Interstate Transport Modeling for the 2015 Ozone Standard in the Midwest and the Northeast
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**Motivation**

In support of “Good Neighbor” State Implementation Plans (CSAPR, 2011; CSAPR Update, 2016) for meeting the 2015 ozone (O₃) National Ambient Air Quality Standard (NAAQS). LADCO used the Comprehensive Air Quality Model with Extensions (CAMS version 6.4) to assess the impacts of interstate transport on surface level O₃ concentrations in the Midwest and Northeast U.S.

**Model Configuration**

- LADCO’s 2023 O₃ air quality and interstate transport forecast is based on the CAMS modeling platform released by U.S. EPA in October 2017 (US EPA, 2017).
- The 2023 emissions data are based on the U.S. EPA 2011v6.3 (“EM”) emissions modeling platform (US EPA, 2017b) except for EGU emissions.
- EGU emissions are estimated using the ERTAC EGU 2.7 Tool (http://www.marxma.org) with 2011 CEM data and state-reported updates for EGU emissions as of May 2017.

**Key Messages**

- Home state is the biggest contributor for its own O₃ design values, except for Wisconsin and Michigan where IL is a dominant contributor.
- O₃ precursors from the south central U.S. contributed to design values in the LADCO states (e.g., TX contributes to MS).

**Summary and Key Findings**

Using the CAMS APCA modeling, LADCO identified monitors with potential air quality problems in 2023 and estimated contributions of 32 source regions (Figure 5) to the monitors. We explored the impacts of including or excluding water cells in the calculation of future design values.

LADCO’s final Technical Support Document for our member state 2015 O₃ “Good Neighbor” SIPs is available at www.ladco.org.

**O₃ Contributions at Selected Monitors & Impacts of Water Cells on Design Values**

- Figure 4: Source region contributions to O₃ DV₂023 are key monitoring sites in the Midwest and Northeast. The O₃ DV₂023 were calculated using the maximum of the modeled Mid2003 values in the 3x3 grid cells surrounding a monitor where water cells are included (a) and excluded (b). Only the source regions with contributions ≥ 1.0 ppbv are explicitly shown in these plots, all source regions with contributions < 1.0 ppbv are grouped into the “others” category.

**Acknowledgements**

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**Figure References**


**Figure Descriptions**

- Figure 1: Base Year (Average of 2009-2013) O₃ Design Values. O₃ concentrations are higher in urban core cities such as St. Louis and southern Indiana. Shoreline monitors near Lake Michigan and Mid-Atlantic coast are in violation of 2015 O₃ NAAQS (as shown by orange, red, purple dots).
- Figure 2: 2016 NOₓ and VOC emissions estimated by the ERTAC EGU 2.7 Tool (https://www.marxma.org) with 2011 CEM data and state-reported updates for EGU emissions as of May 2017.

- Figure 3: Statewide average contributions to O₃ DV₂023 in the Midwest (a) and Northeast (b). Plots show receptor states with >2 ppbv contribution from upwind states, and exclude ICBC, BGIC, CMAS, SE, OFFSHORE, OSE, and WRAP source region tags.
- Figure 4: Source region contributions to O₃ DV₂023 at key monitoring sites in the Midwest and Northeast. The O₃ DV₂023 were calculated using the maximum of the modeled Mid2003 values in the 3x3 grid cells surrounding a monitor where water cells are included (a) and excluded (b). Only the source regions with contributions ≥ 1.0 ppbv are explicitly shown in these plots, all source regions with contributions < 1.0 ppbv are grouped into the “others” category.
- Figure 5: CAMS APCA source regions used in LADCO 2023 simulation.

- Figure 6: Estimated O₃ DV₂023 in the Midwest and Northeast.

If EGU emissions reductions take place as projected by ERTACv2.7 along with the EPA’s emissions projection for other sources, monitors in the Midwest and the Northeast could attain the 2015 O₃ NAAQS by 2023 (Figure 6). A few sites by the Lake Michigan and Connecticut shorelines are projected to be at or near maintenance status of the standard.

Inland home states are the biggest contributors to their own O₃ concentrations. For shoreline states, WI, MI, CT, NJ, DE, and DC, upwind states are the biggest contributors depending on dominant air circulation in the O₃ season. Mobile (32%), point (17%), and nonpoint (8%) sources appear to be the key contributing emissions sectors to future O₃ design values.

Excluding water cells from the attainment test resulted in higher DV₂023 for the lakeshore monitors in the LADCO region, but lower DV₂023 for the Connecticut shoreline monitors.

**Key References**