Centro Nacional de Huracanes

Serie de Seminarios sobre la Concientización de Huracanes auspiciado por el Centro Nacional de Huracanes y el Equipo de Colaboración Regional del Sureste y el Caribe (SECART)

Tema: Manteniendo el público informado de eventos peligrosos durante la pandemia

Maria M. Torres
Oficial de Comunicaciones Y Relaciones Públicas del Centro Nacional de Huracanes

NOAA Hurricane Webinar Series

https://www.noaa.gov/regions/2022-hurricane-awareness-webinars

Beyond Our Borders: Hurricane Forecast Collaboration in the Caribbean

Date: June 2, 2022
Time and duration: 1-2 PM ET (1 hour)

Speakers: Evan Thompson, Director Jamaica Meteorological Service & President, World Meteorological Organization Region IV, and Dr. Cody Fritz, Storm Surge Team Lead, NHC/NWS

Webinar overview: Our partnerships with other countries are key when it comes to issuing forecasts. Ever wonder how it's done? Join us to hear from the speakers how that coordination is done and new storm surge capabilities NHC is undertaking.

Registration link: https://attendee.gotowebinar.com/register/9147275259339296782

NOAA Hurricane Webinar Series

Resumen

- El Centro Nacional de Huracanes y sus unidades
- Modificaciones en la temporada de Huracanes 2020 y 2021 en medio de la pandemia
- Nuevas iniciativas para comunicar el mensaje de preparación sobre huracanes a la comunidad hispana

Centro Nacional de Huracanes

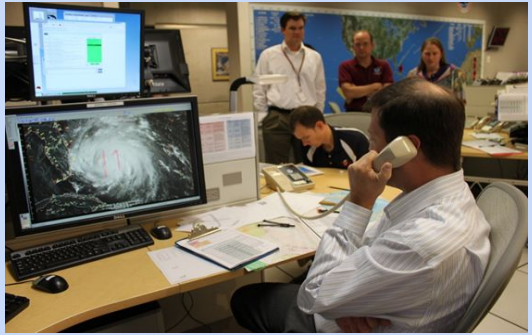
El Centro Nacional de Huracanes (NHC) es un componente de los Centros Nacionales de Predicción Ambiental (NCEP). El CNH está ubicado en la Universidad Internacional de Florida en Miami, Florida.

La misión del NHC es salvar vidas, mitigar la pérdida de propiedad y mejorar la eficiencia económica mediante la emisión de los mejores avisos, advertencias, pronósticos y análisis del tiempo tropical peligroso, y aumentar el conocimiento sobre estos peligros.

Diferentes unidades en el CNH

Oficina del Director

Unidad de Especialistas de Huracanes



Unidad de Análisis y Pronósticos de los Trópicos

Departamento de Tecnología y Ciencia

- Apoya a el sistema de computadoras y la comunicación continúe en el

Unidad de Marejada Ciclónica

Provee un pronóstico preciso y al momento sobre la marejada ciclónica durante un evento de tormenta tropical

Fuerza Aérea de los EE UU
CARCAH

FEMA
Equipo de Coordinadores de Huracanes

WMO RA IV

Visita de Cientificos

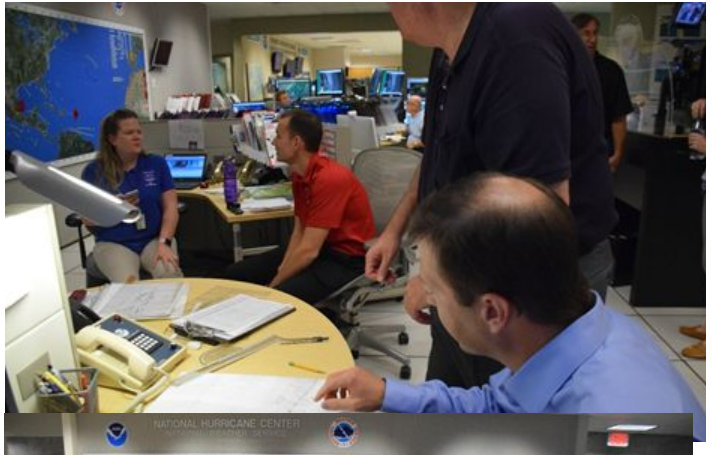
24/7/365 Esfuerzo: Operaciones y Preparación

Unidad de Especialistas de Huracanes

- Producen, coordinan y emiten los aviso y el pronóstico de los sistemas tropicales

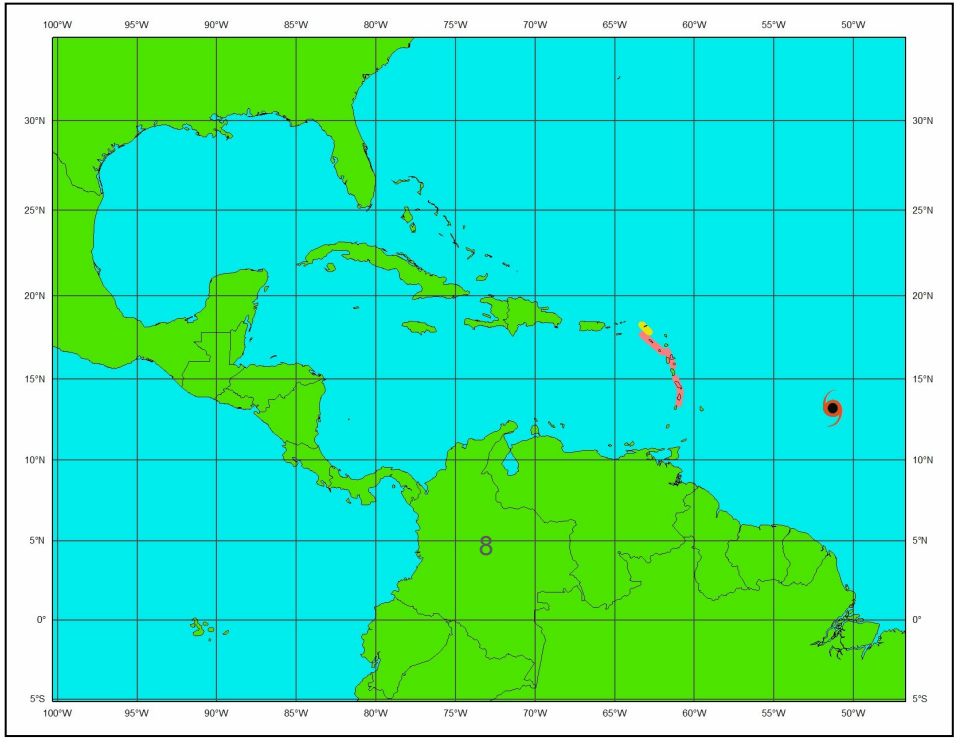
- Conducen programas de concientización al público y entrenamiento para los empleados del manejo de emergencias, meteorólogos y los medios de comunicación

- Equipo de trabajo consiste de:
  - Supervisor y 10 especialistas de huracanes

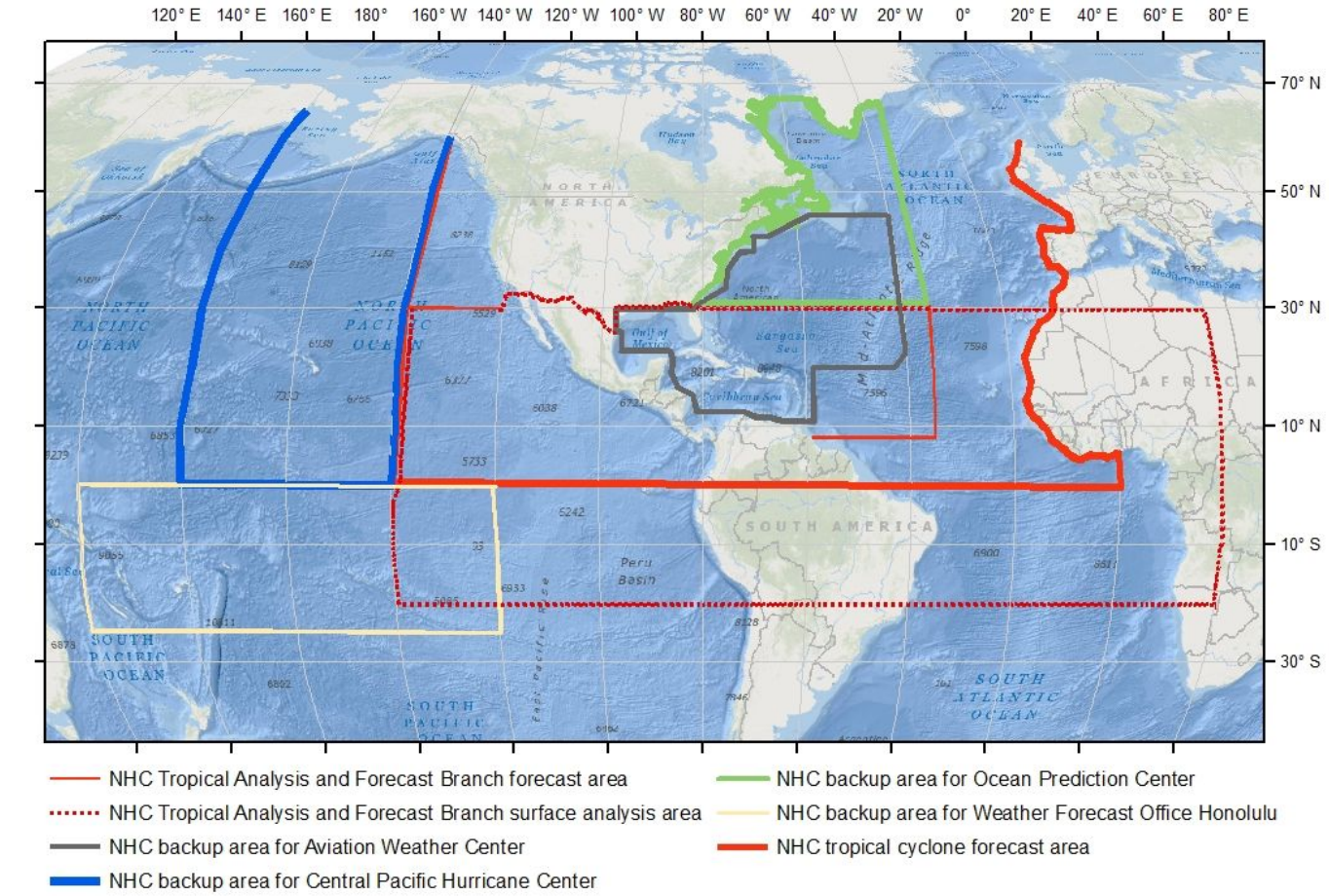


Responsabilidad Internacional

- El CNH recomienda la colocación de avisos y advertencias
- Cada país es responsable de emitir avisos y advertencias para su respectivo país o jurisdicción
- Se coordina por teléfono con las oficinas meteorológicas de todo el área de responsabilidad del CNH

