WSU FY23 Progress Report #1

For the NW-AIRQUEST Consortium

Von P. Walden and Amin Vahidi
13 October 2022

Personnel

Personnel

- Dr. Von P. Walden - Principal Investigator / Group Leader

- Dr. Amin Vahidi - Postdoctoral Fellow

- Ana Carla Fernandez-Valdez - Graduate Student

- Matthew Roetcisoender - Former MS student (AQ sensors and sensor network)

- Joe Vaughan - Acclaimed LAR and NW-AIRQUEST colleague (still around!!)

Update on New LAR modeling position

- The WSU CEE has been granted approval to fill a faculty position in atmospheric modeling

  - Replacement for Yunha Lee <— Brian Lamb

  - Job advertisement is currently being approved by the VCEA dean

  - Anticipated start date is summer 2023

Budget Status

Anticipated budget for FY23

- **Salaries** = $92,000

  - 8 months - Amin Vahidi (postdoc)

  - 6 months (half-time) - Ana Carla Fernandez-Valdes (graduate student)

  - 1 month - Von P. Walden

- **Web maintenance** = $7,000

- **WSU overhead** (12%) = $11,000

- **TOTAL = $110,000**

Budget Status

- FY23 is the first year of a two-year (biennium) budget

- Budget for FY23 is $110,000

  - No equipment $$

  - Current balance = Somewhere between $0.00 and $33,243.00

   - (Depending on how you interpret Workday…)

Equipment

Equipment update

- The Aeolus HPC cluster continues to run the AIRPACT5 modeling system each night.

- The new Motley HPC cluster is still not available for our use.

  - (Andrew Bates, who was building this system, has left WSU…)

- Technical and User Support remain as issues in our college and at WSU.

Equipment update

- Invested in two redundant off-site Network Access Storage (NAS) devices.

  - AIRNAS1 is fully functional !! (AIRNAS2 will be used as a "mirror".)
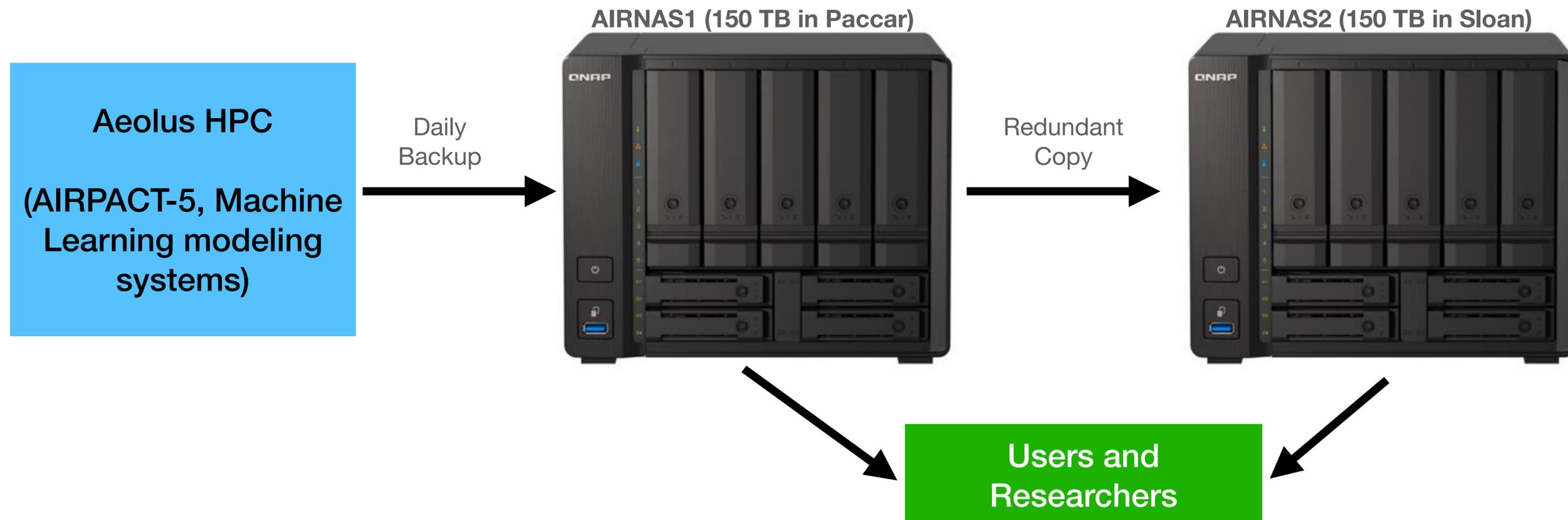
Equipment update

- Uses of the AIRPACT NASs

  - All of the AIRPACT and ML modeling data are being backed up and archived

  - Past data from 2017-2022 have been transferred and archived

    - Still need to restore earlier data from USB drives to NASs

  - NAS storage will be used directly as part of the AIRPACT6 modeling system

  - Quick and easy access to data from all users and researchers

On-going Tasks

ONGOING TASKS

- No major issues.

