Weekly Report – April 5, 2024

Cooperative Institute for Satellite Earth System Studies (CISESS)

NOAA/NESDIS/STAR

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HIGHLIGHT FOR NESDIS LEADERSHIP

NOAA Coral Reef Watch Staff Featured Among 54 Women Space Leaders in *Space.com* Article Celebrating Women's History Month: The NOAA Coral Reef Watch (CRW) Operations Manager and a Senior Faculty Specialist at the University of Maryland (UMD)-Cooperative Institute for Satellite Earth System Studies (CISESS), Jacqueline De La Cour, was among 54 women space leaders chosen for a *Space.com* article celebrating Women's History Month. Ms. De La Cour was asked to provide general thoughts about her career journey or an inspirational message to help motivate current and future generations of women to overcome challenges and adversity to succeed in the sciences. Ms. De La Cour noted the following, to honor the extraordinary women scientists, who came before her and with whom she currently works:

This month, like every month, I wish to acknowledge and honor the exceptional women I work alongside in the fields of coral reef conservation, oceanography, and satellites, and the countless women who came before me, who dedicated themselves and their work to improving the quality of life for our children and society. Their hard work, inner strength, compassion, diligence, passion, perseverance, resilience, and support of one another, led to some of the most incredible scientific and medical discoveries of all time, and paved the way for female scientists like me to have the education and careers we now have. My sincere thanks to all women around the world, who, like me, work tirelessly to overcome obstacles in our paths, so we can create a sustainable and promising future for our children.

Irene Parker, Deputy Assistant Administrator for Systems in NOAA/NESDIS, and Pam Sullivan, Director of the Office of Geostationary Earth Orbit Observations in NOAA/NESDIS, also contributed inspirational messages to the article.

(Jacqueline De La Cour, CISESS, jacqueline.shapo@noaa.gov, Funding: NOS)

This item was submitted in the SOCD Weekly Report.

TRAVEL AND MEETING REPORT

CISESS Scientist Daile Zhang Gave an Invited Seminar and Installed Two Raspberry Pi Cameras at Texas A&M University

CISESS scientist Daile Zhang was invited to give a seminar at Texas A&M University, titled "Electrifying Horizons: Unveiling Lightning Patterns Through Satellite Remote Sensing." Collaborating with Tim Logan, an Assistant Professor at Texas A&M's Department of Atmospheric Sciences, Daile installed two Raspberry Pi cameras at the observatory in the Department's building. The team will record high-speed videos of lightning starting this spring to build a ground-truth database to evaluate the performance of NOAA's Geostationary Lightning Mapper.

