

WSU FY23 Progress Report #2

For the NW-AIRQUEST Consortium

Von P. Walden, Amin Vahidi, Ana Carla Fernandez-Valdes

9 February 2023

Personnel

Personnel

- Dr. Von P. Walden - Principal Investigator / Group Leader
- Dr. Amin Vahidi - Postdoctoral Fellow
- Ana Carla Fernandez-Valdez - Graduate Student

- 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 has been advertised, and we're reviewing applications
 - Anticipated start date is Fall 2023

Budget Status

FY23 Budget

- **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

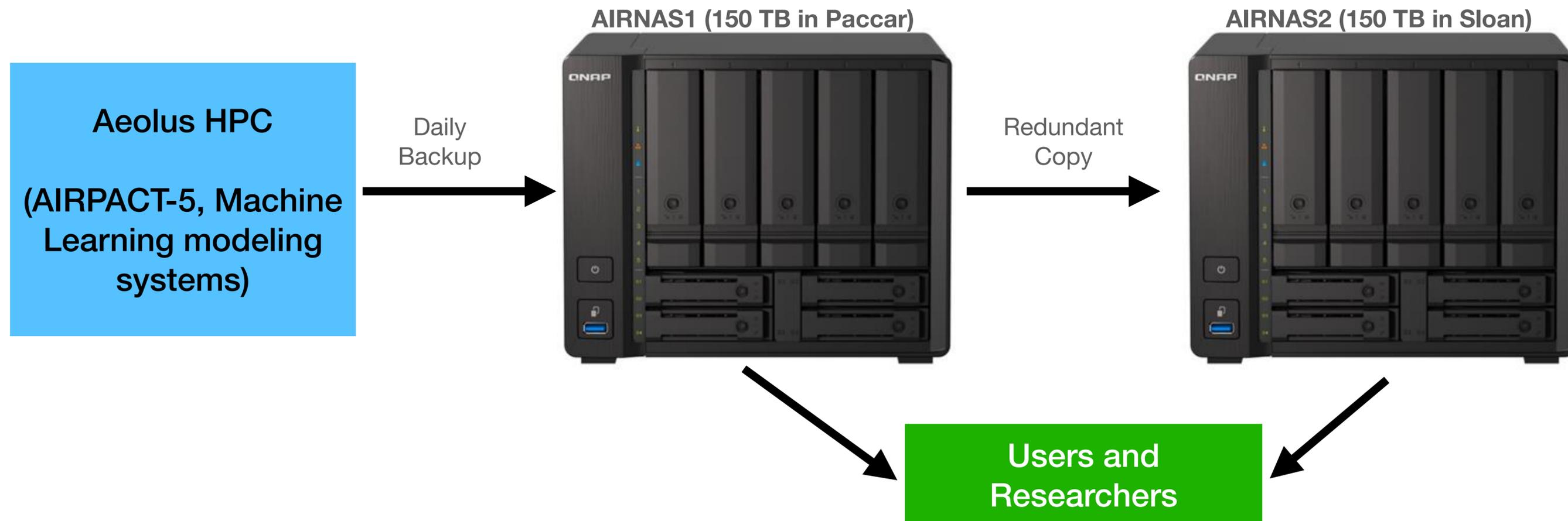
Budget Status

- FY23 is the first year of a two-year (biennium) budget
- Budget for FY23 is \$110,000
 - Current balance = \$53,478 (as of 7 Feb 2023)
 - New AIRPACT website + some web maintenance
 - Salaries

Equipment

Equipment update

- Both AIRNAS1 and AIRNAS2 are fully functional
 - AIRNAS2 is acting as a “mirror” of AIRNAS1



Equipment update

- The Aeolus HPC cluster continues to run the AIRPACT5 modeling system each night.
 - We had one issue with disk storage that prevented Day 2 forecasts for a couple of days. This was easily resolved by deleting old data from Aeolus.
- Daily forecast data from AIRPACT5 and the Machine Learning model are being backed up to AIRNAS1 (then mirrored to AIRNAS2)

