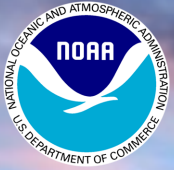


# Southernmost Weather Reporter

**National Weather Service  
Weather Forecast Office  
Key West, FL**



# Southernmost Weather Reporter

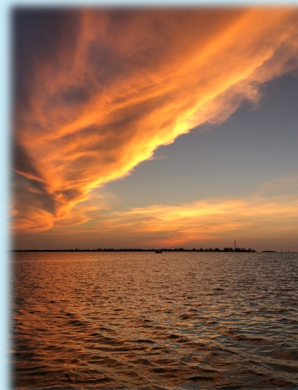
National Weather Service • Key West, FL

## Welcome to the March 2023 Edition!

Welcome to the Spring 2023 edition of the Southernmost Weather Reporter! In this issue, you will read a lot about partnerships. Building and maintaining relationships with our federal, state, local, and industry partners is essential if we are to achieve our vision of a “Weather-Ready Nation™”. What do we mean by “Weather-Ready”? A Weather-Ready Nation™, community, organization, or family is one that is ready, responsive, and resilient. To be “ready”, we recommend staying aware, and being prepared. You can do that by following trusted sources for your weather information like [www.weather.gov/key](http://www.weather.gov/key) or your favorite broadcast meteorologist. Being prepared is about identifying your risk and taking action before hazardous weather develops. Learn more about hurricane preparedness, for example, by consulting your Monroe County Emergency Manager ([www.monroecountyem.com](http://www.monroecountyem.com)). Know how to boat safely and responsibly by following the advice of the dedicated men and women at the Florida Fish and Wildlife Conservation Commission (<https://myfwc.com/boating/safety-education>). “Responsive” means being flexible and adaptable to inevitable changes to your environment. Many Florida Keys organizations were prime examples of responsiveness after Hurricane Irma (2017) and during the COVID-19 pandemic (Monroe County Health Department, Monroe County Sheriff’s Office, and U.S. Coast Guard Sector Key West to name a few). “Resilient” means emerging stronger after the inevitable disaster whether it be a hurricane, tornado, flood, oil spill, or pandemic. Being resilient means learning from every event, and applying lessons learned and best practices to the present and to the future. Ultimately, being “Weather-Ready” is about thinking and acting in ways that will save lives and livelihoods. In that spirit, I invite YOU to be a Weather-Ready Nation Ambassador™. In this role, you can help build community resilience in the face of increasing vulnerability to extreme weather and water events. For more information, check out our Weather-Ready Nation Ambassador™ Program online at <https://www.weather.gov/wrn/amb-tou>. Thank you, and enjoy the newsletter!

Sincerely,

Kennard “Chip” Kasper  
 Meteorologist-in-Charge  
 NOAA/Florida Keys National Weather Service



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# Targeted Marine Weather Program Decision Support Services

By: Chris Rothwell

Marine forecasters at the Florida Keys National Weather Service (NWS) had a busy year providing targeted Decision Support Services (DSS) to our federal, state, and local marine partners. As word spreads across the agencies, we note a growing demand for tailored marine forecasts to support safety of life at sea and mission success. Starting out the year was the Buccaneer Blast Regatta in Blackwater Sound in early February, when our forecasts were included in the Incident Action Plan formulated by the U.S. Coast Guard Auxiliary. In late February, in conjunction with NOAA's Office of Marine and Aviation Operations, the Florida Keys NWS provided a hybrid aviation/marine matrix forecast for testing of the FVR-55 Unmanned Aircraft System (UAS), the latest generation of UAS which will be used by NOAA for a variety of remote sensing applications. Florida Keys NWS Meteorologist-in-Charge Chip Kasper and Marine Program Leader Chris Rothwell joined an outdoor outreach event in March at the Port of Key West Marine Industry Night, where Kasper gave a brief speech on products and services provided by the Florida Keys NWS. Both Kasper and Rothwell had the opportunity to observe a mock United States Coast Guard (USCG) Sector Key West rescue diver deployment in the harbor, which featured an actual MH-65 Dolphin helicopter.

In May, Rothwell and Kasper attended the Harbor Safety Committee Meeting at Key West City Hall, and also attended the USCG Sector Key West Change-in-Command Ceremony, where Captain Chamie welcomed incoming Captain Ingram. In a joint operation between the Florida Keys National Marine Sanctuary (FKNMS) and the Florida Fish and Wildlife Conservation Commission, the Florida Keys NWS provided seven-day marine forecasts in June for a marine debris aerial survey. These forecasts included weather on-site, atmospheric visibility, sea state, and water clarity for mission planning and execution. During another multi-agency mission in July with the United States Geological Survey (USGS) and the FKNMS, WFO Key West provided marine forecasts for mission planning and execution in the Looe Key Sanctuary Preservation Area.



The United States Geological Survey (USGS) SQUID-5 camera system conducting a mission in the Looe Key Sanctuary Preservation Area.

## Targeted Marine Weather Program Decision Support Services (Continued)

This was year two of five for the Mission: Iconic Reefs survey, which included towing the sophisticated camera system “SQUID-5” behind a boat in narrow race tracks along the Reef. These data will be critical in validating the Mission’s success during the 20-year, \$100-million dollar investment. The Florida Keys NWS marine forecasters closed out the year in September with DSS for two regular partners in the Florida Keys, first for the FKNMS Buoy Repair Team at the Dry Tortugas Ecological Reserve North, and finally for the R/V *Nancy Foster* as she surveyed the Marine Sanctuary.



The state-of-the-art FVR-55 UAS.

