

SUMMARY – EPA WORKSHOP ON BACKGROUND OZONE LEVELS

MWAQC-Technical Advisory Committee

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Overview

- EPA Workshop – Purpose & key questions
- US Background ozone and its sources
- US Background ozone - Challenges
- Recent estimates of US background ozone
- Additional research/data needs
- US background ozone & exceptional events

EPA Workshop – Purpose & Key Questions

- To seek inputs from stakeholders on issues related to the background ozone relevant to attaining the 2015 ozone NAAQS consistent with CAA
- **Key Question**
 1. Do stakeholders think that EPA has properly characterized background O₃ in relation to the level and form of the 2015 NAAQS?
 - Are there additional analyses or modeling simulations that could be folded into the assessment?
 - Are there alternate definitions of background O₃ that also concern stakeholders?
 - What improvements would help better characterize background O₃ levels across the U.S.
 - What are stakeholders' perspectives on existing efforts to reduce background O₃ entering the U.S.?



EPA Workshop – Purpose & Key Questions

- **Key Question**

2. Do stakeholders think that EPA has properly characterized background O₃ in relation to the level and form of the 2015 NAAQS?

- Do stakeholders think EPA has properly characterized the statutory mechanisms by which background O₃ issues could be addressed as part of implementation of the 2015 NAAQS?
- Has EPA identified all of the CAA mechanisms available to address areas influenced by background O₃?
- What other approaches (consistent with CAA provisions) could be considered?
- Are sufficient tools, data, and guidance available to make the necessary demonstrations?
- Do states want additional assistance from the EPA to develop the necessary demonstrations?



US Background Ozone & Its Sources

US Background Ozone - Any ozone formed from sources other than U.S. man-made ozone precursor emissions (NO_x, VOC, CO, and CH₄)

The following processes (sources) can contribute to USB ozone values across the U.S.:

- Natural global ozone in troposphere (precursor emissions from biogenic and geogenic sources)
- Transported ozone from the stratosphere (ozone formed by natural processes in the stratosphere)
- Transported ozone from international sources (manmade ozone precursor emissions from outside the U.S.)



US Background Ozone - Challenges

- Definitions can vary.
- Impacts can vary across space and time.
- Difficult to measure. Estimates requires modeling.
- Models, while valuable, are imperfect.
- Background formed by a variety of sources.
- Role of sources vary across space and time.
- Multiple background sources often interact.
- CAA provisions vary by background type.
- Attribution demonstrations desirable (difficult).
- Resource limitations exist (at all levels).

Recent Estimates of Background Ozone

EPA ISA summarized peer-reviewed literature through 2012 and concluded:

- Seasonal mean background levels are highest in the inter-mountain western U.S.;
- Seasonal mean background levels are highest in the spring and early summer;
- Background impacts can occur on episodic and non-episodic scales (higher in discrete events); and
- Models compare reasonably w.r.t. seasonal mean estimates, but daily estimates are imprecise.

Region	Spring mean observed MDA8 O ₃ (ppb)	Spring mean base model MDA8 O ₃ (ppb)	Spring mean model USB MDA8 O ₃ (ppb)	Summer mean observed MDA8 O ₃ (ppb)	Summer mean base model MDA8 O ₃ (ppb)	Summer mean model USB MDA8 O ₃ (ppb)
Northeast	48 (+/- 10)	45 (+/- 7)	33 (+/- 7)	45 (+/- 14)	45 (+/- 13)	24 (+/- 7)

Subset of information from Table 3-1 of ISA. Summary of Zhang et al. (2011) estimates of seasonal mean MDA8 O₃ observations, seasonal mean model concentrations from the GEOS-Chem global model, and GEOS-Chem estimates of seasonal mean USB O₃ at selected CASTNET sites by region.



