Weekly Report – May 08, 2026

Cooperative Institute for Satellite Earth System Studies (CISESS)

NOAA/NESDIS/STAR

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HIGHLIGHTS FOR NESDIS LEADERSHIP

Data and Information

New SODA4 Digital Ocean, 1980–2024

The massive new Simple Ocean Data Assimilation version 4 (SODA4) analysis of global ocean and sea ice systems, led by University of Maryland faculty Gennady Chepurin, (CISESS Scientists) James Carton and Ligang Chen, and Luyu Sun, is now available. For decades, SODA has been the standard reference for documenting ocean and sea ice variability and change, combining information from a wide variety of surface and subsurface observing systems. This latest release vastly expands previous efforts providing enhanced spatial resolution, improved forcing, and continental discharge, as well as updated ocean observations. These improvements, which increase the data set size to more than 50 terabytes, allow SODA4 to extend into coastal zones and narrow passages. SODA4 is described in a paper now in press at *Geophysical Model Development*.

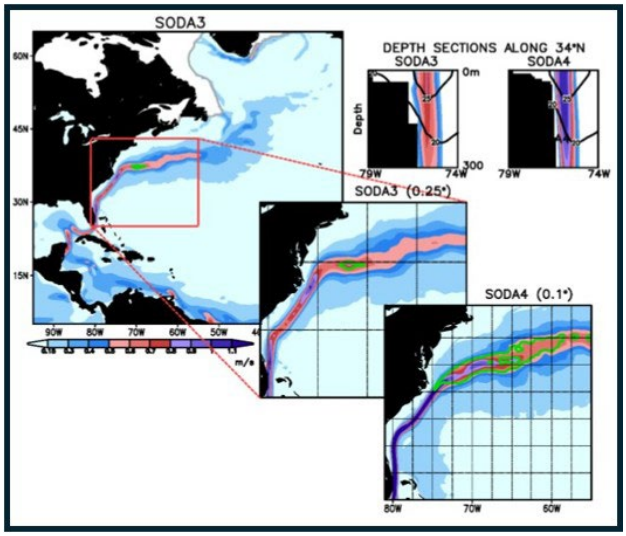

Figure: Comparison of surface currents in the western North Atlantic from the early SODA3 analysis and the new SODA4 analysis.

(James Carton, CISESS, carton@umd.edu, Funding: Jason; Ligang Chen, CISESS, lchen2@umd.edu, Funding: Jason)

People

Shao Receives Distinguished Research Scientist Prize

The University of Maryland College of Computer, Mathematical & Natural Sciences (CMNS) held its College Award Ceremony on 1 May 2026. Among the award recipients was CISESS Scientist Xi Shao, honored with the Distinguished Research Scientist Prize for 2026. Shao is recognized

for his more than 25 years of interdisciplinary research experience spanning space physics, imaging radiometer calibration and validation, and Global Navigation Satellite System radio occultation algorithms.

Figure: Xi Shao (on the left) receiving his award from CMNS Dean Amitabh Varshney. Photo credit: Mark Sherwood (UMD/CMNS)

(Xi Shao, CISESS, xshao@umd.edu; Funding: COSMIC2, JSTAR & STAR)

PUBLICATIONS

PUnet: A New Global Precipitation Dataset
Citation: Nguyen, Phu, Vu Dao, Tu Ung, Claudia Jimenez Arellano, **Kuolin Hsu, Soroosh Sorooshian**, Amir AghaKouchak, George J. Huffman, and F. Martin Ralph, 2026: PERSIANN-U-Net: a global deep learning framework for near-real-time precipitation estimation using infrared data. *J. Hydrometeor.*, **27**, 597–615, https://doi.org/10.1175/JHM-D-25-0162.1.
Summary: High-quality, high-resolution, near-real-time precipitation data are needed for weather forecasting, flood monitoring, and disaster response. Rain gauges and radars are useful tools but are sparsely distributed and have their technical limitations. Satellite remote sensing of precipitation provides global coverage at high spatiotemporal resolutions, typically combining thermal infrared (IR) and passive microwave data from different sensors. Of the two, IR sensors provide consistent, high-frequency global observations. In recent years, artificial intelligence/machine learning techniques have helped improve satellite precipitation retrievals. Enter Precipitation Estimation from Remotely Sensed Information Using Artificial Neural

Networks (PERSIANN)-Unet (or PUnet), an almost global algorithm that produces precipitation estimates at a 0.04° resolution every 30 minutes, introduced by CISESS Scientists Kuolin Hsu and Soroosh Sorooshian and colleagues in their recent paper published in the *Journal of Hydrometeorology*. This novel algorithm combines IR data, monthly climatology, and UNet, a convolutional neural network architecture. The model is trained using Integrated Multi-satellitE Retrievals for the Global Precipitation Measurement (IMERG) version 07 Final (IMERGF), which combines IR observations with passive microwave retrievals from multiple satellite platforms. IMERGF is also used as the baseline reference for PUnet evaluation purposes. Other satellite precipitation satellite datasets used for PUnet evaluation include PDIR-Now, developed at the University of California – Irvine, and Hydro Estimator (HE) developed by NOAA/NESDIS. Overall, compared to existing satellite products, PUnet agrees the best with IMERGF across global and regional domains, capturing well, for example, the spatiotemporal structure of extreme precipitation events shown in the case study of Hurricane Idalia (2023).

