

NW-AIRQUEST PROJECT STATUS REPORT

NW-AIRQUEST MEETING OF FEBRUARY 6, 2020

JOE VAUGHAN FOR LAR/CEE/VCEA/WSU

BUDGET STATUS

Budget as of 02/03/2020 (effectively a biennial budget)

Category	Object	Allocation	Expense	Encumbrance	Balance	Alloc Spent
Salaries	00	122,343.00	68,951.50	26,227.53	27,163.97	77.80 %
Wages	01	2,251.00	3,600.00	0.00	-1,349.00	159.93 %
Consumable Goods And Services	03	18,700.00	12,355.70	0.00	6,344.30	66.07 %
Travel	04	6,157.00	7,339.99	0.00	-1,182.99	119.21 %
Equipment - Capitalized	06	40,000.00	30,190.24	0.00	9,809.76	75.48 %
Employer Contributions	07	46,335.00	28,591.01	9,037.20	8,706.79	81.21 %
Facilities & Administrative Cost	13	23,214.00	13,323.30	9,890.70	0.00	100.00 %
Account Totals:		259,000.00	164,351.74	45,155.43	49,492.83	80.89 %

~ \$2500 in charges expected for web support from Univ. of Idaho.

META TASKS

Staffing of AQ Modeling by Personnel at LAR

- Brian K Lamb, Professor, Emeritus ...
- Yunha Lee, Assistant Professor working half-time remotely...
- Mahshid Etesamifard (PhD student)
- Jordan Munson (MS graduate, departed, employed)
- Ana Fernandez (PhD student)
- Kai Fan (PhD student)
- Amit Sharma, Postdoc April 2019 – April 2020.
- Joe Vaughan, 60% of a Research Associate Prof.

META TASKS

Cluster upgrades	<p>Aeolus cluster is being updated (PGI license, update for Centos, ...)</p> <p>Aeolus remains, after much hand-wringing, a VCEA HPC resource!</p> <p>Support remains a challenging college issue.</p>

ONGOING TASKS

Task	Status January 2020	
I. Provide daily forecasts of air quality for the three state region that can be used in daily AQ management.	DAY-ONE runs for July thru December 2019: for for 185 days, six were missed and four were late for success rate of 96% . DAY-TWO runs ... a tale of three bugs...but for success rate of 94% .	

ONGOING TASKS

Task	Status January 2020	
<p>2. Provide near real-time verification statistics of the current AIRPACT system accuracy by pollutant, by month, and Provide for user access to AIRPACT results and monitoring data for user-defined periods for download & analysis.</p>	<p>Statistics maintained.</p> <p>Current data requests:</p> <p>Olivia Sanderfoot (UW) for Bird vocalization research,</p> <p>Kim Serry (UW) for Human health research.</p>	

ONGOING TASKS

Task	Status January 2020	
<p>3. Track and continue to improve model performance so that model predictions provide useful guidance for air quality forecasting.</p>	<p>Ongoing concern.</p>	

ONGOING TASKS

Task	Status January 2020	
4. Maintain ambient air monitoring data streams from AIRNow.	Ongoing.	
5. Maintain satellite retrievals.	Ongoing.	
6. Continue improvements and requested additions to web graphical display.	No new graphics requests.	

ONGOING TASKS

Task	Status January 2020	
7. Maintain the “Change Log”, posted on the AIRPACT website.	Ongoing.	
8. Archive daily model output of the first 24 hours... Web-based graphical displays for each day’s first 24 hours of forecast should be available for the most recent 5 years & gridded files for at least one month.	Ongoing. Forecast graphics available beginning December 2015.	

ONGOING TASKS

Task	Status January 2020	
9. Modify AIRPACT as needed to respond to changes in fire emissions produced by other organizations.	Waiting for USDA/FS new Fire Info System.	
10. Continue hosting the link to the latest background concentration lookup tool.	Hosted at http://lar.wsu.edu/nw-airquest/lookup.html	

TASKS CARRIED FORWARD TO 2019-2020

SFY 2019 Task		Comments
Incorporate dust-suppression module for rainy days (AFDUST)		Instead addressed by FHT: <ul style="list-style-type: none">• Splitting Eastside from Westside• Leaving Westside dust off.• Toggling Eastside dust ON/OFF by precipitation seasons, ~ July 1 and October 15.

