Weekly Report – December 19, 2025

Cooperative Institute for Satellite Earth System Studies (CISESS)

NOAA/NESDIS/STAR

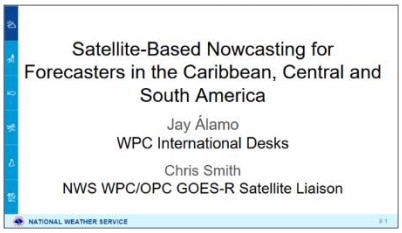
Submitted by: Maureen Cribb
Email: mcribb@umd.edu
Phone: 301-405-9344

Date of Submission: 19 December 2025

TRAINING AND EDUCATION

CISESS Scientist Co-Leads WMO Region Four Satellite-Based NowCasting Training

CISESS Scientist Christopher Smith, GOES-R Satellite Liaison for the National Weather Service Weather Prediction Center (WPC) and Ocean Prediction Center, co-led a World Meteorological Organization (WMO) Region Four "Satellite-Based Nowcasting in the Caribbean, Central and South America" training on 9 December 2025. The purpose of the training was to provide practical satellite tools for nowcasting deep convection in radar-sparse regions to improve situational awareness and warning lead time. Christopher Smith presented with WPC International Desk Chief José "Jay" Alamo on various Red-Green-Blue composites, satellite imagery viewers, and machine-learning products like LightningCast, that can be used to detect convective initiation. The presentation will also be used to train fellows from Central and South America that will visit the WPC International Desk in early 2026.



(Christopher Smith, CISESS, csmith70@umd.edu; Funding: GOES-R PGRR)

SOCIAL MEDIA AND BLOG POSTS

Atmospheric Rivers and the Pacific Northwest

Roaring winds, record flooding, heavy snowfall in mountainous areas … a stream of atmospheric rivers (ARs) has winded its way over the Pacific Northwest since the beginning of December, recounts CISESS Scientist Christopher Smith, GOES-R Satellite Liaison for the National Weather Service (NWS) Weather Prediction Center (WPC) and Ocean Prediction Center in a recent blog post. The first round of moisture hit Washington and Oregon on 8 December, creating ground and river conditions ripe for flooding and associated hazards like debris flows and landslides. Over the coming week, more ARs are expected, extending further south into coastal California.