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: Missed 3 days)	

ONGOING TASKS

Task	Status October 2022
<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>

ONGOING TASKS

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

ONGOING TASKS

Task	Status October 2022	
<p>4. Maintain ambient air monitoring data streams from AIRNow.</p> <p>5. Maintain satellite retrievals that are still functioning (except for MODIS and OMI).</p> <p>6. Continue improvements and requested additions to web graphical display.</p>	<p>Continuing; no issues</p> <p>Satellite data are no longer being actively archived</p> <p>New AIRPACT website is online</p>	

ONGOING TASKS

Task	Status October 2022	
<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 2022	
<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>Ongoing as needed</p> <p>Hosted by IDEQ;</p> <p>Link will be added to AIRPACT site under Related Programs -> Graphics and Data</p>	

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	<p><u>AIRPACT6 Singularity container:</u></p> <ul style="list-style-type: none">• Container is based on Ubuntu 22.04<ul style="list-style-type: none">• Development is being tracked on GitHub• netCDF libraries - built and installed• OpenMPI - built and installed for HPC deployment• CMAQ code has nearly been compiled• Replaced entire workflow run at UW with Python and container• Now working on ICON, BCON, JPROC and CCTM <p><i>Result = Greatly simplified scripting and code Easy management in the future</i></p>

TASKS CARRIED FORWARD FROM 2022

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

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.	<ul style="list-style-type: none">• UW is now supplying WRF 4-km output for 3 days (instead of 2).• Amin continues to work on producing a 3rd day of emissions forecasting<ul style="list-style-type: none">• Very complicated scripting• MEGAN is working; testing SMOKE now

TASKS CARRIED FORWARD FROM 2022

FY 2023 Task	Comments
<p>5. Continued improvement of Machine Learning forecast system for ozone and PM2.5.</p>	<ul style="list-style-type: none">• LAR continues to run a new version along side original model• Training datasets were recently updated in new model (2017-2022)• Working on adding additional sites from WA Ecology<ul style="list-style-type: none">• However, these sites will have shorter training sets...• Working on adding PurpleAir sites (with long records; 2017-2022)<ul style="list-style-type: none">• 3045 sites in PNW• Interpolation will be implemented into LAR's version• Working on improved model system based on Deep Neural Network (DNN) - funded by USDA project

TASKS CARRIED FORWARD FROM 2022

FY 2023 Task	Comments
6. Experimental drone flights of opportunity (e.g., wintertime inversion conditions)	Available per request

New FY23 Tasks

NEW 2023 TASKS

FY 2023 Task	Comments
<p>Collaborate with Ecology to develop internal website to extend long-term 3- to 5-day ensemble forecasts that cover ID and OR.</p>	<ul style="list-style-type: none">• OR shapefiles have been transferred to WA Ecology• LAR has identified a web server for posting results for WA, OR and ID

NEW 2023 TASKS

FY 2023 Task	Comments
Upgrade of AIRPACT website	<ul style="list-style-type: none">• Now available at https://airpact.wsu.edu• New LAR website is also available at https://lar.wsu.edu

NEW 2023 TASKS (funded by USDA project)

FY 2023 Task	Comments
Availability of LAR forecasting products (AIRPACT5, ML) via GIS server	<ul style="list-style-type: none">• GeoServer has been created internally at LAR• Currently testing various GIS products (shapefiles, netCDF files)• Available in summer 2023

