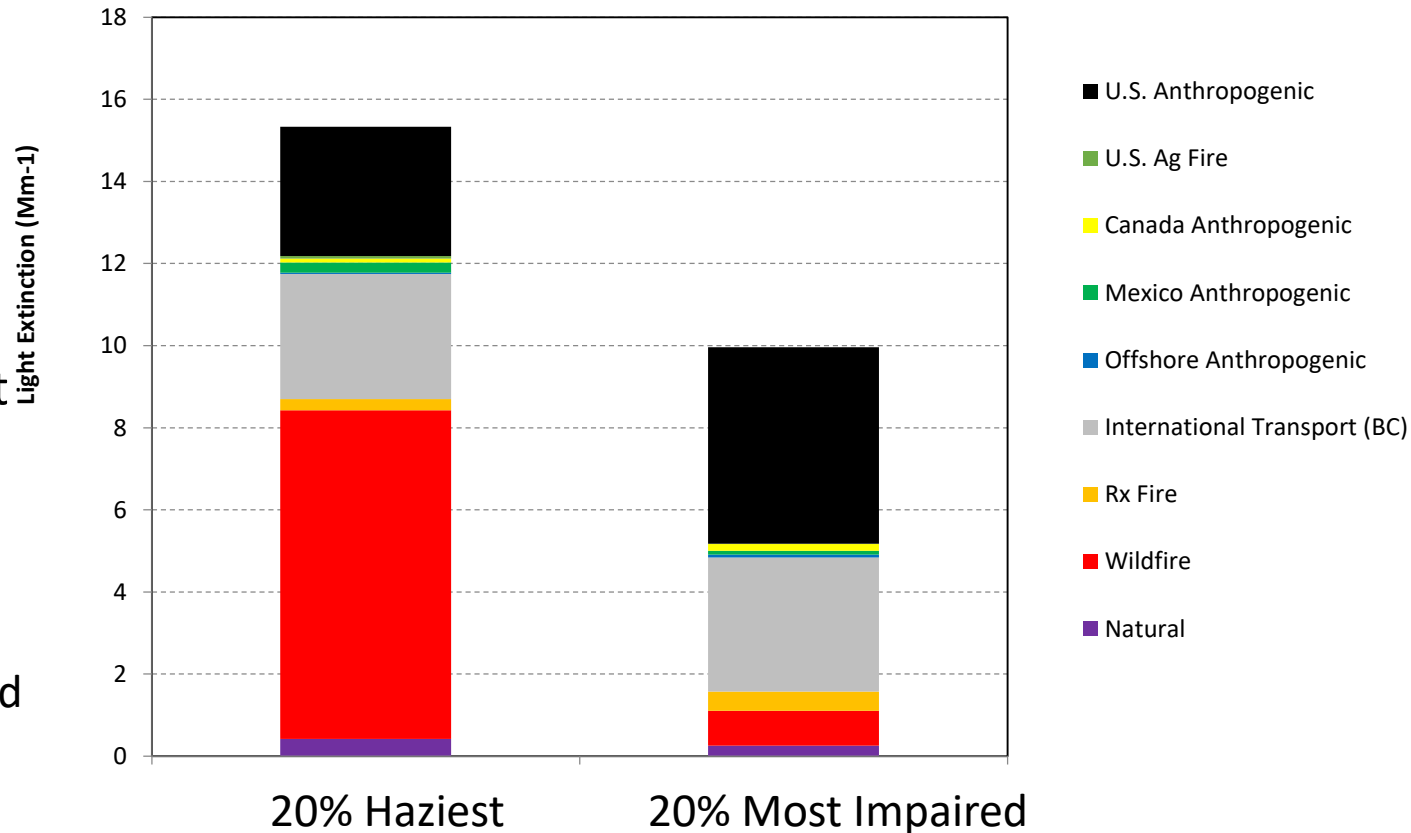

Most Impaired

Does the metric change really affect control evaluation and planning, and if so, how?

