

Hurricane Seasonal Forecasts

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Background Information

- BS in Meteorology from Penn State University 1994
- 14 years experience
- Certified Consulting Meteorologist by the AMS.
 - Applied, Forensic, Forecasting, Training/Education, Expert Testimony, Climatology, Marine/Coastal, Industrial, Energy and Commodity Markets, Tropical.
- Member of the National Council of Industrial Meteorologists.
- Chief Meteorologist of Shell Energy North America

Name the Storm

- “Send military supplies, fire arms, animal and human food stuff. Danger; food riots any moment. Situation horrible, can’t describe. For Gods sake help us...”

Galveston, TX, 1900

- “Send military supplies, fire arms, animal and human food stuff. Danger; food riots any moment. Situation horrible, can’t describe. For Gods sake help us...”

Hurricane Seasonal Forecasting

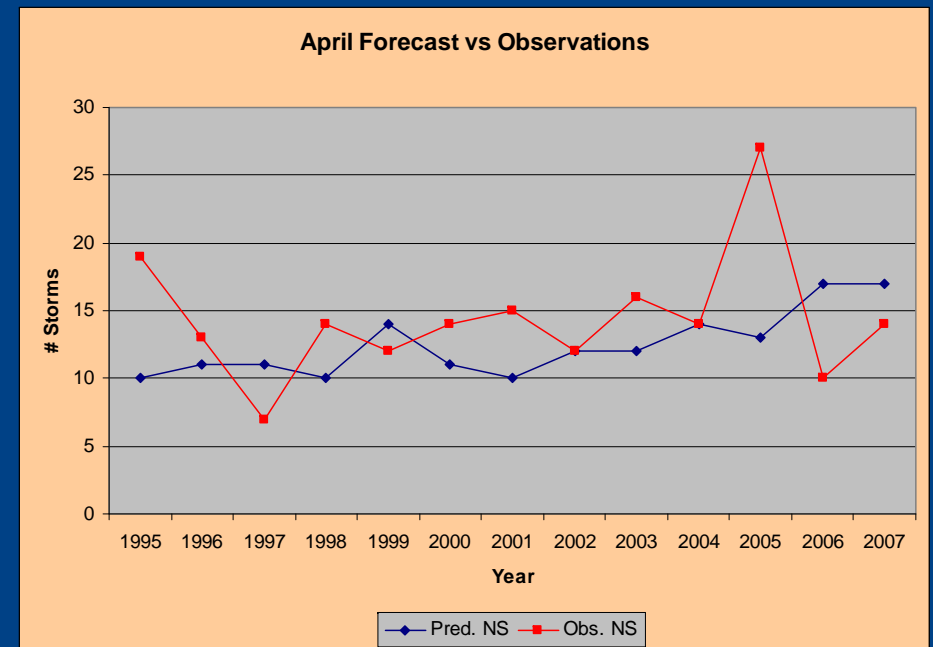
- Since the mid 1990's there has been a notable increase in hurricane activity across the Atlantic Basin.
- This is reflected not only in the number of storms per year but also the general strength of the systems as well.
- As a result a great deal of media attention has been placed on Seasonal Hurricane Forecasts.

Hurricane Seasonal Forecasting

- The last two hurricane seasons have failed to live up to expectations presented in the media
- Have the forecasts been that bad?

Hurricane Seasonal Forecasting

- The correlation for the April Forecast is -0.12
- Not much skill in the number of storms but if just looking at active vs. inactive years the skill improves dramatically.
- 8 out of 13 years the correct trend was identified (62%).



Forecast and Verification
Data Provided by CSU

Hurricane Season Forecasting

- Looking at just the last few years (2004-2007) to see why CSU is expected to be correct on their forecasts...

	F TC	# TC	F H	# H	F IH	# IH
2004	14	14	8	9	3	6
2005	15	26	8	14	4	7
2006	17	9	9	5	5	2
2007	17	14-15	9	6	5	2

How did the forecasts verify?

- In 2004 and 2005 CSU provided a good forecast on the number and intensity of storms
- In 2006 their forecast was overstated by nearly a factor of 2
- Their 2007 forecast was fairly good and only off by 2 or 3 storms (Andrea) but was off by 3H and 3IH. Still a good forecast though

Why are they getting beaten up in the press?

