Weekly Report – July 29, 2022

Satellite Climate Studies Branch (SCSB)/CISESS

NOAA/NESDIS/STAR

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TRAVEL AND MEETING REPORTS

CISESS Scientists attended the 2022 NOAA CoRP Science Symposium:

CISESS sponsored two early career scientists, Drs. Malar Arulraj and Daile Zhang, to attend the 2022 Cooperative Research Program (CoRP) Science Symposium, which was held in person on July 25th to 27th at the Cooperative Institute for Research in the Atmosphere (CIRA) of Colorado State University located in Fort Collins, CO. The Symposium focused on multi-disciplinary research and brought together members from NOAA and the academic community to discuss the latest developments in satellite remote sensing research and applications. The Symposium was a great opportunity for students and early career scientists to network with their peers from other Cooperative Institutes and NOAA. In addition to providing an opportunity to present their most recent research, the Symposium included several career development and support sessions, including mentor panel discussions, small group social events, and a workshop to develop a support network. The attendees also had the opportunity to visit the CSU Drone Center (https://www.research.colostate.edu/csudronecenter/) and get a hands-on experience flying a drone.

(POC: E. Hugo Berbery, berbery@umd.edu; Funding: CISESS Task I)

CISESS Scientists Presented their Research at the 2022 NOAA CoRP Science Symposium:

CISESS Scientists Daile Zhang and Malar Arulraj delivered oral presentations in the "Student and Young Scientist Presentations" session. Dr. Zhang presented work-in progress of her CISESS Seeds Grant on "Developing & Deploying Tools to Better Observe Lightning in the Washington D.C. Region & Beyond." Her work focuses on building a Raspberry Pi camera network to enhance the capability of existing lightning observation networks of GLM and other ground-based measurements. A video collection of thunderstorms and lightning captured by the

Raspberry Pi camera network that was shared at the CoRP Science Symposium is available at https://www.youtube.com/watch?v=7xkcp_YyAKA.

Award-Winning Oral Presentation on Satellite Precipitation Retrievals:
Dr. Arulraj presented her research on precipitation vertical structure identification titled "Assessing the Impact of Precipitation Vertical Structure in the Satellite Precipitation Retrievals – Feature-based approach", for which she was awarded 3rd prize in the Oral Presentation Award category.

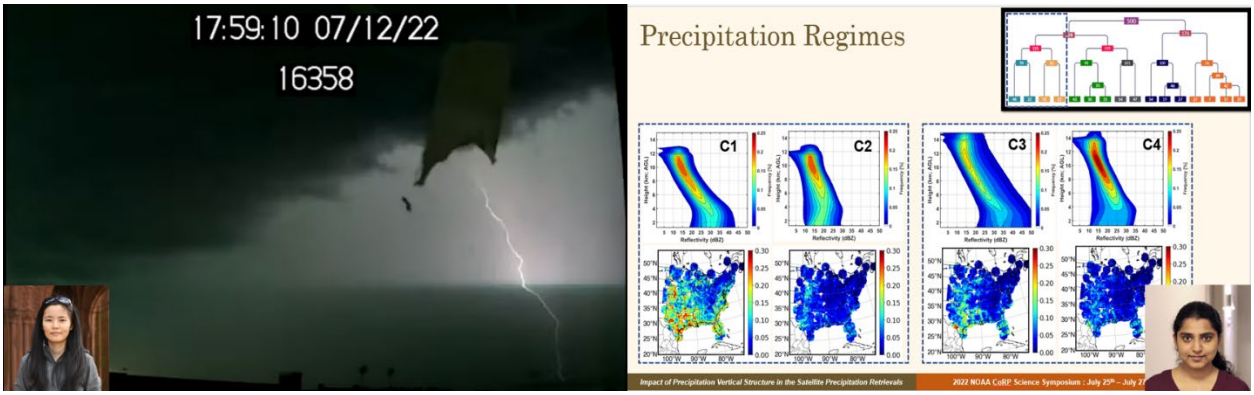

Figure: Snapshot of (Left panel) Dr. Zhang's lightning observation video; (Right panel) Dr. Arulraj's research results presented at the 2022 NOAA CoRP Science Symposium.

