Air Management Study Group Quarterly Meeting Agenda

- Opening remarks & agenda review
- Hiring update
- Proposed guidance, rules and legislative update
- ACE rule
- Member updates
- 2020 Goals and vision for DNR
- Ozone topics
- Air quality monitoring
- Inspection/Compliance consistency
- 2020 Priority topics

Wisconsin
Department of Natural Resources

Air Management Study Group
Quarterly Meeting

Madison
February 20, 2020

Hiring Update

Gail Good
Air Program Director

Proposed Guidance and Rules Legislative Update

Kristin Hart
Permits and Stationary Source Modeling Section Chief

David Bizot
Air Quality Planning and Standards Section Chief

Proposed DNR Guidance

DNR Guidance in Drafting Phase	Description	Target Date
None		
DNR Guidance in Public Comment	**Description**	**Date Posted**
None		
Finalized DNR Guidance	**Location**	**Final Date**
None		

Proposed DNR Rules

Proposed DNR rule	Description	Phase
AM-24-12b Air Permit Streamlining Rule Part 2	Changes to improve operational efficiency and to simplify the permitting processes administered under chs. NR 406 and 407, while remaining consistent with the federal Clean Air Act (CAA).	Signed by governor, in leg review
AM-20-18 VOC RACT	Updates two RACT rules in ch. NR 422 to meet current EPA Guidelines for Miscellaneous Metal and Plastic Parts Coatings, and Miscellaneous Industrial Adhesives.	Rule drafting
AM-10-19 2015 Ozone NAAQS	Incorporates the 2015 ozone NAAQS into state rule. Scope statement approved by NRB in June 2019.	Rule drafting

Proposed EPA Rules/Guidance

Proposed EPA rule/guidance	Docket	Comments due
Control of Air Pollution from New Motor Vehicles: Heavy-Duty Engine Standards	EPA-HQ-OAR-2019-0055	2/20/2020
2008 Ozone National Ambient Air Quality Standards; Wisconsin; Determination of Attainment by the Attainment Date for Inland Sheboygan; Reclassification of Shoreline Sheboygan	EPA-R05-OAR-2019-0518	3/6/2020
International Transport of Air Pollution - Draft Guidance on the Preparation of Clean Air Act Section 179B Demonstrations for Nonattainment Areas Affected by International Transport of Emissions	EPA-HQ-OAR-2019-0668	3/10/2020
Draft Guidance for Ozone and Fine Particulate Matter Permit Modeling	None. Email: bridgers.george@epa.gov	3/27/2020

Proposed EPA Rules/Guidance

Proposed EPA rule/guidance	Docket	Comments due
Draft Guidance: Plantwide Applicability Limitation Provisions Under the New Source Review Regulations	None. Submit through: EPA's NSR permitting website	3/16/2020

Finalized EPA Rules/Guidance

Finalized EPA rule/guidance	Link	Date finalized
Air Plan Approval; Wisconsin; Title V Operation Permit Program	84 FR 67200	12/9/2019

State Draft and Final Legislation

Draft legislation	Link
PFAS Legislation	

Final legislation	Link
None to report	

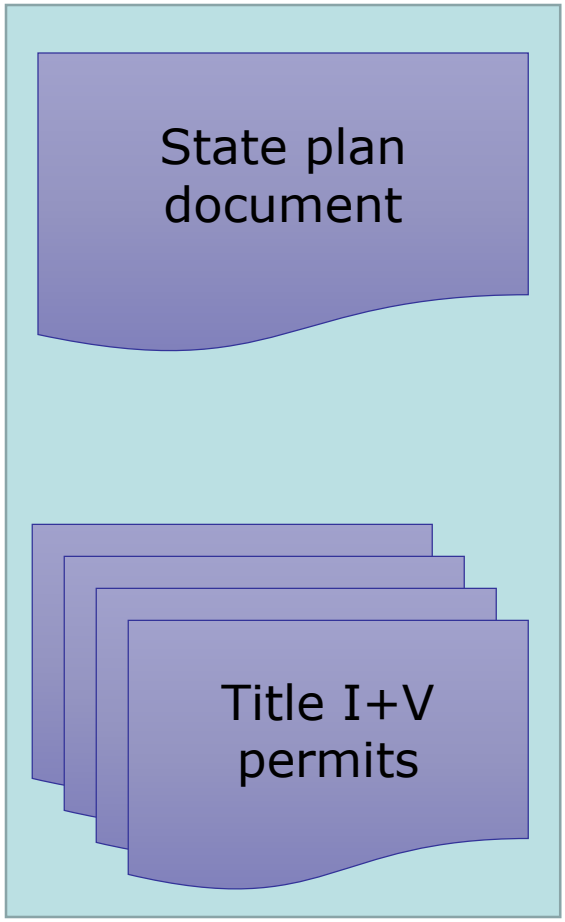
Affordable Clean Energy (ACE) Rule Implementation Update

David Bizot

ACE Rule Implementation

- Held public meetings with utilities in September 2019 and February 2020.
- During this period, the program developed an implementation approach to the ACE Rule state plan due in July 2022
- ACE Rule affects 13 units at 7 facilities
  - Genoa power plant shutting down by end of 2021.

Elements to Wisconsin's ACE Rule State Plan



Together comprise ACE state plan submittal

Akin to attainment plan or other Section 110 SIP.
Includes information such as:

- Purpose
- Description of how submittal meets rule requirements
- Approach/methodology used
- Assumptions made
- Unit-by-unit summary info
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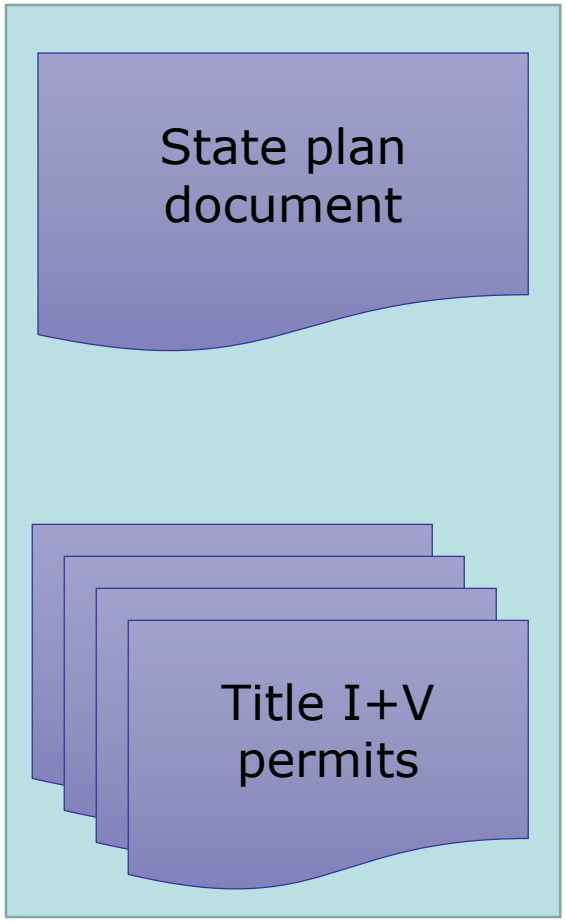
- Conclusions

Appendices to main plan document.
Each permit:

- Sets the unit-specific standards of performance
- Includes permanent and enforceable conditions, compliance plan, etc.

Elements to Wisconsin's ACE Rule State Plan



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DNR develops, w/public review prior to submittal

Appendices to main plan document.
Each permit:

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Standard application & issuance process

Why this approach?

- Takes advantage of existing, recognized processes, from approaching the program with an application, through public review and issuance of permits.
- Includes sources submitting an application that proposes emission rates, conditions and operational parameters and provides an evaluation that justifies the proposed conditions.
- Recognizes that ACE rule requires a detailed knowledge of specific units that the utilities themselves are best suited to initially analyze.
- Offers the most flexibility to utilities in terms of addressing future changes they may want to see, through the existing permit revision procedures.
- Supports completion of state plan by the ACE rule's deadline.
- EPA has indicated this approach is an option and is likely approvable.

Implementation schedule

Date	Milestone	Who	Comment
Feb 2020	Public meeting	DNR + sources	Review implementation process
Periodically/ as needed	Public meetings/discussions with sources	DNR + sources	To give updates and address permit application questions
Apr 2021	Permit applications due	Sources	Early applications are encouraged
Feb 2022	All permits issued by DNR	DNR	
Mar 2022	Release draft plan document for public comment	DNR	
Jul 2022	Submit state plan	DNR	
Jul 2024	Compliance schedule for affected EGUs begins	Sources	24 months after plan submittal

ACE Rule Implementation

- Developing a website to post latest information – coming this spring
- Engaging other states on their processes

Member Updates

EPA Region V update

Frank Acevedo
EPA

Federal litigation update

Todd Palmer
Michael Best & Friedrich LLP

Member Updates

2020 Goals and vision for DNR

Darsi Foss
Environmental Management Division Director

Bart Sponseller
Environmental Management Division Deputy Director

Ozone Update

Brad Pierce
UW Madison Space Science and Engineering Center Director

Katie Praedel
Air Monitoring Section Chief

David Bizot
Air Quality Planning and Standards Section Chief

Ozone Formation Along Wisconsin's Lake Michigan Shore

1. **Lake Michigan Ozone Transport**
2. 2017 Lake Michigan Ozone Study – R. Bradley Pierce
3. Enhanced Ozone Monitoring and data analysis - Katie Praedel and David Bizot


PROHIBITION

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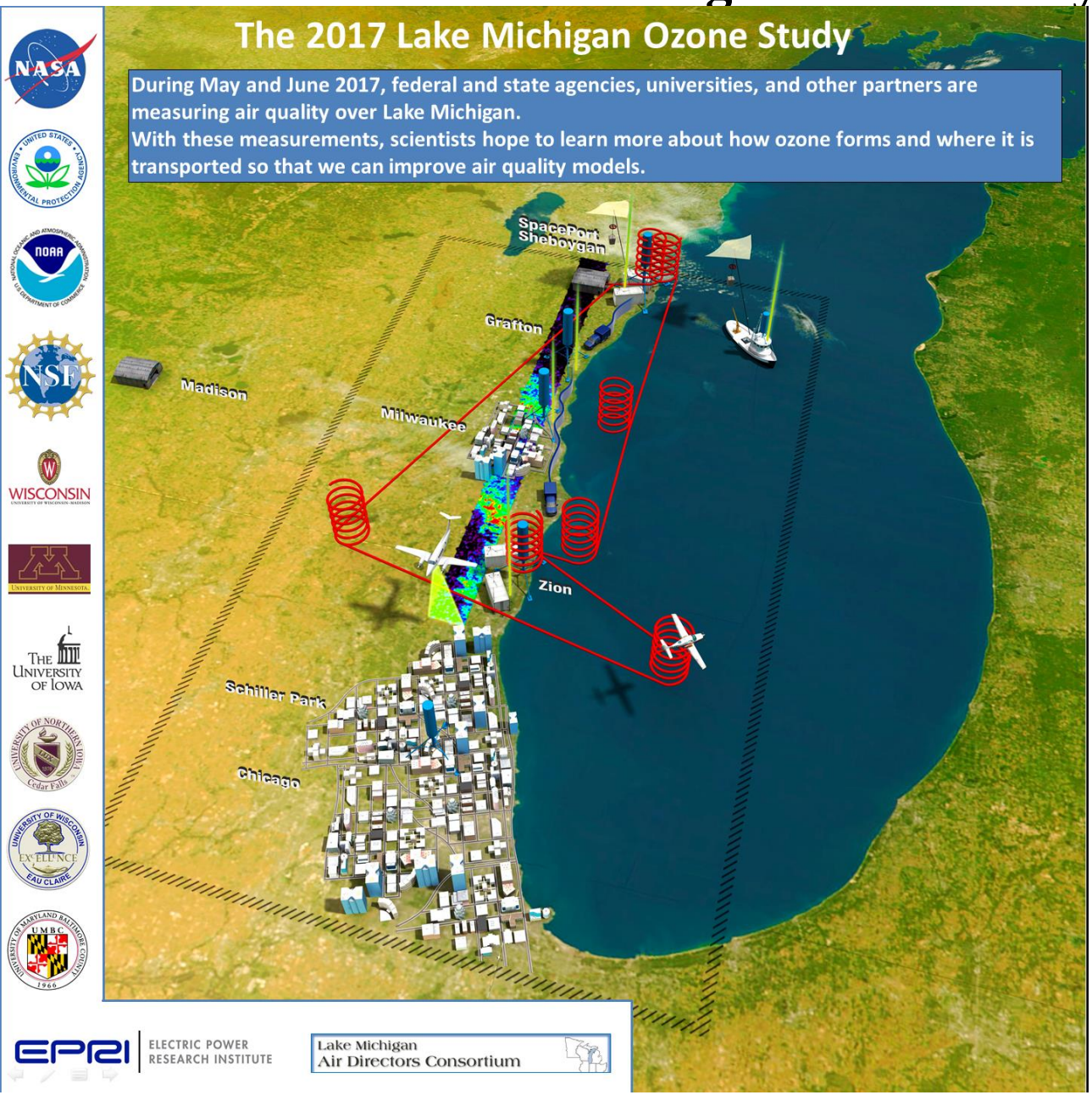
2017 Lake Michigan Ozone Study (LMOS)



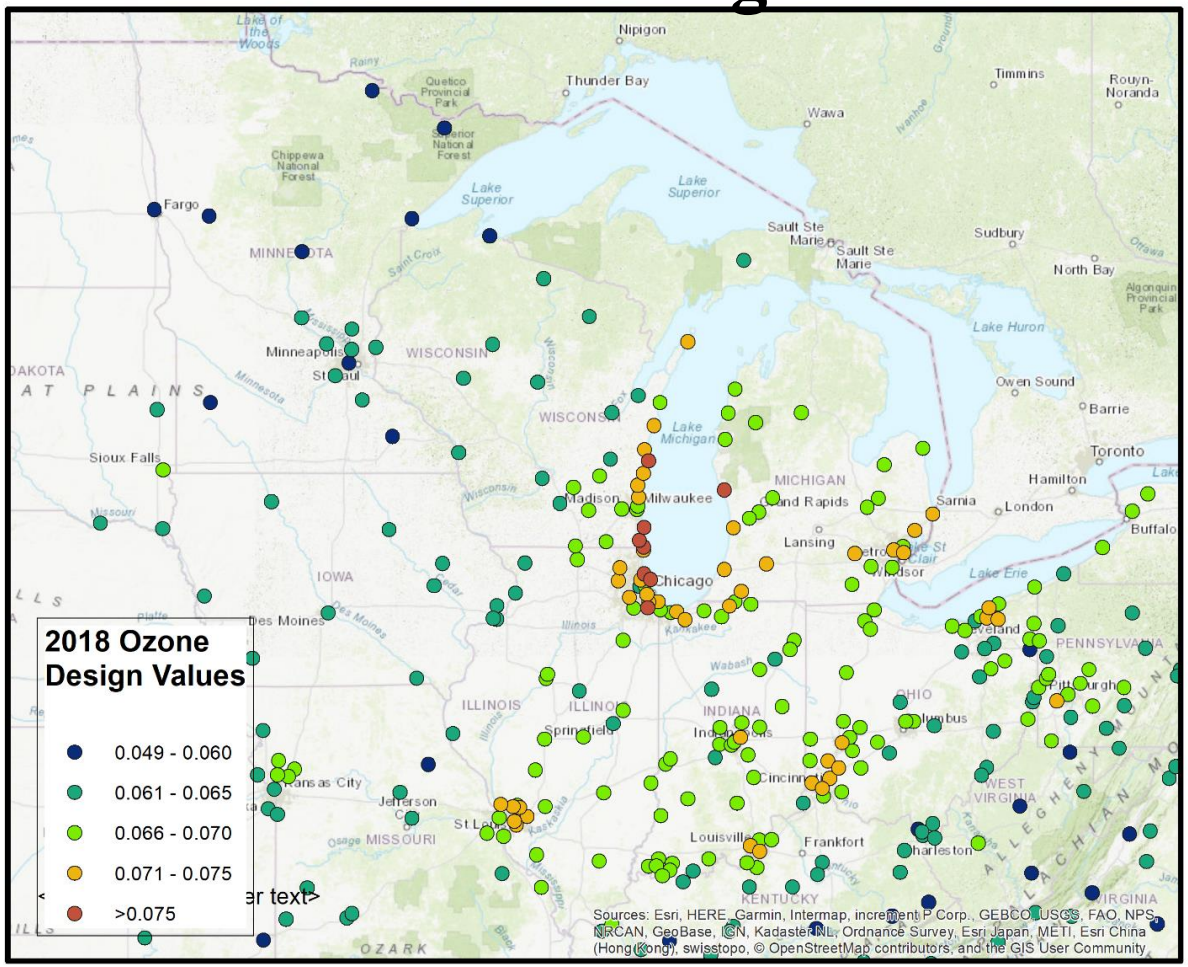
Brad Pierce

UW-Madison
Space Science and Engineering Center

WDNR Air Program, Sheboygan, WI October 29th, 2019

2018 Ozone Design Values

- 48 sites over 0.070 ppmv (70 ppbv)
- 8 sites over 0.075 ppmv
- Highest 8 all around Lake Michigan.

