Ozone Background Issues: Growing Influence of International Transport

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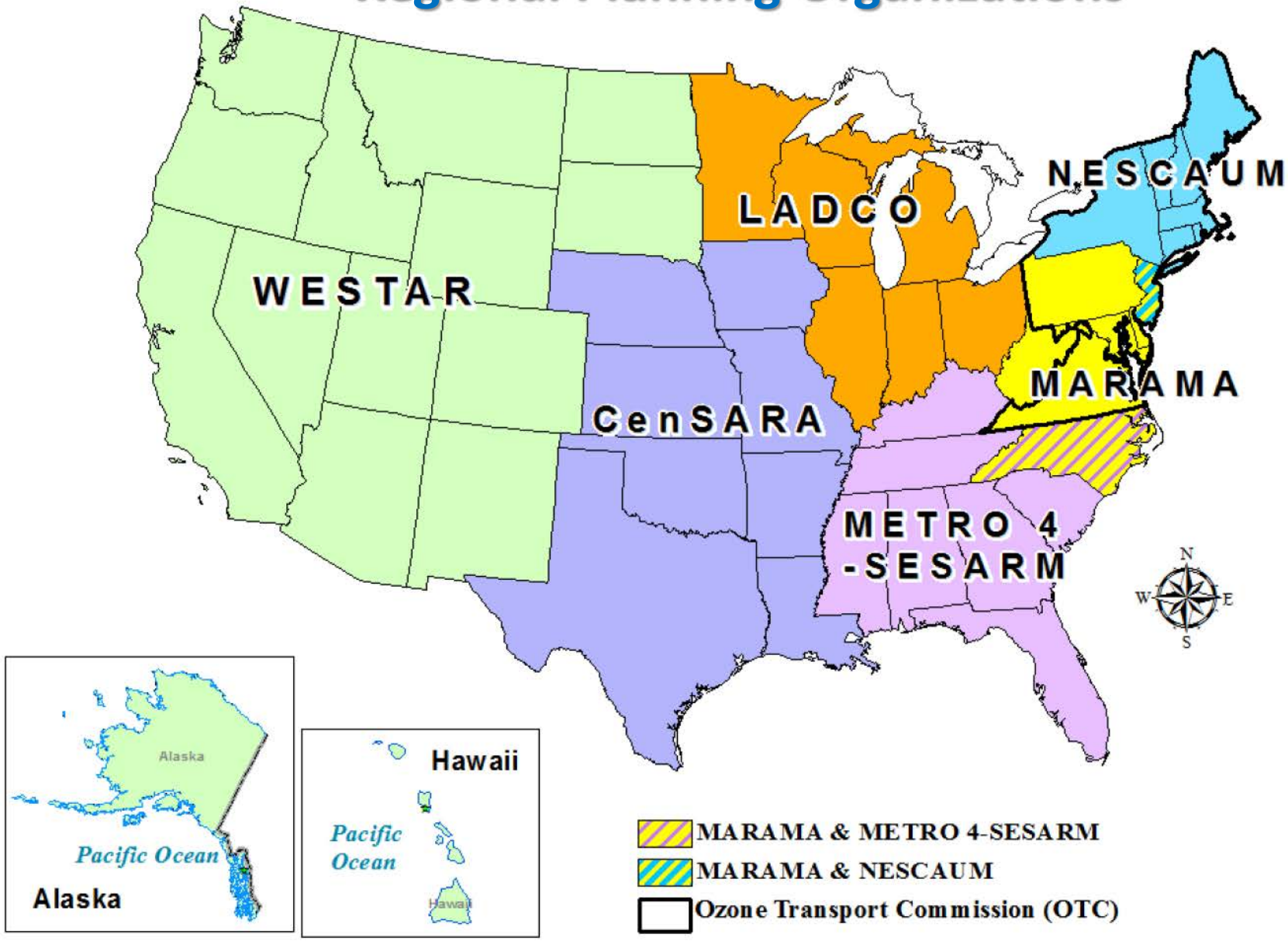
Lake Michigan Air Directors Consortium
March 3, 2016

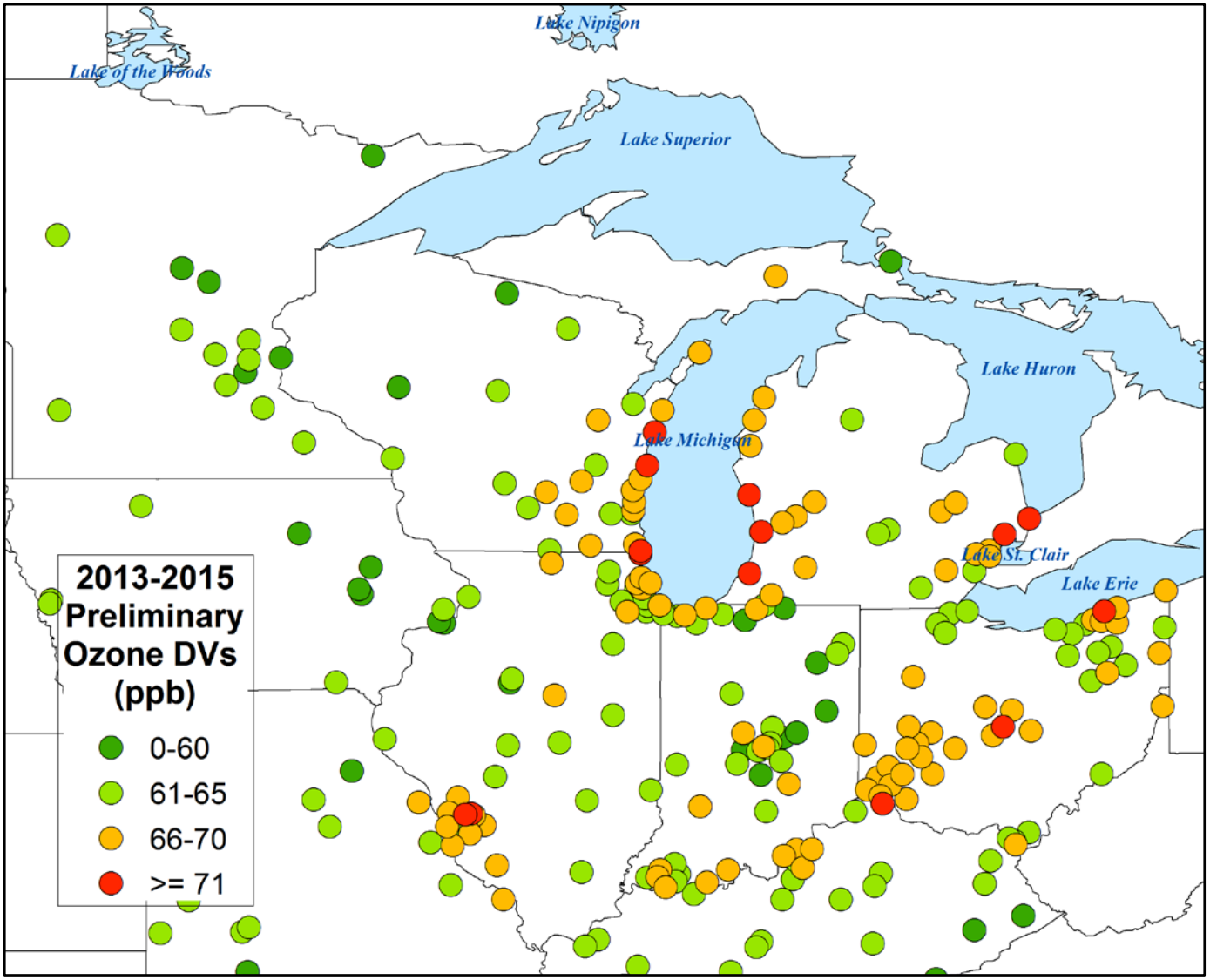
The Lake Michigan Air Directors Consortium

- Established in 1989
- Original members**: IL, IN, MI, & WI**
- **OH** joined in 2004**; MN** joined in 2012**.**
- Purpose:
  - **technical assessments** on problems of air quality**;**
  - **provide a forum** for discussion and coordination;
  - **coordinate training** activities for member states.
- **Regional** focus

