**Weekly Report – May 29, 2026**

Cooperative Institute for Satellite Earth System Studies (CISESS)

NOAA/NESDIS/STAR

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## HIGHLIGHTS FOR NESDIS LEADERSHIP

### Data and Information

**NOAA Oceansat-3 Ocean Surface Wind Products Archived**

NCEI has successfully archived the NOAA Ocean Surface Wind products from the Oceansat-3 satellite through the NOAA Comprehensive Large Array-data Stewardship System (CLASS). Oceansat-3, also designated as Earth Observation Satellite 6, is an advanced oceanographic satellite launched by the Indian Space Research Organization as a follow-on mission to the Oceansat-2 and SCATSAT-1 missions. The OSCAT-3 scatterometer is a microwave radar instrument specifically designed to measure ocean surface wind vectors. As one of the leads in the NCEI end-to-end stewardship process, CISESS Scientist Yongsheng Zhang has coordinated with the Center for Satellite Applications and Research, the Office of Satellite and Product Operations (OSPO), CLASS, and the NCEI Data Stewardship Division to ensure a successful long-term preservation of these products. Oceansat-3 Ocean Surface Winds products provide critical data to the National Weather Service's numerical weather prediction models to improve tropical storm monitoring and forecasting.

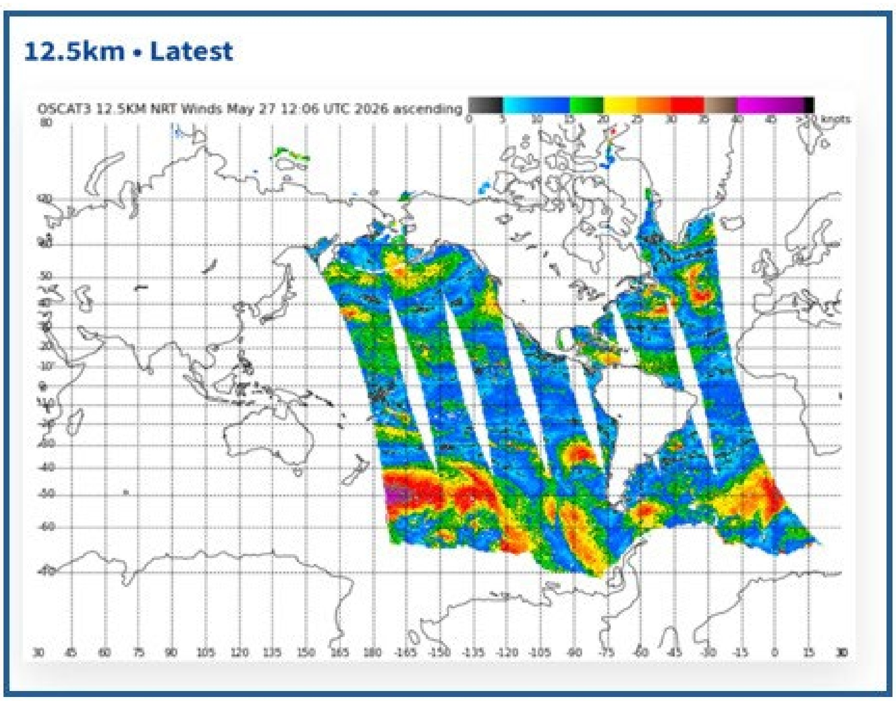

*Figure: Example of a map of daily ocean surface wind speeds (in knots) downloaded from the NESDIS/OSPO data website: https://www.ospo.noaa.gov/products/atmosphere/oceansat*

*(Yongsheng Zhang, CISESS, yzhang25@umd.ed; Funding: NCEI)*

## SOCIAL MEDIA AND BLOG POSTS

### Mid-May Midwest Flooding

With a bevy of satellite tools at hand, CISESS Scientist Christopher Smith, the GOES-R Satellite Liaison to the National Weather Service's Weather Prediction Center and Ocean Prediction Center, followed the evolution of an intense dryline that raced through the Midwest on May 18–19 and its associated strong convective activity, described in his latest blog post. Although flash floods were a general threat everywhere in the region, of note, it was highest in Kansas and Missouri, where total precipitable water amounts in Missouri, for example, approached an anomalously high 2 inches (percentile values exceeding 200% percent of normal).

*(Also published on the Satellite Liaison Blog, along with other blog posts of interest by other contributors.)*

