

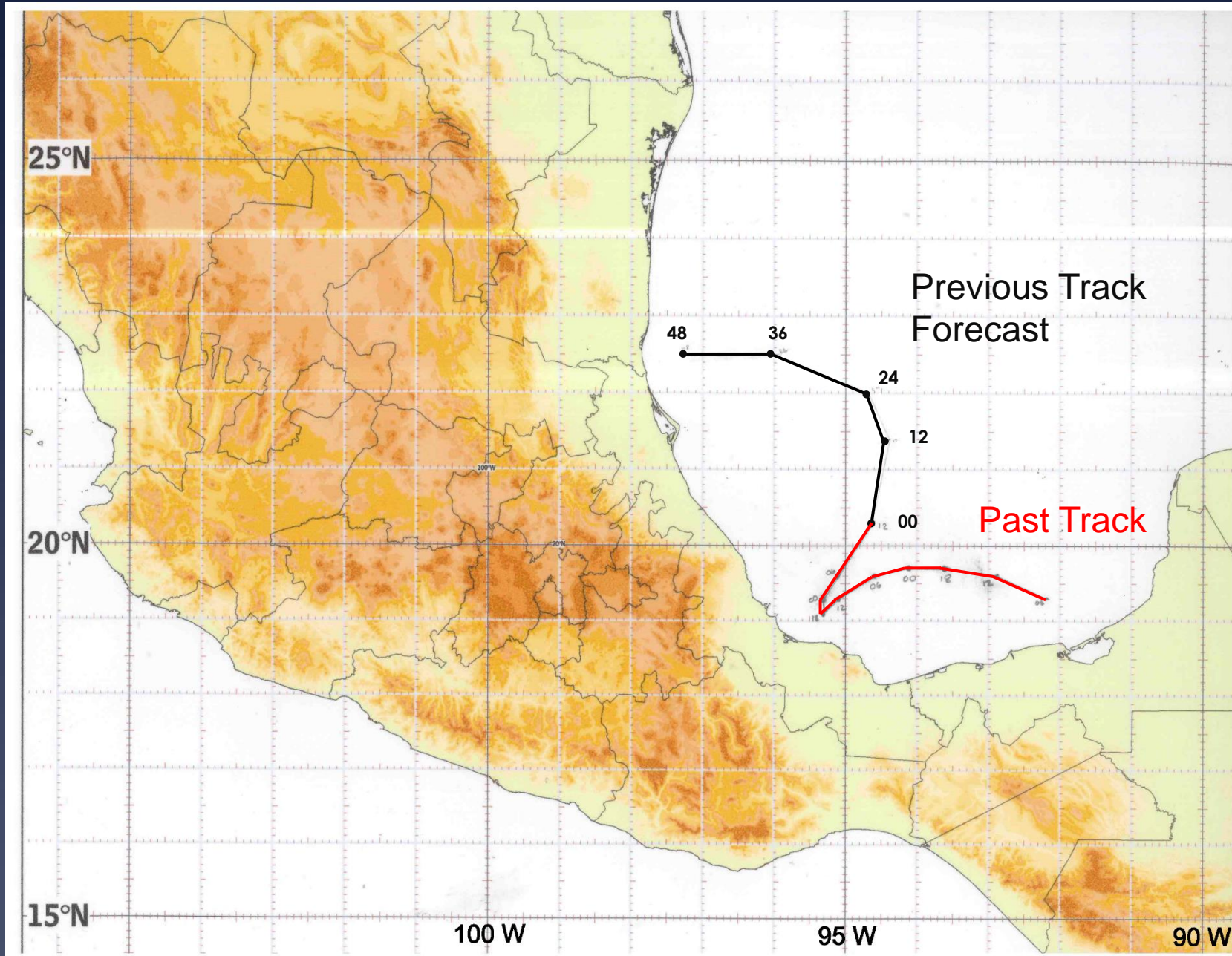
# Track Forecasting Exercise

2018 WMO RA-IV Workshop  
March 7, 2018

# Track Forecasting Exercise

- You are given 48-h model forecast tracks for a hurricane in the Bay of Campeche.
- You are also given 850 mb vorticity, 500mb height, and 200mb wind fields for the members of the multimodel consensus (GFS, ECMWF, UKMET, HWRF, GFDL)
- Using this information, make a 12-, 24-, 36-, and 48-h track forecast for the hurricane. Provide a latitude and longitude position (to the nearest tenth of a degree), and compute the storm motion at each forecast hour. Plot your forecast on the map provided.
- Will the hurricane make landfall in the next 48 hours? And if so, where?
- Is it time to issue a Hurricane Warning?

# Track Forecast Map



# Track Forecast Worksheet

National Hurricane Center Advisory Composition Worksheet

Cyclone Name	ATCF ID	Adv #	Special	Last	Date	Time (UTC)	Forecaster(s)
Hurricane WMO	ALXX2018	XX	<input type="checkbox"/>	<input type="checkbox"/>	7 March 2018	1800	
Watches and Warnings	Hurricane Watch: North of Cabo Rojo to La Pesca						
Hazards Statements	<input type="checkbox"/> Storm Surge						
	<input type="checkbox"/> Rainfall						
	<input type="checkbox"/> Tornadoes						
Notes							

Fcst Hr	Date/Time (UTC)	Lat (°N)	Lon (°W)	Dir/Spd (deg/kt)	Pres (mb)	Wind (kt)	Gusts (kt)	Status	Wind Radii (nm)				
									kt	NE	SE	SW	NW
0	07 / 00 06 12 18	21.0	94.4		1006	65	80	HU	34	70	80	40	40
									50	40	20	0	20
3	07 / 03 09 15 21								64	20	0	0	0
		miles / km of							12'				
12	08 / 12 18 00 06								34				
									50				
									64				
24	08 / 00 06 12 18								34				
									50				
									64				
36	09 / 12 18 00 06								34				
									50				
									64				
48	09 / 00 06 12 18								34				
									50				

Will the storm make landfall within 48 hours? (Yes or No) \_\_\_\_\_

If yes, what is your forecasted landfall position? (Lat/Lon) \_\_\_\_\_

If the storm is forecasted to remain the same intensity and size, is it time to issue a Hurricane Warning? (Yes or No) \_\_\_\_\_

# Part 1:

## Compute the initial Storm Motion

# How to compute the storm motion

Unit Conversions:

1 kt = 1 n mi / h

1° latitude = 60 n mi

1/60° latitude = 1 n mi

$$\text{Speed (kt)} = \frac{\text{distance (degrees)}}{\text{time (h)}} \times \frac{60 \text{ (n mi)}}{1 \text{ (degree)}}$$

Direction = Clockwise degrees departure from 0° (N)