(POC: Daile Zhang, CISESS, dlzhang@umd.edu, *Funding: GOES*-R AWG, GOES-R PGRR, NOAA-NASA ROSES & CISESS Seed Grant; Malar Arulraj, CISESS marulraj@umd.edu, Funding: JSTAR)

PUBLICATIONS

Summary: CISESS Scientist and University of Maryland Professor, Dr. Jonathan Poterjoy, has a new article published in the June issue of the *Monthly Weather Review* on some of the specialized data assimilation he has been working on with AOML and EMC. "Data assimilation" for atmospheric models is the process of using incomplete and error-prone environmental measurements to provide a holistic picture of natural systems. Numerical predictions of Earth's atmosphere are used to represent known physical processes governing the evolution of atmospheric flow, clever statistical methods to construct a complete model-representation of the true atmosphere from incomplete measurements along with assumptions of the shape of error distributions for variables that are input into models for generating predictions. This undertaking was further complicated by the need to consider how an error in one variable (e.g., temperature in Washington DC) is related to all other variables that characterize Earth's atmosphere (e.g., wind, moisture, and pressure across the planet). In this article, Poterjoy examines the fidelity of error assumptions made by regional weather prediction systems using

a novel technique that avoids common approximations. This study used a month-long period and extensive forecast region that captured numerous high-impact tropical cyclones from the 2017 hurricane season (see figure), including Hurricanes Harvey and Maria. Findings reveal practical and measured improvements in operational prediction that can be achieved by simply adopting a more sophisticated specification of uncertainty than is currently used at environmental prediction centers worldwide. The findings of this study motivate further research on new methods of performing data assimilation for atmospheric models.

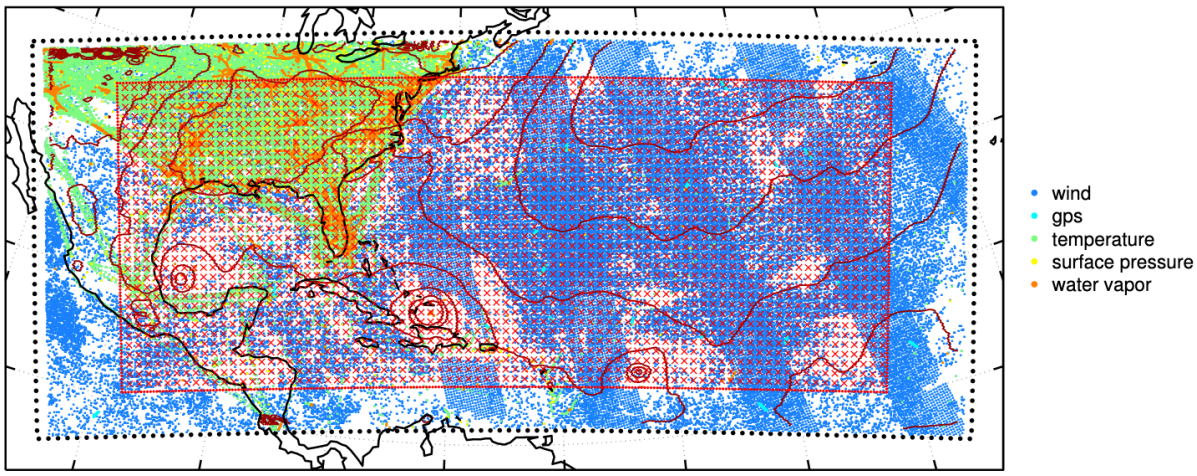

Figure: The dotted line indicates model domain boundaries used for this study, which are plotted alongside (solid black lines) land boundaries. For reference, (red lines) contours of modeled surface pressure are plotted every 5 hPa along with locations of measurements at a single time (00 UTC8 September 2017). The red hatched region indicates the domain over which verifications were performed.

(POC: Jonathon Poterjoy, CISESS, poterjoy@umd.edu , Funding: EMC & AOML)