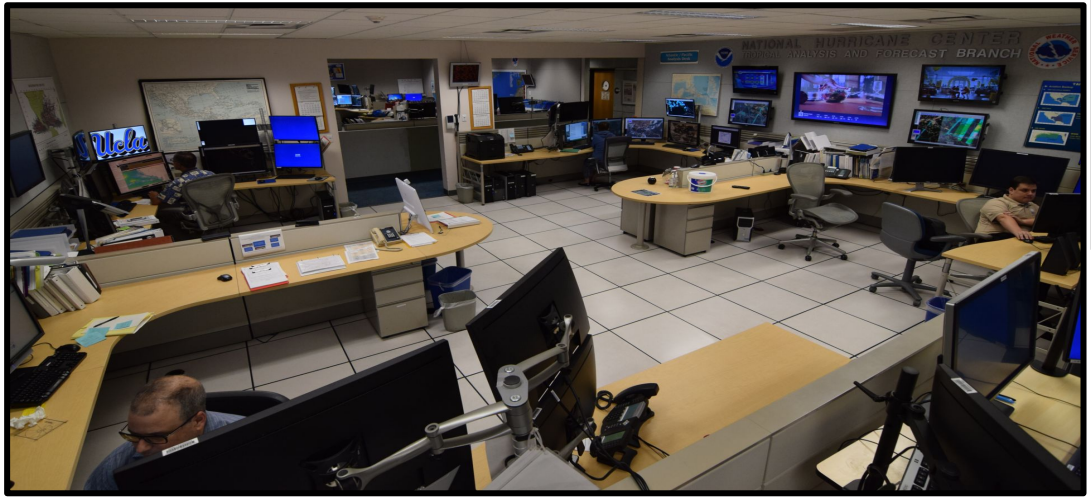


CNH Área de Responsabilidad



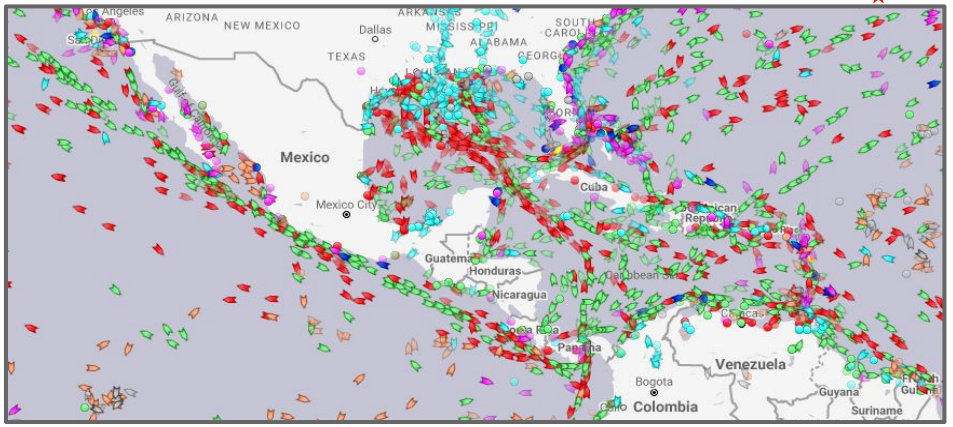
Unidad de Análisis y Pronósticos de los Trópicos

- Proporcionar análisis meteorológicos, pronósticos y avisos sobre las cuencas tropicales y subtropicales
- Trabajan 24 horas al día y producen ~100 productos/día en formato de texto y gráfico
- Proporcionar apoyo a los especialistas durante la temporada de huracanes
- Estimaciones de intensidad utilizando la técnica Dvorak



Porque es tan importante el pronóstico marítimo?

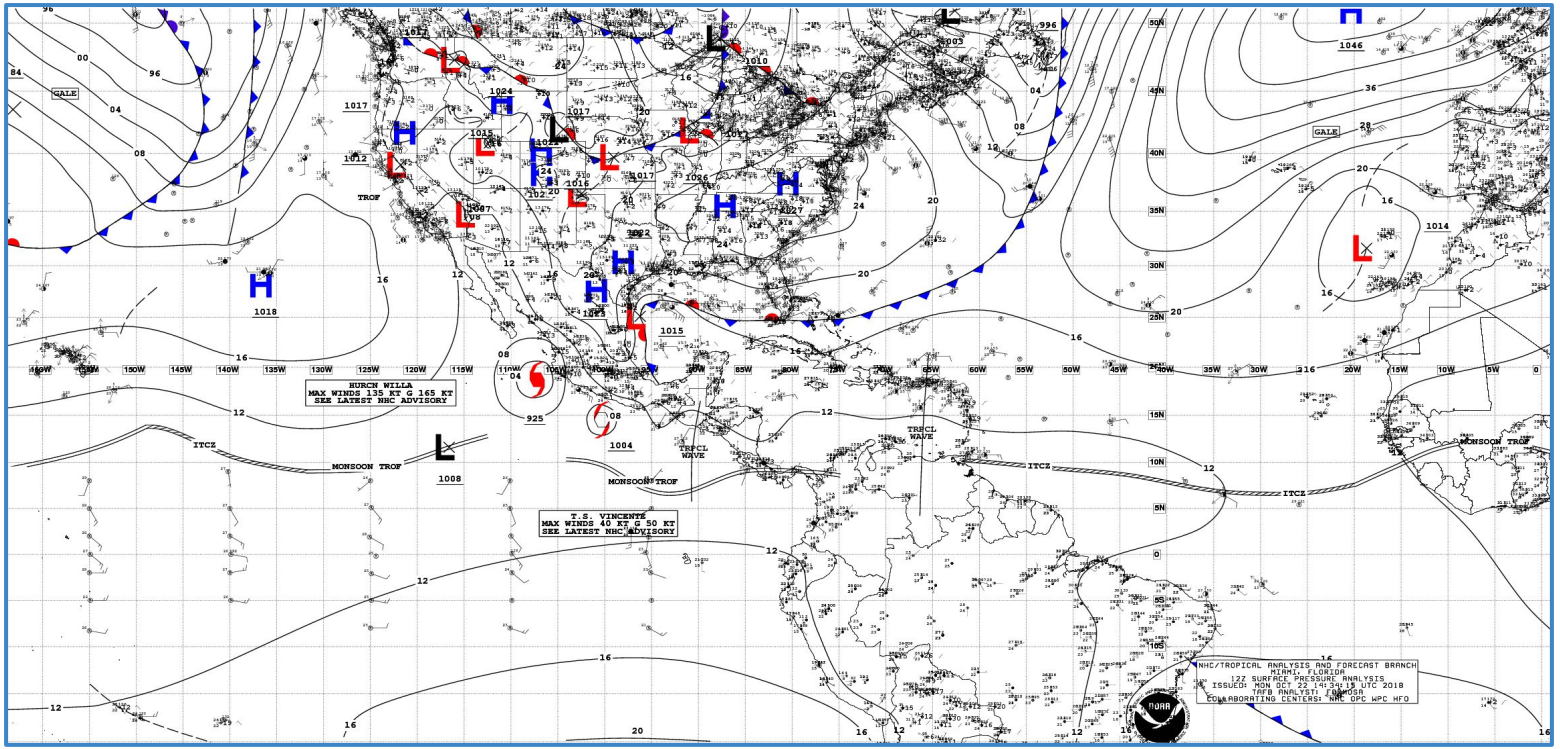
- Alrededor del **90%** del comercio mundial es transportado por la industria del transporte marítimo internacional
- El transporte marítimo es la sangre vital de la economía mundial
- Hay más de 50,000 buques mercantes que comercian a nivel internacional
- Datos meteorológicos son importantes desde el punto de vista económico