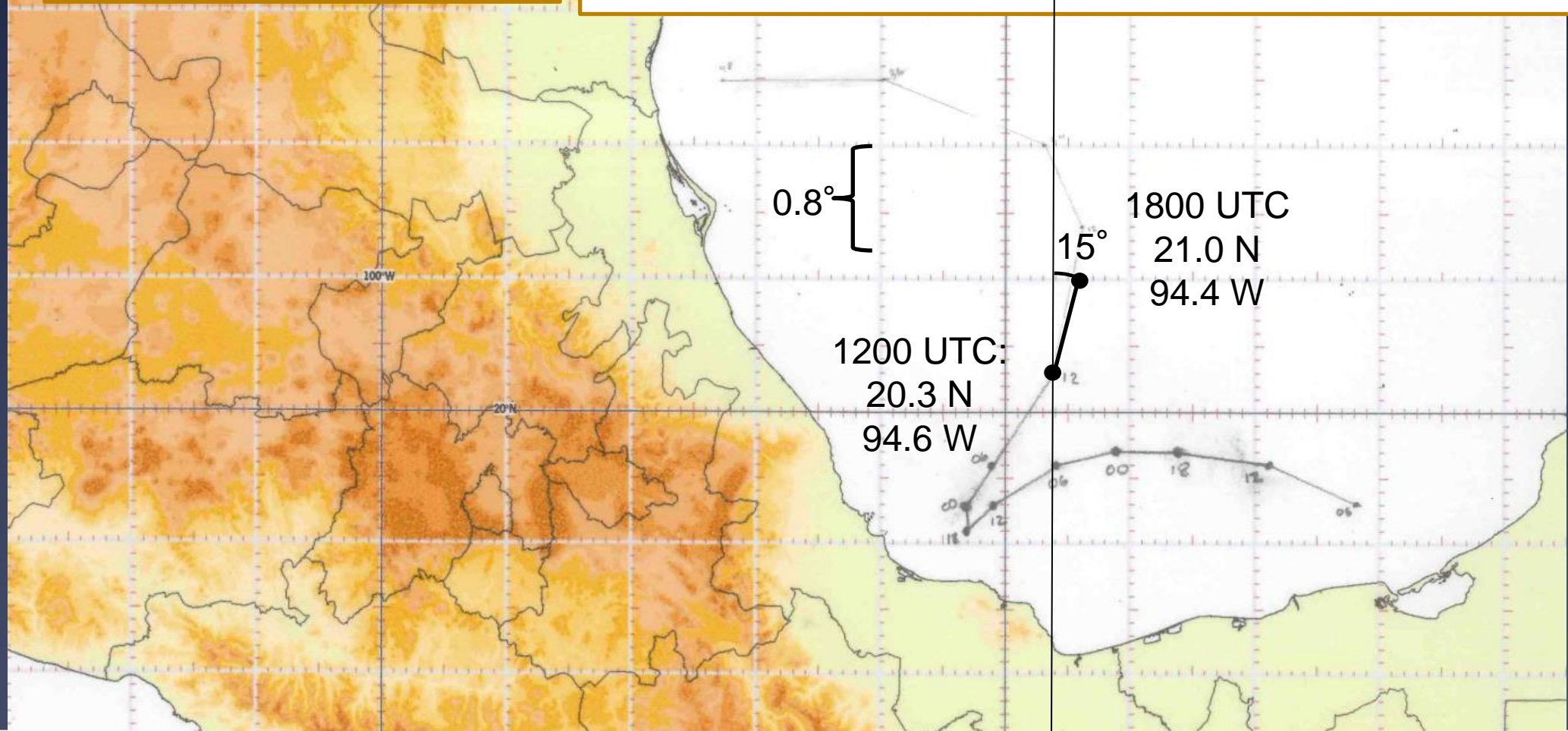


# Calculating the Initial Motion

Direction =  $15^\circ$

Motion Vector = 015/08

$$\text{Speed} = \frac{0.8 \text{ (degrees)}}{6 \text{ (h)}} \times \frac{60 \text{ (n mi)}}{1 \text{ (degree)}} = 8 \text{ kt}$$



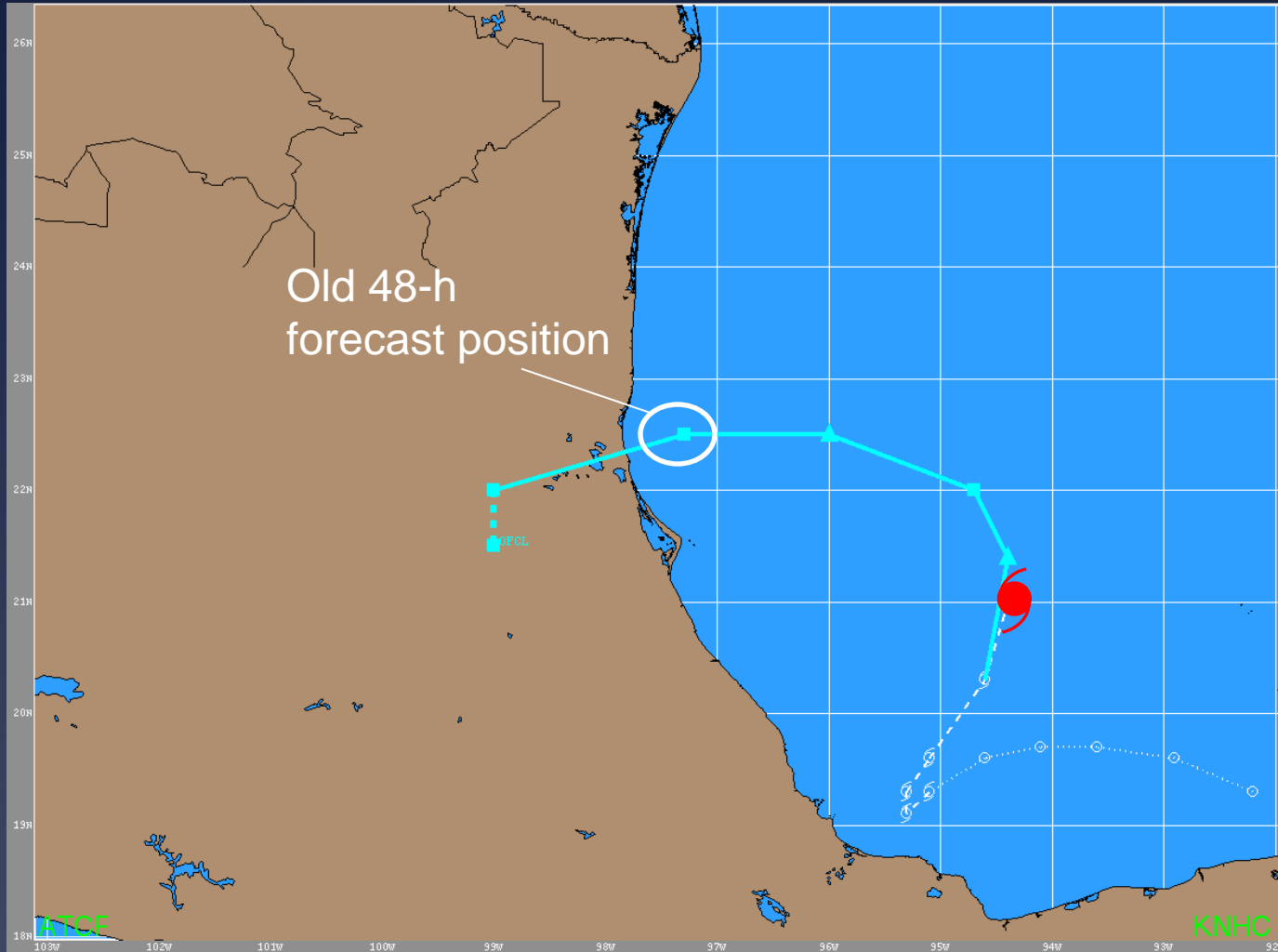
# Track Forecast Worksheet

Notes														
Fcst Hr	Date/Time (UTC)	Lat (°N)	Lon (°W)	Dir/Spd (deg/kt)	Pres (mb)	Wind (kt)	Gusts (kt)	Status	Wind Radii (nm)					
									kt	NE	SE	SW	NW	
0	<u>07</u> / 00 06 12 (18)	21.0	94.4	015/08	1006	65	80	HU	34	70	80	40	40	
									50	40	20	0	20	
3	<u>07</u> / 03 09 15 (21)	---	---	---	---	---	---	---	64	20	0	0	0	
		miles / km of							12'	---	---	---	---	
12	<u>08</u> / 12 18 00 (06)					---	---	---	34	---	---	---	---	
									50	---	---	---	---	
									64	---	---	---	---	
24	<u>08</u> / 00 06 12 (18)					---	---	---	34	---	---	---	---	
									50	---	---	---	---	
									64	---	---	---	---	
36	<u>09</u> / 12 18 00 (06)					---	---	---	34	---	---	---	---	
									50	---	---	---	---	
									64	---	---	---	---	



# Part 2: Make a Forecast

# Initial position, storm motion, and previous forecast



Position:

21.0 N  
94.4 W

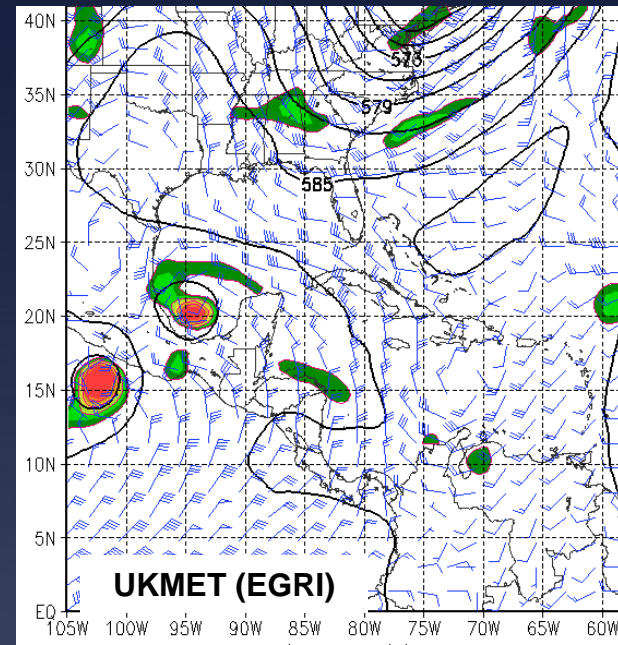
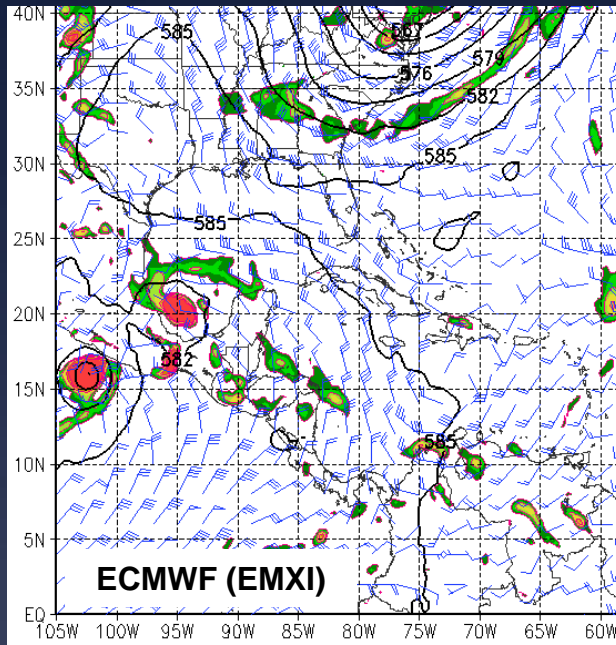
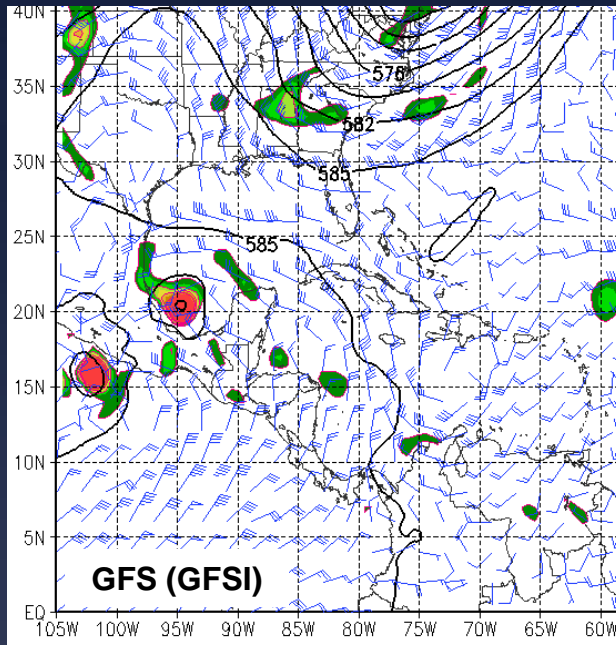
Motion:  
015° (NNE)  
8 kt

