Weekly Report – June 27, 2025

Cooperative Institute for Satellite Earth System Studies (CISESS)

NOAA/NESDIS/STAR

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TRAINING AND EDUCATION

CISESS Participation in the AMS Short Course Workshop on Satellites and Fire

Three CISESS Scientists led training sessions over the past two weeks for the 2025 American Meteorological Society Satellite Meteorology, Oceanography, and Climatology (SatMOC) short course for "Satellites and Fire". Christopher Smith, GOES-R Satellite Liaison for the National Weather Service (NWS) Weather Prediction Center and Ocean Prediction Center, led a training session on "An Introduction to Environmental Satellite Capabilities", where he gave an overview of using satellite imagery for fire weather conditions and response. Joseph Patton, Geostationary Lightning Mapper Researcher, headed a session on "The Pre-fire Phase of Wildland Fires", where he led an interactive exploration of recognizing critical atmospheric conditions which promote extreme fire behavior using satellite imagery. Finally, Javier Villegas Bravo, NWS Operations Proving Ground Satellite Liaison, conducted a training session on "The Post-Fire Phase of Wildland Fires", where he presented on the post-fire phase of wildland fire response and management incorporating satellite-based products. The course is catered towards undergraduate and graduate college students but is also beneficial to those changing careers or moving to a position requiring increased environmental satellite knowledge. Accessible satellite resources were provided to increase preparedness for wildland fire ignition and monitoring, as well as post-fire burn scar risks.

Figure. AMS Short Course announcement on Satellites and Fire, featuring CISESS Scientists Joseph Patton, Christopher Smith, and Javier Villegas Bravo.

(*Joseph Patton, CISESS, jpatton4@umd.edu, Funding: GEO-XO, GOES-R AWG & GOES-R PGRR; Christopher Smith, CISESS, csmith70@umd.edu, Funding: GOES-R PGRR; Javier Villegas Bravo, CISESS, vllgsbr2@umd.edu, Funding: GOES-R PGRR)*

PUBLICATIONS

How South American Agricultural Flash Droughts Affect Soybean and Corn Yields
Citation: Lovino, Miguel A., M. Josefina Pierrestegui, Lumila Masaro, Omar V. Müller, Gabriela V. Müller, and **Ernesto H. Berbery**, 2025: Agricultural flash droughts and their impact on crop yields in southeastern South America. *Environ. Res. Lett.*, **20**, 054058, https://doi.org/10.1088/1748-9326/adcd88.
Summary: Southeastern South America (SESA), where agriculture depends on rain rather than irrigation for watering purposes, is prone to agricultural flash droughts (AFDs). In a recent study published in the journal *Environmental Research Letters*, CISESS Deputy Director and Research Professor Ernesto H. Berbery and colleagues analyze AFDs in SESA and their effects on soybean and corn during critical growth periods. Using European Centre for Medium-Range Weather Forecasts Reanalysis version 5 (ERA5) data (1960–2022), AFD frequency, intensity, duration, trends, and land–atmosphere interactions are examined. Central SESA sees the most frequent AFDs (3–8 per decade), which often develop into seasonal droughts. Southern Brazil and Uruguay show increasing trends, while northern SESA has fewer AFDs (1–3 per decade) but rising frequency and intensity. AFDs intensify due to high vapor pressure deficits and temperatures despite stable rainfall. Though they cover smaller areas, their timing during key crop stages can significantly reduce yields.

