

Tropical Disturbance Rainfall Exercise

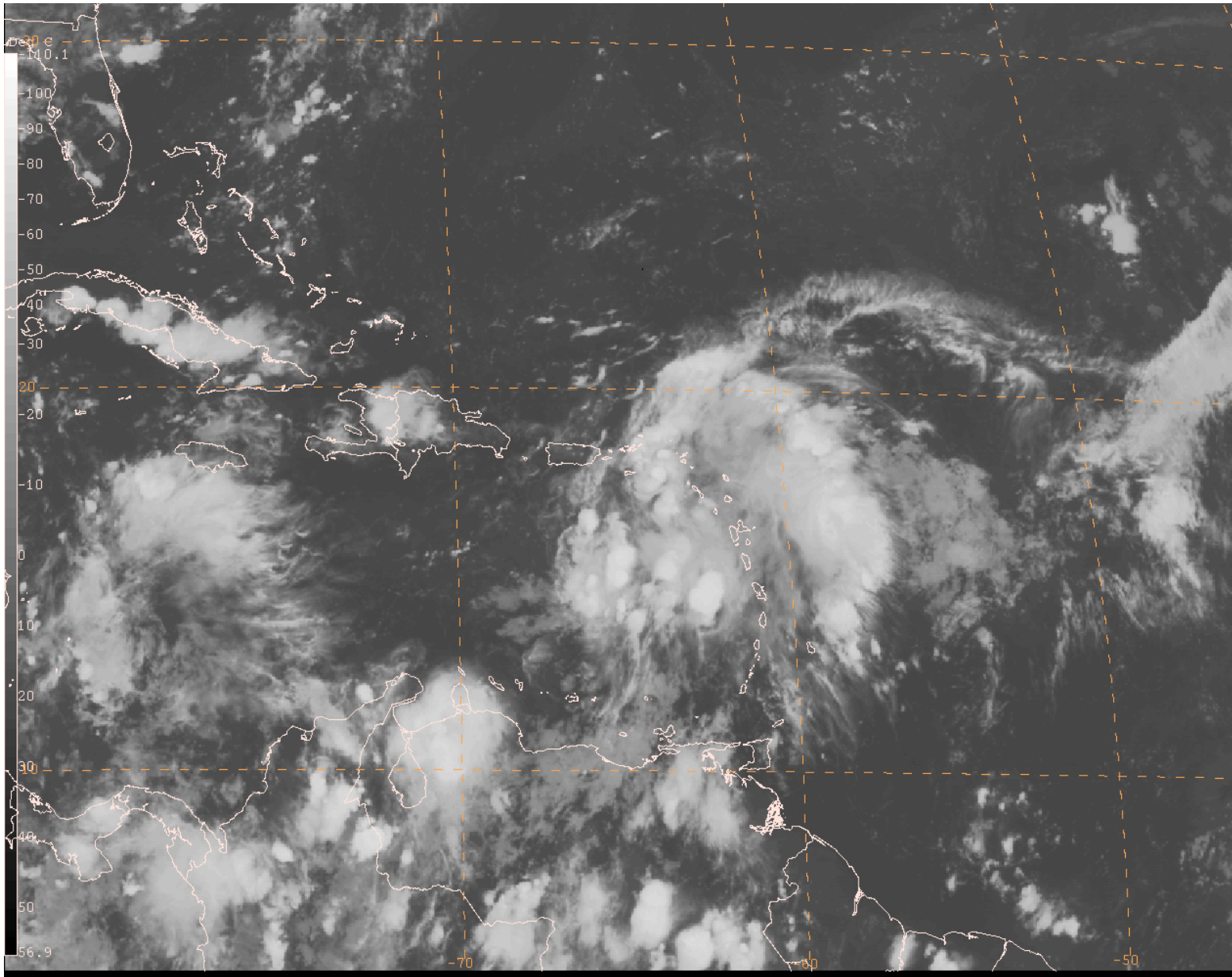
A tropical disturbance lies south of Puerto Rico at 0000 UTC on the 21st of the month

You will draw a 72-hour quantitative precipitation forecast (QPF) for Puerto Rico for the period from 21/1200 UTC to 24/1200 UTC

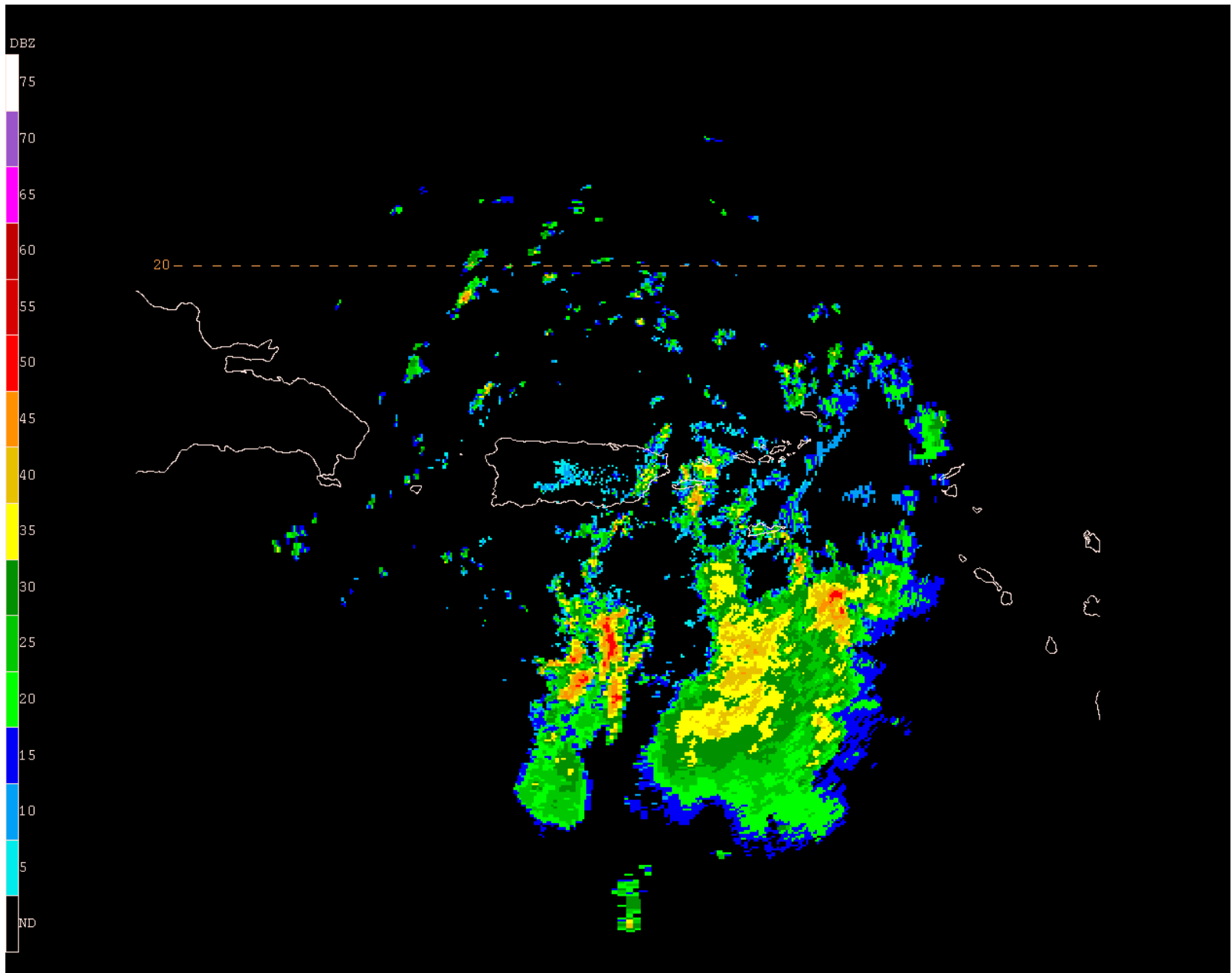
You will be provided:

- Infrared (IR) Satellite Loop through 21st at 1200 UTC
- San Juan Radar Loop through 21st at 1200 UTC
- San Juan soundings from 0000 and 1200 UTC on the 21st
- Water Vapor Satellite Loop through 21st at 1200 UTC
- ECMWF 250mb forecast initialized 21st at 1200 UTC
- Track guidance including the GFS and ECMWF
- GFS 850mb, MSLP, and QPF forecasts
- ECMWF 850mb, MSLP, and QPF forecast
- Puerto Rico topographic map