TASKS CARRIED FORWARD TO 2019-2020

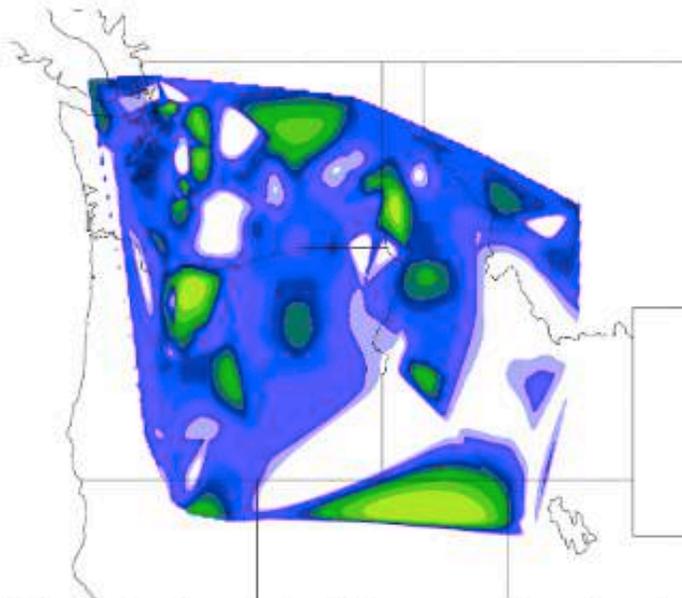
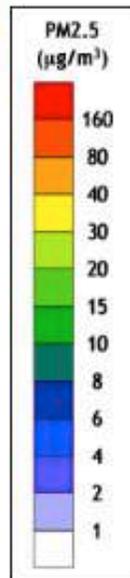
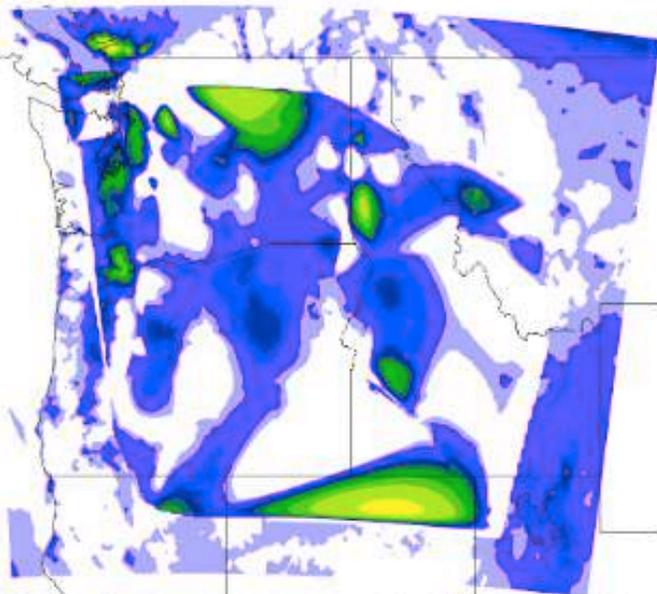
SFY 2019 Task	Comments
Incorporate new emission inventory (MOVES, Canada, etc) (MOVES update from Idaho...)	FHT has updated emissions and run through CMAQ. SMOKEv4.5 has been built, tested, and tested for AIRPACT5 by FHT.

