Weekly Report – March 1, 2024

Cooperative Institute for Satellite Earth System Studies (CISESS)

NOAA/NESDIS/STAR

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TRAVEL AND MEETING REPORTS

CISESS at the Ocean Sciences Meeting

The Ocean Sciences Meeting was held last week, February 18-23, in New Orleans, Louisiana. CISESS scientist **Korak Saha** gave a talk on "Long-term Spatiotemporal Trends in Offshore Wind Energy Resources along the Coastal USA," coauthored by **James Frech**. CISESS Scientist **Erick Geiger** spoke about "NOAA Coral Reef Watch's Single-Pixel Virtual Stations for the Florida Keys: A New Monitoring Tool to Assist in the Response to an Unprecedented Marine Heatwave," coauthored by **Jacqueline De La Cour.** A figure from his talk (below) shows that sea surface temperatures in 2023 set high temperature records (top), with unprecedented effects on degree heating week (DHW - bottom), a measure of coral reef stress.

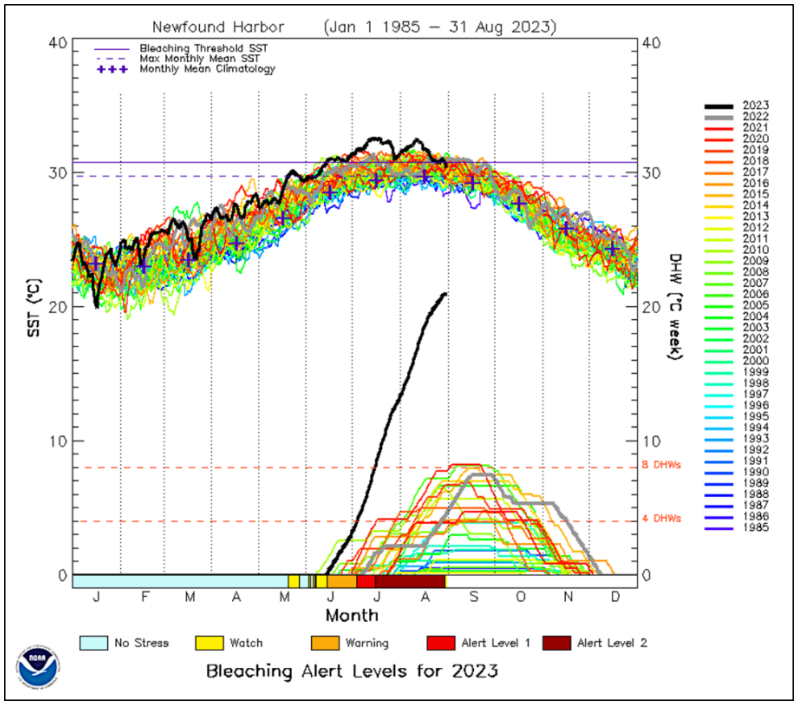

Figure: from Erick Geiger, et al., 2024: NOAA Coral Reef Watch's Single-Pixel Virtual Stations for the Florida Keys: A New Monitoring Tool to Assist in the Response to an Unprecedented Marine Heatwave, Ocean Sciences Conference, February 18-23, in New Orleans, Louisiana.

Posters presenters at the Ocean Science Meeting included:

- **Eder Herrera-Estrella** and **Alex Gilerson** (CISESS Consortium: CUNY), Analyzing Sources of Remote Sensing Reflectance Uncertainties in the Blue and UV Spectral Bands;
- **Paige Lavin** (CISESS), Can Deep Argo Close the Sea Level Budget in the Southwest Pacific Basin? and
- **David Trossman** (CISESS), Extraction of the Ocean Circulation's Contribution to the Magnetic Field and its Physical Oceanographic Applications.

The NOAA Bio-GO-Ship project also had a large presence at the conference (see table), including a talk by CISESS Consortium Scientist **Adam Martiny** (UCI).

Name	Time	Title
Megan Sullivan	M 10:45 am	Integrating Trait-Based Physiology in a Biogeochemical Inverse Model Reveals the Links Between Phytoplankton Stoichiometry and Global Carbon Export
Tia Chung-Swenson	M Poster	Sharp Environmental Gradients in the Pacific Arctic Ocean Lead to Variable Plankton Diversity
Luke Thompson	Tu Poster	Standardized methods for collection, preservation, and extraction of DNA and RNA on GO-SHIP cruises
Jun Yu	W Poster	Ecosystem composition and biogeochemical cycles: Community Earth System Model Simulations with multiple plankton functional types
Nataly Pineda	Th Poster	Marine elemental stoichiometry of Particulate Organic Matter in the Southern Indian Ocean
Adam Fagan	Th Poster	Determination of Particulate Organic Matter and Phytoplankton Biomass Using In-Situ and Satellite Measurements Across the North Pacific Ocean
Amy Nuno	Th 9:47	Integrating Phytoplankton Genomics, Photophysiology and Remote Sensing to Detect Iron Stress from Space
Adam Martiny	Th 11:47	Genomic-to-space measurements reveal global ocean nutrient stress
Stephanie O'Daly	Th 14:55	Large-scale patterns of marine snow in the Southern Ocean and the impact of fronts
Skylar Gerace	F 11.05	Nutricline depths show increasing P limitation in the global ocean over the past 5 decades
Nicole Poulton	F 11:15	A comprehensive view of surface picophytoplankton dynamics in the subtropical Pacific from underway BIO GO-SHIP measurements
Nicole Wiseman	F 11:10	Phytoplankton variable elemental composition modifies the marine biological pump and largely determines the global patterns of nutrient limitation

(Debra Baker, CISESS, drb@umd.edu, Funding: Task I)

PUBLICATIONS

Header

Citation**: Liang, Xingming**; Lihang Zhou, Mitch Goldberg, Satya Kalluri, **Christopher Grassotti**, Ninghai Sun, Banghua Yan, **Hu Yang**, **Lin Lin**, and Quanhua Liu, 2024: Improving ATMS imagery visualization using limb-correction and AI resolution enhancement, *IEEE J. Sel. Top. Appl. Earth Obs. Remote Sens.*, **17** (Jan), 4263–4279, https://dx.doi.org/10.1109/JSTARS.2024.335410.

