



Ozone Modeling Platform Development: Status

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Topics

- Overview of Modeling Platform (MP)
- Modeling Domain
- Inputs Development
- Platform Setup
- Next Steps



MP Overview - Components

Episode



April 1 – Oct 31, 2019

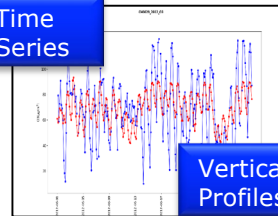
Air Quality Modeling Inputs

- **2019 Meteorology**
- **2019, 2023, 2026 Initial/Boundary Conditions**
- **2019, 2023, 2026 Modeling Emissions Inventories**

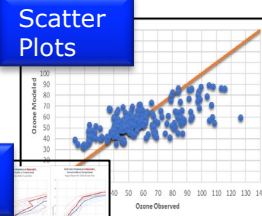
Domains



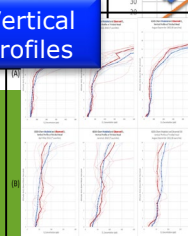
Time Series



Scatter Plots

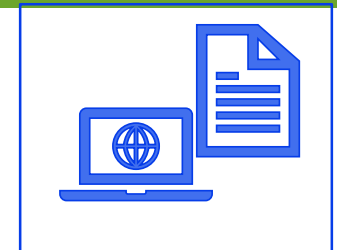


Vertical Profiles



Model Performance Evaluation (MPE)

