Weekly Report

CIRA
STAR/NESDIS
National Oceanic and Atmospheric Administration (NOAA)

Submitted by: Maranda Hutson
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Prepared by: CIRA and STAR contributors

Products and Applications

Blended TPW on SLIDER: CIRA's Blended Total Precipitable Water (TPW) product is now available on SLIDER. This product combines information from low-earth orbiting microwave water vapor retrievals (e.g. MiRS), geostationary infrared water vapor bands (e.g. GOES-R ABI) and surface-based Global Positioning System (GPS) observations to provide hourly retrievals of the total precipitable water around the globe. This global product, long used by forecasters with access to AWIPS, is now available on CIRA's SLIDER website (https://rammb-slider.cira.colostate.edu). The global product is remapped to each geostationary satellite domain (Full Disk sectors only) and to all three JPSS sectors (Northern Hemisphere, Southern Hemisphere and CONUS). In each case, Blended TPW is listed under the new "Microwave Products" section of the product menu. Examples are shown in the figure below. (POC: C. Seaman, J. Forsythe, K. Micke and Z. Amundson, CIRA; curtis.seaman@colostate.edu; john.forsythe@colostate.edu; kevin.micke@rams.colostate.edu; zayd.amundson@colostate.edu) Funding: GOES-R and JPSS

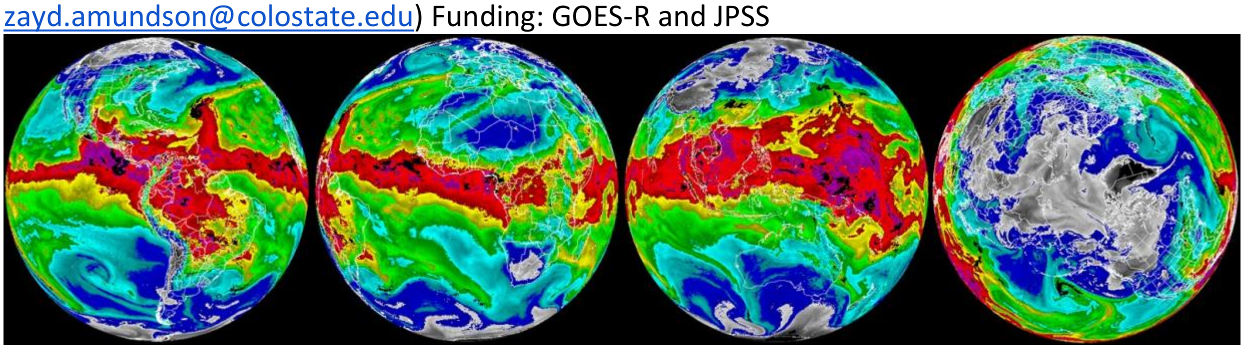


Figure: From L-to-R, CIRA's Blended TPW product remapped to the GOES-16, Meteosat-10, Geo-KOMPSAT-2A, and JPSS Northern Hemisphere domains (1500 UTC, 25 October 2023).

Publications (Citation: followed by a short Summary: (Why & so what), & detailed summary):

Awards and Recognition

Media Interactions and Requests

Hurricane Otis: Satellite visuals created by Dakota Smith, Kim Erickson, and Josh Reiter made available in CIRA's Satellite Library were downloaded and featured by several high profile news outlets to cover Hurricane Otis and its impact in Mexico. NOAA also used the imagery in their social media and public relations initiatives. More information and links can be found below. (POC: D. Smith, dakota.smith@colostate.edu K. Erickson, kim.erickson@colostate.edu, J. Reiter, josh.reiter@colostate.edu, S. Miller, Steven.Miller@colostate.edu, CIRA) Funding: GOES-R

NBC Nightly News with Lester Holt: "Hurricane Otis hits Mexico as a powerful Category 5 storm". https://www.youtube.com/watch?v=hyfnVIAqPDc&ab_channel=NBCNews

The New York Times: "Why Hurricane Otis caught many by surprise". https://www.nytimes.com/2023/10/25/world/americas/hurricane-otis-mexico-intensity-surprise.html

The Washington Post: "Now a tropical storm, Otis cuts communication after landfall near Acapulco". https://www.washingtonpost.com/weather/2023/10/25/hurricane-otis-landfall-acapulco-mexico/

The Atlantic: "Hurricane Otis Was Too Fast for the Forecasters". https://www.theatlantic.com/science/archive/2023/10/hurricane-otis-forecast-warming-oceans/675773/

