

Weekly Report – May 16, 2025
Cooperative Institute for Satellite Earth System Studies (CISESS)
NOAA/NESDIS/STAR

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TRAVEL AND MEETING REPORTS

CISESS Student Intern Participates in Student Research Symposium

CISESS student intern, Humberto Tolentino, presented his senior research at the 12th Annual Student Research Symposium hosted by the Department of Atmospheric & Oceanic Science on 8 May 2025 at the Atlantic Building on the University of Maryland – College Park campus. Humberto, who is expected to graduate this semester, highlighted his project titled “Precision in Lightning Detection: Evaluating the Geostationary Lightning Mapper Through High-Speed Imaging.” His research was conducted under the mentorship of Dr. Daile Zhang (University of North Dakota) and Dr. Guangyang Fang (ESSIC/CISESS, University of Maryland). His project evaluated the performance of the GOES-16 Geostationary Lightning Mapper (GLM) using synchronized ground-based high-speed camera footage and National Lightning Detection Network data. By analyzing lightning detection accuracy, spatial offsets, and timing precision, Humberto’s work highlights both the strengths and limitations of GLM and underscores the importance of integrating multi-source data for enhanced environmental hazard monitoring.

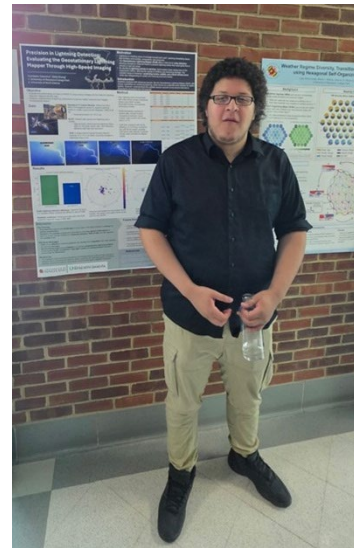


Photo credit: Guangyang Fang

(Guangyang Fang, CISESS, gfang@umd.edu; Funding: GEO-XO, GOES-R AWG. GOES-R PGRR)

CISESS Scientist Participates in 2025 Satellite Convective Applications Experiment

During the week of May 5-9, CISESS Scientist and Satellite Liaison to the National Weather Service (NWS) Weather Prediction and Ocean Prediction Centers, Christopher Smith, participated in the 2025 Satellite Convective Applications Experiment. The goal of the Experiment was to provide feedback on the data quality, display, applications, and limitations of experimental satellite products for forecasting convection and thunderstorms. This year, updated versions of the machine-learning ProbSevere LightningCast and the GOES Radar Estimation via Machine Learning to Inform NWP products, along with an optical-flow-derived product suite, OCTANE, were evaluated. Smith attended as a Visiting Scientist, contributing feedback to product developers through the creation of blog posts, while also shadowing NWS meteorologists who mimicked operations during the Experiment. A Final Report with

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Recommendations for Operational Implementations will be released by the Experiment Organizer and Satellite Liaison at the NWS Storm Prediction Center, Kevin Thiel, later this year.

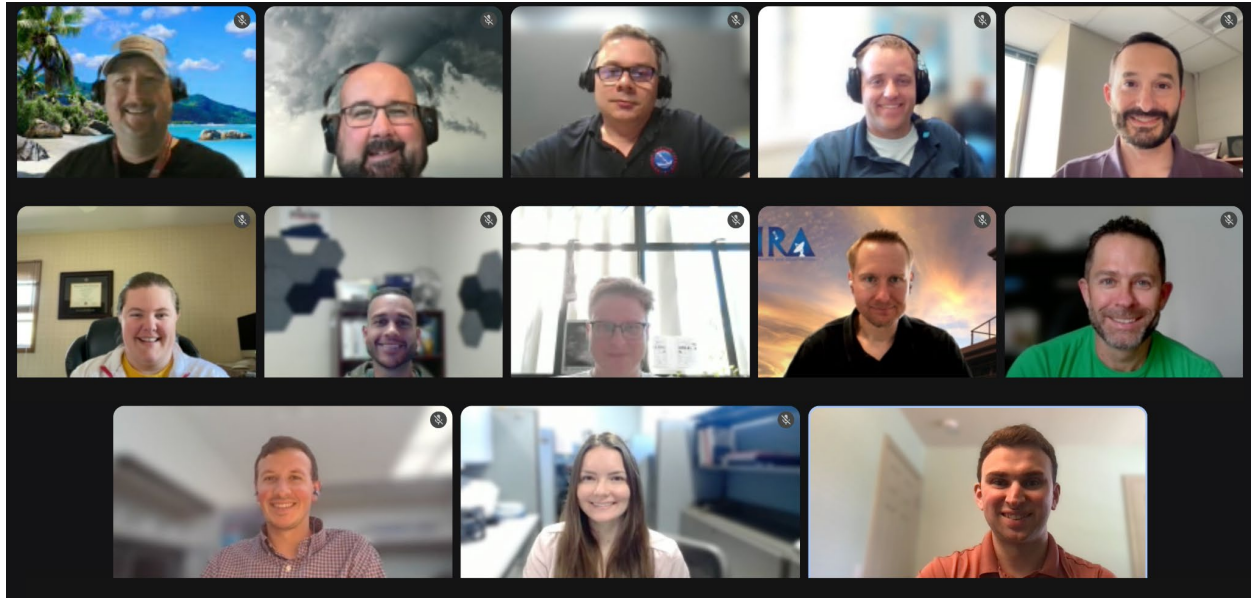


Figure. CISESS GOES-R Satellite Liaison, Christopher Smith, is pictured bottom-left on the final day of the Week 1 2025 Satellite Convective Applications Experiment on 9 May 2025.