Mapa Analisis Superficie Tropical

Unified Surface Analysis

Joint effort from 3 National Centers and 1 Weather Forecast Office



Productos de TAFB

Tropical Weather Discussion

Atlantic and Pacific

★ Describe principales características meteorológicas sinópticas

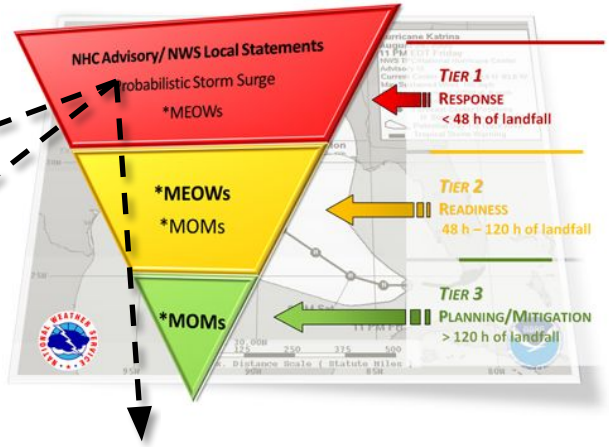

```
Tropical Weather Discussion
NWS National Hurricane Center Miami FL
2256 UTC Mon Jun 8 2020

Tropical Weather Discussion for North America, Central America
Gulf of Mexico, Caribbean Sea, northern sections of South
America, and Atlantic Ocean to the African coast from the
Equator to 32N. The following information is based on satellite
imagery, weather observations, radar and meteorological analysis.

Based on 1800 UTC surface analysis and satellite imagery
through 2200  UTC.

...SPECIAL FEATURES...

Tropical Depression Cristobal is well inland near near 34.0N
92.0W at 08/2100 UTC or 100 nm north of Monroe Louisiana moving
N at 16 kt. Estimated minimum central pressure is 994 mb. Maximum
sustained wind speed is 30 kt with gusts to 40 kt. Buoy and CMAN
observation platforms indicate fresh to strong southerly winds
are still active in the Mississippi Sound and at the entrance to
Mobile Bay. Moderate to fresh southerly winds are noted elsewhere
over the Louisiana and Alabama coastal waters with gusts to near
gale force and seas to seven feet. No significant shower or
thunderstorm activity associated with Cristobal is noted over the
Gulf any longer, although scattered thunderstorms are noted
inland from the Sabine Pass through central Mississippi and
Alabama. Please read the latest NHC Public Advisory at
https://www.nhc.noaa.gov/text/MIATCPAT3.shtml and Forecast/
Advisory at https://www.nhc.noaa.gov/text/MIATCMAT3.shtml for
more details.

...TROPICAL WAVES...

An Atlantic Ocean tropical wave is along 29W south of 15N moving
W around 15-20 kt to the southwest of the Cape Verde Islands. To
the north and west of this tropical wave a large plume of
Saharan dust exists. No significant convection is active near the
wave axis.

An Atlantic Ocean tropical wave is along 47W south of 12N,
moving W at 10 kt. Scattered moderate convection is from 07N-10N
between 42W-45W.
```

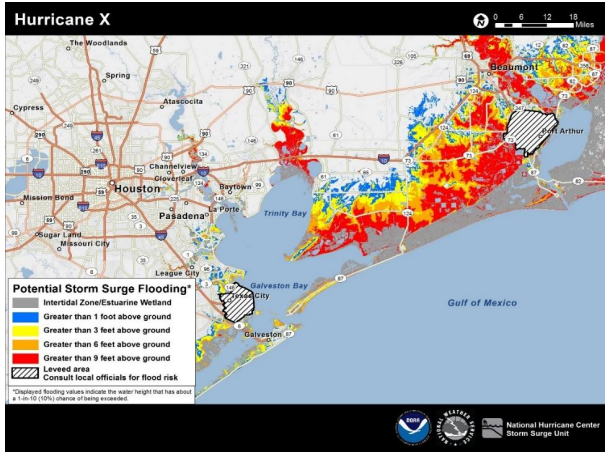
★ Producto de Alta Mar:
★ Formato en texto
★ Para buques oceanicos
★ Actualiza cada 6 horas
★ Pronóstico se extiende hasta 48 hr.


TROPICAL ANALYSIS & FORECAST BRANCH
TAFB
SWM - NATIONAL HURRICANE CENTER
Backup Desk
Atlantic / Pacific Analysis Desk
WPN

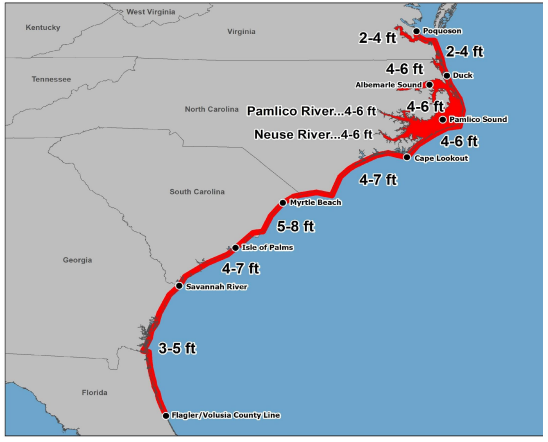
Productos de la Unidad de Marejada Ciclónica

Mission #1: Proporcionar pronósticos en tiempo real sobre el oleaje durante los eventos de ciclones tropicales.

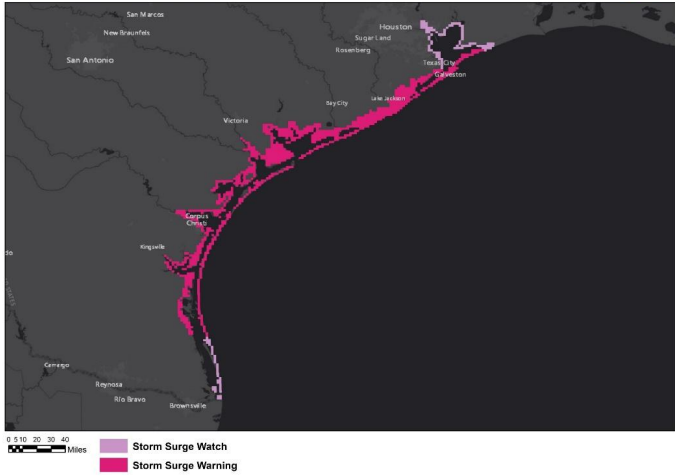




Mapa de Probabilidad de Marejada Ciclónica



Gráfica Experimental sobre el Pico de la Marejada Ciclónica

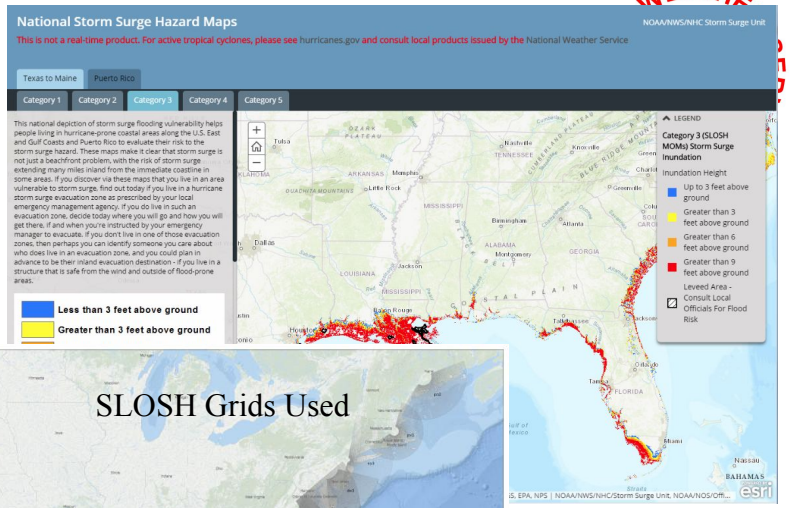


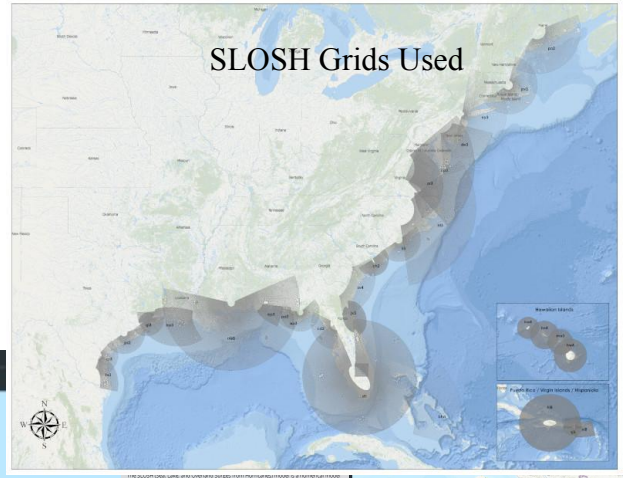
Avisos y Vigilancias Marejada Ciclónica

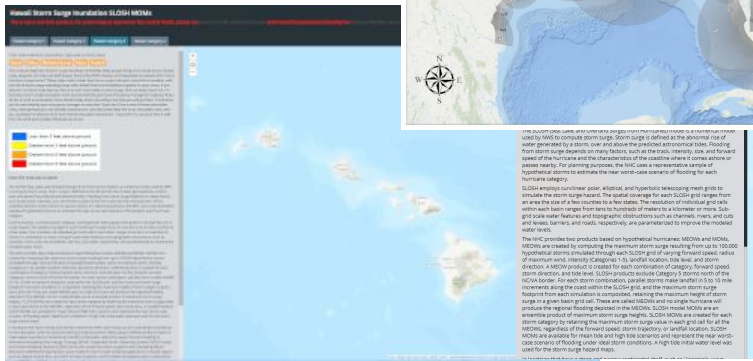
Preparación en Comunidades Costeras

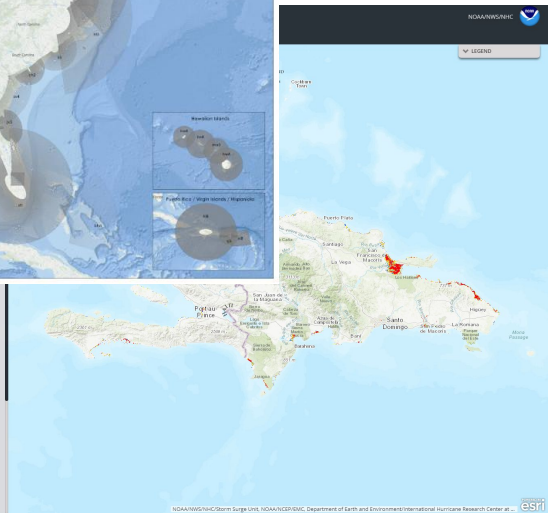
- Mission #2: Apoyo en la preparación a las comunidades costeras y resiliencia por medio de mapas de vulnerabilidad de marejada ciclónica

