Weekly Report – February 14, 2025

Cooperative Institute for Satellite Earth System Studies (CISESS)

NOAA/NESDIS/STAR

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Date of Submission: 14 February 2025

HIGHLIGHTS FOR NESDIS LEADERSHIP

Adam Clark Honored with AMS Second-Place Best Student Poster Presentation Award

Adam Clark, a junior student in Atmospheric Science at Texas A&M and treasurer of the Texas A&M student chapter of the AMS, was given the second-place award for the AMS best student poster presentation. Adam was a summer intern at CISESS in 2024, mentored by Daile Zhang, formerly with CISESS. He was using the Raspberry Pi camera, which was developed by the CISESS lightning group, to record high-speed lightning videos in the Southeast Texas region and evaluate the Geostationary Lightning Mapper (GLM) based on the videos.


AMERICAN METEOROLOGICAL SOCIETY

Second Place Best Student 12Lightning Poster Presentation

is presented to

Adam D Clark

Texas A&M University - College Station

12Lightning **Evaluation of GLM in Southeast Texas via Ground-Sensor and High-Speed Raspberry Pi-Based Camera Network**

presented at the

105th AMS Annual Meeting

January 12 - 16, 2025

Brian Papa
Acting Executive Director

(Daile Zhang, now with the University of North Dakota, daile.zhang@und.edu)

TRAINING AND EDUCATION

Mariners Learn How to Use Satellite Resources to Stay Safe on the Water

On 5 February 2025, CISESS Scientist and Satellite Liaison to the NWS Weather Prediction Center and Ocean Prediction Center, Christopher Smith, presented at the 52nd Annual Conference on Sail Training and Tall Ships. The talk was co-authored by OPC Ocean Applications Branch, Branch Chief, Joseph Sienkiewicz, and was titled '"Flash, crash, boom - Thunderstorms!!!"'. Smith presented GOES-R Satellite capabilities to monitor convection and thunderstorms, and new machine-learning products on the way, like LightningCast, to provide a prediction of lightning based on satellite data. Training and other resources were provided to mariners to provide information on how to track storms using satellite imagery readily available online. The talk came at a time when two large vessels were lost at sea over the past year due to thunderstorms, including near the Bahamas with the cargo schooner "De Gallant" and off Sicily with the "Bayesian" sailing yacht.