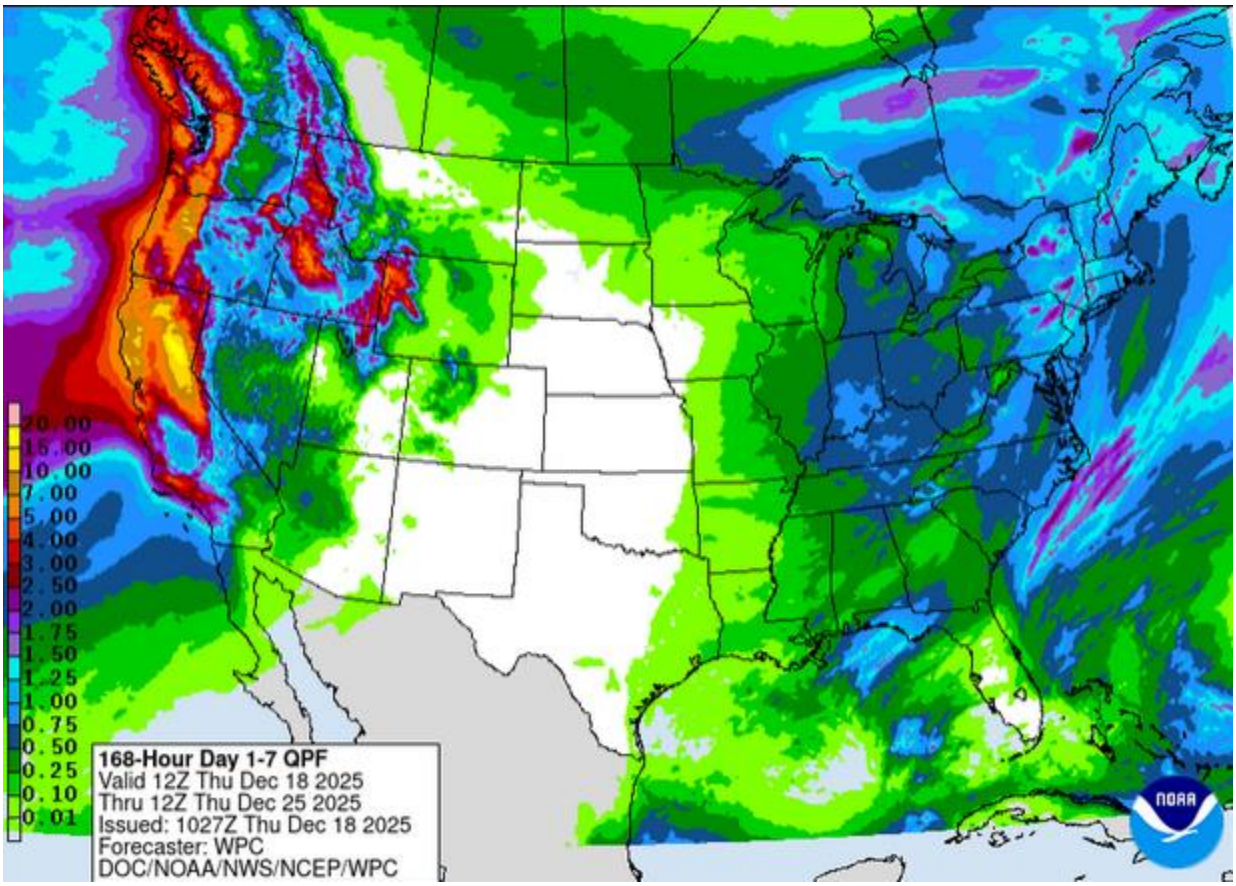


Figure: NWS WPC 7-day Quantitative Precipitation Forecast (QPF) issued at 1027 UTC 18 December 2025, valid from 1200 UTC 18 December to 1200 UTC 25 December 2025.

(Christopher Smith, CISESS, csmith70@umd.edu; Funding: GOES-R PGRR)

PUBLICATIONS

Examining Greenhouse Gas Emissions from Cropland Fires Around the World
Citation: An, Shuai, **Xiaoyang Zhang**, Shobha Kondragunta, Aihua Zhu, Yongchang Ye, and **Fangjun Li**, 2025: Influence of country development levels and agricultural burning policies on global cropland biomass burning observed from satellites. *Environ. Res. Lett.*, **20,** 124008, https://doi.org/10.1088/1748-9326/ae1b1d.
Summary: Greenhouse gas (GHG) emissions from cropland fires are a critical component affecting climate change. However, long-term variations in GHGs from cropland biomass-burning emissions (CBBE) remain unclear across the world's countries. CISESS Scientists Xiaoyang Zhang and Fangjun Li and coauthors used satellite observations of CBBE of carbon dioxide (CO_2) and methane (CH_4), both GHGs, to examine emission trends from 2003 to 2023 and analyze the causes across 139 agricultural-producing countries. Global CO_2 and CH_4 from

CBBE are decreasing at a rate of -8.21×10^9 kg CO_2 and -1.55×10^7 kg CH_4 per year, respectively. However, their emissions are increasing significantly ($P < 0.05$) in eight countries, mainly in South and East Asia. In thirteen other countries, variations in CBBE are associated with changes in crop residue from productivity. However, there is also a strong variation in CBBE associated with the regulation of agricultural fires, in which appropriate agricultural residue management policies have effectively reversed the increasing CBBE trends in some countries.