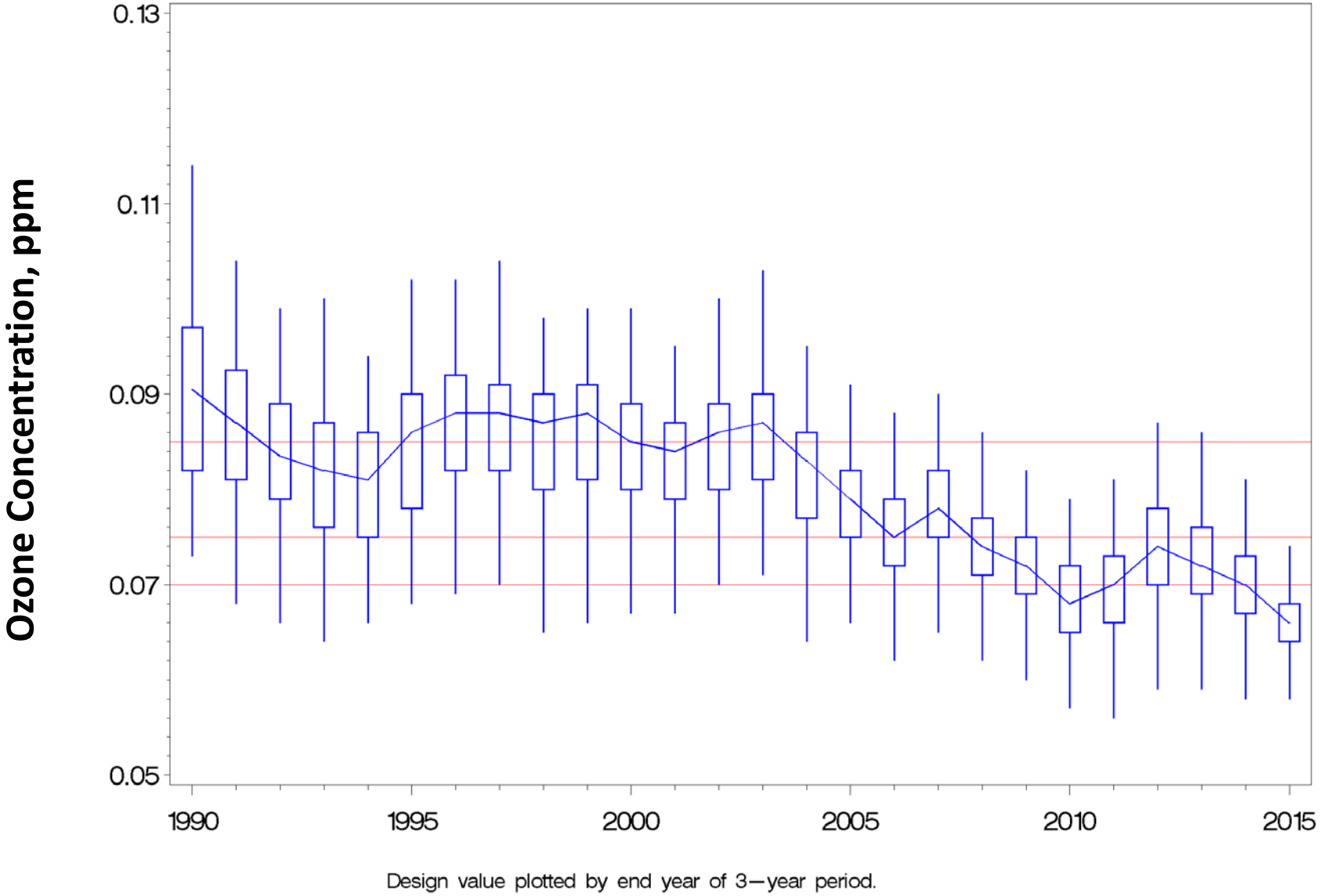
Regional Planning Organizations



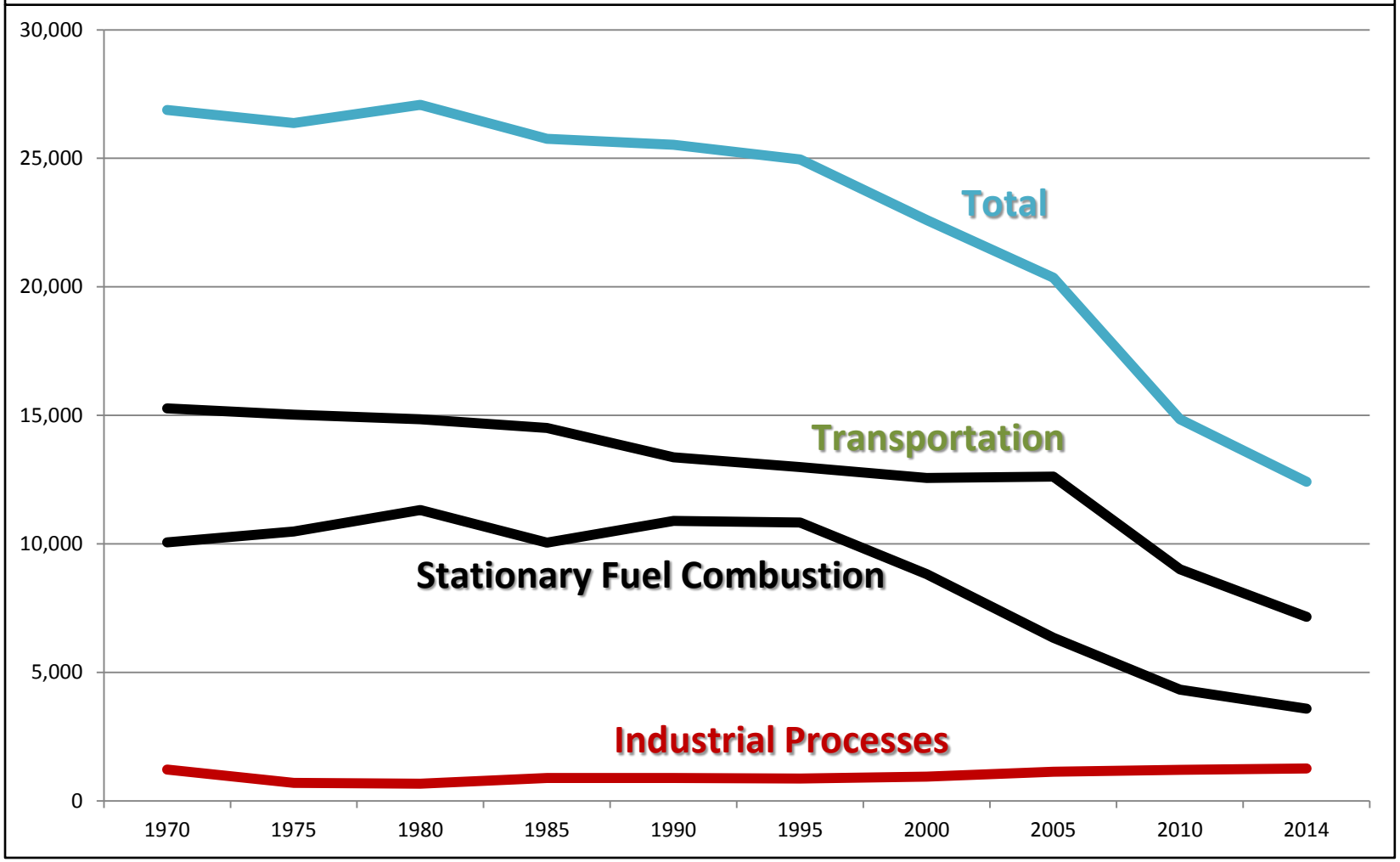
2013-2015 - 8-Hour Ozone Design Values
New U.S. Ozone Standard – 70 ppb



