

Weekly Report – March 27, 2026
Cooperative Institute for Satellite Earth System Studies (CISESS)
NOAA/NESDIS/STAR

Submitted by: Maureen Cribb
Email: mcribb@umd.edu
Phone: 301-405-9344

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HIGHLIGHTS FOR NESDIS LEADERSHIP

Data and Information

SOM-FFN Machine Learning Ocean Carbon Dataset Updated

CISESS Scientist Annika Jersild has published [the v2025 updated version](#) of the Self-Organizing Map-Feed-Forward Network (SOM-FFN) machine learning ocean carbon dataset. Using SOM-FFN to gap-fill observations of surface ocean carbon, a monthly, 1x1-degree resolution dataset from 1982 to the present was generated for both surface ocean carbon and air-sea carbon flux. This dataset is the first of its kind covering the global ocean and is widely used by the ocean carbon community as a robust quantification of difficult-to-observe values, applicable to a range of biogeochemical and ocean dynamics research. It is based on the work of [Landschuster et al. \(2016\)](#).

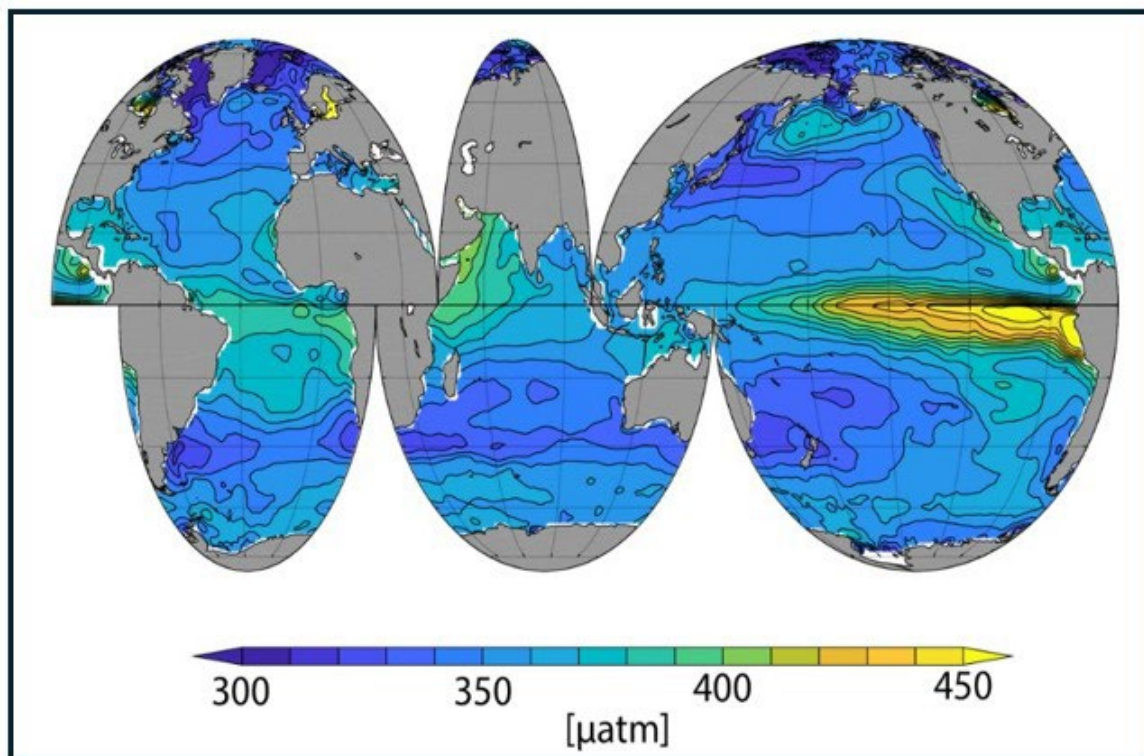


Figure: Mean sea surface partial pressure of CO₂ averaged from 1990 to 2020.

(Annika Jersild, CISESS, ajersild@umd.edu; Funding: GOMO)

People

City College of New York’s CREST Professor Receives the “Nobel Prize of Water”

CISESS Consortium Institute The City College of New York’s CUNY Remote Sensing Earth System (CREST) Institute are delighted to announce that one of its Research Professors and Director of the United Nations University Institute of Water, Environment and Health, Dr. Kaveh Madani, is the [2026 laureate of the prestigious Stockholm Water Prize](#), commonly known as the “Nobel Prize of Water”. Dr. Madani is the youngest recipient of this award, bestowed to him in honor of his outstanding contributions to the sustainable use and protection of water resources. He will receive the award from H.M. King Carl XVI Gustaf of Sweden in August 2026. A message from Dr. Madani can be viewed [here](#).



