Weekly Report – February 9, 2024

Cooperative Institute for Satellite Earth System Studies (CISESS)

NOAA/NESDIS/STAR

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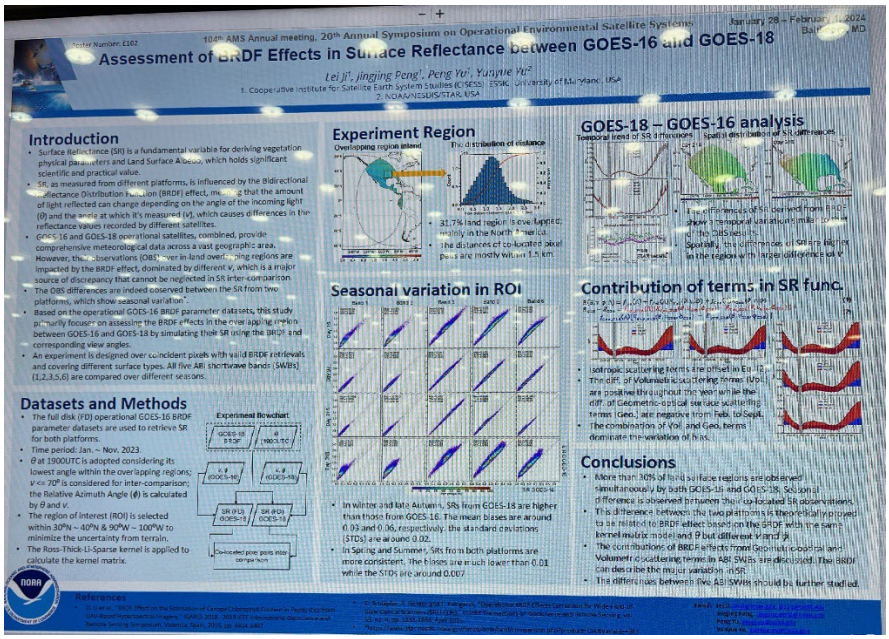
TRAVEL AND MEETING REPORTS

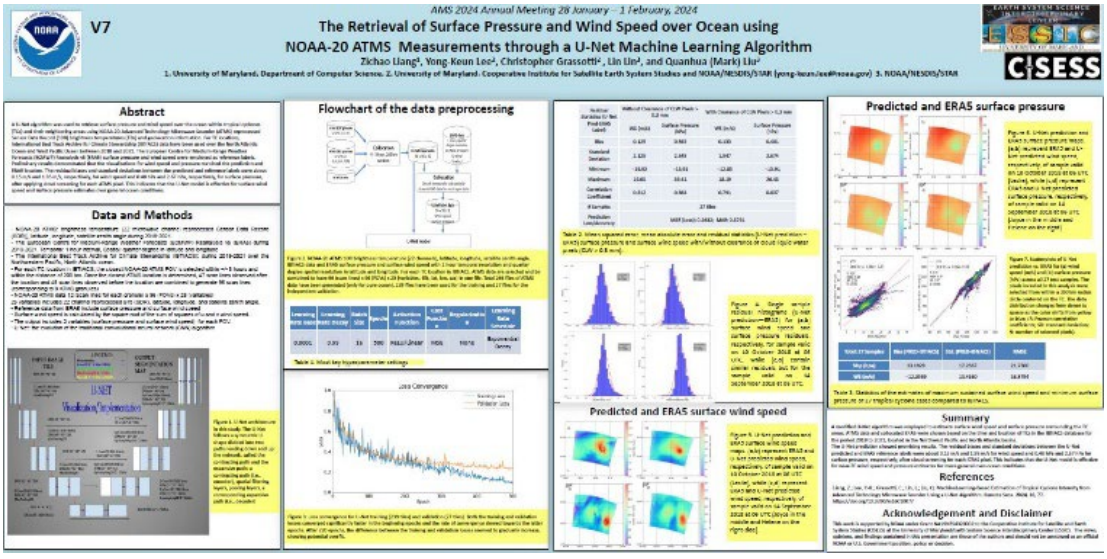
CISESS Participation in the 104th American Meteorological Society Annual Meeting, 28 January to 1 February 2024, Baltimore, MD

