

weather'n'co

METEO & OCEANO – Formation

Weather Training

Tropical CYCLONE Activity



Sommaire

- 1 – Cyclone IDALIA 29-31 Aout 2023
- 2 - Cyclone FIONA 2330 Septembre 2023
 - 2.1 Contexte statistique
- 3 – Cyclone IAN
- 5 – Bilan IAN

1 – Hurricane IDALIA

29-31 Août 2023

- **Caractéristiques**

10 ième cyclone tropical de la saison

Catégorie 4

Vent max 215 km/h

A propos de sa trajectoire

Dépression tropicale dans le canal du Yucatan le 26 Août

Tempête tropicale le 27 Aout (Idalia)

Intensification sur le golfe du Mexique stade 4 juste avant de toucher terre.

Le 31 au large de la Caroline du sud Cyclone post tropical

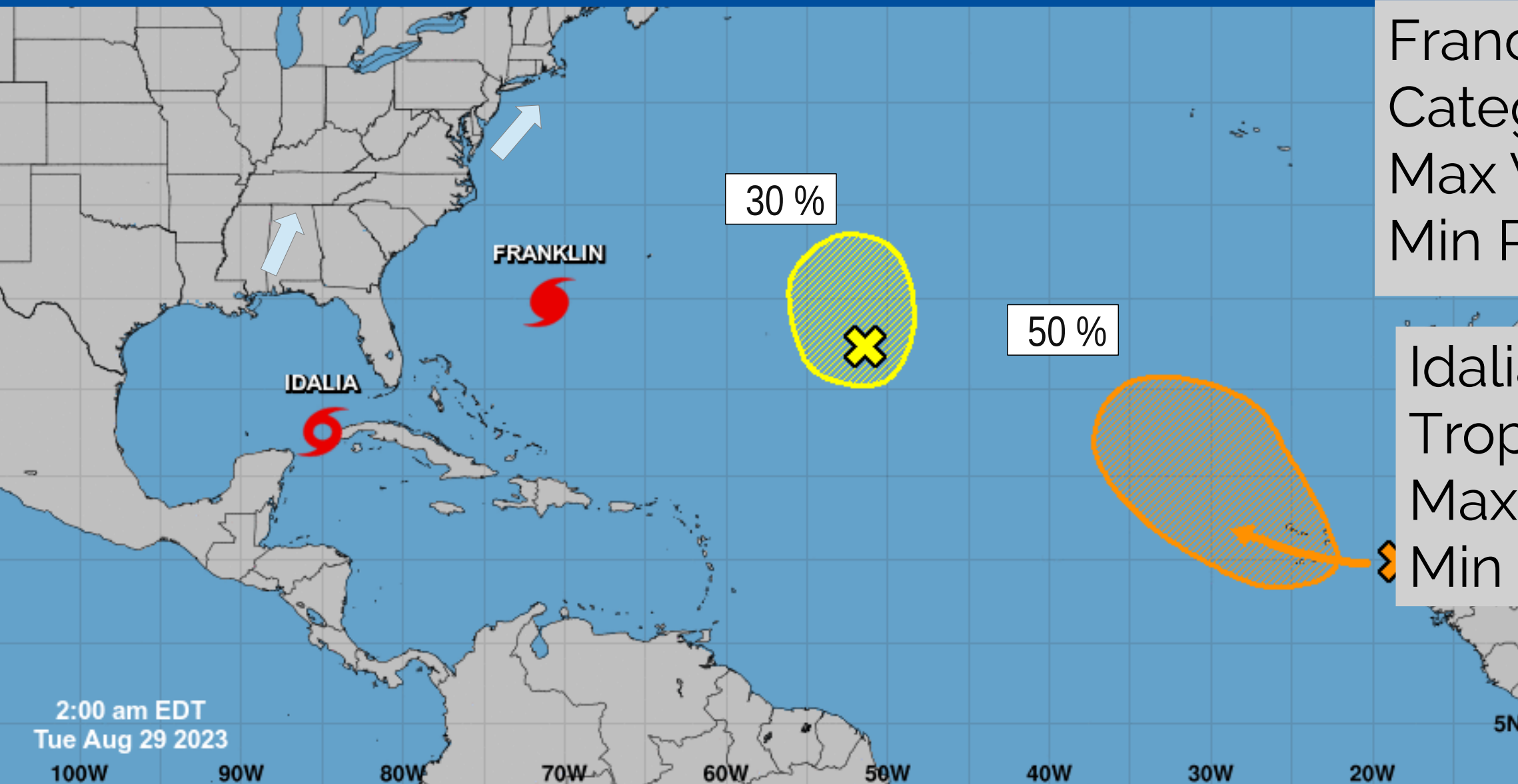


Seven-Day Graphical Tropical Weather Outlook

National Hurricane Center Miami, Florida



Prévision Atlantique à 7 jours- Mar 29 Aou 2023



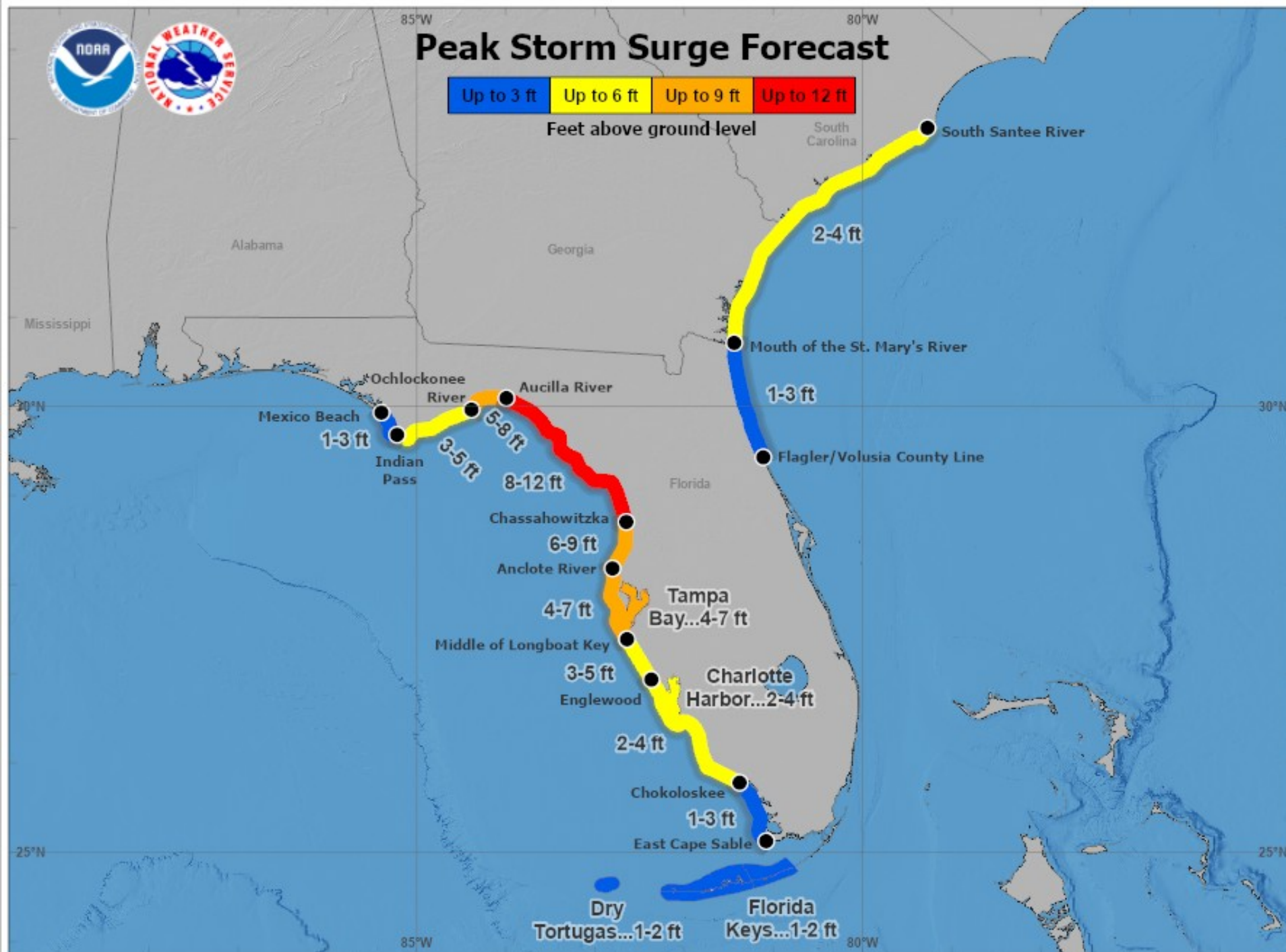
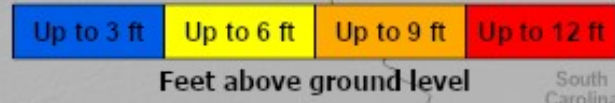
Franklin à 06UTC
Category 4
Max Wind: 125 kt
Min Pres: 930 hPa

Idalia à 06UTC
Tropical Storm
Max Wind: 60 kt
Min Pres: 983 hPa

Current Disturbances and Seven-Day Cyclone Formation Chance: < 40% 40-60% > 60%
Tropical or Sub-Tropical Cyclone: Depression Storm Hurricane
 Post-Tropical Cyclone or Remnants



Peak Storm Surge Forecast

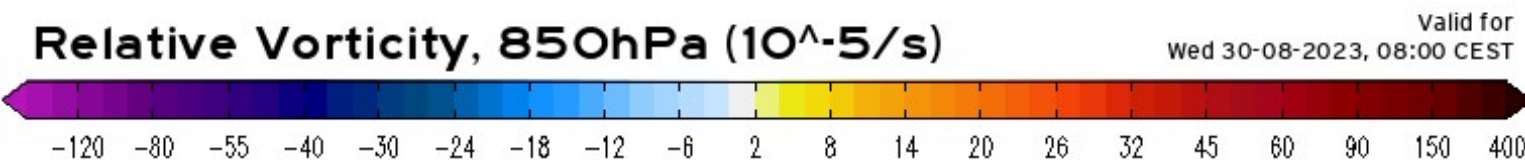
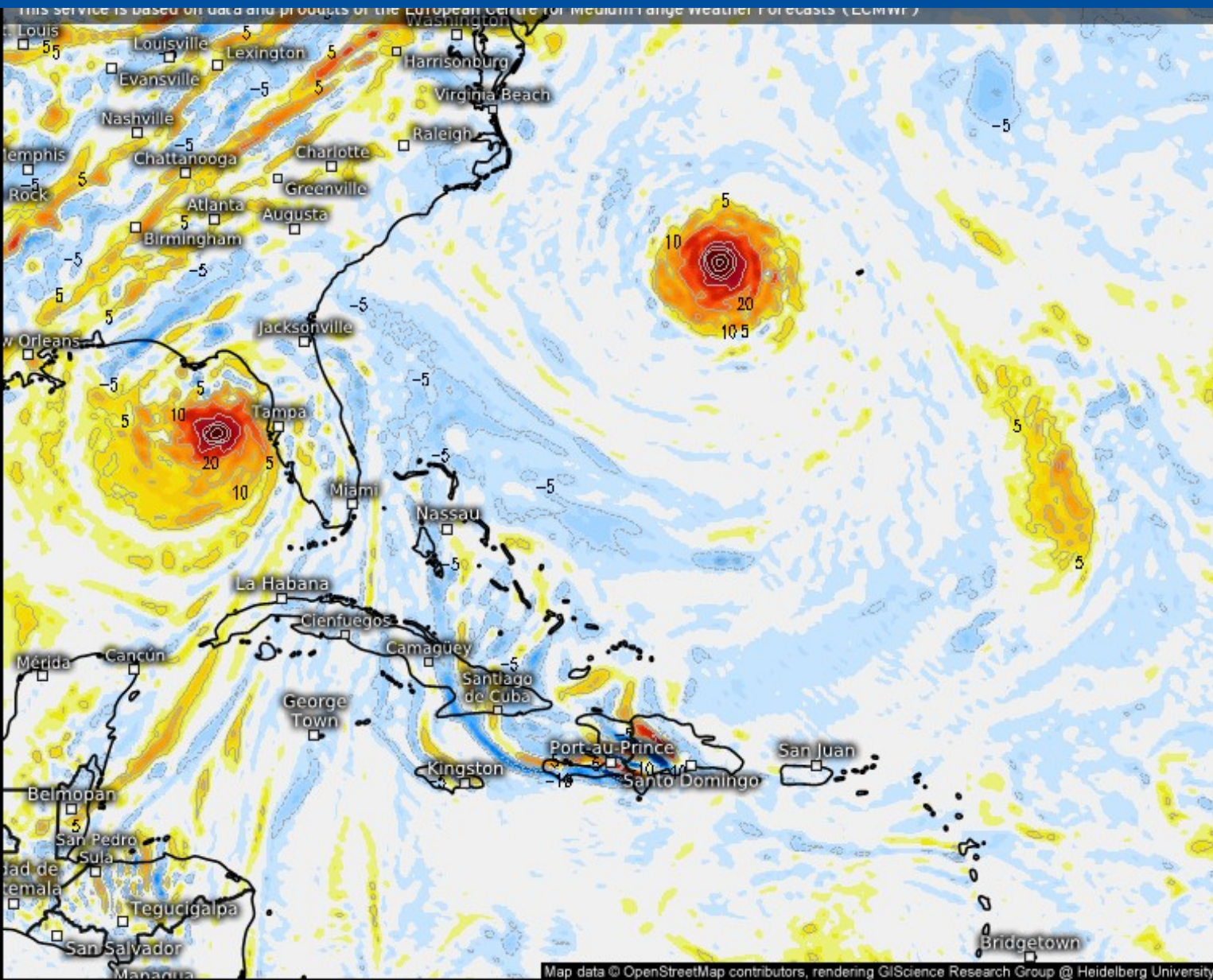


Hurricane Idalia
Tuesday August 29, 2023
04 AM CDT Advisory 11
NWS National Hurricane Center

User Notes: Water levels along the immediate coast could reach the following heights above ground level within the indicated areas. Elevated water levels will likely be accompanied by large and destructive waves. Colors are determined by the highest values in the associated forecast peak surge range. Values shown on this graphic are inclusive of tide.

https://www.nhc.noaa.gov/refresh/graphics_at5+shtml/093743.shtml?peakSurge#contents

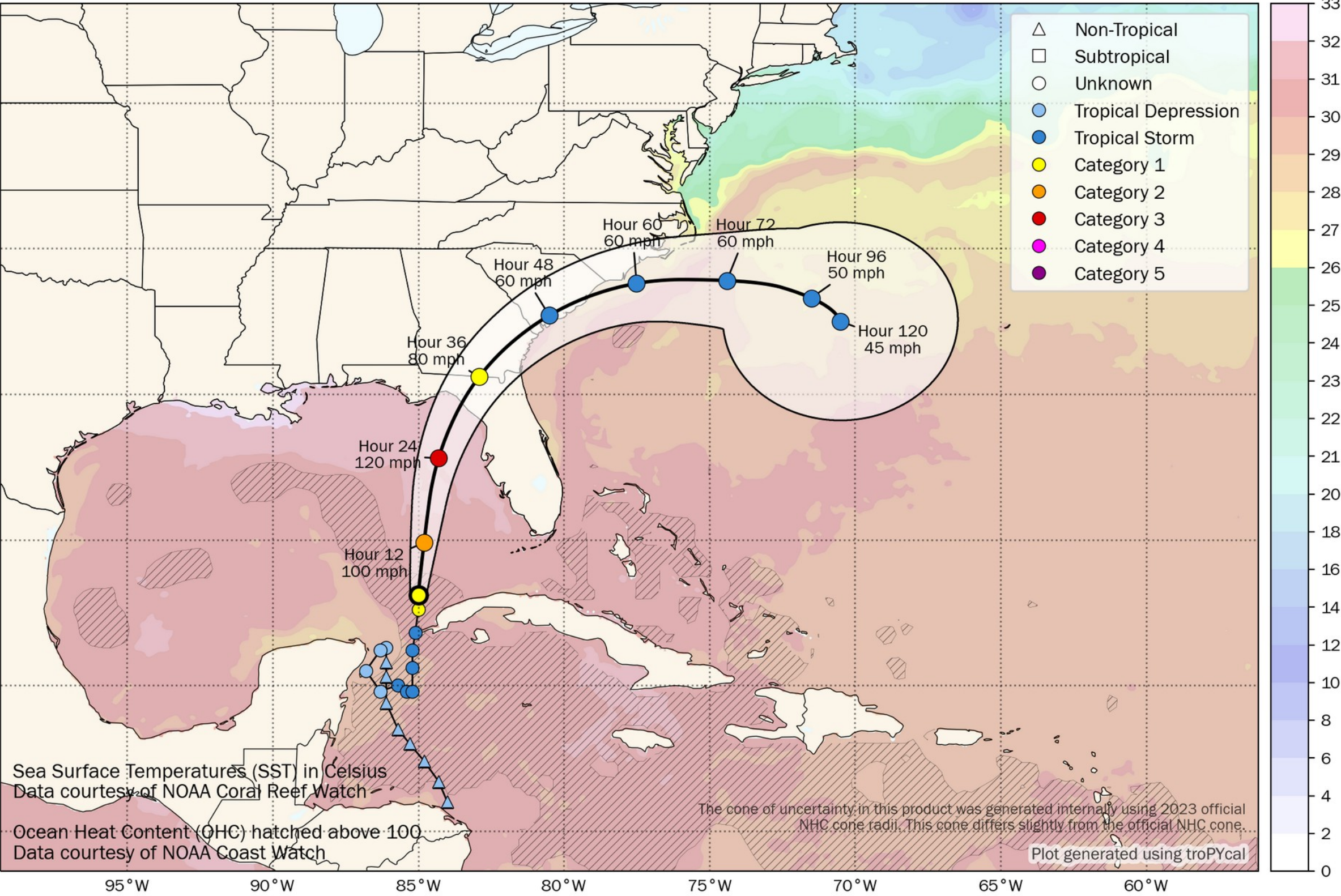
Vorticity 850 hPa pour Mer 30 Aou 2023 à 07H TU

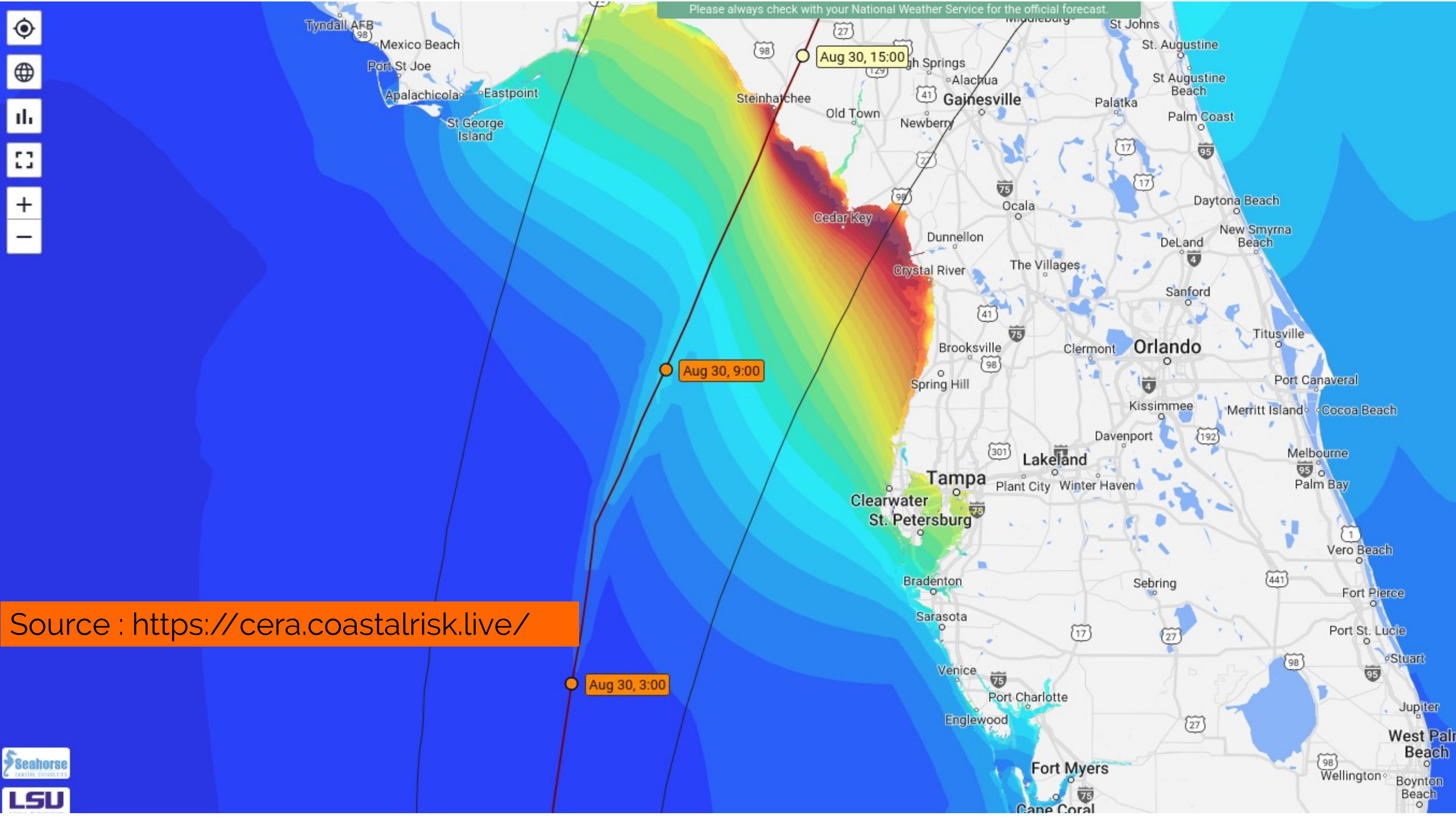


Grid map 72.4 W, 26.3 N (Zoom level 1 / Resolution 5km)
ECMWF IFS HRES 02/12z (10 days) from 29-08-2023/00z

Hurricane IDALIA

Current Intensity: 75 mph • 981 hPa
NHC Issued: 0900 UTC 29 Aug 2023





Source : <https://cera.coastalrisk.live/>

2 – Hurricane FIONA
23-30 Septembre 2022

- **Caractéristiques**

Premier ouragan majeur de la saison 2022

Catégorie 4

Vent max 220 km/h

Pression minimale 931 hPa

A propos de sa trajectoire

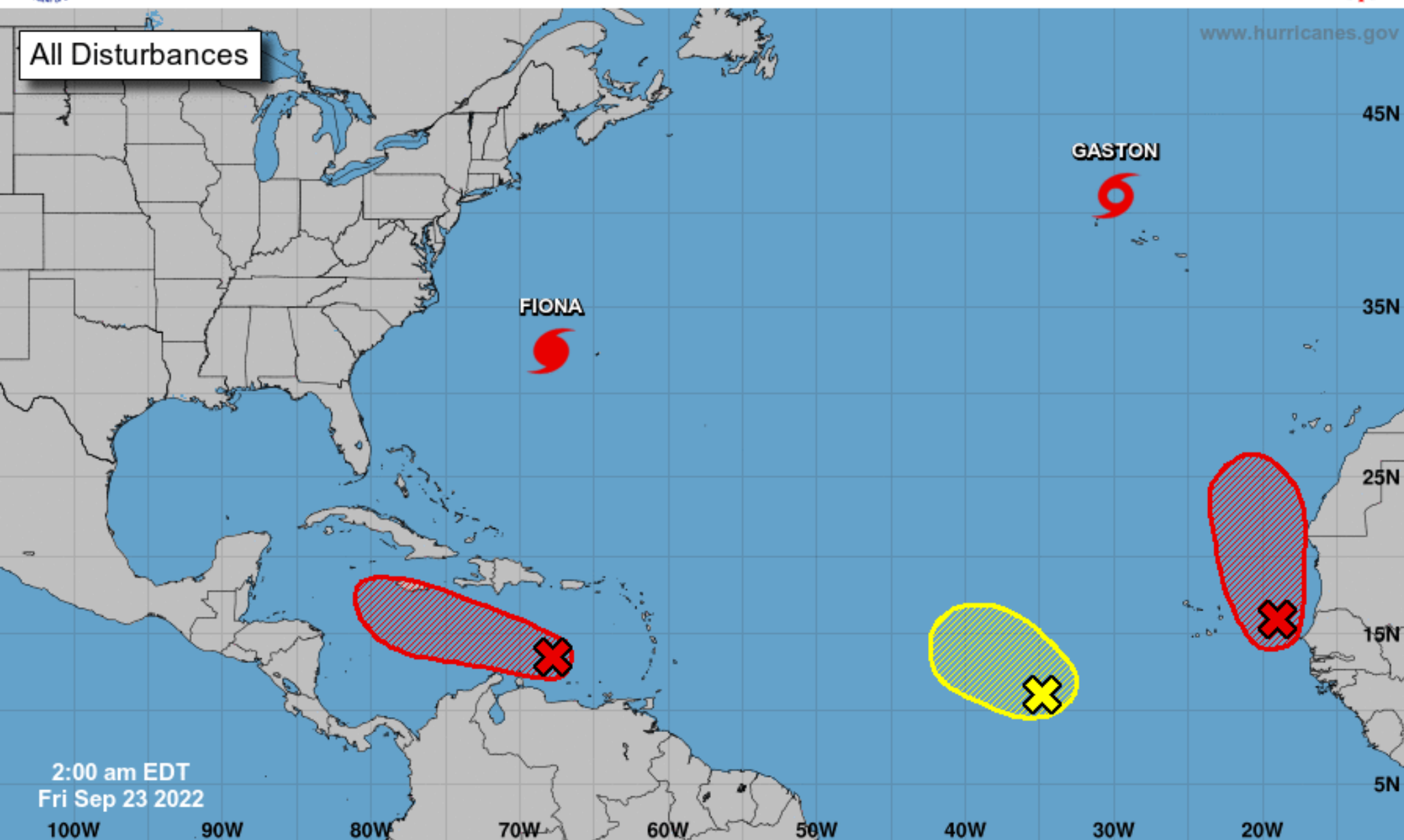
Passé juste au nord de la Guadeloupe

Contexte sur l'atlantique le 23 Sept 2022



Five-Day Graphical Tropical Weather Outlook

National Hurricane Center Miami, Florida



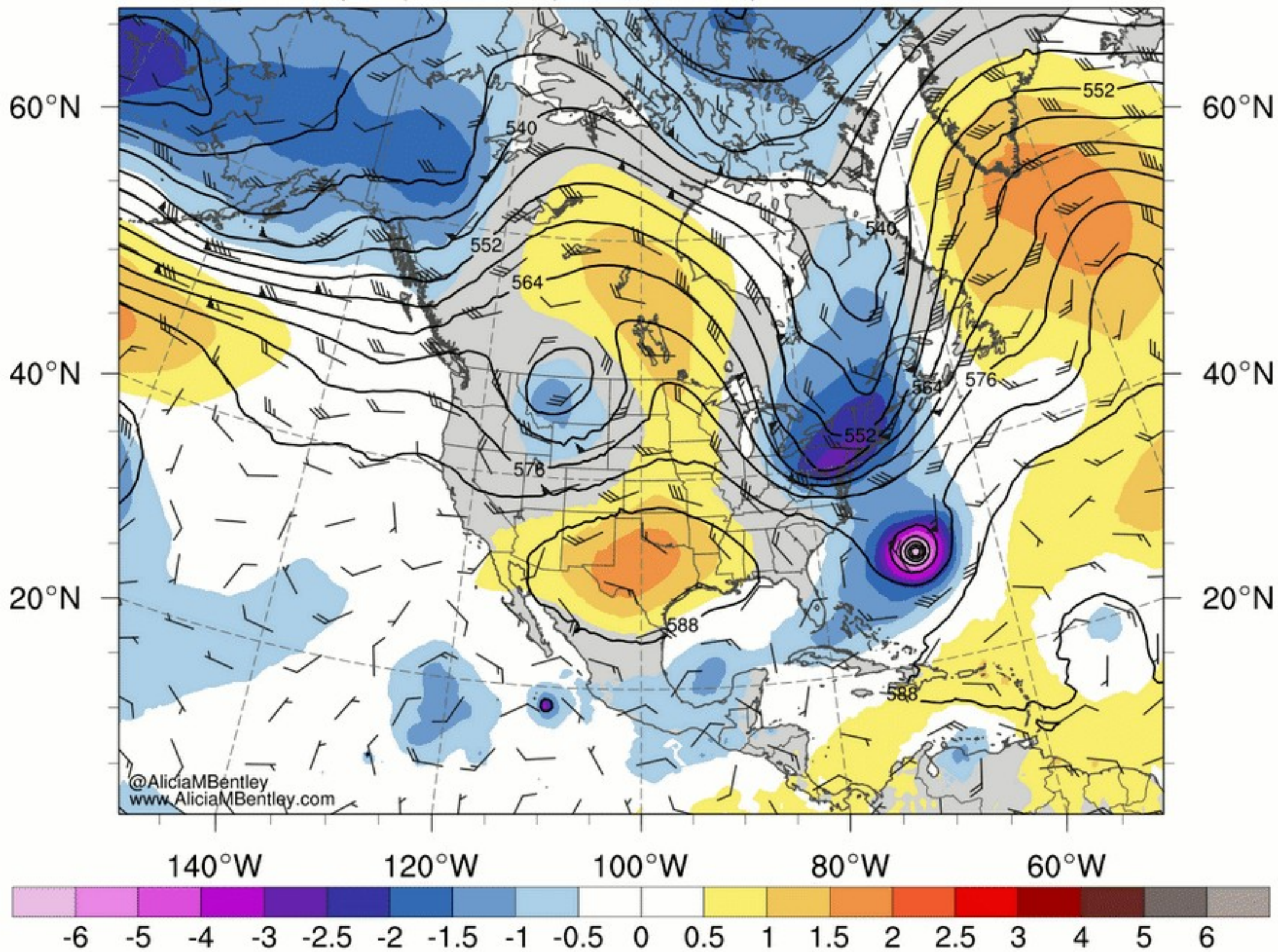
Current Disturbances and Five-Day Cyclone Formation Chance: < 40% 40-60% > 60%