Yale Climate Connection: "Why did Hurricane Otis get so strong, so fast?". https://yaleclimateconnections.org/2023/10/nightmare-scenario-category-5-hurricane-otis-devastates-acapulco/

The Weather Channel: "Hurricane Otis Live Updates". https://weather.com/news/weather/news/2023-10-25-hurricane-otis-mexico-live-updates

The Wall Street Journal: “Ots makes landfall in Mexico”. https://www.youtube.com/watch?v=gboDAtDCTXs&ab_channel=WSJNews

The Independent:

“Why did Hurricane Otis rapidly intensify into a Category 5 overnight?”. https://www.independent.co.uk/climate-change/news/hurricane-otis-mexico-landfall-category-5-b2435790.html

“Hurricane Otis batters Mexico’s Acapulco after hitting as Category 5 storm”. https://www.independent.co.uk/news/world/americas/hurricane-otis-mexico-acapulco-storm-b2436063.html

“Infrared satellite shows ‘extremely dangerous’ Hurricane Otis making landfall in Mexico”. https://www.youtube.com/watch?v=OMLQIyWB7Qo&ab_channel=TheIndependent

Yahoo!: “Infrared satellite shows ‘extremely dangerous’ Hurricane Otis making landfall in Mexico”. https://sg.news.yahoo.com/infrared-satellite-shows-extremely-dangerous-125218534.html

Fox 26 Houston: “Hurricane Otis makes landfall in Mexico”. https://www.youtube.com/watch?v=w7jgVtT7ICk&ab_channel=FOX26Houston

NOAA Satellites on Twitter: “SATELLITE SPOTLIGHT: @NOAA’s #GOES18 caught…” https://twitter.com/NOAASatellitePA/status/1717198619735118261

NOAA Satellites on Instagram: “NOAA’s GOES West satellite watched as Hurricane Otis…” https://www.instagram.com/p/Cy1Vl_xRd6D/

Blog Posts and Social Media

Travel, Workshops, Conferences, and Meeting Reports

Alan Brammer traveled to the National Hurricane Center to collaborate on research-to-operations transitions. Over the past 12 months a cloud based AWIPS system has been leveraged for developing new data visualizations and processing of experimental data from reconnaissance, research projects and new satellites. This trip culminated in three new datasets being available to forecasters in the Hurricane Specialist Unit and Tropical Analysis Forecast Branch at NHC. The new datasets include multi-level Tail Doppler Radar reflectivity and winds, with AWIPS2 visualizations to reveal the observed vertical strength and tilt of tropical cyclones. Two significant wave height datasets were also made available, giving forecasters observed wave heights around observed tropical cyclones with all data coming from the NOAA P-3 reconnaissance in real-time. These data were immediately useful to forecasters with rapid feedback from forecasters including "*Awesome Stuff,… Bravo*", "*This will revolutionize our approach for analyzing/forecasting seas within tropical cyclones*". (POC: Alan Brammer; CIRA alan.brammer@colostate.edu; Funding HFIP; collaborating with Stephanie Stevenson, Samantha Camposano, and Wallace Hogsett; NHC)