SOCIAL MEDIA AND BLOG POSTS

The Rain-Soaking Saga Continues in the Deep South

Wind, hail, lightning, heavy precipitation, flash flooding ... [another round of stormy weather](#) rumbled across the Deep South during the first week of May, reports Christopher Smith, CISESS Satellite Liaison to the National Weather Service Weather and Ocean Prediction Centers. Given the unstable atmosphere over the southern part of the U.S. and the influx of moisture from the Gulf, strong storms developed. The Geostationary Lightning Mapper detected a large swath of lightning activity across Texas and Louisiana, and numerous instances of quarter-sized and even golf-sized hail across Louisiana were reported. This weather system slowly pushed toward the east this past week, bringing with it much needed rain to the Eastern Seaboard.

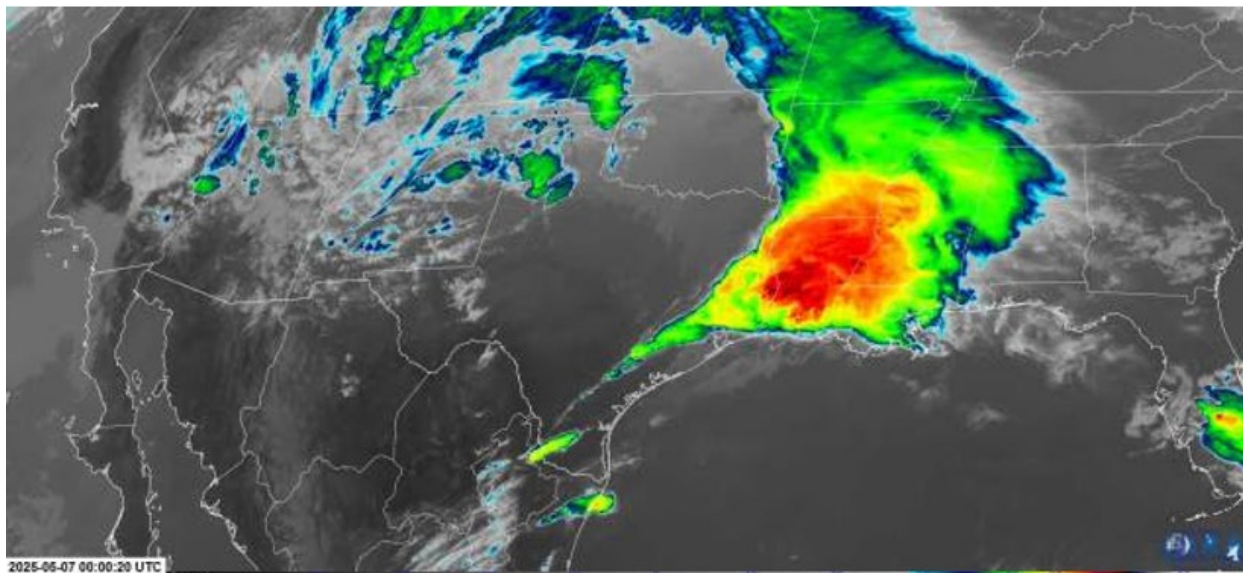


Figure. Advanced Microwave Scanning Radiometer 2 89-GHz Red-Green-Blue imagery on the Global Change Observation Mission – Water satellite. Areas with deep convection overhead are colored red.

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

PUBLICATIONS

Methane in Eastern Maryland

Citation: Sun, Jiayang, **Cédric Magen**, Mojghan A. Haghnegahdar, Jiarui Liu, Julianne M. Fernandez, and James Farquhar, 2025: Constraining wetland and landfill methane emission signatures through atmospheric methane clumped isotopologue measurements. *J. Geophys. Res. – Biogeosci.*, 130, e2024JG008249, <https://doi.org/10.1029/2024JG008249>.

Summary: Based on stable isotope ratios and gas concentrations, the Keeling plot method is a commonly used technique to analyze isotopic signatures of gases so that sources and sinks can be determined. Including clumped isotopologues, i.e., molecules of similar chemical composition but different isotopic composition, may also help identify the source of gases from atmospheric measurements. CISESS Scientist Cédric Magen and colleagues explore this idea in their latest paper published in the *Journal of Geophysical Research – Biogeosciences*, focusing on methane from the Brown Station landfill and wetlands of Jug Bay and along the Patuxent River in eastern Maryland. Air samples above the landfill site were collected in the winters of 2022 and 2023 and above the Jug Bay wetland from June 2022 to May 2023 and along the Patuxent River in the summer of 2023. The authors developed a novel approach that uses methane clumped isotopologue data to estimate the bulk isotope compositions of methane independently of concentration, thus reducing the uncertainty associated with concentration data. Magen reports that there were significant seasonal variations in the isotopic and isotopologue signatures of regionally integrated methane emissions due to microbial oxidation,

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more obvious in winter. Directions for further research are suggested, including doing more comprehensive field surveys and air samplings at different wetlands in different ecological environments.