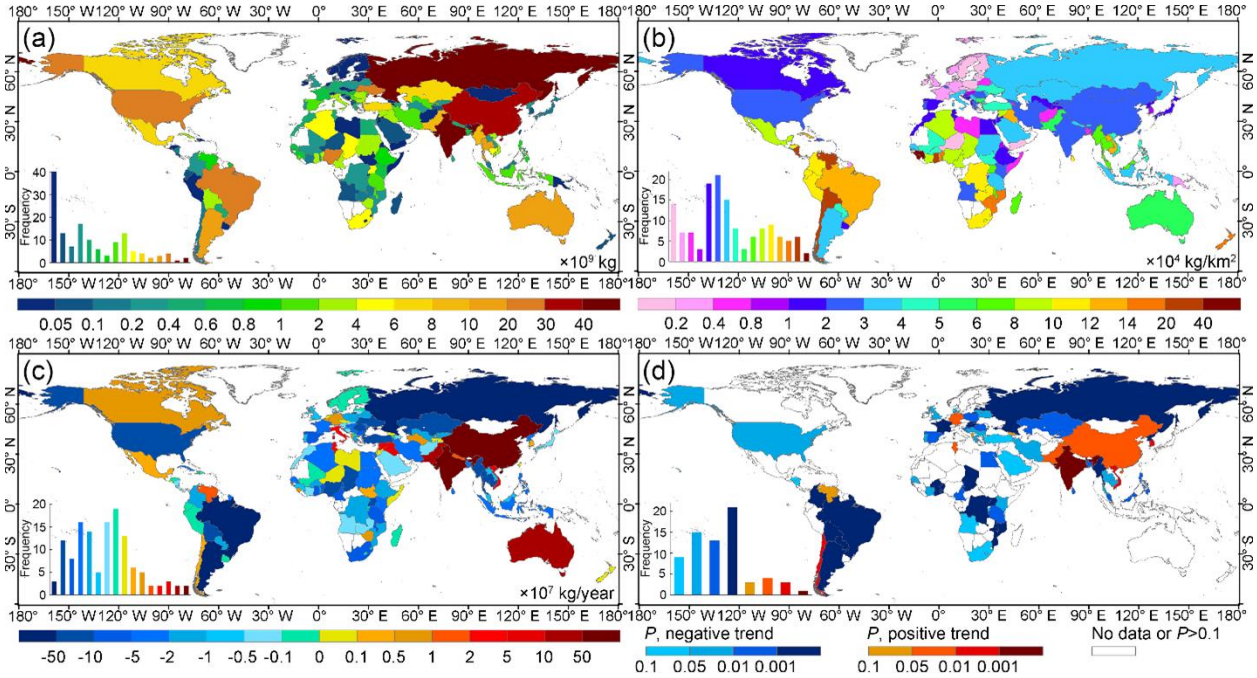


Figure: Long-term changes of CO_2 emissions from cropland biomass burning from 2003 to 2023 at a country scale worldwide. (a) Multi-year mean CO_2 emissions (×10^9 kg), (b) multi-year mean CO_2 emissions per unit cropland area (×10^4 kg/km^2), (c) Theil-Sen/Mann-Kendall (TS-MK) trend of annual total CO_2 emissions (×10^7 kg/year), and (d) significance test of the TS-MK trend of annual total CO_2 emissions. The vertical bars in the lower-left corner of each panel represent the proportions of countries corresponding to each level denoted in its color legend.

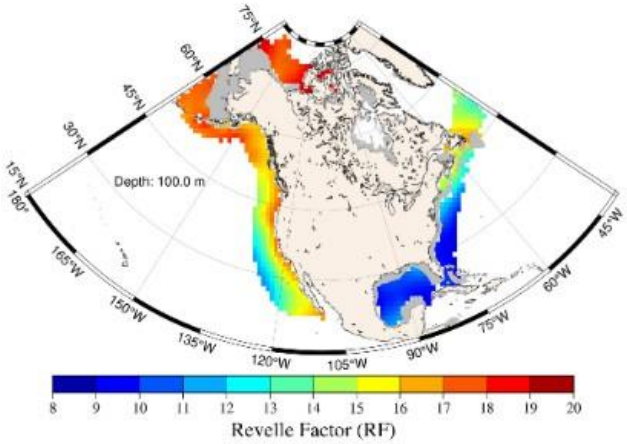
(Xiaoyang Zhang, CISESS, xiaoyang.zhang@sdstate.edu, Funding: JPSS PGRR; Fangjun Li, CISESS, fangjun.li@sdstate.edu, Funding: OCS)

Welcome to the World of Ocean Carbonate Chemistry Data Products

Citation: Jiang, Li-Qing, Amanda Fay, Jens Daniel Müller, Lydia Keppler, Dustin Carroll, Siv K. Lauvset, Tim DeVries, Judith Hauck, Christian Rödenbeck, Luke Gregor, Nicolas Metzl, Andrea J. Fassbender, Jean-Pierre Gattuso, Peter Landschützer, Rik Wanninkhof, Christopher Sabine, Simone R. Alin, Mario Hoppema, Are Olsen, Matthew P. Humphreys, Kumiko Azetsu-Scott, Dorothee C. E. Bakker, Leticia Barbero, Nicholas R. Bates, Nicole Besemer, Henry C. Bittig, Albert

E. Boyd, Daniel Broullón, Wei-Jun Cai, Brendan R. Carter, Thi-Tuyet-Trang Chau, Chen-Tung Arthur Chen, Frédéric Cyr, John E. Dore, Ian Enochs, Richard A. Feely, Hernan E. Garcia, Marion Gehlen, Lucas Gloege, Melchor González-Dávila, Nicolas Gruber, Yosuke Iida, Masao Ishii, Esther Kennedy, **Alex Kozyr**, Nico Lange, Claire Lo Monaco, Derek P. Manzello, Galen A. McKinley, Natalie M. Monacci, Xose A. Padin, Ana M. Palacio-Castro, Fiz F. Pérez, Alizée Roobaert, J. Magdalena Santana-Casiano, Jonathan Sharp, Adrienne Sutton, Jim Swift, Toste Tanhua, Maciej Telszewski, Jens Terhaar, Ruben van Hooidonk, Anton Velo, Andrew J. Watson, Angelicque E. White, Zelun Wu, **Hyelim Yoo**, and Jiye Zeng, 2025: Synthesis of data products for ocean carbonate chemistry. *Earth System Science Data*, accepted, https://doi.org/10.5194/essd-2025-255.

Summary: CISESS Scientists Li-Qing Jiang, Alex Kozyr, and Hyelim Yoo, along with researchers from around the world, present an in-depth overview of 60 existing ocean carbonate chemistry data products in their recently accepted paper soon to be published in the journal *Earth System Science Data*. These data products provide critical information about the ever-changing chemistry of the world's oceans, the largest dynamic carbon reservoir on the planet. Replete with details, this overview is a useful resource for those interested in coastal and global ocean carbonate chemistry research. The data product webpage includes products developed by Jiang.



(Li-Qing Jiang, CISESS, liqing.jiang@noaa.gov, Funding: NCEI; Alex Kozyr, CISESS, alex.kozyr@noaa.gov, Funding: NCEI; Hyelim Yoo, CISESS, hyelim.yoo@noaa.gov, Funding: NCEI)

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