Weekly Report

RAMMB / CIRA
Cooperative Research Program Division (CoRP)
STAR/NESDIS
National Oceanic and Atmospheric Administration (NOAA)

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Products and Applications

Preparation for demonstration of tropical cyclone (TC) products in Joint Hurricane Testbed (JHT) and Hurricane and Oceans Testbed (HOT) testbeds and satellite proving ground: CIRA Tropical Cyclone group's scientists put together one-slide summaries for candidate products for demonstration to National Hurricane Center (NHC) forecasters as part of the JHT, HOT, and GOES and JPSS Proving Ground (March 21 - 28). The National Hurricane Center and other NWS forecasters are receiving a large number of newly developed products. Due to a very large number of new products and limited resources, it is difficult to transition new products to operations. As part of this joint effort to make transition of the new products to operations more efficient, NHC is coordinating the demonstration of candidate products to NHC forecasters that were produced by JHT, HOT, and GOES and JPSS PG activities. CIRA's TC group provided slides to JHT Facilitator Alan Brammer for presentation to NHC's Hurricane Specialist Unit (HSU) forecasters. Slides for the following products have been submitted:

JTTI:

1) WTCM-based Wind Speed Probability (WSP) Model
2) NCODA ocean depth-averaged temperature and sea surface salinity for improved situational awareness and TC intensity forecasting

GOES PG:

1) Derived-Motion WInds TC rapid intensification diagnostics
2) GLM-based Rapid Intensification Index (RII)
3) Improved ProxyVis geostationary imagery
4) ProxyVis geostationary imagery in Automated Tropical Cyclone Forecast System (ATCF)

JPSS PG:

1) Moisture In-Flux Storm Tool (MIST) for TC intensity and rapid intensification forecasting
2) VIIRS Day-Night Band (DNB) in GOES projection for situational awareness

Hurricane Supplemental:

1) Model 3-d visualization for situational awareness

TROPICS:

1) TROPICS MW data display in AWIPS2

(K. Musgrave, M. DeMaria, G. Chirokova, A. Schumacher, A. Brammer, A. Libardoni, R. DeMaria, D. Molenar, CIRA, C. Slocum, J. Knaff, STAR/RAMMB, Kate.Musgrave@colostate.edu, Mark.DeMaria@colostate.edu, Galina.Chirokova@rams.colostate.edu, Andrea.Schumacher@colostate.edu, Alan.Brammer@colostate.edu, Alex.Libardoni@colostate.edu, Robert.DeMaria@colostate.edu, Christopher.Slocum@noaa.gov, John.Knaff@noaa.gov). Funding: JTTI, GOES, JPSS, Hurricane Supplemental, TROPICS, PDRA

CIRA ProxyVis Imagery for Himawari on SLIDER: Galina Chirokova's ProxyVis Imagery for Himawari is now available in real-time on RAMMB-SLIDER https://rammb-slider.cira.colostate.edu (March 28th). The ProxyVis imagery combines daytime Vis imagery with nighttime IR-based visible-like imagery to create seamless visible-like day/night imagery and provides a significant improvement over legacy algorithms for tracking low-level cloud motion during nighttime. ProxyVis is used operationally by the Hurricane Specialist Unit (HSU) and Tropical Analysis and Forecast Branch (TAFB) at the National Hurricane Center (NHC) and is also available in real-time to Ocean Prediction Center (OPC) and Weather Prediction Center (WPC). The Himawari version will allow the project team to demonstrate ProxyVis imagery to operational forecasters at the Joint Typhoon Warning Center (JTWC) and Australian Bureau of Meteorology.

