

Weekly Report – June 12, 2026
Cooperative Institute for Satellite Earth System Studies (CISS)
NOAA/NESDIS/STAR

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TRAINING AND EDUCATION

CISS Observes Lightning Products Tested with National Weather Service Forecasters

Over three separate weeks during the virtual Spring 2026 Experiment at the Hazardous Weather Testbed Satellite Proving Ground with the National Weather Service, CISS Scientists, including researcher Joseph Patton, observed and assisted weather forecasters exploring new satellite-derived products concerning lightning and enhanced decision-making support services. Among the new imagery and methods tested were improved satellite-derived probabilities for short-term lightning forecasting and an updated approach to spatially monitoring lightning safety during ongoing thunderstorms incorporating both ground- and satellite-based lightning detections. Insights from these testbed sessions will be used to improve the quality of satellite-based lightning products and create more informed and effective training for implementing these measures into operations to advance our weather forecasting capabilities.

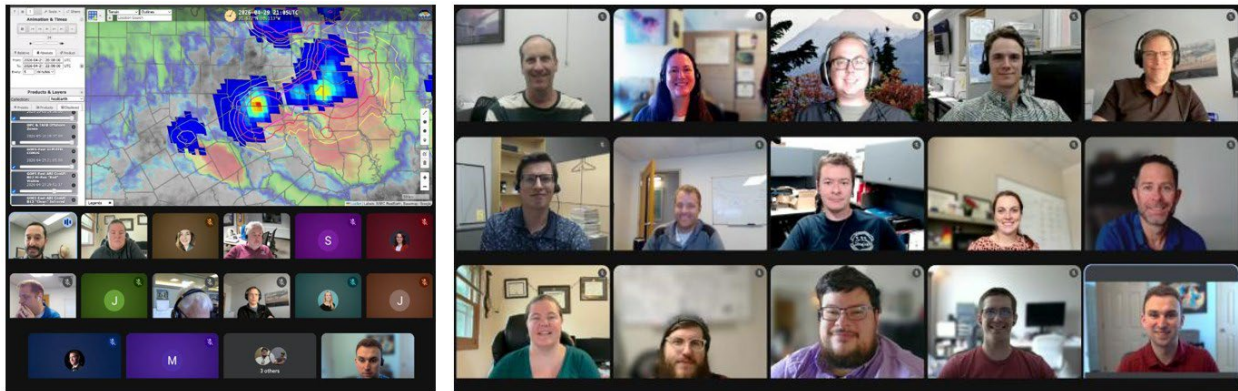


Figure: (left) Scientists and forecasters observe satellite-derived lightning products in the first week of the 2026 Hazardous Weather Testbed Spring Experiment. (right) Group photo of participants in the third week of the 2026 Hazardous Weather Testbed Spring Experiment. CISS Researcher Joseph Patton (bottom row, center) attended to observe and assist forecasters in applying lightning products.

(Joseph Patton, CISS, jpatton4@umd.edu; Funding: GEO-XO, GOES-R AWG, GOES-R PGRR & IJA)

PUBLICATIONS

Moist Static Energy Perspectives on Tropical Intraseasonal Predictability

Citation: Choi, Nakbin, Jakub Stanczak, and **Cristiana Stan**, 2026: The role of atmosphere-ocean coupling on the prediction of Madden-Julian Oscillation. *J. Climate*, **39**(13), e250247, <https://doi.org/10.1175/JCLI-D-25-0247.1>.