## 2022 Florida Keys National Weather Service Staff Changes

By: Bryce Tyner

In 2022, there were several staffing changes at the Florida Keys National Weather Service (NWS):

- Mark Webb accepted a position as Open System Team Lead with the United States Army Human Resources Command in Fort Knox, Kentucky. He completed his service as Information Technology Officer at the Florida Keys NWS in February 2022.
- Lexia Williams accepted a position in the private sector as a meteorologist. Lexia’s service to the Florida Keys NWS ended in June 2022.
- Sofia de Solo, Meteorologist at the Florida Keys NWS, accepted a position as Support Meteorologist with the NOAA Aircraft Operations Center in Lakeland, Florida. She concluded her tenure at the Florida Keys NWS in August 2022.
- Manuel Ramos-Rodriguez accepted a position as Meteorologist at the NWS Office in San Juan, Puerto Rico. Manuel’s service to the Florida Keys NWS ended in April 2022.
- Juan Agosto-Perez, former Information Technology Specialist at NOAA Aircraft Operations Center (AOC) in Lakeland, Florida, accepted a position as the Information Technology Officer at the Florida Keys NWS. He began his career with the NWS in August 2022.
- Michael Vuotto, former Meteorologist at the NWS Office in Anchorage, Alaska, started his service as Meteorologist at the Florida Keys NWS in November 2022.

We wish the best to those moving on to new opportunities. For those joining the Florida Keys NWS, we embrace you with a warm welcome!

# NOAA Scientists Assess Machine Learning Skill in Spanish Translation

By: Keren Rosado Vazquez

Eight people were selected among National Weather Service (NWS) offices across the country, including non-meteorologists, to participate in a NOAA Leveraging Abilities, Needs, Talents, Energies, and Resources Network (L.A.N.T.E.R.N.) project to help assess the skill of Machine Learning/Artificial Intelligence (ML/AI) in translating various issued products into Spanish. This opportunity is a joint effort between NWS Central Processing (CP) and Science and Technology Integration (STI) departments. Florida Keys NWS Meteorologist Keren Rosado-Vazquez was selected to participate in this project. During the course of this project, each participant is assigned 3 or more individual evaluations, consisting of ranking and evaluating 100 matched English and Spanish translated sentence pairs per evaluation. These evaluations are entered within individual surveys that include categorical subjective rankings, number of errors, and alternative translations. This study is aimed at addressing how well ML/AI can be used operationally to translate NWS weather outlooks, discussions, watches, and warnings into Spanish. This project is of special importance in providing accurate messaging to those with Limited English Proficiency, as well as serving socially vulnerable communities, both being the subject of recent White House Executive Orders. In addition, this project is of great importance to help the NWS Weather Ready Nation meet their specific goals.

One of the big challenges that the team members on this project will continue to face is every country has different Spanish dialects or slangs. One word can have different meanings depending on the country. As a team, they will need to find words that people in all countries can understand, a tremendous challenge to overcome. As of December 2022, each member of this team has individually evaluated 244 automatic Spanish translations. After the first set of evaluations, the team met and agreed on a consensus of acceptable translations of sentences and phrases provided by the National Hurricane Center. Additional iterations will continue over the upcoming year, with the ultimate goal of universal Spanish translations of NWS products that can be comprehended by all Spanish speakers.

## Getting to Know the New Staff: Juan Agosto-Perez

***What were you doing before joining the team at the Florida Keys National Weather Service (NWS)?***

Before joining the team at the Key West NWS, I was working as an Information Technology Specialist at NOAA Aircraft Operations Center (AOC) in Lakeland, Florida. I was supporting the operations of the Office of Marine and Aviation Operations (OMAO), working with the Hurricane Hunters, aircraft division, as well as some of their marine vessels IT systems. It was definitely a great experience working with a diverse group of professionals.

***Where do you see yourself in ten years?***

In ten years I envision myself supporting the NWS mission and helping all citizens in every way I can. It has been an excellent experience working with NOAA overall, knowing that the work that I do will impact millions of people directly, and I consider it a blessing. I enjoy working with all my teammates, and I look forward to more years to come.

***What do you like to do in your free time?***

In my time off, I like going outdoors, to the beach, going on road trips, and playing video games.

# New Monroe County Emergency Operations Center Groundbreaking

By: Chip Kasper

On October 18, 2023, Meteorologist-in-Charge Chip Kasper and Warning Coordination Meteorologist Jon Rizzo attended the groundbreaking ceremony for the new, dedicated Monroe County Emergency Operations Center (EOC) at the west end of the Florida Keys Marathon International Airport. The new state-of-the-art EOC will consolidate several existing organizations into a 28,321 square-foot, 220 mph-wind-rated facility that will include Monroe County Emergency Management, Monroe County Fire Rescue Administration, and Monroe County Sheriff's Office 9-1-1 Center. In addition, dedicated space will be provided for Florida Keys National Weather Service Meteorologists to deliver impact-based decision support services to core partners in the EOC before, during, and after hurricane threats and impacts. The design is based on a 500-year storm, and will include a FEMA "Impact Rating" (Windborne Debris Missile Criteria for Hurricane Shelter Safe Room), a first floor elevation of 20.16 feet above NAVD-88 (17 feet above ground), and emergency communications via satellite phone/internet service. In addition, the facility will be constructed to be self-sustaining for 72 hours, and able to support up to 150 emergency response staff, including food, drinking water, electric power, and wastewater storage.

An EOC is a central command and control system responsible for carrying out the principles of emergency preparedness and emergency management during an emergency, and ensuring the continuity of operations for an organization. The Monroe County EOC will be a safe location from which Monroe County leaders will coordinate information and resources to support incident management activities. The project was made possible through both federal and state funding, and construction is tentatively scheduled for completion in Spring of 2024.



Groundbreaking ceremony for the new Monroe County EOC.

# A Glancing Blow from Major Hurricane Ian Provides a Challenging Exercise in Impact-based Decision Support Services

By: Jon Rizzo

The Florida Keys National Weather Service (NWS) provides Impact-based Decision Support Services (IDSS) during tropical storm and hurricane events for numerous core partners serving within Monroe County. IDSS includes detailed forecast advice and meteorological interpretive services to assist decision-making when weather, water, or climate has a direct impact on the protection of lives and property. During late September 2022, Hurricane Ian provided unique challenges due to a combination of forecast uncertainty from a large, intensifying hurricane moving north through the southeast Gulf of Mexico, as well as the modern, post-pandemic virtual support environment to emergency operations centers and first responders.