Intensity:  
65 kt

Previous Forecast:

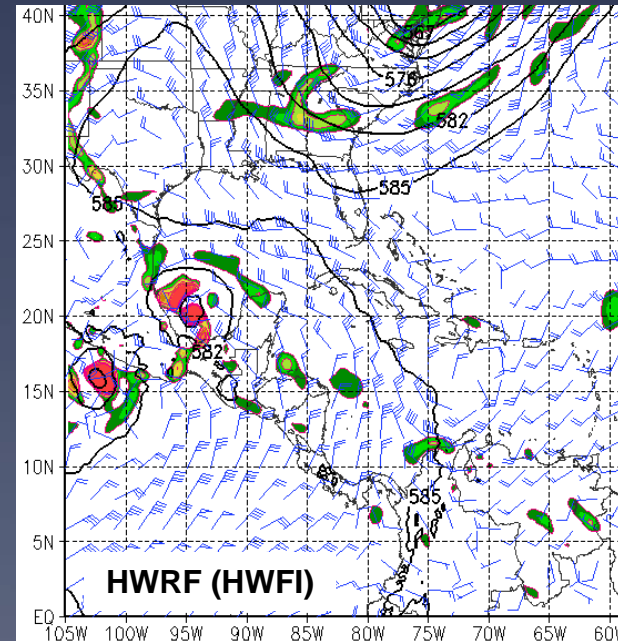
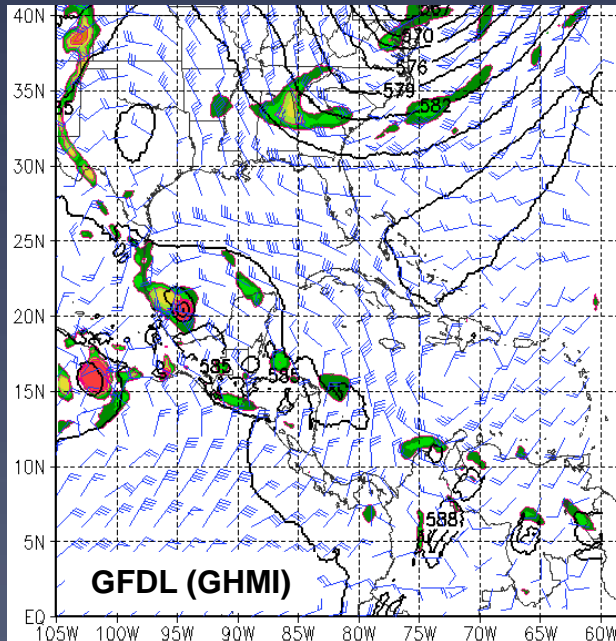
Fhr	Lat	Lon
12	21.4	94.4
24	22.0	94.7
36	22.5	96.0
48	22.5	97.3

# Initial model fields

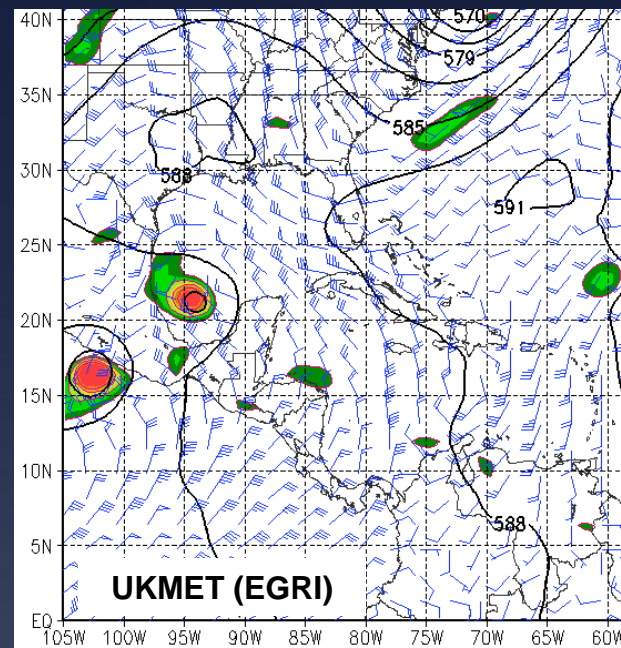
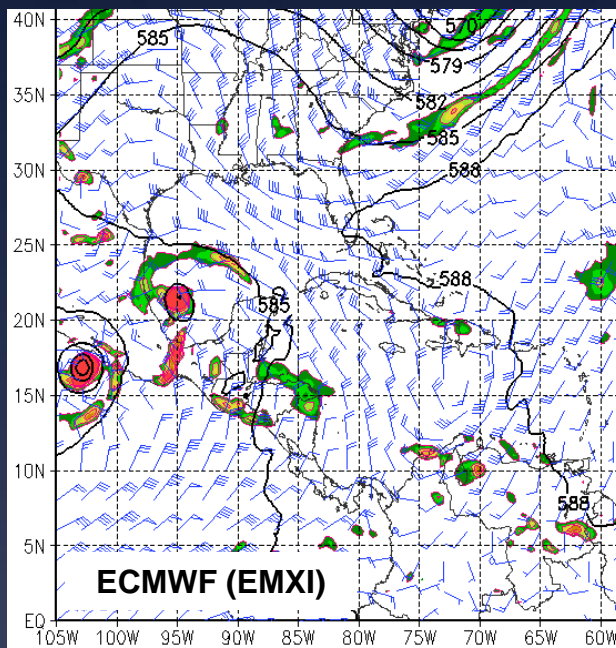
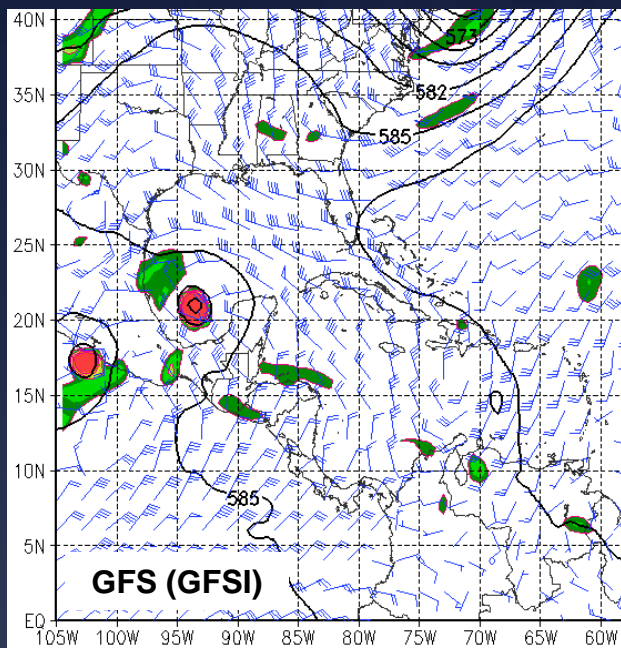


00-h forecasts of :