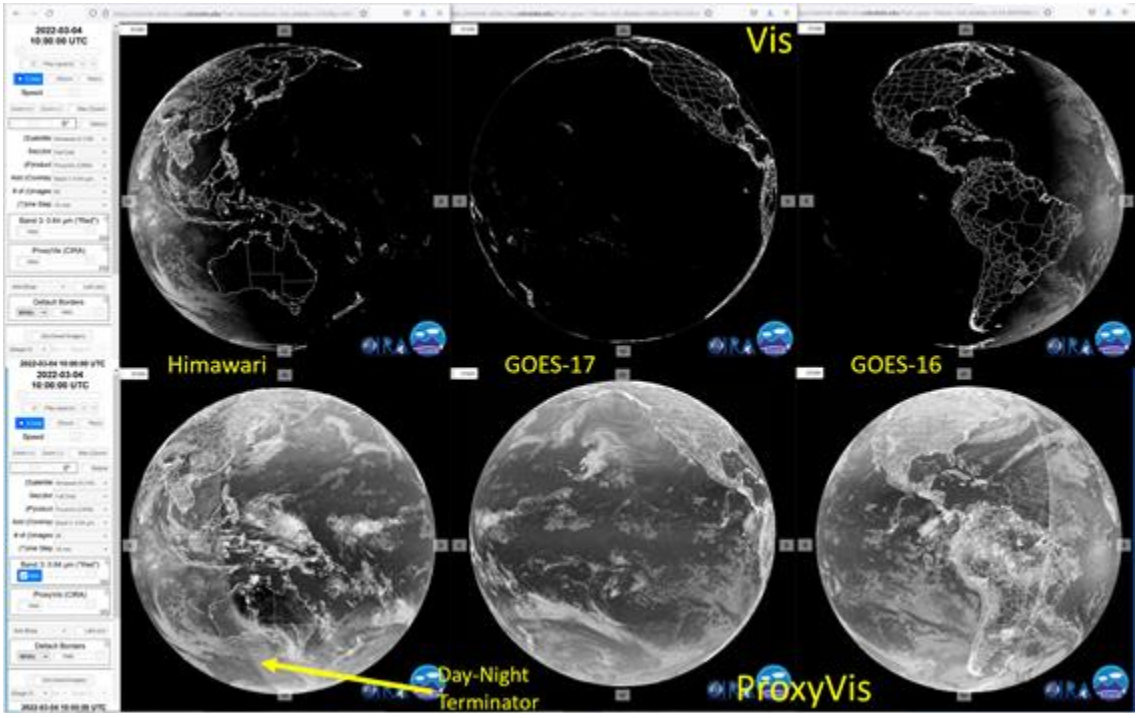


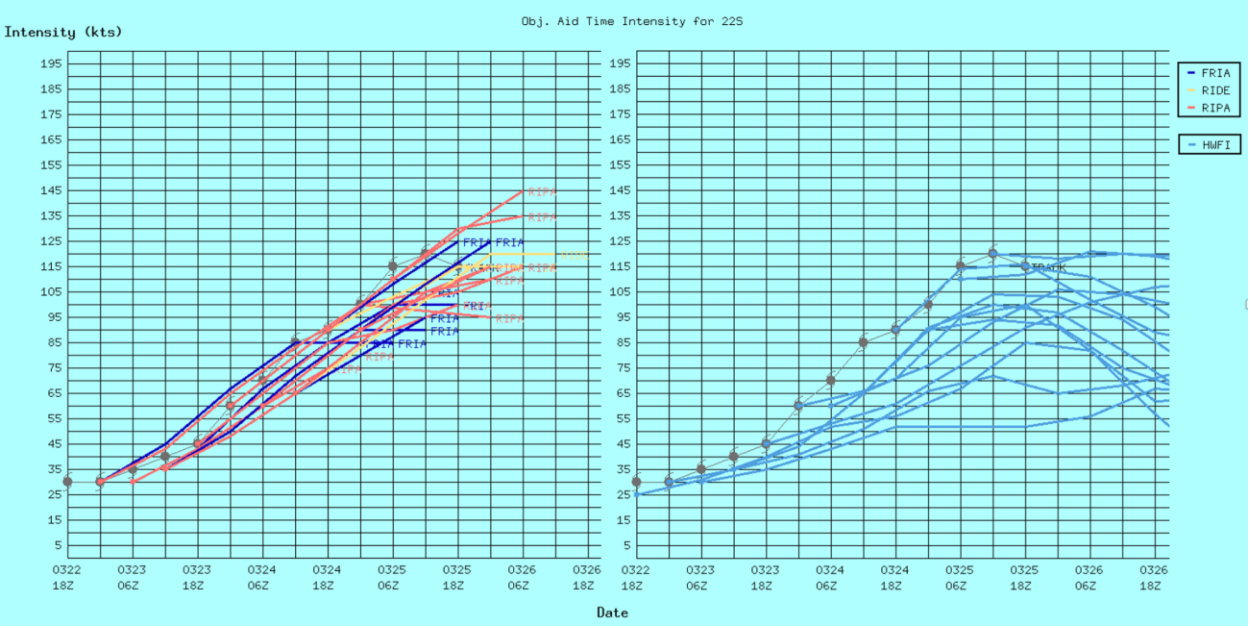
Figure. ProxyVis imagery on SLIDER for Himawari, GOES-17, and GOES-16 (lower row) compared to visible imagery for the same satellites (upper row).