8-Hour Ozone Design Value Trends 1990-2015, LADCO States

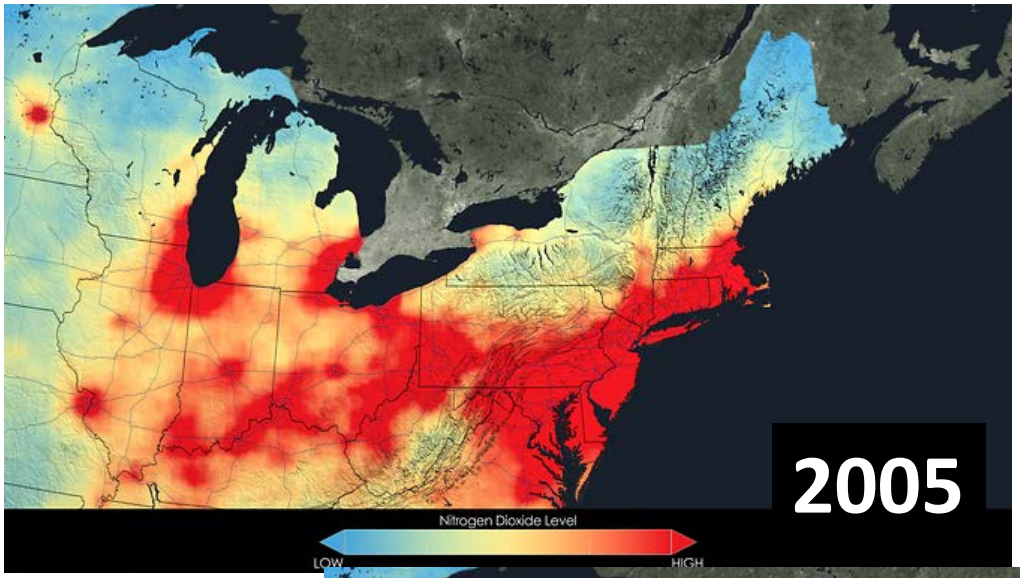


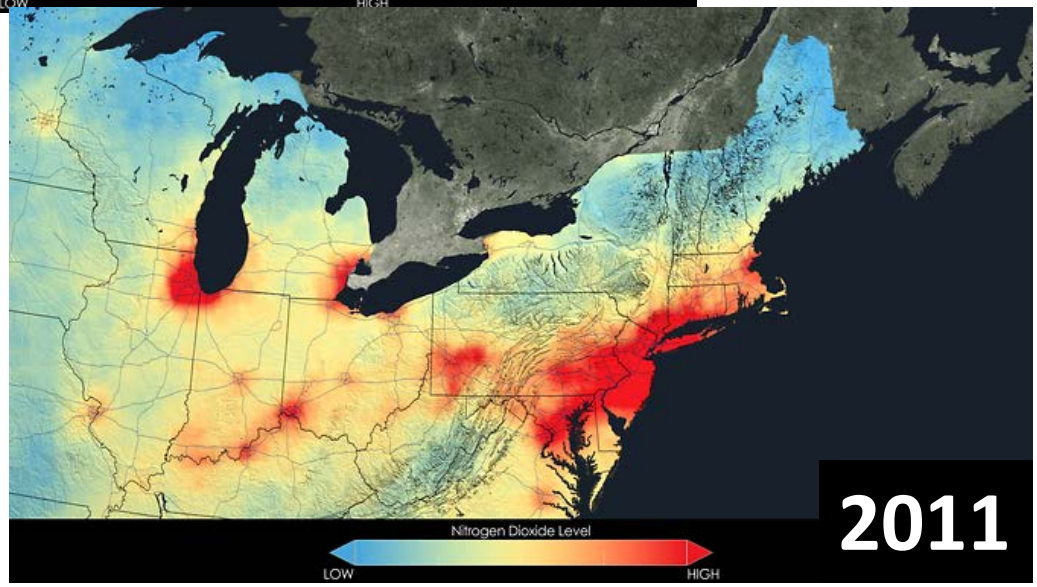
NOx Emissions Trends in the US, 1970-2014



EPA, NEI - 2014

NO_2 Air Quality Improvements Shown by NASA Satellite Data



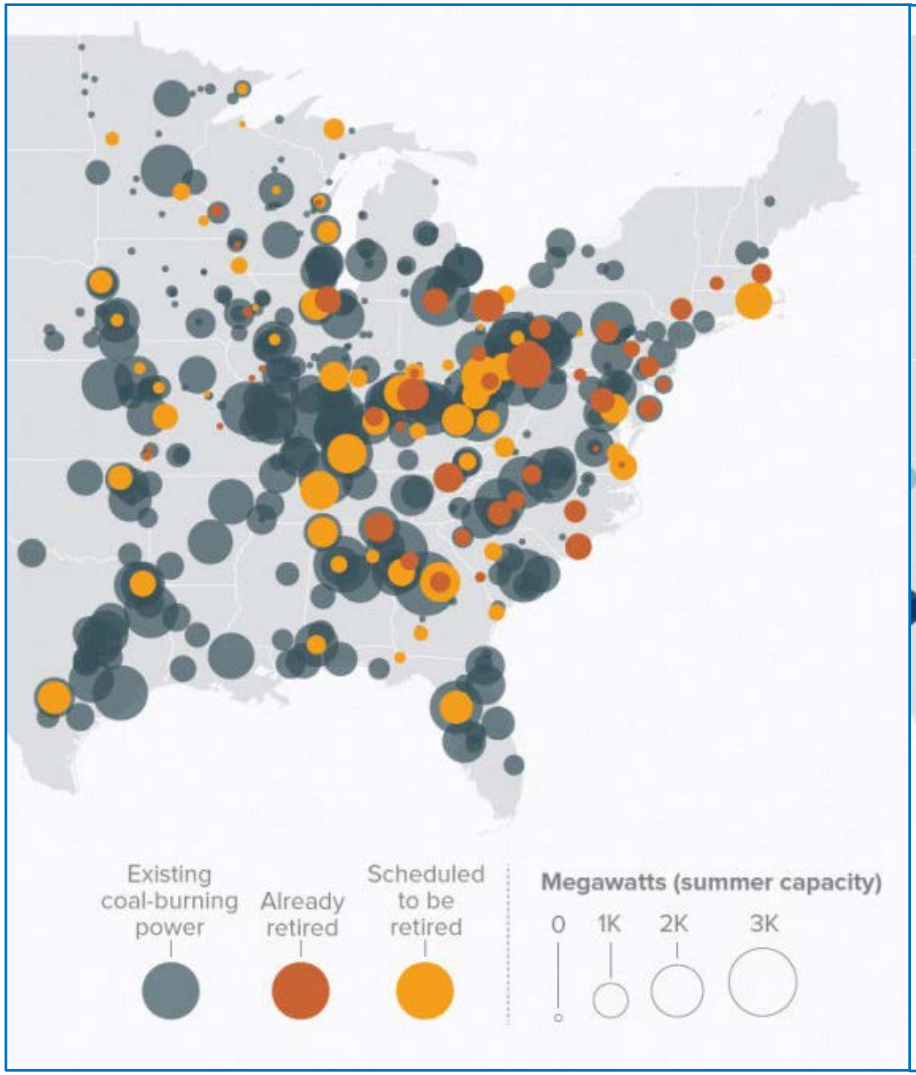


AQAST
NASA Air Quality Applied Sciences Team

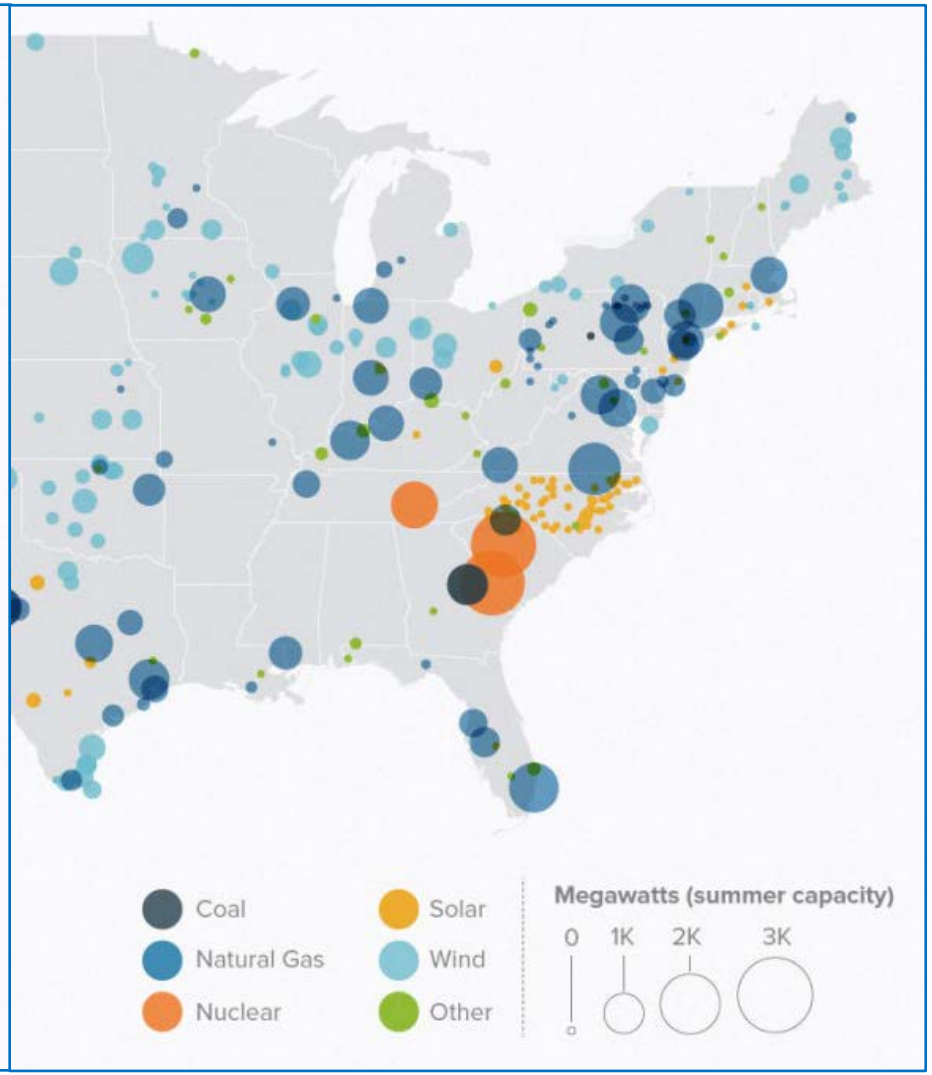
NASA

Goodbye coal, hello… what?