- Mapas de inundación por marejada ciclónica de alta resolución:
  - Texas a Maine
  - Puerto Rico
  - U.S. Virgin Islands
  - Islas de Hawaii
  - Republica Dominicana y Haiti





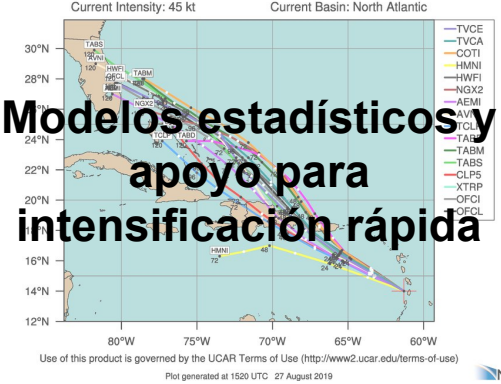




Que hace la Unidad de Tecnología y Ciencias?

Apoyo Operacional

Desarrollo de Productos



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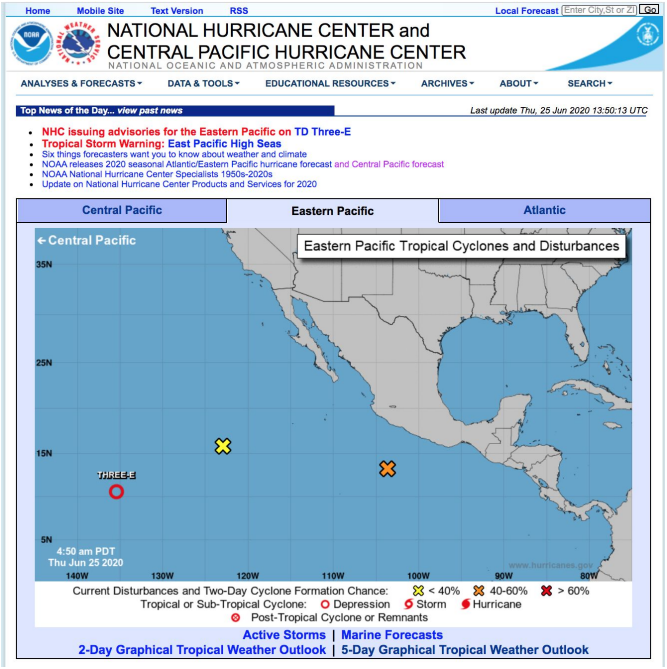


Adaptación durante la Pandemia

Antes

Despues

Comunicación y trabajo en equipo fue la clave

- La tecnología hizo posible para nosotros adaptarnos y cuidarnos durante la pandemia.
- Casi todas las herramientas que utilizamos en el CNH eran accesibles a distancia, lo que permitió hacer el trabajo lo mejor posible.

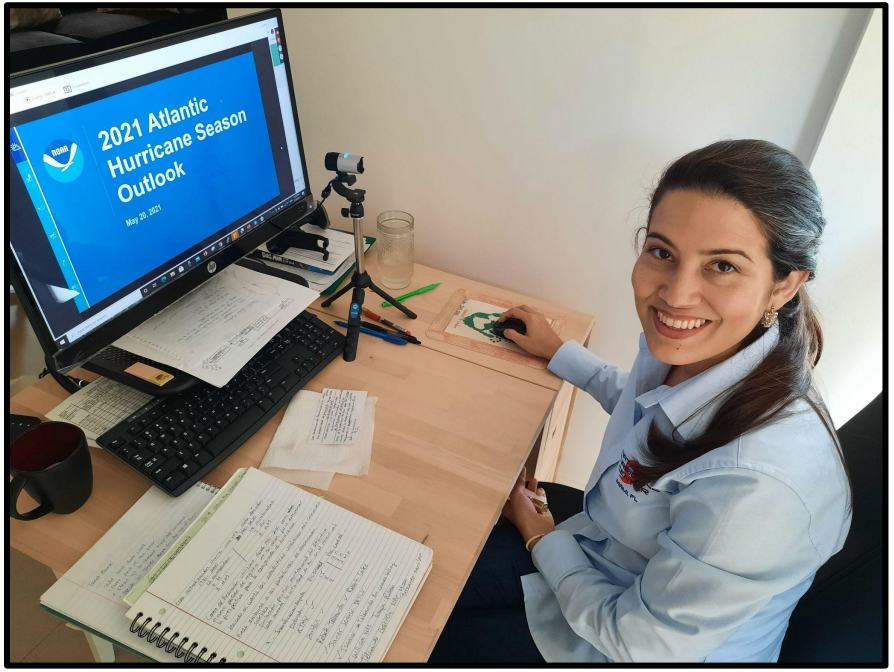
Subdivisión de Análisis y Pronósticos de los Trópicos

Antes

Subdivisión de Análisis y Pronósticos de los Trópicos

Antes

Ahora



Nuevas iniciativas para comunicar el mensaje de preparación ante la amenaza de un sistema tropical

Proyecto de Traducción Automatizada

Tropical Cyclone Product

BOLETIN
Número de Advertencia de tormenta tropical Elsa 35
SNM Centro Nacional de Huracanes Miami FL AL052021
500 PM EDT jueves 08 de julio de 2021

... ELSA LIGERAMENTE MÁS FUERTE ...
... SE DIRIGE A LA COSTA MEDIO ATLÁNTICO ....

RESUMEN DE LAS 500 PM EDT ... 2100 UTC ... INFORMACIÓN

UBICACIÓN ... 36,3N 78,3W
CERCA DE 125 MI ... 200 KM AL OESTE DE NORFOLK VIRGINIA
CERCA DE 300 MI ... 485 KM AL SO DE ATLANTIC CITY NUEVA JERSEY
VIENTOS MAXIMOS SOSTENIDOS ... 50 MPH ... 85 KM/H
MOVIMIENTO ACTUAL ... NE O 40 GRADOS A 21 MPH ... 33 KM/H
PRESION CENTRAL MINIMA ... 1006 MB ... 29.71 PULGADAS

VIGILANCIAS Y ADVERTENCIAS

CAMBIOS CON ESTA ADVERTENCIA:

La Aviso de Tormenta Tropical al sur de Little River Inlet ha sido descontinuado.

RESUMEN DE VIGILANCIAS Y ADVERTENCIAS EN EFECTO:

Una Aviso de Tormenta Tropical está en efecto para ...
* Little River Inlet, Carolina del Sur, a Sandy Hook, Nueva Jersey
* Sonidos de Pamlico y Albemarle
* Chesapeake Bay al sur de North Beach y la marea del Potomac al sur de la isla de Cobb
* Bahía de Delaware al sur de Slaughter Beach
* Long Island desde East Rockaway Inlet hasta el extremo este a lo largo del costa sur y desde el puerto de Port Jefferson hacia el este en el norte orilla
* New Haven, Connecticut a Merrimack River, Massachusetts, incluido Cape Cod, Block Island, Martha's Vineyard y Nantucket

Una Aviso de tormenta tropical significa que las condiciones de tormenta tropical son esperado en algún lugar dentro del área de advertencia.

Para obtener información sobre los peligros del viento al norte del Aviso de Tormenta Tropi área, favor ver productos de su oficina meteorológica local.

Para obtener información específica sobre tormentas en su área, incluyendo posibles interior alertas y advertencias, favor, productos de monitor emitido por su oficina local de pronóstico del Servicio Nacional de Meteorología.

Perspectivas De Las Condiciones Del Tiempo En El Tropico

000
ACCA62 TJSJ 151729 CCA
TWOSPN

Perspectiva sobre las Condiciones del Tiempo en el Tropico
Centro Nacional de Huracanes del SNM Miami FL
Traduccion Revisada por el SNM San Juan PR
200 PM EDT domingo 15 de mayo de 2022

Para el Atlantico Norte...Mar Caribe y Golfo de Mexico:

No se espera la formacion de ciclones tropicales durante los proximos 5 dias.

Hoy, 15 de mayo, marca el primer dia de emision rutinaria de la Perspectiva sobre las Condiciones del Tiempo en el Tropico de la cuenca del Atlantico en 2022. Este producto describe areas significativas de mal tiempo y su potencial de formacion de ciclones tropicales durante los proximos cinco dias. La Perspectiva sobre las Condiciones del Tiempo en el Tropico se emite desde el 15 de mayo hasta el 30 de noviembre de cada ano. Los horarios de emision de este producto son las 2 AM, las 8 AM, las 2 PM Y las 8 PM EDT. Despues del cambio a la hora estandar en noviembre, los horarios de emision son la 1 AM, las 7 AM, la 1 PM Y las 7 PM EST.

Se emitira una Perspectiva sobre las Condiciones del Tiempo en el Tropico para proveer actualizaciones, segun sea necesario, entre las publicaciones programadas regularmente de la Perspectiva sobre las Condiciones del Tiempo en el Tropico. Las Perspectivas meteorologicas tropicales especiales se publicaran bajo los mismos encabezados de la OMM y el AWIPS que las Perspectivas sobre las Condiciones del Tiempo en el Tropico habituales.