- Being directionally correct for the last 3 of 4 years should bring praise but CSU has been getting pummeled
- Expectations are for perfect forecasts with the assumption that an active season is also a destructive one
- CSU does not forecast track, strength or timing of any storm they just give basin wide numbers

Why are they getting beaten up in the press?

- We (user groups and media) are more to blame for the perceived missed forecasts
- An active hurricane season is not just determined by the number of storms
- Factors that determine an active/inactive season
 - Where does it go
 - How strong and large is it
 - How fast is it moving
 - How much time did it spend over open water

Inactive season of 1900

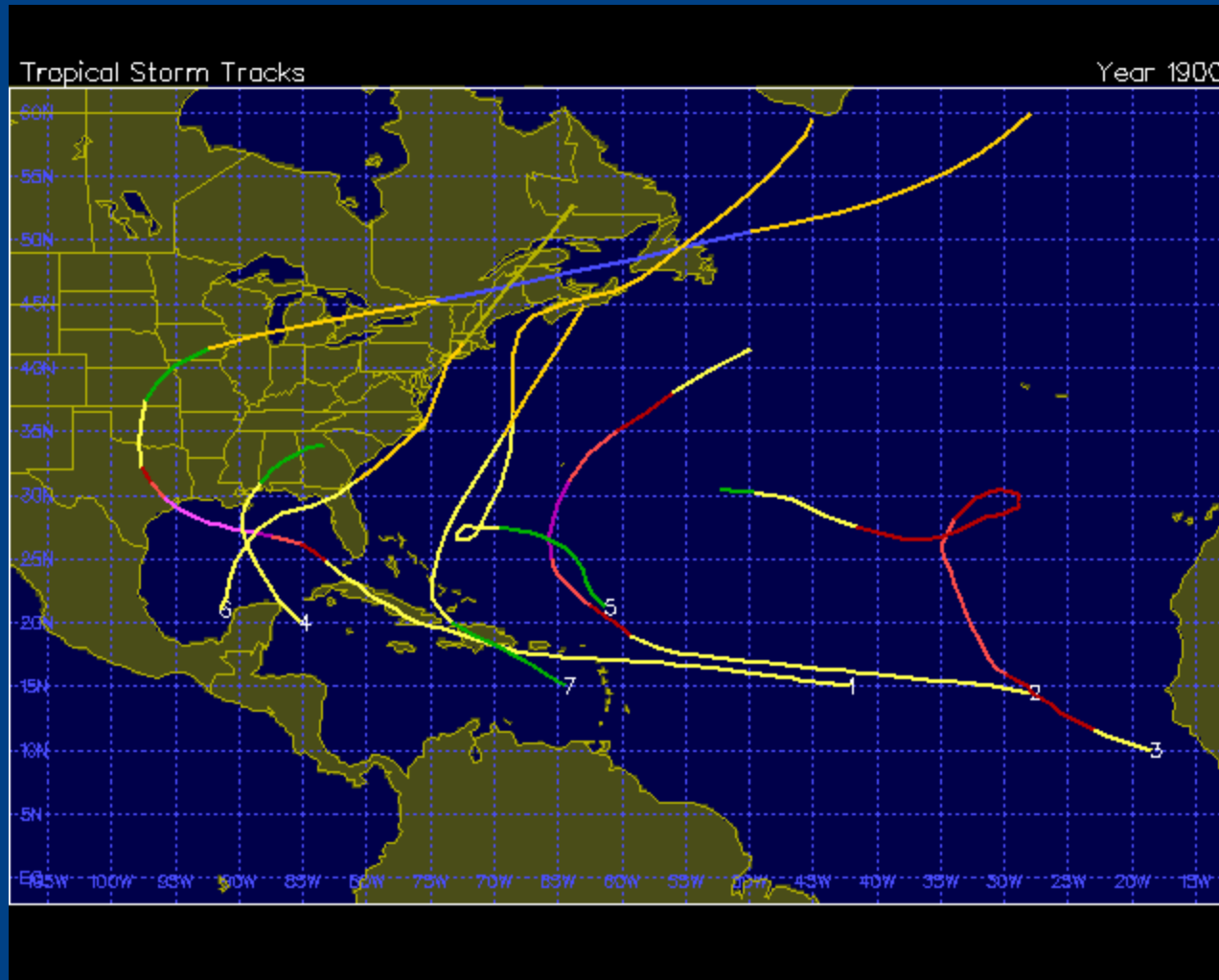


Image provided by
www.weather.unisys.com

Inactive season of 1983

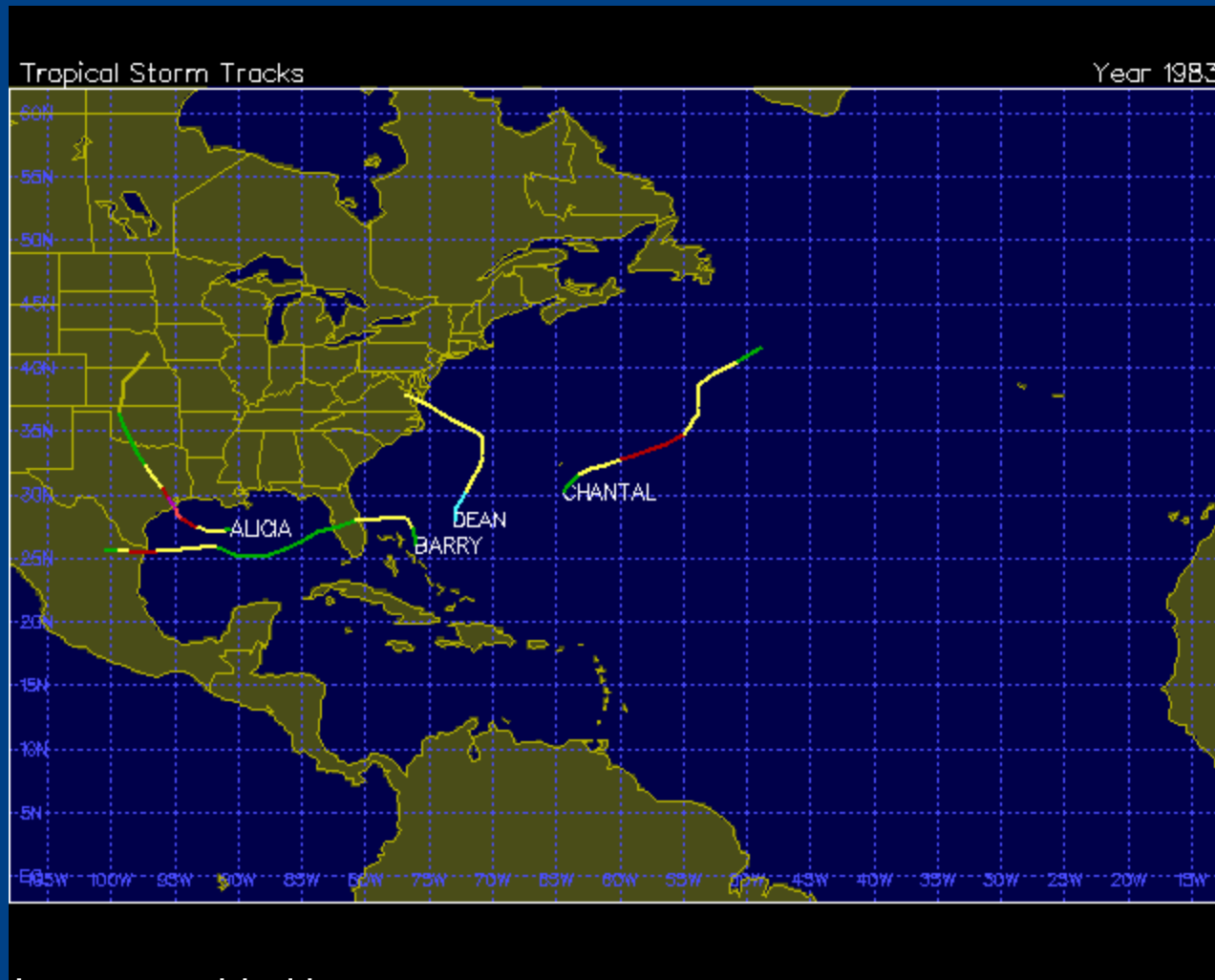


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Inactive season of 1992

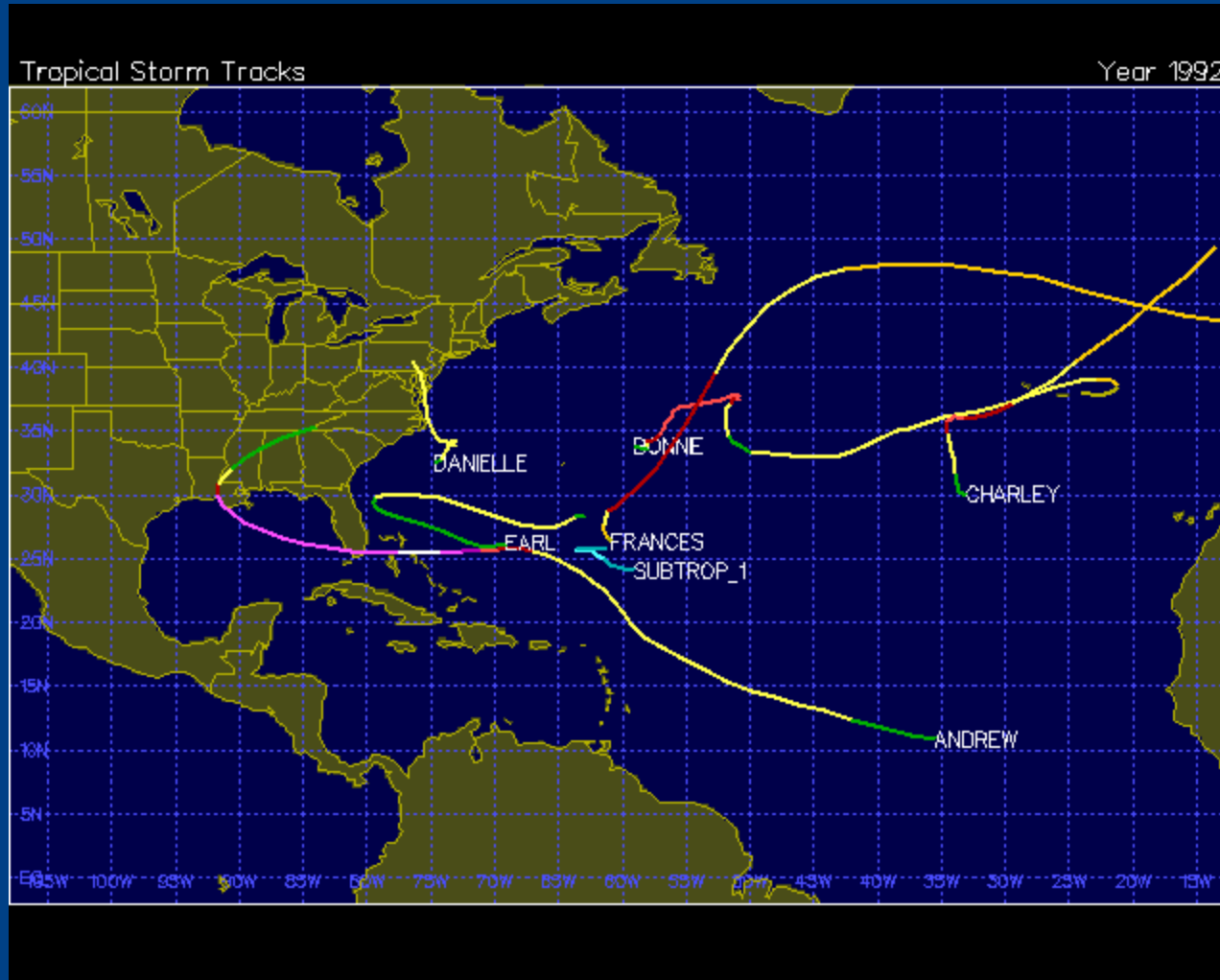


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Inactive season of 2007?