Coal Power Retirements (2012-2023)



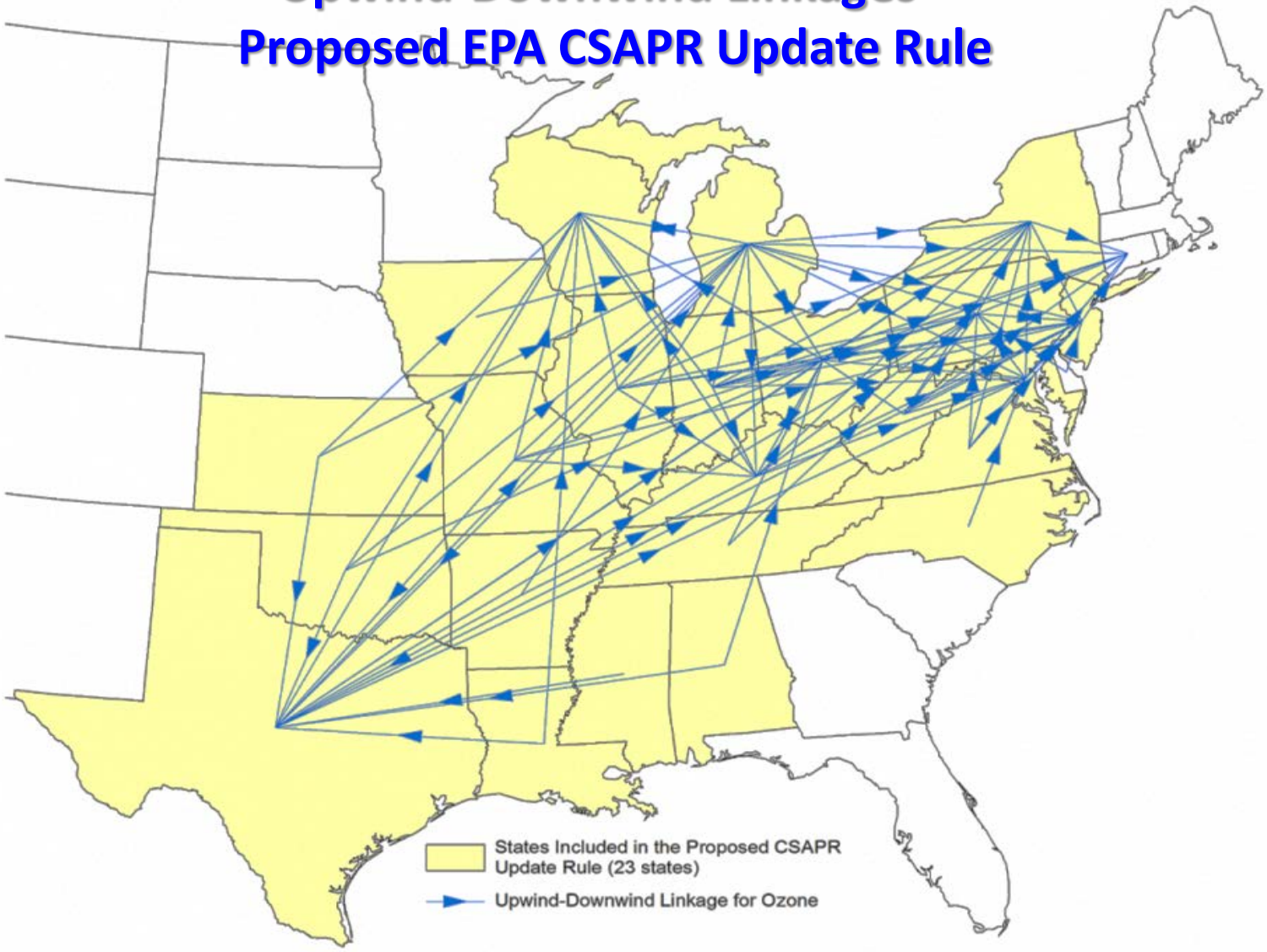
Power Capacity Being Added (2015-2023)



Source: POLITICO analysis of data from EIA

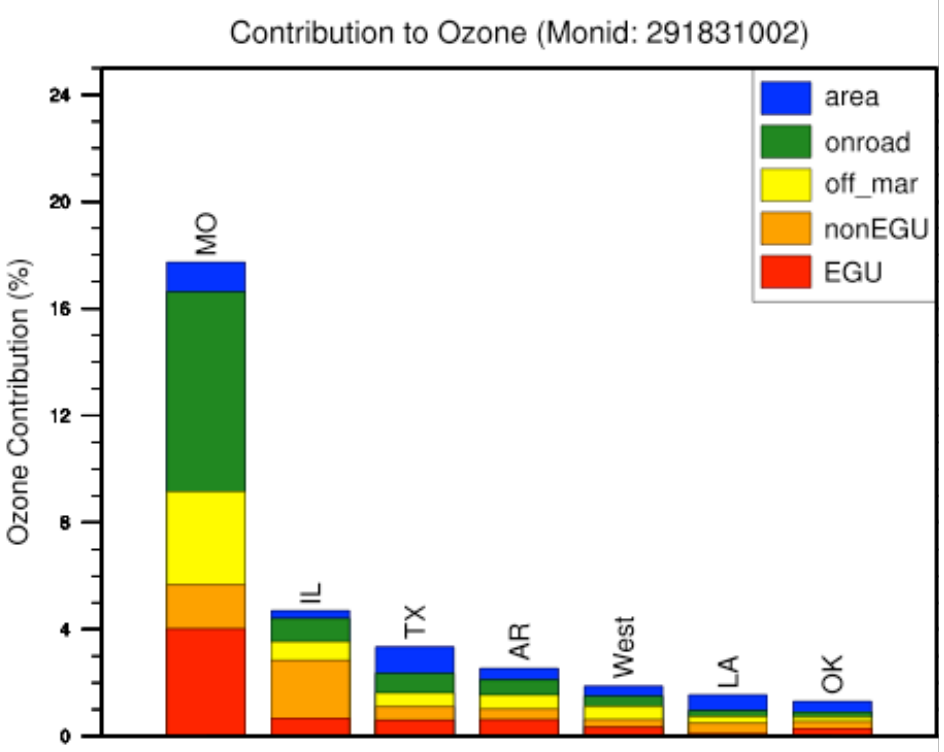
Where Is The Ozone Coming From?

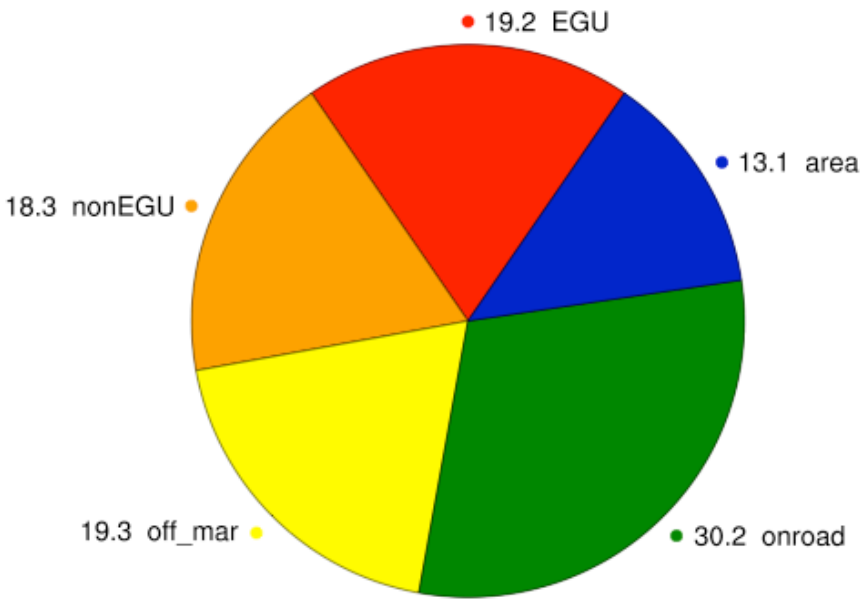
Upwind-Downwind Linkages – Proposed EPA CSAPR Update Rule



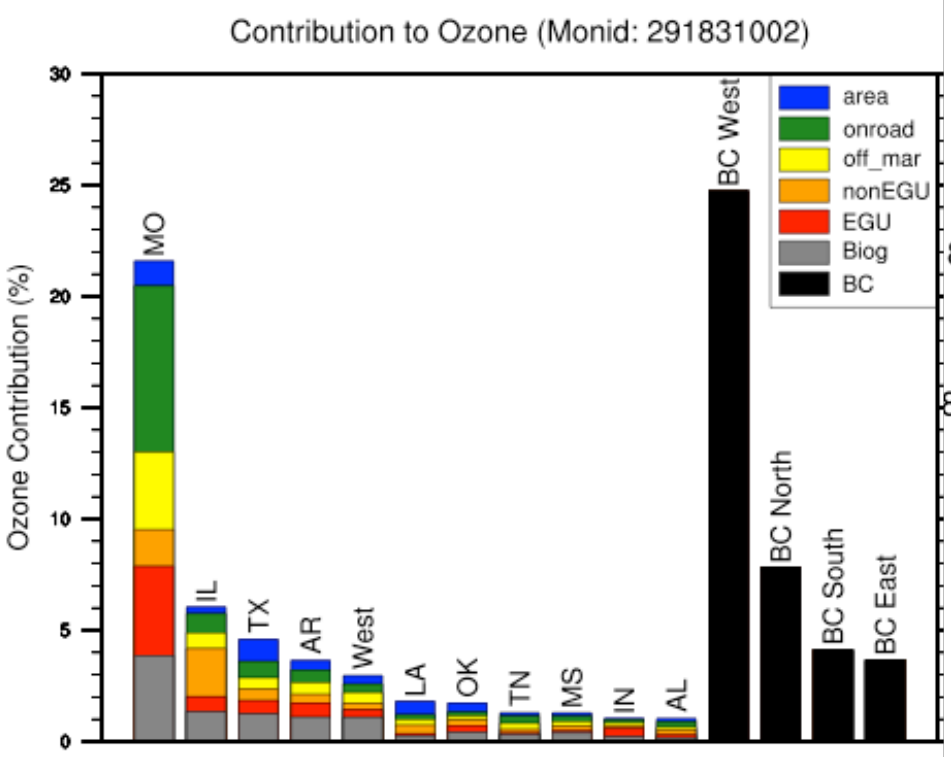
Where is the Ozone Coming From?