Florida Keys NWS Warning Coordination Meteorologist (WCM) Jon Rizzo notified Monroe County Emergency Management seven days prior to Ian's passage through the Straits of Florida, while the system was just then approaching the Lesser Antilles. A schedule of formal IDSS briefings for all Florida Keys emergency managers, first responders, and critical infrastructure personnel began the following day. Monroe County Emergency Management began their intensive rhythm of countywide stakeholder, media, and incident management calls on Friday, September 23rd, 2022, a full four days prior to the passage of Ian west of the Florida Keys. The WCM provided five to six weather briefs each day at every step through the Monroe County incident management planning cycle, with additional briefings conducted via phone to the U.S. Army Special Forces Underwater Operations School Command. Meteorologist-in-Charge (MIC), Kennard "Chip" Kasper, provided briefings directly to the U.S. Coast Guard Sector Key West Command. The meteorological intelligence provided to these important decision makers enabled them to make critical decisions on the timing and closures of the Port of Key West, government offices, and schools, and prepare law enforcement, fire and rescue, and utilities for damage typical of strong tropical storm events.

The frequent provision of virtual briefings worked well in advance of Ian's close passage to the Florida Keys, given the set times to answer detailed tactical questions about the level and timing of any preparedness actions. However, challenges arose as Ian strengthened to major (category three and above) hurricane strength and later passed over the Dry Tortugas. The WCM capitalized on having physical presence within the operations of the Florida Keys NWS for situational awareness as Ian moved into the western Straits of Florida, and tropical storm force winds overspread the Florida Keys. Simple text messages were used to notify the City of Key West once sustained tropical storm force winds, with gusts near 60 mph, first reached the island. This information quickly spread through our emergency management contacts to all first responders serving the Lower Florida Keys, with response becoming limited to life-safety issues only. Later, detailed information provided by the Naval Air Station Key West emergency manager concerning a significant storm surge was confirmed by operational NWS meteorologists, and shared with civilian emergency managers and responders.

*(Continued on page 7)*

## A Glancing Blow from Major Hurricane Ian Provides a Challenging Exercise in Impact-based Decision Support Services (Continued)

The NWS Florida Keys then used the virtual environment to coordinate with the damage assessment teams serving the Florida Keys, obtaining high-density water mark data in the Key West and oceanside neighborhoods of Monroe County. This assisted the post-storm activities by avoiding duplication of effort, and allowed the assessment personnel to complete their work for assisting residents impacted by the storm. These post-storm observations helped provide the NWS with context about tropical cyclone impacts, comparison with reference water level data, and offer opportunities to convey storm surge information more visually for emergency managers in future storms.

The success of the Florida Keys NWS involves a diverse methodology of preparation to serve during high-impact weather events.. The NWS' core partners are not mere organizations; they are the people with whom we collaborate with to prepare and respond to weather disasters. Business cards are exchanged on sunny days well in advance of hurricane season. No matter the method, the Florida Keys NWS stands ready to answer the call for meteorological information and potential hazardous weather impacts.



Jon Rizzo virtually briefs core partners on the latest forecast for Hurricane Ian.

## Getting to Know the New Staff: Michael Vuotto

### ***What were you doing before joining the team at the Florida Keys National Weather Service (NWS)?***

Before joining the team here at the Florida Keys NWS, I was employed at the NWS Weather Forecast Office in Anchorage, Alaska, where I was so excited to get my start in the federal government. Before Anchorage, I was living in the northeastern United States; more specifically, the Hudson Valley and Lehigh Valley, where I was working as a meteorologist in the private sector.

### ***Where do you see yourself in ten years?***

In ten years, I want to definitely be a Lead Meteorologist for NWS, although I'm a little unsure of which office I will ultimately settle into for much of my career. I like it here in Key West, Florida for the time being, but someday, I envision myself back in the New York City area still with NWS, as NYC is where I was born and raised. It is my dream to forecast for New York City. I also hope to be married by then and even have one or two kids by this time, as I definitely want to have a family.

### ***What do you like to do in your free time?***

I like to go to the beach and body surf the waves. I also just like to sit out in the sun and just relax. I am a die hard New York Yankees baseball fan, as well as a New York Knicks fan for basketball. I like to go to the gym to run on the treadmill and lift weights to help keep myself in shape. Also, I love to watch various television shows.



# Hurricane Ian Makes its Mark on the Florida Keys

**By: Travis Washington**

On Friday morning, September 23rd, 2022, a tropical wave that was passing north of the island country of Curaçao was upgraded to Tropical Depression Nine, with sustained winds of 35 mph. Tropical Depression Nine remained weak as it traversed the warm Caribbean waters due to the limited convection encompassing the vortex, coupled with northerly shear from Hurricane Fiona, which was impinging on Tropical Depression Nine's outflow channel. Nevertheless, Tropical Depression Nine overcame the hostile environmental conditions late Friday night and became Tropical Storm Ian southwest of Jamaica, resulting in a Tropical Storm Watch for Jamaica and a Hurricane Watch for the Cayman Islands. By late Friday night, the Florida Keys were added to NHC's Key Messages in their public advisory as well as in their forecast discussion.

Tropical Storm Ian initially maintained a west to northwest heading, then took on more of a northwest heading by Saturday. Ian slowly strengthened throughout the weekend as it trekked through the Caribbean waters despite continued wind shear, which resulted in a vertically misaligned low and mid-level circulation. Overnight Sunday into early Monday morning, satellite presentations and data from hurricane reconnaissance aircraft revealed Ian had strengthened into the season's fourth hurricane over the northwestern Caribbean Sea. Around this time, the Lower Keys and Dry Tortugas were placed under a Tropical Storm Watch. Hurricane Ian took advantage of what was now a low shear environment, as well as the warm waters of the Caribbean, and finally was able to align its low and mid-level centers.