Yes – nitrate and sulfate have larger contributions on the most impaired days in the western U.S.

Changes in source sector contributions using, 2011 WAQS CAMx PSAT for Yellowstone 20% Haziest vs. 20% Most Impaired days.

Note: CAMx model estimates use PSAT % contributions multiplied by IMPROVE data.



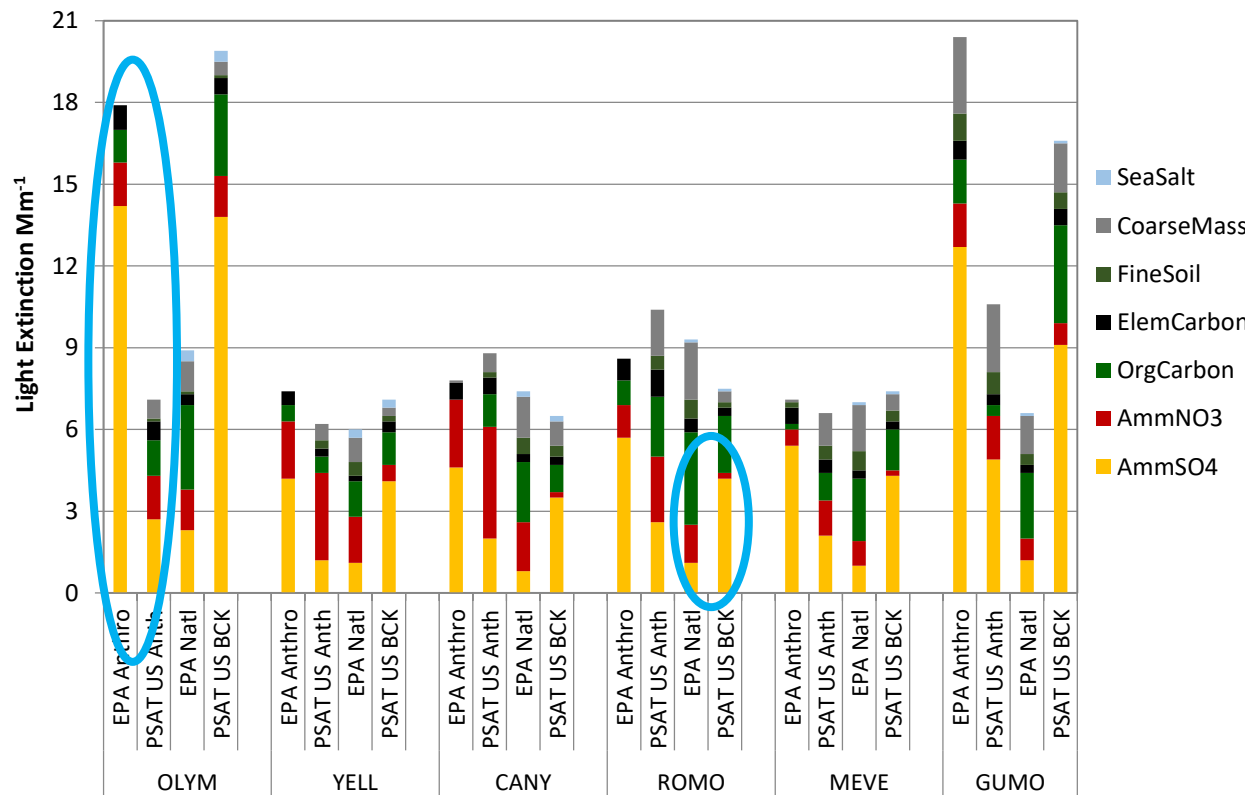
Does the metric change really affect control evaluation and planning, and if so, how?

However, more work is needed on model evaluation and analysis of impairment in the IMPROVE data to answer this question.

Uncertainty remains in contributions to sulfate.

There are large differences in the CAMx PSAT vs. EPA IMPROVE analysis estimates of natural nitrate.