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Layer Preview

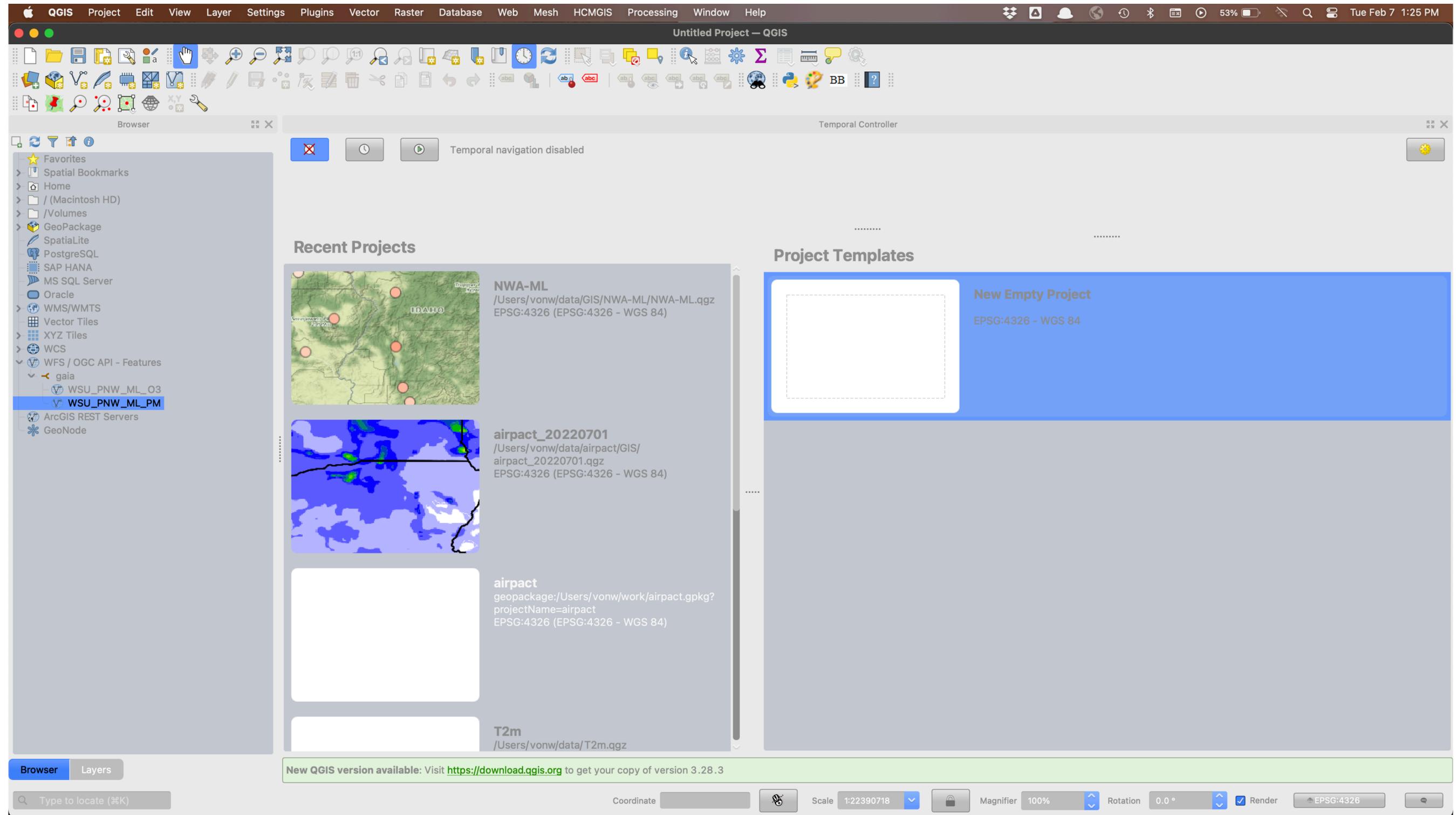
List of all layers configured in GeoServer and provides previews in various formats for each.