(G. Chirokova, R. DeMaria, A. Brammer, M. DeMaria, CIRA, J. Knaff, STAR/RAMMB, Galina.Chirokova@rams.colostate.edu, 970-491-8522, Robert.DeMaria@colostate.edu,

Alan.Brammer@colostate.edu, Mark.DeMaria@colostate.edu, John.Knaff@noaa.gov).
Funding: GOES, PDRA

STAR Tropical Cyclone Intensity Guidance: Tropical cyclone rapid intensity guidance created by John Knaff and Chris Slocum are making a difference in predicting South Indian Ocean storms. Tropical cyclone Halima underwent a 60-h period of rapid intensification in the South Indian Ocean where the storm's maximum sustained winds increased from 30 to 120 kt. The Forest-based Rapid Intensification Aid (FRIA), Rapid Intensification Deterministic Ensemble (RIDE), and Rapid Intensification Prediction Aid (RIPA) models created by the STAR tropical cyclone science team outperformed the Hurricane Weather Research and Forecast model (HWFI) for Halima by capturing the persistent, short-term intensity increase as it was occuring. Aids like FRIA and RIPA bring in independent geostationary satellite data not available to the dynamical models like HWFI, which contribute valuable skill in an equally-weighted intensity consensus that is the primary basis for intensity forecasting. That is, these forecasts are resulting in improved intensity forecasts of rapidly intensifying tropical cyclones.

(POC: C. Slocum, J. Knaff, STAR, Christopher.Slocum@noaa.gov, John.Knaff@noaa.gov, 970-491-2409; Funding: PDRA)



Caption: Intensity predictions from the Automated Tropical Cyclone Forecast system display for tropical cyclone Halima in the South Indian Ocean from the Forest-based Rapid Intensification Aid (FRIA), Rapid Intensification Deterministic Ensemble (RIDE), and Rapid Intensification Prediction Aid (RIPA) models on the left panel and Hurricane Weather Research and Forecast model (HWFI) on the right panel.

Tropical cyclone wind-pressure relationship software provided to the National Hurricane Center (NHC): Tropical cyclone intensity is related to both estimates of maximum 10-m winds

and central pressures. For example, satellite estimates are typically provided in terms of the wind, but aircraft-reconnaissance-based observations often provide reliable estimates of central pressure. Forecasters need tools to reconcile the information of these two different estimates in their estimates of intensity, the maximum wind (the 1-minute sustained 10-m wind speed) for real-time guidance and for post-season reanalyses. The software, developed by John Knaff, Ray Zehr, and Joe Courtney (Australian Bureau of Meteorology), and furnished to NHC provides both estimates of the maximum wind from estimates of central pressure, and estimates of the central pressure from estimates of the maximum wind. These software were described in Knaff and Zehr (2007, DOI: 10.1175/WAF965.1) and Courtney and Knaff (2009, DOI: 10.22499/2.5803.002). (POC:, J. Knaff, STAR, John.Knaff@noaa.gov, (970) 279-1611; Funding: PDRA)

