Progress and status on tasks in NW-AIRQUEST contract

Joe Vaughan

October 3, 2019 NW-AIRQUEST Meeting

Topics:

- Contract overview
- AIRPACT5 operations
- AIRPACT evaluation by Jordan Munson
- Simple Air Quality Model (SAQM) requested by PSCAA
- Kalman Filter PM2.5 Bias Correction
- Emissions Updating
  - SMOKE building

Contract overview:

- AIRPACT5 operation & maintenance…
- Emphasis on developing AI, machine learning approaches!
- Contract funding in place by ~August 1st.

AIRPACT5 Operations

Failed runs Sept 27-29, 2019

- During period of intense frontal passage forecast. (so…?)
- Segmentation fault likely caused by high wind speeds.
- Secondary issue found with BCON from WACCM.

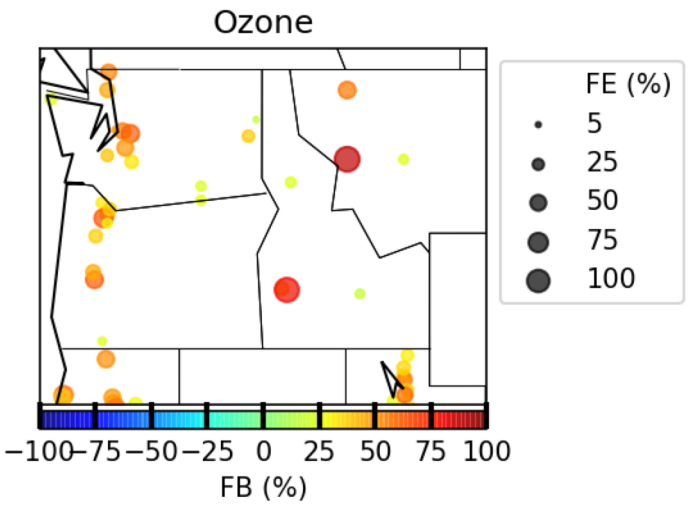
AIRPACT Evaluation by Jordan Munson (Yunha Lee)

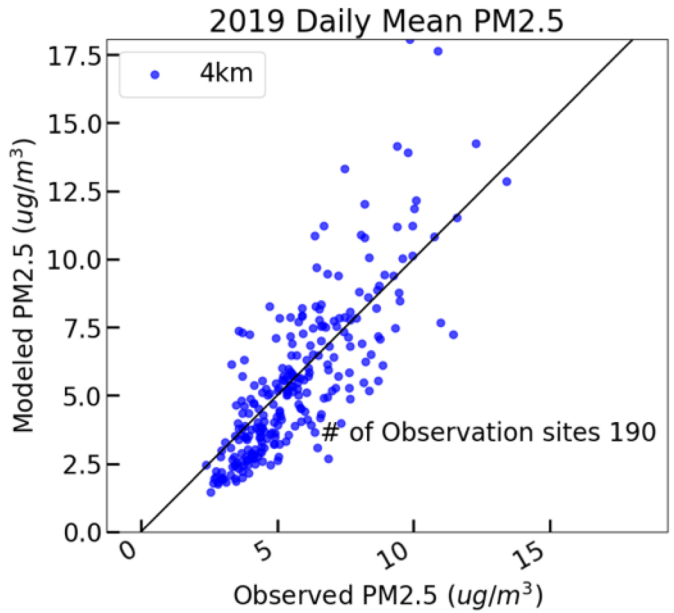
- Procedure available for “automatic evaluation” in future
- Estimating health impact of air quality using BenMAP