Tropical or Sub-Tropical Cyclone: Depression Storm Hurricane

Post-Tropical Cyclone or Remnants

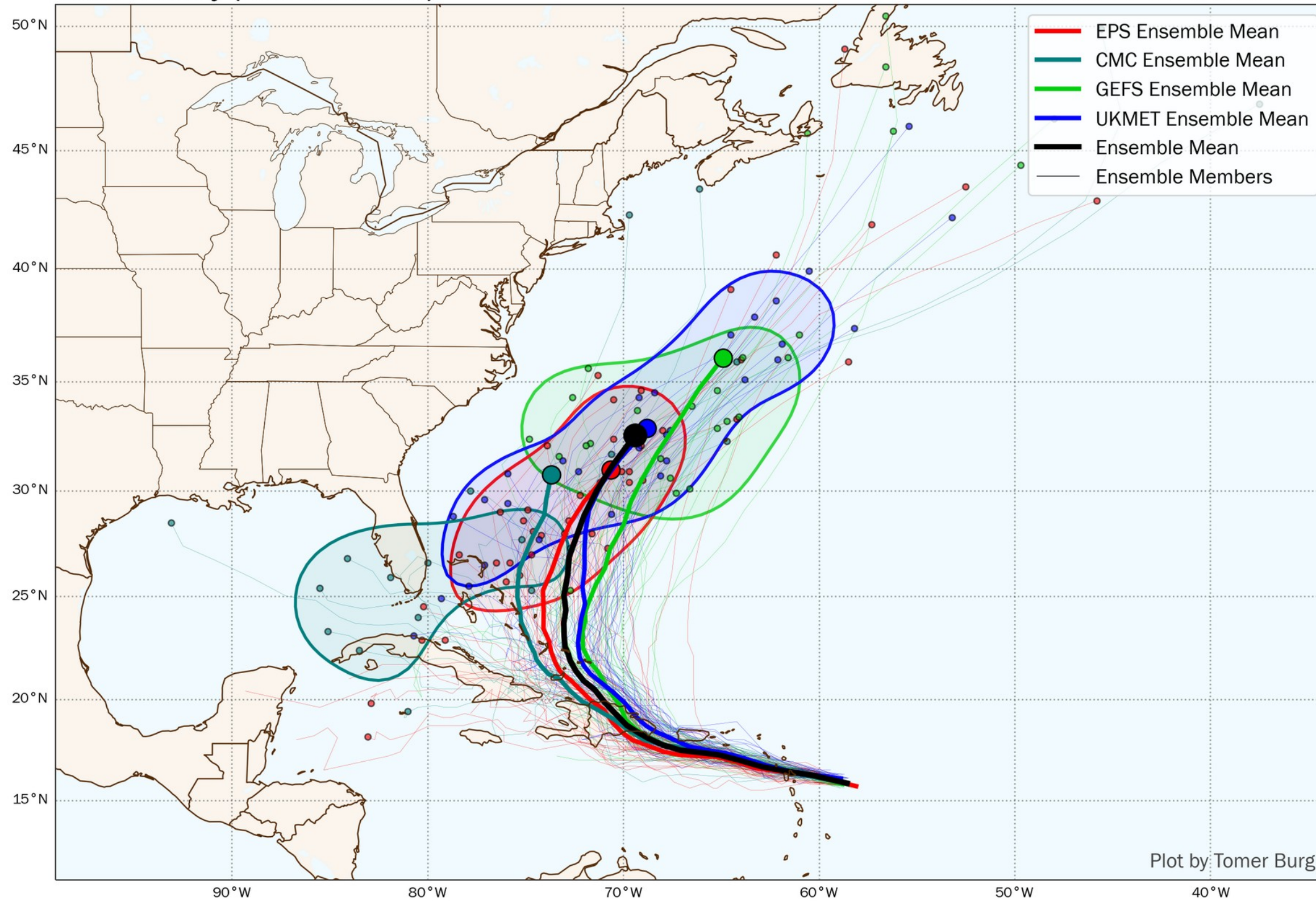
500-hPa geo. height (black, dam), wind (barbs, kt), standardized geo. height anomaly (shaded, sigma)

Initialized: 0000 UTC 23 Sep 2022 | Forecast hour: 0 | Valid: 0000 UTC 23 Sep 2022

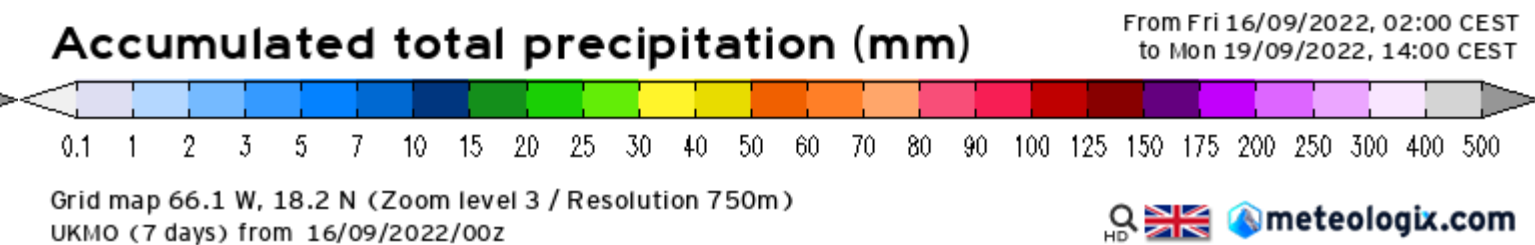
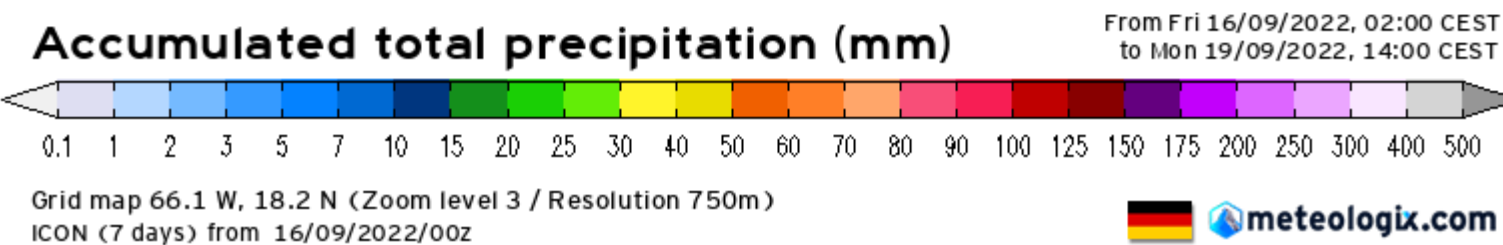
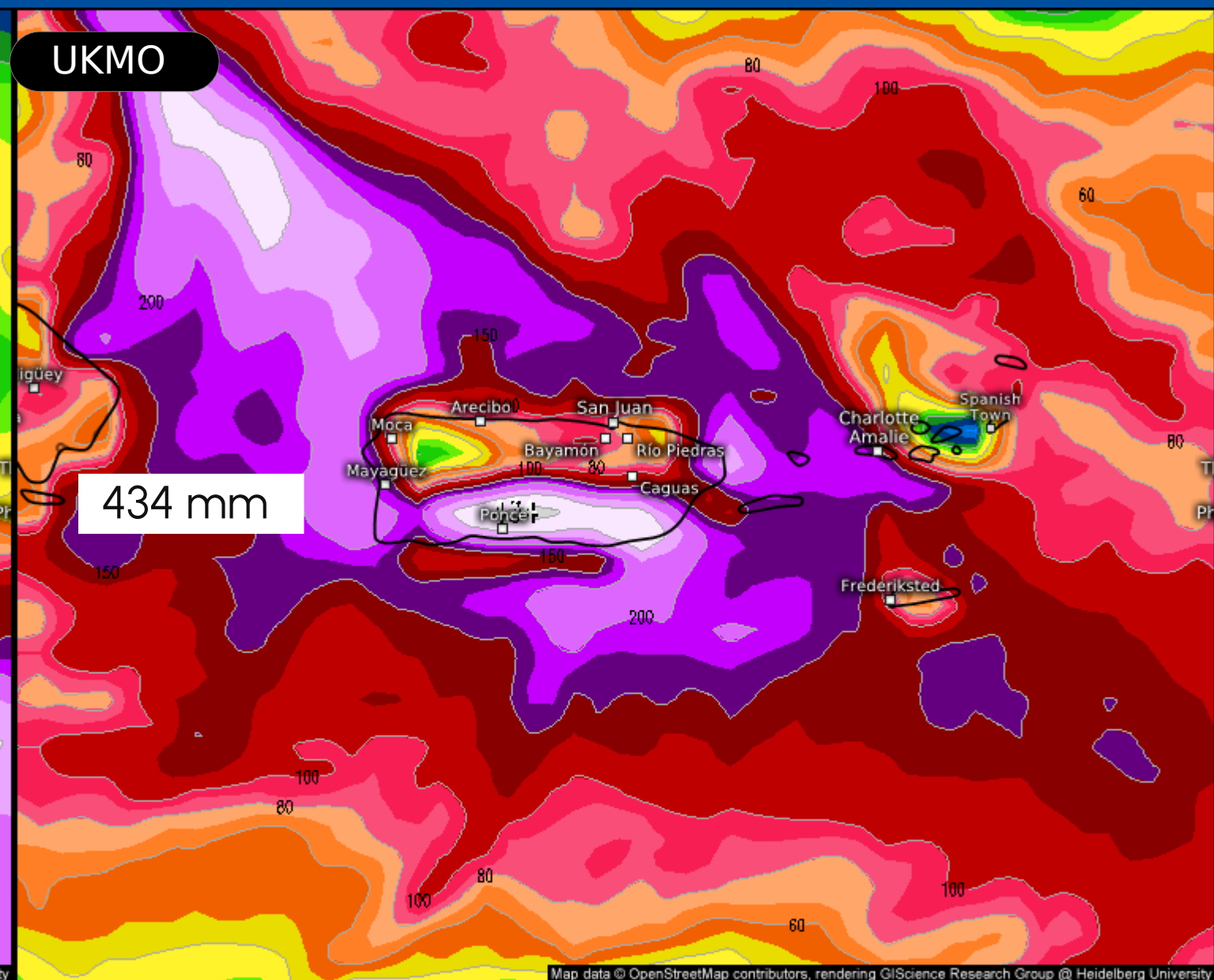
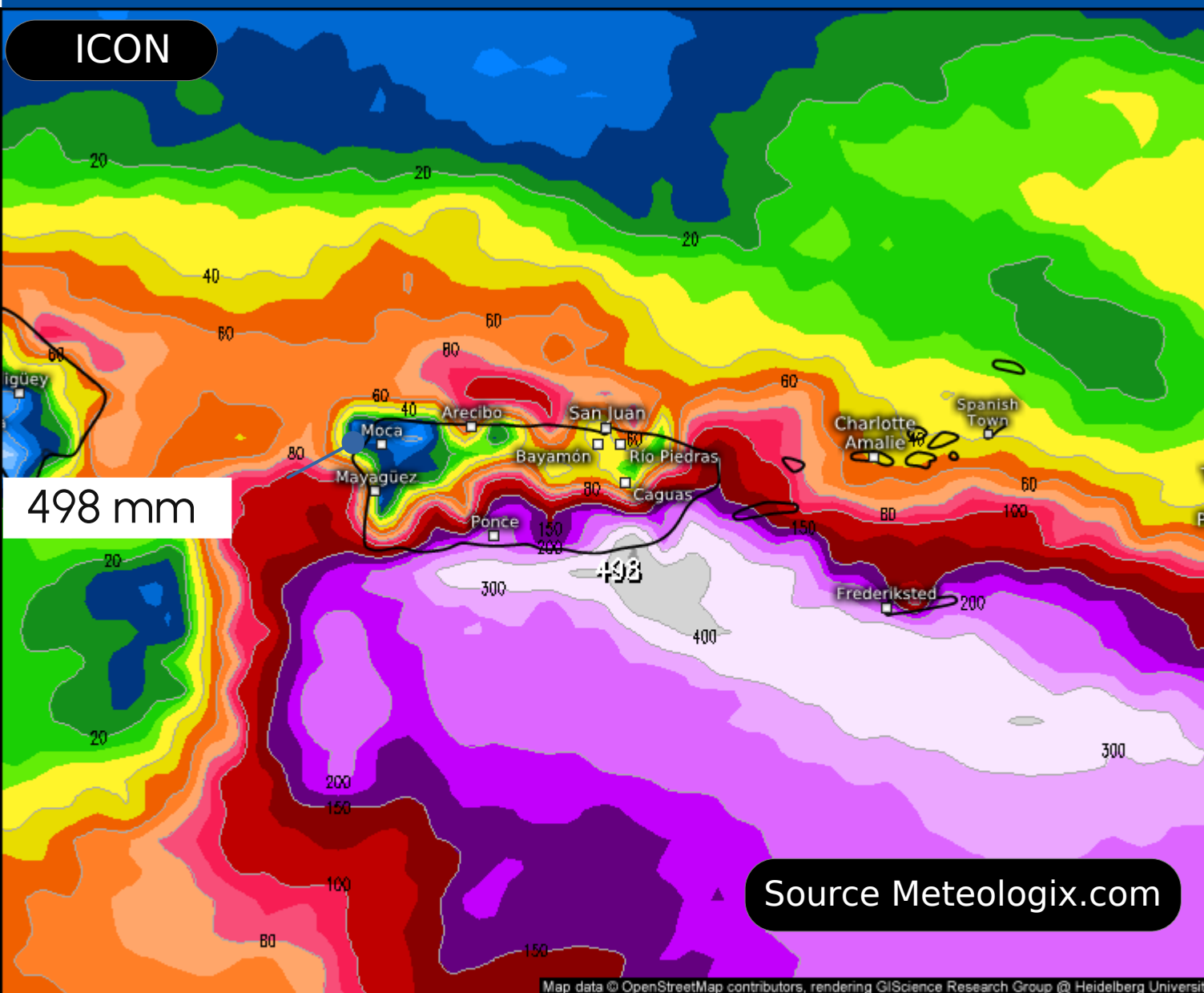


Fiona Super-ensemble (EPS + GEFS + UKMET + CMC) Track Density (350-km radius)

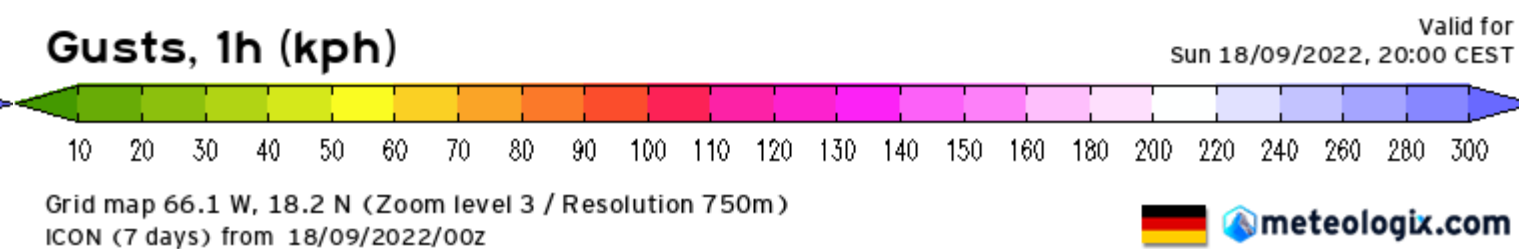
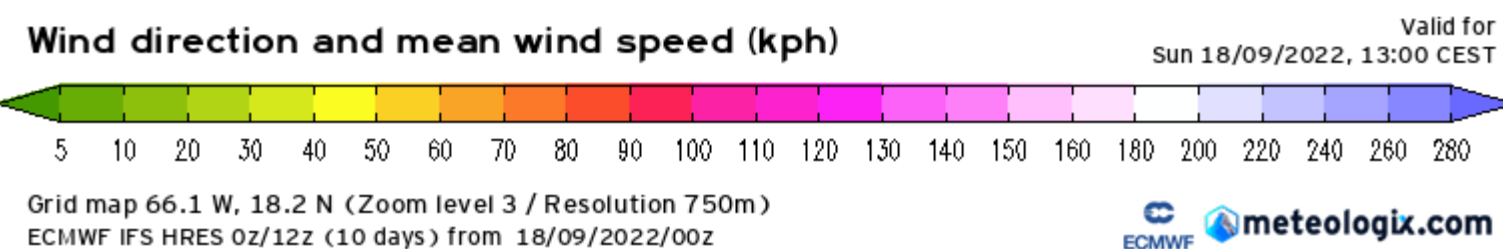
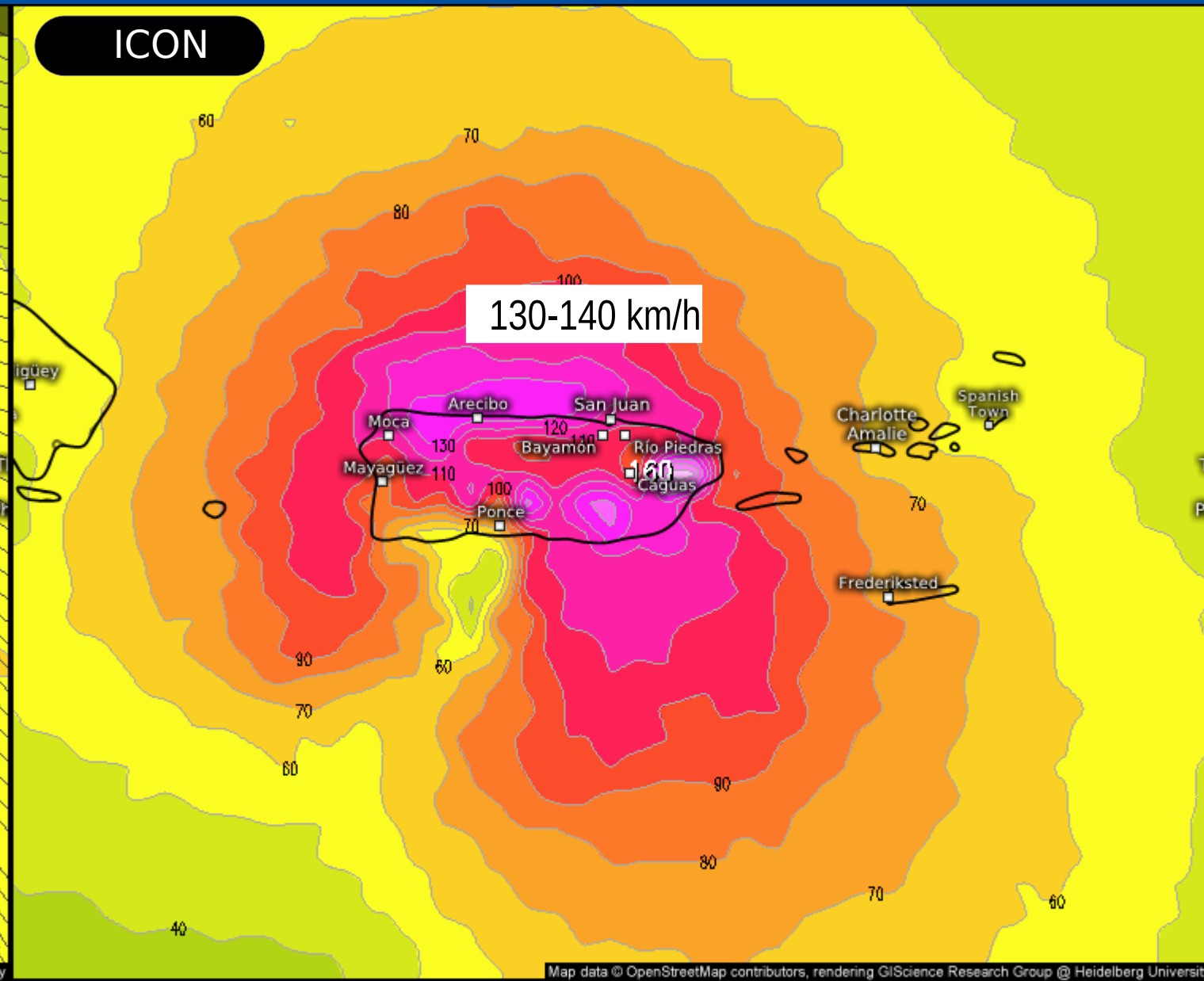
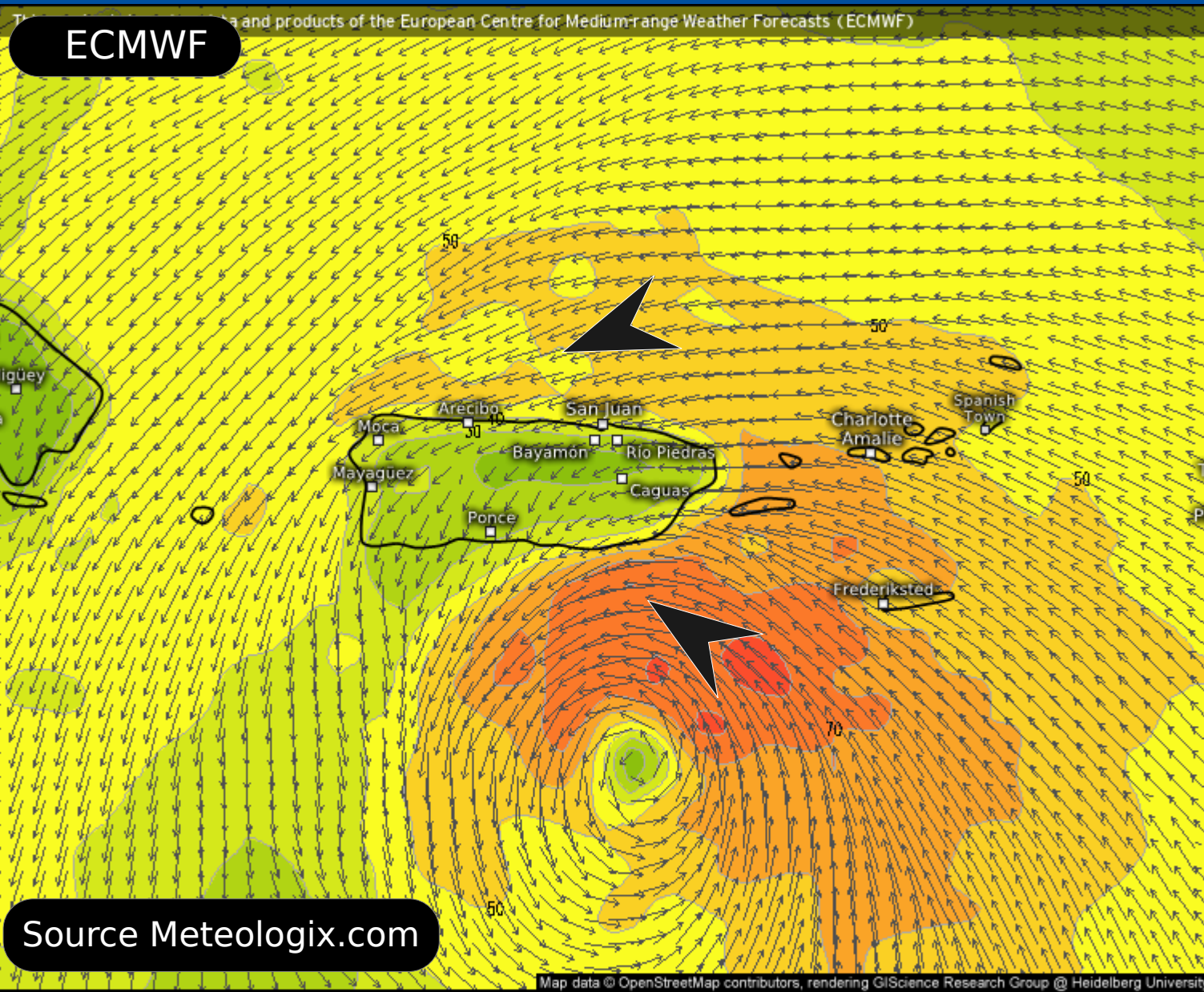
Hour 180 | Valid 0000 UTC 24 September 2022
Initialized 1200 UTC 16 September 2022



