NOAA ACM Summit 2026: Towards UFS Capabilities

Executive Summary

Dates: May 13-14, 2026 | Location: Silver Spring, MD

Attendees: OAR: ARL, CPO, CSL, GFDL, GML, GSL, WPO; NWS: MDC; NESDIS: GEO, JPSS, STAR



NOAA's Atmospheric Composition modeling (ACM) portfolio spans seven OAR laboratories and programs, operational applications at NWS, and satellite data from NESDIS. Collectively, NOAA uses around 20 modeling systems or components for atmospheric composition, based on the FY26 NOAA Modeling Inventory. NOAA's Unified Forecasting System (UFS) represents an opportunity for the ACM community to leverage this unified infrastructure to align ACM components, as well as software engineering standards and protocols to a shared model that can accommodate multiple applications. To that end, version 1 of the UFS model with chemistry (UFS-Chem) has been developed as a prototype. The objective of the summit was to take stock of NOAA's multi-LO atmospheric composition modeling assets, reduce legacy programmatic fragmentation, and map out a unified pathway toward integrating these capabilities into the UFS framework. Specifically, the goals of the summit were to:

1. Increase cross-NOAA awareness and coordination of Atmospheric Composition modeling activities, including research and modeling, through exchange of information and networking.
2. Assess all Atmospheric Composition modeling tools, applications and development needs across NOAA
3. Develop a plan for UFS-Chem Version 2
4. Develop a strategy for UFS-focused collaboration with the external community and across all labs, programs, and centers at NOAA.

Outcomes from the summit

The summit achieved its first and second goals through gathering 50 NOAA scientists, engineers, and managers from all relevant laboratories, programs, and centers, mostly in person (an additional 30 joining remotely), to present their work on atmospheric composition modeling and outline their needs and requirements for alignment with UFS. The two day meeting featured 38 presentations, discussions, and breakout sessions. Prior to the meeting, the need for UFS-Chem development and the cross-NOAA engagement were widely discussed with leadership across the three LOs, thus further increasing awareness of atmospheric composition modeling needs and opportunities. Input on applications and development needs was gathered through breakout group discussions and targeted voting on development priorities.

Presentations on the first day focused on science and applications and how to transition science to the UFS, engaging both internal and external science communities. The second day of presentations focused on framework unification and a vision for UFS-Chem next-generation infrastructure components, including emissions, chemistry, physics coupling, dynamical cores, model evaluation, data assimilation, and artificial intelligence. Earth observations needed for model evaluation and reanalysis were presented, including from ground networks, aircraft, and satellites. The content covered helped identify the need for bridging scales, including from global to regional and weather to subseasonal-to-seasonal to decadal time scales.

The third goal of the summit, a plan for development of UFS-Chem version 2, emerged from discussions of priorities and interest from the attendees. Version 2 is on track to be completed by the end of FY27 with at least 3 of the top 5 priorities identified at the summit already underway. Top 5 priorities for UFS-Chem development are:

- configurable chemistry and emission components
- tight coupling between chemistry and physics
- mass conservation for trace gas mixing ratios
- regional refinement capability
- Earth system capability (atmosphere coupled with ocean, biosphere, sea ice, and other components)

Going forward, UFS-Chem development will be organized in several working groups:

- Chemistry
- Chemistry - Physics Coupling
- Data Assimilation & Reanalysis
- Emissions & Fluxes
- Model evaluation
- Fires
- Software Engineering - Data Management
- AI
- Earth System
- Clouds-Aerosols-Chemistry
- Stratosphere
- Carbon Cycle

The first seven working groups are actively working on UFS-Chem, whereas the other six are exploring incorporating additional capabilities to future versions of UFS-Chem. In addition to the

working groups, a management team will help coordinate the efforts into a unified system, providing overall guidance for model development and its resources. The entire UFS-Chem team will contribute to and play an active role in UFS activities leveraging EPIC community platforms, including membership in the UFS steering group.

The fourth goal of the summit - to develop engagement plans internally and externally - was discussed throughout the meeting. The attendees provided input regarding the level of engagement expected from the external community and the readiness of UFS-Chem for input from outside the agency. The development of version 2 of UFS-Chem, especially its much more modular configuration, will be critical in bringing new users and developers of the model, as well as a reasonable starting point for external engagement. Investments to accelerate this development have been facilitated by CPO and WPO in FY26 already, particularly in software engineering. Additional next steps in engaging the external community are as follows: planned extramural funding opportunities, potentially as early as FY27; presentations at the CESM Workshop in June 2026, UIFCW workshop in July 2026; and an AMS Town Hall in January 2027 (abstract submitted). Further developments and updates, including subsequent meetings, will be posted on the UFS and UFS-Chem websites.

Link to the summit website