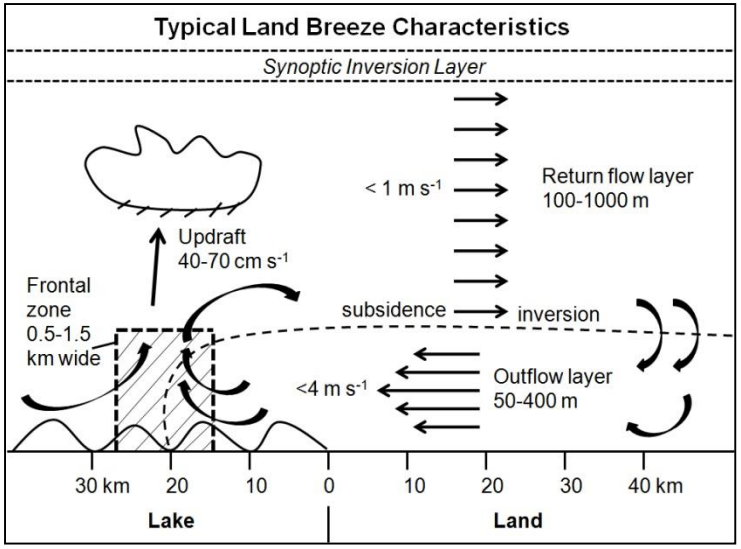


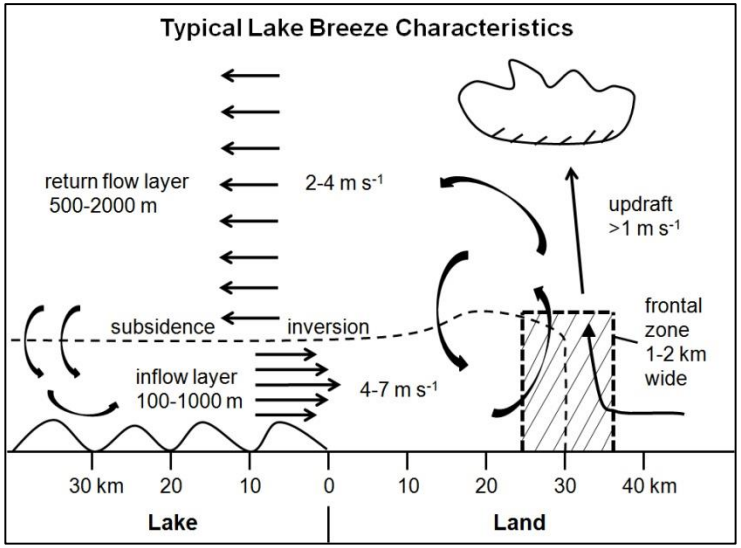
4th highest value of daily 8-hour maximum ozone values are averaged over 3 years to derive the design value, which is the metric that is compared to the National Ambient Air Quality Standards (NAAQS) and determines attainment or nonattainment.

From Donna Kenski (LADCO)

Lake Michigan and Ozone Formation

- ***Land breeze*** blows ozone precursor compounds from rush hour over lake.
- The boundary layer height is low due to cold water chilling the air above.
- The pollutants are concentrated near the surface where ozone forms.
- An afternoon ***lake breeze*** transports the ozone back onto land.





LMOS White Paper: http://www.ladco.org/

VIIRS Image June 09, 2017

Satellite image of Lake Michigan showing Lake Breeze Front

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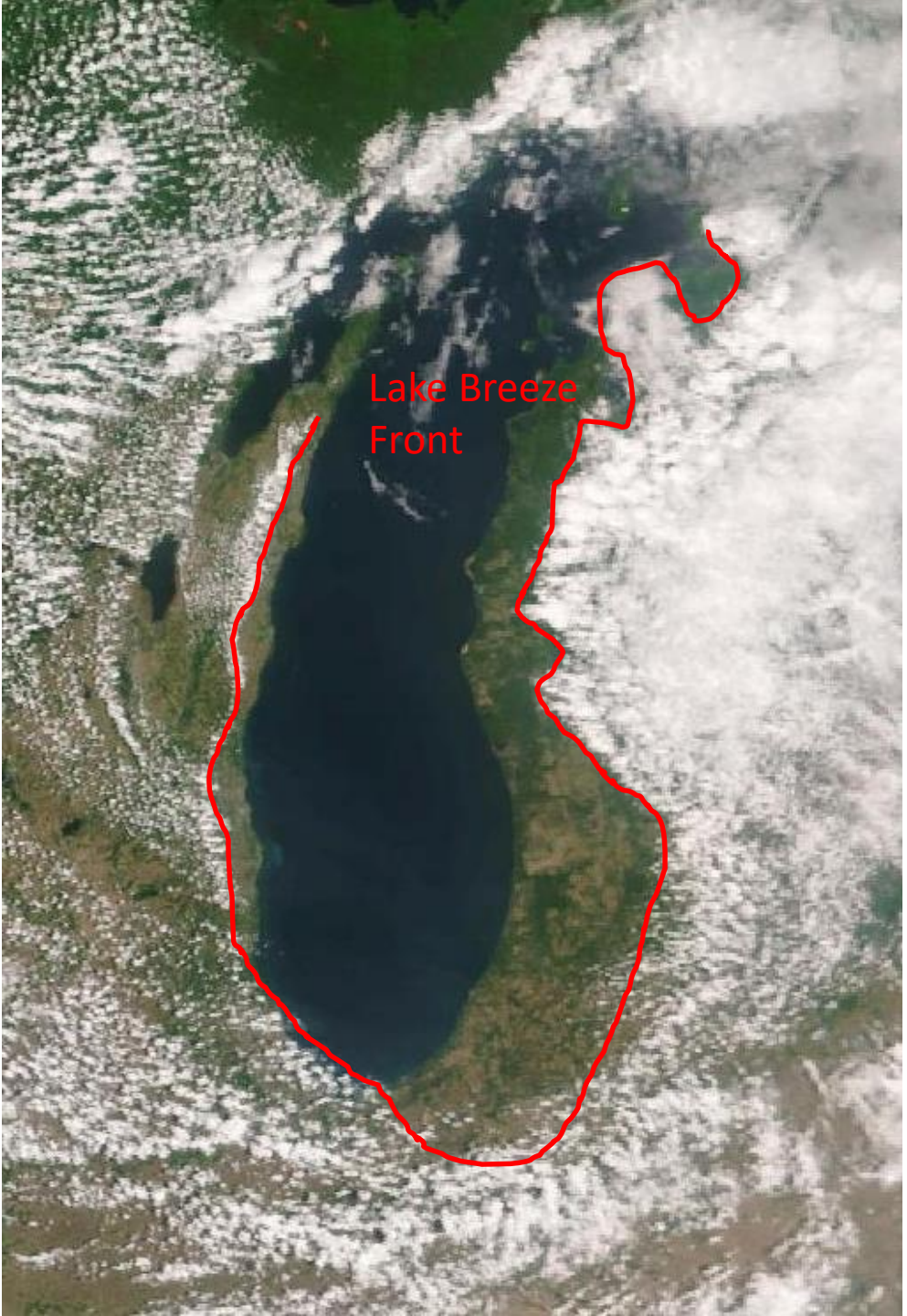

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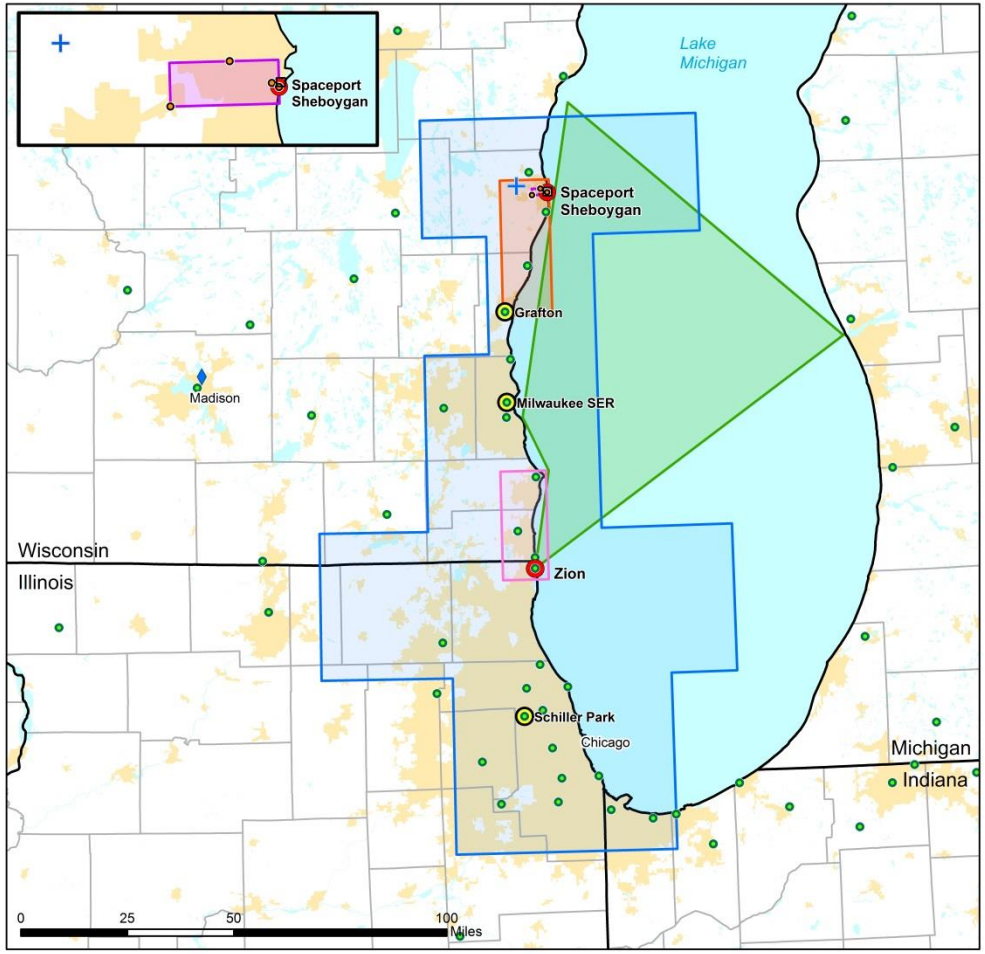
Summary of measurements made during the LMOS 2017 field campaign



Area of operations

- Aircraft
- POMs transect
- GMAP mobile
- UWEC mobile
- Ship

- Super-sites
- Pandoras/ceilometers
- Regulatory monitors (WI DNR, IL EPA, IN DEM, MI DEQ)
- POMs
- Scientific Aviation base
- GeoTASO base
- Ship base

Location	Measurement*	Research Institution*
Ground Sites		
Spaceport Sheboygan	Remote sensing of meteorology (SPARC Trailer)	UW-Madison -SSEC
	In situ measurements of pollutants	U.S. EPA ORD
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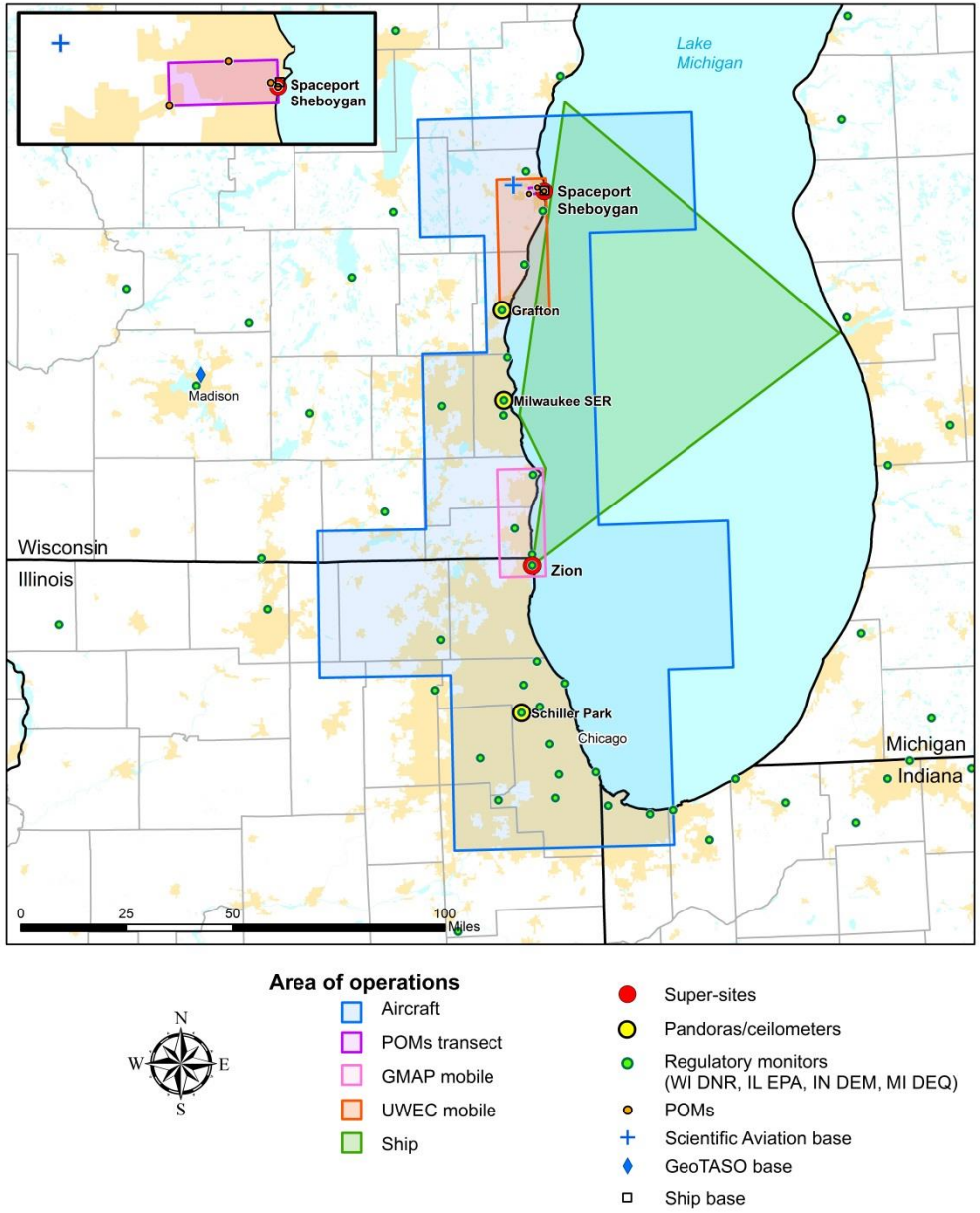

