Weekly Report – November 1, 2024

Cooperative Institute for Satellite Earth System Studies (CISESS)

NOAA/NESDIS/STAR

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SOCIAL MEDIA AND BLOG POSTS

Oscar Churns Up the Western Atlantic

In his latest blog post, CISESS Satellite Liaison to the NWS Weather and Ocean Prediction Centers, Chris Smith, offers a slew of images derived from different sources describing what Hurricane Oscar was up to after clipping Cuba in late October. Oscar was the smallest hurricane on record, with an 8.0- to 9.7-km-wide hurricane-force wind field. Its remnants morphed into a strong extratropical storm off the Eastern Seaboard, re-intensifying as it cruised north along the Gulf Stream in the early hours of 24 October 2024. Of note was the unusual ozone anomaly around the storm-force low, up to 160 to 180 percent of the normal over much of the western Atlantic. Significant wave heights of up to 7 m were also forecast, confirmed by a satellite altimeter overpass, which observed wave heights of almost 6 m. Still powerfully trucking along the Atlantic two days later, Met Éireann, the Irish Meteorological Service, issued weather warnings for heavy rain and potential flooding from Oscar. The start of an active extratropical-stormy north Atlantic winter season has begun.

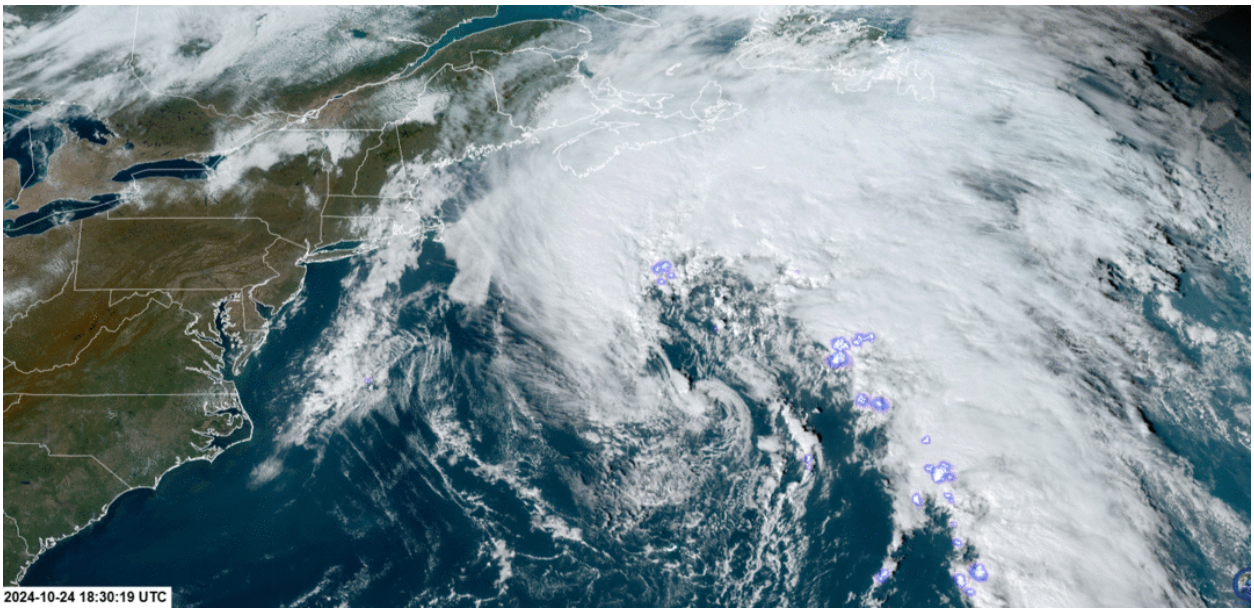

Figure: GOES-East Full Disk GeoColor imagery overlaid with Geostationary Lightning Mapper group energy density information from ~1520 UTC to ~2000 UTC 24 October 2024. Lightning is seen along the cold front and elsewhere (purple-outlined areas).