TASKS CARRIED FORWARD TO 2019-2020

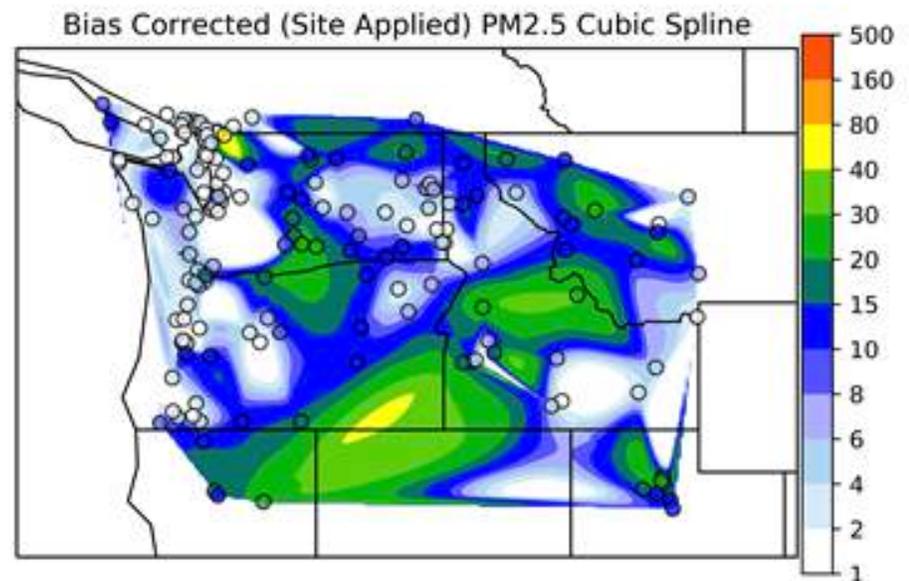
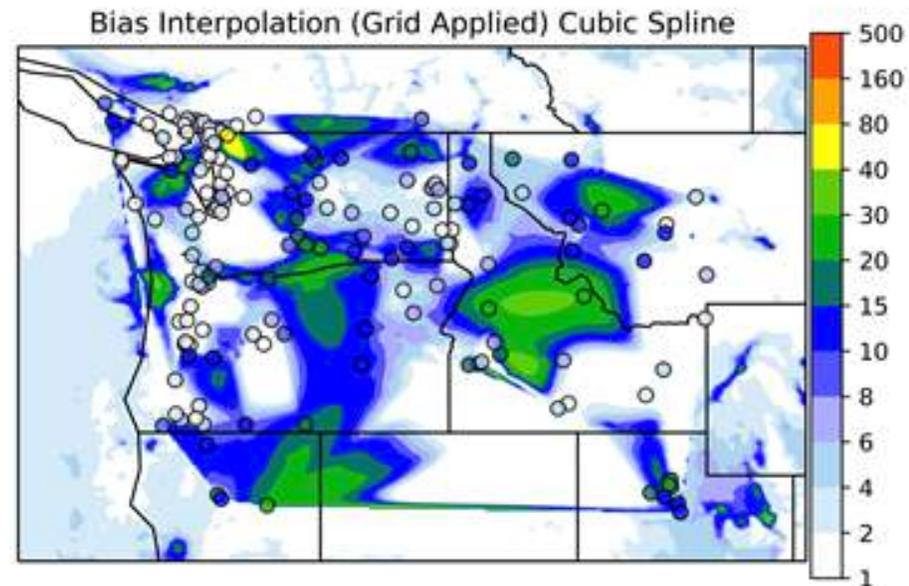
SFY 2019 Task	Comments
Develop PM2.5 bias correction scheme. Possibly apply a Bayesian-Kriging approach?	Nicole June (Penn State, Meteorology) continues work with Vaughan & Lamb on a Kalman Filter bias correction scheme and interpolation throughout domain. Bayesian-Kriging has yet to be tried.

KALMAN FILTER BIAS CORRECTION -- A WORK IN PROGRESS...