Documentation

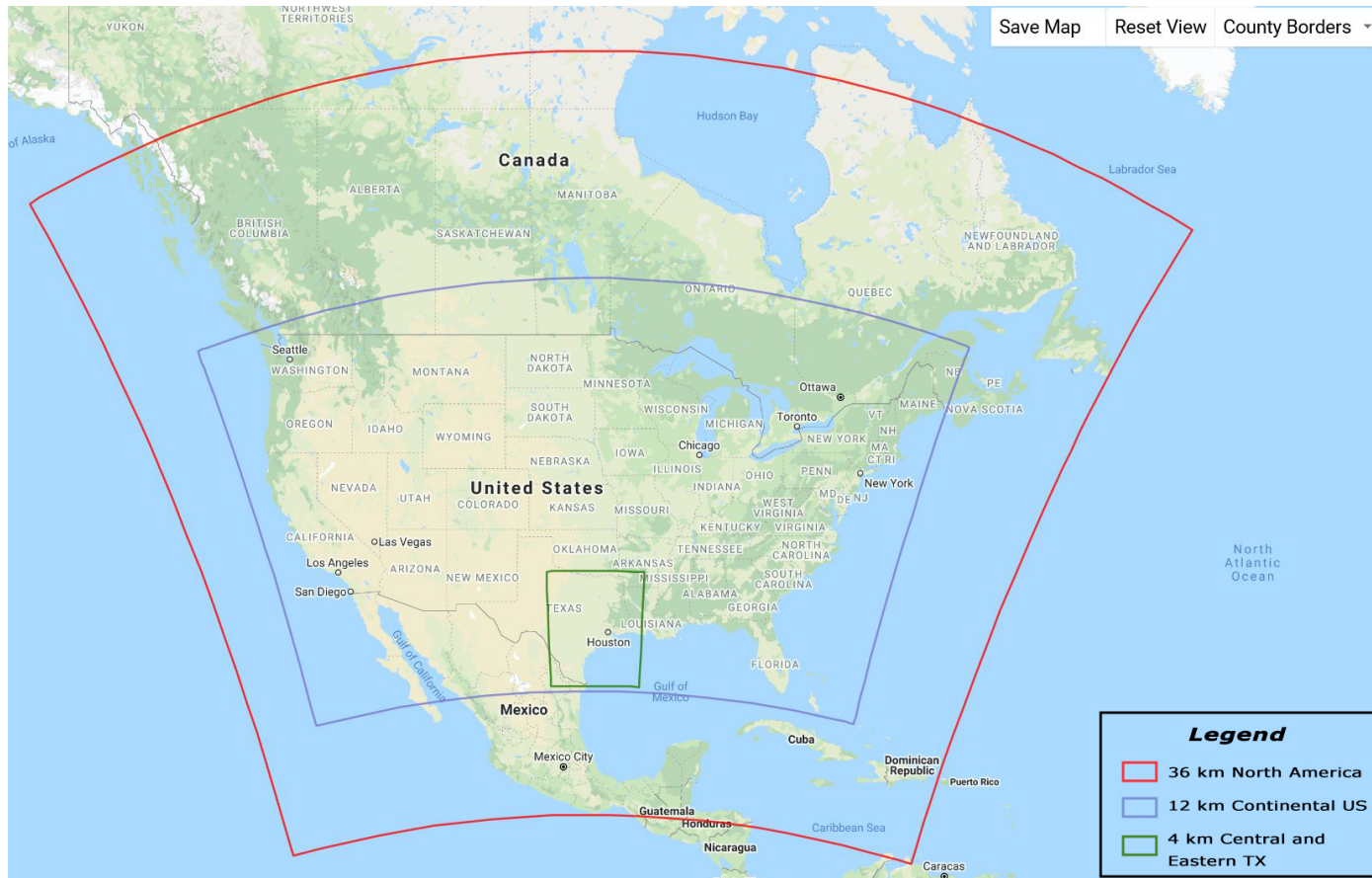




MP Overview - Domain

Domains were determined based on potential applications.

- 36 km domain to cover all of Mexico and almost all of Canada
- 12 km domain now expanded to cover continental United States (CONUS)
- 4 km domain in central and eastern Texas expanded south to capture the full TX gulf coast





Emissions Inputs

Selection of data sets and models for various sectors:

Model Sector	Datasets/Model
EGU Points	2019 Air Market Program Data (AMPD)
TX Non-EGU Points	2019 State of Texas Air Reporting System (STARS)
Non-TX Non-EGU Points	EPA 2016v1 Modeling Platform
International Eis	2019 Community Emission Data System (CEDS); SMOKEv4.7_CEDS
TX Non-Point Oil & Gas	2019 Railroad Commission of Texas (RRC)
Non-TX Non-Point Oil & Gas	EPA 2017 Modeling Platform
Offshore/Gulf of Mexico	2017 Bureau of Ocean Energy Management (BOEM)
On-Road Mobile	MOVES3
Non-Road Mobile	TexN2.2 (TX); MOVES3 (non-TX)
TX Area	2017 Air Emissions Reporting Requirements (AERR)
Non-TX Area	EPA 2017 Modeling Platform
Shipping	2019 Automatic Identification System (AIS); MARINER v1
Biogenics	Biogenic Emissions Landuse Database (BELD5); BEIS v3.7 and SMOKEv4.8
Fires	2019 MODIS and VIIRS; FINN v2.2



Meteorology Inputs

- Weather Research and Forecasting (WRF), version 4.1.5
- 2019 MP WRF configuration:
 - Hybrid vertical coordinate system
 - Noah Land Surface Model (LSM)
 - Yonsei University (YSU) Planetary Boundary Layer (PBL)
 - Kain-Fritsch (KF) Cumulus
- Other Met configurations considered:
 - Pleim-Xu (PX) LSM, YSU PBL, with Multi-Scale KF Cumulus
 - Observational nudging with radar profiler data



Initial/Boundary Conditions Inputs

- Model used: GEOS-Chem v12.7.1
- Set up for 2019 Initial/Boundary Conditions (IC/BC):
 - Met: Modern-Era Retrospective analysis for Research and Application, Version 2 (MERRA-2)
 - Grid resolution: 2-degree by 2.5-degree grid
 - Chemistry scheme: tropospheric chemistry (trochem) with simplified secondary organic aerosols
- Anticipated future year IC/BC (2023 and 2026):
 - Emissions interpolated based on a moderate emissions from Representative Concentration Pathways (RCP4.5)
 - Regional scaling factors used for North America and China



Baseline vs. Base Case

- EPA guidance no longer recommends using a baseline emissions inventory for future year design value (DV_F) calculations.
- Comparison of previous baseline and base case model runs found only minor differences in DV_F .