Awards and Recognition

Second AMS Award: The American Meteorological Society (AMS) awarded Emily Luschen, a graduate student from the University of Oklahoma, 3rd place in the student poster competition for the joint 12th Conference on Transition of Research to Operations/18th Symposium on Operational Environmental Satellite Systems at the 2022 Annual Meeting of the AMS for her work entitled "Updates to the GOES16 Split-Window Precipitable Water Product". Emily was an REU (Research Experiences for Undergraduates) student at Colorado State University during the summer of 2021 and worked with CIRA scientists Jack Dostalek and Louie Grasso on a method for measuring low-level water vapor from GOES ABI imagery. Earlier in the year the AMS presented Emily with an "Outstanding Student Conference Poster" award for the same work. (POC: Jack Dostalek and Louie Grasso, CIRA, Jack.Dostalek@colostate.edu, (970) 491-8326; lewis.grasso@colostate.edu , (970) 491-8380) Funding: GOES-R

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

Citation: Anderson, G.B., Schumacher, A. & Done, J. Exposure Assessment for Tropical Cyclone Epidemiology. Current Environmental Health Reports (2022). https://doi.org/10.1007/s40572-022-00333-z

Summary: Tropical cyclones impact human health, sometimes catastrophically. Epidemiological research characterizes these health impacts and uncovers pathways between storm hazards and health, helping to mitigate the health impacts of future storms. These studies, however, require researchers to identify people and areas exposed to tropical cyclones, which is often challenging. In this paper we review approaches, tools, and data products that can be useful in this exposure assessment.

(POC: A. Schumacher, CIRA, Andrea.Schumacher@colostate.edu, (970) 491-8057, Funding: CIRA Social and Economic Science)