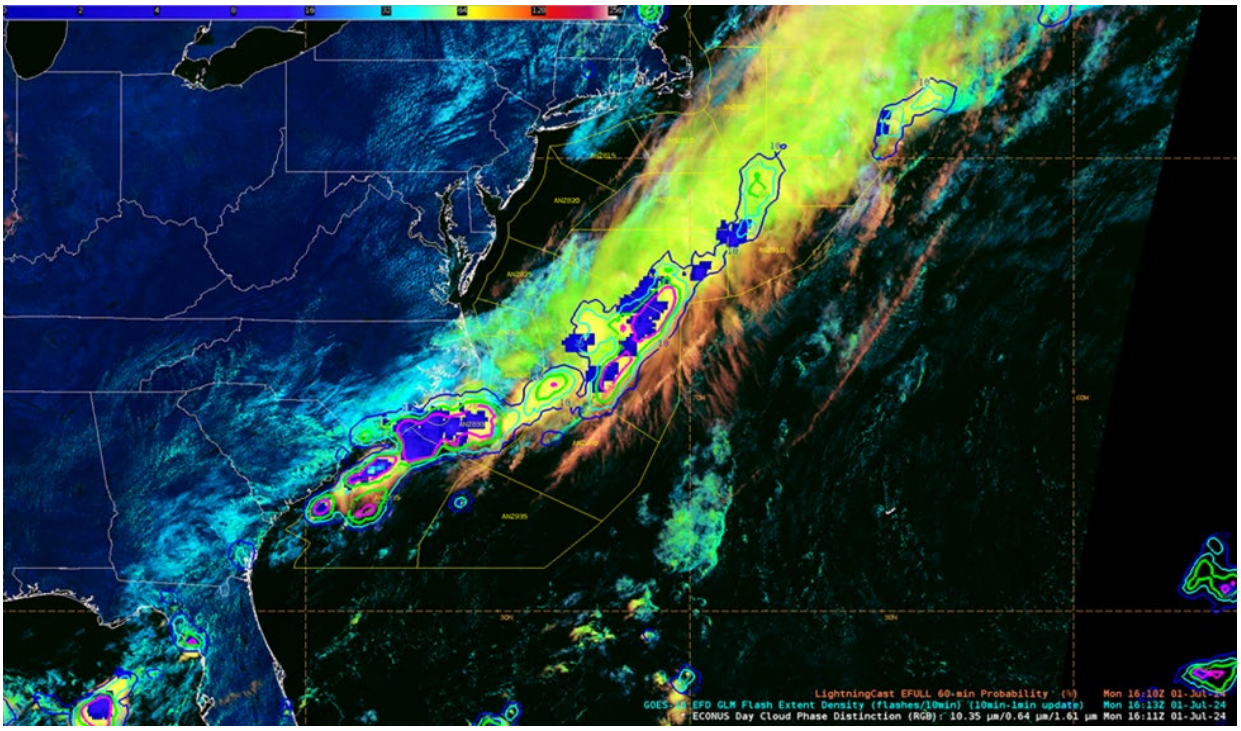

Figure. GOES-East LightningCast output overlaid on the Day Cloud Phase Distinction RGB and GLM Flash Extent Density at ~1610 UTC 01 July 2024.

(Christopher Smith, CISESS, csmith70@umd.edu; Funding: GOES-R PGRR)

TRAVEL AND MEETING REPORTS

CISESS Students Participate in MIT Reality Hack
On 23 January 2025, CISESS students Damian Figueroa and Samuel Wiggins–also members of the XR Club at the University of Maryland–traveled to the iconic MIT campus in Cambridge, Massachusetts to take part in MIT Reality Hack, one of the most prominent hackathons in the XR community.

A “hackathon” is a competition where participants, known as “hackers,” join forces to transform mere ideas into working prototypes within a limited period of a few days. Hackers come from a diverse set of backgrounds, including students, designers, programmers, artists, scientists, and more. They then select a “track” to compete in, each with a specific theme and technologies. For instance, Meta hosted tracks that encouraged hackers to leverage the mixed-reality and social capabilities of the Meta Quest 3.

Damian and his team created a glove embedded with thermoelectric modules, allowing users to feel temperature sensations on their hands. They developed an accompanying virtual-reality

experience that transports users to a cozy winter setting, where the gloves simulate the chill of the surrounding air and the warmth of a virtual campfire. Damian hopes this technology will continue to advance and gain mainstream adoption in education, including its use in geoscience learning experiences like those he and Samuel have developed within CISESS's Virtual Proving Ground & Training Center.

Samuel and his team developed "BookwXRms," using Apple Vision Pro's high-fidelity mixed-reality features to enhance reading. The app tracks the user's progress in a book and dynamically adjusts the environment with sounds, visuals, and more. Now, Samuel aims to apply his Vision Pro development skills to bring his geoscience educational modules to the device.

Damian and Samuel are eager to attend more hackathons in the future, where they will continue advancing their skills to create even more incredible immersive experiences for CISESS and beyond.

Figure. CISESS students Damian Figueroa (left) and Samuel Wiggins (right) at the MIT Reality Hack.

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

PUBLICATIONS

Shortwave Infrared Observations and NWP Forecasts
Citation: Jones, Erin, Kevin Garrett, **Kayo Ide**, Bryan Karpowicz, Christopher Barnet, Yingtao Ma, and Sid Boukabara, 2024: Enabling the assimilation of CrIS shortwave infrared observations in global NWP at NOAA. Part II: OSEs and results. *J. Atmos. Ocean. Tech.*, 41, 1277-1295, https://doi.org/ 10.1175/JTECH-D-23-0149.1.
Summary: Medium-range numerical weather prediction (NWP) forecasts benefit from the assimilation of hyperspectral infrared (IR) data from sensors onboard low-Earth-orbiting satellites. Longwave IR data is typically used in NWP, but shortwave IR (SWIR) information is not because, for one, instrument noise is higher in this spectrum. However, recent advances in radiative transfer modeling have improved SWIR brightness-temperature simulations. In this second part of a two-part paper published in the *Journal of Atmospheric and Oceanic Technology*, CISESS Scientist Kayo Ide and colleagues assess the impacts of assimilating Cross-track Infrared Sounder SWIR observations on global analyses and forecasts. Insignificant differences in analyses and forecasts when CrIS SWIR observations were assimilated versus when they were not assimilated are reported. This suggests that future SWIR instruments onboard small satellites or CubeSats can be used in global data assimilation once issues like observation errors and quality control are addressed.