Nonattainment Area	Avg. DV_F Difference	Max DV_F Difference	Min DV_F Difference
DFW	0.450 (0.372)	1 (0.958)	0 (0.092)
HGB	0.225 (0.245)	1 (1.007)	0 (0.005)
SAN	0.546 (0.558)	2 (1.076)	0 (0.152)

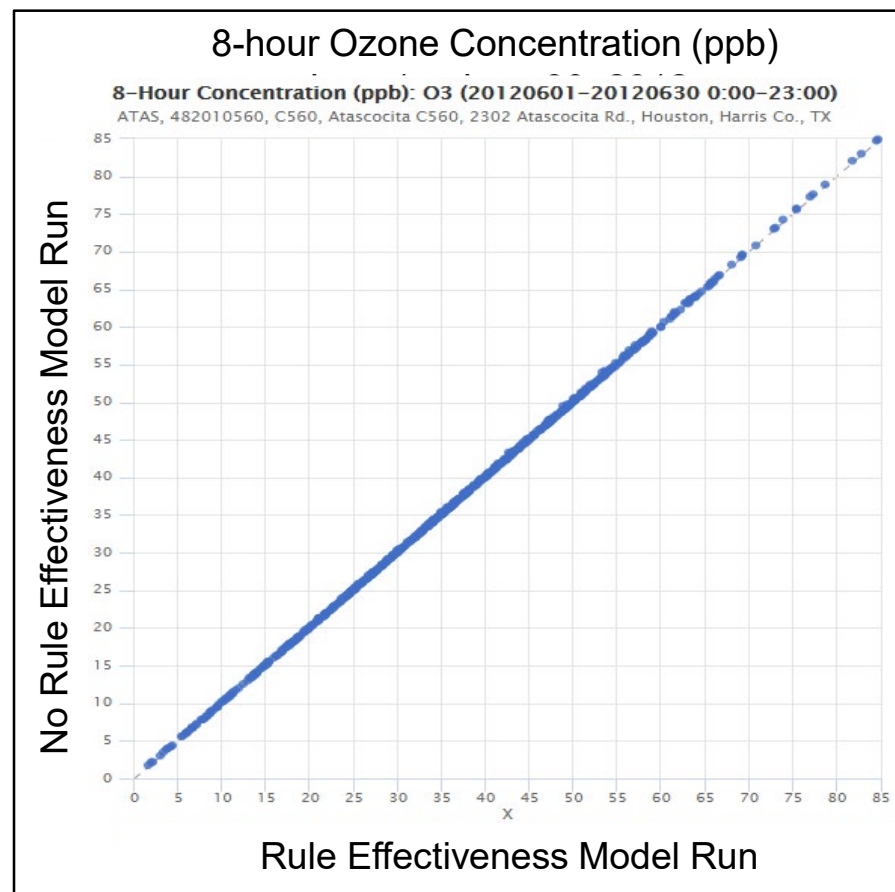
Rounded (Unrounded) in parts per billion

Baseline will not be developed as part of the 2019 MP.



Rule Effectiveness (RE)

- Under RE, non-Electric Generating Unit (EGU) emissions are increased to reflect inefficiencies of new regulatory programs.
- There are no new regulations currently being phased in.
- RE is no longer used by others in the modeling community.
- Test shows that RE has no impact on model performance.



RE will not be used in developing non-EGU emissions for the 2019 MP.



Photochemical Modeling

- Comprehensive Air Quality Model with Extensions (CAMx), version 7.1
- Tasks completed:
 - CAMx v7.1 compiled and ready to go
 - O3MAP program and Tropospheric Ultraviolet and Visible (TUV) processed to be compatible with CAMx v7.1 and CB6r5
- Several test runs for CAMx v7.1:
 - V7.0 vs. v7.1 using CB6r4
 - Binary vs. netcdf EI inputs
 - CB6r4 vs. CB6r5 with CAMx v7.1



Next Steps

- Finish base year emissions inventory (EI) and future year EI
- CAMx runs with appropriate EIs
- EI inputs available to the public in Fall of 2021



Questions?



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