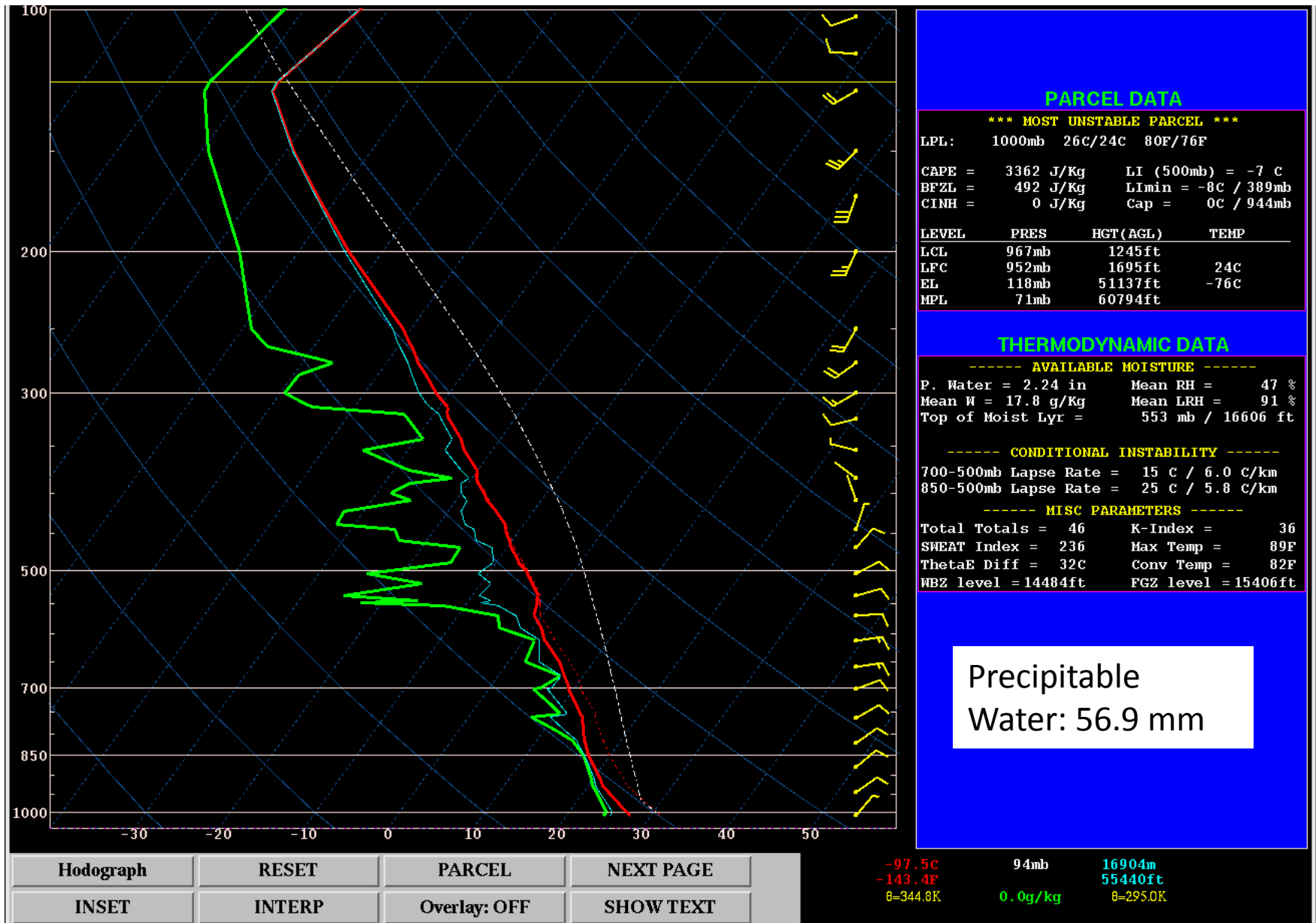
Infrared Satellite Loop



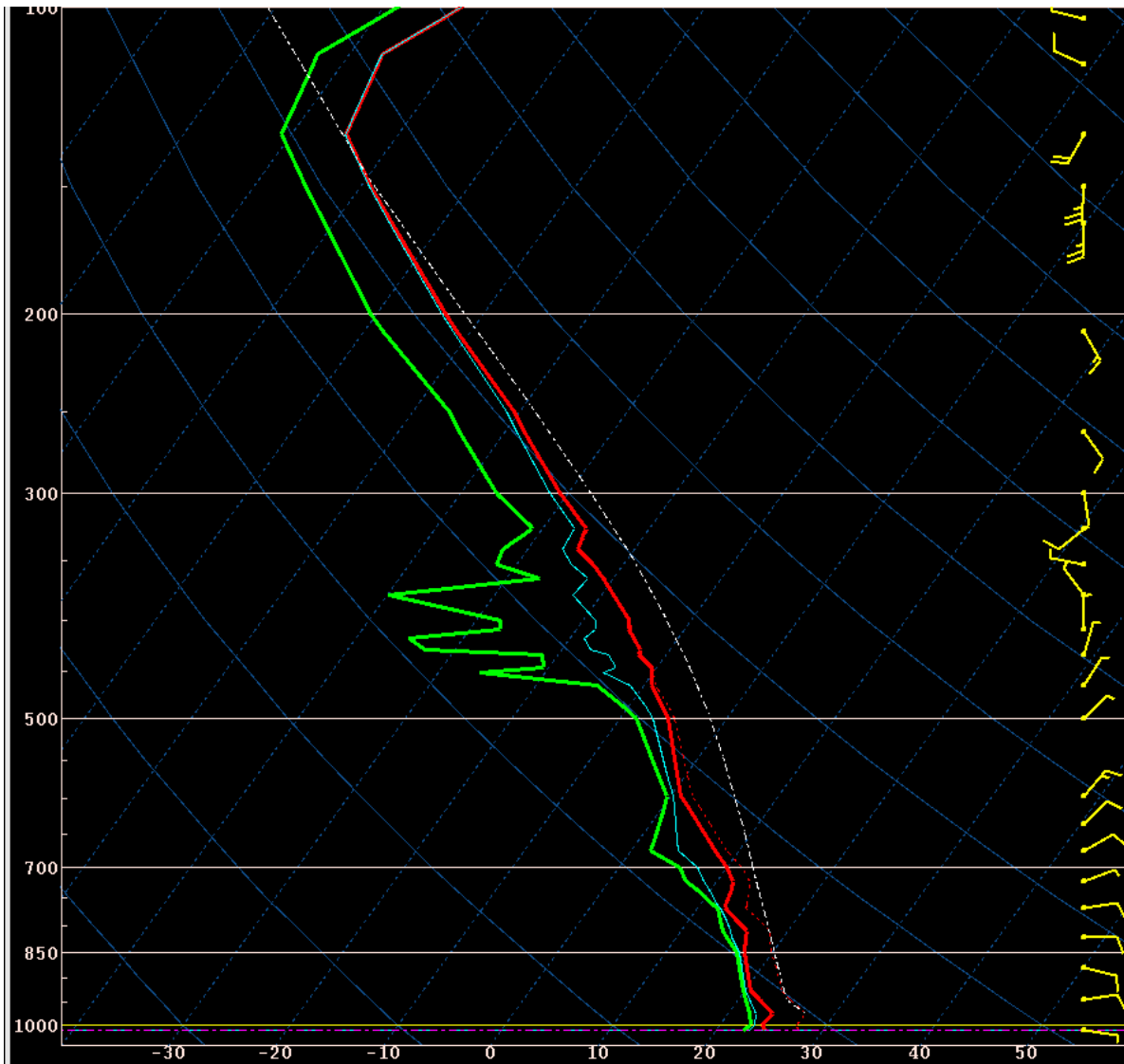
San Juan Radar Loop



San Juan Radiosonde – 00Z 21st



San Juan Radiosonde – 12Z 21st



PARCEL DATA

*** MOST UNSTABLE PARCEL ***

LPL: 977mb 24C/22C 75F/71F
CAPE = 1190 J/Kg LI (500mb) = -4 C
BFZL = 224 J/Kg LImix = -4C / 341mb
CINH = -1 J/Kg Cap = 0C / 945mb

LEVEL	PRES	HGT(AGL)	TEMP
LCL	946mb	1899ft	
LFC	805mb	6457ft	16C
EL	140mb	47948ft	-72C
MPL	96mb	55163ft	

THERMODYNAMIC DATA

----- AVAILABLE MOISTURE -----

P. Water = 2.30 in Mean RH = 60 %
Mean W = 16.7 g/Kg Mean LRH = 93 %
Top of Moist Lyr = H / H

----- CONDITIONAL INSTABILITY -----

700-500mb Lapse Rate = 16 C / 6.0 C/km
850-500mb Lapse Rate = 25 C / 5.7 C/km

----- MISC PARAMETERS -----

Total Totals = 45 K-Index = 35
SWEAT Index = 223 Max Temp = 88F
ThetaE Diff = 16C Conv Temp = 80F
WBZ level = 14815ft FGZ level = 15342ft