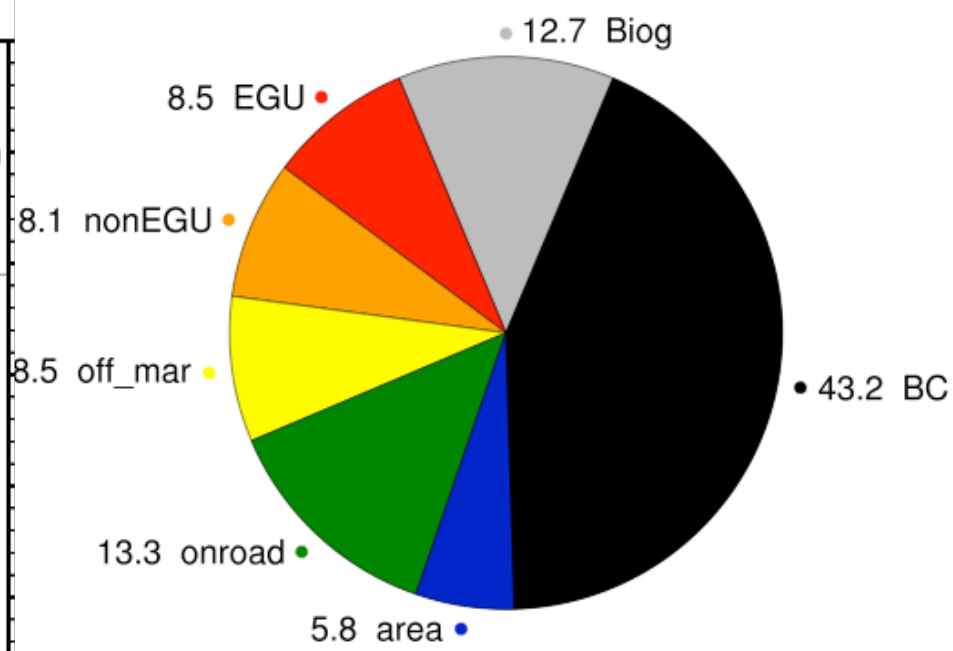
Ozone Source Apportionment – U.S. Anthropogenic Sources West Alton, MO