Una version grafica de Perspectiva sobre las Condiciones del Tiempo en el Tropico esta disponible en la web en:
www.hurricanes.gov.

$$
Pronosticador Brown

Prioridad a los Productos del CNH

- Advertencia de Tormenta Tropical
  Perspectiva sobre las Condiciones del Tiempo en el Trópico
  Discusion de Ciclon Tropical

Atlantic Tropical Weather Outlook

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ABNT20 KNHC 151722
TWOAT

Tropical Weather Outlook
NWS National Hurricane Center Miami FL
200 PM EDT Sun May 15 2022

For the North Atlantic...Caribbean Sea and the Gulf of Mexico:

Tropical cyclone formation is not expected during the next 5 days.

Today, May 15th, marks the first day of routine issuance of the Atlantic basin Tropical Weather Outlook in 2022. This product describes significant areas of disturbed weather and their potential for tropical cyclone formation during the next five days. The Tropical Weather Outlook is issued from May 15 through November 30 each year. The issuance times of this product are 2 AM, 8 AM, 2 PM, and 8 PM EDT. After the change to standard time in November, the issuance times are 1 AM, 7 AM, 1 PM, and 7 PM EST.

A Special Tropical Weather Outlook will be issued to provide updates, as necessary, in between the regularly scheduled issuances of the Tropical Weather Outlook. Special Tropical Weather Outlooks will be issued under the same WMO and AWIPS headers as the regular Tropical Weather Outlooks.

A graphical version of the Tropical Weather Outlook is available on the web at: www.hurricanes.gov.

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Forecaster Brown

Sistema Automatizado de Traducción

Perspectivas De Las Condiciones Del Tiempo En El Tropico

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ACCA62 TJSJ 151729 CCA
TWOSPN

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Pronosticador Brown
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Atlantic Tropical Weather Outlook

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Forecaster Brown
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Mensajes Claves

Key Messages on Hurricane Joaquin

Thursday Morning, October 1, 2015

1. Preparations to protect life and property in the central Bahamas should be complete. The slow motion of Joaquin during the next 24 to 36 hours will bring a prolonged period of hurricane force winds, storm surge, and very heavy rainfall to those islands.

2. Confidence in the details of the forecast after 72 hours remains low, as there have been some large changes in the model guidance overnight. The range of possible outcomes is still large, and the possibility of a hurricane landfall in the Carolinas still cannot be ruled out.

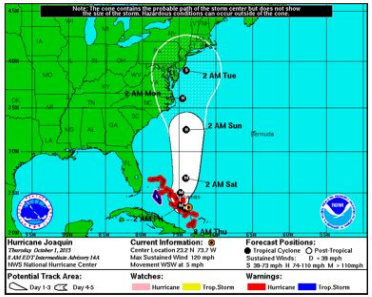
3. Efforts continue to provide the forecast models with as much data as possible. The NOAA G-IV jet flew the first in a series of missions in the storm environment last night, and these missions will continue today. The National Weather Service also continues to launch extra balloon soundings.

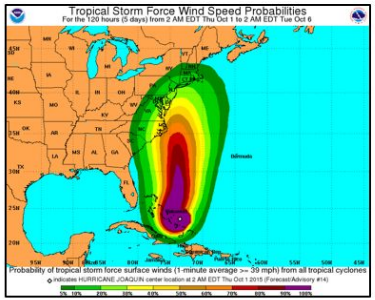
4. Because landfall, if it occurs, is still more than three days away, it's too early to talk about specific wind, rain, or surge impacts from Joaquin in the United States. Regardless of Joaquin's track, strong onshore winds will create minor to moderate coastal flooding along the coasts of the mid-Atlantic and northeastern states through the weekend.

5. A hurricane watch for a portion of the U.S. coast could be required as early as tonight.

6. Many portions of the eastern U.S. are currently experiencing heavy rains and gusty winds associated with a frontal system. These heavy rains are likely to continue for the next few days, even if the center of Joaquin stays offshore. The resulting inland flood potential could complicate preparations for Joaquin should it head toward the coast, and even more substantial inland flooding is possible if Joaquin later passes near or over these same areas.

National Hurricane Center: www.hurricanes.gov



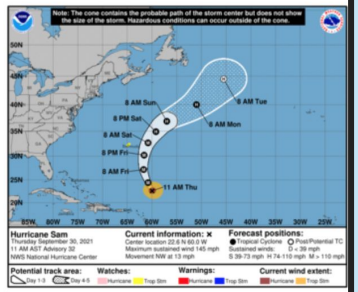


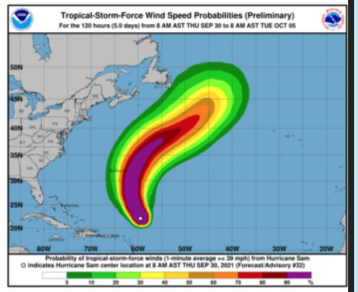
Mensajes Claves Sobre Huracan Sam

Advertencia 32: 11:00 AM AST jueves, 30 de septiembre de 2021

1. Marejadas generadas por Sam afectarán el extremo norte de las Islas de Sotavento y las Antillas Mayores, incluyendo Puerto Rico durante los próximos días. Se espera que las marejadas alcancen a Bermuda y Las Bahamas para el viernes, y luego se desplace a la costa este de los Estados Unidos para este fin de semana. Estas marejadas resultarán en condiciones de resaca y corrientes marinas amenazantes a la vida. Por favor consulte los productos de su oficina de pronóstico local.

2. Condiciones de tormenta tropical son posibles en Bermuda empezando el viernes en la noche o temprano el sábado, y una Vigilancia de Tormenta Tropical ha sido emitida para esa isla.





Para obtener más información visite la página web hurricanes.gov

Preguntas

Gracias

Maria M. Torres
maria.torres@noaa.gov

NOAA Hurricane Webinar Series

https://www.noaa.gov/regions/2022-hurricane-awareness-webinars

Beyond Our Borders: Hurricane Forecast Collaboration in the Caribbean

Date: June 2, 2022
Time and duration: 1-2 PM ET (1 hour)

Speakers: Evan Thompson, Director Jamaica Meteorological Service & President, World Meteorological Organization Region IV, and Dr. Cody Fritz, Storm Surge Team Lead, NHC/NWS

Webinar overview: Our partnerships with other countries are key when it comes to issuing forecasts. Ever wonder how it's done? Join us to hear from the speakers how that coordination is done and new storm surge capabilities NHC is undertaking.

Registration link: https://attendee.gotowebinar.com/register/9147275259339296782

"Behind-The-Scenes"

Technology and Science Branch (TSB)

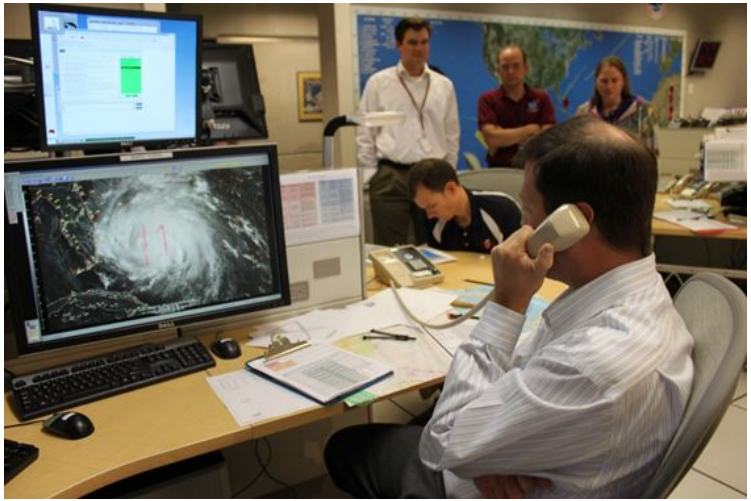
Subdivisión de Marejada Ciclónica

- Proporciona pronósticos precisos y a tiempo real de las marejada ciclónica durante los eventos de ciclones tropicales.
- Apoya la preparación y la resiliencia de las comunidades costeras mediante la elaboración de mapas de riesgo de marejada ciclónica
- Desarrolla, verifica y mantiene el modelo de mareas de tempestad
- Aumenta la concienciación a través de la divulgación y la educación del público, los medios de comunicación, los gestores de emergencias y los meteorólogos.



Typical Day - Hurricane Season

- Rotating shift work with widely varying (event driven) workload
- Shift usually includes 2 people, but can vary from 1 to 4
- Weather watch for tropical cyclone activity and potential formation
- Tropical Weather Outlook every 6 h
- TC analysis and forecast packages
- Issuing watches/warnings
- Coordination
- Tasking aircraft reconnaissance
- Post-analysis/Tropical Cyclone Reports
- Training
- Outreach
- Evaluating JHT projects/feedback

