NW-AIRQUEST project Status Report

NW-AIRQUEST QUARTERLY MEETING

4 FEBRUARY 2021

VON P. WALDEN AND JOE VAUGHAN

FOR LAR/CEE/VCEA/WSU

BUDGET STATUS

Budget Statement - Expense Summary by Object

Budget as of 12/31/2020 (six months into first year of biennial budget)

Refreshed: 2/3/21

BTD Through: 12/31/2020

| 14E | 3815-5678 | LRAPA NW AIRQUEST BIENNIUM | | | | | #SYNTAX | #ERROR | #SYNTAX |

Category	Object	Allocation	Expense	Encumbrance	Balance	Alloc Spent
Salaries	00	68,979.00	6,856.50	24,371.12	37,751.38	45.27 %
Consumable Goods And Services	03	10,000.00	348.40	0.00	9,651.60	3.48 %
Travel	04	2,405.00	0.00	0.00	2,405.00	0.00 %
Equipment - Capitalized	06	10,000.00	0.00	0.00	10,000.00	0.00 %
Employer Contributions	07	16,830.00	541.09	9,277.31	7,011.60	58.34 %
Facilities & Administrative Cost	13	11,786.00	929.52	10,856.48	0.00	100.00 %
Account Totals:		**120,000.00**	**8,675.51**	**44,504.91**	**66,819.58**	**44.32 %**

(WSU recently went to a new accounting system called WorkDay, which necessitates reentry of some budget information. We are awaiting an update on which salaries are encumbered, and until when.)

META TASK: STAFFING AT LAR

For AQ Modeling	Brian K Lamb, Professor, Emeritus …
	Von Walden, Professor at LAR
	Yunha Lee, Assistant Professor currently on medical leave.
	Mahshid Etesamifard, PhD student, working w/ CMAQ in Ports & Boise Proj.
	Joe Vaughan, 50% of a Research Associate Prof. (retiring by July 2021)
For Machine Learning	New Postdoc, Anticipate 3-month overlap with Joe
	Ana Fernandez (PhD student) WRF-Chem and now working into ML
For Sensor work	Kai Fan (PhD student) Defended in Dec 2020; now postdoc in Germany
	Matthew Roetcisoender (PhD student) working with Von Walden on Sensors.

Status of New Postdoc Position

Job ad approved and posted by WSU HRS on 20 January

5 applicants as of 2 February

Review of applicants will start on 1 March

Anticipate hiring postdoc by at least 1 April (3-month overlap with Joe)

META TASKS

Cluster upgrades	**December 2020**: Worked on power issues for the new cluster racks.
	January 2021:
	    Made major improvements to the cooling infrastructure to handle the new servers
	    Established a L2/physical link to the high-speed research network (HSSRC) for WSU campuses
	February 2021: Currently working on:
	    login and compute node firmware updates
	    login and compute node OS installs
	    alpha testing storage setup
	    authentication mechanisms for users
	    SLURM scheduler (replacement to Torque and Maui)
	    environment modules
	New storage: was waiting on power/cooling that happened in January. Currently pending some parts purchases.

ONGOING TASKS

Task	Status February 2021	
1. Provide daily forecasts of air quality for the three-state region that can be used in daily AQ management.	DAY-ONE runs for July '20 thru Jan '21, for 213 days: success rate by 7 AM was ~86%. This includes late runs due to multiple failed runs during September wildfires, due to emissions failures, and system maintenance outages. DAY-TWO runs for July '20 thru Jan '21: ~94%.	

ONGOING TASKS

Task	Status Feb 2021
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.	Statistics maintained. Current data requests: Solmaz Amiri (WSU Medical School) requested PM2.5 for human health. Olivia Sanderfoot (UW) for bird vocalization research. Kim Serry (UW) inquired for human health research.

ONGOING TASKS

Task	Status Feb 2021	
3. Track and continue to improve model performance so that model predictions provide useful guidance for air quality forecasting.	Ongoing.	

ONGOING TASKS

Task	Status Feb 2021
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.	Request for profiles?