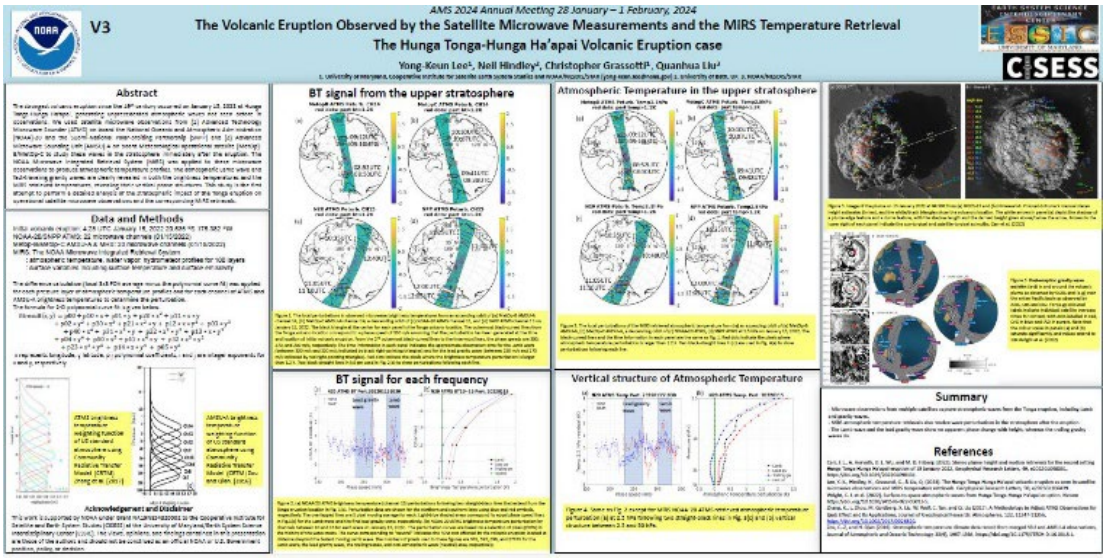
Poster presentations

- Guangyang Fang and Ashmita Pyne (intern),” Using Virtual Reality to Demonstrate the Law of Faraday Cage and Its Applications in Lightning Safety”
- Lei Ji, “Assessment of BRDF Effects in Surface Reflectance between GOES-16 and GOES-18”

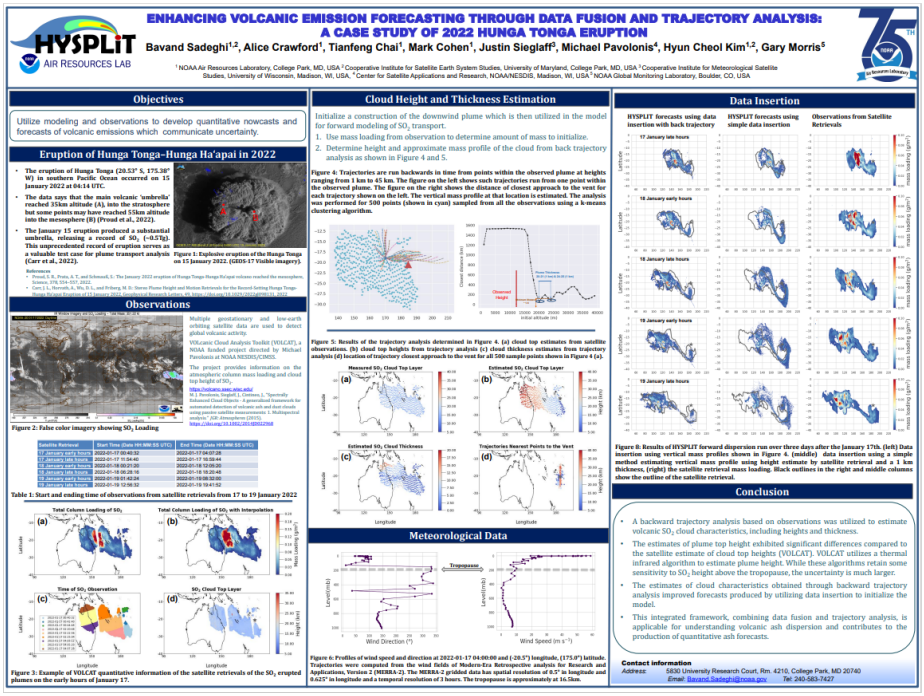


- Yong-Keun Lee, “The Volcanic Eruption Observed by the Satellite Microwave Measurements and the MiRS Retrieved Temperature Profiles: The Hunga Tonga-Hunga Ha'apai Volcanic Eruption Case” and “The Retrieval of Surface Pressure and Wind Speed over Ocean using NOAA-20 ATMS Measurements through a U-Net Machine Learning Algorithm”





