

Annual Performance in 2025 by Jianping Huang 2/19/2025

From October 1, 2024, to February 2025, I made significant contributions to the development and advancement of the Air Quality Modeling (AQM) version 8 (AQMv8) package, which is planned for implementation in Q3 2026. Under the supervision of Fanglin Yang at EMC/PDD, I diligently completed all tasks outlined in my 2025 Performance Plan, exceeding expectations in multiple areas.

As the project lead, I developed project plans, charters, and Quad charts while managing both the Development and T2O Projects via Smartsheet for AQMv8.0. I created and coordinated tasks related to workflow development, upgrades of the UFS-atmosphere model and CMAQ, updates of anthropogenic emissions, refinement of the FENGSHA dust module and better use of wildfire emissions, implementation of inline post-processing, and the development of new forecast products such as NO₂, NO_y, and VOCs in support of the AQMv8.0 implementation to further meet our product users' requirements.

To ensure the readiness of the AQMv8, I have integrated the updated workflow, models, emissions, and other components, and established real-time runs. Since November 11, 2024, I have supported the AQMv8.0 real-time runs four cycles per day to ensure the stability of the AQMv8.0 package while continuously improving model performance. I completed a series of sensitivity studies assessing the impact of vertical distribution and adjustments for wildfire emissions during the forecast period to mitigate PM_{2.5} overprediction near wildfire source regions. Additionally, I led efforts to address wintertime O₃ overpredictions in CMAQv5.4, collaborating with team members to test and debug the NEI 2019 (NEMO) emissions inventory, updated global emissions, and point sources. I also led the efforts to test and evaluate the GFS v17 CCPP package with AQMv8.0, which is still ongoing.

Beyond technical development, I effectively collaborate with OAR labs such as ARL, PSL, CSL and GSL, NESDIS, and university partners, ensuring that their contributions benefit AQMv8 package performance. I actively engaged in outreach efforts by presenting the team work at major conferences, including the 2024 National Air Quality Forecaster Group Workshop in College Park, MD, the 2024 CMAS Annual Conference in Chapel Hill, NC, and the 40th ITM in Copenhagen, Denmark. Additionally, as the lead author, I published a peer-reviewed article titled *"Development of the Next-Generation Air Quality Prediction System in the Unified Forecast System Framework: Enhancing Predictability of Wildfire Air Quality Impacts"* in BAMS, further demonstrating my contributions to the field.

Overall, I have successfully completed all assigned tasks and exceeded the expectations outlined in my performance plan. My efforts have significantly improved the capabilities of AQMv8, supporting NOAA's mission by enhancing air quality forecasting to better protect lives and property across the nation.