Recent Estimates of Background Ozone

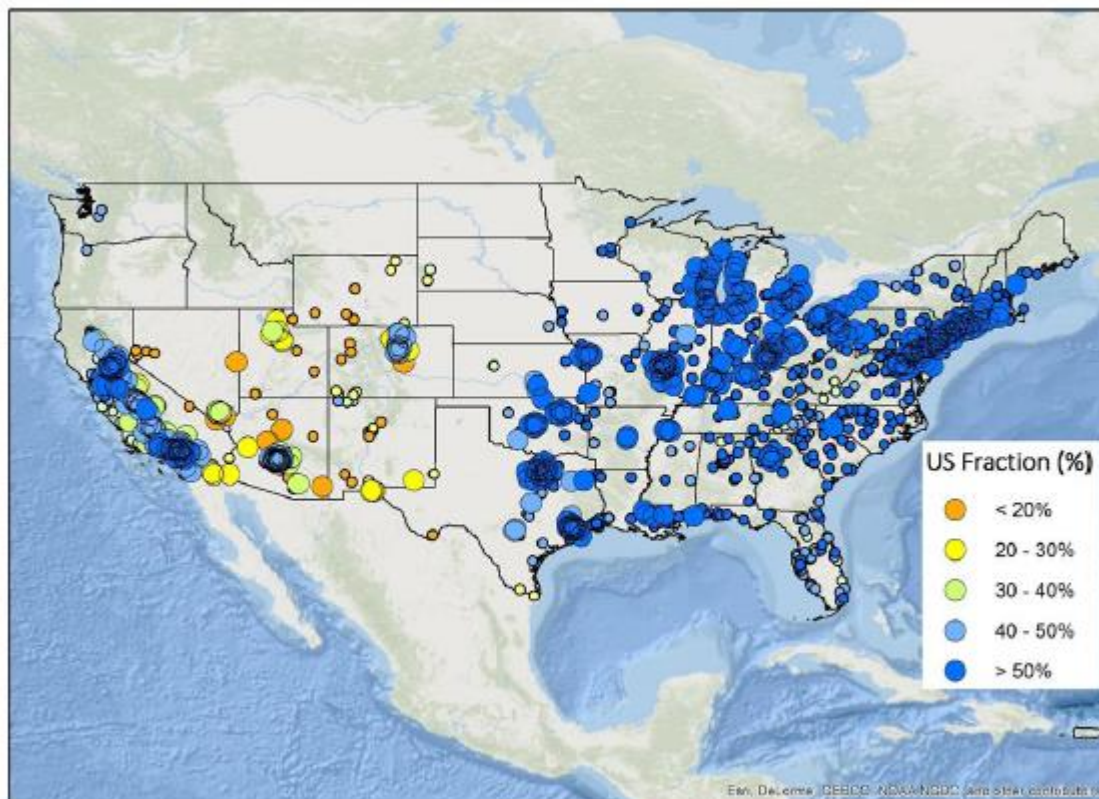
EPA source apportionment and zero out modeling confirmed earlier studies and also concluded that:

- USB can comprise an appreciable fraction of mean daily max 8-hour avg (MDA8) ozone across the U.S., with the largest relative contributions at higher-elevation, rural locations in the inter-mountain western U.S. in the spring and early summer seasons;
- U.S. manmade emission sources are generally the dominant contributor to the modeled exceedances of the 2015 O3 NAAQS, nationally and within individual regions across the country; and
- Analyses suggest that there can be infrequent events where MDA8 ozone concentrations approach or exceed 70 ppb largely due to the influence of USB sources like a wildfire or stratospheric intrusion.
- There is no indication that USB ozone concentrations alone will prevent attainment of the 2015 O3 NAAQS.

Recent Estimates of Background Ozone

Combining 2012-14 O3 DVs with Model Attribution

(2017 source apportionment modeling from the proposed Cross-State Air Pollution Update Rule)



- Larger circles represent DVs > 70.
- Color coding of the circles displays fractional importance of U.S. manmade emissions on high days.
- Not intended to imply thresholds re: significance of USB in any particular area.