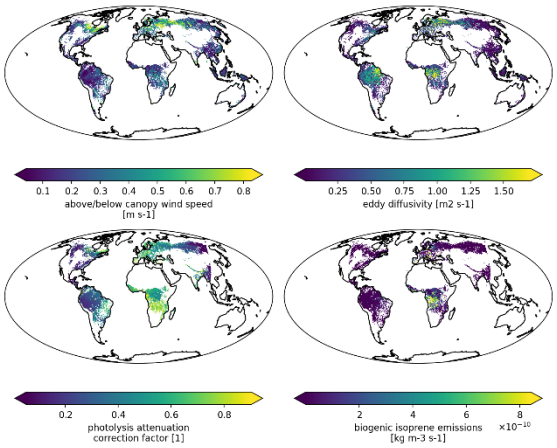
- Yuling Liu, "Towards Routine Radiance-Based Validation of VIIRS LST Using GDAS Profiles"
- Bavand Sadeghi, "Enhancing Volcanic Emission Forecasting Through Data Fusion and Trajectory Analysis: A Case Study of 2022 Hunga Tonga Eruption"



- Feng Zhang, "Evaluation of VIIRS Thermal Emissive Bands Long-Term Stability and Inter-sensor Consistency with Radiative Transfer Modeling"
- Xiaoyang Zhang, F. Li, Y. Ye, and S. Kondragunta, "Global Biomass Burning Emissions Product for Operational Air Quality Forecasting"

Oral Presentations

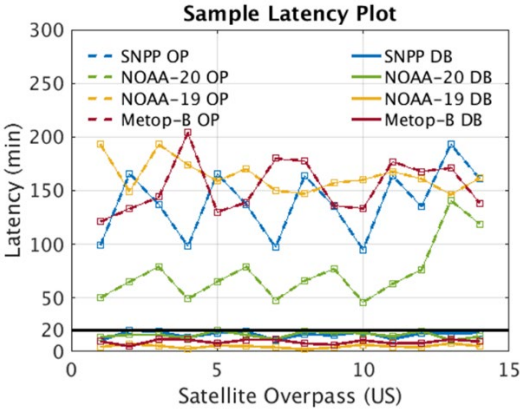
- Chris Brown, "Ecological Forecasting and Ecosystem Modeling: Challenges and Opportunities for the High-Performance Computing Community"
- Patrick C. Campbell, "Development of Canopy-App for Atmospheric Composition Modeling Across Scales"



Example canopy-app output for canopy averaged variables driven by NOAA's Global Forecast System on July 01, 2022, at 1200 UTC.

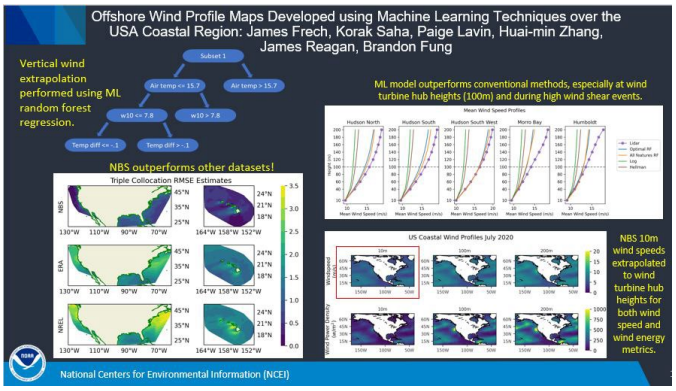
- Russ Dickerson, "University of Maryland and NOAA/ARL Collaboration over the Years: Learning how Weather, Climate, and Chemistry Conspire to Create Air Pollution" and "Environmental Justice in Baltimore, MD: Insight from BC Measurements from a Mobile Laboratory"

- Jun Dong, "NOAA Operational Satellite Snowfall Rate Product to Support Nowcasting"