- Skipping, but can any address questions if needed.

ONGOING TASKS

Task	Status October 2022	
1. Provide daily forecasts of air quality for the three state region that can be used in daily AQ management.	DAY-ONE runs for Jul 2022 thru Sep 2022: (Success rate: 100%) DAY-TWO runs for Jul 2022 thru Sep 2022: (Success rate: 100%)	

ONGOING TASKS

Task	Status October 2022	
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 continue to be maintained.	

ONGOING TASKS

Task	Status October 2022	
3. Track and continue to improve model performance so that model predictions provide useful guidance for air quality forecasting.	Continuing; no issues.	

ONGOING TASKS

Task	Status October 2022	
4. Maintain ambient air monitoring data streams from AIRNow.	Continuing; no issues.	
5. Maintain satellite retrievals that are still functioning (except for MODIS and OMI).	Continuing; no issues.	
6. Continue improvements and requested additions to web graphical display.	"visual range" (VR) was added	

ONGOING TASKS

Task	Status October 2022	
7. Maintain the "Change Log", posted on the AIRPACT website.	Ongoing. Now stored at GitHub; https://github.com/wsular/airpact	
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 October 2022	
9. Modify AIRPACT as needed to respond to changes in fire emissions produced by other organizations. 10. Continue hosting the link to the latest background concentration lookup tool.	Ongoing as needed Hosted by IDEQ: http://lar.wsu.edu/nw-airquest/lookup.html has link	

ONGOING TASKS

Task	Status October 2022	
11. Modeling infrastructure maintenance and updates.	Continuing; no issues.	

FY23 Tasks

TASKS CARRIED FORWARD FROM 2022

FY 2023 Task		Comments
1. Implement the **new AIRPACT6 forecasting framework** as a Singularity container for use on HPC systems		AIRPACT6 Singularity container: • Container is based on Linux Centos 7 • Development is being tracked on GitHub • netCDF libraries - built and installed • Using Intel OneAPI compilers • MPICH - for eventual HPC deployment • Some CMAQ code has been compiled • Replaced entire workflow run at UW with Python and Singularity

TASKS CARRIED FORWARD FROM 2022

FY 2023 Task		Comments
2. Validate AIRPACT6 by running it concurrently with AIRPACT5 for six months. 3. Run validation case studies for ozone and PM2.5 for events using both AIRPACT5 and AIRPACT6.		Pending AIRPACT6 operations

TASKS CARRIED FORWARD FROM 2022

FY 2023 Task		Comments

4. **Extend the AIRPACT forecast period** from 48 h (2 days) to 72 h (3 days), in AIRPACT6.		• UW is now supplying WRF 4-km output for 3 days (instead of 2).
		
		• Amin is currently working on producing a 3rd day of emissions forecasting
		
		    • We will first replicate what is being done for Day 2
		
		    • Then improvements will be made by eliminating "persistence"

TASKS CARRIED FORWARD FROM 2022

FY 2023 Task		Comments

5. **Continued improvement of Machine Learning forecast** system for ozone and PM2.5.		• Ana Carla added more robust error-checking to Kai Fan's ML model; LAR is currently running this version along with Kai's version
		  • Training datasets were recently recreated
		  • Will likely start posting data from LAR's version soon
		• Working on including additional sites from WA Ecology
		• Working on adding PurpleAir sites (with long records)
		• Interpolation will be implemented into LAR's version of the ML model

TASKS CARRIED FORWARD FROM 2022

FY 2023 Task	Comments
6. Experimental drone flights of opportunity to study wintertime inversion conditions (e.g., Pinehurst, ID).	Ana Carla is working on this. • Purple Air recently changed their data API • She can now access both current and historic data from Purple Air • Plan is to incorporate these data into LAR's ML model

New FY23 Tasks

NEW 2023 TASKS

FY 2023 Task	Comments
Collaborate with Ecology to develop internal website to extend long-term 3- to 5-day ensemble forecasts that cover ID and OR.	Pending AIRPACT6 operations.

NEW 2023 TASKS

FY 2023 Task	Comments
Upgrade of AIRPACT website	• Invested in upgrades using carry-over and salary savings in FY2022 • https://lar-new.vcea.wsu.edu/map.html • Final work is needed on pages related to emissions and updates to text related to AIRPACT • Hoping for Jan 2023 release

- https://lar-new.vcea.wsu.edu

- https://lar-new.vcea.wsu.edu/map.html

Thank You!!

Questions?