Summary: The Madden–Julian Oscillation (MJO) is a large-scale atmospheric pattern that moves eastward along the equator, completing a circuit around the globe roughly every 30 to 60 days. Among its various impacts on weather, the MJO can contribute to jet stream changes leading to cold air outbreaks, extreme heat events, and flooding rains over the United States and North America. Predicting the MJO and its behavior using climate models is thus an important thing to do despite the challenges. The “moisture mode” framework, where column-integrated moist static energy (MSE) plays a major role, is a theoretical model in tropical meteorology used to understand and predict large-scale weather phenomena like the MJO. Predicting the MJO using the MSE budget framework, evaluating the dynamical processes involved, and figuring out the source of model errors in misrepresenting the MJO is the focus of a paper published by CISESS Scientist Cristiana Stan and colleagues in the *Journal of Climate*. Their analyses are based on NOAA’s state-of-the-art coupled model Unified Forecast Model (UFS) prototype 8 (UFS P8), focused on the global tropics (108°S–108°N), the Indian Ocean, and western Pacific Ocean in the months of November to April of the years 2011 to 2018. European Centre for Medium-Range Weather Forecasts Reanalysis Fifth Generation (ERA5) provides the observational part of their analyses. Compared to observations, the UFS-P8-predicted MJO has a weaker amplitude and propagates slower. The misrepresentation of the MSE budget in UFS P8, primarily driven by (1) errors in surface latent heat flux due to errors in its wind-driven and thermodynamic components and (2) overestimation of atmosphere-ocean coupling due to uncertainties in the upper-ocean, vertical-mixing parameterization, leads to the prediction of the MJO with an amplitude weaker than observed. The stronger-than-observed Kelvin waves, a driver of MJO, in UFS P8 may contribute to the slower propagation of the MJO. These findings, among others presented in the study, offer a way forward for future upgrades to this coupled model.

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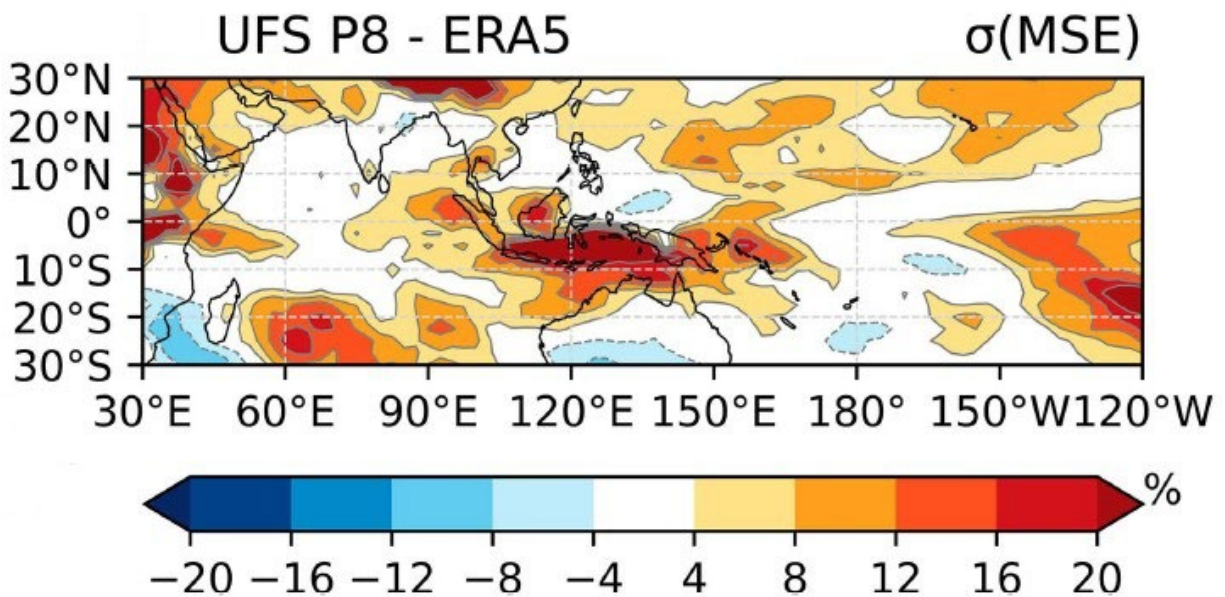


Figure: Difference between the standard deviation of modeled (UFS P8) and observed (ERA5) MSE (shown as a percentage). Errors exceeding 20% are concentrated over the Maritime Continent (i.e., Indonesia, the Philippines, Papua New Guinea, and the surrounding shallow seas). The study looks into how these differences affect the prediction of the MJO in UFS P8.

(Cristiana Stan, CISESS, cstan@gmu.edu; Funding: OSTI)

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