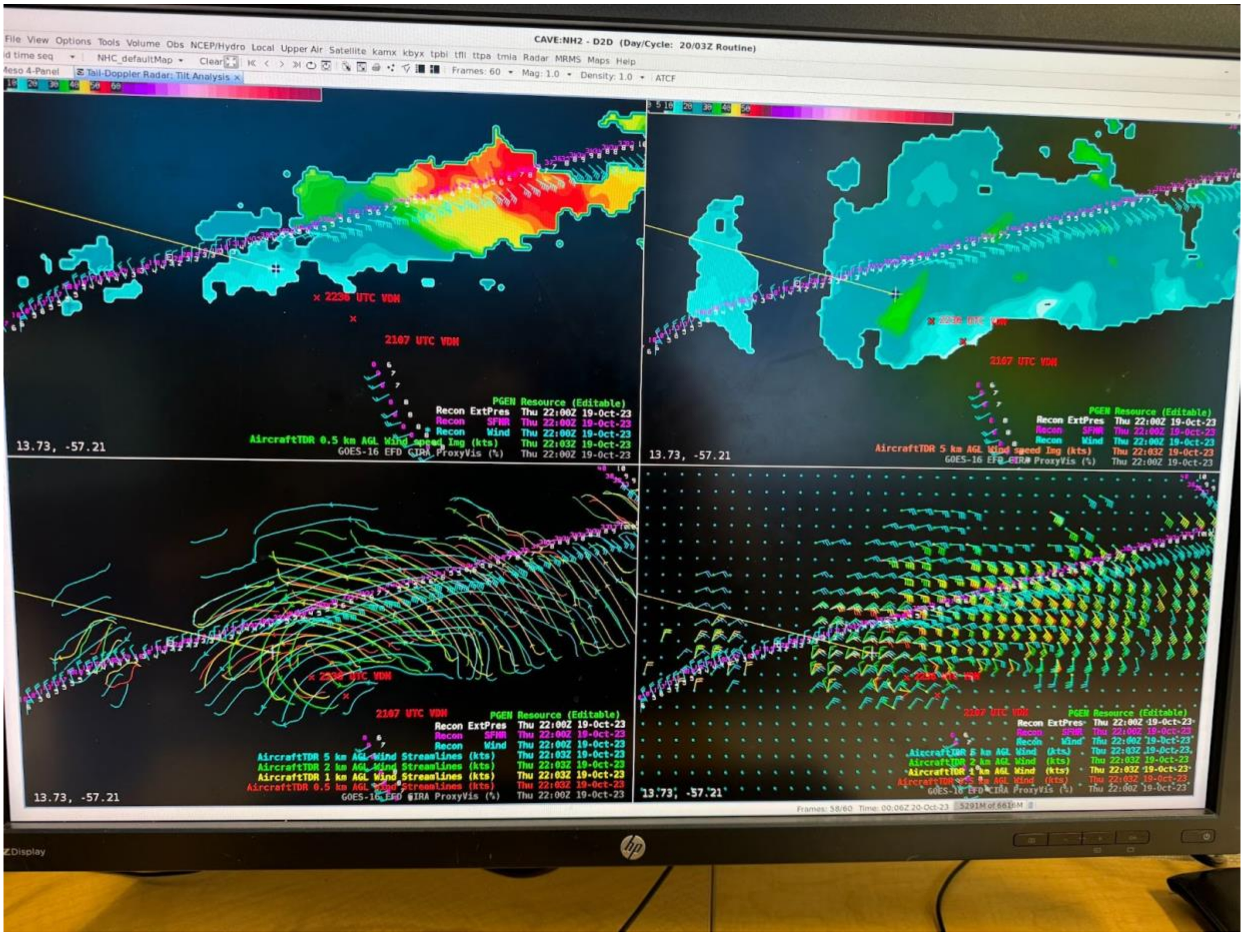


Figure: New operationally available datasets in AWIPS2, developed and transitioned to operations with facilitation through the Hurricane Ocean Testbed.

Two Presentations by CIRA scientists at the NSF Summit for AI Institutes Leadership (SAIL 2023): Kate Musgrave and Imme Ebert-Uphoff gave remote presentations at SAIL 2023 - the annual meeting of the leadership of NSF-funded AI institutes that took place Oct 23-26 in Atlanta, GA. Musgrave served on a panel on *AI for Scientific Discovery*, where she highlighted work on science discovery for tropical cyclones at CIRA based on synthetic microwave imagery. Ebert-Uphoff served on the *Generative AI Panel*, where she gave a short presentation on "Generative AI for Environmental Applications", which highlighted the important role that scientists from CIRA and NOAA-GSL are playing in the evaluation of AI-based global weather prediction models. (POC: Kate Musgrage, Imme Ebert-Uphoff, CIRA, kate.musgrave@colostate.edu, iebert@colostate.edu; Funding: NSF)

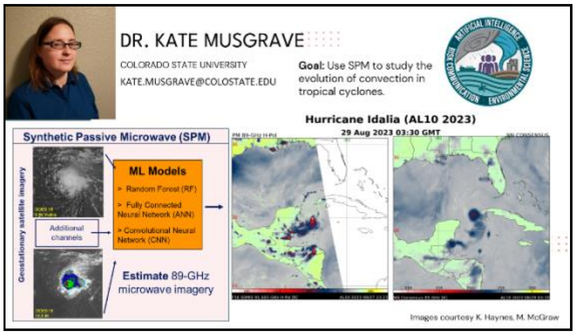


Figure: Title slides of the two CIRA presentations at the NSF Summit for AI Institutes Leadership