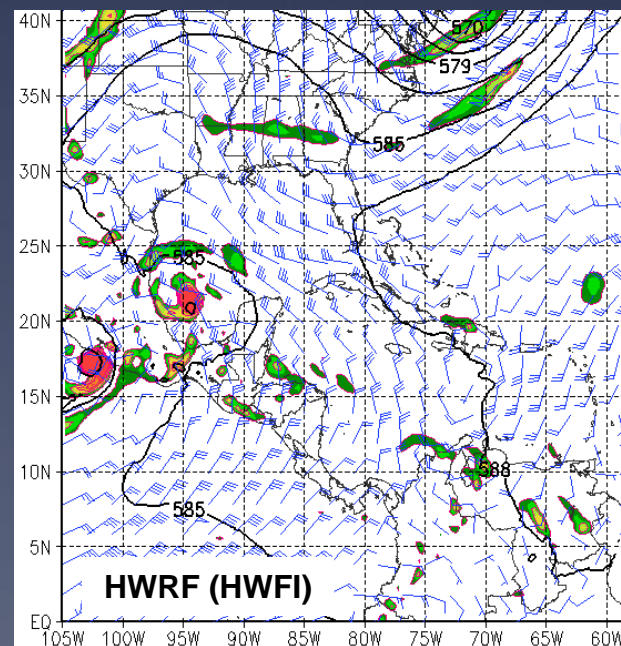
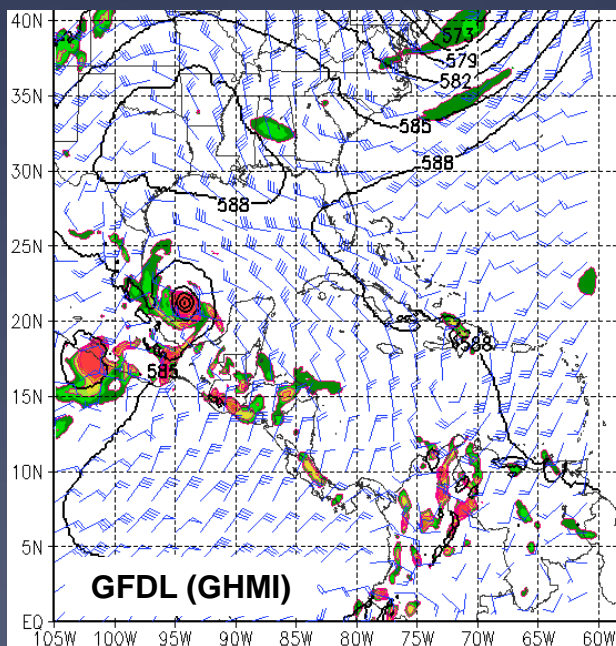
- 850mb relative vorticity (shaded,  $\times 10^{-5}/s$ ),
- 500mb geopotential height (black contours,  $\times 10m$ )
- 200mb wind vectors (blue barbs, kt)



# 12-h Model Forecast Fields

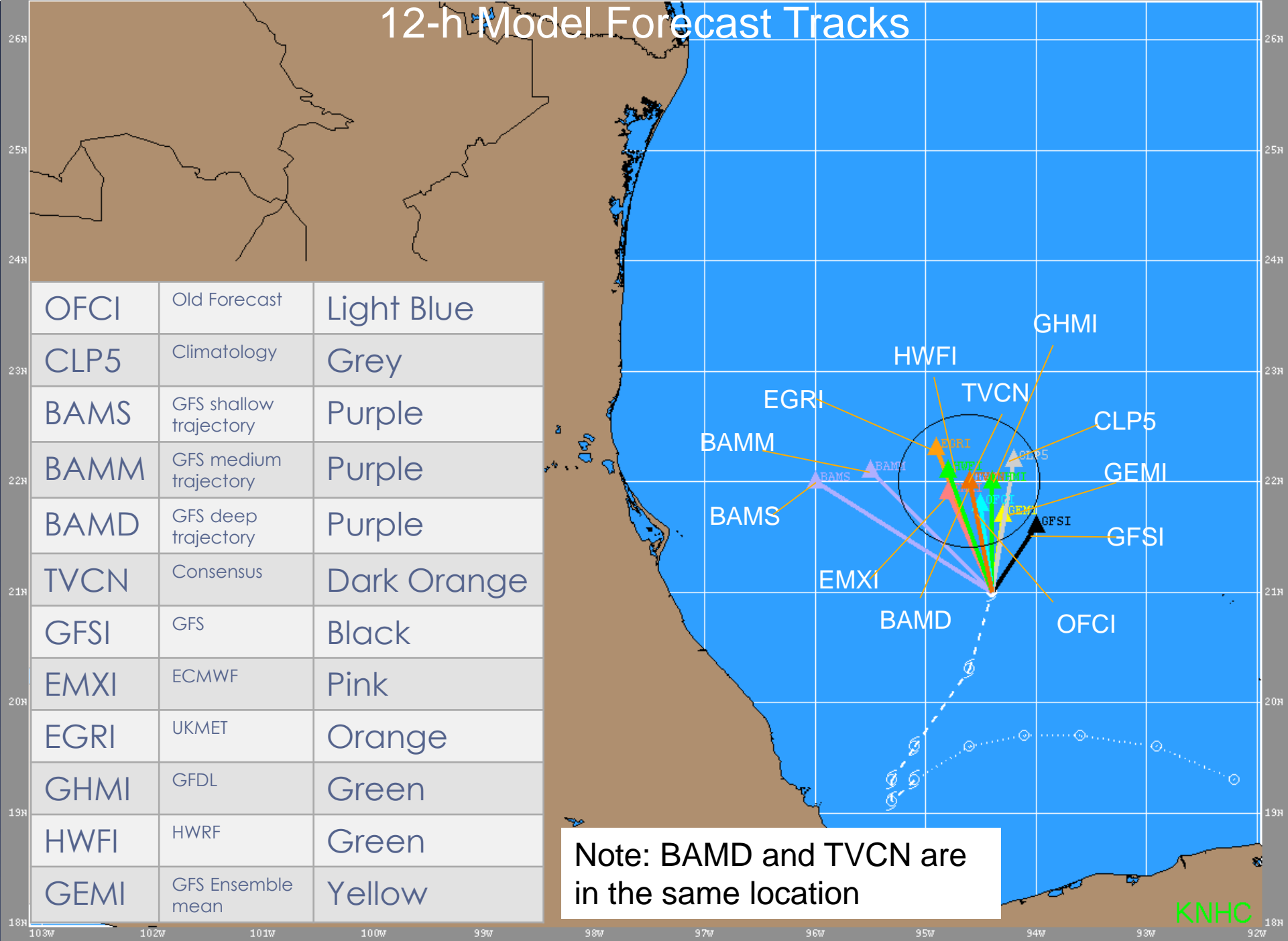


12-h forecasts of :  
- 850mb relative vorticity  
(shaded,  $\times 10^{-5}/s$ ),  
- 500mb geopotential  
height (black contours,  
 $\times 10m$ )  
- 200mb wind vectors  
(blue barbs, kt)