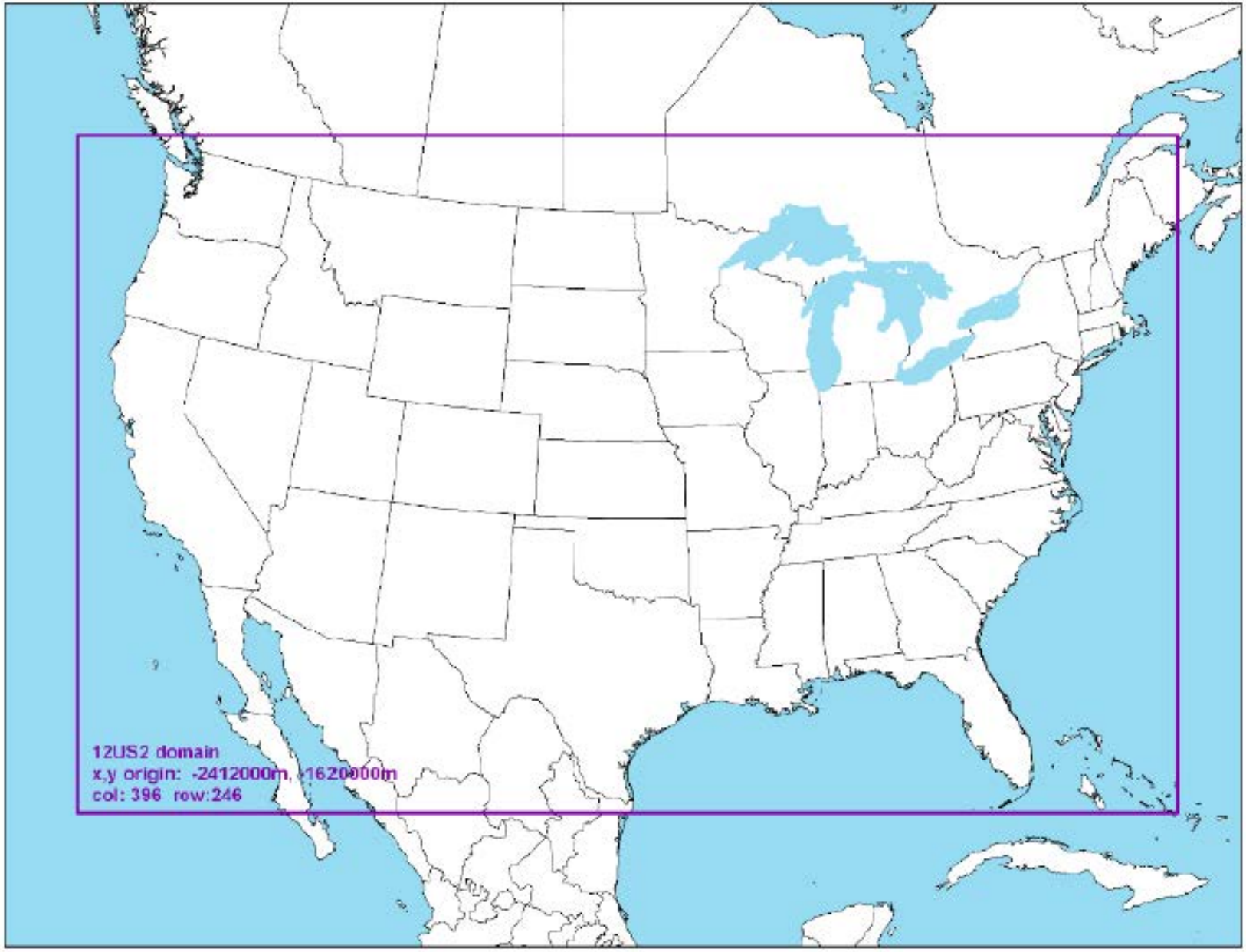




Ozone Source Apportionment – All Sources West Alton, MO



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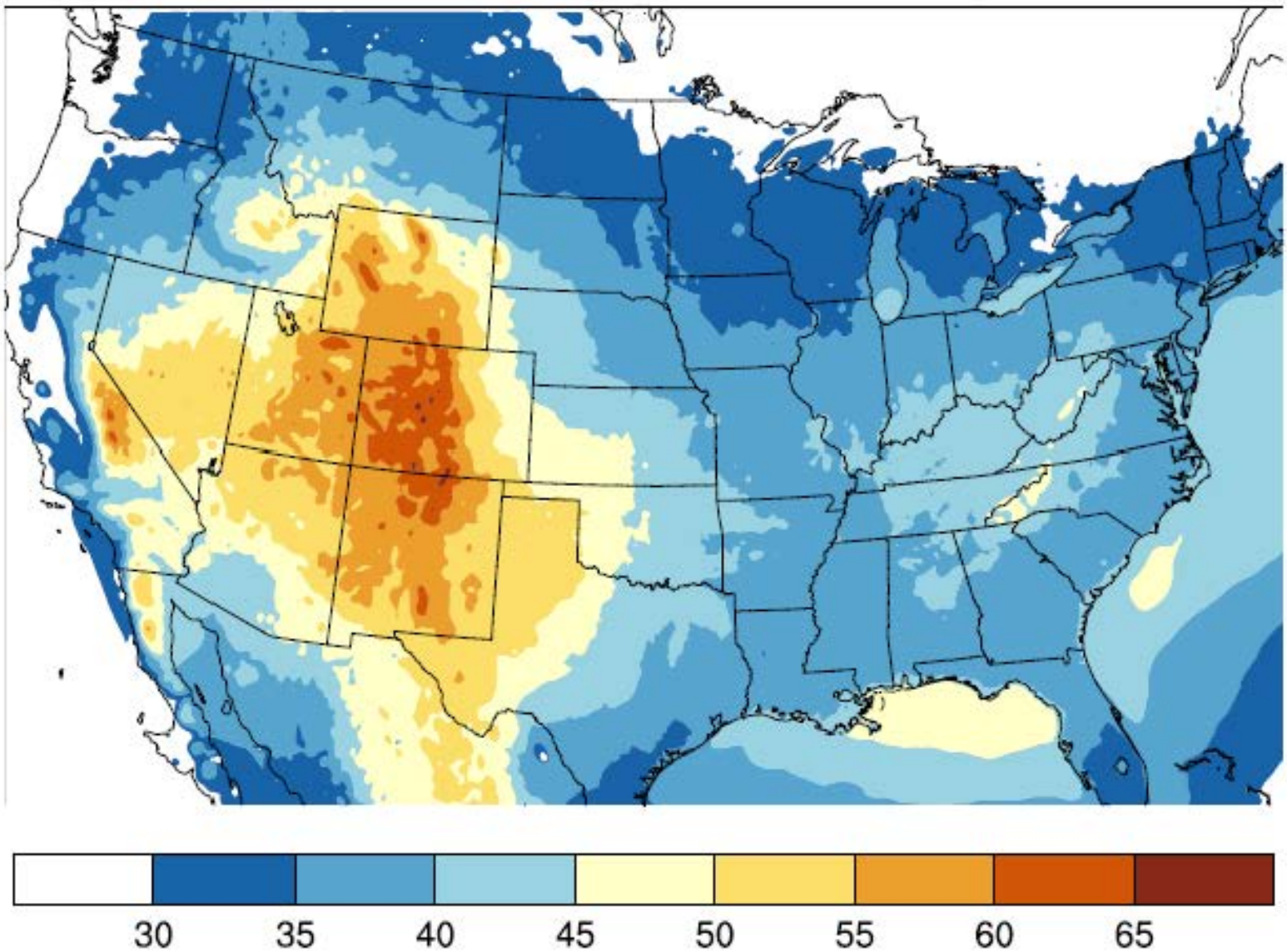
Importance of Background Ozone

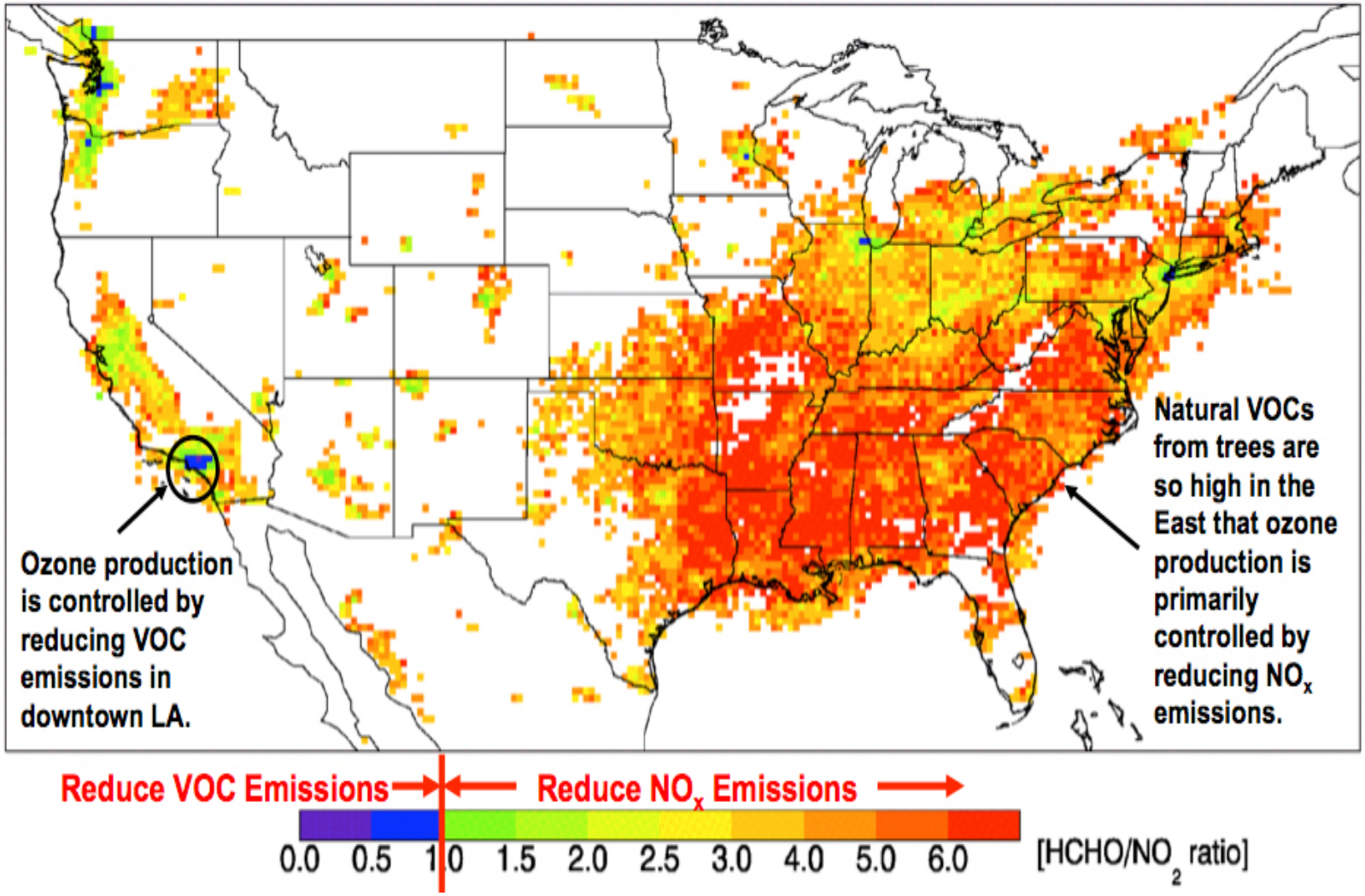


Background Ozone Definition and Sources

- EPA defines U.S. background… "to be any O3 formed from **sources other than U.S. manmade ozone** precursor emissions (NOx, VOC, CH4, and CO)" [1]
- Sources:
  - **Natural** global O3 (precursor emissions from biogenic and geogenic sources)
  - O3 transported from the **stratosphere**
  - O3 transported from **international sources**

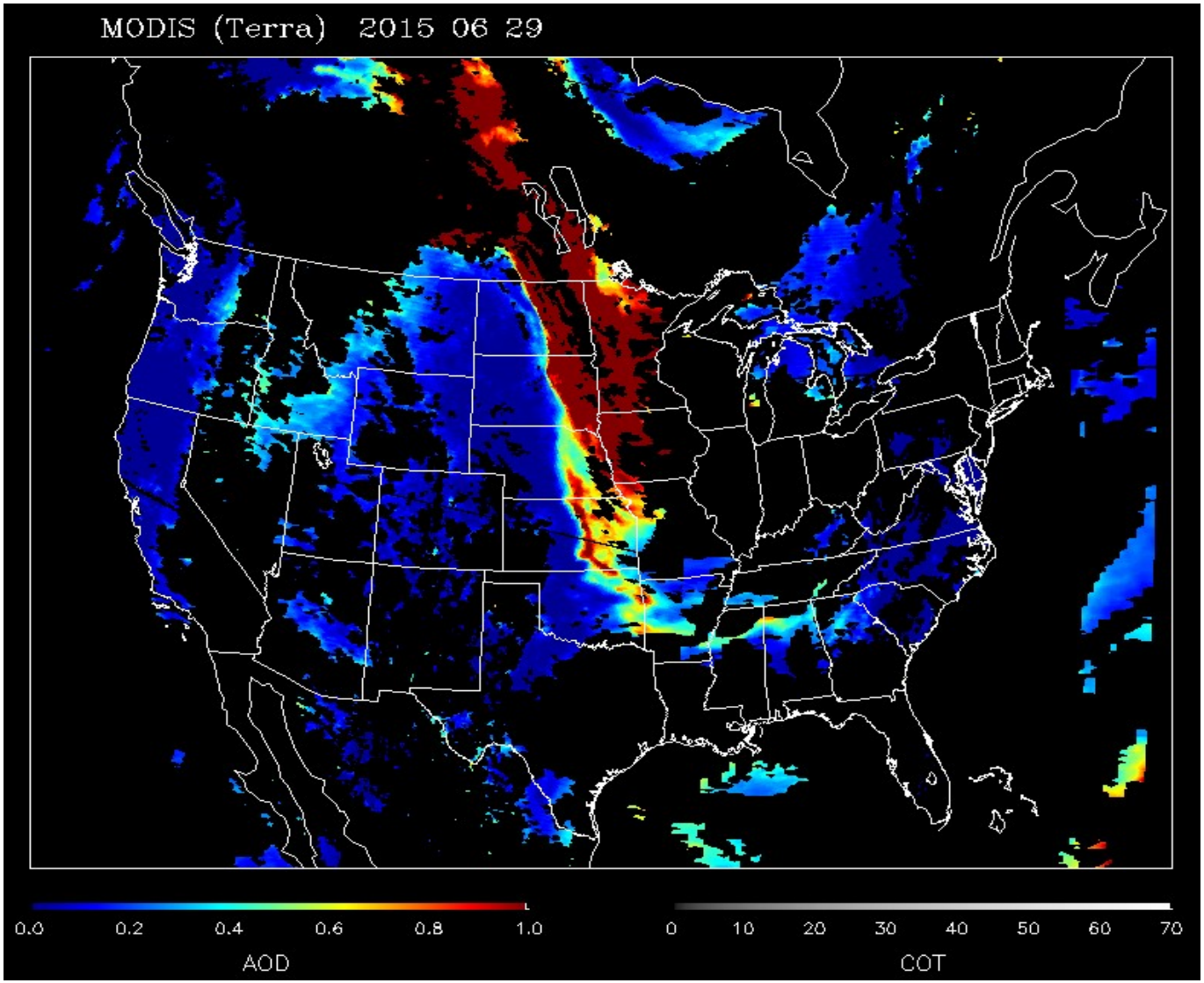
[1] Source: EPA Background Ozone Workshop, February 2016

