

NW-AIRQUEST Project Status Report

Progress by WSU Lab for Atmospheric Research

NW-AIRQUEST ANNUAL Meeting

14 October 2021

Presented by Von P. Walden for LAR/CEE/VCEA/WSU

LAR Personnel

META TASK: STAFFING AT LAR

AIRPACT
And Machine
Learning
Modeling

Amin Vahidi, LAR postdoc, AIRPACT Ops, AIRPACT6 development, ML
(arriving at WSU soon - Oct/Nov)

Mahshid Etesamifard, PhD student, CMAQ for Ports & Boise Projects

Ana Carla Fernandez-Valdes, PhD student, WRF-Chem, ML Modeling

Von Walden, Professor

Joe Vaughan, Consultant

BUDGET STATUS

Budget as of 14 October 2021 (in Year 2 of biennial budget)

Award Budget to Actuals



Award	Budget	Expenses	Commitments	Obligations	Total Spend	Available Balance
> Award Total	240,000.00	87,951.05			87,951.05	152,048.95
Cost Share Total						
> Project Total	240,000.00	87,951.05			87,951.05	152,048.95

- Currently underspent due to Amin's late arrival.
- Unclear if both Mahshid's and Ana Carla's support has been accounted for.

META TASKS

	Status October 2021
Cluster upgrades	<p>New Motley cluster is being built. (update to Centos 8, NVIDIA compiler)</p> <p>Aeolus remains a VCEA HPC resource that runs AIRPACT5 nightly.</p> <p>Technical and User Support remains a challenging college issue.</p>

Ongoing Tasks

ONGOING TASKS

Task	Status October 2021
<p>1. Provide daily forecasts of air quality for the three state region that can be used in daily AQ management.</p>	<p>DAY-ONE runs for July thru 13 October 2021:</p> <p>13-14 August - Issue with aeolus cluster scheduler</p> <p>16-22 August - UCAR updated web server and changed web address of ACOM data files</p> <p>16 September - MCIP weather files were not generated by UW (9 missed; Success rate: 90%)</p> <p>DAY-TWO runs for July thru 13 October 2021: (10 missed; Success rate: 89%)</p>

ONGOING TASKS

Task	Status October 2021
<p>2. Provide near real-time verification statistics of the current AIRPACT system accuracy by pollutant, by month, and</p> <p>Provide for user access to AIRPACT results and monitoring data for user-defined periods for download & analysis.</p>	<p>Statistics continue to be maintained.</p> <p>Current data requests: Daily PM2.5 are used by smokeCENSE API - human health</p>

ONGOING TASKS

Task	Status October 2021	
<p>3. Track and continue to improve model performance so that model predictions provide useful guidance for air quality forecasting.</p>	<p>Ongoing.</p>	

ONGOING TASKS

Task	Status October 2021	
4. Maintain ambient air monitoring data streams from AIRNow.	Ongoing.	
5. Maintain satellite retrievals that are still functioning (except for MODIS and OMI).	Ongoing.	
6. Continue improvements and requested additions to web graphical display.	Joe Vaughan recently added “visual range” - VR Might contract redesign in 2022	

ONGOING TASKS

Task	Status October 2021	
<p>7. Maintain the “Change Log”, posted on the AIRPACT website.</p> <p>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.</p>	<p>Ongoing. Now stored at GitHub; https://github.com/wsular/airpact</p> <p>Ongoing.</p> <p>Forecast graphics available beginning December 2015.</p>	

ONGOING TASKS

Task	Status October 2021	
<p>9. Modify AIRPACT as needed to respond to changes in fire emissions produced by other organizations.</p> <p>10. Continue hosting the link to the latest background concentration lookup tool.</p>	<p>Received info on USDA/FS new Fire Info System. Addressing in AIRPACT6</p> <p>Now hosted by IDEQ: http://lar.wsu.edu/nw-airquest/lookup.html has link</p>	

ONGOING TASKS

Task	Status October 2021	
11. Modeling infrastructure maintenance and updates.	Von Walden is now chair of the VCEA HPC committee; quarterly meetings (Status of aeolus and motley)	

Carry-over Tasks

TASKS CARRIED FORWARD TO 2021-2022

SFY 2021 Task		Comments
1. Create updated AIRPACT6 forecasting framework to accommodate changes in computation platform and implement component updates/upgrades		<p>While waiting for motley to become available, a Linux VM was created at Microsoft Azure. Following software has been installed:</p> <ul style="list-style-type: none">• Linux Centos 8.2• NetCDF C library• IO API 3.2• SMOKE 4.81• CMAQ 5.3.2 <p>(Now waiting for Amin's arrival !!)</p> <p>Plan is to "containerize" AIRPACT6 for remote deployment</p>

TASKS CARRIED FORWARD TO 2021-2022

SFY 2021 Task	Comments
<p>2. Update biogenics to MEGAN v3 in AIRPACT6 (possibly with HPC parallelization)</p> <p>3. Switch to running with updated emissions and SMOKE 4.5, in AIRPACT6.</p> <p>4. Extend the AIRPACT forecast period from 48 h (2 days) to 72 h (3 days), in AIRPACT6.</p>	<p>All of these tasks are pending progress on building AIRPACT6 on new HPC</p>

TASKS CARRIED FORWARD TO 2021-2022

SFY 2021 Task	Comments
5. Implement the Simple Air Quality Model (PSCAA) for PM2.5 in Tacoma, in AIRPACT6.	No progress since June meeting.

TASKS CARRIED FORWARD TO 2021-2022

SFY 2021 Task	Comments
6. Interpolate ML forecasts for ozone and PM2.5 to provide domain-wide forecasts, in AIRPACT6.	Ana Carla is currently working on adding more robust error-checking into Kai Fan's ML model. Interpolation will begin once LAR has a stable version of the ML model working operationally; we plan to run the new version along side Kai's version for a couple of months.

TASKS CARRIED FORWARD TO 2021-2022

SFY 2021 Task	Comments
7. Incorporate existing sensor networks (Urbanova, Purple Air, etc.) into ML forecasting system, in AIRPACT6.	No progress since June meeting.

TASKS CARRIED FORWARD TO 2021-2022

SFY 2021 Task	Comments
8. Case studies for ozone and PM2.5 for events using new AIRPACT6 system (rerunning previous events for evaluation and study).	Work will begin after the completion of AIRPACT6.

TASKS CARRIED FORWARD TO 2021-2022

SFY 2021 Task	Comments
9. Experimental drone flights of opportunity to study wintertime inversion conditions (e.g., Pinehurst, ID).	Work on hold due to Covid-19 pandemic. Jake Wolf's question from June !! - What sensors are planned for wintertime inversion studies? Temperature and Humidity profiling PM2.5 (PMS6003 sensor)

New 2022 Tasks

NEW 2022 TASKS

SFY 2022 Task	Comments
Migration of AIRPACT scripts and code to GitHub repository	Completed. AIRPACT Operations (public) https://github.com/wsular/airpact AIRPACT6 Development (private) https://github.com/wsular/airpact6 ML Model Development (private) https://github.com/wsular/aq-ml-model-kai_fan

NEW 2022 TASKS

SFY 2022 Task	Comments
<p>Collaborate with Ecology to develop internal website to extend long-term 3- to 5-day ensemble forecasts, to cover ID and OR.</p>	<p>No progress since June meeting.</p>

Thank you!