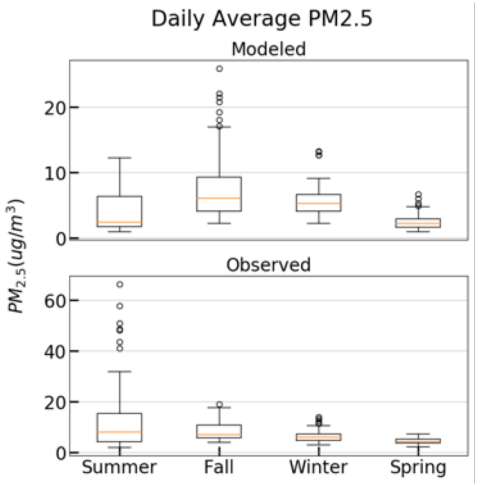
Automatic Evaluation

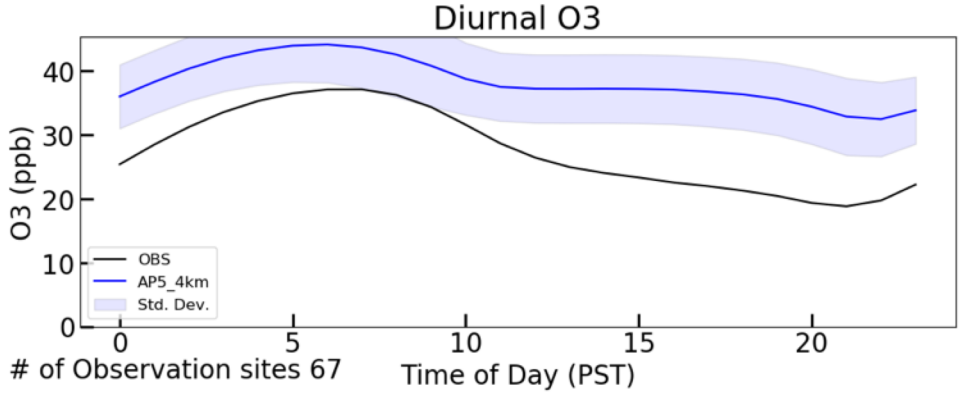
by Jordan Munson

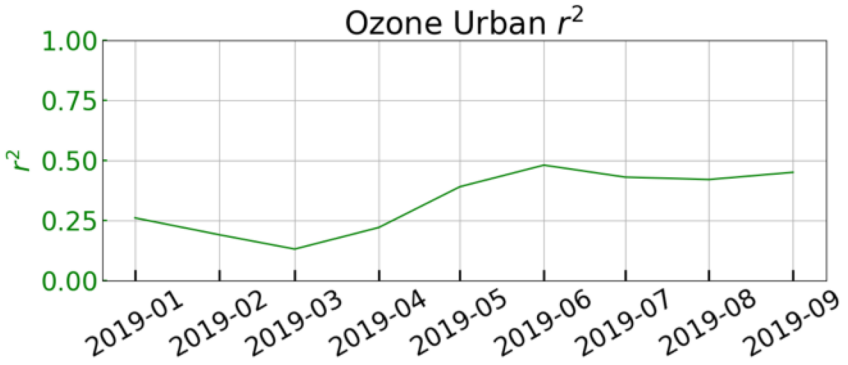
- To run an AIRPACT evaluation
  1. Go to "/data/lar/users/jmunson/automatic_airpact_evaluation"
  2. Open auto_master.py using vi or emacs
  3. Edit the variable "eval_year" with the date range desired
     Currently set to 2019,1,1 to 2019,9,16
  4. Save and exit auto_master.py
  5. Run "qsub qsub_evaluation.sh"
     Job should take less than an hour of run time
- Uses Python in Aeolus
  - Could also be run on a personal computer
- Computes for ozone, $PM_{2.5}$, CO, and NO_x