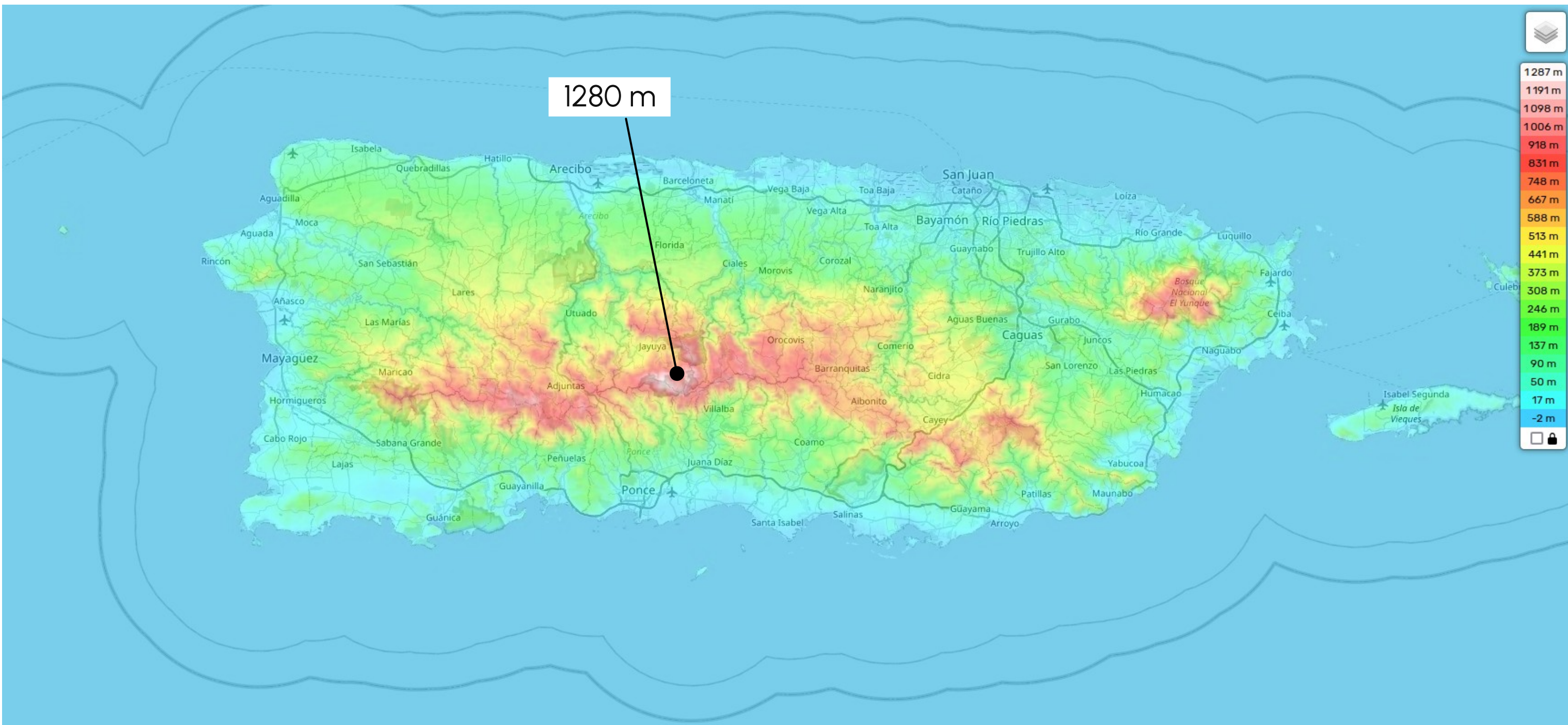
Cumul sur 60 heures



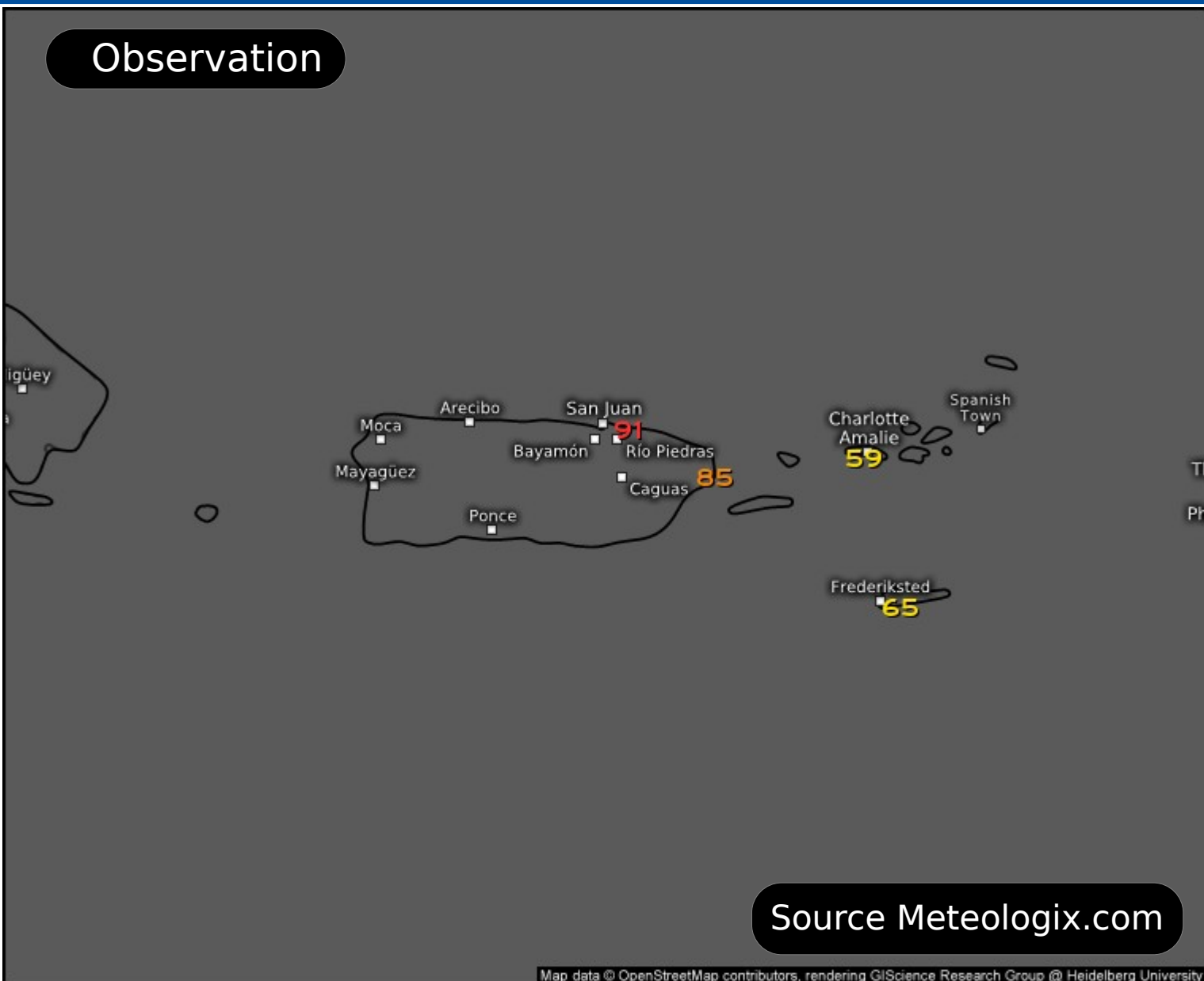
Vent moyen & Rafales – Dim 18 Sep 2022 à 12H TU et 19H TU



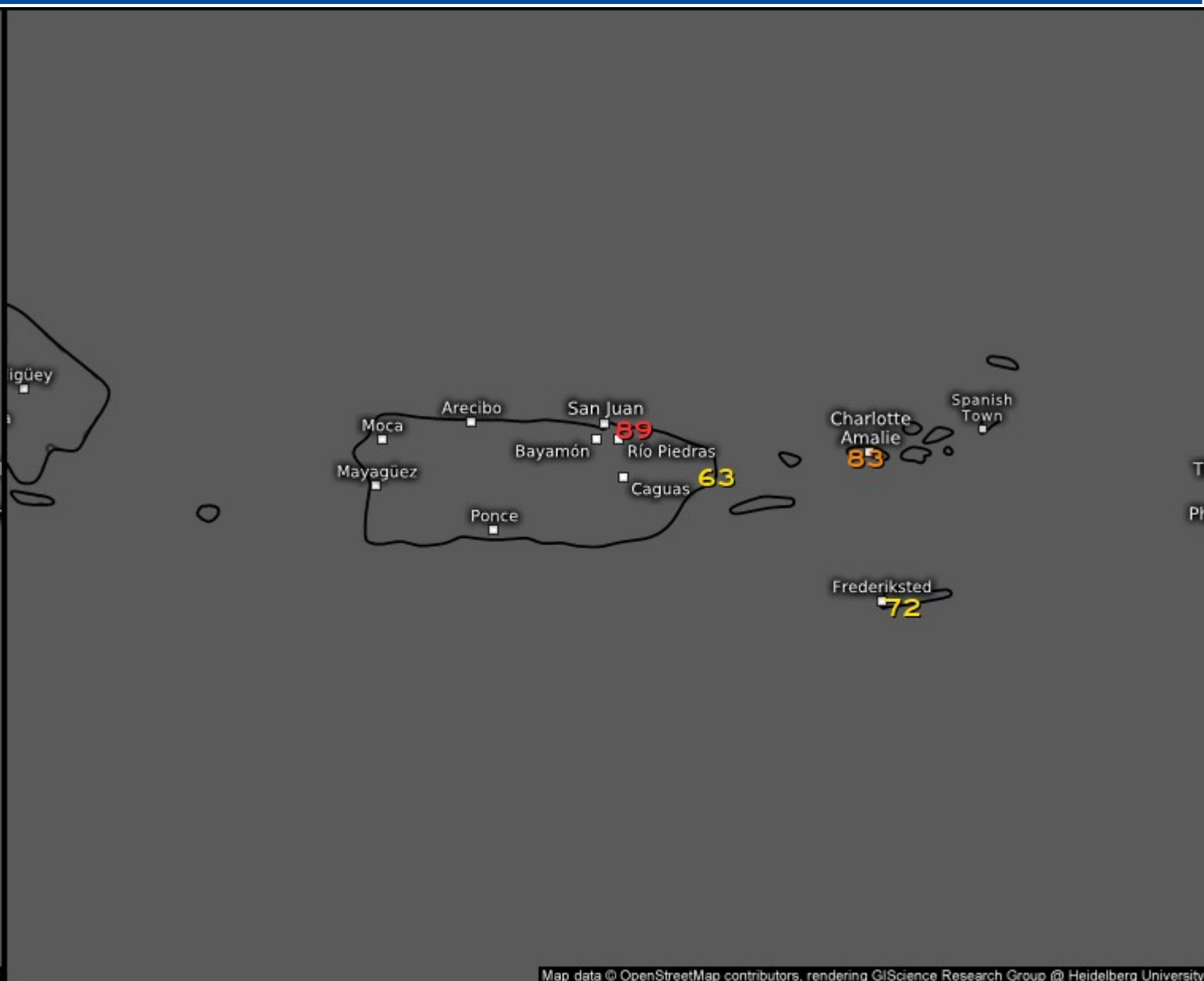
Reliefs



Observation



Source Meteologix.com



Gusts, 1h (kph)

Sun 18/09/2022, 15:00 CEST



66.1 W, 18.2 N, 4 stations within this area

Gusts, 1h (kph)

Sun 18/09/2022, 18:00 CEST

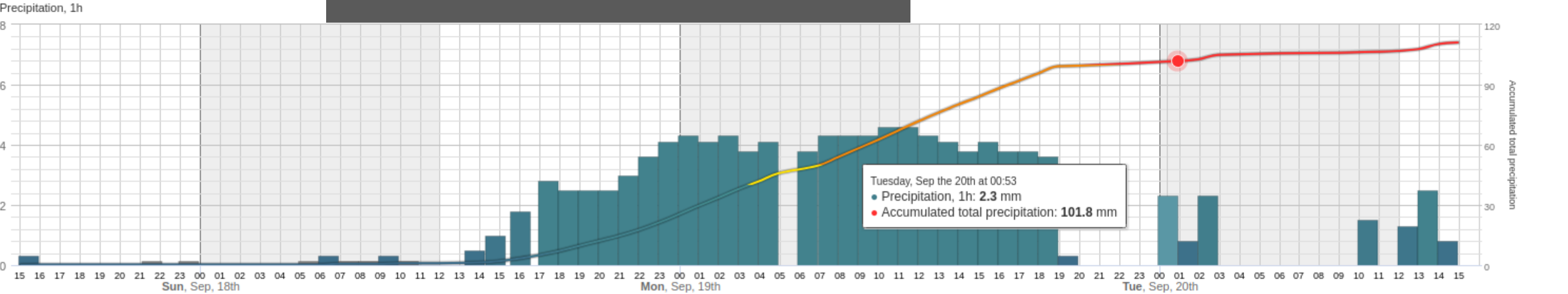


66.1 W, 18.2 N, 4 stations within this area

Roosevelt Roads (12m)



last 6 12 24 48 72 hours



Precipitation, 1h

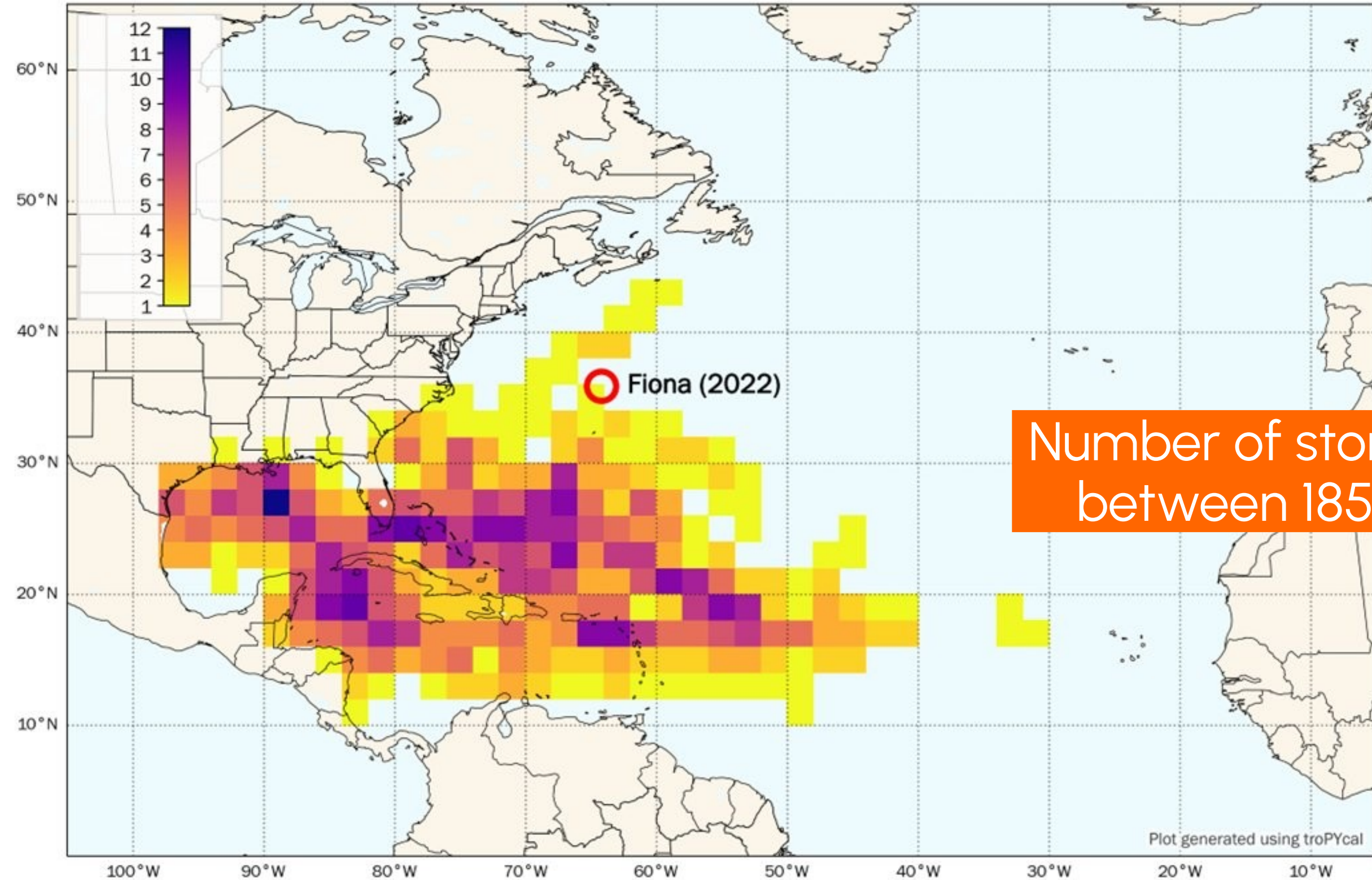
Time	Reading
20/09/2022, 14:53	0.8mm
20/09/2022, 13:53	2.5mm
20/09/2022, 12:53	1.3mm
20/09/2022, 10:53	1.5mm
20/09/2022, 02:53	2.3mm

2.1 – Hurricane FIONA

Contexte statistique

Number of storms
 $\geq 115\text{kt}$

Jan 01 – Dec 31 • 1851 – 2022

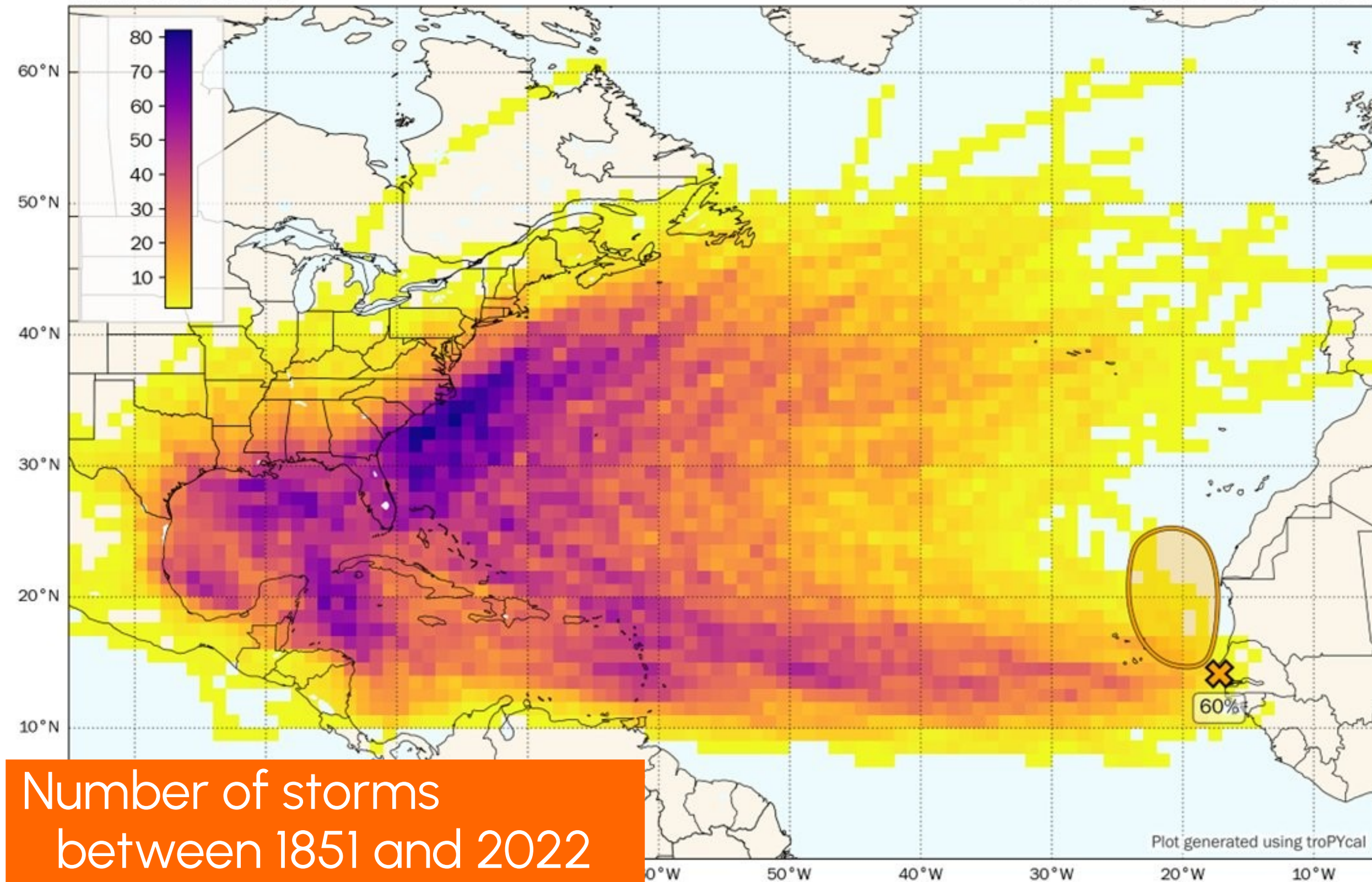


Number of storms ($\geq 115\text{ kt}$)
between 1851 and 2022

Plot generated using troPYcal

Number of storms

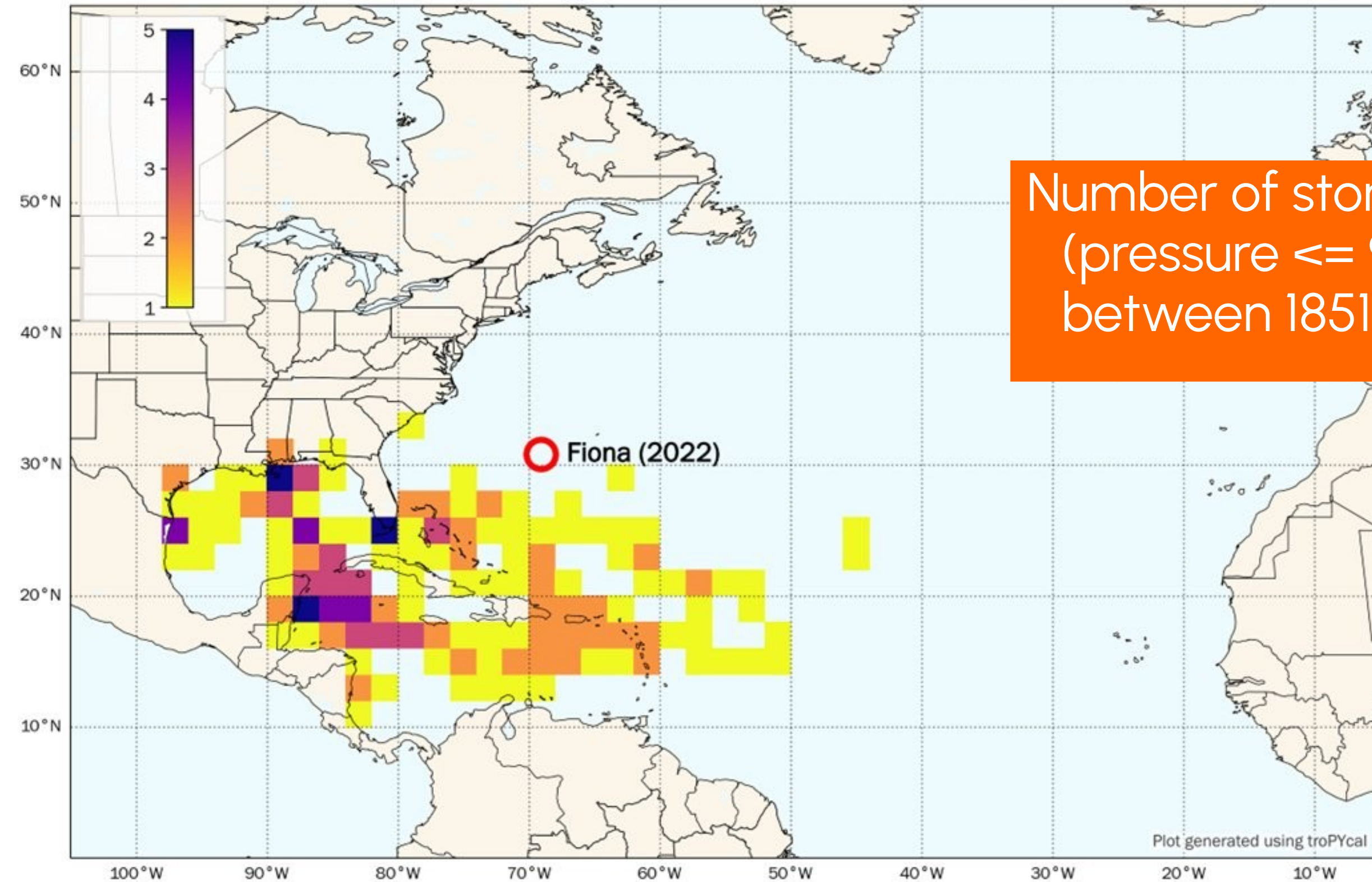
Jan 01 - Dec 31 • 1851 - 2022



Number of storms
between 1851 and 2022

Number of storms
 $\leq 932\text{hPa}$

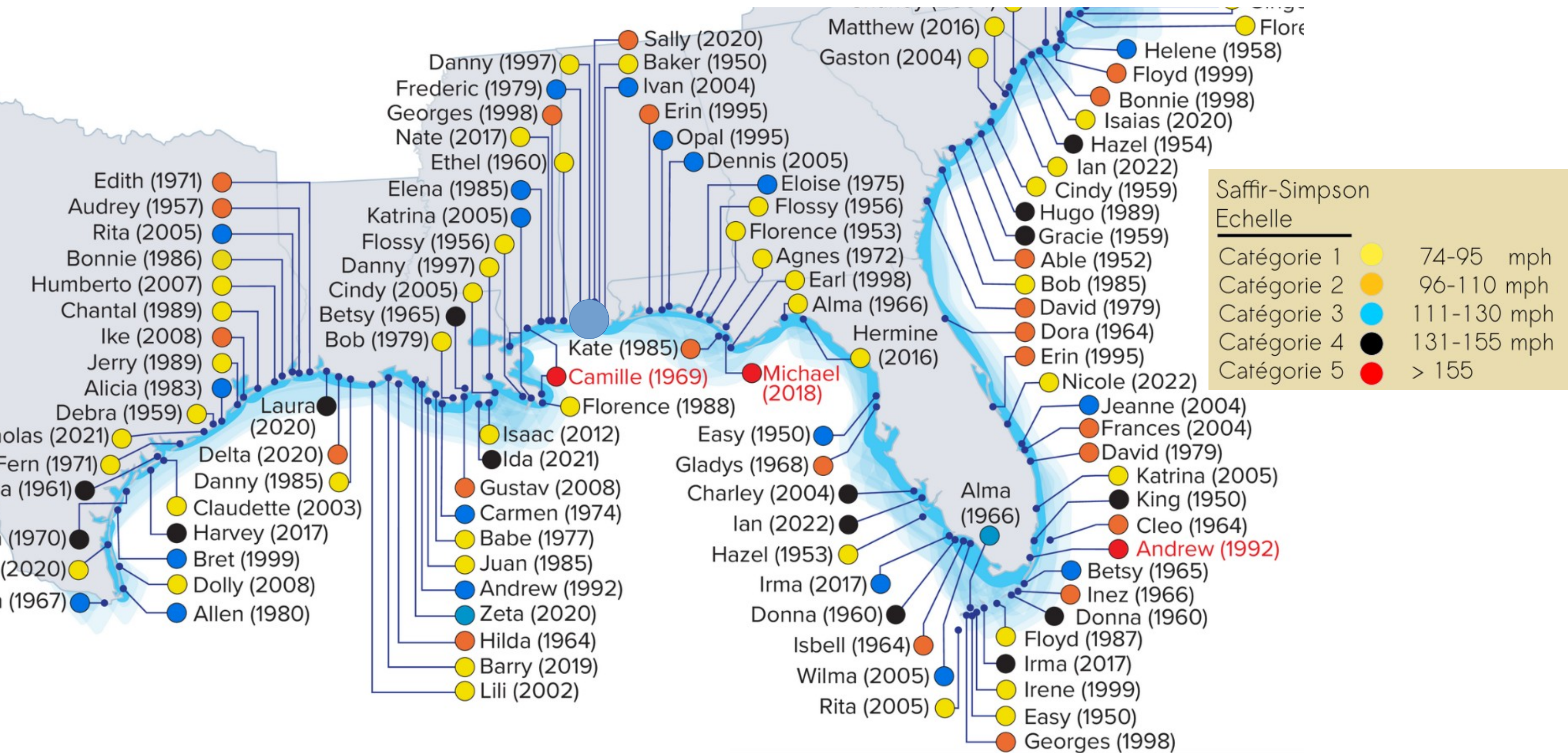
Jan 01 – Dec 31 • 1851 – 2022



Number of storms
(pressure $\leq 932\text{ hPa}$)
between 1851 and 2022

Plot generated using troPYcal

U.S Hurricane Landfall locations (1950-2021)



3 – Hurricane IAN

23-30 Septembre 2022

- **Caractéristiques**

2 ieme cyclone tropical majeur de la saison 2022 après Fiona (C4)

Catégorie 5

Vent max 260 km/h

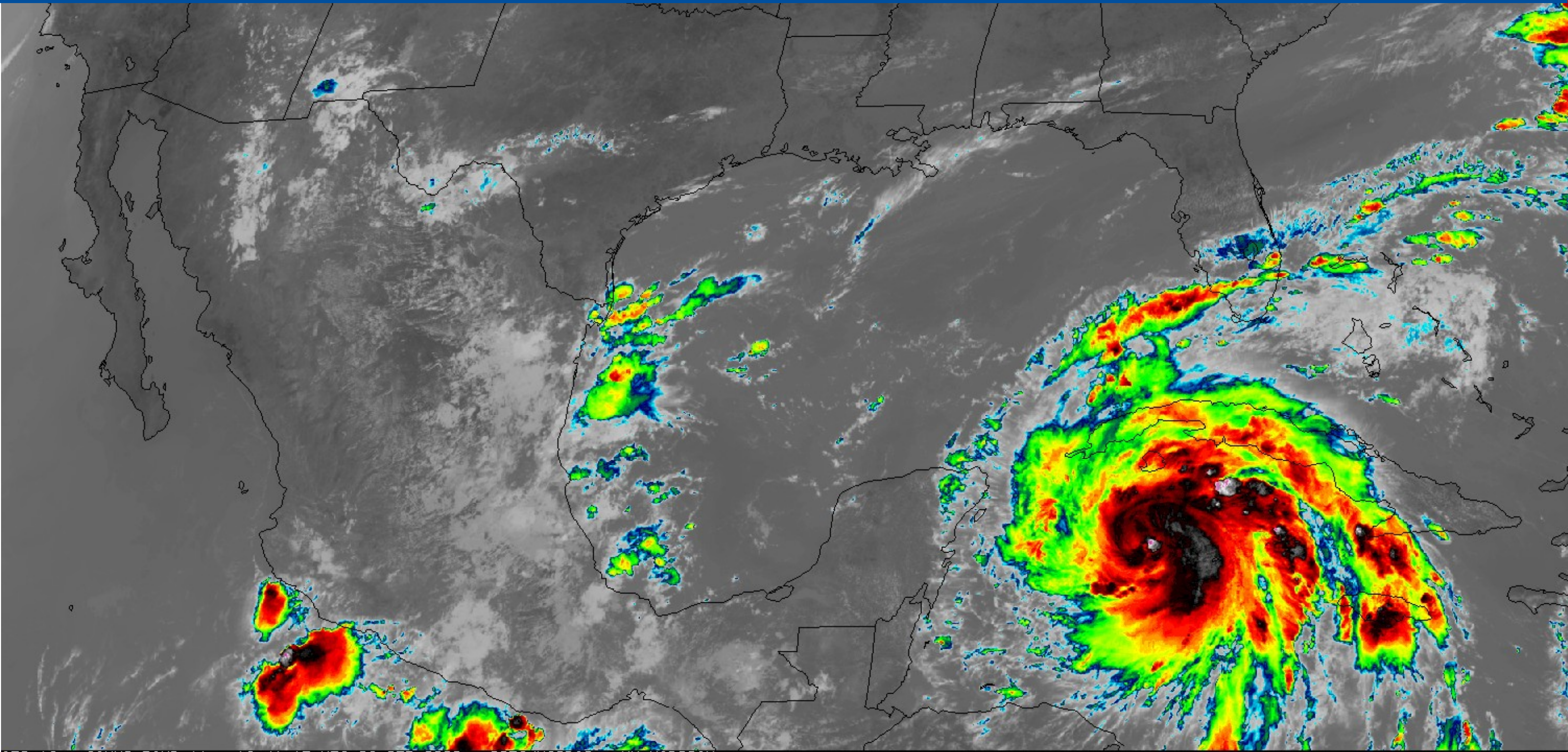
Pression minimale 937 hPa

A propos de sa trajectoire

Atterrissage dans le sud ouest de la Floride avec une onde de tempête très importante équivalent à IRMA

5 ième rang des ouragans les plus puissants à toucher les U.S.