MODTRAN Training: Jack Dostalek attended the MODTRAN6 Training Course hosted by Spectral Sciences, Inc., the developers of the software. MODTRAN6 is a powerful tool that can be used to perform many different radiative transfer calculations relevant to CIRA activities. (POC: J.Dostalek, CIRA, jack.dostalek@colostate.edu, Funding: GeoXO and CIRA)

Front Range Tropical Cyclone Workshop: The Fall 2023 Front Range Tropical Cyclone Workshop, organized by C. Slocum, took place on 25 October at the National Center for Atmospheric Research in Boulder, CO. This two-decade-old workshop allows researchers an opportunity to share ideas and solicit feedback from others interested in tropical meteorology, specifically tropical cyclones. This fall's workshop brought together nearly forty researchers from Cooperative Institute for Research in the Atmosphere, Colorado State University, National Center for Atmospheric Research, NOAA Earth System Research Laboratories, Cooperative Institute for Research in Environmental Sciences, University of Colorado at Boulder, and NOAA Atlantic Oceanographic & Meteorological Laboratory Hurricane Research Division. Members of the STAR tropical cyclone science team and CIRA tropical cyclone group participated and presented.
(C. Slocum, STAR, Christopher.Slocum@noaa.gov, 970-491-2409; Funding: PDRA; Submitted to SOCD)

Training and Education activities

Future Meetings and Events (dates, meeting/event, location, staff involved)

Other

Travel, Workshops, Conferences, and Meeting Reports

GHRSST24 SCIENCE TEAM MEET, OCT 2023, HOSTED BY ISRO SAC, AHMEDABAD, INDIA.
CIRA employee/NOAA STAR affiliate: Prasanjit Dash, **project NEAT**

The International SST Users' Symposium and GHRSST Science Team Meeting was held in Ahmedabad, India, hosted by the Indian Space Research Organisation (ISRO) Space Applications

Centre (SAC) from 16-20 Oct, 2023. The meeting was in a hybrid format and attended by over 100 participants, including senior-level and early-career scientists. It was held in India for the first time as we look into strengthening our working relations with the Indian space-based researchers as the nation has emerged as a major space innovation hub. The initial plan was made in 2019 at ESA ESRIN, Frascati, Italy, but it was delayed due to the pandemic.

The **final meeting agenda** is available here on Google Drive. Contributions and some outcomes are listed below. I was a guest and contributed to the host's actions for coordination purposes.

1. Chair/Moderator for Agencies' Reports Monday 16, 2023 by:

- ISRO/SAC (Rashmi Sharma)
- NOAA OSPO (Sheekela Baker-Yeboah), STAR-1 (Olafur Jonasson/Alex Ignatov), STAR-2 RDAC (Andy Harris/Eileen Maturi), NCEI (Huai-Min Zhang)
- NASA PO.DAAC (Ed Armstrong)
- ESA (Steffen Dransfeld)
- Copernicus Marine Services (Andrea Pisano)
- Australian BoM (Helen Beggs and Pallavi Govekar)
- JMA (Kei Sakamoto), JAXA (Misako Kachi)
- CSIR (Christo Whittle)
- EUMETSAT (Anne O' Carroll)
- NAVOCEANO (Danielle Carpenter)

All agency reports are available on the YouTube channel

Q&A Moderation by Prasanjit Dash on the Canva channel

Moderating Day-1 session


An appreciation from Dr. Raj Kumar, ISRO SAC

2. Chair/Moderator for Task Team Reports Monday 16, 2023 by:

- Climatology and L4 Inter-Comparison (Chunxue Yang, CNR; Jorge Vazquez, (JPL/NASA)
- Climate Data Assess. F (Jon Mittaz, U. Reading; P Dash, NOAA; Rishi Gangwar, ISRO)
- Coral Heat Stress User SST Req (William Skirving, NOAA; Jonathan Mittaz, U. Reading)
- Cloud Masking (Christopher Merchant, U. Reading)

Other task team reports were made separately on day 4.

All task team reports are available on the YouTube channel.

Moderation is to be added later.

Discussions during task team report moderation with Jon Mittaz (Univ of Reading) and Helen Beggs (ABoM)

3. Co-chair for S3: Calibration, Validation, Product Assessment, Tues 17, 2023:

All S3 talks, with other sessions, are available on YouTube. Moderation is to be added later.

4. Contributed results to the following task team activities since 2022

Climate Data Assessment Framework (YouTube), Climatology and L4 Inter-Comparison (YouTube), A component of Coral Heat Stress User SST Requirements (YouTube)

5. Invited Speaker

Session 5: Computing and products
Temporal and geospatial characterization of trends in sea surface temperature

Pre-recorded video on YouTube.