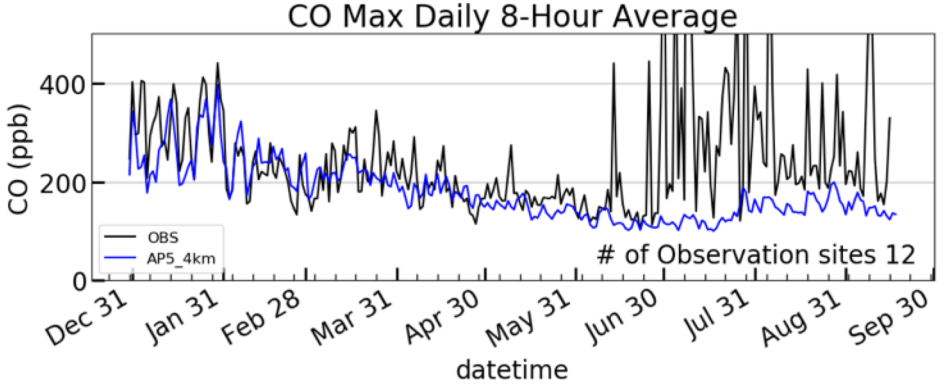








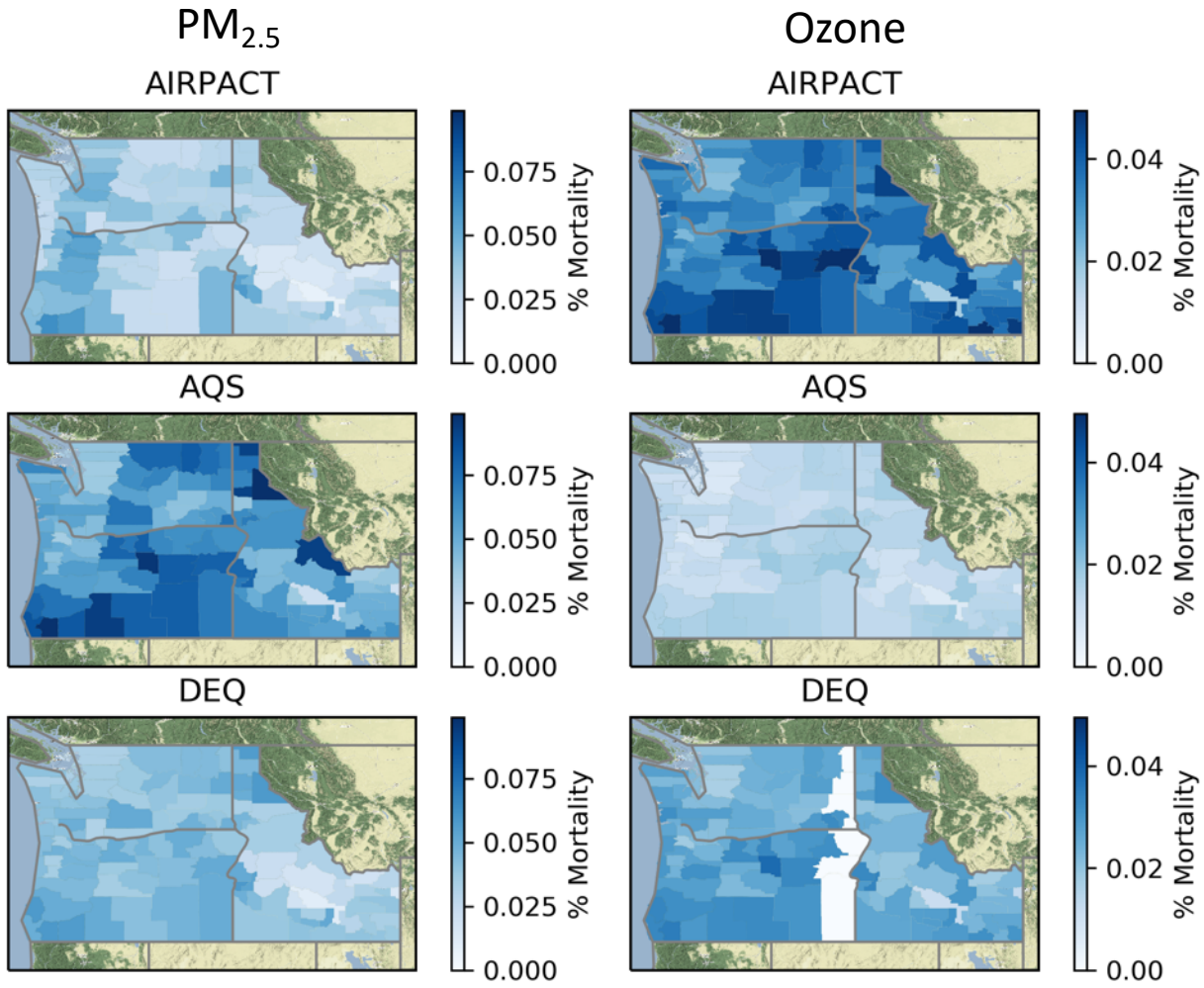




Health Impact of Ambient AQ in the PNW

by Jordan Munson

- BenMAP analysis conducted for 2016-2018
  - Utilizes AIRPACT, AQS, and DEQ datasets
  - Ozone and $PM_{2.5}$
    - Mortality
    - Asthma Exacerbation
    - Emergency Room Visits
    - Work/School loss days
  - 2017 wildfire season had higher mortality than either 2016 or 2018
  - 2017 combined $PM_{2.5}$ and O_3 mortality:
    - AIRPACT – 6,100
    - AQS – 4,800
    - DEQ – 3,600 (DEQ dataset is a 2014-2017 composite of monitor w/ forecast; a single year can not be selected)