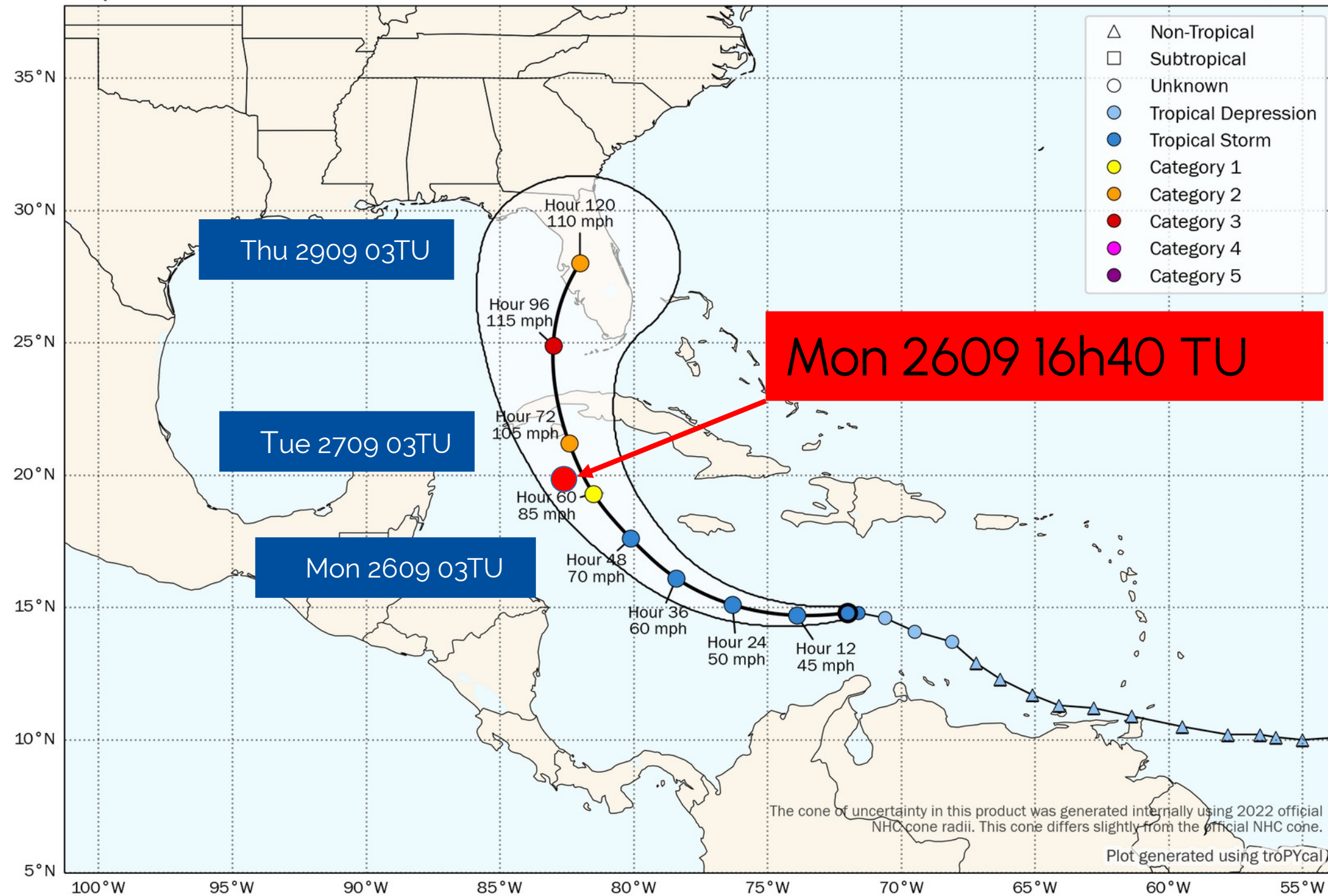
IAN Monday 26 Sept 2022 at 16h40 UTC - GOES16



Forecast + 60H Sat 24 Sep 2022

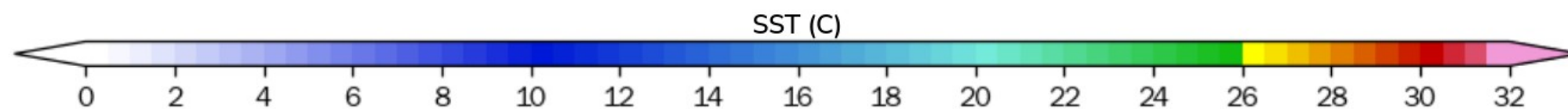
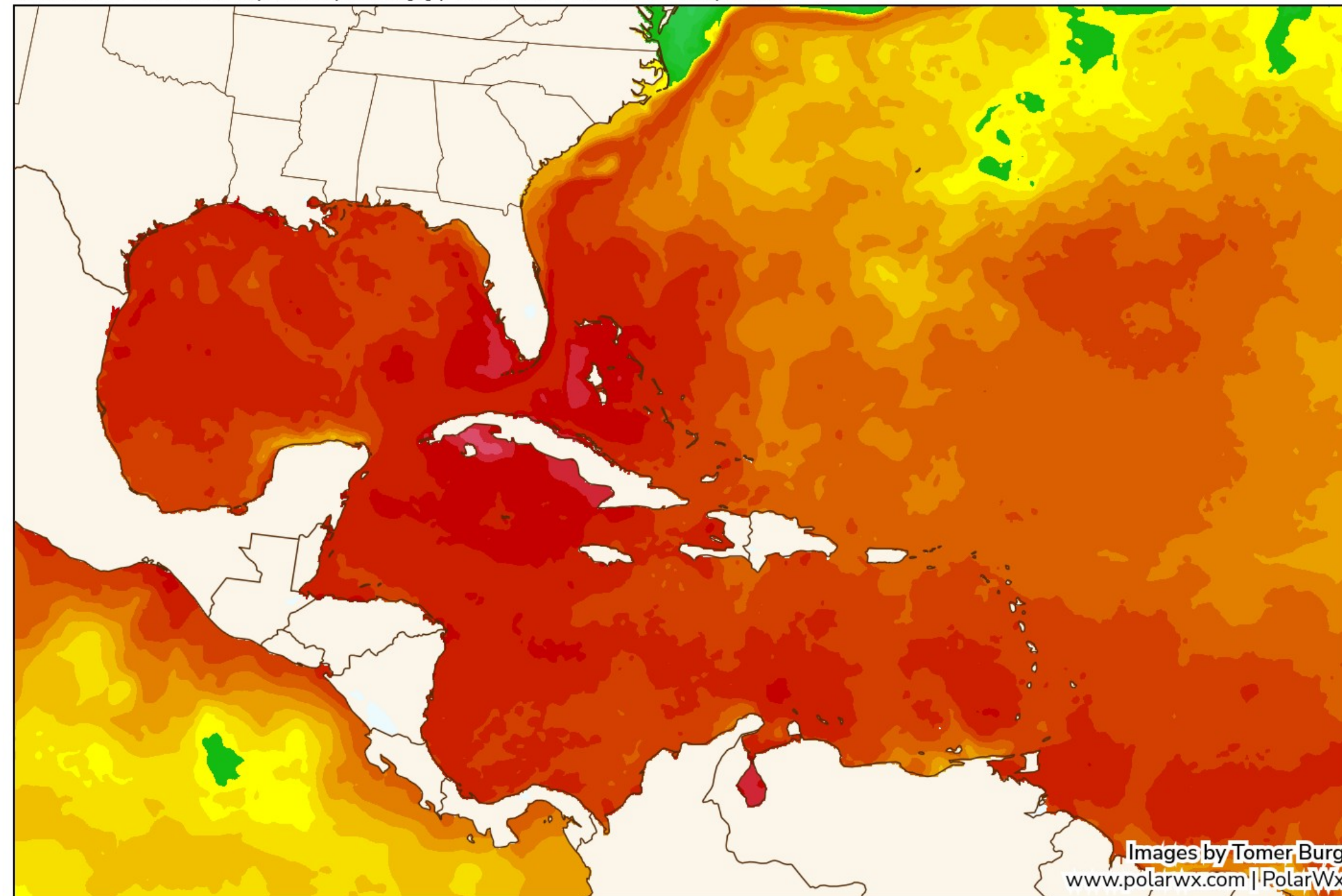
Tropical Storm IAN

Current Intensity: 40 mph • 1005 hPa
NHC Issued: 0300 UTC 24 Sep 2022



0.25° GFS • NOAA Coral Reef Watch | Sea Surface Temperature (°C)

Init: 0000 UTC Sat 24 Sep 2022 | Hour: [0] | Valid: 0000 UTC Sat 24 Sep 2022



Somewhere in between the two scenarios

Let's take a deeper look into the forecast track uncertainty with Tropical Depression

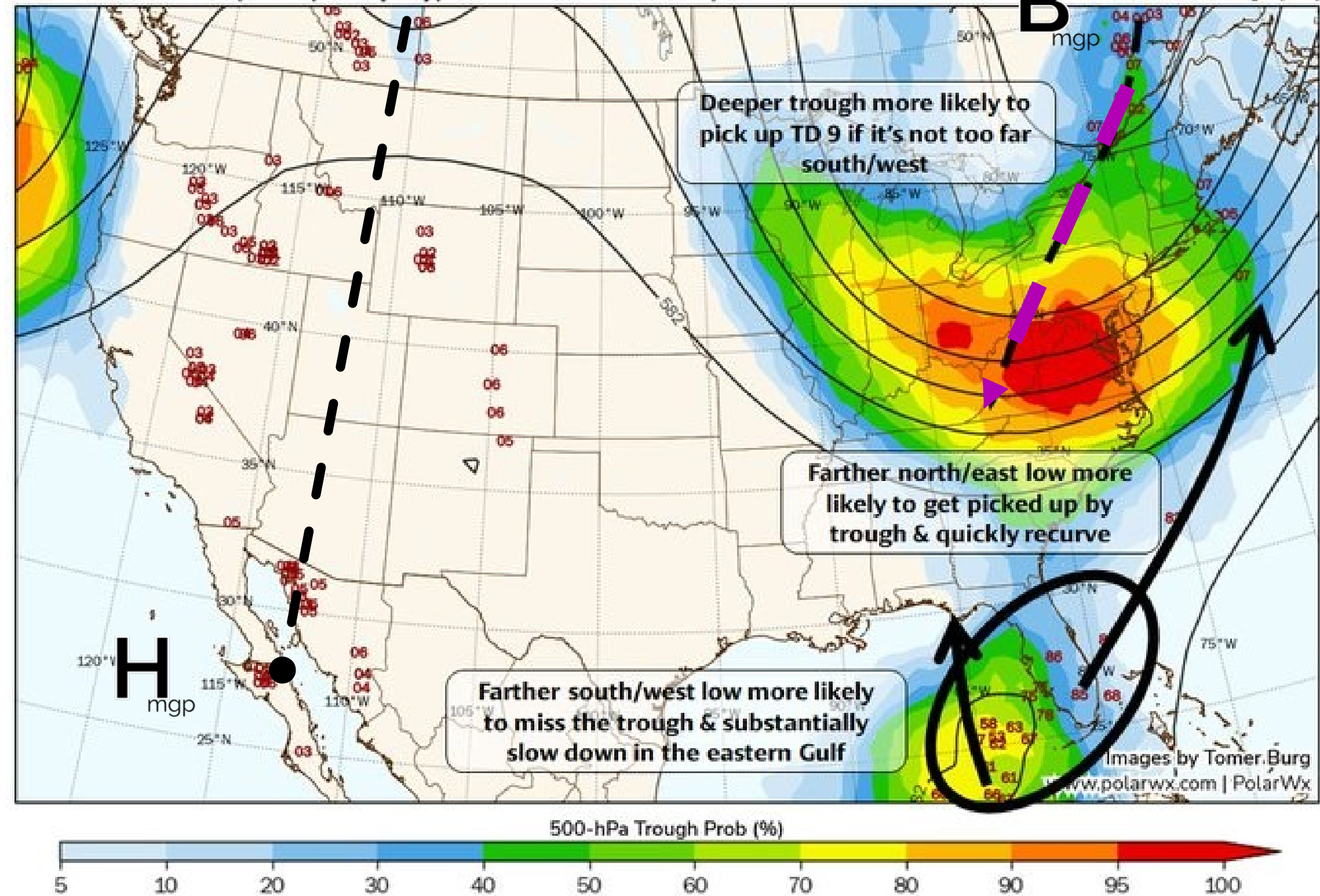
- Deterministic ECMWF
- Deterministic GFS
- Deterministic UKMET
- Ensemble Mean
- Ensemble Members
- Ensemble Ellipse

1 - Quickly recurves & tracks up East Coast

2- Slows down in eastern Gulf

The majority of ensemble members can be generally split into 2 scenarios:

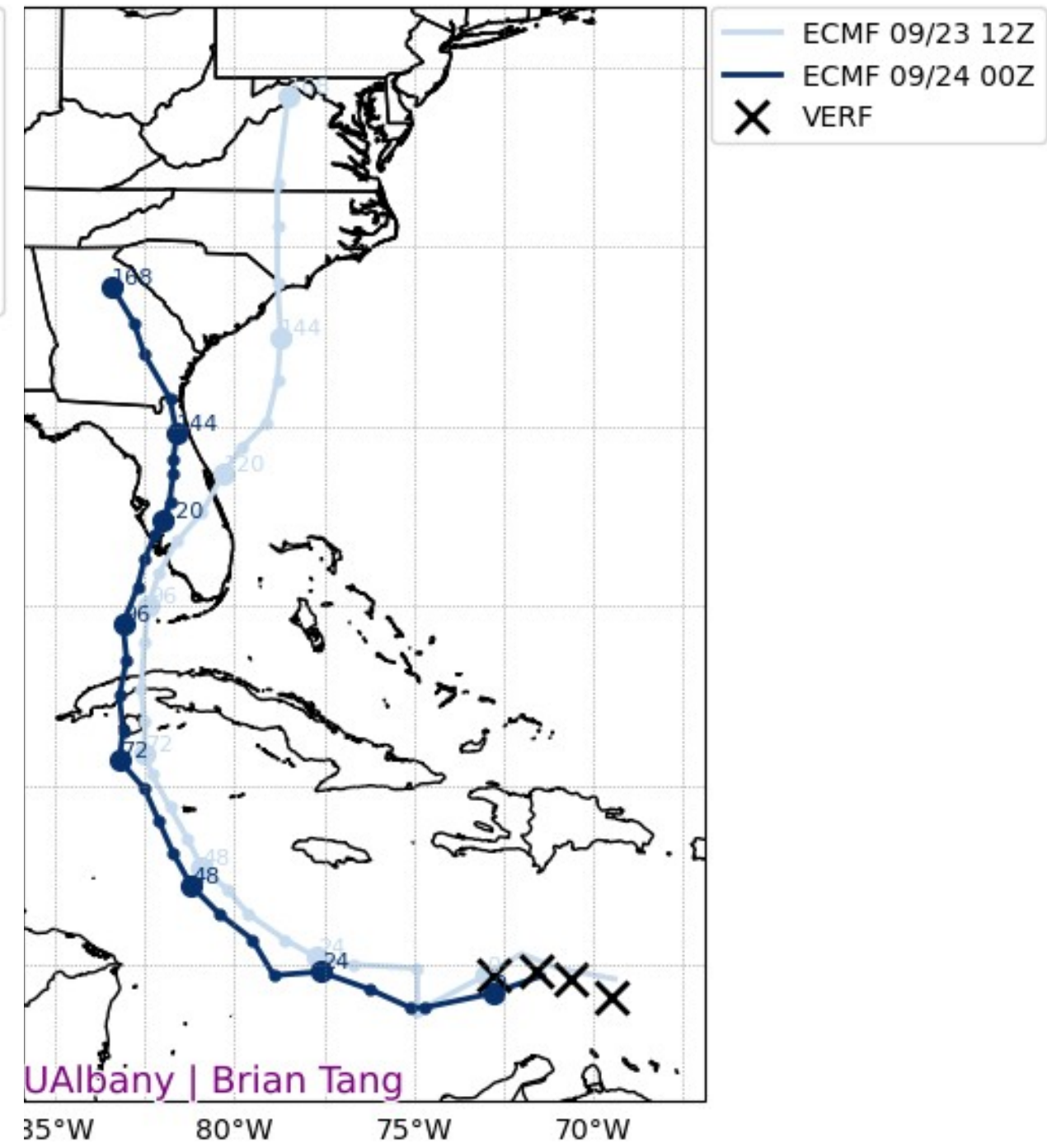
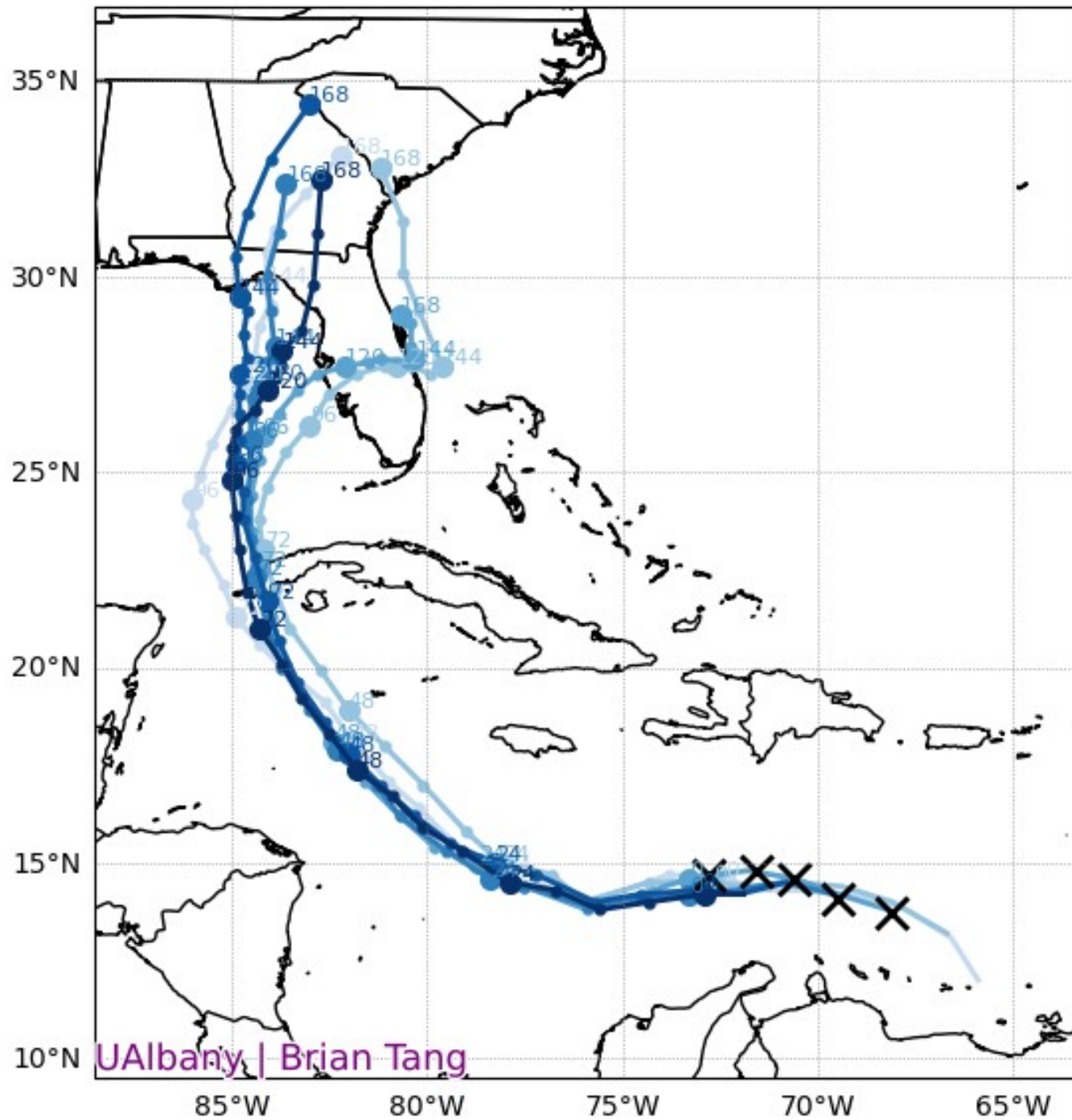
0.25° GEFS • 500-hPa Trough Axis Probability (%)
Init: 1200 UTC Fri 23 Sep 2022 | Hour: [108] | Valid: 0000 UTC Wed 28 Sep 2022



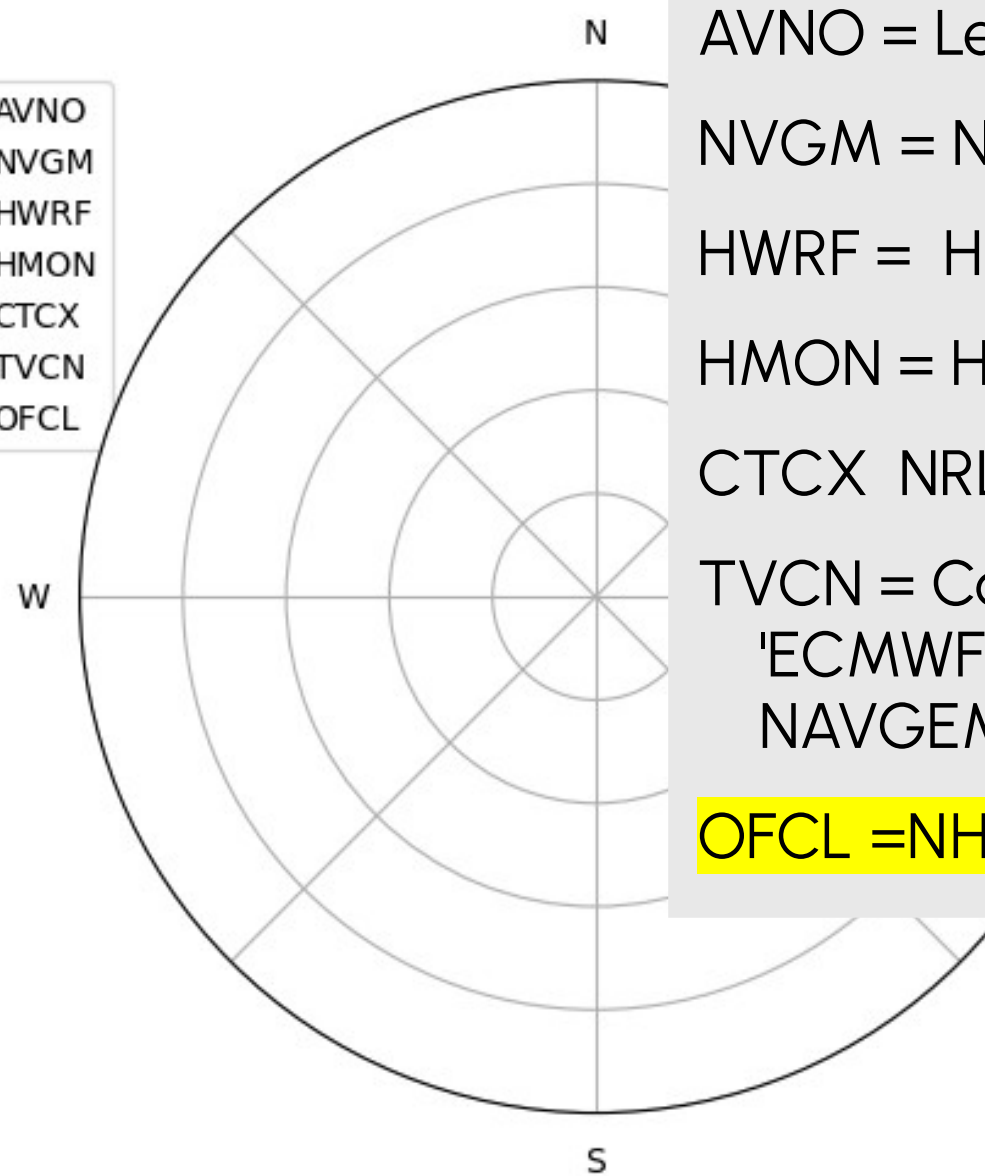
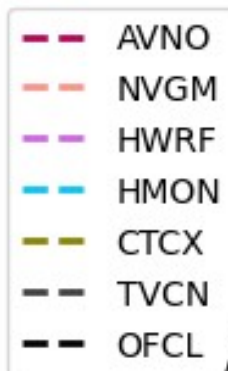
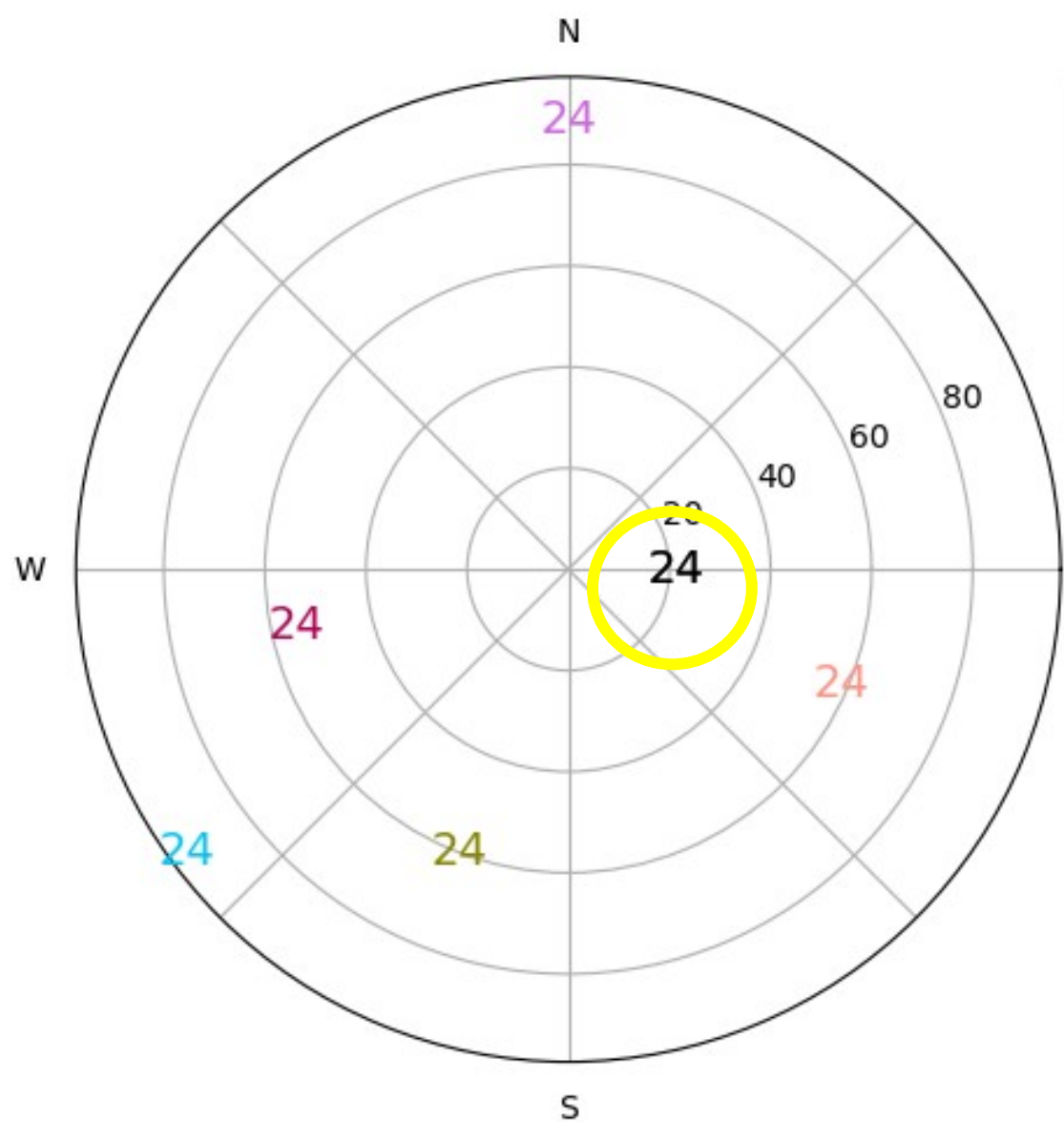
Why is the longitude at which IAN arrives in the Gulf important ?