IMPROVE: Average of 20% Most Impaired Days
EPA: Anthropogenic vs Natural
PSAT: U.S. Anthropogenic vs U.S. Background



How are state anthropogenic contributions translated into RPGs?

Table shows state to state anthropogenic contributions to light extinction (Mm^{-1}) at Yellowstone using WAQS 2011 CAMx PSAT source apportionment.

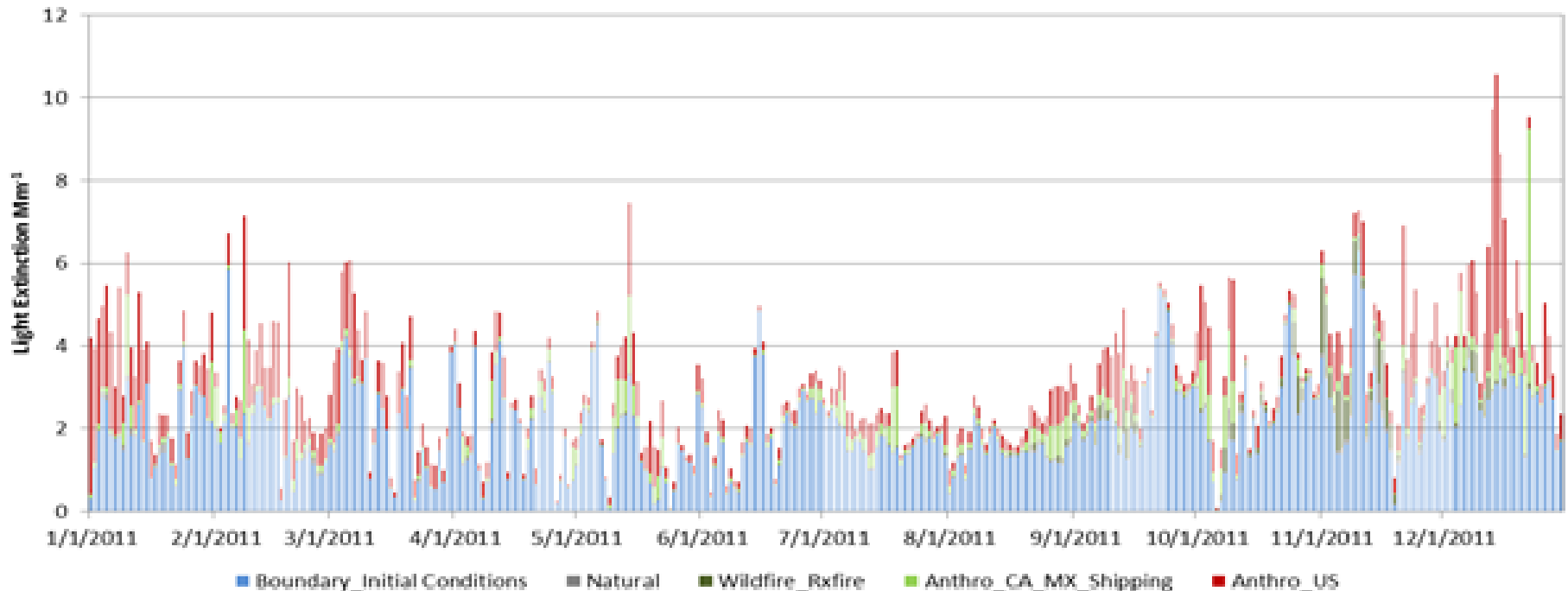
Model projected RPG in 2028 will include effects of reduced source contributions from all states.