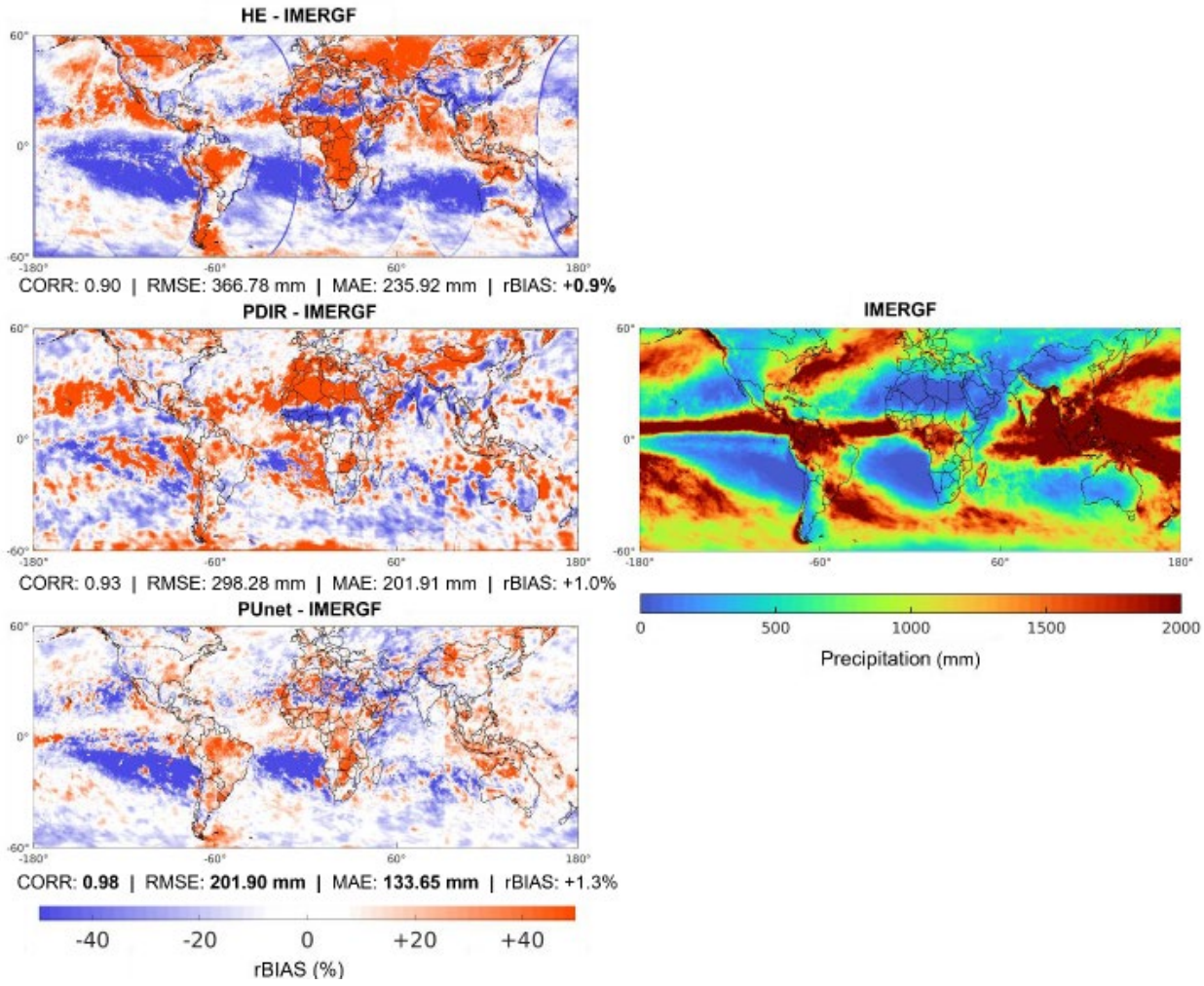

Figure: Mean global annual precipitation (mm) from (right) IMERGF (reference) and (left) differences relative to IMERGF for HE, PDIR, and PU-Net during 2022–23. Evaluation metrics are shown for each dataset (bold values indicating the best performance).

(Kuolin Hsu, CISESS, kuolinh@uci.edu, Funding: LEO; Soroosh Sorooshian, CISESS, soroosh@uci.edu, Funding: JPSS PGRR)

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