IAN is more likely to be picked up by a deep NE US trough

While a more south/west TD 9 is more likely to miss the trough.



Model Ensemble - Verification Bias



AVNO = Legacy GFS Model

NVGM = NGAPS Model

HWRF = HWRF Model

HMON = HMON Model

CTCX = NRL COAMPS-TC model

TVCN = Consensus of ≥ 2 :
'ECMWF, HWRF, HMON, UKMET,
NAVGEM, GFS.

OFCL = NHC official forecast

UAlbany
Brian Tang

Model Ensemble Verification Bias +48 to +72 H

AVNO = Legacy GFS Model

NVGM = NGAPS Model

HWRF = HWRF Model

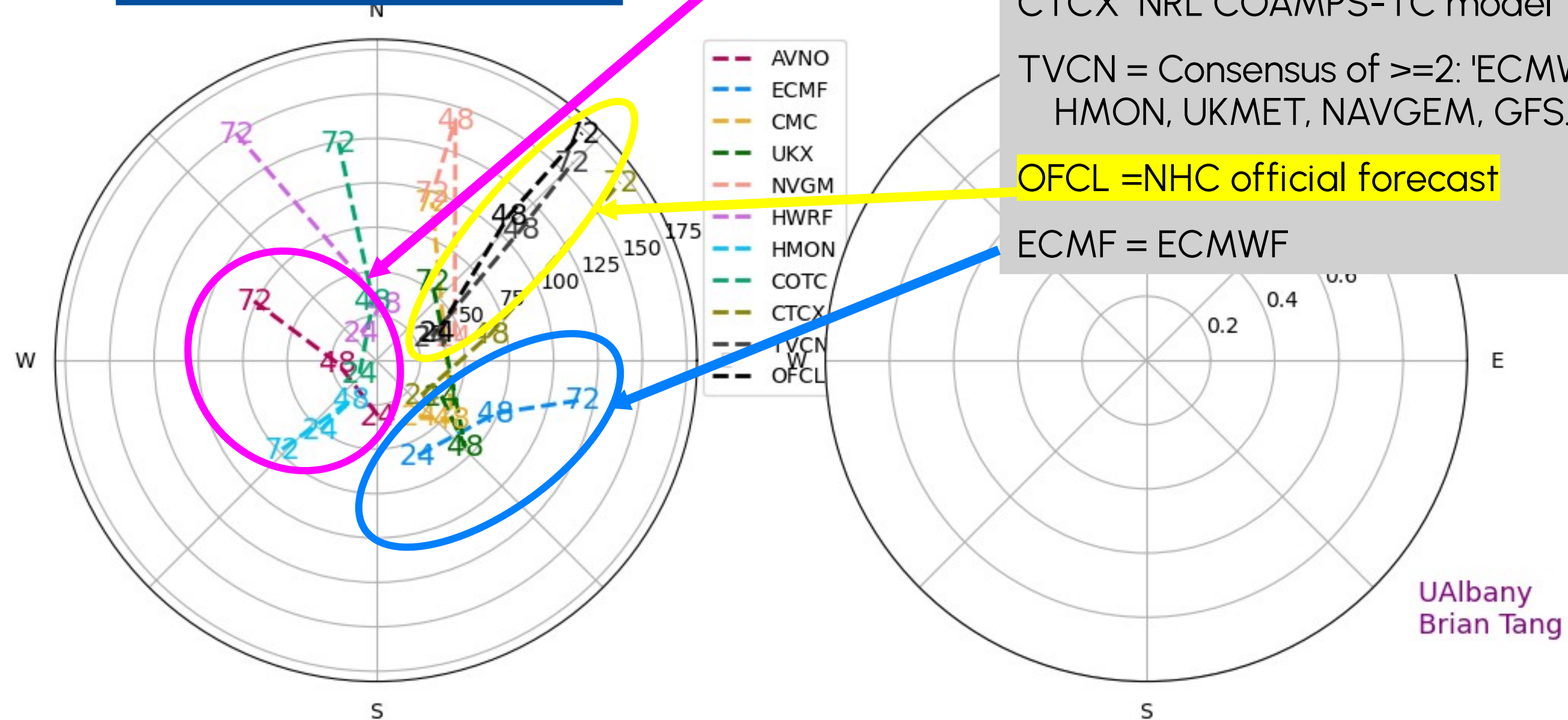
HMON = HMON Model

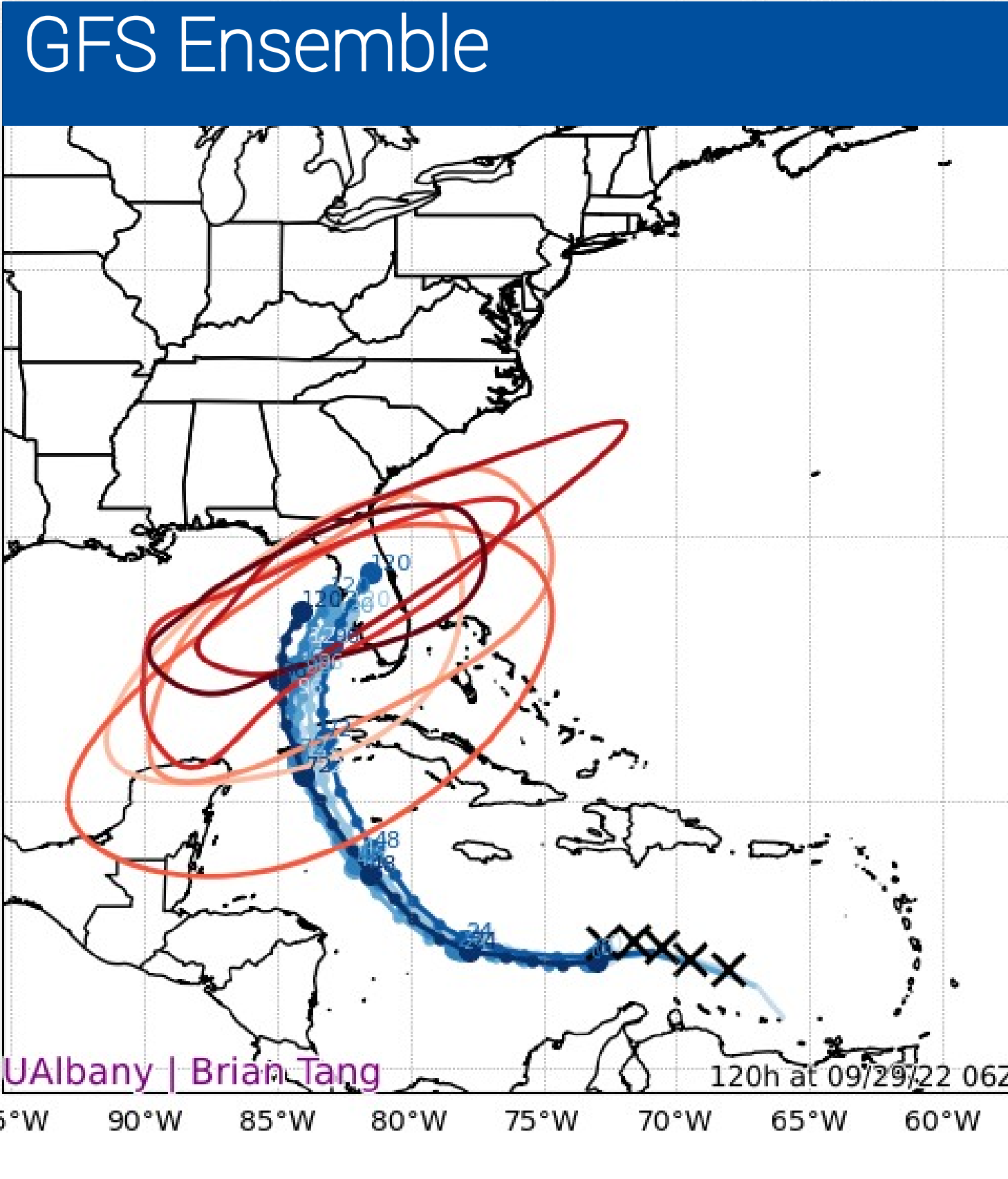
CTCX = NRL COAMPS-TC model

TVCN = Consensus of ≥ 2 : 'ECMWF, HWRF, HMON, UKMET, NAVGEM, GFS.

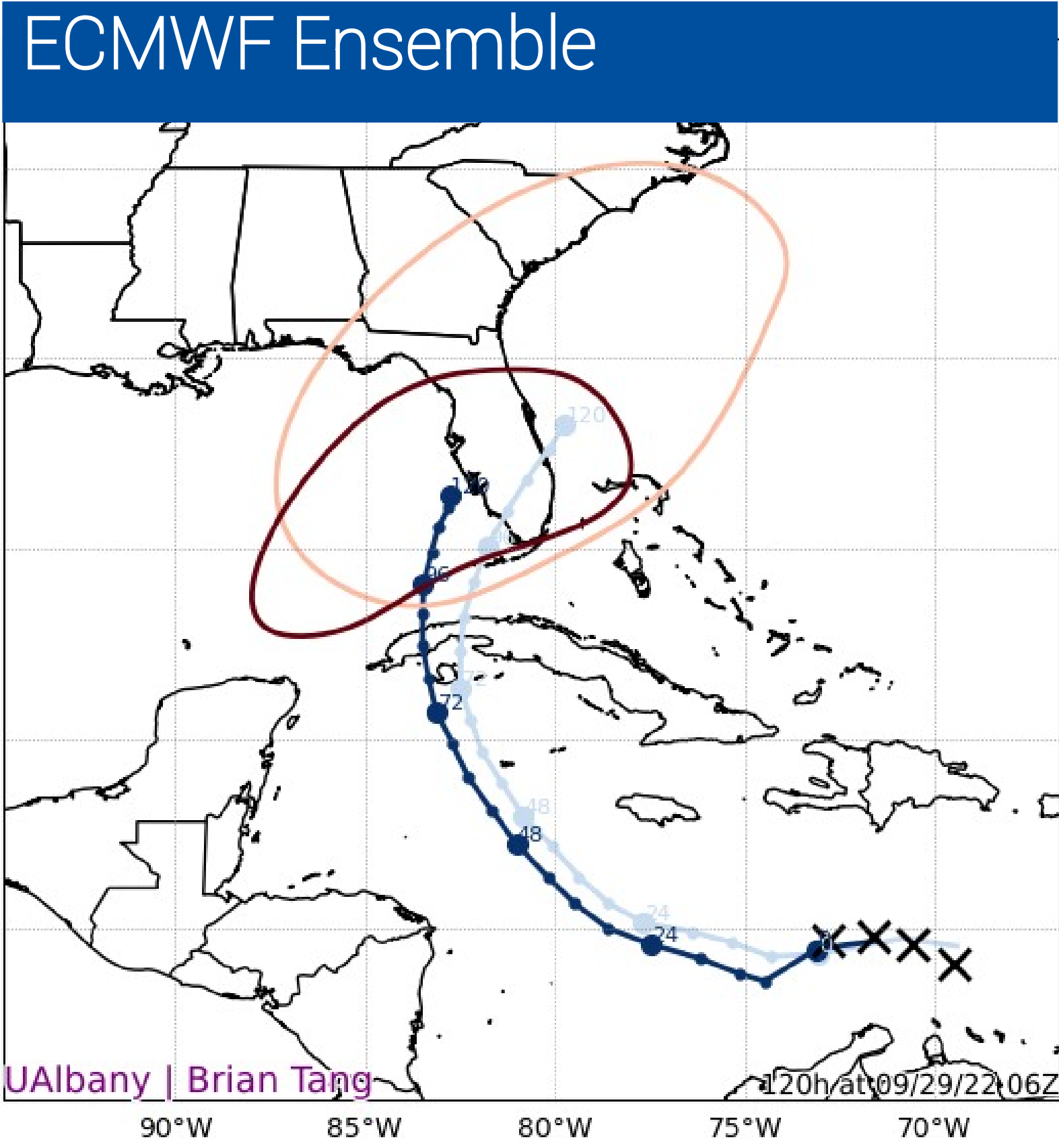
OFCL = NHC official forecast

ECMF = ECMWF



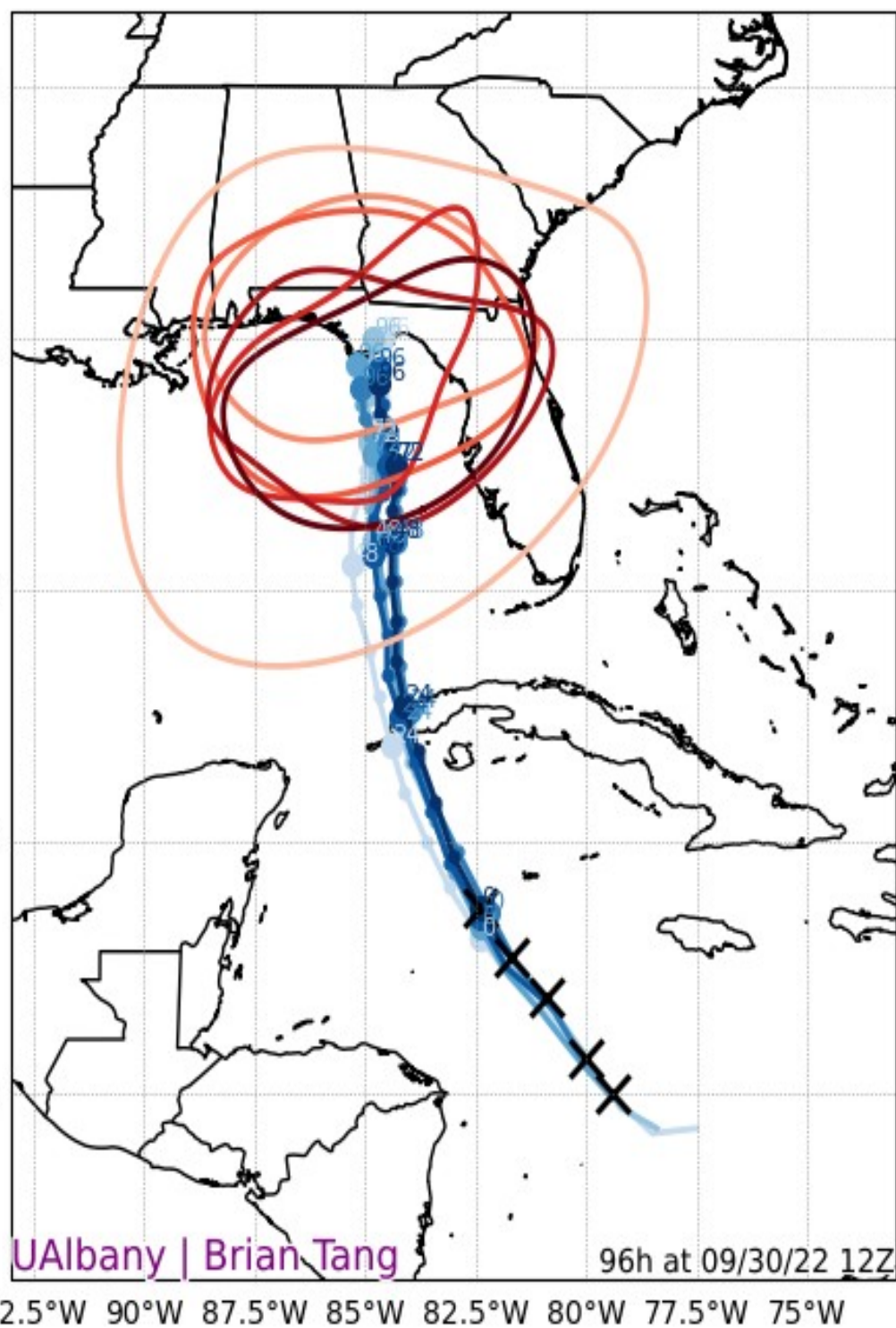


- AEMN 09/22 18Z
- AEMN 09/23 00Z
- AEMN 09/23 06Z
- AEMN 09/23 12Z
- AEMN 09/23 18Z
- AEMN 09/24 00Z
- VERF

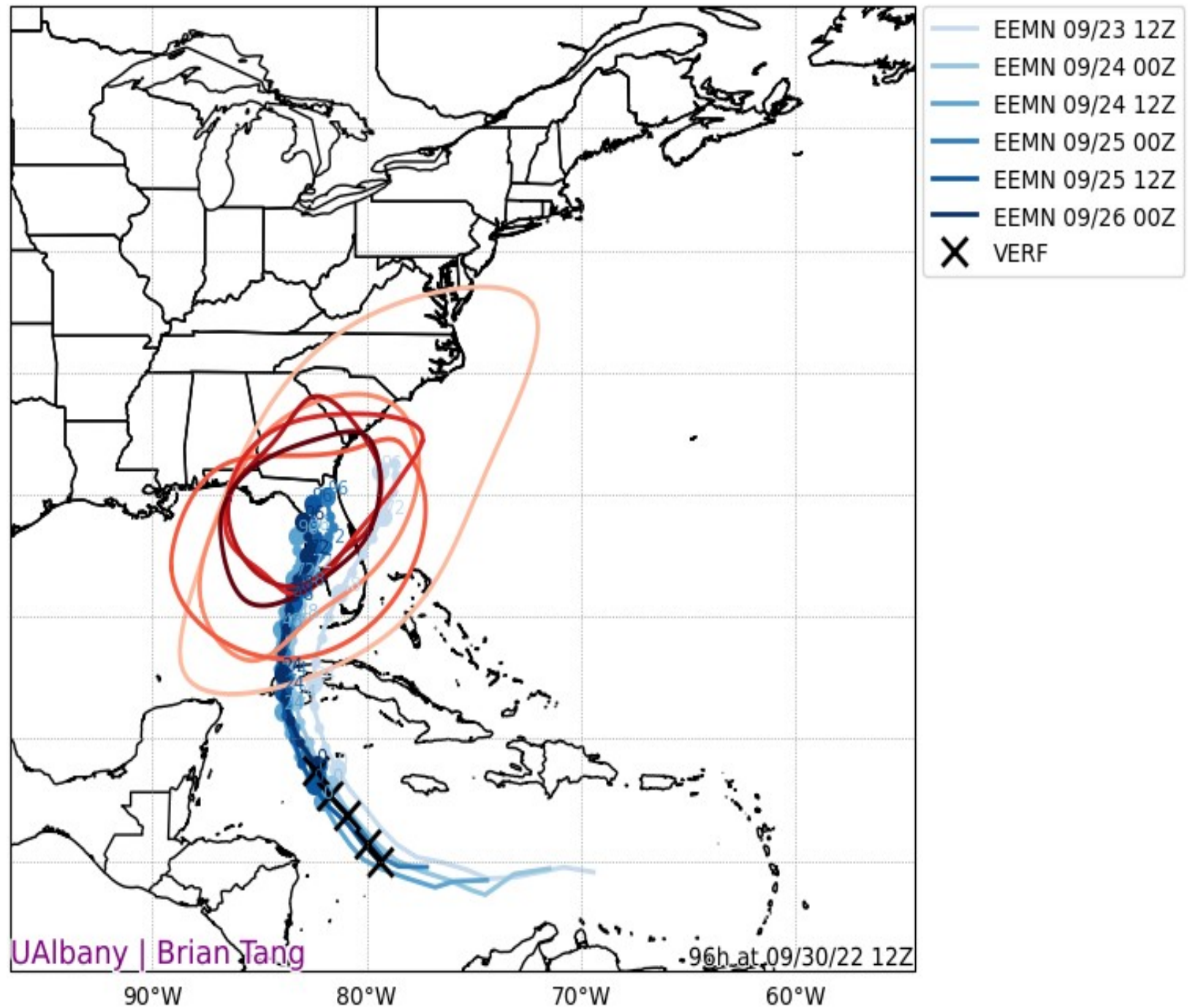


- EEMN 09/23 12Z
- EEMN 09/24 00Z
- X VERF

GFS Ensemble

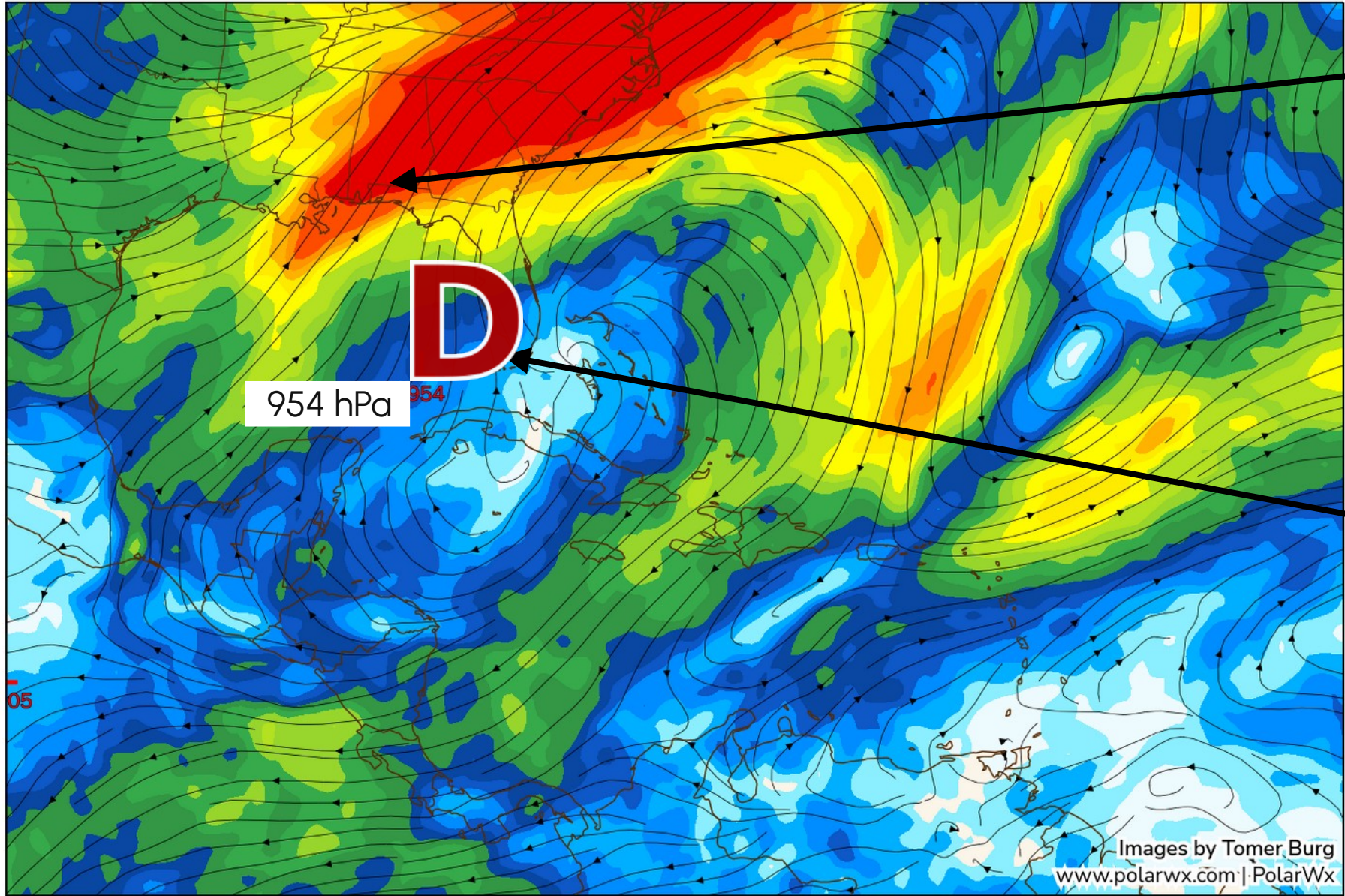


ECMWF Ensemble



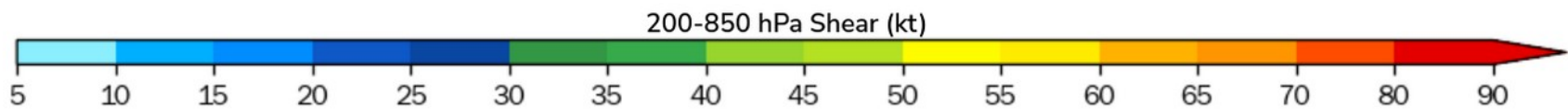
Wind shear Wed 28 Sep at 00H TU

0.25° GFS • 200-850 hPa Vortex-removed Shear (kt)
Init: 0000 UTC Mon 26 Sep 2022 | Hour: [48] | Valid: 0000 UTC Wed 28 Sep 2022