Additional Research/Data Needs

We need more monitoring data to help characterize USB and better evaluate the accuracy of model-based estimates of USB.

- Need more measurements of vertical ozone profiles.
- Network of ozone LIDAR vertical profiles (e.g., NASA TOLNET).
- More ground-based ozone and precursor measurements in rural areas.

We need more comprehensive model evaluation studies using new monitoring data to assess contributions to background ozone.

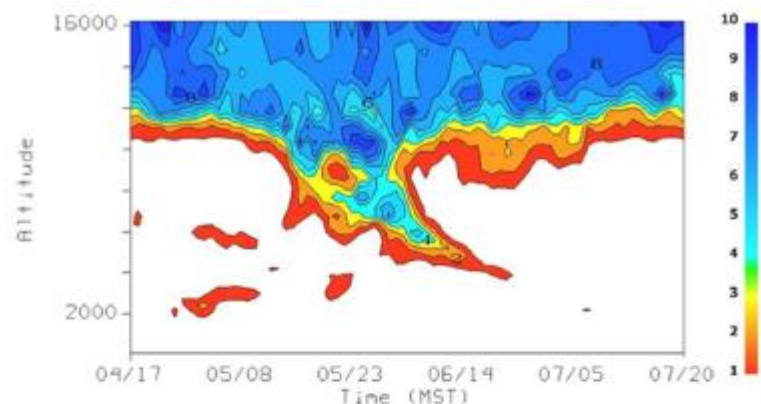
- Do global models accurately estimate BC inflow?
- Do regional models accurately simulate natural ozone (e.g., fires & biogenics)?
- Do regional models accurately simulate vertical mixing of ozone?
- Need projections of future trends in global ozone.

We need more state/federal planner/researcher collaborations to improve modeling and data analysis for ozone transport, wild fires, and stratospheric intrusion.

Background Ozone and Exceptional Events (Ozone Designations)

Stratospheric Ozone Intrusions

- During certain meteorological conditions, discrete plumes of stratospheric air can be displaced far into the troposphere and impact ground-level O₃ concentrations.



Wildland Fires

- During certain meteorological conditions, NO_x and VOC emissions from fires can contribute to increased ground-level O₃ concentrations.



Exceptional Event Demonstrations

EPA Regions routinely work with states to prioritize assistance and review of those events most likely to affect:

- Attainment status (e.g., decision to designate “attainment” rather than “nonattainment”)
- Classification (e.g., distinction as “Moderate” rather than “Serious”)

EPA proposed revisions to the Exceptional Events Rule on November 10, 2015

- Intended to make the demonstrations more manageable for the air agency seeking to exclude data and for the EPA office reviewing and acting on these demonstrations.
- EPA intends to finalize in Summer 2016.

EPA Draft Guidance on the Preparation of Exceptional Events Demonstrations for Wildfire Events that May Influence Ozone Concentrations

- Available for public comment 11/10/2015 to 2/3/2016.
- EPA intends to finalize with Exceptional Events Rule revision.

General Exceptional Events Support Information

- www.epa.gov/air-quality-analysis/treatment-data-influenced-exceptional-events

Example Exceptional Event Demonstrations

- www.epa.gov/air-quality-analysis/exceptional-events-submissions-table

Discussion Questions - Exceptional Events

- Do stakeholders think EPA identified all of the CAA mechanisms available to address areas influenced by ozone-related exceptional events?
- Assuming EPA finalizes proposed amendments to the Exceptional Events Rule, do stakeholders think there are sufficient technical tools, data, and EPA guidance available to make the demonstrations necessary to assess ozone-related exceptional events?
- Do air agencies want or need additional assistance from the EPA to develop the demonstrations necessary to use the CAA's exceptional event exclusion authority?

Public Comments

- EPA is seeking public comments

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