Weekly Report – May 23, 2025

Cooperative Institute for Satellite Earth System Studies (CISESS)

NOAA/NESDIS/STAR

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SOCIAL MEDIA AND BLOG POSTS

Yet Another Powerful Storm Churns Up the North Atlantic

A hurricane-force low developed off the southern tip of Greenland in mid-May, reports Christopher Smith, CISESS Satellite Liaison to the National Weather Service Weather and Ocean Prediction Centers, in his latest blog post. That part of the central North Atlantic is typically the birthplace of such late-season intense extratropical cyclones. A minimum central pressure of 984 mb was determined, close to typical values for hurricanes. Storm-force winds of more than 60 km/hr were observed by The RadarSat Constellation Mission – 1 Synthetic Aperture Radar. It is not surprising then that wave observations around the time of peak intensity were over 5.3 meters (17 feet)!

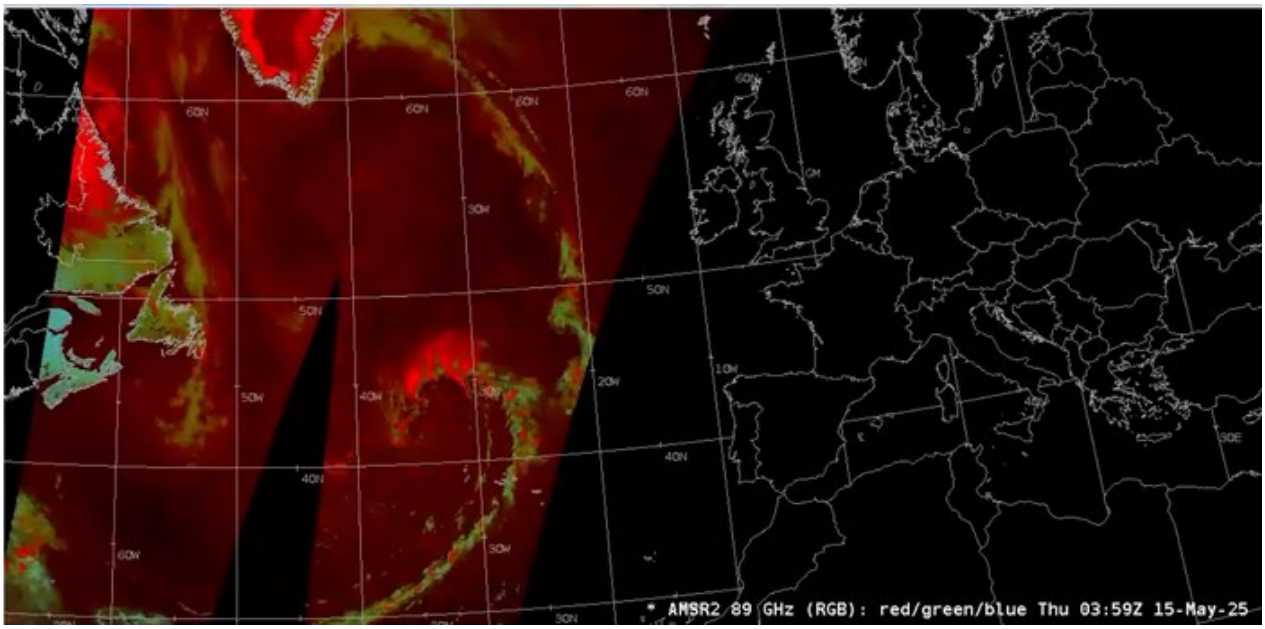

Figure. Advanced Microwave Scanning Radiometer 2 89-GHz Red-Green-Blue imagery valid at 0359 UTC 15 May 2025. The bright red area at the top of the occluded front (the comma shape) represents areas of intense convection.

(Christopher Smith, CISESS, csmith70@umd.edu; Funding: JPSS PGRR)

PUBLICATIONS

Examining Oceanic Diurnal Warming

Citation: Harris, Andrew R., Gary A. Wick, and Sandra A. Castro, 2025: The effect of water vapor and solar zenith angle on oceanic diurnal warming. Geophys. Res. Lett., 52, e2024GL114394, https://doi.org/10.1029/2024GL114394.