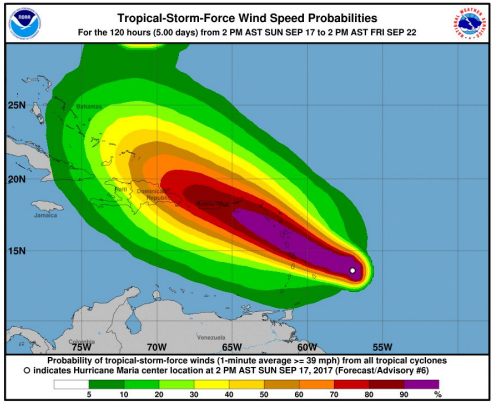


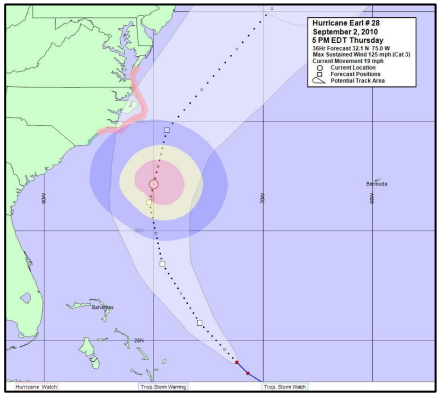
Typical Day - Outside Hurricane Season

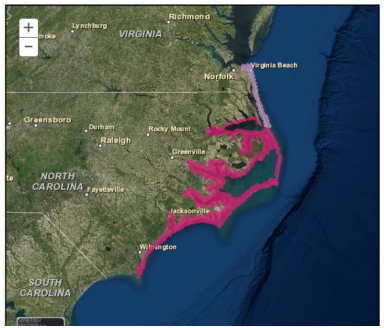
- Post-analysis/Tropical Cyclone Reports
- Developing and updating training presentations for EMs, meteorologists, media
- Attending conferences and meetings
- Media interviews
- Creating hurricane exercises for training
- Hurricane awareness tours
- Scientific research projects/papers
- Verification
- Model evaluations and feedback to developers
- Developing and evaluating new product ideas
- Collaboration/feedback with JHT and other projects

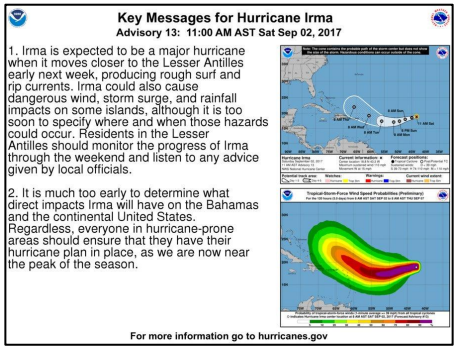
Tropical Cyclone Advisory Packages

- 5-day track and intensity forecast
- Forecast of storm size through 72 hours (hurricane-force winds through 48 hours)
- Watches and warnings
- Hazard information
  - Tropical storm and hurricane force winds
  - Storm surge
  - Rainfall
- Forecast Discussion
  - Forecaster reasoning and confidence
  - Key Messages



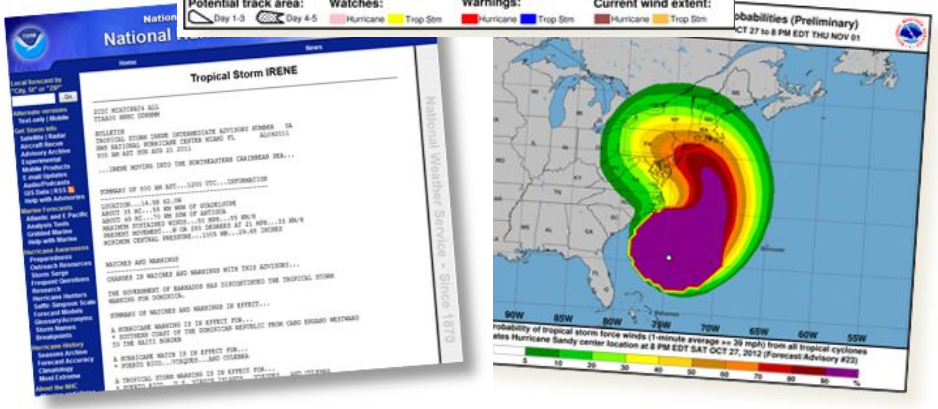






Especialistas de Huracanes
Productos

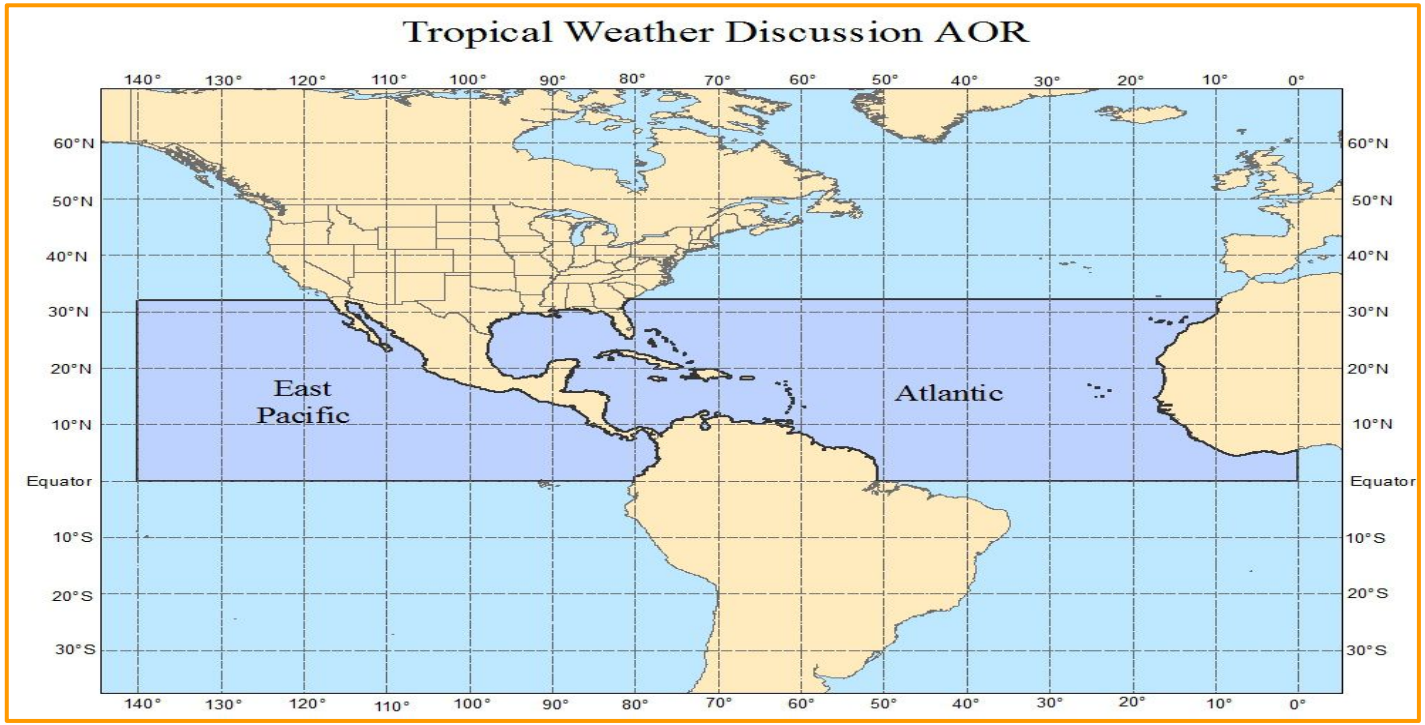
- HSU's products provide the "big picture" overview of tropical cyclones
  - Where is the storm going?
  - How strong is it?
  - How big is it?
  - Large-scale hazards and impacts
- Local impacts are provided by WFOs in the U.S. and meteorological services in other countries



IDSS

- HSU provides multi-level DSS to federal, state, and local partners throughout the TC lifecycle, including
  - Briefings for FEMA and federal agencies through Hurricane Liaison Team (VTCs, phone)
  - Briefings on state conference calls, sometimes including local jurisdictions
  - Key Messages provide high-level talking points focused on the large-scale impacts, evolving risk, and forecast confidence
  - Media pool
  - Congressional briefings

TAFB Areas of Responsibility



Area Coverage: ~ 14 millions nm^2

Offshore Water Forecast

- 5-day forecast designed for recreational and smaller fishing vessels, which may spend a few days at sea
- Elements of forecast include:
  - winds (speed and direction)
  - Seas (significant wave height)
  - Major weather impacts that pose danger to navigation (i.e. visibility)
    - Fog, smoke and volcanic ash
- Include a synopsis of large scale environmental conditions, and marine warnings through 36 hrs
  - TC, Gale, Storm, Hurricane Warnings

32 zones

17 zones

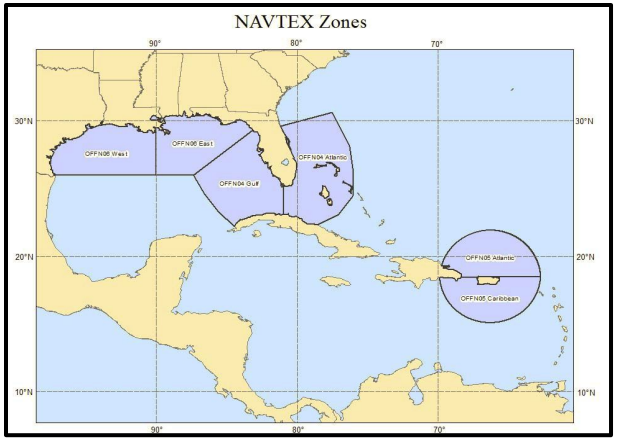
High Seas Forecast

Atlantic High Seas: 7° N to 31° N West of 35° W

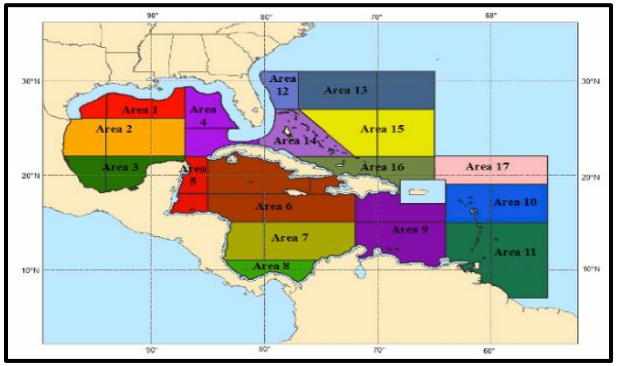
E Pacific High Seas: Equator to 30° N East of 140° W and Equator to 3.4° S East of 120° W

