# Weekly Report – April 04, 2025

Cooperative Institute for Satellite Earth System Studies (CISESS)

NOAA/NESDIS/STAR

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## TRAINING AND EDUCATION

**CISESS Lightning Team Invited to NWS Weather Day at College Park Academy**

On 1 April 2025, CISESS Scientist Guangyang Fang and CISESS Interns Damian Figueroa and Samuel Wiggins were invited to participate in the NWS Weather Day at College Park Academy Middle School. College Park Academy is a college preparatory middle and high school located in the Discovery District of the University of Maryland in College Park, MD. Fang and his students represented ESSIC/CISESS by hosting an interactive booth highlighting Virtual and Mixed Reality (MR) technologies focused on lightning safety. The newly released MR application, Faraday Lightning Safety, was featured for the first time at a public outreach event. Designed to engage and educate, the application allowed 7th-grade students to explore lightning safety concepts in an immersive environment. The booth attracted significant interest and was well received by students, marking a successful outreach effort for ESSIC/CISESS.

*Figure 1. CISESS Interns Damian Figueroa and Samuel Wiggins, along with Dr. Guangyang Fang (from left to right) at the NWS Weather Day held at College Park Academy Middle School. (Photo credit: Damian Figueroa)*

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

**PUBLICATIONS**

**A Novel Retracker of Synthetic-Aperture Radar Altimetry Signals**
**Citation: Buchhaupt, Christopher**, Alejandro Egido, Salvatore Dinardo, Claire Maraldi, Thomas Moreau, Luciana Fenoglio, 2025: Impact of the antenna characteristics on sea surface parameters estimated from low- and high-resolution satellite altimetry. Adv. Space Res., https://doi.org/10.1016/j.asr.2025.02.056.

**Summary**: Monitoring ocean characteristics, like sea surface height (SSH) and significant wave height (SWH), and other sea-state parameters has typically been done over the years using data gathered from nadir-looking satellite radar altimeter missions. In a process called retracking, parameterized models for the expected radar power returned from a randomly rough surface are fit to the averages of radar pulse echoes to retrieve such ocean-height parameters. Techniques used for retracking range from simple averaging, known as Low Resolution Mode (LRM) modeling, to more sophisticated techniques in recent years that take advantage of the higher pulse repetition frequencies of newer synthetic-aperture radars (SARs), referred to as the SAR mode. Over the past several years, CISESS Scientist Christopher Buchhaupt has developed retrackers aimed at improving the accuracy of SWH retrievals from SAR altimetry. In his latest paper published in the journal *Advances in Space Research*, Buchhaupt and colleagues introduce an extension to existing numerical retrackers. The novelty of the new method approximates the theoretical antenna pattern using a sum of three Gaussian functions to mitigate the SSH estimation errors for Sentinel-3A and Sentinel-6A satellites in SAR mode. They report that overall, the new tracking method is more accurate compared with LRM. This new methodology may also benefit other altimeter missions like the upcoming Copernicus Polar Ice and Snow Topography Altimeter mission, which features a smaller antenna beam width for which a simple Gaussian approximation of the antenna pattern is invalid. Future work will include conducting an in-situ validation campaign involving tide gauges and buoys and looking into the contribution of swell waves to retracker output, a factor not previously considered in this and other studies.

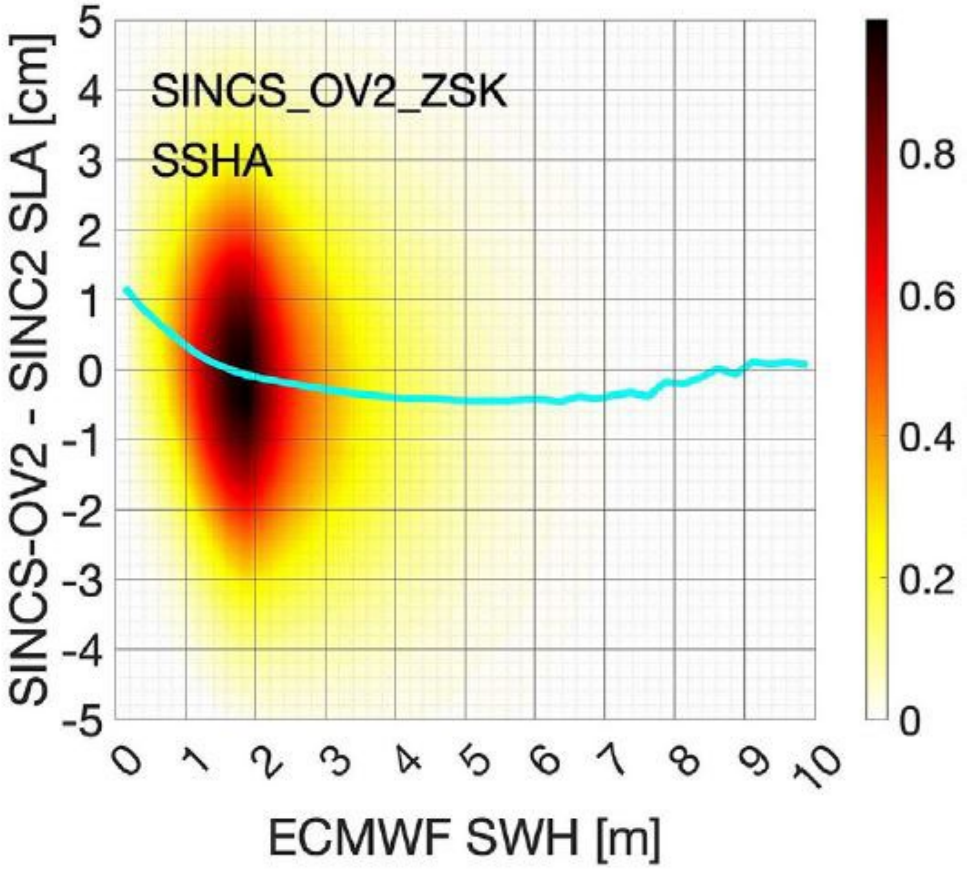


*Figure. Difference between the sea-level anomaly (SLA) from the new method (SINCS-OV2) and from the LRM (SINC2) as a function of significant wave height (SWH). The sum of three Gaussian retracking results (the new method) shows no clear SWH trend except for when SWH is less than 2 m.*

*(Christopher Buchhaupt, CISESS, cbuchhau@umd.edu; Funding: Jason)*

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