NW-AIRQUEST PROJECT STATUS REPORT

NW-AIRQUEST MEETING OF FEBRUARY 7, 2019

JOE VAUGHAN FOR LAR/CEE/VCEA/WSU

BUDGET STATUS

Budget as of 1/16/2019

Category	Allocation	Expense	Encumbrance	Balance	Alloc Spent
Salaries	61,909.00	18,423.15	2,229.00	41,256.85	33.36 %
Wages	8,700.00	3,315.45	0.00	5,384.55	38.11 %
Consumable Goods And Services	2,920.00	429.01	0.00	2,490.99	14.69 %
	30,000.00	0.00	0.00	30,000.00	0.00 %
Travel	25,114.00	8,979.01	1,203.66	14,931.33	40.55 %
Employer Contributions	10,357.00	3,229.38	7,127.62	0.00	100.00 %
Account Totals:	139,000.00	34,376.00	10,560.28	94,063.72	32.33 %

META TASKS

Staffing of AQ Modeling Personnel at LAR	• Brian K Lamb, Professor, is retiring…
	• Yunha Lee, Assistant Professor …
	• Mahshid Etesamifard (PhD student)
	• Jordan Munson (MS student)
	• Ana Fernandez (PhD student)
	• Kai Fan (PhD student)
	• New Postdoc to start April 2019
	• Joe Vaughan, 75% of a Research Associate Prof.

META TASKS

Cluster upgrades	Cluster improvements (for PGI, for Centos and new nodes) await an administratively flexible cost recovery center being set up. Approval is expected (hoped for) soon.

TASKS CARRIED FORWARD TO 2018-2019

SFY 2019 Task	Status January 2019	Comments
Annual AIRPACT evaluation	Well along. Jordan Munson is debugging and refining his analysis and drafting a paper covering AIRPACT-3, -4, & 5.	Jordan is conducting multi-year evaluation, in the process creating automated procedures, designed for rerunning for updates. Annual runs are intended to provide an appendix to annual state of the model reports.

TASKS CARRIED FORWARD TO 2018-2019

SFY 2019 Task	Status January 2019	Comments
Assess feasibility of employing bidirectional NH3 scheme.	Waiting on EPA input files	Donna Schwede (EPA) says that EPIC has been updated & /debugged. EPA is now ready to assist LAR in getting the outputs from EPIC that we needed for bi-dir NH3 in CMAQ.

TASKS CARRIED FORWARD TO 2018-2019

SFY 2019 Task	Status January 2019	Comments
Incorporate dust-suppression module for rainy days (AFDUST)	Pending task	Likely task for new Postdoc.

TASKS CARRIED FORWARD TO 2018-2019

SFY 2019 Task	Status January 2019	Comments
Get BCON from the NCAR Whole Atmosphere Community Climate Model (WACCM).	Implemented WACCM BCON for AIRPACT5 effective 11/1/18	

TASKS CARRIED FORWARD TO 2018-2019

SFY 2019 Task	Status January 2019	Comments
Incorporate new emission inventory (MOVES, Canada, etc) (MOVES update from Idaho…)	MOVES update files from IDEQ (Wei Zhang) have been acquired.	Spring, 2019

TASKS CARRIED FORWARD TO 2018-2019

SFY 2019 Task	Status January 2019	Comments
Develop PM2.5 bias correction scheme.	Active task	Nicole June (LAR Summer 2018 REU student from Penn State Meteorology) is working on a Kalman Filter bias correction scheme and interpolation throughout domain. Work continues through Spring Semester 2019.

SFY 2019 NEW TASKS

SFY 2019 Task	Comments
Develop standard annual evaluation report using the AIRNOW/web generated stats along with one or two episode case studies (perhaps). Do this every year, but keep it simple and concise.	Next annual report, June, 2019. Base will be generated using Jordan Munson's codes, discussed above.

SFY 2019 NEW TASKS

SFY 2019 Task		Comments
Conversion to SMOKE 4.5, CMAQ 5.2 and include latest MCIP (and new PGI license, CENTOS update to v7)). MEGAN v3		Upgrades planned for Spring 2019.

Testing of CMAQv2.5 is happening now in PORTS project.

SMOKE4.5 still to be built at LAR.

MEGANv3 requires modification for parallelization following MEGAN 2 example. |

SFY 2019 NEW TASKS

SFY 2019 Task	Comments
Implement IDEQ wildfire plume rise, emission updates, and in-line photolysis and compare to current/recent runs	IDEQ plume rise is in place now. In-line photolysis is being tested with CMAQv5.2. in the Boise project by Mahshid.