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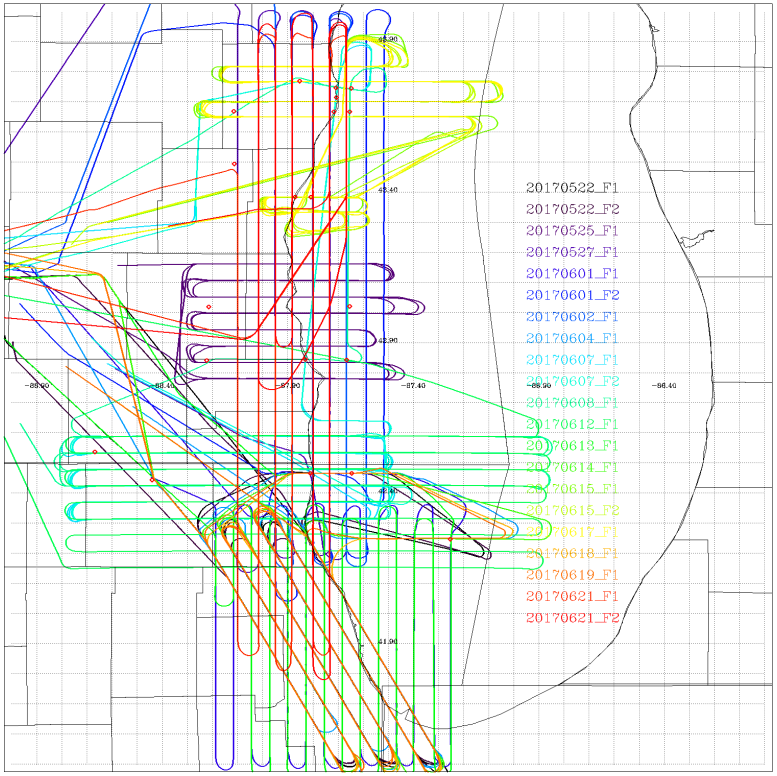
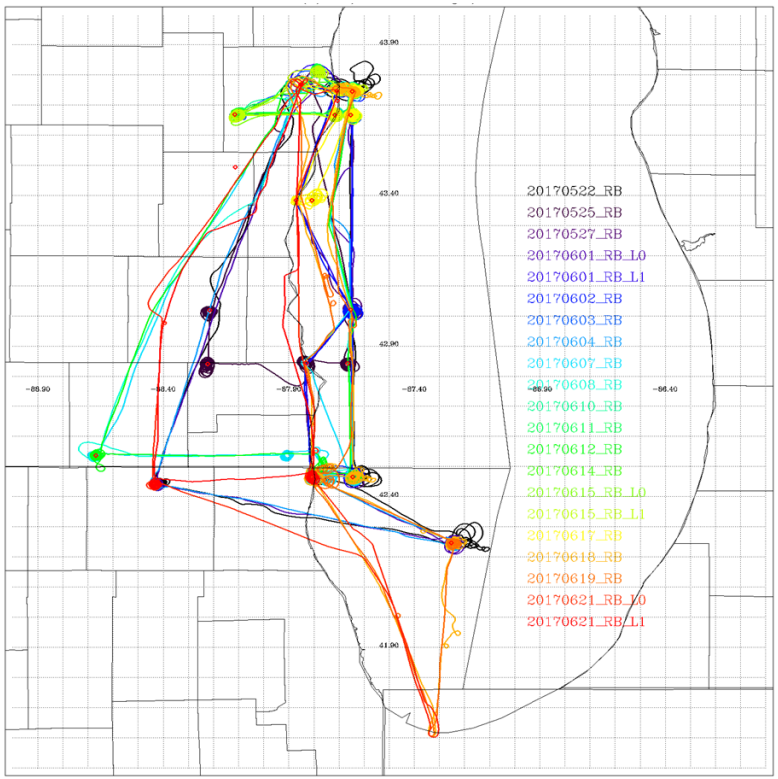
LMOS 2017 Aircraft Measurements

NASA GeoTASO remote sensing Flights



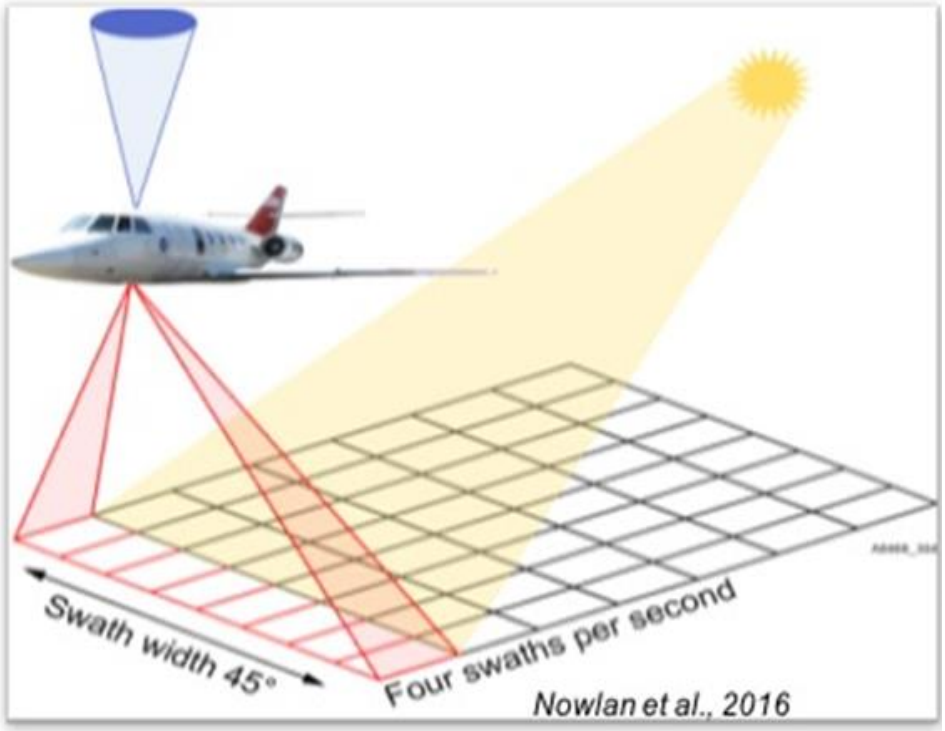
Scientific Aviation insitu sampling Flights



GeoTASO (Geostationary Trace gas and Aerosol Sensor Optimization) is a NASA airborne hyperspectral mapping instrument that is being used as an airborne testbed for future high-resolution trace-gas observations from geostationary sensors such as TEMPO

The Electric Power Research Institute (EPRI) provided funding for Scientific Aviation Flights during LMOS

NASA GeoTASO remote sensing

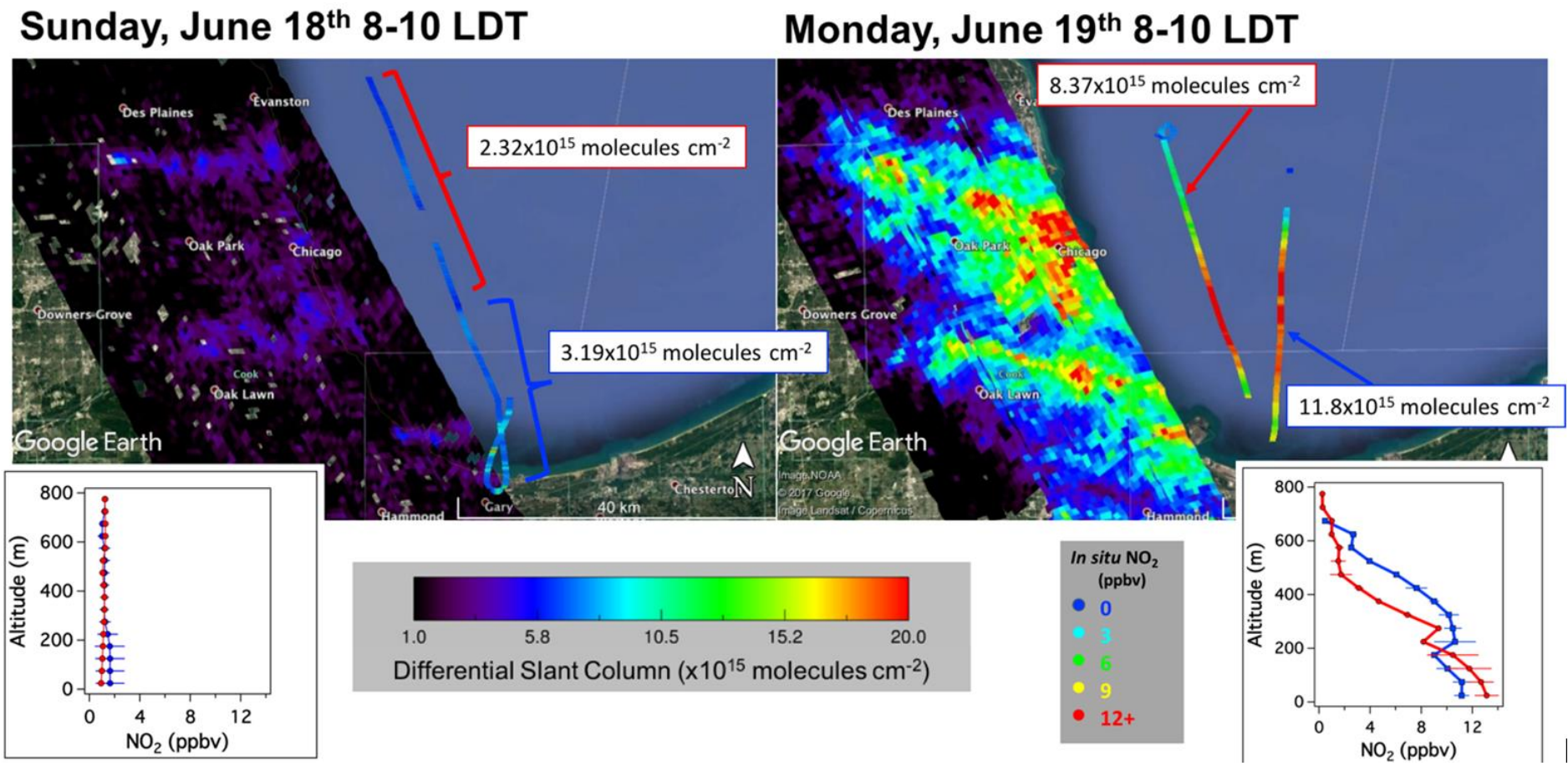


NO_2 differential slant columns (DSCs) were retrieved from GeoTASO spectra via Differential Optical Absorption Spectroscopy (DOAS).

Scientific Aviation in situ profiling

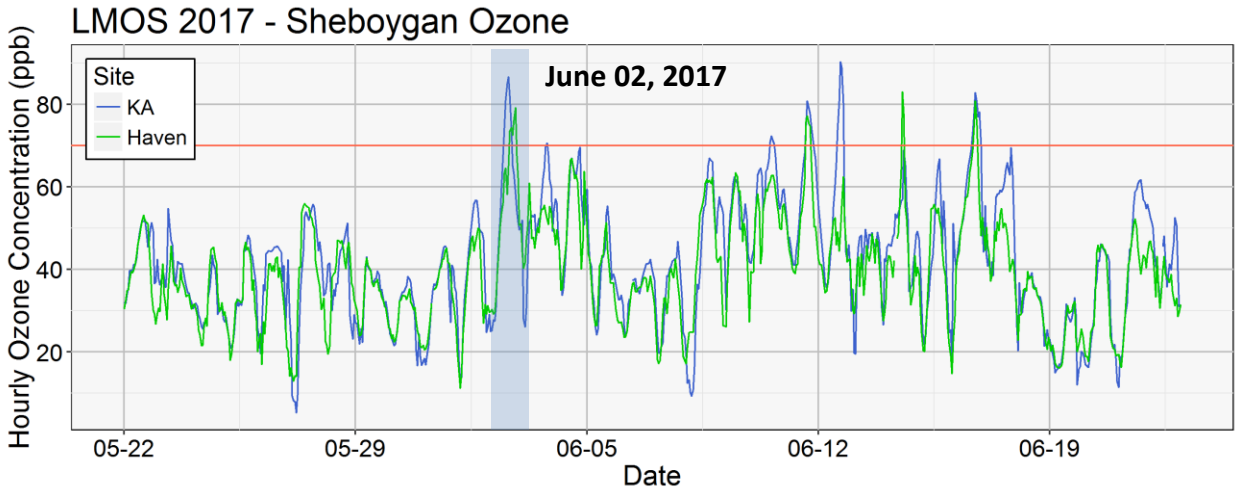
Scientific Aviation (SA) provided in situ profiling of O_3, NO_2, CO_2, CH_4, altitude, T, RH, winds, and pressure.

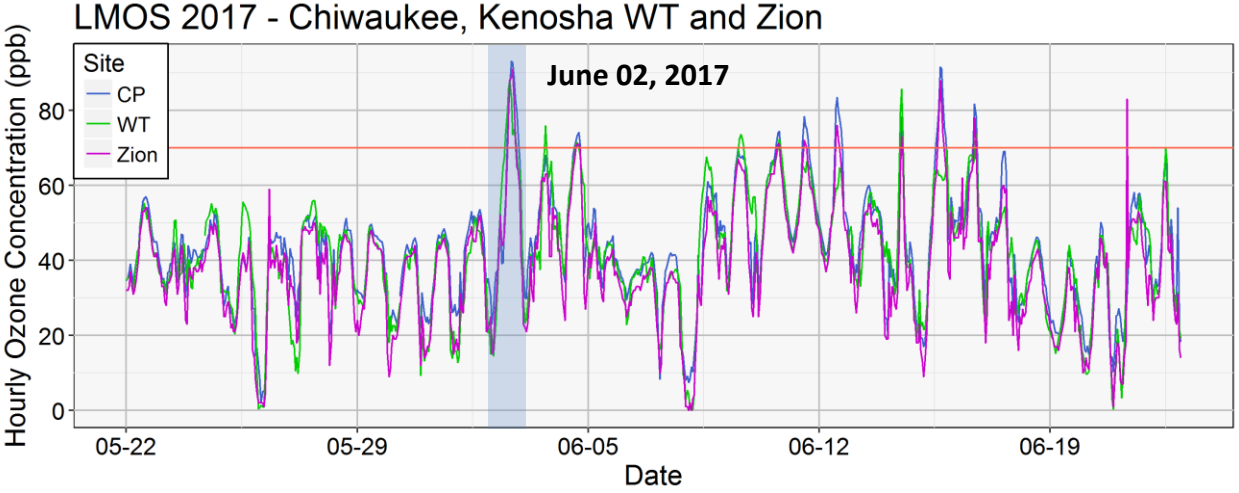
Chicago Emission Mapping and profiling Weekend/Weekday



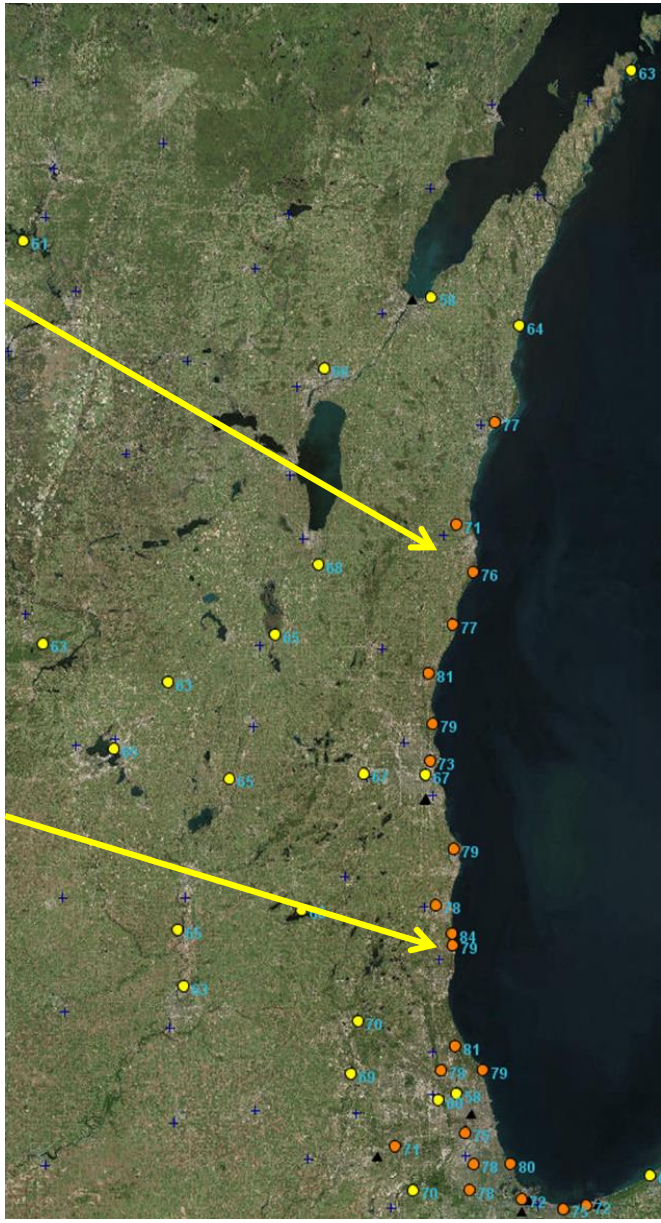
GeoTASO NO2 columns and Scientific Aviation NO2 profiles show large differences between weekend and weekday NO2 abundances. LMOS measurements provide constraints on emissions from commuter traffic (Analysis by Laura Judd, NASA/LaRC)