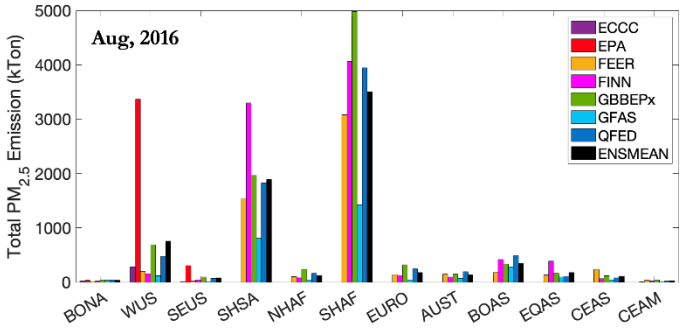


NOAA/NESDIS developed the Operational Snowfall Rate (SFR) product with a latency of 2 to 3 hours. To support nowcasting, latency is crucial. By using satellite Direct Broadcast (DB) data, a DA DB-SFR product has been developed with a latency less than 30 or 20 minutes. A comparison of the SFR latency from the operational data stream (dashed lines) and the DB system (solid lines) is shown in the plot.

- Guangyang Fang, "Visualizing Real-Time Climate Data in Virtual Reality and Its Application in Climatology"
- Guangyang Fang and Damian Figueroa (intern, presenter), "Intuitive Supercell Visualization Using Virtual Reality"
- James Frech (presenter), Korak Saha, Paige Lavin, Huai-min Zhang, James Reagan, and Brandon Fung (intern), "Offshore Wind Profile Maps Developed using Machine Learning Techniques over the USA Coastal Region"



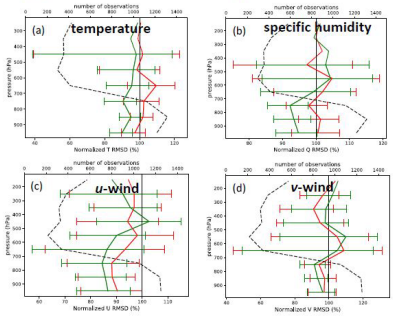
- Linfred Kingston (intern), "Exploring GOES-R ABI Lunar Image Registration with AI"
- Yunyao Li, "Global Ensemble Fire Emission Dataset and Subseasonal Wildfire Emission Forecast"



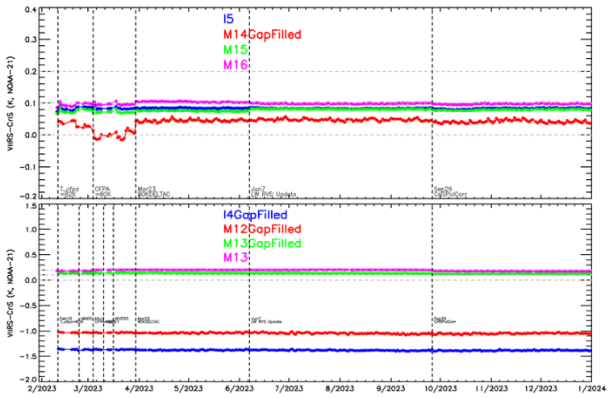
- Zaizhong Ma, "Simulation and Evaluation of Next Generation Microwave Satellite Observation for NWP Application"
- William Miller, "Investigating Spire GNSS RO Bending Angle Assimilation Impacts on HWRF Forecasts of Four 2022 Atlantic Hurricanes"

Spire Data Assimilation Impacts on HWRF 6-h Forecast RMSD Against P-3 Dropsondes

- Red lines: $RMSD_{C2}$ / $RMSD_{Control}$
- Green lines: $RMSD_{C2SPIRE}$ / $RMSD_{Control}$
- Assimilating Spire on top of COSMIC-2 data leads to statistically significant *T*, *q*, *u*, and *v* forecast improvement for most layers below 700 hPa
- Spire DA impacts on HWRF *T*, *q* RMSD are mixed for later forecast lead times (not shown)