SFY 2019 NEW TASKS

SFY 2019 Task		Comments
Use the WRF-Chem system on the WSU Kamiak cluster (initiated with an Ecology contract) to demonstrate WRF-Chem capabilities. Operation in a forecast mode will be decided at a later time. More resources will be required to run this at the same level as the current AIRPACT.		Ana is making progress on WRF-Urban, applied to Spokane w/ 500m grid-spacing, and is working on some initial evaluations. Ana intends to try running WRF-Urban within WRF-Chem. The WRF-Chem demo uses a regional domain, and we hope to nest the Spokane Urbanova domain within it.

~88% OF DAY1 RUNS COMPLETED BY 6 AM

Month	Days	Late/missing	Comments on delay and causes
July 2018	31	5 days/ 0 days	Late WRF-MCIP operation on 1 day. Failed to get US fire data one day. One day run late due to conflict over airpact5 resource reservation.
Aug. 2018	31	4/0	Late WRF-MCIP operation on 3 days; one day ~12h late. Failed to get US fire data one day, also with MOVES emissions failure.
Sept. 2018	30	4/0	Late WRF-MCIP operation on 3 days; one ~8h and one ~12h. WRF problems followed system chances at UW. Failed to get CAN fire data one day.
Oct. 2018	31	4/1	Late WRF-MCIP operation on 6 days; 3 days ~3h late.
Nov.2018	30	6/1	Late WRF-MCIP operation on 4 days; one ~4h and one ~3h.
Dec. 2018	31	1/0	Late WRF-MCIP operation on 2 days; 16h late on 1 day.
Jan. 2019	31	1/0	Late WRF-MCIP operation on 0 days.
Totals:	215	25 / 2	On time: 88 %

~95% OF DAY2 RUNS COMPLETED BY 6 HOURS AFTER DAY1 COMPLETED (OR BY NOON)

Month	Days	Late/missing	Comments on delay and causes
July 2018	31	4 days/ 3 days	
Aug. 2018	31	1/0	Late WRF-MCIP operation on 3 days; one day ~12h late. Failed to get US fire data one day, also with MOVES emissions failure.
Sept. 2018	30	1/1	Late WRF-MCIP operation on 3 days; one ~8h and one ~12h. WRF problems followed system chances at UW. Failed to get CAN fire data one day.
Oct. 2018	31	0/0	Late WRF-MCIP operation on 6 days; 3 days ~3h late.
Nov.2018	30	3/0	Late WRF-MCIP operation on 4 days; one ~4h and one ~3h.
Dec. 2018	31	0/1	Late WRF-MCIP operation on 2 days; 16h late on 1 day.
Jan. 2019	31	1/0	Late WRF-MCIP operation on 0 days.
Totals:	215	10 / 5	On time: 95 %