Daily 24-hr average PM2.5
02/03/2020

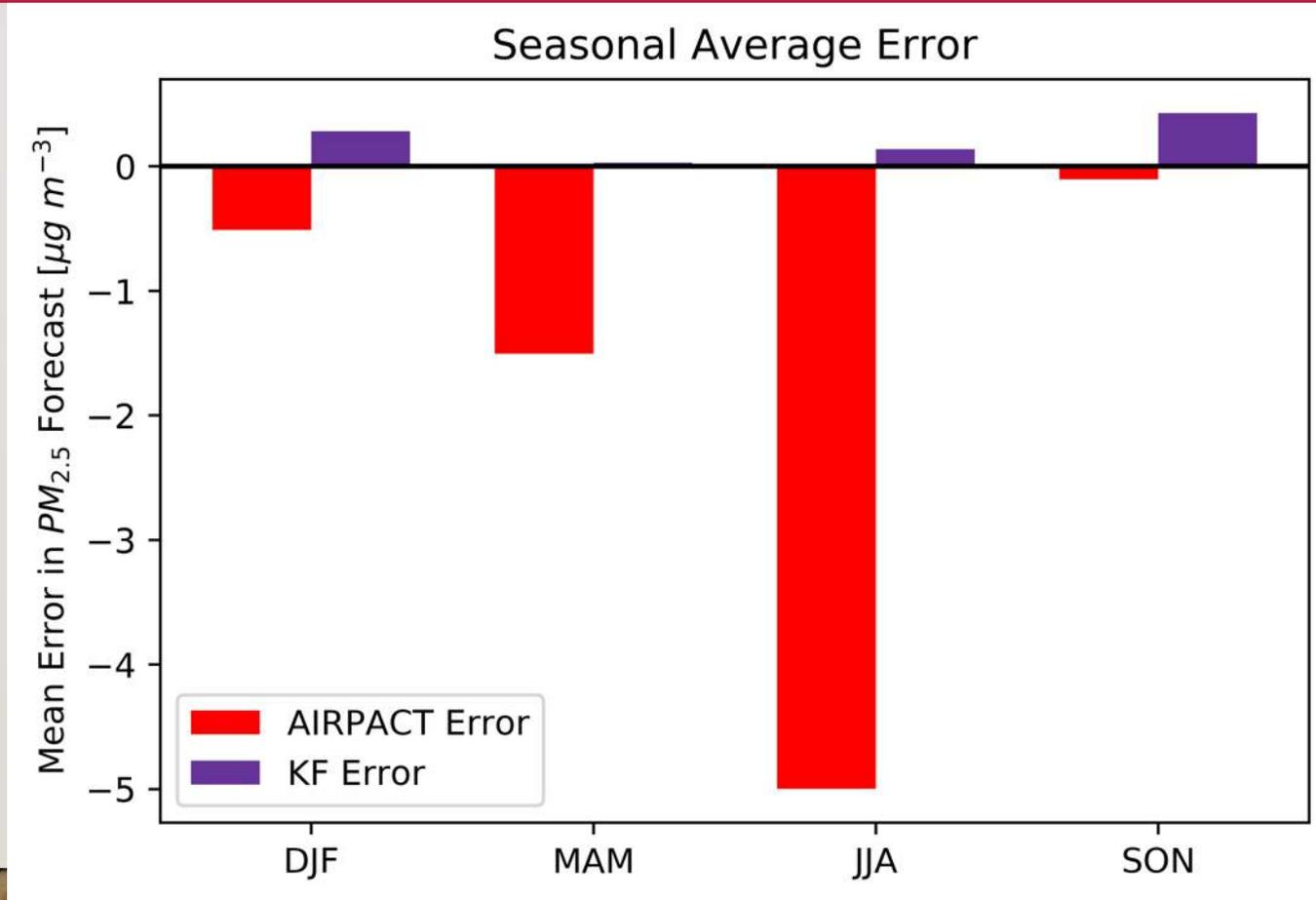


Calculated as Interpolated Bias-corrected