Summary: Oceanic diurnal warm layers have been extensively studied over the years due to their important role in a variety of geophysical disciplines as well as for the analysis of, for example, satellite-derived sea surface temperatures. Reliable modeling of oceanic diurnal warming is thus needed. CISESS Scientist Andrew Harris and colleagues address this issue by introducing a new insolation scheme in a paper recently published in the journal *Geophysical Research Letters*. Harris reports that significant variability can be accounted for by addressing the combined impacts of atmospheric water vapor and solar zenith angle on both the spectral distribution of insolation energy at the water surface and its subsequent absorption within the water column. Comparisons with satellite-observed diurnal amplitudes on the basin-scale show that the new scheme provides notable improvements over one with a fixed insolation parameterization. One implication is that addressing the heat source term within the water column is a key first step when developing and tuning models of the diurnal layer. Further avenues of study include developing a spectral adjustment due to cloud amount and type and integrating ocean biology into the in-water absorption.

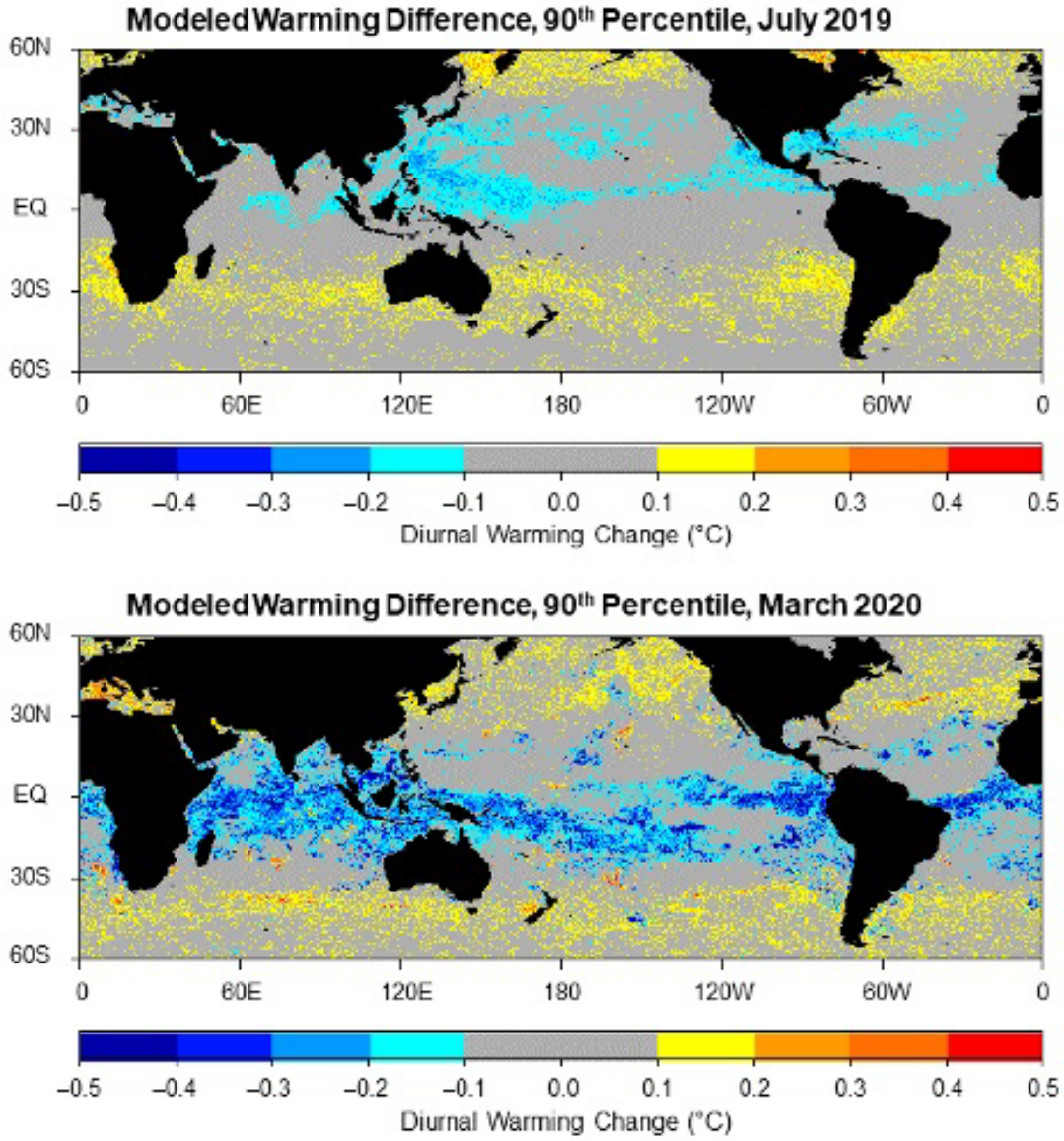

Figure. (Top panel) Difference in 90th percentile peak warming values between modeling using the full two-dimensional absorption scheme and static 48° coefficients for July 2019. (Bottom panel) The equivalent plot for an equinox month (March 2020). Note the increase in diurnal amplitude for larger solar zenith angles and the water-vapor-related depression in warming in the tropics, especially for the equinox case.