Precipitable
Water: 58.4 mm

Hodograph

RESET

PARCEL

NEXT PAGE

INSET

INTERP

Overlay: OFF

SHOW TEXT

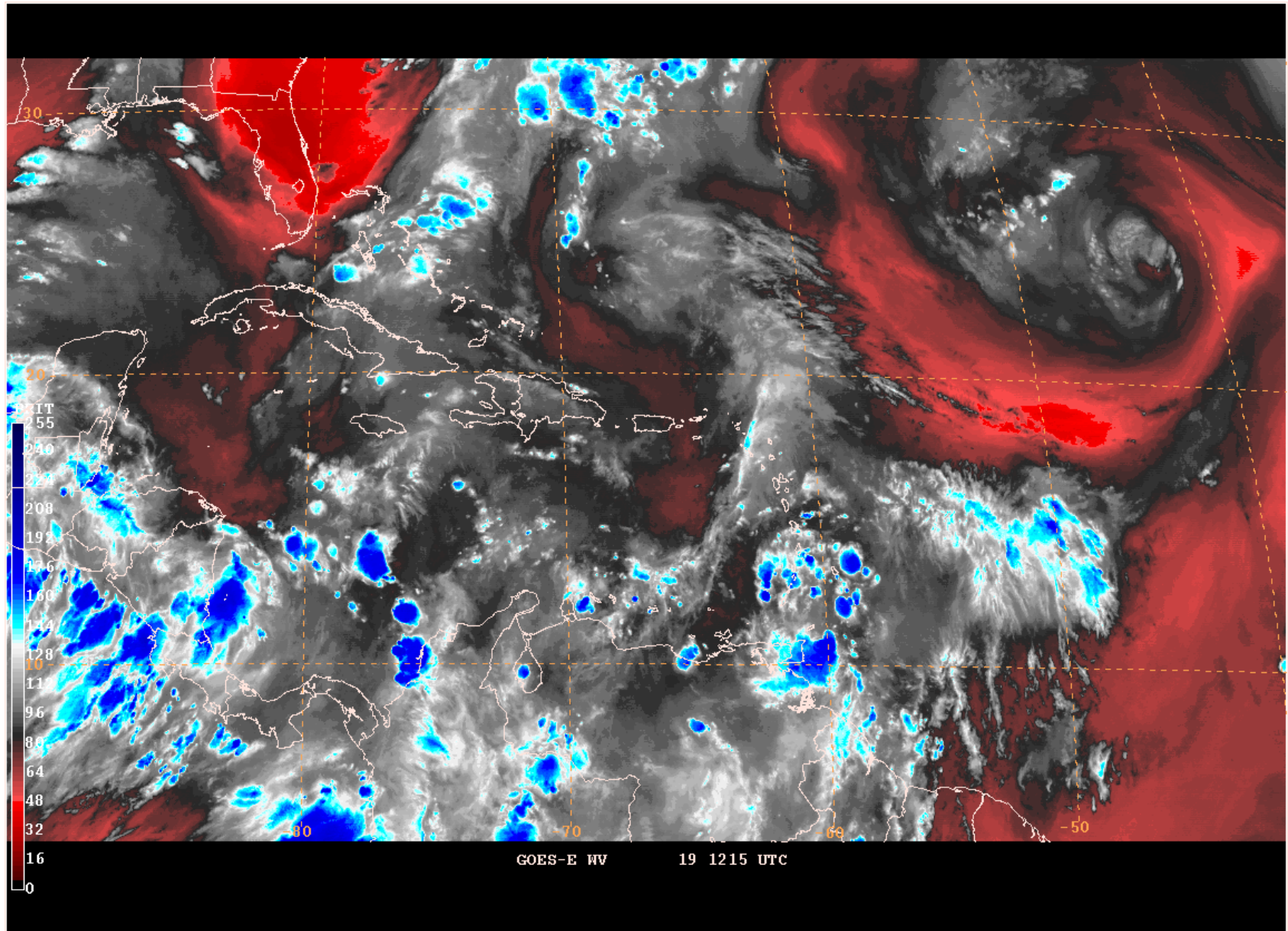
-84.2C
-119.6F
θ=276.1K

265mb

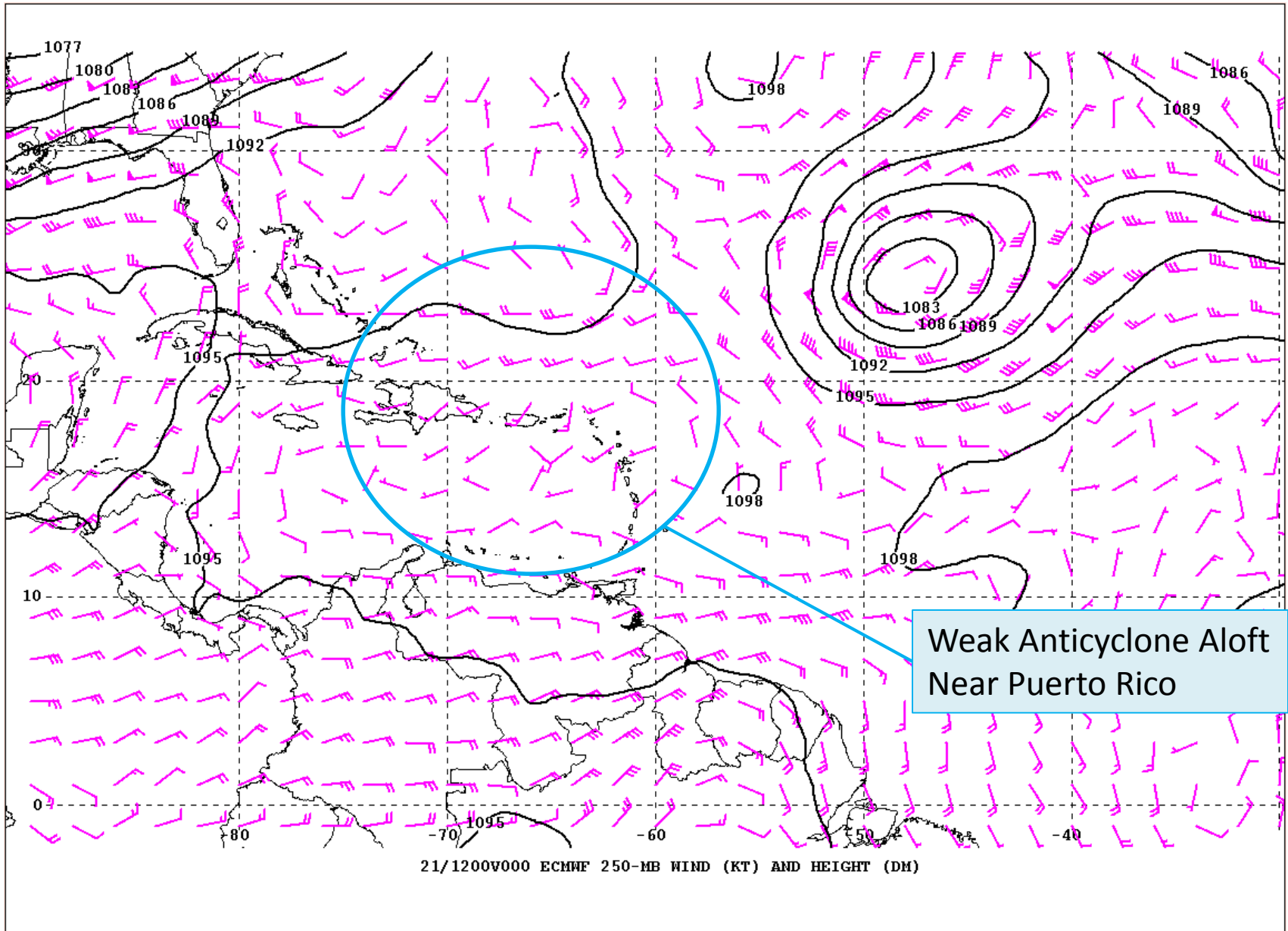
0.0g/kg

10556m
34623ft
θ=268.7K

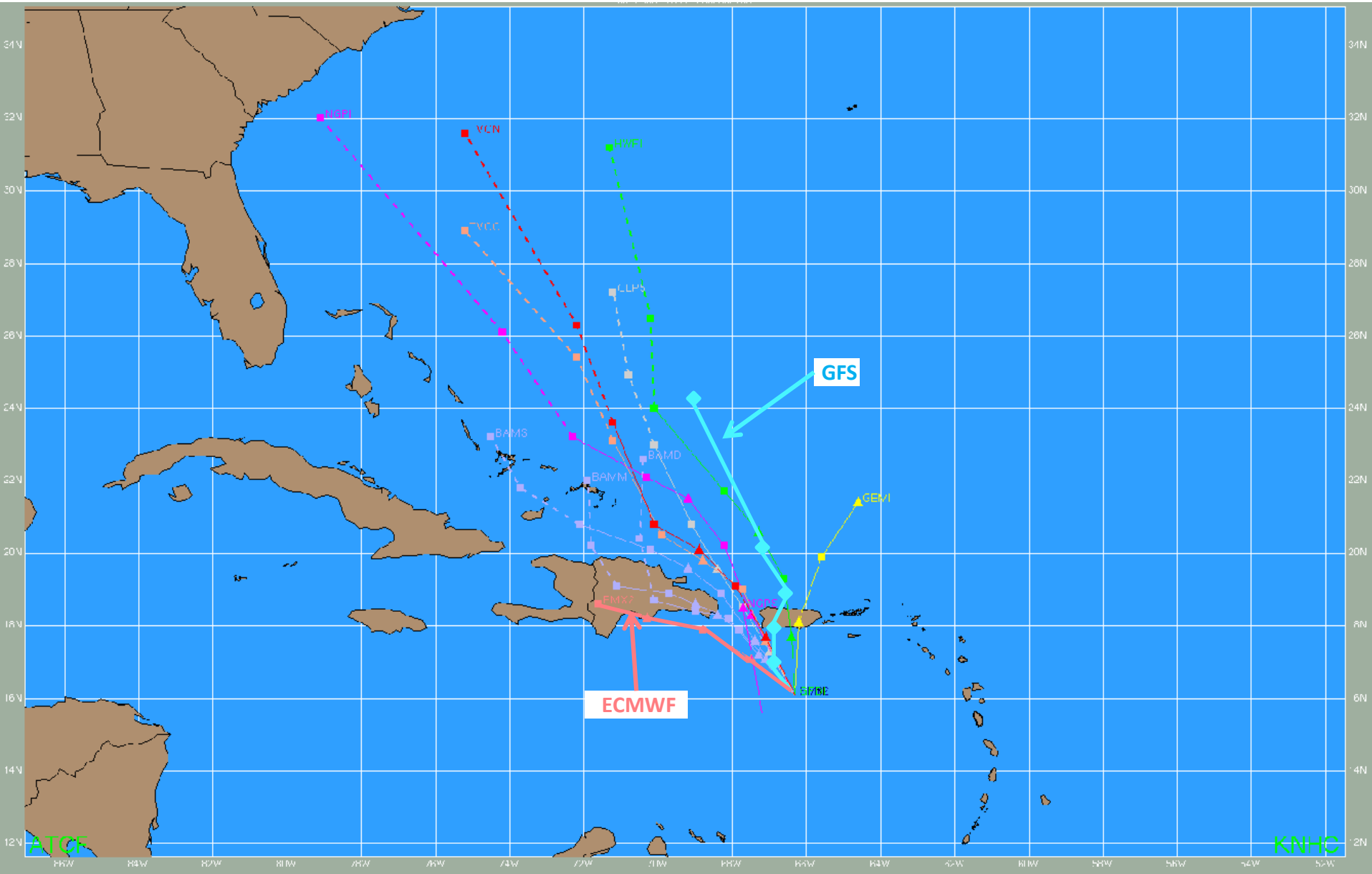
Water Vapor Satellite Loop



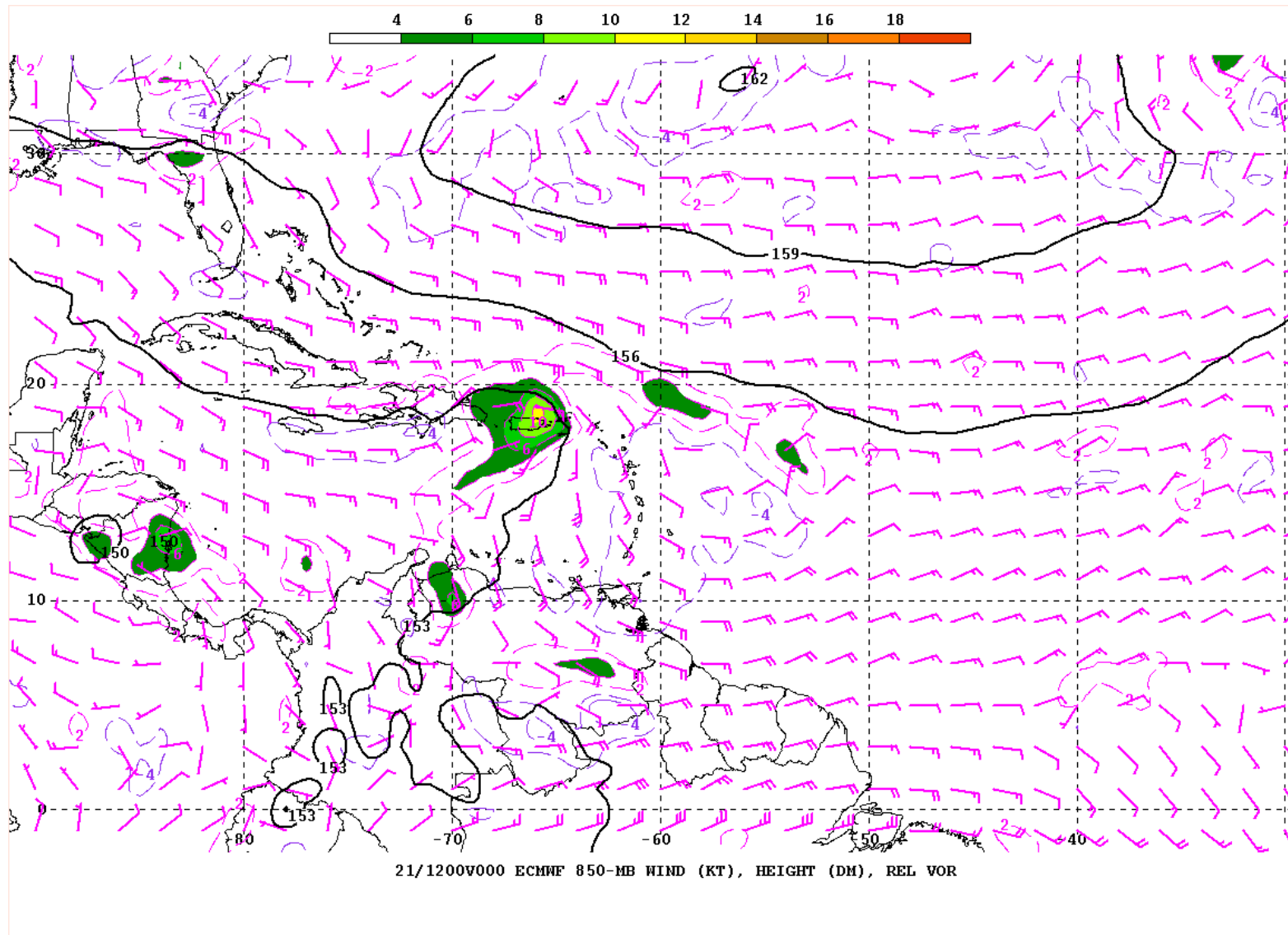