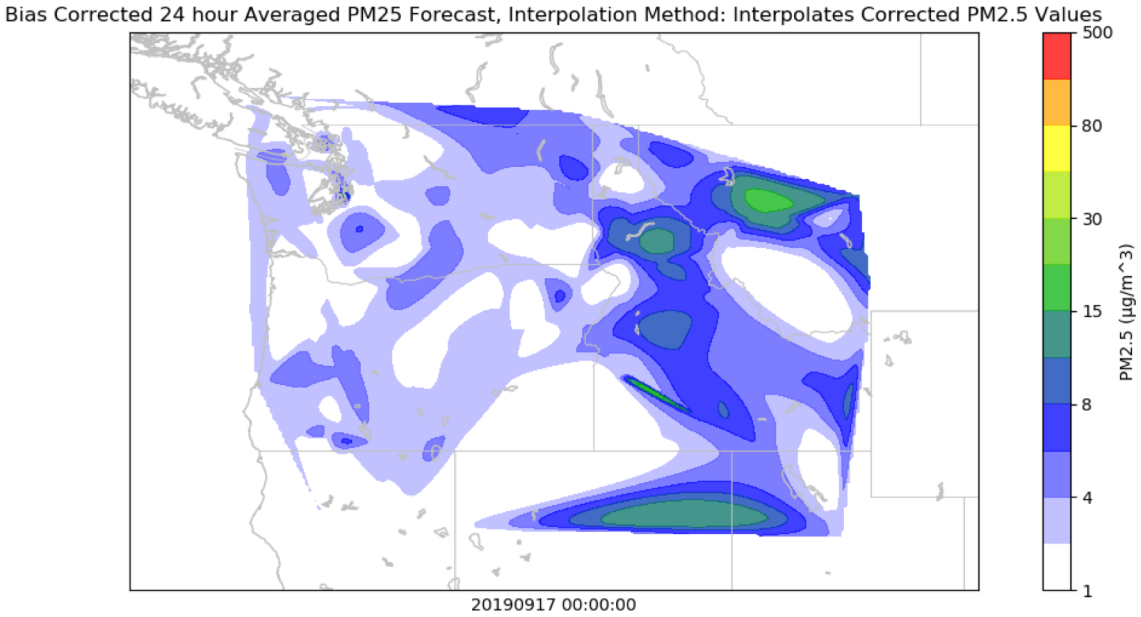


Simple Air Quality Model (SAQM) requested by PSCAA for PM2.5

- Phil Swartzendruber pitched model for getting better PM2.5 for woodstove dominated cities & towns.
- Demonstrated for Tacoma, on which initial demonstration will focus.
- Lauryn Guerrissi (CEE student, summer 2019 Ramboll intern)
  - Lauryn & JKV met with Phil late August.
- PM2.5(t) = Function of: PM2.5(t-1), Wind speed, Emission
- Emission = Function of Temperature
- Lauryn is developing code in Python scripting in a Jupyter notebook.
- No results to share, yet.