Lakeshore ozone during LMOS 2017





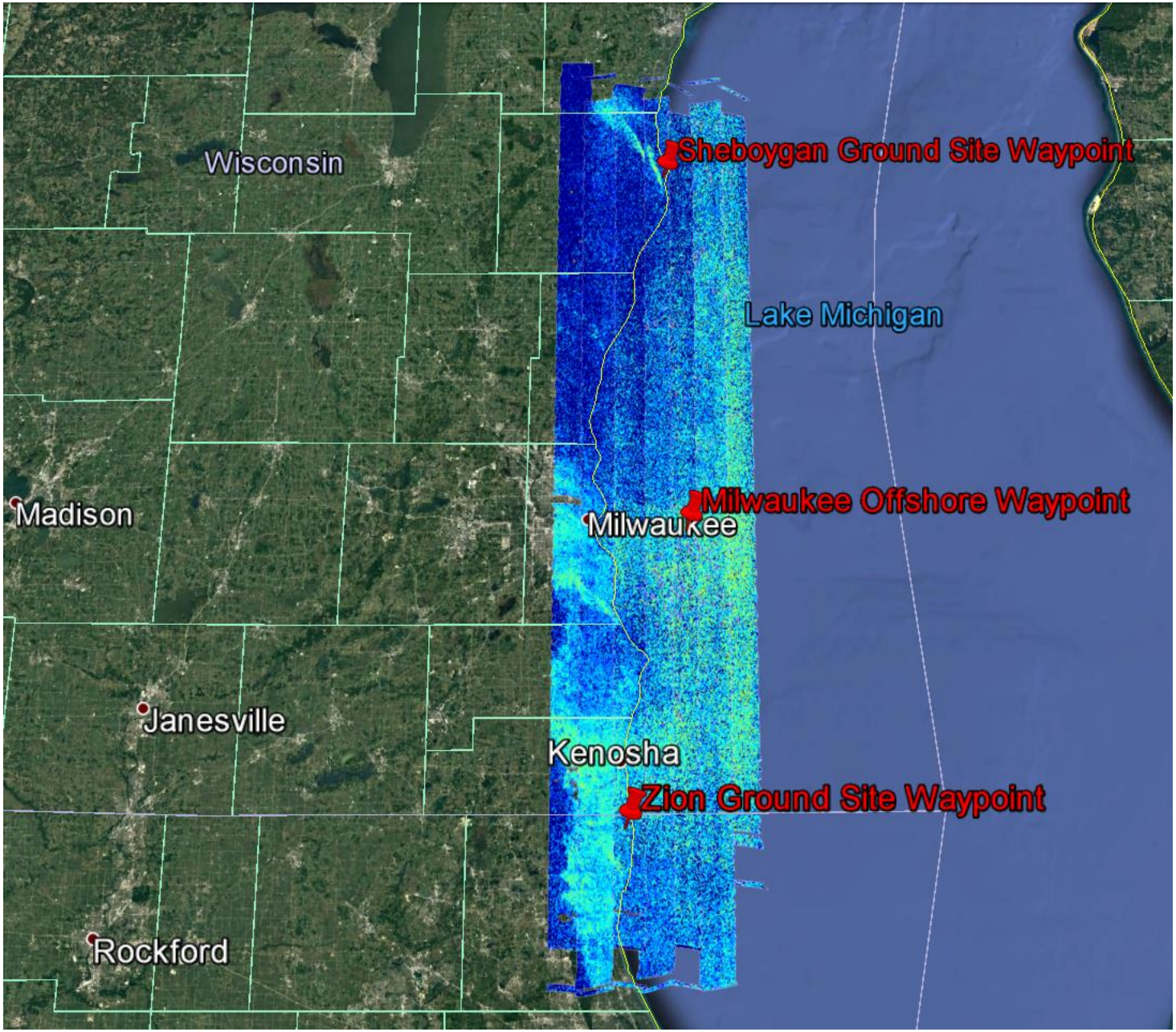
June 02, 2017 MDA8



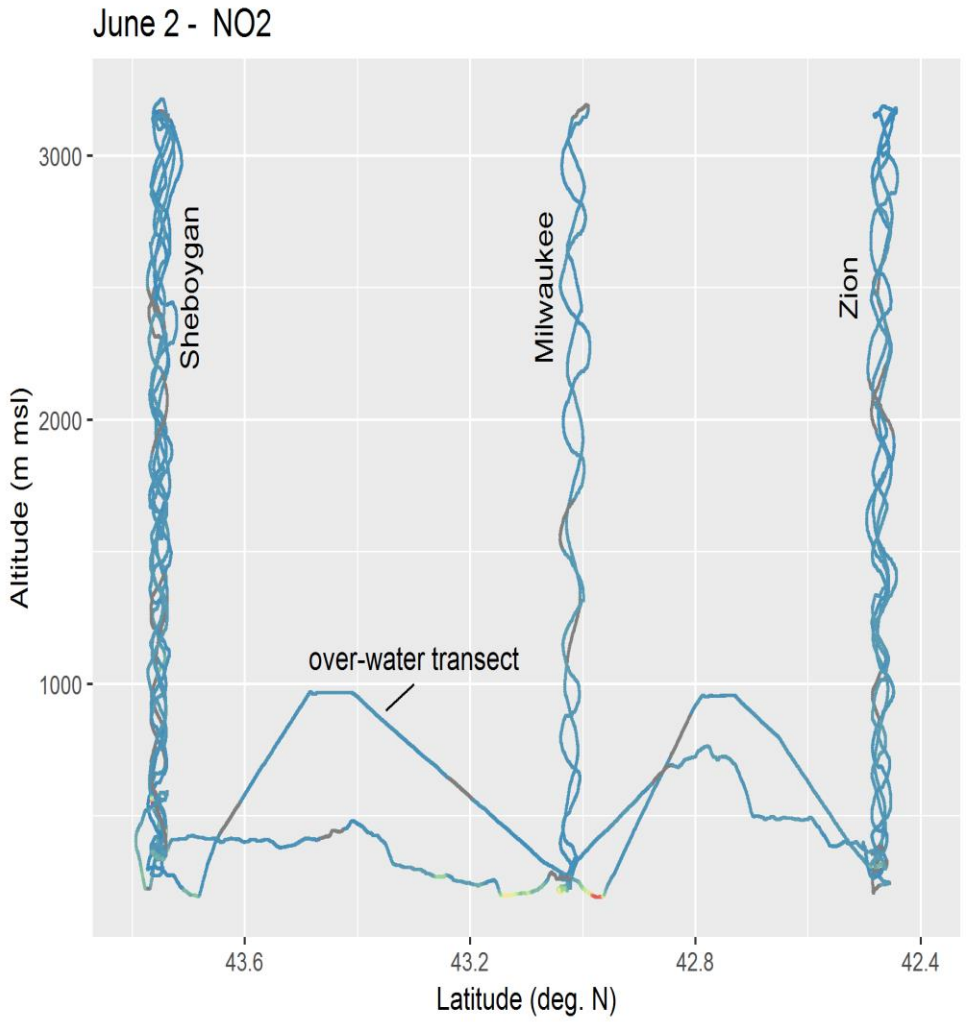
(Angie Dickens , WDNR)

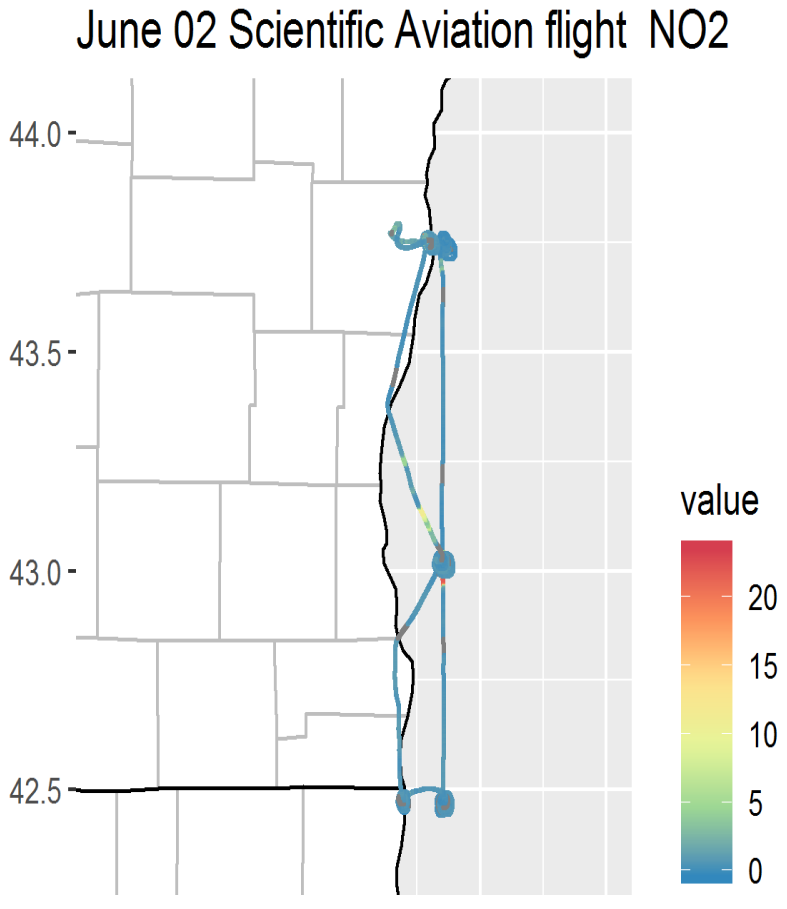
MDA8=Maximum Daily 8 hour Average

GeoTASO NO2 column retrieval June 02, 2017



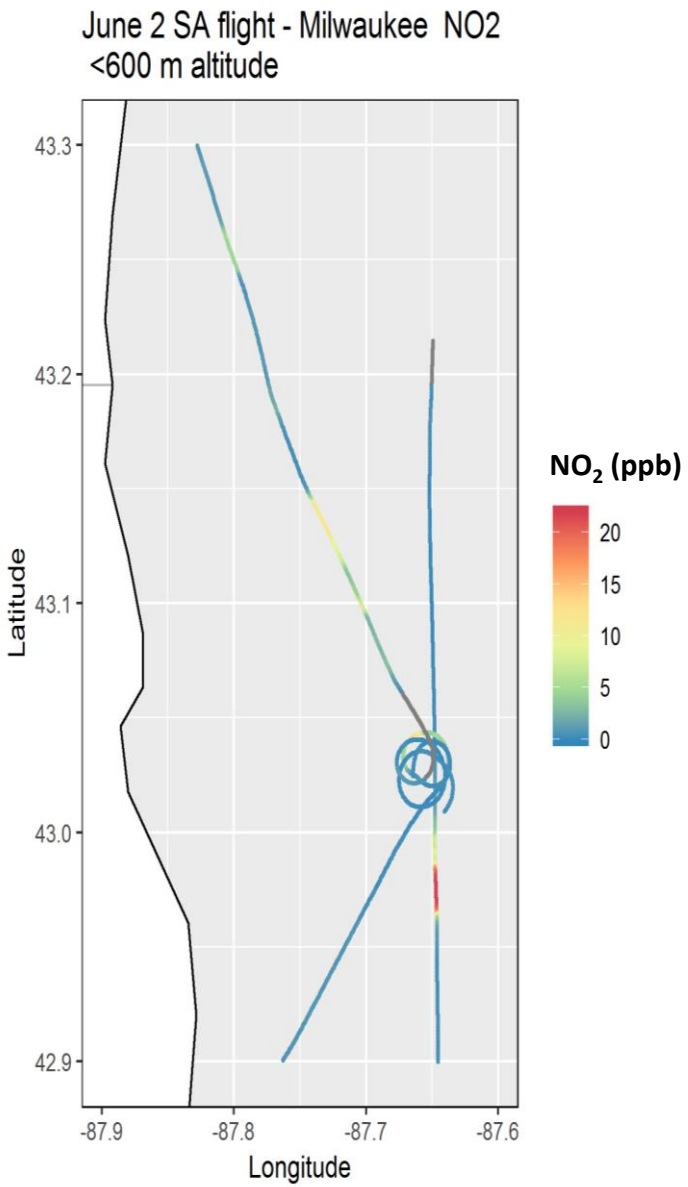
June 2nd (Friday)
NO2 concentrations





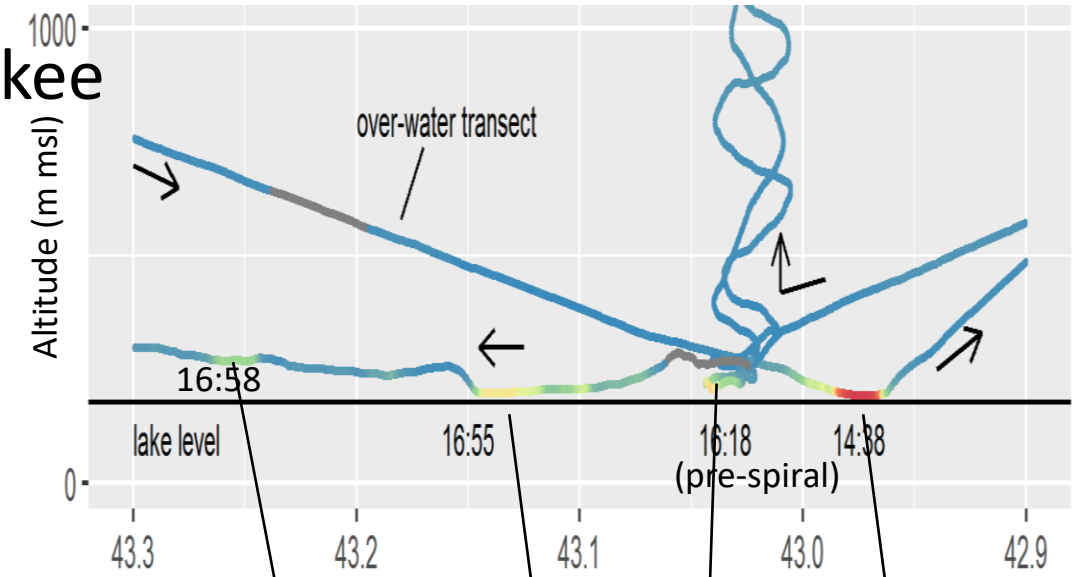
(Angie Dickens , WDNR)

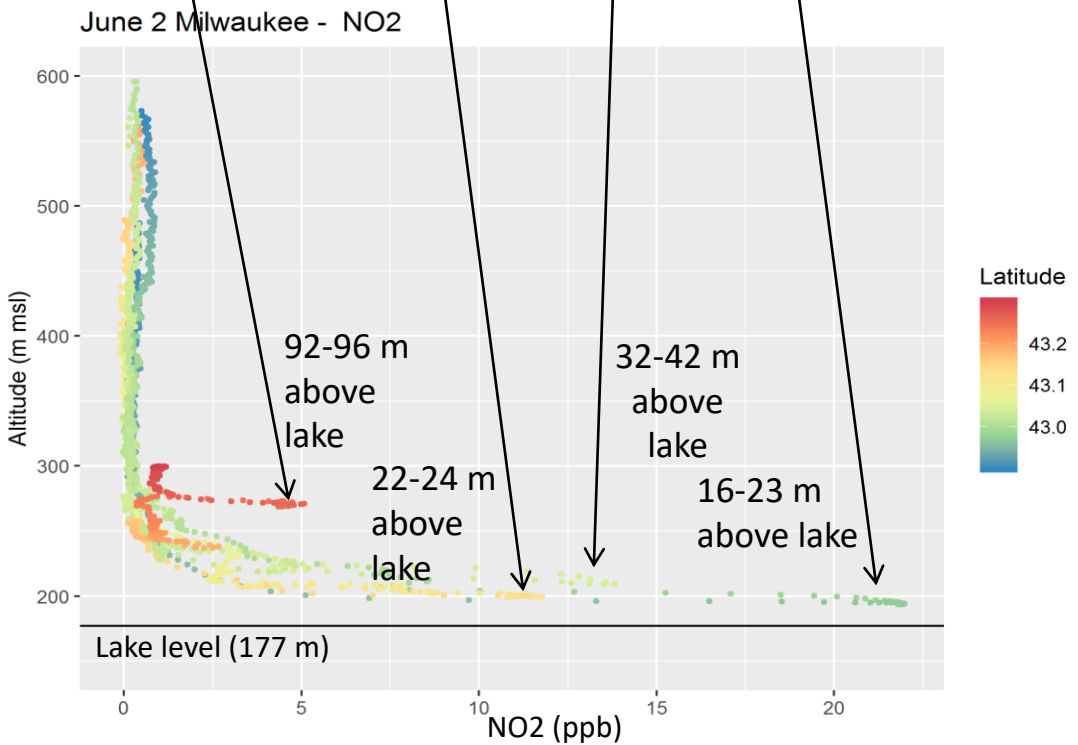
High-NO_2 by Milwaukee



Times are in CST not CDT

Milwaukee area





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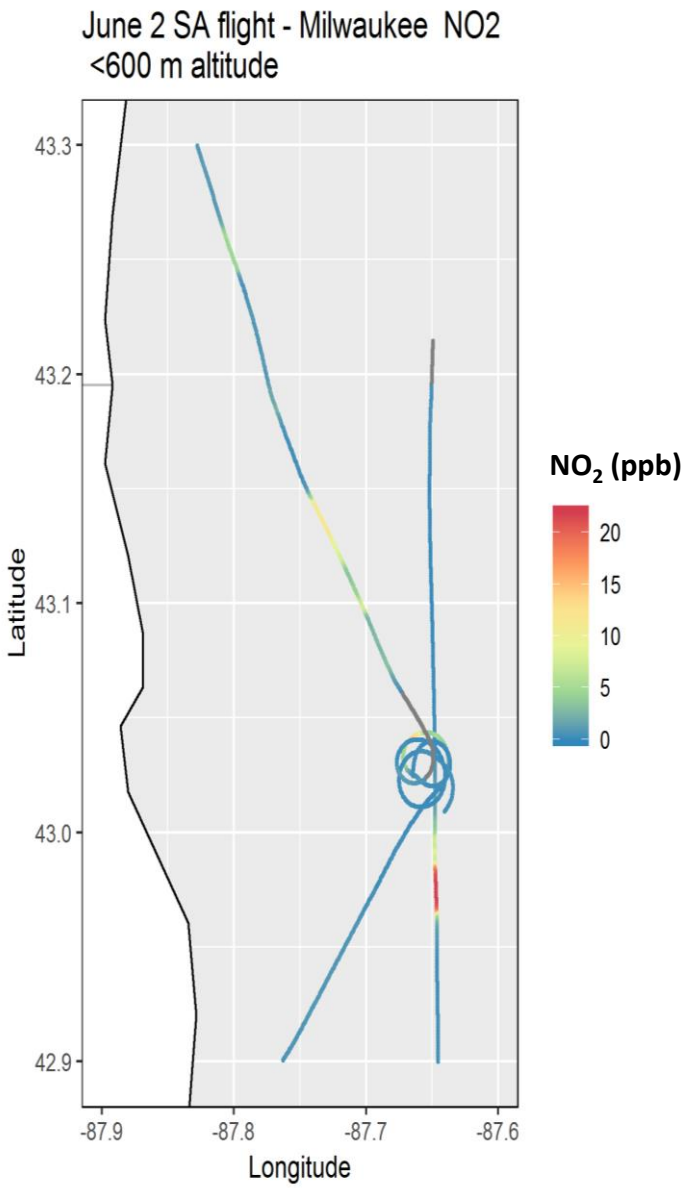