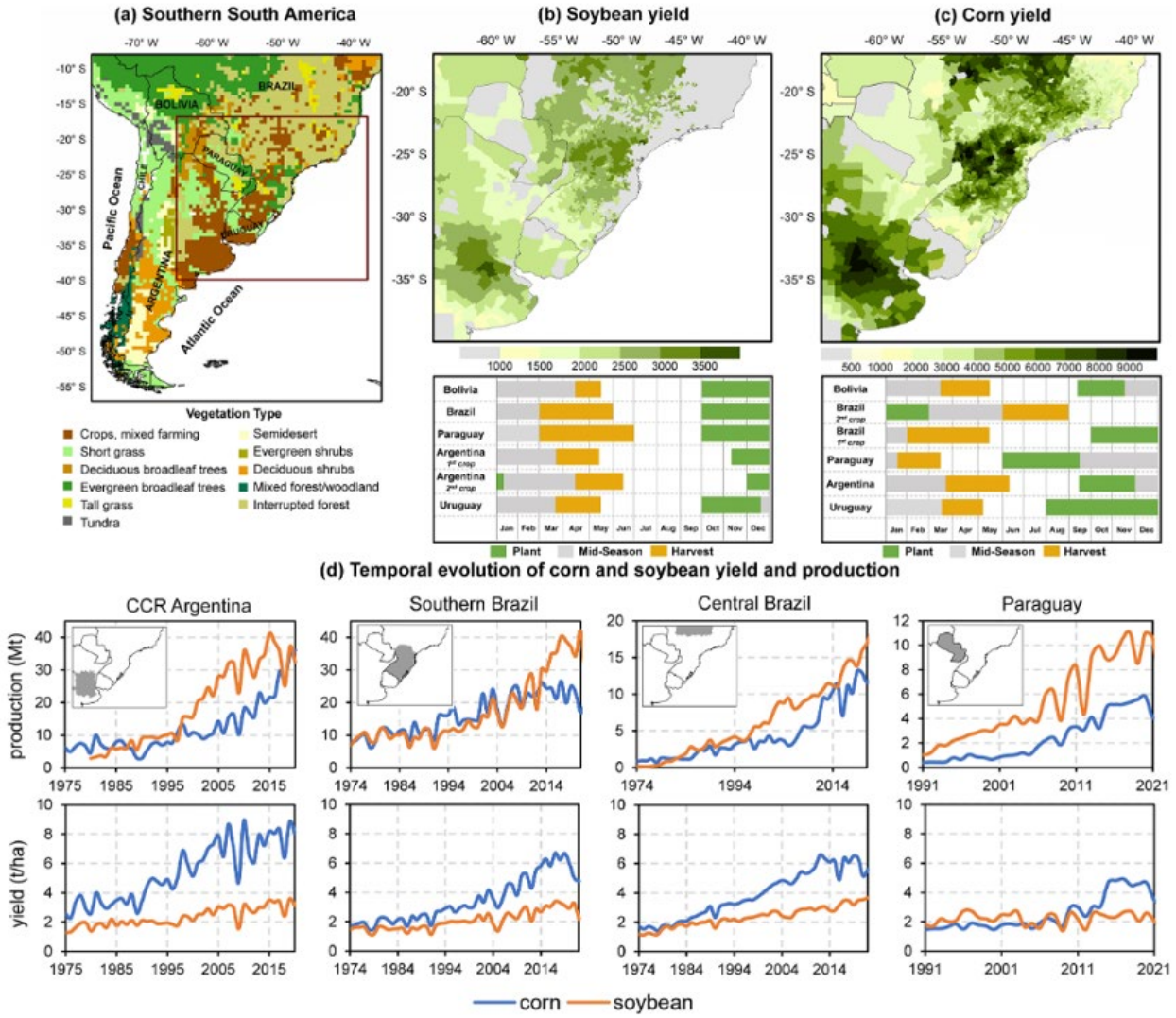

Figure. (a) Southern South America countries with dominant vegetation types in the ERA5 dataset according to each pixel's high or low vegetation coverage. The study region (SESA) is highlighted with a red rectangle. Average (b) soybean yields and (c) corn yields during the 2000–2020 period, with crop life cycles displayed for each country. (d) Temporal evolution of corn and soybean yields and production across key agricultural regions: Argentina's core crop region (CCR, 1975–2020), southern Brazil, central Brazil (1974–2022), and Paraguay (1991–2021).