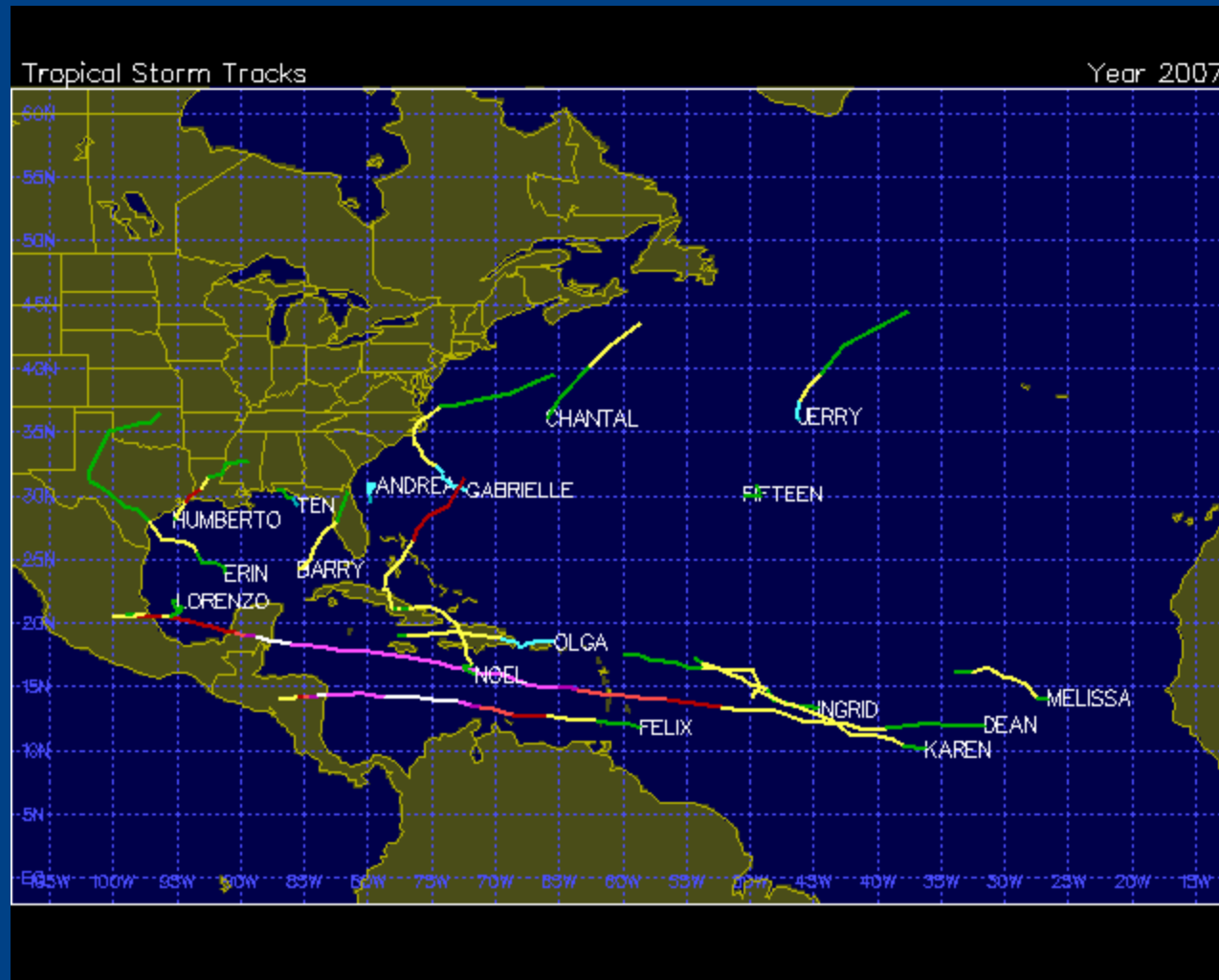


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www.weather.unisys.com

Why are they getting beaten up in the press?

- CSU does not deserve the bad press.
- The user groups are trying to derive information (US destructive potential) from a forecast that is simply not there.
- That mistake leads to dangerous assumptions that public and private entities use in setting insurance rates, emergency response protocol and business planning.

What are they saying for '08

- 13 named storms (9.6)
- 7 hurricanes (5.9)
- 3 intense hurricanes (2.3)

- CSU is forecast another above normal season

<http://typhoon.atmos.colostate.edu/Forecasts/2007/dec2007/dec2007.pdf>

How should a the CSU Forecast be used?

- The CSU forecast should be used as any seasonal forecast is; with caution
- It is simply a well researched group making an above, below or normal prediction on the number of tropical cyclones
- Nothing is implied on strength, landfall, strength or size at landfall of any storm; simply the season as a whole.