State	20% Hazeiest days (Mm^{-1})	EPA 20% most impaired days (Mm^{-1})
Eastern US	0.04	0.01
ARIZONA	0.11	0.08
CALIFORNIA	0.2	0.27
COLORADO	0.04	0
KANSAS	0.01	0
IDAHO	1.39	2.68
MONTANA	0.1	0.09
OKLAHOMA	0.01	0
OREGON	0.15	0.23
WASHINGTON	0.1	0.18
WYOMING	0.44	0.39
NORTH DAKOTA	0.01	0.01
SOUTH DAKOTA	0	0
NEBRASKA	0.01	0
NEVADA	0.1	0.15
UTAH	0.4	0.64
TEXAS	0.07	0.02
NEW MEXICO	0.05	0.03
Total	3.23	4.78

How are source sector contributions translated into RPGs?

Related question: How is the URP adjusted to account for international transport?

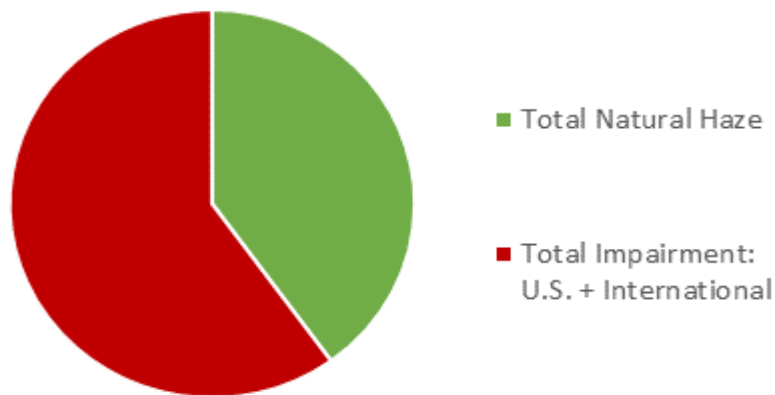
2011 Modeled Extinction Ammonium Sulfate - YELL2



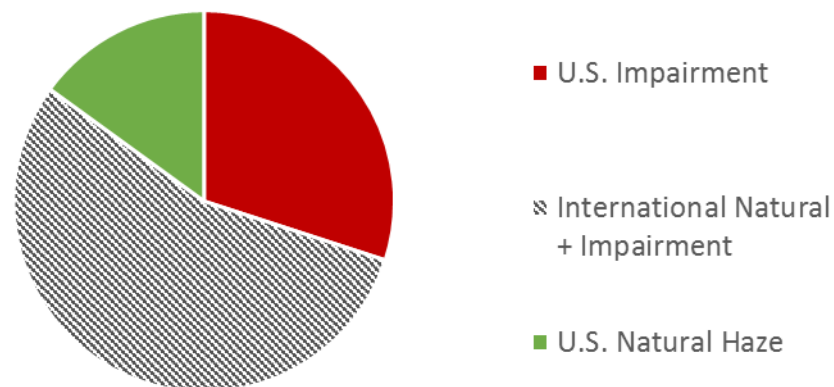
Evaluating Impairment from International Transport

- Using currently available regional scale photochemical models, we cannot compare estimates of natural haze and impairment in the IMPROVE data and in the photochemical model because the boundary condition (BC) data derived from global scale models do not distinguish between natural and anthropogenic PM_{2.5}.

IMPROVE data statistical analysis



Photochemical Model Source Attribution
current BC approach

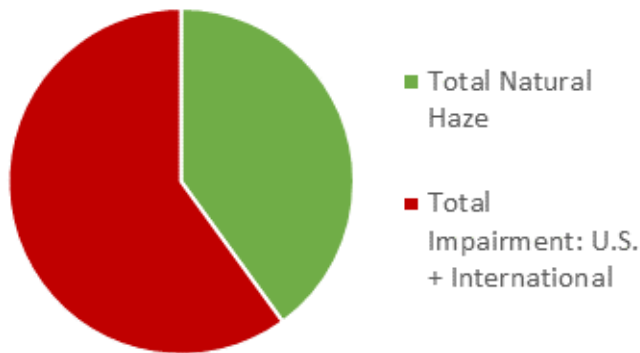


Note: hypothetical values are used in the pie chart to illustrate the method.