HIGHLIGHTS

- Mahshid's Boise Study, using Dan Jaffe's data, is testing IDEQ plume rise and in-line photolysis for ozone forecasts.
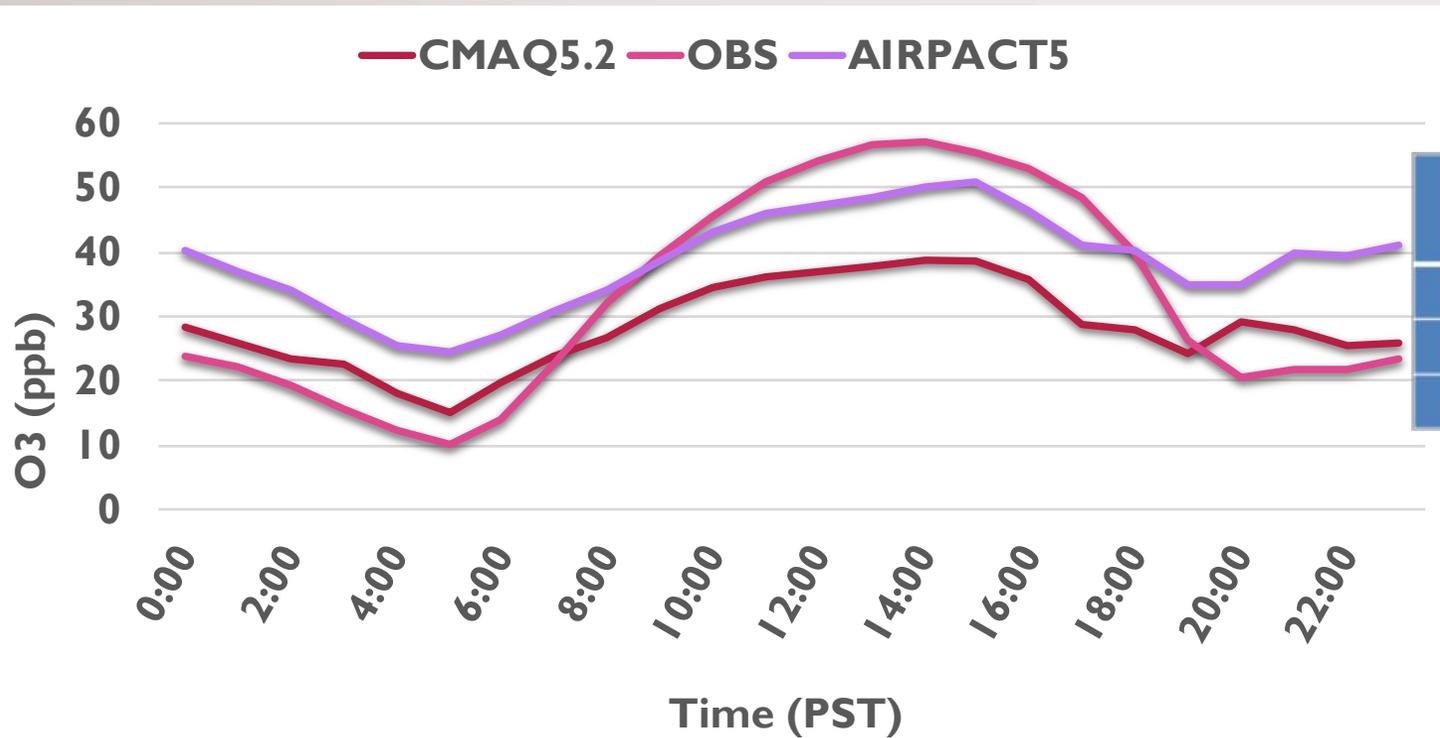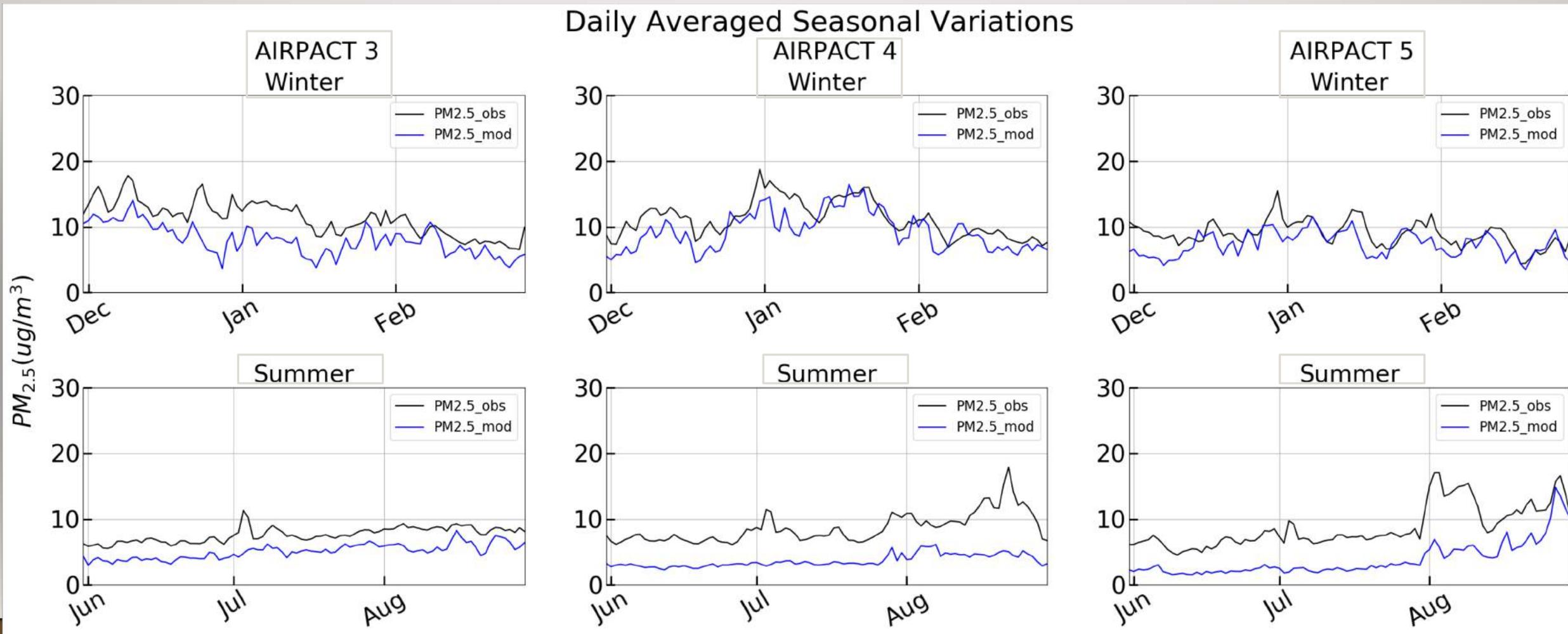