ECMWF 250mb Height and Wind Forecast



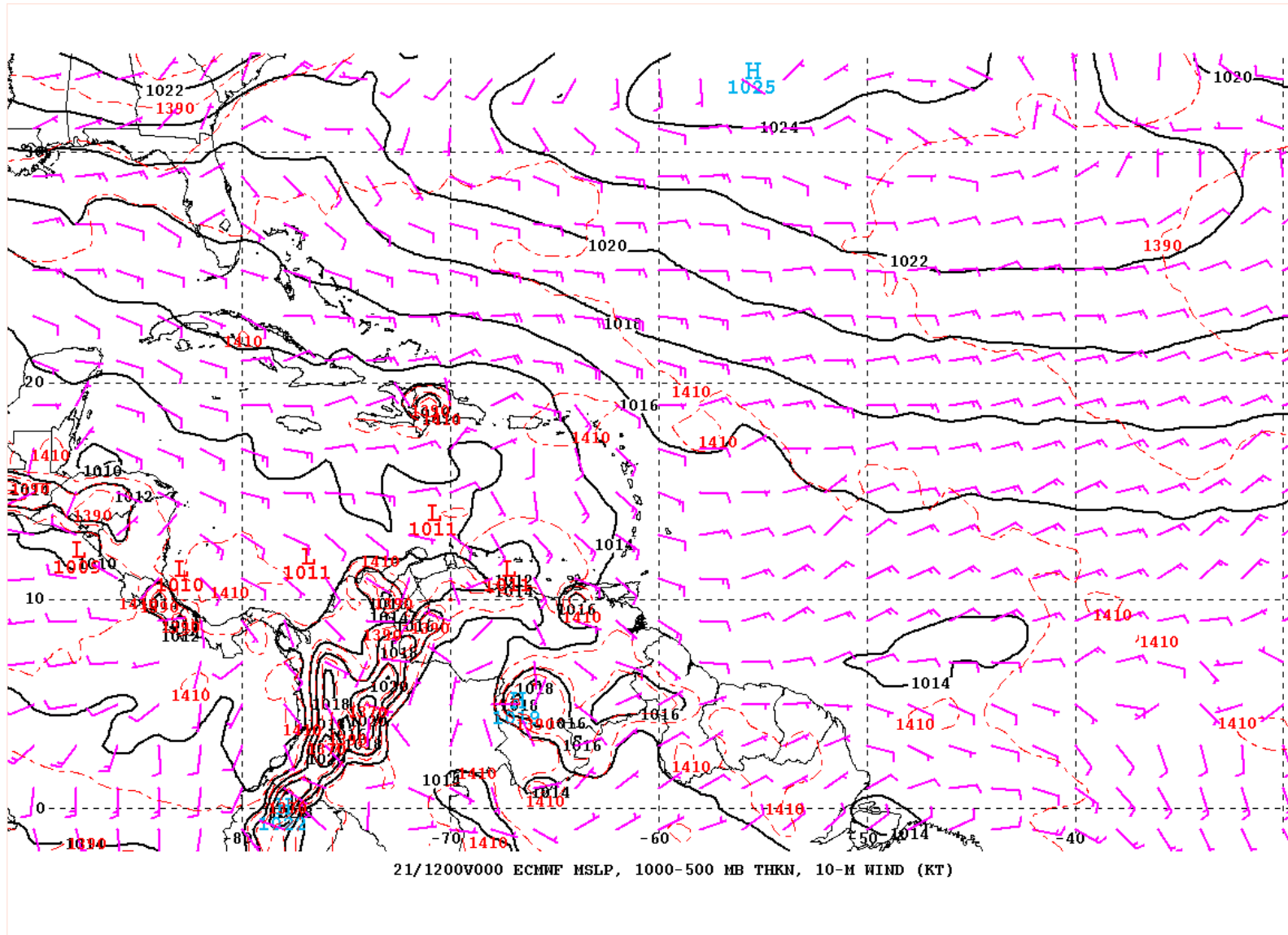
ATCF Track Guidance



ECMWF 850mb Height, Wind, Relative Vorticity Forecast

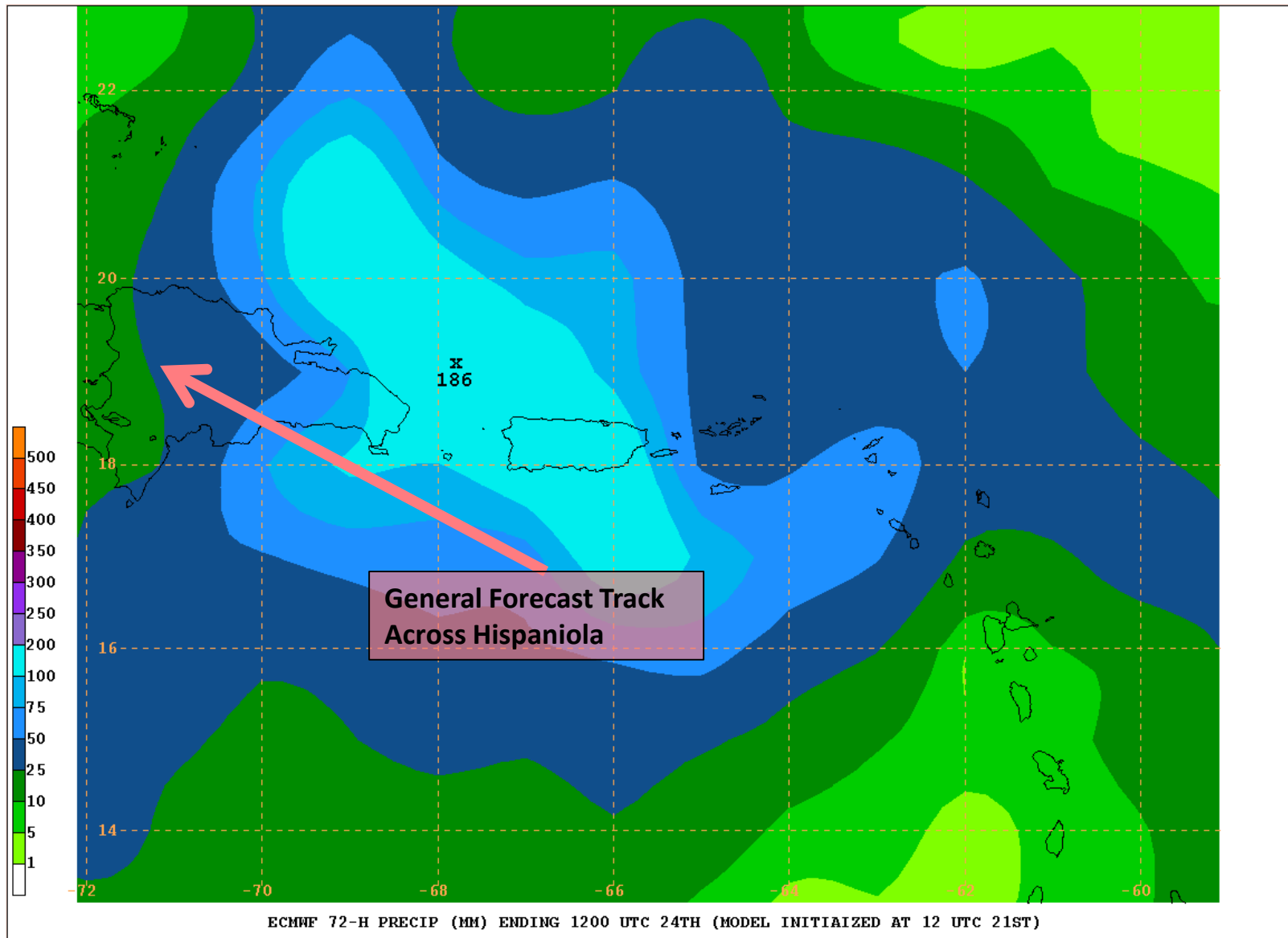


ECMWF MSLP, 1000-500 Thickness, & 10-m Wind Forecast

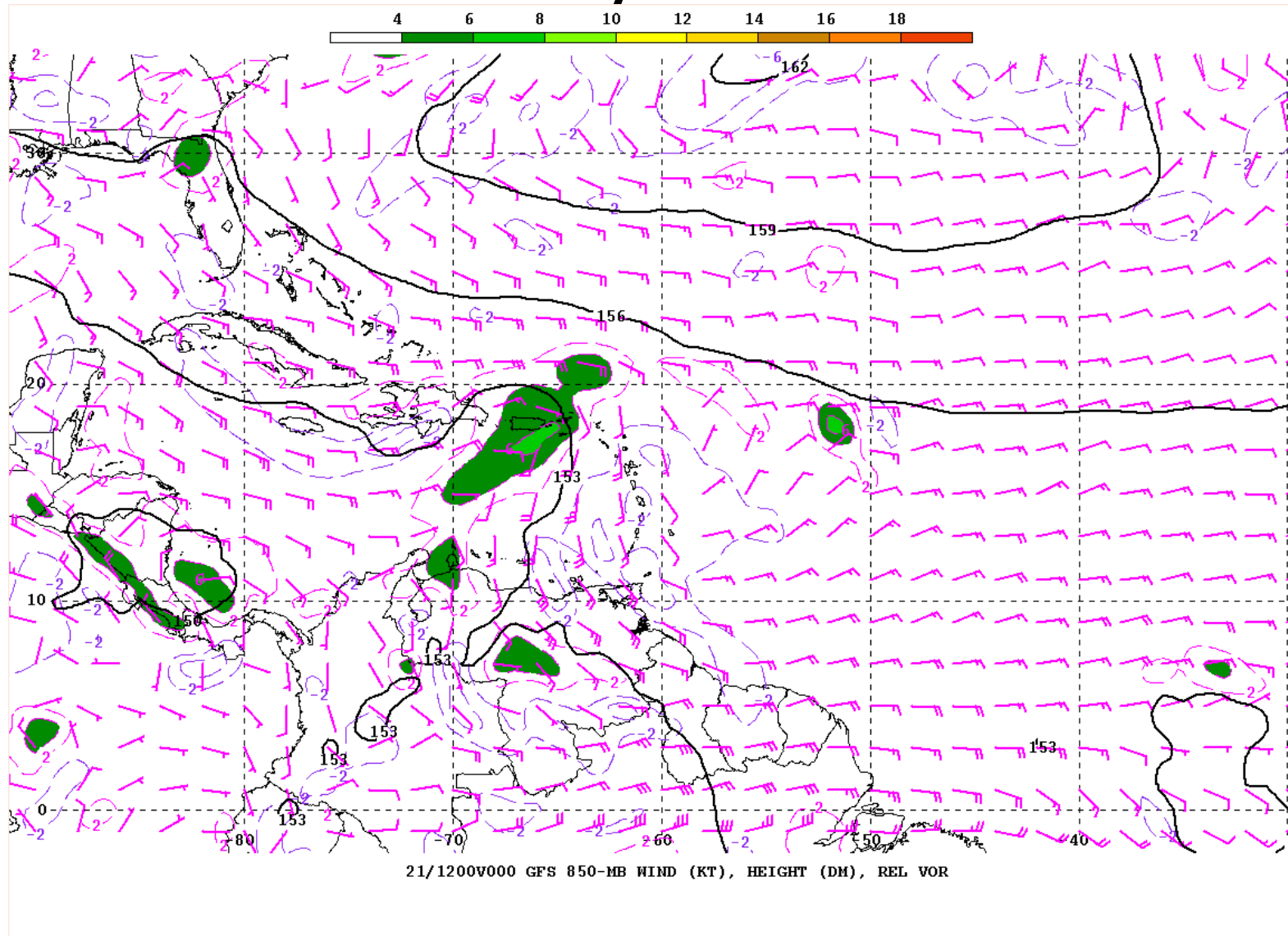


ECMWF 72-h QPF ending 1200 UTC 24th

