Weekly Report – November 10, 2023

Cooperative Institute for Satellite Earth System Studies (CISESS)

NOAA/NESDIS/STAR

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HIGHLIGHTS FOR NESDIS LEADERSHIP

Data and Information

Updated High-Resolution Northern North Pacific Regional Climatology Released

On November 7th, CISESS Scientist Alexey Mishonov and NCEI released the Northern North Pacific (NNP) regional climatology, version 2. This is a collection of high-resolution quality-controlled temperature and salinity fields retrieved from the latest World Ocean Database (WOD23) on standard depth levels from the sea surface to 5,200 m depth covering the period from 1955 to 2022. Annual and seasonal fields for the entire period as well as for each of the seven decades (1955-1964, 1965-1974, 1975-1984, 1985-1994, 1995-2004, 2005-2014, and 2015-2022) are compiled. This climatology is instrumental for assessing ocean climate changes in this region of the North Pacific Ocean over the extended time period of seven decades and can be used in various climate studies, numerical ocean and climate modeling, environmental research projects, and other related applications. Updated high-resolution NNP regional climatology, version 2 is an enhanced tool to study the long-term oceanic trends in this dynamic area.

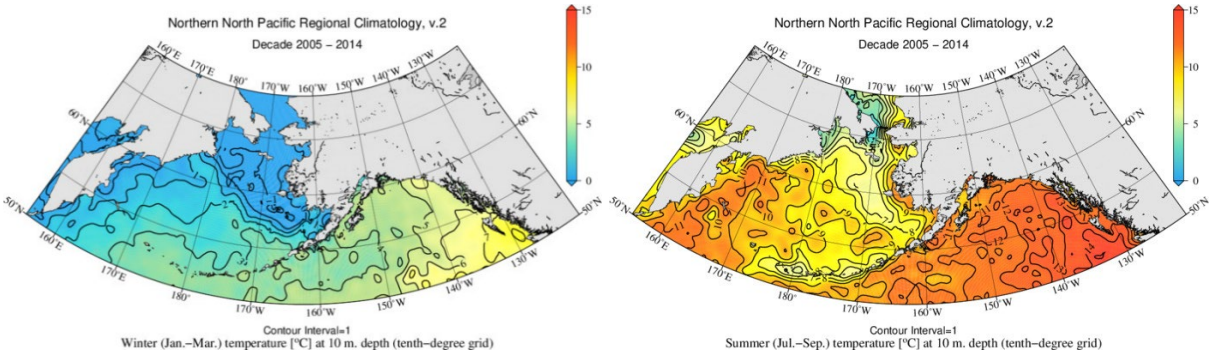

Figure: NNP regional climatology: Winter (left) and Summer (right) Temperature for 2004-2014 decade on 1/10-degree grid at 10m depth.

The NNP is a resource rich region, which includes Gulf of Alaska and Bering Sea, with abundant fisheries and other material assets that can be significantly impacted by ocean climate variability. Ocean processes in the NNP play an important role in long-term ocean climate change affecting all aspects of marine ecosystems. The complete set of all climatological maps, as well as objectively analyzed fields and associated statistical fields at all standard depth levels, presented in ASCII comma separated value (CSV), ArcGIS compatible, and netCDF formats and documentation are available online at the NNP regional climatology, version 2 web site https://www.ncei.noaa.gov/products/northern-north-pacific-regional-climatology.

(Alexey Mishonov, CISESS, alexey.mishonov@noaa.gov, Funding: NCEI)

TRAVEL AND MEETING REPORTS

CISESS Virtual Reality (VR) Team Attending Mid-Atlantic Severe Weather Conference

On Saturday November 4th, 2023, ESSIC/CISESS VR team Guangyang Fang, Damian Figueroa, Ashmita Pyne, and Joseph Patten attended the annual Mid-Atlantic Severe Weather Conference hosted at the Science Museum of Virginia in Richmond, VA. The conference featured presentations by meteorologists from the National Weather Service and the broadcast media, regional storm chasers, decision makers from Emergency Management, and scientists from severe weather research communities. On Friday November 3rd, the day before the conference, our students Damian and Ashmita presented on the topic of VR applications in supercell storm visualization and the application of Faraday cage in lightning safety at the Meteorology Student Conference in association with the Mid-Atlantic Severe Weather Conference. The 2024 Mid-Atlantic Severe Weather Conference will be held on Saturday, October 26th at the Science Museum of Virginia.