Figure: *A new Raspberry Pi camera installed at Texas A&M University.*

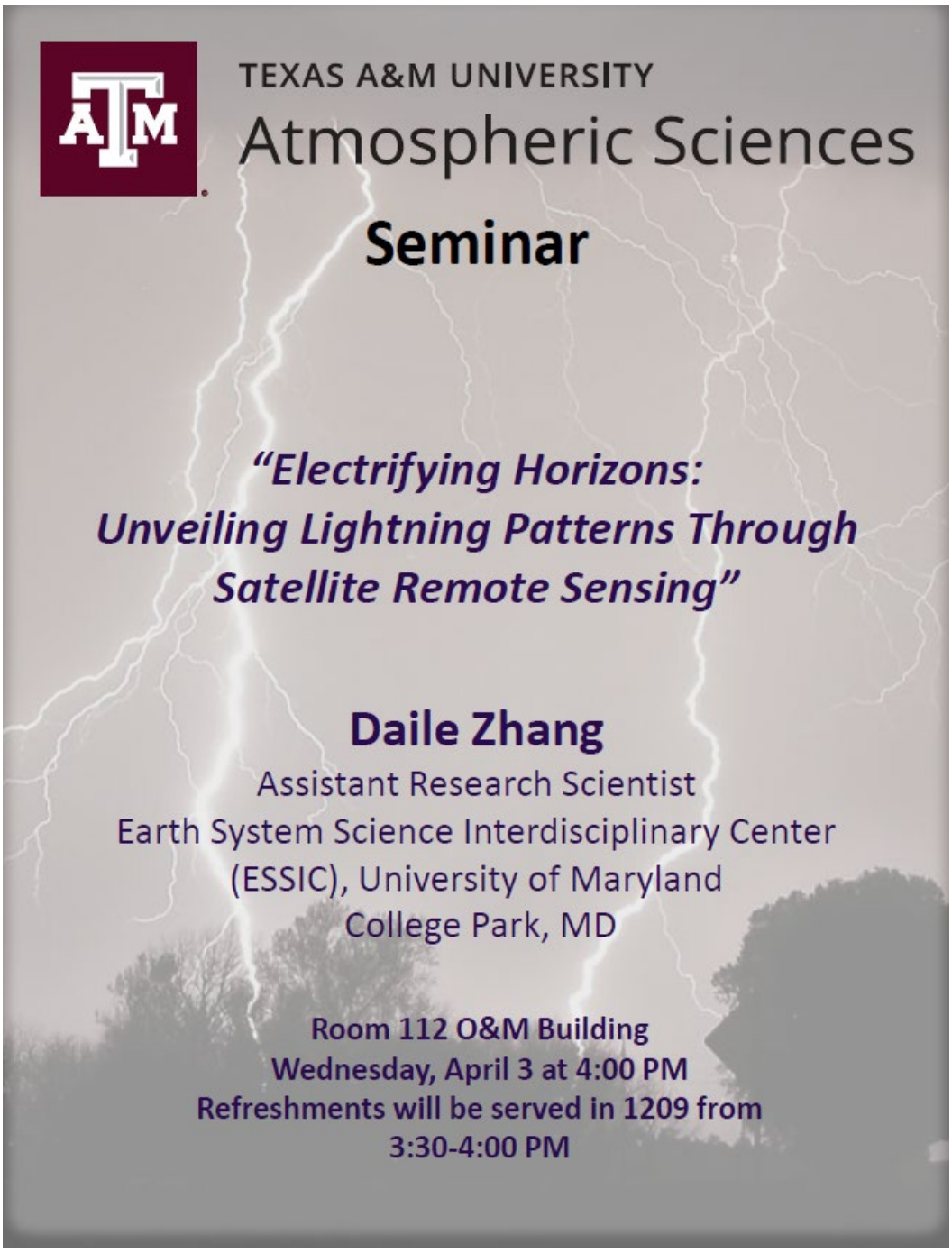

Figure: *Seminar flyer announcing Daile Zhang's talk.*

(Daile Zhang, CISESS, dlzhang@umd.edu, Funding: GOES-R AWG, GOES-R PGRR, NOAA ROSES, and CISESS Seed Grant)

PUBLICATIONS

Refining the on-orbit radiometric calibration of NOAA-20 VIIRS

Choi, Taeyoung, Changyong Cao, Slawomir Blonski, **Xi Shao**, and **Wenhui Wang**, 2024: NOAA-20 VIIRS on-orbit reflective solar band radiometric calibration five-year update. *IEEE Trans. Geosci. Remote Sens.* **62**, 1000610, https://doi.org/10.1109/TGRS.2024.3363661.

The recent publication by CISESS Scientists Xi Shao and Wenhui Wang, and their co-authors, describes in detail their examination of the on-orbit radiometric calibration stability of the NOAA-20 satellite's Visible Infrared Imaging Radiometer Suite, launched in November 2017. This instrument has successfully operated for over five years and has produced high-quality sensor data records on a daily basis from around the globe, contributing greatly to environmental and climate change studies.