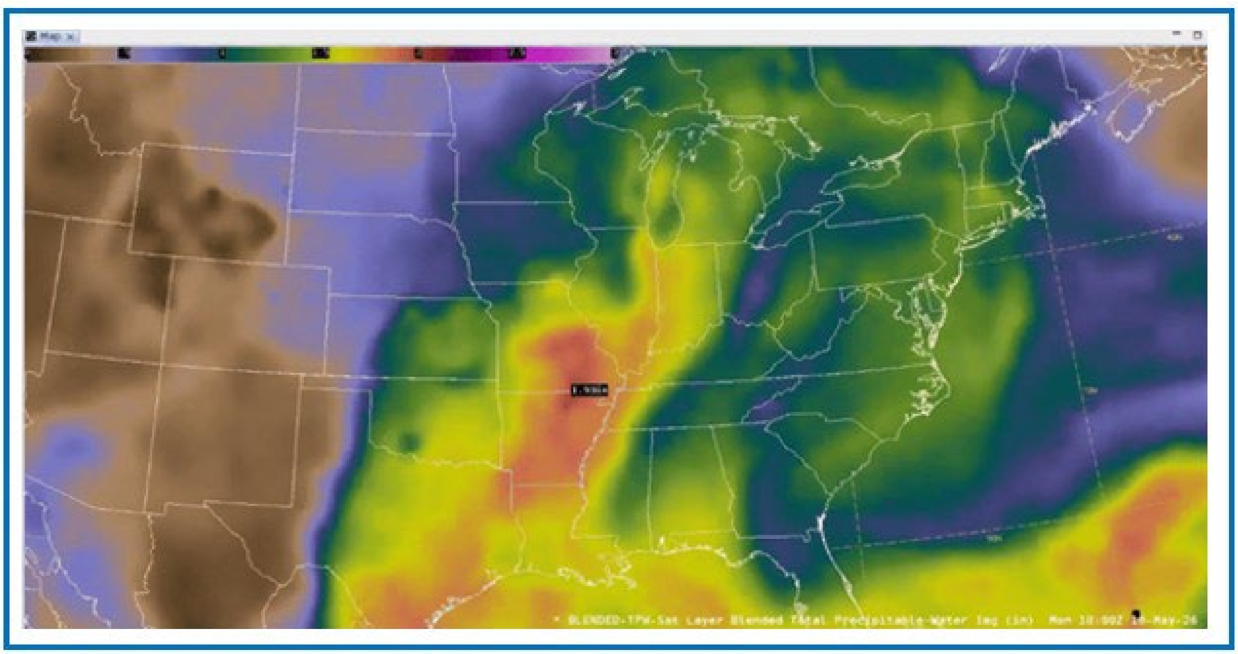

*Figure: NESDIS Blended Total Precipitable Water product output at 1800 UTC 18 May 2026. Colors go from brown (less than 0.5 in) to green/yellow (1.5 in) to orange/red (~2 in).*

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

## PUBLICATIONS

**Citation: Liang, Xingming**, Quanhua Liu, and Christopher Grassotti, 2026: Refining clear-sky AI radiative transfer model forward predictions and Jacobian accuracy for ATMS using a ResNet and physical constraints. *IEEE Trans. Geosci. Remote Sens.*, **64**, https://doi.org/10.1109/TGRS.2026.3665759.

**Summary**: Christopher Grassotti and Quanhua Liu (both no longer with CISESS) and CISESS Scientist Xingming Liang introduce an artificial intelligence (AI)-enhanced radiative transfer modeling framework designed to speed up satellite radiance simulations while preserving the physical accuracy needed for data assimilation (DA) applications. Conventional radiative transfer models (RTMs), such as the Community RTM (CRTM), simulate satellite-observed radiances and Jacobians, which are matrices describing how radiances respond to changes in atmospheric or surface conditions. These Jacobians are essential for variational DA in, for example, numerical weather prediction (NWP) systems. RTMs are especially important for microwave sounding instruments like the Advanced Technology Microwave Sounder (ATMS) because microwave observations are assimilated in NWP systems, contributing greatly to forecast skill. Traditional RTMs, however, are computationally expensive, a problem given that modern satellite sensors produce increasingly large, high-resolution datasets. Enter AI-based “fast” RTMs. Although computationally faster, these RTMs cannot generate reliable and physically consistent Jacobians. To address this, the authors propose an AI-CRTM framework built on a Residual Neural Network (ResNet). The framework was trained and tested using simulated observations from the ATMS under global clear-sky conditions. Its performance was evaluated against both CRTM simulations and high-accuracy line-by-line simulations from MonoRTM, an RTM particularly useful in the microwave spectral region. Results show that combining the ResNet architecture with physics-based Jacobian constraints improves forward radiance prediction accuracy, Jacobian quality and stability, physical consistency, and robustness for different atmospheric conditions. Future plans involve adopting cloud processes and expanding the AI-CRTM framework to support infrared and hyperspectral sensors.

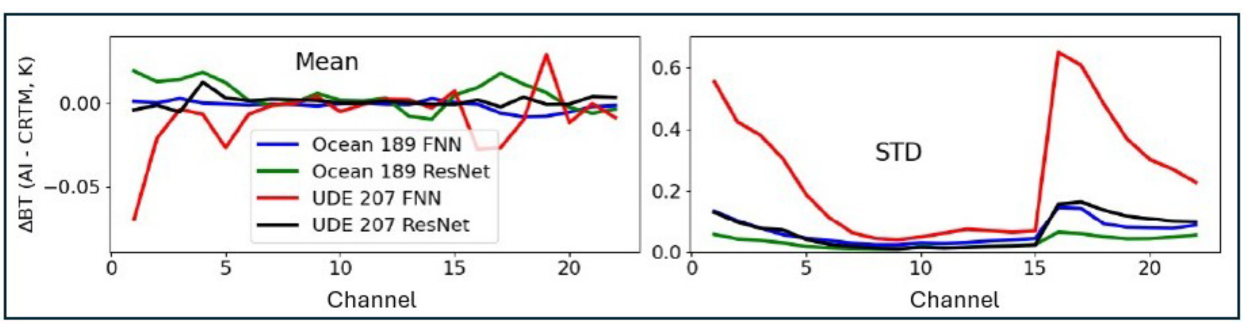


*Figure: Differences (AI-CRTM minus CRTM) in mean and standard deviation (STD) for brightness temperature (BT) across 22 ATMS channels. FNN stands for feedforward neural network, an early AI RTM; ResNet is the newly developed AI RTM. Emissivity scenarios are “Ocean” (constant* *emissivity near unity) and "UDE" (user-defined emissivity). The numbers 189 and 207 are the numbers of input features. In the ocean scenario, mean BT biases are within ±0.02 K for all 22 channels in both FNN and ResNet architectures. However, ResNet has lower STDs (~0.02 to 0.1 K across the channels). This improvement is especially noticeable in window bands (Channels 1, 2, 3, 16, and 17), highlighting the benefits of the ResNet structure.*

*(Xingming Liang, CISESS, lddl514@umd.edu; Funding: IIJA)*

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