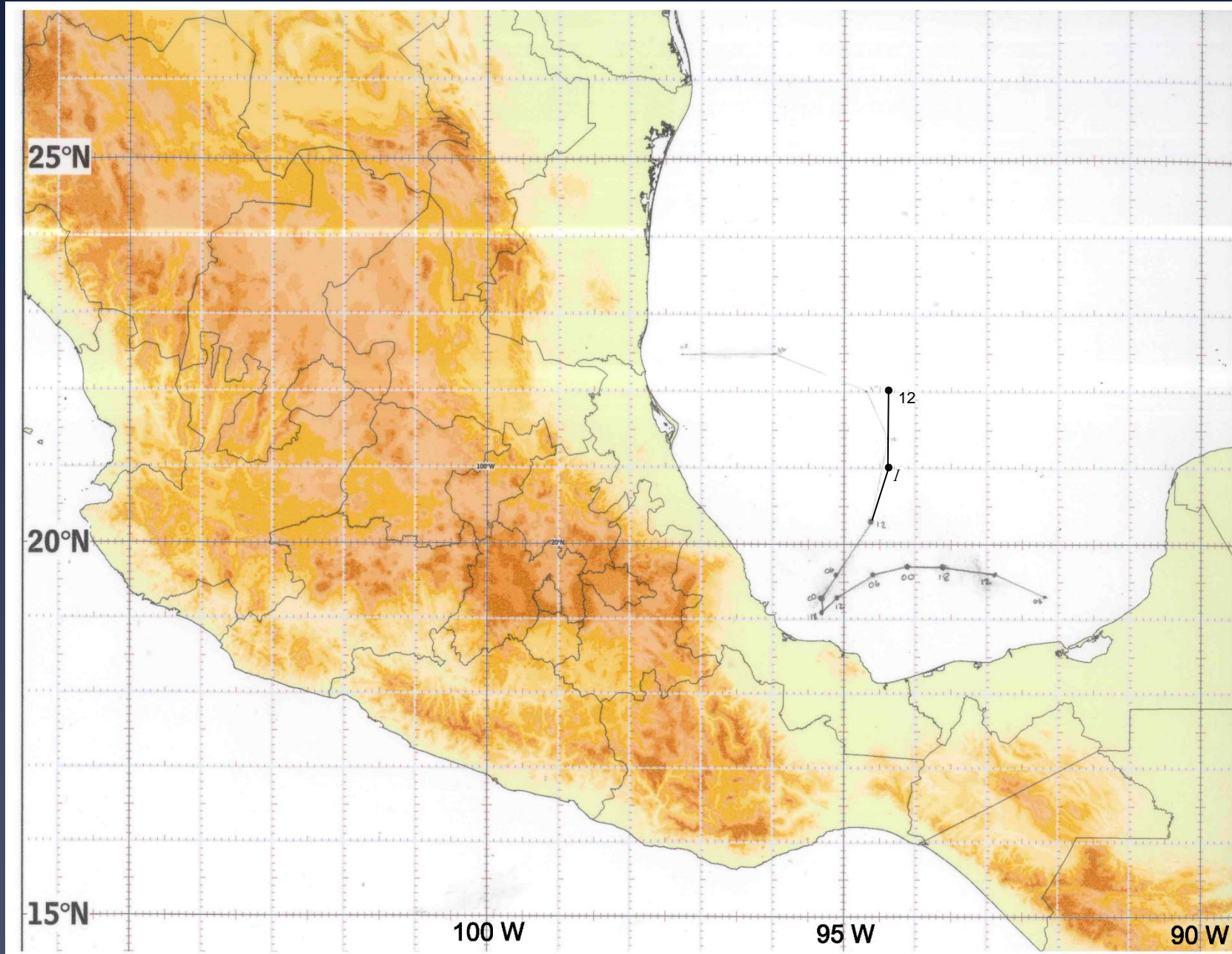


# 12-h Model Forecast Tracks





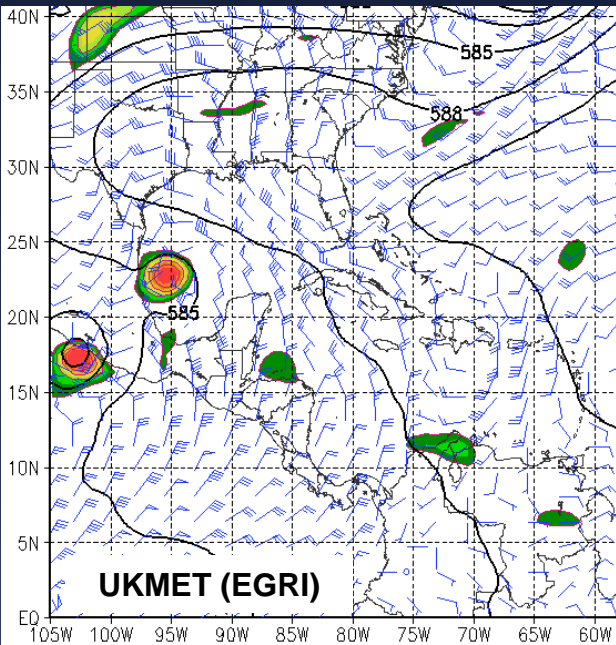
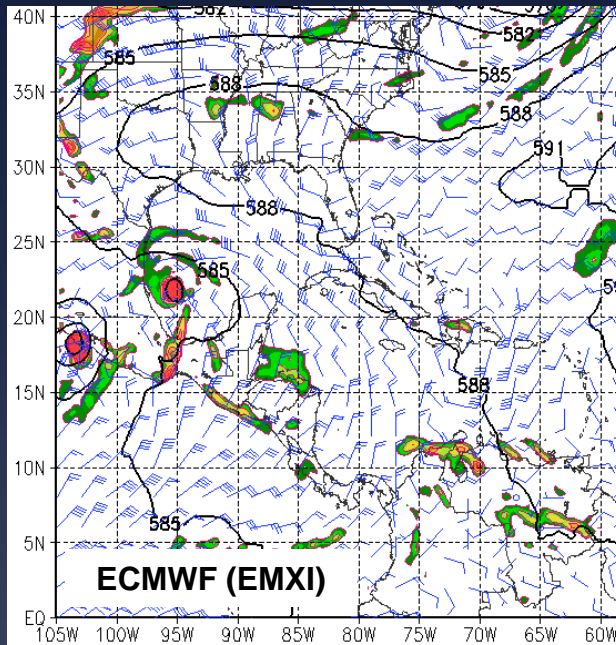
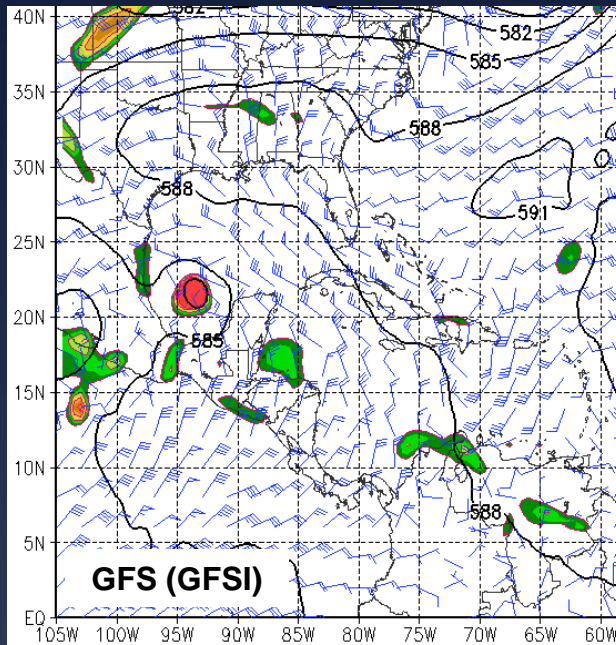
# Track Forecast Map



# Track Forecast Worksheet

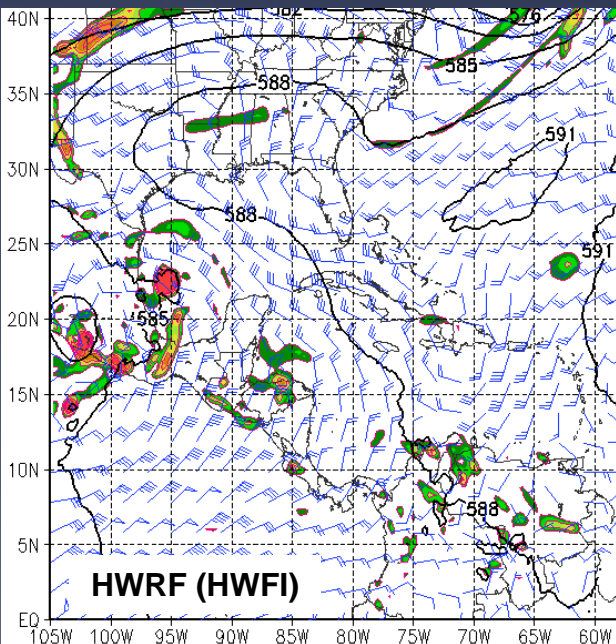
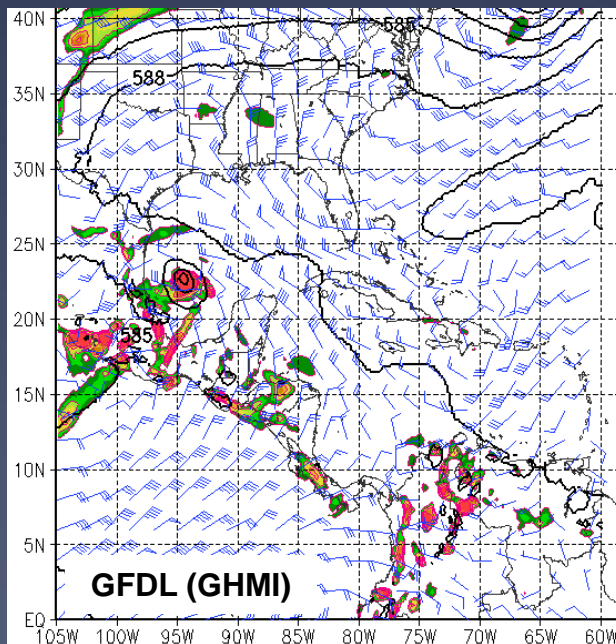
Notes														
Fcst Hr	Date/Time (UTC)	Lat (°N)	Lon (°W)	Dir/Spd (deg/kt)	Pres (mb)	Wind (kt)	Gusts (kt)	Status	Wind Radii (nm)					
									kt	NE	SE	SW	NW	
0	<u>07</u> / 00 06 12 (18)	21.0	94.4	015/08	1006	65	80	HU	34	70	80	40	40	
									50	40	20	0	20	
3	<u>07</u> / 03 09 15 (21)	---	---	---	---	---	---	---	64	20	0	0	0	
		miles / km of							12'	---	---	---	---	
12	<u>08</u> / 12 18 00 (06)	22.0	94.4	000/05		---	---	---	34	---	---	---	---	
									50	---	---	---	---	
									64	---	---	---	---	
24	<u>08</u> / 00 06 12 (18)					---	---	---	34	---	---	---	---	
									50	---	---	---	---	
									64	---	---	---	---	
36	<u>09</u> / 12 18 00 (06)					---	---	---	34	---	---	---	---	
									50	---	---	---	---	
									64	---	---	---	---	