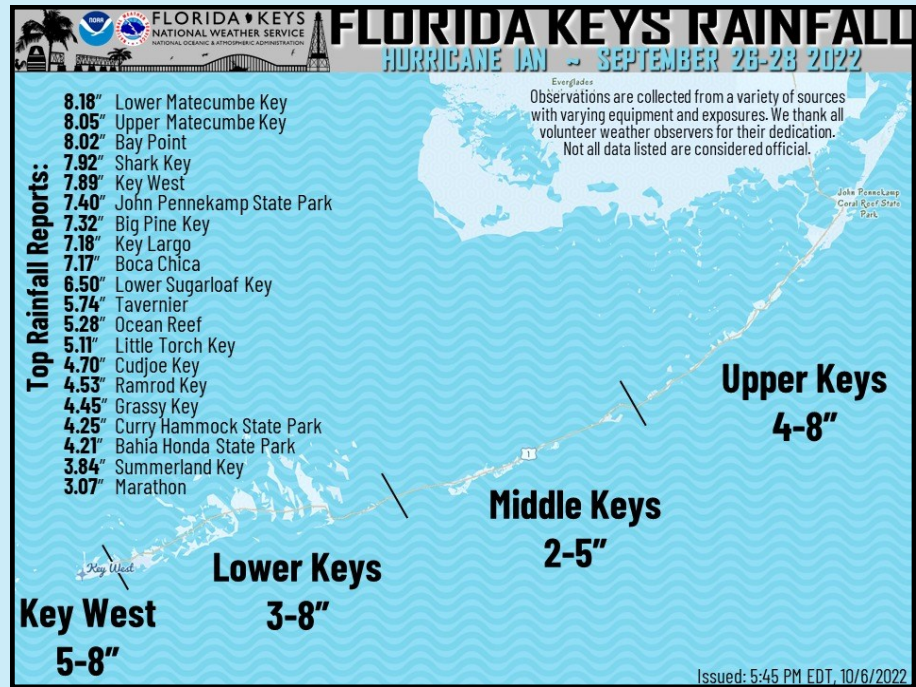
Model guidance continued to suggest rapid intensification of Ian, and with the combination of a low shear environment, very warm waters, and an abundance of deep tropical moisture, it certainly was not out of the question. As predicted, Hurricane Ian went from a low end Category 1 hurricane with sustained winds of 75 mph on Monday morning, to a strong Category 2 hurricane with sustained winds of 105 mph in just 18 hours. The storm continued to intensify as it approached the western tip of Cuba. By the time it made landfall in Cuba just southwest of the town of La Coloma in the Pinar Del Rio Province, it was a Category 3 hurricane with sustained winds of 125 mph, a 50 mph increase in winds in just 24 hours.

After Ian made landfall in western Cuba early Tuesday morning, September 27th, the storm turned to the north-northeast and emerged into the southeastern Gulf of Mexico. Although Ian's center of circulation had moved over land which generally tends to weaken storms, it was able to maintain its Category 3 strength. Similar to Hurricane Charley 19 years prior, Ian traversed over the less mountainous areas of Cuba and held on to its well-defined circulation.

*(Continued on page 9)*

# Hurricane Ian Makes its Mark on the Florida Keys (Continued)

As Ian moved into the Gulf, the outer rain bands began to lash the Florida Keys and surrounding coastal waters. Early Tuesday morning, a few tornado warnings were issued along the island chain, and multiple rain bands that swiftly passed through the forecast area brought tropical storm force gusts. Major Hurricane Ian moved through the western Straits of Florida and began to undergo an eyewall replacement cycle as it neared the Dry Tortugas. This resulted in a brief pause in intensification and an expansion of the wind field as it passed through our waters. Sustained tropical storm force winds in the Lower Keys began in the afternoon to evening hours on September 27th. Hurricane Ian delivered major hurricane conditions to the Dry Tortugas and the western marine zones. On land, moderate-to-strong tropical storm force winds impacted the Lower Keys and adjacent coastal waters, and low-end tropical storm force winds impacted the Middle and Upper Keys and adjacent coastal waters. Island communities throughout the Florida Keys saw widespread rainfall storm totals of 5 to 8 inches.



Rainfall totals at various locations in the Florida Keys for Hurricane Ian.

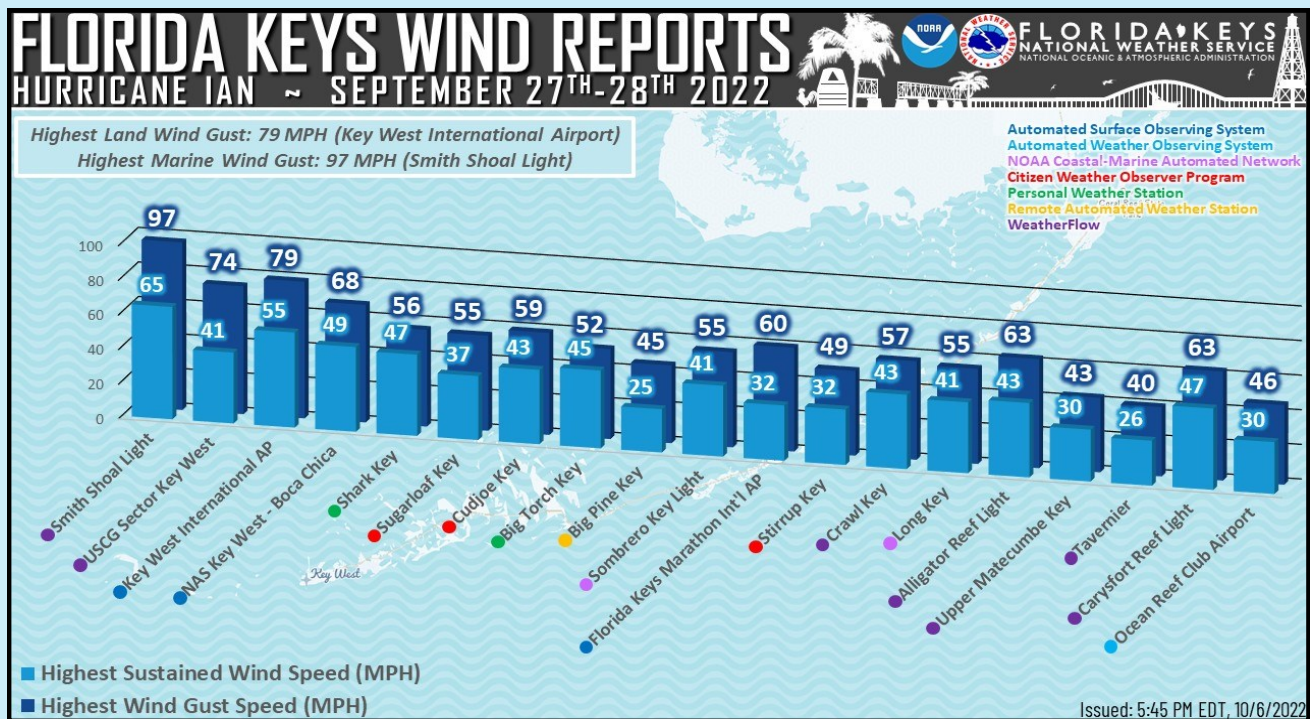
The most significant impacts came from Ian’s storm surge in the Lower Keys, particularly on the south sides of Key West and Stock Island, where major street flooding and significant flooding of homes occurred (> 100 homes flooded in Key West alone). Storm surge flooding extended east into the Atlantic-side communities of the Lower Keys, with flood waters entering many ground story enclosures. A combination of high astronomical tides, a significant tidal anomaly (likely related to the passage of major Hurricane Fiona over the Gulf Stream a week before), storm surge in the right-front quadrant of Hurricane Ian, and a combination of wind-driven wave setup and runup caused water levels to peak at 3.0 to 4.5 feet above NAVD88 (approximately Mean Higher High Water) along the southern sides of Key West and Stock Island late Tuesday evening. A subsequent Gulf surge Wednesday afternoon resulted in water level rises peaking 2 to 3 feet above NAVD88, resulting in flooding of low-lying streets and enclosures in portions of the Florida Keys.