ONGOING TASKS

Task	Status Feb 2021	
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 are 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 Feb 2021	
9. Modify AIRPACT as needed to respond to changes in fire emissions produced by other organizations. 10. Continue to provide data to the latest background concentration lookup tool.	AIRPACT5 has been modified using new FIS BSP from USFS. Addressing in AIRPACT6. Linked at http://lar.wsu.edu/nw-airquest/lookup.html	

TASKS CARRIED FORWARD TO 2020-2021

SFY 2020 Task	Comments
Implemented PM2.5 bias correction scheme.	Nicole June (Penn State, Meteorology) published work with Vaughan & Lamb on a Kalman Filter bias correction scheme and interpolation throughout domain. Results on AIRPACT website. Intend to capture categoric performance stats (along with ML)

TASKS CARRIED FORWARD TO 2020-2021

SFY 2020 Task	Comments
Hosting wood smoke PM forecast models from formulas shared by the state and local agencies	Phil Swartzendruber at PSCAA provided algorithm in April 2019, for Simple Air Quality Model (SAQM) for RWC season PM2.5 in Tacoma. Lauren Guerrissi (CEE) implemented it. Phil @ PSCAA will update with optimal parameters.

TASKS CARRIED FORWARD TO 2020-2021

SFY 2020 Task	Comments
Use the WRF-Chem system on the WSU Kamiak cluster to demonstrate WRF-Chem capabilities	Ana Fernandez and Yunha Lee: Update from previous speaker during this meeting

NEW 2021 TASKS

SFY 2021 Task	Comments
Implement Bias Correction with Kalman Filtering and Kriging interpolation and investigate Bayesian Kriging for PM2.5 for daily forecasts, in AIRPACT5.	Finalizing implementation and adding performance statistics.

NEW 2021 TASKS

SFY 2021 Task	Comments
Develop an ML forecast system for PM2.5 for points within the PNW domain	Completed as part of Kai Fan's PhD

NEW 2021 TASKS

SFY 2021 Task	Comments
Provide training workshops (webinars) on AIRPACT modeling system, AIRPACT web products and their use for air-quality forecasting	Long training module was provided at June 2020 annual meeting. Shorter modules are being recorded for posting to website. (10 out of about 15 completed.) Will continue supporting training workshops as needed.

NEW 2021 TASKS

SFY 2021 Task	Comments
Create updated forecasting framework AIRPACT6 to accommodate changes in computation platform Aeolus (Linux cluster at VCEA/WSU), and implementing component updates/upgrades	In progress. Delayed by hardware infrastructure issues (power and cooling) in computer room. Waiting for new HPC version to be available.

NEW 2021 TASKS

SFY 2021 Task	Comments
Switch to running with updated emissions and SMOKE 4.5 in AIRPACT6	Spring 2021 – depending availability of new HPC

NEW 2021 TASKS

SFY 2021 Task	Comments
Extend the AIRPACT forecast period from 48 h (2 days) to 72 h (3 days), in AIRPACT6	Spring 2021 – depending availability of new HPC

NEW 2021 TASKS

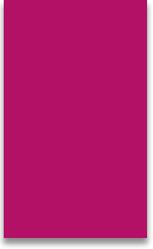| SFY 2021 Task	Comments
Implement the Simple Air Quality Model (PSCAA) for PM2.5 in Tacoma, in AIRPACT6	Waiting for new optimal parameters from Phil @ PSCCA

NEW 2021 TASKS

SFY 2021 Task	Comments
Update biogenics to MEGAN v3 in AIRPACT6 (possibly with HPC parallelization)	Spring 2021 – depending availability of new HPC

NEW 2021 TASKS

SFY 2021 Task	Comments
Interpolate ML forecasts for ozone and PM2.5 to provide domain-wide forecasts in AIRPACT6 Incorporate existing sensor networks (Urbanova, Purple Air, …) into ML forecasting system in AIRPACT6 Case studies for ozone and PM2.5 for events using new AIRPACT6 system (rerunning previous events for evaluation and study)	Spring 2021 (work by Ana Fernandez-Valdes)

NEW 2021 TASKS

SFY 2021 Task	Comments
Experimental drone flights of opportunity to study wintertime inversion conditions	Delayed due to COVID-19…

Thank you!

Questions?