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

PUBLICATIONS

Improving the Detection of Chlorophyll-a
Citation: Gilerson, Alexander, **Mateusz Malinowski**, Jacopo Agagliate, **Eder Herrera-Estrella**, Maria Tzortziou, Michelle C. Tomlinson, Andrew Meredith, Richard P. Stumpf, Michael Ondrusek, Lide Jiang, and Menghua Wang, 2024: Development of VIIRS-OLCI chlorophyll-a product for the coastal estuaries. Front. Mar. Sci., 11, 1476425, https:/doi.org/10.3389/fmars.2024.1476425.
Summary: Chlorophyll-a (Chl-a) is commonly considered a measure of the abundance of phytoplankton, or algae, in a water body, providing information about the quality of the water. CISESS Scientists Alexander Gilerson and Eder Herrera-Estrella, along with Ph.D. student Mateusz Malinowski and other colleagues, present a novel neural network algorithm for estimating Chl-a in two large U.S. estuaries, namely, the Chesapeake Bay and the Long Island Sound. These estuaries cover a wide range of Chl-a concentrations and experience harmful algal blooms from time to time. This new bio-optical model was developed using satellite data and imagery from Suomi National Polar-Orbiting Partnership and NOAA-20 Visible Infrared Imaging Radiometer Suite (VIIRS) instruments and Sentinel-3A and 3B Ocean and Land Colour Instrument instruments and in-situ measurements. Current algorithms incorporate information from three bands, i.e., 443, 486, and 551 nm. Gilerson and co-authors found that including an additional band, the imaging I1 600–680-nm band centered at 638 nm, resulted in significantly improved retrievals of Chl-a and other water parameters in comparison with similar algorithms that use only three bands. They also found that certain combinations of algorithms could perform the best depending on the Chl-a concentration level. Further research paths are suggested to provide better, more consistent Chl-a estimates from coastal to offshore, with an improved cloud-clearing capability through a multi-sensor approach.

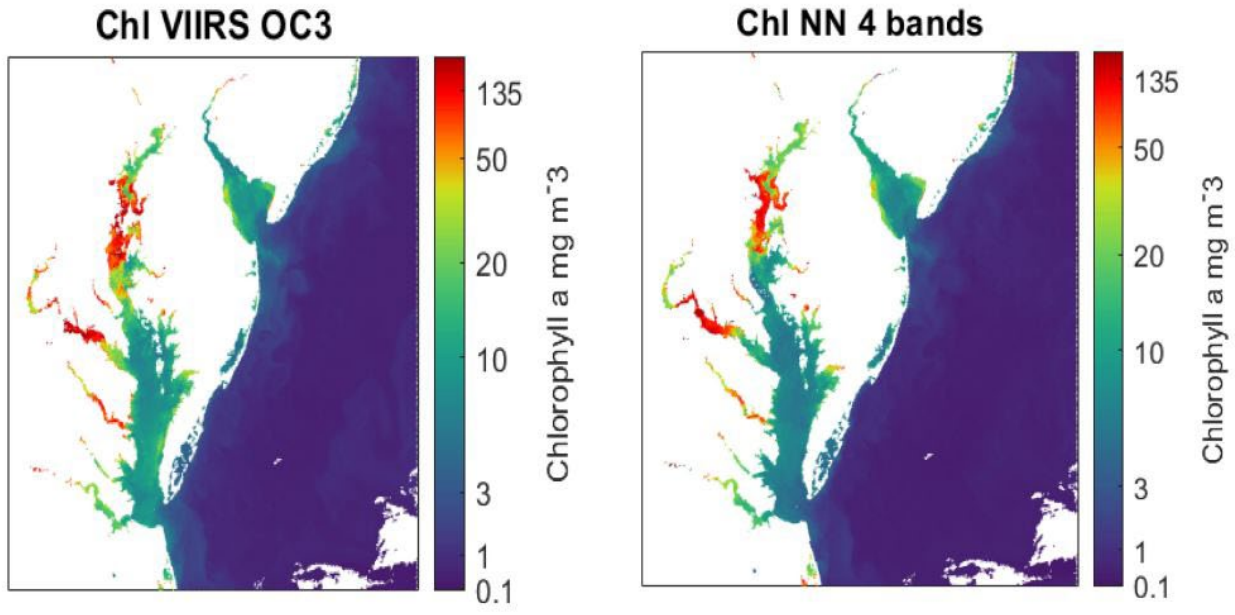

Figure: Comparison of NOAA-20 VIIRS images retrieved with OC3V (standard three-band) and NN4 (neural network using the standard three bands plus the I1 600–680-nm band) algorithms.