(Continued on page 10)

# Hurricane Ian Makes its Mark on the Florida Keys (Continued)

On Wednesday, September 28th, Hurricane Ian intensified into a Category 4 hurricane in the extreme southeastern Gulf of Mexico before making landfall at Cayo Costa in Southwest Florida on Wednesday afternoon. Hurricane Ian devastated Southwest Florida, with major impacts extending across the Florida Peninsula, even though it weakened to a tropical storm during its passage over land. Ian moved off the northeast coast of Florida into the Atlantic and regained hurricane strength before making a third landfall near Georgetown, South Carolina.

Before September 1st, the 2022 Atlantic Hurricane Season was historically slow, with only three named storms, and zero named storms from the second-half of July through August. However, the season quickly returned to normal, with 11 named storms after September 1st. Hurricane Ian is a reminder to remain vigilant with our preparedness and evacuation plans well into the second half of the season. The indelible marks of Ian will certainly be remembered by Florida residents for generations to come.



Peak observed sustained wind speeds and gusts at various locations in the Florida Keys for Hurricane Ian.

## 2022 Rainfall and Temperature Recap for the Florida Keys

By: David Ross

Last year turned out to be similar to 2021, with generally warmer and drier conditions throughout the Florida Keys. The main difference between the years for our two climate sites was Key West ending up much closer to normal rainfall, and near the median for annual totals dating back to 1871. Key West International Airport recorded a total of 39.54 inches of rainfall in 2022, just 0.90 inches below normal, while Marathon International Airport recorded only 34.73 inches of rainfall, or 4.99 inches below normal. 'Normal' in this case, is referencing a calculation based on the 1991-2020 30-year average. Marathon's rainfall ranked as the 18<sup>th</sup> driest on record, with observations dating back to 1950 for the area. Though 2022 annual rainfall amounts were below normal, Key West and Marathon each had several above normal rainfall periods (January, June, and September-October for Key West; January, June-July, and August for Marathon).

The wettest days last year occurred on June 3<sup>rd</sup> for Marathon (5.47 inches) and on September 27<sup>th</sup> for Key West (4.18 inches). Perhaps not surprisingly, these were both associated with tropical systems. Marathon's wettest day was in conjunction with the passing of Potential Tropical Cyclone One (later becoming Tropical Storm Alex north of The Bahamas) and Key West's wettest day was due to Major Hurricane Ian passing over the Dry Tortugas on its way to Southwest Florida. Ian's proximity to the island chain also resulted in the highest wind gusts recorded at both Key West and Marathon last year, 79 mph and 60 mph respectively, both on September 27<sup>th</sup>.

COOP / ASOS	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dry Tortugas	3.35	1.48	0.28	0.08	0.83	9.91	3.12	2.58	0.46	M	M	2.84
Florida Keys	1.79	1.25	0.59	2.46	1.42	6.69	3.87	1.82	11.60	2.09	1.84	4.10
Key West Int'l	1.64	1.35	0.56	2.54	1.72	6.61	2.37	2.33	12.06	2.78	1.40	4.18
Boca Chica	1.12	1.22	0.35	3.75	0.90	7.46	0.70	1.68	10.02	M	M	2.71
Bahia Honda	1.43	1.56	0.14	1.06	0.23	9.19	3.11	2.80	8.11	3.88	1.78	3.64
Marathon Int'l	1.30	0.93	0.06	1.90	2.65	8.92	2.67	2.42	6.80	1.88	1.96	3.24
Curry Hammock	1.59	1.07	0.44	1.44	1.93	8.78	1.78	3.85	7.44	2.57	2.72	3.44
Tavernier FKEC	1.76	1.01	1.73	0.48	2.33	11.78	2.00	2.54	6.27	3.76	3.36	3.61
John	3.58	0.74	1.07	1.41	2.06	5.22	3.87	3.87	10.62	1.95	5.56	3.16

Monthly rainfall totals, in inches, from Florida Keys COOP and ASOS locations. Shading indicates above (green) or below (red) normal/30-year average (1991-2020).

(Continued on page 12)

## 2022 Rainfall and Temperature Recap for the Florida Keys (Continued)

As for temperatures, Marathon tied 2017 for the 3<sup>rd</sup> warmest year on record with an average temperature of 80.4 degrees Fahrenheit, or 1.6 degrees above normal. Key West tied 1994 for the 14<sup>th</sup> warmest year on record, with an average temperature of 79.0 degrees, or 0.1 degrees above normal. The highest temperature recorded at Marathon last year was 96 degrees, occurring on 9 days in August and September. Some of these days tied or set new daily record highs for Marathon, and in September they tied the monthly record high temperature. Marathon also set new records for the warmest August (average of 87.3 degrees), November (average of 80.7 degrees), and fall (average of 82.5 degrees). Meteorological fall is defined as the months of September, October, and November. For Key West, the highest temperature of the year was 93 degrees on July 5<sup>th</sup>, 2 degrees shy of the daily record.