Kalman Filter PM2.5 Bias Correction

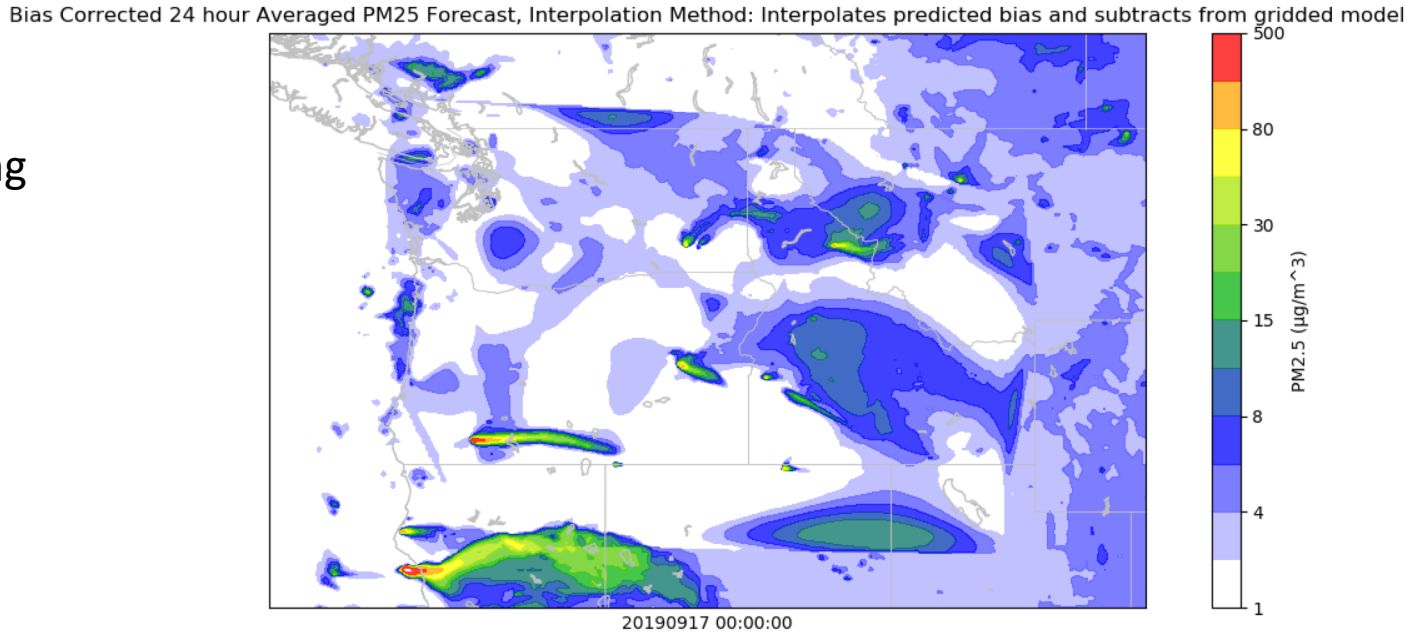
- Nicole June (Penn State Meteorology, LAR 2018 REU)
- Testing script for daily application of KF Bias Correction, to generate bias corrected 24-hr PM2.5 map files (netcdf) and csv files for sites.
- Next step is integration with daily runs.
- Using the csv files from the two approaches to generate statistics on performance, using withheld sites.



Left: Nicole initially experimented with interpolating the bias-corrected model results at monitoring sites.

Right: The intended approach is to interpolating the bias from monitoring sites throughout the domain before applying to the model results.

But, we're looking at performance of *both* over months of 2017 & 2018.



Emissions Update Effort

- SMOKEv4.5 build…
  - Make is in process after M3-IOAPI and netCDF rebuilds.

- And, if time permits… The current Aeolus context
  - Staffing…
  - Migration to newer CENTOS version..
  - Aeolus relationship to CIRC (center for inst. res. comp.) & Kamiak
  - WSU funding commitment?

The End

Comments?