monitor-site forecast values

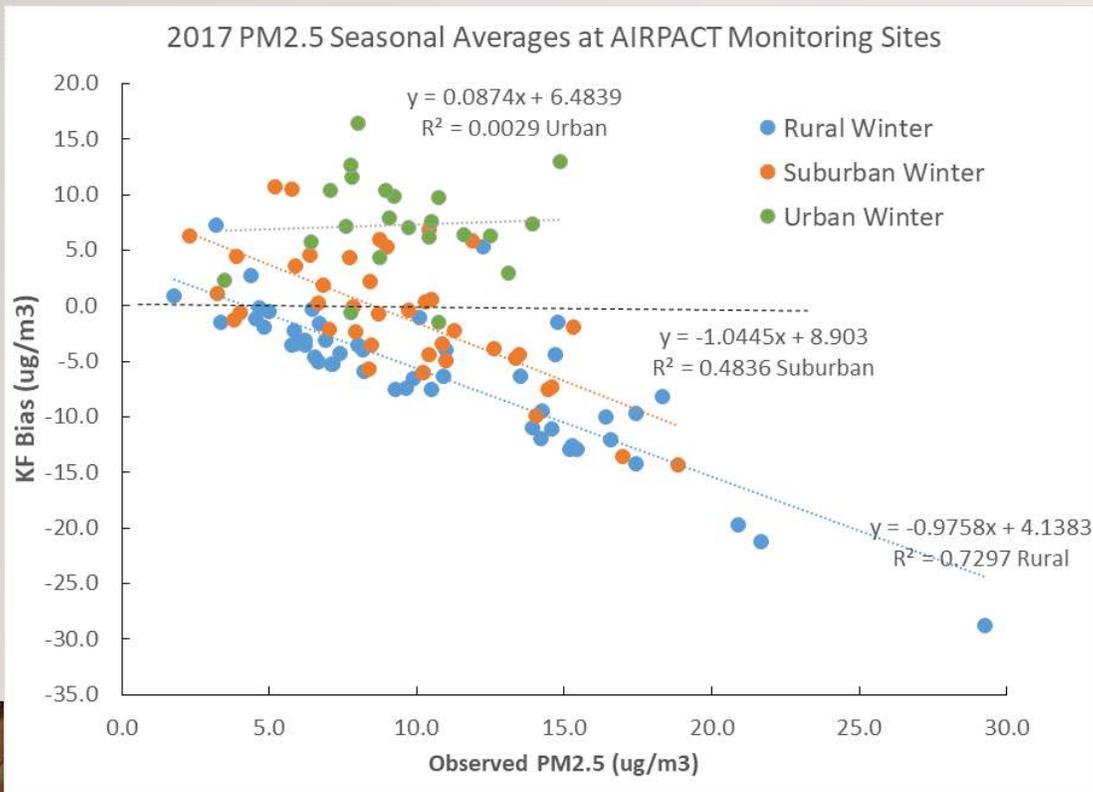
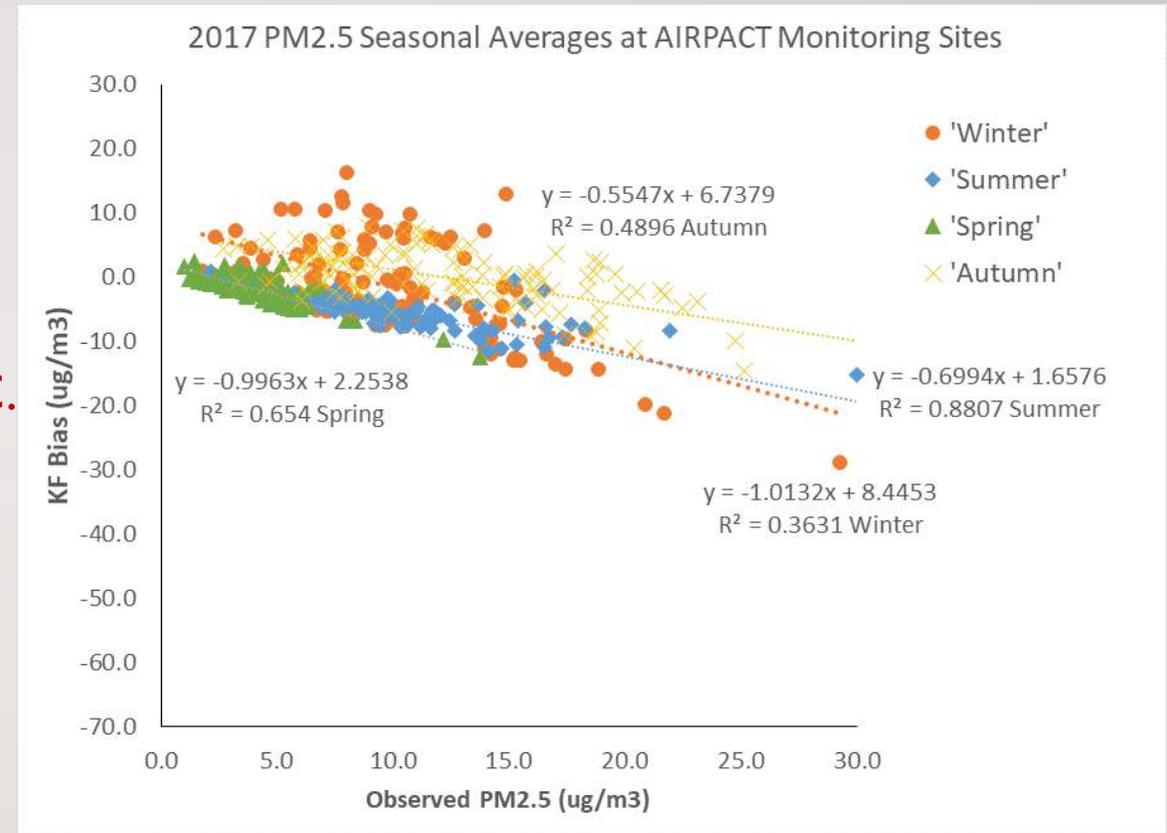