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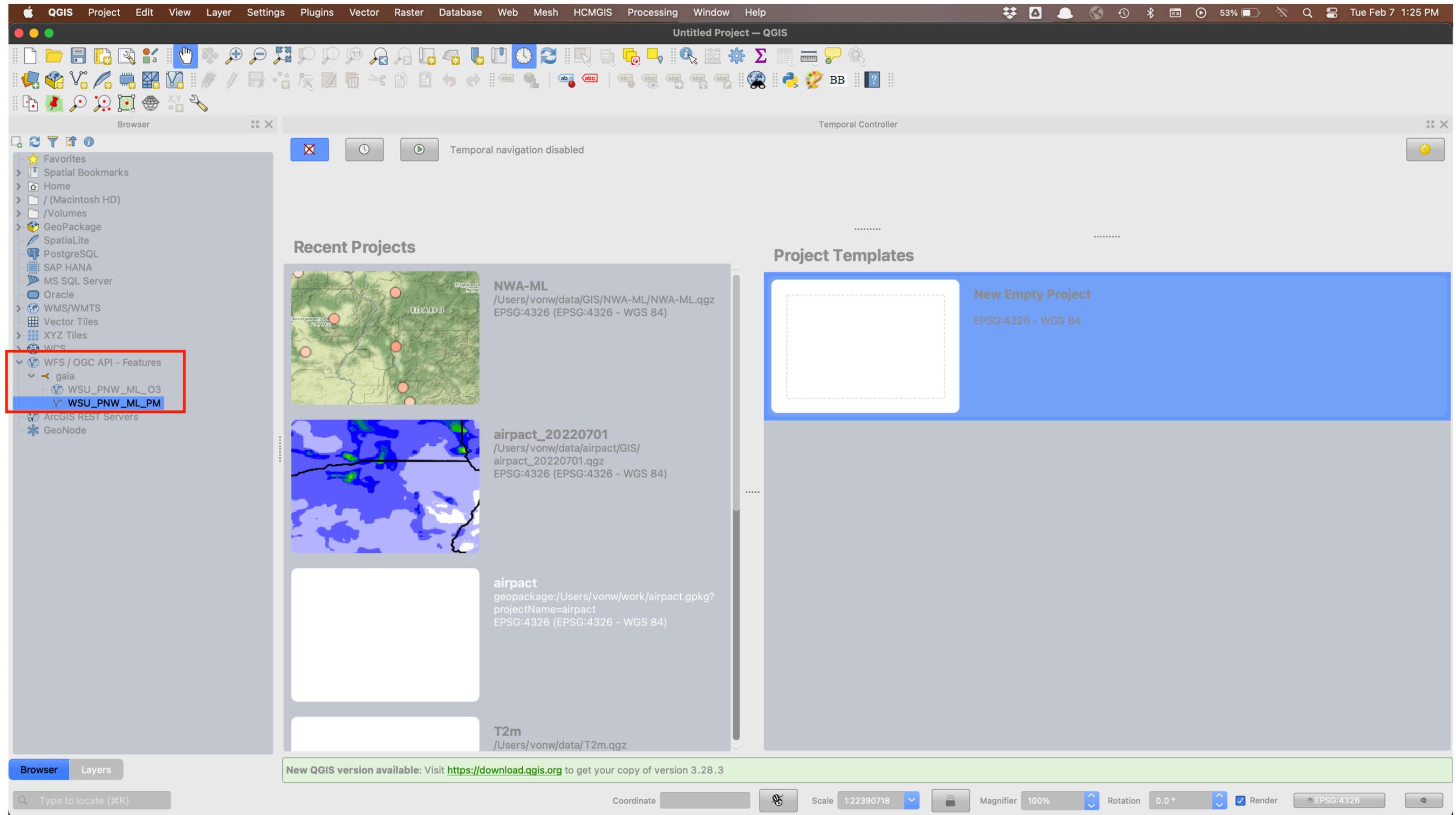
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