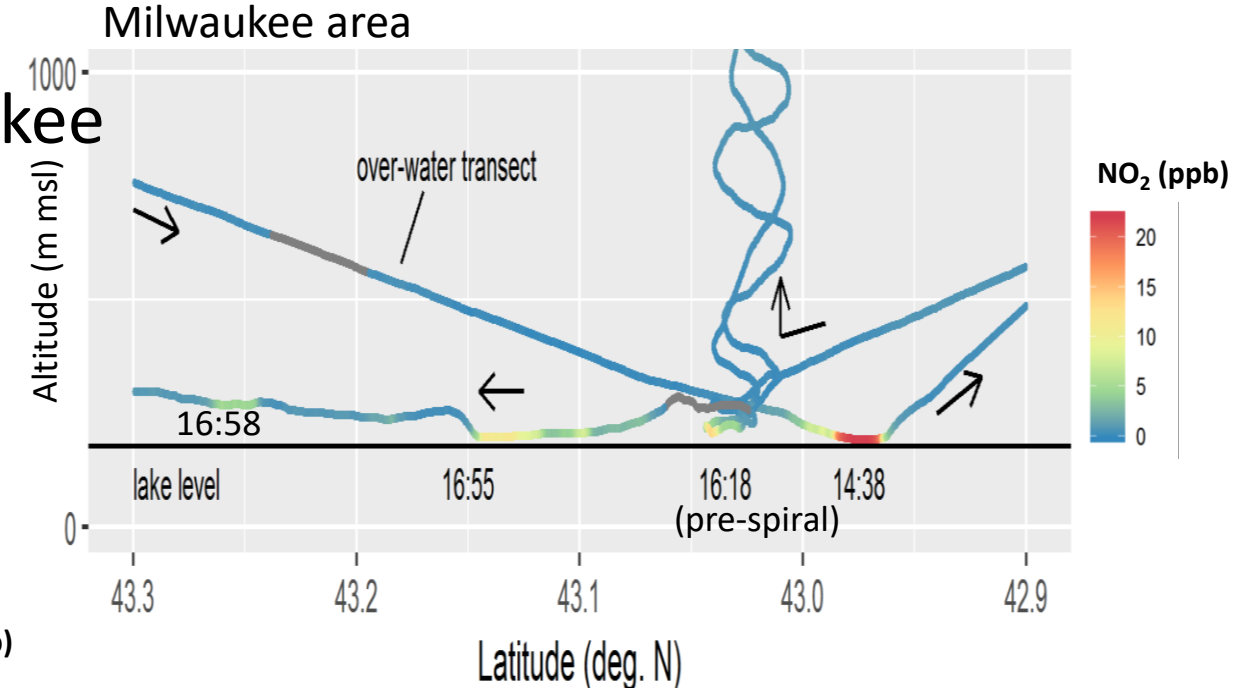

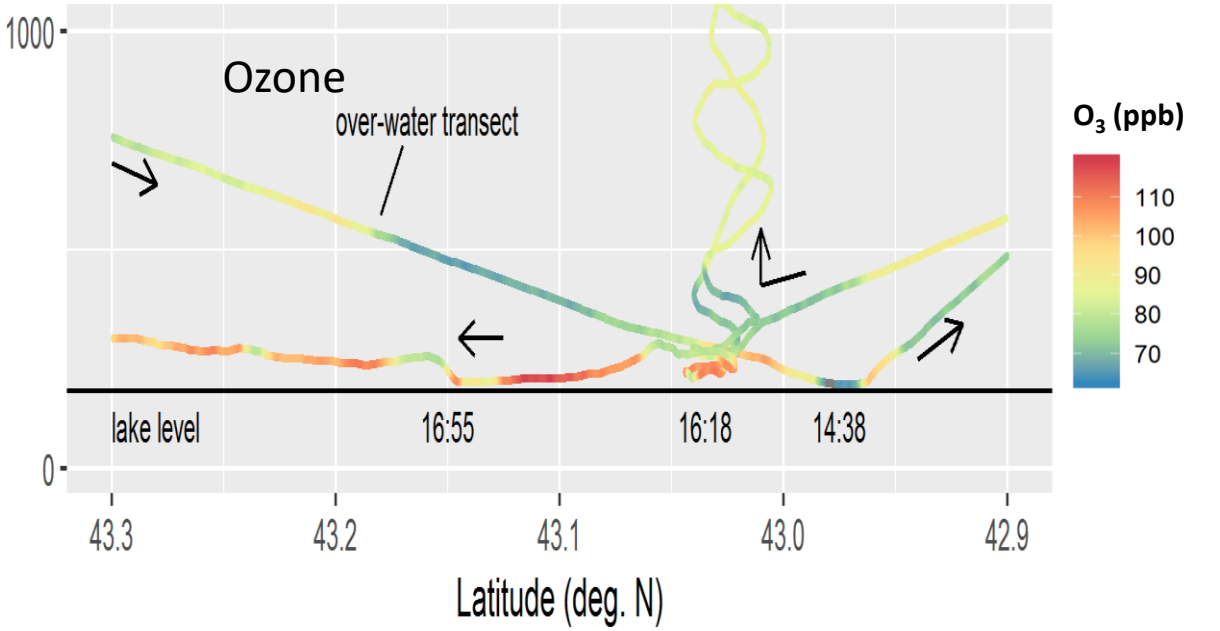

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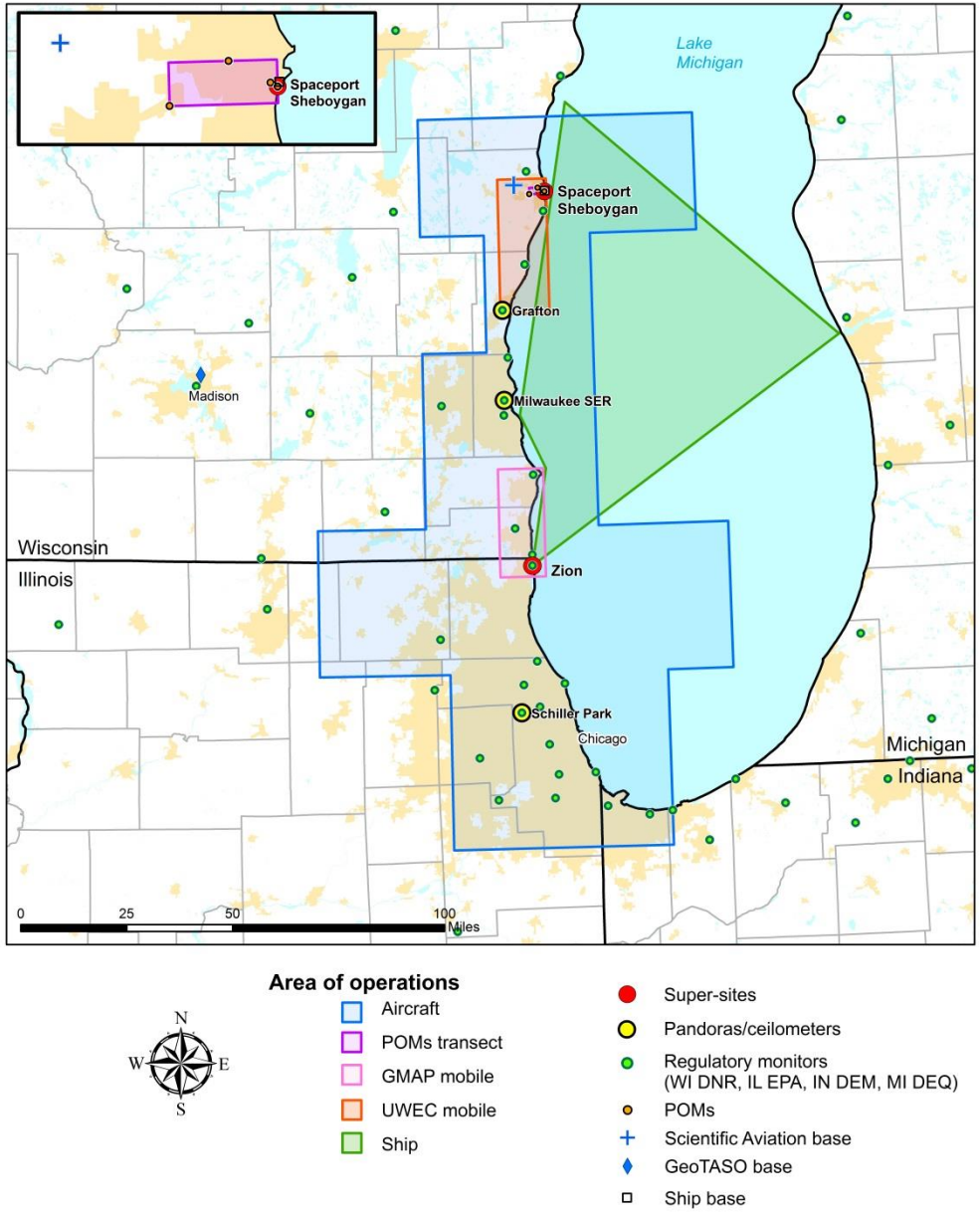

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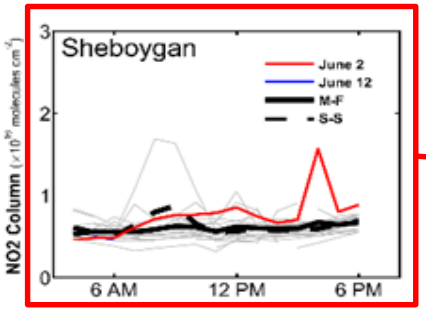
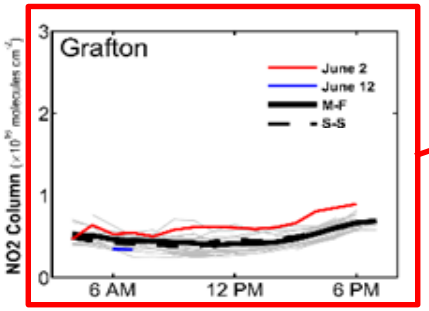
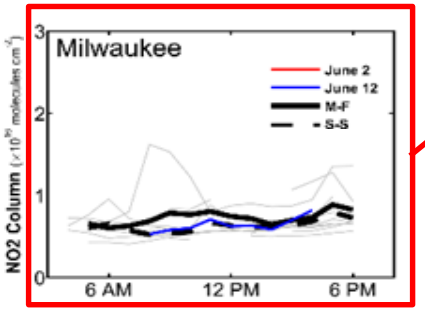
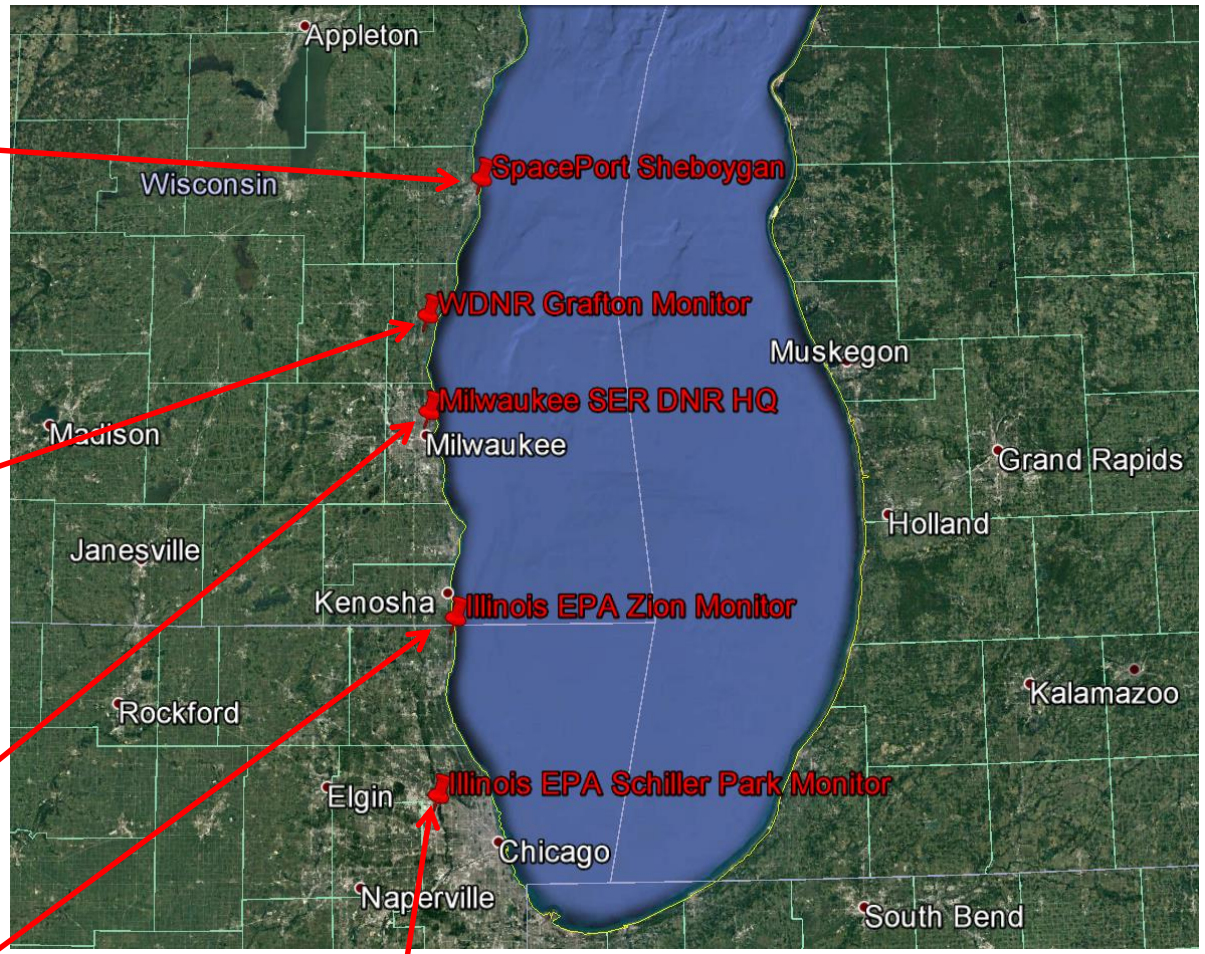
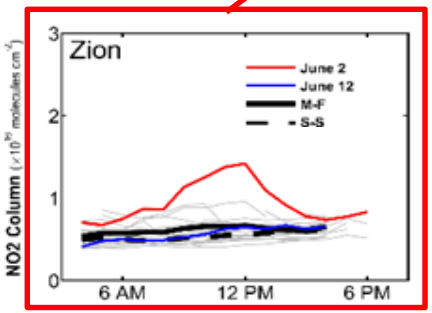
Ground based UV/visible grating spectrometers (Pandoras) column NO2 measurements during LMOS 2017