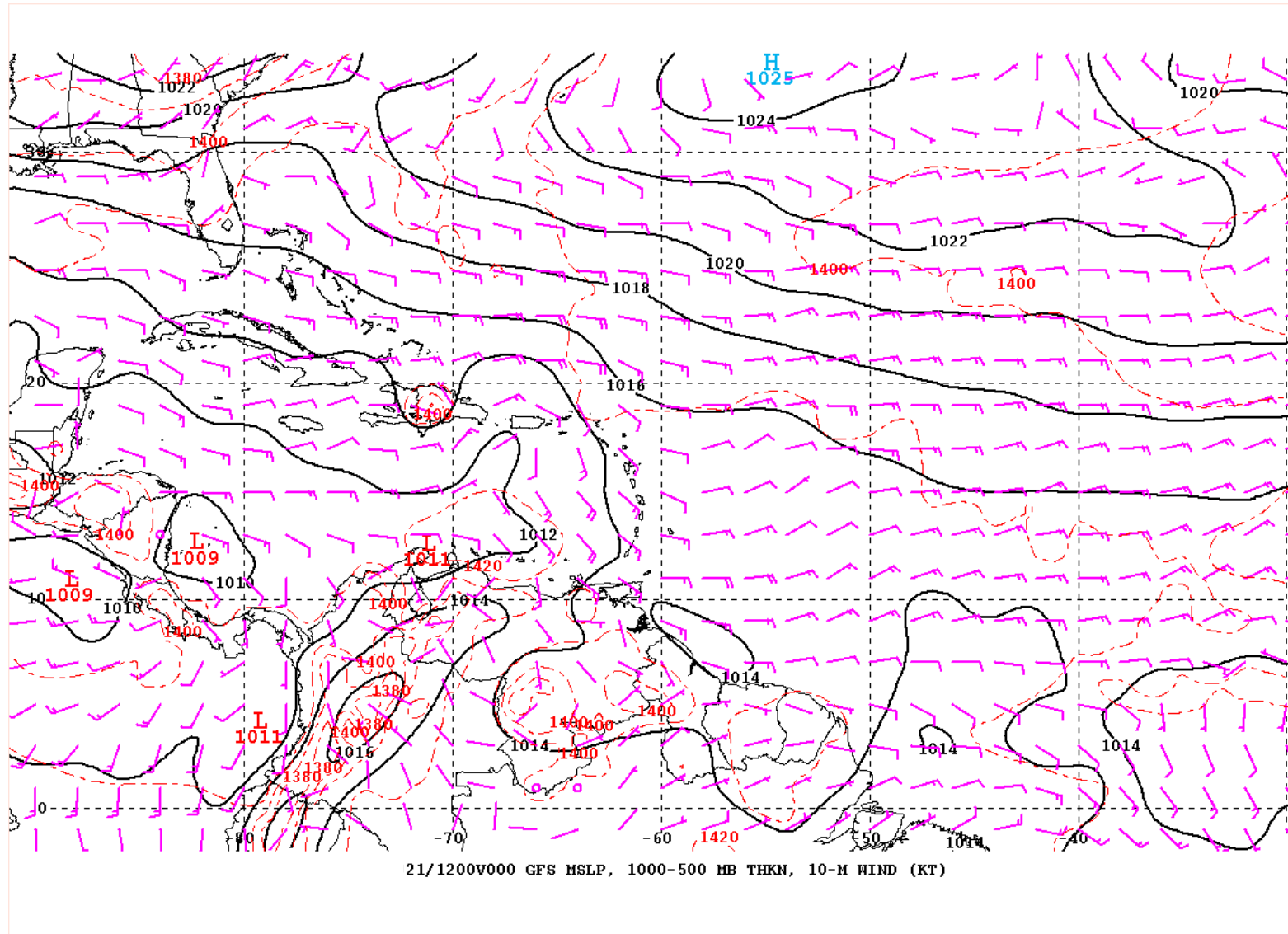
Initialized 1200 UTC 21st



GFS 850mb Height, Wind, Relative Vorticity Forecast

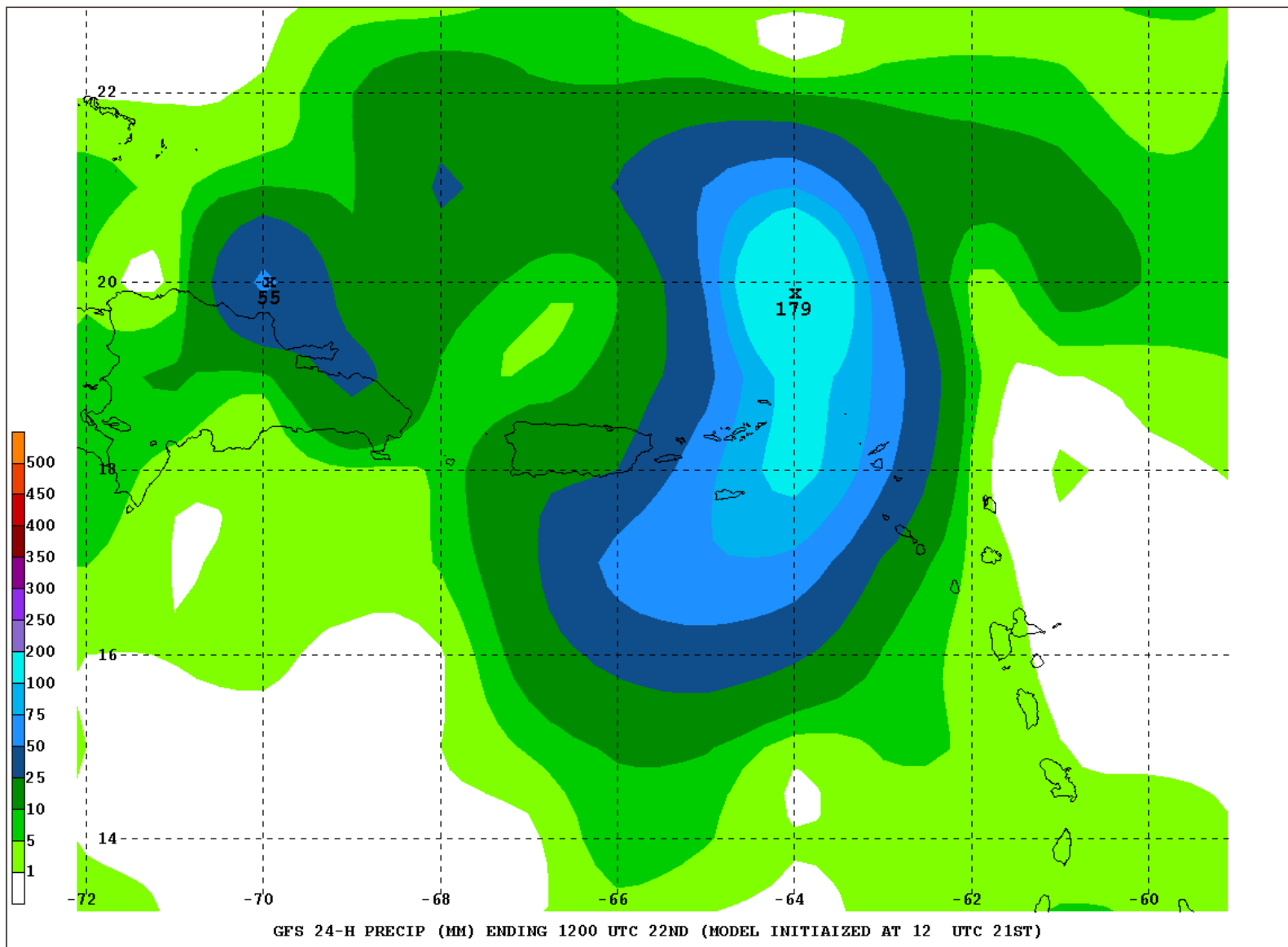


GFS MSLP, 1000-500 Thickness, and 10-m Wind Forecast



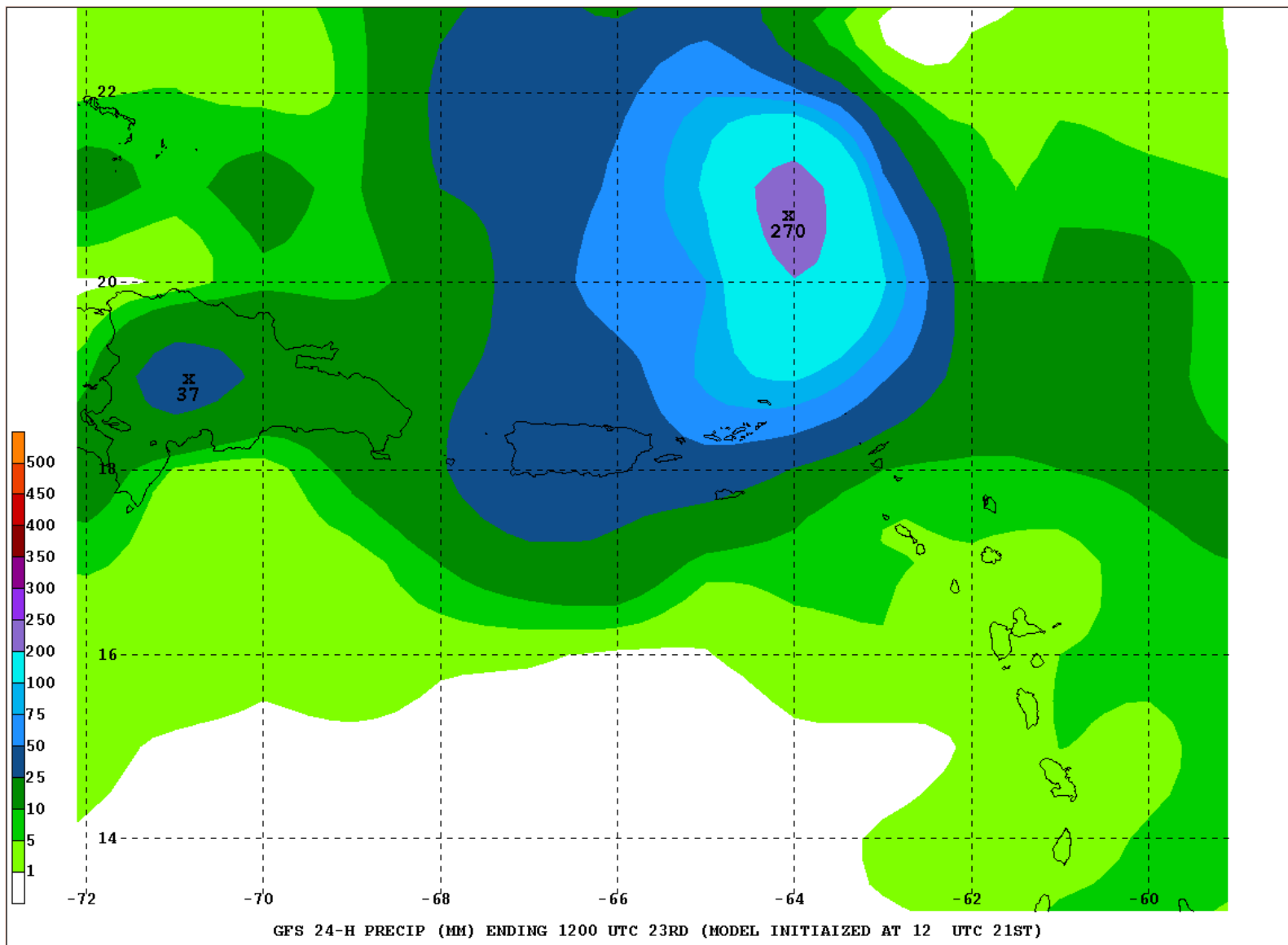
GFS 24-h QPF ending 1200 UTC 22nd

Initialized 1200 UTC 21st



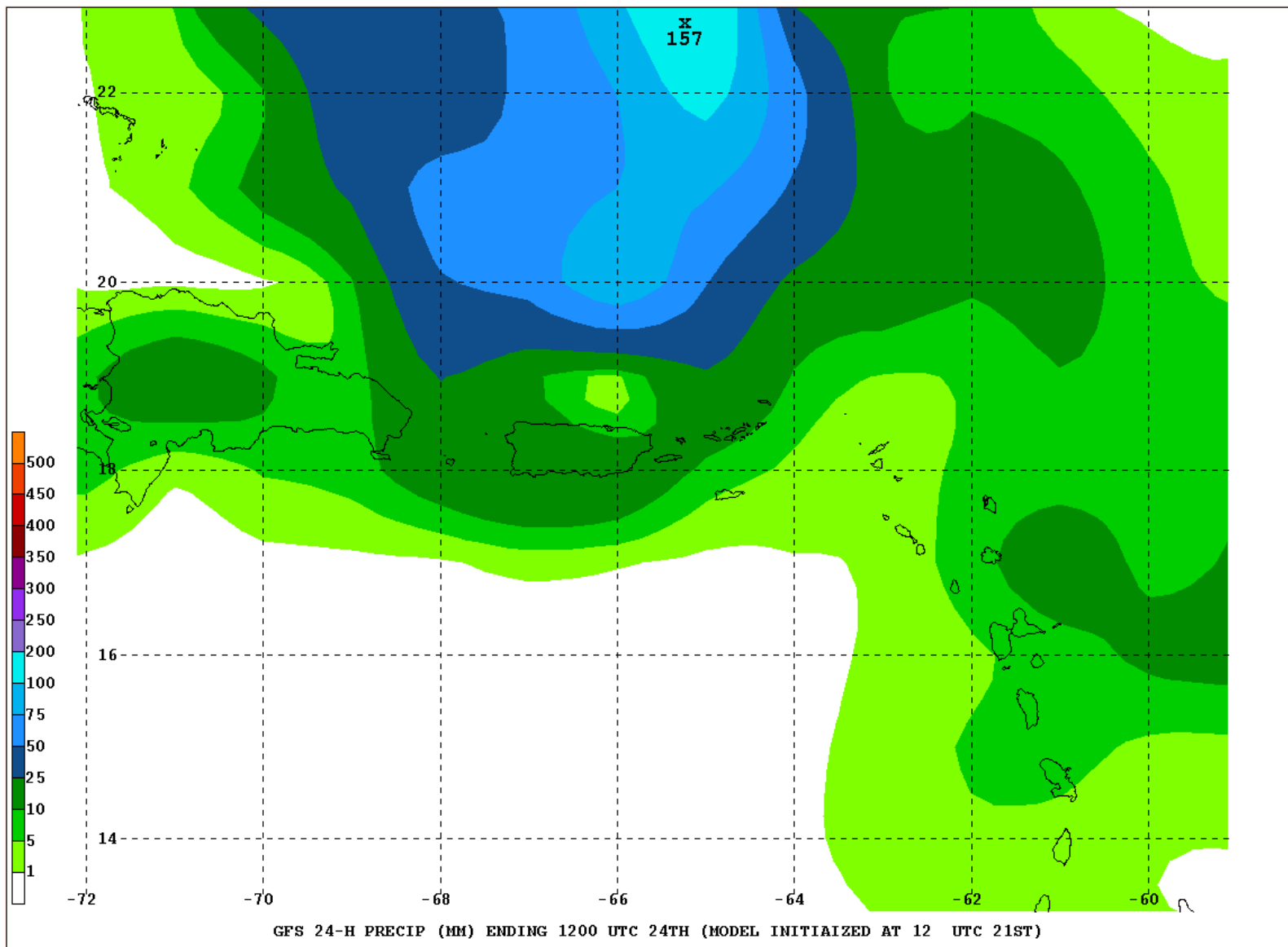