	AIRPACT5 w/ CMAQ5.0.2	AIRPACT5 w/ CMAQ5.2
NMB	17.68	-13.20
NME	29.93	27.87
R^2	0.80	0.85

HIGHLIGHT: Jordan's analysis covering AIRPACT-3, -4, & 5

	AIRPACT-3	AIRPACT-4	AIRPACT-5
RECORDED FORECAST	2007- Dec 2012	Jan 2013 – Dec 2015	Jan 2016 - Current
GRID CELLS	12-km	4-km	4-km
VERTICAL LAYERS	21	21	37
MCIP	v3.3	v3.6	v3.6
SMOKE	v2.1	v2.7, v3.5	v3.5.1
METEOROLOGY	MM5 3.7.3 April 2008, WRF v3.1.1	WRF v3.4.1, v3.5	WRF v3.6.1, v3.7.1
CMAQ	v4.6	v4.7.1	v5.0.2
MASS ADJUSTMENT	denrate	yamo	yamo
GAS-PHASE MECHANISM	SAPRC99	SAPRC99	CB05
NON-MOBILE ANTHROPOGENIC EMISSIONS	2005 from Ecology, IDEQ, ODEQ	2007-2008 from Ecology, IDEQ, ODEQ	2014
MOBILE EMISSIONS	MOBILE6	MOBILE6, MOVES	MOVES 2010b
FIRE EMISSIONS	BlueSky	SMARTFirev1/BlueSky SMARTFire v2, BlueSky 3.5.1 (2014 and later)	SMARTFire v2, BlueSky 3.5.1

SEASONAL CHANGES

Daily Averaged Seasonal Variations

HIGHLIGHTS

- Ana Fernandez is Modeling Urbanova domain with WRF-Urban

WRF-URBAN FOR SPOKANE AREA

- Domain= 320 x 127 grid cells w/ Grid spacing = 500 m

- Chemistry turned off

- Built Environment Parameterization: BEP

- Landuse

  - 10 Urban Classes of WUDPAT data (created by Alex Schmies)

  - Combined with MODIFIED_IGBP_MODIS_NOAH.