Figure: (Top from left to right) Damian Figueroa, Ashmita Pyne, Guangyang Fang, and Joseph Patton attending 2023 Mid-Atlantic Severe Weather Conference; (Bottom) Damian and Ashmita presenting at the Meteorology Student Conference hosted by Central Virginia AMS chapter. (Guangyang Fang, CISESS, gfang@umd.edu, Funding: GOES-R AWG, GOES-R PGRR, CISESS Seed Grant)

Use of Satellite Heat Stress Monitoring Products for the Great Barrier Reef (GBR)
CISESS Consortium Scientist Dr. Blake Spady (ReefSense) at NOAA Coral Reef Watch joined key partners from the Australian Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australian Institute of Marine Science (AIMS), Bureau of Meteorology (BOM), and the Great Barrier Reef Marine Park Authority (GBRMPA) on November 3 in Townsville, Australia.

Dr. Spady was invited to discuss how CRW's daily global 5km satellite coral bleaching heat stress monitoring products could meet the needs of reef managers and restoration partners on the GBR. He found that GBRMPA's managers already rely heavily on NOAA CRW's satellite and modeled products for the GBR. The accuracy of CRW's satellite coral bleaching heat stress monitoring products has already been validated on the GBR. CRW's Degree Heating Week value of 4 °C-weeks (the threshold for the expected onset of significant bleaching) was validated by *in situ* observations of coral bleaching in 93%, 95%, 79%, and 91% of surveyed reefs on the GBR during the mass bleaching events of 2016, 2017, 2020, and 2022, respectively. These results clearly demonstrated that NOAA CRW's satellite products accurately monitor the GBR for bleaching-level heat stress. *(Blake Spady, CISESS/ReefSense, blake.spady@noaa.gov ,Funding: NOS).*
This item was submitted in the SOCD Weekly Report.

MEDIA INTERACTIONS AND REQUESTS

Report on Chesapeake Bay Fishery Resources featured in *Virginian-Pilot* News Article
The Virginian-Pilot featured a news article on November 5 highlighting a NOAA report containing an operational satellite data product from CISESS scientist, Ron Vogel. The report, "Synthesis of Environmental Impacts on Key Fishery Resources in the Chesapeake Bay", is released seasonally by the NOAA Chesapeake Bay Office and is used by regional fishery managers to help guide management decisions. The report uses data from satellites, buoys, flow gauges and forecast models to describe seasonal water temperature, salinity, streamflow, hypoxia and other environmental factors for managers to understand how current

environmental conditions may affect the future of economically important fish species and other marine resources. Ron Vogel produces seasonal water temperature anomaly maps for the reports and participates on the report's research team. As part of CISESS, Ron's work supports the NOAA CoastWatch Program, whose regional nodes work directly with stakeholders to apply NOAA's satellite data to decisions that help society address a changing environment.

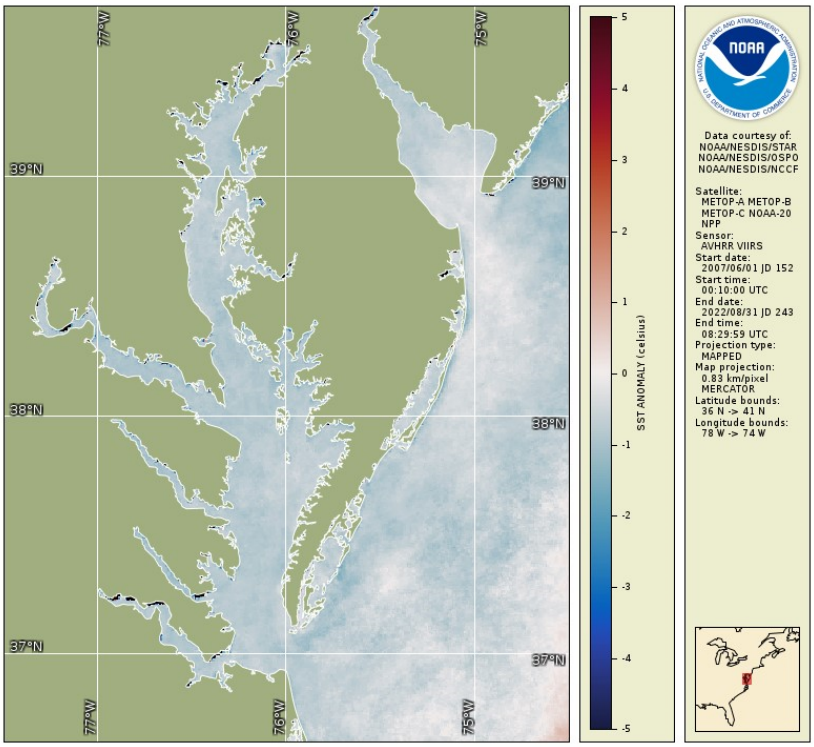

Figure: Summer 2023 water temperature anomaly map for Chesapeake Bay shows a 1°C decrease in temperature compared to a 2007-2022 baseline, indicating favorable conditions for several key fish species, according to the seasonal fishery impacts report released by the NOAA Chesapeake Bay Office and containing data generated by UMD/ESSIC/CISESS.