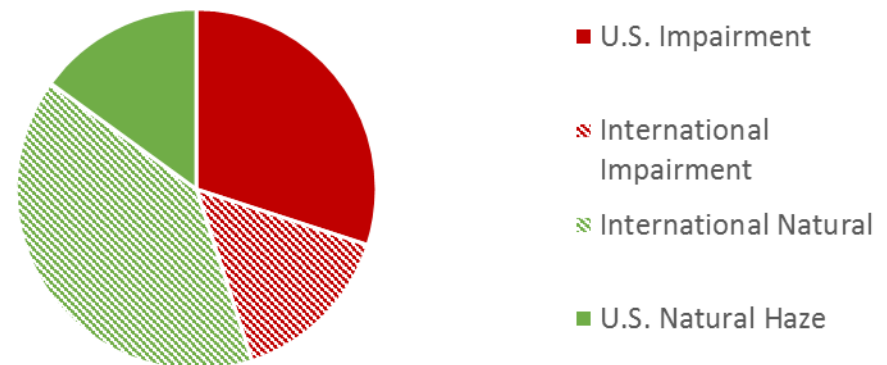
Boundary Conditions from Global Models

- Global model source attribution is needed so that regional models can distinguish transported natural haze and impairment in the boundary conditions.
 - Global model simulation with zero anthropogenic emissions can be used to quantify modeled natural haze and this can then be compared to the natural haze estimates used in the statistical analysis of IMPROVE data.

IMPROVE data statistical analysis



Photochemical Model with Global Model BC Source Attribution



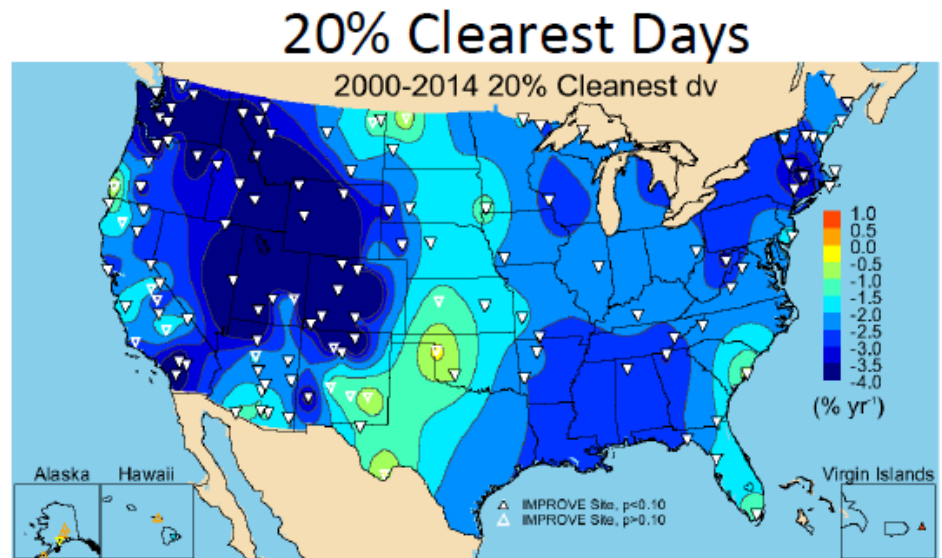
Next Steps

- More extensive evaluation needed of global scale models.
- Improve model performance for the regional scale models (see PPT on Dynamic Model Evaluation for regional haze).
- Compare global/regional model estimates of natural haze levels to the Trijonis and EPA estimates.
- Update estimates of natural haze conditions.
- Develop procedures to adjust URP to account for international anthropogenic emissions.

Communicating to the Public

- Show reductions in emissions from baseline period to 2016 and projected 2028.
- Show improvements on best days, average days and most impaired days.
- Explain that the worst haze days are caused by wildfires and dust storms that are not controllable.
- Plan for quantifying international contributions to impairment.

Analysis from B. Schichtel, NPS



- Success! Haze on clear days is not degrading and actually improving, particularly in the intermountain west