# 24-h Model Forecast Fields



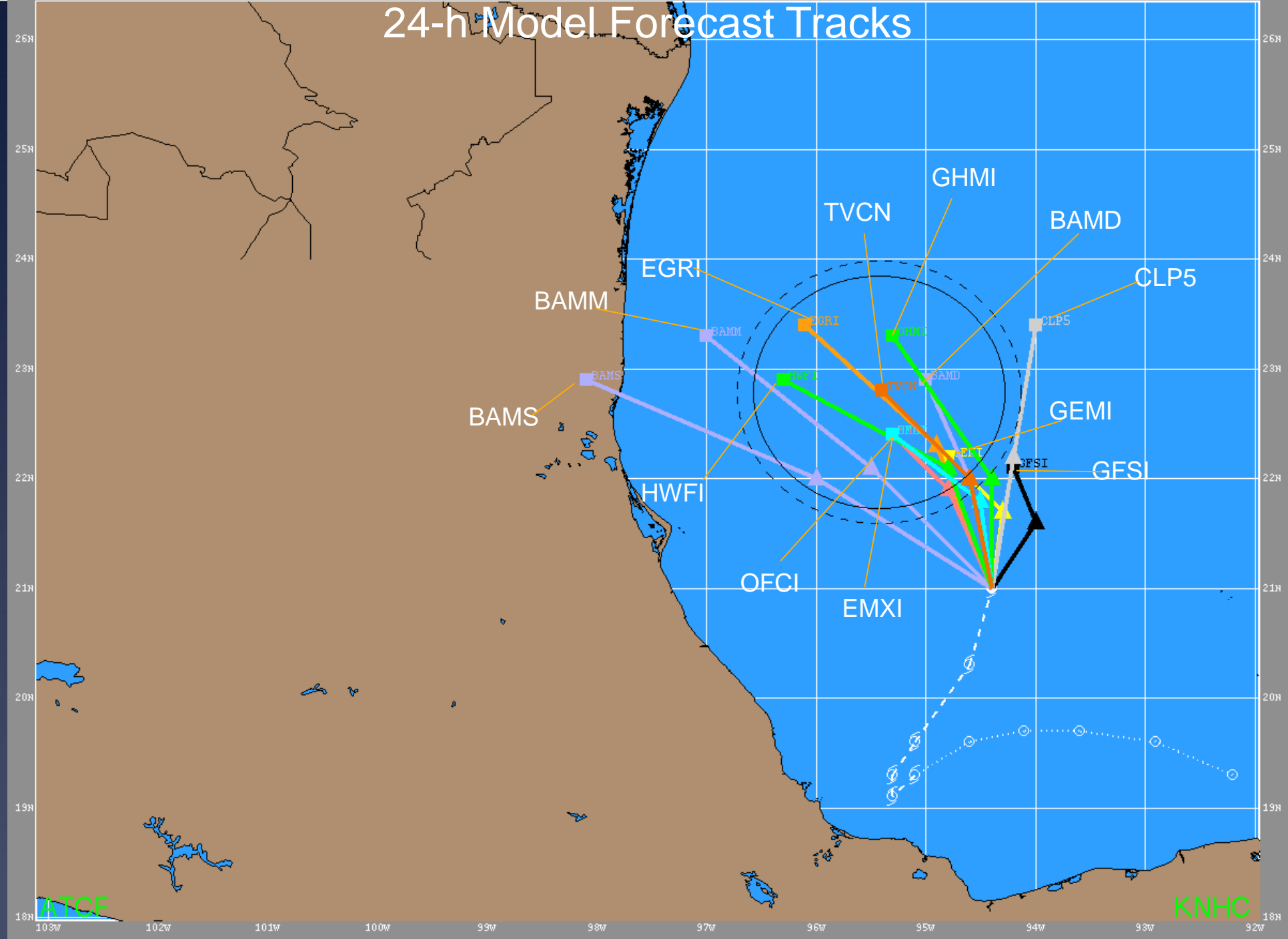
24-h forecasts of :

- 850mb relative vorticity (shaded,  $\times 10^{-5}/s$ ),
- 500mb geopotential height (black contours,  $\times 10m$ )
- 200mb wind vectors (blue barbs, kt)

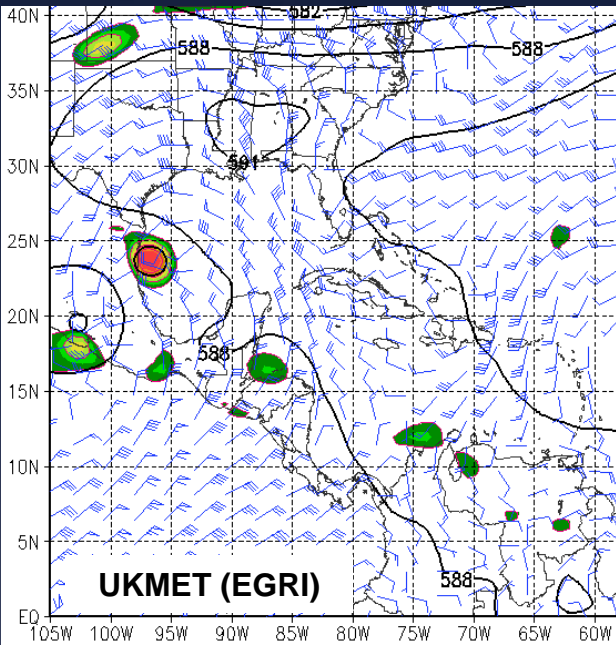
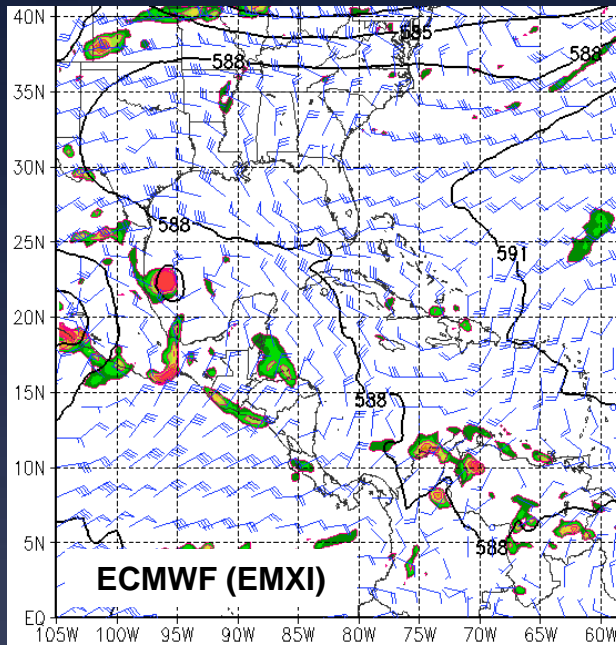
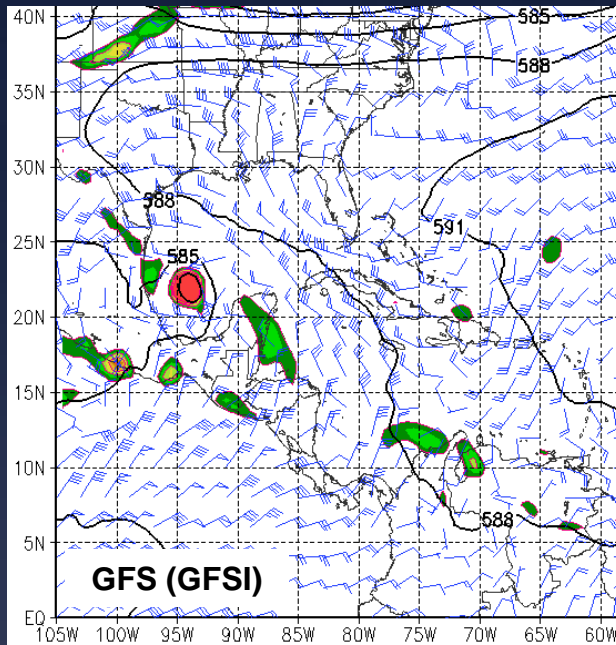