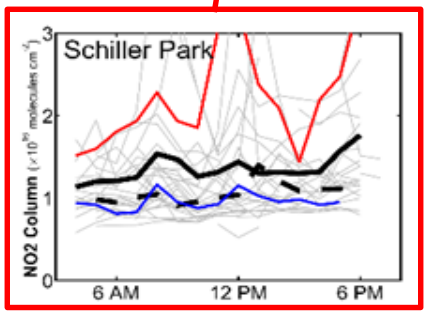












Pandora NO2 column measurements show high values at Zion, Grafton, and Sheboygan on June 2, 2017

(Luke Valin, EPA)

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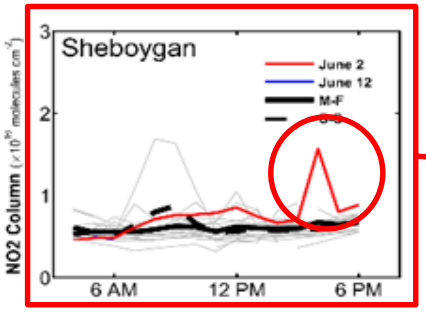
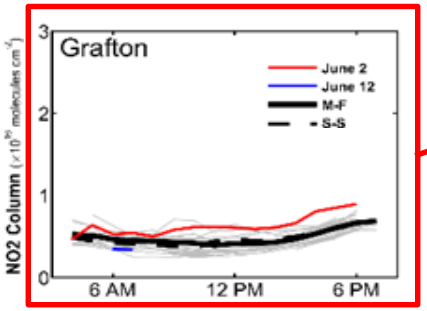
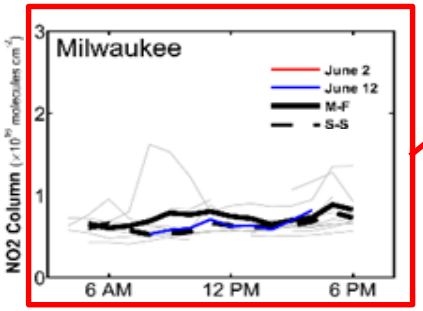
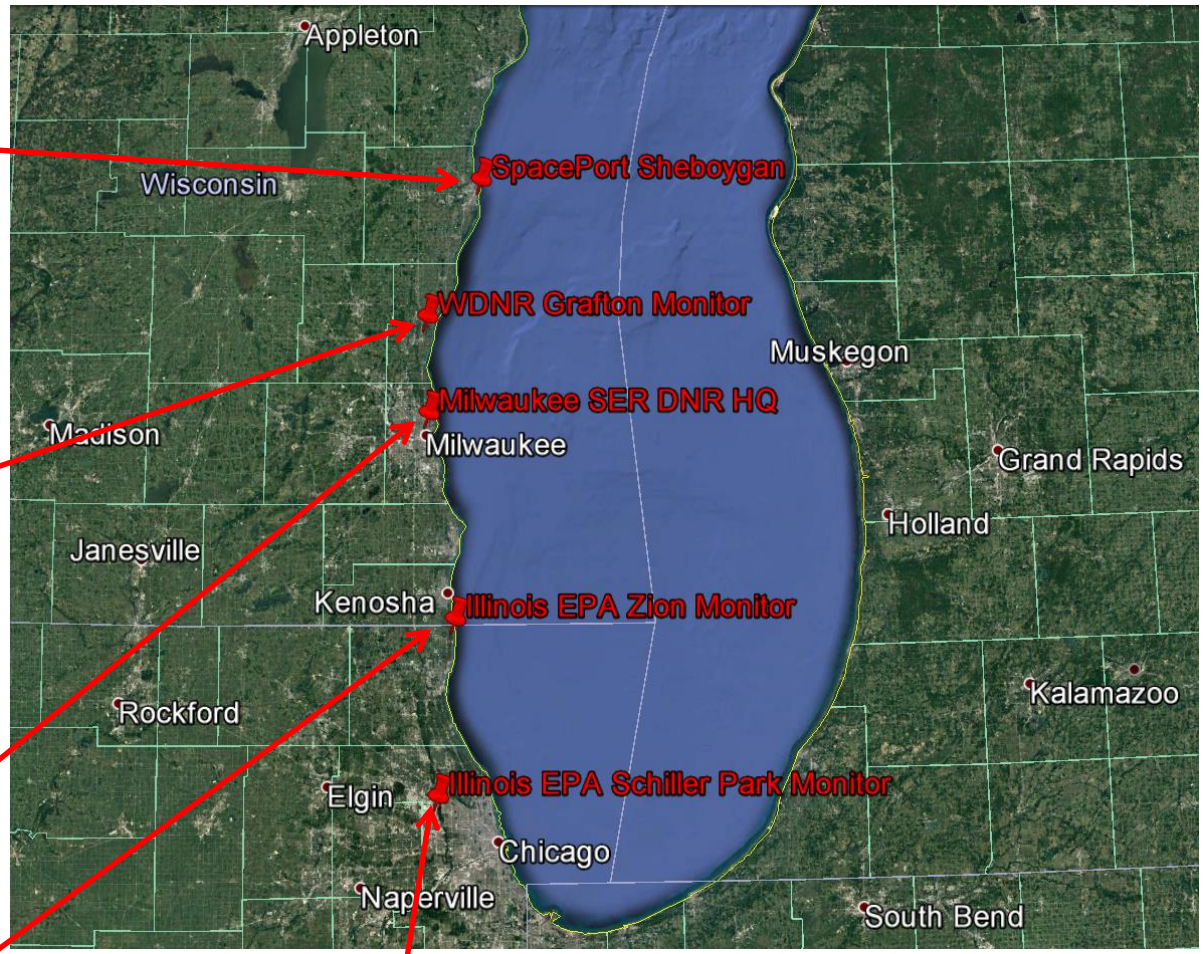
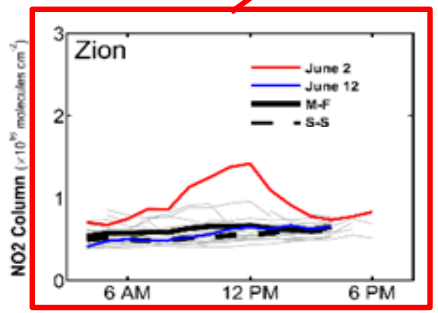
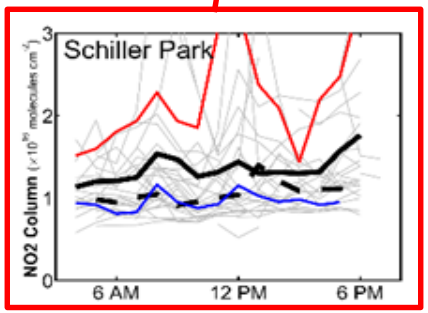








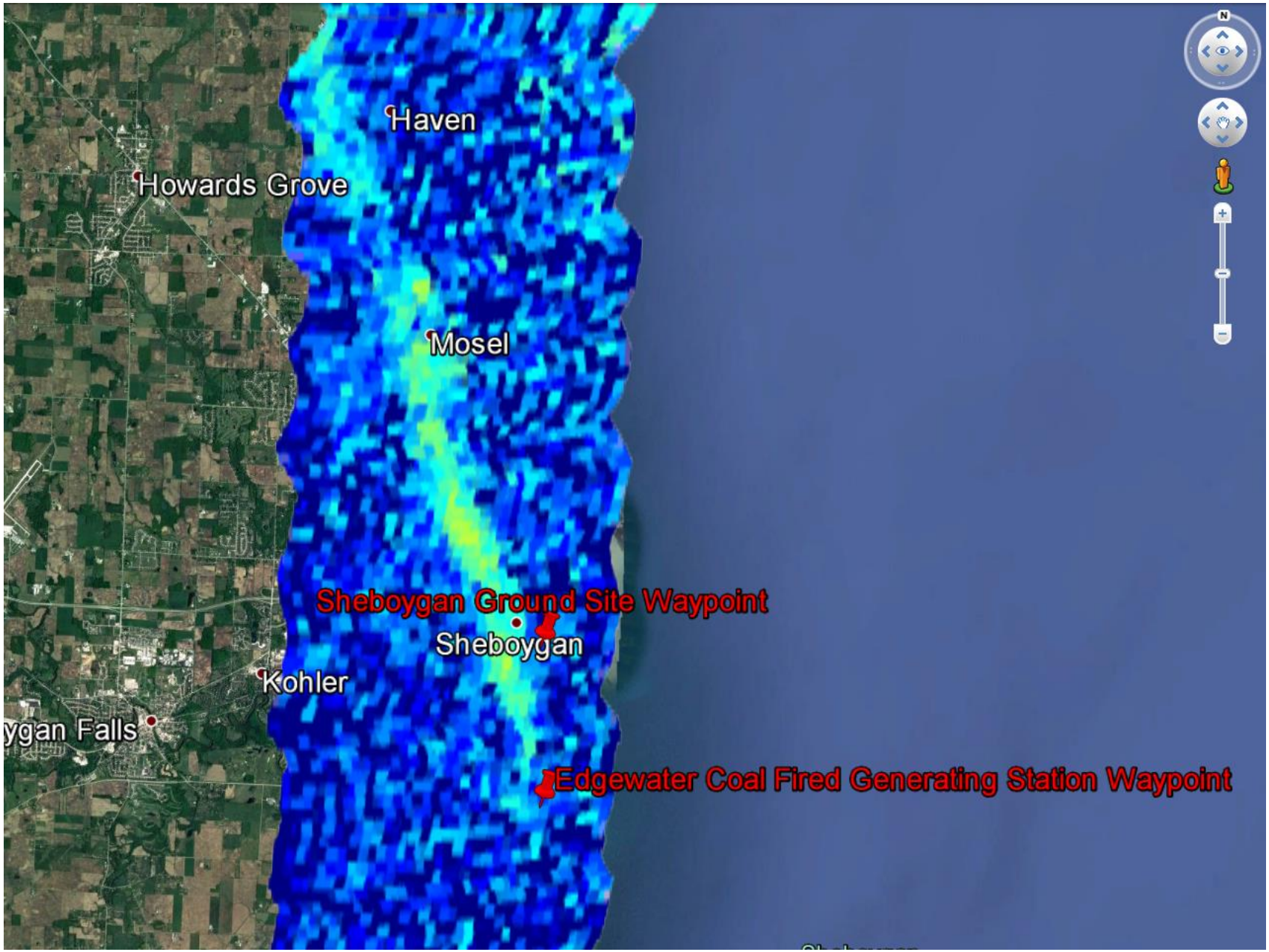




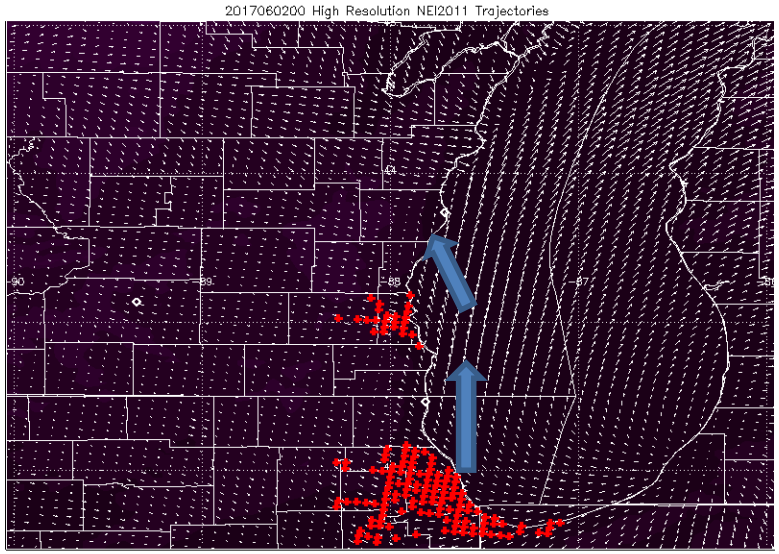
Pandora NO2 column measurements show high values at Zion, Grafton, and Sheboygan on June 2, 2017

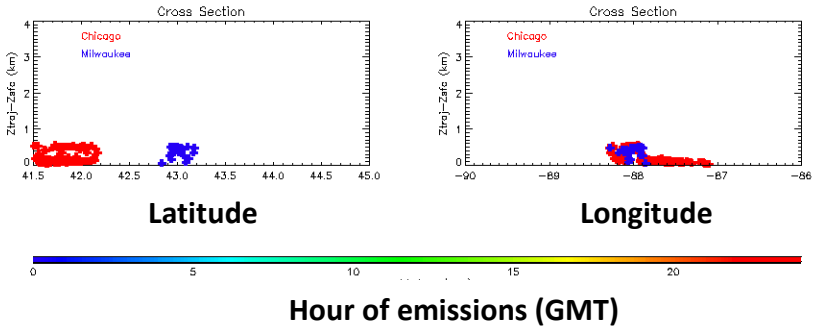
(Luke Valin, EPA)

GeoTASO NO2 column retrieval June 02, 2017

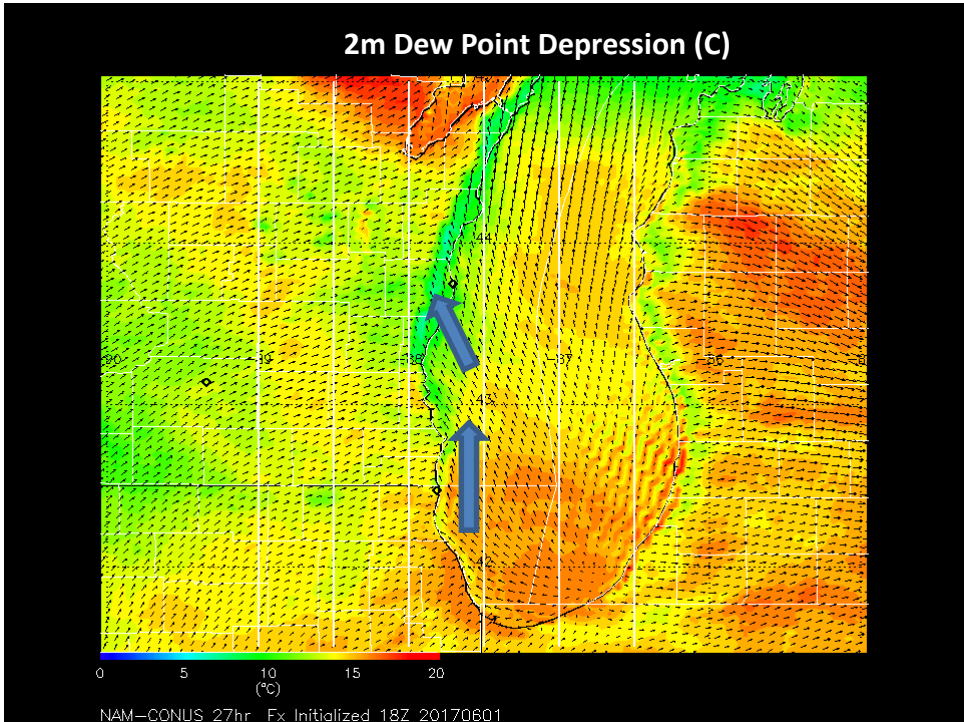


High-resolution (3km) Chicago/Milwaukee NOx emission trajectories





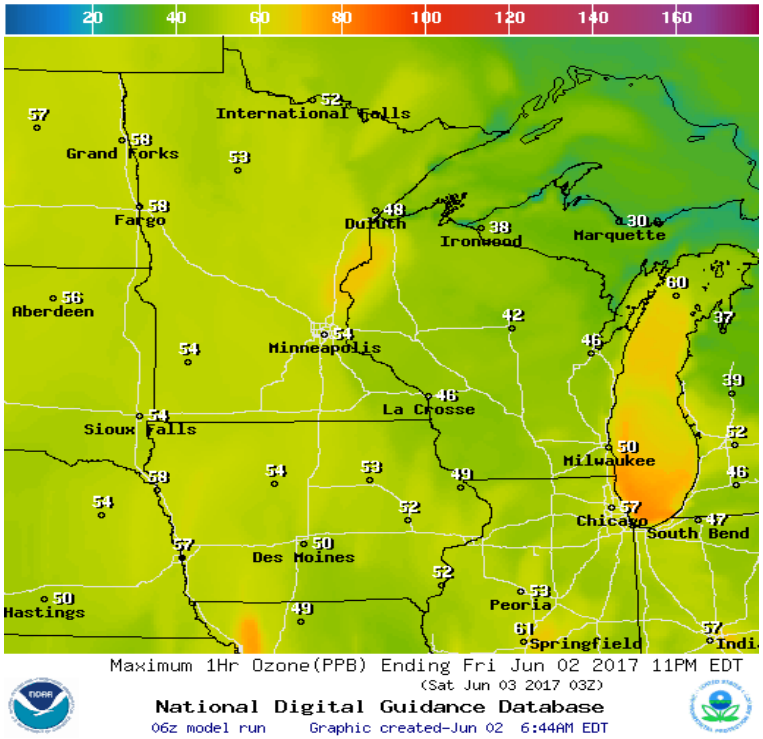
Transport of Chicago/Milwaukee emissions turns North in late afternoon (well defined Lake Breeze)