http://lar.wsu.edu/airpact/bias_corr.php#

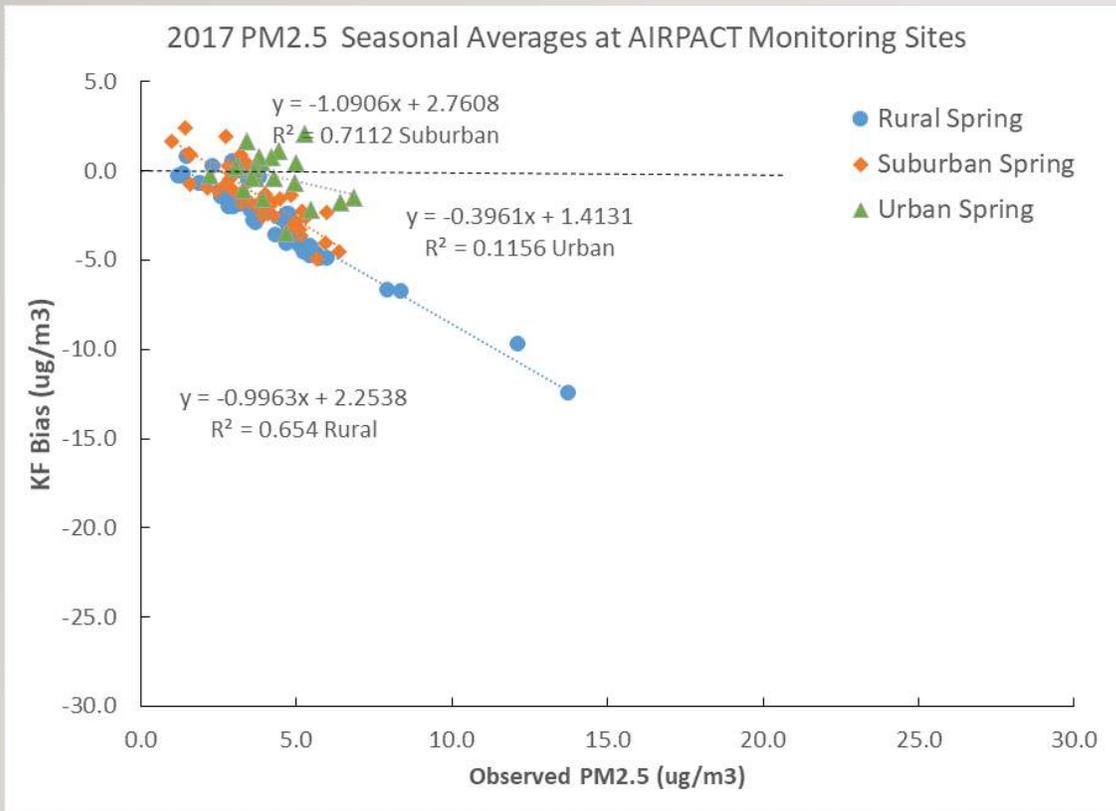
KF BIAS CORRECTION SEASONAL ERROR, 2017-2019



Comparison of seasonal model biases at all (undifferentiated) sites show biases for Winter and Autumn have much greater variability, and are more frequently positive (overestimates), compared to biases for Spring and Summer, which tend to be negative, and less variable. Winter biases likely reflect too much RWC.