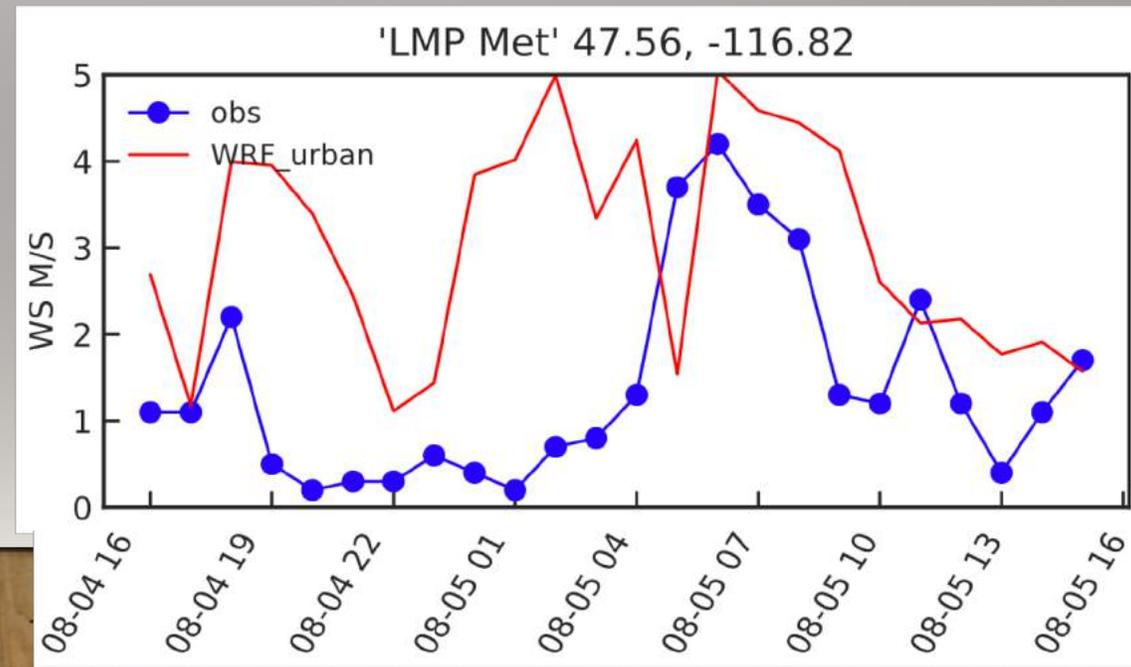 - Totals to 40 landuse classes.
