Weekly Report – May 09, 2025

Cooperative Institute for Satellite Earth System Studies (CISESS)

NOAA/NESDIS/STAR

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Date of Submission: 09 May 2025

SOCIAL MEDIA AND BLOG POSTS

No Respite From the Rain in the Southern Great Plains

Surely April showers will bring May flowers to the Southern Great Plains, hit again with heavy rain and flash flooding during the week of April 29. In his latest blog post, Chris Smith, CISESS Satellite Liaison to the National Weather Service Weather and Ocean Prediction Centers, describes in technicolor detail how convection welled up over the Texas Panhandle, spawning hail-laden storms that moved toward the northeast at observed speeds of 60 km/hr. Moisture plumes developed, leading to flash flooding in places, especially northern Texas and southern Oklahoma, where 10" of rain fell over the course of four days.

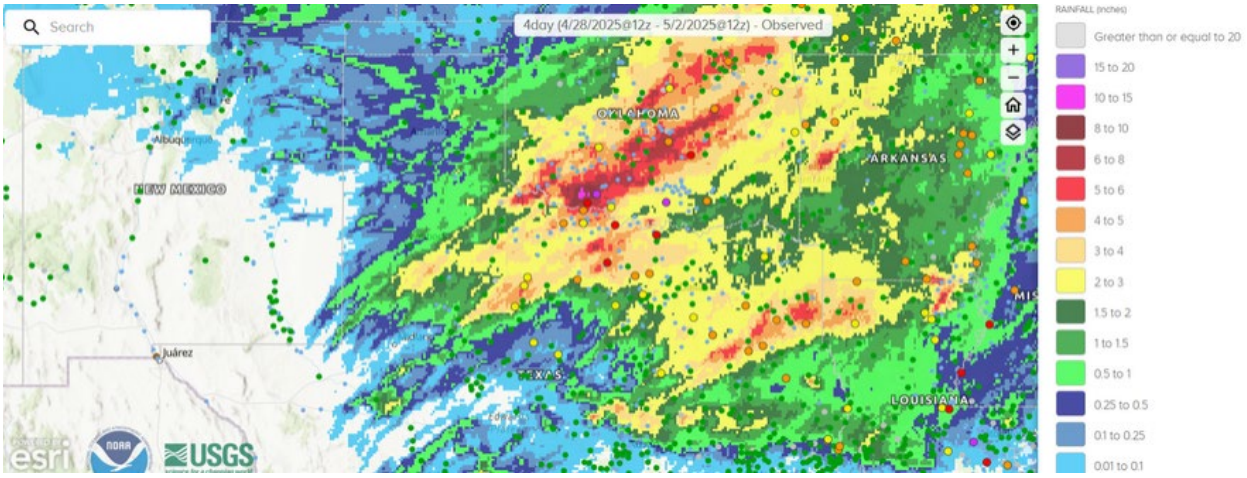

Figure: Precipitation estimates show up to 10" of rain in southern Oklahoma (deep red) with multiple rivers in Moderate (red dots) or Major (purple dots) Flood Stage (from the National Water Prediction Service).

(Christopher Smith, CISESS, csmith70@umd.edu; Funding: JPSS PGRR)

PUBLICATIONS

Assessing the Performance of NOAA's Next-Generation Air Quality Model

Citation: Li, Wei, Beiming Tang, Patrick C. Campbell, **Youhua Tang**, Barry Baker, Zachary Moon, **Daniel Tong**, Jianping Huang, Kai Wang, Ivanka Stajner, and Raffaele Montuoro, 2025: Updates and evaluation of NOAA's online-coupled air quality model version 7 (AQMv7) within the

Unified Forecast System. *Geoci. Model Dev.*, 18, 1635-1660, https://doi.org/10.5194/gmd-18-1635-2025.

Summary: In their paper published in the journal *Geoscientific Model Development*, CISESS Scientists Youhua Tang and Daniel Tong, along with colleagues, describe the latest version of NOAA's next-generation regional air quality model (AQMv7_new) and evaluate it using ground ozone (O_3) and fine particulate matter ($PM_{2.5}$) observations, all within the Unified Forecast System framework. New elements of AQMv7_new include changes in the Carbon Bond version 6 scheme (updates in halogen chemistry, reaction rates, products, photolysis rates, and the addition of new reactions), the introduction of a new aerosol module, and updated air-surface exchange processes, particularly regarding dry deposition processes. Also improved is the model's computational efficiency. The performance of AQMv7_new was assessed via three-month simulations (June–August 2023) for the contiguous U.S. (CONUS), with surface O_3 and $PM_{2.5}$ observations at AirNow sites serving as the ground truth. Overall, compared to AQMv7, an earlier version of AQMv7_new, the updated model simulates O_3 better over the CONUS. However, no improvement in model performance is seen for $PM_{2.5}$ in the vicinity and downwind of fire emissions. As part of future work, they propose doing longer simulations covering all seasons and conducting more comprehensive evaluations with different observational platforms like aircraft and lidar.

