Weekly Report – November 13, 2026

Cooperative Institute for Satellite Earth System Studies (CISESS)

NOAA/NESDIS/STAR

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TRAVEL AND MEETING REPORTS

CISESS Scientists and Student Interns Attend the 2026 Mid-Atlantic Severe Weather Conference

The 2026 Mid-Atlantic Severe Weather Conference took place on November 7 at George Mason University in Fairfax, Virginia. CISESS Scientists Guangyang Fang and Joseph Patton attended alongside student interns: Samuel Wiggins, Ian Way, Abdur-Rahman Shakir, and Adbul Hadi. Hosted by the university's weather club, the conference brought together forecasters, researchers, emergency managers, and students to discuss severe weather forecasting, preparedness, and public communication. The program covered severe weather patterns in the Mid-Atlantic and Washington, D.C. area, National Weather Service products for severe weather prediction, and emergency preparedness. A panel on careers in meteorology gave the interns a chance to hear from professionals with experience in operational forecasting, broadcasting, and consulting. For the CISESS team, the sessions also offered perspectives on how forecasters and emergency managers communicate severe weather risks, a topic relevant to the team's work in lightning observations and its immersive tools for weather data visualization, education, and outreach.



Figure: From left to right - Samuel Wiggins, Ian Way, Abdur-Rahman, Guangyang Fang, Chris White (conference founder), Joseph Patton, and Abdul Hadi at the 2026 Mid-Atlantic Severe Weather Conference. Photo credit: Guangyang Fang

(Guangyang Fang, CISESS, gfang@umd.edu, Funding: GEO-XO & Seed Grant; Joseph Patton, CISESS, jpatton4@umd.edu, Funding: GOES-R AWG, GOES-R PGRR & IIJA)

PUBLICATIONS

Mapping Urban Pollution Hotspots with High-Resolution Emissions Modeling
Citation: Rho, Ju-Hwan, Sang-Hyun Lee, **Hyun Cheol Kim**, Chang-Keun Song, Minjoong J. Kim, and Jae-Jin Kim, 2026: A multi-sectoral high-resolution emission refinement system for CFD-GIS based air quality modeling. *Urban Clim.*, **68**, 103030, https://doi.org/10.1016/j.uclim.2026.103030.
Summary: Localized areas of high concentrations of pollutants, or hotspots, form in dense urban centers where commercial, residential, and traffic activities happen all at once. Computational Fluid Dynamics (CFD) models, which take into consideration the complex flows around buildings and streets, have been successfully used to characterize the spatial distribution of urban air pollutant concentrations. Coupled with atmospheric chemistry modules, CFD-Chem models can also simulate the transport and dispersion of air pollutants as well as the various chemical reactions involved with production and destruction of these pollutants. Most studies using these models have focused on road traffic pollution only, ignoring other emission sources, such as those from building heating and industrial activities, because it is a challenge to integrate all pollution sources in high-resolution simulations. With this in mind, CISESS Scientist Hyun Cheol Kim and colleagues propose a multi-sectoral high-resolution (20 m) emission refinement methodology based on the Clean Air Policy Support System (CAPSS), South Korea's national air pollutant emission inventory with a 1-km resolution and use it as the emission data input to the Fine-scale Air-quality Simulation Unit (FASU), a modeling system that integrates a CFD-Chem, and initial and boundary conditions provided by regional models. The new integrated emissions dataset synthesizes contributions from non-industrial combustion, manufacturing combustion, production processes, energy transport and storage, organic solvent use, road transport, non-road transport, and fugitive dust. The 20 km × 20 km study area is a major urban area in Changwon, South Korea, representative of an industrially busy city. Two emission experiments were conducted: a conventional emission (CE) experiment, where the 1-km CAPSS dataset was downscaled to model grid resolution, and a high-resolution emission (HE) experiment using the proposed emission dataset. The authors find that HE did a noticeably better job at resolving in detail hotspots associated with the urban structure than the 1-km grid-based CE. The HE also accurately simulated non-linear photochemical reactions within the urban core. Overall, they conclude that incorporating the high-resolution emission refinement system into FASU vastly improves assessing urban air quality at a very fine scale, useful for better urban management purposes. In the works are

plans to make the simulations more realistic by adding more information about activities like real-time traffic flows and building-specific energy usage.

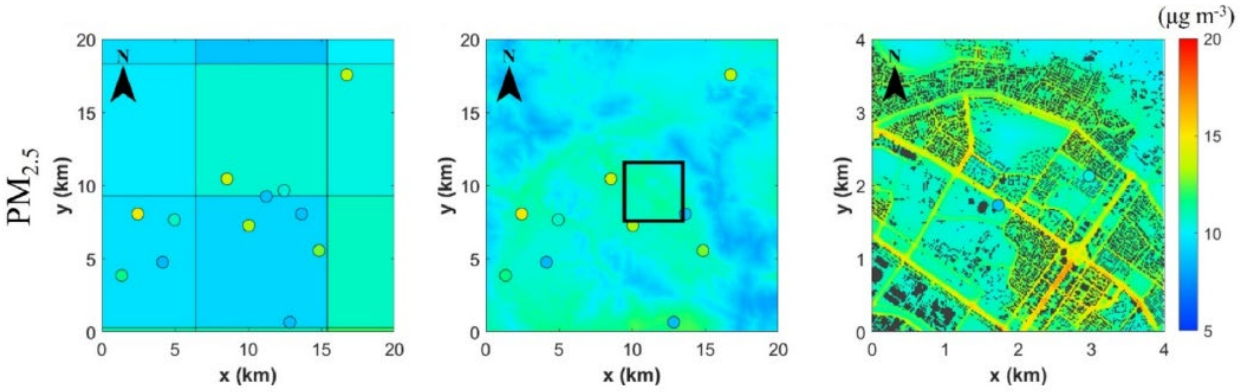

Figure: Time-averaged concentration field of $PM_{2.5}$ from the Community Multiscale Air Quality model (left panel) and HE over the 20 km x 20 km domain (middle panel) and over a 4 km x 4 km portion of the original domain (right panel; outlined in black in the middle panel). Circles denote time-averaged observed concentrations at air-quality-monitoring stations. The right panel shows that hotspots along road sections or intersections are clearly identified.

(Hyun Cheol Kim, CISESS, hyun.kim@noaa.gov; Funding: ARL)

(Maureen Cribb, CISESS, mcribb@umd.edu, Funding: CISESS Task I)