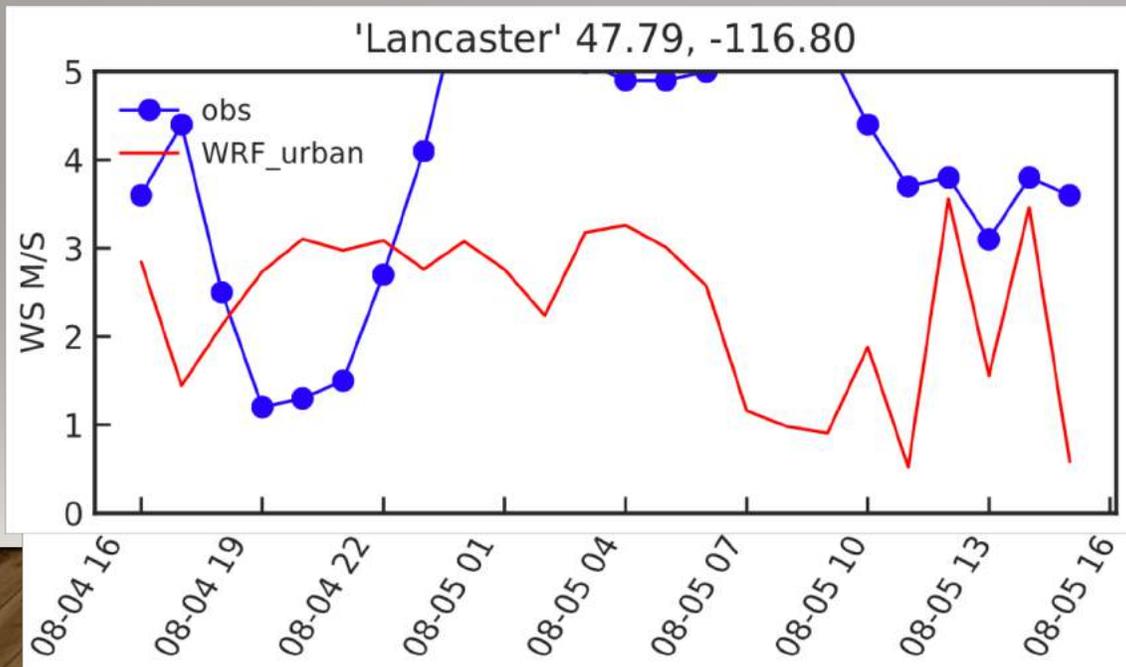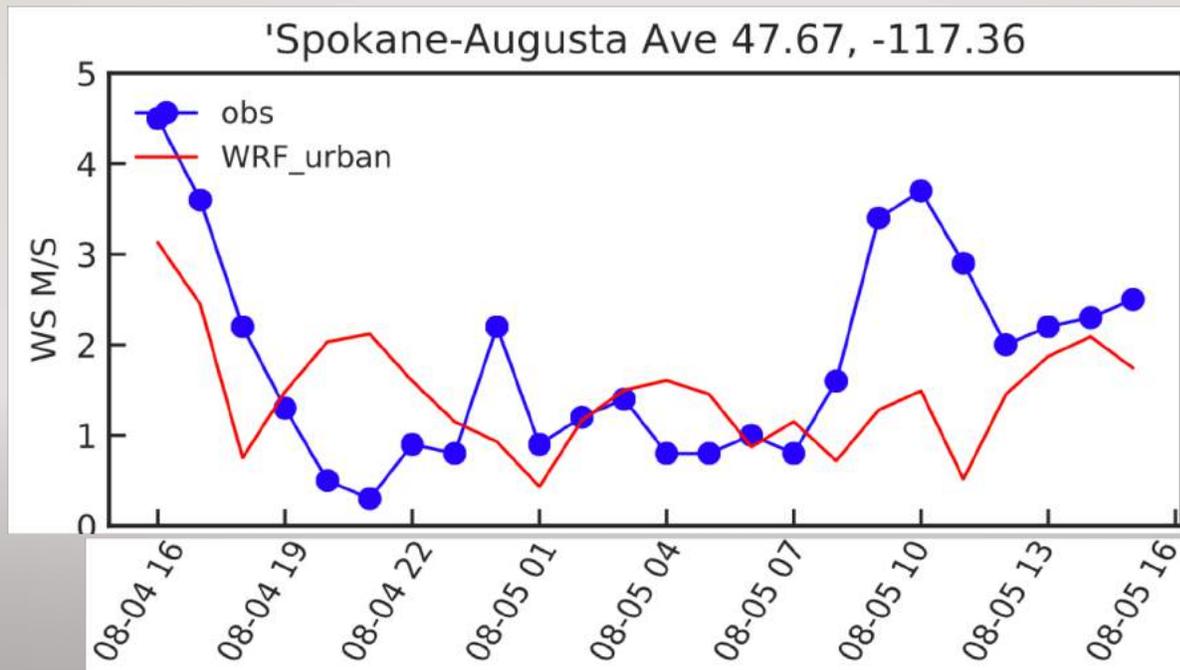
- 1 day simulation run