Background Ozone: Importance of Biogenic Emissions



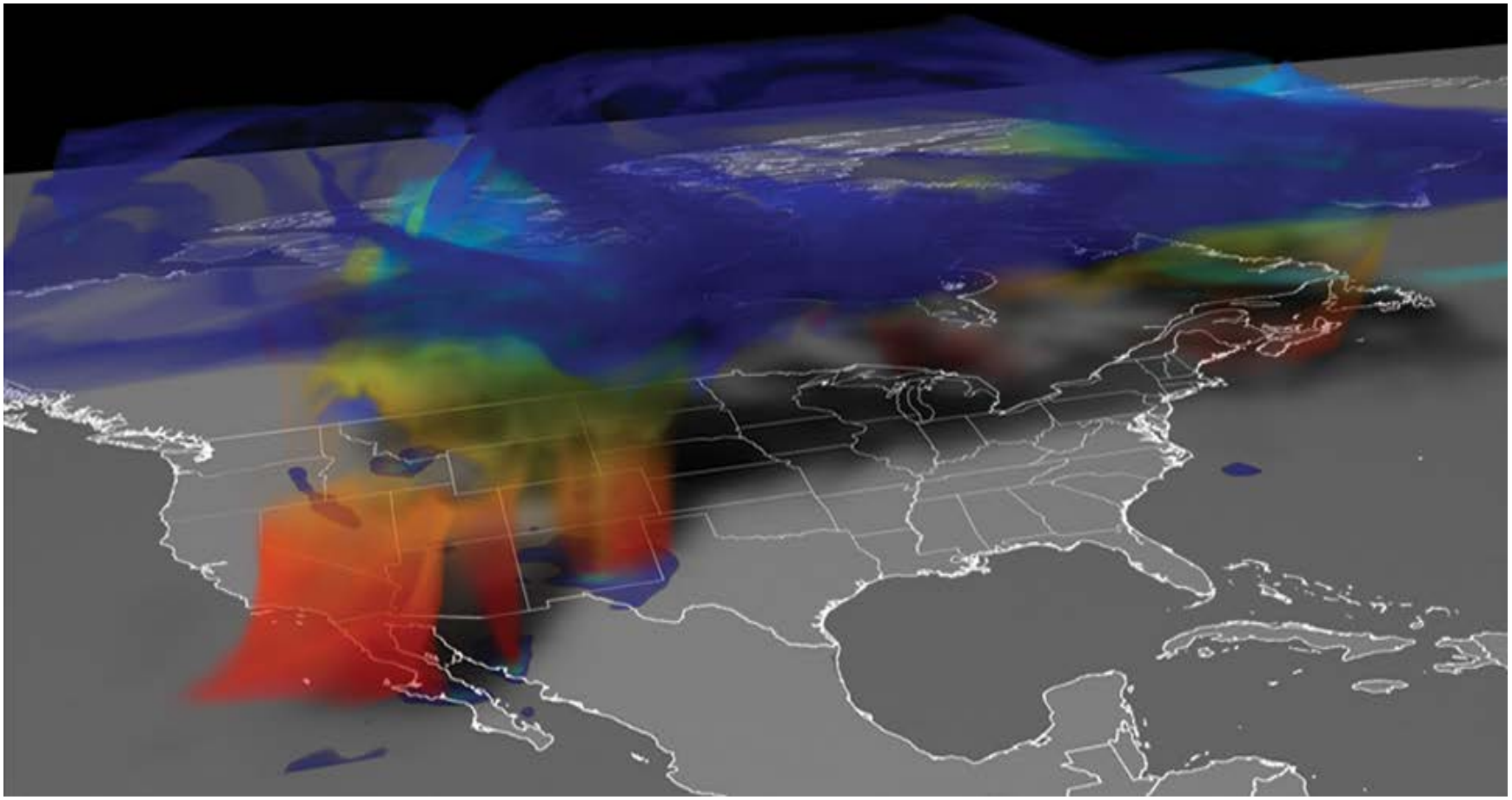
Source: http://aura.gsfc.nasa.gov/science/feature-102009b.html

Background Ozone and Exceptional Events: Wildland Fires



Source: http://alg.umbc.edu/usaq

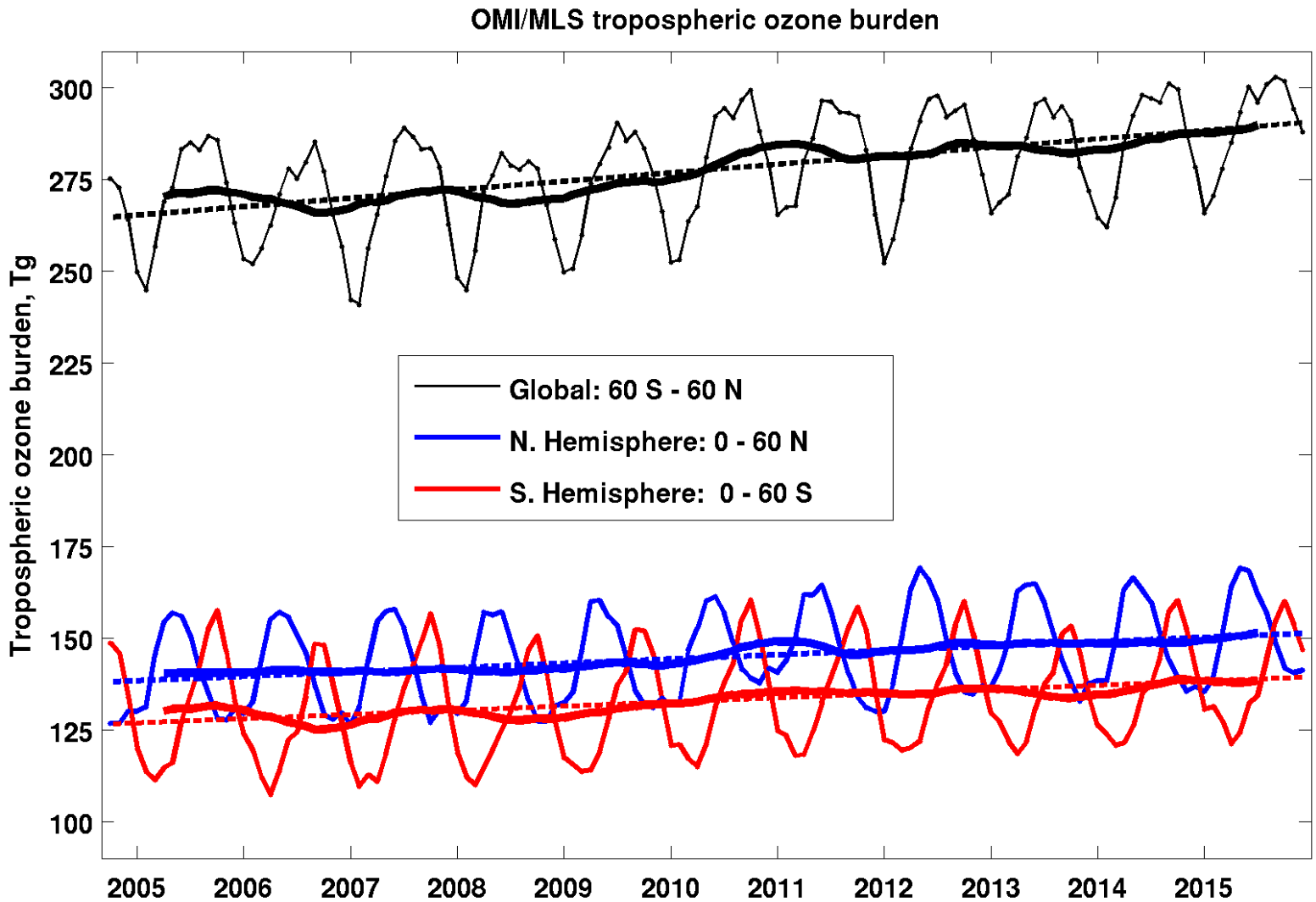
Background Ozone and Exceptional Events: Stratospheric Ozone Intrusions