- ✔ Text forecast issued primarily for large ocean going vessels
- ✔ Updated every 6 hrs
- ✔ Describes winds and waves:
  - Nowcast
  - 24 hr
  - 48 hr
- ✔ Threshold:
  - 20 KT winds or greater
  - 8 ft seas or higher

Other TAFB Products

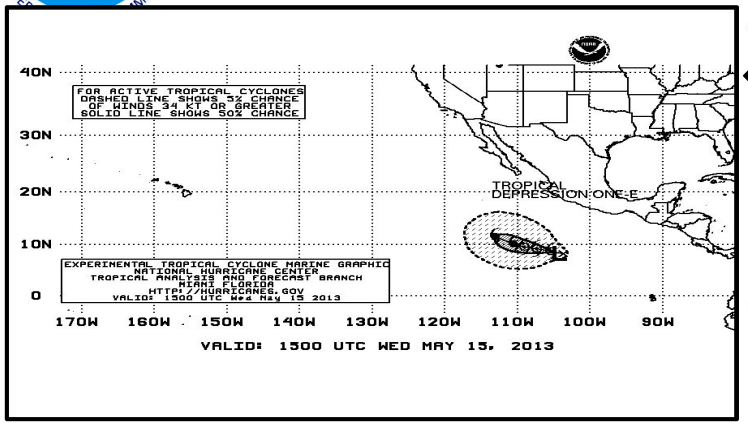


- ✔ **NAVTEX** is an internationally required broadcast of coastal urgent marine safety information to ships
- ✔12 U.S. Coast Guard transmitter locations
- ✔ TAFB transmits for New Orleans, Miami and San Juan



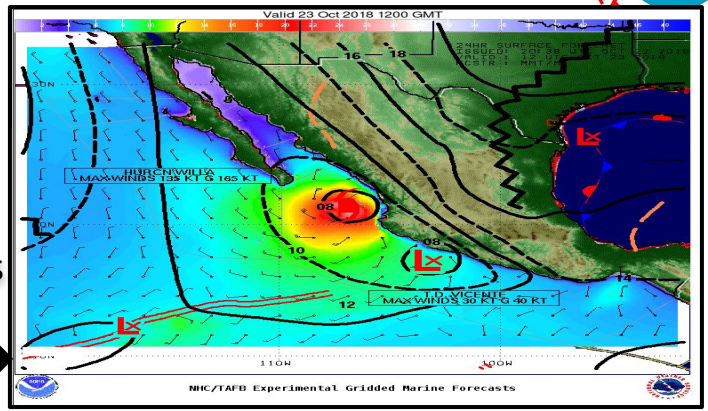
- ✔ **VOBRA** is a high frequency voice broadcast transmitted by the USCG
- ✔ Contains basic weather information prepared by the NWS (OPC, NHC and HFO)
- ✔ For vessels operating in areas beyond the range of coastal NOAA Weather Radio
- ✔ Has a lower resolution than the offshore forecasts