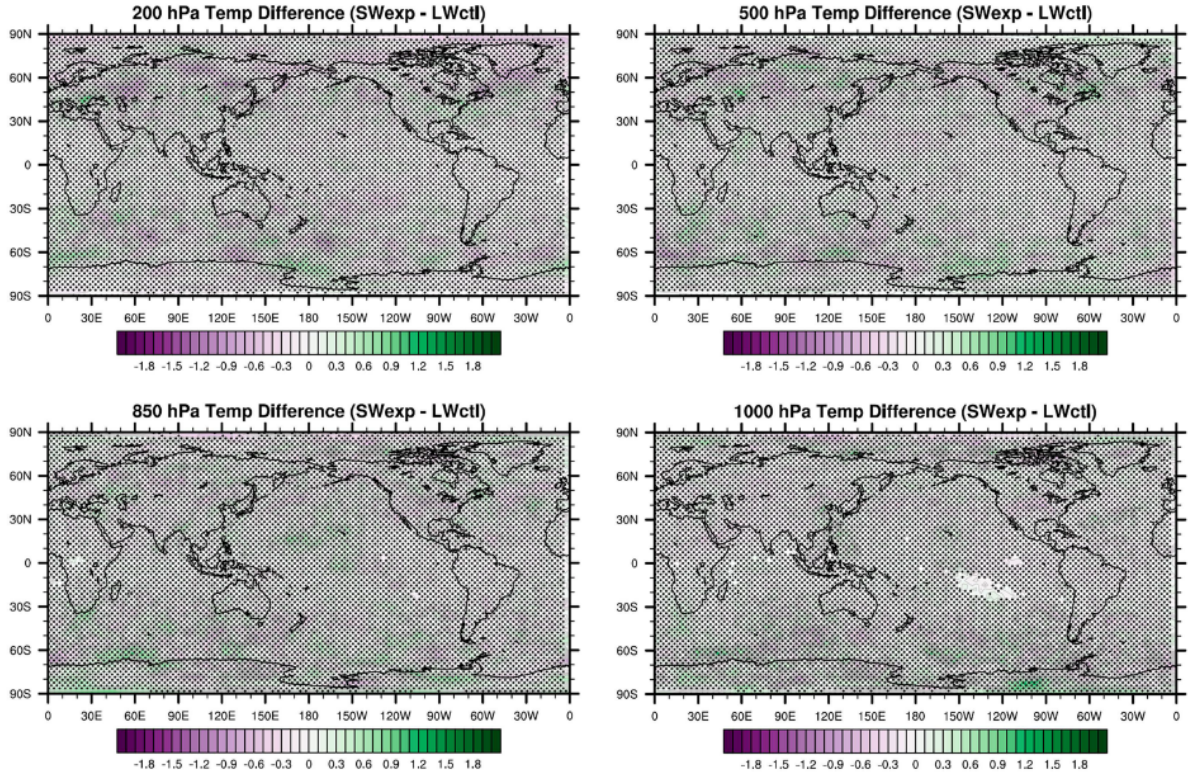

Figure. Mean analysis (8 Dec 2018 to 31 Jan 2019) five-day temperature differences between the runs where only longwave IR observations are assimilated (LWctl) and where only SWIR observations are assimilated (SWexp) at four levels of the atmosphere. Hatching stands for areas where no significant difference (at the 95% confidence level) is found.

(Kayo Ide, CISESS, ide@umd.edu; Funding: EMC)

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