Summary: This article discusses efforts to improve visualization of data from the Advanced Technology Microwave Sounder (ATMS), a key instrument on the JPSS satellites. Visualization from microwaves sounders is often hindered by its coarse resolution and angular dependence. This significantly limits the depiction of surface and atmospheric information and the clear identification of extreme weather events. Efforts to correct the scan angle dependence of

cross-track microwave sensors are known as limb correction, and this method is used for ATMS. It is combined with artificial intelligence resolution enhancement, specifically, an enhanced super-resolution generative adversarial network (ESRGAN). In applying ESRGAN to ATMS, the researchers were able to increase the pixel resolution by a factor of four and generate realistic textures in the ATMS images. ESGRAN is not dependent on the specific sensor or channel but they found it was limited by its lack of specific remote sensing and atmospheric information. They were able to make significant improvements in ATMS image visualization (see figure).

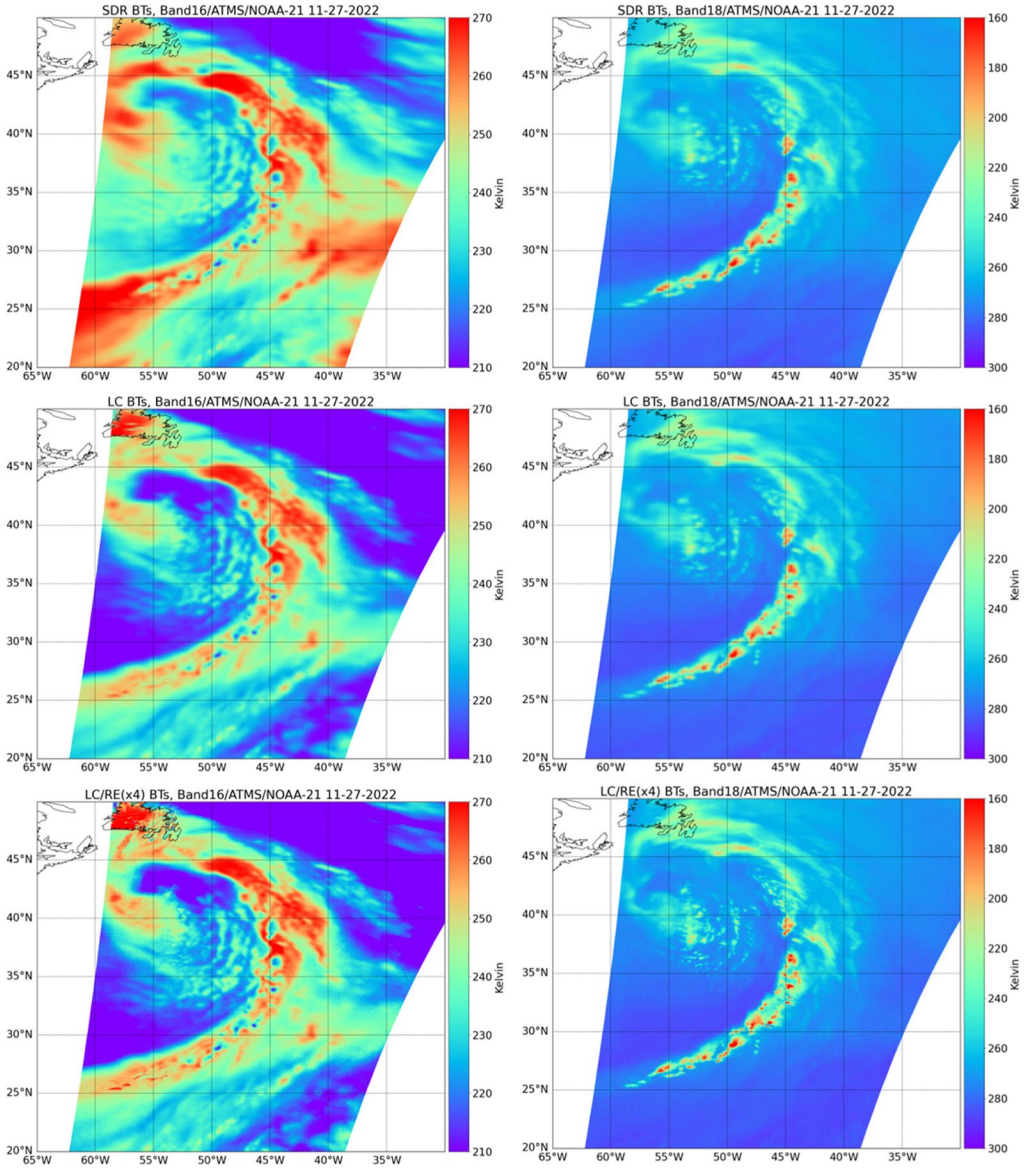

Figure: ATMS brightness temperature (BT) image from the sensor data records of two different channels (top), with the addition of limb correction (middle) and then the further addition of resolution enhancement (bottom). (Xingming Liang, CISESS, xingming.liang@noaa.gov, Funding: JSTAR, JPSS PGRR, SAE)