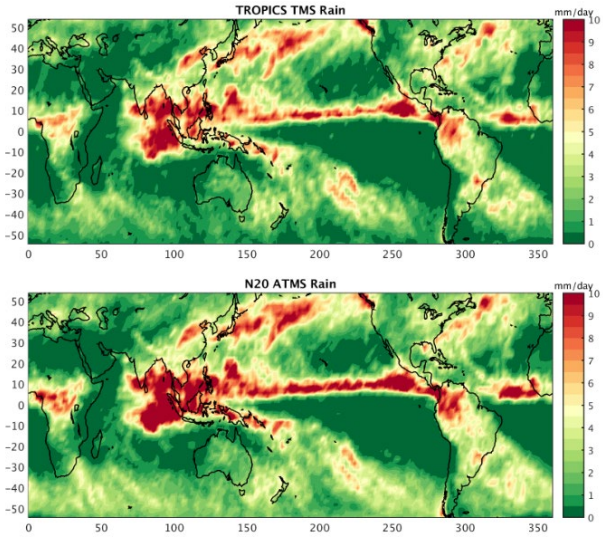


- Veljko Petkovic (invited talk), "Understanding the Uncertainty of Satellite Passive Microwave Precipitation Products"
- Thomas Smith, "Improving Daily Snow-Depth Analysis from Updated Spatial Statistics" ***This item was submitted in the SOCD Weekly Report.***
- Wenhui Wang (presenter), Xi Shao, Hui Xu, and Likun Wang, "Evaluation of NOAA-21 VIIRS Thermal Emissive Bands (TEB) Calibration Stability and Biases Using CrIS Observed and Gap-Filled Spectra"

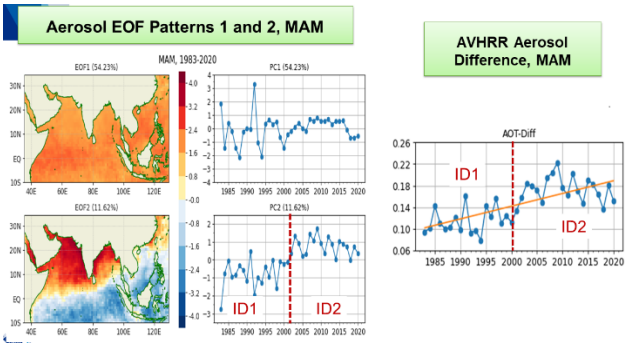


Time series of daily-averaged VIIRS-CrIS BT biases for NOAA-21 VIIRS thermal bands.

- John Yang, Yong-Keun Lee, Shuyan Liu, Chris Grassotti, Kevin Garrett, Quanhua (Mark) Liu, and Coauthors, "Assessing TROPICS Pathfinder's Precipitation Retrieval Performance Through the NOAA Microwave Integrated Retrieval System (MiRS)"



- Fangfang Yu, "Evaluation of GOES ABI Channel-to-Channel Registration Accuracy at Sub-Satellite Point"
- Yongsheng Zhang (presenter), James Frech, Xuepeng Zhao, and Huai-Min Zhang, "Impact of the Atlantic and West Pacific Warming on the Interdecadal Increase of Spring Aerosol Loadings in the North Indian Ocean since the early 21st Century"



The leading spatial patterns (left panels) and the principal component (PC) time series (middle) of Empirical Orthogonal Function (EOF) analyses on the NOAA-AVHRR observed aerosol in the northern Indian Ocean (NIO) for March-April-May (MAM) during 1983-2020. The differences of domain-averaged aerosol between the northern subtropical (55°E-100°E, 7°N-23°N) and the equatorial NIO (55°E-100°E, 10°S-6°N) (left).

- F. Li, Xiaoyang Zhang, S. Kondragunta, and C. Xu, "The Record-Breaking 2023 Canadian Wildfires: Spatial and Temporal Patterns of Fire Intensity, Fuel Consumption, and Fire Emissions"
- A. Zhu, S. Kondragunta, C. Xu, Xiaoyang Zhang, and F. Li, "Satellite Monitoring of Greenhouse Gas Emissions from Biomass Burning"

- Jun Zhou, "Construction of Temperature Climate Data Records in Upper Troposphere and Lower Stratosphere (UTLS) Using Multiple RO Missions from 2006 to 2023 at NESDIS/STAR"