GFS 24-h QPF ending 1200 UTC 23rd

Initialized 1200 UTC 21st



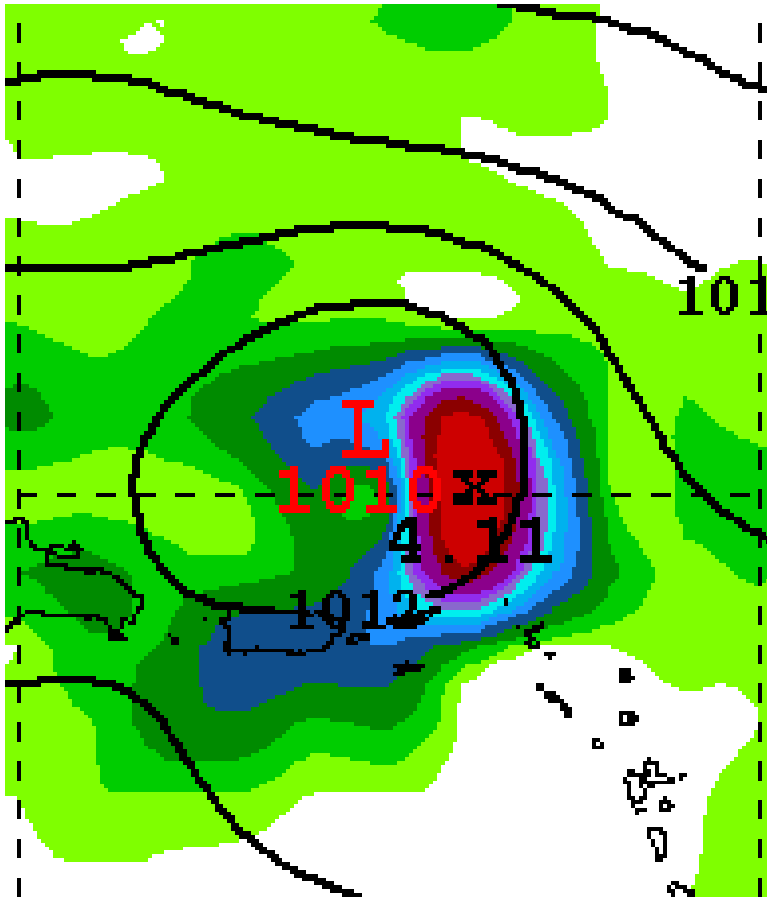
GFS 24-h QPF ending 1200 UTC 24th

Initialized 1200 UTC 21st

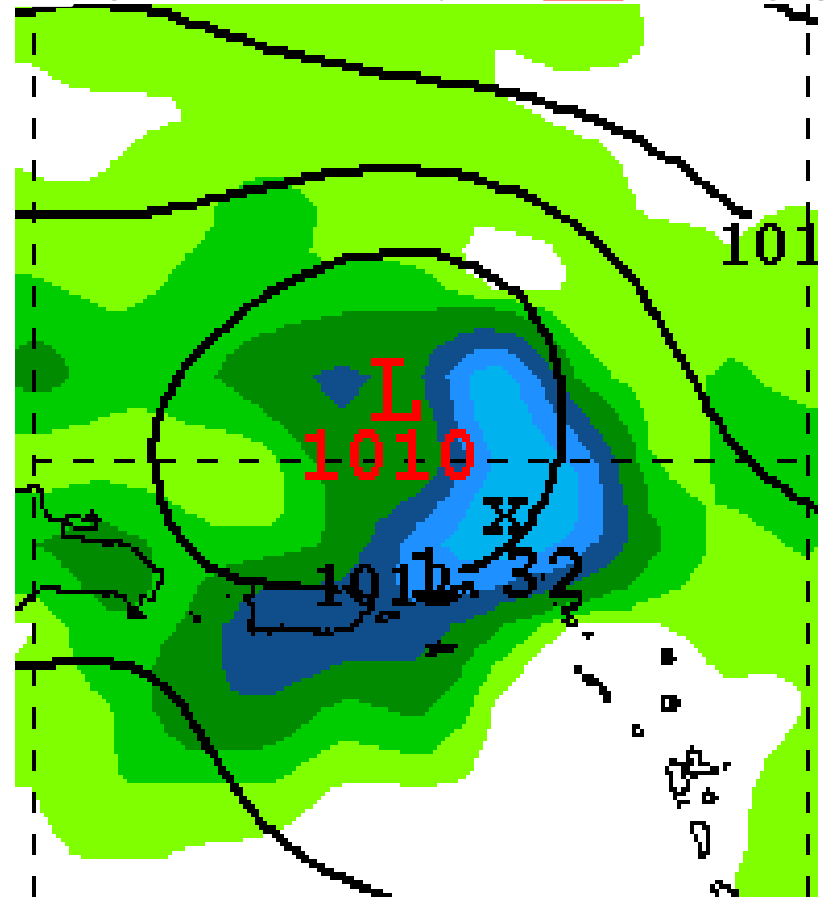


Convective Feedback?

22/1800V030 GFS MSLP, 6-H PRECIP (IN)



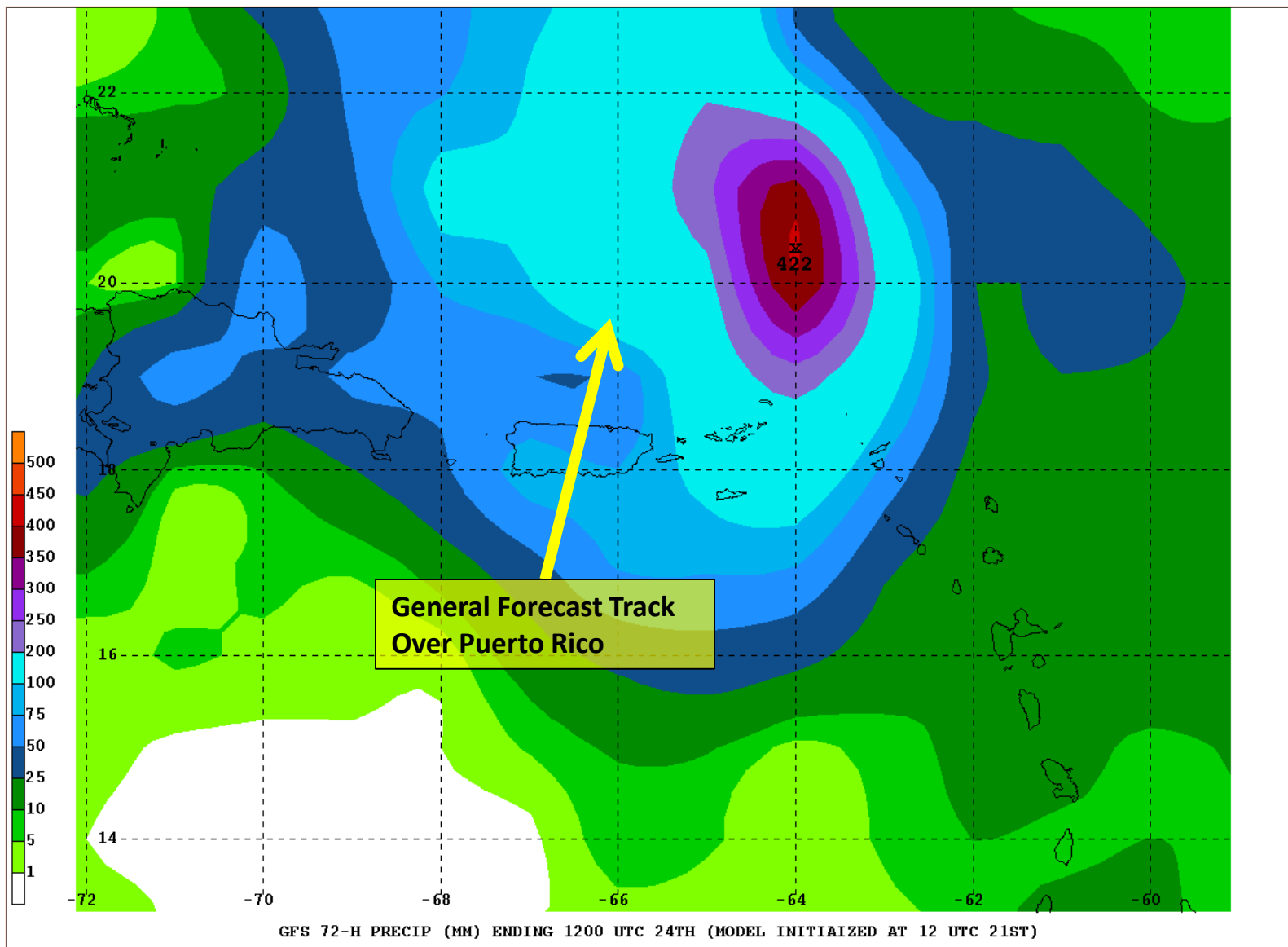
22/1800V030 GFS MSLP, 6-H CONV PRECIP (IN)