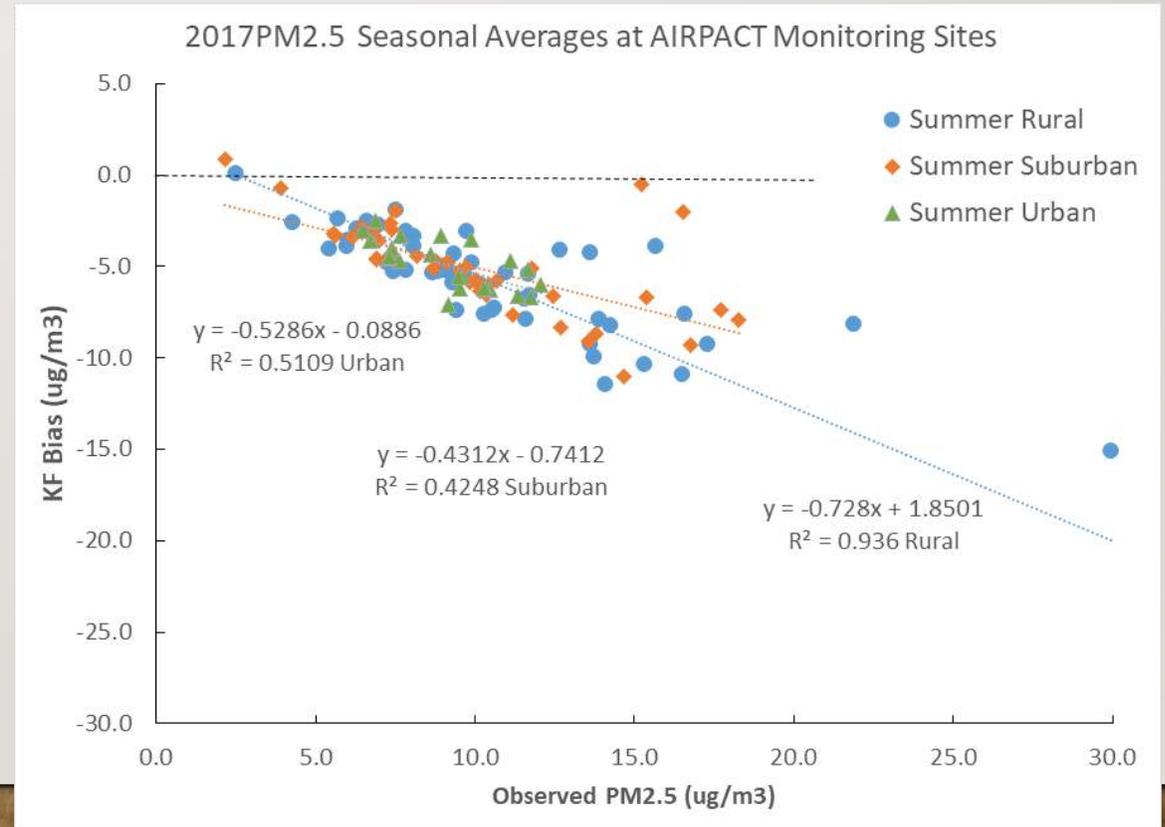


← Comparison of Winter model biases by site types shows Urban areas biases variable but relatively independent of magnitude of observations; Rural and Suburban site biases show a strong negative dependence on observations, likely reflecting RWC effects.



← Larger negative biases for rural sites in Spring suggests the model may be missing prescribed forest/field/orchard burning.

Large negative Summer biases for all site types suggests model is missing (underestimating) large magnitude regional events, i.e. wildfires. →



TASKS CARRIED FORWARD TO 2019-2020

SFY 2019 Task	Comments
Hosting wood smoke PM forecast models from formulas shared by the state and local agencies	<p>PSCAA provided framework in April, 2019, for Simple Air Quality Model (SAQM) for RWC season PM2.5 in Tacoma.</p> <p>Lauryn Guerrissi (CEE student) will have results soon...</p>

TASKS CARRIED FORWARD TO 2019-2020

SFY 2019 Task	Comments
<p>Convert to SMOKE 4.5, CMAQ 5.2 with in-line photolysis and include latest MCIP</p>	<p>SMOKE4.5 has been built and tested. ..</p> <p>CMAQv5.2 is in use now in the PORTS project.</p> <p>MCIPv5.0 is released with CMAQv5.3</p> <p>MEGANv3 requires modification for parallelization following MEGAN 2 example.</p>

TASKS CARRIED FORWARD TO 2019-2020

SFY 2019 Task	Comments
Use the WRF-Chem system on the WSU Kamiak cluster to demonstrate WRF-Chem capabilities.	Ana Fernandez and Yunha Lee: Currently the focus is on a nested version for Spokane.

NEW 2020 TASKS

SFY 2019 Task	Comments
Develop standard annual evaluation report using the AIRNow/web generated statistics along with one or two episode case studies (perhaps). Do this every year (except 2020), but keep it simple and concise.	Defer until 2021. Jordan created automated scripts for rerunning an annual analysis.

NEW 2020 TASKS

SFY 2019 Task	Comments
Test machine learning methods in the AIRPACT domain for PM and ozone	Kai Fan has a report n this.

NEW 2020 TASKS

SFY 2019 Task	Comments
<p>Incorporate machine learning methods into AIRPACT forecast for bias correction.</p>	<p>Kalman Filter Bias Correction being tested for PM2.5 and draft results written to the webpages: http://lar.wsu.edu/airpact/bias_corr.php# Conversion for ozone could follow.</p>

Expect to see more from these efforts at
the June 2020 NW-AIRQUEST meeting,

Thank you!