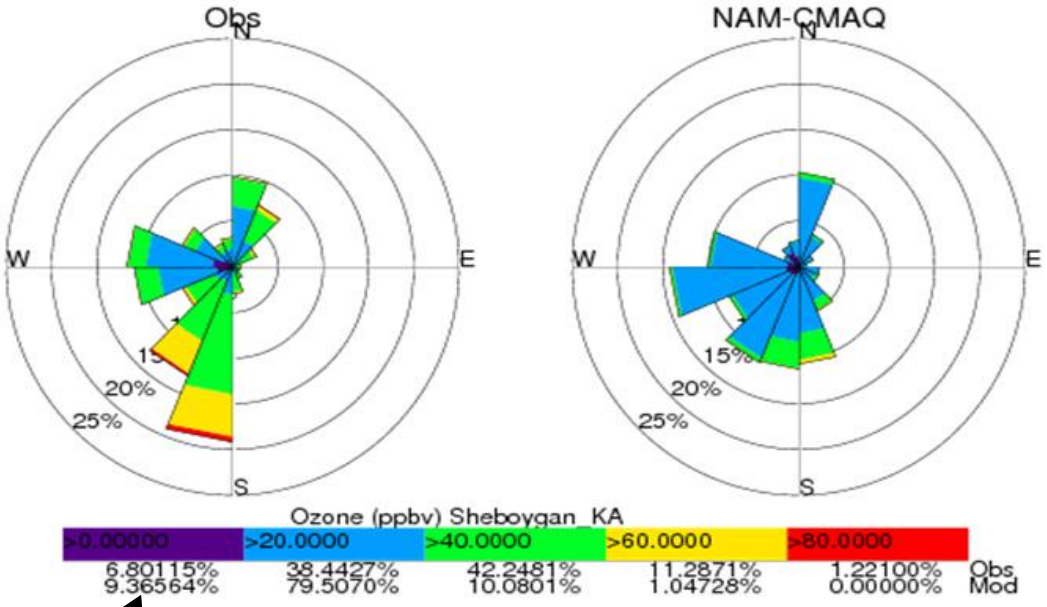


21Z June 02, 2017
(4:00pm)

National Weather Service NAM-CMAQ ozone forecasts during LMOS 2017 (http://airquality.weather.gov/)

May 22 through June 22, 2017

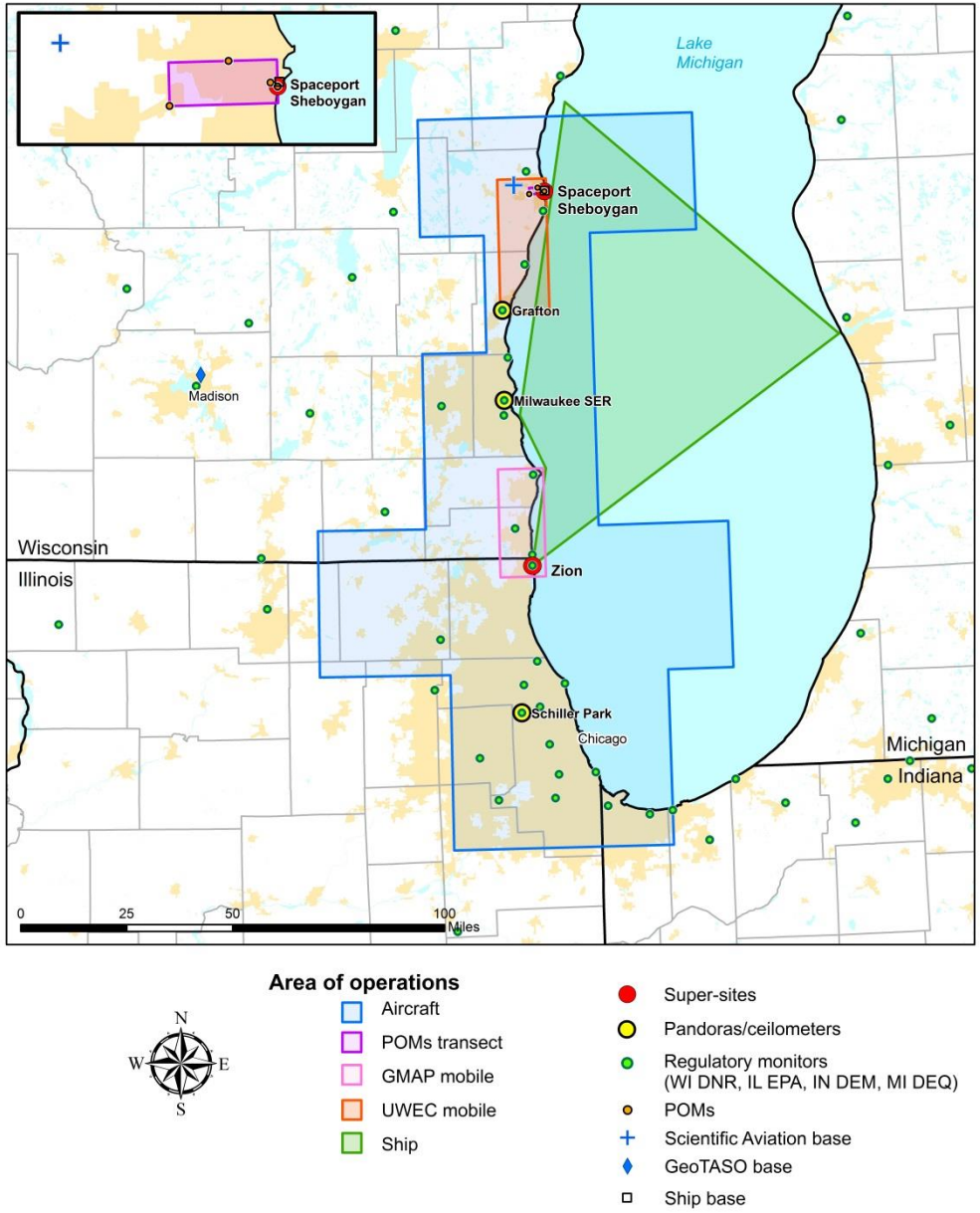




During LMOS 2017 NAM-CMAQ underestimates the occurrence of high ozone (>60ppbv) during Southerly and Southwesterly flow at Sheboygan, KA.

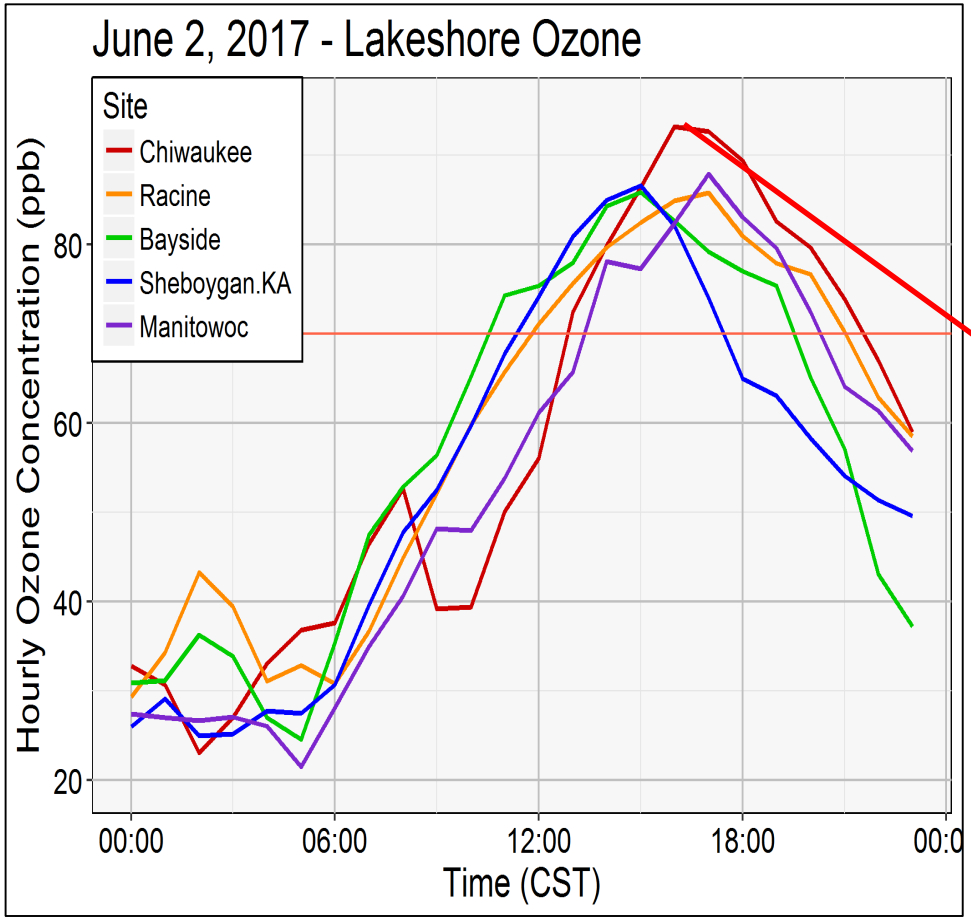
The North American Model (NAM) meteorology drives the Environmental Protection Agency's (EPA) Community Multiscale Air Quality Model (CMAQ)

Summary of measurements made during the LMOS 2017 field campaign



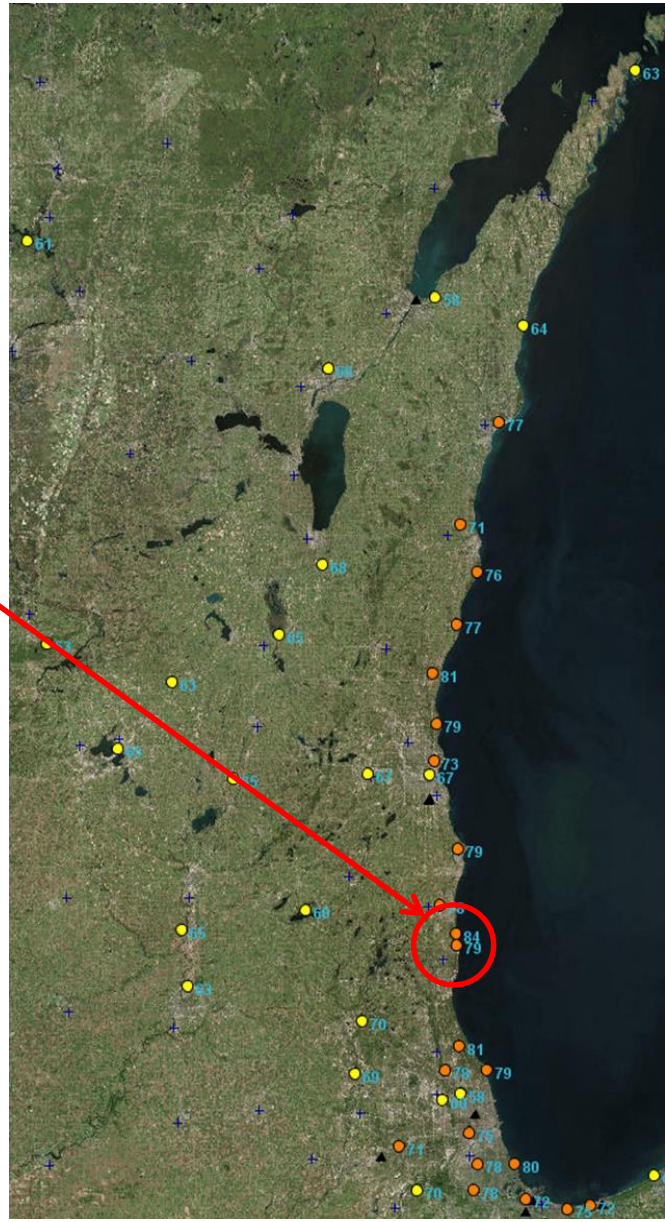
Location	Measurement*	Research Institution*
Ground Sites		
Spaceport Sheboygan	Remote sensing of meteorology (SPARC Trailer)	UW-Madison -SSEC
	In situ measurements of pollutants	U.S. EPA ORD
Zion, IL	Remote sensing of meteorology (Sodar/MW Radiometer)	Univ. Northern Iowa
	Detailed in situ chemical measurements	Univ. Iowa, UW-Madison, Univ. Minnesota
	Routine measurements of ozone	Illinois EPA
Various†	Remote sensing of pollutants and boundary layer height	U.S. EPA ORD
Sheboygan transect	In situ measurements of ozone at four locations	U.S. EPA ORD
Airborne Platforms		
Lakeshore region	Airborne remote sensing of NO_2 (GeoTASO)	NASA
	Airborne remote sensing of clouds (AirHARP)	Univ. Maryland, Baltimore County
	Airborne in situ profiling of pollutants and meteorology	Scientific Aviation
Shipboard Platform		
Lake Michigan	In situ measurements of pollutants	U.S. EPA ORD
	Remote sensing of pollutants and boundary later height	U.S. EPA ORD
Mobile Platforms		
Northeast IL and Southeast WI	In situ measurements of pollutants (GMAP)	U.S. EPA Region 5
Grafton to Sheboygan	In situ measurements of ozone and meteorology	UW-Eau Claire

June 2nd (Friday)
MDA8 Ozone



Deep Lake Breeze at northern & southern sites

June 02, 2017 MDA8



MDA8=Maximum Daily 8 hour Average

JGR Atmospheres

Research Article | Full Access

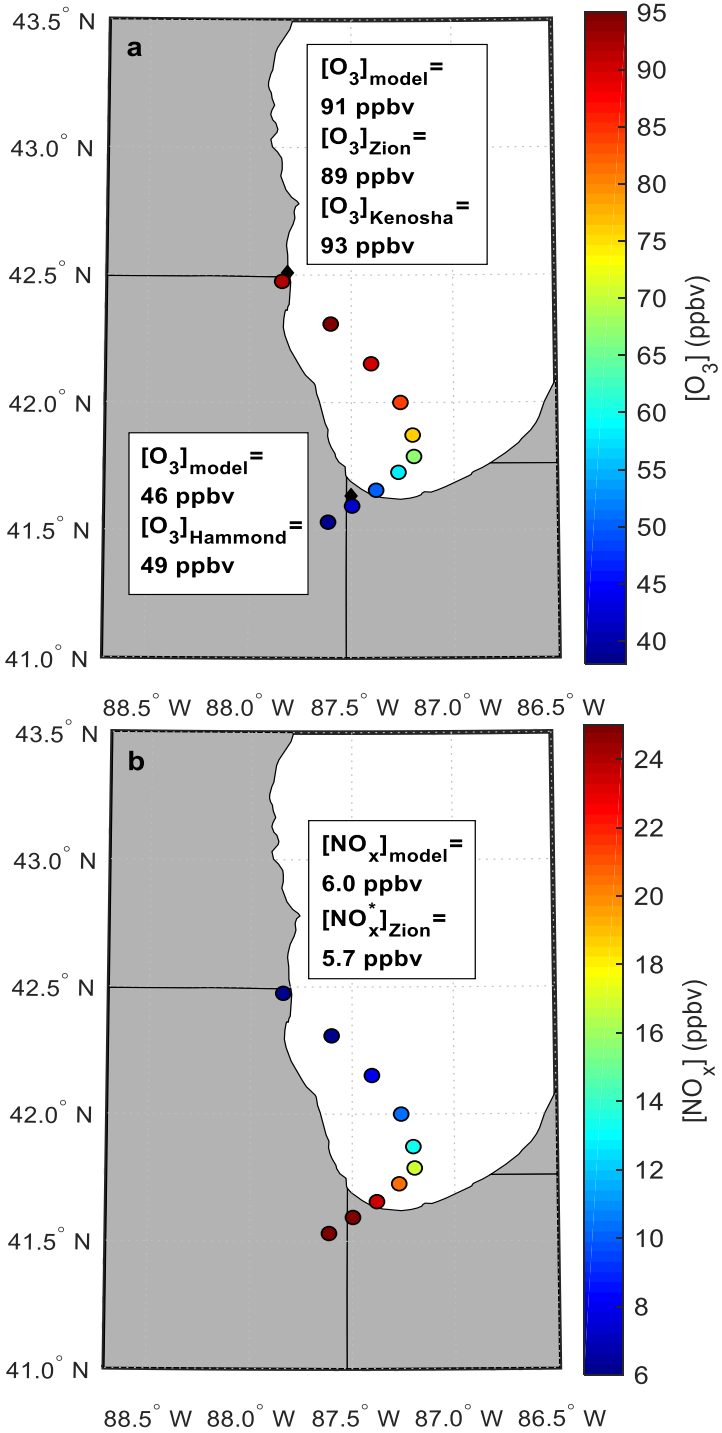
Sensitivity of Ozone Production to NO_x and VOC along the Lake Michigan Coastline