  - 1 h 20 min on 80 processors

HIGHLIGHTS

- WRF-Urban Landuse
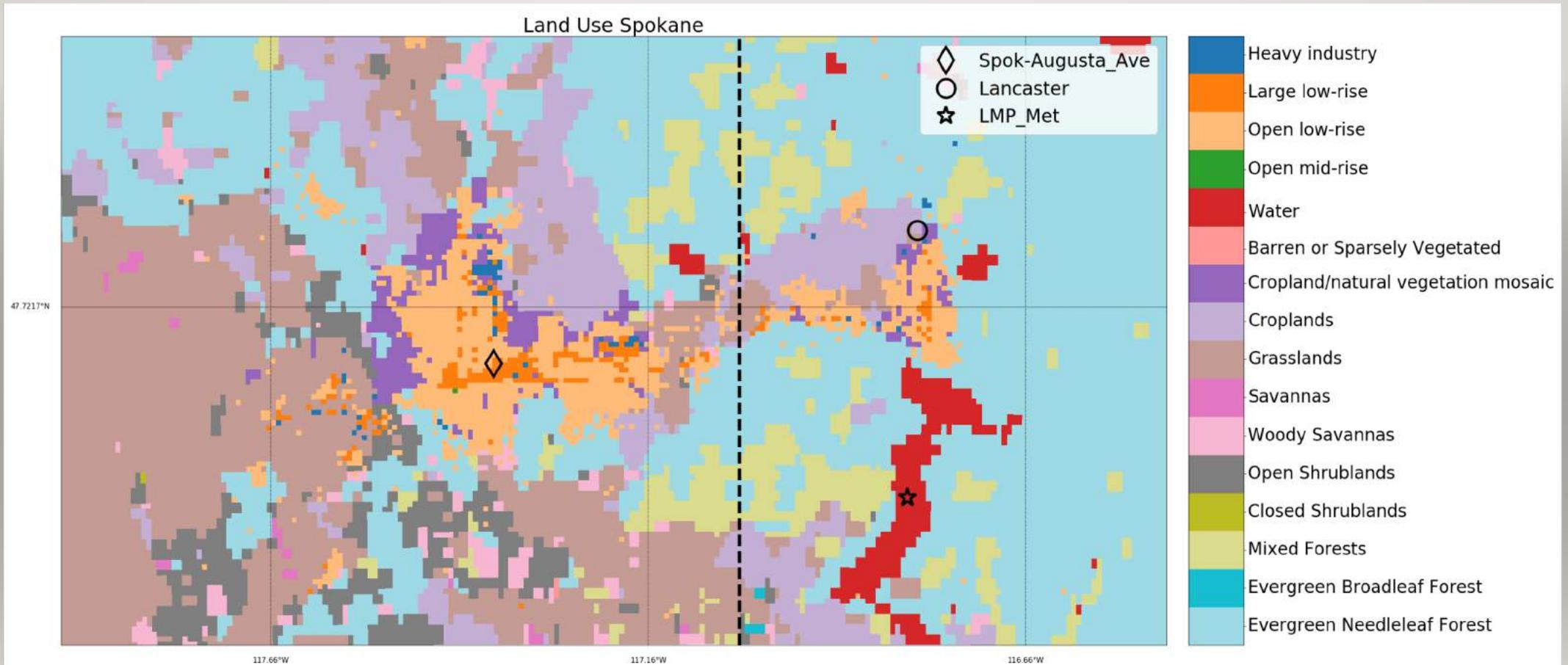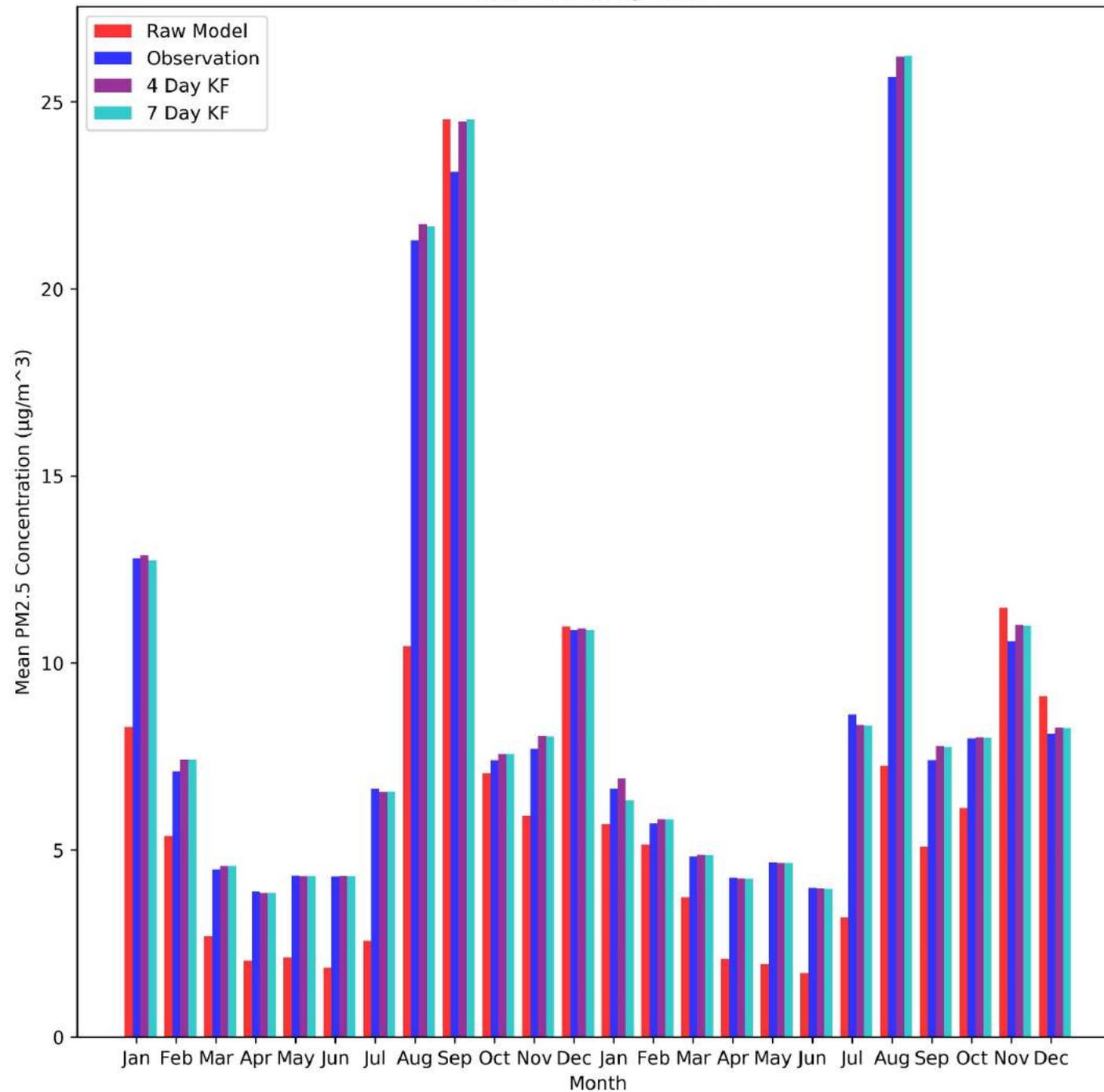
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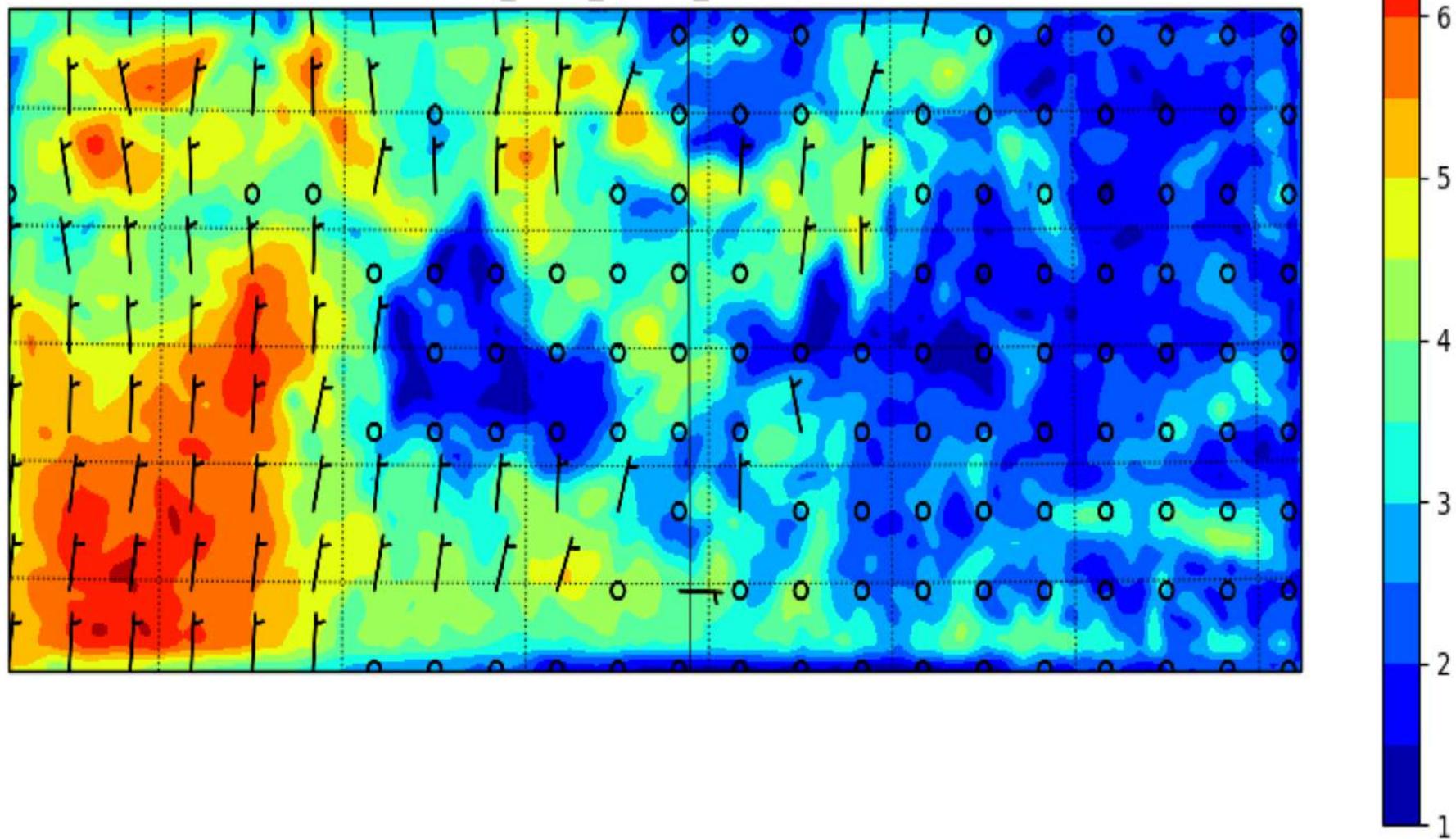
HIGHLIGHTS

- Nicole Ann June, Summer 2018 REU student at LAR, is Applying Kalman Filter to compute bias and correction for 24-hr PM2.5 at AirNow sites, and interpolating throughout AIRPACT5 domain.

  - Testing 7-day and 4-day Kalman Filter for Bias Correction.

  - Testing several interpolation schemes for AIRPACT5 domain.

Mean PM2.5 by Month

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

Thank you!