Weekly Report

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

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Products and Applications

CIRA Advances Tracking Capabilities on Planned GeoXO Bands: The GeoXO Imaging Team has expanded optical flow retrieval capabilities to function on the 0.91 µm and 0.86 µm-based "water-vapor transmittance" product using real data from the Meteosat Third Generation Flexible Combined Imager provided by our partners at EUMETSAT (See Figure Below). Water-vapor transmittance provides low-level boundaries and features motions related to near-boundary-layer winds, which are undersampled by today's in-situ and remote sensing network. Unlike typical infrared-based water-vapor band information, water-vapor transmittance also contains significant textures and signals related to surface features, which challenge traditional atmospheric motion vector retrieval systems. The tool developed by CIRA is designed to filter and ignore such signals. Such a system is developed in preparation for similar bands on the GeoXO Imager (GXI). Validation and height assignment efforts are currently underway. (POC: J. Apke, C. Seaman, and J. Haynes, CIRA, jason.apke@colostate.edu, curtis.seaman@colostate.edu, john.haynes@colostate.edu; Funding: GeoXO).

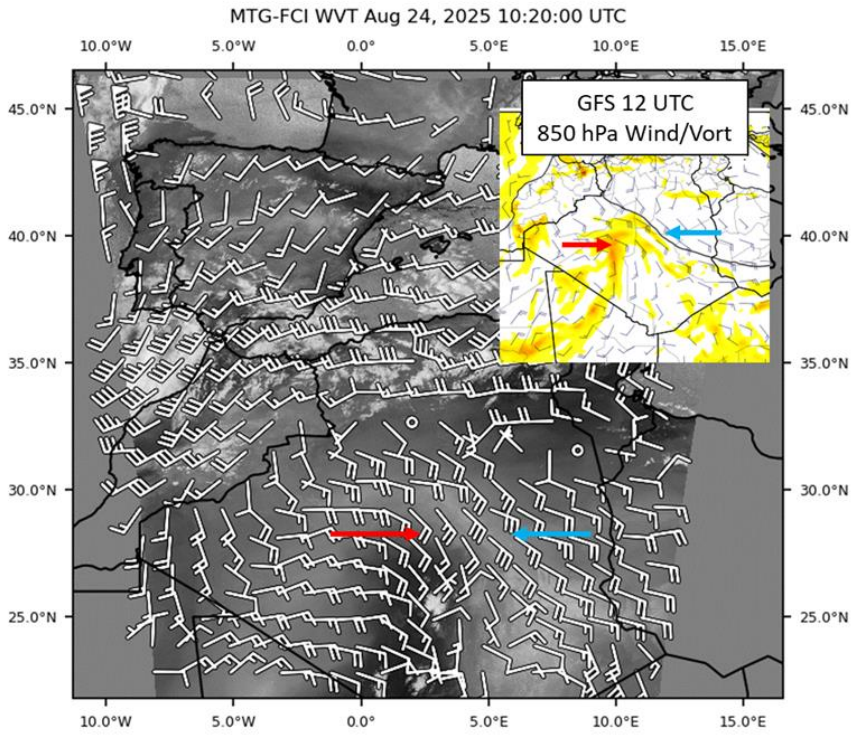

Figure 1. *The 24 Aug 2025 10:20 UTC Water Vapor Transmittance from the Meteosat-12 FCI shown with navigated optical flow-based motions (wind barbs) and the GFS 850 hPa winds and vertical vorticity (color shade; source: tropicaltidbits.com) over central Algeria, with annotations highlighting an observed vorticity maximum (red arrow) and low level jet (cyan arrow).*

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

Awards and Recognition

Media Interactions and Request

Imagery Production Team Content of Hurricane Melissa's Mesovortices Featured by News Publications: In late October, Hurricane Melissa displayed impressive mesovortices as a Category 5 storm. Unique satellite visuals created by the Imagery Production Team made available in CIRA's Satellite Library were used by several high-profile media outlets to highlight the storm. 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, CIRA) Funding: GOES-R.

The Washington Post: “Watch this wild swirl at Hurricane Melissa’s core. Here’s what’s happening”. https://www.washingtonpost.com/weather/2025/10/30/hurricane-melissa-mesovortex-miniswirl-tornado-video/

The Washington Post (on social media): “Recently released satellite imagery of Hurricane Melissa’s core reveals a handful...” https://www.facebook.com/reel/1533731417664962

Space.com: “Satellite images show ‘mesovortices’ forming around the eye of deadly Hurricane Melissa”. https://www.space.com/astronomy/earth/satellite-images-show-mesovortices-forming-around-the-eye-of-deadly-hurricane-melissa

MyRadar Weather: “LOOK A THESE! You’ve probably never heard of “mesovortices” but the eyes of major/intensifying hurricanes...” https://x.com/MyRadarWX/status/1983897095355478485

Brad Panovich: “Wild! Close-up view of the mesovortiecs in the eye of #Melissa. This view rotates with the eye of a peak-strength...” https://x.com/wxbrad/status/1983695480619200683

FoxWeather: “Weather Coverage Lives on Fox Weather”. https://www.youtube.com/@Foxweather

WeatherNation: “New Details – Live". https://www.weathernationtv.com/ ; https://x.com/WeatherNation/status/1983738129581301844

Blog Posts and Social Media

Travel, Workshops, Conferences, and Meeting Reports

Keynote lecture at INCUS science meeting: Kristen Rasmussen (ATS; lead presenter), Imme Ebert-Uphoff (CIRA), Kyle Hilburn (CIRA), and Hungjui Yu (CIRA), jointly presented at the INCUS (INvestigation of Convective UpdraftS) Science Meeting, held November 4–7 at CIRA Commons. The presentation, "Leveraging Machine Learning to Study Storms: Opportunities for INCUS," was presented on Nov 6 as a 1h keynote lecture and highlighted how machine learning can advance understanding of convective processes. The INCUS mission aims to determine why, when, and where tropical convective storms form—and why only some produce severe weather. It will provide the first tropics-wide investigation of convective mass flux, a key but previously unmeasured process that describes the vertical transport of air and water by storms. The mission consists of three SmallSats flying in close succession (30, 90, and 120 seconds apart), each carrying a Ka-band radar (RainCube-like), with one also equipped with a cross-track scanning radiometer (TEMPEST-D-like). This configuration will enable the first space-based estimates of convective mass flux across the tropics. (POC: Hungjui Yu, CIRA; hungjui@colostate.edu; Imme Ebert-Uphoff, CIRA, iebert@colostate.edu; Kyle Hilburn, CIRA, Kyle.Hilburn@colostate.edu, Funding: INCUS, GOES-R, NSF)

Training and Education Activities

Invited Lecturers for KMA forecasters at NCAR COMET: Yoo-Jeong Noh and Sheldon Kusselson delivered lectures at UCAR/COMET in Boulder, CO for a course to Korean Meteorological Agency (KMA) forecasters. This course is a series of invited lecturers to span a range of topics for two weeks (3-14 Nov). The four-session lectures, delivered by two CIRA researchers, covered a range of topics on general satellite remote sensing, identifying weather features in various satellite images, and Advected Layered Precipitable Water (ALPW) with operational forecast applications. (POC: Y.J. Noh, yoo-jeong.noh@colostate.edu, Sheldon Kusselson, sheldon.kusselson@colostate.edu, CIRA; Funding: GOES-R and JPSS)

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

Other