(Andrew Harris, CISESS, andy.harris@noaa.gov; Funding: DACS, JSTAR GCOM, & ORS)

Other:

CISESS Seed Grant: Integrating GNSS-Reflectometry Observations to Retrieve High-resolution Satellite Soil Moisture Information

Soil moisture (SM) impacts energy, carbon, and water interactions in the planetary boundary layer, with wider importance to the development of weather and water forecasting products. Current microwave satellite missions are expensive and offer SM products at a coarse 25-km resolution. SM products at a higher spatial resolution would be useful to capture small-scale surface features. Signals from Global Navigation Satellite System (GNSS)-Reflectometry (GNSS-R) receivers in a GNSS can be used to derive SM products. Because of their narrow swaths, current GNSS-R SM retrievals have a low spatial coverage. CISESS Scientist Jifu Yin plans to develop a daily 9-km SM product by integrating GNSS-R observations from three GNSS missions in his 2025 CISESS Seed Grant. This will yield a product with greater spatial coverage than is currently available.

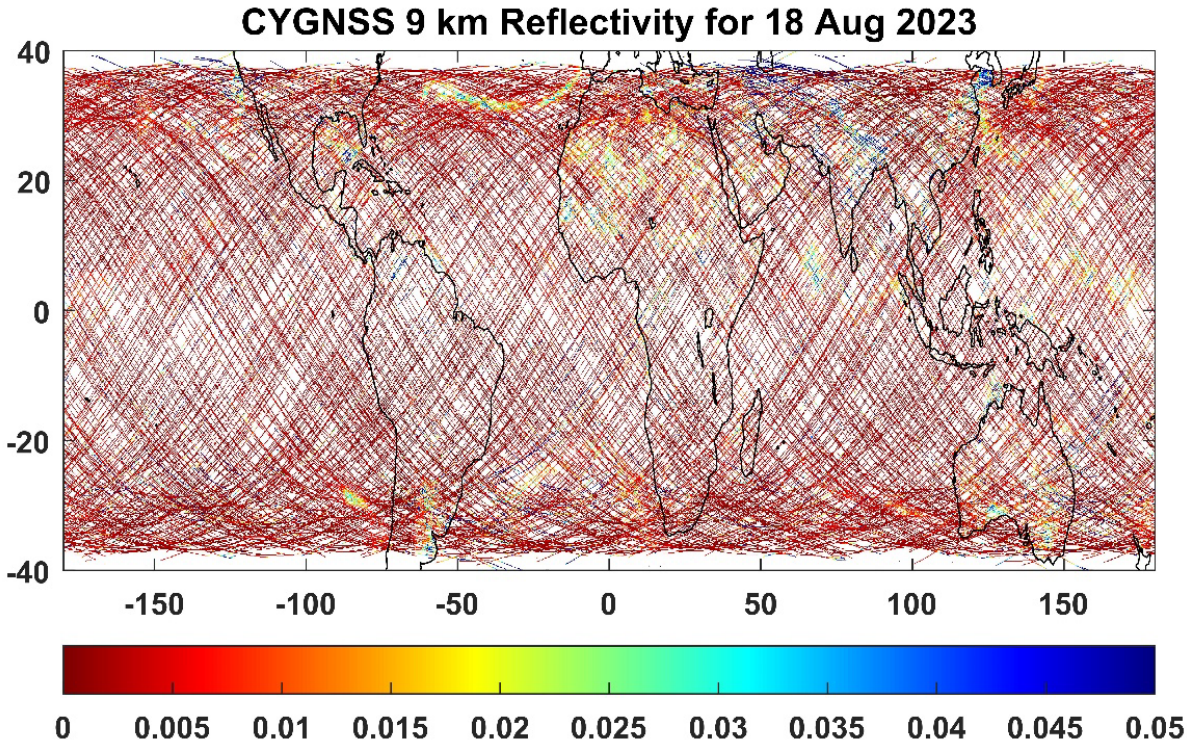

Figure. Example of the spatial coverage of Cyclone Global Navigation Satellite System reflectivity for 18 August 2023.

(Jifu Yin, CISESS, jifu.yin@noaa.gov; Funding: DACS, JSTAR GCOM, & METOP-SG)

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