Global Models and Satellite Informed Lateral Boundary Conditions

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EPA

LADCO

GMAO

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Tiger Team Motivation and Goals

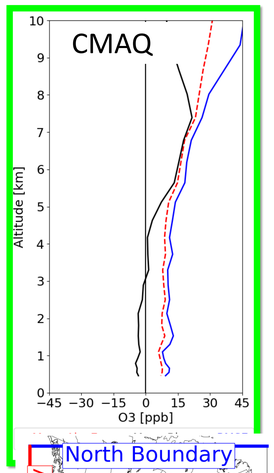
- Emission controls have reduced local US anthropogenic contributions of ozone.
- Natural and international contributions from "lateral boundaries" increase as a fraction.
- Lateral boundaries from global models with satellite constraints have been shown to improve regional model performance (e.g., Pour-Biazar et al, 10.1029/2010JD015200).
- **GOAL**: NASA Health and Air Quality Applied Sciences Team (HAQAST) working to improve access to boundary conditions from multiple global models including satellite data assimilation.

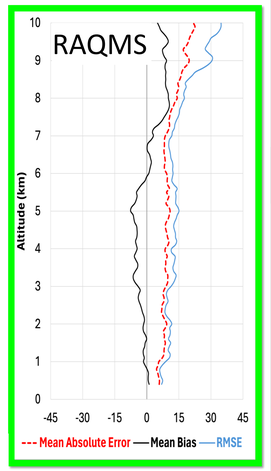
Progress

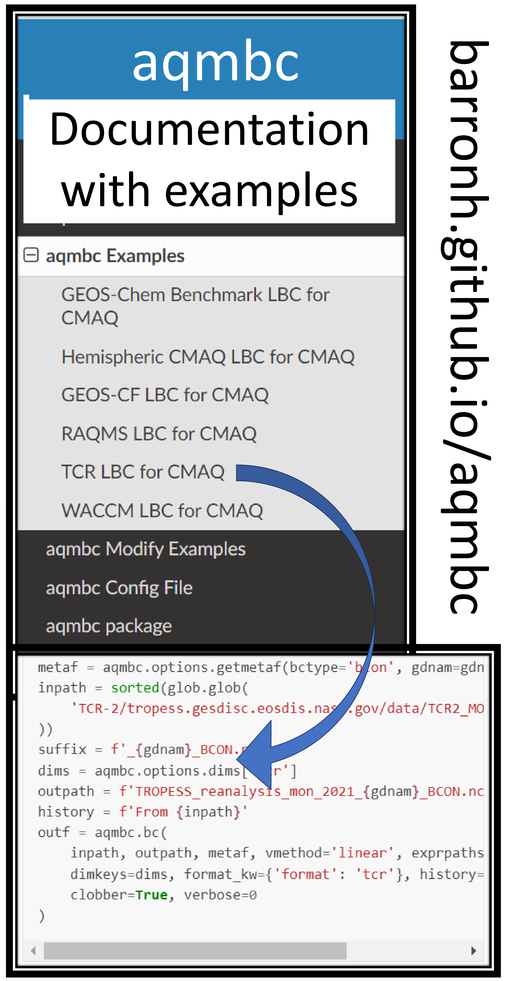
- Identification of a focus: 2022 year, 36US3 domain, and case study June 20 to July 3rd
- Evaluation of GOES-Chem, GOES-CF, Hemispheric CMAQ, and RAQMS to sondes.
- air quality model boundary condition (aqmbc) processor updated to facilitate multiple models.
- aqmbc updated to automate LBC documentation including summary tables and figures.
- LBC processing with aqmbc and comparison of boundary conditions for the case study.
- Case study CAMx simulations to evaluate the value of LBC are ***in progress***
- Availability satellite constraints via assimilation: TCR available, GEOS-*CF soon*

Sonde Evaluation

Examples below for May-Oct at Trinidad Head.
More models/sondes/dates available.



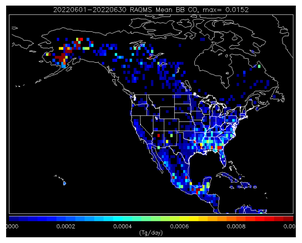


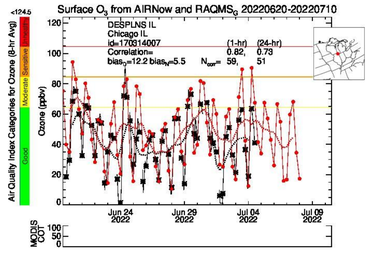


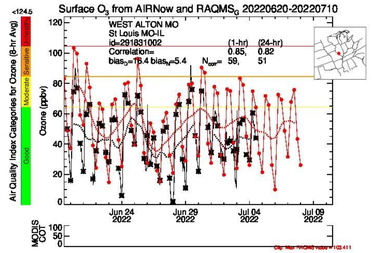
barronh.github.io/aqmbc

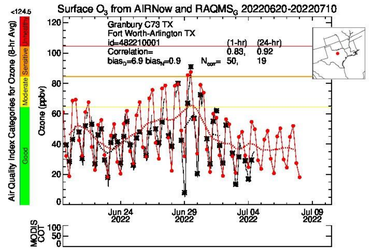
Case Study

June 2022 had wildfires in Alaska (more fires in July, but not clear surface impact). Elevated ozone seen at monitors



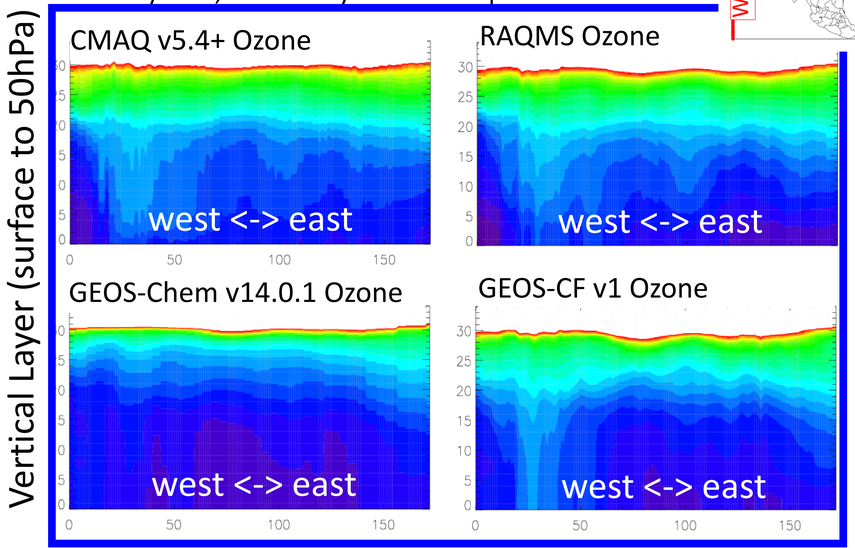






North Boundary Comparison

General consistency, but this GEOS-Chem simulation used monthly fires, which may not have captured the fire well.



West Boundary Comparison

Structure of stratosphere mixing is similar, but the structure and coherence of the downward mixing is quite different.