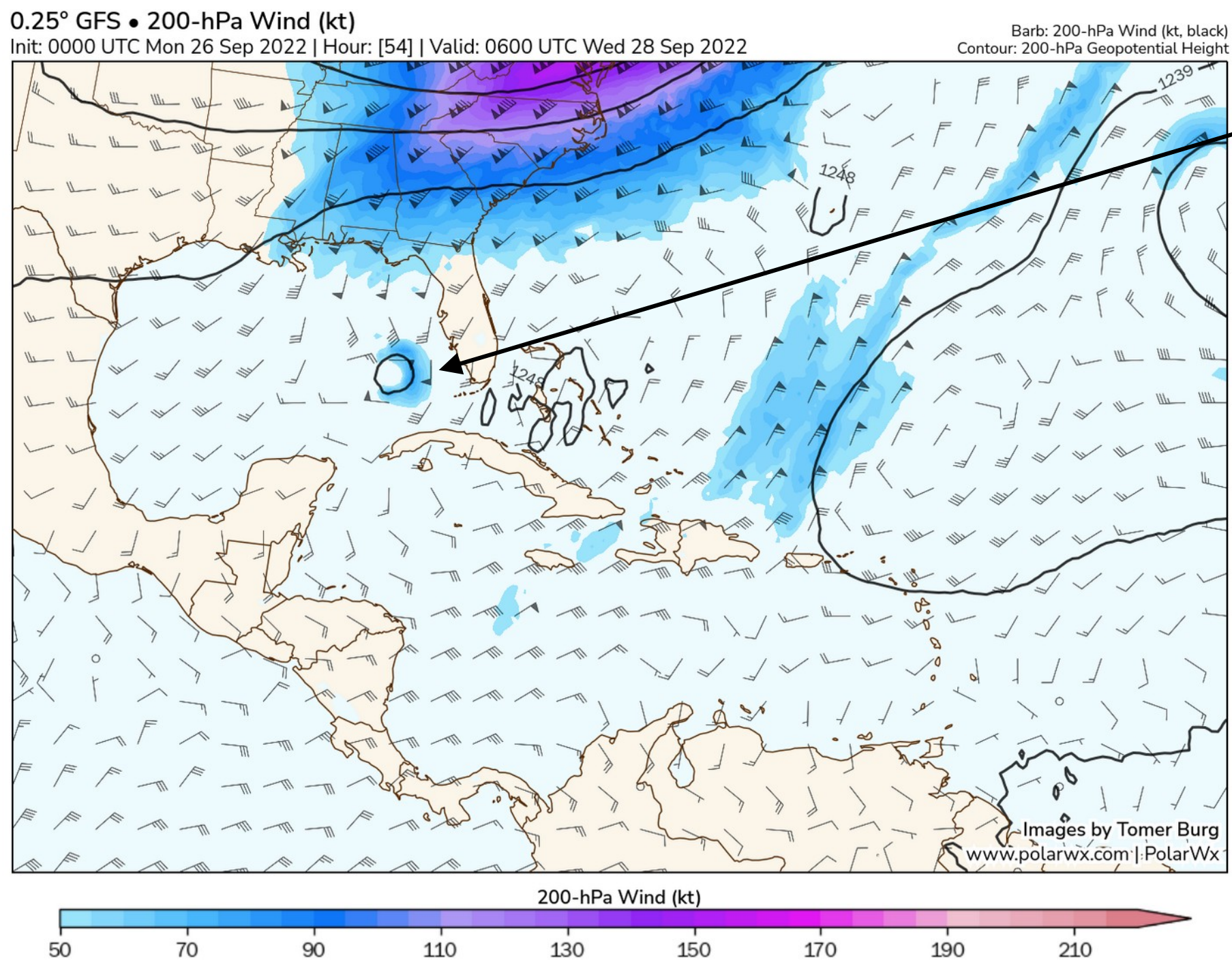


Area with more shear

Area with low shear



Upper level divergence ? 200 hPa Wind Wed 28 Sep at 00H TU



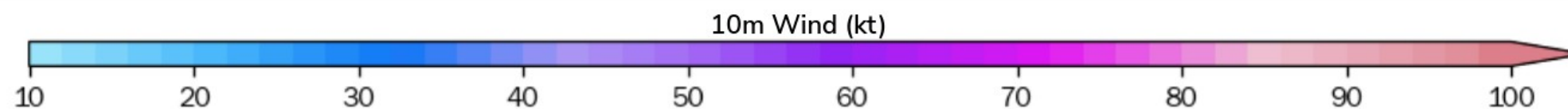
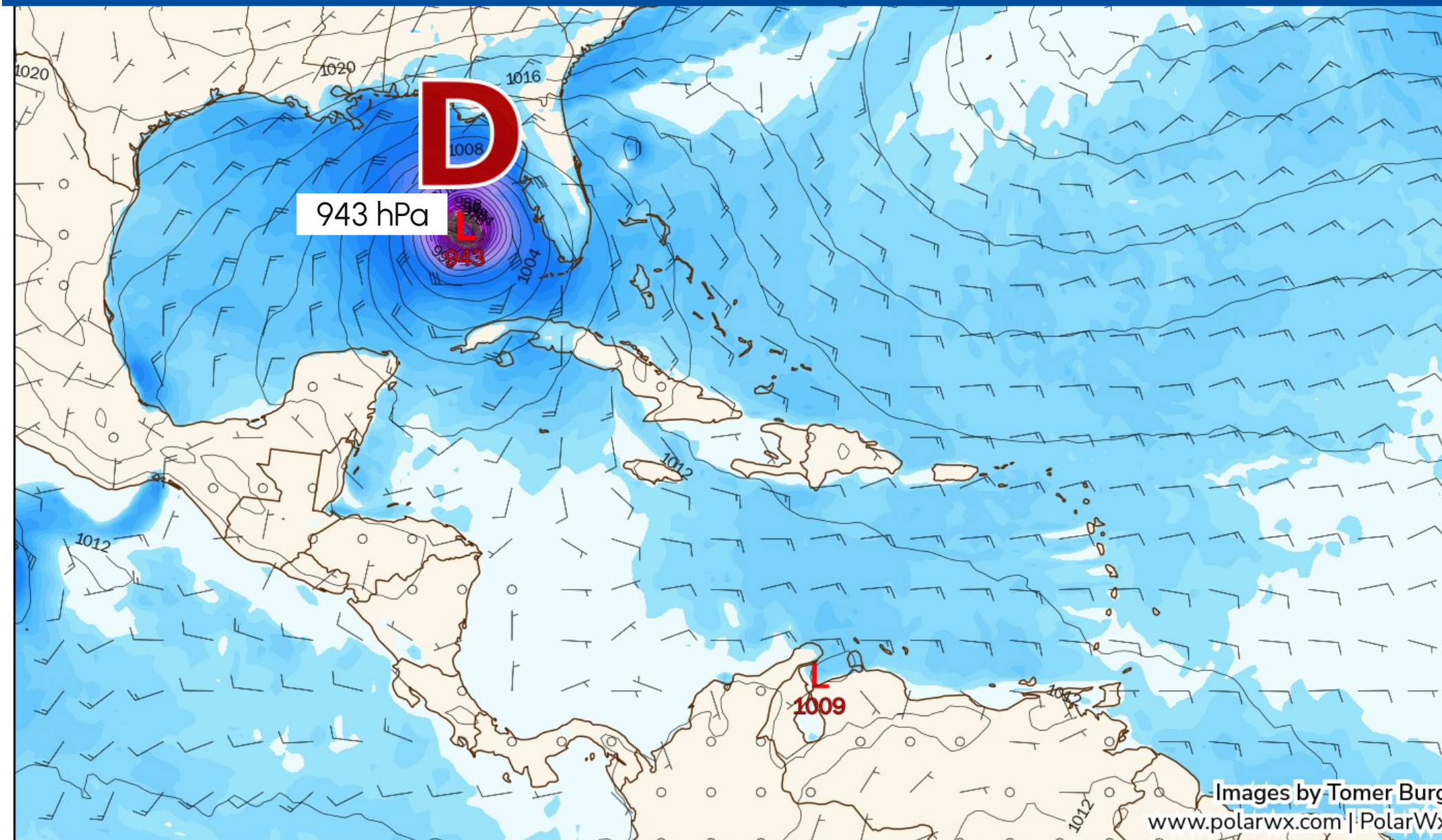
Context :
Area with upper level divergence

0.25° GFS • 10m Wind (kt)

Init: 0000 UTC Mon 26 Sep 2022 | Hour: [60] | Valid: 1200 UTC Wed 28 Sep 2022

Barb: 10m Wind (kt)
Contour: MSLP (every 2 hPa)

Surface Vent GFS - Mer 28 Sep à 12H TU

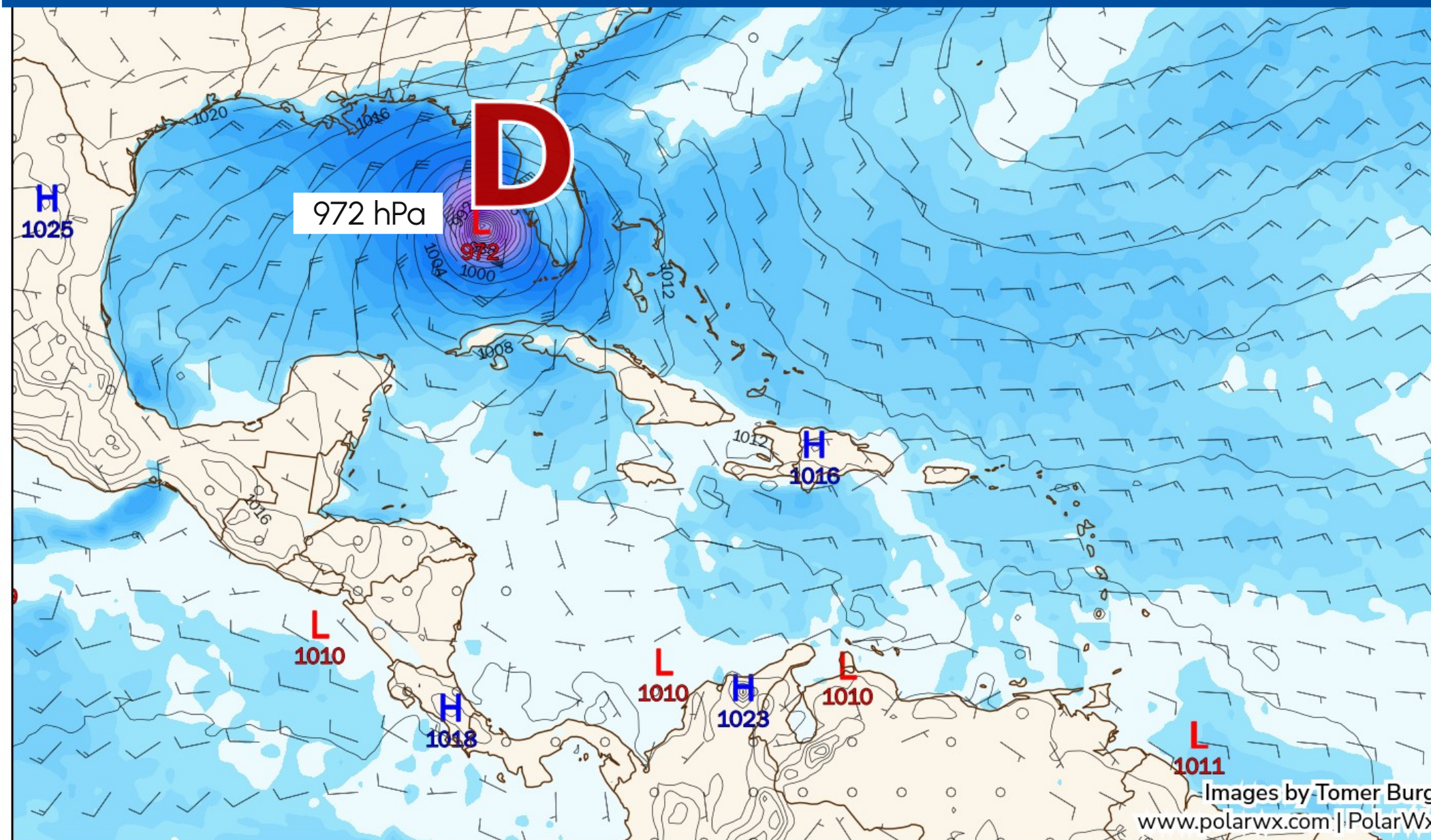


0.4° ECMWF • 10m Wind (kt)

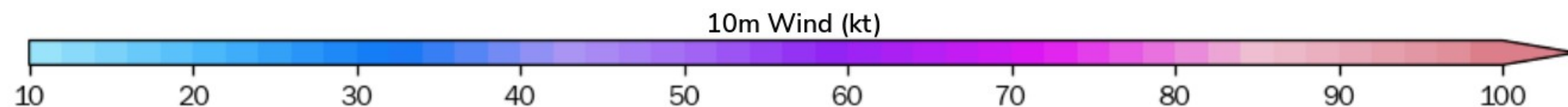
Init: 0000 UTC Mon 26 Sep 2022 | Hour: [60] | Valid: 1200 UTC Wed 28 Sep 2022

Barb: 10m Wind (kt)
Contour: MSLP (every 2 hPa)

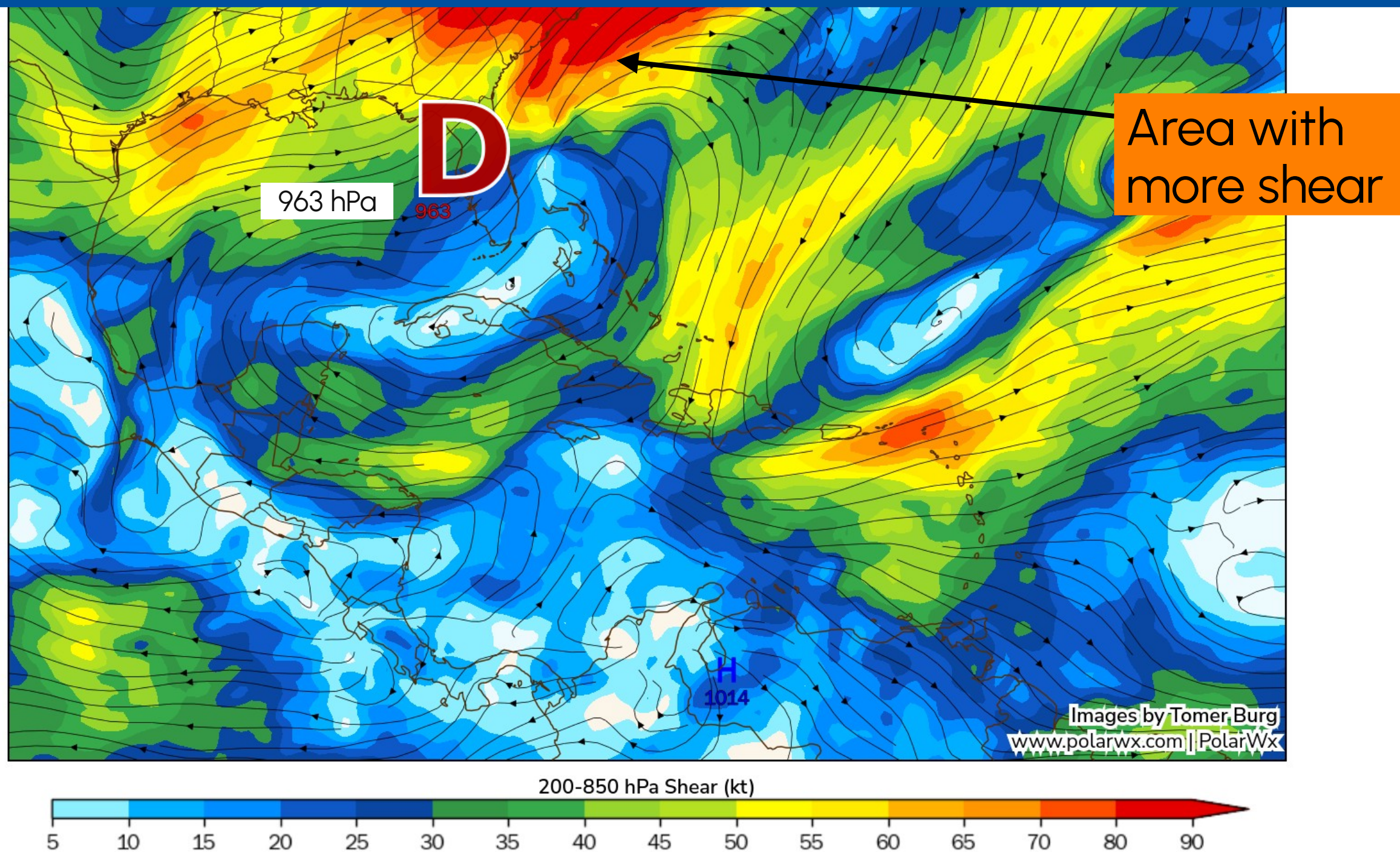
Surface Vent ECMWF - Mer 28 Sep à 12H TU



Images by Tomer Burg
www.polarwx.com | PolarWx



Wind shear Jeu 29 Sep à 12H TU

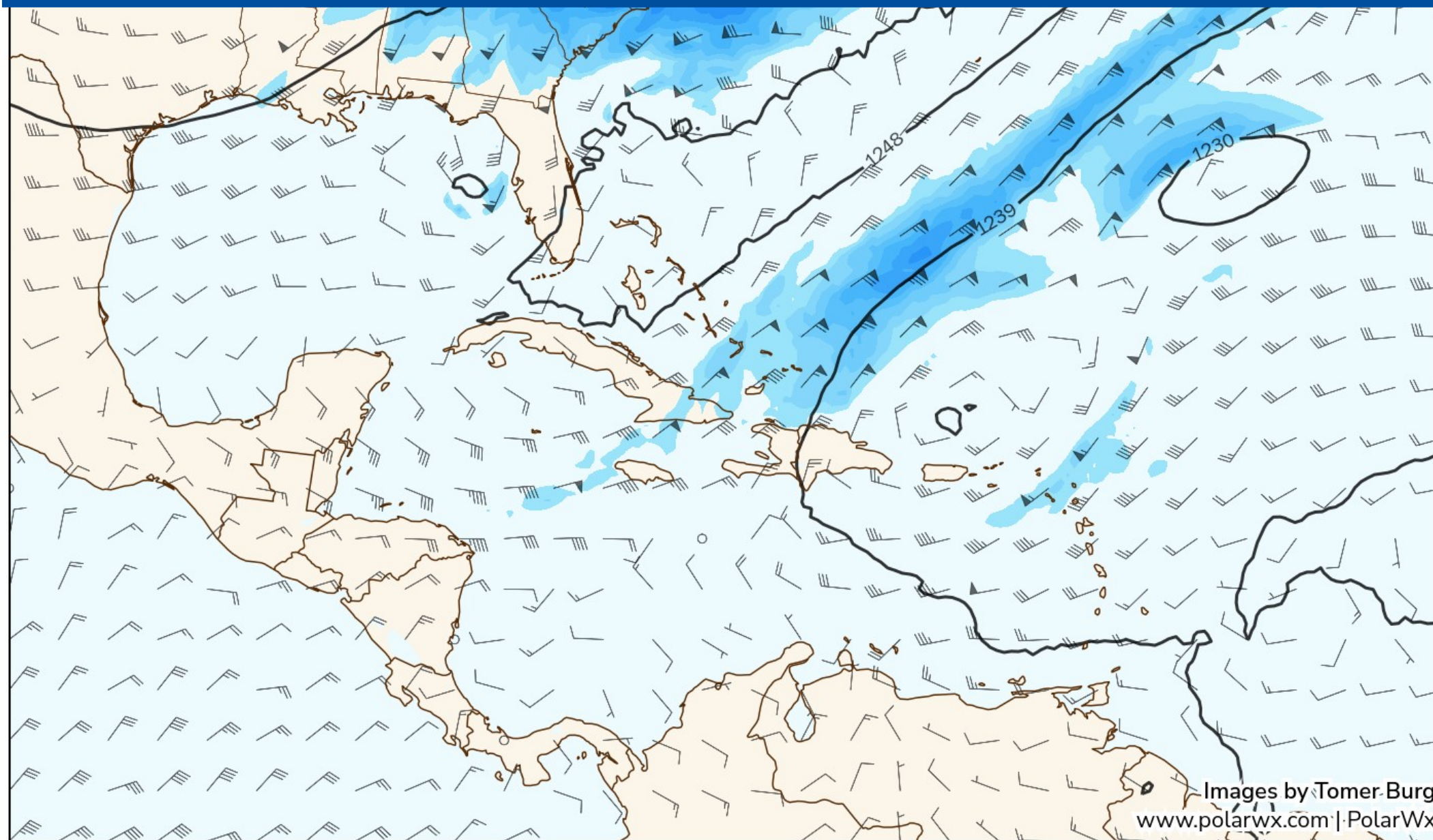


0.25° GFS • 200-hPa Wind (kt)

Init: 0000 UTC Mon 26 Sep 2022 | Hour: [78] | Valid: 0600 UTC Thu 29 Sep 2022

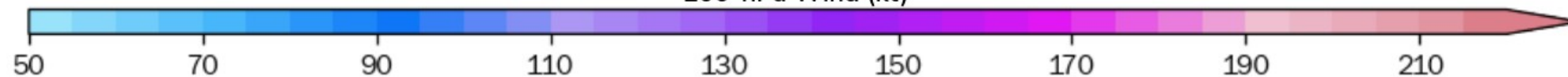
Barb: 200-hPa Wind (kt, black)
Contour: 200-hPa Geopotential Height

Altitude 200 hPa Vent GFS – Jeu 29 Sep à 06H TU



Images by Tomer Burg
www.polarwx.com | PolarWx

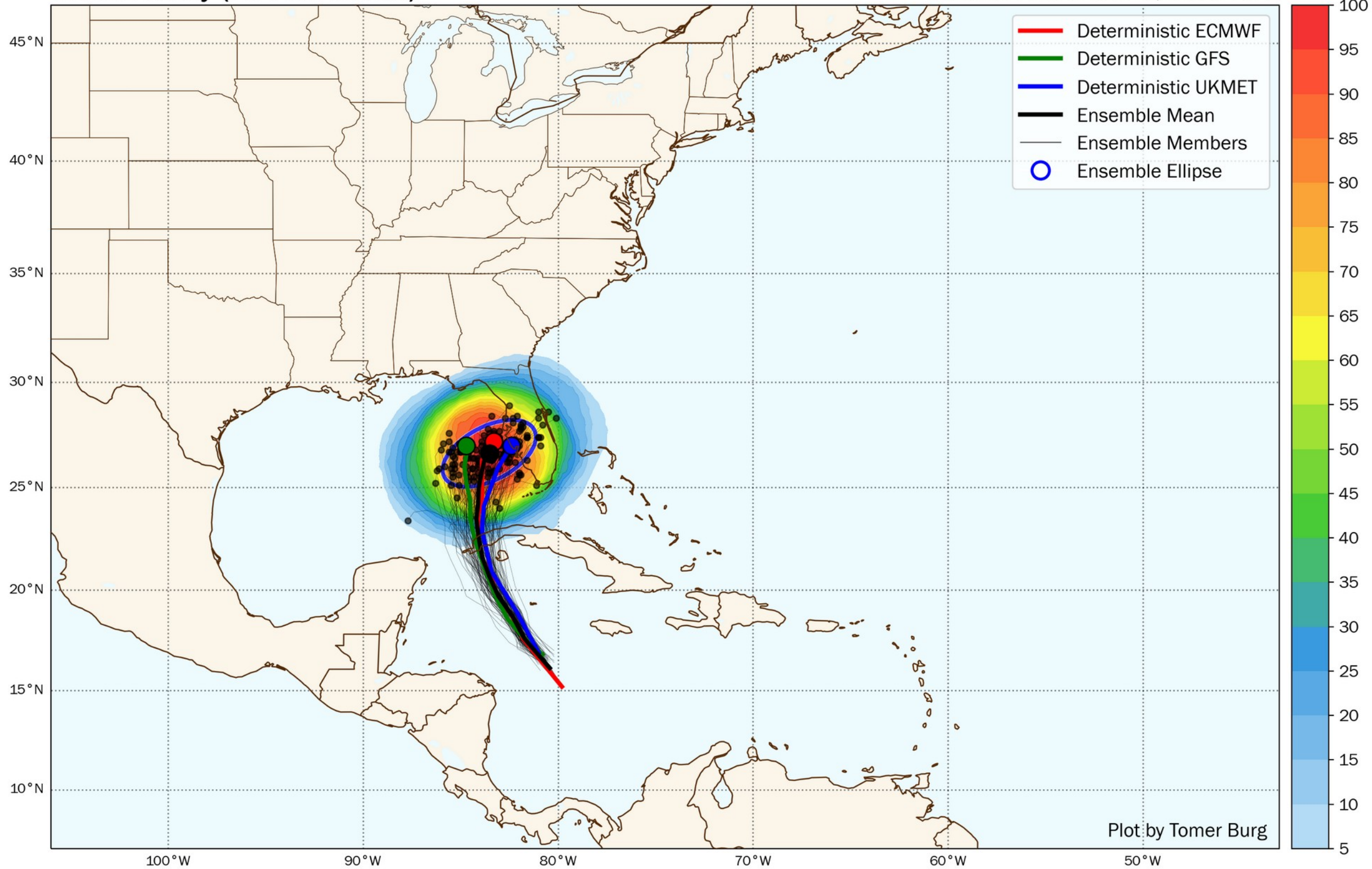
200-hPa Wind (kt)



Ian Super-ensemble (EPS + GEFS + UKMET + CMC)

Track Density (350-km radius)

Hour 72 | Valid 0000 UTC 29 September 2022
Initialized 0000 UTC 26 September 2022

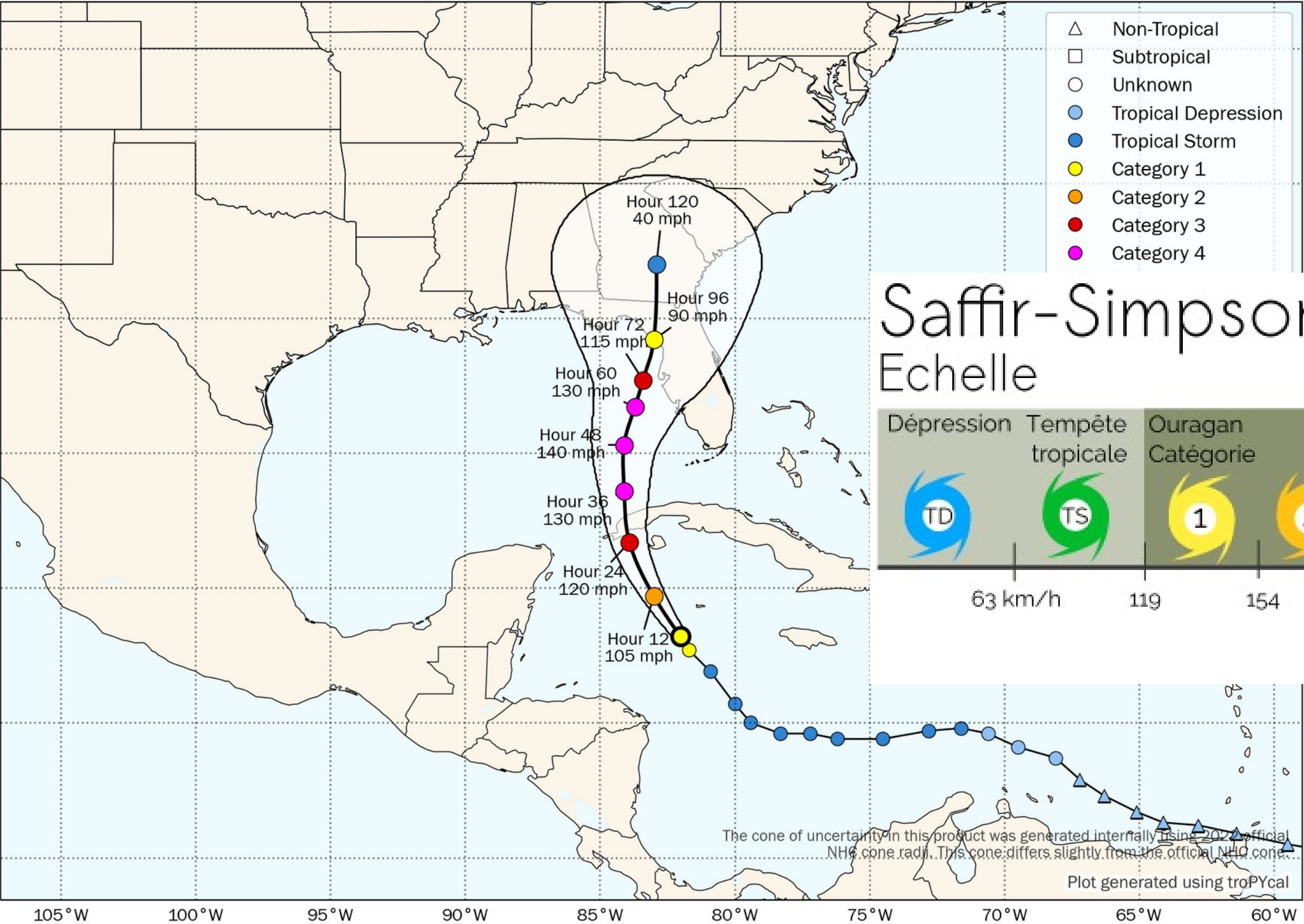
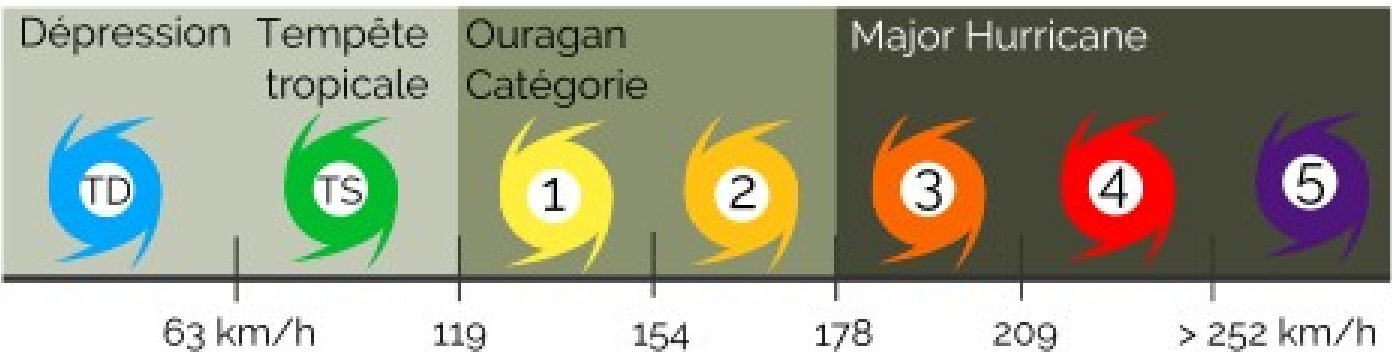