The *live version* will be added later.

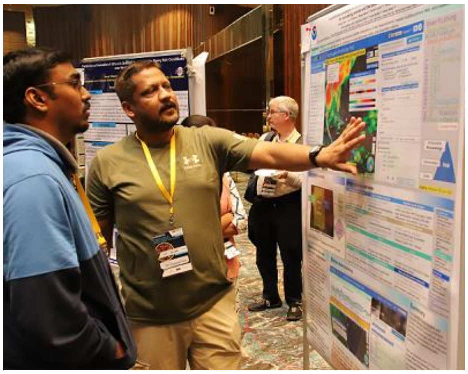
Responding to online audiences in the hybrid meeting. Scientists in the first row: Ed Armstrong, Nitant Dube, Prasanjit Dash, Raj Kumar, Rashmi Sharma

6. Poster

Session 5: Novel Computing and Products:
Application Knowledge Hub (AKH) for monitoring events and the state of coastal areas

Pre-recorded YouTube explanation for the poster.

The PDF is available from GHRSST pages.



Presenting a poster on CEOS COAST Application Knowledge Hub (AKH) to the local participants

7. Contributed as a participant to Q&A sessions in the GHRSST priority workshop
Workshop Session 1: GHRSST Priorities: GHRSST Priorities YouTube Q&A

Workshop Session 2: What are the best practices for SST data producers?: YouTube Q&A

8. A few specific outcomes related to my area of interest for future potential

- **US NRL**
  URL folks working on GDEM ocean climatology (3D) showed interest in SST trends, especially the relative cooling around the Atlantic Meridional Overturning Circulation (AMOC) region, and think that this may inform them how they might adapt the construction of climatologies given a non-stationary time series. More discussions to follow with the NRL colleagues (on my to-do list to follow up and provide info).
- **JPL CALTECH**
  Folks also got interested in the SST trend pattern and thought about how this may affect South American coasts and around fronts. More offline discussions to follow.
- **OTHER INDIAN AGENCIES**
  Developed initial contacts with INCOIS and additional ISRO colleagues for topics of mutual interest, including *in situ* and Indian Ocean-related studies. More discussions to follow. These are part of long-term visions to build meaningful and mutually beneficial relations, not one-off benefits. Also, the trend study will be explored for the Indian Ocean region, and possibly Indian SST product, with Dr. Rishi Gangwar from ISRO SAC.
- **CEOS COAST Relevance**
  Many GHRSST folks (Ifremer, ISRO, and others) are interested in improving coastal retrievals. Some suggested opening a *Coastal Task Team*. We proposed developing a closer working relationship with the CEOS COAST project (co-chaired by Paul DiGiacomo, NOAA, and Rashmi Sharma, ISRO). Dr. Rashmi Sharma, DD (Earth, Ocean, Atmosphere, Planetary Sciences & Applications Area), ISRO SAC, encouraged this. The community has been made aware of the CEOS COAST Application Knowledge Hub (AKH) contribution to GHRSST presentations, and we are planning to initiate GHRSST/CEOS COAST relations from GHRSST in 2024. However, this

preliminary idea needs more discussions with the science team meeting. Also, with Paul DiGiacomo/Rashmi Sharma and possibly the European partners and colleagues in India to identify areas of common interest and data access.

- **CSIR, South Africa**
  I discussed with Christo Whittle of CSIR, a long-term friendly acquittance, to potentially collaborate on our CEOS COAST AKH. The CSIR agency report, unlike other agencies, was more application-oriented and less product-oriented. They also perform HAB detection, etc. I have encouraged them to explore contributing to the global UNESCO HAB dataset, as the amount of information worldwide is currently incomplete. (one-to-one discussion to follow)
- **GHRSST AMBASSADOR NETWORK ELIGIBILITY RELAXATION**
  GHRSST has recently (2022) developed a mentor-mentee program to train early-career scientists, called the GHRSST Ambassador Network (GAN), as decided by the advisory council. One of the eligibility requirements for candidacy is a “recent Ph.D.”. This is a bit stringent to my mind, and I have strongly encouraged relaxing this requirement so that early career folks without a Ph.D. can benefit from it as we prepare the next generation of SST scientists. The council is considering this suggestion.

Funding: NOAA/NESDIS JPSS Program and NOAA/NESDIS Ocean Remote Sensing (ORS) Program