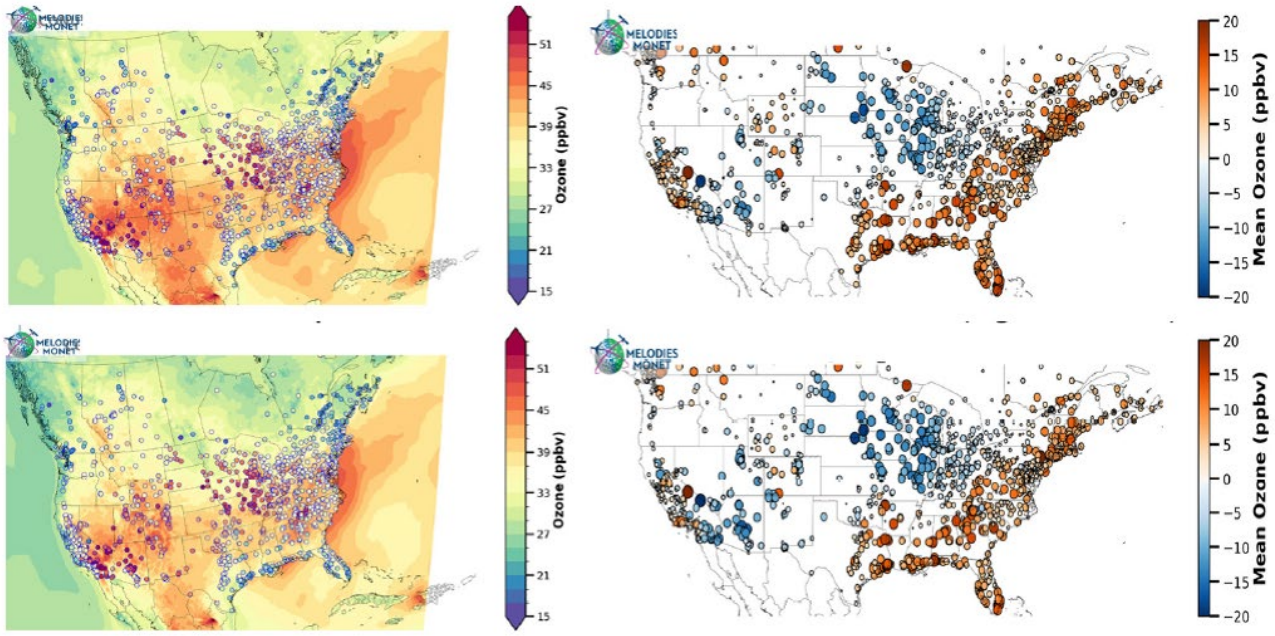

Figure. (Top panels) AQMv7-derived mean hourly O_3 overlaid by AirNow observations (colored dots) and the difference between simulations and observations (model minus AirNow). (Bottom panels) Same as above but from AQMv7_new. The results shown are for June 2023.

(Youhua Tang, CISESS, youhua.tang@noaa.gov, Funding: ARL; Daniel Tong, CISESS, daniel.tong@noaa.gov, Funding: ARL)

OTHER

Retrieving Latent Heat Atmospheric Profiles from Passive Microwave Satellite Observations
Latent heat fluxes influence atmospheric moisture, temperature, and circulation patterns, driving convection and precipitation. Through his 2025 CISESS Seed Grant, CISESS Scientist Veljko Petković plans to explore the feasibility of retrieving the latent heating profile of the atmospheric column using passive microwave satellite observations, specifically those from the Global Change Observation Mission and the Global Observing SATellite Mission advanced microwave scanning radiometers as well as the Global Precipitation Measurement dual-frequency precipitation radar. The hope is to, among other things, gain a better understanding of energy and water budgets at global and regional scales.

(Veljko Petković, CISESS, veljko@umd.edu; Funding: JSTAR, JSTAR GCOM, METOP-SG)

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