(Ron Vogel, CISESS, vogelr@umd.edu; Funding: Ocean Remote Sensing)

PUBLICATIONS

Optimal Summertime Precipitation Data from GEO and LEO Observations
Citation**: Gorooh, Vesta Afzali; Veljko Petković, Malarvizhi Arulraj**, **Phu Nguyen**, **Kuo-lin Hsu**, **Soroosh Sorooshian**, and **Ralph R. Ferraro**, 2023: Integrating LEO and GEO observations: Toward optimal summertime satellite precipitation retrieval. *J. Hydrometeor.*, **24**(11), 1939–1954, https://doi.org/10.1175/JHM-D-23-0006.1.
Summary: CISESS Summer Intern Vesta Gorooh (UCI PhD student) and CISESS Scientists Veljko Petković and Malarvizhi Arulraj have a new article in the November issue of the *Journal of Hydrometeorology.* The article describes the use of machine learning techniques to improve the retrieval of surface precipitation from passive meteorological sensors aboard geosynchronous Earth-orbiting (GEO) and low Earth-orbiting (LEO) satellites. The researchers used a U-Net–like architecture to map instantaneous, summertime surface precipitation intensity at a spatial

resolution of 2 km. As inputs, they used the Global Precipitation Measurement (GPM) Microwave Imager (GMI) and the GOES-R Advanced Baseline Imagers (ABI) along with total precipitable water and 2-m temperature from the Global Forecast System (GFS) model. They found that the U-Net algorithm could capture fine-scale patterns and intensity of surface precipitation at high spatial resolution for both stratiform and convective precipitation regimes. The evaluations also revealed the potential of extracting relevant, high spatial features over complex surface types such as mountainous regions and coastlines.

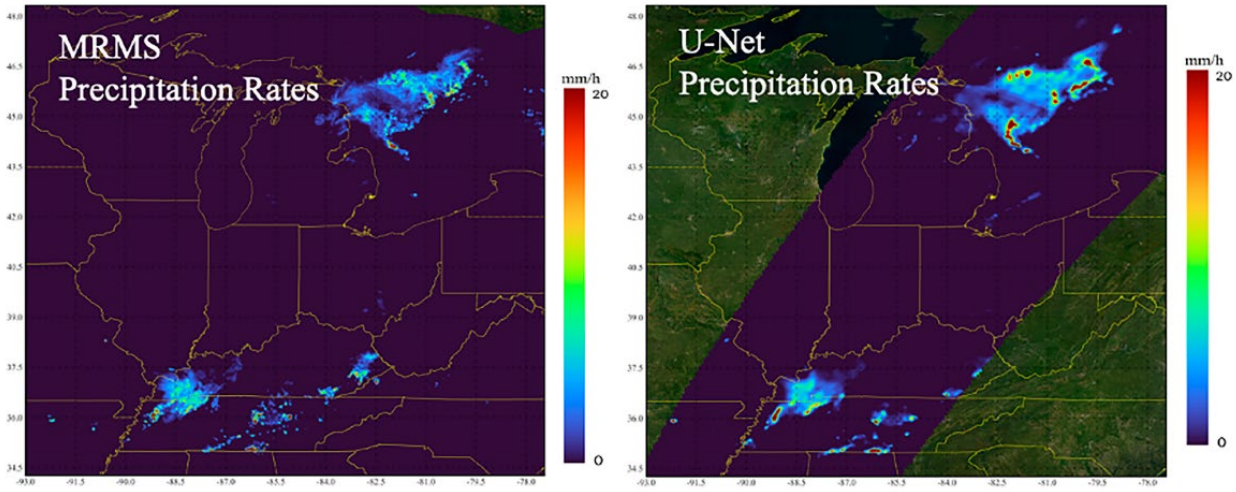

Figure: Precipitation system observed at 0725 UTC 11 Aug 2020, over the U.S. Midwest. MRMS surface precipitation product (observations) on the left and U-Net output on the right. (Veljko Petković , CISESS, veljko@umd.edu; Funding: JSTAR GCOM, METOP-SG, HPCC)