PUBLICATIONS

Introducing the Next-level Unified Forecasting System

Citation: He, Jian, Li Zhang, Rebecca H. Schwantes, Barry D. Baker, Larry Wayne Horowitz, Vaishali Naik, Congmeng Lyu, Zachary Moon, Georg A. A. Grell, Ravan Ahmadov, Jordan Schnell, **Kai Yang**, Zigang Wei, Siyuan Wang, Kai-Lan Chang, Alan M. Gorchov Negron, Aihua Zhu, Shobha Kondragunta, Eric C Apel, Ilann Bourgeois, Roisin Commane, Samuel R Hall, Alan J. Hills, Rebecca S. Hornbrook, Jeff Peischl, Kirk Ullmann, Gonzalo Gonzalez Abad, Zolal Ayazpour, Caroline R. Nowlan, and Brian McDonald, 2025: Incorporating gas-phase chemistry into the Unified Forecast System (UFS) for global air quality applications. *J. Adv. Model. Earth Syst.*, **18**(3), e2025MS005299, <https://doi.org/10.1029/2025MS005299>.

Summary: The Unified Forecasting System (UFS) is a suite of numerical models developed by the science community to support weather, smoke, and air quality prediction at NOAA. Currently, NASA’s Goddard Chemistry Aerosol Radiation and Transport model and the U.S. Environmental Protection Agency’s Community Multiscale Air Quality model are incorporated into the UFS, providing some atmospheric chemistry information for air quality forecasts. However, having different chemistry-related code from different models complicates things within the UFS. Creating a generalized global configuration of the official UFS to better simulate full tropospheric and stratospheric chemistry needed for global air quality applications would be beneficial. CISESS Scientist Kai Yang and colleagues aimed to do just that, describing how they went about it in their paper published in the *Journal of Advances in Modeling Earth Systems*. They developed the Configurable ATmospheric Chemistry (CATChem) library and modeling component that includes comprehensive chemical and aerosol processes from NOAA’s Geophysical Fluid Dynamics Laboratory’s Atmosphere Model version 4.1. UFS-Chem v1.0 was thus born. Simulations of various atmospheric gases using this new UFS were validated against a whole slew of observations, including aircraft measurements from NASA’s

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Atmospheric Tomography Mission; satellite retrievals from the Measurement of Pollution in the Troposphere instrument, the Ozone Mapping and Profiler Suite, and the Ozone Monitoring Instrument; ozonesonde data from the World Ozone and Ultraviolet Radiation Data Centre; and Tropospheric Ozone Assessment Report surface observations. The authors report that overall, UFS-Chem does a reasonable job of simulating observations and captures well the spatiotemporal distributions of different atmospheric gases. They note some issues with the UFS-Chem, for example, its coarse resolution does not capture fine-scale changes in primary pollutants in urban areas, which they plan on tackling in future work.

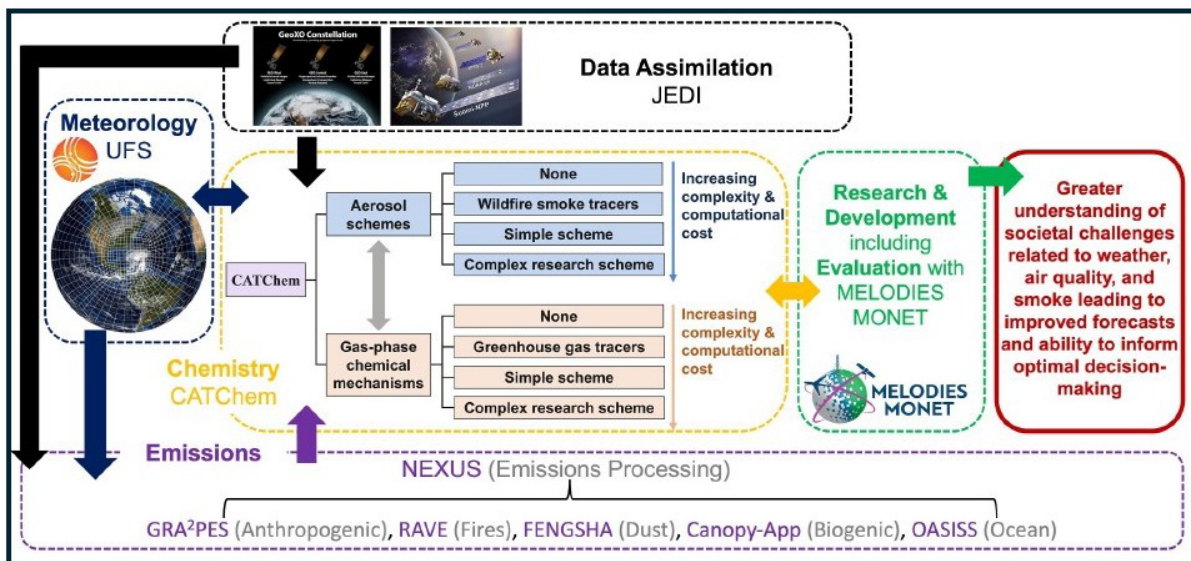


Figure: The conceptual framework of UFS-Chem.

(Kai Yang, CISESS, kaiyang@umd.edu; Funding: LEO & METOP-SG)

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