(Ernesto H. Berbery, CISESS, berbery@umd.edu; Funding: CPO & GOES-R PGRR)

Examining an Unreported Australian Coral Bleaching Event

Citation: Spady, Blake L., William J. Skirving, **Erick F. Geiger**, Neal E. Cantin, Gang Liu, **Jacqueline L. De La Cour**, Peter J. Mumby, Andrew Norrie, and Derek P. Manzello, 2025: Satellite-based

analysis of an unverified mass coral bleaching event on the Great Barrier Reef in 2021. Coral Reefs, https://doi.org/10.1007/s00338-025-02690-1.

Summary: Erick Geiger and Jacqueline De La Cour (no longer with CISESS at the time of writing, post-publication of their paper), along with colleagues, investigate the utility of Coral Reef Watch daily global 5-km satellite coral bleaching heat stress monitoring products to identify heat stress events and their evolution over time on in-situ-monitored and unmonitored coral reefs of the vast Australian Great Barrier Reef (GBR). Here, they analyze the characteristics of an unreported severe heat stress event that occurred in a remote part of the GBR in the summer of 1921. They demonstrate that a strong correlation exists between satellite-based heat stress metrics and mass bleaching on the GBR, reporting that the GBR has likely experienced at least eight mass bleaching events from 1998 to 2024, three of which were consecutive events affecting the northern GBR from 2020 to 2022. This suggests that near-annual monitoring of the GBR may be necessary moving forward.

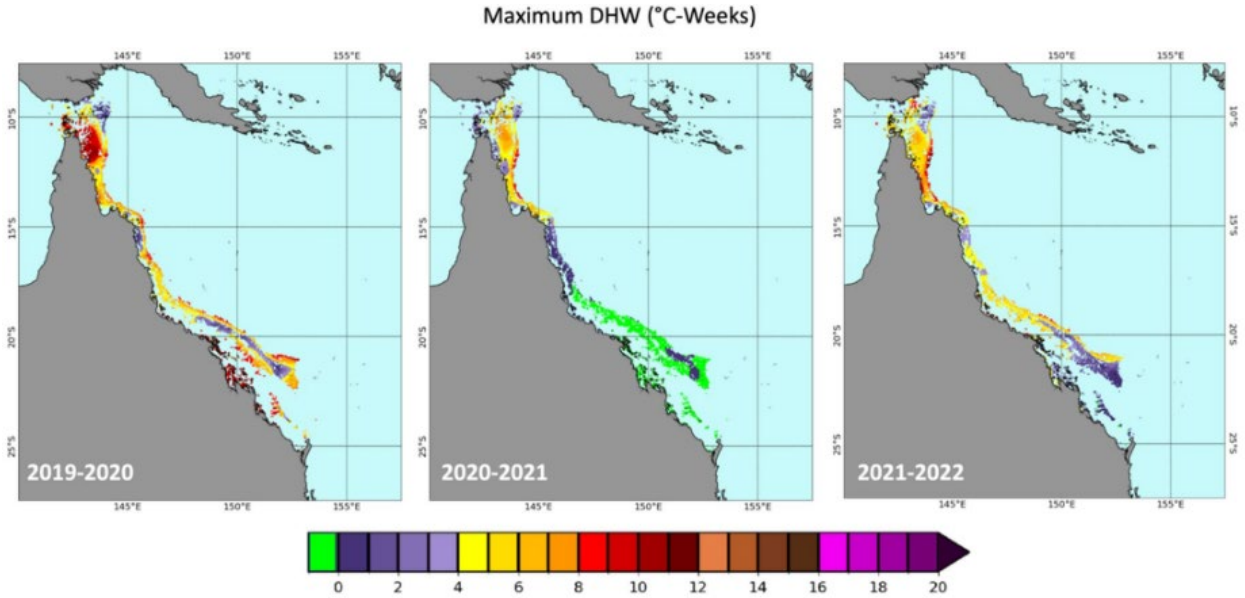

Figure. Maximum degree heating weeks (DHWs) on the Great Barrier Reef for the confirmed summertime mass-bleaching events of 2019–2020 (left) and 2021–2022 (right) and the unverified event of 2020–2021 (middle). DHW values ≥ 4 are considered sufficient to result in significant coral bleaching.

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