Source: https://www.nccs.nasa.gov/images/

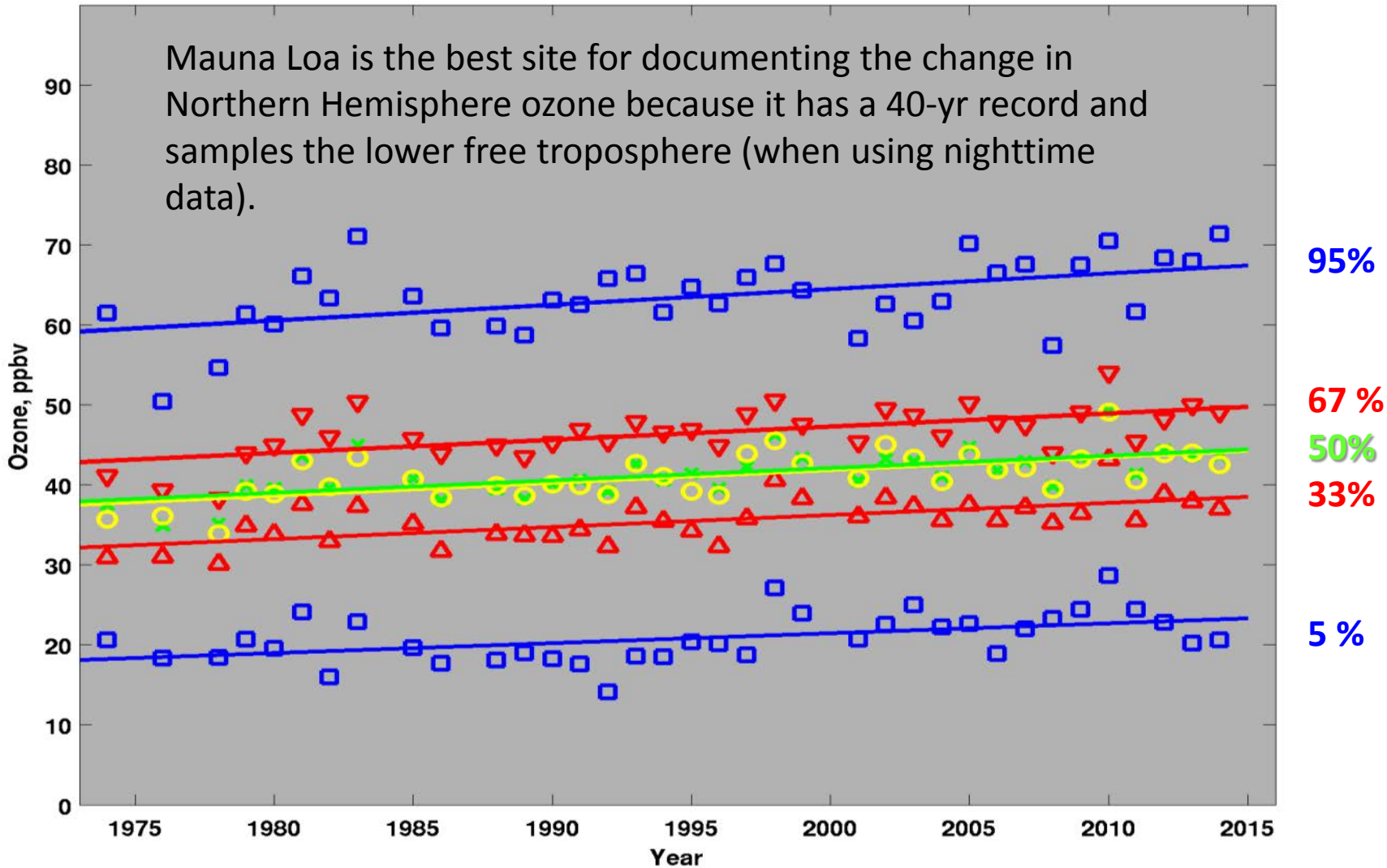
OMI/MLS tropospheric ozone burden, 2005-2015

The global (60°N –60°S) tropospheric ozone burden has increased by 9% (25 Tg) over 11 years



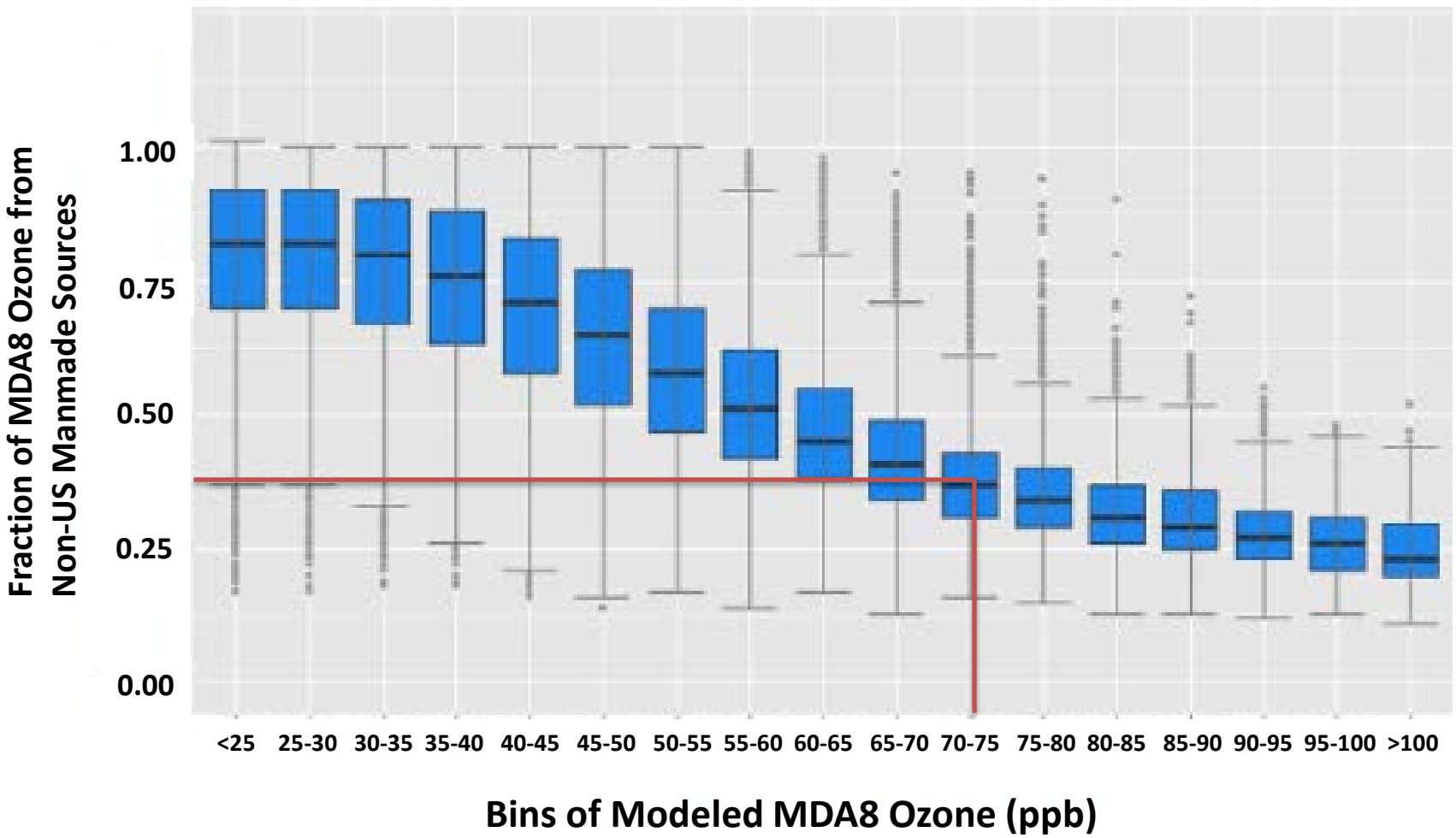
Data produced by Jerry Ziemke, Morgan State U./NASA Goddard

Nighttime O_3 trend at Mauna Loa Obs., Hawaii, 3.4 km above sea level



Data collected by NOAA Global Monitoring Division

Recent Estimates of U.S. Background Ozone



Source: EPA Background Ozone Workshop, February 2016

U.S. EPA Background Ozone Workshop

FEBRUARY 24-25, 2016

PHOENIX, ARIZONA

- **EPA opened a non-regulatory docket to receive comments:**

Docket ID no. EPA-HQ-OAR-2016-0097 at Federal Register Portal: http://www.regulations.gov

- **For more information and future postings:**

http://www3.epa.gov/ozonepollution/registration.html

Questions?

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