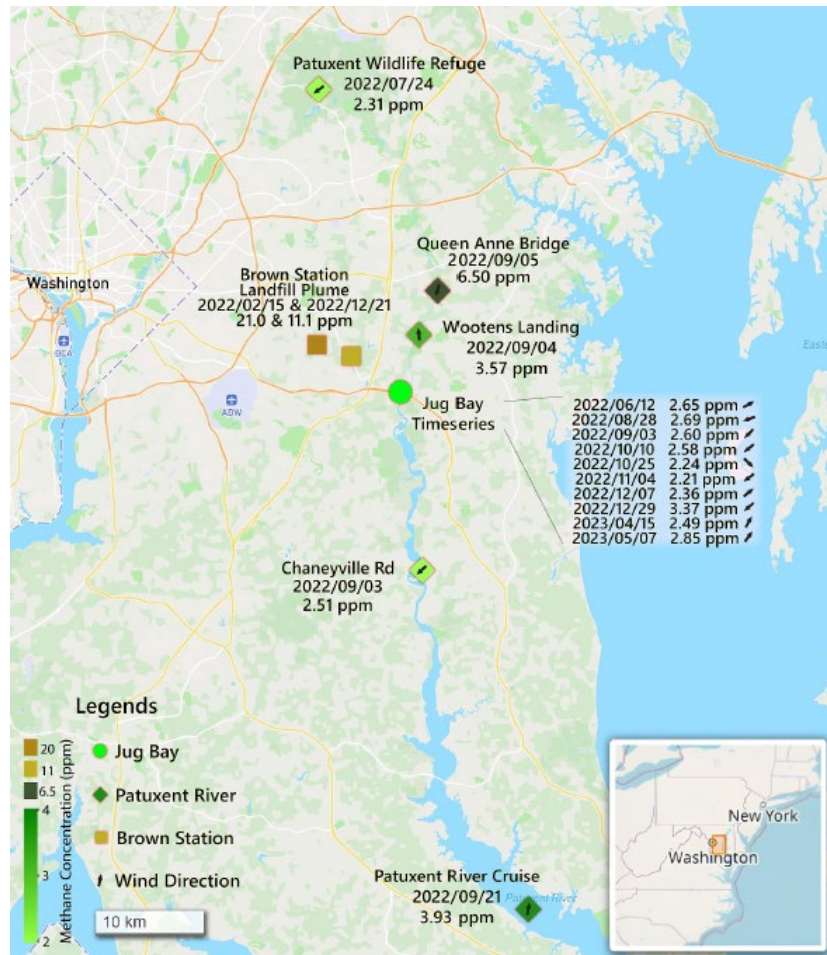


Figure. Map of sampling locations. The Jug Bay time series samples are represented by circles with 10 sampling events at the same location. The Patuxent River series samples are shown by diamonds, and landfill air samples by squares. Wetland air samples are in varying shades of green, with darker greens indicating higher methane concentrations. Landfill air is filled with light and dark brown shades. Prevailing wind directions at the time of sampling are indicated by black arrows on the map.

(Cédric Magen, CISESS, cmagen@umd.edu; Funding: OAP)

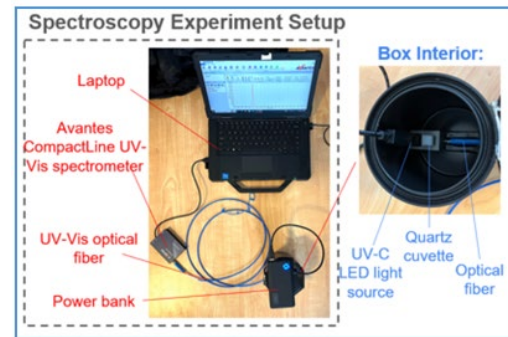
OTHER

CISESS Seed Grant: Machine-learning-based Hyperspectral Sensor Data Retrieval at the CISESS Remote Sensing Laboratory

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Payloads on low-Earth-orbit and geostationary satellites are starting to include more hyperspectral sensors, such as the Ocean Color Instrument (OCI) with its over two hundred bands as part of NASA's Plankton, Aerosol, Cloud, ocean Ecosystem (PACE) satellite mission. This [CISESS Seed Grant awarded to CISESS Scientist Xi Shao](#) will focus on using PACE OCI hyperspectral data to develop machine-learning-based retrieval methods for ocean composition classification and algae monitoring. The project will also serve as a training opportunity for interns as they learn how to collect and analyze hyperspectral radiometer measurements from field and lab experiments.



(Xi Shao, CISESS, xshao@umd.edu; Funding: COSMIC2, JSTAR, STAR)

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