(Alexander Gilerson, CISESS, gilerson@ccny.cuny.edu, Funding: JPSS PGRR, JSTAR; Eder Herrera-Estrella, CISESS, eherrera@gradcenter.cuny.edu, Funding: JPSS PGRR)

Deep Ocean Unknowns

Citation: Pillar, Helen R., Elizabeth Hetherington, Lisa A. Levin, Laura Cimoli, Jonathan M. Lauderdale, Jesse M. A. van der Grient, Kristen Johannes, Patrick Heimbach, Leslie Smith, Charles I. Addey, Pavanee Annasawmy, Sandra Antonio, Narissa Bax, Henri F. Drake, Elva Escobar, Laura G. Elsler, Mara A. Freilich, Natalya D. Gallo, Fanny Girard, Matthew J. Harke, Daniel O. B. Jones, Siddhi Joshi, Xinfeng Liang, Paige J. Maroni, Otmane Sarti, Paris V. Stefanoudis, Olivier Sulpis, and **David Trossman**, 2024: Future directions for deep ocean climate science and evidence-based decision making. Front. Clim., 6, https://doi.org/10.3389/fclim.2024.1445694.

Summary: This study performed a meta-analysis of the latest (sixth series of) Intergovernmental Panel on Climate Change reports, characterizing the low confidence conclusions about the deep ocean (> 2000 m depth). Each author of this study read and summarized the low confidence findings from two chapters of the latest IPCC reports. We found that most of the known unknowns about the deep ocean are mostly related to ocean biology, but next most related to physics, and least commonly having to do with biogeochemistry.

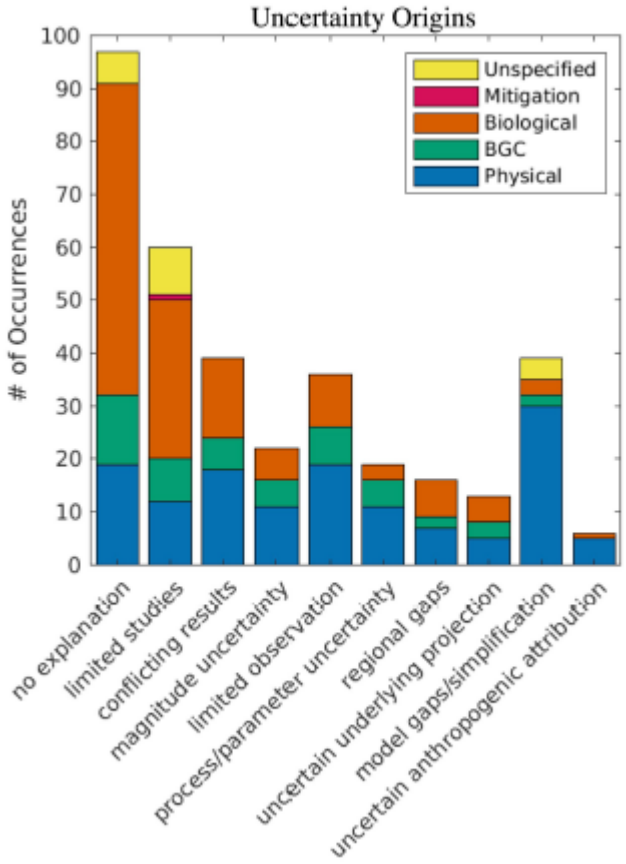

Figure: Origins of uncertainty associated with the deep ocean science gaps identified in the IPCC AR6 meta-analysis. Colors indicate the area in which uncertainty is manifested.

(David Trossman, CISESS, trossman@umd.edu, Funding: ORS)

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