Warm temperatures were the predominant type of records tied or set last year, as has been the trend for the last several years. Marathon recorded 47 high temperature records and 26 warm low temperature records last year, while Key West recorded 3 and 14 such records, respectively. Marathon's low temperature of 81 degrees on November 2<sup>nd</sup> not only tied the daily warm low record, but also the monthly record which has occurred on 3 different dates.

The lowest temperatures recorded last year were 46 degrees on January 30<sup>th</sup> for Marathon and 50 degrees on January 30<sup>th</sup> and 31<sup>st</sup> for Key West. Marathon's coldest reading set a new daily record for the 30<sup>th</sup>, surpassing 1955's low of 49 degrees. The lows of 50 degrees at Key West were 3 degrees above the daily record of 47 for both days, set in 1940 on the 30<sup>th</sup> and 1966 on the 31<sup>st</sup>.

COOP / ASOS	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dry Tortugas	70.2	71.0	76.3	79.1	M	82.8	M	85.4	M	82.1	M	M
Florida Keys NWS	69.6	72.7	76.6	78.4	80.9	81.7	85.0	85.2	82.7	78.7	78.4	73.0
Key West Int'l AP	70.6	72.5	76.5	78.4	81.1	82.6	85.1	84.9	83.4	80.1	79.3	73.5
Bahia Honda	70.7	72.5	77.3	78.8	82.3	83.4	85.7	86.3	84.9	80.6	80.9	73.6
Marathon Int'l AP	70.3	74.5	78.3	80.2	82.6	83.9	86.9	87.3	85.9	80.8	80.7	74.0
Curry Hammock	70.6	73.7	77.0	79.1	81.2	82.6	85.8	85.6	84.7	80.1	80.3	73.0
John Pennekamp	70.3	73.2	76.2	78.5	80.7	82.9	85.7	85.9	84.9	79.6	79.4	73.0

Average monthly temperatures, in degrees Fahrenheit, from Florida Keys COOP and ASOS locations. Shading indicates above (red) or below (blue) normal/30-year average (1991-2020). Average & missing months have no shading.

That concludes the look back at 2022! For the latest outlooks, regarding the months ahead, readers should visit the Climate Prediction Center (CPC) at [www.cpc.ncep.noaa.gov](http://www.cpc.ncep.noaa.gov). The CPC is one of nine national centers of the National Weather Service, and they specialize in producing operational predictions that cover time scales from a week to seasonal outlooks. These forecasts cover the land, ocean, and atmosphere, even extending into the stratosphere.

# 2022 Marine Program Inter-office Collaborative Efforts

By: Chris Rothwell

The Florida Keys National Weather Service (NWS) and the Miami Weather Forecast Offices (WFOs) work closely together as neighboring offices. Although we both forecast weather for the same general region in Florida, gaining expertise for our individual County Warning Areas (CWAs) requires years of experience. In September of this year, Larry Kelly, the Marine Program Leader from the Miami office, joined Chris Rothwell from Key West for a crash course in Florida Keys marine weather forecasting. During their three-day forecasting exchange, Chris discussed the unique bathymetry of the Florida Keys and how it affects marine weather, the pitfalls of numerical weather prediction here in the Florida Keys, the unique needs of our broad list of federal, state, and local partners, and our challenges with the vulnerable liveaboard communities along the island chain. This forecaster exchange included several technical advancements Kelly passed along from the Miami office, which will be used to improve some of Florida Keys NWS' digital and derived forecast products. Larry's visit included a VIP tour of United States Coast Guard Sector Key West, a tour of the Fast Response Cutter *Raymond Evans*, and a Familiarization Float on the Key West Harbor Pilot boat *Nonpareil* while they disembarked a pilot from the *Carnival Ecstasy* near the Key West Sea Buoy. The Florida Keys NWS and WFO Miami plan to continue these forecaster exchanges to broaden and improve our products and services for both of our respective CWAs.



The Carnival Ecstasy following the Key West Harbor Pilot boat, as it is escorted out of the harbor and into the open ocean.

(Continued on page 14)

## 2022 Marine Program Inter-office Collaborative Efforts (Continued)



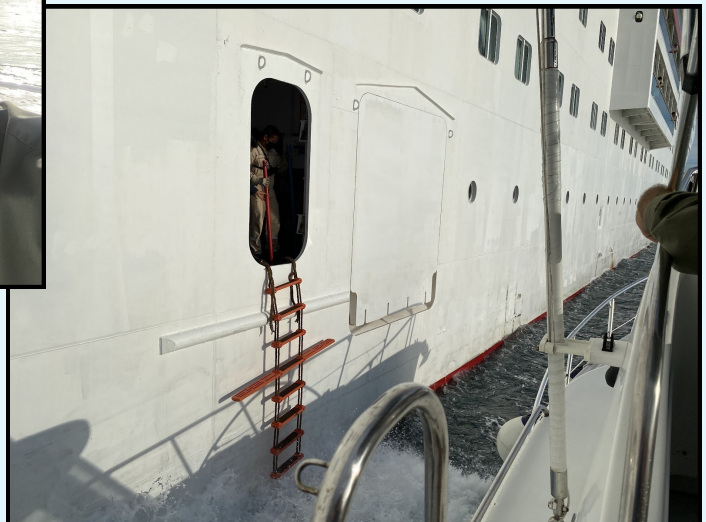
Pilot Boat Captain Chuck discussing the history of the Pilot profession.



The *Carnival Ecstasy* following the Key West Harbor Pilot boat, as it is escorted out of the harbor and into the open ocean.



Pilot Boat Captain Chuck, with Larry Kelly, Dave Ross, and Chris Rothwell (from left to right).



With the ladder deployed, the Pilot Boat approaches and leans into the cruise ship, and the Pilot disembarks, all within 30 seconds.