MEDIA INTERACTIONS AND REQUESTS

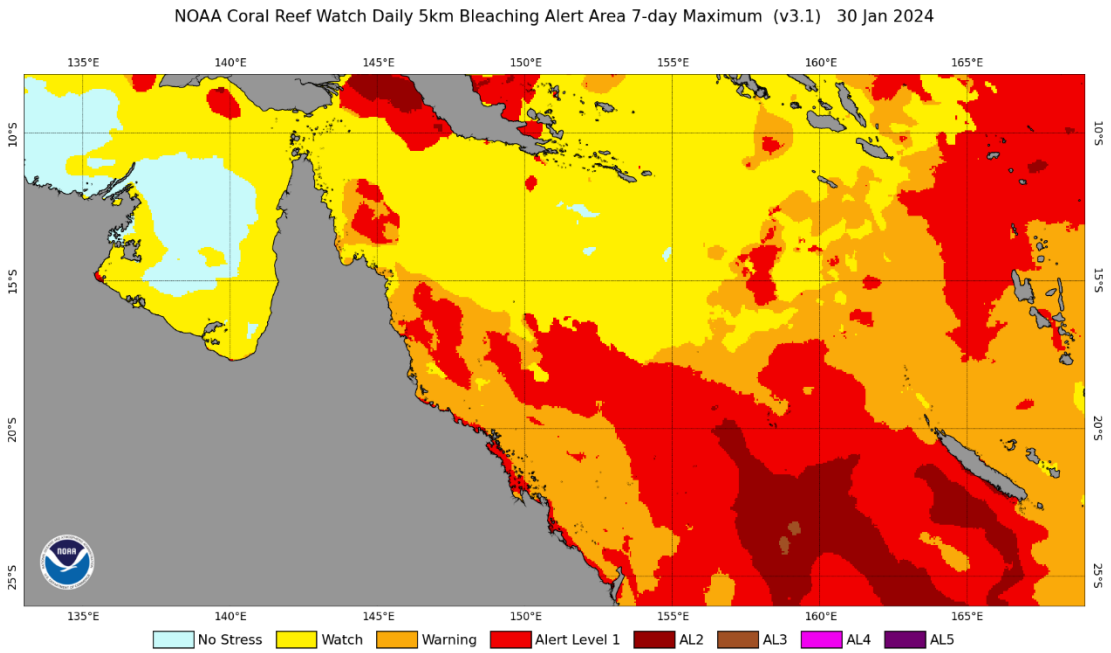
HIGHLIGHT FOR NESDIS LEADERSHIP

NOAA Coral Reef Watch's new Bleaching Alert Levels featured by *The Guardian*: As reported on previously, on December 15, 2023, NOAA Coral Reef Watch (CRW) implemented a revised coral bleaching heat stress category system for its daily global 5km satellite coral Bleaching Alert Area product. Extreme accumulations of bleaching-level heat stress in 2023 necessitated the introduction of additional Bleaching Alert Levels. This development is a refinement of the original system that only used Bleaching Alert Levels 1 and 2. As shown below, the new Alert Levels 3-5 provide important, added detail, for when the magnitude of extreme heat stress exceeds the threshold of Alert Level 2 conditions.

On January 31, 2024, *The Guardian* featured CRW's revised coral bleaching heat stress system in the article, "'Literally off the charts': global coral reef heat stress monitor forced to add new alerts as temperatures rise". The NOAA CRW Federal Coordinator, Dr. Derek Manzello, as well as multiple, key partners in Australia, were interviewed for the article. Heat stress continues to build in the central Pacific Ocean, Indian Ocean, and along the Great Barrier Reef (GBR). All satellite Regional Virtual Stations for the GBR region are now at Bleaching Alert Level 1 (see below). The global coral reef community remains concerned that another global coral bleaching event is imminent. (POC: Jacqueline De La Cour, CISESS, jacqueline.shapo@noaa.gov, Funding: NOS).

Stress Level	Definition	Potential Bleaching and Mortality
No Stress	HotSpot <= 0	No Bleaching
Bleach Watch	0 < HotSpot < 1	
Bleaching Warning	1 <= HotSpot and 0 < DHW < 4	Risk of Possible Bleaching
Bleaching Alert Level 1	1 <= HotSpot and 4 <= DHW < 8	Risk of Reef-Wide Bleaching
Bleaching Alert Level 2	1 <= HotSpot and 8 <= DHW < 12	Risk of Reef-Wide Bleaching with Mortality of Heat-Sensitive Corals
Bleaching Alert Level 3	1 <= HotSpot and 12 <= DHW < 16	Risk of Multi-Species Mortality
Bleaching Alert Level 4	1 <= HotSpot and 16 <= DHW < 20	Risk of Severe, Multi-Species Mortality (> 50% of corals)
Bleaching Alert Level 5	1 <= HotSpot and 20 <= DHW	Risk of Near Complete Mortality (> 80% of corals)

NOAA Coral Reef Watch's revised coral bleaching heat stress category system for its daily global 5km satellite coral Bleaching Alert Area product, introducing new Bleaching Alert Levels 3-5.