The Visible Infrared Imaging Radiometer Suite collects data in the reflective solar bands and primarily uses solar diffuser observations, along with long-term lunar calibrations and deep convective cloud trends, for the on-orbit radiometric calibration of these bands. Degradation of the instrument can occur due to exposure to ultraviolet radiation from direct sunlight, so calibrating these bands is important to ensure high-quality sensor data records. Over the five years of on-orbit operation, the authors report that the NOAA-20 Visible Infrared Imaging Radiometer Suite has shown very stable on-orbit radiometric stability in all reflective solar bands from the onboard solar-diffuser-based calibration, independent monthly lunar calibrations, and deep-convective-cloud observations. However, the authors found that applying small positive correction slopes to the on-orbit radiometric calibration coefficients enhanced the accuracy of radiometric products from the observed long-term trends in deep-convective-cloud observations and lunar calibrations. Their work on revising long-term correction slopes is ongoing, ensuring high-quality NOAA-20 Visible Infrared Imaging Radiometer Suite sensor data records for the user community.

(Xi Shao, CISESS, xshao@umd.edu; Funding: JSTAR, METOP-SG, COSMIC-2; Wenhui Wang, CISESS, wenhui.wang@noaa.gov; Funding: JSTAR)

The Bulletin of the American Meteorological Society Highlights SatERR 1.0

The work of CISESS Scientist John Yang has been featured in the March 2024 issue of the Bulletin of the American Meteorological Society (BAMS), the flagship journal of the American Meteorological Society. In the highlight, the BAMS editor delved into the origins, challenges, and stories behind the development of SatERR 1.0. John Yang has led a project for the development of SatERR 1.0, a comprehensive satellite error inventory and simulator, now accessible as an open-source project on GitHub. SatERR is NOAA's first satellite error inventory.

This highlight underscores the significance of the work supported by NOAA projects and enhances the visibility of research at NOAA.

A summary of the paper (citation below) is provided in the CISESS Weekly Report of 19 January 2024.
Yang, John Xun, Yalei You, William Blackwell, **Cheng Da**, **Eugenia Kalnay**, **Christopher Grassotti**, Quanhua (Mark) Liu, **Ralph Ferraro**, Huan Meng, Cheng-Zhi Zou, Shu-Peng Ho, **Jifu Yin**, **Veljko Petkovic**, Timothy Hewison, Derek Posselt, Antonia Gambacorta, David Draper, Sidharth Misra, Rachael Kroodsma, and Min Chen, 2023: SatERR: A community error inventory for satellite microwave observation error representation and uncertainty quantification, Bull. Amer. Meteor. Soc., 105(1), E2316–E2335, https://doi.org/10.1175/BAMS-D-22-0207.1.

METADATA

BAMS: What would you like readers to learn from this article?

John Xun Yang (University of Maryland and NOAA/National Environmental Satellite, Data, and Information Service/Center for Satellite Applications and Research): *We're excited to introduce readers to SatERR 1.0, a comprehensive satellite error inventory and simulator, now accessible as an open-source project on GitHub. It simulates a wide range of satellite observation errors, from instrument measurement errors to model assimilation errors, for better satellite error representation and uncertainty quantification. This valuable resource encompasses 15 microwave sensors across 37 satellites, including 2 CubeSats. We invite readers to recognize this major achievement and eagerly await feedback for further improvements.*

BAMS: How did you become interested in the topic of this article?

JXY: *My journey into this field was sparked by my engagement in a number of NOAA/NASA satellite missions such as JPSS, GPM, and TROPICS. Over recent years, it has become clear to those of us in NOAA, NASA, and ECMWF that we need a bottom-up simulator and error inventory. This complements the more traditional top-down approach like diagnostics techniques in data assimilation, offering a fresh perspective for satellite observation error quantification.*

BAMS: What surprised you the most about the work you document in this article?

JXY: *Satellite observation error stems from a chain from instrumental level through data assimilation, weather forecasts, and science products. I was surprised that a subset error can be so complex and influential, yet frequently overlooked by nonspecialists.*

BAMS: What was the biggest challenge you encountered while doing this work?

JXY: *Cooking up such an intensive simulator demands a lot of coding, not to mention the workload of validation. On top of that, herding input and insights from a crew of engineers and scientists is not easy.*

(John Xun Zhang, CISESS, xun.yang@noaa.gov; Funding: JSTAR)

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