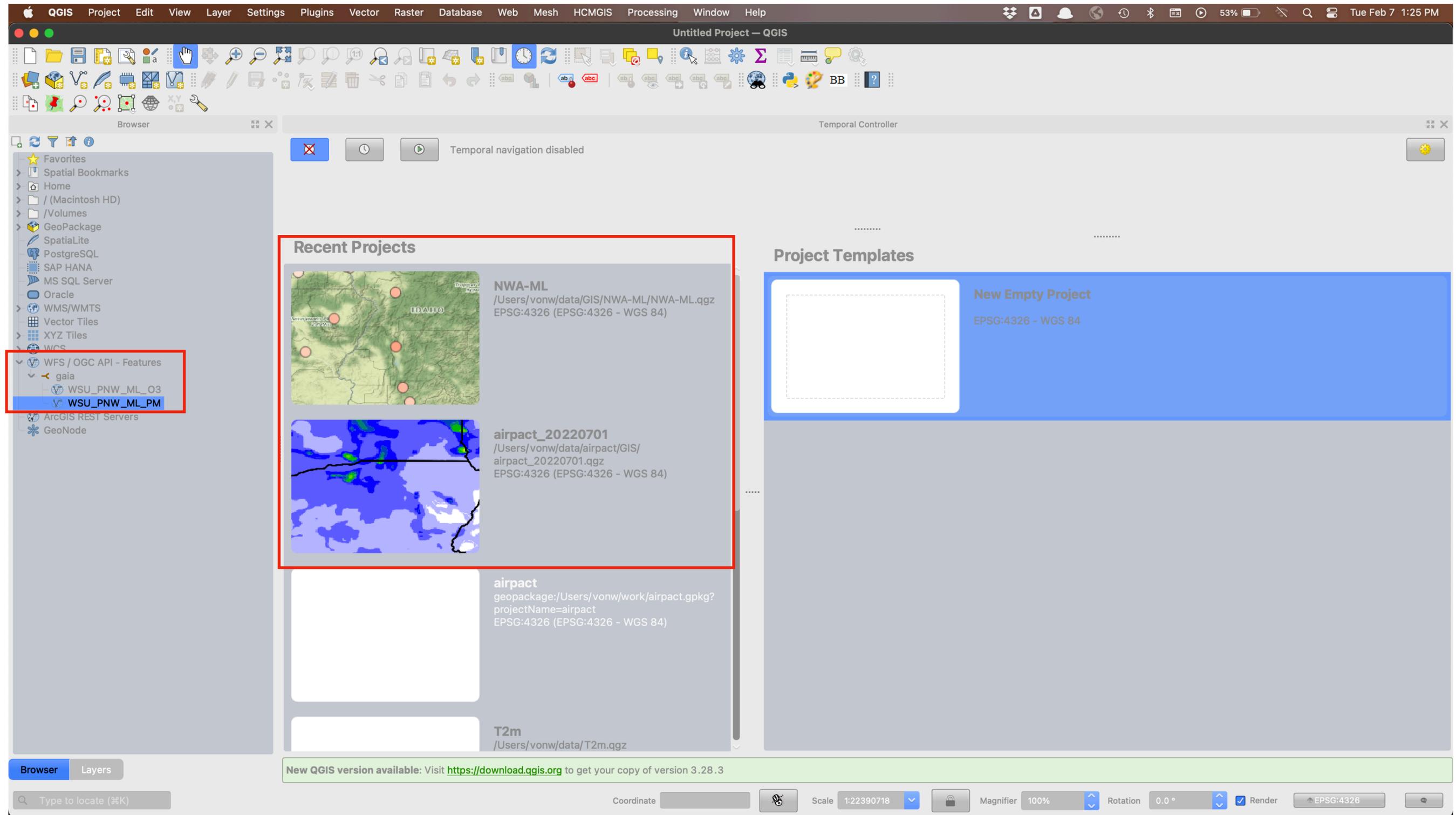
NEW 2023 TASKS



NEW 2023 TASKS (funded by USDA project)



NEW 2023 TASKS (funded by USDA project)



Thank You!!

Questions?