# 2022 Core Partner Visits: United States Coast Guard

*By: Nancy Barnhardt and Justin McReynolds*

One of the most important aspects of our job here at the Florida Keys National Weather Service (NWS) is coordination with core partners. Core partners are defined as government and non-government entities which are directly involved in the preparation, dissemination, and discussions involving weather, water, or climate related NWS information that supports decision making for routine or episodic high impact events. Trustworthy relationships with our core partners are extremely critical during high impact weather events (such as tropical cyclones, severe squall lines, or gale force winds). To build this trust, we rely on regular, day-to-day interactions.

The Florida Keys NWS and United States Coast Guard Sector Key West are deep core, federal partners working together in the interest of maritime safety. U.S. Coast Guard Sector Key West is a unified command consisting of six Fast Response Cutters, three small boat stations, an Aids to Navigation Team, and a number of staff departments. Sector Key West has a unique area of responsibility; 55,000 square miles bordering the territorial seas of Cuba and the Bahamas. United States Coast Guard Sector Key West routinely uses our products to assess weather impacts to operations, such as the Florida Keys NWS Three-Day Outlook used in the Command Center at the daily operations briefing. Over the past few months, members of the Florida Keys NWS and the United States Coast Guard Sector Key West have exchanged visits to understand the day-to-day operations at each respective duty station or office.



Captain Jason Ingram assists Meteorologist Justin McReynolds with the evening launch at the Florida Keys NWS.



Members of the USCG *Thetis* conduct a site visit of the Florida Keys NWS.

The kick-off visit occurred back in early September 2022 at the Florida Keys NWS, when U.S. Coast Guard Sector Key West Commanding Officer Captain Jason Ingram and Deputy Sector Commander Richard Armstrong came to our Weather Forecast Office (WFO) in Key West for an office tour. Meteorologist-In-Charge (MIC) Chip Kasper conducted the tour, and Meteorologist Justin McReynolds showed him the process of the twice-daily weather balloon launch, including prepping the balloon, launching the balloon, and QC'ing the processed data.

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## 2022 Core Partner Visits: United States Coast Guard (continued)

In early December 2022, a few meteorologists from the Florida Keys NWS had the opportunity to take a tour of the U.S. Coast Guard base at Trumbo Point Annex. This tour included a visit to the FRC *Raymond Evans*, attendance at the morning operations briefing, where they saw first-hand how the NWS products were used to aid in critical operations. In attendance was also the Southern Region Deputy Director of the NWS, Jennifer McNatt, which further emphasized the importance of a strong relationship between the NWS and U.S. Coast Guard.

Later in December 2022, the command staff of the U.S. Coast Guard Cutter *Thetis* requested exchange visits, as well as marine weather training. A few meteorologists accompanied MIC Kasper to the *Thetis* for the requested marine training and were given a tour of the ship. As a follow-up, the command staff from the *Thetis* came to the Florida Keys NWS office in January 2023 for a tour and were shown everyday forecasting and operations.



Rear Admiral Brendan McPherson and staff visit the Florida Keys NWS for a morning balloon launch and site visit.

Lastly, On February 2nd, the Commander of the Seventh Coast Guard District (headquartered in Miami, Florida), Rear Admiral (RADM) Brendan McPherson, his Aide, Lieutenant Penny, and Command Master Chief Aaron Zimmer made an impromptu visit to the Florida Keys National Weather Service for an early morning weather balloon launch. Meteorologist-In-Charge Chip Kasper welcomed the group and took them up the balloon tower to watch the morning balloon launch. Meteorologist Justin McReynolds then explained the process of the balloon launch and the value of the data received, and RADM Brendan McPherson was able to assist Justin with releasing the balloon. After heading back downstairs, Justin explained the value of the data that were being received from the radiosonde and how we use the data in our forecast process.

Frequent visits between the Florida Keys NWS and the unified command at Sector Key West continue to build trust ahead of our next high impact weather event. Experience has taught us, the first time you meet a core partner should not be when decisions to protect life and property are on the line.



Florida Keys NWS meteorologists conduct a familiarization visit of the USCG base at Trumbo Point Annex.

# Diversity and Inclusion Initiatives: 2022 Annual Wrap-up

By: Luis Ingram-Westover

2022 was a very rewarding year for Diversity and Inclusion (D&I) initiatives led by Lead Meteorologist Luis Ingram-Westover. First, with the help of Dr. Nelsie Ramos, the third annual Florida D&I Workshop was held this past June. This collaborative effort began several years ago, originating from an idea to bring south and central Florida National Weather Service (NWS) offices together in person to discuss various D&I topics. Due to the unforeseen and unprecedented pandemic, the workshop had to go virtual, which ended up opening the door to a much larger audience. Since then, the workshop has been held virtually on a single day, but this year's workshop was split into two days. This was done in order to better accommodate people who may not have been able to attend a full-day workshop, which proved to be successful, with nearly twice the number of attendees this year compared to prior years. Among others, the topics for this year included mental health, justice and equity, and wellness. To ensure those with hearing or visual impairments could still participate and learn from this workshop, a sign language interpreter was utilized, as well as 508 compliant handouts. Based on feedback collected from attendees after the conclusion of the workshop, this continues to be a valuable resource for people interested in learning more about D&I topics.

The successes of the D&I program continued into November 2022, when a 3-year project with a goal to have NOAA serve as an exhibitor for the annual Out in Science, Technology, Engineering, and Mathematics (oSTEM) was finally achieved. oSTEM is an organization that empowers LGBTQ+ people in STEM to succeed personally, academically, and professionally by cultivating environments and communities that nurture innovation, leadership, and advocacy. The November oSTEM conference was held in Boston, Massachusetts, and Ingram-Westover had the opportunity to attend. Other NOAA attendees included Lisa Guy from the Northeast Fisheries Science Center, Michelle Moore from the Office of Inclusion and Civil Rights, and Symone Barkley from the National Ocean Service. The team spoke with over 100 students at the career expo and shared information on the various career opportunities available across all NOAA line offices, as well as opportunities available to students, including the Hollings Scholar and Pathways programs. The representatives also attended workshops designed to gain valuable insight into D&I initiatives happening in other government agencies and in the private sector.

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## Diversity and Inclusion Initiatives: 2022 Annual Wrap-up (continued)



Luis Ingram-Westover and other NOAA employees staffing their booth at the 2022 oSTEM conference.