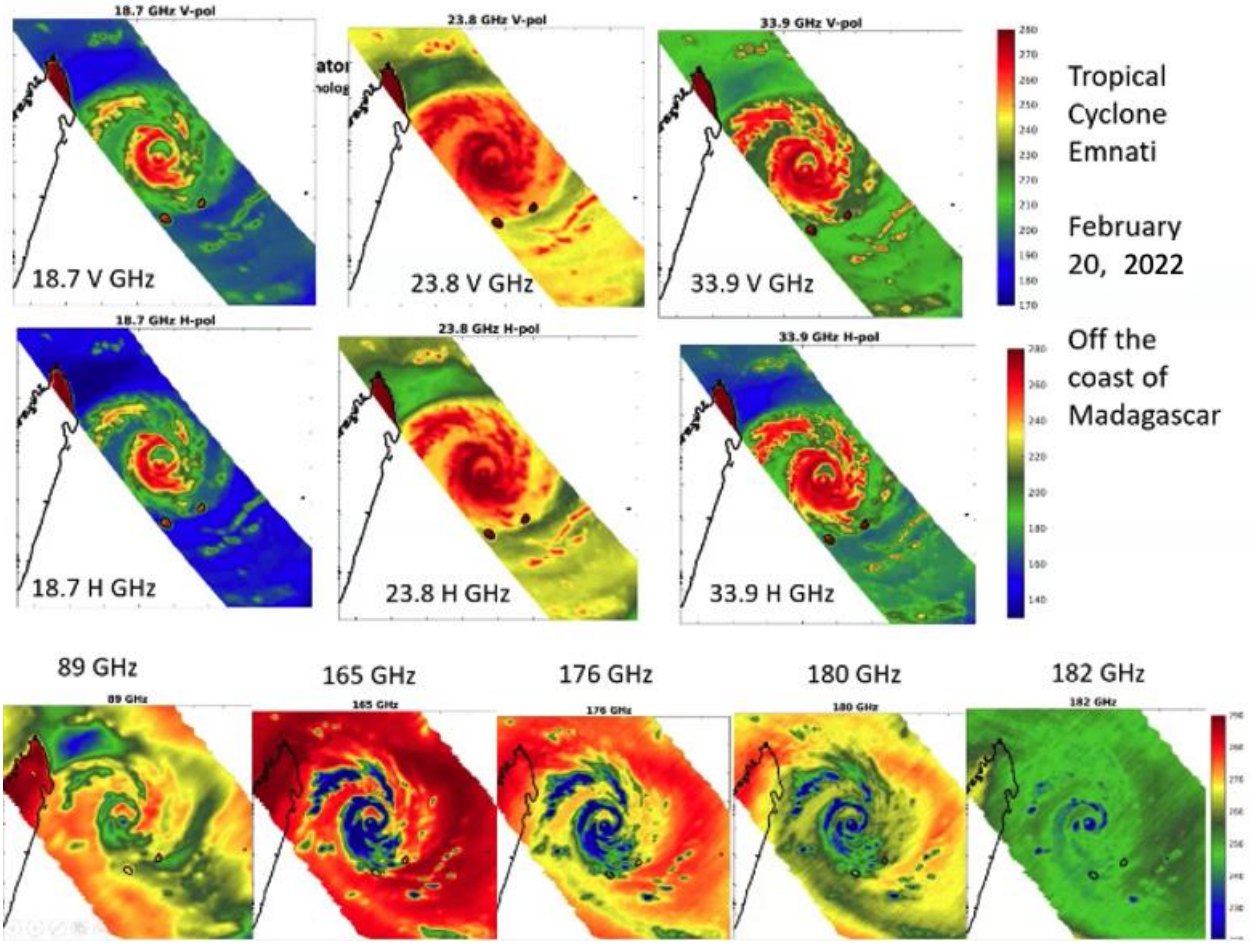
Media Interactions and Requests

Blog Posts and Social Media

Travel, Workshops, Conferences, and Meeting Reports

NASA Air-Sea Interface and Atmospheric Profile Observatory Science Working Group: Chris Slocum, John Knaff, and other STAR staff participated in the NASA Air-Sea Interface and Atmospheric Profile Observatory Science Working Group meeting for post-launch updates for Compact Ocean Wind Vector Radiometer (COWVR) and Temporal Experiment for Storms and Tropical Systems (TEMPEST). The instruments are performing nominally after being installed onto the International Space Station. Data will be in the calibration/validation phase. But, will be available for early adopters around the 6-month point for early adopters.

(POC: C. Slocum, J. Knaff, STAR, Christopher.Slocum@noaa.gov, John.Knaff@noaa.gov, 970-491-2409; Funding: PDRA)



Caption: Sample imagery from COWVR and TEMPEST for tropical cyclone Emnati on 20 February 2022 off the coast of Madagascar.

Training and Education activities

Accessing the NOAA Student STEM Talent Pool: Chris Slocum attends the NOAA Central Libraries

"Accessing the NOAA Student STEM Talent Pool" seminar co-hosted by the NOAA Office of Education. The seminar aimed to highlight how students involved in NOAA-supported education and training programs can increase NOAA's goals to increase the diversity of the NOAA workforce through leveraging the Direct Hiring Authority.
(POC: C. Slocum STAR, Christopher.Slocum@noaa.gov, 970-491-2409; Funding: PDRA)

CSU ENgage seminar: Chris Slocum participates in the CSU College of Engineering Diversity Equity and Inclusion (ENgage) seminar on "Integrating Social Justice and Engineering: The Missing (and Perhaps Most Important) Link to Make Engineering Diverse and Inclusive" with Dr. Juan Lucena.
(POC: C. Slocum STAR, Christopher.Slocum@noaa.gov, 970-491-2409; Funding: PDRA)

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

UCAR Improving Scientific Software Conference: The UCAR Software Engineering Assembly will be holding the 2022 Improving Scientific Software Conference virtually from 4 to 8 April. The Improving Scientific Software Conference focuses on new technologies that address current technical challenges in Earth sciences. This year, the conference is focusing on machine learning for Earth Science, cloud computing for HPC development and operations, tools for scientific workflows, and best practices for software engineering in scientific disciplines. Mattie Niznik, Robert DeMaria, and Chris Slocum are attending.
(POC: C. Slocum STAR, M. Niznik, R. DeMaria, CIRA, Christopher.Slocum@noaa.gov, mniznik@rams.colostate.edu, rdemaria@rams.colostate.edu; 970-491-2409; Funding: PDRA/CIRA)

Other