At FHR 30, the convective component (right) was less than 1/3 of the total precipitation (left). This means that most of the QPF was produced by the model on the grid scale and not by the convective scheme.

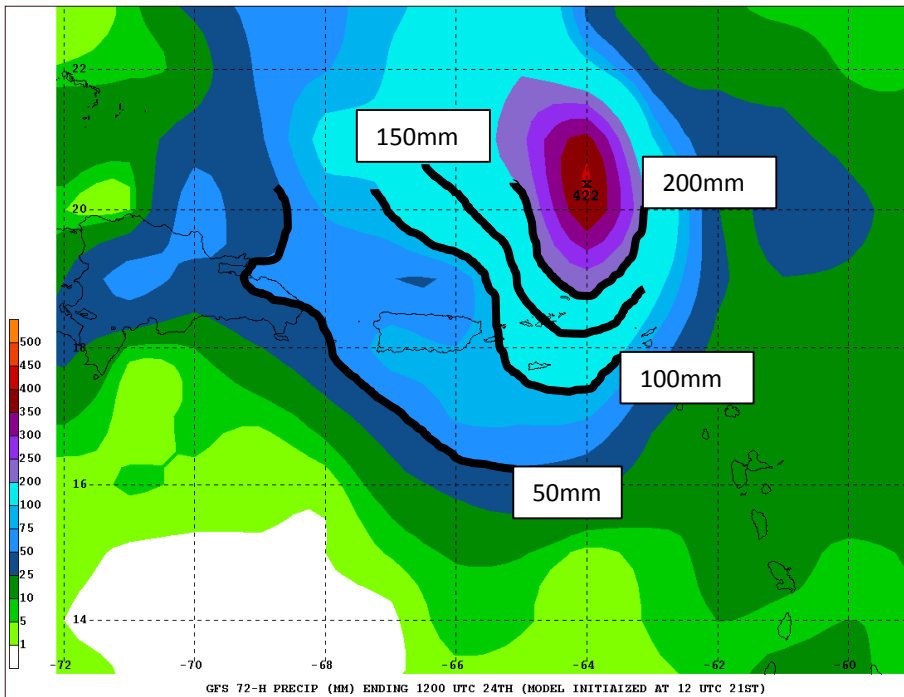
GFS 72-h QPF ending 1200 UTC 24th

Initialized 1200 UTC 21st

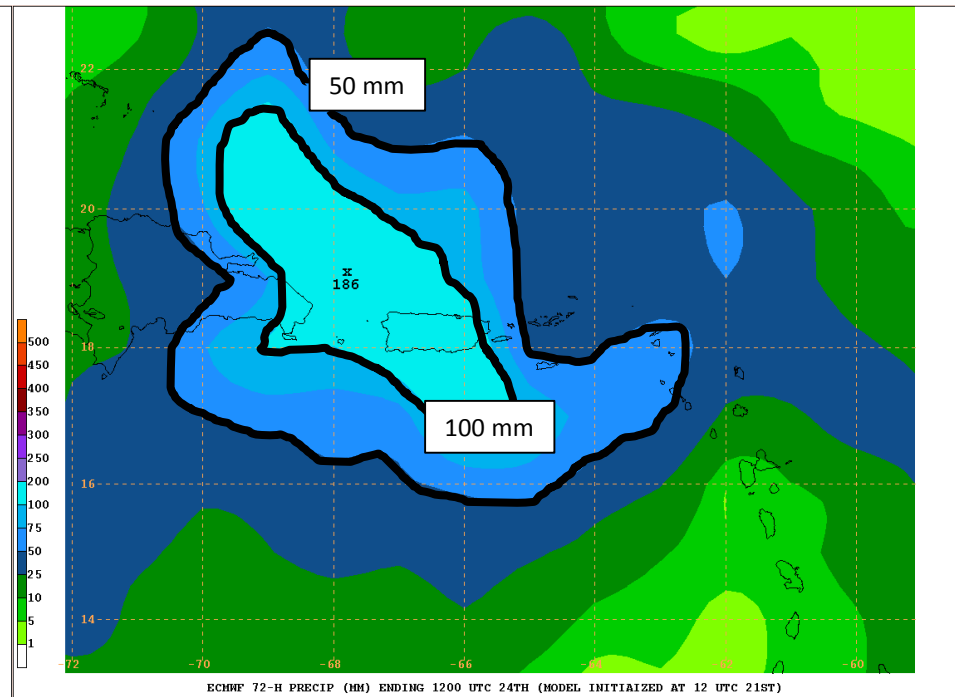


72-h QPFs ending 1200 UTC 24th Initialized 1200 UTC 21st

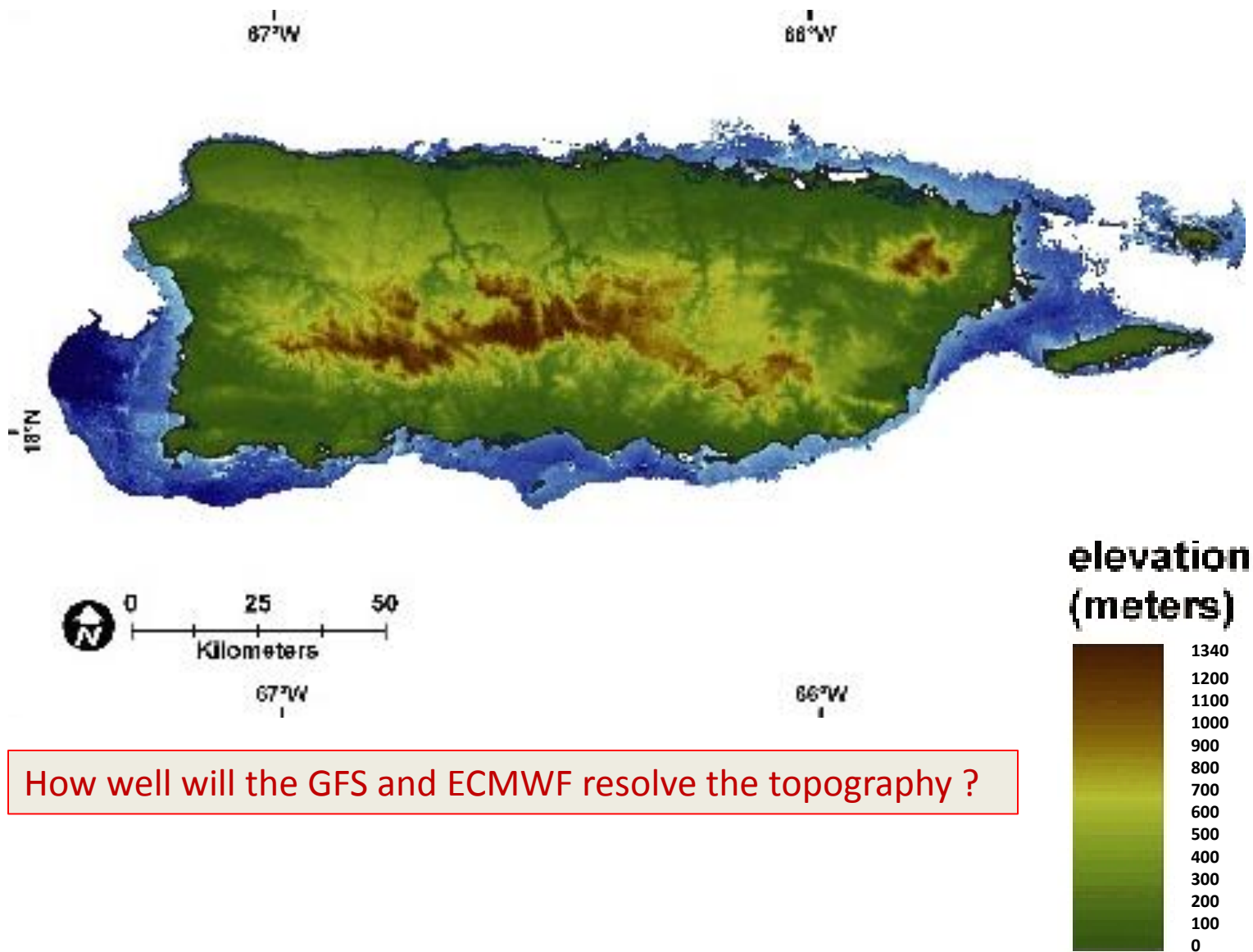
GFS



ECMWF



Black contours = 50 mm isohyets



How well will the GFS and ECMWF resolve the topography ?