In summary, the Florida Keys NWS continues to build its strong reputation of participation in D&I initiatives. The annual Florida D&I workshop continues to serve as a wealth of knowledge and resources for everyone that wants to be a better ally for underrepresented communities. In addition, the door is open for NOAA to participate at the annual oSTEM conference, which has great value for fulfilling NOAA's strategic goal to build a more diverse workforce.

## Upper-air System Upgrade at the Florida Keys National Weather Service

**By: Dave Ross and Nancy Barnhardt**

In May of 2022, the upper-air program at your Florida Keys National Weather Service (NWS) Weather Forecast Office transitioned from the Radiosonde Replacement System (RRS), which was installed here in March 2010, to the Vaisala Manual Radiosonde Observing System (MROS). While the data that comes from the radiosonde largely remains the same, many physical aspects of how this data is collected have changed. For starters, the receiver for the data is no longer the large antenna that is located inside the dome in the backyard of the NWS in Key West on White Street. The MROS team from Silver Springs, Maryland installed a new Ultra High Frequency (UHF) antenna system on top of the tower where the balloon is launched. Inside this dome are 7 directional antenna segments, 6 used for horizontal directions and 1 used for overhead. This is a big improvement, as there are no longer any moving parts within the antenna that can lead to a possible motor failure.

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## Upper-air System Upgrade at the Florida Keys National Weather Service (continued)

Another significant change with the new radiosonde is the weight difference. Previously, RRS radiosondes were powered by 6 AA batteries, which made them heavier (7.4 oz) and only had a lifespan of up to a few hours. The new MROS radiosondes are powered by a single AA battery, making them significantly lighter (2.8 oz), with a longer lifespan of between 530 and 600 minutes. With this now even smaller and lighter radiosonde, we have also been able to discontinue the use of photodegradable parachutes when launching the balloon. *[Fun fact: the new radiosonde is actually the same weight as the old parachutes!]* With the removal of the parachute because of the reduced risk these light radiosondes pose to people and property when they descend, balloon launches have become even more environmentally friendly. Another implication of having a lighter radiosonde and no parachute is that less helium is required to fill up the balloon that will take it upwards of 20 miles into the atmosphere.



The new MROS UHF antenna dome installed on the Florida Keys NWS upper-air tower.

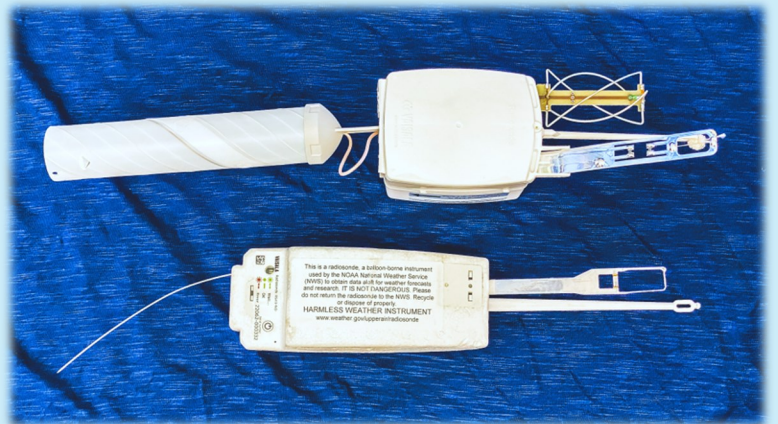
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# Upper-air System Upgrade at the Florida Keys National Weather Service (continued)



RRS antenna dome in the backyard of the Florida Keys NWS office.

Here is a look at the installation of the new antenna system and some of the upgrades to the equipment.



Size comparison of the RRS (top) and MROS (bottom) radiosondes.



MROS installation crew hoisting the UHF antenna system up to the tower.



MROS installation crew begins to lift the new UHF antenna system to the tower.



## FASCINATED BY WEATHER? BECOME A SKYWARN STORM SPOTTER!



- ⚡ There are over 350,000 trained SKYWARN spotters across the country. These volunteers help keep the community safe by providing accurate and timely reports of severe weather to the National Weather Service.
- ⚡ SKYWARN classes are announced on our website at [www.weather.gov/key](http://www.weather.gov/key) as well as on our Facebook and Twitter pages.
- ⚡ SKYWARN training does not have to wait for a scheduled public course. If you would like SKYWARN storm spotter training for your government agency, employees, or homeowner's association in the Florida Keys, please contact Jon Rizzo, our Warning Coordination Meteorologist, at phone number 305-295-1316 extension 223 or email address [jonathan.rizzo@noaa.gov](mailto:jonathan.rizzo@noaa.gov).

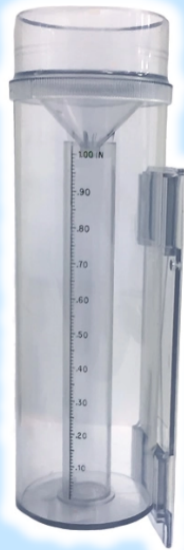
### CoCoRaHS March Madness 2023

**March 1–31, 2023**

How many new volunteers can you recruit in your state?



### CoCoRaHS: Citizen Science



#### What is CoCoRaHS?

A community-based network of volunteers working together to measure and map rainfall, hail, & snow (for those up north!)

#### How is CoCoRaHS data useful?

- Rainfall in the Keys is highly variable!
- Data sources along the islands are more spread out, additional reports welcome!
- Reports are used by local meteorologists for flood warning operations!
- Also used for research by scientists!

#### As a CoCoRaHS observer you will need:

- Internet access
- Approved CoCoRaHS rain gauge (available for purchase via their website)
- Site with good exposure
- Be willing to enter rainfall data daily

#### Observers Needed:

- |                   |                   |                   |
|-------------------|-------------------|-------------------|
| • Stock Island    | • Upper Sugarloaf | • Marathon        |
| • Big Coppitt Key | • Summerland Key  | • Sombrero Beach  |
| • Geiger Key      | • Ramrod Key      | • Long Key        |
| • Baypoint        | • Torch Keys      | • Upper Matecumbe |
| • Lower Sugarloaf | • Big Pine Key    | • Plantation Key  |
|                   | • No Name Key     | • Tavernier       |

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