How are Hurricanes Forecast

- Forecasting an active hurricane is similar to following the lanes of a highway.
- The features generally follow the mid to upper level winds once developed.
- This places them on the classic westerly track across the Central Ocean but closer to North America that stable easterly flow is disrupted.

How are Hurricanes Forecast

- The intensity of a Hurricane is much more complicated vs. the track.
- The intensity depends on moisture content of the atmosphere, wind shear, water temperatures and the depth of the water, interaction with land, nearby upper level weather features and the speed of the system.
- This is where sophisticated computer models begin to take over.

The Hurricane Model Suite

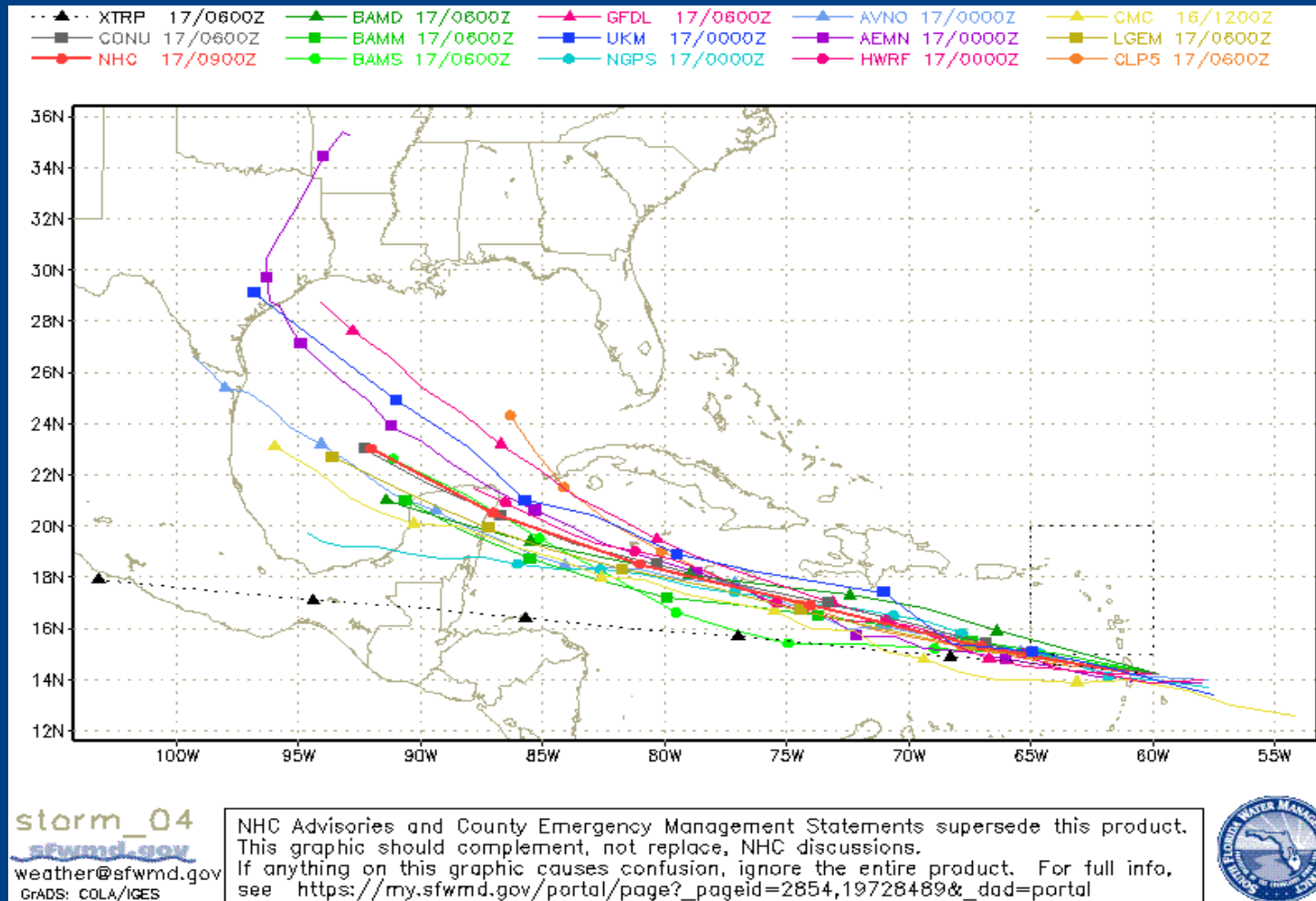
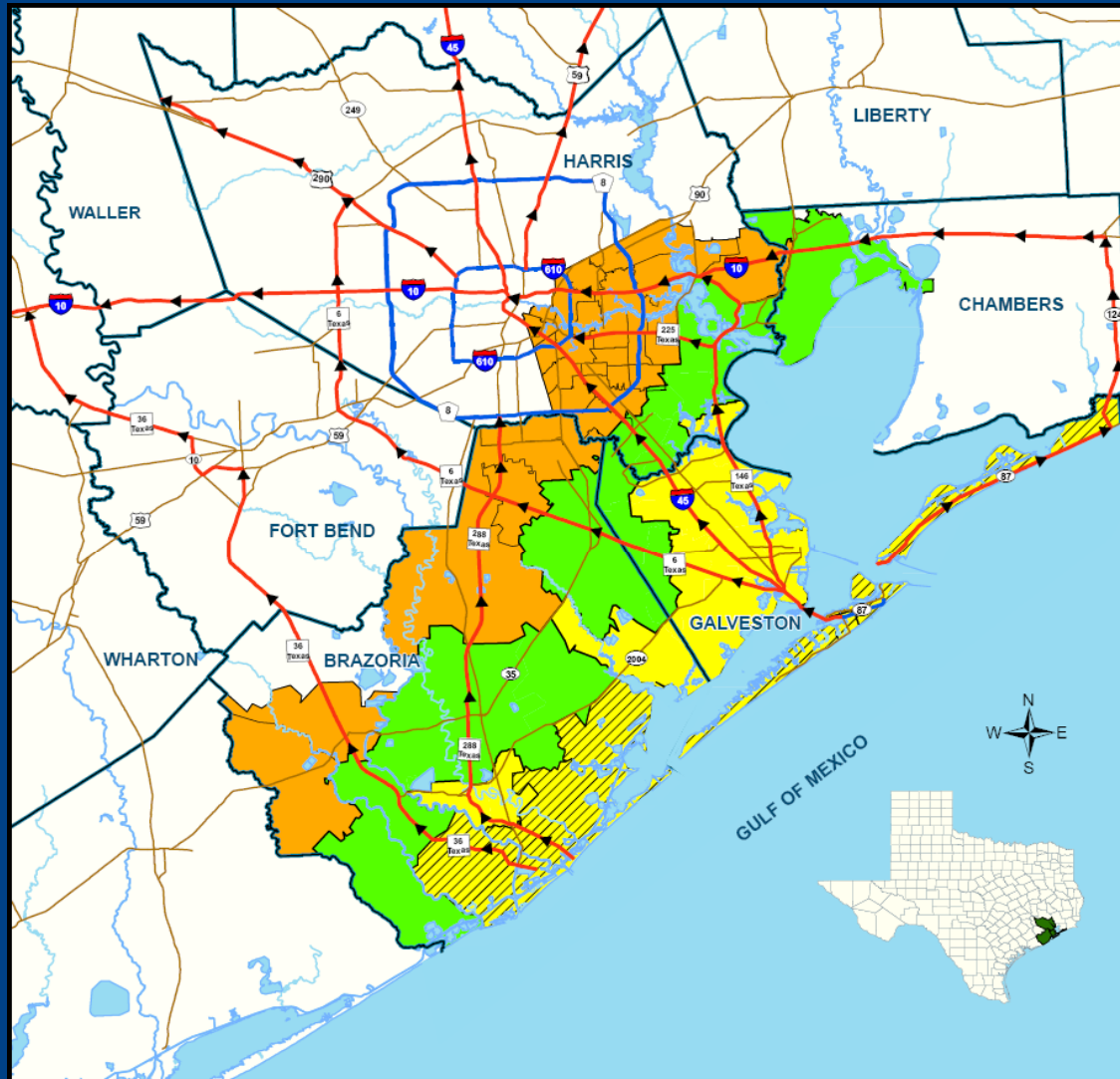


Image provided by South Florida Water Management

Who Evacuates Houston?