Australia

Great Barrier Reef (7 stations)

Station Name	Current Stress Level	Change From Last Update	Time Series Graphs	Data
Torres Strait	Bleaching Alert Level 1	==> No Change	Multi-Year | Select a 2-yr range:	txt
Far Northern GBR	Bleaching Alert Level 1	==> No Change	Multi-Year | Select a 2-yr range:	txt
Northern GBR	Bleaching Alert Level 1	==> Alert: (+) Bleaching Alert Level 1	Multi-Year | Select a 2-yr range:	txt
Central GBR	Bleaching Alert Level 1	==> Alert: (+) Bleaching Alert Level 1	Multi-Year | Select a 2-yr range:	txt
Southern GBR	Bleaching Alert Level 1	==> Alert: (+) Bleaching Alert Level 1	Multi-Year | Select a 2-yr range:	txt
Northern Coral Sea Islands	Bleaching Alert Level 1	==> No Change	Multi-Year | Select a 2-yr range:	txt
Southern Coral Sea Islands	Bleaching Alert Level 1	==> No Change	Multi-Year | Select a 2-yr range:	txt

(top image) NOAA Coral Reef Watch's daily global 5km satellite coral Bleaching Alert Area product, of January 30, 2024, for the Great Barrier Reef (GBR), Australia. Heat stress continues to build along the GBR; all satellite Regional Virtual Stations for the GBR region are currently at Bleaching Alert Level 1 (bottom image).

This item was submitted in the SOCD Weekly Report.

Media coverage of NOAA Coral Reef Watch's new Bleaching Alert Levels continues: Over the last week, press coverage continued surrounding NOAA Coral Reef Watch (CRW's implementation of a revised coral bleaching heat stress category system for its daily global 5km satellite coral Bleaching Alert Area product. Extreme accumulations of bleaching-level heat stress in 2023 necessitated CRW's introduction of additional Bleaching Alert Levels 3-5; these provide important, added detail, for when ocean heat stress conditions are so extreme that they exceed

the original threshold of Bleaching Alert Level 2. The new Bleaching Alert Levels were featured most recently in articles by *CBS News*, *Earth.org* and multiple other media outlets in the US and abroad. Additionally, the CRW Federal Coordinator, Dr. Derek Manzello, was interviewed by *The Weather Channel's America's Morning Headquarters* and *CBC Radio's As It Happens* programs about the new product refinements, conditions on reefs in Florida and the Caribbean this past summer, and the potential of a global coral bleaching event in 2024.

Also of note, CRW's daily global 5km satellite Sea Surface Temperature (SST) Anomaly product was highlighted in a February 7, 2024 article in *USA Today* about the record heat stress in the world's oceans and whether the impacts being witnessed are tied to climate change.

Multiple NOAA Coral Reef Watch products, including the newly-revised heat stress category system for the satellite coral Bleaching Alert Area product, were featured in a news article about *Mission: Iconic Reef*'s efforts to restore Florida's Coral Reef in Science, February 7: https://www.science.org/content/article/after-mass-coral-die-off-florida-scientists-rethink-plan-to-save-ailing-reefs.

NOAA Climate.gov released a feature article on February 8 (https://www.climate.gov/news-features/featured-images/noaa-coral-reef-watch-extends-alert-scale-following-extreme-coral), about NOAA CRW's monitoring of the extreme marine heat stress that led to mass bleaching of corals in the eastern Tropical Pacific, Florida, and Caribbean in 2023, as well as CRW's newly-revised heat stress category system for our satellite Bleaching Alert Area product.

(POC: Jacqueline De La Cour, CISESS, jacqueline.shapo@noaa.gov, Funding: NOS).

This item was submitted in the SOCD Weekly Report.

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