# 24-h Model Forecast Tracks

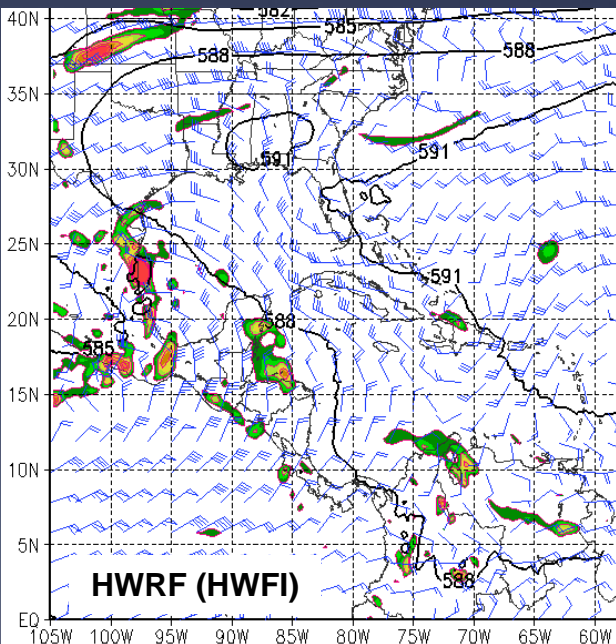
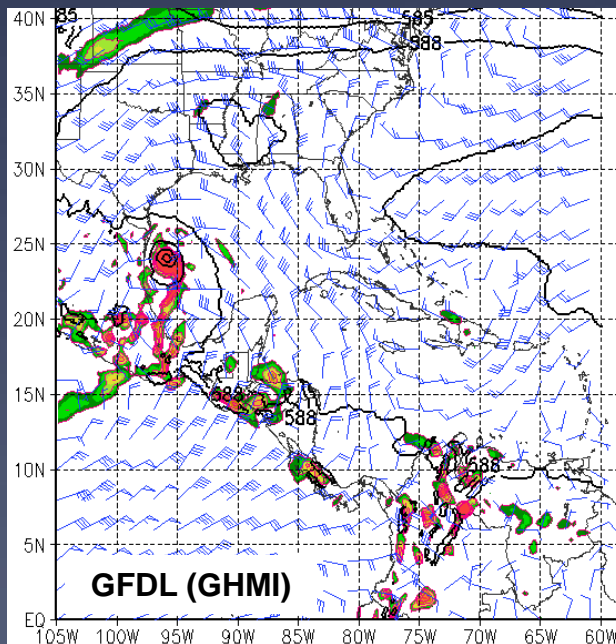


# 36-h Model Forecast Fields



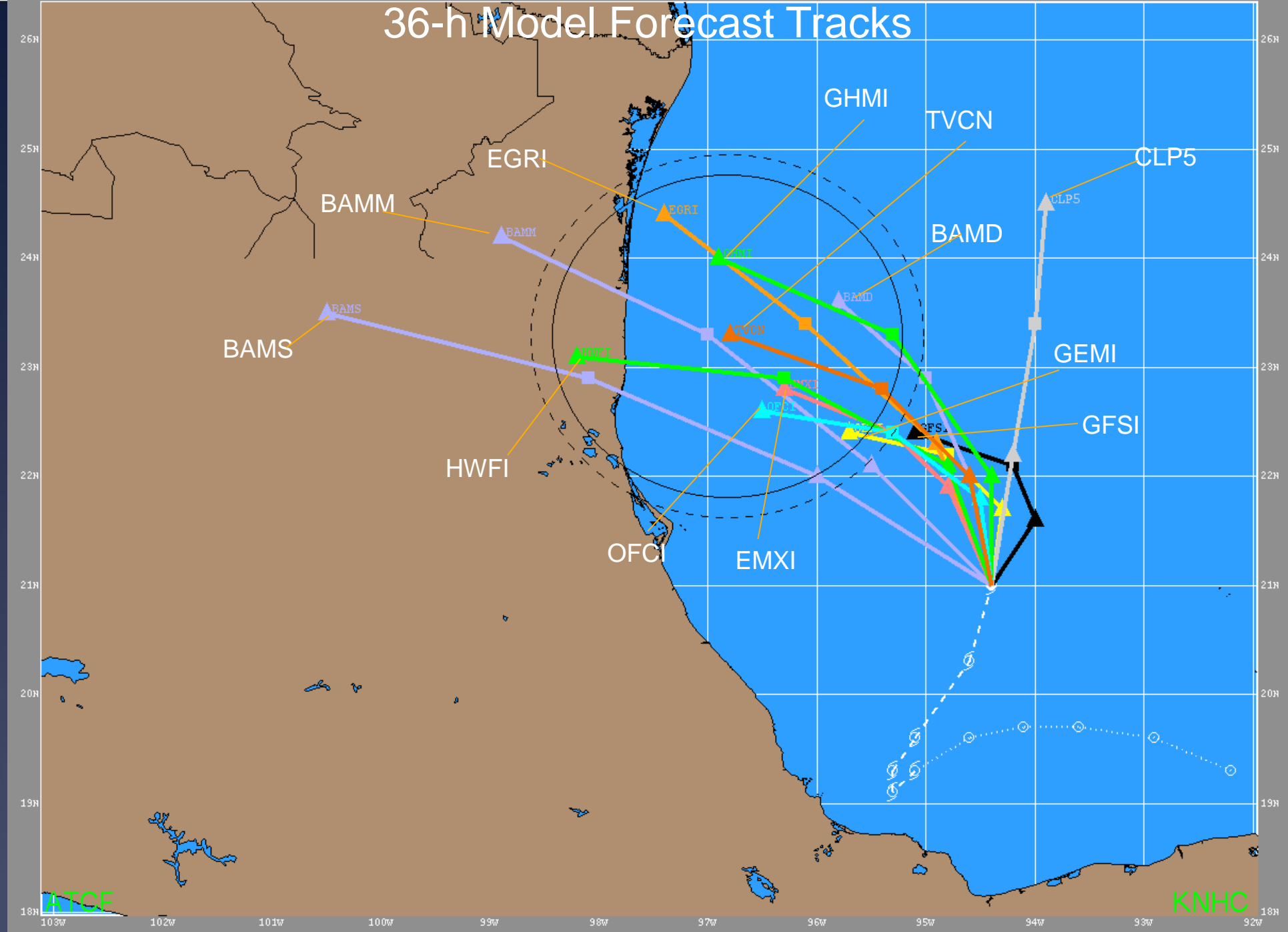
36-h forecasts of :

- 850mb relative vorticity (shaded,  $\times 10^{-5}/s$ ),
- 500mb geopotential height (black contours,  $\times 10m$ )
- 200mb wind vectors (blue barbs, kt)

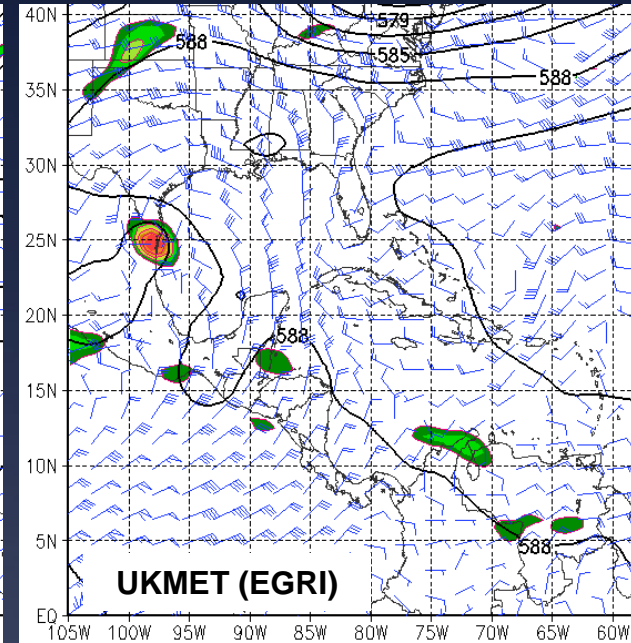
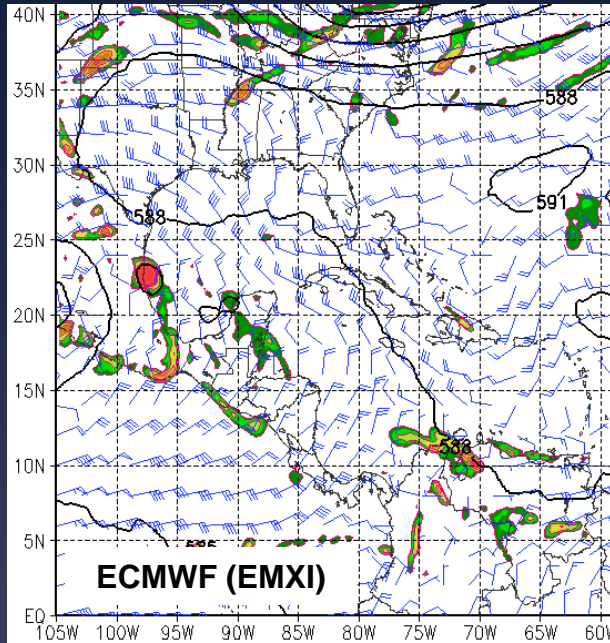
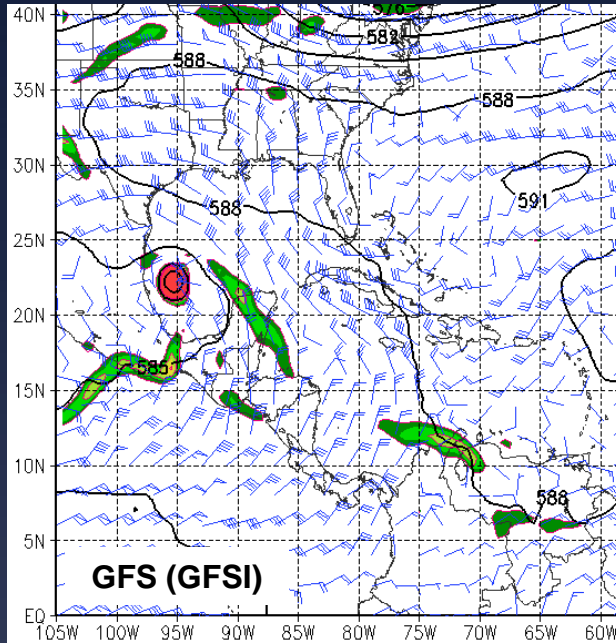