Brazoria/Galveston/Harris County
Hurricane Evacuation
Zip-Zones Coastal, A, B and C

Route Designation

- Evacuation Corridors
- Feeder to the Evacuation

Zip-Zone Coastal

77541	77550	77551	77554	77617
77623	77650			

Zip-Zone A

77510	77518	77531	77539	77563
77565	77586	77568	77573	77577
77586	77590	77591		

Zip-Zone B

77058	77059	77062	77422	77507
77511	77515	77517	77520	77534
77546	77571	77598		

Zip-Zone C

77011	77012	77013	77015	77017
77023	77029	77034	77049	77061
77075	77087	77089	77480	77486
77502	77503	77504	77505	77506
77521	77530	77536	77547	77562
77578	77581	77583	77584	77587

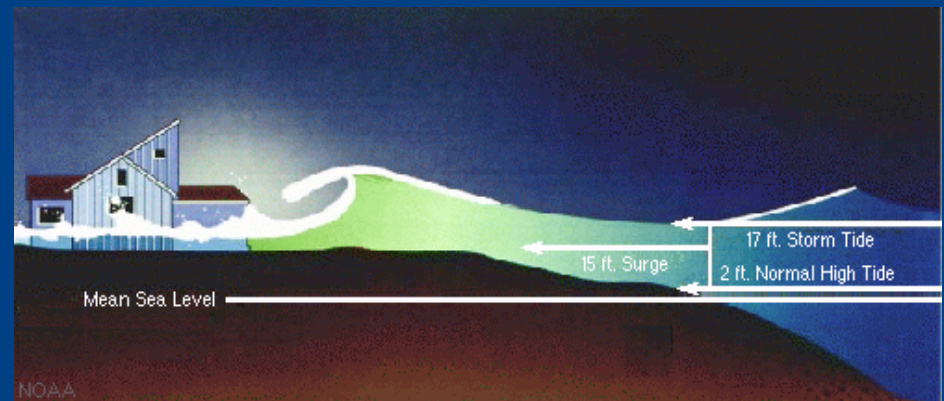


May 2007

Image provided by Harris
County OEMT/FEMA

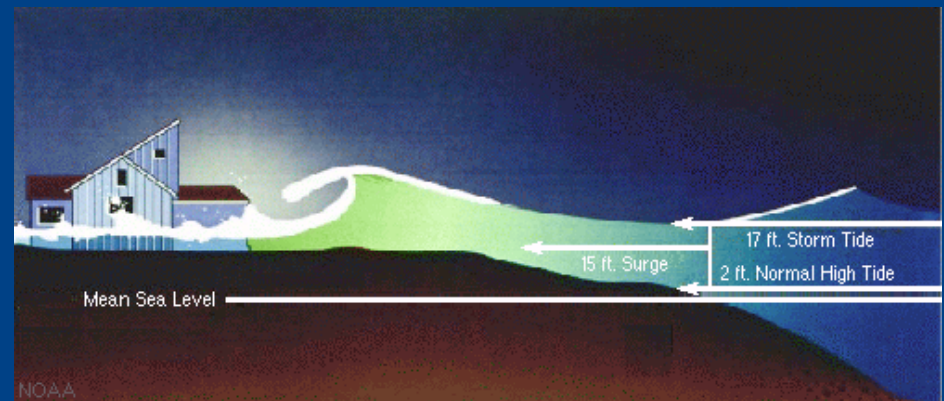
Why?

- The ***storm surge*** is the most damaging part of the hurricane
- It is a mass of water that is pushed by the wind field of the hurricane.
- As the storm nears the coast this mass of water is forced up the coastal shelf.
- Besides the surge itself, wind driven waves (on top of the surge) add to the damage potential.



Why?

- If you live in an inundation region you only have one choice but to evacuate!
- Wind driven waves can be $\frac{2}{3}$ the water depth; 15 foot surge = 10 foot waves which equally 25 foot ***storm tide***.



Why should everyone else remain?

- You only need to evacuate if you are threatened by the surge.
- Areas further inland will see moderate winds but with the impact of **FRICION** retarding the surface winds there is little need to flee.
- Inland wind speeds are greatly misunderstood and are always over-forecast.
- Friction can reduce the winds by 50 to 70% vs. open waters so Katy, Sugar Land and Spring have little reason to evacuate.