Hurricane IAN

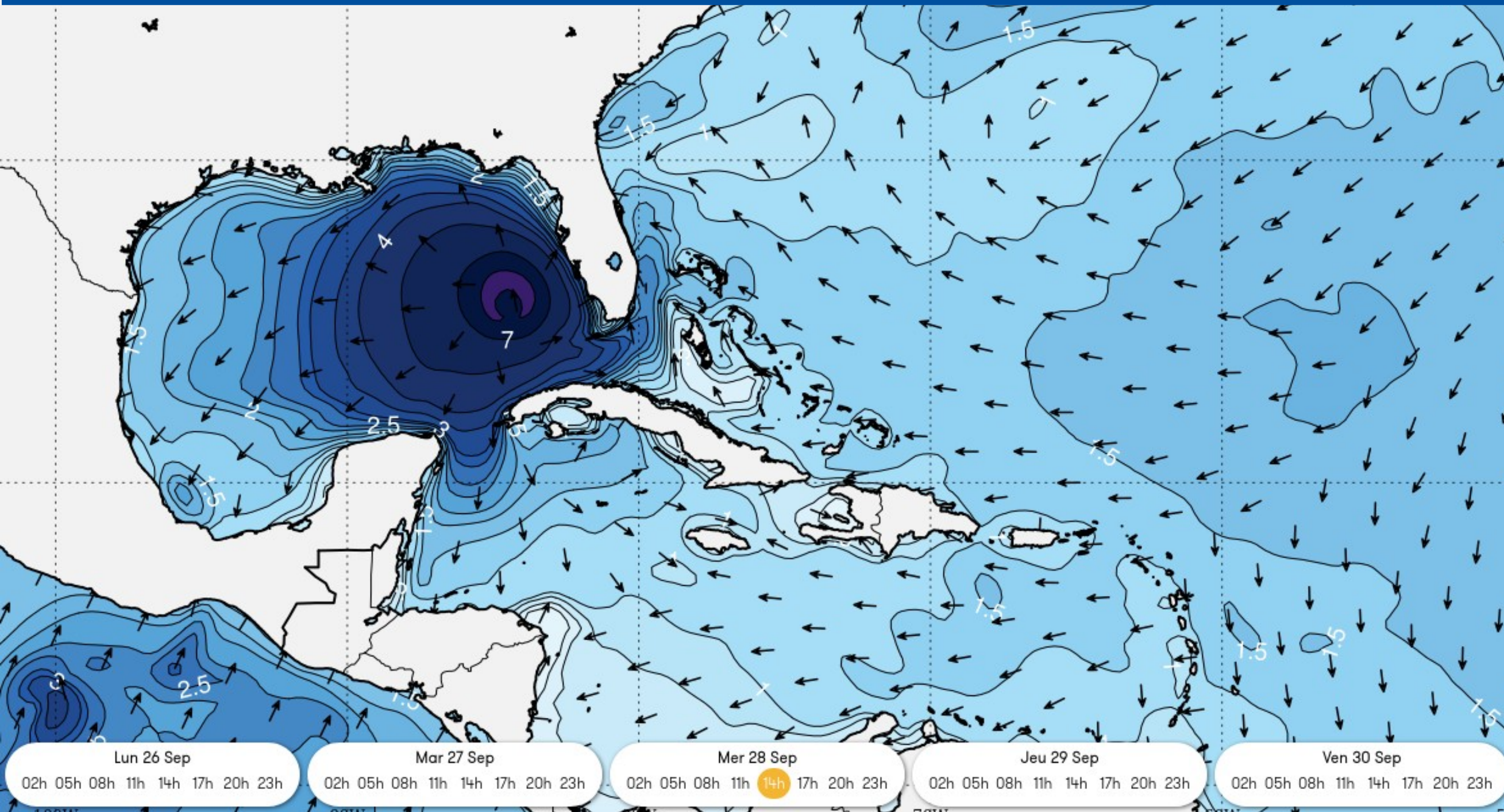
Current Intensity: 75 mph • 983 hPa
NHC Issued: 0900 UTC 26 Sep 2022

- △ Non-Tropical
- Subtropical
- Unknown
- Tropical Depression
- Tropical Storm
- Category 1
- Category 2
- Category 3
- Category 4

Saffir-Simpson
Echelle

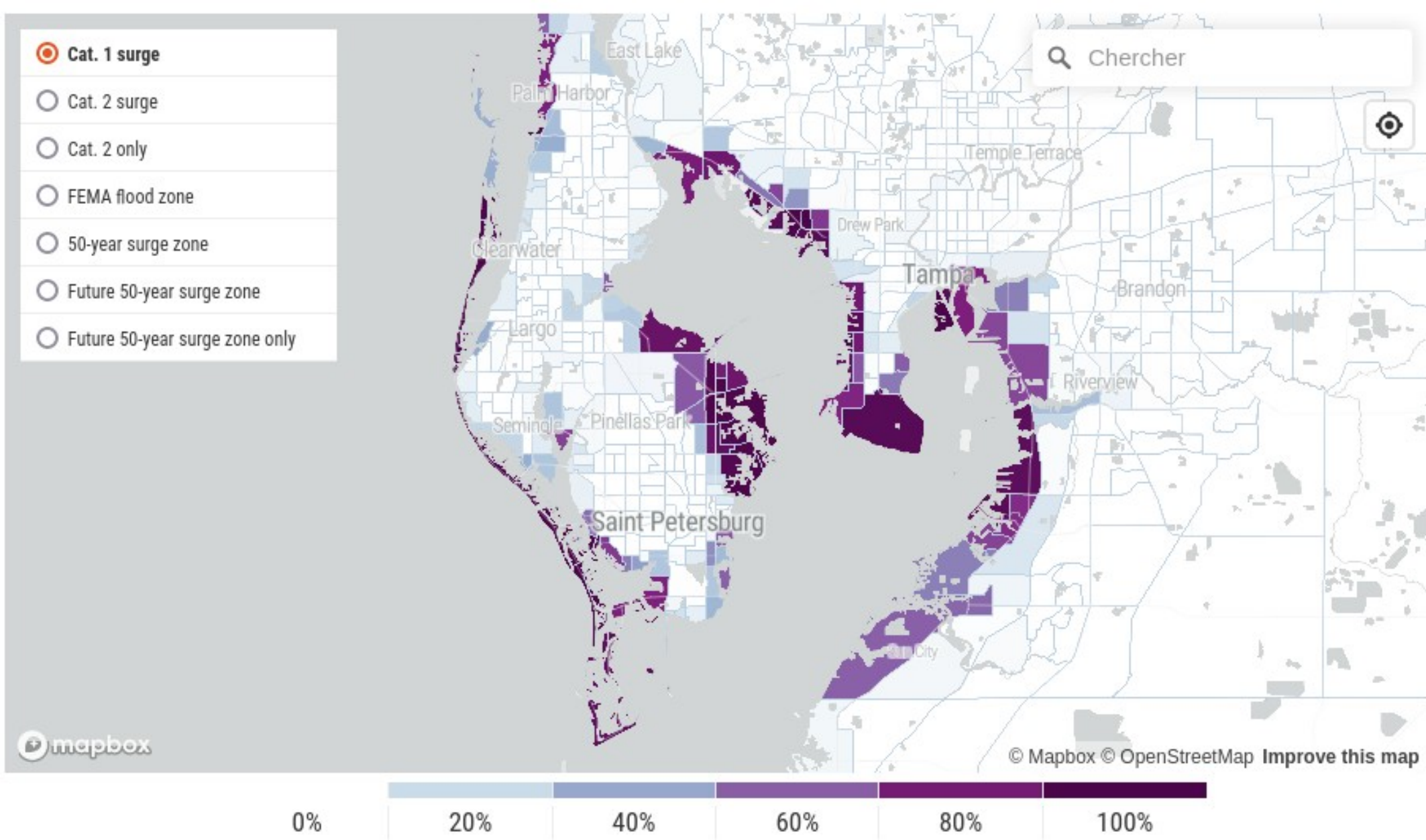


Vagues H1/3 WW3 – Mer 28 Sep à 12H TU



TAMPA BAYS





Buildings on land that could see 1 foot or more of storm surge from worst-case Category 1 hurricanes.

<https://www.tampabay.com/hurricane/2022/02/03/search-your-tampa-bay-neighborhood-to-see-the-hurricane-flood-risk/>



EXPERIMENTAL Peak Storm Surge Forecast

Up to 3 ft Up to 6 ft Up to 9 ft Up to 10 ft

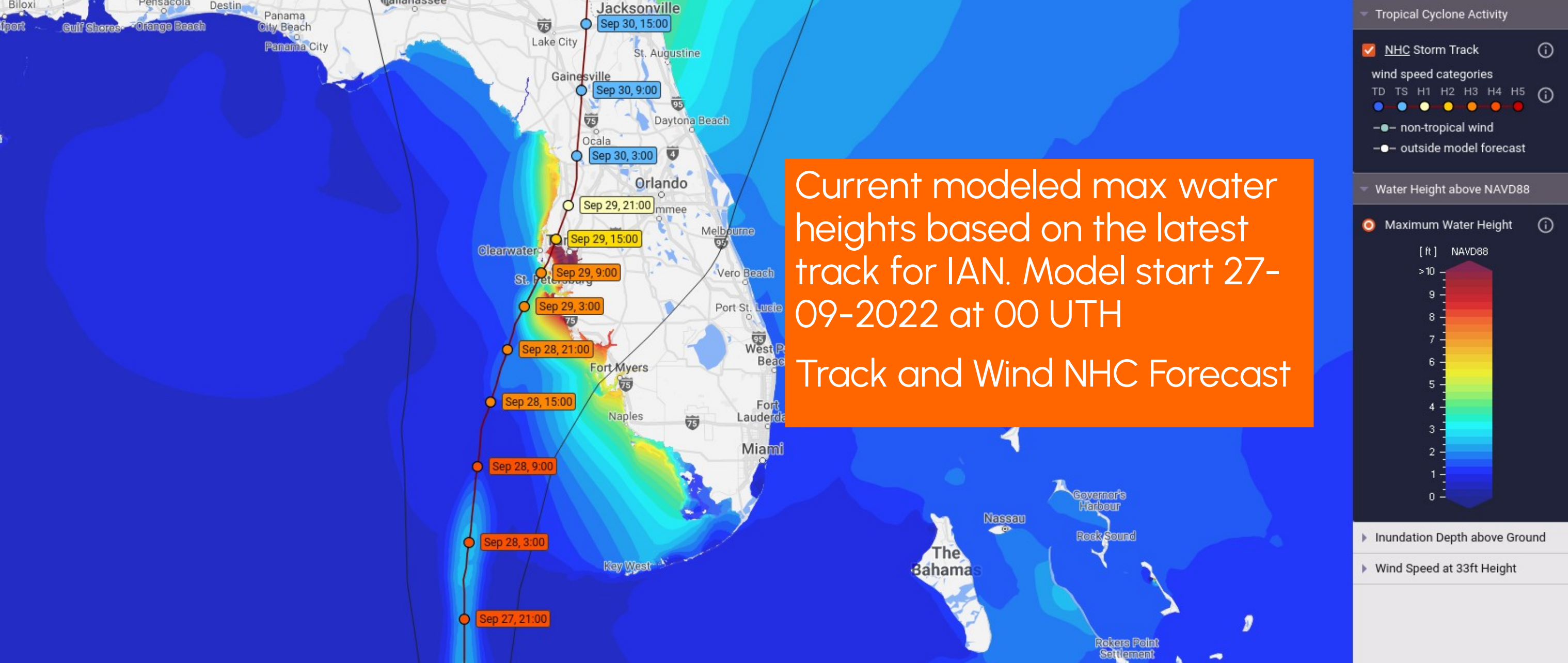
Feet above ground level



https://www.nhc.noaa.gov/refresh/graphics_at4+shtml/102341.shtml?peakSurge#contents

Hurricane Ian
Monday September 26, 2022
11 AM EDT Advisory 14
NWS National Hurricane Center

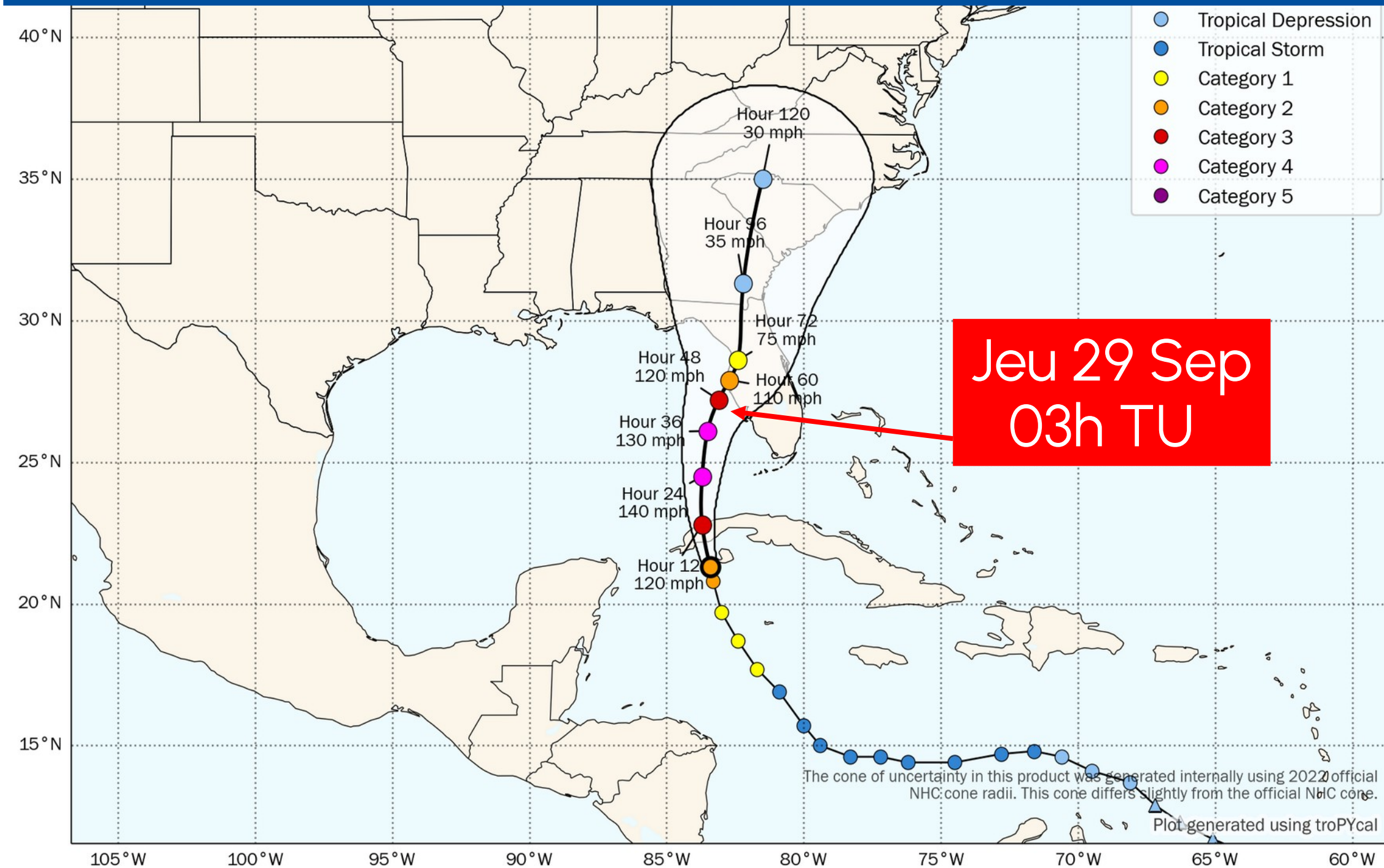
User Notes: Water levels along the immediate coast could reach the following heights above ground level within the indicated areas. Elevated water levels will likely be accompanied by large and destructive waves. Colors are determined by the highest values in the associated forecast peak surge range. Values shown on this graphic are inclusive of tide.



<https://cera.coastalrisk.live/>

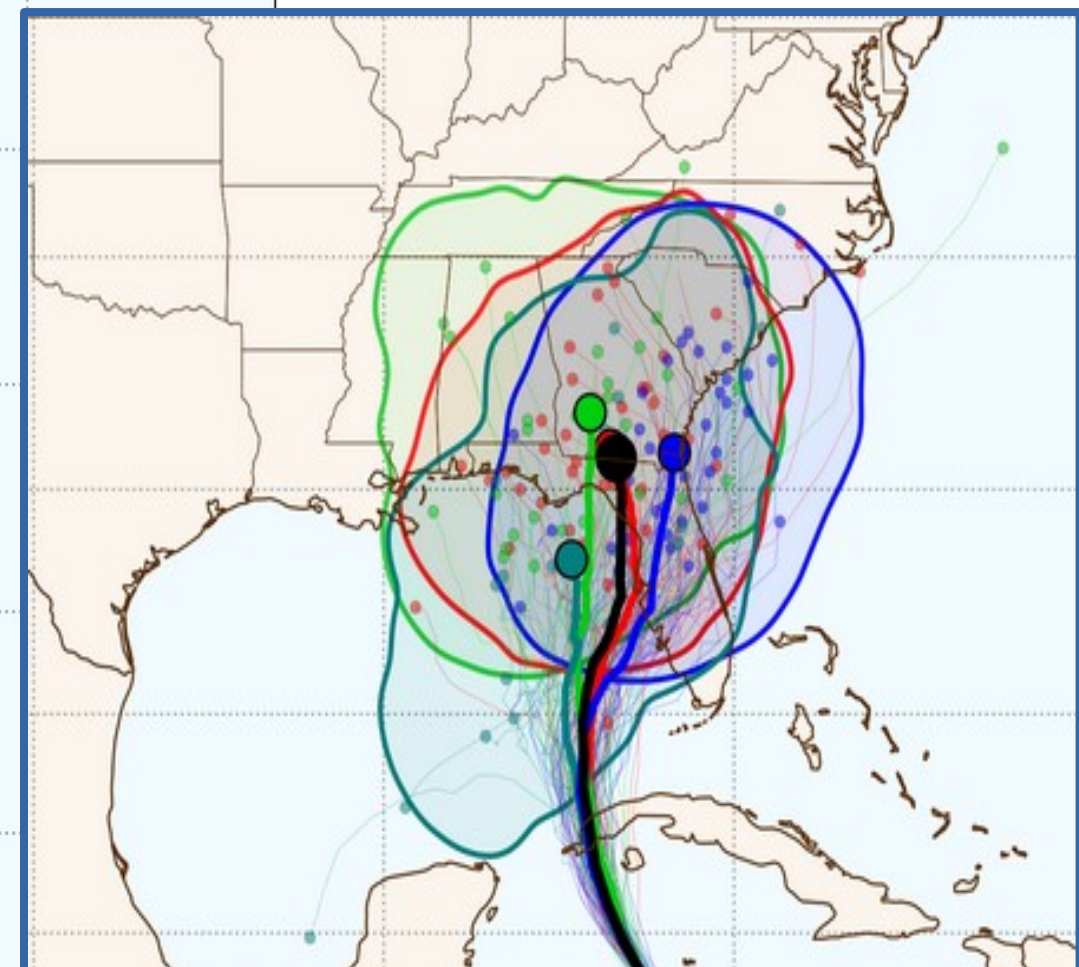
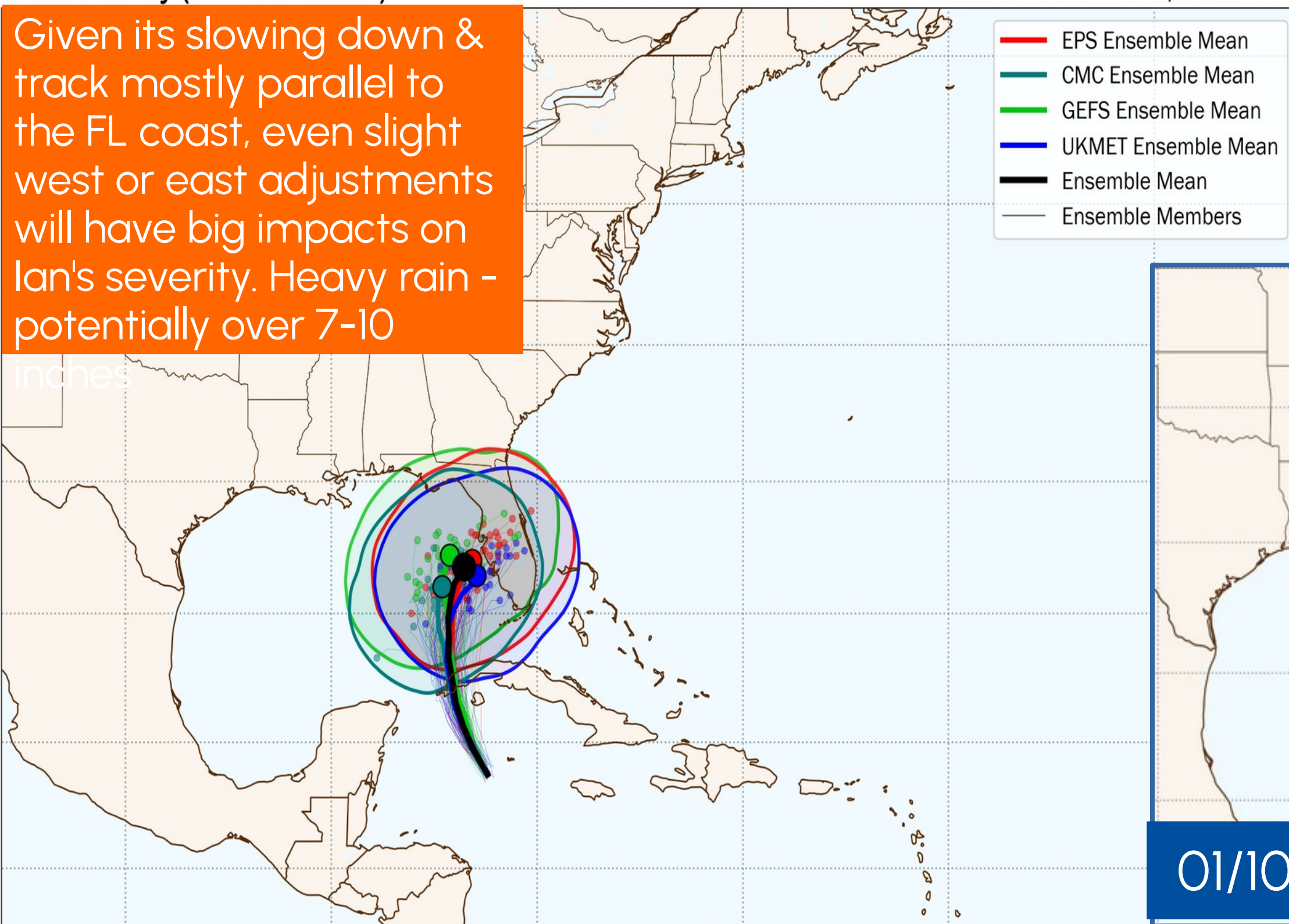
4 – Hurricane IAN Bilan

Analysis & forecast Mar 27 Sep 2022 à 03H UTC



Given its slowing down & track mostly parallel to the FL coast, even slight west or east adjustments will have big impacts on Ian's severity. Heavy rain - potentially over 7-10

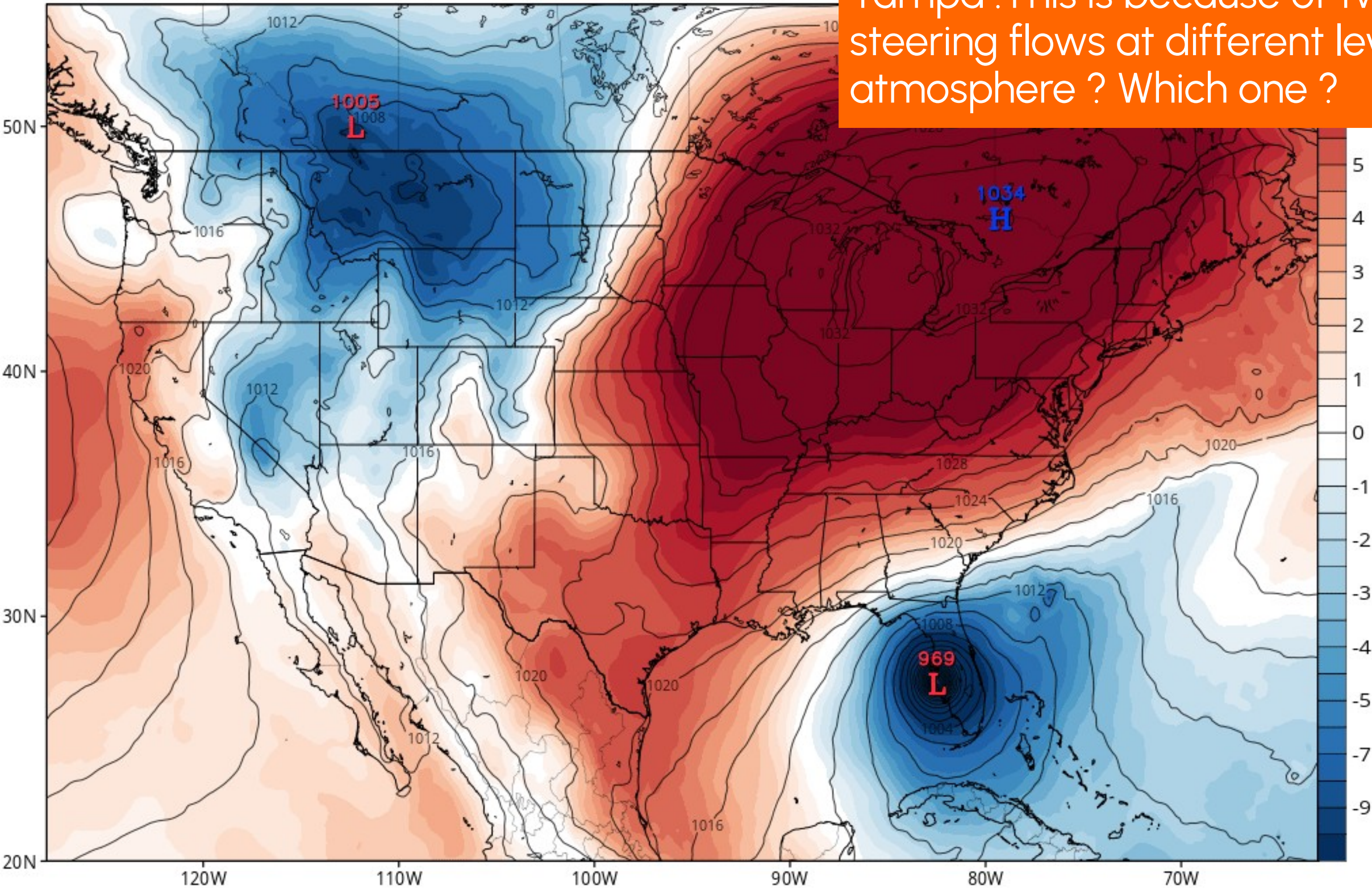
inches



01/10 at 06H TU

GFS MSLP and Anomaly (hPa) (based on CFSR 1981-2010 Climatology)