Michael P. Vermeuel, Gordon A. Novak, Hariprasad D. Alwe, Dagen D. Hughes, Rob Kaleel, Angela F. Dickens, Donna Kenski, Alan Czarnetzki, Elizabeth A. Stone, Charles O. Stanier, R. Bradley Pierce, Dylan B. Millet, Timothy H. Bertram ... See fewer authors

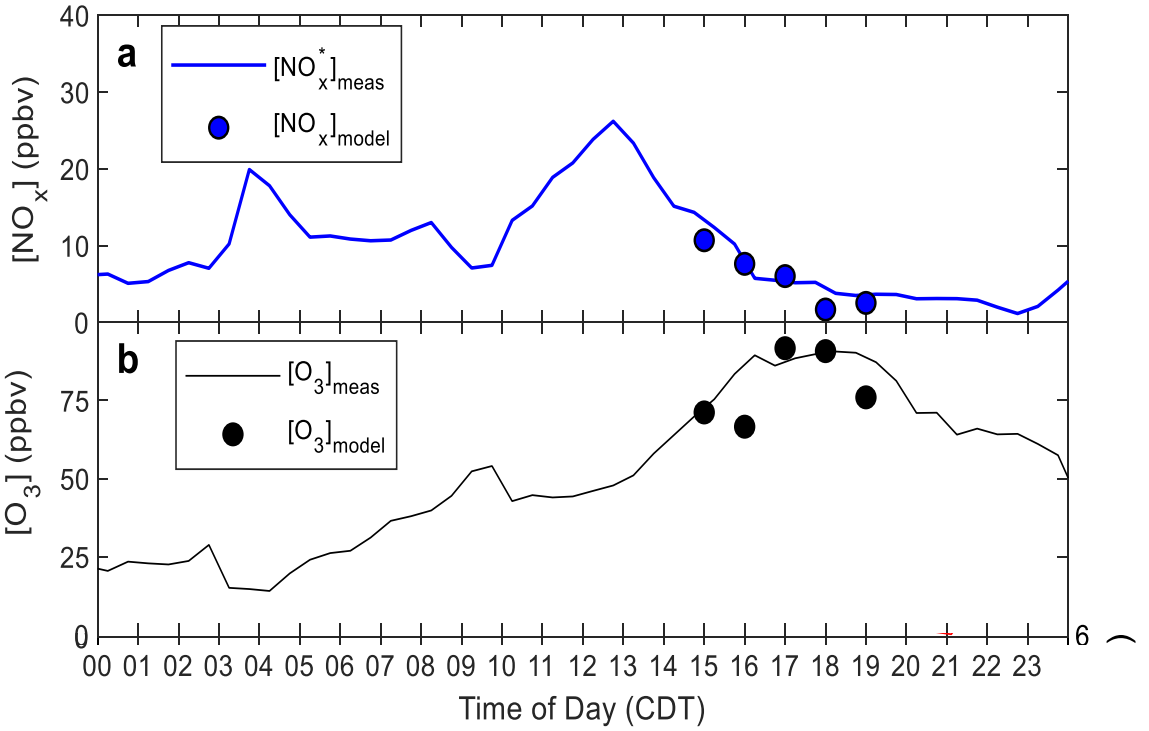
First published: 12 October 2019 | https://doi.org/10.1029/2019JD030842

A master mechanism chemical trajectory model, constrained measurements from LMOS 2017, EPA ground-station data, the EPA NEI 2014 emissions, and NOAA meteorological data was developed to understand the NO_x-VOC sensitivity of coastal high O_3 events.

Trajectories of modeled O_3 and NO_x (colored circles) ending at the Zion site at 17:00 CDT.

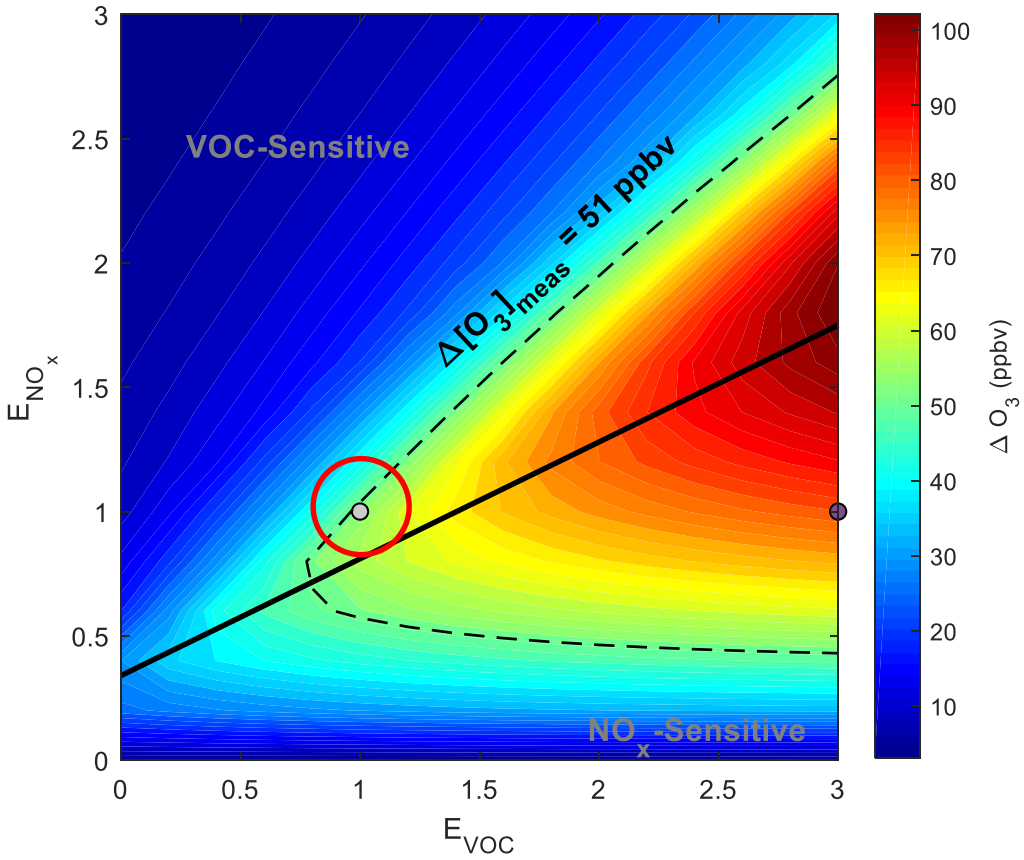


June 2nd (Friday)



Comparison of modeled (colored dots) and half-hour average measurements (lines) of NO_x^*, O_3, HNO_3, and H_2O_2 mixing ratios at Zion, IL.

Increase in O3 from 8:00-17:00 along trajectory on 2 June 2017



- **Isopleths in ΔO3 were generated by varying NOx and anthropogenic VOC emissions relative to the base case where ENOx and EVOC =1.**
- **The dashed contour corresponds to measured Δ[O3] during this period**
- **The model base case ΔO3 suggests that O3 formation is in a VOC-sensitive regime.**

Outcomes/Benefits of LMOS 2017

LMOS 2017 measurements provide critical observations for evaluating a new generation of air quality models attempting to better simulate ozone episodes in the region. Over the long term, the information collected is expected to result in:

- **Improved modeled ozone forecasts for this region, which states and EPA use to meet state and federal Clean Air Act requirements.**
- **Better understanding of the lakeshore gradient in ozone concentrations, which could influence how EPA addresses future regional ozone issues.**
- **Improved knowledge of how emissions influence ozone formation in the region.**

NASA LaRC data archive at https://www-air.larc.nasa.gov/cgi-bin/ArcView/lmos

Ozone Formation Along Wisconsin's Lake Michigan Shore

1. Lake Michigan Ozone Transport

2. 2017 Lake Michigan Ozone Study – R. Bradley Pierce

3. **Enhanced Ozone Monitoring and data analysis - Katie Praedel and David Bizot**

Enhanced Ozone Monitoring in WI

- **2008 Ozone NAAQS**: Non-attainment areas classified at moderate and above are required to submit an Enhanced Ozone Monitoring (**EOM**) Plan by Oct 2019

- **EOM**: Long-term, experimental study utilizing numerous **monitoring strategies** targeted to better understand the unique lakeshore precursors that lead to ozone creation

Big Questions?

- What is the ratio of the precursors being converted into Ozone (O3) over the lake?

vs.

- What is the chemical composition of the Volatile Organic Compounds (VOCs) found in O3 precursors?

- How can the data be used to improve regulatory meteorological and photochemical models that are used in State Implementation Plans to estimate future O3 values?

Long Term EOM Plan: 3 Phases

- **Phase 1** (2019): Deploy Mobile Air Monitoring Lab (MAML) at multiple O3 lakeshore sites

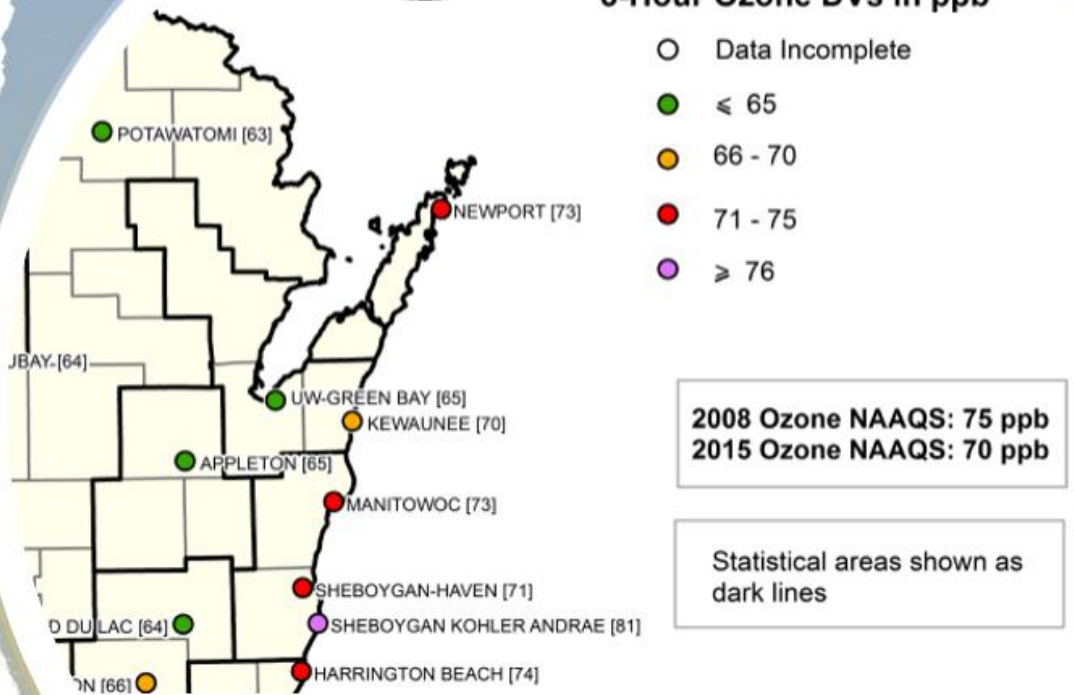
- **Phase 2** (2020-2021): Phase 1 + Ceilometer, Pandora, Vertical Column O3 measurements on Water Tower

- **Phase 3** (2022-?): Phase 1 +2 + Formaldehyde, Hydrocarbon, Biogenic VOCs, Monitoring from Lighthouses, and Ships

Mobile Air Monitoring Lab (MAML)

Phase 1 EOM:

- **MAML** placed at Grafton and Chiwaukee lakeshore sites
- **Criteria Parameters** Measured:
  - PM2.5
  - O3
  - CO
  - NO2
- **VOC Event sampling**
  - 18 events in 2019



Phase 2 EOM:

- **MAML** being placed at in Sheboygan – lakeshore
- **Chiwaukee Site Upgrade**
  - Existing parameters (PM2.5, O3)
  - Additional parameters
    - VOC event sampling
      - Two sites instead of one and increasing capacity
    - Pandora (NO2 in the vertical column)
    - UW research instruments
- **Kenosha Water Tower**
  - Comparable ozone measurements using two instruments with inlets at regulatory height and ~100 feet

Future of Wisconsin EOM and BEYOND

- Learning Experience
- Continually Evolving
- Collaboration with Externals

Ozone-related Data Analysis

- Data from DNR EOM measurements, LMOS2017, and historical records are in a state of constant analysis in support of program policy objectives.

- Current staff work includes looking at precursor trends since the 1990s to determine if NOx and VOC ratios have changed over time, reviewing met buoy data to see how overwater data relates to monitored ozone values, and assessing 2019 EOM VOC samples for trends.

- Recently funded through LADCO two projects (Timothy Bertram/Brad Pierce and Charlie Blanchard) to review current NOx/VOC sensitivity.

- Program is adding a full-time data analyst and developing more rigorous plans to analyze, archive and make available ozone-related data.

Ozone Nonattainment Areas Update

David Bizot

Ozone NAA redesignation requests

Area	NAAQS	Status
Door County (partial)	2015	Submitted to EPA on Jan. 27
Kenosha County (partial)	2008	Submitted to EPA on Jan. 26
Shoreline Sheboygan County	2008	Submitted to EPA on Feb. 11

Areas are meeting applicable NAAQS based on certified 2017-19 data

Ozone NAA redesignation requests

- The program is in close coordination with EPA on these requests (e.g., discussing weekly and more often as needed).
- All requests must complete federal notice and comment rulemaking before they are final/effective.
- Program collaborating with EPA to ensure all Clean Air Act requirements for redesignation are met.
- Agencies are working together to explore available efficiencies.

Air quality modeling

John Roth
Stationary Source Modeling Policy Coordinator

Modeling Policy Update

Since Aug 2016 (Last Report to AMSG)

- U.S.EPA released DRAFT $PM_{2.5}/O_3$ SIL
  - (WDNR commented 30SEP2016)
- WDNR proposed time-varying backgrounds for 1-hour SO_2/NO_2 in Sep 2016
- WDNR finalized backgrounds 19DEC2016

Calendar Year 2017

- Guideline on Air Quality Models finalized Jan 2017
- U.S.EPA released MERPs guidance in Jan 2017
- Developed 1-hour NO_2 approach - DRAFT released Aug 2017, with Wisconsin Modeling Guidelines

Modeling Policy Update

Calendar Year 2018

- Wisconsin Modeling Guidelines with 1-hour NO_2 approach finalized March 2018
- U.S.EPA released SIL for $PM_{2.5}/O_3$ in April 2018
- U.S.EPA released draft ambient air policy
  - (DNR commented 05DEC2018)

Calendar Year 2019

- U.S.EPA finalized ambient air policy Dec 2019

Background Concentrations

- Modeling in comparison to NAAQS includes background concentration
- Derived from ambient monitoring data
- In 2007, a workgroup identified background concentrations as an issue for modeling
- By 2008, the current methodology was defined and used with 2001-2006 data

Background Concentrations

- In 2014, $PM_{2.5}$ updated; In 2017, NO_2 and SO_2
  - As part of 2017 update, began planning for 2021

- In 2021, after census data released, all backgrounds will be updated to 2018-2020 data with revised geographic regions

Ambient Air Policy

- Ambient air is defined to be where the general public has access
- 1980 exclusion to ambient air for land owned or controlled by the source where access is precluded by a fence or physical barriers
- 2019 exclusion to ambient air is for land owned or controlled by the source where the source employs measures, that may include physical barriers, that are effective in precluding access by the general public

Ambient Air Policy

- Wisconsin receptor placement already excludes conveyors, material piles, trailer parking, and areas not accessible to public
- 2019 exclusion provides additional support for existing practice, especially for PSD projects
- Example of receptor placement

Ambient Air Example

- Property Line – Pink
- Structures – Purple
- Receptors – Black Dots
- Red Stacks
- Dashed Grid 50m

Inspection and compliance consistency

Maria Hill
Compliance, Enforcement and Emission Inventory Section Chief

Compliance Assistance

- Courtesy calls
- Partial compliance evaluations for more complex facilities
- Electronic reporting and e-Signature
- Automated response notifications

Compliance Consistency

- New inspection report
- Regular in-person meetings/training for compliance staff
- Weekly statewide discussions about all enforcement actions (includes all regional supervisors, legal, the field operations director, the compliance policy coordinator, the section chief and the inspectors with new noncompliance issues)

2020 Priority Topics

Gail Good

2020 Priority topics

- **Emerging federal regulation**
  - Emerging contaminants (PFAS)
  - New source review reform
  - Long term planning at the federal level
  - ACE Rule
- **Ongoing efforts**
  - 2008/2015 ozone NAAQS implementation
  - SIP submittals and redesignation requests
  - Regional haze
  - Permit streamlining and other rulemaking
- **Opportunities**
  - Transparency in information (data, digitization)
  - Other states organizations