Other TAFB Products

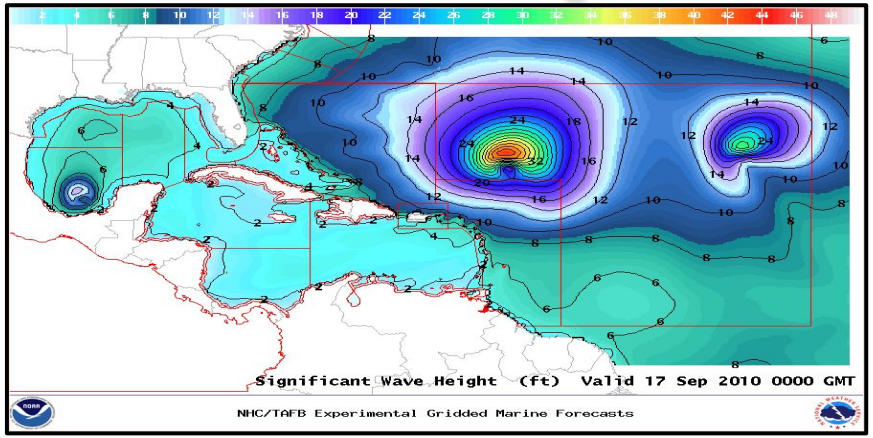


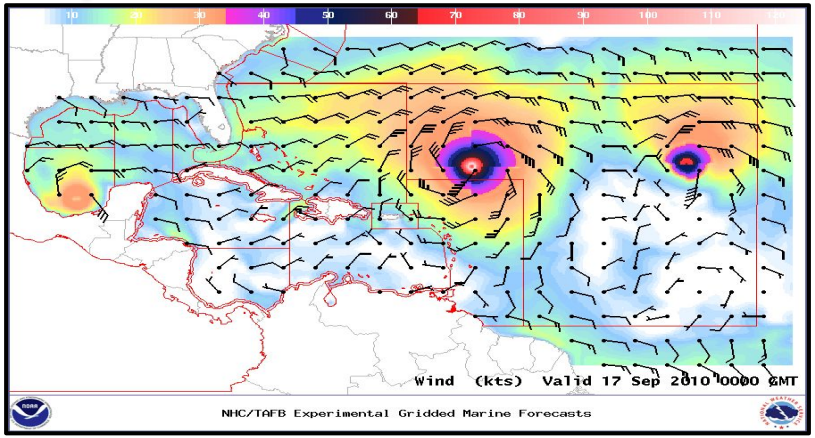
TC Danger Graphic

Marine Composite Page – Wind, Waves and Features

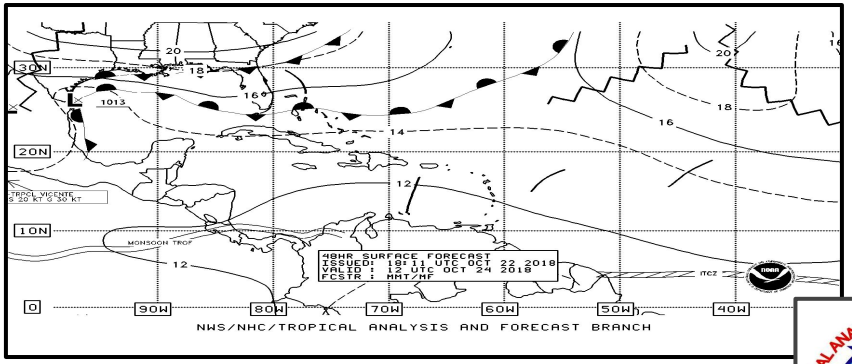


TAFB National Digital Forecast Database (NDFD) Gridded Marine Forecast

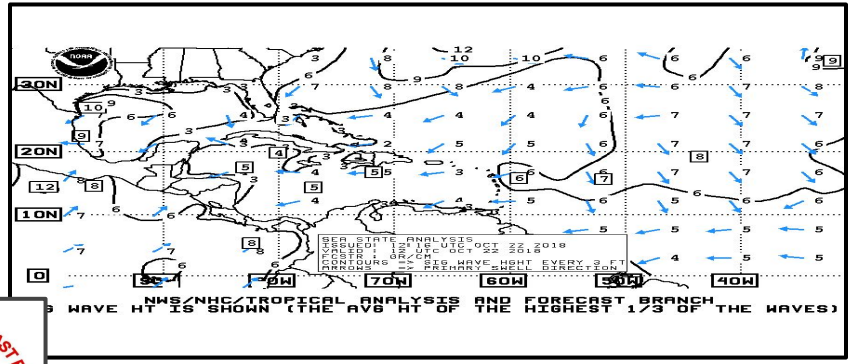




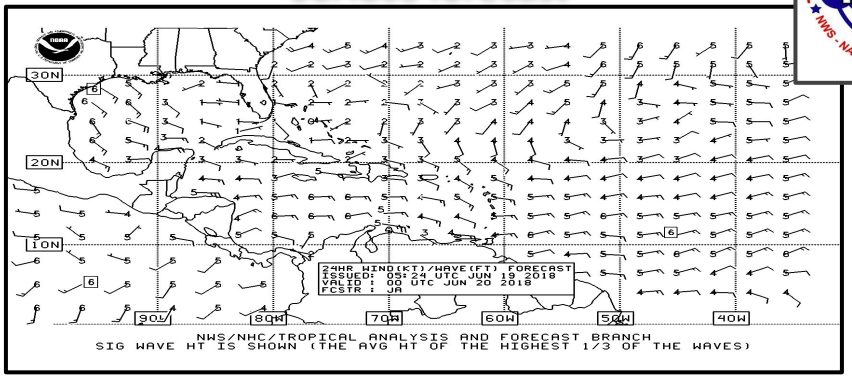
Other TAFB Products



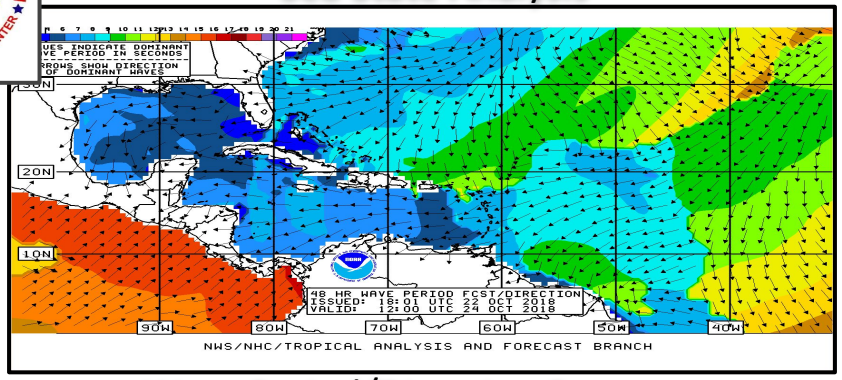
Surface forecast



Sea State Analysis



Wind Wave Forecast

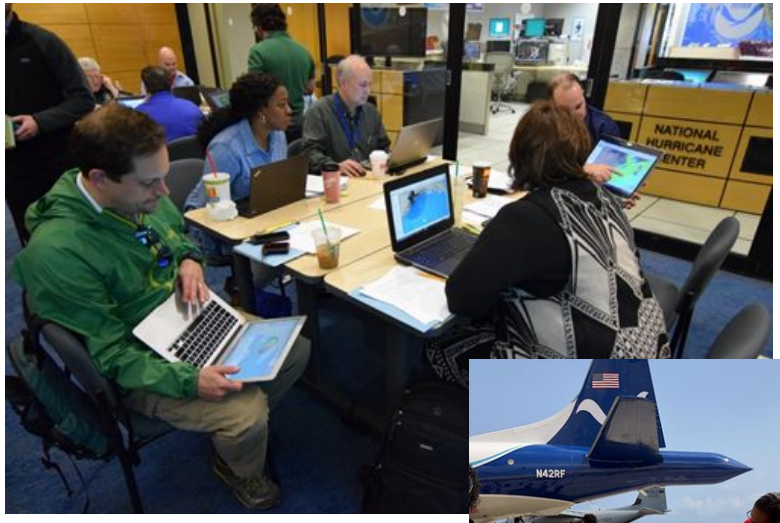


Wave Period/Direction Forecast

54 Spot Forecasts by NHC/TAFB for 2019 U.S. Coast Guard District Operations

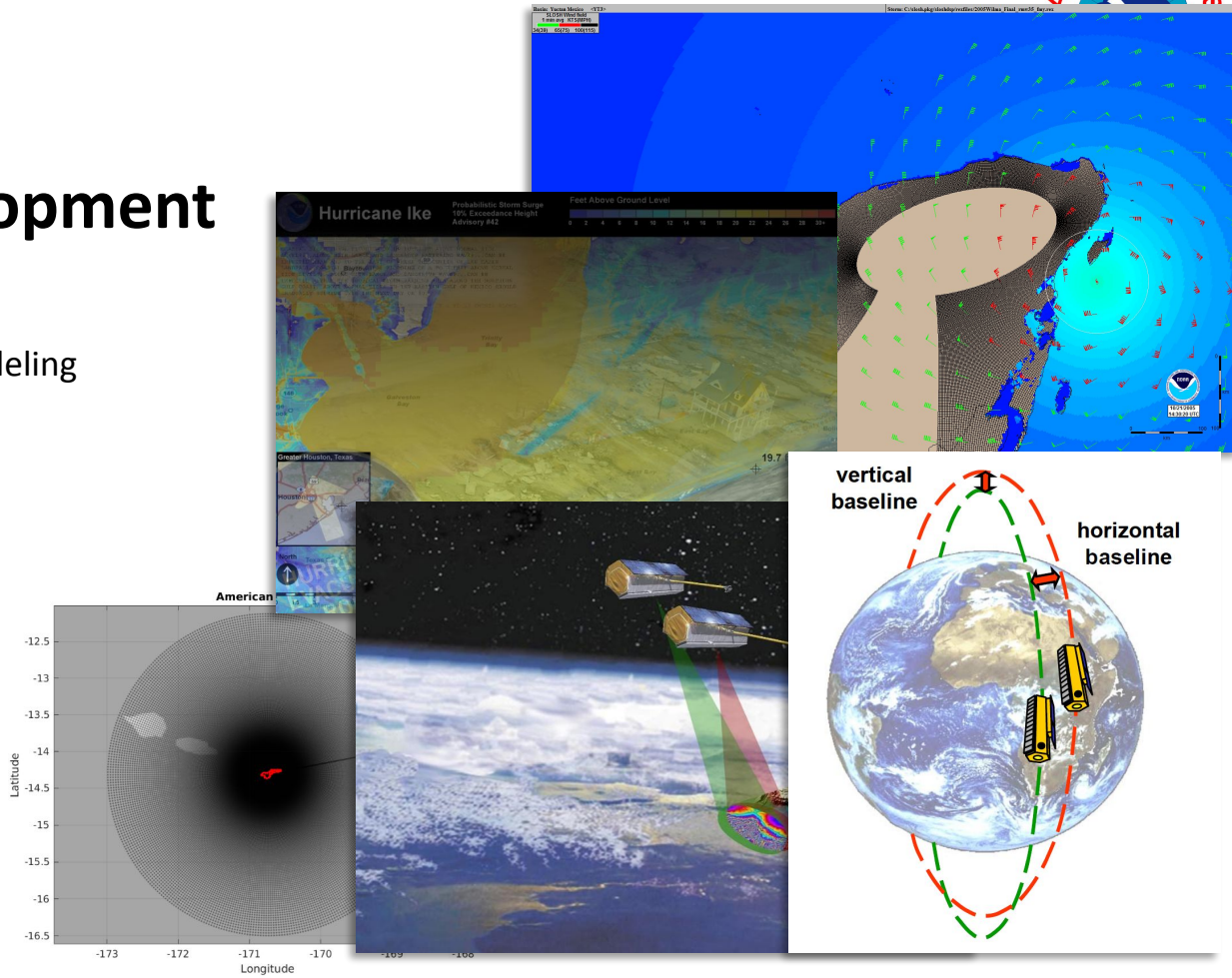
Outreach and Training

- Three one-week FEMA Courses for local emergency managers (~2,000 trained since 1990)
- Interdepartmental Coordinating Committee on Hurricanes (ICCOH) meeting with state hurricane program managers
- WMO two-week course for international meteorologists
- Interdepartmental Hurricane Conference
- National Hurricane Conference (~2,000 attendees)
- National Tropical Weather Conference
- WMO RA-IV Hurricane Committee Meeting
- Caribbean Hurricane Awareness Tour
- U.S. Hurricane Awareness Tour & National Hurricane Preparedness Week
- Effective Hurricane Messaging courses for NWS meteorologists
- Florida Governor's Hurricane Conference (~2,000 attendees) + other state conferences



Research and Development

- Storm surge forecasting and modeling approach (i.e., deterministic vs probabilistic)
- Domestic and international developments/partnerships
- Digital elevation data and GIS applications



Outreach and Education

- Mission #3: Increase awareness through outreach and education

- FEMA courses for emergency managers
- WMO workshops for international meteorologists
- Hurricane messaging courses for NWS meteorologists
- Hurricane conferences/international wave workshops/USAID partnerships and many more…

What does TSB do?

- Support NHC computer and communication systems
  - Maintain data flow into and out of the building
- Maintain the NHC website and respond to Webmaster email
- Continued development of software and computer programs
  - Automated Tropical Cyclone Forecasting (ATCF) system
  - Statistical and dynamical models for tropical cyclone prediction (run on NOAA supercomputer)
  - NAWIPS/AWIPS-II: configure and customize data displays
  - Many others!
- Work with other government and academic entities to gather data, develop and transition new tools and techniques into operations
  - Run the Joint Hurricane Testbed (JHT)
- Occasionally fill operational shifts in HSU & TAFB

Collaborating Offices for Data and Services

A “Typical” Day in TSB

Morning Rounds:
Check the shift logs for issues and the calendar for things like scheduled code changes, upgrades, or network changes

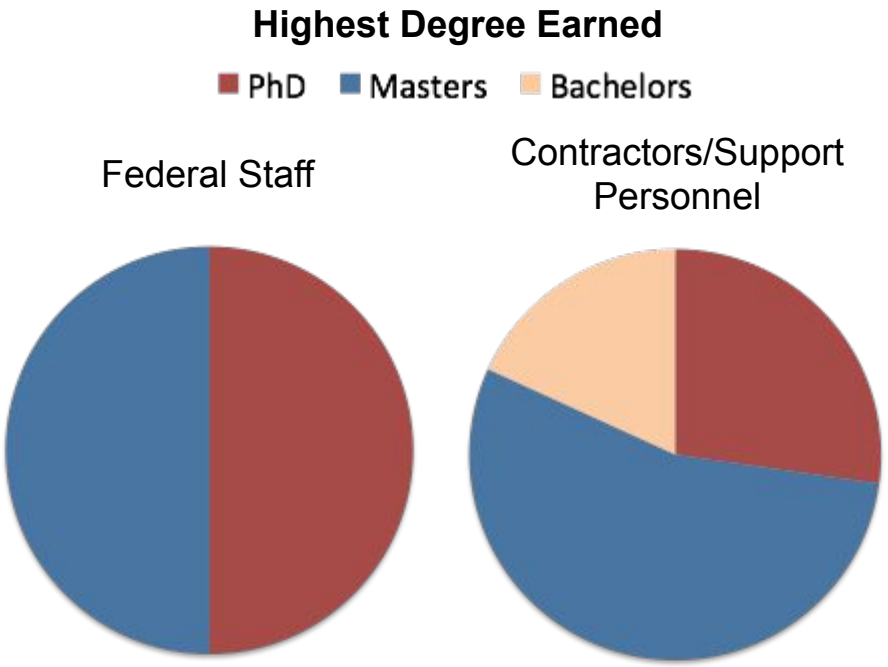
Operational support:
Fix broken things

Development:
Develop and test new models, upgrade scripts, add new dataset, migrate code

Meetings:
Staff, coordinate with partners, project updates

Fun Facts about TSB

- 10 FTEs, ~11 contractors/support personnel (includes SSU)



- Some of the technical languages used in TSB:

- Words to describe TSB culture:
  - Teamwork
  - Stimulating
  - Fast-Paced
  - Friendly