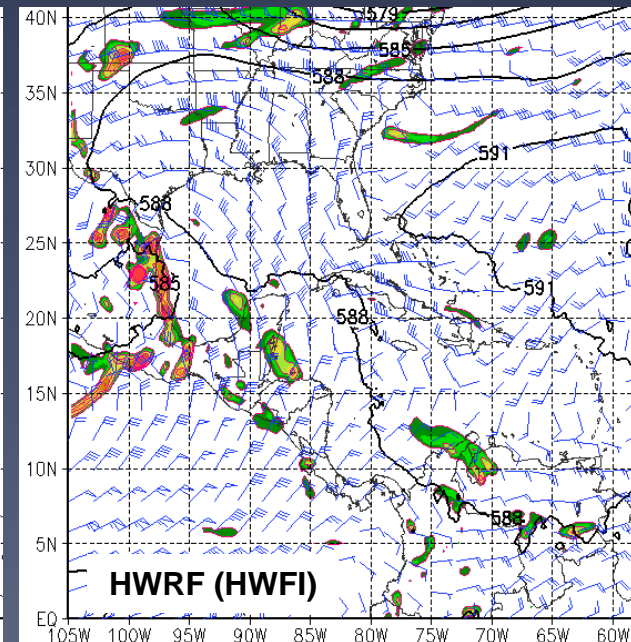
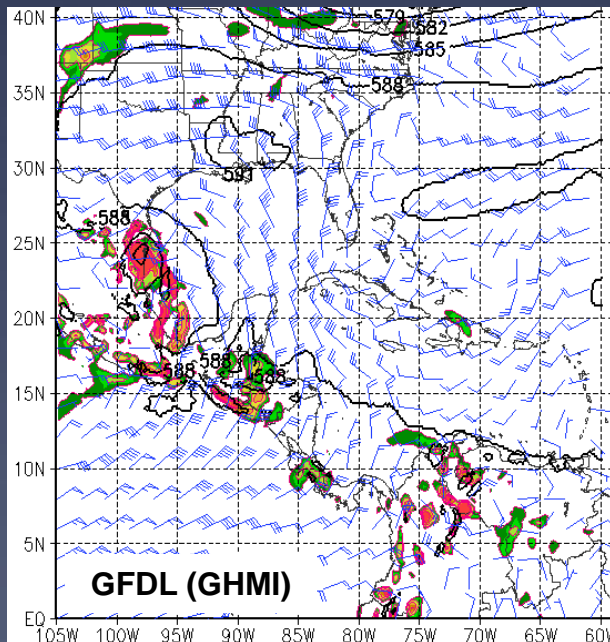
# 36-h Model Forecast Tracks



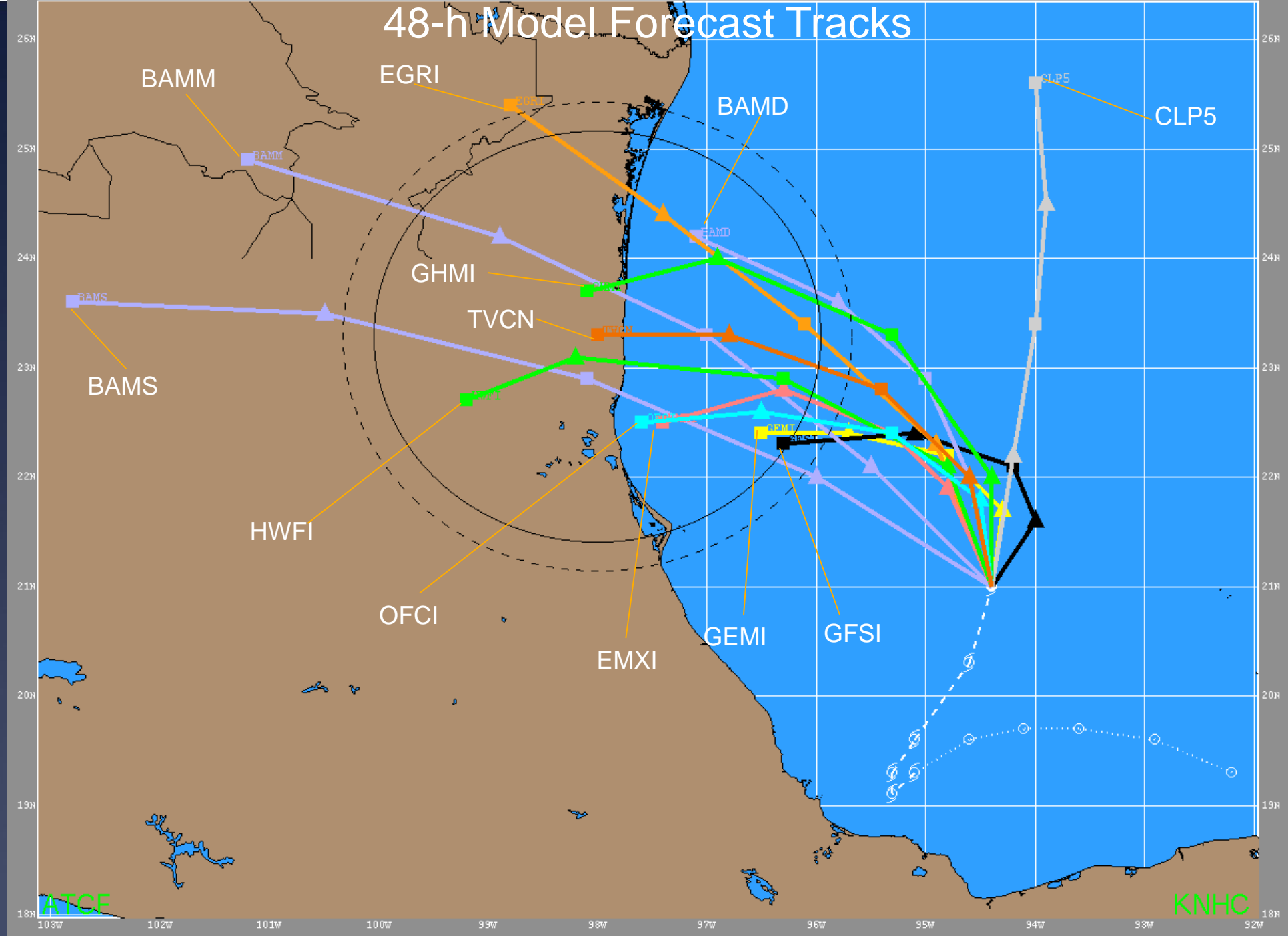
# 48-h Model Forecast Fields



48-h forecasts of :  
- 850mb relative vorticity  
(shaded,  $\times 10^{-5}/s$ ),  
- 500mb geopotential  
height (black contours,  
 $\times 10m$ )  
- 200mb wind vectors  
(blue barbs, kt)



# 48-h Model Forecast Tracks



# Part 3: Answer Questions

# Definitions of Hurricane Watch/Warning

- Hurricane Watch: hurricane conditions are possible somewhere within the watch area. Because hurricane preparedness activities become difficult once winds reach tropical storm force, the hurricane watch is issued 48 hours in advance of the anticipated onset of tropical-storm-force winds.
- Hurricane Warning: hurricane conditions are expected somewhere within the warning area. Because hurricane preparedness activities become difficult once winds reach tropical storm force, the hurricane warning is issued 36 hours in advance of the anticipated onset of tropical-storm-force winds.



**Will the storm make landfall within 48 hours? (Yes or No) \_\_\_\_\_**

**If yes, what is your forecasted landfall position? (Lat/Lon) \_\_\_\_\_**

**If the storm is forecasted to remain the same intensity and size, is it time to issue a Hurricane Warning? (Yes or No) \_\_\_\_\_**