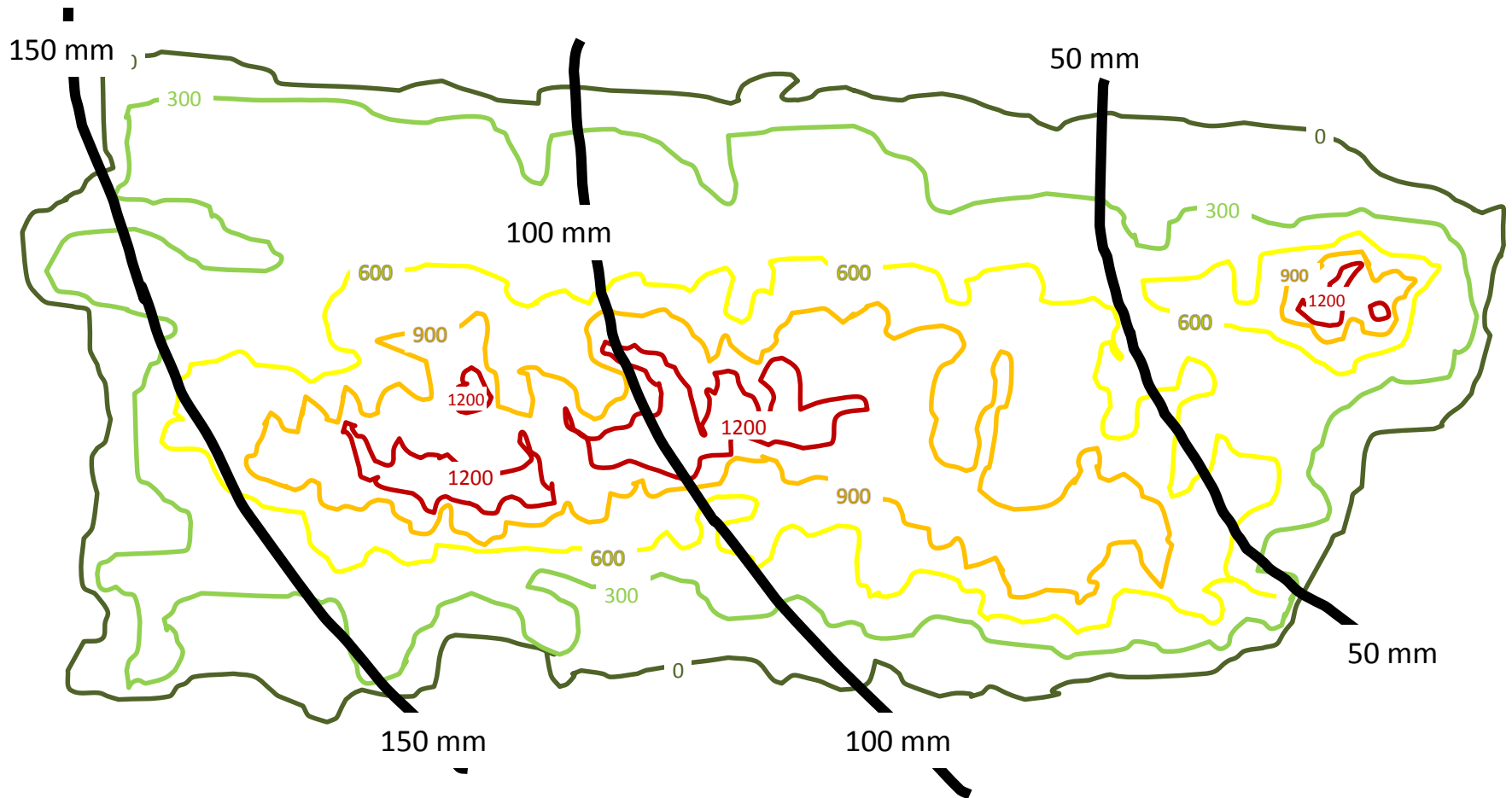
Terrain Map of Puerto Rico

Draw your 50 mm isohyets on this topographic map



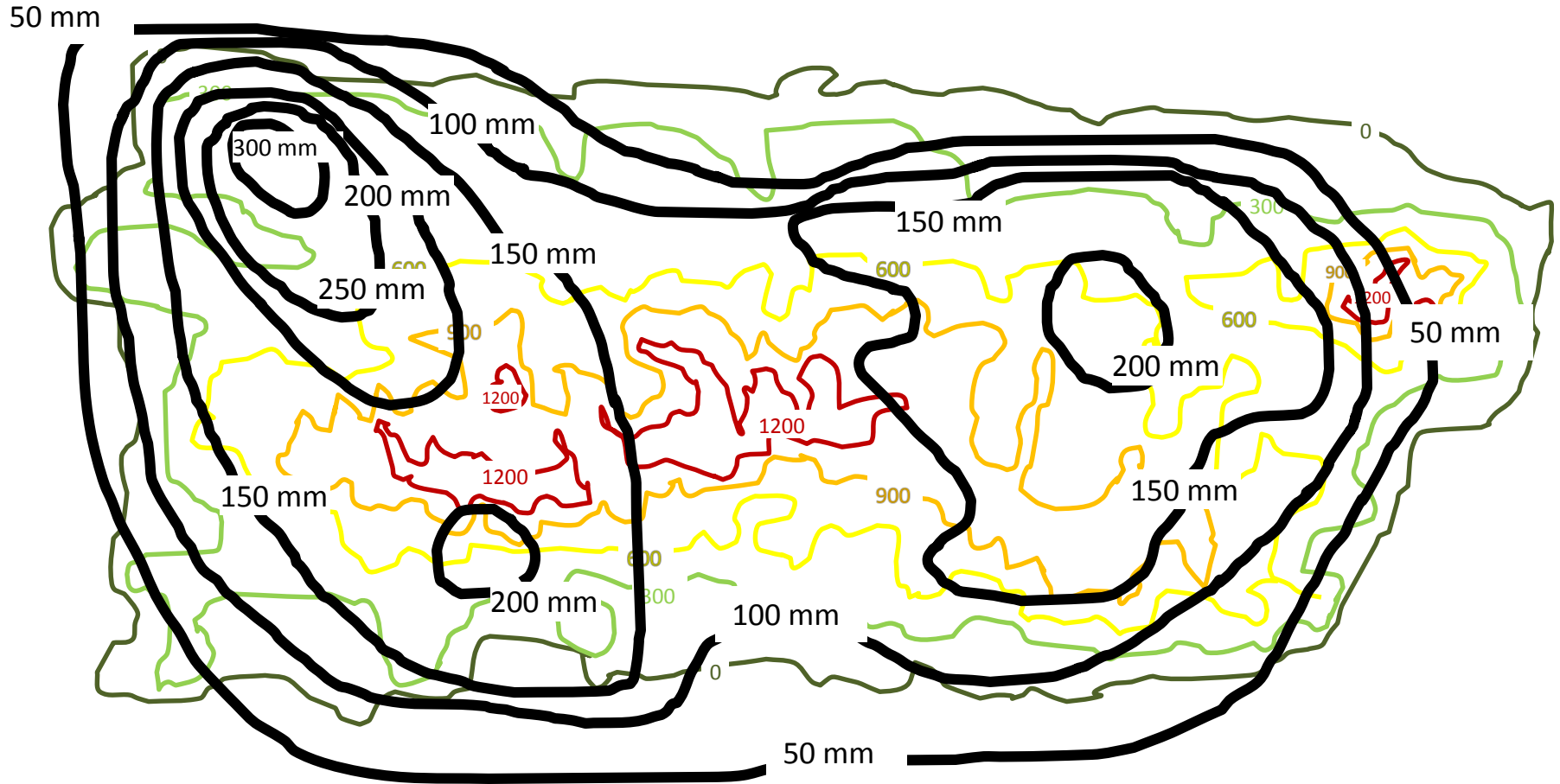
Terrain Map of Puerto Rico

Draw your 50 mm isohyets on this topographic map



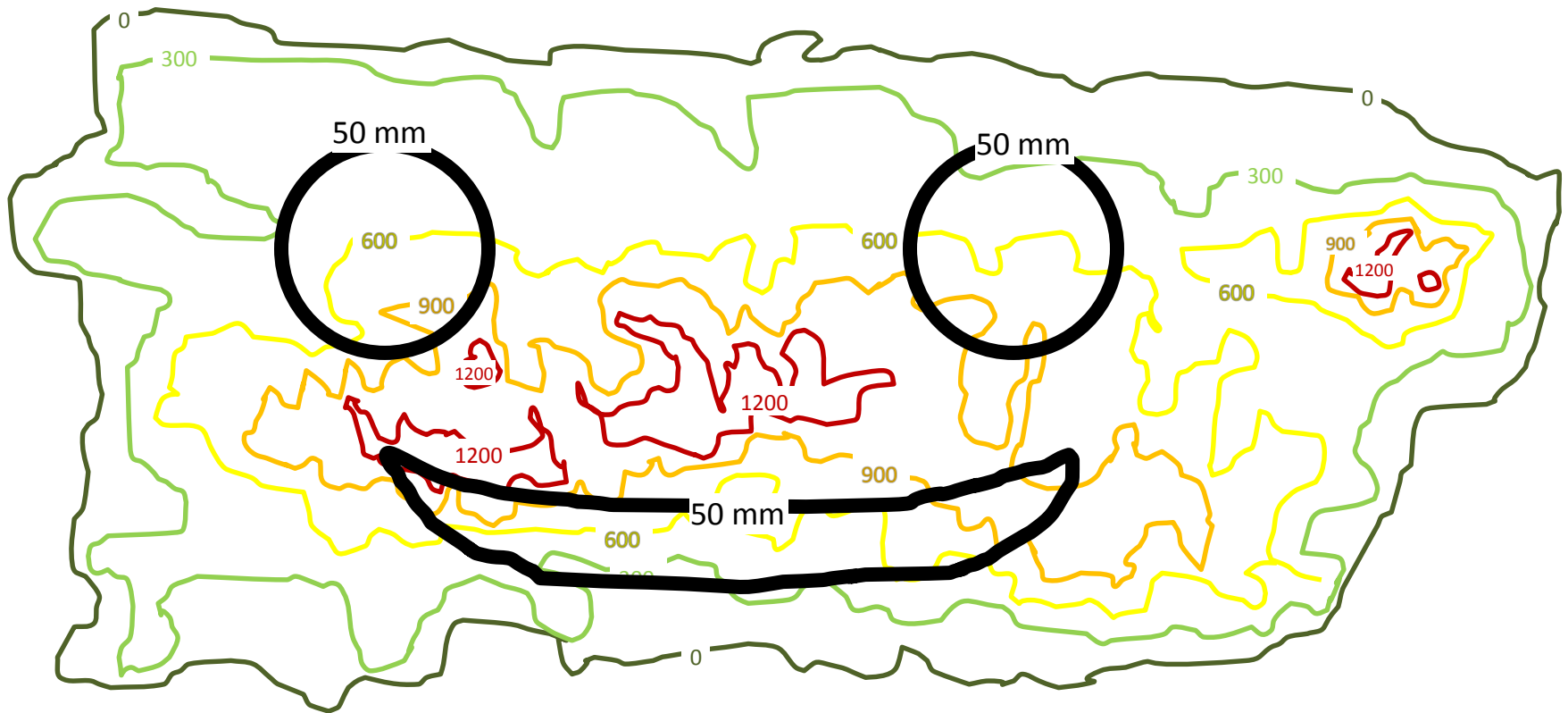
Terrain Map of Puerto Rico

Draw your 50 mm isohyets on this topographic map



Terrain Map of Puerto Rico

Draw your 50 mm isohyets on this topographic map



Instructions

Draw a 72-hour QPF for Puerto Rico ending 1200 UTC on the 24th with 50 mm isohyets

- **Since there is no official NHC forecast, you will need to determine a forecast track for the system**
 - How will forecast track impact the distribution of precipitation?
- **How well are the models handling the current conditions?**
 - Do you think the ECMWF and GFS are too high or too low with their QPF amounts? How well do they incorporate orographic lift?
 - Are they placing the heaviest rainfall where you would expect it to fall relative to the forecast track?
- **What factors will help enhance precipitation?**
- **What factors will diminish precipitation?**

Provide a forecast for the maximum rainfall amount expected during this 72-hour period and its location