Init: 00z Sep 27 2022 Forecast Hour: [60] valid at 12z Thu, Sep 29 2022

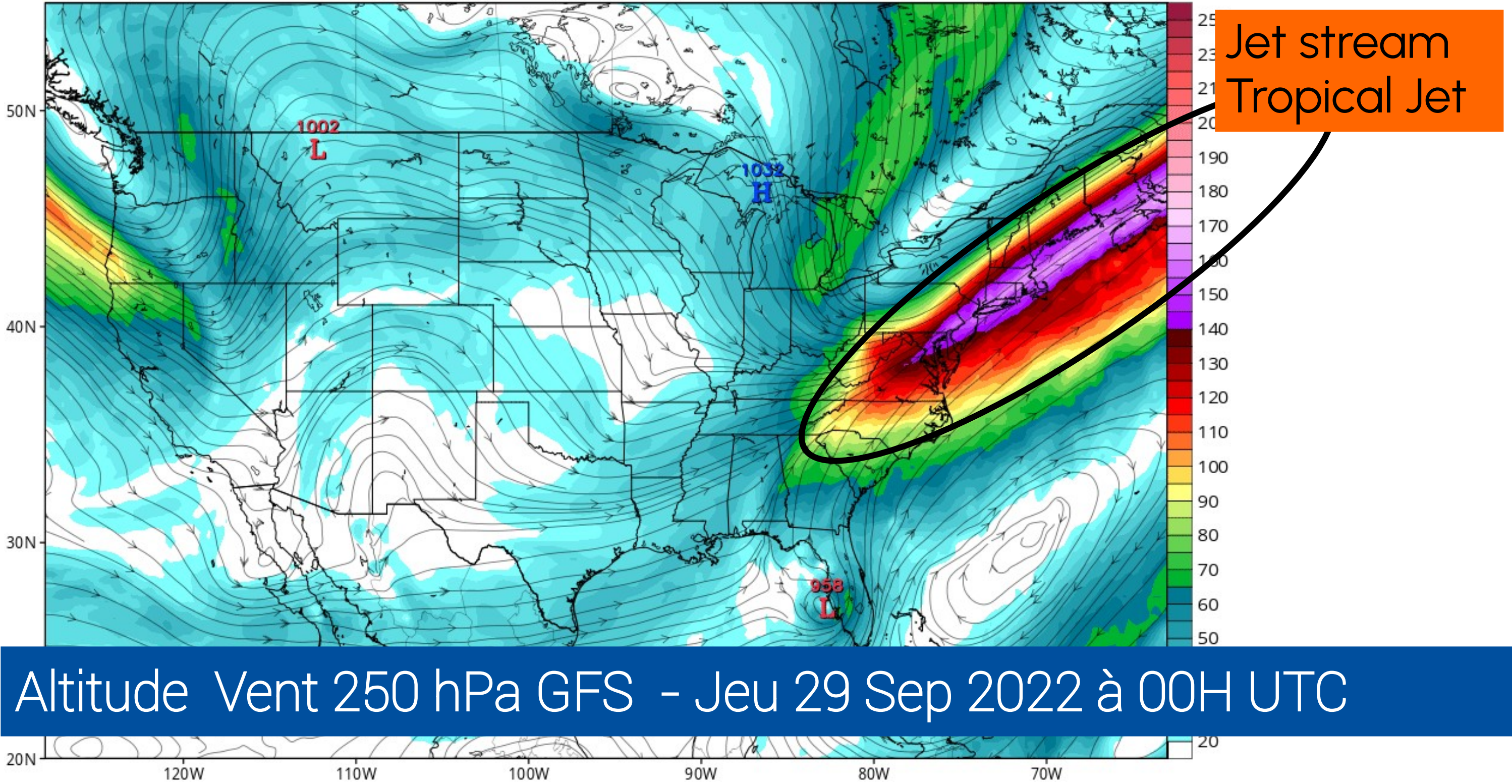


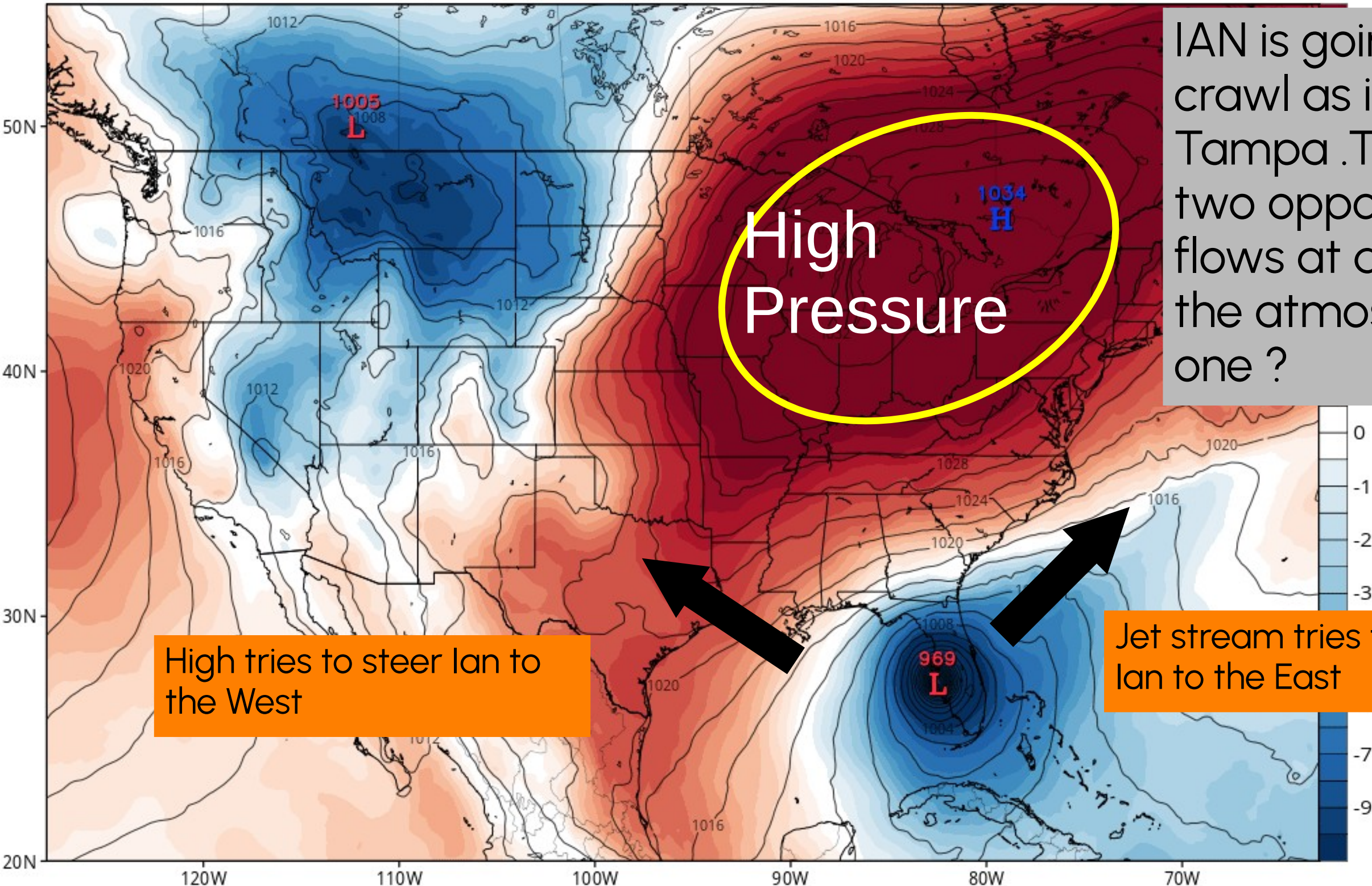
IAN is going to slow to a crawl as it approaches Tampa. This is because of two opposite steering flows at different levels in the atmosphere ? Which one ?

GFS 250mb Wind Speed/Streamlines (kt) & MSLP Extrema (mb)

Init: 00z Sep 27 2022 Forecast Hour: [48] valid at 00z Thu, Sep 29 2022

TROPICALTIDBITS.COM





IAN is going to slow to a crawl as it approaches Tampa. This is because of two opposite steering flows at different levels in the atmosphere? Which one?

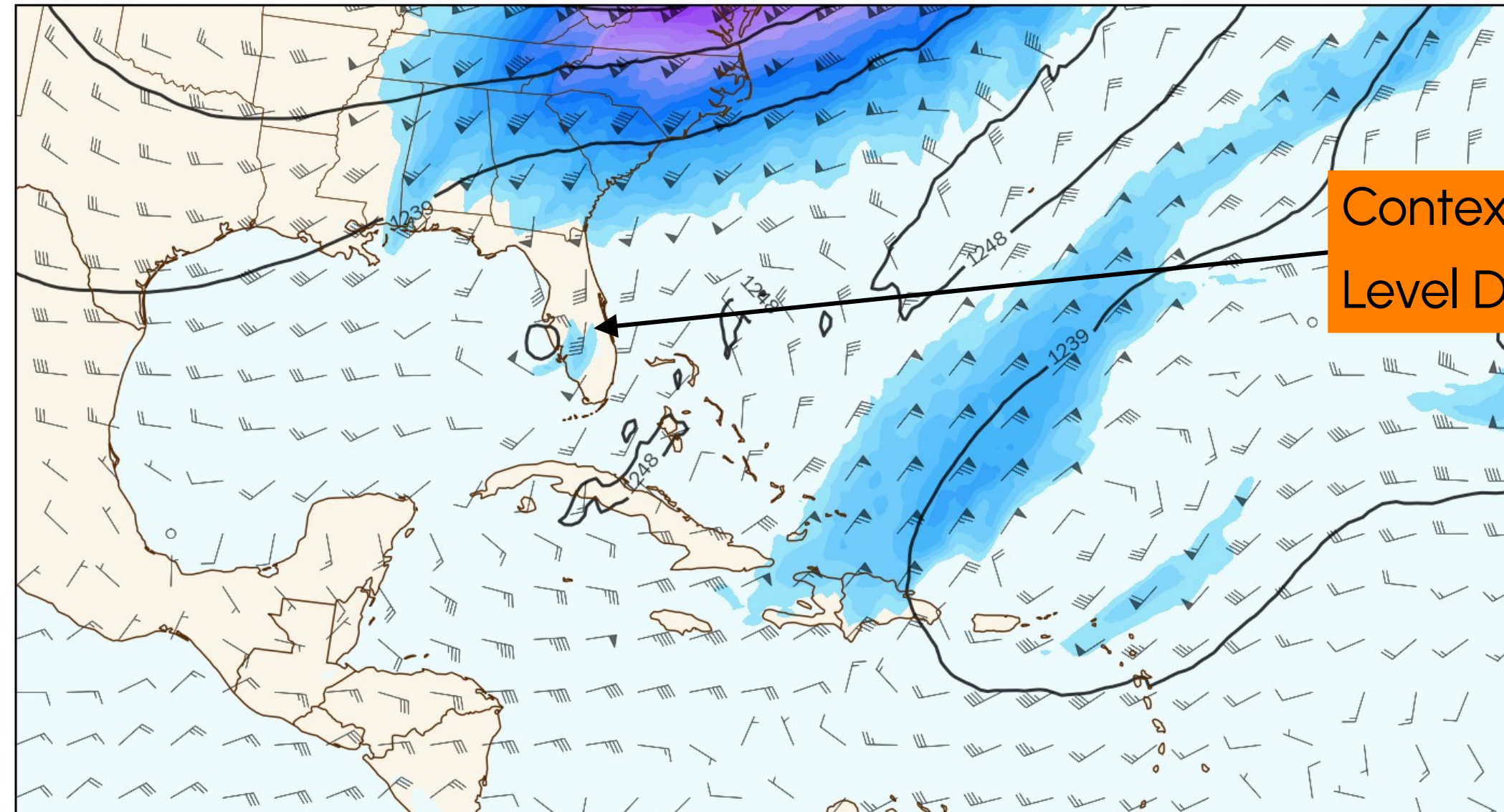
High tries to steer Ian to the West

Jet stream tries to steer Ian to the East

0.25° GFS • 200-hPa Wind (kt)

Init: 0000 UTC Tue 27 Sep 2022 | Hour: [48] | Valid: 0000 UTC Thu 29 Sep 2022

Barb: 200-hPa Wind (kt, black)
Contour: 200-hPa Geopotential Height



Context :
Level Divergence ?

Upper level divergence ? 200 hPa Wind Jeu 29 Sep à 00H TU



200-hPa Wind (kt)

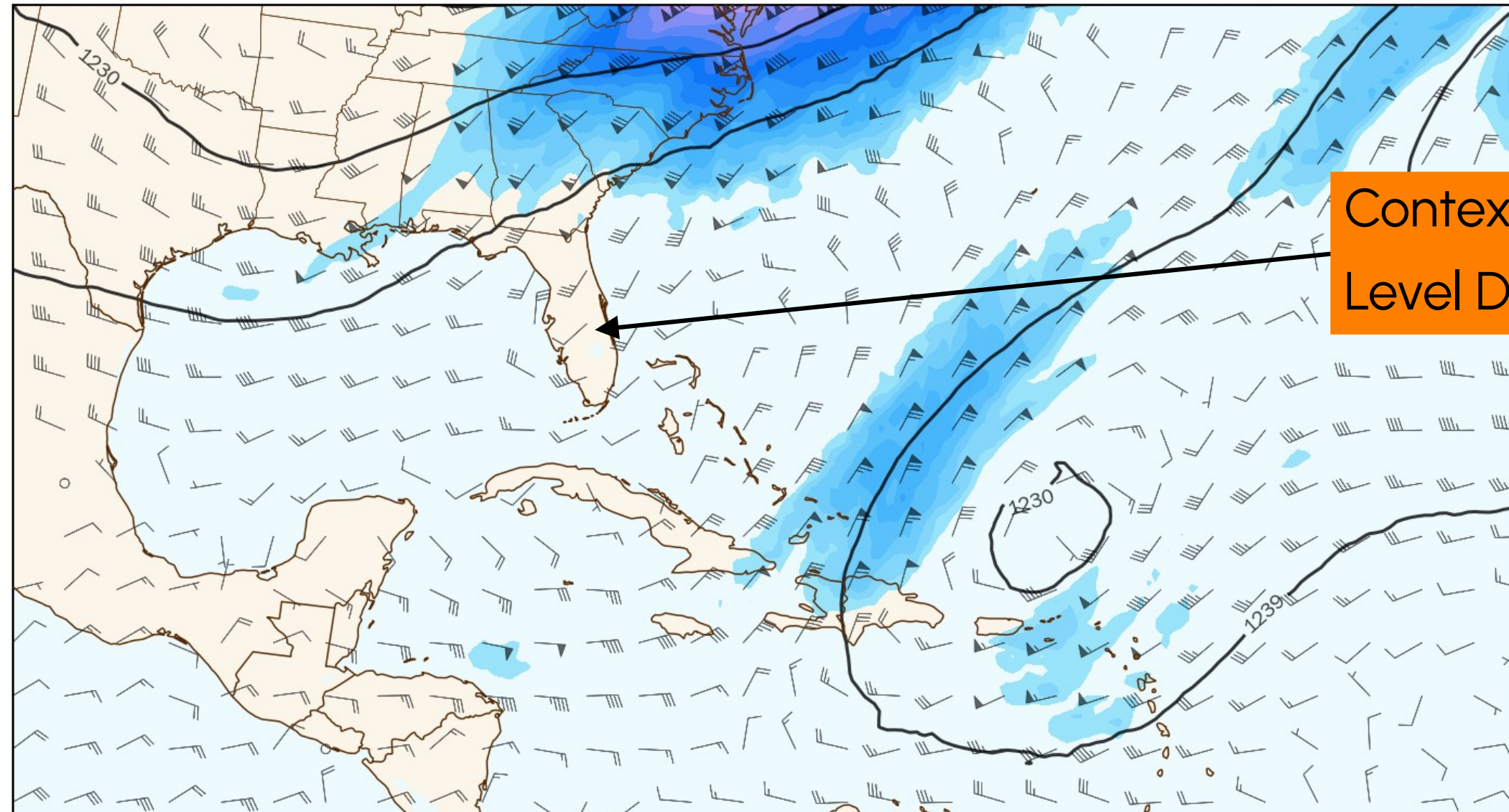


Images by Tomer Burg
www.polarwx.com | PolarWx

0.25° GFS • 200-hPa Wind (kt)

Init: 0000 UTC Tue 27 Sep 2022 | Hour: [60] | Valid: 1200 UTC Thu 29 Sep 2022

Barb: 200-hPa Wind (kt, black)
Contour: 200-hPa Geopotential Height



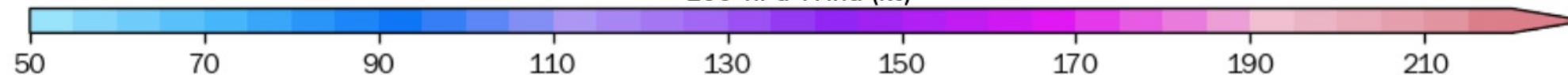
Context :
Level Divergence ?

Upper level divergence ? 200 hPa Wind Jeu 29 Sep à 12H TU

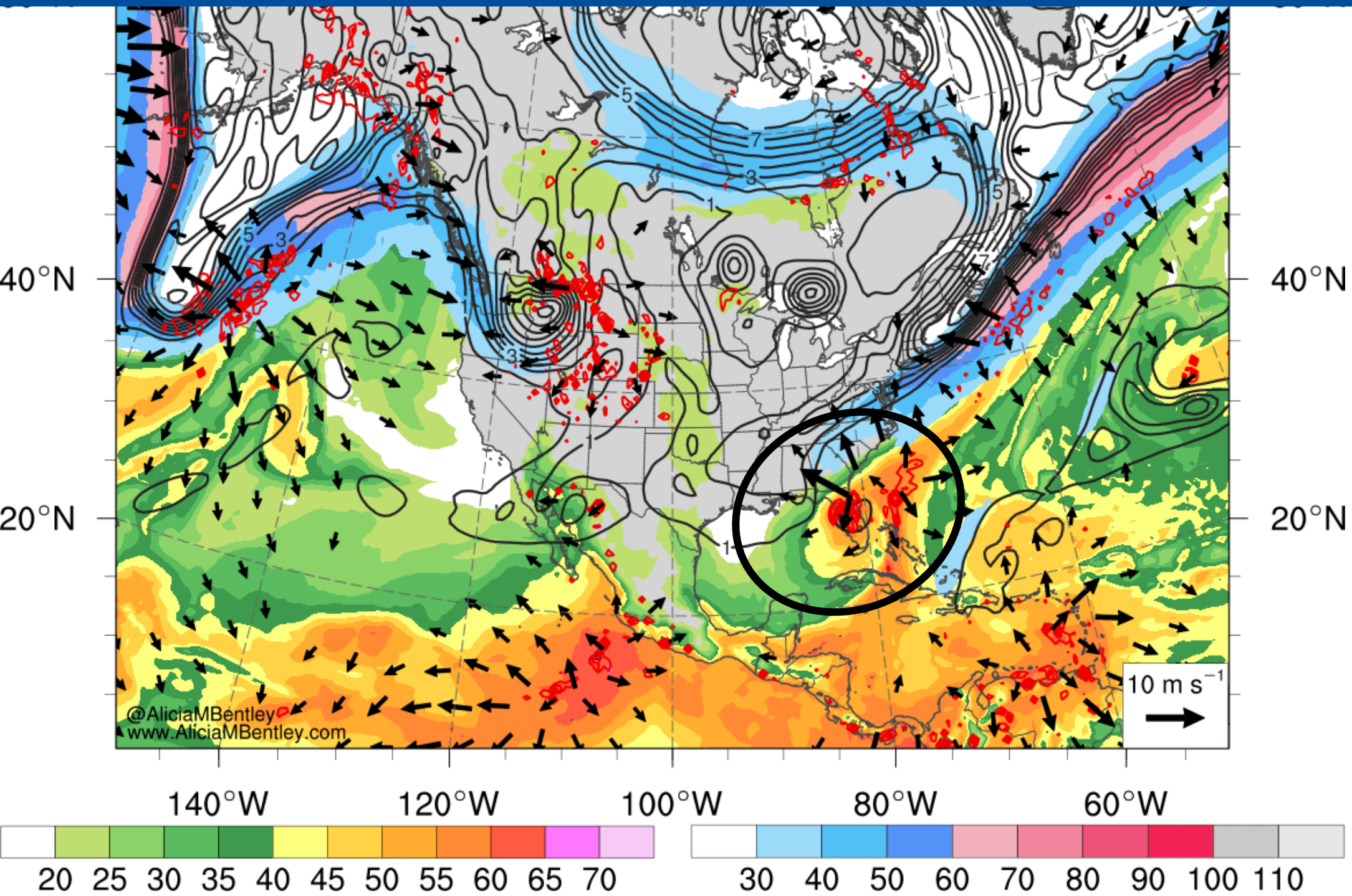


Images by Tomer Burg
www.polarwx.com | PolarWx

200-hPa Wind (kt)



Upper level divergence ? 200 hPa Wind Ven 30 Sep à 00H TU



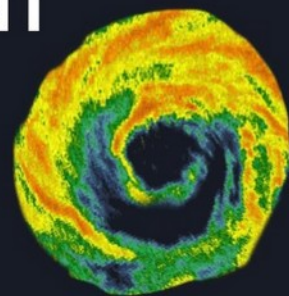
HURRICANE IAN'S EYE

METEOROLOGIST NASH RHODES

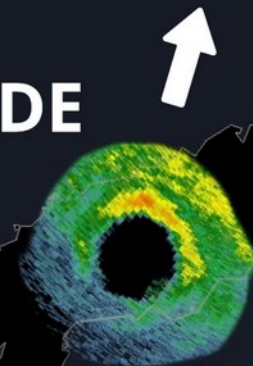
35 MILES WIDE



EYEWALL
REPLACEMENT



21 MILES WIDE



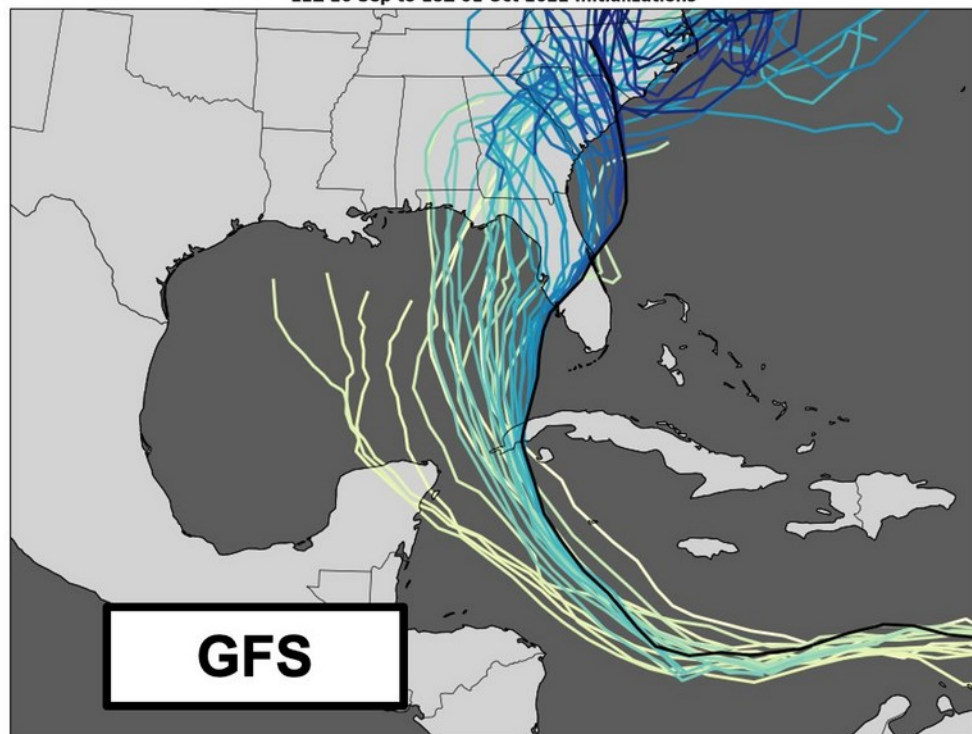
RadarScope Pro

The surprisingly fast replacement allowed #Ian to nearly triple the size (area) of its eye before landfall, expanding its impacts.

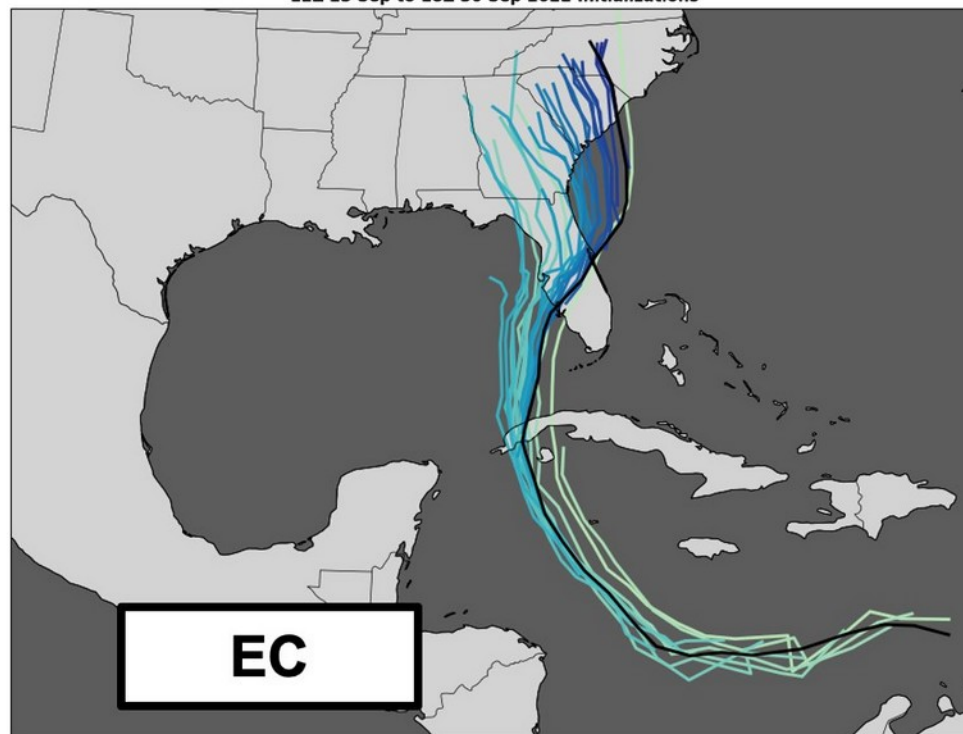


Left-of-Track Bias in Global Models

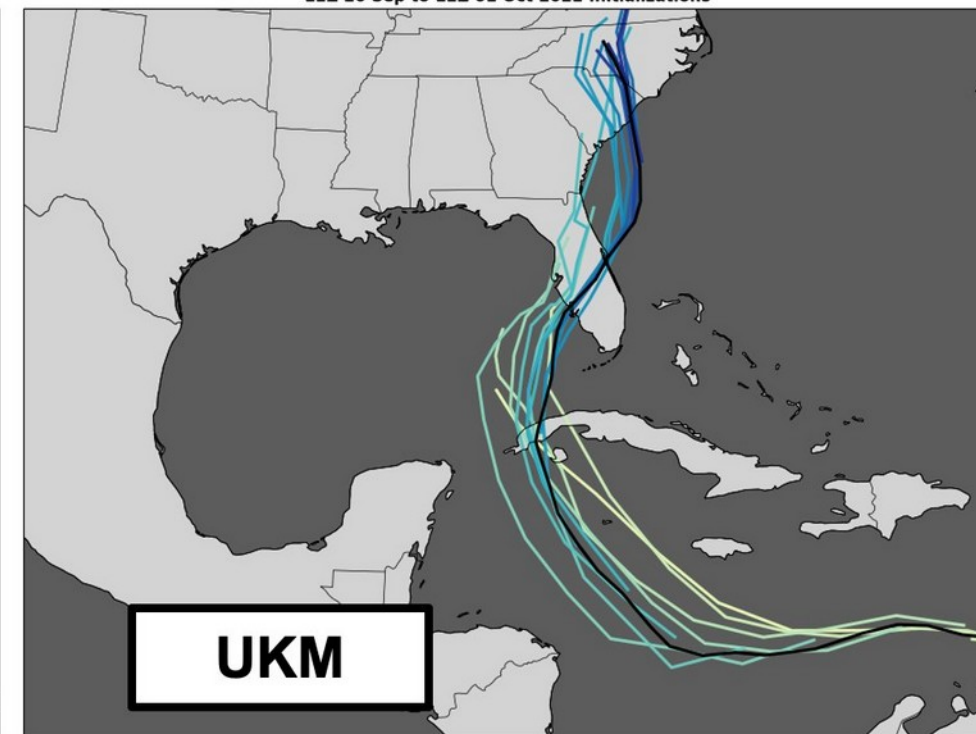
Hurricane Ian - GFS Tracks
12Z 20 Sep to 18Z 01 Oct 2022 Initializations



Hurricane Ian - EC Tracks
12Z 23 Sep to 18Z 30 Sep 2022 Initializations



Hurricane Ian - UKM Tracks
12Z 20 Sep to 12Z 01 Oct 2022 Initializations



Cycles are colored by initialization time: **Lighter** (**Darker**) colors are **Older** (**Newer**)

- As previously discussed, all global deterministic models tended to have a left-of-track bias. This bias was **largest for the GFS** and **smallest for the UKM**
- **UKM** best predicted the location of landfall in Florida (and also South Carolina). The **GFS** suggested much more of a threat to the Florida Panhandle than the EC or UKM
- **GFS** did show the potential for a strong hurricane to enter the Gulf of Mexico at long forecast ranges

Contact

Une question, une suggestion à propos de ces pages?
N'hésitez pas à m'envoyer un mail ou me contacter sur Twitter !

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